

# A Citizen's Role in the CMS and Risk Assessment

CMS: Corrective Measures Study  
Workshop for Middleport Residents  
Middleport, NY  
August 12, 2008

## Topics for Consideration

- Topic 1: What is the Regulatory Process and How Does the CMS Fit Into It?
- Topic 2: What are the Objectives of the CMS?
- Topic 3: What are the Components of the CMS and How Can Citizens Participate in Them?
- Topic 4: What is the Current Status of the CMS Process?
- Topic 5: How will the Level of Risk be Determined?
- Topic 6: What Happens after the CMS and How Can Citizens Participate?
- Questions and Discussion

## RCRA Background

- RCRA: Resource Conservation and Recovery Act
  - Major Federal Law to Address Hazardous Waste Management in the Nation
  - Primary Focus is on Management of Waste during or soon after Generation
  - Also Covers Actions to Correct Problems
- RCRA is not Superfund
  - Although Some of the Cleanup Procedures are Similar

## RCRA Background

- RCRA: Resource Conservation and Recovery Act
  - Usually Applies Where A Generator (Industry) is Still in Operation
  - Actions are Usually Proposed by the Generator with Agreement by the EPA and/or the State Agency
  - Sometimes Overseen Under the Basis of a Consent Order
  - Law and Regulations do not Really Focus on Off-Site Situations, Although there are Often Groundwater Issues
- Superfund (CERCLA)
  - Usually Applies to Sites Not Currently in Operation
  - EPA or States Usually Have the Lead Although Some Companies with Liability Frequently Undertake the Remediation

## Steps in Corrective Action Process

- RCRA Facility Assessment—RFA
  - Gather Information to determine whether a cleanup is necessary
- RCRA Facility Investigation—RFI
  - Gather detailed information to determine the nature and scope of necessary corrective action
- (Interim Actions)
  - Used to control or mitigate serious issues before final corrective action begins
- Corrective Measures Study—CMS
  - Used to identify potential corrective action techniques or technologies
  - Includes consideration of several options for remediation
  - Includes consideration of clean-up goals including risk reduction
- REMEDY SELECTION
- Corrective Measures Implementation—CMI
- Completion

Introduction

### Why Are Corrective Measures Required?

- ▶ RFI results define the nature and extent of contamination and indicate that further action is required
- ▶ Contamination must be addressed
- ▶ Risk assessment results indicate site poses a risk
- ▶ Contaminant concentrations exceed action levels
- ▶ Note that a CMS may be required even if an action level is not exceeded



Introduction

### CMS Purpose

- ▶ Identify, develop, and evaluate potential remedial alternatives for removal, containment, and/or treatment of contamination
- ▶ CMS should focus on realistic remedies and consider the extent, nature, and complexity of releases and contamination
- ▶ If presumptive remedies are being considered, the purpose of the CMS will be to confirm that the presumptive remedy is appropriate
- ▶ If technical impracticability is evident, the CMS should provide justification, and stipulate performance standards that will be met



Introduction

### CMS Work Plan

- ▶ CMS Work Plan (optional)
  - Should include a description of current site conditions
  - Should establish corrective action objectives
    - Units, wastes, and hazardous constituents to be addressed
    - How Media Protection Standards will be attained
  - Description of approach to CMS
  - CMS schedule



Remedial Alternatives

### Selecting Remedial Alternatives

- ▶ Site characteristics from the Site Conceptual Model
  - Site data
  - Environmental setting
  - Receptor proximity
- ▶ Waste characteristics
  - Effectiveness/feasibility limitations
  - Nature and extent
- ▶ Technology limitations
  - Reliability/fully demonstrated
  - Performance record
  - O&M history



Remedial Alternatives

### Selecting Remedial Alternatives

- ▶ Other considerations
  - Based on good engineering practice
  - Capable of addressing all site problems and corrective action objectives
  - Evaluate only appropriate, implementable options
  - Need for any additional site characterization data
  - New or innovative technologies may require laboratory and/or bench-scale studies



## Performance Standards

**Three Performance Standards For CMS**

- ▶ Remedial alternatives must meet three performance standards:
  - Attain media cleanup standards
  - Control the sources of the releases
  - Protect human health and the environment
  
- ▶ The performance standards are considered the main goal of the cleanup and are non-negotiable
  
- ▶ All remedial and corrective measures alternatives must meet the performance standards



## Balancing Factors

**If more than one remedial alternative meets the performance standards, consider the balancing factors to select the remedial alternative**

- ▶ The balancing factors are:
  - Long-term reliability and effectiveness
  - Reduction of toxicity, mobility, or volume of wastes
  - Short-term effectiveness
  - Implementability
  - Cost
  - State and community acceptance



Balancing Factors

### **Balancing factors are not ranked in terms of relative importance**

- ▶ Any one of the balancing criteria may prove to be the most important based on site conditions (Site Conceptual Model)
- ▶ Example: A remedy at a certain site might be protective in the short term but not necessarily reliable in the long term
  - Capping a highly contaminated area may require long-term operation and maintenance, so may be more appropriate to remove the hot spots and then cap the residual contamination and implement an institutional control



Balancing Factors

### **Effectiveness and Acceptance**

- ▶ Short-term effectiveness
  - Protection of community during remedial actions (transportation-related risks)
  - Protection of workers during remedial actions (contaminated dust)
  - Environmental impacts (sediment disturbance)
  - Time until remedial action objectives are achieved
  - May conflict with first two factors (long-term reliability and reduction of toxicity, mobility, or volume of wastes)
- ▶ State and community acceptance
  - Should consider reuse and future planning



## Components of the CMS

- The following slides represent the EPA perspective on what a CMS should include.

CMS Considerations

### The CMS should include information on:

- ▶ Performance
  - Effectiveness as a remedy
  - Limitations of remedy
  - Useful life (i.e., length of time the level of effectiveness can be maintained)
  - Resource availability in future life of technology
  - Appropriateness of technology





CMS Considerations

**The CMS should include information on:**

- ▶ Reliability
  - O&M requirements
  - Effectiveness under similar conditions
  - Historical technology combination of effectiveness
  - Flexibility to deal with uncontrollable changes
  - Failure impact on receptors
  
- ▶ Safety
  - Safety to nearby communities and environments
  - Safety to workers during implementation



CMS Considerations

**THE CMS should include information on:**

- ▶ Implementability
  - Constructability
    - Internal conditions
    - External conditions
  - Time
    - Time to implement
    - Time to produce results
  - Technical Practicability
    - Will the technology be able to achieve media cleanup standards or performance standards?



CMS Considerations

### **CMS should include:**

- ▶ Environmental assessment
  - Short-term and long-term beneficial and adverse effects of response alternative
  - Evaluation of any adverse effects on environmentally sensitive areas
  - Analysis of measures to mitigate adverse impacts
  
- ▶ Assessment will describe
  - Contaminant levels and characterizations on site
  - Potential exposure routes
  - Potentially affected populations



CMS Considerations

### **CMS should include:**

- ▶ Human health and ecological criteria
  - Each alternative is evaluated to
    - Determine level of exposure and reduction over time
    - Determine overall protectiveness both during and after implementation
    - Compare residual levels to existing criteria, standards, or regulations (i.e., maximum contaminant levels (MCLs), action levels, water quality criteria)



CMS Considerations

**CMS should include:**

- ▶ Institutional factors for each alternative
  - Federal, state, and local environmental and public health standards, regulations, guidance, advisories, ordinances
  - Community relations aspects on the...
    - Design
    - Operation
    - Timing
    - ...of each alternative
- ▶ Capital cost estimates
  - Direct
  - Indirect



## What is the Current Status of the CMS Process for Middleport

- FMC Has Submitted a Draft Workplan for the CMS for the Historic Air Deposition Area.
- The Agencies Have Responded with Comments
- Discussions Between the Company and the Agencies will Lead to the Final Work Plan
- Residents Have an Opportunity to Comment on the Situation as Well.

## Components of FMC Workplan

- 1. evaluate the concentrations of potentially FMC-related arsenic and associated exposures within the Study Area in comparison to background (e.g., Gasport) arsenic concentrations and associated exposures to identify areas that may warrant remediation;
- 2. identify potentially feasible remedial technologies to address impacted soils for the various land uses within the Study Area;
- 3. develop alternative corrective action scenarios that will identify different areas proposed for corrective action and incorporate appropriate remedial technologies into corrective measure alternatives;

## Components of FMC Workplan

- 4. evaluate the corrective measure alternatives taking into account community concerns and site-specific information, to the extent practicable; and
- 5. recommend the corrective measure alternative or alternatives for the areas warranting remediation that would effectively reduce potential incremental risks/exposures associated with FMC-related arsenic in soil within the Study Area while addressing community concerns.

## CMS Tasks Proposed by FMC

- CMS Task 1: Community Participation
- CMS Task 2: Study Area and Background Data Evaluation
- CMS Task 3: Risk Assessments
- CMS Task 4: Technology Screening and Pilot Studies
- CMS Task 5: Development of Corrective Measures Alternatives
- CMS Task 6: Evaluation of Corrective Measures Alternatives
- CMS Task 7: Development of Recommended Alternative

## Components of Community Participation Task

- **Provide Information** - Balanced and objective information will be provided to assist the public and stakeholders in understanding the project scope of work; the problems; the process for addressing the problems; the alternatives and solutions to the problems. Information will be provided to the public and stakeholders by fact sheets, newsletters, web sites, open houses, availability sessions, and/or meetings.

## Components of Community Participation Task

- **Obtain Feedback** - Public and stakeholder feedback on the project scope of work, the problems, the process for addressing the problems, the alternatives and solutions to the problems will be obtained. Comments and feedback will be obtained by maintaining open communications; holding public comment periods, public information sessions, and/or public meetings; conducting surveys; community-wide mailings with return/reply comment cards and/or web-site discussion forums.

## Components of Community Participation Task

- **Provide Opportunities for Involvement** – Opportunities for will be provided to stakeholders for involvement during the implementation of the project and not just at the end of the project. Opportunities will be provided by holding meetings, workshops, information sessions and/or public meetings.

## Possible Remediation Technologies Presented in Draft Workplan

- 1. No Action or No Further Action;
- 2. Administrative Controls to prevent or reduce potential for human exposure to contaminated soil. Administrative controls include use of deed restrictions (nonenforceable and requires property owner consent), private property agreements/easements (requires property owner consent and does not require intervention of government authority), and/or environmental easements (requires property owner consent and intervention of by NYSDEC);

## Possible Remediation Technologies Presented in Draft Workplan

- 3. Access Restrictions consist of physical mechanisms that can restrict access and or maintain the integrity of another technology. Access restrictions include posting of signage and/or fencing to restrict access;
- 4. Monitoring and Maintenance consists of activities required to verify and maintain the effectiveness of a remedial measure;
- 5. Engineered Cover involves the construction of an engineered cover to limit contact with contaminated soil;

## Possible Remediation Technologies Presented in Draft Workplan

- 6. Soil Excavation/CAMU involves the removal of contaminated soil and the disposal of the excavated soil in a CAMU at the FMC Facility;
- 7. Phytoremediation involves the use of certain plants to reduce arsenic levels in soil. Plant materials accumulate arsenic and will require periodic harvesting/removal and offsite disposal. Phytoremediation is an in situ treatment technology and is considered to be a “Green” technology;

## Possible Remediation Technologies Presented in Draft Workplan

- 8. Soil Tilling/Blending involves the tilling, mixing and blending (with topsoil or compost that contain low levels of arsenic) of soil to reduce arsenic levels and to recycle land/soil. Soil Tilling/Blending is considered to be an in situ technology and a “Green” technology since it conserves a significant natural resource--soil.



### Agency Comments on the Draft Workplan

- Agencies will very soon provide draft Corrective Action Objectives for soils in the Air Deposition Area
- Agencies do not want the CMS to first identify areas that may warrant remediation, rather, the CMS should “develop and evaluate corrective action alternative or alternatives and to recommend the corrective measure or measures to be taken”
- “However, the AOC does allow for consideration of different cleanup goals in conjunction with an evaluation of corrective measures alternatives. .”

### Agency Comments on the Draft Workplan

- Each CMA (Corrective Measures Alternative) should indicate concentration-based soil cleanup goals for each contaminant. The arsenic background concentration utilized in the RFI should be used to represent remediation of the entire RFI area. FMC could propose other CMAs for sub-areas where arsenic data may exceed each proposed cleanup goal.

### Agency Comments on the Draft Workplan

- It is the Agencies' preference that each CMA include some type of tree preservation technology to address community and individual property owner concerns.
- Where a CMA uses excavation and soil removal, evaluation of disposal technologies in addition to the CAMU should be included, such as beneficial daily cover at an off-site landfill or disposal as waste at an appropriate off-site facility.

### Agency Comments on the Draft Workplan

- Combinations of technologies could be considered.
- The workplan will be evaluated for human health in terms of the extent to which it mitigates or eliminates both short term and long term potential exposures. This could include a human health risk assessment for arsenic based on the cleanup goal of each CMA.

### Agency Comments on the Draft Workplan

- The work plan will be evaluated for community acceptance. How will the CMAs be presented to the community, how will feed back be encouraged? How will concerns of property owners be addressed in terms of flexibility?
- The Agencies agree the each CMA should be evaluated in consideration of EPA “Green Remediation” guidance.

### Agency Comments on the Draft Workplan

- An additional technology should be considered—hand excavation and/or multi-year, segmented excavation.
- Objective is to preserve tree root integrity and function.

## Risk: Concepts and Definitions

- Risk is the Probability of Suffering Harm as the Result of a Hazard
- People Face Multiple Risks Everyday
- Risks to People are Often Discussed in Terms of Deaths per Year that Result from the Hazard

## Mortality Rates from Certain Events in the Netherlands

<u>Activity</u>	<u>Annual Mortality Rate</u>
Being Struck by Lightning	1 in 10 million
Flying	1 in 814,000
Walking	1 in 54,000
Driving a Car	1 in 5,700
Riding a Motorcycle	1 in 1,000
Smoking Cigarettes (one pack a day)	1 in 200
U.S. Standard for Acceptable Environmental Risk	1 in 1 million

## Calculation of Risks

- Simplified Formula:

$$\text{Risk} = k (\text{degree of toxicity}) (\text{exposure})$$

- Risk Can Be Reduced by Lowering the Degree of Toxicity
- Risk Can Be Reduced by Lowering the Level of Exposure

## Complications of Risk Calculation from Chemicals

- There are Issues Related to Exposure:
  - How Much Chemical Was Involved (Dose)?
  - Was the Exposure One Time (Acute Exposure)?
  - Or Was the Exposure Repeated for Many Times (Chronic Exposure)?
  - What Was the Route of Exposure?
    - Breathing--Respiratory
    - Eating or Drinking--Ingestion
    - Through the Skin--Dermal

## Complications of Risk Calculation from Chemicals

- There are Issues Related to Degree of Toxicity
  - What is the Age and Size of the Individual Exposed?
  - How Long Does the Toxin Stay in the Body (Half Life)?
  - Where Does the Toxin Concentrate in the Body?
  - What is the Type of Toxicity or Damage?

## Toxicity of Arsenic

### What are the minimal risk levels (MRL) for arsenic exposure?

An MRL is an estimate of the daily human exposure to a hazardous substance that is likely to be without appreciable risk of adverse non-cancer health effects over a specified duration of exposure.

ATSDR Minimal Risk Levels (MRLs), December 2005

Name	Route	Duration	MRL	Factors	Endpoint
Arsenic	Oral	Acute	0.005 mg/kg/day*	10	Gastrointestinal
		Chronic	0.0003 mg/kg/day	3	Dermal

\*Provisional; mg/kg/day = milligrams per kilogram of body weight per day