

# DOE-ID NEPA CX DETERMINATION

## Idaho National Laboratory

### SECTION A. Project Title: Seismic Monitoring for Seismic Hazards Analyses

### SECTION B. Project Description:

The Idaho National Laboratory (INL) Probabilistic Seismic Hazards Analysis (PSHA) Phase I – Data Collection and Evaluation project is being conducted by Battelle Energy Alliance (BEA) at the request of the U.S. Department of Energy Idaho Operations office (DOE-ID) and INL Management. The project is being conducted from FY-2013 to FY-2017. Earthquake data will be collected at seismic stations located near INL facility areas for at least two years using seismometers and for the long-term using accelerometers. Installation of the seismic stations is being funded by the INL PSHA - Data Collection and Evaluation project and, following completion of this project, long-term maintenance of the seismic station will be funded as part of BEA's annually funded INL Seismic Monitoring Program. The earthquake recordings provide waveform data containing site-specific information of earthquake source, path attenuation, and site response that will be used to calculate ground motion model parameters and their sigma. These data will be used to assess seismic hazard design levels for INL facilities.

This project will be conducted in three phases. Phase 1 activities are independent of whether or not Phase 2 or 3 are performed. The project would like to measure seismic velocities using the techniques in Phase 2 and 3 near the seismic station sites. Any possible impacts to known cultural and biological resources for the proposed locations of Phase 2 and 3 should be identified to the project, however, field clearances will not be performed for Phase 2 and 3 locations until funding is available in future fiscal years. This environmental checklist (EC) will be reviewed and revised if needed, prior to completion of phases 2 and 3. The project will make every effort to use existing roads and minimize ground disturbance.

#### Phase 1

The first phase (FY-2013) of the project will consist of constructing and operating the seismic stations. A total of five seismic stations will be installed in FY-2013 outside, but adjacent to, fenced INL facility areas (see attached maps), including the Advanced Test Reactor (ATR) (Figure 1), Idaho Nuclear Technology and Engineering Center (INTEC) (Figure 2), Materials and Fuels Complex (MFC) (Figure 3), Naval Reactors Facility (NRF) (Figure 4), and at the INEL-1 borehole (Figure 5). Each seismic station location has been chosen to allow other nearby data collection efforts in FY-2014 to FY-2016 that include measuring velocities in nearby boreholes and acquiring seismic data along three to six 1968 ft (600 m) orthogonally oriented lines. Also, each was chosen to avoid known locations of surface and subsurface contamination, and to reduce manmade vibrations (such as vehicle traffic). The seismic stations will be located adjacent to existing roads to the extent practicable. The installation of each seismic station will require disturbance to soils and will consist of the following instrumentation and infrastructure:

- A small concrete pad (approximately 3 x 3 x 3 ft) to support a 10 ft high antenna tower, which may be attached to three guide wires
- One solar panel and one antenna attached to the tower
- Seismic instrumentation that includes a NetDAS and Quanterra Q330 digital recording systems
- Cellular modem (1.0 Watts or less) radios that transmit digital seismic signals continuously to satellites
- A 3 x 3 x 3 ft fiberglass box buried in the ground adjacent to the tower to house two or more sealed 12 volt, 100 amp/hr Gel Cell batteries
- A three-component Nanometrics Trillium T120-PA broadband seismometer and a three-component Applied MEMS SiFlex SF2500 tri-axial accelerometer
- A 4 ft diameter, 2 ft high enclosure (metal, concrete, or plastic) set in the shallow subsurface (< 3 ft depth) and covered by a lid and native soils overtop, which will house the seismometer and accelerometer
- ~12 x 12 ft area fence to enclose the seismic station and prevent vehicles from driving over the sensors.

#### Phase 2

The project is proposing to perform seismic surveys called Spectral Analysis of Surface Waves (or SASW) to collect velocity data in the top 1312 ft (or 400 m) of the subsurface basalt and sediment layers. In FY-2014, a test of the SASW approach using four array lines is planned for the west side of MFC. The results of this test will determine whether or not SASW can be used at INL and how many array lines are necessary to collect velocity data to the target depth of 1312 ft. Based on an evaluation of SASW results from other non-INL sites with similar geology, the project proposes a minimum of three array lines for a location east of MFC and two locations at each of the ATR Complex, INTEC, NRF, and at the INEL-1 borehole (see maps). These remaining surveys are planned for FY-2015 and FY-2016. Prior to the test in FY-2014 and the other surveys, required field clearances for cultural and biological resources will be performed and funded per its planned fiscal year. This EC will be reviewed and revised, as needed, prior to completion of this phase of the project.

The SASW array line lengths will be up to 1968 ft (or 600 m) to allow a maximum profile depth of 1312 ft. Cable will be laid on top of ground and will not be buried. Up to six standard, 1-Hz vertical seismometers will be used to acquire the SASW data along the array lines. The spacing between seismometers will change for the three types of sources that will be used: sledgehammer and two vibroseis trucks (or a truck mounted vibrator plate that couples to the ground surface). For easy installation and removal, the seismometers will be buried in shallow holes (<1 ft deep and <1 ft diameter) excavated with a shovel or hand auger. Each array line will use a sledgehammer source with receivers spaced along a length of 26 ft. A vibroseis truck called T-Rex (64,000 lbs weight; vibrates the ground at frequencies 12-180 Hz) will be used with receivers spaced along a length of 330 ft. Another vibroseis truck called Liquidator (70,000 lbs weight; vibrates the ground to lower frequencies 1.3-100 Hz) will be used with receivers spaced along a length of 984 ft. The receiver line arrays for each of the sources will overlap. The source trucks will be placed at one end of the line for entire test of each individual line. Existing roads will be utilized where possible for SASW lines and to access a single location for the Seismic source

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truck. A pickup truck will be used to lay down and pickup cable along each designated line. Each array line with all of its receiver configurations and source locations will be surveyed one time.

The azimuths of the SASW array lines should be oriented parallel and perpendicular to the basalt lava flow directions. However, the project has attempted to place the array lines along existing two-track dirt roads where available at the proposed SASW locations. The vibroseis trucks will not be used on paved roads. Some of the project's proposed locations may require new two-track roads and a turn-around point for the vibroseis trucks to return along the same two-track road back to an existing road. In FY-2014, the project plans to have the SASW vendor visit the test location west of MFC and all other proposed SASW locations at INL to evaluate and determine the final locations for SASW array lines.

### Phase 3

The project is proposing to measure seismic velocities using two different seismic borehole techniques in two boreholes at the ATR Complex, INTEC, and NRF facility areas, and in one borehole at MFC. To make the measurements, five new boreholes will be drilled to depths of 1312 ft (or 400 m) and, if possible, two existing boreholes will be deepened to 1312 ft. If an assessment of the the existing well (USGS-074 at ATR Complex) in FY-2015 determines that it cannot be used (hole collapse or obstructions), then the project plans to drill a new well nearby to the location. The drilling and seismic measurements are planned for FY-2014 through FY-2016 with drilling of one borehole starting in FY-2014. It is possible that parallel drilling activities could take place depending on different funding sources such as BEA, Naval Reactors, and CWI. Clearances for cultural and biological resources will be performed and funded per its planned fiscal year and source. The drilling sites have been located near existing roads to allow a short two-track road to its location. This EC will be reviewed and revised, as needed, prior to conducting any activities associated with phase 3.

Drilling activities will disturb a surface area of 200 feet in diameter, but the area surveyed will include 600 ft in diameter around the proposed borehole. Ground disturbance will be minimized to the maximum extent practical. The boreholes will be drilled using air rotary drilling and will be cored to identify the depths and thicknesses of basalt and sediment layers to the depth of 1312 ft. The borehole will be drilled and measured in sections. Each borehole section will be cased with <3 inch plastic, schedule 40 PVC (Polyvinyl Chloride) using grout that has a sufficient cement and bentonite mixture to allow proper grout expansion and coupling of the casing to the formation. A plastic PVC casing must be used so as not to interfere with the seismometers (or geophones) and compass used for orientation of the sensors. The design and installation of the PVC casing will have to conform to the requirements specified in Subsection 025.04.b of IDAPA 37.03.09.

The suspension (S-P) logging and downhole seismic velocity measurement techniques will be used. For S-P logging, the casing will be capped at the bottom-hole depth and then filled with fluid (water or drilling mud). This ensures that the probe is well coupled to the casing and allows effective transmission the seismic signals into and back from the geologic formation. The probe containing the seismic source and receivers (or geophones) is moved to different depths where the source is activated and signals are received on the geophones. Once the section is measured, the hole is drilled deeper and additional casing is set. The S-P logging measurement will be conducted after the downhole measurements. The downhole measurements are made using a surface seismic source while the geophones are lowered to different depths. The surface sources will include a sledgehammer and vibroseis truck (T-Rex or Liquidator, yet to be decided).

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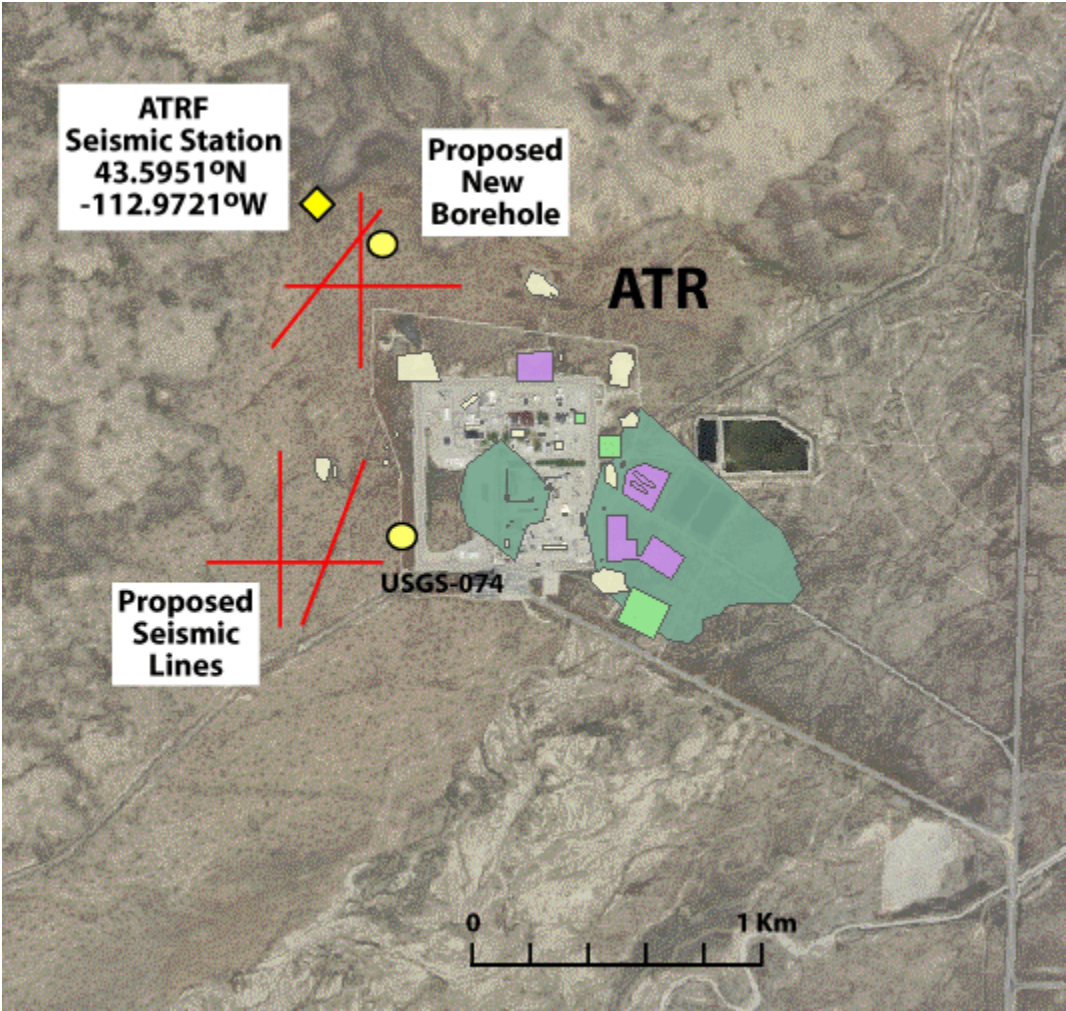


Figure 1. Proposed Location for the ATRF seismic station (yellow diamond). Other proposed locations are shown for six 1,970 ft (600 m) long seismic lines (red lines) proposed for surveys in FY-2015 and two drilling sites (yellow dots), one that is a proposed new location near the ATRF seismic station, and the other at USGS-074 to deepen the existing well. Drilling is proposed at both locations in FY-2014 or FY-2015.

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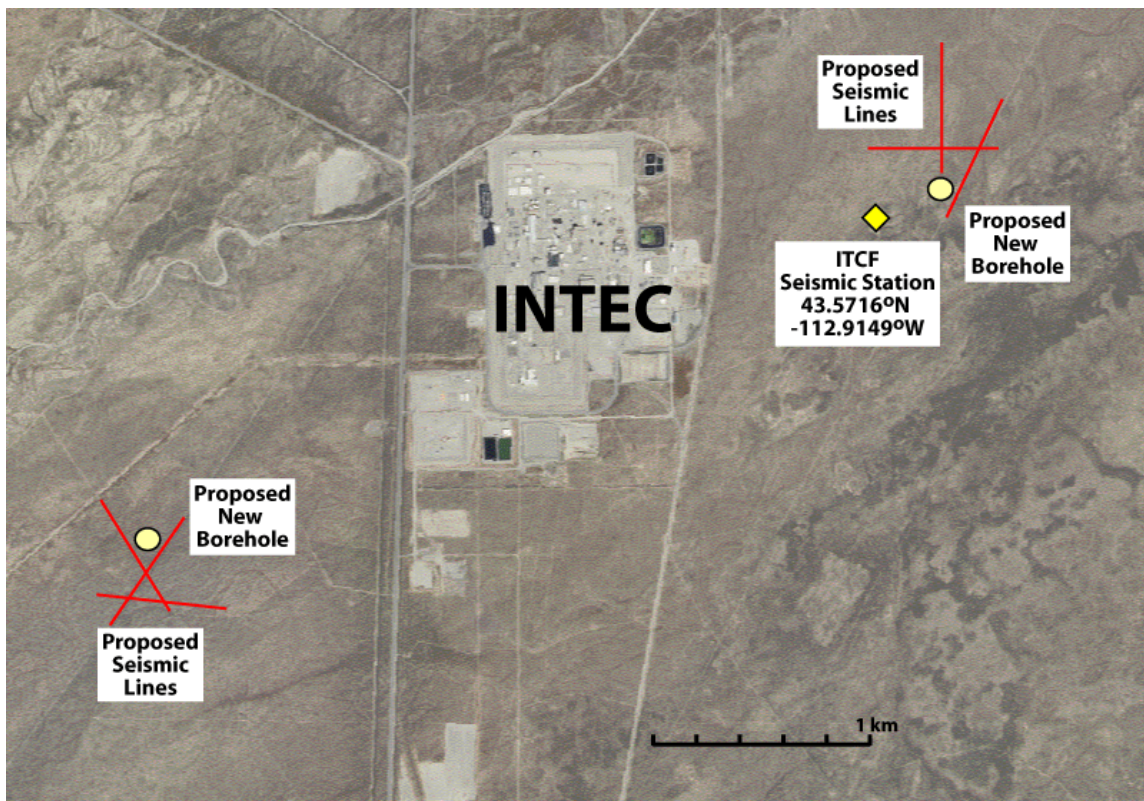


Figure 2. Proposed location for the ITCF seismic station (yellow diamond) east of INTEC. Other proposed locations are shown for six 1,970 ft (600 m) long seismic lines (red lines) proposed for surveys in FY-2015 and two drilling sites (yellow dots). These sites will be located outside existing groundwater contamination zones and outside of the INTEC wellhead protection zone. Drilling is proposed at both locations in FY-2015 or FY-2016.

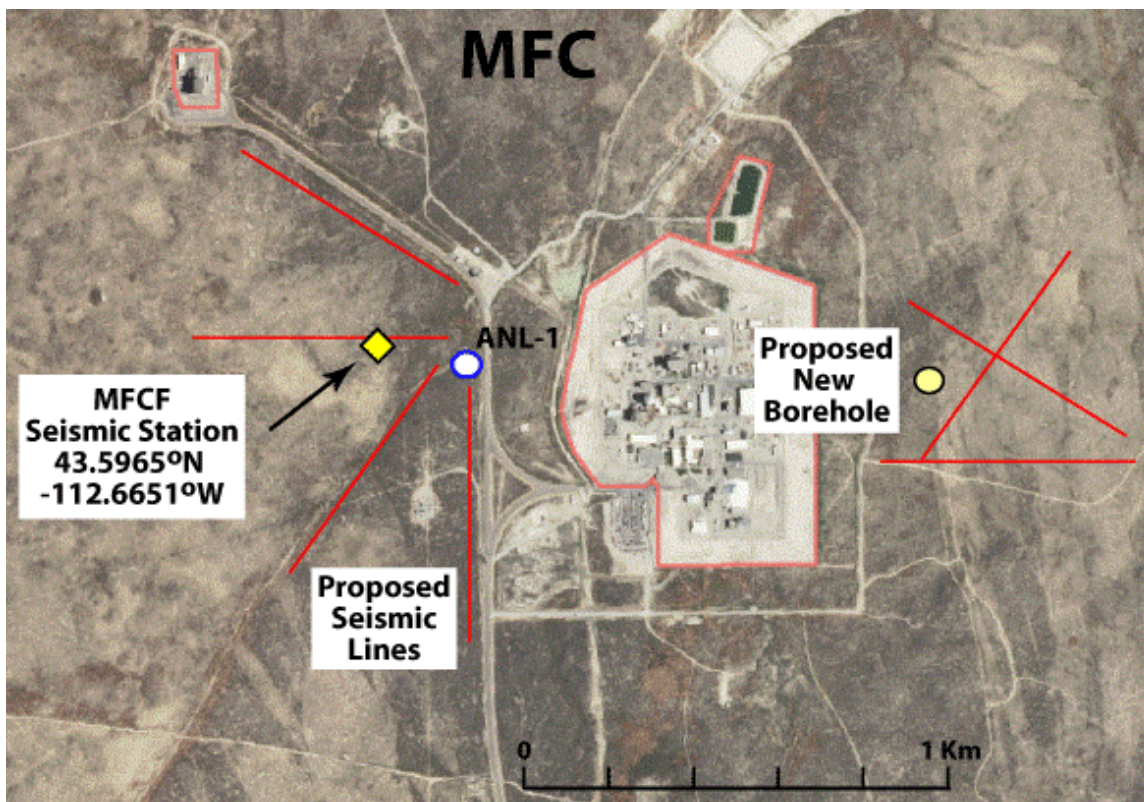


Figure 3. Proposed location for the MFCF seismic station (yellow diamond) west of MFC. Proposed locations are shown for four 1970 ft (600 m) long seismic lines (red lines) west of MFC proposed for surveys in FY-2014. Also shown are proposed locations for a new

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drilling site (yellow dot) in as early as FY-2014 and three 1970 ft (600 m) long seismic lines east of MFC proposed to be surveyed in FY-2015.

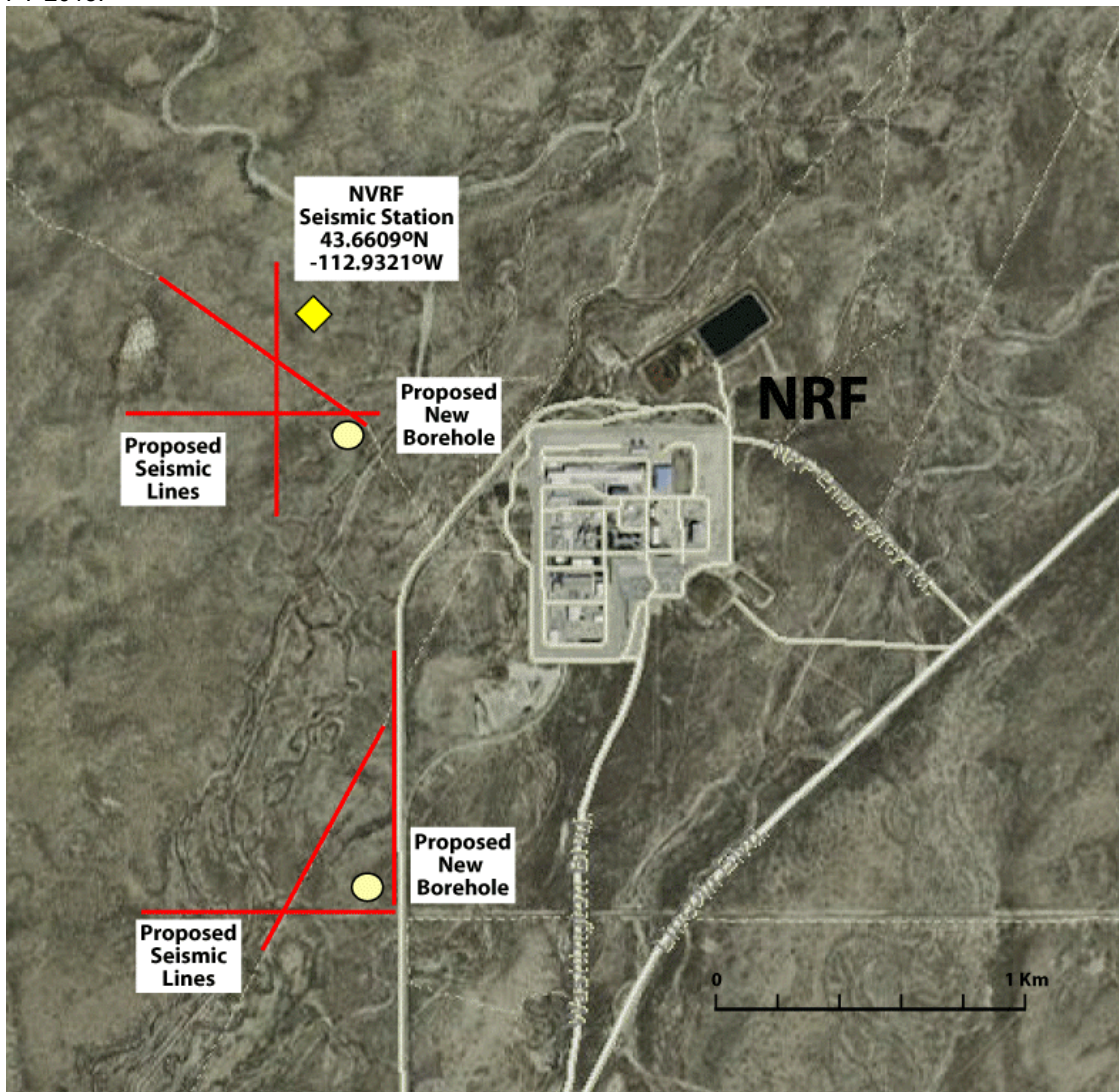


Figure 4. Proposed location for the NVRF seismic station (yellow diamond) north of NRF. Other proposed locations are shown for six 1970 ft (600 m) long seismic lines (red lines) proposed for surveys FY-2015 and two drilling sites (yellow dot), one that is a proposed new location near the NVRF seismic station, and the other south of NRF. Drilling is proposed at both locations in FY-2014 or FY-2015.

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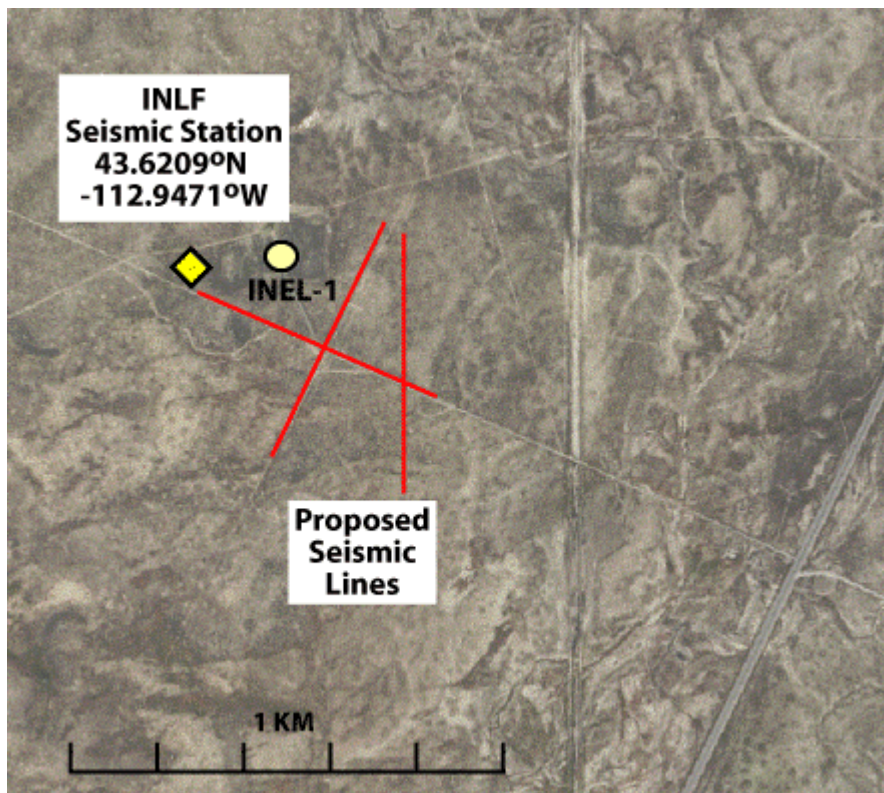


Figure 5. Proposed location for the INLF seismic station (yellow diamond) west of the INEL-1 borehole (yellow dot). Other proposed locations are shown for three 1970 ft (600 m) long seismic lines (red lines) proposed for surveys in FY-2015.

### SECTION C. Environmental Aspects or Potential Sources of Impact:

**Air Emissions** - Fugitive dust may be generated during excavation activities. All reasonable precautions will be taken to prevent particulate from becoming airborne. If dust control methods are required, the date, time, location, and amount/type of suppressant used shall be recorded in the project records. These records will be used to demonstrate compliance with the INL Title V Air Permit. Personnel bringing non-INL owned air emission sources onto the INL (e.g., internal combustion equipment) are responsible for determining if any permitting requirements apply to that equipment and, if necessary, obtaining the permit and maintaining an on-site file of the documentation. This requirement does not apply to mobile equipment (an engine that is connected to a drive train to propel a vehicle).

**Discharging to Surface-, Storm-, or Ground Water** - The seismic station, boreholes and seismic lines proposed near INTEC are within the INL storm water corridor. A notice of intent and storm water pollution prevention plan (SWPPP) will be required to be submitted to EPA if the total area to be disturbed exceeds 1 acre in size. Final stabilization (revegetation, gravel, etc.) will need to be completed and a notice of termination filed in order to close out the SWPPP.

If the buried enclosures (holding the seismometer and accelerometer and the batteries) will have drain systems (e.g.french drain,) they must be evaluated for shallow injection well requirements prior to construction.

Boreholes and modified wells will need to be constructed according to the applicable requirements of IDAPA 37.03.09 Well Construction Standards,

When no longer needed, the boreholes are to be closed in accordance with IDAPA 37.03.09 and/or as agreed upon by the Idaho Department of Water Resources. Prior to decommissioning any of the boreholes, the project needs to contact the USGS and other site contractors to determine if any of these wells can be used for future groundwater monitoring.

The design and installation of PVC casing will have to conform to the requirements specified in Subsection 025.04.b of IDAPA 37.03.09.

**Disturbing Cultural or Biological Resources** - The proposed locations for the seismic stations, boreholes, and seismic lines are outside the previously disturbed facility fenced areas/improved grounds and has the potential to disturb Cultural or Biological resources. Any potential limiting impacts to known cultural and biological resources for the proposed locations of Phase 2 and 3 should be identified to the project, however, field clearances will not be requested or performed for Phase 2 and 3 locations until funding is available in future fiscal years. Brenda Pace (526-0916) with the INL Cultural Resource Management (CRM) office should be contacted early in the planning process to arrange for a cultural resource review and for identification of any potential project restrictions due to

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cultural resource requirements. Jackie Hafla (525-9358) with Gonzales-Stoller Surveillance should be contacted early in the planning process to arrange for a biological resource review and for identification of any potential project restrictions due to biological/ecological requirements. If objects of potential archaeological or historical significance (e.g., arrowheads, flints, bones, etc.) are encountered during project activities, personnel would discontinue disturbance in the area and contact the CRM office [Brenda Pace (526-0916)].

Off-road travel and drilling activities have the potential to remove vegetation and introduce invasive species. Soil disturbance may require revegetation with certified native seed. Soil removal and transportation activities must be reviewed by Jenifer Nordstrom (526-8119). Any travel through weed infestations would require monitoring for spread of weeds and contacting the CFA Weed Maintenance group for control measures per PLN-611.

**Generating and Managing Waste** - The construction portion of the project may generate small amounts of industrial waste such as concrete, scrap metal/wire, packaging material, etc. Hazardous waste is not expected to be generated. Batteries will be used while operating the seismic stations and will need to be replaced on occasion. Waste planning for disposal of any soil waste generated from the CERCLA site near INTEC will need to be coordinated through CERCLA and WGS personnel (ICP). Drill cuttings from the boreholes and wells will also be generated. All waste will be appropriately characterized and disposed at the direction of the facility Waste Generator Services representative. Project personnel will incorporate waste minimization measures and recycling where practical.

**Releasing Contaminants** - Typical construction chemicals such as fuels, lubricants, adhesives, etc. will be used while constructing the seismic stations. Chemicals must be approved for use and entered into the Comply Plus Chemical Management System by the designated Chemical Coordinator. Pesticides/fertilizers may also be used if revegetation becomes necessary. Subcontracted drillers will use chemicals such as fuels and lubricants during drilling operations. The subcontractor will submit chemical inventory lists with associated MSDS's prior to bringing them on site. The Construction Chemical Coordinator will enter these chemicals into the Comply Plus Chemical Management System for tracking and reporting purposes. To minimize the potential impact of contaminant release, project personnel would use non-hazardous chemical substitutes in the place of hazardous chemicals as long as the non-hazardous substitutes meet the requirements/specifications of the requester. Project personnel would apply spill prevention/minimization measures during chemical use and storage and will reference Affirmative Procurement (Management Control Procedure [MCP]-592) as guidance to procure appropriate chemicals.

The proposed seismic station and boreholes near INTEC will be located outside of any existing contamination zones and outside the INTEC wellhead protection zone (see attached maps).

**Using, Reusing, and Conserving Natural Resources** - All applicable waste would be diverted from disposal in the landfill when possible. Project personnel would use every opportunity to recycle, reuse, and recover materials and divert waste from the landfill when possible. The project would practice sustainable acquisition, as appropriate and practicable, by procuring construction materials that are energy efficient, water efficient, are bio-based in content, environmentally preferable, non-ozone depleting, have recycled content, and are non-toxic or less-toxic alternatives.

<p><b>SECTION D. Determine the Recommended Level of Environmental Review (or Documentation) and Reference(s):</b> Identify the applicable categorical exclusion from 10 CFR 1021, Appendix B, give the appropriate justification, and the approval date.</p>
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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, or similar requirements of DOE or Executive Orders; 2) require siting and construction or major expansion of waste storage, disposal, recovery, or treatment or 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) have the potential to cause significant impacts on environmentally sensitive resources (see 10 CFR 1021). 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:** National Environmental Policy Act (NEPA) Implementing Procedures, Final Rule, 10 CFR 1021 Appendix B to Subpart D, Categorical Exclusion B3.1, "Site characterization and environmental monitoring" effective November 14, 2011.

**Justification:** Project activities are consistent with 10 CFR 1021 Appendix B to Subpart D, Categorical Exclusion B3.1. "Site characterization and environmental monitoring (including, but not limited to, siting, construction, modification, operation, and dismantlement and removal or otherwise proper closure (such as of a well) of characterization and monitoring devices, and siting, construction, and associated operation of a small-scale laboratory building or renovation of a room in an existing building for sample analysis). Such activities would be designed in conformance with applicable requirements and use best management practices to limit the potential effects of any resultant ground disturbance. Covered activities include, but are not limited to, site characterization and environmental monitoring under CERCLA and RCRA. (This class of actions excludes activities in aquatic environments. See B3.16 of this appendix for such activities.) Specific activities include, but are not limited to:

(a) Geological, geophysical (such as gravity, magnetic, electrical, seismic, radar, temperature gradient), geochemical, and engineering surveys and mapping, and the establishment of survey marks. Seismic techniques would not include large-scale reflection or refraction testing;

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- (b) Installation and operation of field instruments (such as stream-gauging stations or flow-measuring devices, telemetry systems, geochemical monitoring tools, and geophysical exploration tools);
- (c) Drilling of wells for sampling or monitoring of groundwater or the vadose (unsaturated) zone, well logging, and installation of water-level recording devices in wells;..."

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: 5/13/2013