Task 1.3.4 Communications and Outreach Plan

A comprehensive plan will be developed for communications, education and outreach across the site management team, DOE, and outside stakeholders, noting the communication method, a description of the intended audience, information and material content conveyed, and the frequency of the activities. The plan will include details regarding operating the project website (with links to the data node at EGI), generating public information material and press releases, coordinating meetings, and site visits. The plan will also include the approach and lines of communication for conflict resolution with external stakeholders. The plan will describe how the Recipient will coordinate with other ongoing key communications, education, and outreach efforts supported by DOE outside of the scope of this project. The plan will address workforce development through engaging students and educators (K-12 and higher education) onsite and in the classroom regarding EGS science and technology.

Introduction

The Utah FORGE project will advance geothermal energy EGS technologies. Its success is linked to strong and effective communication to the general public and the broader scientific/engineering community of progress and of basic knowledge and benefits regarding geothermal energy This Communications and Outreach Plan describes the approaches that will be undertaken to provide the FORGE team, the DOE, the general public, and outside stakeholders including landowners, regulators, and scientists with information on FORGE activities in a timely, transparent, easily accessible, and appropriate manner.

We will employ a variety of approaches to target specific audiences including: (1) websites; (2) social media (e.g., Facebook); (3) scientific and educational conferences; (4) distributed databases (National Geothermal Data System (NGDS); Geothermal Data Repository (GDR)); (5) K-12 lectures, educational tools and contests; (6) field trips; (7) press releases; (8) booths, exhibits, and presentations at science fairs and competitions; (9) participation by students and teachers from the local and regional schools; and (10) graduate student scholarships. The team will keep the DOE informed through scheduled frequent conference calls.

Stakeholders

The Utah FORGE laboratory site is located within the Milford renewable energy corridor that is host to two geothermal plants, a solar and wind farm and a biogas facility. Stakeholders within the energy corridor include private, state and federal landowners, private developers, the local community and state and federal agencies. Other stakeholders include federal and state laboratories, universities, R&D performers, oil & gas and geothermal companies, service organizations and independent contractors. Table 1 lists representative organizations from each of these categories

Website

Information on the Utah FORGE team and its activities can be obtained from our website at www.forgeutah.com. In addition, the website contains descriptions and attributes of the site, links to the DOE, Energy & Geoscience Institute (EGI), Utah Geological Survey (UGS),

Table 1. Representative stakeholder and partner organizations in addition to the DOE.

Private Developers
Cyrq Energy
PacifiCorp (Blundell geothermal plant)
SunEdison (solar and wind)
Blue Mountain Biogas

Property Owners
Murphy Brown LLC
Utah School and Institutional Trust Land Administration (SITLA)
Bureau of Land Management
Unitarian Universalist Service Committee
Toni and Pat Rule
Ft. Churchill Corp.
Federal and state landholders

Federal and State Laboratories
Idaho National Laboratory
USGS
UGS

Universities
University of Utah
Oklahoma University

Regulatory Agencies
Bureau of Land Management
Utah Division of Environmental Quality
Utah State Engineer
State Historic Preservation Office (SHPO)

Interested Public
City of Milford
Beaver County Commissioners
Utah Office of Energy Development
Scientific Community

Oil and Gas Industry
Casa Exploration
ENI
Halliburton
Schlumberger

University of Utah Seismic Stations and the NGDS websites, outreach activities, and recent news on EGS. The website has been fully operational since February 8, 2015.

Communications and Outreach Contacts

All participants in the FORGE project are expected to contribute to communications and outreach activities as requested by the project management team (PMT) or the DOE. Dr. Joseph Moore, Managing Principal Investigator (PI), will oversee communication and outreach activities and serve as the contact point with the DOE. The PI will be supported by Ms. Gosia Skowron, EGI Project Administrator; Mr. Lance Weaver, Website Administrator; Mr. Mark Milligan, Outreach Coordinator and main point of contact for public outreach activities; and Dr. Greg Nash, Data Manager. Figure 1 shows the management structure and the relationships between the PMT, support personnel, communications, and data management. Contact information is provided in Appendix 1. Additional information is contained within the Project Management Plan (PMP).

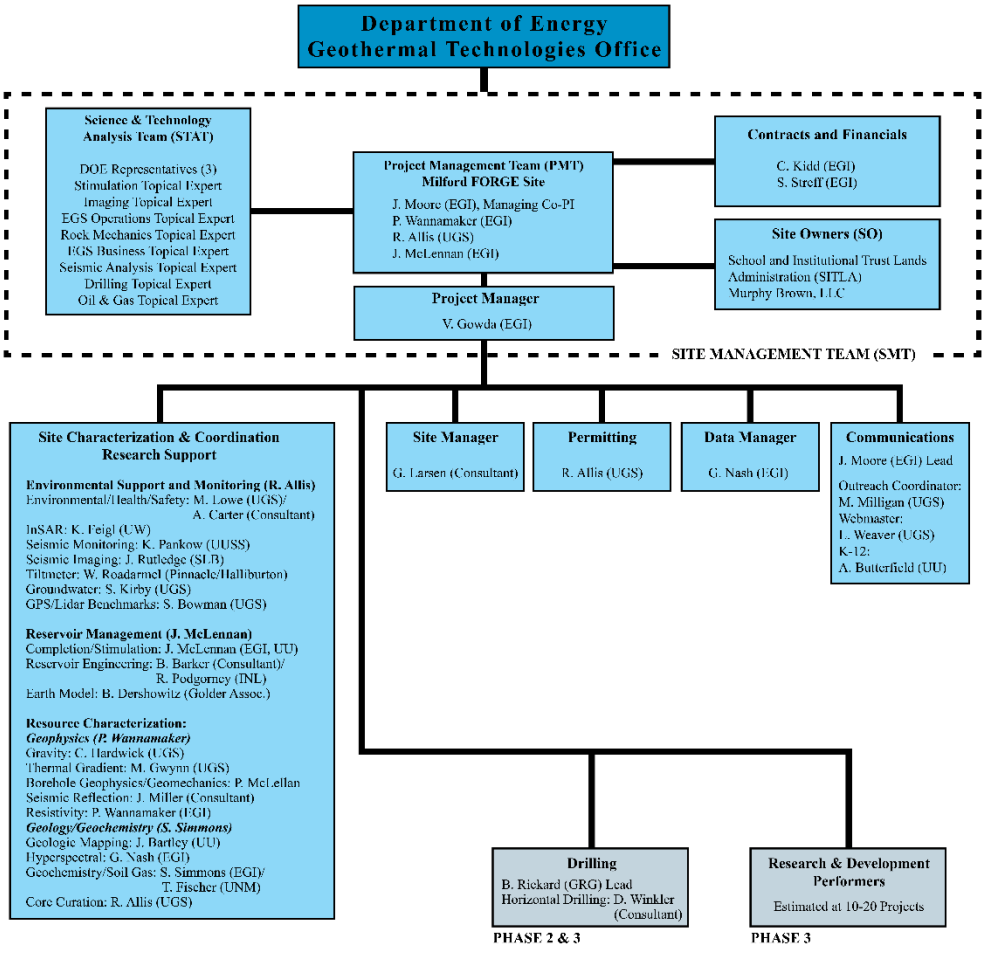

Figure 1: *Project organization.*

The website administrator will manage the website and ensure that it is up to date. He will work closely with the outreach coordinator to provide the public with current information on the Utah

FORGE project and links to other geothermal information of public interest. The outreach coordinator will seek out opportunities to highlight activities on the Utah FORGE project as well as on other pertinent geothermal activities. He will serve as a primary contact with the public and will work closely with the website administrator. The data manager will be responsible for management of the NGDS nodes and ensuring all technical information is collected and uploaded to the NGDS or Geothermal Data Repository (GDR) as prescribed by the DOE in a timely manner.

Communication Protocols

Good communications are essential for promoting cost-effective research and avoiding duplication of effort and conflicts. This section describes the protocols to be followed for communications with: (1) project members; (2) the public and stakeholders; (3) the DOE; and (4) external researchers funded under the FORGE project.

1. *Internal Communication Among Project Members:*
    a. A web-based data repository has been established for sharing and reviewing data, material, reports, and support documents by project participants. The Managing PI can authorize access to the repository.
    b. The Project Manager will prepare monthly briefings for the PMT team. These briefings will be augmented by individual researchers as requested by the PMT.
    c. The co-PIs will meet at least monthly with their team to review progress and discuss potential issues, schedules, budgets and conflicts.
    d. The Project Manager, in collaboration with the managing PI will compile individual reports prepared by team participants for the DOE quarterly reports. The reports will be approved by the managing PI and will be made available to all project participants through the web based data repository.
    e. Team participants will meet at least twice a year to discuss progress, review plans and conduct field visits.

2. *Communications with the Public*

    Our goal is to substantially improve knowledge, understanding and appreciation of new geothermal energy technologies for the benefit of the public, state and federal legislatures, and agencies that manage public lands and resources. This will have a strong positive effect on the Utah FORGE project, FORGE researchers, their organizations and the DOE. The value of outreach activities and participation from the entire team cannot be overemphasized. The following activities will be conducted as part of the Communications and Outreach Program.

    a. Press Releases: To ensure quality, press releases shall be submitted and reviewed by the outreach coordinator and managing co-PI for approval by the PMT. PMT approval is required before the material is released. The managing PI shall provide the Geothermal Technologies Office (GTO) a courtesy copy of all press release materials for review. GTO comments and edits will be carefully considered prior to release.
    b. Social Media: A variety of social media, such as Facebook, will be utilized to provide information on Utah FORGE activities. Mr. Mark Milligan will serve as

the outreach coordinator and will manage these accounts. He will apprise the PMT at least on a monthly basis. Team members may defer any media contacts to the outreach coordinator.

c. FORGE Website: The website will be maintained by the website administrator, Mr. Lance Weaver. The website administrator will work with the managing PI to ensure that the information on the website is current.
d. Scientific Publications: All researchers will be expected to present their findings at scientific conferences. These conferences will include those that target the geothermal community (e.g., Geothermal Resources Council, Stanford Geothermal Workshop, and New Zealand Geothermal Workshop), as well as conferences of interest to the broader geoscientific community (e.g., American Geophysical Union, Geological Society of America). All materials to be published shall be reviewed by one independent (separate from authors) reviewer and approved by the respective managing co-PI.
e. Branding: All PowerPoint materials, printed and digital, shall include, at a minimum the Utah FORGE logo and an acknowledgement of DOE funding.
f. Public Forums: Numerous opportunities exist each year to reach out to the general public, legislators, and regulators such as local and regional science fairs and energy conferences. The outreach coordinator will solicit, identify, prioritize, and recommend public forums that provide opportunities to discuss the Utah FORGE project and geothermal energy. Recommendations for participation will be presented to the PMT for approval.
g. Data Dissemination: EGI will host all data and reports generated by the project. Data generated prior to Phase 2C will be available through the GDR and its links to the NGDS. Data generated during Phases 2C and 3 will be uploaded to our NGDS compatible, data-sharing node. These data can be accessed directly through the NGDS or GDR website. EGI has served as a node on the NGDS for the last several years and is familiar with its operations (Dr. Joseph Moore was co-PI on the NGDS project). Real time seismic data can be accessed via http://www.quake.utah.edu/helicorder/foru_webi.htm. This site will be accessible through a link on the GDR and Utah FORGE website.

Communication with the DOE:

The managing PI will assume responsibility for ensuring that there is open communication between the Utah FORGE team and the DOE. He will serve as the primary contact between the Utah FORGE team and the DOE.

a. The Utah FORGE team will follow the FORGE team's communications guidelines provided by the GTO and will coordinate with other communications, education, and outreach efforts supported by the DOE outside of the scope of FORGE, as requested.
b. Conference Calls: Conference calls with the DOE and their technical monitoring team will be conducted at regularly scheduled intervals established by the DOE project manager. It is anticipated that conference calls will be held at least monthly, and when necessary, or requested by the DOE or Utah FORGE managing PI, conference calls will be held more often. For example, it is anticipated that conference calls will be held at least weekly, when wells are being

drilled. These meetings will provide a useful forum for discussing potential issues and solutions. The managing PI will confer with the DOE prior to the conference calls to ensure that the appropriate team members and researchers are present.

c. Reporting: Periodic, topical, and final reports shall be submitted in accordance with the Federal Assistance Reporting Checklist and its corresponding instructions. All reports will be submitted by the managing PI in a timely fashion following the DOE format. Research and development participants under contract to the Utah FORGE project will be required to follow the same schedules, guidelines, and protocols.
d. Report Dissemination: Unless otherwise instructed, it will be the responsibility of the DOE to provide reports and other written communications to members of the Science and Technology Analysis Team.
e. Science and Technology Analysis Team Reviews: Meetings will be convened twice a year to discuss project results with the DOE and the Science and Technology Analysis Team. The purpose of these meetings will be to: (1) ensure that state-of-the-art techniques from the geothermal and oil and gas industry are being employed: (2) assist in establishing research objectives and developing Funding Opportunity Announcements (FOA) for external project funding; and (3) review proposals submitted under the FOAs. A field trip to the FORGE site will be conducted as part of the meeting.

Communication with DOE Outside of FORGE:

The Utah FORGE team will work closely with the DOE to ensure that we project a single, coherent message regarding the Utah FORGE project, EGS activities, and geothermal energy in general. In addition to working with the DOE FORGE team as outlined under the section "Communications with DOE", the Utah FORGE team will strive to coordinate with DOE on projects outside of the FORGE program.

The Utah FORGE team can coordinate with DOE outreach, education, and communication activities hosted outside the FORGE program in several ways. As a first step, we can work with FORGE project and communication managers to identify key personnel in DOE responsible for these activities. Once the appropriate personnel are identified, we can host a series of webinars to discuss the Utah FORGE team's outreach and education program and the best approaches to support the DOE activities occurring outside the FORGE project. The Utah FORGE team has decades of experience in all phases of geothermal development and can, in addition to providing information on the Utah FORGE project, help the DOE in developing material on conventional geothermal resource development.

Coordination can be maintained through quarterly or, if needed, more frequent webinars and telephone conferences. The meeting schedule will be based on the level of effort requested by the DOE. These meetings will include the DOE FORGE communications managers. Interested individuals outside the Utah FORGE team will be invited to participate in scheduled calls with the DOE.

The Utah FORGE team can provide assistance to the DOE by preparing written material for briefings and outreach activities, participating in briefings and outreach activities, providing

links to its website and social media sites, and sending press releases to and personally contacting local, Utah media outlets.

Student Educational Outreach Activities

The FORGE team recognizes the great value in teaching the advantages of geothermal energy, describing the value of Utah FORGE and EGS projects, and preparing tomorrow's workforce through engaging teachers and students in active, cutting-edge science and technology. We will conduct outreach activities tailored to specific educational levels. Outreach activities will be made available to local and national students. In addition to the activities listed under Communications with the Public, the following activities specifically address student needs.

K-12: The FORGE team will collaborate with the Salt Lake City based National Energy Foundation (NEF; https://nef1.org/) to develop and prepare geothermal educational materials as budget allows in Phase 3. NEF currently has an industry funded initiative preparing natural gas educational materials for elementary school students (roughly 100,000 students reached in 20 states) that may serve as a model. Electronic material will include posters and workbooks that can be downloaded from the website and used as teaching materials for student science classes.

High School: In addition to providing electronic materials to the K-12 sector across the nation, the Utah FORGE team will conduct outreach events throughout the state. Dr. Anthony Butterfield, an Assistant Professor in the Department of Chemical Engineering at the University of Utah, will develop hands-on teaching modules and organize outreach activities for the Utah FORGE project. Dr. Butterfield's has extensive experience in the field of STEM pedagogy research, focusing on the interface between hands-on active learning and simulated systems. For approximately five years, he has managed an outreach team of approximately 20 undergraduates. This team visits over 2,000 K-12 students in their classrooms each year, has active contact with scores of teachers throughout the state, and has developed over 30 K-12 STEM teaching modules for various levels of student sophistication. Each year this team also conducts outreach trips through rural Utah, visiting hundreds of students who would typically be neglected by large universities.

For this work, Dr. Butterfield and his outreach team will develop at least two hands-on teaching modules, which will familiarize students (and the public) with the core engineering principles and goals behind the Utah FORGE project. These modules will include detailed instructions for K-12 educators, along with curricular ties and assessment tools. Modules will be made available online to the public, along with the outreach team's existing collection (http://www.che.utah.edu/outreach/teaching_modules). Dr. Butterfield's team of undergraduate mentors will use their many existing contacts with high school teachers throughout the state and their experience with rural outreach events to execute this project's rural outreach campaign. At least one rural trip will be conducted per year. Furthermore, the developed teaching modules will be used in outreach events throughout the Salt Lake valley year-round and incorporated into at least one of the three summer camps performed by Dr. Butterfield's outreach team each year.

The Utah FORGE team will participate in science fairs to bring students a better understanding of geothermal technologies and concepts. In February, 2015, the Utah FORGE team participated in Utah STEM Fest, a fair dedicated to science, technology, engineering and mathematics.

Students from Milford High School will participate directly in the Utah FORGE project. The Utah FORGE team is coordinating its efforts with Milford High School Principal David Cluff, who is enthusiastic about fostering learning opportunities for his students. Mr. Cluff has agreed to provide space on the high school campus for a ground motion detector and library space for a web-connected monitor so that students and faculty can observe real time seismic activity being recorded by University of Utah Seismic Station seismometers. Lectures and site field trips will be conducted for students. In addition, we will seek opportunities for students to participate in site surveys, data collection, and site monitoring.

Higher Education: The Utah FORGE project will provide many undergraduate and graduate student opportunities, including internships, part time jobs, and thesis research. EGI has a long history of supporting students at the University of Utah and has worked closely with students from many universities around the world. Since its founding in 1975, more than 100 University of Utah students have earned advanced degrees (M.S. and Ph.D) working under researchers from EGI. In addition, DOE-funded projects have supported scores of undergraduate students. These students have conducted research, compiled data, and helped prepare reports. Many have gone on to earn advanced degrees. EGI and the University of Utah have arguably provided more financial and research opportunities to students earning advanced degrees on topics related to geothermal energy than any other institution in the United States.

The EGI-managed Raft River EGS demonstration project supported two Ph.D research projects in Chemical Engineering and Mechanical Engineering, as well as an M.S. project in Chemical Engineering. Phase 1 of the FORGE project is providing support for a geology and geophysics M.S. student. This student is evaluating seismic data collected during the last 20 years in the Utah FORGE project area.

At the University of Utah, project funds will support student research in the Department of Geology and Geophysics, University of Utah Seismic Stations, the Department of Chemical Engineering and the Department of Education. Additional funds will support students and researchers at universities across the country, including Temple University, University of New Mexico and the University of Wisconsin at Madison.

To our knowledge, there are no efforts being undertaken by any organization to evaluate the effectiveness of geothermal outreach activities to different sectors of the public. We believe such information is essential for developing the most effective approaches and materials for communicating the benefits of geothermal energy. The graduate student in education will work toward this goal.

Other Initiatives

The Utah FORGE project proposes to establish a Jules Verne Student Competition for a novel approach to heat extraction from an EGS system. The competition will involve teams from universities across the country.

Conflict Resolution with External Stakeholders:

Conflict resolution will be the responsibility of the PMT. In this section, we consider conflict resolution with external stakeholders (e.g. landowners). Conflict resolution with R&D performers and contractors will be explicitly considered within the provisions set forth in the

contracts. If an amicable resolution cannot be reached, the dispute will be referred to University of Utah Legal Services.

The PMT will make every effort possible to avoid conflicts with external stakeholders but recognizes that conflicts may occur. Any issues that are raised will be taken seriously and be given immediate attention. We are keenly aware of the fact that many conflicts arise as a result of poor communication. In order to avoid these conflicts, the Utah FORGE team has met with the local landowners, the high school principal, and community, state and federal officials to discuss the activities that will be conducted as part of the project. In December, the landowners and regulators participated in a field trip of the site to better understand the breadth and extent of the project. All are supportive of the project. Letters of support are included in the proposal.

Nevertheless, we recognize conflicts can arise. The following steps will be taken to avoid and resolve conflicts:

a. The Utah FORGE team will hold scheduled meetings in Milford to discuss the project and hear any concerns that may have developed. The team will review existing and newly collected baseline data so that the public can understand the natural state and behavior of the region. Meeting notes will be posted on the Utah FORGE website.
b. The Utah FORGE team will establish a regional monitoring program to track and characterize microseismicity, ground motions, water chemistry and depth to the water table. The data will be made available to the public on a real time basis via the website.
c. The Managing PI's contact information will be available at the Utah FORGE field office and provided to local landowners so that he can be reached if concerns do develop.
d. Site staff will immediately inform the Managing PI of any potential conflicts, whether or not they have been transmitted to the Managing PI by a third party. The complaints will be logged and documented.

The Managing PI will immediately review the complaint. If there is a possibility of damage to personnel or property, the Managing PI will immediately halt project activities without discussion with the PMT and DOE Project Manager. If safety is not an issue, the Managing PI will review the complaint with the PMT and DOE Project Manager. Efforts will be made to resolve the conflict amicably and in a timely manner. If the issue cannot be resolved, the Managing PI, with concurrence from the DOE, will review the issue with Legal Services