**Table 2-1**
**Reported Uses of Data Generated by Field Analytical and Site Characterization Technologies**

| Technology | Site Screening | Site Characterization | Cleanup Monitoring | Compliance Monitoring | Confirmation Sampling | Enforcement | Health and Safety Monitoring | Waste Characterization | Risk Assessment |
|---|---|---|---|---|---|---|---|---|---|
| *Chemical Technologies* | | | | | | | | | |
| Biosensor | ✔ | | ✔ | ✔ | | | | | |
| Colorimetric test strip | ✔ | ✔ | ✔ | ✔ | | | | | |
| Cone penetrometer mounted sensor | ✔ | ✔ | | | | | | | |
| Fiber-optic chemical sensor | ✔ | ✔ | | | | | | | |
| Fourier-transformed infrared spectrometry | | ✔ | ✔ | ✔ | | | ✔ | | |
| Gas chromatography | ✔ | ✔ | ✔ | | ✔ | | | | |
| Immunoassay | ✔ | ✔ | ✔ | ✔ | ✔ | | | ✔ | |
| Mercury vapor analyzer | | ✔ | | | | | ✔ | | |
| X-ray fluorescence | ✔ | ✔ | ✔ | ✔ | ✔ | ✔ | | | ✔ |
| *Geophysical Technologies* | | | | | | | | | |
| Bore-hole geophysical | | ✔ | | | | | | | |
| Direct-push electrical conductivity | ✔ | | | | | | | | |
| Electromagnetic induction | | ✔ | | | | | | | |
| Ground penetrating radar | ✔ | ✔ | | | | | | | |
| Magnetometry | | ✔ | | | | | | | |
| Seismic profiling | ✔ | ✔ | | | | | | | |
| *Radionuclide Technologies* | | | | | | | | | |
| Gamma radiation detector | ✔ | ✔ | | | | | | | |
| Passive alpha detector | ✔ | ✔ | | | | | ✔ | | |

**Table 2-1**
**Reported Uses of Data Generated by Field Analytical and Site Characterization Technologies (continued)**

| Technology | Site Screening | Site Characterization | Cleanup Monitoring | Compliance Monitoring | Confirmation Sampling | Enforcement | Health and Safety Monitoring | Waste Characterization | Risk Assessment |
|---|---|---|---|---|---|---|---|---|---|
| *Sampling and Sampler Emplacement Technologies* | | | | | | | | | |
| Closed-piston soil sampling | | ✔ | | | | | | | |
| Direct-push prepacked well screen | | ✔ | | ✔ | | | | | |
| Low-flow ground-water pumping | ✔ | ✔ | | ✔ | | | | | |
| Soil gas sampling | | ✔ | | | | | | | ✔ |
| Vertical ground-water profiling | | ✔ | | ✔ | | | | | |
| Vibrating well installation | ✔ | ✔ | | | | | | | |

## Table 2-2
## Reported Uses of Technologies by Medium and Analyte

| Analyte / Technology / Medium | Volatile Organic Compounds | | | | | Semivolatile Organic Compounds | | | | | Fuels | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Soil | Sediment | Ground Water | Soil Gas | Air | Soil | Ground Water | Surface Water | Soil Gas | Air | Soil | Sediment | Ground Water | Surface Water | Soil Gas |
| Biosensor | | | | | | | | | | | | | | | |
| Colorimetric test strip | | | | | | | | | | | | | | | |
| Cone penetrometer mounted sensor | ✔ | | ✔ | | | ✔ | ✔ | | | | ✔ | | ✔ | | |
| Fiber-optic chemical sensor | | | ✔ | ✔ | | | ✔ | | | | | | ✔ | | |
| Fourier-transformed infrared (FTIR) spectrometry | | | | | ✔ | | | | | ✔ | | | | | |
| Gas chromatography | ✔ | ✔ | ✔ | ✔ | ✔ | ✔ | ✔ | | | | ✔ | | ✔ | | ✔ |
| Immunoassay | ✔ | ✔ | ✔ | | | ✔ | ✔ | ✔ | | | ✔ | ✔ | ✔ | ✔ | |
| Mercury vapor analyzer | | | | | | | | | | | | | | | |
| X-ray fluorescence | | | | | | | | | | | | | | | |
| Bore-hole geophysical | | | | | | | | | | | | | | | |
| Direct-push electrical conductivity | | | | | | | | | | | | | | | |
| Electromagnetic induction | | | | | | | | | | | | | | | |
| Ground penetrating radar | | | | | | | | | | | | | | | |
| Magnetometry | | | | | | | | | | | | | | | |
| Seismic profiling | | | | | | | | | | | | | | | |
| Gamma radiation detector | | | | | | | | | | | | | | | |
| Passive alpha detector | | | | | | | | | | | | | | | |
| Closed-piston soil sampling | | | | | | | | | | | | | | | |
| Direct-push prepacked well screen | | | ✔ | | | | | | | | | | | | |
| Low-flow ground-water pumping | | | ✔ | | | | | | | | | | | | |
| Soil gas sampling | | | | ✔ | | | | | ✔ | | | | | | |
| Vertical ground-water profiling | | | ✔ | | | | | | | | | | | | |
| Vibrating well installation | | | ✔ | | | | ✔ | | | | | | ✔ | | |

**Table 2-2**
**Reported Uses of Technologies by Medium and Analyte (continued)**

| Analyte | Inorganics | | | Explosives | | Radio-nuclides | | Pesticides | | Geophysical | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Technology / Medium | Ground Water | Soil | Air | Soil | Ground Water | Soil | Sediment | Ground Water | Soil | Depth to Ground Water | Soil Type | Bedrock Stratigraphy | Conductivity | Buried Ferrous Metals | Temperature | Redox Potential | pH |
| Biosensor | | | | ✔ | ✔ | | | | | | | | | | | | |
| Colorimetric test strip | ✔ | ✔ | | ✔ | ✔ | | | | | | | | | | | | |
| Cone penetrometer mounted sensor | | | | | | | | | | ✔ | ✔ | | ✔ | | ✔ | ✔ | ✔ |
| Fiber-optic chemical sensor | | | | | | | | | | | | | | | | | |
| Fourier-transformed infrared (FTIR) spectrometry | | | | | | | | | | | | | | | | | |
| Gas chromotography | | | | | | | | ✔ | ✔ | | | | | | | | |
| Immunoassay | ✔ | ✔ | | | | | | ✔ | ✔ | | | | | | | | |
| Mercury vapor analyzer | | | ✔ | | | | | | | | | | | | | | |
| X-ray fluorescence | ✔ | ✔ | | | | | | | | | | | | | | | |
| Bore-hole geophysical | | | | | | | | | | ✔ | | ✔ | ✔ | | | | |
| Direct-push electrical conductivity | | | | | | | | | | | ✔ | ✔ | ✔ | | | | |
| Electromagnetic induction | | | | | | | | | | | | | ✔ | | | | |
| Ground penetrating radar | | | | | | | | | | ✔ | | ✔ | | ✔ | | | |
| Magnetometry | | | | | | | | | | | | | | ✔ | | | |
| Seismic profiling | | | | | | | | | | ✔ | ✔ | ✔ | | | | | |
| Gamma radiation detector | | | | | | ✔ | ✔ | | | | | | | | | | |
| Passive alpha detector | | | | | | ✔ | ✔ | | | | | | | | | | |
| Closed-piston soil sampling | | | | | | | | | | | ✔ | | | | | | |
| Direct-push prepacked well screen | | | | | | | | | | ✔ | | | | | | | |
| Low-flow ground-water pumping | ✔ | | | | | | | | | | | | | | | | |
| Soil gas sampling | | | | | | | | | | | | | | | | | |
| Vertical ground-water profiling | | | | | | | | | | | | | | | | | |
| Vibrating well installation | | | | | | | | | | | | | | | | | |

**Table 2-3**
**Summary of Field Analytical and Site Characterization Technologies**
**Reported Data on Specific Technologies**

| Site Description | EPA Region | Vendor/ Product | Media Monitored | Contaminant/ Parameter | Period of Use | Through-put | Data Use(s) | Cost | Technology Advantages | Technology Limitations | Contact(s) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Chemical Technologies** | | | | | | | | | | | |
| **Biosensor** | | | | | | | | | | | |
| Umatilla Army Depot-Hermiston, OR: explosives washout lagoon, open burn/open detonation (OB/OD) area, small arms incinerator, explosives in ground water | 10 | Research International, Inc. | Soil, ground water, composite residues (biotreatment monitoring) | Military explosives (TNT, RDX, HMX) | 15 months | 10-30 samples per day | Site screening, cleanup monitoring, compliance monitoring | Not provided | Real-time data; lower cost compared with analytical laboratory; higher sampling density at same cost | Not provided | Harry Craig (EPA) 503/326-3689 |
| **Colorimetric Test Strip** | | | | | | | | | | | |
| Agra PWS-Agra, KS: grain fumigation, pesticide and fertilizer production | 7 | Merck, Ltd. (purchased from Thomas Scientific, Inc.) | Soil (ex situ), ground water | Nitrate | 5 days | Soil: 10 minutes per sample Water: 2 minutes per sample | Site screening, site characterization | $10 per sample, including labor | Very fast; easy to use; low cost; used on site to guide investigation | Check for interference caused by nitrite; creation of soil slurry necessary to achieve performance | Darrell Hamilton (Tetra Tech EM Inc. [Tetra Tech]) 913/894-2600 Scott Alberg (KDHE) 913/296-1541 |
| Naval Submarine Base Bangor-Silverdale, WA: open burn and open detonation area | 10 | Strategic Diagnostics, Inc. (SDI) (RDX soil test kit) | Soil (ex situ) | Explosives (TNT, RDX) | 3 months | 5 samples per hour | Site characterization | $20 to $25 per sample, plus accessory kit | High sampling density and collection of real-time data; less expensive than laboratory data | Not provided | Harry Craig (EPA) 503/326-3689 |
| Umatilla Army Depot-Hermiston, OR: explosives washout lagoon, OB/OD area, small arms incinerator, explosives in ground water | 10 | SDI | Soil, ground water, composite residues | Military explosives (TNT, RDX, HMX) | 15 months | 10-30 samples per day | Site screening, cleanup monitoring, compliance monitoring | Not provided | Real-time data; lower cost compared with analytical laboratory; higher sampling density at same cost; worked exceptionally well with target analyte | Not provided | Harry Craig (EPA) 503/326-3689 |

**Table 2-3**
**Summary of Field Analytical and Site Characterization Technologies**
**Reported Data on Specific Technologies (continued)**

| Site Description | EPA Region | Vendor/ Product | Media Monitored | Contaminant/ Parameter | Period of Use | Through-put | Data Use(s) | Cost | Technology Advantages | Technology Limitations | Contact(s) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Cone Penetrometer Mounted Sensor** | | | | | | | | | | | |
| Site unidentified-Netherlands: landfill and refinery | Not applicable | Delft Geotechnics (Chemoprobe) | Soil, ground water, soil gas | Geophysical data (pH, redox potential, specific conductivity, hydraulic conductivity), LNAPL | Not provided | Measure-ments in 4 minutes; 0.5 hour to 1 hour for a complete sounding | Site characterization | Not provided | Much quicker and more cost-effective than conventional methods; more accurate measurements; allows three-dimensional mapping | Not provided | J.J. Olie (Delft Geotechnics) |
| Central Landfill 1-RI | 1 | Not provided | Soil (in situ) | DNAPL | Not provided | Not provided | Cleanup monitoring | Not provided | Rapid sampling; greater accuracy | Subsurface cobbles; not too sensitive | John Courzier (EPA) 617/573-5779 |
| Hanscom Air Force Base (AFB)-MA | 1 | Not provided | Soil | Not provided | Not provided | Not provided | Site characterization, cleanup monitoring | Not provided | Rapid sampling; greater accuracy | Subsurface cobbles; not too sensitive | Bob Lim (EPA) 617/223-5521 |
| Industriplex 1-MA | 1 | Not provided | Soil | Not provided | 1994 | Not provided | Site characterization | Not provided | Rapid sampling; greater accuracy | Subsurface cobbles; not too sensitive | Joe Lemay (EPA) 617/573-9622 |
| Loring AFB-ME | 1 | Not provided | Soil (in situ) | Not provided | Not provided | Not provided | Cleanup monitoring | Not provided | Rapid sampling; greater accuracy | Subsurface cobbles; not too sensitive | Mike Nalipinski (EPA) 617/223-5503 |
| Silresim 1-MA | 1 | Not provided | Soil, ground water | VOCs | Not provided | Not provided | Cleanup monitoring | Not provided | Not provided | Not provided | Almerinda Silva (EPA) 617/573-9627 |
| Stamina Mills 1-RI | 1 | Not provided | Soil (in situ) | TCE | Not provided | Not provided | Cleanup monitoring | Not provided | Technology minimizes vertical migration | Not provided | Neil Handler (EPA) 617/573-9636 |
| Union Chemical 1-ME | 1 | Not provided | Soil (in situ) | VOCs | Not provided | Not provided | Cleanup monitoring | Not provided | Not provided | Not provided | Terry Connelly (EPA) 617/573-9638 |

**Table 2-3**
**Summary of Field Analytical and Site Characterization Technologies**
**Reported Data on Specific Technologies (continued)**

| Site Description | EPA Region | Vendor/ Product | Media Monitored | Contaminant/ Parameter | Period of Use | Through-put | Data Use(s) | Cost | Technology Advantages | Technology Limitations | Contact(s) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Cone Penetrometer Mounted Sensor (continued)** | | | | | | | | | | | |
| Naval Weapons Station Earle- Colts Neck, NJ | 2 | U.S. Navy (SCAPS) | Soil (in situ) | BTEX, nonhalogenated VOCs, nonhalogenated SVOCs, | Not provided | 4 per hour | Site characterization | Not provided | Quick turnaround of results and fingerprinting capability; good for measuring the extent of free product in soils | Not provided | Jeffrey Gratz (EPA) 212/637-4320 John Mayhew (U.S. Navy) 610/595-0567 x125 & x146 |
| Freedom Textile Chemicals Co.- Charlotte, NC: landfill contaminated with VOCs and SVOCs | 4 | Not provided | Soil (in situ), sludge | Halogenated and nonhalogenated VOCs and SVOCs | Not provided | Not provided | Site characterization | Not provided | Not provided | Not provided | Joseph Alfand (EPA) 404/562-8496 Phillip Pelp (Freedom Textile Chemicals Co.) 704/393-0089 |
| Naval Air Station New Orleans- New Orleans, LA: fuel farm and piping | 6 | Navy Research and Development (NRaD) (SCAPS) | Soil (in situ) | PAHs (JP-5 aviation fuel) | 1/26/96- 1/27/96 | 41 LIF pushes (296 feet) | Site characterization | $2,300 to $4,600 per day for an average push rate of 200 feet per day | Enhanced site delineation | Not provided | Tom Hampton (NRaD) 619/553-1172 Hal Bolinger (LDEQ) 504/765-0232 |
| Sandia National Laboratory- Albuquerque, NM | 6 | NRaD (SCAPS) | Soil (in situ) | PAHs (diesel fuel) | 8/16/95- 8/18/95 and 11/1/95- 11/8/95 | 18 LIF pushes (905 feet) | Site characterization | $2,300 to $4,600 per day for an average push rate of 200 feet per day | Enhanced site delineation | Not provided | Tom Hampton (NRaD) 619/553-1172 John Wesnousky (California Environmental Protection Agency [CalEPA]) 916/322-2543 Steve Billets (USEPA National Environmental Research Laboratory-Las Vegas [NERL-LA]) 702/798-2232 |

**Table 2-3**
**Summary of Field Analytical and Site Characterization Technologies**
**Reported Data on Specific Technologies (continued)**

| Site Description | EPA Region | Vendor/ Product | Media Monitored | Contaminant/ Parameter | Period of Use | Through-put | Data Use(s) | Cost | Technology Advantages | Technology Limitations | Contact(s) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Cone Penetrometer Mounted Sensor (continued)** | | | | | | | | | | | |
| Site unidentified-Location not provided: former manufactured gas plant, coal tar wastes | 7 | TriServices SCAPS program | Soil (in situ), ground water | PAHs, TPH | 10 days | 208 feet per day | Site characterization | $2,300 to $4,600 per day for an average push rate of 200 feet per day | Continuous, real-time data; quick decontamination; no soil cuttings | Limited by rough terrain, tight spaces, and subsurface cobbles | Greg Stenback (Iowa State University) Dr. Al Bevolo (Ames Laboratory) 515/294-5414 Kathy Older (USACE) |
| Site unidentified-Lexington, NE: manufacturing site, use of solvents, cutting oils, motor fuels, hydraulic fluids, and heating oil | 7 | Unisys Corporation (Rapid Optical Screening Tool [ROST™]) | Soil (in situ) | Aromatic petroleum hydrocarbons | 3 days | Cone penetro-meter is advanced at 2 centimeters per second or 290 feet per day | Site characterization | $7,000 per day, or $500 per push, or $24 per foot | Faster and less expensive than traditional techniques; continuous and real-time data; no soil cuttings; quicker decontamination than other methods | Difficult to correlate fluorescence intensity with TPH data | Kevin Earley and Keith Rapp (Unisys) |
| Department of Defense Housing Facility-Novato, CA: exchange gas station | 9 | NRaD (SCAPS) | Soil (in situ) | PAHs (diesel fuel and gasoline) | 5/15/96-5/22/96 | 15 LIF pushes (178 feet) | Site characterization | $2,300 to $4,600 per day for an average push rate of 200 feet per day | Enhanced site delineation | Not provided | Tom Hampton (NRaD) 619/553-1172 John Pfister (NAVFAC EFA-West) 415/244-2568 |
| Guadelupe Oil Field-CA: | 9 | NRaD (SCAPS) | Soil (in situ) | PAHs (kerosene) | 8/23/94-9/8/94 | 36 LIF pushes (1,327 feet) | Site characterization | $2,300 to $4,600 per day for an average push rate of 200 feet per day | Enhanced site delineation | Not provided | Tom Hampton (NRaD) 619/553-1172 Richard Aleshire (California Central Coast Regional Water Quality Control Board) 805/542-4631 |

**Table 2-3**
**Summary of Field Analytical and Site Characterization Technologies**
**Reported Data on Specific Technologies (continued)**

| Site Description | EPA Region | Vendor/ Product | Media Monitored | Contaminant/ Parameter | Period of Use | Through-put | Data Use(s) | Cost | Technology Advantages | Technology Limitations | Contact(s) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Cone Penetrometer Mounted Sensors (continued)** | | | | | | | | | | | |
| Marine Corps Air Station, Site 13-Gallarnd, CA: leaking USTs, refinery wastes | 9 | U.S. Navy (SCAPS) | Soil (in situ) | TPH | 2 weeks | 4 cone penetrometer testing (CPT) soundings per day (depends on depth) | Site characterization | $3,500 per day | Real-time profile; quick understanding of site; allows focusing of CLP sampling | Expensive; requires a lot of equipment; naturally occurring fluorescence material can lead to false positives | Rachael Simon (EPA) 415/744-2383 |
| Marine Corp Air Station-29 Palms, CA | 9 | NRaD (SCAPS) | Soil (in situ) | PAHs (JP-5 [aviation fuel], diesel fuel, waste and heating oil) | 8/23/95-8/25/95 | 8 LIF pushes (220 feet) | Site characterization | $2,300 to $4,600 per day for an average push rate of 200 feet per day | Enhanced site delineation | Not provided | Tom Hampton (NRaD) 619/553-1172 |
| Marine Corps Base-Camp Pendelton, CA: ground control approach facility | 9 | NRaD (SCAPS) | Soil (in situ) | PAHs (diesel fuel) | 6/27/94-7/6/94 | 25 LIF pushes (335 feet) | Site characterization | $2,300 to $4,600 per day for an average push rate of 200 feet per day | Enhanced site delineation | Not provided | Tom Hampton (NRaD) 619/553-1172 Vickie Church (San Diego County, California) 619/338-2243 |
| Marine Corp Air Station-Yuma, AZ: firefighter training area and fuel bladders | 9 | NRaD (SCAPS) | Soil (in situ) | PAHs (JP-5 [aviation fuel], diesel and gasoline fuel) | 5/17/94-6/9/94 | 29 LIF pushes (1169 feet) | Site characterization | $2,300 to $4,600 per day for an average push rate of 200 feet per day | Enhanced site delineation | Minor mineral fluorescence, spectrally indistinguishable | Tom Hampton (NRaD) 619/553-1172 Davis Mangold (Navy Facilities Command Southwest Division [NAVFACSW-DIV]) 619/532-2534 |

**Table 2-3**
**Summary of Field Analytical and Site Characterization Technologies**
**Reported Data on Specific Technologies (continued)**

| Site Description | EPA Region | Vendor/ Product | Media Monitored | Contaminant/ Parameter | Period of Use | Through-put | Data Use(s) | Cost | Technology Advantages | Technology Limitations | Contact(s) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Cone Penetrometer Mounted Sensors (continued)** | | | | | | | | | | | |
| Marine Corp Recruit Depot- Yuma, AZ: fire training area, disposal of aircraft cleaning fluids (solvents), landfill, sewage lagoon | 9 | U.S. Navy (SCAPS) | Soil (in situ) | PAHs (diesel and gasoline fuel) | 1/30/95-2/9/95 and 2/21/95-3/1/95 | 25 LIF pushes (514 feet) 21 LIF pushes (318 feet) | Site characterization | Not provided | Enhanced site delineation | Not provided | Tom Hampton (U.S. Navy) 619/553-1172 Vickie Church (San Diego County) 619/338-2243 |
| Naval Air Station, Site 13- Alameda, CA: former refinery | 9 | NRaD (SCAPS) | Soil (in situ), ground water | PAHs (refinery waste) | 3/17/94-4/6/94 | 45 LIF pushes (808 feet) | Site characterization | $2,300 to $4,600 per day for an average push rate of 200 feet per day | Enhanced site delineation | Not provided | Tom Hampton (NRaD) 619/553-1172 Lt. Mike Petouhoff (Base Environmental) 510/263-3726 |
| Naval Air Station North Island- CA: leaking UST | 9 | NRaD (SCAPS) | Soil (in situ) | PAHs (diesel fuel) | 7/25/94-8/4/94 | 25 LIF pushes (701 feet) | Site characterization | $2,300 to $4,600 per day for an average push rate of 200 feet per day | Enhanced site delineation; data was used to support the closure of USTs | Not provided | Tom Hampton (NRaD) 619/553-1172 Richard Mach (NAVFAC SWDIV) 619/556-9934 |
| Naval Complex- Long Beach, CA: multiple UST sites | 9 | NRaD (SCAPS) | Soil (in situ), ground water | PAHs (diesel fuel, gasoline, and waste oil) | 9/16/96-9/27/96, 10/7/96-10/18/96, and 10/28/96-11/8/96 | 121 LIF pushes (1667 feet) | Site characterization | $2,300 to $4,600 per day for an average push rate of 200 feet per day | Enhanced site delineation; assisted with plume delineation; site closure with minimum sampling; obtained regulatory closure of 16 sites with LIF data and limited confirmation sampling of soil and ground water by a fixed laboratory | Minor mineral fluorescence, spectrally indistinguishable | Tom Hampton (NRaD) 619/553-1172 Hugh Marley (Los Angeles Regional Water Quality Control Board) 213/266-7669 Gary Simon (NAVFAC SWDIV) 619/532-2537 |

**Table 2-3**
**Summary of Field Analytical and Site Characterization Technologies**
**Reported Data on Specific Technologies (continued)**

| Site Description | EPA Region | Vendor/ Product | Media Monitored | Contaminant/ Parameter | Period of Use | Through-put | Data Use(s) | Cost | Technology Advantages | Technology Limitations | Contact(s) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Cone Penetrometer Mounted Sensors (continued)** | | | | | | | | | | | |
| Naval Radio Receiving Facility-<br>Imperial Beach, CA | 9 | NRaD<br>(SCAPS) | Soil (in situ) | PAHs<br>(fuel oil) | 3/6/95-<br>3/22/95 | 36 LIF pushes (813 feet) | Site characterization | $2,300 to $4,600 per day for an average push rate of 200 feet per day | Enhanced site delineation; obtained regulatory closure of 2 UST sites with only 1 confirmatory soil boring each | Petroleum UST cleanups are moving toward risk-based closure; therefore, the screening-level data from SCAPS is becoming less valuable | Tom Hampton (NRaD) 619/553-1172<br>Richard Mach (NAVFAC SWDIV) 619/556-9934 |
| Naval In Service Engineering/West-<br>San Diego, CA: hydraulic pump pit | 9 | NRaD<br>(SCAPS) | Soil (in situ) | PAHs<br>(hydraulic oil) | 7/22/96-<br>7/23/96 | 8 LIF pushes (56 feet) | Site characterization | $2,300 to $4,60 per day for an average push rate of 200 feet per day | Enhanced site delineation; rapid delineation with limited confirmatory soil and water sampling; permitted regulatory approval of site reuse | Not provided | Tom Hampton (NRaD) 619/553-1172 |
| Naval Training Center-<br>San Diego, CA: exchange service station and hobby shop | 9 | NRaD<br>(SCAPS) | Soil (in situ) | PAHs<br>(gasoline and waste oil) | 10/24/94-<br>11/8/94, and 11/15/94-<br>11/16/94 | 33 LIF pushes (593 feet)<br>16 LIF pushes (214 feet) | Site characterization | $2,300 to $4,600 per day for an average push rate of 200 feet per day | Enhanced site delineation; provided data to develop and implement site remediation and closure | Not provided | Tom Hampton (NRaD) 619/553-1172<br>Thomas Macchiarelli (NAVFAC SWDIV) 619/532-3808 |
| Naval Weapons Station-<br>China Lake, CA | 9 | NRaD<br>(SCAPS) | Soil (in situ) | PAHs<br>(JP-5 [aviation fuel], diesel fuel, gasoline, and waste oil) | 8/29/95-<br>8/30/95 | 12 LIF pushes (224 feet) | Site characterization | $2,300 to $4,600 per day for an average push rate of 200 feet per day | Enhanced site delineation | Not provided | Tom Hampton (NRaD) 619/553-1172 |

**Table 2-3**
**Summary of Field Analytical and Site Characterization Technologies**
**Reported Data on Specific Technologies (continued)**

| Site Description | EPA Region | Vendor/ Product | Media Monitored | Contaminant/ Parameter | Period of Use | Through-put | Data Use(s) | Cost | Technology Advantages | Technology Limitations | Contact(s) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Cone Penetrometer Mounted Sensors (continued)** | | | | | | | | | | | |
| Naval Outlying Landing Field-<br>Imperial Beach, CA:<br>fuel depot | 9 | NRaD (SCAPS) | Soil (in situ) | PAHs (JP-5 [aviation fuel], diesel fuel and gasoline) | 11/30/94-12/15/94 | 38 LIF pushes (698 feet) | Site characterization | $2,300 to $4,600 per day for an average push rate of 200 feet per day | Enhanced site delineation; data was used to support the closure of 2 USTs | Not provided | Tom Hampton (NRaD) 619/553-1172<br>Richard Mach (NAVFAC SWDIV) 619/532-1156 |
| Naval Station-<br>San Diego, CA:<br>Bldg. 279 | 9 | NRaD (SCAPS) | Soil (in situ) | PAHs (gasoline) | 8/12/96-8/15/96 | 20 LIF pushes (177 feet) | Site characterization | $2,300 to $4,600 per day for an average push rate of 200 feet per day | Enhanced site delineation | Not provided | Tom Hampton (NRaD) 619/553-1172 |
| Naval Station-<br>San Diego, CA:<br>firefighter training facility | 9 | NRaD (SCAPS) | Soil (in situ) | PAHs (JP-5 [aviation fuel], gasoline) | 1/11/94-2/8/94 | 22 LIF pushes (313 feet) | Site characterization | $2,300 to $4,600 per day for an average push rate of 200 feet per day | Enhanced site delineation | Not provided | Tom Hampton (NRaD) 619/553-1172<br>Rick Bassinet (NAVFAC SWDIV) 619/532-1636 |
| Naval Construction Battalion Corps-<br>Port Hueneme, CA:<br>hydrocarbon national test site and exchange gas station | 9 | NRaD (SCAPS) | Soil (in situ) | PAHs (diesel fuel) | 4/4/95-4/11/95, 5/16/95-5/22/95, and 5/28/96-5/30/96 | 24 LIF pushes (472 feet) | Site characterization | $2,300 to $4,600 per day for an average push rate of 200 feet per day | Enhanced site delineation; vertical resolution of 2 inches; enhanced vertical resolution | Not provided | Tom Hampton (NRaD) 619/553-1172<br>John Wesnousky (CalEPA) 916/322-2543<br>Steve Billets (USEPA NERL-LV) 702/798-2232 |
| Naval Air Station North Island-<br>Coronado, CA:<br>fuel tank depot | 9 | NRaD (SCAPS) | Soil (in situ) | PAHs (JP-5 [aviation fuel], marine diesel fuel) | 7/14/93-7/15/93, 8/18/93-8/31/93, and 10/5/93-10/8/93 | 40 LIF pushes (708 feet) | Site characterization | $2,300 to $4,600 per day for an average push rate of 200 feet per day | Enhanced site delineation; vertical resolution of 2 inches; data used to develop site remediation system | Not provided | Tom Hampton (NRaD) 619/553-1172<br>Richard Mach (NAVFAC SWDIV) 619/556-9934 |

**Table 2-3**
**Summary of Field Analytical and Site Characterization Technologies**
**Reported Data on Specific Technologies (continued)**

| Site Description | EPA Region | Vendor/ Product | Media Monitored | Contaminant/ Parameter | Period of Use | Through-put | Data Use(s) | Cost | Technology Advantages | Technology Limitations | Contact(s) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Cone Penetrometer Mounted Sensors (continued)** | | | | | | | | | | | |
| Naval Amphibious Base-Coronado, CA: abandoned fuel farm | 9 | NRaD (SCAPS) | Soil (in situ) | PAHs (gasoline and diesel fuel) | 2/15/94-3/1/94 | 22 LIF pushes (274 feet) | Site characterization | Not provided | Enhanced site delineation | Not provided | Tom Hampton (NRaD) 619/553-1172 Kevin Heaton (San Diego County, California) 619/338-2243 |
| **Fiber-optic Chemical Sensor** | | | | | | | | | | | |
| Site unidentified-Northeast United States (specific location not provided): two leaking UST sites | 1 | ORS Environmental Systems (ChemSensor) | Ground water | VOCs (TCE), SVOCs, BTEX, TPH | Not provided | 10 minutes per measure-ment | Site screening, site characterization | Not provided | Easy to use; rapid, inexpensive data; very portable | Concentration of contaminants affects response time | John Hanshaw (ORS Environmental Systems) 800/228-2310 |
| Savannah River Site-Aiken, SC: TCE used as degreasing solvent | 4 | Lawrence Livermore National Laboratory (TCE sensor) | Soil gas, ground water | VOC (TCE) | Not provided | Continuous measure-ment | Site screening, site characterization | Not provided | Capable of in situ measurements; less expensive than off-site analysis; rapid measurements | Possible interference from other chlorinated VOCs | Joe Rossabi (Westinghouse Savannah River Company) 803/725-5220 |
| Site unidentified-Las Vegas, NV: leaking UST site | 9 | FCI Environmental, Inc. (PetroSense® PHA-100) | Ground water | TPH | Not provided | Not provided | Site characterization | Not provided | Can be used in situ; real-time data; easy to use; less expensive than off-site analysis | Results affected by bailing method and amount of water bailed | Devinder P.Salini (FCI Environmental, Inc.) 702/361-7921 |
| **Fourier-transformed Infrared (FTIR) Spectrometry** | | | | | | | | | | | |
| French Limited Superfund Site-Crosby, TX | 6 | Not provided | Air | BTEX, PAHs, methane, carbon monoxide | 4 days | Continuous measure-ment | Cleanup monitoring (to evaluate bioremediation), health and safety monitoring | Not provided | Not provided | Water vapor presents a potential interference for the absorption features of toluene, benzene, and naphthalene | Jim Sealy (ManTech Environmental Technology) 405/436-8658 |

**Table 2-3**
**Summary of Field Analytical and Site Characterization Technologies**
**Reported Data on Specific Technologies (continued)**

| Site Description | EPA Region | Vendor/ Product | Media Monitored | Contaminant/ Parameter | Period of Use | Through-put | Data Use(s) | Cost | Technology Advantages | Technology Limitations | Contact(s) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Fourier-transformed Infrared (FTIR) Spectrometry (continued)** | | | | | | | | | | | |
| Bliss Ellisville-Wild Wood, MO: dioxin-contaminated oil sprayed on site, buried drums of industrial waste, and uncontained waste | 7 | Not provided | Air | VOCs | 4 months | 40-50 measure-ments over a 4-month period | Health and safety monitoring | Not provided | Real-time data; portable system; compound-specific | QA/QC methods not well developed | Wood Ramsey (EPA) 913/551-7382 Mark Thomas (EPA) 913/551-7937 Randy Scheidermann (E&E) 913/432-9961 |
| Site unidentified-Location not provided | 7 | None - developed by universities | Air | VOCs | 1 day | Measure-ments every 12 minutes | Compliance monitoring (for air emissions) | Not provided | Precision and accuracy similar to accepted Method TO-14; adequate detection levels; fast, on-site data | Not appropriate for a high degree of spatial resolution in ambient air monitoring | Jody Hudson (EPA) 913/551-5064 |
| **Gas Chromatography** | | | | | | | | | | | |
| Site unidentified-Jard, VT | 1 | Not provided | Not provided | Not provided | 12/31/91-11/11/92 | Not provided | Cleanup monitoring | Not provided | Avoided downtime; data quality effective for determining final sampling locations | Not provided | Mary Ellen Stanton (EPA) 617/573-9670 |
| Beede Waste Oil-NH | 1 | PE Photovac, Inc., Thermo Instrument Systems, Inc. | Soil | VOCs, PCBs | 11/93-12/93 | Not provided | Site characterization | Not provided | Avoided downtime; data quality effective for determining final sampling locations | Not provided | Dorrie Paar (EPA) 617/573-5768 |
| Connecticut Building Wrecking-CT | 1 | PE Photovac, Inc. | Air | VOCs | 12/23/91 | Not provided | Site characterization | Not provided | Avoided downtime; data quality effective for determining final sampling locations | Not provided | Dorrie Paar (EPA) 617/573-5768 |
| Indian Line Farm-MA | 1 | PE Photovac, Inc., Thermo Instrument Systems, Inc. | Soil | VOCs, PCBs | 2/27/92-5/28/93 | Not provided | Site characterization, cleanup monitoring | Not provided | Avoided downtime; data quality effective for determining final sampling locations | Not provided | Gary Lipson (EPA) 617/223-5584 |

**Table 2-3**
**Summary of Field Analytical and Site Characterization Technologies**
**Reported Data on Specific Technologies (continued)**

| Site Description | EPA Region | Vendor/ Product | Media Monitored | Contaminant/ Parameter | Period of Use | Through- put | Data Use(s) | Cost | Technology Advantages | Technology Limitations | Contact(s) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Gas Chromatography (continued)** | | | | | | | | | | | |
| Site unidentified- Leicester, MA: landfill | 1 | PE Photovac, Inc., Thermo Instrument Systems, Inc. | Air | VOCs | 1/22/92 | Not provided | Site characterization | Not provided | Avoided downtime; data quality effective for determining final sampling locations | Not provided | Dorrie Paar (EPA) 617/573-5768 |
| Pichillo Farm Superfund Site-Coventry, RI | 1 | TMA | Soil (ex situ), soil gas | VOCs, SVOCs | 6/96-12/96 | 2 soil samples per hour | Site characterization | Not provided | On-site real-time results | Not provided | Anna Kraskow (EPA) 617/573-5749 Richard Willy (EPA) 617/573-9639 Alan Peterson (EPA) 617/860-4607 |
| Resolve 1- MA | 1 | PE Photovac, Inc. | Air | VOCs | 6/93-7/94 | Not provided | Compliance monitoring | Not provided | Avoided downtime; data quality effective for determining final sampling locations | Instrument calibration requires a significant amount of time | Joe Lemay (EPA) 617/573-9622 |
| Site unidentified- Stratford, CT | 1 | Thermo Instrument Systems, Inc. | Soil | PCBs | 6/17/93 | Not provided | Cleanup monitoring | Not provided | Avoided downtime; data quality effective for determining final sampling locations | Not provided | Mike Jagingici (EPA) 617/573-5786 |
| Three C- MA | 1 | Thermo Instrument Systems, Inc. | Soil | PCBs | 8/8/95- 8/26/95 | Not provided | Site characterization, cleanup monitoring | Not provided | Avoided downtime; data quality effective for determining final sampling locations | Not provided | Dorrie Paar (EPA) 617/573-5768 |
| Toka-Renbe Farm- MA | 1 | PE Photovac, Inc., Thermo Instrument Systems, Inc. | Soil | VOCs, PCBs | 7/7/94 | Not provided | Site characterization, cleanup monitoring | Not provided | Avoided downtime; data quality effective for determining final sampling locations | Not provided | Lisa Danek (EPA) 617/573-5707 |

**Table 2-3**
**Summary of Field Analytical and Site Characterization Technologies**
**Reported Data on Specific Technologies (continued)**

| Site Description | EPA Region | Vendor/ Product | Media Monitored | Contaminant/ Parameter | Period of Use | Through-put | Data Use(s) | Cost | Technology Advantages | Technology Limitations | Contact(s) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Gas Chromatography (continued)** | | | | | | | | | | | |
| Site unidentified-Location not provided: active manufacturing facility | 3 | PE Photovac, Inc. (10S70GC with photoionization detector) | Soil (ex situ) | Halogenated and nonhalogenated VOCs | Not provided | 120 samples per day with 3 GCs | Cleanup monitoring | $35 per sample | On-site data used to guide investigation; less costly than off-site analysis; high sample throughput; saved costs for the removal action | Not provided | David Catherman (Environmental Resources Management, Inc.) 610/524-3500 |
| Site unidentified-Illinois: contamination from old compressors that used PCB-containing oils | 4 | Hewlett Packard (5890 Series II GC) | Soil (ex situ), sediment (ex situ) | PCBs | Not provided | 20 minutes per sample | Cleanup monitoring | Not provided | Good correlation between on-site and off-site data; reduced cost; quick data | Modified extraction time required to obtain consistent results | Brad Anderer (TRC Environmental Corporation) |
| Koppers-Morrisville-Morrisville, NC: wood treatment operations | 4 | Shimadzu (14AGC) | Soil (ex situ), ground water, air | SVOCs (PCP), dioxin | 3 weeks | 2 samples per hour | Cleanup monitoring, health and safety monitoring | $13.50 per sample for expendables; $23,214 to purchase GC system; $1,500 per month to rent GC system | On-site data used to verify performance of remediation technology; quick-turnaround data; less expensive than formal analysis | Petroleum carrier solvent for PCP caused interference problems, resulting in poor recovery for some soil samples | Darrell Hamilton (Tetra Tech) 913/894-2600 |
| Florida Department of Transportation - Fairbanks, FL: contaminated landfill | 4 | Not provided | Soil (ex situ) | PAHs | 1 year | Not provided | Site screening, site characterization, cleanup monitoring, confirmation sampling | Not provided | Allows for quick separation of soil into clean or dirty groups when removing large volumes of soil | Operator must be familiar with equipment | Wesley S. Hardegree (EPA) 404/562-8486 Steve Spurlin (EPA) 404/562-8743 |

**Table 2-3**
**Summary of Field Analytical and Site Characterization Technologies**
**Reported Data on Specific Technologies (continued)**

| Site Description | EPA Region | Vendor/ Product | Media Monitored | Contaminant/ Parameter | Period of Use | Through-put | Data Use(s) | Cost | Technology Advantages | Technology Limitations | Contact(s) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Gas Chromatography (continued)** | | | | | | | | | | | |
| Pig's Eye Landfill-St. Paul, MN: municipal solid waste landfill (also contains industrial wastes) | 5 | Tekmar-Dohrmann, Inc. (HSA) Shimadzu (14AGC) | Soil (ex situ), ground water, soil gas | Halogenated and nonhalogenated VOCs, solvents, BTEX | 3 weeks | 20 samples per day | Site screening (to determine extent of contamination), site characterization | $50 per sample | Technology was less expensive than off-site laboratory analysis; achieved low detection limits, especially for chlorinated VOCs; data used to guide investigation; only one mobilization | Not provided | Patrick Splichal (Tetra Tech) 913/894-2600 |
| Hastings Superfund Site-NB: landfill, contaminated ground water | 7 | Not provided (GC used with electron capture detector) | Soil (ex situ), ground water | Halogenated VOCs | 6/97 | Not provided | Site characterization, cleanup monitoring | Not provided | Real-time data; CLP equivalent; no purge and trap required | Technology requires mobile laboratory | Diane Easley (EPA) 915/551-7797 |
| Kinsley Airport- Kinsley, KS: pesticide formulation, spraying, and tank and applicator cleaning | 7 | Hewlett Packard | Soil (ex situ), ground water | Pesticides, herbicides (containing chlorinated and nitrogen compounds) | 1 week | Not provided | Site screening, site characterization | Approxi-mately $100 per sample | Ability to detect compounds at MCL concentrations; technology produced quick results at about one-third the cost of off-site analysis | Simultaneous elution of 3 target pesticides hinders ability to meet detection limits | Darrell Hamilton (Tetra Tech) 913/894-2600 |
| Site unidentified-Location not provided: drum recycling site | 8 | Viking Instruments Inc. (GC/MS) | Soil gas, air | VOCs | Not provided | Not provided | Cleanup monitoring, health and safety monitoring | Not provided | Data correlated well with off-site data; data could be used to guide the removal action; portable system; data could be used to monitor public safety | Not provided | Alan Humphrey (EPA) 732/321-6748 Steven Hawthorn (EPA) 303/312-6061 |

## Table 2-3
## Summary of Field Analytical and Site Characterization Technologies
## Reported Data on Specific Technologies (continued)

| Site Description | EPA Region | Vendor/ Product | Media Monitored | Contaminant/ Parameter | Period of Use | Through-put | Data Use(s) | Cost | Technology Advantages | Technology Limitations | Contact(s) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Gas Chromatography (continued)** | | | | | | | | | | | |
| Mount Olivet Cemetery-Salt Lake City, UT | 8 | PE Photovac, Inc. | Soil (ex situ) | VOCs (Pentachloro-ethane [PCE]) | Ongoing | Not provided | Site screening (plume tracing) | Not provided | Time savings; cost savings | Not provided | Luke Chaved (EPA) 303/312-6512 Barry Hayhurst (URS Greiner, Inc.) 303/291-8270 |
| China Lake NAWS-Ridgecrest, CA: laboratory wastes and petroleum wastes from refueling operations and leaking USTs | 9 | Hewlett-Packard (5890 GC) | Soil (ex situ), ground water | TPH-extractable, PAHs, PCBs, phthalates, light nonaqueous phase liquids (LNAPL) | 6 weeks | 20 samples per day | Site screening, site characterization | Rental cost of $3,000 per month; $5,000 for expendable supplies for 450 samples | Quick turnaround data; reduced number of samples sent off-site for analysis; reduced costs | Lack of positive identification because there was no mass spectroscopy or second column confirmation; requires operator experience; TPH interference | Darrell Hamilton (Tetra Tech) 913/894-2600 |
| Moffett Field-Mountain-View, CA: leaking USTs and pipelines at fuel farm | 9 | Shimadzu (14A GC) Tekmar-Dohrmann, Inc. (headspace analyzer) | Soil (ex situ), ground water | TPH-purgeable, BTEX | 2 weeks | 25 to 30 samples per day | Site screening, site characterization | Equipment can be rented for about $2,500 per month | Simultaneous analysis for BTEX, as well as several fuels; inexpensive; no solvent waste | Poor extraction of diesel fuel from soils with high organic matter | Patrick Splichal (Tetra Tech) 913/894-2600 Jean Barranco (Tetra Tech) 303/295-1101 |
| Piper Aircraft Corporation-Vero Beach, CA | 9 | Sentex Systems, Inc. (portable GC - Sentograph™) | Soil (ex situ), sediment (ex situ), ground water | VOCs (TCE) | 8/23-8/26/92 | 25 samples per 4 days | Site characterization | Not provided | Real-time data | Library of components limited | Roger E. Carlton (EPA) 706/355-8609 Bill Bokey and Arthur Lee (Piper Aircraft Corporation) 706/355-8604 |
| Garden City Ground Water-Garden City, ID: ground water contamination | 10 | Not provided (sample extracted using mobile laboratory equipment and analyzed with field GC) | Soil (ex situ), ground water, soil gas | VOCs, solvents | 5 weeks | 2 samples per hour | Site screening, site characterization, enforcement | Not provided | Quick turnaround time; allowed sampling of a large area for a low cost | Not provided | David Bennett (EPA) 206/553-2103 |

**Table 2-3**
**Summary of Field Analytical and Site Characterization Technologies**
**Reported Data on Specific Technologies (continued)**

| Site Description | EPA Region | Vendor/ Product | Media Monitored | Contaminant/ Parameter | Period of Use | Through-put | Data Use(s) | Cost | Technology Advantages | Technology Limitations | Contact(s) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Gas Chromatography (continued)** | | | | | | | | | | | |
| Preston Ground Water-Preston, ID: gas station with a leaking UST, causing ground-water contamination | 10 | Hewlett Packard (HP 5890) | Soil (ex situ), ground water | VOCs, BTEX | 1 month | 3 samples per hour | Site screening, site characterization | 50 percent of the cost of CLP data | Real-time data to help direct the field program; tracking of the plume; cost-effective; high quality results | Not provided | Chris Field (EPA) 206/553-1674 |
| **Immunoassay** | | | | | | | | | | | |
| Industrial Buildings-Location not provided | Not specified | ImmunoSystems, SDI (EnviroGard) | Wipe samples from solid surfaces | PCBs | Not provided | 20 samples per 2 hours | Cleanup monitoring, health and safety monitoring | Not provided | Reduced cost per sample; rapid analysis; on-site data | Better control needed for heterogeneity of PCB distribution; possible interference from PCB cleansers | Craig Kostyshyn (SDI) 215/860-5115 (contact obtained from Vendor FACTS database) |
| Site unidentified-Location not provided | Not specified | BioNebraska (BiMelyze Mercury Assay) | Soil (ex situ), sediment (ex situ), ground water | Mercury | Not provided | Not provided | Site characterization | Not provided | Convenient; cost-effective; real-time data; highly selective for mercury; data correlates well with those obtained by other methods | Not provided | Craig Schweitzer (BioNebraska) 800/786-2580 (contact obtained from Vendor FACTS database) |
| CYRO Industries-Location not provided | 1 | SDI | Soil | PAHs | 10/95-11/95 | Not provided | Site characterization | Not provided | Low cost; 90% accuracy | 10% false positives | Ernest Waterman (EPA) 617/223-5511 |
| Site unidentified-Norwood, MA | 1 | SDI | Not provided | PCBs, PAHs | 12/94-8/95 | Not provided | Cleanup monitoring, health and safety monitoring | Not provided | Low cost; rapid | Not provided | John LeMay (EPA) 617/573-9622 |

**Table 2-3**
**Summary of Field Analytical and Site Characterization Technologies**
**Reported Data on Specific Technologies (continued)**

| Site Description | EPA Region | Vendor/ Product | Media Monitored | Contaminant/ Parameter | Period of Use | Through-put | Data Use(s) | Cost | Technology Advantages | Technology Limitations | Contact(s) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Immunoassay (continued)** | | | | | | | | | | | |
| Nyanza Chemical Waste Superfund Site- Ashland, MA: dye manufacturing facility, mercury contamination in soils and sediments | 1 | BioNebraska, Inc. (BiMelyze Mercury Assay) | Sediment, soil (ex situ) | Mercury | 9/94-10/94 | 70 split samples per day | Site screening | $35 per sample | Results showed acceptable correlation with laboratory results; mercury concentrations ranged from less than 0.5 parts per million (ppm) to greater than 100 ppm | Not provided | Greg Morin (U.S. Army Corps of Engineers [USACE]) 617/647-8232 Pam Shields (EPA) 617/573-9632 |
| Pine Street 1- VT | 1 | Not provided | Soil | PAHs | Not provided | Not provided | Cleanup monitoring | Not provided | Rapid, low cost | Extraction problem caused by soil moisture content | Ross Gilleland (EPA) 617/573-5766 |
| Pinette's- ME | 1 | Not provided | Soil | PCBs | Not provided | Not provided | Cleanup monitoring | Not provided | Rapid, low cost | Not provided | Ross Gilleland (EPA) 617/573-5766 |
| Raymark 3- CT | 1 | Not provided | Soil | PCBs | 9/93-9/97 | Not provided | Cleanup monitoring | Not provided | Rapid, low cost | Not provided | Mike Jasinski (EPA) 617/573-5786 |
| Resolve 1- MA | 1 | SDI | Soil | PCBs | Not provided | Not provided | Cleanup monitoring | Not provided | Low cost; 90% accuracy | 10% false positives | Joe Lemay (EPA) 617/573-9622 |
| Resolve 2- MA | 1 | SDI | Soil | PCBs | Not provided | Not provided | Cleanup monitoring | Not provided | Low cost | False positives | Joe Lemay (EPA) 617/573-9622 |
| Resolve 1 & 2- MA: PCB-contaminated sites | 1 | SDI | Soil (ex situ) | PCBs | 2 months | 3 per hour | Cleanup monitoring | $10 per sample | Results more conservative than laboratory (confirmation sampling) | No major problems encountered | Joe Lemay (EPA) 617/573-9622 |

**Table 2-3**
**Summary of Field Analytical and Site Characterization Technologies**
**Reported Data on Specific Technologies (continued)**

| Site Description | EPA Region | Vendor/ Product | Media Monitored | Contaminant/ Parameter | Period of Use | Through-put | Data Use(s) | Cost | Technology Advantages | Technology Limitations | Contact(s) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Immunoassay (continued)** | | | | | | | | | | | |
| General Electric Corp. (GE) Site No. 5-NY: industrial landfill | 2 | SDI (EnviroGard) | Soil (ex situ) | PCBs (Aroclor 1260) | Not provided | 80 samples per day | Site characterization (technology evaluation performed by GE) | $18 per sample | Low rate of false positives results | Not provided | L.A. Socha (GE) |
| General Motors, Central Foundary Division Site-Massena, NY | 2 | SDI (PCB RISC™) | Soil (ex situ), sediment (ex situ) | PCBs | 2-3 months on 2 occas-ions | 4 samples per hour | Cleanup monitoring, compliance monitoring | Not provided | Large savings in time and analytical costs; savings in labor and equipment costs; real-time data aided in guiding excavation activities | No official report on verification procedures | Lisa Jackson and Anne Kelly (EPA) 212/637-4274 Jim Hartnett (GMC) 315/764-2239 |
| Aberdeen Proving Ground-Aberdeen, MD: military activities | 3 | New Horizons Diagnostic Corp. (The SMART Test) | Soil, sediment (ex situ) | Bacteria | 7/93-7/97 | Not provided | Not provided | $6 per sample | Not provided | Not provided | Peter Stopa (U.S. Army) |
| Delaware Sand and Gravel-New Castle, DE: landfill drum pit | 3 | OHM | Soil (ex situ) | PCBs | Not provided | Not provided | Site screening | Not provided | Real-time monitoring | Not provided | Eric Newman (EPA) 215/566-3237 |
| Former Coal Gasification Site-Georgetown, DE: coal gasification wastes | 3 | SDI (RaPID® Assay) | Soil (ex situ), ground water | VOCs, BTEX, PAHs | Not provided | 40 samples per day | Site screening, site characterization | BTEX-$20 per sample PAHs-$25 per sample | Not provided | Not provided | Robert M. Schulte (Delaware Department of Natural Resources) |
| Saunders Supply-VA: wood treating facility | 3 | Not provided | Ground water | SVOCs (PCP) | 2 days | Not provided | Site characterization | Not provided | Fast results | Not provided | Andy Palestini (EPA) 215/566-3223 |
| Woodbridge Research Facility-Woodbridge, VA: former radio transmission facility/research lab | 3 | Not provided | Soil (ex situ) | PCBs | 1994 | Not provided | Site characterization | Not provided | Not provided | False positives detected | Jack Porosnak (EPA) 215/566-3362 Jeff Waugh (Earth Tech) 410/671-1615 |

**Table 2-3**
**Summary of Field Analytical and Site Characterization Technologies**
**Reported Data on Specific Technologies (continued)**

| Site Description | EPA Region | Vendor/ Product | Media Monitored | Contaminant/ Parameter | Period of Use | Through-put | Data Use(s) | Cost | Technology Advantages | Technology Limitations | Contact(s) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Immunoassay (continued)** | | | | | | | | | | | |
| Agricultural Cooperative- South-central, WI: herbicide and pesticide manufacturing | 4 | SDI (RaPID® Assay) | Soil (ex situ) | Pesticides (atrazine) | Not provided | 20 samples per day | Not provided | $50 per sample | Not provided | Not provided | Dr. Kirsti Sorsa (RMT, Inc.) |
| American Creosote Works- Jackson, TN: wood preserving facility | 4 | SDI (EnviroGard) | Soil (ex situ) | PAHs | Not provided | 80 samples per day | Site characterization (technology evaluation) | $18 per sample | Good agreement with results produced by EPA Method 8270 | Not provided | Dennis Revell (EPA) 703/355-8807 |
| Transformer and Refurbishing Facility- MI: utility wastes | 5 | SDI (RaPID® Assay) | Soil (ex situ), ground water | PCBs | Not provided | Not provided | Not provided | $25 per sample | Not provided | Not provided | P. Berlinski (Delta Environmental, Inc.) 916/638-2085 |
| Arnesor Timber- Steelville, MO: lumber treatment | 7 | SDI | Soil (ex situ) | SVOCs (PCP) | 3 days | 25 samples per day | Site characterizations | $225 per kit | Cost-effective; quick turnaround time for results; helped to direct sampling efforts; reduced the number of samples needed to characterize the site | Sufficient reagent was not provided; only 60 of the 70 samples collected produced valid results | Paul Doherty (EPA) 913/551-7924 |
| Farmland Refinery- Coffeyville, KS: refinery (petroleum waste) | 7 | SDI (RaPID® Assay) | Soil (ex situ), ground water, surface water | PAHs | 5 days | 20 samples in 2 hours | Site characterization | $50 per sample exclusive of labor | Easy to use; low detection limits; rapid data | Interference caused by high concentration of petroleum; cannot identify individual PAHs | Patrick Splichal (Tetra Tech) 913/894-2600 Scott Ritchey (EPA) 913/551-7641 |
| Former Manufactured Gas Plant- Marshalltown, IA: coal gasification | 7 | SDI (D Tech) | Soil (ex situ), sediment (ex situ), ground water | TPH (coal tar and coal gasification wastes), dense nonaqueous phase liquids (DNAPL) | Not provided | 50 samples per day | Site characterization | $12,855 to complete project and report | Results of the survey showed the area of DNAPL contamination | Conditions of interference affected the data | Dr. Al Bevolo (Ames Laboratory) 515/294-5414 |

**Table 2-3**
**Summary of Field Analytical and Site Characterization Technologies**
**Reported Data on Specific Technologies (continued)**

| Site Description | EPA Region | Vendor/ Product | Media Monitored | Contaminant/ Parameter | Period of Use | Through-put | Data Use(s) | Cost | Technology Advantages | Technology Limitations | Contact(s) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Immunoassay (continued)** | | | | | | | | | | | |
| Kinsley Airport-Kinsley, KS: washing of pesticide application rigs | 7 | SDI (Envirogard) | Soil (ex situ) | Toxaphene | 3 days | 12 soil samples in 3 hours | Site screening, site characterization | $50 per sample exclusive of labor | Cost savings; portable; quick turnaround times; detection limits capable of meeting action levels | High percentage of false negative results when compared with results from confirmation laboratory | Keith Brown (Tetra Tech) 913/894-2600 Susan Stover (KDHE) 913/296-5531 |
| Osage Metal-Kansas City, KS: metal salvage yard, recycling of car batteries and transformers | 7 | SDI | Soil (ex situ) | PCBs | 5 months | 50 samples | Cleanup monitoring, confirmation sampling, waste characterization | Not provided | Saved time; produced usable results | Unsure of specific detection limits of the test | Wood Ramsey (EPA) 913/551-7382 |
| Roanoke Apartments-Kansas City, MO: gasoline service station with a leaking UST | 7 | SDI (D Tech) | Soil (ex situ), sediment (ex situ), ground water | TPH, LNAPL | Not provided | 50 samples per day | Site characterization | $13,345 to complete project | Allowed definition of migration pathways | Not provided | Craig Kostyshyn (SDI) 215/860-5115 (contact obtained from Vendor FACTS database) |
| Whiteman AFB-MO: gasoline service station with a leaking UST | 7 | SDI (D Tech) | Soil (ex situ), sediment (ex situ), ground water | Fuel oil | Less than 1 month | 50 samples per day | Site characterization | $22,981 to complete site characteriza-tion | Allowed straight-forward definition of 2 plumes confirmed by FID readings | Not provided | Craig Kostyshyn (SDI) 215/860-5115 (contact obtained from Vendor FACTS database) |
| Crows Landing-Patterson, CA: burn pit, landfill area | 9 | SDI (PETRO RISC™) | Ground water | TPH | 2 weeks | 10 samples in 2 hours | Site screening, site characterization | $194 for 4 tests; $400 per week for spectrophoto-meter | Cost-effective; easy to use; very portable; quick turnaround times | Test kit gave false negative results because fuel oil was degraded | Todd Bechtel (Tetra Tech) 303/295-1101 |

**Table 2-3**
**Summary of Field Analytical and Site Characterization Technologies**
**Reported Data on Specific Technologies (continued)**

| Site Description | EPA Region | Vendor/ Product | Media Monitored | Contaminant/ Parameter | Period of Use | Through-put | Data Use(s) | Cost | Technology Advantages | Technology Limitations | Contact(s) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Immunoassay (continued)** | | | | | | | | | | | |
| Gila River Indian Reservation- Gila River Indian Community, AZ: storage, mixing, and application of pesticides | 9 | SDI | Soil (in situ) | Pesticides | 3 months | 1 sample every 20 minutes | Site screening, site characterization | $20 per sample | Faster method of collecting reliable data; easier to use (can develop a generic sampling plan); cheaper; quick, reliable data; real-time data; flexible for use in the field | Not provided | Carolyn Douglas (EPA) 415/744-2343 |
| Hickam Air Force Base- Honolulu, HI: leaking UST site | 9 | SDI (EnviroGard) | Soil (ex situ) | TPH (JP-4 aviation fuel) | Less than 1 month | 10 samples in 1 day | Site screening, site characterization | $18 per sample | Low rate of false positive results (one false positive result in 10 samples at a screening level of 1,000 ppm) | Not provided | Bryce Hataoka (Hawaii Department of Health) |
| McCormick and Baxter- Stockton, CA: wood treatment | 9 | SDI (RaPID® Assay) | Soil (ex situ) | Halogenated SVOCs (PCP), PAHs | 10 days | 233 samples | Site screening, site characterization | Not provided | Technology saved money by allowing reduction in the number of samples sent to the off-site lab | Not provided | Marie Lacey (EPA) 415/744-2236 |

**Table 2-3**
**Summary of Field Analytical and Site Characterization Technologies**
**Reported Data on Specific Technologies (continued)**

| Site Description | EPA Region | Vendor/ Product | Media Monitored | Contaminant/ Parameter | Period of Use | Through-put | Data Use(s) | Cost | Technology Advantages | Technology Limitations | Contact(s) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Immunoassay (continued)** | | | | | | | | | | | |
| Navajo Nation Dip Vats Project-<br>AZ:<br>toxaphene dip vats | 9 | SDI (EnviroGard) | Soil (ex situ) | Pesticides (toxaphene) | Ongoing | 1 sample every 20 minutes | Site screening, site characterization (technology demonstration) | $20 per sample | Good agreement with EPA Method 8081 (no false positive or negative results at 10-ppm level); faster method of collecting reliable data; easy to use cheaper; flexible for use in the field | Not provided | Carolyn Douglas (EPA) 415/744-2343<br>Stanley Edison (Navajo Nation) 520/871-6861 |
| Naval Station, Treasure Island-<br>San Francisco, CA:<br>fire training area,<br>fuel farms | 9 | SDI (PETRO RISC™,<br>D Tech) | Soil (in situ), storm drain sediments | PCBs,<br>BTEX,<br>TPH (gas, diesel) | 6 months | 4 samples per hour | Site screening | $30 per test | Real-time data; able to delineate and verify contamination in the field | Need better concentration range; operator must be certified to use kit | Gina Kathuria (California Regional Water Quality Board) 510/286-4267 |
| Naval Station Treasure Island-<br>San Francisco, CA:<br>leaking USTs and pipelines | 9 | SDI (PETRO RISC™ and PCB RISC™) | Soil (ex situ), ground water | BTEX,<br>PCBs,<br>PAHs | 5 months | 4 samples per hour | Site screening, site characterization | Not provided | Not provided | Degraded fuels, which lacked aromatics, gave 15 to 20% false negative results, compared with results from formal laboratory; PAH test kits not useful | Thorsten Anderson (Tetra Tech) 415/543-4880<br>Gina Kathuria (California Regional Water Quality Board) 510/286-4267 |
| NCS Stockton-Stockton, CA:<br>pesticide storage, leaking drums containing pesticides | 9 | SDI (EnviroGard and RISC™) | Soil (ex situ), ground water | Pesticides (Dichlorodi-phenyltrichloro-ethane [DDT]) | 2-3 weeks | 4 samples per hour | Site screening, site characterization | Less than $50 per sample | Field screening data showed good correlation with independent laboratory data | TPH interference required dilution and affected detection limit; peat or bog samples gave poor extraction efficiency | Beth Kelley (Tetra Tech) 916/853-4523 |
| Sanders Aviation-<br>Tempe, AZ:<br>crop duster activities | 9 | SDI | Soil (ex situ) | Pesticides | 2 weeks | 10 samples in 1 hour | Site screening, site characterization | Not provided | Real-time data; cost-effective; identification of hot spots | Must be careful about setting up and defining ranges | Tom Dunkelman (EPA) 415/744-2294 |

**Table 2-3**
**Summary of Field Analytical and Site Characterization Technologies**
**Reported Data on Specific Technologies (continued)**

| Site Description | EPA Region | Vendor/ Product | Media Monitored | Contaminant/ Parameter | Period of Use | Through-put | Data Use(s) | Cost | Technology Advantages | Technology Limitations | Contact(s) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Immunoassay (continued)** | | | | | | | | | | | |
| Astoria Plywood-Astoria, OR: plywood mill operations | 10 | SDI (PETRO RISC™ and PCB RISC™) | Soil (ex situ) | PCBs, TPH | 4 days | 4 samples per hour | Site screening, site characterization | PCB-$38 per sample; TPH-$29 per sample; accessory kit rented for $550 per week | Data for soil samples screened with PCB test kits showed reasonable correlation with analytical laboratory data | Data for soil samples screened with TPH test kits showed poor correlation with data from analytical laboratory; possible matrix interference from presence of hydraulic oil having higher molecular chains | Joe Mollusky (Tetra Tech) 206/587-4650 |
| Battery Recycling Plant-AK: | 10 | BioNebraska, Inc. (BiMelyze Mercury Assay) | Soil (ex situ), sludge | Heavy metals (mercury) | Not provided | 48 samples per day | Not provided | $24 per sample | Operational mercury range up to 4,400 ppm for analysis of confirmation samples | Not provided | Mike Boykin (Ecology and Environment) 206/624-9537 |
| Environmental Pacific Corp.- Amity, OR: abandoned battery recycling facility | 10 | BioNebraska, Inc. (BiMelyze(R) Mercury) | Soil (ex situ), ground water, dust, sludge, concrete residue | Heavy metals (mercury) | 1 month | 1-2 samples per hour | Site screening, compliance monitoring, verification sampling | Not provided | Cost-effective; real-time data; reproducible results | Not provided | Thor Cutler (EPA) 206/553-1673 |
| Pacific Wood Treating-Ridge Field, WA: former wood treating facility | 10 | SDI (RaPID® Assay) | Soil (ex situ), ground water, surface water | SVOCs, PCBs, PAHs | 1 month | 1 sample every 2 hours | Site screening, site characterization, cleanup monitoring | Not provided | Quick turnaround, allowed for definition of extent of contamination; reduced analytical costs allowed for effective direction of field efforts | Not provided | Bill Langston (EPA) 206/553-1679 Mark Ader (EPA) 206/553-1808 |

**Table 2-3**
**Summary of Field Analytical and Site Characterization Technologies**
**Reported Data on Specific Technologies (continued)**

| Site Description | EPA Region | Vendor/ Product | Media Monitored | Contaminant/ Parameter | Period of Use | Through-put | Data Use(s) | Cost | Technology Advantages | Technology Limitations | Contact(s) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Immunoassay (continued)** | | | | | | | | | | | |
| Reynolds Metal Co.-Troutdale, OR: aluminum reduction facility | 10 | SDI (RaPID® Assay) | Soil (ex situ), sediment (ex situ), ground water | PCBs, PAHs | 3 months | 51 samples per hour (after extraction and analysis in batches) | Site screening, cleanup monitoring, confirmation sampling | $20 per sample | Quick turnaround allowed for definition of extent of contamination; provided oversight of the potentially responsible party's data collection efforts | Cannot distinguish individual PCBs | Chris Field (EPA) 206/553-1674 |
| Umatilla Army Depot-Hermiston, OR: explosives washout lagoon, OB/OD, small arms incinerator, explosives in ground water | 10 | SDI (RaPID® Assay, D-TECH) | Soil, ground water, composite residues | Military explosives (TNT, RDX, HMX) | 15 months | 10-30 samples per day | Site screening, cleanup monitoring, compliance monitoring | Not provided | Real-time data; lower cost compared with analytical laboratory; higher sampling density at same cost | Not provided | Harry Craig (EPA) 503/326-3689 |
| **Mercury Vapor Analyzer** | | | | | | | | | | | |
| Dewey Daggett-MA: landfill | 1 | Jerome Meter (mercury vapor analyzer) | Air | Heavy metals (mercury) | 8/30/95 | Not provided | Cleanup monitoring | Not provided | Avoided downtime; data quality effective for determining final sampling locations; fast analysis | Not provided | Not provided |
| Truman-St. Joseph, MO: mercury spill | 7 | Jerome Meter (mercury vapor analyzer), Gillian pump™ | Air | Heavy metals (mercury) | 6/96-7/97 | Not provided | Cleanup monitoring, confirmation sampling, health and safety monitoring | $60 per sample | Allowed for a real-time understanding of exposure; quick turnaround time on data | Learning curve associated with the operation of the technology; Gillian pumps™ did not work well if the pumps were not charged fully | Ken Rapplean (EPA) 913/551-7769 |
| **X-Ray Fluorescence** | | | | | | | | | | | |
| Bristol Sandblasting-RI | 1 | TN Spectrace (Spectrace 9000) | Soil | Heavy metals (lead) | 10/19/94 | Not provided | Site characterization, cleanup monitoring | Not provided | Effective in guiding final sampling locations | Not provided | Dorrie Paar (EPA) 617/573-5768 |

**Table 2-3**
**Summary of Field Analytical and Site Characterization Technologies**
**Reported Data on Specific Technologies (continued)**

| Site Description | EPA Region | Vendor/ Product | Media Monitored | Contaminant/ Parameter | Period of Use | Through-put | Data Use(s) | Cost | Technology Advantages | Technology Limitations | Contact(s) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **X-Ray Fluorescence (continued)** | | | | | | | | | | | |
| Brockton Gas-<br>MA | 1 | Not provided | Soil | Heavy metals (lead) | Not provided | Not provided | Cleanup monitoring | Not provided | Not provided | Not provided | Dorrie Paar (EPA) 617/573-5768 |
| Carroll Products-<br>RI | 1 | Not provided | Soil, sludge | Heavy metals (lead) | Not provided | Not provided | Site characterization | Not provided | Not provided | Not provided | Bob Brackett (EPA) 617/573-5744 |
| Cohen Property-<br>MA | 1 | Not provided | Soil | Heavy metals (lead) | 8/9/94 | Not provided | Cleanup monitoring | Not provided | Not provided | Not provided | Janis Tsang (EPA) 617/573-5732 |
| Finberg Field-<br>MA | 1 | TN Spectrace (Spectrace 9000) | Soil | Heavy metals (lead) | 6/8/95 | Not provided | Site characterization | Not provided | Effective in guiding final sampling locations | Not provided | Frank Gardner (EPA) 617/573-5722 |
| Goldfedders-<br>CT | 1 | TN Spectrace (Spectrace 9000) | Soil | Heavy metals (lead) | 3/20/95-8/18/95 | Not provided | Cleanup monitoring | Not provided | Not provided | Not provided | Frank Gardner (EPA) 617/573-5722 |
| Hatherway and Patterson-<br>MA | 1 | Not provided | Soil | Heavy metals (lead) | Not provided | Not provided | Cleanup monitoring | Not provided | Not provided | Not provided | Lisa Danek (EPA) 617/573-5707 |
| Kearsarge-<br>NH | 1 | Not provided | Soil | Heavy metals (lead) | 9/26/90-4/17/91 | Not provided | Cleanup monitoring | Not provided | Not provided | Not provided | Dean Taglioferro (EPA) 617/263-5596 |
| Lake Success Business Park, Remington Arms-Bedford, MA | 1 | Niton XL spectrum analyzer | Soil | Heavy metals (lead) | 10/96-present | Not provided | Site characterization, cleanup monitoring | Not provided | Low cost; quick turnaround time for data; ease of use | Not provided | Stephanie Carr 617/573-5593 Niton, Inc. 800/875-1578 |
| New Hampshire Plating Co.-<br>Merrimack, NH: electroplating facility | 1 | Not provided | Soil (ex situ) | Heavy metals (cadmium) | 1993 | Not provided | Site characterization | Not provided | Not provided | Not provided | Dick Goehlevet (EPA) (617) 573-5742 |

**Table 2-3**
**Summary of Field Analytical and Site Characterization Technologies**
**Reported Data on Specific Technologies (continued)**

| Site Description | EPA Region | Vendor/ Product | Media Monitored | Contaminant/ Parameter | Period of Use | Through-put | Data Use(s) | Cost | Technology Advantages | Technology Limitations | Contact(s) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **X-Ray Fluorescence (continued)** | | | | | | | | | | | |
| New Hampshire Plating Co.- Merrimack, NH: electroplating facility | 1 | Not provided | Soil | Heavy metals (lead) | 6/93-6/94 | Not provided | Cleanup monitoring | Not provided | Rapid analyses; low cost | Not provided | Jim DiLorenzo (EPA) 617/223-5510 |
| Precision Chrome Plating Corporation- RI | 1 | TN Spectrace (Spectrace 9000) | Soil | Heavy metals (lead, chromium) | 4/24/95 | Not provided | Site characterization | Not provided | Effective in guiding selection of final sampling locations | Not provided | Dorrie Paar (EPA) 617/573-5768 |
| RAE Battery- CT | 1 | TN Spectrace (Spectrace 9000) | Soil | Heavy metals (lead) | Not provided | Not provided | Cleanup monitoring | Not provided | Speed and less down time | Not provided | Lisa Danek (EPA) 617/573-5707 |
| Raymark- CT | 1 | Not provided | Soil | Heavy metals (lead) | Not provided | Not provided | Site characterization | Not provided | Not provided | Not provided | Mike Jasinski (EPA) 617/573-5786 |
| Shapiro Site- MA | 1 | TN Spectrace (Spectrace 9000) | Soil | Heavy metals | 6/14/95 | Not provided | Site characterization | Not provided | Effective in guiding selection of final sampling locations | Not provided | Dorrie Paar (EPA) 617/573-5768 |
| Sparkling Fiber- NH | 1 | TN Spectrace (Spectrace 9000) | Soil | Heavy metals (lead) | Not provided | Not provided | Site characterization | Not provided | Effective in guiding selection of final sampling locations | Not provided | Dorrie Paar (EPA) 617/573-5768 |
| Site unidentified- Stratford, CT | 1 | Not provided | Soil | Heavy metals (lead) | 6/17/93 | Not provided | Cleanup monitoring | Not provided | Not provided | Not provided | Mike Jasinski (EPA) 617/573-5786 |
| Surrette Battery- NH | 1 | TN Spectrace (Spectrace 9000) | Soil | Heavy metals (lead) | 4/2/95- 8/22/95 | Not provided | Cleanup monitoring | Not provided | Effective in guiding selection of final sampling locations | Not provided | Frank Gardner (EPA) 617/573-5722 |
| West Street Property- MA | 1 | TN Spectrace (Spectrace 9000) | Soil | Heavy metals (lead) | Not provided | Not provided | Site characterization | Not provided | Effective in guiding selection of final sampling locations | Not provided | Dorrie Paar (EPA) 617/573-5768 |

## Table 2-3
## Summary of Field Analytical and Site Characterization Technologies
## Reported Data on Specific Technologies (continued)

| Site Description | EPA Region | Vendor/ Product | Media Monitored | Contaminant/ Parameter | Period of Use | Through- put | Data Use(s) | Cost | Technology Advantages | Technology Limitations | Contact(s) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **X-Ray Fluorescence (continued)** | | | | | | | | | | | |
| Vega Baja Solid Waste Disposal Site- PR | 2 | TN Spectrace (model number not provided) | Soil (in situ), soil (ex situ) | Heavy metals | 7 days | 350 samples | Site characterization | $17 per sample | Effective use of time and resources, resulting in further cost savings; identification of hot spots | Research needed to determine how effective an analytical tool technology would be for non-screening purposes | Dennis Munhall (EPA) 212/637-4343 Juan Davila (EPA) 212/637-4341 |
| Hebelka- Location not provided | 3 | Not provided | Soil (ex situ) | Heavy metals (lead) | 2 months in 1992 | Not provided | Not provided | Not provided | Not provided | Not provided | Fred MacMillian (EPA) 215/566-3201 |
| Mid-Atlantic Wood Preserves- MD: wood treatment facility | 3 | Not provided | Soil (in situ) | Heavy metals (copper, chromium, arsenic) | Not provided | 200 samples per 3 days | Cleanup monitoring | Not provided | Fast verification during response action; good correlation with lab samples | May want to use concentration range to allow flexibility in decision making | Eric Newman (EPA) 215/566-3237 |
| Palmerton Zinc- Palmerton, PA: wall paint | 3 | Outokumpu Electronics and Princeton Gamma Tech | Solid walls | Heavy metals | 6 months in 1991 | 200 hours | Site characterization | Not provided | Not provided | Penetration depth was limited | Fred MacMillan (EPA) 215/566-3201 |
| Site unidentified- Location not provided: active manufacturing facility | 3 | TN Spectrace (Spectrace 6000) | Soil (ex situ) | Heavy metals (chromium, copper, nickel) | 4 months | 954 samples per 4 months | Cleanup monitoring | $146 per sample | Less expensive than off-site analysis; no waste generated; nondestructive method; real-time data; reduced cost of cleanup | Not provided | David Catherman (Environmental Resources Management, Inc.) 610/524-3500 |
| Lockheed Martin Advanced Recorders- Sarasota, FL: ground-water and soil contamination | 4 | Not provided | Soil (ex situ) | Heavy metals | 5 days | Not provided | Site characterization | Not provided | Not provided | Analysis of metals other than lead may be suspect | Wesley S. Hardegree (EPA) 404/562-0486 |
| Old Citgo Refinery- Bossier City, LA: petroleum refinery operations | 6 | TN Spectrace (Spectrace 9000) | Soil (ex situ), sludge | Heavy metals (chromium, lead) | 1 week | Collected and analyzed 200 to 300 samples | Site screening | Approxi- mately $4,000 per week | Time and cost savings | Not provided | Paul Dubois (Tetra Tech) 214/740-2012 |

**Table 2-3**
**Summary of Field Analytical and Site Characterization Technologies**
**Reported Data on Specific Technologies (continued)**

| Site Description | EPA Region | Vendor/ Product | Media Monitored | Contaminant/ Parameter | Period of Use | Through-put | Data Use(s) | Cost | Technology Advantages | Technology Limitations | Contact(s) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **X-Ray Fluorescence (continued)** | | | | | | | | | | | |
| St. Charles Metal Finishing Company-St. Charles, MO: plating wastes | 7 | HNU Systems, Inc. (SEFA-P) | Soil (ex situ) | Heavy metals (lead and chromium) | 5 days | 10 samples per hour | Site characterization | $55,000 to purchase SEFA-P; rental charge of $2,000 for 2 weeks | Less expensive than off-site analysis; quick turnaround time; data used to guide investigation; can handle multiple analytes simultaneously; little sample preparation | Detection limits for chromium at least 200 milligrams per kilogram; instrument weighs 50 lbs and is not very portable; requires liquid nitrogen | Ruben McCullers (EPA) 913/551-7455 |
| Tri-State-Jasper County, MO: airborne emissions deposited from smelter | 7 | Metorex (X-MET-880) | Soil (in situ), soil (ex situ) | Heavy metals | 1 year | 10,000 samples | Site screening, site characterization, cleanup monitoring, confirmation sampling | $10 to $20 per sample (exclusive of labor cost) | Real-time data to guide excavation; quick turnaround; portable | Equipment malfunctioned | Dave Williams (EPA) 913/551-7625 |
| Site unidentified-Location not provided: 15 abandoned or inactive smelter sites | 8 | TN Spectrace (Spectrace 9000) | Soil (ex situ) | Heavy metals | Not provided | Not provided | Site characterization | Not provided | Rapid on-site data; inexpensive; little sample preparation; no solvent waste; can handle multiple analytes simultaneously | Not provided | Lawrence Kaelin (RF Weston) Steve Hawthorn (EPA) 303/312-6061 |
| California Gulch Superfund Site-Leadville, CO: old mining and smelter operations | 8 | Metorex (X-MET 880) | Soil (ex situ) | Heavy metals (lead) | 3 months | 10 samples per hour; analyzed 3,700 soil samples | Site characterization | Not provided | Field-portable XRF data correlated well with CLP data; faster and less expensive than off-site analysis; data used to guide investigation; nondestructive method | Need to pulverize the quality control check sample instead of using loose soil | C.A. Kuharic and W.H. Cole (Lockheed Martin) |

**Table 2-3**
**Summary of Field Analytical and Site Characterization Technologies**
**Reported Data on Specific Technologies (continued)**

| Site Description | EPA Region | Vendor/ Product | Media Monitored | Contaminant/ Parameter | Period of Use | Through-put | Data Use(s) | Cost | Technology Advantages | Technology Limitations | Contact(s) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **X-Ray Fluorescence (continued)** | | | | | | | | | | | |
| China Lake NAWS-Ridgecrest, CA: laboratory wastes discharged to drainage ditches and lagoons | 9 | TN Spectrace (Spectrace 9000) | Soil (ex situ), soil (in situ), sediment (ex situ), sediment (in situ) | Heavy metals | 1 month | 12 samples per hour | Site characterization | Leased for $6,000 per month | Easy to use; portable; can perform in situ measurements; no solvent waste; provides rapid data; little sample preparation | High detection limits (200 mg/kg) for chromium; field portable XRF barium data did not compare well with confirmatory data | Bryce Smith or Scott Schulte (Tetra Tech) 913/894-2600 |
| Concord Naval Weapons Station-Concord, CA: storage and distribution of military munitions | 9 | Not provided | Soil (ex situ) | Heavy metals | Fall 1995 | 30-50 samples per day (no preparation)<br>20 samples per day (with preparation) | Site characterization | Not provided | Quick screening of sites; identification of hot spots | Detection limits not low enough to meet ecological concerns; matrix interference; results only indicate surface conditions and therefore may not provide adequate information for remediation purposes | Barbara Smith (EPA) 415/744-2366 |
| Defense Distribution Region West, Sharpe Depot-Lanthrop, CA: storage and distribution of military munitions | 9 | Not provided | Soil (ex situ) | Heavy metals | 2 weeks | 3 samples per hour | Site characterization | Not provided | Quick turnaround time; cheaper than use of CLP laboratory; good results | Data not comparable to laboratory data | John Guzman (Defense Logistics Agency) 209/982-2093 Mike Wolfram (EPA) 415/744-2410 |
| Defense Distribution Region West-Location not provided | 9 | Not provided | Soil (in situ), soil (ex situ) | Heavy metals | Not provided | Not provided | Site characterization | Not provided | Can collect more samples per area because of cost savings; allows for identification of trends in the field; saves time and money | Lack of guidance on data validation procedures | Marlon Mezquita (EPA) 415/744-1527 |

**Table 2-3**
**Summary of Field Analytical and Site Characterization Technologies**
**Reported Data on Specific Technologies (continued)**

| Site Description | EPA Region | Vendor/ Product | Media Monitored | Contaminant/ Parameter | Period of Use | Through-put | Data Use(s) | Cost | Technology Advantages | Technology Limitations | Contact(s) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **X-Ray Fluorescence (continued)** | | | | | | | | | | | |
| Mare Island Naval Shipyard- Vallejo, CA: naval submarine and ship repair, maintenance, and construction facility | 9 | TN Sprectrace (Spectrace 6000) | Soil (ex situ), sediment (ex situ) | Heavy metals | Ongoing | Not provided | Site characterization | Not provided | Rapid turnaround time; lower cost; flexibility in the field; consistent quality control, instead of inconsistencies that arise when various laboratories are used | Analytical biases for certain metals; difficulties in obtaining sufficiently low detection limits because of matrix interference | Tom Huetteman (EPA) 415/744-2384 |
| Sacramento Army Depot- Sacramento, CA | 9 | Not provided | Soil (in situ), soil (ex situ) | Heavy metals | 9 months | Not provided | Site characterization, cleanup monitoring | Not provided | Can collect more samples per area because of cost savings; allows for identification of trends in the field; saves time and money | Lack of guidance on data validation procedures | Marlon Mezquita (EPA) 415/744-1527 |
| Verdese Carter Park- Oakland, CA: lead acid waste, disposal of batteries | 9 | Not provided | Soil (in situ), soil (ex situ), (paint and dust) | Heavy metals (lead) | 2 years | 50 samples per day | Site screening, site characterization, cleanup monitoring | Not provided | Saves time and money; non-destructive (therefore the same sample analyzed in the field can be analyzed in the laboratory) | No EPA Region 9 standard operating procedures | Mike Bellot (EPA) 415/744-2364 Loran Henning (EPA) 415/744-1305 |
| McCarty's Pacific Hide and Fur- Pocatello, ID: metal salvaging yard and lead acid battery storage | 10 | Outokumpu Electronics | Soil (in situ) | Heavy metals (lead) | 10 days | Not provided | Site screening, site characterization, cleanup monitoring, confirmation sampling | Not provided | Transportable; capable of screening 6 elements simultaneously; data correlated well with laboratory data | Not provided | Ann Williamson (EPA) 206/553-2739 Lorraine Edmond (EPA) 206/553-7366 David Frank (EPA) 206/553-4019 |

**Table 2-3**
**Summary of Field Analytical and Site Characterization Technologies**
**Reported Data on Specific Technologies (continued)**

| Site Description | EPA Region | Vendor/ Product | Media Monitored | Contaminant/ Parameter | Period of Use | Through-put | Data Use(s) | Cost | Technology Advantages | Technology Limitations | Contact(s) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **X-Ray Fluorescence (continued)** | | | | | | | | | | | |
| Umatilla Army Depot-Hermiston, OR: explosives washout lagoon, OB/OD area, small arms incinerator, explosives in ground water | 10 | TN Spectrace (model number not provided) | Soil | Heavy metals (lead) | 15 months | 10-30 samples per day | Cleanup monitoring, compliance monitoring | Not provided | Real-time data; lower cost, compared with cost of using analytical laboratory; higher sampling density at same cost | Not provided | Harry Craig (EPA) 503/326-3399 |
| **Geophysical Technologies** | | | | | | | | | | | |
| **Bore-hole Geophysical** | | | | | | | | | | | |
| Loring AFB-Limestone, Maine: fuel oil release area, blasting conducted to support recovery of fuel oil | 1 | Mala Geo-Sciences, Inc. (Terra Plus bore-hole GPR) | Soil (bedrock) | Bedrock stratigraphy | 6/95-present | Not provided | Site characterization | Bore-hole radar $250,000 | Produces "picture" of bedrock planes to 25-50 meter radius of the bore-hole | Not provided | Pete Haeni (United States Geological Survey [USGS] - Connecticut) 860/240-3299 Richard Willy (EPA) 617/573-9639 |
| New Hampshire Plating Co.- Merrimack, NH: electroplating facility | 1 | Geonics Ltd. (EM-39 bore-hole electromagnetic induction unit used in conjunction with natural gamma log survey) | Soils (in situ), ground water | Electrical conductivity | 1994 | Continuous readout | Site characterization | $25,000 per unit | Technology delivered good results | Can be used only in open bore-holes/PVC with diameter > 2", (non-metallic wells) | Richard Willy (EPA) 617/573-9639 Thomas Mach (USGS) 603/226-7805 |
| Letterkenny Army Depot- Letterkenny, PA | 3 | Geophex (bore-hole acoustic equipment) | Ground water | Depth to ground water | 5/95-6/97 | 1 hole per day | Site characterization | $120,000 per unit | Produces superior data; produces picture of bedrock fractures; real-time data | Post-processing of data is expensive | Paul Stone (USACE) 717/261-6863 |

**Table 2-3**
**Summary of Field Analytical and Site Characterization Technologies**
**Reported Data on Specific Technologies (continued)**

| Site Description | EPA Region | Vendor/ Product | Media Monitored | Contaminant/ Parameter | Period of Use | Through-put | Data Use(s) | Cost | Technology Advantages | Technology Limitations | Contact(s) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Bore-hole Geophysical (continued)** | | | | | | | | | | | |
| Limestone Rd.- Cumberland, MD: ground water contamination | 3 | USGS | Soil (bedrock) | Bedrock fracture identification, temperature | 7/93 | 3 bore-holes per day | Site characterization | Not provided | Better understanding of ground-water flow | Bore-hole size and terrain may limit equipment | Andy Sochanski (EPA) 215/566-3370 Leslie Brunner (EPA) 215/566-3239 Dan Phelan (USGS) 410/828-1535 |
| **Direct-push Electrical Conductivity** | | | | | | | | | | | |
| Salina North- Salina, KS: industrial area, solvent use and disposal, grain fumigation, chemical manufacturing | 7 | Geoprobe® Systems (Direct Image® soil conductivity logging system) | Soil (in situ) | Site subsurface lithology ( to define subsurface geologic and hydrogeologic, conditions) | 3 days | 11 logs to 65 feet in 3 days | Site characterization | $14,000 per unit | Capable of identifying stratigraphic layers that conventional methods missed; very fast; less expensive than standard methods; no soil cuttings | Susceptible to operator error; experienced operator needed to calibrate and interpret logs | Curt Enos (Tetra Tech) 913/839-8515 Wes McCall (Geoprobe Systems, Inc.) 913/825-1842 Susan Stover (KDHE) 913/296-5531 |
| **Electromagnetic Induction** | | | | | | | | | | | |
| Holtrachem- Location not provided | 1 | VLF Electromagnetic Survey equipment | Bedrock | Not provided | 1994 | Not provided | Site characterization | Not provided | Not provided | Not provided | Ernest Waterman (EPA) 617/223-5511 |
| Bliss Ellisville- Wild Wood, MO: buried drums containing dioxin | 7 | Geonics, Limited (EM-31) | Soil (in situ) | Buried ferrous metal | 2 months | 7 acres | Site characterization | Not provided | Not provided | Overhead power lines caused interference | Wood Ramsey (EPA) 913/551-7382 |
| Letterkenny Army Depot- Letterkenny, PA: landfill | 3 | Geophex (multifrequency conductivity instrument) | Soil (in situ) | Disposal trenches | 6/97 | 12 acre site per week | Site characterization | $10,000 per acre | Quick turnaround time; ease of use, portable | Large metal objects can introduce noise | Paul Stone (USACE) 717/261-6863 Eric Powers (Geophex) 919/839-8515 |

**Table 2-3**
**Summary of Field Analytical and Site Characterization Technologies**
**Reported Data on Specific Technologies (continued)**

| Site Description | EPA Region | Vendor/ Product | Media Monitored | Contaminant/ Parameter | Period of Use | Through-put | Data Use(s) | Cost | Technology Advantages | Technology Limitations | Contact(s) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Ground Penetrating Radar** | | | | | | | | | | | |
| Ciba-Geigy- Cranston, RI | 1 | Not provided | Till, bedrock | Structure contours | 1991 | Not provided | Site characterization | Not provided | Nonintrusive | Poor identification of buried utilities | Frank Battaglia (EPA) 617/573-5747 |
| General Electric- Pittsfield, MA | 1 | Not provided | Till | Structure contours | 1995-present | Not provided | Site characterization | Not provided | Nonintrusive | Not provided | Bryan Olsen (EPA) 617/573-5747 |
| Gilson Road- Nashua, NH: former waste disposal site (1960-70s) | 1 | Not provided | Subsurface | Water table, bedrock stratigraphy | Not provided | Continuous profile | Site characterization | Not provided | Information pertaining to depth of water table and bedrock compared favorable with GFR data; produced a picture of the bedrock plane | Not provided | Thomas Mack (USGS, New Hampshire) 603/226-7805 |
| Dupont-Newport- Newport, DE: contamination in riverbed | 3 | OceanSystems, Inc. (GPR with dual frequency sounding and side-scanning sonar) | Soil (in situ) (river bottom) | Sediment layers | Not provided | Continuous profile | Site characterization | Not provided | Focused sample location mapping | Fine grain analysis more expensive | Randy Sturgeon (EPA) 215/566-3227 |
| **Magnetometry** | | | | | | | | | | | |
| Naval Air Engineering Station- Lakehurst, NJ | 2 | Geo-Centers, Inc. (Surface-Towed Ordnance Locating System [STOLS]) | Soil (in situ) | Buried ferrous metals | Not provided | 0.75 acre per hour | Site characterization | $8,600 per acre | Relatively quick survey of terrain | Limited by field conditions (mud, severe weather, foliage, and deeply located anomalies); equipment tends to underestimate number of targets compared with hand-held devices; signals from extraneous metals must be filtered out | Jeffrey Gatz (EPA) 212/637-4320 Greg Bury (Naval Air Engineering Station Lakehurst) 908/323-1014 |

**Table 2-3**
**Summary of Field Analytical and Site Characterization Technologies**
**Reported Data on Specific Technologies (continued)**

| Site Description | EPA Region | Vendor/ Product | Media Monitored | Contaminant/ Parameter | Period of Use | Through-put | Data Use(s) | Cost | Technology Advantages | Technology Limitations | Contact(s) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Magnetometry (continued)** | | | | | | | | | | | |
| Bliss Ellisville-Wild Wood, MO: buried drums containing dioxin | 7 | Geonics Limited (proton magnetometer, G-856) | Soil (in situ) | Buried ferrous metal | 2 months | 7 acres | Site characterization | Not provided | Not provided | Overhead power lines caused interference | Wood Ramsey (EPA) 913/551-7382 |
| **Seismic Profiling** | | | | | | | | | | | |
| Allegany Ballistics Laboratory-Rocket City, WV: TCE disposal pit, drum storage area | 3 | Resolution Resources, Inc. (three-dimensional seismic reflection technology) | Soil (in situ) | Bedrock stratigraphy | 10/95-11/95 | Not provided | Site characterization | Not provided | Cost-effective method for determining migration path for DNAPLs | Data return is very specific; trained technicians required | Jeff Kidwell (Navy Sea Systems Command) 757/322-4795 |
| National Aeronautic and Space Administration (NASA) Kennedy Space Center-FL: former components cleaning facility for rocket parts | 4 | Resolution Resources, Inc. (three-dimensional seismic reflection technology) | Soil (in situ) | Soil type | 12 days on site; 45 days for data assessment | 2 months to sample and delineate seismic data for a 1,500' x 1,500' area | Site characterization | $150,000 to develop subsurface, high resolution model | Very detailed image of soil stratigraphy that aids in the placement of wells; defines fractures within one foot | Removal of vegetation required | Jacqueline Quinn (NASA) 407/867-4265 |
| Former Vickers Site-Omaha, NE: hydraulic pump facility | 7 | Resolution Resources, Inc. (three-dimensional seismic reflection technology) | Soil (in situ) | Depth to ground water, bedrock stratigraphy | 5/12-5/20/97 | 62,000 sq ft per day | Site characterization, cleanup monitoring | $100,000 per 500,000 sq ft | Portable unit; identified fractures in bedrock | Not provided | Paul Broorner (Unisys) 612/687-2673 Mike Westerheiw 612/687-2887 |
| Naval Air Station Alameda-Alameda, CA: aircraft support operations | 9 | Resolution Resources, Inc. (three-dimensional seismic reflection technology) | Soil (in situ) (sediments, bedrock) | Bedrock stratigraphy | 11/96-10 days | Not provided | Site screening | Not provided | Noninvasive; real-time; cost-effective; easy to use | Equipment requires direct contact with ground, which presents a problem in buildings; data require interpretation | Ken Speilman (Navy EFA West) 415/244-2539 |

**Table 2-3**
**Summary of Field Analytical and Site Characterization Technologies**
**Reported Data on Specific Technologies (continued)**

| Site Description | EPA Region | Vendor/ Product | Media Monitored | Contaminant/ Parameter | Period of Use | Through-put | Data Use(s) | Cost | Technology Advantages | Technology Limitations | Contact(s) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Seismic Profiling (continued)** | | | | | | | | | | | |
| Lawrence Livermore National Laboratory-Livermore, CA: landfills, disposal pits, spills | 9 | EG&G, Inc. (Innovative Transducers) | Sediment, ground water | Depth to ground water, soil type, bedrock stratigraphy | 1992-present | Not provided | Site characterization, cleanup monitoring | $150,000 per unit | Rapid data collection; provides opportunity to properly design and install remedial system and determine migration pathways for contaminants | Works best where water table is shallow | Robert Bainer (Lawrence Livermore National Laboratory) 510/422-4635 |
| Lawrence Livermore National Laboratory-Livermore, CA | 9 | Resolution Resources, Inc. (three-dimensional seismic reflection technology) | Sediments, bedrock | Subsurface stratigraphy (structure) | 1-2 weeks | Not provided | Site characterization | Not provided | Information can be used to determine likely migration pathways | Not provided | Robert Bainer (Lawrence Livermore National Laboratory) 510/422-4635 Mary-Linda Adams (Resolution Resources) 540/349-9172 or 517/647-1832 |
| Naval Air Station North Island-San Diego, CA: chemical waste dumping site | 9 | Resolution Resources, Inc. (three-dimensional seismic reflection technology) | Soil (in situ) | Bedrock stratigraphy | 2 months | Not provided | Site characterization | $250,000 for 40-acre site | Cost-effective method of obtaining detailed on-site stratigraphy, using minimal preexisting bore-hole data; able to identify fault zones (contaminant migration pathways), saving several months in field exploration | Not provided | Bill Collins (NAVFACSW-DIV) 619/556-8929 |

**Table 2-3**
**Summary of Field Analytical and Site Characterization Technologies**
**Reported Data on Specific Technologies (continued)**

| Site Description | EPA Region | Vendor/ Product | Media Monitored | Contaminant/ Parameter | Period of Use | Through-put | Data Use(s) | Cost | Technology Advantages | Technology Limitations | Contact(s) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Seismic Profiling (continued)** | | | | | | | | | | | |
| Stringfellow hazardous waste site- Riverside, CA: Former hazardous waste landfill (1956-1972) | 9 | Resolution Resources, Inc. (three-dimensional seismic reflection technology) | Soil (in-situ) | Bedrock stratigraphy, fractures | 1/97-6/97 | 11 acres (7,800 data points) per 30 days | Site characterization | Not provided | Used to locate groundwater extraction wells, minimizing drilling costs | Metal objects on surface (fence) caused interference, but did not prohibit use of equipment | Stewart Black (URS Greiner, Inc.) 916/929-2346 |
| **Radionuclide Technologies** | | | | | | | | | | | |
| **Gamma Radiation Detector** | | | | | | | | | | | |
| Site unidentified- Texas City, TX: abandoned tin smelter facility | 6 | Ludlum, Inc. (Model 19 with a sodium iodide scintillation detector) | Soil (in situ), sediment (in situ) | Radionuclides | Not provided | Not provided | Site characterization | Not provided | Rapid, real-time data; portable system; data compared favorably with laboratory data; less expensive | Not provided | Warren Zehner (EPA) 281/983-2127 Joe Cornelius (E&E) |
| Ramp Industries Removal Action - Denver, CO: radioactive and mixed waste processor, transfer station, abandoned material at site, spills | 8 | Canberra (gamma spectrography) | Liquid waste (drummed) | Radionuclides | 2.5 months | Not provided | Waste characterization | $900 per wk rental, inspector at $370 per wk | Identifies waste in the field before shipping and disposal | Expensive; requires trained operator; sensitive to power fluctuations; requires liquid nitrogen; needs protection from elements | Dave Christenson (EPA) 303/312-6645 Dave Hall (SEG) 423/376-8246 |
| Naval Air Station Alameda, Hunters Point Annex- Oakland, CA | 9 | EG&G ORTEC (Micro Nomad) | Soil (in situ) | Radionuclides | 9/95-11/95 | Not provided | Site characterization | $750 per week (minus laptop) | Ease of use; portability; much cheaper than conventional methods | Not provided | Kevin Taylor (Tetra Tech) 404/225-5505 |

**Table 2-3**
**Summary of Field Analytical and Site Characterization Technologies**
**Reported Data on Specific Technologies (continued)**

| Site Description | EPA Region | Vendor/ Product | Media Monitored | Contaminant/ Parameter | Period of Use | Through-put | Data Use(s) | Cost | Technology Advantages | Technology Limitations | Contact(s) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Passive Alpha Detector** | | | | | | | | | | | |
| Area 11B at the Nevada Test Site- Mercury, NV | 9 | Rad Electric, Inc. (electric ionization chambers and alpha track detectors made by Landuer, Inc.) | Soil (in situ) | Radionuclides, (uranium) | Not provided | Not provided | Site characterization, health and safety monitoring | $25 per sample | Alpha track detectors have fewer potential interferences than electric ionization chamber; both techniques are fast, easy to use, and inexpensive | Not provided | C.S. Dudney and K.E. Meyer (Oak Ridge National Laboratory) |
| **Sampling and Sampler Emplacement Technologies** | | | | | | | | | | | |
| **Closed-piston Soil Sampling** | | | | | | | | | | | |
| Salina North- Salina, KS: industrial area, solvent use and disposal, grain fumigation, chemical manufacturing | 7 | Geoprobe Systems, Inc. (Marco-Core® closed piston soil sampler) | Soil (ex situ) | Not provided | 2 days | Not provided | Site characterization | $630 per unit | Can retrieve intact soil cores from below the water table (saturated materials); no cuttings; faster and less expensive than conventional drill rig | The sampler is designed for use only in soils and unconsolidated sediments; it generally is used at depths of less than 50 feet; if used for discrete interval sampling at depth, the bore hole must be preprobed to the top of the targeted sampling interval | Wes McCall (Geoprobe Systems Inc.) 913/825-1842 Susan Stover (KDHE) 913/296-5531 |
| **Direct-push Prepacked Well Screen** | | | | | | | | | | | |
| Salina North- Salina, KS: industrial area, solvent use and disposal, grain fumigation, chemical manufacturing | 7 | Geoprobe (direct-push prepacked-screen monitoring well) | Ground water | Halogenated and nonhalogenated VOCs | 1 week | 3 hours to install one prepacked well to 65 feet | Site characterization, compliance monitoring | $45 per 3-foot prepacked screen | Less expensive and faster than installing well by conventional methods; no soil cuttings | Depth limitations; wells cannot be placed in bedrock; small diameter of well creates difficulty in developing, purging, and sampling when large volumes of water are needed | Wes McCall (Geoprobe Systems Inc. 913/825-1842 Susan Stover (KDHE) 913/296-5531 |

**Table 2-3**
**Summary of Field Analytical and Site Characterization Technologies**
**Reported Data on Specific Technologies (continued)**

| Site Description | EPA Region | Vendor/ Product | Media Monitored | Contaminant/ Parameter | Period of Use | Through-put | Data Use(s) | Cost | Technology Advantages | Technology Limitations | Contact(s) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Low-flow Ground-water Pumping** | | | | | | | | | | | |
| Auburn Road-NH: landfill | 1 | Not provided | Ground water | VOCs, heavy metals | 4/95-4/96 | Not provided | Cleanup monitoring | Not provided | Samples for inorganic water quality are more representative | Longer sampling time, increasing cost | Darryl Luce (EPA) 617/573-5767 |
| Davis GSR-RI | 1 | Not provided | Ground water | VOCs, SVOCs, heavy metals | 4/93-8/93 | Not provided | Cleanup monitoring | Not provided | Samples for inorganic water quality are more representative | Not provided | Joe Lemay (EPA) 617/573-9622 |
| Fort Devens-MA | 1 | Not provided | Ground water | VOCs, heavy metals | 1/96-present | Not provided | Cleanup monitoring | Not provided | Fewer waste by-products; data quality | Not provided | Jim Byrne (EPA) 617/573-5799 |
| Otis AFB-MA | 1 | Not provided | Ground water | VOCs, heavy metals | 1993-present | Not provided | Cleanup monitoring | Not provided | Fewer waste by-products; data quality | Not provided | Carol Keating (EPA) 617/223-5594 |
| Peterson/Puritan-RI | 1 | Not provided | Ground water | VOCs, heavy metals | 5/95-present | Not provided | Cleanup monitoring | Not provided | Fewer waste by-products; data quality | Not provided | Dave Newton (EPA) 617/573-9612 |
| Revere Textile-CT | 1 | Not provided | Ground water | VOCs, heavy metals | 1993-present | Not provided | Cleanup monitoring | Not provided | Fewer waste by-products; data quality | Not provided | Leslie McVickar (EPA) 617/573-9689 |
| Saco Land Fill-ME | 1 | Not provided | Ground water | Heavy metals | 1992-1993 | Not provided | Cleanup monitoring | Not provided | Fewer waste by-products; data quality | Not provided | Ron Jennings (EPA) 617/573-5794 |
| Tibbetts-NH | 1 | Not provided | Ground water | VOCs, heavy metals | 6/95-present | Not provided | Cleanup monitoring | Not provided | Fewer waste by-products; data quality | Longer sampling time, increasing costs | Darryl Luce (EPA) 617/573-5767 |
| Ponders Corner (Lakewood)-South of Tacoma, WA: drycleaning and laundry operations | 10 | Brainard-Kilman | Ground water | Halogenated VOCs | 7 days | Not provided | Site screening, site characterization, cleanup monitoring | Not provided | Minimizes sucking of soil and sediments into sampler | Not provided | Ann Williamson (EPA) 206/553-2739 |

**Table 2-3**
**Summary of Field Analytical and Site Characterization Technologies**
**Reported Data on Specific Technologies (continued)**

| Site Description | EPA Region | Vendor/ Product | Media Monitored | Contaminant/ Parameter | Period of Use | Through-put | Data Use(s) | Cost | Technology Advantages | Technology Limitations | Contact(s) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Soil Gas Sampling** | | | | | | | | | | | |
| Site unidentified-eastern United States: former coal gas manufacturing plant | Not specified | W.L. Gore and Associates (GORE-SORBER℠) | Soil gas (also used to monitor soil and ground water) | PAHs, SVOCs | Exposure time of 3 weeks | Not provided | Site characterization | Not provided | Low-volatility compounds can be absorbed; can be used in situ; cost savings; good correlation with monitoring well data | Not provided | Mark Stutman and Mark Wrigley (W.L. Gore and Associates) 410/996-3406 |
| Davis GSR - Smithfield, RI: landfill | 1 | Not provided | Soil gas | VOCs | 4/92-8/92 | Not provided | Site investigation | Not provided | Cost-effective; real-time data | Not provided | Joe Lemay (EPA) 617/573-9622 |
| Sothersworth - NH: landfill | 1 | Petrex | Soil gas | VOCs | Not provided | Not provided | Cleanup monitoring | Not provided | Not provided | Not provided | Roger Duwart (EPA) 617/573-9628 |
| Site unidentified-Location not provided | 7 | Not provided (Summa Canister) | Soil gas | VOCs (solvents) | Not provided | Not provided | Site characterization, cleanup monitoring, compliance monitoring, health and safety monitoring | $658 per canister | Easy to collect a sample; portable system | Not provided | Harry Kimball (EPA) 913/551-5171 |
| Sacramento Army Depot-Sacramento, CA | 9 | SEAMIST (equipment used in conjunction with soil gas monitoring wells) | Soil gas | Halogenated VOCs (TCE, PCE) | 9 months | 50 samples per well, 6 wells per day | Verification sampling | $30,000 per well | Independent verification; versatility of application (can sample the ports desired); retractable (could move the wells) | Must customize technology to the site's lithology | Marlon Mezquita (EPA) 415/744-1527 |
| **Vertical Ground-water Profiling** | | | | | | | | | | | |
| Pease AFB 3-NH | 1 | Waterloo Centre for Groundwater Research | Ground water | DNAPL | 1/95-9/95 | Not provided | Cleanup monitoring | Not provided | Vertical delineation of contaminants | Not provided | Mire Daly (EPA) 617/573-5783 |

**Table 2-3**
**Summary of Field Analytical and Site Characterization Technologies**
**Reported Data on Specific Technologies (continued)**

| Site Description | EPA Region | Vendor/ Product | Media Monitored | Contaminant/ Parameter | Period of Use | Through-put | Data Use(s) | Cost | Technology Advantages | Technology Limitations | Contact(s) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Vertical Ground-water Profiling (continued)** | | | | | | | | | | | |
| Savage-<br>NH | 1 | Waterloo Centre for Groundwater Research | Ground water | DNAPL | 3/95-5/95 | Not provided | Cleanup monitoring | $350, 000 | Vertical delineation of contaminants | Not provided | Dick Goehlert (EPA) 617/573-5742 |
| Wells G&H 1-<br>MA | 1 | Waterloo Centre for Groundwater Research | Ground water | Not provided | 8/94 | Not provided | Cleanup monitoring | Not provided | Discrete fracture ground water samples | Not provided | Mary Garren (EPA) 617/573-9613 |
| Sacramento Army Depot-<br>Sacramento, CA | 9 | Not provided (BAT Probe) | Ground water | Halogenated VOCs | 6 months | Not provided | Site characterization | Not provided | Cost-effective; enables vertical profiling; can target monitoring well zones; enables tracking of plume boundaries | Problems with data comparability; difficult to model migration of TCE | Marlon Mezquita (EPA) 415/744-1527 |
| **Vibrating Well Installation** | | | | | | | | | | | |
| Town Garage/Radio Beacon-<br>NH | 1 | Solinst, Inc. (Ground-water Packer)<br>Mykro Waters, Inc. (Microwells) | Ground water | VOCs | 1/91-7/97 | Not provided | Cleanup monitoring | Not Provided | Discrete fracture ground water samples | Not provided | Jim Di Lorenzon (EPA) 617/223-5510 |
| Yaworski-<br>CT | 1 | Mykro Waters, Inc. (Microwells) | Ground water | VOCs (benzene) | 9/97-present | Not provided | Cleanup monitoring | Not provided | Lower cost, rapid installation | Not provided | Anni Loughlin (EPA) 617/223-5575 |
| Fletcher's Paint-<br>NH | 1 | Mykro Waters, Inc. (Microwells) | Ground water | VOCs, inorganics | 9/94 | Not provided | Cleanup monitoring | $1,000 per well | Lower cost, rapid installation | Not provided | Darryl Luce (EPA) 617/573-5767 |
| Gallops Quarry-<br>CT | 1 | Mykro Waters, Inc. (Microwells) | Ground water | VOCs, inorganics | 9/94 | Not provided | Cleanup monitoring | Not provided | Lower cost, rapid installation | Not provided | Leslie McVickar (EPA) 617/573-9689 |
| New Hampshire Plating-<br>NH | 1 | Mykro Waters, Inc. (Microwells) | Ground water | VOCs, SVOCs, inorganics | 6/93-6/94 | Not provided | Cleanup monitoring | Not provided | Lower cost, rapid installation | Not provided | Jim Di Lorenzo (EPA) 617/223-5510 |

**Table 2-3**
**Summary of Field Analytical and Site Characterization Technologies**
**Reported Data on Specific Technologies (continued)**

| Site Description | EPA Region | Vendor/ Product | Media Monitored | Contaminant/ Parameter | Period of Use | Through-put | Data Use(s) | Cost | Technology Advantages | Technology Limitations | Contact(s) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Vibrating Well Installation (continued)** | | | | | | | | | | | |
| Hastings Superfund Site-NE: landfill, contaminated ground water | 7 | Mykro Waters, Inc. (Microwells) | Ground water, soil | VOCs | 6/97 | Up to 2000 feet of well per day | Site characterization, cleanup monitoring | Not provided | Wells can be installed to approximately 100' without pilot hole and 200' with pilot hole; generates no drill cuttings; equipment can fit into tight spaces | Equipment overheats frequently; well screens clog easily in clay and other fine materials; requires welding 20' sections | Diane Easley (EPA) 913/551-7797 Randell Ross (ADA) 405/436-8611 |