Portsmouth EM Site Specific Advisory Board

FUTURE USE SUBCOMMITTEE

TUESDAY, MARCH 10, 2015 @ 6:15 P.M.

THE PURPOSE OF THIS MEETING IS TO PRESENT THE BACKGROUND SURVEY RESULTS TO THE SSAB SUBCOMMITTEE

AGENDA

- BACKGROUND SURVEY RESULTS–JD CHIOU, FBP
- MISCELLANEOUS

ADJOURN

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FUTURE USE SUBCOMMITTEE

MEETING SUMMARY
MARCH 10, 2015 • 6:15 P.M.
THE OHIO STATE UNIVERSITY ENDEAVOR CENTER
1862 SHYVILLE ROAD, PIKETON, OH 45661

Subcommittee Members Present: Bob Berry, Al Don Cisco, Sharon Manson

SSAB Subcommittee Members Absent: Brian Huber, chair; Carlton Cave, vice chair; Shirley Bandy, Adrian Harrison

Other SSAB Members Present: Lisa Bennett, Martha Cosby, Stan Craft

U.S. Department of Energy (DOE) and contractors: Greg Simonton, Johnny Reising, DOE; Rick Greene, Joe Moore, Restoration Services, Inc. (RSI); Jeff Wagner, Fluor-B&W Portsmouth (FBP)

Liaisons: Mike Rubadue, Ohio Department of Health (ODH); Melody Stewart, Ohio Environmental Protection Agency (EPA)

Support Staff: Eric Roberts, Julie Galloway, Cindy Lewis, EHI Consultants (EHI)

Public: None

Simonton: opened the meeting

1. **Background Survey Results-JD Chiou, FBP:**

- **What is Background?**
- **Schedule**
- **Goals and Objectives**
- **Sampling and Analysis Approach**
- **Final Data Evaluation**
- **Soil Groupings**
- **Calculation of Background Values**
- **PORTS Soil Background Metal Concentrations**
- **PORTS Soil Background Radionuclide Concentrations**
- **Paducah Radionuclies-Background**
- **Fernald Radionuclides-Background**

- **Uranium Background Levels in Ohio**

Roberts: The number that is being represented by the blue bar Risk Based PRG on page four is still a safe level right?	***Chiou:*** Yes, that is a safe level.
Is there a reason why Arsenic seems to be unexpectedly high?	The soils type clay and shale tend to have higher arsenic. The arsenic is natural to the soil not man-made.
Is Arsenic one of the chemicals that you can expect to find on site because of the process?	Yes, arsenic is one chemical that is a concern. In Fernald, we spent a lot of time chasing arsenic.

2. **Miscellaneous:** None at this time.

Simonton: Adjourned the meeting.

3. **Action Items:** None at this time.

PREPARING THE FUTURE

PORTS D&D PROJECT

Soil Background Study

- Summary Briefing

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Tuesday, March 10, 2015

1. What is Background?

Background refers to concentration of chemicals at locations that are unaffected by any current or past site activities involving the management, handling, treatment, storage or disposal of hazardous substances.

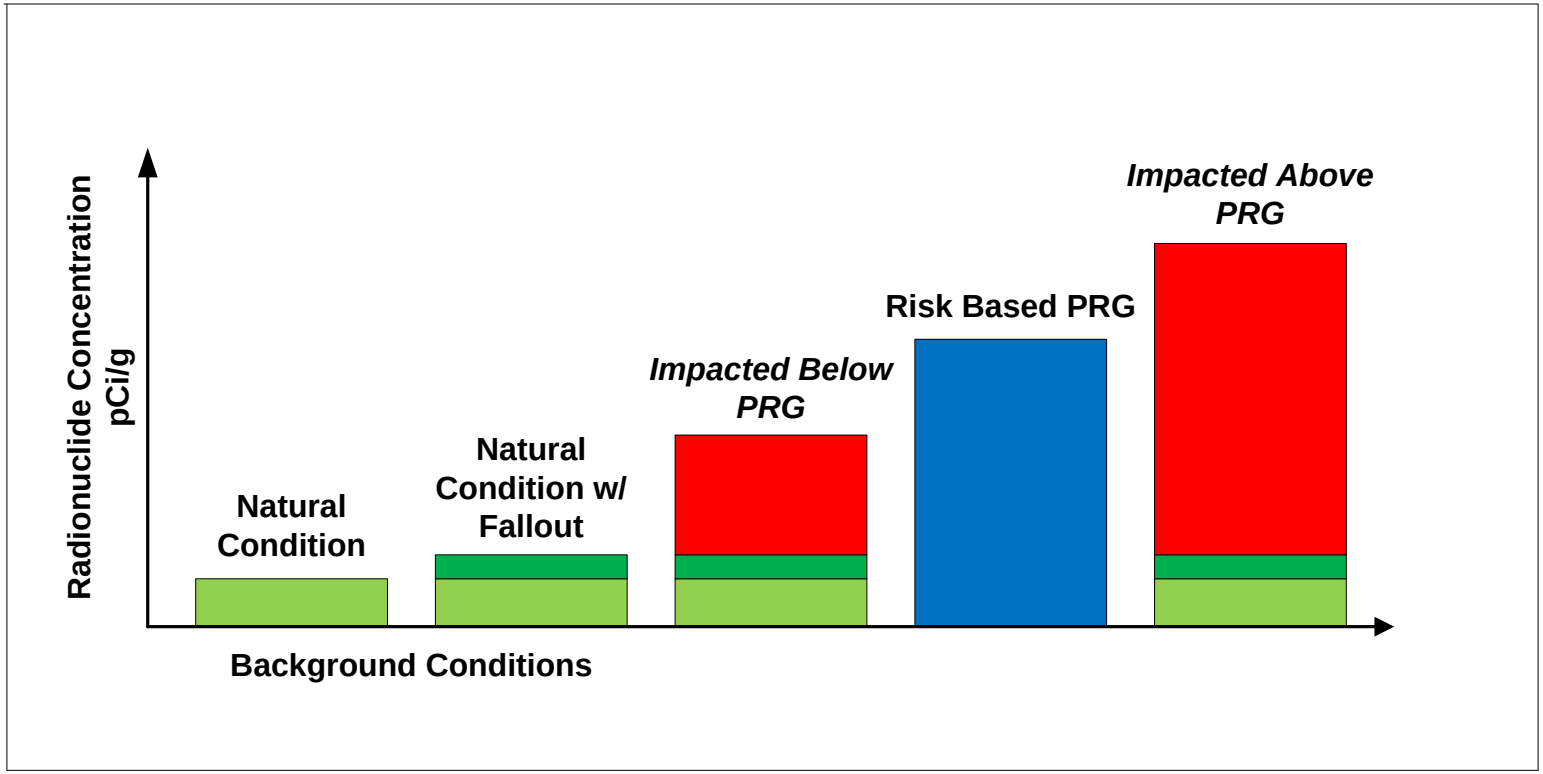
Background includes concentrations of both anthropogenic and naturally occurring chemicals.

1. What is Background? (cont.)

- *Anthropogenic* – natural and human-made substances present in the environment as a result of human activities (not specifically related to the site in question).
- *Naturally occurring* – substances present in their unaltered form or altered solely through naturally occurring processes or phenomena, in a location where they are naturally found.

1. What Is Background? (cont.)

Conceptual Comparison Of Background Conditions, PRG, and Impacted Conditions



2. Schedule

- Sampling and Analysis Work Plan approved by Ohio EPA on March 1, 2012
- Field sampling completed June 21, 2012 (120 sampling locations)
- Laboratory analysis of surface and subsurface soils (152,000 analytical results)
- Report of sampling results and preliminary evaluation delivered to Ohio EPA in November 2012
- Final Soil Background Report currently undergoing review at DOE for delivery to Ohio EPA in March 2015

3. Goals And Objectives

- Goals and objectives from Data Quality Objectives workshop and technical meetings with Ohio EPA from June to September 2011

- The Soil Background Study provides *representative background data* for each major soil formation on the DOE reservation, property easements and DOE leased property off the reservation to:
  - Help determine the extent of soil contamination
  - Support development of risk-based soil cleanup levels
  - Support real property transfers under Section 120 (h) of the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA) for a site reuse effort

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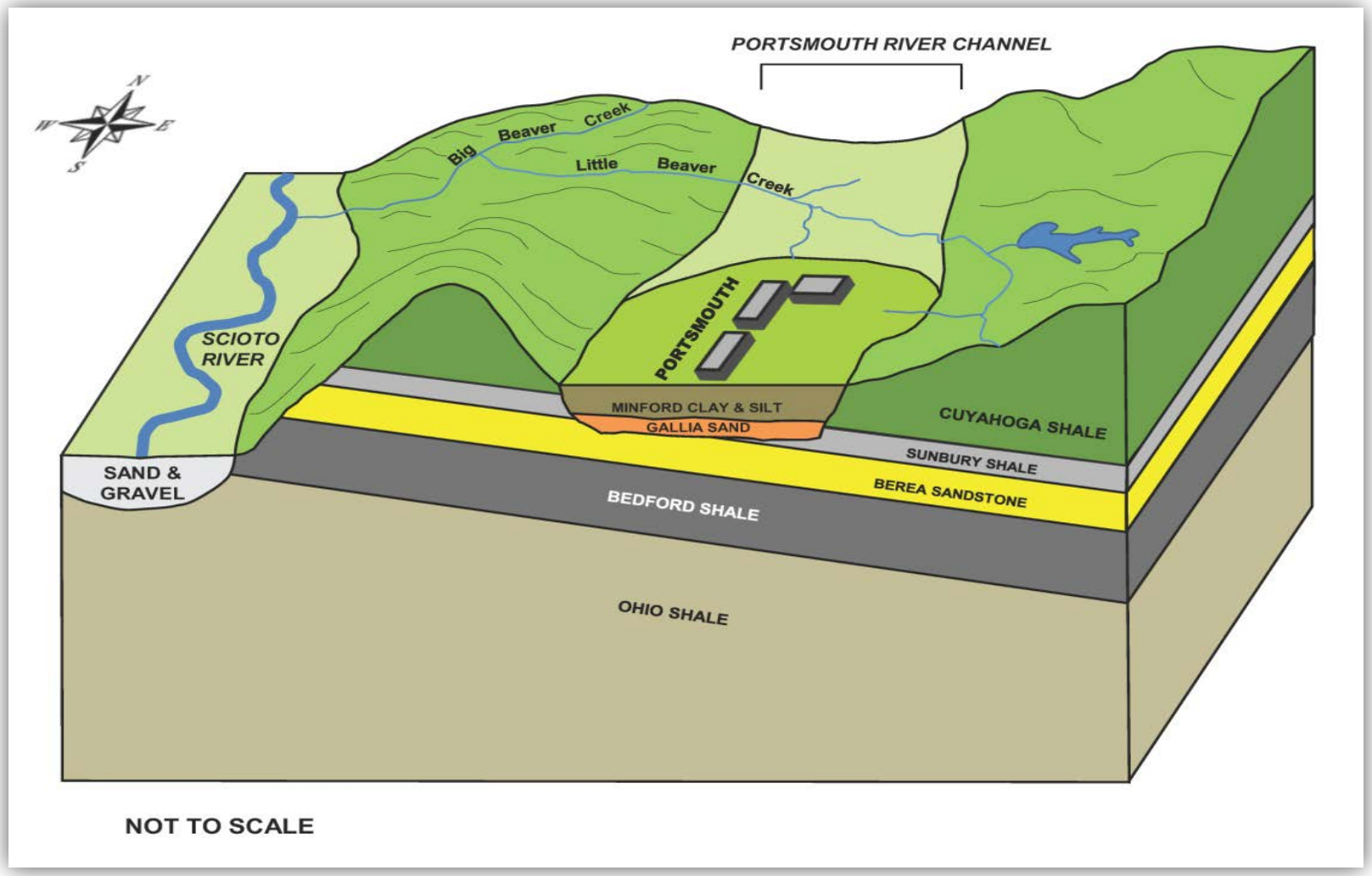
3. Goals And Objectives (cont.)



Schematic Block Diagram Showing Geological Relationships at PORTS

4. Sampling and Analysis Approach

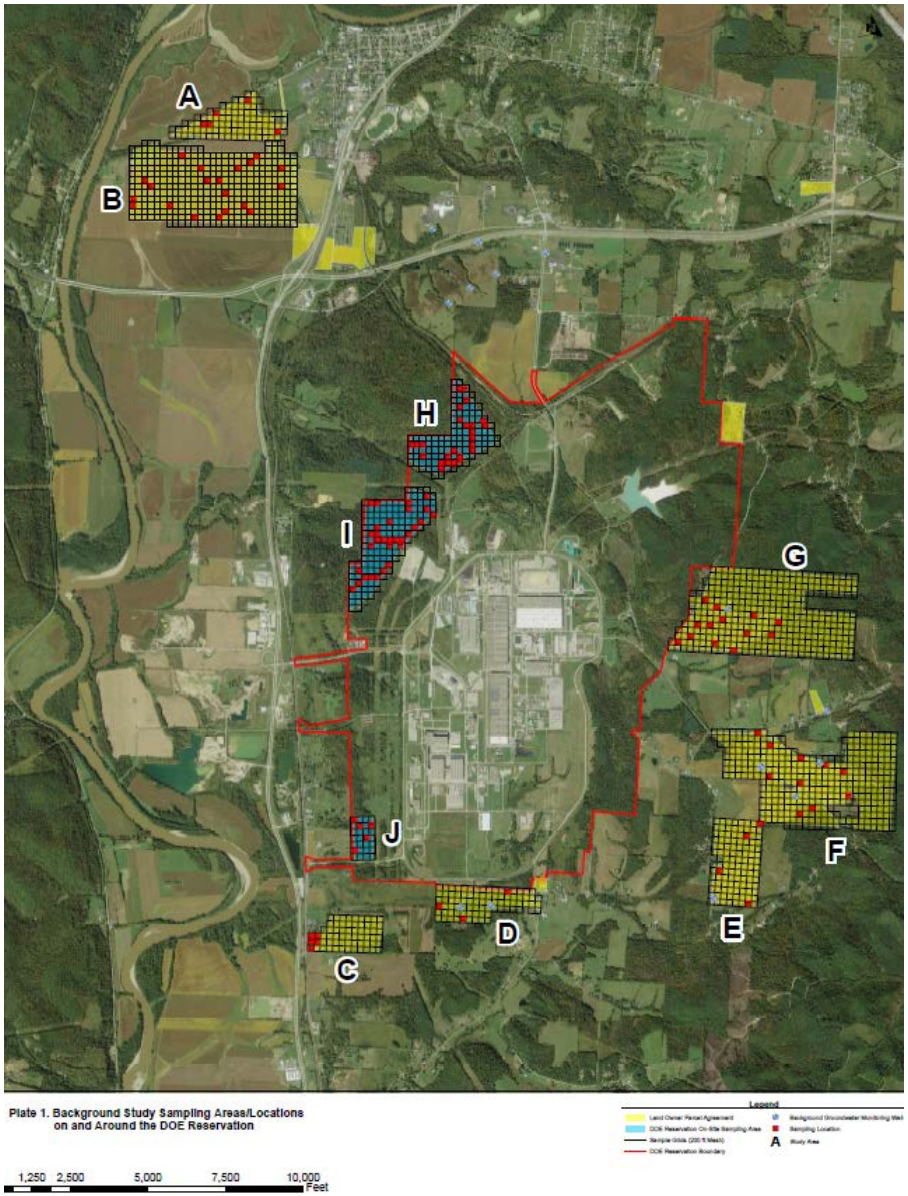
Characterize concentrations of naturally occurring and anthropogenic constituents in surface and subsurface soils in and around the PORTS facility using the following criteria:

- Areas not impacted by site operation where the geologic formations of interest are present
- Reasonable proximity to the PORTS facility
- Statistically sufficient number of soil samples from surface and subsurface formations
- Similar environment of deposition and geologic source material as PORTS

4. Sampling and Analysis Approach (cont.)

Ten study areas were identified as soil background sampling locations based on the following criteria:

- Similar environment of deposition and geologic source material as found at PORTS
- Un-impacted by site operations where the geologic formations of interest are present
- In reasonable proximity to PORTS
- Land Owner Parcel Agreements



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4. Sampling and Analysis Approach (cont.)

Sampling Areas

- Minford materials overlying Gallia deposits (east and south of the DOE reservation)
- Scioto River Valley soils and subsurface material
- Surface soils on the western boundary of the DOE reservation
- 200 ft. x 200 ft. sequentially numbered grids
- Specific sampling locations randomly selected
- 800 – 900 samples:

  -60 subsurface sampling locations

  -120 surface sampling locations

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4. Sampling and Analysis Approach (cont.)

Vertical Sampling Profile:

A. Surface soils (0 to 1 foot bgs, Minford clay or soil over Cuyahoga),
B. Unsaturated Minford clay (discrete samples 1 to 16 feet bgs),
C. Saturated Minford clay/silt (discrete samples 16 feet bgs to immediately above the Minford/Gallia interface at about 25 feet to 70 feet bgs),
D. Saturated Gallia formation (composited),
E. Scioto River Valley unsaturated/unconsolidated surface soils (0 to 1 foot bgs) and subsurface materials (8 to 10 feet bgs) above the water table.
F. Sampling completed April to June 2012

4. Sampling and Analysis Approach (cont.)

Analytical Parameters (139)

- 48 Semi-Volatile Organic Compounds (SVOCs)
- 17 Poly-Aromatic Hydrocarbons (PAHs)
- 8 Polychlorinated Biphenyls (PCBs)
- 28 Pesticides/Herbicides
- **27 Metals**
- **11 Radionuclides**
- 0 Volatile Organic Compounds (VOCs)

Results reported in the Preliminary Report submitted to Ohio EPA in November 2012

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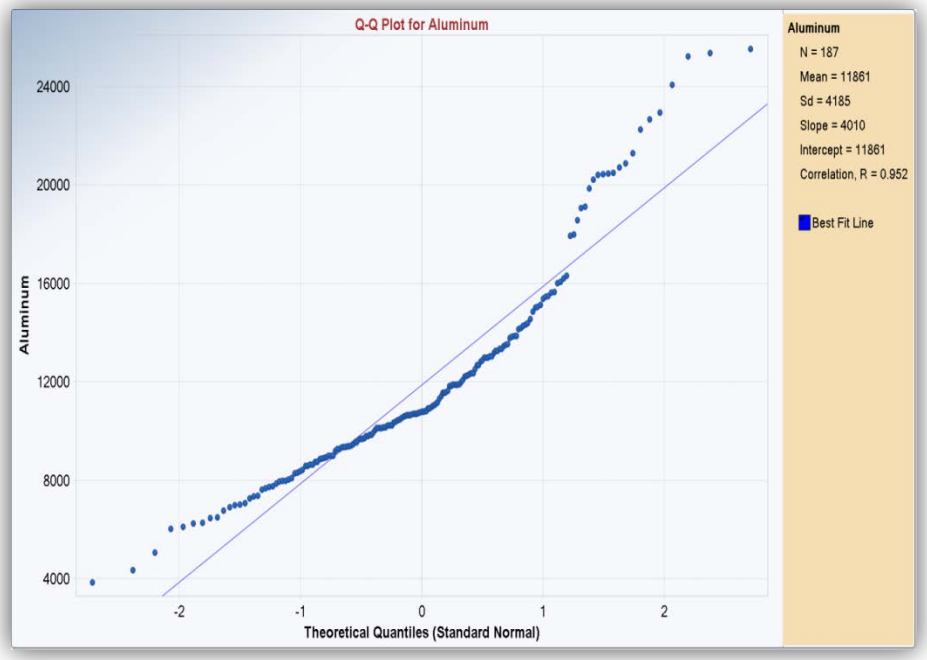
5. Final Data Evaluation

Statistical tests were performed primarily by using EPA's ProUCL software and Microsoft Excel to determine soil grouping that are comparable and representative of the various soil formations at PORTS

Data Evaluation included the following lines of evidence:

- Confirmation of no enriched U
- Preliminary Data Statistics
- Quantile-Quantile Plots
- Outlier Test
- Goodness of Fit Test
- Hypothesis Test



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Soil Groupings

Areas A and B

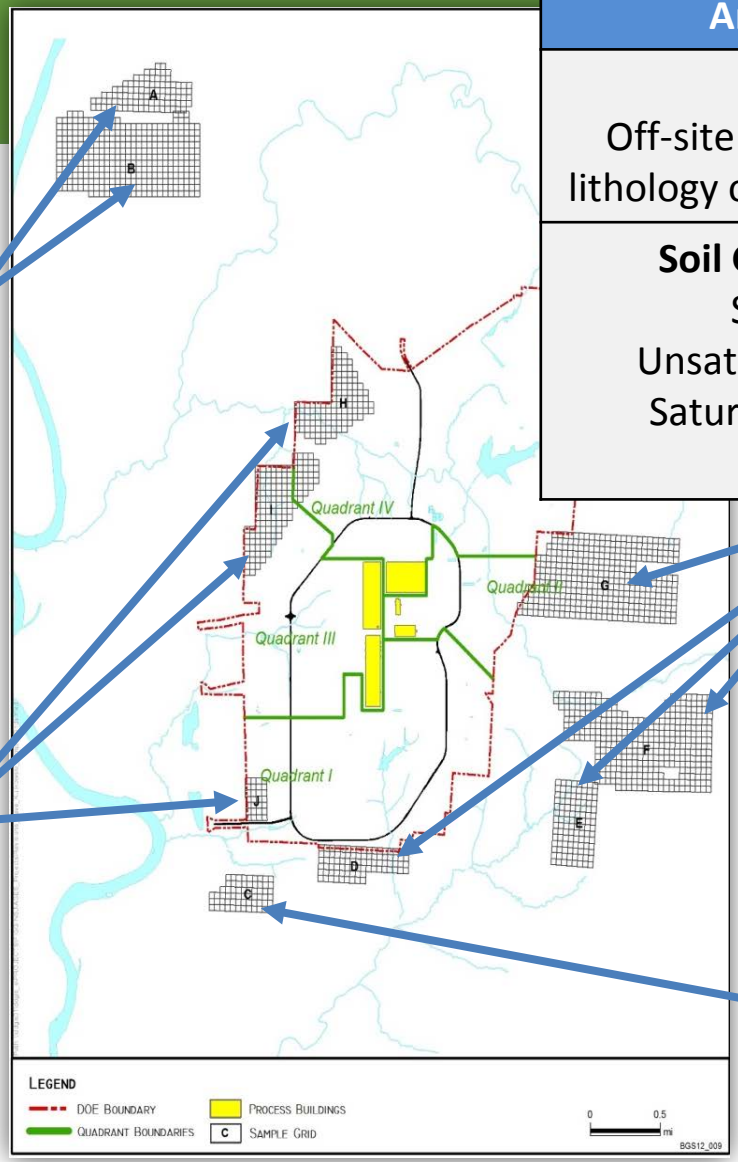
Description
Scioto River Valley

Soil Grouping and Depth
Surface soil (0-1)
Subsurface soil (1-10)

Areas D, E, F and G

Description
Off-site areas representative of lithology observed on site at PORTS

Soil Grouping and Depth
Surface soil (0-1)
Unsaturated Minford (1-16)
Saturated Minford (16-30)
Gallia (16-90)



Areas H, I and J

Description
PORTS upland area

Soil Grouping and Depth
Surface soil (0-1)

Area C

Not representative of the same depositional conditions, samples from this area are excluded from final soil groupings

Notes

Depths are provided in feet below ground surface (ft bgs)
*Samples in this group are only in Areas E, F and G

Calculation of Background Values

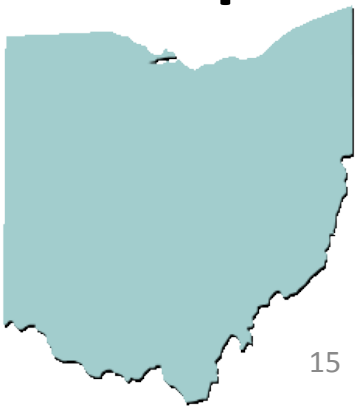
Background concentrations were calculated using one of the following three statistical methods:

- 95% UTL
- Upper Bound per 2004 Ohio EPA guidance
- Maximum detected value of the data set

Concentrations are presented in a matrix of background numbers for each metal and radionuclide in each soil grouping. And set background level for all organics at zero.

Comparison to Other Ohio Reports

PORTS Soil Background results were compared to results from similar soil investigations in Ohio



PORTS Soil Background Metal Concentrations

Parameter	Surface Soil (0-1 ft bgs) Areas DEFG	Unsaturated Minford (1-16 ft bgs) Areas DEFG	Saturated Minford (16-30 ft bgs) Areas EFG	Gallia Areas DEFG	Ohio Range in Soil[a]
Aluminum	24,477	20,717	12,698	13,430	2,000 – 16,100
Antimony	2.0	1.8	3.5	8.4	0.97 – 92.0
Arsenic	31	29	86	129	0.5 – 56.0
Barium	114	136	72	100	9.3 – 323
Beryllium	1.2	1.6	1.2	1.5	0.1 - 3.15
Cadmium	0.2	0.3	0.7	2.0	0.07 - 4.40
Chromium	32	29	25	29	2.0 - 80.5
Cobalt	28	37	19	27	1.0 - 53.6
Copper	19	26	23	27	1.2 – 58.0
Iron	86,080	62,782	56,423	155,228	5,150 – 100,000
Lead	33	23	13	38	1.0 - 147
Lithium	113	123	120	97	NR[b]
Manganese	1,858	1,491	465	2,558	59.0 – 1,750
Mercury	0.060	0.052	0.041	0.067	0.01 - 1.60
Nickel	23	50	53	78	2.0 - 110
Selenium	1.8	0.6	0.6	0.6	0.2 – 35.0
Silver	11	7	4	14	0.2 – 14.8
Thallium	0.3	0.4	0.8	0.5	0.17 – 0.59
Total Uranium	4.1	4.7	7.2	7.3	0.9 – 6.0[c]
Vanadium	78	58	65	88	4.60 – 71.0
Zinc	93	117	148	244	7.50 - 190

[a]Cox & Colvin, 1996, Evaluation of Background Metal Concentrations in Ohio Soils, Table 7.
[b]Reference value for similar soil type not reported in the literature.
[c]Uranium not reported in Cox & Colvin. Uranium range is from USGS aerial survey of Ohio surface soil

Notes:
All results are presented in milligrams per kilogram (mg/kg)
Within Cox & Colvin Ohio soil range
Above Cox & Colvin Ohio soil range

PORTS Soil Background Radionuclide Concentrations

Parameter	Surface Soil (0-1 ft bgs) Areas DEFG	Unsaturated Minford (1-16 ft bgs) Areas DEFG	Saturated Minford (16-30 ft bgs) Areas EFG	Gallia Areas DEFG	Reference Range in Soil[a]
Thorium-228	1.6	1.9	1.6	1.7	1.5 - 1.6
Thorium-230	1.6	1.7	2.4	2.5	2.15 - 2.17
Thorium-232	1.6	1.9	1.6	1.7	1.4 - 1.6
Uranium-233/234	1.3	1.6	2.4	2.3	1.1 - 1.2
Uranium-235/236	0.10	0.12	0.17	0.17	0.13 - 0.15
Uranium-238	1.4	1.6	2.4	2.5	0.3 – 2[b]

Notes:
All results are presented in picocuries per gram (pCi/g)
Statistical calculations may result in decay-chain daughters appearing to be in disequilibrium (e.g., Th-230 and U-234).
Within Ohio soil range
Within +/-10 percent of Ohio soil range

[a]Reference Range from background values reported in the DOE 1993 CERCLA/RCRA Background Soil Study for the DOE Fernald Site except the U-238.
[b]U-238 range from the state wide areal radiometric map

The following conclusion are made based on the comparison of the PORTS Soil Background results to similar soil investigations in Ohio:

- The majority of metal concentrations are within Ohio soil ranges
- Radionuclide concentrations are either within or slightly lower/higher than Ohio soil ranges

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Paducah Radionuclides - Background

Radionuclide	Surface (pCi/g)	Subsurface (pCi/g)
Neptunium-237	0.028	NA
Plutonium-238	0.004	NA
Plutonium-239	0.018	NA
Technetium-99	0.3	0.79
Thorium-228	2.3	2.3
Thorium-230	2.2	2.2
Thorium-232	2.2	2.2
Uranium-234	1.9	1.8
Uranium-235	0.11	0.11
Uranium-238	1.9	1.8
Total Uranium	5.7 ug/g	5.4 ug/g

NA = not available

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Fernald Radionuclides - Background

Radionuclide	Surface (pCi/g)	Subsurface (pCi/g)
Neptunium-237	NA	NA
Plutonium-238	NA	NA
Plutonium-239	NA	NA
Technetium-99	< 1	< 1
Thorium-228	1.4	1.4
Thorium-230	2.0	1.9
Thorium-232	1.4	1.3
Uranium-234	1.2	1.0
Uranium-235	0.16	0.15
Uranium-238	1.2	1.1
Total Uranium	3.7 ug/g	3.3 ug/g

NA = not available

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Uranium Background Levels in Ohio

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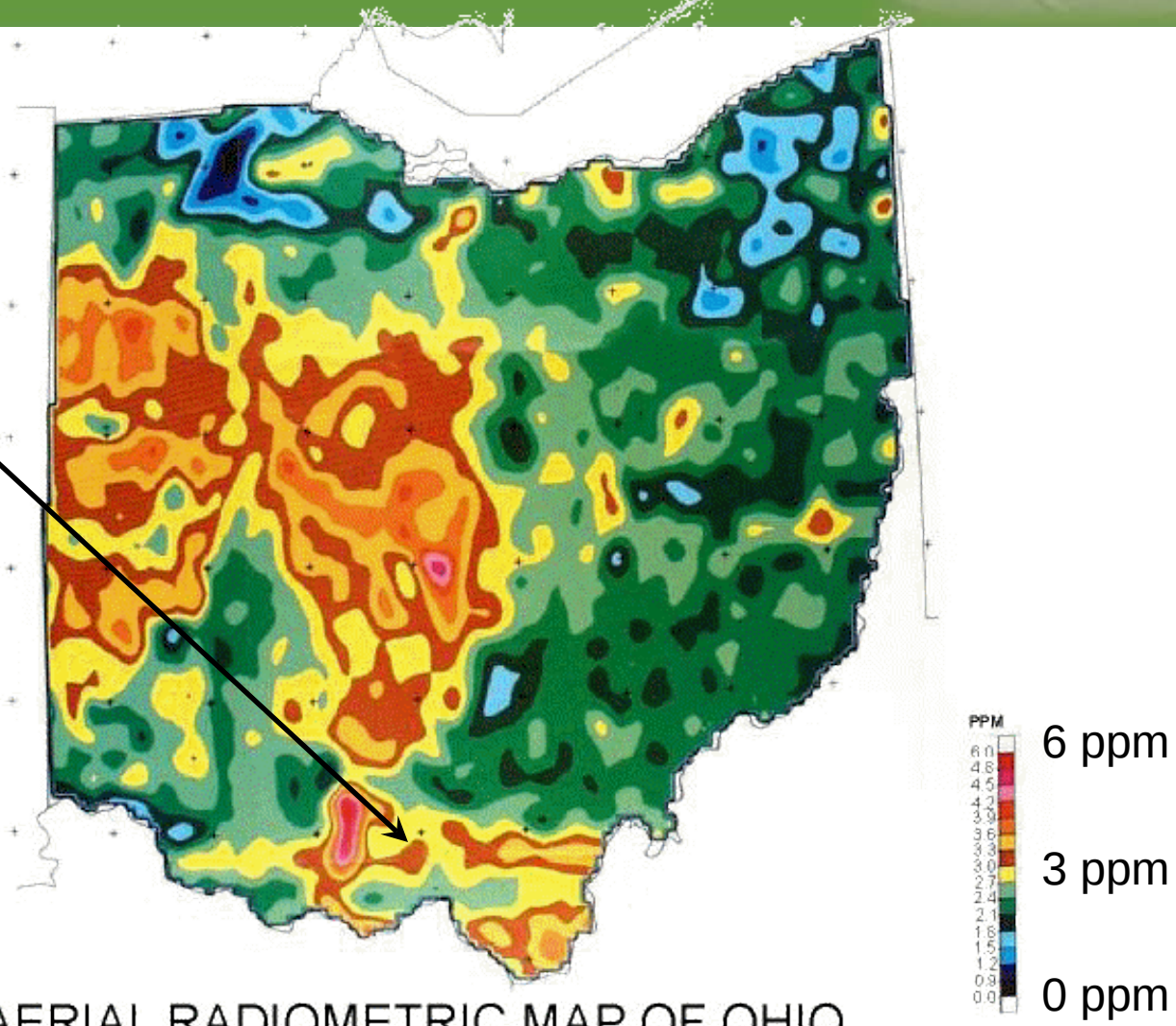
3 to 4 ppm



AERIAL RADIOMETRIC MAP OF OHIO SHOWING THE CONCENTRATION OF URANIUM IN SURFICIAL SEDIMENTS AND SOILS (in parts per million)

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