Welcome

Tonight's Agenda

- Portsmouth Site Update
- Co-located Air Monitoring Data
- Air Monitoring & Managing Risk
- Public Comments/Questions

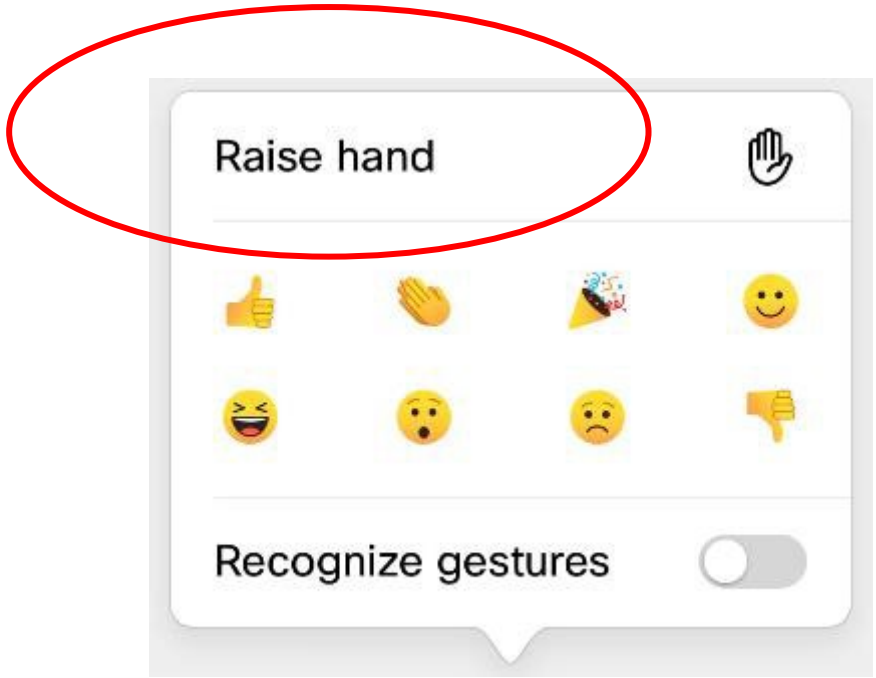
Public Engagement

How to have your voice heard

- Email: ports-demo-questions@pppo.gov
- Add a question via the chat on YouTube
- Add a question via the chat on WebEx
- Participate in the public comment session

Public Comment Protocols

- Raise your hand to be identified
- Be courteous and respectful
- Keep comments to 3-4 minutes to allow all participants a chance to speak. Comments can also be submitted in writing
- To reduce background noise, speakers will be unmuted during their public comment and then returned to mute afterwards



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Portsmouth Site Update

Joel Bradburne, Manager
DOE's Portsmouth/Paducah Project Office

- 40+ years of experience in the nuclear industry
- Former Portsmouth Site Lead
- Bachelor of Science in Biology
- Master of Science in Environmental Management
- Certified Project Management Professional
- Has experience in:
  - Shipyard, commercial nuclear, Department of Energy, and foreign nuclear site decommissioning in various program and project management assignments

Jeremy Davis, Acting Portsmouth Site Lead

- 20 years of experience in the nuclear industry
- Life-long resident of Pike County
- B.S. Natural Sciences of Biology, Chemistry and Geology
- Experience in areas including:
  - Project Management
  - Environmental Compliance
  - Hazardous Waste Management
  - Environmental Program Integration and Facility Oversight.
- Currently a Certified Hazardous Material Manager and Project Management Professional Manager

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Portsmouth Site Overview

- Located in south central Ohio
- Plant occupies approx. 1,200 acres of a 3,700-acre federal site
- Uranium enrichment operations started in 1954
- DOE EM cleanup mission began in 1989
- Full scale Demolition and Decontamination (D&D) and cleanup began in 2010

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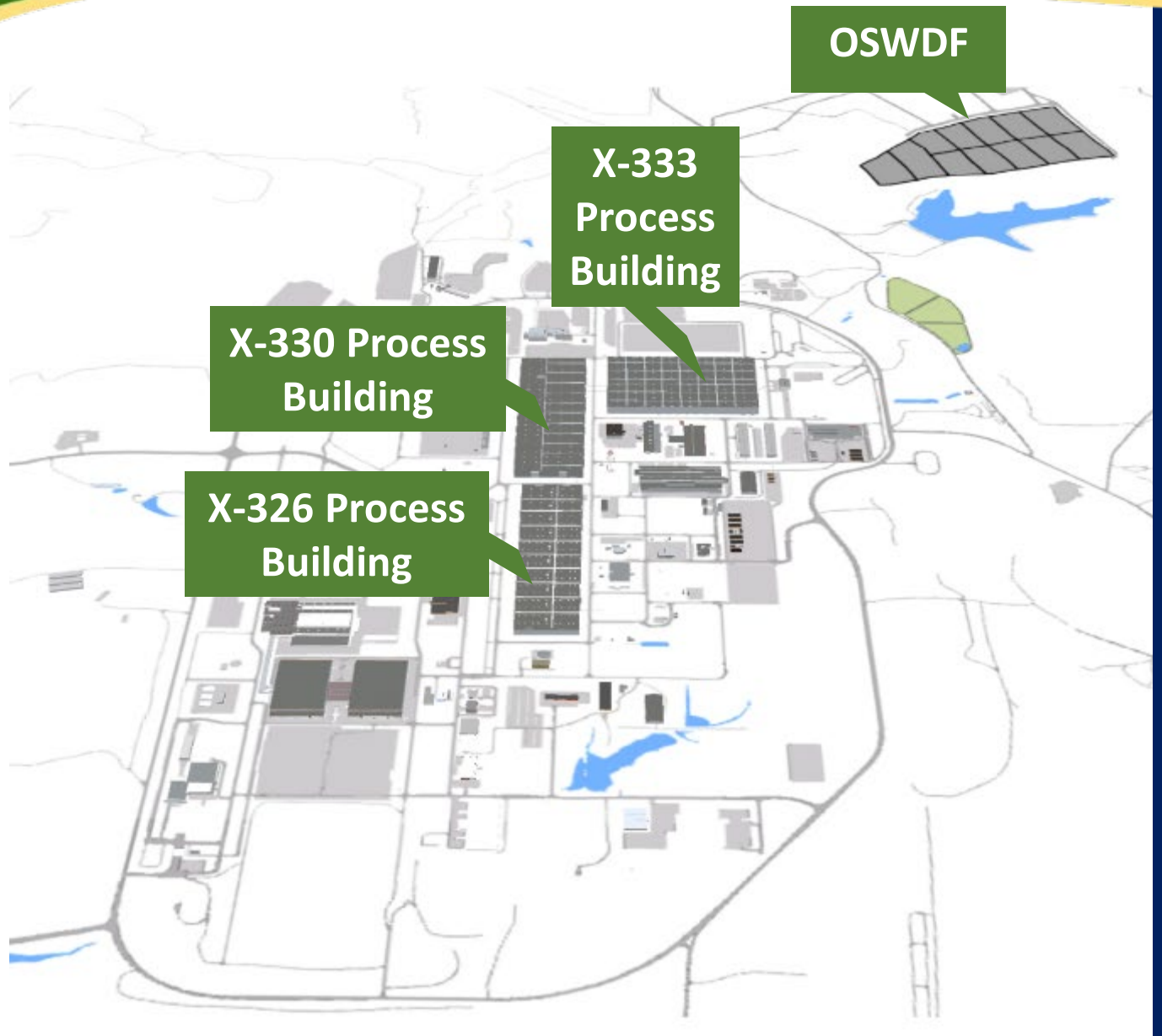
Portsmouth Ten Year Deactivation, Demolition and Cleanup Focus



- Complete deactivation and demolition of X-326, X-333 and X-330 Process Buildings
- Complete CAP 1 liners and three CAP 2 liners at On Site Waste Disposal Facility (OSWDF)
- Excavate landfills and plumes within Perimeter Road for OSWDF fill and provide contiguous land for future economic development
- Transfer ~300 acres of land to the Southern Ohio Diversification Initiative (SODI)

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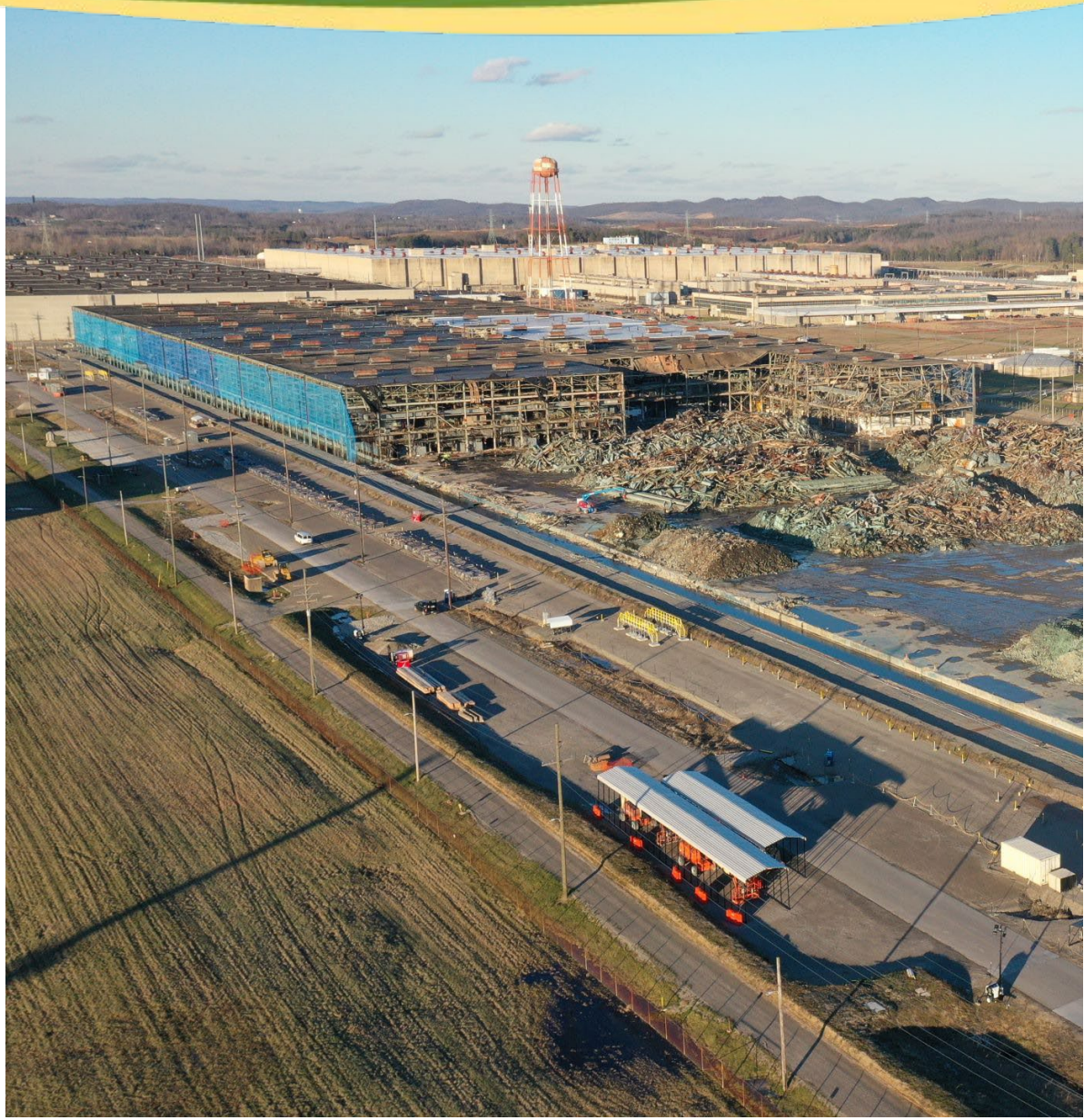
X-326 Process Building Deactivation, Demolition and Cleanup

- ✓ Deactivation Complete
  September 2020
- ✓ Demolition Design Plan
  Approved February 2021
- ✓ Transite Removal started
  February 2021
- ✓ Full Demolition started
  May 17, 2021
- ✓ Transite removal completed
  November 23, 2021
- ✓ Structural demolition 50% completed
  January 24, 2022
- ❑ Structural demolition to be complete in CY 2022



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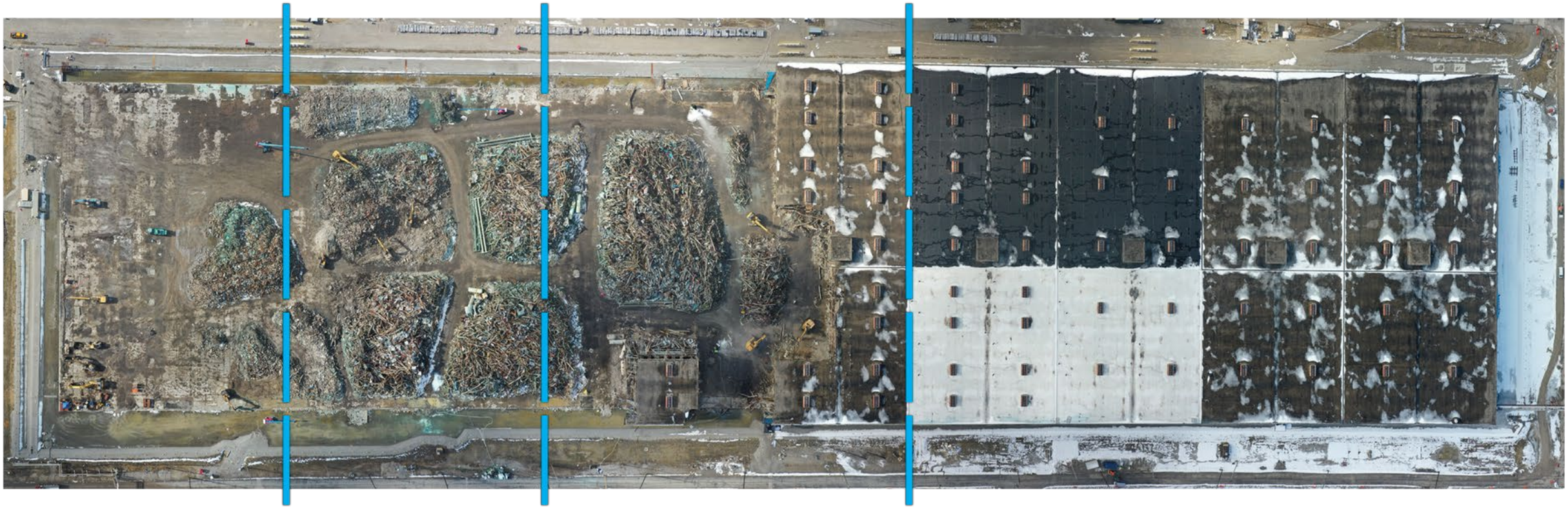
X-326 Demolition Progress

Public Meeting Dates

Oct 12 & 14, 2021

Nov 30 & Dec 2, 2021

Mar 1 & 3, 2022



20% Complete

35% Complete

60% Complete

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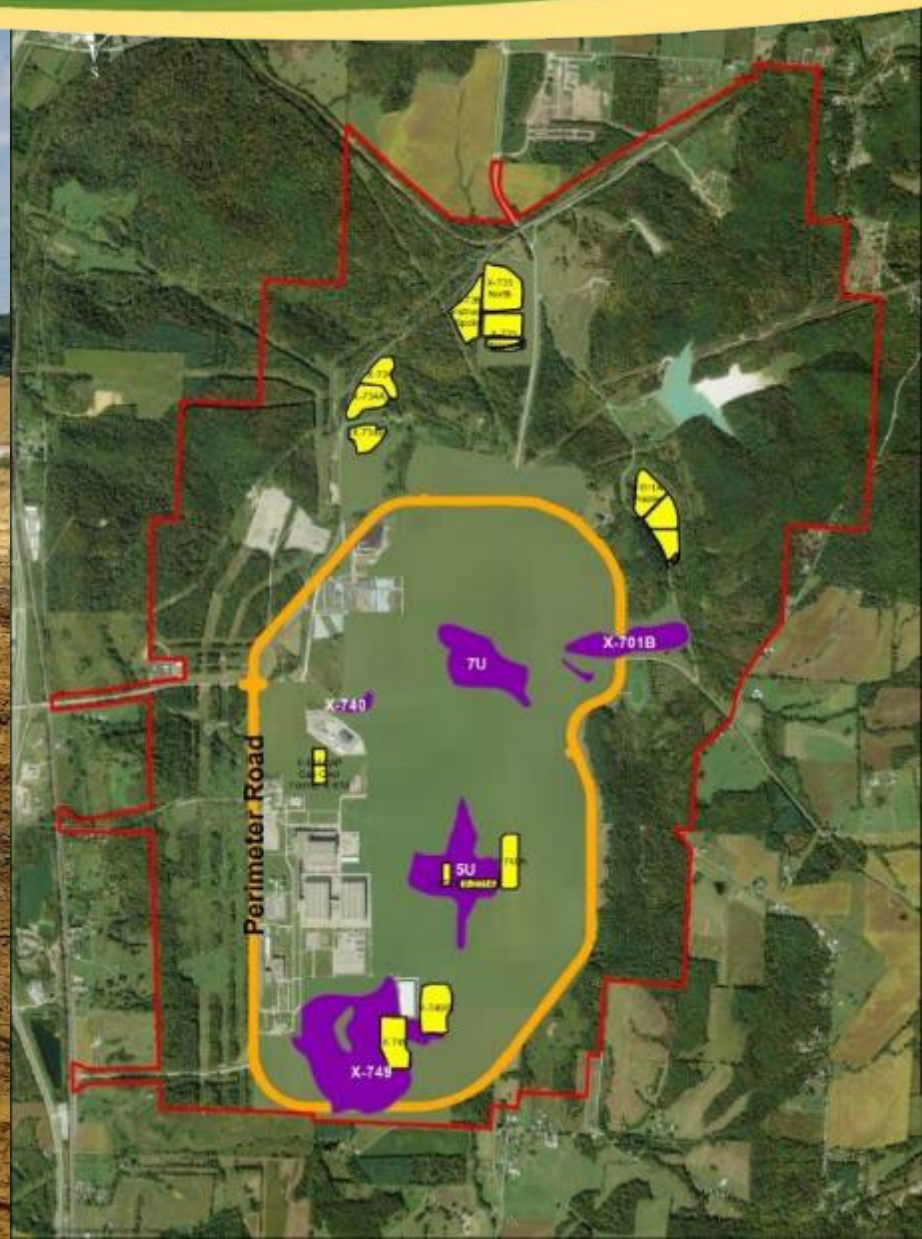
Contaminated Plume Excavation

X-740 Plume Excavation

- ✓ Excavation complete
- ✓ Delivered 40,000 cubic yards of soil/fill to the OSWDF

X-231B Plume Excavation

- ❑ In progress
- ❑ Excavation anticipated to be complete summer 2022



- DOE is meeting its commitment to excavate plumes within Perimeter Road
- Excavating plumes will support future site reuse

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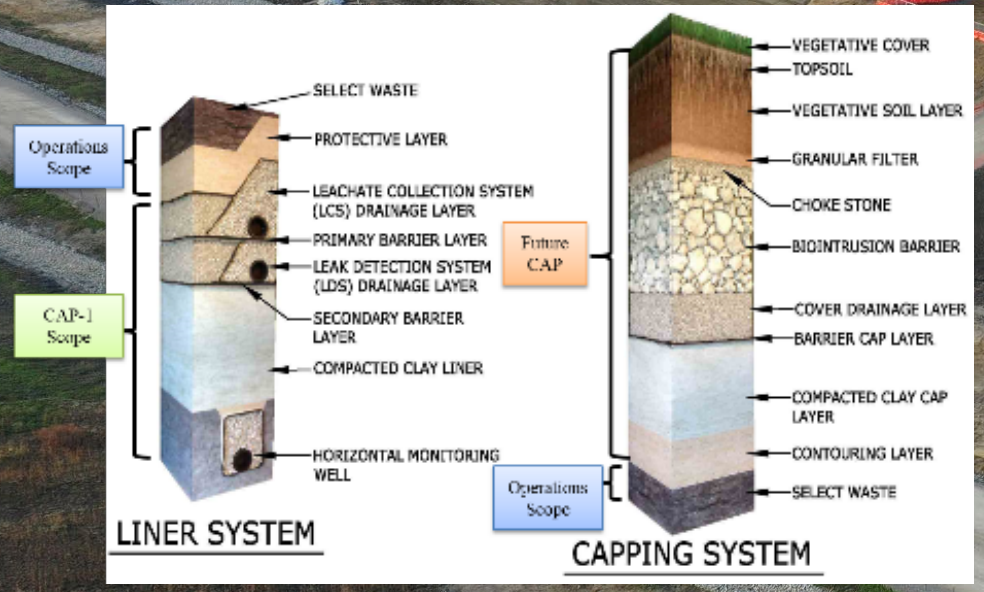
On-Site Waste Disposal Facility

Cells 4 & 5
- Liner Construction Underway

Cell 1
- Construction Complete
- Accepting Waste



Demolition Safety Planning

- A safe and methodical demolition plan, approved by Ohio EPA
- Lessons learned from decommissioning experience at DOE projects across the country
- Hazards removed from the building to make it safe for demolition
- Trained, experienced and capable workforce
- Protective measures to minimize disturbance of any residual radiological or chemical contaminants during demolition

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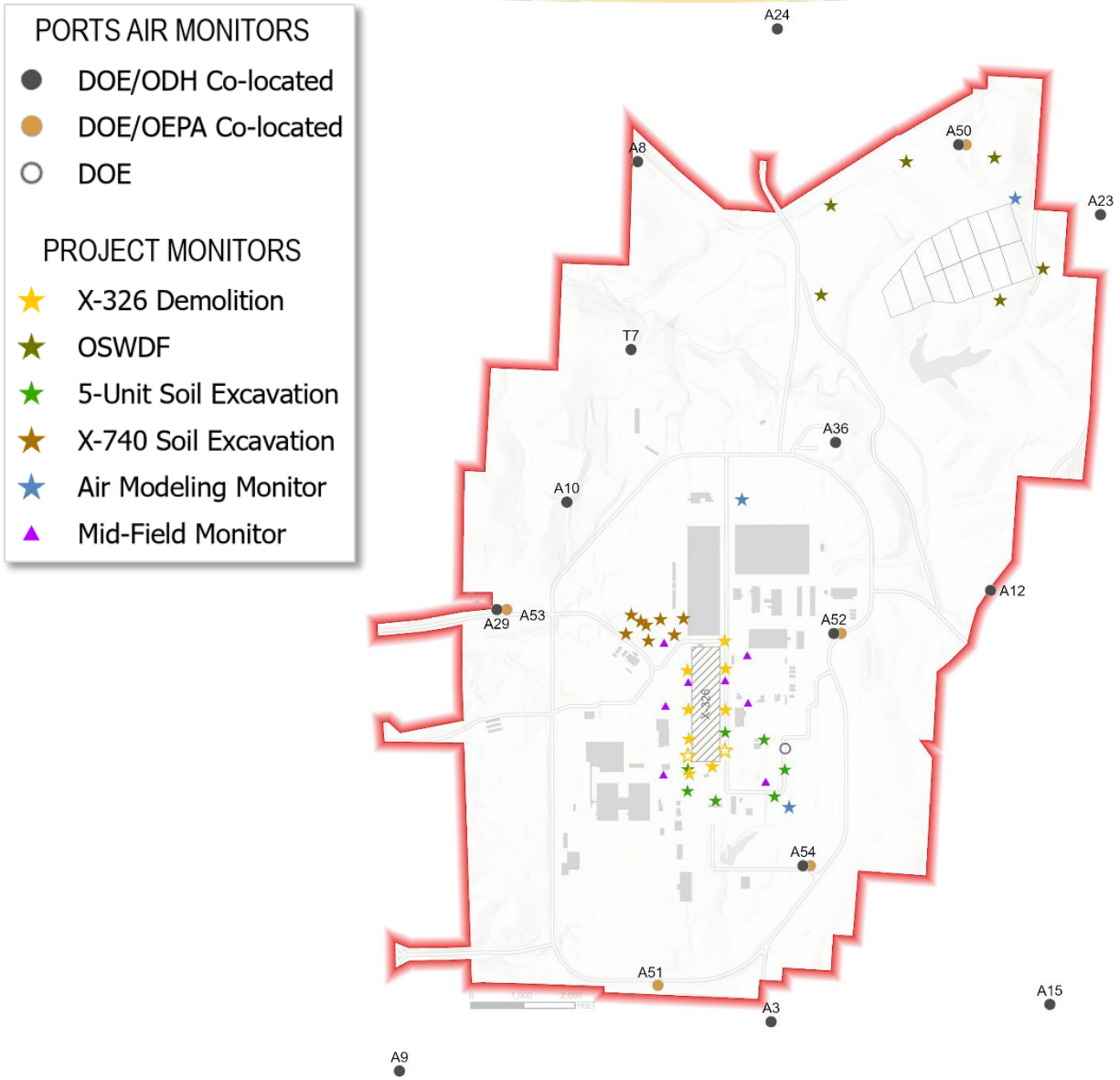
X-326 Process Building Air Monitoring

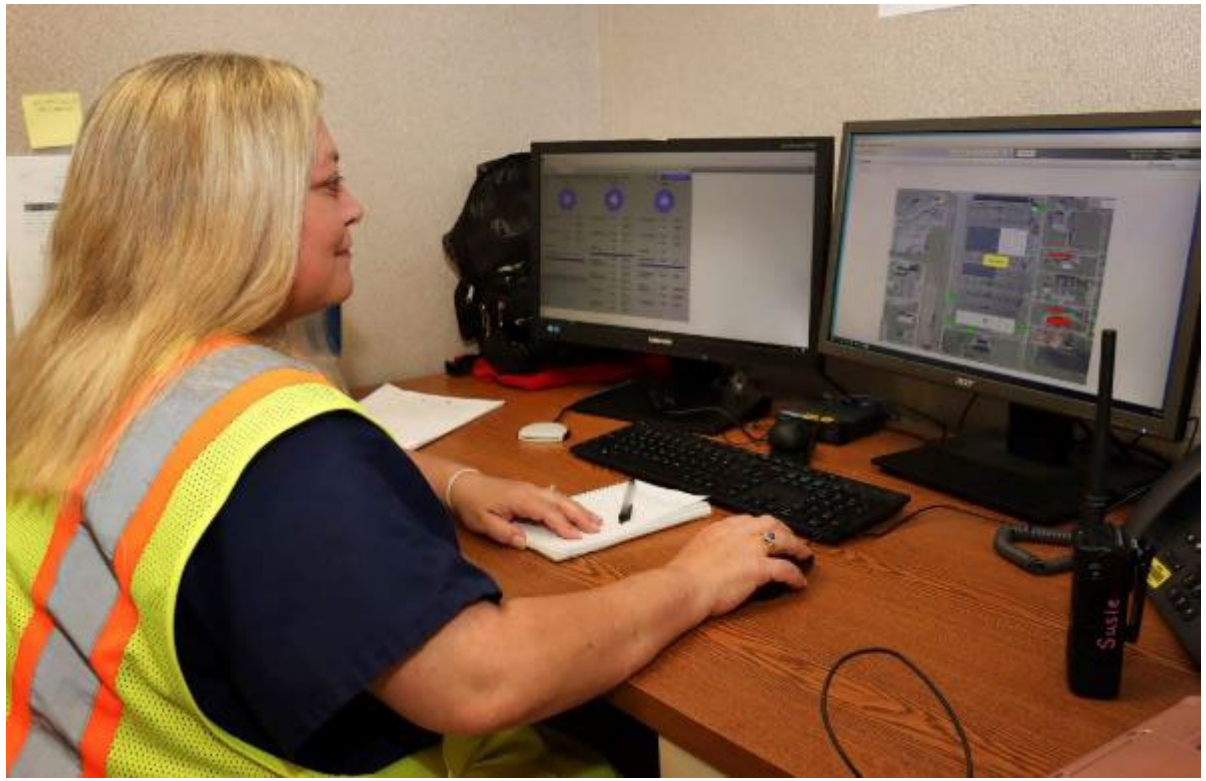
- Using input from the community, DOE lessons learned, industry best practices, meteorological data, and air modeling, the Portsmouth site Air Monitoring Network provides a layering of air monitoring equipment from the project boundary to off-site locations.

- Air monitoring is one of the many safety measures taken to ensure a safe and successful demolition.



Real Time Air Monitoring Approach

- Real Time Monitoring provides the first line of defense.
- Thresholds are established so emissions at the project boundary meet established limits then assurance is provided that limits at the property boundary will be safe and compliant.
- This provides the ability to immediately react to field activity to adjust operations or apply additional controls.
- Weather conditions are also monitored real-time to ensure activities are conducted within acceptable conditions



X-326 Process Building Real-Time Monitoring Trends to Date

- ✓ Particulate matter (PM) data recorded to date indicate good control of fugitive dust
- ✓ Contamination controls including application of water misting and fixative application are effective
- ✓ Radiological releases as measured by real-time alpha/beta measurements indicate the controls instituted are protective of workers and the public

Co-Located Air Monitoring

- DOE worked with OEPA and ODH to co-locate a total of 23 air monitoring stations
- In addition to DOE's data, OEPA and ODH air monitors will provide independent confirmation of air quality data during demolition work
- Tonight's session will present the most recent results from DOE monitors co-located with OEPA and ODH.

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X-326 Process Building Demolition Air Monitoring Data Results

March 1 and 3, 2022

Frank Johnston, Director of Environmental Protection
Fluor-BWXT Portsmouth

- 37 years experience
- Experienced in Environmental Management and Compliance:
  - Remedial Design/Remedial Action Implementation and Compliance
  - Environmental Management Systems
  - Environmental Permitting
- Experienced in the design, startup and operation of:
  - Remedial Response Actions
  - Air Emission Control Systems
  - Industrial and Municipal Wastewater Treatment Facilities
- B.S. Chemical Engineering
- Masters Business Administration

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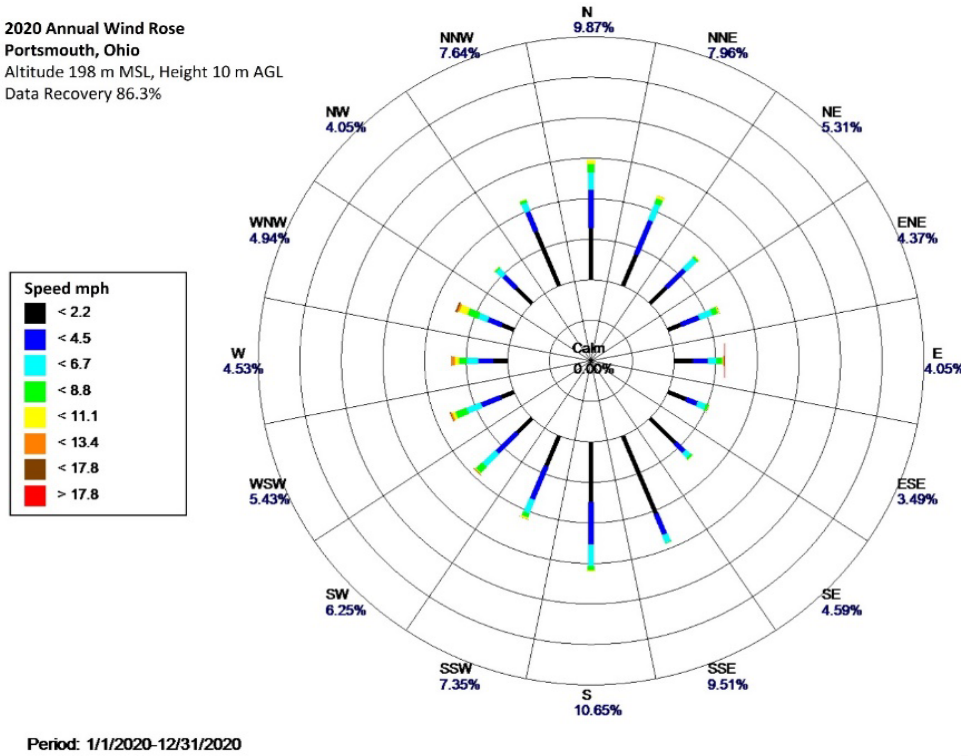
X-326 Process Building Air Monitoring

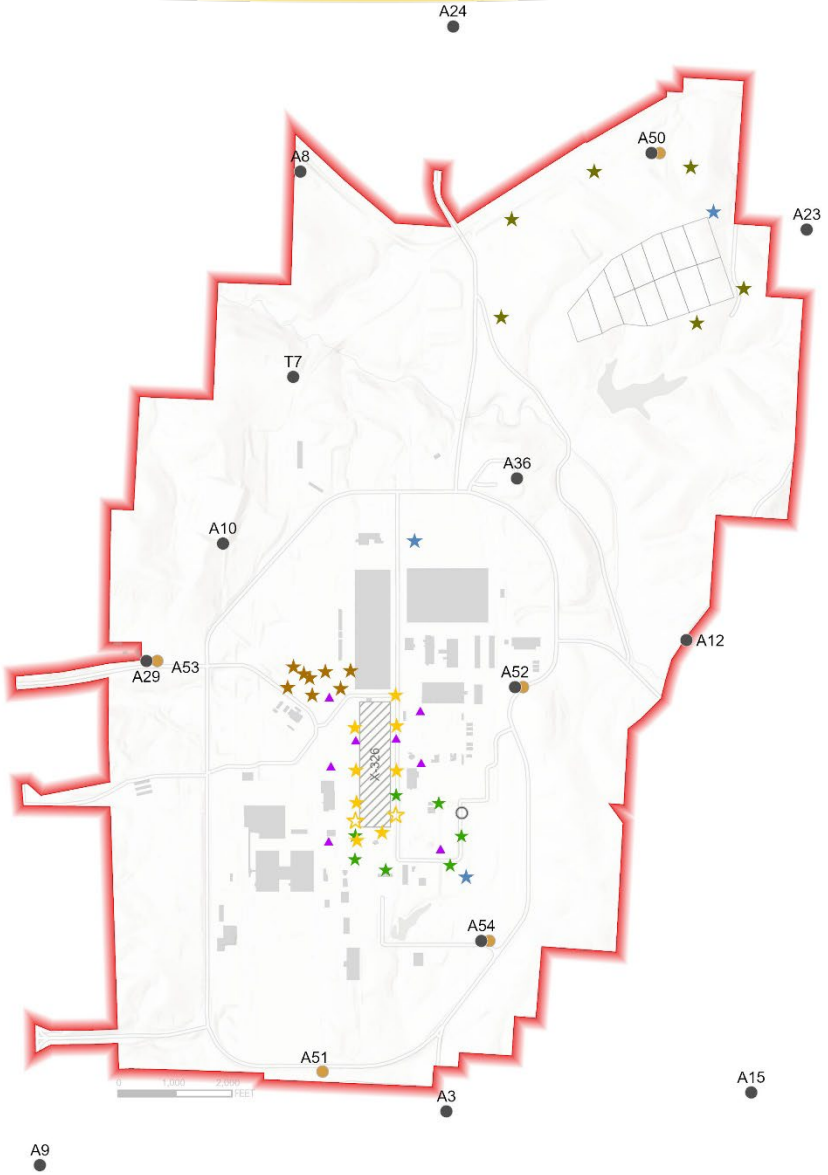


PORTS AIR MONITORS

- DOE/ODH Co-located
- DOE/OEPA Co-located
- DOE

PROJECT MONITORS

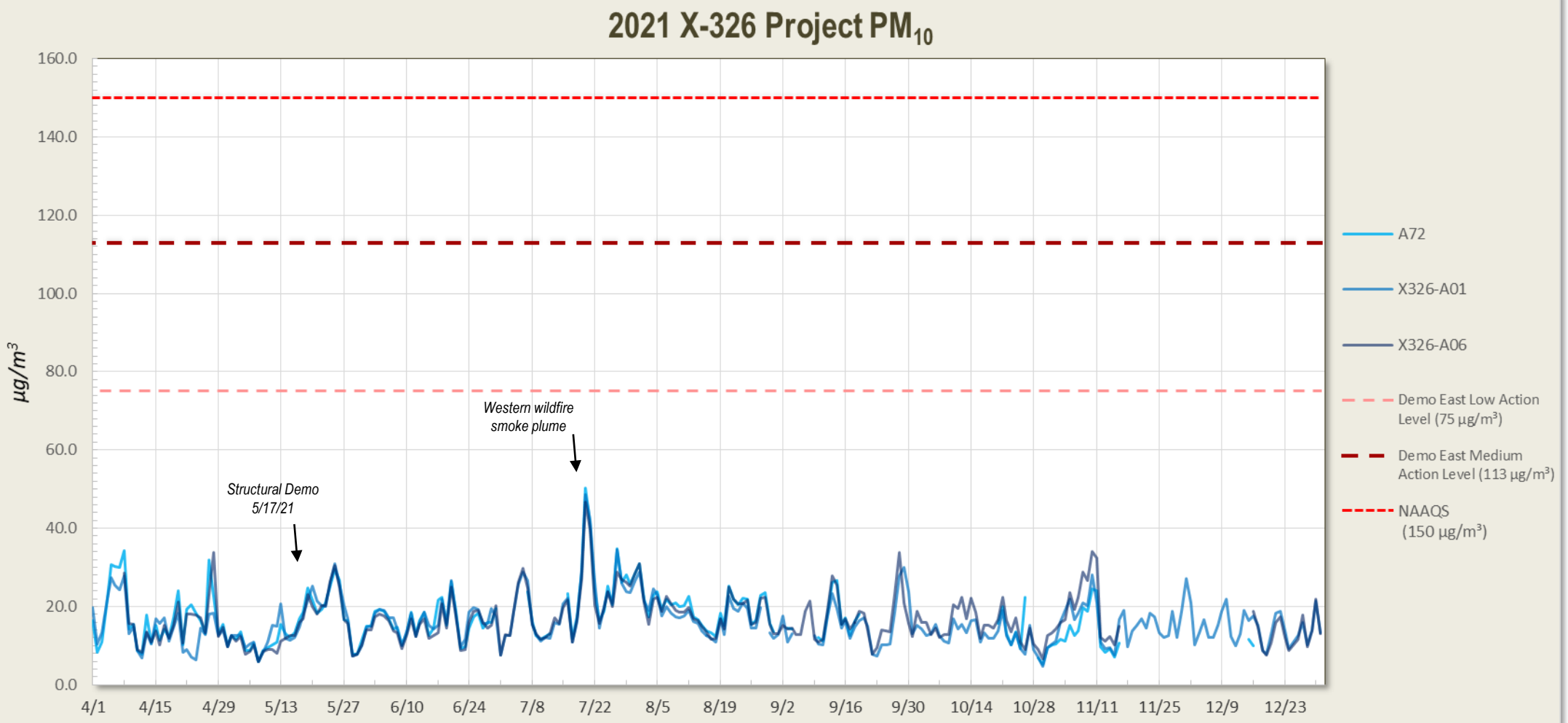
- X-326 Demolition
- OSWDF
- 5-Unit Soil Excavation
- X-740 Soil Excavation
- Air Modeling Monitor
- Mid-Field Monitor



Using input from the community, DOE lessons learned, industry best practices, meteorological data, and air modeling, the Portsmouth site Air Monitoring Network provides a layering of air monitoring equipment from the project boundary to off-site locations.

UPDATE – Real Time Particulate Matter

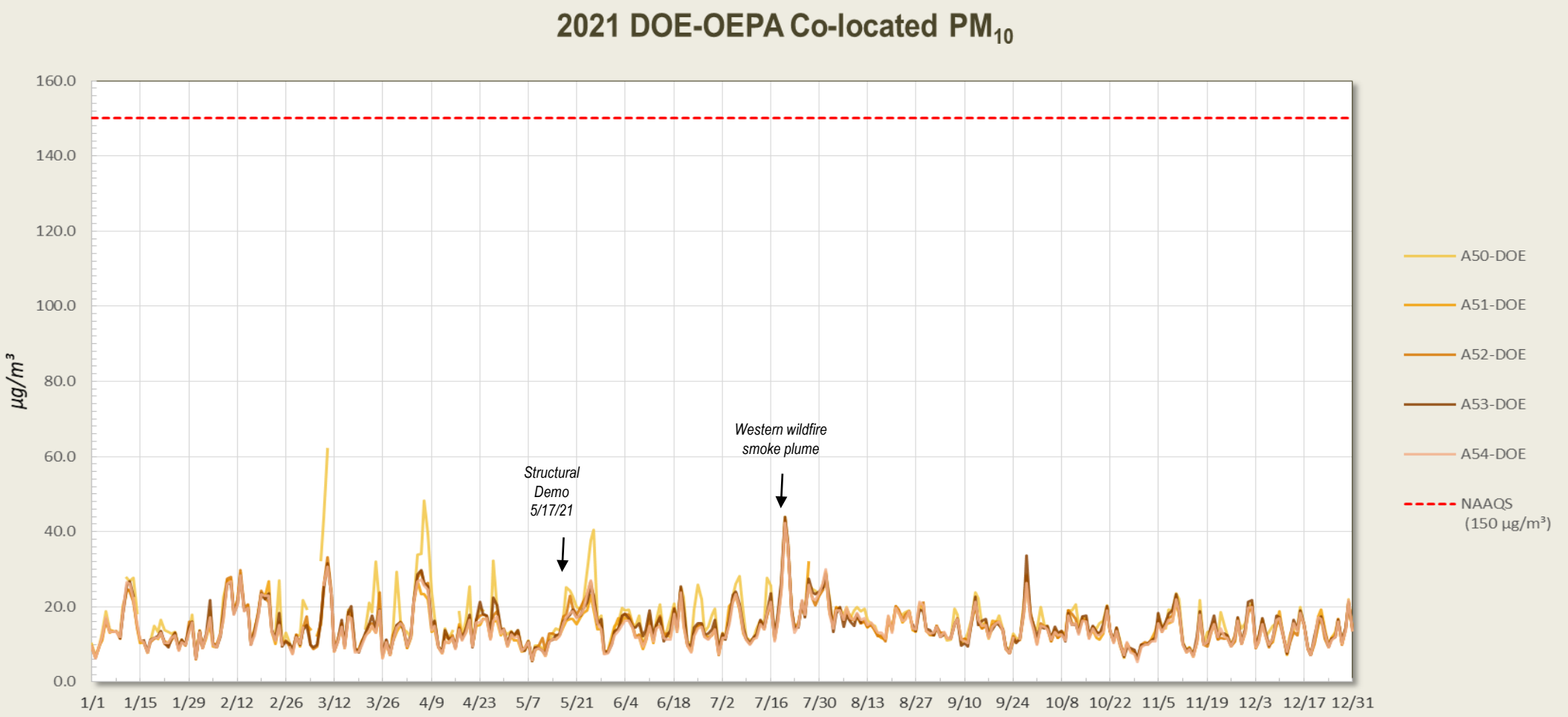
★ X-326 Demolition: Real Time Particulate Matter Air Monitors



NAAQS - National Ambient Air Quality Standards
The Clean Air Act requires USEPA to set standards for six criteria air pollutants which can be harmful to public health and the environment. Particulate matter is one of those six criteria pollutants.

UPDATE – Real Time Particulate Matter

DOE/OEPA Co-located: Real-Time Particulate Matter Air Monitors



NAAQS - National Ambient Air Quality Standards
The Clean Air Act requires USEPA to set standards for six criteria air pollutants which can be harmful to public health and the environment. Particulate matter is one of those six criteria pollutants.

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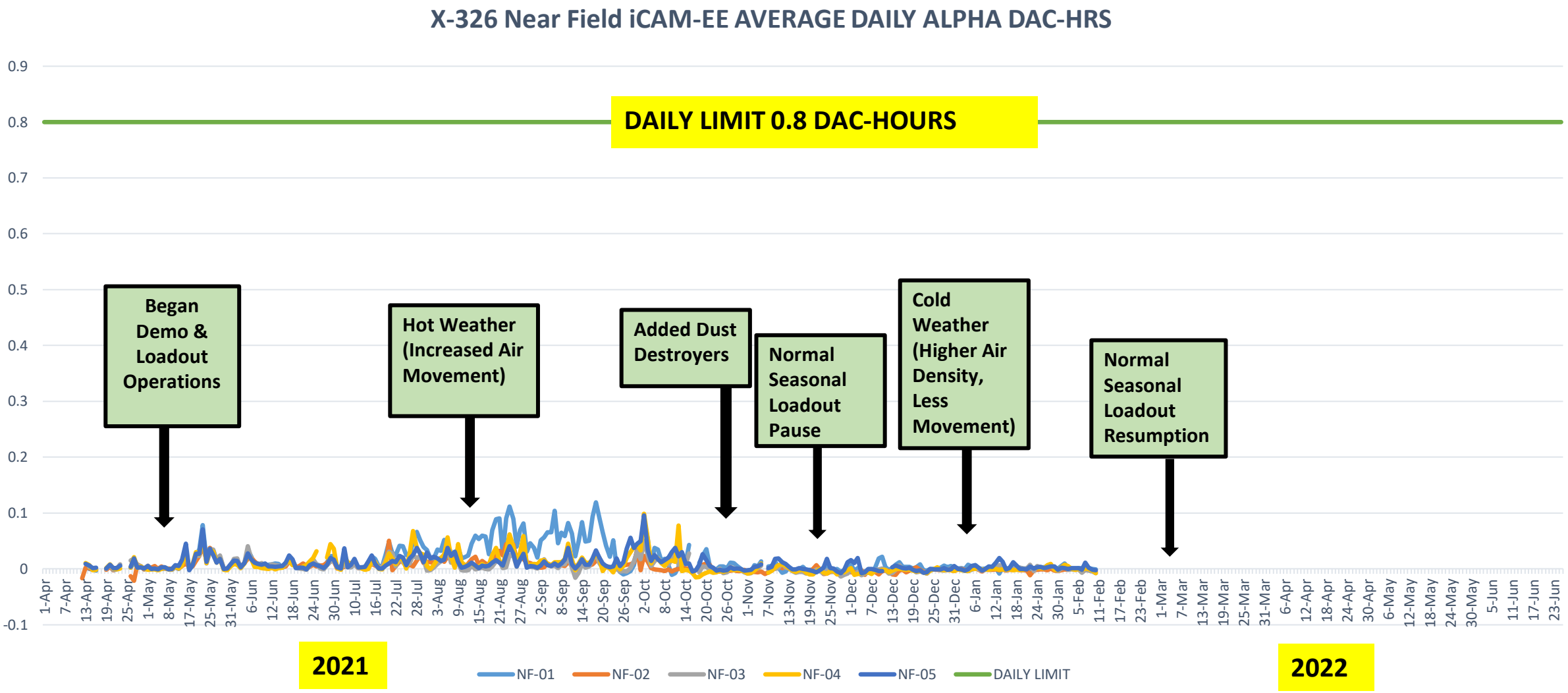
UPDATE - Real Time Radiological Measurements



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X-326 Process Building Real-Time Monitoring Trends to Date

- ✓ PM data recorded to date indicate good control of fugitive dust
- ✓ Application of water misting and fixative application are proving to be effective
- ✓ Real-time alpha/beta measurements indicate the controls instituted are protective of workers and the public

Identifying Contaminants of Concern for Air Modeling/Monitoring

- The majority of the chemical and radiological hazards were removed during the deactivation of the X-326 from 2011 – 2020
- Some contaminants remain due to residual chemical contamination, residual radiological contamination and contaminants associated with the building materials
- The "Contaminants of Concern" were selected based on the operational history and materials of construction of the X-326 Process Building
    - Non-Radiological contaminants (e.g. Metals, Asbestos, VOCs, PCBs)
    - Radiological contaminants (e.g. Uranium; Technetium)

Air Modeling Drives the Air Monitoring Program

- A comprehensive X-326 demolition air modeling effort was conducted during the demolition design process
- The report was peer reviewed by an independent expert retained by FBP and by a separate independent expert retained by DOE
- Air emissions calculations and air dispersion modeling assessments evaluate source-specific and cumulative impacts from activities planned
- D&D and all other site activities can be completed in compliance with Clean Air Act requirements and established emissions standards
- Ohio EPA concurred with the modeling report on May 20, 2020

This air modeling effort was used to establish appropriate locations for the Portsmouth Air Monitoring Network, parameters to be analyzed and action levels employed during work.

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UPDATE – Air Monitoring Locations

X-326 Demolition

- 8 locations

DOE/ODH Co-located

- 18 locations

DOE/OEPA Co-located

- 5 locations

Co-located Monitoring

- Provides a redundancy in air sampling to help confirm air emission impacts from on and off-site activities are consistently measured
- Regulators and the public have an independent mechanism to evaluate air emission data thus increasing confidence in the data collected
- Provides an increased level of transparency with state regulatory agencies

Co-located Air Monitoring Types

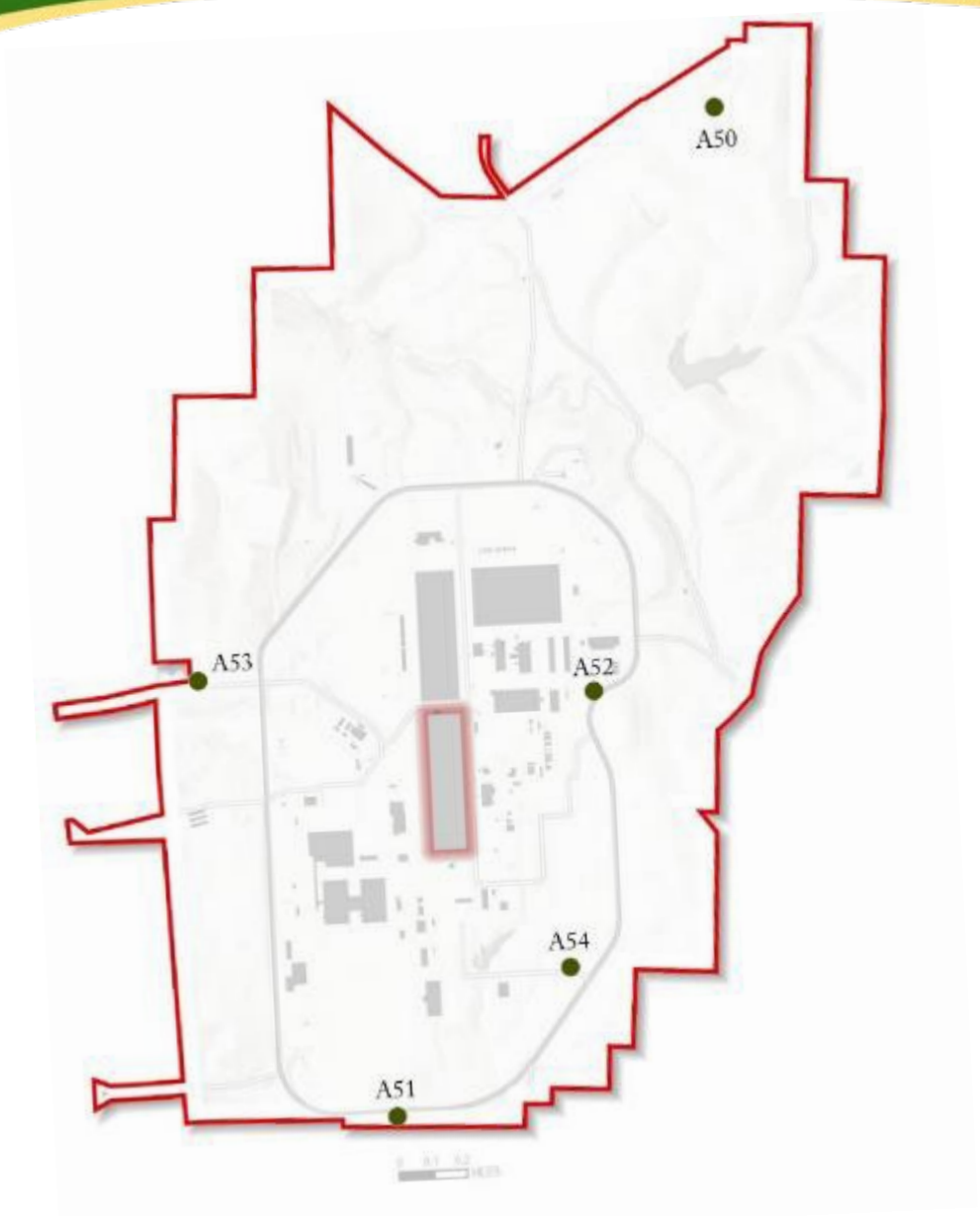
Ohio EPA/DOE Co-Located

- 5 locations on site
- Monitoring for:
  - Particulate matter
  - VOCs
  - Metals
  - Asbestos
- Data is gathered, analyzed and validated independent of DOE
- Data published quarterly

ODH/DOE Co-Located

- 18 locations on site and off site
- Monitoring for:
  - RADs (radiological)
  - Fluoride*
- Data is gathered, analyzed and validated independent of DOE
- Data published quarterly

DOE/Ohio EPA Non-Radiological Sampling



- Metals: Antimony, Arsenic, Beryllium, Cadmium, Chromium, Cobalt, Lead, Manganese, Mercury, Nickel, and Selenium are sampled weekly
- Volatile Organic Compounds (VOCs) (Trichloroethene and others) are sampled weekly
- Fibers/Asbestos fibers is sampled weekly

Non – Radiological Monitoring Limits

- Per Ohio EPA Technical Guidance, the Maximum Acceptable Ground-Level Concentration (MAGLC) is used as the basis for comparison of our air monitoring data.
- The MAGLC is a calculated value based on exposure and operational assumptions.
- The MAGLC is established for non-radiological parameters at the property boundary. Analytical data are then compared to the corresponding MAGLC.
- The use of the MAGLC and the associated calculations were presented in the Air Modeling Report approved by Ohio EPA

Threshold limit values come from OSHA and the American Conference of Governmental Industrial Hygienists

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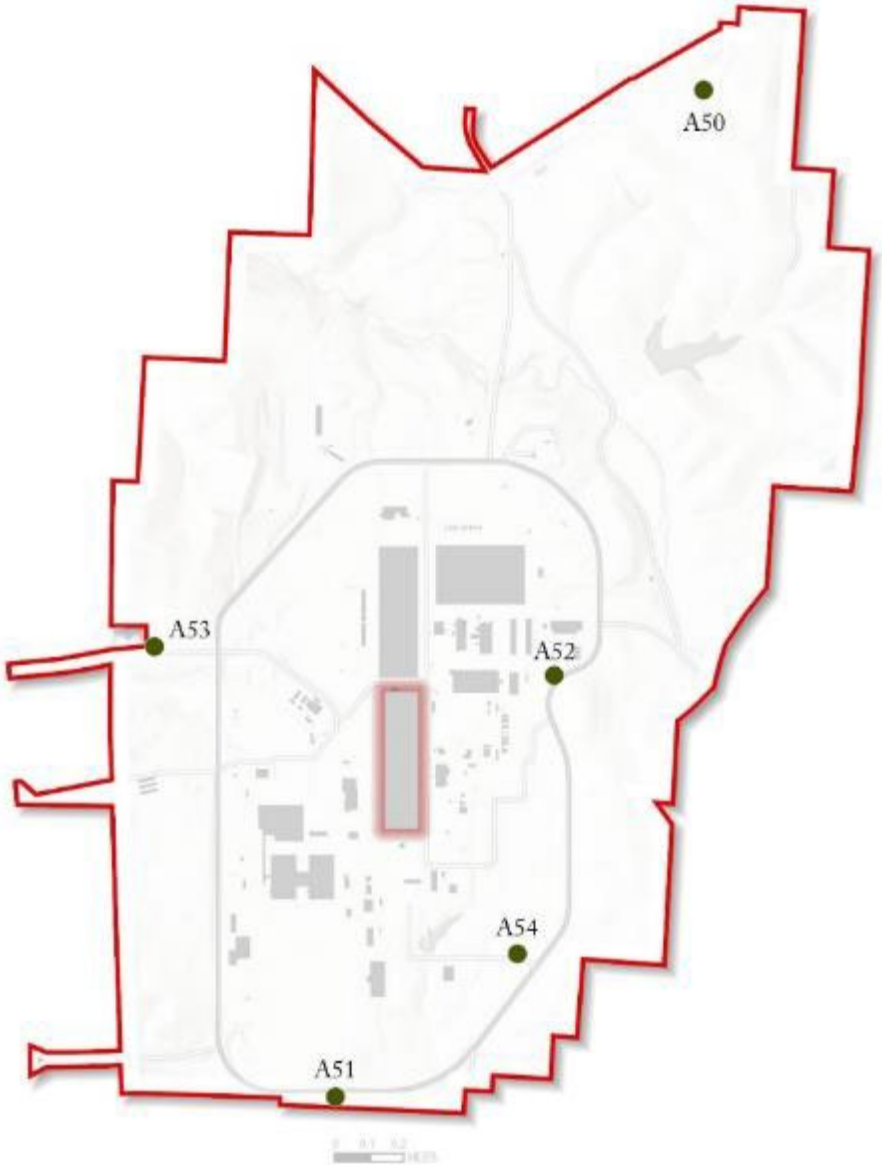
UPDATE – DOE Data at DOE/Ohio EPA Co-Located Stations



Analyte	MAGLC ($\mu g/m^3$)	MAX DETECT ($\mu g/m^3$)				
		A50	A51	A52	A53	A54
Metals						
Antimony	11.9	0.01275	0.01751	0.01065	0.01397	0.02003
Arsenic	0.238	0.00107	0.00098	0.00071	0.00083	0.00233
Beryllium	0.00119	0.00015	0.00021	None	0.00004	0.00026
Cadmium	0.0476	0.00209	0.00176	0.00279	0.00343	0.00190
Chromium	1.19	0.08327	0.01293	0.03881	None	0.03260
Cobalt	0.476	0.00324	0.00171	0.00220	0.00217	0.00179
Lead	1.19	0.05904	0.04946	0.04139	0.05806	0.03758
Manganese	0.476	0.03466	0.01968	0.01050	0.07215	0.09357
Mercury	0.595	0.00025	0.00022	0.00025	0.00022	0.00020
Nickel	2.38	0.02362	0.04485	0.01970	0.14994	0.01072
Selenium	4.76	0.00566	0.00542	0.00823	0.00709	0.00606
VOCs						
Trichloroethene	1334	0.40102	1.33308	1.73737	2.91200	0.62283

Data Range
Metals December 2020- November 2021
TCE December 2020- October 2021

Metal and VOC detects significantly below MAGLC values

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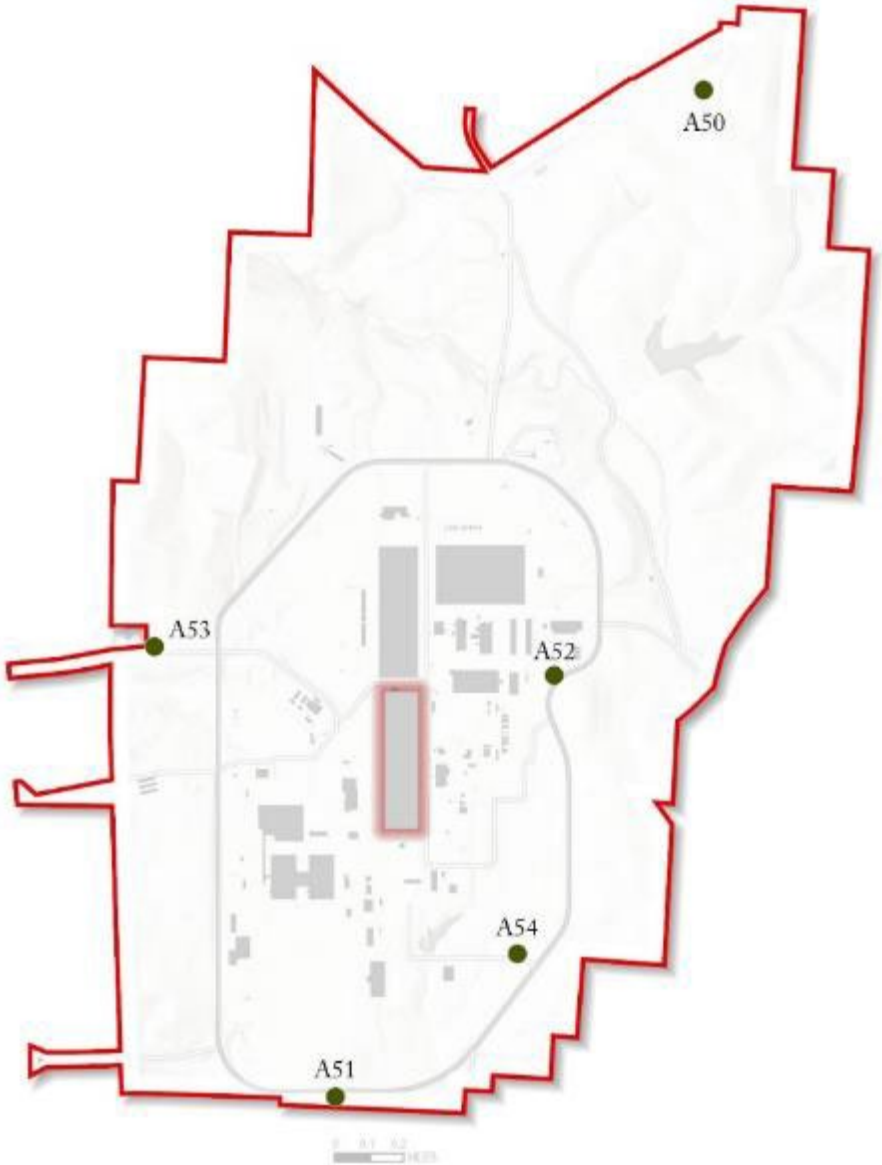
UPDATE – DOE Data at DOE/Ohio EPA Co-Located Stations



Analyte	MAGLC ($\mu g/m^3$)	AVG DETECT ($\mu g/m^3$)				
		A50	A51	A52	A53	A54
Metals						
Antimony	11.9	0.00192	0.00202	0.00184	0.00185	0.00199
Arsenic	0.238	0.00073	0.00071	0.00051	0.00055	0.00081
Beryllium	0.00119	0.00014	0.00021	None	0.00004	0.00011
Cadmium	0.0476	0.00039	0.00040	0.00060	0.00041	0.00030
Chromium	1.19	0.06953	0.01293	0.03580	None	0.01654
Cobalt	0.476	0.00063	0.00064	0.00046	0.00051	0.00031
Lead	1.19	0.01084	0.00770	0.00440	0.00938	0.00660
Manganese	0.476	0.01519	0.01184	0.00702	0.03012	0.03368
Mercury	0.595	0.00011	0.00006	0.00012	0.00008	0.00006
Nickel	2.38	0.00834	0.01119	0.00648	0.02294	0.00348
Selenium	4.76	0.00274	0.00200	0.00156	0.00209	0.00126
VOCs						
Trichloroethene	1334	0.21591	0.61718	0.29175	0.59970	0.21604

Data Range
Metals December 2020- November 2021
TCE December 2020- October 2021

Metal and VOC detects significantly below MAGLC values

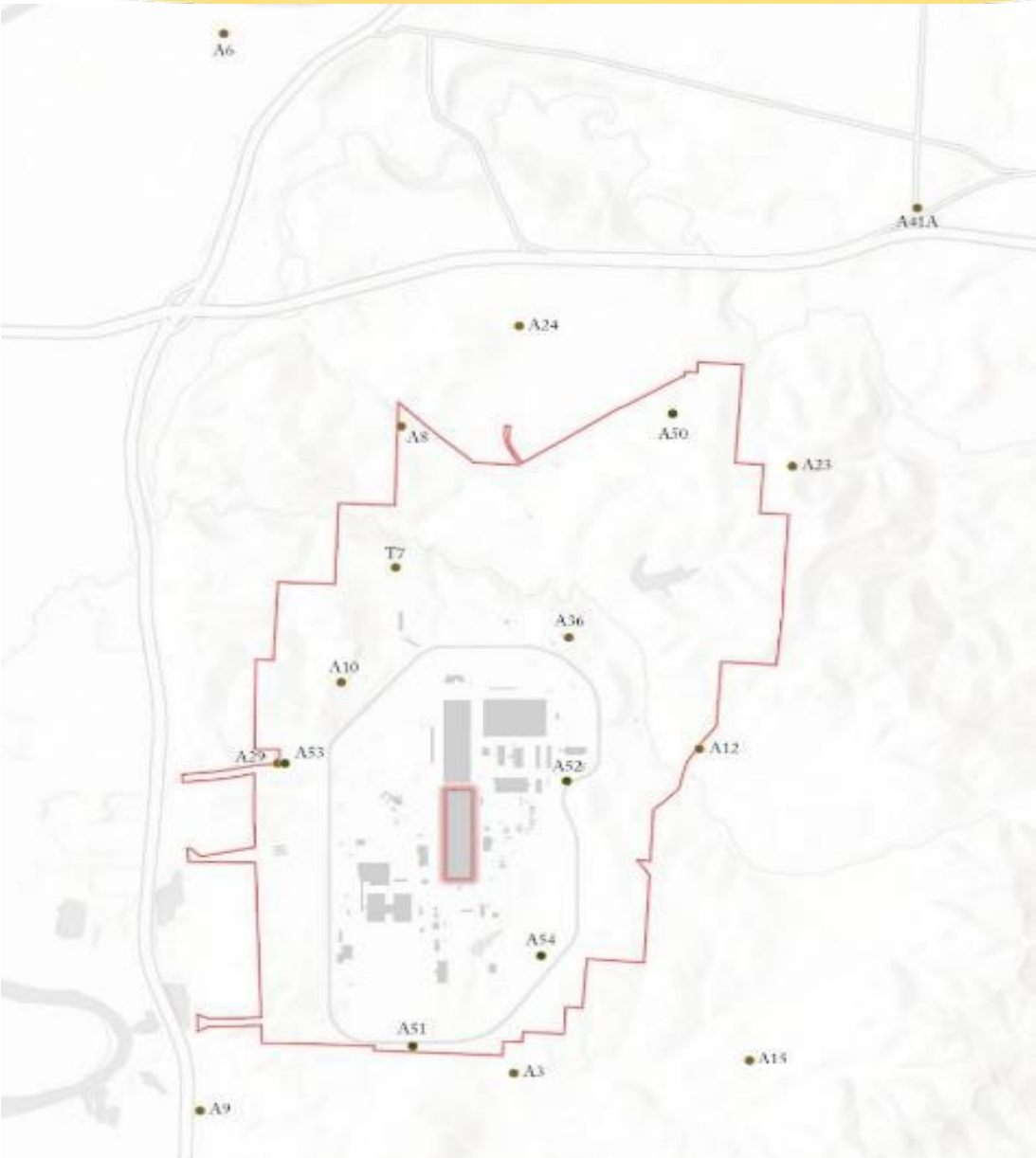
Airborne Asbestos Sampling

- Airborne asbestos sampling is taken on a weekly frequency
  - Sampling collects all fibers
  - Asbestos monitoring is also conducted Industrial Hygiene technicians for worker protection
- DOE uses National Institute for Occupational Safety and Health (NIOSH) approved methods
  - NIOSH methods for sampling and analysis are nationally recognized and standard industry practice
- Samples are sent to an independent laboratory for analysis

No indication of asbestos fibers at the DOE/Ohio EPA co-located air

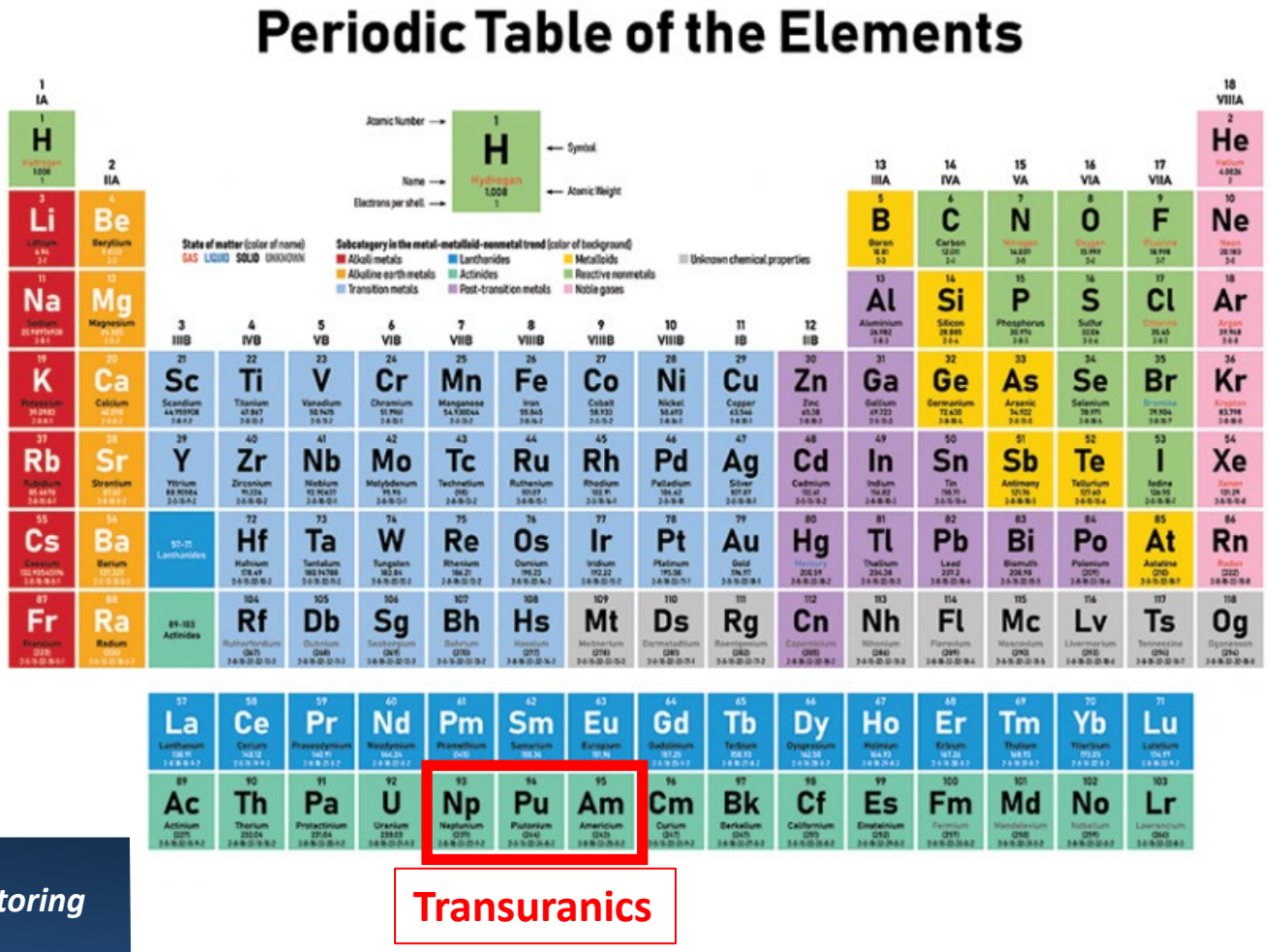
DOE/ODH Co-Located Radiological Sampling

- Transuranics: Americium-241, Neptunium-237, Plutonium-238, Plutonium-239/240 (sampled quarterly)
- Thorium Isotopes: Thorium-228, Thorium-230, Thorium-232 (sampled quarterly)
- Total Uranium (sampled monthly)
  - Uranium Isotopes: Uranium-233/234, Uranium-235/236, Uranium-238
- Technetium-99 (sampled monthly)

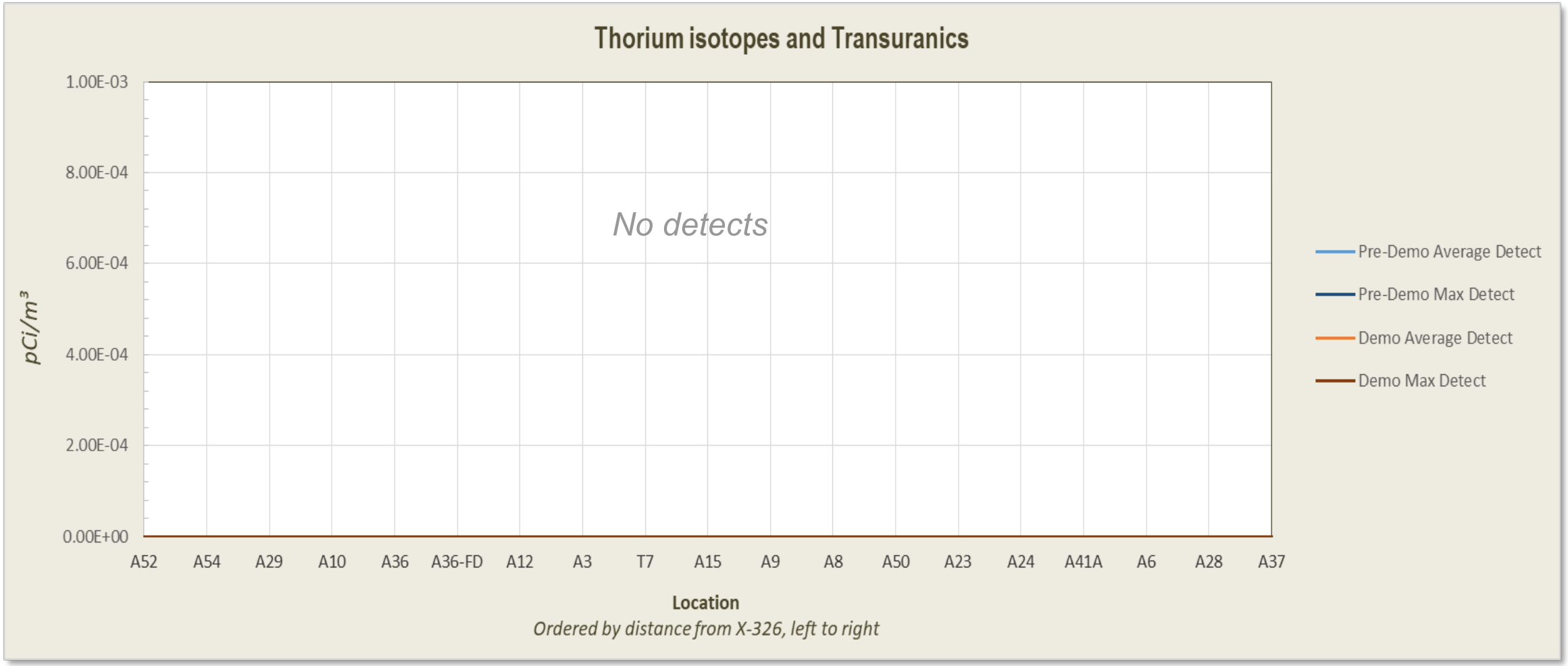


Transuranics at Portsmouth

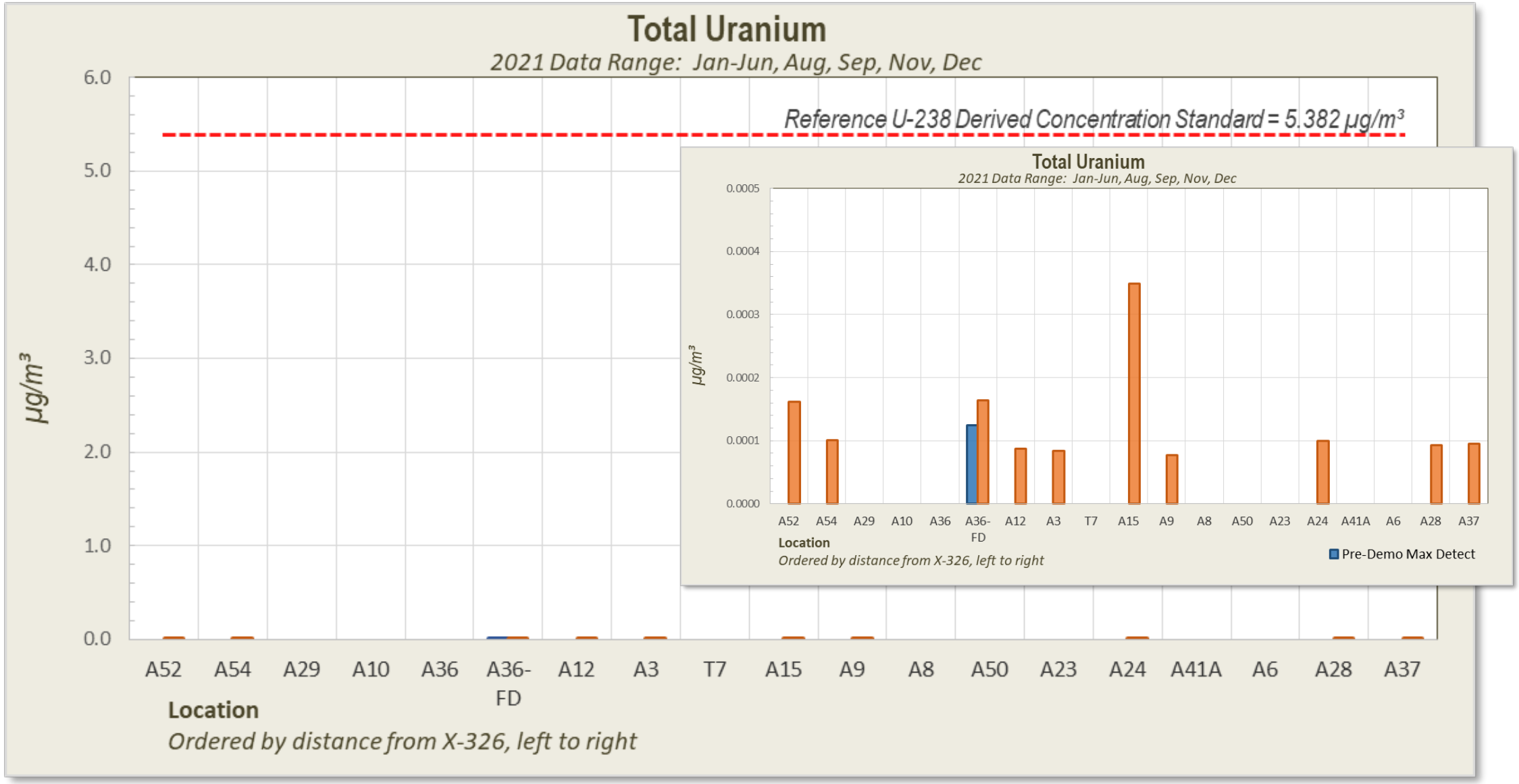
- Transuranic elements (e.g., Np, Pu, Am) are heavier than uranium and listed after uranium on the Periodic Table of the Elements
- Isotopes of Np, Pu, and Am have been continuously monitored at the ambient air monitors in and around PORTS since the mid-90s
- Transuranic isotopes have been occasionally detected in ambient air samples at concentrations well below the regulatory limits through the last two plus decades

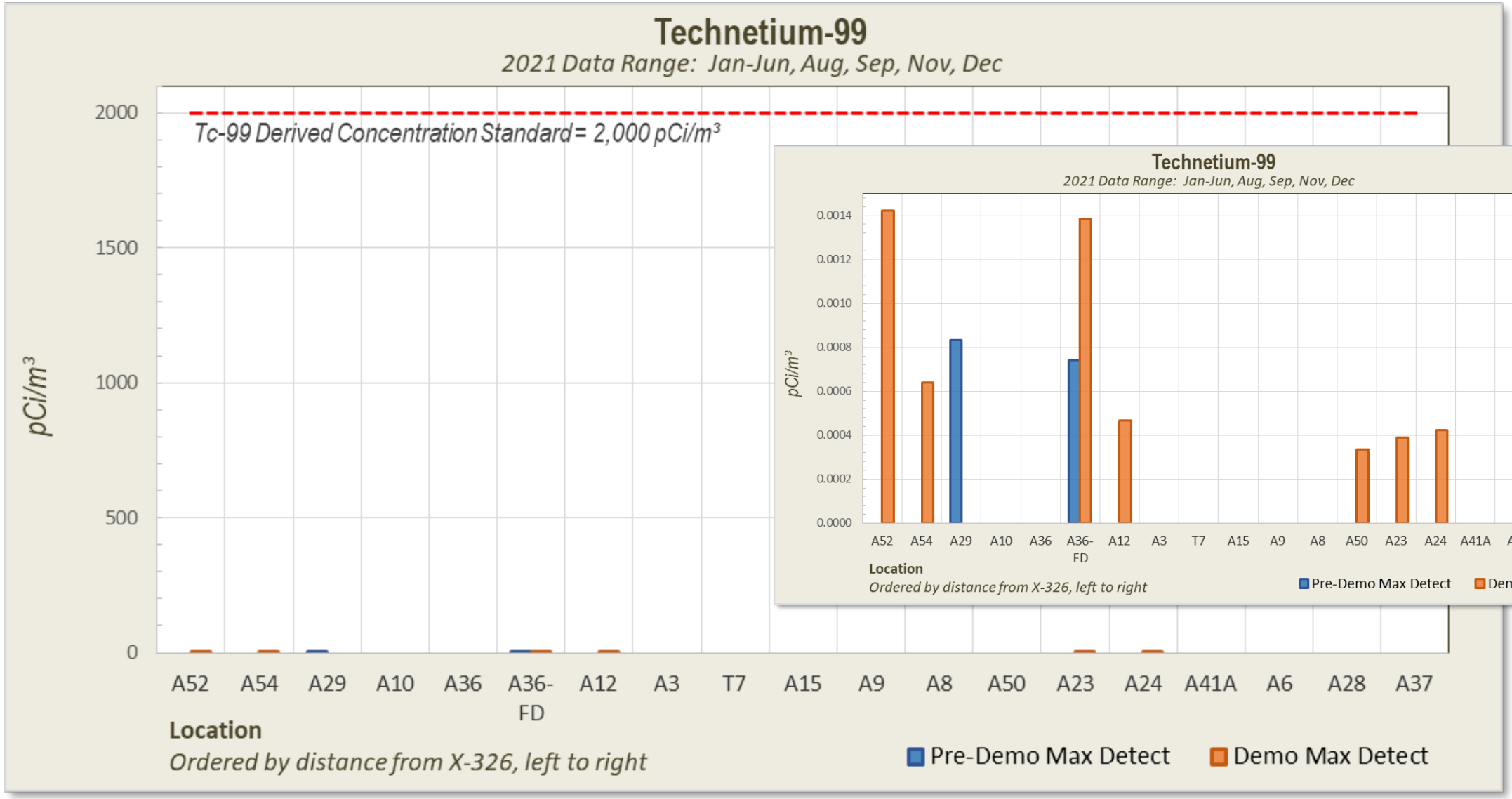


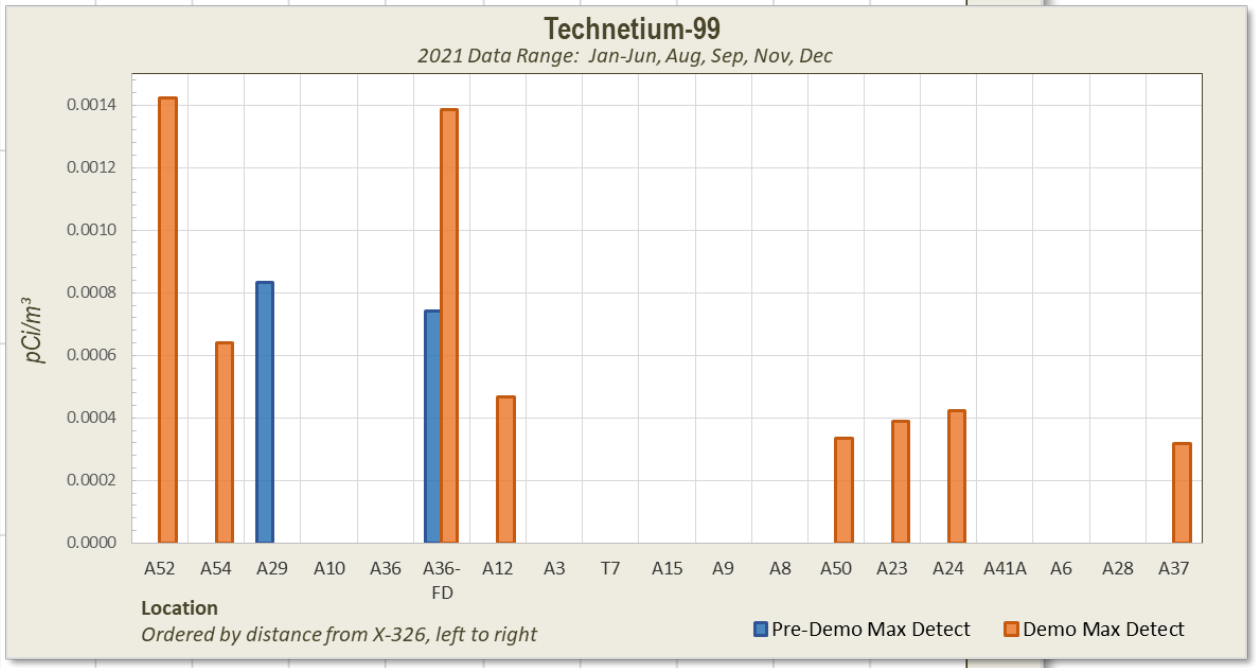
No Transuranic isotopes have been detected in any ambient air monitoring samples during X-326 demolition to date



Pre-Demolition data range: January-February 2021
Demolition data range: March-June 2021


Total Uranium
2021 Data Range: Jan-Jun, Aug, Sep, Nov, Dec
Reference U-238 Derived Concentration Standard = 5.382 µg/m³
µg/m³
6.0
5.0
4.0
3.0
2.0
1.0
0.0
A52 A54 A29 A10 A36 A36-FD A12 A3 T7 A15 A9 A8 A50 A23 A24 A41A A6 A28 A37
Location
Ordered by distance from X-326, left to right
Total Uranium
2021 Data Range: Jan-Jun, Aug, Sep, Nov, Dec
µg/m³
0.0005
0.0004
0.0003
0.0002
0.0001
0.0000
A52 A54 A29 A10 A36 A36-FD A12 A3 T7 A15 A9 A8 A50 A23 A24 A41A A6 A28 A37
Location
Ordered by distance from X-326, left to right
Pre-Demo Max Detect


Technetium-99
2021 Data Range: Jan-Jun, Aug, Sep, Nov, Dec
Tc-99 Derived Concentration Standard = 2,000 pCi/m³
pCi/m³
2000
1500
1000
500
0
A52
A54
A29
A10
A36
A36-FD
A12
A3
T7
A15
A9
A8
A50
A23
A24
A41A
A6
A28
A37
Location
Ordered by distance from X-326, left to right
Pre-Demo Max Detect
Demo Max Detect


Technetium-99
2021 Data Range: Jan-Jun, Aug, Sep, Nov, Dec
pCi/m³
0.0014
0.0012
0.0010
0.0008
0.0006
0.0004
0.0002
0.0000
A52
A54
A29
A10
A36
A36-FD
A12
A3
T7
A15
A9
A8
A50
A23
A24
A41A
A6
A28
A37
Location
Ordered by distance from X-326, left to right
Pre-Demo Max Detect
Demo Max Detect

X-326 Co-Located Air Monitoring Summary

- Results from DOE co-located air monitors are consistent with Ohio EPA and ODH independent monitoring data.

- The current results from all monitors including DOE and State of Ohio indicate no detects have been found above regulatory limits

- Monitoring data posting websites:
  - **DOE** –https://pegasis.ports.pppo.gov
  - **Ohio EPA** – https://epa.ohio.gov/dapc/ams/amsmain/AMSSpecSam-DOE
  - **ODH** – https://data.ohio.gov/wps/portal/gov/data/view/doe-portsmouth-facility_-radiological-air-sampling-results

Air Monitoring & Managing Risk

Kathryn Higley, PhD, CHP, HPS Fellow

Professor

Oregon State University
College of Engineering

Kathryn A. Higley is a Professor, and former Head of the School of Nuclear Science and Engineering in the College of Engineering at Oregon State University. She is the Interim Director of the Center for Quantitative Life Sciences. She has managed OSU's Radiation Health Physics program, including developing its online graduate degree, into the largest in the country.

Dr. Higley has been at Oregon State University since 1994 teaching undergraduate and graduate classes on radioecology, dosimetry, radiation protection, radiochemistry, and radiation biology. She is also a council member of the National Council on Radiation Protection. She is a board member and fellow of the Health Physics Society and a Certified Health Physicist. Dr. Higley and her students have done research in radiologically contaminated environments around the globe.

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Employment

Risk Varies

Home Life

Recreation

Safety regulations vary, based on type of activity

Close-in *and* distant monitoring are used, for radioactivity and airborne releases

- Example from decommissioning at another DOE site→
- "Bullseye" pattern
  - Highest concentrations generally close-in to ongoing work
- At PORTS
  - Multiple ***movable*** monitors follow work activity
  - Protecting public and environment (lower concentrations), may require longer sampling times and use of ***fixed*** monitor locations

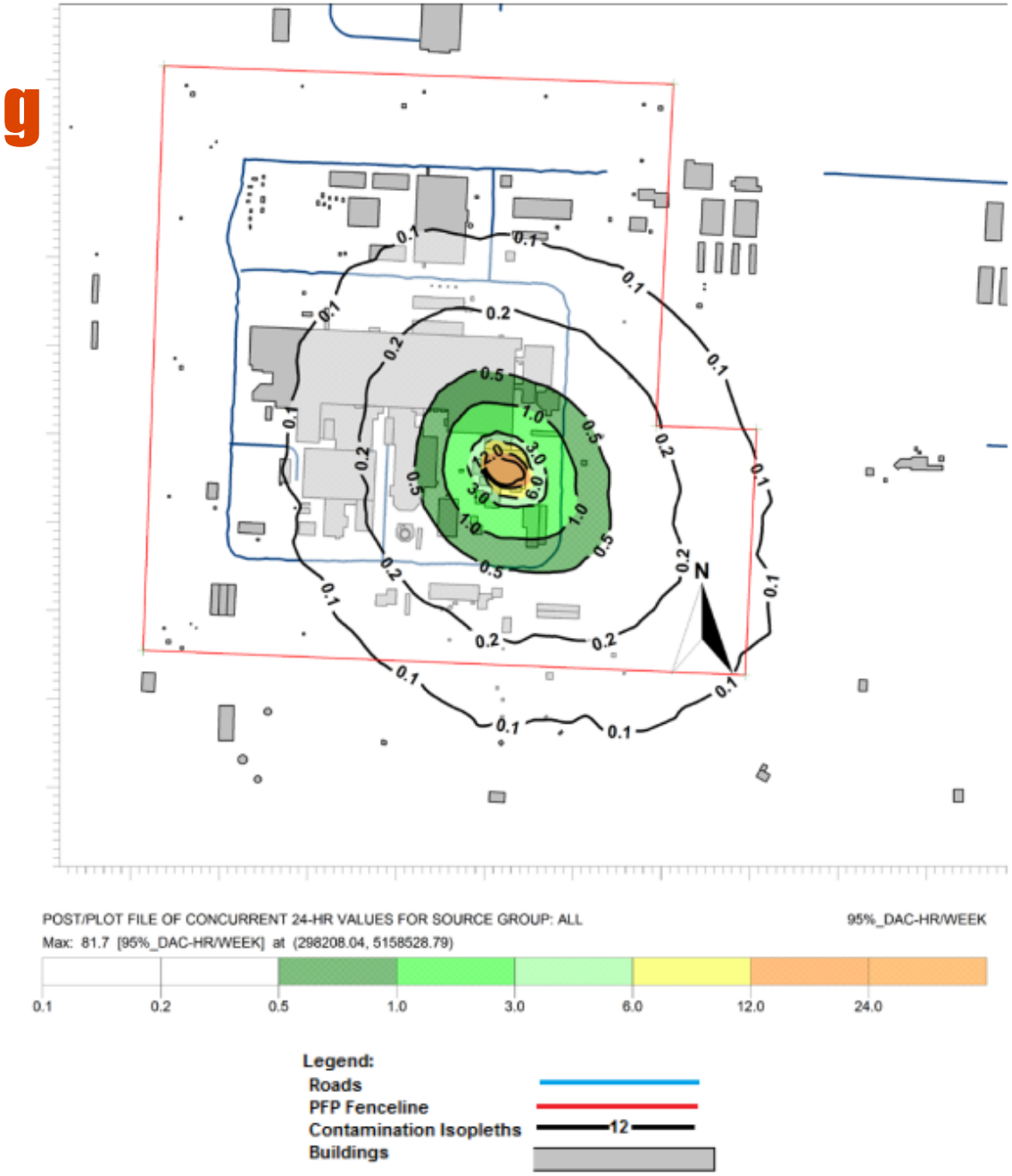


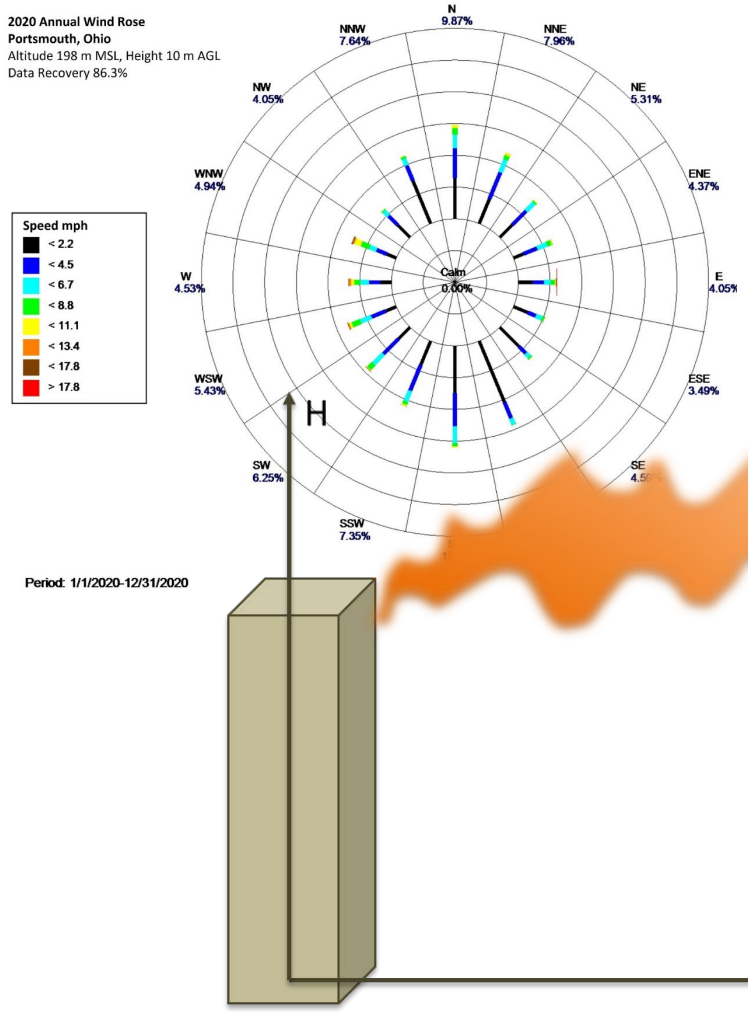
Figure S.2. Predicted Weekly Air Exposure (DAC-hr/week) 95th Percentile Values for 236Z Rubble Pile Removal for the 60-day Removal Option

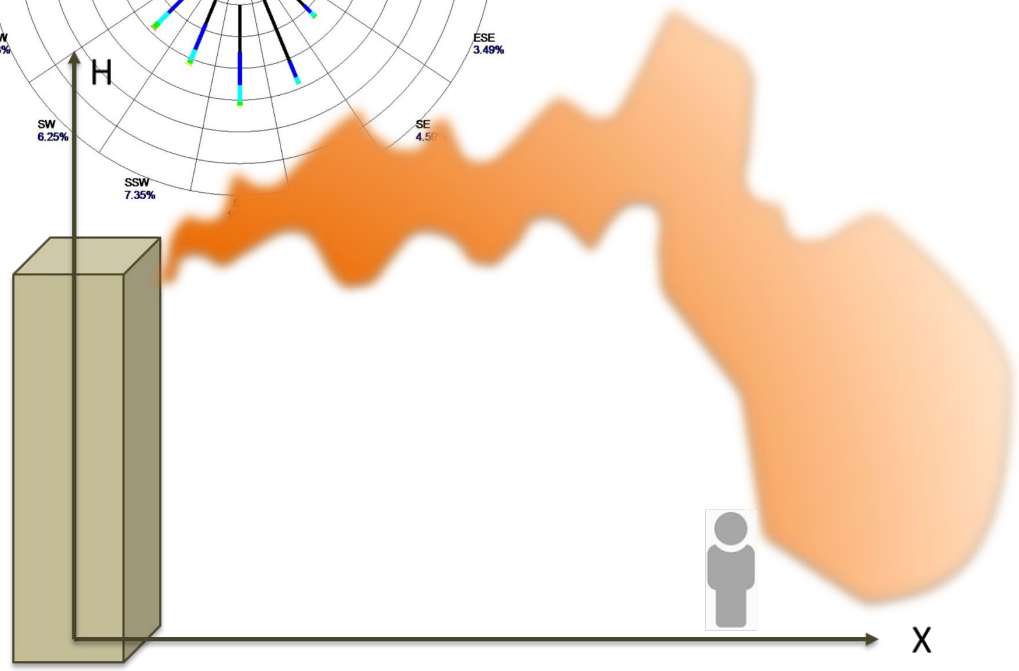
Placing air monitors

→ Windrose shows most common directions and wind speeds

→ How far from the release should monitors be located?

- Computer models predict locations
- Sampling locations assess and confirm





Ground level concentration at point x

Exposure Times & Limits

- Occupational:
  - 40+ hour per week exposure
  - Age ~ 18 – 70 years
- Public:
  - Assume up to 24-hour continuous exposure
  - All ages and includes at risk or sensitive groups (very young or very old)
- Result:
  - Different exposure limits for each group
  - Public limits lower (10% to 0.2%)

What's being sampled

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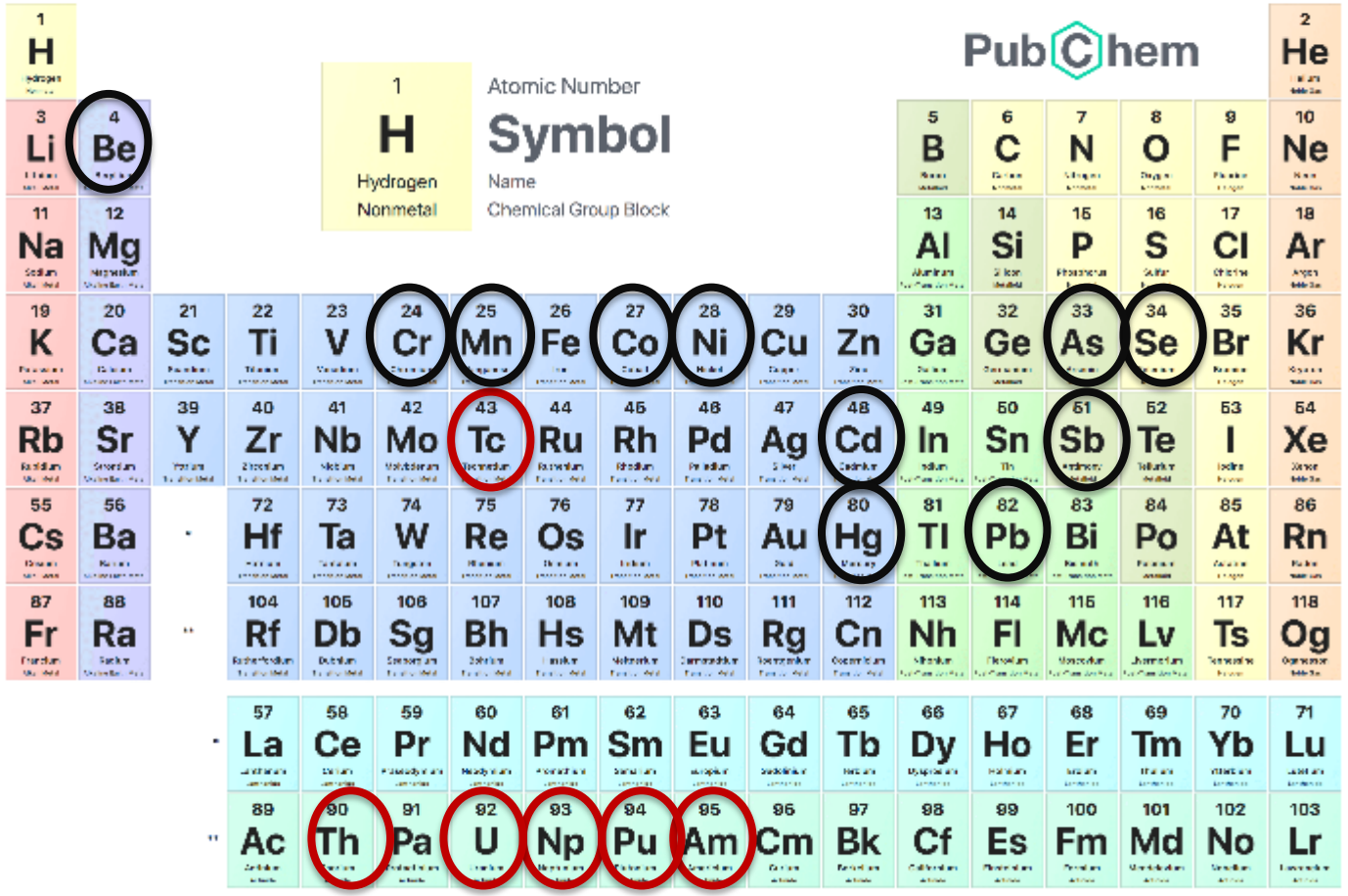
Metals	Radionuclides
Antimony	Americium-241
Arsenic	Neptunium-237
Beryllium	Plutonium-238
Cadmium	Plutonium-239/240
Chromium	Thorium-228
Cobalt	Thorium-230
Lead	Thorium-232
Manganese	Total Uranium
Mercury	Uranium-233/234
Nickel	Uranium-235/236
Selenium	Uranium-238
	Technetium-99

Asbestos

Volatile organic compounds



Potential Sources

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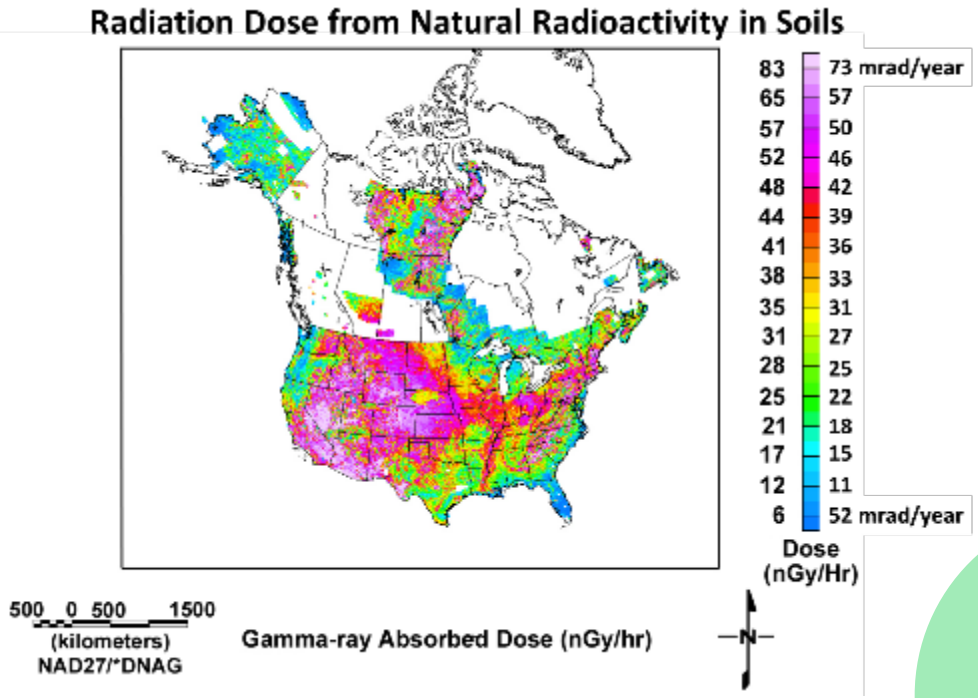
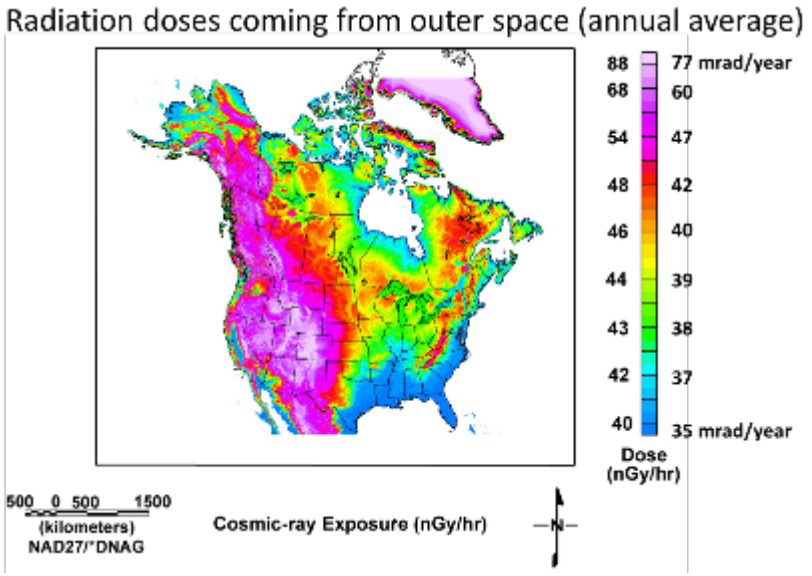
- Metals
  - Geochemical (natural)
  - Human caused: electronics, coal plants, vehicle exhaust
- Radionuclides
  - Uranium (natural, mining, fertilizers, nuclear…)
  - Technetium (fallout, nuclear)
- Other
  - Asbestos (natural and technology)
  - Volatile organics (autos, factories, fires..)

Radiation Sources & Doses for the Public



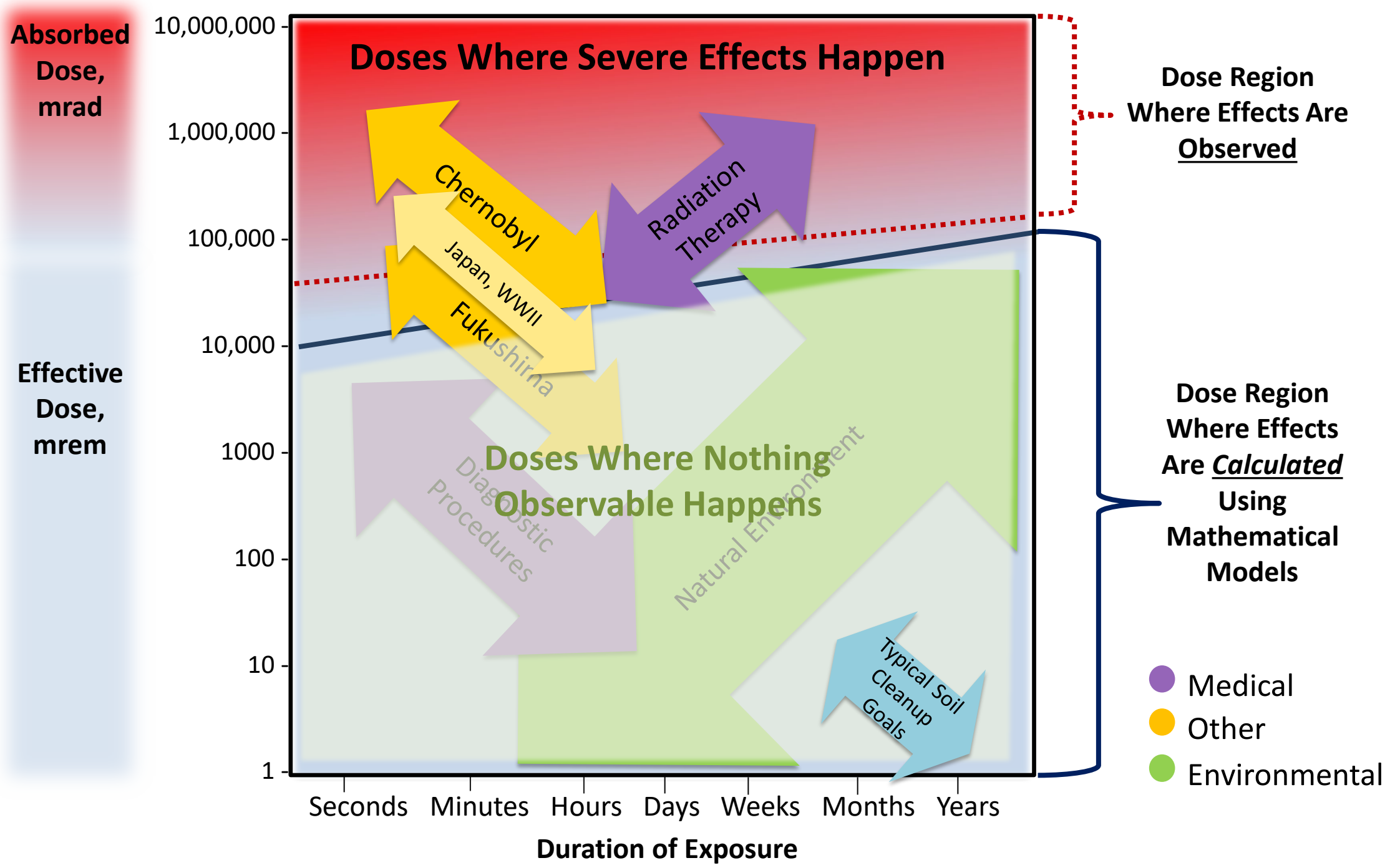


Natural ~ 300 mrem/yr

Background: ~ 600 mrem/yr

Medical ~ 300 mrem/yr

PORTS public dose ~ 1 mrem/yr


Absorbed Dose, mrad
Effective Dose, mrem
10,000,000
1,000,000
100,000
10,000
1000
100
10
1
Doses Where Severe Effects Happen
Chernobyl
Japan, WWII
Fukushima
Radiation Therapy
Doses Where Nothing Observable Happens
Diagnostic Procedures
Natural Environment
Typical Soil Cleanup Goals
Seconds
Minutes
Hours
Days
Weeks
Months
Years
Duration of Exposure
Dose Region Where Effects Are Observed
Dose Region Where Effects Are Calculated Using Mathematical Models
Medical
Other
Environmental

How to Achieve this Endpoint

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The requirements

- Protect workers
- Protect the public
- Protect the environment

The process

- Review, analyze, plan, implement
  - Pick monitoring locations for safety & relevance
  - Decontaminate & decommission & deconstruct
  - Release for redevelopment

Summary

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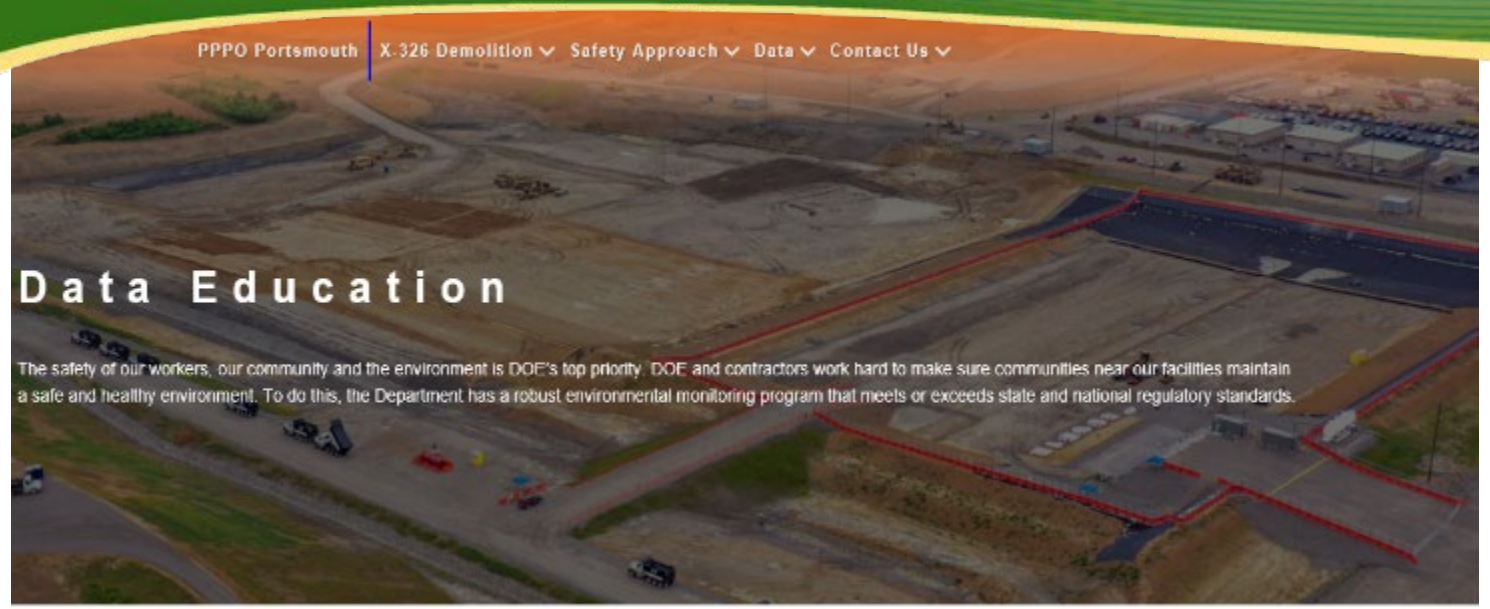
- Acceptable / regulated risk varies
  - Work
  - Play
  - General living

- The goal of remediation
  - Not to eliminate all risk from site
  - Reduces risk to acceptable level for workers, public and environment
  - Safety *is* always part of the consideration

- Thank you!

OFFICE OF ENVIRONMENTAL MANAGEMENT

X-326 Demolition Data Website



WHAT IS ENVIRONMENTAL MONITORING?

Environmental monitoring is a system of monitors that sample at regular times. The samples are then analyzed at a laboratory and assessed to see if site activities have any impact on the public or the environment.

Environmental Monitoring at the Portsmouth site

At DOE's Portsmouth site, years of environmental studies conducted on and around the site revealed what type of contaminants were associated with uranium enrichment operations. Scientists, health officials, and risk professionals created a plan to monitor for those contaminants to maintain the safety of workers, the public and the environment.

At Portsmouth, DOE has installed an extensive monitoring program that samples for radiological and chemical contaminants in air, water, soil, sediment, and biota (animals, vegetation, crops) on and near the plant site. Each year, DOE collects, reviews and reports on more than 10,000 environmental samples. The Annual Site Environmental Report (ASER) is published each year to report the results of these monitoring efforts. Copies of the ASER are available here.

- www.portsdemo.com is a new DOE website focusing on X-326 project air monitoring data
- Website will include:
  - Updated real time and co-located monitoring data
  - Project updates
  - Frequently Asked Questions

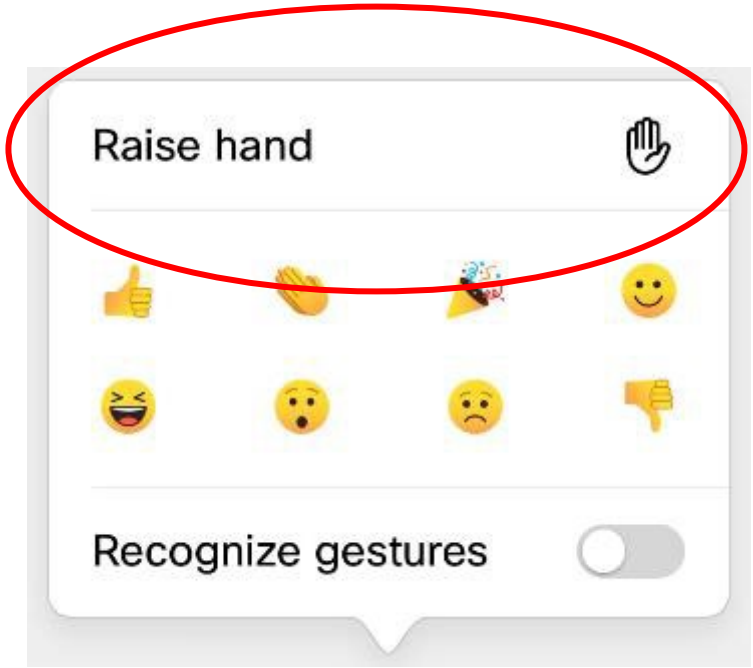
How to have your voice heard

Email: ports-demo-questions@pppo.gov

Add a question via the chat on YouTube

Add a question via the Chat on WebEx

Participate in the Public Comment Session

Public Comment Protocols

- Raise your hand to be identified
- Be courteous and treat everyone with respect.
- We ask that you keep comments within a 3-4 minute timeframe to allow for all interested parties to speak. Additional or lengthy comments can be submitted in writing.
- In order to reduce background noise, speakers will be unmuted during their public comment and then will return to mute afterwards.