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Ecological Resources Assessment for the Radiological Response Test Range Environmental Assessment

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1.0 Introduction

1.1 Purpose of this Report

There is a broad based need by United States national security agencies to have a training range where they can safely conduct realistic training exercises and demonstrate technologies in radiologically controlled environments that simulate major incidents. Responders to any major radiological incident must be able to effectively use a variety of specialized equipment in a timely and integrated manner to collect the necessary information to characterize the event. This Ecological Resources Assessment evaluates the constructing and operating training ranges where field exercises will simulate conditions encountered from radiological dispersal devices (i.e. "dirty bomb") or an improvised nuclear device.

The purpose of this report is to assess the potential impacts to ecological resources including threatened, endangered, and sensitive species due to construction and operation of a facility to provide the radiological response training associated with the alternatives described below.

1.2 Description of the Proposed Action

1.2.1 Alternative 1 – Onsite Locations

Alternative 1 establishes three outdoor ranges: T-28 Training Range, TAN Training Range, and the Infiltration Pond Training Range (see Figure 1). The T-28 Training Range consists of the south T-28 Gravel Pit, a short section (<1 mile) of T-28 (north of the gravel pit), a section (~0.6 miles) of access road (south of the gravel pit), the T-28 Gravel Pit (9 acres), a berm/ditch structure (0.75 miles), and a large area (825 acres) surrounding the gravel pit. The TAN Training Range consists of two areas: TAN parking lot (~2.5 acres) and an area consisting of the old TAN Facility (23.5 acres). The RWMC Training Range consists of four areas: Infiltration Basin (~7.5 acres), a smaller area (0.5 acres) just adjacent to and west of the Infiltration Pond, two small areas (~3.6 acres) along the access road to the west of the Infiltration Pond, and the parking area (~5.0 acres) just south of RWMC.

These sites will be used to train personnel, test sensors, and develop detection capabilities (both aerial and ground based) under a variety of dispersion scenarios using short-lived radioactive source materials (see glossary).

The training includes: (1) site characterization with aerial surveys on well defined sources, and (2) ground based sample collection, contamination control, decontamination operations, and remote field radiation measurements. The different locations allow range users flexibility in planning their training activities. Training and demonstrations will be conducted on an as-needed basis and will incorporate the respective areas that best satisfy the specific training objectives.

Project activities include: (1) preparing the site, (2) operating the site, and (3) performing training exercises at the site (see Table 1 for specifics).

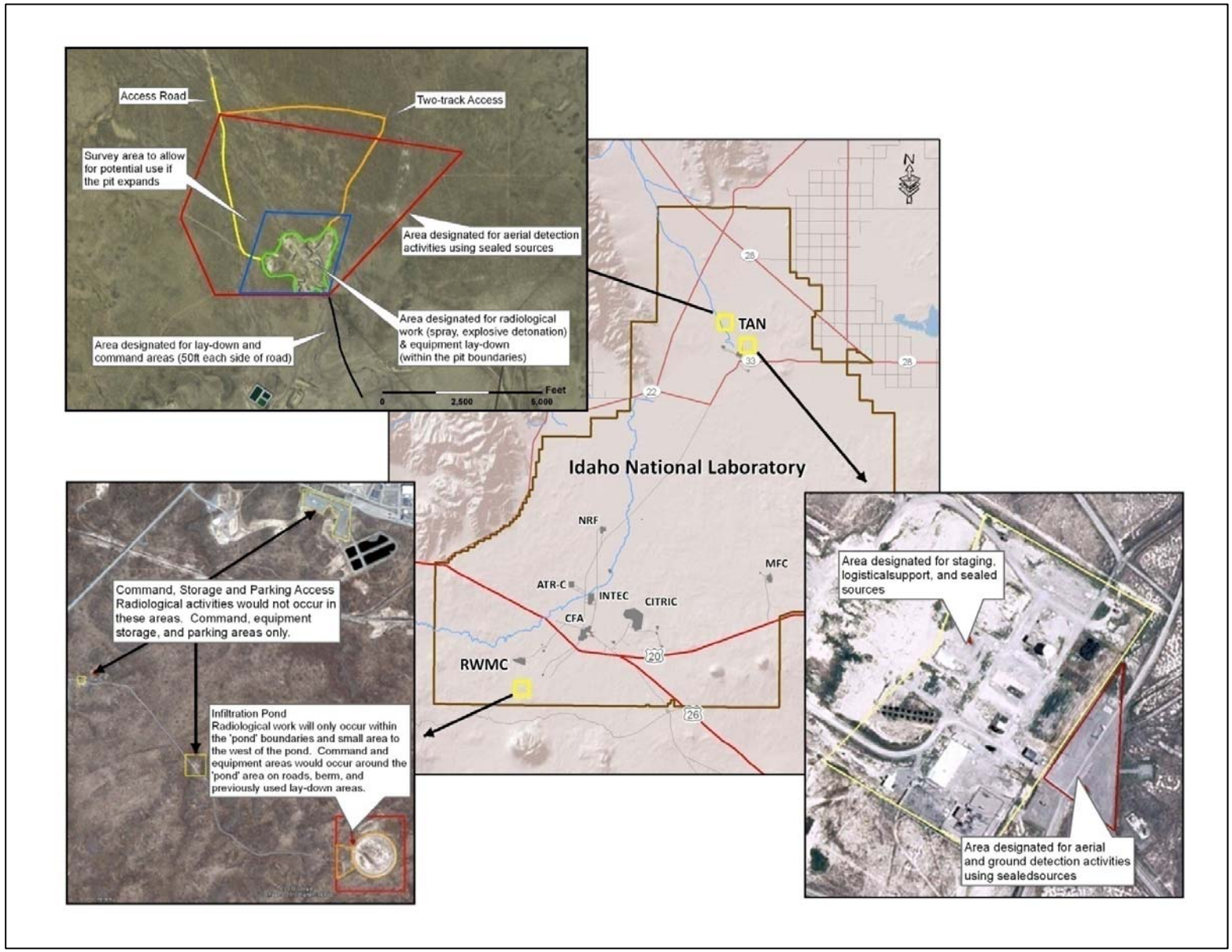

Figure 1. Location of RRTR training ranges on the INL.

Table 1. Project activities related to (1) preparing, (2) operating, and (3) training at the sites.

Activities to Prepare Sites

- Contour the gravel pit areas to grade/compact the earth. Use two-track roads outside the gravel pit. At the gravel pit and infiltration pond, manage (mow) grasses and brush before each exercise to reduce fire hazards.
- Use about 600 gallons/test water to apply the KBr. Store water in several 200–500 gallon polyethylene containers on site. Apply about 1000 gallons/day of water for dust control on roadways and parking lots.
- Construct temporary simulated urban environments for exercises reflective of populated/urban settings.
- Establish tent set-up areas for decontaminating personnel and equipment.
- Establish a base area for tents or trailers to support equipment storage, mission planning and data assessment activities, communication activities, and sleeping and eating accommodations.
- Conduct pre-survey (i.e., soils, etc.) for legacy radioactive contaminants and as appropriate surveys for cultural and biological resources (i.e., nesting bird surveys).

Operating Activities

- Control site access for security consideration
- Irradiate KBr at an irradiation facility (Project personal receive a 'purity statement' attesting to the purity of the isotope, assuring that project personnel know the isotopes produced during irradiation).
- Determine maximum amount of KBr salt (up to 500 grams, *but less than 1 curie*) to be used for each test and identify/quantify any chemical contaminants present.
- Transport the KBr to the testing site using U. S. Department of Transportation (DOT) approved methods and transport containers.
- Maximum curies of each isotope present at the time of distribution—both of the curies of the major, intended isotopes, and any from tramp contaminants[1] (maximum of 1 curie at time of dispersal—see inset table for isotope breakdown) ECAR-334, 2008.
- Disperse the short-lived KBr in accordance with scenario requirements; it is expected that 12 or less tests would occur annually. This may include:
  - Dissolve in water and apply with sprayers (for precise control of KBr levels and deposition pattern)
  - Use CO_2 or compressed air gas jet to disperse the KBr radionuclide as a powder with a specified particle size without explosive residues
  - Use explosives, such as C-4 or equivalent (about 1/2 pound), to disperse the KBr radionuclide for a dirty method to disperse the materials with a range of particle sizes.
- Fully contained or "sealed" radioactive sources may be used to calibrate instruments or as supplemental training materials to augment field or samples characterized; the following isotopes are representative of those that may be used for training: ^{137}Cs, ^{60}Co, ^{192}Ir, ^{75}Se, ^{226}Ra, and isotopes of U, Pu, Am, and Th. Project personnel will use INL radiological control and hazard identification and mitigation procedures to select and control the isotopes used for training events.
- INL would continue to use the gravel pit to mine gravel for on-site uses; however, access may be restricted during and after training exercises while radioactive levels decay to pre-test background level.

KBr Source Term (in curies)

P-33	1.357E-12
Cl-36	2.258E-10
Cl-38	2.890E-12
Ar-39	1.479E-6
Ar-41	2.106E-6
K-40	3.803E-9
K-42	4.260E-2
K-43	1.133E-9
Se-81	5.417E-14
Se-81m	3.669E-14
Br-80	2.500E-1
Br-80m	2.339E-1
Br-82	4.731E-1
Br-82m	000E+00
Br-83	1.936E-8
Kr-79	9.409E-12
Kr-83m	6.532E-8
Total	1.00E+00

1. Unwanted or unneeded trace or minor constituents.

Training Exercise Activities
• Use gasoline/diesel generators for electrical power. • Use ground robots for sample collection and site surveillance activities. • Use portable toilets or sanitary facilities. • Place cargo containers, old vehicles, and similar objects in the training range to test sample collection methodologies. • Use stakes to anchor equipment and spray paint, stakes, and rope to mark areas as appropriate. • Collect ground soil samples and surface smears off objects located in the training range. • Perform aerial measurements using fixed or rotary-wing based aircraft. • Establish a helibase area (transporting materials to and from site and fueling the helicopter). • Use unmanned aerial vehicles (UAV, fixed or rotary) to characterize the contamination area. • Use surrogate materials (CaCl2 etc.) to test application methods (~200 grams per test). • Transport personnel and equipment in all-terrain or utility (gators) vehicles (ATVs) throughout the project areas (e.g., gravel pit, pond, roads) for characterization and sample collection. • Practice decontamination procedures on personnel and equipment with cloth and wet (water spray) methods. • Dismantle and dispose of temporary structures following testing. • Store contaminated equipment and clothing until all detectable radionuclides are decayed then disposed as conditional waste or surveyed as free for release and reuse. • Cold waste will be disposed through Waste Generator Services. • Collect samples for a post-survey of the area. • Conduct interrogation and characterization of surrogate suspect packages and devices. • Fly Over: Project personnel would conduct flyovers of the T-28 Training Range area to detect irradiated isotopes and the area bounded in red to detect sealed sources up to 12 times per year.

Waste Management: Operations at the RRTR would generate several types of waste: (1) common trash; (2) low-level radioactive waste; and (3) liquid waste. Common trash would consist of routine office trash, non-radioactive personal protective equipment (PPE) (i.e., gloves, etc), and PPE which was initially radioactive, but was stored until radioactive constituents decayed to background levels. Routine office trash and non-radioactive PPE would be disposed at the state-regulated INL landfill.

Low-level radioactive waste would include PPE used to enter the training area, sample material generated during training (i.e., analytical waste, soil, and wipes), and water used to decontaminate personnel exiting the training area. All low-level radioactive waste would be stored in accordance with INL procedures to allow decay of the radioactive constituents. After decay, the non-soil solid waste would be disposed at the state-regulated INL landfill. Soil samples would be returned to the training area after decay.

Liquid waste would include water used to decontaminate personnel exiting the training area and liquid laboratory analytical waste, and sewage. All low-level decontamination water would be stored in accordance with INL procedures to allow decay to background levels of the radioactive constituents.

After decay, the decontamination wastewater would be disposed to the Central Facilities Area (CFA) Sewage Treatment Plant (STP). No decontamination wastewater is allowed to be disposed off the INL Site. Approval for disposing decontamination wastewater to the CFA STP must be obtained from Facility and Site Services prior to discharge.

Laboratory analytical waste would be solidified, allowed to decay if radioactive, and disposed at the state-regulated INL landfill. None of the laboratory waste is expected to be classified as Hazardous Waste.

Portable toilets will be used at the RRTR. The portable toilets would be provided and pumped by a commercial vendor possessing a current and valid septic tank pumping permit issued by the State of Idaho. Wastewater pumped from the portable toilets shall be discharged to the CFA STP. The CFA STP must be included on the commercial vendors' State of Idaho approved list of disposal sites prior to discharge. Approval for disposal to the CFA STP must be obtained from Facility and Site Services.

If hazardous waste is generated, it would be managed in accordance with state regulations and disposed at a permitted off-INL facility.

Typical Training Exercise: Each training exercise could include up to 75 people and 15 vehicles at the range proper and will be conducted according to its own carefully prepared plan and schedule. Before the exercise, a radiation background check will be performed and environmental monitoring equipment will be in place to verify exactly what occurs. Support equipment such as radios, generators, cargo containers, command tents, and portable toilets will be on scene as needed. The radiological materials to be used will be carefully packaged and transported to the training ground and placed (for sealed radiological sources) and/or dispersed (KBr) according to the previously approved plan. The entire area will be carefully controlled to prevent unauthorized persons from inadvertently entering.

Those involved in each exercise will be carefully briefed beforehand about what is to take place, any potential hazards and the expected course of the exercise events. For some exercises, source materials in sealed containers will be placed on site, and later removed after the event is over. For other exercises, minute quantities of material will be dispersed in a liquid sprayed on the ground or in the air (through aerosol or small explosive dispersal). Trainees will use specialized equipment to take readings and samples in the test area to gain proficiency in using instruments and techniques to effectively characterize an incident scene. The activities will continue for several days, depending on the exercise being conducted and may include aerial based monitoring of the test area. After each exercise, test equipment and any sealed source materials will be removed and stored as needed; monitoring of the test area will continue until background radiation levels return to normal pre-test levels. DOE would then release the test area for unrestricted use.

1.2.1.1 Alternative 1a: Maximizing Training Flexibility

This alternative gives DOE the maximum training flexibility in conducting training exercise, as described above and below at the following onsite locations.

T-28 Gravel Pit Area

- T-28 Gravel Pit: Project personnel will use the T-28 gravel pit for radiological work (spraying on the ground & dispersing using explosives). Personnel may also request the grading and leveling of small areas of the pit for command centers, radiological source preparation, decontamination areas, and equipment storage. Project activities would not extent beyond the obvious boundaries of the gravel pit; where the boundary is not clearly defined, project personnel will work with those responsible for the pit to place markers to identify a boundary.
- T-28 Road (North of the T-28 Gravel Pit): Project personnel will use T-28 for placement of the command centers and for travel to the west side of the larger area. Project personnel would identify two locations to place command centers along the road (some adjustments would occur to protect sensitive cultural resources or wildlife). Project personnel could place sealed sources along the road. To meet wildland fire requirements, mowing may occur to allow for a 30-foot buffer around the current disturbed area.
- T-28 Road and Access Road (South of the T-28 Gravel Pit) and the berm/ditch structure (Northeast of the T-28 Gravel Pit): Project personnel would use the berm leading out of the northeast part of the gravel pit, the arch road across the top of the area and T-28 to travel around the area on small vehicles to place and detect sealed sources. Project personnel would leave vehicles on the road and travel on foot to place sealed sources within the larger area. There would be no off-road vehicle travel, or any extended stay along those two-track roads or berm/ditch. Project personnel would limit travel on the berm/ditch to ATVs, but may use light trucks on T-28 and the arc two-track roads. In addition, project personnel would use the disturbed areas just outside the south boundary of the gravel pit (right & left of the entrance road) as equipment laydown/storage and areas along the southeast road for placement of command posts. The portion of T-28 extending north of the arc road may be used to find appropriate areas where light vehicles can turn around.
- Small trapezoid surrounding the T-28 pit: Project personnel will use this area to place sealed sources, but would also take advantage of any gravel pit enlargement to conduct other radiological work (such as spraying or dispersal using explosives), but only if the pit expands. Entry to that area would be by foot traffic only.
- Large area surrounding the T-28 pit: Project personnel will use this area to place sealed sources; no other radiological work, other than allowed by the above description would occur within the red boundary. Entry to that area would be by foot traffic only.
- Fly Over: Project personnel would conduct flyovers of the T-28 Training Range area to detect irradiated isotopes and the area bounded in red to detect sealed sources up to 12 times per year.
    - Aerial platforms including fixed or rotary wing aircraft or unmanned vehicles (UAV) may be used to overfly the RRTR. These aircraft would have sensor platforms to detect radioactivity and provide mapping of the area. Aircraft would overfly the range at varying above-ground levels (AGL) possibly as low as 100 feet AGL and up to 1000 feet AGL or higher. The flights may involve multiple flyovers in patterns (e.g., a north-south and then east west grid on 100 meter flight line centers at multiple locations and speeds) or a single flyover. The number of flights per exercise will vary

with the training requirements. Not all exercises will require aircraft activity. Some exercises may require multiple daily flyovers or flights during the exercise period. Fixed and rotary wing aircraft will be leased in accordance with DOE requirements or will be associated with and controlled by the group undergoing training (e.g., a military aircraft). UAV platforms may be supplied by INL or the organization being trained.

- Overflights will be restricted to RRTR and immediately adjacent area. Overflights of occupied facilities at the INL will not occur in relation to the RRTR activities without a separate evaluation. Some rotary wing aircraft may land at the INL for refueling. The INL has a landing strip for UAV operations or separate launch and retrieval equipment could be used at the INL.
- All aircraft operational activities require extensive INL coordination and review processes including flight planning, refueling plans, frequency reviews, security planning, and associated concerns.

TAN Training Range Area

- TAN/TSF Area: Project personnel will use the area above the berm as equipment laydown and storage, including the storage of sealed sources.
- TAN Parking Lot: Project personnel will use the parking lot area to place sealed sources; no other radiological work would occur in this area. Ground survey's to detect sealed sources would occur in this area.
- Fly Over: Project personnel would conduct fly overs of the parking lot area to detect sealed sources.

Infiltration Pond Training Range Area

- Parking lot near RWMC: Project personnel will use this area for parking and equipment storage only. To meet wildland fire requirements, mowing may occur to allow for a 30 foot buffer around the current disturbed area. Project personnel will not conduct any radiological work, including the use of sealed sources, in this area.
- Road to Pond: Other than the 'West Gate Area" and the "Center Area", project personnel would only use the road to travel to and from the pond. Project personnel would not use areas along the road, other than those identified below, other than for travel. Project personnel will not conduct any radiological work, including the use of sealed sources, in this area.
- West Gate Area: Project personnel will use this area for parking and placement of command centers. Parking and placement of the command centers would occur only on previously disturbed parts of the area. To meet wildland fire requirements, mowing may occur to allow for a 30 foot buffer around the current disturbed area. There will be no radiological work done at this area.
- Center Area (along road to pond): Project personnel will use area for parking and placement of command centers. Parking and placement of the command centers would occur only on previously disturbed parts of the area. To meet wildland fire requirements, mowing may occur to allow for a 30 foot buffer around the current disturbed area.

Project personnel will not conduct any radiological work, including the use of sealed sources, in this area.

- Infiltration Pond: Radiological work will occur within the pond and on the surrounding berm and in the area adjacent to and west of the pond. In other words, no radiological work will occur outside the pond boundary (the berm), except in the area directly to the west where project personnel will prepare the sources, and conduct decontamination activities. Project personnel will restrict their activities in the area adjacent to and west of the pond to previously disturbed areas. To meet wildland fire requirements, mowing may occur to allow for a 30 foot buffer around the current disturbed area. No activities would occur outside the infiltration pond or the area adjacent to and west of the pond (orange lines). No work with sealed sources would occur at this site outside the pond boundaries. Project personnel would place a camera (with a sealed source) on the berm, but would not go further out beyond the berm.

1.2.1.2 Alternative 1b: Minimizing Project Impacts

This alternative restricts project activities in the areas surrounding the T-28 Gravel Pit to minimize impact to biological and cultural resources. The project activities at the other onsite locations (TAN/TSF, TAN Parking Lot, and the Infiltration Pond) would remain the same as described in Alternative 1a. In addition, the activities in the T-28 Gravel Pit and along the berm/ditch (northeast of the T-28 Gravel Pit) would remain unchanged from Alternative 1a (see description below).

T-28 Training Range Area

- T-28 Gravel Pit: Project personnel will use the T-28 gravel pit for radiological work (spraying on the ground & dispersing using explosives). Personnel may also request the grading and leveling of small areas of the pit for command centers, radiological source preparation, decontamination areas, and equipment storage. Project activities would not extent beyond the obvious boundaries of the gravel pit; where the boundary is not clearly defined, project personnel will work with those responsible for the pit to place markers to identify a boundary. (Same as in Alternative 1a)
- T-28 Road and Access Road (South of the T-28 Gravel Pit) and the berm/ditch structure (Northeast of the T-28 Gravel Pit): Project personnel would use the berm leading out of the northeast part of the gravel pit, the arch road across the top of the area and T-28 to travel around the area on small vehicles to place and detect sealed sources. Project personnel would leave vehicles on the road and travel on foot to place sealed sources within the larger area. There would be no off-road vehicle travel, or any extended stay along those two-track roads or berm/ditch. Project personnel would limit travel on the berm/ditch to ATVs, but may use light trucks on T-28 and the arc two-track roads. In addition, project personnel would use the disturbed areas just outside the south boundary of the gravel pit (right & left of the entrance road) as equipment laydown/storage and areas along the southeast road for placement of command posts. The portion of T-28 extending north of the arc road may be used to find appropriate areas where light vehicles can turn around.
- Small trapezoid surrounding the T-28 pit: Project personnel will use this area to place sealed sources, but would also take advantage of any gravel pit enlargement to conduct

other radiological work (such as spraying or dispersal using explosives), but only if the pit expands. Entry to that area would be by foot traffic only.

- Large area surrounding the T-28 pit: Project personnel will use this area to place sealed sources; no other radiological work, other than allowed by the above description would occur within the red boundary. Entry to that area would be by foot traffic only.
- Fly Over: Project personnel would conduct flyovers of the T-28 gravel pit to detect irradiated isotopes and the area bounded in red to detect sealed sources up to 12 times per year.

TAN Training Range Area

- Same as in Alternative 1a.

Infiltration Pond Training Range Area

- Same as in Alternative 1a.

1.2.2 No Action Alternative

DOE must consider a no action alternative in all its EAs. Selection of the no action alternative means that the proposed activity, as described in Section 1.2.1 would not take place. For this EA, that means personnel would not receive training, at INL, to execute effective responses to acts of nuclear terrorism, including developing and testing tools and field methodology under realistic scenarios. No action does not meet the purpose and need, and could decrease the ability to respond to terrorist actions and increase risks to first responders, characterization personnel, and the public.

INL would continue to use the gravel pit to mine gravel for various onsite uses. The TAN parking area and infiltration pond near RWMC would be available for other uses or reclamation activities.

2.0 Affected Environment

2.1 Vegetation

2.1.1 Plant Communities

The T-28 Training Range including the T-28 gravel pit, T-28 road, access road, the arc road, berm, and area southeast of the gate into the gravel pit covers several different vegetation community types including Wyoming big sagebrush shrubland, green rabbitbrush/winterfat shrubland, sickle saltbush dwarf shrubland, shadscale dwarf shrubland, basin big sagebrush/Great Basin wild rye, and Wyoming big sagebrush/green rabbitbrush shrubland, crested wheatgrass, and halogeton monocultures (around the top edge of the gravel pit). The area south of the gravel pit is dominated by annual species that are both native and non-native or crested wheatgrass. There is very little shrub cover in the proposed area.

The TAN/TSF Training Range is an area recently decommissioned from industrial land use. Most of it is in asphalt or gravel. Vegetated areas are dominated by crested wheatgrass.

The RWMC Training Range is generally in an area dominated by big sagebrush and three-tip sagebrush community types as well as some crested wheatgrass. The Command, Storage and Parking area immediately adjacent to RWMC is gravel. The Infiltration Basin Site was disturbed more than 15 years ago with soil pushed up to form a berm in a circle. The interior of the Basin was replanted to native grasses and shrubs about 10 years ago.

2.1.2 Sensitive Plant Species

A list of the sensitive plant species that have the potential to occur within the area affected by construction of the RRTR facilities was compiled using data from the Idaho CDC (2009). All sensitive species known to occur in Butte, Custer, Jefferson, Bonneville and Bingham counties were considered. Species with habitat requirements similar to the conditions occurring around the affected area were included in the list. Sensitive species that were not included in the list were discounted because the habitat around the affected area was not suitable due to topography, soils, or climate. Table 2 lists sensitive plant species for which suitable habitat is present on or around the affected area.

A survey specifically for sensitive plant species was completed in June of 2010 at the proposed sites. The yearly precipitation levels were good for vegetation across the desert. Although suitable habitat for the sensitive plant species was located, none of the specific plants in question were found.

Table 2. Sensitive species potentially occurring in the area affected by construction and operation of the RRTR and appropriate State of Idaho, U.S. Forest Service Region 4, and/or Bureau of Land Management Ranking.

Scientific Name	Common Name	State	USFS Reg. 4	BLM
Astragalus aquilonius	Lemhi milkvetch	GP3	S	TYPE 2
Astragalus diversifolius	meadow milkvetch	GP2	S	TYPE 3
Camissonia pterosperma	wing-seeded evening-primrose	S		TYPE 4
Catapyrenium congestum	earth lichen			S
Eriogonum capistratum Rev. var. *welshii* Rev.	Welsh's buckwheat	GP2	S	TYPE 3
Ipomopsis polycladon	spreading gilia	2		TYPE 3

2.1.3 Ethnobotany

A list of species thought to be of historical importance to local tribes was compiled from Plant Communities, Ethnoecology, and Flora of the Idaho National Engineering Laboratory by Anderson et al. (1996). The list included those species documented to have been used by "indigenous groups of the eastern Snake River Plain," (Anderson et al. 1996). Table 3 lists those species of ethnobotanical concern observed during the surveys for sensitive plants.

Table 3. List of species of ethnobotanical concern occurring on vegetation plots surveyed in the affected area of the proposed radiological response test range.

Current Scientific Name	Common Name	Uses
Achnatherum hymenoides	Indian ricegrass	food
Artemisia tripartita	threetip sagebrush	food, medicine, cordage, clothing, shelter, fuel, dye
Artemisia tridentata	big sagebrush	food, medicine, cordage, clothing, shelter, fuel, dye
Chenopodium leptophyllum	narrowleaf goosefoot	food
Chrysothamnus viscidiflorus	green rabbitbrush	medicine, gum
Cirsium arvense	Canada thistle	food
Descurainia pinnata	western tansymustard	food, medicine
Descurainia sophia	herb sophia	food, medicine
Ericameria nauseosus	rubber rabbitbrush	medicine, gum
Lappula occidentalis	flatspine stickseed	food
Leymus cinerus	basin wildrye	food, manufacture
Opuntia polyacantha	pricklypear	food
Poa secunda	Sandberg bluegrass	food, medicine
Salsola kali	Russian thistle	food

2.1.4 Invasive and Non-Native Plant Species

A total of eleven Idaho Noxious Weeds have been identified on the INL Site. Of those, only Canada thistle (*Cirsium arvense*) was observed at the RWMC Training Range area. Musk thistle (*Carduus nutans)* has been observed in the area in the past but was not located in June 2010. In a literature survey, Pyke (1999) identified 46 exotic species that are weeds capable of invading sagebrush steppe ecosystems, with as many as 20 of these classed as highly invasive and competitive. Other significant non-native and/or invasive plants found on or near the proposed road corridors include cheatgrass (*Bromus tectorum*), Russian thistle (*Salsola kali*), halogeton (*Halogeton glomeratus*), tumble mustard (*Sysimbrium altissimum*) and crested wheatgrass (*Agropyron cristatum, A. desertorum, A. sibericum*).

Musk thistle and Canada thistle are both very common noxious weeds on the INL. Canada thistle appeared frequently in the basin during the survey. Canada thistle is extremely difficult to control in that it reproduces from both seed and rootstock (Sheley and Petroff 1999). Musk thistle is more readily controlled, but requires persistent management.

Non-native species also present a challenge in disturbed areas. They establish very quickly and successfully compete with the native species. Cheatgrass and halogeton were present on both proposed sites. These non-native annual species are very quick to colonize any new disturbance and are very difficult to eradicate once they are present. Most non-native annuals produce large amounts of seed every year and the seeds remain viable for long periods of time.

2.2 Wildlife

Scientists on the INL have been collecting wildlife data for more than 40 years and have recorded a total of 219 vertebrate species (Reynolds et al. 1986) occurring on the INL, many of which are directly associated with sagebrush steppe habitat. Species that permanently reside within the alternative areas include small and medium sized mammals (bushy-tailed woodrat [*Neotoma cinerea*], Ord's kangaroo rat [*Dipodomys ordii*], pygmy rabbit [*Brachylagus idahoensis*], black-tail jackrabbit [*Lepus californicus*], long-tailed weasel [*Mustela frenata*], badger [*Taxidea taxus*]), and reptiles (sage brush lizard [*Sceloporus graciosus*] and gopher snake [*Pituophis catenifer*]). Such species have small home ranges, limited mobility, or a social structure that restricts movements. With the exception of pygmy rabbit, each of these species can be found in both sagebrush and grassland habitats. Birds (horned lark [*Eremophila alpestris*], sage sparrow [*Amphispiza bilineata*], rough-legged hawk [*Buteo lagopus*], and red-tailed hawk [*Buteo jamaicensis*]) and large mammals (elk [*Cervus elaphus*], mule deer [*Odocoileus hemionus*], and pronghorn antelope [*Antilocapra americana*]) use the areas in a seasonal transitory manner.

At the T-28 Training Range location, a wide variety of species were either seen or indication of their presence was evident. These species include: badger, coyote, antelope, elk, jack rabbit, sagebrush lizard, horned lizard, ground squirrel, cottontail, jack rabbit, chipmunk, kangaroo rat, pygmy rabbit, and various bird species.

At the RWMC Training Range location, antelope, elk, and coyote are present in the area as well as various small mammals and birds.

In addition to native wildlife species, sign of use by cattle was noted at both the T-28 Training Range as well as the picnic area (center area) associated with the RWMC Training Range. Neither the T-28 Training Range nor the RWMC Training Range sites are within BLM grazing allotments

Wildlife species of concern addressed in this analysis include all migratory birds (including raptors), greater sage-grouse (*Centrocercus urophasianus*), pygmy rabbits and all large mammal species.

2.2.1 Greater Sage-Grouse

The U.S. Fish and Wildlife Service recently released a finding that sage-grouse warrant protection under the Endangered Species Act, but are precluded due to other listing priorities (DOI-FWS 2010). Breeding habitats, primarily leks, have become a focal point for managing this species. Lyon (2000) estimated the average nest distances to the nearest lek varies from 0.6-3.9 mi (1.1 to 6.2 km) but may be as great as 12.5 mi (20 km). Sage-grouse guidelines from Connelly et al. (2000) suggest that all sagebrush habitats within 2 miles of occupied leks be protected.

The Environmental Surveillance, Education and Research (ESER) program is conducting a sage-grouse radio telemetry study on the INL site. The results of this research will be incorporated into the INL Conservation Management Plan and a Candidate Conservation Agreement with the U.S. Fish and Wildlife Service. Sage-grouse were captured and fitted with radio transmitters at numerous leks throughout the INL in 2008 and 2009. No birds in that study have been reported

to use the areas associated with the Alternative sites for proposed action (ESER unpublished data).

No historical sage-grouse leks have been reported in the vicinity of either alternative site (Shurtliff and Whiting 2009a). Because leks are focal points for conservation of this species, we conducted additional surveys to determine if leks are in the vicinity of two of the proposed sites. The Infiltration Basin was visited on April 26, May 3, and May 10, while the T-28 Gravel Pit was visited on April 30, May 8, and May 13 to document the potential presence of sage-grouse at or near these locations. The visits occurred during the morning hours between 0640 and 0800 to coincide with the time when sage-grouse display on leks, generally being one-half hour before sunrise to an hour and one half after sunrise. Sunrise times were based on estimates for Arco, ID. Sampling locations at the Infiltration Basin were located at each of the cardinal directions of the circular basin (Figure 2). Sampling locations at the T-28 Gravel Pit were chosen at the outermost points on the lobes of the gravel pit and resulted in six sampling points (Figure 2).

At each sampling point we documented the UTM coordinates (NAD83), date, time, wind speed, temperature, cloud cover; as well as if grouse were present, heard, or if any grouse sign (i.e., scat, feathers, or tracks) was observed. The UTM coordinates were obtained using a hand-held Garmin Legend GPS receiver. Next, we attempted to detect sage-grouse displaying using both the unaided ear and a parabolic microphone. This microphone allowed us to hear and locate sage-grouse up to 1.6 km (1 mi) away. If no grouse were detected, we walked outward ~100 meters from the center of the sampling point and then listened again for male grouse calls for two minutes using the parabolic microphone and searched the ground for evidence of grouse sign.

Sage-grouse were not observed or heard at any of the sampling locations (Table 2). Grouse sign (scat) was observed at one location at the Infiltration Basin (Table 2). The grouse sign consisted of one small pile (11 pellets) of dried and weathered scat that appeared to be several years old. The scat was located on the northwest perimeter of the basin approximately 40 meters away from the berm of the basin. There was no grouse sign detected at any of the six sampling points at the T-28 Gravel Pit (Table 4).

2.2.2 Pygmy Rabbit

Pygmy rabbits are sagebrush steppe obligate species and under consideration for protection under the Endangered Species Act. Pygmy rabbits depend on sagebrush for cover and forage. Once sagebrush is removed from an area pygmy rabbits disappear (Green and Flinders 1980, Katzner et al. 1997). Populations of pygmy rabbits on the INL may be relatively stable because much of the site remains undisturbed; however, little is currently known about the status of pygmy rabbit populations on the INL Site. Pygmy rabbits were seen at two separate locations to the west and north of the T-28 road (Figure 3). Pygmy rabbit habitat is extensive in the area and other locations containing both burrow systems and scat were also documented.

The proposed training range sites were surveyed for presence of pygmy rabbits during June of 2010. It is preferable to conduct these surveys with fresh snow cover because recent tracks and pellets are obvious in fresh snow, thus facilitating identification of active burrows.

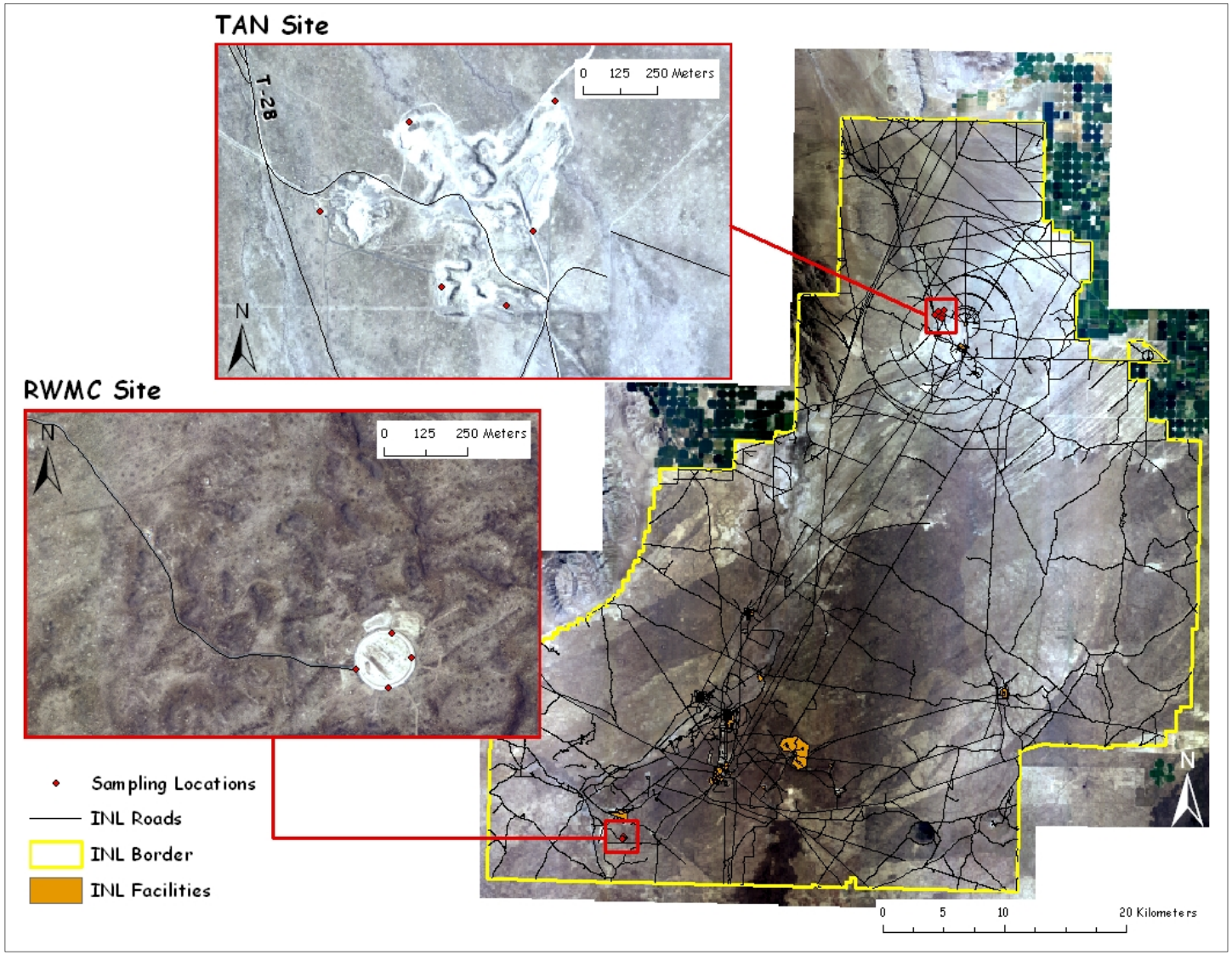

Figure 2. Areas sampled for sage-grouse activity around RWMC and the TAN gravel pit.

Table 4. Areas sampled, abiotic data, and sign of sage-grouse from surveys around RWMC and the TAN Gravel Pit.

Sampling Location	Temperature (°F)	Wind Speed	Cloud Cover	Grouse Observed	Grouse Heard	Grouse Sign
RWMC Infiltration Basin East Side	28	0-5 mph	76-100%	No	No	No
RWMC Infiltration Basin East Side	36	5-10 mph	76-100%	No	No	No
RWMC Infiltration Basin East Side	35	0-5 mph	0-25%	No	No	No
RWMC Infiltration Basin North Side	28	0-5 mph	76-100%	No	No	Old scat
RWMC Infiltration Basin North Side	36	5-10 mph	76-100%	No	No	No
RWMC Infiltration Basin North Side	35	0-5 mph	0-25%	No	No	No
RWMC Infiltration Basin South Side	28	0-5 mph	76-100%	No	No	No
RWMC Infiltration Basin South Side	36	5-10 mph	76-100%	No	No	No
RWMC Infiltration Basin South Side	35	0-5 mph	0-25%	No	No	No
RWMC Infiltration Basin West Side	28	0-5 mph	76-100%	No	No	No
RWMC Infiltration Basin West Side	36	5-10 mph	76-100%	No	No	No
RWMC Infiltration Basin West Side	35	0-5 mph	0-25%	No	No	No
TAN Gravel Pit Stop 1	36	10-15 mph	76-100%	No	No	No
TAN Gravel Pit Stop 1	29	0-5 mph	76-100%	No	No	No
TAN Gravel Pit Stop 1	32	0-5 mph	0-25%	No	No	No
TAN Gravel Pit Stop 2	36	10-15 mph	76-100%	No	No	No
TAN Gravel Pit Stop 2	29	0-5 mph	76-100%	No	No	No
TAN Gravel Pit Stop 2	32	0-5 mph	0-25%	No	No	No
TAN Gravel Pit Stop 3	36	10-15 mph	76-100%	No	No	No
TAN Gravel Pit Stop 3	29	0-5 mph	76-100%	No	No	No
TAN Gravel Pit Stop 3	32	0-5 mph	0-25%	No	No	No
TAN Gravel Pit Stop 4	36	10-15 mph	76-100%	No	No	No
TAN Gravel Pit Stop 4	29	0-5 mph	76-100%	No	No	No
TAN Gravel Pit Stop 4	32	0-5 mph	0-25%	No	No	No
TAN Gravel Pit Stop 5	36	10-15 mph	76-100%	No	No	No
TAN Gravel Pit Stop 5	29	0-5 mph	76-100%	No	No	No
TAN Gravel Pit Stop 5	32	0-5 mph	0-25%	No	No	No
TAN Gravel Pit Stop 6	36	10-15 mph	76-100%	No	No	No
TAN Gravel Pit Stop 6	29	0-5 mph	76-100%	No	No	No
TAN Gravel Pit Stop 6	32	0-5 mph	0-25%	No	No	No

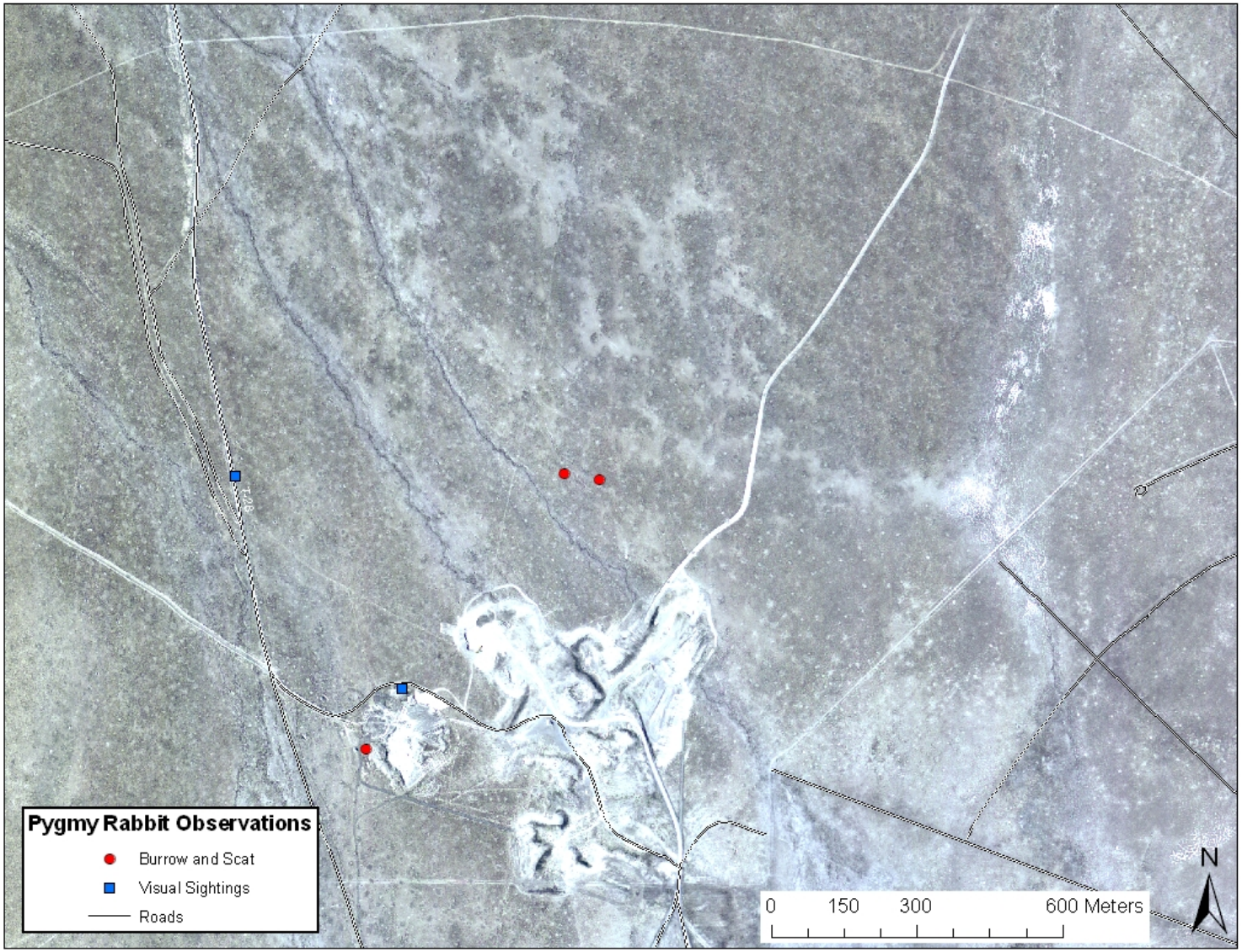

Figure 3. Locations of pygmy rabbit observations at the T-28 Training Range.

2.2.3 Birds

Most avian species occupying the INL Site use both sagebrush and grassland habitats from a few days for feeding and resting during migration to several months for breeding and raising young. Many bird species utilize specific habitats for foraging and reproduction. Species that primarily use sagebrush include the greater sage-grouse (*Centrocercus urophasianus*), sage sparrow, Brewer's sparrow (*Spizella breweri*), sage thrasher (*Oreoscoptes montanus*), and loggerhead shrike (*Lanius ludovicianus*). Species that occur mainly in grassland habitats include horned lark *(Eremophila alpestris)*, western meadowlark (*Sturnella neglecta*), vesper sparrow (*Pooecetes gramineus*), and grasshopper sparrow (*Ammodramus bairdii*). Although most raptors use the site indiscriminately for foraging, nesting structures are a limiting factor in population abundance and species diversity.

Bird species observed at the T-28 Training Range were western meadowlark, sage thrasher, horned lark, sage sparrow, mourning dove (*Zenaida macroura*), and other unidentified sparrow species. Bird species observed at the RWMC Training Range were western meadowlark, horned lark, and unidentified sparrow species.

2.2.4 Large Mammals

Elk, mule deer and pronghorn have been observed during semi-annual surveys using the general areas of both alternative sites throughout the year. Comer (2000) found that elk tend to utilize sagebrush on lava habitat more frequently than any other habitat type on the INL. The majority of this habitat type on the INL Site occurs within the non-grazed areas. Pronghorn and mule deer are more randomly scattered throughout the INL Site, with concentrations being greater near the Big Lost River Sinks and juniper woodlands respectively.

At the proposed sites, signs of elk, mule deer, and pronghorn use of the areas were observed during the surveys conducted in June of 2010. Pronghorn sign was common at both locations while the basin location at the RWMC Training Facility has extensive sign of use by elk.

2.3 Ecological Research and Monitoring

Thirteen Breeding Bird Survey (BBS) routes were established on the INL Site in 1985 (Shurtliff and Whiting 2009b). Each of these routes is surveyed once each June. Each route requires one day to complete the survey. Five of the routes are in remote areas and the data from these are reported to the U.S. Geological Survey Biological Resources Division as part of a national effort to monitor the status of bird populations. The other eight BBS routes are associated with facilities and are used to monitor the effects of INL Site activities on bird populations. The BBS route at TAN follows the south and southeast boundaries of the large outlined area at the T-28 Training Range.

3.0 Environmental Consequences

Operational controls would be implemented prior to and during the facility construction and operation to minimize the potential for adverse direct and indirect impacts to ecological resources in the area of potential effects. A tiered approach with initial efforts focusing on identification and assessment, followed by various protection strategies, as necessary, would be adopted as summarized below.

3.1 Vegetation

3.1.1 Plant Communities

Some of the proposed activities would result in vegetation and soil disturbance, and vegetation community fragmentation. An increase in soil disturbance would likely lead to an associated increase in weedy non-native species. The potential to displace native species in the communities adjacent to the selected site also would be amplified. This impact would be greatest associated with the preparation for command centers along road T-28.

Potential impacts to the vegetation communities at locations where vegetation removal is proposed could be minimized by limiting the size of the footprint of the disturbance. Weed management would also be necessary because even the slightest amount of soil disturbance would lead to non-native species invasions. Prompt revegetation of disturbed areas with native species would limit the potential impact to native plant communities.

3.1.2 Invasive and Non-Native Species

Soil disturbance is a primary contributor to the spread of invasive plants. Invasive and non-native plants are present on both of the Alternative sites and could be spread by mowing, blading, grubbing, and any other means used to remove the vegetation as described for some of the proposed activities. If the proposed activity schedule coincided with or immediately followed seed ripening for certain invasive plants, including cheatgrass, spreading would likely occur. Similarly, disturbed soils would be open and available to receive seeds through much of the seed dispersal period for nearly all of the invasive species found in this survey. Operational controls to minimize invasive and non-native species would include the development and implementation of a weed management plan.

3.1.3 Ethnobotany

Fourteen plant species of ethnobotanical interest were found at the proposed Test Range sites (Table 3). The impacts of vegetation and soil disturbance would likely be greater on less common species than they would be on abundant species. Frequently occurring species are generally quite abundant; thus, removing several individuals would not greatly affect the larger population. Populations of species with more isolated distributions, however, are much more sensitive to the loss of several individuals.

Because the soil and vegetation disturbance and risk of non-native species invasion would impact populations of species of ethnobotanical concern, the most effective operational control to protect those populations would be to minimize the amount of soil disturbed. Potential impacts to populations of plant species of ethnobotanical concern also may be minimized by revegetating disturbed areas. Seeds or seedlings are commercially available for about one-third of the species listed in Table 3; therefore, those species may be directly replanted, provided care is taken to choose appropriate subspecies and cultivars. Using a diverse mix of native species for revegetation would be important if species of concern, for which seed or stock is not available, are to re-establish voluntarily. Finally, weed control would be critical to facilitate re-establishment of native communities, including species of ethnobotanical concern.

3.1.4 Sensitive Plant Species

Because no occurrences of sensitive plants were found, no direct impacts to sensitive plant species are anticipated due to the development and operation of the Radiological Response Training Range.

3.2 Wildlife

Vegetation and soil disturbance would have common unavoidable impacts to wildlife, including loss of certain ground-dwelling wildlife species and associated habitat, and displacement of certain wildlife species due to increased habitat fragmentation. These impacts can be minimized by limiting the disturbance footprint, implementing a weed management strategy and promptly revegetating the disturbed areas. Any activity potentially disturbing vegetation or soils would require a nesting bird survey prior to disturbance.

3.2.1 Sage-Grouse

Although suitable habitat was found, minimal impacts to sage-grouse are anticipated due to the limited amount of disturbance planned in the areas with habitat.

3.2.2 Pygmy Rabbit

Extensive habitat and signs of use were found for pygmy rabbits at the T-28 Training Range. The areas west of the gravel pit and along both sides of the T-28 road present numerous locations containing actual sightings, burrow systems, and scat (Figure 3). Due to the mature stands of basin big sagebrush along the road and ample cover and forage as well as deep soils make this an ideal setting for the rabbits. Any vegetation disturbance to this section of the project area would result in a direct loss of habitat for pygmy rabbits and possible loss of individuals as well.

3.2.3 Habitat Fragmentation

Nearly all of the sites where the proposed activities activities could impact habitat have been previously disturbed. The exception is the portion of T-28 road extending north from the T-28 gravel pit. Although this road already exerts some force on fragmentation, the potential for increasing that effect would be increased by the potential loss of vegetation at multiple locations along that road. This impact could be reduced by minimizing the footprint of the disturbance, promptly revegetating the areas that have been disturbed, and implementing a weed management plan.

3.2.4 Radiological Impacts

Due to the short radiological half-lives (Table 1), most less than 24 hours, and low concentrations, radiological impacts to biota (plants and animals) in the area are not anticipated. The long-lived radionuclides Ar-39, Cl-36 and K-40 are naturally occurring in the environment and the addition of the concentrations proposed are insignificant compared to those existing naturally.

However, to ascertain no impacts to biota are occurring, a biota dose assessment should be conducted on the initial releases of radionuclides as required by DOE Orders 450.1a (2008) and 5400.5 (1993). The impact of environmental radioactivity at the INL Site on nonhuman biota can be assessed using *A Graded Approach for Evaluating Radiation Doses to Aquatic and Terrestrial Biota* (DOE 2002) and the associated software, RESRAD-Biota (ISCORS 2004).

The graded approach evaluates the impacts of a given set of radionuclides on aquatic and terrestrial ecosystems by comparing available concentration data in soils and water with biota concentration guides. A biota concentration guide is defined as the environmental concentration of a given radionuclide in soil or water that, under the assumptions of the model, would result in a dose rate less than 1 rad/day (10 mGy/day) to aquatic animals or terrestrial plants or 0.1 rad/day (1 mGy/day) to terrestrial animals. If the sum of the measured environmental concentrations divided by the biota concentration guides (the combined sum of fractions) is less than one, no negative impact to plant or animal populations is expected. No doses are calculated unless the screening process indicates a more detailed analysis is necessary.

3.3 Ecological Research and Monitoring

Limiting access to the large area surrounding the gravel pit at the T-28 Training Range could impact the continuity and utility of the BBS route at TAN. Coordinating timing of access to this route as an operational control would eliminate this impact. Continuation of the monitoring route would also provide information on the potential impacts the proposed action could be having on local bird populations.

3.4 Cumulative Impacts

The impacts associated with the proposed action would appear to have a small footprint, have low intensity, and be located in or near areas with much larger impacts to ecological resources. Because of that, no cumulative effects are anticipated.

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APPENDIX A

Suggested Text for the Environmental Assessment
Affected Environment

Affected Environment

The natural vegetation of the INL Site consists of a shrub overstory with a grass and forbs understory. The most common shrub is Wyoming big sagebrush, where basin big sage may dominate or co-dominate in areas with deep or sandy soils. Other common shrubs include green rabbitbrush, winterfat, spiny hopsage, gray horsebrush, gray rabbitbrush, and prickly phlox. The shrub understory consists of native grasses: thickspike wheatgrass, Indian ricegrass, bottlebrush squirreltail, needle-and-thread grass, Sandberg bluegrass, and bluebunch wheatgrass and native forbs: tabertip hawksbeard, Hood's phlox, hoary false yarrow, paintbrush, globe-mallow, buckwheat, lupine, milkvetches and mustards. A portion of the INL Site has been designated as the Sagebrush Steppe Ecosystem Reserve that has a mission to provide research opportunities and preserve sagebrush steppe habitat. In addition, the INL site is designated a National Environmental Research Park.

A wide range of vertebrate species are located within the INL Site; several species are considered sagebrush-obligate species, meaning that they rely upon sagebrush for survival. Among others, those species include: sage sparrow, Brewer's sparrow, northern sagebrush lizard, sage grouse, and pygmy rabbit.

There are currently no species on the INL Site that are listed as Endangered or Threatened; however, the Greater sage-grouse is a Candidate species and is common on the INL Site. Several species of concern, including, long-eared myotis, small-footed myotis, Townsend's big-eared bat, pygmy rabbit, Merriam's shrew, , long-billed curlew, ferruginous hawk, northern sagebrush lizard, and loggerhead shrike occur on the site.

Environmental Consequences

Alternative 1a Maximizing Training Flexibility

Potential impacts to vegetation communities, sensitive plant species and species of ethnobotanical concern associated with the proposed activity would be minimizing by limiting the footprint of the disturbance, revegetating the areas that have been disturbed, and implementing a weed management plan. Revegetating with a diverse mix of native species similar in composition to the existing plant community may help maintain the diversity of those communities. Revegetation in sagebrush steppe is generally successful in only one of three years because of the variability in availability and timing of precipitation.

Certain of the proposed activities would have unavoidable impacts to wildlife such as: (1) loss of ground-dwelling wildlife species and associated habitat, (2) displacement of certain wildlife species due to increased habitat fragmentation, and (3) an increase in the potential for negative interaction between wildlife and humans (Blew et al 2010). The control measures that would reduce the impact on wildlife include seasonal timing of activities, nesting bird surveys and awareness programs.

Wildlife species of concern include Greater sage-grouse, all migratory birds (including raptors), pygmy rabbits, Great Basin rattlesnakes, and all large mammal species (Blew et. al. 2010). Nesting bird surveys would be conducted prior to any soil or vegetation disturbance occurring between May 1 and September 1. No critical habitat for threatened or endangered species, as

defined in the Endangered Species Act (ESA), exists on the INL site. Greater sage-grouse is a Candidate species for listing under ESA. It is likely the proposed activity would have an impact directly on pygmy rabbits and indirect effects on sage-grouse, pygmy rabbit or other sensitive species through habitat alteration (Blew et al 2010). If a species such as the Greater sage-grouse or pygmy rabbit are listed before or during construction of the facility, DOE would initiate formal consultation with the U.S. Fish and Wildlife Service.

To ascertain no impacts to biota would occur due to radionuclide releases, a biota dose assessment would be conducted based on the proposed initial releases of radionuclides as required by DOE Orders 450.1a (2008) and 5400.5 (1993). The impact of environmental radioactivity at the INL Site on nonhuman biota can be assessed using *A Graded Approach for Evaluating Radiation Doses to Aquatic and Terrestrial Biota* (DOE 2002) and the associated software, RESRAD-Biota (ISCORS 2004). The graded approach evaluates the impacts of a given set of radionuclides on aquatic and terrestrial ecosystems by comparing available data for concentration in soils and water with biota concentration guides.

Alternative 1b: Minimizing Project Impacts

Activities that disturb or remove vegetation have the potential to impact ecological resources on the INL Site (Blew et al (2010). Potential impacts to vegetation communities, sensitive plant species and species of ethnobotanical concern associated with the proposed activity would be minimizing by limiting the footprint of the disturbance, revegetating the areas that have been disturbed, and implementing a weed management plan. Revegetating with a diverse mix of native species similar in composition to the existing plant community may help maintain the diversity of those communities. Revegetation in sagebrush steppe is generally successful in only one of three years because of the variability in availability and timing of precipitation.

Certain of the proposed activities would have unavoidable impacts to wildlife such as: (1) loss of ground-dwelling wildlife species and associated habitat, (2) displacement of certain wildlife species due to increased habitat fragmentation, and (3) an increase in the potential for negative interaction between wildlife and humans (Blew et al 2010). The control measures that would reduce the impact on wildlife include seasonal timing of activities, nesting bird surveys and awareness programs.

Wildlife species of concern include Greater sage-grouse, all migratory birds (including raptors), pygmy rabbits, Great Basin rattlesnakes, and all large mammal species (Blew et. al. 2010). Nesting bird surveys would be conducted prior to any soil or vegetation disturbance occurring between May 1 and September 1. No critical habitat for threatened or endangered species, as defined in the Endangered Species Act (ESA), exists on the INL site. Greater sage-grouse is a Candidate species for listing under ESA. It is unlikely the proposed activity would have an impact on sage-grouse, pygmy rabbit or other sensitive species. However, if a species such as the Greater sage-grouse or pygmy rabbit are listed before or during construction of the facility, DOE would initiate formal consultation with the U.S. Fish and Wildlife Service.

To ascertain no impacts to biota would occur due to radionuclide releases, a biota dose assessment would be conducted based on the proposed initial releases of radionuclides as required by DOE Orders 450.1a (2008) and 5400.5 (1993). The impact of environmental radioactivity at the INL Site on nonhuman biota can be assessed using *A Graded Approach for*

Evaluating Radiation Doses to Aquatic and Terrestrial Biota (DOE 2002) and the associated software, RESRAD-Biota (ISCORS 2004). The graded approach evaluates the impacts of a given set of radionuclides on aquatic and terrestrial ecosystems by comparing available concentration data in soils and water with biota concentration guides.

Table 2. Project controls to avoid or lessen impacts to natural, ecological, and cultural resources.

Activity	**Control**
Vegetation removal or soil disturbance	Nesting bird surveys prior to disturbance between May1 and September 1. Limit size of areas disturbed Prompt revegetation with native species Weed management
Release of radionuclides to the environment	Prepare a biota dose assessment
Limiting access to the TAN BBS route	Coordination of timing to allow access for the BBS survey.

Permits and Regulatory Requirements

Soil and vegetation disturbing activities, including those associated with mowing, blading and grubbing, have the potential to increase noxious weeds and invasive plant species that would be managed according to 7 USC § 2814, "Management of Undesirable Plants on Federal Lands") and Executive Order 13112, "Invasive Species." The INL would follow the applicable requirements to manage undesirable plants.

In analyzing the potential ecological impacts of the action alternative for this project, DOE-ID has followed the requirements of the Endangered Species Act (16 USC §1531 et seq.) and has reviewed the most current lists for threatened and endangered plant and animal species. Other federal laws that could apply include: the Fish and Wildlife Coordination Act (16 USC § 661 et seq.), Bald Eagle Protection Act (16 USC § 668), and the Migratory Bird Treaty Act (16 USC § 715–715s).

References

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APPENDIX B

Complete Species Lists for both the T-28 Training Range and the RWMC Training Range

inl_code	scientific_name	common_name	family	nativity	duration	growth_habit
achy	Achnatherum hymenoides	Indian ricegrass	Poaceae	Native	Perennial	Grass
agcr	Agropyron cristatum	crested wheatgrass	Poaceae	Introduced	Perennial	Grass
alde	Alyssum desertorum	desert alyssum	Brassicaceae	Introduced	Annual	Forb
anmi	Antennaria microphylla	littleleaf pussytoes	Asteraceae	Native	Perennial	Forb
arfr	Arenaria franklinii	Franklin's sandwort	Caryophyllaceae	Native	Perennial	Forb
artp	Artemisia tripartita	threetip sagebrush	Asteraceae	Native	Perennial	Shrub
artrt	Artemisia tridentata Nutt. ssp. tridentata	basin big sagebrush	Asteraceae	Native	Perennial	Shrub
artrw	Artemisia tridentata Nutt. ssp. wyomingensis	Wyoming big sagebrush	Asteraceae	Native	Perennial	Shrub
ascu	Astragalus curvicarpus	curvepod milkvetch	Fabaceae	Native	Perennial	Forb
asfi	Astragalus filipes	basalt milkvetch	Fabaceae	Native	Perennial	Forb
asle	Astragalus lentiginosus	freckled milkvetch	Fabaceae	Native	Perennial	Forb
brte	Bromus tectorum	cheatgrass	Poaceae	Introduced	Annual	Grass
caan	Castilleja angustifolia	northwestern Indian paintbrush	Scrophulariaceae	Native	Perennial	Forb
cado	Carex douglasii	Douglas' sedge	Cyperaceae	Native	Perennial	Grass
chdo	Chaenactis douglasii	Douglas' dustymaiden	Asteraceae	Native	Biennial	Forb
chle	Chenopodium leptophyllum	slimleaf goosefoot	Chenopodiaceae	Native	Annual	Forb
chvi	Chrysothamnus viscidiflorus	yellow rabbitbrush/ green rabbitbrush	Asteraceae	Native	Perennial	Shrub
ciar	Cirsium arvense	Canada thistle	Asteraceae	Introduced	Perennial	Forb
crac	Crepis acuminata	tapertip hawksbeard	Asteraceae	Native	Perennial	Forb
crin	Cryptantha interrupta	Elko cryptantha	Boraginaceae	Native	Perennial	Forb
crsc	Cryptantha scoparia	Pinyon Desert cryptantha	Boraginaceae	Native	Annual	Forb
depi	Descurainia pinnata	western tansymustard	Brassicaceae	Native	Annual	Forb
deso	Descurainia sophia	herb sophia	Brassicaceae	Introduced	Annual	Forb
elel	Elymus elymoides	squirreltail bottlebrush	Poaceae	Native	Perennial	Grass
ella	Elymus lanceolatus	thickspike wheatgrass	Poaceae	Native	Perennial	Grass
erna	Ericameria nauseosa	rubber rabbitbrush/gray rabbitbrush	Asteraceae	Native	Perennial	Shrub
erov	Eriogonum ovalifolium	cushion buckwheat	Polygonaceae	Native	Perennial	Forb

erpu	Erigeron pumilus	shaggy fleabane	Asteraceae	Native	Perennial	Forb
heco	Hesperostipa comata	needle and thread grass	Poaceae	Native	Perennial	Grass
hoju	Hordeum jubatum	foxtail barley	Poaceae	Native	Perennial	Grass
ipco	Ipomopsis congesta	ballhead gilia	Polemoniaceae	Native	Perennial	Forb
kosc	Bassia scoparia	kochia summer cypress	Chenopodiaceae	Introduced	Annual	Forb
laoc	Lappula occidentalis	flatspine stickseed	Boraginaceae	Native	Annual	Forb
lase	Lactuca serriola	prickly lettuce	Asteraceae	Introduced	Biennial	Forb
leci	Leymus cinereus	basin wildrye	Poaceae	Native	Perennial	Grass
lepu	Linanthus pungens	prickly phlox	Polemoniaceae	Native	Perennial	Shrub
lipi	Linus perenne	blue flax	Linaceae	Introduced	Perennial	Forb
lupsp	Lupinus species	unknown lupine	Fabaceae	N/A	N/A	Forb
maca	Machaeranthera canescens	hoary tansyaster	Asteraceae	Native	Perennial	Forb
maca	Machaeranthera canescens	hoary tansyaster	Asteraceae	Native	Perennial	Forb
mesa	Medicago sativa	alfalfa	Fabaceae	Introduced	Perennial	Forb
pasm	Pascopyrum smithii	western wheatgrass	Poaceae	Native	Perennial	Grass
pecy	Penstemon cyaneus	blue penstemon	Scrophulariaceae	Native	Perennial	Forb
phho	Phlox hoodii	Hood's phlox spiny phlox	Polemoniaceae	Native	Perennial	Forb
phlo	Phlox longifolia	longleaf phlox	Polemoniaceae	Native	Perennial	Forb
pose	Poa secunda	Sandberg bluegrass	Poaceae	Native	Perennial	Grass
pose	Poa secunda	Sandberg bluegrass	Poaceae	Native	Perennial	Grass
pssp	Pseudoroegneria spicata	bluebunch wheatgrass	Poaceae	Native	Perennial	Grass
scli	Schoenocrambe linifolia	flaxleaf plainsmustard	Brassicaceae	Native	Perennial	Forb
sial	Sisymbrium altissimum	Jim Hill mustard tall tumble mustard	Brassicaceae	Introduced	Annual	Forb
spco	Sphaeralcea coccinea	scarlet globemallow	Malvaceae	Introduced	Biennial	Forb
teca	Tetradymia canescens	spineless horsebrush	Asteraceae	Native	Perennial	Shrub
tofl	Townsendia florifer	showy Townsend daisy	Asteraceae	Native	Annual	Forb
trdu	Tragopogon dubius	yellow salsify	Asteraceae	Introduced	Biennial	Forb
trdu	Tragopogon dubius	yellow salsify	Asteraceae	Introduced	Biennial	Forb