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(A) Item No.	(B) Document/Drawing No.	(C) Sheet No.	(D) Rev. No.	(E) Title or Description of Data Transmitted	Approval Designator	Reason for Transmittal	Originator Disposition	Receiver Disposition
1	HNF-5242	NA	0	Tech. Basis for WPAM @ PFP	NA	2	1	1

16. KEY		
Approval Designator (F)	Reason for Transmittal (G)	Disposition (H) & (I)
E, S, Q, D OR N/A (See WHC-CM-3-5, Sec. 12.7)	1. Approval 2. Release 3. Information 4. Review 5. Post-Review 6. Dist. (Receipt Acknow. Required)	1. Approved 2. Approved w/comment 3. Disapproved w/comment 4. Reviewed no/comment 5. Reviewed w/comment 6. Receipt acknowledged

17. SIGNATURE/DISTRIBUTION (See Approval Designator for required signatures)										
(G) Reason	(H) Disp.	(J) Name	(K) Signature	(L) Date	(M) MSIN	(G) Reason	(H) Disp.	(J) Name	(K) Signature	(L) Date (M) MSIN
		Design Authority				1	1	WF White	<i>WF White</i>	10/5/99 TS-20
		Design Agent				1	1	DA Connors	<i>DA Connors</i>	10/5/99
2	1	Cog. Eng. RA Jones	<i>RA Jones</i>	10/5/99	TS-57					
2	1	Cog. Mgr. TD Merkling	<i>TD Merkling</i>	10/5/99	TS-59					
		QA								
1	1	Safety DA Connors	<i>DA Connors</i>	10/6/99	TS-11					
		Env.								

18. <i>RA Jones</i> 10/5/99 Signature of EDT Originator Date		19. NA Authorized Representative for Receiving Organization Date		20. <i>TD Merkling</i> 10/5/99 Design Authority/Cognizant Manager Date		21. DOE APPROVAL (if required) Ctrl No. _____ ☐ Approved ☐ Approved w/comments ☐ Disapproved w/comments	
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UNREVIEWED SAFETY QUESTION (USQ) SCREENING AND EVALUATION

1. Identification Number: HNF-5242, Rev. 0

USQ SCREENING

Page 1 of 2

2. Title: Technical Basis for Work Place Air Monitoring at the Plutonium Finishing Plant (PFP)

DESCRIPTION:

HNF-5242 provides a technical basis for work place air monitoring at the Plutonium Finishing Plant (PFP). This document provides requirements for location of air sampling equipment based on 10 CFR 835, HSRM-1, HNF-PRO-331, and the facility Authorization Basis.

INTRODUCTION:

See Description

AFFECTED SSCs:

No facility, systems, structures, or components are affected by the proposed change.

AUTHORIZATION BASIS:

The PFP airborne radioactivity sampling and monitoring is described in chapter 8, Rev. 1, section 8.3.5 of the PFP FSAR (HNF-SD-CP-SAR-021, Plutonium Finishing Plant Final Safety Analysis Report). No other Authorization Basis Documents as listed in FSP-PFP-5-8, Section 2.23, Rev 21, Appendix A are affected.

CONCLUSION:

All USQ screening questions can be answered "no," therefore an Unreviewed Safety Question Evaluation will not be required.

REFERENCES: N/A

Instructions: Respond to each question and provide justification for each response. A restatement of the question does not constitute a satisfactory justification or basis. An adequate justification provides sufficient explanation such that an independent reviewer could reach the same conclusion based on the information provided [DOE 5480.21, 10.e.1].

QUESTIONS

1. Does the proposed change or occurrence represent a change to the facility or procedures as described in the Authorization Basis?
☐ N/A ☒ No ☐ Yes/Maybe

BASIS: Chapter 8, Section 8.3.1.7 (and various other places) of the PFP FSAR state that Fixed Head Samplers (FHS) are required for sampling airborne contamination levels that may exceed 2% of the applicable annual limit of intake (ALI). This section also states that CAMs are required for sampling airborne contamination levels that may exceed the applicable DAC guides. The proposed change describes which rooms CAMs and FHS are required based on these criteria. Section 8.3.5 of the PFP FSAR states that the work space air sampling and monitoring is reviewed annually. The proposed document is part of that annual review to ensure compliance with applicable regulations and guidelines. The proposed change does not represent a change to the facility or procedures as described in the current FSAR. Therefore, the answer to this question is "No."

2. Does the proposed change or occurrence represent conditions that have not been analyzed in the Authorization Basis?
☐ N/A ☒ No ☐ Yes/Maybe

BASIS: See response to #1 above. No conditions are introduced by the procedure change. The proposed change is part of the annual review as described in E 5. Therefore, the answer to this question is "No."

3. Does the proposed change represent a test or experiment NOT described in the Authorization Basis that may affect the safe operation of the facility?
☒ N/A ☐ No ☐ Yes/Maybe

UNREVIEWED SAFETY QUESTION (USQ) SCREENING AND EVALUATION

1. Identification Number: HNF-5242, Rev. 0

USQ SCREENING

Page 2 of 2

2. Title: Technical Basis for Work Place Air Monitoring at the Plutonium Finishing Plant (PFP)

BASIS: The proposed change is not a test or experiment.

4. Does the proposed change or occurrence represent a change to the Technical Safety Requirements or a reduction in the margin of safety defined in the Technical Safety Requirements?

☐ N/A ☒ No ☐ Yes/Maybe

BASIS: This proposed change is a descriptive document stating where CAMs and FHS are required. This document is also based on the current national regulations and standards. This proposed change does not affect any OSR/TSR/LCO or AC in the WHC-SD-CP-CSR-010, "Plutonium Finishing Plant Operational Safety Requirements," Rev. 0-K. Therefore, no change to any TSR, OSR, or margin of safety is involved with the proposed procedure change.

USQE #1

Robert A. Jones

(Print Name)

Signature

Date: 10/5/99

USQE #2

J.R. King

(Print Name)

Signature

Date: 10/5/99

If there is a YES/MAYBE response to questions 1, 2, 3, or 4, then a USQ Evaluation must be completed.

The following guidance should be considered when completing this screening. This guidance should not be considered all-inclusive; additional factors may need to be considered depending on the nature of the proposed change.

Does the proposed change:

- 1) Modify, add, or delete a safety class function of a structure, system or component stated in the authorization basis?
- 2) Alter the design of a structure, system, or component as described in the authorization basis?
- 3) Modify, add, or delete the description of operation, operating environment, or analyses of any system or component described in the authorization basis?
- 4) Modify, add, delete or conflict with any of the design bases stated in the authorization basis?
- 5) Conflict with the principle or general design criteria stated in the authorization basis?
- 6) Modify, add, or delete any plant design features described in the authorization basis?
- 7) Modify, add, or delete a flow diagram or facility drawing provided in the authorization basis?
- 8) Create the potential for a new system or component interactions (e.g., seismic, electrical breaker coordination)?

Technical Basis for Work Place Air Monitoring for the Plutonium Finishing Plant (PFP)

R. A. Jones

Babcock and Wilcox Hanford Co.

Richland, WA 99352

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**TECHNICAL BASIS FOR WORK PLACE AIR MONITORING AT THE
PLUTONIUM FINISHING PLANT (PFP)**

**HNF-5242
REVISION: 0**

AUTHOR: ROBERT A. JONES

Technical Basis for Work Place Air Monitoring at the Plutonium Finishing Plant (PFP)

HNF-5242

Revision: 0

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1. Purpose

This document establishes the basis for the Plutonium Finishing Plant's (PFP) work place air monitoring program in accordance with the following requirements:

- Title 10, Code of Federal Regulations (CFR), Part 835 "Occupational Radiation Protection"
- Hanford Site Radiological Control Manual (HSRCM-1)
- HNF-PRO-331, Work Place Air Monitoring
- WHC-SD-CP-SAR-021, Plutonium Finishing Plant Final Safety Analysis Report
- Applicable recognized national standards invoked by DOE Orders and Policies.

2. Scope

The criteria, standards, and requirements contained in this technical basis apply to airborne radioactive particulate sampling measuring and monitoring in the workplace under **normal operating conditions** within the PFP facility. Guidance for placement of air sampling and monitoring equipment will be given. Situation based air monitoring needs (such as maintenance and de-activation activities) should be derived from guidance provided by this technical basis. Air monitoring needs for these activities should be addressed in work plans and/or radiological work permits.

Not within the scope of this technical basis:

- Air sampling and monitoring for facility effluent streams
- Environmental ambient air sampling and monitoring

3. Technical Basis for Work Place Air Monitoring

HNF-PRO-331, Work Place Air Monitoring provides direction for when air monitoring is required. In general, purposes for work place air monitoring are:

- Demonstrating regulatory compliance
- Documenting radiological conditions
- Detecting changes in radiological conditions
- Detecting the gradual buildup of airborne radioactive material
- Verifying the effectiveness of engineering controls in preventing or reducing levels of airborne radioactive material

This technical basis will include the basis for selection and placement of air sampling and monitoring equipment. This will include providing rationale for placing air samplers and

monitors, addressing sample transport line losses where applicable and direction to facility maps showing locations of air monitoring equipment.

3.1. Work Place Air Sampling

Work place air sampling is required to be performed if the area is classified as occupied (infrequently occupied or continuously occupied), and an individual is likely to receive an annual intake of 2 percent or more of the specific annual limit on intake (ALI). 2 percent of an ALI is equivalent to 40 Derived Air Concentration (DAC) hours. A combination of the following activities/documentation should be used when determining the need for air sampling:

- Air sample data
- Radiological survey data
- Source term(s)
- Release potential of the source term(s)
- Containment or confinement of the source term(s)
- Radiological work permit (RWP) constraints
- Occupancy times

Use grab/breathing air samples, when cost effective to monitor infrequently occupied areas. This practice allows for better representation of workers breathing zone¹.

Occupancy

HNF-PRO-331 glossary describes several occupancy classes. To be defined as occupied, personnel must be present for an average of 96 minutes per day, 8 hours per week, 104 hours per quarter, 416 hours per calendar year or more. Occupancy is the true rate and can be converted to other time intervals as needed. Once occupancy is established, there are two classes described:

- ***Infrequently occupied*** areas are occupied areas where workers are present less than 2000 hours per year
- ***Continuous occupancy*** means that a worker could occupy an area for 2000 hours per year or more

Occupancy classes allow for the use of administrative controls instead of air sampling. For example, if a room is considered not occupied, then air sampling is not required in that room. HSRCM-1, Article 316 requires consideration of respiratory protection under the following conditions:

- Entry into posted Airborne Radioactivity Areas (ARA)

¹ "Breathing zone" is defined as the general volume of air breathed by the worker, usually at a height of 1 to 2 meters.

- During breach of contaminated systems or components
- Work in areas or on equipment with removable contamination levels greater than 100 times the values in HSRCM-1 Table 2-2 (2000-dpm/100 cm² for ²³⁹Pu)
- During work on contaminated or activated surfaces with the potential to generate airborne radioactivity

The trigger level (according to HSRCM-1, Articles 223 and 235) for posting an ARA is 10 percent of a DAC. At this level, an individual entering an area less than the times considered occupied would receive less than 40 DAC-hrs in a working year². This is the limit for requiring air sampling. If airborne concentrations are above 10 percent of a DAC, then air sampling is required for entry because of the potential to exceed 40 DAC-hrs exposure to an individual entering the room classified as non-occupied.

If the area is defined as occupied, occupancy time and predicted airborne concentration may be used to determine the need for air sampling. The following examples may be used to determine when air sampling is required:

- 4.0 E-14 µCi/ml for ²³⁹Pu integrated over one working year (2000 hours)
- 8.0 E-14 µCi/ml for ²³⁹Pu integrated over 1000 hours in one working year

Source Term

PNL-MA-552, *Hanford Internal Dosimetry Project Manual* contains a table, referenced by HSRCM-1 in table H5-1 that describes when bioassay should be considered. These are based on the same trigger level that is required for air sampling (2 percent of an ALI exposure in one year). The table below is adapted from table H5-1 in the HSRCM-1 for ²³⁹Pu³:

Table 1

Source Term Criteria for Considering Air Sampling	
Containment	Activity (µCi)
Fume Hood	1
Glovebox	10

² Dose evaluations are considered for individuals on a working year basis, defined as 2000 hours. If an individual is present in a room for 416 hours in a working year, then the other times defining occupancy have been exceeded (See definitions for Occupancy in Section 3.1)

³ PFP primarily contains weapons-grade plutonium. The most restrictive DAC value of 2E-12 uCi/ml is used for ²³⁹Pu. ²⁴¹Am in-growth is also present. Because the DAC value is the same activity, ²³⁹Pu is stated as the isotope of interest.

General activities for fume hoods and gloveboxes have been determined, based on percent release fraction potentials of powder source term likely to expose workers to 2 percent of an ALI. This table should be used for determining which rooms require air sampling. In general, all fume hoods and gloveboxes at the PFP (with some exceptions) should be considered as exceeding the values in Table 1.

HNF-PRO-331 provides guidance for trigger levels requiring air sampling based on airborne suspension (re-suspension) of surface contamination. This document provides three basic suspension factors:

- 1.0 E-5/m – For non-heat generating aggressive work such as sweeping
- 1.0 E-6/m – For minimal activities such as general inspection/surveillance
- 1.0 E-7/m – For stationary working conditions

Using these values for re-suspension of loose surface contamination, air sampling should be considered where the following contamination is present:

- 88-dpm/100 cm² for non-heat generating aggressive work
- 880-dpm/100 cm² for minimal activities
- 8800-dpm/100 cm² for stationary work activities

These values may be modified by accounting for several factors such as (but not limited to):

- Chemical form
- Particle size
- Ventilation
- Work scope
- Total radioactivity
- Occupancy time

In general, minimal activities will be considered, and a loose surface contamination value of 880-dpm/100 cm² will be used (from a suspension factor of 1E-6/m). This is inherently conservative because of the assumptions used to derive the suspension factors: an enclosed air space, lacking ventilation, with uniformly distributed removable contamination across the horizontal floor surface.

Some source term at the PFP is contained in physical structures designed to prevent release. Some examples of this are:

- Piping
- Ducting
- Permanently sealed systems

Air sampling should be considered in areas where significant amounts of source term (determined by risk analysis) exist, taking into consideration occupancy time,

historical data and other radiological surveys. Risk is calculated by multiplying the potential airborne concentration by the probability of material release. Because the PFP is an aging facility, some systems yield higher risk of release than newer systems. This should be taken into account when prescribing air sampling. The purpose for air sampling in these areas is to monitor the effectiveness of engineered barriers. Routine radiological surveys may be used instead of continual air sampling for these areas.

Transport only areas (such as corridors and rooms not normally containing radioactive material) do not require air sampling. Because these areas are generally considered continuously occupied, source term occupancy⁴ is used instead. Engineered controls, radiological surveys, and transport times for the source negate the necessity of conducting air sampling in transport only areas. Corridors and hallways should not be used for storage of source term capable of exposing workers to 2 percent of an ALI.

3.2. Work Place Air Monitoring using CAMs

Work place air monitoring using continuous air monitors (CAMs) is required to be performed in occupied⁵ areas where:

- An individual is likely to be exposed to a concentration of airborne radioactivity exceeding one DAC (one DAC averaged over a single eight hour shift is equivalent to eight DAC-hrs) or
- Where there is a need to alert potentially exposed individuals to unexpected increases in airborne radioactivity levels⁶

A combination of the following activities/documents should be used when determining the need for air monitoring:

- Air sample data
- Occupancy time
- Radiological survey data
- Source term(s)
- Release potential of the source term(s)
- Containment or confinement of source term(s)
- RWP constraints

When cost effective; use portable CAMs to monitor infrequently occupied areas. This practice allows for faster alarm response because of work specific placement.

⁴ Source term occupancy is classified in the same manner as personnel occupancy.

⁵ See section 3.1 "Occupancy" for more details.

⁶ CAMs are recommended by the WPAM Facility Technical Authority when personnel are required to perform work with respiratory protection assigned for the purposes of potentially changing airborne conditions.

Occupancy

Criteria for using CAMs based on work and occupancy is as follows:

- $2.0\text{E-}12$ $\mu\text{Ci/ml}$ based on exposure for an eight-hour shift
- $1.6\text{E-}11$ $\mu\text{Ci/ml}$ based on exposure for a one-hour shift (instantaneous)
- $2.7\text{E-}12$ $\mu\text{Ci/ml}$ based on exposure for a six-hour shift

Occupancy time may be used in determining need for CAMs. The exposure trigger level is 8 DAC-hrs for requiring CAMs. The use of protection factors for workers wearing respiratory protection may be considered.

Transport only areas (such as corridors and rooms not normally containing radioactive material) do not require air monitoring. Because these areas are generally considered continuously occupied, source term occupancy is used instead. Engineered controls, radiological surveys, and transport times for the source negate the necessity of conducting air monitoring in transport only areas.

Source Term

Table 1 activities were calculated based on potential release to workers over one working year. Since that amount was 2 percent of an ALI, general release over one working year is 2 percent of a DAC. For source term characterization criteria, a value of fifty times⁷ Table 1 values will be used in considering CAM placement. In general, all fume hoods and gloveboxes at the PFP (with some exceptions) should be considered as exceeding fifty times Table 1 values. Gloveboxes and fume hoods, which are inactive and isolated to prevent use ("pie-plated" – not including gloveboxes with expired or failed gloves), do not require routine CAM coverage.

These values were determined based on actual work with source term. Modifications to CAM considerations may be made based on work with the source term. In cases where 8 DAC-hrs releases are possible, but remote, risk analysis may be performed to assess when CAMs are needed.

For removable surface contamination, suspension factors should be used. Using a suspension factor of $1.0\text{E-}6/\text{m}$ for minimal activities, the amount of surface contamination to trigger consideration of CAMs is $44.4\text{E}3\text{ dpm}/100\text{ cm}^2$. This value may be modified based on factors explained in section 3.1. Protection factors of engineered barriers and respirators may also be used to modify these values.

⁷ Since Table 1 values are interpreted to be likely to release 2% DAC over 1 working year, 50 times Table 1 values are considered likely to release 1 DAC.

Vault Monitoring

WHC-SD-CP-SAR-021, Plutonium Finishing Plant Final Safety Analysis Report (PFP FSAR) recognizes that primary containment barriers for plutonium bearing materials stored in vaults and the steel food pack cans might be breached by pressurization due to the effects of radiolysis, chemical reactions, or internal thermal energy. Should this occur, the FSAR (Section 9.1.4) establishes that the event would most likely be detected by the room CAMs, and later by personnel inspection. Therefore, CAMs or an equivalent real-time storage container breach-detection system must be used where vault storage is used for plutonium bearing materials. Certain vault storage configurations may be exempted from this requirement provided the materials are over-packed to prevent contamination spread in the event of lost primary containment. Example of these storage configurations includes material stored in DOT shipping containers or equivalent strong tight over-packs. *CAMs used in PFP vaults are also included in the facility tracking system, so that statistical data is available.*

3.3. Placement and Selection of Air Monitoring Equipment

NUREG 1400 and HNF-PRO-331 provide guidance for placement and selection of air monitoring equipment. A (adapted from HNF-PRO-331) description for placement and selection of sampling equipment based on purpose is as follows⁸:

Table 2

Sample Function/Location		
Purpose of Sampling/Monitoring	General Placement of Samplers/Monitors	General Facility Application
Estimate worker's intake for calculating internal dose	Sampler located in worker's breathing zone, near nose and mouth	GAS, FHAS
Identify area needing confinement control	Sampler in airflow pathway near actual or potential release point	FHAS, GAS
Provide early warning of elevated airborne release	Continuous air monitor(s) placed between worker(s) and release point(s)	CAM, portable or strategic placement
Test for leakage of radioactive materials from sealed confinement	Samplers placed downstream of confinement-control area	FHAS, CAMs, GAS

⁸ This table provides general facility application heading, not in NUREG 1400. It is to be used as general guidance to match purpose of air sampling.

system		
Determine total concentration from many potential release points	Downstream at exhaust point	FHAS, CAMs at exhauster
Determine airborne radioactivity area status or respiratory protection adequacy	Samplers at worker's location	FHAS, GAS in workers breathing zone
Special purposes, e.g., determining particle size	Case-by-case depending on airflow patterns	Case by Case

FHAS = Fixed Head Air Sampling
GAS = Grab Air Sampling

CAM = Continuous Air Monitoring

Fixed head air sampling is generally used for identifying areas needing confinement control. For this purpose, airflow patterns of the area should be known. *Airflow studies, following guidance in NUREG 1400 should be used to place fixed head air samplers.* Potential release points should also be known. Other sampling techniques may also be used by the facility, such as grab sampling.

Continuous air monitors are used to provide early warning of elevated airborne release. For prompt warning of an airborne release, the CAM should be placed between the release point, and the workers. Portable CAMs are generally used for this task, however, strategically placed CAMs may also be used. An example of a strategically placed CAM for this purpose is placing the CAM near a glovebox, with a sample line⁹ between the workers and the glovebox. Likewise, a portable CAM may also be used with a sample line near the release point. For placement to be effective, worker location and potential release points should be well known. Other information, such as airflow should also be used.

A variety of methods may be used to test for leakage of radioactive materials from sealed confinement systems. One is to use fixed head air sampling or CAMs. These should be placed downstream of the confinement system at either strategic locations or at the room exhaust. Strategic location is made more effective when factors such as likely release points, worker operations and airflow studies are incorporated.

Place samplers at room exhaust locations to determine total concentration from many potential release points. CAMs or fixed head air sampling may be used for this purpose. This also may serve a dual purpose of testing for leakage from sealed confinement systems. Care should be taken when using this approach alone because single point releases will cause under-representation of worker's breathing zone.

Grab air samples taken in the workers' breathing zone during work is the usual method of determining airborne radioactivity status or respiratory protection

⁹ See heading "Sample Line Loss" in this section for more details on correct sample line configuration.

adequacy. Programmatic and continuing assessments are usually performed with fixed head air sampling.

Because of low airflow associated with lapel air samplers and the high sensitivity required for most air sampling applications with airborne ^{239}Pu , there is currently no lapel air-sampling program at PFP. Also, high DAC environments likely to exceed respiratory protection¹⁰ (where Lapel air sampling is most useful) are generally not encountered at PFP. Grab and fixed air sampling is currently used at PFP, when bioassay is either unavailable or inadequate, to estimate the worker's intake. *Lapel air sampling should be evaluated on a case-by-case basis if planned work may exceed the protection factor of prescribed respiratory protection. Should lapel air sampling be required for planned work, use procedures, maintenance/calibration and training shall also be developed.*

General

Fixed head air samplers perform several functions. Placement should be based on identified function. Generally, fixed head air samplers for breathing zone monitoring should be placed slightly above head height, in front of the worker. For PFP, fixed head air samplers should be installed at the face of the containment device the worker is using, or in the normal breathing zone. Airflow studies, work and release point characterizations are important in the placement of fixed head air samplers. Careful consideration should be given to the placement of air samplers. *Drawings identifying locations of fixed head air samplers are found in drawing number H-2-80062, "Air Sampling Locations."*

Continuous air monitors are generally used for prompt detection of an airborne release of radioactivity. This function is ideally served when CAMs are placed downstream of the potential release points, and upstream of the workers. This may not be possible because of configuration constraints; so placement of CAMs downstream of release points, or sample lines near release points should be considered. If multiple release points exist in an area, CAMs may be placed at the exhaust of the room. Careful consideration for dilution and adequate response time should be given before placement of CAMs at exhaust points.

CAMs should generally not be used for determining concentrations because of relatively low intrinsic particle collection efficiency as compared to other air samplers. CAMs may be used for tracking and trending purposes, but should not be used for demonstration of applicable airborne radioactivity limits. Historical facility use of CAMs have shown consistent data for event analysis. *Drawings identifying locations of CAMs are found in drawing number H-2-80107, "Constant Air Monitor Station Locations."*

¹⁰ A high DAC environment likely to exceed respiratory protection is any environment, where planned radiological work is likely to expose the worker to >10% DAC for the duration of work.

Two CAM types are used at PFP: Eberline Alpha 4, 5, 5A and 5 AS series, and the Canberra Alpha Sentry CAM (currently under evaluation). The Eberline series have been used at PFP for over 20 years, and have been approved by the Hanford Instrument Evaluation Committee (this committee approves portable instruments for Hanford). The Canberra Alpha Sentry CAM was developed by the DOE at LANL, Canberra Industries and Texas A&M University. The system has been tested per ANSI standard N42-17.b and documented in "Independent Evaluation of Los Alamos National Laboratory Continuous Air Monitor Instrumentation at the Inhalation Toxicology Research Institute," prepared by Hoover, Newton, Fencel, and Marcinkovich in November, 1995.

Grab air samplers are generally used for determining airborne radioactivity area status or respiratory protection adequacy. Grab air samplers should be placed near the workers' breathing zone. Two types of grab air samplers are in use at PFP:

- Portable air samplers: Some use batteries, others use outlet power for operation. These generally sample from 0.5 to 5 cubic feet of air per minute. Uses paper filters for collection of airborne particles. Generally used for during job air samples.
- "Staplex" annular kinetic impactor: High volume of air sampled (generally from 20 to 50 cubic feet of air per minute). Uses kinetic impaction to physically segregate plutonium particles from radon progeny particles onto a planchette. This sampler allows for rapid determination of airborne concentration of plutonium because of high volumes and intrinsic radon discrimination. Generally used for short duration jobs or to determine airborne radioactivity status.

More detailed information and guidance for placement of air samplers may be obtained from NUREG 1400.

Air Sample Minimum Detectable Concentration

Careful consideration should be given to air sample volume requirements. The Minimum Detectable Concentration (MDC) **shall** be equal to or less than the applicable limit. The equation for MDC is as follows:

$$MDC(uCi/ml) = \frac{2.71 + 3.29 \sqrt{R_b T_g (1 + \frac{T_g}{T_b})}}{(6.29E10) E_c T_g T_s E_f F}$$

Where:

- E_c = Instrument Counting Efficiency (%/100) identified on the calibration sticker
- E_f = Fractional collection efficiency (% Eff)/100
- F = Air flow rate through the filter (ft³/min)
- R_b = Background count rate (cpm)
- T_b = Background count time (min)
- T_g = Gross sample count time (min)
- T_s = Duration of air sample collection (min)

For PFP, the applicable limit for radiological work is found on the Radiological Work Permit (RWP). Normally, the applicable limit placed on the RWP does not expose the worker to levels greater than 10 percent of a DAC¹¹. A during-job, grab air sample in an ARA allows for a higher MDC (per the RWP) than a grab air sample taken to down-post the room from ARA status. Fixed head air samples are taken in occupied areas likely to exceed 2 percent of an ALI; therefore, the required MDC (averaged over the year) is 2 percent of a DAC.

Sample Line Loss

Sample lines should be avoided wherever possible for work place air monitoring. If sample lines are used for collecting airborne particulate, the lines should be as short as possible and should be made of a material not subject to significant static charge effects (e.g. grounded metal). However, up to several feet of flexible plastic tubing, such as tygon, may be used to connect the sampling line to the sample collector. *Flexible plastic tubing should only be used in the vertical; or only in the horizontal position, when repositioning CAMs is not practical.* The penetration of particles with an aerodynamic equivalent diameter of 10 µm should be at least 50 percent.

¹¹ An example of applicable limits would be 10% DAC for no respiratory protection, or 10 DAC with a respiratory protection factor of 100.

DEPOSITION software should be used for calculating particle penetration where applicable¹². Sample line loss evaluations may be found in engineering configuration document WHC-SD-CP-SDD-011.

More detailed information and guidance for design of sample lines may be obtained from NUREG 1400 and ANSI N13.1.

Selection of Air Sample Filters

Site approved sample filter media used for air sampling (applicable to PFP) are as follows:

- **VERSAPORE 3000**

This filter is recommended for most applications at PFP, such as FHAS, CAMs, and grab air sampling. This filter is rugged, and is suitable for destructive analysis.

- **FLUOROPORE FS**

This air sample filter is normally used for alpha spectrometry analysis. Because of the filters' higher resolution capabilities, it may be used for breathing air CAMs. Because of relatively high cost, these filters should not be used for fixed head air sampling or grab air sampling unless alpha spectrometry is needed for analysis. These filters may be used for all work place air monitoring applications. This filter is not appropriate for destructive analysis. Because of this, these filters shall not be used for stack monitoring CAMs or environmental air sampling¹³.

Airflow Analysis

The most current airflow analysis for the facility is dated 1991¹⁴. The PFP's Radiological Control Organization is currently evaluating each sampler location, and will provide a technical basis for each location at a later date. *Detailed information and guidance for airflow analysis methods may be obtained from NUREG 1400.*

¹² Contact Facility or Site Technical Authority for work place air monitoring for information regarding DEPOSITION software.

¹³ Though environmental air sampling applications are not in the scope of this document; PFP radiological control normally performs sample-changing services for the facility, and should be aware of allowed filter types.

¹⁴ See: "Evaluation of Workplace Air Monitoring Locations in Selected Areas of the Plutonium Finishing Plant," G.A. Stoetzel and G.R. Cicotte, May, 1991; Pacific Northwest Laboratory, Richland, WA

3.4. Tracking and Trending Program

Work place air monitoring air samples are tracked through ABCASH. *The PFP's air sample trending program may be found in FSP-PFP-5-8 volume 2, section 14.18, Trending Air Sample Data.* This procedure outlines which air samples are to be trended for analysis. The procedure also establishes a basis for investigations of abnormal air sample data.

4. Required Air Monitoring at the PFP Complex

This section describes the required air monitoring by building and room number. The information provided (in Table 4) is as follows:

- **Building/Room Number**
 - Building number only if no source term exists
- **Source Term Characterization**
 - Use Logic Codes for most categories
 - A = Glovebox, source term disturbed (In-Service)
 - B = Fume Hood, source term disturbed (In-Service)
 - C = Contamination $> 880 \text{ dpm}/100\text{cm}^2$, $\leq 44.4 \text{ E3 dpm}/100\text{cm}^2$
 - D = Glovebox, source term not disturbed (inactive¹⁵ or pie-plated to prevent use)
 - E = Fume Hood, source term not disturbed (inactive or sash down to prevent use)
 - F = Vault items
 - G = No source term (contamination less than $880 \text{ dpm}/100\text{cm}^2$, no Glovebox, fume hoods) or source term contained to prevent release (sealed sources, or source contained in piping)
- **Occupancy Category**
 - Category I = Not Occupied (occupied for less than 96 min/day, 8 hrs/wk, 104 hrs/quarter, or 416 hrs/calendar year – True Rate, not average)
 - Category II = Infrequently Occupied (occupied for less than 2000 hrs/yr.)
 - Category III = Continuously Occupied (occupied for 2000 hrs/yr.)
- **Comments**

Comments include data and historical information that may be used for exceptions from Table 3 and other recommendations.
- **Required Air Monitoring**
 - CAMs, FHAS or None
 - Assume fixed location air monitoring
 - Comments will be given when non-fixed location air monitoring is appropriate

Information on all categories have been obtained from document review, observation and personnel interview. Information for work performed with source term and occupancy categories has been obtained from the PFP FSAR¹⁶ and appropriate management.

¹⁵ Not intended to include gloveboxes that are inactive because gloves have failed. This also assumes that the glovebox has ventilation.

¹⁶ Occupancy information marked with an asterisk (e.g. I*, II*, III*) has been obtained from Table 8-14 of the PFP FSAR.

The following table is a matrix for decisions concerning air-monitoring coverage. This table is used as a general tool for decision, designed to match most situations at the PFP, and is not an absolute rule. Exceptions may be made and recorded in the comment section of Table 4.

Table 3

Air Monitoring Decision Matrix							
	Source Term Classification						
Occupancy Class	A	B	C	D	E	F	G
I	NONE	NONE	NONE	NONE	NONE	CAM	NONE
II	CAM, FHAS	CAM, FHAS	FHAS	FHAS	FHAS	CAM	NONE
III	CAM, FHAS	CAM, FHAS	FHAS	FHAS	FHAS	CAM	NONE

Using information from Table 3 and direction from this technical basis; Table 4, which describes the air monitoring requirements by room¹⁷, is as follows:

Table 4

BLDG/Rm	Source Term	Occupancy	Comments	Air Monitoring Required
BLDG 232-Z				
LAVATORY	G	I		None
MEN'S CHANGE ROOM	G	II*		None
FILTER RM	G	I*	Filters and duct system in room. Contamination potential under layers of paint. Use FHAS to determine effectiveness of engineered barriers.	FHAS
PROCESS RM	A	I*	Incinerator Room. Flighty ash from the process glovebox is the source.	FHAS, (CAM required for radiological work in the room)
JANITOR	G	I		None
ELECTRICAL	G	I		None
CHEM MIX	G	I		None

¹⁷ Table 4 describes the air monitoring requirements of 10 CFR-835, HSRM-1, HNF-PRO-331 and HNF-SD-CP-SAR-021 for PFP.

Bldg./Rm. #	Source Term	Occupancy	Comments	Access Control/Entry Requirement
SCRUBBER	See Comments	I	Access is controlled. High contamination within. Air Sampling and CAMs recommended for entry.	None
HVAC	G	I	Supply fan room.	None
RM 232Z AL	G	I		None
VALVE ROOM	G	I		None
BLDG 234-5Z				
390	G	I	Front side Supply Plenum Access	None
AIRLOCK 682	G	I	Front side Airlock	None
AIRLOCK 878	G	I	Front side Airlock	None
CORR 1	G	III	Front side corridor	None
CORR 2	G	III	Front side corridor	None
CORR 3	G	III	Back side corridor	None
CORR 4	G	II	Analytical labs corridor	None
CORR 4A	G	II	Analytical labs corridor	None
CORR 4B	G	II	Analytical labs corridor	None
CORR 4B AL	Potential high levels of contamination	I*	Access controlled. Air lock to the "McKlusky room" in building 242-Z	None
CORR 4C	G	II	Analytical labs corridor	None
CORR 4D	G	II	Analytical labs corridor	None
CORR 5	G	II	Back side corridor	None
CORR 6	G	II	Back side corridor	None
CORR 7	G	II	Back side corridor	None
CORR 7A	G	II	Back side corridor	None
CORR 7A AL	G	I	Back side air lock (to outside)	None
CORR 8	G	II	PPSL corridor	None
CORR 9	G	II	PPSL corridor	None
CORR 9 AL	G	I	PPSL air lock to offices	None
CORR 13	G	II	Front side corridor	None
CORR 13 AL	G	I	Front side air lock (Emergency Back side Exit from Room 235-C)	None
CORR 13A	G	II	Front side corridor	None
CORR 13A AL	G	II	Front side air lock (to outside)	None
CORR 14A	G	II	Front side corridor (elevator access)	None
CORR 14B	G	II	Front side corridor (lockers)	None
CORR 14 AL	G	I	Front side air lock	None
CORR 14A AL	G	II	Front side air lock (to outside)	None
CORR 14C	G	II	Front side corridor (snack machines)	None
CORR 15	G	III	PPSL office corridor	None
CORR 16	G	I	PPSL corridor	None
CORR 16 AL	G	I	PPSL air lock (to outside)	None
CORR 31	G	II	Front side corridor	None
CORR 31A	G	II	Office corridor	None
CORR 32	G	II	Front side corridor	None

Bldg./Rm. #	Source Term	Occupancy	Comments	AC Monitoring Required
CORR 33A	G	I	Back side corridor (access to Filter Room 318)	None
CORR 34	G	I	Back side corridor (access to Filter Rooms)	None
CORR 192	G	I	Back side corridor	None
CORR 192 AL	G	I	Back side air lock (to outside)	None
CORR 242B	G	I	Bldg. 236 Z main entry corridor	None
CORR 242B AL	G	I	Back side air lock (main back side access)	None
CORR 303-1	G	II	Office corridor	None
CORR 303-2	G	I	Office storage	None
GUARD STATION	G	III	Guards stationed at backside primary access	None
MEZZ 230A	See comments	I	Within room 230A. Monitoring will be the same as room 230A.	See comments
MEZZ 230B	See comments	I	Within room 230B. Monitoring will be the same as room 230B.	See comments
MEZZ 230C	See comments	I	Within room 230C. Monitoring will be the same as room 230C.	See comments
MEZZ 235B	See comments	I	Within room 235B. Monitoring will be the same as room 235B.	See comments
MEZZ 235D	See comments	I	Within room 235D. Monitoring will be the same as room 235D.	See comments
MEZZ 236A	See comments	I	Within room 236A. Monitoring will be the same as room 236A.	See comments
MEZZ 236B	See comments	I	Within room 236B. Monitoring will be the same as room 236B.	See comments
MEZZ 236C	See comments	I	Within room 236C. Monitoring will be the same as room 236C.	See comments
RM 1	G	I	Within Tunnel 1. Monitoring will be the same as Tunnel 1.	See comments
RM 2	G	I	Within Tunnel 6. Monitoring will be the same as Tunnel 6.	See comments
RM 3	G	I	Within Tunnel 4. Monitoring will be the same as Tunnel 4	See comments
RM 4	G	I	Room adjacent to Tunnels 5 and 7	None
RM 5	G	I	Radioactive Waste Storage	None
RM 80	G	II	PPSL storage	None
RM 81	G	III	PPSL office	None
RM 82	G	III	PPSL office	None
RM 83	G	III	PPSL office	None
RM 84	G	I	M. Restroom (PPSL)	None
RM 85	G	I	W. Restroom (PPSL)	None
RM 86	G	III	PPSL office	None
RM 87	G	III	PPSL office	None
RM 88	G	III	PPSL office	None
RM 89	G	III	PPSL office	None
RM 90	G	III	PPSL office	None
RM 92	G	I	PPSL hot water closet	None
RM 100	G	III	Front side main foyer	None
RM 101	G	III	Front side office	None
RM 102	G	III	Front side office	None

Bldg./Rm. #	Source Term	Occupancy	Comments	Atmospheric Release
RM 103	G	III	Front side office	None
RM 104	G	III	Front side office	None
RM 105	G	III	Front side office	None
RM 106	G	III	Front side office	None
RM 107	G	III	Front side office	None
RM 108	G	III	Front side office	None
RM 109	G	II	Front side air lock/Office	None
RM 110	G	II	Front side W. Locker	None
RM 110A	G	II*	Back side Laundry Hampers	None
RM 110B	G	II	Front side W. Locker	None
RM 110C	G	II	Front side W. Locker	None
RM 111	G	III	Front side office	None
RM 112	G	III	Front side office	None
RM 113	G	III	Back side storage	None
RM 114	G	III	Front side office	None
RM 115	G	III	Front side office	None
RM 116	G	III	Back side storage	None
RM 117	G	III	Front side office	None
RM 117A	G	III	Front side office	None
RM 119	G	III	Front side office corridor	None
RM 120	G	II	Front side W. Locker	None
RM 121	G	II	Front side W. Locker	None
RM 122	G	II	Front side W. Locker	None
RM 123	G	II	Front side W. Locker	None
RM 124	G	II	Front side W. Locker	None
RM 126	G	I*	Personnel Decontamination Facility. Special air monitoring may be needed on a case-by-case basis depending on contaminated personnel.	None
RM 129	G	I	Closet	None
RM 131	A	II*	Pu Assay work	CAM, FHAS
RM 132	E	II*	Mass Spectrometry work. Isolated Fume Hood.	FHAS
RM 133	G	I*	Dark Room	None
RM 134	B	II*	Mass Spectrometry work	CAM, FHAS
RM 135	B	II*	Mass Spectrometry work	CAM, FHAS
RM 136	D	II*	Emission Spectrometry work	FHAS
RM 137	D	I*	Emission Spectrometry work	FHAS
RM 139	A	III*	PuO ₂ sample storage	CAM, FHAS
RM 140	G	III*	Office	None
RM 140A	G	III*	Office	None
RM 140B	G	III*	Office	None
RM 141	G	II*	Non-Radioactive Solution Preparation	None

Bldg./Rm. #	Source Term	Occupancy	Comments	Analysis/Control Requirements
RM 142	G	I*	Storage Cabinets are considered the same as Vaults. CAM coverage is needed for the Cabinets.	FHAS, CAMs for Cabinets
RM 143	B	II*	Waste processing	CAM, FHAS
RM 144	B	III*	Process Support	CAM, FHAS
RM 145	D	I*	RMA storage	FHAS
RM 146	B	I*	WIPP Repackaging and Sample Analysis	CAM, FHAS
RM 147	G	III*	Office	None
RM 148	B	II	Sample Analysis, 90-day storage.	CAM, FHAS
RM 149	B	I*	Sample Dissolution work performed. In the 1960's there was an explosion in the room which spread large amounts of contamination. Use FHAS to monitor effectiveness of engineered barriers.	FHAS, (CAM required when working in Hood)
RM 150	G	III*	Counting Room with Sealed Sources	None
RM 151	G	III*	Office	None
RM 152	A, B	II*	Old Concentration Lab. Concentration of liquid Waste.	CAM, FHAS
RM 153	D, B	I*	DIONEX sample analysis. Use FHAS to monitor effectiveness of engineered barriers.	FHAS, (CAM required when working in Fume Hood or Glovebox)
RM 154	D	I*	Old Sample Analysis glovebox. Use FHAS to monitor effectiveness of engineered barriers.	FHAS
RM 155	B	II	Sample Analysis	CAM, FHAS
RM 156	B, E	II	Sample Analysis Room. This room has several fume hoods including 2 fume hoods containing UO_2 . Work is no longer performed with these 2 hoods. No special monitoring for Uranium is required because the Uranium is not disturbed. Removal of Uranium from this hood shall be considered maintenance or deactivation activity, and air sampling will be required on a case-by-case basis.	CAM, FHAS
RM 157	D	I*	"Pie plated" Glovebox. Use FHAS to monitor effectiveness of engineered barriers.	FHAS
RM 158	G	III*	Instrument shop	None
RM 158A	G	I	Storage closet in Instrument shop	None
RM 159	B	III*	Instrument Decontamination Hood, which has history of flow problems	CAM, FHAS
RM 159A	G	II*	Storage	None
RM 161	G	III*	Back side office	None
RM 162	G	II*	Back side office	None
RM 163	G	II	Paint shop and office area	None
RM 164	G	III*	Back side office	None
RM 165	G	I*	Room 166 access	None

Bldg./Rm. #	Source Term	Occupancy	Comments	Att. Monitoring Requirements
RM 166	A, B	I*	Primarily drum storage for Solid Waste Operations. Contains fume hood and gloveboxes. Historical evidence shows potential for leaking from engineered barriers in room.	FHAS, (CAM required for radiological work in room)
RM 167	G	III*	PPE Change room	None
RM 168	G	III*	PPE Change room	None
RM 169	D	I*	"Pie plated" Glovebox. Use FHAS to monitor the effectiveness of Engineered Barriers.	FHAS
RM 170	D, E	I*	"Pie plated" Glovebox and Hood with sash down. Use FHAS to monitor the effectiveness of Engineered Barriers.	FHAS
RM 171	G	III*	Corridor, drum storage	None
RM 172	G	I*	Item storage. Use FHAS to monitor effectiveness of engineered barrier	FHAS
RM 173	G	I*	Equipment storage for Rm 192	None
RM 174	F	I*	Vault	CAM
RM 175	F	I*	Vault	CAM
RM 176	G	I	Air lock	None
RM 179	A	III*	Process Support Laboratory	CAM, FHAS
RM 180	G	II*	Thermal analysis lab (hood in room not contaminated at this time)	None
RM 182	G	II*	Scanning electron microscope	None
RM 183	G	II*	Drum/chemical storage	None
RM 185	G	I*	Drum/chemical storage	None
RM 186	G	I	Seismic shutdown switch room	None
RM 187	B	III*	Process development	CAM, FHAS
RM 188	A	III*	Prototype De-nitration Caliciner	CAM, FHAS
RM 189	G	II*	Ion chromatography	None
RM 190	F	I*	Vault	CAM
RM 191	G	II*	Non-radioactive chemistry	None
RM 192	G	II*	Radioactive material storage/assay room	None
RM 192A	F	I*	Un-irradiated fuel storage vault. Also contains some stored MOX items. Creation of airborne radioactive material is highly unlikely	None
RM 192B	F	I*	Vault	CAM
RM 192C	F	I*	Vault	CAM
RM 192D	G	I*	Drum storage (items and old L-10). Use FHAs to monitor the effectiveness of engineered barriers.	FHAS
RM 192N	G	I	Back side Office	None
RM 192S	G	I*	Back side Office	None
RM 193	G	I*	Airlock	None
RM 194	G	I	Front side tool storage	None
RM 194A	G	II	Front side tool storage	None
RM 194B	G	III	Front side office	None
RM 195M	G	I	M. Rest room (inactive)	None

Bldg./Rm. #	Source Term	Occupancy	Comments	Air Monitoring Required
RM 195W	G	I	W. Restroom (inactive)	None
RM 196	G	I*	90 Day storage area	None
RM 197	G	I*	Drum storage (Items and old L-10). Use FHAs to monitor the effectiveness of engineered barriers.	FHAS
RM 197A	G	I	Mixed Waste: 90 day storage.	None
RM 198	G	III	Front side machine shop	None
RM 198 AL	G	I	Front side airlock	None
RM 198A	G	III	Lunch Room	None
RM 199	G	II	Front side weld shop	None
RM 200	G	I	Front side machinery storage	None
RM 200A	G	I	Front side machinery storage	None
RM 201	G	I	Front side storage	None
RM 202	G	II	Front side "cold" development lab	None
RM 205	G	III	Front side office	None
RM 208	G	II	Front side copy room	None
RM 208A	G	I	Front side office/closet	None
RM 209	G	III	Front side office	None
RM 210	G	III	Front side office	None
RM 211	G	III	Front side office	None
RM 212	G	III	Front side office	None
RM 212A	G	I	Front side office storage	None
RM 214	G	I	Front side office storage	None
RM 215	G	III	Front side office	None
RM 216	G	I	Front side office storage	None
RM 217	G	III	Front side office	None
RM 217A	G	III	Front side office	None
RM 218A	G	III	Front side office	None
RM 218B	G	III	Front side office	None
RM 218C	G	III	Front side office	None
RM 218D	G	III	Front side office	None
RM 218E	G	III	Front side office	None
RM 218F	G	III	Front side office	None
RM 221A	G	III*	HPT Office/Counting Equipment	None
RM 221B	G	III*	HPT Instrument and Source Storage	None
RM 221C	A, B	II*	Standards Lab	CAM, FHAS
RM 221D	A, B	II*	Standards Lab	CAM, FHAS
RM 221E	B	II*	Standards Lab	CAM, FHAS
RM 221F	G	III	RC Supervisor Office	None
RM 221G	G	III	A-Labs air sample counting room (Tennelec)	None
RM 223	G	I	W. Shower	None
RM 224	G	I	Back side passageway	None
RM 225	F	I*	Vault	CAM

Bldg./Rm. #	Source Term	Occupancy	Comments	Assessment/Control Requirements
RM 227	A, B	III*	Glovebox with Batch Tanks and Drum Fume Hood	CAM, FHAS
RM 228A	A	II	Gloveboxes in room. Several instances of confinement loss of control have occurred in room.	CAM, FHAS
RM 228B	A	II	Pyrolysis in gloveboxes planned.	CAM, FHAS
RM 228C	A	II	Thermal Stabilization Sampling and item storage	CAM, FHAS
RM 229	G	I	Observation / control room	None
RM 230A	A	III*	Furnace glovebox, process control station	CAM, FHAS
RM 230B	A	III*	Product sampling and handling glovebox	CAM, FHAS
RM 230C	A	II*	Non-contaminated Vertical De-nitration Calciner, other gloveboxes not currently used. Several taped areas on conveyer.	CAM, FHAS
RM 231	G	I	Mezzanine / Electrical	None
RM 232	D	I*	Glovebox Scrubber (Not used and pie-plated). Use FHAS to monitor the effectiveness of Engineered Barriers.	FHAS
RM 232A	See Comments	I	Scrubber Cell. Access requires special entry.	None
RM 233	G	III*	"A-Line" control room	None
RM 233A	G	I	"A-Line" control panel	None
RM 234	See Comments	I*	Trash Compactor	FHAS, (CAM when working compactor)
RM 234A	See Comments	I*	Drum NDA room	None
RM 235	See Comments	I	Filter room	None
RM 235A-1	See Comments	I*	Potential and history of glovebox leakage. This area is a throughway commonly used for access to other rooms. CAMs are required to alert potentially exposed workers to changing airborne conditions. Use FHAS to monitor the effectiveness of Engineered Barriers.	CAM, FHAS
RM 235A-2	See Comments	I*	Potential and history of glovebox leakage. This area is a throughway commonly used for access to other rooms. CAMs are required to alert potentially exposed workers to changing airborne conditions. Use FHAS to monitor the effectiveness of Engineered Barriers	CAM, FHAS
RM 235A-3	See Comments	I*	Potential and history of glovebox leakage. This area is a throughway commonly used for access to other rooms. CAMs are required to alert potentially exposed workers to changing airborne conditions. Use FHAS to monitor the effectiveness of Engineered Barriers	CAM, FHAS
RM 235B	A	III*	Furnace glovebox, process staging glovebox	CAM, FHAS
RM 235C	G	III*	Corridor/walkthrough	None
RM 235D	D, G	I*	RAM Storage, pie plated glovebox. Use FHAS to monitor effectiveness of engineered barriers.	FHAS
RM 235E	See Comments	I	Filter Room	None

Bldg./Rm. #	Source Term	Occupancy	Comments	Air Monitoring Required
RM 236	See Comments	I*	Item Storage Vault. No credible release mechanism for large airborne releases. Use FHAS for monitoring the effectiveness of engineered barriers.	FHAS
RM 236A	G	I	Containers with Mixed Oxides of Uranium and Plutonium. Low probability for credible release of material.	None
RM 236B	G	I	Mezzanine	None
RM 236C	G	I	Mezzanine	None
RM 237	G	I	Mezzanine	None
RM 238	G	I	Mezzanine	None
RM 239	G	I	Mezzanine	None
RM 240	G	I	Mezzanine	None
RM 241	G	I	Mezzanine	None
RM 242	G	I	Mezzanine	None
RM 242A	G	I	Mezzanine	None
RM 242B	G	I	Mezzanine	None
RM 245	G	I*	Corridor	None
RM 247	G	I	Corridor (mezzanine)	None
RM 248	G	I	Corridor	None
RM 249	G	I	Corridor	None
RM 250	G	I	Front side office	None
RM 251A	G	I	Front side office	None
RM 251B	G	I	Front side office	None
RM 252	G	I	Front side office	None
RM 253	G	I	Front side office	None
RM 254	G	I	Front side office	None
RM 255	G	I	Front side office	None
RM 260	G	I	Front side duct level	None
RM 260A	G	I	Caged storage	None
RM 261	G	I	Airlock	None
RM 262	G	II*	Source Term is within aging piping ducting and Filter Boxes, which may be leaking. Air sampling should be used to monitor the effectiveness of engineered barriers.	FHAS
RM 263	G	II*	Source Term is within aging piping ducting and Filter Boxes, which may be leaking. Air sampling should be used to monitor the effectiveness of engineered barriers.	FHAS
RM 264	G	II*	Source Term is within aging piping ducting and Filter Boxes, which may be leaking. Air sampling should be used to monitor the effectiveness of engineered barriers.	FHAS
RM 265	G	I	Front side duct level bay area	None
RM 266	G	I	Switch gear room	None
RM 267	G	I	Front side duct level. Phone Room.	None

Bldg./Rm. #	Source Term	Occupancy	Comments	Air Contamination Required
RM 268	G	I	Front side duct level. Storage Room.	None
RM 269	G	I	Front side duct level. Battery Room.	None
RM 270	G	I	Front side storage	None
RM 270A	G	I	Air lock	None
RM 271	G	I	PRF Supply damper room	None
RM 272	G	I	Front side duct level.	None
RM 300	G	II	Front side bay area storage	None
RM 301	G	III	Front side office	None
RM 301A	G	III	Front side office	None
RM 301B	G	III	Front side office	None
RM 301C	G	III	Front side office	None
RM 301D	G	III	Front side office	None
RM 302	G	I	Mock-up area	None
RM 303	G	III	Front side office	None
RM 303A	G	III	Front side office	None
RM 303B	G	III	Front side office	None
RM 303C	G	III	Front side office	None
RM 303D	G	III	Front side office	None
RM 303E	G	III	Front side office	None
RM 303F	G	III	Front side office	None
RM 303G	G	III	Front side office	None
RM 303H	G	III	Front side office	None
RM 303J	G	III	Front side office	None
RM 303K	G	III	Front side office storage	None
RM 303L	G	III	Front side office	None
RM 303M	G	III	Front side office	None
RM 304	G	III	Plastic shop	None
RM 304A	G	III	Front side office	None
RM 304B	G	III	Front side office	None
RM 305	G	III	Lunch room	None
RM 305A	G	I	Closet	None
RM 306	G	II	Conference room	None
RM 306A	G	II	Computer room	None
RM 307	G	I	Air lock	None
RM 308	G, C	II*	Source Term is within aging piping ducting and Filter Boxes, which may be leaking. Air sampling should be used to monitor the effectiveness of engineered barriers. High Contamination Area is posted, but under ducting (difficult to unintentionally disturb) and not disturbed. CAMs and Grab Air Sampling is recommended when High CA surfaces are disturbed.	FHAS

Bldg./Rm. #	Source Term	Occupancy	Comments	Air Monitoring Required
RM 309	Potential for High levels of contamination	I*	E-4 filter room. Entry requires special access control. Draws air from gloveboxes and hoods. CAMs and Grab Air Sampling recommended for entry.	None
RM 310	Potential for High levels of contamination	I*	E-4 filter room. Entry requires special access control. Draws air from gloveboxes and hoods. CAMs and Grab Air Sampling recommended for entry.	None
RM 311	Potential for High levels of contamination	I*	E-3 filter room. Entry requires special access control. Draws air from breathing air spaces. CAMs and Grab Air Sampling recommended for entry.	None
RM 312	Potential for High levels of contamination	I*	E-3 filter room. Entry requires special access control. Draws air from breathing air spaces. CAMs and Grab Air Sampling recommended for entry.	None
RM 313	Potential for High levels of contamination	I*	E-3 filter room. Entry requires special access control. Draws air from breathing air spaces. CAMs and Grab Air Sampling recommended for entry.	None
RM 314	Potential for High levels of contamination	I*	E-3 filter room. Entry requires special access control. Draws air from breathing air spaces. CAMs and Grab Air Sampling recommended for entry.	None
RM 315	Potential for High levels of contamination	I*	E-3 filter room. Entry requires special access control. Draws air from breathing air spaces. CAMs and Grab Air Sampling recommended for entry.	None
RM 316	Potential for High levels of contamination	I*	E-3 filter room. Entry requires special access control. Draws air from breathing air spaces. CAMs and Grab Air Sampling recommended for entry.	None
RM 318	Potential for High levels of contamination	I*	E-3 filter room. Entry requires special access control. Draws air from breathing air spaces. CAMs and Grab Air Sampling recommended for entry.	None
RM 319	G	I	Air lock.	None
RM 320	G	I*	Source Term is within aging piping ducting and Filter Boxes, which may be leaking. Use FHAS to monitor the effectiveness of engineered barriers.	FHAS
RM 321	G	I	Power operations room	None
RM 321A	G	II	Control room	None
RM 321B	G	II	Change room.	None
RM 321C	G	II	Office	None
RM 322	G	II	Electrical shop	None
RM 323	G	II	Electrical shop	None
RM 324	G	I	Janitor Closet	None
RM 325	G	II	Electrical shop	None
RM 326	G	I	Air lock	None
RM 327	G	I	M. Locker	None
RM 329	G	II	M. Rest room	None
RM 330	G	I	M. Shower	None
RM 331	G	I	Closet	None
RM 332	G	I	Locker room access	None

Bldg./Rm. #	Source Term	Occupancy	Comments	Air Monitoring Required
RM 333	G	II	M. Rest room	None
RM 333A	G	II	W. Rest room	None
RM 334	G	I	Storage room	None
RM 335	G	I	Storage room	None
RM 336	G	I	Chemical make-up	None
RM 337	G	I	Chemical make-up	None
RM 338	G	I	Storage	None
RM 340	G	I	Instrument shop	None
RM 341	G	I	Office	None
RM 349	G	III	Office	None
RM 350	G	I	Backside corridor. Supply ducting within room.	None
RM 351	G	II	Computer Equipment	None
RM 734	G	I	W. Change room closet	None
RM 879 AL	G	I	Front side air lock	None
STR 1	G	I	Stairwell	None
STR 2	G	I	Stairwell	None
STR 3	G	I	Stairwell	None
STR 4	G	I	Stairwell. RAM storage under stairwell.	None
STR 5	G	I	Stairwell	None
STR 6	G	I	Stairwell	None
STR 12	G	I	Stairwell	None
STR 13	G	I	Stairwell	None
STR 14	G	I	Stairwell	None
STR 15	G	I	Stairwell	None
STR 16	G	I	Stairwell	None
STR 17 N	G	I	Stairwell	None
STR 17 S	G	I	Stairwell	None
STR 18	G	I	Stairwell	None
STR 19	G	I	Stairwell	None
STR 19	G	I	Stairwell	None
STR 20	G	I	Stairwell	None
STR 21	G	I	Stairwell	None
STR 23	G	I	Stairwell	None
STR 25	G	I	Stairwell	None
STR 26	G	I	Stairwell	None
STR 104	G	I	Stairwell	None
STR 105	G	I	Stairwell	None
STR 130	G	I	Stairwell	None
STR 134	G	I	Stairwell	None
STR 192B	G	I	Stairwell	None
STR 192C	G	I	Stairwell	None

Bldg./Rm. #	Source Term	Occupancy	Comments	Air Monitoring Required
STR 202	G	I	Stairwell	None
STR 228A	G	I	Stairwell	None
STR 230B	G	I	Stairwell	None
STR 232N	G	I	Stairwell	None
STR 235	G	I	Stairwell	None
STR 580	G	I	Stairwell	None
STR 633	G	I	Stairwell	None
STR 679	G	I	Stairwell	None
STR 707	G	I	Stairwell	None
STR ROOF 1	G	I	Stairwell	None
STR ROOF 2	G	I	Stairwell	None
STR ROOF 3	G	I	Stairwell	None
SUPPLY PLENUM CHAMBER	G	I		None
TUNNEL 1	G	I	Source term within piping. Use FHAS to monitor the effectiveness of engineered barriers.	FHAS
TUNNEL 2	G	I	Source term within piping. Use FHAS to monitor the effectiveness of engineered barriers.	FHAS
TUNNEL 3	G	I	Historically leaking flanges from contaminated piping which have been covered with wrapping. Use FHAS to monitor the effectiveness of engineered barriers.	FHAS
TUNNEL 4	G	I	Source term within piping. Use FHAS to monitor the effectiveness of engineered barriers.	FHAS
TUNNEL 5	G	I	Source term within piping. Use FHAS to monitor the effectiveness of engineered barriers.	FHAS
TUNNEL 6	G	I	Source term within piping. Use FHAS to monitor the effectiveness of engineered barriers.	FHAS
TUNNEL 7	G	I	Access from Tunnel 4 to outside. No piping within.	None
BLDG 236-Z			<i>Work performed on building 236-Z is normally done on routine surveillance.</i>	
CORR 10	See Comments	I*	Source term within Filter box and under diamond-plated pipe trench with high levels of contamination. Normal configuration has E-4 ventilation on pipe trench. Use FHAS to monitor the effectiveness of the Engineered barriers	FHAS
CORR 11	See Comments	I*	Process Cell Glovebox within Corridor. Glovebox is no longer used, but gloves and port bags are still present. Use FHAS to monitor the effectiveness of Engineered barriers.	FHAS
CORR 14	See Comments	I*	Process Cell Glovebox within Corridor. Glovebox is no longer used, but gloves and port bags are still present. Use FHAS to monitor the effectiveness of Engineered barriers.	FHAS

Bldg./Rm. #	Source Term	Occupancy	Comments	Air Monitoring Requirements
CORR 20	See Comments	I*	Filter box within room. Use FHAS to monitor the effectiveness of Engineered barriers.	FHAS
CORR 21	See Comments	I*	Process Cell Glovebox within Corridor. Glovebox is no longer used, but gloves and port bags are still present. Use FHAS to monitor the effectiveness of Engineered barriers.	FHAS
CORR 25	See Comments	I*	Process Cell Glovebox within Corridor. Glovebox is no longer used, but gloves and port bags are still present. Use FHAS to monitor the effectiveness of Engineered barriers.	FHAS
CORR 30	G	I*	Steam and Instrument Air Lines	None
CORR 31	See Comments	I*	Contaminated (sometimes-pressurized) process lines. Use FHAS to monitor the effectiveness of Engineered barriers. Use CAMs to provide early warning of airborne release.	CAM, FHAS
CORR 33	See Comments	I*	Contaminated (sometimes-pressurized) process lines. Use FHAS to monitor the effectiveness of Engineered barriers. Use CAMs to provide early warning of airborne release.	CAM, FHAS
CORR 47	G	I*	Hallway	See Comments
MEZZ 12A	See Comments	I	Within room 12 (Process Cell or "Canyon")	See Comments
MEZZ 12B	See Comments	I	Within room 12 (Process Cell or "Canyon")	None
RM 12	See Comments	I*	Entry requires special access control. Very high levels of contamination within cell area. CAMs and grab air sampling required for entry.	None
RM 13	G	I*	Ceiling has Process-Cell drum bag-out hatch. Use FHAS to monitor the effectiveness of Engineered Barriers.	FHAS
RM 15	G	I*	Old welding booth (no longer used)	None
RM 16	G	I	Maintenance/Drum storage	None
RM 17	G	I*	Office	None
RM 18 AL	G	I*	Air lock to outside	None
RM 19	G	I*	Item loading and counting	None
RM 26	See Comments	I*	Source term is within wooden Filters. Use FHAS to monitor the effectiveness of engineered barriers.	FHAS
RM 27	A	I*	Maintenance Glovebox (infrequently used). Use FHAS to monitor the effectiveness of Engineered Barriers.	FHAS, (CAM required when working in Glovebox)
RM 28	See Comments	I	Maintenance cell. Immediately adjacent to corridors. Access to glovebox to process cell (no longer used)	None
RM 34	G	I*	Electrical switch room	None
RM 35	G	I*	Pump room for 17" sample vacuum. Liquid cooling water lines.	None
RM 36	See Comments	I*	Filter Box in room. In-line CAM is sampling from the filter box.	None
RM 37	G	I*	Janitor closet	None

Bldg./Rm.#	Source Term	Occupancy	Comments	Air Monitoring Required
RM 38	G	I*	Rest room	None
RM 39	See Comments	I	Maintenance cell. Immediately adjacent to corridors. Access to glovebox to process cell (no longer used)	None
RM 40	G	I*	Chemical tanks. Legacy contamination is located under paint in the tank basin.	None
RM 41	See Comments	I*	Gloveboxes within room. Some gloveboxes are isolated; some gloveboxes are not. Gloveboxes are no longer used. Use FHAS to monitor the effectiveness of engineered barriers.	FHAS, (CAM required when working in Glovebox)
RM 42	D	I*	Column Hoods – no longer used (pie plated). Use FHAS to monitor the effectiveness of engineered barriers.	FHAS
RM 43	D	I*	Glovebox no longer used (pie plated). Use FHAS to monitor the effectiveness of engineered barriers.	FHAS
RM 43A	See Comments	I	Caged area within room 43. Subject to same air sampling requirements as room 43.	See Comments
RM 44	G	I*	Control room	None
RM 45	G	I*	Office	None
RM 50	D	I*	Column Hoods – no longer used (pie plated). Use FHAS to monitor the effectiveness of engineered barriers.	FHAS
RM 60	D	I*	Column Hoods – no longer used (pie plated). Use FHAS to monitor the effectiveness of engineered barriers.	FHAS
RM 70	G	I	Access is controlled.	None
RM 71	G	I	Access is controlled.	None
RM 72	See Comments	I	Air lock from outside to process canyon. Contamination capable of producing airborne contamination is present. Entry requires special access control. Air sampling should be performed on a case-by-case basis. CAMs and grab air sampling is recommended for special entry.	None
RM 73	G	I	Fire Systems	None
STR 1	G	I	Stairwell	None
STR 2	G	I	Stairwell	None
STR 3	G	I	Stairwell	None
BLDG 242-Z				
AIRLOCK	G	I	Normal PRF access	None
CORR 242B	G	I	Normal PRF access	None
ALL OTHERS	See Comments	I	Access is restricted, and requires special entry. Site of resin column explosion in the 1970's (AKA the McKlusky room). Gloveboxes are located within room. This area was used for Am-241 separations from various waste streams. Am-241 is the primary isotope of concern. This area is considered highly contaminated.	None
BLDG 291-Z				

Bldg./Rm.#	Source Term	Occupancy	Comments	Access/Control/Requirement
CABLE VAULT	G	I	Electrical Equipment	None
RM 500	G	II	Electrical Equipment	None
RM 501	See Comments	II	Sump Room. Historically Contaminated – use FHAS to monitor effectiveness of Engineered Barriers.	FHAS
RM 502	See Comments	II	Fan Room. Contains degrading ducting from Building 232-Z. Use FHAS to monitor the effectiveness of Engineered Barrier.	FHAS
RM 503	G	I	Below surface of 502. Not normally accessed.	None
RM 504	See Comments	I	Plenum. Non accessible.	None
RM 505	See Comments	I	Plenum. Non accessible.	None
RM 506	See Comments	I	Fan Room. Contains degrading ducting from Building 232-Z. Use FHAS to monitor the effectiveness of Engineered Barrier.	FHAS
RM 507	See Comments	I	Final Exhaust plenum manhole access. Requires special entry controls.	None
RM 508	G	I	Manhole. Difficult to access.	None
RM 509	See Comments	II	Fan Room. Contains degrading ducting from Building 232-Z. Use FHAS to monitor the effectiveness of Engineered Barrier.	FHAS
RM 510	G	I	Below surface of 509. Not normally accessed.	None
STR 1	G	I	Stairwell	None
STR 2	G	I	Stairwell	None
STR 3	G	I	Stairwell	None
BLDG 2736-Z				
VAULT CORR	G	II	Corridor to Vaults	None
VAULT 1	F	I*	Vault	CAM
VAULT 2	F	II*	Vault	CAM
VAULT 3	F	II*	Vault	CAM
VAULT 4	F	I*	Vault	CAM
2736 Z AL	G	I	Air lock to Corridor (outside access)	None
CORR 625 AL	G	I	Air lock to Corridor	None
BLDG 2736-ZB				
CORR 601	G	I	Corridor	None
CORR 609	G	I	Corridor	None
CORR 617	G	I	Corridor	None
RM 600	See Comments	I	Filter boxes within room. Use FHAS to monitor the effectiveness of Engineered Barriers.	FHAS
RM 602	G	I	Electrical	None
RM 603	G	III	Office	None
RM 604	G	II	Computer room	None
RM 605	G	III	Office	None
RM 606	G	III	Office	None
RM 607	G	III	Office	None

Bldg./Rm. #	Source Term	Occupancy	Comments	Air Monitoring Required
RM 608	G	I	Front Air Lock	None
RM 610	G	III	Secretary Office	None
RM 611	G	III	Office	None
RM 612	G	I	Copy Room/Office	None
RM 613	G	I	Storage	None
RM 614	G	I	W. Change room	None
RM 615	G	I	W. Change room	None
RM 616	G	II*	W. Change room	None
RM 618	G	I	M. Change room	None
RM 619	G	I	M. Change room	None
RM 620	G	II	M. Change room	None
RM 621	G	I	Air Lock	None
RM 622	G	II*	M. Change room	None
RM 623	G	I*	Corridor. UPS Room	None
RM 624	G	I*	Corridor.	None
RM 625	G	I*	Corridor.	None
RM 626	G	I*	Janitor closet	None
RM 627	G	I*	W. Rest room	None
RM 628	G	I*	M. Rest room	None
RM 629	G	III*	Guarded Station	None
RM 630	G	I*	Personnel decontamination room. Decontamination of personnel is performed in room 126 of 234-5Z. Room 630 only has proper equipment for nasal/blood smears.	None.
RM 631	G	III*	RCT office/counting room	None
RM 632	G	III*	Chemist office	None
RM 633	G	I*	Corridor.	None
RM 634	G	III*	Office	None
RM 635	G	II*	Office	None
RM 636	A, B	I*	Repackaging glovebox and fume hood. Use FHAS to monitor the effectiveness of engineered barriers.	FHAS, (CAM required when working on glovebox)
RM 637	G, F	III*	NDA laboratory. Vault items are handled frequently in this room. CAM is currently linked to interlock ventilation.	CAM, FHAS
RM 638	G, F	I*	Drum and Can Storage. Some items (Cans) are considered vault items.	CAM, FHAS
RM 638A	See Comments	I*	Within room 638. High Radiation Area Cage. Subject to same air monitoring requirements as room 638	See Comments
RM 639	G	I*	Safety shower room. Containers (ITC and Drums) bearing material are opened within this room. This work is performed on ARA for potential. CAMs and grab air sampling are recommended when opening drums.	None, See Comments
RM 640	G	I*	Supply storage	None

Bldg./Rm. #	Source Term	Occupancy	Comments	Air Monitoring Required
RM 641	G	I*	Receiving room / Drum Storage. Use FHAS to monitor the effectiveness of engineered barriers. Containers (ITC and Drums) bearing material are opened within this room. This work is performed on ARA for potential airborne contamination. CAMs and grab air sampling are recommended when opening drums.	FHAS, See Comments
RM 641A	G	I	Within Room 641 (Electrical Components)	None
RM 642	G	I*	Shipping room	None
RM 643	G	I*	Personnel entry	None
RM 644	G	I*	Material passageway	None
RM 645	G	I	Entrance to Computer Room	None
RM 646	G	I	Entrance to W. Change room	None
OTHER BUILDINGS				
234-5 ZA	G	III	Building houses M. Locker rooms, Primary ACES station and Secured entry to 234-5 Z main building.	None
225-WC	G	I	Liquid Effluent Sampling	None
234-ZB	G	I	Construction Shop	None
241-Z	G	I*	Ventilation/Operating area. Pits may not be entered without special work planning. CAMs and grab air sampling are recommended when entering.	None
241-ZG	G	I	Change room	None
241-ZB	G	I	Chemical tanks	None
241-ZA	A, D	I*	Sampling gloveboxes within room for sampling liquid effluent. Small glovebox is isolated and no longer used. Large glovebox does not have enough source term to cause airborne.	None
243-Z	G	I	Effluent	None
243-ZA	G	I	Overflow tank and sump pit	None
270-Z	G	III	Administrative Building	None
2701-ZA	G	III	Patrol	None
2701-ZD	G	III	Guard shack	None
2704-Z	G	III	Safeguards and Security personnel	None
2705-Z	G	III	OCF	None
2712-Z	G	I	Stack CAM shed	None
2715-Z	G	II	Carpenter/painter shed	None
2721-Z	G	I	Diesel generator	None
2727-Z	G	I	Shed	None
2729-Z	G	III	Insulator shop	None
2731-Z	G	I	Laundry Storage	None
2731-ZA	G	I	Non radiological storage	None
2734-Z	G	I	Gas storage	None
2734-ZL	G	I	Electrical	None

Bldg./Rm. #	Source Term	Occupancy	Comments	Air Monitoring Requirements
2735-Z	G	I	Non radiological tanks and basin	None
2736-ZC	G	I	Drum Dock	None
2736-ZA	G	I	OSR In-line monitoring of Filter Boxes	None
2904-ZA	G	I	Discontinued Effluent sampling	None
2904-ZB	G	I	Discontinued Effluent sampling	None
MO-14	G	I	Sign-painters office/shop	None
MO-287	G	III	Mobile Office/trailer	None
MO-428	G	III	Mobile Office/trailer	None
MO-429	G	III	Solid Waste Operations trailer and Emergency personnel decontamination room. This is primarily used for nasal/blood smears.	None
TC-66	G	I	Unused airlock to 242-Z	None
Z-9	See Comments	I	Old Crib building. Gloveboxes are isolated and ventilation is disconnected (also disconnected to building). Recommend Grab Air Sampling for entry when posted ARA.	None
JAJ 64-15332	G	III	Construction Trailers	None
JAJ 64-15305	G	III	Construction Trailers	None
2734-ZB	G	I	Q-ONSET Hut	None

* Occupancy information obtained from Table 8-14 of the PFP FSAR

5. Required Review

Facility Radiological Control shall perform and document a review of the adequacy of work place air monitoring systems as part of facility or operational changes affecting radiological control. In the absence of such changes, a review should be conducted annually. When changes to the work place air monitoring program do occur, the facility should update the work place air monitoring technical basis document to reflect the changes. Re-evaluate airflow patterns in a given area when facility changes occur that may affect airflow or every three years, as needed.

6. References

6.1 Facility Air Monitoring References

WHC-SD-CP-SDD-011 "Definition and Means of Maintaining the Room Continuous Air Monitors Portion of the PFP Safety Envelope"

HNF-SD-CP-SAR-021 "Plutonium Finishing Plant Final Safety Analysis Report"

HNF-EP-0924: 1997, M.S. Gerber, "History and Stabilization of the Plutonium Finishing Plant (PFP) Complex, Hanford Site"

FSP-PFP-IP-003: 1999, A.L. Ehlert, "Radiological History of the Plutonium Finishing Plant (1954-1997)"

WHC-SD-CP-TI-190: 1994, RD Crowe and RW Szempruch, "Technical Basis for Characterization of Plutonium for PFP Safety Analysis"

FSP-PFP-5-8, Section 14.18 "Trending Air Sample Data"

FSP-PFP-5-8, Section 14.8 "Radiological Area Occupancy During Support System Outages"

ZRC-100-002 "Initial CAM Setup and Weekly Performance Testing"

ZRC-100-003 "Daily CAM Operational Checks"

ZRC-100-004 "Grab Air Sampling"

ZRC-100-005 "Operation of Staplex High Volume Air Sampler with Kinetic Impactor"

ZRC-100-009 "Continuous Air Monitor (CAM) Alarm Response for Breathing Air"

6.2 General References

Title 10, Code of Federal Regulations (CFR), Part 835 "Occupational Radiation Protection"

Hanford Site Radiological Control Manual

HNF-PRO-330 "Work Place Air Monitoring"

HNF-PRO-332 "Radon"

HNF-PRO-380 "Internal Dosimetry Program"

7. Appendices

Appendix A

Constant Air Monitor Stations

A2
HNF-5242
RevD

BLDG NO. 2736-ZA				
INDEX		INSTALLATION		
CAM #	ROOM #	SE	KEY PLAN	INSTL DWG & SH NO. ELEC. DWG NO.
Z803	2	-	H-2-80107-4	125 H-2-27668 ZN 11-F LP
Z804	2	-	H-2-80107-4	125 H-2-27668 ZN 11-F LP

BLDG NO. 2736-ZB				
INDEX		INSTALLATION		
CAM #	ROOM #	SE	KEY PLAN	INSTL DWG & SH NO. ELEC. DWG NO.
Z286	636	SE	H-2-80107-4	156 H-2-80143-1 ZN 7-F LP-EP-3
Z302	637	-	H-2-80107-4	160 H-2-80143-1 ZN 6-D LP-EP-3
Z304	637	-	H-2-80107-4	161 H-2-80143-1 ZN 8-E LP-EP-2
Z305	637	-	H-2-80107-4	162 H-2-80143-1 ZN 9-E LP-EP-2
Z306	637	-	H-2-80107-4	163 H-2-80143-1 ZN 9-F LP-EP-2
Z310	638	-	H-2-80107-4	164 H-2-80143-1 ZN 6-E LP-EP-3
Z313	600	-	H-2-80107-4	165 H-2-80143-1 ZN 8-E LP-EP-2
Z321	641	-	H-2-80107-4	167 H-2-80143-1 ZN 6-E LP-EP-3
Z328	642	-	H-2-80107-4	168 H-2-80143-1 ZN 6-D LP-EP-3

BLDG NO. 2736-Z				
INDEX		INSTALLATION		
CAM #	ROOM #	SE	KEY PLAN	INSTL DWG & SH NO. ELEC. DWG NO.
Z330	1	SE	H-2-80107-4	96 H-2-28079-1 ZN 12-F E
Z331	1	SE	H-2-80107-4	97 H-2-28079-1 ZN 12-F E
Z332	1	SE	H-2-80107-4	98 H-2-28079-1 ZN 12-F E
Z333	1	SE	H-2-80107-4	99 H-2-28079-1 ZN 12-F E
Z334	1	SE	H-2-80107-4	100 H-2-28079-1 ZN 12-F E
Z335	1	SE	H-2-80107-4	101 H-2-28079-1 ZN 12-F E
Z336	1	SE	H-2-80107-4	102 H-2-28079-1 ZN 12-F E
Z337	1	SE	H-2-80107-4	103 H-2-28079-1 ZN 12-F E
Z338	2	SE	H-2-80107-4	104 H-2-28079-1 ZN 12-D E
Z339	2	SE	H-2-80107-4	105 H-2-28079-1 ZN 12-D E
Z340	2	SE	H-2-80107-4	106 H-2-28079-1 ZN 12-C E
Z341	3	SE	H-2-80107-4	107 H-2-28079-1 ZN 7-F E
Z342	3	SE	H-2-80107-4	108 H-2-28079-1 ZN 7-E E
Z343	3	SE	H-2-80107-4	108 H-2-28079-1 ZN 7-E E
Z344	4	SE	H-2-80107-4	110 H-2-28079-1 ZN 7-D E
Z345	4	SE	H-2-80107-4	111 H-2-28079-1 ZN 7-D E
Z346	4	SE	H-2-80107-4	112 H-2-28079-1 ZN 7-C E
Z348	CORR.	-	H-2-80107-4	113 H-2-80108-18 H-2-28079-1 ZN 10-F E

GENERAL NOTES:

1. PLASTIC NAMEPLATES WITH CAM NUMBERS ON THEM SHALL BE ATTACHED TO THE CAM SUPPORT ASSEMBLY PER GENERAL NOTE 5 ON DRAWING H-2-80108 SHEET 2.
2. SEE DRAWING H-2-99559 SH 1 FOR BLDG 232-Z.
3. THE ROOM NUMBER INDICATES THE AIR THAT IS SAMPLED.
4. FOR CAMS MARKED FOR AMBER LENS, REPLACE THE EXISTING RED LENS WITH FEDERAL SIGNAL PART NO. 84448019-12 (AMBER CONNECTION TO BELL).
5. CAM CIRCUITS FOR EACH PANELBOARD ARE SHOWN ON THE PANELBOARD SCHEDULE DRAWING, H-2-99550.

BUILDING NUMBER
204-2-1, 2736-Z, 241-Z, 241-ZA, 281-Z
204-2-1, 2736-Z, 2736-ZA, 2736-ZB, 2804-ZA

ESSENTIAL DRAWING

U.S. DEPARTMENT OF ENERGY DOE Field Office, Resident Washington, D.C. 20545	
CONSTANT AIR MONITOR STATION LOCATIONS	
DATE: 7-1-92	BY: J. B. BRUNO
DESIGNED BY: J. B. BRUNO	CHECKED BY: J. B. BRUNO
SCALE: 1" = 10'-0"	PROJECT: H-2-80107-20

BLDG NO. 236-Z				
INDEX		INSTALLATION		
CAM #	ROOM #	SE	KEY PLAN	INSTL DWG & SH NO. ELEC. DWG NO.
Z002	CORR.10	SE	H-2-80107-4	156 H-2-28478 ZN 11-E EB
Z003	CORR.11	SE	H-2-80107-4	13 H-2-80108-2 H-2-28478 ZN 10-F EB
Z004	CORR.11	SE	H-2-80107-4	12 H-2-80108-2 H-2-28478 ZN 10-E EB
Z006	CORR.13	SE	H-2-80107-4	119 H-2-80108-2 H-2-28478 ZN 11-E EB
Z007	CORR.14	SE	H-2-80107-4	131 H-2-80108-8 H-2-28478 ZN 12-G EB
Z012	CORR.14	SE	H-2-80107-4	11 H-2-80108-2 H-2-28478 ZN 12-E EB
Z014	CORR.20	SE	H-2-80107-2	157 H-2-28479 (622) CV
Z016	CORR.20	SE	H-2-80107-2	9 H-2-80108-1 H-2-28478 ZN 9-F EB
Z017	CORR.21	SE	H-2-80107-2	10 H-2-80108-1 H-2-28478 ZN 7-F EB
Z025	27	SE	H-2-80107-2	129 H-2-28478 ZN 9-E EB
Z028	CORR.33	SE	H-2-80107-3	8 H-2-80108-1 H-2-28478 ZN 3-F EB
Z031	CORR.33	SE	H-2-80107-3	7 H-2-80108-1 H-2-28478 ZN 5-F EB
Z033	36	-	H-2-80107-3	126 H-2-28478 ZN 5-E EB
Z038	41	SE	H-2-80107-3	3 H-2-80108-1 H-2-28478 ZN 12-B EB
Z038	41	SE	H-2-80107-3	6 H-2-80108-1 H-2-28478 ZN 12-B EB
Z040	41	SE	H-2-80107-3	6 H-2-80108-1 H-2-28478 ZN 12-B EB
Z042	42	-	H-2-80107-3	5 H-2-80108-1 H-2-28478 ZN 10-C EB
Z044	43	-	H-2-80107-3	4 H-2-80108-1 H-2-28478 ZN 12-C EB
Z045	43	-	H-2-80107-3	4 H-2-80108-1 H-2-28478 ZN 11-C EB
Z049	50	-	H-2-80107-3	2 H-2-80108-1 H-2-28478 ZN 8-C EB
Z051	60	-	H-2-80107-3	1 H-2-80108-1 H-2-28478 ZN 6-C EB
---	CORR.30	SE	---	---

BLDG NO. 241-Z				
INDEX		INSTALLATION		
CAM #	ROOM #	SE	KEY PLAN	INSTL DWG & SH NO. ELEC. DWG NO.
Z138	---	-	H-2-80107-4	127 H-2-80101-1 H-2-80101 ZN 10-F L
Z139	---	-	H-2-80107-4	127 H-2-80101-1 H-2-80101 ZN 10-F L

BLDG NO. 241-ZA				
INDEX		INSTALLATION		
CAM #	ROOM #	SE	KEY PLAN	INSTL DWG & SH NO. ELEC. DWG NO.
Z140	---	-	H-2-80107-4	128 H-2-80101-1 H-2-26703 ZN 12-D A

BLDG NO. 291-Z				
INDEX		INSTALLATION		
CAM #	ROOM #	SE	KEY PLAN	INSTL DWG & SH NO. ELEC. DWG NO.
Z801	507	-	H-2-80107-4	95 H-2-80108-18 H-2-28475-1 ZN 12-C P

LEGEND:

- ① = CAM WITH EXTERNAL PUMP
- ② = T80 NO. T80-CP-XXX
- ③ = CAM VALVED OUT (NOT REMOVED)
- ④ = INFORMATION TO BE PROVIDED IN FUTURE BY ENGINEERING AS REQUIRED.
- ⑤ = NOT FIELD VERIFIED
- ⑥ = INSTALLATION NUMBER
- ⑦ = CONSTANT AIR MONITOR
- ⑧ = SAFETY ENVELOPE FEATURE BREATHING AIR CAM
- ⑨ = CAM WITH AMBER LENS - SILENCED ALARM (SEE NOTE 4)

BLDG NO. 234-5Z				
INDEX		INSTALLATION		
CAM #	ROOM #	SE	KEY PLAN	INSTL DWG & SH NO. ELEC. DWG NO.
Z232	234A	SE	H-2-80107-4	156 H-2-28474 ZN 10-D CC
Z234	235B	SE	H-2-80107-4	139 H-2-80108-18 H-2-28474 ZN 10-D CC
Z235	235B	SE	H-2-80107-4	63 H-2-80108-12 H-2-28474 ZN 10-D CC
Z236	235-A1	SE	H-2-80107-4	177 (619) CC
Z237	235-A1	SE	H-2-80107-4	61 H-2-80108-12 H-2-28474 ZN 12-D CC
Z238	235-A2	SE	H-2-80107-4	62 H-2-80108-12 H-2-28474 ZN 13-D CC
Z239	235-A2	SE	H-2-80107-4	155 (619) CC
Z240	236	-	H-2-80107-4	64 H-2-80108-13 H-2-28474 ZN 6-E CW
Z241	236	-	H-2-80107-4	64 H-2-80108-13 H-2-28474 ZN 5-E CW
Z242	236	-	H-2-80107-4	64 H-2-80108-13 H-2-28474 ZN 5-E CW
Z243	236	-	H-2-80107-4	64 H-2-80108-13 H-2-28474 ZN 6-E CW
Z244	236	-	H-2-80107-4	64 H-2-80108-13 H-2-28474 ZN 6-E CW
Z245	232	SE	H-2-80107-4	57 H-2-80108-10 H-2-28473 ZN 6-C CE
Z247	232	SE	H-2-80107-4	56 H-2-80108-10 H-2-28473 ZN 5-C CE
Z248	235-A3	SE	H-2-80107-4	59 H-2-80108-11 H-2-28473 ZN 4-C CE
Z249	235-A3	SE	H-2-80107-4	58 H-2-80108-11 H-2-28473 ZN 4-C CE
Z252	TUNNEL 1	-	H-2-80107-2	89 H-2-80108-17 H-2-28481 ZN 12-B CA
Z254	TUNNEL 3	-	H-2-80107-2	90 H-2-80108-17 H-2-28481 ZN 12-B CA
Z256	TUNNEL 6	-	H-2-80107-2	91 H-2-80108-17 H-2-28481 ZN 12-B CA
Z261	308	-	H-2-80107-3	76 H-2-80108-16 H-2-28476-1 ZN 7-E 2CA
Z262	308	-	H-2-80107-3	76 H-2-80108-16 H-2-28476-1 ZN 10-F 2CA
Z264	308	-	H-2-80107-3	79 H-2-80108-16 H-2-28476-1 ZN 8-F 2CA
Z265	308	-	H-2-80107-3	77 H-2-80108-16 H-2-28476-1 ZN 7-E 2CA
Z266	308	-	H-2-80107-3	76 H-2-80108-16 H-2-28476-1 ZN 8-E 2CA
Z269	308	-	H-2-80107-3	87 H-2-80108-17 H-2-28476-1 ZN 4-E 2CA
Z270	308	-	H-2-80107-3	74 H-2-80108-15 H-2-28476-2 ZN 9-F 2CB
Z271	308	-	H-2-80107-3	71 H-2-80108-15 H-2-28476-2 ZN 6-F 2CB
Z272	308	-	H-2-80107-3	72 H-2-80108-15 H-2-28476-2 ZN 6-F CS
Z273	308	-	H-2-80107-3	75 H-2-80108-15 H-2-28476-2 ZN 6-F CS
Z275	308	-	H-2-80107-3	85 H-2-80108-17 H-2-28476-1 ZN 9-F 2CA
Z278	308	-	H-2-80107-3	81 H-2-80108-16 H-2-28476-1 ZN 12-G 2CA
Z281	308	-	H-2-80107-3	83 H-2-80108-16 H-2-28476-2 ZN 11-G 2CA
Z283	320	-	H-2-80107-3	88 H-2-80108-17 H-2-28476-2 ZN 8-D CS
Z287	262	-	H-2-80107-2	141 H-2-80108-14 H-2-28475 ZN 10-D CT
Z288	262	-	H-2-80107-2	66 H-2-80108-14 H-2-28475 ZN 8-C CT
Z289	263	-	H-2-80107-2	121 H-2-80108-14 H-2-28475 ZN 9-C CT
Z290	263	-	H-2-80107-2	67 H-2-80108-14 H-2-28475 ZN 7-B CT
Z293	264	-	H-2-80107-2	69 H-2-80108-14 H-2-28475 ZN 8-C CT
Z294	264	-	H-2-80107-2	68 H-2-80108-14 H-2-28475 ZN 8-C CT
Z356	180	SE	H-2-80107-4	140 H-2-97196 ZN 9-B CL
Z359	186	SE	H-2-80107-4	146 H-2-98564-1 H-2-28474 ZN 5-F A
Z361	159	SE	H-2-80107-4	147 H-2-80108-1 (617) CD
Z442	228C	SE	H-2-80107-4	178 H-2-80108-1 H-2-28473 ZN 12 CE
Z443	235B	SE	H-2-80107-4	179 H-2-80108-1 H-2-28474 ZN 14-B CD
Z444	235B	SE	H-2-80107-4	180 H-2-80108-1 H-2-28474 ZN 14-B CD
Z445	235B	SE	H-2-80107-4	181 H-2-80108-1 H-2-28474 ZN 14-B CD
Z446	235B	SE	H-2-80107-4	182 H-2-80108-1 H-2-28474 ZN 14-B CD
Z447	---	---	H-2-80107-4	183 H-2-80108-1 H-2-28474 ZN 14-B CD

BLDG NO. 234-5Z				
INDEX		INSTALLATION		
CAM #	ROOM #	SE	KEY PLAN	INSTL DWG & SH NO. ELEC. DWG NO.
Z055	131	SE	H-2-80107-4	15 H-2-80108-3 H-2-28473 ZN 12-E CC
Z060	134	SE	H-2-80107-4	17 H-2-80108-3 H-2-28473 ZN 11-G K
Z064	135	SE	H-2-80107-4	18 H-2-80108-3 H-2-28473 ZN 11-G K
Z068	137	-	H-2-80107-4	20 H-2-80108-4 H-2-28473 ZN 11-G CC
Z069	139	SE	H-2-80107-4	23 H-2-80108-4 H-2-28473 ZN 10-F CC
Z071	142	-	H-2-80107-4	124 H-2-80108-4 H-2-28473 ZN 10-E CT
Z072	143	SE	H-2-80107-4	21 H-2-80108-4 H-2-28473 ZN 9-E CC
Z077	144	SE	H-2-80107-4	22 H-2-80108-4 H-2-28473 ZN 9-E CC
Z082	144	SE	H-2-80107-4	22 H-2-80108-4 H-2-28473 ZN 9-E CC
Z085	145	-	H-2-80107-4	92 H-2-80108-4 H-2-28473 ZN 10-F CC
Z086	145	-	H-2-80107-4	92 H-2-80108-4 H-2-28473 ZN 10-F CC
Z087	146	SE	H-2-80107-4	118 H-2-80108-4 H-2-28473 ZN 9-F CC
Z088	146	SE	H-2-80107-4	24 H-2-80108-5 H-2-28473 ZN 9-G CC
Z090	148	SE	H-2-80107-4	27 H-2-80108-5 H-2-28473 ZN 8-G CC
Z094	149	SE	H-2-80107-4	25 H-2-80108-5 H-2-28473 ZN 8-F CC
Z097	152	SE	H-2-80107-4	26 H-2-80108-5 H-2-28473 ZN 7-G CC
Z099	153	SE	H-2-80107-4	28 H-2-80108-5 H-2-28473 ZN 7-F CC
Z102	154	SE	H-2-80107-4	29 H-2-80108-5 H-2-28473 ZN 7-F CC
Z103	155	SE	H-2-80107-4	30 H-2-80108-5 H-2-28473 ZN 7-F CC
Z108	156	SE	H-2-80107-4	148 H-2-80108-5 H-2-28473 ZN 7-E CN
Z110	157	-	H-2-80107-4	32 H-2-80108-6 H-2-28473 ZN 7-E CC
Z115	221-C	SE	H-2-80107-4	133 H-2-80108-1 H-2-28473 ZN 8-C CC
Z119	221-C	SE	H-2-80107-4	135 H-2-80108-1 H-2-28473 ZN 8-D CC
Z121	221-C	SE	H-2-80107-4	135 H-2-80108-1 H-2-28473 ZN 8-D CC
Z124	221-C	SE	H-2-80107-4	134 H-2-80108-1 H-2-28473 ZN 8-D CC
Z126	221-E	SE	H-2-80107-4	136 H-2-80108-1 H-2-28473 ZN 8-D CC
Z127	221-E	SE	H-2-80107-4	137 H-2-80108-1 H-2-28473 ZN 7-D CC
Z129	225	SE	H-2-80107-4	44 H-2-80108-8 H-2-28473 ZN 7-C CC
Z152	174	SE	H-2-80107-4	37 H-2-80108-6 H-2-28474 ZN 11-E CG
Z153	175	SE	H-2-80107-4	38 H-2-80108-6 H-2-28474 ZN 10-E CG
Z155	179	SE	H-2-80107-4	37 H-2-80108-7 H-2-2

[illegible]

234-5Z DUCT LEVEL

[illegible]

Appendix B
Air Sampling Stations

INSTALLATION INDEX OF FILTER STATIONS

Z NO.	INSTL NO.	DWG AND SH NO.	BLDG NO.	ROOM NO.	KEY PLAN DWG AND SH NO.	QTY AT STA	AIR SAMPLING STA ASST DWG	BLDG FLR
2053	99	H-2-80063	7	234-52	125	H-2-80062	4	1
2056	066	H-2-80063	7	234-52	131	H-2-80062	4	1
2057	069	H-2-80063	7	234-52	131	H-2-80062	4	1
2058	25	H-2-80063	6	234-52	132	H-2-80062	4	1
2061	26	H-2-80063	6	234-52	134	H-2-80062	4	1
2062	26	H-2-80063	6	234-52	134	H-2-80062	4	1
2065	27	H-2-80063	6	234-52	135	H-2-80062	4	1
2066	27	H-2-80063	6	234-52	135	H-2-80062	4	1
2070	28	H-2-80063	7	234-52	141	H-2-80062	4	1
2073	29	H-2-80063	7	234-52	143	H-2-80062	4	1
2074	29	H-2-80063	7	234-52	143	H-2-80062	4	1
2075	29	H-2-80063	7	234-52	143	H-2-80062	4	1
2076	29	H-2-80063	7	234-52	143	H-2-80062	4	1
2078	30	H-2-80063	8	234-52	144	H-2-80062	4	1
2079	30	H-2-80063	8	234-52	144	H-2-80062	4	1
2080	30	H-2-80063	8	234-52	144	H-2-80062	4	1
2083	30	H-2-80063	8	234-52	144	H-2-80062	4	1
2084	30	H-2-80063	8	234-52	144	H-2-80062	4	1
2089	32	H-2-80063	9	234-52	146	H-2-80062	4	1
2092	31	H-2-80063	9	234-52	148	H-2-80062	4	1
2093	33	H-2-80063	9	234-52	149	H-2-80062	4	1
2095	33	H-2-80063	9	234-52	149	H-2-80062	4	1
2096	143	H-2-80063	1	234-52	150	H-2-80062	4	1
2098	34	H-2-80063	10	234-52	152	H-2-80062	4	1
2100	35	H-2-80063	10	234-52	153	H-2-80062	4	1
2101	35	H-2-80063	10	234-52	153	H-2-80062	4	1
2104	36	H-2-80063	10	234-52	155	H-2-80062	4	1
2106	36	H-2-80063	10	234-52	155	H-2-80062	4	1
2107	37	H-2-80063	10	234-52	156	H-2-80062	4	1
2108	37	H-2-80063	10	234-52	156	H-2-80062	4	1
2111	103	H-2-80063	7	234-52	221A	H-2-80062	4	1
2112	104	H-2-80063	7	234-52	221B	H-2-80062	4	1
2113	71	H-2-80063	16	234-52	221E	H-2-80062	4	1
2114	71	H-2-80063	16	234-52	221E	H-2-80062	4	1
2115	75	H-2-80063	16	234-52	221C	H-2-80062	4	1
2117	74	H-2-80063	16	234-52	221C	H-2-80062	4	1
2118	74	H-2-80063	16	234-52	221C	H-2-80062	4	1
2120	72	H-2-80063	16	234-52	221D	H-2-80062	4	1
2122	73	H-2-80063	16	234-52	221D	H-2-80062	4	1
2123	73	H-2-80063	16	234-52	221D	H-2-80062	4	1
2125	72	H-2-80063	16	234-52	221D	H-2-80062	4	1
2128	100	H-2-80063	7	234-52	117	H-2-80062	4	1
2133	105	H-2-80063	19	234-52	229	H-2-80062	4	1
2151	071	H-2-80063	12	234-52	172	H-2-80062	4	1
2154	45	H-2-80063	12	234-52	178	H-2-80062	4	1
2156	44	H-2-80063	12	234-52	179	H-2-80062	4	1
2160	44	H-2-80063	12	234-52	179	H-2-80062	4	1
2161	44	H-2-80063	12	234-52	179	H-2-80062	4	1
2162	46	H-2-80063	12	234-52	CORR 5	H-2-80062	4	1
2164	47	H-2-80063	13	234-52	182	H-2-80062	4	1
2165	47	H-2-80063	13	234-52	183	H-2-80062	4	1
2166	48	H-2-80063	13	234-52	183	H-2-80062	4	1
2168	50	H-2-80063	13	234-52	185	H-2-80062	4	1
2170	51	H-2-80063	14	234-52	187	H-2-80062	4	1
2171	51	H-2-80063	14	234-52	187	H-2-80062	4	1
2172	49	H-2-80063	13	234-52	186	H-2-80062	4	1
2173	52	H-2-80063	14	234-52	189	H-2-80062	4	1
2174	53	H-2-80063	14	234-52	191	H-2-80062	4	1
2176	64	H-2-80063	15	234-52	242	H-2-80062	4	1
2177	63	H-2-80063	15	234-52	197A	H-2-80062	4	1
2178	55	H-2-80063	14	234-52	192B	H-2-80062	4	1
2179	57	H-2-80063	15	234-52	CORR 192	H-2-80062	4	1
2183	58	H-2-80063	15	234-52	182A	H-2-80062	4	1
2184	142	H-2-80063	1	234-52	187	H-2-80062	4	1
2186	145	H-2-80063	1	234-52	192D	H-2-80062	4	1

INSTALLATION INDEX OF FILTER STATIONS

Z NO.	INSTL NO.	DWG AND SH NO.	BLDG NO.	ROOM NO.	KEY PLAN DWG AND SH NO.	QTY AT STA	AIR SAMPLING STA ASST DWG	BLDG FLR
2187	54	H-2-80063	14	234-52	192	H-2-80062	4	1
2188	65	H-2-80063	15	234-52	100A	H-2-80062	4	1
2189	59	H-2-80063	15	234-52	193	H-2-80062	4	1
2190	62	H-2-80063	15	234-52	235D	H-2-80062	4	1
2191	61	H-2-80063	15	234-52	235D	H-2-80062	4	1
2192	60	H-2-80063	15	234-52	235D	H-2-80062	4	1
2202	39	H-2-80063	11	234-52	158	H-2-80062	4	1
2203	39	H-2-80063	11	234-52	158	H-2-80062	4	1
2205	41	H-2-80063	11	234-52	165	H-2-80062	4	1
2206	42	H-2-80063	11	234-52	169	H-2-80062	4	1
2208	43	H-2-80063	11	234-52	170	H-2-80062	4	1
2212	129	H-2-80063	1	234-52	227	H-2-80062	4	1
2214	66	H-2-80063	16	234-52	228A	H-2-80062	4	1
2215	67	H-2-80063	16	234-52	228A	H-2-80062	4	1
2220	68	H-2-80063	16	234-52	228B	H-2-80062	4	1
2222	69	H-2-80063	16	234-52	228C	H-2-80062	4	1
2233	144	H-2-80063	1	234-52	234	H-2-80062	4	1
2246	101	H-2-80063	7	234-52	232	H-2-80062	4	1
2250	102	H-2-80063	7	234-52	235-A3	H-2-80062	4	1
2253	86	H-2-80063	17	234-52	TUNNEL 2	H-2-80062	5	1
2255	87	H-2-80063	17	234-52	TUNNEL 3	H-2-80062	5	1
2259	83	H-2-80063	17	234-52	308	H-2-80062	3	1
2260	82	H-2-80063	17	234-52	308	H-2-80062	3	1
2263	81	H-2-80063	17	234-52	308	H-2-80062	3	1
2276	80	H-2-80063	17	234-52	308	H-2-80062	3	1
2282	84	H-2-80063	17	234-52	CORR 3	H-2-80062	3	1
2284	85	H-2-80063	17	234-52	320	H-2-80062	3	1
2285	79	H-2-80063	17	234-52	303	H-2-80062	2	1
2291	77	H-2-80063	17	234-52	263	H-2-80062	2	1
2292	78	H-2-80063	17	234-52	264	H-2-80062	2	1
2354	40	H-2-80063	11	234-52	CORR 5	H-2-80062	4	1
2356	107	H-2-80063	20	234-52	180	H-2-80062	4	1
2414	127	H-2-80063	1	234-52	227	H-2-80062	4	1
2415	128	H-2-80063	1	234-52	228	H-2-80062	4	1
2417	131	H-2-80063	1	234-52	ROOM 239B	H-2-80062	4	1
2418	131	H-2-80063	1	234-52	ROOM 239B	H-2-80062	4	1
2419	132	H-2-80063	1	234-52	ROOM 239C	H-2-80062	4	1
2420	132	H-2-80063	1	234-52	ROOM 239C	H-2-80062	4	1
2421	130	H-2-80063	1	234-52	ROOM 239A	H-2-80062	4	1
2422	133	H-2-80063	1	234-52	ROOM 139	H-2-80062	4	1
2423	133	H-2-80063	1	234-52	ROOM 139	H-2-80062	4	1
2424	134	H-2-80063	1	234-52	ROOM 135	H-2-80062	4	1
2425	144	H-2-80063	1	234-52	ROOM 136	H-2-80062	4	1
2426	32	H-2-80063	9	234-52	ROOM 145	H-2-80062	4	1
2427	32	H-2-80063	9	234-52	ROOM 145	H-2-80062	4	1
2428	34	H-2-80063	10	234-52	ROOM 152	H-2-80062	4	1
2429	135	H-2-80063	1	234-52	ROOM 154	H-2-80062	4	1
2430	135	H-2-80063	1	234-52	ROOM 154	H-2-80062	4	1
2431	136	H-2-80063	1	234-52	ROOM 165	H-2-80062	4	1
2432	137	H-2-80063	1	234-52	ROOM 165	H-2-80062	4	1
2433	137	H-2-80063	1	234-52	ROOM 165	H-2-80062	4	1
2436	138	H-2-80063	1	234-52	ROOM 228A	H-2-80062	4	1
2437	138	H-2-80063	1	234-52	ROOM 228A	H-2-80062	4	1
2438	139	H-2-80063	1	234-52	ROOM 228A	H-2-80062	4	1
2439	139	H-2-80063	1	234-52	ROOM 228A	H-2-80062	4	1
2440	140	H-2-80063	1	234-52	ROOM 228C	H-2-80062	4	1
2441	141	H-2-80063	1	234-52	ROOM 235B	H-2-80062	4	1

INSTALLATION INDEX OF FILTER STATIONS

Z NO.	INSTL NO.	INSTALLATION		BLDG NO.	ROOM NO.	KEY PLAN DWG AND SH NO.		QTY AT STA	AIR SAMPLING STA ASSY DWG	BLDG FLR
		DWG AND SH NO.								
Z001	24	H-2-80063	5	236-Z	CORR 10	H-2-80062	4	1	H-2-80064	1ST
Z005	22	H-2-80063	5	236-Z	CORR 13	H-2-80062	4	1	H-2-80064	1ST
Z008	20	H-2-80063	5	236-Z	16	H-2-80062	4	1	H-2-80064	1ST
Z010	21	H-2-80063	5	236-Z	16	H-2-80062	4	1	H-2-80064	1ST
Z011	23	H-2-80063	5	236-Z	19	H-2-80062	4	1	H-2-80064	1ST
Z013	17	H-2-80063	4	236-Z	CORR 20	H-2-80062	2	1	H-2-80064	2ND
Z015	16	H-2-80063	4	236-Z	CORR 19	H-2-80062	2	1	H-2-80064	2ND
Z018	12	H-2-80063	4	236-Z	CORR 21	H-2-80062	2	1	H-2-80064	2ND
Z019	18	H-2-80063	4	236-Z	26	H-2-80062	2	1	H-2-80064	2ND
Z020	19	H-2-80063	4	236-Z	26	H-2-80062	2	1	H-2-80064	2ND
Z026	15	H-2-80063	4	236-Z	27	H-2-80062	2	1	H-2-80064	2ND
Z027	13	H-2-80063	4	236-Z	MAIN CELL	H-2-80062	2	1	H-2-80064	2ND
Z029	10	H-2-80063	3	236-Z	CORR 31	H-2-80062	3	1	H-2-80064	3RD
Z030	9	H-2-80063	3	236-Z	CORR 33	H-2-80062	3	1	H-2-80064	3RD
Z034	11	H-2-80063	3	236-Z	MAIN CELL	H-2-80062	3	1	H-2-80064	3RD
Z037	3	H-2-80063	1	236-Z	41	H-2-80062	3	1	H-2-80064	4TH
Z041	4	H-2-80063	1	236-Z	42	H-2-80062	3	1	H-2-80064	4TH
Z043	5	H-2-80063	2	236-Z	43	H-2-80062	3	1	H-2-80064	4TH
Z046	6	H-2-80063	2	236-Z	44	H-2-80062	3	1	H-2-80064	4TH
Z047	6	H-2-80063	2	236-Z	45	H-2-80062	3	1	H-2-80064	4TH
Z048	2	H-2-80063	1	236-Z	50	H-2-80062	3	1	H-2-80064	5TH
Z050	1	H-2-80063	1	236-Z	60	H-2-80062	3	1	H-2-80064	6TH
Z052	8	H-2-80063	3	236-Z	34	H-2-80062	3	1	H-2-80064	3RD
Z401	117	H-2-80063	1	236-Z	CORR 13	H-2-80062	4	1	H-2-80064	1ST
Z402	126	H-2-80063	1	236-Z	ROOM 27	H-2-80062	2	1	H-2-80064	2ND
Z403	126	H-2-80063	1	236-Z	ROOM 27	H-2-80062	2	1	H-2-80064	2ND
Z404	126	H-2-80063	1	236-Z	ROOM 27	H-2-80062	2	1	H-2-80064	2ND
Z405	126	H-2-80063	1	236-Z	ROOM 27	H-2-80062	2	1	H-2-80064	2ND
Z406	123	H-2-80063	1	236-Z	ROOM 41	H-2-80062	4	1	H-2-80064	4TH
Z407	118	H-2-80063	1	236-Z	ROOM 41	H-2-80062	4	1	H-2-80064	4TH
Z408	119	H-2-80063	1	236-Z	ROOM 41	H-2-80062	4	1	H-2-80064	4TH
Z409	120	H-2-80063	1	236-Z	ROOM 41	H-2-80062	4	1	H-2-80064	4TH
Z410	121	H-2-80063	1	236-Z	ROOM 41	H-2-80062	4	1	H-2-80064	4TH
Z411	122	H-2-80063	1	236-Z	ROOM 41	H-2-80062	4	1	H-2-80064	4TH
Z412	125	H-2-80063	1	236-Z	ROOM 41	H-2-80062	4	1	H-2-80064	4TH
Z413	124	H-2-80063	1	236-Z	ROOM 41	H-2-80062	4	1	H-2-80064	4TH

4NF-5242 Rev D

DUCT LEVEL 234-5Z & 2ND FLOOR PLAN-236-Z

[illegible]

Rev D
HNF-5242

236-Z 6TH FL

236-Z 5TH FL

236-Z 6TH FL

2ND FLOOR PLAN 234-5Z & 3RD, 4TH, 5TH, & 6TH FLOOR PLAN 236-Z

ESSENTIAL DRAWING

U.S. DEPARTMENT OF ENERGY		OFFICE OF Nuclear Energy Research and Development		Washington, D.C. 20545	
AIR SAMPLING STATION LOCATIONS					
NAME		DATE		PAGE 3 OF 5	
1. WYATT		3-1-82			
2. K.D. JUNT		5-10-82			
3. JAMES R. BARTLETT		5-15-82			
4. JAMES B. BRUNO		5-14-82			
5. G.N. WEDDLE		6-8-82			
6. J. PARAZIN		6-8-82			
7. JAMES B. BRUNO		6-15-82			
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[illegible]

REF NUMBER	TITLE	REFERENCES
		NEXT USED ON H-2-80062 SH 1

FIELD VERIFIED REV 2, 5/92

54-0200-027(5/100)

BS
HNF-5242
REV D

BUILDING NUMBER
234-5Z, 232-Z, 236-Z, 291-Z
2736Z, 2736ZA, 2736ZH

26 ESSENTIAL DRAWING

DATE	TIME	LOCATION	WATER	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100
DATE	TIME	LOCATION	WATER	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100
DATE	TIME	LOCATION	WATER	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100
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DATE	TIME	LOCATION	WATER	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100
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DATE	TIME	LOCATION	WATER	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100
DATE	TIME	LOCATION	WATER	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100
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	REF NUMBER	TITLE	REFERENCES
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4

FIELD VERIFIED REV. 5/92		DRAWING TRACEABILITY LIST	
ISSUE NO.	TITLE		

1ST FL 234-5Z, 232-Z, 236-Z, 291-Z, 2736Z, 2736ZA, 2736ZB

14-00000-0000-14

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