Investigating Environmental Contamination

A Practical Guide to Understanding Key Concepts and Project Management
What This Is

Intended to:

- Provide introductory awareness
- Be a terminology primer

Not intended to:

- Be wholly comprehensive
- Address Superfund sites/issues
- Explain all regulatory inputs
Outline

- Acronyms
- Introduce key concepts
- Regulatory Framework
- Tribal capacity needs
  - Why important, who, what and how
- General principles of an Environmental Contamination Investigation
- Remedy Selection
- Dealing with Contractors and subcontractors
Acronyms Used

- AAI – All Appropriate Inquiry
- AST – Above Ground Storage Tank
- CERCLA – Comprehensive Environmental Response and Compensation Liability Act (Superfund)
- CSM – Conceptual Site Model
- EPA – United States Environmental Protection Agency
- O/O – Owner/Operator
- RCRA – Resource Conservation and Recovery Act
- RP – Responsible Party
Acronyms Used

- Subtitle C – Part of RCRA that deals with Hazardous & Regulated WASTE
- Subtitle D – Part of RCRA that deals with municipal solid waste
- Subtitle I – Part of RCRA that deals with USTs
- TSD – Transportation, Storage and Disposal
- UST – Underground Storage Tank
Key Concepts

- Environmental contamination involves soil, ground & surface water, soil vapors
- Can involve various EPA regulations and/or offices
  - Sometimes other federal agencies
- May or may not be a currently regulated facility
- Sites can be very simple or very complex
- No standardized prescriptive actions or remedies
  - Dependent on regulatory program
Regulatory Considerations

- EPA response requirements depend on the regulatory authority the site falls under.
- RCRA driven responses may be managed through state programs:
  - Dependent on which RCRA “Subtitle” (C, D or I) regulated under.
- CERCLA Section 128(a) provides for states/Tribes to develop Voluntary Response Programs:
  - Oversee “unregulated” sites, establish clean up standards.
Relationships

Solid Wastes Permitted Facilities (RCRA D)

Hazardous Wastes Permitted Facilities (RCRA C)

CERCLA
Hazardous Substances Released to the Environment
Tribal Capacity Needs

- Internal roles and responsibilities
- Skills, technical capabilities needed
- Establish clear lines of communication
- Regulatory hierarchy
- Terminology
Identifying Capacity Needs

• What do you need to know?
  ◦ How develop and administer contracts/work orders
  ◦ A basic understanding of RCRA/CERCLA
  ◦ Awareness of regulations governing Federally permitted facilities
  ◦ The potential array of sites
Identifying Capacity Needs

What specific knowledge, skills or training?

- Environmental chemistry
- Understanding and interpretation of laboratory results
- RCRA Basic Inspector Training
- ASTM Phase 1 & Phase 2 training
- Hazard communication principles
- Basic earth sciences
- Reading and interpreting maps
The Basics
Pre-Planning for a Discovery

- Identify Requirements for:
  - Personnel Roles
  - Workplace safety
  - Waste disposal
  - Notification of release
  - Interim actions
  - Potential partners
Discovery

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UST Discovery

Tank Removal Discovery

- “Site Assessor” observes the removal
- Records observations
- Samples are collected from around the tank, piping runs and dispensers if accessible.
  - Soil samples can be field screened; and/or
  - Submitted to laboratory for analysis
Failed automatic tank gauge test

- Discovered during routine record keeping by O/O or during inspection
- Discovered during equipment inspection
- Confirm by collecting soil samples from around tanks, piping runs and dispensers if accessible.
  - Submitted to laboratory for analysis
RCRA TSD Discovery
(Subtitle C)

Inspection Failure or Environmental Sampling Indicators

- O/O Groundwater monitoring indicates a release to the environment (point of compliance)
- Other permit violations identified
- RCRA Inspector identifies areas of suspect releases
- Reporting failure – failure to document receipt and treatment
- Citizen Complaint
RCRA Municipal Solid Waste
(Subtitle D)

Inspection Failure or Environmental Sampling Indicators

- O/O Groundwater monitoring indicates a release to the environment (point of compliance)
- Other permit violations identified
- RCRA or state Inspector identifies areas of suspect failure
- Citizen Complaint
Response Program Discovery
(CERCLA 128(a))

All Appropriate Inquiry (AAI) Discovery

- Environmental Professional identifies a recognized environmental condition that requires additional investigation
- Additional soil and/or groundwater monitoring indicates a release to the environment
  - Requires EPA program approval of work
  - Requires EPA program approval for funding
- Protections from liability
  - What’s there before you buy
Tools

Photo-ionization Detector (PID) – screening tool for “volatile” gases in a sample.

Laboratory samples have specific requirements for collection, containers, amount of sample, hold times, preservation and QA/QC.
**Tools**

Geoprobe or Direct push sampling

Hollow stem auger drilling
Tools

Direct push sampling spoon

Split Spoon Sampler
Tools

Flushmount monitoring well

Stand up monitoring well

Temporary monitoring well
Environmental Contamination Investigation
Terminology

- Varies by regulatory program and “standard practice” employed
  - Corrective Action
  - Environmental Assessment
  - Phase 2
  - Contamination Investigation
  - Preliminary Assessment/Site Inspection
  - Environmental Site Investigation

Environmental Contamination Investigation
Terminology

- **Brownfields**
  - No regulatory requirement unless permitted facility
  - Discovery during an ASTM 1903 Phase 2

- **Superfund**
  - Preliminary Assessment
  - Site Inspection
  - Remedial Investigation/Feasibility Study
Environmental Contamination Investigation

Phase 2 versus Site Investigation

- Phase 2
  - Confirms the presence of contamination
  - Exploratory
  - ASTM Standard

- Environmental Site Investigation (or Assessment)
  - Defines degree and extent (exhaustive)

- EPA guidance
- American Petroleum Institute Guidance
- Used to select or define an appropriate remedial action
Environmental Contamination Investigation

- Conducted after confirmation (Phase 2)
- Assemble site data
  - “General” local soil conditions
  - Water table location
  - Local utility conflicts
  - Site history/use
  - Sensitive Receptors
Triggers

- Varies by regulatory program and “standard practice” employed

RCRA Programs
- Action under 7003
- Point of Compliance Exceedence
- Approved State programs
- Self Implementing Corrective Action
  - Permit driven
Hiring A Contractor – Requirements of an RFP

- Expected contaminants
- Quality assurance or quality control requirements (EPA specific)

Deliverables
- QA/QC Plan (defensible results)
- Health and safety plan (OSHA requirement)
- Sampling & analysis plan
- Updates and regulatory correspondence
- Site Assessment Report

- Required Bidder’s site visit
Elements of an RFP

In addition to standard contract language, should include:

• Detailed description of the site use and history
• Results of the Site Assessment (copy optional)
• Site access issues (utilities, roads, buildings, tanks)
• Regulatory authority (most contractors work within state regulations)
• Any applicable Tribal regulations/permits/permissions needed
Environmental Contamination Investigation

Contractor Deliverables

- Work plan
  - Conceptual Site Model
    - Site elevation, expected groundwater flow direction
    - Known areas of contamination
    - Site features
    - Migration routes & sensitive receptors

- Sampling and analysis plan
  - Contaminant Sampling
  - Sampling for Natural Attenuation
Environmental Contamination Investigation

- Site Maps
- Vertical Profiles
- Analytic Data
- Flow Diagram
- Site Visits
- Other

A “Good” CSM
Environmental Contamination Investigation

Basic Steps

- Confirm the presence
- Mitigate immediate threat
- Compare to background
- Identify routes of migration
- Locate sensitive receptors
- Define degree and extent
  - Laterally & horizontally
Environmental Contaminant Sampling

- Quality and Representative Samples
- Collecting samples representative of site conditions.
- Since flammable, combustible or federally regulated hazardous substances consist largely of volatile organic compounds (VOCs), care in collecting samples is required.
- Hazard Awareness
Field Activities

- Soil Sampling
  - hollow stem auger & split spoon

- Monitoring Well location and construction
  - Based on observations made during soil boring installation
  - Proper depth for well screen
  - Special sealing and grouting

- Groundwater Sampling
Environmental Contamination Site Investigation Report

- Completed when degree and extent of contamination defined
- Contains:
  - Maps (general, sample locations, contaminant plumes, groundwater flow direction)
  - Tables of results (laboratory, field measurements)
  - Soil boring logs
  - Monitoring well Construction forms
  - Laboratory data sheets
  - Recommendation for remediation.
Corrective Action, Remediation and Closure

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Guidance Documents

- Cleaning up Underground Storage Tanks
  - EPA Guidance Compendium
    - [http://www.epa.gov/oust/cat/index.htm](http://www.epa.gov/oust/cat/index.htm)

- Risk Based Corrective Action
  - EPA Guidance
    - [http://www.epa.gov/oust/rbdm/index.htm](http://www.epa.gov/oust/rbdm/index.htm)
  - ASTM Guidance
    - [http://www.astm.org/Standards/E1739.htm](http://www.astm.org/Standards/E1739.htm)
Remediation

- Based on findings of the environmental site investigation
- Level of activity dependent on the threat to human health and the environment
  - Risk Based Corrective Action (RBCA)
- Dependent on future site use
- No prescriptive alternatives
- Cost/benefit analysis
Remediation

- When selecting a remedial alternative, pre-determine how clean is clean
  - What screening standards will be used?
  - Will they be site specific?

- [http://www.epa.gov/oust/cat/coc.htm](http://www.epa.gov/oust/cat/coc.htm)
Remediation

“Dig and Dump”

- Scale can vary
  - Hot spot removal
  - Removal to “Clean”

- Disposal of soil
  - Landfill, biopile, soil burning, soil washing

- Placement and compaction of backfill

- Utilities
Remediation

In-situ Treatments

- Enhanced biodegradation
- Air sparging
Remediation

Groundwater Treatments

• Pump and treat technologies
  ◦ Air stripping
  ◦ Granular activated carbon
  ◦ UV treatment
  ◦ Chemical treatment

• Permits needed
  ◦ Air
  ◦ Water
Remediation

- Monitored Natural Attenuation
  - refers to naturally-occurring processes in soil and groundwater
  - act without human intervention reduces mass, toxicity, mobility, volume, or concentration of contaminants
  - Includes - biodegradation, dispersion, dilution, adsorption, volatilization, and chemical or biological stabilization or destruction
Closure

• Can take years to achieve
• Remedial Goals achieved and documented
  ◦ Institutional Controls for remaining contaminants
• Concurrence by EPA
  ◦ No further action
Thank you!

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