Department of Energy
Idaho Operations Office
1955 Fremont Avenue
Idaho Falls, ID 83415

September 11, 2019

Dear Citizen:

Pursuant to 10 CFR 1021.321 – Requirements for Environmental Assessments, the U.S. Department of Energy (DOE) has prepared the *Draft Environmental Assessment for Expanding Capabilities at the National Security Test Range and the Radiological Response Training Range at Idaho National Laboratory (DOE/EA-2063).* The draft environmental assessment provides DOE's analysis of the proposed expansion which evaluates activities aimed at offering new and relevant capabilities to confront changing threats to military personnel, national and homeland security, and first responders. Capability enhancements include constructing a new explosives test pad and access road, ballistic tunnel, a downrange target area, and supporting infrastructure at the National Security Test Range (NSTR). Also included are expanded capability to support radiological training and technology test and evaluation at both the Radiological Response Training Range (RRTR) and NSTR and fencing the north and south training ranges of the RRTR.

DOE prepared this draft environmental assessment to determine whether an environmental impact statement should be prepared for this action, or that no further National Environmental Policy Act (NEPA) documentation is required.

The draft environmental assessment and existing NEPA documents referenced in the draft environmental assessment are available at the following web link: http://www.id.energy.gov/insideNEID/PublicInvolvement.htm.

The draft environmental assessment has been issued for a 30-day public comment period. Comments received after the 30-day public comment period will be considered to the extent practicable. Comments are due to DOE on or before October 12, 2019. Comments can be submitted to Vic Pearson, U.S. Department of Energy, Idaho Operations Office, 1955 Fremont Avenue, Idaho Falls, Idaho, 83415-1222 or by email at nsrrea@id.doe.gov. A paper copy of the draft environmental assessment can be requested at nsrrea@id.doe.gov.

Sincerely,

Robert Boston
Manager

DOE/EA-2063

U.S. Department of Energy
Idaho Operations Office

Draft Environmental Assessment for Expanding Capabilities at the National Security Test Range and the Radiological Response Training Range at Idaho National Laboratory

Draft

September 2019

Idaho National Laboratory

DOE/EA-2063

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

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FIGURES

TABLES

ACRONYMS

ALARA	as low as reasonably achievable
AN	ammonium nitrate
APE	area of potential effect
BCG	Biota Concentration Guide
CCA	Candidate Conservation Agreement
CEQ	Council on Environmental Quality
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFA	Central Facilities Area
CFR	Code of Federal Regulations
CITRC	Critical Infrastructure Test Range Complex
DGBE	diethylene glycol monobutyl ether
DOE	Department of Energy
DOE-ID	Department of Energy Idaho Operations Office
EA	environmental assessment
ED	effective dose
EPA	Environmental Protection Agency
ESER	Environmental Surveillance, Education, and Research
FONSI	finding of no significant impact
GAO	Government Accountability Office
HMX	high-melting explosive
INL	Idaho National Laboratory
MCL	maximum contaminant level
MEI	maximally exposed individual
MFC	Materials and Fuels Complex
NEPA	National Environmental Policy Act
NERP	National Environmental Research Park
NESHAP	National Emission Standards for Hazardous Air Pollutants
NEW	net explosives weight
NRHP	National Register of Historic Places
NSTR	National Security Test Range
NTR	north training range
PETN	pentaerthritol tetranitrate
PGTB	Power Grid Test Bed

PRGs	preliminary remediation goals
RCRA	Resource Conservation and Recovery Act
RDD	radiological dispersion device
RDX	research department explosive
ROD	Record of Decision
RRTR	Radiological Response Training Range
RWMC	Radioactive Waste Management Complex
SGCA	Sage-Grouse Conservation Area
SHPO	State Historic Preservation Office
SMC	Specific Manufacturing Capability
SRPA	Snake River Plain Aquifer
STP	sewage treatment plant
STR	south training range
TNT	trinitrotoluene
TREAT	Transient Reactor Test Facility
UAV	unmanned aerial vehicle
USFWS	U.S. Fish and Wildlife Service
VOC	volatile organic compound

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. The number thus 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).

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).

ft	foot	Gy	Gray
in.	inch	mrem	millirem
km	kilometer	ppm	parts per million
lb	pound	Rem	Roentgen-equivalent-man
m	meter	yd	yard
		yr	year

Conversions

English to Metric			Metric to English		
To Convert	Multiply By	To Obtain	To Convert	Multiply By	To Obtain
ft	3.048×10^{-1}	m	m	3.28084	ft
gallons	3.785	liters	grams	2.204×10^{3}	lb
lb	4.536×10^{-2}	grams	liters	2.641×10^{-1}	gallons
mi	1.609334	km	km	6.214×10^{-1}	mi
square mi	2.590	square km	square km	3.861×10^{-1}	square mi
yd	9.144×10^{-1}	m	m	1.093613	yd

Glossary

Area of Potential Effects: the geographic area, or areas, within which an undertaking or project may directly or indirectly cause changes in the character or use of historic properties or historical resources, should any such resources be present.

Attainment Area: An area considered to have air quality as good as or better than the National Ambient Air Quality Standards as defined in the Clean Air Act. An area may be an attainment area for one pollutant and a non-attainment area for others.

Basalt: A hard, dense, dark volcanic rock composed chiefly of plagioclase, pyroxene, and olivine, and often having a glassy appearance.

Clean Air Act: The Federal Clean Air Act is the basis for the national air pollution control. Basic elements of the act include national ambient air quality standards for major air pollutants, hazardous air pollutants, state attainment plans, motor vehicle emission standards, stationary source emission standards and permits, acid rain control measures, stratospheric ozone protection, and enforcement provisions.

Clean Water Act: The Clean Water Act is the primary federal law in the United States governing water pollution. The Clean Water Act established the goals of eliminating releases to water of high amounts of toxic substances, eliminating additional water pollution by 1985, and ensuring that surface waters meet standards necessary for human sports and recreation by 1983.

Curie: A unit of radioactivity equal to 3.7×10^{10} disintegrations per second.

Effective Dose: The sum of the products of the dose equivalent received by specified tissues of the body and a tissue-specific weighting factor. This sum is a risk-equivalent value used to estimate the health effects risk of the exposed individual. The tissue-specific weighting factor represents the fraction of the total health risk resulting from uniform whole-body irradiation contributed by that tissue. The effective dose includes the committed effective dose from internal deposition of radionuclides and the effective dose equivalent due to penetrating radiation from sources external to the body. The effective dose is expressed in units of rem or mrem.

Historic Properties: Cultural and historic resources that are eligible or potentially eligible for nomination to the National Register of Historic Places.

Maximum Contaminant Level: Standards set by the United States Environmental Protection Agency for drinking water quality. A maximum contaminant level is the legal threshold limit on the amount of a substance allowed in public water systems under the Safe Drinking Water Act.

National Ambient Air Quality Standards: Standards established by the U.S. Environmental Protection Agency under authority of the Clean Air Act that apply for outdoor air throughout the country. Primary standards protect human health, including that of sensitive populations (e.g., children, the elderly, and individuals suffering from respiratory disease), with an adequate margin of safety. Secondary standards protect public welfare from any known or anticipated adverse effects of a pollutant.

National Environmental Research Park: The Idaho National Laboratory Site is a National Environmental Research Park. National Environmental Research Parks are outdoor laboratories that impart opportunities for environmental studies on protected lands that act as buffers around U.S. Department of Energy facilities. U.S. Department of Energy uses these research parks to evaluate the environmental consequences of energy use and development, and strategies to mitigate these effects and demonstrate possible environmental and land-use options. Regional U.S. Department of Energy Operations Offices manage the seven National Environmental Research Parks while the Office of Science coordinates and guides them.

National Emission Standards for Hazardous Air Pollutants for Radionuclides: The Clean Air Act requires the Environmental Protection Agency to regulate airborne emissions of hazardous air pollutants (including radionuclides) from a list of industrial sources called “source categories.” Each source category that emits radionuclides in significant quantities must meet technology requirements to control them and is required to meet specific regulatory limits. These standards are the National Emission Standards for Hazardous Air Pollutants for Radionuclides.

Preliminary Remediation Goals: Concentrations that correspond to certain levels of risk in air, soil, water, and biota for a given radionuclide or chemical. Preliminary remediation goals are screening level concentrations that would not likely result in adverse health impacts under reasonable maximum exposure conditions for long-term/chronic exposures.

Radioactive Materials: For the purpose of this document, radioactive materials include (1) sealed sources; (2) special form sealed sources; (3) contained (or unsealed) sources; and (4) dispersible material. Project personnel use these materials to produce radiation fields for detection and training during exercises.

Sagebrush Obligate: Species restricted to sagebrush habitats whether during the breeding season or year-round.

Sealed Radioactive Sources: These sources are small metal containers in which a specific amount of a radioactive material is sealed. Manufacturers of these devices must demonstrate protectiveness of human health and the environment to receive a license to manufacture and sell them.

Tiering: Section 1508.28 of the Council on Environmental Quality regulations defines tiering as “the coverage of general matters in broader environmental impact statements (such as national program or policy statements) with subsequent narrower statements or environmental analyses (such as regional or basin-wide program statements or ultimately site-specific statements) incorporating by reference the general discussions and concentrating solely on the issues specific to the statement subsequently prepared.” It also notes that tiering “is appropriate when it helps the lead agency to focus on the issues which are ripe for decision and exclude from consideration issues already decided or not yet ripe.”

Vadose Zone: The region of aeration above the water table, which extends from the top of the ground surface to the water table.

Environmental Assessment for Expanding Capabilities at the National Security Test Range and the Radiological Response Training Range at Idaho National Laboratory

1. INTRODUCTION

The National Environmental Policy Act of 1969 (NEPA) (42 USC § 4321 et. seq., 1970) requires federal agencies to consider the environmental consequences of proposed actions before decisions are made. To comply with NEPA, the U.S. Department of Energy (DOE) follows the Council on Environmental Quality (CEQ) regulations (40 Code of Federal Regulations [CFR] 1500-1508) and DOE's NEPA implementing procedures (10 CFR Part 1021, 2011). The purpose of an environmental assessment (EA) is to give federal decision makers evidence and analysis for determining whether to prepare an environmental impact statement or issue a finding of no significant impact (FONSI).

DOE manages the National Security Test Range (NSTR) on the Idaho National Laboratory (INL) Site. NSTR was designed and constructed to accommodate testing activities that analyze the effects of explosives and explosive devices, munitions, and similar items on security systems, facilities, vehicles, structures, and other materials. DOE evaluated the environment impacts from establishing and operating NSTR in the *Final Environmental Assessment for the National Security Test Range and FONSI* (DOE-ID 2007). The selected alternative (Alternative 1) consolidated INL security system testing activities at a central location about 1.5 miles west of Road T-25, 7.1 miles north of the Materials and Fuels Complex (MFC), and 10 miles south of Test Area North. The alternative also included constructing a 900-ft diameter test bed, earthen berm, a concrete test pad, new access road, and laydown and administrative areas. Equipment for monitoring and evaluating testing activities (such as buried data acquisition cables, protective camera boxes, and other such devices) was also installed.

Current activities at NSTR include explosives breaching and testing, non-nuclear weapons testing, vehicle-borne improvised explosive device research, barrier testing, delay analysis for vulnerability assessments, and ballistic testing. Testing includes using explosives and explosive-driven devices and firing explosive and non-explosive projectiles. Typical test assemblies include concrete blocks and walls, electronic sensors, metals, sandbags, and wood. NSTR encompasses about 12 acres at the INL Site. The location was selected because it is separated from any surrounding population or facilities that could be affected by blast or sound and access to the area can be effectively controlled.

DOE established the Radiological Response Test Range (RRTR) to develop and maintain an effective response capability for major radiological incidents. The *Final Idaho National Laboratory Radiological Response Training Range Environmental Assessment and FONSI* (DOE-ID, 2010) evaluated the environmental effects of establishing and operating RRTR. DOE implemented Alternative 1a and uses RRTR to train personnel, test sensors, and develop detection capabilities (both aerial and ground based) under a variety of scenarios in which radioactive materials are used to create a radioactive field for training in activities such as contamination control, site characterization, and field sample collection methods.

Typical training exercises at RRTR currently involve up to 75 people and 15 vehicles. Some exercises involve placing sealed radioactive sources, special form-sealed radioactive sources, and contained (or unsealed) radioactive sources in approved areas. Other exercises disperse radioactive materials (KBr) in a liquid sprayed on the ground, spread dry, or in the air through aerosol or small explosive dispersal. Trainees use specialized equipment to characterize the radiation fields or areas, obtain radiation readings, train with disablement tools, and collect samples in the test area. RRTR includes two training locations at the INL Site: (1) the North Training Range (NTR), including the Technical Support Facility, and (2) the South Training Range (STR). Figure 1 depicts the general location of the proposed action on the INL Site.

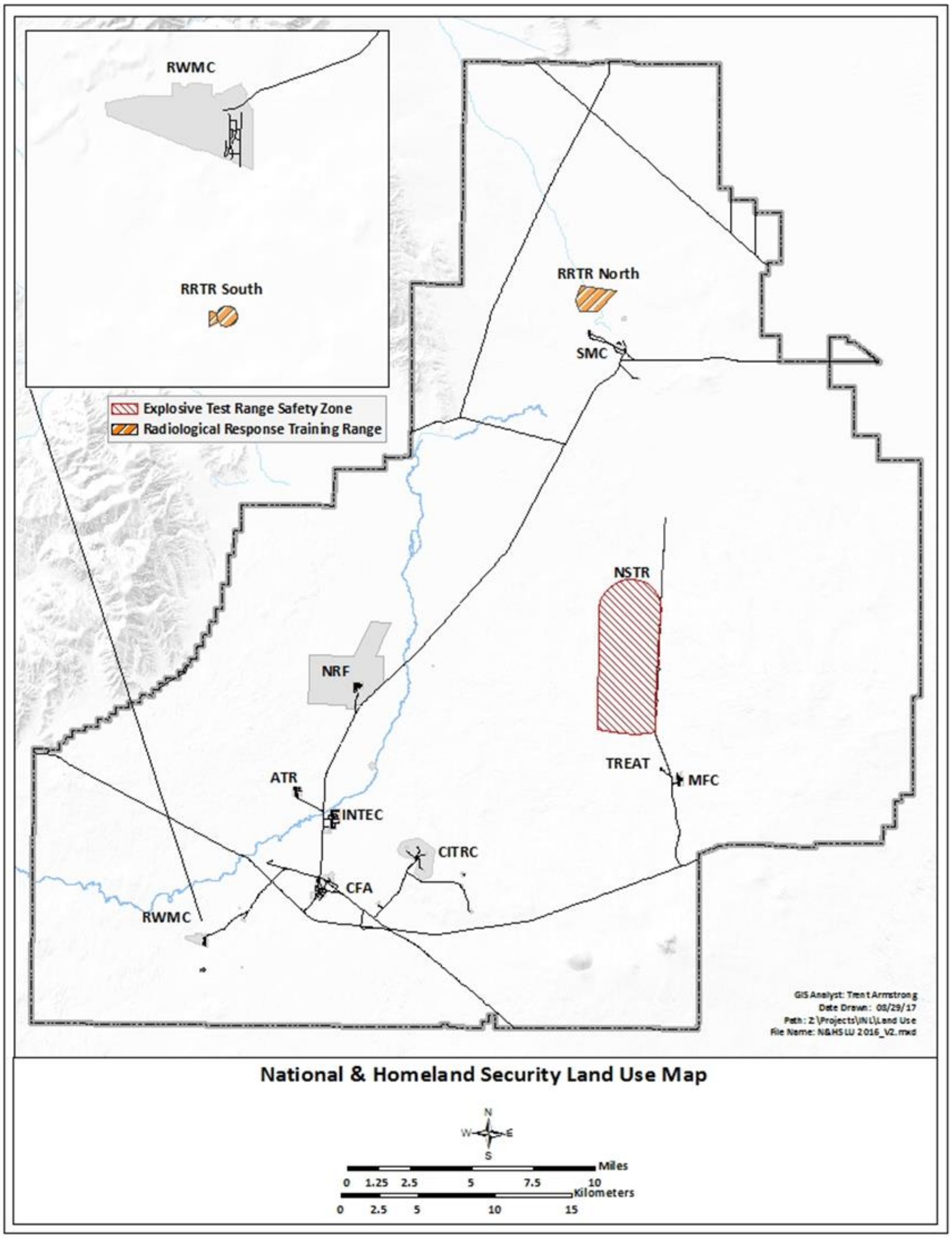

Figure 1. Locations of NSTR and RRTR at the INL Site.

Federal agencies, industry, and academic institutions use NSTR and RRTR (hereafter referred to as the Ranges) to research, develop, demonstrate, and deploy next generation technologies focused on enabling defense, intelligence, and public safety organizations to confront changing threats to military personnel, national and homeland security, and first responders. The Ranges support developing and deploying methods and training to enhance national security by offering capabilities for military, law enforcement, industry, and other partners to develop, test, deploy, and train end users in new technologies and systems.

Testing and training at the Ranges involves defining research questions and test objectives, developing test articles, setting up and calibrating test instruments, performing tests, analyzing results, and using the results to develop future test objectives. Operations require a systematic review of individual test activities. Both Ranges lack support infrastructure. Portable generators supply electricity and a modular classroom serves as a training facility. NSTR erected a tension fabric structure to store materials and offer shelter, but neither range has utility connections. The Ranges use portable sanitary facilities and bottled drinking water.

In this EA, DOE evaluates the following activities aimed at offering new and relevant capabilities to confront changing threats to military personnel, national and homeland security, and first responders:

1. Implementing operational changes such as increasing the frequency of using explosives at NSTR, expanding unmanned aerial vehicle (UAV) operations at both Ranges, using new radiological materials for response training at RRTR, and performing radiological response training at NSTR.
2. Increasing the size of training exercises up to about 200 people and numerous vehicles at the Ranges.
3. Constructing a new explosives test pad and access road, ballistic tunnel, and a downrange target area at NSTR.
4. Constructing an access road to NSTR around the Transient Reactor Test Facility (TREAT) exclusion area and a new power line from MFC to NSTR.
5. Fencing about 184 acres at RRTR's north and south training ranges.
6. Using various methods to spread radioactive materials for training exercises at NSTR and RRTR.
7. Constructing infrastructure (such as permanent buildings, water production and storage facilities, sanitary systems, an electrical substation and distribution system, and data collection and transmission equipment) at NSTR.

The goal of NEPA and this EA is to enable DOE decision-making based on an understanding of environmental consequences. This EA supplies DOE environmental information to (1) evaluate impacts to human health and the environment and (2) develop project controls to minimize or avoid adverse effects to human environmental integrity and natural ecosystems if DOE decides to expand infrastructure and testing and training capabilities at the Ranges (see Figure 2).

Figure 2. NSTR and RRTR.

1.1 Purpose and Need for Action

The isolated nature of the INL Site, its test bed infrastructure, and its applied-science focus make it a major center for national security technology development and demonstration. National and Homeland Security programs at the INL Site protect nuclear material from proliferation, advance the nation's military personnel, address secure communications channels for first responders, and improve the security and resilience of critical infrastructure.

The United States faces a complex array of threats to national security, including political, economic, military, and social systems. These threats continue to evolve as new and resurgent adversaries develop politically and militarily, as weapons and technology advance, and as environmental and demographic changes occur. In a 2018 report to congressional committees, the U.S. Government Accountability Office (GAO) analyzed more than 210 individual threats identified by organizations across the Department of Defense, State Department, Department of Homeland Security, the Office of the Director of National Intelligence; reviewed national security strategies and related documents; and interviewed key agency officials to identify specific threats and develop broad threat categories (GAO, 2018). The following list includes several evolving threats identified in the GAO report:

- Terrorism: Violent ideologies could influence additional individuals to turn to terrorism to achieve their goals across Africa, Asia, and the Middle East. Terrorists could advance their tactics, including building nuclear, biological, or chemical weapons.
- Emerging Technologies: Actors may gain access to emerging technologies (such as additive manufacturing [i.e., three-dimensional printing]) that may be used to manufacture restricted materials, such as weapons.
- Weapons of Mass Destruction: An increasing number of actors may gain access to these weapons. Adversaries could steal nuclear materials from existing facilities to develop weapons.

As new and evolving threats emerge and the nature of warfare changes, the United States and its allies need to develop responses faster than their adversaries; prevent adversaries from acquiring, proliferating, or using weapons of mass destruction; maximize the competitive advantage of the United States and its partners, while constraining the ability of adversaries to achieve their military objectives; and reduce the vulnerability of the United States to terrorism. The Ranges support a wide variety of full-scale and practical research, testing, and training opportunities to address these needs and understand and mitigate emerging challenges with capabilities for emergency or law enforcement response, in-theater conflicts, counterterrorism, and to prevent the proliferation of weapons of mass destruction.

As new and evolving threats are identified, the Ranges need to maintain relevant capabilities for developing solutions to rapidly changing national security and defense threats by (1) enabling research, development, demonstration, and deployment of technologies that provide the United States with a strategic advantage over potential adversaries and (2) supporting defense, intelligence, and public safety organizations in confronting changing threats to military personnel, national and homeland security, and first responders. The purpose of the proposed action is to expand Range capabilities to address new and emerging threats to national security and continue to provide federal agencies, industry, and academia partners with relevant test range assets for conducting national security research, development, demonstration, and deployment.

2. DESCRIPTION OF THE PROPOSED ACTION AND ALTERNATIVES

The CEQ regulations 40 CFR 1508.9(b) (2011) require that an EA include a brief discussion of alternatives to a proposed action. This section describes the proposed action and the no action alternative.

The DOE Idaho Operations Office (DOE-ID) considered action alternatives for meeting the need to offer new and relevant capabilities for confronting changing threats to national security. For the action alternatives to be feasible, they must accomplish the following:

- Enable flexible research and development efforts adaptable to evolving changes
- Enable increased testing and training frequency
- Develop new capabilities to collect and assess the origin of material in response to radiological incidents
- Develop new research and development capabilities for explosives and radiological testing and training
- Limit transporting explosive materials
- Maintain expertise in operations at a single existing, isolated government facility.

2.1 Proposed Action – Expand Capabilities at NSTR and RRTR

The proposed action expands capabilities at the Ranges by offering new infrastructure and implementing operational changes that enable ongoing DOE research and development of new technologies needed by military personnel, national and homeland security, and emergency responders. The proposed action constructs a new explosives test pad and access road, ballistic tunnel, support facilities, and a downrange target area at NSTR; constructs a new access road to NSTR around the TREAT exclusion area; installs a new power line from MFC to NSTR; fences about 184 acres at RRTR's NTR and STR; and authorizes various methods to spread multiple radioactive materials during testing and training exercises at the Ranges. These activities have the potential to impact about 460 acres on the INL Site.

Proposed construction activities and operational changes are summarized in Sections 2.1.1 and 2.1.2, respectively.

2.1.1 Construction Activities

Construction activities require clearing vegetation, grading to level work areas, hauling and placing fill material in cleared areas, establishing a new explosives test pad and a downrange target area, building roads, and installing fences. Equipment and vehicle types include pickup trucks, graders and dozers, bucket trucks, rubber-tired or track-mounted augers, cranes, off highway vehicles, and tractor trailers.

DOE requires vehicles used at the Ranges to be equipped with accessible fire tools (e.g., shovels or fire extinguishers). During operations and maintenance, DOE requires vegetation be mowed and maintained near infrastructure vulnerable to wildland fire. The INL Site's defensible space requirements apply to construction and operations and are as follows:

1. Maintain a 30 to 50-ft defensible area around all buildings, structures, and major support equipment
2. Maintain a 30-ft defensible area around parking lots, storage pads, designated buildings, designated perimeters, designated propane and fuel tanks, substations, and along-the-rail system within the INL Site.

Project controls also require revegetating disturbed areas and controlling weeds and invasive species. In addition, the proposed action curtails range operations involving tracer rounds or other fire hazards from May 1st to the end of the fire season unless authorized by the INL Site Fire Marshal.

2.1.1.1 Construction at NSTR. The proposed action constructs the following new infrastructure at NSTR:

- Access road around the TREAT exclusion area
- Ballistic tunnel
- Downrange target area
- 900-ft diameter explosives test pad with command center and access road
- Power line from MFC to NSTR
- 500-ft radiological testing pad
- Support structures
- Utilities.

Initial TREAT operations established an 833-yard radius exclusion zone during reactor operations; the exclusion zone included part of the T-25 road from MFC to NSTR; this section of the road, and subsequently NSTR, would have been inaccessible during TREAT operations. Current TREAT operations require a smaller exclusion zone that does not include the T-25 road, but future operations could increase the exclusion zone to again include this segment of the T-25 road.

The proposed action upgrades about 1 mile of a two-track road from MFC to the T-25 road outside the original TREAT exclusion zone from a Priority 3 road (maintained as passable, but grading not permitted) to a Priority 2 road (maintained as passable and occasionally graveled and spot graded) to allow uninterrupted access to NSTR in case the TREAT exclusion zone is increased. Assuming a road width of 14 ft, 1 mile of new road disturbs about 2 acres.

There are two laydown areas at NSTR. The proposed action constructs an enclosed ballistic tunnel, about 13 ft × 197 ft in size, at the second laydown area for testing projectiles up to 30 mm (1.18 in.) in size. The specific location of the ballistic tunnel at the second laydown area has not been determined, but it will be within the current disturbed area. The ballistic tunnel includes an earthen berm at the end of the tunnel to collect the fired projectiles.

The proposed action also constructs a down range target area measuring about 3,300 yd × 66 yd with targets located at 100, 200, 300, 400, 500, 750, 1,000, 1,610, 2,260, 2,760, and 3,300 yd from the firing point. The downrange target area includes the following features:

- A 500-ft diameter radiological training pad at the southernmost target
- An 80 ft × 80 ft storage area between the 2,760 and 3,300-yd target areas to support radiological response training activities at the radiological training pad
- A Priority 2 gravel road constructed from the observation point through each target area
- A 150 ft × 150 ft command area at the 2,760-yd target area
- Berms and barriers, concrete pads, rail tracks, Conex containers, and other equipment within the disturbed area at each target area as needed
- Vegetation removed from the first 300 yd downrange.

Constructing the downrange target area and the 500-ft diameter radiological training pad disturbs about 50 acres. Other components of the target area (i.e., storage area, road, and command area) fit within the 66-yd width of the downrange target area. The proposed action also establishes an area around the downrange target area, which covers about 863 acres, known as the downrange area. Projectiles fired at the downrange target area have a 1:10,000 probability of impacting outside the downrange area. Section 4 2.1.2.1 describes the decision process to verify projectiles impact within the down range area.

The proposed 900-ft diameter explosives test pad to the north and east of the current explosives test pad requires a new Priority 2 access road from the observation point to the new test pad (estimated to be about 1 mile long), and the proposed action establishes a graveled 150 ft × 150 ft command area along the new access road about 400 yd south of the new explosives test pad and a temporary static firing point on the new access road to allow firing long-range ammunition at the downrange target area. The new explosives test pad, access road, command area, and firing point have the potential to disturb about 16 acres at NSTR.

To meet explosives safety and range safety criteria for the new explosives test pad, the NSTR administrative boundary needs to be moved north (about 450 yd) and west. Moving the boundary involves surveying the area to avoid cultural resources during sign placement then driving the perimeter and placing warning signs in the ground to mark the border. Routine maintenance of the boundary signs will result in a primitive, unmaintained perimeter road. The administrative boundary perimeter is about 90,660 ft in length and about 28,640 ft of the perimeter parallel to the T-25 road. Assuming a vehicle width of 14 ft and driving the 62,026 ft of perimeter not accessible from the T-25 road, boundary marking potentially disturbs 20 acres.

The proposed action authorizes construction of new support facilities (e.g., trailer units and permanent facilities [less than 15,000 ft^2 total per facility]) to house offices, classrooms, conference rooms, kitchens, restrooms and locker rooms, laboratories, machine shops, and high bays. DOE anticipates construction taking place over several years, as range activity increases, and funding becomes available. The proposed action expands laydown areas by about 12 acres (about 55 yd out from the edge of the current disturbed area) and constructs new support facilities in the laydown areas and collocates utility lines (e.g., power, water, and sanitary systems) along roads and other disturbed areas to the extent practicable. Placing new facilities in expanded laydown areas limits the size and quantity of new facilities. New support facilities include permanent foundation-based buildings and portable and mobile trailer-based units. A water well, storage tanks, and well houses would also be installed at one or both current laydown locations. Wastewater would be discharged to a septic system in one or both laydown areas.

New water wells, well houses, and storage tanks supply a non-transient, non-community potable water system for drinking water, fire suppression systems, and sanitary facilities. Sanitary systems (e.g., septic systems) manage wastewater associated with new infrastructure. New support facilities are limited to the expanded laydown areas. Figure 3 shows the laydown areas and areas surveyed for proposed expansion.

The MFC substation supplies electrical power to new infrastructure at NSTR via a new 13.8-kilovolt (kV) line. The proposed 13.8-kV power line runs about 7 miles parallel to the existing 138-kV line that runs from the MFC substation to NSTR with an off-set between the power lines of about 50 ft. Prior to construction, crews stake and flag the power line corridor (measuring about 100 ft out from each side of center) and mark each structure location. The T-25 road gives access to most new pole locations. Power line construction requires driving from pole to pole to install the new poles and lines. In areas where accessing new pole locations cannot be accomplished by driving a straight line from the previous location, crews access the next location by returning to the T-25 road.

Off-road vehicle access along the 7-mile route disturbs about 170 acres of land (200 ft wide or 100 ft each side of center line) on the INL Site (7 miles = 36,960 ft x 200 ft wide = 7,392,000 ft^2 = 169.7 acres). Because the route follows the established 138-kV power line with about 50-ft offset, an area about 200 ft around each pole will be permanently disturbed for pole installation and future maintenance. The remaining area between poles is considered temporary disturbance and will be revegetated.

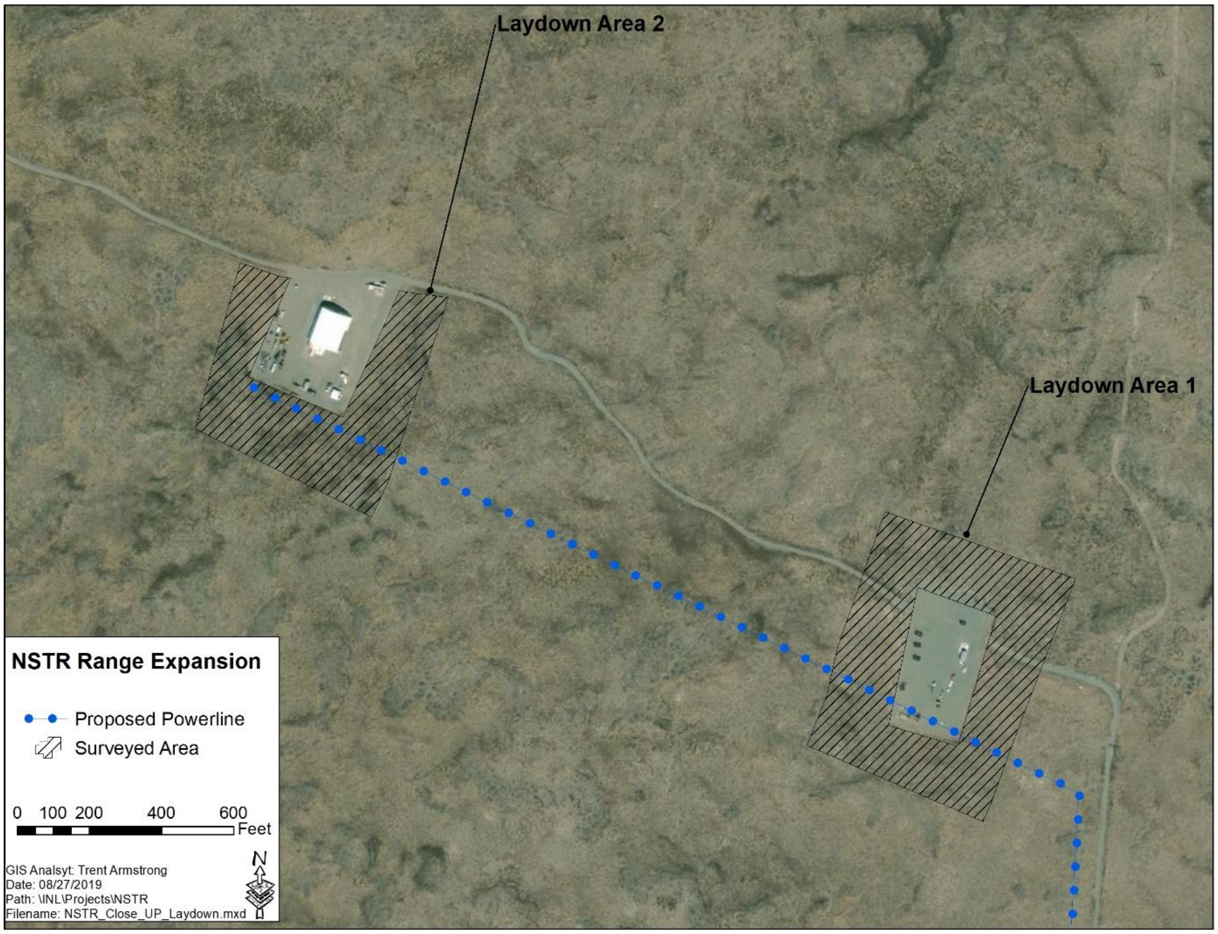

Figure 3. NSTR laydown areas and areas surveyed for proposed expansion.

Installing the power line requires about two to three distinct pull and reel sites to aid stringing the conductor. Power line construction generally requires pull and tension sites every 1 to 4 miles. The size of a pull and tension site varies, but 800 ft by 100 ft is typical. The proposed action locates pull and tension and reel sites within already disturbed areas when possible. However, pulling and reeling stations have the potential to disturb about 6 acres if all are in undisturbed areas.

Figure 4 depicts the combined construction modifications at NSTR included in the proposed action.

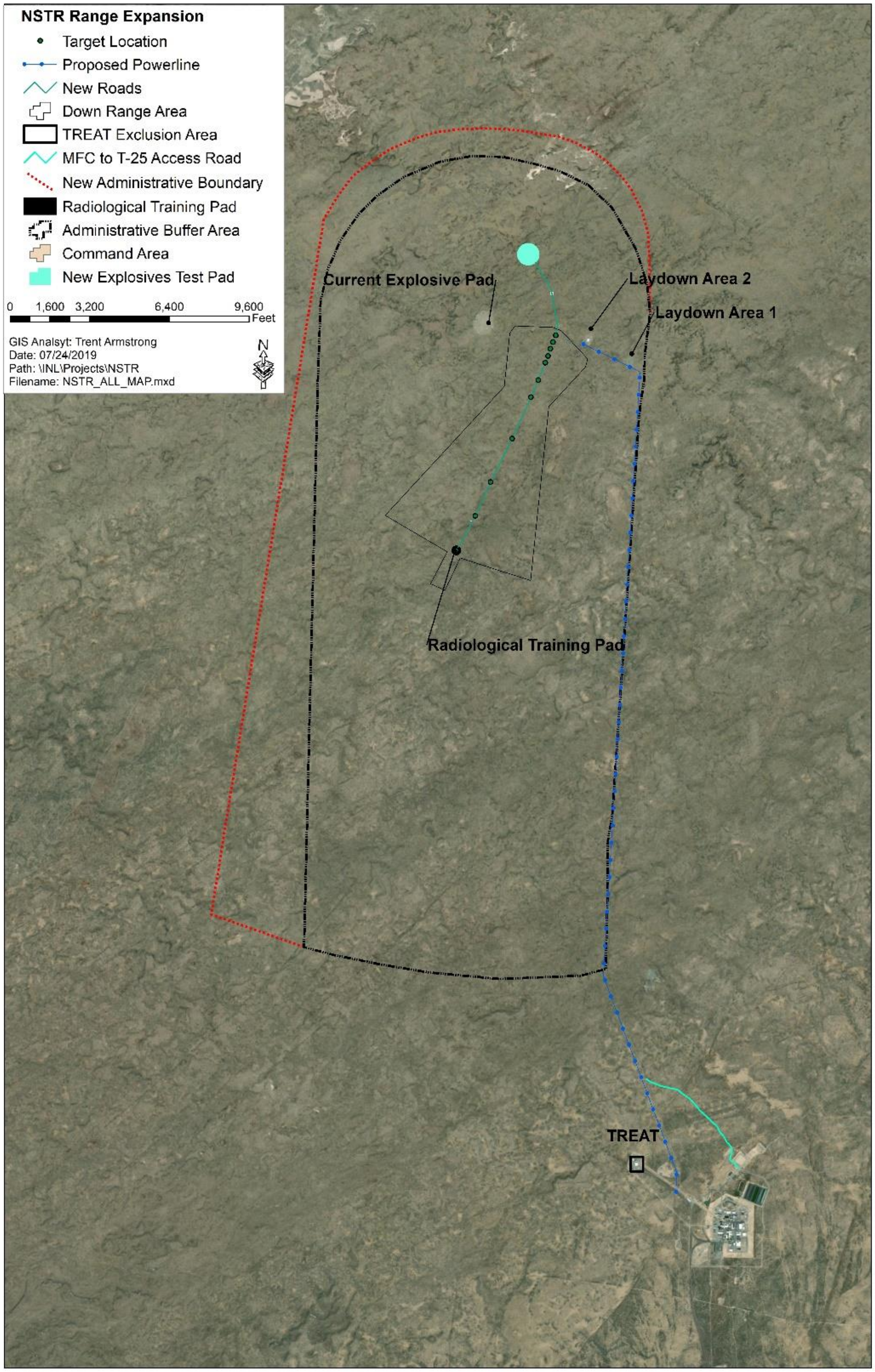

Figure 4. Proposed changes to NSTR in the proposed action.

2.1.1.2 Construction at RRTR. The proposed action modifies the RRTR ranges to support proposed operational changes. RRTR utilizes two locations for radiological response training: (1) NTR, located in the area around the T-28 gravel pit north of the Specific Manufacturing Capability (SMC), and (2) STR south of the Radioactive Waste Management Complex (RWMC). Figure 5 shows the current configuration of the two RRTR locations.

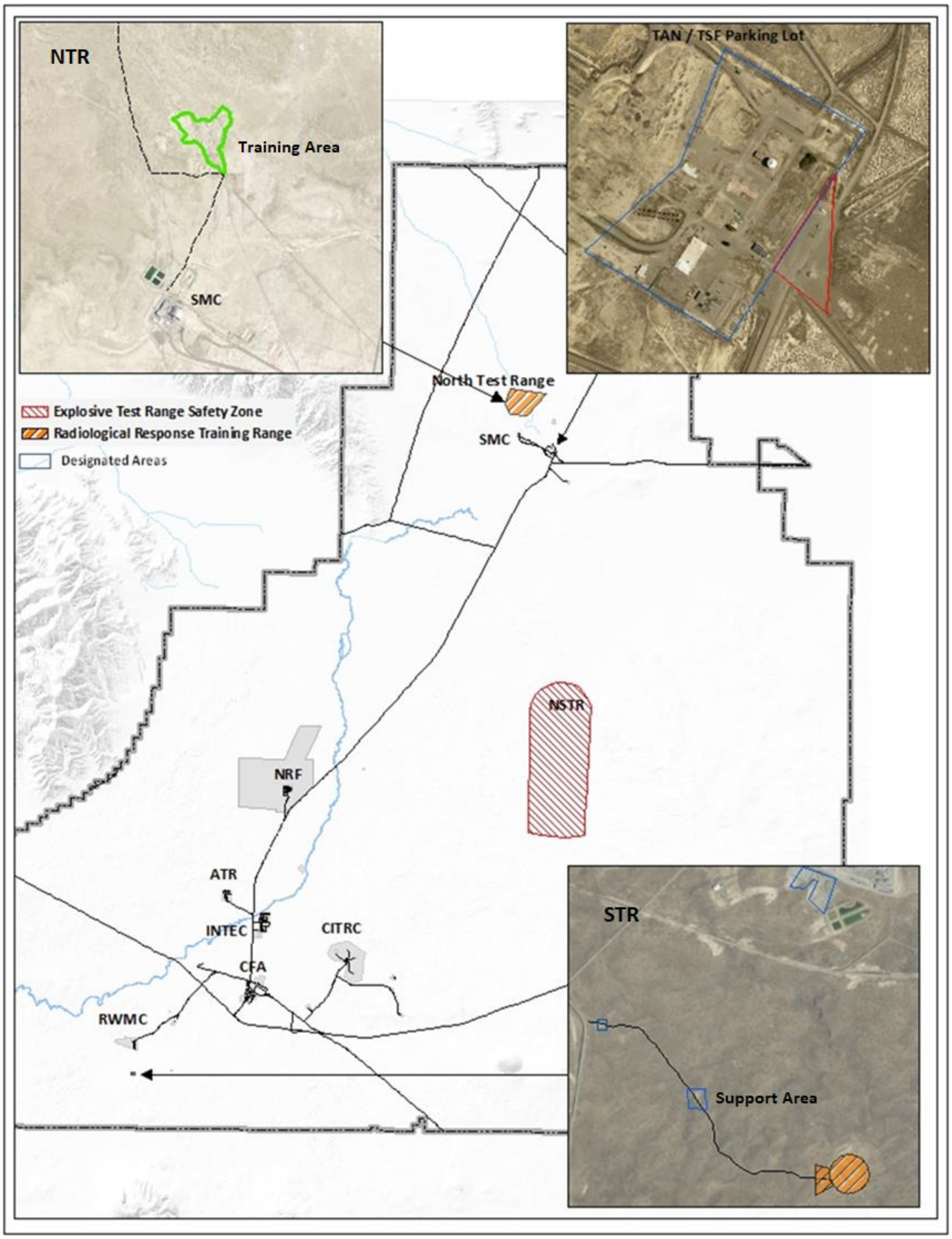

Figure 5. RRTR range configurations.

The proposed action installs a 6 to 8-ft tall chain link fence around the RRTR NTR and STR to control access to training areas. The fence encloses about 184 acres (i.e., about 92 acres at each RRTR range). At NTR, the proposed fence matches the current southern boundary fence and a portion of the new fence road on the west side will connect the T-53 road with the T-28 road to allow access around NTR when access restrictions are necessary. While not all the fenced area will be disturbed, it is counted as such because the area no longer functions as habitat. Figures 6 and 7 show the approximate locations for the proposed fences at NTR and STR.

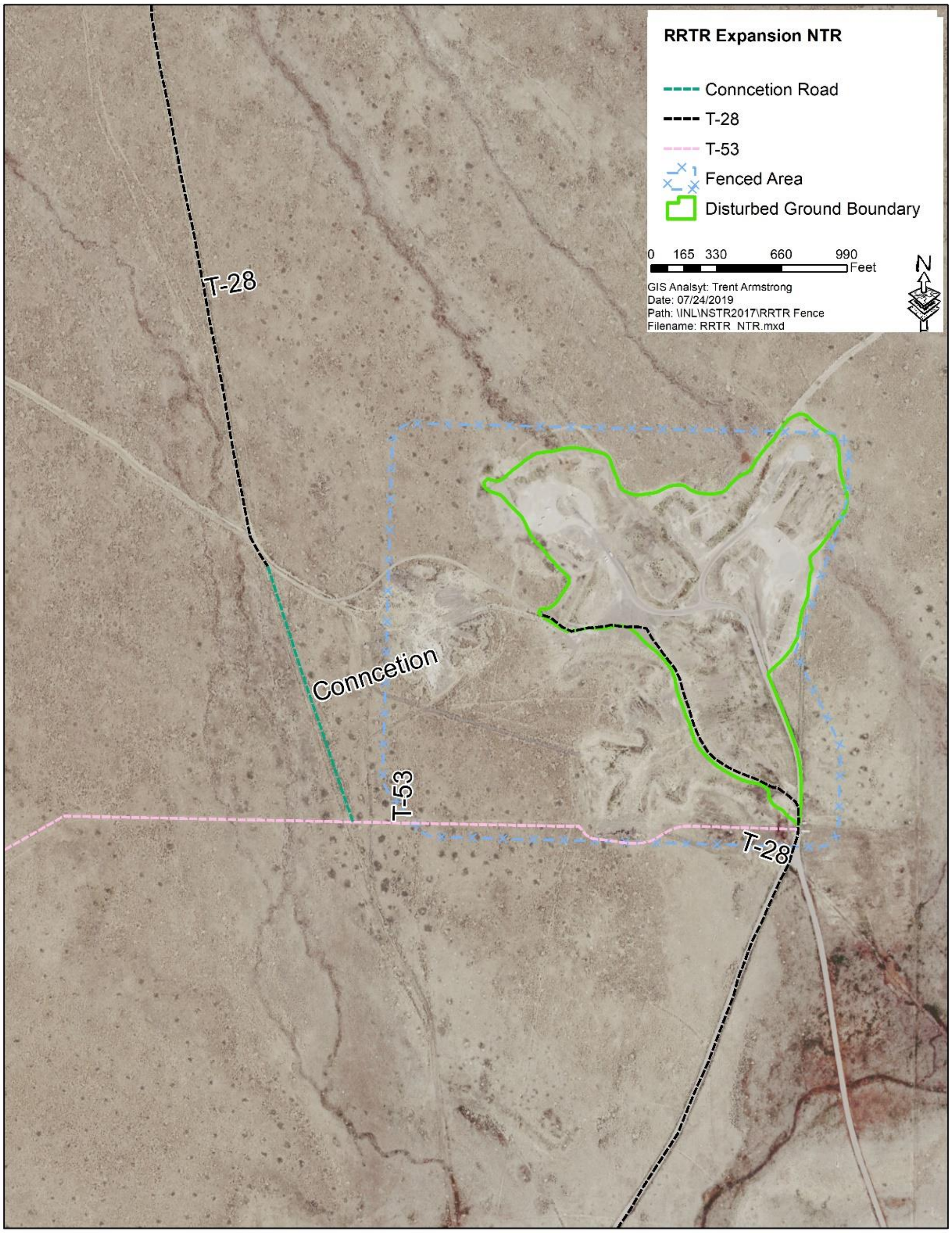

Figure 6. Proposed locations of the NTR fence.

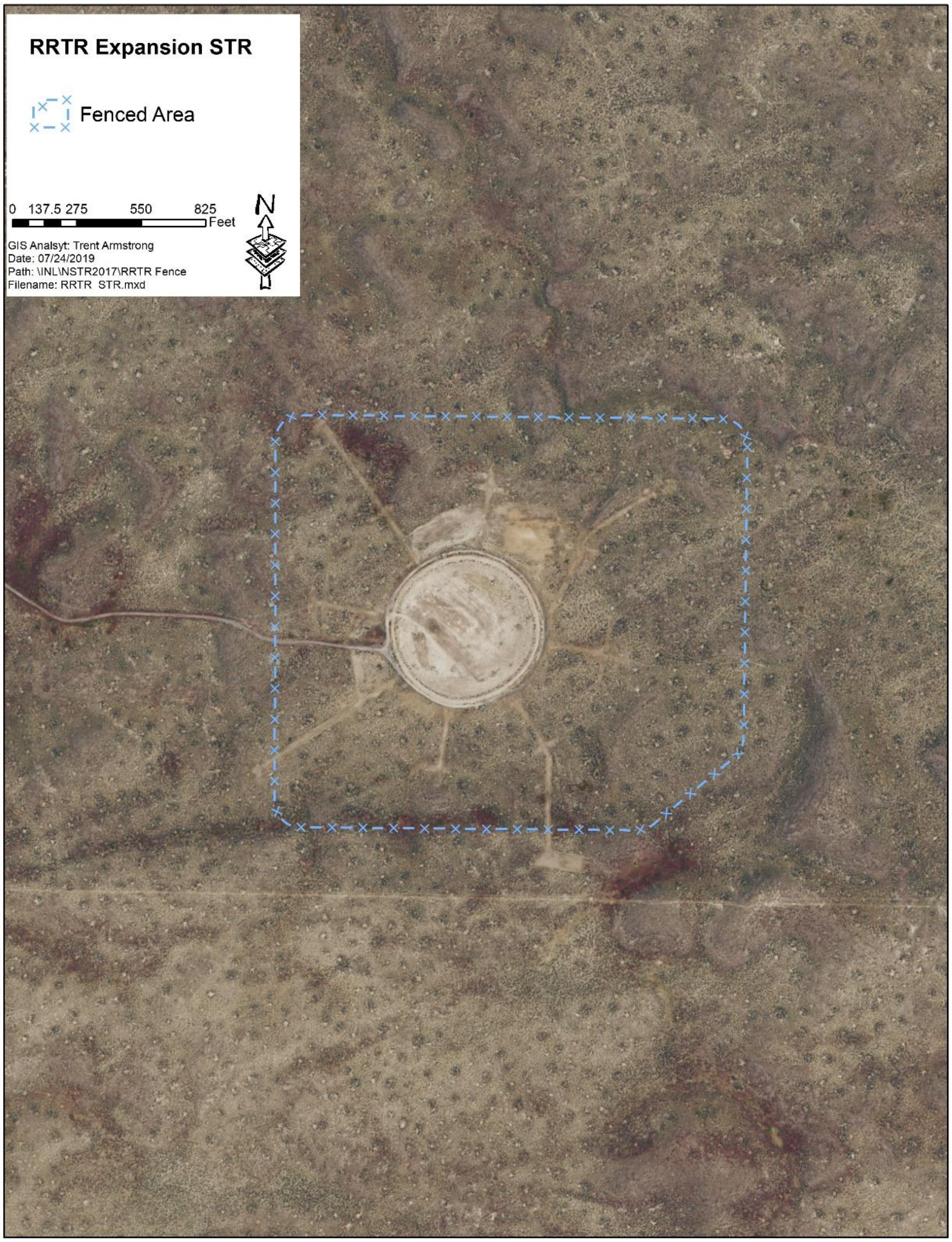

Figure 7. Proposed locations of the STR fence.

2.1.1.3 Construction Cleanup. The proposed action restores temporarily disturbed areas (i.e., not used for proposed operations and infrastructure maintenance) to near preconstruction conditions following construction. Restoration includes grading and restoring sites to original contours and active revegetation using native seed. In addition, the project removes construction materials and debris and recycles or disposes of the materials as appropriate.

2.1.1.4 Permanent Land Use. The proposed action has the potential to disturb about 460 acres at the INL Site. Table 1 summarizes the acres of potential disturbance from completing proposed construction activities.

Table 1. Summary of potential surface disturbance from construction.

Area of Disturbance	Size (acres)
Access road around TREAT	2
Administrative boundary signs installation and maintenance	20
Ballistic tunnel[a]	NA
Downrange target area	45
New 900-ft diameter explosives test pad and access road	16
Power line installation and maintenance	170
500-ft diameter radiological training pad	5
Support facilities and utilities[a]	12
RRTR fences[b]	184
TOTAL	**454**

a. Activity is within previously disturbed areas.
b. Entire area is not disturbed but is no longer considered habitat.

2.1.2 Operational Activities

The proposed action implements radiological and non-radiological operational changes at the Ranges. The proposed action authorizes radiological response training and testing at NSTR and using additional radiological materials not currently authorized for use at RRTR during radiological response training and testing at both NSTR and RRTR. Operational changes also include increasing the frequency of explosives use at NSTR and expanded UAV operations at both Ranges (including using UAVs to detect radiation and chemicals but not for dispersing radionuclides).

Training exercises increase the number of participants from about 75 up to about 200 people and numerous vehicles at the Ranges. Operations include defining research questions and test objectives, developing test articles, setting up and calibrating test instruments, performing tests, analyzing results, and using the results to develop future test objectives. Operations require a systematic review of individual test activities. Testing and training include using explosives and explosive-driven devices, firing explosive and non-explosive projectiles, and using radioactive materials. Typical test assemblies include concrete blocks and walls, electronic sensors, metals, sandbags, wood, silica glass, and foam.

During seasons having high wildland fire potential, DOE requires a fire tender be present during activities having the potential to start wildland fires (e.g., driving vehicles off road or performance of certain test activities). In addition, UAVs carrying explosives or flammable materials are controlled to prevent them from leaving test pad locations (e.g., tethered).

2.1.2.1 Non-Radiological Operations. Non-radiological explosives and ballistic testing only takes place at NSTR and is not proposed at the RRTR ranges (NTR and STR). The proposed action uses a variety of non-radiological explosive materials at NSTR (see Table 2). Typical non-radiological test articles include chain link fencing, concrete barriers, electronic sensors (e.g., high-speed video and photography and pressure sensors), vehicles (drained of all fluids and batteries and mercury switches removed), reinforced concrete walls, armor plates, masonry walls, and customer-provided test articles.

Non-radiological testing involves firing non-explosive projectiles into different test media to understand the penetration resistance or projectile testing.

DOE performs explosive operations per DOE-STD-1212-2012, Explosives Safety (DOE, 2012). This technical standard applies to DOE facilities engaged in developing, manufacturing, handling, storing, transporting, processing, or testing explosives, pyrotechnics, and propellants or assemblies containing these materials and to safely managing such operations. Department of the Army Pamphlet 385-63 (Range Safety, 2014) was referenced for operations not discussed in DOE documents. The proposed action uses other Department of Defense documents and processes if appropriate for testing purposes as identified in TEV-3572 (INL, 2018).

Table 2. List of explosives used at NSTR.

- Research Department Explosives (RDX)
  - Bulk RDX
  - Plastic Explosives, Composition C-4, or PE-4
  - Demx
  - Shaped Charges
  - Linear-Shaped Charges
  - Flexible Linear-Shaped Charges
  - Explosive Cutting Tape
  - SX-2 Primasheet 2000 Sheet Explosives
  - Plastic-Bonded Explosives
- Pentaerythritol Tetranitrate (PETN) Explosives
  - Bulk PETN
  - Detonation cord
  - Sheet Explosives, DetaSheet, SX-1, Metabel, Primasheet
  - Boosters, DetaPrime
- Trinitrotoluene (TNT) Explosives
  - Bulk TNT
  - Cast Boosters
- Ammonium Nitrate (AN) Explosives
  - AN and Fuel Oil
  - AN Slurries
  - AN Gels
- High-Melting Explosives (HMX)
  - Bulk HMX
- Smokeless Powder
- Black Powder Devices
  - Bulk Black Powder
  - Time Fuse, Safety Fuse
  - Diversionary Devices, Flashbangs
- Nitroglycerine Explosives
- *Dynamite*
  - Straight
  - Ammonia
- *Detonators*
  - Electric
  - Non-Electric
  - Exploding Bridge Wire
- *Binary Mixtures*
  - Binex 400
  - AN-NM
  - NM-Al
  - AN-Al
  - HMX-GAP
  - Al-IPN
- Mixed Explosives
  - Semtex (50% RDX, 50% PETN)
  - Composition B, Shaped Charges, ads (40% TNT, 60 % RDX)
  - Octal, Shaped Charges, Warheads (TNT 30 %, HMX 70%)
  - Pentolite (TNT 50%, PETN 50%)
  - Dexs (PETN 10%, AN 35%)
  - Baratol, Warheads (TNT 80%, Barium nitrate 20%)
  - Explosive D, Warhead
- Tetryol (TNT 30%, Tetryl 70%)

DOE limits explosives testing at NSTR to 20,000 lb net explosives weight (NEW). Table 3 compares proposed uses of explosives to current explosives use.

Table 3. Proposed changes to explosives use at NSTR.

Proposed Explosives Operations Changes	Current Explosives Use
No change	Large explosive events (11,000 to 20,000 lb NEW) once every 5 years
Large projectiles (greater than 30 to 120 mm) about 24 times a year	Large projectiles (greater than 30 to 120 mm) three or four times per year
Mid-test range events (3,000 to 11,000 lb NEW) about 5 times per year	Mid-range explosives test events (3,000 to 11,000 lb NEW) once or twice per year
Explosive dispersal of radionuclides[a]	Not addressed
Rocket-propelled grenades and other live warheads (e.g., 40-mm grenades and mortars up to about 30 lb NEW) may be fired about 24 times per year	Not addressed

Proposed Explosives Operations Changes	Current Explosives Use
Deliver explosives and other materials to ground-based targets using controlled UAVs	Not addressed
Small events (100 to 3,000 lb NEW) about 5 to 8 times per month	Small explosive events (100 to 3,000 lb NEW) about once per month
Small-scale projectiles (30 mm or less) about 10 times per month	Small-scale projectiles (30 mm or less) bi-weekly
Very small events (less than 100 lb NEW) daily	Very small events (less than 100 lb NEW) weekly
a. Explosive radiological dispersals use up to 1 lb NEW TNT equivalent at RRTR and 5 lb at NSTR and are discussed in Section 2.1.2.2.	

The proposed action authorizes shooting incendiary, explosive, and non-explosive projectiles at the NSTR downrange target area. The use of weapons systems to destroy or severely damage a specific target is known, in general, as "fires." "Fires" can be broken down into two subcategories: "direct fire," where the weapon system can physically see and aim directly at the target, and "indirect fire," where the weapon system cannot physically see the target and thus aims instead at a specific target location that has been provided to the weapon system. The "aiming method" is the principal difference between these two types of fires, but usually means the target is closer to the weapon system for direct fire than for indirect fire. Once the weapon has been fired, there is no difference between the two methods at the point of impact. The proposed action uses both firing methods.

The targets used for ground-to-ground fires include both stationary and mobile targets.

For air-to-ground scenarios, proposed non-radiological operations use UAVs capable of delivering explosive or flammable material to ground-based targets on disturbed areas. These activities require using methods that prevent UAVs carrying explosive or flammable materials from escaping operator control. UAVs will be tethered when carrying explosives.

Weapons systems use various munitions that are categorized by size and type. Small arms include .50-caliber munitions and smaller. Large arms include munitions larger than .50 caliber.

To maximize the capabilities at NSTR, the proposed action allows firing weapons having a 1:10,000 probability of impact outside the downrange area boundary (see Figure 4). The proposed action includes shooting incendiary, explosive, and non-explosive projectiles at the NSTR downrange target area (3,300 by 66 yd). A review process is required to determine if projectiles greater than 30 mm and less than or equal to 120 mm will remain within the downrange area under all firing conditions.

The review process for firing large projectiles (greater than 30 to 120 mm) at the downrange target area verifies projectiles remain within the downrange area. TEV-3572 (INL, 2018), "Process to Determine if Projectiles, > 30 mm and ≤120 mm, can be Fired at the NSTR Downrange Target Area," details the methodology for reviewing projectile use under various conditions. Firing activities use administrative and engineering controls, as necessary, to meet this requirement. If modeling and analysis shows the projectile impacts areas outside the downrange area, including with use of administrative and engineering controls, firing the projectile is prohibited. Figure 8 portrays the decision process used to evaluate projectile use at NSTR.

After determining a projectile meets criterion for firing at the downrange target area (including range safety requirements, target requirements, and engineering and administrative controls), the proposed action implements an additional decision process after firing each round as shown in Figure 9.

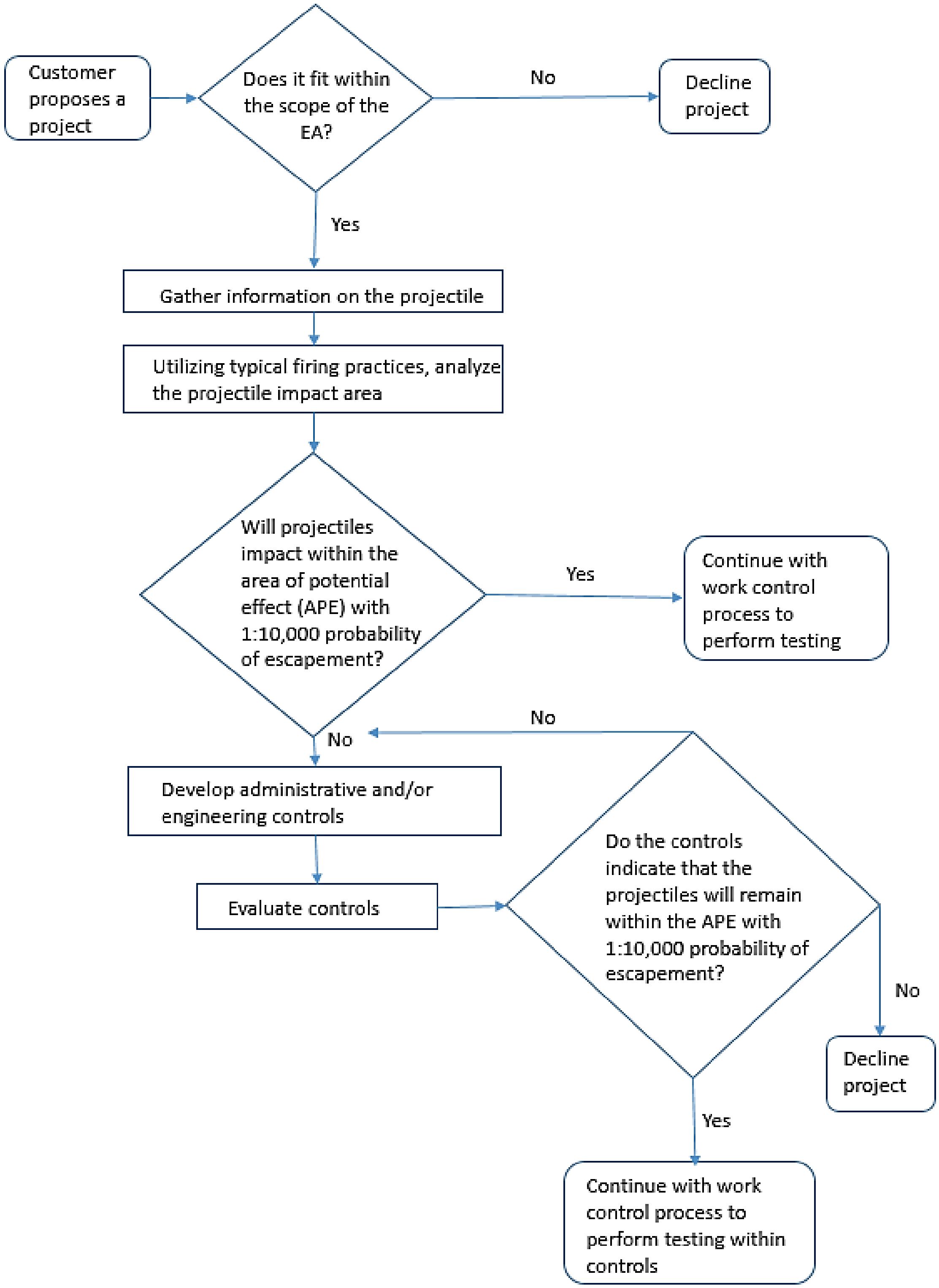

Figure 8. Projectile use decision process.

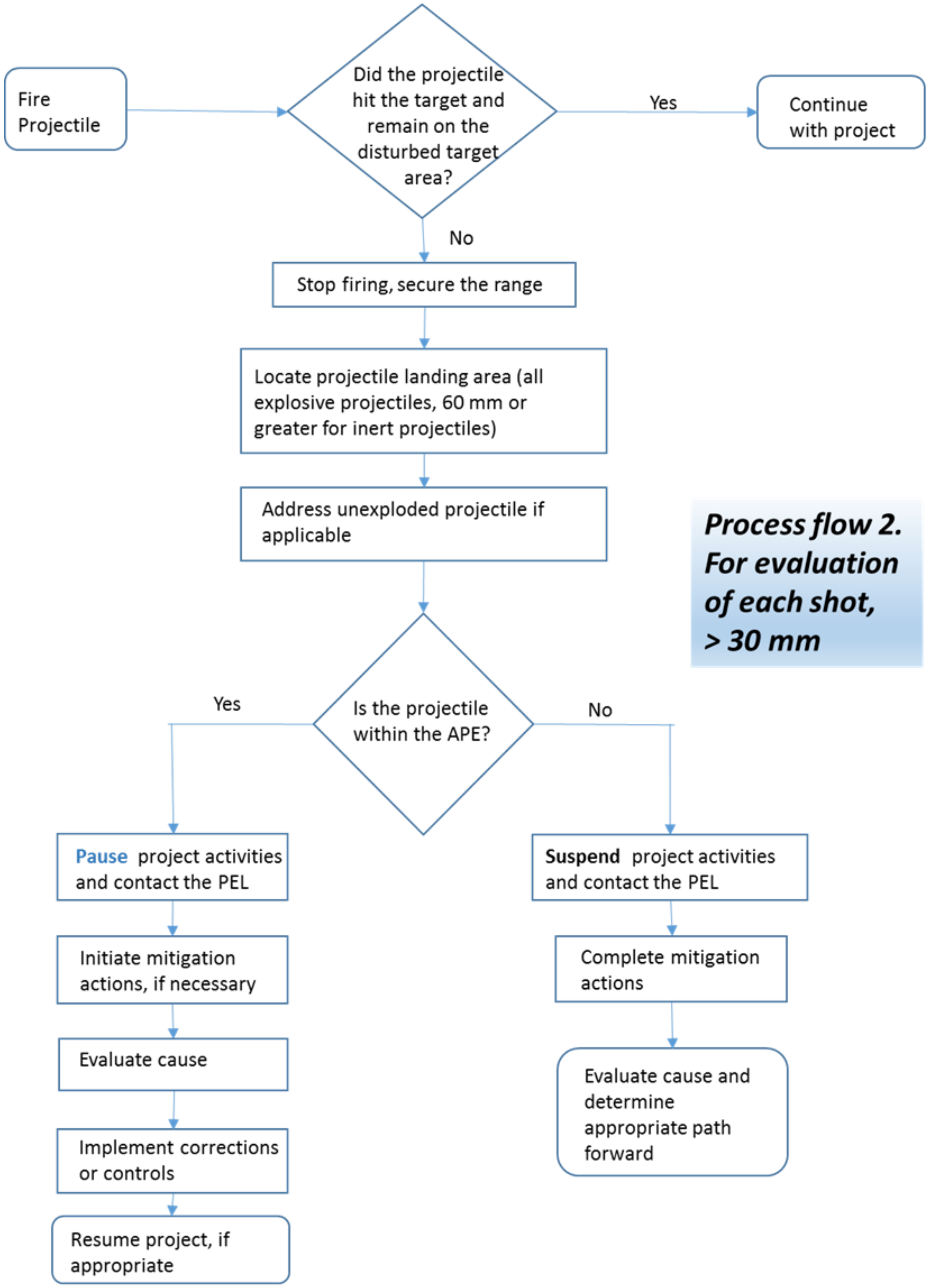

Figure 9. Second process flow for the projectile use decision process.

2.1.2.2 Radiological Training and Testing. Radiological training and testing under various scenarios use (1) dispersed radioactive material, (2) contained (unsealed) radioactive sources, (3) sealed radioactive sources, and (4) special form sealed radioactive sources. Radiological materials are packaged and transported to the training area and placed or dispersed according to approved plans. Testing and training may also include contamination control and decontamination operations, evaluating command

and control protocols, collecting samples, and site characterization using vehicles, aerial surveys, and remote radiation measurements. Training equipment includes, but is not limited to, generators, cargo containers, vehicles, and command tents. After each exercise, range personnel remove and store test materials. Training can last several days.

Radiological response training and testing uses the new explosives test pad and the radiological training pad at NSTR (see Figure 4). At both Ranges, proposed radiological response training and testing uses mechanical spreaders or sprayers and limited quantities of explosives to spread radioactive materials on the ground. The proposed action authorizes using multiple radioactive materials (e.g., Cu-64, F-18, K_2O, KBr, $LaBr_3$, and Zr-97) during any single training event. Explosive radiological dispersals use up to 1 lb NEW TNT equivalent at RRTR and 5 lb at NSTR. The proposed action limits explosive detonations to the disturbed areas of the explosive test pad and radiological training pad at NSTR and to disturbed areas of RRTR. Spreading radioactive materials with mechanical spreaders or sprayers is also limited to these areas. Using explosives to spread radioactive materials releases radionuclide air emissions that can be carried by air currents beyond the boundary of the test pads, the Ranges, and the INL Site. The proposed action does not include mechanical dispersals outside these disturbed areas for testing and training, but foot traffic outside of disturbed areas may occur.

Radiological dispersion device (RDD) training relies on a majority of explosively dispersed radionuclides being dispersed on the ground at or near the detonation site. Small amounts of materials have the potential to disperse outside the detonation site. As the distance from the detonation site increases, the activity of the dispersed material decreases. Boundaries (e.g., ropes, signs, and barricades) are then installed to control access to these areas until the activity returns to normal (i.e., background) levels.

Some training exercises use contained (or unsealed) radioactive sources, sealed radioactive sources, and special form sealed radioactive sources, which are removed from the training location each day. Other exercises spread radioactive material (e.g., Cu-64, F-18, K_2O, KBr, $LaBr_3$, and Zr-97) on the ground. Trainees characterize radiation fields, collect radiation readings and samples, and disable mock devices using specialized equipment. Measuring samples occurs in the field, using hand-held instruments, and in mobile laboratories. Locked and shielded containers store samples. Radiological training uses non-toxic shielding (i.e., tungsten or bismuth) instead of lead when possible.

The term "ground dispersal of radioactive materials" means using mechanical spreaders or sprayers and limited quantities of explosives to spread radioactive materials on the ground for training and testing events. Dispersed radioactive materials contain radionuclides (i.e., unstable atoms of an element that decay and emit energy in the form of radiation). Radionuclides have unique half-lives. A half-life is the length of time it takes for half of the radioactive atoms of a specific radionuclide to decay; radioactive half-lives range from milliseconds to millions of years. Longer half-lives equate to longer persistence in the environment.

Table 4 lists the isotopes produced from irradiating K_2O, KBr, $LaBr_3$, Cu and Zr metals, and F for the proposed source term. The table also includes the half-life for each isotope, the estimated radioactivity released in a single test, and the proposed total annual release. DOE will evaluate using other radionuclides on an individual basis using the as low as reasonably achievable (ALARA) process and limit the dose to the public at each test location to less than 0.1 mrem/year.

Table 4. Potential source term per test and total annual releases.

Radionuclide	Half-Life	Release per Test (Ci)	Total Annual Release[a] (Ci)
Material: Potassium Oxide (K_2O)			
Be-10	1.51E+06 year	2.87E-20	3.44E-19
C-14	5.7E+03 year	2.13E-09	2.56E-08
Cl-36	3.01E+05 year	6.78E-08	8.14E-07

Radionuclide	Half-Life	Release per Test (Ci)	Total Annual Release[a] (Ci)
Ar-39	269 year	1.43E-04	1.72E-03
Ar-41	1.83 hour	2.17E-09	2.61E-08
Ar-42	32.9 year	2.15E-15	2.58E-14
K-40	1.25E+09 year	3.43E-06	4.11E-05
K-42	12.4 hour	7.00E+00	8.40E+01
Material: Lanthanum Bromide ($LaBr_3$)			
As-76	1.09 d	1.22E-06	1.46E-05
Se-79	3.26E+05 year	1.45E-11	1.74E-10
Se-81m	57.3 m	1.48E-24	1.77E-23
Br-80	17.68 m	1.71E-03	2.06E-02
Br-80m	4.42 hour	1.60E-03	1.92E-02
Br-82	35.3 hour	4.88E-01	5.86E+00
Kr-79	35.0 hour	1.68E-12	2.02E-11
Kr-81	2.29E+05 year	5.00E-15	6.00E-14
Kr-83m	1.83 hour	7.19E-16	8.63E-15
Cs-135	2.3E+06 year	2.71E-19	3.25E-18
Cs-136	13.04 d	3.59E-09	4.30E-08
Cs-137	30.08 year	1.85E-19	2.22E-18
Ba-136m	0.308 s	5.91E-10	7.09E-09
Ba-139	83.06 m	3.73E-17	4.47E-16
Ba-140	12.75 d	4.19E-17	5.03E-16
La-137	6.00E+04 year	1.15E-14	1.38E-13
La-138	1.02E+11 year	9.48E-11	1.14E-09
La-140	1.679 d	5.08E-01	6.10E+00
La-141	3.92 hour	1.89E-10	2.27E-09
Ce-139	137.6 d	4.44E-26	5.33E-25
Ce-141	32.51 d	4.83E-09	5.80E-08
Material: Potassium Bromide (KBr)			
Cl-36	3.01E+05 year	7.73E-10	9.27E-09
Ar-39	269 year	1.63E-06	1.95E-05
Ar-41	1.83 hour	2.48E-11	2.97E-10
Ar-42	32.9 year	2.44E-17	2.93E-16
K-40	1.25E+09 year	3.90E-08	4.69E-07
K-42	12.4 hour	7.98E-02	9.57E-01
Ni-63	101.2 year	2.06E-14	2.47E-13
Ni-65	2.52 hour	4.16E-16	5.00E-15
Cu-64	12.7 hour	3.97E-09	4.76E-08
Cu-67	61.83 hour	1.57E-11	1.89E-10
Zn-65	243.9 d	1.22E-08	1.46E-07
Zn-69	56.4 m	1.38E-20	1.66E-19
Ga-72	14.1 hour	1.08E-21	1.30E-20
As-76	1.09 d	1.22E-05	1.46E-04
Se-79	3.26E+05 year	1.45E-10	1.74E-09
Se-81m	57.3 m	1.48E-23	1.78E-22
Br-80	17.68 m	1.71E-02	2.06E-01

Radionuclide	Half-Life	Release per Test (Ci)	Total Annual Release[a] (Ci)
Br-80m	4.42 hour	1.60E-02	1.92E-01
Br-82	35.3 hour	4.89E+00	5.86E+01
Kr-79	35.0 hour	1.68E-11	2.02E-10
Kr-81	2.29E+05 year	5.01E-14	6.01E-13
Kr-83m	1.83 hour	7.20E-15	8.64E-14
Kr-85	10.78 year	2.48E-12	2.98E-11
Kr-87	1.27 h	4.95E-21	5.94E-20
Rb-86	18.64 d	3.57E-06	4.28E-05
Rb-87	4.97E+10 year	5.28E-11	6.34E-10
Rh-105	35.36 hour	2.46E-23	2.95E-22
Pd-107	6.5E+06 year	3.26E-21	3.91E-20
Pd-109	13.7 hour	1.10E-13	1.32E-12
Ag-106	24.0 hour	1.83E-12	2.20E-11
Ag-109m	39.6 s	1.13E-13	1.35E-12
Ag-110	24.6 s	2.24E-11	2.69E-10
Ag-110m	249.8 d	1.69E-09	2.02E-08
Ag-111	7.45 d	2.93E-14	3.52E-13
Cd-109	461.4 d	3.67E-17	4.41E-16
Ir-192	73.83 d	9.27E-10	1.11E-08
Ir-194	19.28 hour	3.65E-09	4.39E-08
Material: Copper Metal			
Cu-64	12.7 hour	3	36
Material: Zirconium Metal			
Zr-97	16.744 hour	10	120
Material: Fluorine			
F-18	109.8 m	5	60

a. The assessment assumes using all six material types in each of the 12 tests per year. However, the conclusion remains valid for more or fewer tests if the annual release rates are not exceeded.

Contamination control training involves medical isotopes (e.g., Ga-68 and Tc-99m) used only in contained structures such as Conex containers and tented structures with containment.

Training uses explosives or hand methods to disperse radioactive ballistic particles made from Cu-64 and Zr-97 materials. Radioactive ballistic particles mimic radiological fragmentation for training purposes. Explosives disperse particles about 1 mm × 1mm in size produced from either zirconium or copper (i.e., Zr-97 and Cu-64). Each exercise disperses about 3 curies of Cu-64 pellets and about 10 curies of Zr-97 pellets, respectively.

Radiological response training at the Ranges uses radioactive sources not available on the commercial market but manufactured at INL Site facilities. Silica glass-containing radioactive materials are manufactured using a sol-gel process in a manner that preserves the purity of selected isotopes. These glasses range in size from 20 microns to several millimeters in diameter. The proposed action prohibits using glass particles in the respirable range of 10 microns or less. These particles mimic nuclear fallout and are used to test collection techniques and technologies and analyze forensic detection capabilities.

Each glass material dispersal is limited to 100 grams or less and to 1 Ci or less for indoor and outdoor dispersals that use radioactive materials with half-lives shorter than 20 days (i.e., Au-196, Ba-140, KBr, Sc-44m/44, Te-132, and Y-90). Outdoor glass dispersals containing these short-lived isotopes without containment are limited to releasing no more than 12 Ci/year.

Silica glass dispersals containing isotopes having half-lives longer than 20 days or isotopes with daughter products having half-lives longer than 20 days (e.g., fission and activation products Ce-141, Ce-143, Mo-99, Nd-147, Th-227, and Zr-95) only takes place within enclosed structures having removable spill containment to prevent spreading dispersed material to the environment. The final *Idaho National Laboratory Radiological Response Training Range Environmental Assessment and FONSI* (DOE-ID, 2010) discusses construction and use of temporary containment structures. The proposed action prohibits silica glass dispersals using explosives.

Table 5 lists the half-lives of radionuclides used in silica glass dispersals.

Table 5. Half-life and total annual release limits for radionuclides in silica glass.

Radionuclide	Half-Life	Release per Test (Ci)	Total Annual Release[a] (Ci)
Silica glass with half-lives longer than 20 days requiring containment[b]			
Ce-141	See Table 4	See Table 4	See Table 4
Ce-143	33.04 hours	1	12
Mo-99	65.92 hours	1	12
Nd-147	10.98 days	1	12
Th-227	18.70 days	1	12
Zr-95	64.03 days	1	12
U-238	4.47E9 years	1	12
Silica glass half-lives less than 20 days approved for outdoor dispersal without containment			
Au-196	6.17 days	1	12
Ba-140	12.75 days	1	12
Ce-147	56.40 seconds	1	12
KBr	See Table 4	See Table 4	See Table 4
Sc-44/44m	3.97 hours/58.61 hours	1	12
Te-132	3.20 days	1	12
Y-90	64.00 hours	1	12

a. Total annual release for all glass containing radionuclides will not exceed 12 Ci per year.
b. Dispersed only within enclosed structures having removable spill containment

Some radiological response training exercises investigate RDDs and devise methods for RDD disablement. Disablement training uses gel blocks (100 gel blocks, each about 8 in. × 9 in. × 16 in. in size) or containment foam to cover RDD training materials. Training using foam containment requires that RDD material surveys and evaluations take place after foam dissipation (typically1 to 3 days). Foam containment uses foam-filled, 8-ft fabric cubes or 16-ft and 30-ft diameter fabric domes. Other disablement tools include "Stingrays" (i.e., an explosively formed and focused blade of water) or percussion actuated non-electric disrupters.

Range access control and monitoring continues until background radiation levels return to pre-test levels. Approved security plans prevent unauthorized persons from inadvertent entry to the Ranges during testing and training activities. Table 6 summarizes radiological training material and uses.

Table 6. Summary of radiological training materials and use.

Training Material	Training Use
Radiological materials	Ballistic particle dispersals. Dispersals using multiple radionuclides during single test events. Large area dispersal using up to 5 lb of high explosives at NSTR and 1 lb at RRTR. Multiple dispersals in accordance with releases listed in Table 4. Additional radionuclides evaluated using the environmental ALARA process.
Containment foam and gel blocks	RDD training exercises.
Glass-containing radionuclides	Non-explosive indoor and outdoor glass dispersals containing radionuclides with half-lives less than 20 days (e.g., Au-196, Ba-140, KBr, Sc-44m/44, and Te-132). Non-explosive glass dispersals using materials with a half-life greater than 20 days or progeny with a half-life greater than 20 days year (Ce-141, Ce-143, Mo-99, Nd-147, Th-227, and Zr-95) within an enclosed and contained structure.
Sealed radioactive sources and radiation-emitting devices (x-ray and gamma ray radiation-producing equipment such as portable x-ray generators, Betatrons, and sealed radioisotope sources).	Characterizing radiation fields and collecting radiation readings and samples.

2.1.3 Project Controls

Project controls are included in the proposed action for the purpose of reducing anticipated environmental impacts that might otherwise stem from project implementation. The project controls listed in Table 7 are integral to all activities and the proposed action.

Table 7. Project controls.

Component	Control
Air	
	Control fugitive dust by applying water, covering soils, replanting disturbed areas, or other methods
	Remove all portable/mobile generators used during construction and operations within 1 year of installation
	Monitor wind speeds prior to each dispersal
	Limit explosive dispersals to wind speeds less than 25 mph
	Evaluate all new isotopes in irradiated materials for potential offsite dose prior to initial distribution
Historical and Cultural Resources	
	Follow methodology in TEV-3572 when firing large projectiles (greater than 30 and up to 120 mm) at the downrange target area
	Restrict vehicle travel to established roads, laydown areas, and turnarounds
	Stop work and make necessary notifications if unanticipated cultural, historical, pre-contact, or prehistoric resources are discovered during any project activities
	Use Micro-site project elements (e.g., fences, signs, and powerlines) to avoid sensitive resources

Component	Control
Ecological Resources	Restore areas subject to short-term ground disturbance to original contours and revegetate with certified weed-free native seed to at least 70% of pre-disturbed cover
	Control weeds as necessary
	Comply with regulations pertaining to control of noxious weeds on INL Site land
	Comply with regulations and requirements for herbicide use
	Avoid impacts to painted milkvetch along the proposed new power line access route by surveying the proposed route and placing poles in areas not occupied by the species
	Restrict vehicle travel to established roads, laydown areas, and turnarounds
	Construct new support facilities in disturbed areas such as laydown areas, command areas, and safety observation points
	Collocate infrastructure to the extent practicable
	Apply time-of-day restrictions to construction and operations activities within 1 km of greater sage-grouse leks from March 15 to May 15
	Comply with conservation measures described in the Candidate Conservation Agreement (CCA) (DOE-ID & USFWS, 2014) for greater sage-grouse
	Avoid installing power lines within 1 km of an active leks
	Install raptor perch deterrents on power poles and guy wire flight deterrents as necessary
	Control human activity and blasting during the nesting period if ferruginous hawks are confirmed nesting
	Complete pre and post construction surveys to establish the amounts of sagebrush restoration and other native revegetation efforts needed to rehabilitate disturbed areas as determined by DOE's Environmental Surveillance, Education, and Research (ESER) contractor
	Monitoring sagebrush disturbance and plant amounts equal to that disturbed in areas beneficial to sage-grouse
	Minimize impacts to nesting raptors by prohibiting construction and operations within recommended spatial and seasonal buffers identified by the ESER contractor
	Perform migratory bird nesting surveys 72 hours prior to vegetation disturbance during the migratory bird nesting season (April 1 through October 1) and implement measures, such as buffer areas or halting work, to prevent nest abandonment until after the migratory bird nesting season or until young have fledged
	Perform annual surveys for nesting birds, especially ferruginous hawks and burrowing owls.
	Report dead or injured birds immediately
Fire	
	Equip vehicles used at the Ranges with accessible fire tools (e.g., shovels or fire extinguishers)
	Maintain defensible space by mowing or clearing vegetation near infrastructure vulnerable to wildland fire
	Keep a fire tender onsite at the Ranges during activities having the potential to start wildland fires
	Tether UAVs carrying explosives or flammable materials to prevent them from leaving test pad locations
	Remove vegetation from the first 300 yd of the downrange target area
Soils	
	Establish background soil characteristics prior to any testing associated with the proposed action
	Perform contamination control training using medical isotopes (e.g., Ga-68 and Tc-99m) only in contained structures
	Limit individual glass material dispersal to 1 Ci or less for indoor and outdoor dispersals with short-lived radioactive materials
	Limit outdoor glass dispersals containing short-lived isotopes to 12 Ci/year

Component	Control
Soils continued	Disperse glass materials with half-lives greater than 20 days only within enclosed structures having removable spill containment
	Control erosion by placing fill material such as gravel in cleared areas as appropriate
	Restrict vehicle traffic to designated roadways and parking and laydown areas
	Limit regrading of soil to areas maintained as sterile or otherwise free of vegetation
	Limit potential soil contamination so soil does not become contaminated with hazardous waste or exceed soil concentrations of hazardous substances, which would require remediation under federal or state clean-up laws and regulations
	Perform soil monitoring at least every 2 years for at least two rounds of monitoring and, based on the results, increase or decrease monitoring frequency (but to no less than every 5 years) to verify radionuclide, chemical, and explosive constituent concentrations do not approach preliminary remediation goals (PRGs)
	If soil concentrations approach PRGs, remove soils and place in a licensed disposal facility
	If K-40 soil concentrations exceed initial background concentrations, remove soils and place in a licensed disposal facility
	Remove and dispose of range debris in accordance with proper disposal procedures
	Clean up spills as soon as possible and, if necessary, remove contaminated soils and dispose in an approved facility, then sample remaining soils to verify successful removal of contaminants
	Verify all explosive material has been consumed or removed after testing has been performed
Hazardous Materials and Waste Management	
	Prohibit using pure unused Resource Conservation and Recovery Act (RCRA) P or U-listed commercial chemicals that are considered RCRA hazardous waste when released to the environment and chemicals considered RCRA toxic waste when released to the soil
	Evaluate the release of all chemicals to determine if any release exceeds the reportable quantity for that chemical or mixture of chemicals
	Prohibit releases that require an air permit, exceed the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) reportable quantity, exceed groundwater or drinking water standards in the aquifer, or exceed CERCLA screening levels in soil
	Use covered dumpsters to contain refuse and empty dumpsters when full
	Remove unconsumed explosive material, used test articles, and debris from the Ranges and dispose according to applicable regulations
	Use licensed vendors to furnish portable toilets, maintain them on a regular basis, and pump portable toilet waste to approved INL Site facilities (e.g., Central Facilities Area [CFA] sewage treatment plant) after verifying the discharge meets facility acceptance criteria
	Use non-toxic shielding (i.e., tungsten or bismuth) instead of lead when possible for radiological training
Testing and Training	
	Limit explosive radiological dispersals to 1 lb NEW TNT equivalent at RRTR and 5 lb at NSTR
	Explosives operations at NSTR will be monitored to ensure consistency with the evaluated frequency of use as reflected in Table 3.
	Install boundaries (e.g., ropes, signs, and barricades) to control access to radiological training areas until the activity returns to normal (i.e., background) levels.
	Implement approved security plans to prevent unauthorized persons from inadvertent entry to the Ranges during testing and training activities
	Limit the dose to the public at each test location to less than 0.1 mrem/year
	Prohibit silica glass dispersals using explosives
	Limit explosive dispersals to wind speeds less than 25 mph and postpone training and testing as necessary

Component	Control
Testing and Training continued	Verify the curie content and isotopic-distribution of the major, intended, isotopes and any contaminants in radiological materials used in radioactive material distribution testing and training at least once per year
	Evaluate all changes in isotopes or isotope concentrations against Table 4 and include in the annual reporting requirements
	Model newly found isotopes with a half-life greater than 74 days for impact to soil and groundwater prior to initial distribution to demonstrate the impact analysis in this EA remains valid
	Review any changes to the source materials (e.g., composition or manufacturer), which will be irradiated, or the source of irradiation prior to any such use, to verify the releases in Table 4 will not be exceeded

2.2 No Action Alternative

The CEQ regulations (40 CFR 1502.14) direct agencies to evaluate a no action alternative. The purpose of a no action alternative in the NEPA process is to provide a baseline to compare the impacts of the other analyzed alternatives. “No action” does not mean doing nothing. Rather, the no action alternative involves maintaining or continuing the “status quo” of ongoing operations and activities.

The no action alternative does not expand infrastructure or training and testing capabilities at the Ranges. The no action alternative continues current and ongoing testing and training activities at the Ranges as analyzed in the *Final Environmental Assessment for the National Security Test Range and FONSI* (DOE-ID 2007) and the *Final Idaho National Laboratory Radiological Response Training Range Environmental Assessment and FONSI* (DOE-ID 2010) would continue. As such, no physical modifications or changes in operations at the Ranges take place under the no action alternative.

If the proposed activities were not performed at the INL Site, other entities and locations could potentially support the research, testing, and training capabilities proposed at the Ranges. Performing the proposed activities at another location and the associated environmental impacts is outside the scope of this analysis.

The no action alternative does not include suspension of activities or closure of the Ranges. Furthermore, DOE established the Ranges in DOE/EA-1557 and DOE/EA-1776 and closure of the facilities is not foreseeable.

Table 8 compares activities at the Ranges for the proposed action and no action alternative.

Table 8. Comparison of activities at the Ranges for the proposed action and no action alternative.

Activity	No Action NSTR	Proposed Action NSTR	No Action RRTR	Proposed Action RRTR
Use Containment Foam	Containment foam not used	Use containment foam and gel blocks multiple times per year	Use foam and gel blocks multiple times per year	No change
Disperse Isotopes	Isotopes not dispersed	Ballistic particle dispersals Radionuclide and ballistic particle dispersals Dispersing one or more radionuclides during any individual test event Ground dispersals using up to 5 lb of high explosives within the area of the training pads (air emissions have the potential to travel outside these areas) Use aerial detection capabilities (e.g., helicopters and UAVs) Multiple dispersals in accordance with releases listed in Table 4; additional radionuclides evaluated using the environmental ALARA process	Multiple dispersals per year using KBr (up to 500 grams but less than 1 Ci) at NTR and STR, not exceeding 12 Ci per year	Ballistic particle dispersals Radionuclide dispersals using up to 1 lb of high explosives within the disturbed area of the gravel pit (NTR) and infiltration basin (STR) (air emissions have the potential to travel outside these areas) Radionuclide and ballistic particle dispersals Multiple dispersals in accordance with releases listed in Table 4; additional radionuclides evaluated using the environmental ALARA process
Use Explosives	Deliver explosives to ground-based targets using controlled UAVs not authorized Large explosive events (11,000 to 20,000 lb NEW) once every 5 years Large projectiles (greater than 30 to 120 mm) three or four times per year Mid-test range events (3,000 to 11,000 lb NEW) once or twice a year Firing RPGs and other live warheads not authorized Small events (100 to 3,000 lb NEW) once per month	Deliver explosives to ground-based targets using controlled UAVs Large explosive events (11,000 to 20,000 lb NEW) about once every 5 years Large projectiles (greater than 30 to 120 mm) about 24 times per year Mid-test range events (3,000 to 11,000 lb NEW) about five times per year RPGs and other live warheads fired about 24 times per year Small events (100 to 3,000 lb NEW) about five to eight times per month	Explosive dispersals of radionuclides with about 0.5 lb NEW	Explosive dispersals of radionuclides with up to 1 lb NEW

Activity	No Action NSTR	Proposed Action NSTR	No Action RRTR	Proposed Action RRTR
	Small-scale projectiles (30 mm or less) bi-weekly Very small events (less than 100 lb NEW) weekly	Small scale projectiles (30 mm or less) about ten times per month Very small events (less than 100 lb NEW) daily		
Use Sealed Radioactive Sources and Radiation-Emitting Devices	Radioactive materials not used	X-ray and gamma ray radiation producing equipment such as portable x-ray generators, Betatrons, and sealed radioisotope sources Sealed sources include Ir-192, Co-60, Cs-137, Ra-226, Se-75, and isotopes of Am, Pu, Th, and U Source strengths vary from micro-curies to roughly 200 Ci depending on the isotope	X-ray and gamma ray radiation producing equipment such as portable x-ray generators, Betatrons, and sealed radioisotope sources Sealed sources include Ir-192, Co-60, Cs-137, Ra-226, Se-75, and isotopes of Am, Pu, Th, and U Source strengths vary from micro-curies to roughly 200 Ci depending on the isotope	No change
Use Silica Glass-Containing Radionuclides	Silica glasses not used	Non-explosive dispersals of glass materials containing radionuclides with half-lives greater than 20 days within an enclosed and contained structure Non-explosive dispersals of glass materials with half -lives less than 20 days (Au-196, Ba-140, KBr, Sc-44m/44, Te-132, and Y-90)	Silica glasses not used	Non-explosive dispersals of glass materials containing radionuclides with half-lives greater than 20 days within an enclosed and contained structure Non-explosive dispersals of glass materials with half-lives less than 20 days (Au-196, Ba-140, KBr, Sc-44m/44, Te-132, and Y-90)
Surface Disturbance	No change	About 460 acres of ground disturbance	No change Radiological Response Training continues as defined in DOE/EA-1776	Construct chain-link fence around NTR and STR (enclosing about 184 total acres)

3. AFFECTED ENVIRONMENT

This section describes the area potentially impacted by the proposed action as required by CEQ regulations. The extent of the affected environment may not be the same for potentially affected resource areas. Discussion of the present day setting in this document is limited to environmental information that relates to the scope of the proposed action and alternatives analyzed.

The INL Site contains several facilities, each occupying less than 2 square miles, and covers about 890 square miles of otherwise undeveloped, cool desert terrain. DOE controls INL Site land, which is in portions of five southeastern Idaho counties: Bingham, Bonneville, Butte, Clark, and Jefferson. Population centers in the region include the cities (i.e., more than 10,000 people) of Blackfoot, Idaho Falls, Pocatello, and Rexburg. Several smaller cities and communities (i.e., less than 10,000 people), including Arco, Atomic City, Fort Hall Indian Reservation, Howe, and Mud Lake, are located around the site less than 30 miles away. Craters of the Moon National Monument and Preserve is less than 20 miles to the west of the INL Site; Yellowstone and Grand Teton National Parks and the city of Jackson, Wyoming are located more than 70 miles northeast of the INL Site, and Sun Valley ski resort lies less than 70 miles to the west.

The land adjacent to the INL Site boundary consists of public and private land. The U.S. Bureau of Land Management manages about 75% of land adjacent to the INL Site; their lands support wildlife habitat, mineral and energy production, grazing, and recreation. The State of Idaho owns about 1% of adjacent land that supports uses like those on federal land. The remaining 24% of land adjacent to the INL Site is private land, with grazing and crop production as the most common uses.

Specific recreational and tourism areas near the INL Site include the Birch Creek Camping Area, Black Canyon Wilderness Study Area, Camas National Wildlife Refuge, Craters of the Moon National Monument and Preserve, Hell’s Half-Acre Wilderness Study Area, Market Lake State Wildlife Management Area, and Mud Lake Wildlife Management Area. Two national forests, the Salmon-Challis and Caribou-Targhee, also lie within 50 miles of the INL Site. Populations potentially affected by INL Site activities include INL Site employees, ranchers grazing livestock in areas on or near the INL Site, hunters on or near the INL Site, residential populations in neighboring communities, travelers on public highways, and visitors at the Experimental Breeder Reactor-I National Historic Landmark. No permanent residents are located on the INL Site.

No prime or unique farmland protected by the Farmland Protection Policy Act occurs on the INL Site.

3.1 Air Quality

The five Idaho counties containing portions of the INL Site are in an attainment area or are unclassified for National Ambient Air Quality Standards status under the Clean Air Act. In 2018, the Idaho Department of Environmental Quality issued a facility emission cap permit to construct to INL. For the purposes of air regulations, INL is an area source of air pollution for pollutants and not regulated by the Prevention of Significant Deterioration rules (40 CFR 52.21).

The Craters of the Moon National Monument and Preserve, located west-southwest of the INL Site, is a Prevention of Significant Deterioration Class I area. Class I areas have the highest level of protection from air pollutants and little deterioration of air quality is allowed.

In addition to National Ambient Air Quality Standards requirements, the Clean Air Act includes National Emission Standards for Hazardous Air Pollutants (NESHAP) and New Source Performance Standard requirements. The primary application of NESHAP requirements at INL Site is for controlling and reporting radionuclide emissions (40 CFR 61, Subpart H, 1989). DOE complies with the standards and requirements for radionuclide emissions and associated dose limits to the public (DOE, 2019b). The INL Site is an area source of hazardous air pollutants under the NESHAP regulations. New Source

Performance Standard rules apply to any new or reconstructed apparatus to which a standard applies under this program.

Airborne releases of radionuclides from INL Site operations are reported each calendar year with the calendar year 2018 report released in June 2019 (DOE, 2019b). For calendar year 2018, the effective dose (ED) equivalent to the maximally exposed individual (MEI) member of the public was 1.02E-02 millirem (mrem) per year, which is 0.10 percent of the 10 mrem per year standard, for the INL Site.

In 2017, the most current year available, all radionuclide concentrations in ambient air samples were below DOE radiation protection standards for air and were within historical measurements (DOE, 2018). In addition, gross alpha and gross beta concentrations were analyzed statistically; there were few differences between samples collected on the INL Site, at the INL Site boundary, and off the INL Site.

3.2 Historical and Cultural Resources

Cultural resources, including historic and Native American archaeological sites, historic architectural properties, and areas of importance to the Shoshone-Bannock Tribes, are numerous across INL and many are eligible for nomination into the National Register of Historic Places (NRHP or National Register). INL lands are also included within the aboriginal homeland of the Shoshone-Bannock people. The Native American archaeological sites, burial sites, native plants and animals, and features of the natural environment that occur within the protected boundaries of the INL Site continue to fill important roles in tribal heritage and ongoing cultural traditions. Numerous historic archeological sites reflect emigrant use along Goodale’s Cutoff (a northern spur of the Oregon Trail) beginning 160 years ago. Soon after, early homesteaders tried harnessing the intermittent flows of the Big Lost River to transform sagebrush flats into irrigated farmland, but few were successful.

During World War II, lands now encompassing the INL Site, were designated a Naval Proving Ground to support the war effort. In 1949, to support development and testing of nuclear reactors, the United States established the National Reactor Testing Station on land that is now the INL Site.

Cultural resource investigations from 2016 to 2018 (Holmer, Cook, Henrikson, Gilbert, & Armstrong, 2019) for NSTR and RRTR identified 19 previously documented archaeological sites through archival searches. Intense archaeological surveys of about 1,725 acres (1,540 acres at NSTR, 106 acres at NTR, and 79 acres at STR) were completed. These surveys recorded 46 Native American archaeological sites, 40 Native American isolate locations, and a historic Euroamerican road at NSTR. Cultural investigations at RRTR (including NTR and STR) documented eight Native American archaeological sites, five Native American isolate locations, and a wooden Euroamerican structure. A variety of natural resources of potential importance to the Shoshone-Bannock Tribes are also contained within the NSTR and RRTR project areas.

A total of 33 potentially eligible properties were documented during the 2016 to 2018 cultural resource investigations of the NSTR and RRTR. Of these properties, 22 potentially eligible properties (21 at NSTR and one at NTR) were evaluated through test excavations and, based on results, all are recommended as ineligible into NRHP. The remaining 11 potentially eligible properties at both the NSTR and RRTR have been avoided through project redesign. Table 9 summarizes these findings.

Table 9. Number of cultural resources identified in the project area.

Number of Cultural Resources Identified at the Ranges				
Location	Native American Sites	Native American Isolates	Euroamerican Artifact	Total
NSTR	46	40	1	87
RRTR	8	5	1	14
Total	**54**	**45**	**2**	**101**

3.3 Ecological Resources

The INL Site covers one of the largest remnants of undeveloped, ungrazed sagebrush steppe ecosystems in the Intermountain West (INL, 2016). The INL Site is also home to the Idaho National Environmental Research Park. The National Environmental Research Park is an outdoor laboratory for evaluating the environmental consequences of energy use and development and strategies to mitigate effects from energy use and development.

A shrub overstory with a grass and forb understory forms most natural vegetation across the INL Site. The most common shrub is Wyoming big sagebrush, though basin big sagebrush dominates or co-dominates in areas with deep or sandy soils.

The INL Site supports a variety of vertebrates, including several sagebrush-obligate species, meaning species that need sagebrush to survive. These species include sage sparrow, Brewer's sparrow, northern sagebrush lizard, greater sage-grouse, and pygmy rabbit.

The United States Fish and Wildlife Service (USFWS) lists, by county, threatened and endangered species and other species of concern for the State of Idaho. The following list includes the species listed as threatened in the five counties of which the INL Site is a part:

- Bull Trout
- Canada Lynx
- North American Wolverine (proposed)
- Ute Ladies'-tresses
- Whitebark Pine
- Yellow-billed Cuckoo.

Of the species listed by the USFWS, the yellow-billed cuckoo has been documented near the INL Site and wolverines may pass through. The remaining species have not been documented on the INL Site.

Several species of concern or candidate species occur on the INL Site, including sage-grouse, three species of bats (i.e., long-eared myotis, small-footed myotis, and Townsend's big-eared), pygmy rabbit, Merriam's shrew, long-billed curlew, ferruginous hawk, northern sagebrush lizard, and loggerhead shrike. Bald and golden eagles also occupy the INL Site and are protected under the Bald and Golden Eagle Protection Act.

The United States Fish and Wildlife Service is evaluating if the little brown myotis and the big brown bat warrant listing under the Endangered Species Act.

The following subsections present site-specific information on the ecological resources of the project area on the INL Site, with much of the information coming from Hafla et al. (2019).

3.3.1 Plant Communities

3.3.1.1 NSTR. Five wildland fires burned plant communities on and around NSTR between 1995 and July 2019. Plant community composition in the area reflects wildland fire activity over the past few decades.

The only sagebrush shrubland in the project area occupies the area of the proposed road around the TREAT exclusion zone. Big sagebrush communities dominated the NSTR site before recent wildland fires. Under normal fire regimes, plant communities will transition back to sagebrush-dominated communities through natural recruitment over the next century or so.

Native, perennial grasses dominate much of NSTR. Localized patches of non-native annuals (such as cheatgrass and Russian thistle) occupy shallow rocky soils on basalt outcroppings.

Twelve plant communities populate the NSTR project area and these communities are in good ecological condition (Hafla, et al., 2019). Table 10 lists the 12 plant communities documented at NSTR.

Table 10. Documented NSTR plant communities.

Scientific Class Name	Colloquial Class Name
***Achnatherum hymenoides* Herbaceous Vegetation**	Indian Ricegrass Herbaceous Vegetation
Agropyron cristatum (Agropyron desertorum) Semi-natural Herbaceous Vegetation	Crested Wheatgrass Semi-Natural Herbaceous Vegetation
Artemisia tridentata Shrubland	Big Sagebrush Shrubland
***Artemisia tridentata* ssp. *wyomingensis* Shrubland**	Wyoming Big Sagebrush Shrubland
***Bromus tectorum* Semi-natural Herbaceous Vegetation**	Cheatgrass Semi-Natural Herbaceous Vegetation
***Chrysothamnus viscidiflorus/Alyssum desertorum* Herbaceous Vegetation**	Green Rabbitbrush/Desert Alyssum Shrub Herbaceous Vegetation
***Chrysothamnus viscidiflorus/Elymus lanceolatus* (*Pascopyrum smithii*) Shrub Herbaceous Vegetation**	Green Rabbitbrush/Streambank Wheatgrass (Western Wheatgrass) Shrub Herbaceous Vegetation
***Chrysothamnus viscidiflorus* Shrubland**	Green Rabbitbrush Shrubland
***Ericameria nana* Dwarf Shrubland**	Dwarf Goldenbush Dwarf Shrubland
***Hesperostipa comata* Herbaceous Vegetation**	Needle and Thread Herbaceous Vegetation
***Leymus cinereus* Herbaceous Vegetation**	Great Basin Wildrye Herbaceous Vegetation
***Poa secunda* Herbaceous Vegetation**	Sandberg Bluegrass Herbaceous Vegetation

Painted milkvetch is the only sensitive plant species positively identified during surveys of the NSTR project area (Hafla, et al., 2019). Surveys located three small populations, each with ten or fewer individuals, along the proposed new power line route. Several additional small populations were observed adjacent to, but not directly within, the area of the new explosives test pad and access road. The downrange target area contains appropriate habitat for painted milkvetch and the species is present in similar adjacent habitats; therefore, it likely occurs on the downrange target area. The proposed downrange target area was moved from the original surveyed location for safety reasons too late in the season to complete new sensitive species surveys. Because painted milkvetch has a short growing season and local population persistence is annually variable, populations may be more detectable in some years than others; therefore, the known distribution of painted milkvetch in 2016 may not reflect population distribution in other years. It is possible for painted milkvetch to occur anywhere in the proposed NSTR project area, with appropriate habitat, during any given year.

3.3.1.2 RRTR. Vegetation at the NTR and STR differ from that found at NSTR. The RRTR locations have not experienced vegetation-changing events, such as fire, since completion of the INL Site vegetation classification in 2008. Native sagebrush with various understory components dominates plant communities at RRTR. Table 11 lists vegetation communities documented at NTR and STR.

The NTR gravel pit is maintained without vegetation to prevent the spread of undesirable species. NTR soils tend to be alkaline and salt-tolerant plant species, such as shadscale saltbush, sickle saltbush, and winterfat, occupy the area. Various grasses also inhabit the area. Although conditions at NTR are favorable to the growth of sensitive plants such as iodinebush, meadow milkvetch, and silvery primrose, surveys of the area did not find any of these sensitive plant species.

Wyoming Big Sagebrush Shrubland surrounds STR and sagebrush and a wide range of other shrub and grass species dominate the area. The infiltration basin at STR and the berm around the basin have less shrub composition than the surrounding areas from past mowing. Soils composing the berm tend to be very dry and vegetative cover is low. Weeds and invasive species compose most of the vegetation on the berm. Surveys of STR did not find sensitive plant species, although conditions are favorable for twinleaf onion and desert dodder.

Table 11. Documented NTR and STR plant communities.

Scientific Class Name	Colloquial Class Name
***Agropyron cristatum (Agropyron desertorum)* Semi-natural Herbaceous Vegetation**	Crested Wheatgrass Semi-Natural Herbaceous Vegetation
***Artemisia tridentata* Shrubland - *Artemisia tripartita* Shrubland**	Big Sagebrush Shrubland - Three-Tip Sagebrush Shrubland
***Artemisia tridentata* Shrubland - *Atriplex falcata* Dwarf Shrubland**	Big Sagebrush Shrubland - Sickle Saltbush Dwarf Shrubland
***Artemisia tridentata* ssp. *wyomingensis* Shrubland**	Wyoming Big Sagebrush Shrubland
***Artemisia tridentata* ssp. *wyomingensis* Shrubland - *Agropyron cristatum* (*Agropyron desertorum*) Semi-natural Herbaceous Vegetation**	Artemisia tridentata ssp. wyomingensis Shrubland - Crested Wheatgrass Semi-Natural Herbaceous Vegetation
***Artemisia tridentata* ssp. *wyomingensis* Shrubland - *Chrysothamnus viscidiflorus – Kraschenninikovia lanata* Shrubland**	Artemisia tridentata ssp. wyomingensis Shrubland - Green Rabbitbrush - Winterfat Shrubland
***Atriplex confertifolia* Dwarf Shrubland - Atriplex falcata Dwarf Shrubland**	Shadscale Dwarf Shrubland - Sickle Saltbush Dwarf Shrubland
***Chrysothamnus viscidiflorus* – Kraschenninikovia lanata Shrubland - Atriplex confertifolia Dwarf Shrubland**	Green Rabbitbrush - Winterfat Shrubland - Shadscale Dwarf Shrubland

3.3.2 Ethnobotany

Species of ethnobotanical importance occur on and around the Ranges. Hafla et al. (2019) lists species thought to be of historical importance taken from *Plant Communities, Ethnoecology, and Flora of the Idaho National Engineering Laboratory* (Anderson, Ruppel, Glennon, Holt, & Rope, 1996). The list includes species used by “indigenous groups of the eastern Snake River Plain.” Plant community and sensitive plant surveys identified 39 species from the list of ethnobotanical importance throughout the project area. Many of these species are abundant and widespread throughout the area and across much of the rest of the INL Site (Hafla, et al., 2019). Table 12 lists species of ethnobotanical importance at the Ranges.

Table 12. Species of ethnobotanical importance at the Ranges.

Scientific Name	Common Name	Uses
Achnatherum hymenoides	Indian ricegrass	Food
Allium textile	Textile onion	Food, medicine, flavoring, and dye
Artemisia tridentate	Big sagebrush	Food, medicine, cordage, clothing, shelter, fuel, and dye
Bromus techorum	Cheatgrass	Food
Chaenactis douglasii	Douglas’ dustymaiden	Food and medicine
Carex douglasii	Douglas’ sedge	Food and medicine
Chenopodium fremontii	Fremont’s goosefoot	Food
Chenopodium leptophyllum	Narrowleaf goosefoot	Food
Chrysothamnus viscidiflorus	Green rabbitbrush	Medicine and gum
Crepis acuminate	Tapertip hawksbeard	Food
Delphinium andersonii	Anderson’s larkspur	Medicine and dye
Descurainia pinnata	Western tansymustart	Food and medicine
Descurainia Sophia	Herb sophia	Food and medicine

Scientific Name	Common Name	Uses
Elymus elymoides	Bottlebrush squirreltail	Food
Elymus lanceolatus	Streambank wheatgrass	Food
Ericameria nauseosus	Rubber rabbitbrush	Medicine and gum
Erigeron pumilus	Shaggy fleabane	Medicine and arrow tip poison
Eriogonum ovalifolium	Cushion buckwheat	Medicine
Gutierrezia sarothrae	Broom snakeweed	Medicine
Hesperostipa comate	Needle-and-threads	Food
Lactuca serriola	Prickly lettuce	Food and medicine
Lappula occidentalis	Flatspine stickseed	Food
Leyms cinerus	Basin wildrye	Food and manufacture
Lomatium dissectum	Fernleaf biscuitroot	Food and medicine
Lomatium foeniculaceum	Desert biscuitroot	Food and medicine
Lygodesmia grandiflora	Largeflower skeletonplant	Food and gum
Mentzelia albicaulis	Whitestern blazingstar	Food
Oenothera caespitosa	Tufted evening-primrose	Food and medicine
Opuntia polyacantha	Pricklypear	Food
Phacelia hastate	Silverleaf phacelia	Food
Pleiacanthus spinosus	Thorn skeletonweed	Food and gum
Poa secunda	Sandberg bluegrass	Food and medicine
Pteryxia terebinthina	Turpentine wavewing	Food
Rumex venosus	Veiny dock	Food and medicine
Salsola kali	Russian thistle	Food
Sisymbrium altissimum	Tall tumblemustard	Food
Sphaeralcea munroana	White-stemmed globe-mallow	Food, medicine, and manufacture
Taraxacum officinale	Common dandelion	Food and medicine
Tragopogon dubius	Yellow salsify	Food and medicine

3.3.3 Wildlife

About 40 years of wildlife research at the INL Site has recorded 219 vertebrate species (Reynolds, Connelly, Halford, & Arthur, 1986). Many recorded species are associated with sagebrush-steppe habitat or are sagebrush obligates. Habitat change from recent fires has altered wildlife communities and wildlife use in burned areas. Areas where sagebrush-associated species such as pygmy rabbit, sage sparrow, and Brewer’s sparrow were common before fire now support species that thrive in grasslands such as elk, mountain cottontail, horned larks, and vesper sparrows. Sagebrush-dependent species, such as sage-grouse, flourish in sagebrush habitat outside burned areas and use adjacent grasslands.

Wildlife common to disturbed areas and habitats recovering from fire include small and medium-sized mammals (e.g. bushy-tailed woodrat, Ord’s kangaroo rat, black-tail jackrabbit, mountain cottontail, long-tailed weasel, badger, and reptiles such as sagebrush lizard and gopher snake). These species have small home ranges, limited mobility, or a social structure that restricts movement.

Big game species, including elk and pronghorn, utilize most of the INL Site, including areas on and around the Ranges.

3.3.3.1 ***NSTR.*** Many species migrate through the NSTR area between seasonal habitats in search of prey, forage, reproductive areas, and shelter from the elements. Isolated live and burned junipers near lava outcrops contribute nesting sites for ferruginous hawks and other raptors. Bald eagles use the area during the winter and golden eagles use the area throughout the year. Lek surveys conducted since 2008 document the presence of sage-grouse in areas surrounding NSTR, but habitat in these areas is not ideal for sage-grouse.

Surveys documented the western rattlesnake, gopher snake, northern sagebrush lizard, and short-horned lizard near exposed basalt outcrops. Great Basin rattlesnakes are listed as protected non-game wildlife by the State of Idaho. Great Basin rattlesnakes require winter habitats that allow them to go below the frost line. On the INL Site, these habitats are typically associated with volcanic features such as craters, cones, and lava tubes. The presence of rattlesnakes and gopher snakes suggests that a snake hibernaculum (i.e., wintering area) is present in the general area; however, no evidence of a communal hibernation site was identified during surveys. All Idaho reptiles and amphibians (except bullfrog) are classified as protected non-game species. This designation is held at the state level to help protect populations (IDFG 2005).

Surveys documented several small mammal species using the NSTR area, including the black-tailed jackrabbit, mountain cottontail, Townsend's ground squirrel, bushy-tailed woodrat, Ord's kangaroo rat, deer mouse, and montane vole. Although these species are not listed as sensitive, they do provide a food resource for many species such as prairie falcon, ferruginous hawk, bald eagle, golden eagle, coyote, and bobcat.

Many species use the NSTR area in a transitory manner. Bird species observed using the area include horned lark, western meadowlark, vesper sparrow, grasshopper sparrow, loggerhead shrike, rock wren, common nighthawk, red-tailed hawk, ferruginous hawk, prairie falcon, and common raven. Most bird species are protected under the Migratory Bird Treaty Act. Although only one abandoned raptor nest was observed during surveys, isolated live junipers and skeletons of burned junipers near lava outcrops may provide nesting substrate for ferruginous hawks and other raptor species. Bald eagles have been observed using the general area during the winter and golden eagles have been observed using the area throughout the year.

Elk and pronghorn use the NSTR area year-round and benefit from increased grass and herbaceous vegetation associated with recent fires. Elk use the NSTR area for calving, and pronghorn use the area for fawning. The INL Site contributes critical winter range for around 1,000 elk and over 3,000 antelope, and more than 100 elk and about 500 pronghorn summer on the INL Site.

Bat acoustic surveys at NSTR identified western small-footed myotis and big brown bats using the area (Hafla, et al., 2019). The timing and level of observed activity suggests important summer roosts do not occur in the area. Townsend's big eared bat, a Bureau of Land Management sensitive species (BLM, 2004), has been documented roosting in caves and lava tubes across the INL Site but was not detected during NSTR surveys.

3.3.3.2 RRTR. Wildlife species associated with the RRTR include sagebrush obligates and habitat generalists common on the INL Site. Many species identified at NSTR also use areas around RRTR areas, including small and medium-sized mammals, birds, reptiles, and big game. Surveys at RRTR recorded signs of elk, mule deer, and pronghorn use of the area. Pronghorn and elk are common. During winter, golden eagles may be common on the northern side of the INL Site near NTR. Surveys did not find any greater sage-grouse leks in the vicinity.

Surveys at NTR recorded species such as the pygmy rabbit. Pygmy rabbits depend on sagebrush for cover and forage. Populations of pygmy rabbits on the INL Site may be relatively stable because much of the area remains undisturbed. Pygmy rabbit habitat is extensive in sagebrush steppe in the area around NTR and surveys documented both burrow systems and scat.

At STR, pronghorn, mule deer, elk, coyote, and small mammals are present in the vicinity. Surveys have not documented historical greater sage-grouse leks in the vicinity, but recent surveys discovered eggshell fragments.

Wildlife species of concern at RRTR ranges include species protected under the Migratory Bird Treaty Act (including raptors), greater sage-grouse, pygmy rabbits, and big game species.

3.3.4 Invasive and Non-Native Species

Surveys have documented 11 Idaho noxious weeds on the INL Site. Non-native and invasive plants found on or near the project area include cheatgrass, Russian thistle, halogeton, tumble mustard, and crested wheatgrass (Hafla, et al., 2019). Of the 11 noxious weeds found on the INL Site, musk thistle was the only noxious species documented in the NSTR area, although past surveys documented Canada thistle. Musk thistle occupies disturbed areas along T-25 and the alternate access road around the TREAT exclusion zone and one location on the downrange target area.

Surveys of the RRTR facilities did not locate any noxious weeds in the project area, but areas dominated by non-native species such as halogeton, cheat grass, introduced mustards, and desert alyssum occur in the area.

3.4 Soils

Soil sampling at the INL Site is completed on a 5-year rotation to evaluate long-term accumulation trends and to estimate environmental radionuclide inventories. Data from previous years of soil sampling and analysis on the INL Site show no evidence of detectable concentrations depositing onto surface soil from ongoing INL Site releases (DOE, 2018). Soil types and composition at the Ranges are discussed in the following subsections.

3.4.1 NSTR

Sands over basalt generally describes soil in the NSTR area. Figure 10 shows the Grassy Butte-Rock Outcrop Complex found at NSTR. This soil complex has several soil mapping units. Grassy Butte’s very stony loamy sand makes up about 30% of this soil complex and Rock Outcrop makes up about 20%. The remaining 50% is about equal parts Grassy Butte 10 to 40 in. deep, Grassy Butte 40 to 60 in. deep, Matheson loamy sand, Bondfarm sandy loam, and Grassy Butte loamy sand. The soil at the new explosive test pad is likely the Grassy Butte series. The downrange target area likely intersects areas of Grassy Butte, Rock Outcrop, and Bondfarm sandy loam.

Both Grassy Butte and Bondfarm sandy loam soil have a very high potential for wind erosion. The very high wind erosion hazard limits use of these soils (Hafla, et al., 2019). These soils are not suited to mechanical rangeland management treatments, including seeding due to erosion potential. These soils also exhibit an impaired ability to support vehicle traffic.

3.4.2 RRTR

Terreton silty clay loam forms in old lakebeds. Terreton silty clay loam comprises the primary soil type at the NTR gravel pit. The soil is very deep and well drained. This soil is typically suitable for crops and native vegetation is usually in excellent condition. Coarse material likely inundates the gravel pit, making it suitable for extraction and use as a borrow source. A large portion contained in the proposed fence is used as a gravel source and is devoid of vegetation.

The soil map (Figure 11) shows Whiteknob gravelly loam in the northwest corner of the proposed fenced area. This soil is deep, well drained, and the underlying mixture is often gravelly or very gravelly sand. This soil type could range farther south, contributing to the suitability for using the area as a gravel source.

The Coffee-Nargon-Atom complex soil (2 to 12% slopes) constitutes the only soil type at STR. This soil is moderate to very deep, well drained, and formed in alluvium from loess deposited on basalt. Areas composed of this soil type are found at elevations between 4,500 and 5,500 ft and receive an average of

10 in. of precipitation per year. The soils are moderately extensive throughout southeast Idaho and dominated by sagebrush (Hafla, et al., 2019).

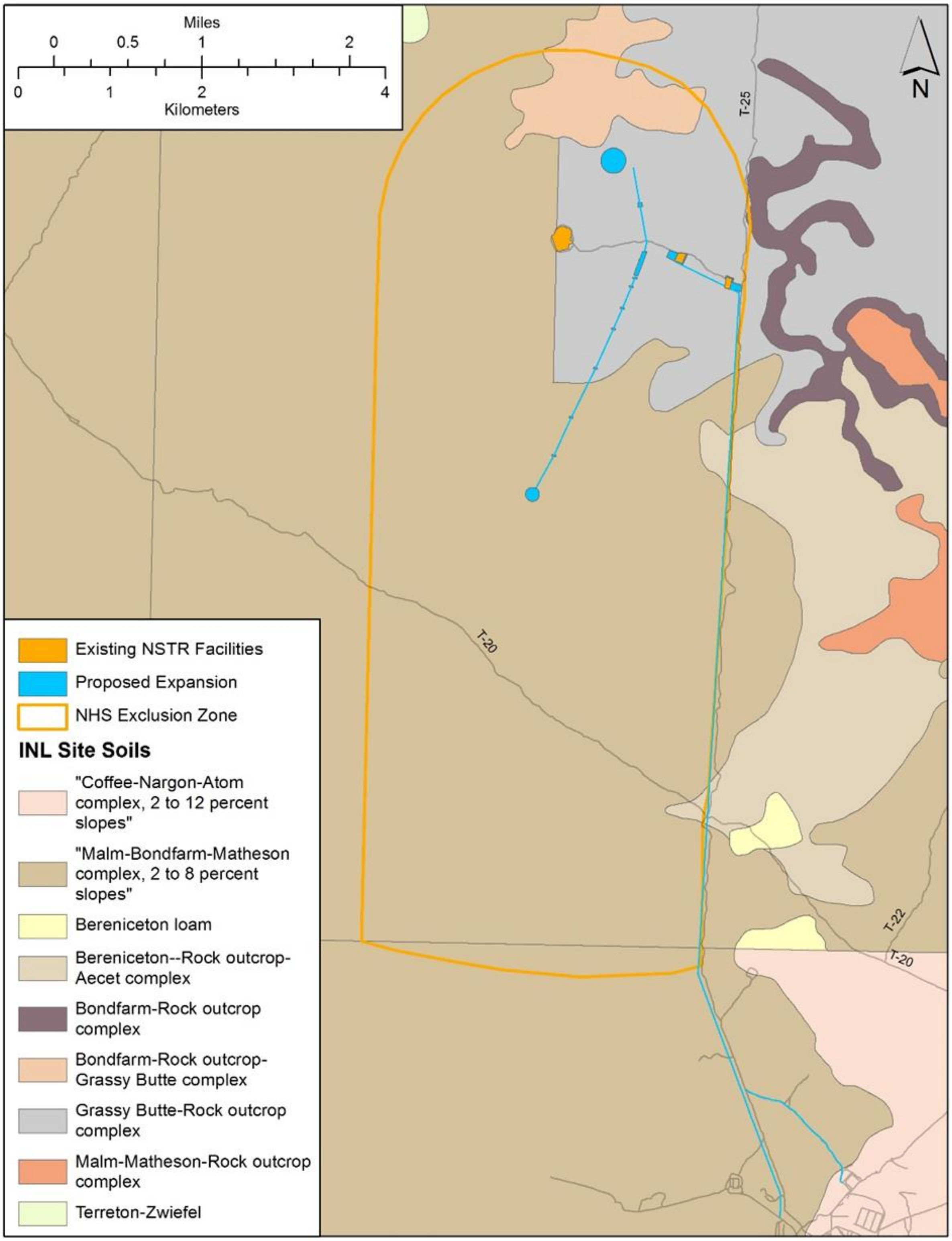

Figure 10. Soils at NSTR.

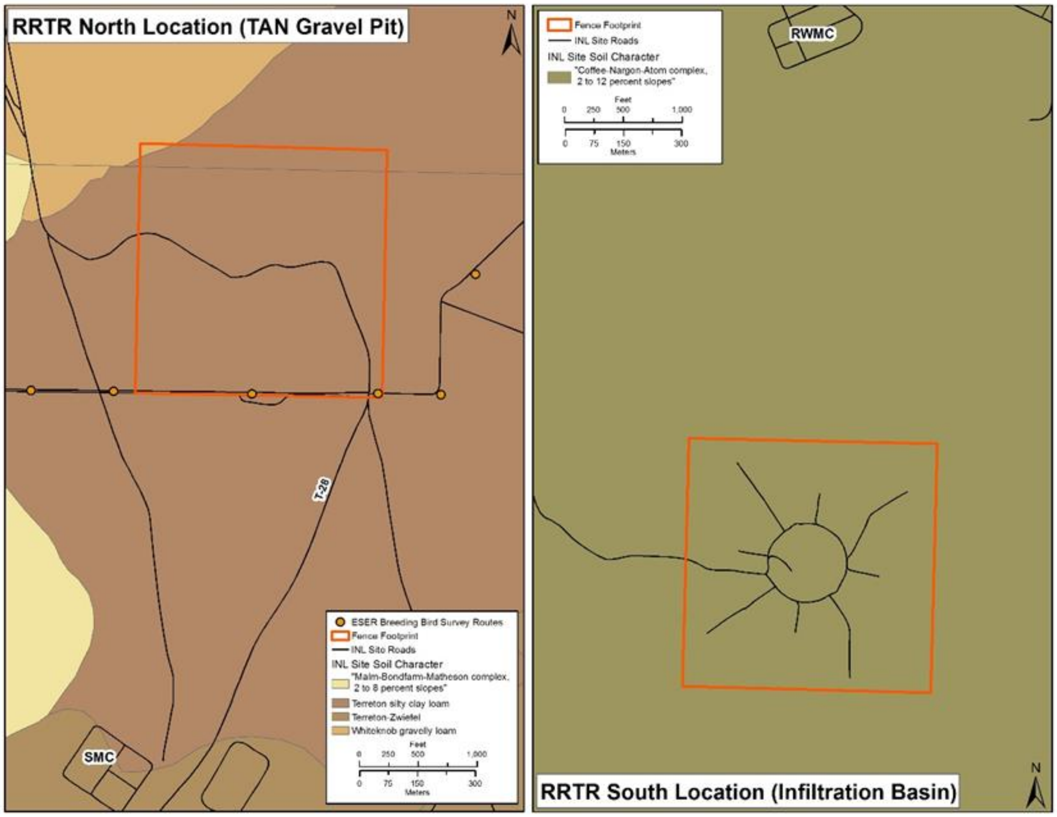

Figure 11. Soils at RRTR locations.

3.5 Water Quality

3.5.1 Groundwater

The Snake River Plain Aquifer (SRPA) under the INL Site lies from 220 ft below land surface at Test Area North to 610 ft below land surface at STR. The geology above the SRPA (i.e., the vadose zone) consists of about 95% basalt flows covered with a layer of soil with thin layers of sediments (1 to 20-ft thick) between basalt flows. The SRPA has geology like the overlying vadose zone and is about 250 to 900-ft thick.

The eastern SRPA is the source for 12 active public water systems at the INL Site and is the primary source for drinking water and crop irrigation in the Upper Snake River Basin. The Environmental Protection Agency (EPA) recognizes the eastern SRPA as a sole source aquifer, because most people living above the aquifer use it as the only source of drinking water. The designation recognizes the importance of water quality in the eastern SRPA. Figure 12 shows predicted average linear flow velocity vectors in the eastern SRPA beneath the INL Site (DOE-ID, 2008).

Historical waste disposal practices have produced localized areas of chemical and radiochemical contamination beneath the INL Site in the eastern SRPA. These areas are regularly monitored, and reports are published showing the extent of contamination plumes.

Groundwater surveillance monitoring is performed for CERCLA waste area groups and the INL Site. At Test Area North, near NTR, groundwater monitoring evaluates the progress of remediation of the plume of trichloroethene. Remedial action consists of three components: (1) in situ bioremediation; (2) pump and treat; and (3) monitored natural attenuation. Sr-90 and Cs-137 were present in wells in the source area at levels higher than those prior to starting in situ bioremediation. The elevated concentrations of these radionuclides are due to in situ bioremediation activities and are predicted to decline below EPA maximum contaminant levels by 2095 (DOE, 2018). No new wells are proposed at NTR.

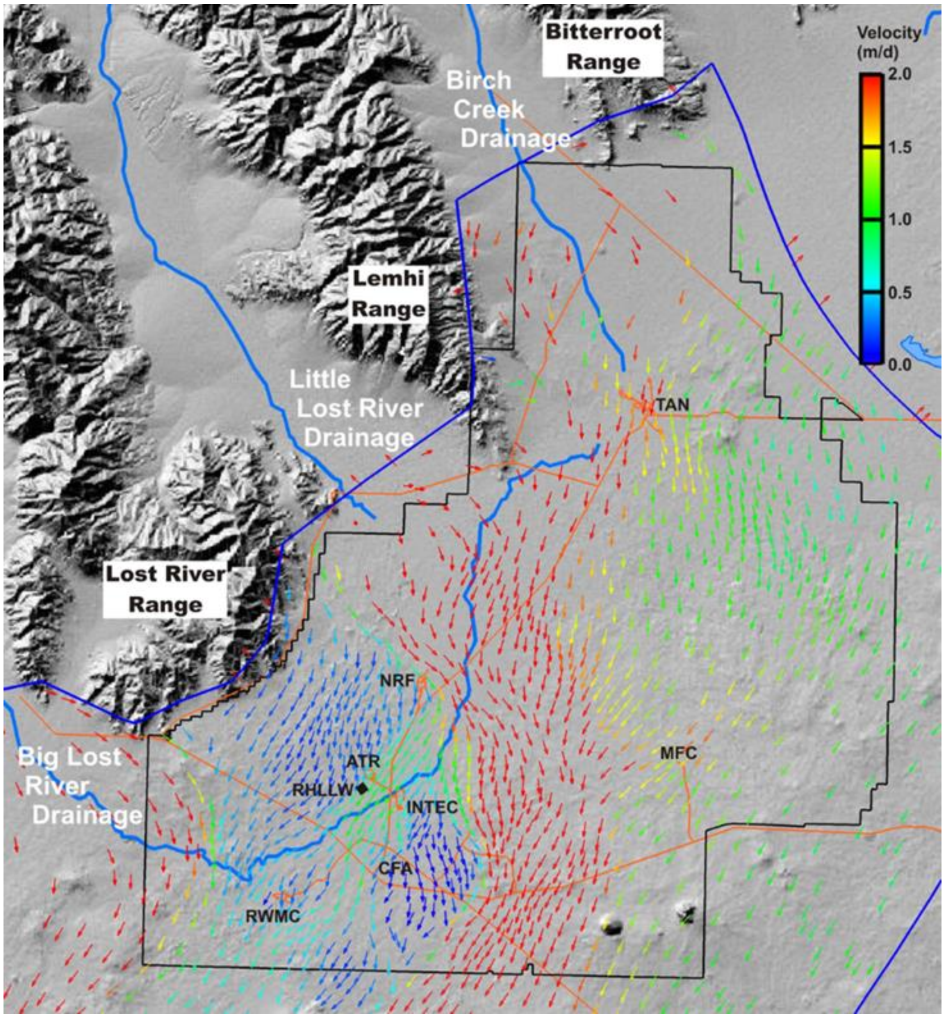

Figure 12. Model-predicted average flow in the SRPA beneath the INL Site.

Historically, volatile organic compound (VOC) concentrations in water samples from several wells at and near RWMC and STR exceeded reporting levels. Concentrations for all VOCs, except tetrachloromethane (also known as carbon tetrachloride), were less than the MCL for drinking water. Concentrations of carbon tetrachloride have routinely exceeded the MCL (5 µg/L) at RWMC since 1998. Trend test results for carbon tetrachloride concentrations in water from the RWMC production well indicate a statistically significant increase in concentrations since 1987, but also indicate a decreasing trend since 2005. The more recent decreasing trend indicates that engineering practices to reduce VOC movement to the aquifer are having a positive effect (DOE, 2018).

Wells at MFC monitored for radionuclides, metals, and other water quality parameters show no evidence of impacts from MFC activities (DOE, 2018). No known past source of potential groundwater contamination of the eastern SRPA occurs at or near NSTR where new drinking water wells are proposed. The nearest drinking water wells at MFC meet groundwater and drinking water standards.

3.5.2 Surface Water

The Big Lost River and Birch Creek are the only surface waters on the INL Site, and both streams carry water on an irregular basis, with most of the flow diverted for irrigation before entering the INL Site boundary. During high water years or during shutdown of the diversion, water has the potential to flow down the historic Birch Creek channel and through parts of the T-28 road and the gravel pit at NTR.

The Big Lost River on the INL Site flows northeast and ends in a playa area called the Big Lost River Sinks on the northwest portion of the INL Site. The river evaporates or infiltrates into the subsurface at the Big Lost River Sinks. No surface water moves off the INL Site.

3.6 Hazardous Materials and Waste Management

3.6.1 Hazardous Materials

Hazardous materials are broadly defined as materials with clearly hazardous properties that pose a substantial threat to human health or the environment. In general, these materials pose hazards from quantities, concentrations, or physical or chemical characteristics. Hazardous materials include common items such as petroleum products, coolants, paints, adhesives, solvents, corrosion inhibitors, cleaning compounds, and chemicals. Hazardous materials also are used in high-technology missiles, munitions, and targets because they are strong, lightweight, reliable, or long-lasting. Both live and inert munitions contain hazardous materials. Hazardous materials at the Ranges include fuel, lubricants, munitions, and cleaning and maintenance materials.

Hazardous constituents are defined as hazardous materials present at low concentrations in a generally non-hazardous matrix; therefore, their hazardous properties do not produce acute effects. Component hazardous materials are considered hazardous constituents. Components that contain hazardous constituents include propellants, batteries, igniters, fuel, diesel fuel, hydraulic fluid, and explosives. Each of these constituents has the potential to affect human health and the environment through direct contact with water, soil, or air.

Equipment used in testing and training does not intentionally release hazardous constituents into the environment. However, tactical equipment may produce waste streams that contain hazardous constituents. Waste streams are handled according to standard DOE procedures and are not released into the environment.

Expended testing and training material such as bombs, targets, and detonation residues can release contaminants to the environment during use or leach small amounts of toxic substances as they explode and decompose. The hazardous constituents that may be released upon use are generally referred to as energetic chemicals. Most are commonly found in the explosive, propellant, and pyrotechnic elements of munitions. These constituents may also leak from munitions that do not detonate upon impact as intended.

DOE conducted a baseline assessment to determine the potential for munitions constituents from NSTR to migrate off-range and cause an unacceptable risk to human or ecological receptors. This baseline assessment was conducted as part of the analysis in the *Final Environmental Assessment for the National Security Test Range and FONSI* (DOE-ID, 2007)Soil monitoring continues, at a minimum, every 5 years at NSTR. The analysis in the *Final Environmental Assessment for the National Security Test Range and FONSI* (DOE-ID, 2007) determined these constituents do not pose any significant impact to personnel or facilities on or off the INL Site.

3.6.2 Hazardous Waste Management

A hazardous waste may be a solid, liquid, semi-solid, or contain gaseous material that alone or in combination may: (1) cause, or significantly contribute to, an increase in mortality or an increase in serious irreversible or incapacitating reversible illness; or (2) pose a substantial present or potential hazard to human health or the environment when improperly treated, stored, transported, disposed, or otherwise managed.

RCRA (42 USC § 6901 st seq.) regulates management of solid waste and hazardous waste. The EPA Military Munitions Rule (40 CFR Parts 260, 261, 262, 263, 264, 265, 266, and 270, 1997) clarifies when conventional and chemical military munitions become a hazardous waste under RCRA. The rule applies to DOE and the Department of Defense. Military munitions are not considered hazardous waste under two conditions stated in the Military Munitions Rule. These conditions cover virtually all uses of munitions and targets at NSTR. Specifically, munitions are not considered hazardous waste when:

- Used for their intended purpose, including training military personnel and explosive emergency response specialists, research and development activities, and when recovered, collected, and destroyed during range clearance events
- Unused and being repaired, reused, recycled, reclaimed, disassembled, reconfigured, or subjected to other material recovery activities.

Hazardous waste is present at INL Site facilities. These materials are accumulated in designated areas and then transported to licensed disposal facilities in accordance with RCRA requirements.

3.7 Noise and Ground Vibration

Testing and training conducted at the Ranges, particularly explosives use at NSTR, present certain safety and health concerns due to fragmentation, air blasts, ground shock, and projectiles. Characteristic noise associated with NSTR explosives testing occurs in pulses rather than as continuous noise. The *Final Environmental Assessment for the National Security Test Range and FONSI* (DOE-ID, 2007) evaluated the noise and ground velocity impacts associated with the maximum test size of 20,000 lb NEW and found that noise and ground motion from 20,000-lb explosives tests have only minor impacts on personnel or facilities on or off the INL Site. Noise levels at the Ranges have not increased above levels analyzed in the *Final Environmental Assessment for the National Security Test Range and FONSI* (DOE-ID, 2007) and the *Final Idaho National Laboratory Radiological Response Training Range Environmental Assessment and FONSI* (DOE-ID, 2010).

3.8 Public Health and Safety

Public health and safety issues include potential hazards inherent in testing and training operations at the Ranges. It is DOE policy to observe precautions in planning and executing all activities that occur on the Ranges to prevent injury to people or damage to property. Procedures established for the safe use of materials at the Ranges set restrictions on the use of various types of ordnance and certain types of operations. Procedures provide specific safety guidelines for each individual range and testing and training facility.

Public health and safety from current operations at the Ranges are discussed in the *Final Environmental Assessment for the National Security Test Range and FONSI* (DOE-ID, 2007) and the *Final Idaho National Laboratory Radiological Response Training Range Environmental Assessment and FONSI* (DOE-ID, 2010).

3.9 Environmental Justice

Executive Order 12898, *Federal Action to Address Environmental Justice in Minority Populations and Low-Income Populations* (1994), directs Federal agencies to address disproportionately high and adverse human health or environmental effects of proposed projects on minority populations and low-income populations.

Sixteen counties are within 50 miles of the INL Site. Fifteen of these counties are in the State of Idaho and one is in the State of Montana. This 16-county region has a low population density. In 2010, the population for this region was 390,608 (U.S. Census Bureau, 2011). Nearly 48% of this population resides in the two most populous counties: Bonneville and Bannock. The largest regional cities are Idaho Falls (located in Bonneville County), with a 2010 estimated population of 56,891 residents, and Pocatello (located in Bannock County), with a 2010 estimated population of 54,224 residents. These two cities represent about 28% of the regional population. The Fort Hall Indian Reservation is located south of the INL Site. It has a 2010 estimated population of 3,201 (about 2% of the population in the five counties in which the INL Site is located).

Table 13 (U.S. Census Bureau, 2018b) lists population by race and Hispanic or Latino origin for the five counties in which the INL Site is located.

Table 13. INL five county population by race and Hispanic or Latino origin.

County	Total Population	Race							Hispanic or Latino (of any race)
		One race						Two or More Races	
		White	Black or African American	American Indian and Alaska Native	Asian	Native Hawaiian and Other Pacific Islander	Some Other Race		
Bingham	45,607	36,752	105	2,970	285	36	4,480	979	7,864
Bonneville	104,234	94,411	585	790	856	86	5,334	2,172	11,912
Butte	2,891	2,761	6	13	5	5	59	42	119
Clark	982	711	7	10	5	0	234	15	398
Jefferson	26,140	23,844	52	203	103	23	1,514	401	2,641
Total	179,854	158,479	755	3,986	1,254	150	11,621	3,609	22,934

For the purpose of this EA, minority populations are those listed in Table 13, except white persons. Minority populations make up about 25% of the five-county population (i.e., 44,174 individuals), and persons of Hispanic or Latino origin comprise 52% of the minority population (i.e., about 12.8% of the total population).

Table 14 shows the percentage of the five-county population living in poverty and median household income in dollars (U.S. Census Bureau, 2018c).

Table 14. Percentage of five county area population in poverty and median household income in dollars by county.

Year	State / County Name	All Ages in Poverty %	Under Age 18 in Poverty %*	Ages 5 to 17 in Families in Poverty %	Median Household Income in Dollars
2017	Bingham County (ID)	12.5	16.1	15.1	$52,697
2017	Bonneville County (ID)	10.5	13.3	11.8	$55,744
2017	Butte County (ID)	16.9	22.1	18.1	$45,226
2017	Clark County (ID)	14.5	21.4	19.2	$42,226
2017	Jefferson County (ID)	9.2	11.3	10.2	$59,869
*Data for ages under age 5 are not available for the counties listed.					

The Fort Hall Indian Reservation has a poverty rate of about 26%, while about 43% of families with children under 18 are below the poverty level (U.S. Census Bureau, 2018a).

4. ENVIRONMENTAL CONSEQUENCES

This section evaluates potential impacts of the proposed action and no action alternative. The CEQ regulations for implementing NEPA require the environmental consequences discussion to address both direct and indirect effects and their significance (40 CFR § 1502.16). Direct effects are caused by the action and occur at the same time and place (40 CFR § 1508.8). Indirect effects are caused by the action and are later in time or farther removed in distance but are still reasonably foreseeable (40 CFR § 1508.8). This section discusses potential direct, indirect, and cumulative environmental impacts resulting from implementation of the proposed action.

Assumptions were made to determine impacts of the proposed action within the project area. Construction disturbance was quantified for both temporary and permanent disturbance to estimate the acreage disturbed as presented in Table 1. Using these assumptions, the proposed action permanently disturbs about 460 acres.

4.1 Proposed Action

Preliminary analysis indicates that implementing the proposed action would not result in impacts on the following elements of the human environment: land use and aesthetic resources, socioeconomics, and surface water. Therefore, this EA does not analyze these elements further for the reasons given in the following paragraphs:

Land Use and Aesthetic Resources – Implementing the proposed action would not introduce new land uses at the INL Site. Activities associated with the proposed action are consistent with current land uses for the INL Site. Implementing the proposed action would not degrade the visual character or quality of the INL Site or its surroundings. Therefore, implementing the proposed action would not affect land use or aesthetic resources.

Socioeconomics – Implementing the proposed action could result in hiring of new employees over time at the INL Site. However, because the increase would be gradual over time and because this would be minimal compared to the rest of the INL Site workforce, potential impacts on the local economy, housing demand, and population growth would be negligible. Therefore, implementing the proposed action would not result in impacts on socioeconomics over the no action alternative.

Surface water – Birch Creek is the only surface water feature in the project area. A permanent control structure diverts the entire stream flow for hydropower production at a power plant several miles north and east of NTR and does not return water to the natural channel. Irrigation consumes flow passing through the power plant. Water not used for irrigation during winter infiltrates the surface in trenches above NTR constructed for flood control and aquifer recharge. Ephemeral flow resulting from precipitation events can flow down the historic Birch Creek channel and through parts of the T-28 road and the gravel pit at NTR. The proposed action does not include activities that physically or chemically alter surface water resources and testing activities are not authorized when water is present in the NTR pit. Therefore, the proposed action does not affect surface water resources.

4.1.1 Air Quality

The proposed action has the potential to generate particulate emissions (i.e., dust) from bulldozing, grading, excavating, and dumping during construction and additional grading for road maintenance. To reduce the potential for fugitive dust, construction crews apply water during soil disturbance. In addition, the proposed action covers soils, replants after construction before erosion becomes advanced, and uses engineering controls (e.g., geotextiles) or other methods to prevent fugitive dust and blowing sand.

All portable/mobile generators used during construction and operations activities would be removed within 1 year of installation.

To minimize dispersals and areas of effect, weather conditions are monitored at the Ranges, and testing and training are postponed as necessary. Project activities are subject to air permitting applicability determinations and additional reviews to limit environmental impacts. The proposed action does not allow releases that exceed the limitations of this EA (e.g., require an air permit, exceed the CERCLA reportable quantity, exceed groundwater or drinking water standards in the aquifer, or exceed CERCLA screening levels in soil).

The proposed action does not install any stationary air pollution sources but does produce air contaminants from construction and operations activities. Air quality modeling furnishes a means to estimate downwind air pollution concentrations, given information about the pollutant emissions and nature of the atmosphere. Impacts to air quality from radiological activities at the Ranges considers pollutant transport, dispersion, and transformation in the atmosphere. This analysis evaluates non-radiological and radiological impacts to air quality.

4.1.1.1 ***Non-Radiological Impacts NSTR.*** Non-radiological explosives and ballistic testing only takes place at NSTR. Proposed activities at NSTR generate air pollutants such as criteria pollutants (e.g., carbon monoxide and sulfur oxides), fugitive dust, soil particles ejected by blasts, and toxic pollutants (e.g., ammonia and formaldehyde). Proposed testing limits explosive amounts and types to keep emissions from exceeding permit to construct facility emission cap limits, indicating very low levels of releases.

Potential airborne emissions from detonating various explosives at NSTR and the effect of those emissions on air quality was modeled for the *Final Environmental Assessment for the National Security Test Range and FONSI* (DOE-ID, 2007) and is described in EDF-7147 (INL, 2006). Constituent information used in the 2006 analysis has not changed and the analysis remains valid.

Calculated maximum quantities of explosives that could be detonated without exceeding ambient air concentration limits for toxic air pollutants and criteria pollutant National Ambient Air Quality Standards at points of compliance are documented in EDF-7147 (INL, 2006). Table 15 (INL, 2006, p. 7) lists allowable releases of pollutants as products of explosives and PM_{10} from displaced soil. DOE based these calculations on air modeling (using EPA's toxic screening model), regulatory air quality limits, and background air concentrations. Calculations used the following receptor locations:

1. The nearest public access location, which is a point 7.0 miles from the proposed test range on Idaho State Highway 33 (used for criteria pollutants and toxic air pollutants with short-term limits)
2. A point on the nearest INL Site land boundary, which is 10.9 miles from the proposed test range (used for formaldehyde, which is the carcinogenic toxic air pollutant with an annual limit).

Table 15. Allowable releases of pollutants as products of explosives and PM_{10} from displaced soil.

Contaminant	Receptor Location	Averaging Period	Air Concentration Limit[8] (µg/m^3)	INL Site Background Concentration	Unit Concentration (µg/m^3 per lb released)	Allowable Release (lb)
Criteria Pollutants						
Carbon monoxide	Hwy33	8 hours	10,000	2300	4.01E+00	1.92E+03
Carbon monoxide	Hwy33	1 hour	40,000	3600	3.21E+01	1.14E+03
Pb	Hwy33	Quarterly	1.5	0.03	1.46E-02	1.00E+02
PM_{10}	Hwy33	Annual	50	9.6	3.66E-03	1.10E+04
PM_{10}	Hwy33	24 hours	150	43	1.34E+0O	8 .01E+01
NO_2	Hwy33	Annual	100	4.3	3.66E-03	2.61E+04
Sulfur oxides	Hwy33	Annual	80	8	3.66E-03	1.97E+04
Sulfur oxides	Hwy33	24 hours	365	26	1.34E+00	2.54E+02

Contaminant	Receptor Location	Averaging Period	Air Concentration Limit[8] ($\mu g/m^3$)	INL Site Background Concentration	Unit Concentration ($\mu g/m^3$ per lb released)	Allowable Release (lb)
Sulfur oxides	Hwy33	3 hours	1,300	34	1.07E+01	1.18E+02
			Toxic Pollutants			
Al_2O_3	Hwy33	24 hours	500	NA	1.34E+00	3.74E+02
CH_2O_2	Hwy33	24 hours	470	NA	1.34E+00	3.52E+02
CH_3OH	Hwy33	24 hours	13,000	NA	1.34E+00	9.73E+03
HCI	Hwy33	24 hours	375	NA	1.34E+00	2.81E+02
HCN	Hwy33	24 hours	250	NA	1.34E +00	1.87E+02
H_2S	Hwy33	24 hours	700	NA	1.34E+0O	5.24E+02
Ammonia	Hwy33	24 hours	900	NA	1.34E+00	6.74E+02
			Carcinogens			
Formaldehyde	INL Site Boundary	Annual	7.7E-02	NA	1.98E-03	3.89E+01

Explosive blasts also eject soil particles. Emissions of soil particles with an aerodynamic diameter less than or equal to 10 micrometers (PM_{10}) were conservatively estimated based on blast crater volumes and the clay fraction measured in soil samples from NSTR. Modeling data show no exceedance of PM_{l0} ambient air limits.

The maximum quantities of explosives that could be detonated without exceeding air quality limits does not change under the proposed action and are listed in Table 16 (also in Table 7 of the *Final Environmental Assessment for the National Security Test Range and FONSI* (DOE-ID, 2007, p. 31).The analysis of air effects from fugitive dust, criteria pollutants, and toxic pollutants in the *Final Environmental Assessment for the National Security Test Range and FONSI* (DOE-ID, 2007) and remains valid.

Table 16. Maximum tons of explosives meeting air quality standards and permit to construct exemption criteria.

	Averaging Time			
Explosive	**1 Hour**	**8 Hours**	**24 Hours**	**Annual**
AI-IPN	0.2	0.2	0.2	6.1
Ammonium Picrate	6.7	56.7	56.7	2,124.9
AN-AI	0.3	0.3	0.3	12.7
ANFO	16.9	28.7	69.2	298.5
AN-NM	56.7	56.7	56.7	2,124.9
Baratol	0.4	0.4	0.4	15.9
Binex 400	1.0	1.0	1.0	38.2
Black Powder	6.7	11.3	21.8	117.6
Dexs	56.7	56.7	56.7	2,124.9
Detonators	0.1	0.1	0.1	0.4*
Dynamite Ammonia	16.9	16.9	16.9	317.5
Dynamite Gelatin (Nitroglycerine)	10.9	18.5	56.7	150.9
Dynamite Straight	4.0	6.8	56.7	71.2
Explosive Mixtures				
HMX Explosives	0.9	0.9	0.9	34.3

	Averaging Time			
Explosive	**1 Hour**	**8 Hours**	**24 Hours**	**Annual**
HMX-GAP	0.4	0.4	0.4	13.6
NM-AI	0.3	0.3	0.3	12.6
PETN	3.8	6.5	44.7	67.3
RDX	5.8	9.8	15.3	102.0
Semtex	4.6	7.8	29.3	81.0
Smokeless Powder	14.7	25.0	25	259.7
Tetryol	53.5	53.5	53.5	2,004.6
TNT	1.4	2.4	6.9	25.1
[*]No more than 0.1 ton per quarter year				

Air emissions from proposed construction activities at NSTR are like typical facility and infrastructure construction projects. Light-duty and heavy-duty trucks are used to level sites, deliver materials to the construction areas, and remove any debris within the project area. During construction, short-term adverse effects on air quality may result from dust and exhaust emissions. Construction phases of the proposed action at NSTR do not increase local air pollutant concentrations beyond state and federal standards at any time. Topography and meteorology of the project area does not restrict dispersion of air pollutants. Localized, short-term effects to air quality from construction activities are expected. Once construction activities are completed, air quality returns to near pre-construction levels. Because of the limited nature of construction activities and use of project controls (e.g., applying water to disturbed areas), air quality impacts would be negligible.

Mobile source usage would increase during construction from heavy equipment and during maintenance and operations at the Ranges. The INL Site is in an area classified by EPA as attainment for all criteria pollutants. Therefore, DOE is not required to keep records on, or otherwise track, air emissions generated by the mobile sources operating on and around the Ranges.

4.1.1.2 Non-Radiological Impacts RRTR. Non-radiological air quality impacts from explosives testing are not evaluated for RRTR. The RRTR ranges (NTR and STR) do not allow this type of non-radiological explosives and ballistic testing. Explosives use at the NTR and STR are limited to that needed for radiological response training as described in Section 2.1.

The proposed action installs a 6 to 8-ft tall chain link fence around the RRTR NTR and STR to control access to radiological training areas (see Figures 6 and 7). Light-duty and heavy-duty trucks deliver materials to the areas and remove construction and other debris. During fence construction, short-term adverse effects on air quality may result from dust and exhaust emissions. Topography and meteorology of the project area do not restrict dispersion of air pollutants. Localized, short-term effects to air quality from construction activities are expected. Once construction activities are completed, air quality returns to near pre-construction levels. Fence maintenance involving vehicle use on dirt roads generates fugitive dust and exhaust emissions in small quantities not exceeding regulatory limits. Because of the limited nature of construction activities and use of project controls (e.g., applying water to disturbed areas), air quality impacts would be negligible.

The *Final Idaho National Laboratory Radiological Response Training Range Environmental Assessment and FONSI* (DOE-ID, 2010) analyzed effects to air quality from initial operations of RRTR such as fugitive dust, criteria pollutants, and toxic pollutants and found only minimal impacts to air quality.

4.1.1.3 Radiological Impacts. While the proposed training limits the area of impact from explosive detonations to the disturbed areas of the explosive test pad, radiological training pad at NSTR, to disturbed areas of RRTR and spreading radioactive materials with mechanical spreaders or sprayers to these same areas, these dispersals produce airborne radioactive contaminants. Atmospheric transport of radionuclides to potential receptors and time-integrated air concentrations were calculated with a Gaussian plume model and 3 years of hourly meteorological data from the nearest meteorological tower to compute the dispersion factor for each worker and public receptor location (Sondrup (2019a) and (2019b)). The dispersion factor is the atmospheric concentration of a radioactive material divided by the source strength at a given distance and direction from the source. The dispersion factor illustrates dilution and dispersal effects in the atmosphere.

The analysis assumes performing 12 tests per year at each test area using all six material types (i.e., Cu, F, KBr, K_2O, $LaBr_3$, and Zr) in each test. More or fewer tests may be performed each year with higher or lower release rates, but the total annual release rate remains the same. The analysis is conservative, because using two radioactive materials per test is more realistic than the model assumption. The model also conservatively assumes each test releases the total activity to the atmosphere, and the radionuclides are easily transported through the air. The analysis is especially conservative for the copper and zirconium metal particulates, which are about 1 mm in size. The proposed action uses liquid fluorine, but this analysis assumes fluorine moves in the environment as a respirable particulate.

The U.S. Nuclear Regulatory Commission Regulatory Guide 1.145 (NRC, 1983) recommends using the 95th percentile dispersion factor in consequence analysis of reactor accidents. The 95th percentile dispersion factor translates to a 5% chance of dose exceedance. In calculating the 95th percentile dispersion factor, the model considers the hours between 9:00 am and 4:00 pm.

For dose calculations, multiplying the 95th percentile dispersion factors by the total annual releases gives a time-integrated concentration at each receptor location. The product of the time-integrated concentration and the inhalation rate delivers an intake rate that yields an annual inhalation dose when multiplied by a dose coefficient. For submersion doses, the time-integrated concentration multiplied by the submersion dose coefficient yields the annual dose from submersion. The total dose is the sum of the inhalation and submersion doses.

4.1.1.4 Radiological Impacts NSTR. Explosive radiological dispersals at NSTR use up to a 5-lb NEW TNT equivalent. Radiological air effects at NSTR were analyzed for tests performed at the new explosives test pad and the new radiological training pad (Sondrup, 2019b). A Gaussian plume model used 3 years of hourly meteorological data (2006 through 2008) from the meteorological tower at nearby MFC.

Table 17 shows the annual ED results for each test location by radionuclide for the worker and public receptor locations with the maximum 95th percentile dispersion factor from all analyzed receptors. The table shows total dose by material type and the total dose assuming all six proposed material types during each test. Table 17 also displays the overall total dose for tests at the new explosives test pad and radiological training pad.

Comparing the 95th percentile dispersion factors for the public shows Location 16 has the highest dispersion factor for the new explosives test pad and Location 13 has the highest for the radiological training pad. Locations 13 and 16 are farmhouses located near Mud Lake, Idaho (see Figure 13).

Figure 14 shows the percent contribution to the total dose by material type for each receptor. The graph is the same for the new explosives test pad and the radiological training pad. The graphs show most dose comes from Zr-97 for both worker and public receptors. The Cu-64 contributes very little to total dose (2.2%).

The overall maximum 95th percentile annual EDs for workers and public receptors are much less than regulatory limits. The maximum 95th percentile dose for a public receptor is 0.0417 mrem/year, which is about 1/239th the regulatory limit of 10 mrem/year. This dose is the maximum dose at Location 16 for tests at the new explosive test pad (12.1 miles north-northeast of the new explosive test pad), plus the maximum dose at Location 13 for tests at the radiological training pad (14.6 miles northeast of the radiological training pad).

Table 17. Maximum 95th percentile annual ED results for NSTR.

Radionuclide	New Explosive Test Pad Worker Dose (CITRC)[a] (mrem/year)	New Explosive Test Pad Public Dose (Location 16)[a] (mrem/year)	Radiological Training Pad Worker Dose (CITRC)[a] (mrem/year)	Radiological Training Pad Public Dose (Location 13)[a] (mrem/year)
Material: Potassium Oxide (K_2O)				
Total Dose K_2O	**3.77E-03**	**2.77E-03**	**4.23E-03**	**2.42E-03**
Material: Lanthanum Bromide ($LaBr_3$)				
Total Dose $LaBr_3$	**1.82E-03**	**1.32E-03**	**2.04E-03**	**1.15E-03**
Material: Potassium Bromide (KBr)				
Total Dose KBr	**7.60E-03**	**5.36E-03**	**8.52E-03**	**4.68E-03**
Material: Copper Metal				
Total Dose Cu-64	**6.02E-04**	**4.32E-04**	**6.75E-04**	**3.78E-04**
Material: Zirconium Metal				
Total Dose Zr-97	**6.02E-04**	**4.32E-04**	**1.68E-02**	**9.88E-03**
Material: Fluorine				
Total Dose F-18	**1.58E-03**	**1.06E-03**	**1.77E-03**	**9.26E-04**
Total Dose All Materials	**3.04E-02**	**2.22E-02**	**3.41E-02**	**1.94E-02**

a. See Figure 13 for locations.

Although the maximum public dose locations are different for the two test locations at NSTR, this analysis conservatively adds the dose values together for comparison to the regulatory limit (see Table 18). The maximum 95th percentile dose for a worker is 0.0644 mrem/year (less than 1/77,000th the federal limit of 5,000 mrem/year). This dose is for a worker located at CITRC, 13.5 miles southwest of the new explosives test pad and 11.4 miles southwest of the radiological training pad. This dose is from 12 tests per year at both the new explosive test pad and the radiological training pad.

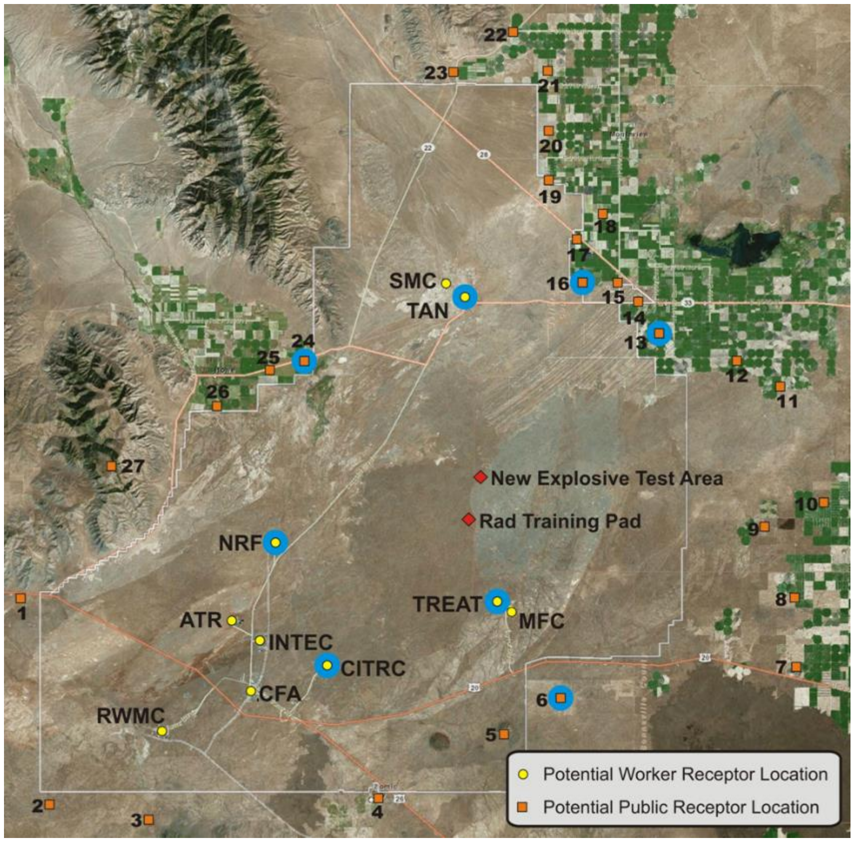

Figure 13. Potential NSTR public and worker receptor locations (analyzed receptors shown in blue).

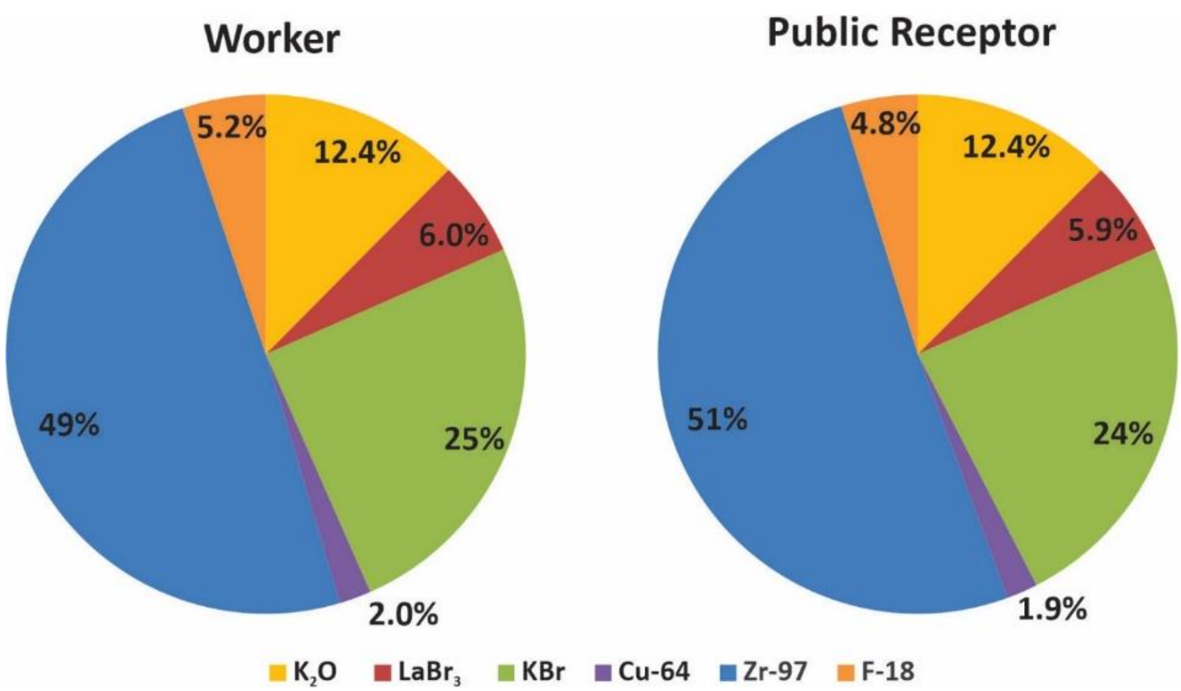

Figure 14. Percent contribution to total dose by material type for NSTR worker and public receptors.

The maximum 95th percentile dose for a public receptor is 0.0417 mrem/year. Although the maximum public dose locations are different for the two test locations at NSTR, this analysis conservatively adds the dose values together for comparison to the regulatory limit (see Table 18). The maximum 95th percentile dose for a worker is 0.0644 mrem/year (less than 1/77,000th the federal limit of 5,000 mrem/year). This dose is for a worker located at CITRC, 13.5 miles southwest of the new explosives test pad and 11.4 miles southwest of the radiological training pad. This dose is from 12 tests per year at both the new explosive test pad and the radiological training pad.

Table 18. Overall combined maximum 95th percentile annual ED for both NSTR locations.

Test Location	Worker Dose (mrem/yr)	Public Dose (mrem/yr)
New Explosives Test Pad	3.04E-02 (CITRC)[a]	2.22E-02 (Location 16)[b]
Radiological Training Pad	3.41E-02 (CITRC)[a]	1.94E-02 (Location 13)[b]
Total	**6.44E-02**	**4.174E-02**[c]

[a] CITRC is the maximum worker dose location for both the new explosives test pad and the radiological training pad.

[b]Location 16 is the maximum public dose location for the new explosive test pad, and Location 13 is the maximum public dose location for radiological training pad. See Figure 13 for locations.

[c]Conservative sum of maximum dose from two different locations.

4.1.1.5 Radiological Impacts RRTR. The analysis evaluates radiological dose from potential atmospheric releases for public receptors off the INL Site and for workers at nearby INL Site facilities. The analysis couples a Gaussian plume model with 3 years of hourly meteorological data (i.e., 2006 through 2008). Meteorological data for the NTR analysis came from the nearest tower at Test Area North and data for STR came from the nearest tower at RWMC (Sondrup, 2019a).

The model calculated dispersion factors at potential public receptor and worker locations (see Figure 15). The analysis calculated dispersion factors for the nearest public receptors to both RRTR sources (i.e., STR and NTR). The public receptor nearest STR is Location 3 (Frenchman’s cabin) and the nearest to NTR is Location 19. Comparison of 95th percentile dispersion factors for Locations 2, 3, and 4, which are nearest to the STR, confirm Location 3 has the highest value. Comparison of 95th percentile dispersion factors for Locations 16 through 20, nearest NTR, indicate the maximum value was not at Location 19, but at Location 20. Location 3 is 3.75 miles south-southwest of STR. Location 20 is 9.18 miles northeast of NTR.

The analysis also calculated dispersion factors for workers at INL Site facilities nearest NTR and STR. The northwest corner of the SMC facility is the worker occupied area nearest NTR (about 1.02 miles south-southwest of NTR) (see Figure 15). The STR worker exposure point is the parking lot at the southeast corner of RWMC, which is located about 0.93 miles north-northeast of STR. The analysis did not consider other facilities because of the proximity to SMC and RWMC.

Figure 16 shows the percent contribution to the total dose by material type for each receptor. The graphs are the same for NTR and STR and show most of the dose comes from Zr-97 with smaller contributions from F-18, K_2O, KBr, and $LaBr_3$ for both receptors. Cu-64 contributes little to the total dose (about 2%).

The calculated maximum 95th percentile annual EDs for workers and public receptors are considerably less than the regulatory limits. The maximum 95th percentile dose for a public receptor is 0.0482 mrem/year, which less than 1/207th the regulatory limit of 10 mrem/year from airborne emissions. This dose is for a receptor 9.2 miles northeast of NTR. The maximum 95th percentile public dose for STR is 3.43E-04 mrem/year, which is also much less than the regulatory limit of 10 mrem/year. The maximum 95th percentile doses for workers are about the same for the NTR (i.e., 0.605 mrem/year) and STR (i.e., 0.594 mrem/year). These doses are less than 1/8200th of the federal worker dose limit of 5,000 mrem/year.

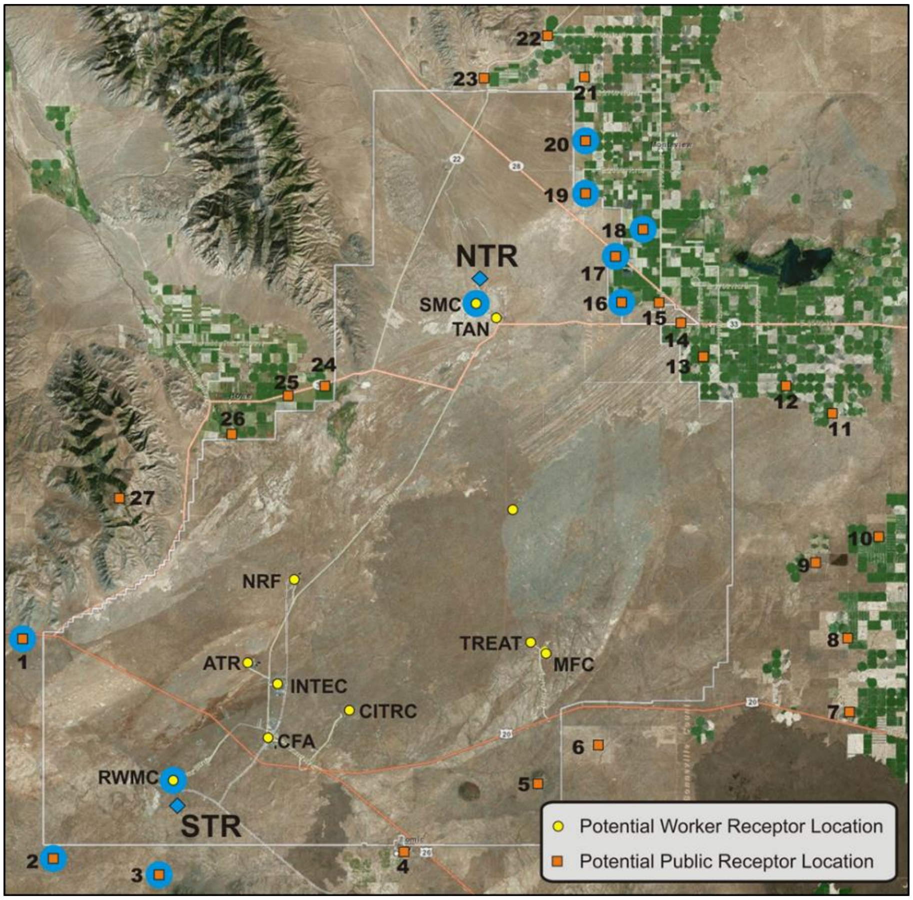

Figure 15. Potential RRTR public and worker receptor locations (analyzed receptors shown in blue).

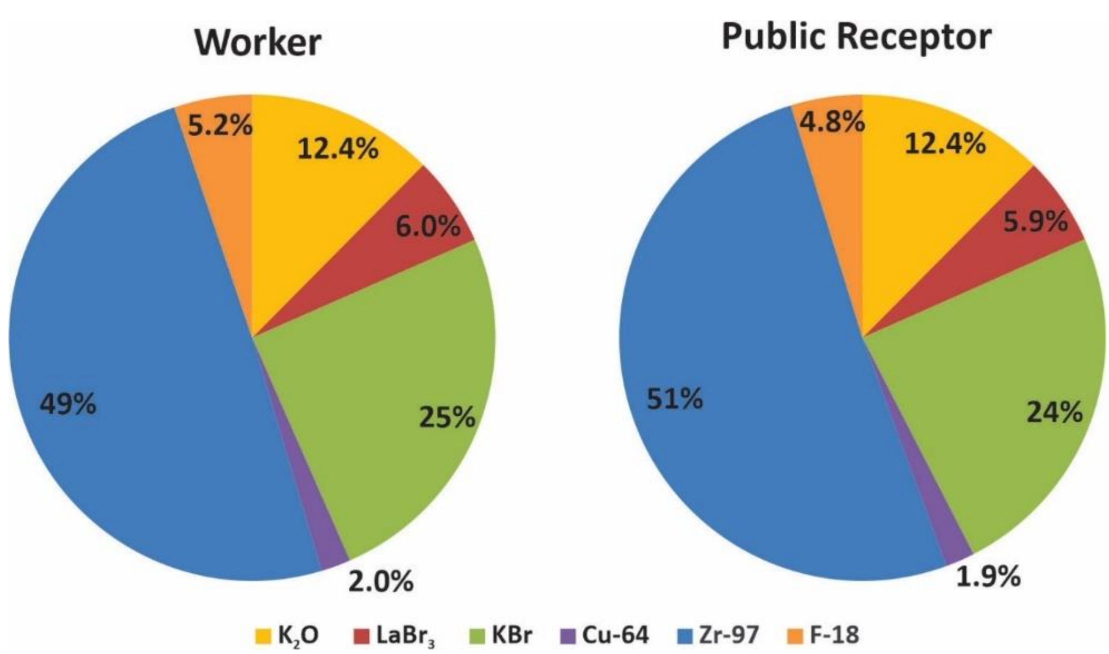

Figure 16. Percent contribution to total dose by material type for the NTR and STR worker and public receptors.

Table 19 shows the annual ED by radionuclide for the NTR and STR worker and public receptor locations. The table shows total dose by material type and the total dose assuming use of all six material types during each test.

Table 19. Maximum 95th percentile annual ED results for NTR and STR.

	------- North Test Range -------		------- South Test Range -------	
Radionuclide	Worker Dose (SMC)[a] (mrem/year)	Public Dose (Location 20)[a] (mrem/year)	Worker Dose (SMC)[a] (mrem/year)	Public Dose (Location 20)[a] (mrem/year)
Material: Potassium Oxide (K_2O)				
Total Dose K_2O	7.52E-02	6.00E-03	7.38E-02	4.26E-05
Material: Lanthanum Bromide ($LaBr_3$)				
Total Dose $LaBr_3$	3.62E-02	2.85E-03	3.55E-02	2.03E-05
Material: Potassium Bromide (KBr)				
Total Dose KBr	1.51E-01	1.16E-02	1.49E-01	8.26E-05
Material: Copper Metal				
Total Dose Cu-64	1.20E-02	9.37E-04	1.18E-02	6.66E-06
Material: Zirconium Metal				
Total Dose Zr-97	2.99E-01	2.45E-02	2.93E-01	1.74E-04
Material: Fluorine				
Total Dose F-18	3.14E-02	2.30E-03	3.08E-02	1.63E-05
Total Dose All Materials	**6.05E-01**	**4.82E-02**	**5.94E-01**	**3.43E-04**

a. See Figure 15 for locations.

Figure 16 shows the percent contribution to the total dose by material type for each receptor. The graphs are the same for NTR and STR and show most of the dose comes from Zr-97 with smaller contributions from F-18, K_2O, KBr, and $LaBr_3$ for both receptors. Cu-64 contributes little to the total dose (about 2%).

The calculated maximum 95th percentile annual EDs for workers and public receptors are considerably less than the regulatory limits. The maximum 95th percentile dose for a public receptor is 0.0482 mrem/year, which less than 1/207th the regulatory limit of 10 mrem/year from airborne emissions. This dose is for a receptor 9.2 miles northeast of NTR. The maximum 95th percentile public dose for STR is 3.43E-04 mrem/year, which is also much less than the regulatory limit of 10 mrem/year. The maximum 95th percentile doses for workers are about the same for the NTR (i.e., 0.605 mrem/year) and STR (i.e., 0.594 mrem/year). These doses are less than 1/8200th of the federal worker dose limit of 5,000 mrem/year.

4.1.1.6 Air Quality Modeling Summary and Potential Combined Impacts. Actual air impacts are likely less than those presented due to conservative assumptions and parameters used in the modeling (Sondrup 2019a, Sondrup 2019b). For example, calculations assume release and transport of the entire inventory of each material with no plume deposition, depletion, or radioactive decay during transport. The calculations also assume the same meteorological conditions (e.g., wind velocity, wind direction, and stability class) that produce the 95th percentile dose are the same during all 12 tests each year and the presence of the same receptor during all 12 tests. The analysis also assumes performing 12 tests each year at test locations using all six material types (Cu, F, KBr, K_2O, $LaBr_3$, and Zr) for each test. The assumption is conservative, because using only two materials per test is likely.

Maximum potential dose impacts were calculated and presented separately for the new explosives test pad and radiological training pad at NSTR and for NTR and STR at RRTR. The location of maximum effect for a member of the public was different for each test location. The location of maximum effect for a worker was different for RRTR's NTR (SMC) and STR (RWMC), but it was the same for the new explosives test pad and radiological training pad at NSTR (CITRC).

Modeling did not calculate the effect at a single receptor location (worker or public) from combined testing at locations. However, Table 20 shows the combined effect if the maximum dose results at different receptors are summed for the four test locations. Although the scenario is unrealistic, it highlights the summed results are still below regulatory limits for workers and members of the public. The dose estimates are also below the average background dose from environmental sources (terrestrial and cosmic radiation) for persons living at high altitude (about 0.3 mrem/day) (U.S. EPA, 2017).

15, Location 3). The potential annual dose at Frenchman's Cabin has ranged between 0.01 mrem (2018) and 0.07 mrem (2009) over the last 10 years. While the modeled public doses are higher than the annual NESHAP dose, actual doses from testing at NSTR and RRTR are likely to be a smaller fraction of the dose to the INL Site MEI. For example, the estimated dose at the INL Site MEI location from testing at RRTR during 2018 was 7.56E-05 mrem/year (DOE, 2019b), which is less than 1% of the total MEI dose.

Table 20. Overall combined 95th percentile annual ED results for test locations.

Test Location	Worker Dose (mrem/year)	Public Dose (mrem/year)
NSTR New Explosives Test Pad	3.04E-02 (CITRC)	2.228E-02 (Location 16)
NSTR Radiological Training Pad	3.41E-02 (CITRC)	1.94E-02 (Location 13)
NSTR Total	6.44E-02	4.17E-02[a]
RRTR NTR	6.05E-01 (SMC)	4.82E-02 (Location 20)
RRTR STR	5.94E-01 (RWMC)	3.43E-04 (Location 3)
RRTR Total	1.20E+00[a]	4.85E-02[a]
NSTR/RRTR Total	1.26E+00[a]	9.02E-02[a]
Dose Limit (mrem/year)	5.0E+03	1.0E+02

a) These values are mathematical summations and do not represent realistic doses because each dose calculation used a different location. Results summed only for comparison to regulatory limits.

To comply with NESHAP regulations, DOE calculates annual potential doses to public receptors for INL Site releases. The location of the NESHAP MEI is typically Frenchman's cabin south of RWMC (Figure 14, Location 3). The potential annual dose at Frenchman's Cabin has ranged between 0.01 mrem (2018) and 0.07 mrem (2009) over the last 10 years. While the modeled public doses are higher than the annual NESHAP dose, actual doses from testing at NSTR and RRTR are likely to be a smaller fraction of the dose to the INL Site MEI. For example, the estimated dose at the INL Site MEI location from testing at RRTR during 2018 was 7.56E-05 mrem/year (DOE, 2019b), which is less than 1% of the total MEI dose.

Air quality impacts from implementing the proposed action caused by construction, operations, and testing and training activities would be minimal and localized and would not cause changes to regional air quality. In addition, long-term operations would not result in any non-permitted sources of toxic air emissions. Because of the limited nature of construction activities and use of project controls to minimize radiological dispersals and areas of effect, air quality impacts would be negligible.

4.1.2 Historical and Cultural Resources

Under the National Historic Preservation Act (2014) and 36 CFR Part 800 (2004) regulations, the specific legal context of a cultural or historical site's significance as set out in Section 106 of the National Historic Preservation Act (2014), as amended, guides assessing adverse effects on cultural resources. A property may be listed in NRHP if it meets the criteria for evaluation defined in 36 CFR 60.4 (1981):

The quality of significance in American history, architecture, archaeology, engineering, and culture is present in districts, sites, buildings, structures, and objects that possess integrity of location, design, setting, materials, workmanship, feeling, and association and

- that are associated with events that have made a significant contribution to the broad patterns of our history
- that are associated with the lives of persons significant in our past
- that embody the distinctive characteristics of a type, period, or method of construction, that represent the work of a master, that possess high artistic values, or that represent a significant and distinguishable entity whose components may lack individual distinction;
- that have yielded or may be likely to yield information important in prehistory or history.

Most Native American archaeological sites are evaluated according to Criterion d, which refers to site data potential. These sites typically lack historical documentation that might describe important characteristics. Applying archaeological methods and techniques contributes to understanding information recovered from sites. DOE evaluates sites partly to obtain data to contribute to answering scientific research questions, but also to apply those data to further understand traditional cultural values. For example, animal bones from an archaeological deposit can provide information about the nature of precontact peoples' diet, foraging range, exploited environments, environmental conditions, and seasons during which various wildlife species were taken. These data help reconstruct Native American ways of life and further understanding of sites that have traditional or spiritual significance to contemporary Native Americans or other groups.

NRHP eligibility determinations also consider archaeological site integrity. Pre-contact and prehistoric site evaluations analyze location, setting, design, workmanship, feeling, association, and materials to assess site integrity. Cultural and post-depositional factors (e.g., highway construction, erosion, or disturbance) may compromise resources, yet sites may retain their integrity under Criterion d if important information potentially remains. Conversely, the quantities or preservation of archaeological materials may be insufficient for accurate identification, which reduces the potential to obtain information. Assessing these qualities is particularly important when the spatial relationships of artifacts and features are necessary to determine patterns of past human behavior. It is important to note that Native American artifacts remain important to the Shoshone-Bannock Tribes even if they are not associated with an NRHP-eligible archaeological site.

Based on survey results and subsurface evaluations documented in the *Cultural Resource Assessment for the expansion of capabilities at National Security Test Range and Radiological Response Training Range at Idaho National Laboratory* (Holmer, Cook, Henrikson, Gilbert, & Armstrong, 2019), the cultural resources identified at the Ranges are either ineligible for the NRHP or are outside the area potentially effected by project activities. Those resources that remain eligible for inclusion into the NRHP will not be impacted by project activity through project redesign in order to circumvent eligible resources or avoidance and archaeological monitoring during construction activities. As such, the proposed action will have no effect on historic properties.

DOE completed Section 106 consultation with the Shoshone-Bannock Tribes and the Idaho State Historic Preservation Office (SHPO). SHPO concurred with the recommendation that the proposed action will have no effect on historic properties.

While the proposed action will have no effect on cultural or historic properties eligible under NRHP, the cultural practices, beliefs, and identity of indigenous people connects them to the land in intangible ways not captured in the National Register criteria. The National Register criteria do not capture the indigenous cultural feeling, association, and experience derived from an intangible view of the area. Tribal members typically have a high sensitivity to landscape change and changes to the visual quality of the landscape based on these historical and spiritual connections. Infrastructure and other changes across the landscape can erode these connections.

Because proposed infrastructure and land disturbance is mostly associated with existing facilities and previous disturbance, changes to the existing landscape are not expected to be substantial. There are open panoramic views across the INL Site with Big Southern, Middle, and East Buttes and several mountain ranges in the background. However, the exact location of infrastructure such as powerlines and the associated impacts to intangible connections can only be determined and known by the people whose cultural practices, beliefs, or identity connects them to the affected area. As such, DOE is committed to actively engaging representatives of the Shoshone-Bannock Heritage Tribal Office in evaluating new infrastructure, interpreting the associated impacts, and identifying potential mitigation, avoidance, and protection measures.

The proposed action does not have the potential to impact properties eligible for listing on NRHP. However, if during any project activities, project personnel discover unanticipated cultural, historical, pre-contact, or prehistoric resources, they must make proper notifications and cease all work in the immediate area. DOE will follow any and all applicable laws that may apply to the discovery dependent on its nature (e.g., the Native American Graves and Repatriation Act (43 CFR Part 10, 1990) and the Archaeological Resource Protection Act (19 USC Ch. 1B, 2004)); see the Cultural Resource Management Plan (DOE-ID, 2016). Following an analysis of the discovery, work will continue in the area when DOE has given clearance to do so.

4.1.3 Ecological Resources

The following provisions pertain to general wildlife (e.g., jack rabbits, lizards, snakes, and squirrels) and protected species (e.g., those species protected under various state and federal laws or regulations, such as special status species) during construction and operations.

Greater Sage-Grouse — *The Final Environmental Assessment for the National Security Test Range and FONSI* (DOE-ID 2007) required an annual sage-grouse population survey. These surveys were conducted for nine consecutive years and found no impact on sage-grouse populations in the vicinity of the range (Hafla et al. 2019). The proposed action removes requirements for the annual NSTR survey and supplants the requirement with the annual INL Sitewide sage-grouse population survey as discussed in Hafla et al. (2019).

Time-of-day restrictions apply to construction and operations activities within 1 km of greater sage-grouse (Centrocercus urophasianus) leks from March 15 to May 15. Other design features include reclamation and avoiding habitat disturbance if possible. Activities at the INL Site comply with other conservation measures described in the CCA for greater sage-grouse, including avoiding installing power lines within 1 km of active leks and installing raptor perch deterrents on power poles and guy wire flight deterrents when necessary.

In compliance with the CCA (DOE-ID & USFWS, 2014), the project must complete pre and post construction surveys to establish the amounts of sagebrush restoration and other native revegetation efforts needed to rehabilitate disturbed areas as determined by DOE's ESER contractor. To mitigate the loss of sagebrush and comply with DOE policy, the proposed action requires monitoring sagebrush disturbance and planting amounts equal to that disturbed in areas beneficial to sage-grouse.

Raptors and Migratory Birds — To minimize impacts to nesting raptors, the proposed action prohibits construction and operations within recommended spatial and seasonal buffers. Spatial and seasonal buffers would be identified by the ESER contractor for species observed in the project area (see Section 3). If topography limits actual line-of-sight between an active nest (i.e., the nest has eggs or young) and construction activities, the spatial and seasonal buffers can be reduced with prior authorization from the ESER contractor.

Work during the migratory bird nesting season (April 1 through October 1) requires a migratory bird nesting survey 72 hours prior to vegetation disturbance in an area. If surveys discover active nests, the project implements measures, such as buffer areas or halting work, to prevent nest abandonment until after the migratory bird nesting season or until young have fledged.

Construction and operations personnel also must report dead or injured birds. Any dead bald eagles or golden eagles that are found must be reported immediately to DOE upon discovery. Other dead or injured migratory birds that appear to have been poisoned, shot, electrocuted, or were otherwise killed or injured as the result of potential criminal activity must also be reported to DOE immediately.

The proposed action would result in the loss of about 1,300 acres of habitat at the Ranges through direct disturbance from activities listed in Table 21. The estimated area of disturbance is conservative because it assumes the proposed action removes all vegetation on the entire downrange area (908 acres). However, direct disturbance in the downrange area to establish the downrange target area amounts to about 45 acres. If projectile testing limits impacts to the disturbed area of the downrange target area, the proposed action disturbs about 270 acres at NSTR.

Table 21. Acres of disturbance in the proposed action.

Location	Acres
Downrange target area and downrange area	908[a]
Laydown areas expansion	12
New explosives test pad and access road	16
NSTR administrative buffer area perimeter	20
NSTR access road around TREAT exclusion zone	2
Power line installation and maintenance	170
NTR fence perimeter and enclosure	92
STR fence perimeter and enclosure	92
Total	1,312

a. It is unlikely the entire downrange area would be disturbed. Construction of the downrange target area disturbs about 45 acres. Disturbance in the remaining downrange area is limited to munitions fired downrange that miss targets.

Section 4.1.3.5 discusses potential impacts on ecological resources from radionuclides used during radiological response training at NSTR and RRTR.

Intensive ecological surveys were completed and are detailed in Hafla et al. (2019). Survey methods and results are summarized in the following subsections. DOE activities at the INL Site release radioactive and non-radioactive constituents. Pathway vectors (such as air, soil, plants, animals, and groundwater) can transport these constituents to nearby populations.

At NSTR, ecological surveys focused on areas of expected disturbance with an additional buffer. Each area was surveyed for signs of wildlife, invasive species, and sensitive plants. The plant community surveys occurred every 100 m in areas in and adjacent to areas of proposed disturbance. A total of 227 points were surveyed for vegetation classification. The point count for each section of the survey follows: powerline adjacent to T-25 – 110, alternate route to T-25 around TREAT– 15, downrange target area – 61, and the new explosives test pad and road – 41. Random surveys of the project area from MFC to NSTR using aerial photos, topographic maps, and previously collected data were conducted to determine areas containing potential habitat for sensitive species and/or wildlife.

At RRTR, ecological surveys focused on areas of expected disturbance based on the project description. Fence placement at NTR and STR will be based on avoiding cultural and other sensitive resources. Therefore, road and fence surveys included a smaller buffer area than surveys at NSTR, but they did consider the general area and focused on areas more likely to have invasive or sensitive species within the fence boundaries and a select number of random areas outside the fence boundaries.

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. Impacts to ecological resources are taken from Hafla, et. al. (2019) and summarized in this section.

4.1.3.1 ***NSTR Plant Communities.*** Soil disturbance, such as blading the explosives test pad, will result in the direct loss of vegetation. Fragmentation of plant communities and reduction to the habitat value of those communities is also a direct environmental consequence of soil disturbance. Indirectly, soil disturbance increases the risk of invasion by non-native weeds and may act as a vector for introducing those weeds into adjacent undisturbed plant communities.

DOE complies with regulations pertaining to control of noxious weeds on INL Site land. The proposed action implements future weed control as needed. Herbicide use complies with regulations and requirements.

The sandy soils and sensitive needle-and-thread dominated communities at the NSTR site are particularly susceptible to weed invasion, which is one of the primary reasons they are considered vulnerable to critically imperiled across their historic range. The proposed action disturbs about 270 acres of vegetation at NSTR. Hafla et al. (2019) note that needle-and-thread dominated and co-dominated communities represent about 10% of the areas surveyed for the new explosives test pad, downrange target area, and new powerline. About 30 acres of needle-and-thread dominated and co-dominated communities would be permanently disturbed.

The soil at the new explosive test pad and the downrange target area have very high potential for wind erosion that makes them unsuitable for revegetation due to erosion. This becomes important when considering restoration or long-term erosion control measures. The proposed action permanently removes vegetation from the new explosives test pad and most of the downrange target area; vegetation restoration is not a goal in these areas. The proposed action controls erosion by placing fill material in cleared areas. Soil impacts are discussed in Section 4.1.4.

Painted milkvetch populations will be removed where soils are disturbed and will be impacted by habitat fragmentation and increased risk of weed invasion across the entire NSTR area. Disturbance to populations of painted milkvetch should be carefully considered, because it is narrowly endemic to the region and occupies specific habitat in semi-stabilized sand dunes. Current population numbers and trends are unknown, so it is difficult to correlate the impact of removing some populations at NSTR to the persistence of the species overall. Removing additional populations on the INL Site (some were removed with the original NSTR project) may eventually affect the regulatory status of the species because it was originally removed from listing consideration due to the stability of several INL Site populations.

Impacts to painted milkvetch populations along the proposed new power line access route can be avoided by surveying the proposed route and placing poles in areas not occupied by the species and restricting vehicle travel. Surveys did not find any populations of this species in the area proposed for the new explosives test pad and access road. While populations of painted milkvetch likely occur on the proposed downrange target area, the downrange target area totals roughly 5.2% of the NSTR downrange area. It is anticipated that with use of administrative and engineering controls, such as conducting operations according to DOE-STD-1212-2012 (DOE, 2012) and Department of the Army Pamphlet 385-63, the likelihood of projectiles impacting painted milkvetch outside of the length and width of the downrange target area is small.

4.1.3.2 RRTR Plant Communities. Vegetation removal and disturbance reduces habitat in the project area, which is more pronounced in good condition sagebrush habitat. In the CCA (DOE-ID & USFWS, 2014), DOE agreed to implement a "no net loss" of sagebrush policy across the INL Site. By fencing areas of sagebrush, the area no longer supplies habitat. The proposed action fences about 184 acres. To mitigate the loss of sagebrush and comply with DOE policy, the proposed action requires monitoring sagebrush disturbance and planting amounts equal to that disturbed in areas beneficial to sage-grouse. Assuming the proposed action disturbs 184 acres of sagebrush, 184 acres of sagebrush would be planted in restoration areas identified in the CCA (DOE-ID & USFWS, 2014). The total amount is likely less than 184 acres, because not all fenced area contains sagebrush.

In addition, all roads and disturbances are vectors for the spread of undesirable species. Weed control around both perimeter roads and other areas at NTR and STR reduces the potential for weed invasion.

Project controls minimize soil and vegetation disturbance and limit vehicle travel to established roadways, laydown areas, and turnarounds. Project controls also require restoring areas subject to short-term ground disturbance to original contours and revegetating with certified weed-free native seed. The loss of protected or sensitive species or loss of local populations from direct mortality or diminished survivorship is not anticipated at the Ranges.

4.1.3.3 NSTR and RRTR Ethnobotany. Most species of ethnobotanical importance documented on the Ranges are common across the INL Site. The impacts of the proposed activities would likely be greater on less common species than they would be on abundant species. Removing several individuals from large populations will not greatly affect the species persistence. However, it will affect the potential use of an area for harvesting seeds or vegetative structures. Because soil disturbance and the risk of non-native species invasion will impact populations of species of ethnobotanical concern, the most effective mitigative measure to protect those populations is to minimize the amount of soil disturbed. Potential impacts to populations of plant species of ethnobotanical concern may also be mitigated through revegetation of areas impacted by soil disturbance.

The proposed action results in loss of individuals but does not affect the persistence of populations of species of ethnobotanical concern.

4.1.3.4 Wildlife. Hafla et al. (2019) identified the following potential direct and indirect impacts to wildlife from implementing the proposed action:

1. Permanent and temporary habitat loss and associated wildlife species from disturbing soils and clearing vegetation
2. Nest abandonment or wildlife displacement from operations (e.g., equipment, materials, and testing)
3. Habitat fragmentation, increased fire frequency, and weed invasion
4. Disturbance and direct wildlife mortality from increased motor vehicle activity
5. Increased wildlife disturbance from increased human and wildlife interactions.

Wildlife impacts occur when habitats or individuals are disturbed or lost. The significance of impacts depends, in part, on population sensitivity. The proposed action has a greater potential to affect sensitive wildlife species than to affect general wildlife, because these species are generally less tolerant of environmental changes. Hafla et al. (2019) detail other potential effects to wildlife summarized as follows:

NSTR—With the incorporation of project controls and other project features, potential impacts to wildlife will be minimized or avoided to the extent practical. These controls include, but are not limited to, seasonal timing of specific testing activities to avoid critical times for wildlife and minimize wildland fire risk, reduced speed limits on access roads, managing potential wildlife attractants such as disturbed soils and trash, weed management planning, keeping work areas neat, warning signs (to alert personnel as to the presence of wildlife), reflectors, ultrasonic warning whistles on vehicles, hazing animals from the road and test bed, and worker awareness programs. For wildlife, impacts are considered significant if they resulted in loss of individuals of protected or sensitive species or loss of local populations of wildlife through high levels of direct mortality or diminished survivorship. No such impacts were identified previously.

Most proposed activities and associated potential impacts are very similar to those from current operations. However, proposed construction activities cause increased ground disturbance and habitat loss within the boundaries of the administrative buffer area. Increased permanent infrastructure (offices and work buildings) would be established in areas previously disturbed or adjacent to disturbed areas. New access roads connecting NSTR facilities (new test circle and downrange target area), new power line, and a new alternate route to T-25 would increase linear features, weed species penetration, and potential fragmentation of wildlife habitat. Consistent implementation of previously identified controls minimizes and avoids potential impacts to wildlife species in the NSTR area.

Proposed activities unique to the NSTR site include installation of a new 13.8-kV distribution line to bring electric power from a substation at MFC to the NSTR facilities area, UAV testing at testing pads, ballistic projectile training outside the current test range, and training using radioactive sources, including the release of radionuclides in specified locations. Among these, only the new distribution line has the potential to affect wildlife. However, the new line would be located within 50 ft of a long established 138-kV transmission line and be sited close to the existing T-25 road; little increased fragmentation would be associated with the new line and limited new access would be required for construction and maintenance. Minimal impacts from the new powerline are expected.

Potential impacts to wildlife from an increase in the frequency of explosive detonations would primarily be noise disturbance. Hafla et al. (2019) note that noise effects on wildlife vary from serious to nonexistent in different species and situations. Impacts include increased stress hormones, fleeing behavior, permanent and temporary hearing threshold shifts, masking the ability to hear predators, and interfering with communication.

Incidental evidence, including continued use of the project area, indicates that wildlife at NSTR are not adversely affected by the existing ambient and impulse noise conditions. Impulse noise events occur only during daytime operational hours (i.e., normally 7:00 a.m. to 5:30 p.m.). Animals active at night (nocturnal) and at twilight (crepuscular) would be unlikely to be active during this time. Therefore, disruption of nocturnal or crepuscular individuals' normal behaviors, including foraging and breeding would be negligible. Impulse noise would be unlikely to result in direct mortality of wildlife because of the short duration (typically less than 1 second) of each event. Diurnal (i.e., active during the daytime) wildlife in the area would likely have a startle reaction to impulse noise events. This reaction could result in the temporary interruption of individuals' normal behaviors, including foraging and breeding. However, because the impulse noise is of short duration and large and mid-range test events are relatively infrequent, it is unlikely to result in adverse impacts on wildlife populations.

The proposed action also involves firing large caliber weapons and small arms at NSTR. However, noise effects from daily explosive detonations using less than 100 lb NEW dominate the overall Range operational noise. Most NSTR activities require short bursts of intense activity and some noise. During these timeframes, wildlife in the immediate vicinity may be disrupted from their normal activities, but there would be no lasting effects. For single detonations, behavioral disturbance is likely to be limited to a short-lived startle reaction. Momentary behavioral reaction of an animal to a brief, time-isolated acoustic event constitutes a minor effect on wildlife. The proposed action would not result in behavioral changes or responses in a biologically important behavior or activity to a point where such behaviors are abandoned or significantly altered.

Wildlife in testing and training areas may temporarily avoid the areas during exercises but will likely return after training has ceased. Therefore, disturbance to wildlife from increased operations and human interactions under the proposed action is expected to be short-term and temporary and will not permanently impact wildlife populations

Greater sage-grouse – In 2014, a spring lek survey route was established around the NSTR area. This route consists of three leks that are monitored annually. Recent burns have resulted in a notable long-term impact on sage-grouse nesting, brood-rearing, and foraging habitat at NSTR and in areas adjacent to NSTR. However, if sage-grouse re-occupy the area in the future, project controls such as seasonal time restrictions for specific testing activities to avoid critical times for sage-grouse, minimizing wildland fire risk, and controlling invasive species will minimize impacts.

NSTR is not within the established sage-grouse conservation area but is subject to DOE's no net-loss of sagebrush habitat policy on the INL Site and the project must complete pre and post construction surveys to establish the amounts of sagebrush restoration and other native revegetation efforts needed to rehabilitate disturbed areas as determined by DOE's ESER contractor. To mitigate the loss of sagebrush and comply with DOE policy, the proposed action requires monitoring sagebrush disturbance and planting amounts equal to that disturbed in areas beneficial to sage-grouse.

Clearing vegetation on the explosives and downrange target area within 2 miles (3.2 km) of nesting habitat may increase use of the area by breeding sage-grouse by inadvertently providing an ideal area for breeding displays during the spring. Continuous use of these areas would likely preclude use by sage-grouse, but if use is observed on new areas cleared under the proposed action, time-of-day and seasonal restrictions will be implemented.

Ferruginous hawk – Ferruginous hawks are highly sensitive to human-induced disturbance. Based on habitat requirements and the presence of nests, this species has the potential to occur in the NSTR area. Increased human activity associated with increased customer use in spring has the potential to displace nesting ferruginous hawks. These impacts can be minimized by temporal avoidance (controlling human activity and blasting during the nesting period if ferruginous hawks are confirmed nesting).

The Migratory Bird Treaty Act protects migratory birds, their nests, and eggs. If any activity having the potential to disturb nests, including mowing, occurs between March 1 and October 1, a nesting bird survey will be conducted before the activity begins. Work control to avoid nest disturbance is implemented when nests are discovered.

RRTR—Direct and indirect impacts to wildlife at the RRTR locations would be like those for NSTR discussed above. Construction activities, additional roads, new fencing, vegetation alteration or removal, and soil disturbance would have common unavoidable impacts to wildlife, including disturbance caused by increased human presence, loss of certain ground-dwelling wildlife species and associated habitat, and displacement of certain wildlife species due to increased habitat fragmentation. The proposed action minimizes these impacts through proper micro-siting of project elements (e.g., fences and signs) to avoid sensitive resources, limiting disturbance footprints, managing weeds, and revegetating temporarily disturbed areas. In addition, installing 8,400 linear feet of 6 to 8-ft fencing at both NTR and STR creates an intermittent barrier for big game species but prevents inadvertent radiological exposure to these species. New fencing encloses about 92 acres around each test area; big game species could potentially enter and be trapped in fenced areas prior to training events; however, the probability is low. Fencing would not prevent movement of birds or small animals.

Although suitable habitat for greater sage-grouse occurs in the vicinity of RRTR test areas, minimal direct impacts to greater sage-grouse are anticipated due to (1) the limited amount of disturbance planned in areas with habitat and (2) the distance from known leks to developed areas. Portions of the proposed STR perimeter fence lie within the Sage-grouse Conservation Area (SGCA). The CCA includes fencing in its definition of infrastructure and construction of fencing within the SGCA constitutes a loss of sagebrush habitat (DOE-ID & USFWS, 2014). Infrastructure (such as fencing) also presents a collision risk to sage-grouse. Fencing 184 acres is well below the habitat adaptive management trigger identified in the CCA (i.e., 20% of existing habitat within the SGCA or 194,922 acres).

In addition, DOE committed in the CCA to avoid constructing new infrastructure in the SGCA unless feasible alternatives could not be identified. This commitment requires that DOE contact the U.S. Fish and Wildlife Service (USFWS) to determine whether an amendment to the CCA or associated conference opinion is necessary. DOE and USFWS have determined the proposed action does not require such amendments.

Consistent implementation of previously identified measures and controls minimize and avoid potential impacts to wildlife species in the project area.

Because of the limited nature of disturbance and use of project controls, ecological impacts would be negligible. Implementing the proposed action will result in the direct loss of vegetation and associated indirect impacts to habitat, soils, and wildlife, but will not cause loss of protected or sensitive species populations or loss of local populations from direct mortality or diminished survivorship (Hafla, et al., 2019).

4.1.3.5 *Biota Dose Assessment.* Radiological activities that cause direct radiation of the environment, or that discharge or otherwise release radioactive material into the environment must comply with DOE-STD-1153-2019, *A Graded Approach for Evaluating Radiation Doses to Aquatic and Terrestrial Biota* (DOE, 2019a) to show that dose rates to representative biota populations do not exceed the dose rate criteria in DOE Order 458.1. The DOE dose limits for protecting terrestrial biota (DOE, 2019a) are 1 rad/d (10 mGy/d) for terrestrial plants and 0.1 rad/d (1 milligray [mGy]/d) for terrestrial animals. These dose limits represent expected safe levels of exposure; dose rates below these limits cause no measurable adverse effects to populations of plants and animals (DOE, 2019a).

In addition, the *Operable Unit 10-08 Record of Decision for Site-Wide Groundwater, Miscellaneous Sites, and Future Sites* (DOE-ID, 2009) the ecological screening level for all radionuclides and for all functional groups are based on a chronic dose of 1 mGy/d (10mGy/d for plants), the dose below which there do not appear to be changes in animal populations and is consistent with the DOE dose limits above. The DOE dose limits for protecting terrestrial biota and the ecological screening levels in the *Operable Unit 10-08 Record of Decision for Site-Wide Groundwater, Miscellaneous Sites, and Future Sites* (DOE-ID, 2009) are the same—1 rad/d (10 mGy/d) for terrestrial plants and 0.1 rad/d (1 mGy/d) for terrestrial animals.

The DOE dose limits are measured using rad/d and the discussion of biota dose in the following analysis uses mrem/per unit of time for consistency. The difference between rad and rem is that rad measures the radiation absorbed by the material or tissue. The rem measures the biological effect of that absorbed radiation. Generally, for x-rays and gamma rays, one rad equal one rem (1,000 mrem).

To determine impacts on the environment, the dose from radioactive materials to plant and animal populations in the affected area were evaluated. The maximum predicted soil concentrations in the top 5 cm of soil after 15 years of testing (assuming a density of 1.5 g/cc and a moisture content of 0.3) within a 16-ft diameter circle were used for this assessment (Table 22).

The impact on non-human biota can be assessed using *A Graded Approach for Evaluating Radiation Doses to Aquatic and Terrestrial Biota* (DOE, 2019a) and the associated software, RESRAD-Biota 1.8 (http://resrad.evs.anl.gov/codes/resrad-biota/). Dose limits of 1.0 rad/day (10 mGy/d) for terrestrial plants and 0.1 rad/day (1 mGy/d**)** for terrestrial animals are intended to provide protection from chronic exposure of whole populations of individual species rather than individual members of the population. If the estimated ratio is below 1.0, the dose to the receptor is below the biota dose limit and the general screening evaluation has been passed.

Table 22. Maximum radionuclide concentrations in soil after 15 years of testing.

Nuclide	Maximum Soil Concentration (pCi/g)
Be-10	2.78E-12
C-14	5.00E-03
Cl-36	1.67E-02
K-40	4.64E+01
Ni-63	2.11E-06
Zn-65	6.67E-02
Se-79	6.07E-04
Rb-87	2.37E-03
Pd-107	1.46E-13
Cd-109	1.54E-10
Ag-110m	1.34E-02
Cs-135	3.01E-11
Cs-137	1.76E-11
La-137	1.39E-06
La-138	1.15E-02

The impact on non-human biota can be assessed using *A Graded Approach for Evaluating Radiation Doses to Aquatic and Terrestrial Biota* (DOE, 2019a) and the associated software, RESRAD-Biota 1.8 (http://resrad.evs.anl.gov/codes/resrad-biota/). The RESRAD code calculates both radiological dose and risk. Carbon-14, Cl-36, Cs-135, Cs-137, K-40, and Zn-65 are the only radionuclides shown in Table 22 and in the RESRAD-Biota 1.8 radionuclide library. The screening results for these radionuclides are presented in Table 23. As shown in the table, terrestrial animals are the limiting organism, and the dose to terrestrial animals from the proposed action is below the biota dose limit for C-14, Cl-36, Cs-135, Cs-137, K-40, and Zn-65.

ERICA 1.2.1 (http://www.erica-tool.com/), a software system like RESRAD-Biota 1.8, was employed to assess the impact of some of the remaining radionuclides on terrestrial biota. The Terrestrial Environmental Media Concentration Limit used for terrestrial environments is analogous to the Biotic Concentration Guide (BCG) used in RESRAD-Biota for terrestrial animals. The limit is based on a dose level of 40 µGy/hour, which is approximately equivalent to 1 mGy/day (the DOE standard for terrestrial animals). ERICA was used to assess the risk quotient (analogous to the BCG/concentration ratio shown in Table 23) for Ni-63, Se-79, Cd-109, and Ag-110m. As shown in Table 24, the final risk quotient sum (2.72E-07) is below 1.0 and four orders of magnitude below the summed BCG/concentration ratios (0.42) calculated using RESRAD-Biota for the radionuclides shown in Table 23.

The sum of the BCG/concentration ratios for C-14, Cl-36, Cs-135, Cs-137, K-40, and Zn-65 (Table 23) and the risk quotients for Ni-63, Se-79, Cd-109, and Ag-110m (Table 24) is 0.39, which is below the DOE dose limit (1 mGy/da or 40 µGy/hour). No detrimental impact to terrestrial biota from these radionuclides is expected.

The remaining radionuclides (Be-10, Rb-87, Pd-107, La-137, and La-138) are not available in either RESRAD-Biota 1.8 or ERICA 1.2.1. They are all long-lived beta emitters and two of them (Rb-87 and La-138) have half-lives long enough (49.2 billion and 102 billion years, respectively) to be considered primordial. The shortest half-life (60 thousand years) belongs to La-137. Palladium-107 (half-life of 6.5 million years) is a pure beta emitter. Be-10 (half-life of 1.39 million years) is also a naturally occurring radionuclide formed in the Earth's atmosphere mainly by cosmic ray spallation of nitrogen and oxygen.

Table 23. Terrestrial BCG report for RESRAD-Biota 1.8 Level 1 analysis.

Terrestrial Animal					
Nuclide	Soil Concentration (pCi/g)	BCG (pCi/g)	Ratio	Limiting Organism	Ratio
C-14	0.005	4.76E+03	1.05E-06	Yes	1.05E-06
Cl-36	0.0167	2.89E+02	5.78E-05	Yes	5.78E-05
Cs-135	3.01E-11	2.62E+02	1.15E-13	Yes	1.15E-13
Cs-137	1.76E-11	2.08E+01	8.48E-13	Yes	8.48E-13
K-40	46.4	1.19E+02	3.90E-01	Yes	3.90E-01
Zn-65	0.0667	4.13E+02	1.62E-04	Yes	1.62E-04
Summed	-	-	**3.90E-01**	-	**3.90E-01**
Terrestrial Plant					
	Soil				TOTAL
Nuclide	**Concentration (pCi/g)**	**BCG (pCi/g)**	**Ratio**	**Limiting Organism**	**Ratio**
C-14	0.005	6.07E+04	8.24E-08	No	8.24E-08
Cl-36	0.0167	3.36E+03	4.98E-06	No	4.98E-06
Cs-135	3.01E-11	2.81E+04	1.07E-15	No	1.07E-15
Cs-137	1.76E-11	2.21E+03	7.98E-15	No	7.98E-15
K-40	46.4	1.38E+03	3.36E-02	No	3.36E-02
Zn-65	0.0667	2.47E+04	2.70E-06	No	2.70E-06
Summed	-	-	**3.36E-02**	-	**3.36E-02**

Table 24. Risk quotient and limiting reference organisms for ERICA 1.2.1 screening analysis.

Nuclide	Concentration (pCi/g)	Concentration (Bq/kg)	Terrestrial Environmental Media Concentration Limit (Bq/kg)[1]	Risk Quotient	Limiting Reference Organism
Ni-63	2.11E-06	7.81E-11	5.11E+06	4.13E-13	Reptile
Se-79	6.07E-04	2.25E-08	2.20E+05	2.75E-09	Annelid
Cd-109	1.54E-10	5.70E-15	6.38E+04	2.41E-15	Arthropod - detritivorous
Ag-110m	1.34E-02	4.96E-07	2.35E+04	5.69E-11	Mammal - large
			∑ Risk Quotients	**2.72E-07**	
Dose screening rate value is 40 Gy/hour for terrestrial animals, birds, amphibians, and reptiles, and 400 Gy/hour for plants and other aquatic organisms. It previously has been suggested that below these values (of chronic exposure), no measurable population effects would occur. 40 Gy/hour is approximately equivalent to 1 mGy/day, which is the DOE dose rate limit for terrestrial animals.					

These radionuclides are beta emitters and consequently the doses received by terrestrial animals due to external exposure would be negligible. A small burrowing mammal would more likely receive a dose from inhalation of suspended contaminated soil particles or ingestion of soil, but vegetation is prevented from growing on the test pads. Because there are no known published dose conversion factors for biota for Be-10, Rb-87, Pd-107, La-137, and La-138, dose conversion factors for inhalation and ingestion for human receptors (EPA 2002) were used to compare the potential impact of these radionuclides with the those assessed using RESRAD-Biota and ERICA. The comparison of the combination of dose conversion factors and soil concentrations indicates that the doses that would be received by biota from these remaining radionuclides would be bounded by doses previously calculated by RESRAD-Biota and ERICA. For example, the concentration of La-138 in soil (1.15E-2 pCi/g) is similar to that of Cl-36 (1.67E-2 pCi/g). The ingestion dose conversion factor for La-138 (4.05E-03 rem/Ci) is also similar that that for Cl-36 (3.44E03 rem/Ci). The inhalation dose conversion factor for La-138 (5.77E-05 rem/Ci) is slightly higher than for Cl-36 (1.40E-05 rem/Ci). However, given that the BCG ratio estimated for Cl-36 is 5.78E-5 (Table 23), it is logical to assume that the ratio for La-138 would also be orders of magnitude below 1.0 and would not affect the final summed ratios. Using the same approach, the remaining radionuclides were likewise dismissed as minor contributors to the total dose to terrestrial animals.

For populations of flora and fauna not listed as threatened and/or endangered, exposures to contaminated soil that result in a hazard quotient greater than or equal to 10 are inhibited (DOE-ID, 2009). As shown in Table 24, the risk quotient for the proposed action is 2.72E-07 which is 367 times lower than this exposure limit for flora and fauna.

Radiological testing at the Ranges would not exceed DOE standards for protection of biota and do not indicate that populations of plants and animals could be impacted from exposure to ionizing radiation from implementing the proposed action.

4.1.3.6 NSTR Invasive and Non-Native Species. Soil disturbance is a primary contributor to spreading invasive plants. Invasive and non-native plants are present on much of the T-25 road and around the edges of developed areas at NSTR. Most invasive and non-native species produce large numbers of seed. Mowing, blading, and other means used to remove the vegetation could result in the spread of invasive and non-native species. Minimizing ground disturbance minimizes seed dispersal. Failure to limit seed dispersal from these areas increases revegetation and weed management efforts. Given the proposed schedule for construction activity to begin in summer, the probability for seed dispersal onto the project site and roads is high, as is the likelihood of offsite transport of weed seeds.

Project controls restricting unnecessary off-road traffic and repetitive mowing reduces the potential spread of non-native and invasive species. Weed control on and adjacent to areas where soil disturbance and vegetation removal is recurring also minimizes the introduction of weeds. Weed control and prevention requirements at the INL Site are implemented through PLN-611, "Sitewide Noxious Weed Management" (INL, 2013).

4.1.3.7 RRTR Invasive and Non-Native Species. Although surveys of the RRTR ranges did not find noxious weed species, invasions could occur during soil disturbing events. Seed dispersal issues and controls mentioned above for the NSTR location apply to the RRTR locations.

Minimal impacts from invasive and non-native species from the proposed action are expected. Consistent implementation of previously identified measures and controls minimizes and avoids potential impacts from invasive and non-native species in the project area.

4.1.4 Soils

The proposed action minimizes soil and vegetation disturbance to that necessary to install project components and for future safe operation and maintenance. It also limits vehicle travel to established roadways, laydown areas, and turnarounds.

Project controls require restoring areas subject to short-term ground disturbance (e.g., pole areas and spur routes) to original contours. Disturbed areas around poles and on spur routes require revegetation as soon as practicable using certified weed-free seed mix composed of native species found in or endemic to the area. Reclamation aims to restore disturbed areas to at least 70% of pre-disturbed cover.

Under the proposed action, soil monitoring for radionuclides will take place at least every 2 years for at least two rounds of monitoring. Based on the results, monitoring frequency may be either increased to annually or decreased. Soil monitoring and sampling will also be performed no less than every 5 years to verify radionuclide, chemical, and explosive constituent concentrations do not approach ecological screening levels or PRGs. If concentrations approach ecological screening levels or PRGs, soils will be removed and placed in a licensed disposal facility. Using the ecological screening levels and residential PRG verifies human health and the environment will be protected when training at the Ranges is complete.

A vehicle-mounted Global Positioning Radiometric Scanner (GPRS) system (Rapiscan Model GPRS-1111) is used to conduct soil surface monitoring (gross gamma) surveys to assess any buildup of radioactivity due to Range operations. The GPRS system consists of two scintillator gamma detectors, housed in two separate metal cabinets, and a Trimble global positioning system receiver, mounted on a rack above the front bumper of a pickup. The detectors are about 36 inches above-ground. The detectors and the global positioning system receiver are connected to a system controller and to a laptop computer. The GPRS system displays the gamma counts per second from the detectors and the latitude and longitude of the system in real time on the laptop screen. The laptop computer also stores the data files collected for each survey. The GPRS system collects latitude, longitude, and gamma counts per second from both detectors. Data files generated during the radiological surveys are saved for mapping after survey completion, and the maps show where survey counts are at or near background levels and areas above background levels.

Data from the GPTS surveys indicate the need for additional review if data show that soil concentrations exceed background concentrations. Background concentrations are used as comparative data and not as risk-based screening levels or final “action levels” above which a prescribed action must occur. Rather, these data are a starting point by which the significance of a measured concentration and the need for soil sampling can be evaluated.

The DOE Handbook *Environmental Radiological Effluent Monitoring and Environmental Surveillance* (DOE, 2015) states that soil sampling and analysis should be used to evaluate the long-term accumulation trends and to estimate environmental radionuclide inventories. It notes that soil provides an integrating medium that can account for contaminants released to the atmosphere either directly in gaseous effluents or indirectly from resuspension of onsite contamination. However, while soil sampling is a useful approach for determining the accumulation of airborne radionuclides that have been deposited on the ground, soil sampling is of questionable value in attempting to estimate small increments of deposition over a period of a few years or less because of 1) the large uncertainties in sampling, 2) the inherent variability in soil, and 3) it is not recommended as a routine method of environmental monitoring except in preoperational surveys (DOE, 1997).

4.1.4.1 Non-Radiological Impacts. Erosion is the natural process by which water or wind removes soil from its natural location. Vegetation removal impacts soils by increasing exposure of susceptible soils to water or wind erosion at the land surface. While bare-ground conditions would not be a typical result of the proposed action (except for at test pads, downrange target area, and roads) in isolated areas, erosion could result in a degradation of the land surface and reduced long-term soil productivity through loss of topsoil material. Soil disturbance also results in a direct loss of native vegetation and supplies opportunities for establishment of invasive and other non-native plants.

NSTR—Vehicle traffic to and on NSTR test areas, including on the downrange target area, also disturbs soil. This is due to the limited ability of the soil at NSTR to support vehicle traffic. All-terrain vehicles can have similar impacts on these sandy soils. Limiting the amount of traffic to the project site and restricting traffic to the project site itself reduces the area of soil disturbance.

Planning and site preparation that minimizes soil disturbance reduces impacts to soil and vegetation, and limits efforts required for revegetation and weed management, efforts which are difficult in the sandy soil types found at NSTR. Implementing the following project controls minimizes or avoids soil disturbance:

- Limit regrading of soil to areas maintained as sterile or otherwise free of vegetation
- Restrict vehicle traffic to designated roadways and parking and laydown areas.

The proposed action limits travel to once a year and on an emergency basis (e.g., wildland fire) on areas that are secondary to the project such as areas where fence and sign maintenance occur. Because of the high wind erosion hazard for these soils, the proposed action requires erosion control measures such as covering soils, replanting after construction before erosion becomes advanced, or using engineering controls (e.g. geotextiles) or other methods to prevent fugitive dust and blowing sand.

The proposed routes for new road segments (downrange target area and new explosives pad) pass through highly erodible soils. Portions of proposed new roads have potential to erode and down-cut during notable precipitation events such as large thunderstorms and rain-on-snow events and will require repair, graveling, or grading.

As part of routine range maintenance activities, range debris (e.g., target debris, military munitions packaging and crating material, and unexploded ordnance) would continue to be periodically removed and disposed of in accordance with proper disposal procedures. Many training events include cleanup after the exercise. Discarded training materials (i.e., expended munitions debris) that accumulate on ranges would also be periodically removed. The actual depth clearing and the frequency for how often this maintenance is required depends on the specific location and ordnance type. Soils would be impacted during the cleanup of discarded training materials but would be regraded and reseeded if necessary.

In addition, the volume of expended material that decomposes within the training areas and the amounts of toxic substances being released to the environment could increase over the period of use. Concentrations of some substances in sediment surrounding the expended material may also increase over time. Transport of these substances via winds and erosion has the potential to disperse these contaminants outside the training areas.

However, background samples for a wide variety of constituents was performed at NSTR in 2007, and additional samples were taken in 2013/2014 and 2017 to assess deposition rates. These soil samples taken over 10 years at NSTR showed positive detections for several products of combustion that may be attributed to detonating explosives and that are also normally found in soil. The concentrations of nearly all detected constituents have remained relatively constant over the 10 years of NSTR operation. Only a few chemical constituents showed an increase in concentration over the lifetime of NSTR. These chemicals, and their respective maximum concentration (in any single sample) can be compared to PRGs using Table 25. Concentrations of chemicals below the PRGs are unlikely to cause adverse health effects over a lifetime of exposure.

Table 25. PRGs and maximum concentrations of products of combustion that increased at NSTR from 2007-2017.

Constituent	PRG (ppm)	Maximum Concentration Detected at NSTR
Ammonia	No PRG	139 ppm
Chloride	No PRG	19.3 ppm
Sulfate	No PRG	37 ppm
Nitrate	1.3E+5 ppm	70 ppm
Toluene	4.9E+3 ppm	24 ppb
m/p-Xylene	5.5E+2 ppm	30 ppm
o-Xylene	6.5E+2 ppm	11 ppm
Methanol	1.2E+5 ppm	0.46 ppm

In addition, the *Comprehensive Remedial Investigation Feasibility Study (RI/FS) for Waste Area Group 6 (WAG-6) and Waste Area Group 10 (WAG 10) Operable Unit (OE) 10-04* (DOE, 2001) identifies the ecological risk for RDX at 2 ppm and TNT at 9 ppm. The minimum concentration in soil samples from NSTR that can be detected with a high degree of confidence is about 0.095 ppm. Soil sampling results from 2007 to 2017 for all nitro-aromatics, including TNT, taken after 10 years of operation at NSTR show “not-detected.”

While the proposed action increases the frequency of explosives use at NSTR, the hourly and daily limits listed in Table 16 restrict the amounts of explosives use and remain unchanged from the amounts analyzed in the 2007 NSTR EA (DOE-ID, 2007). Under the proposed action, no individual detonations would exceed 20,000 lb NEW. Table 7 lists a number of required actions to address explosive residues, including verifying that all explosive material has been consumed or removed after testing is performed; removing and disposing of test articles after testing is performed; and performing soil sampling in the area for residue deposition/accumulation at least every five years. Based on these limitations and soil sampling results from 2007 to 2017, the maximum concentrations of chemicals showing an increase in concentration over the lifetime of NSTR are anticipated to remain well below hazardous levels.

As previously stated, soil sampling will be performed no less than every 5 years to verify chemical and explosive constituent concentrations do not approach PRGs. If concentrations approach PRGs, soils will be removed and placed in a licensed disposal facility.

RRTR— The above information also applies to RRTR; however, the proposed action disturbs less ground and does not authorize explosives testing at RRTR. The proposed action disturbs about 5 acres from fence construction and subsequent perimeter road. Although road use increases, the proposed action does not upgrade roads in RRTR area and prohibits vehicle travel off roads and outside of the gravel pit and infiltration basin.

Impacts to soil from non-radiological operations included in the proposed action are anticipated to be minimal.

4.1.4.2 ***Radiological Impacts.*** This subsection summarizes potential radiological impacts to soil from the proposed action as described in detail for NSTR in Sondrup (2019b) and for RRTR in Sondrup (2019a). One set of calculations was performed as soil and infiltration conditions were assumed to be similar for NSTR and RRTR test sites. Concentrations of radionuclides in soil due to potential buildup from continued testing were calculated and compared to EPA PRGs for workers and potential future residents. PRGs are risk-based concentrations derived from standardized equations combining exposure information assumptions with EPA toxicity data. They are soil concentrations that would not likely result in adverse health impacts under reasonable maximum exposure conditions for long-term/chronic exposures.

The impacts to ecological resources from concentrations of radionuclides in soil are discussed in Section 4.1.3.5. Soil concentrations, BCGs, and the ratio of soil concentrations to BCGs are listed in Tables 22, 23, and 24 and are based on ecological soil screening levels in *Operable Unit 10-08 Record of Decision for Site-Wide Groundwater, Miscellaneous Sites, and Future Sites* (DOE-ID, 2009). DOE Order 458.1, *Radiation Protection of the Public and the Environment*, requires that radiological activities that have the potential to impact the environment be conducted in a manner that protects populations of aquatic animals, terrestrial plants, and terrestrial animals in local ecosystems from adverse effects due to radiation and radioactive material released from DOE operations. Dose limits below which deleterious effects on populations of aquatic and terrestrial organisms have not been observed are considered by DOE to be relevant to protecting all aquatic and terrestrial biota on DOE sites.

As previously stated, the impact on non-human biota was assessed using *A Graded Approach for Evaluating Radiation Doses to Aquatic and Terrestrial Biota* (DOE, 2019a). Using the graded approach demonstrates that resident populations of plants and animals are adequately protected from the effects of ionizing radiation. Typically, PRGs are risk-based, conservative screening values to identify areas and contaminants of potential concern that may warrant further investigation and are represented as a concentration in soil. It is worth noting that the ecological soil screening levels in Table 12 of the *Operable Unit 10-08 Record of Decision for Site-Wide Groundwater, Miscellaneous Sites, and Future Sites* (DOE-ID, 2009) and the dose rate criteria in DOE Order 458.1 (DOE, 2019a) are the same—1 rad/d (10mGy/d) for terrestrial plants and 0.1 rad/d (1 mGy/d) for terrestrial animals. The discussion from Section 4.1.3.5 is not reiterated here.

However, it is important to note that impacts to ecological resources discussed in section 4.1.3.5 are described in terms of absorbed dose. Radiation dose is a well-defined quantity. Absorbed dose is the concentration of energy deposited in tissue as a result of an exposure to ionizing radiation. Absorbed dose describes the intensity of the energy deposited in tissue and is measured in mGy.

PRGs, on the other hand, are risk-based, conservative screening values to identify areas and contaminants of potential concern that may warrant further investigation. PRGs represent acceptable levels, or concentrations, of radionuclides in soil based on a one-in-a-million (1E-06) individual excess cancer risk. This section discusses impacts to soils using risk based PRGs based on concentrations of radionuclides in soil measured in pCi/g.

Silica glass dispersals are not anticipated to impact soils. The longest half-life for short-lived isotopes dispersed outdoors in silica glass is 20 days (Ba-140). After about 200 days, all material would be at background levels. The activity of these materials will decay below background levels before the silica particles break down enough to release radioactive materials for leaching or airborne distribution.

Table 26 provides the release quantities for radionuclides considered for the soil impact analysis. These are radionuclides with half-lives greater than 74 days and the same radionuclides considered for the groundwater pathway modeling (Section 4.1.5.2). Most radionuclides have half-lives less than a few days and will not persist in soil. The analysis assumed 12 tests are performed each year for 15 years at the same test area using all six material types (i.e., Cu, F, KBr, K_2O, $LaBr_3$, and Zr). The analysis is conservative, because using two radioactive materials per test is more realistic than the model assumption.

Table 26. Releases for radionuclides considered for the soil impact analysis.

Radionuclide	Half Life (years)	Release per Test[a] (Ci)	Total Annual Release[b] (Ci)
Be-10	1.51E+06	2.87E-20	3.44E-19
C-14	5.73E+03	2.13E-09	2.56E-08
Cl-36	3.01E+05	6.86E-08	8.23E-07
K-40	1.25E+09	3.46E-06	4.16E-05
Ni-63	1.01E+02	2.06E-14	2.47E-13
Zn-65	6.68E-01	1.22E-08	1.46E-07
Se-79	3.27E+05	1.60E-10	1.92E-09
Rb-87	4.97E+10	5.28E-11	6.34E-10
Pd-107	6.50E+06	3.26E-21	3.91E-20
Cd-109	1.26E+00	3.67E-17	4.41E-16
Ag-110m	6.84E-01	1.69E-09	2.02E-08
Cs-135	2.30E+06	2.71E-19	3.25E-18
Cs-137	3.01E+01	1.85E-19	2.22E-18
La-137	6.00E+04	1.15E-14	1.38E-13
La-138	1.02E+11	9.48E-11	1.14E-09

a. Includes Cl-36 and K-40 from both K_2O and KBr materials and Se-79 from both KBr and $LaBr_3$ materials (see Table **21**).
b. Assumes 12 tests per year.

Calculations assume the entire non-gaseous radionuclide inventory from each test is deposited onto the soil and is subject to leaching and radioactive decay. No atmospheric dispersal or volatilization is assumed. During the 15-year testing period, infiltration is based on a background infiltration rate of 10 cm/year and additional transient water from the use of foam. After testing, the infiltration rate is assumed to be a constant 10 cm/year for 10 years and 1 cm/year thereafter. The 10 cm/year is a typical background infiltration rate for disturbed unvegetated soils at the INL Site, while 1 cm/year is reflective of undisturbed soils. The test area is based on a 16-ft diameter dome. This is more conservative than the 30 ft diameter dome because the amount of water used for testing in a 16-ft diameter dome is less, which results in less leaching and higher soil concentrations. Predicted concentrations are the average concentrations in the top 5 cm of soil.

Table 27 presents PRGs for both an outdoor worker and a potential future resident due to incidental soil ingestion, inhalation of fugitive dust, and external exposure. Worker limits are based on a target risk level of 1E-04, while resident limits are based on a target risk level of 1E-06, even though the *Operable Unit 10-08 Record of Decision for Site-Wide Groundwater, Miscellaneous Sites, and Future Sites* (DOE-ID, 2009) has a target risk for current workers and/or future residents of 1E-04 (DOE-ID, 2009). Table 27 also lists calculated soil concentrations at the end of the 15-year testing period (i.e., time of maximum concentrations) for comparison to worker PRGs and in year 2095 for comparison to resident PRGs. Year 2095 is the end of the 100-year institutional control period assumed for most INL Site CERCLA investigations (DOE-ID, 2009).

Table 27. Predicted soil concentrations compared to PRGs for workers and potential future residents.

Radionuclide	Worker			Future Resident		
	Maximum Soil Concentration at 15 Years (pCi/g)	Worker PRG (pCi/g)	Ratio Maximum Soil Concentration at 15 years to Worker PRG	Maximum Soil Concentration in Year 2095 (pCi/g)	Resident PRG (pCi/g)	Ratio Maximum Soil Concentration in Year 2095 to Resident PRG
Be-10	2.78E-12	1.49E+00	1.87E-12	2.55E-12	3.70E+01	6.89E-14
C-14	5.00E-03	1.95E+04	2.57E-07	6.55E-07	3.17E+02	2.07E-09
Cl-36	1.67E-02	1.23E+05	1.36E-07	0	4.39E+01	0
K-40	4.64E+01	2.15E+03	2.16E-02	1.06E+01	1.44E-01	7.38E+01[a]
Ni-63	2.11E-06	1.00E+04	2.11E-10	1.31E-06	5.23E+02	2.51E-09
Zn-65	6.67E-02	2.62E+04	2.54E-06	5.41E-30	4.13E-02	1.31E-28
Se-79	6.07E-04	7.67E+00	7.91E-05	2.62E-06	6.17E+01	4.25E-08
Rb-87	2.37E-03	2.43E+01	9.73E-05	1.58E-03	6.89E+01	2.29E-05
Pd-107	1.46E-13	2.83E+03	5.16E-17	9.74E-14	1.26E+03	7.73E-17
Cd-109	1.54E-10	3.22E+00	4.79E-11	1.06E-26	1.15E+01	9.26E-28
Ag-110m	1.34E-02	4.98E+05	2.69E-08	1.49E-29	8.85E-03	1.69E-27
Cs-135	3.01E-11	1.69E+06	1.78E-17	2.88E-11	9.20E+01	3.13E-13
Cs-137	1.76E-11	4.05E+04	4.34E-16	4.13E-12	4.55E-02	9.07E-11
La-137	1.39E-06	3.48E+04	4.00E-11	1.36E-06	1.66E+01	8.21E-08
La-138	1.15E-02	6.94E+00	1.65E-03	1.13E-02	1.91E-02	5.90E-01

a. Ratio greater than 1 indicates the predicted concentration exceeds the PRG.

In all cases, calculated maximum soil concentrations are less than PRGs, except for K-40 for the resident. In this case, the maximum K-40 soil concentration in year 2095 (10.6 pCi/g) exceeds the PRG of 0.144 pCi/g. However, it is worth noting that the resident PRG is 167 times less than the average background concentration of K-40 at the INL Site (24 pCi/g; Rood et al. 1996). Because of the conservativeness of the calculations, it is unlikely there would be enough buildup of K-40 in soil to be distinguishable from background. However, because it is remotely possible, soil at the test area will be surveyed prior to testing to establish background levels. If K-40 concentrations exceed the initial background concentrations, soils will be removed and placed in an appropriate disposal facility.

As noted, soil monitoring and sampling will be performed at least every 2 years for at least two rounds of monitoring, and based on the results, frequency will be increased or decreased (but to no less than every 5 years) to verify radionuclide, chemical, and explosive constituent concentrations do not approach the PRGS, BCG, or risk quotients listed in Tables 23, 24, and 27. The most restrictive soil concentrations for each radionuclide analyzed for soil are highlighted in Table 28 and will be used to evaluate soil sampling results for additional actions. The values used are below the human health cleanup levels and ecological screening levels in Table 12 of the *Operable Unit 10-08 Record of Decision for Site-Wide Groundwater, Miscellaneous Sites, and Future Sites* (DOE-ID, 2009). Impacts to soils are anticipated to be minor.

Table 28. Comparison of soil concentrations for PRGs and BCGs for soil sampling evaluations.

Radionuclide	Worker PRG (pCi/g)	Resident PRG (pCi/g)	Terrestrial Animal BCG (pCi/g)	Terrestrial Plant BCG (pCi/g)
Be-10	1.49E+00	3.70E+01	--	--
C-14	1.95E+04	3.17E+02	4.76E+03	6.07E+04
Cl-36	1.23E+05	4.39E+01	2.89E+02	3.36E+03
K-40[b]	2.15E+03	1.44E-01[b]	1.19E+02	1.38E+03
Ni-63	1.00E+04	5.23E+02	5.11E+06[a]	
Zn-65	2.62E+04	4.13E-02	4.13E+02	2.47E+04
Se-79	7.67E+00	6.17E+01	2.20E+05[a]	--
Rb-87	2.43E+01	6.89E+01	--	--
Pd-107	2.83E+03	1.26E+03	--	--
Cd-109	3.22E+00	1.15E+01	6.38E+04[a]	--
Ag-110m	4.98E+05	8.85E-03	2.35E+04[a]	--
Cs-135	1.69E+06	9.20E+01	2.62E+02	2.81E+04
Cs-137	4.05E+04	4.55E-02	2.08E+01	2.21E+03
La-137	3.48E+04	1.66E+01	--	--
La-138	6.94E+00	1.91E-02	--	--

a. Terrestrial Environmental Media Concentration Limit (Bq/kg). Dose screening rate value is 40 Gy/hour for terrestrial animals, birds, amphibians, and reptiles, and 400 Gy/hour for plants and other aquatic organisms. It previously has been suggested that below these values (of chronic exposure), no measurable population effects would occur. 40 Gy/hour is approximately equivalent to 1 mGy/day, which is the DOE dose rate limit for terrestrial animals.

b. The resident PRG for K-40 is 167 times less than the average background concentration of K-40 at the INL Site (24 pCi/g; Rood et al. 1996).

4.1.5 Water Quality

This section summarizes potential groundwater impacts from the proposed action as described in detail for NSTR in Sondrup (2019b) and for RRTR in Sondrup (2019a). Modeling of groundwater impacts conservatively assumes the entire inventory of radionuclides and contaminants in containment foam infiltrates into soil and migrates toward the aquifer. Sondrup (2019a and 2019b) estimates maximum contaminant concentrations from the proposed action in the aquifer below each facility and compares those concentrations to drinking water standards or screening levels for resident tap water.

Figure 17 shows the conceptual model for flow and transport from the source area to a hypothetical receptor well. The model considers (1) transient water influx from the infiltration area, (2) transport through the unsaturated zone, and (3) dilution and mixing in the aquifer. The transport calculations account for advection, dispersion, and sorption in the unsaturated zone along this pathway and advection and dispersion in the underlying aquifer. Modeling also assumes sorption takes place on alluvium and sedimentary interbed materials, but not on basalt. Calculations account for radioactive decay for radionuclides and degradation for non-radionuclides, but not volatilization.

Modeling simulated two source area sizes based on the 16-ft and a 30-ft diameter dome tents the proposed action uses for activities requiring foam containment. Modeling presumes the receptor well (see Figure 17) is located at the immediate downgradient edge of the source area, which is the location of maximum concentration. Because the modeling code uses rectangular source areas, the analysis converted the 16-ft and 30-ft diameter source areas to equivalent size squares. The analysis assumes a receptor ingests the water at the downgradient edge of the source.

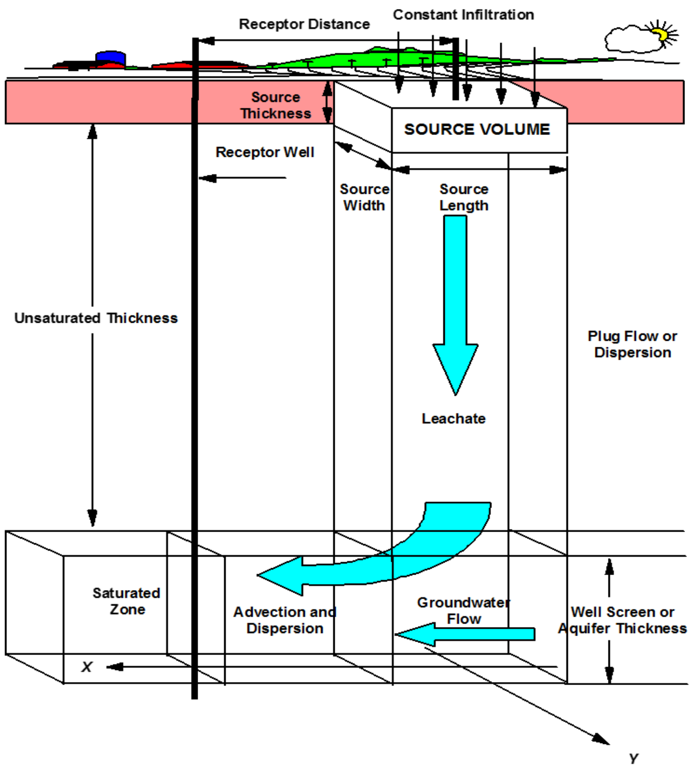

Figure 17. Conceptual flow and transport model for the groundwater pathway.

4.1.5.1 Non-Radiological Impacts to Groundwater. Groundwater pathway modeling analyzed the impacts from performing 12 tests per year for 15 years. The modeling assumes each test has the same location at the Ranges. A single test for a 16-ft diameter dome requires about 150 gallons of water and 10 gallons of BlastGuard AFC-380 foam concentrate for a total liquid volume of 160 gallons. A single test for a 30-ft diameter dome requires about 900 gallons of water and 65 gallons of BlastGuard AFC-380 foam concentrate for a total liquid volume of 965 gallons. According to safety data sheets, BlastGuard AFC-380 includes hazardous constituents diethylene glycol monobutyl ether (DGBE), 1-dodecanol, and isobutanol. Table 29 shows the mass fractions, volumes, and masses of each contaminant for the two dome sizes. After each test, the foam collapses to an aqueous mixture that can infiltrate soil in about 3 days. Modeling assumes the entire volume of liquid and the contaminants from each test soaks into the ground.

There are no enforceable federal or State of Idaho drinking water standards for the non-radionuclide contaminants in Table 29. Therefore, the analysis used EPA regional screening levels for tap water for comparison to the maximum estimated groundwater concentrations (see Table 30). The EPA website https://www.epa.gov/risk/regional-screening-levels-rsls-generic-tables supplies these screening levels. The contaminants are not carcinogens; therefore, non-cancer screening levels for children from the Hazard Index (HI) = 1 table were used. Screening levels are not enforceable standards but serve as technical guidance for water quality officials or managers of contaminated sites. Screening levels are contaminant concentrations in tap water that are protective of human exposures (including sensitive subpopulations) over a lifetime. This assessment considers groundwater as tap water.

EPA has not developed MCLs or screening levels for 1-dodecanol, which is a non-toxic food additive and was not included in modeling impacts to groundwater.

Table 29. Contaminant properties and mass released per test for both dome sizes.

Contaminant	CAS #	Volume Fraction	Component Density (kg/L)	16-ft Dome		30-ft Dome	
				Volume in 10 Gallons[a] (L)	Mass Released per Test (kg)	Volume in 10 Gallons[a] (L)	Mass Released per Test (kg)
DGBE	112-34-5	0.1	0.995	3.79	3.77	24.6	24.5
1-dodecanol	112-53-8	0.01	0.833	0.379	0.315	2.46	2.05
Isobutanol	78-83-1	0.5	0.803	1.89	1.52	12.3	9.88

a. Gallons of BlastGuard AFC-380.

Table 30. Regional screening values for non-radionuclide contaminants in tap water.

Contaminant	CAS #	Non-Cancer Screening Level for Child (HI=1) (ug/L)
DGBE	112-34-5	600
1-dodecanol	112-53-8	None available
Isobutanol	78-83-1	5900

Infiltration rate, unsaturated zone hydrostratigraphy, hydraulic conductivity and moisture content relationships, texture of the sedimentary interbeds, contaminant sorptive properties, and the velocity of water in the aquifer comprise the most important groundwater model parameters and characteristics. This analysis obtained parameters from guidance documents, previous studies of flow and transport, and regional studies of groundwater flow and transport.

Table 30 compares the overall maximum concentrations to non-cancer screening levels from Table 31 for NSTR and RRTR. The results show non-radiological contaminants (DGBE and isobutanol) having a low potential to exceed the screening levels. It also appears that continued testing beyond 15 years would not increase maximum concentrations at NSTR or NTR because the concentrations had reached a steady-state condition. Concentrations at STR had not quite peaked at the end of the 15-year testing period, so it is possible they could increase slightly if testing continued, but would not exceed screening levels (Sondrup 2019a, Sondrup 2019b).

Table 31. Comparison of screening levels and predicted maximum groundwater concentrations for non-radionuclides for 15 years.

Contaminant	HI=1 Non-Cancer Screening Level for Child (µg/L)	Maximum Concentration for 16-ft Dome (12 tests/year for 15 years) (µg/L)		Maximum Concentration for 30-ft Dome (12 tests/year for 15 years) (µg /L)	
NSTR					
DGBE	600	7.3		279	
Isobutanol	5,900	3.4		123	
RRTR					
		NTR (µg/L)	STR (µg/L)	NTR (µg/L)	STR (µg/L)
DGBE	600	21.4	0.24	574	36.5
Isobutanol	5,900	9.23	0.11	243	16.1
NOTE: The impact of each range on the concentrations at the other ranges would be insignificant given the distances between them and locations relative the flow paths from each range.					

4.1.5.2 Radiological Impacts to Groundwater. Due to radioactive decay, many radionuclides considered in the proposed action decay to inconsequential levels before reaching the aquifer and are not considered in the groundwater pathway modeling. Most of the radionuclides in Table 4 have half-lives less than a few days. This is very short relative to the time it takes for water to travel from land surface to the aquifer (about 2 years based on enhanced infiltration rates from testing). For example, the activity of a radionuclide having a 74-day half-life would be about $1/1000^{th}$ its original activity after 2 years. Therefore, only radionuclides with half-lives greater than 74 days were included, except for Ar-39 and Ce-139. Ar-39 is a gas and would not impact groundwater. Ce-139 was not included because the activity released each test is only 4.44E-26 Ci (from KBr), which is slightly more than 1 atom. Table 25 lists the release quantities of radionuclides considered for the both the soil and groundwater pathways. The analysis includes K-40 even though it is not regulated (40 CFR Parts 9, 141 and 142) and La-138 even though it is essentially stable.

Table 30 lists the limiting aquifer concentrations for radionuclides. The table includes MCLs from EPA (2000) if there is a published value. The table lists EPA preliminary remediation goal for resident tap water ingestion for radionuclides that do not have a published MCL. These values are based on a risk level of 1E-06 and can be found at https://epa-prgs.ornl.gov/radionuclides/download.html using the "Calculator" option.

Given the rather large sorption coefficients and long half-lives for some radionuclides, simulations cover a period of 100,000 years from the start of testing to verify concentrations in the aquifer have peaked, or nearly peaked. In addition, radionuclide simulations only analyzed the 30-ft dome because it is the limiting case based on the non-radionuclide simulation results.

Table 32 lists the overall maximum concentrations of radionuclides compared to limiting concentrations from Table 33. Peak radionuclide concentrations in the aquifer are less than MCLs (where available) and less than PRGs (if MCL not available). Radionuclides with small sorption coefficients (i.e., C-14 and Cl-36) or relatively short half-lives (i.e., Zn-65, Cd-109, and Ag-110m) result in peak concentrations near the end of the testing period. Peak concentrations of other radionuclides occur hundreds to thousands of years after testing ceases. Concentrations of some radionuclides with high sorption coefficients and long half-lives (i.e., Cs-135, La-137, and La-138) had not peaked by the end of the 100,000-year simulation time, but the concentrations at 100,000 years are very low and unlikely to exceed the limiting values beyond 100,000 years. Potassium-40 (K-40) concentrations were the highest percentage of the respective limiting concentration, but K-40 occurs naturally and is not regulated in food or drinking water.

Table 32. Limiting concentration standards for radionuclides.

Radionuclide	Limiting concentration (pCi/L)	Standard type
Be-10	7.43	EPA PRG[a]
C-14	2,000	MCL
Cl-36	700	MCL
K-40	2.12	EPA PRG[a]
Ni-63	50	MCL
Zn-65	300	MCL
Se-79	7.55	EPA PRG[a]
Rb-87	300	MCL
Pd-107	202	EPA PRG[a]
Cd-109	600	MCL
Ag-110m	90	MCL
Cs-135	900	MCL
Cs-137	200	MCL
La-137	148	EPA PRG[a]
La-138	14.7	EPA PRG[a]

a. For radionuclides with no MCL, the limiting concentration is based on the EPA PRG for tap water ingestion.

Table 33. Comparison of limiting concentrations and predicted maximum groundwater concentrations for radionuclides.

Radionuclide	Limiting Concentration (pCi/L)	Maximum Concentration at NSTR[a] (pCi/L)	Maximum Concentration at RRTR-NTR (pCi/L)	Maximum Concentration at RRTR-STR (pCi/L)
Be-10	7.43	1.52E-17 (93,000)[d]	1.37E-17 (52,000)	2.99E-17 (97,000)
C-14	2,000[b]	3.71E-03 (14)	2.47E-03 (13)	7.22E-03 (16)
Cl-36	700[b]	1.20E-01 (13)	7.96E-02 (13)	2.33E-01 (16)
K-40	2.12	3.18E-02 (5,600)	2.82E-02 (3,100)	6.26E-02 (5,800)
Ni-63	50[b]	<1E-30 (3,200)	9.95E-26 (1,800)	<1E-30 (3,400)
Zn-65	300[b]	1.99E-44 (16)	6.44E-26 (15)	<1E-30 (17)
Se-79	7.55	5.37E-06 (1,500)	4.75E-06 (800)	1.04E-05 (1,600)
Rb-87	300[b]	1.32E-07 (21,000)	1.17E-07 (11,000)	2.61E-07 (21,000)
Pd-107	202	8.13E-18 (21,000)	7.18E-18 (11,000)	1.60E-17 (21,000)
Cd-109	600[b]	<1E-30 (17)	1.17E-25 (15)	<1E-30 (18)
Ag-110m	90[b]	<1E-30 (18)	<1E-30 (17)	<1E-30 (22)
Cs-135	900[b]	~2.50E-17 (>100,000)	~6.24E-17 (>100,000)	~1.17E-18 (>100,000)
Cs-137	200[b]	<1E-30 (990)	<1E-30 (540)	0.00E+00 (NA)
La-137	148	4.62E-21 (>100,000)	~3.84E-15 (>100,000)	1.97E-21 (>100,000)
La-138	14.7	~1.20E-16 (>100,000)	~9.94E-11 (>100,000)	~5.09E-17 (>100,000)
Sum of Fractions[c]		1.73E-04	1.15E-04	3.36E-04

a) Applies to both new explosive test area and radiological training pad.
b) Limiting concentration is MCL.
c) Sum of fractions represents sum of ratios of model concentration to MCL and does not include ratios of model concentrations to EPA PRGs. The regulation for MCLs (40 CFR 141.66) specifies that for multiple radionuclides the sum of fractions be less than 1. In this case, the peak concentrations are summed even though they occur at different times.
d) Time of maximum concentration (years after testing begins) shown in parentheses. For times greater than 100,000 years, the concentration was increasing only slightly and is not expected to exceed the limiting value.

All results assume 12 test/year for 15 years using a 30-ft dome tent whose location is fixed.

Modeling results show that radionuclide concentrations are not likely to exceed the limiting concentrations. It appears that continued testing after 15 years is not likely to result in an exceedance of limiting concentrations. In addition, dividing the total annual release (see Table 26) into less than 12 tests per year is likely to result in lower concentrations because less tests would mean less additional water from the foam, which would increase the travel time to the aquifer and result in more decay.

4.1.6 Hazardous Materials and Waste Management

The significance of potential impacts associated with hazardous materials and hazardous waste is based on the toxicity of the substances and their management (e.g., transportation, storage, and disposal). Hazardous materials and waste impacts are considered adverse if the use, storage, transportation, or disposal of these substances substantially increases the human exposure risk or environmental contamination.

Fuel trucks transport fuel to construction equipment in the field. Mobile equipment presents sources of potential petroleum or other hazardous material spills. If a fuel, oil, or other hazardous material spill occurs, the spill is cleaned up as soon as possible. If necessary, soil remediation removes contaminated soils and DOE characterizes, manages, and disposes of contaminated soil in an approved facility. Soil sample(s) then verify successful removal in compliance with State of Idaho regulations.

Proposed UAV operations consist of flights with data collection devices (e.g., sensors and cameras), inert materials, chemicals, and explosive or flammable materials at NSTR. Chemical use is subject to classification and the limitations and requirements applicable to the class of chemicals used.

The proposed action prohibits use of pure unused commercial chemicals that are RCRA P or U-listed chemicals considered RCRA hazardous waste when released to the environment. This limitation does not apply to products and mixtures (such as explosives), which include a P or U-listed chemical as a constituent. The proposed action also prohibits using chemicals considered RCRA toxic waste when released to the soil. Project personnel identify substitute chemicals to achieve test objectives when prohibited chemicals are proposed.

CERCLA lists many chemicals as hazardous or extremely hazardous substances that are not considered as RCRA hazardous waste when released. The proposed action evaluates release of these chemicals to the soil and environment to determine if any release exceeds the reportable quantity for that chemical or mixture of chemicals. The goal for limiting use of certain RCRA-identified materials and CERCLA hazardous substances is to limit potential soil contamination so soil does not become contaminated with hazardous waste or exceed soil concentrations of hazardous substances, which would require remediation under federal or state clean-up laws and regulations.

The proposed action does not allow releases that exceed the limitations of this EA (e.g., require an air permit, exceed the CERCLA reportable quantity, exceed groundwater or drinking water standards in the aquifer, or exceed CERCLA screening levels in soil).

DOE considers chemicals not included on the list of CERCLA hazardous or extremely hazardous substances to be relatively benign and subject to minimal review for both environmental and personnel hazards. For example, calcium carbonate (common chalk) is not an environmental hazard, but safety and industrial hygiene professionals evaluate use and dispersal.

To minimize dispersals and areas of effect, weather conditions are monitored at the Ranges, and testing and training are postponed as necessary.

Covered dumpsters contain refuse and are emptied when full. Following construction activities, crews remove refuse, including, but not limited to, broken equipment parts, wrapping material, cords, cables, wire, rope, strapping, twine, buckets, metal or plastic containers, and boxes from the site and dispose of waste as appropriate. Project controls include reusing and recycling items where practicable.

Following testing and training activities, unconsumed explosive material, used test articles, and debris are removed from the Ranges and disposed of according to applicable regulations.

Portable toilets supply sanitary facilities during construction and operations. Licensed vendors furnish portable toilets, maintain them on a regular basis, and pump portable toilet waste to approved INL Site facilities (e.g., CFA sewage treatment plant) after verifying the discharge meets facility acceptance criteria.

The proposed action follows other local, state, and federal regulations relating to using, handling, storing, transporting, and disposing of hazardous materials.

4.1.6.1 Hazardous Materials. Testing and training operations involving hazardous materials would increase in support of the proposed action. Amounts of expended testing and training materials would increase in rough proportion to the overall increases in these training operations.

Test and training at the Ranges would continue to use hazardous materials for operations and maintenance. Increase in hazardous materials transport, storage, and use to support increased training operations under the proposed action would be managed using the same procedures as the no action alternative. No releases of hazardous materials to the environment and no unplanned exposures of personnel to hazardous materials are anticipated.

4.1.6.2 Hazardous Waste Management. Operational changes at NSTR and RRTR have the potential to generate the following types of waste: (1) common trash, (2) low-level radioactive waste, and (3) liquid waste. Routine office trash and non-radioactive personal protective equipment are disposed of at the state-regulated INL Site landfill.

Non-liquid, low-level radioactive waste includes personal protective equipment used during radiological response training and sample material generated during radiological response training (i.e., analytical waste, soil, and wipes). Non-liquid low-level radioactive waste is disposed according to DOE procedures.

Liquid low-level radioactive waste includes water used to decontaminate personnel exiting the radiological response training area, liquid laboratory analytical waste, and sewage. Low-level decontamination water is stored per DOE procedures to allow decay to background levels of the radioactive constituents.

After decay, decontamination wastewater is disposed at the CFA Sewage Treatment Plant (STP), since requirements do not allow disposal of decontamination wastewater off the INL Site. Laboratory analytical waste is solidified, allowed to decay if radioactive, and disposed of at the state-regulated INL Site landfill; none of the waste is expected to be classified as hazardous waste.

A commercial vendor, holding a valid State of Idaho permit, will supply and pump portable toilets at the remote locations (e.g., north and south training ranges at RRTR and NSTR). Wastewater pumped from the portable toilets must be discharged to the CFA STP. The CFA STP must be included on the commercial vendor’s State of Idaho approved list of disposal sites prior to discharge. INL Site Facilities and Site Services must approve waste disposal to the CFA STP.

Used targets are collected and retained for examination and future reference and testing, returned to the customer, or disposed per federal and state requirements

Hazardous waste is managed per Idaho regulations and disposed of at a permitted offsite facility.

4.1.7 Noise and Vibration

Under the proposed action, the frequency of explosive detonations at NSTR would increase. However, the limit of 20,000 lb NEW would not increase. Thus, single event noise levels would not be expected to change. Because the proposed action would not increase the size of detonations, vibration conditions around the NSTR perimeter remain unchanged. The noise and vibrations impacts were analyzed in EDF-7235 (INL, 2007).

The proposed action also involves using large caliber weapons and small arms at NSTR. However, noise impacts off the INL Site increase very little from the added weapons firing above the no action levels. Noise effects from explosive detonations dominate the overall Range operational noise off the INL Site and the slight change in noise impacts would not amount to an adverse impact.

Impacts to wildlife from noise are discussed in Section 4.1.3.4.

4.1.8 Health and Safety

DOE conducts radiological operations, including activities at the Ranges, in a manner that protects the health and safety of employees, contractors, and the public and maintains exposures to employees and the public and releases of radioactivity to the environment below regulatory limits. DOE takes deliberate actions to reduce exposures and releases to ALARA. For example, the proposed action limits the use of radioactive materials to quantities and radionuclides that keep exposures and releases ALARA while meeting individual test objectives.

The proposed radiological response training at the Ranges creates potential for multiple types of radiological exposure. Handling activated materials and placing sealed sources at the Ranges can lead to exposure. Dispersing radioactive materials on the ground generates surface contamination and airborne radioactivity that can lead to exposure.

The rules in 10 CFR 835, "DOE Occupational Radiation Protection," (2015) contain radiation protection standards, limits, and program requirements for protecting employees and the public from ionizing radiation resulting from DOE activities. The dose limit from DOE sources to employees is 5,000 mrem/year ED. The dose limit for the public entering an onsite controlled area managed by DOE, such as facilities at the INL Site, is 100 mrem/year ED. The offsite public dose limit in DOE Order 458.1, "Radiation Protection of the Public and the Environment," is 100 mrem/year ED (2013). The public dose limit in DOE Order 458.1 applies to members of the public located off DOE sites and on DOE sites outside of controlled areas and to members of the public exposed to residual radioactive material resulting from any remedial action or property clearance.

In addition, under Federal regulation 40 CFR 61 Subpart H, airborne radionuclide emissions from all INL Site operations must not exceed amounts that would cause any member of the public to receive an annual ED equivalent of 10 mrem/year. Table 34 summarizes public dose limits.

Table 34. Regulatory radiological dose limits for members of the public.

Public Dose Limits		
Regulatory Authority	**Onsite in Controlled Areas**	**Offsite or Onsite Outside of Controlled Areas**
10 CFR 835	100 mrem/year	NA
DOE Order 458.1	NA	100 mrem/year
40 CFR 61 Subpart H	NA	Maximum 10 mrem/year from air emissions[a]
a. Airborne radionuclide emissions are included in the 10 CFR 835 and 40 CFR 61 Subpart H limits but must not exceed 10 mrem/year.		

The proposed action requires verification, no less than once per year, of the curie content and isotopic-distribution of the major, intended isotopes and any contaminants in radiological materials used in radioactive material distribution testing and training. Any changes in isotopes or isotope concentration must be evaluated against Table 4 and included in annual reporting requirements. Newly found isotopes with a half-life greater than 74 days must be modeled for impact to soil and groundwater to demonstrate that the impact analysis in this EA remains valid.

Any changes to the source materials (e.g., composition or manufacturer), which will be irradiated, or the source of irradiation requires additional review, prior to any such use, to verify the releases in Table 4 will not be exceeded. Any new isotopes found in irradiated material, with a half-life greater than 74 days, must be modeled for potential impact to soil and groundwater prior to initial distribution. All new isotopes found in irradiated material must be evaluated for potential offsite air dose prior to initial distribution.

In addition, to minimize radiological material dispersals and areas of effect, weather conditions are monitored at the Ranges, and testing and training are postponed as necessary. Explosive dispersals are limited to wind speeds less than 25 mph; wind speed is monitored prior to each dispersal. Winds speeds less than 10 mph are optimal for training purposes. Range access control and monitoring continues until background radiation levels return to pre-test levels. Approved security plans prevent unauthorized persons from inadvertent entry to the Ranges during testing and training activities.

Public health and safety issues include potential hazards inherent in range training operations. DOE takes precautions in the planning and execution of activities to prevent injury to people or damage to property. Testing conducted at the Ranges presents certain safety and health concerns due to radiological exposure, fragmentation, air blasts, ground shock, and projectiles. Project controls to maintain radiological exposures ALARA and to protect people and property (such as following range guidance criteria and implementing safe stand-off distances) minimize health and safety impacts. No adverse impacts to human health and safety are anticipated from the proposed action.

4.1.9 Environmental Justice

Environmental justice requires fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income with respect to developing, implementing, and enforcing environmental laws, regulations, and policies. No predominately minority or low-income populations reside within the five-county area. For this area, about 88% of the population is white and, across the five counties, the percentage of the population living in poverty averages about 13% (tables in Section 3.9).

Most proposed activities occur in Bingham and Butte counties. The population of Bingham county is 81% white, and for Butte County, 95.5% of the population is white. The poverty rate in Bingham county is below the five-county average at 12.5%, which is about equal to the national poverty rate (12.3%), but in Butte County, 16.9% of the total population is in poverty and 22.1% of children under 18 live in poverty. Butte County has the highest county poverty rate for the area; this rate is slightly above the national average. The Fort Hall Indian Reservation has a poverty rate of about 26% while about 43% of families with children under 18 are below the poverty level (U.S. Census Bureau, 2018a).

The proposed project would not require a large workforce for either construction or operation; therefore, it would not result in impacts to typical socioeconomic parameters (e.g., housing, schools, emergency services, and in-migration of workers).

The proposed action would impact the Shoshone-Bannock Tribes and other people having traditional ties to the INL Site and surrounding areas. Limited access to the INL Site restricts access to culturally significant areas that impart cultural, spiritual, and historical connections to the land and the potential for unauthorized artifact collection. These impacts will be felt most by the Shoshone-Bannock Tribes and constitute a disproportionately high impact to these people.

4.1.10 Intentional Destructive Acts

Explosive materials stored and used on the INL Site have the potential to be stolen and used against facilities and personnel at the INL Site. Security measures are in place at the INL Site to prevent the theft of explosives. Protective force personnel control access to the INL Site and allow access only to persons conducting official business and having proper credentials. Explosives are stored in approved and locked explosive storage magazines. DOE also maintains a highly trained and equipped protective force to prevent attacks against and entry into INL Site facilities.

However, destructive acts to proposed facilities could cause environmental effects. Environmental impacts from attacks to the new infrastructure would most likely cause localized effects resulting from damage and destruction of infrastructure at the Ranges and efforts to mitigate the impact by repairing and reconstructing the damaged infrastructure. Large-scale regional impacts could result, for example, from wildfire if the act resulted in a secondary effect, such as wildfire ignition during particularly dry periods.

The proposed project would present an unlikely target for an act of terrorism and would have an extremely low probability of attack. Fences, gates, and barriers, coupled with using keying systems, access card systems, and security personnel at entry points, restricts access to the INL Site and project area. Using these physical obstructions and warning signs effectively deters and delays intruders. Personnel identification and control measures such as photo IDs, visitor passes, and contractor IDs help quickly identify unauthorized persons within the INL Site.

The proposed action would not constitute an attractive target for vandalism, sabotage, or terrorism, because the facilities would be difficult to damage and the impact from any successful act would be negligible both from a practical and political perspective. Because the proposed action presents an unlikely target for an act of terrorism, the probability of an attack is extremely low.

4.1.11 Cumulative Impacts

Cumulative impacts result "from the incremental impact of an action when added to other past, present and reasonably foreseeable future actions." The impacts of past and present actions from the affected environment are considered in Section 3.

Cumulative impacts can result from individually minor, but collectively significant, onsite or offsite actions occurring over time (40 CFR 1508.7). Those actions within the spatial and temporal boundaries (i.e., project impact zone) of the proposed action are considered in this EA. The spatial and temporal boundaries vary depending on the type of action proposed.

The area potentially affected was determined by the scope of the proposed action, including all potential direct and indirect impacts associated with project. The geographic boundaries for analyses of cumulative impacts in this EA vary for different resources and environmental media. For example, for air quality, the potentially affected air quality region is the appropriate boundary for assessment of cumulative impacts from releases of pollutants into the atmosphere. For wide-ranging or migratory wildlife, impacts from the proposed action might combine with impacts from other sources within the INL Site or elsewhere in the range of a potentially affected population. For soils and plants, on the other hand, the boundary of the project area may provide the appropriate geographical area for assessing cumulative impacts.

There are several proposed projects at the INL Site that DOE considers reasonably foreseeable that would include radiological emissions that could contribute to cumulative impacts. Those that DOE reviewed include the following:

- Remote-Handled LLW Disposal Facility
- Plutonium-238 Production for Radioisotope Power Systems
- Recapitalization of Infrastructure Supporting Naval Spent Nuclear Fuel Handling
- Resumption of Transient Testing using the TREAT Facility
- Expanding Capabilities at the Power Grid Test Bed.

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. Conclusions are as follows:

Existing land use would not be affected by the changes in radiological training and increase in explosives use involved in the proposed action, but the area of disturbance increases at NSTR. Land use patterns and designations on the INL Site would remain unchanged. The proposed action would be confined to the Ranges and would not affect land use outside the INL Site. In conjunction with past, present, and reasonably foreseeable future actions, the proposed action would not be expected to result in an adverse cumulative impact to land use.

During normal operations, cumulative radiological and waste generating impacts would be minimal. Radiologic releases during normal operations would not result in adverse health impacts. Additional waste volumes would be small compared to current disposal volumes at INL.

4.1.11.1 Air Quality. Temporary impacts from construction activities and fugitive dust emissions would result in direct, short-term adverse impacts, which would be mitigated through applying project controls and dust control measures during construction. As a result, construction activities present minimal harm to air quality.

Table 35 presents the estimated dose from each reasonably foreseeable project to a MEI. Most are screening-level dose estimates, which means the analysis used conservative assumptions (e.g., no mitigation). In addition, some projects estimate dose at the nearest offsite public receptor location, which may be several miles from Frenchman’s Cabin. For example, the location of the public receptor dose presented for NSTR is near the INL Site northeast boundary, more than 38 miles from the INL MEI location at Frenchman’s Cabin. If the doses for each project are conservatively assumed to occur at Frenchman’s Cabin (which they do not), the total dose from reasonably foreseeable projects, including expanding the Ranges, is 1.77 mrem/year. If combined with the current maximum total annual estimated dose reported for INL Site compliance (0.0102 mrem in 2018), the dose from current and reasonably foreseeable future actions on the INL Site would be 1.78 mrem as indicated in Table 35. Although the actual dose is expected to be much less, this estimated dose is still much lower than the 10 mrem annual dose standard.

Potential additive impacts from implementing the proposed action are determined to be collectively small and would have little impact to reasonably foreseeable future actions or current operations. Future projects at the INL Site would also be regulated by federal and state laws. Table 35 shows the estimated annual air pathway dose (mrem) to the MEI from normal operations and the proposed action.

Table 35. Estimated annual air pathway dose (mrem) from normal operations to the maximally exposed offsite individual from proposed projects, including the estimated dose from expanding capabilities at the Ranges.

Current and Reasonably Foreseeable Future Action	Estimated Annual Air Pathway Dose (mrem)
DOE Idaho Spent Fuel Facility (NRC, 2004)	0.000063[a]
Integrated Waste Treatment Unit (ICP/EXT-05-01116)	0.0746[h]
New DOE Remote-Handled LLW Disposal Facility (DOE/ID 2018)	0.0074[a]
Plutonium-238 Production for Radioisotope Power Systems (DOE/EIS 2013)	0.00000026[b]
Recapitalization of Infrastructure Supporting Naval Spent Nuclear Fuel Handling (DOE/EIS 2016)	0.0006[c]
TREAT (DOE/EA 2014)	0.0011[a]
Radiological Response Training Range (North Test Range)	0.048[d]
Radiological Response Training Range (South Test Range)	0.00034[a]

Current and Reasonably Foreseeable Future Action	Estimated Annual Air Pathway Dose (mrem)
National Security Test Range	0.04[e]
HALEU Fuel Production (DOE-ID, 2019)	1.6[a]
Total of Reasonably Foreseeable Future Actions on the INL Site	1.77[g]
Current (2018) Annual Estimated INL Emissions (DOE 2019a)	0.0102[f]
Total of Current and Reasonably Foreseeable Future Actions on the INL Site	1.78[g]

a. Dose calculated at Frenchman's Cabin, typically INL's MEI for annual NESHAP evaluation.
b. Receptor location is not clear. Conservatively assumed at Frenchman's Cabin.
c. Dose calculated at INL boundary northwest of Naval Reactor Facility. Dose at Frenchman' Cabin likely much lower.
d. Dose calculated at INL boundary northeast of Specific Manufacturing Capability. Dose at Frenchman's Cabin likely much lower.
e. Sum of doses from New Explosive Test Area and Radiological Training Pad calculated at separate locations northeast of MFC near Mud Lake. Dose at Frenchman's Cabin likely much lower.
f. Dose at MEI location (Frenchman's Cabin) from 2018 INL emissions (DOE 2019a). The 10-year (2008 through 2017) average dose is 0.05 mrem/year.
g. This total represents air impact from current and reasonably foreseeable future actions at INL. It conservatively assumes the dose from each facility was calculated at the same location (Frenchman's Cabin), which they were not.
h. Receptor location unknown.

4.1.11.2 Historical and Cultural Resources. DOE has consulted with SHPO under Section 106 of the NRHP and has received concurrence that there would be no adverse effects to eligible or potentially eligible NHRP sites. Therefore, the proposed action does not contribute to cumulative impacts to eligible cultural and historical resources.

As noted in Section 4.1.3, the cumulative impacts to intangible connections to the land from landscape changes and changes to the visual quality of the landscape can only be interpreted, determined, and known by the people whose cultural practices, beliefs, or identity connects them to the affected area. As such, DOE is committed to actively engaging representatives of the Shoshone-Bannock Heritage Tribal Office in evaluating new infrastructure, interpreting the associated impacts, and identifying potential mitigation/avoidance/protection measures.

4.1.11.3 Ecological Resources. Cumulative effects on ecological resources are generally additive and proportional to the amount of ground disturbance within specific habitat areas. The proposed action has the potential to impact vegetation, wildlife, and sensitive species. Sensitive species at the INL Site are discussed earlier in Sections 3 and 4.

Long-term impacts to plants and animals can be attributed to fragmentation caused by new access roads, downrange target area, and new explosives test pad. New development has the potential to fragment botanical and wildlife habitat at the INL Site. Opening areas to increased vehicular access and testing events causes direct and indirect impacts. Increased human and wildlife interactions, vehicle collisions, and spread of noxious weeds can result. The proposed land disturbance, when combined with road effects from past, present, and reasonably foreseeable actions, reduces the continuity of open and undeveloped land at the INL Site.

The 2019 Sheep Fire burned over 100,000 acres at the INL Site, including the area around NSTR and the INL PGTB. The extent of sagebrush habitat loss from the Sheep Fire is unknown at the present time, but likely far outweighs the loss of such habitat expected from expanding capabilities at the Ranges and PGTB. The area around NSTR also burned in the 2010 Jefferson Fire and was mostly devoid of sagebrush prior to 2019.

A small portion of STR lies within the SGCA. NSTR and NTR are not located within the SGCA. The Sheep Fire burned a relatively small number of acres within the SGCA (INL Wildland Fire Committee Meeting July 29, 2019). The CCA (DOE-ID & USFWS, 2014) established habitat and population triggers to guard against sage-grouse declines. The habitat trigger would be tripped if more than 20% of sagebrush habitat within the SGCA is lost or converted to a non-sagebrush-dominated vegetation class. If a net

38,824 acres of sagebrush habitat were lost, DOE and the USFWS would follow procedures outlined in the CCA to determine the cause and develop new conservation measures.

If the entire fenced area (184 acres) at NTR and STR were comprised of sagebrush, the amount of habitat loss would amount to about 0.5% of the habitat trigger. When combined with potential sagebrush loss from expanding the PGTB (276 acres), the potential loss amounts to about 462 acres (about 1.2% of the habitat trigger). This estimate is conservative because it assumes complete loss of sagebrush across both the PGTB expansion area and NTR and STR. The loss of 462 acres of sagebrush at the INL Site is not expected to affect the Site's ability to maintain enough habitat for sage-grouse or other sagebrush-dependent species.

NSTR is located within a large undisturbed tract of INL that covers about 153,600 acres (about 240 square miles). Establishing NSTR disturbed about 19 acres (DOE-ID 2007). The proposed action disturbs about 270 acres at NSTR, which is about 0.18% of the undisturbed core of the INL Site. While a large portion of the core area burned in the 2019 Sheep Fire, the amount of added disturbance from the proposed action is unlikely to cause a notable amount of habitat fragmentation or to affect wildlife migration though the core area. The stability of INL Site wildlife populations would not be affected.

Increased training operations could have minor impacts on ecological resources. Although there would be no habitat changes, vegetation and wildlife could experience temporary, minor adverse impacts from the proposed increases in disturbance and testing and training activities. The increase in disturbance and in training and testing events is unlikely to cause a notable amount of habitat fragmentation or to result in behavioral changes or responses in a biologically important behavior or activity to a point where such behaviors are abandoned or significantly altered.

Wildlife in testing and training areas may temporarily avoid the areas during exercises but will likely return after training has ceased. Therefore, disturbance to wildlife from increased operations and human interactions under the proposed action is expected to be short-term and temporary. There are no known future actions in the core area that would have additive impacts on wildlife. The stability of INL Site wildlife populations would not be affected.

The proposed action co-locates new infrastructure with current facilities, and the proposed roads and power line follow existing routes. Habitat in these areas has already been lost or modified. Consolidating similar linear features (i.e., power lines and roads) in this manner reduces cumulative effects.

Project activities, such as vegetation removal, soil disturbance, UAV flights, and other disruptive activities have the potential to affect ecological resources. However, from a cumulative impact perspective, the incremental impacts of the proposed action when added to past, present, and reasonably foreseeable actions at the INL Site are minor. Considering the widespread nature of INL Site facilities and pristine conditions on most of the INL Site, the cumulative impacts of the proposed action are small. In addition, by implementing project controls, such as revegetation with native seed, weed control, and minimizing soil disturbance, the effects of the proposed action are anticipated to be minor.

4.1.11.4 Soils. While increased training and testing on the Ranges adds to the potential for soil disturbances and erosion, mitigation through following project controls counters or contains adverse direct impacts.

Review of relevant past and present projects indicates minor impacts during clearing and grading activities; however, potential erosion impacts will be temporary and covering soils with gravel or other surfacing material and revegetating temporarily disturbed areas minimizes soil erosion.

Soils monitoring at the Ranges will take place at least every 2 years for at least two rounds of monitoring. Based on the results, monitoring frequency may be either increased to annually or decreased. Soil monitoring and sampling will also be performed no less than every 5 years to verify radionuclide, chemical, and explosive constituent concentrations do not approach ecological screening levels or PRGs.

If concentrations approach ecological screening levels or PRGs, soils will be removed and placed in a licensed disposal facility. Using the ecological screening levels and residential PRG verifies human health and the environment will be protected when training at the Ranges is complete. Monitoring and sampling will continue to be evaluated at a minimum of every 5 years to determine whether a release or substantial threat of a release of testing and training constituents poses an imminent and substantial threat to human health or the environment.

Cumulative impacts to soils are not anticipated.

4.1.11.5 Water Quality. Direct impacts on groundwater from the proposed action are estimated to result in minimal changes in the potential for groundwater contamination. However, even though the increase in testing and training at the Ranges would result in no additional direct negative impacts, the increase in munitions expended at NSTR adds munitions constituents to the soil and could result in an added potential for groundwater contamination, albeit very small.

The analysis of potential groundwater impacts from explosives residues in the *Final Environmental Assessment for the National Security Test Range and FONSI* (DOE-ID 2007) found that these residues are not expected to have an impact on groundwater due to a low infiltration rate and adsorption onto the soil. Studies at the INL Site undertaken through the CERCLA Program have demonstrated that small amounts of chemical contaminants, located at the ground surface, do not present a risk to groundwater even if there is no adsorption on soil (DOE, 2001).

While there may be additive effects from past, present, and future testing and training events, soil monitoring and removing soil, if necessary, minimizes potential impacts to groundwater quality.

4.1.11.6 Hazardous Materials and Hazardous Waste Management. The proposed action has the potential to deposit hazardous constituents on the Ranges from radiological dispersals and explosive detonations and could increase the amounts of hazardous materials stored at the Ranges. The amounts would be a minor increase compared to existing INL Site operations.

The amount of hazardous waste generated would increase, commensurate with the increase in training operations. The increase in hazardous materials and hazardous waste associated with the proposed action would increase the potential damage a release might cause; however, existing programs and capabilities at the INL Site could easily handle and contain any potential release.

The increase in hazardous materials and normal industrial waste associated with the proposed action is not expected to perceptively add to the existing cumulative hazardous materials and waste impacts. Although weapons constituents are not considered hazardous waste until they leave the range, the increase in hazardous constituents from expended munitions in the soil of the Ranges amounts to a potential contaminant and would be an added minimal cumulative impact.

The Ranges will continue to be evaluated at a minimum of every 5 years to determine whether a release or substantial threat of a release poses an imminent and substantial threat to human health or the environment. If a significant increase in Range operations occurs or new munitions types are used, then the assessment should occur earlier than 5 years to ensure no additional threat resulting from the change in operation.

4.1.12 Conclusion

Implementing the proposed action would result in minor adverse impacts to the environment. These impacts, in conjunction with other past, present, and reasonably foreseeable future actions, would result in negligible cumulative impacts.

4.2 No Action Alternative

The no action alternative means that none of the actions described in the proposed action would occur at the Ranges. Environmental impacts, as described in Section 4, would not occur on the INL Site from actions described in the proposed action. However, current operations at NSTR and RRTR, as evaluated in the *Final Environmental Assessment for the National Security Test Range and FONSI* (DOE-ID, 2007) and the *Final Idaho National Laboratory Radiological Response Training Range Environmental Assessment and FONSI* (DOE-ID, 2010) would continue.

If the proposed activities were not performed at the INL Site, other entities and locations could potentially support the research, testing, and training capabilities proposed at the Ranges. Performing the proposed activities at another location and the associated environmental impacts is outside the scope of this analysis.

4.3 Summary of Environmental Consequences

Table 36 provides a summary of the environmental consequences that would result from the no action and proposed action alternatives for air, cultural, ecological, and soil resources.

Table 36. Summary of environmental impacts under the proposed action and no action alternatives.

Resource	No Action Alternative	Proposed Action
Air	Under the no action alternative, there would be no change in the current conditions at the INL Site; therefore, there would be no direct, indirect, or cumulative impacts to air quality.	Air quality impacts from implementing the proposed action caused by mobile emissions sources used to conduct project activities (including maintenance and testing) and ground disturbance would be minimal and localized and would not cause changes to regional air quality. In addition, the long-term operation and maintenance of the project would not result in any non-permitted sources of toxic air emissions. Because of the limited nature of construction activities and use of project controls (e.g., applying water to disturbed areas), air quality impacts would be negligible. A conservative assessment of radionuclide releases during anticipated normal operations indicates cumulative doses from all INL sources would be well below the 10 mrem/year dose standard for a member of the public at the INL MEI location.
Historical and Cultural	All archaeological sites within the project area have been recommended as ineligible and the no action alternative would have no effect to historic or cultural properties.	DOE has consulted with SHPO under Section 106 of the NHPA and has received concurrence that there would be no adverse effects to eligible or potentially eligible NHPA sites.
Ecological	The current levels and types of testing and training operations would continue under the no action alternative. No changes would occur to ecological resources. The no action alternative, in conjunction with other past, present, or reasonably foreseeable projects, would not be expected to result in cumulative impacts to ecological resources.	Radiological testing at the Ranges would not exceed DOE standards for protection of biota. The increase in disturbance and in training and testing events is unlikely to cause a notable amount of habitat fragmentation or loss or to affect wildlife migration. The stability of INL Site ecological resources would not be affected.
Soils	Present training operations are contained within well defined, existing training areas and ranges, and no additional impacts would occur by implementing the no action alternative.	The effects of soil disturbance would be localized; there are no other planned projects with which the effects of the proposed action would combine to result in cumulative hazards. Therefore, the impacts to soils from disturbance associated with the proposed action would be minimal. Build-up of munitions constituents and/or radiological materials in soils is unlikely.
Water Quality	Under the no action alternative there would be no change in the current conditions at the INL Site; therefore, there would be no direct, indirect, or cumulative impacts to water quality.	The proposed action is estimated to result in minimal changes in the potential for groundwater contamination. Therefore, impacts to groundwater are minimal.
Hazardous Materials	The current use levels and types of hazardous materials and waste management activities at	The increase in hazardous materials and normal industrial waste associated with the proposed action is not expected to

Resource	No Action Alternative	Proposed Action
and Waste Management	the INL Site would continue under the no action alternative. No changes would occur.	perceptively add to the existing cumulative hazardous materials and waste impacts at the INL Site.
Health and Safety	The current levels and types of testing and training operations would continue under the no action alternative. No changes would occur to human health and safety.	No adverse impacts to human health and safety are anticipated from the proposed action.
Noise and Vibration	The current levels and types of testing and training operations would continue under the no action alternative. No changes would occur.	Vibration conditions around the NSTR remain unchanged from the no action level. Noise impacts increase slightly from added weapons firing above the no action level. Noise effects from explosive detonations dominate the overall Range operational noise and the slight change in noise impacts would not amount to an adverse impact.
Intentional Destructive Acts	Under the no action alternative, there would be no change in current conditions at the INL Site; therefore, there would be no change in the potential for intentional destructive acts.	The proposed action would not constitute an attractive target for vandalism, sabotage, or terrorism, because the facilities would be difficult to damage and the impact from any successful act would be negligible both from a practical and political perspective. Because the proposed action presents an unlikely target for an act of terrorism, the probability of an attack is extremely low.

5. COORDINATION AND CONSULTATION

5.1 Shoshone-Bannock Tribes

DOE provided the NSTR/RRTR cultural resource investigation report (INL/LTD-18-52362) to the Tribes for review and comment on January 29, 2019. DOE briefed Heritage Tribal Office representatives on July 15, 2019, on the EA and project. DOE briefed the Fort Hall Business Council on July 24, 2019.

DOE briefed the Heritage Tribal Office on the cultural resource evaluation for the NSTR/RRTR Project during several regularly scheduled Cultural Resource Working Group meetings held during 2016 through 2019. Members of the Office also participated in field surveys performed within the project area of potential effect as documented in INL/LTD-18-52362.

5.2 Idaho State Historic Preservation Office

DOE performed National Historic Preservation Act Section 106 consultation with SHPO. DOE briefed Idaho SHPO on the cultural resource investigation of NSTR/RRTR on January 31, 2019. DOE provided the NSTR/RRTR cultural resource investigation report (INL/LTD-18-52362) to the Idaho SHPO for review on January 29, 2019. On April 4, 2019, DOE received concurrence from Idaho SHPO on the determination of no adverse effect to historic properties. As a result of the no adverse effect determination, there was no need to consult with the Advisory Council for Historic Preservation.

5.3 Congressional

DOE briefed staff members of Senator Risch, Senator Crapo, and Congressman Simpson on July 16, 2019.

5.4 Idaho Governor's Office

DOE briefed Idaho Governor's Office Energy and Mineral Resources Administrator, John Chatburn, Policy Analyst Marissa Warren, and several Idaho Department of Environmental Quality officials including Regional Administrator Erick Neher on July 15, 2019.

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