

Seismic Reflection Profiling in the Big Gulch Area

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Summary of completed work

On July 5, a crew from Boise State University mobilized to begin testing for a seismic reflection profile on the M3 Inc. properties located north of Star, Idaho. As noted in the work plan (Appendix A), the first objective of the testing was to ensure that the seismic source (a 500lb accelerated weight drop) and surface conditions were suitable to seismic reflection profiling - specifically, would our system likely achieve the experiment objectives.

The deep water table at the site (~150-450 ft) means that the seismic signal must propagate through a significant thickness of unsaturated sediments prior to reaching the primary target, which in this case is the stratigraphy associated with the fresh water aquifer and the fault that appears to traverse the property. Unsaturated sediments absorb the signal more than water saturated sediments or crystalline rock and this effect can have a detrimental impact on data quality.

After acquisition and analysis of data acquired at several shot positions located on the southwest end of the proposed seismic profile, we determined that our system would not likely produce data that would meet the survey objectives. Figure 1 shows the highest quality shot gather we obtained. While a number of wave modes are evident in the shot gather, these are primarily forms of coherent noise that would be removed in processing a reflection image. No seismic reflection events are evident in the data.

After observation of the poor data quality, in consultation with Hydro Logic Inc., and in accordance with the project work plan we chose to terminate acquisition as noted in the contract work plan.

Recommendations for future work

A more energetic seismic source may produce adequate data quality. For example, the 16,000 lb mini-vibe produce by Geosys Inc. may provide adequate energy. Completion of the project with the mini-vibe would add approximately \$25,000 to the project. A gravity and magnetics survey could be completed at relatively low cost (< \$5000) and would provide an image of the gross geometry of the system. This information could be used, for example, to constrain the position of the fault:

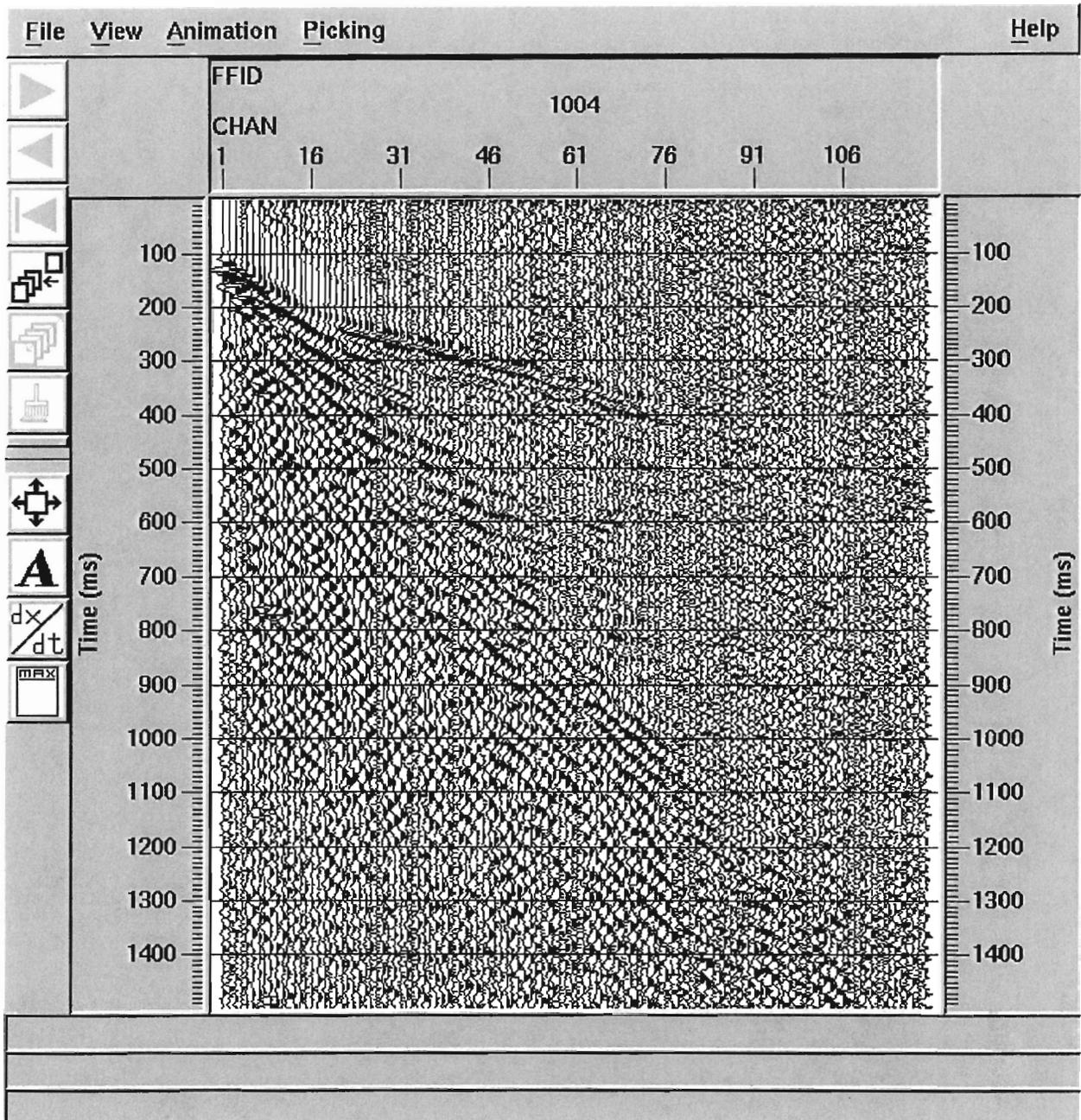


Figure 1. A shot gather from the tests conducted on July 5. The data consists of 4 coincident source impacts that were subsequently stacked to attenuate noise. A weak water table refraction is evident from channels 18-120 with respective times from 200 ms – 530 ms. Additional events that are evident are ground-roll and guided waves trapped between the water table and surface. No reflections are evident in the data.

APPENDIX A

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1.0 Summary

We propose to acquire, process and interpret approximately 10 miles of seismic reflection data for Hydro Logic, Inc. north of Star, Idaho. The project objectives are

1. Perform noise tests to determine acquisition parameters and to evaluate the quality of the data acquisition.
2. Image shallow (to 1,000 feet bgl) sedimentary section and structures to delineate aquifers.
3. Image deeper volcanic bed rock and structural faulting.
4. Data to be plotted at client's preferred depth and distance scales.

The quality of the seismic reflection data may be adversely impacted by the deep water table at the site (~150 - 450 ft). The noise tests will be completed during the first two days of data acquisition. In consultation with Hydro Logic Inc. we will carefully evaluate data quality to ensure that the survey will satisfy project objectives. Should data quality be deemed inadequate, the project will be terminated with no additional costs charged to Hydro Logic Inc. In this case, total costs will include mobilization and demobilization and two days of field work.

The scope of work includes 1 day of mobilization, 1 day of demobilization and 10 days of seismic reflection field work. The costs include acquisition (~75% of total cost), processing and report preparation (~25% of total cost). Work will begin July 5, 2006 and be completed before September 1, 2006.

2.0 Site and Acquisition Details

The field site is located in the Boise Range foothills north of Star, Idaho. The seismic profiles will consist of one primary profile along the axis of Big Gulch. Additional cross profiles and an axis profile along Little Gulch will be acquired as time permits, not to exceed 10 field days. All profile locations will be established in consultation with Hydro Logic, Inc. We will use a 120-channel seismograph with geophones deployed every 5 m. The seismic source will be the CGISS trailer-mounted weight drop. We will use either a Topcon total station or Trimble differential GPS system for spatial control. Based on similar experiments we have conducted at a nearby location, we anticipate that we can complete 1 mile of seismic reflection imaging per full field day.

3.0 Data Processing and Report Preparation

We will complete the seismic and survey data processing using the CGISS computing center and will collaborate with Hydro Logic, Inc. to complete a written report prior to the termination of the contract (September 1, 2006). Interpreted seismic sections will be presented in depth and horizontal position. Seismic data will be available for future CGISS publications.