Advanced Site Characterization Tools (ASCT) Update Team

ECOS

ERIS
ENVIRONMENTAL RESEARCH INSTITUTE OF THE STATES

INTERSTATE TECHNOLOGY REGULATORY COUNCIL
ITRC

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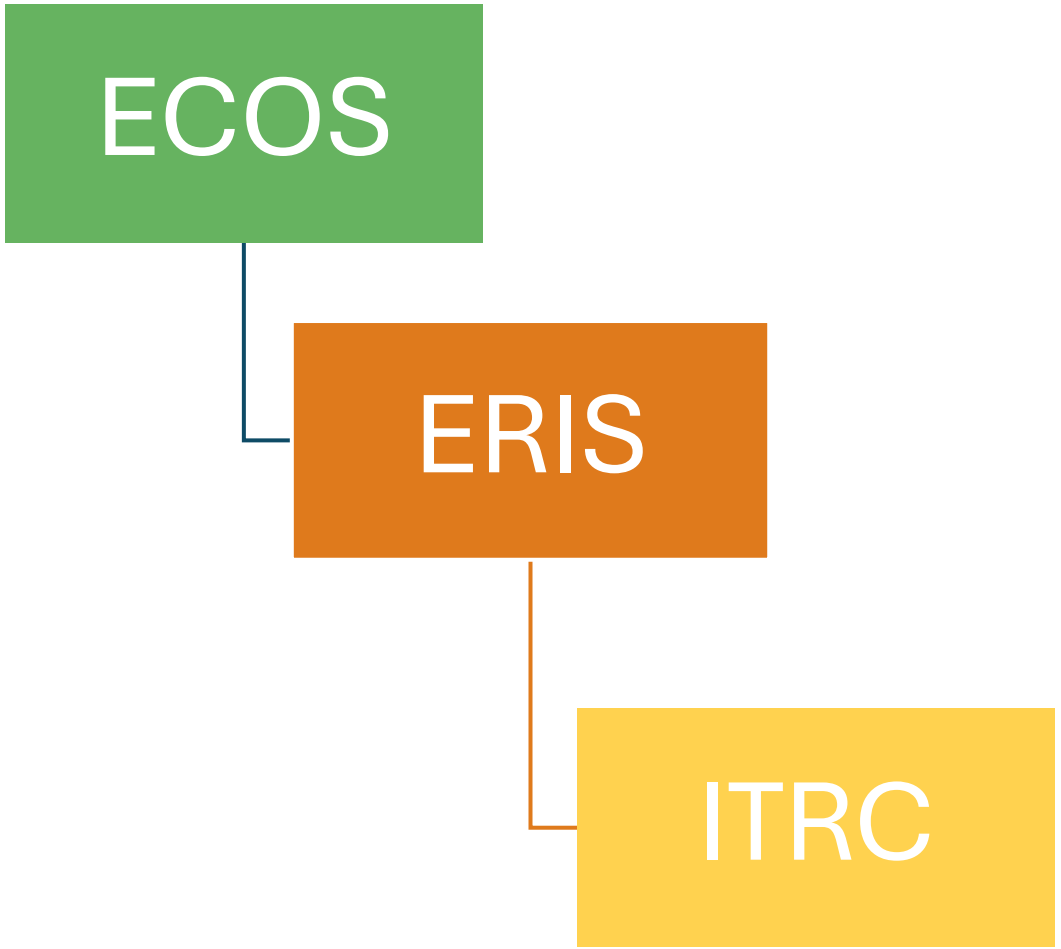
What is ITRC?

- ITRC is a program of the Environmental Research Institute of the States (ERIS)
- A national coalition focused on developing tools and strategies – documents, training materials - to reduce interstate barriers to the deployment of innovative environmental technologies
- Membership from state, federal, tribal, and local agencies, private sector, academics and public stakeholders

Organization



Environmental Council of the States (ECOS)

The national nonprofit, nonpartisan 501(c)(6) association of state and territorial environmental agency leaders

https://www.ecos.org/

Environmental Research Institute of the States (ERIS)

501(c)(3) education and research nonprofit corporation affiliated with ECOS

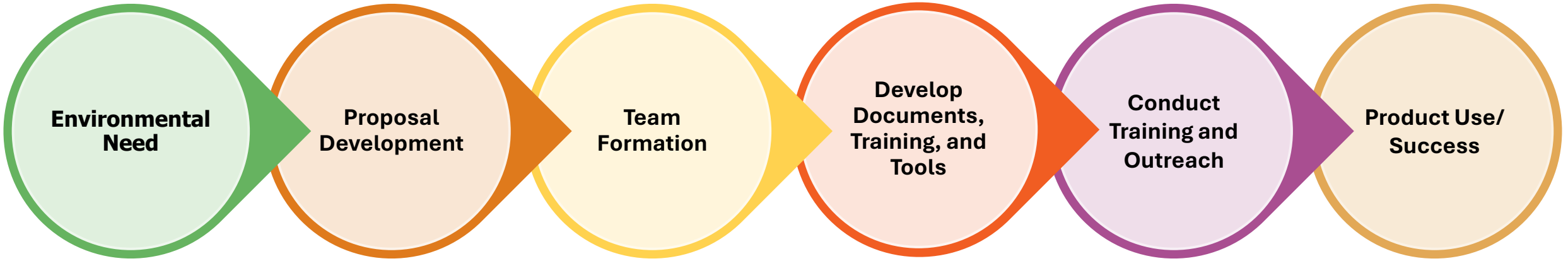
https://www.eristates.org/

Interstate Technology & Regulatory Council (ITRC)

Program of ERIS

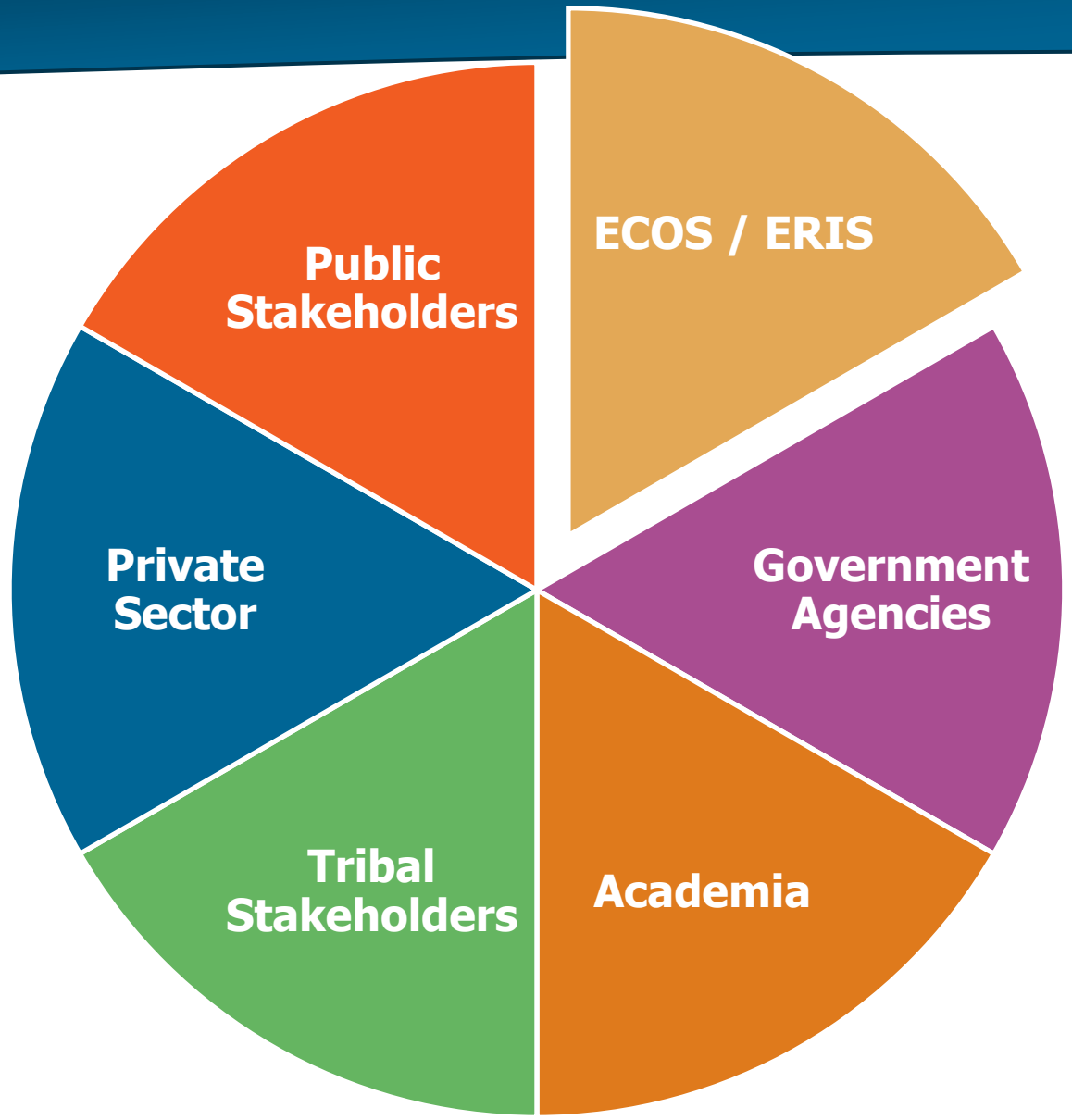
https://itrcweb.org/

ITRC Project Development Process



ITRC Membership

- **FREE** for government agencies, Tribal stakeholders, academia, and public stakeholders
- Private Sector participation through our Industry Affiliates Program (IAP)
- Learn from and network with a diverse group of environmental professionals with several areas of expertise
- Write and review documents
- Develop and deliver training
- Leadership and professional development opportunities



Focus Areas

Guidance Materials

ITRC develops peer-reviewed resources that provide the environmental community with technical knowledge and foster consistent regulatory approaches. To date, ITRC has published over 150 guidance documents.

Trainings and Webinars

Free webinars, offered with EPA's Clu-In, deliver accessible, on-demand technical and regulatory insights drawn from ITRC resources. To date, ITRC's trainings, both online and in-person, have reached over 200,000 participants.

Project Teams

Our project teams bring together members with diverse expertise to fulfill our mission by developing products that address environmental challenges.

Green and Sustainable Chemistry Team

Underwater Munitions Team

Sustainable Management of Waste from Energy Resources Team

Advanced Site Characterization Tools (ASCT) – Update Team

New Project Teams for 2026

Phytotechnologies Update	Modernizing ITRC's existing Phytotechnology Guidance by integrating new science and tools and providing nature-based cleanup strategies for today's environmental challenges.
PFAS Treatment Technologies	Developing a new, comprehensive ITRC guidance document on PFAS Treatment including treatment technologies, performance verification, and management of residuals.
Petroleum Training Workgroup	Building a training roadmap to equip new environmental professionals with essential petroleum concepts and resources.
AI/ML in the Environmental Field	Exploring how artificial intelligence and machine learning can empower more informed, timely, and effective environmental decisions across regulatory and technical landscapes.

ITRC Membership

Benefits!

Learn: Support research & reference and case study identification

Write: Help draft content for final products

Review: Provide comments to draft & final products

Train: Develop and deliver training materials & courses

Network: Participate in calls/meetings, surveys, and discussion posts

Leadership Opportunities

Project Team Leaders and Subgroup Leaders

Board of Advisors

State Engagement Program

Emerging Environmental Leaders Forum

How do you sign up?

2019 ASCT Technical Document

- Introduction
- ASCT Implementation
- Direct Sensing
- Borehole Geophysics
- Surface Geophysics
- Remote Sensing
- Stakeholder and Tribal Perspectives
- Regulatory Perspectives
- Case Studies

Advanced Site Characterization Team 2025

- Project Duration: June 2025 – December 2026
- This Project Team will review and update the 2019 ITRC ASCT Guidance (ASCT-1)

ASCT Update Team 2025

Updates to the document:

- Adding new technologies and updating the ones currently in the document
- Discussing and updating the acceptance and use of the technologies
- Discussing how each technology provides data and how to interpret it
- Further developing and updating training

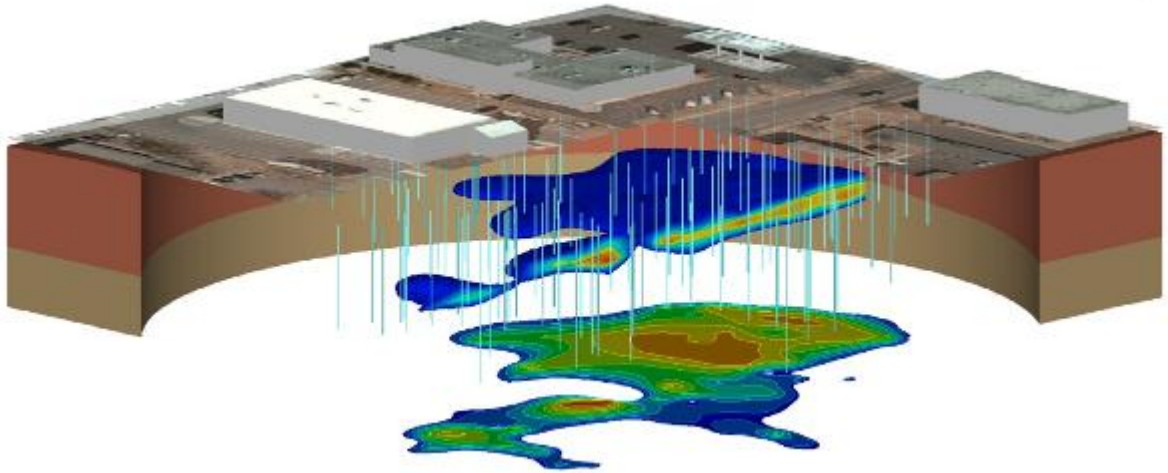


Figure 3-14, retrieved from ASCT-1. Source: Dakota Technologies, Inc., Used with Permission.

Welcome

Implementing Advanced Site Characterization Tools (ASCT-1)

Advanced Site Characterization Tools (ASCT) in this document are organized into four sections: Section 3 – Direct Sensing, Section 4 – Borehole Geophysical, Section 5 – Surface Geophysical, and Section 6 – Remote Sensing. For each tool within these sections, the document provides a discussion of:

- the information the tool provides,
- how it works,
- advantages and limitations of the tool,
- quality assurance/quality control considerations,
- data collection design,
- data interpretation and presentation, and
- cost considerations

An ASCT Selection Tool, along with Summary Tables, Case Studies, and Checklists are included with this document to support the selection and use of these tools.

1.3 How to Use this Document

The ASCT in this document are divided into four general categories: direct sensing tools, downhole geophysical tools, surface geophysical tools, and remote sensing tools. Using the table of contents or the figure on the main page, you can go to one of the four sections that describe the tools under a general category or go directly to an individual tool. Tool summary tables, case studies, and checklists are also included. The summary tables provide additional information to evaluate the applicability of each tool. Case studies are examples of the use of these tools at a site. Checklists provide information to be considered when planning to use a tool, describe typical content of a report, and identify appropriate quality control checks.

If you are interested in identifying and reviewing tools that might address a data need for a site, you can use the ASCT Selection Tool. The ASCT Selection Tool is a Microsoft Excel spreadsheet that can be downloaded from the ITRC ASCT page. To select tools to evaluate you will need to provide the following information using the pulldown boxes on the spreadsheet:

- **The type of data needed** – chemistry (chemical identification, NAPL presence, contaminant concentration, pH, conductivity, organic content, total organic solids), geology (lithology, stratigraphy, fractures, structural, physical properties), or hydrology (porosity, permeability, flux, groundwater flow, hydraulic conductivity, hydraulic gradient)
- **The type of subsurface** – consolidated/bedrock (cannot penetrate with direct-push platforms) or unconsolidated
- **Data quality needed** – quantitative (for chemistry – concentrations based on standards, for geo or hydro – parameter measurements that are generally repeatable), semi-quantitative (measurements that fall within a range), or qualitative (an indirect measurement)
- **Data collection characteristics** – invasive (requires a boring or subsurface access), non-invasive (, access restrictions (surface cover, topology or other characteristics that may restrict or make access difficult).

Based on your input, the selection tool will provide a list of tools that meet these four criteria. Once a shortlist of tools has been identified, you can follow links to the category section, individual tool subsections, summary tables, case studies, and checklists.

Print this page/section

Direct Sensing

- Tools Included
- Principles of Direct Sensing
- Tools
  - Membrane Interface Probe (MIP)
  - Optical Interface Probe (OIP)
  - Laser Induced Fluorescence (LIF)
  - Cone Penetrometer Testing (CPT)
  - Groundwater Profiling
  - Electrical Conductivity (EC)
  - Flexible Liners
- Case-study Video

General Principles of Direct Sensing

- Screening tools to rapidly and efficiently detect contamination and characterize subsurface conditions
  - High-resolution subsurface lithologic and groundwater data to aid in site assessment and improve the CSM
  - Allow a site or project to progress more rapidly toward cleanup or closure
- Typically deployed using direct-push technology or are deployed in open boreholes
- Data generated with these tools can be used to select confirmatory soil boring and monitoring well locations to verify and enhance the direct sensing results

Membrane Interface Probe - MIP

The tool consists of:

- A small electrical conductivity (EC) array and a block heater
- A probe fitted with a small gas-permeable membrane connected to flowing stream of inert carrier gas that is directed uphole to one or more detectors (PID, ECD, etc.)

The MIP can detect VOCs and some semi-volatile organic compounds (SVOCs) in the subsurface and generates real-time logs of detector response

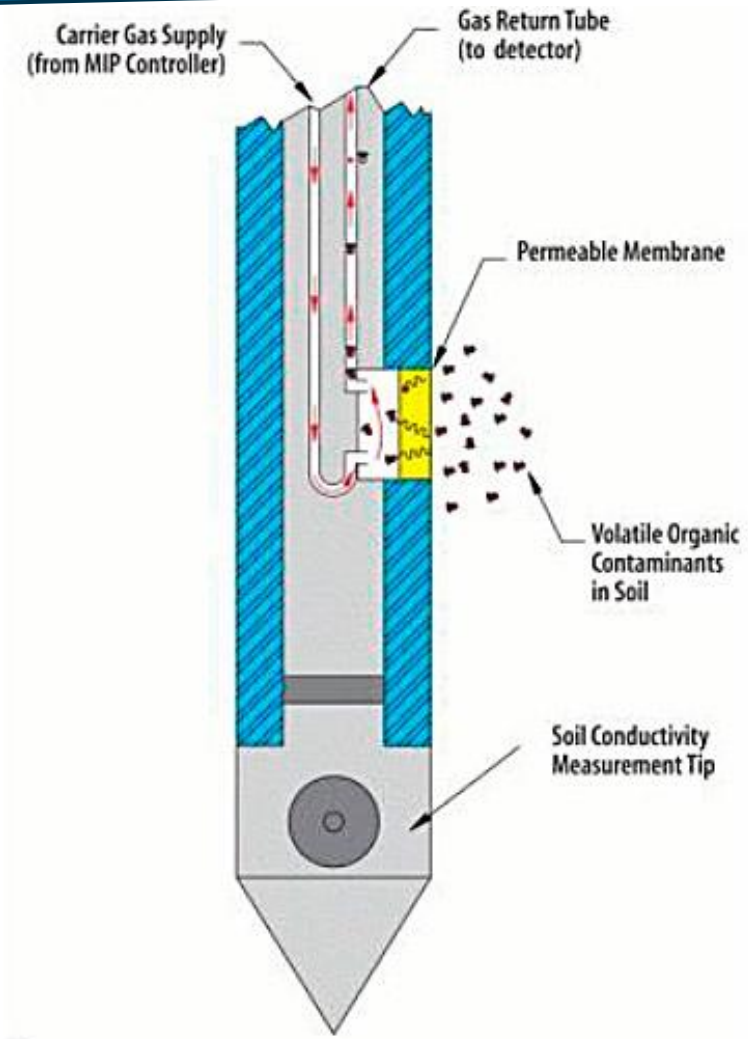


Figure 3-3, retrieved from ASCT-1. Source: Geoprobe Systems®, used with permission.

Optical Image Profiler – OIP

- The OIP (Geoprobe Systems®) is a field-screening tool for characterizing the subsurface distribution of NAPL with polycyclic aromatic hydrocarbons (PAHs)
  - Provides qualitative to semiquantitative results
- The OIP system employs a UV light-emitting diode (LED) to induce **fluorescence** in PAHs, a visible (white) light LED to examine the media, and an integrated camera to capture images of both
- Like MIP, the probe also contains an electrical conductivity (EC) array

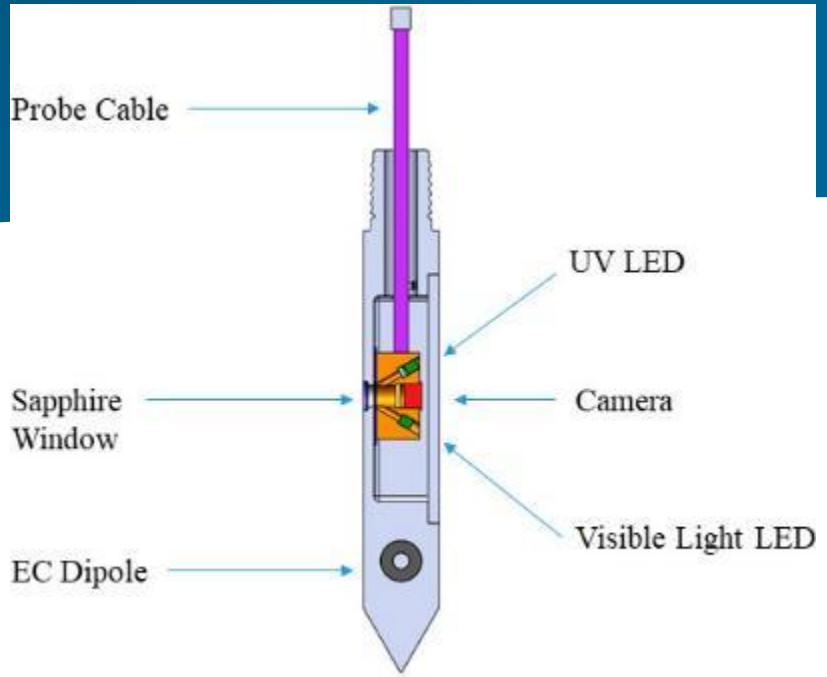


Figure 3-7, retrieved from ASCT-1. Source: Geoprobe Systems®, used with permission

Laptop computer with software

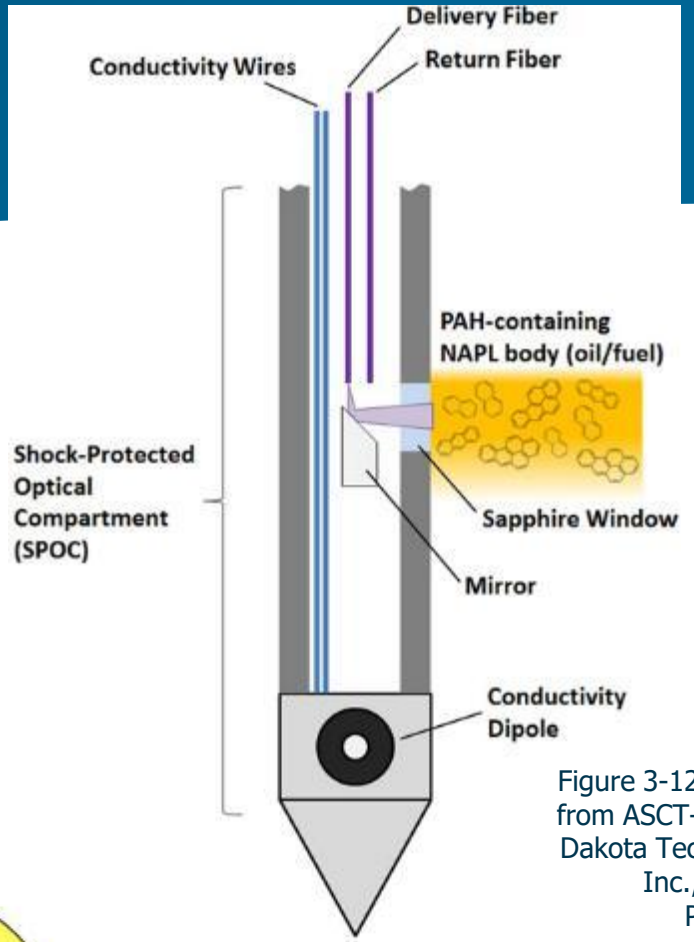
OIP6000 Optical Interface

FI6000 Field Instrument

Figure 3-6, retrieved from ASCT-1. Source: Geoprobe Systems®, used with permission

Laser Induced Fluorescence – LIF

- LIF detects NAPL in the subsurface, including most refined fuels through heavy crude petroleum
  - It employs UV laser light to excite fluorescent molecules in NAPL, including jet fuel/kerosene, petroleum fuels/oils, coal tars, and creosotes
  - It also detects fluorescent compounds added to nonfluorescent NAPLs



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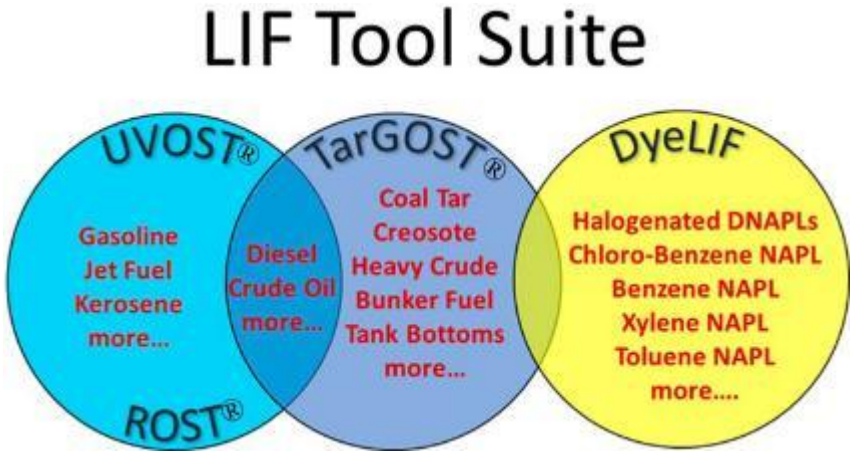

Figure 3-13, retrieved from ASCT-1. Source: Dakota Technologies, Inc., used with Permission.

Advanced Borehole Logging Tools

- Nuclear Magnetic Resonance - uses a quantum physical property of hydrogen atoms and the response of hydrogen atoms to magnetic field perturbations.
- Provides quantitative estimates of total porosity, pore-size distribution, permeability, and relative pore-fluid saturations of oil and water.

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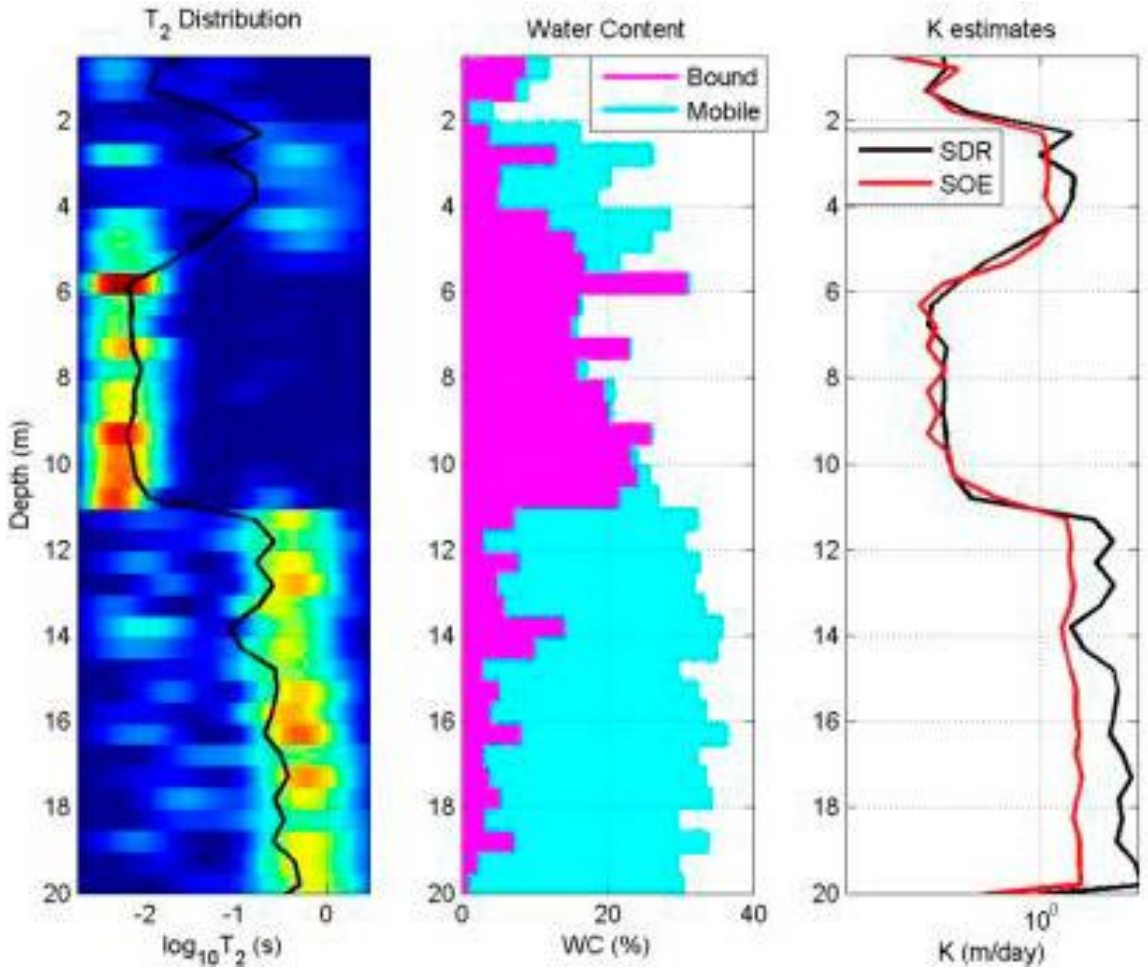

Figure 4-22, retrieved from ASCT-1. Source: Vista Clara, Inc., Used with permission.

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