SUMMARY

U.S. DEPARTMENT OF ENERGY
WASHINGTON, DC 20585

FINAL ENVIRONMENTAL IMPACT STATEMENT FOR THE RECAPITALIZATION OF INFRASTRUCTURE SUPPORTING NAVAL SPENT NUCLEAR FUEL HANDLING

OCTOBER 2016

DOE/EIS-0453-F

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FINAL
Environmental Impact Statement for the Recapitalization of Infrastructure Supporting Naval Spent Nuclear Fuel Handling

Summary

October 2016

Prepared by:
U.S. Department of Energy
Naval Nuclear Propulsion Program

COVER SHEET

RESPONSIBLE AGENCY: U.S. Department of Energy (DOE), Naval Nuclear Propulsion Program (NNPP)

TITLE: Final Environmental Impact Statement for the Recapitalization of Infrastructure Supporting Naval Spent Nuclear Fuel Handling at the Idaho National Laboratory (DOE/EIS-0453-F)

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ABSTRACT:

The Naval Nuclear Propulsion Program (NNPP), also known as the Naval Reactors Program, is a joint United States (U.S.) Navy and Department of Energy (DOE) organization with responsibility for all matters pertaining to naval nuclear propulsion from design through disposal (cradle-to-grave). The NNPP's mission is to provide the U.S. with safe, effective, and affordable naval nuclear propulsion plants and to ensure their continued safe and reliable operation through lifetime support, research and development, design, construction, specification, certification, testing, maintenance, and disposal.

This Environmental Impact Statement (EIS) evaluates the potential environmental impacts associated with recapitalizing the infrastructure needed to ensure the long-term capability of the NNPP to support naval spent nuclear fuel handling for at least the next 40 years (i.e., the proposed action). The NNPP is committed to managing naval spent nuclear fuel in a manner that is consistent with the *Department of Energy (DOE) Programmatic Spent Nuclear Fuel Management and Idaho National Engineering Laboratory Environmental Restoration and Waste Management Programs Final Environmental Impact Statement (*DOE/EIS-0203-F) and to complying with the 1995 Settlement Agreement, as amended in 2008, among the State of Idaho, the DOE, and the Navy concerning the management of naval spent nuclear fuel.

Consistent with the Record of Decision for DOE/EIS-0203-F, naval spent nuclear fuel is shipped by rail from shipyards and prototypes to the Expended Core Facility (ECF) on the Idaho National Laboratory for processing. The proposed action is needed because significant upgrades are necessary to the ECF infrastructure to continue safe and environmentally responsible naval spent nuclear fuel handling until at least 2060.

To allow the NNPP to continue to unload, transfer, prepare, and package naval spent nuclear fuel for disposal, three alternatives were identified and are evaluated in this EIS:

1. No Action Alternative – Maintain the naval spent nuclear fuel handling capabilities of ECF by continuing to use the current ECF infrastructure while performing only preventative and corrective maintenance.

2. Overhaul Alternative – Recapitalize the naval spent nuclear fuel handling capabilities of ECF by overhauling ECF with major refurbishment projects for the ECF infrastructure and water pools to keep the infrastructure and water pools in safe working order and provide the needed long-term capabilities for transferring, preparing, and packaging naval spent nuclear fuel.

3. New Facility Alternative – Recapitalize the naval spent nuclear fuel handling capabilities of ECF by constructing and operating a new facility at one of two potential locations at the Naval Reactors Facility (NRF).

This EIS evaluates the environmental impacts (direct, indirect, and cumulative) that result from recapitalizing the naval spent nuclear fuel handling capabilities. The EIS presents a comparison of the environmental impacts from these alternatives. The impacts to human health and the environment for all these alternatives would primarily be small. The preferred alternative to recapitalize naval spent nuclear fuel handing capabilities is to build a new facility (New Facility Alternative) at Location 3/4.

SCOPING PROCESS:

The DOE published a Notice of Intent (NOI) to prepare an EIS for naval spent nuclear fuel handling and examination recapitalization in 75 Fed. Reg. 42082 (July 20, 2010). The purpose of this NOI was to announce the NNPP's intent to prepare an EIS for the recapitalization of the infrastructure supporting naval spent nuclear fuel handling and examination and to solicit comments on the scope of the EIS.

During preparation of the Draft EIS, it was determined that the NNPP plan for a single EIS that addressed the recapitalization of the infrastructure supporting both naval spent nuclear fuel handling and examination was not feasible. When the EIS was initially scoped in 2010, the NNPP plans showed the evaluation of alternatives for examination recapitalization being developed in parallel with the development of the Draft EIS such that planning for the recapitalization of the examination capabilities would closely follow planning for the recapitalization of the naval spent nuclear fuel handling capabilities. However, due to fiscal restraints on the DOE budget, project schedules changed such that the proposed action progressed further than evaluations for examination recapitalization. The examination recapitalization evaluations have not developed at a pace sufficient to conduct a proper National Environmental Policy Act (NEPA) evaluation concurrent with the proposed action. A final set of alternatives for the examination recapitalization has not been established, and pre-conceptual design information is not available upon which impacts can be evaluated. An amended NOI was published in 77 Fed. Reg. 27448 (May 10, 2012). The purpose of the amended NOI was to announce the NNPP's intent to reduce the scope of the EIS to include only the recapitalization of naval spent nuclear fuel handling capabilities in the proposed action. The NNPP used the input received during both scoping periods to prepare the Draft EIS.

PUBLIC COMMENT ON THE DRAFT EIS:

On June 19, 2015 the NNPP published a notice announcing the availability of the Draft EIS; the duration of the public comment period through August 10, 2015; the location and timing for three public hearings; and the various methods that could be used for submitting comments on the Draft EIS (80 Fed. Reg. 35331). In response to a request from the Shoshone-Bannock tribes, on

August 14, 2015 the NNPP published a notice that it was reopening the public comment through August 31, 2015 (80 Fed. Reg. 48850).

Three public hearings were held in Idaho from August 4 through August 6, 2015 in Idaho Falls, Pocatello, and Twin Falls. Elected officials and members of the public provided oral and written comments during hearings. Additionally, a website (www.ecfrecapitalization.us) was established to provide further information to the public about the Draft EIS, how to submit comments, and other pertinent information.

All written public comments received plus a transcript of oral comments made during the public hearings are included in Appendix G. Responses to all comments are also included in Appendix G. All comments were considered in preparing this Final EIS.

CHANGES TO THE DRAFT EIS:

Throughout this Final EIS, text revisions and modifications that have occurred since publication of the Draft EIS are indicated by a vertical line (sidebar) in the margin. Section 1.7 provides a summary of the important changes made since the Draft EIS. Other changes were made to update information and make other minor clarifications and editorial revisions. Appendix G does not contain any side-barred text, since that Appendix is an entirely new section of the EIS and did not appear in the Draft EIS.

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ACRONYMS

CEQ	Council on Environmental Quality
C.F.R.	Code of Federal Regulations
CSRF	Cask Shipping and Receiving Facility
CVN	Carrier Vessel - Nuclear
DART	Days Away, Restricted, or on-the-job Transfer
D&D	Decontamination and Decommissioning
DOE	Department of Energy
ECF	Expended Core Facility
EIS	Environmental Impact Statement
EPA	Environmental Protection Agency
FY	Fiscal Year
GHG	Greenhouse Gas
IDA	Intentionally Destructive Act
IDEQ	Idaho Department of Environmental Quality
INL	Idaho National Laboratory
IWD	Industrial Waste Ditch
LLW	Low-Level Radioactive Waste
MLLW	Mixed Low-Level Radioactive Waste
MOI	Maximally-Exposed Off-site Individual (NRF)
MT CO_2e	Metric Tons of CO_2 Equivalent
NEPA	National Environmental Policy Act
NNPP	Naval Nuclear Propulsion Program
NOI	Notice of Intent
NRF	Naval Reactors Facility
OSB	Overpack Storage Building
OSE	Overpack Storage Expansion
PCB	Polychlorinated Biphenyl
PSD	Prevention of Significant Deterioration
RCRA	Resource Conservation and Recovery Act
ROD	Record of Decision
ROI	Region of Influence
SFPF	Spent Fuel Packaging Facility
SRPA	Snake River Plain Aquifer
SSCs	Structures, Systems, and Components
TAP	Toxic Air Pollutants
TRC	Total Recordable Cases
TSCA	Toxic Substances Control Act
U.S.	United States
U.S.C.	United States Code

CONVERSION CHART

Metric to English / English to Metric

Area

Multiply	by	To Find	Multiply	by	To Find
square kilometers	0.386	square miles	square miles	2.590	square kilometers
square meters	10.764	square feet	square feet	0.093	square meters
hectares	2.471	acres	acres	0.405	hectares

Length

Multiply	by	To Find	Multiply	by	To Find
centimeters	0.394	inches	inches	2.540	centimeters
meters	3.281	feet	feet	0.305	meters
kilometers	0.621	miles	miles	1.609	kilometers

Volume

Multiply	by	To Find	Multiply	by	To Find
liters	0.264	gallons	gallons	3.785	liters
cubic meters	1.308	cubic yards	cubic yards	0.765	cubic meters

Weight/Mass

Multiply	by	To Find	Multiply	by	To Find
metric tons	1.102	U.S. tons (short)	U.S. tons (short)	0.907	metric tons
kilograms	0.001102	U.S. tons (short)	U.S. tons (short)	907.185	kilograms
kilograms	2.205	pounds	pounds	0.4536	kilograms
grams	0.0353	ounces	pounds	453.59	grams
grams	0.0022	pounds	ounces	28.35	grams

Temperature

Multiply	by	To Find	Multiply	by	To Find
[degrees Kelvin - 273.15]	1.8, then add 32	degrees Fahrenheit	[degrees Fahrenheit - 32]	0.556, then add 273.15	degrees Kelvin
degrees Celsius	1.8, then add 32	degrees Fahrenheit	[degrees Fahrenheit - 32]	0.556	degrees Celsius

Units of Radiation

1 Curie = 3.7×10^{10} disintegrations per second

1 Curie = 3.7×10^{10} Becquerels

1 Becquerel = 1 disintegration per second

1 rad = 0.01 gray

1 rem = 0.01 Sievert

1 gray = 1 joule per kilogram

Metric to Metric

metric ton = 1000 kilograms

English to English

U.S. ton (short) = 2000 pounds

U.S. ton (long) = 2240 pounds

Metric Prefixes

mega = multiplication factor of 1,000,000 (1×10^{6})

kilo = multiplication factor of 1,000 (1×10^{3})

centi = multiplication factor of 0.01 (1×10^{-2})

milli = multiplication factor of 0.001 (1×10^{-3})

micro = multiplication factor of 0.000 001 (1×10^{-6})

pico = multiplication factor of 0.000 000 000 001 (1×10^{-12})

SUMMARY

This document summarizes the United States (U.S.) Department of Energy (DOE) *Environmental Impact Statement for the Recapitalization of Infrastructure Supporting Naval Spent Nuclear Fuel Handling* (DOE/EIS-0453-F). It provides background on the Naval Nuclear Propulsion Program (NNPP); describes the purpose and need for the proposed action, the alternatives considered, and the results of the public involvement process; and it provides a summary of environmental impacts of the alternatives. It also summarizes the reasons for the differences between environmental impacts of the alternatives. A preferred alternative is identified at the end of this Summary. Readers who would like more detail on these and other topics are directed from the Summary to the pertinent sections of the Environmental Impact Statement (EIS).

S.1 Introduction

The National Environmental Policy Act (NEPA), and the regulations promulgated by the Council on Environmental Quality (CEQ) (40 C.F.R. § 1500-1508), establish environmental policy, set goals, and provide a means for implementing the policy. The key provision of NEPA requires preparation of an EIS for "major Federal actions significantly affecting the quality of the human environment" (40 C.F.R. § 1502.3). NEPA ensures that environmental information is available to public officials and citizens before decisions are made and actions are taken (40 C.F.R. § 1500.1(b)). DOE/EIS-0453-D has been prepared in accordance with NEPA, as amended (42 U.S.C. 4321 et seq.), as well as CEQ regulations and DOE NEPA implementing procedures codified in 40 C.F.R. § 1500-1508 and 10 C.F.R. § 1021, respectively.

S.2 Background

The mission of the NNPP, also known as the Naval Reactors Program, is to provide the U.S. with safe, effective, and affordable naval nuclear propulsion plants and to ensure their continued safe and reliable operation through lifetime support, research and development, design, construction, specification, certification, testing, maintenance, and disposal. NNPP maintains total responsibility for all aspects of the U.S. Navy's nuclear propulsion systems. At the end of reactor service life, the NNPP transports naval spent nuclear fuel from its origin (e.g., from shipyards and prototypes) to the Naval Reactors Facility (NRF) at the Idaho National Laboratory (INL) (Figure S-1).

Located at NRF, the Expended Core Facility (ECF) provides the infrastructure to unload shipping containers and transfer, examine, prepare, temporarily store, and package naval spent nuclear fuel for transfer to an interim storage facility or geologic repository (Figure S-2). ECF capabilities are vital to the NNPP's mission of maintaining reliable operation of the naval nuclear-powered fleet, developing militarily effective nuclear propulsion plants, and fulfilling cradle-to-grave responsibilities.

Since 1957, the NNPP has transported naval spent nuclear fuel removed from nuclear-powered naval vessels and prototypes to ECF. In a Record of Decision (ROD) issued following the *Department of Energy (DOE) Programmatic Spent Nuclear Fuel Management and Idaho National Engineering Laboratory Environmental Restoration and Waste Management Programs Final Environmental Impact Statement* (DOE/EIS-0203-F), dated April 1995 (DOE 1995), the DOE selected INL as the location for managing naval spent nuclear fuel (ROD 1995).

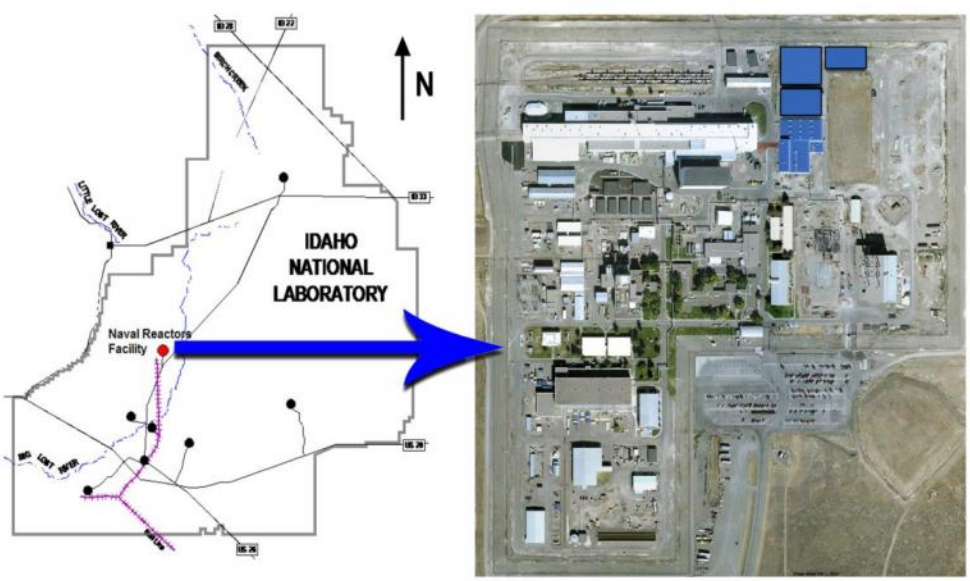


Figure S-1: The NRF Site at INL

Note: Overpack Storage Expansion #3 is a conceptual facility to be built if needed.

Figure S-2: ECF and Major Naval Spent Nuclear Fuel Handling Support Facilities at NRF

S.3 Proposed Action

Figure S-3 illustrates major naval spent nuclear fuel handling capabilities that exist at NRF. A description of the capabilities proposed to be recapitalized is provided following the figure.

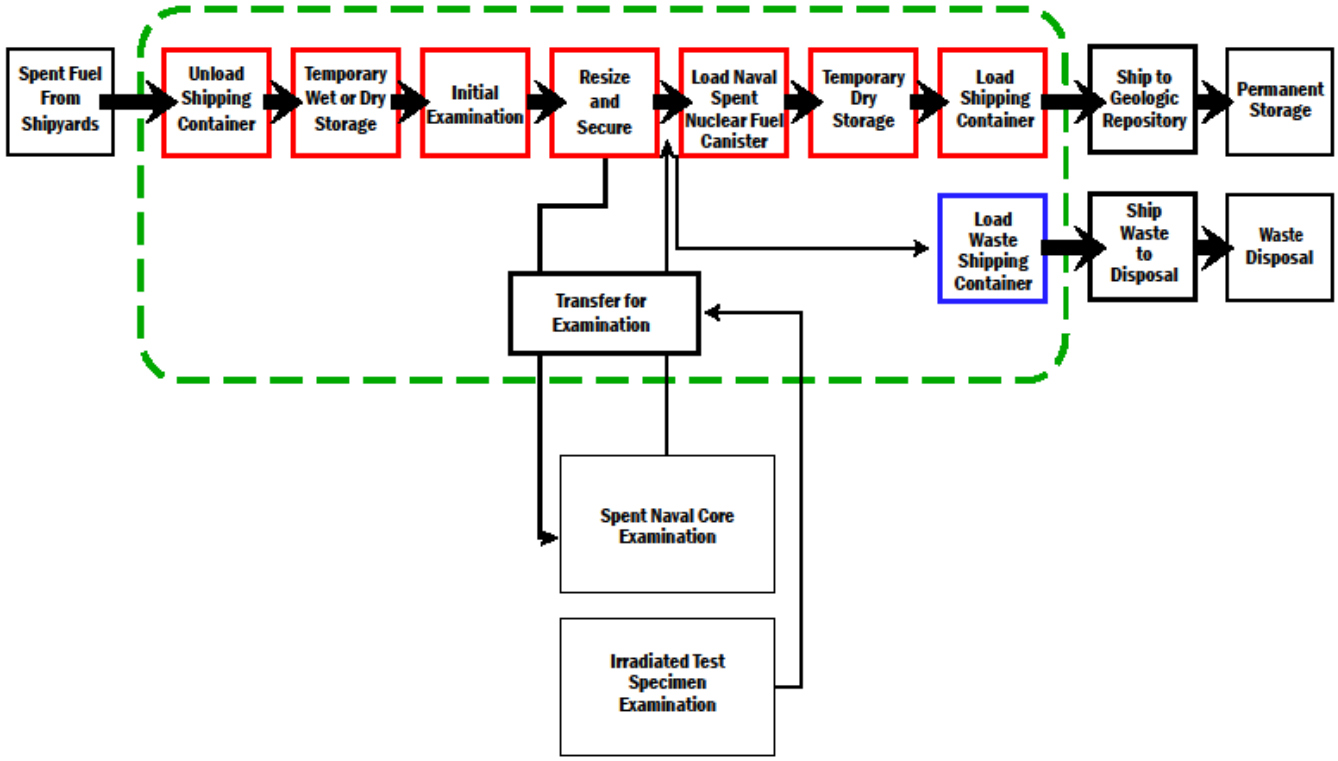


Figure S-3: Naval Spent Nuclear Fuel Handling Capabilities

Unload Shipping Container

Naval spent nuclear fuel is shipped by rail in shipping containers from shipyards and prototypes to ECF. The ability to receive and unload naval spent nuclear fuel from shipyards and prototypes is within the scope of the proposed action.

Temporary Wet or Dry Storage

After unloading naval spent nuclear fuel from the shipping container, the naval spent nuclear fuel is temporarily stored wet in the ECF water pool. The core examination library of naval spent nuclear

fuel, core examination specimens, and irradiation test specimens are also stored wet in the ECF water pool. The ability to store naval spent nuclear fuel, core examination specimens, and irradiation test specimens in a wet configuration is within the scope of the proposed action.

Naval spent nuclear fuel may also be unloaded from shipping containers and placed into concrete overpacks in the Cask Shipping and Receiving Facility (CSRF) for temporary storage in the Overpack Storage Building (OSB) or Overpack Storage Expansion (OSE) buildings. When required, this naval spent nuclear fuel can be reloaded into a shipping container to be transferred to a facility to unload the naval spent nuclear fuel into the water pools for subsequent operations. The ability to unload temporarily dry stored naval spent nuclear fuel into the water pool for subsequent operations is within the scope of the proposed action.

Initial Examination

A visual inspection is performed on each naval spent nuclear fuel assembly before it is prepared for transfer to an interim storage facility or geologic repository. These visual inspections are currently performed in the ECF water pools. The ability to perform visual inspections is within the scope of the proposed action.

Some naval spent nuclear fuel is given more detailed examinations for such purposes as confirming the adequacy of new design features, exploring material performance concerns, and obtaining detailed information to confirm or adjust computer predictions of naval nuclear core performance attributes. These non-destructive examinations, which do not penetrate the fuel cladding or otherwise reduce the integrity of the fuel, could include detailed visual examinations, dimension measurements, or evaluations of corrosion product build-up. The ability to perform non-destructive examinations in the water pool is within the scope of the proposed action.

Resize and Secure

Naval spent nuclear fuel is prepared for more detailed examination by resizing and for disposal by resizing and inserting or securing neutron poison when necessary. This preparation is currently done in the ECF water pools. The ability to resize naval spent nuclear fuel and install and secure neutron poison is within the scope of the proposed action.

Transfer for Examination

ECF provides the capability to transfer those naval spent nuclear fuel assemblies, core examination specimens, and core components designated for more detailed or destructive examinations to the examination location (e.g., shielded cells in ECF). The ability to transfer naval spent nuclear fuel assemblies, core examination specimens, and core components for more detailed and destructive examination is within the scope of the proposed action.

Load Naval Spent Nuclear Fuel Canister

Naval spent nuclear fuel, core examination specimens, and irradiation test specimens are loaded into naval spent nuclear fuel canisters in the Spent Fuel Packaging Facility (SFPF). The ability to package naval spent nuclear fuel, core examination specimens, and irradiation test specimens into naval spent nuclear fuel canisters is within the scope of the proposed action.

Temporary Dry Storage

Once naval spent nuclear fuel is packaged into naval spent nuclear fuel canisters, the canisters are loaded into concrete overpacks for temporary dry storage. These operations currently take place in the SFPF. Once loaded into concrete overpacks, the overpacks are transferred to the OSB or OSE buildings. The ability to load naval spent nuclear fuel canisters into concrete overpacks and place them in temporary dry storage is within the scope of the proposed action.

Load Shipping Container

Naval spent nuclear fuel canisters will be removed from the concrete overpacks and loaded into M-290 shipping containers in the CSRF to ship to an interim storage facility or a geologic repository for disposal. The ability to unload naval spent nuclear fuel canisters from the concrete overpacks into M-290 shipping containers is within the scope of the proposed action.

Load Waste Shipping Container

Waste is generated at ECF during the process of preparing naval spent nuclear fuel for examination, dry storage, and disposal. The waste is currently packaged into waste shipping containers for shipment from NRF. The infrastructure to manage and package the waste generated during operations, including use of a waste shipping container, is within the scope of the proposed action.

S.4 Purpose and Need for Proposed Action

The purpose of the proposed action is to provide the infrastructure necessary to support the naval nuclear reactor defueling and refueling schedules required to meet the operational needs of the U.S. Navy. The proposed action is needed because significant upgrades are necessary to the ECF infrastructure to continue safe and environmentally responsible naval spent nuclear fuel handling until at least 2060.

Based on the life-cycle of current and new designs and planned construction of aircraft carriers and submarines, the ability to perform naval spent nuclear fuel handling will be required into the foreseeable future. Next-generation aircraft carriers have a ship life of approximately 50 years, while new nuclear submarines will have operational lives of approximately 30 years. The scheduled delivery for the first next-generation nuclear-powered U.S. Navy aircraft carrier, GERALD R. FORD (CVN 78), is 2016; new nuclear-powered submarines are also under construction. The NNPP must maintain the infrastructure to support naval nuclear reactor defueling and refueling schedules required to meet the operational needs of the U.S. Navy. The NNPP is committed to manage naval spent nuclear fuel consistent with DOE 1995 and DOE 1996 and to comply with the naval spent nuclear fuel aspects of the Idaho Settlement Agreement (SA 1995) and its 2008 Addendum (SAA 2008).

The capabilities described in Section S.3 are vital to the NNPP mission of maintaining the reliable operation of the naval nuclear-powered fleet and developing effective naval nuclear propulsion plants. The NNPP continues to maintain and operate ECF in a safe and environmentally responsible manner. The water in the water pool has excellent water clarity due to the use of a water purification system, and it does not have biological buildup due to the use of a cooling system. The radioactivity concentrations in the pool water are low, and the water pool does not have a buildup of radioactive debris on the water pool floor. An updated seismic analysis of the ECF water pool reinforced concrete structures and adjacent building steel superstructure concluded that the reinforced concrete portion of the pools and adjacent building superstructure meet the seismic strength requirements of DOE 2002a.

Outdated infrastructure designs and upgrades to ECF structures, systems, and components necessary to continue ECF operations in a safe and environmentally responsible manner present a challenge to the continuity of ongoing ECF naval spent nuclear fuel handling operations. Major portions of the ECF infrastructure have been in service for over 50 years. The maintenance and repair burden necessary to sustain ECF as a viable resource for long-term operations is increasing. The ECF water pools have never undergone a complete refurbishment and have not been upgraded to current seismic standards. Although water pool surfaces are covered with a fiberglass or epoxy coating, the water pool does not have a liner, creating the potential for water infiltration into the reinforced concrete structure and the potential for corrosion damage of the reinforcing bar within the structure. The capability to detect and collect small leaks, a common feature in modern water pools, is not present for the ECF water pool. Consequently, while the replacement or overhaul of the current water pool is not a matter of urgency that must be done in a very short period, it is something that needs to be planned and started soon (Section 2.3).

NRF is currently the only industrial base equipped to perform all aspects of naval spent nuclear fuel handling. There are no existing alternative facilities that could be employed effectively if the NNPP's current infrastructure for handling naval spent nuclear fuel becomes unavailable. Without the capabilities of ECF, the U.S. Navy's nuclear-powered fleet defueling and refueling operations would need to be stopped, leading to the inability of the nuclear-powered ships or their nuclear-trained naval personnel to be redeployed into fleet operations. The availability of the nuclear-powered fleet directly affects the ability of the U.S. Navy to meet its military missions, ultimately impacting national security interests.

S.5 Alternatives

Consistent with programmatic decisions made by DOE in ROD 1995, naval spent nuclear fuel would continue to be shipped by rail from shipyards and prototypes to INL for processing. To allow the NNPP to continue to unload, transfer, prepare, and package naval spent nuclear fuel for disposal, three alternatives were identified:

1. No Action Alternative - Maintain the naval spent nuclear fuel handling capabilities of ECF by continuing to use the current ECF infrastructure while performing only preventative and corrective maintenance.

2. Overhaul Alternative - Recapitalize the naval spent nuclear fuel handling capabilities of ECF by overhauling ECF with major refurbishment projects for the ECF infrastructure and water pools to keep the infrastructure and water pools in a safe working order and to provide the needed long-term capabilities of transferring, preparing, and packaging naval spent nuclear fuel.

3. New Facility Alternative - Recapitalize the naval spent nuclear fuel handling capabilities of ECF by constructing and operating a new facility at one of two potential locations at NRF.

Timeline and duration information is provided below for each alternative.

S.5.1 No Action Alternative

The time period evaluated for the No Action Alternative is 45 years.

The No Action Alternative involves maintaining ECF without a change to the present course of action or management of the facility. The current naval spent nuclear fuel handling infrastructure at ECF would continue to be used while the NNPP performs only preventative and corrective maintenance.

The No Action Alternative does not meet the NNPP's need because significant upgrades are necessary to the ECF infrastructure to continue safe and environmentally responsible naval spent nuclear fuel handling until at least 2060. As currently configured, the ECF infrastructure cannot support use of the new M-290 shipping containers. Significant changes in configuration of the facility and spent fuel handling processing locations in the water pool would be required to support unloading naval spent nuclear fuel from the new M-290 shipping containers. In addition, over the next 45 years, preventative and corrective maintenance without significant upgrades and refurbishments may not be sufficient to sustain the proper functioning of ECF structures, systems, and components. Upgrades and refurbishments needed to support use of the new M-290 shipping containers and continue safe and environmentally responsible operations would not meet the definition of the No Action Alternative; therefore, these actions are represented by the Overhaul Alternative.

The implementation of the No Action Alternative (i.e., failure to perform upgrades and refurbishments), in combination with the NNPP commitment to only operate in a safe and environmentally responsible manner, may result in ECF eventually being unavailable for handling naval spent nuclear fuel. If the naval spent nuclear fuel handling infrastructure were to become unavailable, the inability to transfer, prepare, and package naval spent nuclear fuel could immediately and profoundly impact the NNPP's mission and national security needs to refuel and defuel nuclear-powered submarines and aircraft carriers. In addition, the NNPP could not ensure its ability to meet the requirements of SA 1995 and SAA 2008.

Since the No Action Alternative does not meet the purpose and need for the proposed action, it is considered to be an unreasonable alternative; however, the No Action Alternative is included in the EIS as required by CEQ regulations and is provided as a baseline for comparison to other alternatives.

S.5.2 Overhaul Alternative

The time period evaluated for the Overhaul Alternative is 45 years.

The Overhaul Alternative involves continuing to use the aging infrastructure at ECF, while incurring increasing costs to provide the required refurbishments and workaround actions necessary to ensure uninterrupted aircraft carrier and submarine refuelings and defuelings. Under the Overhaul Alternative, the NNPP would operate ECF in a safe and environmentally responsible manner by continuing to maintain ECF while implementing major refurbishment projects for the ECF infrastructure and water pools. This would entail:

- Short-term actions necessary to keep the infrastructure in safe working order, including regular upkeep and actions sufficient to sustain the proper functioning of structures, systems, and components (e.g., the ongoing work currently performed in ECF to inspect and repair deteriorating water pool concrete coatings).

- Facility, process, and equipment reconfigurations needed for specific capabilities required in the future. These actions involve installation of new equipment and processes, and relocation of existing equipment and processes within the current facility to provide a new capability (e.g., modification of ECF and reconfiguration of the water pool as necessary to handle M-290 shipping containers).

- Major refurbishment actions necessary to sustain the life of the infrastructure (e.g., to the extent practicable, overhaul the water pools to bring them up to current design and construction standards).

Refurbishment activities would take place in parallel with ECF operations for the majority of the Overhaul Alternative time period. The first 33 years of the 45 years (i.e., the refurbishment period), refurbishment and operations activities would be conducted in parallel. During certain refurbishment phases, operations could be limited due to the nature of the refurbishment activities (e.g., operations would not continue in water pools that are under repair). There would then be a 12-year period where only operational activities would take place in ECF (i.e., the post-refurbishment operational period).

Failure to implement this overhaul in advance of infrastructure deterioration would impact the ability of ECF to operate for several years. Further, overhaul actions would necessitate operational interruptions for extended periods of time.

The scope of the overhaul alternative is based on several factors: (1) the age of the ECF infrastructure; (2) acceptable service lifetimes for similar infrastructure; (3) major repair, refurbishment, and corrective maintenance needs; and (4) the time periods in which these actions would be needed. The overhaul actions needed to provide the required capabilities for the naval spent nuclear fuel handling infrastructure can be separated into two general categories: ECF infrastructure refurbishment (including ECF building structure, utilities, and service areas) and water pool refurbishment.

ECF infrastructure refurbishment would include correcting deteriorating conditions in the ECF building structure and supporting infrastructure due to the building's age. Parts of the building would be structurally reinforced, as necessary, and many supporting infrastructure systems would be replaced over time. These systems include the steam distribution system, pressurized air distribution system, and the potable water distribution system. As discussed in Section 4.11, a new security boundary system would be needed to improve the protection of the facility and other facilities on NRF.

Water pool refurbishment would include correcting deteriorating conditions. These actions would be necessary to ensure that the water pools support long-term use by, to the extent practicable, bringing the water pools up to current design and construction standards. Refurbishment efforts for the water pools could include actions such as lining the pool to form a water-tight barrier between the water in the water pool and the concrete walls of the water pool, and reinforcing areas of known structural degradation. The water pools would need to be drained, decontaminated, and emptied of some equipment. This equipment would be discarded, due to the equipment exceeding its useful service life and the excessive cost to refurbish the equipment. As a result of the water pool overhaul, work-around actions would be required to ensure that ECF continued to support the mission-critical work of the naval nuclear-powered fleet.

New capabilities would be added to ECF during the overhaul. The NNPP began to use the M-290 shipping container to transport naval spent nuclear fuel to NRF in 2016. To unload naval spent nuclear fuel from an M-290 shipping container into the water pool to examine, transfer, prepare, and package for disposal, the ECF water pools would need to be reconfigured to provide adequate footprint to allow installation of new equipment and processes. This reconfiguration would require additional disruption to the flow of work at ECF.

S.5.3 New Facility Alternative

The time period evaluated for the New Facility Alternative is 45 years.

A New Facility Alternative would acquire capital assets to recapitalize naval spent nuclear fuel handling capabilities. While a new facility requires new process and infrastructure assets, the design could leverage use of the newer, existing ECF support facilities (OSB, OSEs, and CSRF) and would

leverage use of newer equipment designs. The facility would be designed with the flexibility to integrate future identified mission needs.

Under the current budget and funding levels for the New Facility Alternative, it is anticipated that construction activities (including pre-construction activities) would occur over approximately a 5-year period.

Construction of the New Facility Alternative would occur in parallel with ECF operations. An approximately 2-year period would follow the construction of the New Facility Alternative when new equipment would be installed and tested, and training would be provided to qualify the operations workforce.

A new facility would include all current naval spent nuclear fuel handling operations conducted at ECF. In addition, it would include the capability to unload naval spent nuclear fuel from M-290 shipping containers in the water pool and handle aircraft carrier naval spent nuclear fuel assemblies without prior disassembly for preparation and packaging for disposal. Such capability does not currently exist within the ECF water pools, mainly due to insufficient available footprint in areas of the water pool with the required depth of water. The New Facility Alternative would include a new security boundary system to protect the new facility and other facilities on NRF as discussed in Section 4.11.

As described in Section 2.3, the NNPP will continue to operate ECF during new facility construction, during a transition period, and after the new facility is operational for examination work. To keep the ECF infrastructure in safe working order during these time periods, some limited upgrades and refurbishments may be necessary. Details are not currently available regarding which specific actions will be taken; therefore, they are not explicitly analyzed as part of the New Facility Alternative. The environmental impacts from these upgrades and refurbishments are considered to be bounded by the environmental impacts described for the Refurbishment Period of the Overhaul Alternative in Chapter 4.

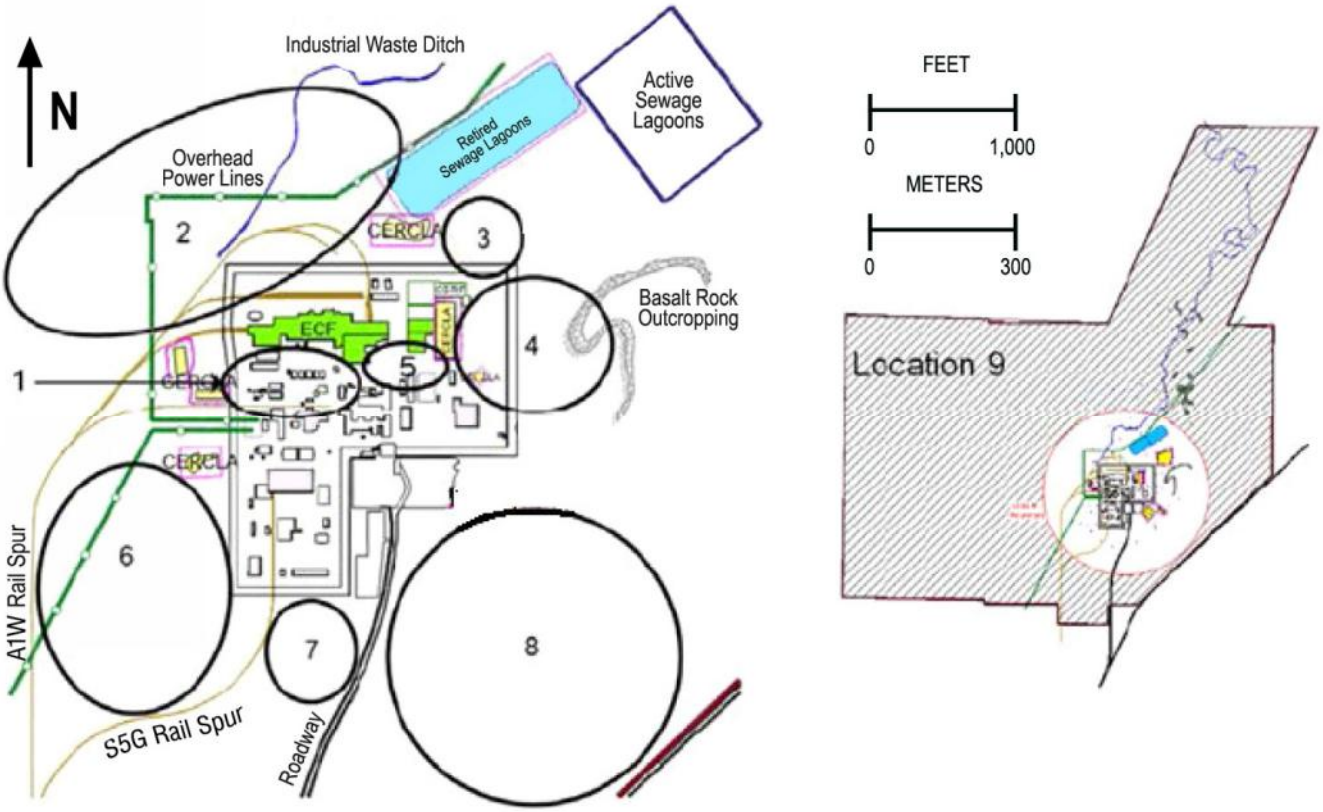
Operations for the New Facility Alternative would overlap with current ECF operations. Operations occur in ECF to support naval spent nuclear fuel examinations and naval spent nuclear fuel handling operations. For a period of time after the new facility is built, all ECF operations (exams and spent fuel handling) would continue. Eventually, the spent fuel handling operations would be fully transitioned from ECF to the new facility. The bounding time period when ECF continues full operations in parallel with new facility operations is called the transition period.

The timeframe of the transition period is dependent on several variables, including the schedule of when naval spent nuclear fuel arrives from the shipyards or prototypes and the rate of naval spent nuclear fuel handling operations in ECF. Current estimates show that the overlap in naval spent nuclear fuel handling operations in ECF and the new facility would last approximately 5 years. Earlier estimates have been as high as 12 years.

Full operations for the New Facility Alternative would be expected to begin in the early 2020s. The facility, related structures, and support systems would be designed for a life of at least 40 years with normal maintenance, repair, and replacement. Therefore, operations for the New Facility Alternative would be expected to continue for at least 40 years.

Originally, nine plausible locations were defined for a new facility at NRF (Figure S-4). These locations were screened further, based on the defined needs of a new facility. The screening process, further detailed in Chapter 2, determined that Location 3/4 and Location 6 warranted further evaluation. (Location 3 and adjacent Location 4 were combined into Location 3/4 to take advantage

of the lack of physical barrier between them; individually, each location has inadequate space for the project.) The other locations were eliminated from consideration.



Note: Location 9 represents all of the areas outside a 945 meters (3100 feet) radius of ECF

Figure S-4: Plausible Locations at NRF for a New Facility

A conceptual site layout drawing and a conceptual new facility drawing are presented in Figures S-5 and S-6, respectively, for new facility Location 3/4. Figure S-7 presents a conceptual site layout drawing for new facility Location 6.

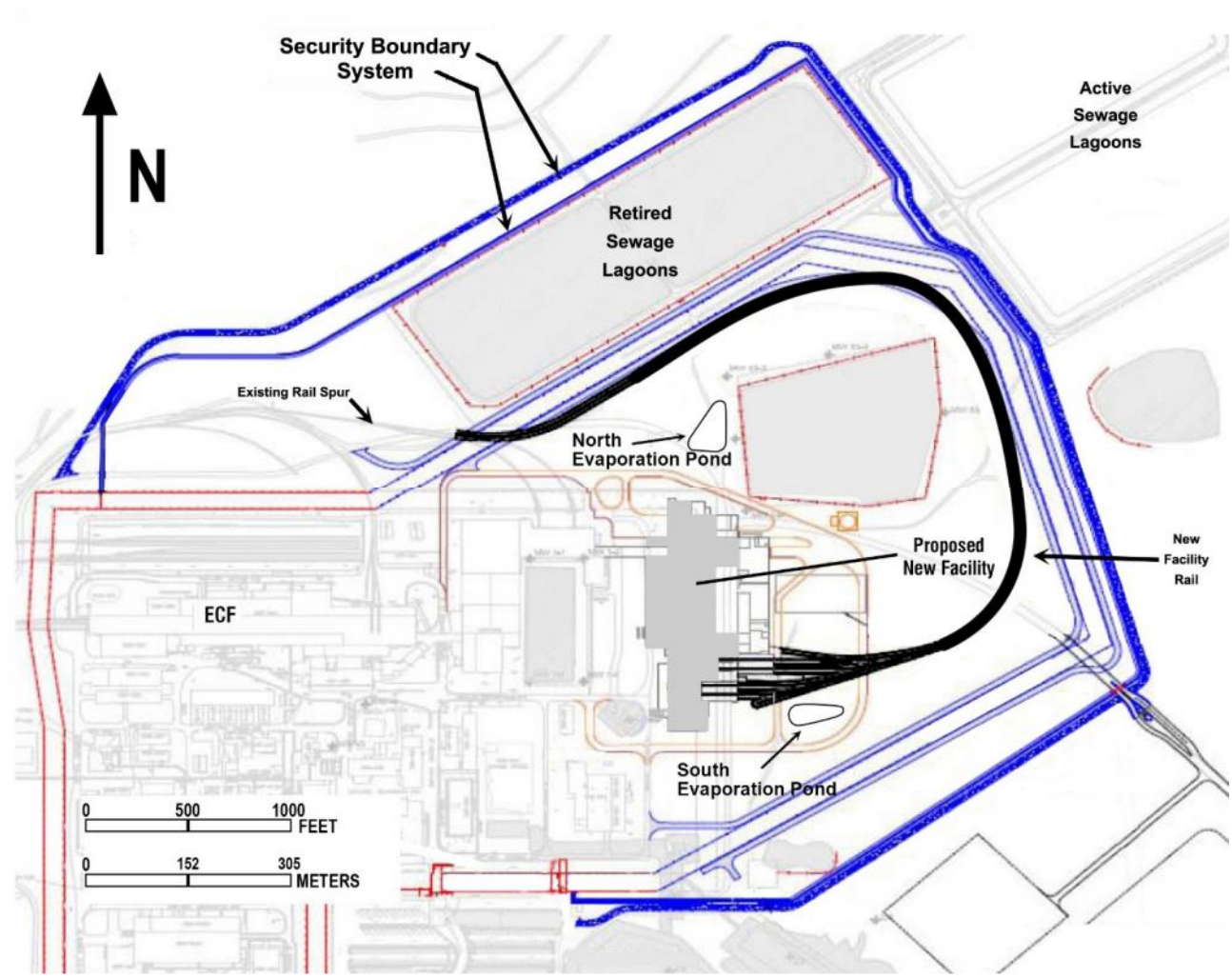


Figure S-5: Conceptual Site Layout for Proposed New Facility at Location 3/4

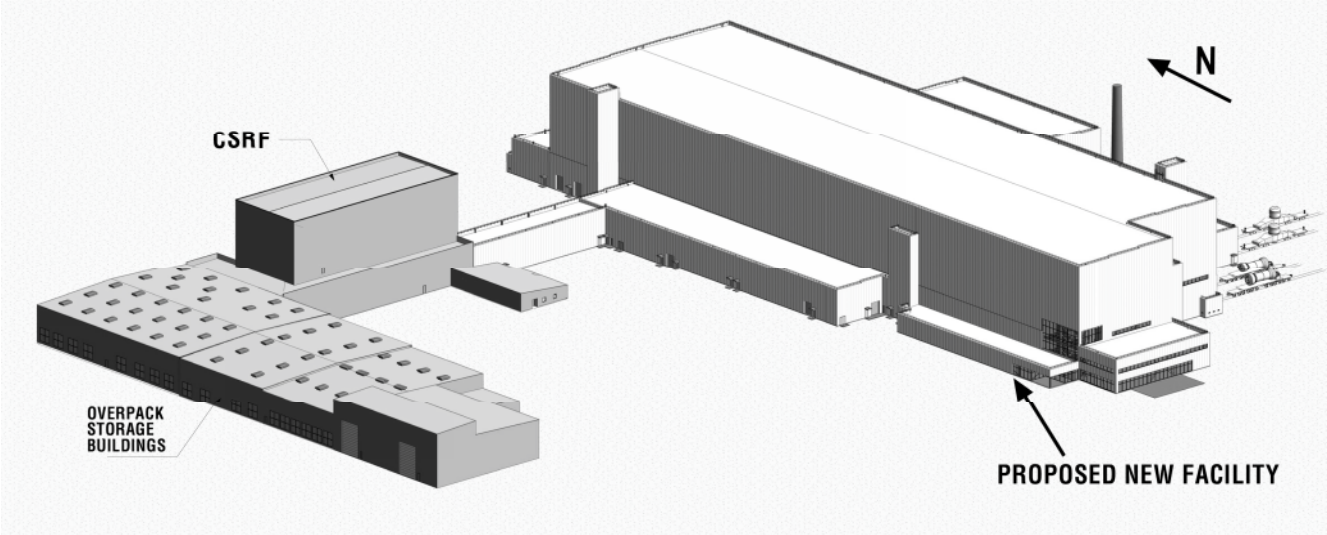


Figure S-6: Conceptual New Facility at Location 3/4

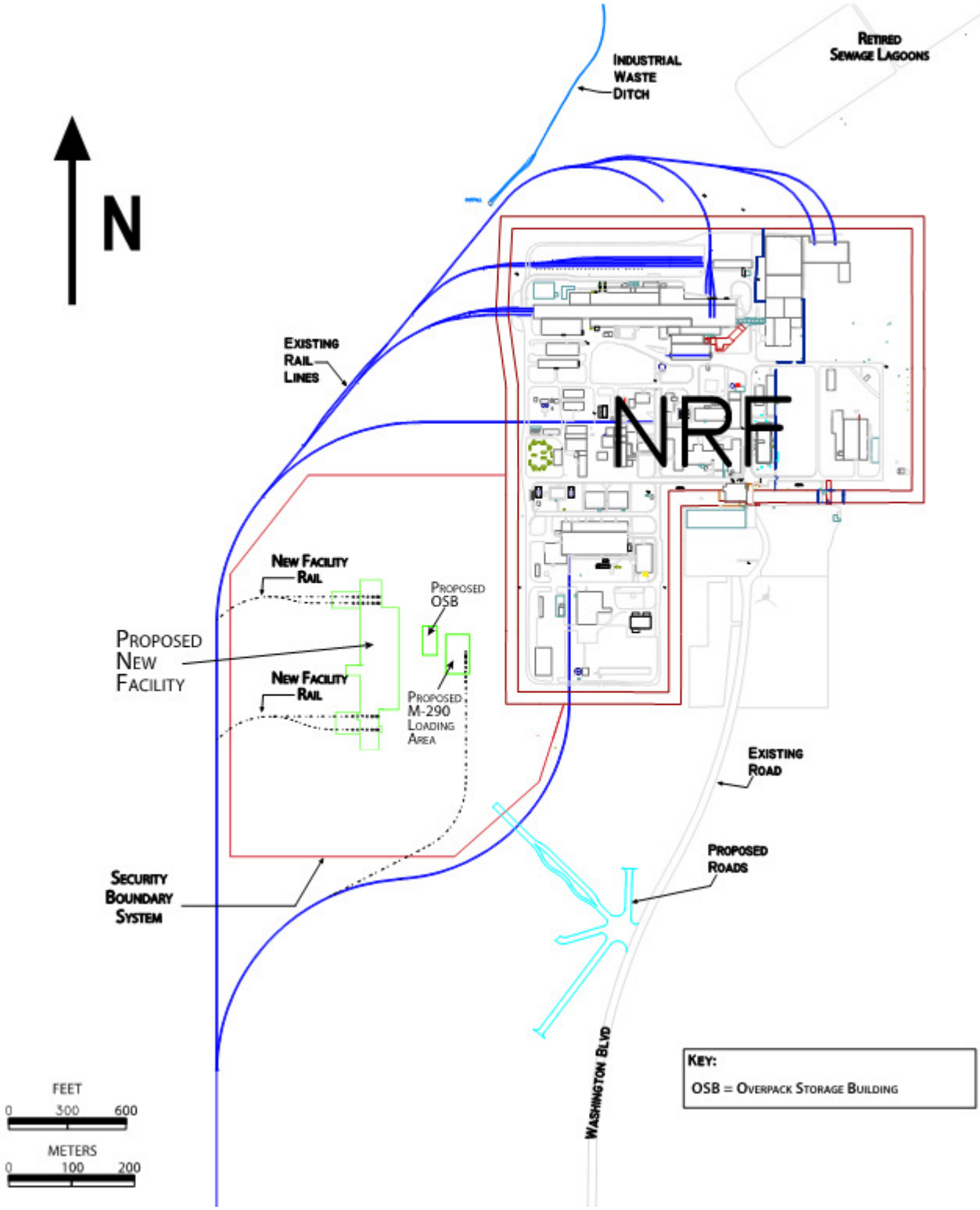


Figure S-7: Conceptual Site Layout for Proposed New Facility at Location 6

S.5.4 Alternatives Evaluated but Eliminated From Further Analysis

In addition to those alternatives identified, other siting locations for a new facility on the INL were evaluated. An alternate naval spent nuclear fuel handling process was also considered but eliminated from analysis. Further details on alternatives eliminated from analysis are provided in Chapter 2 of this EIS.

S.6 Public Involvement

An essential component of the NEPA process is public involvement. The process of preparing this EIS includes two opportunities for public involvement: the scoping process and the public comment period for the Draft EIS. Section S.6.1 describes the scoping process. Section S.6.2 summarizes the public comment period process for the Draft EIS.

S.6.1 Scoping Process

During the scoping process, the NNPP solicited public involvement in determining the scope of issues to be addressed and to identify the significant issues that need to be addressed in this EIS. The DOE published a Notice of Intent (NOI) to prepare an EIS for naval spent nuclear fuel handling and examination recapitalization in 75 Fed. Reg. 42082 (July 20, 2010). The purpose of this NOI was to announce the NNPP's intent to prepare an EIS for the recapitalization of the infrastructure supporting naval spent nuclear fuel handling and examination and to solicit comments on the scope of the EIS. NOI publication and public scoping meetings were announced in ten selected newspapers in Idaho and Wyoming to ensure communication with the public. Notifications were also sent to federal officials, state agencies, tribal officials, and citizens groups.

The NOI invited participation in any of three public scoping meetings at the following locations:

Idaho Falls, ID	August 24, 2010
Pocatello, ID	August 25, 2010
Twin Falls, ID	August 26, 2010

The comment period on the scope of the EIS lasted from July 20, 2010 to September 3, 2010.

Naval spent nuclear fuel handling includes the transfer of spent nuclear fuel removed from a naval reactor to NRF, where it is received, unloaded, prepared, and packaged for temporary dry storage and disposal. In addition to preparing naval spent nuclear fuel for disposal, NRF performs detailed destructive and non-destructive examinations on naval spent nuclear fuel, core components, and irradiated test specimens. Recapitalization of both capabilities, naval spent nuclear fuel handling and examinations will eventually be necessary.

During preparation of the Draft EIS, it was determined that the NNPP plan for a single EIS that addressed the recapitalization of the infrastructure supporting both naval spent nuclear fuel handling and examination was not feasible. When the EIS was initially scoped in 2010, the NNPP expected the evaluation of alternatives for examination recapitalization would proceed in parallel with the development of the Draft EIS such that planning for the recapitalization of the examination capabilities would closely follow planning for the recapitalization of the naval spent nuclear fuel handling capabilities. However, due to fiscal restraints on the DOE budget, project schedules changed such that the evaluation of the recapitalization of naval spent nuclear fuel handling capabilities progressed further than evaluations for examination recapitalization. The examination recapitalization evaluations have not developed at a pace sufficient to conduct a proper NEPA evaluation concurrent with the proposed action. A final set of alternatives for the examination recapitalization has not been

established, and pre-conceptual design information is not available upon which impacts can be evaluated.

As a result, an amended NOI was published in 77 Fed. Reg. 27448 (May 10, 2012). The purpose of the amended NOI was to announce the NNPP's intent to reduce the scope of the EIS to include only the recapitalization of naval spent nuclear fuel handling capabilities in the proposed action. The amended NOI was published in ten selected newspapers in Idaho and Wyoming to ensure communication with the public. Notifications were also sent to federal officials, state agencies, tribal officials, and citizens groups. The comment period on the reduced scope of the EIS lasted from May 10, 2012 to June 11, 2012.

Comments were received during the initial public scoping period and during the comment period for the amended NOI via U.S. Mail, e-mail, and public meetings. These comments, and the comment responses, are provided in Appendix A of this EIS. The scoping process helped identify those issues requiring in-depth analysis. Such information was used to prepare the Draft EIS.

S.6.2 Public Comment Period Process

On June 19, 2015 the NNPP published a notice announcing the availability of the Draft EIS; the duration of the public comment period through August 10, 2015; the location and timing for three public hearings; and the various methods that could be used for submitting comments on the Draft EIS (80 Fed. Reg. 35331). In response to a request from the Shoshone-Bannock tribes, on August 14, 2015 the NNPP published a notice that it was reopening the public comment through August 31, 2015 (80 Fed. Reg. 48850).

Three public hearings were held in Idaho from August 4 through August 6, 2015 in Idaho Falls, Pocatello, and Twin Falls. Elected officials and members of the public provided oral and written comments during hearings. Additionally, a website (www.ecfrecapitalization.us) was established to provide further information to the public about the Draft EIS, how to submit comments, and other pertinent information.

All written public comments received plus a transcript of oral comments made during the public hearings are included in Appendix G. Responses to all comments are also included in Appendix G. All comments were considered in preparing this Final EIS.

S.7 Baseline Operational Characteristics

Table S-1 provides characteristics of current ECF operations derived from Chapter 3.

Table S-1: Current Operational Characteristics

Resource/Material Category	Current Characteristics
Land Use	NRF is located in Butte County. The developed area of NRF consists of 34 hectares (84 acres).
Water Use	NRF average annual water use is approximately 140 million liters (37 million gallons). This is approximately 0.3 percent of the Federal Reserved Water Right for INL.
Non-Radiological Liquid Effluent	The NRF Industrial Waste Ditch (IWD) wastewater reuse permit requires certain non-radiological parameters to be monitored and stipulates the monitoring frequency. The monitoring data show no appreciable concentrations of heavy metals and varying levels of non-hazardous salts. The wastewater reuse permit has primary constituent standards for total nitrogen and total suspended solids. These standards were not exceeded in the IWD effluent based on 5 years of data. A permit is not required for the sewage lagoons; however, the retired sewage lagoons were monitored for the same parameters and on the same frequency as the IWD as a best management practice. The constituents released from NRF are not in concentrations that are harmful to the environment.
Radiological Liquid Effluent	NRF does not discharge radiological liquid effluent to the environment. NRF operates a water reuse system in association with the operation of ECF whereby liquids containing radioactivity are collected, processed, and reused rather than discharged to the environment. NRF monitors liquid effluent into the IWD and the active sewage lagoons for radiological parameters on a quarterly basis as a best management practice.
Non-Radiological Air Emissions	
Criteria Pollutants	The National Ambient Air Quality Standards set maximum levels of air pollutants in ambient air deemed to provide protection for human health and welfare. Limits have been established for six criteria pollutants: sulfur dioxide, nitrogen dioxide, particulate matter, carbon monoxide, lead, and ozone. INL as whole, including NRF, is designated as “attainment,” “better than national standards,” or unclassifiable/attainment,” depending on the criteria pollutant being considered. The modeling results for INL (including NRF) criteria pollutant concentrations for ambient air show that the standards are met for all pollutants and averaging times at INL and Craters of the Moon National Monument public receptor locations.

Table S-1: Current Operational Characteristics (cont.)

Resource/Material Category	Current Characteristics
Greenhouse Gases (GHGs)	GHG emissions are reported as Scope 1, Scope 2, and Scope 3. Scope 1 are direct emissions from production of electricity, heat, cooling, or steam; mobile combustion sources (e.g., automobiles, ships, and aircraft); fugitive emissions within an agency's organizational boundary; and process emissions from laboratory activities. Scope 2 emissions are indirect or shared emissions associated with consumption of purchased or acquired electricity, steam, heating, or cooling. Scope 3 emissions include all other indirect emissions not included in Scope 2 (e.g., business air/ground travel, employee commuting, contracted solid waste disposal, contracted wastewater treatment, subcontractor emissions, and transmission and distribution losses associated with purchased electricity). The NRF Fiscal Year (FY) 2012 inventory of GHGs totaled 15,400 metric tons (17,000 U.S. tons) of carbon dioxide equivalent (MT CO_2e). The total inventory is broken into Scope 1, Scope 2, and Scope 3 emissions. The NRF FY 2012 inventory of Scope 1 emissions was 4800 MT CO_2e (5300 U.S. tons). The NRF FY 2012 inventory of Scope 2 emissions was 8100 MT CO_2e (8900 U.S. tons). The NRF FY 2012 inventory of Scope 3 emissions was 2500 MT CO_2e (2800 U.S. tons).
Climate Change	INL and NRF are negligible contributors to GHG emissions on a state, and nationwide level and therefore negligible contributors to global climate change. The INL is located on the Eastern Snake River Plain which lies within the Great Basin Desert. The Great Basin Desert has warmed by 0.3 to 0.6 degrees Celsius (0.54 to 1.08 degrees Fahrenheit) in the last 100 years. Observed changes associated with global climate change within the Great Basin Desert include onset of early snowmelt, drought, and increase in wildfire frequency and intensity.
Visibility	The modeling results for INL (including NRF) indicate that visibility is not impaired by INL emissions since all visibility parameters are below threshold levels.
Prevention of Significant Deterioration (PSD)	The area surrounding INL is classified as Federal Class II, an area with reasonable or moderately good air quality while still allowing moderate industrial growth. Craters of the Moon National Monument, Grand Teton National Park, and Yellowstone National Park are classified as Federal Class I areas. PSD increments are established for Class I and Class II areas. Atmospheric dispersion modeling for PSD air pollutant concentrations at INL public receptor locations and Federal Class I areas done cumulatively for all INL facilities (including NRF) shows that all pollutants are within the increases allowed under the PSD program and do not contribute to a deterioration in air quality.

Table S-1: Current Operational Characteristics (cont.)

Resource/Material Category	Current Characteristics
Toxic Air Pollutants	Atmospheric dispersion modeling for toxic air pollutant concentrations at INL public receptor locations done cumulatively for all INL facilities (including NRF) shows that Idaho Administrative Procedures Act standards are met for all pollutants and averaging times, indicating concentrations do not injure or unreasonably affect human or animal life or vegetation.
Radiological Air Emissions	The majority of the radiological air emissions at NRF are from activities at ECF such as unloading naval spent nuclear fuel from shipping containers, loading naval spent nuclear fuel canisters for temporary dry storage, water pools where naval spent nuclear fuel is processed and stored, and shielded cells where test specimen and naval spent nuclear fuel examinations are performed. In 2009, NRF radiological air emissions were approximately 0.95 Curies. In 2009, NRF operations accounted for approximately 0.02 percent of the total radiological air emissions from INL.
Noise	Noise at NRF is not transmitted at detectable levels off-site since the closest site boundary is 10.5 kilometers (6.5 miles) from the center point at NRF and the closest member of the public (a residence that is occupied year round) is located 13.7 kilometers (8.5 miles) from NRF.
Workforce	Approximately 1370 people work at NRF.
Electricity Use	The peak electrical demand at NRF is approximately 6 megawatts.
Fuel Use	NRF uses fuel oil for its three fuel oil-fired boilers. Fuel oil usage at NRF is approximately 2,280,000 liters (603,000 gallons) annually. NRF uses approximately 42,000 liters (11,000 gallons) per year of diesel fuel for emergency diesel generators and miscellaneous combustion sources. NRF uses approximately 5300 liters per year (1400 gallons per year) of gasoline on miscellaneous combustion sources.

Table S-1: Current Operational Characteristics (cont.)

Resource/Material Category	Current Characteristics
Occupational Radiation Exposure	The average exposure per person monitored since 1979 is about 0.0006 Sievert (0.06 rem) per year for NRF personnel. This dose is approximately one-sixth the average annual exposure to a member of the population in the U.S. from natural background radiation, less than one-fourth the average annual exposure to a member of the population in the U.S. from common diagnostic medical x-ray procedures, and less than the difference in the annual exposure due to natural background radiation between Denver, Colorado and Washington, D.C. Decreases in annual radiation exposure have been achieved as a result of continuing efforts to reduce radiation exposures to the minimum practicable. 2010 exposure data for individuals involved in naval spent nuclear fuel handling operations show the highest average annual exposure of 0.00018 Sievert (0.018 rem) was obtained by technicians who unload shipping containers. These exposures are even lower than the running average for which perspective is provided above.
Public Radiation Exposures	Specific provisions of the Environmental Protection Agency (EPA) National Emissions Standards for Hazardous Air Pollutants standards (40 C.F.R. § 61, Subpart H) limit the radionuclide dose to a member of the public to 10 millirem per year. The annual dose limit applies to the maximally exposed off-site individual and is designed to protect public health with an adequate margin of safety. The radiation dose to the Maximally Exposed Off-site Individual (MOI), living at the INL property boundary, from NRF and ECF routine operation releases for 2009 was approximately 2.7×10^{-9} Sievert (2.7×10^{-7} rem). The radiation dose to the surrounding population from NRF and ECF routine operation releases for 2009 was approximately 9.0×10^{-5} Sievert (9.0×10^{-3} rem). The individual doses from NRF are well below the 10 millirem per year limit.
Waste Generation and Shipments	
High-Level Radioactive Waste	NRF does not currently generate any high-level radioactive waste.
Transuranic Waste	NRF does not currently generate any transuranic waste from naval spent nuclear fuel handling operations.

Table S-1: Current Operational Characteristics (cont.)

Resource/Material Category	Current Characteristics
Solid Low-Level Radioactive Waste (LLW)	Operations at ECF result in generation of solid LLW primarily consisting of filters, resin, contaminated components, pieces of insulation, rags, sheet plastic, paper, and filter paper and towels resulting from radiochemistry and radiation monitoring operations. The annual average of LLW waste generated at NRF is 740 cubic meters (960 cubic yards) from routine activities and 1200 cubic meters (1600 cubic yards) from decontamination and decommissioning (D&D) activities. There are 38 shipments of LLW from NRF annually.
Toxic Substances Control Act (TSCA) Waste	TSCA waste at NRF includes waste containing polychlorinated biphenyls (PCBs). The annual average of TSCA waste generated at NRF is 1.6 metric tons (1.8 U.S. tons). The annual average of low-level radioactive TSCA waste generated at NRF is 10.3 metric tons (11.4 U.S. tons). There are 12 shipments of low-level radioactive TSCA waste from NRF annually. Non-radioactive TSCA waste is included with the 12 annual shipments of hazardous waste described below.
Mixed Low-Level Radioactive Waste (MLLW) and TSCA MLLW	NRF generates a small amount of MLLW and TSCA MLLW, primarily from D&D activities at ECF. The annual average of MLLW and TSCA MLLW generated at NRF is 20 cubic meters (26 cubic yards). There are 12 shipments of MLLW (including TSCA MLLW) from NRF annually.
Resource Conservation and Recovery Act (RCRA) Hazardous Waste	The annual average of RCRA hazardous waste generated at NRF is 1.4 metric tons (3.0 cubic meters) from routine activities and 1.5 metric tons (2.6 cubic meters) from D&D activities. The weight to volume conversions are impacted by shipping frequencies and container sizes. There are 12 shipments of RCRA hazardous waste (which include non-radioactive TSCA waste, as applicable) from NRF annually.

Table S-1: Current Operational Characteristics (cont.)

Resource/Material Category	Current Characteristics
Non-Hazardous Waste	At NRF, non-hazardous waste generally consists of routine waste generated by personnel on-site. As much as possible, recyclable materials are segregated from the solid waste stream in accordance with waste minimization and pollution prevention protocols. The annual average of non-hazardous solid waste generated at NRF is 4600 cubic meters (6000 cubic yards) from routine activities and 2500 cubic meters (3300 cubic yards) from D&D activities. There are 52 shipments of non-hazardous waste from NRF annually.

S.8 Basis for Analysis

Chapter 4 of this EIS presents an evaluation of the environmental impacts of the alternatives. Unless otherwise noted, there would be no changes to the existing naval spent nuclear fuel handling processes used in ECF associated with the proposed action.

Refurbishment activities and new facility design are conceptual in nature. Therefore, they are not described in detail in this EIS. However, for the purpose of environmental impact analysis, conservative assumptions are used. Thus, the impacts from the implementation of the proposed action would likely be less than those analyzed in this EIS.

Estimates associated with the number of personnel at NRF affect many resource evaluations in Chapter 4. In most cases, the change in number of naval spent nuclear fuel handling workers due to the proposed action is used in impact evaluations. However, the total change in the number of NRF personnel during the time periods evaluated for each alternative is provided for use in system capacity impact evaluations (e.g., in Section 4.4). Although these labor estimates are described in Section 4.10, they are repeated here to aid in the comparison of impacts provided in Section S.9.1.

Employment impacts are estimated by evaluating both the direct and indirect impacts. Direct impacts are jobs and income that result directly from the proposed action (e.g., creation of a construction job). Indirect impacts are jobs and income created in the community as a result of the direct impacts created by the proposed action.

- For the No Action Alternative while ECF operations continue, employment would be expected to remain at current levels. Although operations activities in the ECF would be reduced, these reductions would be offset by increased maintenance activities. Under the No Action Alternative, if operations cease, employment would decrease.
- For the refurbishment period of the Overhaul Alternative, impacts associated with an additional 180 refurbishment workers and 220 indirect jobs in the Region of Influence (ROI) are evaluated. There would be no change to the number of naval spent nuclear fuel handling workers during the refurbishment period. With the exception of the increase in employment from the 180 construction jobs, NRF employment levels would be expected to remain at current levels during the 33-year refurbishment period.
- For the post-refurbishment period of the Overhaul Alternative, impacts associated with an additional 80 naval spent nuclear fuel handling workers and 140 indirect jobs in the ROI are evaluated. These additional naval spent nuclear fuel handling workers would be necessary to

perform work delayed during the refurbishment period. Also, NRF employment unrelated to the proposed action is projected to decrease during this period. Therefore, the total increase in NRF employment during the post-refurbishment operational period would be approximately 50 workers.

- For the construction period of the New Facility Alternative, impacts associated with an additional 360 direct construction jobs and 450 indirect jobs in the ROI are evaluated. Also, NRF employment unrelated to the proposed action is projected to increase during this period. Therefore, the total increase in NRF employment during the construction period would be approximately 420 workers.
- For the transition period of the New Facility Alternative, impacts associated with an additional 60 naval spent nuclear fuel handling workers and 100 indirect jobs in the ROI are evaluated. The additional naval spent nuclear fuel handling workers would be necessary due to parallel operations in ECF and the new facility. Also, NRF employment unrelated to the proposed action is projected to decrease during the transition period. Therefore, the total increase in NRF employment during this time-period would be approximately 40 workers.
- For the new facility operational period, impacts associated with 60 fewer naval spent nuclear fuel handling workers and 100 indirect jobs in the ROI are evaluated. The decrease in number of naval spent nuclear fuel handling workers reflects the efficiency gains in the new facility. Also, NRF employment that is unrelated to the proposed action is projected to decrease during this time-period. Therefore, the total decrease in NRF employment for the operational period would be approximately 110 workers.

S.9 Comparison of Alternatives

Table S-2 provides a comparison of the environmental impacts of the alternatives evaluated in this EIS, summarizing the evaluations provided in Chapter 4 for each resource area. Section S.9.1 summarizes the reasons for the differences between the environmental impacts of the alternatives. Additional detail on the impact evaluation for each time period of each alternative is provided in Chapter 4. As demonstrated in Chapter 4, there are very few differences in impacts between a new facility at Location 3/4 and a new facility at Location 6. Therefore, Table S-2 and Section S.9.1 only discuss the locations where relevant.

With the following exceptions, there are no environmental impacts associated with any of the alternatives, or the impacts are negligible or small:

- For the No Action Alternative, there would be large and profound impacts to naval spent nuclear fuel management and national security needs.
    - While ECF operations continue, management of M-290 shipping containers and work stoppages would affect fleet performance and the ability to manage naval spent nuclear fuel in accordance with SA 1995 and SAA 2008.
    - If ECF operations cease, the NNPP would eventually be unable to defuel and refuel submarines, leading to the inability of the nuclear-powered ships or their nuclear-trained naval personnel to be deployed or redeployed into fleet operations. Additionally, the NNPP would be unable to meet the requirements of SA 1995 and SAA 2008.
- For the refurbishment period of the Overhaul Alternative, there would be moderate impacts on naval spent nuclear fuel management from temporary work stoppages; however, the facility would be operated to minimize the impact on the NNPP's ability to meet its mission.
- For the New Facility Alternative, there would be beneficial impacts on naval spent nuclear fuel management once the new facility is fully operational because of increased process efficiencies.

- For the No Action Alternative, the refurbishment period of the Overhaul Alternative, and the construction and transition period of the New Facility Alternative, the impact from seismic hazards to ECF, without additional refurbishment or upgrades, would be moderate from the continued degradation of the facility over time.
- For the New Facility Alternative, electrical energy consumption impacts would be moderate in the transition period and the new facility operational period.

Table S-2: Comparison of Environmental Impacts for the Project Alternatives

Resource/Material Category	No Action Alternative	Overhaul Alternative	New Facility Alternative Location 3/4 and Location 6
Land Use Impacts			
Land Use	There would be no impact on land use since no land would be disturbed.	Refurbishment Period: There would be small impacts on land use from the disturbance of approximately 20 hectares (50 acres) of which 2 hectares (4 acres) would remain developed for the new security boundary system. Post-Refurbishment Operational Period: There would be no impact on land use since no land would be disturbed.	Construction Period: There would be small impacts on land use from land disturbance of up to 60 hectares (150 acres) of which 16 hectares (40 acres) would remain permanently developed for facilities and infrastructure. Transition Period: There would be no impact on land use since no land would be disturbed. New Facility Operational Period: There would be no impact on land use since no land would be disturbed.
Transportation Impacts			
Naval Spent Nuclear Fuel Shipments	There would be negligible impacts from shipments of naval spent nuclear fuel since shipments are infrequent.		
Infrastructure	There would be no impact on transportation infrastructure since no transportation infrastructure would be added.	Refurbishment Period: There would be no impact on transportation infrastructure since no transportation infrastructure would be added. Post-Refurbishment Operational Period: There would be no impact on transportation infrastructure since no transportation infrastructure would be added.	Construction Period: There would be small impacts on transportation infrastructure from the addition of temporary gravel roadways, paved roadways, and additional rail line. Transition Period: There would be no impact on transportation infrastructure since no transportation infrastructure would be added.

Table S-2: Comparison of Environmental Impacts for the Project Alternatives (cont.)

Resource/Material Category	No Action Alternative	Overhaul Alternative	New Facility Alternative Location 3/4 and Location 6
Transportation Impacts (cont.)			
Infrastructure (cont.)			New Facility Operational Period: There would be no impact on transportation infrastructure since no transportation infrastructure would be added.
Personnel	While ECF operations continue, there would be no impact from personnel transportation since the average daily traffic would not increase. If ECF operations cease, the average daily traffic could decrease.	Refurbishment Period: There would be small impacts from an average increase in daily traffic on U.S. Highway 20, U.S. Highway 26, and State Route 33 of approximately 3 percent. Post-Refurbishment Operational Period: There would be a negligible impact from an average increase in daily traffic on U.S. Highway 20, U.S. Highway 26, and State Route 33 of approximately 0.3 percent.	Construction Period: There would be small impacts from an average increase in daily traffic on U.S. Highway 20, U.S. Highway 26, and State Route 33 of approximately 6 percent. Transition Period: There would be a negligible impact from an average increase in daily traffic on U.S. Highway 20, U.S. Highway 26, and State Route 33 of approximately 0.3 percent. New Facility Operational Period: There would be negligible beneficial impacts from an average decrease in daily traffic on U.S. Highway 20, U.S. Highway 26, and State Route 33 of approximately 0.3 percent.

Table S-2: Comparison of Environmental Impacts for the Project Alternatives (cont.)

Resource/Material Category	No Action Alternative	Overhaul Alternative	New Facility Alternative Location 3/4 and Location 6
Transportation Impacts (cont.)			
Material Shipments	There would be no impact from transportation of materials since the number of shipments would be expected to remain within the current range.	Refurbishment Period: There would be a negligible impact on transportation from approximately one additional shipment of materials each day. Post-Refurbishment Operational Period: There would be no impact on transportation from material shipments since the number of shipments would be expected to remain within the current range.	Construction Period: There would be small impacts to transportation from approximately 50 additional shipments per day resulting in an increase in daily traffic on U.S. Highway 20, U.S. Highway 26, and State Route 33 of approximately less than 1 percent. Transition Period: There would be no impact on transportation from material shipments since the number of shipments would be expected to remain within the current range. New Facility Operational Period: There would be no impact on transportation from material shipments since the number of shipments would be expected to remain within the current range.

Table S-2: Comparison of Environmental Impacts for the Project Alternatives (cont.)

Resource/Material Category	No Action Alternative	Overhaul Alternative	New Facility Alternative Location 3/4 and Location 6
Transportation Impacts (cont.)			
Non-Hazardous Waste, RCRA Hazardous Waste (including non-radioactive TSCA waste), and Recyclable Material Shipments	While ECF operations continue, there would be no impact from transportation of non-hazardous waste, RCRA hazardous waste (including non-radioactive TSCA waste), and recyclable material since the same number of shipments would be required. If ECF operations cease, there could be a decrease in the number of shipments.	Refurbishment Period: There would be no impact from transportation of non-hazardous waste, RCRA hazardous waste (including non-radioactive TSCA waste), and recyclable material. The volume of waste in each shipment would increase, but would not exceed the capacity of the routine shipment. Post-Refurbishment Operational Period: There would be no impact from transportation of non-hazardous waste, RCRA hazardous waste (including non-radioactive TSCA waste), and recyclable material. The volume of non-hazardous waste and recyclable material in the shipment would increase, but would not exceed the capacity of the routine shipment. The volume of RCRA hazardous waste would not increase.	Construction Period: There would be a negligible impact from transportation of non-hazardous waste, RCRA hazardous waste (including non-radioactive TSCA waste), and recyclable material. For the RCRA hazardous and recyclable material shipments, the volume of waste or materials in each shipment would increase but would not exceed the capacity of the routine shipment. There would be approximately one additional shipment per day of non-hazardous solid waste. Transition Period: There would be no impact from transportation of non-hazardous waste, RCRA hazardous waste (including non-radioactive TSCA waste), and recyclable material. The volume of non-hazardous waste and recyclable material would increase but would not exceed the capacity of the routine shipment. The volume of RCRA hazardous waste would not increase.

Table S-2: Comparison of Environmental Impacts for the Project Alternatives (cont.)

Resource/Material Category	No Action Alternative	Overhaul Alternative	New Facility Alternative Location 3/4 and Location 6
Transportation Impacts (cont.)			
Non-Hazardous Waste, RCRA Hazardous Waste (including non-radioactive TSCA waste), and Recyclable Material Shipments (cont.)			New Facility Operational Period: There would be no impact from transportation of non-hazardous waste, RCRA hazardous waste (including non-radioactive TSCA waste), and recyclable material. The volume of non-hazardous waste and recyclable material would decrease. The volume of RCRA hazardous waste would not increase.

Table S-2: Comparison of Environmental Impacts for the Project Alternatives (cont.)

Resource/Material Category	No Action Alternative	Overhaul Alternative	New Facility Alternative Location 3/4 and Location 6
Transportation Impacts (cont.)			
Radiological Waste Shipments	While ECF operations continue, there would be no impact from transportation of radiological waste since the same number of shipments would be required. If ECF operations cease, there could be a decrease in the number of shipments.	Refurbishment Period: There would be no impact from transportation of radioactive TSCA waste and MLLW. The volume of radioactive TSCA waste and MLLW in each shipment would increase, but would not exceed the capacity of the routine shipments. There would be a negligible impact from transportation of approximately one additional shipment of solid LLW each day. Post-Refurbishment Operational Period: There would be no impact from transportation of radioactive TSCA waste and MLLW, since radioactive TSCA waste and MLLW generation would not increase. There would be no impact from transportation of approximately six additional solid LLW shipments per year.	Construction Period: There would be no impact from transportation of radiological waste since radiological waste would not be generated. Transition Period: There would be no impact from transportation of radioactive TSCA waste and MLLW since radioactive TSCA waste and MLLW would not be generated. There would be no impact from transportation of approximately eight additional solid LLW shipments per year. New Facility Operational Period: There would be no impact from transportation of radioactive TSCA waste and MLLW since radioactive TSCA waste and MLLW would not be generated. There would be no impact from transportation of approximately eight additional solid LLW shipments per year.

Table S-2: Comparison of Environmental Impacts for the Project Alternatives (cont.)

Resource/Material Category	No Action Alternative	Overhaul Alternative	New Facility Alternative Location 3/4 and Location 6
Geological and Soil Impacts			
Use of Geologic and Soil Resources	There would be no impact on geologic and soil resources since no geologic or soil resources would be consumed or excavated.	Refurbishment Period: There would be small impacts to geologic and soil resources from the use of approximately 13,000 cubic meters (17,000 cubic yards) and the excavation of approximately 16,000 cubic meters (21,000 cubic yards). Post-Refurbishment Operational Period: There would be no impact on geologic and soil resources since no geologic or soil resources would be consumed or excavated.	Construction Period: There would be small impacts to geologic and soil resources from the use of approximately 160,000 cubic meters (209,000 cubic yards) and the excavation of approximately 406,000 cubic meters (531,000 cubic yards), for Location 3/4. There would be small impacts to geologic and soil resources from the use of approximately 179,000 cubic meters (235,000 cubic yards) and excavation of approximately 578,000 cubic meters (756,000 cubic yards), for Location 6. Transition Period: There would be no impact on geologic and soil resources since no geologic or soil resources would be consumed or excavated. New Facility Operational Period: There would be no impact on geologic and soil resources since no geologic or soil resources would be consumed or excavated.

Table S-2: Comparison of Environmental Impacts for the Project Alternatives (cont.)

Resource/Material Category	No Action Alternative	Overhaul Alternative	New Facility Alternative Location 3/4 and Location 6
Geological and Soil Impacts (cont.)			
Quality of Geologic and Soil Resources	There would be no impact to the quality of geologic and soil resources since no geologic or soil resources would be consumed or excavated.	Refurbishment Period: There would be small impacts to the quality of geologic and soil resources from compaction of soil; diminished topsoil quality and quantity resulting from stockpiling and erosion; erosion and sedimentation resulting from changes to the terrain; slight changes to topography resulting from grading and backfilling; and the creation of temporary, unstable slopes. Post-Refurbishment Operational Period: There would be no impact to the quality of geologic and soil resources since no geologic or soil resources would be consumed or excavated.	Construction Period: There would be small impacts to the quality of geologic and soil resources from compaction of soil; diminished topsoil quality and quantity resulting from stockpiling and erosion; erosion and sedimentation resulting from changes to the terrain; slight changes to topography resulting from grading and backfilling; and the creation of temporary, unstable slopes. Transition Period: There would be no impact to the quality of geologic and soil resources since no geologic or soil resources would be consumed or excavated. New Facility Operational Period: There would be no impact to the quality of geologic and soil resources since no geologic or soil resources would be consumed or excavated.

Table S-2: Comparison of Environmental Impacts for the Project Alternatives (cont.)

Resource/Material Category	No Action Alternative	Overhaul Alternative	New Facility Alternative Location 3/4 and Location 6
Geological and Soil Impacts (cont.)			
Soil Contamination	There would be small impacts from radiological constituents in the soil if preventive and corrective maintenance are not sufficient to prevent a minor water pool leak. There would be no impact due to the use of best management practices for controlling contamination from chemical or petroleum leaks or spills.	Refurbishment Period: There would be small impacts from radiological constituents in the soil if preventive and corrective maintenance are not sufficient to prevent a minor water pool leak. There would be no impact due to the use of best management practices for controlling contamination from chemical or petroleum leaks or spills. Post-Refurbishment Operational Period: There would be no impact due to the use of best management practices for controlling contamination from chemical or petroleum leaks or spills.	Construction Period: There would be no impact due to the use of best management practices for controlling contamination from chemical or petroleum leaks or spills. Transition Period: There would be no impact due to the use of best management practices for controlling contamination from chemical or petroleum leaks or spills. New Facility Operational Period: There would be no impact due to the use of best management practices for controlling contamination from chemical or petroleum leaks or spills.
Volcanic Hazards	Based on the low probability of occurrence for volcanic hazards, the potential impacts would be negligible.		

Table S-2: Comparison of Environmental Impacts for the Project Alternatives (cont.)

Resource/Material Category	No Action Alternative	Overhaul Alternative	New Facility Alternative Location 3/4 and Location 6
Geological and Soil Impacts (cont.)			
Seismic Hazards	There would be moderate impacts from seismic hazards, without additional refurbishment or upgrades, from the continued degradation of the existing facility over time.	Refurbishment Period: There would be moderate impacts from seismic hazards until refurbishment activities are complete. Activities during the refurbishment period would improve the building's ability to withstand vibratory ground motions from seismic activity. Post-Refurbishment Operational Period: There would be small impacts from seismic hazards since the refurbishment actions would improve the building's ability to withstand vibratory ground motions from seismic activity.	Construction Period: There would be small impacts from seismic hazards, without additional refurbishment or upgrades, from the continued degradation of the existing facility over a short period of time. Transition Period: There would be moderate impacts from seismic hazards, without additional refurbishment or upgrades, from the continued degradation of the existing facility over time. There would be small impacts from seismic hazards for the new facility since SSCs would be designed to withstand vibratory ground motions from seismic activity. New Facility Operational Period: There would be moderate impacts from seismic hazards, without additional refurbishment or upgrades, from the continued degradation of the existing facility over time. There would be small impacts from seismic hazards for the new facility since SSCs would be designed to withstand vibratory ground motions from seismic activity.

Table S-2: Comparison of Environmental Impacts for the Project Alternatives (cont.)

Resource/Material Category	No Action Alternative	Overhaul Alternative	New Facility Alternative Location 3/4 and Location 6
Water Quality Impacts			
Radiological Effluent	There would be no impact from radiological effluent since none would be discharged to surface water or the Snake River Plain Aquifer (SRPA).		
Big Lost River	There would be no impact since wastewater or storm water would not be discharged to the Big Lost River.		
Process Wastewater Constituents	While ECF operations continue, there would be no impact to water quality from discharge of process wastewater since no new constituents are expected in process wastewater discharges; constituent concentrations would not change. If ECF operations cease, constituent concentrations could decrease.	<u>Refurbishment Period:</u> There would be no impact to water quality from discharge of process wastewater since no new constituents are expected in process wastewater discharges; constituent concentrations would not change. <u>Post-Refurbishment Operational Period:</u> There would be no impact to water quality from discharge of process wastewater since no new constituents are expected in process wastewater discharges; constituent concentrations would not change.	<u>Construction Period</u>: There would be no impact to water quality from discharge of process wastewater since no new constituents are expected in process wastewater discharges; constituent concentrations would not change. <u>Transition Period</u>: There could be small impacts to water quality from an increase in the total output of non-hazardous salts in process wastewater discharge. <u>New Facility Operational Period</u>: There could be small impacts to water quality from an increase in the total output of non-hazardous salts in process wastewater discharge.
Storm Water Constituents	There would be no impact to water quality from discharge of storm water since no new constituents are expected in storm water discharges; constituent concentrations would not change.		

Table S-2: Comparison of Environmental Impacts for the Project Alternatives (cont.)

Resource/Material Category	No Action Alternative	Overhaul Alternative	New Facility Alternative Location 3/4 and Location 6
Water Quality Impacts (cont.)			
Process Wastewater and Storm Water Discharge Volumes	While ECF operations continue, there would be no impact from discharge to the IWD since discharge volumes would not change. If ECF operations cease, process wastewater discharge volumes could decrease.	Refurbishment Period: There would be no impact from discharge to the IWD since discharge volumes would not change. Post-Refurbishment Operational Period: There would be no impact from discharge to the IWD since discharge volumes would not change.	Construction Period: There could be an increase in discharge volume to the IWD of approximately 44 percent from potential discharges associated with water pool leak testing; however, there would be no impact because total NRF discharge to the IWD would be within approximately 55 percent of the IWD permit limit. There would be a small impact to the amount of water seeping into the perched water zone at the outfall of the IWD due to the potential increased volume of water discharge. Transition Period: There would be an increase in discharge volume to the IWD of approximately 0.6 percent from process wastewater discharges at Location 3/4 and 35 percent from process wastewater and storm water discharges at Location 6. There would be no impact because total NRF discharge to the IWD would be within approximately 38 percent (Location 3/4) and 52 percent (Location 6) of IWD permit limit.

Table S-2: Comparison of Environmental Impacts for the Project Alternatives (cont.)

Resource/Material Category	No Action Alternative	Overhaul Alternative	New Facility Alternative Location 3/4 and Location 6
Water Quality Impacts (cont.)			
Process Wastewater and Storm Water Discharge Volumes (cont.)			Transition Period (cont.): There would be a small impact to the amount of water seeping into the perched water zone at the outfall of the IWD due to increased volume of water discharge. New Facility Operational Period: There would be an increase in discharge volume to the IWD of approximately 0.6 percent from process wastewater discharges at Location 3/4 and 35 percent from process wastewater and storm water discharges at Location 6. There would be no impact because total NRF discharge to the IWD would be within approximately 38 percent (Location 3/4) and 52 percent (Location 6) of IWD permit limit. There would be a small impact to the amount of water seeping into the perched water zone at the outfall of the IWD due to increased volume of water discharge.

Table S-2: Comparison of Environmental Impacts for the Project Alternatives (cont.)

Resource/Material Category	No Action Alternative	Overhaul Alternative	New Facility Alternative Location 3/4 and Location 6
Water Quality Impacts (cont.)			
IWD Erosion and Sedimentation	While ECF operations continue, there would be no impact from discharge to the IWD since discharge volumes would not change. If ECF operations cease, there could be a decrease in discharge volume.	Refurbishment Period: There would be no impact since there is no increase in discharge volumes to the IWD. Post-Refurbishment Operational Period: There would be no impact since there is no increase in discharge volumes to the IWD.	Construction Period: There could be small impacts from potential discharges associated with the water pool leak testing. Transition Period: There would be no impact from increased discharge volumes due to best management practices. New Facility Operational Period: There would be no impact from increased discharge volumes due to best management practices.
Sanitary Wastewater Constituents	There would be no impact to water quality from discharge of sanitary wastewater since no new constituents are expected in sanitary wastewater discharges; constituent concentrations would not change.		

Table S-2: Comparison of Environmental Impacts for the Project Alternatives (cont.)

Resource/Material Category	No Action Alternative	Overhaul Alternative	New Facility Alternative Location 3/4 and Location 6
Water Quality Impacts (cont.)			
Discharge Volume to the Active Sewage Lagoons	While ECF operations continue, there would be no impact from discharge to the active sewage lagoons since discharge volumes would not change. If ECF operations cease, the discharge volume to the active sewage lagoons could decrease.	Refurbishment Period: There would be no impact from the increase in annual and daily discharge to the active sewage lagoons of approximately 13 percent. The total volume of sanitary wastewater discharged from NRF would be within the design operating parameters of the active sewage lagoons. Post-Refurbishment Operational Period: There would be no impact from the increase in annual and daily discharge to the active sewage lagoons of approximately 4 percent. The total volume of sanitary wastewater discharged from NRF would be within the design operating parameters of the active sewage lagoons.	Construction Period: There would be no impact from potential discharge to the active sewage lagoons since the potential for discharge of water from leak testing the water pools would be within the design operating parameters of the active sewage lagoons. Transition Period: There would be no impact from the increase in annual and daily discharge to the active sewage lagoons of approximately 2 percent. The total volume of sanitary wastewater discharged from NRF would be within the design operating parameters of the active sewage lagoons. New Facility Operational Period: There would be no impact from the decrease in annual and daily discharge to the active sewage lagoons.

Table S-2: Comparison of Environmental Impacts for the Project Alternatives (cont.)

Resource/Material Category	No Action Alternative	Overhaul Alternative	New Facility Alternative Location 3/4 and Location 6
Water Quality Impacts (cont.)			
Groundwater	There would be no impact to groundwater from non-radiological constituents since best management practices would continue to be used to protect groundwater. There would be negligible impacts on groundwater from radiological constituents if preventive and corrective maintenance are not sufficient to prevent a minor water pool leak.	Refurbishment Period: There would be no impact to groundwater from non-radiological constituents since best management practices would continue to be used to protect groundwater. There would be negligible impacts on groundwater from radiological constituents if preventive and corrective maintenance are not sufficient to prevent a minor water pool leak prior to water pool refurbishment. Post-Refurbishment Operational Period: There would be no impact to groundwater since best management practices would continue to be used to protect groundwater.	Construction Period: There would be no impact to groundwater since best management practices would continue to be used to protect groundwater. Transition Period: Best management practices will continue to be used to protect groundwater. However, there could be small impacts to groundwater from potential increases in non-hazardous salts in wastewater discharges. New Facility Operational Period: Best management practices will continue to be used to protect groundwater. However, there could be small impacts to groundwater from potential increases in non-hazardous salts in wastewater discharges.

Table S-2: Comparison of Environmental Impacts for the Project Alternatives (cont.)

Resource/Material Category	No Action Alternative	Overhaul Alternative	New Facility Alternative Location 3/4 and Location 6
Water Quality Impacts (cont.)			
Drinking Water	There would be negligible impacts on drinking water sources if preventive and corrective maintenance are not sufficient to prevent a minor water pool leak.	Refurbishment Period: There would be negligible impacts on drinking water sources if preventive and corrective maintenance are not sufficient to prevent a minor water pool leak prior to water pool refurbishment. Post-Refurbishment Operational Period: There would be no impact to drinking water since wellhead protection measures would continue to be used.	Construction Period: There would be no impact to drinking water since wellhead protection measures would continue to be used. Transition Period: There would be no impact to drinking water since wellhead protection measures would continue to be used. New Facility Operational Period: There would be no impact to drinking water since wellhead protection measures would continue to be used.

Table S-2: Comparison of Environmental Impacts for the Project Alternatives (cont.)

Resource/Material Category	No Action Alternative	Overhaul Alternative	New Facility Alternative Location 3/4 and Location 6
Water Use Impacts			
Surface Water Use	There would be no impact from use of surface water since all water is obtained from the SRPA.		
Groundwater Use	While ECF operations continue, there would be no impact to the SRPA from groundwater use since volume of water use would not change. If ECF operations cease, there could be a decrease in groundwater use.	Refurbishment Period: There would be a negligible impact to the SRPA from the increase in groundwater use of approximately 5 percent because NRF groundwater use would only be approximately 0.4 percent of the Federal Reserved Water Right for INL. Post-Refurbishment Operational Period: There would be a negligible impact to the SRPA from the increase in groundwater use of approximately 2 percent because NRF groundwater use would only be approximately 0.4 percent of the Federal Reserved Water Right for INL.	Construction Period: There would be a negligible impact to the SRPA from the increase in groundwater use of approximately 50 percent because NRF groundwater use would only be approximately 0.6 percent of the Federal Reserved Water Right for INL. Transition Period: There would be a negligible impact to the SRPA from the increase in groundwater use of approximately 9 percent because NRF groundwater use would only be approximately 0.4 percent of the Federal Reserved Water Right for INL. New Facility Operational Period: There would be a negligible impact to the SRPA from the increase in groundwater use. The increase would be from non-potable water use.
Vegetation Impacts			
Federal/State-Listed Species	There would be no impact to federal-listed or state-listed plant species, or designated critical habitat, since none occurs on NRF property or on INL. There would be no impact to rare or sensitive plant species since there are none at NRF.		
Non-Radiological Air Pollutant Emissions	There would be no impact on vegetation from non-radiological air pollutant emissions since all air pollutant standards would be met.		

Table S-2: Comparison of Environmental Impacts for the Project Alternatives (cont.)

Resource/Material Category	No Action Alternative	Overhaul Alternative	New Facility Alternative Location 3/4 and Location 6
Vegetation Impacts (cont.)			
Radiological Dose Assessment from Routine Naval Spent Nuclear Fuel Handling Operations	There would be no impact on vegetation from radiological releases during routine naval spent nuclear fuel handling operations because the radionuclide concentrations would be well below biota concentration guides.		
Radiological Dose Assessment from Hypothetical Accidents	There would be small impacts to vegetation from radiological releases in the event of a hypothetical accident. Mitigation plans for biota would be considered based on the level and extent of contamination in accordance with the graded approach established in DOE 2002b.		
Loss or Disturbance of Vegetation	There would be no impact from loss or disturbance of vegetation since there would be no land disturbance.	<u>Refurbishment Period:</u> There would be small impacts from removal of vegetation from approximately 13 hectares (33 acres) for construction of a new security boundary system. <u>Post-Refurbishment Operational Period:</u> There would be no impact from loss or disturbance of vegetation because there would be no land disturbance.	<u>Construction Period:</u> There would be small impacts from removal of vegetation; however, the impacted plant communities are well represented across INL. Approximately 55 hectares (136 acres) of land, much of which has been previously disturbed and is dominated by non-native species, would be cleared of vegetation at Location 3/4. Land disturbance at Location 6 would be smaller. There would be small impacts to vegetation from soil erosion and sedimentation due to increased storm water runoff. <u>Transition Period:</u> There would be no impact from loss of vegetation because there would be no land disturbance. There would be small impacts to vegetation from soil erosion and sedimentation due to increased storm water runoff.

Table S-2: Comparison of Environmental Impacts for the Project Alternatives (cont.)

Resource/Material Category	No Action Alternative	Overhaul Alternative	New Facility Alternative Location 3/4 and Location 6
Vegetation Impacts (cont.)			
Loss or Disturbance of Vegetation (cont.)			New Facility Operational Period: There would be no impact from loss of vegetation because there would be no land disturbance. There would be small impacts to vegetation from soil erosion and sedimentation due to increased storm water runoff.
Noxious Weeds and Non-Native Species	There would be no impact from noxious weeds and non-native species since there will be no land disturbance.	Refurbishment Period: There would be small impacts from the potential establishment of non-native species and noxious weeds in cleared areas for the new security boundary system. The spread of noxious weeds and non-native plants would continue to be minimized by best management practices. Post-refurbishment Operational Period: There would be no impact from noxious or non-native species since there would be no land disturbance.	Construction Period: There would be small impacts from the potential establishment of non-native species and noxious weeds in cleared areas for construction. The spread of noxious weeds and non-native plants would continue to be minimized by best management practices. Transition Period: There would be no impact from noxious weeds or non-native species since there would be no land disturbance. New Facility Operational Period: There would be no impact from noxious weeds or non-native species since there would be no land disturbance.

Table S-2: Comparison of Environmental Impacts for the Project Alternatives (cont.)

Resource/Material Category	No Action Alternative	Overhaul Alternative	New Facility Alternative Location 3/4 and Location 6
Wildlife Impacts			
Federal/State-Listed Species	There would be no impact to federal-listed or state-listed threatened or endangered wildlife or designated critical habitat since none occur on the NRF property.		
Non-Radiological Air Pollutant Emissions	There would be no impact on wildlife from exposure to contaminants since all air pollutant standards would be met and no changes in concentrations of arsenic, lead, or mercury (identified as ecological risk drivers) would occur in the IWD or active sewage lagoons.		
Radiological Dose Assessment from Routine Naval Spent Nuclear Fuel Handling Operations	There would be no impact on wildlife from radiological releases during routine naval spent nuclear fuel handling operations because the radionuclide concentrations would be well below biota concentration guides.		
Radiological Dose Assessment from Hypothetical Accidents	There would be small impacts to wildlife from radiological releases in the event of a hypothetical accident. Mitigation plans for biota would be considered based on the level and extent of contamination in accordance with the graded approach established in DOE 2002b.		
Habitat Loss and Fragmentation	There would be no impact from habitat loss or fragmentation since there would be no land disturbance.	<u>Refurbishment Period:</u> There would be small impacts due to habitat loss from ground disturbance. There would also be small impacts from habitat loss and fragmentation from the new security boundary system. <u>Post- Refurbishment Operational Period:</u> There would be small impacts due to habitat loss and fragmentation from the new security boundary system.	<u>Construction Period:</u> There would be small impacts due to habitat loss and fragmentation from ground disturbance. There would also be small impacts from habitat loss and fragmentation from the new security boundary system. <u>Transition Period:</u> There would be small impacts due to habitat loss and fragmentation from permanent facility structures and the new security boundary system. <u>New Facility Operational Period:</u> There would be small impacts due to habitat loss and fragmentation from permanent facility structures and the new security boundary system.

Table S-2: Comparison of Environmental Impacts for the Project Alternatives (cont.)

Resource/Material Category	No Action Alternative	Overhaul Alternative	New Facility Alternative Location 3/4 and Location 6
Wildlife Impacts (cont.)			
Localized Death or Injury	While ECF operations continue, there would be no impact from localized death and injury since there would be no changes in activity levels. If ECF operations cease, there could be a decrease in localized death and injury due to a decrease in activity levels.	Refurbishment Period: There would be small impacts from localized death and injury from land clearing and construction activities associated with the new security boundary system for small animals. Large animals would avoid the area. Post-Refurbishment Operational Period: There would be no impact from localized death and injury since there would be no additional land clearing or construction activities.	Construction Period: There would be small impacts from localized death and injury from land clearing and construction activities for small animals. Large animals would avoid the area. Transition Period: There would be no impact from localized death and injury since there would be no additional land clearing or construction activities. New Facility Operational Period: There would be no impact from localized death and injury since there would be no additional land clearing or construction activities.

Table S-2: Comparison of Environmental Impacts for the Project Alternatives (cont.)

Resource/Material Category	No Action Alternative	Overhaul Alternative	New Facility Alternative Location 3/4 and Location 6
Wildlife Impacts (cont.)			
Noise	While ECF operations continue, there would be no impact to wildlife from noise since there would be no change in noise levels. If ECF operations cease, noise levels could decrease.	Refurbishment Period: There would be small impacts to wildlife from area avoidance due to increased noise levels during construction of the new vehicle boundary system. Post-Refurbishment Operational Period: There would be no impact to wildlife from noise because there would be no change in noise levels.	Construction Period: There would be small impacts to wildlife from area avoidance due to increased noise levels during construction of the new facility. Transition Period: There would be small impacts to wildlife from noise because impacts from area avoidance would be extended over a greater area (combined habitat around ECF and a new facility). New Facility Operational Period: There would be small impacts to wildlife from noise because impacts from area avoidance would be extended over a greater area (combined habitat around ECF and a new facility).

Table S-2: Comparison of Environmental Impacts for the Project Alternatives (cont.)

Resource/Material Category	No Action Alternative	Overhaul Alternative	New Facility Alternative Location 3/4 and Location 6
Non-Radiological Air Quality Impacts			
Criteria, Toxic, and PSD Air Pollutant Emissions	There would be no impact from emissions of criteria, toxic, and PSD air pollutants since there would be no change in pollutant emissions.	Refurbishment Period: There would be a negligible impact from emissions of criteria air pollutants from an increase in workforce traffic. Intermittent fugitive dust and equipment emissions from the construction of the new security boundary system would have a negligible impact on pollutant concentrations at receptor locations. There would be no impact from operations in ECF since there would be no change in criteria, toxic, or PSD pollutant emissions. Post-Refurbishment Operational Period: There would be a negligible impact from an increase in traffic emissions. There would be no impact from operations in ECF since there would be no change in criteria, toxic, or PSD pollutant emissions.	Construction Period: There would be small impacts from an increase in criteria and PSD air pollutant emissions and negligible impacts from an increase in toxic air pollutant emissions. However, all air quality standards would be met for criteria, toxic, and PSD air pollutants at INL receptor locations. PSD standards would be met for Federal Class I areas. Transition Period: There would be negligible impacts from an increase in criteria, toxic, and PSD air pollutant emissions. All air quality standards would be met for criteria, toxic, and PSD air pollutants at INL receptor locations. PSD standards would be met for Federal Class I areas. New Facility Operational Period: There would be negligible impacts from an increase in criteria, toxic, and PSD air pollutant emissions. All air quality standards would be met for criteria, toxic, and PSD air pollutants at INL receptor locations. PSD standards would be met for Federal Class I areas.

Table S-2: Comparison of Environmental Impacts for the Project Alternatives (cont.)

Resource/Material Category	No Action Alternative	Overhaul Alternative	New Facility Alternative Location 3/4 and Location 6
Non-Radiological Air Quality Impacts (cont.)			
Visibility, Ozone, and Deposition	There would be no impact to visibility, ozone, or deposition at Federal Class I areas since there would be no changes to pollutant emissions.	Refurbishment Period: There would be no impact to visibility, ozone, or deposition at Federal Class I areas since there would be no changes to pollutant emissions. Post-Refurbishment Operational Period: There would be no impact to visibility, ozone, or deposition at Federal Class I areas since there would be no changes to pollutant emissions.	Construction Period: There would be small impacts to visibility, ozone, or deposition at Federal Class I areas since air pollutant emissions would increase. However, all threshold values would be met. Transition Period: There would be negligible impacts to visibility, ozone, or deposition at Federal Class I areas since air pollutant emissions would increase. However, all threshold values would be met. New Facility Operational Period: There would be negligible impacts to visibility, ozone, or deposition at Federal Class I areas since air pollutant emissions would increase. However, all threshold values would be met.

Table S-2: Comparison of Environmental Impacts for the Project Alternatives (cont.)

Resource/Material Category	No Action Alternative	Overhaul Alternative	New Facility Alternative Location 3/4 and Location 6
Non-Radiological Air Quality Impacts (cont.)			
Greenhouse Gases (GHGs)	There would be no impact from GHG emissions since there would be no change in pollutant emissions.	Refurbishment Period: There would be negligible impacts from small increases in GHG emissions primarily associated with increased commuting and increased purchased electricity. Post-Refurbishment Operational Period: There would be negligible impacts from small increases in GHG emissions primarily associated with increased commuting.	Construction Period: There would be negligible impacts from small increases in GHG emissions primarily associated with increased commuting and on-site operation of construction equipment. Diesel generators and purchased electricity would also contribute to GHG emissions. Transition Period: There would be negligible impacts from small increases in GHG emissions primarily associated with purchased electricity and fuel oil-fired boilers. New Facility Operational Period: There would be negligible impacts from small increases in GHG emissions primarily associated with purchased electricity and fuel oil-fired boilers.
Climate Change	There would be small impacts from continued climate change that could pose threats to infrastructure and risk to worker health and safety through increased frequency and severity of extreme weather events (e.g., drought, thunderstorms, strong winds, hail, tornadoes, snow storms, dust devils, and wildfires). There is also potential for persistent drought to increase risk of power disruptions during summer months, when water shortages could lead to decreased energy production from the region's electricity facilities. Increased temperatures resulting in additional cooling demands in the summer may also impact the proposed action by contributing to power disruption or by increasing stress on cooling systems. These potential vulnerabilities can be mitigated through existing NRF safety, operations, and emergency planning processes.		

Table S-2: Comparison of Environmental Impacts for the Project Alternatives (cont.)

Resource/Material Category	No Action Alternative	Overhaul Alternative	New Facility Alternative Location 3/4 and Location 6
Radiological Air Quality Impacts			
Radiological Pollutant Emissions	While ECF operations continue, there would be no impact from radiological emissions since radiological emissions could decrease. If ECF operations cease, there would be a decrease in radiological emissions.	Refurbishment Period: There would be no impact from radiological emissions since radiological emissions would not change. Post-Refurbishment Operational Period: There would be a negligible impact from radiological pollutant emissions since the total NRF radiological emissions would represent less than 0.03 percent of INL emissions.	Construction Period: There would be no impact from radiological emissions since construction would not involve any radioactive materials or produce any radiological emissions. Transition Period: There would be a negligible impact from radiological pollutant emissions since the total NRF radiological emissions would represent less than 0.03 percent of INL emissions. New Facility Operational Period: There would be a negligible impact from radiological pollutant emissions since the total NRF radiological emissions would represent less than 0.03 percent of INL emissions.

Table S-2: Comparison of Environmental Impacts for the Project Alternatives (cont.)

Resource/Material Category	No Action Alternative	Overhaul Alternative	New Facility Alternative Location 3/4 and Location 6
Noise Impacts			
Noise Levels	While ECF operations continue, there would be no impact to public and sensitive receptors since noise levels would not change. If ECF operations cease, there could be a decrease in noise levels.	Refurbishment Period: There would be no impact to public and sensitive receptors from refurbishment activity noise levels due to the distance of public receptors. There would be negligible impacts to public and sensitive receptors located along U.S. Highway 20, U.S. Highway 26, and State Route 33 from an increase in traffic noise. Post-Refurbishment Operational Period: There would be no impact to public and sensitive receptors since noise levels would not change.	Construction Period: There would be no impact to public and sensitive receptors from construction activity noise levels due to the distance of the public receptors. There would be negligible impacts to public and sensitive receptors located along U.S. Highway 20, U.S. Highway 26, and State Route 33 from an increase in traffic noise. Transition Period: There would be no impact to public and sensitive receptors since noise levels would not change. New Facility Operational Period: There would be no impact to public and sensitive receptors since noise levels would not change.

Table S-2: Comparison of Environmental Impacts for the Project Alternatives (cont.)

Resource/Material Category	No Action Alternative	Overhaul Alternative	New Facility Alternative Location 3/4 and Location 6
Cultural Resource Impacts			
Cultural Resources and Historic Properties	There would be no impact to cultural resources or historic properties since there would be no ground disturbance, visual changes, or culturally or historically significant changes made to ECF.	Refurbishment Period: There would be no impact to cultural resources since there are no cultural resources or historic properties located in the disturbance area. Post-Refurbishment Operational Period: There would be no impact to cultural resources since no land would be disturbed.	Construction Period: There would be small unavoidable impacts to Native American cultural resources; however, no resources eligible for listing on the National Register of Historic Places would be disturbed at Location 3/4 or Location 6. Transition Period: There would be no impact to cultural resources since no land would be disturbed. New Facility Operational Period: There would be no impact to cultural resources since no land would be disturbed.

Table S-2: Comparison of Environmental Impacts for the Project Alternatives (cont.)

Resource/Material Category	No Action Alternative	Overhaul Alternative	New Facility Alternative Location 3/4 and Location 6
Visual/Scenic Resource Impacts			
Landscape Contrast	There would be no impact to visual/scenic resources from landscape contrast since no new structures would be built.	Refurbishment Period: There would be no impact to visual/scenic resources from landscape contrast since the new security boundary system would be at ground level and would not be visible from surrounding areas. Post-Refurbishment Operational Period: There would be no impact to visual/scenic resources from landscape contrast since no new structures would be built.	Construction Period: There would be no impact to visual/scenic resources from landscape contrast since the new facility would be consistent with the current visual character of NRF. Transition Period: There would be no impact to visual/scenic resources from landscape contrast since no new structures would be built. New Facility Operational Period: There would be no impact to visual/scenic resources from landscape contrast since no new structures would be built.

Table S-2: Comparison of Environmental Impacts for the Project Alternatives (cont.)

Resource/Material Category	No Action Alternative	Overhaul Alternative	New Facility Alternative Location 3/4 and Location 6
Visual/Scenic Resource Impacts (cont.)			
Deterioration of Landscape	There would be no impact to visual/scenic resources from deterioration of the landscape since emissions would not cause an increase in visibility impacts.		Construction Period: There would be a small impact to visual/scenic resources from deterioration of the landscape since emissions would cause a small increase in visibility impacts. Transition Period: There would be a negligible impact to visual/scenic resources from deterioration of the landscape since emissions would cause a negligible increase in visibility impacts. New Facility Operational Period: There would be a negligible impact to visual/scenic resources from deterioration of the landscape since emissions would cause a negligible increase in visibility impacts.

Table S-2: Comparison of Environmental Impacts for the Project Alternatives (cont.)

Resource/Material Category	No Action Alternative	Overhaul Alternative	New Facility Alternative Location 3/4 and Location 6
Socioeconomic Impacts			
Employment	While ECF operations continue, there would be no impact to employment since employment levels at NRF would not change. If ECF operations cease, there would be small impacts to levels of employment from a decrease in the number of workers.	Refurbishment Period: There would be a small beneficial impact from an increase of 180 direct refurbishment jobs. Post-Refurbishment Operational Period: There would be a small beneficial impact from an increase of 80 naval spent nuclear fuel handling jobs.	Construction Period: There would be a small beneficial impact from an increase of 360 direct construction jobs. Transition Period: There would be a small beneficial impact from an increase of 60 naval spent nuclear fuel handling jobs. New Facility Operational Period: There would be a small impact from the reduction of 60 naval spent nuclear fuel handling jobs.
Region of Influence (ROI) Population Increase	While ECF operations continue, there would be no impact to ROI population since employment levels at NRF would not change. If ECF operations cease, there could be a negligible impact from a population decrease in the ROI.	Refurbishment Period: There would be a negligible impact from a population increase of less than 0.01 percent in the ROI. Post-Refurbishment Operational Period: There would be a negligible impact from a population increase of approximately 0.04 percent in the ROI.	Construction Period: There would be a negligible impact from a population increase of approximately 0.01 percent in the ROI. Transition Period: There would be a negligible impact from a population increase of approximately 0.03 percent in the ROI. New Facility Operational Period: There would be a negligible impact from a population decrease of approximately 0.03 percent in the ROI.

Table S-2: Comparison of Environmental Impacts for the Project Alternatives (cont.)

Resource/Material Category	No Action Alternative	Overhaul Alternative	New Facility Alternative Location 3/4 and Location 6
Socioeconomic Impacts (cont.)			
Housing Vacancies	While ECF operations continue, there would be no impact to housing vacancies since employment levels at NRF would not change. If ECF operations cease, there could be a negligible impact from an increase in housing vacancies.	Refurbishment Period: There would be a negligible impact from a decrease in housing vacancies of approximately 0.06 percent in the ROI. Post-Refurbishment Operational Period: There would be a negligible impact from a decrease in housing vacancies of approximately 0.7 percent in the ROI.	Construction Period: There would be a negligible impact from a decrease in housing vacancies of approximately 0.1 percent in the ROI. Transition Period: There would be a negligible impact from a decrease in housing vacancies of approximately 0.5 percent in the ROI. New Facility Operational Period: There would be a negligible impact from an increase in housing vacancies of approximately 0.5 percent in the ROI.
Taxes	While ECF operations continue, there would be no impact to local and state revenues since employment levels at NRF would not change. If ECF operations cease, there could be a small annual impact from a decrease in local and state revenues.	Refurbishment Period: There would be a small annual beneficial impact from an increase in local and state revenues of approximately $6 million. Post-Refurbishment Operational Period: There would be a small annual beneficial impact from an increase in local and state revenues of approximately $3 million.	Construction Period: There would be a small annual beneficial impact from an increase in local and state revenues of approximately $9 million. Transition Period: There would be a small annual beneficial impact from an increase in local and state revenues of approximately $2 million. New Facility Operational Period: There would be a small annual impact from a decrease in local and state revenues of approximately $2 million.

Table S-2: Comparison of Environmental Impacts for the Project Alternatives (cont.)

Resource/Material Category	No Action Alternative	Overhaul Alternative	New Facility Alternative Location 3/4 and Location 6
Socioeconomic Impacts (cont.)			
Public Service Levels	While ECF operations continue, there would be no impact to public service levels since employment levels at NRF would not change. If ECF operations cease, there would be no impact to public service levels since no less teachers, police officers or firefighters would be required to maintain current levels of service.	Refurbishment Period: There would be a negligible impact to public service levels since less than one additional teacher, firefighter, and police officer would be required to maintain current levels of service. Post-Refurbishment Operational Period: There would be small impacts to public service levels since two additional teachers, and less than one additional firefighter and police officer would be required to maintain current levels of service.	Construction Period: There would be a negligible impact to public service levels since less than one additional teacher, firefighter, and police officer would be required to maintain current levels of service. Transition Period: There would be small impacts to public service levels since two additional teachers, and less than one additional firefighter and police officer would be required to maintain current levels of service. New Facility Operational Period: There would be no impact to public service levels since two fewer teachers and no additional police officers or firefighters would be required to maintain current levels of service.

Table S-2: Comparison of Environmental Impacts for the Project Alternatives (cont.)

Resource/Material Category	No Action Alternative	Overhaul Alternative	New Facility Alternative Location 3/4 and Location 6
Energy Consumption, Site Utilities, and Security Infrastructure Impacts			
Energy Consumption	There would be no impact from energy consumption since there would not be an increase in energy demand.	Refurbishment Period: There would be small impacts from energy consumption due to an increase in peak electrical demand of 0.5 megawatts (approximately 10 percent over current NRF electrical demands), and a small increase in consumption of diesel fuel and gasoline. Post-Refurbishment Operational Period: There would be beneficial impacts to energy consumption from the incorporation of Federal High Performance and Sustainable Building Guiding Principles.	Construction Period: There would be small impacts from energy consumption due to an increase in peak electrical demand of 5.1 megawatts (85 percent over current NRF electrical demands), and a small increase in consumption of diesel fuel and gasoline. Transition Period: There would be moderate impacts from energy consumption from an increase in electrical demand of 12 megawatts and a small increase in consumption of diesel fuel and gasoline. Small impacts to energy consumption are expected from the increase in consumption of fuel oil, if fuel oil-fired boilers are used. The increased electrical demand for NRF added to the peak load at INL would not exceed the contract demand in the agreement with Idaho Power (45 megawatts).

Table S-2: Comparison of Environmental Impacts for the Project Alternatives (cont.)

Resource/Material Category	No Action Alternative	Overhaul Alternative	New Facility Alternative Location 3/4 and Location 6
Energy Consumption, Site Utilities, and Security Infrastructure Impacts (cont.)			
Energy Consumption (cont.)			New Facility Operational Period: There would be moderate impacts from energy consumption from an increase in electrical demand of 12 megawatts, and no impact from the consumption of diesel fuel and gasoline. The increased electrical demand for NRF added to the peak load at INL would not exceed the contract demand in the agreement with Idaho Power (45 megawatts).
Site Utilities	There would be no impact to site utilities since there would not be any utility modifications.	Refurbishment Period: There would be no impact to site utilities because no site utility modifications would be necessary. Post-Refurbishment Operational Period: There would be no impact to site utilities because no site utility modifications would be necessary.	Construction Period: There would be small to moderate impacts to site utilities due to changes necessary to support construction and operations. Transition Period: There would be no impact to site utilities because no site utility modifications would be necessary. New Facility Operational Period: There would be no impact to site utilities because no site utility modifications would be necessary.

Table S-2: Comparison of Environmental Impacts for the Project Alternatives (cont.)

Resource/Material Category	No Action Alternative	Overhaul Alternative	New Facility Alternative Location 3/4 and Location 6
Energy Consumption, Site Utilities, and Security Infrastructure Impacts (cont.)			
Security Infrastructure	There would be no impact to security infrastructure since there would not be any security infrastructure modifications.	Refurbishment Period: There would be beneficial impacts from the construction of a new security boundary system. Post-Refurbishment Operational Period: There would be beneficial impacts from the addition of a new security boundary system.	Construction Period: There would be beneficial impacts from the construction of a new security boundary system. Transition Period: There would be beneficial impacts from the addition of a new security boundary system. New Facility Operational Period: There would be beneficial impacts from the addition of a new security boundary system.
Environmental Justice Impacts			
Environmental Justice	There would be no disproportionately high and adverse impacts to minority or low-income populations since any potential impacts to these populations and the Shoshone-Bannock tribes would be similar to those experienced by the general population. Impacts to all populations are small.		

Table S-2: Comparison of Environmental Impacts for the Project Alternatives (cont.)

Resource/Material Category	No Action Alternative	Overhaul Alternative	New Facility Alternative Location 3/4 and Location 6
Public and Occupational Health and Safety Impacts			
Non-Radiological Impacts to Workers	While ECF operations continue, there would be no change to impacts from Total Recordable Cases (TRC) and Days Away, Restricted or on-the-job Transfer (DART) cases annually. If operations in ECF cease, there could be a decrease in the number of TRC and DART cases annually.	Refurbishment Period: There would be small impacts from approximately two additional TRCs and less than one additional DART case annually. Post-Refurbishment Operational Period: There would be small impacts from less than one additional TRC and less than one additional DART case annually.	Construction Period: There would be small impacts from less than four additional TRCs and less than two additional DART cases annually. Transition Period: There would be small impacts from less than one additional TRC and less than one additional DART case annually. New Facility Operational Period: There would be no impact from a fractional decrease in the number of TRCs and DART cases annually.
Non-Radiological Impacts to the Public	There would be no impact to the public since construction, refurbishment, and operations activities would take place at NRF approximately 10.5 kilometers (6.5 miles) from the INL property boundary.		

Table S-2: Comparison of Environmental Impacts for the Project Alternatives (cont.)

Resource/Material Category	No Action Alternative	Overhaul Alternative	New Facility Alternative Location 3/4 and Location 6
Public and Occupational Health and Safety Impacts (cont.)			
Radiological Impacts to Workers	While ECF operations continue, there would be no impact to workers since the individual exposures would not increase. If operations in ECF cease, there would be no naval spent nuclear fuel handling workers and therefore no radiation exposure to those workers.	Refurbishment Period: There would be no impact to workers since individual exposures would not increase. Due to an increase in number of workers, there would be a collective increase in radiological exposure to workers of 0.11 person-Sievert (11 person-rem). Post-Refurbishment Operational Period: There would be no impact to workers since individual exposures would not increase. Due to an increase in number of workers, there would be a collective increase in radiological exposure to the workers of 0.014 person-Sievert (1.4 person-rem).	Construction Period: There would be no impact to workers since exposures from ECF would not increase. Transition Period: There would be no impact to workers since individual exposures would not increase. Due to an increase in number of workers, there would be a collective increase in radiological exposure of 0.011 person-Sievert (1.1 person-rem). New Facility Operational Period: There would be no impact to workers since individual exposures would not increase. Due to an increase in number of workers, there would be a collective decrease in exposure of 0.011 person-Sievert (1.1 person-rem).

Table S-2: Comparison of Environmental Impacts for the Project Alternatives (cont.)

Resource/Material Category	No Action Alternative	Overhaul Alternative	New Facility Alternative Location 3/4 and Location 6
Public and Occupational Health and Safety Impacts (cont.)			
Radiological Impacts to Individuals Outside ECF or the New Facility	While ECF operations continue, there would be no impact from radiological exposure to individuals outside ECF since a reduction in radiation exposure could occur. If ECF operations cease, radiological exposure would decrease.	Refurbishment Period: There would be no impact to individuals outside ECF since the radiation exposure would not increase. Post-Refurbishment Operational Period: There would be no impact to individuals outside ECF from an increase in exposure since the radiation exposure is negligible compared to annual background radiation exposure.	Construction Period: There would be no impact to individuals outside ECF since radiological exposures from ECF would be negligible. Transition Period: There would be no impact to individuals outside ECF and the new facility from an increase in exposure since the radiation exposure is negligible compared to annual background radiation exposure. New Facility Operational Period: There would be no impact to individuals outside ECF and the new facility from an increase in exposure since the radiation exposure is negligible compared to annual background radiation exposure.
Radiological Impacts from Hypothetical Accident and Intentionally Destructive Act (IDA) Scenario Exposures	There would be no impact since the increased likelihood of fatal cancer from an accident or IDA is negligible compared to the risk of developing fatal cancer from a lifetime of normal activities.		

Table S-2: Comparison of Environmental Impacts for the Project Alternatives (cont.)

Resource/Material Category	No Action Alternative	Overhaul Alternative	New Facility Alternative Location 3/4 and Location 6
Waste Management Impacts			
Non-Hazardous Solid Waste and Recyclable Materials	While ECF operations continue, there would be no impact since waste generation volumes would not change. If ECF operations cease, waste generation could decrease.	Refurbishment Period: There would be small impacts from an increase in the average annual generation rate of non-hazardous solid waste and recyclable materials of approximately 700 cubic meters (900 cubic yards). Post-Refurbishment Operational Period: There would be small impacts from an increase in the average annual generation rate of non-hazardous solid waste and recyclable materials of approximately 300 cubic meters (400 cubic yards).	Construction Period: There would be small impacts from an increase in the average annual generation of non-hazardous solid waste and recyclable materials of approximately 10,000 cubic meters (13,000 cubic yards). In addition, disposal of 78,000 cubic meters (102,000 cubic yards) of unusable soil could be necessary if the material is not stockpiled near the construction site, or used to backfill an existing gravel pit at NRF, or used to backfill the retired sewage lagoons. Transition Period: There would be small impacts from an increase in the average annual generation rate of non-hazardous solid waste and recyclable materials of approximately 230 cubic meters (300 cubic yards). New Facility Operational Period: There would be no impact from the reduction in the average annual generation rate of non-hazardous solid waste and recyclable materials of approximately 230 cubic meters (300 cubic yards).

Table S-2: Comparison of Environmental Impacts for the Project Alternatives (cont.)

Resource/Material Category	No Action Alternative	Overhaul Alternative	New Facility Alternative Location 3/4 and Location 6
Waste Management Impacts (cont.)			
RCRA Hazardous Waste	While ECF operations continue, there would be no impact from RCRA hazardous waste since waste generation volumes would not change. If ECF operations cease, RCRA hazardous waste generation could decrease.	Refurbishment Period: There would be small impacts from an increase in the average annual generation rate for RCRA hazardous waste of approximately 25 cubic meters (30 cubic yards). Post-Refurbishment Operational Period: There would be no impact from RCRA hazardous waste since waste generation volumes would not increase.	Construction Period: There would be small impacts from an increase in the average annual generation rate for RCRA hazardous waste from the disposal of unused chemicals remaining after construction. Transition Period: There would be no impact from RCRA hazardous waste since waste generation volumes would not increase. New Facility Operational Period: There would be no impact from RCRA hazardous waste since waste generation volumes would not increase.
TSCA Waste	While ECF operations continue, there would be no impact from TSCA waste since waste generation volumes would not change. If ECF operations cease, TSCA waste generation could decrease.	There would be no impact from TSCA waste during the Overhaul Alternative periods since none would be generated.	There would be no impact from TSCA waste during the New Facility Alternative periods since waste generation volumes would not increase.

Table S-2: Comparison of Environmental Impacts for the Project Alternatives (cont.)

Resource/Material Category	No Action Alternative	Overhaul Alternative	New Facility Alternative Location 3/4 and Location 6
Waste Management Impacts (cont.)			
Solid LLW	While ECF operations continue, there would be no impact from solid LLW since waste generation volumes would not change. If ECF operations cease, solid LLW generation could decrease.	Refurbishment Period: There would be small impacts from an increase in the average annual generation rate for solid LLW of approximately 3550 cubic meters (4640 cubic yards). Post-Refurbishment Operational Period: There would be small impacts from an increase in the average annual generation rate for solid LLW of approximately 850 cubic meters (1100 cubic yards).	Construction Period: There would be no impact on solid LLW generation since none would be generated due to construction activities. Transition Period: There would be small impacts from an increase in the average annual generation rate for solid LLW of approximately 890 cubic meters (1200 cubic yards). New Facility Operational Period: There would be small impacts from an increase in the average annual generation rate for solid LLW of approximately 890 cubic meters (1200 cubic yards).

Table S-2: Comparison of Environmental Impacts for the Project Alternatives (cont.)

Resource/Material Category	No Action Alternative	Overhaul Alternative	New Facility Alternative Location 3/4 and Location 6
Waste Management Impacts (cont.)			
Radioactive TSCA (PCB) and Radioactive Asbestos Waste	While ECF operations continue, there would be no impact from radioactive TSCA (PCB) or radioactive asbestos waste since waste generation volumes would not change. If ECF operations cease, radioactive TSCA (PCB) or radioactive asbestos waste generation could decrease.	Refurbishment Period: There would be small impacts from an increase in the average annual generation rate for radioactive TSCA (PCB) waste of approximately 3.4 cubic meters (4.4 cubic yards), and an increase in the average annual generation rate for radioactive asbestos waste of approximately 235 cubic meters (310 cubic yards). Post-Refurbishment Operational Period: There would be no impact on radioactive TSCA (PCB) or radioactive asbestos waste since there would be no increase in their generation rates.	Construction Period: There would be no impact on radioactive TSCA (PCB) and radioactive asbestos waste generation since none would be generated due to construction activities. Transition Period: There would be no impact on radioactive TSCA (PCB) and radioactive asbestos waste generation since there would be no increase in generation. New Facility Operational Period: There would be no impact on radioactive TSCA (PCB) and radioactive asbestos waste generation since there would be no increase in generation.

Table S-2: Comparison of Environmental Impacts for the Project Alternatives (cont.)

Resource/Material Category	No Action Alternative	Overhaul Alternative	New Facility Alternative Location 3/4 and Location 6
Waste Management Impacts (cont.)			
MLLW	While ECF operations continue, there would be no impact from MLLW since waste generation volumes would not change. If ECF operations cease, MLLW generation could decrease.	Refurbishment Period: There would be small impacts from an increase in the average annual generation rate for MLLW of approximately 170 cubic meters (230 cubic yards). Post-Refurbishment Operational Period: There would be no impact on MLLW generation since there would be no increase in the generation rate.	Construction Period: There would be no impact on MLLW generation since none would be generated due to construction activities. Transition Period: There would be no impact on MLLW generation since there would be no increase in generation. New Facility Operational Period: There would be no impact on MLLW generation since there would be no increase in generation.

Table S-2: Comparison of Environmental Impacts for the Project Alternatives (cont.)

Resource/Material Category	No Action Alternative	Overhaul Alternative	New Facility Alternative Location 3/4 and Location 6
Waste Management Impacts (cont.)			
Liquid LLW	While ECF operations continue, there would be no impact from liquid LLW since waste generation volumes would not change. If ECF operations cease, liquid LLW generation volumes could decrease.	Refurbishment Period: There would be no impact from liquid LLW since waste generation volumes would not change. Post-Refurbishment Operational Period: There would be no impact from liquid LLW since waste generation volumes would not change.	Construction Period: There would be no impact from liquid LLW since none would be generated due to construction activities. Transition Period: Although there could be an increase of approximately 30 liters (8 gallons) in the annual liquid LLW generation rate, there would be no impact since this waste stream is sent off-site to be burned for fuel. New Facility Operational Period: Although there could be an increase of approximately 30 liters (8 gallons) in the annual liquid LLW generation rate, there would be no impact since this waste stream is sent off-site to be burned for fuel.

Table S-2: Comparison of Environmental Impacts for the Project Alternatives (cont.)

Resource/Material Category	No Action Alternative	Overhaul Alternative	New Facility Alternative Location 3/4 and Location 6
Naval Spent Nuclear Fuel Management Impacts			
Naval Spent Nuclear Fuel Management	While ECF operations continue, there would be large impacts on naval spent nuclear fuel management due to management of M-290 shipping containers and work stoppages that would affect fleet performance and the ability to manage naval spent nuclear fuel in accordance with SA 1995 and SAA 2008. If ECF operations cease, there would be large impacts on naval spent nuclear fuel management since the NNPP would eventually be unable to defuel and refuel submarines, leading to the inability of the nuclear-powered ships or their nuclear-trained naval personnel to be deployed or redeployed into fleet operations. Additionally, the NNPP would be unable to meet the requirements of SA 1995 and SAA 2008.	Refurbishment Period: There would be moderate impacts on naval spent nuclear fuel management from temporary work stoppages; however, the facility would be operated to minimize the impact on the NNPP's ability to meet its mission. Post-Refurbishment Operational Period: There would be no impact on naval spent nuclear fuel management since NRF would manage ECF to meet SA 1995 and SAA 2008 despite facility constraints.	Construction Period: There would be small impacts on naval spent nuclear fuel management from temporary mitigation measures needed until the new facility is operational. Transition Period: There would be small impacts on naval spent nuclear fuel management from the inefficiencies of performing naval spent nuclear fuel handling operations concurrently in two separate facilities. New Facility Operational Period: There would be beneficial impacts on naval spent nuclear fuel management once the new facility is fully operational because of increased process efficiencies.

S.9.1 Comparison of Environmental Impacts

Land Use

Differences in impacts to land use from the alternatives are related to the amount of land that is disturbed by construction or refurbishment activities and land required for permanent facilities and supporting infrastructure. The largest impacts from land disturbance are from the construction period of the New Facility Alternative. The New Facility Alternative requires a new facility and supporting infrastructure in addition to a new security boundary system. There is less land disturbance for the Overhaul Alternative than the New Facility Alternative because only a new security boundary system would be built. There are no impacts associated with the No Action Alternative because there would be no land disturbance.

Transportation

Infrastructure

The only impacts to transportation infrastructure are from the construction period of the New Facility Alternative due to the addition of temporary gravel roadways, paved roadways, and additional rail line.

Personnel

Differences in impacts to personnel transportation from the alternatives are related to the traffic from the number of commuter vehicles. Under the No Action Alternative, if ECF operations cease, the average daily traffic could decrease. For the Overhaul Alternative and the New Facility Alternative, there would be small impacts from an increase in traffic on U.S. Highway 20, U.S. Highway 26, and State Route 33 due to an increase of commuters; these impacts are largest during the refurbishment period of the Overhaul Alternative (due to an additional 180 commuters) and the construction period of the New Facility Alternative (due to an additional 360 commuters) where there are increases of 3 and 6 percent, respectively. The impacts from the post-refurbishment operational period and the transition period are smaller due to the use of the INL bus by NRF employees.

Material Shipments

Differences in impacts to traffic from the alternatives are related to the number of truck shipments of construction materials (e.g., asphalt, concrete, piping, and building cranes). There would be a negligible impact from transportation of materials during the refurbishment period of the Overhaul Alternative from 1 additional shipment each day. There would be a small impact to traffic from transportation of materials during the construction period of the New Facility Alternative from approximately 50 additional shipments each day.

Waste Shipments

Differences in impacts from transportation of waste are related to waste generation. Under the No Action Alternative, if ECF operations cease, there could be a decrease in the number of shipments. There would be a negligible impact from transportation of non-hazardous waste, RCRA hazardous waste (including non-radioactive TSCA waste), and recyclable material during the construction period of the New Facility Alternative.

Geology and Soils

Use of Geologic and Soil Resources

Differences in impacts to geologic and soil resources from the alternatives are related to the excavated materials and borrow materials required for the construction and refurbishment activities. The largest impacts to geologic and soil resources are from the construction period of the New Facility Alternative. The New Facility Alternative requires a new facility and supporting infrastructure in addition to a new security boundary system. Less borrow materials and excavated materials are needed for the Overhaul Alternative than the New Facility Alternative because only a new security boundary system would be built and the water pool refurbished. There would be no excavated materials and no geologic and soil resources required for the No Action Alternative.

Quality of Geologic and Soil Resources

The only impacts to quality of geologic and soil resources occur during the refurbishment period of the Overhaul Alternative and the construction period of the New Facility Alternative. There are no differences in impacts between these alternatives.

Soil Contamination

The only impacts from soil contamination would occur for the No Action Alternative and during the refurbishment period of the Overhaul Alternative if preventive and corrective maintenance are not sufficient to prevent a minor water pool leak.

Volcanic Hazard

There would be no differences in impacts from volcanic hazards for the alternatives. Based on the low probability of occurrence for volcanic hazards, the potential impacts to the alternatives would be negligible.

Seismic Hazards

Differences in impacts from seismic hazards from the alternatives are related to the ability to withstand vibratory ground motions under each alternative. Since there would be no additional refurbishment or upgrades to ECF for the No Action Alternative, the facility and supporting infrastructure would continue to degrade for a period of 45 years.

During the refurbishment period of the Overhaul Alternative, to the extent practicable, infrastructure and equipment would be refurbished or designed to the appropriate natural phenomena hazard category to withstand vibratory ground motions.

During the construction and transition periods of the New Facility Alternative, there may be upgrades or refurbishments to ECF, to ensure operations continue in a safe and environmentally responsible manner. During the transition and new facility operational periods, the structures, systems, and components in the new facility would be designed to the appropriate natural phenomena hazard category to withstand vibratory ground motions.

Water Resources

Differences in impacts to water resources from the alternatives are related to changes in water quality (i.e., constituent concentrations and discharge volumes) and water use.

Water Quality

Process Wastewater Constituents

The only impacts to constituents in process wastewater would be during the transition and operational periods of the New Facility Alternative. Total output of non-hazardous salts in the IWD effluent could increase under the New Facility Alternative due to increased water softening and de-ionized water treatment processes. Water softening could increase during the transition period due to increased potable water use. De-ionized water treatment could increase during the transition and operational periods due to a larger water pool and the need for replacement water due to evaporation. Under the No Action Alternative (during ECF operations) and Overhaul Alternative, constituents in process wastewater would not change. If ECF operations cease under the No Action Alternative, constituent concentrations could decrease.

Process Wastewater and Storm Water Discharge Volumes

The only impact from discharge volume to the IWD would be from the New Facility Alternative. The largest increase in discharge volume would occur during the construction period. Increases in discharge would be from potential discharges associated with water pool leak testing; however, there would be no impact because the total NRF discharge to the IWD would be within approximately 55 percent of the IWD permit limit. There would be a small impact to the amount of water seeping into the perched water zone at the outfall of the IWD due to the potential increased volume of water discharge. Storm water would be discharged to lined evaporation ponds at Location 3/4. During the construction period, storm water from cleared and compacted construction areas would be managed on-site. Under the No Action Alternative (during ECF operations) and Overhaul Alternative, discharge volumes to the IWD would not change. If ECF operations cease under the No Action Alternative, discharge volumes to the IWD could decrease.

Discharge Volumes to the Active Sewage Lagoons

The largest increase from discharge volume to the active sewage lagoons would be from the refurbishment period of the Overhaul Alternative from the increase of 180 refurbishment workers. Increases during the post-refurbishment operational period of the Overhaul Alternative, and the transition period would also occur due to the increase of 50 and 45 naval spent nuclear fuel handling workers, respectively. However, there would be no impacts because the total discharge would be within the design operating parameters of the active sewage lagoons. Under the No Action Alternative, while operations in ECF continue, discharge volume of sanitary wastewater to the active sewage lagoons would not change. If operations in ECF cease under the No Action Alternative, there could be a decrease in discharge volume to the active sewage lagoons. During the construction period of the New Facility Alternative, discharge volume of sanitary wastewater to the active sewage lagoons would not change due to the use of portable sanitary sewer systems. During the new facility operational period, the work force would decrease by about 110 personnel resulting in small decrease in sanitary wastewater discharge.

Groundwater

There would be negligible impacts to groundwater under the No Action Alternative and the refurbishment period of Overhaul Alternative from radiological constituents if preventive and corrective maintenance are not sufficient to prevent a minor water pool leak. There could be small impacts to groundwater during the transition period and new facility operational period under the New Facility Alternative from potential increases in non-hazardous salts in wastewater discharge.

Drinking Water

The only impacts to drinking water would occur under the No Action Alternative and the refurbishment period of Overhaul Alternative. There would be negligible impacts on drinking water sources if preventive and corrective maintenance are not sufficient to prevent a minor water pool leak.

Groundwater Use

The extent of groundwater use varies amongst alternatives; however, where there is an increase in the volume of groundwater used, the increase is negligible in comparison to the Federal Reserved Water Right for INL. The largest increases in water use occur for the New Facility Alternative. During the construction period, water use would increase from dust control, soil and engineered fill compaction, equipment washing and flushing, landscaping, water pool leak test, final water pool fill, and batch plant operations. During the transition period, water use would increase due to increased work force (45 personnel), from replacing evaporated water from water pools larger than those in ECF, fire water usage during testing, and landscape irrigation. During the operations period, potable water use would decrease due to decreased work force (110 personnel), but there would be a net increase due to non-potable water used for replacing evaporated water from water pools larger than those in ECF, fire water usage during testing, and landscape irrigation. During the refurbishment period of the Overhaul Alternative, water use would increase due to increased workforce (180 personnel) and for activities such as washing equipment and tools, concrete saw cutting, and concrete drilling. Under the No Action Alternative (while ECF operations continue) groundwater use would not change. If ECF operations cease under the No Action Alternative, there could be a decrease in groundwater use.

Ecological Resources

Vegetation

Differences in impacts to vegetation from the alternatives are related to area of land disturbance. The primary impacts to vegetation would be loss or disturbance during construction activities and potential for invasion of disturbed areas by noxious weeds and non-native plants. The impacts would occur during the refurbishment period of the Overhaul Alternative and the construction period of the New Facility Alternative. The largest impacts would occur during the construction period of the New Facility Alternative since the area disturbed is larger than during the refurbishment period of the Overhaul Alternative. During the construction period, land disturbance at Location 6 would result in the greatest impacts since Location 6 is currently less disturbed than Location 3/4. Location 6 is also dominated by native species while Location 3/4 is dominated by non-native species. For the No Action Alternative, post-refurbishment period of the Overhaul Alternative, and transition and new facility operational periods of the New Facility Alternative, no additional land disturbance would occur.

Wildlife

Differences in impacts to wildlife from the alternatives are related to area of land disturbance and level of activity. The primary impacts to wildlife would be habitat loss and fragmentation, localized death and injury, and noise. Noise during construction could result in avoidance of the construction areas and adjacent habitat. Land clearing during construction of the new security boundary system during the refurbishment period of the Overhaul Alternative and construction of new facility structures during the construction period of the New Facility Alternative could result in mortality of small animals. Large animals would avoid the area due to the increase in noise levels. These impacts would be largest for the construction period of the New Facility Alternative due to the larger area that would be disturbed.

If ECF operations cease under the No Action Alternative, there could be a decrease in localized death and injury and a decrease in noise due to a decrease in activity levels.

Air Quality

Non-Radiological Air Emissions

Differences in impacts from non-radiological air emissions from the alternatives are related to increases in non-radiological air pollutant emissions. These pollutant emissions can affect visibility, ozone, and deposition. The impacts to non-radiological air emissions from the New Facility Alternative are due to an increase in criteria, toxic, and PSD air pollutant emissions. During the construction period, these impacts would be small for criteria and PSD air pollutant emissions and negligible for toxic air pollutant emissions. The impacts result from construction activities such as excavation, use of diesel generators, and equipment operation. During the transition and new facility operational period, the increases are from boiler emissions associated with heating a larger facility and greater power requirements for the emergency diesel generators. However, impacts would be negligible and all air quality standards would be met for criteria, toxic, and PSD air pollutants at INL receptor locations. PSD and visibility standards would be met for Federal Class I areas. For the Overhaul Alternative, the construction of the new security boundary system during the refurbishment period would generate intermittent fugitive dust and equipment emissions, and there would be an increase in workforce traffic, resulting in negligible impact to non-radiological air emissions. The increase in workforce traffic would also result in a negligible impact to non-radiological air emissions. Non-radiological air emissions would not change for the No Action Alternative.

Greenhouse Gases

Increases in GHGs impact global climate change. With the exception of the No Action Alternative, there would be no differences in climate change impacts from GHGs for the alternatives. GHG emissions would not increase under the No Action Alternative; therefore, impacts on global climate change would not change. Impacts on global climate for the Overhaul Alternative would be negligible and primarily due to increases in GHGs from worker commute or purchased electricity. Impacts on global change for the New Facility Alternative would be negligible for the construction, transition, and operational periods. During construction, these impacts would be primarily due to increases in GHGs from worker commute, operation of construction equipment, and use of diesel generators. During the transition and operational periods, impacts would be primarily due to increases in GHGs from purchased electricity and fuel oil-fired boilers used for heat. Increased worker commuting would also contribute during the transition period.

There would be no differences in impacts from global climate change for the alternatives. If global GHG emissions remain at or above current rates, impacts on global climate change will continue to occur. Continued climate change could pose threats to infrastructure and risk to worker health and safety through increased frequency and severity of extreme weather events (e.g., drought, thunderstorms, strong winds, hail, tornadoes, snow storms, dust devils, and wildfires). There is also potential for persistent drought to increase risk of power disruptions during summer months when water shortages could lead to decreased energy production from the region's electricity facilities. Increased temperatures resulting in additional cooling demands in the summer may also impact the proposed action by contributing to power disruption or by increasing stress on cooling systems. These potential vulnerabilities can be mitigated through existing NRF safety, operations, and emergency planning processes. Therefore, impacts of climate change would be small for the alternatives.

Radiological Air Emissions

Differences in impacts from radiological air emissions from the alternatives are related to changes in radiological air pollutant emissions. Radiological air emissions could decrease for the No Action Alternative while operations continue due to the decrease in the operational pace at ECF. There would be no radiological emissions from the No Action Alternative if operations in ECF cease or from the construction period of the New Facility Alternative since construction would not involve any radioactive materials or produce any radiological emissions. Radiological air emissions would not change for the refurbishment period of the Overhaul Alternative due to the reduced pace of operations at ECF. For the post-refurbishment operational period of the Overhaul Alternative, the transition period of the New Facility Alternative, and the new facility operational period, radiological emissions would increase from operations at maximum capacity for unloading M-140 shipping containers, unloading M-290 shipping containers, and loading naval spent nuclear fuel canisters. However, the increase in emissions would represent less than 0.03 percent of INL emissions.

Noise

Differences in impacts from noise between the alternatives are related to the increase in traffic along U.S. Highway 20, U.S. Highway 26, and State Route 33. Noise levels would not change for the No Action Alternative (while ECF operations continue), the post-refurbishment operational period of the Overhaul Alternative, the transition period of the New Facility Alternative, and the new facility operational period. For the refurbishment period of the Overhaul Alternative and the construction period of the New Facility Alternative, local noise levels would increase, due to the increase in traffic; therefore, the increase in noise would be negligible to public and sensitive receptors located along U.S. Highway 20, U.S. Highway 26, and State Route 33. If ECF operations cease under the No Action Alternative, there could be a reduction in noise levels.

Cultural Resources and Historic Properties

Differences in impacts to cultural resources from the alternatives are related to the location of disturbance areas and whether cultural resources are present in that area. The only impacts are from the construction period of the New Facility Alternative. For the construction period of the New Facility Alternative, small archaeological sites that have been identified are not eligible for listing on the National Register of Historic Places; however, the historical record described in the INL Cultural Resources Management Plan supports the conclusion that the INL site, including the proposed disturbance areas, is located within a large original territory of the Shoshone-Bannock people, and archaeological and other cultural resources reflect the importance of the area to the Tribes that are located there. Construction of a new facility at NRF would have small unavoidable impacts to Native American cultural resources. There would be no land disturbance from the No Action Alternative. During the refurbishment period of the Overhaul Alternative, a new security boundary system would be constructed; however, there are no cultural resources or historic properties in the land disturbance area.

Visual and Scenic Resources

There would be no differences in impacts to visual and scenic resources from landscape contrast or deterioration of the landscape. No new structures would be built for the No Action Alternative. The new security boundary system constructed for the Overhaul Alternative would be at ground level and would not be visible from surrounding areas. The structures associated with the New Facility Alternative would be consistent with the current visual character of NRF.

Socioeconomic Impacts

Differences among the alternatives are related to the number of workers and the resulting population increase from in-migration to the ROI. In-migration to the ROI varies based on assumptions about the workforce. It is assumed that 3 percent of the construction and refurbishment workforce would be non-local workers, and 70 percent of the naval spent nuclear fuel handling workers would be non-local workers during operational periods.

Employment

The largest impact to direct employment in a single year is from the construction period of the New Facility Alternative. However, the largest overall impact to direct employment is from the increase in 180 construction workers during the refurbishment period of the Overhaul Alternative. The increase of 180 construction workers during the refurbishment period is a larger overall impact than the increase of 360 construction workers during the construction period because of the duration of the impact (i.e., 33 years for the refurbishment period versus 3 years for the construction period). There would be no change to the number of naval spent nuclear fuel handling workers at NRF for the No Action Alternative while operations continue in the ECF. If ECF operations cease, the number of workers at NRF would decrease.

ROI Population Increase

The ROI population would not change for the No Action Alternative while operations in the ECF continue. If ECF operations cease, there may be decreases in the ROI population. For the Overhaul and New Facility Alternatives, the ROI population would increase the most from the Overhaul Alternative post-refurbishment period. However, the largest ROI population increase would only increase the ROI population by 0.04 percent. The differences in ROI population changes result from the assumptions about in-migration that vary based on the number of workers that would be local and non-local.

Housing Vacancies

The percent of vacant housing would not change for the No Action Alternative while operations in the ECF continue. If ECF operations cease, there could be an increase in housing vacancies. For the Overhaul and New Facility Alternatives, the decrease in vacant housing would be the largest during the post-refurbishment operational period of the Overhaul Alternative. However, the largest decrease in vacant housing would only decrease the percent of vacant housing in the ROI by less than 1 percent. The differences in housing vacancy changes result from the assumptions about in-migration that vary based on the number of workers that would be local and non-local.

Taxes

The largest annual increase to local and state revenues would be from the construction period of the New Facility Alternative based on a workforce of 360 construction workers. The differences in the local and state revenues among the alternatives are a result of the differences in workforce changes. There would be no change in local and state revenues from the No Action Alternative while operations in the ECF continue since the number of naval spent nuclear fuel handling workers at NRF would not change. Under the No Action Alternative, if ECF operations cease, there could be a decrease in the amount of local and state revenues resulting from a decrease in the number of workers.

Public Service Levels

The largest increase to public service levels would be from the transition period of the New Facility Alternative. The differences in public service level impacts result from the assumptions about in-migration that vary based on the number of workers that would be local and non-local. For the No Action Alternative while operations in the ECF continue, public service levels would not change since the number of naval spent nuclear fuel handling workers at NRF would not change. Under the No Action Alternative, if ECF operations cease, there would be no impact to public service levels since fewer teachers and no additional police officers or firefighters would be required to maintain current levels of service.

Energy Consumption, Site Utilities, and Security Infrastructure

Energy Consumption

Differences among the alternatives are related to the increase in electrical demand and whether or not the demand exceeds the capability of the INL electrical infrastructure. The New Facility Alternative would have the largest impacts from energy consumption during the transition period and new facility operational period. During these time periods, there would be an increase in electrical demand of 12 megawatts which, when added to peak INL load, would not exceed the contract demand in the agreement with Idaho Power (45 megawatts). For the refurbishment period of the Overhaul Alternative, there would be an increase in electrical demand of approximately 0.5 megawatts. For the No Action Alternative and post-refurbishment period of the Overhaul Alternative there would be no increase in electrical demand.

Site Utilities

Differences among the alternatives are related to the extent of changes to water and electrical systems needed to support the alternatives. The New Facility Alternative would have the largest impacts from changes to site utilities. For the New Facility Alternative, impacts to the site utilities would be made to support construction and operations. The potable water system and the sanitary sewer system would be modified by adding length of pipe. Additional tanks, pumps, and piping may be added for the fire water system. At Location 6, a pump and lift station could be installed (if necessary) and the drainage system would be tied into the existing storm water line. At Location 3/4, a local storm water collection system would discharge water by gravity flow into local lined evaporation ponds. For the No Action Alternative and the Overhaul Alternative, no modifications to site utilities would be necessary.

Security Infrastructure

Differences among the alternatives are related to the extent of changes to the security infrastructure. For the No Action Alternative, there would be no security infrastructure changes. For the Overhaul Alternative and the New Facility Alternative, a new security boundary system would be constructed. During the construction period of the New Facility Alternative, a personnel fence would separate the operational areas of NRF from the construction workers.

Environmental Justice Impacts

Impacts to environmental justice populations and the Shoshone-Bannock tribes would be similar to those experienced by the general population.

Public and Occupational Health and Safety Impacts

Non-Radiological Impacts to Workers

Differences among the alternatives are related to the number of workers. TRCs and DART cases increase or decrease proportionately to number of workers required. The largest annual increase in TRCs and DART cases would be from the construction period of the New Facility Alternative consistent with the 360 construction workers necessary for that alternative. For the No Action Alternative while operations in ECF continue, additional workers would not be required; therefore, there would be no change to the TRCs and DART cases. If ECF operations cease under the No Action Alternative, there would be a decrease in the number of workers and associated TRC and DART cases.

Radiological Impacts to Workers

The radiation exposure to an individual naval spent nuclear fuel handling worker would not change for any alternative. The collective radiation exposures differ between the periods and alternatives because they are related to the number of workers. The refurbishment period of the Overhaul Alternative would have the largest increase in collective exposure due to the exposure of 180 refurbishment workers. If operations in ECF cease under the No Action Alternative, there would be no naval spent fuel handling workers and therefore no radiation exposure to those workers. During the construction period of the New Facility Alternative, radiation exposure from ECF operations to construction workers would be negligible.

Radiological Impacts to the Public

If operations in ECF cease under the No Action Alternative, there will be no public radiation exposure. Radiation exposure to the public could be reduced during the No Action Alternative while operations in ECF continue or if operations in ECF cease. Radiation exposure to the public would not increase during the refurbishment period of the Overhaul Alternative. During the post-refurbishment operational period of the Overhaul Alternative, the construction period, transition period, and new facility operational period of the New Facility Alternative, there would be an increase in public exposure due entirely to conservatively assuming the respective facilities are operated at maximum capacity. This increase in exposure is negligible compared to annual background radiation exposure.

There would be no difference in impact to the public from a hypothetical accident scenario or an IDA. The increased likelihood of fatal cancer from an accident or IDA is negligible compared to the risk of developing fatal cancer from a lifetime of normal activities.

Waste Management

Differences in impacts to waste management from the alternatives are related to the volume of waste generated.

Non-Hazardous Solid Waste and Recyclable Materials

The greatest increase in non-hazardous solid waste and recyclable materials from all alternatives comes from the construction period of the New Facility Alternative; the majority of the increase comes from the disposal of unsuitable surface soil associated with the footprint of the new facility. The volume of unsuitable surface soil is based on the conservative assumption that the soil could not be re-used on-site and would need to be disposed of instead. The non-hazardous and recyclable waste

generation rates during the transition period and the new facility operational period are based on the increase and decrease, respectively, in the naval spent nuclear fuel handling workforce.

For the Overhaul Alternative, the increase in generation of non-hazardous solid waste and recyclable materials results from the increase in 180 refurbishment workers during the refurbishment period and an increase in 80 naval spent nuclear fuel handling workers during the post-refurbishment operational period.

Under the No Action Alternative if ECF operations cease, non-hazardous solid waste and Recyclable materials generation could decrease.

RCRA Hazardous Waste

The greatest increase in RCRA hazardous waste generation from all alternatives comes from the refurbishment period of the Overhaul Alternative from activities such as paint and equipment removal. The construction period of the New Facility Alternative would also have an increase in RCRA hazardous waste generation from the disposal of unused chemicals remaining after construction. Under the No Action Alternative if ECF operations cease, there could be a decrease in the generation of RCRA hazardous waste.

TSCA Waste

If ECF operations cease under the No Action Alternative, there could be a decrease in the generation of TSCA waste. For all other alternatives, TSCA waste would not be generated or waste generation volumes would not increase.

Solid LLW

The refurbishment period of the Overhaul Alternative has the greatest increase in solid LLW generation from all alternatives. This increase is primarily from the refurbishment activities. The New Facility Alternative (transition and operational periods) increases are attributed to additional waste from processing naval spent nuclear fuel that arrives in M-290 shipping containers, and from the water purification system (resin and filter waste). The increase in the solid LLW generation rate from the transition and operational periods of the New Facility Alternative is higher than the increase in the solid LLW generation rate for the post-refurbishment operational period of the Overhaul Alternative because the generation rate for the New Facility Alternative includes processing and water purification system waste, while the Overhaul Alternative generation rate only includes processing waste. If ECF operations cease under the No Action Alternative, solid LLW generation could decrease.

Radioactive TSCA (PCB) Waste and Radioactive Asbestos Waste

Only the refurbishment period of the Overhaul Alternative would have an increase in the radioactive TSCA (PCB) waste and radioactive asbestos waste generation rates. The bulk of this waste would be generated during asbestos abatement included in the refurbishment work. If ECF operations cease under the No Action Alternative, radioactive TSCA (PCB) or radioactive asbestos waste generation could decrease.

MLLW

Only the refurbishment period of the Overhaul Alternative would have an increase in the MLLW generation rate, due to refurbishment activities such as decontamination of facilities. If ECF operations cease under the No Action Alternative, MLLW generation could decrease.

Liquid LLW

Only the transition and operational periods of the New Facility Alternative would have an increase in the generation of liquid LLW. If ECF operations cease under the No Action Alternative, liquid LLW generation could decrease.

Naval Spent Nuclear Fuel Management

Differences in impacts to naval spent nuclear fuel management from the alternatives are related to meeting the needs of the U.S. Navy nuclear-powered fleet and the requirements of SA 1995 and SAA 2008. The largest impacts would be from the No Action Alternative due to 1) work stoppages associated with continuing ECF operations that could affect fleet performance and the ability to manage naval spent nuclear fuel in accordance with SA 1995 and SAA 2008, and 2) the eventual inability to defuel and refuel submarines that would result if ECF operations were to cease altogether. Additionally, the NNPP would be unable to meet the requirements of SA 1995 and SAA 2008 if ECF operations ceased. During the refurbishment period of the Overhaul Alternative, there would be temporary work stoppages; however, the facility would be operated to minimize the impact on the NNPP's ability to meet its mission. NRF would manage ECF to meet SA 1995 and SAA 2008, despite facility constraints during the post-refurbishment period of the Overhaul Alternative. During the construction period of the New Facility Alternative, temporary mitigation measures would be needed until the new facility is operational. During the transition period, there would be inefficiencies of performing naval spent nuclear fuel handling operations in two facilities (ECF and the new facility). The operational period of the new facility would benefit from process efficiencies.

S.10 Preferred Alternative

CEQ regulations require the federal agency to identify its preferred alternative to fulfill its statutory mission, if one or more exists, in a Draft EIS (40 C.F.R. § 1502.14). Because the impacts to human health and the environment for all the alternatives would primarily be small, all alternatives are considered to be comparable and indistinguishable under these criteria. In this EIS, the preferred alternative to recapitalize the infrastructure supporting naval spent nuclear fuel handing is to build a new facility (New Facility Alternative) at Location 3/4.

New Facility Selection

Recapitalizing the infrastructure and processes for naval spent nuclear fuel handling by building a new facility will improve long-term capacity, increase efficiency and effectiveness, and reduce long-term costs and risks. While the ECF continues to be operated in a safe and environmentally responsible manner, the reliability of the existing facility will continue to decrease because of aging infrastructure and equipment.

The existing infrastructure at ECF was not built to current day design codes and standards. Consequently, the overall level of effort required to reliably and safely operate the existing facility is increasing. A major benefit of the New Facility Alternative is that the facility would be built to current design and construction standards.

Implementation of the New Facility Alternative would improve the ability to meet long-term mission needs and anticipated future production capacities. The capability to unload naval spent nuclear fuel from an M-290 shipping container into the water pool to examine, transfer, prepare, and package for disposal is not currently available in ECF. Upgrading ECF for new capabilities is not currently feasible without facility, process, and equipment reconfigurations. This may result in work stoppages which would temporarily impact the mission critical work and delay processing of naval spent nuclear fuel

into dry storage. The New Facility Alternative would be more cost effective than the ECF reconfigurations necessary to install new equipment into the constrained space as part of the Overhaul Alternative. In addition, the ECF naval spent nuclear fuel handling infrastructure continues to age and more extensive and complex sustainment efforts continue to be needed. The ability of the existing ECF infrastructure to meet the long-term needs of the NNPP will continue to decrease.

The new facility would be an opportunity to improve the effectiveness of naval spent nuclear fuel handling. The new facility would be designed with the production capacity to meet fleet demands based on lessons learned from over 50 years of operating ECF. Incremental facility changes and additions to the ECF have resulted in facility and process configuration constraints that cause less than optimal work flow. The recapitalized infrastructure under the New Facility Alternative would eliminate ECF's constraints by optimizing the product flow and designing a facility configuration to house the optimized product flow.

Another benefit of more efficient processes under the New Facility Alternative is the enhanced ability to meet SA 1995, as amended (SAA 2008). This agreement includes limitations on quantity and duration of naval spent nuclear fuel in water pools. For example, naval spent nuclear fuel may only be managed in a water pool for 6 years. The recapitalized infrastructure will provide a more reliable and efficient production line, providing added assurance that those requirements will be met.

Location Selection

Section 2.1.3 describes evaluation criteria used to determine which locations on NRF would be good for new facility construction. Section 2.1.3 also discusses the use of existing assets at NRF. The primary difference between locating a facility at Location 3/4 and Location 6 would be the extent to which existing assets could be used. A new facility at Location 3/4 would utilize the existing OSB, OSEs, and the CSRF, minimizing ground disturbance and construction impacts. Therefore, Location 3/4 is preferred to Location 6.

S.11 Important Changes From the Draft EIS

Changes to Resolve Public Comments

All written public comments received plus a transcript of oral comments made during the public hearings are included in Appendix G. All comments were considered in preparing this Final EIS. Responses to all comments are included in Appendix G.

As a result of comments, the NNPP added discussion about the characteristics of naval spent nuclear fuel and updated the description of the percentage of naval cores examined in Chapter 1. Chapter 2 was revised to update figures showing rail alignment to better reflect the planned alignment. Chapter 3 was updated to reflect the most recent seismic studies, climate change information, and greenhouse gas emissions. Also a cultural resource map was removed at the request of the Shoshone-Bannock Tribe, as the map displays zones that are modeled to have high or low probabilities of having cultural resources. Chapter 4 was revised to update maps to show the latest rail alignment, add additional discussion of climate change and greenhouse gases consistent with NNPP and DOE documents, and to add a description of the NNPP safety design strategy. Chapter 5 was revised to reflect the current status of DOE projects on the INL. Chapter 6 was updated to discuss mitigation measures committed to during consultation and actions where credit is taken to reduce expected impacts. Additional minor clarifications were made as described in Appendix G.

Changes to Reflect Additional Design for the New Facility Alternative

Changes were also made to the Draft EIS as a result of additional design and planning for the New Facility Alternative. The design and planning for a new facility at Location 3/4, the NNPP preferred alternative, has continued to progress consistent with DOE Order 413.3B, Program and Project Management for Acquisition of Capital Assets. The plans for the New Facility Alternative have progressed from the conceptual design stage to preliminary design. Changes to the design and planning for the construction have been identified including changes to the seismic design strategy, storm water management, and potential air emissions as a result of changes in the planned operation of concrete batch plants.

Seismic Design Strategy

The seismic performance of the New Facility Alternative was revised to reflect a more mature facility design and finalized seismic design requirements. The Draft EIS assumed that the New Facility Alternative spent nuclear fuel water pool would be designed and built to the highest seismic design category, which corresponded to a probability of seismic-related failure of 1 in 100,000 per year.

Based on further development of the New Facility Alternative, designing all of the structures surrounding the water pool to this standard would be impractical. Therefore, the Final EIS reflects that both the New Facility Alternative and Overhaul Alternative would be designed and built to meet the DOE requirements, which correspond to a probability of seismic-related failure of 1 in 10,000 per year. The level of conservatism selected appropriately balances protection of facility workers and the public in a seismic event with the use of proven and reliable technology.

In addition, for the New Facility Alternative, major elements of the new facility would be designed and built to exceed DOE requirements. For example, the new facility would include features to enhance the robustness of the spent nuclear fuel water pool concrete structure to withstand the seismic spectra of the highest seismic design category. Surrounding structures would also be designed and built, where practical, to lower the overall probability of seismic-related failure of the facility. These additional features are only practical and cost effective for the New Facility Alternative. As discussed in Section F.5.4.4, the probability of seismic-related failure for the New Facility Alternative in the Final EIS is set at 1 in 14,300 per year (or a probability of 7×10^{-5} per year); the resulting risk is less than the risks from seismic-related failure for the Overhaul Alternative and the No Action Alternative.

There were no changes to the Overhaul Alternative or No Action Alternative seismic-related probability of failure.

Water Management

Retention and evaporation basins would be used in the design of the storm water management systems for storm water runoff for the new facility at Location 3/4 consistent with low impact development techniques. Retention and evaporation basins provide advantages over connection of storm water drains into the existing NRF drainage system that discharges to the IWD. Section 4.4 was updated to describe the revised plans for management of storm water discharges for the New Facility Alternative at Location 3/4. The changes to storm water management for the New Facility Alternative are not expected to result in additional land clearing or other changes to impacts described in Section 4.1.

Water pool design and leak testing methodology was further developed. The preferred method for managing water used to leak test the pools is to move it between gated sections of the pool and

not discharge the water to the environment. Alternative methods would be to discharge the water from leak testing the pools (up to 18,927,000 liters (5 million gallons)) to the sewage lagoons or to the IWD during the last year of construction. The preferred location for discharge is to the sewage lagoons (shorter distance, high capacity). Discharge to the IWD would be the last choice. This discharge would occur over a short period of time (about 6 days) but is not expected to exceed the infiltration capacity or the maximum flow distance (2.9 kilometers (1.8 miles)) previously recorded for the IWD. The permitted annual discharge rate for the IWD of 113,600,000 liters (30,000,000 gallons) would not be exceeded. Section 4.4.3 reflects this potential discharge of water for pool leak testing.

Non-Radiological Air Emissions

The operation of only one batch plant was assumed for the Draft EIS. Plans to simultaneously operate two concrete batch plants during the facility construction period were identified based on updated design and construction planning information for the New Facility Alternative. In addition, expected material throughput increased. Air pollutant emissions and modeling are updated in Section 4.6 and Appendix E to address these project changes. Impact conclusions did not change for criteria or toxic air pollutants based on the updated modeling as discussed in Section 4.6. In addition, air quality modeling sensitivity analyses that were requested by the Idaho Department of Environmental Quality (IDEQ) in Appendix B of the Draft EIS were added to Appendix E. The sensitivity analyses showed that changes in the models did not result in changes to the air quality impact conclusions.

S.12 References

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