CH2M HILL Plateau Remediation Company

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DOCUMENT REVISION SUMMARY

NOTE: Provide a brief description or summary of the changes for the document listed.

The purpose of this report is to disclose the results of an asbestos thorough inspection of 291Z structure and associated 291Z001 stack located in the Plutonium Finishing Plant Complex. Note: Revision 0 was never issued.

REVIEWERS **Others**

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CWR-PFP-00027
Revision 1

Asbestos NESHAP Thorough Inspection Report at 291Z

Prepared for the U.S. Department of Energy
Assistant Secretary for Environmental Management

Contractor for the U.S. Department of Energy
under Contract DE-AC06-08RL14788

P.O. Box 1600
Richland, Washington 99352

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Asbestos NESHAP Thorough Inspection Report at 291Z

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CH2M HILL Plateau Remediation Company

Date Published
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Executive Summary

The 291Z Building (exhaust air filter stack building) and 291Z001 (main exhaust air stack) were constructed in 1949. The 291Z/291Z001 system provides ventilation exhaust for the 234-5Z, 242Z, and 236Z Buildings. 291Z is a reinforced concrete structure, south of the central part of 234-5Z (Figure 1) and of irregular shape, with approximate dimensions of 22 m (74 ft) wide by 43 m (143 ft) long. Its overall height is approximately 7 m (23 ft), with only 1.2 m (4 ft) abovegrade. This structure houses the exhaust fans, mechanical service equipment, and electrical substation 252Z2.

The 291Z001 exhaust stack is 60 m (200 ft) high of reinforced concrete that exhausts through a large exhaust plenum from 291Z. The stack's inside diameter is approximately 4.5 m (15 ft). The stack foundation is a massive concrete footing block that is octagonal in shape and 10 m (32 ft) across its flat sides. The foundation block is approximately 8 m (27 ft) thick, and its top is about 1 m (3 ft) above the finished grade. A 90-degree elbow opening in the footing connects the bottom of the stack to the main exhaust duct from 291Z. The monitoring building (2712Z) is attached to the stack at the 15 m (50 ft) level with stairs up to the building.

This report documents the asbestos inspection results of 291Z and 291Z001. Characterization was completed using a multitude of methods (Table ES-1) to evaluate categories of suspect materials such as floors/mastic, coving/mastic, walls, ceilings, wall patches, caulk gaskets, and thermal system insulation (TSI).

Table ES-1. Summary of Evaluation Methods

Evaluation Methods	Number of Samples Taken
Visual Evaluation	39
Historical Samples	24
Current Laboratory Samples	47
Process Knowledge	12
Total	122
Positive Hits	31

Results indicate that the following asbestos needs to be removed prior to demolition of 291Z:

- 243.8 linear m (800 linear ft) of TSI (Note: All TSI has already been abated).
- Room 501 contains electrical switchgear 4 × 2.1 × 0.61 m (12 × 7 × 2 ft), which is made up of 21 "buckets." The electrical wiring and certain components are assumed to be friable asbestos (wiring) and Category II (Transite insulators). Operations will remove these "buckets" whole prior to demolition.
- Three doors (693, 694, and 695) within 291Z were presumed to be regulated asbestos-containing material. These doors will be removed prior to demolition. A separate report is being developed for doors.
- Flexible exhaust fans/expansion joints, which were initially assumed to be asbestos, have been subsequently characterized as non-asbestos. Abatement of this material is no longer required.
- The U.S. Environmental Protection Agency has given approval to leave the following Category I asbestos-containing material in the building during demolition:
  - Gaskets and packings in good condition (these materials are found throughout 291Z)
  - Roofing material (Category I) approximately 1.1 m^2 (12 ft^2 roof of 291Z)

291Z001 contains no asbestos.

Contents

Appendices

Figures

Tables

Terms

ACM	asbestos-containing material
ACWM	asbestos-containing waste material
AHERA	*Asbestos Hazard Emergency Response Act of 1986*
Cat I	Category I
Cat II	Category II
CERCLA	*Comprehensive Environmental Response, Compensation, and Liability Act of 1980*
EPA	U.S. Environmental Protection Agency
NAD	no asbestos detected
NESHAP	"National Emission Standards for Hazardous Air Pollutants" (40 CFR 61)
PFP	Plutonium Finishing Plant
RACM	regulated asbestos-containing material
RAWP	removal action work plan
SAP	sampling analysis plan
TSI	thermal system insulation

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1 Introduction

The scope of this report is to document the thorough asbestos inspection of the 291Z Building (Exhaust Air Filter Stack Building) and 291Z001 (Main Exhaust Air Stack). The current Plutonium Finishing Plant (PFP) schedule includes demolition of these structures in 2017.

The U.S. Environmental Protection Agency (EPA) asbestos regulations (40 CFR 61, "National Emission Standards for Hazardous Air Pollutants" [NESHAP]) require that prior to commencement of any demolition activity, a certified *Asbestos Hazard Emergency Response Act of 1986* (AHERA) Building Inspector must perform a thorough inspection of the affected facility and document the inspection to identify the following items:

- Homogeneous areas of asbestos-containing material (ACM) and their locations
- Quantity of ACM
- NESHAP (40 CFR 61) category of ACM (regulated asbestos-containing material [RACM], Category I [Cat I], or Category II [Cat II])
- Condition of all ACM (particularly important if nonfriable Cat I or Cat II ACM is to be left in place during demolition)
- Cat I or Cat II ACM that has become RACM based on condition
- Cat I or Cat II ACM that can become RACM, based on planned demolition techniques
- Suspect ACM that was determined (through inspection or sampling and analysis) not to be ACM.

Each homogenous area needed to be sampled sufficiently to know the asbestos content and prove its consistency. A homogeneous area is uniform in texture, color, and date of application and appears identical in every other respect. Materials installed at different times belong to different homogeneous sampling areas. If there is any reason to suspect that materials might be different, even though they appear uniform, they were assigned to different homogeneous sampling areas.

NESHAP (40 CFR 61) requires the inspection to address hidden ACM. Inspectors had to open areas such as walls, ceilings, crawl spaces, and plenums to address inaccessible areas where hidden materials (e.g., pipe runs and insulated ducts) may have been found. This report meets all elements of a thorough inspection as defined in NESHAP.

1.1 Building History

The 291Z Exhaust Air Filter Stack Building and 291Z001 Main Exhaust Air Stack were constructed in 1949. The 291Z/291Z001 system provides ventilation exhaust for the 234-5Z, 242Z, and 236Z Buildings. These facilities are part of the PFP Complex, located in the 200 West Area of the Hanford Site, in Washington State.

PFP operations began in 1949. Until 1991, the primary mission for PFP was processing plutonium metal into hockey puck sized buttons for defense purposes. Plutonium was separated and recovered from liquid and solid process streams. In 1991, the mission changed to plutonium bearing material stabilization, cleanup, decontamination and demolition, and environmental restoration. Material stabilization campaigns and the mission for storage of stabilized plutonium materials were completed in December 2009 when the final containers of stored material were shipped offsite. During the operational history of PFP, 291Z and 291Z001 provided ventilation exhaust for the 234-5Z, 242Z, and 236Z Buildings.

The Hanford Site is owned by the U.S. Department of Energy, and the PFP Complex is currently being operated by CH2M HILL Plateau Remediation Company.

The PFP Closure Project is conducting a *Comprehensive Environmental Response, Compensation, and Liability Act of 1980* (CERCLA) removal action authorized by DOE/RL-2005-13, *Action Memorandum for the Plutonium Finishing Plant Above-Grade Structures Non-Time Critical Removal Action*. The work is being implemented in accordance with DOE/RL-2011-03, *Removal Action Work Plan for the Deactivation, Decontamination, Decommissioning, and Demolition of the Plutonium Finishing Plant Complex*, hereinafter called the removal action work plan (RAWP).

Demolition of 291Z and 291Z001 is scheduled for 2017 and will be conducted as part of the CERCLA removal action. 291Z covers an area of approximately 983.1 m^2 (10,582 ft^2) (Figure 1 shows an aerial view). The 291Z001 stack is 61 m (200 ft) high and is 4.6 m (15 ft) in diameter.

Figure 1. Location of 291Z and 291Z001 in the PFP Complex

1.2 Building/Zone Description

The exhaust air filter stack building (291Z) is also known as the exhaust fan and compressor house. It is a reinforced concrete structure, approximately 16.2 m (53 ft) south of the central part of the 234-5Z Building. It has an irregular shape, with approximate dimensions of 22.5 m (74 ft) wide by 43.6 m (143 ft) long with an overall height of approximately 7 m (23 ft), 1.2 m (4 ft) of which are abovegrade. This building houses the exhaust fans, mechanical service equipment, and electrical substation.

The 291Z Building is predominantly a belowgrade space containing the exhaust fans, process vacuum lines, and other equipment. An abovegrade ventilation duct at the north end of 291Z connects with the

ventilation systems from 234-5Z and 242Z. A subgrade ventilation duct from 236Z enters the east side of 291Z. 291Z also contains a ventilation duct from the previously demolished 232Z that enters on the west side of the building. A portion of this duct was removed when 232Z was demolished in 2006; the remaining section is part of the 291Z scope. A cutaway diagram of the 291Z layout is shown in Figure 2.

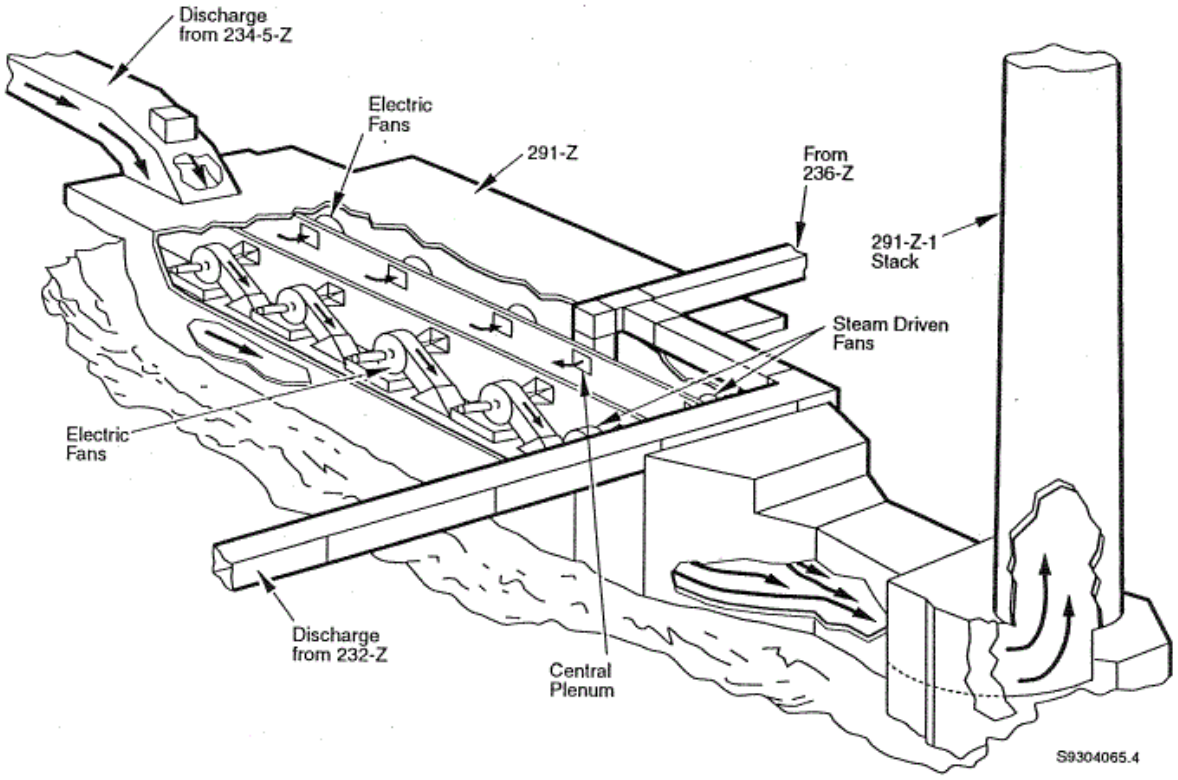

Figure 2. Cutaway Showing Interior of 291Z

1.2.1 291Z Building

291Z is divided into 11 rooms. Room 500 houses the electrical switchgear used to provide normal electrical power to the Plutonium Reclamation Facility and 291Z Facility. Electric power to the Room 500 switchgear comes from its own high voltage electric line and transformer. This room is 5.2 × 11 m (17 × 35 ft) and has its own facility number: 252Z2 (also known as 252-Z-2). A separate report will be developed for 252Z2.

Room 501 contains two air compressors, electrical switchgear, and the air sample vacuum system equipment for the 234-5Z and 291Z Buildings. Rooms 502 and 509 house the exhaust fans, including the steam turbine driven backup exhausters. Rooms 503 and 510 house the exhaust plenums that are combined in a common plenum (Room 508), which discharges to the 291Z stack. The two rooms housing the exhaust fans are connected by two cross passageways (Rooms 504 and 506). Room 505 contains the inlet plenum, and Room 507 contains air supply units that provide conditioned air for the 291Z Building. Figure 3 provides a floor plan of 291Z and Figure 4 is a cross section of the facility.

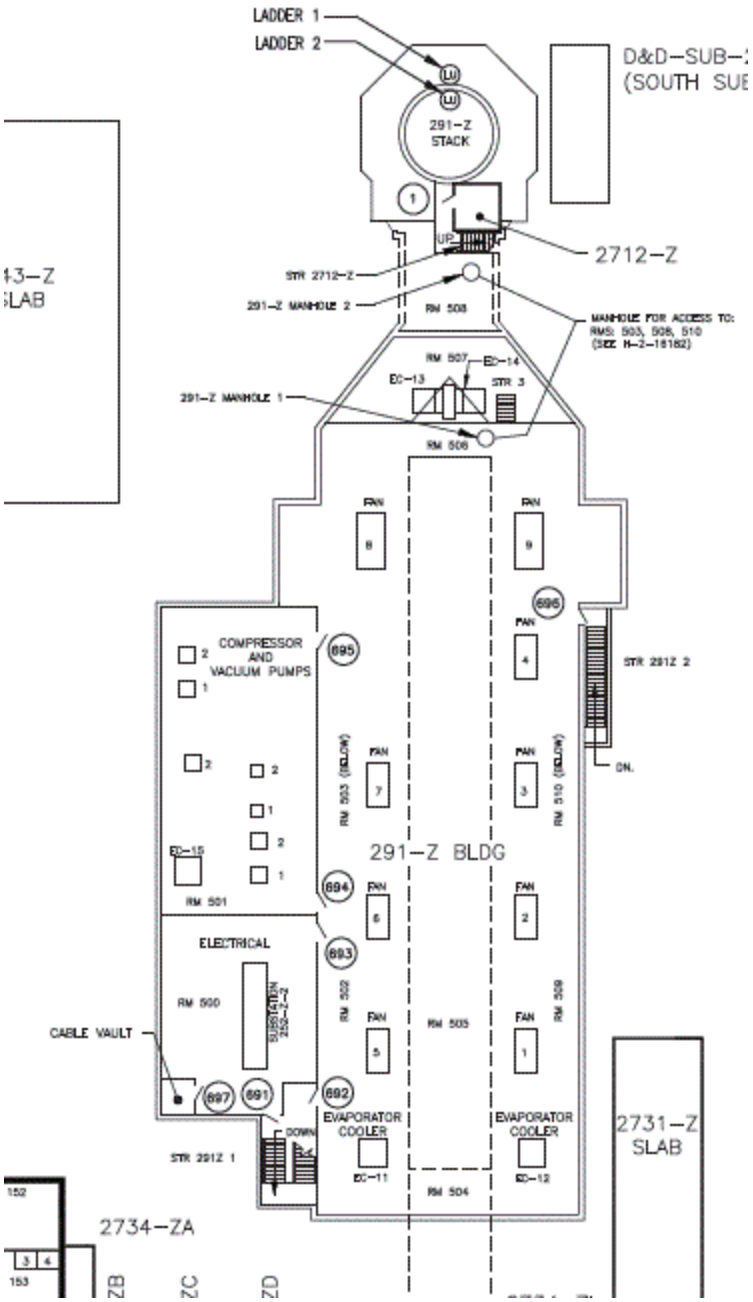

Figure 3. Facility Diagram for 291Z and 291Z001

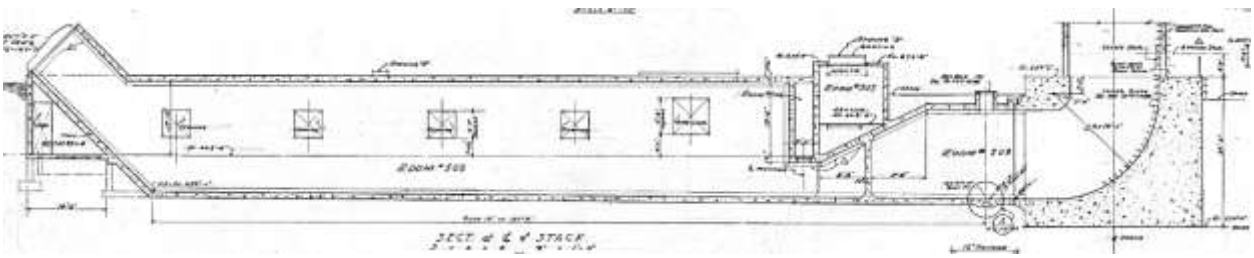

Figure 4. North-South Cross Section of 291Z

1.2.2 291Z001 Main Exhaust Air Stack

The 60 m (200 ft) high, reinforced concrete stack exhausts through a large exhaust plenum from 291Z. Inside diameter of the stack is approximately 4.5 m (15 ft). The stack foundation is a massive concrete footing block that is approximately octagonal in shape and 10 m (32 ft) across its flat sides. The foundation block is approximately 8 m (27 ft) thick, and its top is about 1 m (3 ft) above the finished grade. A 90-degree elbow opening in the footing connects the bottom of the stack to the main exhaust duct from 291Z.

The center of the stack is 19.2 m (63 ft) from the near end of Building 291Z and 70.1 m (230 ft) from the south wall of the 234-5Z Building. The stack and 291Z Building are separated by an expansion joint. The 2712Z monitoring building is attached to the stack at the 15 m (50 ft) level with stairs up to the building.

The same asbestos sampling and analysis plan (SAP) format that was developed for 236Z, 2727Z, 2729Z, and 234-5Z was used for 291Z/291Z001. The plan called for an evaluation of the ceiling, floors, walls, caulk, electrical, thermal system insulation (TSI), doors, and gaskets/packings. Three SAPs (roof, TSI, and general) were developed for the ceiling, walls, and floor. Another SAP will be developed for electrical wiring and components. Execution of that SAP is dependent upon the building being cold and dark. Copies of these SAPs are included in Appendix A.

A search of site records revealed 24 historical samples for 291Z. Nine of these samples had insufficient information to identify the specific location of the samples, but they were used to identify areas of interest for further sampling. Historic samples included in this report can be found in the general SAP (Appendix A).

The photographs shown as Figure 5 are representative of 291Z and its stack.

A review of the drawings and construction documents and a walkdown of the 291Z001 stack verified that it was constructed solely of reinforced concrete. No suspect ACMs were identified, and no SAPs were developed (no samples are required).

1.3 Description of Inspection and Sampling

The thorough inspection and sampling processes are described in this chapter.

1.3.1 Thorough Inspection Process

The RAWP (DOE/RL-2011-03) requires that, “Prior to the commencement of the demolition, a thorough inspection of the affected structure will be performed and documented for the presence of asbestos, including Category I and Category II non-friable ACM.” The process of completing a thorough inspection of this building consisted of the actions described in the following subsections.

Figure 5. 291Z and Stack Photographs

1.3.1.1 Records Review

Design drawings renovations, past asbestos surveys, and other existing information were evaluated to determine building materials used at the time of construction.

Historical samples identified for 291Z were used to focus the SAP evaluation of specific media (e.g., TSI, mastic, and flexible expansion joints). All historical data used for characterization are included in Appendix B.

1.3.1.2 Walkdowns

Visual inspections/walkdowns were conducted by certified AHERA Building Inspectors T.A. Hopkins and W.G. Cox (copies of AHERA Building Inspector certifications are provided in Appendix D) to make the following ACM determinations:

- All suspect ACM and suspect materials that would require sampling and analysis
- Sample density (for materials not handled as suspected ACM), as prescribed by AHERA
- Homogenous/nonhomogeneous ACM, as appropriate
- Areas requiring special needs (i.e., accessibility for sampling, confined space, industrial hygiene/safety, and radiation support)

1.3.1.3 Sampling and Analysis Plans

Two SAPs (roof and interior) were created for 291Z (copies in Appendix A.) The SAP associated with the interior of 291Z relied on visual evaluation and process knowledge to determine TSI. Sampling was then prioritized, scheduled, and executed as follows:

- Samples for 291Z were taken by certified AHERA Building Inspector G.A. Murbach.
- Guidance for sampling is provided by DOE/RL-2004-29, *Sampling and Analysis Plan for the Plutonium Finishing Plant Above-Grade Structures*.

1.3.1.4 Laboratory Analysis

All samples were documented on chain-of-custody forms with sample identification numbers and sent to a certified laboratory for analysis. Sample results were analyzed by an AHERA Building Inspector/Designer to identify the following materials:

- ACM that requires abatement
- ACM that can remain in place during demolition

EPA approval will be required for ACM to remain in place during demolition. Results are documented in this report (sample results are summarized in Table 1).

Note: EPA has approved the PFP request to leave Cat I ACM in place during demolition.

1.3.2 Sampling and Analysis Plans

NESHAP (40 CFR 61), AHERA, and the RAWP (DOE/RL-2011-03) require a thorough asbestos inspection of the facility prior to demolition. All suspect ACMs need to be characterized. To fulfill that requirement, one to three SAPs were completed for each unit. These SAPs were designed to incorporate both historical sampling records as well as new sample results. Representative samples were taken as directed by the SAP. With the execution of the SAP and receipt of results, all ACM present in this zone, including Cat I and Cat II nonfriable and all friable RACM (TSI), was identified. Results have been documented in this report.

By strictly following the SAP format, the AHERA Building Inspector ensured a systematic approach to asbestos characterization for each zone. The format for these SAPs includes the following areas:

- Plaster walls and ceilings
- Acoustic ceiling tile
- Coving and mastic
- Secondary containment surface coating
- Wall texture
- Electrical wiring
- Caulk
- Wall patches
- Doors
- Roofing material
- Insulation on exterior of air ducts

Regulations allowed like materials to be evaluated together. These homogenous areas needed to be sufficiently sampled to know the asbestos content and prove its consistency. A homogeneous area is

uniform in texture, color, and date of application and appears identical in every other respect. Materials installed at different times belong to different homogeneous sampling areas. If there is any reason to suspect that materials might be different, even though they appear uniform, they were assigned to different homogeneous sampling areas. Homogeneous areas were defined for the following materials:

- Wall construction: lath and plaster
- Wall construction: drywall/gypsum board
- Ceiling: lath and plaster
- Ceiling: acoustic tile
- Electrical wiring/panels
- 480 V service
- 220 V service
- 110 V service
- Build up roofing material

1.4 Methodology

Visual evaluations and process knowledge are described in this section.

1.4.1 Visual Evaluations

Characterization for doors and TSI was conducted using the following process called visual evaluation:

- Define a common field (doors or TSI).
- Characterize a representative segment of that field using analytical data or process knowledge.
- Apply the standard to field results.

1.4.1.1 Visual Evaluation Process for Doors

Facility doors can be categorized into fire, exterior, interior, and elevator doors. A representative number of doors were sampled from these categories, and material from the interior of the door was sent to a certified laboratory for analysis. Each door was handled as a miscellaneous unit, and two samples of the interior contents were taken from the lower quarter of each door. The results were used to formulate the visual evaluation process, which consisted of the following actions:

- AHERA Building Inspectors would drill a 1-in. hole into the lower portion of the door to be sampled.
- Upon completion of the hole, a visual inspection of the contents of the door would be made by the inspector. A determination of no asbestos detected (NAD) would be made if the interior of the door was hollow or contained any of the following material:
  - Brown paper
  - Fiberglass
  - Urethane/STYROFOAM™

If any material other than fiberglass, urethane foam, or brown paper is present, the door would be presumed asbestos or sampled. Results of this visual evaluation assessment for doors can be found in the individual Zone 11 report.

™ STYROFOAM is a trademark of The Dow Chemical Company, Midland, Michigan.

Fire Protection Engineering prohibited the drilling of fire doors in 291Z. As a result, the following doors were presumed to be RACM: 693, 694, and 695. These doors will be removed prior to demolition.

1.4.1.2 Visual Evaluation Process for TSI

Visual evaluation for TSI was conducted by AHERA Building Inspectors that had abated thousands of feet of asbestos insulation. They were intimately familiar with TSI from this building. The inspector would cut into the insulation and examine the contents. Special attention was paid to joints, elbows, and 90 degree fittings because asbestos mud was often used in these areas even when the straight runs were fiberglass. When asbestos was identified, the piping was declared presumed ACM and removed prior to demolition. If an unknown material was identified, samples were taken following a written SAP, or the material was presumed to be asbestos and abated or removed.

1.4.2 Process Knowledge/Suspect ACM

Identification of suspect ACMs was based on process knowledge and training of the AHERA Building Inspectors. In general, the following materials in 291Z were presumed to contain asbestos:

- Gaskets/packings (Cat I) present throughout the building and in good condition.
- Doors 693, 694, and 695.
- The electrical switchgear in Room 501 was energized at the time of the inspection. As a result, the AHERA Inspector assumed the "21 electrical buckets" that made up the switchgear contained asbestos wiring and insulators (Figure 6). These buckets will be removed prior to demolition.

Figure 6. Room 501, Electrical Switchgear (21 Buckets)

2 Sample Information and Results

Asbestos bulk sampling has been conducted at PFP over many years in support of deactivation activities under CERCLA.

2.1 Historical Asbestos Analytical Data

Sample collection was mainly performed upon request in support of specific project activities (e.g., facility modifications and mechanical/electrical isolation). All sample collections were performed by insulators certified as AHERA Building Inspectors. There are 24 historical data identified for 291Z, and no historical samples were identified for 291Z001 (historical samples can be found in Table 1 and Appendix B).

2.2 Asbestos Characterization Results

NESHAP (40 CFR 61), AHERA, and the RAWP (DOE/RL-2011-03) require completion of a thorough asbestos inspection prior to demolition, identification of all Cat I and Cat II nonfriable ACM and all friable RACM, and documentation of those findings.

Samples were taken in accordance with the attached SAPs and submitted to a certified laboratory for analysis. Bulk asbestos sample log sheets and analytical data results were reviewed for each zone. Zone reports summarize the following information:

- Sample locations
- Material types and descriptions
- Condition of the materials
- Analytical results

This information is summarized in the following tables:

- Table 1 summarizes the sample results.
- Table 2 lists the ACM to be removed prior to demolition.
- Table 3 lists the Cat I and Cat II ACM that will remain in the building during demolition. In accordance with AHERA requirements and EPA concurrence, nonfriable Cat I and Cat II materials that are in good condition may remain in the building during demolition provided subsequent demolition activities do not render them friable.
- Table 4 lists the 291Z rooms and corridors.

In addition to analytical sampling, visual evaluations of the ceiling, doors, metal paneling, walls, and electrical wiring/panels were conducted.

Note 1: Gaskets and packings are found throughout the facility in equipment (valves, glove boxes, and pumps). All gaskets and packings were characterized using process knowledge as suspect ACM and were not sampled. All gaskets and packings are in good condition.

Note 2: All friable ACM will have been removed prior to demolition. As of June 5, 2017, all 243.8 linear m (800 linear ft) of TSI have been removed from 291Z.

Note 3: All Cat I and Cat II ACM will be managed in accordance with the RAWP (DOE/RL-2011-03), which requires removal or a demonstration that demolition techniques will not render them friable. If left in the building for demolition, EPA approval is required.

2.3 Non-Asbestos Containing Structures

Knowledge of non-asbestos materials is equally important as ACM knowledge. Materials such as the ceiling, roofing, flooring, and walls were characterized. Characterization results for each of these materials can be found in Appendix A.

2.4 Controls

During the demolition of areas where ACM Cat I and Cat II are encountered, the project will respond in the following ways:

- Wet methods will be used on ACM items during removal.
- Demolition activity will only use methods that minimize breaking, crushing, pulverizing, or reducing to powder suspect ACM during removal with heavy equipment.
- Cutting and grinding of suspected ACM will not be allowed.
- Operators will be directed to remove suspect ACM in as large of pieces as possible.
- Suspect ACM will be lowered to the ground, not dropped.
- Suspect asbestos-containing waste material (ACWM) will be segregated from other waste to the extent possible. Comingled ACWM and non-ACM waste materials will be treated as ACWM.
- ACWM will be managed in accordance with the substantive requirements of NESHAP (40 CFR 61) and the U.S. Department of Transportation.
- ACWM will be kept adequately wet at all times after demolition and will be kept wet during handling and loading for transport to the disposal site. This ACWM will be transported and disposed of in bulk following applicable site procedures.

Table 1. Summary of Sample Results for 291Z

	Visual Evaluation	Historical	Analytical (Lab) Samples	Process Knowledge	Positive	Category	Total Samples	Results	Extent
Floors/Concrete	0	0	0	2	0	N/A	2	NAD	
Doors	7	0	0	0	3	N/A	7	Presumed ACM (3 fire doors)	5 m^2 (54 ft^2)
Electrical	0	0	2	1	1	RACM/ Cat II	3	Electrical wiring, 20-50% chrysotile, transite insulators	4 × 2.1 × 0.61 m (12 × 7 × 2 ft) (21 buckets)
Caulking/Coving	0	0	0	4	0	N/A	4	NAD	
Inaccessible Areas/ Plenum Internals	0	0	0	2/historical video and photos	0	N/A	2	NAD	
Ceiling/Walls Concrete	0	0	0	3	0	N/A	3	NAD	
Roof	0	4	45	0	1	Cat I roofing	49	2% chrysotile	1.9 m^2 (20 ft^2)
Fiberboard/Black Mastic	0	9	0	0	2	Cat I/ mastic	9	10% chrysotile	unknown
TSI Piping Inside 291Z	0	7	0	0	3	RACM	7	25 to 65% chrysotile/low levels of amosite	244 linear m (800 linear ft)
TSI Piping Outside 291Z	25	0	0	0	17	RACM	25	25 to 65% chrysotile/low levels amosite	91.4 linear m (300 linear ft)
Gaskets/Packings	0	4	0	0	4	Cat I	4	20% chrysotile	<0.2 m^2 each (<2 ft^2 each)
Expansion Joints/Exhaust Fans	7	0	0	0	0	N/A	7	NAD	N/A
TOTAL	**39**	**24**	**45**	**12**	**31**		**122**		

Table 2. Summary of ACM to be Removed Prior to Demolition of 291Z

Area	Room/ Location	Field Description	Results	Category	Aerial Extent
291Z	Entire facility	243.8 linear m (800 linear ft) of TSI present All TSI has been abated as of 06/05/17.	Process knowledge; 20 to 60% chrysotile with low levels of amosite possible	RACM	243.8 linear m (800 linear ft)
291Z	Fire doors	Three fire doors 1.8 × 0.9 m (6 × 3 ft each)	Process knowledge; 20% to 60% chrysotile	RACM	5 m^2 (54 ft^2)
292Z	Room 500	Electrical switchgear	Process knowledge, 20% to 50% chrysotile (wiring); transite insulators	RACM/ Cat II	4 × 2.1 × 0.61 m (12 × 7 × 2 ft) 21 buckets

Table 3. Listing of Category I and Category II ACM Remaining in 291Z during Demolition

Area	Room/ Location	Field Description	Results	Category	Aerial Extent
291Z	Entire building	Gaskets/packings	10% to 70% chrysotile	Cat I	<0.2 m^2 each (<2 ft^2 each)
291Z	Roof	Small area around hatch cover	2% chrysotile/mastic	Cat I	1.9 m^2 (20 ft^2)

Table 4. 291Z Rooms

Room Number	Description
503	Plenum below main floor; access through manhole 1 or 2
510	Plenum below main floor; access through manhole 1 or 2
508	Plenum north end of 291Z leads to stack
507	North end main floor of 291Z
506	Main fan room; north end
505	Center opening of main floor; main plenum
502	Southeast fan room
509	Southwest fan room
504	North end (below main floor [plenum]); connects to Room 505
501	Compressor and vacuum pump room
500	Electrical room (252Z2)

2.5 Conclusions

This report documents the thorough asbestos inspection results for 291Z and 291Z001. Characterization was completed using a variety of methods to evaluate categories of suspect materials such as floors/mastic, walls, ceilings, caulk gaskets, and TSI. The evaluation methods employed for asbestos characterization are listed in Table 5.

Table 5. Summary of Evaluation Methods

Evaluation Methods	Number of Samples Taken
Visual Evaluation	39
Historical Samples	24
Current Laboratory Samples	47
Process Knowledge	12
Total	**122**
Positive Hits	**31**

Results indicate that the following asbestos needs to be removed prior to demolition of 291Z:

- 243.8 linear m (800 linear ft) of TSI (Note: All TSI has already been abated).
- Room 501 contains electrical switchgear 4 × 2.1 × 0.61 m (12 × 7 × 2 ft), which is made up of 21 "buckets." The electrical wiring and certain components are assumed to be friable asbestos (wiring) and Cat II (Transite insulators). Operations will remove these "buckets" whole prior to demolition.
- Three doors (693, 694, and 695) within 291Z were presumed to be RACM. These doors will be removed prior to demolition.

291Z001 contains no asbestos.

EPA has given approval to leave the following Cat I ACM in the building during demolition:

- Gaskets and packings in good condition (these materials are found throughout the facility [0.2 m^2 each [<2 ft^2 each]).
- Cat I roofing materials.

All Cat I and Cat II ACM will be managed in accordance with the RAWP (DOE/RL-2011-03), which requires their removal or a demonstration that demolition techniques will not render them friable. Sample results are summarized in Table 1. Table 2 identifies all ACM that must be removed prior to demolition.

Table 3 identifies Cat I and Cat II ACM that will remain in the building during demolition.

SAPs with results are provided in Appendix A. A summary of sample results can be found in Appendix B. Laboratory sample reports are provided in Appendix C. AHERA Building Inspector and laboratory credentials are provided in Appendix D.

A demolition plan has been developed that describes in detail the management methods that will be used to ensure that demolition techniques will not render any ACM remaining in the building during demolition friable. Section 2.3 summarizes these controls.

3 References

40 CFR 61, "National Emission Standards for Hazardous Air Pollutants," *Code of Federal Regulations*. Available at: http://www.gpo.gov/fdsys/pkg/CFR-2010-title40-vol8/xml/CFR-2010-title40-vol8-part61.xml.

Asbestos Hazard Emergency Response Act of 1986, 15 USC 2641, et seq. Available at: http://www.gpo.gov/fdsys/pkg/USCODE-2009-title15/html/USCODE-2009-title15-chap53-subchapII.htm.

Comprehensive Environmental Response, Compensation, and Liability Act of 1980, 42 USC 9601, et seq., Pub. L. 107-377, December 31, 2002. Available at: http://epw.senate.gov/cercla.pdf.

DOE/RL-2004-29, 2005, *Sampling and Analysis Plan for the Plutonium Finishing Plant Above-Grade Structures*, Rev. 0, U.S. Department of Energy, Richland Operations Office, Richland, Washington. Available at: http://pdw.hanford.gov/arpir/index.cfm/viewDoc?accession=DA236741.

DOE/RL-2005-13, 2005, *Action Memorandum for the Plutonium Finishing Plant Above-Grade Structures Non-Time Critical Removal Action*, Rev. 0, U.S. Department of Energy, Richland Operations Office, Richland, Washington. Available at: http://pdw.hanford.gov/arpir/pdf.cfm?accession=DA00914134.

DOE/RL-2011-03, 2016, *Removal Action Work Plan for the Deactivation, Decontamination, Decommissioning, and Demolition of the Plutonium Finishing Plant Complex*, Rev. 1, U.S. Department of Energy, Richland Operations Office, Richland, Washington. Available at: http://pdw.hanford.gov/arpir/index.cfm/viewDoc?accession=0077210H.

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Appendix A

Sampling and Analysis Plans with Results

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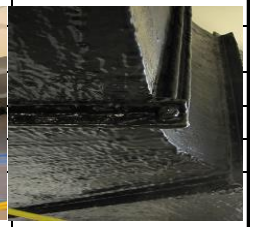
Visual verification. AHERA trained inspector cuts sheathing to reveal insulation material; joints and elbows along with horizontal and vertical pipe runs.	**Visual Verification of TSI**	**Condition of material sampled: Good or Poor**	**Photograph of sample location(s) taken?**
	Results		
TSI Location/ description			
South side of 234-5Z 2" pipe Figure 1. South side of 234-5Z showing suspect TSI piping. Visual verification of vertical straight run; elbows and horizontal run. In addition verify that the material on the vertical run and horizontal run are identical.			
Vertical run	TSI	removal or abatement required	
Elbows/ joints	TSI		
Horizontal run	TSI		
40 linear ft of piping 2" pipe			
30 linear ft of 8" pipe.			
TSI piping 242-Z Roof; Figure 2. North side of 236-Z exterior. Suspect TSI piping (two). Sample the straight runs (three each) and the elbows (three each). Two pipes. Elbows (three samples each = total of six) orange arrows Straight run (three samples each = total of six)			
Vertical run	Fiberglass		
Elbows/ joints	Fiberglass		
horizontal run	Fiberglass		
Figure 3: North side, exterior of 291-Z. North side, exterior of 291Z; suspect TSI piping. Vertical riser according to insulators has been abated and is now wrapped in fiberglass. The remaining portions of the main steam line are suspect. Conduct visual verification of vertical piping and sample the elbow and straight runs.			
Vertical Riser/ larger pipe	Fiberglass		
Horizontal Run/ larger pipe	Fiberglass		
Horizontal runs change in size/larger pipe	Fiberglass		

Visual verification. AHERA trained inspector cuts sheathing to reveal insulation material; joints and elbows along with horizontal and vertical pipe runs.	**Visual Verification of TSI**	**Condition of material sampled: Good or Poor**	**Photograph of sample location(s) taken?**		
Vertical Run from 90 degree to 291Z: 30 linear ft.	TSI				
Elbows/joints (length included in vertical run estimate)	TSI				
Figure 4: Vertical run from 291Z to 234-5Z main steam line					
Horizontal Runs/	TSI	Abated			
Elbows/joints	TSI				
Vertical	TSI				
					
Figure 5: Aluminum clad TSI piping. Large straight runs (vertical/horizontal). Visual verification required to ensure that the horizontal and vertical runs are identical.					
Vertical	TSI	Abated			
Horizontal	TSI				
Elbows/ joints	TSI				
Small piping	Fiberglass				
Figure 6: Green aluminum clad piping should be non-asbestos. Visual verification of elbow and straight runs required. If other than fiberglass; three samples each.					
Straight run	Fiberglass				
Elbow/ joint	Fiberglass				

Visual verification. AHERA trained inspector cuts sheathing to reveal insulation material; joints and elbows along with horizontal and vertical pipe runs.	**Visual Verification of TSI**	**Condition of material sampled: Good or Poor**	**Photograph of sample location(s) taken?**		
DIRECTIONS for sampling/evaluation and a DESCRIPTION of the material.	**Visual Verification of TSI**			**Condition of material sampled: Good or Poor**	**Photograph of sample location(s) taken?**
					
Figure 7 Elbows Mainline. Visual verification main line 90° elbows on main steam line. West Side					
Straight run	TSI	Abated			
Elbows/ joints	TSI				
Figure 8: Small and large steam lines, valves, piping, etc.					
Small piping straight runs and	TSI				
small piping elbows/joints	TSI	Abated			
Large piping; Straight run	TSI				
Large piping elbows/joints	TSI				
Blanket wrap (2 types) Visual Verification	TSI	Abated			

Visual verification. AHERA trained inspector cuts sheathing to reveal insulation material; joints and elbows along with horizontal and vertical pipe runs.	**Visual Verification of TSI**	**Condition of material sampled: Good or Poor**	**Photograph of sample location(s) taken?**
			 
Figure 9: Rhino liner; NAD. No further evaluation required. Process knowledge installed by insulators.	NAD		
Figure 10: Miscellaneous piping (2). Visual verification for each change in piping size. Assumption: the larger clad piping (yellow arrow) will have already been characterized by previous sampling.			
Valve body; large pipe	TSI	Abated	
Large metal clad pipe	TSI	Abated	

Visual verification. AHERA trained inspector cuts sheathing to reveal insulation material; joints and elbows along with horizontal and vertical pipe runs.	**Visual Verification of TSI**	**Condition of material sampled: Good or Poor**	**Photograph of sample location(s) taken?**
Figure 11: Suspect TSI piping—Large yellow, two straight runs, elbow and green clad piping. Visual verification on green clad piping, required.			
Green piping	Fiberglass		
Small pipe (A)	TSI	Abated	
Small pipe (B)	TSI		
Elbow	TSI		
Large valve body	TSI		
Figure 12: Miscellaneous piping (4). TSI suspect line on floor of 291Z. Assumption, large steam line already characterized. Sample small line, only.			

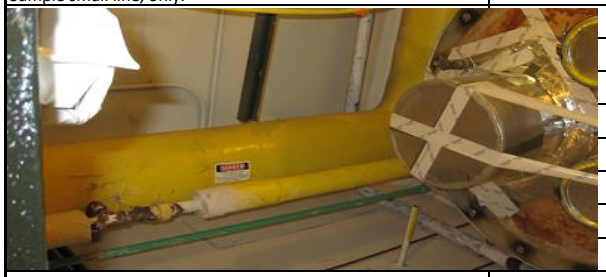
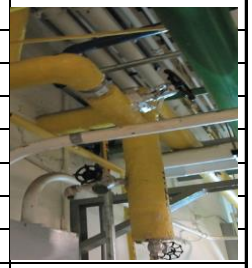
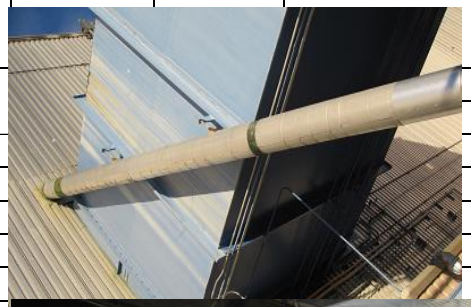



Figure 12: Miscellaneous piping (5)			
Small piping; horizontal run	TSI	Abated	
Small piping joints/elbows	TSI		

Visual verification. AHERA trained inspector cuts sheathing to reveal insulation material; joints and elbows along with horizontal and vertical pipe runs.	**Visual Verification of TSI**	**Condition of material sampled: Good or Poor**	**Photograph of sample location(s) taken?**		
Figure 13: Miscellaneous piping (6) (30 linear ft)	TSI	Abatement required			
Valve body	TSI				
Small piping	TSI	Abatement required			
Connecting piping	TSI				
Green piping	TSI	Abatement required			
Very small piping	TSI				
Medium piping	TSI	Abatement required			
Medium piping	TSI				
Elbows/ joints	TSI	Abatement required			
Straight runs: Total to be abated 50 linear ft.	TSI				
Figure 14: Large steam line, marked asbestos and non-asbestos.					
Straight run	TSI	Abatement required			
Elbow	TSI				
Collar	TSI				
20 linear ft.					



Visual verification. AHERA trained inspector cuts sheathing to reveal insulation material; joints and elbows along with horizontal and vertical pipe runs.	**Visual Verification of TSI**	**Condition of material sampled: Good or Poor**	**Photograph of sample location(s) taken?**		
Figure 15: Main steam line exiting 234-5Z and running into 291Z. Note change in outside protective coating at bottom of picture. May denote change in composition					
Straight runs	TSI	Abatement required			
Joints	TSI				
40 linear ft.					
Figure 16: NW corner exterior of 291Z. Note change in pipe size. Interview with insulators indicates that the smaller side is fiberglass and the large asbestos TSI. Conduct visual inspection.					
Small pipe straight run	TSI	Abatement required			
Small pipe joints/elbows	TSI				
Large pipe; straight run	Fiberglass				
Large pipe; elbows/joints	Fiberglass				
Length included in previous estimate.					

Visual verification. AHERA trained inspector cuts sheathing to reveal insulation material; joints and elbows along with horizontal and vertical pipe runs.	**Visual Verification of TSI**	**Condition of material sampled: Good or Poor**	**Photograph of sample location(s) taken?**
Figure 17: Process vacuum line north of 291Z.			
Straight runs	TSI	Abatement required	
Elbows/joints	TSI		
40 linear ft.			
Figure 18; Small pipe under main duct. Main steam line going from 291Z to 234-5Z.			
Main steam line; straight runs	TSI	Abatement required	
Ebows/ joints	TSI		
Small line straight runs (40 linear ft)	TSI	Abatement required	
Elbows/joints	TSI		
Medium lines; straight run (two pipe 80 linear ft)	TSI	Abatement required	
Elbows/joints	TSI		
Steam line running over the top of the black rhino liner duct. 70 linear ft	TSI	Abatement required	

Sample Location: Building 291Z, 291Z001, and outside piping. 291Z is approximately 76' X 140' or 10640 sq. ft. 291Z001 has a square base approximately 35 feet on a side and a stack of approximately 200 feet. This Sample plan is based on historical data (file search, photographs, engineering plans etc.) and a walk down completed October 12, 2015. Whenever possible, a visual evaluation will be completed by an AHERA trained inspector familiar with installation and maintenance of TSI in this facility. will verify accuracy during the sampling event and is authorized to modify this plan in the field as required. All sampling will be conducted in accordance with IHSP-D&D-003, Determination Sampling for Presumed Asbestos-Containing Material. Sampling to be conducted by AHERA certified inspector. Photographs will be taken of each sample location and a unique SWIHDs number will be assigned to each room for each sample phase.

Date Sampled	Site wide Industrial Hygiene Database No.	RJLEE Group/ Lab Sample No.	Area	Field Description	Results	NESHAP Category (e.g., RACM, Cat I)	Extent of ACM (m^2 [ft^2] or Linear m [ft.])	Condition: Poor or Good	Determination Method
Historic Gasket									
14-Aug-13	13-21290-001	20130809	291Z	ET-8 Throttle valve gasket	20% chrysotile	CAT I	< 2 sq. ft.	Good	Polarized Light Microscopy PLM, EPA-600/R-93-116
14-Aug-13	13-21290-001	20130809	291Z	Throttle valve; possible duplicate of ET-8 sample	20% chrysotile	CAT I	< 2 sq. ft.	Good	Polarized Light Microscopy PLM, EPA-600/R-93-116
19-May-08		W08IM01050	291Z	Fan gasket/ gray gasket material	95% chrysotile	CAT I	< 2 sq. ft.	Good	Polarized Light Microscopy PLM, EPA-600/R-93-116
19-May-08		W08IM01051	291Z	Fan gasket/ gray gasket material	95% chrysotile	CAT I	20 linear ft	Good	Polarized Light Microscopy PLM, EPA-600/R-93-116
Historic Roof									
18-Nov-11	11-25469	11-25469-001	291Z	Roof: West wall near large pipe conduit	30% chrysotile	CAT I? roofing material	Unknown	Good	Polarized Light Microscopy PLM, EPA-600/R-93-116
18-Nov-11	11-25469	11-25469-002	291Z	Roof: West wall near large pipe conduit	30% chrysotile	CAT I? roofing material	Unknown	Good	Polarized Light Microscopy PLM, EPA-600/R-93-116
13-Sep-04		WO41005781	291Z	Roof: Rope seal around hatch cover	NAD	NA	NA	NA	Polarized Light Microscopy PLM, EPA-600/R-93-116
10-Aug-94	1	E9408-0312	291Z	Roof: Black fibrous tar	NAD	NA	NA	NA	Polarized Light Microscopy PLM, EPA-600/R-93-116
Historic TSI Piping									
7-Jun-00	291-501-1A	W00I001263	291Z	501/ Compressor Room fiberglass from compressor pump	NAD	NA	NA	NA	Polarized Light Microscopy PLM, EPA-600/R-93-116
7-Jun-00	291-501-2A	W00I001264	291Z	501/ Compressor Room mud from steam line; east wall of 502	10-15% amosite	RACM	TBD	Good	Polarized Light Microscopy PLM, EPA-600/R-93-116

Date Sampled	Site wide Industrial Hygiene Database No.	RJLEE Group/ Lab Sample No.	Area	Field Description	Results	NESHAP Category (e.g., RACM, Cat I)	Extent of ACM (m^2 [ft^2] or Linear m [ft.])	Condition: Poor or Good	Determination Method
7-Jun-00	291-501-3A	W00I001265	291Z	501/ Compressor Room mud from steam line; east wall of 502	4-8% amosite	RACM	TBD	Good	Polarized Light Microscopy PLM, EPA-600/R-93-116
7-Jun-00	291-501-4A	W00I001266	291Z	501 Compressor Room; Low presssure steam line, south side of 501 (mineral wool)	NAD	NA	NA	NA	Polarized Light Microscopy PLM, EPA-600/R-93-116
21-Jun-00	291-Z-5	W00I001319	291Z	Steam station east side. Large 90 at steam station east side	NAD	NA	NA	NA	Polarized Light Microscopy PLM, EPA-600/R-93-116
21-Jun-00	291-Z-6	W00I001320	291Z	Steam station east side. Large 90 at steam station east side	5% amosite; 65% chrysotile	RACM	TBD	Good	Polarized Light Microscopy PLM, EPA-600/R-93-116
21-Jun-00	291-Z-7	W00I001321	291Z	Low presssure steam line, south side of 501	NAD	NA	NA	NA	Polarized Light Microscopy PLM, EPA-600/R-93-116
Historic NO Data on specific location									
3-Feb-98		W98I000220	291Z	95% brown compressed, fibrous board	NAD	NA	NA	NA	Polarized Light Microscopy PLM, EPA-600/R-93-116
3-Feb-98		W98I000220	291Z	5% black adhesive	NAD	NA	NA	NA	Polarized Light Microscopy PLM, EPA-600/R-93-116
3-Feb-98		W98I000221	291Z	100% brown compresssed fibrsous material/little adhesive	NAD	NA	NA	NA	Polarized Light Microscopy PLM, EPA-600/R-93-116
21-Jun-00	#1 291ZA	W99I003985	291Z	80% black/off-white fiber/filler mix	NAD	NA	NA	NA	Polarized Light Microscopy PLM, EPA-600/R-93-116
21-Jun-00	#1 291ZA	W99I003985	291Z	Layer 2: 20% black mastic	NAD	NA	NA	NA	Polarized Light Microscopy PLM, EPA-600/R-93-116
21-Jun-00	#2: 291Z	W99I003986	291Z	90% woven black fibers	NAD	NA	NA	NA	Polarized Light Microscopy PLM, EPA-600/R-93-116
21-Jun-00	#2: 291Z	W99I003986	291Z	Layer 2: 20% black mastic	NAD	NA	NA	NA	Polarized Light Microscopy PLM, EPA-600/R-93-116
21-Jun-00	#3: 291Z	W99I003987	291Z	90% woven black fibers	10% chrysotile	CAT 1	TBD	TBD	Polarized Light Microscopy PLM, EPA-600/R-93-116
21-Jun-00	#4: 291Z	W99I003988	291Z	Layer 2: black mastic	10% chrysotile	CAT I	TBD	TBD	Polarized Light Microscopy PLM, EPA-600/R-93-116

Date Sampled	Site wide Industrial Hygiene Database No.	RJLEE Group/ Lab Sample No.	Area	Field Description	Results	NESHAP Category (e.g., RACM, Cat I)	Extent of ACM (m^2 [ft^2] or Linear m [ft.])	Condition: Poor or Good	Determination Method
FLOORS									
FLOORS, DIRECTIONS: Identify flooring material - If tile or linoleum - schedule for sampling. Minimum of two samples each new type of flooring material (include mastic). Exceptions: Process knowledge, Previous Sampling or determined to be PACM because of radiological conditions.									
12-Oct-16	NA	NA	291Z	Concrete floors throughout	NAD	NA	NA	NA	AHERA Trained Inspector/ Process Knowledge
12-Oct-16	NA	NA	291Z001	Concrete floors throughout	NAD	NA	NA	NA	AHERA Trained Inspector/ Process Knowledge
Roof									
A separate SAP was developed for the 291Z Roof. This SAP can be found in Appendix A along with the results of sampling.									
WALLS									
12-Oct-16	NA	NA	291Z	Concrete throughout	NAD	NA	NA	NA	AHERA Trained Inspector/ Process Knowledge
12-Oct-16	NA	NA	291Z001	Concrete throughout	NAD	NA	NA	NA	AHERA Trained Inspector/ Process Knowledge
ELECTRICAL									
Room 501: Switchgear 12' X 7' X 2'; 21 electrical buckets. Using Process Knowledge the electrical wire and components were assumed to be ACM. These units will be removed prior to demolition.									
31-May-17	Process Knowledge	NA	291Z	Room 501, switchgear. Electrical wiring. 21 buckets. 12' X 7' X 2'	20-50% chrysotile	RACM	168 sq. ft.	GOOD	AHERA Trained Inspector/ Process Knowledge
31-May-17	Process Knowledge	NA	291Z	Room 501, switchgear. Electrical components/insulators 21 buckets. 12' X 7' X 2' (Transite/ ebonite)	20-70% chrysotile	CAT 2	168 sq. ft.	GOOD	AHERA Trained Inspector/ Process Knowledge
10-Sep-16	16-22153-005	M88GQ1AA	291Z	Electrical power lead/ braided outside wire. 3 Layers	NAD	NA	NA	NA	TestAmerica Lab
10-Sep-16	16-22153-006	M88GQ1AA	291Z	Electrical power lead/ braided outside wire. 3 Layers	NAD	NA	NA	NA	TestAmerica Lab
12-Oct-16	Process Knowledge	NA	291Z001	No electrical wiring/components present	NAD	NA	NA	NA	AHERA Trained Inspector/ Process Knowledge
INACCESSIBLE AREAS:									
Inaccessible areas. Internal areas of the plenum were not accessed. Old photographs were used to verify the absence of suspect material.									
12-Oct-16	NA	NA	291Z	Historic photographs were used to eliminate the need to sample internals of the plenums.	NAD	NA	NA	NA	Visual conducted by AHERA Inspector
12-Oct-16	NA	NA	291Z001	Historic photographs were used to eliminate the need to sample internals of the plenums.	NAD	NA	NA	NA	Visual conducted by AHERA Inspector

Date Sampled	Site wide Industrial Hygiene Database No.	RJLEE Group/ Lab Sample No.	Area	Field Description	Results	NESHAP Category (e.g., RACM, Cat I)	Extent of ACM (m^2 [ft^2] or Linear m [ft.])	Condition: Poor or Good	Determination Method
TSI PIPING									
A separate SAP was developed using Visual Evaluation for characterizing TSI in 291Z. There is no TSI in 291Z001. Using process knowledge, the AHERA Inspectors have estimated approximately 840 feet of TSI was present in 291Z. It has been abated. No TSI was present in 291Z001.									
ACOUSTIC TILE/ TILE ADHESIVE									
12-Oct-16	NA	NA	291Z	None present	NAD	NA	NA	NA	AHERA Trained Inspector/ Process Knowledge

Date Sampled	Site wide Industrial Hygiene Database No.	RJLEE Group/ Lab Sample No.	Area	Field Description	Results	NESHAP Category (e.g., RACM, Cat I)	Extent of ACM (m^2 [ft^2] or Linear m [ft.])	Condition: Poor or Good	Determination Method
12-Oct-16	NA	NA	291Z001	None present	NAD	NA	NA	NA	AHERA Trained Inspector/ Process Knowledge
CAULKING									
12-Oct-16	NA	NA	291Z	None present	NAD	NA	NA	NA	AHERA Trained Inspector/ Process Knowledge
12-Oct-16	NA	NA	291Z001	None present	NAD	NA	NA	NA	AHERA Trained Inspector/ Process
COVING:									
12-Oct-16	NA	NA	291Z	None present	NAD	NA	NA	NA	AHERA Trained Inspector/ Process Knowledge
12-Oct-16	NA	NA	291Z001	None present	NAD	NA	NA	NA	AHERA Trained Inspector/ Process Knowledge
CEILING									
12-Oct-16	NA	NA	291Z	Concrete	NAD	NA	NA	NA	AHERA Trained Inspector/ Process Knowledge
12-Oct-16	NA	NA	291Z001	Concrete	NAD	NA	NA	NA	AHERA Trained Inspector/ Process Knowledge
DOORS									

Using the Visual Evaluation process developed for 236Z NS 234-5Z, drill at least one 1" hole in the bottom quarter of each door and determine its contents based on past sampling of 600+ doors in 236Z, and 234-5Z. If new material is identified, either sample or presume the material to be RACM. VE to be conducted only by AHERA Trained Inspectors.

Door #	RESULTS				Comments:
	Fiberglass	Brown paper/ cardboard	ACM	OTHER	
691			PACM	Fire doors cannot drill considered PACM	
692			PACM	Fire doors cannot drill considered PACM	
693			PACM	Fire doors cannot drill considered PACM	
694			NAD	Metal/with wood interior	
695			NAD	Metal/with wood interior	
696			NAD	Metal/with wood interior	
697			NAD	Metal/with wood interior	

Sample Location: Building 291Z, Fan expansion joints. There are seven Exhaust Fans in 291Z. FanS 1 and 5 are out of service. This Sample plan is based on file search, photographs, engineering plans, etc. and a walkdown. An AHERA trained inspector will verify accuracy during the sampling event and is authorized to modify this plan in the field as required. All sampling will be conducted in accordance with IHSP-D&D-003, Determination Sampling for Presumed Asbestos-Containing Material. Sampling to be conducted by AHERA certified inspector. Photographs will be taken of each sample location and a unique SWIHDs number will be assigned to each room for each sample phases.								
SYSTEM / SWIHDs #	**VERIFICATION Present Not accessible**		**Sample required**	**# of Samples**	**Total # of samples taken**	**Homogenous material?**	**Condition of material sampled: Good or Poor**	**Extent of material sampled (sq. ft. or linear feet)**	**Photograph of sample location(s) taken?**
16-23054	**Present**	**Not accessible**							
Exhaust Fans	There are seven Exhaust Fans in 291Z. Conduct a visual evaluation of all seven. Determine whether or not the intake and exhaust expansion joints are made of similar membranes. Take photographs and if possible, identify manufacturer. Take a sample of the flexible joint material from Exhaust Fan #1 and Exhaust Fan #5 of suspect material. Take a sample from each of the intake and exhaust expansion joints from Fans 1 and 5 if these materials are different. If they are the same, only two samples are required. Tape up the hole with cargo tape. Note: Air flow may be present as a result of leak/ flow by in the dampers.								
Visual Verifification	**Exhaust Fan #1. VE intake and exhaust expansion joints. Results: NAD.**								
Visual Verifification	**Exhaust Fan #2. VE intake and exhaust expansion joints. Results: NAD.**								
Visual Verifification	**Exhaust Fan #3. VE intake and exhaust expansion joints. Results: NAD.**								
Visual Verifification	**Exhaust Fan #4. VE intake and exhaust expansion joints. Results: NAD.**								
Visual Verifification	**Exhaust Fan #5. VE intake and exhaust expansion joints. Results: NAD.**								
Visual Verifification	**Exhaust Fan #6. VE intake and exhaust expansion joints. Results: NAD.**								
Visual Verifification	**Exhaust Fan #7. VE intake and exhaust expansion joints. Results: NAD.**								

SYSTEM / SWIHDs #	RJ Lee Group/ Sample #	DIRECTIONS for sampling/evaluation and a DESCRIPTION of the material/Lab description. SAMPLED 10/16/15	RESULTS	Category	# of Samples	Homogenous material?	Condition of material sampled: Good or Poor	Extent of material sampled (sq. ft. or linear feet)
DIRECTIONS: The 291-Z roof consists of a concrete base roof that may be covered with up roofing material. There are numerous large metal hatches penetrating the concrete substrate that were used to add or remove large equipment. Six of these hatches were used and then re-sealed. The edges of the these hatches are clearly defined with built up sealing material and covered by gray paint/surfacing material. The roof is approximately 76' X 140' or 10640 sq. ft.								
For sampling purposes, the roof has been divided into nine blocks. See attached map. A sample will be taken from seven of these areas. The areas to be sampled were selected by random number. The areas to be sampled are 9, 8, 7, 6, 5, 3, and 1. Core sample through all layers of roofing/sealing material that are present.								
15-22897-001	**W510085-01A**	Roof/ underlying concrete: Area 9/Yellow foam/gray rubbery material/ black asphalt chunks; three layers	**NAD**	**NA**	**7**	**NA**	**NA**	**NA**
		Layer 1: 45% yellow foam; 100% non-fibrous material.	**NAD**	**NA**	**1 of 7**	**NA**	**NA**	**NA**
		Layer 2: 10% gray material; 10% synthetic fibers; 90% non-fibrous material.	**NAD**	**NA**		**NA**	**NA**	**NA**
		Layer 3: 45% black asphalt, 30% synthetic fibers, 70% non-fibrous material.	**NAD**	**NA**		**NA**	**NA**	**NA**
15-22897-002	**W510085-02A**	Roof/ underlying concrete: Area 8/Yellow foam/gray rubbery material/ black asphalt chunks; three layers	**NAD**	**NA**	**2 of 7**	**NA**	**NA**	**NA**
		Layer 1: 70% yellow foam; 100% non-fibrous material.	**NAD**	**NA**		**NA**	**NA**	**NA**
		Layer 2: 25% gray material; 10% synthetic fibers; 90% non-fibrous material.	**NAD**	**NA**		**NA**	**NA**	**NA**
		Layer 3: 5% gray concrete, 100% non-fibrous material.	**NAD**	**NA**		**NA**	**NA**	**NA**
15-22897-003	**W510085-03A**	Roof/ underlying concrete: Area 7/Yellow foam/gray rubbery material/ black asphalt chunks; three layers	**NAD**	**NA**	**3 of 7**	**NA**	**NA**	**NA**
		Layer 1: 45% yellow foam; 100% non-fibrous material.	**NAD**	**NA**		**NA**	**NA**	**NA**
		Layer 2: 50% gray material; 5% synthetic fibers; 95% non-fibrous material.	**NAD**	**NA**		**NA**	**NA**	**NA**
		Layer 3: 5% gray concrete, 100% non-fibrous material.	**NAD**	**NA**		**NA**	**NA**	**NA**
15-22897-004	**W510085-04A**	Roof/ underlying concrete: Area 6/Yellow foam/gray rubbery material/ black asphalt chunks; three layers	**NAD**	**NA**	**4 of 7**	**NA**	**NA**	**NA**
		Layer 1: 35% yellow foam; 100% non-fibrous material.	**NAD**	**NA**		**NA**	**NA**	**NA**
		Layer 2: 60% gray material; 10% synthetic fibers; 90% non-fibrous material.	**NAD**	**NA**		**NA**	**NA**	**NA**

SYSTEM / SWIHDs #	RJ Lee Group/ Sample #	DIRECTIONS for sampling/evaluation and a DESCRIPTION of the material/Lab description. SAMPLED 10/16/15	RESULTS	Category	# of Samples	Homogenous material?	Condition of material sampled: Good or Poor	Extent of material sampled (sq. ft. or linear feet)
		Layer 3: 5% gray concrete, 100% non-fibrous material.	NAD	NA		NA	NA	NA
15-22897-005	W510085-05A	Roof/ underlying concrete: Area 5/Yellow foam/gray rubbery material/ black asphalt chunks; three layers	NAD	NA	5 of 7	NA	NA	NA
		Layer 1: 35% yellow foam; 100% non-fibrous material.	NAD	NA		NA	NA	NA
		Layer 2: 60% gray material; 10% synthetic fibers; 90% non-fibrous material.	NAD	NA		NA	NA	NA
		Layer 3: 5% gray concrete, 100% non-fibrous material.	NAD	NA		NA	NA	NA
15-22897-006	W510085-06A	Roof/ underlying concrete: Area 3/Yellow foam/gray rubbery material/gray crumbled concrete; three layers	NAD	NA	6 of 7	NA	NA	NA
		Layer 1: 45% yellow foam; 100% non-fibrous material.	NAD	NA		NA	NA	NA
		Layer 2: 60% gray material; 10% synthetic fibers; 90% non-fibrous material.	NAD	NA		NA	NA	NA
		Layer 3: 5% gray concrete, 100% non-fibrous material.	NAD	NA		NA	NA	NA
15-22897-007	W510085-07A	Roof/ underlying concrete: Area 1/Yellow foam/gray rubbery material/gray crumbled concrete; three layers	NAD	NA	7 of 7	NA	NA	NA
		Layer 1: 60% yellow foam; 100% non-fibrous material.	NAD	NA		NA	NA	NA
		Layer 2: 35% gray material; 10% synthetic fibers; 90% non-fibrous material.	NAD	NA		NA	NA	NA
		Layer 3: 5% gray concrete, 100% non-fibrous material.	NAD	NA		NA	NA	NA
		Hatch blocks. Six hatch blocks have been raised/opened and replaced. Upon replacing, surfacing material/foam was used to seal the hatch. Take one sample of the built up seal areas around the hatch openings from five different hatches. Sample all layers.			5			
15-22897-08	W510085-08A	Hatch cover block re-sealing area. / yellow foam, gray rubbery material, gray concrete; 3 layers	NAD	NA	1of 5	NA	NA	NA
		Layer 1: 50% yellow foam; 100% non-fibrous material.	NAD	NA		NA	NA	NA
		Layer 2: 48% gray material; 100% non-fibrous material.	NAD	NA		NA	NA	NA

SYSTEM / SWIHDs #	RJ Lee Group/ Sample #	DIRECTIONS for sampling/evaluation and a DESCRIPTION of the material/Lab description. SAMPLED 10/16/15	RESULTS	Category	# of Samples	Homogenous material?	Condition of material sampled: Good or Poor	Extent of material sampled (sq. ft. or linear feet)
		Layer 3: 2% gray concrete, 100% non-fibrous material.	NAD	NA		NA	NA	NA
15-22897-09	W510085-09A	Hatch cover block re-sealing area. / yellow foam, gray rubbery material, gray concrete; 3 layers	NAD	NA	2 of 5	NA	NA	NA
		Layer 1: 55% yellow foam; 100% non-fibrous material.	NAD	NA		NA	NA	NA
		Layer 2: 40% gray material; 100% non-fibrous material.	NAD	NA		NA	NA	NA
		Layer 3: 5% gray concrete, 100% non-fibrous material.	NAD	NA		NA	NA	NA
15-22897-10	W510085-10A	Hatch cover block re-sealing area. /thin white plastic/ white foam/ fibrous material/ black asphalt; 4 layers	NAD	NA	3 of 5	NA	NA	NA
		Layer 1: 15% white plastic, 100% non-fibrous material.	NAD	NA		NA	NA	NA
		Layer 2: 20% white foam; 100% non-fibrous material.	NAD	NA		NA	NA	NA
		Layer 3: 30% brown fibers; 95% cellulose fibers, 5% non-fibrous material.	NAD	NA		NA	NA	NA
		Layer 4: 35% black asphalt/ 40% cellulose; 60% non-fibrous material.	NAD	NA		NA	NA	NA
15-22897-11	W510085-11A	Hatch cover block re-sealing area. /yellow foam/ gray rubbery material/ black asphalt chunks; 3 layers	NAD	NA	4 of 5	NA	NA	NA
		Layer 1: 35% yellow foam; 100% non-fibrous material.	NAD	NA		NA	NA	NA
		Layer 2: 20% gray material; 100% non-fibrous material.	NAD	NA		NA	NA	NA
		Layer 3: 45% black asphalt/; 30% cellulose; 70% non-fibrous material.	NAD	NA		NA	NA	NA
15-22897-12	W510085-12A	Hatch cover block re-sealing area. /yellow foam/ gray rubbery material/ black asphalt chunks; 3 layers	2% chrysotile	CAT 1	5 of 5	No	Good	12 sq. ft.
		Layer 1: 55% yellow foam; 100% non-fibrous material.	NAD	NA		NA	NA	NA

SYSTEM / SWIHDs #	RJ Lee Group/ Sample #	DIRECTIONS for sampling/evaluation and a DESCRIPTION of the material/Lab description. SAMPLED 10/16/15	RESULTS	Category	# of Samples	Homogenous material?	Condition of material sampled: Good or Poor	Extent of material sampled (sq. ft. or linear feet)
		Layer 2: 5% gray material; 100% non-fibrous material.	NAD	NA		NA	NA	NA
		Layer 3: 40% black asphalt/; 5% cellulose; 93% non-fibrous material; 2% chrysotile asbestos	**2% chrysotile**	**CAT 1**		**No**	**Good**	**12 sq. ft.**
		Surfacing material covering over Steel access hatch. Take a sample of all layers toward the center of the steel access hatches (flat roofing area)/		**3**				
15-22897-13	**W510085-13A**	Center of Hatch 1, Sample 1./ yellow foam/ gray rubbery material; two layers.	NAD	NA	1of 3	NA	NA	NA
		Layer 1: 80% yellow foam/ 100% non-fibrous material.	NAD	NA		NA	NA	NA
		Layer 2: 20% gray material; 100% non-fibrous material.	NAD	NA		NA	NA	NA
15-22897-14	**W510085-14A**	Center of Hatch 4, Sample 2/ yellow foam/ gray rubbery material/ brown crumbled material; 3 layers	NAD	NA	2 of 3	NA	NA	NA
		Layer 1: 63% yellow foam; 100% non-fibrous material.	NAD	NA		NA	NA	NA
		Layer 2: 35% gray material; 100% non-fibrous material.	NAD	NA		NA	NA	NA
		Layer 3: 2% brown crumbled material/; 100% non-fibrous material.	NAD	NA		NA	NA	NA

SYSTEM / SWIHDs #	RJ Lee Group/ Sample #	DIRECTIONS for sampling/evaluation and a DESCRIPTION of the material/Lab description. SAMPLED 10/16/15	RESULTS	Category	# of Samples	Homogenous material?	Condition of material sampled: Good or Poor	Extent of material sampled (sq. ft. or linear feet)
15-22897-15	**W510085-15A**	Center of Hatch 3, Sample 3/ yellow foam/ gray rubbery material/ brown crumbled material; 3 layers	**NAD**	**NA**	**3 of 3**	**NA**	**NA**	**NA**
		Layer 1: 65% yellow foam; 100% non-fibrous material.	**NAD**	**NA**		**NA**	**NA**	**NA**
		Layer 2: 15% gray material; 100% non-fibrous material.	**NAD**	**NA**		**NA**	**NA**	**NA**
		Layer 3: 20% brown crumbled material/; 100% non-fibrous material.	**NAD**	**NA**		**NA**	**NA**	**NA**

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Appendix B

Sample Results – Historical and Current

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Date Sampled	Commercial Lab Sample #	Site wide Industrial Hygiene Database No.	Area (Name or No.)	Room No.	Field Description	Results	NESHAP Category (RACM, Cat 1 and Cat 2)	Extent of ACM [m2 (ft2) or Linear m (ft.)]	Condition (Good/ Poor)	Determination Method	Laboratory	Results / Material	Results / Percentage (%)
14-Aug-13	20130809	**13-21290-001**	**291Z**	Fan Room	**ET-8 Throttle valve gasket**	**20% chrysotile**	**CAT I**	**< 2 sq. ft.**	**Good**	Polarized Light Microscopy PLM, EPA-600/R-93-116	No lab given; historic sample	chrysotile	20
14-Aug-13	20130809	**13-21290-001**	**291Z**	Fan Room	**Throttle valve; possible duplicate of ET-8 sample.**	**20% chrysotile**	**CAT I**	**< 2 sq. ft.**	**Good**	Polarized Light Microscopy PLM, EPA-600/R-93-116	No lab given; historic sample	chrysotile	20
19-May-08	W08IM01050	No Data	**291Z**	Fan Room	**Fan gasket/ gray gasket material**	**95% chrysotile**	**CAT I**	**< 2 sq. ft.**	**Good**	Polarized Light Microscopy PLM, EPA-600/R-93-116	WSCF	chrysotile	95-99
19-May-08	W08IM01051	No Data	**291Z**	Fan Room	**Fan gasket/ gray gasket material**	**95% chrysotile**	**CAT I**	**20 linear ft**	**Good**	Polarized Light Microscopy PLM, EPA-600/R-93-116	WSCF	chrysotile	95-99
18-Nov-11	**11-25469-001**	**11-25469**	**291Z**	Roof	**ROOF: West wall near large pipe conduit.**	**30% chrysotile**	**CAT I**	20 square ft.	**Good**	Polarized Light Microscopy PLM, EPA-600/R-93-116	No lab given; historic sample	chrysotile	30
18-Nov-11	**11-25469-002**	**11-25469**	**291Z**	Roof	**ROOF: West wall near large pipe conduit.**	**30% chrysotile**	**CAT I**	20 square ft.	**Good**	Polarized Light Microscopy PLM, EPA-600/R-93-116	No lab given; historic sample	chrysotile	30
13-Sep-04	**WO41005781**	No Data	**291Z**	Roof	**ROOF: Rope seal around hatch cover.**	**NAD**	**NA**	**NA**	**NA**	Polarized Light Microscopy PLM, EPA-600/R-93-116	No lab given; historic sample	**NA**	**NA**
10-Aug-94	**E9408-0312**	No Data	**291Z**	Roof	**ROOF: black fibrous tar**	**NAD**	**NA**	**NA**	**NA**	Polarized Light Microscopy PLM, EPA-600/R-93-116	HEHF	**NA**	**NA**
7-Jun-00	**W00I001263**	291-501-1A	**291Z**	501	**501/ Compressor Room fiberglass from compressor pump**	**NAD**	**NA**	**NA**	Good	Polarized Light Microscopy PLM, EPA-600/R-93-116	WSCF	**NA**	**NA**
7-Jun-00	**W00I001264**	291-501-2A	**291Z**	501	**501/ Compressor Room mud from steam line; east wall of 502.**	**10-15% amosite**	**RACM**	Abated	Good	Polarized Light Microscopy PLM, EPA-600/R-93-116	WSCF	amosite	10-15
7-Jun-00	**W00I001265**	291-501-3A	**291Z**	501	**501/ Compressor Room mud from steam line; east wall of 502.**	**4-8% amosite**	**RACM**	Abated	Good	Polarized Light Microscopy PLM, EPA-600/R-93-116	WSCF	amosite	4-8
7-Jun-00	**W00I001266**	291-501-4A	**291Z**	501	**501 Compressor Room; Low presssure steam line, south side of 501 (mineral wool)**	**NAD**	**NA**	**NA**	Good	Polarized Light Microscopy PLM, EPA-600/R-93-116	WSCF	**NA**	**NA**
21-Jun-00	**W00I001319**	291-Z-5	**291Z**	Steam station	**Steam station east side. Large 90 at steam station east side**	**NAD**	**NA**	**NA**	Good	Polarized Light Microscopy PLM, EPA-600/R-93-116	WSCF	**NA**	**NA**

Date Sampled	Commercial Lab Sample #	Site wide Industrial Hygiene Database No.	Area (Name or No.)	Room No.	Field Description	Results	NESHAP Category (RACM, Cat 1 and Cat 2)	Extent of ACM [m2 (ft2) or Linear m (ft.)]	Condition (Good/ Poor)	Determination Method	Laboratory	Results / Material	Results / Percentage (%)
21-Jun-00	**W00I001320**	291-Z-6	**291Z**	Steam station	**Steam station east side. Large 90 at steam station east side**	**5% amosite; 65% chrysotile**	**RACM**	Abated	Good	Polarized Light Microscopy PLM, EPA-600/R-93-116	WSCF	amosite and chrysotile	5 65
21-Jun-00	**W00I001321**	291-Z-7	**291Z**	501	**Low presssure steam line, south side of 501**	**NAD**	**NA**	**NA**	Good	Polarized Light Microscopy PLM, EPA-600/R-93-116	WSCF	**NA**	**NA**
3-Feb-98	**W98I000220**	No Data	**291Z**	No Data	**95%S brown compressed, fibrous board**	**NAD**	**NA**	**NA**	**NA**	Polarized Light Microscopy PLM, EPA-600/R-93-116	WSCF	**NA**	**NA**
3-Feb-98	**W98I000220**	No Data	**291Z**	No Data	**5% black adhesive**	**NAD**	**NA**	**NA**	**NA**	Polarized Light Microscopy PLM, EPA-600/R-93-116	WSCF	**NA**	**NA**
3-Feb-98	**W98I000221**	No Data	**291Z**	No Data	**100% brown compresssed fibrsous material/ little adhesive**	**NAD**	**NA**	**NA**	**NA**	Polarized Light Microscopy PLM, EPA-600/R-93-116	WSCF	**NA**	**NA**
21-Jun-00	**W99I003985**	#1 291ZA	**291Z**	No Data	**80% black/off-white fiber/filler mix**	**NAD**	**NA**	**NA**	**NA**	Polarized Light Microscopy PLM, EPA-600/R-93-116	WSCF	**NA**	**NA**
21-Jun-00	**W99I003985**	#1 291ZA	**291Z**	No Data	**Layer 2: 20% black mastic**	**NAD**	**NA**	**NA**	**NA**	Polarized Light Microscopy PLM, EPA-600/R-93-116	WSCF	**NA**	**NA**
21-Jun-00	**W99I003986**	#2: 291Z	**291Z**	No Data	**90% woven black fibers**	**NAD**	**NA**	**NA**	**NA**	Polarized Light Microscopy PLM, EPA-600/R-93-116	WSCF	**NA**	**NA**
21-Jun-00	**W99I003986**	#2: 291Z	**291Z**	No Data	**Layer 2: 20% black mastic**	**NAD**	**NA**	**NA**	**NA**	Polarized Light Microscopy PLM, EPA-600/R-93-116	WSCF	**NA**	**NA**
21-Jun-00	**W99I003987**	#3: 291Z	**291Z**	No Data	**90% woven black fibers**	**10% chrysotile**	**CAT 1**	unknown location	Unknown	Polarized Light Microscopy PLM, EPA-600/R-93-116	WSCF	chrysotile	10
21-Jun-00	**W99I003988**	#4: 291Z	**291Z**	No Data	**Layer 2: black mastic**	**10% chrysotile**	**CAT I**	unknown location	Unknown	Polarized Light Microscopy PLM, EPA-600/R-93-116	WSCF	chrysotile	10
16-Oct-15	**W510085-01A**	**15-22897-001**	**291Z**	Roof	Roof/ underlying concrete: Area 9/Yellow foam/gray rubbery material/ black asphalt chunks; three layers	**NAD**	**NA**	**NA**	**NA**	Polarized Light Microscopy PLM, EPA-600/R-93-116	RJLEE Group	**NA**	**NA**
16-Oct-15	**W510085-02A**	**15-22897-002**	**291Z**	Roof	Roof/ underlying concrete: Area 8/Yellow foam/gray rubbery material/ black asphalt chunks; three layers	**NAD**	**NA**	**NA**	**NA**	Polarized Light Microscopy PLM, EPA-600/R-93-116	RJLEE Group	**NA**	**NA**

Date Sampled	Commercial Lab Sample #	Site wide Industrial Hygiene Database No.	Area (Name or No.)	Room No.	Field Description	Results	NESHAP Category (RACM, Cat 1 and Cat 2)	Extent of ACM [m2 (ft2) or Linear m (ft.)]	Condition (Good/ Poor)	Determination Method	Laboratory	Results / Material	Results / Percentage (%)
16-Oct-15	**W510085-03A**	**15-22897-003**	**291Z**	Roof	Roof/ underlying concrete: Area 7/Yellow foam/gray rubbery material/ black asphalt chunks; three layers	**NAD**	**NA**	**NA**	**NA**	Polarized Light Microscopy PLM, EPA-600/R-93-116	RJLEE Group	**NA**	**NA**
16-Oct-15	**W510085-04A**	**15-22897-004**	**291Z**	Roof	Roof/ underlying concrete: Area 6/Yellow foam/gray rubbery material/ black asphalt chunks; three layers	**NAD**	**NA**	**NA**	**NA**	Polarized Light Microscopy PLM, EPA-600/R-93-116	RJLEE Group	**NA**	**NA**
16-Oct-15	**W510085-05A**	**15-22897-005**	**291Z**	Roof	Roof/ underlying concrete: Area 5/Yellow foam/gray rubbery material/ black asphalt chunks; three layers	**NAD**	**NA**	**NA**	**NA**	Polarized Light Microscopy PLM, EPA-600/R-93-116	RJLEE Group	**NA**	**NA**
16-Oct-15	**W510085-06A**	**15-22897-006**	**291Z**	Roof	Roof/ underlying concrete: Area 3/Yellow foam/gray rubbery material/ black asphalt chunks; three layers	**NAD**	**NA**	**NA**	**NA**	Polarized Light Microscopy PLM, EPA-600/R-93-116	RJLEE Group	**NA**	**NA**
16-Oct-15	**W510085-07A**	**15-22897-007**	**291Z**	Roof	Roof/ underlying concrete: Area 1/Yellow foam/gray rubbery material/ black asphalt chunks; three layers	**NAD**	**NA**	**NA**	**NA**	Polarized Light Microscopy PLM, EPA-600/R-93-116	RJLEE Group	**NA**	**NA**
16-Oct-15	**W510085-08A**	**15-22897-008**	**291Z**	Roof	Hatch cover block re-sealing area. / yellow foam, gray rubbery material, gray concrete; 3 layers	**NAD**	**NA**	**NA**	**NA**	Polarized Light Microscopy PLM, EPA-600/R-93-116	RJLEE Group	**NA**	**NA**
16-Oct-15	**W510085-09A**	**15-22897-009**	**291Z**	Roof	Hatch cover block re-sealing area. / yellow foam, gray rubbery material, gray concrete; 3 layers	**NAD**	**NA**	**NA**	**NA**	Polarized Light Microscopy PLM, EPA-600/R-93-116	RJLEE Group	**NA**	**NA**
16-Oct-15	**W510085-10A**	**15-22897-010**	**291Z**	Roof	Hatch cover block re-sealing area. / yellow foam, gray rubbery material, gray concrete; 3 layers	**NAD**	**NA**	**NA**	**NA**	Polarized Light Microscopy PLM, EPA-600/R-93-116	RJLEE Group	**NA**	**NA**
16-Oct-15	**W510085-11A**	**15-22897-011**	**291Z**	Roof	Hatch cover block re-sealing area. / yellow foam, gray rubbery material, gray concrete; 4 layers	**NAD**	**NA**	**NA**	**NA**	Polarized Light Microscopy PLM, EPA-600/R-93-116	RJLEE Group	**NA**	**NA**
16-Oct-15	**W510085-12A**	**15-22897-012**	**291Z**	**Roof**	**Hatch cover block re-sealing area. / yellow foam, gray rubbery material, gray concrete; 3 layers**	**2% chrysotile**	**CAT 1**	**20 square ft.**	**Good**	**Polarized Light Microscopy PLM, EPA-600/R-93-116**	**RJLEE Group**	**chrysotile**	**2%**
16-Oct-15	**W510085-13A**	**15-22897-013**	**291Z**	Roof	Center of Hatch 1, Sample 1./ yellow foam/ gray rubbery material; two layers.	**NAD**	**NA**	**NA**	**NA**	Polarized Light Microscopy PLM, EPA-600/R-93-116	RJLEE Group	**NA**	**NA**
16-Oct-15	**W510085-14A**	**15-22897-014**	**291Z**	Roof	Center of Hatch 4, Sample 2/ yellow foam/ gray rubbery material/ brown crumbled material; 3 layers	**NAD**	**NA**	**NA**	**NA**	Polarized Light Microscopy PLM, EPA-600/R-93-116	RJLEE Group	**NA**	**NA**
16-Oct-15	**W510085-15A**	**15-22897-015**	**291Z**	Roof	Center of Hatch 3, Sample 3/ yellow foam/ gray rubbery material/ brown crumbled material; 3 layers	**NAD**	**NA**	**NA**	**NA**	Polarized Light Microscopy PLM, EPA-600/R-93-116	RJLEE Group	**NA**	**NA**

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Appendix C

Laboratory Analytical Results

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October 28, 2015

CH2M Hill PRC
Attn. Bruce Hey
Bruce_E_Hey@rl.gov
509-373-7787

Subject: Bulk Asbestos Analysis Report Group 15-22897

Fifteen samples were received on 10/22/15 for Bulk analysis of Asbestos. The samples were collected on 10/16/15 and were assigned laboratory ID W510085. The samples were analyzed using Polarized Light Microscopy by test method EPA-600/R-93/116 on 10/26-28/15.

The results are as follows:

Lab ID	Client ID
W510085-01A	15-22897-001

Sample Description: Yellow foam/gray rubbery material/black asphalt chunks
Sample was non homogeneous containing 3 layers.

45% Yellow Foam	*10% Gray Material*	*45% Black Asphalt*
No Asbestos Detected 100% Non-fibrous Material	No Asbestos Detected 10% Synthetic Fibers 90% Non-fibrous Material	No Asbestos Detected 30% Synthetic Fibers 70% Non-fibrous Material

W510085-02A	15-22897-002

Sample Description: Yellow foam/gray rubbery material/gray crumbled concrete
Sample was non homogeneous containing 3 layers.

70% Yellow Foam	*25% Gray Material*	*5% Gray Concrete*
No Asbestos Detected 100% Non-fibrous Material	No Asbestos Detected 10% Synthetic Fibers 90% Non-fibrous Material	No Asbestos Detected 100% Non-fibrous Material

W510085-03A	15-22897-003

Sample Description: Yellow foam/gray rubbery material/gray crumbled concrete
Sample was non homogeneous containing 3 layers.

45% Yellow Foam	*50% Gray Material*	*5% Gray Concrete*
No Asbestos Detected 100% Non-fibrous Material	No Asbestos Detected 5% Synthetic Fibers 95% Non-fibrous Material	No Asbestos Detected 100% Non-fibrous Material

W510085-04A 15-22897-004

Sample Description: Yellow foam/gray rubbery material/gray crumbled concrete
Sample was non homogeneous containing 3 layers.

35% Yellow Foam	*60% Gray Material*	*5% Gray Concrete*
No Asbestos Detected 100% Non-fibrous Material	No Asbestos Detected 5% Synthetic Fibers 95% Non-fibrous Material	No Asbestos Detected 100% Non-fibrous Material

W510085-05A 15-22897-005

Sample Description: Yellow foam/gray rubbery material/black asphalt chunks
Sample was non homogeneous containing 3 layers.

30% Yellow Foam	*30% Gray Material*	*40% Black Asphalt*
No Asbestos Detected 100% Non-fibrous Material	No Asbestos Detected 10% Synthetic Fibers 90% Non-fibrous Material	No Asbestos Detected 30% Synthetic Fibers 70% Non-fibrous Material

W510085-06A 15-22897-006

Sample Description: Yellow foam/gray rubbery material/gray crumbled concrete
Sample was non homogeneous containing 3 layers.

45% Yellow Foam	*60% Gray Material*	*5% Gray Concrete*
No Asbestos Detected 100% Non-fibrous Material	No Asbestos Detected 10% Synthetic Fibers 90% Non-fibrous Material	No Asbestos Detected 100% Non-fibrous Material

W510085-07A 15-22897-007

Sample Description: Yellow foam/gray rubbery material/gray crumbled concrete
Sample was non homogeneous containing 3 layers.

60% Yellow Foam	*35% Gray Material*	*5% Gray Concrete*
No Asbestos Detected 100% Non-fibrous Material	No Asbestos Detected 10% Synthetic Fibers 90% Non-fibrous Material	No Asbestos Detected 100% Non-fibrous Material

W510085-08A 15-22897-008

Sample Description: Yellow foam/gray rubbery material/gray concrete
Sample was non homogeneous containing 3 layers.

50% Yellow Foam	*48% Gray Material*	*2% Gray Concrete*
No Asbestos Detected 100% Non-fibrous Material	No Asbestos Detected 100% Non-fibrous Material	No Asbestos Detected 100% Non-fibrous Material

W510085-09A 15-22897-009

Sample Description: Yellow foam/gray rubbery material/gray concrete
Sample was non homogeneous containing 3 layers.

55% Yellow Foam	*40% Gray Material*	*5% Gray Concrete*
No Asbestos Detected 100% Non-fibrous Material	No Asbestos Detected 100% Non-fibrous Material	No Asbestos Detected 100% Non-fibrous Material

W510085-10A 15-22897-010

Sample Description: Thin white plastic/white foam/brown fibrous material/black asphalt
Sample was non homogeneous containing 4 layers.

15% White Plastic	*20% White Foam*	*30% Brown Fibers*	*35% Black Asphalt*
No Asbestos Detected 100% Non-fibrous Material	No Asbestos Detected 100% Non-fibrous Material	No Asbestos Detected 95% Cellulose Fibers 5% Non-fibrous Material	No Asbestos Detected 40% Cellulose 60% Non-fibrous Material

W510085-11A 15-22897-011

Sample Description: Yellow foam/gray rubbery material/black asphalt chunks
Sample was non homogeneous containing 3 layers.

35% Yellow Foam	*20% Gray Material*	*45% Black Asphalt*
No Asbestos Detected 100% Non-fibrous Material	No Asbestos Detected 100% Non-fibrous Material	No Asbestos Detected 30% Cellulose Fibers 70% Non-fibrous Material

W510085-12A 15-22897-012

Sample Description: Yellow foam/gray rubbery material/black asphalt
Sample was non homogeneous containing 3 layers.

55% Yellow Foam	*5% Gray Material*	*40% Black Asphalt*
No Asbestos Detected 100% Non-fibrous Material	No Asbestos Detected 100% Non-fibrous Material	2% Chrysotile Asbestos 5% Cellulose Fibers 93% Non-fibrous Material

W510085-13A 15-22897-013

Sample Description: Yellow foam/gray rubbery material
Sample was non homogeneous containing 2 layers.

80% Yellow Foam	*20% Gray Material*	
No Asbestos Detected 100% Non-fibrous Material	No Asbestos Detected 100% Non-fibrous Material	

W510085-14A 15-22897-014

Sample Description: Yellow foam/gray rubbery material/brown crumbled material
Sample was non homogeneous containing 3 layers.

63% Yellow Foam	*35% Gray Material*	*2% Brown Crumbled Material*
No Asbestos Detected 100% Non-fibrous Material	No Asbestos Detected 100% Non-fibrous Material	No Asbestos Detected 1000% Non-fibrous Material

W510085-15A 15-22897-015

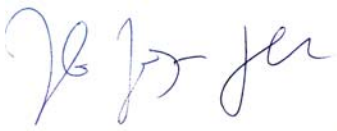
Sample Description: Yellow foam/gray rubbery material/brown crumbled material
Sample was non homogeneous containing 3 layers.

65% Yellow Foam	*15% Gray Material*	*20% Brown Crumbled Material*
No Asbestos Detected 100% Non-fibrous Material	No Asbestos Detected 100% Non-fibrous Material	No Asbestos Detected 1000% Non-fibrous Material

Samples are analyzed with a stereomicroscope followed by a polarized light microscopic analysis. The results of these analyses are generally sufficient for identification and quantitation of major concentrations of asbestos. Since floor tiles may contain fibers too small to be resolved by PLM detection of those fibers by this method may not be possible. Asbestos may be detected at concentrations less than one percent by volume, but this detection is highly material dependent and alternate techniques may be considered.

The results provided in this report relate only to the items tested. Samples were received in acceptable condition unless otherwise noted in the comments above.

We certify that this data package is in compliance with the SOW. Both technically and for completeness, including a full description of, explanation of, and corrective actions for, any and all deviations, from either the analyses requested or the case narrative requested. Release of the data contained in this hard copy data package has been authorized by the Laboratory Analytical Manager (or a designee) and the laboratory's client services representative (or designee) as verified by their signatures on this report.



10/28/2015

Laboratory Manager, Heinz Huber Date

10/28/2015

Analyst, Susan Adami Date

If you have any questions, please feel free to contact Susan Adami or Heinz Huber at 509-545-4989.

SWIHD - Chain of Custody

INDUSTRIAL HYGIENE CHAIN OF CUSTODY AND LABORATORY REQUEST

W510085

Lab: RJ Lee Pasco WA	**Turnaround Needed:** 5 Days
Contractor: CH2M Hill Plateau Remediation Company	**CACN:** **COA:** JPRC
Billing POC: Keas, Tami L **Email:** Tami_L_Keas@rl.gov **Phone:** (509)373-1622 303531	
Email Report To: IH_Management@rl.gov; Bruce_E_Hey@rl.gov	**Date Sampled:** 10/16/2015
Project IH: **Phone:** 942-6483	**Survey No.:** 15-22897 - PFP - 291Z Roof Asbestos Sampling
Instructions and Comments for Lab: N/A	
RAD: No	

Sample ID/Type/Description	Required Analysis
15-22897-001 / Bulk (container) *15-22897-001*	Asbestos, Layered
15-22897-002 / Bulk (container) *15-22897-002*	Asbestos, Layered
15-22897-003 / Bulk (container) *15-22897-003*	Asbestos, Layered
15-22897-004 / Bulk (container) *15-22897-004*	Asbestos, Layered
15-22897-005 / Bulk (container) *15-22897-005*	Asbestos, Layered
15-22897-006 / Bulk (container) *15-22897-006*	Asbestos, Layered
15-22897-007 / Bulk (container) *15-22897-007*	Asbestos, Layered
15-22897-008 / Bulk (container) *15-22897-008*	Asbestos, Layered
15-22897-009 / Bulk (container) *15-22897-009*	Asbestos, Layered
15-22897-010 / Bulk (container) *15-22897-010*	Asbestos, Layered
15-22897-011 / Bulk (container) *15-22897-011*	Asbestos, Layered
15-22897-012 / Bulk (container) *15-22897-012*	Asbestos, Layered

	Signature	Printed Name	Date	Time
Relinquished By:		Russell Medli	10-22-15	0940
Received By:		P.M. Hall/CHPRC	OCT 2 2 2015	0940
Relinquished By:		P.M. Hall/CHPRC	OCT 2 2 2015	1105
Received By:		Joe Sears	OCT 2 2 2015	1105
Relinquished By:				
Received By:				

SWIHD - Chain of Custody

INDUSTRIAL HYGIENE CHAIN OF CUSTODY AND LABORATORY REQUEST

Lab: RJ Lee Pasco WA	**Turnaround Needed:** 5 Days
Contractor: CH2M Hill Plateau Remediation Company	**CACN:** **COA:** JPRC
Billing POC: Keas, Tami L **Email:** Tami_L_Keas@rl.gov **Phone:** (509)373-1622 303531	
Email Report To: IH_Management@rl.gov; Bruce_E_Hey@rl.gov	**Date Sampled:** 10/16/2015
Project IH: **Phone:** 942-6483	**Survey No.:** 15-22897 - PFP - 291Z Roof Asbestos Sampling
Instructions and Comments for Lab: N/A	
RAD: No	

Sample ID/Type/Description	Required Analysis
15-22897-013 / Bulk (container) *15-22897-013*	Asbestos, Layered
15-22897-014 / Bulk (container) *15-22897-014*	Asbestos, Layered
15-22897-015 / Bulk (container) *15-22897-015*	Asbestos, Layered

	Signature	Printed Name	Date	Time
Relinquished By:		Russell Midili	10-22-15	0940
Received By:		F.M. Hall/CHPRC	OCT 22 2015	0940
Relinquished By:		F.M. Hall/CHPRC	OCT 22 2015	1105
Received By:		Joe Sean	OCT 22 2015	1105
Relinquished By:				
Received By:				

Appendix D

Building Inspector Certifications

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Certificate of Completion
This is to certify that
William G. Cox

Has satisfactory Completed 8 hours of Refresher training as an
AHERA Project Designer
In compliance with TSCA Title II AHERA 40 CFR Part 763 &
Missouri State RSMo 643.230

RH WELCH INC
Michael J. Moore
Training Director/Instructor

Certificate of Completion
This is to certify that
Ted A. Hopkins

Has satisfactory Completed 4 hours of refresher training as an
AHERA Building Inspector
In compliance with TSCA Title II AHERA 40 CFR Part 763 &
Missouri State RSMo 643.230

RH WELCH INC
Michael J. Moore
Training Director/Instructor

Certificate of Completion
This is to certify that
William G. Cox

Has satisfactory Completed 4 hours of refresher training as an
AHERA Building Inspector
In compliance with TSCA Title II AHERA 40 CFR Part 763 &
Missouri State RSMo 643.230

RH WELCH INC
Michael J. Moore
Training Director/Instructor

Certificate of Completion
This is to certify that
Ted A. Hopkins

Has satisfactory Completed 24 hours of Initial training as an
AHERA Project Designer
In compliance with TSCA Title II AHERA 40 CFR Part 763 &
Missouri State RSMo 643.230

R.H. Welch, Inc.
Robert H. Welch PhD (ABD
Safety Engineer/Consultant

Certificate of Completion
This is to certify that
James M. Leary

Has satisfactory Completed 24 hours of Initial training as an
AHERA Project Designer
In compliance with TSCA Title II AHERA 40 CFR Part 763 &
Missouri State RSMo 643.230

R.H. Welch, Inc.
Robert H. Welch PhD (ABD
Safety Engineer/Consultant

Certificate of Completion
This is to certify that
Ted A. Hopkins

Has satisfactory Completed 24 hours of Initial training as an
AHERA Building Inspector
In compliance with TSCA Title II AHERA 40 CFR Part 763 &
Missouri State RSMo 643.230

R.H. Welch, Inc.
Michael J. Moore
Instructor/Consultant

Certificate of Completion
This is to certify that
James M. Leary

Has satisfactory Completed 24 hours of Initial training as an
AHERA Building Inspector
In compliance with TSCA Title II AHERA 40 CFR Part 763 &
Missouri State RSMo 643.230

R.H. Welch, Inc.
Michael J. Moore
Instructor/Consultant

Certificate of Completion
This is to certify that
Ted A. Hopkins

Has satisfactory Completed 8 hours of Refresher training as an
AHERA Project Designer
In compliance with TSCA Title II AHERA 40 CFR Part 763 &
Missouri State RSMo 643.230

RH WELCH INC
Michael J. Moore
Training Director/Instructor

Course Presented By R. H. Welch, Inc.
AHERA Project Designer Refresher

RH WELCH INC.

Certificate # RHW-PDR-16-010

ourse Date: **March 11, 2016**
efresher Required By: **March 11, 2017**

02 E. Kaitlyn Rd. Kennewick, WA 99338 m.j.moore@frontier.com

Course Presented By R. H. Welch, Inc.
AHERA Building Inspector Refresher

RH WELCH INC.

Certificate # RHW-BIR-16-017

Course Date: **February 4, 2016**
Refresher Required By: **February 4, 2017**

96902 E. Kaitlyn Rd. Kennewick, WA 99338 m.j.moore@frontier.com

Course Presented By R. H. Welch, Inc.
AHERA Building Inspector Refresher

RH WELCH INC.

Certificate # RHW-BIR-16-048

urse Date: **May 3, 2016**
fresher Required By: **May 3, 2017**

)2 E. Kaitlyn Rd. Kennewick, WA 99338 m.j.moore@frontier.com

Course Presented By R. H. Welch, Inc.
AHERA Project Designer Refresher

R.H. Welch, Inc.

Certificate # RHW-PD-15-006

Course Date: **3-31-15 – 4-2-15**
Refresher Required By: **4-2-16**

96902 E. Kaitlyn Rd. Kennewick, WA 99338 m.j.moore@frontier.com

Course Presented By R. H. Welch, Inc.
AHERA Project Designer Refresher

R.H. Welch, Inc.

Certificate # RHW-PD-15-007

Course Date: **3-31-15 – 4-2-15**
Refresher Required By: **4-2-16**

Course Presented By R. H. Welch, Inc.
AHERA Building Inspector Refresher

R.H. Welch, Inc.

Certificate # RHW-BI-15-004

Course Completion Date: **2-19-15**
Refresher Required By: **2-19-16**

96902 E. Kaitlyn Rd. Kennewick, WA 99338 m.j.moore@frontier.com

Course Presented By R. H. Welch, Inc.
AHERA Building Inspector Refresher

R.H. Welch, Inc.

Certificate # RHW-BI-15-005

Course Completion Date: **2-19-15**
Refresher Required By: **2-19-16**

96902 E. Kaitlyn Rd. Kennewick, WA 99338 m.j.moore@frontier.com

Course Presented By R. H. Welch, Inc.
AHERA Project Designer Refresher

RH WELCH INC.

Certificate # RHW-PDR-16-011

Course Date: **March 2, 2016**
Refresher Required By: **March 2, 2017**

96902 E. Kaitlyn Rd. Kennewick, WA 99338 m.j.moore@frontier.com

Certificate of Completion
This is to certify that
James M. Leary

Has satisfactory Completed 4 hours of refresher training as an
AHERA Building Inspector
In compliance with TSCA Title II AHERA 40 CFR Part 763 & Missouri State RSMo 643.230

RH WELCH INC.

Michael J. Moore
Training Director/Instructor

Course Presented By R. H. Welch, Inc.
AHERA Project Designer Refresher

RH WELCH INC.

Certificate # RHW-PDR-16-012

Course Date: **March 22, 2016**
Refresher Required By: **March 22, 2017**

96902 E. Kaitlyn Rd. Kennewick, WA 99338 m.j.moore@frontier.com

Certificate of Completion
This is to certify that
James M. Leary

Has satisfactory Completed 8 hours of Refresher training as an
AHERA Project Designer
In compliance with TSCA Title II AHERA 40 CFR Part 763 & Missouri State RSMo 643.230

RH WELCH INC.

Michael J. Moore
Training Director/Instructor

Course Presented By R. H. Welch, Inc.
AHERA Building Inspector Refresher

RH WELCH INC.

Certificate # RHW-BIR-16-018

Course Date: **February 4, 2016**
Refresher Required By: **February 4, 2017**

96902 E. Kaitlyn Rd. Kennewick, WA 99338 m.j.moore@frontier.com

Certificate of Completion
This is to certify that
James M. Leary

Has satisfactory Completed 24 hours of Initial training as an
AHERA Building Inspector
In compliance with TSCA Title II AHERA 40 CFR Part 763 & Missouri State RSMo 643.230

Michael J. Moore
Instructor/Consultant

R.H. Welch, Inc.

Course Presented By R. H. Welch, Inc.
AHERA Building Inspector Refresher

R.H. Welch, Inc.
Certificate # RHW-BI-15-005

Course Completion Date: **2-19-15**
Refresher Required By: **2-19-16**

96902 E. Kaitlyn Rd. Kennewick, WA 99338 m.j.moore@frontier.com

Certificate of Completion
This is to certify that
James M. Leary

Has satisfactory Completed 24 hours of Initial training as an
AHERA Project Designer
In compliance with TSCA Title II AHERA 40 CFR Part 763 & Missouri State RSMo 643.230

Robert H. Welch PhD (ABD
Safety Engineer/Consultant

R.H. Welch, Inc.

Course Presented By R. H. Welch, Inc.
AHERA Project Designer Refresher

R.H. Welch, Inc.
Certificate # RHW-PD-15-007

Course Date: **3-31-15 – 4-2-15**
Refresher Required By: **4-2-16**

Certificate of Completion
This is to certify that
William G. Cox

Has satisfactory Completed 24 hours of Initial training as an
AHERA Building Inspector
In compliance with TSCA Title II AHERA 40 CFR Part 763 & Missouri State RSMo 643.230

Michael J. Moore
Instructor/Consultant

R.H. Welch, Inc.

Course Presented By R. H. Welch, Inc.
AHERA Building Inspector Refresher

R.H. Welch, Inc.
Certificate # RHW-BI-15-003

Course Completion Date: **2-19-15**
Refresher Required By: **2-19-16**

96902 E. Kaitlyn Rd. Kennewick, WA 99338 m.j.moore@frontier.com

Certificate of Completion
This is to certify that
William G. Cox

Has satisfactory Completed 24 hours of Initial training as an
AHERA Project Designer
In compliance with TSCA Title II AHERA 40 CFR Part 763 & Missouri State RSMo 643.230

Robert H. Welch PhD (ABD
Safety Engineer/Consultant

R.H. Welch, Inc.

Course Presented By R. H. Welch, Inc.
AHERA Project Designer Refresher

R.H. Welch, Inc.
Certificate # RHW-PD-15-004

Course Date: **3-31-15 – 4-2-15**
Refresher Required By: **4-2-16**