

## Rocky Mountain Arsenal National Wildlife Refuge

# AN INDUSTRY REVIEW OF DATA COLLECTION, EVALUATION AND REPORTING STANDARDS FOR LEAK DETECTION SYSTEMS AT HAZARDOUS WASTE LANDFILL FACILITIES and A REVIEW OF THE PRACTICE AT THE ROCKY MOUNTAIN ARSENAL



# Presentation Outline

- RMA Location and History
- Hazardous Waste Landfill History and Liner Design
- Sources of Flow in the Leak Detection System
- Regulatory Requirements for HWLs
- LCS/LDS Monitoring Objectives at RMA
- Study Results
- Reasons to Consider LDS Monitoring

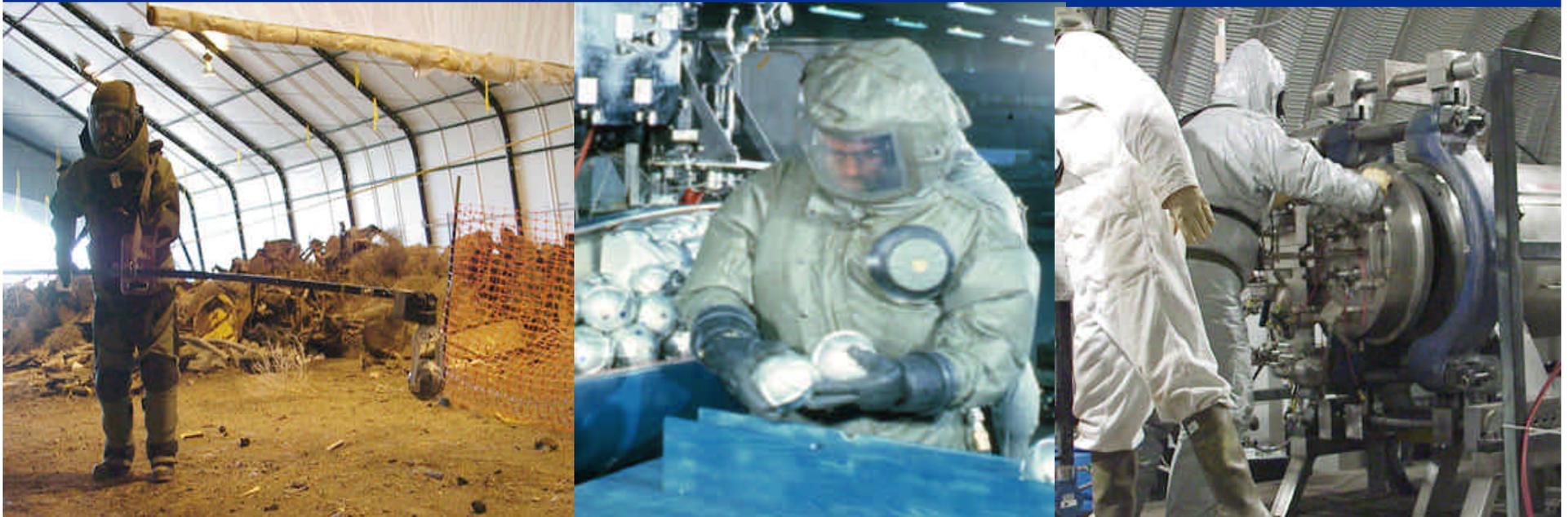


# Rocky Mountain Arsenal



# HISTORY-

- Established in 1942 by the Army
- Chemical warfare agents/munitions/ World War II
- 1946 Leased to private companies
- 1952 to 1982 -Shell (manufactured industrial and Agricultural chemicals including pesticides)
- Contamination of structures, soil, surface water, sediment, and groundwater.



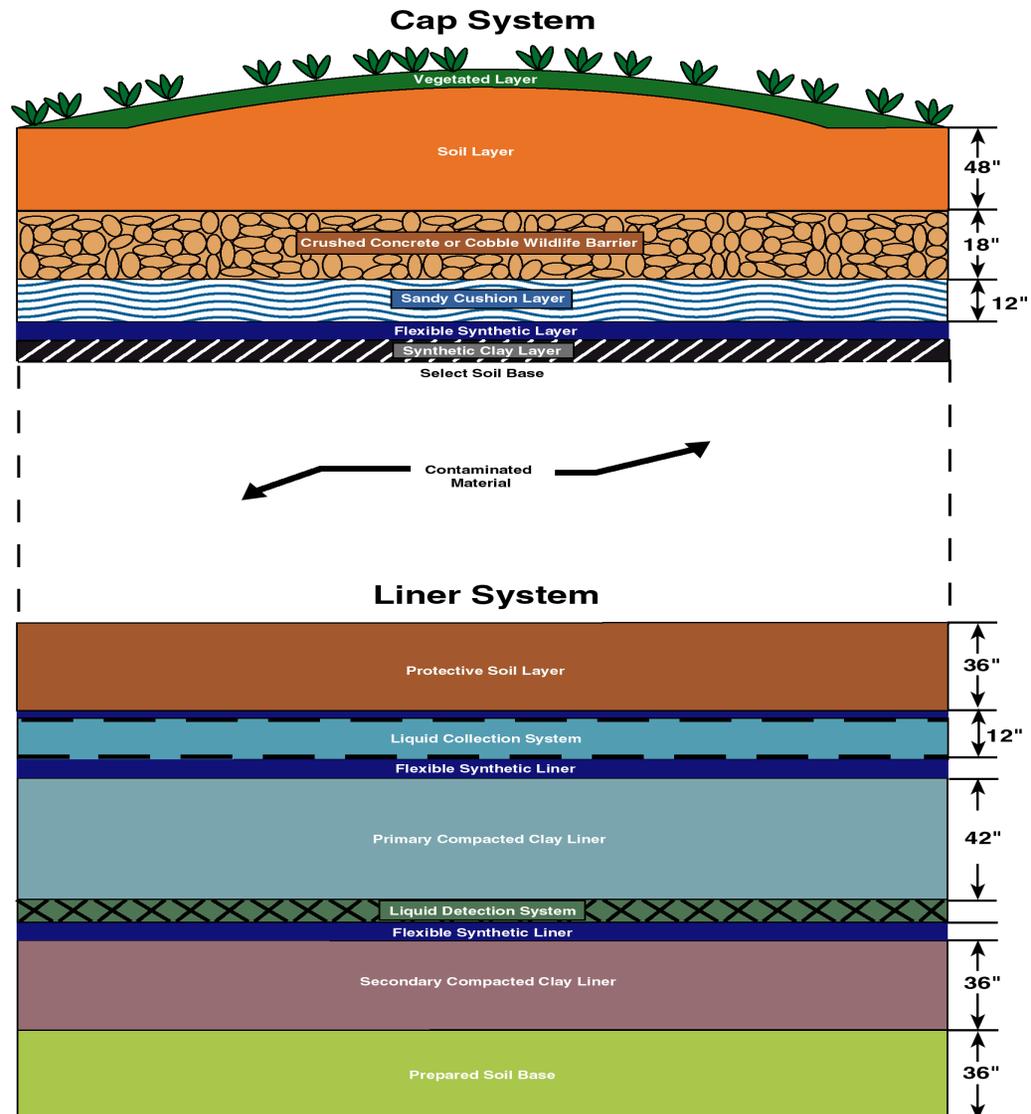
## RMA Hazardous Waste Landfill

- RMA is a EPA Superfund Site (CERCLA)
- Corrective Action Management Unit (CAMU) – CDPHE
- Permanent landfill disposal facility
- Waste from Remedial Implementation Projects and other onsite sources
- Approximately 1.2 million cubic yards



Rocky Mountain Arsenal

# Hazardous Waste Landfill (Liner Design)



# Sources of Flow in Leak Detection Systems

- Leakage through the top liner
- Construction water (water from precipitation or added water that collects in the detection layer during construction)
- Groundwater infiltration (not at RMA)



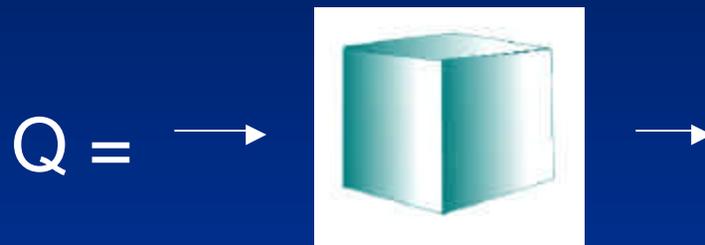
Liquid in the LDS is to be expected and cannot by itself become the indicator of liner performance.

How do we measure the liner performance?  
Action Leakage Rate (ALR)



The ALR represents the capacity of the LDS to transmit flow and is independent of the sources of the liquids flowing into the system.

(Darcy's Equation)



$$Q=TIW$$

If ALR is below the established rate, the liner systems are functioning correctly.

# Regulatory Requirements for HWL Monitoring

- No regulatory requirements to monitor the quality of the liquid in the LCS or LDS
- Quantitative evaluation for purposes of ARL compliance
- At RMA site specific Regulatory Agency agreements mandate monitoring the quality of the liquid in the LCS/LDS



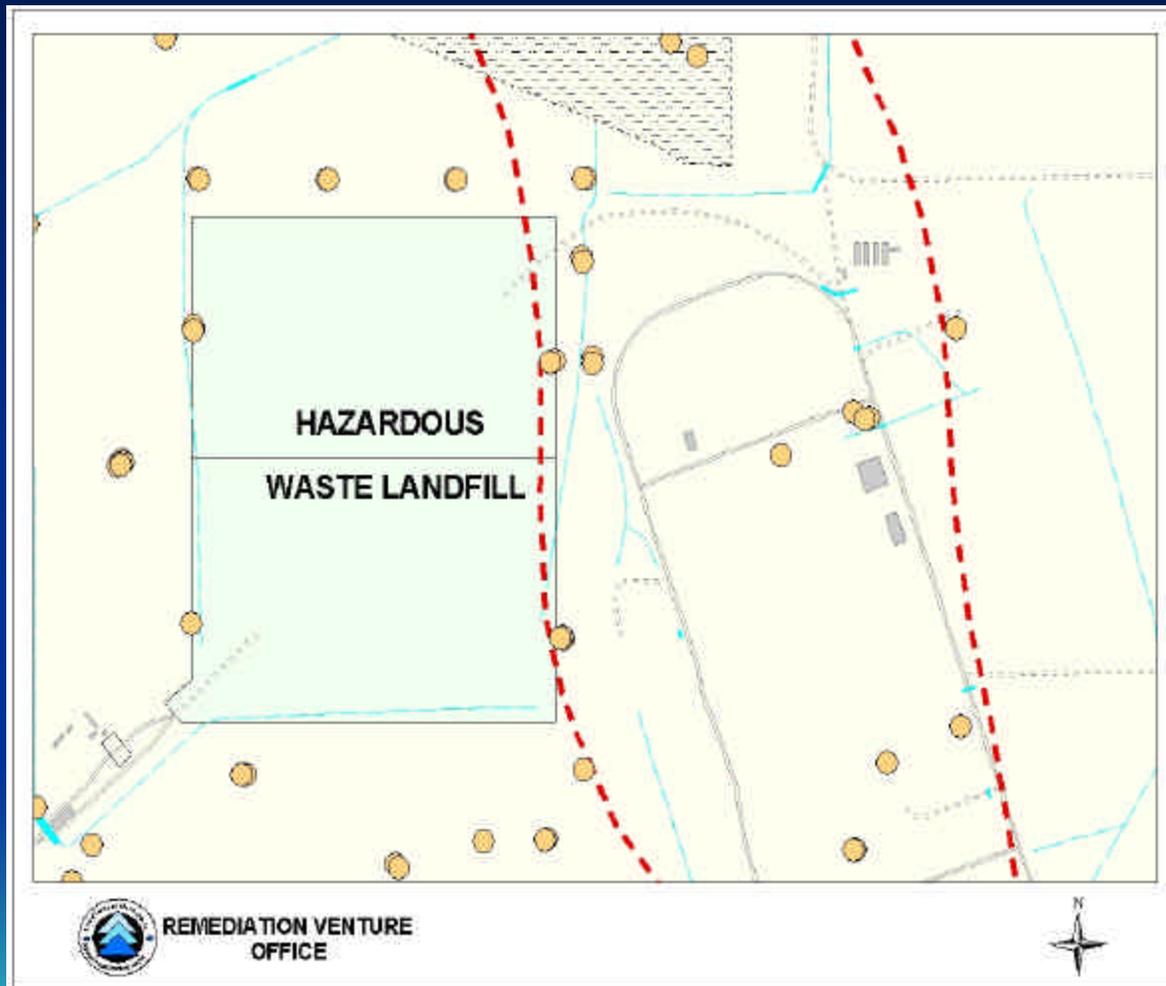


# LCS/LDS Objectives at RMA

- Analyze liquids in the LCS quarterly
  - Characterize leachate for treatment
  - Modify our analyte list in upgradient and downgradient compliance monitoring wells
- Analyze liquids in the LDS quarterly
  - Same as above
  - Assist in determining whether groundwater contamination is originating from the HWL or one of the groundwater contamination sources at RMA



# HWL-Rocky Mountain Arsenal



The ability to detect a leak in the landfill was a concern since the landfill was built near pre-existing groundwater contamination.

# Survey

The survey studied LDS requirements, LDS data usage, and LDS reporting.

21 Hazardous Waste Facilities in the U.S. categorized as Subtitle C hazardous waste landfills and holding current USEPA identification numbers were identified for this study.

14 Facilities in 9 States were available for the Survey



<u>State</u>	<u>Facility</u>	<u>ALR</u>	<u>LDS Monitoring</u>
CA	Kettleman Hills Landfill	YES	YES
CA	Buttonwillow	NO	NO
CA	Westmoreland	YES	NO
CO	Rocky Mountain Arsenal	YES	YES
CO	Deer Trail Landfill	YES	YES
ID	Grandview	YES	NO
IL	Peoria Disposal	YES	YES
LA	Lake Charles Facility	YES	NO*
OH	Fernald Landfill	YES	YES
SC	Pinewood	YES	YES
TX	HWY136	YES	YES
TX	Deer Park Facility	YES	YES
TX	Texas Ecologist Facility	NO	NO
UT	Grassy Mountain Landfill	YES	NO

## How are facilities using LDS results...

- Characterize liquid for treatment
- Additional data for specific reasons such as:
  - Pre-existing contamination
  - Potential for contaminant migration
  - Hydrologic conditions – groundwater table

## Data Reporting...

Regulatory Agency



# Reasons to Consider LDS Monitoring

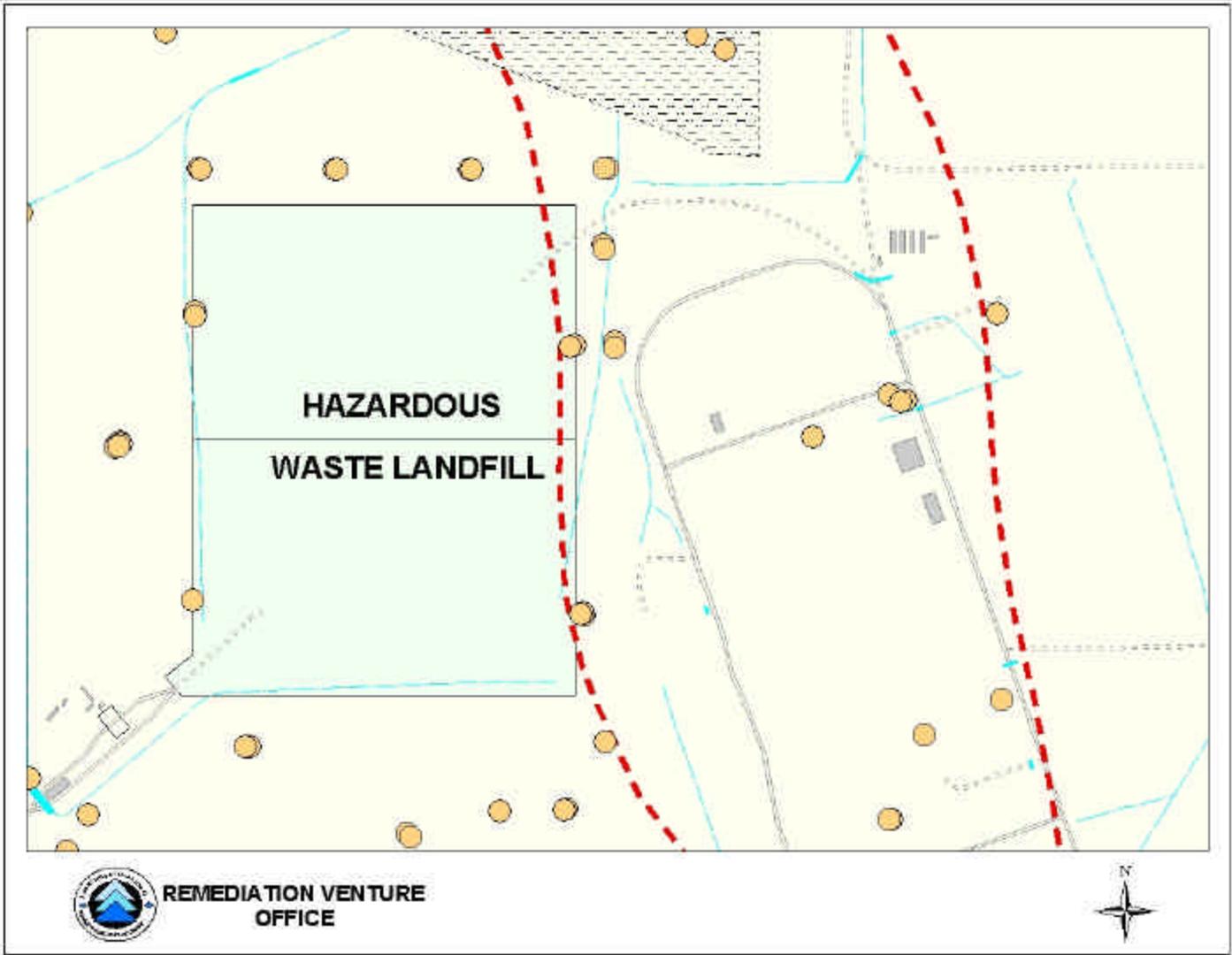
- Relatively Inexpensive
- Prove landfill integrity
- Differentiate between pre-existing contamination and landfill leakage
- Safeguard landfill owners in case contaminants migrate on-site



# Summary

- The performance and integrity of a landfill is important for the environment, protection of human health, and as a landfill owner, environmental liability
- LDS ALR – Measure of landfill performance at most landfills
- Data from LDS liquid monitoring can be valuable





**REMEDIATION VENTURE  
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# Comments/Questions?

## ROCKY MOUNTAIN ARSENAL NATIONAL WILDLIFE REFUGE

