

DOE-ID NEPA CX DETERMINATION

Idaho National Laboratory

SECTION A. Project Title: Versatile Test Reactor Preconceptual Design Seismic Studies

SECTION B. Project Description and Purpose:

The Versatile Test Reactor (VTR) program has been established to fulfill the DOE-NE Nuclear Energy Advisory Committee (NEAC) recommendation to "...proceed immediately with pre-conceptual design planning activities to support a new test reactor (including cost and schedule estimates)." To support preconceptual design activities and establish seismic design parameters for the VTR, seismic studies are needed. Project Scope includes the following:

1. Construct and operate a permanent seismic station adjacent to the Materials and Fuels Complex (MFC) near the site of the VTR, including a) a small concrete pad (about 3' x 3' x 3') to support a 10-ft high antenna tower, b) a 3' x 3' x 3' metal box set on the surface adjacent to the tower to house two or more sealed 12-volt, 100-amp/hr batteries, and c) a subsurface (<3' depth) covered enclosure (4' diameter by 2' high) to house a seismometer and accelerometer.
2. Perform seismic surveys called Spectral Analysis of Surface Waves (SASW). This will involve laying about 1,312 ft of cable on top of the ground, burying up to 6 seismometers in a hole <1-ft diameter x < 1-ft underground, and vibrating the ground.
3. Drill up to four boreholes into the subsurface to a depth of about 656'. The holes would then be instrumented and the surface would be vibrated to allow the instruments to collect information.

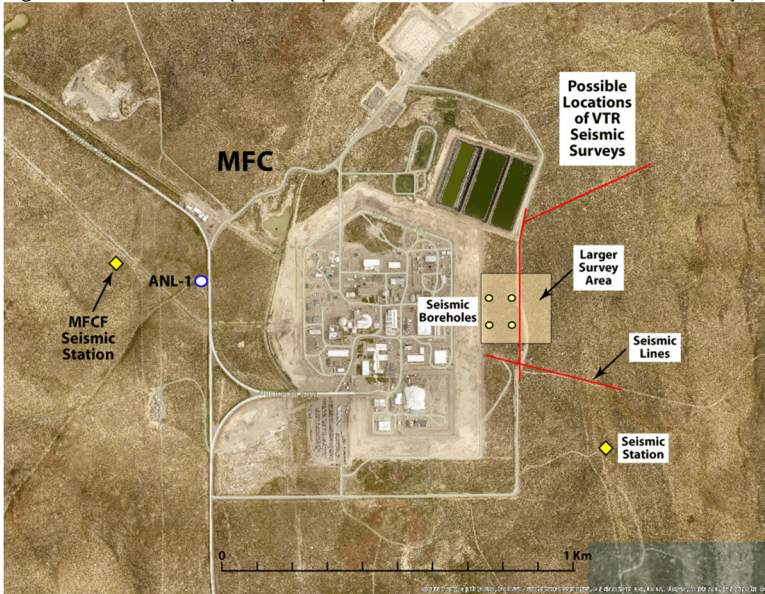
The SASW array line lengths will be up to 1312 ft to allow a maximum profile depth of 650 ft. Cable will be laid on top of the ground and will not be buried. Up to six standard, 1-Hz vertical seismometers will be used to acquire the SASW data along the array lines. The spacing between seismometers will 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' deep and <1' diameter) excavated with a shovel or hand auger. Each array line will use a sledgehammer source with receivers spaced along a length of 26'. 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'. 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'. 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 truck. A pickup truck or ATV 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 at one time.

The azimuths of the SASW array lines will be oriented parallel and perpendicular to the basalt lava flow directions or as much as possible where existing roads permit such orientations. 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. The need for new two-track roads will be minimized as much as possible.

Drilling activities will disturb a surface area commensurate with a size that represents the proposed footprint of the reactor facility. A larger area of up to 650 ft x 650 ft will be surveyed. Ground disturbance will be minimized to the maximum extent practical. Four boreholes will be drilled in a smaller area within the surveyed area using air rotary drilling and will be cored to identify the depths and thicknesses of basalt and sediment layers (if present) to depths of 650 ft. Each borehole will be drilled and cored at a diameter specified by the geophysical vendor for the size of the downhole seismic probe (between 4 and 6 inch diameter). Each borehole will be cased with steel or 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 may need to 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. 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).

Figure 1 shows an example of the possible locations for the VTR seismic surveys, drilling area, and new seismic station.



Before closing the wells, the project will off ownership of the wells to other entities such as the United States Geological Survey (USGS) for future monitoring activities.

Preconceptual design is required before the Department of Energy can determine the feasibility of building a new test reactor. Therefore, activities outside of those needed to complete preconceptual design are beyond the scope of this review. This analysis may be revised if activities are proposed after and based upon the preconceptual design efforts.

SECTION C. Environmental Aspects or Potential Sources of Impact:

Air Emissions

Fugitive dust and emissions from mobile equipment may be generated during excavation activities.

Discharging to Surface-, Storm-, or Ground Water

Drilling boreholes has the potential to impact groundwater.

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 have the potential to disturb Cultural or Biological resources.

Generating and Managing Waste

The seismic investigation 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. 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. Program 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. Pesticides and fertilizers may also be used if revegetation becomes necessary. Although not anticipated, there is a potential for spills when using chemicals or fueling equipment. In the event of a spill, notify facility PEL. If the PEL cannot be contacted, report the release to the Spill Notification Team (208-241-6400). Clean up the spill and turn over spill cleanup materials to WGS.

Using, Reusing, and Conserving Natural Resources

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All applicable waste would be diverted from disposal in the landfill when possible. Program personnel would use every opportunity to recycle, reuse, and recover materials and divert waste from the landfill when possible. The program 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.

SECTION D. Determine Recommended Level of Environmental Review, Identify Reference(s), and State Justification: Identify the applicable categorical exclusion from 10 Code of Federal Regulation (CFR) 1021, Appendix B, give the appropriate justification, and the approval date.

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 Department of Energy (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 Comprehensive Environmental Response, Compensation, and Liability Act (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 that would affect the significance of the action. In addition, the action is not "connected" to other action actions (40 CFR 1508.25(a)(1) and is not related to other actions with individually insignificant but cumulatively significant impacts (40 CFR 1608.27(b)(7)).

References: 10 CFR 1021, Appendix B, B3.1 "Site characterization and environmental monitoring"

Justification: Project activities are consistent with 10 CFR 1021, Appendix B, 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 Resource Conservation and Recovery Act (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, and engineering surveys and mapping, and the establishment of survey marks. Seismic techniques would not include large-scale reflection or refraction testing;
- 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;
- d) Aquifer and underground reservoir response testing; (e) Installation and operation of ambient air monitoring equipment;
- e) Sampling and characterization of water, soil, rock, or contaminants (such as drilling using truck- or mobile-scale equipment, and modification, use, and plugging of boreholes);
- f) Sampling and characterization of water effluents, air emissions, or solid waste streams;
- g) Installation and operation of meteorological towers and associated activities (such as assessment of potential wind energy resources);
- h) Sampling of flora or fauna; and
- i) Archeological, historic, and cultural resource identification in compliance with 36 CFR part 800 and 43 CFR part 7.

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

Approved by Jason Sturm, DOE-ID NEPA Compliance Officer on: 3/10/2018