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Idaho Operations Office

Draft Environmental Assessment for the High Temperature Test Facility at Idaho National Laboratory

July 2024

Idaho National Laboratory

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ENVIRONMENTAL ASSESSMENT FOR THE HIGH TEMPERATURE TEST FACILITY AT IDAHO NATIONAL LABORATORY

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Prepared for the
U.S. Department of Energy
DOE Idaho Operations Office

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ACRONYMS

AC	alternating current
APE	Area of Potential Effect
BLM	Bureau of Land Management
BMP	best management practice
CAP	criteria air pollutant
CEQ	Council on Environmental Quality
CFA	Central Facilities Area
CFR	Code of Federal Regulations
CJEST	Climate and Economic Justice Screening Tool
CO2e	carbon dioxide equivalent
CRMO	Cultural Resource Management Office
dBA	A-weighted decibel
DBE	Design Basis Earthquake
DC	direct current
DI	deionized
DOE	U.S. Department of Energy
EA	environmental assessment
EDE	Effective dose equivalent
ESA	Endangered Species Act
ESL	Energy Systems Laboratory
FEC	facility emissions cap
GHG	greenhouse gas
H2Hubs	Regional Clean Hydrogen Hubs Program
HAP	hazardous air pollutant
HFTO	U.S. DOE Office of Energy Efficiency & Renewable Energy, Hydrogen and Fuel Cell Technology Office
HTE	high-temperature electrolysis
HTTF	High Temperature Test Facility
IDFG	Idaho Department of Fish and Game
INL	Idaho National Laboratory
IPaC	Information for Planning and Consulting
MEI	Maximum exposed individual
MW	megawatt
MWh	megawatt hours

NEPA	National Environmental Policy Act
NRHP	National Register of Historic Places
OSHA	Occupational Safety and Health Administration
PM	particulate matter
PSD	prevention of significant deterioration
PTC	permit to construct
RCRA	Resource Conservation and Recovery Act
RD&D	research, development, and demonstration
REC	Research and Education Campus
ROI	region of influence
SHPO	State Historic Preservation Office
SOEC	Solid oxide electrolysis cells
SOFC	Solid oxide fuel cells
SRPA	Snake River Plain Aquifer
UPRR	Union Pacific Railroad
USC	United States Code
USEPA	U.S. Environmental Protection Agency
USFWS	U.S. Fish and Wildlife Service
VAC	volts alternating current

HELPFUL INFORMATION FOR THE READER

Scientific Notation

Scientific notation expresses numbers that are very small or very large. Negative exponents, such as 1.3×10^{-6}, express very small numbers. To convert the number to decimal notation, move the decimal point to the left by the number of places equal to the exponent, in this Case 6. Thus, the number becomes 0.0000013. For large numbers, those with a positive exponent, move the decimal point to the right by the number of places equal to the exponent (e.g., the number 1.3×10^{6} becomes 1,300,000).

Number	Power	Name
1,000,000,000,000,000	10^{15}	quadrillion
1,000,000,000,000	10^{12}	trillion
1,000,000,000	10^{9}	billion
1,000,000	10^{6}	million
1,000	10^{3}	thousand
10	10^{1}	ten
0.1	10^{-1}	tenth
0.01	10^{-2}	hundredth
0.001	10^{-3}	thousandth
0.000001	10^{-6}	millionth
0.000000001	10^{-9}	billionth
0.00000000001	10^{-12}	trillionth
0.000000000000001	10^{-15}	quadrillionth

Units

The document uses English units with conversion to metric units given below. Occasionally, metric units are used if metric is the common usage (i.e., when discussing waste volumes or when commonly used in formulas or equations).

Unit	Abbreviation
foot	ft
inch	in
kilometer	km
pound	lb
meter	m
Gray	Gy
millirem	mrem
Roentgen-equivalent-man	rem
yard	yd
yr	year

Conversions

To Convert	Multiply By	To Obtain
ft	3.048×10^{-1}	m
lb	4.536 × 102	grams
gallons	3.785	liters
mi	1.609334	km
square mi	2.590	square km
yd	9.144×10^{-1}	m
m	3.28084	ft
grams	2.204×10^{-3}	lb
liters	2.641×10^{-1}	gallons
km	6.214×10^{-1}	mi
square km	3.861×10^{-1}	square mi
m	1.093613	yd

Environmental Assessment for the High Temperature Test Facility at Idaho National Laboratory

1. INTRODUCTION

Idaho National Laboratory (INL) is a science-based, applied engineering national laboratory dedicated to supporting the U.S. Department of Energy's (DOE's) nuclear and energy research, science, and national defense missions. The INL mission is to discover, demonstrate, and secure innovative nuclear energy solutions, other clean energy options, and critical infrastructure. INL works to optimize hybrid energy systems that expand the nation's integrated energy portfolio, invent new materials and processes for nuclear systems, innovate with advanced intelligent systems, and integrate renewable energy sources to ensure more power is available. As part of its mission, INL supports state-of-the-art hydrogen laboratory testing capabilities.

1.1 Background

Establishing a clean hydrogen energy network is a vital component of DOE's strategy to support a more sustainable and just energy future and to meet the nation's goal to transition to a fully clean electrical grid. Clean energy is energy that does not directly emit greenhouse gases. A cornerstone of this effort is the Regional Clean Hydrogen Hubs Program (H2Hubs). DOE's Office of Energy Efficiency and Renewable Energy, Hydrogen and Fuel Cell Technology Office (HFTO) proposes to leverage INL's unique capabilities and resources to provide testbed capabilities for clean hydrogen high-temperature electrolysis (HTE) production. With funding provided by HFTO, the proposed capability would assist vendors in private industry with demonstrating various Solid Oxide Electrolyzer Systems (SOEC) systems at scale and give insight and information critical to the continuing development of a nationwide network of H2Hubs.

1.2 Purpose and Need

INL's Energy Systems Laboratory (ESL) at the Research and Education Campus (REC) in Idaho Falls, Idaho is home to state-of-the-art hydrogen laboratory testing capabilities and supports commercial developers looking to design, operate, and prove the performance of HTE modules. Using both the high bay interior space and the available backyard space at ESL, the facility currently has the capability of testing 25kW to 500 kW sized SOEC units. However, private industry is now seeking higher capacity testing facilities, and the ESL does not have the available area or capacity to add testing capabilities for multiple multi-megawatt sized units sought by industry. The ESL backyard is shared between various research, development, and demonstration (RD&D) programs, including hydrogen, electric vehicles, thermal energy management, microgrid development, and bioenergy, and there is limited overall area for further development by all programs. In addition, power at the REC is supplied by Idaho Falls Power, and there is limited capacity along MK Simpson Boulevard, where the ESL is located. Idaho Falls Power, a municipal utility, is considering upgrades to the area, including a new substation and siting options. However, lead times and construction are not yet in planning, and the project has not yet been funded.

Due to a lack of available space and limited power supply at REC, DOE needs an alternative location to support INL's research for industry-enabling clean energy demonstration systems.

The purpose of the proposed action is to address a strategic gap in the US acceleration pathway for commercial deployment of HTE systems (up to 10 MW), particularly SOECs and solid oxide fuel cell (SOFC) systems, by supplying the operations necessary for installing, testing, and operating a wide range of potential HTE technology demonstrations. On this basis, the high-level objectives of the proposed action include the following:

- De-risk U.S. Hydrogen Hub development and deployment at-scale.

- Accelerate hybrid nuclear and renewable HTE by enabling commercial system deployment and market penetration through at-scale demonstrations with INL expertise and industry partners.
- Enable achievement of the Department of Energy's (DOE's) H2 Earth Shot goal to produce hydrogen at one U.S. dollar per one kilogram within a decade.
- Implement the INL "Net Zero in 10-year plan".

2. ALTERNATIVES

The Council on Environmental Quality (CEQ) regulations in 40 Code of Federal Regulations (CFR) 1501.5(c) require that an Environmental Assessment (EA) include a brief discussion of alternatives to a proposed action. This section describes the proposed action, the no action alternative, and alternatives considered but eliminated from further analysis. The DOE Idaho Operations Office (DOE-ID) considered action alternatives to meet the need to offer an alternative site for INL's research for industry-enabling clean energy hydrogen demonstration systems. For the action alternatives to be feasible, they must accomplish the following:

- Be located on the INL Site to support INL's core RD&D programs that promote the acceleration of the commercialization and market penetration of Hybrid Energy Systems based on nuclear/renewables integrated with HTE technology for the generation of clean hydrogen.
- Enable full-scale research for industry-enabling clean energy demonstration systems by offering infrastructure and space at a previously disturbed location to protect human health and the environment.
- Have access to reliable commercial power and other INL utilities and infrastructure.
- Support the re-use and re-purposing of existing facilities to the maximum extent practicable to minimize disruptions to other INL mission critical programs and projects.

Based on these criteria and in collaboration with INL's Facility and Site Services organization, DOE identified potential testing and demonstration areas located at the Central Facilities Area (CFA) that were available to meet the purpose and need of the proposed action (see Figure 1).

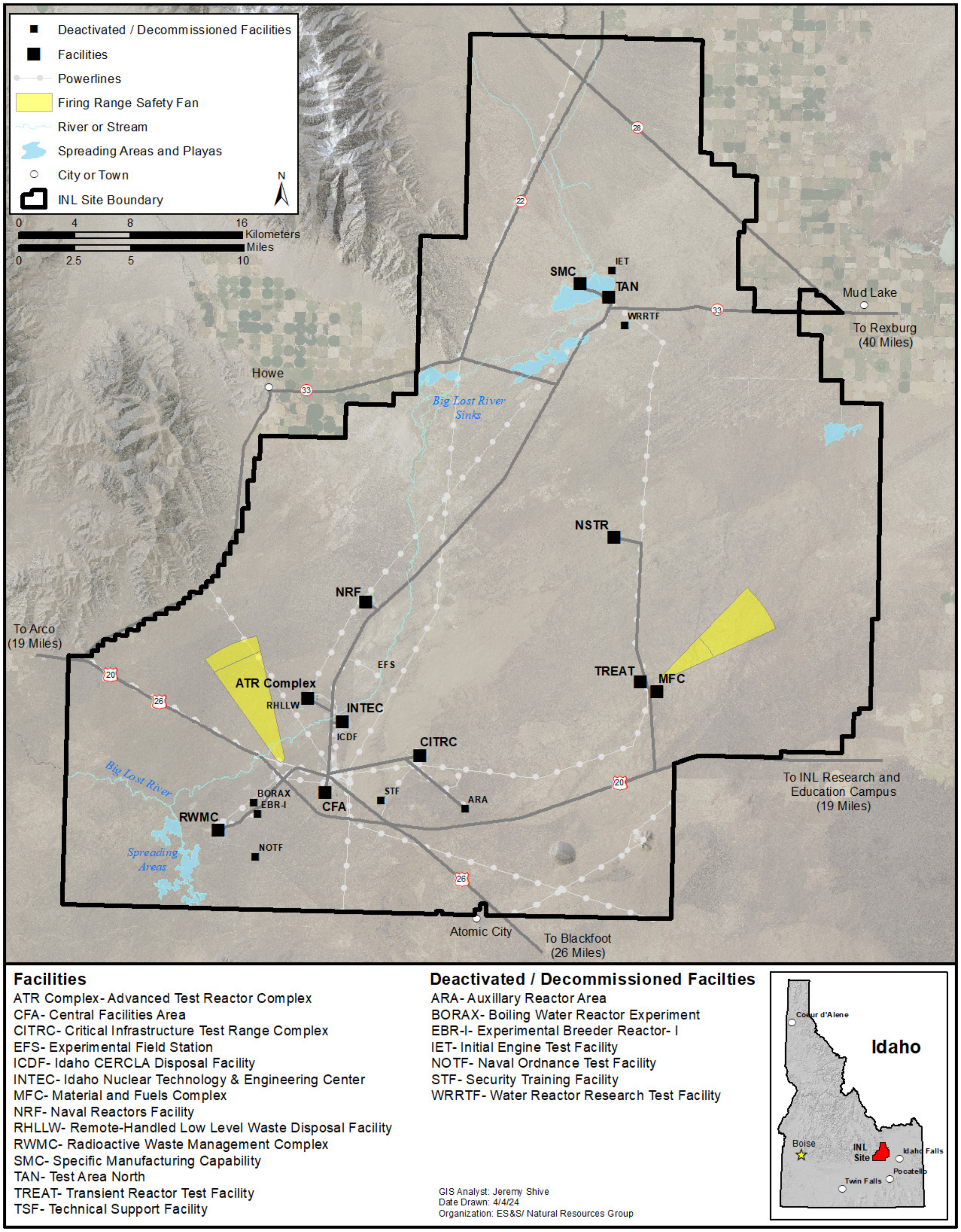

Figure 1. INL Site and facility locations.

2.1 The Proposed Action – Constructing and Operating the High Temperature Test Facility (HTTF) at CFA

The proposed action would include the following activities: (1) site preparation, including construction of HTTF infrastructure, (2) transportation and installation of commercial HTE systems (also referred to as test articles), (3) demonstration testing of commercial HTE systems, and (4) disconnection and decommissioning of test articles. These proposed activities are described in more detail in Sections 2.1.1 through 2.1.4. DOE anticipates that site preparation, construction, and HTTF operations would occur within the boundaries of the project area, which encompasses about 7 acres of previously disturbed land. Figure 2 shows the general project area boundaries.

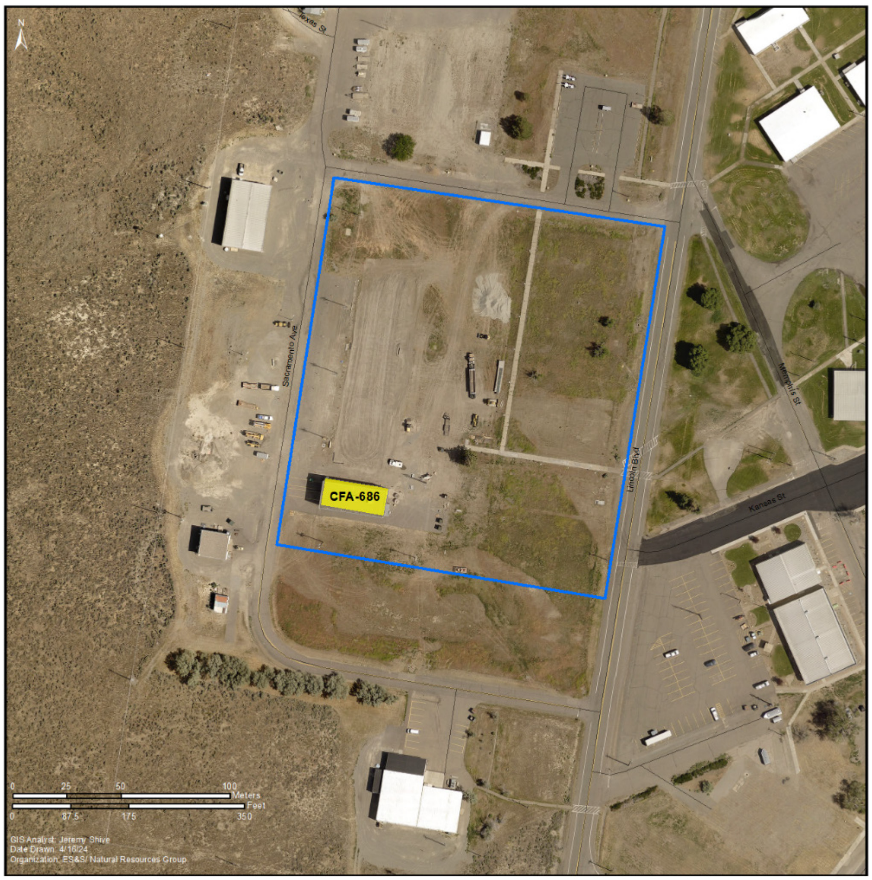

Figure 2. Proposed HTTF project area.

Under the proposed action, DOE would offer infrastructure for the demonstration testing of commercial HTE systems in a realistic environment to allow for demonstration of durability and reliability, as described in the following sections. The HTTF would accommodate HTE systems from various industry partners and include the ability to produce, process, store, and dispense for end use electrolysis-produced hydrogen. DOE proposes to locate the HTTF at CFA in the north yard of building CFA-686 on the INL Site, about 45 miles west of Idaho Falls, Idaho (see Figure 3).

Figure 3. Building CFA-686 and surrounding area at CFA.

The proposed HTTF would offer the ability to produce, process, store, and dispense electrolytically produced hydrogen. The system would be designed to accommodate electrolysis systems from various industry partners and capable of providing up to 10 MW of power for electrolysis at five separate test article locations. The initial phase of construction would support the demonstration of interested industrial partners' electrolysis system at three of the test article locations leaving capacity and capability to support two additional electrolysis systems. The system would also include hydrogen post-processing and storage.

DOE proposes to demonstrate two types of test articles at the HTTF (SOECs and SOFCs), which would be supplied by industry partners.

The SOEC is the main type of test article DOE proposes to demonstrate at the HTTF. The SOEC system may use external alternating current (AC) or direct current (DC) power to convert an external steam supply to hydrogen. The building block unit is called a test stand, which can generate 1.8 tons of hydrogen per day from a 2-MW power input. Multiple test stands can be aggregated to satisfy the demand for hydrogen.

Solid oxide electrolysis requires steam, a cathode, anode, solid electrolyte, and direct current (DC). Two half-reactions occur: one at the cathode and one at the anode. Steam enters at the cathode, which is negatively charged, and accepts electrons that split water into hydrogen gas and O^(2-) ions. The HTTF would have the capability to test up to five SOEC units, but DOE anticipates the initial demonstration would consist of three units. Support systems needed for the SOEC test articles include steam distribution, condensate return, steam condensate drains, and control air. The project includes an uninterruptible power supply sized to carry vital loads such as controls, instrumentation, and data acquisition to assure safe shutdown following a loss of facility power.

The steam distribution system includes steam condensate drains and condensers, a chiller to supply cooling water to the condensers, and a water support system for recycling condensate from steam drains as well as piping associated with these system components. Table 1 shows the design parameters for these support system components needed for the SOEC test articles.

Table 1. Design parameters for SOEC support system components.

Support System Component	Pressure	Temperature	Flowrate
Steam Supply	150 pounds per square inch gauge (psig)	366°F	7700-lb mass per hour (lbm/hr) maximum
Steam Condensate Drains	50 psig condensate pump discharge	200°F	7700-lb mass per hour (lbm/hr) maximum
Condensers	1500 lbm/h minimum	482°F	Inlet steam pressure would be between 0 and 0.29 psig[a]
a. Maximum allowable differential pressure across the condenser cannot exceed 0.05 pounds per square inch (psid) at rated steam flow to prevent an overpressure condition at the SOEC stack discharge.			

Major components necessary to support demonstration testing at HTTF include the following:

- Air compressor
- Air filter and dryer
- Saturated Steam Generator
- HTE stacks
- Hydrogen vent stacks
- Fixed liquid nitrogen tank
- Mass-flow controllers
- High-temperature air heater
- Furnace
- Hydrogen gas cylinders
- Safe gas cylinders
- Nitrogen dewars
- Mass-flow controllers
- Exhaust steam-hydrogen cooler (air-cooled)
- Condenser/Condensate return system
- Deionized (DI) water supply
- Chiller
- Hydrogen gas cylinders
- Hydrogen product gas compressors
- AC and DC power supplies
- Hydrogen storage tank
- Superheated heated steam generator
- Steam generator heat exchanger
- Steam superheater
- Residual steam condensers
- Hydrogen recycle compressor
- Counterflow heat exchanger
- Hydrogen storage tank.

A co-located DI water supply would furnish liquid water feedstock to the steam generator systems. The steam generator unit would control the DI water inflow rate according to the steam generation rate setpoint. A precision mass-flow meter monitors the inlet liquid water flow rate. The steam generator also measures the steam production rate. A small fraction of the liquid DI water supplied to the steam generator unit is excess and is released through the steam generator overflow line.

A chiller would supply cooling for the condensers. The system would also include a nitrogen supply for carrier gas and system purging. A hydrogen test stand would be located outdoors, including the hydrogen-containing components and piping. The chiller would be located outside adjacent to the test stands. Support systems supply electrical power for electrolysis and other components, feedstock gases, sweep gas, and appropriate exhaust handling.

For hydrogen production, the system would introduce a mixture of steam and hydrogen (and possibly nitrogen) to the cathode side of the SOECs, typically with a volumetric composition of 90 percent steam and 10 percent hydrogen. Nitrogen would also be included in the cathode inlet gas mixture. Using nitrogen would allow independent variation of the partial pressures of the other process gases while operating at atmospheric pressure. Nitrogen would also serve as purge gas to purge air and oxygen out of the stacks and the hydrogen exhaust line prior to and following system operation. A compressed gas cylinder or dewar would supply nitrogen. DOE anticipates the proposed action would use about 530 gallons of nitrogen per month.

During SOEC operation, oxygen would be produced on the anode side of the unit. Air would be used as a sweep gas on the anode side to dilute and carry away this oxygen. Flow rates of nitrogen, hydrogen, and air would be set and controlled by precision mass-flow controllers.

An electrically heated steam generator would be used to generate steam. The steam generator would supply steam up to 366°F. The system would mix hydrogen (and possibly nitrogen) with the steam downstream of the steam generator so that a gas mixture of steam and hydrogen is introduced to the SOEC. SOEC operation would electrochemically reduce some of the steam (typically 60 percent) to hydrogen, which would enrich the cathode gas mixture exiting the stack with hydrogen. The condenser would remove most residual steam, and a hydrogen vent would release most of the remaining gas. Cold water supplied by the chiller would cool the condenser units.

The stack inlet always requires hydrogen to maintain reducing conditions on the cathode. During startup a compressed gas cylinder would supply this hydrogen. However, during long-term operation, the test article will provide its own reducing gas supply by diverting a portion of the hydrogen produced back to the stack inlet.

A hydrogen handling and storage system would compress, dry, and condition the product hydrogen from the SOEC and prepare it for use in the SOFC. The post-processing system would process hydrogen at a flowrate up to about 775 lbs/hr followed by compressing the hydrogen using low-pressure (150–200 psig) and high-pressure compressors (6500 psig) to increase the product hydrogen from near-atmospheric pressure at the discharge of the SOEC up to a working pressure for the drying and conditioning. The system would include low- (200 psig) and high-pressure (6500 psig) gas storage and liquefaction and liquid hydrogen storage above ground in the following estimated quantities:

- Low-pressure hydrogen storage up to about 4,500 lbs
- High-pressure hydrogen storage up to about 70,000 lbs.

The proposed action would include condensate handling, venting, and freeze protection for the hydrogen handling and storage system.

The SOFC is the second type of test article DOE proposes to demonstrate at the HTTF and is designed to convert hydrogen to electricity. The SOFC splits molecules of hydrogen (the fuel gas) and oxygen into their elemental form, and the molecules then react with each other. This produces direct current (DC) power (480 V) that is converted to AC in an inverter. Electricity produced by the SOFC would be connected back to the AC distribution system for use by the system to produce more hydrogen. The SOFCs would be sized to consume all hydrogen produced by the SOEC units. Production would be curtailed to not exceed SOFC demand and storage capacity.

Figure 4 summarizes the hydrogen production process associated with the proposed action.

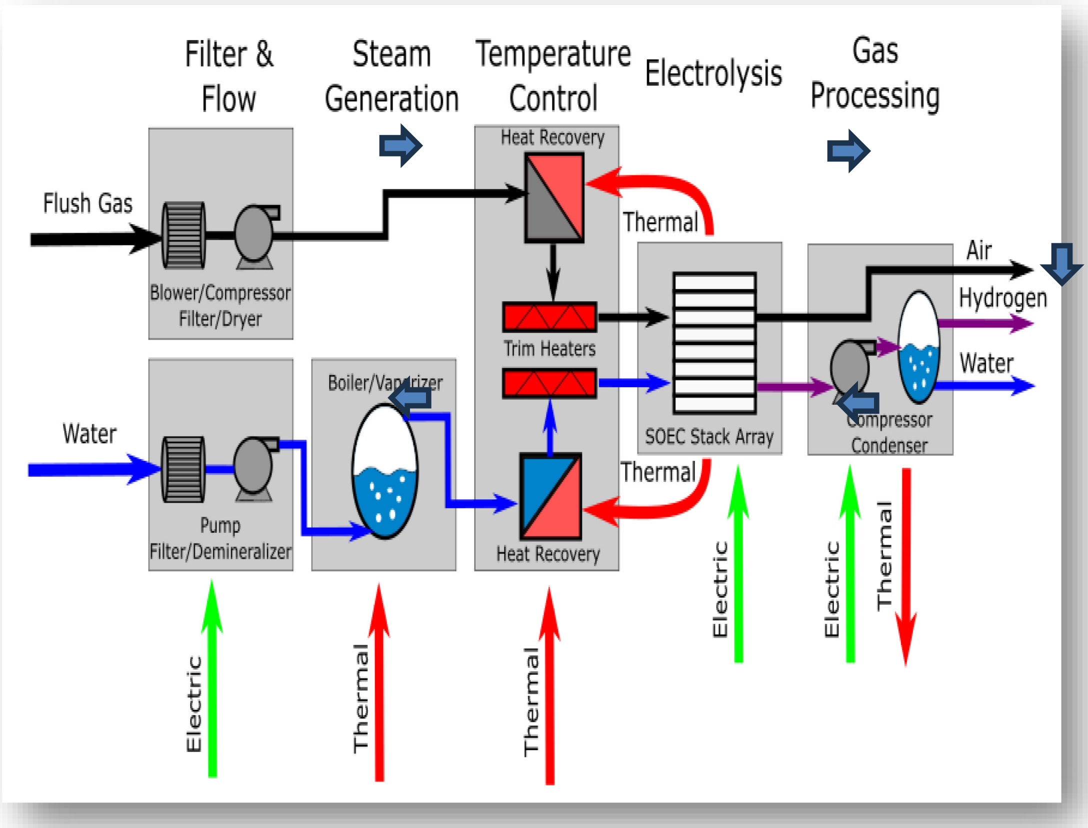

Figure 4. Summary of proposed hydrogen production process

Each test article would have its own independent support and instrumentation system. The feedstock and product gas streams for each test article would be monitored and controlled separately and the inlet and outlet gas composition and flow rate known independently for each test article. If a test article fails during operation, that test article would have the ability to be shut down without affecting the safe performance or testing of the other test articles. Since each test article can be operated and monitored separately, each module would have the capability to support different operating conditions (gas flow rates, operating voltage, current density, etc.) simultaneously. In this way, a test matrix covering a wide range of operating conditions could be covered more quickly.

The HTTF would also include programmable logic controls for system monitoring, control, and data acquisition and management and to supply an emergency stop function. The system would include adequate instrumentation to control three 2-MW rectifiers, steam distribution, and condensate return; hydrogen venting and post-processing controls; as well as interface with the customer supplied SOEC and SOFC equipment.

The proposed action would include administrative and engineering controls to protect users from moving parts, high temperatures, electrical shocks, and other hazards; electrical and control enclosures to protect delicate components from outside contaminants and keep workers from contacting those components, including wire ducts and products with guards and shields to provide a safe work environment.

Safety equipment would include physical guards and covers; non-contact switches, interlock safety switches, and trapped key interlock switches to limit access. The electrical design would include disconnect switches to isolate downstream systems from power, while circuit breakers, fuses, and overload devices for motors would protect downstream conductors from overcurrent and short-circuit conditions. Additional components include surge protection devices on safety interlock circuits and phase monitoring relays and vibration, temperature, and leak sensors to stop equipment when a hazardous or problematic condition is detected.

DOE proposes to use five existing concrete pads located north of CFA-686 and to construct an additional concrete pad, for a total of six pads, as test stations where the commercial test articles would be located for demonstration testing. Figure 5 shows the existing concrete pads north of CFA-686.

Figure 5. Proposed location of testing stations north of CFA-686.

2.1.1 Site Preparation and Construction

Prior to initiating demonstration testing activities, DOE would prepare the project area and construct and install additional infrastructure and support equipment. Site preparation and construction would consist of the following activities:

- Grading and shaping the construction area
- Trenching and installing underground utilities, including electrical duct banks and vaults
- Constructing concrete foundations for equipment, including an additional concrete test pad for a total of six test pad locations
- Constructing concrete walkway and utility trench
- Setting equipment and installing interconnecting piping

- Connecting utilities
- Constructing a new road east of the CFA-636 north yard area.

Equipment or components that need to be built outside of the pre-existing concrete pads (e.g., post process handling and storage) would require suitable support foundations and structures, which would likely require additional concrete pads. The proposed action includes placing about ¾-in. of gravel on the new road, around the concrete test pads, and on parking areas. DOE estimates the total graveled area to be approximately 3 acres in size and would require about 520 tons of gravel. Depending on available funding, the project may include installing asphalt on the north and east side of the Site. DOE would source clean fill material and gravel from INL borrow sources.

Demonstration and testing at the HTTF operations, described in Section 2.1.3, would require water, power, and other utilities to operate different test articles. Power from the CFA distribution system and water from the non-transient, non-community water system at CFA are available at the project location and adequate for proposed needs.

The CFA power distribution would supply up to 10 MWs of power for electrolysis at the five test article locations. DOE would route power from the utility pole tops to the test pad locations and install the following components:

- Five 250 A 3-phase 480-volts alternating current (VAC) outdoor-rated subpanels (one at each test article location)
- Five 200 A 3-phase 208-VAC panels fed via a transformer from the collocated 480-VAC panel (oriented to supply power to the test article location).

DOE would also install HTTF yard lighting and fencing to prevent unauthorized entry. Exterior lighting for the HTTF (e.g., buildings, parking lots, walkways) would employ technologies designed for increased energy savings, reduced maintenance costs, improved visual environment, enhanced safety measures, and reduced light pollution (DOE, 2010). The fence would include at least two man-gates and two 12-ft gates to accommodate heavy truck traffic and crane access. All infrastructure and support components would be located within the project area boundary depicted in Figure 2 . Figure 6 shows a conceptual layout of HTTF components.

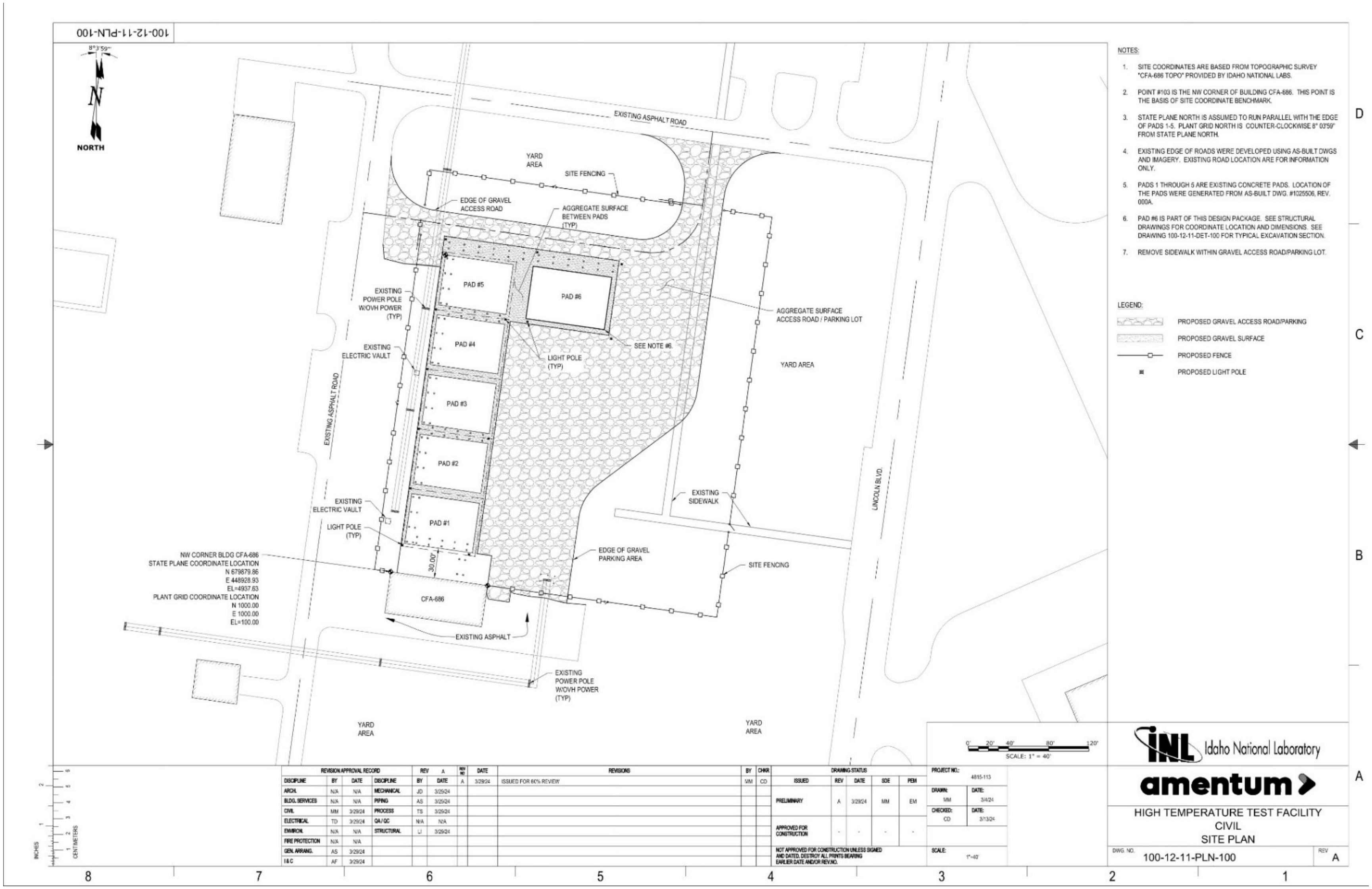

Figure 6. Conceptual layout of HTTF components.

Typically, 10–12 workers would be at the project location during construction. Access for equipment staging and parking is available within the project. Table 2 lists the equipment and hours of operation DOE estimates would be needed for HTTF site preparation and construction.

Table 2. Equipment needs and hours of operation for HTTF site preparation and construction.

Equipment[a]	Total Hours of Operation[b]
Crane	200
Forklift	40
Telehandler	600
Backhoe (2)	480
Dump Truck (2)	480
Standard Pickup (6)	4,800
330 Excavator	300
Bobcat	400
Roller	200
Cement Truck (6)	480
Paving Machine	80
Compactor (2)	400
Portable Diesel Welders (2)	800
Generators (2)	600
Service Truck	120
Semi/Transport Trailer	240
Line Truck	240

a. The number in parentheses represents the number of each separate piece of equipment. Where no parentheses are included, a single item is indicated.

b. For equipment types where more than one unit is anticipated to be used, the hours listed are for all units combined.

2.1.2 Transportation and Installation of Test Articles

Following initial site preparation, commercial developers and industry partners would supply commercial HTE systems for demonstration testing at HTTF. DOE estimates that transportation of HTE system from commercial vendors to the INL Site would require three transport trucks and six pilot cars for the rectifiers; one transport truck for the 2-MV transformers; and eight to 10 transport trucks to supply the structural steel, chillers, condensers, above ground low-pressure storage tanks, and other major equipment.

2.1.3 Demonstration Testing

Demonstration testing of test articles at the HTTF would involve the following activities:

- Receiving the test articles at CFA-686
- Offloading articles from transport vehicles, using a crane or other equipment
- Transporting the test articles to the concrete testing pads
- Connecting the test articles to HTTF support infrastructure (utilities, water, etc.).

DOE estimates that demonstration testing of commercial test articles is anticipated to take a minimum of 18 months for each vendor. The HTTF would operate continuously, unattended with remote online monitoring (24 hours a day, 7 days a week).

2.1.4 Disconnecting and Decommissioning of Test Articles

Following completion of a demonstration test, the devices would be removed, and the vendor would transport them to their next location.

2.2 No Action Alternative

The no action alternative establishes a baseline against which this EA compares the environmental impacts of the HTTF. No action does not necessarily mean doing nothing but involves maintaining or continuing the existing status or condition. Under the no action alternative DOE would not construct and operate HTTF as described in Section 2.1, and the national need for facilities to support INL's research for industry-enabling clean energy demonstration systems to achieve DOE's Clean Hydrogen goals would not be met at INL. The no action alternative does not meet the purpose and need. INL would continue to conduct small-scale clean hydrogen RD&D activities at the REC. The project area would be available for other uses or reclamation activities.

2.3 Alternatives Considered but Eliminated from Analysis

Other locations at the INL Site were removed from consideration due to their potential to disrupt other INL Site programs and projects. DOE did not consider offsite locations because the purpose and need is directly related to INL RD&D programs that support DOE's Clean Hydrogen goals. Based on these criteria, DOE chose to evaluate two alternatives: Alternative 1: The Proposed Action – Constructing and Operating the High Temperature Test Facility (HTTF) at CFA, and Alternative 2: No Action.

3. AFFECTED ENVIRONMENT AND ENVIRONMENTAL IMPACTS

This section provides a brief background description of only those environmental aspects affected by the HTTF project. This EA describes the resources that may be affected by the HTTF. Discussion of the present day setting in this document is limited to environmental information that relates to the scope of the HTTF project. The level of detail varies depending on the potential for impacts for each resource area. This section summarizes several site-specific and recent project-specific documents that describe the affected environment and incorporates these documents by reference.

Under the no action alternative, activities at the INL Site would continue under present day operations, and the HTTF project would not be implemented. The no action alternative would not result in impacts to resources at the INL Site beyond those captured in the discussion of the affected environment. The environmental impacts of future activities at the INL Site would be evaluated in project or program specific analyses in compliance with the National Environmental Policy Act of 1969 (NEPA). Therefore, impacts from the no action alternative are not discussed further in this EA.

An important component in analyzing impacts is identifying or defining the geographic area in which impacts to resources are anticipated to occur. This Region of Influence (ROI) is specific to the type of effect evaluated. The ROI was determined by the scope of the HTTF project, including potential direct and indirect impacts associated with the project. The ROI for analyses of cumulative impacts in this EA varies for different resources and environmental media. Table 3 briefly describes the ROI for each resource area evaluated in this EA.

Table 3. The ROI in which impacts from HTTF are anticipated to occur.

Resource Area	Region of Influence
Air Quality	INL and nearby offsite areas that could be affected by air quality impacts from the HTTF.
Cultural and Historic Resources	The area of potential effects (APE) encompasses about 71.33 acres and includes the HTTF project area and the surrounding areas where potential impacts of the HTTF to the visual environment could occur.
Ecological Resources	The area directly or indirectly affected by the HTTF project.
Geology and Soils	The area surrounding CFA-686 and INL borrow sources.
Groundwater	The Snake River Plain Aquifer (SRPA).
Electricity	INL power supply.
Fuel Consumption	INL Fuel consumption.
Land Use	The project area and immediate vicinity.
Noise	Project area at CFA and 0.5-mile zone from the edge of the project area.
Waste Management	INL waste treatment, storage, and disposal facilities.
Human Health and Safety	INL onsite project workers and INL noninvolved workers.
Traffic and Transportation	INL onsite road systems, regional U.S. Interstate Highways, U.S. Highways, State Routes, major arterial roadways, and collector roads in the areas.
Environmental Justice	Populations within a 30-mile radius of CFA

In addition, cumulative impacts can result from individually minor, but collectively significant, onsite or offsite actions occurring over time (40 CFR 1508.1). Those actions within the spatial and temporal boundaries (i.e., ROI) of the HTTF are considered in this EA. DOE reviewed the resources at risk; geographic boundaries; past, present, and reasonably foreseeable future actions; and baseline information in determining the significance of cumulative impacts. Actions that have little or no impact generally do not result in cumulative impacts. Conclusions regarding cumulative impacts are included in the following sections.

To guide the assessment of environmental impacts, this EA uses four levels of impact—Negligible, Small, Moderate, or Large—which are defined as follows:

- Negligible. Any anticipated impact, or effect, are not detectable in the affected environment or differ from existing INL Site operations.
- Small. Environmental effects are not detectable or are so minor that they will neither destabilize nor noticeably alter any important attribute of the resource.
- Moderate. Environmental effects are sufficient to alter noticeably, but not to destabilize, important attributes of the resource.
- Large. Environmental effects are clearly noticeable and are sufficient to destabilize important attributes of the resource.

Scoping and preliminary analyses indicate the HTTF would not impact the following elements; therefore, this EA does not analyze these elements further for the reasons described:

- Surface Water. No perennial or permanent surface water bodies are near the project area at CFA. No streams or other bodies of surface water are in the project area. The proposed action does not include activities that physically or chemically alter surface water resources. Therefore, the proposed action does not affect surface water resources.
- Floodplains and Wetlands. There are no wetlands in the project area. CFA is not located within the probable maximum flood hazard area at the INL Site.
- Land Use. Land use is the term used to describe the human development and use of land. It represents the economic and cultural activities (e.g., agriculture, residence, and industry) that are practiced at a given place. The proposed facility modifications, construction, and operations proposed as part of the HTTF would occur in existing facilities. Construction and operation of the HTTF would occur on existing facilities and on previously disturbed land. The project area is characterized by industrial and support facilities. Land use would not change. The HTTF would have no impact on land use or aesthetics.
- Seismic. CFA lies on a boundary between basaltic lava flows and alluvial deposits (Kunz, et al., 1994). The basalt lava flows near CFA contain pahoehoe and a'a lava flows and are typically not covered by sediments. The alluvial deposits in the area (generally to the north of CFA) contain minor sand and the upper 0.5 to 2 meters (1.6 to 7 feet) include sand and silt of eolian and/or alluvial origin. The nearest boreholes in the vicinity of the proposed HTTF site indicate the depth to basalt varies anywhere from 1 to 10 meters (3 to 28 feet). No mapped faults are at or near CFA and the closest volcanic vent is more than 7 kilometers (4 miles) to the north. Shear wave velocity measurements are required to classify bedrock (ASCE, 2017). No such measurements are found for bedrock within the proposed HTTF area. Therefore, classification is based on unit descriptions from Kuntz, et al. (1994) and shear wave velocities at CFA presented in Payne (2006). Volcanic and plutonic bedrock geological units (basalt, rhyolite, and granitic rocks) are assigned to Class B (rock). No environmental impacts are anticipated to result from the HTTF as the result of potential future earthquakes.
- Socioeconomics. Implementing the HTTF would result in hiring up to four employees at the INL Site. In 2018 the total population of Bannock, Bingham, Bonneville, Butte, Clark, Jefferson, and Madison counties was 322,434. The impacts to population, housing, employment, income, community services, public transportation, and public finance from an additional four employees would be negligible. The impacts to socioeconomic factors from the HTTF would not likely be distinguishable from current INL Site operations, and the anticipated change would not noticeably alter socioeconomic conditions in the seven-county region around the INL Site.

Decisions will be made during ongoing design phases of the HTTF that could affect the eventual final design and construction. However, DOE anticipates activities associated with the HTTF, including (1) site preparation, including construction of HTTF infrastructure; (2) installation of commercial HTE systems (also referred to as test articles); (3) demonstration testing of commercial HTE system; and (4) disconnection and decommissioning of test articles would occur within the boundaries of the project area depicted in Figure 2. The environmental impacts of these activities and transportation of test articles from commercial developers to the project location are discussed in the following sections.

3.1 Idaho National Laboratory Site

The INL Site is an 890-square-mile DOE facility located on the Eastern Snake River Plain. It is primarily located within Butte County, but portions of the INL Site are also in Bingham, Jefferson, Bonneville, and Clark counties. All land within the INL Site is controlled by DOE, and public access is restricted to highways, DOE-sponsored tours, special-use permits, and the Experimental Breeder Reactor-I National Historic Landmark. The INL Site location and boundary is shown in Figure 1. Public highways U.S. 20 and 26 and Idaho 22, 28, and 33 pass through the INL Site, but off-highway travel within the INL Site and access to INL Site facilities are controlled.

CFA is in the south-central region of the Site about 13.5 miles from the southern INL Site boundary and about 45 miles west of Idaho Falls, Idaho (see Figure 3) in Butte County. It is the main service and support center for the other Site facilities and programs. CFA houses many technical and support services for the INL contractor, including administrative offices, monitoring and calibration laboratories, fire protection, medical services, warehouses, vehicle and equipment pools, and bus operations. Of the activities at CFA, about 80 percent support other programs across the Site. These support services fall into the broad categories of transportation, maintenance, security, fire protection, warehousing, calibration and instrumentation laboratories, and support offices.

Currently, INL employs about 6,100 people. No permanent residents reside on the INL Site. Population centers in the region include large cities (more than 10,000 residents), such as Idaho Falls, Pocatello, and Blackfoot, located to the east and south, and several smaller cities (less than 10,000), such as Arco, Fort Hall, Howe, and Atomic City, located around the INL Site.

3.2 Air Quality

INL is immediately surrounded by a Prevention of Significant Deterioration (PSD) Class II area, as designated under the Clean Air Act (42 United States Code [USC] 7401 et seq). This area is characterized as having reasonable to moderately good air quality while allowing moderate industrial growth and is in attainment for all regulated pollutants. The Craters of the Moon Wilderness area lies about 6.5 miles southwest from the INL Site boundary and is designated as a PSD Class I area. PSD Class I areas severely restrict degradation of local air quality, of which INL emissions are a potential contributor.

Emissions from INL include criteria air pollutants (CAPs) and both radiological and nonradiological hazardous air pollutants (HAPs). The contiguous INL Site operates as an area source under a Permit to Construct (PTC) with a Facility Emissions Cap (FEC) issued from the State of Idaho, which limits CAP and nonradiological HAP emissions to below major source thresholds. Radiological HAP emissions are regulated by the FEC-PTC, but primacy is maintained by the U.S. Environmental Protection Agency (USEPA) under Chapter 40 of the Code of Federal Regulations, Part 61, Subpart H. Subpart H limits the effective dose equivalent (EDE) from emissions at INL to the maximum exposed individual (MEI) to 10 mRem/year.

Sources of CAP and nonradiological HAP emissions are primarily from the use and maintenance of diesel and propane fired boilers, the treatment of contaminated wastes, and emergency standby generators. Insignificant sources consist of a wide variety, including, but not limited to small gasoline, diesel, and propane combustion sources, mobile sources, non-municipal landfill, storage tank breathing, munitions use and testing, cooling tower drafts, and the use of chemicals and solvents. INL reported actual emissions of CAP and HAPs at significantly below the FEC-PTC thresholds in 2022.

Sources of radiological emissions include point sources (e.g. process stacks and vents), and fugitive sources (e.g. waste ponds, buried waste, contaminated soil areas, and decontamination and decommissioning operations). In 2022, the calculated EDE to the MEI from INL Site operations was 1.78E-02 millirem (mrem) per year, which is 0.18 percent of the 10 mrem per year standard (DOE-ID 2023).

Recent scientific evidence indicates a correlation between increasing global temperatures over the last century and the worldwide proliferation of greenhouse gases (GHGs) emitted by humankind. Climate change associated with global warming is predicted to produce negative environmental, economic, and social consequences across the globe (IPCC, 2021) (USGCRP, 2023). Detailed predictions of future climate change and environmental impacts for the region that encompasses the INL Site are available in the Fifth National Climate Assessment (USGCRP, 2023).

Atmospheric levels of GHGs and the resulting effects on climate change are due to innumerable sources of GHGs across the globe. The direct environmental effect of GHG emissions is an increase in global temperatures, which indirectly causes numerous environmental and social effects. Therefore, the ROI and potential effects of GHG emissions from the project are by nature global and cumulative.

3.2.1 Impacts to Air Quality

Project activities have the potential to release GHGs, criteria pollutants, fugitive dust, hazardous and chemical contaminants into the air. Emissions can be separated into two different categories, construction phase emissions, and operation phase emissions.

Construction activities may generate GHGs, criteria and hazardous air pollutants from the operation of fossil fuel fired equipment, fugitive dust from the moving of equipment and machinery, and minor emissions from welding, adhesives, cleaners, and solvents. Operating HTTF emits hydrogen, nitrogen, and steam. Neither hydrogen or nitrogen are regulated as criteria or hazardous air pollutants, and do not contribute to GHG emissions in their pure form.

The proposed construction activities are temporary, intermittent, short duration, and confined to a small area of land (7 acres). The proposed construction would produce two types of air contaminants: exhaust emissions from construction equipment and fugitive dust from soil disturbance. In general, emissions during construction are exempt from PSD review because the PSD requirements are primarily for major stationary sources and specifically exempt temporary increases in these emissions.

The proposed action would emit GHGs during site preparation and construction due to the operation of fossil fuel-powered equipment, trucks, and worker commuter vehicles. These emissions would be substantially less than the annual GHGs emitted from all INL Site sources (INL, 2023b). The GHG emissions from the proposed action would result in a negligible contribution to cumulative impacts on climate change. To minimize GHG emissions from each option, emission sources would comply with applicable regulations and GHG policies, and for mobile sources, federal vehicle clean fuels, mileage efficiencies, and emissions regulations.

An estimate of potential emissions from the construction phase based on the operation of construction equipment identified in Table 2, result in emissions below significant levels (see Table 4). Construction activities would result in small impacts to air quality.

Table 4. Estimated air emissions from construction of the HTTF.

Pollutant	Construction Emissions	Significant Levels (40 CFR Pt 52.21)
SO2	0.2 (tons)	40 (tons)
NOx	7.6 (tons)	40 (tons)
CO	1.9 (tons)	100 (tons)
Particulate Matter (PM)	0.3 (tons)	25 (tons)
VOCs	0.36 (tons)	40 (tons)
Total HAP	5.12E-03 (tons)	25 (tons)
CO2e	314 (tons)	75,000 (tons)

The proposed action has the potential to generate particulate emissions (i.e., dust) from minimal bulldozing, grading, excavating, and dumping during construction, and additional grading for road maintenance. Fugitive dust consists of particulate matter up to 100 µm with the larger particles (30 to 100µm) settling out relatively close to the source of disturbance. The finer particulate, typically with an aerodynamic diameter less than 15 µm do not settle out of the atmosphere via gravitational forces and maintain suspended in the atmosphere. Fugitive dust is controlled with watering, chemical stabilization, or reduction of surface wind speed with windbreaks or enclosures (USEPA, 2006). To reduce the potential for fugitive fine particulate matter, construction crews would apply water or use other dust suppression methods to control fugitive dust emissions from disturbed areas. In addition, the proposed action gravels permanently disturbed areas to reduce fugitive dust and control erosion.

Craters of the Moon Wilderness Area is located about 6.4 miles southwest from the INL Site boundary and roughly 18 miles from the project location. The transport of project emissions to the Craters of the Moon Wilderness Area would substantially dilute their concentrations. The use of water and other project controls to control fugitive dust would ensure that the proposed action would negligibly affect air quality-related values within the Craters of the Moon Wilderness Area.

The nearest locations of cumulative project emissions would occur from facilities at CFA. When combined with controlled project emissions, the transport of these cumulative emissions to the INL Site boundary would result in dispersed concentrations of air pollutants at locations outside the INL Site that would not contribute to an exceedance of an ambient air quality standard and would have a negligible effect on air quality-related values within the Craters of the Moon Wilderness Area. Therefore, the proposed action would not substantially contribute to cumulative impacts on air quality.

During operations, the generation hydrogen from electrolysis would not utilize equipment that produce criteria or hazardous air pollutants. Steam is passed through a cathode and an anode with a solid electrolyte, and grid supplied electricity. Hydrogen gas and oxygen ions are produced. Inert nitrogen gas may be used as a carrier gas or to purge the system during startup, shutdown, and maintenance. Neither nitrogen nor hydrogen are regulated as a criteria or hazardous air pollutants. Nitrogen, an inert gas, makes up almost 80 percent of the atmosphere. USEPA does regulate the production of hydrogen, however the regulation under the Mandatory Greenhous Gas Reporting rule (40 CFR Part 98, Subpart P), regulates processes that produce hydrogen by reforming, gasification, oxidation, reaction, or other transformation feedstocks, but not electrolysis without associated carbon fuel sources. Without a carbon fuel source or feedstock, GHG emissions will not be generated.

The produced hydrogen is intended to be used to generate electricity via a fuel cell, but it may also be used for other beneficial purposes, vented, or possibly flared. Flaring hydrogen does not directly emit criteria or hazardous air pollutants from the combustion, but the nitrogen in the air can be converted to NOx from the heat of the flare. Estimated NOx generated from the flare is expected not to exceed 0.0026 lbs of NOx for every lb of hydrogen flared. The HTTF, at maximum capacity, has the potential to produce 6 metric tons of hydrogen per day. In the event 100% of that hydrogen was flared, potentially 5.6 metric tons per year of NOx could be generated. Significant sources of NOx are any sources that emit more than 40 tons per (IDAPA 58.01.01.06). It is not anticipated to flare 100% of the hydrogen produced from the HTTF, and therefore, the NOx generated from actual flaring is expected to be significantly less and therefore insignificant.

The lack of emissions of any criteria air pollutant, hazardous air pollutant, or GHG provide certainty that the operations would not have impacts to the quality of the ambient air and would not contribute to cumulative impact on air quality.

3.3 Cultural and Historic Resources

The current conceptual layout of HTTF components was georeferenced in ArcGIS to provide correct positioning for proposed elements. Observer points were placed at the extreme corners of the current and proposed concrete pads (Pads 1, 5, and 6), where the test articles are proposed for installation. The observer point was set to 15 feet; to capture the full height of the tallest element to be installed and the surface point was set to 5 feet to mimic a human sight line. The result is an approximately 71.33-acre APE that encapsulates the potential to cause visual effects to surrounding historic properties. The area of ground disturbance represents the archaeological portion of the APE and is approximately 6.6 acres. All areas within the project area that could have sediments impacted by project activities are within the area of ground disturbance. This includes a block shape area located where CF-689 and CF-688, two demolished buildings, were once located, the vacant field immediately east and south of where these buildings once stood and which was landscaped in the past, and disturbance areas for the construction of fencing, gates, guard posts, and yard lighting.

The APE has been inventoried under ISU-85-11-2 and no historic properties or cultural resources were reported. There are no archaeological resources, thus no archaeological historic properties within the ground disturbance portion of the APE for the HTTF at CFA. There are 21 built environment cultural resources within the APE for the HTTF at CFA. Twelve have not yet reached the 50-year threshold required for evaluation to the National Register of Historic Places (NRHP) and do not possess the extraordinary significance required under Criteria Consideration G for evaluation prior to reaching that threshold. Seven buildings were surveyed by the Center for Environmental Management of Military Lands in 2021 (Wallace, 2022). All seven were recommended not eligible, and concurrence by the Idaho State Historic Preservation Office (SHPO) was received 23 May 2023 under SHPO Review Number 2022-556. Two historic districts were also evaluated in 2021. Both were recommended not eligible and SHPO concurrence was received 23 May 2023 under SHPO Review Number 2022-556. (ID-SHPO, 2022)).

3.3.1 Impacts to Cultural and Historic Resources

The INL Cultural Resource Management Office (CRMO) reviewed the HTTF project in compliance with Section 106 of the National Historic Preservation Act per 36 CFR § 800. Section 106 review was integrated with the NEPA process, and completed in keeping with the review processes identified in the 2023 Programmatic Agreement

There will be no physical or visual affects to archaeological historic properties as there are none present within the ground disturbance portion of the APE.

The proposed HTTF was evaluated for potential visual effects to built environment historic properties due to the introduction of new vertical elements on the landscape. The HTTF will introduce an industrial aspect to a campus that has been dominated by support services and activities since the establishment of the National Reactor Testing Station in 1949. The APE encompasses about 71.33 acres, designed to accommodate any potential visual effects to built environment historic properties. No built environment historic properties were identified within the APE; therefore, the proposed HTTF has no potential to impact any built environment historic properties.

The result of the Section 106 review recommends the HTTF project would not affect archaeological and building environment historic properties. On 14 May 2024 DOE concurred with the recommendation and determined the undertaking would not affect historic properties.

3.4 Ecological Resources

Ecological resources include the plant and animal species, habitats, and ecological relationships within the area of impact, which is the area directly or indirectly affected by the HTTF project. Consideration is given to sensitive species, which are those species protected under federal or state law, including threatened and endangered species, migratory birds, and bald and golden eagles. For the purposes of this EA, sensitive and protected ecological resources include plant and animal species that are federally or state-listed for protection.

There are several species of concern or special status species that occur within the INL Site boundary. The United States Fish and Wildlife Service (USFWS) provides spatially explicit information regarding threatened and endangered species. Based on the information provided by the USFWS, there is no critical habitat identified within the HTTF project boundary nor within the INL Site boundary (USFWS, 2024). The USFWS identifies the North American wolverine (Threatened), the yellow-billed cuckoo (Threatened), Ute ladies'-tresses (Threatened), whitebark pine (Threatened) and monarch butterfly (Candidate) as potentially occurring within several counties partially occupied by the INL Site, including Butte, Bonneville, Jefferson, Bingham, and Clark counties, Idaho. However, the likelihood of the North American wolverine, yellow-billed cuckoo, whitebark pine or Ute ladies'-tresses occurring within the HTTF project boundary is small because it does not support the appropriate habitats for those species.

Although no wildlife nor plant species currently listed under the Endangered Species Act of 1973 (ESA) are known to occur on the INL, there are at least 20 special status plant species and 24 wildlife species of conservation concern identified by the Bureau of Land Management (BLM) as special status species (Type 2) that have been documented on the INL Site (DOE-ID, 2023). Many of those plant species are rare and occur very infrequently within their optimal habitats. Others may have slightly larger population sizes but are restricted by unique habitat requirements. A few special status plants have a widespread distribution across the INL Site. Of these BLM Type 2 wildlife species, some of the most common at the INL Site include the sage thrasher (Oreoscoptes montanus), the loggerhead shrike (Lanius ludovicianus), the ferruginous hawk (Buteo regalis), and the greater sage-grouse. Additionally, at least 20 wildlife species identified in the Idaho State Wildlife Action Plan (IDFG, 2024) by the Idaho Department of Fish and Game (IDFG) as Species of Greatest Conservation Need have been documented on the INL Site (DOE-ID, 2023). These include transitory species, such as the American white pelican (Pelecanus erythrorhynchos) and the ring-billed gull (Larus delawarensis), to species that occupy the INL Site during some or all their lifecycle, such as the greater sage-grouse (Centrocercus urophasianus), big brown bat (Eptesicus fuscus), and the burrowing owl (Athene cunicularia). Many special status species are detected during annual survey efforts at the INL Site and monitoring efforts are directed toward understanding the abundance, distribution, and habitat use patterns of some of those species.

3.4.1 Impacts to Ecological Resources

Impacts to ecological resources are considered significant if they result in a loss of protected or sensitive species or loss of local populations from direct mortality or diminished survivorship. The facility modifications, construction, and operations proposed as part of the HTTF would occur in and around existing facilities. The HTTF does not require additional land use that would result in the disturbance of intact native vegetation communities.

All areas used for transportation, construction, and operation of the HTTF are mapped as existing facilities or other existing manmade features (Shive, et al., 2019). There are no anticipated impacts from HTTF activities on native vegetation communities, special status plant species, nor critical habitat designated under the ESA. Any peripheral effects on native plant communities or sensitive plant species from HTTF activities would not be discernable from current INL operations, and impacts would be negligible.

There is potential for HTTF activities to impact various wildlife species both directly and indirectly during transportation, construction, and operation activities. Transportation activities, including shipment of construction equipment, supplies, and employee commuter vehicles, have the potential to impact wildlife from inadvertent vehicle strikes. The loss of protected or sensitive species or loss of local populations from direct mortality of diminished survivorship is not anticipated. Additionally, the use of commuter vehicles on public roads would not be discernable from current INL operations. Therefore, impacts to wildlife during transportation activities would be negligible.

Construction and operations activities have the potential to impact wildlife species both directly and indirectly. Various bird species including those protected under the Migratory Bird Treaty Act have the potential to be impacted during construction and operations activities. Many bird species may use structures, equipment, and surrounding areas for nesting during construction and operations of HTTF and may result in a "take" under DOE-ID's Special Purpose-Miscellaneous Permit issued by USFWS. In addition to bird species, various bat species have the potential to roost in existing facilities that are proposed to be modified. These activities have the potential to result in the harm or destruction of potential roosting bat species.

Regulatory and planning controls used for construction and facility operations on the INL Site can greatly reduce any of the potential impacts to ecological resources discussed above. Conservation measures outlined in the INL Bat Protection (DOE-ID, 2018), such as searching existing structures for the presence of bats before building modifications take place, greatly reduce the likelihood of impacting bat species on the INL Site. The direct impacts of disturbance on wildlife would be limited to the period of construction and maintenance, and the level of disturbance may be reduced for some species through the implementation of design features such as conducting work outside migratory bird nesting season, pre-work surveys, and onsite monitoring intended to minimize these types of effects.

From a cumulative impact perspective, the incremental impacts to ecological resources of the HTTF when added to past, present, and reasonably foreseeable actions at the INL Site are small.

3.5 Geology and Soils

Mineral resources inside the INL Site boundary are limited to several quarries, or "borrow sources," which supply sand, gravel, pumice, silt, clay, and aggregate for road construction and maintenance; new facility construction and maintenance; waste burial activities; and landscaping onsite. Onsite topsoil is a limited commodity. The INL Site contains six active gravel/borrow pits that support onsite maintenance operations, new construction, and environmental restoration and waste management activities (DOE-ID, 2019). The Monroe Borrow Source, the nearest borrow source to CFA, is about 4 miles to the northwest. Outside of the INL Site and within about 100 miles of the boundary, mineral resources include sand, gravel, pumice, phosphate, and base and precious metals (NRC, 2004).

3.5.1 Impacts to Geology and Soils

Rock and soil disturbance would be associated with grading and shaping the construction area, trenching for installing underground utilities, constructing equipment foundation and walkways, and road construction. The proposed action would directly disturb about 7 acres of previously disturbed land within the project area. There would be no additional land disturbance during operations, testing, and dismantling of test articles; any activities outside CFA-686 would occur on previously disturbed areas at CFA. At the end of construction, the temporarily disturbed area outside of CFA-686 would be graded, covered with soil stockpiled from site clearing and excavation, and graveled.

The USEPA and Idaho Department of Environmental Quality require a Stormwater Pollution Prevention Plan under the National Pollutant Discharge Elimination System General Permit for stormwater discharges from construction activities. Although soils disturbed during construction would be temporarily subject to wind and water erosion, adherence to standard best management practices (BMPs) for soil erosion and sediment control (e.g., use of silt fencing, staked hay bales, mulching and geotextile fabrics, and revegetation) during facility construction would serve to minimize soil erosion and loss.

Because the 7 acres of disturbed land would be less than 0.001percent of the 569,600 acres of the INL Site and BMPs would be used to limit soil erosion, small impacts on soils at the INL Site are expected. Other uses for geologic and soil materials include components of concrete and asphalt, as a base under parking lots, roadways, concrete slabs, fill, grading, and revegetation of the Site. Sources of construction materials would include rock and soil stockpiled during site excavation; and soil, crushed stone, sand, gravel, and soil supplied by from INL Site borrow sources. The nearest borrow source, Monroe, is about 11 miles northwest of CFA, and the proposed action would not result in expansion of the Monroe Borrow Source beyond its approved footprint. The total quantities of geologic and soil materials needed during construction would represent small percentages of regionally plentiful resources and are unlikely to adversely impact geology and soil resources.

Operation of the HTTF would involve no ground disturbance, minimal soil erosion, and little or no use of local geologic and soil materials and, therefore, would have a small additional impact on geology and soils. Given the previously disturbed characteristics of the HTTF project area, when combined with past, present, and reasonably foreseeable future activities at the INL Site, cumulative impacts from the proposed HTTF would be negligible.

3.6 Electricity

Commercial electric power is delivered by contract with Idaho Power Company to supply the operating areas of the INL Site. The current contract allows for a total power demand of up to 50,000 kilowatts (50 MW) but can be increased to 55,000 kilowatts (55 MW) if advance notice is provided to Idaho Power. Power demand above this transmission would need to be negotiated with Idaho Power. Electrical energy available to the INL Site is about 481,800 MW hours (MWh) per year based on the contract load limit of 55,000 kilowatts (55 MWs) for 8,760 hours per year. Current electrical energy consumption at the INL Site.

3.6.1 Impacts to Electricity Consumption

Based on 30 days a month running at 24 hours a day, the HTTF will roughly consume a maximum of about 96,768 MWh per year. In fiscal year 2023, the most recent year for which information is available, INL purchased a total of is 176,499 MWh of electricity (Terrill, 2024). Operation of the HTTF would increase INL power consumption by about 55 percent. At present, Idaho Power is the sole provider of power to the INL Site. The electricity required to operate the HTTF is available from the INL power grid and comprises about 20 percent of the electrical energy available to the INL Site each year based on the contract load limit. The estimated amount of electricity to be used by the HTFF are the maximum, bounding quantity of electricity that could be used by the HTTF because the estimate does not account for production of electricity by SOFCs that will feed power back into the HTTF for operations. The increased use of electrical power would result in moderate impacts to the consumption of electricity at the INL Site, meaning the effects would be noticeable, but would not destabilize the available power supply.

INL power needs are projected to increase notably over the next 20 years due to growth in INL programs. Moderate cumulative impacts to electricity consumption are anticipated from construction and operations of the HTTF when viewed in combination with reasonably foreseeable future growth but would not result in the need for additional power infrastructure and would not negatively impact other INL programs.

3.7 Fuel Consumption

Fuel consumed at INL includes natural gas, fuel oil (for heating), diesel fuel, gasoline, and propane. All fuels are transported to the site for use and storage. There are no gas or oil lines on the INL Site, although individual facilities may have propane or fuel storage tanks. Fuel storage is provided for each facility and inventories are restocked as needed. INL fuel consumption was about 998,713 gallons in 2023 (e.g., diesel, E10 ethanol fuel, E85 ethanol fuel, and R99 renewable diesel) (Terrill, 2024).

3.7.1 Impacts to Fuel Consumption

The HTTF would not consume fossil fuels during demonstration testing and operations. The Proposed action would use fuel during construction and transportation activities. The use of fuel for construction and transportation would include equipment listed in Table 2, transport trucks, and commuter vehicles for 10–12 construction workers and about four additional employees. Given the short-term nature of construction and transportation activities, and the very minor increase in INL employment associated with the HTTF, direct, indirect, and cumulative impacts to fuel use would be negligible.

3.8 Groundwater

The eastern Snake River Plain Aquifer serves as the primary source of drinking water and crop irrigation in the upper Snake River Basin. The SRPA underlies about 9,600 square miles in southeastern Idaho, including the INL Site. On a regional scale, groundwater moves westwardly at an average gradient of 12 feet per mile. Recharge to the aquifer occurs from percolation of surface water used for irrigation, underflow from tributary drainage basins, direct precipitation upon the eastern Snake River Plain, and losses from the Snake River. Groundwater discharge from the aquifer occurs as seeps and springs to surface water or as withdrawal from water wells. Most groundwater discharge occurs along the reach of the Snake River between Milner and King Hill known as the Thousand Springs area.

The SRPA is the major source of drinking water and crop irrigation for southeastern Idaho and has been designated a Sole Source Aquifer by the USEPA. The U.S. Geological Survey estimates that the thickness of the active portion of the SRPA at the INL Site ranges from 250 to 820 feet. Depth to the water table ranges from about 200 feet below land surface in the northern part of the INL Site to about 1,000 feet in the southern part.

The SRPA is the only source of water for INL facilities. The INL's Federal Reserved Water Right permits a maximum water consumption of 11.4 billion gallons per year from the SRPA. Each major facility is serviced by one or more production or potable water wells. Wells CFA-1 and CFA-2 serve CFA facilities.

3.8.1 Impacts to Groundwater

The HTTF would use a maximum of about 18 gallons of water per minute when running at the maximum 10 MW and 24 hours a day for a total of about 9.5 million gallons per year. The estimated amount of water to be used by the HTFF is conservative and represents the maximum, bounding quantity of that could be used by the HTTF because the estimate does not account for unused steam being returned to the boiler for reuse.

In 2023, total water consumption at CFA was about 55.5 million gallons (Terrill, 2024). Construction and operation of the HTTF would increase water consumption at CFA by about 17 percent. The total water use at the INL Site was 735 million gallons in 2023 (Terrill, 2024), and HTTF would consume about 1.3 percent of the INL Site total. The impacts of increased water use would be moderate for CFA, meaning they would be noticeable but would not destabilize the resource. Impacts to overall INL water consumption would be small.

In 2022, the INL Site's production well system withdrew a total of about 728 million gallons of water, which represents about 6.38 percent of the Federal Reserved Water Right for the INL Site (INL, 2023a). However, the 9.5 million gallons per year used by the HTTF when added to the amount of water the INL Site's production well system withdrew in 2022, the total water withdrawn from the SRPA from the INL Site's production well system would remain at about 6.38 percent of the Federal Reserved Water Right. The cumulative impacts of water consumption at HTTF when considered in context with past, present, and reasonably foreseeable future actions at the INL Site is small.

For HTTF, potable site water will be de-ionized and used to produce steam to be consumed in the electrolysis process. Unused steam will condense back to liquid form and be returned to the boiler for regeneration. During the de-ionizing process, reject water will be released to site sanitary system and released to the sanitary lagoons at CFA.

The CFA sanitary system has two evaporation lagoons. Table 5 lists the maximum design features of the CFA wastewater lagoons.

Table 5. Design features of the CFA wastewater lagoons

Lagoon	Area (acres)	Depth (feet)	Volume (million gallons)
Lagoon 1	1.7	8	3.6
Lagoon 2	10.3	8	21.8

CFA facilities management currently operate the wastewater lagoons at a depth of 7 feet. Levels in Lagoon 1 are set at 7 feet, which is considered full, for treatment purposes. Lagoon 1 overflows into Lagoon 2. Levels in Lagoon 2 fluctuate, but when filled to 7 feet, Lagoon 2 is conservatively estimated to hold about 18.5 million gallons of wastewater.

Because Lagoon 1 operates at full capacity for treatment purposes, this EA assumes all wastewater from the HTTF would be discharged to Lagoon 2. Current wastewater discharges to Lagoon 2 vary from 6,000 gallons per day in the winter to 13,000 gallons per day in the summer. Conservatively assuming that current operations at CFA discharge the maximum of 13,000 gallons per day to Lagoon 2 for 365 days of the year, total discharges from current CFA operations would be about 4.8 million gallons per year.

Operation of the HTTF would add about 26,000 gallons per day (9.5 million gallons per year) to the CFA wastewater treatment system. The maximum annual discharge to the CFA wastewater lagoons from the HTTF combined with current maximum operations at CFA would be about 14.2 million gallons per year and is within the design capacity of the CFA wastewater lagoons. This estimate represents a maximum bounding estimate because it 1) assumes maximum discharges from current CFA operations, 2) does not account for the water fed back into the SOEC test articles for hydrogen production, and 3) does not account for evaporation of water in the lagoons. Discharge of about 26,000 gallons per day from the HTTF is within the design capacity of the CFA wastewater treatment system and would have small impacts to CFA system.

Water consumption and discharges to the CFA wastewater system from the addition of 10–12 temporary construction workers and the addition of four new employees would be negligible.

3.9 Noise

The area surrounding the project site is characterized as being predominantly developed, surrounded by sagebrush steppe communities. Regionally, elevated noise levels mainly result from vehicular traffic on the highways. The closest manmade structures within the project area are numerous access roads and INL facilities. Primary noise contributors in the project area at CFA include natural sounds (e.g., the wind and occasionally wildlife) and manmade sounds, including vehicular traffic and activities associated with INL operations. Within the INL Site boundary, the vegetation cover and regional topography quickly attenuate noise and vibrations with distance from the noise source.

CFA is about 13.5 miles from the INL Site boundary. The closest noise-sensitive receptor is a rest area on U.S. Highway 20 about 3.5 miles from the CFA. Noise from traffic on U.S. Highway 20 is expected to be the primary noise at this location. At CFA, manmade noise is primarily limited to that associated with INL activities, including vehicular traffic and equipment and machinery operation. Noise from most of these activities are barely audible or are inaudible at the rest area on U.S. Highway 20.

This EA considered the following data sources for characterizing the noise environment and vibration:

- Aerial photography to identify potential noise-sensitive receptors near the project area, including the Google Earth™ imagery for the project area
- The 2018 U.S. Department of Transportation Federal Transit Administration Transit Noise and Vibration Impact Assessment methodology to estimate ambient, construction, and operational noise levels and to evaluate general noise and vibration concepts (FTA, 2018)
- The Federal Highway Administration Highway Construction Noise Handbook (FHWA, 2006)
- 2022 Idaho National Laboratory Site Environmental Report (DOE-ID, 2023).

3.9.1 Impacts to Noise

The HTTF will be located at CFA and includes several noise-generating sources typical of industrial activities such as industrial heating, ventilation, and air conditioning equipment, blowers, moving equipment, and vehicles, which could affect noise-sensitive receptors. Discernable noise from the HTTF would be generated from blowers, exhaust fans, compressors, and other similar equipment. These items do create noise, which is generally well defined in engineering documents. Systems rarely exceed Occupational Safety and Health Administration (OSHA) noise thresholds. Hydrogen fuel cell generators do not have internal combustion engines resulting in no moving parts and noise generation is minor. The noise generated from the HTTF, and associated facility modifications and other activities would be consistent with other existing industrial equipment at CFA and the potential concurrent noise would be like existing levels. As a result, the HTTF would not cause a noticeable long-term change in the noise environment at the INL Site or at the nearest sensitive receptor.

Elevated noise levels would generally be limited to the immediate area of the noise source, with noise levels quickly attenuating from the source due to distance and topography. Elevated noise levels can affect the health and safety of personnel, result in annoyance and disturbance to receptors nearby, and disturb wildlife. It can degrade the quality of outdoor space. Noise-sensitive receptors evaluated for this project include onsite workers, the nearest sensitive noise receptors discussed in Section 3.7, and wildlife.

Table 6 presents typical noise levels of standard heavy construction equipment that could be used during construction.

Table 6. Typical noise levels of construction equipment.

Construction Equipment	Noise Level (dBA) at 50 Feet
Air Compressor	80
Generator	82
Cement Pump	82
Roller	85
Loader	80
Excavator	81
Dozer	85
Grader	85
Scraper	85
Trucks	84
Sources: (FTA, 2018); (FHWA, 2006) Key: dBA = A-weighted decibel	

Noise levels decrease (attenuate) with distance from the source. The decrease in sound level from any single noise source normally follows the "inverse square law." Meaning the sound level change is inversely proportional to the square of the distance from the sound source (FTA, 2018).

Conservatively assuming simultaneous use of some of the loudest noise-generating construction equipment listed in Table 6, intermittent elevated noise levels from construction activities would be at about 91 dBA (at 50 feet). At 91 dBA (at 50 feet), construction noise levels would attenuate to 71 dBA (at 500 feet), 61 dBA (at 1,500 feet), 57 dBA (at 0.5 miles), and 51 dBA (at 1 mile). Beyond a half-mile, any elevated noise levels would likely be faint or not detected. Heavy trucks would typically have noise levels between 74 dBA and 85 dBA at 50 feet (FHWA, 2006). Therefore, heavy trucks could generate noise levels ranging from 54 dBA to 65 dBA at 500 feet. Project-related sound levels would be expected to dissipate to background levels before reaching most publicly accessible areas. The closest noise-sensitive receptor is a rest area on U.S. Highway 20 about 3.5 miles from the CFA; therefore, the receptor would not detect project-related noise.

Potential impacts from noise would continue to be regulated to be protective of human health. Per 10 CFR 851, employee exposures to hazardous agents are maintained below the American Conference of Governmental Industrial Hygienists threshold limit values, the OSHA permissible exposure limits, and other applicable standards as defined by DOE. When exposure limits defined by the various agencies conflict, INL policy is to comply with the more stringent limit.

Construction and operations of the HTTF could disturb wildlife (e.g., noise and vibration). Species in the vicinity of the construction area would likely move to suitable habitat nearby. In general, noise impacts are expected to be greatest during construction activities associated with the proposed HTTF. Any adverse noise impacts would generally be small due to the ongoing industrial activity already occurring in the project area.

Given the distance to the nearest offsite receptor, cumulative noise from construction or operation of projects at CFA and other locations within the INL Site would be indistinguishable from background, and therefore the impacts would be negligible.

3.10 Waste Management

Radioactive and chemical wastes are generated by production, maintenance, and remediation activities at the INL Site. Radioactive wastes categories include (1) low-level radioactive waste, (2) mixed low-level radioactive waste, and (3) transuranic waste, including mixed transuranic waste. Chemical wastes categories include (1) hazardous (i.e., designated under Resource Conservation and Recovery Act [RCRA] regulations), (2) toxic, and (3) hazardous construction and demolition debris. Waste quantities vary with different operations, construction activities, and implementation of waste minimization activities. Activities and capabilities for waste management include waste characterization, packaging, and labeling; waste transport, receipt, and acceptance; waste treatment; waste staging; waste disposal; and radioactive liquid waste treatment. All waste is handled, treated, transported, and disposed of in accordance with federal and state regulations applicable to specific waste classifications.

3.10.1 Impacts to Waste Management

Under the proposed action, small quantities of industrial (i.e., construction debris) and hazardous wastes would be generated. Industrial waste in the form of scrap wood, scrap metal, packaging material, RCRA empty chemical containers, rags, wire, concrete, pipe scrap, etc., would be generated by the project. The proposed action has the potential to generate small quantities of hazardous waste from paint waste, adhesive waste, cleaning solvents, and other materials. It may be necessary to occasionally drain some de-ionized water from the system. No other category of wastes discussed in Section 3.8 would be generated under the proposed action. All waste would be handled in accordance with INL's waste management procedures.

In 2023, the INL Site generated 2,921,342.01 lbs of nonhazardous municipal solid waste and 36,224,993 lbs of construction and demolition waste (INL, 2023c). Waste generated from the proposed action would be negligible compared to the INL Site as a whole. Impacts to onsite waste operations or offsite disposal facilities are anticipated to be small. Because impacts would be small, they would not substantially contribute to cumulative impacts on waste management.

3.11 Human Health and Safety

For this EA, the topic of human health encompasses the baseline health condition of area residents, workers, and uninvolved workers who could be negatively or positively affected by implementation of the proposed action. The nature of some INL Site activities present potential human health risks that are avoided through operational controls and verified through monitoring. Health risks can be caused through exposure to chemicals or radionuclides (through ingestion, respiration, or skin contact) or from direct physical harm. The INL 2022 Annual Site Environmental Report (DOE-ID, 2023) gives descriptions of the public health baseline, radionuclides, and chemicals in the environment surrounding the INL Site. Annual air, water, soil, and biota monitoring data indicate public exposures to INL emissions are maintained at or below permitted or recommended levels and protect public health and welfare.

Operations at the INL Site are required to comply with the DOE requirements for worker health and safety. DOE environmental, safety, and health programs regulate the work environment and seek to minimize the likelihood of work-related exposures, illnesses, and injuries. These programs are controlled by the safety and health regulations for DOE contractor workers governed by 10 CFR 851, which establishes requirements for worker safety and health programs to ensure that DOE contractor workers have a safe work environment. Provisions are included to protect against occupational injuries and illnesses, accidents, and hazardous chemicals.

The project area is not located in a Comprehensive Environmental Response, Compensation, and Liability Act, and therefore, there are no institutional controls in place that limit use at the proposed location.

3.11.1 Impacts to Human Health and Safety

Under the proposed action, project activities would not involve direct hazards to the public. Access to CFA and the project area is restricted and not readily accessible to the public. Noise-generating activities and fugitive dust would be unlikely to affect members of the public at the nearest publicly accessible points. The level of exposure to hazards, the regulatory requirements for managing those hazards, and existing exposures are not anticipated to change. Therefore, the direct, indirect, and cumulative impacts from exposure to normal industrial hazards would be small. Effects on human health would be negligible.

Construction activities planned under the proposed action would not be expected to have any adverse health effects on workers. Under the proposed action various pieces of heavy equipment would be used. Primarily general and support and maintenance contractors would be involved in site clearing, earth moving, heavy-equipment operations, access road maintenance, and electrical installation. INL employees would serve mostly in oversight roles.

Approximately 10–12 workers would be involved during periods of peak activity. Applicable safety and health training and monitoring, personal protective equipment (e.g., steel-toed boots, hardhats, hearing protection), and work-site hazard controls would be required for workers.

Potentially serious exposures to various hazards or injuries are possible during construction. Hazards include direct injury; noise; heat stress; and slips, trips, and fall. Effects could range from relatively minor events (such as cuts or sprains) to major injuries (such as broken bones or fatalities). To minimize the potential of serious injuries, workers would be required to adhere to a health and safety plan while performing project activities. Adherence to an approved plan, use of personal protective equipment and engineered controls, and completion of appropriate hazards training would be expected to help prevent adverse acute or chronic health effects to workers.

Operation of the HTTF includes activities that involve the handling and storing of pressurized gases (e.g., hydrogen, nitrogen, and oxygen) and the production of hydrogen for storage and for SOFC operations. Hazards associated with compressed gases include oxygen displacement, fires, explosions, and gas exposures, and the physical hazards associated with high pressure gas systems. Project personnel would follow all requirements for special storage, use, and handling precautions to control these hazards.

Hydrogen safety is a concern due to its high diffusivity and transparent flames. Hydrogen is a very light gas that diffuses rapidly in the air and can easily spread over large distances. Hydrogen is a colorless, odorless, and tasteless gas that is highly flammable in air and can ignite at concentrations as low as 4 percent. It has the lowest density of all gases and is fourteen times lighter than air. If hydrogen leaks occur, it can rapidly spread and accumulate in enclosed spaces.

Hydrogen presents fire and explosion risks due to its high flammability. Hydrogen flames are transparent and difficult to detect; therefore, it is more difficult to identify and mitigate hydrogen flames, at least in the early stages. Moreover, due to its low molecular weight, hydrogen molecules can easily penetrate materials such as metals and plastics, thus activating cracking or embrittlement phenomena which cause accidental release.

However, if hydrogen were to be accidentally leaked, it would diffuse rapidly into the atmosphere because of its gaseous properties, thus preventing it from maintaining the level needed to support ignition. If a hydrogen leak occurs, the HTTF would be configured in an open environment which would allow air to flow throughout the structure and rapidly dilute the hydrogen to below levels needed for combustion. Hydrogen storage at HTTF would comply with regulatory requirements.

Per 10 CFR 851 (2012), employee exposures to hazardous agents at the INL Site are maintained below the American Conference of Governmental Industrial Hygienists threshold limit values, the OSHA permissible exposure limits, and other applicable standards as defined by DOE.

Standard industrial hazards are hazards that are routinely encountered in general industry and construction; for these hazards national consensus codes and standards, such as OSHA standards and DOE-prescribed occupational safety and health standards, guide project activities.

In addition, the HTTF would have hydrogen detection systems and automatic shutoff valves to prevent a release of flammable hydrogen into the environment as described in Section 2.1. The HTTF would include programmable logic controls for system monitoring, control, and data acquisition and management and to supply an emergency stop function. Additional components include surge protection devices on safety interlock circuits and phase monitoring relays and vibration, temperature, and leak sensors to stop equipment when a hazardous or problematic condition is detected. Implementation of these safety measures along with providing safety training and protocols to workers involved in hydrogen production, storage, and use, would minimize the risks associated with hydrogen.

As effective design processes and safeguards are in place, the direct and indirect impacts from exposure to industrial hazards would be small. Because impacts would be small, they would not substantially contribute to cumulative impacts on human health and worker safety.

3.12 Traffic and Transportation

INL and commercial transportation systems include road and highway systems, railroad systems, and airports. Approximately 6 percent of Site land (approximately 34,000 acres) is devoted to public road and utility rights of way crossing the Site. The Site has 140 km (87 miles) of paved roads within its boundary, approximately 29 km (18 miles) of which are considered service roads. Road use is restricted to employees and visitors on official business. An additional 145 km (90 miles) of paved public highways run through the Site. United States Highways 20 and 26 cross the southern portion of the Site, and Idaho State Highways 22, 28, and 33 cross the northern portion of the Site (see Figure 1). Over 100 miles of unpaved roads and trails provide additional access for emergency, security, and service vehicles. The Union Pacific Railroad (UPRR) Mackay Branch Line services the southern portion of the Site through the Scoville Spur. Freight services are received from UPRR main lines from Butte, Montana, on the north, and Pocatello, Idaho, and Salt Lake City, Utah, on the south. Interconnections are made from those locations throughout the United States. The INL freight comes through Blackfoot, Idaho, from the UPRR north-south track over the Mackay Branch Line. There are 23 km (14 miles) of Mackay Branch Line traversing the southern part of the Site (see Figure 6). A DOE-owned railroad track passes north at the Scoville siding from the Mackay Branch through CFA, past the east side of the Idaho Nuclear Technology and Engineering Center and terminates within the Naval Reactors Facility.

3.12.1 Impacts to Traffic and Transportation

The average increases in daily traffic during construction are not expected to exceed the existing level of service on offsite roads and no upgrades or improvements to onsite roads are anticipated. Operations traffic is not expected to cause a change in the existing level of service on offsite roads and no upgrades or improvements to onsite roads are anticipated. In this EA, the transportation activities do not involve radioactive wastes and material transports and would be limited to nonradiological health impacts from construction and support equipment supplies.

DOE estimates the proposed action would require about 15 truck shipments would be needed to supply materials (e.g., rectifiers, transformers, structural steel, chillers, condensers, storage tanks, and other major equipment) for construction and operation of the HTTF. The proposed action would need about 40 dump truck shipments of fill materials from the Monroe Borrow Source.

In 2022 Idaho's fatality rate per 100 million vehicle miles traveled was 1.12 and the rate for accidents resulting in in injury was 63.46 per 100 million vehicle miles traveled (ITD, 2022). Conservatively estimating one-way distances of about 5 miles for gravel fill material from the Monroe Borrow Source, about 1,000 miles for the other material shipments by truck and using the Idaho accident and fatality rates of 6.3×10^{-7} and 1.12×10^{-5}, respectively, it is unlikely these activities would lead to a single traffic accident or fatality during construction and operations. Table 7Table shows a summary of transportation impacts.

Table 7. Summary of transportation impacts.

Transport Vehicle	Number of Shipments	Distance Round Trip (Miles)	Accident Rate (Per 1 million Miles)	Number of Accidents from the Proposed Action	Fatality Rate (Per 1 million Miles)	Number of Fatalities from the Proposed Action
Dump Trucks from Monroe Borrow Source	40	10	6.40E-05	2.56E-08	1.12E-06	4.48E-10
Haul Trucks Offsite	15	2000	6.40E-05	1.92E-06	1.12E-06	3.36E-08

The impacts on traffic from construction and operation activities are anticipated to be negligible to small. As such, they would not substantially contribute to cumulative traffic impacts.

3.13 Intentional Destructive Acts

Vandalism, terrorist attacks, and sabotage could affect INL Site facilities. The proposed action presents an unlikely target for an act of terrorism at the INL Site and would have an extremely low probability of attack. However, because neither the possibility nor the probability of an attack is truly known, the risk of terrorism or sabotage and any consequent environmental impact cannot be reliably estimated. Federal and other utilities use physical deterrents (e.g., fencing, cameras, warning signs, and rewards) to help deter theft, vandalism, and unauthorized access to facilities. Security measures are in place at the INL Site to prevent theft, vandalism, and other destructive acts. A highly trained and equipped Protective Force prevents attacks against and entry into INL Site facilities. Protective Force controls access to the INL Site from public entry on Highways 20, 26, and 33, and allows access only to persons conducting official business and having proper credentials.

3.14 Environmental Justice

Consideration of environmental justice in NEPA analysis is driven by Executive Order 12898, “Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations,” and is further supported by Executive Order 14008, “Tackling the Climate Crisis at Home and Abroad,” and Executive Order 14096 “Revitalizing our Nation’s Commitment to Environmental Justice for All” as well as accompanying guidance (IWG, 2016) (CEQ, 1997).

The executive orders direct federal agencies to identify disproportionately high and adverse human health or environmental effects of federal programs, policies, and activities on communities of environmental justice concern and to take action to address such impacts.

Currently, all census tracts comprising and immediately surrounding the INL Site are considered disadvantaged and communities of environmental justice concern under CEQ’s Climate & Economic Justice Screening Tool (CJEST) methodology. Table 8 shows the burden thresholds met by the communities that intersect or immediately surround a 10-mile buffer of the location of the proposed activity as described in the preferred alternative:

Table 8. Environmental Justice burden thresholds of communities within 10 miles of the proposed HTTF

Census Tract ID #	Environmental Burden Threshold(s) Met or Exceeded & Percentile Rank	Socioeconomic Burden Threshold(s) Met or Exceeded& Percentile Rank
16023970100	Climate Change: -Expected Agricultural Loss (91st) Legacy Pollution: -Formerly Used Defense Sites (YES)	Low Income(65th)
16011950300	Legacy Pollution: -Formerly Used Defense Sites (YES)	Low Income (89th)
16051960100	Climate Change: -Expected Agricultural Loss (91st) Housing -Lack of Indoor Plumbing (95th) Energy -Energy Cost (90th)	Low Income (74th)

3.14.1 Impacts to Environmental Justice

DOE considered the following factors to determine if the effects from construction and operation of the HTTF to communities of environmental justice concern would be disproportionately high and adverse:

1. Does the physical location of the proposed activity and/or the ROI reside within or encroach upon a community considered disadvantaged as defined by the CEQ CJEST Tool methodology?
2. What CEJST burden thresholds do the census tracts collocated with the ROI meet?
3. Are there additional potential effects that need to be considered to analyze the potential impacts to environmental justice?
4. Do anticipated impacts have the potential to exacerbate or negatively impact environmental justice conditions for the census tracts collocated with the ROI when compared to baseline conditions?
5. Whether direct or cumulative effects are anticipated to be significant or have a reasonable potential to have disproportionately or adverse impacts in communities of environmental justice concern in relation to potential impacts on the general public.

Although the project is located within and surrounded by census tracts identified as communities of environmental justice concern (including Native American communities), construction and operation of the HTTF would have little to no potential to negatively affect the baseline environmental justice conditions in surrounding communities. The impacts to other resources analyzed in this EA would be negligible to moderate. Construction and operation of the HTTF would have negligible impacts on the environmental or socioeconomic burdens of concern in surrounding communities. The proposed activities would not have a direct or cumulative impact on severe weather, median household income, the presence of former defense sites, the availability of residential indoor plumbing, or the price of energy. As such, the effects to communities of environmental justice concern would not be disproportionately high or adverse as compared to the public at large within the greater INL ROI.

3.15 Conclusion

Table 9 summarizes the anticipated environmental impacts from construction and operation of the HTTF as described in this EA. Implementing the proposed action would result in small adverse impacts to the environment. However, these impacts, in conjunction with other past, present, and reasonably foreseeable future actions, would not result in discernible cumulative impacts.

Table 9. Summary of environmental impacts from the HTTF.

Resource	Impacts from the HTTF
Air	Construction of the HTTF would produce two types of air contaminants: exhaust emissions from construction equipment and fugitive dust from soil disturbance, resulting in small, temporary impacts to air quality. During operation the HTTF would not emit any criteria air pollutant, hazardous air pollutant, or GHG, and the impacts of operations on air quality would be negligible. Construction and operations would not contribute to cumulative impact on air quality.
Cultural and Historic Resources	There will be no physical or visual affects to archaeological historic properties as there are none present within the ground disturbance portion of the APE. No built environment historic properties were identified within the APE; therefore, the proposed HTTF has no potential to impact any built environment historic properties. The result of the Section 106 review recommends the HTTF project would not affect archaeological and building environment historic properties. On 14 May 2024 DOE concurred with the recommendation and determined the undertaking would not affect historic properties.
Ecological	The construction and operations proposed as part of the HTTF would occur in and around existing facilities. There are no anticipated impacts from HTTF activities on native vegetation communities, special status plant species, nor critical habitat designated under the ESA. Any peripheral effects on native plant communities or sensitive plant species from HTTF activities would not be discernable from current INL operations, and impacts would be negligible. The direct impacts of disturbance on wildlife would be limited to the period of construction and maintenance, and the level of disturbance may be reduced for some species through the implementation of design features such as conducting work outside migratory bird nesting season, pre-work surveys, and onsite monitoring intended to minimize these types of effects. From a cumulative impact perspective, the incremental impacts of the HTTF when added to past, present, and reasonably foreseeable actions at the INL Site are small.
Geology	The proposed action would directly disturb about 7 acres of previously disturbed land. There would be no additional land disturbance during operations, testing, and dismantling of test articles; any activities outside CFA-686 would occur on previously disturbed areas at CFA. Operation of the HTTF would involve no ground disturbance, minimal soil erosion, and little or no use of local geologic and soil materials and, therefore, would have a small additional impact on geology and soils. Given the previously disturbed characteristics of the HTTF project area, when combined with past, present, and reasonably foreseeable

Resource	Impacts from the HTTF
	future activities at the INL Site, cumulative impacts from the proposed HTTF would be negligible.
Electricity	The electricity required to operate the HTTF is available from the INL power grid and comprises about 20 percent of the electrical energy available to the INL Site each year based on the contract load limit. The increased use of electrical power would result in moderate impacts to the consumption of electricity at the INL Site, meaning the effects would be noticeable, but would not destabilize the available power supply. Moderate cumulative impacts to electricity consumption are anticipated from construction and operations of the HTTF when viewed in combination with reasonably foreseeable future growth but would not result in the need for additional power infrastructure and would not negatively impact other INL programs.
Fuel Consumption	Given the short-term nature of construction and transportation activities, and the very minor increase in INL employment associated with the HTTF, direct, indirect, and cumulative impacts to fuel use would be negligible.
Groundwater	Construction and operation of the HTTF would increase water consumption at CFA by about 17 percent and total INL consumption by about 1.3 percent. The impacts of increased water use would be moderate for CFA, meaning they would be noticeable but would not destabilize the resource. Impacts to overall INL water consumption would be small. The cumulative impacts of water consumption at HTTF when considered in context with past, present, and reasonably foreseeable future actions at the INL Site is small.
Noise	The proposed action would generate noise from construction activities and from the use of equipment, machinery, and vehicles, which could affect noise-sensitive receptors. Elevated noise levels would generally be limited to the immediate area of the noise source and are expected to dissipate before reaching publicly accessible areas. Any adverse noise impacts would generally be small.
Waste Management	Additional waste volumes from the HTTF would be small compared to current disposal volumes at INL. These small volumes would be nearly indiscernible from current operations when combined with past, present, and reasonably foreseeable future actions.
Health and Safety	Potential impacts from noise, exposure to chemicals, and occupational injuries are and would continue to be regulated to be protective of human health. No adverse impacts to human health and safety are anticipated from the HTTF.
Traffic and Transportation	The average increases in daily traffic during construction are not expected to exceed the existing level of service on offsite roads and no upgrades or improvements to onsite roads are anticipated. Operations traffic is not expected to cause a change in the existing level of service on offsite roads and no upgrades or improvements to onsite roads are anticipated. The impacts on traffic from construction and operation activities are anticipated to be negligible to minor. As such, they would not substantially contribute to cumulative traffic impacts.
Intentional Destructive Acts	Acts of sabotage are unlikely, but should they occur, resultant health impacts to members of the public would be small. Resultant health impacts to workers would be mitigated by normal response actions and would also be small.
Environmental Justice	Although the HTTF is located within and surrounded by census tracts identified as communities of environmental justice concern, the HTTF would have little to

Resource	Impacts from the HTTF
	no potential to negatively affect the baseline environmental justice conditions in surrounding communities. The effects in communities of environmental justice concern would not be disproportionately high or adverse.

4. COORDINATION AND CONSULTATION

NEPA drives federal agencies to evaluate environmental resources, which may include a consultation process in accordance with other environmental laws. This section describes environmental consultations that are associated with the proposed action. Additional details on these environmental resources are provided in Chapter 3.

4.1 Shoshone-Bannock Tribes

DOE briefed the Shoshone-Bannock Tribes Tribal staff on May 23, 2024 and the Fort Hall Business Council on June 17, 2024 on the HTTF operations.

On the same day, DOE submitted the Section 106 report to the Tribes' Heritage Tribal Office (HeTO), which has a 30-day review.

4.2 State of Idaho

DOE briefed the Idaho Office of Energy and Mineral Resources on the HTTF operations on June 24, 2024.

DOE submitted the Section 106 report for the HTTF EA to Idaho SHPO on June 2, 2024. SHPO returned comments on June 10, 2024, requesting additional information on the APE. DOE and SHPO will discuss these comments at a meeting on July 11, 2024. It is anticipated that the project will receive concurrence on the No Historic Properties Affected determination of effects.

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