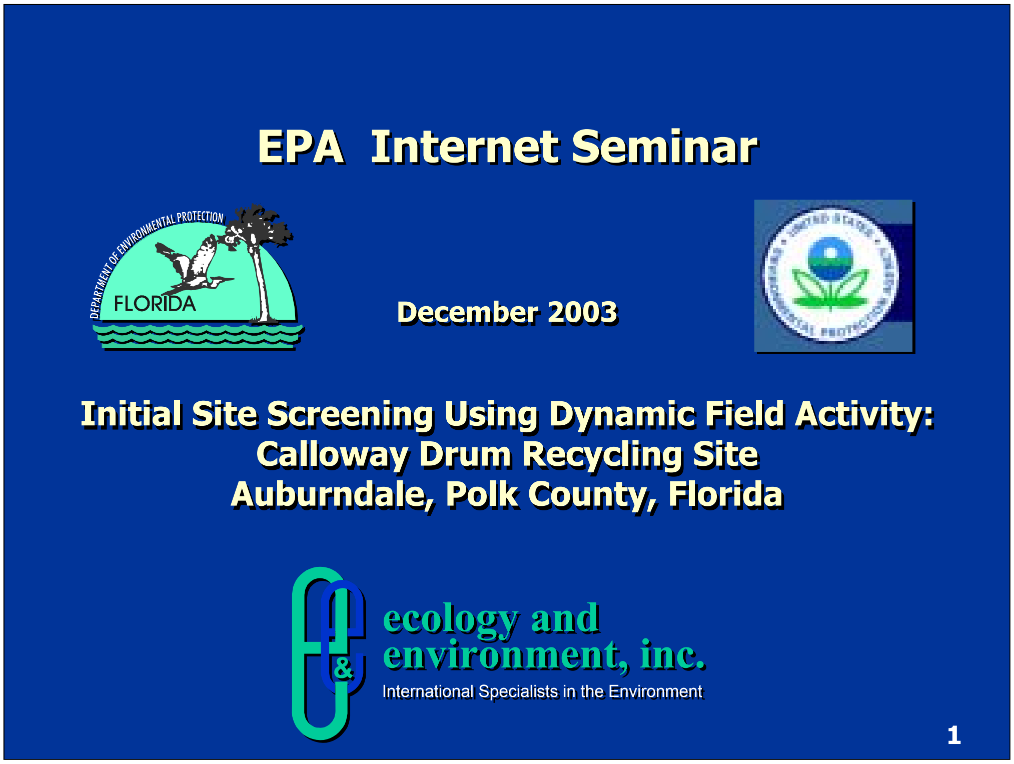

Jeff – Introduction of seminar

Speakers

Perry Kelso, PG

Senior Geologist Ecology & Environment, Inc. – Tallahassee

Joseph McGarrity

Environmental Specialist – Florida Department of Environmental Protection Superfund Site Screening Bureau of Waste Cleanup

2

Jeff – Introduction of speakers

FDEP Site Assessment Program

- Background
  - Cooperative Agreement with EPA Region IV
    - CERCLA site assessments
      - Prescreening evaluations
      - Preliminary assessment
      - Site inspections
      - Expanded site assessments
      - Combined and integrated assessments
    - Targeted brownfields assessments
      - Phase I and Phase II Environmental assessments
      - Contamination assessments
      - Risk assessments
      - Source removals (future activity)

3

Joe – FDEP SSI discussion

Main point:

To promote the concept of using **field-based analysis** and **field-based decision making** to achieve project goals with increased certainty that the overall results are reliable (i.e. certainty that nothing was overlooked).

CERCLA Site Assessment Objectives

- CERCLA Objectives
  - HRS score documentation
  - Limited sampling points (biased)
  - Limited overall cost
- FDEP Objectives
  - Meet CERCLA objectives
  - Support state and local agency needs
  - Use flexible workplans and field-based analysis to reduce sampling uncertainty

4

Joe

Soil Assessment Objectives

FDEP Approach

- Site specific/flexible
  - XRF field analysis
  - TVA (FID, PID) headspace analysis
  - Color-Tec analysis

Soil exposure

- 0-3 In (DOH, ATSDR)
  - Residential/public use
- 0-2ft (HRS)
  - Residential/Public use
  - Industrial/commercial use

Site Categorization

- Document contaminant source and waste quantity
- Collect data to support contamination assessment needs
- Evaluate soil conditions as related to land use

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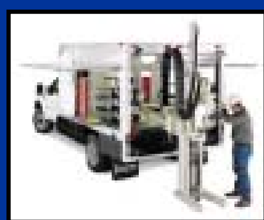
Joe

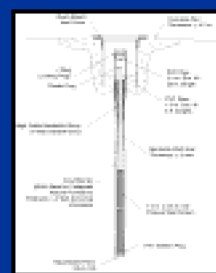
Groundwater Assessment Objectives

FDEP Approach

- Document observed release
- Document level 1 or level 2 actual contamination (municipal, public, private potable wells)



- Groundwater gradient/contaminant delineation
- Temporary wells, microwells, direct push, permanent wells (PVC and stainless steel)
- Geophysical surveys/ stratigraphic evaluation



6

Joe

Workplans/DQOs

HRS minimum requirements
- Definitive analysis (CLP)
- Limited sample quantities (<10 samples)
- Pre-determined sampling locations (Based on site file information)

↓

High Analytical Certainty
Low Sampling (Site Coverage) Certainty

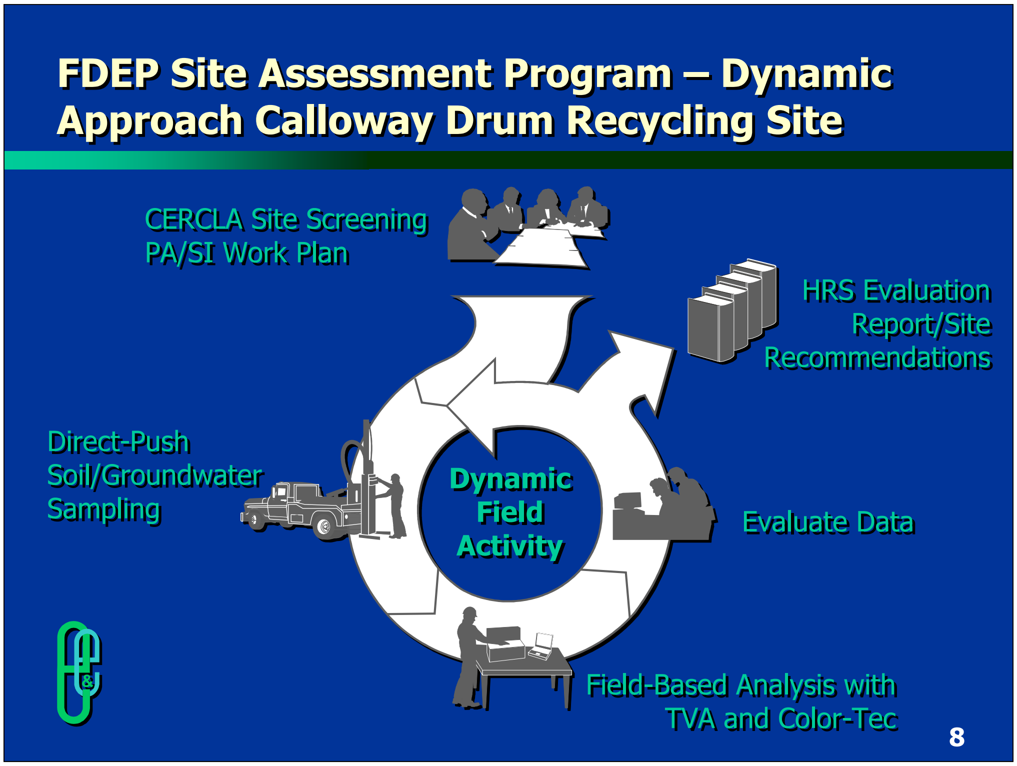
FDEP SSI approach
- Use low-cost field-based analyses to maximize sampling coverage (30 to 40 samples)
- Use field data to focus required CLP sampling locations on "hot-spots"
- All sampling locations are flexible (based on field-based analytical data)

↓

High Analytical Certainty
High Sampling (Site Coverage) Certainty

7

Joe



Joe: Briefly discuss goals for Calloway Project, then hand over to Perry

Joe:

To achieve these goals for the Calloway project, we used a flexible work plan approach that combined low-cost field-based sample analysis with direct-push soil and groundwater sampling techniques

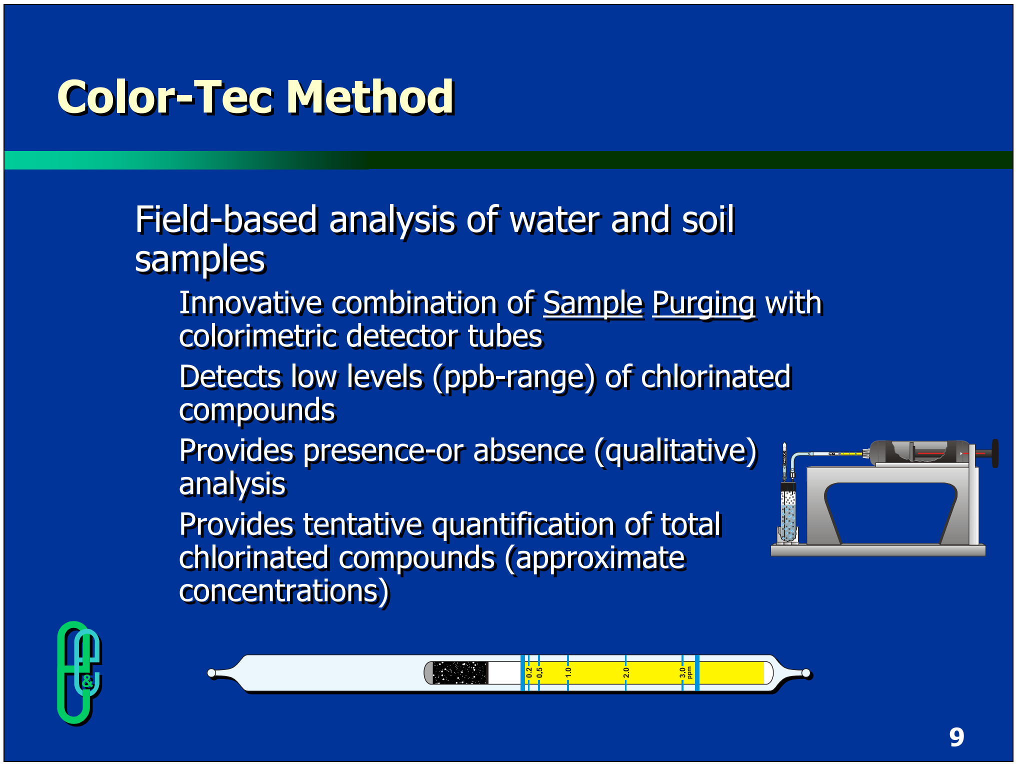
To control costs, fixed-laboratory analysis was limited to 10 biased-hot sampling locations. Therefore, to accurately score the site, these 10 samples had to represent the most contaminated areas of the site.

A higher quantity of low-cost, field-analysis sampling points were used to locate and confirm the hottest areas to focus the more costly, definitive, lab-based sampling efforts.

This approach required field-based data evaluation and real-time decision making, therefore, the use of qualified personnel with project-level decision-making authority was critical.

Because we used a relatively unknown field analytical technology at the site, I'll take a moment to preface the case study with a few slides describing the basic principals of the Color-Tec field method.

The case study will deal with how we applied this method and other innovative approaches to expedite the site investigation and ranking process and achieve our goals, which were to accurately score the site within a very limited budget and to have a fair degree of certainty that we had collected samples that represented the highest levels of contamination present on the site.

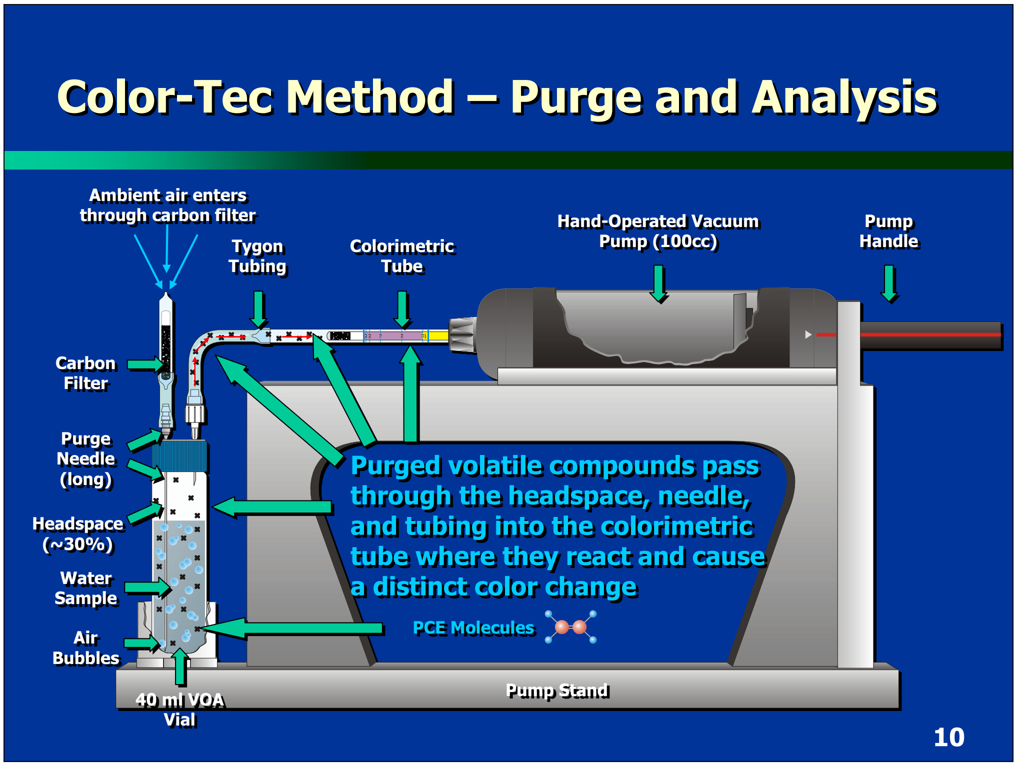


Perry:

Color-Tec is an innovative field-based analytical method that combines sample purging techniques with colorimetric tubes to detect very low-level concentrations of chlorinated compounds in soil and groundwater samples.

The method provides qualitative (presence or absence) analysis and tentatively quantifies total chlorinated compounds by providing approximate concentration ranges.

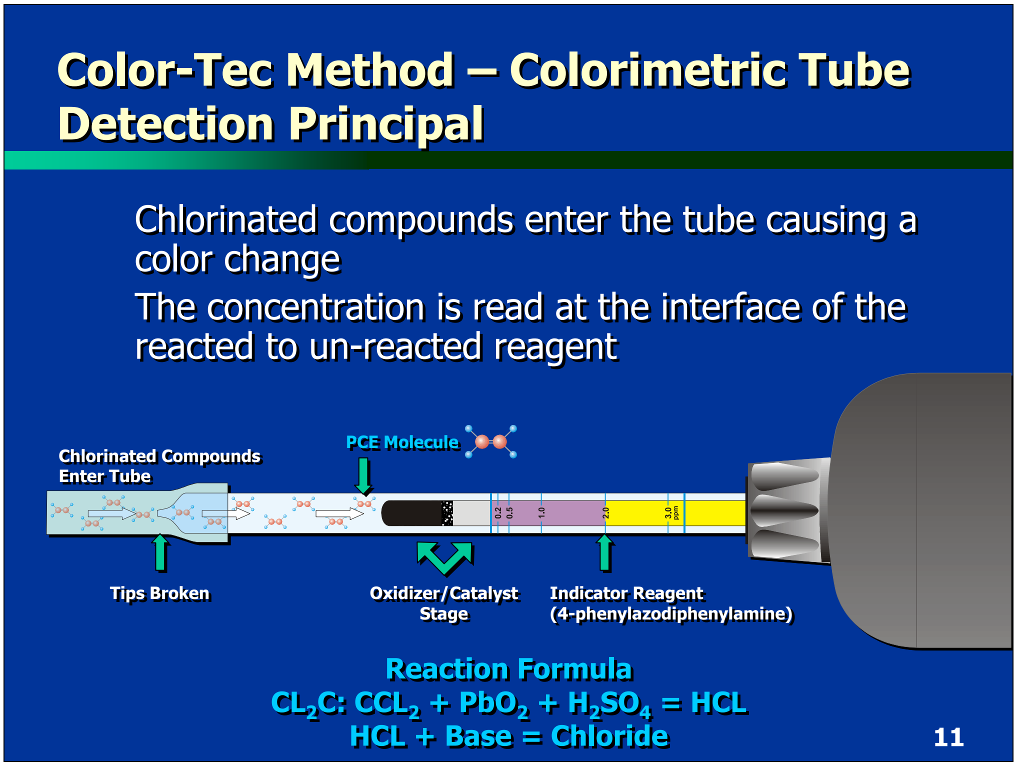
The operating cost is less than $10.00 per sample. The procedure is fast, simple, and does not require dedicated field personnel to operate



Perry:

Purging is the key to the method's low level detection capability. To conduct the method, a water sample is sealed into a 40ml VOA vial leaving an approximately 30% headspace to facilitate purging. Soil samples are prepared by mixing the soil with clean water in a sealed VOA vial with a 30% headspace.

Using a hand-operated vacuum pump, filtered ambient air is purged through the sample for 1 to 2 minutes to strip any volatile contaminants present, directing them into the colorimetric indicator tube where they react to create a color change.



Perry:

The method can be used to detect a variety of compounds by using colorimetric tubes designed to detect specific compounds. We used the Color-Tec method in the CDR investigation to detect chlorinated compounds.

The tubes work by oxidizing the chlorinated compounds to produce HCl, which enters a yellow reagent phase discoloring it to purple. The concentration value is obtained by matching the furthest extent of the color change to a scale printed on the tube.

Color-Tec Method
All Chlorinated Compounds Detected

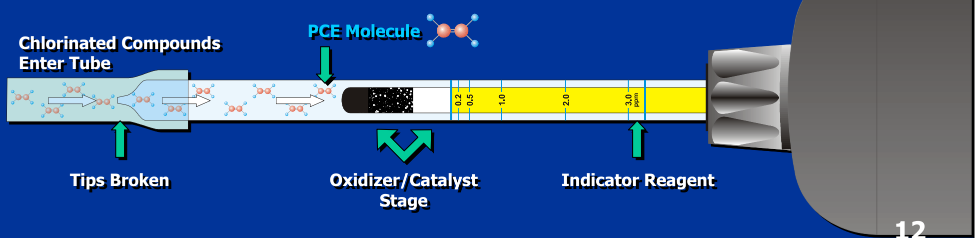
All Chlorinated Alkenes and Alkanes Detected as "Total Chlorinated Compounds"

Chlorinated Alkenes

Compound	EPA MCL (µg/L)
Tetrachloroethene	5
Trichloroethene	5
Cis-1,2-Dichloroethene	70
Trans-1,2-Dichloroethene	100
1,1-Dichloroethene	7
Vinyl Chloride	2

Chlorinated Alkanes

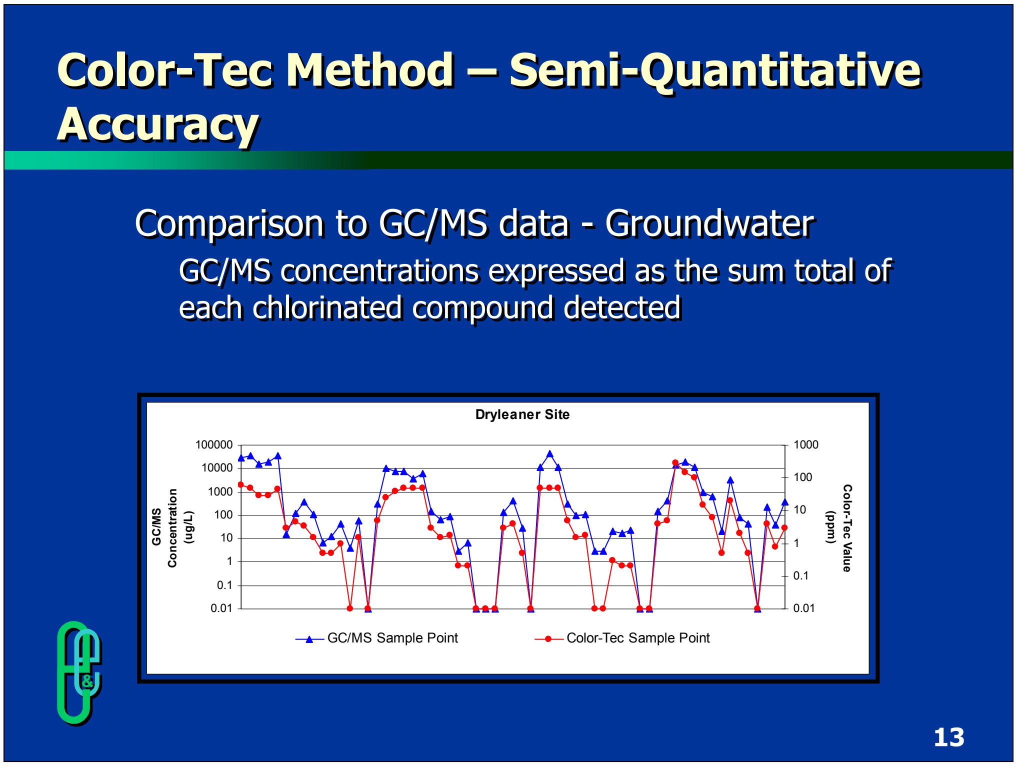
Compound	EPA MCL (µg/L)
Carbon tetrachloride	5
Dichloromethane (methylene chloride)	5
1,1-Dichloroethane	-
1,2-Dichloroethene	5
1,1,1-Trichloroethane	200



Perry:

The tubes used to detect chlorinated compounds are class-specific in that they only detect chlorinated alkenes and alkanes. These tubes do not distinguish between the individual chlorinated compounds (such as PCE and TCE); therefore, the tube values are expressed as "total chlorinated compounds".

Using the Color-Tec Method with pre-heated water samples provides consistent detection at concentrations near or below the corresponding EPA drinking water standard for each chlorinated compound.



Perry:

The Color-Tec Method has been used since 1997 at drycleaner projects and other chlorinated solvent sites to analyze several hundred groundwater samples. For much of this data, duplicate samples were collected for comparison to laboratory analysis. This graph shows the comparability trends of Color-Tec values to the duplicate sample GC/MS concentrations. The GC/MS values are presented here as the sum of each chlorinated compound concentration detected, since the Colorimetric tubes detect total chlorinated compounds rather than specific chlorinated compounds.

In this data set, collected from a drycleaner site, you can see that the Color-Tec data trends closely to the GC/MS data at various concentration magnitudes, and that all total chlorinated compound concentrations of 4 μg/L and above were detected by the Color-Tec Method.

Color-Tec Method – Comparative Accuracy

Expected concentration ranges based on GC/MS comparison data collected during several drycleaner site investigation projects.

Colorimetric Tube Reading	Corresponding GC/MS Value Range (µg/L)	
	Low	High
0.1	1	5
0.2	3	19
0.5	9	33
1	15	56
2	42	180
3	94	279
5	150	416
10	365	1627
25	1050	3300
50	2120	19000
100	10000	28000
300	18240	61920

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Perry:

Using the duplicate GC/MS comparison data from several drycleaner site investigation projects, we compiled a table of expected concentration ranges corresponding to various colorimetric tube values for groundwater samples. As you can see, the method detection range for this data set was 1 to 28,000 µg/L.

This table is used as general guide to tentatively quantify Color-Tec values in the field. The comparability of Color-Tec values to GC/MS data may vary significantly from site-to-site depending primarily on the distribution of the individual chlorinated compounds present in the sample.

As with any analytical tool, there are limitations, such as interference compounds and temperature, that must be considered when choosing the most appropriate field-based analytical tool to meet the required project goals.

Perry:

As the name suggests, Calloway Drum Recycling was formerly a drum cleaning and reconditioning operation. The original facility was located in Auburndale, Florida during the 1970s, and was moved to Lake Alfred Florida in the early 1980s. The two sites are about abut 5-miles apart, located near Interstate 4, halfway between Tampa and Orlando.

Our investigation and site ranking activities were focused on the Auburndale site. The former Lake Alfred facility is currently being addressed as an NPL site. I mention it here because the background information obtained from the Lake Alfred operation played an important role in planning the Auburndale site investigation activities.

Callaway Drum Recycling Combined (PA/SI) Assessment Planning (FDEP/E&E)

- Discuss available site history/previous findings
- Identify potential migration pathways and HRS data gaps
- Discuss/propose a flexible scope of work for field data collection
- Discuss site-specific data quality objectives

Perry:

As discussed earlier, the Preliminary Assessment and Site Investigation phases were combined for the Calloway Drum Project to reduce time and costs. The planning activities were conducted by the FDEP and contractor project teams in a coordinated efforts consisting of historical file review, historical aerial photo review, identification of potential receptors, evaluation of potential off-site migration pathways, and a site reconnaissance. This information was used to design a flexible work plan with site-specific data quality objectives to meet the project goals.

Callaway Drum Recycling Preliminary Assessment Activities

- Site history
  - Purchased by fruit packing company in 1947
  - Used as a drum recycling facility from 1971 through 1977
  - Former CDR employee notifies EPA in 2000
  - CDR moved operations to Lake Alfred in 1977 and terminated operations in 1991
  - Lake Alfred Facility National Priorities List, May 2000
- Aerial photo review
  - Historical operational interpretation
  - Current conditions and surroundings

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Perry:

Callaway Drum Recycling Preliminary Assessment Activities

- Evaluation of potential receptors (within 4 miles radius)
  - 6 public potable water supply wells
  - 49 community supply wells
  - 3 private supply wells (within 0.25 mile)
  - ~25,000 people reside within 4 miles radius
- Regional geology
  - Floridan aquifer

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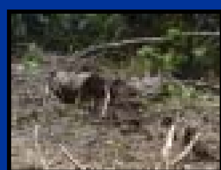
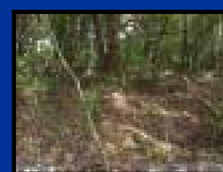
Perry:

Callaway Drum Recycling Preliminary Assessment Activities

- Site reconnaissance
- Visual evidence of past activities
- Visual confirmation of potential receptors
- Noted potential physical limitations to field data collection
  - Heavily forested with thick undergrowth
  - Steep trenches and depressions

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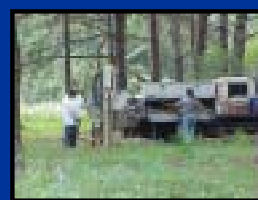
Perry:

Callaway Drum Recycling Flexible "Dynamic" Site Inspection Work Plan

- 4 primary focus areas (based on site history)
- Land clearing needed to access all areas
- Use direct-push technology for all sampling
  - Continuous soil core samples (surface to water table)
  - Groundwater "grab" samples
  - Install permanent monitoring wells (small diameter, pre-packed screens)



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Perry:

Callaway Drum Recycling Flexible "Dynamic" Site Inspection Work Plan

- Proposed sampling frequency
  - 30 to 40 locations
  - Soil at 2-foot vertical intervals
  - Groundwater at 5-foot vertical intervals
- Proposed field-base analysis methodology
  - TVA (FID, PID) headspace - soil samples
  - Color-Tec analysis - of all soil and groundwater samples

21

Perry:

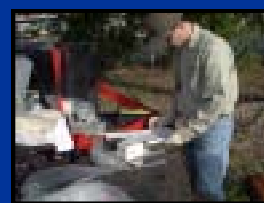
Callaway Drum Recycling Flexible "Dynamic" Site Inspection Work Plan

Why use Color-Tec?

- Suspected chlorinated solvents based on contaminants present at the CDR facility in Lake Alfred

Why use TVA?

- Suspected petroleum and other solvents based on Lake Alfred facility



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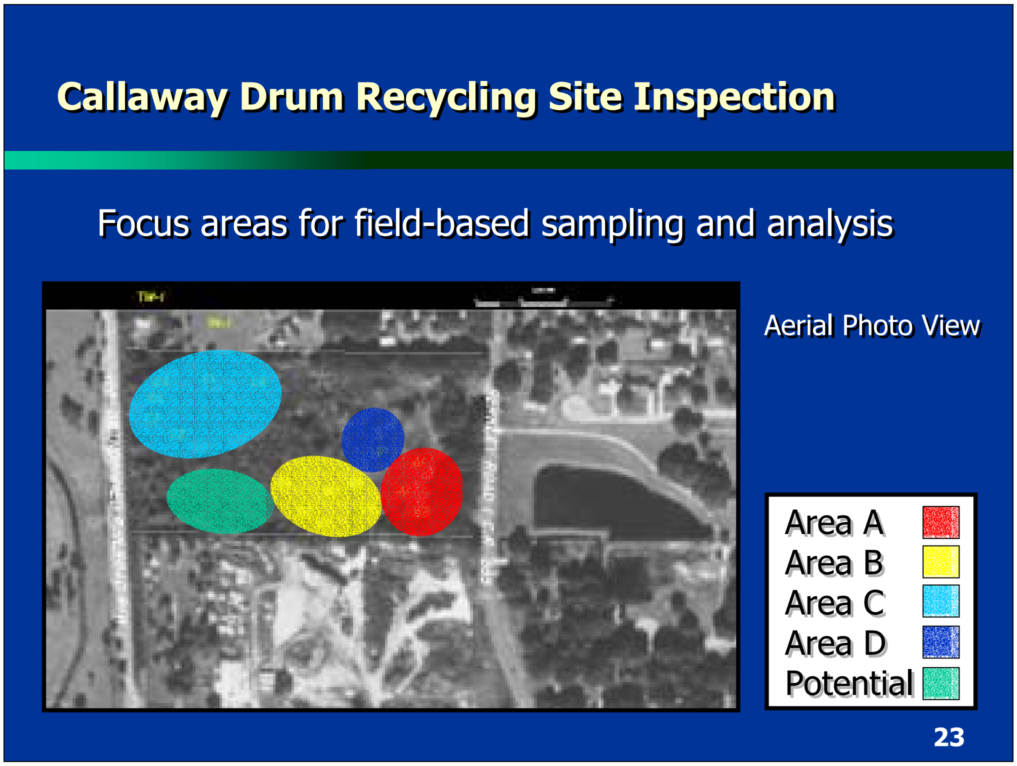
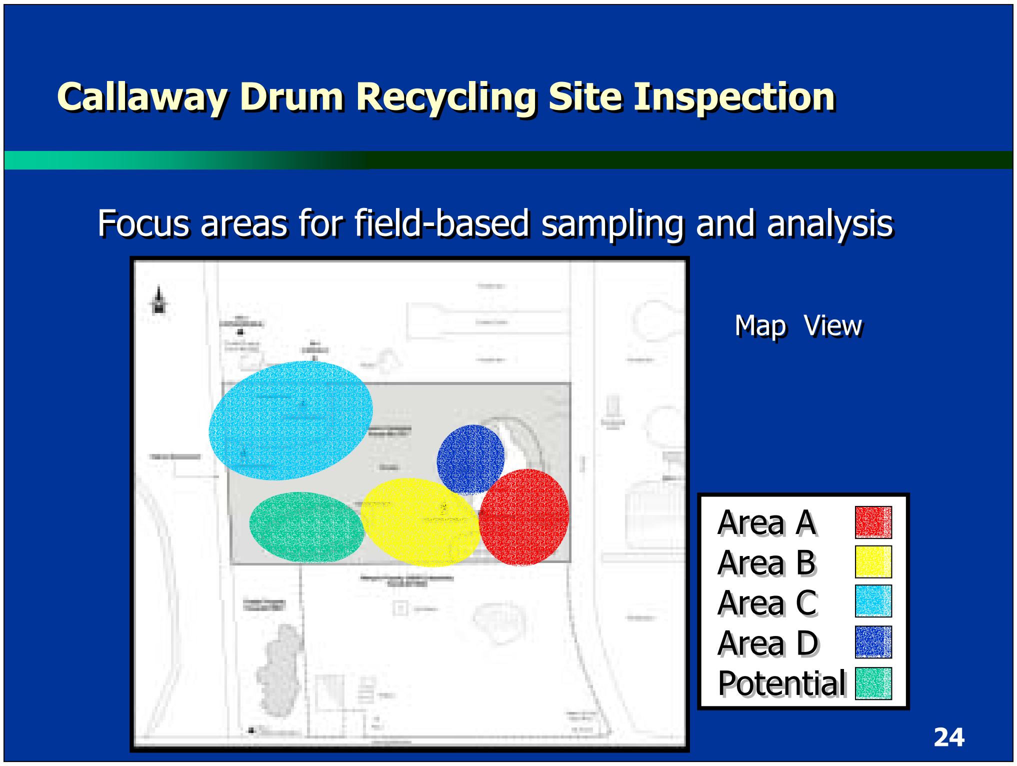
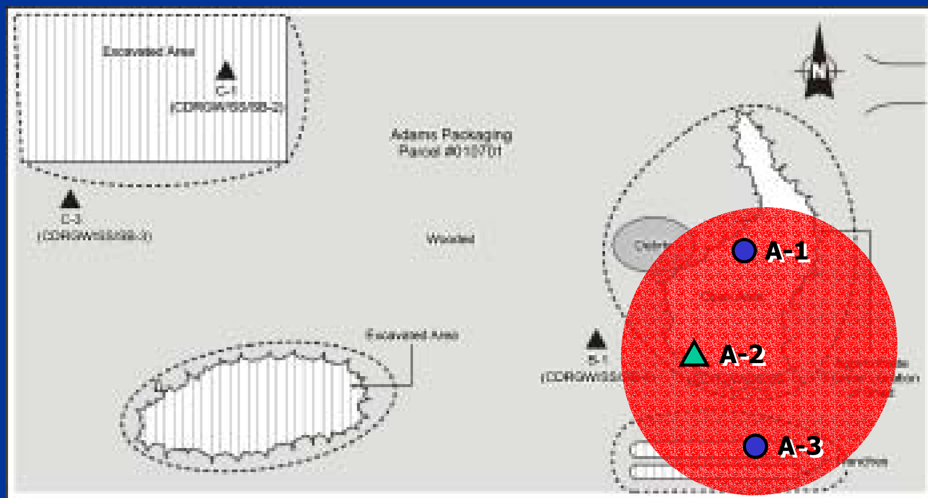
Perry:


Callaway Drum Recycling Site Inspection
Focus areas for field-based sampling and analysis
Aerial Photo View
Area A
Area B
Area C
Area D
Potential
23

Perry:


Callaway Drum Recycling Site Inspection
Focus areas for field-based sampling and analysis
Map View
Area A
Area B
Area C
Area D
Potential
24

Perry:

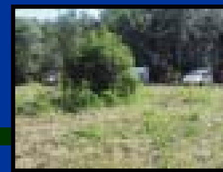


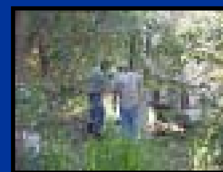
Area A

25

Perry:

Case Study:
Callaway Drum Recycling





Focus Area A

- 3 field profile locations (21 samples)
- 2 laboratory samples (1 soil, 1 GW)
- A1 and A3 = Trace or no response on CT and TVA
- A2 = Positive response on CT and TVA (laboratory data confirmed field results)

Color-Tec	TVA		Laboratory
	PID	FID	
Water 110 Units	Soil/Water 432 ppm	Soil/Water 4,000 ppm	PCE 7,300 µg/L

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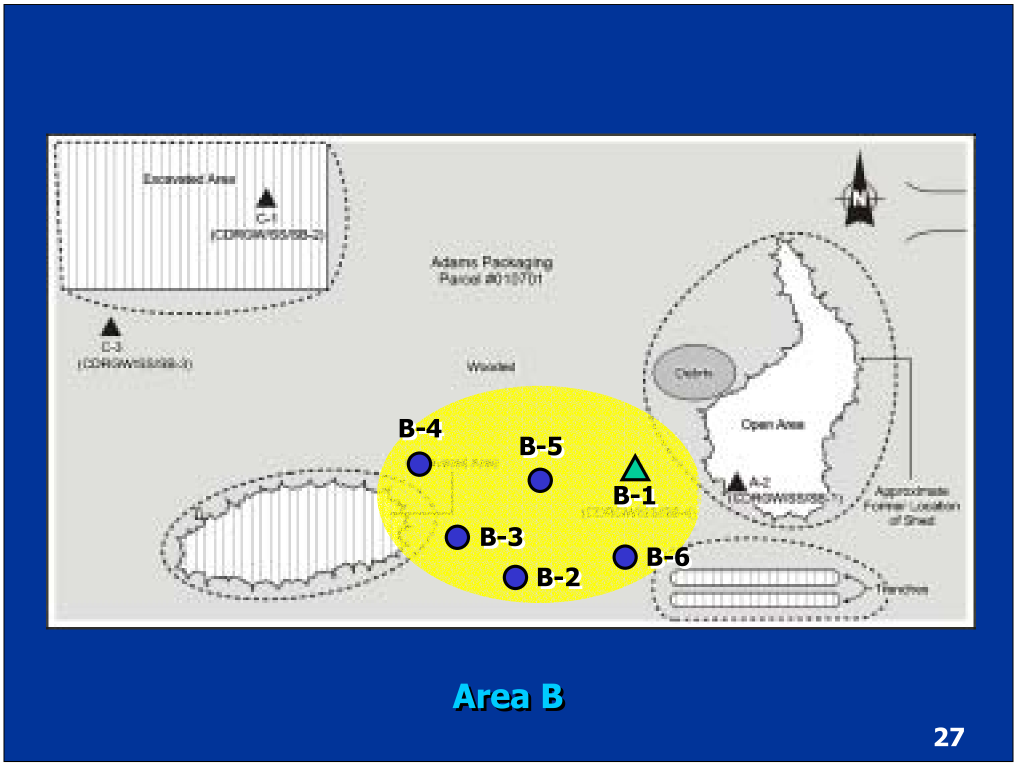
Perry:

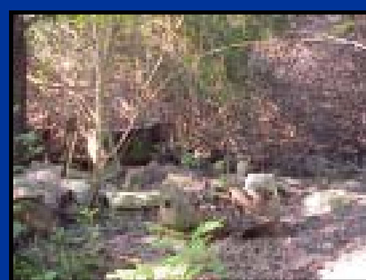

Excavated Area
C-1
C-3
Adams Packaging
Wooded
Debris
Open Area
A-2
Approximate Former Location of Shed
Trenches
B-4
B-5
B-1
B-3
B-6
B-2
Area B
27

Perry:

Case Study:
Callaway Drum Recycling

Focus Area B

- 6 field profile locations (38 samples)
- 4 laboratory samples (2 soil, 2 GW)
- Trace/low response Color-Tec/TVA
- Trace/low levels – lab data



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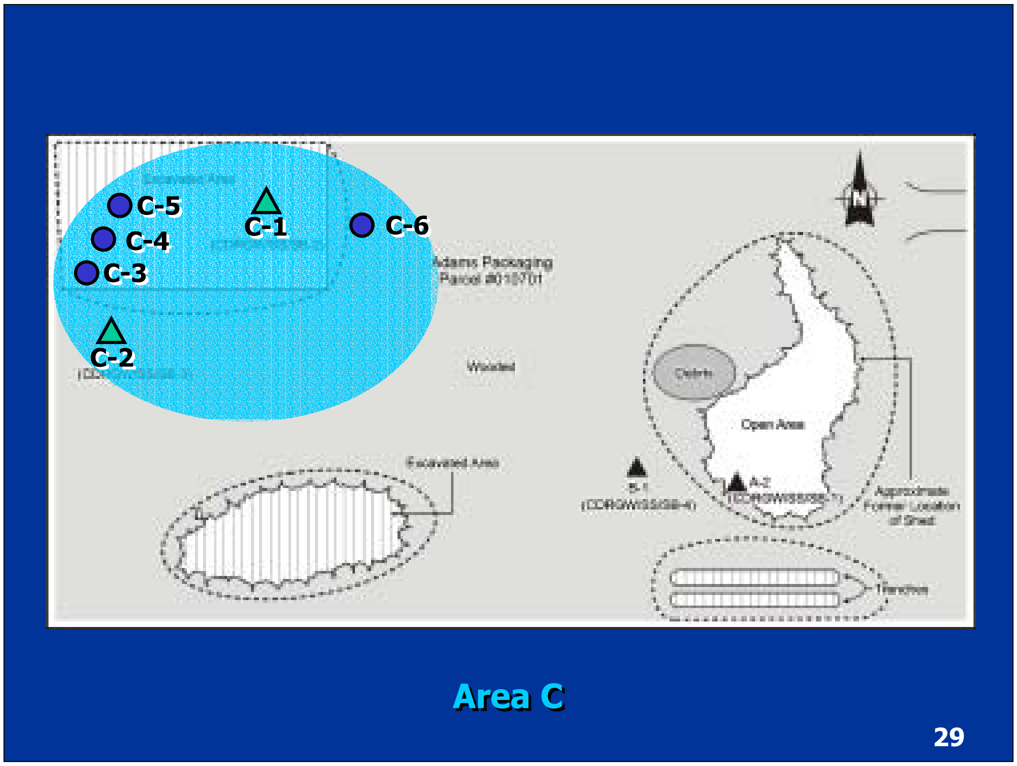
Perry:


C-5
C-1
C-6
C-4
C-3
C-2
Adams Packaging
Parcel #010701
Wooded
Debris
Open Area
Excavated Area
A-2
B-1
Approximate
Former Location
of Shed
Trenches
Area C
29

Perry:

Case Study:
Callaway Drum Recycling

Focus Area C

- 6 field profile locations (37 samples)
- 4 laboratory samples (2 soil, 2 GW)
- Positive TVA hits in all borings
- No positive Color-Tec results

Sample No.	Ethylbenzene	Toluene	Xylenes	Naphthalene	Isophorone
C1	1,300	3,300	8,000	35	79
C3	1,200	2,500	7,100	33	93

- No chlorinated compounds detected
- Chlorinated solvents not detected

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Perry:

Case Study:
Callaway Drum Recycling

Benefits of Field-Based Analysis/Field-Based Decision Approach at CDR

- Overall cost savings
- Increased certainty in targeting hot spots
  - Example: Focus Areas A and C
- Reduced waste of definitive samples (definitive analysis targeted to source areas)
- Significantly increased the sampling density and overall site coverage

(106 field samples vs. 10 lab samples)

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Perry:

Case Study:
Callaway Drum Recycling

Summary of regulatory decisions for Callaway Drum site since completion of HRS evaluation report

- NPL Caliber – deferred to state enforcement
- State consent order for corrective actions (requires assessment/remedial action)
- PRP currently implementing contamination assessment

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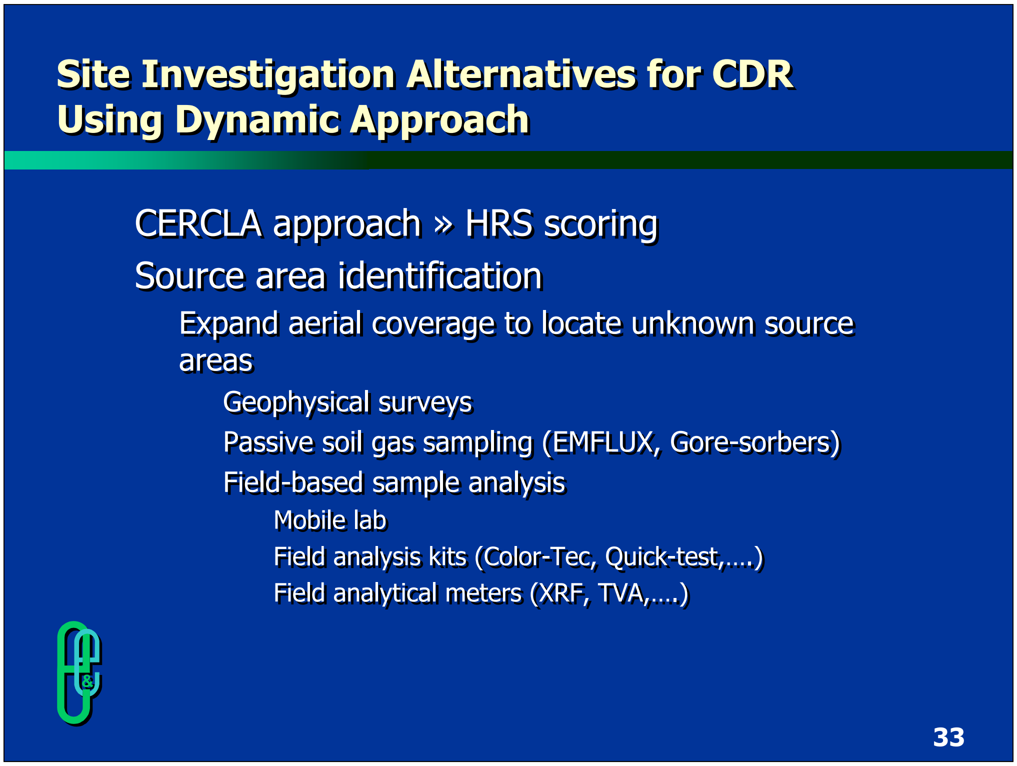
Perry hand back to Joe to discuss CDR decisions and ultimate disposition of the site.

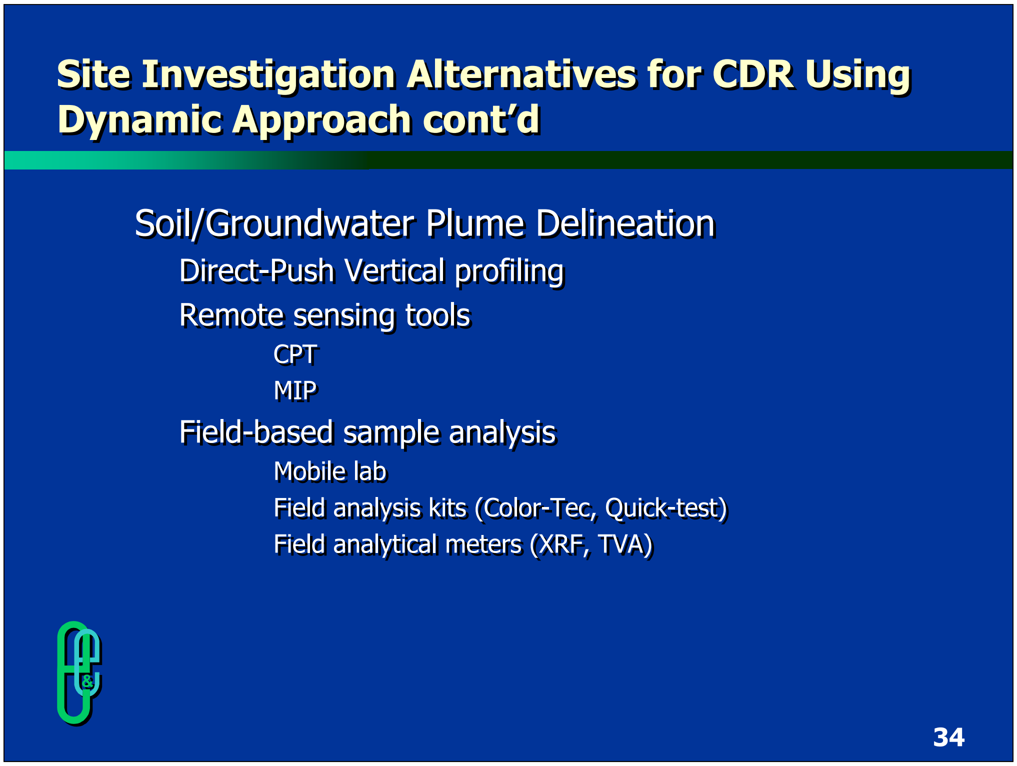


Perry:

The CERCLA approach used at CDR was limited to achieving the goal of HRS scoring.

The use of field based measurement technologies and field-based decision making was beneficial in accurately targeting the sampling points at CDR to achieve the program goals. However, beyond the limitations of our program goals for CDR there are widespread applications for the field-based decision-making approach.

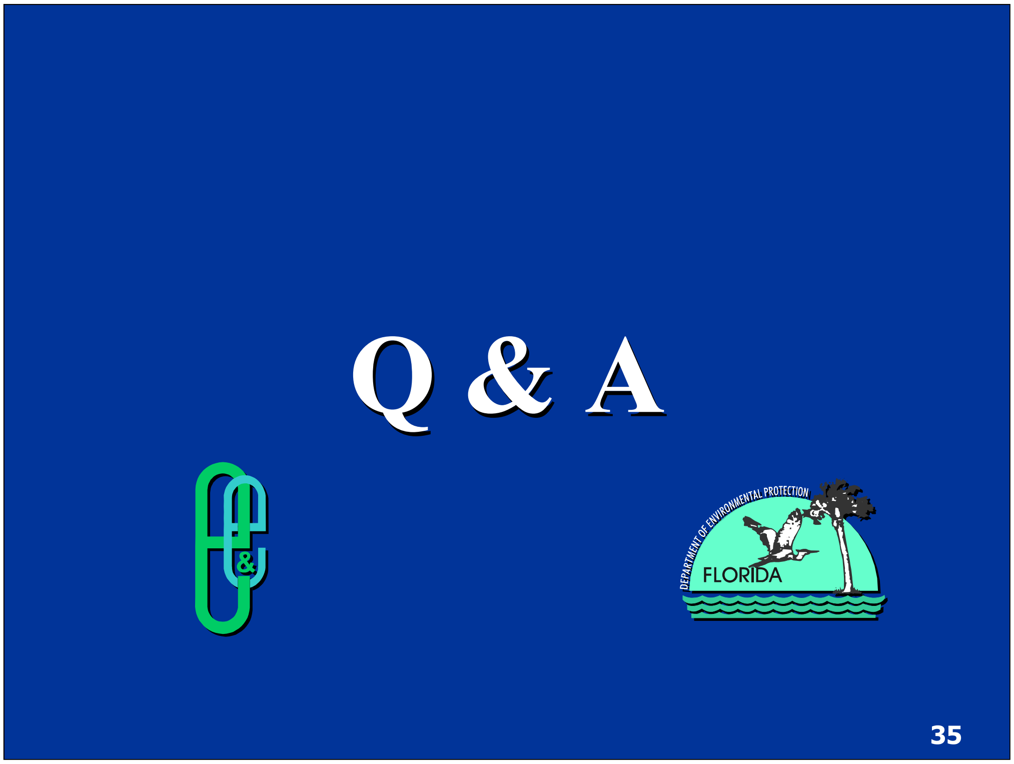
For example, several other effective field-based measurement technologies could be applied to expand the overall coverage across the site to identify any unknown or undocumented source areas. These technologies include Geophysical surveys, passive gas surveys, and conventional sampling combined with field-based analytical methods such as mobile lab, analytical kits, and field meters.



Perry:

Field-based measurement technologies can also offer highly effective, low-cost plume delineation capabilities.

For example, the Cone Penetrometer combined with the membrane interface probe can accurately and cost-effectively locate residual NAPL, while field-based analytical methods, such as mobile laboratory and analytical kits, can effectively achieve the low contaminant concentrations needed to define plume boundaries. These alternative methods offer decision quality data with significant cost savings over the traditional, multi-phased approach which depends solely on fixed lab data.


Q & A
DEPARTMENT OF ENVIRONMENTAL PROTECTION
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