SITE CLOSEOUT REPORT REV 2 –
APPENDIX F BNL AIR MONITORING DATA

U.S. DEPARTMENT OF ENERGY

HIGH FLUX BEAM REACTOR STACK (BLDG 705)
DECOMMISSIONING AND DEMOLITION (D&D)
BROOKHAVEN NATIONAL LABORATORY
UPTON, NY
CERCLIS NUMBER NY 789008975

APPENDIX F
BNL AIR MONITORING DATA

Brookhaven National Laboratory (BNL) Stack D&D Project
Brookhaven Science Association (BSA) Exterior Paint Abatement Monitoring Summary

Process

The contractor used a specialized high-pressure closed loop coating abatement system to safely remove the exterior paint from the Stack up to Elevation 320' (see mitigation discussion below). The specialized decontamination equipment was used by workers in protective clothing to remove the coatings in a controlled fashion. Water used by the decontamination system was passed through a series of filtration steps and containerized at the work site and sent to an authorized off-site disposal facility authorized to accept the wastewater.

Work Planning/Mitigation

For the coating removal and stack exterior, the primary hazards were associated with lead and asbestos which were mitigated through the closed-loop coating abatement and filtration processes system. The Contractor also conducted verification radiological field tests of coatings as abatement crew proceeded up the Stack. In the uppermost region at the Stack Cap, slightly elevated fixed surface contamination was detected on the coating. Abatement work was suspended and the remaining activities to install rigging, remove and drop the Stack Cap were conducted using demolition-related radiological monitoring and mitigative controls established per the Contractor Radiation Protection Plan in additional to existing safety & health measures that were already in place for monitoring and mitigation during coating removal. Additional mitigation measures included the use of HEPA-filtered decontamination tools to pre-clean surfaces where cuts/holes were required to install rigging and the implementation of misting dust suppression to support the safe dropping of the Stack Cap to the enclosed Pedestal Base to allow for safe placement of the MANTIS on the Stack.

Monitoring

The Industrial Hygiene Department within the Safety & Health Services Division (SHSD) at BNL performed air monitoring during the abatement activities conducted on the High Flux Beam Reactor Stack (BLDG 705). Air monitoring was performed to assess and protect BNL staff and guests not involved in the Stack demolition from potential health impacts during abatement activities.

During the abatement activities, SHSD monitored the environment for airborne lead and airborne fibers, inclusive of asbestos, which were the main contaminants of concern due to the presence of lead and asbestos within the paint on the exterior of the Stack. The sampling locations and frequency of sampling was determined by a group of both experienced and certified industrial hygienists. These discussions considered wind direction and proximity of personnel in nearby buildings. Due to the mitigation techniques utilized by the USACE and their contractors as well as the fact that the lead and asbestos were bound within a paint matrix, it was determined that monitoring stations did not need to be located much further beyond the established construction zone and it was very unlikely that results for airborne lead and asbestos would exceed the OSHA and American Conference of Governmental Industrial Hygienists (ACGIH) limits.

The associated limits for lead and Fibers inclusive of asbestos can be found in Table 1 below.

Table 1: Regulatory Limits

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

Airborne lead is analyzed via NIOSH method 7301 and airborne fibers inclusive of asbestos is analyzed by NIOSH method 7400. NIOSH method utilizes a technique called Phase Contrast Microscopy (PCM) which can identify the presence of both asbestos and non-asbestos type fibers, with the result being the combination of the two. Further analysis by NIOSH method 7402 utilizing a technique called Transmission Electron Microscopy (TEM) can be performed to further distinguish between asbestos and non-asbestos type fibers when further differentiation is required, with the result only pertaining to asbestos. Due to the low laboratory results obtained via PCM analysis, further analysis by TEM was not required.

Figure 1 below depicts the sampling locations for exterior airborne sampling with the exact location descriptions.

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

Sampling Locations

Figure 1

Results

Reported results were circulated internally within BNL's SHSD for data verification, as well as to SHSD management and BNL management. Sampling during abatement activities occurred at the six (6) exterior locations approximately twice a week. This frequency was dependent on the weather and if abatement activities were occurring.

- All airborne lead results obtained at the six (6) locations were below the detectable limit for the equipment (< 0.21 µg/m^3).
- Airborne fiber results collected ranged from below the detection limit to a calculated ACGIH 8-hr TWA TLV of 0.0078 f/cc, significantly below the OSHA and ACGIH limit of 0.1 f/cc. In response to the low values obtained for PCM analysis, no TEM analysis was performed. Refer to Table 2 for average TWA and standard deviation values corresponding to the exterior sampling results for airborne fibers (inclusive of asbestos).

Table 2: Average Exterior Sampling Results – Asbestos

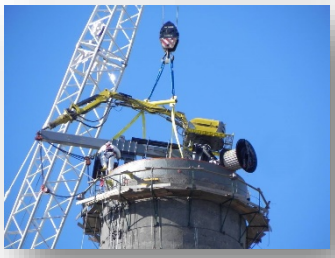
Building	Asbestos & Other Fibers (f/cc)	
	Average TWA	Standard Deviation
901	0.0028	0.0017
703	0.0027	0.0010
480	0.0030	0.0011
510	0.0026	0.0011
815	0.0023	0.0004
801	0.0026	0.0008

Brookhaven National Laboratory (BNL) Stack D&D Project
Brookhaven Science Association (BSA) Stack Demolition Monitoring Summary

Process

The patented MANTIS demolition system was placed on the top of the Stack to carefully segment the concrete (see photographs). Interior facing dust suppression rings were installed to be available for use during debris dropping from the MANTIS Platform and subsequent waste removal/packaging at the Base through the contractor-installed hatch. Specially trained riggers installed the exterior working platforms and support systems.

During the demolition process the non-radiological exterior surface was struck by a breaker tip mounted to the MANTIS arm; the MANTIS Arm push-pulls the segment of stack concrete towards the interior allowing the workers to torch cut the uncontaminated concrete reinforcements. The segment was then allowed to free-fall to the Stack Base below where waste accumulated for periodic removal. Periodic removal of dropped concrete segments and other debris occurred when demolition at heights was suspended and air concentration in the Stack were suitable to open the Stack Base Hatch Door.



At ground level, heavy equipment with pinchers, grabbers, and hoe ram attachments were used to remotely segment and remove debris that accumulated inside the Stack for packaging. With an air monitoring assessment and approval from project Radiological Control, the Hatch Door was removed allowing for heavy equipment access to the stack interior. The waste was then placed into suitable storage areas or inter-modal transport containers.

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. Except as noted above, radioactive residuals were adhered to interior components/surfaces of the Stack or in buried components that were excavated after the Stack was removed.

The radioactive residuals could have become dislodged during demolition with the MANTIS or other surface-destructive tools, when the falling debris contacted the Stack Base, and during removal from the Stack Base for packaging. Due to the effective controls and good work practices employed, dislodged residuals were not spread outside of the Stack to the environment or become a potential intake hazard for nearby personnel.

The primary non-radiological hazards were silica and nuisance dusts. Methods used to control dusts for this project were effective for both radiological and non-radiological hazards.

The Contractor first relied on sound work practices and safe demolition techniques using remote equipment, to strike the 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 was installed, the Stack was only open at the top and there was 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:

- A Water Emitter was mounted to the MANTIS breaker head to condition the exterior surface and control the non-rad silica/nuisance dusts generated at height. There was some visible overspray and occasional dust from this activity (the dusts were from striking the non-rad exterior surface of the Stack); workers wore PPE which included particulate respirators for non-radiological purposes.
- The Contractor also installed two interior spray rings (four emitters per ring at Elevation 50' and 100') to suppress particulate air concentrations within the Stack during debris dropping & management.
- The Contractor also used spray dust suppression or foggers at the Shield Door to suppress particulates generated during debris removal and packaging for transport.

Radiological Modeling and Monitoring

Modeling

Prior to the start of this project BNL subject matter experts assessed off-site radiological consequences. This National Emission Standard for Hazardous Air Pollutants (NESHAPs) evaluation was performed in accordance with USEPA requirements (40CFR61 Subpart H) utilizing Clean Air Act Code CAP88-PC, version 4.0.1.17 modeling program. This code is the standard for determining maximum radiological exposures to an off-site individual utilizing a known radiological source term based on existing characterization data. The calculated source term fraction is the amount of radiological material at risk that has the potential to become airborne when engineering barriers and other mitigation factors are not utilized (i.e., no engineering controls are used). This gives a very conservative dose-risk estimate to members of the public.

The results of this evaluation provided a conservative estimate of the effective dose equivalent of 0.003 mrem/year to a Maximally Exposed Offsite Individual (MEOSI) at 2,405 meters northwest of the stack. This estimate is well below the 10 mrem/year annual limit as specified in the 40 CFR 61, subpart H.

Monitoring

To confirm that the contractors dust suppression and emission control measures were effective, BSA performed periphery air monitoring surrounding the construction site (Figure 2) where stack debris size reduction and handling activities generated the greatest potential for particulate. While it was unlikely that particulates from this demolition project would travel far beyond the construction site, BSA also collected air samples at the site boundary from four (4) existing sampling stations that were analyzed for airborne radioactivity (Figure 3).

The locations of project specific periphery monitoring stations and permanent site boundary stations were based on over 60 years of meteorological data that has been collected on site by the Lab's meteorological services department. The prevailing ground-level winds at BNL are from the southwest during the summer, from the northwest during the winter, and about equally from those two directions during the spring and fall. Figure 4 shows the 2020 annual wind rose for BNL, which depicts the annual frequency distribution of wind speed and direction, measured at an on-site meteorological tower at heights of 33 feet (10 meters) and 300 feet (85 meters) above land surface.

Periphery Monitoring

BSA began periphery air monitoring for airborne radioactivity three weeks prior to the scheduled stack demolition start date. Radioactive contamination was not a constituent on the stack exterior surfaces. Data was collected during this phase to establish a background measurement during routine Laboratory operations and continued to collect air samples daily during the stack demolition phase and compared to the established background levels. BSA collected project periphery air samples through air pumps. Ambient air was drawn through a fiberglass filter medium. That filter was collected daily and analyzed using onsite counting equipment capable of seeing very low levels of alpha and beta radioactivity.

Location #	Description	Compass Heading (from stack center)	Feet from Stack	Lat.	Lon.
1	Building 703 - East Loading Dock	318	475	40.871801N	72.877927W
2	Building 815 - Southeast Corner	59	674	40.871402N	72.878059W
3	Building 480 - West Grass Median	273	543	40.869659N	72.879555W
4	Building 510 - Northeast Loading Dock	242	650	40.869753N	72.878017W

Figure 2 – Periphery Monitoring Locations

Site Boundary Monitoring

Site boundary air sampling stations are monitored routinely as part of the Laboratory's ongoing environmental monitoring program. At each sampling station (See Figure 3), vacuum pumps continuously draw air through columns where particulate matter is captured on a glass-fiber filter. Particulate filters are collected weekly and analyzed by a contract laboratory for gross alpha and beta activity using a gas-flow proportional counter. Results from these air sampling stations are summarized in the Laboratory's Annual Site Environmental Report in Chapter 4 (Air Quality) and have shown that concentrations are consistent with natural background. These stations continued to be monitored throughout the project and results compared to historical records.

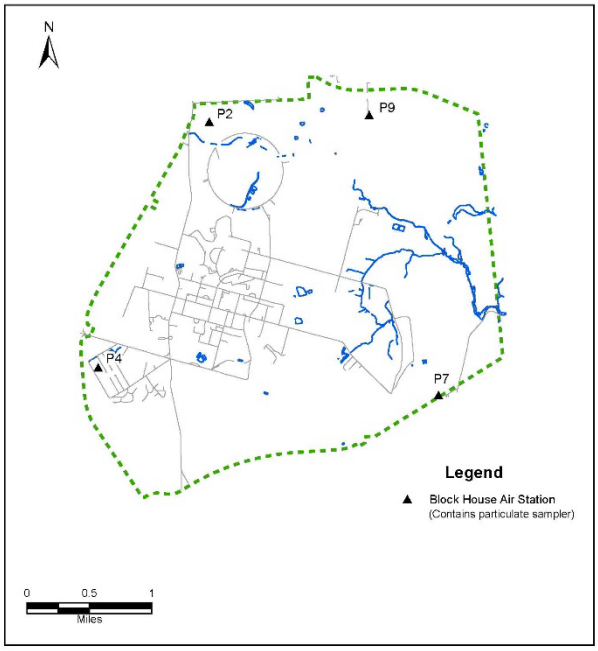
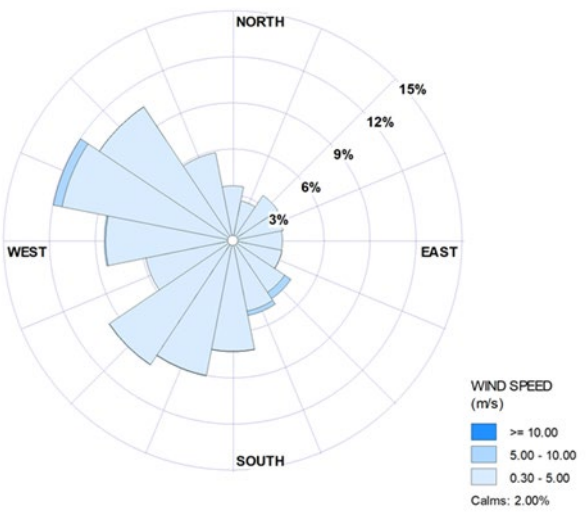
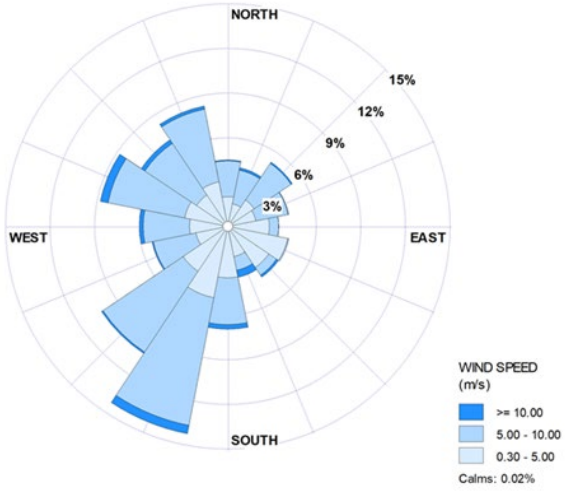


Figure 3 – Site Boundary Monitoring Locations



Wind Rose for January 1 to December 31, 2020 taken at the 10-m height



Wind Rose for January 1 to December 31, 2020 taken at the 85-m height

Figure 4 – 2020 Wind Rose

The following are established limits related to this project:

Part 835 – Occupational Radiation Protection (10CFR835.208) limits the total effective dose for members of the public exposed to radiation and/or radioactive material during access to a controlled area is 0.1 rem in a year.

BNL implements more conservative administrative limits for Exposures to the Public - Radiation exposures to members of the public off-site shall not exceed more than 5 mrem (0.005 rem) in one year via the airborne release pathway from normal operations. For perspective, a typical chest X-Ray results in an exposure of approximately 5 mrem.

Results – Periphery Air Sampling

The purpose of this section is to demonstrate that the 705 Stack periphery air sampling results obtained during demolition activities are not statistically different than the baseline air sampling results obtained prior to the start of demolition activities, that is, that they are not distinguishable from background.

The data set consists of daily air filter results counted on an automated smear counter 64-68 hours after sample isolation from four sampling locations. The data is in the form of net counts for both the beta/gamma channel and the alpha channel. Demolition activities commenced on 12/10/2020. There are 96 pre-demolition samples and 128 demolition samples (Figure 5).

The two data sets were compared channel by channel, that is, the pre-demolition alpha count data was compared to the alpha count data obtained during stack demolition, and the beta/gamma pre-demolition count data was compared to the beta/gamma count data obtained during demolition.

Methodology

The data from each data set was first confirmed to be normally distributed by plotting it in Excel (Figure 6). Next, the null hypothesis was stated as the mean alpha counts and the mean beta counts from the pre-demolition and demolition sample populations are from the same population at a significance level of 0.05. The alternative hypothesis is that the data are from two different populations and that demolition activities released small, detectable amounts of airborne radioactivity. The null hypothesis was then tested using a two-tailed t-test for comparison of means using an on-line t-test calculator.

Alpha Results

Mean α Counts, Pre-Demo	**Mean α Counts, Demo**	**α Count Variance, Pre-Demo**	**α Count Variance, Demo**
0.88	0.89	0.72	0.78

The calculated t statistic is -0.11, and the 95% confidence interval for the difference in means is (-0.23, +0.01) meaning 95% of the time the difference in the mean alpha count is expected to be within this interval. The p value is calculated as .91 which indicates the means are not significantly different. p values less than the significance level of 5% (.05) indicate an effect is present and provide strong evidence for rejecting the null hypothesis. The p value of .91 is >>.05 and indicates there is no effect in the demolition data set and the null hypothesis should not be rejected. At the 95% confidence level, therefore, it is concluded that the pre-demolition and demolition alpha count data is from the same population and there is no evidence that alpha activity was released into the air during stack demolition and captured by any of the four perimeter air samplers.

Beta/Gamma Results

Mean β/γ Counts, Pre-Demo	**Mean β/γ Counts, Demo**	**β/γ Count Variance, Pre-Demo**	**β/γ Count Variance, Demo**
17.6	17.3	25.6	25.9

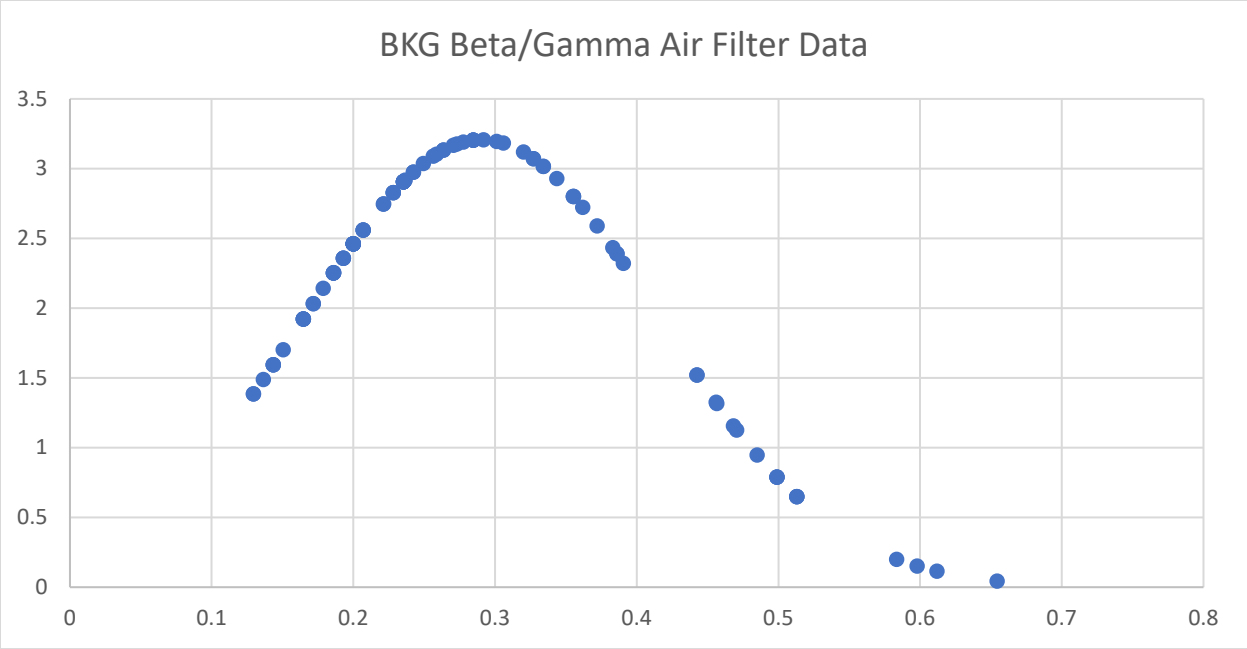
The calculated t statistic is +0.52, and the 95% confidence interval for the difference in means is (-0.17, +1.21) meaning 95% of the time the difference in the mean beta/gamma count is expected to be within this interval. The p value is calculated as 0.60 which indicates there is no effect in the demolition data set, the means are not significantly different, and the null hypothesis should not be rejected. At the 95% confidence level, therefore, it is concluded that the pre-demolition and demolition beta/gamma count data is from the same population and there is no evidence that beta/gamma activity was released into the air during stack demolition and captured by any of the four perimeter air samplers.

Brookhaven National Laboratory (BNL) Stack D&D Project
Brookhaven Science Association (BSA) Stack Demolition Monitoring Summary

	480	510	703	814
Date of Air Sample	alpha	alpha	alpha	alpha
11/07/20	0.4	1.2	0.0	0.0
11/08/20	4.4	2.0	1.2	0.4
11/09/20	2.4	0.0	0.8	3.2
11/16/20	0.4	0.4	0.8	0.8
11/17/20	0.4	0.4	0.0	0.8
11/18/20	0.8	1.2	0.0	0.4
11/19/20	0.4	1.2	0.8	0.0
11/21/20	1.2	1.6	0.0	2.4
11/22/20	0.4	0.0	0.0	0.4
11/23/20	0.0	0.0	0.0	0.8
11/24/20	0.8	0.0	0.0	0.8
11/25/20	1.6	2.0	2.4	1.6
11/28/20	0.8	1.6	1.2	2.4
11/29/20	0.4	0.8	0.4	1.6
11/30/20	0.8	0.4	0.8	1.2
12/01/20	2.4	1.2	0.8	0.4
12/02/20	2.0	1.6	0.4	0.4
12/03/20	1.6	1.2	0.0	0.4
12/04/20	1.6	0.8	1.2	0.0
12/05/20	0.0	2.4	0.0	0.0
12/06/20	2.4	0.8	1.6	0.8
12/07/20	0.4	1.6	0.0	2.0
12/08/20	0.8	0.4	0.0	0.4
12/09/20	0.0	0.4	1.2	0.0
12/10/20	1.2	0.0	0.0	1.2
12/11/20	0.4	0.8	0.0	0.4
12/12/20	0.8	1.2	0.8	0.8
12/13/20	0.0	0.0	0.4	0.0
12/14/20	1.2	0.4	0.8	0.0
12/15/20	1.6	0.0	0.8	1.6
12/19/20	1.6	1.6	0.0	0.4
12/21/20	0.8	0.4	0.4	0.8
12/22/20	0.4	2.8	2.0	1.6
01/04/21	0.8	0.0	1.6	1.6
01/05/21	2.0	0.0	0.0	2.8
01/06/21	0.4	0.0	0.4	1.2
01/07/21	2.8	0.8	0.4	1.6
01/08/21	0.0	0.8	2.4	1.6
01/09/21	0.8	0.0	0.8	1.6
01/10/21	2.4	1.2	2.4	2.8
01/11/21	2.0	1.6	4.0	4.0
01/12/21	0.0	0.8	0.4	0.8
01/13/21	0.8	0.0	0.8	2.4
01/14/21	1.2	0.4	2.4	1.6
01/15/21	1.6	0.4	0.0	0.8
01/16/21	0.0	0.0	0.8	1.6
01/18/21	0.0	0.4	0.0	2.4
01/19/21	0.4	0.0	0.4	2.4
01/20/21	0.0	1.2	1.2	0.0
01/21/21	2.0	1.2	0.4	1.2
01/22/21	0.8	0.4	1.6	1.2
01/23/21	0.4	0.4	0.0	0.4
01/24/21	0.0	0.4	0.0	2.0
01/25/21	0.0	0.0	2.4	0.4
01/26/21	0.0	0.0	0.4	0.0
01/27/21	0.8	1.2	0.0	0.0
01/28/21	0.8	0.4		0.8
01/29/21				

	480	510	703	814
Date of Air Sample	b-g	b-g	b-g	b-g
11/07/20	21	15	27	21
11/08/20	35	19	24	25
11/09/20	29	17	27	23
11/16/20	14	11	19	11
11/17/20	22	10	25	15
11/18/20	17	18	15	12
11/19/20	20	13	18	ND
11/21/20	21	25	17	18
11/22/20	29	17	15	20
11/23/20	18	19	18	17
11/24/20	19	18	10	11
11/25/20	25	19	27	11
11/28/20	21	14	14	25
11/29/20	27	10	18	18
11/30/20	14	19	14	17
12/01/20	18	19	12	10
12/02/20	21	22	12	15
12/03/20	15	17	18	15
12/04/20	18	19	15	14
12/05/20	12	23	16	13
12/06/20	15	17	13	11
12/07/20	15	23	17	13
12/08/20	16	15	15	10
12/09/20	18	9	16	20
12/10/20	3	16	22	13
12/11/20	27	17	20	26
12/12/20	14	17	16	10
12/13/20	22	17	29	16
12/14/20	17	16	11	15
12/15/20	18	11	12	23
12/19/20	19	16	11	19
12/21/20	12	15	19	20
12/22/20	13	13	20	17
01/04/21	18	17	14	16
01/05/21	16	18	15	16
01/06/21	22	15	15	9
01/07/21	20	13	17	19
01/08/21	29	21	21	29
01/09/21	17	15	26	26
01/10/21	29	16	23	20
01/11/21	26	17	25	19
01/12/21	21	21	20	9
01/13/21	32	23	26	24
01/14/21	20	21	24	22
01/15/21	25	26	17	19
01/16/21	20	17	16	17
01/18/21	16	16	11	20
01/19/21	11	12	11	16
01/20/21	15	11	17	21
01/21/21	16	14	14	13
01/22/21	20	15	15	12
01/23/21	17	14	11	12
01/24/21	18	15	9	8
01/25/21	21	12	13	15
01/26/21	20	10	17	10
01/27/21	16	16	11	16
01/28/21	14	14		17
01/29/21				

Figure 5


BKG Beta/Gamma Air Filter Data
3.5
3
2.5
2
1.5
1
0.5
0
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8

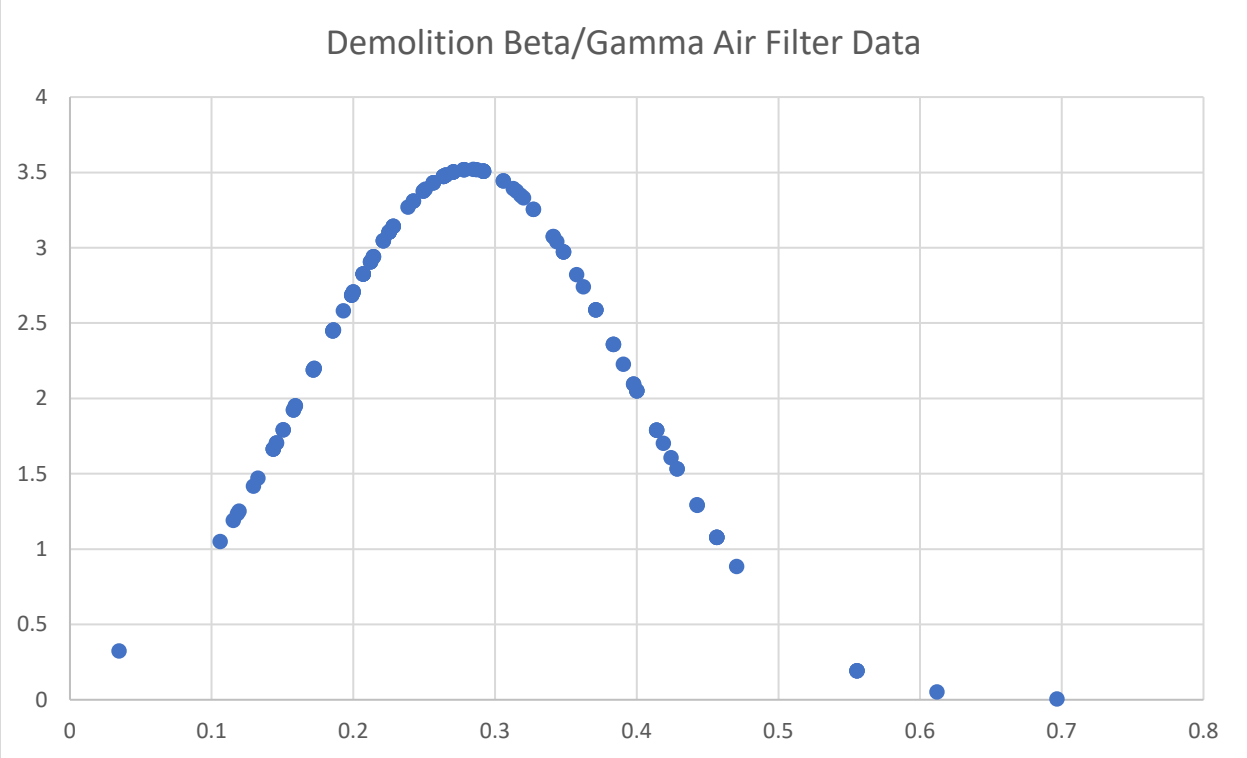

Demolition Beta/Gamma Air Filter Data
4
3.5
3
2.5
2
1.5
1
0.5
0
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8

Figure 6

Results – Site Boundary Air Sampling

For all site boundary air monitoring station locations (Figure 3 above), the average concentration of gross alpha emitters and gross beta emitters during calendar year 2020 through November (pre-demolition) and December 2020 through April 2021 (period of demolition) was well within two standard deviations. Also, for the entire period of demolition, no alpha emitter concentration exceeded 0.00405 pCi/m^3, and no beta emitter concentration exceeded 0.0331 pCi/m^3. There is no apparent indication, beyond normal statistical fluctuation, that gross alpha or gross beta emitters were detected or released during the stack demolition project.

Non-Radiological Monitoring

The Industrial Hygiene Department within the Safety & Health Services Division (SHSD) performed air monitoring during the demolition activities conducted on the High Flux Beam Reactor Stack (BLDG 705). Air monitoring was performed to assess and protect the onsite BNL staff and guests not involved in the Stack demolition from potential health impacts during demolition activities.

Specifically, SHSD monitored the environment for airborne silica and dust, which were the main contaminants of concern. The sampling locations and frequency of sampling were determined by a group of both experienced and certified industrial hygienists. The discussions focused on wind directions and proximity of personnel in nearby buildings. Due to the mitigation techniques utilized by the stack contractor, it was not anticipated that measurable quantities of silica and dust would exceed the OSHA and American Conference of Governmental Industrial Hygienists (ACGIH) limits.

Sampling locations were selected to provide a range of distances surrounding the High Flux Beam Reactor Stack to assess the environment for airborne silica and dust at locations with potential impact to onsite BNL staff and guests not involved in the Stack demolition (Figure 7). Sampling occurred daily when demolition activities were occurring.

Sampling Locations
Exterior Building 703
Exterior Building 815
Exterior Building 480
Exterior Building 510
Exterior Building 801
Exterior Building 901
Exterior Building 860
Exterior Building 923
Exterior Building 735
Exterior Building 639
Exterior Fence line – North Direction
Exterior Fence line – East Direction
Exterior Fence line – South Direction
Exterior Fence line – West Direction

Figure 7 – Non-radiological sampling locations

Associated Regulatory limits (OSHA and ACGIH) for both Silica and Dust can be found in Table 3 below. Please note ACGIH does not have an associated limit for dust, however, they do have recommended limits which are located in Table 4.

Table 3: Regulatory Limits

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

Table 4: ACGIH Recommended Limits

	ACGIH Threshold Limit Values (TLV)
Substance	TLV-TWA-8-hr
Dust (Respirable)	3 mg/m^3
Dust (Inhalable)	10 mg/m^3

Results - Non-Radiological Monitoring

Table 5: Non-Radiological Monitoring Results during Demolition Activities

Building	< LOD*	Avg TWA - Silica (ug/m3)	Standard Deviation	Avg TWA - Dust (mg/m3)	Standard Deviation
Building 815	<	8.25	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		8.18	0.14	0.04	0.00
Fence-line South		7.94	1.33	0.04	0.01
Fence-line East		8.26	0.23	0.04	0.01
Fence-line West		8.22	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		8.22	0.02	0.04	0.00
Building 480		8.11	0.78	0.04	0.00
Building 860		8.19	0.04	0.04	0.01
Building 639		8.20	0.04	0.04	0.00

*Limit of Detection

All sample results collected at a singular location were averaged and reported in Table 5 above. All Silica results collected were below the equipment detection limit in which the detection limit was reported as worst case. Ninety-three percent of the dust samples collected were also below the detection limit. Of the samples generating results above the detection limit, the highest value calculated for 8-hr TWA was 0.09 mg/m^3, significantly below the OSHA limit and ACGIH recommendations. These results further support that the mitigation techniques employed were appropriate to protect the on-site BNL staff and guests, not associated with the Stack Demolition.