



**ACID AREAS 2 AND 3 PROPOSED PLANS
MEETING MINUTES
PLUM BROOK ORDNANCE WORKS
Thursday March 21, 2013
Firelands Community College, Huron, OH**

This document has been modified from the original to comply with DoD web policy.

USACE Project Manager opened the meeting.

Jacobs Engineering presented the Proposed Plans developed for Acid Area 2 and Acid Area 3 at the former Plum Brook Ordnance Works located in Sandusky, Ohio. The public meeting initiated the 30-day Public Comment Period, from March 21, 2013 through April 23, 2013.

Jacobs Engineering presentation is attached as part of these Public Meeting Minutes. The presentation highlighted the following information:

- Brief history of the Acid Areas 2 and 3 and the PCB contamination
- Summary of the investigations at the Acid Areas
- Review of the Feasibility Study
- Description of the contamination delineation in each area
- Presentation of the selected alternative

Several questions were posed from the meeting attendees:

Q - How deep were samples taken?

A – During the remedial investigation sample depths ranged from 3ft down to 10 ft

Q – After the soil is sampled, can it be taken to taken to landfill if possible?

A - Yes, low levels (nonhazardous) to landfill, higher levels to hazardous disposal in Michigan, which is closest location

Q – Are the PCB concentrations (55 mg/L) in AA3 concentrations up to 55 mg/kg sitewide?

A – Two locations were 55 mg/kg but most of area was 5-10 mg/kg

Q - Is MuniRem® treatment temperature sensitive?

A – The chemical itself is not temperature sensitive and the process produces heat but needs water and needs to be tilled, so it is not viable in freezing temperatures.

Following the questions and answers, USACE Project Manager reminded the attendees that the public comment period was from March 21, 2013 through April 23, 2013 and that hardcopies of the Proposed Plans are available at the BGSU Firelands library and on the PBOW website. Copies were also provided to the meeting attendees. Comments on the Proposed Plans should be submitted electronically to PBOW@usace.army.mil or via regular mail to the following address:

USACE Huntington District
502 Eighth St.
Huntington, WV 25701
Attn: PBOW, USACE Project Manager

USACE Project Manager asked if there were any additional questions, with none, the meeting was adjourned.

Jacobs

**Public Meeting
Acid Areas 2 & 3 Proposed Plan
Former Plum Brook Ordnance Works
Sandusky, Ohio**

Presented by:
Jacobs

March 21, 2013

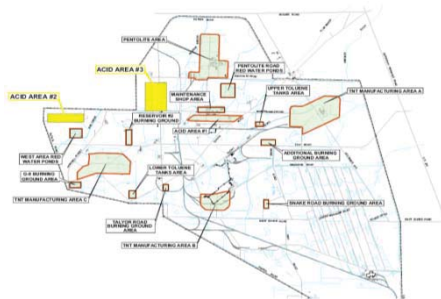


Presentation Agenda

- Brief Review of Acid Areas 2 & 3 History
- Brief Review of Investigations at the Acid Areas
- Detailed review of the Feasibility Study
- Analysis of the Proposed Remedial Alternative

Jacobs

Location Map



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Acid Areas Site History – US Army

- Operation from 1941 to 1945
- Site Facilities Used for the Production of Various Acids Needed for the Manufacture of TNT
- Process Buildings, Storage Tanks, Rail Transfer
- Facilities Were Dismantled Between 1958 and 1968
- Acid Areas 2 and 3 Were not Used by NASA

Jacobs

Acid Areas Site History – USACE

- Preliminary Assessment - 1991
- Site Investigations – 1998 (PAHs and PCBs)
- Remedial Investigations – 2004 -2005
- Risk Assessments Completed - 2008
- Delineation Sampling for PCBs – 2008 to 2010
- Feasibility Study Completed - 2012

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Origin of PCBs at Plum Brook

- Used in Paints – may have been applied to storage tanks
- Used in oils for dust control
- Used for weed control

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Nature of PCBs

- Readily Absorbs to soil
- Hydrophobic – Will not dissolve in water and will not leach into groundwater
- Limited to surface soil
- Recalcitrant – one of the most stubborn compounds to destroy and to separate from soil

Jacobs

Risk Assessment Summary

- Unacceptable Risk from **PCBs in Surface Soil**
- Impacts to Construction Worker, Groundskeeper, Indoor Worker, and Future Residents
- Unacceptable Cancer Risks range from 2.2×10^{-5} to 2.7×10^{-4} (1.0×10^{-5} is unacceptable)
- Unacceptable Non Cancer Hazard Index ranges from 2.2 to 2.4 (1.0 is unacceptable)
- Future Child Resident is the most affected.

Jacobs

Feasibility Study Objectives

- Development of Remediation Goals
- Further Delineation of the Contamination Area
- Determine the Volume of Contaminated Soil Needing Remediation
- Determine the Levels of Contamination
- Perform Remediation Technology Screening
- Selection of Remediation Alternatives for Further Detailed Evaluation

Jacobs

Remedial Objectives

- Prevention of adverse exposure to PCBs in soil
- Includes Unrestricted Future Land Use
- Risk-Based Remediation Goal of 2 mg/kg total PCBs

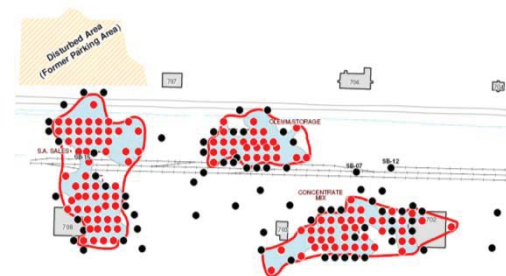
Jacobs

Contaminant Delineation Efforts

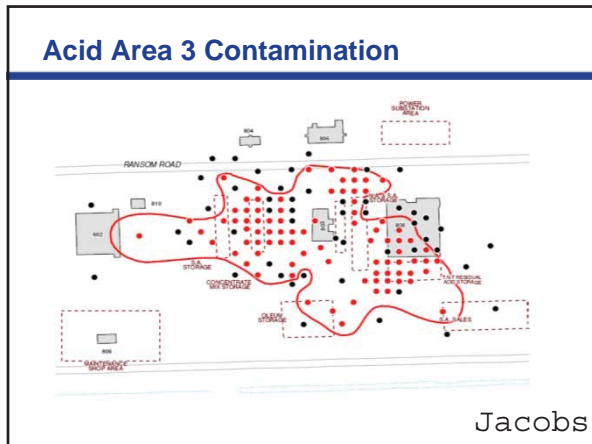
- Six Rounds of Sampling (November 2008 through August 2010)
- Surface Soil Only
- 174 additional samples from Acid Area 2
- 117 additional samples from Acid Area 3

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Acid Area 2 Contamination



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- ### Soil Volumes & Contamination Levels
- Acid Area 2**
- 14,000 Cubic Yards of Soil Exceeding the Remediation Goal of 2 mg/kg total PCBs.
 - PCB concentrations as high as 49 mg/kg
- Acid Area 3**
- 17,000 Cubic Yards of Soil Exceeding the Remediation Goal of 2 mg/kg total PCBs
 - PCB Concentrations as high as 55 mg/kg
- Jacobs

- ### Technology Screening Process
- Literature Search
 - Development of Technology Categories
 - Technology Screening
 - Viable Alternatives Evaluation
- Jacobs

- ### Technology Categories
- Established Technologies**
- Institutional Control
 - Containment
 - Incineration
 - Excavation/Off-site Disposal
- Jacobs

- ### Technology Categories (Cont)
- Demonstrated Technologies**
- Thermal Desorption
 - Dehalogenation
 - Solvent Extraction
 - Soil Washing
- Jacobs

- ### Technology Categories (Cont)
- Emerging Technologies**
- Solidification/Stabilization
 - Bioremediation
 - Vitrification
- Jacobs

Screening Criteria

- Ability to address the Remediation Goal of 2 mg/kg total PCBs
- Long term reduction in concentrations and potential future exposure.
- Practicality
- Cost

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Potential Technologies

Chemical Dehalogenation

- Alkaline Hydrolysis
- Palladized Nanoscale Iron
- Chemical Oxidation
- Chemical Reduction
- Alkali Metal Polyethylene Glycolate
- Base Catalyzed Dehalogenation

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Potential Technologies (Cont)

Bioremediation

- Windrow Composting
- Enhanced Bioremediation

Incineration

Excavation / Disposal

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Detailed Analysis of Viable Technologies

- In depth evaluation of case studies
- Ability to address the Remediation Goal of 2 mg/kg total PCBs
- Long term reduction in concentrations and potential future exposure.
- Practicality
- Cost

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Viable Alternatives

- Excavation / Disposal
- Incineration
- Chemical Reduction using Munirem®
- Enhanced Bioremediation

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Excavation / Offsite Disposal

- Excavate contaminated soil
- Load into dump trucks
- Transportation to a local Landfill (< 50 mg/kg)
- Transportation to hazardous landfill (>50 mg/kg)
- Backfill the site with clean soil

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Incineration

- Excavate contaminated soil
- Load into roll-off boxes
- Transportation to a local rail yard
- Ship via Rail Line to a TSCA Incinerator
- Incineration of soil under controlled conditions to prevent creation of dioxins/furans

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Chemical Reduction - Munirem®

- Munirem® is a proprietary compound in powder form
- Creates sulfate free radicals which have been demonstrated to break down PCBs
- In-situ treatment
- Tilling Munirem® into soil in 9" lifts
- Repeated mixing and water spraying as needed.
- Estimated 9 days treatment time
- Confirmation sampling
- Pilot Test

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Enhanced Bioremediation

- Excavation and transport to on-site composting facility
- Composting in windrows
- Utilizes micro-organisms to break down PCBs
- Requires routine cycling from aerobic to anaerobic conditions
- Horse manure provides microorganisms
- Molasses provides the anaerobic condition
- Estimated 12 weeks treatment time
- Confirmation Sampling
- Backfill with treated soil
- Pilot Study

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Alternatives Evaluation Criteria

- Protection of Human Health and the Environment
- Compliance with Federal and State Laws
- Overall Effectiveness
- Reduction in Toxicity, Mobility, or Volume through Treatment
- Implementability
- Cost – (Perform a detailed cost analysis)
- Schedule

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Alternatives Comparison

Protection of Human Health and Environment

• Excavation / Disposal	Yes
• Incineration	Yes
• Chemical Reduction - Munirem®	Yes
• Enhanced Bioremediation	Yes

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Alternatives Comparison

Compliant with Federal and State Laws

• Excavation / Disposal	Yes
• Incineration	Yes
• Chemical Reduction - Munirem®	Yes
• Enhanced Bioremediation	Yes

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Alternatives Comparison	
Effectiveness	
• Excavation / Disposal	Yes
• Incineration	Yes
• Munirem®	Uncertainties
• Enhanced Bioremediation	Uncertainties
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Alternatives Comparison	
Reduction in Toxicity, Mobility, Volume	
• Excavation / Disposal	No
• Incineration	Yes
• Munirem®	Yes
• Enhanced Bioremediation	Yes
Jacobs	

Alternatives Comparison	
Implementable	
• Excavation / Disposal	Yes
• Incineration	Yes
• Munirem®	Uncertainties
• Enhanced Bioremediation	Uncertainties
Jacobs	

Alternatives Comparison	
Cost Acid Area 2	
• Excavation / Disposal	\$2.0MM
• Incineration	\$19.7MM
• Munirem®	\$2.3 – 4.3MM
• Enhanced Bioremediation	\$2.0 – 2.9MM
Jacobs	

Alternatives Comparison	
Cost Acid Area 3	
• Excavation / Disposal	\$2.3MM
• Incineration	\$23.0MM
• Munirem®	\$2.7 – 4.9MM
• Enhanced Bioremediation	\$2.4 – 3.6MM
Jacobs	

Alternatives Comparison	
Schedule Acid Area 2	
• Excavation / Disposal	6 months
• Incineration	24 months
• Munirem®	8 – 20 months
• Enhanced Bioremediation	15 – 26 months
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Alternatives Comparison	
Schedule Acid Area 3	
• Excavation / Disposal	6 months
• Incineration	28 months
• Munirem®	9 – 20 months
• Enhanced Bioremediation	19 – 36 months
Jacobs	

Proposed Alternative
Excavation / Off-site Disposal
• Proven Alternative
• No Uncertainties
• Least Expensive
• Shortest Duration
• Does not reduce the toxicity or volume of contaminated soil
• Manages the mobility of contaminated soil
Jacobs