



TechData Sheet

Naval Facilities Engineering Service Center
Port Hueneme, California 93043-4370



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High-Resolution 3-D Seismic Reflection Surveys

The Naval Facilities Engineering Service Center (NFESC) and the Environmental Security Technology Certification Program (ESTCP) are investigating the use of 3-D seismic reflection (3DSR) surveys to plan remediation at hazardous waste sites.

Seismic reflection has been used for the exploration of oil and gas since the 1970s. Recent advances in instrumentation now enable this technique to be used to explore shallow depths. This geophysical survey method can identify subsurface features such as faults, confining layers, and preferential pathways (Figure 1). This technique works by recording the response to seismic signals introduced at the surface and reflected off of subsurface features.

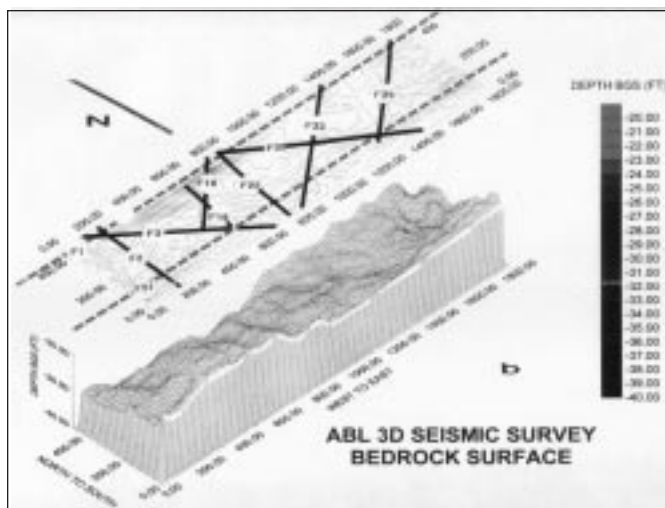


Figure 1. Bedrock layer and fractures.

Seismic Reflection. During a typical 3DSR survey, an array of geophones is laid out in a grid pattern at the surface at 20-foot intervals (Figure 2). Seismic signals are then introduced sequentially at each point of the grid with a hammer and striking plate. The geophones detect the reflected seismic signals and send the data to the central processor. Distinguishing wave patterns and variances in amplitude, frequency, and phase are interpreted to provide a high

resolution 3-D model of the subsurface features. This 3-D model can then be used to identify subsurface regions that are likely to contain contamination.

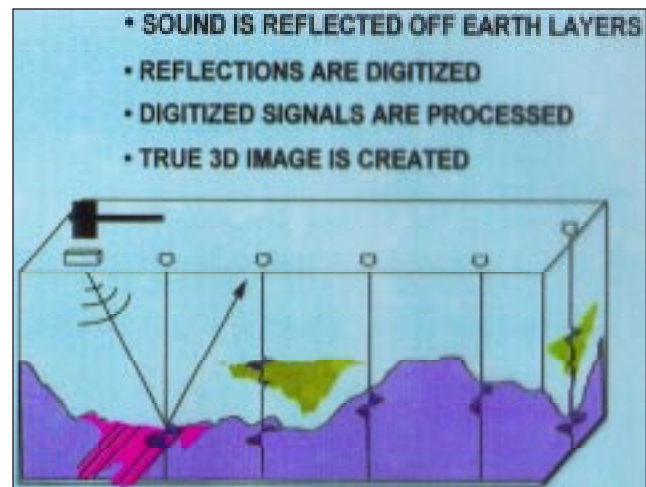


Figure 2. Seismic principles.

Demonstration. Four sites have been selected to test the ability of high-resolution 3DSR surveys to accurately model the subsurface features of hazardous waste sites. These sites are located across the United States and provide a wide variety of subsurface conditions including saturated sediments, sand and shale, Karst, and fractured bedrock. Testing is expected to be completed in the Fall of 1998.

For more information, contact:

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