



November 9, 1994

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REVIEW OF PHASE I AND PROPOSED PHASE III GEOPHYSICAL SURVEYS - GSC-05-94

Dear Mr. Brown:

At your request, I have reviewed the Phase I and proposed Phase III geophysical surveys at the Naval Air Warfare Center, Warminster, PA. The following are my comments regarding that work.

Phase I

The geophysical surveys performed under Phase I have significant technical shortcomings. Because of the survey design, no trench positions were identified and no meaningful conclusion could be drawn.

Geophysical Measurement

Based on the project objectives and expected target properties, the Geonics EM-31 is a good choice of tools. This tool measures the earth's response to an induced electromagnetic signal. The ability to measure both the inphase and quadrature components of the induced field is powerful and necessary because of the range of target materials expected including scrap metal as well as sludges and free liquids.

Data Spacing

The inappropriate choice of data station spacing is the primary reason for the shortcomings of these surveys.

The data station spacing for the program objectives is not appropriate. Thirty feet between stations and one hundred feet or more between profiles is too wide. The required station spacing is a function of the size of the target to be detected and the depth of burial. At these shallow depths of investigation, the data spacing should be no larger than one half the target size. In the case of sites 2, 4, 5, 6, and 7, the width of the trenches is estimated at 12 feet. Therefore the station spacing in that dimension should be no more than 6 feet. Because the trenches are long features, the spacing between profiles can be larger. In general, this spacing should be kept as small as practical (25 ft). The data acquisition rate of the EM-31 should be 1,500 - 2,000 stations per day. It should have been reasonable to collect data at each of these sites with appropriate station and profile spacings for a similar budget.

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Data Presentation

Both the inphase and quadrature phase data should have been presented and discussed.

Comments

In the report, terminology was used that suggested a lack of experience in collecting and evaluating geophysical data. For example, the inphase data was referred to repeatedly as the "comp" data. Also the units of conductivity in the Phase II report are said to be micromhos/meter. Although not impossible, they almost certainly should be in millimhos/meter. If micromhos/meter is correct, these very unusual values are worthy of discussion.

Phase III (Proposed)

During Phase III, an additional geophysical survey is proposed at Site 7. The objective again is to locate trench positions. I have concerns about this program as well for some of the same reasons.

Geophysical Measurement

In the proposed work, it is planned that the Geonics EM-34 be used. This tool measures the earth's response to an induced electromagnetic signal. The frequency and coil spacing of the EM-31 instrument is more appropriate for the objectives of the survey, and productivity of the EM-31 is considerably greater than that of the EM-34. The increased productivity of the EM-31 will allow for a significantly greater number of data stations to be collected resulting in closer station spacing.

Data Spacing

The proposed work is to include 200 points collected along 4 profiles with stations spaced no more than 20 feet apart. Twenty feet between data stations is too large to resolve the target trenches and 4 profiles is too few. An EM-31 could be used to collect data over this site at considerable closer station spacing and produce a more defensible product.

Ground Penetrating Radar

Ground Penetrating Radar (GPR) has been proposed if the electromagnetic surveys fail. This is a reasonable approach.

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I relayed these comments verbally to Kathy Davies on 11/7/94. Because of the urgent nature of the Regions request, I will also FAX a copy of this letter to her office. If you have additional questions or comments, please contact me at (208)526-4166.

Sincerely,



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