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Plan

Idaho National Engineering and Environmental Laboratory Site Beryllium Contamination Sampling and Analysis Plan

Idaho National Engineering and Environmental Laboratory

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CONTENTS

ACRONYMS v

1. INTRODUCTION 1
   - 1.1 Background 1
   - 1.2 Objective and Scope 2
2. DATA QUALITY OBJECTIVES 3
   - 2.1 Problem Statement 3
   - 2.2 Identify the Decisions 4
   - 2.3 Decision Inputs 4
   - 2.4 Study Boundaries 4
   - 2.5 Decision Rules 5
   - 2.6 Decision Error Limits 6
   - 2.7 Design Optimization 6
3. SAMPLING ACTIVITIES 7
   - 3.1 Building Information 7
   - 3.2 Homogeneous Sampling Areas 7
   - 3.3 Sample Locations 8
   - 3.4 Sample Collection 9
   - 3.5 Sampling for Background Levels 10
4. QUALITY ASSURANCE AND QUALITY CONTROL 11
   - 4.1 Chain of Custody 11
   - 4.2 Quality Control Samples 11
   - 4.3 Analysis 12

5. REFERENCES 12

Appendix A, Locations of Beryllium Activities 13

Appendix B, INEEL Beryllium Sample Collection Log 166

Attachement 1, Building Specific Sampling Plan, CFA689 18

TABLES

1. Examples of biased sample locations 8
A-1. Locations of beryllium activities 13

ACRONYMS

AIHA	American Industrial Hygiene Association
BBWI	Bechtel BWXT Idaho, LLC
Be	beryllium
CFA	Central Facilities Area
CFR	Code of Federal Regulations
COC	chain of custody
D&D	decontamination and decommissioning
DOE	United States Department of Energy
DOE-HQ	United States Department of Energy Headquarters
DQOs	data quality objectives
HASS	Hazard Assessment and Sampling System
HSA	homogeneous sampling area
INEEL	Idaho National Engineering and Environmental Laboratory
MCP	management control procedure
NNSA	National Nuclear Security Administration
NTS	Nevada Test Site
PPE	personal protective equipment
QC	quality check
R&D	research and development
RCS	Retrieval Containment Structure
TRA	Test Reactor Area

1. INTRODUCTION

On October 23, 2003, the Bechtel BWXT Idaho, LLC (BBWI) Industrial Hygiene Program received an informal request for information from United States Department of Energy Headquarters (DOE-HQ) regarding the implementation of the Idaho National Engineering and Environmental Laboratory (INEEL) beryllium program and response to recent lessons learned from the Nevada Test Site (NTS).

The DOE-HQ request for information references the lessons learned identified by the National Nuclear Security Administration's (NNSA) *Final Report of the Investigation of Beryllium Exposure Cases Discovered at the North Las Vegas Facility.* This report, released in August 2003, is a comprehensive investigation of the beryllium concerns at the North Las Vegas Facility arising from the diagnosis of an employee with chronic beryllium disease and other employees with confirmed beryllium sensitization.

Lessons learned from the NNSA investigation at NTS demonstrated that United States Department of Energy (DOE) sites need to identify and characterize historical site/facilities/areas where beryllium or beryllium-containing products were known to have been handled, used, or stored. These locations need to be characterized to evaluate the presence of releasable beryllium contamination and identify measures needed to prevent or minimize the spread of contamination from these areas.

1.1 Background

At the INEEL, beryllium has been associated with research and development processes or beryllium articles that have been used as a moderator or reflector in the operation of nuclear test reactors. While these activities fall outside the scope of 10 Code of Federal Regulations (CFR) 850, measures have been implemented to eliminate or control the potential risk of exposure to employees for current activities. Activities considered within the scope of 10 CFR 850 are managed through company Management Control Procedure (MCP)-50, "Chronic Beryllium Disease and Prevention."

Lessons learned from the NNSA investigation at NTS recognized the need for DOE to provide additional guidance on the implementation of 10 CFR 850 in order to ensure legacy hazards are identified and evaluated for residual risk to employees. The Judgment of Needs states; "*DOE needs to review 10 CFR 850 against the lessons learned from this investigation, especially focusing on (1) the narrow focus of the rule's application; (2) the lack of requirements for beryllium contamination limits in uncontrolled areas; and (3) the lack of requirements for monitoring the spread of contamination into uncontrolled areas adjacent to or accessible from beryllium-controlled areas.*"

The BBWI Industrial Hygiene Program has reviewed and concluded that the lessons learned identified within the NNSA summary report establish two primary expectations of the program that have not been fully evaluated at the INEEL. The two programs expectations and status are:

- Identify all past locations and operation where beryllium or beryllium-containing compounds were used—completed during the second quarter of Fiscal Year 2004.

- Perform surface sampling of potential beryllium contamination locations—established by this plan.

1.2 Objective and Scope

The objective of this sampling and analysis plan is to provide the method for the sample collection and analysis required to identify and characterize beryllium contamination levels in buildings where beryllium or beryllium-containing compounds were historically handled, used, or stored. Appendix A lists historical beryllium-related activities at locations identified for characterization. The potential for beryllium contamination is believed to depend upon the following:

- Specific type and form of beryllium materials used
- Quantity of beryllium handled at the location
- Specific type of beryllium work performed
- Frequency and duration of handling
- Control methods followed
- Housekeeping and decontamination procedures followed.

The results of sampling and analysis efforts to characterize beryllium contamination levels will be compiled and entered into the Industrial Hygiene Hazard Assessment and Sampling System (HASS) electronic database. A management plan, based upon the results of initial characterization, will also be developed to address worker safety and health issues if determined to be necessary.

2. DATA QUALITY OBJECTIVES

Data quality objectives (DQOs) define:

- Specific sample media required
- Locations for obtaining samples
- Number of samples required
- Type of analysis required.

DQOs consist of seven iterative steps that yield a set of principal study questions and decision statements that must be answered to address a primary problem statement. The seven steps comprising the DQO process include:

1. State the problem
2. Identify the decision
3. Identify the inputs
4. Define the study boundaries
5. Develop decision rules
6. Specify limits on the decision
7. Optimize design for collecting data.

2.1 Problem Statement

Past locations where beryllium or beryllium-containing products were used at the INEEL need to be characterized to evaluate the presence of releasable beryllium contamination and determine mitigations needed to prevent or minimize the spread of contamination from these areas. Releasable contamination is defined to be dirt and dust that is removable by hand pressure from building systems, components, and equipment surfaces.

Two important issues surround the gathering and interpretation of the data that will be collected through this project. First, the DOE has not established a surface contamination threshold level for uncontrolled work areas. A threshold level will be established from an evaluation of the release criteria identified in 10 CFR 850 and levels adopted at other DOE sites. Second, natural background levels of beryllium are known to be present in the soil at the INEEL. Sampling efforts will need to establish if the source of beryllium is from background levels of contamination in INEEL soil or man-made processes. Contamination levels found to occur from natural background concentrations of beryllium are exempt from the 10 CFR 850 requirements and the scope of DOE lessons learned.

2.2 Identify the Decisions

Decisions that need to be made to ensure the data collected provide the information needed to evaluate worker protection include:

- Which INEEL buildings have the potential for beryllium contamination?
- Where is the contamination located within the buildings?
- What are the levels of contamination?
- What are background contamination levels of beryllium at the INEEL?
- What surface contamination threshold will be used to establish limits believed to present exposure concerns to employees?
- Do any of the INEEL building locations contain surface contamination levels presenting a potential health concern to employees, requiring a management plan for mitigation and control?

2.3 Decision Inputs

The information needed to resolve identified decisions inputs include:

- Current inventories of beryllium handling, use, and storage locations as compiled through process knowledge, employee interviews, visual observations, area walkdowns, building drawings, industrial hygiene exposure assessment and sampling records, and past operating documents. See Appendix A.
- Sample collection of a statistically valid population of wipe samples in a nonrandom, biased approach for locations with the highest expected concentrations of surface contamination based upon process knowledge and building configurations.
- A determination of an appropriate threshold limit for beryllium surface contamination levels at uncontrolled locations.
- A determination if detected levels of beryllium contamination are from man-made sources or background levels of beryllium present in soil.

2.4 Study Boundaries

The physical boundary for this project is limited to those building locations identified in Appendix A. The sampling and analysis efforts will be limited to specific rooms, systems, components, and equipment within a building's envelope that were close to or in direct contact with past beryllium activities. Additional sampling and analysis efforts will be extended beyond this envelope to include adjacent rooms, hallways, and equipment if initial sampling identifies concentration in excess of the defined surface contamination threshold.

Sampling efforts will be limited to building and equipment surfaces having the highest probability of beryllium contamination. Sampling areas will include, but is not limited to, process equipment (lathes, presses, gloveboxes), external surfaces (shelves, counter tops, processing surfaces, storage shelves), building infrastructure (plumbing, electrical, ventilation), and building floors and walls.

The boundary for the collection of surface contamination is the dirt and dust removable by hand pressure from the described building systems, components, and equipment.

2.5 Decision Rules

Decision rules are applied to the collected data to answer those questions expressed in Section 2.2. For this project, it is recognized that DOE has not established a surface contamination threshold limit for beryllium contamination in uncontrolled work areas. In the absence of an established threshold limit, it has been determined that the threshold limit for surface contamination will be the 10 CFR 850 release criteria established by DOE for releasing beryllium contaminated equipment or other items to the general public or a DOE facility for non-beryllium use. The release criteria states; "The removable contamination level of equipment or item surfaces shall not exceed the higher of 0.2 ug/100 cm^2 or the concentration level of beryllium in soil at the point of release, whichever is greater."

In order to characterize surface contamination levels, individual surface wipe samples will be collected and compared against the 0.2 ug/100cm^2 criteria as part of the SAP effort. If levels are found to exceed this initial criteria then a subsequent study will be conducted to compare sample data to background levels of beryllium found in soil. This study, if determined necessary, will compare source markers of naturally occurring copper and barium to concentrations of beryllium in the soil. This concentration ratio can then be compared against the concentrations ratio identified at surface contamination locations where the initial criteria is exceeded. This comparison will establish the source of beryllium contamination as either background levels from soil or man-made sources. Background levels of beryllium and other source markers in the soil at the INEEL have been previously sampled and documented. These values are contained in INEEL document; "*Background Dose Equivalent Rates and Surficial Soil Metal and Radionuclides Concentrations for the Idaho National Engineering Laboratory.*"

If it is determined that sample data exceeds the 0.2 ug/100cm^2 threshold limit criteria, from sources other than background, then contamination is present. Conversely, individual results that indicate concentrations are below these criteria will indicate that contamination is not present. If contamination concentrations are found to exceed the established threshold limit, a building-specific sampling plan will be developed to perform additional characterization of the contaminated area and adjacent locations such as neighboring rooms or hallways. Building-specific sampling plans, if determined necessary, shall be included as attachments to this document.

In the event the contamination concentrations exceed the threshold limit, air sampling will also be performed to determine personal exposure levels from work activities that may be occurring in the contaminated location. Air sampling results will be compared against the 2 ug/m^3 permissible exposure limit (PEL) established in 29 CFR 1910.1000 and the 0.2 ug/m^3 action level established in 10 CFR 850.

2.6 Decision Error Limits

A frequency of concern of 10% for the sample population has been selected based upon the assumption that all areas are assumed to be free of beryllium contamination and are managed without the need for personal protective equipment (PPE) and engineering controls. A 10% decision error has been selected and will provide conclusions that can be stated with 90% confidence. Enough samples will be obtained to provide a 90% confidence level that contamination does or does not occur above the contamination threshold level.

If results from the samples collected indicate beryllium levels are below the established threshold defined for beryllium contamination, the following conclusion can be stated:

> *"We are 90% confident that 90% or more of the building/location surfaces are free from beryllium contamination."*

2.7 Design Optimization

The purpose of the sampling effort is to confirm a presumed absence of beryllium contamination using a nonrandom biased sampling technique. Biased sampling is based on process knowledge and visual observation of those areas deemed most likely to harbor contamination.

Building locations shall be recognized to have homogeneous sampling areas (HSAs) needing characterization. HSAs identified for sampling include;

- Floors
- Process equipment (lathes, presses, mills)
- Storage locations (shelves, cabinets, table tops)
- Building infrastructure (ventilation ducting, light fixtures, electrical panels)
- Miscellaneous horizontal surfaces (window sills, tops of equipment).

The number of samples collected in a building or location is determined by the established confidence level of 90% and the frequency of concern of 10%. The location of samples within a building or location will be determined by a nonrandom biased sampling scheme. A biased sampling scheme is preferred when attempting to demonstrate that contamination is not present. This allows the sampling efforts to focus on locations where contamination is most likely to occur. If contamination is not present at these locations, it is reasonable to assume that it is not present at other, less likely, locations either. Biased sampling strengthens the conclusion that contamination is not present.

3. SAMPLING ACTIVITIES

The following subsections describe the sampling procedure to be used to meet the DQOs described in Section 2. Prior to performing any sampling activities, training on this sampling and analysis plan will be provided to the industrial hygiene professional(s). Additionally, the industrial hygiene professional(s) performing sampling activities will have completed the requisite training and qualification program needed to perform these sampling activities in accordance with the BBWI qualification standard, *STD-1103 Industrial Hygiene Qualification.*

3.1 Building Information

Appendix A establishes the inventory of historical beryllium handling, use, and storage locations as compiled through process knowledge, employee interviews, visual observations, area walkdowns, building drawings, industrial hygiene exposure assessments, sampling records, and past operating documents. Sampling and analysis efforts will be limited to those buildings identified on this inventory and to specific rooms, systems, components, and equipment within a building's envelope that were close to or in direct contact with past beryllium activities.

3.2 Homogeneous Sampling Areas

Various materials, equipment, and structures are associated with the building locations identified within Appendix A. These areas of potential contamination can be categorized into homogeneous sampling areas (HSAs) needing characterization. HSAs identified for sampling include:

- Floors (hard surface)
- Process equipment (lathes, presses, mills)
- Storage locations (shelves, cabinets, table tops)
- Building infrastructure (ventilation ducting, light fixtures, electrical panels)
- Miscellaneous horizontal surfaces (window sills, tops of equipment).

3.3 Sample Locations

Sampling efforts will be limited to building and equipment surfaces having the highest probability of beryllium contamination. These are locations within a building that are known to have been directly associated with or close to beryllium handling, use, or storage activities. The location of samples within an HSA shall be determined using a nonrandom biased sampling scheme. A biased sampling scheme will identify sample locations within the established HSAs where contamination is most likely to occur. Examples of biased sample locations include but are not limited to those listed in Table 1.

Table 1. Examples of biased sample locations.

Homogeneous Sampling Area	Biased Sample Location
Floor	Corner of the room where dust accumulates
	Traffic areas traversed by beryllium workers
	Surfaces immediately below or adjacent to beryllium work
Process	Top surfaces where dust accumulation is noted
Equipment	Hidden surfaces where not routinely cleaned
	Oily areas where dust tends to cling
HVAC Systems	Access flanges where dust accumulates
	Upper surfaces of vent louvers
	Ceiling tile surfaces adjacent to exhaust plenums
Storage Locations	Back of shelf areas
	Tops of cabinets
	Inside surfaces of work benches/tables not routinely cleaned
Misc. Horizontal Surfaces	Door jams
	Window sills
	Tops of light fixtures
	Tops of piping, bus bars, and other building components
	Tops of girders and other structural members

If sampling identifies that contamination levels are present at levels exceeding the established surface contamination threshold, subsequent sampling will be performed for additional locations to characterize adjacent building rooms, hallways, materials, and equipment that may have been subject to a spread of contamination from source activities.

3.4 Sample Collection and Analysis

Surfaces identified as having the highest probability for beryllium contamination through nonrandom biased sampling will be characterized using surface wipe samples. Field data shall be recorded on the "INEEL Beryllium Sample Collection Log" listed in Appendix B. These sample logs will be maintained in logbook binders that will remain with the sampling hygienist during sampling activities.

Wipe samples will be performed using prepackaged moistened towelettes or wipe media moistened with de-ionized water to capture unbound particulate from a surface. The prepackaged moistened towelette method is performed using foil packaged moist towelettes, such as Ghost Wipes. Wipe media moistened with de-ionized water is performed using mixed cellulose ester filters or other media such as Smear Tabs. Both methods can be used on smooth, semismooth, or irregularly shaped surfaces. Any prepackaged moist wipe or media moistened with de-ionized water, compatible with the analytical digestion procedure can be used.

Sampling will be performed in accordance with OSHA Analytical Method ID-125G, Section 5.3. A deviation to this method will include the use of seal-lock sample collection bags instead of scintillation vials. The NIOSH 7300 Method, *Elements by ICP*, will be used for analysis of the collected wipe samples.

Samples will be wiped from areas of 100 cm^2. If the industrial hygienist judges that a different surface area is necessary, it is allowable as long as the new surface area is measured and recorded. The sample collection shall include surface contamination such as dirt and dust that is removable by hand pressure from the identified building systems, components, and equipment. The surface to be sampled shall be wiped in a manner that moves unbound particulate towards the center of the area using wiping strokes. Repeat this step with as many filters as is necessary to capture the majority of this loose particulate. The number of wipes used is at the discretion of the individual performing the sampling.

The person obtaining the sample shall wear clean, impervious, disposable gloves when taking each wipe sample to prevent sample contamination and avoid direct hand contact with any surface potentially contaminated with beryllium.

After obtaining a sample, fold into quarters (as a minimum) with exposed side in, and place into a clean sample bag. Each sample shall be clearly labeled with a unique sample identification number. The sample logbook shall include the unique sample identification number, the building number, room number, and description of sample location, date of sample collection, and name of sampler.

If the sample is being collected in a radiation contaminated control area, the sample location shall be surveyed for radiation contamination prior to collecting the wipe sample. If the sample location is found to be radioactively contaminated, an equivalent location not radioactively contaminated shall be sampled. If such a location cannot be identified, the sampling shall be collected and handled in accordance with applicable radiation control procedures and analysis performed on-site using the INEEL analytical laboratory capable of handling radiation contaminated samples.

The number of samples collected in a building or location shall be determined using a decision error of 10% in order to establish a 90% confidence interval statement for the sample data. The calculated number of biased samples to be collected for a building/location is determined through the following equation:

$$N = \frac{Ln(1-P)}{Ln(1-Y)} \tag{1}$$

where:

N = required number of samples

P = desired confidence level (0.90)

Y = frequency of concern (0.10)

Ln = symbol for taking the natural logarithm.

The resultant from this equation, using the established confidence level of 90%, requires that 22 samples be obtained for each building/location. The specific location for each set of 22 samples shall be determined by the sampling industrial hygienist using nonrandom biased sample locations. Samples shall be obtained for each HSA present within specific building/locations identified in Appendix A. The number of samples, from the 22 required for each building/location, will be assigned to each identified HSA through a subjective evaluation by the sampling industrial hygienist based upon the relative surface area present for each assigned HSA.

3.5 Sampling for Background Levels

The surface contamination threshold established for this study is the 10 CFR 850 release criteria. The release criteria states that removable contamination levels shall not exceed the higher of .2 ug/100cm^2 or the concentration level of beryllium in soil. Individual surface wipe samples collected through this study will be compared against the 0.2 ug/100cm^2 criteria. If levels are found to exceed the initial criteria then a subsequent study will be conducted to compare sample data to background levels of beryllium found in soil at the INEEL. This study, if determined necessary, will compare source markers of copper, barium, and beryllium ratios in the soil to concentrations ratios identified through the initial wipe sampling. If the concentration ratios are statistically correlated, the contamination levels will be recognized as originating from naturally occurring soil concentrations and the threshold level will not be exceeded.

In order to support a follow-up comparison study to background concentrations of beryllium in the soil using source markers, the wipe samples collected through this SAP will be analyzed for concentrations of beryllium, copper, and barium. Background levels for beryllium contamination in soil has been previously established at the INEEL through the analysis of soil concentrations of metals and radionuclides at various locations across the site. The rationale, methodology, and background concentrations of metal in soil are presented in *Background Dose Equivalent Rates and Surficial Soil*

Metal and Radionuclides Concentrations for the Idaho National Engineering Laboratory (Rood et al. 1996).

4. QUALITY ASSURANCE AND QUALITY CONTROL

4.1 Chain of Custody

Samples shall be submitted for analysis at the end of each day. If samples cannot be submitted on the day of collection, the responsible industrial hygienist shall ensure the custody and safekeeping of all samples.

A sample will be considered under the custody if it is in the possession of the sampling industrial hygienist, in view of the sampling industrial hygienist, or transferred to a secure area that is locked and access is controlled. The industrial hygienist is responsible for the custody of the collected samples in the field until they have been properly packaged, documented, and transferred to the on-Site laboratory or to a procurement agent for transfer to a courier.

A chain of custody (COC) form shall accompany all samples. The COC shall be signed and dated for all samples when released from the responsible custodian. The analytical laboratory shall follow their own internal procedures to include:

- COC forms accompanying the samples that are signed and dated upon receipt
- Copies of the forms maintained as part of the final package
- An internal sample tracking system so that custody is traceable from time of receipt to disposal.

4.2 Quality Control Samples

The use of field quality control (QC) blanks will provide validation that data of known quality are produced by the analytical laboratory. Ten percent (10%) or one field blank for every 10 samples collected shall be submitted for analysis. Field QC samples shall be documented in field logbooks and submitted "blind" to the analytical laboratory. "Blind" samples will ensure the laboratory cannot distinguish between actual samples and QC blanks during analysis.

Duplicate samples will not be submitted for validation of sample precision because natural heterogeneity of the surface areas being sampled is not predictable. Heterogeneity is recognized as compromising the ability to obtain a true duplicate of any given sample.

4.3 Analysis

All samples shall be submitted for analysis to an American Industrial Hygiene Association (AIHA) accredited laboratory. The NIOSH 7300 Method, *Elements by ICP*, will be used for analysis of wipe samples. This methodology is performed using Inductively Coupled Argon Plasma-Atomic Emission Spectroscopy (ICP-AES). The turnaround time requested for preliminary results is no more than 5 working days from laboratory receipt of samples. Preliminary results will include the results determined immediately following analysis prior to any laboratory data validation and assemblage of the final data package. Finalized results shall be received within 15 working days from receipt of samples.

5. REFERENCES

Background Dose Equivalent Rates and Surficial Soil Metal and Radionuclides Concentrations for the Idaho National Engineering Laboratory (Rood et al. 1996).

National Nuclear Security Administration's (NNSA), 2003, *Final Report of the Investigation of Beryllium Exposure Cases Discovered at the North Las Vegas Facility.*

MCP-50, "Chronic Beryllium Disease and Prevention."

STD-1103, "Industrial Hygiene Qualification"

10 CFR 850, "Chronic Beryllium Disease Prevention Program," *Code of Federal Regulations.*

29 CFR 1910.1000, "Subpart Z - Toxic and Hazardous Substances", *Code of Federal Regulations.*

Appendix A

Locations of Beryllium Activities

Table A-1. Locations of beryllium activities.

Building	Room/Area	Process/Be Source	Comments
CFA 621	N/A	Instrument tech work and/or machining.	Process completed. Process equipment has been removed from the facility.
CFA 623	GRITB	Grit Blast Bag House.	Process completed. Equipment still present in facility.
CFA 625	150, 170	Preparation of Be analytical standards.	Process completed. Be standards removed.
CFA 633	135	Preparation of Be analytical standards.	Process completed. Laboratory equipment has been removed from the facility
CFA 686	N/A	Instrument tech work and/or machining.	Process completed. Process equipment has been removed from the facility.
CFA 689	128	Research and development (R&D) activities with clean-up of lab hoods. Assembly of Be-containing thermocouples.	Process completed. Lab hoods and lab benches have been removed
CFA 688	132, 116, 112, 120	Assembly of Be-containing thermocouples (Rm 132). Machined/lathed Be metal (Rm 116, 112, 120).	Process completed. Lab benches still present (Rm 132). Process equipment removed from facility (Rm 116, 112, 120).
CPP 627	N/A	Laboratory chemical analysis.	Process completed. Process equipment removed from facility.
CPP 630	Old Machine Shop	Machined/lathed small Be pieces.	Process completed. Process equipment removed from facility.

Building	Room/Area	Process/Be Source	Comments
IF 603	B16	Handling of thermocouples that contained BeO as an insulator.	Process completed.
PBF 609	N/A	Ash transfer from incinerator to drum, ash removal from baghouse, inspection and cleaning of heat exchanger, sampling of fly ash.	Process completed. Process equipment has been removed from the facility.
PBF Reactor	N/A	Beryllium oxide insulators, stripping cables, manufacturing instrumentation assemblies.	Process completed. Some equipment remains in facility.
TAN 607	N/A	Machined/lathed small pieces or blocks of Be to meet QA specifications for mag-particle measurements. Custodial activities.	Process completed. Process equipment has been removed from the facility.
TAN Reactor (LOFT)	N/A	Beryllium oxide insulators, stripping cables, manufacturing instrumentation assemblies.	Process completed. Process equipment has been removed from the facility.
TRA 635	101	Cleaned contamination off of beryllium bars using mild acid or alkali. This area was also the location of the Test Reactor Area (TRA) machine shop prior to moving over to TRA 653. There has been discussion that Be was machined here on occasions but not confirmed.	Process completed. Process equipment has been removed from the facility.
TRA 642	ETR Reactor Bldg.	Engineering Test Reactor (ETR) Be reflector changeouts. Handled and examined Be reflectors and joint connectors.	Process completed. Equipment still present in facility. 766 kilograms reactor shielding, 81 kilograms reflector.
TRA 654	ETRC Reactor	Be components were used in this reactor.	Process completed. Process equipment has been removed from the facility.

Building	Room/Area	Process/Be Source	Comments
TRA 660	ARMF	Be components were used in the reactors.	Process completed. Process equipment has been removed from the facility.
TRA 603	MTR	Be components were used in the reactor.	Process completed. Equipment still present in facility. 2,608 kilograms reactor vessel structure shielding (main floor), 1,134 kilograms 20 outershim control cylinders (basement), 2 reflecter block spares for ATR (basement).

Appendix B

INEEL Beryllium Sample Collection Log

LOCATION SKETCH

Building/Area: _____ Room: _____

Date	Location Number	Sample Number	Location Description	Sample Size	Sampler

Date	Location Number	Sample Number	Location Description	Sample Size	Sampler

Attachment 1

CFA-689
Building Specific Sampling Plan

1.0 Introduction

This building specific sampling and analysis plan has been developed in response to the initial sampling efforts, completed in accordance PLN-1747, which detected elevated levels of beryllium contamination on three sample locations found within CFA 689, room 128. In accordance with PLN-1747, Section 2.5, Decisions Rules, if it is determined that initial sample data exceeds the 0.2 ug/100 cm^2 threshold limit criteria, from sources other than background, then contamination is determined to be present and a building specific sampling plan will be developed to perform additional characterization of the contaminated area and adjacent locations such as neighboring rooms or hallways. Accordingly, this attachment establishes the building specific sampling plan needed to conduct additional sampling and characterization of the beryllium contamination identified in CFA 689, room 128.

1.1 Background

CFA 689, room 128 was identified for initial characterization due to past work activities involving the assembly of beryllium containing thermocouples. The location of work activities was identified through employee interviews and determined to have occurred at the south end of room 128. On September 20, 2004, the industrial hygiene organization received notification of beryllium sampling results for this location. Three sample locations were identified to have beryllium concentrations exceeding the 0.2 ug/100 cm^2 threshold limit criteria established by PLN-1747. A total of 22 samples were collected within room 128. The remaining 19 samples locations were found to have concentrations below the threshold limit criteria. The following table provides a summary of all sample results obtained from this initial characterization.

Wipe sample details for CFA 689, Room 128 Aug-Sep 2004

No.	Location	HAS	Surface	Results (ug/100cm^2)
01	W wall	Miscellaneous	top of door	0.097
02	W wall	Miscellaneous	ledge of Dutch door	0.000
03	N end	Floor	within outline of former partition	0.000
04	W wall	Infrastructure	wall bracket for mounting electrical panels	0.000
05	S wall	Infrastructure	air return louver	0.951

06	Blank	NA	N/A	0.000
07	S wall	Infrastructure	baseboard heater run	0.775
08	S wall	Storage	stub box	0.504
09	SE corner	Floor		0.000
10	E wall	Miscellaneous	wall bracket for mounting wind tunnel	0.000
11	S wall	Miscellaneous	on wind tunnel	0.000
12	E end	Infrastructure	top side of drop ceiling panel	0.040
13	E wall	Storage	small, low work surface w/stone top	0.022
14	E wall	Storage	storage rack	0.000
15	N wall	Storage	shelf above work bench	0.000
16	N wall	Miscellaneous	top of file cabinet	0.000
17	W end	Miscellaneous	bottom ledge of work bench	0.000
18	W end	Infrastructure	in-floor electrical outlet box	0.079
19	Blank	NA	N/A	0.000
20	Middle	Infrastructure	top side of drop ceiling panel	0.076
21	N wall	Floor		0.000
22	N wall	Miscellaneous	ballistic flow calibrator	0.000
23	E wall	Infrastructure	baseboard heater run	0.025
24	Middle	Floor	under wind tunnel	0.000

1.2 Objective and Scope

The objective of this sampling and analysis plan is to provide additional characterization of CFA 689, room 128 and adjacent locations such as neighboring rooms, hallways, and ventilation systems. This sampling plan will focus on three primary areas for characterization. The first area will include more detailed characterization around the immediate vicinity where the three contaminated sample locations were found at the south wall of room 128. The second area will include characterization of the ventilation system to evaluate if contamination found on the air return louver has been introduced to the insides of the ventilation ducting. The third area will include general characterization of adjacent rooms and hallways located on the main floor of building 689. These are locations supported by the HVAC system which uses return air, obtained in part, from the plenum with the contaminated air return louver.

The sampling events established through this plan will provide the additional characterization needed to perform clean-up activities of contaminated surfaces. Upon completion of clean-up activities additional sampling will be performed to validate that clean-up efforts reduced contamination levels to concentration below the 0.2 ug/100cm^2 threshold limit.

2.0 Sampling Activities

Sampling activities will include two separate events. The first event will provide additional characterization of the three described areas; the contaminated location within room 128, the ventilation system, and adjacent rooms supported by the ventilation system. The number of samples will not be predetermined because the data will be used to characterize the boundaries of contamination and will not be used to establish a statistical statement. Sampling will be performed until contamination boundaries are clearly established.

The second event will be performed after cleaning and decontamination efforts have been completed within the contamination boundary. This event will demonstrate the removal of contamination to levels below the established threshold of .2 ug/100 cm^2. Sampling during this phase will be performed in accordance with the minimum number of 22 samples needed to establish the original statistical statement based on a frequency of concern of 10% and confidence level of 90%.