SMU SEISMOMETER VAULT AND EQUIPMENT FACILITY DESIGN

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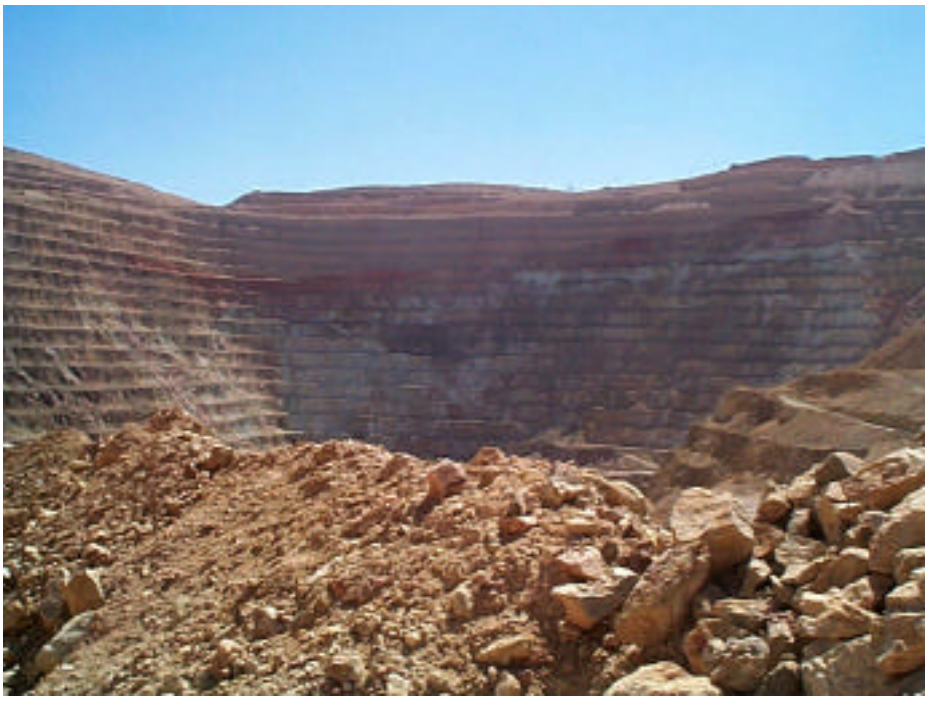

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SUMMARY

As part of the DTRA funded contract no. DSWA01-98-C-0176, the Southern Methodist University Geophysics Laboratory will be conducting close-in and regional seismic and acoustic experiments in the Western United States. Sources for the seismic and acoustic energy will be rock fragmentation explosions at the copper mines in eastern Arizona and western New Mexico. The purpose of this report is to document progress made in the development of a seismometer vault design and accompanying data recording facility for the temporary deployment of the Strickheisen STS-2 broadband seismometer. These temporary deployments will be both at the copper mines for close-in studies as well as at regional distances.

Each seismic station (Figure 1) will consist of a three-component broadband STS-2 (Figure 2) sensor and RefTek digitizing and archival system. A 15" plastic sewer pipe (Figure 3) is to be cemented into place in a 2' 3" deep hole with a diameter of 24". The STS-2 should be oriented in the proper direction, leveled, and unlocked. Once the analog seismometer and power cables are connected to the DAS through a 5' run of flexible conduit, tests are to be conducted to ensure the system is operating properly. The vault is then insulated, sealed, and back-filled around the pipe with sand. This type of installation should reduce the effects of temperature and wind noise.

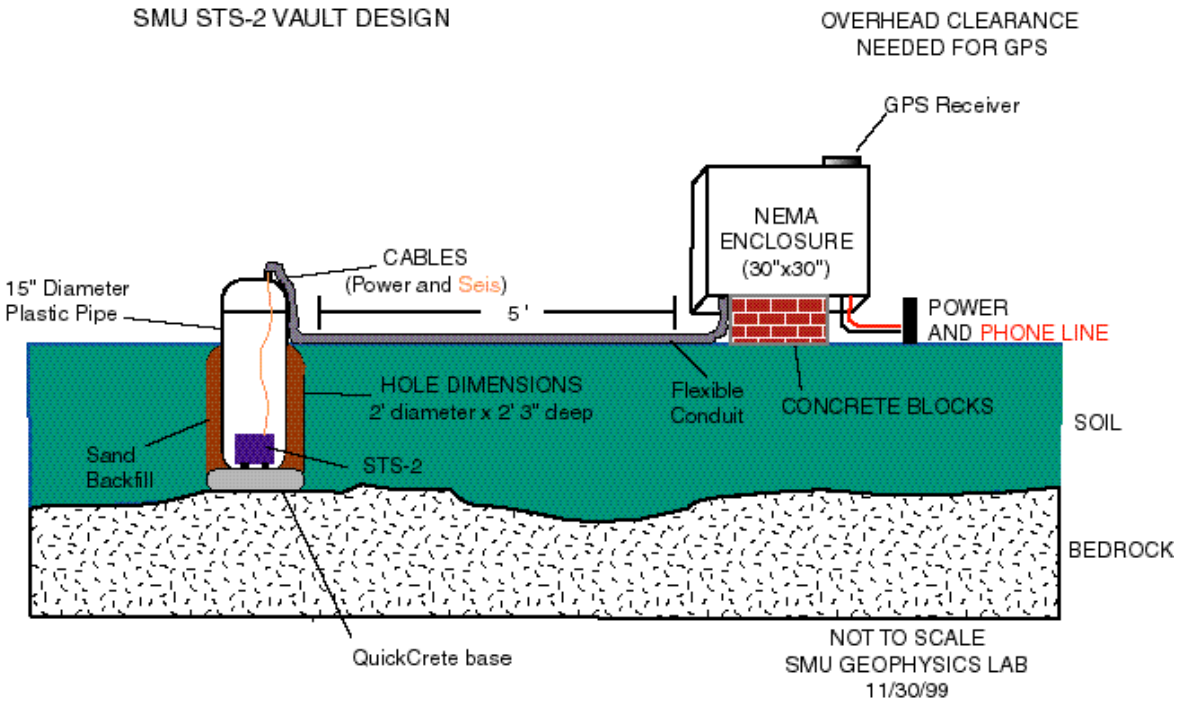

Figure 1. Schematic of the vault design and NEMA enclosure for

temporary field deployments.

Figure 2. Strickheisen STS-2 three-component broadband seismometer.

Figure 3. Plastic pipe used as vault enclosure.

The recording devices for the system are housed in a 30" X 30" standard NEMA (Figure 4) enclosure. The RefTek 72A-08 digitizer is attached to a 4GB hard disk by a SCSI cable. Also, monitoring the data flowing into the hard drive is another computer-- the RefTek 114. This unit analyzes the data for triggered events and can be dialed into using a modem connected to a telephone line. Raw data from the hard drive can be transferred from the station to a central recording station at SMU where analysis for start time, shot size, and additional parameters will occur. Electrical power for each station is provided by a 12-volt car battery recharged by a Dayton trickle charger connected to 110 Vac. The total system amperage draw is 1.2 amps average facilitating the use of commercial power as opposed to solar power. Accurate timing information at each station is obtained via GPS satellite clocks mounted to the top of the enclosure.

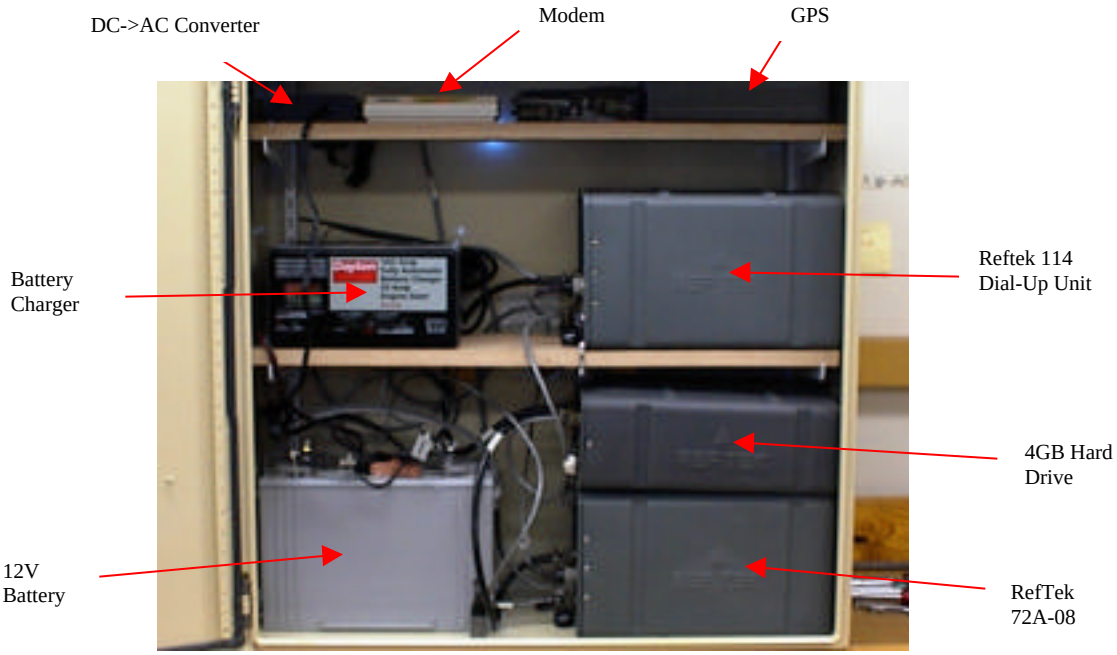

Figure 4. NEMA enclosure housing RefTek data acquisition equipment, including the RefTek 114 dial-up unit.

The current plan is to install the sites at the Phelps Dodge Morenci and Tyrone (see image on the front cover) mines in late Fall 1999. In the winter of 2000, we plan to install 5-10 sites along a profile between the copper mines and the TXAR seismo-acoustic array (Figure 5).

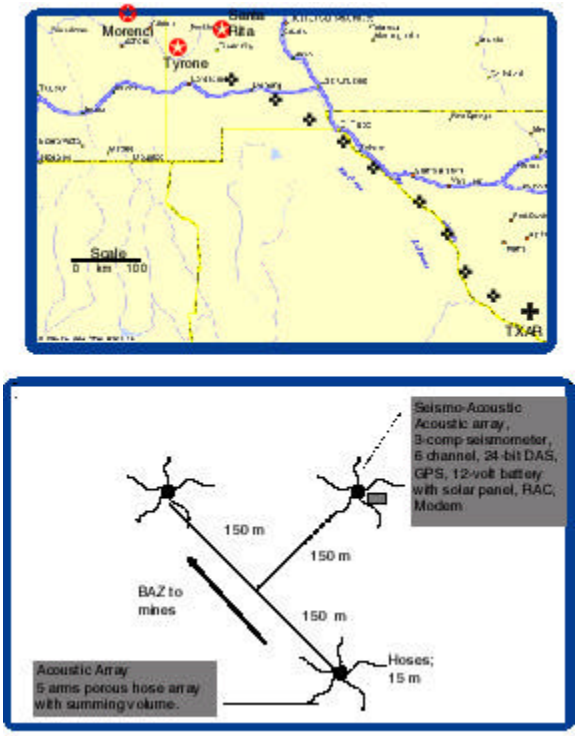

Figure 5. Plan for seismic sensor and acoustic array installations along a profile between the Morenci and Tyrone mines and TXAR.