

# SITE INVESTIGATION

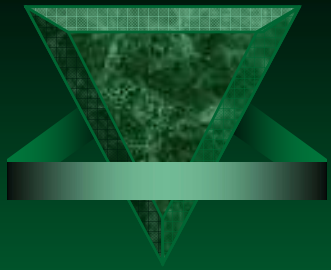
AHFA 2005 Environmental/Safety/Health  
Conference and Expo  
September 28-30, 2005

Presented by:



John M. Stewart, P.G.  
Trigon Engineering Consultants, Inc.

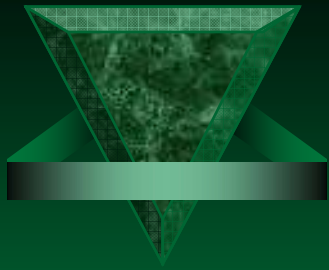




# THREE STAGES OF SITE INVESTIGATION

- ✓ First Phase: Environmental Site Assessment (ESA)
- ✓ Second Phase: Site Assessment or Investigation
- ✓ Third Phase: Remediation, Remedial Action, Corrective Action

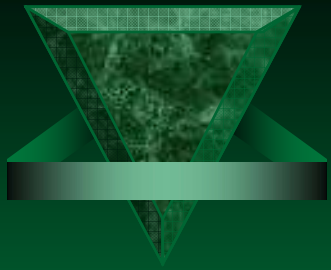




# PHASE 1: ESA

- ✓ May be Conducted as Part of a Property Transaction
  - At Present, Conducted in Accordance with ASTM Standard E 1527-00
  - In the Future, Will Follow All Appropriate Inquiry (AAI) Regulations (40 CFR 312)
- ✓ May be Conducted During Early Stage of RCRA Investigation
- ✓ May be Conducted Internally as an Audit



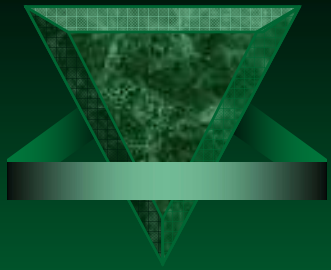


## PHASE 1: ESA (cont.)

### ▼ May Include:

- Site Visit and Interviews
- Geologic, Hydrogeologic, and Well Data
- Historical Review of Property Use Including Adjacent Properties
  - Aerial Photographs, Sanborn Maps, City Directories
- Environmental and Regulatory Review of Property and Adjacent Properties
  - Regulatory Files, EDR

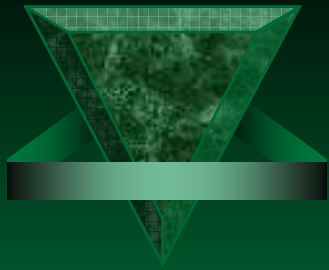




## PHASE 1: ESA (cont.)

- ✓ Major Difference Between ASTM Standard and AAI
  - Establish Two New Liability Defenses
    - Bona Fide Prospective Purchaser
    - Contiguous Property Owner
  - Require Environmental Professional to Oversee Work (PE, PG, Degree with Experience)
  - Shelf Life – Six Months, No Updates

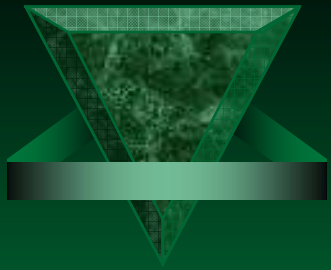




## PHASE 2: INVESTIGATION

- ✓ Why Conduct a Phase 2 Investigation?
  - Spills of Paints, Lacquers, Solvents
  - Illegal Discharge
  - Use of the Property
    - Farm, Industrial Facility
  - Potential Contamination from Adjacent Property
  - UST Investigations

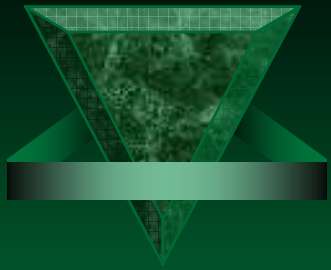




## PHASE 2: INVESTIGATION (cont.)

- ✓ Phase 2 Investigations Can be Conducted at Different Types of Facilities
  - Super Fund Sites - Under CERCLA
  - Permitted Facilities, LQG or TSD Sites - Under RCRA
  - Non-Permitted Sites – Ex. North Carolina, Aquifer Protection Section





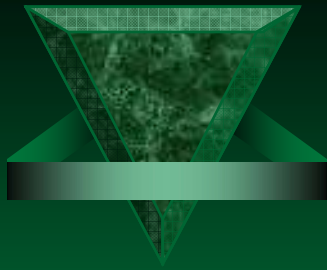
## PHASE 2: INVESTIGATION (cont.)

### ▼ Super Fund Sites

– National Contingency Plan (CFR 40 300)  
Contains Framework for Conducting Work at  
Super Fund Sites

- Preliminary Assessment (PA) and Site Investigation (SI) – Determine Extent of Contamination and Severity, Highest Priority Sites are Placed on the National Priority List (NPL)



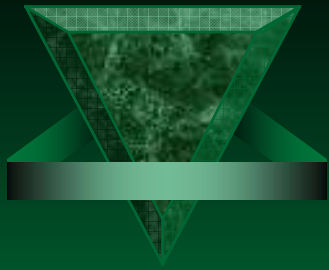


## PHASE 2: INVESTIGATION (cont.)

### ✓ Permitted RCRA Sites

- Have RCRA Permit After November 1984
- Clean up Requirements in Permit or Established by State in an Order, ex. Special Order by Consent (SOC)
- Investigate Specific Area – Solid Waste Management Unit (SWMU)
- Regulatory Agency Conducts Comprehensive Review of Site or a RCRA Facility Assessment (RFA)



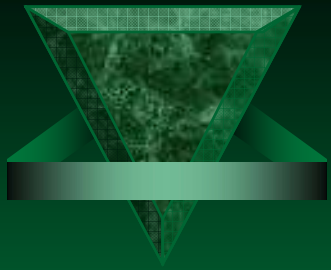


## PHASE 2: INVESTIGATION (cont.)

### ✓ Non-RCRA Sites

- Conduct Soil and Groundwater Investigation
- State or Local Statutes, ex. North Carolina NCAC 15A 2L Sections .0100, .0200, and .0300
- Comprehensive Site Assessment (CSA)

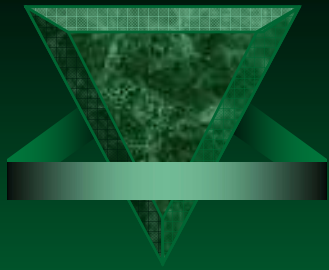




## PHASE 2: INVESTIGATION (cont.)

- ✓ What is Included in a “Phase 2 Investigation”?
  - Define “the Full Vertical and Horizontal Extent of Contamination”
  - Require Soil and Groundwater Sampling
  - Determine Aquifer Characteristics Such as Rate and Direction of Groundwater Flow
  - Receptor Survey: Water Wells, Surface Water





# SOIL AND GROUNDWATER SAMPLING

## ✓ Soil Sampling

- Hand Auger
- Direct Push Rig aka GeoProbe
  - Collect Soil in Plastic Tubes
- Drill Rig
  - Hollow Stem Auger
  - Collect Soil with Split Spoon Sampler

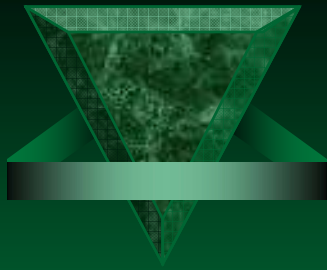


# SOIL AND GROUNDWATER SAMPLING



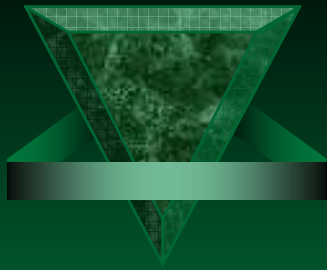
# SOIL AND GROUNDWATER SAMPLING





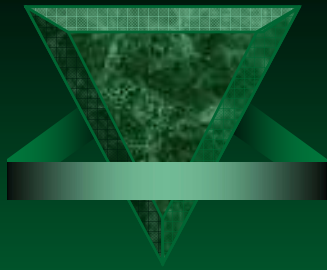
# SOIL AND GROUNDWATER SAMPLING





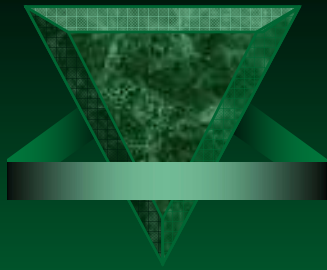
# SOIL AND GROUNDWATER SAMPLING





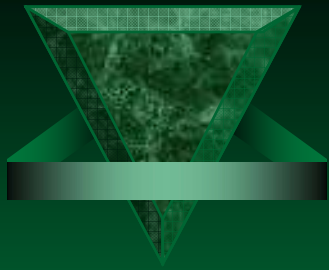
# SOIL AND GROUNDWATER SAMPLING





# SOIL AND GROUNDWATER SAMPLING





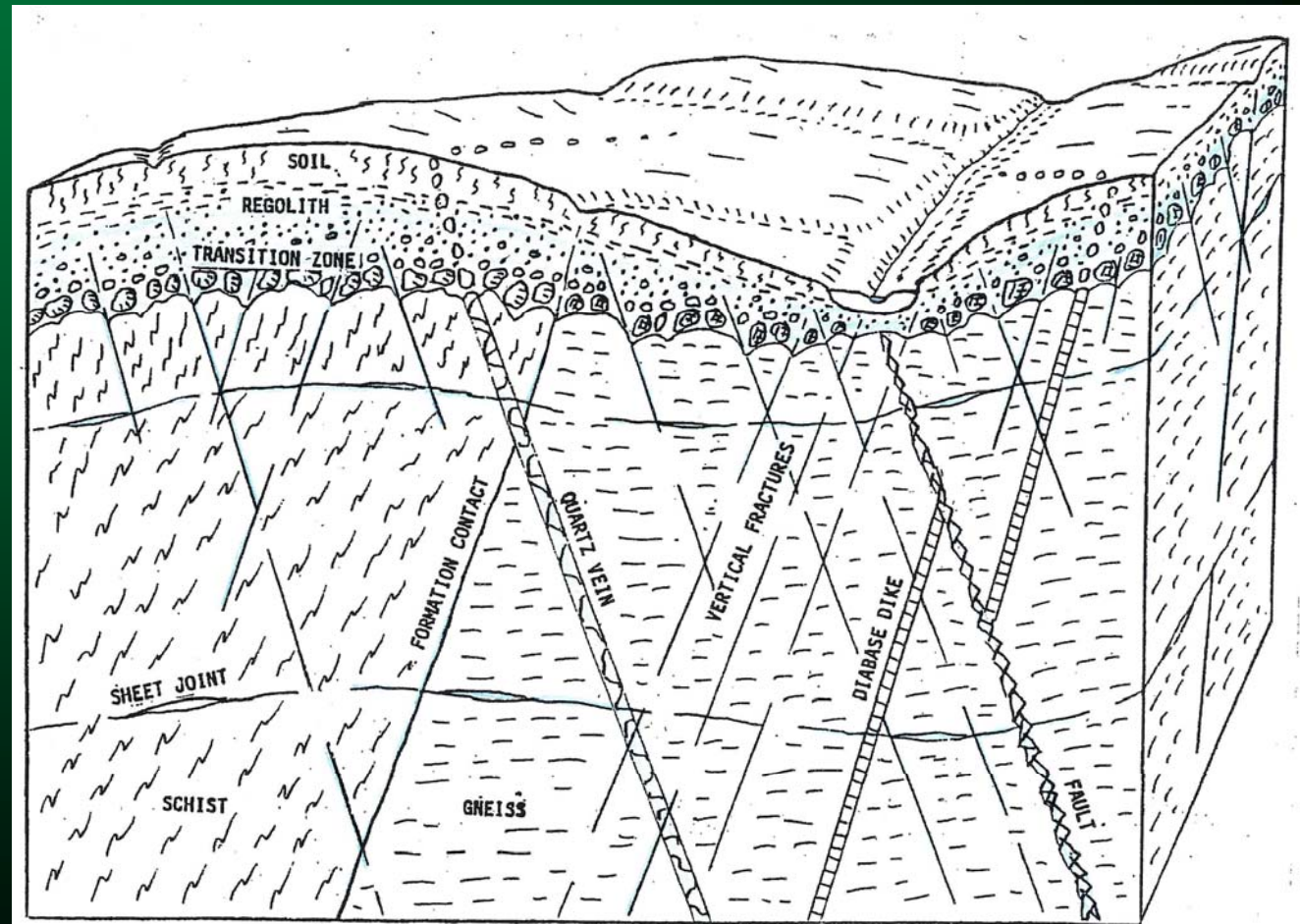
# AQUIFER CHARACTERISTICS

- ✓ Rate and Direction of Groundwater Flow
  - Need Minimum of Three Monitoring Wells
  - Survey Top of Casing Elevations
  - Measure Depth of Water Table
  - Plot Elevations on Site Map
  - Contour Data



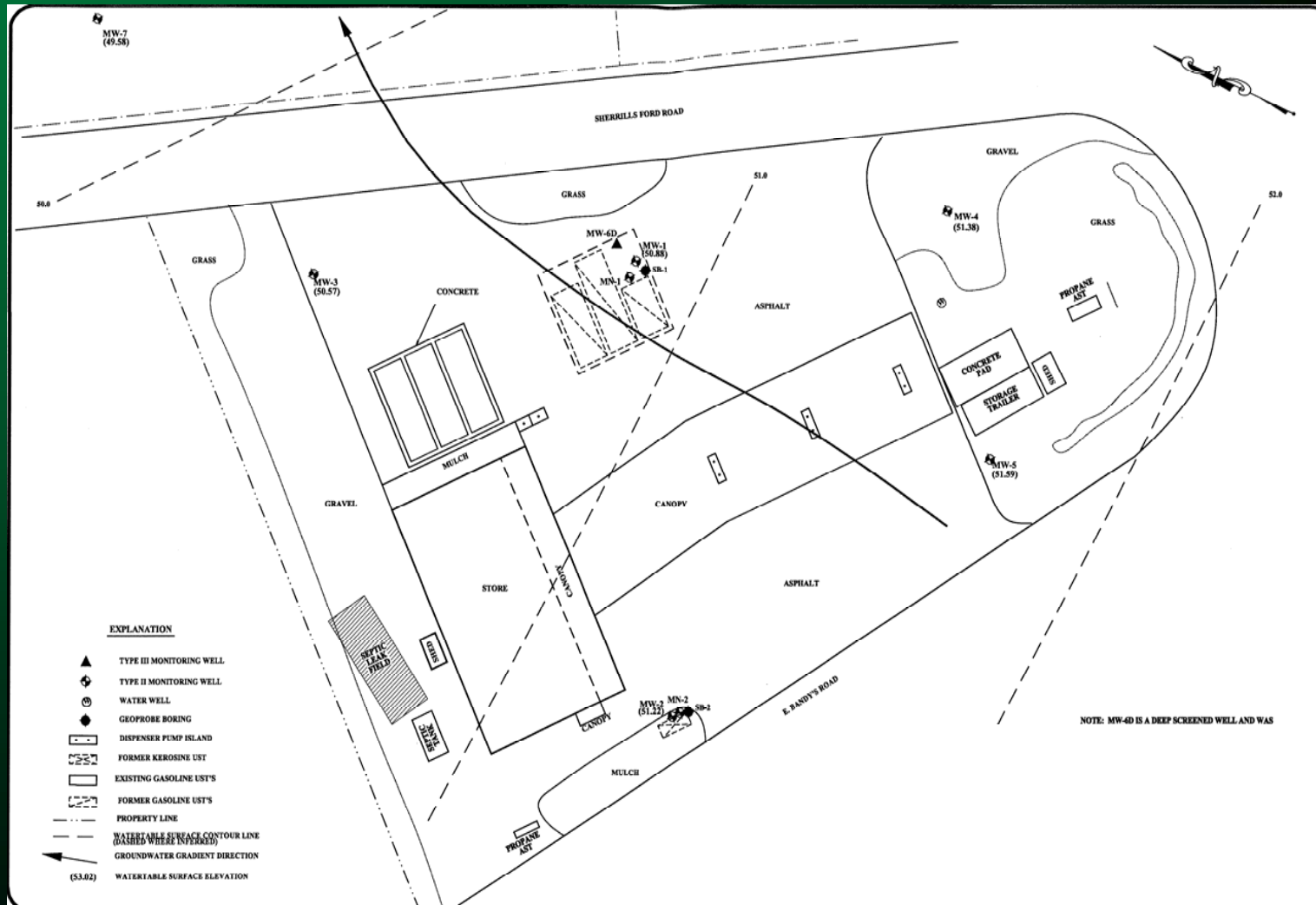
# AQUIFER CHARACTERISTICS

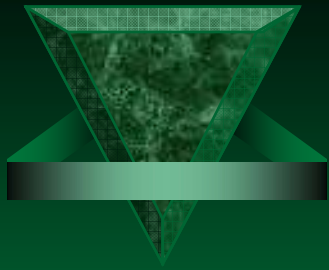
## Cross Section of Bedrock Aquifer



# AQUIFER CHARACTERISTICS

## Groundwater Flow Direction

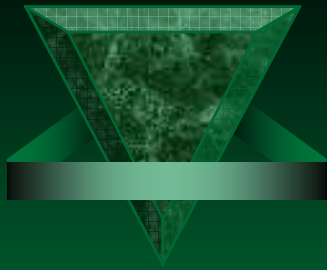




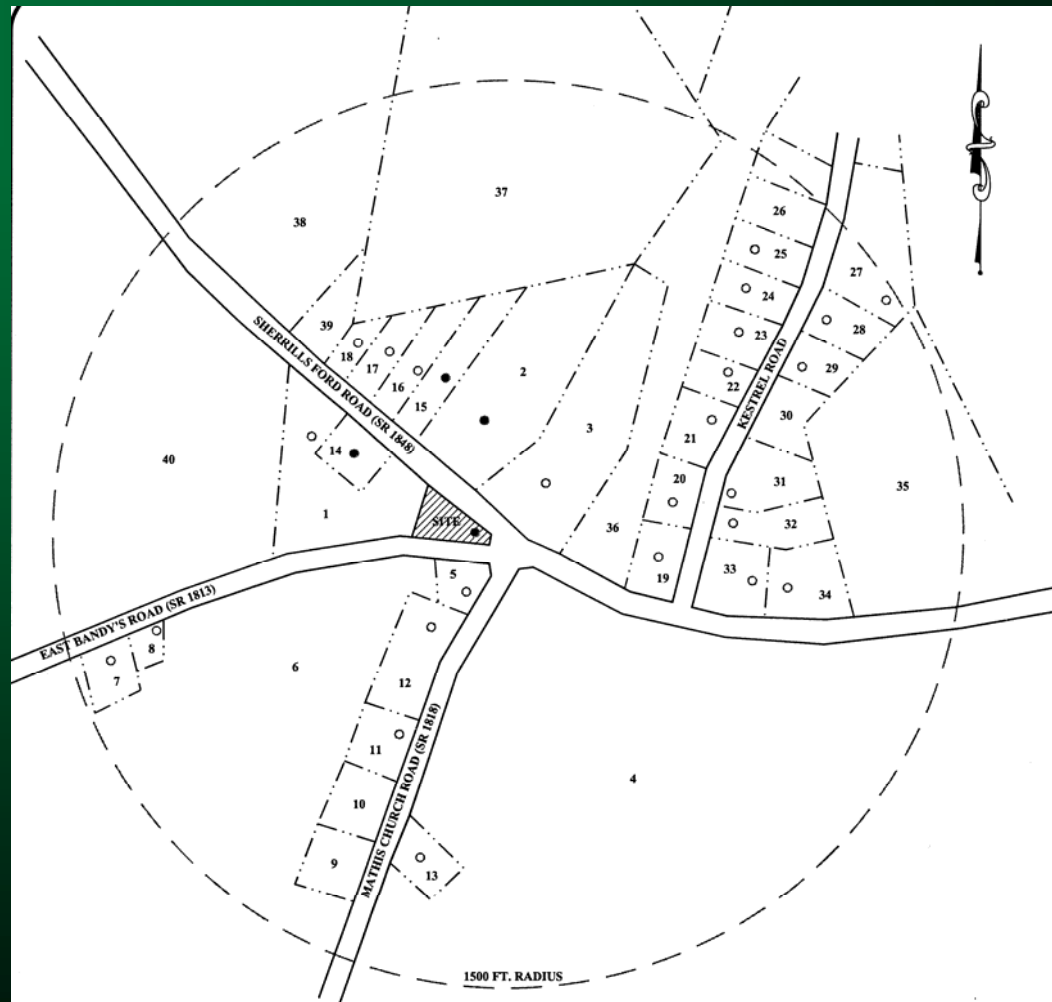
# RECEPTOR SURVEY

- ✓ Groundwater Use
  - Identify Water Well Use
- ✓ Surface Water
  - Locate Streams and Rivers
- ✓ Breathing Space
  - Monitor Building for Vapor Intrusion

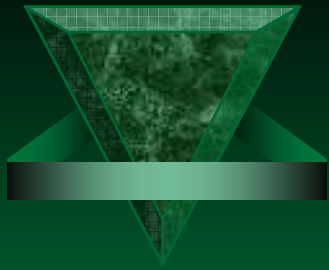




# RECEPTOR SURVEY



Water Well Locations



## PHASE 3: REMEDIATION

- ✓ Why Conduct Remediation?
  - Contaminants Over an Established Action Level
  - Risk to Receptor





# PHASE 3: REMEDIATION

## ✓ Super Fund Sites

### – First Stage of Remediation Process

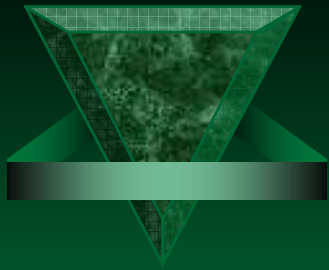
- Remedial Investigation (RI) – More Thorough Investigation Than the PA/SI
- Feasibility Study (FS) – Uses Data Collected in the RI to Evaluate Remedial Action; What Will it Cost, What Will Work Best, Pilot Studies
- Usually Conducted Together - RI/FS

### – If RI/FS Approved, EPA Issues a Record of Decision (ROD)

### – Second Stage of Remediation Process

- Remedial Design/Remedial Action (RD/RA) – What Will Be Done and the Construction/Implementation of the Remedial Action



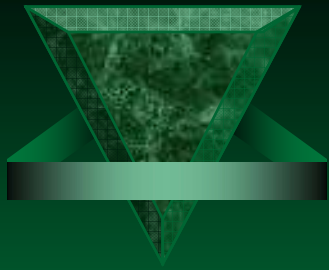


# PHASE 3: REMEDIATION

## ✓ RCRA Sites

- Conduct a RCRA Facility Investigation (RFI)
  - Extensive Investigation Similar to CERCLA RI/FS
- Conduct a Corrective Measures Study (CMS)
  - Cost and Feasibility, Similar to CERCLA FS
- Corrective Measures Implementation (CMI)
  - Design, Construction, and Operation of Approved Corrective Action
  - Combines RD and RA of CERCLA Cleanup





## PHASE 3: REMEDIATION

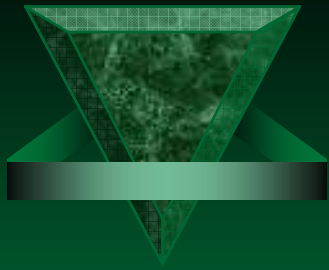
- ✓ Non-RCRA or Super Fund Sites
  - Develop Corrective Action Plan (CAP) or Remedial Action Plan (RAP)
  - Includes Elements of the CERCLA RD/RA or RCRA CMS/CMI but Generally Not as Intensive



# CERCLA/RCRA SUMMARY

| GOAL   | RCRA<br>Subtitle C<br>Hazardous Waste    | CERCLA<br>Superfund                                |
|--|--|--|
| Identify Releases Needing Further Investigation  | RCRA Facility Assessment (RFA)           | Preliminary Assessment/ Site Investigation (PA/SI) |
| ↓  | ↓  | ↓  |
| Characterize Nature, Extent, and Rate of Release | RCRA Facility Investigation (RFI)        | Remedial Investigation (RI)                        |
| ↓  | ↓  | ↓  |
| Evaluate Alternatives & Identify Remedy (s)      | Corrective Measures Study (CMS)          | Feasibility Study (FS)                             |
| ↓  | ↓  | ↓  |
| Propose Selected Remedy                          | Draft Permit Modification                | Proposed Plan                                      |
| ↓  | ↓  | ↓  |
| Public Participation                             | Public Comment                           | Public Comment                                     |
| ↓  | ↓  | ↓  |
| Authorize Selected Remedy                        | RCRA Permit                              | Record of Decision                                 |
| ↓  | ↓  | ↓  |
| Design & Implement Chosen Remedy                 | Corrective Measures Implementation (CMI) | Remedial Design/ Remedial Action (RD/RA)           |





## What Services has Trigon Provided for the Furniture Industry:

- ✓ Stack Testing and Continuous Emissions Monitoring
- ✓ Air Quality Consulting
- ✓ Wastewater Engineering
- ✓ Atmospheric Computer Dispersion Modeling
- ✓ Pollution Prevention Plans
- ✓ Indoor Air Monitoring
- ✓ Environmental Drilling
- ✓ Forensic Engineering
- ✓ Environmental Audits/Site Assessments
- ✓ Water Treatment Design
- ✓ Regulatory Compliance Engineering
- ✓ Stormwater Permitting
- ✓ Groundwater Studies/Remediation

