

# Dismantlement & Disposal of High Flux Beam Reactor Building 705 (The Stack)

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Brookhaven National Laboratory  
Community Advisory Council  
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US Army Corps  
of Engineers®



with Teaming Partners  
**Cabrera Services, Inc.**  
**ICC Commonwealth**  
**GEI**



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# Introduction



## Name

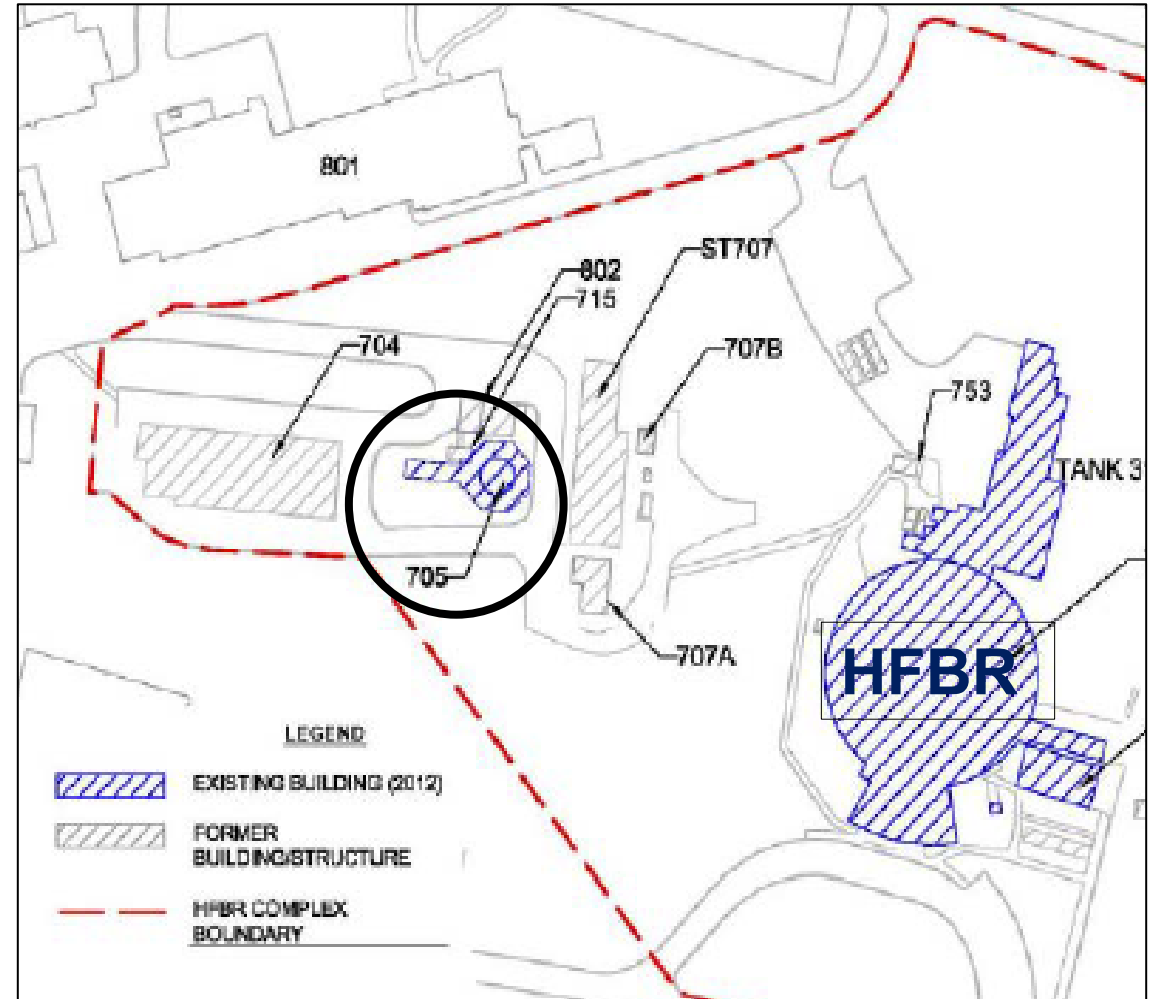
Matthew Creamer  
Project Manager – NY District  
US Army Corps of Engineers

## Tonight's presentation and discussion:

- Scope of Work
- Remedy Implementation Status
- Mitigation and Monitoring
- Next Steps/Schedule

## Questions:

- For clarifying? At any time.
- Deeper dive? Save for the end, please.





# Scope of Work



## Project Scope Includes:

- Exterior Paint Abatement and Exterior Platforms Removed (Completed)
- Stack Demolition (Completed)
- Soil Excavation
- Packaging and Shipment of Wastes
- Final Status Survey, Third Party Verification, Site Restoration



Perform all work safely and within quality standards



# Remedy Implementation

## Contractor Team

Olgoonik-FPM JV contracted to conduct stack dismantling and disposal using the remote controlled “hydraulic breaking” method. Project team includes:

- **Olgoonik-FPM Joint Venture (OFJV)** Prime Contractor
- **ICC Commonwealth (ICC)** Internal/External stack structure removal, exterior coating abatement, demolition means and methods
  - Design, build, inspect, repair and demolish stacks/chimneys since 1927
  - Since 2013, completed 33 stack/chimney demolitions using MANTIS demolition machine, which was used on the stack
- **Cabrera Services Inc.** Radiological controls and waste management
- **GEI Consultants** Vibration Monitoring and Management



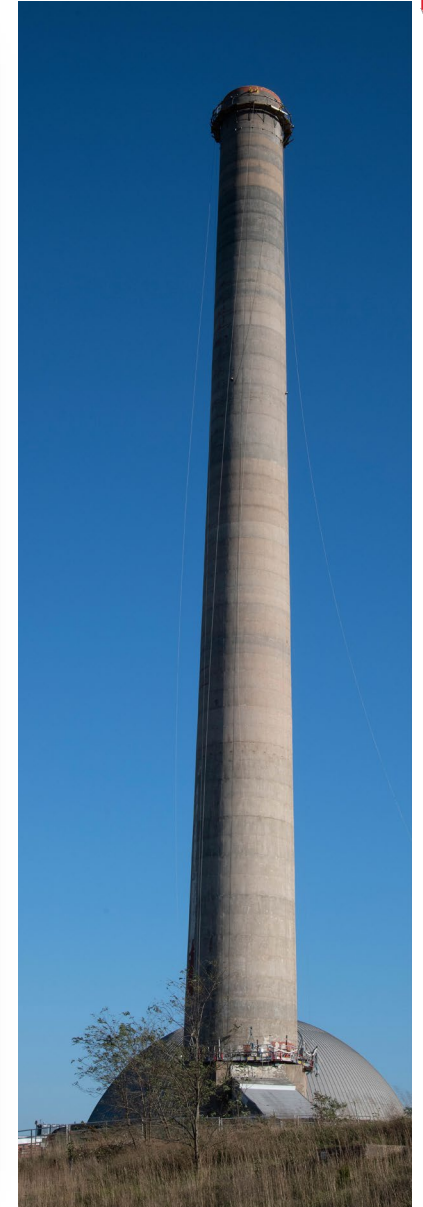
# Remedy Implementation



## Exterior Paint Abatement

### August – November 2020

- Exterior coating and water pumped to a vacuum box lined with an asbestos-approved bladder bag.
- During abatement, wastewater ran to a holding tank. Holding tank water was then treated through a series of filters.
- Water tested after filtration to verify process performed as expected and currently being prepared for transport to an approved off-site disposal facility.
- Air monitoring done throughout entire abatement process.



# Mitigation and Monitoring

## Exterior Paint Abatement

### Work Planning/Mitigation

- Primary hazards were associated with lead and asbestos; mitigated through the closed-loop coating abatement and filtration processes system.
- Conducted verification radiological field tests of coatings as abatement crew proceeded up the Stack.
- At the top of the Stack, slightly elevated fixed surface contamination was detected. Abatement was paused and removal of the top of the Stack occurred using demolition-related radiological monitoring and mitigative controls established per the Radiation Protection Plan.
- Additional mitigation measures included the use of HEPA-filtered decontamination tools and misting dust suppression

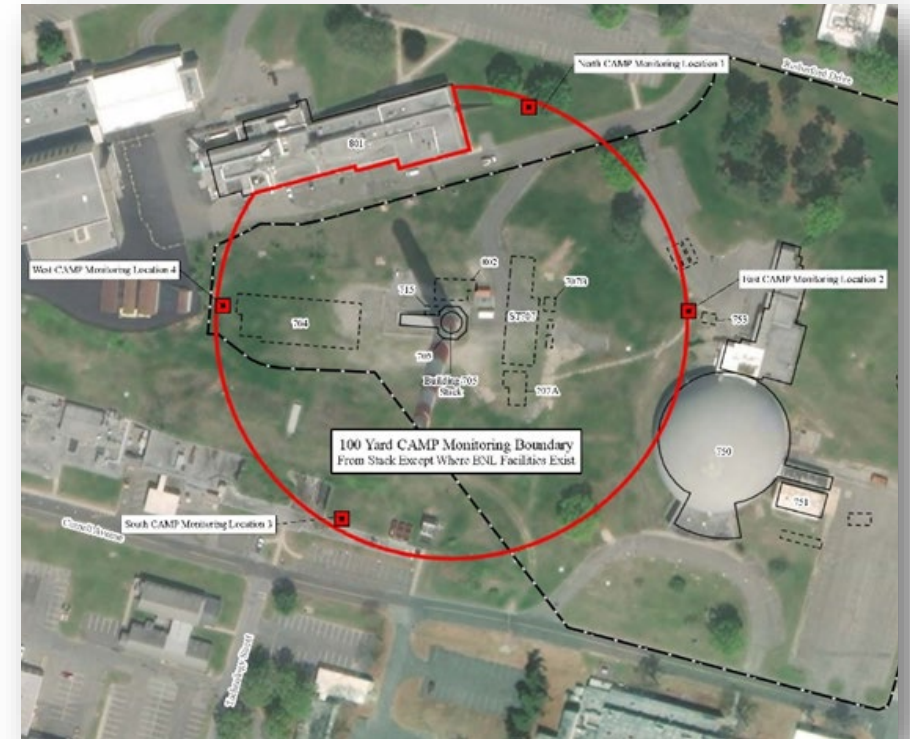


# Mitigation and Monitoring

## Exterior Paint Abatement

### Monitoring

- Community Air Monitoring Plan (CAMP) is being implemented, in accordance with NY State Department of Environmental Conservation (NYSDEC) requirements, to monitor for dust and particles at the perimeter of the work zone.
- The air monitoring stations continuously collect dust/particulate matter (PM) samples for immediate real-time analysis.
- Air samples were collected at four monitoring stations at the construction site perimeter for lead and asbestos during coating abatement and, breathable silica during demolition activities.
- Air samples for relevant activities were also collected within the work zone area to monitor demolition workers
- Worker monitoring during coating abatement was completed for asbestos and lead while monitoring during demolition includes silica sampling and radiation monitoring.





# Mitigation and Monitoring

## Exterior Paint Abatement



### Results

- No Exceedances of OSHA Permissible Exposure Limits (PEL) were identified for lead and asbestos during coating abatement personnel monitoring.
- All air samples collected during CAMP monitoring were analyzed by the approved laboratory under the Quality Assurance Project Plan (QAPP) and reviewed by regulators showing no exceedances of agreed upon CAMP action limits of  $4.5 \mu\text{g}/\text{m}^3$  for lead and 0.1 f/cc for asbestos at the CAMP boundary.
- During demolition activities, Silica CAMP sampling results were well below  $25 \mu\text{g}/\text{m}^3$  CAMP action limits due to continued implementation of engineering controls.





# Industrial Hygiene Sampling at the High Flux Beam Reactor Stack

Megan Magrum, Industrial Hygiene Program Manager  
CAC Meeting, March 11<sup>th</sup>, 2021

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# Paint Abatement Asbestos/Lead Sampling Locations

Exterior Building 703  
Exterior Building 815  
Exterior Building 480  
Exterior Building 510  
Exterior Building 801  
Exterior Building 901



- The sampling locations and frequency of sampling were selected by evaluating wind directions and proximity of personnel in nearby buildings. Sampling during abatement activities occurred at the six (6) exterior locations approximately twice a week.
- Due to the mitigation techniques utilized by USACE as well as the fact that the lead and asbestos were bound within the paint matrix, it was determined to be unlikely that results for airborne lead and asbestos would exceed the OSHA and American Conference of Governmental Industrial Hygienists (ACGIH) limits.

# Paint Abatement Asbestos/Lead Results

## Regulatory Limits

Substance	ACGIH Threshold Limit Values (TLV)	OSHA Standards Permissible Exposure Limits (PEL)	
	TLV-TWA-8-hr	PEL 8-hr	Action level 8-hr
Asbestos	0.1 f/cc	0.1 f/cc	NA
Lead	50 ug/m <sup>3</sup>	50 ug/m <sup>3</sup>	30 ug/m <sup>3</sup>

## Asbestos Sampling Results

Building	Asbestos (f/cc)	
	Average TWA	Standard Deviation
901	0.0028	0.0017
703	0.0027	0.0010
480	0.0030	0.0011
510	0.0026	0.0011
815	0.0023	0.0004
801	0.0026	0.0008

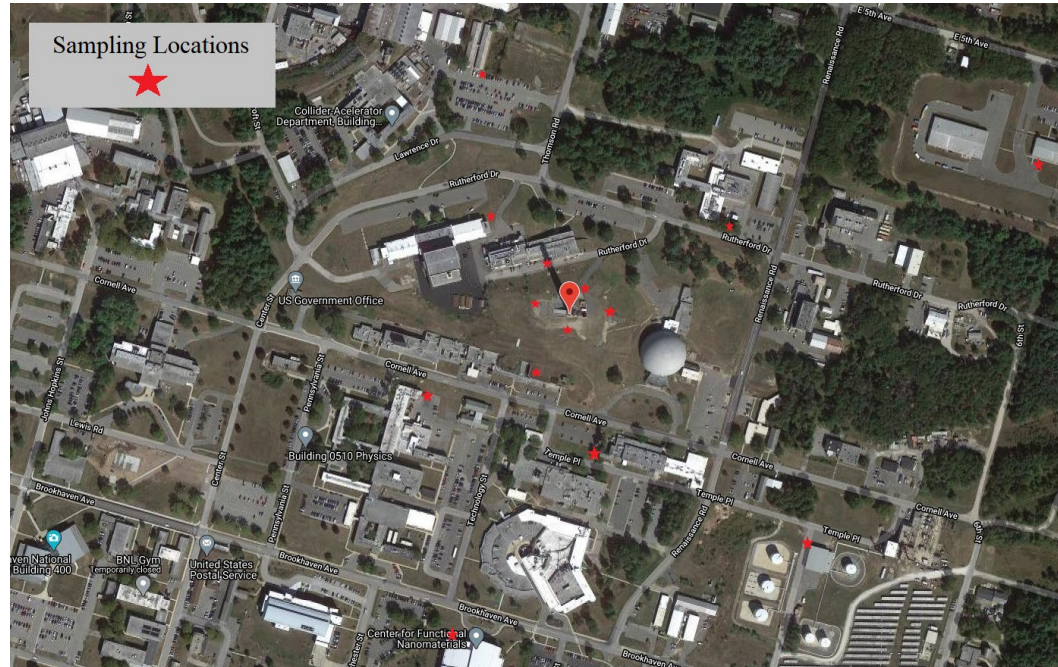
Monitoring Pump



- All airborne lead results obtained at the six (6) locations were below the detectable limit with an 8-hr TWA value < 0.21 ug/m<sup>3</sup>.
- Airborne fiber results collected ranged from below the detection limit to a calculated 8-hr TWA of .0078 f/cc, significantly below the OSHA and ACGIH limit of 0.1 f/cc.

# Stack Demolition Silica Sampling Locations

Exterior Building 703  
Exterior Building 815  
Exterior Building 480  
Exterior Building 510  
Exterior Building 801  
Exterior Building 901  
Exterior Building 860 'WM'  
Exterior Building 923  
Exterior Building 735 'CFN'  
Exterior Building 639 'Birdhouse'  
Exterior Fence line – North Direction  
Exterior Fence line – East Direction  
Exterior Fence line – South Direction  
Exterior Fence line – West Direction



- Sampling locations were selected to provide a range of distances to assess the environment for airborne silica and dust. Other factors considered included wind patterns for this time of year and potential impact to personnel. Sampling during demolition activities occurred ~daily during demolition activities.
- Due to the mitigation techniques utilized by the USACE, it is expected that any measurable quantities of silica and dust would not exceed the OSHA and ACGIH limits.

# Stack Demolition Silica & Dust Results

## Regulatory Limits

Substance	ACGIH Threshold Limit Values (TLV)		OSHA Standards Permissible Exposure Limits (PEL)	
	TLV-TWA-8-hr	Action Level 8-hr TLV	PEL 8-hr	Action level 8-hr
Silica	25 ug/m <sup>3</sup>	12 ug/m <sup>3</sup>	50 ug/m <sup>3</sup>	25 ug/m <sup>3</sup>
Dust	NA	NA	5 mg/m <sup>3</sup> (respirable)	NA

Note: The following ACGIH limits established for dust are recommended:

Substance	ACGIH Threshold Limit Values (TLV)
Dust (Respirable)	3 mg/m <sup>3</sup>
Dust (Inhalable)	10 mg/m <sup>3</sup>

# Stack Demolition Silica & Dust Results

## Silica & Dust Sampling Results

Building	< LOD*	Avg TWA - Silica (ug/m3)	Standard Deviation	Avg TWA - Dust (mg/m3)	Standard Deviation
Building 815	<	8.26	0.10	0.04	0.00
Building 923		8.25	0.06	0.04	0.00
Building 703		8.22	0.12	0.04	0.00
Building 801		8.25	0.10	0.04	0.01
Fence-line North		8.19	0.14	0.04	0.00
Fence-line South		7.89	1.41	0.04	0.01
Fence-line East		8.26	0.25	0.04	0.01
Fence-line West		8.21	0.12	0.04	0.00
Building 901		8.21	0.10	0.04	0.00
Building 510		8.31	0.30	0.04	0.01
Building 735 (CFN)		8.22	0.02	0.04	0.00
Building 480		8.07	0.80	0.04	0.00
Building 860 (WM)		8.19	0.04	0.04	0.01
Building 639 (Birdhouse)		8.20	0.04	0.04	0.00

\*Limit of detection

- All silica results collected were below the detection limit.
- 93% of the dust samples collected were below the detection limit. Of the samples above the detection limit, the highest value calculated for 8-hr TWA was 0.09 mg/m<sup>3</sup>, significantly below the OSHA limit and ACGIH recommendations.

# Stack Demolition Noise Monitoring

## Regulatory Limits

	OSHA Standards Permissible Exposure Limits (PEL)	ACGIH Threshold Limit Values (TLV)
	PEL 8-hr	TLV-TWA-8-hr
Noise	90 dB	85 dB

Monitoring Location: Building 801 platform  
While people may stand on the platform, it is typically unoccupied.

Noise Monitoring of MANTIS Operations (containing hammer)  
Stack Height: Approximately 90 ft  
8-hr TWA – 73.4 dB

Noise Monitoring of Ground-based Excavator Operations (containing hammer)  
Stack Height: Approximately 40 ft  
8-hr TWA – 63.1 dB

The noise from the MANTIS operations were somewhat noisier. All noise exposures at the point of monitoring were well below occupational exposure levels.

# Thank You!



# Remedy Implementation

## Stack Demolition

**December 2020 – February 2021**

### MANTIS System

- Only requires a crane for the installation & removal of the equipment and is supported by the stack itself during demolition operations.
- Debris is controlled by using the MANTIS to direct the debris' center of gravity to the inside of the stack, away from the personnel access platform.
- Demolition methodology utilizes the stack itself as a debris control system, as the demolished concrete is contained within the stack at all times and collected at grade.



# Remedy Implementation

## Stack Demolition

### MANTIS System (cont'd)

- The K-Bracket personnel access platform design incorporates a “sealed” deck that contains all material and small debris by utilizing a rubber belt around the circumference of the stack, in conjunction with plywood decking and outer vertical guard, and heavy debris netting that extends outward at the top of the handrail.
- The MANTIS is run by electric and controlled by remote, which removes hazards associated with using fuel and allows the operator to remain on the working deck at all times.

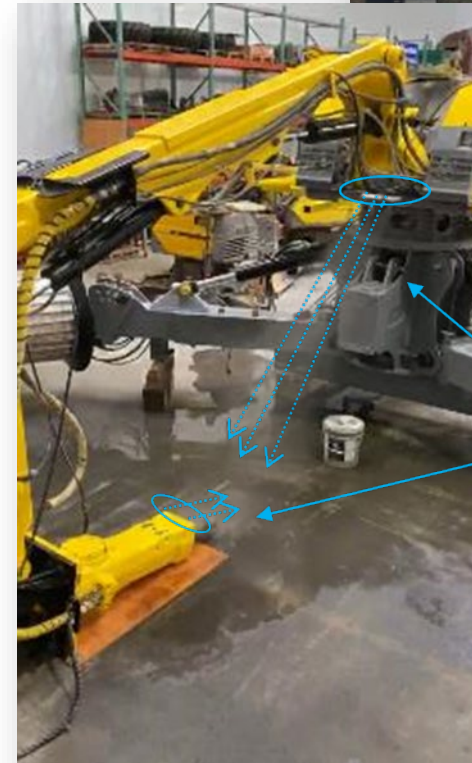


# Mitigation and Monitoring

## Stack Demolition

### Work Planning/Mitigation

- The primary radiological hazards were the residuals from past emissions that absorbed/adhered to the interior of the concrete chimney and associated components and could become dislodged during demolition with the MANTIS or other surface-destructive tools.
- The Contractor relied on sound work practices and safe demo techniques using remote equipment, striking non-radiological exterior surfaces with the MANTIS, and the natural design of the now-disconnected stack (a bottom-sealed chimney) to control the spread of dropped debris or associated radionuclides. **When the Shield Door is installed, the Stack is only open at the top and there is no mechanical airflow.**
- The Contractor also judiciously used misting dust suppression under a graded approach to address the potential for emissions from the highest risk activities.



Water nozzles on MANTIS and at hammer impact point





# Mitigation and Monitoring

## Stack Demolition



### Monitoring

RadCon Staff conducted occupational air monitoring of the radiologically controlled areas to ensure compliance with standards and established As Low As Reasonably Achievable (ALARA) goals for the project.

- Throughout the entire demolition phase, particulate air sampling was conducted:
  - In the worker breathing zones for those types of workers with the greatest intake potential
  - In radiological posted areas where debris demolition and waste handling is occurring
  - At the perimeter boundary of the contractor-controlled area
- Additional monitoring was made operational on the upper working platform to coincide with the MANTIS demolition operations.
- RadCon personnel also performed:
  - Spot frisks of workers and tools
  - Routine large-area contamination surveys in radiological work areas to verify no spread of radioactive contamination
  - Contamination surveys against established Lab Authorized Limits prior to releasing any materials or equipment removed from site



# Mitigation and Monitoring

## Stack Demolition



## Results

- Reported results throughout the project are reviewed and verified by the RadCon Manager to ensure occupational dose limits and associated ALARA goals are achieved.
- To date, all air sample screening results indicate occupational doses to project personnel remain within the ALARA Goal (100 millirem/year or 2% of the regulatory limit).
- To date, there was no contamination of personnel or equipment, as well as any spread or release of contamination



# BSA Stack Demolition Radiological Air Monitoring



Nate Foster, Radiological Control Division Manager  
CAC Meeting, March 11<sup>th</sup>, 2021

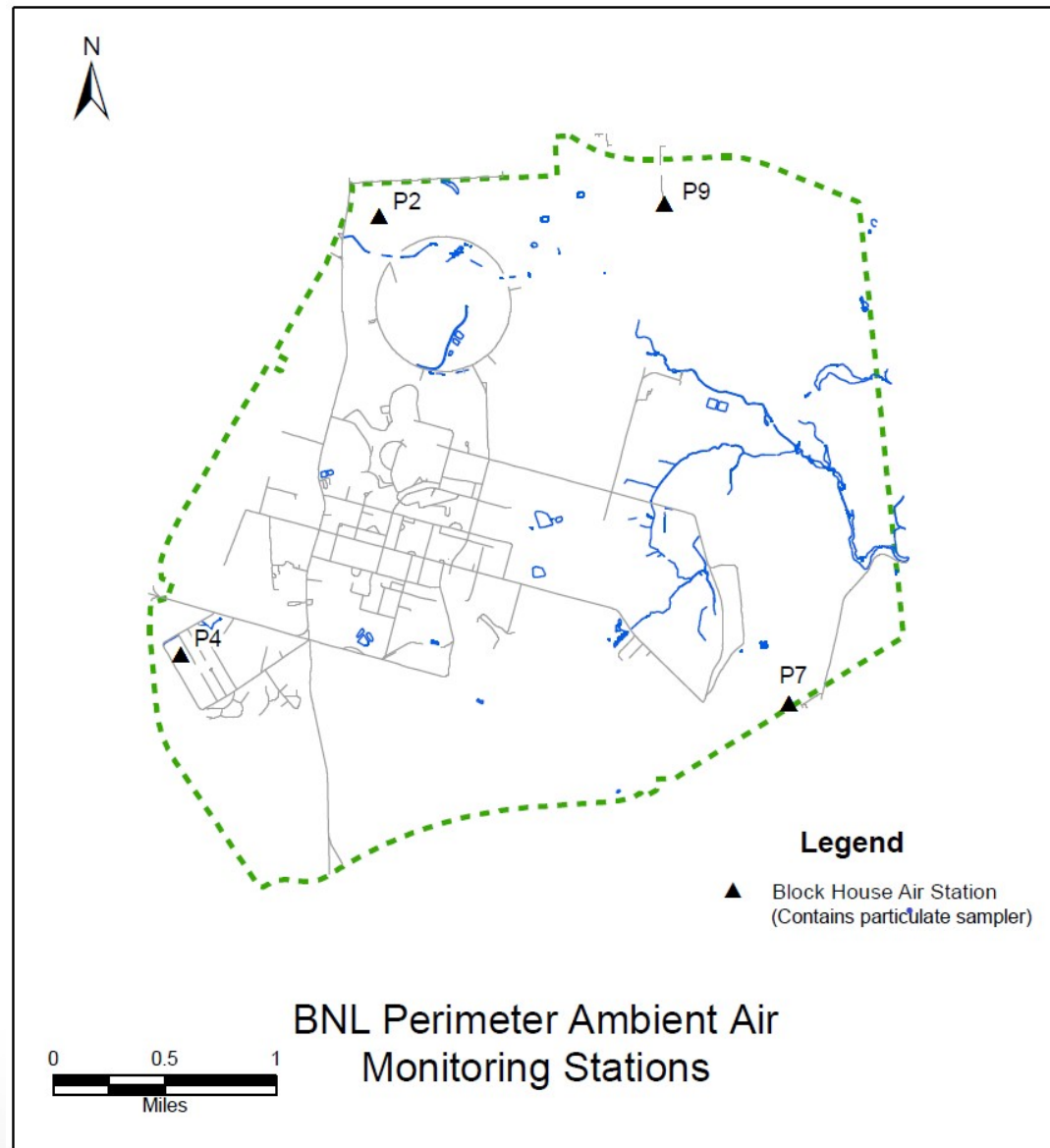
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# Locations

## Site boundary particulate monitors

- Continuous sampling at these locations for years.
- Data reported annually as part of the Site Environmental Report.
- There was no significant difference in data taken during stack demolition activities from pre-demolition sampling data.



# Locations

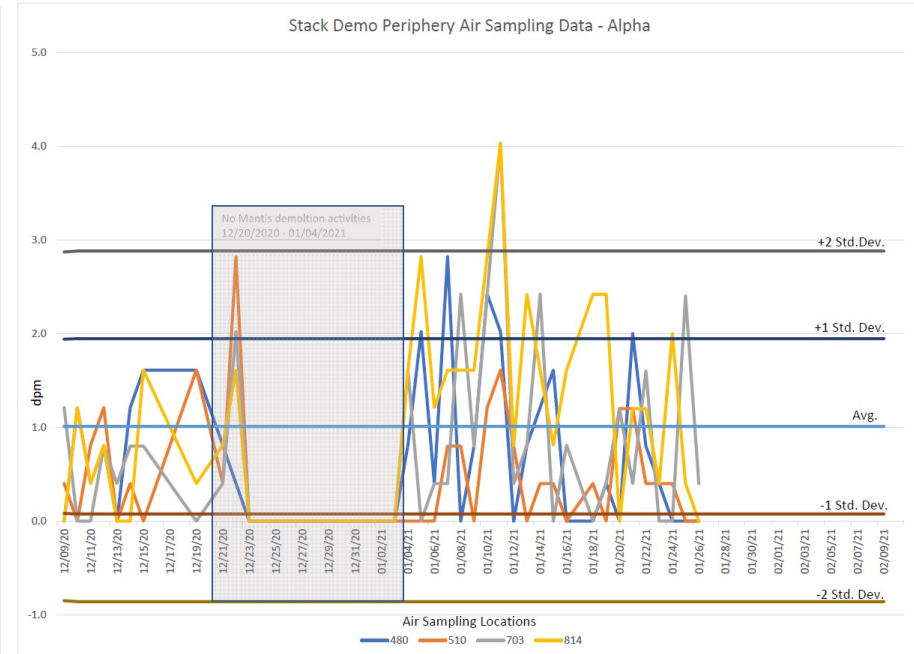
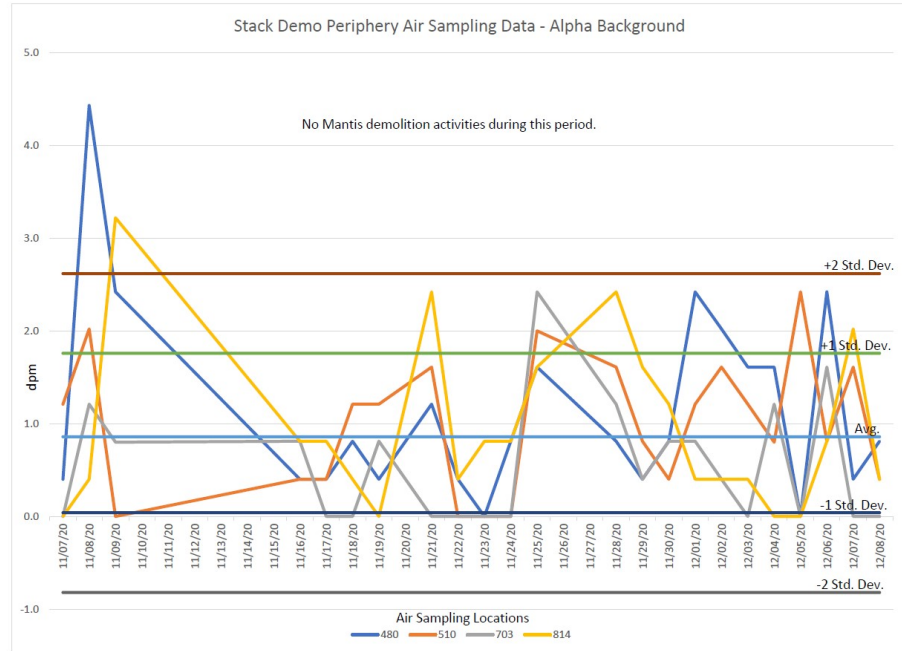
## Project periphery particulate monitors

- Air sampling initiated one month prior to demolition to establish background levels.
- Locations determined with consideration of:
  - Wind Rose
  - Available power taps
  - ~90 degree separation.



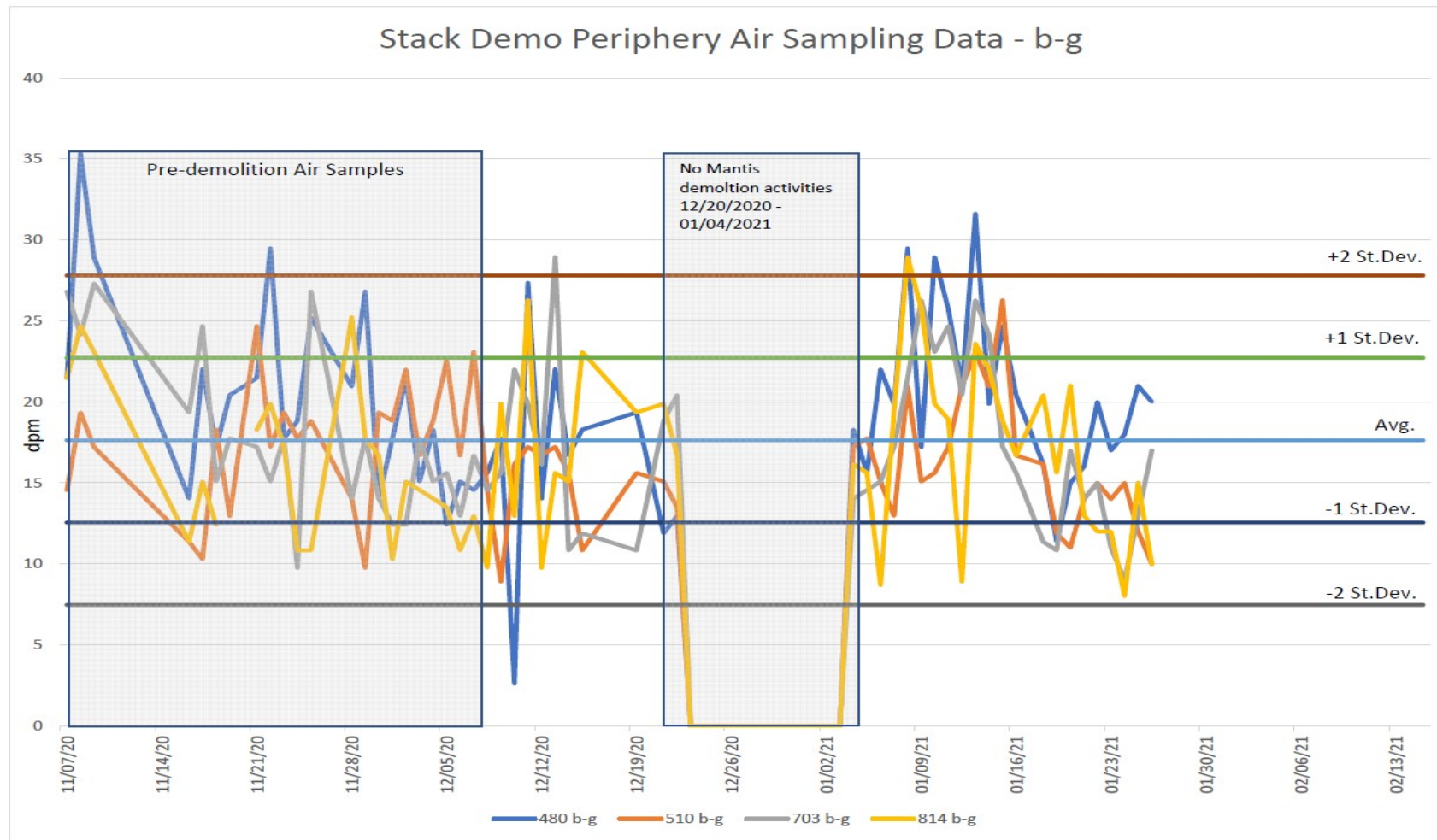


# Results:



Alpha	Pre-Demo	During Demo
(pCi/m <sup>3</sup> )	0.012	0.013

# Results:



Beta-Gamma	Pre-Demo	During Demo
(pCi/m <sup>3</sup> )	0.24	0.24

# Remedy Implementation

## Current Work Processes

### Waste Transportation and Disposal

- Stack debris handled in Inter Modal Containers (IMCs)
- Materials are direct-loaded into IMCs and then returned to rail spur staging area
- IMCs loaded onto railcars and shipped for disposal
- Stack debris, soil, and paint abatement waste will be transported to Waste Control Specialists (WCS) in Texas for disposal



# Remedy Implementation

## Current Work Processes

### Soil Excavation

Delineation-and-excavation method to assure removal of contaminated soil and minimizes removal of uncontaminated soil

- Conducted after stack demolition in areas around the pedestal and silencer
- Excavate to depth based on sample results
- Post-excavation confirmation sampling
- Continued excavation until cleanup levels achieved
- Unaffected soil stockpiled for potential re-use as fill at site
- Water truck for dust suppression
- Final Status Surveys and ORISE independent verification surveys to be utilized





# Schedule/Next Steps



## Schedule (Subject to weather and COVID-19 Delays)

**March – May 2021:** Soil excavation, followed by final status survey, ORISE verification, site restoration

**May 2021:** Field activities complete

**July 2021:** Draft-final closeout report to regulators

**September 2021:** Project closeout



# QUESTIONS AND DISCUSSION

