Department of Energy Richland Operations Office | Office of River Protection

Hanford Operating Experience Program

WRPS-IB-20-009 **Lessons Learned** July 29, 2020

Sample Collection Errors Resulted in Over-Quantification of Potential Worker Exposure to Beryllium

SUMMARY

Personal air samples collected during abrasive blasting activities inside of verification tank 60-H-TK-1C at the Effluent Treatment Facility (ETF) initially indicated detectable levels of beryllium over the Hanford Site Chronic Beryllium Disease Prevention Program (CBDPP) Action Level and the Occupational Safety and Health Administration (OSHA) Permissible Exposure Level. Subcontractor workers engaged in the blasting activity were wearing supplied air blasting hoods and were protected from all airborne hazards including beryllium. Upon further data review, after response actions were taken, it became apparent that sample collection errors resulted in over-quantification of potential worker exposure.

Lessons Learned: Prior to initiating extensive response actions to an unanticipated condition, thorough review of sampling data, collection methods, and work site conditions should be conducted.

DISCUSSION

On February 5, 2020, WRPS IH received notification of elevated beryllium personal air sample results over the CBDPP action limit. The WRPS Beryllium Subject Matter Expert (SME) immediately discussed the validity of the sample results with the project Industrial Hygienist (IH), and based on the available information at the time it was determined that the sample results had no apparent issues. The fieldwork supervisor was contacted and work was immediately stopped, the area secured, and appropriate parties notified. WRPS IH believed the indications of elevated air sample results and responded appropriately in a timely, conservative, and protective posture.

Once the area was in a safe configuration follow-up sampling was initiated to determine if any beryllium contamination was present. Through extensive sampling, the blasting material was identified as containing trace concentrations of beryllium. No sample results of the blasting material or adjacent work areas met or exceeded levels that would require the controls of a Beryllium Work Permit (BWP).

ANALYSIS

Additional analysis of the personal air sampling results revealed several issues with the sampling techniques employed. A literature review identified that the sampling techniques used for metals analysis during the ETF abrasive blasting project accumulated inertia driven blasting material in the sample cassettes, which is not indicative of potential worker exposure. This inertia driven blasting material collection results in over-

quantification of potential worker exposure. This over-quantification was exacerbated by sample pumps being set to run for two hours, but not being removed from the worker at the time the pump shut off.

Calculations to determine the total dust required to reach the observed beryllium air concentrations were conducted. These calculations demonstrated total dust air concentrations not likely to have existed at the work site when considering the ventilation and work activities. When considering these factors, the personal air samples collected during sandblasting activities at the Effluent Treatment Facility are suspect.

LESSONS LEARNED and RECOMMENDATIONS

Prior to initiating extensive reponse actions to an unanticipated condition, thorough review of sampling data, collection methods, and work site conditions should be conducted.

In response to this event, the following corrective actions are being taken:

- An alternative 'beryllium free' blasting abrasive material was identified. A sampling analysis validated that there was no beryllium present in the material.
- A 'Lessons Learned' document was generated to communicate this event and raise awareness.
- An IH Communication was issued by Industrial Hygiene within WRPS to communicate the event.
- Alternative sampling methods used to quantify potential worker exposure during sandblasting will be evaluated for similar work scopes in the future.
- The personal air sample results collected during the sandblasting activities of verification tank 60-H-TK-1C will be dispositioned per IH procedure.

REFERENCES

Work Order # 575200, *Perform Protective Coating of ETF Verification Tank 1C*; WRPS-PER-2020-0231, Combined Event Investigation Report and Apparent Cause Analysis EIR-2020-006, *Unanticipated Be Sample Result that Exceeded OEL Inside Verification Tank at ETF*; TOC-IH-RPT-50031, *Effluent Treatment Facility Verification Tank Sandblasting Beryllium Summary*; DOE-0342, *Hanford Site Chronic Beryllium Disease Prevention Program* [implements requirements of 10 Code of Federal Regulations 850 (10 CFR 850)]; *Evaluation of Air Sampling Methods for Abrasive Blasting* [Diana Ceballos, David Sylvain & Max Kiefer (2013) Case Study, Journal of Occupational and Environmental Hygiene, 10:3, D34-D39, DOI: 10.1080/15459624.2012.750555].

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