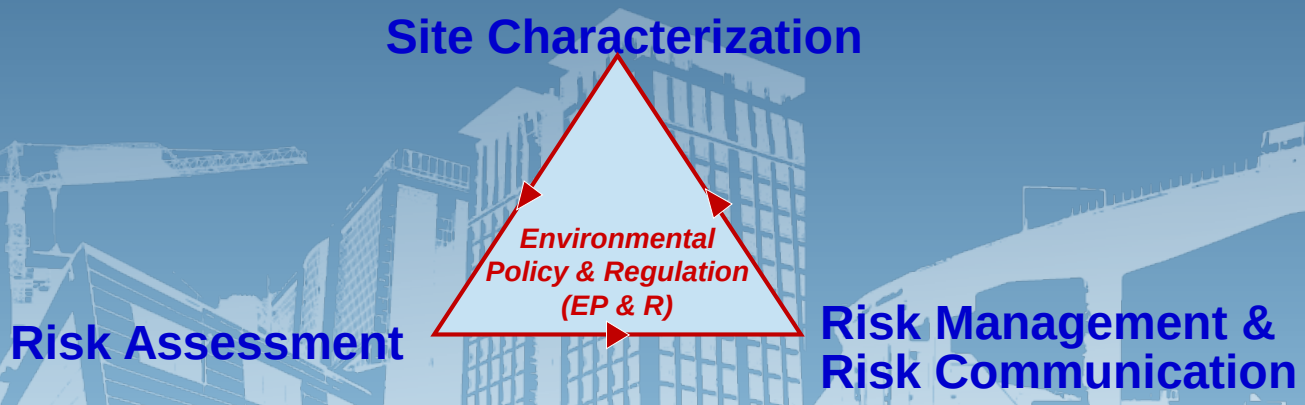
Gannett Fleming

100 Years of Excellence Delivered As Promised

Management of Contaminated Sites

Training Needs & Methods



Atul M. Salhotra, PhD.

asalhotra@gfnet.com

832-498-1717

© Gannett Fleming, Inc.

Topics

1. Type of contaminated sites
2. Process of managing contaminated sites
3. Stakeholders
4. Need for training and standards

© RAM Group, Inc.

Contaminated Sites

Hundreds of thousands of contaminated sites

- Landfills, gas stations, pipelines, manufacturing facilities, pesticide formulating facilities, military installations……..

Hundreds of toxic chemicals

- Pesticides, hydrocarbons, metals, radioactive materials, personal care chemicals, solvents, unexplored ordinances….

The issue is how to manage these sites so they do not cause risk to human health and the environment.

© RAM Group, Inc.

Refinery and Tank Farms, Illinois

© RAM Group, Inc.

Airport/Maintenance & Manufacturing Facility

Ganne 100 Years of Excellence Delivered As Promised

© RAM Group, Inc.

Chemical Plant

© RAM Group, Inc.

Gas Station

© RAM Group, Inc.

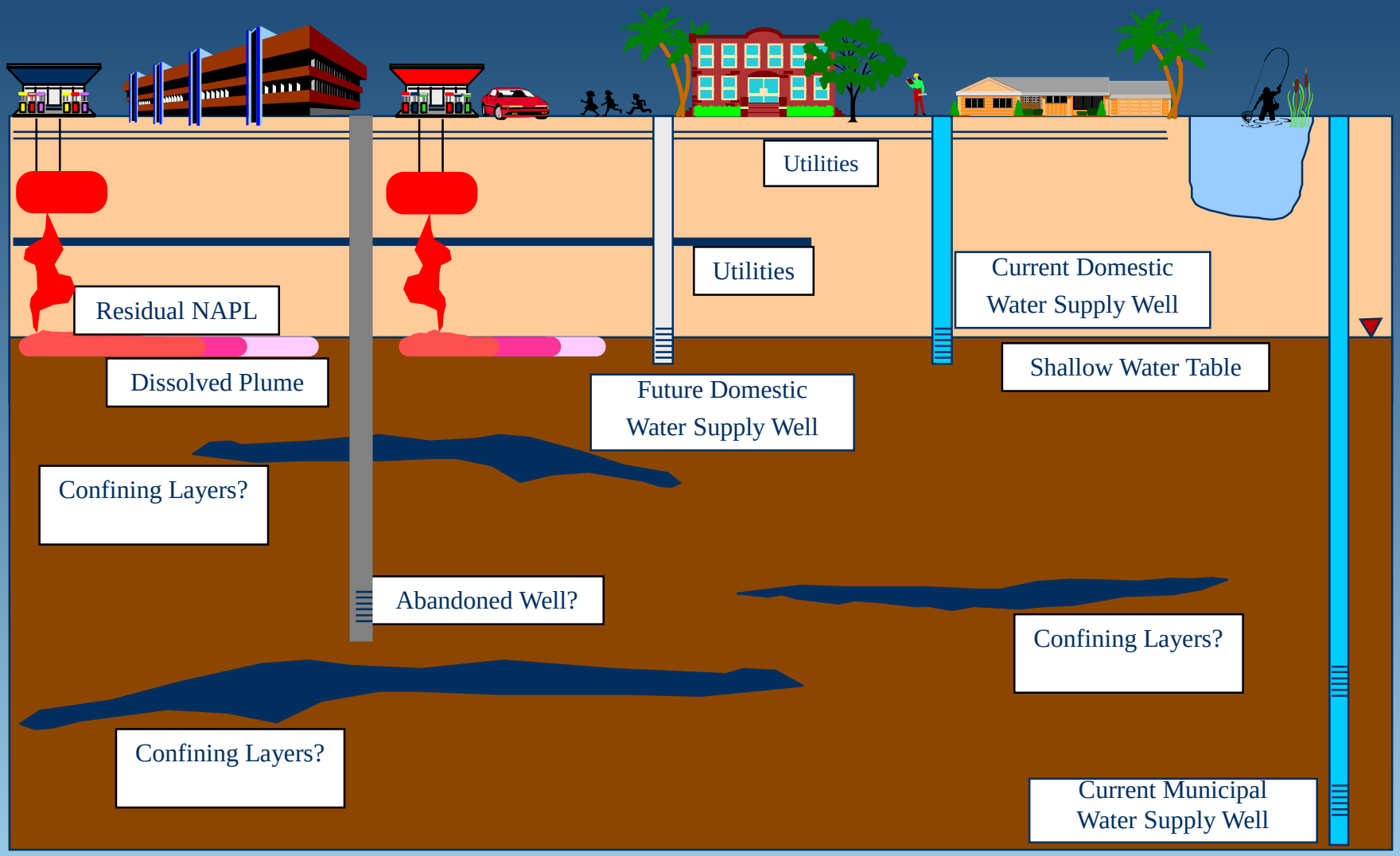
Operating Terminal – Mobile, AL

© RAM Group, Inc.

Hackensack River – New Jersey

© RAM Group, Inc.

A General Site Model



Management of Contaminated Sites

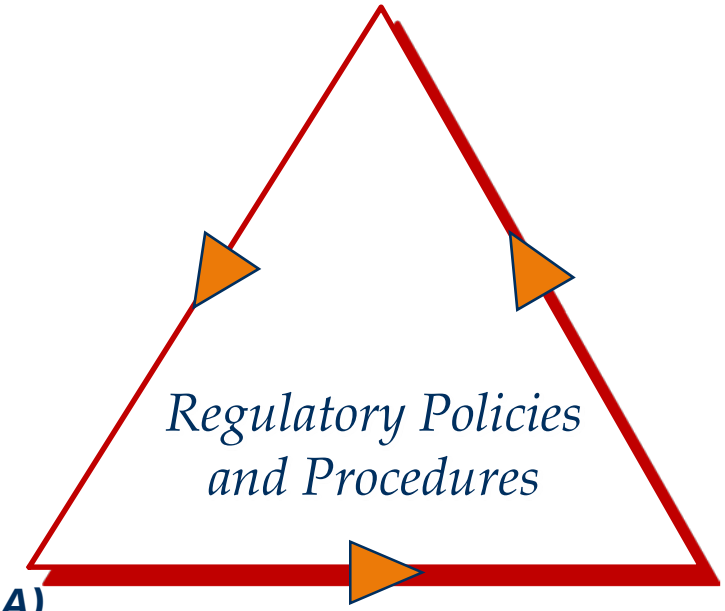
Despite 50 years of intensive efforts to mange contaminated sites, significant technical and institutional challenges remain

USEPA estimates that the expenditures at over 300,000 sites through 2033 may exceed 200 billion

© RAM Group, Inc.

Management of Contaminated Sites

Site Characterization (SC)



Risk Assessment (RA)

- ***Explosive Conditions***
- ***Human Health***
- ***Environment***
- ***Nuisance conditions***

Risk Management (RM)
Risk Communication

© RAM Group, Inc.

Step 1: Site Characterization (SC)

Reasons to collect data:

- Estimate risk
- Identify and implement risk management
- Confirm stability of impacts
- Understand fundamental processes that affect chemical behavior (fate and transport properties and processes)

Important to understand the objective of data collection.

© RAM Group, Inc.

Step 1: Site Characterization (SC)

- Source characteristics (size, location, chemicals of concern)
- Land use and building characteristics (current and future)
- Spatial and temporal variation in concentrations in soil, groundwater, surface water, soil vapor, and sediments.
- Characteristics of media (soil, groundwater, surface water, soil vapor, indoor and ambient air.)
- Define plume (delineation to what levels?)

Collect data to understand site, i.e., to develop conceptual model

Do not collect data just because….

© RAM Group, Inc.

Step 2: Risk Assessment (RA)

RA is a quasi-scientific and regulatory process used to:

1. **Estimate risk based on site-specific factors and <u>concentrations</u>**
   This is called forward mode of RA (FMRA)

2. **Estimate cleanup levels based on site-specific factors and <u>acceptable risk standards</u>**
   This is called backward mode of RA (BMRA)

© RAM Group, Inc.

Step 2: Why RA?

- **Ideally would like to clean properties to pristine conditions**

- **Extensive experience suggests that:**
  - **Technology nor resources exist to clean sites to pristine conditions.**
  - **Not necessary to clean to pristine conditions to meet goals.**

Risk Assessment is a tool that helps resolve this dilemma.

© RAM Group, Inc.

Step 2: Risk Assessment (RA)

- Toxicology of chemicals
- Fate and transport modeling (how chemicals behave in the environment)
- Potential routes of exposure (ingestion, inhalation, and dermal contact)
- Receptor characteristics (residential, non-residential, and construction worker)
- Degree of exposure

© RAM Group, Inc.

Step 3: Risk Management (RM)

RA is followed by Risk Management (RM) and is used to:

1. Decide whether calculated site risk is acceptable, and

2. Determine cleanup levels or other institutional controls if risk is unacceptable.

RM includes technical and non-technical considerations such as policy choices, cost, stakeholder agreements, risk perception, institutional controls, etc.

Risk communication is a key part of RM

© RAM Group, Inc.

Step 3: Risk Management (RM)

- Engineered treatment systems
- Engineered containment systems
- Land use controls
- Ongoing operation and maintenance

© RAM Group, Inc.

Step 3: Institutional Controls: Key RM Tool

- Ensures productive and safe use of property
- Ensure that the RA assumptions remain valid
- Knowledge of impacted sites is not lost
- Provide long-term protection for risk based remedies

© RAM Group, Inc.

Nature of Business

- Multidisciplinary
- Multiple stake holders
- Long time frames
- Very expensive
- Highly regulatory driven
- Need for consistency and standards

These characteristics affect the nature, content, and the method of delivery of training

Training Topics: Multidisciplinary Profession

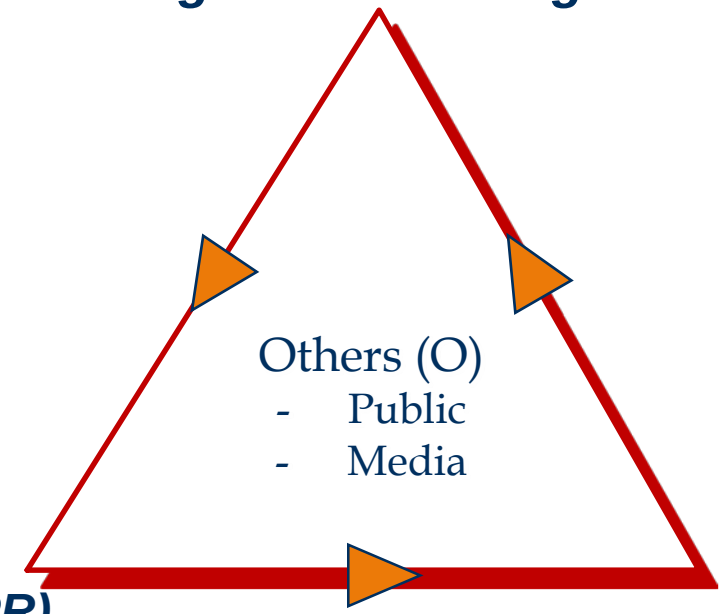
- Geology, Hydrology, Meteorology
- Chemistry and Toxicology
- Engineers (Civil, Environmental, Chemical, Mechanical)
- Ecologists
- Data Analysis (statistics and modeling)
- Field technicians
- Policy & Regulatory process

These characteristics affect the nature, content, and the method of training

On the job training and learning is key

Stakeholders Remediation Industry

Regulator and Regulations (R&R)



Responsible Party (PR)

- *Dollars*
- *Schedules*

Service Providers (SPs)

- *Consultant*
- *Contractor*
- *Laboratories*

Gannett Fleming 100 Years of Excellence Delivered As Promised

© RAM Group, Inc.

Objectives and Motivation

Regulator: Protection of the public, often conservative

Responsible party: Run their business and optimize their resources. Want a clear and transparent process

Service Providers: Interesting work and profits

Public: Want to be protected

Media: Sensational news. Information dissemination

Well thought out and implemented program can balance everyone's needs. No one is happy but all can be satisfied.

Regulators and Regulations

- **Regulations, guidance documents and protocols are critical to managing the entire process**
- **Regulations have to be evergreen to respond to changes in science, technology, and public demands**

Need access to trained and third party experts on an as needed basis.

© RAM Group, Inc.

Responsible Parties

- **Recognize the need to remove contaminants and clean land, air and waters**
- **Want a clear process: What do I have to do?**
- **Do it right the first time. Good SCM, SC, will pay in the long term**

Have to understand the regulations and what they are paying for.

Delegating everything to service providers is not necessarily the best idea.

© RAM Group, Inc.

Service Providers

- **Work hard to make sure commercial interest does not cloud integrity**
- **Continuing practical education is significant**

Most conflicted stakeholder.

© RAM Group, Inc.

Public

- Most affected
- Most important but at times most neglected stakeholder
- Media has not always been very helpful

Overcome human irrationality: Bad news makes the best news!

© RAM Group, Inc.

Who Requires Training: Multiple Stakeholders

- **Service providers**
- **Regulators and first responders**
- **Responsible party (industry, developers, defense personnel)**
- **Financial professionals**
- **Insurance professionals**
- **Adjacent land owners**
- **Media**

Training has to be customized for each class of stakeholder.

Avenues for Training

- High school & College degree programs
- Certificate programs
- Short in-class courses
- Field demonstrations
- Training to maintain licenses
- Internet & web based training
- On the job training

Significance of Standards

- Consistency
- Reliability of analysis
- Reliability of conclusions

Understanding and training of regulations and standards is critical.

Summary

- **The business of managing contaminated sites is expensive**
- **In the US it is a multi-billion dollar multi-disciplinary industry**

Standards,education and training is a key to making progress and containing costs

© RAM Group, Inc.