

GEOPROBE: CAPABILITIES AND USE IN USGS PROJECTS



DIRECT PUSH TECHNOLOGY

UNCONSOLIDATED DEPOSITS

THE 100-FOOT CLUB

- SOIL SAMPLING
- GROUND-WATER SAMPLING
- PIEZOMETER INSTALLATION
- AQUIFER TESTING
- GEOPHYSICAL LOGGING
- SOIL-GAS SAMPLING

ILLINOIS WSC GEOPROBE

- **MODEL 5400 -- 1.25 & 2.125-inch drive rods**
- **FORD F450 TURBO DIESEL (4-wheel drive)**
 - **SIDE CARGO BAYS, OVERHEAD RACK**
 - **60 GAL. H2O TANK**
 - **VENTED EXHAUST STACK**

USGS PROJECTS ILLINOIS GEOPROBE USED

- SOIL SAMPLING (STRATIGRAPHY AND/OR CHEMISTRY)
 - JUDY'S BRANCH: ILLINOIS
 - BROWNFIELD SITE: ILLINOIS
 - NAWQA ACT: NEBRASKA
 - ARMY RESERVE BASES: IOWA, NEBRASKA, KANSAS
 - AIR FORCE BASES: NEW MEXICO
- GROUND-WATER SAMPLING, PZ INSTALLATION
 - DOVER AFB: DELAWARE
 - NAWQA ACT: DELAWARE, MISSISSIPPI
 - DOMESTIC SEPTIC SITES: OHIO
- SOIL SAMPLING, PZ INSTALLATION
 - MIDWIN PRAIRIE: ILLINOIS
 - STATEWIDE: MARYLAND
 - NATIONAL GUARD BASES: I INDIANA
 - NAWQA ACT: MISSISSIPPI
- BEDROCK MAPPING
 - NAWQA: ILLINOIS, MISSOURI

SOIL SAMPLING

MACRO-CORE SAMPLER

- 1.5-IN SLEEVED CORES
- CONTINUOUS SAMPLE
 - OPEN OR CLOSED TIP

LONG BORE SAMPLER

- 0.75-IN SLEEVED CORES
- DISCRETE SAMPLE



Sleeved Cores
from
Macro-Core Sample

GROUND-WATER SAMPLING

MILL SLOT

- ORIGINAL DESIGN
- SANDY SEDIMENTS

VERTICAL PROFILER

- SANDY TO SILTY SEDIMENTS

SCREENPOINT 15

- SANDY TO CLAYEY SEDIMENTS
- DISCRETE INTERVAL

ScreenPoint 15

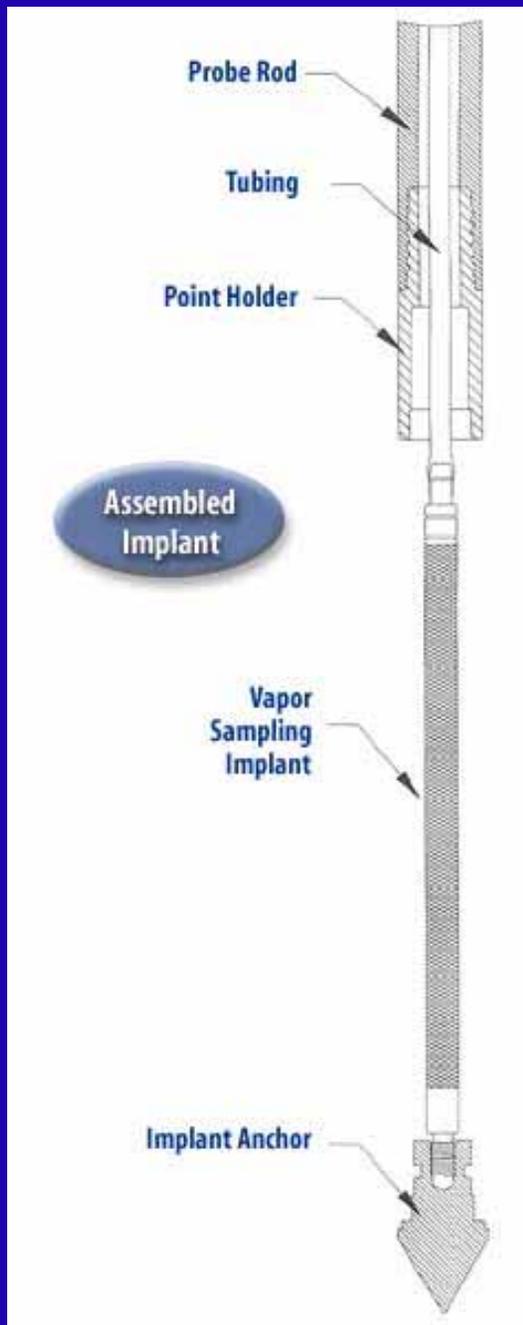
Screen sleeve



43-in. SS screen



SOIL-GAS IMPLANTS AND SAMPLING PIEZOMETERS



COLLECTING WATER SAMPLES

PERISTALTIC PUMP

- MOST USED METHOD
- LIMITED TO DEPTH OF ~ 25 FT
- MAY AFFECT VOLATILE SAMPLES

MINI-BLADDER PUMP

- POSITIVE DISPLACEMENT
- DECON REQUIRED

INERTIAL PUMP, MINI-BAILER

- COLLECT FROM ANY DEPTH
- LOW FLOW RATE, AGITATES SAMPLE

WATER-QUALITY SAMPLING





← 1.25-in. Drive Rod

PIEZOMETER INSTALLATION

INSTALLED THROUGH PUSH ROD

- 1-IN PIEZOMETERS
- 0.25-0.5-IN TUBING W/ SS SCREEN
- PRE-PACKED SCREENS, 0.5-IN CASING

INSTALLED IN SOIL-CORE HOLE

PIEZOMETER INSTALLATION



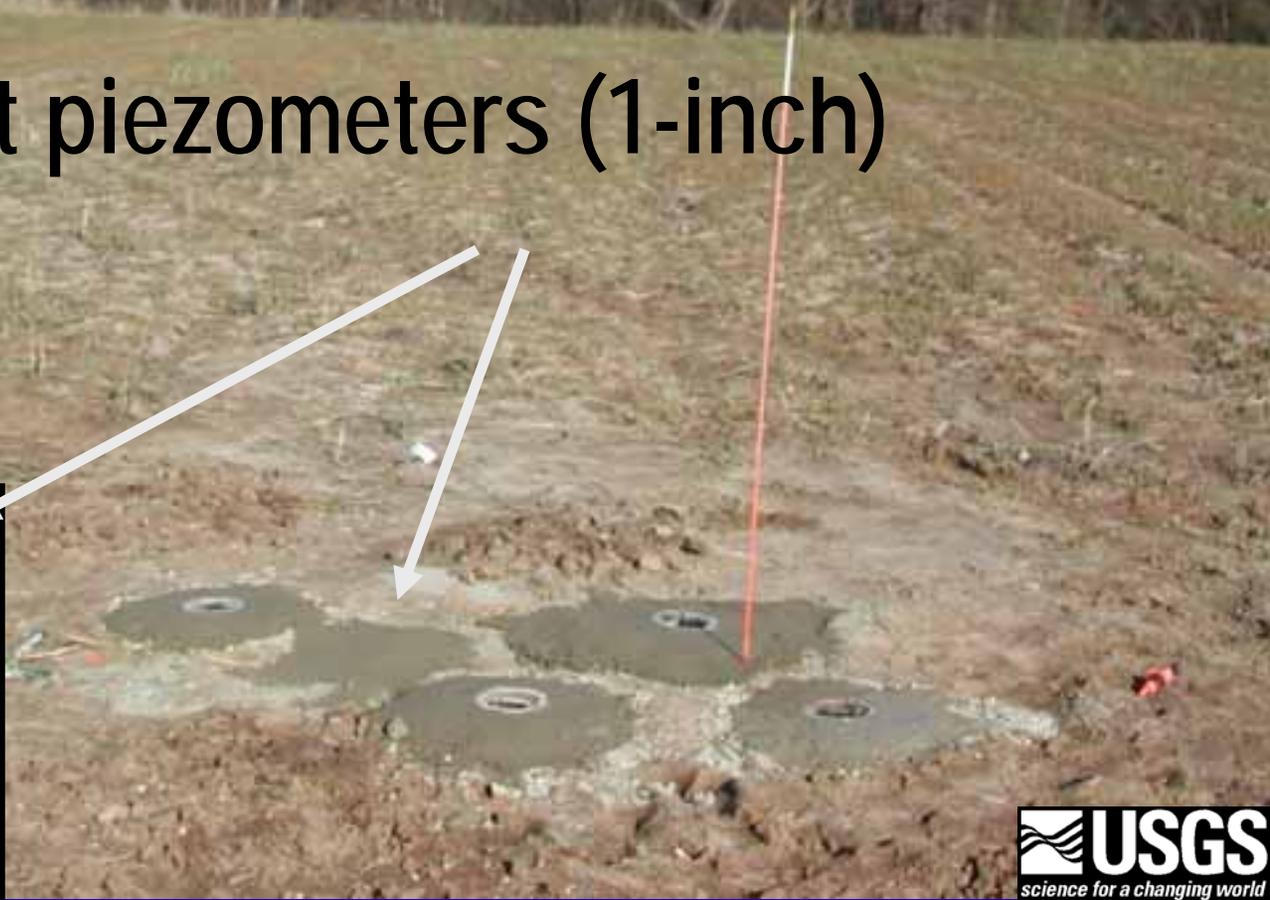


INSTALLED
PIEZOMETER

Piezometers (1-inch)



Flush-mount piezometers (1-inch)



MANUAL INSTALLATION

- **HAND DRIVEN W/ SLIDE WEIGHT**
- **SHALLOW INSTALLATIONS, LIMITED ACCESS**
- **REMOVE RODS W/ HYDRAULIC EXTRACTOR**

DUAL-TUBE SYSTEM

USE LARGER DIAMETER OUTER CASING TO:

- COLLECT SOIL CORES
- INSTALL PIEZOMETERS

CASES OFF CONFINING UNITS, CONTAMINATED UNITS

SAMPLING STRATEGIES

THE HIGHER THE QUALITY—THE MORE THE COST

- ASSURANCE OF DISCRETE SAMPLE TAKES LONGER

QUALITY-ASSURANCE MEASURES

- SAMPLING & GEOPROBE TOOLS
- SAMPLING STRATEGIES

SAMPLING RATES

- SOIL SAMPLING: ~ 40 FT PER DAY
- GROUND-WATER SAMPLING: 100-200 FT PER DAY

SPECIALIZED TOOLS

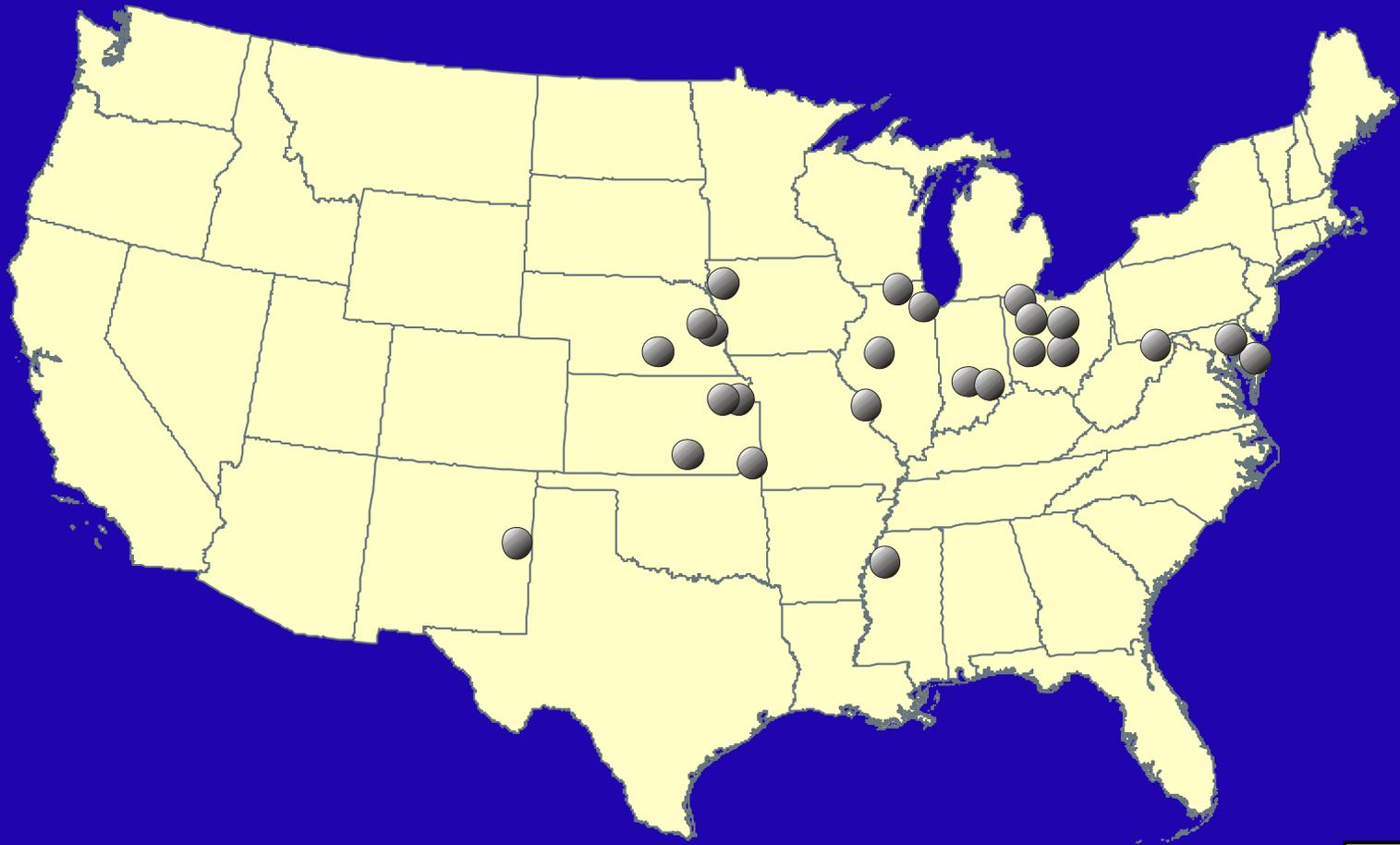
ELECTRICAL CONDUCTIVITY PROBE

Soil conductivity logged as drive rod advanced

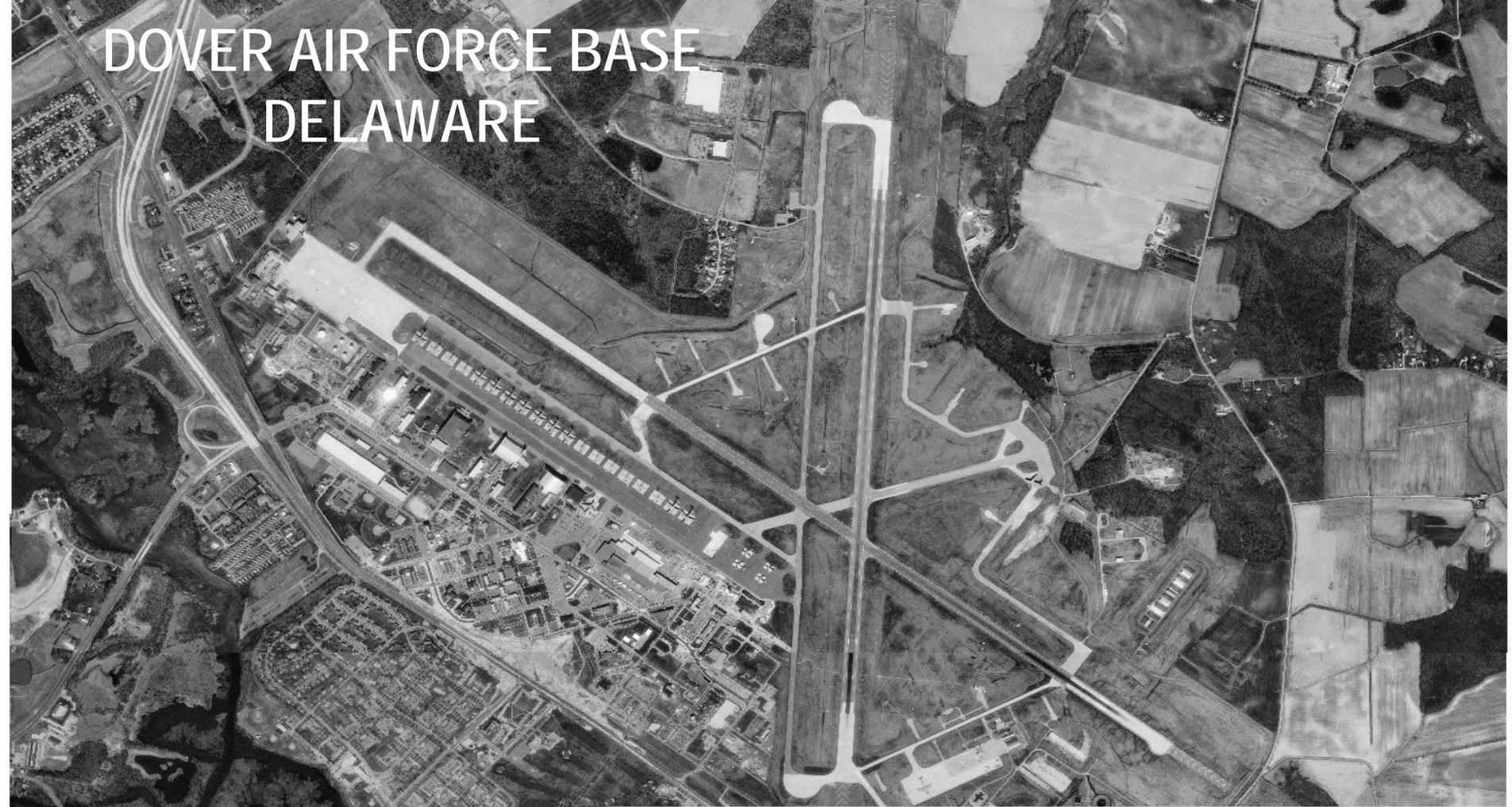
MEMBRANE INTERFACE PROBES

Organic compounds in soil heated and vented to surface for evaluation w/ gas-phase detector at land surface

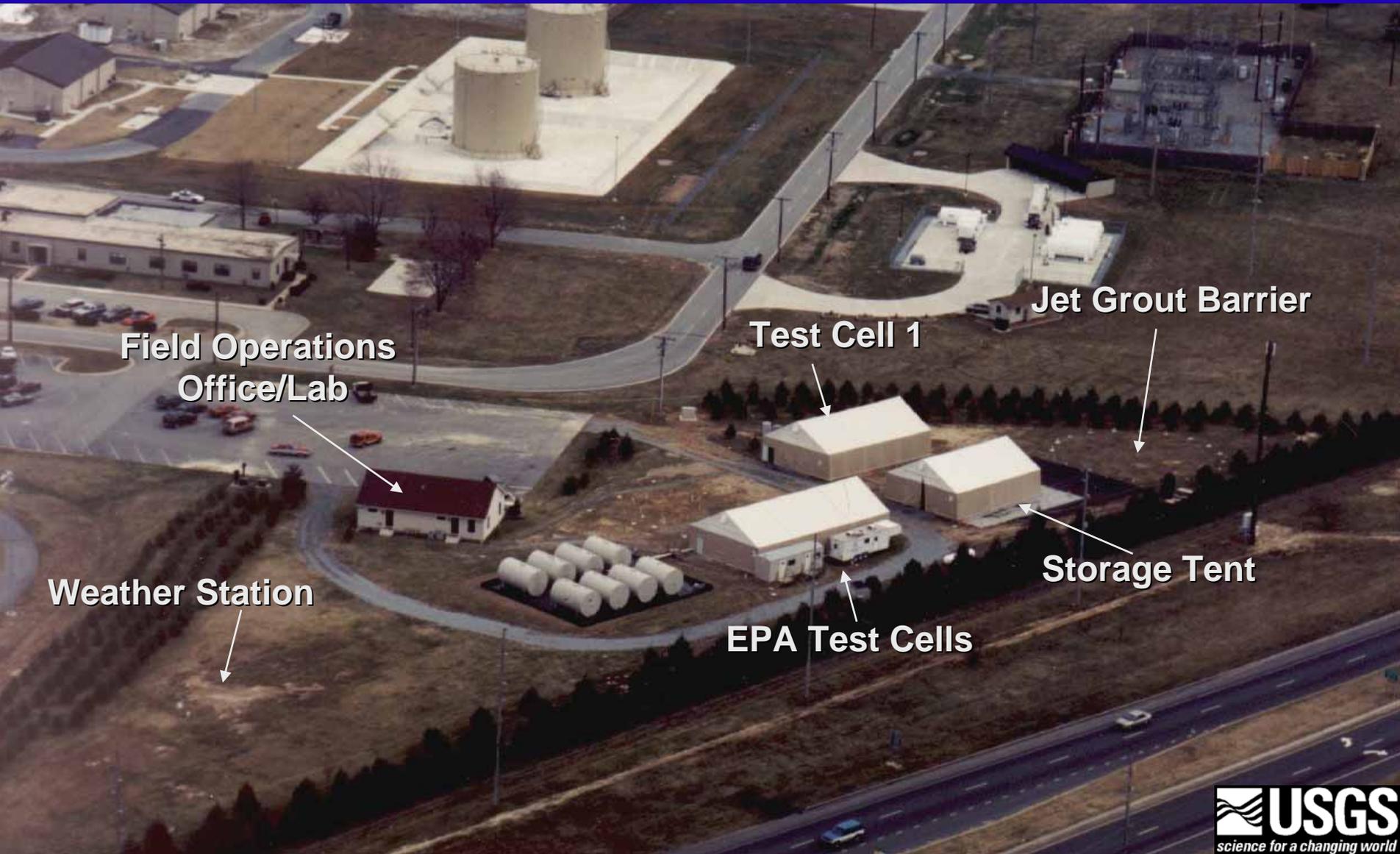
HYDROLOGIC STUDY APPLICATIONS



DOVER AIR FORCE BASE DELAWARE



Dover National Test Site



Field Operations
Office/Lab

Test Cell 1

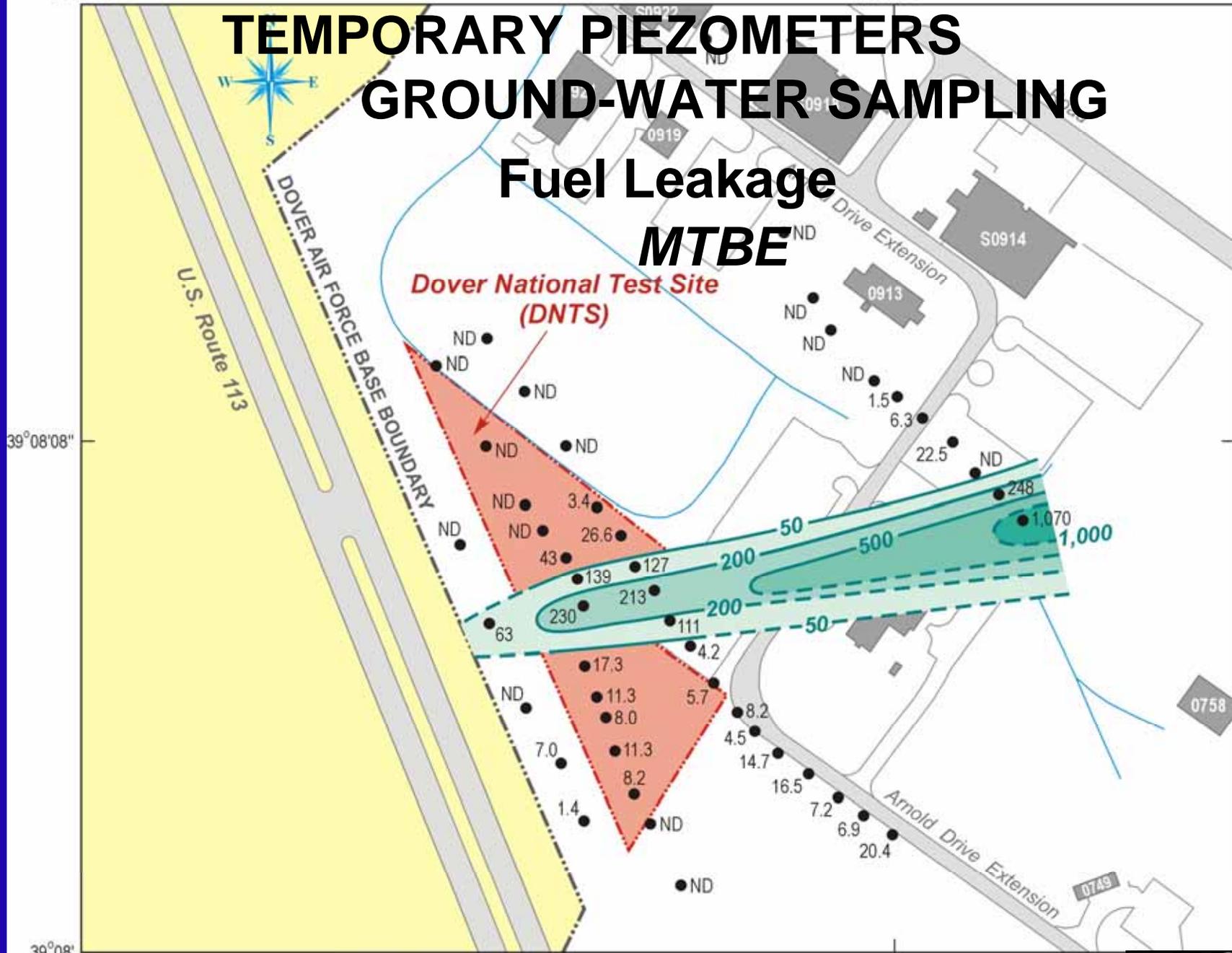
Jet Grout Barrier

Weather Station

EPA Test Cells

Storage Tent

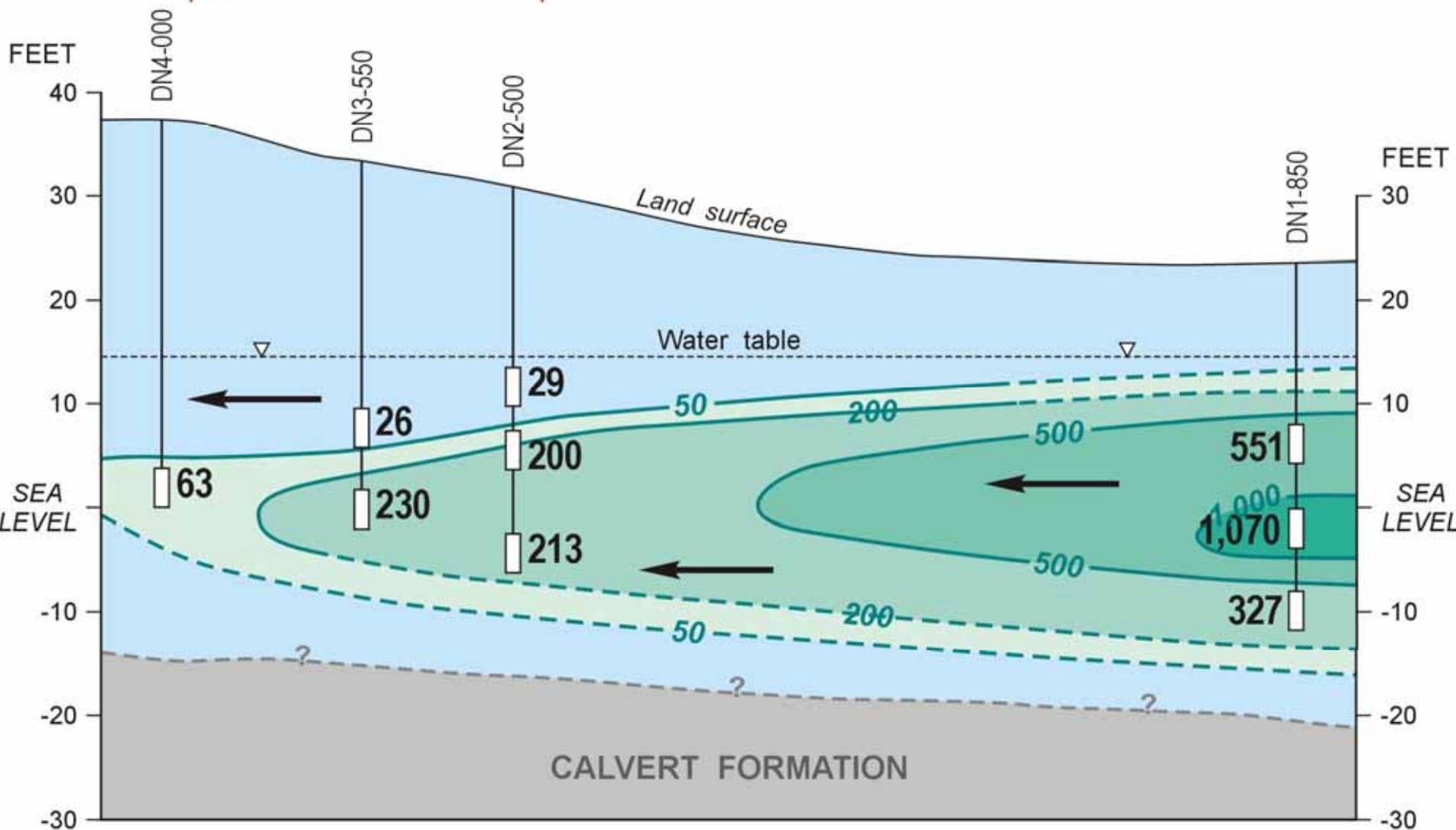
TEMPORARY PIEZOMETERS GROUND-WATER SAMPLING Fuel Leakage *MTBE*



A
(West)

**Dover National
Test Site (DN2S)**

A'
(East)



TEMPORARY PIEZOMETERS

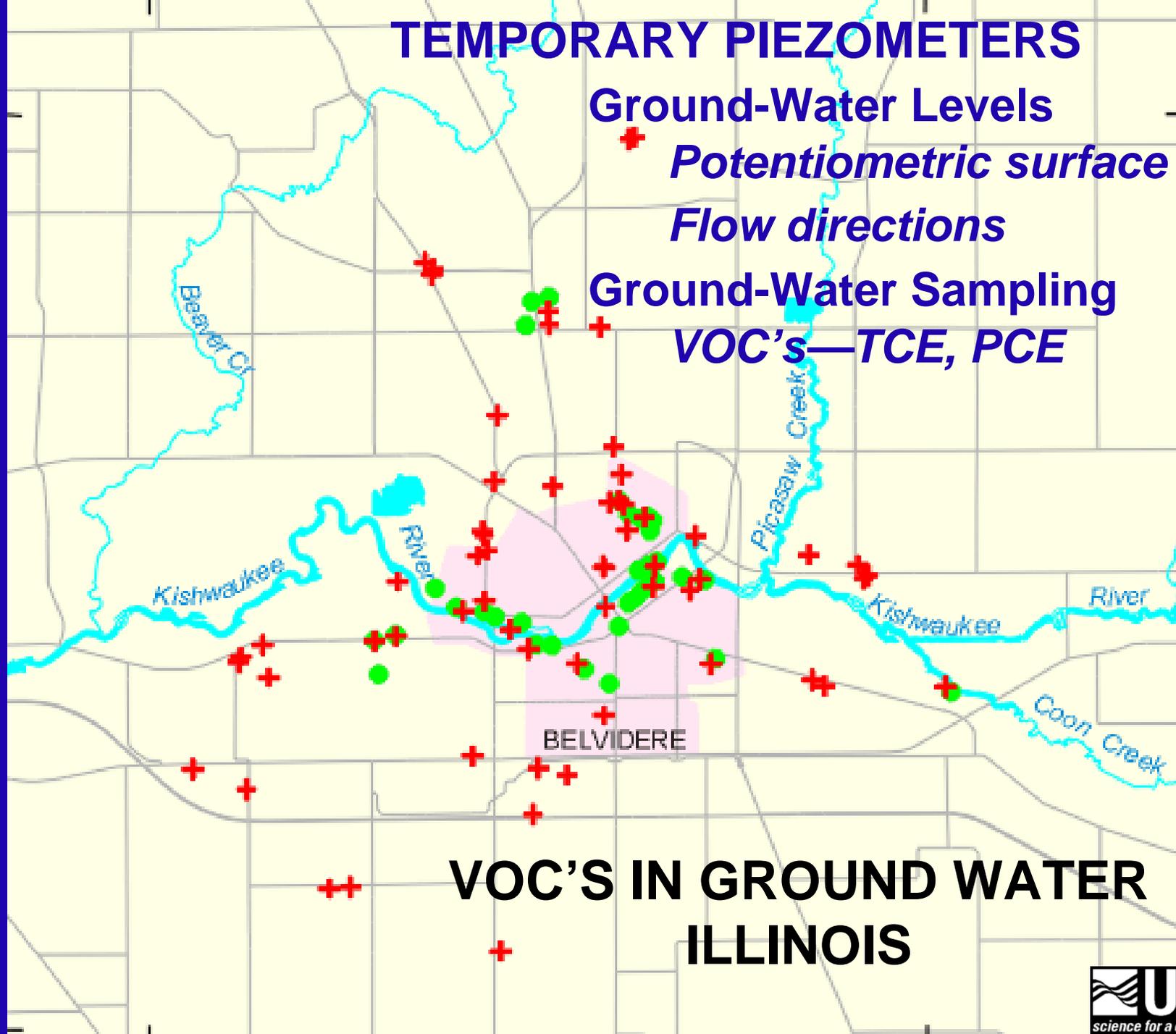
Ground-Water Levels

Potentiometric surface

Flow directions

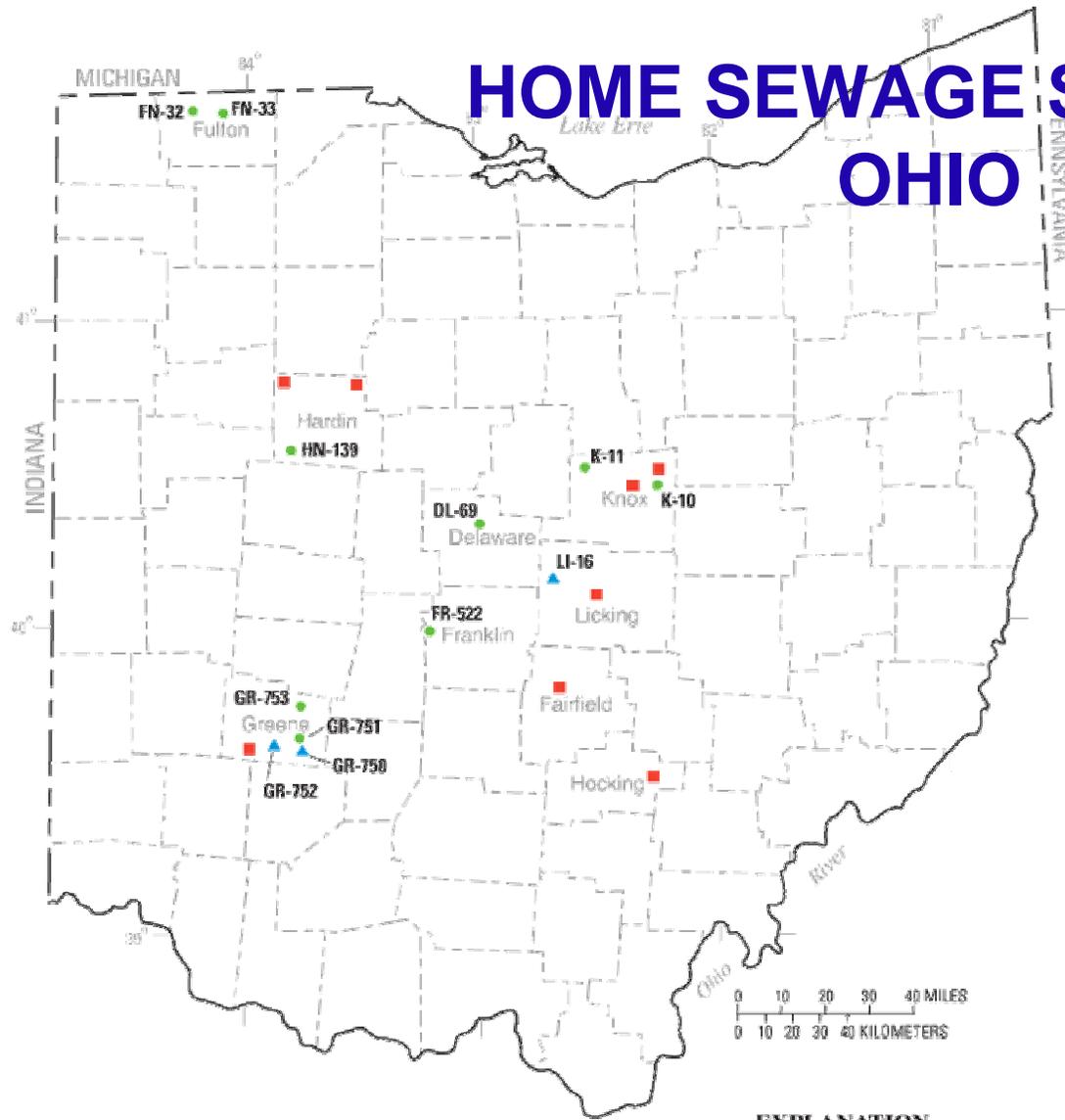
Ground-Water Sampling

VOC's—TCE, PCE



VOC'S IN GROUND WATER ILLINOIS

HOME SEWAGE SYSTEMS OHIO



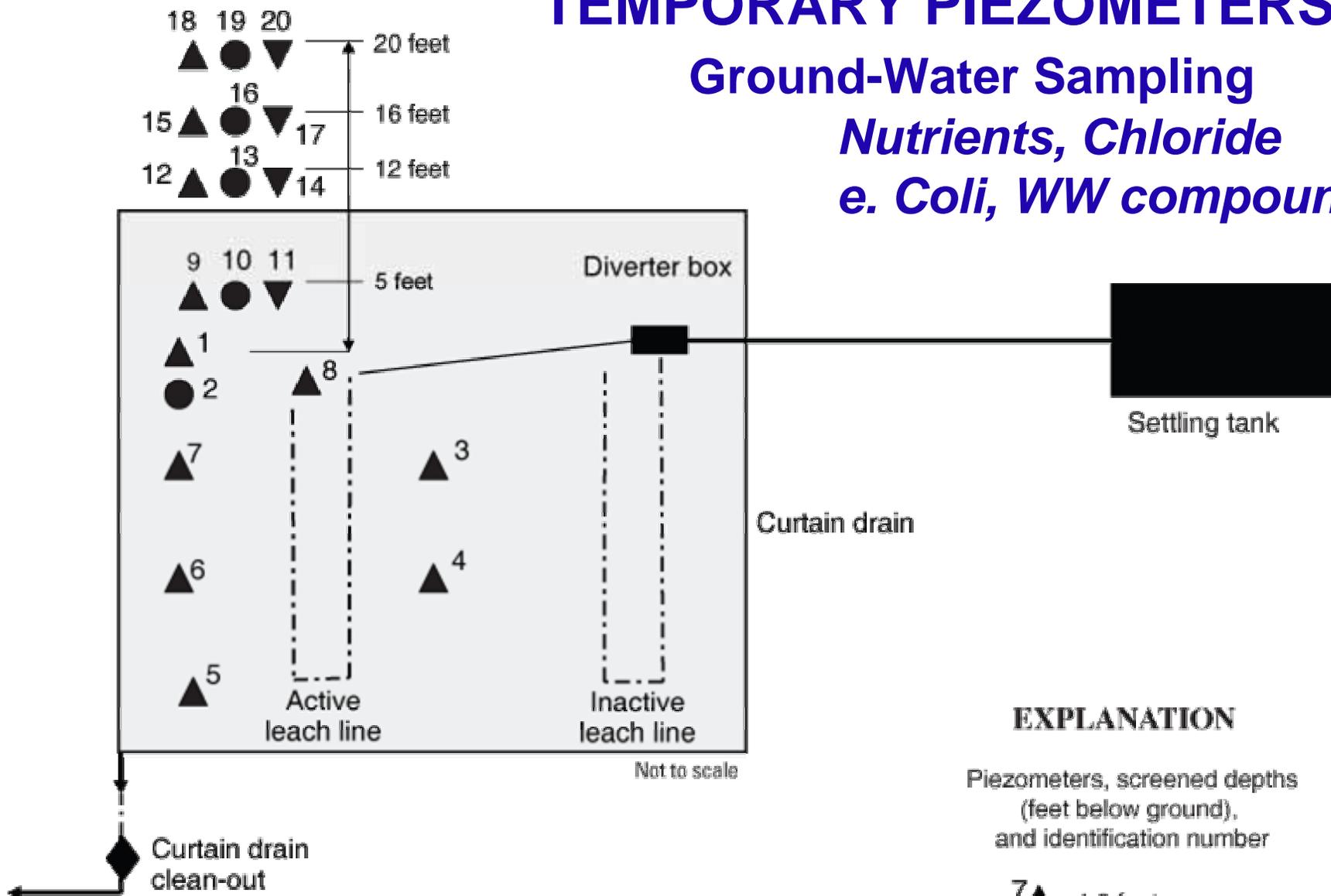
Dumouchelle and Stoeckel, 2005

EXPLANATION

- Unsampled phase 2 site
- GR-751 Sampled phase 2 site and identifier
- ▲ GR-750 Sampled phase 2 and phase 3 site and identifier
- - - County boundary

TEMPORARY PIEZOMETERS

Ground-Water Sampling
*Nutrients, Chloride
e. Coli, WW compounds*



EXPLANATION

Piezometers, screened depths (feet below ground), and identification number

7 ▲ 4-8 feet

10 ● 8-12 feet

17 ▼ 12-16 feet

Dumouchelle and Stoeckel, 2005

SOIL CORES

Hydrogeologic Framework

PIEZOMETER INSTALLATION

Ground-Water Levels

Flow Mapping

INDIANA NATIONAL GUARD
CAMP ATTERBURY, IN

CANNON AIR FORCE BASE NEW MEXICO



SOIL SAMPLING

Fuel Spills

VOC'S

Recharge Estimation

Chloride

Moisture Content



SOIL SAMPLING

Ordnance Residues

Organics

Nitrates

Trace Metals



U.S. ARMY RESERVES OIL-WATER SEPARATORS

Soil-Coring Boreholes



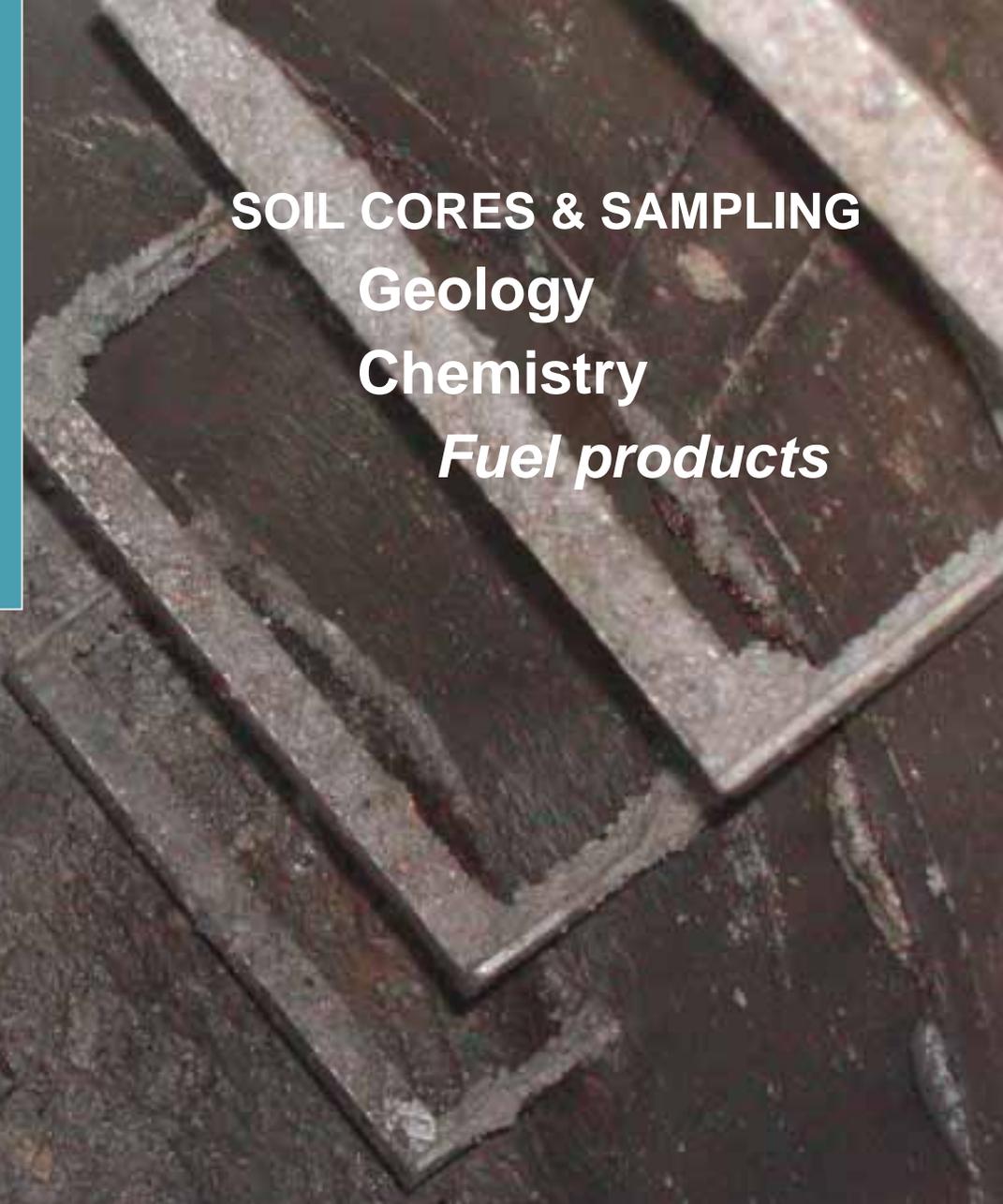


OWS UNIT

WASHING PAD



SOIL CORES & SAMPLING
Geology
Chemistry
Fuel products



Separator w/ die tracing

Sewer line w/ die tracing

OTHER PROJECT APPLICATIONS

- Rapid assessment of bedrock surface and saturated zone
- Installation of soil-moisture sensors
- Installation of drive-point wells
- Soil sampling under floorings or slabs
- Soil-gas sampling adjacent to a landfill



[HOME](#)