

**UNITED STATES DEPARTMENT OF AGRICULTURE  
SOIL CONSERVATION SERVICE**

**Northeast NTC  
CHESTER, PA 19013**

**SUBJECT:** Ground-Penetrating Radar (GPR)  
Field Studies in Warren and  
Sussex Counties, New Jersey;  
9 to 13 March 1992

**DATE:** 19 March 1992

**To:** Ronnie L. Taylor  
State Soil Scientist  
USDA-Soil Conservation Service  
Somerset, New Jersey

**Purpose:**

To evaluate the potential of using GPR as a quality control tool for use in the updating of soil information in Warren and Sussex Counties, New Jersey.

**Participants:**

Cluster Belcher, Soil Conserv (IPA w/DEP), SCS, Trenton, NJ  
Cecil Currin, State Conservationist, SCS, Somerset, NJ  
Jim Doolittle, Soil Specialist, SCS, Chester, PA  
Donna Drewes, RC&D Coordinator, SCS, Annandale, NJ  
Andy Fisk, Student, Rutgers University, New Brunswick, NJ  
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David Kingsbury, Soil Scientist, SCS, Annandale, NJ  
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Jeff Waldner, Geologist, NJGS, Trenton, NJ  
Mike Watson, Civil Engineer, SCS, Annandale, NJ

**Activities:**

Field studies were conducted in accordance with the "Itinerary for ground-penetrating radar project" prepared by David Kingsbury.

However, field and staff soils scientists did not interpret this interface as a fragic horizon.

TABLE 1

DEPTH TO BEDROCK

| TRANSECT # | MAP UNIT | SHALLOW | MOD-DEEP | DEEP | VERY DEEP |
|------------|----------|---------|----------|------|-----------|
| 1          | WoB      | 0%      | 88%      | 12%  | 0%        |
| 2          | WaB      | 25%     | 75%      | 0%   | 0%        |
| 3          | WoB      | 50%     | 40%      | 0%   | 10%       |
| 4          | RWF      | 9%      | 46%      | 36%  | 9%        |
| 11a        | NbB      | 0%      | 0%       | 22%  | 78%       |
| 11b        | BaB      | 0%      | 100%     | 0%   | 0%        |
| 12         | BfC      | 15%     | 54%      | 0%   | 31%       |
| 13         | NbB      | 4%      | 21%      | 54%  | 22%       |

Areas of Adrian muck (Ad) and Carlisle muck (Ck) near Stevens Island were transected with GPR. Adrian is a member of the sandy or sandy-skeletal, mixed, euic, mesic Terric Medisaprists and Carlisle is a member of the euic, mesic Typic Medisaprists families. Maximum profiling depth of the 120 MHz antenna in these soils was about 5feet. Auger observations and radar interpretations were used to prepared Table 2.

TABLE 2

Taxonomic subgroups of Histisols

| TRANSECT # | MAP UNIT | TERRIC | TYPIC |
|------------|----------|--------|-------|
| 6          | Ad       | 100%   | 0%    |
| 7          | Ad       | 100%   | 0%    |
| 8          | Ad       | 100%   | 0%    |
| 9          | Ck       | 36%    | 64%   |
| 10         | Ck       | 0%     | 100%  |

All radar profiles were turned over to David Kingsbury for review and analysis.

**Recommendations:**

1. This field study addressed the potential of using GPR methods as a quality control tool for soil surveys in northwestern New Jersey. The results of this study indicate that Ground-penetrating radar techniques can be used to help update the composition of soil map units in Warren and Sussex counties. The utility of using GPR to extend the depth of observation and determine the depth to bedrock are discussed in the enclosed articles. Traditional transect methods are too slow, labor intense, and ineffective for determining the depth to bedrock. I urge the scheduling by the New Jersey Soil Staff

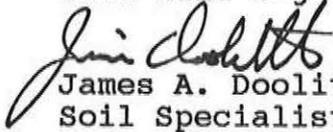
of NSSC - GPR field assistance. Field studies should immediately address the composition of map unit in areas of moderately deep or shallow Bartley, Bath, Nassau, Rockaway, and Wassaic soils.

2. The potential of using EM techniques for site assessments, ground water and mineralogical studies in south New Jersey should be explored in the near future.

3. I hope that the LORAN-C unit will be used in the upcoming sampling trip by Dr. Robert Grossman. I would be interested in learning of Lenore Matula's experiences with and impressions of the unit.

The field study was exceptionally well prepared. The efforts, enthusiasm, and participation of all were greatly appreciated. I enjoyed this opportunity to work with your fine staff and to provide GPR assistance to New Jersey.

With kind regards.

  
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Soil Specialist

cc:

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