Jim D

United States Department of Agriculture

Soil Conservation Service

Northeast NTC
160 E. 7th Street
Chester, PA 19013

Subject: ENG - GPR Survey, RAMP

Date: FEB 19 1986

To: James H. Olson
State Conservationist
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PURPOSE

To investigate subsidence problem areas at RAMP sites in Bedford and Center Counties.

PARTICIPANTS

Bruce A. Benton, Geologist, SCS, Harrisburg, PA
Daniel A. Delp, Civil Engineer, SCS, State College, PA
Robert R. Dobos, Soil Scientist, SCS, Bedford, PA
James A. Doolittle, Soil Specialist (GPR), SCS, Chester, PA
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Gene A. Krotzer, Engineer Technician, SCS, Somerset, PA
Ronald S. Phelps, District Conservationist, SCS, Bedford, PA
Daniel R. Seibert, Soil Scientist, SCS, Somerset, PA
Peter J. Vanderstappen, Area Engineer, SCS, State College, PA

EQUIPMENT

The equipment used during this field trip was the SIR System-8, the ADTEK SR-8004H graphic recorder, and the ADTEK DT-6000 tape recorder. The 120 MH_Z antenna with the model 705DA and 705DA2 transceivers were used. The model 705DA2 transceiver was preferred as it provided the greater probing depth. The scanning time on the control unit was 174 nanoseconds; the scanning rate was 25.6 scans/sec. The equipment operated well in the field with no observed malfunctions.

ACTIVITIES

On February 5, 1986, all scheduled assignments were completed at the Kenneth Cartwright RAMP site in Coaldale, Bedford County, and the Francis Hollis RAMP Site in Osceola Mills, Center County.

RESULTS

An earlier trip report (GPR Survey, RAMP; dated 22 January 1986) summarized the advantages and disadvantages of using GPR techniques to investigate Rural Abandoned Mine Sites. This field study is a continuation of the earlier study.

Results from the GPR investigation at the Kenneth Cartwright and the Francis Hollis RAMP sites varied in interpretability and utility. At the Cartwright RAMP site, discrimination of subsurface features and depth of effective radar penetration were limited. The poor quality of the radar's graphic images can be explained by several possible factors. These factors include the small size of the study site and the inability of the operator to obtain a broad perspective into the nature of the underlying medium(s); proximity to interfering mediums, such as the house and utility wires, which produced unwanted background noise; the possible deleterious effects of road salts and soil amendments on the radar's signal; and unfavorable site conditions. Unfavorable site conditions include wet or saturated soils, possible high clay or shale contents, and wet snow.

Generally, subsurface interfaces are not identifiable on graphic profiles from the Cartwright site. Most of the more "exciting" subsurface features that can be observed on the graphic profiles are unwanted background noise. The background noise was caused by overhanging features, such as the house or utility wires (which were "picked-up" by the unshielded 120 MH_Z antenna), and signal reverberations. A distinct subsurface pattern is recognizable on the graphic profiles at the corner of the Cartwright's home. The subsurface return corresponds with the location of a fissure on the ground surface. Unfortunately, studying the radar images provides no further clarification of the nature or extent of this feature.

Results from the Francis Hollis RAMP site were more rewarding (see enclosed profile). Several parallel transects were completed at and near the site where a fencepost had entered a fissure. Each transect produced graphic profiles having recognizable subsurface features. A distinct group of those features corresponds with a subsidence area on the ground surface. On one transect, a distinct subsurface feature is discernable between depths of 4 to 6 meters. This feature is believed to be an abandoned air shaft. No significant subsurface feature is apparent near the opened fissure. The fissure is, itself, small and twisted. However, a minor, depressional area adjoins the fissure area on transect "C" and "D." This depression predates the excavation of embankment as it is filled and has no expression on the surface.

Future GPR surveys can be improved by flagging sites (if possible) with a grid network. A grid will help to establish ground positions and to evaluate the extent and proportion of the area which is underlain by subsurface cavities. This study was most encouraging and hopefully will be followed by more similar investigations.

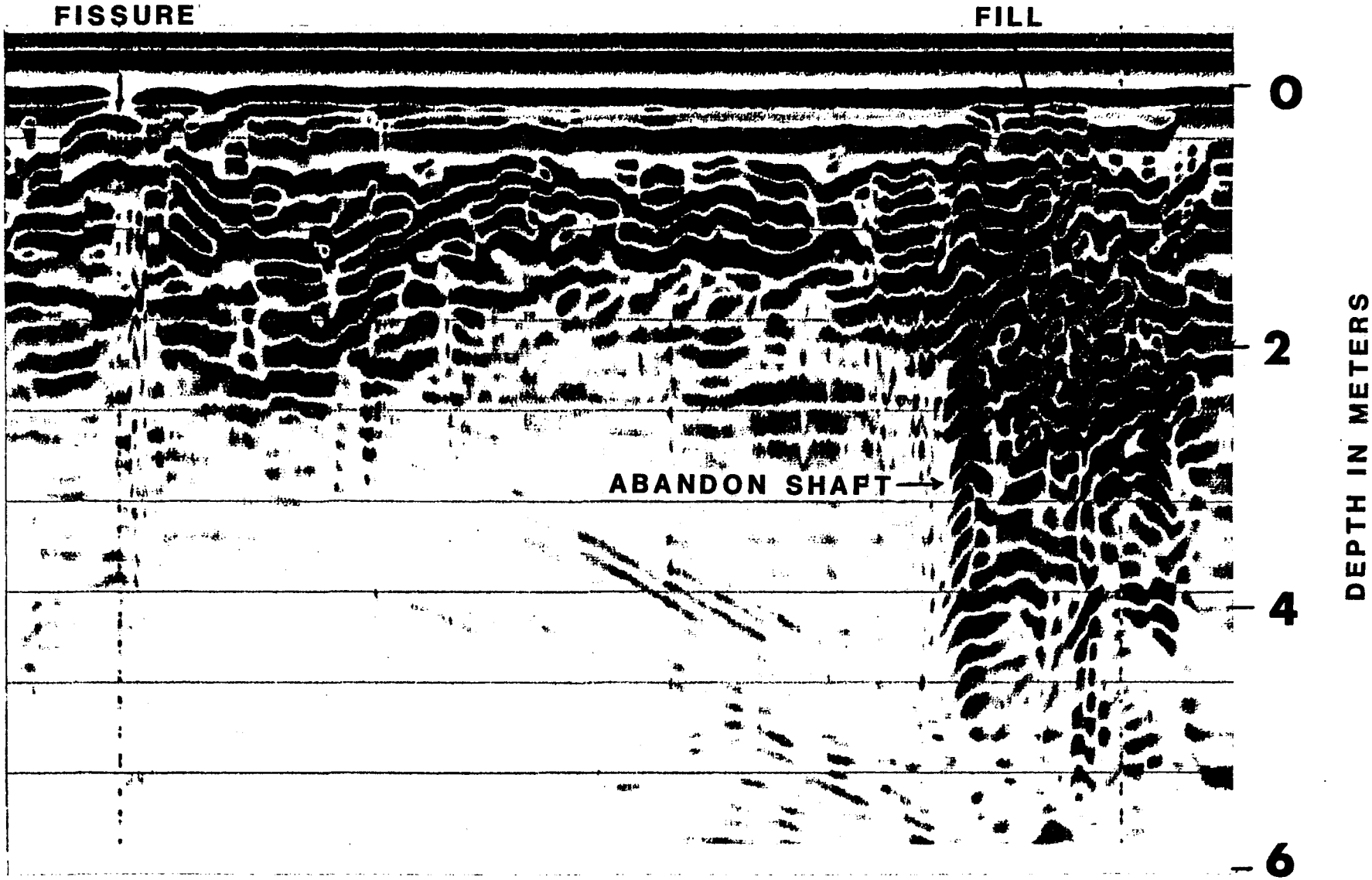
A complete record of the graphic profiles have been returned to Bruce A. Benton, Geologist, under a separate cover letter.

J. A. Doolittle

James A. Doolittle
Soil Specialist (GPR)

Enclosure

cc: A. Holland, B. Benton



GPR PROFILE FROM RAMP SITE
CENTER COUNTY, PENNSYLVANIA