TNTA and TNTC
Feasibility Study Update
Plum Brook Ordnance Works
Sandusky, Ohio

Presented To:
Restoration Advisory Board
June 5, 2002

Shaw The Shaw Group Inc.

200-1e
G05OH001815_08.10_1004_a

Site Description

- **TNTA**
  - » NE Portion of PBOW
  - » 114 Acres
  - » 25% Wooded
  - » Predominantly Large Open Areas of Grassland

Shaw The Shaw Group Inc.

Site Description

- **TNTC**
  - » SW Portion of PBOW
  - » 119 Acres
  - » Mostly Overgrown with Trees and Brush

Shaw The Shaw Group Inc.

Past Decontamination Efforts

- **1940s**
  - » Buildings and Structures Demolished and Burned
  - » Steam and Drain Lines Flushed and Dismantled
- **1950s**
  - » Removal of Underground Flumes and Sewer Lines
  - » 16,000 lbs. Of TNT Removed from TNTA
  - » TNTC decontamination undocumented

Shaw The Shaw Group Inc.

Remedial Investigation Activities

- Soil Samples Collected for Field Screening of Nitroaromatics (430 TNTA & 385 TNTC)
- Confirmation Soil Samples (39 TNTA & 40 TNTC)
- Surface Water Samples (9 TNTA, 10 TNTC, & 1 Offsite)
- Sediment Samples (10 TNTA, 15 TNTC, & 5 Offsite)

Shaw The Shaw Group Inc.

Human Health Risk Assessment

- **Plausible Receptors:**
  - » Groundskeeper
  - » Indoor Worker
  - » Construction Worker
  - » Hunter
  - » On-site Resident

Shaw The Shaw Group Inc.

Human Health Risk Assessment *(Continued)*

- **Media Evaluated:**
  - » Surface Soil
  - » Total Soil (Surface and Subsurface Soil Combined)
  - » Surface Water
  - » Sediment
  - » Groundwater Not Evaluated (To be Evaluated in Future Report)

Shaw The Shaw Group Inc.

TNTA Human Health Risk Assessment

- **Unacceptable risk:**
  - » Construction Worker (total soil)
  - » On-Site Resident (total soil)
- **Highest risk to future on-site resident**

Shaw The Shaw Group Inc.

TNTC Human Health Risk Assessment

- **Unacceptable risk:**
  - » Groundskeeper (surface soil)
  - » Indoor Worker (surface soil)
  - » Construction Worker (total soil, sediment)
  - » On-Site Resident (total soil, sediment)
  - » Hunter (surface soil)
- **Highest risk to future on-site resident**

Shaw The Shaw Group Inc.

Chemicals of Concern

- **Principal human health threat in soil at TNTA and TNTC is nitroaromatic compounds (NAC).**
- **Primary chemicals of concern in soil are:**
  - » 2,4,6-Trinitrotoluene
  - » 2,4-Dinitrotoluene
  - » 2,6-Dinitrotoluene
  - » 2-Amino-4,6-Dinitrotoluene
  - » 4-Amino-2,6-Dinitrotoluene
  - » Lead

Shaw The Shaw Group Inc.

Ecological Risk Summary

- Screening assessment performed
- Impact on terrestrial plants insignificant
- Limited aquatic habitat
- Some terrestrial receptors (mouse, rabbit, shrew, wren) may incur elevated hazards
- Rare, threatened, and endangered species of plants exist at the PBOW site
- Consideration will be given to these if encountered within the remediation area

Shaw The Shaw Group Inc.

Remedial Technologies Screened

- Capping – Excluded (limits future development of property)
- Excavation - Included
- Off-Site Disposal - Included
- Ex-Situ Chemical Stabilization – Included
- In-situ Chemical Oxidation – Excluded (contaminants not distributed uniformly within subsurface soil)
- Windrow Composting – Included

Shaw The Shaw Group Inc.

Remedial Alternatives Developed

- Alternative 1 – No Action
- Alternative 2 – Excavation, Windrow Composting, On-Site and Off-Site Disposal
- Alternative 3 – Excavation, Chemical Stabilization, and Off-Site Disposal
- Alternative 4 – Excavation and Off-Site Disposal
- Alternative 5 – Excavation, Windrow Composting, Chemical Stabilization, On-Site and Off-Site Disposal.

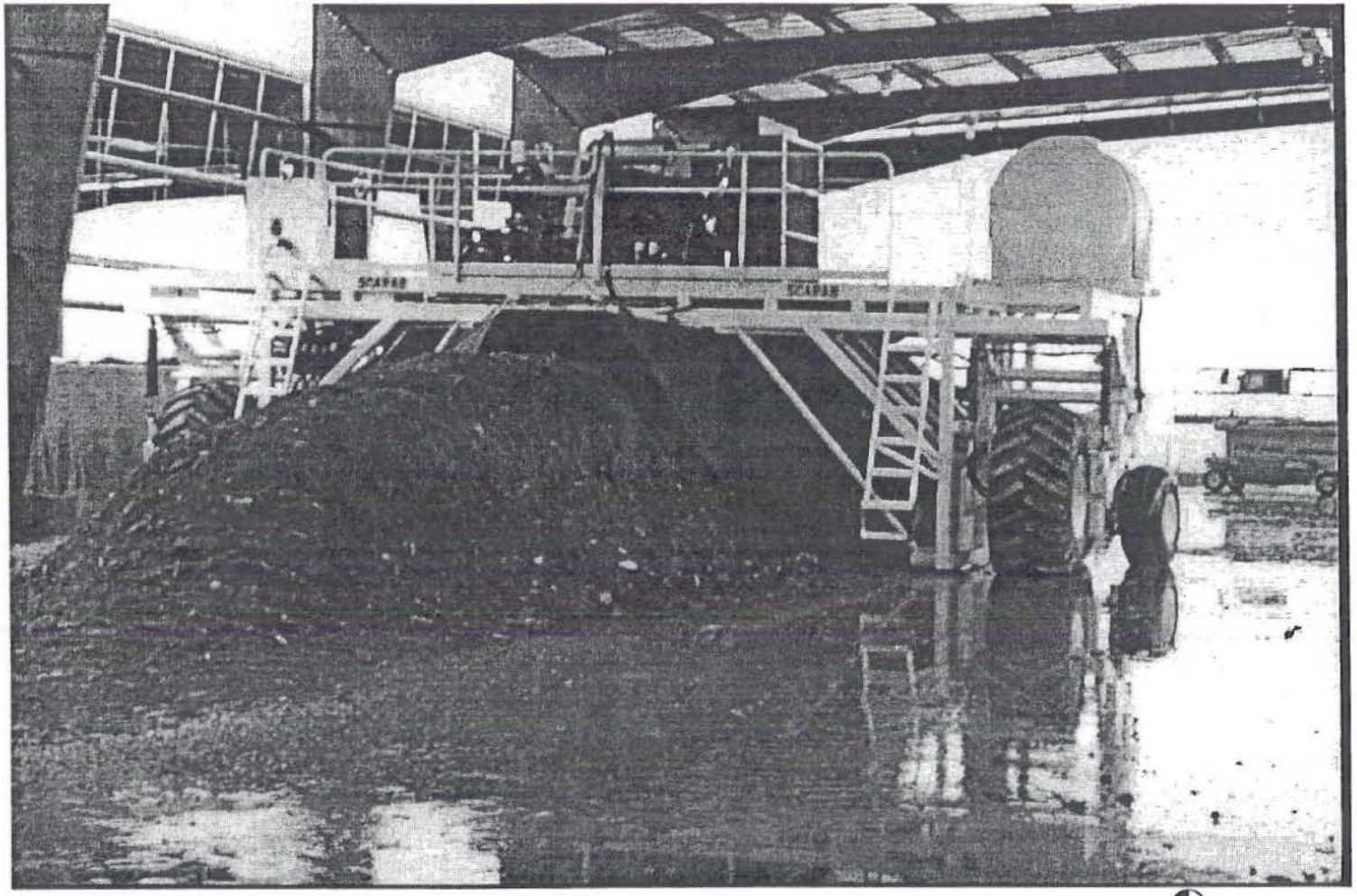
Shaw The Shaw Group Inc.

Windrow Composting

- Proven technology for treating soil contaminated with nitroaromatics
- Involves mixing contaminated soil with manure and bulking material
- Long pile (windrow) is turned periodically with specialized equipment
- Treatment typically takes 15 to 45 days

Shaw The Shaw Group Inc.

Windrow Turning Machine



Shaw The Shaw Group Inc.

Alternative 1: No Action

- No further investigation, remediation, or monitoring
- Evaluated as a baseline to compare other remedial alternatives

Alternative 2: Excavation, Windrow Composting, On-Site and Off-Site Disposal

- Excavation of soil "hot spots" contaminated with nitroaromatic compounds (NAC) and lead.
- Off-site treatment and disposal of lead-contaminated soil at an approved hazardous waste treatment, storage, and disposal facility.
- On-site treatment of nitroaromatic-contaminated soil via windrow composting.
- Backfill excavation with soil treated on-site via windrow composting.

Shaw The Shaw Group Inc.

Alternative 3: Excavation, Chemical Stabilization, and Off-Site Disposal

- Excavation of soil "hot spots" contaminated with nitroaromatic compounds (NAC) and lead.
- Treatment of excavated soil failing TCLP test (hazardous waste) via chemical stabilization to immobilize contaminants and render the stabilized soil non-hazardous.
- Offsite disposal of treated and untreated soil at an industrial waste landfill as a non-hazardous solid waste.

Shaw The Shaw Group Inc.

Alternative 4: Excavation and Off-Site Disposal

- Excavation of soil "hot spots" contaminated with nitroaromatic compounds (NAC) and lead.
- Offsite disposal of soil passing TCLP test (non-hazardous waste) at an approved industrial waste landfill.
- Offsite treatment and disposal of soil failing TCLP (hazardous waste) at an approved hazardous waste treatment, storage, and disposal facility.

Alternative 5: Excavation, Windrow Composting, Chemical Stabilization, On-Site & Off-Site Disposal

- Combination of Alternatives 2 & 3.
- Excavation of soil "hot spots" contaminated with nitroaromatic compounds (NAC) and lead.
- On-site treatment of nitroaromatic-contaminated soil via windrow composting to biologically destroy NACs.
- Treatment of lead-contaminated soil via chemical stabilization to immobilize contaminants and render the stabilized soil non-hazardous.
- Backfill excavation areas with soil treated via composting.
- Offsite disposal of soil treated via chemical stabilization at an industrial waste landfill as a non-hazardous waste.

Shaw The Shaw Group Inc.

Status of Feasibility Study

- USACE has reviewed and commented on the draft feasibility study.
- Ohio EPA will review a revised draft.
- Feasibility study will be finalized after regulatory comments are received.
- Summary of revised feasibility study will be presented to the RAB at a public meeting for comment.

Shaw The Shaw Group Inc.

SUMMARY

Second Quarterly Background Sampling
and
Analytical Update of Downgradient Wells

FORMER PLUM BROOK ORDNANCE WORKS
SANDUSKY, OHIO

Presented To:

Restoration Advisory Board

June 5, 2002

Shaw The Shaw Group Inc.

Background Groundwater Investigation

- **The current background groundwater investigation at PBOW began during the groundwater sampling in September and October of 2001. Information concerning the investigation and results were presented at the last RAB (March 27, 2002) . The objectives of this investigation include:**
  - Determine the quality of bedrock groundwater entering PBOW, including the range of inorganic (metals) concentrations.
  - Perform seasonal trend analysis of inorganics
  - Establish background concentrations of inorganics in the bedrock groundwater

Shaw The Shaw Group Inc.

Second Quarterly Background Sampling

- The Second Quarter of bedrock background sampling occurred January 15th-17th, 2002.

Shaw The Shaw Group Inc.

Sampling Procedures

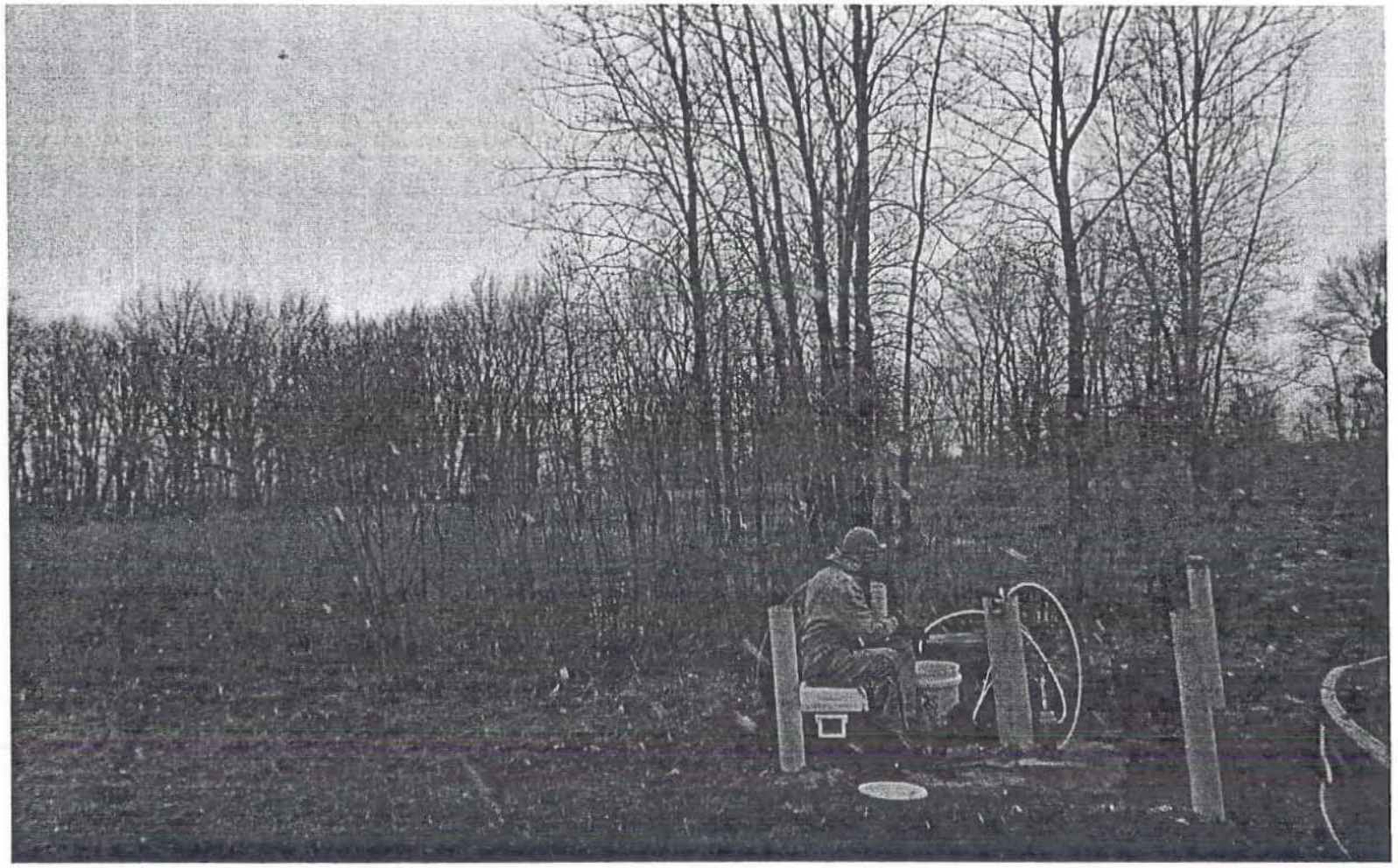
- Low-Flow (minimal drawdown)
  - Conducted January 15-17, 2002
  - Groundwater collected from five bedrock wells
  - Groundwater pumped from within screened portion of well
  - Water level drawdown never greater than 0.5 feet
  - Pumping rates between 200 to 500 ml per minute
  - Low-flow sampling not performed on background well PB-BED-MW26

Shaw The Shaw Group Inc.

Sample Collection

- Low-Flow (minimal drawdown)
  - Sample collected after 3 consecutive water chemistry parameters (pH, Eh, conductivity, temperature, DO, and turbidity) recorded
  - Filtered metal samples collected through 0.45-micrometer filter
  - Groundwater from PB-BED-MW26 collected with disposable Teflon bailer.

Shaw The Shaw Group Inc.



IT collecting water quality readings from well ABG-BEDGW-001 during low-flow sampling.
4/5/02 – 2002 Wet Season Sampling Event.

Shaw The Shaw Group Inc.

Low-flow sampling system set-up at well AA3-BEDGW-001. 4/10/02 – 2002 Wet Season Sampling Event.

Shaw The Shaw Group Inc.

Groundwater Analysis

- Samples Analyzed for:
  - » Nitroaromatics
  - » Target Compound List (TCL) VOCs
  - » TCL SVOCs
  - » Target Analyte List (TAL) Metals
  - » Various Water Quality Parameters

Shaw The Shaw Group Inc.

Background Groundwater Sampling Results

- **Background Monitoring Wells**
  - » **No nitroaromatics detected (1st quarter [dry season])**
    - – Nitroaromatics not analyzed 2nd quarter (wet season) due to lab QA/QC problem
  - » **Inorganics detected above PRGs (1st or 2nd quarter)**

First Quarter	Second Quarter
Arsenic (F)	Aluminum (U)
Barium (U/F)	Arsenic (U)
	Barium (U/F)
	Chromium (U)
	Iron (U)
	Lead (U)
	Manganese (U)
	Thallium (U/F)

Shaw The Shaw Group Inc.

Preliminary Downgradient Analytical Results

- **Downgradient Well (PB-BED-MW27)**

Parameter	Unit	PRG	October 2001 (dry)	April 2002 (wet)
2,4-DNT	µg/L	0.099	1.5	0.58
2,6-DNT	µg/L	0.099	1.1	0.59

- **Other organics detected above PRGs**

Dry Season	Wet Season
Benzene	Benzene
Methylene Chloride	Methylene Chloride
Naphthalene	Naphthalene

- **Inorganics detected above PRGs**

Dry Season	Wet Season
Arsenic (U)	Arsenic (F)
Iron (U)	Iron (U)
	Manganese (F/U)

Shaw The Shaw Group Inc.

IT purging groundwater from PB-BED-MW27.
Black organic substance possibly related to H_2S.
4/7/02 – 2002 Wet Season Sampling Event.

Shaw The Shaw Group Inc.

PBOW. PB-BED-MW27

Purge water from PB-BED-MW27.
4/7/02 – 2002 Wet Season Sampling Event.

Shaw The Shaw Group Inc.