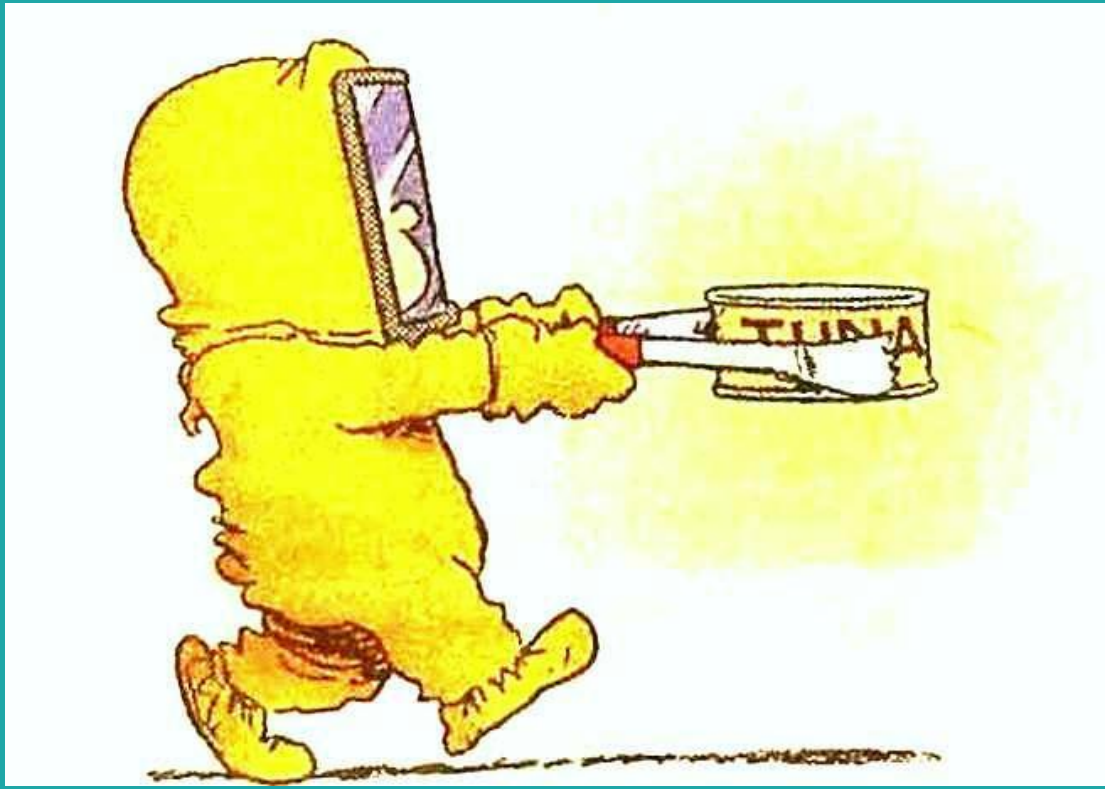
A Case Study: Cleanup Decision Making



TRP Cleanup Process

Decision: Cleanup Needed

128(a) Funding Eligibility
or
104 Brownfield Grant Award

Hire Env. Professional/Contractor
- Request for Proposal(s) (RFP)
- Negotiate Contract(s)

Develop Cleanup Documents:
- Cleanup Alternatives
- Cleanup Plan/Cost Estimate
- Supporting Documents (QAPP/FSP/H&SP)
- Reports

Establish Administrative Record

Add to Public Record

Public Participation:
- Community Involvement Plan
- Notice of planned cleanup
- Public comment
- Ongoing communication

TRP Cleanup Process

Conduct Cleanup
- **Oversight of field work**
- **Review data & reports**

Cleanup Verification

Cleanup Certification

Post Cleanup Activities:
- Monitoring?
- Institutional/Eng. Controls?
- Final Report
- Reporting (Tribe, EPA, Public)

Complete Administrative Record

Update Public Record

Public Participation:
- Final meeting
- Report results of cleanup
- Need for eng. Or ICs

ACRONYMS
THEY ARE PART OF THE JOB*

- DQOs =Data Quality Objectives
- QAPP = Quality Assurance Project Plan
- HRS = Hazard Ranking System
- PRGs = Preliminary Remediation Goals
- RSL = Regional Screening Levels (TSLs?)
- TBA = Targeted Brownfield Assessment
- RCRA = ?

* Never trust an acronym

Concepts to Learn:

- ✓ Background Levels
- ✓ Screening Levels
- ✓ Site Exposure Pathways
- ✓ Data Quality Objectives (DQOs)
- ✓ Preliminary Remedial Goals (PRGs)

These all lead to:

- ✓ Final Cleanup Goals

Any Tribe USA

Old Army Stockade Bldg.
Brownfields Grant Cleanup Project
2 TBAs Conducted by EPA Contractor

Site Description:

- Historic Building from old Army Post days – important for Tribal History
- Most recently used by the BIA for storage; Was a jail in the past.
- Tribes wants to restore the building as a local Tribal Museum for tourists.
- Setting: within 100 Ft. of a school and a head start Bldg.; In a residential area; no fence; parking for museum visitors will be next to the building.
- Phase I Report listed suspected use of pesticides with Arsenic around the building.

Background Levels

Definition?

- Because previous Phase II sampling in the area had arsenic detections higher than usual, naturally occurring arsenic was suspected in this area.
- Two Phase II background samples were collected to determine actual naturally occurring background arsenic levels. The background sample with the lowest reading contained 8 mg/kg arsenic.
- The naturally occurring arsenic level documented for the area is 7 mg/kg arsenic (USGS 1984).

Risk Assessment Assumptions

RESIDENTIAL: WHERE PEOPLE LIVE AND PLAY, INCLUDING CHILDREN, 24/7/365.

INDUSTRIAL: Where people work 40 hrs. a week (5 days)

Substance Name : Arsenic
Phase II: Screening Levels for Soil
Possible Screening Levels:

- ✓ **Screening Criteria for the <u>Hazard Ranking System (HRS)* = 3 times background</u>**

- ✓ **EPA Regional Screening Levels:** *= EPA Region 9 Preliminary Remediation Goals (PRGs)*
  - ➢ **Industrial = 1.6 mg/kg (c)**
  - ➢ **Residential = 0.39 mg/kg (c)**

- ✓ **SCDM-RDSC = 23 mg/kg**

SCDM = Superfund Chemical Data Matrix
RDSC = Reference Dose Screening Concentration
c = Cancer

US EPA REGION 9 PRELIMINARY REMEDIAL GOALS(PRGs) (Mg/Kg)

ARSENIC RESIDENTIAL SOILS							
Cancer Risk = 1E-06				Chronic HQ = 1			
soil-inhale	soil-dermal	soil-ingest	combined	soil-inhale	soil-dermal	soil-ingest	combined
5.90E+02	4.50E+00	4.30E-01	3.90E-01		2.80E+02	2.30E+01	2.20E+01

Scientific Notation: 3.90E-01 = 0.39 mg/kg

US EPA REGION 9 PRELIMINARY REMEDIAL GOALS(PRGs) (Mg/Kg)

ARSENIC **INDUSTRIAL SOIL**							
Cancer Risk = 1E-06				Chronic HQ = 1			
soil-inhale	soil-dermal	soil-ingest	combined	soil-inhale	soil-dermal	soil-ingest	combined
1.30E+03	9.60E+00	1.90E+00	1.60E+00		1.50E+03	3.10E+02	2.60E+02
1.60E+03	1.50E+00	3.00E-01	2.50E-01				

1.60E + 00 = 1.6 mg/kg

Anatomy of Risk-Based Environmental Cleanups

- VOCs
- SVOCs
- Inorganics
- Pesticides
- PCBs

contamination

receptor

- People
  - Especially sensitive populations
- Animals &/or Plants
  - Sensitive Ecological Areas (wetlands, surface water bodies, etc.)

exposure route or pathway

- Pathways: Soil, Surface Water, Ground Water & Air
- Routes: Ingestion, Inhalation & Contact

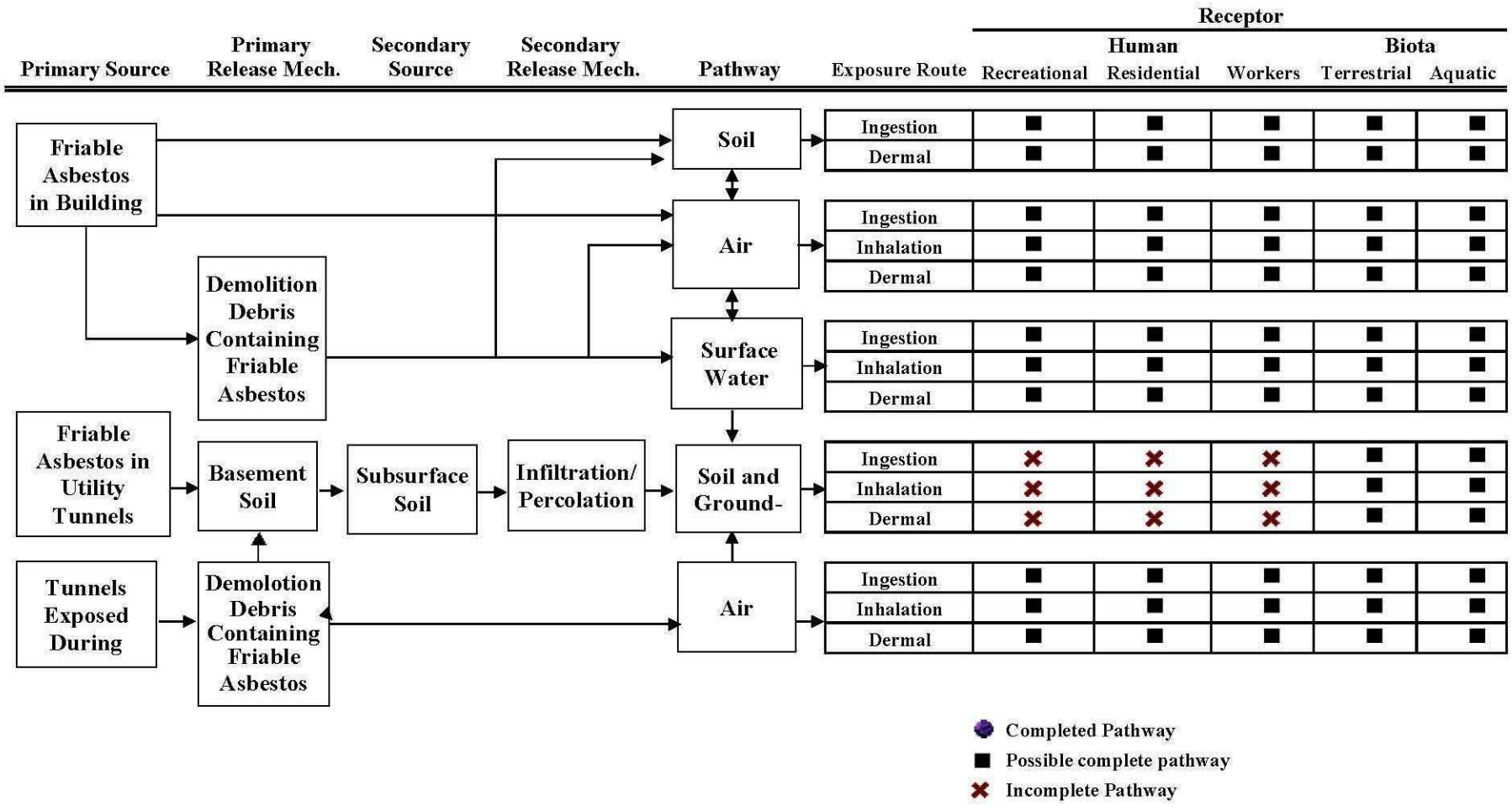
Modified after Mike Charles, IEPA, 2012

Pathways

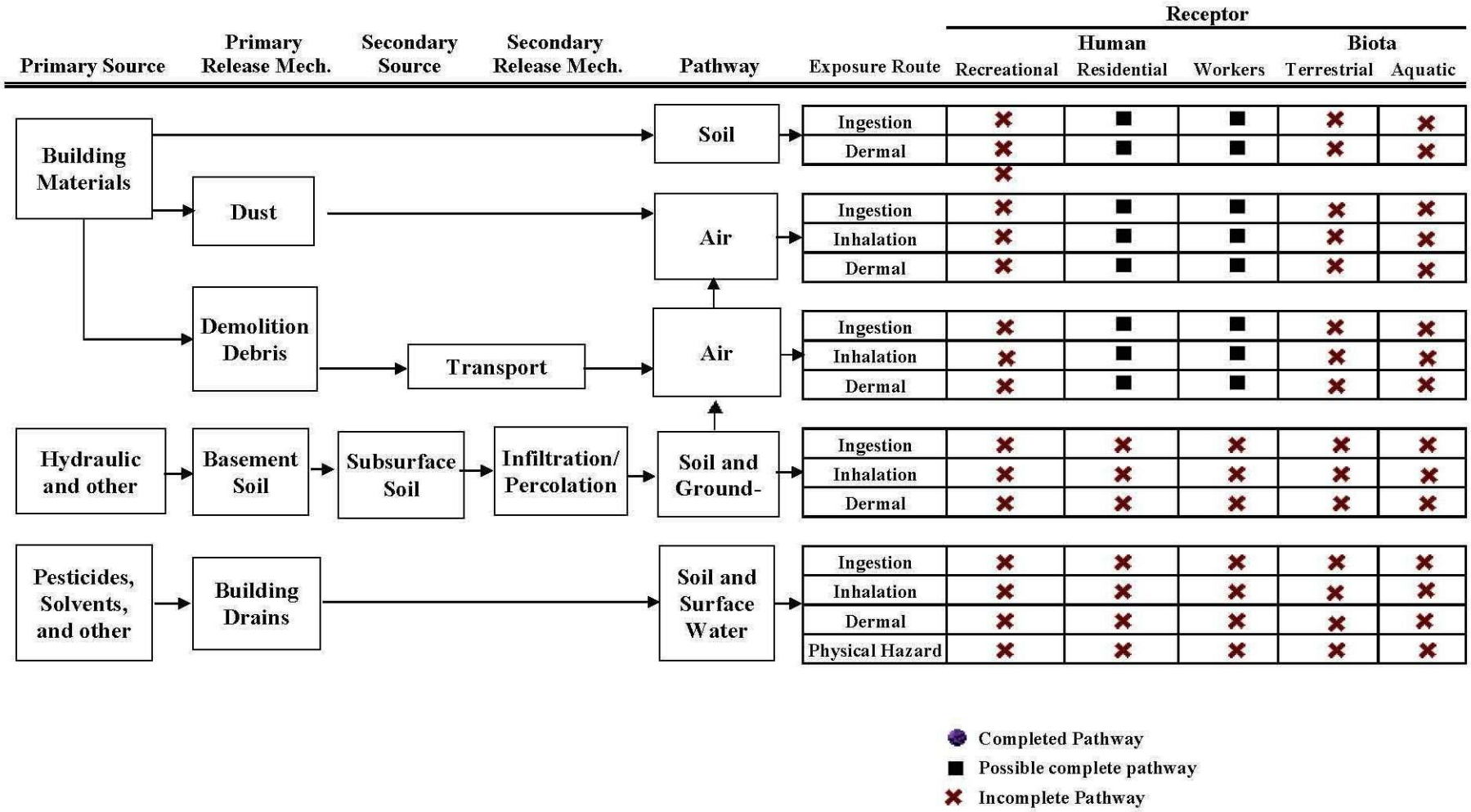
There are 5 Pathways by which Contamination can leave a Brownfields Site

Air Pathway	Soil Pathway	Surface Water Pathway	Groundwater Pathway	Biological Pathway
1. smoke from burning trash; 2. landfill gases; methane and vapors; 3. particulate matter, dust	1. workers at a site; 2. people recreating on a site; 3. people walking across a site.	1. runoff to a stream, lake, or wetland; 2. storm runoff to a storm drain	1. contaminated liquids soaking into the soil and flowing away in a groundwater plume. 2. seeps to surface water	1. rodents and vermin; 2. mosquitos; 3. molds

Example for Old Building andUtility Tunnels - Conceptual Site Model



Example of Auto Maintenance Garage - Conceptual Site Model



DISCUSSION QUESTIONS:

1) What kind of “exposures” could occur at this site?

2) Who would be the “receptors”?

3) What Phase II Screening Level is appropriate for this Site?

Or

Which Screening Level is more representative of the Tribe’s intended redevelopment or reuse of this site?

WHAT IS A QA PROJECT PLAN? (QAPP)

A document that describes the technical and quality activities of an environmental data operations project that should be implemented to ensure that the results of the work performed will satisfy the data user's needs.

WHY SHOULD I HAVE A QA PROJECT PLAN?

- It is a good idea!

  and

- it is required when using EPA Grant funds to conduct sampling and generate environmental data.

QA PROJECT PLAN PREPARATION

Usually
Written by your
Contractor
BUT
It should be a
“Team Effort”

US EPA Review
Required!

Data Quality Objectives

(DQOs)

What are DQOs?

- Planning Tool
- Cost Management
- Decision Identification
- Clear Goals
- Contingency Planning

Where are the DQOs?

They are in the QAPP

Who Drafts the DQOs?

The Phase II Contractor doing the Sampling

{TBA or your Contractor(s)}

Who Approves the DQOs?

the Tribe (TRP)*

DEFINE THE BOUNDARIES OF THE STUDY AREA

What are the spatial (property) boundaries of the study area?

- ✓ Property lines known?
- ✓ Property Access?
- ✓ one or multiple areas?
- ✓ media boundaries?

OPTIMIZE THE STUDY DESIGN

What is the most cost-effective design that is expected to meet the data quality objectives?

- ✓ **Time & Budget realistic?**
- ✓ **Need to refine scope?**
- ✓ **need to phase field work?**
- ✓ **Screening levels correct for the site?**

DISCUSSION QUESTIONS:

What should the DQOs be?

- Area of Study?
- Media Sampled?
- How many Samples? (random, every sq.ft., every sq. yard, selected areas?)
- Data detection level?
- Budget adequate?

TBA Phase II Screening Levels:

The TBA Phase II Assessment used 21 mg/kg (HRS) as the screening level to determine if there was a hazardous release of Arsenic at the site.

Discussion Questions:

- **Was the HRS screening criteria appropriate for the site? If not- Why not?**
- **If not, what screening criteria should have been used?**
- **How could use of the HRS screening criteria been prevented?**

Field Screening Data

Using the screening criteria for the <u>Hazard Ranking System (HRS)*</u>, samples with levels less than 3 times the background level, or 21 mg/kg arsenic, would *<u>not be considered a hazardous release.</u>* *(3 X 7 mg/kg = 21 mg/kg)*

What were the Residential & Industrial PRGs?

**HRS used to rank sites for the Superfund (NPL)*

Field XRF Data

TBA Samples: Arsenic in Soils

- ✓ **All four XRF samples had arsenic levels that exceeded the Industrial RSL**
- ✓ **All four XRF Samples exceeded the HRS screening level**

Highest XRF Sample= 27 Mg/Kg

Question: Is cleanup of the soils needed?

(Yes or No?)

Use of Screening Levels: TBA Phase II Report

"Screening levels should not be used as cleanup levels.
Cleanup levels need to be determined through the performance of a risk assessment, which takes into account exposure pathway, affected population, toxicity, and exposure concentrations."

CLEANUP GOALS

US EPA REGION 9 PRELIMINARY REMEDIAL GOALS(PRGs) (Mg/Kg)

ARSENIC **RESIDENTIAL SOILS**							
Cancer Risk = 1E-06				Chronic HQ = 1			
soil-inhale	soil-dermal	soil-ingest	combined	soil-inhale	soil-dermal	soil-ingest	combined
5.90E+02	4.50E+00	4.30E-01	3.90E-01		2.80E+02	2.30E+01	2.20E+01

3.90E-01 = 0.39 mg/kg

CLEANUP GOALS

US EPA REGION 9 PRELIMINARY REMEDIAL GOALS(PRGs) (Mg/Kg)

ARSENIC **INDUSTRIAL SOIL**							
Cancer Risk = 1E-06				= 1		Chronic HQ	
soil-inhale	soil-dermal	soil-ingest	combined	soil-inhale	soil-dermal	soil-ingest	combined
1.30E+03	9.60E+00	1.90E+00	1.60E+00		1.50E+03	3.10E+02	2.60E+02
1.60E+03	1.50E+00	3.00E-01	2.50E-01				

1.60E + 00 = 1.6 mg/kg

DISCUSSION QUESTIONS:

1) Based upon the field data: Is a “Clean Up” of Arsenic in the soils needed?

2) Considering the Tribe’s intended reuse of the site: What kind of exposures should be considered for what kind of receptors?

3) Should the PRG be: Residential or Industrial level?

4) Should the PRG be: Chronic or Cancer level?

5) What should be the cleanup goal?

NEWS FLASH!
Laboratory Sampling Data

TBA Samples: Arsenic in Soils
Highest XRF Sample = 27 mg/kg

Highest Laboratory Sample = **9.2 mg/kg**

Background = 7 to 8 mg/kg

Final TBA Phase II Report

2 Phase II Assessments were conducted by an EPA Superfund contractor and included soil sampling for Arsenic (an XRF was used for on-site sampling data and some samples were sent to a Lab.)

Based upon the findings of the TBA Phase II Report:

- **Arsenic levels in the soil did not exceed the Phase II Screening Levels.**
- **Phase II Report Conclusion: There is no hazardous release of Arsenic at the site.**

DISCUSSION QUESTION: CLEANUP OF ARSENIC IN SOILS NEEDED?

- Highest Laboratory Arsenic Level = 9.2 mg/kg
- The background sample with the <u>lowest</u> reading contained 8 mg/kg arsenic.

REVIEW:

Based upon the findings of the TBA Phase II Report there is no hazardous release of Arsenic at the site.

QUESTIONS:

- **Was the HRS screening criteria appropriate for the site?**
- **If not, what screening criteria should have been used?**
- **How could use of the HRS screening criteria been prevented?**
- **Is a soil cleanup needed?**
- **Is making a cleanup decision easy?**