



# Hanford Site Beryllium Program Corrective Action Plan

**Presented to: BHSC Fall 2010 Meeting**

**Presented by: Scott Seydel, CIH**

# Biography

- **Scott Seydel**

- Senior Industrial Hygienist at CH2M HILL Plateau Remediation Company
- Member of the development team for the Hanford Site Chronic Beryllium Disease Prevention Program (CBDPP)
- Current chair of the Hanford Site CBDPP Committee
- Former manager of Fluor Hanford's Industrial Hygiene and Chemical Management programs
- Certified Industrial Hygienist
- professional member of the American Society of Safety Engineers
- 20 years of environmental, health, and safety experience in a variety of industries, including environmental remediation, semiconductor fabrication, and aircraft manufacturing

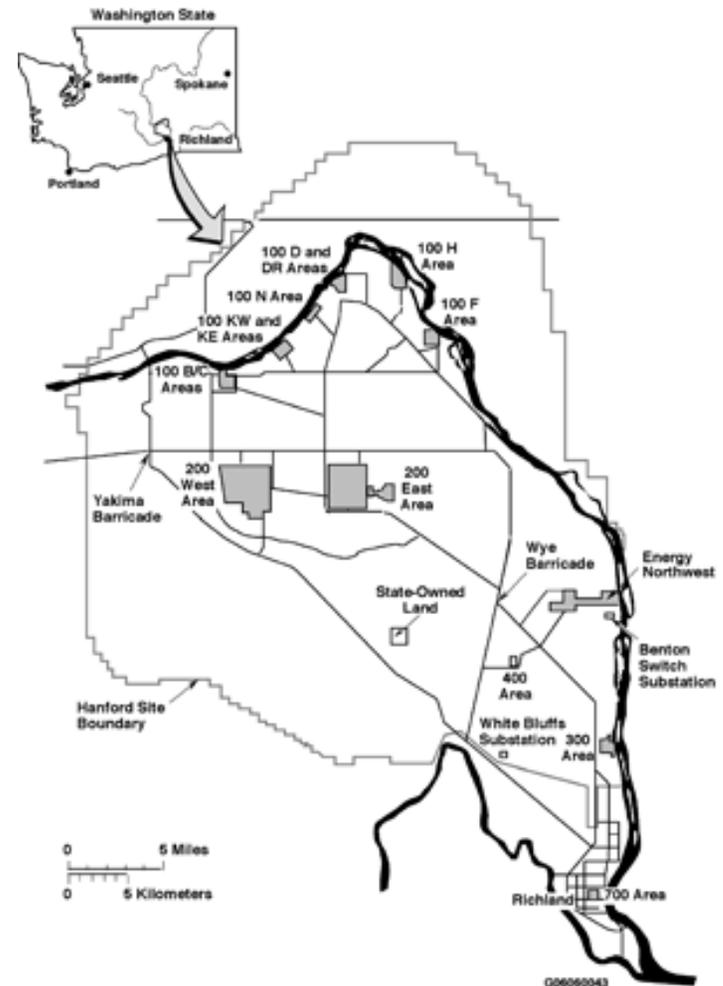
# Disclaimer

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# Beryllium at Hanford

- Limited current beryllium mission activities
- Beryllium legacy contamination
  - Fuel production in 300 Area
  - Rocky Flats ash/oxide
  - Beryllium alloy components
- 1200 active buildings
- 290 inactive buildings
- 2050 structures and tanks



# Timeline

- **July 2008 – Began development of CBDPP**
- **June 2009 – CBDPP approved by RL/ORP**
- **Sept 2009 – Implementation guidance provided to contractors**
- **Jan 2010 – “Completion” of implementation**
- **Feb - Apr 2010 – Assessment conducted**
- **May 18-20, 2010 – Factual accuracy check completed**
- **June 2, 2010 – Assessment report released**
- **Sept 2010 – Corrective Action Plan approved**

# Key Stakeholders

- **Hanford Atomic Metals Trade Council**
- **Beryllium Awareness Group**
- **Hanford Advisory Board**

# Not Your Typical Assessment

- **Team was assessing a moving target**
- **Primary focus was stakeholder concerns**
  - **Assessment driven by stakeholder interviews and field observations**
  - **Lines of Inquiry were secondary**
- **Informal daily outbriefs with contractors**
- **Formal daily outbriefs with stakeholders**
  - **Contractor representatives not allowed to attend stakeholder outbriefs**
- **Three days for factual accuracy check of draft report**

# Assessment Findings

- **F-1 Completion of contractor baseline beryllium inventory and hazard assessments (RL/ORP)**
  - 51 actions tied to the finding
- **F-2 Beryllium-related training (RL/ORP)**
  - 24 actions tied to the finding
- **F-3 Analysis of medical, job, and exposure data (AMH)**
  - 24 actions tied to the finding
- **F-4 Work planning and control (CHPRC, MSA, WCH, WRPS)**
  - 39 actions tied to the finding

# Opportunities For Improvement

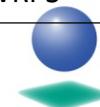
- **AMH Improvement Plan**
- **Identify deficiencies and implement interim controls**
- **Comprehensive implementation plans**
- **Strengthen baseline inventories**
- **Strengthen assessments and issues management**
- **Improve beryllium information accuracy**
- **Formalize expectations of the CBDPP Committee**
- **Improve communications with stakeholders**
- **Improve communications with beryllium affected workers**
- **Improve supervisor/manager awareness**
- **Ensure adequate assessments by RL/ORP**

# Corrective Action Plan

- **Every recommendation in the report was included in the CAP**
- **CAP includes 232 actions**
  - Numerous redundancies
  - Intent of recommendations not always clear
    - “Ensure that rigorous reviews of the resolutions for all issues related to beryllium are included in the annual CBDPP program assessments.”
    - “Require all personnel associated with beryllium work or beryllium workers to attend Beryllium Worker Training...”

# CAP Format

MSP Line ID	ID	Action Items:	Deliverable	Owner*	Resource	Start Date:	Completion Date
1	F-1	<b>Finding #1: RL and ORP have not ensured that contractor baseline beryllium inventory and hazard assessments have been completed, as required by 10 CFR 850.20, 10 CFR 850.21, and the corresponding portions of the CBDPP. (CHPRC, MSA, WCH, WRPS, DOE)</b>					
2	F-1.1	Develop a more rigorous process for performing initial beryllium assessments of facilities, and reassess facilities previously declared beryllium-clean facilities.	Single site-wide process documented by contractors in the CBDPP.	CHPRC	M. Hughey	8/1/2010	11/30/2010
			Single site-wide process documented by contractors in the CBDPP.	MSA	R. Gilmore	8/1/2010	11/30/2010
			Single site-wide process documented by contractors in the CBDPP.	WCH	D. Bignell	8/1/2010	11/30/2010
			Single site-wide process documented by contractors in the CBDPP.	WRPS	L. Gurney	8/1/2010	11/30/2010
3	F-1.1.2	Definitive criteria for determining whether a facility is a beryllium-controlled or beryllium clean facility	Incorporated into the response for F-1.1	CHPRC	M. Hughey	8/1/2010	11/30/2010
			Incorporated into the response for F-1.1	MSA	R. Gilmore	8/1/2010	11/30/2010
			Incorporated into the response for F-1.1	WCH	D. Bignell	8/1/2010	11/30/2010
			Incorporated into the response for F-1.1	WRPS	L. Gurney	8/1/2010	11/30/2010
4	F-1.1.3	Training requirements for individuals who will be performing assessments	Incorporated into the response for F-1.1	CHPRC	M. Hughey	8/1/2010	11/30/2010
			Incorporated into the response for F-1.1	MSA	R. Gilmore	8/1/2010	11/30/2010
			Incorporated into the response for F-1.1	WCH	D. Bignell	8/1/2010	11/30/2010
			Incorporated into the response for F-1.1	WRPS	L. Gurney	8/1/2010	11/30/2010



# Training

- **Enhanced Beryllium Worker training**
- **Upgrades to Beryllium Awareness Training**
- **Develop training courses for:**
  - **PIC's, Planners, Supervisors, and Managers**
  - **Industrial Hygienists and IH Technicians**
  - **HR, IR, and Employee Concerns staff**
  - **Risk Communication**
  - **Beryllium Registry Submission**

# Medical Monitoring

- **Capturing beryllium workplace monitoring information and ensuring it available to AMH staff**
- **Establish responsibilities for Beryllium Registry data submission**
- **Improved interface between AMH, the BAG, and the contractor industrial hygiene staff regarding beryllium monitoring information and in the data analysis of newly diagnosed sensitized or CBD workers**
- **Address staffing issues**
- **Outreach to the local medical community**

# Original Assessment Process

- **Only general guidance was provided to contractors**

An initial assessment of all facilities is required to determine if the facility is a beryllium clean facility or a beryllium-controlled facility. If there is not an exposure potential above background, further facility beryllium characterization and assessment is not required. Contractors may use the *Beryllium Facility Assessment Form* (Attachment 2) to document the initial assessment.

- **Use of assessment form was non-mandatory**

- **Focused on potential past beryllium usage**

- **Assessment process viewed as a one time activity for developing the beryllium inventory**

# Assessment Process

- **More rigorous assessment process focusing on:**
  - Machine Shops
  - Metal Manufacturing Activities
  - Materials Research & Development
  - Fuel Assembly Experiments
  - Electrical Component Fabrication
  - Laboratory Operations
  - Tool Cribs
  - Machinery / Equipment Storage of potentially beryllium contaminated items
  - Switchgear, MCC's, bridge cranes, and elevator control systems

# Original Assessment Form

<b>BERYLLIUM FACILITY ASSESSMENT FORM</b> (Attach additional pages and/or documentation if needed)	
Date: _____	Assessor(s): _____
<b>Facility Information</b>	
Building: _____	Building Administrator: _____
Building Description: _____	Contractor: _____
Project: _____	Date Built: _____ Square Footage: _____
Current Status: <input type="checkbox"/> Active <input type="checkbox"/> Inactive	# of Employees Based in Facility: _____
Occupancy: <input type="checkbox"/> Full Time <input type="checkbox"/> Part Time/Regularly <input type="checkbox"/> Occasionally <input type="checkbox"/> Unoccupied	
RAD Contaminated Facility: <input type="checkbox"/> Yes <input type="checkbox"/> No	
Public Access: <input type="checkbox"/> Yes <input type="checkbox"/> No	
Facility Usage:	
<b>Assessment Information</b>	
Individuals Contacted:	
Documented/Suspected Usage of Beryllium Materials in Facility:	<input type="checkbox"/> Yes <input type="checkbox"/> No
Possible maintenance of Be items producing airborne Be in Facility:	<input type="checkbox"/> Yes <input type="checkbox"/> No
Possible handling/storage of Be items:	<input type="checkbox"/> Yes <input type="checkbox"/> No
Facility Historical Usage:	<input type="checkbox"/> Fully Known <input type="checkbox"/> Partially or Incompletely Known
Comments:	
<b>Characterization Information (to be completed by industrial hygienist)</b>	
Recommendation for Characterization/Sampling:	<input type="checkbox"/> Yes <input type="checkbox"/> No
If No, Current Status:	<input type="checkbox"/> Beryllium Clean Facility <input type="checkbox"/> Beryllium Controlled Facility <input type="checkbox"/> Status TBD
Legacy Probability Factor (P) = _____	Occupancy Factor (F) = _____
References:	
If Yes, # of Recommended Survey Units and Locations:	
If BCF, recommendations for Beryllium Controlled Areas in Facility:	

# Revised Assessment Form

BERYLLIUM FACILITY ASSESSMENT FORM (Attach additional pages and/or documentation if needed)			
Date: _____	Assessor: _____	Signature: _____	
<b>Facility Information</b>			
Building: _____	Rev.: _____	Building Administrator: _____	
Building Description: _____		Contractor: _____	
Project: _____	Date Built: _____	Square Footage: _____	
Current Status: <input type="checkbox"/> Active <input type="checkbox"/> Inactive <input type="checkbox"/> Demolished	# of Employees Based in Facility: _____		
Occupancy: <input type="checkbox"/> Full Time <input type="checkbox"/> Part Time <input type="checkbox"/> Unoccupied			
RAD Contaminated Facility: <input type="checkbox"/> Yes <input type="checkbox"/> No			
Building Type: <input type="checkbox"/> Single Purpose <input type="checkbox"/> Multi- Purpose <input type="checkbox"/> Office / Mobile Office			
Facility Usage: _____			
<b>Assessment Information</b>			
Individuals Contacted: _____			
<b>Facility Usage</b>			
	<b>Current</b>		<b>Past</b>
Machine Shops	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Potential
Metal Manufacturing Activities	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Potential
Materials Research & Development	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Potential
Fuel Assemblies Experiments	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Potential
Electrical Component Fabrication	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Potential
Laboratory Operations	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Potential
Tool Cribs	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Potential
Machinery / Equipment Storage	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Potential
Tool Maintenance Activities	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Potential
<b>Items of Concern</b>			
Switchgear / MCC's (≥ 480V)	<input type="checkbox"/> Yes <input type="checkbox"/> No		
Bridge Cranes	<input type="checkbox"/> Yes <input type="checkbox"/> No		
Elevators Control Systems	<input type="checkbox"/> Yes <input type="checkbox"/> No		
Comments: _____			
<b>Characterization Information</b>			
Characterization Sampling Required: <input type="checkbox"/> Yes <input type="checkbox"/> No			
Current Building Status: <input type="checkbox"/> Beryllium Clean Facility <input type="checkbox"/> Beryllium Controlled Facility			
Summary of Sampling Data _____			
References: _____			
Areas requiring characterization: _____			

# Original Characterization Process

- **Based on an adaptation of the MARSSIM process**
- **Process received some level of DOE approval**
  - D06-07-004
- **Buildings divided into survey units**
  - Generally a minimum of 10 bulk and/or wipe samples per survey unit
- **Results compared to agreed upon bulk or wipe limit**
  - 0.2  $\mu\text{g}/100 \text{ cm}^2$  for wipe samples
  - 2  $\mu\text{g}/\text{g}$  for bulk samples

# Characterization Process

- **Enhanced characterization sampling process**
  - Implemented interim process developed with John Martyny, PhD from National Jewish Medical Center
  - Developing the final process with Charles Davis, PhD of EnviroStat
- **Characterization of circuit breakers, switchgear, bus bars, and bridge cranes**
- **Investigating the use of the relative ratio of beryllium to other constituents to “fingerprint” the naturally-occurring beryllium in local soils**

# Characterization Sampling – Contract Direction

<b>Sampling type</b>	<b>Minimum number of samples</b>	<b>Maximum size of survey unit</b>
Standard characterization sampling of buildings	10 per survey unit	1,000 sq. meters
Enhanced characterization sampling of buildings	Samples from areas of concern plus at least 10 random samples per survey unit	100 sq. meters
Validation sampling of buildings considered beryllium clean	No specific minimum	No limit on size

# Contract Direction – Trigger Levels

- **Trigger levels that require additional investigation**
  - 0.1  $\mu\text{g}/100\text{ cm}^2$  for wipe samples
  - 1  $\mu\text{g}/\text{g}$  for bulk samples
- **Standard Characterization**
  - Samples exceeding trigger level require additional sampling
- **Integrated Characterization**
  - Additional sampling normally not required if trigger level exceeded
- **Validation sampling**
  - Samples exceeding trigger level require additional sampling

# Contract Direction – Bulk Sampling

- If bulk sample collected, a wipe sample must also be collected from the area underneath the bulk sample
- If the bulk sample was collected from an area greater than 100 cm<sup>2</sup>, the wipe sample is collected from a representative 100 cm<sup>2</sup> area
- If not feasible to collect a wipe sample, the reason why must be documented
- Bulk sample compared to the bulk sample criteria
- Wipe sample compared to the wipe sample criteria

# Challenge of Wipe Samples



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# Contract Direction – Geometric Mean

- Initial results compared to trigger levels
- If trigger levels exceeded, any additional sampling is then conducted
- An area may be considered beryllium free if the geometric mean of the sample results is less than 1 ppm for bulk samples or  $0.1 \mu\text{g}/100 \text{ cm}^2$  for wipe samples, and no sample results exceed 2 ppm for bulk samples or  $0.2 \mu\text{g}/100 \text{ cm}^2$  for wipe samples

# Characterization Process Development Challenges

- **Technical**
  - Dealing with censored data from wipe samples
  - Statistical concerns regarding the use of bulk data
- **Perception**
  - Stakeholder concerns regarding the handling of outlier data
  - Random sampling versus biased sampling
  - Proving a negative

# Lessons To Consider

- **Regulatory compliance is not sufficient**
  - Some recommendations go well beyond the regulation
- **Stakeholder involvement critical**
  - Good science is not sufficient
- **Develop detailed implementation plans**
- **Consider the potential impacts of 10 CFR 851.25**
- **Engage outside experts**

# More Information On The HSS Assessment Report & CAP

- **HSS Assessment Report**

[http://www.hanford.gov/files.cfm/2010\\_Hanford\\_Beryllium\\_Reportv3\\_final\\_June%2020101.pdf](http://www.hanford.gov/files.cfm/2010_Hanford_Beryllium_Reportv3_final_June%2020101.pdf)

- **Hanford Site Corrective Action Plan**

[http://www.hanford.gov/files.cfm/10-SED-0161\\_CAP\\_in\\_Response\\_to\\_HSS\\_BE\\_Assmt1.pdf](http://www.hanford.gov/files.cfm/10-SED-0161_CAP_in_Response_to_HSS_BE_Assmt1.pdf)