

## Lead & Arsenic Exposure Control for Waste to Energy Furnace Cleaning

John S. Austin, P.E., Plant Manager  
Michael E. Croft, Operations Manager  
Hampton/NASA Steam Plant  
50 Wythe Creek Road  
Hampton, Virginia

### Abstract

In 1997, the Hampton/NASA Steam Plant implemented a successfully re-engineered wet cleaning process for controlling exposure to lead and cadmium during the cleaning and maintenance of electrostatic precipitators. The following year we were ready to apply the lessons learned to the initial furnace cleaning tasks.

As part of the initial process review, industrial hygiene (IH) tests were done during furnace cleaning using the in practice methods. Testing was done for respirable lead and cadmium. Lead exposure was found to be over the action level, but cadmium exposures were just around non-detect levels. May of 1999 the facility became aware, through an IWSA-MWMA-ASME Safety and Health Seminar, that other WTE facilities were testing for arsenic as well.

Another set of tests were performed that same month which included tests for respirable arsenic. The results showed that arsenic was present and found to be over the action level, and one test point was especially high during the sifting hopper cleaning part of the procedure. These results were surprising since IH testing for these tasks during 1987 indicated much lower exposures.

It was decided the procedures had to be changed. Two process improvement outcomes were targeted:

- 1) To prevent accidents, injuries and close calls during the furnace cleaning task, a safer procedure for the task of furnace cleaning would be developed.
- 2) The new procedure must control cadmium, lead and arsenic exposures during furnace and sifting hopper cleaning tasks, to below OSHA Action Levels.

The new procedure standardized cleaning methods and included use of water right from the initial entry into the furnace. Operators had respirators upgraded to Positive Pressure Air Purifying Respirators (PAPR) and wore special disposable coveralls. Subsequent Industrial Hygiene testing showed that exposure levels could be reduced to less than the OSHA Action Level and Permissible Exposure Limits for lead and arsenic.

The newly developed "wet cleaning" procedure provided a safer standardized procedure that the Operators helped to develop, and Operators feel safer doing the task. The new procedure has also reduced task worker exposures to Lead and Arsenic to below OSHA Action Levels.

### Background Information

The Hampton/NASA Steam Plant is a Waste-to-Energy facility located on the NASA Langley Research Center in Hampton, Virginia. The facility provides the Center steam energy by burning municipal waste from the City of Hampton and neighboring communities. The Steam Plant operates 365 days a year 24 hours a day with a staff of 34 full time employees. The 240 ton per day plant has two units that produce a total of 66,000 pounds steam per hour.

Refuse is like other solid fuels, and its combustion produces a residue ash as a by-product. This ash contains trace amounts of lead, cadmium and arsenic from the trash that was burned. For maintenance activities, the furnace must be cleaned of all remaining ash, metal and slagging. Cleaning the furnace exposes the employees to these dust hazards.

Water applied by fire hose has always been used for cleaning furnaces, grate surfaces and sifting hoppers at the Hampton/NASA Steam Plant. However, initial cleaning of the grate surface and wall scaling was being done prior to introducing water into the furnace. This was the specific task targeted for process review and improvements.

Industrial hygiene testing for these tasks were done in 1987, and exposures were found to be below the Action Levels for lead and arsenic. At that time, the industrial hygiene review recommended the facility have employees wear full face respirators to increase the protection level. But initial testing for this review found exposures to be above OSHA Action Levels (AL).

What had changed since the earlier testing. The only new OSHA rule was for cadmium, but that was not a problem. Apparently, the nature of the trash and ash had changed with the recycling and composting programs of the 1990's. Before recycling and composting the facility combusted 80% household and institutional waste. That "wet trash" ratio dropped to 67%, and the balance was made up with drier commercial trash. Before recycling, melted aluminum and brown glass clinker captured much of the harmful dust. Less of these materials and finer dust from "post recycling" ash had increased occupational exposures dramatically. It was clear that the procedures needed to be standardized and improved with the use of water to minimize exposures.