

## MEETING MINUTES

### RESTORATION ADVISORY BOARD For PLUM BROOK ORDNANCE WORKS May 31, 2007

#### ATTENDEES

Rick Meadows, RAB USACE Co-Chairperson	Lannae Long, USACE Nashville
Mark Bohne, RAB Community Co-Chairperson	Jim Beaujon, USACE Nashville
Lisa Humphreys, USACE Huntington	Archie Lunsey, OEPA NWDO
Peg Kingsley, RAB Member	Paul Jayko, OEPA NWDO
Richard Pitsinger, RAB Member	Al Hardesty, Jacobs Engineering
Jan Bohne, RAB Member	Mike Gunderson, Shaw Environmental
Bob Hermes, RAB Member	Steve Downey, Shaw Environmental
Lee Yeckley, RAB Member	Eric Dodrill, Erie Soil and Water District
Starr Truscott, RAB Member	Julie Weatherington-Rice, Bennett & Williams
	Helen Owens, Stillwater Environmental

#### **Agenda**

The agenda for the meeting included the following topics:

- Review of Quarry Visit – Bennett & Williams
- Closure of Monitoring Well PB-BED-MW22 – USACE
- Groundwater Feasibility Study
- Other Business

#### **Introduction**

Mark Bohne, RAB Community Co-Chairperson opened the meeting and formally requested that each RAB meeting be attended by Patty Bertsch (LRD) or Mike Saffron (LRL). The RAB also extended the invitation and request for General Berwick to attend each RAB meeting. In addition to the aforementioned individual's presence at each RAB Meeting, Mr. Bohne stated that the RAB must be updated at each meeting as to the status of the Potentially Responsible Party (PRP) and Liability Shifting issues. Mr. Bohne requested the update of these issues be a permanent agenda item, and discussed at each RAB Meeting.

#### **Visit to Wagner Quarry – Bennett & Williams**

Dr. Julie Weatherington-Rice visited the Wagner Quarry which is situated to the north of PBOW. Dr. Weatherington-Rice's presentation reviewed her observations during the visit. Dr. Weatherington-Rice arranged the visit to examine the potential of quarry operations to influence the groundwater flow across the PBOW site. One of the noted observations was the use of a sump to dewater the quarry site. The sump removes accumulated rainwater/snow melt and groundwater to prevent the quarry from flooding. The quarry has been in operation since 1912. The presentation is included as an attachment to these minutes.

Investigations such as dye-testing which were recommended in Dr. Weatherington-Rice's presentation are not currently part of the scope of the PBOW Environmental Restoration Project.

Any investigations using dye-testing will require further evaluation to determine remedial objectives to be achieved and the need or value added of such tests. Dye testing may be more beneficial to the FS oversight rather than closer to the quarry as proposed.

In addition to any influence by the quarry, RAB Member Starr Truscott suggested reviewing historical photographs of the proposed compressed-air storage facility, which also may influence the groundwater flow across PBOW.

#### **USACE Project Updates – USACE Huntington District TNT Area B**

- Prairie grass seeding at TNT Area B was completed in early May, 2007.

#### **Monitoring Well PB-BED-MW22**

- Monitoring well PB-BED-MW22 is undergoing abandonment. It is necessary to abandon the well due to complaints from property owners adjacent to the well. The well is located along Patrol Road on the north side of PBOW. The nature of the complaints ranged from nuisance odors, unable to use backyard due to odors emitted from the well, and odor-induced nausea.

#### **Groundwater Feasibility Study – Shaw Environmental**

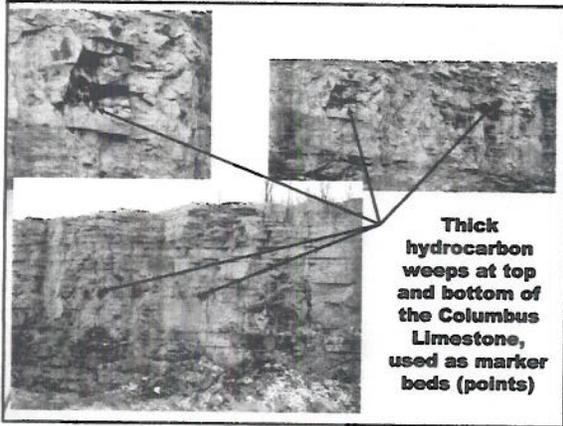
Mike Gunderson presented the PBOW Groundwater Feasibility Study. The presentation summarized the Risk Assessment and Exposure, Groundwater Quality, Groundwater Modeling, Potential for Natural Attenuation, Potential Future Activities and the Project Schedule. The presentation is included as part of these minutes.

#### **Other Business**

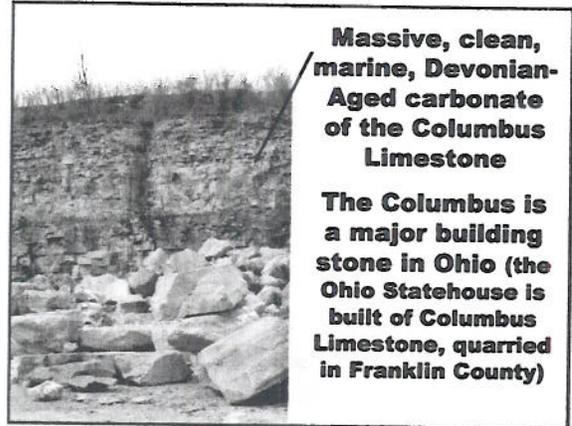
- Jim Beaujon (USACE Nashville District) reminded the group that the approved Site Specific Sampling and Analysis Plan (SSAP) proposed to locate monitoring wells at upgradient, downgradient and mid-sections of the Areas of Concern (AOC).
- Rick Meadows (USACE Huntington District) updated the group on the progress of the Pentolite Road Red Water Ponds Removal Action. Approaching the award of the removal action project. However, USACE Office of Council included language to “not proceed” with new projects until PRP issue was resolved.
- Regarding the Transformation Plan, Rick Meadows advised the PBOW Program Management will stay the same.
- Lisa Humphreys (USACE Huntington District) advised there is a pilot study in the works to evaluate planting grass in lime-treated soil.
- Rick Meadows and Lisa Humphreys (USACE Huntington District) will be involved with USACE Engineering Development and Research Center, Vicksburg Mississippi (Vic Medina and Scott Waisner) in presenting the findings of the Pentolite Road Lime-Treatment Study in October 2007 at a technical conference in San Antonio, Texas.

#### **RAB Meeting Schedule**

The next RAB Meeting is scheduled for Thursday September 13, 2007. A formal meeting announcement will be distributed to the RAB Members, PBOW Project Team and others on the mailing list.

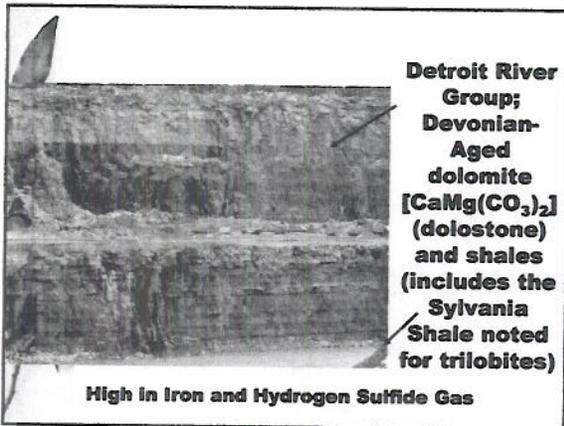


Thick hydrocarbon weeps at top and bottom of the Columbus Limestone, used as marker beds (points)



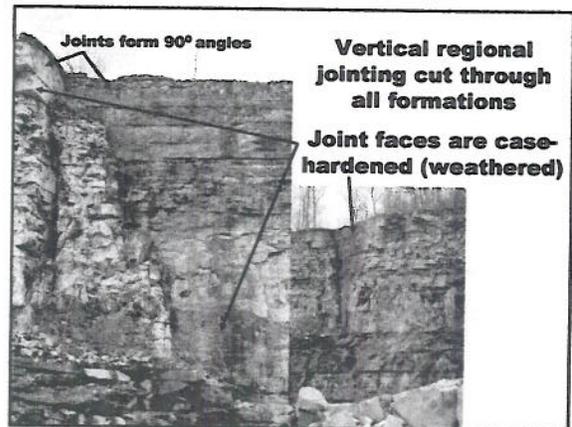
Massive, clean, marine, Devonian-Aged carbonate of the Columbus Limestone

The Columbus is a major building stone in Ohio (the Ohio Statehouse is built of Columbus Limestone, quarried in Franklin County)



Detroit River Group; Devonian-Aged dolomite  $[CaMg(CO_3)_2]$  (dolostone) and shales (includes the Sylvania Shale noted for trilobites)

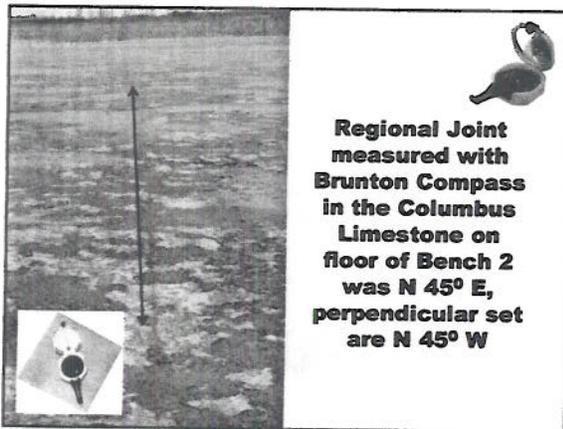
High in Iron and Hydrogen Sulfide Gas



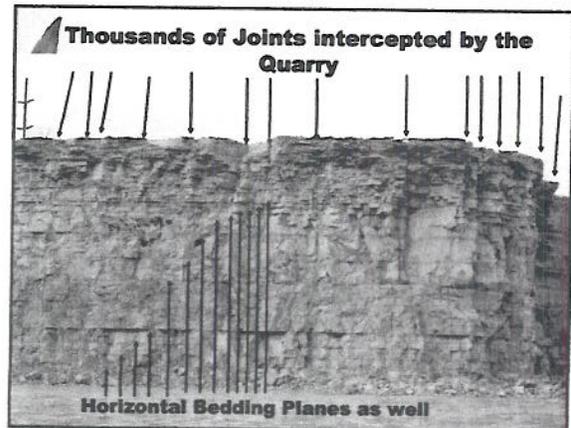
Joints form 90° angles

Vertical regional jointing cut through all formations

Joint faces are case-hardened (weathered)



Regional Joint measured with Brunton Compass in the Columbus Limestone on floor of Bench 2 was N 45° E, perpendicular set are N 45° W



Thousands of Joints intercepted by the Quarry

Horizontal Bedding Planes as well

**Harmless dye added to well(s) at PBOW, intercepted at Wagner Quarry sump, time to get there used to calculate a REAL Time-Of-Travel In the Carbonates**



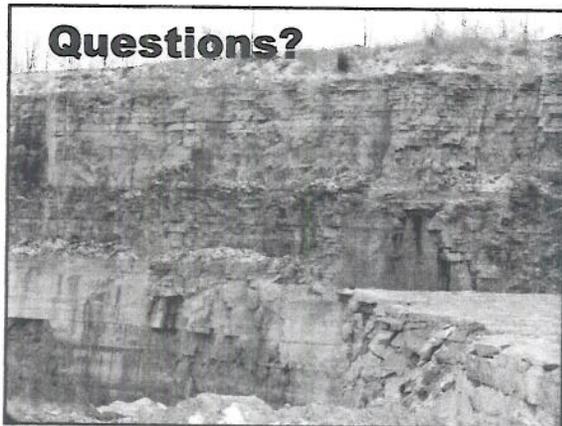
**Dye Testing**



**ODNR Div. of Water is Experienced in Dye Testing Did major sinkhole study in Seneca Co. in 1990s**

**Why do we need to do this?**

- Ground water feasibility study identifies “institutional controls” as important part of ground water remediation
- This is a recognized and useful tool to include – BUT
- PBOW DOES NOT control at least part of the ground water flow on site, the Quarry does
- Have to determine what part of PBOW is in Quarry’s cone to choose final remediation actions across the whole PBOW site



***Feasibility Study  
for Groundwater  
Former TNT Production and Red  
Water Pond Areas***  
**Issues and Current Status**

**Plum Brook Ordnance Works  
Restoration Advisory Board  
May 31, 2007**



# Summary of Issues

- Risk Assessment and Exposure
- Groundwater Quality
- Groundwater Modeling
- Potential for Natural Attenuation
- Potential Future Activities
- Schedule



## **GW BHHRA Potentially Exposed Individuals**

- **No current use of groundwater on site**
- **No current use of groundwater at downgradient boundary**
- **Area serviced by municipal water**
- **Only the bedrock was quantitatively evaluated in BHHRA**
  - » Overburden/shale is discontinuous and seasonally dependent – not a viable drinking water source



# Groundwater BHHRA Summary

- **Bedrock GW does not meet drinking water quality at TNT and RWP Areas (HI>1 and ILCR>1E-5)**
- **Natural conditions indicate an unacceptable risk for residential drinking water use of bedrock GW at each site area and downgradient boundary**
- **Most of the GW risk is non-site-related (exception: WARWP noncancer)**
  - » Background cancer risk at TNTA is 70X greater than site related cancer risk
  - » Virtually all cancer risk at TNTB is associated with background
  - » Virtually all cancer risk at TNTC is associated with background
  - » Background cancer risk at PRRWP 30X greater than site-related cancer risk
  - » Background cancer risk at WARWP is greater than site-related cancer risk
  - » Background cancer risk at TNTA is 10X greater than site related cancer risk
- **Downgradient areas along the facility boundary indicate potential users are unlikely to suffer adverse site-related human health effects or an unacceptable additional risk of cancer**



# GW BHHRA Summary (cont'd)

Summary of Model Results		
	Downgradient Boundary Cancer Risk	Downgradient Boundary Non- Cancer Risk
TNTA	< 1E-05	< 1
TNTB	Slightly > 1E-05	< 1
TNTC	Slightly > 1E-05	< 1
PRRWP	Slightly > 1E-05	< 1
WARP	< 1E-05	< 1



# Groundwater Quality

- **Overburden/Shale**

- » Naturally elevated levels of chloride (34,600 mg/L) exceed the SMCL of 250 mg/L
- » Naturally elevated levels of sodium (9,130 mg/L) exceed the advisory of 20 mg/L (low sodium diet)
- » Naturally elevated levels of sulfate (416 mg/L) exceed the SMCL of 250 mg/L
- » Naturally elevated levels of TDS (43,800 mg/L) exceed the SMCL of 500 mg/L
- » Natural petroleum is present regionally in the shale
- » Undependable yield



# Groundwater Quality (cont'd)

- **Limestone Bedrock**
  - » Presence of naturally occurring petroleum at depth
    - petroleum visible on rock cores and drill bits
    - free product in wells
    - presence of H<sub>2</sub>S, possible methane
  - » Naturally elevated levels of sulfate (1,340 mg/L) exceed the SMCL of 250 mg/L
- **Private Well Inventory**
  - » Limited private wells near PBOW, none used for drinking water
  - » Private well sampling were all non-detect for site-related contaminants (nitroaromatics)



## Natural Attenuation

- Movement of contamination appears to be impeded by the presence of shale
- Breakdown products co-occur with contaminants in the bedrock; geochemical conditions are favorable for the degradation of nitroaromatics
  - » Dissolved O<sub>2</sub> < 1 mg/L
  - » Oxidation-reduction potential ≤ 0.0 mV
- **Summary: Natural attenuation is likely**
  - » Note that model does not consider chemical degradation
  - » Further monitoring would be needed to confirm



# Groundwater Modeling

- TNT, 2,4-DNT and 2,6-DNT modeled under different simulations
- Vast majority of the modeled groundwater contamination is associated with existing overburden/shale groundwater (rather than potential soil leachate)
- **Simulation of soil excavation with ISEB results:**
  - » Greatly reduced overburden/shale groundwater concentrations
  - » No discernible effect on the Delaware Limestone bedrock concentrations



## Groundwater Modeling (cont'd)

- **Addition of P&T in the Delaware Limestone bedrock at Red Water Ponds results**
  - » Virtually no effect on maximum concentrations at the PRRWP Area
  - » Even after 150 years, maximum bedrock concentrations would remain above RGOs, especially at the WARWP Area
  - » Contamination would be contained to smaller areas.
- **Effects of Wagner Quarry**
  - » Indirectly simulated through boundary conditions



# Groundwater Modeling (cont'd)

- **Limitations of Modflow/MT3D**
  - » Designed for porous media, not fracture flow
    - Assumed bedrock to be equivalent porous media
  - » No degradation of contamination
  - » Conservative input parameters
- **Application of Results**
  - » Identify source areas that could potentially impact bedrock
  - » Evaluate pumping scenarios



# Potential Future Activities

- **Sampling of Wagner Quarry “Groundwater”**
  - » Presence of nitroaromatics would indicate direct connection
  - » Needed to answer questions regarding potential exposure
  - » Right of Entry issues for USACE and it's contractors
- **Petroleum Fingerprinting**
  - » Evaluate potential for onsite sources of petroleum BTEX
  - » May require remedial action if an anthropogenic source is identified
- **Other Activities**
  - » Pending resolution of FS comments and selection of preferred alternative



