

DOE-ID-NEPA CX DETERMINATION IDAHO NATIONAL LABORATORY

SECTION A. Project Title: American Recovery and Reinvestment Act (ARRA) Reactive Tracers.

SECTION B. Project Description

The American Recovery and Reinvestment Act (ARRA) Reactive Tracers project will be conducted at both the Raft River hydrothermal site in South Central Idaho and at the INL Research Center in Idaho Falls. The purpose of this work is to characterize tracers and test these tracers at the Raft River project through use of tracers and methods under realistic conditions. INL researchers will use an existing commercial hydrothermal site at Raft River that is currently operated by U.S. Geothermal, Inc. (USG), with whom INL has established a Cooperative Research and Development Agreement (CRADA) partnership. Numerous wells have previously been completed at Raft River by the United States Geological Survey (USGS) in non-INL related work and successful tracer tests have been conducted at the site.

TRACER PROPERTIES:

Tracers can be either conservative or undergo thermal degradation and they may be soluble in the aqueous phase or exist as colloids. The working temperature range at Raft River is approximately 100-170 degrees C, with the temperatures likely to be encountered during the tracer test being around 140 degrees C. Many of the tracers characterized by Adams et al. (1992) will not react at these temperatures and can be used as conservative tracers (e.g., naphthalene sulfonates, fluorescein or other dyes). Amides (e.g., acetamide, butyramide) characterized by Robinson and Tester (1990) are candidates for thermally degrading tracers. Esters characterized by the same authors are too reactive for use in this system. Colloids (particles <10um in diameter) under consideration include iron and polystyrene. Others may be identified in the future and will be presented to USG for deployment as a tracer as part of continued work under this EC.

Any tracer under consideration must be sufficiently soluble (or in the case of particles, abundant) to withstand approximately 1E+5 to 1E+6 dilution and still be detectable by the analytical technique employed. The 2008 Raft River tracer test conducted by U.S. Geothermal and modeled by Richard Holt suggests that injection of a conservative tracer into RRG-5 was accompanied by a dilution factor of approximately 2E+5.

PREPARATION:

Tracers will be received at INL from the manufacturer. Tracers may be mixed in water tanks at INL and transported as solutions to Raft River, or transported to Raft River in solid form and mixed with reservoir brines at Raft River.

INJECTION:

Tracers will be injected into RRG-5. INL will supply the tracers to be injected, tanks for mixing tracers and pumps to pump tracer into wells while USG will perform the actual injection. INL personnel will be present to observe the injection process and will assist USG as directed. INL will record necessary information to interpret the tracer study such as concentration of tracer, quantity injected, duration of injection, quantity of water injected following tracer injection, depth of injection, temperature of injected fluids, flow rates, etc. INL will collect samples of the tracers prior to injection to verify concentration, temperature, and pH.

SAMPLING:

USG personnel will be responsible for collecting samples. INL personnel will assist USG personnel as directed during sampling when INL personnel are on site. Samples of the tracer will be collected just prior to injection.

Following tracer injection, samples will be collected from production wells RRG-4 and RRG-1 at a frequency of four times per day for fourteen days, then twice per day for seven days. We then anticipate performing a second injection at week 4, and the sampling frequency returning to four times per day for fourteen days, and twice a day for the next seven days. Frequency will then drop to once per day for the duration of the test. Injectate water will be sampled twice a week to determine the amount of tracer that is circulated back into the reservoir. We expect the sampling period to extend 10 weeks beyond the last tracer injection (approximately 14 weeks total). Sample collection intervals are approximate and are subject to change. USG will make every effort to collect samples, however INL recognizes that operation of the Raft River geothermal plant takes precedence over the collection of the water samples.

INL will provide materials necessary for sample collection including bottles, filter apparatus, preservative, coolers, and thermometers. USG will provide the hardware attached to the wells needed to collect samples. Modifications to the sampling ports at the wells will be done by USG personnel.

ANALYSIS:

INL will analyze samples for tracer concentrations and other relevant constituents.

SAFETY AND HEALTH:

USG will provide INL with a copy of its safety and health plan. INL will work under requirements of this plan while on-site. INL will supply its workers with required personal protective equipment and pay for any required training not provided by USG.

LABOR:

INL will provide materials, equipment, tracers, and labor to mix tracers. USG will connect INL injection equipment to the injection well, perform tracer injections, and collect samples. INL will provide labor to collect pH measurements. USG will provide a pipefitter, if necessary, to provide proper connections to the wells for pH measurements.

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APPROXIMATE SCHEDULE AND TASKS:

INL will work with USG to plan the injection to include determining the proper quantities of tracer to inject. These calculations will be complete approximately one month before the anticipated injection. Approximate total number of samples collected will be 58 per week for 4 weeks, 30 per week for 2 weeks, then 16 per week for up to 7 weeks, plus 3 of each tracer injectate concentrate for a total of 464 samples. Approximate total number of pH sampling events: 5 over the 14 week test period at RRG-4 and RRG-1.

In summary - the only work activities that will take place at the INL will be mixing tracer solutions and analyzing water samples taken at Raft River.

SECTION C. Environmental Aspects / Potential Sources of Impact:

Discharges to Surface-, Storm-, or Ground Water - Tracer materials will be injected into the Raft River geothermal reservoir for the purpose of tracking water flow dynamics and to characterize the reservoir cooling. Injection will comply with Idaho regulations under permits owned and controlled by the CRADA partner.

Generating and Managing Waste - Industrial waste will be generated at both the INL and Raft River locations. While not anticipated, hazardous waste could be generated during laboratory analyses. Liquid sample waste will be discharged from the IRC to the Idaho Falls sewer system. All INL-generated Solid and Hazardous waste will be managed by Waste Generator Services (WGS). Industrial waste generated at Raft River will be managed by the CRADA partner.

SECTION D. Determine the Level of Environmental Review (or Documentation) and Reference(s): Identify the level of applicable categorical exclusion from 10 CFR 1021, Appendix B, give the appropriate justification, and the approval date.

Note: For Categorical Exclusions (CXs) the proposed action must not: 1) threaten a violation of applicable statutory, regulatory, or permit requirements for environmental, safety, and health, including requirements of DOE orders; 2) require siting and construction or major expansion of waste storage, disposal, recovery, or treatment facilities; 3) disturb hazardous substances, pollutants, contaminants, or CERCLA-excluded petroleum and natural gas products that pre-exist in the environment such that there would be uncontrolled or unpermitted releases; 4) adversely affect environmentally sensitive resources. In addition, no extraordinary circumstances related to the proposal exist which would affect the significance of the action, and the action is not "connected" nor "related" (40 CFR 1508.25(a)(1) and (2), respectively) to other actions with potentially or cumulatively significant impacts.

References: The activities performed by INL personnel at the Raft River hydrothermal site are covered under 10 CFR 1021, Appendix B to Subpart D, categorical exclusion B3.6 'small scale research and development projects'... The R&D activities, at the IRC, identified in this EC are covered by overarching EC INL-07-013 'Research and Development Work at In-Town Locations' that references the categorical exclusion, B3.6.

Justification: The proposed R&D activity, at the IRC, involving lab analysis falls within the scope of the overarching EC, with similar environmental aspects and work activities. In addition, the potential environmental impacts do not exceed those addressed in the overarching document. The activity meets the purpose and need of the overarching EC and the potential impacts are within those already analyzed in the overarching EC.

Is the project funded by the American Recovery and Reinvestment Act of 2009 (Recovery Act) Yes No

Approved by Jack Depperschmidt, DOE-ID NEPA Compliance Officer on 2/23/2010