Bullets for presentations to potential bidders during tours

1. **Subsurface science –** INEEL scientists are developing a range of new technologies, including new geophysical measurements and techniques for the remote subsurface characterization; injectible barriers as in situ treatments for contaminants in the deep subsurface; large scale monitoring networks that can show the effectiveness of remediation technologies applied to contaminated sites through web-based data acquisition system; new numerical modeling methods to accurately predict the fate and transport of contaminants in the subsurface at contaminated sites. These technologies help address the Grand Challenge of subsurface science
   - •Protection of the world's aquifers and ecosystems
   - •Containment of hazardous materials
   - •Improved predictions of contaminant fate and transport
   - •Identification, characterization, and utilization of energy reserves
   - •Accurate interpretation and prediction of processes controlling carbon cycling and sequestration
   - •Energy & Water Nexus

   - The Consortium for Research in the Earth's Subsurface is being organized by INEEL and LBNL to identify and plan research needed to attack "intractable problems" that have eluded solution for the last 100 years.
     i. These intractable problems include enhanced recovery of petroleum from reservoirs; the modeling and characterization of the fate and transport of contaminants in fractured media; the development of ecologically benign mining technologies; etc.

2) **Subsurface geophysics –** INEEL scientists are developing new enhanced geophysical technologies for the remote characterization of subsurface conditions and processes. These includes tools such as a prompt fission neutron probe that can measure the concentration of fissile materials often found as contaminants in wastes disposed at DOE sites to levels approaching 1 nanocurie/gram; a pulsed-neutron gamma probe that can measure the concentration of many elements in situ through inelastic scatter, prompt capture, activation and natural decay processes; and instruments to measure subsurface conditions ahead of the bit in real time while drilling; etc. New field test sites have been developed at the INEEL designed to permit experiments in field conditions with "engineered targets" to simulate relevant buried waste properties.
   i. The development and application of a large scale web-based monitoring system at the 64 acre Gilt Edge Mine repository in South Dakota is a example of a large-scale integrated 600-electrode geophysical sensor system that automatically reports subsurface integrity to regulators, scientists and other interested parties in near-real time from a Super Fund site that has just been remediated with a geo-membrane.

3) **in situ bioremediation –** The INEEL has developed expertise in the application of biogeochemistry to control processes in the subsurface for in situ destruction of organic and inorganic contaminants of concern.

- The first notable application was at the TAN site where a TCE plume, caused by injection of waste into the aquifer, is being destroyed by selectively controlling metabolism of native bacteria.
    - The application of this technology has resulted in an estimated $25M savings compared to a pump-and-treat-system.
    - This technology has been licensed and is now available for commercial applications.
- This research has also resulted in the development of an in situ biogeochemical process the remove Sr from ground water.
    - This process will be demonstrated at full scale at INEEL for application at Hanford and INTEC facility at INEEL.
- Research is underway to determine feasibility of developing a biogeochemical treatment for the Carbon-tetrachloride plume in the aquifer under the RWMC.
- This research is using controlled mesoscale experiments that can replicate coupled biogeochemical processes occurring in the subsurface.