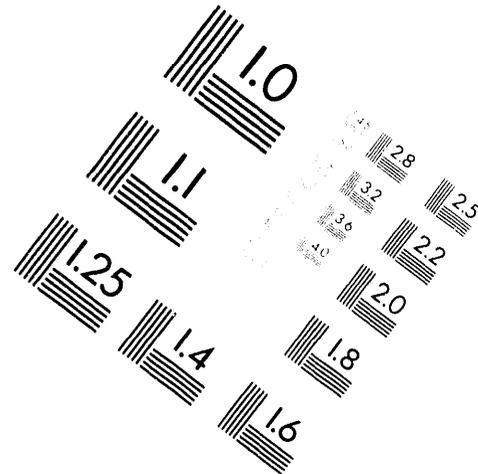
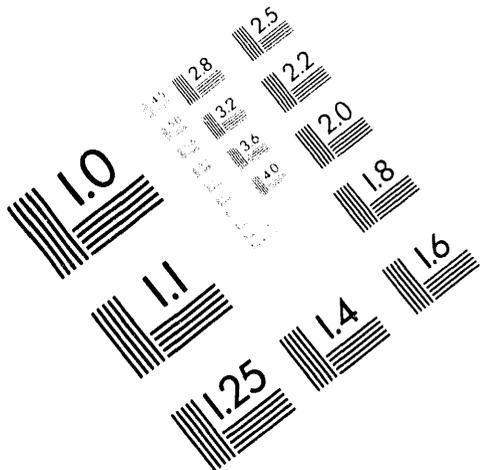




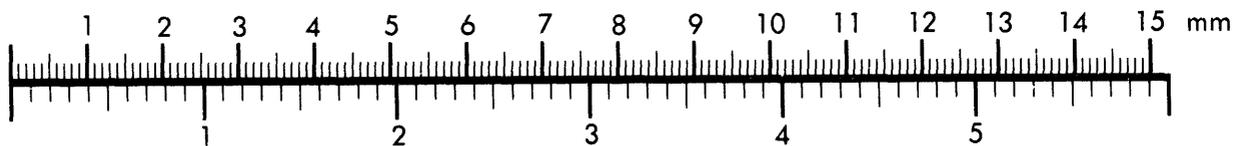
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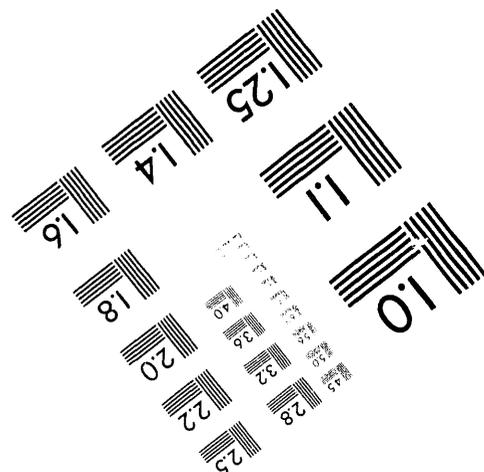
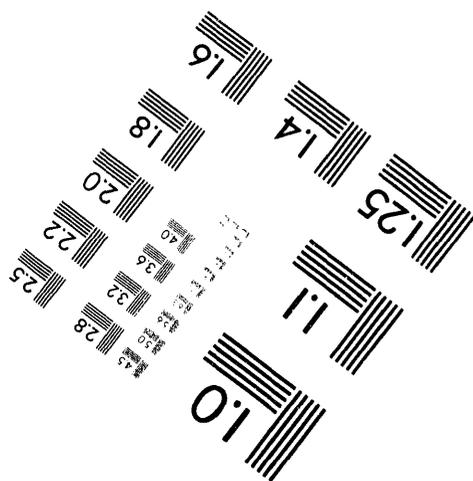
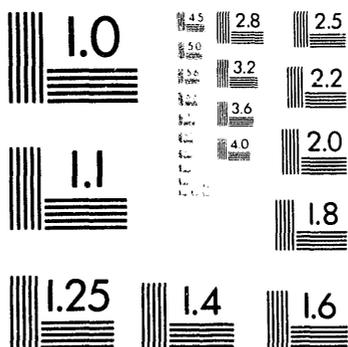
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**1 of 1**

**Ecological Survey for the Siting of the  
Mixed and Low-Level Waste Treatment Facility  
and the Idaho Waste Processing Facility**

**Reed L. Hoskinson**

**Published May 1994**

**Idaho National Engineering Laboratory  
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## ABSTRACT

This report summarizes the results of field ecological surveys conducted by the Center for Integrated Environmental Technologies (CIET) on the Idaho National Engineering Laboratory (INEL) at four candidate locations for the siting of the Mixed and Low-Level Waste Treatment Facility (MLLWTF) and the Idaho Waste Processing Facility (IWPF). The purpose of these surveys was to comply with all Federal laws and Executive Orders to identify and evaluate any potential environmental impacts because of the project. The boundaries of the candidate locations were marked with blaze-orange lath survey marker stakes by the project management. Global Positioning System (GPS) measurements of the marker stakes were made, and input to the Arc/Info® geographic information system (GIS). Field surveys were conducted to assess any potential impact to any important species, important habitats, and to any environmental study areas. The GIS location data was overlaid onto the INEL vegetation map and an analysis of vegetation classes on the locations was done. Results of the field surveys indicate use of Candidate Location #1 by pygmy rabbits (*Sylvilagus idahoensis*) and expected use by them of Candidate Locations #3 and #9. Pygmy rabbits are categorized a C2 species by the U. S. Fish and Wildlife Service (USFWS). Two other C2 species, the ferruginous hawk (*Buteo regalis*) and the loggerhead shrike (*Lanius ludovicianus*) would also be expected to frequent the candidate locations. Candidate Location #5 at the north end of the INEL is in the winter range of a large number of pronghorn antelope (*Antilocapra americana*). None of the candidate locations are in other environmental study areas. Candidate Location #9 and Candidate Location #1, both at the southern end of the INEL, are recommended as the best sites to minimize any ecological impact. The coordinates defining the boundaries of the candidate locations are included as an appendix.

## **ACKNOWLEDGMENTS**

G. L. Olson conducted the field soil surveys and wrote the description of the soils. N. L. Hampton collected the field GPS data and assisted in the data conversion to GIS. R. D. Lee converted the GPS data into GIS format and assisted in the GIS analysis of the data. Their assistance is appreciated.

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## ACRONYMS

BLM	Bureau of Land Management
CIET	Center for Integrated Environmental Technologies
DOE-ID	Department of Energy - Idaho Field Office
E&ES	Environmental & Earth Sciences
EPA	Environmental Protection Agency
ESRP	Eastern Snake River Plain
GIS	geographic information system
GPS	global positioning system
IDFG	Idaho Department of Fish and Game
INEL	Idaho National Engineering Laboratory
IWPF	Idaho Waste Processing Facility
MLLWTF	Mixed and Low-Level Waste Treatment Facility
MU	Mapping Unit
NEPA	National Environmental Policy Act
NRF	Naval Reactors Facility
RESL	Radiological and Environmental Sciences Laboratory
RWMC	Radioactive Waste Management Complex
SCS	Soil Conservation Service
SOP	Standard Operating Procedures
TSD	treatment, storage, and disposal
USDA	U. S. Department of Agriculture
USFWS	U. S. Fish and Wildlife Service
USGS	U. S. Geological Survey

# Ecological Survey for the Siting of the Mixed and Low-Level Waste Treatment Facility and the Idaho Waste Processing Facility

## 1. INTRODUCTION

This ecological survey is the result of a review of four locations on the Idaho National Engineering Laboratory (INEL). These locations are candidates for the siting of the Mixed and Low-Level Waste Treatment Facility (MLLWTF) and the Idaho Waste Processing Facility (IWPF).

The purpose of the ecological survey is to comply with all Federal laws and Executive Orders to identify and evaluate any potential environmental impacts because of the project. There are several Federal laws and Executive Orders concerned with the environment that are applicable to this project.

The National Environmental Policy Act (NEPA) of 1969 (P.L. 90-190, 42 U.S.C. 4321 *et seq.*) establishes national policies and goals for the protection of the environment. In particular, all Federal agencies are required to give appropriate consideration to the environmental effects of their proposed actions in their decision making. They are required to prepare detailed environmental statements on recommendations or reports on proposals for legislation and other major Federal actions significantly affecting the quality of the human environment.

The Endangered Species Act of 1973 (16 U.S.C. 1531 *et seq.*) requires the regional administrator of the U.S. Environmental Protection Agency (EPA) to ensure that any act authorized by the EPA does not jeopardize the continued existence of any endangered or threatened species, or adversely affect its critical habitat.

Executive Order 11990, Protection of Wetlands, in furtherance of NEPA, orders that each agency shall take action to minimize the destruction, loss or degradation of wetlands wherever there is a practicable alternative.

There are other Federal laws that are concerned with environmental issues that have been reviewed for this project, but do not apply to this project.

The Wild and Scenic Rivers Act (16 U.S.C. 1273 *et seq.*) prohibits projects that would have a direct, adverse effect on wild and scenic rivers. The rivers located on the INEL are the Big Lost River, the Little Lost River, and Birch Creek. None of these rivers have been designated as wild and scenic.

The Fish and Wildlife Coordination Act (16 U.S.C. 661 *et seq.*) provides for protection of fish and wildlife resources in any project that impounds, controls, or modifies the waters of a stream or other body of water that is greater than or equal to 10 acres in surface area. This project will not affect any stream or other body of water.

The Coastal Zone Management Act (16 U.S.C. 1451 *et seq.*) requires protection for coastal areas, which does not apply to the INEL.

The Wilderness Protection Act of 1964 (16 U.S.C. 1131 *et seq.*) designates wilderness areas within public lands. These wilderness areas cannot be used for treatment, storage, and disposal (TSD) facilities without congressional approval. There are no designated wilderness areas on the INEL.

## 2. GENERAL OVERVIEW OF THE ECOLOGY OF THE INEL AND VICINITY

The INEL is a 2305 km<sup>2</sup> (890 mi<sup>2</sup>) area of the Eastern Snake River Plain (ESRP) in southeastern Idaho. The Snake River Plain is essentially flat, with an average elevation of the INEL at about 1500 m (4920 ft). The topography of the INEL is flat to gently rolling terrain with frequent lava outcrops, interrupted by East, Middle, and Big Southern buttes rising as high as 2300 m (7546 ft) at the southern end of the INEL.

The Big Lost River enters the INEL in the southwest corner of the INEL and naturally would flow north on the INEL to the Lost River Sinks near Howe, Idaho. However, during peak flows the river is diverted to spreading areas approximately 8 km (5 mi) east of where the river enters the INEL. The Little Lost River and Birch Creek naturally entered the INEL in the past along the west and north borders, but are now both diverted for agricultural irrigation before reaching the INEL. Birch Creek is now also diverted through a low-head hydroelectric plant. In the winter when Birch Creek is not used for irrigation, the outflow from the hydroelectric plant is diverted to a channel along the north end of the INEL and flows onto the INEL. This flow in the winter, and any Big Lost River flow that reaches the spreading areas, percolates into the Snake River Plain aquifer beneath the ESRP.

The soils on the INEL are derived from silicic volcanic and Paleozoic rocks from nearby mountains and buttes and are underlain by basalt (McBride *et al.*, 1978). Rock outcrops are common. Soils in the southern part of the INEL are relatively shallow and gravelly to rocky. The northern portion of the INEL is covered by lake and aeolian deposits, mostly of unconsolidated clay, silt, and sand (Atwood 1970).

The ESRP is in the sagebrush-grass vegetation zone, mostly covered by dense stands of sagebrush (*Artemisia* spp.), rabbitbrush (*Chrysothamnus* spp.), and bunchgrasses (Daubenmire 1952).

The INEL supports an abundant population of pronghorn antelope (*Antilocapra americana*), especially during winter, as well as limited numbers of elk (*Cervus elaphus*) and mule deer (*Odocoileus hemionus*), and several species of small mammals, raptors, passerines, and game birds (Reynolds and Rose 1978, Reynolds, *et al.* 1986).

### 3. RESULTS

#### 3.1 Field Survey Activities

In October, 1992, three candidate locations for the IWPF and MLLWTF were staked out with blaze-orange lath survey marker stakes. In April, 1993, a fourth candidate location was also staked out (Figure 3-1).

Candidate Location #5, at the north end of the INEL, was staked in October, 1992, in four corners approximating the square mile under consideration. In April, 1993, Candidate Location #5 was restaked to define the northern half as the area under consideration.

Field surveys of Candidate Locations #1 and #3 were conducted on November 18, 1992, by representatives of the project and the Center for Integrated Environmental Technologies (CIET) in the Environmental & Earth Sciences (E&ES) Group of EG&G, Idaho, Inc., and a representative from the Department of Energy - Idaho Field Office (DOE-ID) Radiological and Environmental Sciences Laboratory (RESL). A field survey of Candidate Location #9 was conducted with RESL on May 21, 1993. RESL survey reports were submitted to the DOE-ID NEPA Officer (Reynolds 1992, Reynolds 1993, Reynolds 1993a).

Additional field surveys have been conducted by CIET while marking the candidate locations, and while recording global positioning system (GPS) measurements of the boundaries. All field surveys of Candidate Locations #1, #3, and #5 were conducted in Fall, 1992. Field surveys of Candidate Location #9 were conducted in Spring, 1993. Observations were made of soils, vegetation types, animals, and animal signs such as tracks, droppings, dens, burrows, nests, and perches.

GPS locations of the boundary marker stakes for Candidate Locations #3 and #5 were collected in Fall, 1992. A detailed description of the methods used to collect the GPS field locations is in the E&ES Standard Operating Procedures (SOP), Global Positioning System (GPS) Field Operations. GPS locations for Candidate Locations #1, #5 (north half), and #9 were collected in Spring, 1993. The field GPS location data were later corrected against the surveyed community base station data (E&ES SOP, IRC GPS Community Base Station). The location data for all four candidate locations (Appendix A) were input to the Arc/Info<sup>®</sup> geographic information system (GIS), and overlaid onto the CIET vegetation map of the INEL. The results of these vegetation analyses are included as tables following the maps.

Additional background information has been supplied by RESL based on previous field observations and research by them, regarding other ecological concerns such as animal movement patterns, sensitive vegetation, and the relation of the candidate locations to past or ongoing ecological research study areas.

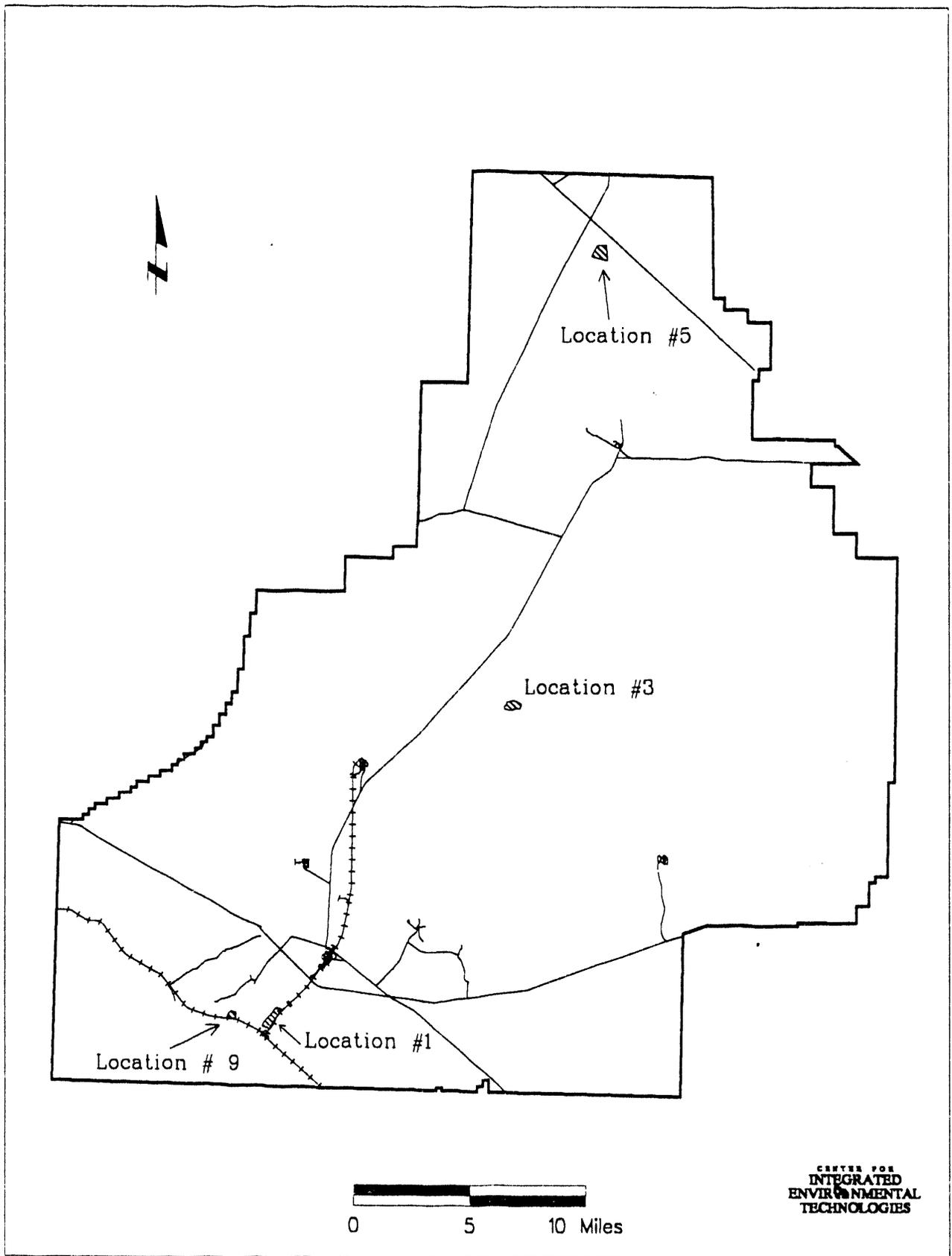


Figure 3-1. Candidate locations on the INEL

## 3.2 Description of the Study Areas

### 3.2.1 Soils

Field investigations were conducted to identify the specific soil series at each of the candidate locations. Information applicable to those soil series was then extracted from U. S. Department of Agriculture (USDA) Soil Conservation Service (SCS) surveys for Jefferson (SCS 1979) and Bonneville (SCS 1981) counties. While all three candidate locations are in Butte County, there is no detailed SCS survey for Butte County that could provide engineering and construction data and limitations by soil series. Relevant engineering and soil physical and chemical data from the Bonneville and Jefferson County soil surveys are summarized in tables by candidate location. Data provided in the tables apply to typical soils found at the candidate locations and do not necessarily apply to small areas of anomalous soils (inclusions).

The candidate locations at the south end of the INEL (Candidate Locations #1 and #9), are dominated by the Pancheri and Polatis soil series, which are moderately deep (20-40") to deep (>40") fine grained soils over lava. Relief is dominated by lava flows, and slopes range from 2 to 12 %. Shallow soils and rock outcrops are present on the pressure ridges. Deep soils are classified by the SCS as Pancheri silt loam, and shallower soils are Polatis silt loam. Typically, the surface layer is pale brown silt loam about 8" thick. The soil is calcareous throughout and has a layer of lime accumulation at a depth of 8 inches. Polatis series consist of moderately deep (20-40"), well-drained soils on basalt plains. They are similar to Pancheri soils, but shallower.

The candidate location in the lava flows in the central part of the INEL (Candidate Location #3) is dominated by Malm, Matheson, and Bondfarm soil series, which are sandy soils over lava. Sands originated from local (Big Lost River) and distant (Snake River) sources, and are still transient. (Wind erosion might be a factor requiring further attention at this site.) Relief of the site is dominated by lava flows, and slopes range from 2 to 12 %. Shallow soils are Bondfarm sandy loams, moderately deep (20-40") soils are Malm sandy loams, and deep (>40") soils are Matheson sandy loams.

The candidate location at the north end of the INEL (Candidate Location #5) is dominated by the Whiteknob soil series, in an alluvial deposit of Birch Creek, which originates between the Beaverhead Mountains to the north and the Lemhi Range to the west. The relief of the site is generally flat, with hummocky microtopography resulting from deposition of gravel bars, recent mammal activity, and possibly from frost heaves. The soils are classified by the SCS as Whiteknob gravelly loam, which are typically found in alluvium derived from mixed sources. Soils are frequently gravelly to the surface.

Based on the above general soil classification information, the following tables suggest characteristics for engineering planning. "The information is not site-specific and does not eliminate the need for onsite investigation of the soils or for testing and analysis by personnel experienced in the design and construction of engineering works" (SCS 1981, p. 40). The information for Candidate Locations #1 and #9 is from the Jefferson County Mapping Unit (MU) 98 (SCS 1979) and Bonneville County MU 33 (SCS 1981). Candidate Location #3 information is from Jefferson County MU 67 (SCS 1979), and Candidate Location #5 information is from Jefferson County MU 122 (SCS 1979).

Table 3-1 summarizes the degree and kind of soil limitations for building site development. *Shallow excavations* are trenches or holes dug to a maximum depth of 5 or 6 feet, and include utility lines, open ditches, basements, and graves. Limitations are based largely on ease of excavation. *Dwellings and small commercial buildings* are structures built on shallow foundations on undisturbed soil. The load limit is the same as that for single-family dwellings no higher than three stories. *Local roads and streets* have an all-weather surface and carry automobile and light truck traffic all year.

**Table 3-1.** Limitations for building site development.

Candidate Location	Shallow Excavation	Dwelling without basement	Dwelling with basement	Small commercial buildings	Local roads and streets
#1 and #9	Moderate to severe: slope, depth to rock	Moderate: slope, low strength	Moderate: slope, low strength, depth to rock	Severe: slope	Moderate: slope, frost action, low strength
#3	Severe: depth to rock	Severe: depth to rock	Severe: depth to rock	Severe: depth to rock	Severe: depth to rock
#5	Severe: small stones	Slight	Slight	Slight	Moderate: frost action

Limitation categories are:

**Slight:** soil properties and site features are generally favorable for the indicated use and limitations are minor and easily overcome;

**Moderate:** soil properties or site features are not favorable for the indicated use and special planning, design, or maintenance is needed to overcome or minimize the limitations;

**Severe:** soil properties or site features are so unfavorable or so difficult to overcome that special design, significant increases in construction costs, and possibly increased maintenance are required. Special feasibility studies may be required where the soil limitations are severe.

Table 3-2 summarizes limitations for the construction and operation of sanitary facilities. *Septic tank absorption fields* are areas in which effluent from a septic tank is distributed into the soil through subsurface tiles or perforated pipe. Only that part of the soil between depths of 24 and 72 inches is evaluated. Groundwater can be polluted if highly permeable sand and gravel or fractured bedrock is less than 4 feet below the base of the absorption field, if slope is excessive, or if the water table is near the surface. *Sewage lagoons* are shallow ponds constructed to hold sewage while aerobic bacteria decompose the solid and liquid wastes. Lagoons should have a nearly level floor surrounded by cut slopes or embankments of compacted soil. *Sanitary landfills* are areas in which solid waste is disposed. In trench landfills, waste is placed in a trench, spread, compacted, and covered daily with a thin layer of

**Table 3-2.** Limitations for the construction and operation of sanitary facilities.

Candidate Location	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
#1 and #9	Moderate: depth to rock, slope	Severe: slope, depth to rock	Moderate to severe: depth to rock	Moderate: slope	Fair to poor: thin layer
#3	Severe: large stones, depth to rock	Severe: depth to rock, seepage, slope	Severe: depth to rock, large stones, seepage	Severe: seepage	Poor: large stones
#5	Slight	Severe: seepage, small stones	Severe: seepage	Severe: seepage	Poor: small stones, thin layer

indigenous soil. In area landfills, the waste is placed in successive layers on the soil surface, spread, compacted and covered daily with a thin layer of soil from a source away from the site.

In summarizing the suitability of a site for providing *daily cover for landfills*, suitability categories are:

Good: soil properties and site features are favorable and good performance and low maintenance can be expected;

Fair: soil properties and site features are moderately favorable for the use and one or more soil properties or site features make the soil less desirable than soils rated good;

Poor: one or more soil properties or one or more site features are unfavorable for the use and overcoming the unfavorable properties requires special design, extra maintenance, or costly alteration.

Physical and chemical properties of the soils are summarized in Table 3-3, and are potentially useful for modeling contaminant transport, determining site stability, and identifying potential for corrosion.

Values are presented by depth, based on the depth of the major soil horizons. *Permeability* refers to the ability of a soil to transmit water or air, and are reported in inches/hour under saturated conditions. *Available water capacity* refers to the quantity of water that the soil is capable of storing for use by plants, and is reported in inches of water per inch of soil. The *pH* is a measure of acidity or alkalinity and is important in the determination of mobility of contaminants and availability of plant nutrients. *Shrink-swell potential* is the potential for volume change in a soil with a loss or gain in moisture. It is based on the change in length of an unconfined clod as moisture content is increased from air-dry to field

**Table 3-3.** Physical and chemical properties of the soils.

Candidate Location	Permeability (in/hr)	Available water capacity	pH	Shrink swell potential	Corrosion risk: Uncoated steel	Corrosion risk: Concrete
<b>#1 and #9</b>						
0-6" depth	0.6-2.0	0.19-0.21	7.9-9.0	low	high	low
6-31" depth	0.6-2.0	0.19-0.21	7.9-9.0	low	high	low
>31" depth	bedrock	bedrock	bedrock	bedrock	bedrock	bedrock
<b>#3</b>						
0-4" depth	2.0-6.0	0.13-0.15	7.4-9.0	low	high	low
4-24" depth	2.0-6.0	0.11-0.13	7.4-9.0	low	high	low
24" + depth	bedrock	bedrock	bedrock	bedrock	bedrock	bedrock
<b>#5</b>						
0-14" depth	0.6-2.0	0.09-0.11	7.4-9.0	low	moderate	low
14-20" depth	2.0-6.0	0.05-0.07	7.4-8.4	low	moderate	low
20-60" depth	>20	0.03-0.05	7.4-8.4	low	moderate	low

capacity. The classes are:

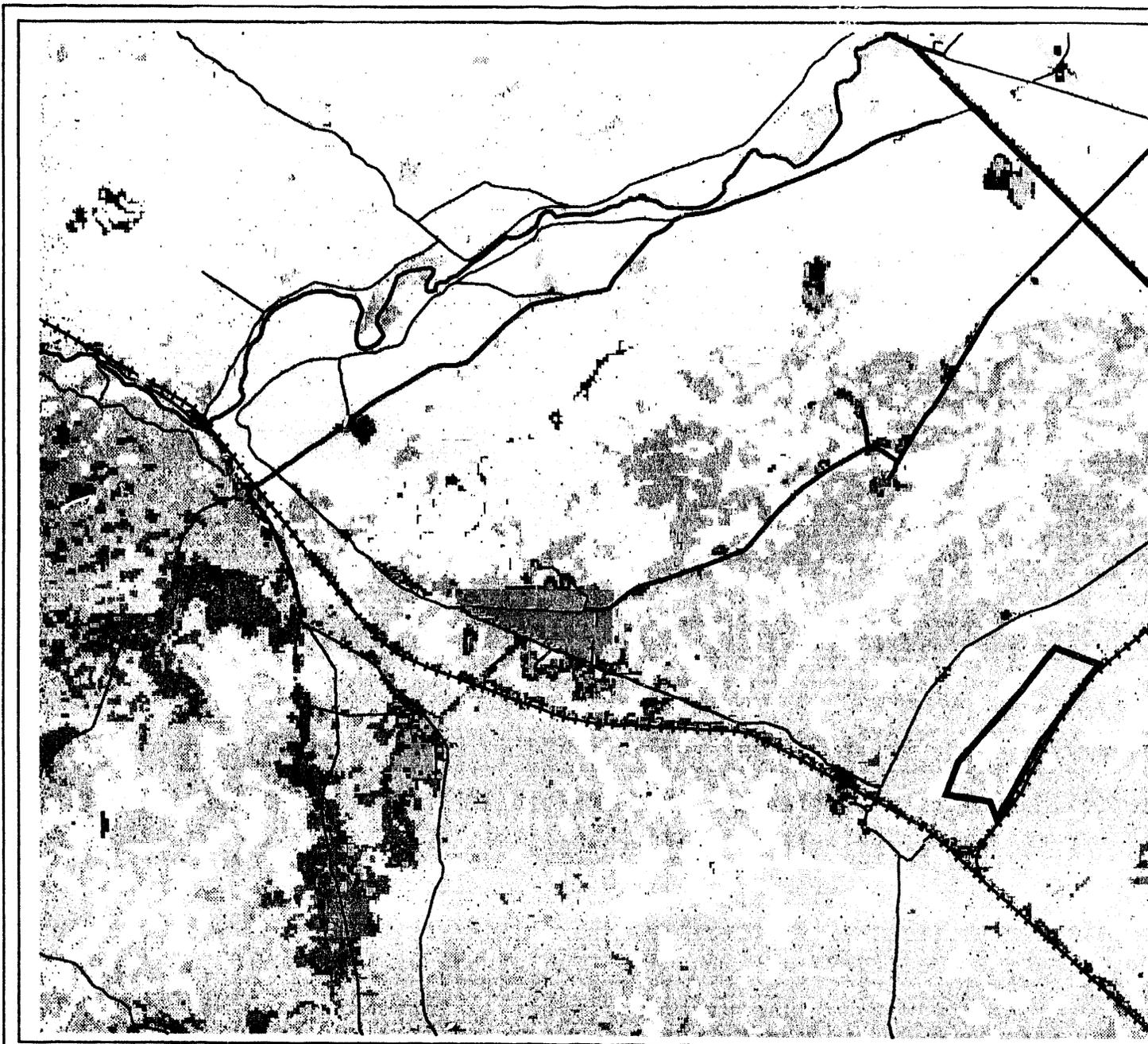
- Low: a change of less than 3 percent
- Moderate: a change of 3 to 6 percent
- High: a change of more than 6 percent

*Risk of corrosion* pertains to potential soil-induced chemical action that dissolves or weakens uncoated steel or concrete. The rate of corrosion of uncoated steel is related to soil moisture, particle-size distribution, total acidity, and electrical conductivity of the soil. The rate of corrosion of concrete is based mainly on the sulfate content, texture, and acidity of the soil.

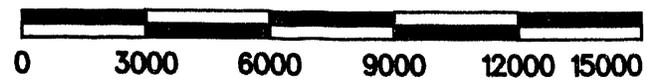
### 3.2.2 Vegetation

Vegetation maps for areas including the four candidate locations were produced by overlaying the location data defining the boundaries of the candidate locations onto the CIET vegetation map of the INEL. The vegetation map has been developed by CIET from satellite imagery data.

Figure 3-2 is the vegetation map of the area around Candidate Location #1. Table 3-4 summarizes the vegetation classes within Candidate Location #1, by area and by percent of total area of Candidate Location #1. As indicated, over 95% of Candidate Location #1 is sagebrush-steppe. Figure 3-3 and Table 3-5 describe Candidate Location #3, which is over 97% sagebrush-steppe cover class. Candidate Location #5 (the north half of the original area staked in October, 1992) is described by Figure 3-4 and Table 3-6. As indicated, Candidate Location #5 is dominated by the sagebrush-steppe cover class (76%), but has more sagebrush/rabbitbrush (21%) than the other three candidate locations.



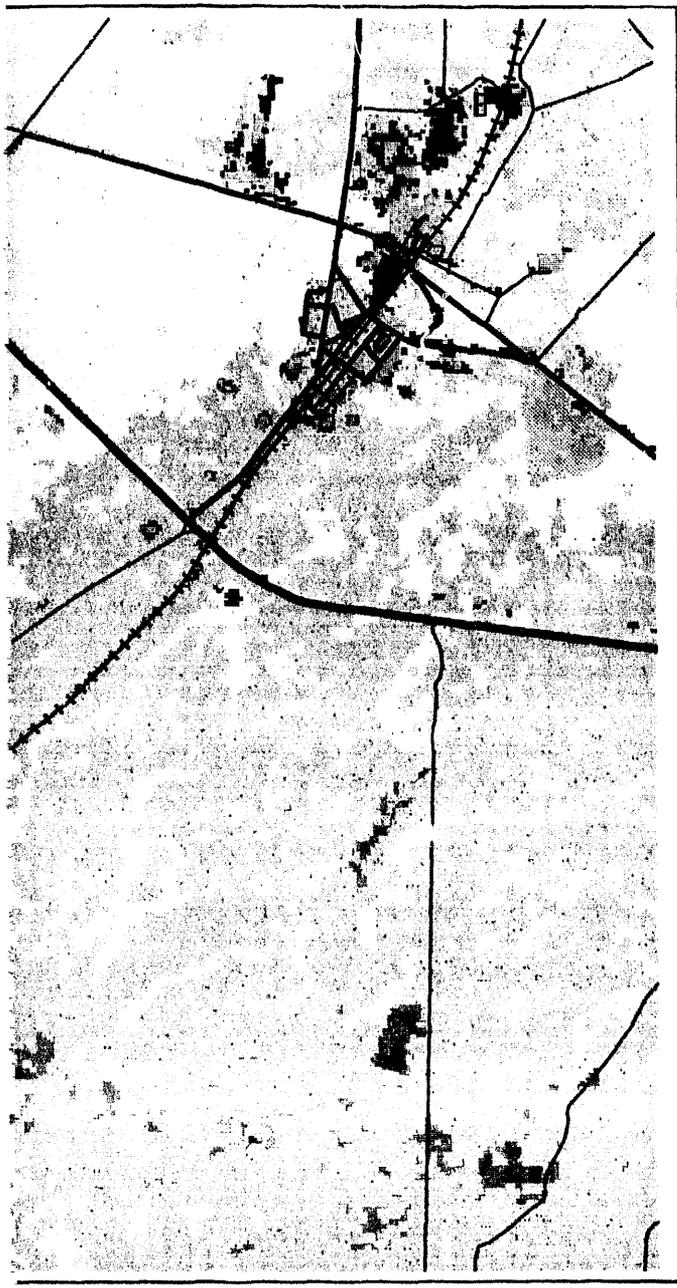
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**Figure 3-2. Vegetation map of candidate location #1.**

# Vegetation Map

Vicinity of Candidate Location 1



- |  |   |
|--|---|
|  Juniper                    |  Salt Desert Shrub                           |
|  Great Basin Wildrye        |  Sagebrush/Rabbitbrush                       |
|  Steppe (bunchgrass)        |  Sagebrush/Low Sagebrush/Rabbitbrush on Lava |
|  Grassland                  |  Playa/Bare ground                           |
|  Sagebrush-Steppe off Lava  |  Lava  |
|  Sagebrush-Steppe on Lava |  Old fields, Disturbed Areas, and Seedings |
|  Sagebrush-Winterfat      |  Facilities                                |
|  Unknown                  |   |

- |   |                    |
|---|--------------------|
|  | U.S. Highways      |
|  | State Highways     |
|  | Paved Roads        |
|  | Unpaved Roads      |
|  | Trails             |
|  | Railroad Tracks    |
|  | River              |
|  | Candidate Location |

Note:  
An accuracy assessment  
of this map has not  
been conducted.

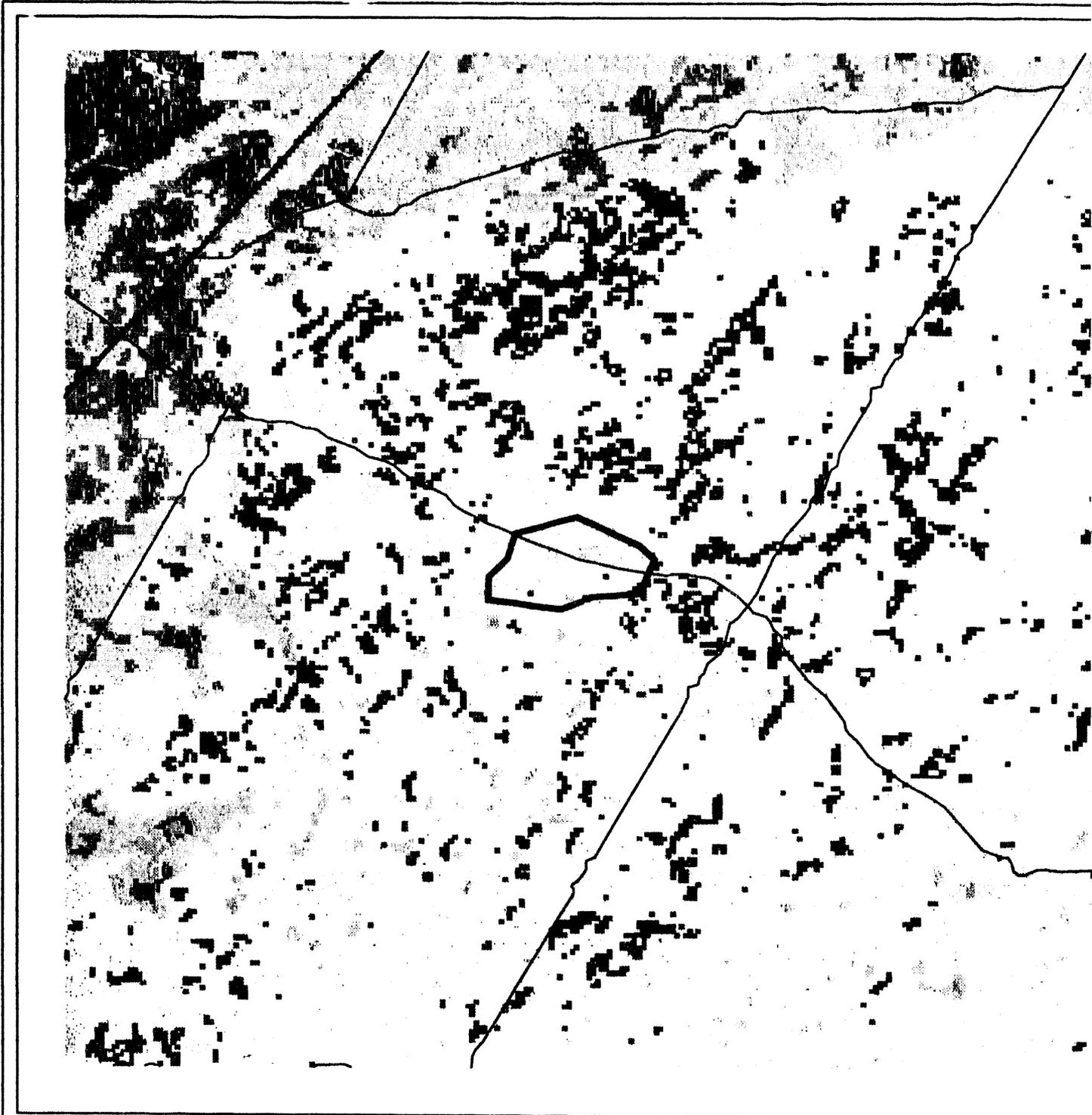
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**Table 3-4. Vegetation on Candidate Location #1.**

Cover Class Description	Area (ha)	% Area	Comments (very general based on limited information)
Juniper Woodlands	0	0.00	Very unique habitat on INEL; important raptor and other bird nesting/perching habitat, provides cover for elk & deer
Great Basin Wildrye	0	0.00	Relatively unique habitat; associated with basins, playas, and deeper soils
Steppe (bunchgrass)	0	0.00	Common, but not abundant; provides forage
Grassland	1.35	1.73	Common, but not abundant; provides forage
Sagebrush-Steppe off lava	42.91	54.97	Very abundant community
Sagebrush-Steppe on lava	32.00	41.01	Most abundant community on INEL
Sagebrush-Winterfat	1.07	1.36	Common, not abundant; more in N. part of INEL. Winterfat is important forage.
Salt Desert Shrub	0	0.00	Common, not abundant; more in N. part of INEL
Sagebrush/Rabbitbrush	0.72	0.93	Common, not abundant; more in N. part of INEL
Sagebrush/Low Sagebrush/ Rabbitbrush on lava	0	0.00	Unique; associated with lava outcrops, may provide habitat for rodents, raptors, and rabbits. These areas may also have juniper trees associated with them. Greater potential for archeological finds.
Wetlands	0	0.00	Unique; Big Lost River, Birch Creek, the Sinks, spreading areas, and many playas are mapped by the USFWS as wetlands.
Playa/Bare ground	0	0.00	Unique; playas may be associated with temporary flooding and, therefore, ephemeral wetlands. Area surrounding playa may include good forage habitat.
Lava	0	0.00	Unique; lava outcrops provide good habitat for small and large mammals, raptors, and reptiles. Also, good potential for archaeological sites. These areas may also have juniper trees associated with them.
Old Fields, Disturbed Areas, and Seedings	0	0.00	Potential for establishment and spread of exotic plant species.
Shadow	0	0.00	N to NW facing areas with significant slope.
Unknown 1	0	0.00	Class seems to be associated with bare ground or disturbed areas.
<b>TOTAL</b>	<b>78.05</b>	<b>100.00</b>	<b>(192.87 acres)</b>

Figure 3-5 and Table 3-7 describe Candidate Location #9, which is also dominated by the sagebrush-steppe cover class.

Although each of the candidate locations has minor amounts of different plant cover classes, all are dominated by sagebrush and bunchgrasses. None of the plant cover classes occurring in any of the candidate locations is uncommon in the sagebrush-steppe ecosystem of the ESRP, and other similar undisturbed associations are common on the INEL.



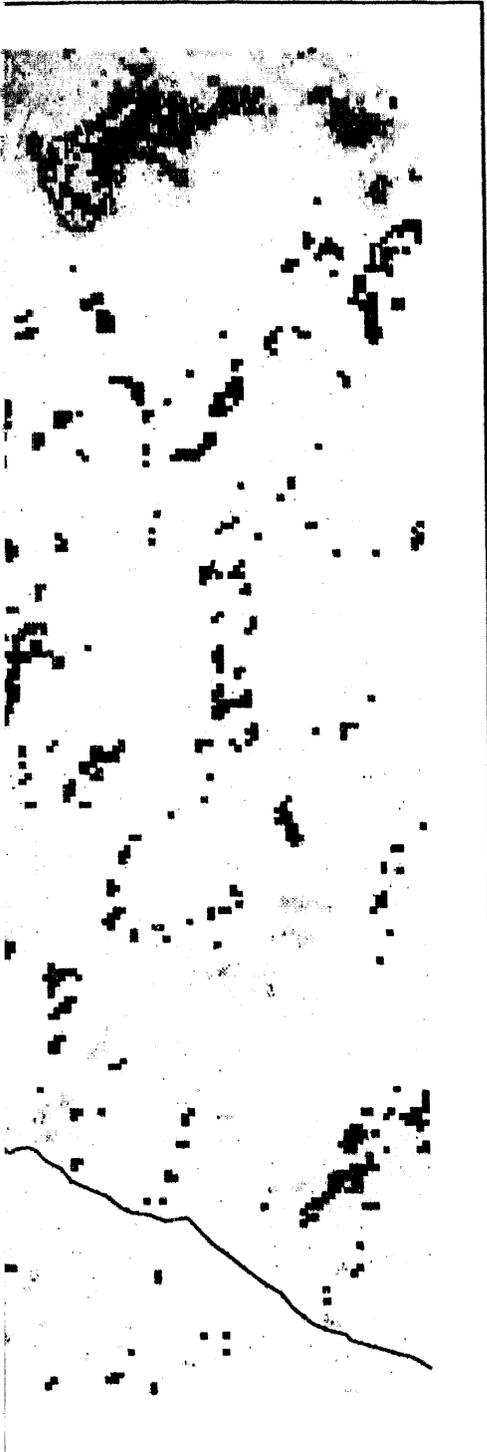
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Figure 3-3. Vegetation map of candidate location #3.

# Vegetation Map

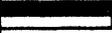
## Vicinity of Candidate Location 3



- |  |   |
|--|---|
|  Juniper                      |  Salt Desert Shrub                               |
|  Great Basin Wildrye          |  Sagebrush/Rabbitbrush                           |
|  Steppe (bunchgrass)          |  Sagebrush/Low Sagebrush/<br>Rabbitbrush on Lava |
|  Grassland                    |  Playa/Bare ground                               |
|  Sagebrush-Steppe<br>off Lava |  Lava  |
|  Sagebrush-Steppe<br>on Lava  |  Old fields, Disturbed<br>Areas, and Seedings    |
|  Sagebrush-Winterfat        |  Facilities                                    |
|  Unknown                    |   |

- |  |
|--|
|  U.S. Highways      |
|  State Highways     |
|  Paved Roads        |
|  Unpaved Roads      |
|  Trails             |
|  Railroad Tracks    |
|  River              |
|  Candidate Location |

Note:  
An accuracy assessment  
of this map has not  
been conducted.

 15000 Feet

**Table 3-5. Vegetation on Candidate Location #3.**

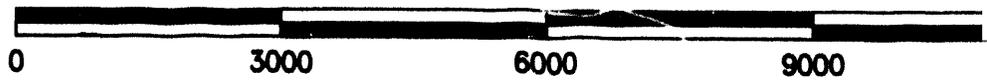
Cover Class Description	Area (ha)	% Area	Comments (very general based on limited information)
Juniper Woodlands	0	0.00	Very unique habitat on INEL; important raptor and other bird nesting/perching habitat, provides cover for elk & deer
Great Basin Wildrye	0.36	0.67	Relatively unique habitat; associated with basins, playas, and deeper soils
Steppe (bunchgrass)	0	0.00	Common, but not abundant; provides forage
Grassland	0.58	1.08	Common, but not abundant; provides forage
Sagebrush-Steppe off lava	0.90	1.68	Very abundant community
Sagebrush-Steppe on lava	51.22	95.44	Most abundant community on INEL
Sagebrush-Winterfat	0	0.00	Common, not abundant; more in N. part of INEL. Winterfat is important forage.
Salt Desert Shrub	0	0.00	Common, not abundant; more in N. part of INEL
Sagebrush/Rabbitbrush	0	0.00	Common, not abundant; more in N. part of INEL
Sagebrush/Low Sagebrush/ Rabbitbrush on lava	0.39	0.73	Unique; associated with lava outcrops, may provide habitat for rodents, raptors, and rabbits. These areas may also have juniper trees associated with them. Greater potential for archeological finds.
Wetlands	0	0.00	Unique; Big Lost River, Birch Creek, the Sinks, spreading areas, and many playas are mapped by USFWS as wetlands.
Playa/Bare ground	0	0.00	Unique; playas may be associated with temporary flooding and, therefore, ephemeral wetlands. Area surrounding playa may include good forage habitat.
Lava	0.22	0.40	Unique; lava outcrops provide good habitat for small and large mammals, raptors, and reptiles. Also, good potential for archaeological sites. These areas may also have juniper trees associated with them.
Old Fields, Disturbed Areas, and Seedings	0	0.00	Potential for establishment and spread of exotic plant species.
Shadow	0	0.00	N to NW facing areas with significant slope.
Unknown 1	0	0.00	Class seems to be associated with bare ground or disturbed areas.
<b>TOTAL</b>	<b>53.67</b>	<b>100.00</b>	<b>(132.61 acres)</b>

### 3.2.3 Fauna

Tracks of pronghorn and coyotes (*Canis latrans*) were very common on Candidate Locations #1 and #9. Cottontail rabbits (*Sylvilagus nuttallii*) and black-tailed jackrabbits (*Lepus californicus*) were commonly observed. One white-tailed jackrabbit (*Lepus townsendii*) and two pygmy rabbits (*Sylvilagus idahoensis*) were observed at Candidate Location #1. Droppings indicated use of Candidate Locations #1 and #9 by sage grouse (*Centrocercus urophasianus*). Magpies (*Pica pica*) and crows (*Corvus brachyrhynchos*) were common, and rough-legged hawks (*Buteo lagopus*) were observed hunting overhead. Candidate Location #1 also has been used occasionally by pronghorn for fawning and neonatal cover (Reynolds 1992). Reynolds (pers. comm.) indicated that Candidate Location #1 has been used by



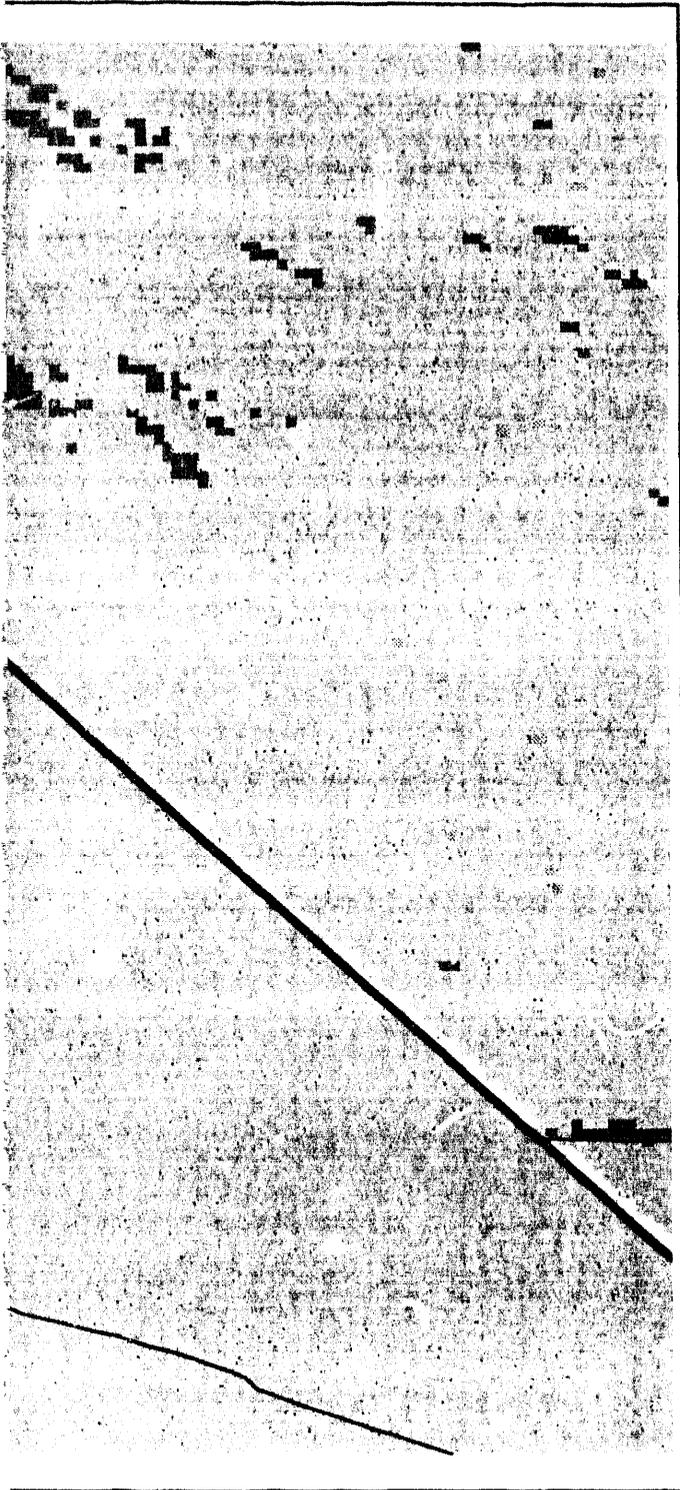
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**Figure 3-4. Vegetation map of candidate location #5.**

# Vegetation Map

## Vicinity of Candidate Location 5



- |                              |   |
|------------------------------|---|
| Juniper                      | Salt Desert Shrub                               |
| Great Basin Wildrye          | Sagebrush/Rabbitbrush                           |
| Steppe (bunchgrass)          | Sagebrush/Low Sagebrush/<br>Rabbitbrush on Lava |
| Grassland                    | Playa/Bare ground                               |
| Sagebrush-Steppe<br>off Lava | Lava  |
| Sagebrush-Steppe<br>on Lava  | Old fields, Disturbed<br>Areas, and Seedings    |
| Sagebrush-Winterfat          | Facilities                                      |
| Unknown                      |   |

- |                    |
|--------------------|
| U.S. Highways      |
| State Highways     |
| Paved Roads        |
| Unpaved Roads      |
| Trails             |
| Railroad Tracks    |
| River              |
| Candidate Location |

Note:  
An accuracy assessment  
of this map has not  
been conducted.

12000                      15000 Feet

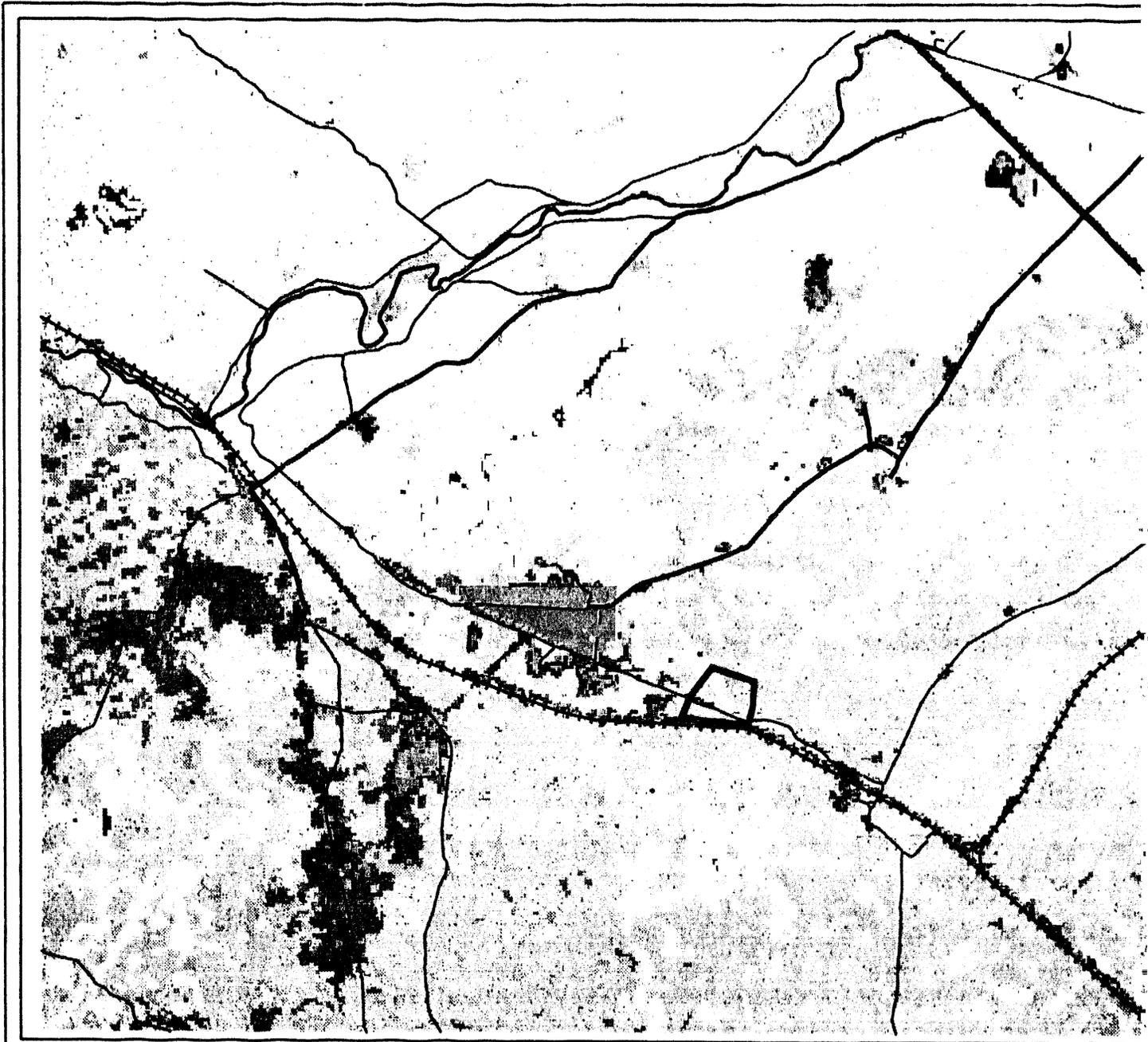
**Table 3-6. Vegetation on Candidate Location #5.**

Cover Class Description	Area (ha)	% Area	Comments (very general based on limited information)
Juniper Woodlands	0	0.00	Very unique habitat on INEL; important raptor and other bird nesting/perching habitat, provides cover for elk & deer
Great Basin Wildrye	0	0.00	Relatively unique habitat; associated with basins, playas, and deeper soils
Steppe (bunchgrass)	0	0.00	Common, but not abundant; provides forage
Grassland	2.26	2.76	Common, but not abundant; provides forage
Sagebrush-Steppe off lava	62.60	76.46	Very abundant community
Sagebrush-Steppe on lava	0	0.00	Most abundant community on INEL
Sagebrush-Winterfat	0.09	0.11	Common, not abundant; more in N. part of INEL. Winterfat is important forage.
Salt Desert Shrub	0	0.00	Common, not abundant; more in N. part of INEL
Sagebrush/Rabbitbrush	16.92	20.67	Common, not abundant; more in N. part of INEL
Sagebrush/Low Sagebrush/ Rabbitbrush on lava	0	0.00	Unique; associated with lava outcrops, may provide habitat for rodents, raptors, and rabbits. These areas may also have juniper trees associated with them. Greater potential for archeological finds.
Wetlands	0	0.00	Unique; Big Lost River, Birch Creek, the Sinks, spreading areas, and many playas are mapped by USFWS as wetlands.
Playa/Bare ground	0	0.00	Unique; playas may be associated with temporary flooding and, therefore, ephemeral wetlands. Area surrounding playa may include good forage habitat.
Lava	0	0.00	Unique; lava outcrops provide good habitat for small and large mammals, raptors, and reptiles. Also, good potential for archaeological sites. These areas may also have juniper trees associated with them.
Old Fields, Disturbed Areas, and Seedings	0	0.00	Potential for establishment and spread of exotic plant species.
Shadow	0	0.00	N to NW facing areas with significant slope.
Unknown 1	0	0.00	Class seems to be associated with bare ground or disturbed areas.
<b>TOTAL</b>	<b>81.87</b>	<b>100.00</b>	<b>(202.31 acres)</b>

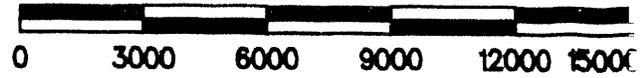
elk, and that just to the south of this location is a large juniper tree that has been used as a nesting site and hunting perch by ferruginous hawks (*Buteo regalis*). A relatively small bushy-tailed woodrat (*Neotoma cinerea*) midden was found near the western edge of Candidate Location #9.

Tracks and droppings at Candidate Location #3 showed use by pronghorn, coyotes, and elk. A large bushy-tailed woodrat midden was found along the southern edge of Candidate Location #3. Sage grouse, black-tailed jackrabbits, and rough-legged hawks were also observed at the location.

Large wintering herds of pronghorns were observed at Candidate Location #5, as well as several sage grouse. Tracks and droppings showed past use by elk in winter, and tracks in the snow indicated



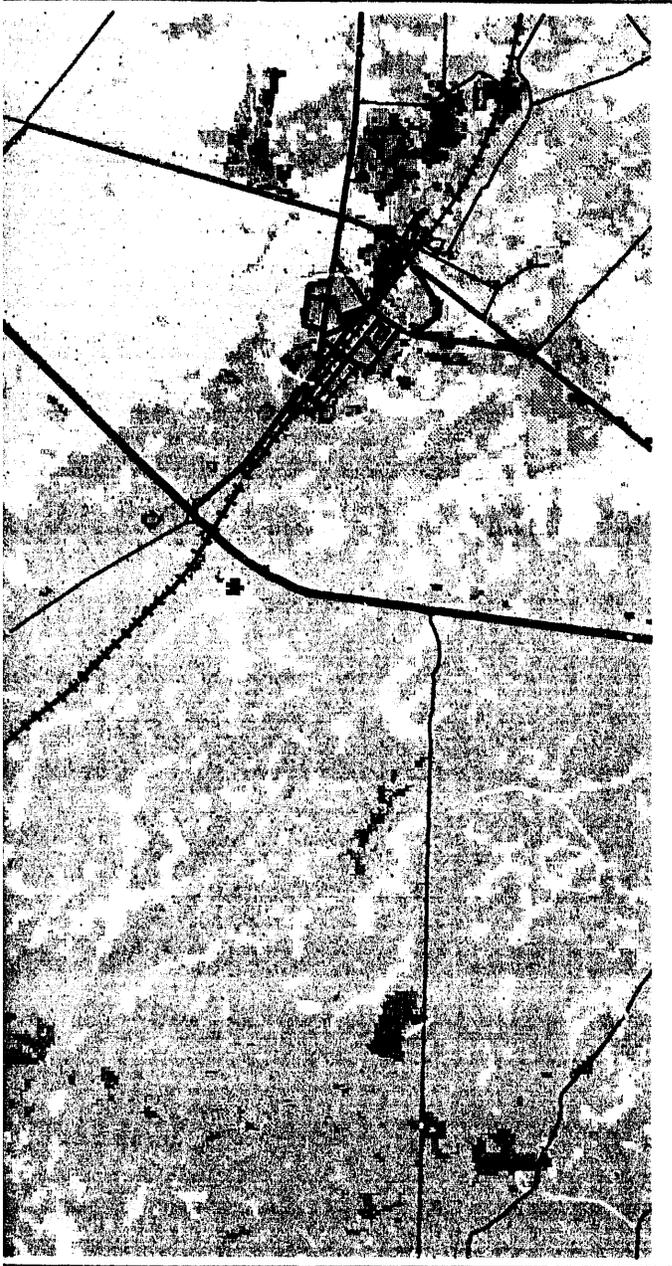
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**Figure 3-5. Vegetation map of candidate location #9.**

# Vegetation Map

Vicinity of Candidate Location 9



- |   |                              |   |   |
|---|------------------------------|---|---|
|    | Juniper                      |    | Salt Desert Shrub                               |
|    | Great Basin Wildrye          |    | Sagebrush/Rabbitbrush                           |
|    | Steppe (bunchgrass)          |    | Sagebrush/Low Sagebrush/<br>Rabbitbrush on Lava |
|    | Grassland                    |    | Plays/Bare ground                               |
|    | Sagebrush-Steppe<br>off Lava |    | Lava  |
|   | Sagebrush-Steppe<br>on Lava  |   | Old fields, Disturbed<br>Areas, and Seedings    |
|  | Sagebrush-Winterfat          |  | Facilities                                      |
|  | Unknown                      |   |   |

- |   |                    |
|---|--------------------|
|  | U.S. Highways      |
|  | State Highways     |
|  | Paved Roads        |
|  | Unpaved Roads      |
|  | Trails             |
|  | Railroad Tracks    |
|  | River              |
|  | Candidate Location |

Note:  
An accuracy assessment  
of this map has not  
been conducted.

Feet

**Table 3-7. Vegetation on Candidate Location #9.**

Cover Class Description	Area (ha)	% Area	Comments (very general based on limited information)
Juniper Woodlands	0	0.00	Very unique habitat on INEL; important raptor and other bird nesting/perching habitat, provides cover for elk & deer
Great Basin Wildrye	0	0.00	Relatively unique habitat; associated with basins, playas, and deeper soils
Steppe (bunchgrass)	0	0.00	Common, but not abundant; provides forage
Grassland	0	0.00	Common, but not abundant; provides forage
Sagebrush-Steppe off lava	13.66	54.70	Very abundant community
Sagebrush-Steppe on lava	7.72	30.93	Most abundant community on INEL
Sagebrush-Winterfat	3.01	12.04	Common, not abundant; more in N. part of INEL. Winterfat is important forage.
Salt Desert Shrub	0	0.00	Common, not abundant; more in N. part of INEL
Sagebrush/Rabbitbrush	0.27	1.08	Common, not abundant; more in N. part of INEL
Sagebrush/Low Sagebrush/ Rabbitbrush on lava	0	0.00	Unique; associated with lava outcrops, may provide habitat for rodents, raptors, and rabbits. These areas may also have juniper trees associated with them. Greater potential for archeological finds.
Wetlands	0	0.00	Unique; Big Lost River, Birch Creek, the Sinks, spreading areas, and many playas are mapped by USFWS as wetlands.
Playa/Bare ground	0.31	1.25	Unique; playas may be associated with temporary flooding and, therefore, ephemeral wetlands. Area surrounding playa may include good forage habitat.
Lava	0	0.00	Unique; lava outcrops provide good habitat for small and large mammals, raptors, and reptiles. Also, good potential for archaeological sites. These areas may also have juniper trees associated with them.
Old Fields, Disturbed Areas, and Seedings	0	0.00	Potential for establishment and spread of exotic plant species.
Shadow	0	0.00	N to NW facing areas with significant slope.
Unknown 1	0	0.00	Class seems to be associated with bare ground or disturbed areas.
<b>TOTAL</b>	<b>24.97</b>	<b>100.00</b>	<b>(61.71 acres)</b>

the presence of coyotes and jackrabbits. During one field survey, a flock of domestic sheep was grazing just south of Candidate Location #5.

### 3.3 Evaluation of Results

#### 3.3.1 Relationship of the Candidate Locations to Important Species

The peregrine falcon (*Falco peregrinus*) and the bald eagle (*Haliaeetus leucocephalus*) are the only endangered species recorded on the INEL. Peregrine falcons are considered rare during all seasons, but the bald eagle is found in limited numbers in winter on the INEL. No peregrines or bald eagles were observed during the field surveys, but Reynolds (1992) reports that there is a bald eagle winter roost about four miles north of Candidate Location #5, and that wintering eagles have been observed hunting and flying over Candidate Location #5.

Pygmy rabbits were observed at Candidate Location #1 during field surveys, and could be expected to occur in the type of habitat and terrain at Candidate Locations #3 and #9. The pygmy rabbit is now categorized a C2 species by the U. S. Fish and Wildlife Service (USFWS) (Moseley and Groves 1992). A C2 species is a species for which information indicates proposing to list as endangered or threatened is possibly appropriate, but for which conclusive data are lacking to support a final decision. The National Heritage Programs and Conservation Data Centers ranks the pygmy rabbit within Idaho as "rare or uncommon but not imperiled" (Moseley and Groves 1992). Idaho presently has a hunting season for pygmy rabbits.

Reynolds (1992) also reported that two other C2 species, the ferruginous hawk and the loggerhead shrike (*Lanius ludovicianus*), would be expected to frequent the candidate locations. Neither of these species was observed at the candidate locations during field surveys.

Candidate Location #3 has the sandy soils in which *Oxytheca dendroidea* is known to occur (Cholewa and Henderson 1984). *Oxytheca dendroidea* is a small buckwheat-like annual, which is on the Idaho State Watch List, and has been recorded on the INEL in areas very near Candidate Location #3 (Cholewa and Henderson 1984). (The State Watch List is a list of taxa of plants that are rare and of special interest, but are not in jeopardy and may be common elsewhere.)

#### 3.3.2 Relationship of the Candidate Locations to Important Habitats

As shown in the tables of vegetation classes, none of the candidate locations include areas categorized as wetlands or playa/bare ground.

Candidate Location #5 at the north end of the INEL is in the winter range used by a significant portion of the Idaho pronghorn population. This area is also an important wintering area for large numbers of sage grouse.

Candidate Location #3 is in the area used extensively by the elk population that became resident on the INEL in the last several years. During Winter, 1992-93, the Idaho Department of Fish and Game (IDFG) trapped and transplanted a significant portion (over 230) of this elk population off the INEL.

Candidate Location #5 is in the area where Mr. Paul Martin, DOE-ID/SMD, has preliminary plans to use water from the Birch Creek hydroelectric outflow canal for some wildlife habitat improvements (Reynolds 1992).

### **3.3.3 Relationship of the Candidate Locations to Environmental Study Areas**

As reported by Reynolds (1992, 1993), RESL has no environmental monitoring or sampling stations or long-term research plots on or near any of the candidate locations.

## 4. Recommendations

Based on field surveys of the four candidate locations, additional information from RESL, and analyses of the locations with respect to the vegetation, wetlands, and soils of the INEL, Candidate Location #9 is recommended when considering the ecological concerns for siting.

From an ecological and environmental viewpoint, Candidate Location #9 has the least drawbacks, and its proximity to the RWMC would minimize many disturbances. A very significant advantage of Candidate Location #9 is that choosing sites in proximity to existing facilities limits the fragmentation of the INEL ecosystem.

If the facility was constructed at Candidate Location #9 and fenced to be included as part of RWMC, the fence would limit large-animal exposure without disturbing their movements and migrations.

Candidate Location #1 has relatively few drawbacks. One concern at Candidate Location #1 would be if the facility at Candidate Location #1 was enclosed by a fence all the way to, and around, RWMC. If so, that fence could have a serious impact on animal movements in the area, especially pronghorn migrations. If fenced to RWMC, it would be necessary that the fence be constructed to allow pronghorns to move through it.

Because of the documented existence of pygmy rabbits at Candidate Location #1, and their probable existence at Candidate Locations #3 and #9, if one of those candidate locations is selected, consultation with the USFWS should be initiated early in the process, as suggested earlier by Reynolds (1992).

Candidate Location #5 is in the winter range of a significant portion of the Idaho pronghorn antelope population. Because of this, siting at Candidate Location #5 would almost assuredly be opposed by the IDFG. This location is also near areas used by bald eagles in winter. Since bald eagles are endangered, it must be expected that siting at this location would be a major concern to sportsman groups and other environmentally concerned groups. It is also an important wintering area for many sage grouse, which would further serve to support any opponent's position.

Candidate Location #5 is within the Twin Buttes grazing allotment administered by the Bureau of Land Management (BLM). Siting at this location would likely require formal adjustment of the agreement between the DOE and the BLM.

Although Candidate Location #3 was used extensively by the resident elk herd, that should not be of concern because a significant portion of the elk were trapped and transplanted offsite during Winter, 1992-1993. If location #3 is selected, a vegetation survey should be conducted to measure the population of *Oxytheca dendroidea* in the area.

Preliminary review of the soil at Candidate Location #3 suggests severe limitations for both building site development and construction and operation of a facility because of minimal depth to bedrock. Before selection of Candidate Location #3, the intense soil survey should be conducted.

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**Appendix A**

**Location Data for the Four Candidate Locations**

**Table A-1. GPS location data (UTM coordinates) for candidate location #1.**

---

Easting	Northing
339343.46	4816988.19
338937.20	4816279.80
338463.18	4816506.13
338583.50	4816807.57
339172.97	4817472.39
339363.95	4817722.21
339888.41	4817710.16
339475.97	4817858.04
338871.16	4816443.41

---

**Table A-2.** GPS location data (UTM coordinates) for Candidate Location #3.

---

Easting	Northing
356344.38	4838652.32
356453.04	4838552.84
356346.38	4838307.45
356007.77	4838282.70
355895.15	4838853.33
355781.13	4838194.28
355262.24	4838262.60
355266.93	4838426.08
355398.56	4838553.10
355453.71	4838733.90

---

**DATE**

**FILMED**

8/24/94

**END**

