U.S. NUCLEAR REGULATORY COMMISSION

OFFICE OF NUCLEAR MATERIAL SAFETY AND SAFEGUARDS

DIVISION OF FUEL CYCLE SAFETY, SAFEGUARDS, AND ENVIRONMENTAL REVIEW

FINAL ENVIRONMENTAL ASSESSMENT FOR THE PROPOSED RENEWAL OF U.S. NUCLEAR REGULATORY COMMISSION LICENSE NO. SNM–2508 FOR U.S. DEPARTMENT OF ENERGY'S TMI UNIT 2 INDEPENDENT SPENT FUEL STORAGE INSTALLATION AT THE IDAHO NUCLEAR TECHNOLOGY AND ENGINEERING CENTER IN BUTTE COUNTY, IDAHO

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ABBREVIATIONS AND ACRONYMS

ac	acre(s)
ALARA	as low as is reasonably achievable
AQCR	Air Quality Control Region
BLM	U.S. Bureau of Land Management
CFR	*Code of Federal Regulations*
Cs	cesium
dBa	decibels adjusted
DSC	dry shield canister
DOE-ID	U.S. Department of Energy, Idaho Operations Office
DTS	Dry Transfer System
EA	Environmental Assessment
EIS	environmental impact statement
ER	Environmental Report
EPA	U.S. Environmental Protection Agency
ESA	Endangered Species Act of 1973
ft	foot (feet)
FWS	U.S. Fish and Wildlife Service
GCRP	U.S. Global Change Research Program
GHG	greenhouse gas
ha	hectare(s)
HEPA	high-efficiency particulate air
HSM	Horizontal Storage Module
In.	inch(es)
INL	Idaho National Laboratory
INTEC	Idaho Nuclear Technology and Engineering Center
ISFSI	Independent Spent Fuel Storage Installation
ILTAB	Intelligence Liaison and Threat Assessment
km	kilometer(s)
MEI	Maximum Exposed Individual
m	meter(s)
m/s	meter(s) per second
mi	mile(s)
mph	mile(s) per hour
mrem	millirem
mSv	milisievert
MTU	metric tons of uranium
MWD/MTU	megawatt-days per metric ton of uranium
NAAQS	National Ambient Air Quality Standard
NEPA	National Environmental Policy Act
NESHAP	National Emission Standards for Hazardous Air Pollutants
NHPA	National Historic Preservation Act
NOAA	National Oceanic and Atmospheric Administration

NRC	U.S. Nuclear Regulatory Commission
pCi/m^3	pico-Curie per meter cubed
PM	particulate matter
PM-2.5	particulate matter with an aerodynamic diameter of 2.5 microns or less
PM-10	particulate matter with an aerodynamic diameter of 10 microns or less
RAI	Request for Additional Information
REMP	Radiological Environmental Monitoring Program
RPP	Radiation Protection Program
SER	Safety Evaluation Report
SHPO	State Historic Preservation Officer
SNM	Special Nuclear Materials
TLD	thermoluminescent dosimeter
TMI-2	Three Mile Island Unit 2
USCB	U.S. Census Bureau

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NUCLEAR TECHNOLOGY AND ENGINEERING CENTER IN BUTTE COUNTY, IDAHO

1.0 INTRODUCTION

1.1 Background

By letter dated March 6, 2017, the U.S. Department of Energy, Idaho Operations Office (DOE-ID) submitted an application to the U.S. Nuclear Regulatory Commission (NRC or Commission) to renew NRC Special Nuclear Materials (SNM) License SNM-2508 for the Three Mile Island Unit 2 (TMI-2) specifically licensed independent spent fuel storage installation (ISFSI), located at the Idaho Nuclear Technology and Engineering Center (INTEC) on the Idaho National Laboratory (INL) Site, formerly known as the Idaho National Environmental and Engineering Laboratory, in Butte County, Idaho (DOE-ID 2017a). DOE-ID is requesting that NRC License SNM-2508 be renewed for a period of 20 years, until March 19, 2039. The NRC issued DOE-ID a 20-year license to operate the TMI-2 ISFSI on March 19, 1999, which expires on March 19, 2019. On May 5, 2017, the NRC staff found DOE-ID's renewal application to be acceptable for a detailed review (NRC 2017a). The NRC issued a notice in the *Federal Register* providing an opportunity to request a hearing and petition for leave to intervene (82 FR 26815). No requests for a hearing or petitions for leave to intervene were received. In response to NRC staff Requests for Additional Information (RAIs) on August 31, 2017 (NRC 2017e), DOE-ID provided supplemental information on October 3, 2017 (DOE-ID 2017b) and November 16, 2017 (DOE-ID 2017c).

The NRC's regulations in Title 10 of the *Code of Federal Regulations* (10 CFR) Part 72, "Licensing Requirements for the Independent Storage of Spent Nuclear Fuel, High-Level Radioactive Waste, and Reactor-Related Greater Than Class C Waste," specifically 10 CFR 72.42(a), state that an ISFSI license may be renewed by the Commission upon application by the licensee for a period not to exceed 40 years if NRC requirements are met.
The NRC staff prepared this environmental assessment (EA) in accordance with the NRC regulations listed in 10 CFR Part 51, "Environmental Protection Regulations for Domestic Licensing and Related Regulatory Functions" and the NRC staff guidance document, NUREG-1748, *Environmental Review Guidance for Licensing Actions Associated with Nuclear Material Safety and Safeguards Programs – Final Report* (NRC 2003). The NRC regulations in 10 CFR Part 51 implement Section 102(2) of the National Environmental Policy Act of 1969, as amended (NEPA).

The NRC staff is also performing a detailed safety analysis of the DOE-ID proposal, which will be documented in a separate Safety Evaluation Report (SER). The NRC staff's decision whether to renew the TMI-2 ISFSI license as proposed will be based on the results of the NRC staff's review, as documented in this EA and in the SER.

On September 19, 2014, the NRC published a revised rule at 10 CFR 51.23, "Environmental Impacts of Continued Storage of Spent Nuclear Fuel Beyond the Licensed Life for Operations of a Reactor" (79 FR 56238). The rule codified the NRC's generic determinations in NUREG-2157, *Generic Environmental Impact Statement for Continued Storage of Spent Nuclear Fuel*, regarding the environmental impacts of continued storage of spent nuclear fuel beyond a reactor's operating license (i.e., those impacts that could occur as a result of the storage of spent nuclear fuel at at-reactor or away-from-reactor sites after a reactor's licensed life for operation and until a permanent repository becomes available). In the NRC Memorandum and Order CLI-14-08 (NRC Commission Order CLI-14-08, 2014), the Commission held that the revised 10 CFR 51.23 and associated NUREG-2157 (NRC 2014) cure the deficiencies identified by the court in New York v. NRC, 681 F.3d 471 (D.C. Cir. 2012) and stated that the rule satisfied the NRC's NEPA obligations with respect to continued storage. The revised rule requires that EAs prepared for future reactor and spent fuel storage facility licensing actions consider the environmental impacts of continued storage, if the impacts of continued storage of spent fuel are relevant to the proposed action. As discussed in NUREG-2157, although the TMI-2 ISFSI is not located at an operating reactor site, the TMI-2 ISFSI has to meet the same NRC regulatory requirements as at-reactor ISFSIs and, thus, the environmental impacts described in the NUREG-2157 for at-reactor ISFSIs are representative of the impacts at the TMI-2 ISFSI. Section 4.14 of this EA provides the NRC staff's consideration of the generic environmental impacts discussed in NUREG-2157 for the proposed renewal of the specifically licensed TMI-2 ISFSI.

1.2 Purpose and Need for the Proposed Action

DOE-ID is requesting renewal of the TMI-2 ISFSI license to continue to provide temporary dry storage of TMI-2 spent fuel core debris at the INTEC site until March 19, 2039. Spent fuel core debris from the 1979 TMI-2 reactor accident is currently being stored on the INTEC site at the ISFSI. The ISFSI consists of 29 dry shield canisters (DSCs) that contain 341 TMI-2 canisters on an above-ground concrete pad. No additional radioactive material will be added to the ISFSI (DOE-ID 2017a). If the NRC approves the license renewal as requested, DOE-ID would be able to continue to possess and store spent fuel core debris for an additional 20 years at the INTEC site.

In addition, the State of Idaho along with DOE-ID and the Department of the Navy are parties to a settlement agreement, which in part, requires that all of the TMI-2 spent fuel core debris be removed from the State of Idaho by January 1, 2035 (DOE-ID 2017a). In response to an RAI, DOE stated its commitment to the 1995 settlement agreement to remove all spent fuel from the State of Idaho by 2035 (DOE-ID 2017b). This date falls within the 20-year license renewal period requested by DOE-ID.

1.3 The Proposed Action

DOE-ID submitted a license renewal application requesting a renewal period of 20 years for License SNM-2508 to temporarily store 341 canisters of TMI-2 spent fuel core debris at its ISFSI at INTEC (DOE-ID 2017a). The current license period ends on March 19, 2019. The NRC's proposed federal action is the renewal of License SNM-2508 for up to an additional 20 years. If approved, DOE-ID would be able to continue to possess and store TMI-2 spent fuel

core debris at the INTEC site in accordance with the requirements in 10 CFR Part 72 and License SNM-2508. DOE-ID states that no additional material will be added to the ISFSI (DOE-ID 2017a).
In response to an RAI, DOE stated its commitment to the 1995 settlement agreement to remove all spent fuel core debris from the State of Idaho by 2035 (DOE-ID 2017b). This date falls within the 20-year license renewal period requested by DOE-ID. Accordingly, impacts associated with spent fuel removal could also occur during the period of the proposed action. If spent fuel removal activities begin in the years preceding January 1, 2035, impacts would include those from activities associated with equipment needed (cranes, hoists, forklifts, and lifting and transport components [NRC 2004]) to remove the fuel debris from the TMI-2 ISFSI. DOE does not anticipate repackaging the TMI-2 fuel debris as each DSC would be directly transferred from the Horizontal Storage Modules (HSMs) into a 10 CFR Part 71 transportation cask for shipment, which in turn would be moved to a designed conveyance (e.g., truck or rail car) for offsite transportation (DOE-2017b).

Upon the completion of spent fuel removal from the INTEC site and in accordance with 10 CFR 72.54(d), DOE-ID would need to submit a decommissioning plan to the NRC for review and approval. Because the impacts from decontamination and decommissioning would likely occur several years after spent fuel removal, they are not considered as part of the proposed action and were not evaluated in this EA. Therefore, the staff evaluated the potential impacts of continued storage and spent fuel removal on environmental resource areas for the period of the license term and these impacts are discussed in the EA.

1.3.1 Site Location and Description

DOE-ID's INTEC complex is on the INL Site in southeastern Idaho. The INTEC site is located in Butte County, but a portion of the larger INL Site falls within Bingham, Bonneville, Jefferson, and Clark Counties, as shown in Figure 1 (DOE-ID 2017a). The TMI-2 ISFSI is located in the south-central part of the INL Site as shown in Figure 2, in a flat area near the Big Lost River. The area surrounding the site is otherwise undeveloped, high-desert terrain, and is remote from major transportation routes and population centers (DOE-ID 2017a). DOE-ID controls access to the INL Site for site personnel, and visitor access is limited to persons driving on public highways or visiting the designated National Historical Monument Experimental Breeder Reactor-I, which is approximately 16 kilometers (km) (10 miles [mi]) from the ISFSI. Several other facilities on the INL Site are within 16 km (10 mi) of the TMI-2 ISFSI, however, there are no permanent residents, cities, or towns within 16 km (10 mi) of the ISFSI. Development within 16 km (10 mi) is unlikely to change during the proposed license renewal period because DOE-ID's institutional controls restrict access to the INL Site (DOE-ID 2017a).

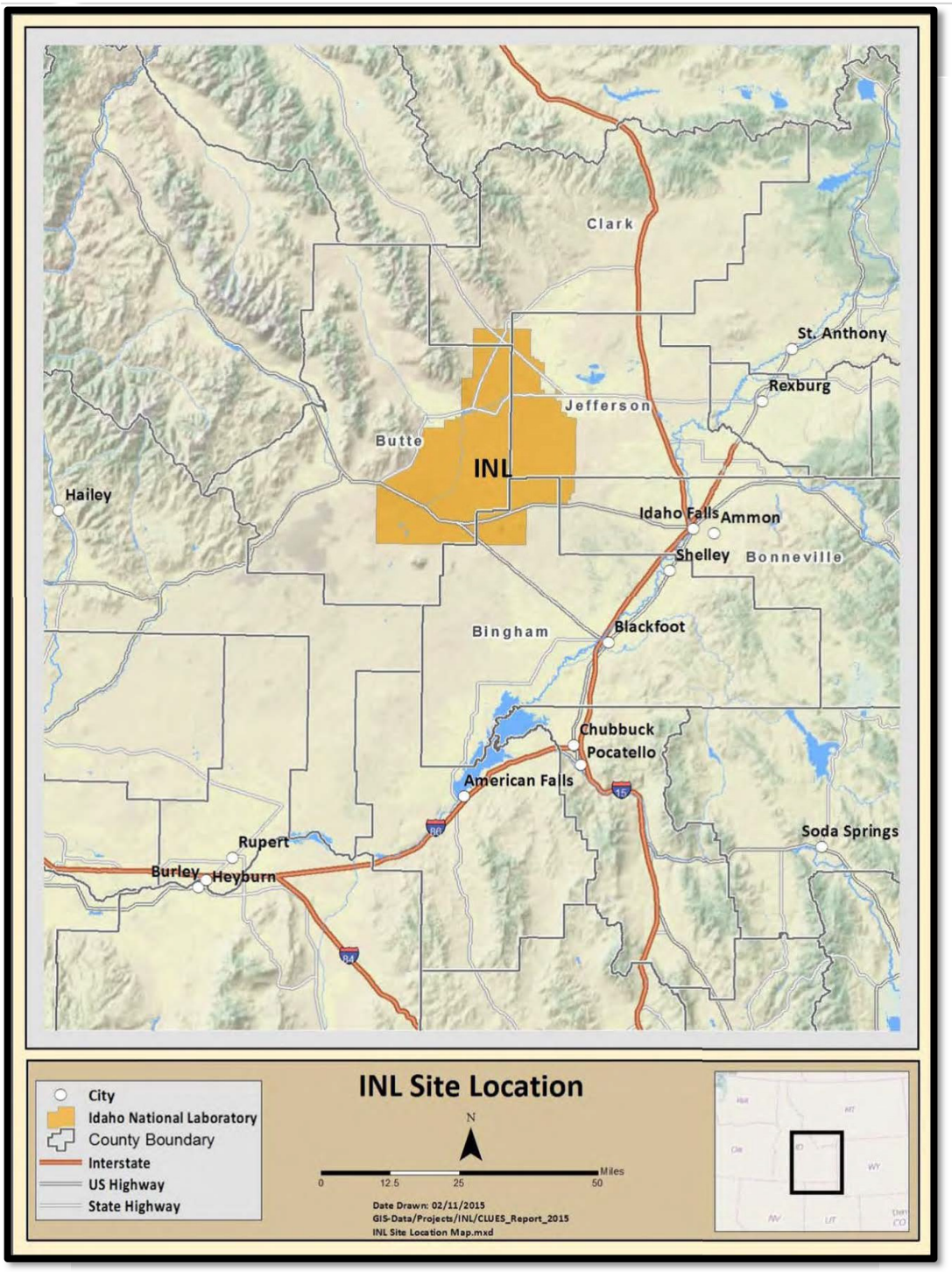

Figure 1. Idaho National Laboratory Site in Southeastern Idaho (DOE-ID 2017a)

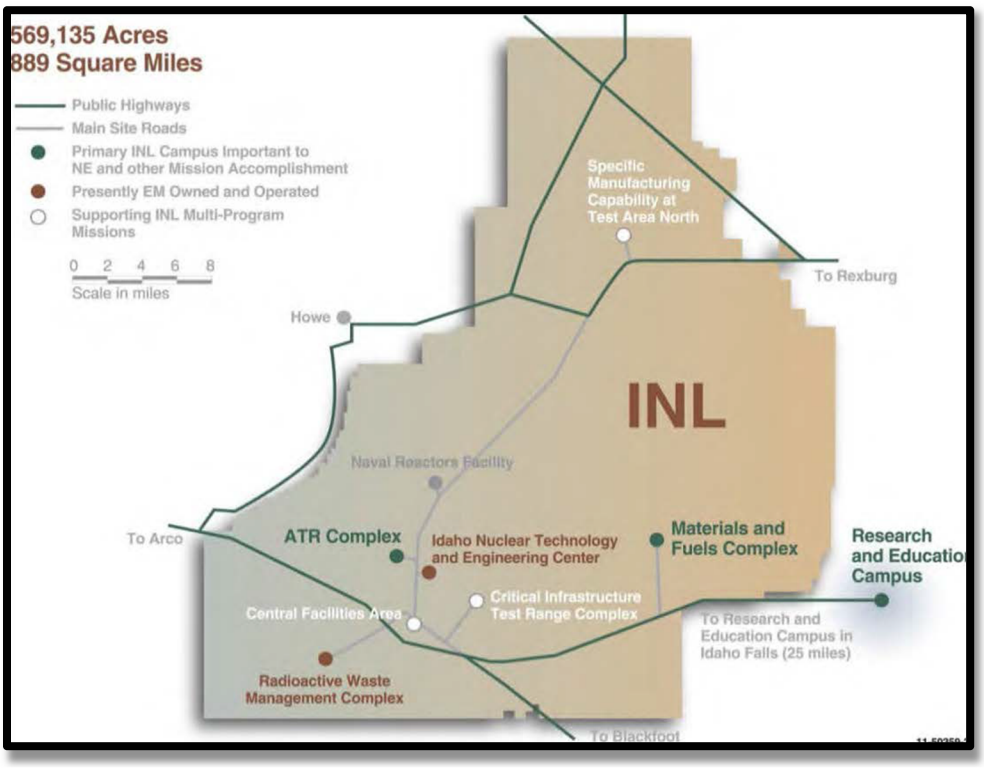

Figure 2. INTEC Location within INL Site (DOE-ID 2017a)

1.3.2 Current ISFSI and Dry Cask Storage System Description

Between 1986 and 1990, TMI-2 core debris was shipped from the accident site in Pennsylvania to INL. Because the TMI-2 ISFSI contains spent fuel core debris that was recovered from the reactor vessel post-accident, the fuel debris is configured differently than intact fuel assemblies from commercial reactors. After recovery from the reactor vessel, the spent fuel core debris was loaded into TMI-2 canisters for shipment to INL (DOE-ID 2017a). Three types of stainless-steel TMI-2 canisters were used to store the spent fuel core debris: fuel canisters for large pieces of core debris, knockout canisters for smaller debris, and filter canisters for stainless-steel filters and fines resulting from defueling the reactor (DOE-ID 2017a). The TMI-2 canisters were originally placed in the Test Area North pool on the INL Site. The ISFSI construction was completed in 1999. The ISFSI contains concrete HSMs on a concrete pad at INTEC. The TMI-2 canisters were placed in 29 DSCs that contain high-efficiency particulate air (HEPA) filters for venting. The DSCs were placed into the HSMs at the ISFSI. The TMI-2 ISFSI loading was complete in 2001 (DOE-ID 2017a). Figure 3 shows the ISFSI site with the pad and HSMs labeled.

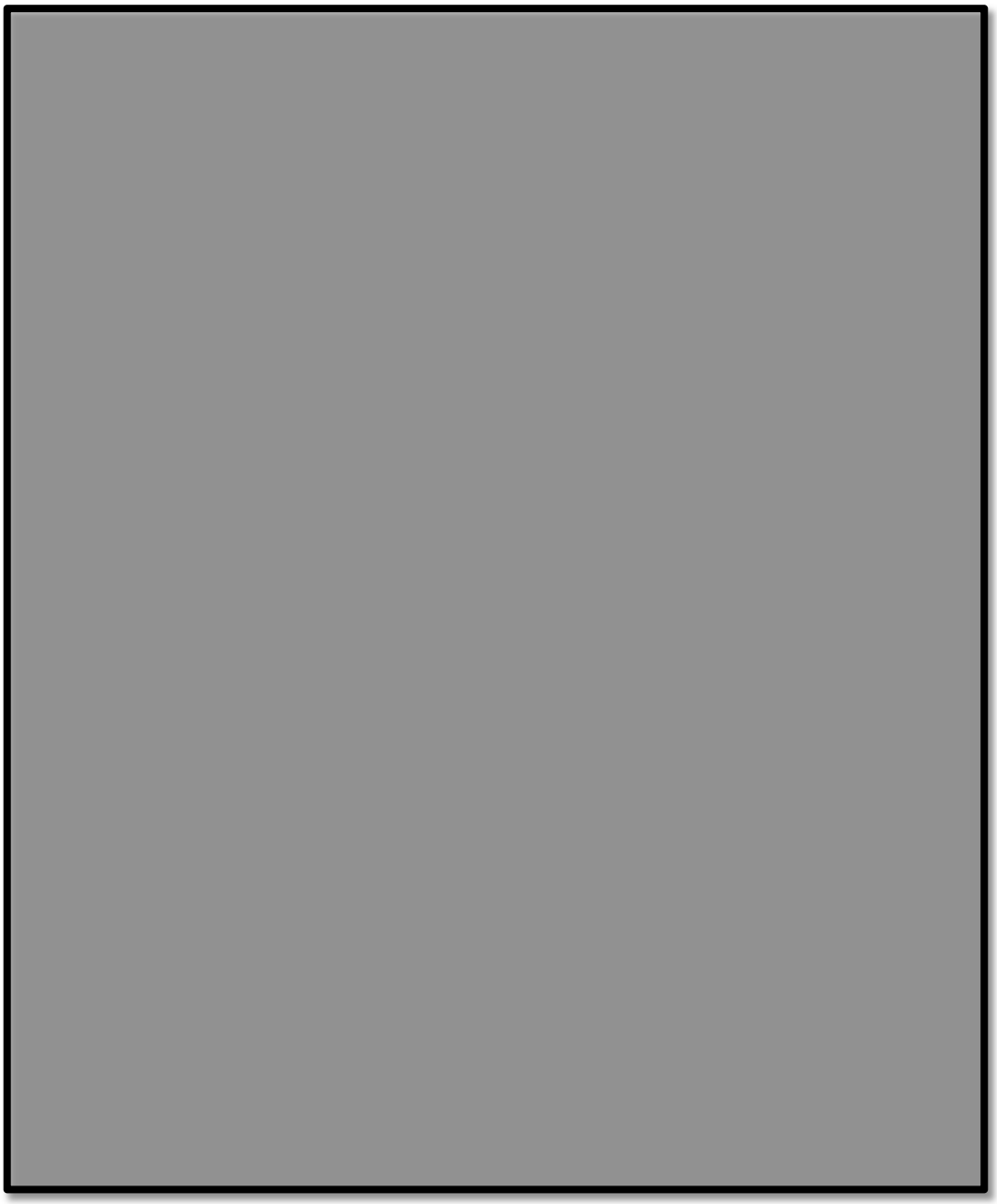

Figure 3. TMI-2 ISFSI Site, HSM and Pad (DOE-ID 2017a)

Approximately 0.8 hectare (ha) (2 acres [ac]) in the immediate vicinity of the ISFSI pad is fenced for security. The ISFSI pad is approximately 34 meters (m) by 61 m (111 feet [ft] by 200 ft), and the HSMs sit atop it (DOE-ID 2017a). Each HSM is approximately 5.5 m (18 ft) long and 4.3 m (14 ft) high, and has 0.6–0.9 m (2–3 ft) thick walls (DOE-ID 2017a). The design of the HSMs provides for radiation shielding and protection from external hazards such as missiles, earthquakes, and tornadoes. The current ISFSI is licensed to hold 341 canisters of TMI-2 spent fuel core debris.

No reactor or steam electric system is used for the ISFSI.

1.3.3 Waste Generation and Management

Operation of the ISFSI does not generate any liquid radioactive waste. Each DSC has a HEPA filter that vents to the atmosphere. Any airborne radionuclides emitted from these HEPA filters are limited by the U.S. Environmental Protection Agency (EPA) through the National Emission Standards for Hazardous Air Pollutants (NESHAP) under 40 CFR Part 61. A small quantity of solid, low-level radioactive waste, such as rubber, plastic, rags, and HEPA filters, is generated due to monitoring and sampling. The waste from the ISFSI is transferred to be processed with the larger waste stream at the INTEC low-level waste pad (DOE-ID 2017b). This waste is then shipped to either Energy Solutions, LLC in Utah or the Nevada National Security Site in Nevada depending upon radioactive content (DOE-ID 2017c).

1.3.4 Monitoring Programs

DOE-ID's overall site monitoring programs include monitoring of the ISFSI site located at INTEC. Results of the monitoring programs are included in an annual site environmental report (ER) sent to DOE Headquarters (DOE-ID 2017a). Specifically for the ISFSI, there is a Radiological Environmental Monitoring Program (REMP) in accordance with 10 CFR 72.44 to monitor potential airborne radioactivity and direct radiation pathways. Results from the REMP are reported annually to the NRC. DOE-ID states that operational monitoring programs on the site will continue through the life of the ISFSI, and will serve as the operational monitoring program of the ISFSI (DOE-ID 2017a). DOE-ID will also perform periodic and confirmatory measurements for NESHAPs compliance (40 CFR Part 61) and sampling of DSC internal gases to verify that hydrogen gases remain at safe levels.

Airborne radioactivity is monitored by conducting loose surface radioactive contamination surveys and periodic air sampling, while direct radiation exposure is monitored using dosimetry along the perimeter fence (DOE 2018). Loose surface radioactive contamination surveys are conducted on an annual basis at DSC vent and purge ports and HSM drain ports.

There are 22 dosimetry stations along the TMI-2 ISFSI outer perimeter fence, as shown in Figure 4. Once each month, an air sampler, located between the two rows of HSMs, as shown in Figure 4, collects samples for a continuous 7-day period each month. Air samples are analyzed for beta radioactivity, and, depending upon results, gamma isotopic analysis is performed for each sample or a sample composite (DOE 2018). Gamma isotopic analysis can identify cesium (Cs-137) concentration. Independent airborne radioactivity monitoring stations are maintained offsite and used as control air sampling stations for comparison measurements as needed.

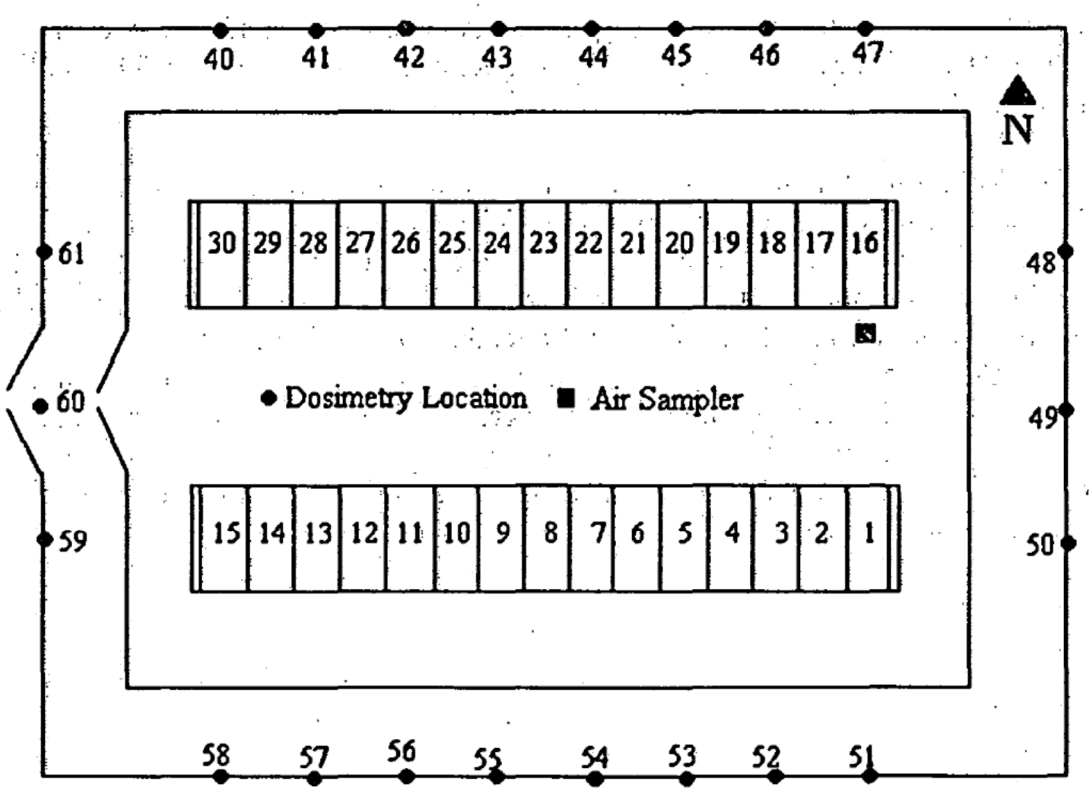

Figure 4. ISFSI Air Sampling Locations (DOE 2018)

The REMP results from calendar year 2017 did not indicate a measurable increase in background radiation levels from airborne radioactivity and direct radiation due to the ISFSI, or any increase in the estimated maximum potential dose commitment to the general public (DOE 2018). The estimated maximum potential dose commitment to the general public is characterized as 2.7×10^{-3} millirem per year (mrem/yr) to the Maximum Exposed Individual (MEI). As stated earlier, there were no radioactive liquid discharges.

1.3.5 Decommissioning

In accordance with 10 CFR 72.54(d), DOE-ID, in part, would need to notify the NRC within 60 days of the occurrence of any of the following: (1) the licensee has decided to permanently cease principal activities, as defined in this part of the regulations, at the entire site or any separate building or outdoor area that contains residual radioactivity such that the building or outdoor area is unsuitable for release in accordance with NRC requirements, or (2) no principal activities under the license have been conducted for a period of 24 months, or (3) no principal activities have been conducted for a period of 24 months in any separate building or outdoor area that contains residual radioactivity such that the building or outdoor area is unsuitable for release in accordance with NRC requirements. DOE-ID would then need to submit a final decommissioning plan within 12 months of this notification to the NRC. DOE-ID would begin decommissioning upon receiving NRC approval of the decommissioning plan.
As discussed in Section 1.3 of this EA, due to DOE-ID's settlement agreement with the State of Idaho and Department of the Navy to remove TMI-2 spent fuel core debris from the State of Idaho by January 1, 2035, the NRC assumes that spent fuel removal activities will begin prior to the end of the requested 20-year renewal period. Upon spent fuel removal and in accordance

with 10 CFR 72.54(d), DOE-ID would need to submit a decommissioning plan to the NRC for review and approval. The actual detailed decommissioning plan would be designed consistent with the applicable regulation at the time of decommissioning and submitted for NRC review and approval at the appropriate time. Criteria addressing the decommissioning of a specifically licensed ISFSI and the submittal of a final decommissioning plan for an ISFSI are provided under 10 CFR 72.54(d) and (g). The NRC would conduct a separate environmental review associated with the review and approval of the decommissioning plan.

Upon the completion of spent fuel removal from the INTEC site and in accordance with 10 CFR 72.54(d), DOE-ID would need to submit a decommissioning plan to the NRC for review and approval. Because the impacts from decontamination and decommissioning would likely occur several years after spent fuel removal, they are not considered as part of the proposed action and were not evaluated in this EA. Therefore, the staff evaluated the potential impacts of continued storage and spent fuel removal on environmental resource areas for the period of the license term and these impacts are discussed in the EA.

DOE-ID states that it will perform decommissioning and dismantlement consistent with the *Conceptual Plan for Decommissioning TMI-2 Independent Spent Fuel Storage Installation*, which was part of the original 1996 license application for the ISFSI (DOE-ID 1996). In its Conceptual Plan, DOE-ID explained that the DECON alternative (prompt removal/dismantling) to decommissioning appeared to be the most reasonable alternative based on the low levels of contamination and the relatively small physical plant size associated with the ISFSI (DOE-ID 1996).

Two scenarios for decommissioning are discussed as potential options, and one approach will be chosen in the final decommissioning plan (DOE-ID 1996). The two scenarios are as follows:

- transporting the TMI-2 canisters in a transportation cask licensed under 10 CFR Part 71 to an offsite location similar to the current ISFSI for storage, decontaminating the DSCs and HSMs to be re-used at this offsite location, and transferring the canisters back to the DSCs and storing them in the HSMs; or

- removing all TMI-2 canisters from the DSCs, transporting the canisters in a 10 CFR Part 71 licensed transportation cask and shipping the cask to an offsite disposal facility, and decontaminating the DSCs and HSMs to allow for their disposal (DOE-ID 1996).

In both scenarios, the concrete pad would be the remaining feature at the site. The Conceptual Plan focuses on the second scenario, because it would result in the most material for decontamination and disposal (DOE-ID 1996). In addition, DOE-ID clarified that the spent fuel debris does not need to be repackaged prior to removal from the ISFSI (DOE-ID 2017b). The TMI-2 canisters are packaged inside DSCs that are designed for transfer directly from the HSM at the ISFSI into an NRC-certified transportation package for shipment offsite (DOE-ID 2017b).

1.4 Basis for Review

In preparing this EA, the NRC staff reviewed and considered the following documents:

- DOE-ID's site-specific ISFSI license renewal application (DOE-ID 2017a)

- DOE-ID's "Responses to NRC Requests for Additional Information" (DOE-ID 2017b)

- DOE-ID's *Conceptual Plan for Decommissioning TMI-2 Independent Spent Fuel Storage Installation* (part of DOE-ID 1996)

- *NRC's Final Environmental Impact Statement for the Construction and Operation of an Independent Spent Fuel Storage Installation to Store the Three Mile Island Unit 2 Spent Fuel at Idaho National Engineering and Environmental Laboratory* (NUREG-1626) (NRC 1998)

- NRC's *Generic Environmental Impact Statement for Continued Storage of Spent Nuclear Fuel* (NUREG-2157) (NRC 2014).

- Consultation with the U.S. Fish and Wildlife, State Historic Preservation Officer, and the Idaho Departement of Environmental Quality (see Section 7 of the EA for additional information).

Additional references may be found in Section 8.0 of this EA.

2.0 ALTERNATIVES TO THE PROPOSED ACTION

In this section, the NRC staff describes alternatives to the proposed 20-year license renewal. As described below, one alternative—the no-action alternative—was considered and evaluated in detail in Section 4 of this EA.

2.1 No-Action

The no-action alternative would occur if the NRC denied DOE-ID's request to renew the TMI-2 ISFSI license, and would result in the TMI-2 ISFSI license expiring in 2019 at the end of its current term. However, in accordance with 10 CFR 72.54(c), the license would continue in effect with respect to possession of licensed material until the NRC notifies the licensee in writing that the license is terminated. DOE-ID would continue to maintain the stored spent fuel on the ISFSI in a safe and secure condition. Impacts from the no-action alternative would result from activities to continue to ensure the safe and secure operations of the ISFSI, which would be similar in nature and scope to the current maintenance, monitoring, and inspection activities and, thus, would not be significant.

As discussed in Section 1.3.5 of this EA, DOE-ID would also need to submit a decommissioning plan within 12 months of notifying NRC of any of the following: (1) the licensee has decided to permanently cease principal activities, as defined in this part of the regulations, at the entire site or any separate building or outdoor area that contains residual radioactivity such that the building or outdoor area is unsuitable for release in accordance with NRC requirements, or (2) no principal activities under the license have been conducted for a period of 24 months, or (3) no principal activities have been conducted for a period of 24 months in any separate building or outdoor area that contains residual radioactivity such that the building or outdoor area is unsuitable for release in accordance with NRC requirements. DOE-ID would begin decommissioning upon NRC approval of the decommissioning plan. NRC approval of the decommissioning plan would constitute a federal action under the NEPA and would be subject to a site-specific environmental review.

As discussed in Section 1.3.5 of this EA, DOE-ID would perform decommissioning and dismantlement consistent with the *Conceptual Plan for Decommissioning TMI-2 Independent Spent Fuel Storage Installation*, which was part of the original 1996 license application for the ISFSI (DOE-ID 1996). In its Conceptual Plan, DOE-ID explained that the DECON alternative (prompt removal/dismantling) to decommissioning appeared to be the most reasonable alternative based on the low levels of contamination and the relatively small physical plant size associated with the ISFSI (DOE-ID 1996). Additional information about the decommissioning activities can be found in Section 1.3.5 of this EA.

Potential impacts from decommissioning activities and site restoration would include those associated with the removal of systems and components; decontamination of the DSCs (DSC steel shell, basket internals, shield plugs); cleaning all ISFSI areas and processing any wastes, removing activated concrete from within the HSMs by decontaminating the inner surfaces exposed to the neutron flux from the DSCs; packaging and disposing of the activated rails, supports, and steel; removing the remaining portions of the HSMs; disposing concrete rubble offsite; and removing the perimeter fence, among other activities (DOE-ID 1996). DOE-ID assumes that the preparations for decommissioning would start at least 3 years prior to the projected completion of the ISFSI operations (DOE-ID 1996). Radiological and nonradiological impacts would result from the activities. Activities would be accomplished in accordance with occupational and public dose regulatory limits.

3.0 AFFECTED ENVIRONMENT

As discussed in Section 1.3.1, the TMI-2 ISFSI is located on the INL Site in southeastern Idaho, as shown in Figure 1. The area surrounding the site is otherwise undeveloped, high-desert terrain, and is remote from major transportation routes and population centers (DOE-ID 2017a). For purposes of the evaluation in this EA, the “affected environment” is the environment that currently exists at and around the TMI-2 ISFSI. The existing conditions that have shaped the environment are at least partially the result of past construction and operation of the TMI-2 ISFSI. Construction and operation of the ISFSI were evaluated in NUREG-1626, the *NRC’s Final Environmental Impact Statement for the Construction and Operation of an Independent Spent Fuel Storage Installation to Store the Three Mile Island Unit 2 Spent Fuel at Idaho National Engineering and Environmental Laboratory* (NRC 1998).

3.1.1 Land Use

The INTEC site is located in Butte County, but a portion of the larger INL Site falls into several nearby counties, as show in Figure 1. The INL Site covers 230,000 ha (571,000 ac) within Butte, Bingham, Bonneville, Jefferson and Clark Counties (DOE-ID 2017a). Only about 3 percent of the INL Site acreage is used for facilities and operations; the rest of the site is open space without a designated use. The INL Site also provides space for recreation and environmental research consistent with its designation as a National Environmental Research Park (NRC 1998).

Land uses include facility operations associated with energy research and waste management activities, cattle and sheep grazing, general open space, and roadways and other infrastructure, as shown in Figure 5. There is restricted access to the facility areas of the site but approximately 6 percent of the INL Site acreage (13,800 ha [34,260 ac]) is used for public roads that cross the site or utility rights-of-way (DOE-ID 2017a).

As mentioned in Section 1.3.1, visitor access is limited to persons driving on public highways or visiting the designated National Historical Monument Experimental Breeder Reactor-I, which is approximately 16 km (10 mi) from the ISFSI. Controlled hunting is permitted on the INL Site, approximately 0.8 km (0.5 mi) within the site boundary adjacent to agricultural lands (DOE-ID 2017a).

Cattle and sheep grazing occur on 121,400 ha (300,000 ac) to 141,640 ha (350,000 ac) of land, 364 ha (900 ac) of which is used as a winter feed lot for sheep by the U.S. Sheep Experiment Station. There is no grazing permitted within 3.2 km (2 mi) of any nuclear facility, and dairy cattle are not permitted on the INL Site in order to avoid radioactive contamination of milk. The U.S. Bureau of Land Management (BLM) oversees grazing permits and rights-of-way.

County plans encourage new development near currently developed areas in order to leverage current infrastructure (DOE-ID 2017a). The INL Site is located in high-desert terrain and remote from developed areas, and is therefore unlikely to see residential or commercial development nearby.

Land use for recreation and agricultural continues to increase in the area surrounding the INL Site due to greater demand for these uses. Surrounding lands are owned by the Federal government, the State, and private parties. Several small communities and towns are located near the INL Site boundaries, and the larger communities of Idaho Falls/Ammon, Rexburg, Blackfoot, and Pocatello/Chubbuck are located to the east and southeast as shown in Figure 6. Recreation and tourist attractions— such as Craters of the Moon National Monument and Preserve—are found in areas surrounding the INL Site, as shown in Figure 6. Other attractions include Hell's Half Acre and Black Canyon Wilderness Study Areas, Camas National Wildlife Refuge, Market Lake State and Mud Lake Wildlife Management Areas, Yellowstone National Park, Targhee and Challis National Forests, Sawtooth National Recreation Area, Sawtooth Wilderness Area, Sawtooth National Forest, Grand Teton National Park, Jackson Hole recreation complex, and the Snake River (DOE-ID 2017a). As shown in Figure 6, the Fort Hall Indian Reservation is located southeast of the INL Site.

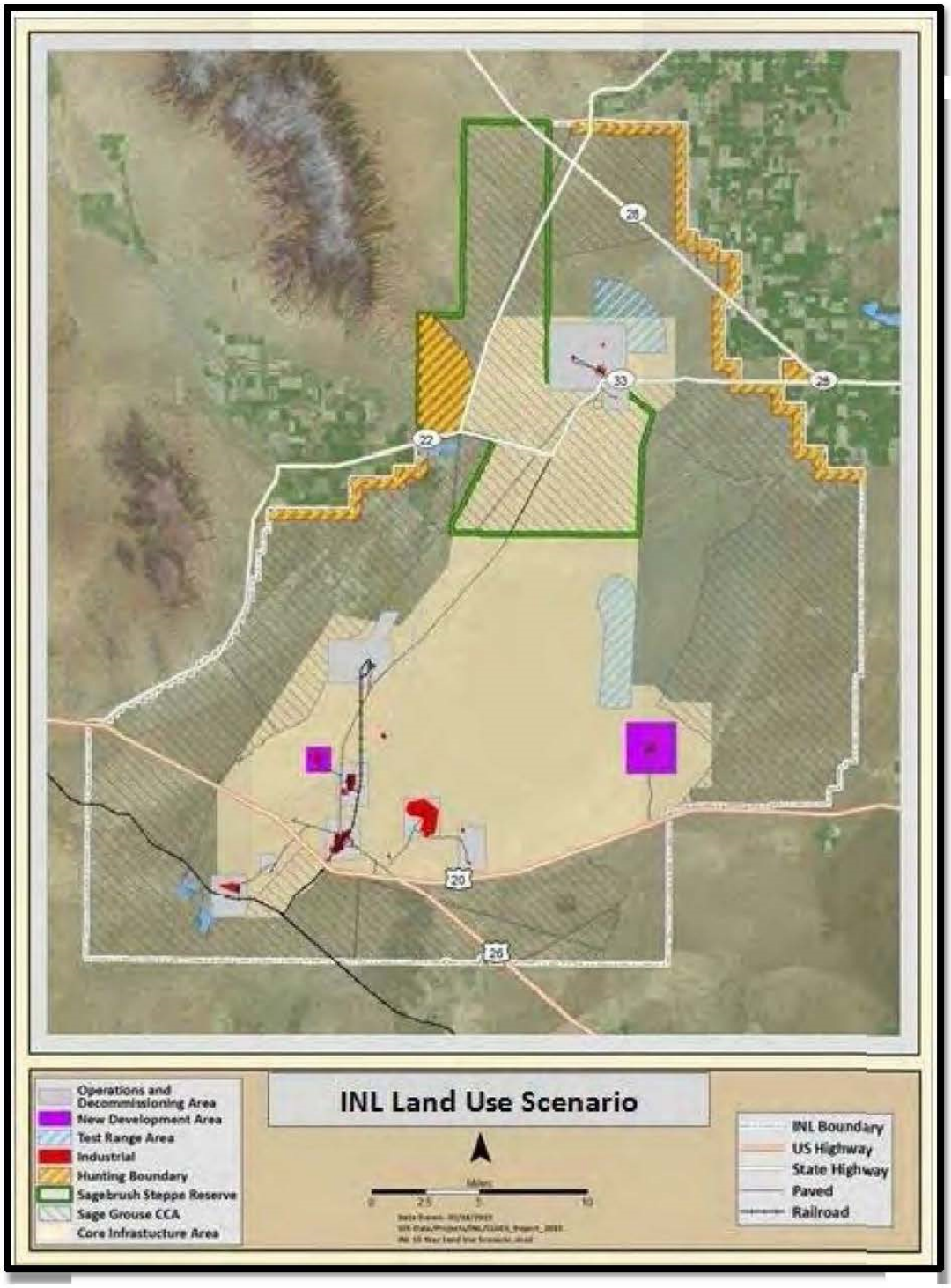

Figure 5. Land Use on the INL Site (DOE-ID 2017a)

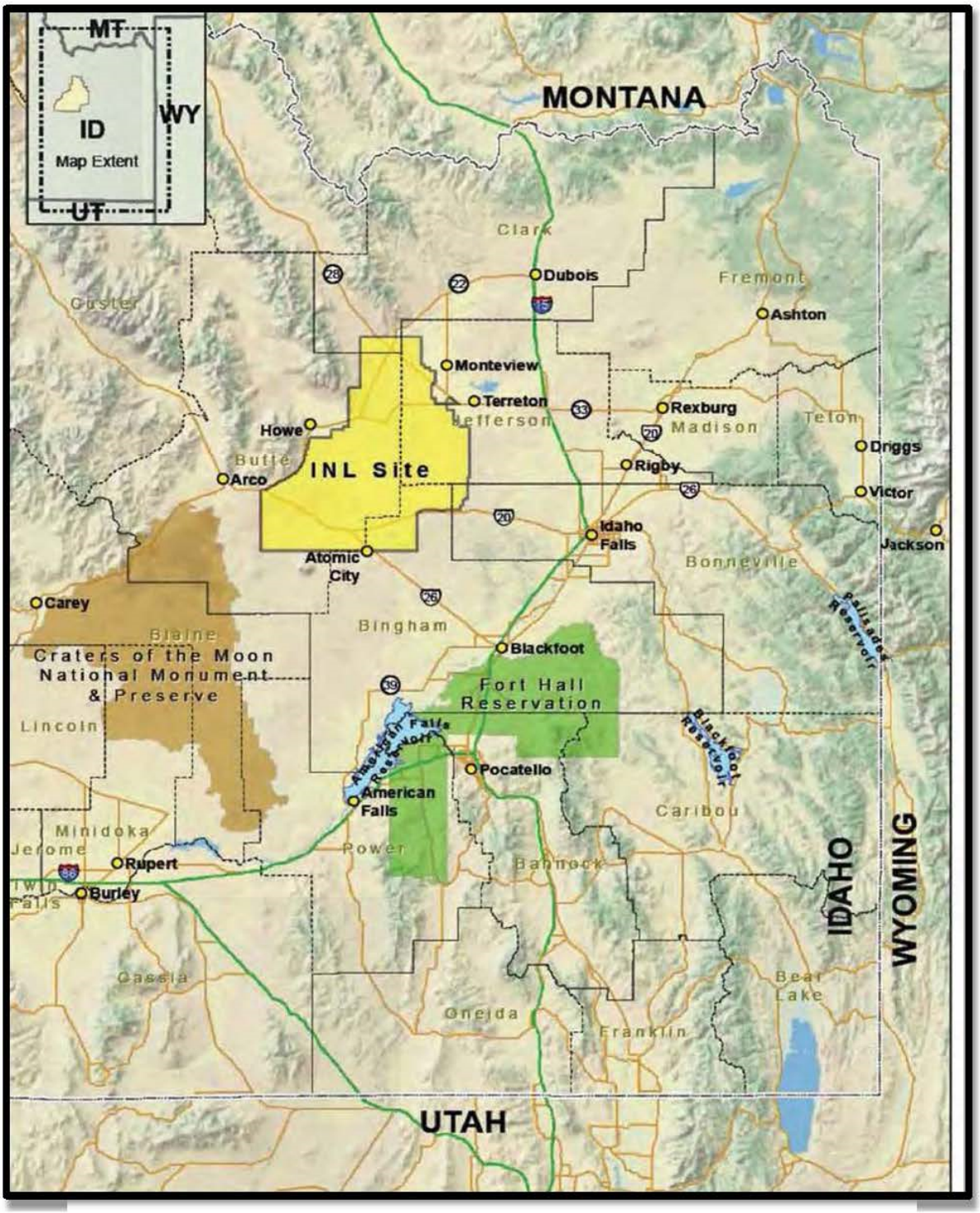

Figure 6. INL Site and Vicinity (DOE-ID 2017a)

3.2 Transportation

Interstate 15 is a north-south route approximately 40 km (25 mi) east of the INL Site and connects several cities along the Snake River. Idaho State Routes 22, 28, and 33 traverse the northern portion of the site. Idaho State Route 33 serves as the primary access to the northern portion of the site (NRC 1998). U.S. Route 20/26 is approximately 6.4 km (4 mi) to the south of INTEC, and serves as the main access to the southern portion of the site (DOE-ID 2017a). It crosses the southern portion of the site in an east-west direction, and has one rest stop next to the highway within the INL Site boundary. Close to U.S. Route 20 is the Experimental Breeder Reactor-I National Historic Landmark, which welcomes approximately 9,000 visitors during the summer. The ISFSI is not generally visible to the public due to its distance from the nearest public road. Figure 7 shows the transportation routes near INTEC. The annual average daily two-way traffic volume on Highway 20/26 in the vicinity of the INL Site is 2,173 vehicles (Idaho Transportation Department 2016).

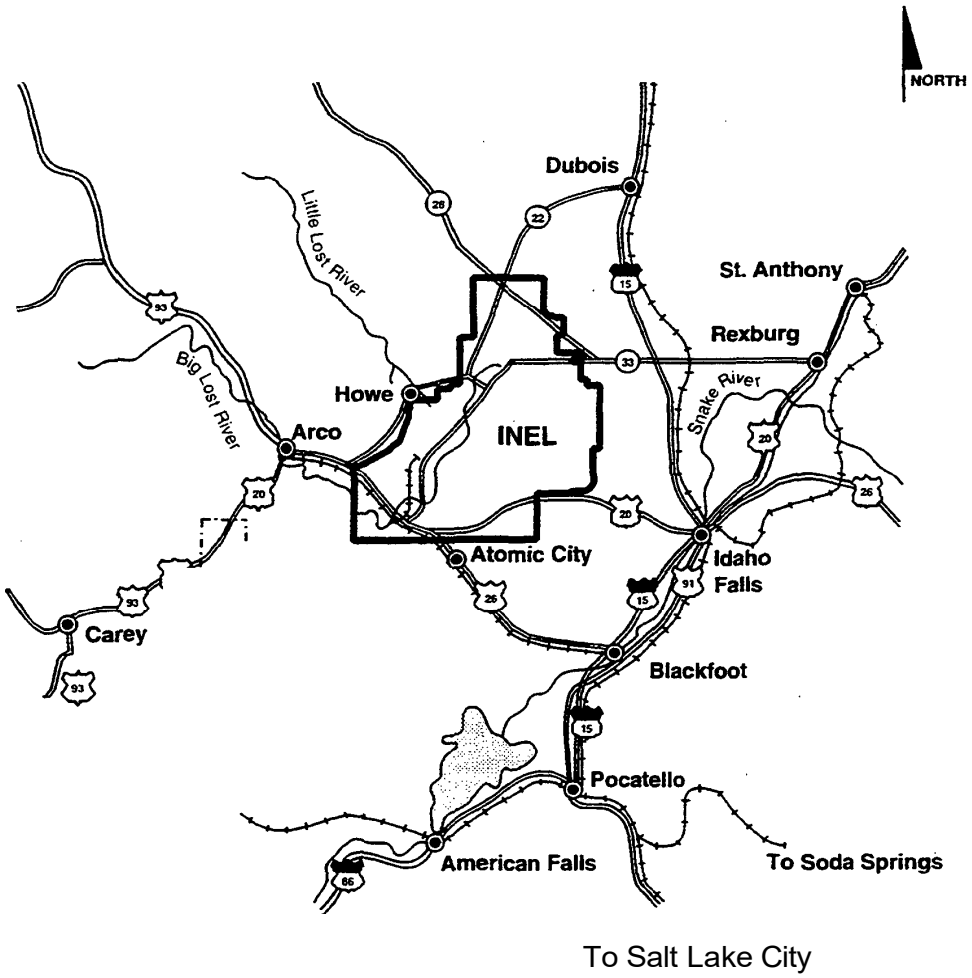

Figure 7. Transportation Routes near the INL Site (NRC 1998)

Idaho Falls Regional Airport, located approximately 56 km (35 mi) east of the INL Site in Idaho Falls, is the closest commercial airport. Union Pacific Railroad operates railroad lines following the Snake River that carry transcontinental traffic, and railroad lines in southern Idaho serving

the Idaho's agricultural industry for transport of agricultural products (potatoes, beans, grains, fertilizers, etc.) (Union Pacific 2018). Pocatello, south of the INL site, is a major hub for the Union Pacific Railroad.

3.3 Demography Socioeconomics

The ISFSI is located within the INL Site, and there are no residents within a 6 km (4 mi) radius. The area within a 16 km (10 mi) radius of the ISFSI site contains no permanent residents, cities, or towns but encompasses several of the INL Site facilities (DOE-ID 2017a). Due to institutional controls restricting site access, the population in this radius is unlikely to change.

Approximately 4,000 workers are employed at the INL Site (DOE-ID 2017a). The percentages of minority and low-income populations in the five counties are listed in Table 1.

Table 1. Percentage of Minority and Low-income Populations (USCB 2018)

	Black or African American	Asian	American Indian and Alaska Native	Native Hawaiian and Other Pacific Islander	Multiracial	Hispanic or Latino	Individuals Below Poverty Level
Idaho	0.6	1.3	1.3	0.1	2.6	12.0	15.2
Butte County	1.2	0	0.2	0	0.2	3.9	15.5
Bingham County	0.3	1.0	5.6	0	2.7	17.8	13.4
Bonneville County	0.4	0.9	0.4	0.1	2.5	12.4	12.7
Jefferson County	0.1	0.2	0.4	0.2	2.6	10.4	11.2
Clark County	0.1	0	0	0	2.7	47.3	27.1

According to the most recent American Community Survey 5-Year Estimates, Butte County has a population of 2,592 compared to the State of Idaho's population of 1,635,483 (USCB 2018). The State of Idaho population increased by about 9 percent from the 2010 Census, while the Butte County population decreased by about 10 percent. The median household income is about $49,174 in the State and $39,653 in Butte County in 2016 dollars (USCB 2018).

3.4 Climatology, Meteorology, and Air Quality

The INL Site is located in the Eastern Snake River Plain in the southeastern part of Idaho. Its climate is influenced in part by the mountain ranges bordering the Eastern Snake River Plain, which channels the prevailing westerly winds into a southwest wind. The region experiences low relative humidity, wide daily temperature swings due to the high-desert terrain, and large seasonal variations in annual precipitation.

As part of the license renewal application, DOE-ID submitted meteorological data measured onsite from January 1950 to December 2014. Since 1949, the National Oceanic and

Atmospheric Administration (NOAA) has maintained a meteorological observation program on the INL Site. The average annual temperatures recorded range from -7.8°C (20°F) in January to 27°C (83°F) in June/July/August (DOE-ID 2017a). The highest temperature recorded during this period was 40°C (105°F) in July and the lowest temperature recorded was -45°C (-47°F) in December. The region experiences large year-to-year variations in monthly temperatures, and large variations in temperature have occurred in different locations.

Average annual recorded rainfall is 21.3 centimeters (cm) (8.40 inches [in.]), and monthly extremes range from zero to 11.8 cm (4.64 in.). The maximum rainfall in a 24-hour period is 4.6 cm (1.8 in.), and the largest short-term precipitation rates are attributable to thunderstorms in summer months. Average annual recorded snowfall is 65.2 cm (25.7 in.), and extremes range from 17.3 cm (6.8 in.) to 151.6 cm (59.7 in.) (DOE-ID 2017a).

Most offsite locations near the INL Site experience wind flows that are predominantly southwest/northeast due to the Eastern Snake River Plain geography, but the INL Site normally experiences southwest winds because the mountain ranges nearby influence wind direction. Wind measurements onsite show the highest hourly average wind speed near the ground is 22.8 meters per second (m/s) (51 miles per hour [mph]) from the west-southwest, and the maximum instantaneous gust of wind recorded was 34.9 m/s (78 mph) (DOE-ID 2017a).

Wind data were recorded at the Global Reporting Initiative meteorological monitoring station, located approximately 1.6 km (1 mi) north of INTEC, from 1994 through 2014 (DOE-ID 2017b). These data show that the wind speeds do not vary considerably over the course of the year; the lowest monthly mean wind speed is 3.1 m/s (6.9 mph) in January and the highest is 5.0 m/s (11.1 mph) in May, and the mean wind direction is generally west-southwest (DOE-ID 2017a). The greatest hourly mean wind speed ranges from16.9 m/s (37.9 mph) in August to 20.7 m/s (46.2 mph) in January.

Except for thunderstorms, which occur about two or three days per month in summer months, the region does not often experience severe weather. NOAA data from 1950 to 2006 reveal that six tornadoes have been recorded near the site's perimeter but not close to the TMI-2 ISFSI, and six funnel clouds have formed during this time (DOE-ID 2017b). Five of these tornadoes were classified as F-0 on the Fujita Scale, and one was classified as F-1 indicating moderate damage (DOE-ID 2017b). Tornadoes are rare in the vicinity of the site and typically cause little to no damage.

The National Ambient Air Quality Standards (NAAQSs) set by the EPA specify the acceptable air concentration thresholds for six common criteria pollutants: nitrogen oxides, ozone, sulfur oxides, carbon monoxide, lead, and particulate matter (PM). Compliance is determined individually for each pollutant, and an area is classified in 40 CFR Part 81 as "in attainment" when concentration levels comply with NAAQSs.

Butte County is in the Eastern Idaho Intrastate Air Quality Control Region (AQCR) (40 CFR 81.190). Butte County is in attainment with the NAAQSs. However, part of Franklin County, which is within the AQCR, is in moderate nonattainment of the 24-hour PM-2.5 (particulate matter with an aerodynamic diameter of 2.5 microns or less) NAAQS (40 CFR 81.313). The nearby Fort Hall Indian Reservation is in nonattainment of the PM-10 (particulate matter with an aerodynamic diameter of 10 microns or less) NAAQS (40 CFR 81.313).

Inversion conditions occur in the region about half of the time, and the mixing layer depth ranges from 120 m (400 ft) in December to 900 m (3,000 ft) in July (DOE-ID 2017a). The low relative humidity coupled with a low concentration of criteria pollutants allows for good visibility in the region. The Craters of the Moon Wilderness Area is approximately 20 km (12.4 mi) southwest of the INL Site and is listed as a Mandatory Class I Federal Area where visibility is an important value (40 CFR 81.410).

Recent improvements in the emissions and the science of climate change have enabled the U.S. Global Change Research Program (GCRP) to estimate regional climate changes in the United States (GCRP 2014). The GCRP predicts increasing temperatures, decreasing summer precipitation, and earlier snowmelt leading to reduced summer stream flows and possible water-use conflicts in the Northwest due to climate change (GCRP 2014). There is variation in model predictions regarding seasonal precipitation changes. However, one consistent prediction across models is a decrease in summer precipitation by as much as 30 percent in the Northwest region by the end of the century under a scenario of continued growth in greenhouse gases (GHGs; GCRP 2014). In the vicinity of the INL Site, the GCRP predicts a reduction in summer stream flow of 20 to 30 percent by the end of the century. The projected change in average annual temperature by late century compared to the period of 1970–1999 in the northwestern United States is a regional average increase of between 3.3°F to 9.7°F (GCRP 2014). Wildfires in the Northwest have increased since the 1970s in both number and extent due to warmer and drier conditions. In the vicinity of the INL Site, there is a 100 to 200 percent projected increase in forested area burned resulting from regional temperature and precipitation changes (GCRP 2014).

3.5 Geology and Seismology

3.5.1 Geology and Soils

The ISFSI is located in the south-central part of the INL Site and sits on 9–18 m (30–60 ft) of Late Pleistocene alluvial gravels above the Holocene floodplain. The ISFSI is about 2,800 ft southeast of the Big Lost River channel. The Holocene floodplain is characterized by abandoned channels and possibly braided channels of the Big Lost River, and the active channel is frequently dry and incised by 1.5 to 2.1 m (5 to 7 ft) into the floodplain deposits. Surficial sediments beneath the site consist of sand and gravel deposits. Beneath the gravelly alluvium, in some areas there is a thin layer of clay and silt, which results in a discontinuous layer that has low permeability above the basalt bedrock layer. Sedimentary interbeds extending to a depth of 600 to 700 m (1,970 to 2,300 ft) beneath the ISFSI consist of silts, clayey silts, and sandy silts (DOE-ID 2017a).

The Eastern Snake River Plain has mostly rough, uneven topography because of the basalt flows that make up the surface (DOE-ID 2017a). Windblown silt deposited into fissures and depressions has softened the topography and, in some areas, has formed dunes and rolling terrain. Small playas have formed due to deposition of silt and clays from intermittent lakes and ponds.

As shown in Figure 8, the Eastern Snake River Plain extends in an arc from the Idaho-Oregon border to the Yellowstone Plateau, and is a low-relief broad basin. The Plain experiences gradually decreasing elevation changes from 2,000 m (6,560 ft) near Yellowstone to 650 m (2,130 ft) near the Idaho-Oregon border.

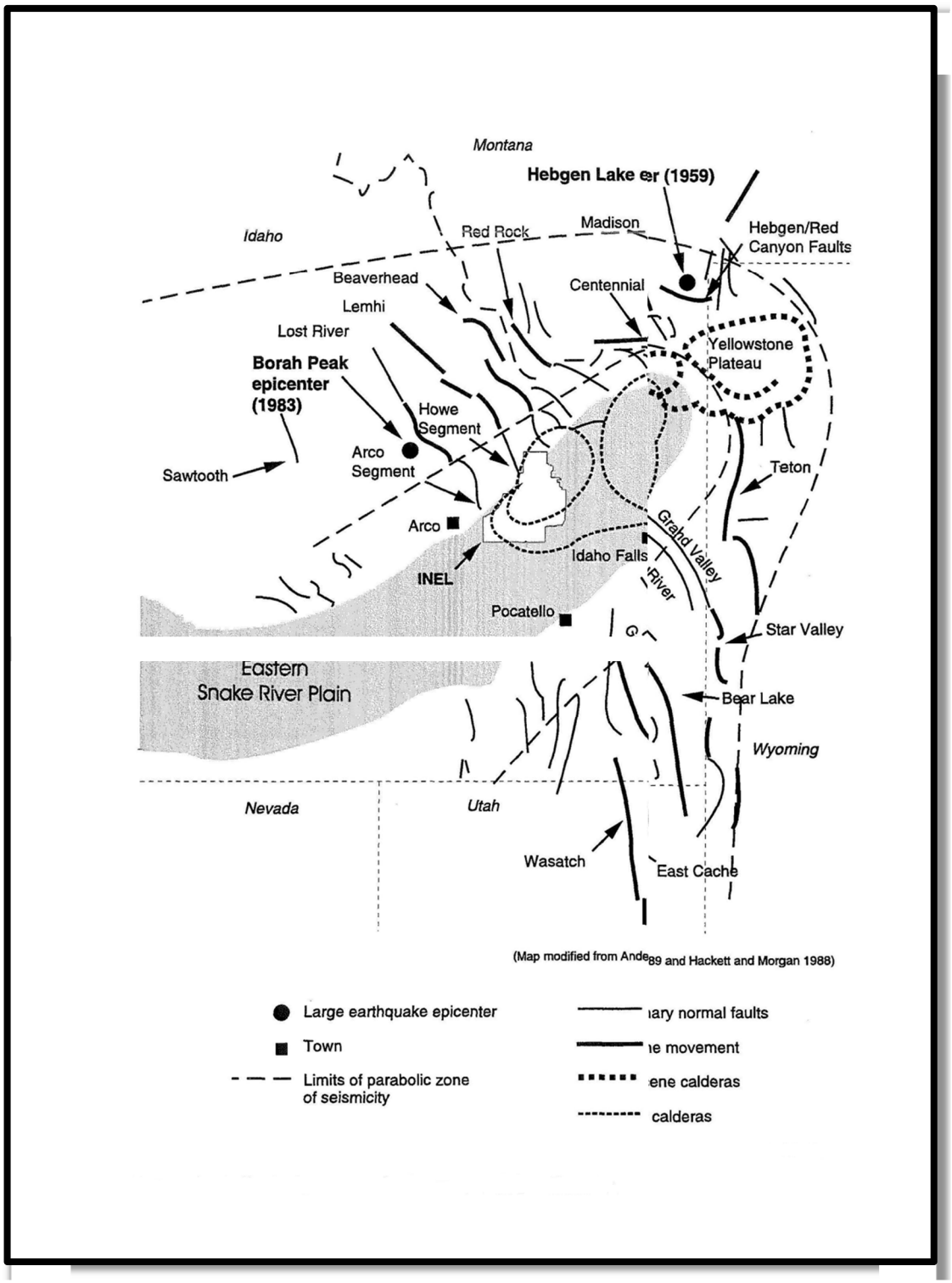

Figure 8. Geologic Features at INL Site (DOE-ID 2017a)

At the northeastern end of the Plain is the Yellowstone Plateau, standing significantly higher than the Plain at 2,100 m (6,889 ft). The Yellowstone Plateau is a highly volcanic plateau with

underlying Pleistocene rhyolitic volcanic rocks (DOE-ID 2017a). The Yellowstone Plateau is not as high as the northern Basin-and-Range Province mountain summits, bordering the Plain to the south. The northern edge of the Plain is bounded by the Idaho Batholith, which is characterized by irregular mountainous terrain. Mountain rivers north of the Plain flow into playas north of the INL Site due to the axial ridge or axial volcanic zone. For example, the Big Lost River flows onto the Plain near Arco before turning northeast in the southwestern corner of the INL Site and flowing north to the Big Lost River Sinks north of the site (DOE-ID 2017a).

3.5.2 Seismology

Earthquake measurements from 1884 to 1989 at the INL Site reveal that the Eastern Snake River Plain has a low rate of seismicity, but the surrounding Basin-and-Range Province has a fairly high rate of seismicity (DOE-ID 2017a). The Basin-and-Range seismicity is attributed to crustal extension in the northeast-southwest direction. Earthquakes greater than 5.5 magnitude are unlikely within the Eastern Snake River Plain based on geology and seismic history.

The INL Site is also subject to volcanic hazards. These hazards include the effects of lava flow, volcanic earthquakes, ground deformation, and ash. The Eastern Snake River Plain has had volcanic activity during the past 4 million years, mostly basaltic lava flows from vents along the northwest-trending volcanic rift zones and axial volcanic zone (DOE-ID 2017a). Catastrophic volcanic eruptions at Yellowstone National Park, located more than 160 km (70 mi) from the INL Site, have occurred three times in the last 2 million years. Craters of the Moon National Monument experienced a volcanic eruption 2,100 years ago—the most recent and closest eruption to the INL Site (20 km [12.4 mi]). However, the axial volcanic zone domes formed somewhere between 1.2 and 0.3 million years ago, with a recurrence interval of 200,000 years, therefore there is low probability of future dome formation impacting INL Site facilities (DOE-ID 2017a).

3.6 Water Resources

3.6.1 Groundwater Hydrology

Subsurface water occurs in the Snake River Plain aquifer and the vadose zone beneath the INL Site (NRC 1998). The Snake River Plain aquifer is the largest aquifer in Idaho and covers approximately 24,890 km^2 (9,611 square miles), and groundwater generally flows south and southwest across the Snake River Plain (NRC 1998). Recharge of the aquifer occurs from infiltration of irrigation water, stream channel and canal seepage, direct infiltration due to precipitation, and underflow from tributaries that extend into the watershed. Discharges from the aquifer occur through springs flowing into the Snake River and irrigation pumping.

Two wells located north of the INTEC supply drinking water. Periodic drinking water samples are collected at the site. In 2013, drinking water samples were collected from various buildings throughout the distribution system and from the point of entry to the distribution system (DOE-ID 2017a). The samples were analyzed for E. coli and total coliform; the results reported their absence from all 68 samples analyzed. One sample was analyzed for nitrate, and the result of 0.7 mg/L was below the Maximum Contaminant Level for nitrate. One surveillance sample was analyzed for gross alpha, gross beta, tritium, and strontium-90, and results indicated gross alpha level was below the Maximum Contaminant Level and the others were non-detectable.

3.6.2 Surface Water Hydrology

The INL Site is in the Pioneer Basin, which is a closed drainage basin on the Eastern Snake River Plain. The Pioneer Basin receives runoff intermittently from the Big Lost River, Little Lost River, and Birch Creek drainage basins (DOE-ID 2017a). Four watersheds have surface water bodies that flow near the INL Site or onto the site: Big Lost River, Birch Creek, Little Lost River, and Medicine Lodge. Surface water from these watersheds is lost to evapotranspiration or infiltration to local aquifers and the Eastern Snake River Plain aquifer, which sits beneath the INL Site. Water is also diverted from contributing tributaries upstream of the INL Site for irrigation use. There is little surface water at the INL Site, other than water bodies formed from snowmelt runoff or heavy precipitation and manmade ponds (NRC 1998). Surface water accumulating from local precipitation flows into topographic depressions on the INL Site, and either evaporates or infiltrates into the ground (NRC 1998). It is not used for drinking water, irrigation, or manufacturing purposes.

Water quality records for Big Lost River, Little Lost River, and Birch Creek from the U.S. Geological Survey during the period from 1982 to 1993 demonstrate that physical, chemical, and radioactive indicators have not exceeded drinking water quality standards. The chemical composition of these rivers is primarily derived from the carbonate rocks in mountain ranges northwest of the INL Site and irrigation water returns to the surface water, such as irrigation outflows that are diverted back to Birch Creek. The State of Idaho regulates discharges of wastewater from the INL Site to evaporation ponds and land surfaces. The wastewater reuse permit at INTEC requires sampling. No permit limits were exceeded at INTEC and drinking water samples have been below the limits set by regulatory authorities.

Flooding was evaluated for the INL Site in the *NRC's Final Environmental Impact Statement (EIS) for the Construction and Operation of an Independent Spent Fuel Storage Installation to Store the Three Mile Island Unit 2 Spent Fuel at Idaho National Engineering and Environmental Laboratory*, NUREG-1626 (NRC 1998). That EIS stated that flooding onto the INL Site from the Big Lost River along with failure of Mackay Dam was a possibility, if there was also topping of the Diversion Dam. The Big Lost River channel is approximately 200 ft (60 m) from INTEC, and the ISFSI is approximately 2,800 ft (850 m) from the Big Lost River channel (DOE-ID 2017a). The ISFSI pad is elevated to 4,917 ft (1,499 m) and the DSCs are slightly more than 4,922 ft (1,500 m) above mean sea level. The probable maximum flood event described above would cause water to flood the INTEC site up to 4,917 ft (1,499 m), but would not cause structural damage of the DSCs (DOE-ID 2017a).

3.7 Ecology

The INL Site is located in high-desert terrain, and the ecological resources found in the site vicinity are typical of the Great Basin and Columbia Plateau.

3.7.1 Aquatic Resources

The INL Environmental Surveillance, Education, and Research Program has identified 5 fish and 1 amphibian species on the site. The Big Lost River has experienced periods of drought and water diversion for irrigation upstream, limiting the native fish species present onsite. During years when water flow is sufficient, these fish species are present, along with the Great Basin spadefoot toad.

3.7.2 Terrestrial Resources

The INL Site environment consists of sagebrush-steppe rangeland, with a shrub overstory and understory of perennial grasses and forbs. The most common shrubs at the INL Site are Wyoming big sagebrush and green rabbitbrush. Other shrubs include winterfat, spiny hopsage, gray rabbitbrush, broom snakeweed, and horsebrush. The sinks and playas of the Big Lost River and Birch Creek contain salt-desert shrub communities. Understory grasses include thick-spiked wheatgrass, Indian rice grass, bottlebrush squirreltail, needle-and-thread grass, and Nevada buegrass (DOE-ID 2017a). Common forbs at the INL Site are tapertip hawksbeard, Hood's phlox, prickly phlox, hoary false yarrow, globe-mallow, evening primrose, bastard toadflax, along with various paintbrushes, lupines, buckwheat, mustards, and milkvetches.

Several non-native species have been identified on the INL Site, including 11 noxious weeds. The non-native species compete with the native species, and have become difficult to eradicate. Cheatgrass and Russian thistle are among the plant species that have become well established in disturbed areas and could be altering the plant community structure in the region.

The INL Environmental Surveillance, Education, and Research Program has identified five species of snake, three lizard species, and the western skink on the INL Site (DOE-ID 2017a). A large population of birds is found at the site, including waterfowl, raptors, and songbirds, although many are migratory. The bald eagle and sage-grouse are important species present in the INL Site vicinity.

The Environmental Surveillance, Education, and Research Program has identified 37 mammal species, mostly small mammals and several important large mammals. The INL Site is used by approximately 30 percent of the State's pronghorn population for winter range, and a small population of elk reside on the site. There is a large population fluctuation among some small mammal species onsite, influencing the behaviors of predator populations (coyote, bobcat, raptors, mountain lions, and badgers). Sage-grouse, sage sparrow, and pygmy rabbit live only in sagebrush communities such as at the INL Site, and rocky outcroppings serve as habitat for bats and wood rats. The grasslands provide habitat for the western meadowlark and mule deer, among other species. Additionally, 740 insect species have been identified at the INL Site.

IN 1992, the INL Site was evaluated as part of the National Wetlands Inventory; 135 areas were mapped and 121 site wetlands were surveyed. The Big Lost River Sinks was the only area at the INL Site identified as potential jurisdictional wetlands (DOE-ID 2017a).

3.7.3 Threatened and Endangered Species

Appendix A contains a list of federally threatened, endangered, proposed, and candidate species believed to occur or known to occur in the State of Idaho. In an April 24, 2017 letter to U.S. Fish and Wildlife Service (FWS), Eastern Idaho Field Office, DOE-ID discussed two species from the Idaho Species Status list published by FWS that may occur on the INL Site (DOE-ID 2017b). These species are the North American wolverine (*Gulo gulo luscus*), a proposed threatened species, and the yellow-billed cuckoo (*Coccyzus americanus*), a listed threatened species. DOE-ID states that the North American wolverine has not been documented on the INL Site but may pass through the site, and the yellow-billed cuckoo has only been observed once near the INL Site (DOE-ID 2017b).

The bald eagle (*Haliaeetus leucocephalus*) and American peregrine falcon (*Falco peregrinus*) are two delisted species that DOE-ID continues to monitor on the INL Site (DOE-ID 2017b). The bald eagle is protected under the Bald and Golden Eagle Protection Act, and has been known to winter on the INL Site and in the Little Lost River Valley to the north of the INL Site. The American peregrine falcon has been observed on the northern portion of the INL Site (DOE-ID 2017b).

3.8 Noise

Noise levels at the INL Site result from industrial operations, construction activities, and vehicle traffic. The noise levels range from 10 decibels adjusted (dBa) due to rustling grass up to 115 dBa due to a combination of the aforementioned activities. Onsite workers use hearing protection in accordance with site procedures. The Occupational Safety and Health Administration sets standards for noise limits, requiring hearing protection to counter the effects of noise exposure for workers experiencing noise levels above 85 dBa over an 8-hour time-weighted average (29 CFR 1910.95). The ISFSI has no hearing protection requirements within its boundaries.

3.9 Historic and Cultural Resources

As required by Section 106 of the National Historic Preservation Act (NHPA), the NRC is evaluating the impact of this license renewal on historic, archaeological, and traditional cultural resources. The area of potential effect for this proposed action consists of the TMI-2 ISFSI site. In its license renewal application (DOE-ID 2017a), DOE-ID referenced INL's management plan for cultural resources, the *Idaho National Laboratory Management Plan for Cultural Resources, Final Draft*, most recently published in February 2016, which identifies cultural resources found at the site. The plan also includes procedures for unanticipated discovery of cultural resources. Prehistoric archaeological sites located at the INL Site include campsites, lithic workshops, hunting blinds, and cairns (DOE-ID 2017a). The prehistoric archaeological sites provide information about aboriginal hunting and gathering groups that inhabited the site area. Archaeological sites of importance to Native American groups include pictographs, caves, and landscape features of the INL Site. There are also 31 fossil localities at the site, and abundant and varied paleontological resources that are typically found in conjunction with archaeological sites (DOE-ID 2017a). Historic sites from the late 1800s and 1900s include the abandoned town of Powell/Pioneer, a northern spur of the Oregon Trail named Goodale's Cutoff, and small homesteads, stage/wagon trails, camps for livestock, and irrigation canals (DOE-ID 2017a). The INL site also has historic information about nuclear science development within the various scientific facilities at the site.

The region in which the INL Site is located is of cultural importance to the Shoshone-Bannock Tribes, including prehistoric archaeological sites and features of the natural landscape. Features of significance to the Shoshone-Bannock Tribes include buttes, wetlands, sinks, grasslands, juniper woodlands, Big Lost River, and Birch Creek (DOE-ID 2017a). The Tribes hold the land sacred, and traditional lifeways (air, water) as well as all natural resources are of special significance (DOE-ID 2017a). The INL Site is located within a larger area previously inhabited by the Shoshone-Bannock, who still use plants located nearby or on the INL Site primarily for food or medicine.

DOE-ID maintains regular contact with the Shoshone-Bannock Tribes of the nearby Fort Hall Indian Reservation, and procedures for tribal involvement during project development are documented in the *Idaho National Laboratory Management Plan for Cultural Resources, Final Draft*. DOE-ID discusses activities associated with TMI-2 ISFSI along with other activities at the INL Site on a regular basis with the Shoshone-Bannock Tribes through the Fort Hall Business Council, an elected governing body for the Shoshone-Bannock Tribes (DOE-ID 2017b). DOE-ID also participates in discussions and briefings with the Citizens Advisory Board quarterly, and the Shoshone-Bannock Tribes participate as a member of the Board (DOE-ID 2017b). The proposed action, license renewal of the TMI-2 ISFSI, was discussed during 2017 meetings of the Citizens Advisory Board.

The NRC staff contacted the Idaho State Historic Preservation Officer (SHPO) and the Shoshone-Bannock Tribes. These consultations are described in Section 5.0 of this EA. Based on this correspondence and review of the *NRC's Final Environmental Impact Statement for the Construction and Operation of an Independent Spent Fuel Storage Installation to Store the Three Mile Island Unit 2 Spent Fuel at Idaho National Engineering and Environmental Laboratory*, NUREG-1626 (NRC 1998), there are no known historic and cultural properties immediately within the TMI-2 ISFSI site. However, the National Historical Monument Experimental Breeder Reactor-I is within approximately 16 km (10 mi) from the ISFSI. DOE-ID, however, controls access to the INL Site for site personnel, and visitor access is limited to persons driving on public highways or visiting the designated National Historical Monument Experimental Breeder Reactor-I. The Craters of the Moon National Monument is located approximately 20 km (12.4 mi) southwest of the INL Site. The activities to be carried out as a result of proposed ISFSI license renewal are not anticipated to affect historic and cultural properties within the TMI-2 ISFSI.

3.10 Visual and Scenic Resources

The INL Site is bordered by the Bitterroot, Lemhi, and Lost River mountain ranges on the north and west, and volcanic buttes on the south. Several highways pass near the site, and many of the site facilities are visible from public highways (DOE-ID 2017a). However, most site facilities are over 0.8 km (0.5 mi) from public roads. The closest facility to a public road is 0.6 km (0.4 mi) from State Highway 33, and this portion of the highway is primarily used by the INL Site workforce. The INL Site is visible from the Fort Hall Indian Reservation. The ISFSI within the INL Site is not visible from public roads and blends in with the generally low-density industrial-looking facilities at the site.

Scenic areas nearby include the Craters of the Moon National Monument, approximately 20 km (12.4 mi) southwest of the INL Site, and it is designated as a Mandatory Class I Federal Area where visibility is an important value. The BLM has jurisdiction over lands adjacent to the INL Site. These lands have been designated as Visual Resource Management Class II areas, meaning the lands should be preserved and the character of the landscape should be retained. Additionally, natural landscape features have significance to the Shoshone-Bannock Tribes.

3.11 Public and Occupational Health

Risks related to occupational health and safety include exposure to radiological and nonradiological hazards. Nonradiological hazards include those associated with normal maintenance activities.

The Atomic Energy Act requires NRC to promulgate, inspect, and enforce standards that provide an adequate level of protection for public health and safety and the environment. The NRC continuously evaluates the latest radiation protection recommendations from international and national scientific bodies to establish the requirements for applicants and licensees. The NRC has established multiple layers of radiation protection limits to protect the public from potential health risks caused by exposure to effluent discharges from nuclear facility operations. ISFSIs in the United States are licensed by the NRC and must comply with NRC regulations and conditions specified in the license in order to operate. Licensees are required to comply with 10 CFR Part 20, Subpart C, "Occupational Dose Limits"; 10 CFR Part 20, Subpart D, "Radiation Dose Limits for Individual Members of the Public"; and 10 CFR 72.104, "Criteria for Radioactive Materials in Effluents and Direct Radiation from an ISFSI or MRS."

DOE-ID maintains a REMP in accordance with 10 CFR 72.44 to monitor potential airborne radioactivity and direct radiation pathways. Results from the REMP are reported annually. DOE-ID states that operational monitoring programs on the site will continue through the life of the ISFSI, and will serve as the operational monitoring program of the ISFSI. The results of the most recent REMP are discussed in Section 1.3.4.
For a U.S. resident, the average annual estimated total effective dose equivalent from natural background and anthropogenic (manmade) radiation sources is about 6.2 millisieverts (mSv) (620 mrem) (NRC 2017b). The source of this dose includes cosmic radiation, background radiation (radon and thoron), cosmic radiation, radiation sources in the Earth (terrestrial sources), naturally occurring radionuclides that exist in the body, medical and occupational sources, industrial sources, and radionuclides present in consumer products. The U.S. population is exposed to two primary sources: naturally occurring background radiation and medical exposure to patients.

4.0 ENVIRONMENTAL IMPACTS

In this section, the NRC staff presents its evaluation of the potential environmental impacts from the proposed continuation of ISFSI operation for an additional 20 years beyond the existing license term, and from reasonable alternatives to that proposed action. To assist in performing the evaluation, the NRC staff reviewed the DOE-ID license renewal application and ER, reviewed prior environmental analyses such as those in Section 1.4, collected information from federal and state government agencies, and contacted tribal organizations.

The NRC staff's evaluation of potential environmental impacts from the proposed action is based on (1) DOE-ID's forecast of activities over the proposed 20-year renewal period; (2) data that reflect current site conditions, activities, and effluent levels; and (3) monitoring data collected.

In its evaluation, the NRC staff assessed both the radiological and nonradiological impacts of the proposed action and the alternatives. As discussed in detail below, the NRC staff expects that radiological doses to site workers and to the public from continued ISFSI operations would be below the NRC's regulatory limits in 10 CFR Part 20. Additionally, the NRC staff expects that nonradiological environmental impacts from continued ISFSI operations to all of the resource areas discussed below would be minimal, because (1) DOE-ID is not requesting approval for any construction activities, and (2) the ISFSI does not generate liquid or solid nonradioactive wastes. However, there would be nonradiological impacts associated with

removal of the fuel from the ISFSI in accordance with the settlement agreement by January 1, 2035. These impacts are addressed in the resource areas likely to be affected.

4.1 Land Use

In its license renewal request, DOE-ID does not anticipate any new construction for continued operation of the ISFSI. Continued storage of spent fuel in the ISFSI for the proposed 20-year license renewal period would not change land use on site.

Long-term operation of the ISFSI structure is not anticipated to require new and/or additional maintenance activities that would impact current land use, because the ISFSI structure is passive and requires little or no maintenance. Impacts associated with fuel removal from the ISFSI could occur prior to the end of the requested 20-year renewal period in accordance with the settlement agreement between DOE-ID, the State of Idaho, and the Department of the Navy. Land use may be impacted for equipment setup and material staging areas, however this area would be localized to the immediate area surrounding the ISFSI. Therefore, the NRC staff concludes that impacts on land use from the proposed action would not be significant.

The no-action alternative could result in impacts on land use. In the short term, when DOE-ID begins to decommission the ISFSI, decommissioning activities may impact land near the ISFSI for equipment setup and material staging areas. However, the NRC staff expects that these impacts on land use would be localized to the ISFSI area. After ISFSI decommissioning, DOE-ID anticipates that land would be returned to its use prior to ISFSI construction and operation (i.e., available for wildlife use), and made available for other uses (DOE-ID 2017a). Despite these potential impacts on land use, the former ISFSI site would remain within the larger INL Site, therefore the NRC staff concludes that impacts on land use from the no-action alternative would not be significant.

4.2 Transportation

The NRC staff expects that the proposed action would not change transportation at the INL Site. The proposed action does not include any construction or expansion of the existing ISFSI footprint, and no additional facility maintenance staff would be needed (DOE-ID 2017a). Impacts due to fuel removal from the ISFSI would occur prior to the end of the requested 20-year renewal period, due to DOE-ID's settlement agreement with the State of Idaho and Department of the Navy to remove TMI-2 spent fuel core debris from the State by January 1, 2035. Impacts on transportation from removal of the ISFSI fuel to an offsite location would result in the years preceding 2035. DOE-ID refers to NUREG-1773, *Environmental Impact Statement for the proposed Idaho Spent Fuel Facility at the Idaho National Engineering and Environmental Laboratory in Butte County, Idaho* (NRC 2004) for additional information regarding removal of spent fuel from the INL Site in its responses to NRC RAIs (DOE-ID 2017b). Impacts associated with removal of the fuel debris from the TMI-2 ISFSI would include slight increases in traffic on local roads from equipment needed (cranes, hoists, forklifts, and lifting and transport components [NRC 2004]). DOE does not anticipate repackaging the TMI-2 fuel debris as each DSC would be directly transferred from the HSMs into a 10 CFR Part 71 transportation cask for shipment, which in turn would be moved to a designed conveyance (e.g., truck or rail car) for offsite transportation (DOE-2017b). There would also be slight increases in traffic on local roads by large transport vehicles used to relocate the transportation casks with

the loaded fuel to an offsite disposal location. However, this would only be a slight increase in traffic volume and would occur on a limited basis only until the fuel is removed. Based on this information, the NRC staff concludes that the impacts on transportation from the proposed action would not result in a significant impact.

The no-action alternative could increase traffic flow and transportation needed to move the spent fuel from the site. When DOE-ID begins to decommission the ISFSI, decommissioning activities, including removal of waste material (steel DSC lids, HEPA filters, vent seals, and connections [NRC 2004]) could result in an increase in the number of trucks entering and leaving the site. Additional transportation impacts would occur on the INL Site because the trucks to transport materials offsite would travel along onsite roads. However, the increase in traffic would be temporary and limited. The NRC staff concludes that increase in traffic flow from decommissioning activities would not be significant.

4.3 Socioeconomics and Environmental Justice

The proposed renewal would not change the size of the operations workforce. Therefore, as a result of the proposed action the NRC does not anticipate a need for additional housing or community services because there would be no influx of people to the area. There would also be no expected related changes or impacts on the local economy. Therefore, the NRC staff does not expect any direct or indirect socioeconomic impacts and concludes that the socioeconomic impacts from the proposed action would not be significant.

Potential impacts on minority and low-income populations would consist of environmental and socioeconomic effects (e.g., noise, dust, traffic, employment, and housing impacts) and radiological effects. Socioeconomic impacts of the proposed action would not change, and therefore would not have a disproportionately high and adverse on minority and low-income populations. There should be no increase in noise and dust because the proposed action does not include any construction or ground-disturbing activities. As discussed in Section 4.11, radiological impacts are not expected to change as a result of the proposed action. Based on the analysis of human health and environmental impacts presented in this EA, the proposed action would not have disproportionately high and adverse human health and environmental effects on minority and low-income populations residing in the vicinity of the TMI-2 ISFSI.

Under the no-action alternative, decommissioning activities, such as building demolition, would increase noise levels and impact local air quality as a result of fugitive dust and equipment and truck exhaust emissions. Additional workers would be needed to perform decommissioning activities, but this increase would be offset by the decrease in the operational workforce, should be temporary, and should not cause a significant socioeconomic impact. Radiological doses to members of the public would result from removal of the fuel debris from the TMI-2 ISFSI. DOE does not anticipate repackaging the TMI-2 fuel debris as each DSC would be directly transferred from the HSMs into a 10 CFR Part 71 transportation cask for shipment, which in turn would be moved to a designed conveyance (e.g., truck or rail car) for offsite transportation (DOE-2017b). Offsite radiological exposures would be expected to be low given the distance of the decommissioning activities to the site boundary as discussed in Section 4.11. Therefore, there may be increased environmental impacts from the no-action alternative, but these impacts are not likely to be significant and would not have disproportionately high and adverse human health and environmental effects on minority and low-income populations residing in the vicinity of the TMI-2 ISFSI.

4.4 Air Quality

The proposed action does not include any construction or ground-disturbing activities, or any increase in operations workforce. The ISFSI is not being expanded, and no additional fuel will be placed in the ISFSI. Therefore, there should be no increase in emissions of criteria pollutants or GHGs due to continued operation of the ISFSI. Gaseous radioactive effluents from the DSC are filtered through a HEPA filter, resulting in doses sufficiently low that a NESHAP permit for continuous monitoring was not required for the ISFSI (DOE-ID 2017a). However, DOE's INL Site operational monitoring programs will continue through the period of license renewal for the ISFSI. Periodic measurements for NESHAP compliance are included in the operational monitoring program at the INL Site (DOE-ID 2017a).

Impacts due to fuel removal from the ISFSI would occur prior to the end of the requested 20-year renewal period, due to DOE-ID's settlement agreement with the State of Idaho and Department of the Navy to remove TMI-2 spent fuel core debris from the State by January 1, 2035. Removal of the spent fuel core debris by 2035, in accordance with the settlement agreement, would involve removal of the ISFSI to an offsite location, which would impact air quality. These impacts would include an increase in criteria pollutants and GHG emissions from equipment needed (cranes, hoists, forklifts, and lifting and transport components [NRC 2004]) to remove the fuel debris from the TMI-2 ISFSI. DOE does not anticipate repackaging the TMI-2 fuel debris as each DSC would be directly transferred from the HSMs into a 10 CFR Part 71 transportation cask for shipment, which in turn would be moved to a designed conveyance (e.g., truck or rail car) for offsite transportation (DOE-2017b). There would also be an increase in criteria pollutant and GHG emissions from large transport vehicles used to relocate the transportation casks with the loaded fuel to an offsite disposal location. However, Butte County is in attainment with the NAAQSs, and these increases in emissions would be localized and temporary. For these reasons, the NRC staff concludes that the impacts on air quality from the proposed action would not result in a significant impact on air quality.

The no-action alternative may degrade the air quality in the vicinity of the ISFSI. DOE-ID refers to NUREG-1773, *Environmental Impact Statement for the proposed Idaho Spent Fuel Facility at the Idaho National Engineering and Environmental Laboratory in Butte County, Idaho* (NRC 2004) for additional information regarding removal of spent fuel from the INL Site in its responses to NRC RAIs (DOE-ID 2017b). That EIS states that decommissioning activities would likely begin with decontamination and removal of equipment, vacuuming or flushing systems to remove residual materials, and disposing of contaminated filters, and end with site restoration (NRC 2004). The NRC staff expects that these decommissioning activities would result in fugitive dust, and emissions of criteria pollutants and GHGs due to truck shipments for disposal of equipment and materials, and operational equipment involved in removal of residual materials from systems. However, Butte County is in attainment with the NAAQSs, and the emissions associated with decontamination and equipment removal would be localized and temporary. Therefore, the NRC staff concludes that impacts on air quality from the no-action alternative would not be significant.

4.5 Geology and Soils

No construction activities are planned as part of the proposed action. The NRC staff does not expect continued ISFSI operation to impact the underlying geology, because the ISFSI has no moving parts that would impact the subsurface.

The design of the ISFSI incorporates multiple confinement barriers to prevent radioactive material releases to the environment (DOE-ID 2017a). Therefore, the potential for spills and leaks to be discharged into the ground is minimal. Additionally, the INL Site monitoring program is designed to detect any discharges, and the Environmental Surveillance Program measures ambient radiation levels, which are reported annually to NRC in the REMP. When the spent fuel core debris is removed by 2035 according to the settlement agreement, there could be soil compaction from equipment needed (cranes, hoists, forklifts, and lifting and transport components [NRC 2004]) to remove the fuel debris from the TMI-2 ISFSI. DOE does not anticipate repackaging the TMI-2 fuel debris as each DSC would be directly transferred from the HSMs into a 10 CFR Part 71 transportation cask for shipment, which in turn would be moved to a designed conveyance (e.g., truck or rail car) for offsite transportation (DOE-2017b). There should not be any radiological impacts on soil due to the transfer. Therefore, the NRC staff concludes that the impacts on geology and soils of the proposed action would not be significant.

The no-action alternative may produce short-term impacts on soils. Decommissioning activities would include ground disturbance and demolition of ISFSI structures, except for the concrete basemat that would remain onsite (DOE-ID 1996). Under 10 CFR Part 20, Subpart E ("Radiological Criteria for License Termination"), soils at the site would have to meet applicable radiological soil concentration limits before the areas could be released for restricted or unrestricted use. After ISFSI decommissioning, DOE-ID anticipates that the site would be restored to its previous state and made available for other uses (DOE-ID 2017a). The NRC staff expects that the subsurface geology would not be impacted by ISFSI decommissioning because decommissioning activities would not extend to a depth that would affect the geology. For these reasons, the NRC staff concluded that impacts on geology and soils from the no-action alternative would not be significant.

4.6 Water Resources

Continued ISFSI operation would not consume water or generate liquid effluents during normal operation. The HSM protects the DSCs that contain the spent fuel core debris within the TMI-2 canisters, such that any precipitation does not come into contact with the spent fuel and there would be no contamination of rainfall runoff. Vegetation around the ISFSI may be maintained through use of commercial herbicides or ground sterilants according to manufacturer guidelines and INL Site procedures, however, any potential runoff would be controlled in accordance with the Industrial Stormwater Pollution Prevention Plan at INTEC (DOE-ID 2017a). Therefore, the NRC staff concludes that the direct impact on water resources from the proposed action would not be significant.

The no-action alternative could impact water quality. When DOE-ID begins to decommission the ISFSI, decommissioning activities that involve earth-moving activities could increase sediment runoff, but DOE-ID may employ best management practices to reduce runoff and erosion. Additionally, if the applicant conducts regular preventative maintenance on the decommissioning equipment, the NRC staff considers that such actions would reduce the potential for oil and grease spills from that equipment to impact surface or groundwater. Therefore, the NRC staff concludes that impacts on water resources from the no-action alternative would not be significant. If these mitigation measures were not implemented, impacts could be noticeable.

4.7 Ecology

The proposed action does not involve any new construction. Maintenance activities associated with continued operation of the ISFSI would generate noise, such as concrete repair and operation of vacuum pumps (DOE-ID 2017a). As part of the original licensing request for construction and operation of the ISFSI, studies were performed to determine the effects of noise on wildlife. These studies indicated that even with high intermittent noise levels of over 100 dBa, there would be no deleterious effect on the productivity of wildlife (DOE-ID 2017a). The ISFSI is located on previously disturbed land on the INTEC site. Animal species present on the INL Site are likely accustomed to the operation of the ISFSI. Therefore, the NRC staff concludes that the impacts on ecological resources from the proposed action would not be significant.

Under the no-action alternative, when DOE-ID begins to decommission the ISFSI, decommissioning activities, such as building demolition, would increase noise levels and impact local air quality as a result of fugitive dust and equipment and truck exhaust emissions. Animal and bird species present on the INL Site would likely avoid the area during decommissioning. Because the ISFSI is located on previously disturbed land, impacts on plant species during demolition and removal would be minimal. DOE-ID anticipates that the ISFSI site would be restored to conditions prior to construction, and made available for other future uses (DOE-ID 2017a). If the site is not disturbed for an alternative use, wildlife and plant species may return. Therefore, the NRC staff concludes that the impact on ecological resources from the no-action alternative would not be significant.

4.7.1 Threatened and Endangered Species

In a May 17, 2017 response to DOE-ID's letter discussed in Section 3.7.3, the FWS concurred with DOE-ID's determination that the proposed project may affect, but is not likely to adversely affect the yellow-billed cuckoo or North American wolverine (DOE-ID 2017b). In that letter, FWS bases its concurrence on the habitat within the INL Site on the lack of observations of these two species within the INL Site, and the low likelihood of exposure of these species to nuclear material as a result of the proposed license renewal (DOE-ID 2017b).

Based on the conclusions in the May 17, 2017 FWS response letter (DOE-ID 2017b), the proposed action may affect, but is not likely to adversely affect federally listed threatened and endangered species. As noted previously in Section 3.7.3, threatened and endangered species are very rarely observed on the INL Site.

Therefore, for the same reasons discussed above, the NRC staff concludes that decommissioning the ISFSI under the no-action alternative would have minimal impacts on threatened and endangered species.

4.8 Noise

Maintenance associated with continued operation of the ISFSI generates noise, such as concrete repair and operation of vacuum pumps (DOE-ID 2017a). This noise would be intermittent in nature. Noise generated at the INL Site is not detectable offsite, because all offsite areas available to the public are at least 8 km (5 mi) from the site (DOE-ID 2017a). Additionally, no construction activities are planned as part of the proposed action. Therefore,

the NRC staff concludes that the impact from noise generated as a result of the proposed action would not be significant.

The no-action alternative would be expected to cause short-term localized noise impacts. Equipment used for demolition of the ISFSI would generate noise. Transfer of the DSCs to transportation vehicles for removal from the INL Site as part of decommissioning is anticipated to be within the range of noise generated during continued operation of the ISFSI (DOE-ID 2017a). However, given the distance from the ISFSI to public areas offsite, noise impacts from decommissioning would be minimal. Therefore, the NRC staff concludes that impacts on noise levels from the no-action alternative would not be significant.

4.9 Historic and Cultural Resources

As discussed in Section 3.9, the National Historical Monument Experimental Breeder Reactor-I is within approximately 16 km (10 mi) of the ISFSI. DOE-ID, however, controls access to the INL Site for site personnel, and visitor access is limited to persons driving on public highways or visiting the designated National Historical Monument Experimental Breeder Reactor-I. The Craters of the Moon National Monument is located approximately 20 km (12.4 mi) southwest of the INL Site. The activities to be carried out as a result of the proposed ISFSI license renewal are not anticipated to affect historic and cultural properties within the TMI-2 ISFSI. The NRC staff contacted the Idaho SHPO and the Shoshone-Bannock Tribes, as discussed in Section 5.0. The SHPO responded to the NRC staff's letter that the proposed action would result in no historic properties being affected (ISHS 2017). The Shoshone-Bannock Tribes did not respond. There are no construction activities planned as part of the proposed action, and only routine operations, monitoring, and maintenance activities would continue if the ISFSI license is renewed. Therefore, the NRC staff concludes that impacts on historic and cultural resources from the proposed action would not be significant.

Under the no-action alternative, when DOE-ID begins to decommission the ISFSI, decommissioning activities, such as building demolition, would cause ground disturbance. However, DOE-ID and the Idaho SHPO meet periodically to discuss project planning at the INL Site (DOE-ID 2017b) in order to avoid impacts on historic and cultural resources, and decommissioning activities would likely be discussed during these meetings for protection of the resources. In addition, the INL Site has a management plan for cultural resources—the *Idaho National Laboratory Management Plan for Cultural Resources, Final Draft*, most recently published in February 2016—which identifies cultural resources found at the site. Therefore, impacts on historic and cultural resources during demolition and removal of ISFSI structures would not be significant.

4.10 Visual and Scenic Resources

The NRC staff does not anticipate any changes in the local or regional scenic quality because the proposed action does not include any new construction and therefore would not generate any fugitive dust that could impact visual quality. As discussed in Section 3.10, the ISFSI is not visible from public roads and blends in with the INL Site facilities. Therefore, the NRC staff concludes that the impacts from the proposed action on visual and scenic resources would not be significant.

Decommissioning activities carried out under the no-action alternative may cause localized short-term impacts on visual and scenic resources as the ISFSI structures are demolished.

However, the ISFSI is not visible from public roads. Therefore, the NRC staff concludes that impacts on visual and scenic resources from the no-action alternative would not be significant.

4.11 Public and Occupational Health

4.11.1 Nonradiological Impacts

The proposed action does not include any physical modification to the ISFSI. There are no planned refurbishments beyond maintenance, storage, and routine inspections and monitoring of the ISFSI site in accordance with the requirements in 10 CFR Parts 20 and 72. No liquid effluents are released due to operation of the ISFSI, and all gaseous effluents from the DSCs are vented through a HEPA filter. Therefore, the NRC staff concludes that the proposed action would have no significant impact on nonradiological resources.

Under the no-action alternative, potential nonradiological accident impacts could result from removal of the DSC from the HSMs, transfer of the DSCs to transportation casks, and demolition and dismantling of the ISFSI. DOE-ID would likely implement existing INL Site procedures to reduce the likelihood of these incidents. If such procedures are in place, the NRC staff concludes that nonradiological impacts under the no-action alternative would not be significant.

4.11.2 Radiological Impacts

The ISFSI is within the INTEC at the INL Site. The two primary pathways for radiation exposure are potential airborne radioactivity releases and direct radiation (DOE 2018). The closest site boundary is 13.7 km (8.5 mi) from the ISFSI (NRC 1998). The proposed action involves no change in routine operations, and no new construction or land disturbance is being requested as part of this license renewal application. Operations during the proposed license renewal period would include storage and routine inspections and monitoring of the ISFSI site in accordance with the requirements in 10 CFR Parts 20 and 72.

4.11.2.1 Occupational Dose

The REMP for the ISFSI was implemented in 1999 in accordance with 10 CFR 72.44, and was designed to monitor the two predominant radiation pathways mentioned above. The INL Site monitoring program is designed to detect any discharges from the ISFSI, and the Environmental Surveillance Program measures ambient radiation levels.

DOE-ID maintains a radiation protection program (RPP) for the ISFSI in accordance with 10 CFR Part 20 to ensure that radiation doses are maintained as low as reasonably achievable (ALARA). All personnel performing radiological work within the ISFSI are issued thermoluminescent dosimeter (TLD) badges (DOE-ID 2007). The results of the TLDs are reported to management for a review of the exposure of personnel.

During the storage phase, radiological impacts on workers would result from routine activities, such as performing radiation surveys, surveillance activities (when necessary) of the inlet and outlet vent of the HSMs, and routine security patrols. The estimated dose to a worker is 0.0046 mSv/yr (0.46 mrem/yr) (DOE-ID 2017a)—a small fraction of the 10 CFR 20.1201 dose limit of 50 mSv/yr (5,000 mrem/yr). Licensees are required to conduct authorized operational,

inspection, and maintenance activities in accordance with the occupational dose limits specified in 10 CFR 20.1201 and to have and follow a RPP consistent with 10 CFR 20.1101. The most recent NRC inspection of the ISFSI occurred in 2018 (NRC 2018). The related inspection report discussed observed and recorded radiological conditions as the TMI-2 ISFSI was approached, conditions at the outer boundary locations of the ISFSI pad, and conditions at the HSM front and rear door locations. The NRC inspector determined all measurements were within the radiological dose rate limit requirements in the Technical Specifications as part of the license (NRC 2018).

10 CFR 72.44(d)(3) requires licensees to monitor and report annually on the principal radionuclides released to the environment in liquid and gaseous effluents during the previous 12 months of ISFSI operations. In the most recent NRC inspection report from 2018 (NRC 2018), the NRC inspector reviewed calendar year 2016 (DOE 2017) and 2017 (DOE 2018) REMPs. The airborne beta activity exceeded the established action threshold of 0.04 pCi/m^3 as set in the REMP in November 2016 and December 2017. In these two months, the airborne beta activity was 0.05 pCi/m^3 but there was no indication of fission or activation product activity in follow-up gamma spectroscopy analysis of the combined samples for each year (NRC 2018). The 2018 NRC inspection report stated that the DOE-ID had "adequately monitored effluents and assessed direct radiation impacts from the ISFSI. The DOE-ID remained in compliance with all environmental monitoring regulatory requirements related to their ISFSI operations." During removal of the fuel debris from the TMI-2 ISFSI as part of the settlement agreement, workers would likely receive minor radiological doses while overseeing the transfer of each DSC from the HSMs into a 10 CFR Part 71 transportation cask for shipment, which in turn would be moved to a designed conveyance (e.g., truck or rail car) for offsite transportation (DOE-2017b). DOE does not anticipate repackaging the TMI-2 fuel debris (DOE-ID 2017b). DOE-ID would be required to maintain doses within the regulatory limits defined in 10 CFR 20.1201. DOE-ID would continue operational radiological monitoring programs for detecting any releases from the ISFSI during the proposed license renewal (DOE-ID 2017a). Based on these findings and the procedures for preventing radiological releases in place at the ISFSI, the NRC staff has determined that the proposed action would not result in significant radiological impacts on workers or the environment.

Under the no-action alternative, workers would likely receive minor radiological doses while removing the DSCs from the HSMs, and while decontaminating and dismantling the ISFSI. Occupational annual radiological doses are expected to be below regulatory limits in 10 CFR 20.1201 given that DOE-ID is required to have procedures in place (such as the RPP) to minimize doses to levels ALARA pursuant to 10 CFR 20.1101(b). For this reason, the NRC staff concludes that occupational radiological doses under the no-action alternative would not be significant.

4.11.2.2 Dose to the Public

The average annual dose rate in southeast Idaho is 3.6 mSv/yr (360 mrem/yr). DOE-ID's estimated annual radiation dose from the site to the MEI within 50 mi was 0.0005 mSv/yr (0.05 mrem/yr) (DOE-ID 2007). With the addition of direct and air-scattered radiation at the controlled area boundary and atmospheric effluents, the total annual exposure to the MEI is 0.0009 mSv (0.09 mrem). This is well below the 10 CFR 72.104 dose limit of 0.25 mSv/yr (25 mrem/yr) to the whole body for the general public. No increase in dose commitment to the general public was observed as a result of airborne radioactivity sampling from the HSM, and there was no increase in radiation levels above ambient background due to ISFSI operation (DOE-ID 2017a).

When the spent fuel core debris is removed by 2035 according to the settlement agreement, radiological doses to members of the public would result from removal of the DSCs from the HSMs and transfer of the spent fuel offsite. Offsite radiological exposures would be expected to be low given the distance of the fuel removal activities from the site boundary. Therefore, the NRC staff concludes that the potential radiological impacts on members of the public as a result of the proposed action would not be significant.

Under the no-action alternative, radiological doses to members of the public would result from the transfer of each DSC from the HSMs into a 10 CFR Part 71 transportation cask for shipment, which in turn would be moved to a designed conveyance (e.g., truck or rail car) for offsite transportation (DOE-2017b). DOE does not anticipate repackaging the TMI-2 fuel debris (DOE-ID 2017b). Offsite radiological exposures would be expected to be low given the distance of the decommissioning activities from the site boundary. For this reason, the NRC staff concludes that such exposures, on an annual basis, would be less than the annual dose limit in 10 CFR 72.104(a) of 0.25 mSv/yr (25 mrem/yr) and the 10 CFR 20.1301(a)(1) dose limit of 1mSv/yr (100 mrem/yr) (excluding background radiation and medical exposures to radiation). Therefore the NRC staff concludes that the potential radiological impacts on members of the public from the no-action alternative would not be significant.

4.11.3 Accidents

The 1999 SER for the original licensing of the TMI-2 ISFSI at INTEC discusses design basis accidents and off-normal events that could affect the safe operation of the ISFSI (NRC 1999). The accident analysis includes the effects of natural phenomena such as earthquakes and tornadoes, as well as operational accidents. The ISFSI is located at or above the maximum predicted floodplain elevation, so flood loads that can affect the TMI-2 ISFSI components is not credible (NRC 1999). Lightning strikes would not affect normal operation because no equipment is required for continued operation of the HSMs, and a lightning protection system is in place (NRC 1999). The SER analysis found that any cracks or surface spalling from the worst-case postulated fire would have no significant impact on structural integrity or radiation protection from the HSM. Seismic evaluations were performed for the DSC and HSM in the event of an earthquake, and both the DSC and HSM were shown to withstand the design basis conditions. The NRC staff found that the criteria in 10 CFR Part 72 were satisfied for all off-normal events and accidents (NRC 1999). Therefore, the impact from accidents at the ISFSI would not be significant.

Under the no-action alternative, the likelihood of any of these postulated accidents would be reduced as the ISFSI is dismantled. Additionally, because the NRC staff expects the impacts from these postulated accidents to not be significant during continued ISFSI operations, the NRC staff concludes that the impacts from accidents under the no-action alternative also would not be significant.

4.12 Waste Management

As discussed in Section 1.3.3, operation of the ISFSI does not generate any liquid radioactive waste. Gaseous effluents from the DSC are processed through HEPA filters that vent to the atmosphere and are monitored. Very little solid waste is generated by TMI-2 ISFSI operation and maintenance activities (DOE-ID 2017b); it is disposed of along with the larger waste stream from INTEC, and shipped to either Energy Solutions, LLC in Utah or the Nevada National Security Site in Nevada depending upon radioactive content (DOE-ID 2017c). No modifications

to the ISFSI or expansion of the ISFSI are planned as part of the proposed action, and DOE-ID has existing programs in place to manage waste generated by ISFSI operations. Therefore, the NRC staff concludes that the impacts of the proposed action on waste management would not be significant.

The no-action alternative may result in short-term waste impacts due to the temporary activities associated with decommissioning (e.g., building demolition and spent fuel relocation). After spent fuel removal, the ISFSI structure would be demolished and disposed of as nonradioactive waste (NRC 2004). Contaminated portions of the HSM and nearby soil may become low-level radioactive waste. The concrete basemat would remain onsite (DOE-ID 1996). The low-level radioactive waste would be shipped to an offsite licensed low-level waste disposal site. Nonradioactive wastes would be disposed of at existing nearby landfills. Therefore, the NRC staff concludes that the impacts of the no-action alternative on waste management would not be significant.

4.13 Impacts from a Hypothetical Terrorist Attack

4.13.1 NRC Security Requirements for ISFSIs

The NRC has established requirements and has initiated several actions designed to provide high assurance that a terrorist attack would not lead to a significant radiological event at an ISFSI. These include: (1) the continual evaluation of the threat environment by the NRC, in coordination with the intelligence and law enforcement communities, which provides, in part, the basis for the protective measures currently required; (2) the protective measures that are in place to reduce the chance of an attack that leads to a significant release of radiation; (3) the robust design of storage casks, which provides substantial resistance to penetration; and (4) NRC security assessments of the potential consequences of terrorist attacks against ISFSIs, that inform the decisions made regarding the types and level of protective measures. Over the past 25 years, there have been no known or suspected attempts to sabotage, or to steal, radioactive material from storage casks at ISFSIs, or to directly attack an ISFSI. Nevertheless, the NRC is continually evaluating the threat environment, to determine whether any specific threat to ISFSIs exists.

4.13.1.1 General Security Considerations

In response to the terrorist attacks of September 11, 2001, and intelligence information subsequently obtained, the U.S. government initiated nationwide measures to reduce the threat of terrorism. The Federal government continues to improve the sharing of intelligence information and the coordination of response actions among Federal, State, and local agencies. The NRC is an active participant in these efforts; it has regular and frequent communications with other Federal, State, and local government agencies, and industry representatives to discuss and evaluate the current threat environment, to assess the adequacy of security measures implemented at licensed facilities, and, when necessary, to recommend additional actions.

The NRC expanded its system for notifying licensees of possible threats to their facilities, after the September 11, 2001, terrorist attacks, to include a broader range of licensees, including ISFSI licensees. The NRC incorporated the threat condition levels used in the U.S. Department

of Homeland Security's (DHS) National Terrorism Advisory System (previously the Homeland Security Advisory System) as required by Presidential Policy Directive-7, dated January 26, 2011, into its own threat advisory system. The NRC's Office of Nuclear Reactor Regulation issued (OUO-SRI) RIS 2018-03, "National Terrorism Advisory System and Protective Measures for the Physical Protection of Category 1 and Category 2 Quantities of Radioactive Material (OUO-SRI)," dated June 1, 2018. The NRC revised its threat alerts and recommended specific actions in RIS 2018-03. The RIS provides recommended actions that licensees and Agreement States may wish to consider in the event that DHS issues an National Terrorism Advisory System alert.

The Intelligence Liaison and Threat Assessment Branch (ILTAB), within the NRC's Office of Nuclear Security and Incident Response reviews, analyzes, coordinates, and disseminates threat and intelligence information relevant to its licensees and Agreement States, at both strategic and tactical levels. The ILTAB staff also liaises and coordinates with external organizations and agencies, including the intelligence and law enforcement communities. Through these improved coordination and communication functions, the NRC is able to efficiently develop and transmit advisories to the appropriate licensees who are then able to take prompt action. Thus, the broad actions taken by the Federal government and the specific actions taken by the NRC since September 11, 2001, have helped to reduce the potential for terrorist attacks against NRC-regulated facilities.

4.13.1.2 Requirements for ISFSIs

The NRC considered the potential impacts of terrorist acts in the development and implementation of its 10 CFR Part 73, "Physical Protection of Plants and Materials," security requirements (NRC, 2007). The NRC's strategy for protecting public health and safety, the common defense and security, and the environment focuses on ensuring that its requirements, in combination with the design features of storage casks, are effective in protecting against the potential effects of terrorist attacks on ISFSIs.

NRC security requirements provide high assurance that terrorist attacks cannot endanger the public's health and safety by intentionally releasing radiation from an ISFSI. The NRC reviews and approves facility security plans, in evaluating the adequacy of these on-site measures. The TMI-2 ISFSI is also inspected to ensure complete and correct implementation of the features of the site security plan as well as the applicable regulations and orders. The NRC staff has determined through recent inspections that the facility meets the requirements of 10 CFR Part 73 and applicable orders.

The details of specific security measures for each facility are designated as Safeguards Information, in accordance with Section 147 of the Atomic Energy Act and 10 CFR 73.21, and, for that reason, cannot be released to the public. However, key features of the security programs for ISFSIs include: (1) physical barriers; (2) surveillance; (3) intrusion detection; (4) intrusion response; and (5) offsite assistance from local law enforcement agencies, as necessary. After the September 11, 2001, terrorist attacks, the Commission initiated prompt and comprehensive actions to address both immediate and longer-term security measures for NRC- regulated facilities. In the months immediately after the attacks, the Commission issued numerous safeguards and threat advisories to its licensees, to strengthen licensees' capabilities and readiness to respond to a potential attack on a nuclear facility. As part of the longer-term efforts, NRC conducted a comprehensive review of the agency's security program. This review examined specific threats, such as a land-based vehicle bomb, ground assault with the use of

an insider, and water-borne assaults, which have led to the imposition of additional requirements, through orders and rules, affecting many categories of licensees, including ISFSIs.

The Commission issued orders to all licensees of operating ISFSIs to implement additional security enhancements identified in NRC's ongoing comprehensive review of its safeguards and security programs and requirements. These orders, imposing additional security measures, were issued to DOE for the TMI-2 ISFSI on October 16, 2002, and August 18, 2004. These measures, which the NRC staff has determined through its inspection activities to be fully implemented, include: (1) increased security patrols; (2) augmented security forces and weapons; (3) additional security posts; (4) heightened coordination with local law enforcement and military authorities; (5) enhanced screening of personnel; and (6) additional limitations on vehicular access. Collectively, these measures further reduce the already low probability of a successful terrorist attack on an ISFSI, by providing high assurance that an attempted attack could be detected; and by mitigating the extent of damage and the potential radiological consequences if an attack were successful. Based on its ongoing consideration of safeguards and security requirements, its review of information provided by the intelligence community, and the implementation of additional security measures at the Nation's ISFSIs, the NRC has high assurance that public health and safety and the environment, and the common defense and security, continue to be adequately protected in the current threat environment.

4.13.2 Consideration of Environmental (Radiological) Impacts from Terrorist Acts

The NRC staff has considered the potential radiological impacts of terrorist acts on ISFSIs, even though the staff considers the probability of a malevolent act against an ISFSI that could result in a significant radiological event to be very low. By design, storage casks are highly resistant to penetration. To be licensed or certified by the NRC, these casks must meet stringent requirements for structural, thermal, shielding, and criticality performance, and confinement integrity, for normal and accident events. Consequently, storage casks are extremely robust structures, specifically designed to withstand severe accidents, including the impact of tornado-generated missiles.

The TMI-2 ISFSI's robust design and construction provides multiple layers of protection. Spent fuel core debris from the 1979 TMI-2 reactor accident is currently being stored on the INTEC site at the ISFSI. The ISFSI construction was completed in 1999. The ISFSI consists of 29 DSCs that contain 341 TMI-2 canisters on an above-ground concrete pad. Three types of stainless steel TMI-2 canisters are used to store the spent fuel core debris: (1) fuel canisters for large pieces of core debris, (2) knockout canisters for smaller debris, and (3) filter canisters for stainless steel filters and fines resulting from defueling the reactor (DOE-ID 2017a). The ISFSI contains concrete HSMs on a concrete pad at INTEC. The TMI-2 canisters were placed in 29 DSCs that contain HEPA filters for venting. The DSCs were placed into the HSMs at the ISFSI. The TMI-2 ISFSI loading was completed in 2001 (DOE-ID 2017a). Approximately 0.8 hectare ha (2 ac) in the immediate vicinity of the ISFSI pad is fenced for security. The ISFSI pad is approximately 34 m by 61 m (111 ft by 200 ft), and the HSMs sit atop it (DOE-ID 2017a). Each HSM is approximately 5.5 m (18 ft) long and 4.3 m (14 ft) high, and has 0.6–0.9 m (2–3 ft) thick walls (DOE-ID 2017a). The design of the HSMs provides for radiation shielding and protection from external hazards such as missiles, earthquakes, and tornadoes.

Based on these facts, and the results of the security assessments of ISFSIs (discussed below), the NRC has determined that the current design features and additional security measures in place provide high assurance that the TMI-2 ISFSI is adequately protected.

Because of the uncertainty inherent in assessing the likelihood of a terrorist attack, the NRC recognizes that, under general credible threat conditions, although the probability of such an attack is believed to be low, it cannot be reliably quantified. The NRC has adopted an approach that focuses on ensuring that the safety and security requirements, and other security measures, are adequate and effective in countering and mitigating the effects of terrorist attacks against storage casks. To provide high assurance that a terrorist act will not lead to significant radiological consequences, NRC has analyzed plausible threat scenarios and required enhanced security measures to protect against the threats, and has developed emergency planning requirements, which could mitigate potential consequences for certain scenarios. All of these actions have been undertaken without regard to the probability of an attack.

The NRC finds this protective strategy reduces the risk from a terrorist attack to an acceptable level.

4.13.2.1 Generic Security Assessments

Following issuance of the 2002 security orders for ISFSIs, the NRC used a security assessment framework as a screening and assessment tool to determine whether additional security measures, beyond those required by regulation and the security orders, were warranted for NRC-regulated facilities, including ISFSIs (Kipp, 2004; Smith, 2004; Yoshimura, 2004). Initially, the NRC screened threat scenarios to determine plausibility. This screening was informed by information gathered through the NRC's regular interactions with the law enforcement and intelligence communities. For those scenarios deemed plausible, the NRC assessed the attractiveness of the facility to attack by taking into account factors such as iconic value, complexity of planning required, resources needed, execution risk, and public protective measures. Separately, the NRC made conservative assessments of the consequences and assessed the potential for prompt fatalities from radiological impacts from those plausible scenarios. The NRC then looked at the combined effect of the attractiveness and the consequence analyses to determine whether additional security measures for ISFSIs were necessary.

In conducting the security assessments for ISFSIs, the NRC chose several storage cask designs that were representative of currently NRC-certified designs. Plausible threat scenarios considered in the generic security assessments for ISFSIs included a large aircraft impact similar in magnitude to the attacks of September 11, 2001, and ground assaults using expanded adversary characteristics consistent with the design basis threat for radiological sabotage for nuclear power plants. The resulting generic assessments formed the basis for NRC's conclusion that there was no need for further security measures at ISFSIs, beyond those currently required by regulation and imposed by orders issued after September 11, 2001.

4.13.2.2 Comparison of the Generic Security Assessment to TMI-2 ISFSI

The NRC staff reviewed the ISFSI security assessments and compared the assumptions in the generic assessments, with the relevant features of the TMI-2 ISFSI. The NRC staff determined the assumptionsin the generic ISFSI security assessments for storage cask design and

atmospheric dispersion were representative of the actual conditions at the TMI-2 ISFSI. The NRC staff also concluded that a DSC, an overpack design, and construction materials for a storage cask analyzed in the generic security assessments were representative of the TMI-2 storage system in use at the TMI-2 ISFSI. The NRC staff compared wind speeds and atmospheric stability classes and determined that the assumptions for atmospheric dispersion used in the generic security assessments are bounding for the actual conditions at the TMI-2 ISFSI (i.e., the generic assessment methodology over-predicts the dose to a given individual).

The NRC staff compared the radioactive material in TMI-2 canisters to the source term (amount of radioactive material released) used in the generic assessments to determine whether the dose consequences of the generic assessments bound those of the TMI-2 canister waste. The NRC staff conservatively assumed all material placed into the TMI-2 canisters is spent fuel and all canisters contain the same amount of source material as the most heavily loaded TMI-2 canister. These assumptions overestimate the radioactive inventory because all but one TMI-2 canister contain less source material, and non-fuel material is present in the fuel debris. In addition, the NRC staff assumed the release fractions of the TMI-2 canisters equal those of the generic assessment, which would be of lower consequence than those reported in the generic assessment, because there is less source material in the TMI-2 canisters. Moreover, because TMI-2 canisters are structurally more robust than the bare fuel assemblies evaluated in the generic assessment, any hypothetical release would be less and result in fewer environmental consequences than were reported in the NRC staff's generic assessment.

Several factors account for the lesser source term of the TMI-2 spent fuel stored at the TMI-2 ISFSI. The most recent TMI-2 ISFSI Safety Analysis Report indicates a TMI-2 DSC contains less source term material than a canister used in the generic assessment. Because a TMI-2 DSC contains less source term material than the generic DSC, the staff concludes the consequences (dose) of a radiological release from a TMI-2 DSC are bounded by the dose calculated for the generic security assessments. Staff assumed that all TMI-2 DSCs contained canisters equivalent to the most heavily loaded TMI-2 canister. Although the most heavily loaded TMI-2 canister contains more spent fuel material than an intact generic assembly, there are only 12 TMI-2 canisters in a single DSC. There are 24 to 36 assemblies in the DSCs assessed in the generic assessment. Thus the total source material in a TMI-2 DSC will be less than half of a normally loaded generic DSC.

In addition, the fuel removed from the TMI-2 reactor and now stored in the TMI-2 DSCs was irradiated to only 3175 megawatt-days per metric ton uranium (MWD/MTU), which is much less than is typical for spent fuel (45,000 MWD/MTU and higher). The short irradiation period also factors into the reduced source term for the TMI-2 spent fuel. The NRC staff also concludes the projected dose to the maximally exposed individual would be well below 0.05 Sv (5 rem), which is the design basis accident dose limit in 10 CFR 72.106. Emergency planning and response actions by on-site personnel and law enforcement agencies could also provide additional protections and mitigate consequences, in the unlikely event that an attack were attempted at the TMI-2 ISFSI.

For these reasons, the staff concludes that potential radiological dose to the public associated with an attack on the TMI-2 ISFSI would be less than the dose calculated for the generic security assessments. The generic security assessments support the NRC's conclusion that the agency's security regulations and orders for ISFSIs provide adequate protection for the public health and safety, the common defense and security, and the environment. Therefore, additional security measures at ISFSIs are not required.

The NRC staff finds the robust structure of storage casks, specifically designed to withstand severe accidents, in conjunction with existing security regulations and orders, provide adequate protection that a terrorist attack on the TMI-2 canisters would not result in a significant release of radiation. For these reasons, the NRC staff concludes the impact from a hypothetical terrorist attack would be small and would not result in a significant impact to the environment.

4.14 Cumulative Impacts

The Council on Environmental Quality regulations implementing NEPA define cumulative effects as "the impact on the environment which results from the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (federal or non- federal) or person undertakes such other actions" (40 CFR 1508.7). The NRC staff evaluated whether cumulative environmental impacts could result from the incremental impact of the proposed action when added to the past, present, or reasonably foreseeable future actions in the area.

If the proposed action were approved, the TMI-2 ISFSI license would be renewed until 2039. Most of the impacts from the proposed action would be limited to the INTEC site, including those associated with removal of fuel from the ISFSI prior to January 1, 2035, in accordance with the settlement agreement. This includes impacts associated with equipment needed to (cranes, hoists, forklifts, and lifting and transport components [NRC 2004]) to remove the fuel debris from the TMI-2 ISFSI. Each DSC would be transferred from the HSMs into a 10 CFR Part 71 transportation cask for shipment, which in turn would be moved to a designed conveyance (e.g., truck or rail car) for offsite transportation (DOE-2017b). DOE does not anticipate repackaging the TMI-2 fuel debris (DOE-ID 2017b). However, impacts associated with the transportation of loaded casks to an offsite storage location would impact areas beyond the INTEC site. The timeframe considered for future actions extends through 2039, and includes the cumulative impacts associated with fuel removal by January 1, 2035, per the settlement agreement.

As discussed above, the NRC staff determined that impacts for all resource areas from the proposed action, including fuel removal in accordance with the settlement agreement, would not be significant. This is due to the passive nature of the ISFSI. Also, the ISFSI is designed to minimize radiological doses to workers and members of the public. DOE-ID's estimated annual radiation dose from the site to the MEI within 50 mi was 0.05 mrem/yr (DOE-ID 2007). With the addition of direct and air-scattered radiation at the controlled area boundary and atmospheric effluents, the total annual exposure to the MEI is 0.09 mrem. As discussed in Section 4.11, both of these estimates are well below the 25 mrem/yr dose limit for the general public. The ISFSI is located at INTEC within the INL Site, and the closest site boundary is 8.5 mi (13.8 km) from the ISFSI (NRC 1998). The INL Site is located in high-desert terrain and remote from developed areas. There is no future development planned near the INL Site and there is unlikely to be any development nearby because access to the INL Site is restricted. Due to the lack of planned future development near the site, and the NRC staff determination that impacts from the proposed action would not be significant and would be mostly confined to INTEC because of its distance from the site boundary, the NRC staff concludes that the proposed action would not significantly contribute to potential cumulative impacts when added to the past, present, or reasonably foreseeable future actions in the area.

4.15 Continued Storage of Spent Nuclear Fuel

The NRC's licensing proceedings for nuclear reactors and ISFSIs have historically relied upon a generic determination codified in the NRC's regulations at 10 CFR 51.23 to satisfy the agency's obligations under NEPA, with respect to the narrow area of the environmental impacts of storage of spent nuclear fuel (spent fuel) beyond a reactor's licensed life for operation and prior to ultimate disposal (continued storage). The Court of Appeals for the District of Columbia Circuit, in *New York v. NRC*, 681 F. 3d 471 (D.C. Cir. 2012), vacated the NRC's 2010 update to that rule and remanded it to the NRC. Thereafter, the Commission determined that NRC would not issue licenses dependent upon the formerly known Waste Confidence Decision and Temporary Storage Rule until the deficiencies identified by the Courts of Appeals were appropriately addressed (NRC Commission Order CLI-12-16, 2012).

On September 19, 2014, the NRC published a final rule at 10 CFR 51.23, "Environmental impacts of continued storage of spent nuclear fuel beyond the licensed life for operations of a reactor" (79 FR 56238). That rule, effective October 20, 2014, codifies the NRC's generic determinations in NUREG-2157 regarding the environmental impacts of the continued storage of spent fuel. In CLI-14-08 (NRC Commission Order CLI-14-08, 2014), the Commission held that the revised 10 CFR 51.23 and associated NUREG-2157 cured the deficiencies identified by the court in *New York v. NRC*, 681 F.3d 471 and stated that the rule satisfies the NRC's NEPA obligations with respect to continued storage. The rule, however, does not authorize the storage of spent fuel. As discussed in the statements of consideration for the final rule (79 FR 56238; September 19, 2014), the rule does not address the safety of continued storage of spent fuel. Appendix B of NUREG-2157, however, discusses the feasibility of safe storage of spent fuel.

In EAs prepared for reactor and spent fuel storage facility licensing actions, 10 CFR 51.23(b) now requires the NRC to consider the environmental impacts of continued storage, if the impacts of continued storage of spent fuel are relevant to the proposed action. The analysis below documents the required consideration of the environmental impacts of continued storage, as determined in NUREG-2157, for the proposed renewal of the TMI-2 ISFSI license.

4.15.1 Overview of 10 CFR 51.23 and NUREG-2157

NUREG-2157 supports the revised rule at 10 CFR 51.23 and includes, among other things, the staff's analyses related to the particular deficiencies identified by the D.C. Circuit in the vacated Waste Confidence decision and rule. The information in NUREG-2157 was developed using an open and public process.

The NRC staff's evaluation of the potential environmental impacts of continued storage of spent fuel presented in NUREG-2157 identifies an impact level, or a range of impacts, for each resource area for a range of site conditions and timeframes. The timeframes analyzed in NUREG–2157 include the short-term timeframe (60 years beyond the licensed life of a reactor), the long-term timeframe (an additional 100 years after the short-term timeframe), and an indefinite timeframe (see NUREG-2157, Section 1.8.2).

The NRC concluded in NUREG-2157 that the potential impacts of spent fuel storage at the reactor site in an at-reactor ISFSI would be SMALL during the short-term timeframe (see NUREG-2157, Section 4.20). However, for the longer timeframes for at-reactor storage, and for

all timeframes for away-from-reactor storage, the analysis in NUREG-2157 has determined a range of potential impacts that are greater than SMALL in some resource areas (see NUREG-2157, Sections 4.20 and 5.20, respectively). The analysis in NUREG-2157 also presents an assessment of cumulative impacts for continued storage with ranges of potential impacts for most resource areas (see NUREG-2157, Section 6.5). These ranges reflect uncertainties that are inherent in analyzing environmental impacts on some resource areas over long timeframes. As explained in NUREG-2157 (Appendix D, page D-96), those uncertainties exist regardless of whether the impacts are analyzed generically or site-specifically.

Appendix B of NUREG-2157 provides an assessment of the technical feasibility of a deep geologic repository and continued safe storage of spent fuel. That assessment concluded that a deep geologic repository is technically feasible and that a reasonable timeframe for its development is approximately 25 to 35 years. The assessment in NUREG-2157 (NRC 2014) referenced the DOE's *Strategy for the Management and Disposal of Used Nuclear Fuel and High-Level Radioactive Waste* published in January 2013, which stated that DOE's goal "… is to have a repository by 2026; the site characterized, and the repository designed by 2042; and the repository constructed and its operations started by the year 2048." Based on the evaluation of international experience with geologic repository programs—including the issues some countries have overcome—and the affirmation by the Blue Ribbon Commission of the geologic repository approach, the NRC continues to believe that 25 to 35 years is a reasonable period for repository development (i.e., candidate site selection and characterization, final site selection, licensing review, and initial construction for acceptance of waste).

4.15.2 Continued Storage at the TMI-2 ISFSI

As discussed in NUREG-2157 (NRC 2014), although the TMI-2 ISFSI is not located at an operating reactor site, the TMI-2 ISFSI is required to adhere to the same NRC regulatory requirements as at-reactor ISFSIs and, thus, the environmental impacts described in the NUREG-2157 for at-reactor ISFSIs are representative of the impacts at the TMI-2 ISFSI (see NUREG-2157, Section 4.0).

The analysis in NUREG-2157 concluded that the potential impacts of at-reactor storage during the short-term timeframe would be SMALL (see NUREG-2157, Section 4.20). Further, the analysis in NUREG-2157 stated that disposal of the spent fuel by the end of the short-term timeframe is the most likely outcome (see NUREG-2157, Section 1.2). In this EA, the NRC staff determined that impacts from the proposed renewal for 20 years would not be significant for all environmental resource areas. This is due to the passive nature of the ISFSI in that it emits no liquid effluents during operation. Also, the ISFSI is designed to minimize radiological doses to workers and members of the public. DOE-ID is not requesting approval for any construction activities or expansion of the existing ISFSI footprint. Thus, the potential impacts of at-reactor continued storage during the short-term timeframe are consistent with the evaluation of the environmental impacts for the proposed TMI-2 ISFSI license renewal as documented in this EA.

4.15.3 Continued Storage at Away-From-Reactor Storage

In NUREG-2157 (NRC 2014), the NRC concluded that a range of potential impacts could occur for some resource areas if the spent fuel from multiple reactors is shipped to a large (roughly 40,000 metric tons of uranium [MTU]) away-from-reactor ISFSI (see NUREG-2157, Section 5.20). The ranges for resources such as air quality, terrestrial resources, and aesthetics are

driven by the uncertainty regarding the location of such a facility and the local resources that would be affected. For example, regarding terrestrial resource impacts, the analysis in NUREG-2157 explained that the impacts would likely be SMALL. However, it also stated that "it is possible that the construction of the project could have some noticeable, but not destabilizing, impacts on terrestrial resources, depending on what resources are affected." Therefore, in NUREG-2157, for away-from reactor storage, the NRC concluded that the impacts on terrestrial resources would be SMALL to MODERATE (see Section 5.9.1) for the short-term timeframe, based primarily on the potential impacts of construction activities. The potential impacts for away-from-reactor storage discussed in NUREG-2157 would be expected to occur once the spent fuel in the TMI-2 ISFSI is removed.

4.15.4 Cumulative Impacts

In NUREG-2157 (NRC 2014), the NRC examined the incremental impact of continued storage on each resource area analyzed in NUREG-2157 in combination with other past, present, and reasonably foreseeable future actions. The analysis in NUREG-2157 presented ranges of potential cumulative impacts for multiple resource areas (see Section 6.5). These ranges, however, are primarily driven by impacts from activities other than the continued storage of spent fuel at the reactor site; the impacts from these other activities would occur regardless of whether spent fuel is stored during the continued storage period.

Similarly, the NRC evaluated the incremental impact of the proposed renewal of the TMI-2 ISFSI license on each resource area in combination with other past, present, and reasonably foreseeable future actions. The NRC staff concluded that the potential impacts of the proposed

TMI-2 ISFSI license renewal are not a significant contributor to cumulative impacts. The analysis in NUREG-2157 concluded that, in the short-term timeframe, which is the most likely timeframe for the disposal of the fuel in a deep geologic repository, the potential impacts of continued storage for at-reactor storage are SMALL and would, therefore, not be a significant contributor to the cumulative impacts. Therefore, the NRC staff has determined that there would be no significant change to the cumulative impacts analysis in this EA.

5.0 AGENCIES AND PERSONS CONSULTED

The NRC staff consulted with other agencies regarding the proposed action in accordance with NUREG–1748 (NRC 2003). These consultations are intended to (1) ensure that the requirements of Section 7 of the Endangered Species Act (ESA) and Section 106 of the NHPA are met; and (2) provide the designated State liaison agencies the opportunity to comment on the proposed action.

5.1 State Historic Preservation Office

In accordance with Section 106 of the NHPA, by letter dated July 6, 2017, the NRC staff requested input from the SHPO regarding identification of historic properties that may be affected by the proposed action (NRC 2017f). The SHPO responded on July 27, 2017, that the proposed action would not affect any historic properties (ISHS 2017).

5.2 U.S. Fish and Wildlife Service

In accordance with Section 7 of the ESA, by letter dated July 6, 2017, the NRC staff requested that the FWS provide a list of endangered or threatened species or their critical habitat that may be affected by the proposed action (NRC 2017c). The FWS did not respond. The NRC staff accessed the FWS Information for Planning and Consultation website to generate a list of threatened and endangered species that may be affected by the proposed ISFSI renewal (FWS 2018).

5.3 Idaho Department of Environmental Quality

By letter dated July 6, 2017, the NRC staff requested input from the Idaho Department of Environmental Quality on the proposed action, particularly with respect to environmental resources (NRC 2017d). The Idaho Department of Environmental Quality did not respond. The NRC staff sent the draft EA to the Idaho Department of Environmental Quality for review and comment on January 17, 2019 (NRC 2019). The Idaho Department of Environmental Quality responded on February 15, 2019 with no specific comments on the EA, but noted that according to the 1995 settlement agreement, all spent fuel must be removed from the State of Idaho by 2035 and that the renewal of the TMI-2 ISFSI license until 2039 does not impact this requirement (IDEQ 2019).

5.4 Native American Indian Tribes

On July 6, 2017, in accordance with Section 106 of the NHPA, the staff sent a letter to the Shoshone-Bannock Tribes (NRC 2017g). The Tribes did not respond.

6.0 CONCLUSION

Based on its review of the proposed action, and in accordance with the requirements in 10 CFR Part 51, the NRC staff has determined that renewal of NRC License SNM-2508, authorizing continued operation of DOE-ID's TMI-2 ISFSI for a period of 20 years, would not significantly affect the quality of the human environment. In its license renewal request, DOE-ID is proposing no changes in how it manages or stores spent fuel at the ISFSI, and no significant changes in authorized operations for the ISFSI are planned during the proposed license renewal period. Approval of the proposed action is not expected to result in any new construction or expansion of the existing ISFSI footprint. The ISFSI is a passive facility that produces no liquid effluents and requires no power or regular maintenance. No significant radiological or nonradiological impacts are expected from continued normal operations. Occupational dose estimates from routine monitoring activities and transfer of spent fuel for disposal are expected to be maintained ALARA and are expected to be within the limits of 10 CFR 20.1201. The estimated annual dose to the nearest potential member of the public from ISFSI activities is less than limits specified in 10 CFR 72.104 and 10 CFR 20.1301(a). For these reasons, the NRC has determined that pursuant to 10 CFR 51.31, preparation of an environmental impact statement is not required for the proposed action, and pursuant to 10 CFR 51.32, a Finding of No Significant Impact is appropriate.

7.0 LIST OF PREPARERS

Diana Diaz-Toro, Project Manager, Office of Nuclear Material Safety and Safeguards, U.S. NRC

Daniel Forsyth, Nuclear Engineer, Office of Nuclear Material Safety and Safeguards, U.S. NRC

Stacey Imboden, Senior Project Manager, Office of Nuclear Material Safety and Safeguards, U.S. NRC

Bernard Stapleton, Senior Security Specialist, Office of Nuclear Security and Incident Response, U.S. NRC

8.0 REFERENCES

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10 CFR Part 51. Code of Federal Regulations, Title 10, *Energy*, Part 51, "Environmental Protection Regulations for Domestic Licensing and Related Regulatory Functions."

10 CFR Part 71. Code of Federal Regulations, Title 10, *Energy*, Part 71, "Packaging and Transportation of Radioactive Material."

10 CFR Part 72. Code of Federal Regulations, Title 10, *Energy*, Part 72, "Licensing Requirements for the Independent Storage of Spent Nuclear Fuel, High-Level Radioactive Waste, and Reactor Related Greater Than Class C Waste."

29 CFR Part 1910. Code of Federal Regulations, Title 29, *Labor*, Part 1910, "Occupational Safety and Health Standards."

40 CFR Part 61. Code of Federal Regulations, Title 40, *Protection of the Environment*, Part 61, "National Emissions Standards for Hazardous Air Pollutants."

40 CFR Part 81. Code of Federal Regulations, Title 40, *Protection of Environment*, Part 81, "Designation of Areas for Air Quality Planning Purposes."

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Appendix A – Federal Special-Status Species in Idaho

Table A-1. Listed Federal Endangered or Threatened Animal and Plant Species Believed to or Known to Occur in Idaho

Common Name	Scientific name	Federal Status
	Animals	
Grizzly Bear	*Ursus arctos horribilis*	T
Woodland Caribou	*Rangifer tarandus caribou*	E
Yellow-billed Cuckoo	*Coccyzus americanus*	T
Banbury Springs Limpet	*Lanx sp.*	E
Canada Lynx	*Lynx canadensis*	T
Bliss Rapids Snail	*Taylorconcha serpenticola*	T
Snake River physa Snail	*Physa natricina*	E
Bruneau Hot Springsnail	*Pyrgulopsis bruneauensis*	E
Northern Idaho Ground Squirrel	*Urocitellus brunneus*	T
White Sturgeon	*Acipenser transmontanus*	E
Bull Trout	*Salvelinus confluentus*	T
	Plants	
Spalding's Catchfly	*Silene spaldingii*	T
MacFarlane's Four-o'clock	*Mirabilis macfarlanei*	T
Water Howellia	*Howellia aquatilis*	T
Ute Ladies'-tresses	*Spiranthes diluvialis*	T
Slickspot Peppergrass	*Lepidium papilliferum*	T

E = Endangered; T = Threatened
Source: FWS 2017, 2018

Table A-2. Candidate and Proposed Federal Endangered or Threatened Animal and Plant Species Believed to or Known to Occur in Idaho

Common Name	Scientific Name	Federal Status
	Animals	
North American Wolverine	*Gulo gulo luscus*	PT
	Plants	
Whitebark Pine	*Pinus albicaulis*	C

PT = Proposed Threatened; C = Candidate

Source: FWS 2017, 2018