

United States Government

Department of Energy

memorandum

DATE: January 19, 1996

REPLY TO
ATTN OF: EH-53 (R. Sastry, 301-903-4664)

SUBJECT: Chemical Safety Concerns / Search of Occurrence Reporting and Processing System (ORPS)

TO: Distribution

Significant Occurrences

December 1995**Class 1:**

None

Class 2:[Idaho National Engineering Lab](#) - propane release during transfer[Idaho National Engineering Lab](#) - airborne lead exposure[West Valley](#) - potential lead exposure during painting preparations[Portsmouth Gaseous Diffusion Plant](#) - chlorine trifluoride and hydrogen fluoride release[Lawrence Livermore National Lab](#) - exposures to formaldehyde**Additional:**

Potassium chloride sprayed on the face of a worker at Savannah River. A USQ evaluation took place at Savannah River due to the discovery of unanticipated benzene release mechanism. Two other events involving high benzene levels were also noted at Savannah River.

These occurrences are further described below with additional information, including Occurrence Report (OR) numbers, provided in [Table 1](#).

A search of ORPS for occurrences having chemical safety relevance conducted for the month of December 1995 produced 31 reports representing potential chemical safety concerns. These occurrences are listed in [Table 1](#). Eleven occurrences were categorized as "Unusual" with the remainder identified as "Off-normal". The Office of Environmental Management (EM) was Cognizant Secretarial Office for 18 occurrences, Uranium Enrichment (UE) reported six, Nuclear Energy (NE) had four, Defense Programs (DP) two, and Energy Efficiency (EE) one.

In order to determine which chemical safety occurrences represent more important (significant) Levels of Concern, a classification scheme has been developed. The definitions of these Classes are as follows:

- Class 1** Occurrences characterized by an injury or exposure requiring hospital treatment, or confirmed, severe environmental effect; also occurrences that had the potential to cause these effects with all safety barriers down, except, for example, that no one was nearby to be injured or exposed, or escaped in time, or the climatic conditions were favorable;
- Class 2** Occurrences characterized by minor injury (first aid) or exposure, or minor environmental damage; also occurrences that were near misses (where one additional safety barrier remained to prevent consequences) to those in Class 1;
- Class 3** Potential precursors to the occurrences in Class 1 or 2;
- Class 4** Minor occurrences such as leaks, spills, or releases, which may be significant in their frequency of occurrence though not in their consequences.

There were five Class 2 occurrence reported during December. There were 14 Class 3 occurrences. Among the Class 3 occurrences, in addition to those noted previously, were the rupture of a natural gas line at NREL causing building evacuations, an abandoned drain line at Hanford found to contain hydrogen at 130% LFL, and two inadvertent transfers of nitric acid to the wrong tank at Savannah River. There were two instances of confirmed UF₆/hydrogen fluoride (HF) releases at the Paducah Gaseous Diffusion Plant..

Summary of Class 2 Occurrences:

Propane Release during Transfer (EM): (ID--LITC-ERP-1995-0005) On December 14, at the INEL, a propane delivery driver could not obtain a seal on the liquid fill line to a 10,000 gallon propane tank. An adequate procedure governing the filling of the on-site propane tank was not available. On the advice of his company's office, he connected to the output/supply (vapor) side of the tank for refilling. The introduction of liquid propane resulted in excessive vapor pressure causing the overpressure controls on the burners to shut down ignition and the vapor pressure relief valves to actuate. Operators noticed the release, shut down propane delivery, manually closed the distribution system valves, verified burner flame cessation and performed emergency shutdown of all electrical systems at the project. Project personnel evacuated and initiated facility and program notification. There were no injuries or exposures reported. Corrective actions include developing a procedure for propane filling, additional training for project and vendor personnel, requiring project personnel to observe all propane deliveries, and installing lockouts/tagouts on the vapor line connection to prevent inadvertent use.

Airborne Lead Exposure (EM): (ID--LITC-WASTEMNGT-1995-0040) On December 13, at the INEL, as a result of an investigation, it was determined that a procedure violation resulted in exposing a construction worker to airborne lead. On 11/9/95, construction workers began cutting lead sheets. The work was being performed in a special tent that was not supplied with local exhaust. Respiratory protection was not required by LITCO Construction Safety based on knowledge of previous similar work and air sample analysis. A communication breakdown occurred between LITCO Construction Safety and Industrial Hygiene (IH) personnel concerning the control measures for preventing potential lead exposure to the workers. IH personnel had assumed that either local exhaust or respiratory protection would be used during the job. IH completed calculations on air monitor samples and determined that one worker had received an airborne lead exposure of 53 micrograms/cubic meter, slightly exceeding the OSHA permissible exposure limit (PEL) of 50 micrograms/cubic meter as an eight hour time-weighted average. The investigation determined that a Job Safety Analysis (JSA) procedure, developed for working with lead, required respiratory protection. No respiratory protection

was worn by the workers, constituting a violation of the procedure.

Potential Lead Exposures (EM): (OH-WV-WVNS-VFS-1995-0008) On December 15, at West Valley, employees were sanding a stair railing in preparation for painting and uncovered red paint beneath the existing yellow paint. The foreman stopped further sanding suspecting that the red paint may have been red lead. The stair rails were tested, and it was discovered that there was a section of rail that had been sanded which contained lead paint. Lead abatement actions were taken to remove contaminated lead chips and dust. Potentially exposed employees submitted blood samples to determine if exposure levels occurred. Results obtained indicated that there was no exposure. Occurrence investigation revealed that subcontractors had been briefed on the areas to be painted avoiding those areas that potentially contained lead-based paint. During the briefing, it was not specifically communicated as to where the potential lead areas were. The subcontractors inadvertently uncovered lead-based paint preparing (sanding) an area that they thought was part of the work package. As a preliminary lesson learned it was noted that as part of any pre-job brief, it is important to point out all restrictions and precautions involved with the associated work in a way that is clearly understood by all.

Release of Chlorine Trifluoride (EM): (ORO--LMES-PORTENVRES-1995-0004) On December 12, 1995, at Portsmouth, a pressure excursion during a gas cylinder repackaging operation resulted in a release of chlorine trifluoride and/or reaction products (chlorine and hydrogen fluoride) into the atmosphere. Initial estimates indicate approximately one pound of material was released. Initial air monitoring in the immediate vessel area indicated the presence of 10 ppm HF which is 10% of the OSHA standard for Immediate Danger to Life and Health (IDLH). No injuries or exposures were reported. It is believed that either the cylinder contained foreign material causing it to react from the heat generated during cylinder penetration, or that the cylinder penetration device or some other portion of the primary containment or buffering systems were contaminated with incompatible material.

Overexposure of Workers to Formaldehyde (DP): (SAN--LLNL-LLNL-1995-0069) On December 28, at Livermore, it was discovered that two employees were exposed to levels of formaldehyde that exceeded the ACGIH standard when the process they were working on was scaled up from a research level to a more production-like operation. A hazards assessment for the formaldehyde exposure associated with the research work in developing carbon aerogel papers was performed in August 1994. That assessment determined that exposures were sufficiently below OSHA standards so that no additional controls were required using those specific procedures and sample sizes. In October 1995, a new commitment was undertaken reflecting more than an order of magnitude increase in fabrication efforts. At that time, additional monitoring of the upscale effort was requested, but that assessment did not start until late November 1995. Actual production started in October 1995. Final exposure levels from the formaldehyde are not yet available; however, based on samples taken using a formaldehyde monitoring kit, the Industrial Hygienist is confident that exposure levels between October 1995 and mid-December 1995 exceeded the ACGIH ceiling (TLV-C) of 0.3 ppm, and may have occasionally exceeded the OSHA short term exposure limit (STEL) of 2 ppm.

Additional information regarding these occurrences and others will be discussed in an upcoming Quarterly Review. As occurrence reports are finalized, lessons learned will be communicated.

[Signature of]

Rama Sastry
Office of Field Support

[Attachment](#)

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Web conversion by: Joe Carbonaro

Web page design: Joseph Kahn