Overview

Surface Geophysical Exploration

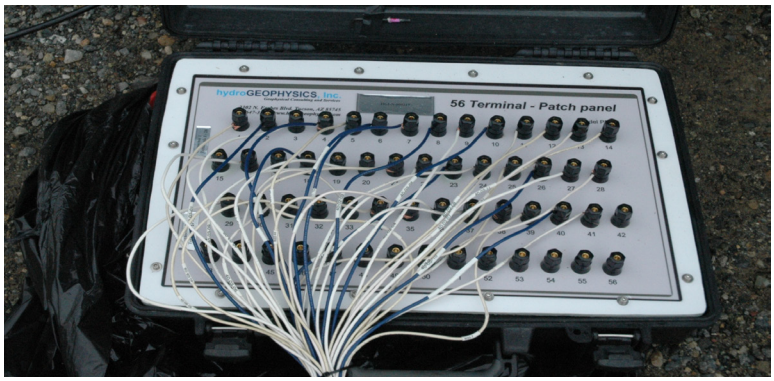
Surface Geophysical Exploration is helping to improve our understanding of the nature and extent of soil contamination beneath Hanford's underground radioactive waste storage tanks. Our goal is to understand the contamination so we can take action to protect human health and the environment.

As many as 67 of Hanford's older, single-shell tanks have leaked as much as a million gallons of liquid waste to the surrounding soil. The waste has moved through the soil and some has reached the water table. Before remediation work can begin we must understand the nature and extent of the contamination so we know where to concentrate our efforts and make the best use of taxpayer dollars. Soil contamination also exists outside tank farms in areas used as liquid waste discharge sites. These areas, too, must be characterized and cleaned up if we are to reduce the risk posed by these contaminants..

Surface Geophysical Exploration, (SGE) is so named because it doesn't require excavation or drilling of holes in the ground, instead it uses the electrical properties of the soil to map potential contamination plumes. Metal probes (electrodes) are inserted in the soil in areas where a contaminant plume is suspected. The probes are connected to a central data collection system. A variation of the technique uses metal casings of existing wells as electrodes alone, and in connection with the probe. Electric current is applied, sequentially to all combinations of probes and well casings, and the resistance of the soil between each electrode is measured. A plume can be identified and its boundaries mapped because soil impacted by waste conducts electrical current better than dry or uncontaminated soil.

SGE is an important addition to our "tool box" of subsurface characterization technologies. Waste is minimized because nothing is brought to the surface as with conventional investigation techniques. Furthermore, since the work is performed on the surface our workers are protected from exposure to subsurface contaminants.

SGE provides a means to precisely target sampling for physical and chemical properties of the vadose zone. As a result, we have expanded our knowledge of the extent of the contamination. With additional work it may be possible to use SGE to learn more about the concentration and distribution of contaminants in the vadose zone. Studies are being conducted to understand the impact of interference from underground piping and other structures buried in the soil. The full impact of Hanford's layered soil formations on SGE interpretations is not fully known. Work in these areas is also continuing.



Electrodes are connected to a central terminal from which waste plume data can be collected.

An array of electrodes is driven into the soil and connected to a central terminal where electricity is applied to measure soil resistance. The data are used to map the location, size and configuration of contaminant plumes in the vadose zone around the tanks.

Contact:
Jerry Holloway, Manager, External Affairs
Washington River Protection Solutions
(509) 372-9953
jerry_n_holloway@rl.gov

http://www.wrpstoc.com/