



*The Snake River Geothermal Consortium
is a research partnership focused on
advancing geothermal energy, hosted
by Idaho National Laboratory.*

Environmental Information Synopsis

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Environmental Information Synopsis

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ACRONYMS

DOE	U.S. Department of Energy
EA	environmental assessment
EGS	enhanced geothermal systems
EMS	Environmental Management System
FONSI	Finding of No Significant Impact
FORGE	Frontier Observatory for Research in Geothermal Energy
GRRR	Geothermal Resource Research Area
INL	Idaho National Laboratory
ISMS	Integrated Safety Management System
NEPA	National Environmental Policy Act
SRGC	Snake River Geothermal Consortium

Environmental Information Synopsis

1. INTRODUCTION

This synopsis provides an overview of the environmental management activities associated with the Frontier Observatory for Research in Geothermal Energy (FORGE) and its potential environmental impacts on biological, natural, and cultural resources. Also addressed are the generation and management of waste at FORGE. This synopsis does not consider possible impacts from socioeconomics, environmental justice, intentional acts of destruction, radioactivity, or climate change. However, some of these impacts may be required to be included in future environmental documentation (e.g., if identified in an environmental assessment [EA] scoping activity as being important or required). In addition, this synopsis identifies technical disciplines needed to support and evaluate FORGE.

The FORGE project is being performed by the Snake River Geothermal Consortium (SRGC) at the 110-km² (42.6-mi²) Geothermal Resource Research Area (GRRA) on the Idaho National Laboratory (INL) Site. FORGE marks the U.S. Department of Energy's (DOE's) largest effort to advance the deployment of enhanced geothermal systems (EGS).

2. MANAGING ENVIRONMENTAL REQUIREMENTS, IMPACTS AND PERMITS

2.1 Environmental Management System

The SRGC will use INL's established Environmental Management System (EMS) to manage FORGE environmental activities. INL's EMS integrates environmental protection, environmental compliance, pollution prevention, and continual improvement into work planning and execution throughout work areas as a function of the Integrated Safety Management System (ISMS). The EMS program is founded on the five core elements of the International Organization for Standardization EMS standard (i.e., ISO 14001), which correlate to the five core functions of INL's ISMS. Major elements of an EMS include policy, planning, implementation and operation, checking and corrective action, and management review. By implementing ISMS, INL protects workers, the surrounding communities, and the environment while meeting operating objectives to comply with legal and other requirements.

Project activities will generate waste; release effluents to the air, water, and soil; and disturb natural, biological, and cultural resources during construction and operations. To address these concerns, we will follow well-established National Environmental Policy Act (NEPA) (42 U.S.C. §§4321-4370h) processes to scope, prepare, and approve an EA (see Permitting Inventory in Appendix E of the FORGE *Topical Report* [Podgorney, 2016]). The EA will describe and analyze the potential environmental impacts associated with constructing, managing, and operating an EGS field laboratory on the INL Site. Table 1 lists tasks that must be done to scope, prepare, and deliver a draft and final EA. The estimated cost for preparing an EA is \$300K–\$400K.

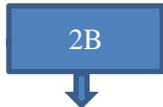
We have available, or have within our subcontracting capability, all disciplines needed to conduct a full environmental evaluation for siting, constructing, operating, and maintaining the FORGE EGS field laboratory. Specific disciplines will include drilling engineers; reservoir engineers; geologists; seismologists; wildlife, plant, air, and water scientists; cultural resource specialists; and waste management experts. INL, a member of the SRGC, routinely conducts its own environmental evaluations under NEPA.

Table 1. EA task list.

INL uses the following generic task list to manage the EA scoping, technical studies, public/agency comment period, and the draft and final document preparation. Applying duration and effort to each task will develop a full 8- to 12-month schedule from the start of scoping activities to the final EA. We expect to conduct these activities in Phase 2A and 2B of the FORGE project.

Completing the five phases and associated tasks will result in several documents required of the DOE Idaho Operations Office to meet its requirements under NEPA, including an EA Scoping Checklist, a draft EA, a response to public comments, a final EA, and, if applicable, a Finding of No Significant Impact (or FONSI) (designated below by **).

Tasks	Tasks
<p>1. Project Management Phase</p> <ul style="list-style-type: none"> ● Draft Planning, Schedule/Cost ● Review Comments ● Final Planning, Schedule/Cost ● Project Closeout <p>2. Scoping Phase</p> <ul style="list-style-type: none"> ● Draft EA Scoping Checklist ● Prepare Scoping Meeting Material ● Scoping Meeting ● Prepare Final EA Scoping Checklist ● Submit Final EA Scoping Checklist ● Project Description Complete ● Technical Studies and Permits <ul style="list-style-type: none"> ○ Risk Assessments (if needed) ○ Air Emissions ○ Cultural Resources ○ Surface and Groundwater ○ Geology and Soils ○ Wildlife/Habitat ○ Waste Management 	<ul style="list-style-type: none"> ○ Incorporate Comments ○ Draft EA Complete ○ Print Draft EA ● Review Media Releases <ul style="list-style-type: none"> ○ Prepare Postcard for Stakeholders ○ Send Postcard to Stakeholders ○ Prepare News Releases ● **Distribute Draft EA <p>4. Public Comment/Response Phase</p> <ul style="list-style-type: none"> ● Comment/Response Document ● Public Comment Period ● Evaluate/Respond to Comments ● **Prepare Comment/Response Document <p>5. Final EA/FONSI Phase</p> <ul style="list-style-type: none"> ● Prepare Final EA/FONSI <ul style="list-style-type: none"> ○ Revise Draft EA/FONSI ○ Compile Preliminary Final EA/FONSI ○ Preliminary Final EA/FONSI Complete ● Review Preliminary Final EA <ul style="list-style-type: none"> ○ Environmental Support and Services ○ Incorporate Comments ○ INL Team Review ○ Incorporate Comments ○ EA Resolution Meeting ● Prepare Final EA/FONSI <ul style="list-style-type: none"> ○ Prepare Final EA/FONSI ○ NEPA Compliance Office/Office of Chief Council Review and Approval ○ Incorporate Comments ○ Final EA/FONSI Complete ○ Print Final EA/FONSI ● Review Media Releases <ul style="list-style-type: none"> ○ Prepare Postcard for Stakeholders ○ Send Postcard to Stakeholders ○ Prepare News Releases ● **Distribute Final EA (and FONSI if applicable)
<p>3. Draft EA Phase</p> <ul style="list-style-type: none"> ● Prepare Preliminary Draft EA <ul style="list-style-type: none"> ○ Prepare EA Sections ○ Compile Draft EA Sections ○ Preliminary Draft EA Complete ○ **Prepare DOE EA Checklist ● Review Preliminary Draft EA <ul style="list-style-type: none"> ○ Environmental Support and Services ○ Incorporate Comments ○ INL Team Review ○ Incorporate Comments ○ EA Resolution Meeting ● Prepare Draft EA <ul style="list-style-type: none"> ○ Prepare Draft EA ○ NEPA Compliance Office/Office of Chief Council Review and Approval 	



2.2 Environmental Impacts, Mitigation, and Reclamation

2.2.1 Biological Resources

Potential environmental impacts from FORGE include disturbance (or removal) of native vegetation during construction activities and disturbance of wildlife during operations activities (see Permitting Inventory in Appendix E of the FORGE *Topical Report* [Podgorney, 2016]). Concerns related to possible adverse impacts include the potential (or risk) of wildland fire, loss of sagebrush (and species that depend on sagebrush), effects on migrating birds (nesting areas), introduction and spread of noxious and invasive plants, and fragmentation of habitat. *A wildland fire in 1994 reduced sagebrush stands within the project area, allowing more flexibility in siting our project wells and facilities without affecting sage-grouse habitat.*

Impacts to biological resources are unlikely during the planning activities associated with Phase 1 of FORGE. However, during parts of Phase 2 (i.e., site characterization) and during Phase 3, soil and vegetation disturbance and general construction activity (i.e., noise) could result in biological resource impacts.

Our mitigation and reclamation activities may include avoiding sagebrush stands and sage-grouse leks within the GRRRA, avoiding disturbance of nesting birds, revegetating disturbed areas, and replanting or reseeding areas of sagebrush. Our experience working in this geographical area suggests that these practices work, but it will be vital to establish mitigation and reclamation details through careful evaluation and planning. As part of the NEPA process, biological resource surveys will help us identify the context and intensity of those impacts and help develop mitigation to avoid or lessen project impacts.

2.2.2 Cultural Resources

INL has conducted archaeological surveys in the project area. Predictive modeling indicates that the GRRRA will likely contain some prehistoric cultural resources (see Permitting Inventory in Appendix E of the FORGE *Topical Report* [Podgorney, 2016]). However, preliminary surveys indicate the area selected for operations contains few, if any, cultural resources.

The INL Site is within the aboriginal homeland of the Shoshone-Bannock Tribes. To the Shoshone-Bannock people, cultural resources include not only archaeological sites affiliated with their history but also many kinds of natural resources, such as traditionally used plants and animals. The tribes have been engaged and offered a letter of support for the FORGE project. Finally, features of the natural landscape (such as buttes, rivers, and caves) often have particular significance to the tribes.

Impacts to cultural resources are unlikely during the planning activities associated with Phase 1 of the GRRRA. However, during Phases 2 and 3, soil disturbance could impact cultural resources.

Our mitigation and reclamation activities may include avoiding cultural resource sites and minimizing soil-disturbing activities that may impact cultural resources or sensitive wildlife and plant species important to the Shoshone-Bannock Tribes. Cultural resource surveys will help us identify sensitive areas for avoidance. We will also consult with the Idaho State Historic Preservation Office and the Shoshone-Bannock Tribes to address any adverse impacts to cultural resources.

2.2.3 Water Resources

Part of the southern portion of the GRRRA, south of Highway 20/26, is in the stormwater drainage of the nearby Big Lost River. However, the actual location of the project is outside the stormwater drainage; thus, project activities would not have the potential to affect surface water at the INL Site. Impacts to the Eastern Snake River Plain aquifer are not expected because of the depth of the research wells (i.e., far below the aquifer) and the quantities of water needed (i.e., generally less than a single irrigation well). Drilling new wells will require a holding pond for water used in boring activities. FORGE operations will require the use of portable restrooms, resulting in some sanitary waste (see Section 2.2.5). INL and the

United States Geological Survey are experienced in drilling and operating production, monitoring, and observation wells on the INL Site while protecting water resources. Well drilling and operations at the EGS field laboratory will not affect the water quality of the Eastern Snake River Plain aquifer. Through INL, we will use best management practices to lessen the impacts from these activities. No other wastewater is expected during the construction or operations activities.

2.2.4 Air Resources

The area surrounding the INL Site is a Prevention of Significant Deterioration Class II area and is designated under the Clean Air Act (42 U.S.C. §7401 et seq.) as an area with reasonable or moderately good air quality, which still allows moderate industrial growth (see Permitting Inventory in Appendix E of the FORGE *Topical Report* [Podgorney, 2016]). The Craters of the Moon Wilderness Area, which is about 20.1 km (12.5 mi) southwest of the proposed FORGE site location, is a Prevention of Significant Deterioration Class I area and is the nearest area to the INL Site where additional degradation of local air quality is severely restricted. INL routinely monitors air quality using a network of air monitors. The monitors collect samples to measure particulate matter, radioactivity, and other air pollutants.

Project activities will likely create temporary fugitive dust and emissions during construction activities (e.g., while building roads, well pads, and laydown areas). However, mitigation (such as covering dump-truck beds when loaded with dirt, wetting the disturbed area with water, and so forth) will lessen the impacts from fugitive dust. Other activities (e.g., combustion engines) may have small emissions but will likely be well within the permitted limits of INL.

2.2.5 Waste Generation and Management

Construction and operations activities will generate some industrial waste that will end up in the INL landfill. Our project activities will not generate hazardous or radioactive waste. Borehole drilling will generate drill cuttings and mud that we will manage under federal, state, and local standards (see Permitting Inventory in Appendix E of the FORGE *Topical Report* [Podgorney, 2016]). Process materials and expendables may be disposed of at the INL landfill. Sanitary wastewater will be disposed of through subcontracts to service the portable restrooms.

3. ENVIRONMENTAL PERMITS

Permitting activities focus on construction and research-and-development operations associated with preparing the site and well drilling within the GRRRA. Future proposed research activities for EGS development may require additional permitting. Research-and-development activities associated with FORGE may require additional permitting. Table 2 shows permitting and consultation that will likely be required before beginning construction and operations (see Permitting Inventory in Appendix E of the FORGE *Topical Report* [Podgorney, 2016]).

REFERENCES

40 CFR 122, EPA Administered Permit Programs: The National Pollutant Discharge Elimination System.

42 U.S.C. §§4321-4370h, 1970, National Environmental Policy Act.

42 U.S.C. §7401 et seq., 1970, Clean Air Act.

Stenzel, J.A., Idaho National Laboratory, to Dunn, D., Idaho Department of Water Resources, December 22, 2009, Record of Meeting Concerning Well Permitting, Maintenance, and Decommissioning at the Idaho National Laboratory: CCN 219522.

ISO 14001, 2015, Environmental management systems – Requirements with guidance for use, International Organization for Standardization, 35 p.

Podgorney, R.K., 2016, Topical Report: Snake River Geothermal Consortium, INL/LTD-38127.

Table 2. Permitting strategy (see also Permitting Inventory in Appendix E of the FORGE *Topical Report* [Podgorney, 2016]).

Permit	Agency	Regulatory Requirement	Estimated Time to Obtain Permit	Comments
Biological				
None	—	—	—	While there are no permits, project activities will require consultation with the U.S. Fish and Wildlife Service and the Idaho Department of Fish and Game.
Cultural				
None	—	—	—	While there are no permits, project activities will require consultation with the Idaho State Historic Preservation Office and the Advisory Council on Historic Preservation. Consultation takes about 30 days but restarts with requests for additional information.
Water				
Injection Well Permit	IDWR	IDAPA 37.03.03	3 Months	IDWR estimated the time at 3 months. However, the permit goes out for public review and could be delayed if there are significant public comments.
Monitoring Well Drilling Permits	IDWR	IDAPA 37.03.09	Immediate	IDWR has agreed (Stenzel, 2009) to allow INL to submit an annual monitoring well drilling application. If a well is drilled that was not on the application, it is allowed to be included in the following year's application. However, every attempt should be made to include the well in the permit before drilling.
Production Well Drilling Permit	IDWR	IDAPA 37.03.09	2 Months	For production wells, the normal permitting process is followed.
Geothermal Well	IDWR	IDAPA 37.03.04	3 Months	—
NPDES General Permit for Discharges from Construction Activities (CGP)	EPA	40 CFR 122 and General Permit	2 Months	The new location overlaps with part of INL's stormwater corridor. Projects that are in the corridor are required to follow the NPDES stormwater requirements for construction activities if the project disturbs 4,047 m ² (1 acre) or more. The CGP will require a stormwater pollution prevention plan and will require final stabilization (e.g., revegetation and asphalt) of the disturbed area.
Air				
None	—	—	—	Fugitive emissions from combustion engines associated with well drilling (e.g., boilers for heat) will require an Air Permitting Applicability Determination but will likely be within INL permitted limits, not requiring a permit/permit modification.
Waste				
None	—	—	—	—
CFR = Code of Federal Regulations CGP = construction general permit		EPA = U.S. Environmental Protection Agency IDAPA = Idaho Administrative Procedure Act		IDWR = Idaho Department of Water Resources NPDES = National Pollutant Discharge Elimination System