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Site Characterization & Monitoring Technologies

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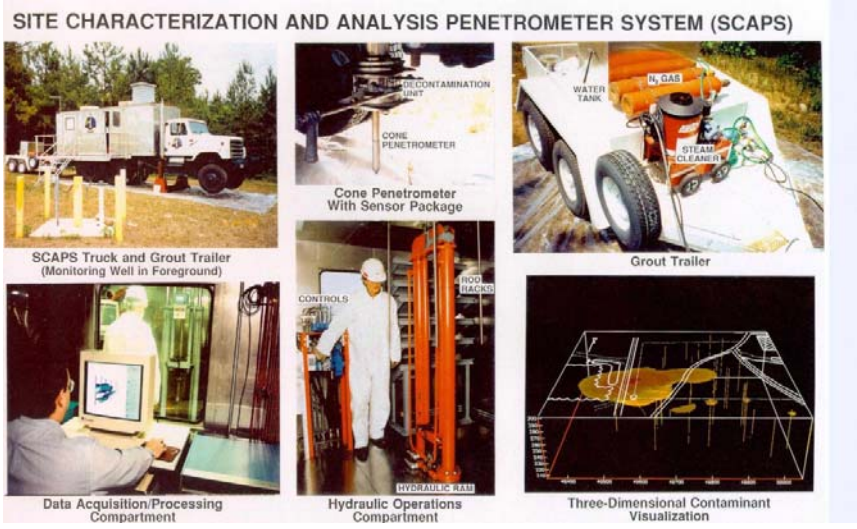
SCAPS Onsite Capabilities



SCAPS System Description

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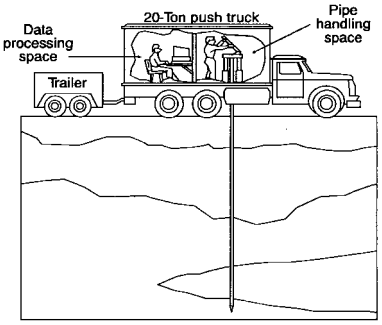
- **Vehicle**
  - Push probe configuration
    - -- Sensors
    - -- Samplers
    - -- Hybrid sensor / samplers
  - Grouting capability
  - Equipment decontamination



- **Data Acquisition and Processing**
  - In-situ sensor data acquisition
  - Near real-time on-site processing
  - 3D visualization

3

SCAPS Sensor / Sampler Technologies

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Technology	Development Status	Implementation
Soil Classification & Electrical Resistivity	Complete	1989
Enhanced Petroleum, Oil, &Lubricant Sensor	Evaluated / Certified Complete	1994 / 1996
Explosives Sensor	Complete	1997
Radioactivity Sensor (Spectral Gamma)	Complete	1997
Radioactivity Sensor & Radioactive Metals	Complete	1998
Volatile Vapor (VOC) Samplers	Evaluated / Certified Complete	2000
Heavy Metals	Evaluation Complete	2000
Xenon Gamma Sensor	Evaluation Ongoing	2003

4

SCAPS Sensor Certification

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- US EPA Consortium for Site Characterization Technologies
- California EPA Innovative Environmental Technology Certification Program
- Interstate Technology Regulatory Cooperation (ITRC) Workgroup
- SCAPS Related Patent Actions
  - 13 Patents Issued To Date
  - 4 Patent Applications
  - 1 Invention Disclosure

5

Documented Cost Savings

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- SCAPS LIF POL Sensor System
  - Fleet Industrial Supply Center Fuel Farm, Point Loma, CA
  - Determined areas free of contamination reducing soil volume requiring excavation / remediation
  - **$1,000,000 Saved**
- SCAPS Hydrosparge VOC Sampler / ITMS System
  - Bush River Site, Aberdeen Proving Ground, MD
  - Installed and analyzed 30 mini-wells in 8.5 days
  - **$300,000 Saved** versus conventional drill / sampling techniques
- SCAPS Spectral Gamma Radioactivity Sensor System
  - R-Reactor Seepage Basin, Savannah River Site, SC
  - 180 in-situ radioactivity detection / speciation evaluations
  - **$800,000 Saved** versus conventional drill / sampling techniques
- Typical **25-50% Cost Savings** versus conventional drill / sampling techniques and **Near Real-Time On-Site Results**

6

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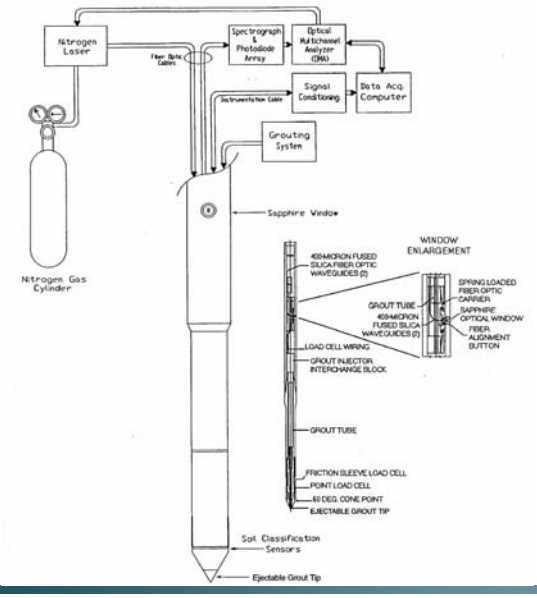
SCAPS POL and Geophysical Sensors Probe Schematic



7

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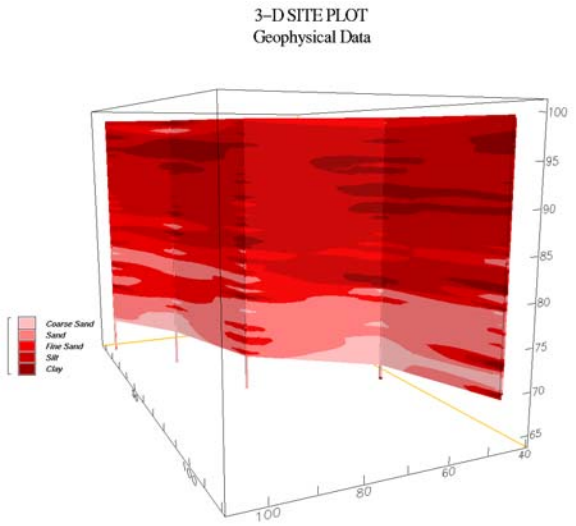
Stratigraphy Visualization



8

Contaminant Visualization

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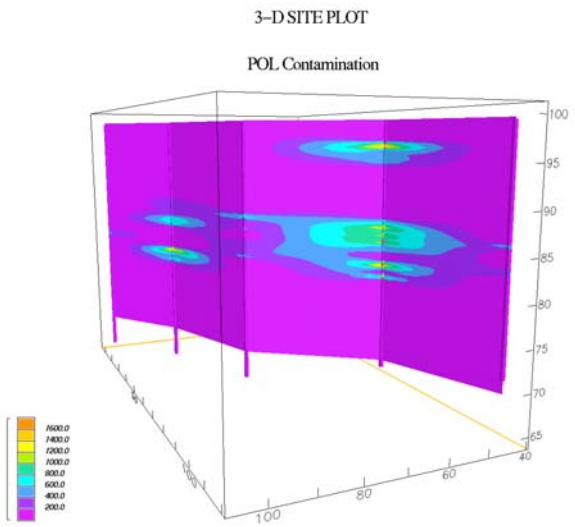

9

Stratigraphy / Contaminant Overlay

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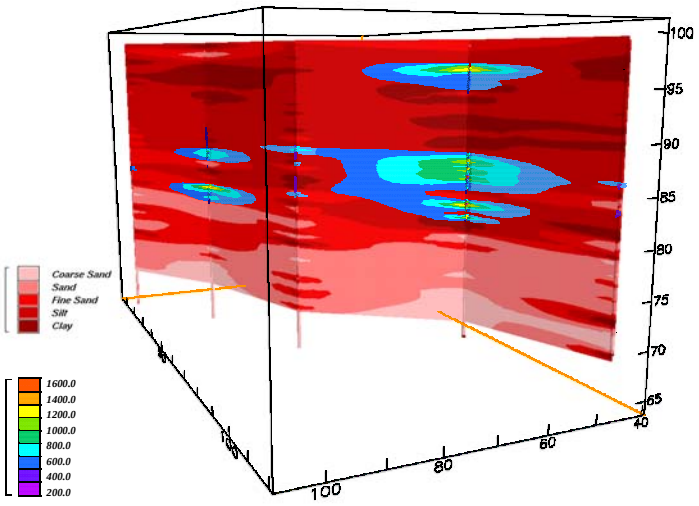

10

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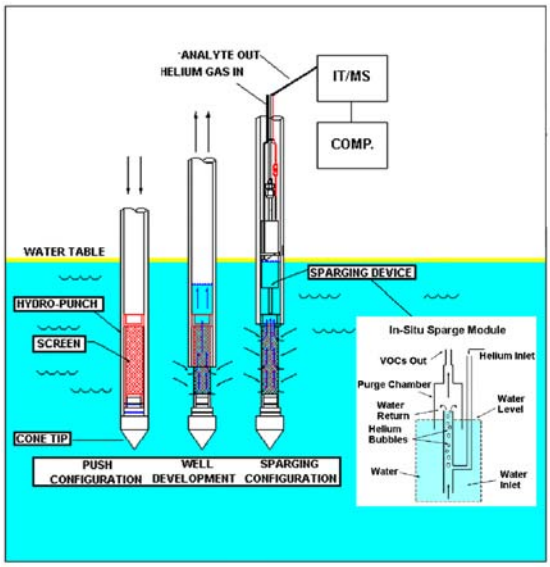
SCAPS Hydrosparge Volatile Organic Compound (VOC) Hybrid Sensor Sampler Installation Schematic



11

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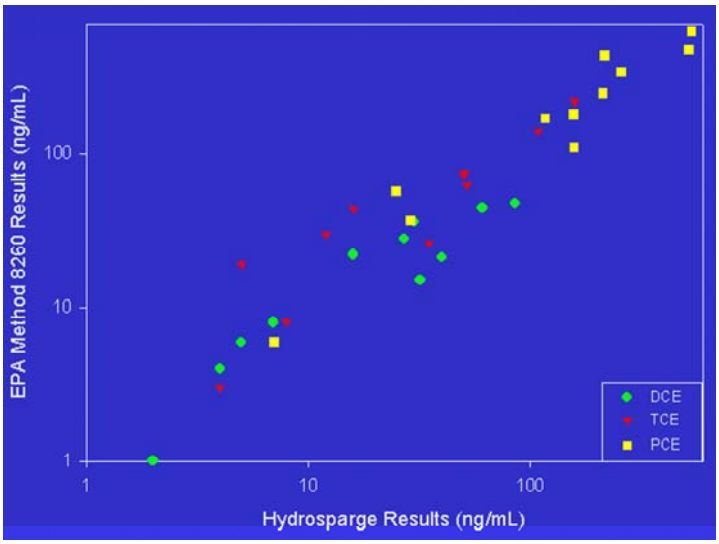
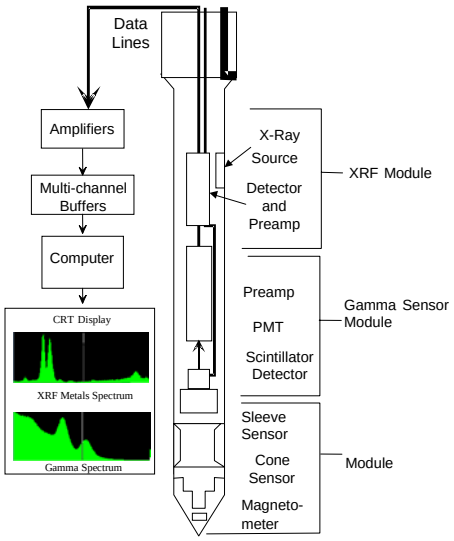
Hydrosparge VOC Sensor Validation, McClellan AFB, CA



12

Multisensor Gamma/Metals Probe Configuration



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13

Multisensor Gamma/Metals Probe Capabilities

- Real-time soil classification/stratigraphy data
- Real-time magnetometer data
- Real-time gamma activity (counts/second)
- Near real-time gamma emitting radionuclide speciation (identification) in situ
- Near real-time temperature corrected spectral gamma data
- Near real-time heavy metal speciation in situ using isotopic, x-ray, or laser excitation; XRF or LIBS spectral analysis
- Co-registered radionuclide speciation, depth, and soil classification data

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14

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Radionuclide & Metals Detection / Speciation

PROBLEM

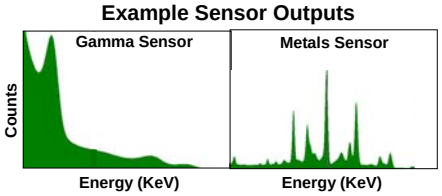
Provide in situ, near real-time detection and speciation of gamma emitting radionuclides and radioactive metals in subsurface media; provide real-time co-registered soil geophysical data.

ACCOMPLISHMENTS

- Exploited downhole isotopic excitation and x-ray fluorescence spectroscopy technology to detect radioactive metal contaminants
- Successfully field demonstrated multi-sensor radionuclide / metals detection technology
- Cost savings of 56% for gamma detection / speciation over standard drill/sample procedures (>$800K saved at the DOE Savannah River Site, SC)
- Implemented by DOE for site characterization during the Hanford Tank Closure Project.

Multi-Sensor Probe in Decontamination Chamber

Example Sensor Outputs



15

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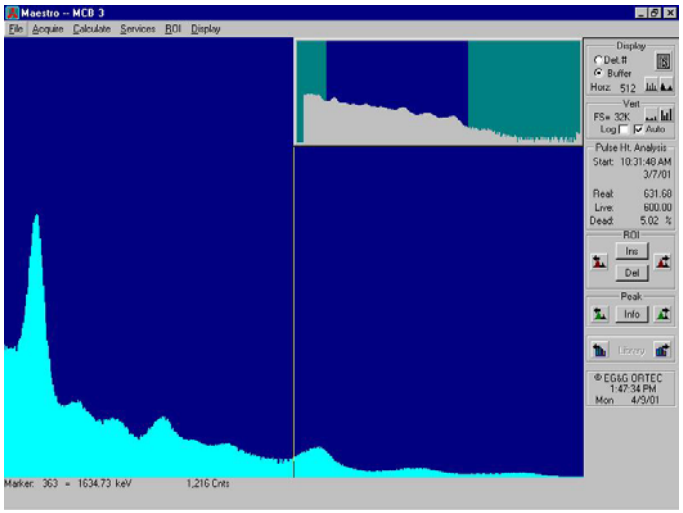
Typical Gamma Sensor Energy Spectrum



High Pressure Xenon Gas Gamma Detector Energy Spectrum of Naturally Occurring Radioactive Material; Data Acquisition for 1200 Seconds

16

Trailer Mounted Multisensor Array
Rapid Site Survey For Gamma-Emitting Radionuclides

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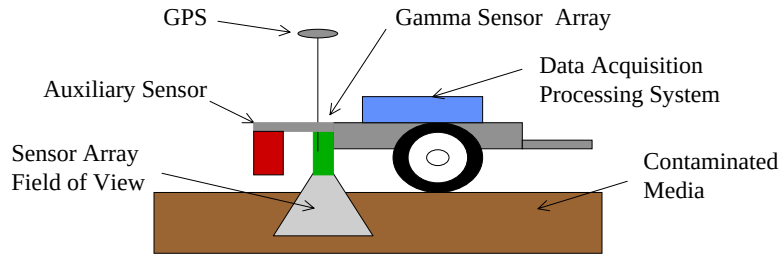
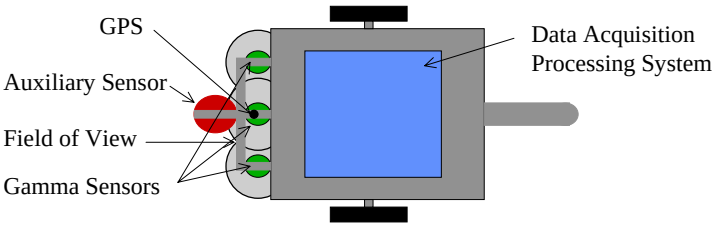


Trailer Viewed from Side



Trailer Viewed from Top

17

ERDC Mobile Data Acquisition System
10-Acre Radionuclide-Enriched Site, Kirtland AFB, NM

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18

Surface Thorium Distribution >157-pCi/g
10-Acre Radionuclide-Enriched Site, Kirtland AFB, NM

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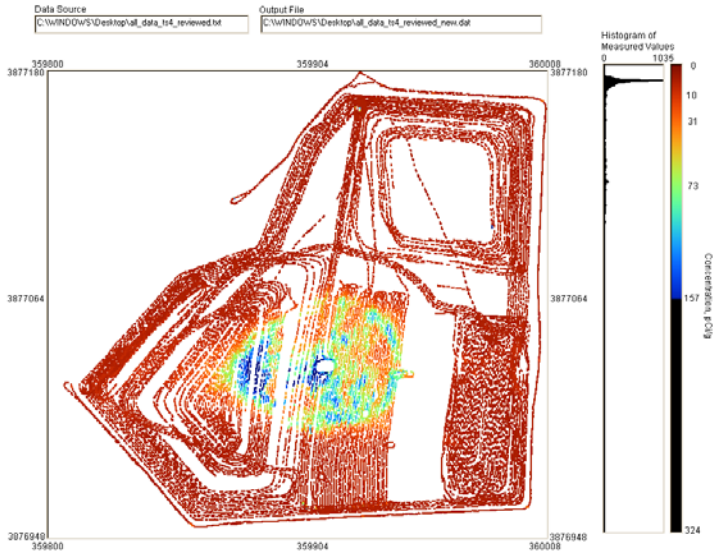

19

Surface Thorium Distribution >10-pCi/g
10-Acre Radionuclide-Enriched Site, Kirtland AFB, NM

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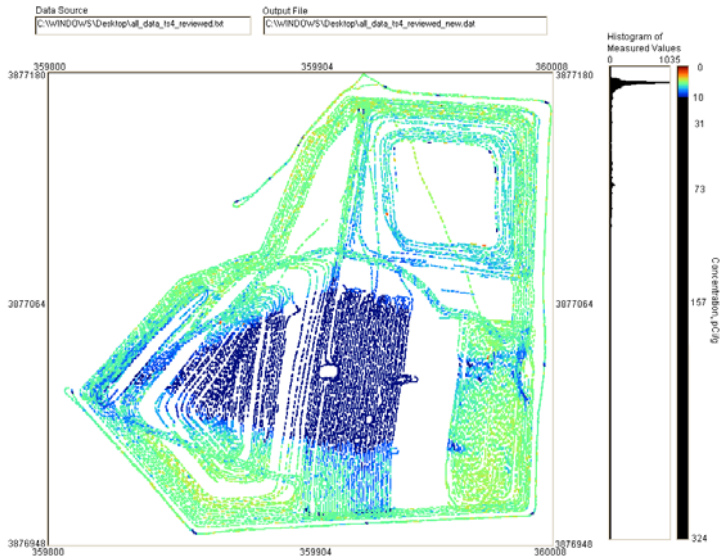

20

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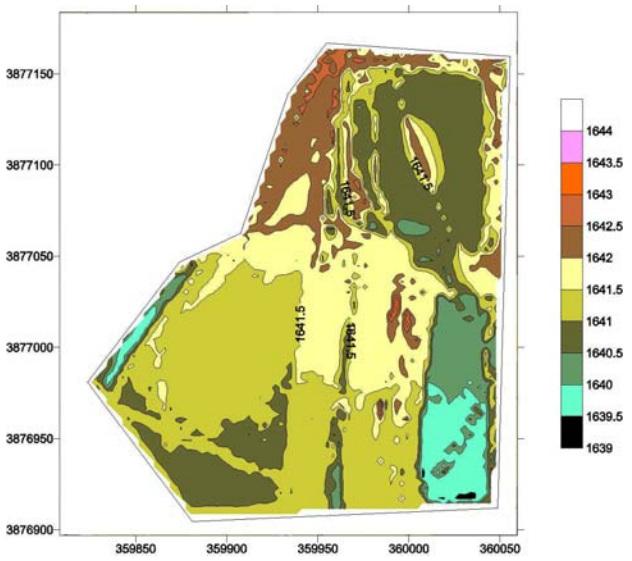
Surface Contour GPS Mapping
10-Acre Radionuclide-Enriched Site, Kirtland AFB, NM



21

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Corps of Engineers Scaps Operators

Corps Of Engineers Operational SCAPS Trucks*

Kansas City District
CENWK-EC-GG
(816) 983-3985 / 3680

Savannah District
CESAS-EN-GG
(912) 652-5674 / 5676

Tulsa District
CESWT-EC-GS
(918) 669-7150 / 832-4122

ERDC R&D SCAPS Truck
CEERD-EM-J
(601) 634-2446

*** Refer to Next Slide for Areas of Responsibility**

22

Corps of Engineers Scaps Operations

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23