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# **Y-12 Plant Beryllium Facilities Characterization**

**U.S. Department of Energy  
Chronic Beryllium Disease Prevention Program  
Best Practices and Lessons Learned Workshop**

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# Objective

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- ▶ **To apply a systematic and cost-effective sampling strategy to the characterization of surface and airborne levels of beryllium in facilities housing beryllium operations and storage locations**
- ▶ **The resulting information is used to provide a statistical basis for establishing administrative control boundaries based on the criteria established in the Chronic Beryllium Disease Prevention Program (CBDPP)**

# Methodology

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- ▶ **Perform a multi-disciplinary review of operational and historic information**
- ▶ **Participants include organization industrial hygienist, area supervisors, operations manager, worker representative, utilities personnel, and statistician as needed**
- ▶ **Identify current or previous beryllium areas, locations of past operations, ventilation systems, and review historical surface and air sampling data. Identify areas that share HVAC system with a beryllium area or operation**
- ▶ **Establish preliminary boundaries around current operating and storage locations**

## Methodology (cont'd)

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- ▶ **Validate information by multi-disciplinary team walk-down of facility**
- ▶ **Develop sampling plan and submit for approval**
- ▶ **Conduct sampling and analysis**
- ▶ **Issue report**
- ▶ **Present recommendations and establish final boundaries**

# Y-12 Beryllium Facilities Characterization

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**Categorize areas outside current operating and storage locations according to the following scheme:**

- ▶ **Category 1: Surface or air data indicative of detectable beryllium**
- ▶ **Category 2: Process knowledge of beryllium activities without data indicative of detectable beryllium**
- ▶ **Category 3: No known beryllium activities based on process knowledge and no data indicative of detectable beryllium**

# Surface Sampling Strategy

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- ▶ **Random sampling strategy applied to locations in Category 3**
- ▶ **Nonrandom (biased) sampling strategy applied to locations in Categories 1 and 2**
- ▶ **Sample results used to finalize the preliminary boundaries applying the criteria in the CBDPP**

# Building 9204-2E Surface Sampling Strategy

- ▶ Samples conducted on three floors, the second floor mezzanine, HVAC, and ancillary surfaces
- ▶ Category 1, 2, and 3 areas were identified and documented on building floor plans

## First Floor

2 – cat. 2  
1 – cat. 3

## Second Floor

5 – cat. 2  
1 – cat. 3

## Third Floor

4 – cat. 2  
1 – cat. 3

## Mezz.

cat. 3

## First Floor

cat. 2

# Building 9204-2E Surface Sampling Strategy

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- ▶ **Category 3 homogenous surfaces identified:**
  - A. External surfaces of nonprocess equipment and materials (office equipment, cabinets, shelves, etc.)**
  - B. Floors**
  - C. Elevated surfaces (pipes, conduit, etc.)**
  - D. Process equipment (mills, presses, furnaces, glove boxes, lab hoods, etc.)**

# Building 9204-2E Surface Sampling Strategy

## ► Category 2

<i>Location</i>	<i>Map Identifier</i>	<i>Number of Samples</i>
First floor	A	59
Transition areas	I–K	177
Second floor	B–E	236
Third floor	F–H	177
HVAC		59
Tools		59
Table tops		59
<i>Subtotal</i>		<u>826</u>

# Building 9204-2E Surface Sampling Strategy

## ▶ Category 3

<i>Location</i>	<i>Map Identifier</i>	<i>Number of Samples</i>
First floor	a–d	116
Second floor	a–d	116
Mezzanine	a–c	87
Third floor	a–c	116
<i>Subtotal</i>		<u>435</u>
	<i>Total (excluding blanks)</i>	<u><u>1261</u></u>

# Air Sampling Strategy

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- ▶ **General area air conducted on each floor**
- ▶ **Sample locations selected by process knowledge and existing administrative control boundaries**
- ▶ **Minimum of 6 samples per floor**
- ▶ **Personal monitoring of IH personnel during characterization**

# Building 9204-2E

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## ▶ Summary Results

- No biased surface sample results exceeded  $5 \text{ ug}/100 \text{ cm}^2$
- For randomly sampled homogenous surfaces, no average value plus three standard deviations exceeded  $5.0 \text{ ug}/100 \text{ cm}^2$
- Range of all 1,261 surface sample results was  $<0.05$  to  $1.41 \text{ ug}/100 \text{ cm}^2$
- All general area air samples were below the analytical limit of quantification ( $<0.05 \text{ ug}$ )

## ▶ Conclusion

Areas outside the current operating or storage areas in Building 9204-2E are below the  $5 \text{ ug}/100 \text{ cm}^2$  site administrative action level for surface contamination established in the Y-12 CBDPP

# Facility Characterization Status

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Facility	Status
▶ Building 9204-2E	Sampling/analysis completed, report issued
▶ Building 9201-5 (Phase 1)	Sampling/analysis completed, report issued
▶ Buildings 9202 & 9203	Sampling/analysis completed, report issued
▶ Building 9201-5N	Sampling/analysis completed, report issued
▶ Building 9204-4	Sampling/analysis completed, report issued
▶ Buildings 9995 & 9723-19	Sampling completed