United States Department of Agriculture
Soil Conservation Service
Northeast NTC
160 East 7th Street
Chester, PA 19013

Subject: Ground-penetrating radar field assistance

Date: February 16, 1988

To: Donald W. Lake, Jr
State Conservation Engineer
SCS, Syracuse, NY

File code: 210

Purpose:

To conduct sedimentation surveys with the ground-penetrating radar (GPR) along the Bouquet River, Willsboro, and Little Choconut 2B, Binghamton, New York.

Participants:

Edward Blackmer, Area Engineer, SCS, Albany, NY
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Debra Hopkins, Ag. Engineer, SCS, Albany, NY
Thomas Iiavari, Geologist (Sed), SCS, Chester, PA
Harlan Moonen, Resource Consvst., SCS, Syracuse, NY
Joseph O'Malley, Civil Engr., SCS, Syracuse, NY
David Sullivan, Geologist, SCS, Syracuse, NY
John Thayer, Eng. Tech., SCS, Syracuse, NY
Edward Tuthill, SWCD Tech., SCS, Westport, NY
David Weeks, District Consvst., SCS, Wesport, NY

Activities:

The GPR unit arrived in Willsboro, New York, on the evening of 8 February after picking-up a toboggan enroute. The survey of the Bouquet River dam site in Willsboro was completed on 9 February. The GPR unit was relocated to the Binghamton area on 10 February. The GPR survey of Little Choconut 2B was completed on the morning of 11 February. The GPR unit returned to Chester during the afternoon of 11 February 1988.

Equipment:

The equipment used during this field trip was the SIR-System-8 radar. This unit consist of the model 4800 control unit, ADTEK SR-8004H graphic recorder, and the ADTEK DT-6000 tape recorder. The 120 MHz antenna with the 705DA transceiver was used for these surveys. The unit was powered by two 12-volt marine batteries. The selected scanning times on the control unit were 120 and 240 nanoseconds, which assuming a dielectric constant of 81 for water, provided scanning depths of about 2.0 and 4.0 meters, respectively.

Discussion:

The ground-penetrating radar performed well at each site and provided continuous profiles of the underlying sediments. As a result of coarse fragments, it was difficult to confirm the depth to bedrock along the Bouquet River. However, based on recent observations, the depth to bedrock was not considered to be deep and was assumed to immediately underlie a thin layer of alluvium. Based on these assumptions, two interfaces were identified on the graphic profiles: the alluvium and the bedrock. Depth to bedrock varies from 0.4 to 4.5 feet and averages about 2.5 feet along the eastern bank. The average depth increases to about 6.1 feet along a transect conducted a short distance from the eastern bank. A third transect was conducted along the western bank where the average depth to bedrock is about 3.3 feet and varies in depth below the ice surface from 1.8 to 4.3 feet. Several additional transects were conducted perpendicular to the river. Figure 1 is a representative cross section of the Bouquet River above the dam in Willsboro.

At the Little Choconut 2B site, five transects lines varying in length from 80 to 380 feet were measured off with observations at 10 foot intervals. This provide 1500 feet of continuous GPR data with 155 observation sites annotated on the graphic profiles. Figure 2 is a representative profile from this site. Profiles from this site were more interpretible.

Data from Little Choconut 2B have been turned over to Tom Iivari for sedimentation calculations using the "SED" program. All GPR records will be returned to Dave Sullivan under a separate cover letter.

Results:

The GPR provides an efficient and economical alternative to the standard methods used for lake sedimentation surveys. At Little Choconut 2B, all necessary field work (laying-out and marking transect lines, radar survey, and collection of ground-truth data) was completed in 3.5 hours. With proper coordination and suitable field conditions, larger areas or more than one site can be surveyed with the GPR in a day. This represents a considerable savings of time. Also, winter surveys with the GPR over ice do not interfer with field work.

The GPR is highly site specific and similar results may not be attained on all lakes in New York. The selected sites are fairly shallow and the maximum probing depth of the GPR was not approached. This depth is dependent upon the conductivity of the water and is assumed to lie in the range of 20 to 35 feet. Based on the success of these surveys, additional winter work with the GPR is feasible and recommended in New York.

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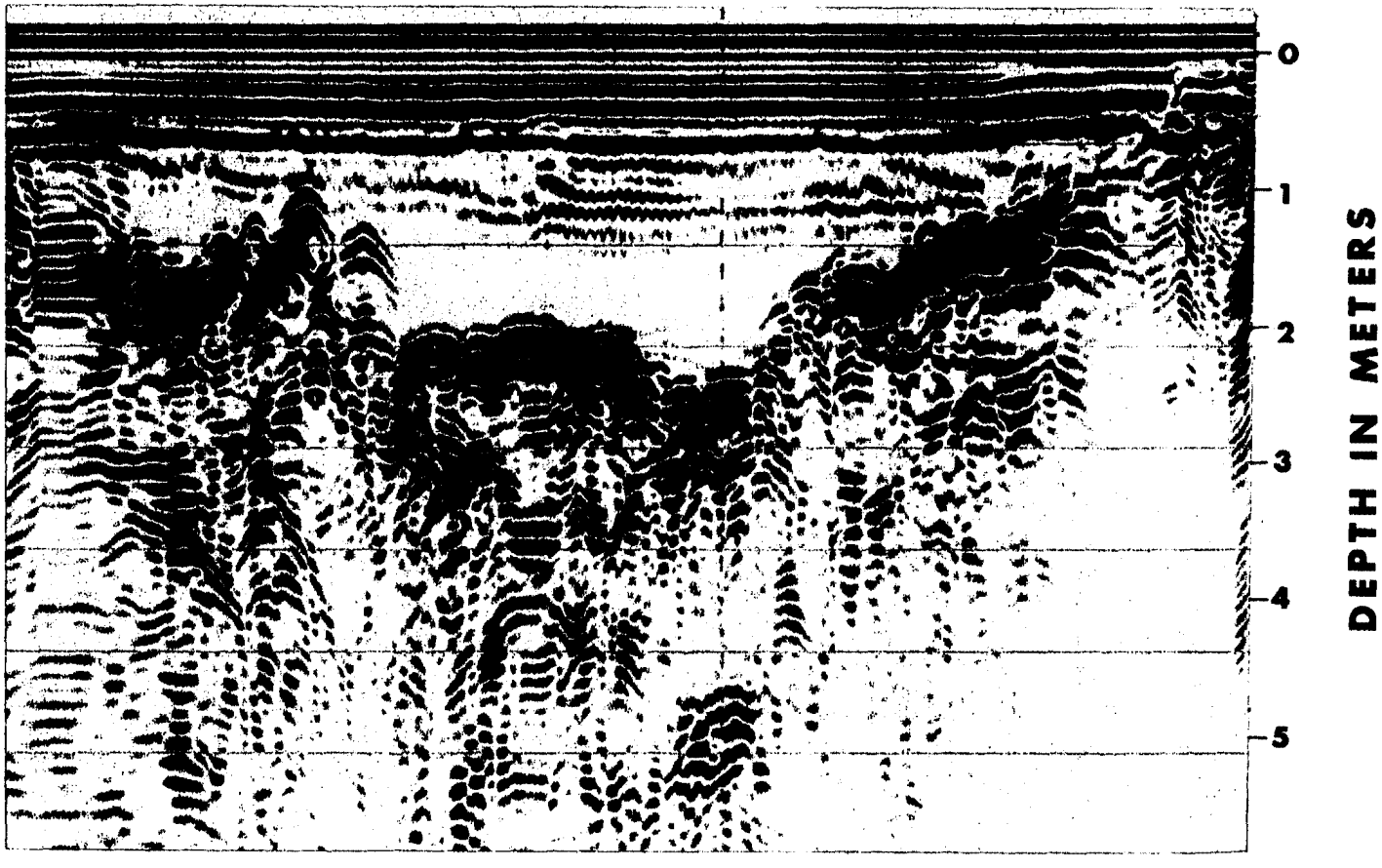
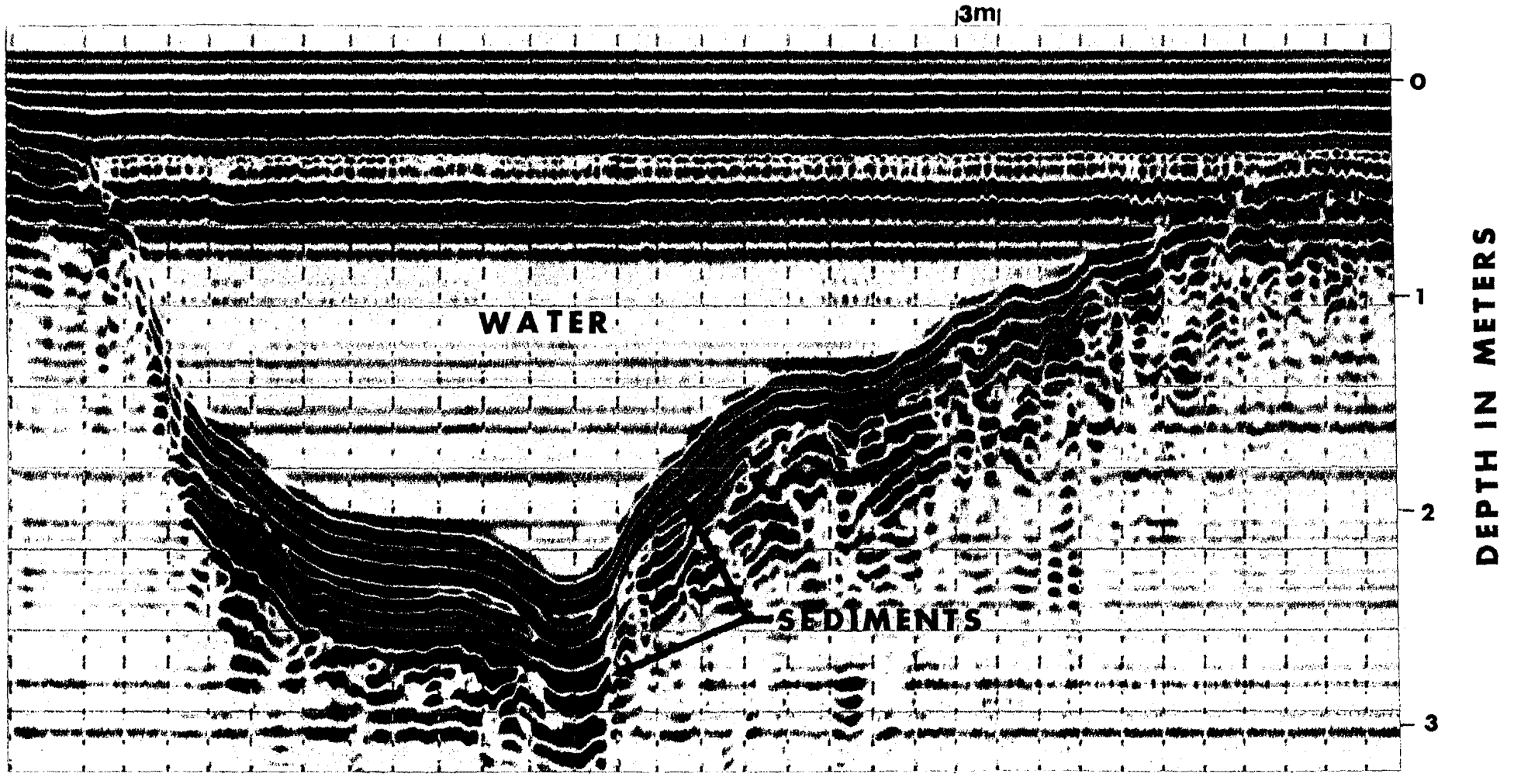


BOUQUET RIVER, WILLSBORO, NY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