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- DRAFT -

Reconnaissance Level Characterization Plan

For Building 123

JULY 1997

RECONNAISSANCE LEVEL CHARACTERIZATION PLAN FOR BUILDING 123

This Reconnaissance Level Characterization Plan has been reviewed and approved by

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ACRONYMS

ACM	Asbestos containing material
AHA	Activity Hazard Analysis
AHERA	Asbestos Hazard Emergency Response Act
APO	Analytical Projects Office
Be	Beryllium
CDPHE	Colorado Department of Public Health and Environment
cm^2	Square Centimeters
DOE	U S Department of Energy
DOP	Decommissioning Operations Plan
dpm	Disintegrations per minute
DQO	Data Quality Objective
EPA	U S Environmental Protection Agency
MDA	Minimum Detectable Amount
PA	Protected Area
PCB	Polychlorinated biphenyl
PLM	Polarized Light Microscopy
RAD	Radioactive
RBA	Radiological Buffer Area
RCRA	Resource Conservation and Recovery Act
RFETS	Rocky Flats Environmental Technology Site
RLC	Reconnaissance Level Characterization
RLCR	Reconnaissance Level Characterization Report
RMRS	Rocky Mountain Remediation Services, L L C
RWP	Radiological Work Permit
SAA	Satellite Accumulation Area
WSRIC	Waste Stream and Residue and Identification and Characterization

1.0 INTRODUCTION

Due to the change in mission of the Rocky Flats Environmental Technology Site (RFETS) from the production of nuclear components to environmental cleanup and shutdown, Building 123 and its associated facilities have no identified mission after Fiscal Year 1997 It has, therefore, been determined by site management that the Building 123 should be decommissioned to a safe and stable configuration to reduce operating costs and hazards The location of B123 is identified in Figure 1-1

1 1 PURPOSE

The purpose of this characterization plan is to outline the data requirements and methodology for Reconnaissance Level Characterization of Building 123 This effort identifies the type, quantity, condition, and location of radioactive and hazardous materials which are, or which may be, present as residual contamination in the subject facilities The compilation of facility information contained herein, in conjunction with the Building 123 project files established during this investigation, brings together pertinent data from various sources to serve as a practical reference for project use

1 2 SCOPE

This report is prepared in support of the Building 123 Characterization for the U S Department of Energy (DOE) at the RFETS located near Golden, Colorado The information presented in this plan specifically pertains to Building 123, the review of historical records and the collection of process knowledge information covers the operational time period for the facility from original construction to present

1.3 DATA LIFE CYCLE

There are three aspects of the data life cycle that apply to the characterization process Planning, Implementation, and Assessment To produce a usable document (i e , Reconnaissance Level Characterization Report) each of the three must be applied in sequence

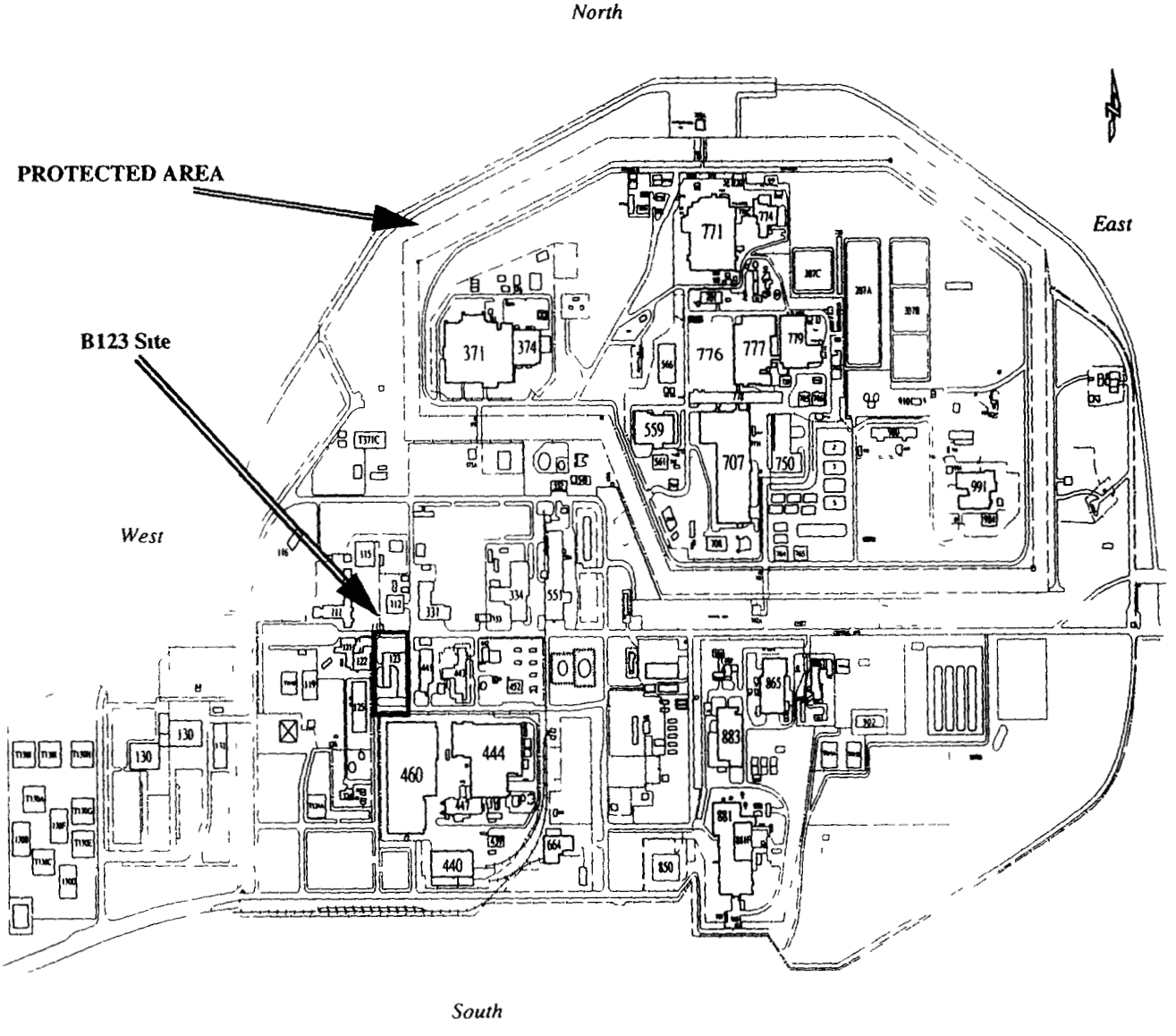
The planning process uses the Data Quality Objectives (DQOs) identified in the Decommissioning Characterization Protocols to determine data needs and quality and survey design This is the initial planning phase for all characterization activities

The second phase of the characterization process is implementation This phase includes the assessment of historical documentation (scoping survey) concerning the operations of a site and any associated chemical or radiological inventory Additionally, the physical survey is accomplished using the design as outlined during the planning phase

The final phase of the life cycle is the assessment of information gathered during the implementation phase The data is evaluated against the DQO criteria and a Reconnaissance Level Characterization Report (RLCR) is developed that outlines results and conclusions

In the following sections the three phases of the data life cycle are developed in detail for the B123 decommissioning project

FIGURE 1-1 SITE MAP



3.1 2 Polychlorinated biphenyls (PCBs)

A PCB evaluation will be conducted for B123 Based on a review of construction information, Building 123 was erected prior to 1980 Therefore, B123 is suspected to contain PCB materials The B123 facilities fluorescent lights and fluorescent light ballast will be removed and disposed in accordance with appropriate RFETS procedures

3 1.3 Excess Chemicals

Although there were hazardous chemicals in the B123 facilities, all excess and hazardous chemicals will be removed from B123 facilities during the deactivation process Should a chemical be found during the decommissioning process, the chemical will be handled in accordance with existing chemical identification and handling procedures

3 1 4 Lead Paint

A complete lead inspection and sampling event of Building 123 will be completed under this plan The analysis of paints will include total lead, chromium, cadmium and arsenic Computer modeling and leachability studies have demonstrated that lead in paint, if it exists, will not create a disposal problem The amount of lead in the painted surfaces will be determined and compared to the previous model as necessary to support the decommissioning effort

3 1 5 Beryllium

Beryllium (Be) metal was removed from Building 123 facilities during the deactivation process Historically, Be was handled in Rooms 111 and 112 Sampling activities for Be will be conducted under this plan

3 1 6 Radioactive Materials

Historical reports indicate that there are no areas within Building 123 which have significant amounts of unidentified/uncontrolled/unmarked radioactive contamination There are some areas which are clearly identified as contamination areas As equipment is removed from Building 123 facilities, sampling and analysis for fixed radiation contamination will be completed Current planning is to decontaminate all rooms which handled significant quantities of radioactive material Preliminary Scoping Surveys of all laboratories and RMMAs/RCAs will be conducted under this plan

3 1 7 Hazard Assessment

An assessment of the hazards that may be encountered during specific decommissioning activities will be performed through walkdowns and job safety analyses This information will be incorporated into the planning process of each activity to ensure maximum protection of the worker

3.1 8 Sampling

Table 3-1 "Building 123 Survey Design" lists the locations and the types of samples that are required for characterization purposes A trained sampling team will be selected to perform the sampling activities required for characterization purposes Analysis for characterization purposes will be performed using Environmental Protection Agency (EPA) approved procedures through laboratory facilities Data Quality Objectives are established for the analytical methods referenced and are on file at the onsite Analytical Projects Office (APO) in Building 881 Sampling and analysis activities will be conducted in accordance with the "characterization protocols" which describe the methods for sampling and analysis for various contaminants of concern including lead, asbestos, PCBs, and radioactive constituents

Table 3-1 includes the descriptions associated with each area, process information regarding the processes conducted in each room, radioactive and/or hazardous considerations (i e , known materials associated with a specific process or area), and the confirmation analysis that will be performed Lead and Asbestos surveys will be conducted by a state-certified inspector who will determine appropriate sampling locations

TABLE 3-1 BUILDING 123 SURVEY DESIGN

W = Wall Board
T = Tile (Floor)
P = Pipe Insulation

Y = Sampling required
N= Not Present
N S= Not Suspect

Room Number	Asbestos	Be	Lead Paint	Rad Cont	Acids Used	Misc
100 West Entry	W/T/P	NS	Y	N	N	
101 Office	W/T/P	NS	Y	N	N	
101A Office	W/T/P	NS	Y	N	N	
102 Office	W/T/P	NS	Y	N	N	
102A Office	W/T/P	NS	Y	N	N	
103 Reagent Lab	W/T/P	Y	Y	N	N	RCRA ck pts
103A Special Bioassay	W/T/P	Y	Y	N	Y	RCA/RMMA
105 Spike & Electroplating Prep	W/T/P	NS	Y	Y	Y	RCRA/RMMA
106 Office	W/T/P	NS	Y	N	N	
107 Office	W/T/P	Y	Y	N	N	
107A Office	W/T/P	NS	Y	N	N	
109 Office	W/T/P	Y	Y	Y	N	
109A Storage	W/T	Y	Y	N	N	
109B Storage	W/T	Y	Y	N	N	
109C Storage	W/T	NS	Y	N	N	RCA/RMMA
111 Beryllium & Bacteriology	W/P	Y	Y	N	Y	
112 Environmental Soil Lab	W/P	Y	Y	N	Y	RCA
113 Men's Restroom	P	NS	Y	N	N	
113A Janitor's Storage	P	NS	Y	N	N	
113B Men's Locker Room	P	NS	Y	N	N	
115 Office	P	NS	Y	N	N	
121 Hallway near 103 & 133	W/P	Y	Y	N	N	
121A Office	N	NS	Y	N	N	
122 Office	W/T/P	Y	Y	N	N	
123 HPI Lab	W/T/P	NS	Y	N	N	RCA/RMMA
123A Hall to Exit Lockers	P	Y	Y	N	N	

Room Number	Asbestos	Be	Lead	Rad Cont	Acids Used	Misc
124 Electroplating Lab	W/T/P	NS	Y	N	N	RCRA
125 Radioactive Spikes	W/T/P	NS	Y	N	Y	
126 Gas Chromatograph	W/T/P	Y	Y	N	N	RCA
126A Office	W/T/P	NS	Y	N	N	
126B Office	W/T/P	NS	Y	Y	N	
126C Office	W/T/P	NS	Y	N	N	
127 Bioassay	WT/P	NS	Y	N	Y	RCA/RMMA
128 Office	W/T/P	NS	Y	N	N	RCA/RMMA
129 Office	N	NS	Y	N	N	
131 Electronics Lab	W/P/T	Y	Y	N	N	
131C Office	W/P/T	NS	Y	N	N	
132 East Utility Room	W	Y	Y	N	N	
133 External Dosimetry	W/P/T	NS	Y	N	N	
133A Office	W/P/T	NS	Y	N	N	
133B Office	W/P/T	NS	Y	N	N	
133C Office	W/P/T	NS	Y	N	N	
135 Alpha Spec & Liquid Scint Lab	W/P/T	NS	Y	N	N	RCA Tritium & C-14
137 Small Room at Truck Dock	N	NS	Y	N	N	
138 Office	N	NS	Y	N	N	
140 Hallway near 140A	T/P	NS	Y	N	N	
140A Office	T/P	NS	Y	N	N	
141 Office	W/T	NS	Y	N	N	
142 Office	W/T	NS	Y	N	N	
143 Office	T	NS	Y	N	N	
143A Office	T	NS	Y	N	N	
144 Office	W/T	NS	Y	N	N	
146 Office	W/T	NS	Y	N	N	
147 Office	W/T	NS	Y	N	N	RCA, lead bricks
150 Office	W/T	NS	Y	N	N	
151 Office	W/T	NS	Y	N	N	

Room Number	Asbestos	Be	Lead	Rad Cont	Acids Used	Misc
154 SW Entry Vestibule	W/T	NS	Y	N	N	
155 Office	W/T	Y	Y	N	N	
155A TLD Irradiator	N	NS	Y	N	N	Sealed Gamma Source
156 Use of Radioactive Spikes, etc	W/T	NS	Y	N	Y	
157 Environmental Sample Prep Lab	W/T	Y	Y	Y	Y	RCA, RCRA
158 Sample Receiving Station	W/T	Y	Y	N	N	RCA
159 West Utility Room	W	Y	Y	N	N	
160 Office	W/T	NS	Y	N	N	
161 Office	W/T	NS	Y	N	N	
162 Office	W/T	NS	Y	N	N	
162A Office	W/T	NS	Y	N	N	
162B Office	W/T	Y	Y	N	N	
163 Air Sample Counting Room	W/T	Y	Y	N	N	RCA/RMMA
164 Hallway in front of 163	W/T	NS	Y	N	N	
165 Computer Room (SE corner)	W/T	NS	Y	N	N	

4.0 ASSESSMENT

The assessment stage of the Building 123 data life cycle will include an evaluation of data and any conclusions that may be drawn from the data The information collected will be detailed in the characterization report

4 1 DATA EVALUATION

The data will be evaluated for completeness and adherence to the appropriate protocols

5.0 REFERENCES

DOE/EM-0142P - Decommissioning Handbook

Decommissioning Characterization Protocols (June, 1997) (Draft)

MARSSIM - Multi-Agency Radiation Survey and Site Investigation Manual (Draft)

NUREG/CR5849 - Manual for Conducting Radiological Surveys in Support of License Termination (Draft)

6.0 APPENDICES

6 1 RADIOLOGICAL SURVEY INSTRUCTIONS

Typical Radiological Survey Instructions are presented in this appendix Additionally, this appendix applies to radiological constituents only Other Instructions presented in Appendix 6 2

6 1 1 RADIOLOGICAL SURVEY DESIGN

To meet the DQOs surveys must be conducted in a well defined consistent manner There are three important aspects of designing a well defined consistent survey

Instrumentation
Survey Locations/Instruction
Procedures/Protocols

These must be accomplished to maximize efficiency and quality data which may be used to determine building status

6 1.2 RADIOLOGICAL SURVEY INSTRUCTIONS

To define the specific survey requirements for this project, characterization survey radiological instructions will be developed for each building/area These instructions include a description of the item/area, number of alpha/beta swipes, the number of direct measurements and special instruction These instructions were developed to meet DQO criteria The specific instructions for the B123 are presented in below

6 1 3 RADIOLOGICAL PROCEDURES/PROTOCOLS

The appropriate procedures/ protocols to conduct the requirements of the characterization survey instruction are contained in Appendix 6 2

6 1.4 RADIOLOGICAL SURVEY INSTRUCTIONS

Location/Room. Bldg 123, Room 163

	Radiological Survey[2]			
Item/Area Description[1]	**# of Alpha Beta Swipes**	**# of Direct Alpha Beta Measurements**	**Scan Survey[3]**	**Special Instructions**
Item # 1 Floors	10	10	N/A	Obtain measurements on floor surfaces throughout the room
Item # 2 Window A/C Units	A minimum of 1 measurement per component	A minimum of 1 measurement per component	N/A	Obtain measurements on air intakes of each A/C unit
Item # 3 Misc Cabinets, Desks, Bookcases etc	A minimum of 1 measurement per component	A minimum of 1 measurement per component	N/A	Obtain measurements on accessible surfaces of each cabinet/desk/bookcase etc

Notes

[1] See attached map of building layout
[2] Surveys to be performed in accordance with 4-K62-ROI-03 01 "Performance of Surface Contamination Surveys Other radiological references are 1-P73-HSP-18 10 Radioactive Material Transfer and Unrestricted Release of Property and Waste" 4-S23-ROI-03 02 "Radiological Requirements for Unrestricted Release" and 4-N83-REP-1108 "Radioactive Material Management Area (RMMA) Determination
[3] Perform an alpha/beta scan survey of the percentage of the accessible surfaces, including fixed equipment, as listed

Review and Approval

Prepared By _____ Date 5/13/97

Reviewed By _____ Date 5/13/97

6 1.5 RADIOLOGICAL INSTRUMENTATION

Radiological instrumentation (portable and fixed) for making direct field measurements and laboratory analysis respectively will be utilized during characterization activities Instrumentation which is reliable, suited to the physical conditions at the site, and capable of detecting the radiations of concern (at the required detection levels) will be chosen Instrumentation which may be used for this project is presented in Table 6-1 Additional equivalent instrumentation may be used if approved by radiological engineering

TABLE 6-1 RADIOLOGICAL INSTRUMENTATION

Instrument	Count Type	Allowable Background Counts	Acceptable Application	MDA (dpm/100 cm^2)
Bicron w/ A100 Probe	60 sec (alpha)	2	Direct Alpha Surveys	55
Bicron w/ B50 Probe	60 sec (beta)	250	Direct Beta Surveys	610
NE Electra W/ DP6 Probe	60 sec (alpha) 60 sec (beta)	2 700	Direct Alpha Surveys Direct Beta Surveys	60 455
Eberline SAC-4	60 sec (alpha)	1	Removable Alpha Swipes	18
Eberline BC-4	60 sec (beta)	200	Removable Beta Swipes	205
LB-5100LW	60 sec (alpha) 60 sec (beta)	0 5 4	Simultaneous Removable Alpha and Beta Swipes	20 35

6 2 DECOMMISSIONING CHARACTERIZATION PROTOCOLS

BERYLLIUM CHARACTERIZATION PROTOCOL

1 0 PURPOSE

The survey practices outlined are specifically designed to provide occupational hazard assessment information in support of decommissioning activities within a facility However, in some cases the results, particularly those from locations not affected by beryllium operations, may be used as final status results or to support a final survey

2 0 SCOPE

This protocol describes how to perform a room by room beryllium survey The criteria outlined are specifically designed to provide occupational hazard assessment information in support of decommissioning activities while performing Be activities However, in some cases the results, particularly those from locations not affected by beryllium operations, may be used as final status results or to support a final survey

No activity that may cause Beryllium to become airborne will be authorized, without the proper personal protective equipment and controls, until smear sampling demonstrates that the area is below the plant housekeeping limit

Instruction Development

This protocol serves as a guide in the preparation of specific instructions for sampling Additionally, the instructions should contain

- Specific instructions, including sample location maps
- Beryllium Surface Sample procedure
- Beryllium Smear Sample log
- Chain of Custody
- Job Briefing sheet for sampling personnel

Implementation of Protocol

Review the locations of Beryllium Areas (Historical/Presents) Review list for information history of the building to determine locations of previous and/or current beryllium use, analysis, etc This may include review of building documentation, personnel processing information, historical Be sampling results

Perform a building walk-through and Note

- Equipment present, its size, location, and relation to beryllium use
- Labs and hoods present
- Local exhaust ventilation equipment
- HVAC system components, location

Also note other issues that may impact sample collection for Be such as radiation areas or difficult to reach areas and any additional engineering controls, equipment or PPE that may be necessary

BERYLLIUM CHARACTERIZATION PROTOCOL (continued)

Areas of high probability and targeted smear locations are

- Floor sumps
- Equipment foot prints
- Return air vent grills
- Horizontal pipe and duct runs
- Local exhaust duct work
- General area exhaust ventilation
- Light fixtures
- Machine working surfaces
- Machine interior surfaces
- Wall ledges and shelves
- 2-3 feet inside exhaust ducts
- Hard to get to areas not normally part of the housekeeping program

Other equipment or furniture may also need to be smeared On porous surfaces, vacuuming may need to be used to collect samples, desk drawers, bookcases, shelves and other internal surfaces may need to smeared Pay particular attention to horizontal surfaces

Areas with the highest potential for beryllium dust accumulation will be sampled IH&S personnel will determine the minimum samples to be obtained as a baseline for each affected area Additional samples will be considered based on the experience and judgment of the industrial hygienist and RCT conducting this work

An instruction sheet will be developed for each room, and inserted into the work package before the equipment is sampled

Each sample location will be identified on a room diagram All sample results will be provided to industrial hygiene for review and will be included in the project files

Analysis Requirements

The beryllium smears will be obtained by a trained/qualified individual All smears will be identified and tracked using a chain of custody form

The smears will be analyzed at a facility capable of a standardized analysis to a detection limit of $\leq$ 1 microgram per square foot The laboratory will have a valid quality control (QC) program and will report the means of data validation methodology for each requested analysis set

BERYLLIUM CHARACTERIZATION PROTOCOL (continued)

Standard sample collection techniques will be used

- Use of building and room maps, mark location on maps
- Photos of sampling locations
- Use of equipment reference numbers such as hoods, tanks, pipes, gloveboxes, etc

BERYLLIUM SURFACE SAMPLING BRIEFING

The following are general guidelines for collection of beryllium surface samples

- The supplies necessary to perform the sampling include

  - Whatman 4 Smear Tabs or equivalent
  - Glassine Bags
  - Beryllium Smear Sample Log
  - Chain of Custody Form
  - Tamper Proof Seals
  - Labels (optional)
  - Sharpie (optional)

- Dry wipe an area of 1 ft ^{2} using Whatman 4 Smear Tabs The determination of the area that is to be surveyed shall be made by the IH&S representative on the job

- Fold smear tab in half, with the potentially contaminated side in, place in a glassine bag, and place smear number on the bag **CAUTION** do not place more than one sample in a glassine bag

- Collect the sample in a manner that your hands will not come in contact with surface being sampled If contact is made, the sampler shall wash hands or change gloves before collecting the next sample

- The sample number and a detailed description of the sample collected is to be entered on the Beryllium Smear Sample Log

- The sample number consists of the Building number - Year, Month, Day - Industrial Hygienist number - Sequence number, e g , 779-961120-00-01 The Industrial Hygienist number that will be used for RCTs is 00

- Once samples have been collected, they shall be counted on the SAC-4 and the BC-4 to assess radiological contamination on the samples This will assist IH&S in determining which analytical method and which analytical facility will be utilized, and if additional packaging will be required to transport samples

- At minimum, the packaging required to transport the samples is to place the glassine bags inside of a zip lock bag, and place a tamper proof seal over the zip lock bag opening

- Complete the Chain of Custody Form If samples are to be transported to the laboratory by someone other than the sampler, then the sampler must relinquish the samples by signing the chain of custody form and the person receiving the samples must sign for the samples Samples must be under chain of custody at all times

BERYLLIUM SURFACE SAMPLING BRIEFING (continued)

- Transport samples to the laboratory identified by the IH&S representative for the job Formally relinquish custody for the samples to the laboratory
- Give the IH&S representative the Beryllium Smear Sample Log, associated maps and other documentation relevant to the samples collected

NOTE The Beryllium housecleaning surface contamination standard is 25 ug/ft^2 (2 7 ug/cm^2)

METALS AND LEAD CHARACTERIZATION PROTOCOL

1.0 PURPOSE

The approach utilized conforms with OSHA requirements 1926, Subpart D and Z Additionally, the approach ensures conformance with the site specific HSPs which address the handling and sampling of carcinogenic waste

2.0 SCOPE

This protocol establishes the framework for the characterization of lead and specific metals such as chromium and zinc oxide in facilities to be decommissioned

Instruction Development

This protocol serves as a guide in the preparation of specific instructions for sampling Additionally, the instructions should contain

- Specific instructions, including sample location maps
- Beryllium Surface Sample procedure
- Beryllium Smear Sample log
- Chain of Custody
- Job Briefing sheet for sampling personnel

Initial Classification

Areas will be classified as suspect or non-suspect for characterization purposes by utilizing the following criteria

Suspect These are components where lead and/or metals have been identified, through historical research of building records or by visual inspection techniques, to exist in paint, fragments or dust

High Probability Locations For Lead And Metals

- Wall and ceiling paint
- Paint on components (i e, guard rails, tanks, machine guards)
- Gloveboxes and associated shielding equipment
- Piping
- Roof jacks
- Mounting plates and bracket bars
- Stationary shields
- Lead fill in walls
- Plaster additives

METALS AND LEAD CHARACTERIZATION PROTOCOL (continued)

Non-Suspect These are areas where there is a high level of certainty that lead and/or metals do not exist due to their absence in paint, chips, dust, fragments or other material forms

Survey Procedure

Sampling for lead and metals will be primarily performed utilizing a dust sampling technique and a paint scraping techniques The paint scraping technique is the preferred method for sampling when possible as the exact location of the lead or metal can be identified precisely With dust sampling, the sample may yield indications from many locations Each sample will be acquired with the intent of assuring the quality, representation and safety of the process Please note that when required, a RCT will be present to survey the area and location of the sample prior to proceeding

Settled Dust Sampling

Settled dust sampling is used as an aid to assessment of Industrial Hygiene issues such as work practices and engineering controls and PPE The general guidelines to perform settled dust sampling are

Supplies Required

- One Micro-Vac Sampler pump calibrated at 2 lpm
- One template that sequesters a 10 sq inch pattern
- One 25 m m cassette attached to the Micro Vac Sampler
- A two inch section of tygon tubing
- Labels, sharpie and sampling logs
- Chain of custody form
- Camera (Optional)
- Figures 1, 2 & 3 of this protocol)

Sampling Technique

- Place template on area to be sampled
- Slowly vacuum all surface areas inside of template with tygon hose which is attached to the Micro-Pump (Change tubing and cassette for each sample)
- Label the cassette with identifying number and seal
- Document sample location and description on Chain of Custody form
- Photograph sample identification area with photo identification card (Optional)
- Complete Figures 1, 2 & 3 of this protocol

METALS AND LEAD CHARACTERIZATION PROTOCOL (continued)

Paint Chip Sampling

Paint chip sampling is used as an aid to assessment of Industrial Hygiene issues such as work practices and engineering controls and P P E The general guidelines to perform paint chip sampling are

Special Note. Ensure that the location of paint sampling is cleaned before samples are obtained to minimize the prospect of cross-contamination Paint chip sampling is a destructive method that may release a small quantity of lead dust Therefore, proper safety precautions must be taken to ensure protection of the sampler and prevent the spread of suspect materials It is also important to ensure that before any paint sampling occurs, the proper method of containment must be utilized

Containment Methods When Procuring Paint Samples

Method One Paint Chip Sampling Utilizing Plastic Sheeting

Procure and place a clean sheet of plastic, large enough to capture all the sample material e area to be sampled to capture the paint chips Any visible paint chips falling onto the plastic shall be included in the sample Thoroughly clean or dispose of the plastic after each sample is collected by placing the sheeting in a trash bag

Method Two Paint Chip Sampling Utilizing Glovebag Approach

If further containment is deemed necessary, a "glovebag" approach may be used A durable sheet of plastic is loosely taped to the surface to be sampled, with a paint scraper, collection device, and shipment container housed inside the plastic There should be enough "play" in the plastic to permit a scraping motion without dislodging the tape holding the plastic to the surface Large plastic baggies can be used in lieu of the sheet of plastic if paint chips are to be shipped to the lab in plastic baggies Properly conducted, this method completely seals the surface during the actual scraping operation A sheet of plastic is recommended for use under the glove bag to capture any debris that falls to the ground during the glove bag removal The tape should be slowly removed from the surface to avoid lifting any additional paint off of the surface

Supplies Required for Paint Chip Sampling

- Sharp stainless steel paint scraper
- Disposable wipes for cleaning paint scraper
- Non-sterilized, non-powdered, disposable gloves
- Hard-shelled containers, that can be rinsed, for paint chip samples if results are to be reported in ug/g or percent by weight
- Collection device (clean creased piece of paper or cleanable tray)
- Field sampling and laboratory submittal forms
- Tape measure or template (if results are reported in mg/cm^2)
- Ladder
- Adhesive tape
- Plastic trash bags
- Flashlight

METALS AND LEAD CHARACTERIZATION PROTOCOL (continued)

Paint Sample Collection

- Template / measure area to be sampled precisely (Area must be 4 square inches in size and must have a minimum weight of 0 2 grams, sample size maybe adjusted with IH&S approval)

Special Note. Person collecting paint chips samples shall wear latex gloves for each sample

Special Note: If analysis results are reported in mg/cm^2 or mg/kg, including a small amount of substrate in the sample is permitted

Utilizing a razor sharp chisel or scraper and hammer , scrape paint sample directly off the substrate surface and/or sampling surface (Ensure to remove all layers of the paint equally but none of the substrate)

- Place the sample in a approved container for shipment
- Record the exact location, dimension, description of paint color and substrate component on the field sampling form and the chain of custody form

Composite Paint Chip Sample Collection

When it is not possible to collect the required size sample at one location, a composite sample may be collected

Paint chip samples may be composited by collecting individual subsamples from different areas but similar surfaces Each subsample should be the same size and weight No more than 5 subsamples shall be included in the same sample container or ziplock baggie

Cleanup and Repair

- All settled dust generated should be cleaned up using wet wipes
- The surface may be resealed with new paint if necessary If desired, apply spackling and/or new paint to repair the area where paint was removed
- Personnel conducting paint sampling shall avoid hand-to-mouth contact (specifically, smoking, eating, drinking, and applying cosmetics) and shall wash their hands with running water immediately after sampling

Preparing Sample for Transfer to Lab

The samples shall be submitted to a laboratory recognized by the EPA National Lead Laboratory Accreditation Program Appropriate sample submittal forms shall be used The field sample number shall appear on the field sampling form, the laboratory submittal form, and the container label The name of the laboratory, the date the samples were sent to the lab, and all personnel handling the sample from the time of collection to the time of arrival at the laboratory shall be recorded on a chain of custody form

FIGURE 1
BULK SAMPLE DATA SHEET

Job# _____ Name_____ Date_____

General Description of building/area

_____

_____

Sample Number	Sample Description And Location	Lab

FIGURE 2
SAMPLE PHOTO DATA CARD

BUILDING _____ROOM _____ DATE_____

SAMPLE NUMBER

_____

FIGURE 3
LABELS

779-970108-MS-001	779-970108-MS-0023	779-970108-MS-0045
779-970108-MS-002	779-970108-MS-0024	779-970108-MS-0046
779-970108-MS-003	779-970108-MS-0025	779-970108-MS-0047
779-970108-MS-004	779-970108-MS-0026	779-970108-MS-0048
779-970108-MS-005	779-970108-MS-0027	779-970108-MS-0049
779-970108-MS-006	779-970108-MS-0028	779-970108-MS-0050
779-970108-MS-007	779-970108-MS-0029	779-970108-MS-0051
779-970108-MS-008	779-970108-MS-0030	779-970108-MS-0052
779-970108-MS-009	779-970108-MS-0031	779-970108-MS-0053
779-970108-MS-0010	779-970108-MS-0032	779-970108-MS-0054
779-970108-MS-0011	779-970108-MS-0033	779-970108-MS-0055
779-970108-MS-0012	779-970108-MS-0034	779-970108-MS-0056
779-970108-MS-0013	779-970108-MS-0035	779-970108-MS-0057
779-970108-MS-0014	779-970108-MS-0036	779-970108-MS-0058
779-970108-MS-0015	779-970108-MS-0037	779-970108-MS-0059
779-970108-MS-0016	779-970108-MS-0038	779-970108-MS-0060
779-970108-MS-0017	779-970108-MS-0039	779-970108-MS-0061
779-970108-MS-0018	779-970108-MS-0040	779-970108-MS-0062
779-970108-MS-0019	779-970108-MS-0041	779-970108-MS-0062
779-970108-MS-0020	779-970108-MS-0042	779-970108-MS-0063
779-970108-MS-0021	779-970108-MS-0043	779-970108-MS-0064
779-970108-MS-0022	779-970108-MS-0044	779-970108-MS-0065

ASBESTOS CHARACTERIZATION PROTOCOL

10 PURPOSE

The purpose of this protocol is to provide guidelines for the sampling analysis of asbestos Although asbestos sampling instructions will be completed by a Colorado State Certified Inspector, the protocol can be used to help understand the sampling requirements

This approach is consistent with the most conservative information available, and ensures compliance with applicable federal and state regulations

20 SCOPE

This protocol describes how to perform asbestos surveys The criteria outlined are specifically designed to provide occupational hazard assessment information in support of decommissioning activities while performing asbestos activities However, in some cases the results, particularly those from locations not affected by asbestos operations, may be used as final status results or to support a final survey

No activity that may cause asbestos to become airborne will be authorized, without the proper personal protective equipment and controls, until smear sampling demonstrates that the area is below the plant housekeeping limit

Instruction Development

This protocol serves as a guide in the preparation of specific instructions for sampling Additionally, the instructions should contain

- Specific instructions, including sample location maps
- Asbestos Inventory Worksheet (Figure 1)
- Asbestos Inspection Checklist (Figure 2)
- Bulk Sample Data Sheet (Figure 3)
- Photo Data Card (Figure 4)
- Labels (Figure 5)

The survey practices outlined in this protocol are specifically designed to provide occupational hazard assessment information in support of decommissioning activities within buildings However, the information may be used to provide support for a comprehensive operation and maintenance program during normal building activities

Initial Classification and Survey Procedures

The first step in sampling for asbestos in a building is to research the building records such as blueprints and specifications for documentation of the use of asbestos Dates of construction are considered in this process In addition to building materials, certain process equipment may have used asbestos as an insulator or protective covering, and this use must be verified through research

ASBESTOS CHARACTERIZATION PROTOCOL (continued)

The second step in this process is to physically tour the building, entering every accessible area and room, looking for affected materials that may indicate, through historical data, or based on the inspector's experience, the presence of asbestos A listing of suspect materials and areas is generated, along with estimated quantities Non-suspect (or unaffected) materials are those traditionally made of wood, glass or metal However, the inspector will suspect the adhesives applied to secure non-suspect materials to the substrate Suspect, or affected materials are separated into three general categories Thermal Systems Insulation, Surfacing Materials, and Miscellaneous Materials Data compilation will separate the materials into homogeneous areas within these three general categories, which will lead to the number of samples necessary for regulatory compliance and statistical reliability of the outcome Any homogeneous area may be assumed to contain asbestos, negating the need for samples Each building and/or construction date is sampled as a single entity

The number of samples for each homogeneous area is determined initially by it's physical condition of friability, then by it's general category Friable materials are those that are capable of being crumbled or reduced to powder by hand pressure Thermal systems insulation, such as that found on pipes or ducts, friable or non-friable, require a minimum of three samples per homogeneous area, one sample from patches less than six linear or square feet, and one from cementitious or "mudded" fittings Each mechanical system, such as hot and cold domestic water, may have several homogeneous areas Each must be sampled accordingly Friable surfacing materials, such as fireproofing or ceiling texture, must have a nine section grid applied to a blueprint of the area and samples must be acquired from the center of randomly selected areas within the grids If the homogeneous area of friable surfacing material is less than 1000 ft^2, three samples are needed, if between 1000 and 5000 ft^2, five samples are needed, if the area is over 5000 ft^2, seven samples are needed Miscellaneous materials, such as floor and ceiling tiles, are sampled according to the inspector's discretion A minimum of one sample of each suspected material in this category will be acquired

Sample locations are selected randomly according to how each represents a homogeneous material Since homogeneous areas are located throughout the building, the representation and number of samples are the driving factors rather than exact location of the sample in each room Exact locations are directly affected by the radiological concerns A Radiological Control Technician will accompany the inspector If a selected location is determined to exceed acceptable parameters, a second location is selected Should no radiologically acceptable location be found, a contaminated sample is acquired and treated accordingly

Sampling Methodology

Each sample is acquired with the intent of assuring the quality of the sample, representation of the sample, and safety of the sampler Note that a RCT will be present as necessary to survey the area and location of the sample prior to obtaining the sample The following steps will be performed for each sample acquired

- The location of the sample is visually verified against written descriptions
- A polyethylene drop cloth or a baggie is secured below the sample areas above the floors
- The immediate sample area is wetted with a mist of water and surfactant

ASBESTOS CHARACTERIZATION PROTOCOL (continued)

- A sampling tool, such as a hammer and chisel, razor knife, "Wondermaker" or hole saw is selected and the sample is acquired, making sure to take a complete sample from the substrate Each sample must be a minimum of one cubic centimeter and no more than that necessary to be representative of the suspect material During this process, the immediate surface is misted as needed to preclude drying
- The acquired sample is placed in a sealable container, such as a plastic bag or vial
- The container is sealed and a pre-numbered label is placed on the container The sample number label is placed on chain of custody papers and the container is verified to be sealed
- The sampling tool is thoroughly cleaned using the mister and wipes
- The sample area is patched as needed
- The description and location is documented on a form, a sample label is placed on the form, and the location is documented on a blueprint or other suitable drawing
- The sample container, drop cloth and immediate sample area is wet, wiped, and the drop cloth is carefully folded in to the center and placed in a sealable bag and the bag is sealed
- In the case of routine maintenance areas, a pre-numbered label is placed at the sample location With permission of the Building Manager, labels will be placed on all sample locations
- The sample location is photographed with a sample photo identification card in the focus area documenting the sample number and date, and orienting the viewer to the location with an arrow
- All spent wipes, drop cloths, and PPE will be added to the appropriate waste stream

FIGURE 1
ACM INVENTORY WORKSHEET

Building Number _____ Room Number _____ Date_____

TSI INVENTORY

Pipe Type _____ Linear/sq ft _____ Fitting count _____
_____Type _____ Linear/sq ft _____ Fitting count _____
_____Type _____ Linear/sq ft _____ Fitting count _____
_____Type _____ Linear/sq ft _____ Fitting count _____
_____Type _____ Linear/sq ft _____ Fitting count _____

Duct Type _____ Duct Size/app _____ Sq ft _____
Duct Type _____ Duct Size/app _____ Sq ft _____

Other _____

_____

SURFACE INVENTORY

Location _____ Description _____ Sq ft _____
Location _____ Description _____ Sq ft _____
Location _____ Description _____ Sq ft _____
Location _____ Description _____ Sq ft _____

MISCELLANEOUS INVENTORY

Location _____ Description _____ Sq /lin ft _____
Location _____ Description _____ Sq /lin ft _____
Location _____ Description _____ Sq /lin ft _____
Location _____ Description _____ Sq /lin ft _____
Location _____ Description _____ Sq./lin ft _____
Location _____ Description _____ Sq /lin ft _____

FIGURE 2
RFETS ASBESTOS CONTAINING MATERIAL
INSPECTION CHECK LIST

1 Inspector _____ Signature _____ Accreditation# _____ State _____
Date _____

2 BUILDING NO _____
BLDG AREA CODE _____

1 1st Floor
2 2nd Floor
3 3rd Floor
4 4th Floor
5 Basement
6 Crawl Space
7 Roof
8 Exterior of BLDG
9 Plenum
10 Other

3 ROOM NUMBER _____
COLUMN NUMBERS _____

4 SPECIFIC LOCATION _____

5 % FUNCTIONAL SPACE _____

6 FUNCTIONAL SPACE I D _____
HOMOGENEOUS AREA I D _____

7 MATERIAL TYPE CATEGORY

T Thermal System Insulation
S Surfacing Material
M Miscellaneous Material

8 1 TSI ACM
PIPE LENGTH (FT) _____

8 2 TSI ACM
PIPE LENGTH (IN) _____

8 3 TSI ACM
PIPE WITH INSULATION DIAMETER (IN) _____

8 4 SURFACING MISC ACM

8 5 TOTAL SURFACE MATERIAL (SQ FT) _____

8 6 SURFACING/MISC ACM
DEPTH OF SURFACE MATERIAL (IN) _____

9 1 FUNCTION CODE

1 Acoustic Insulation
2 Baseboard
3 Boiler/Furnace Insulation
9 Cold Water Pipe Fitting
10 Condensate Pipe
11 Condensate Pipe Fitting

FIGURE 2 (continued)

9 1 FUNCTION CODE (continued)

4 Caulking Mat'l
5 Ceiling Tile
6 Chilled Water Pipe
7 Chilled Water Pipe Fitting
8 Cold Water Piping
12 Cooling Tower Baffles
13 Debris/Settled Dust
14 Domestic Cold Water Pipe
15 Domestic Cold Water Fitting
16 Door
17 Drain Pipe
18 Drain Insulation
19 Exterior Construction
20 Floor Tile
21 Fire Stop
22 FireProofing Insulation
23 High Temp, Water Pipe
24 High Temp Water Pipe Fitting
25 Mastic Adhesive
26 Roofing
27 Steam Pipe
28 Steam Pipe Fitting
29 Tank Insulation
30 Transite Board
31 Vibration Damper
32 Wall Board
33 Wall Insulation
34 Wall Plaster/Spackle

9 2 ASBESTOS FORM CODE

1 Air Cell
2 Blanket
3 Block
4 Cloth
5 Loose Fill
6 Pre-formed
7 Sheet
8 Sprayed On
9 Troweled On
10 Other _____

9 3 COLOR CODE

1 B Blue
2 BL Black
3 BR Brown
4 G Green
5 GR Gray
6 O Orange
7 W White
8 Y Yellow
9 Other _____

10 CONSISTENCY

Brittle - hard
Semi - Solid
Fibrous - loose
Granular - Pliable

11 CURRENTLY FRIABLE

Yes
No

12 CAUSE OF DAMAGE

1 Area Usage
2 Vibration
3 Air Flow
4 Water Damage
5 Service Activity
6 Usual Aging
7 Other _____

13 CONTAMINANT PRESENT

0 None
1 Spotty
2 Widely Scattered
3 Entire Area

14 DISPERSAL FACTOR

1 Water
2 Air
3 Occupant
4 Machinery

15 AREA USED BY

Maintenance Workers
Operations Workers
Administrative Personnel
Visiting Public

FIGURE 3
BULK SAMPLE DATA SHEET

Job# ______________ Name ______________________________ Date ____________

General Description of building/area

____

____

SAMPLE NUMBER	SAMPLE DESCRIPTION AND LOCATION	LAB

FIGURE 4
SAMPLE PHOTO DATA CARD

BUILDING _____ **ROOM** _____ **DATE**_____

SAMPLE NUMBER _____

FIGURE 5
LABELS

779-970108-MS-001	779-970108-MS-0023	779-970108-MS-0045
779-970108-MS-002	779-970108-MS-0024	779-970108-MS-0046
779-970108-MS-003	779-970108-MS-0025	779-970108-MS-0047
779-970108-MS-004	779-970108-MS-0026	779-970108-MS-0048
779-970108-MS-005	779-970108-MS-0027	779-970108-MS-0049
779-970108-MS-006	779-970108-MS-0028	779-970108-MS-0050
779-970108-MS-007	779-970108-MS-0029	779-970108-MS-0051
779-970108-MS-008	779-970108-MS-0030	779-970108-MS-0052
779-970108-MS-009	779-970108-MS-0031	779-970108-MS-0053
779-970108-MS-0010	779-970108-MS-0032	779-970108-MS-0054
779-970108-MS-0011	779-970108-MS-0033	779-970108-MS-0055
779-970108-MS-0012	779-970108-MS-0034	779-970108-MS-0056
779-970108-MS-0013	779-970108-MS-0035	779-970108-MS-0057
779-970108-MS-0014	779-970108-MS-0036	779-970108-MS-0058
779-970108-MS-0015	779-970108-MS-0037	779-970108-MS-0059
779-970108-MS-0016	779-970108-MS-0038	779-970108-MS-0060
779-970108-MS-0017	779-970108-MS-0039	779-970108-MS-0061
779-970108-MS-0018	779-970108-MS-0040	779-970108-MS-0062
779-970108-MS-0019	779-970108-MS-0041	779-970108-MS-0062
779-970108-MS-0020	779-970108-MS-0042	779-970108-MS-0063
779-970108-MS-0021	779-970108-MS-0043	779-970108-MS-0064
779-970108-MS-0022	779-970108-MS-0044	779-970108-MS-0065

CHEMICAL AND LIQUIDS CHARACTERIZATION PROTOCOL

10 PURPOSE

The purpose of this protocol is to provide a consistent approach to the sampling and analysis of liquid materials

The survey practices outlined are designed to provide information to be used in support of decommissioning activities within a facility However, in some cases the results, particularly those from locations not affected by chemical and liquid continuous operations (i e , closed loop) may be used as final status results or to support a final survey

20 SCOPE

This protocol describes how to perform chemical & liquid surveys The criteria outlined are specifically designed to provide occupational hazard assessment information in support of decommissioning activities If the systems sampled are closed loop and no chance exist that foreign or new materials may enter the systems, then results will be used to support final survey results and reporting

The purpose of this document is to describe the protocol for sampling of chemicals and liquids within the facility to be decommissioned or characterized

Instruction Development

This protocol serves as a guide in the preparation of specific instructions for sampling Additionally, the instructions should contain

- to quantify the physical and chemical characteristics of radiological and hazardous constituent contamination and determine the extent of contaminant distribution
- to quantify and qualify environmental parameters that affect potential human exposure from existing and residual radiological or hazardous material contamination
- to support evaluation of detailed planning for decontamination, equipment removal and waste disposal
- to support required project plan considerations such as dose assessments and ALARA analyses
- to support selection of cleanup criteria and approach

Facility drawings, photographs and facility walk-downs provide detailed information to assist the project engineer in making determinations as to where sampling should be conducted

Initial Classification

In an effort to provide an organized approach to the characterization activities, rooms are identified as being in one of two classifications, affected and unaffected These classifications aid in focusing the sampling effort at the areas with a higher potential of contaminants

CHEMICAL AND LIQUIDS CHARACTERIZATION PROTOCOL (continued)

Affected areas For the purpose of liquids sampling, are defined as those rooms that have had a history of containing liquids and chemicals to include the presence of equipment containing reservoirs (i e , machining lathes, etc), process lines, piping, tanks, containers, sinks, sumps and any other vessel likely to contain liquids or chemicals Facility drawings, photographs and facility walk-downs provide detailed information to assist the project engineer in making determinations as to where sampling should be conducted

Unaffected areas Are defined as areas or rooms where there is no history or process knowledge of liquids or chemicals being present, or which have been verified through visual inspection as being empty, and containing no chemical residues or liquids Examples of such rooms would include hallways, closets and office areas which have no visible reservoirs or piping systems associated with them, and have no container storage facilities In some cases, rooms may be classified as unaffected based on visual inspections which confirm all liquid sources to be empty or absent

Data Collection

Upon initial classification as an unaffected or affected area, a facility walk-down of the area or room is conducted in an effort to visually identify those items that require sampling A sampling request is then completed and forwarded to the Analytical Projects Office (APO) for each room and equipment item to be sampled and the APO coordinates with the project engineer to arrange for the sampling event

Data collected during the characterization activities will consist of two types

(1) Field measurements using portable instruments or test kits (i e , pH paper) and

(2) Sample analyses of media using fixed laboratory equipment or systems

Radiological surveys will be performed by trained Radiological Control Technicians (RCTs) using field instrumentation in accordance with Radiological Operations Instructions during sampling activities, as necessary Radiation protection associated with the sampling event and the sampling team will be addressed under a Radiological Work Permit (RWP) Additional personal protective equipment for the sampling activity, if required, will be as specified by Industrial Hygiene support personnel

A trained sampling team is used to perform the sampling activities required for characterization purposes Analysis for characterization purposes will be performed using Environmental Protection Agency (EPA) approved procedures, "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods, U S EPA SW-846, 1986, Third Edition" using laboratory facilities located on-site

During characterization activities, several direct, indirect and media samples will be, obtained and analyzed for radiological and hazardous material contaminants The results will be used to qualify and quantify contaminants and is the basis for estimating waste quantities and decontamination options Sample collection, analysis, and the associated documentation will follow site procedures which meet the recommendations and requirements of applicable regulatory agencies A "chain of custody" sample tracking form is used for each sample collected to account for the sample from collection to the point of analysis Samples will be collected and documented in accordance with Laboratory Procedure No L-6294-A "Sampling Within an RBA/CA", for P A work and L-6245-F, Sampling Procedure for Waste Characterization on the "cold side", non P A work

RADIOLOGICAL CHARACTERIZATION PROTOCOL

10 PURPOSE

The purpose of this protocol is to provide guidelines for the radiological sampling of buildings, structures and environs for characterization purposes

This approach is consistent with the most conservative information available, and ensures compliance with applicable federal, state and site regulations and requirements

20 SCOPE

This protocol describes how to perform radiological characterization surveys The criteria outlined are specifically designed to provide radiological occupational hazard assessment information in support of decommissioning activities while performing radiological work activities

No activity that may cause radioactive materials to become airborne will be authorized, without the proper personal protective equipment and controls, until smear, fixed and scan sampling demonstrates that the area is below the permissible limits for working in radiologically controlled areas

Instruction Development

This protocol serves as a guide in the preparation of specific instructions for sampling Additionally, the instructions should contain

Before starting the actual characterization activities a historical profile must be developed to support the instruction development process This process will include

1 A review of operating history of the facility or building with respect to use, spills, releases and any other significant radiological events

2 Review of radiological data from past scoping and characterization surveys

3 Identification of radionuclides of concern and determine guidelines

4 Classification of areas as to "affected" and "unaffected"

Initial Classification

All areas of facilities or buildings do not have the same potential for residual contamination and therefore do not require the same level of characterization survey coverage to determine the initial classification By combining historical data with surveillance and routine surveys, an effective and efficient characterization process will be conducted

Two classifications of survey areas will be used when determining survey requirements These are affected and unaffected areas These are defined as follows

RADIOLOGICAL CHARACTERIZATION PROTOCOL (continued)

- *Affected areas* These are areas that have potential radioactive contamination (based on historical reviews) or known radioactive contamination (based on past or preliminary radiological surveillance) This would normally include areas where radioactive materials were used and stored, where records indicate spills or other unusual occurrences that could have resulted in spread of contamination and where radioactive materials were buried Areas immediately surrounding or adjacent to locations where radioactive materials were used or stored, spilled, or buried are included in this classification because of the potential for inadvertent spread of contamination

- *Unaffected areas* All areas not classified as affected will be labeled unaffected These areas are not expected to contain residual radioactivity, based on a knowledge of site history and previous survey information

Survey Approach

When performing characterization surveys in affected and unaffected areas the surveys will be directed toward biased locations identified during the historical review phase Additionally random points will also be selected in non biased areas to validate previous survey data

Normally when performing characterization activities the surveys will consist of surveying structures (which consist of equipment, ceilings, walls, floors, etc), environs (surface and subsurface) and liquid pathways, if applicable Sampling guidance from NUREG/CR-5849 "Manual for Conducting Radiation Surveys In Support of License Termination" and "MARSSIM" will be utilized as appropriate

Survey Techniques And Plans

When performing radiological surveys three main techniques will be utilized to acquire the survey data The characterization will be conducted in accordance with documented plans, instructions and procedures The survey plan or instruction will define the general approach to performing measurements and sampling Figure 1 provides an example of a survey instruction (To determine the number of survey locations on the hood the Radiological Eng evaluates)

- Size of equipment or structure
- Radiological history
- Initial classification status

The quality assurance plan establishes the basis for assuring the adequacy and quality of the survey data Specific survey techniques are detailed in procedures, which may be included in the instruction or plan or incorporated by reference Personnel (RCTs) conducting the surveys will be trained and qualified in the ROIs (Radiological Operating Instructions) procedures they use, (Radiological Operating Instructions) to perform the radiological surveys In addition to procedure training, the RCTs will be qualified per the site requirements (DOE and Site Radcon manuals, TUM manual and oral board examinations to ensure they are fully qualified RCTs Changes in plans and procedures will on occasion be necessary, based on unanticipated findings or conditions encountered as the survey progresses These changes will be reviewed and/or documented by the supervision in charge of the survey(s) and these changes will be made in accordance with the site procedure approval & revision process

RADIOLOGICAL CHARACTERIZATION PROTOCOL (continued)

Surveys will address alpha, beta, gamma and neutron emitting materials as appropriate Various types of instrumentation will be utilized However, the instrumentation normally falls into three (3) categories These categories are (1) Gas filled detectors, (2) Scintillation detectors, and (3) Solid state detectors

The design and the conditions under which a specific detector is operated determines the types of radiations (alpha, beta and/or gamma) that can measured, the sensitivity level for measurements and the ability of the detector both to differentiate between different types of radiation and distinguish between the energies of the interacting radiations The particular capabilities of a radiation detector will, in turn, establish its potential applications in conducting a survey for final site release A listing of alpha, beta, and gamma radiation detector types along with their usual applications are listed in Tables 1 and 2

Survey techniques to be utilized include (3) major techniques These techniques include

- *Scan surveys* Scan surveys are conducted by holding the detector as close as possible to a surface and moving the detector across the surface at a slow speed, (about one detector width per second) Nominally the distance between the detector and the surface is maintained at less than 2 centimeters with the exception of alpha scanning for which the distance should be less than 1 centimeter

- *Fixed point surveys or Direct measurements* Fixed point surveys are conducted by holding a detector as close as possible to a surface for a prespecified period of time Normally this is a integrated count for one minute using a (100 cm^2) detector which has the required sensitivities to measure below the guideline values

- *Removable contamination measurements* Smears for removable surface activity are obtained by wiping an area of approximately 100 cm^2 using a dry filter paper, such as a Whatman 50 or equivalent, while applying a moderate pressure Normally a smear is taken at each direct measurement location, although for characterization purposes it is not always required Large area wipes or "masslin swipes" can be utilized during scoping and characterization surveys

Sampling for soil, water or other liquids are outside the scope of this protocol

Laboratory Sample Analysis

Samples collected during characterization will be analyzed by trained individuals using the appropriate equipment and procedures Samples may be analyzed on or off site However, there must be written procedures that document the laboratory's analytical capabilities for the radionuclides of interest and a QA/QC program which assures validity of the analytical results An example of equipment sensitivities for laboratory radiometric equipment/procedures to analyze characterization surveys are found in Table 3

Survey Documentation

As surveys are completed they will be documented and forwarded to the Radiological Foreman and Engineer for review and approval Surveys generated will be controlled by the site record storage and retrieval program and they will be considered quality records

TABLE 1
RADIATION DETECTORS WITH APPLICATIONS TO ALPHA SURVEYS

Detector Type	Detector Description	Application	Remarks
gas proportional	< 1mg/cm^2 window, probe face area 50 to 100cm^2	surface scanning, surface activity measurement, field evaluation of smears	
	< 0 1 mg/cm^2 window, probe face area 10 to 20 cm^2	laboratory measurement of water, air and smear samples	
	no window (internal proportional), Probe face area 10 to 20 cm^2	laboratory measurement of water, air and smear samples	
scintillation	ZnS(Ag) scintillator, probe face area 50 to 100 cm^2	surface scanning, surface activity measurement, field evaluation of smears	
	ZnS(Ag) scintillator, probe face area 10 to 20 cm^2	laboratory measurement of water, air and smear samples	
	Lucas scintillation flask	laboratory measurement for low levels of radium	
solid state	silicon surface barrier detector	laboratory analysis by alpha spectroscopy	

TABLE 2
RADIATION DETECTORS WITH APPLICATIONS TO BETA/GAMMA SURVEYS

Detector Type	Detector Description	Application	Remarks
gas proportional	< 1mg/cm^2 window, probe face area 50 to 1000 cm^2	surface scanning, surface activity measurement, field evaluation of smears	
	< 0 1 mg/cm^2 window, probe face area 10 to 20 cm^2	laboratory measurement of water, air and smear samples	better measurement sensitivity for low energy beta particles than detectors with windows
	no window (internal proportional), Probe face area 10 to 20 cm^2	laboratory measurement of water, air and smear samples	
Geiger-Mueller	1 4 mg/cm^2 window, probe area 10 to 100cm^2	surface scanning, surface activity measurement, laboratory measurement of samples	
	various window thickness, few cm^2 probe face	special scanning applications laboratory	
scintillation	liquid scintillation cocktail containing sample	laboratory analysis, spectrum analysis capabilities	

TABLE 3
TYPICAL MEASUREMENT SENSITIVITIES FOR LABORATORY RADIOMETRIC PROCEDURES ASSOCIATED WITH CHARACTERIZATION SURVEYS

Sample Type	Radionuclides or Radiation Measured	Procedure	Approximate Measurement Sensitivity
Smears (filter paper)	Gross Alpha	Low-background gas proportional counter, 5-min count	5 dpm
		Alpha scintillation detector with scaler, 5-min count	20 dpm
	Gross Beta	Low background gas proportional counter, 5-min count	10 dpm
		End window GM with scaler, 5-min in count (unshielded detector)	80 dpm
	Low Energy Beta (H-3, C-14, Ni-63)	Liquid scintillation B Counter, 5-min count	30 dpm
Soil Sediment	Cs-137, Co-60, Ra-226, (Bi-214)*, TH-232 (Ac-228)*, U-235	Gamma Spectrometry - Intrinsic germanium detector (25% relative efficiency), pulse height analyzer, 500-g sample, 15-min analysis	1-3 pCi/g
	U-234, 235, 238, Pu-328, 239/240, Th-228, 230, 232, other alpha emitters	Alpha spectrometry - pyrosulfate fusion and solvent extraction, surface barrier detector, pulse height analyzer, 1-g sample, 16-hour count	0 1-0 5 pCi/g
Water	Gross alpha	Low-background gas proportional counter, 100-ml sample, 200-min count	1 pCi/l
	Gross beta	Low background gas proportional counter, 100-ml sample, 200-min count	1 pCi/l
	Miscellaneous gamma emitter	Gamma spectrometry - 3 5-ml sample 16-hour count	10 pCi/l
	Miscellaneous alpha emitter	Alpha spectrometry - 100-ml sample, 16-hour count	0 1-0 5 pCi/l
	H-3	Liquid scintillation spectrometry, 5-ml sample, 30 min count	300 pCi/l

DECOMMISSIONING POLYCHLORINATED BIPHENYLS (PCBs) PROTOCOL

Sampling Protocol for Polychlorinated Biphenyls (PCBs)

1 0 PURPOSE

The purpose of this protocol is to provide a consistent approach for the identification and analysis of materials potentially containing PCBs

The survey practices outlined are specifically designed to provide occupational hazard assessment information in support of decommissioning activities within a facility However, in some cases the results, particularly those from locations not affected by new introductions of PCBS (i e , closed loop) may be used as final status results or to support a final survey

2.0 SCOPE

This protocol describes how to perform PCB characterization surveys The criteria outlined are specifically designed to provide PCB occupational hazard assessment information in support of decommissioning activities while performing PCB work activities

No activity that may cause PCB materials to become spilled or spread will be authorized, without the proper personal protective equipment and controls, until PCB sampling demonstrates that the area is below the permissible limits for working in areas with PCBs that are controlled and securely contained

Instruction Development

This protocol serves as a guide in the preparation of specific instructions for sampling Additionally, the instructions should contain

- How to quantify the physical and chemical characteristics of PCB contamination and determine the extent of PCB contaminant distribution in an affected area
- How to quantify and qualify environmental parameters that affect potential human exposure from existing and residual PCB material contamination
- How to identify PCB containing materials based on historical and industrial data
- How to identify the limited conditions for sampling

Facility drawings, photographs and facility walk-downs provide detailed information to assist the project engineer in making determinations as to where sampling should be conducted

Initial Classifications

All areas of facilities or buildings do not have the same potential for PCB contamination and therefore do not require the same level of characterization survey coverage to determine the initial classification
By reviewing RFETS historical data and PCB industry equipment records , an effective and efficient characterization process will be conducted

Two classifications of survey areas will be used when determining PCB survey requirements These are affected and unaffected areas These are defined as follows

DECOMMISSIONING POLYCHLORINATED BIPHENYLS (PCBS) PROTOCOL
(continued)

- *Affected areas* These are areas that have potential PCB contamination (based on historical reviews) or known PCB contamination (based on past or preliminary RFETS and industry surveillance) This would normally include materials such as

  - Transformers
  - Paints (Prior to 1980)
  - Oils & Paints
  - Fluorescent light ballasts
  - Electrical wiring
  - Gaskets in HVAC system

  Areas immediately surrounding or adjacent to locations where PCB containing materials were used or stored, spilled, or buried are included in this classification because of the potential for inadvertent spread of contamination

- *Unaffected areas* All areas not classified as affected will be labeled unaffected These areas are not expected to contain residual PCBs , based on a knowledge of site history and previous RFETS and industrial information concerning PCBs

Sampling Methodology

NOTE For actual sampling activities refer to Procedures L-6294-A and L-6245-F to perform sampling activities

Data collected during the characterization activities will consist of two types

(1) Collection of field swipes taken from PCB-suspect items and

NOTE It is important to note that a minimum of 5 grams of media is required to perform the PCB solids analysis

(2) Sample analyses of media (paint chips, liquids, etc) using laboratory equipment or systems

Before performing sampling activities the following measures must be evaluated

- Method of collection and sampling equipment required
- Bottle/equipment decontamination and disposal
- Field and measuring equipment required
- Sampling parameters
- Sample collection, bottling & preservation
- Sample disposal
- Chain of custody requirements

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Sampling Equipment Required

- Watch
- Spray bottles
- Field sampling requests
- Flashlight
- Sampling logbook
- Coolers
- Squeeze bottles
- Various tools, hammer, screwdriver, scissors, bung drum wrenches
- Pager and/or radio
- Hearing protection
- Ice packs

Sampling Activities

Radiological surveys will be performed by trained Radiological Control Technicians (RCTs) using field instrumentation in accordance with Radiological Operations Instructions during sampling activities, as necessary

A trained sampling team is used to perform the sampling activities Analysis for characterization purposes will be performed using Environmental Protection Agency (EPA) approved procedures identified in, "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods, U S EPA SW-846, 1986, Third Edition "Laboratory facilities located onsite or offsite will support the analysis Onsite methods for analysis of PCBs includes SW-846 Method 8081"GC Analysis for PCBs in oils and solids Offsite methods include SW-846 Method 8080A A table describing the differences in these methods is included in Appendix 1 Data Quality Objectives (DQOs) are established for the analytical methods referenced and are available through the onsite Kaiser-Hill APO office in B-881 DQOs for offsite laboratories are established under individual QA/QC Programs which meet the intent of EPA SW-846 requirements

During characterization activities, several direct, indirect and media samples will be, obtained and analyzed for radiological (as needed) and PCB contaminants The results will be used to determine contaminants and as the basis for estimating waste quantities and decontamination options Sample collection, analysis, and the associated documentation will follow site procedures which meet the recommendations and requirements of applicable regulatory agencies A "chain of custody"sample tracking form is used for each sample collected to account for the sample from collection to the point of analysis Samples will be collected and documented in accordance with Laboratory Procedure No L-6294-A "Sampling Within an RBA/CA"

Analysis Methodology

Specialized procedures have been developed at RFETS to meet technical requirements for analyzing certain substances, such as those containing radionuclides or compounds which interfere with the accuracy and precision of the analysis These test methods are entitled the "L-Procedures " "L- Procedures" are based on test methods found in 6 CCR, 1007-3, Part 261, "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods", U S EPA SW-846, 1986, Third Edition," as amended by Updates I (July 1992), II (September 1994), and IIA (August 1993), "Methods for Chemical Analysis of Water and Wastes," EPA Publication No 600/4-79-020 (1979) Various other EPA approved protocols such as those from the American

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(continued)

Society of Testing and Materials (ASTM) are also used

Analysis for hazardous waste determination is conducted in accordance with Rocky Flats Environmental Technology Site Procedure 1-C75-HWRM-03, "Waste Identification and Analysis" This document outlines and references requirements of waste management for liquids which will be handled as waste material This document contains the guidelines used at RFETS to determine if a waste is regulated as hazardous under RCRA, and to identify the waste characteristics/constituents for proper management of the waste

Quality Assurance

The Quality Assurance Program for characterization activities follows the same program for management of hazardous wastes onsite and meets the minimum requirements established by "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods", U S EPA SW-846, 1986, Third Edition QA/QC procedures addressing waste characterization are maintained at the site

Data Analysis And Review

As specified in 40 CFR 761 60(4), disposal of solid PCBs is regulated at concentrations of 50 ppm or greater in the form of contaminated soil, rags or other debris Processing or distribution in commerce of any PCB or PCB item, regardless of concentration, that is not specifically authorized is prohibited The limit of detection for distribution in commerce is 2 ppm This applies to the resale, reuse, or recycling of materials such as equipment that have painted surfaces with PCBs

Results of all characterization activities will be documented in field notebooks and summarized in a characterization report This characterization report will be distributed to appropriate project personnel to support decisions made for waste management, industrial hygiene, decontamination and other activities which may involve hazardous and radiological contaminants The inventory of materials and the characterization results will be provided to the Industrial Hygiene and Safety (IH & S) group for hazard review IH&S will determine if controls or personal protective equipment will be required during Decommissioning activities and provide recommendations during work package development

Sample results for liquid wastes generated are submitted to the building Environmental Coordinator (EC) and/or the project Waste Specialists in order to prepare for waste disposal

TABLE 1
SUMMARY OF THE MAJOR DIFFERENCES BETWEEN METHOD 8080A AND 8081A

	8080A	8081
Compound		The compound list is considerably longer in 8081 However, it is important to note that the method does not define the compound list (i e , we do not have to analyze for all compounds on the 8081 list)
MDL	Method MDLs are generally lower in 8080A than in 8081	These MDLs should not present any problem, except for the aqueous Aroclor at 0 054 ug/L which may be a typo
Extraction Solvent	CH_2Cl_2/Acetone is the extraction solvent for soils	Hexane/Acetone is listed as an optional extraction solvent for solid CH_2Cl_2/Acetone is also OK
Columns	Packed Columns listed	Capillary columns listed
Standards	Stock standards expire in one year Calibration standards in six months	All standards expire in six months
Surrogates	TCMX and Decachlorobiphenyl recommended	TCMX and Decachlorobiphenyl recommended, single column technique, 4-chloro-3 nitrobenzotrifluoride recommended, dual column technique (Quanterra will use the TCMX/DCB combo for all tests)
Aroclors, Calibration	No additional guidance for calibration of Aroclors	Use 5 points of 1016/1260, single point of other Aroclors Use 5 points of other Aroclors if present in samples
Multicomponents, Quantitation	The two methods have different guidance for quantitation of multicomponent Aroclors - total area	Aroclors - total area or 3-5 characteristic peaks
LCS		LCS (called QC reference sample in the method) limits are set at 80-120%

TABLE 1 (continued)
SUMMARY OF THE MAJOR DIFFERENCES BETWEEN METHOD 8080A AND 8081A

	8080A	8081
Calibration Verification	Every 10 samples Reinject any samples injected after a failed calibration verification	Every 20 samples (every 10 recommended) Samples must be bracketed with acceptable calibration verification
Endrin/DDT Breakdown	≤ 20% each compound	≤ 15% each compound