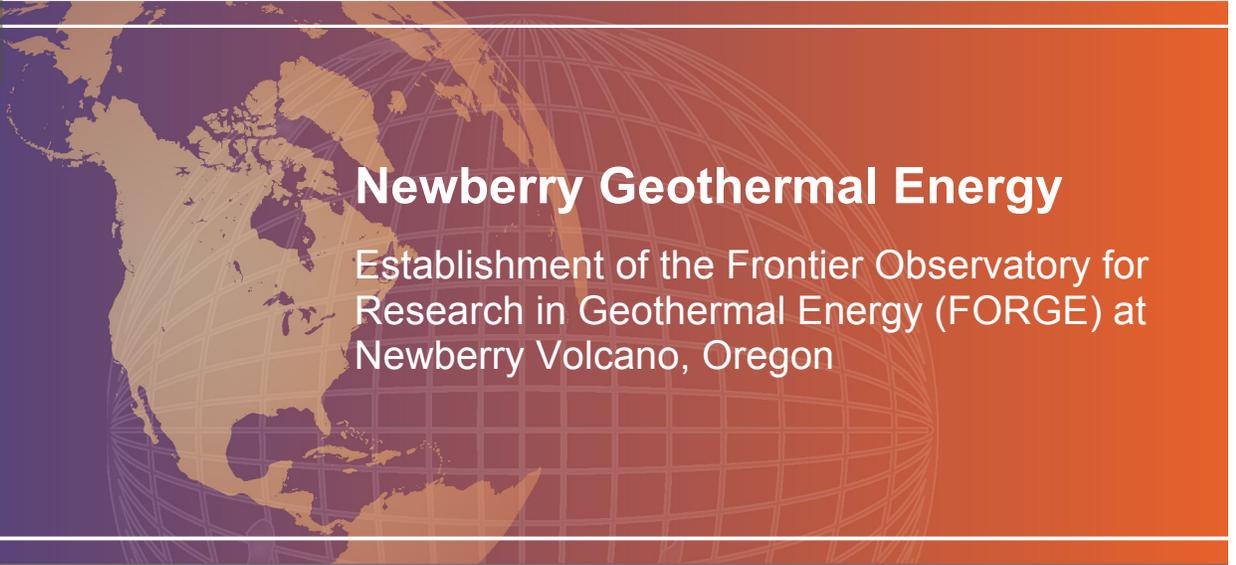




A Research Observatory for a Sustainable Future



Newberry Geothermal Energy

Establishment of the Frontier Observatory for Research in Geothermal Energy (FORGE) at Newberry Volcano, Oregon



Appendix C

Environmental Information Synopsis

April 27, 2016



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Acronyms and Abbreviations

AltaRock	AltaRock Energy, Inc.
BLM	U.S. Bureau of Land Management
DEQ	(Oregon) Department of Environmental Quality
DNH	Davenport Newberry Holdings, LLC
DOGAMI	(Oregon) Department of Geology and Mineral Industries
EIV	Environmental Information Volume
FORGE	Frontier Observatory for Research in Geothermal Energy
GDP	Geothermal Drilling Permit
GSN	Geothermal Sundry Notice
USFS	U.S. Forest Service
NEPA	National Environmental Protection Act
NEGSD	Newberry Volcano Enhanced Geothermal Systems Demonstration
NEWGEN	Newberry Geothermal Energy

Appendix C

Environmental Information Synopsis

C.1 Summary

Newberry Geothermal Energy (NEWGEN) presents this Environmental Information Synopsis to outline the permitting needs for Frontier Observatory for Research in Geothermal Energy (FORGE) Phases 2A and 2B. NEWGEN will build on existing permits and protocols for the Newberry Volcano Enhanced Geothermal Systems Demonstration (NESGD) project to develop permits for FORGE activities. A strong foundation of environmental documentation, prior analysis, and data collection create a foundation for ensuring environmental compliance is continuously in place as the program proceeds.

NEWGEN Core Consortium member AltaRock Energy, Inc. (AltaRock)¹ is the geothermal leaseholder and has established experience and relationships with the U.S. Forest Service (USFS) and the U.S. Bureau of Land Management (BLM) in managing the site in a way that avoids or minimizes environmental impacts. This experience will help obtain the necessary regulatory approvals, including compliance with the National Environmental Protection Act (NEPA), in the time frame required.

C.2 Environmental Management Activities

Throughout all phases of the NEWGEN FORGE project, NEWGEN will incorporate environmental management measures to ensure operations are conducted in an environmentally responsible and safe manner, compliant with all regulations. These measures will be designed based on the project and research experience of the NEWGEN Consortium, especially the NEGSD project. Of particular note is the detailed Induced Seismicity Mitigation Plan (ISMP) described in Appendix J. This plan is based on the ISMP developed for the NEGSD project that was successfully implemented and incorporated into conditions of approval for the project. NEWGEN anticipates the new ISMP will be incorporated in a similar way for the NEWGEN FORGE project. Measures include waste management, site reclamation, environmental impact mitigation, and Best Management Practices. These measures are extensive, specific, and will be detailed during the future NEPA approval and environmental review process as required for each phase of the NEWGEN FORGE project. Examples of measures specific to every phase of work on NEWGEN FORGE facilities include the following:

- Storm water runoff from well pads is controlled by the fact that these surfaces are graded to direct water into the sumps.
- Any sumps used to hold drilling muds and fluids on the well pads are (or will be) lined to prevent any seepage of liquids.
- Drilling muds, fluids, and any geothermal fluids will be temporarily contained in lined sumps until they can be reinjected in accordance with the existing (or new) underground injection control permits. Residual solids will be tested for hazardous materials and will either be left in the sump or disposed of offsite accordingly in a licensed disposal facility.
- The protocols of the Induced Seismicity Mitigation Plan (see Appendix J) will be followed to mitigate potential seismic risks that could arise from injecting pressurized fluids into the subsurface.
- Roads will be watered during heavy traffic periods and dry summer months to reduce dust.

¹ Davenport Newberry Holdings, LLC (DNH) is the leaseholder and AltaRock is the majority owner of DNH and is an authorized agent managing and undertaking activities on behalf of DNH.

- Facilities will be painted a color that best allows them to blend with the natural surroundings to mitigate visual impacts.
- All disturbed areas will be physically regraded and replanted to the original contour or a contour that blends with the surrounding topography at the completion of the project.
- Disturbed sites will be monitored for noxious weeds and all vehicles will be power washed before entering the project site.

C.3 Existing Permits/Updated Permitting Inventory

An updated permitting inventory itemizing the full set of existing permits and NEPA studies for the project site is attached in Appendix E. This inventory has been updated to reflect changes since the original application.

C.4 Permitting Plan

NEWGEN has created the following permitting plan that describes the permits and NEPA review we anticipate will be needed to carry out the planned activities outlined in the Research and Development Implementation Plan (Appendix L).

C.4.1 Phase 2A Tasks

Environmental Information Volume

During Phase 2A, NEWGEN will prepare and submit to the U.S. Department of Energy (DOE) an Environmental Information Volume (EIV) as required in the Funding Opportunity Announcement. The EIV will summarize the environmental conditions at the project site, anticipate any potential environmental impacts, and identify all environmental laws and regulations to ensure that all necessary NEPA and environmental permit requirements can be met in an adequate time frame to meet the FORGE goals. This document will serve as the starting point for the preparation of environmental documents required for compliance with NEPA during Phase 2B.

Four Environmental Assessments (EAs) have been completed on the project site within the past 8 years for geothermal exploration and leasing activities as well as one Environmental Impact Statement for vegetation management by the USFS in the immediate project area. We anticipate drawing heavily on these studies, which describe the existing

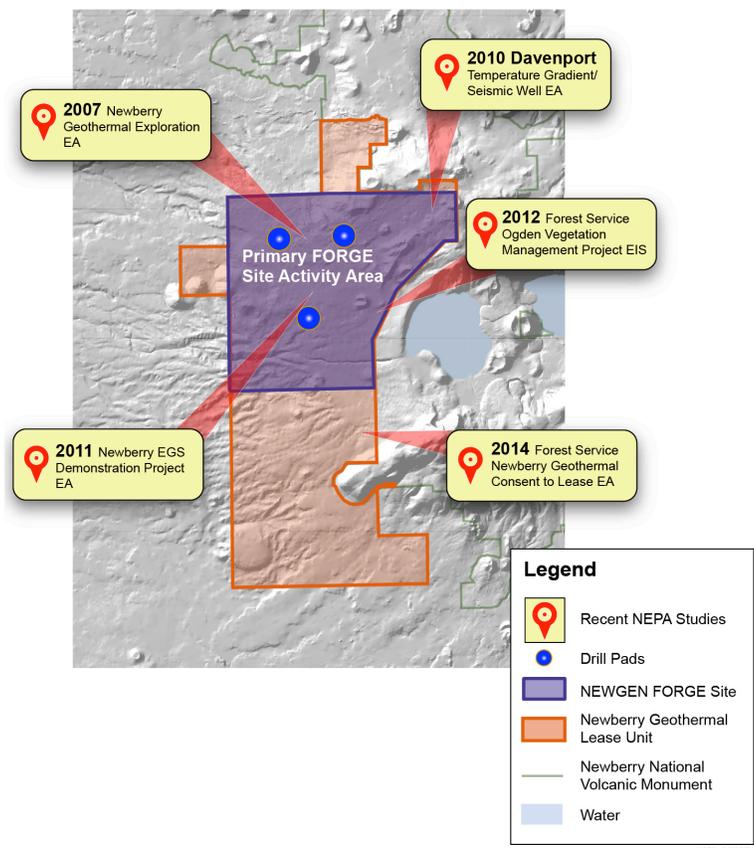


Figure C.1. NEWGEN FORGE site Newberry Historical Environmental Assessment activities.

environmental conditions at the site in great detail. We will also draw on our recent experience permitting the NEGSD project to identify potential environmental impacts and areas of concern with regulators and local stakeholders.

During the previous geothermal exploration activities at the site, NEWGEN Consortium members developed a strong working relationship with the responsible federal and state agencies and will work closely with them during Phase 2A to scope any potential environmental impacts and develop a strategy for NEPA compliance during Phase 2B. Valuable lessons learned by NEWGEN Consortium members, BLM, and USFS will be highlighted in the EIV for future planning.

As part of the Phase 2A environmental review, an updated schedule and budget will be developed for the completion of all required NEPA compliance scheduled for Phase 2B. Finally, we will present the EIV to DOE, BLM, and USFS along with any state regulatory agencies and affected stakeholders.

Preliminary Seismic Monitoring

Background seismic data specific to NEWGEN FORGE will continue to be collected by the Pacific Northwest Seismic Network (PNSN) at four borehole stations installed for NEGSD in 2012 (NN21, NN17, NN18, NN32) in addition to USGS stations installed in 2011 (KWBU, ASBU, SWNB, NORM, etc.). Beginning in July 2016 one to three additional currently idle borehole stations (NN07, NN09, and/or NN24) will be re-occupied (Appendix J). This task will not require occupying any new monitoring stations or installing new equipment, just restoring already permitted equipment. Thus, no new permits will be required to perform this monitoring work.

C.4.2 Phase 2B Tasks

NEPA Compliance and Permit Approvals

During Phase 2B, NEWGEN will work with federal agencies (BLM, USFS) to achieve NEPA compliance and secure all necessary permits for Phases 2C and 3 of the FORGE project. Again, NEWGEN's previous experience with these agencies will guide the successful permitting process.

The project is located entirely on National Forest system lands as part of the USDA Forest Service, Deschutes National Forest (USFS). The majority of the project activities will take place on federal geothermal leases on these lands, which are administered by the BLM. Because the project occurs on federal lands, any proposed activities on the NEWGEN FORGE site will require NEPA compliance.

With regard to NEPA, the BLM will be the lead agency because the majority of the project activity would occur on geothermal leases issued and administered by the BLM. Because some of the project activities may occur on lands where surface disturbance is under the authority of the USFS, it will be a cooperating agency for the preparation of any NEPA documents. Finally, DOE would also be a cooperating agency due to their involvement with funding the project.

We anticipate the NEPA process will commence with the submission to BLM of a Notice of Intent to Conduct Geothermal Resource Exploration Operations along with a detailed Plan of Exploration, Operations Plan, and Drilling Program in Phase 2B of the Project. The Notice will detail all of the planned activities outlined in the Statement of Work and R&D Implementation Plan.

It is not clear based on the available site and regional data as well as prior environmental analysis that the actions contemplated are significant enough to warrant an EIS. Therefore NEWGEN recommends that an

EA start the NEPA process.² NEWGEN will work with BLM to conduct this analysis.³ NEWGEN Consortium members have worked closely with the BLM and USFS on three previous EAs and were successful in helping these agencies complete them. Likely issues of concern, such as potential induced seismicity and water-quality impacts, will be similar to those that were successfully dealt with during the NEGSD project.

The NEGSD EA and other recently completed NEPA documents (listed in Appendix E, Tables E.1 and E.2) identified and analyzed environmental impacts very similar to those one would expect from the proposed NEWGEN FORGE project. NEWGEN anticipates being able to tier off of these documents in order to narrow the range of alternatives and concentrate solely on new issues not already addressed. For example, impacts due to induced seismicity were thoroughly addressed and mitigated through the incorporation of a detailed ISMP. NEWGEN anticipates tiering off of that analysis and focusing only on new issues specific to the NEWGEN FORGE project, such as surface disturbance associated with new borehole microseismic array stations.

Potential impacts on groundwater quality from injection of diverters and tracers were also analyzed in detail in the NEGSD EA. By tiering off that EA the analysis can be expedited by focusing only on potential impacts from new materials that are significantly different than those used during the NEGSD project.

We expect FS will permit the proposed geophysical surveys described in the SOW through a special use permit and NEPA compliance will be met through the use of a categorical exclusion. Permits for geophysical surveys have been permitted this way in the past to DNH, NEGSD, and the OSU/NETL 4D EGS monitoring project. These permits will be obtained during Phase 2B of the project.

New Site Characterization

Noninvasive site characterization work will be performed as permitted by the site's NEPA status. New geophysical surveys will be performed as part of this expanded site characterization (Appendix A), including:

- gravity survey
- aeromagnetic data inversion
- magnetotellurics
- ground deformations
- seismic tomography.

Some aspects of these surveys will require occupying new monitoring locations which, in turn, will require USFS special use permits. These special-use permits for geophysical surveys are eligible for a categorical exclusion under NEPA (36.CFR.220.6.e.8). We anticipate some archaeological surveys may be required depending on specific locations and level of disturbance.

C.4.3 Required Permits and Authorizations

In addition to the NEPA compliance described above, NEWGEN will work with federal and state regulatory authorities to secure the required operating permits for Phases 2C and 3. The project already

² The ultimate decision about how to meet NEPA compliance will be determined by the federal agencies (BLM, FS) once they have reviewed the proposed action and done the environmental analysis.

³ The ultimate decision about how to meet NEPA compliance will be determined by the federal agencies (BLM, USFS) once they have reviewed the proposed action and done the environmental analysis. What is stated here is simply our best estimate at this time.

has an extensive list of existing permits (detailed in Appendix E) that may be used going forward. New permits will be required, but most of them will require NEPA compliance prior to issuance. The anticipated new permits include the following (as tabulated in Table C.1):

- BLM – Upon completing the necessary NEPA analysis, NEWGEN anticipates BLM approving its proposed exploration and operations plan and regulating the project in a phased approach through the use of Geothermal Drilling Permits (GDPs) and Geothermal Sundry Notices (GSNs). Any new geothermal wells will require a GDP and any modifications to existing wells or stimulation proposals will require a GSN.
- USFS – A special use permit will be required from the USFS for the geophysical surveys proposed during Phase 2B. USFS has a categorical exclusion for these activities under NEPA. The current road-use permit will be modified to cover any new locations needed.
- Oregon Department of Geology and Mineral Industries (DOGAMI) – Any new wells proposed as part of Phase 3 will require DOGAMI drilling permits and modification permits for any new stimulation. Well NWG 55-29 is currently permitted by DOGAMI and any changes to that well would need to be approved upon review by DOGAMI.
- Oregon Department of Environmental Quality (DEQ) – As discussed in the updated permitting inventory, NEWGEN has an underground injection control permit for the existing geothermal wells. These permits are still valid and may be used for NEWGEN FORGE.

Table C.1. Required permits and authorizations.

ANTICIPATED PERMITS	DESCRIPTION	APPROVER
Geothermal Drilling Permits	All new planned geothermal wells will require a Geothermal Drilling Permit. <i>* Existing wells at the NEWGEN FORGE site are currently permitted</i> <i>* NWG 55-29 and NWG 46-16 are currently permitted by DOGAMI</i>	BLM DOGAMI
Geothermal Sundry Notices	All planned modifications to existing wells or stimulation proposals will require a Geothermal Sundry Notice.	BLM DOGAMI
Road-Use Permit	NEWGEN will update the existing Road-Use Permit to include all new planned locations for the NEWGEN FORGE Site. <i>* Current road-use permit covers road use to proposed pads.</i>	Forest Service
Underground Injection Control Permit	Underground injection control permits will be required for injecting anything other than water or geothermal fluids. <i>*The NEWGEN FORGE Site currently has statewide UIC permit that allows injection of water and geothermal fluids from wells associated with the NEGSD. The site is also authorized by rule to inject tracers and diverter material on a specific application for Well NWG 55-29.</i>	Oregon DEQ

C.4.4 Proposed NEPA Schedule and Budget

The schedule to achieve NEPA compliance and secure all necessary permits will be better defined during Phase 2A and NEPA compliance activities will commence during Phase 2B with the steps listed in Table C.2.

The budget established to execute the NEPA compliance will be \$135,019 for Phase 2A activities (2A-4 in Table C.2) and \$373,571 for Phase 2B activities (2B-4 in Table C.2). For additional details regarding these activities see the NEWGEN Statement of Work and the NEWGEN Project Management Plan.

Table C.2. NEWGEN Compliance Schedule

 NEWGEN - NEPA Compliance Schedule		Duration (Months)	2017				2018	
			Q3	Q4	Q1	Q2	Q3	Q4
Phase 2A		84						
2A-4 NEPA and Permitting		84						
2A-4.01	Environmental Information Volume	84	[Green bar]					
Phase 2B		236						
2B-4 NEPA and Permitting		236						
2B-4.01	Project Initiation	0			◆			
2B-4.02	Agency Coordination and Meetings	0			◆			
2B-4.03	Project Definition	21			[Green bar]			
2B-4.04	NOI Preparation	44			[Green bar]			
2B-4.05	BLM Scoping Letter and Comment Period	44				[Green bar]		
2B-4.06	Field Studies and Baseline Data Collection	118				[Green bar]		
2B-4.07	Prepare Draft EA	107				[Green bar]		
2B-4.08	Public Review Period	32					[Green bar]	
2B-4.09	Response to Comments/Final EA	32					[Green bar]	
2B-4.10	Decision Record	0						◆
2B-4.D1	Complete Required Permitting Documents (EA)	0						◆

Upon completion of NEPA, the specific environmental approvals as discussed above will be obtained.