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STATEMENT OF DOCUMENT QUALITY
FY 2016 Annual Revegetation Assessment

November 2016

I have prepared this document in accordance with applicable requirements and regulatory agency guidance, and I verify that it is true, accurate, and complete to the best of my knowledge. I understand that senior management of INL and/or DOE-ID, under penalty of law, must certify the report (or permit) as true, accurate, and complete.

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Fiscal Year 2016 Revegetation Assessment

November 2016

The INL is a U.S. Department of Energy National Laboratory
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ABSTRACT

This report summarizes the Fiscal Year (FY) 2016 Revegetation Assessment by Battelle Energy Alliance, LLC. This assessment was conducted to document revegetation efforts at Idaho National Laboratory to verify restoration of disturbed vegetation and soil at various locations occurs as required. This report provides the following information for projects at Idaho National Laboratory completed during FY 2016 that were identified during the National Environmental Policy Act review process as having the potential to disturb soils or vegetation:

1) A summary of all projects identified as having the potential to require revegetation efforts

2) A summary of site disturbance and restoration efforts of each project.

For FY 2016, one project required revegetation and sagebrush restoration. For other projects, implementation of best management practices minimized impacts to vegetation and revegetation efforts were not required.

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ACRONYMS

ARA Auxiliary Reactor Area

BEA Battelle Energy Alliance, LLC

BMPs best management practices

CCA "Candidate Conservation Agreement for Greater Sage-grouse (*Centrocercus urophasianus*) on the Idaho National Laboratory Site"

CDRL Contract Data Requirements List

CITRC Critical Infrastructure Test Range Complex

DOE-ID Department of Energy Idaho Operations Office

EC environmental checklist

ESER Environmental Surveillance, Education, and Research

ESRP Eastern Snake River Plain

HFTB High Frequency Test Bed

IDAPA Idaho Administrative Procedures Act

INL Idaho National Laboratory

ISBN Integrated Satellite Backhaul Network

ISU Idaho State University

MCP Management Control Procedure

MFC Materials and Fuels Complex

NASA National Aeronautics and Space Administration

NEPA National Environmental Policy Act

PBF Power Burst Facility

SGCA Sagebrush Steppe Reserve, Sage-Grouse Conservation Area

SMC Specific Manufacturing Capability

SMR Small Modular Reactor

TAN Test Area North

TBD To Be Determined

USC United States Code

USGS United States Geological Survey

Fiscal Year 2016 Revegetation Assessment

1. Introduction

Revegetation of disturbed areas at the Idaho National Laboratory (INL) Site is identified as a method for prevention and/or control of noxious weeds used to comply with some aspects of both federal (7 United States Code (USC) 2814) and state (Idaho Administrative Procedures Act [IDAPA]02.06.22) noxious weed control laws. Executive Order 13112, Invasive Species, also specifies revegetation as a control measure to limit the spread of invasive species. In addition, in the "Candidate Conservation Agreement for Greater Sage-grouse (*Centrocercus urophasianus*) on the Idaho National Laboratory Site" (CCA) (Department of Energy Idaho Operations Office [DOE-ID] 2014), DOE-ID adopted a policy of no net loss of sagebrush from development activities at the INL Site in order to protect sage-grouse habitat. Battelle Energy Alliance, LLC (BEA) complies with the requirements of the CCA by requiring each project with the potential to disturb sagebrush to replace an equal amount of sagebrush in restoration priority areas.

Since 2001, only native vegetation listed or discussed in "Guidelines for Revegetation of Disturbed Sites at the Idaho National Engineering Laboratory" (DOE/ID-12114) are approved for reseeding and site restoration on the INL Site. The seeding of non-native plant species is prohibited.

1.1 Purpose

The purpose of this report is to comply with Contract Data Requirements List (CDRL) item number F.24 by providing this revegetation assessment to DOE-ID.

2. Background

The location of the INL in the Eastern Snake River Plain (ESRP), including altitude, latitude, and intermountain setting, affects the climate of the Site. Air masses crossing the ESRP have first crossed a mountain barrier and precipitated a large percentage of inherent moisture. Therefore, annual rainfall at the INL Site is light, and the region is classified as arid to semi-arid (Clawson et. al. 1989). Revegetation projects should be adapted to the annual precipitation and soil moisture level of the Site.

Vegetation at the INL Site typically consists of a shrub over story with a perennial grass and forb understory. Wyoming big sagebrush (*Artemisia tridentata* subspecies *wyomingensis*) is the most common shrub. Basin big sagebrush (*Artemisia tridentata* subspecies *tridentata*) is dominant or co-dominant with Wyoming big sagebrush on sites having deep soils or accumulations of sand on the surface. Communities dominated by big sagebrush occupy most of the central portions of the INL and most areas included in this assessment. Green rabbitbrush (*Chrysothamnus viscidiflorus*) is the next most abundant shrub in many of these communities. Other common shrubs include gray rabbitbrush (*Ericameria nauseosus*), winterfat (*Krascheninnikovia lanata*), spiny hopsage (*Grayia spinosa*), prickly phlox (*Leptodactylon pungens*), broom snakeweed (*Gutierrezia sarothrae*), and horse-brush (*Tetradymia canescens*).

The most common native grasses found within sagebrush communities across the INL Site and in the assessment area includes thickspiked wheatgrass (*Elymus lanceolatus*), bottlebrush squirreltail (*Elymus elymoides*), Indian rice grass (*Achnatherum hymenoides*), needle-and-thread grass (*Hesperostipa comata*), and Sandberg bluegrass (*Poa secunda*). Great Basin wildrye (*Leymus cinerus*) and western wheatgrass (*Pascopyrum smithii*) can also be found in localized patches. Bluebunch wheatgrass (*Pseudoroegneria spicata*) is rare at the lowest elevations but is common at slightly higher elevations to the southwest and along the eastern side of the INL; it is often the dominant grass on alluvial fans and slopes of the buttes and foothills (Anderson, et. al. 1989).

Cheatgrass, an invasive annual species, is also widespread and well established across the INL Site. Goodrich and Gale (1999) noted that in similar situations, cheatgrass should be recognized as a component of the potential plant community. The Environmental Surveillance, Education, and Research (ESER) contractor and Idaho State University (ISU) identified the Bromus tectorum Semi-natural Herbaceous Vegetation and Sisymbrium altissmum-Bromus tectorum Semi-natural Herbaceous Vegetation classes (Shive 2011).

In addition, nearly monotypic stands of crested wheatgrass (*Agropyron cristatum*) can be found in localized areas across the INL Site. Crested wheatgrass remains productive for more than 30 years, and stand mortality is virtually unknown, except in cases of extreme drought during critical phenological stages (Hardy BBT Limited 1989). Anderson and Marlette (1986) point out that crested wheatgrass may inhibit or preclude the re-establishment of native species on disturbed sites and may become the dominant species. The ESER contractor reported that in areas with no anthropogenic influence, crested wheatgrass was found to invade sagebrush stands and out-compete the native plant species (Shive 2011). ESER and ISU identified a crested wheat vegetation class at the INL as "Agropyron cristatum (Agropyron desertorum) Semi-natural Herbaceous Vegetation" (Shive 2011).

Big sagebrush is the climax species on most of its range (Eddleman and Doescher 1978, Jensen at. al. 1988). While seedling establishment may begin immediately following a disturbance, it usually takes a decade or more before big sagebrush dominates a site (Welch and Criddle 2003), though some researchers argue 25-45 years is typical (Watts and Wambolt 1996, Wambolt et. al. 2001).

None of the subspecies of big sagebrush resprout after fire or other disturbance, and prior to re-establishment, big sagebrush communities are mostly populated with associated grasses (Sheehy and Winward 1981). As expected, shrub cover on disturbed sites across the INL is usually much lower than that found on undisturbed sites, and grasses associated with big sagebrush communities account for most of the perennial vegetation found on disturbed sites included in this assessment.

It is important to note that revegetation is expensive and should only be implemented when necessary and when adequate desired vegetation that can assist the natural recovery process is present or immediately adjacent to the disturbed area. Interactions between soil disturbance and sources of propagules play an important role in controlling early stages of succession at disturbed sites, and disturbance may play different roles in communities characterized by species with different reproductive strategies. Understanding sources of colonists improves the ability to predict the effects of disturbance.

Kotanen (1996) states revegetation should be constrained by the abundance and types of plants available at the site. The necessity of revegetation should be based upon this advantage. Natural revegetation, therefore, may be the best option when desired plants are adequate at the site. When desired plants are not adequate at the site, for example in areas dominated by crested wheatgrass, revegetation may not be practical and the use of best management practices (BMPs) is sometimes recommended to limit disturbance and protect soils.

3. Site Revegetation Assessment Summary

Project specific revegetation is implemented through Management Control Procedure (MCP)-8000. Section 4.117 of MCP-8000 requires projects that remove or disturb native or naturalized vegetation, disturb soil, or are located within the Sagebrush Steppe Reserve, Sage-Grouse Conservation Area (SGCA), Critical Infrastructure Test Range Complex (CITRC) boundary, the area between the Specific Manufacturing Capability (SMC) and Test Area North (TAN), or in the INL storm water corridor to conduct the following:

- Complete and obtain approval of an environmental checklist (EC) for National Environmental Policy Act (NEPA) documentation

- Work with the appropriate Program Environmental Lead to identify permits, permit modifications or licenses needed for the activity
- Coordinate with DOE's ESER contractor for a biological resource review to determine the need for revegetation, the amount of revegetation needed, and the appropriate seed mix for the revegetation effort.

Table 1 lists projects by EC number and title for INL projects outside of facility boundaries completed in FY 2016 that had the potential to disturb native or naturalized vegetation at the INL Site. Table 1 also lists the recommended revegetation efforts for each project.

Table 1. FY 2016 projects with the potential to disturb native or naturalized vegetation at INL

EC Number	**Project Title**	**Revegetation Efforts/Comments**
INL-14-018 R1	United States Geological Survey (USGS) Geotechnical Drilling for USGS-142 and USGS-143 Rev 1 USGS-142A	Project minimized disturbance and revegetation was not required.
INL-15-068 R1	Idaho National Laboratory (INL) Smart Grid Test Bed Revision 1	Acreage currently disturbed is being determined by the ESER contractor and will be included in contract for sagebrush restoration activities for FY 2017.
INL-15-149 R1	Critical Infrastructure Test Range Complex (CITRC) High Frequency Test Bed (HFTB) Expansion	Project did not disturb vegetation.
INL-16-009	Materials and Fuels Complex (MFC) Substation Transformer Refurbishment	Project did not disturb vegetation.
INL-16-010	Power Burst Facility (PBF)-638 and Central Facilities (CF)-617 Manual Transfer Switch Installation	Project did not disturb vegetation.
INL-16-015	Small Modular Reactor (SMR) Site Inspection Visit	Project did not disturb vegetation.
INL-16-034	Central Facilities Area (CFA) Live Fire Range Elevated Platform	Project did not disturb vegetation.
INL-16-036	CFA Landfill Expansion and Operations	Revegetation was not required for this project due to landfill requirements.
INL-16-064	Auxiliary Reactor Area (ARA)-632 Integrated Satellite Backhaul Network (ISBN) 3-Phase Power Upgrade	Project did not disturb vegetation.
INL-16-066	London Fog	Project was moved to a previously disturbed location to avoid cultural resource impacts.

EC Number	Project Title	Revegetation Efforts/Comments
		Vegetation was not disturbed.
INL-16-068 & INL-16-068 R1	United States Government (USG) #16 Isolated Satellite Backhaul Network (ISBN) Installation and Testing	Project did not disturb vegetation.
INL-16-069	Power Management Training Area Expansion	Project did not disturb vegetation.
INL-16-088	Vehicle Access at the Intermediate Measurement Location	Project was put on hold.
INL-16-092	ARA-632 Increase of Defensible Space	Project was put on hold.
INL-16-110	Materials and Fuels Complex (MFC) Laydown Area	Project was located in a crested wheatgrass monoculture and revegetation was not required.
INL-16-121	National Aeronautics and Space Administration (NASA) Mars Methane Plume Tracer	Mowing occurred but not vegetation disturbance. Revegetation was not required.
INL-16-147	Materials and Fuels Complex (MFC) South Security Road Turn Widening	Project did not disturb vegetation.

The INL Smart Grid Test Bed project (EC INL-15-068 R1) was the only project conducted at INL during FY 2016 that required revegetation. The proposed action has not been completed, but the project is working with the ESER contractor to determine the current amount of disturbance and the cost for reseeding sagebrush. Therefore, exact revegetation requirements were unknown at the time of this assessment.

As previously stated, DOE-ID adopted a policy of no net loss of sagebrush habitat from development activities at the INL Site in the CCA. BEA complies with the requirements of the CCA by requiring each project with the potential to disturb sagebrush to replace an equal amount of sagebrush in restoration priority areas. This requirement is included as a condition in project specific ECs, and project managers must agree to implement the condition for each EC to be approved. Table 2 lists projects that had the potential to disturb sagebrush by EC number and title and also lists the amount of sagebrush disturbed and restored by projects started in FY 2016.

Individual projects are currently required to contact the ESER contractor prior to any ground disturbing activities and to follow any instructions provided by the ESER contractor as part of the biological review required by project-specific ECs and BEA procedures. However, BEA and the ESER Contractor are currently developing a contract to allow the ESER contractor to identify the amount of project specific sagebrush disturbance, replant an amount of sagebrush equal to the amount disturbed during completion of each project in priority restoration sites in compliance with the CCA, and monitor sagebrush establishment for recommended restoration activities.

Table 2. FY 2016 project with the potential to require sagebrush restoration

EC Number	Project Title	Acres Disturbed	Date of Restoration	Acres Restored

EC Number	Project Title	Acres Disturbed	Date of Restoration	Acres Restored
INL-14-018 R1	United States Geological Survey (USGS) Geotechnical Drilling for USGS-142 and USGS-143 Rev 1 USGS-142A	N/A	USGS is responsible for this restoration effort, and the project is not tracked by BEA.	N/A
INL-15-068 R1	Idaho National Laboratory (INL) Smart Grid Test Bed Revision 1	To Be Determined (TBD)	Date of restoration will be identified in contract between BEA and the ESER contractor.	TBD
INL-15-149 R1	Critical Infrastructure Test Range Complex (CITRC) High Frequency Test Bed (HFTB) Expansion	0	Project was located on a previously disturbed site that did not have sagebrush.	0
INL-16-009	Materials and Fuels Complex (MFC) Substation Transformer Refurbishment	0	Project did not disturb sagebrush.	0
INL-16-058	United States Geological Survey (USGS) Geotechnical Drilling for USGS-144	N/A	USGS is responsible for this restoration effort, and the project is not tracked by BEA.	N/A
INL-16-064	Auxiliary Reactor Area (ARA)-632 Integrated Satellite Backhaul Network (ISBN) 3-Phase Power Upgrade	0	Project did not disturb sagebrush.	0
INL-16-068 & INL-16-068 R1	United States Government (USG) #16 Isolated Satellite Backhaul Network (ISBN) Installation and Testing	0	Project did not disturb sagebrush.	0
INL-16-069	Power Management Training Area Expansion	0	Project did not disturb sagebrush.	0
INL-16-088	Vehicle Access at the Intermediate	0	Project was not completed and was	0

EC Number	Project Title	Acres Disturbed	Date of Restoration	Acres Restored
	Measurement Location		put on hold.	
INL-16-092	Fillmore Test Facility (Auxiliary Reactor Area [ARA]-632) Increase of Defensible Space	0	Project did not disturb sagebrush.	0
INL-16-110	Materials and Fuels Complex (MFC) Laydown Area	0	Project did not disturb sagebrush.	0
INL-16-122	Central Facilities Area/Materials and Fuels Complex (CFA/MFC) Live Fire Range Modifications	0	Not all project activities have been completed. Completed activities did not disturb sagebrush. Project will continue to be tracked for sagebrush disturbance and restoration.	0
INL-16-140	United States Geological Survey (USGS) Geotechnical Drilling for USGS-145	N/A	USGS is responsible for this restoration effort, and the project is not tracked by BEA.	N/A

One project during FY 2016 required sagebrush restoration. The amount of disturbance and required sagebrush restoration required by the INL Smart Grid Test Bed project for activities completed in 2016 will be determined in FY 2017. It is anticipated restoration will be identified in the contract between BEA and the ESER contractor currently in development .These activities will be summarized in a future report.

4. Recommendations

In the past, revegetation efforts at the INL Site have been largely unsuccessful due to the arid climate and soil constraints. Disturbed sites, including sites where revegetation has been attempted, can take up to 30 years to recover to pre-disturbed conditions. Projects disturbing vegetation and soils usually only fund a single revegetation effort and lack funding for additional revegetation efforts when the initial attempt is unsuccessful. Therefore, INL identifies and recommends BMPs to reduce the need for revegetation efforts during the NEPA process, for example minimizing off-road vehicle travel, relocating soil disturbing activities to previously disturbed areas, mowing instead of grubbing, etc. BEA also works in consultation with the ESER contractor through the EC process to determine when

project activities have the potential to result in soil disturbance and to identify when and where revegetation is needed.

To address issues associated with unsuccessful revegetation efforts in the past and the requirements in the CCA for no net loss of sagebrush, BEA is working in conjunction with the ESER contractor to develop a contract under which the ESER contractor would identify quantities of sagebrush disturbance, replant equal amounts of sagebrush in priority restoration areas, monitor the success of sagebrush establishment, provide maintenance activities to ensure sagebrush re-establishment is successful, and report sagebrush restoration activities in the ESER contractor annual CCA monitoring report. Requirements would be identified in project specific ECs, and implementation of requirements would be funded by the individual project. This would allow more accurate tracking of disturbance and restoration and has the potential to result in more successful revegetation efforts.

Furthermore, BEA must annually report to DOE-ID the number of disturbed and restored acres of sagebrush at INL to verify compliance with the CCA. In 2016, BEA began tracking sagebrush disturbance and other revegetation requirements for the annual report through the EC process. It is recommended that future revegetation efforts be reported in BEA's annual sagebrush report to DOE as described above and that CDRL F.24 be cancelled due to the redundant information which would be contained in both reports.

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