



May 12, 2008

## Causal Analysis Review

# Legacy Beryllium Contamination

Presented below is a synopsis of a report, finalized in the Occurrence Reporting Processing System (ORPS) on April 24, 2008, that discusses beryllium contamination in the ductwork of a building at Lawrence Livermore National Laboratory (LLNL). This occurrence is similar to another report from Sandia National Laboratories. In an additional report, LLNL also reported legacy beryllium contamination found as part of a statistically based survey of areas. All three occurrence reports are provided in the ORPS attachment. We commend the reporting organizations for offering detailed causal analysis of these occurrences, which stress the importance of work control and communication as key elements in preventing occupational exposures to beryllium. In February 2008, the Office of Health and Safety issued a Safety Advisory on Beryllium Exposure Awareness, and in December, 2006, the same office issued a Safety Bulletin on Beryllium Awareness. Both are attached.

### Featured Occurrence

Lawrence Livermore National Laboratory, Site 200  
 NA--LSO-LLNL-LLNL-2007-0059 - Management Concern - Unexpected Beryllium Contamination Building 695  
 Significance Category 3)

**HQ Summary** Facility Management determined beryllium contamination may have been present in the ducting that was handled in Building 511 and B391. The potential for contamination was not discovered until the ducting was returned to Building 695. Room 1025 in B695 was

immediately posted as a Beryllium Work Area and personnel associated with the work conducted in B391 and B511 were notified. In addition, staff that performed maintenance activities in Room 1025 were also notified. Swipes of the work areas and floor in B391 and B511 were taken and a critique was performed.

**Background** B695 is a hazardous waste treatment, storage and disposal facility operating under a permit issued pursuant to the Resource Conservation and Recovery Act (RCRA). It processes both liquid and solid waste. Room 1025 is a general purpose room used for repacking and similar functions. The operation is performed using appropriate personnel protective equipment (PPE), and then the room is cleaned. Beryllium waste has been processed through the room approximately 4 times in the past 3 years, after which cleaning generally included swiping down the room to a height of about 8 ft. Some beryllium contamination remained on the ductwork and lighting fixtures above this level.

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Some time in late November or early December, 2007, the duct work was removed from Room



1025 and taken to shop areas in other buildings for modification. It was then returned to Building 695, where the beryllium was detected.

**Causal Summary**A review conducted by the reporting organization concluded that the root cause of this occurrence was weaknesses in the work control process and a lack of communication between facility personnel. A scheduled walk down involving ES&H personnel did not occur. Job scoping failed to consider the presence of beryllium on elevated surfaces, though cleaning in Room 1025 was done only to the height of 8 feet. An earlier release of beryllium controls was assumed to apply to the whole room, rather than just the normal work surfaces. As a consequence of these assumptions, the ducts were not evaluated for the presence of beryllium contamination.

**Lessons Learned**Communication and consistently applied requirements must flow throughout the entire work control process. Communication must always be maintained between all organizations involved in the Work Control Process to ensure all potential hazards are addressed prior to commencing work activities. The rigidity of work controls applied to personnel from outside an organization must always be considered by personnel from inside an organization when there is the potential for hazardous work, even when they feel they have adequately addressed all aspects of the work activity.

### Additional Occurrence

In addition to the featured occurrence, we draw your attention to a similar occurrence reported by Sandia National Laboratories in November, 2007, in which work control deficiencies and communications failures resulted in a subcontractor removing beryllium contaminated



ductwork without wearing appropriate PPE. It is summarized below, with the full report included in the attachment.

**Sandia National Laboratories, Tech Area IV NA--SS-SNL-NMFAC-2007-0015 - Removal of Beryllium Contaminated Ductwork without Personal Protective Equipment at Bldg-984 (Significance Category 4)**

**HQ Summary**A two-person crew working for a third-tiered sheet metal subcontractor began removing overhead ductwork that was identified as having internal beryllium contamination. Although the hazard identification and controls were communicated to the prime construction contractor through contract documents, the sheet metal subcontractor was not aware that the interior of the ductwork was still identified as beryllium-contaminated and therefore, the workers did not wear the required PPE. The prime contractor suspended the work. Personnel were placed in the required PPE and work was completed.

**Causal Summary**A fact finding conducted after the occurrence found that no site visit between the project manager and the industrial hygienist was conducted to discuss work scope, potential hazards and appropriate controls. Also, while the prime contractor had scheduled a pre-task meeting with the subcontractor to discuss the PPE needed to perform the work, a miscommunication caused the subcontractor to start work before the scheduled meeting time. This resulted in some ductwork being removed by workers who were not wearing the required PPE.

### Media Impact



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One additional ORPS report is included in the attachment. It further illustrates the critical role of effective hazard communication in environments where beryllium work has occurred. The reporting organization discovered legacy beryllium contamination as part of an ongoing statistically based survey of areas. The building where the contamination was found was identified in the facility's Baseline Beryllium Inventory, and the finding of legacy beryllium contamination was not unexpected. However, the building underwent renovations over a period of years, and there has been media attention directed to the potential contamination of workers who were not informed of the legacy contamination findings. The report identification and summary follow, and one news account is attached.

**Lawrence Livermore National Laboratory, Site 200NA--LSO-LLNL-LLNL-2007-0046 - Legacy Beryllium Contamination in Building 321C (Significance Category 4)**

- **HQ Summary** As part of an ongoing statistically based beryllium legacy contamination survey at LLNL, beryllium contamination levels in non-beryllium work areas of the Building 321C NC Shop were found above the site's administrative release criterion of 0.2 micrograms/100cm<sup>2</sup>. Contamination above the release level was found in 83 of 1,107 samples taken in Building 321C with levels ranging from 0.2 to 3.1 micrograms/100cm<sup>2</sup>. Further surveying found additional areas above the release criterion, with levels ranging from 0.2 to 56 micrograms/100cm<sup>2</sup>. Access to this work area is restricted until a plan has been developed for operations incorporating

additional controls, remediation activities and further characterization.

**Closing Note:**

Comprehensive work planning and hazard communication are essential in preventing occupational exposures to beryllium. In work areas where beryllium has been handled, a structured work control process and effective communications are essential, workers must be made aware of risks, and appropriate protective measures must be implemented. Work control and communications deficiencies place workers at risk.

The Office of Health, Safety and Security requires no response to this transmittal. If you no longer wish to receive this information, please contact Robert Czincila [(301) 903-8008; robert.czincila@hq.doe.gov]. If you are aware of other organizations that may wish to receive this information, please contact Mr. Czincila.

**Attachments**

- ORPS Beryllium Rollup
  - NA--LSO-LLNL-LLNL-2007-0059
  - NA--SS-SNL-NMFAC-2007-0015
  - NA--LSO-LLNL-LLNL-2007-0046
- Beryllium Safety Bulletin – 2006
- Beryllium Safety Advisory – 2008
- Beryllium News Article – 2008