United States Government **Department of Energy**

memorandum

DATE: June 13, 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

May, 1996

Class 2:

Livermore - employees burned in caustic solution reaction

Rocky Flats - worker cut when beaker shatters during hydrolyzing of sodium

INEL - worker splashed with sulfuric acid when hose forced off by pressure

Ames - electric tube furnace explodes

NIPER - vapor released into laboratory and adjacent offices

Fernald - employees exposed to isopropyl ether

Additional:

At Rocky Flats and Y-12, reactive metals were exposed to air and moisture. At Mound, boil-off of liquid nitrogen caused oxygen depletion in an enclosure. .

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 May 1996 produced 33 reports representing potential chemical safety concerns. These occurrences are listed in Table 1. Seven occurrences were categorized as "Unusual" with the remainder identified as "Off-normal." The Office of Environmental Management (EM) was Cognizant Secretarial Office (CSO) for 14 occurrences, Defense Programs (DP) and Nuclear Energy (NE) each reported seven, Energy Research (ER) and Fossil Energy (FE) had two each, and Uranium Enrichment (UE) one. Six of the NE occurrences took place at the Portsmouth Gaseous Diffusion Plant. In recent months there has been some confusion as to whether or not Paducah and Portsmouth are required to report to ORPS and are reporting consistently. There is also a question as to whether NE or UE is the CSO responsible for these facilities. The information presented in this report is based entirely on ORPS and the designated CSO is taken directly from the occurrence report. This CSO designation may change after the distribution of this

monthly memorandum, and this change will be reflected in Quarterly and Annual Reviews.

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 six Class 2 occurrences reported during May. There were 17 Class 3 occurrences. Among the Class 3 occurrences, in addition to those noted previously, were two occurrences at LANL involving loss of ventilation fans. Incompatible explosives were stored together at PANTEX. Incorrect drums were sampled at Savannah River. There were six occurrences at Portsmouth involving UF6 releases, inoperable UF6 detectors, and failure to obtain a negative UF6 reading prior to opening a system for maintenance.

Summary of Class 2 Occurrences:

Employees Burned when Caustic Solution Reacts (DP): (SAN--LLNL-LLNL-1996-0020) On May 8, at LLNL, an employee in the Plating Shop was pouring Ebonol C (Sodium Chlorite/Sodium Hydroxide) powder into a de-ionized water(/acid etching) bath when the bath erupted violently, spewing hot caustic solution into the air, burning himself and another employee working 10 feet away. Both employees were treated at the Medical Facility and returned to work. An Incident Analysis Team was established to analyze the circumstances leading up to the chemical spill incident.

Employee Injured when Beaker Shatters during Hydrolyzing Reaction (EM): (RFO--KHLL-NONPUOPS1-1996-0041) On May 20, at Rocky Flats, a violent reaction occurred while hydrolyzing sodium metal in water. Sodium was cut and the shavings added one at a time to the reaction vessel. After the second addition, an argon purge was added to disperse hydrogen gas faster. After approximately 10 pieces had been treated, the glass beaker shattered releasing the contents of the reaction vessel (1 liter) causing the chemist's hand to receive superficial cuts. The process was being performed under a hood with all safety equipment in place. The treatment of reactive metals was being performed under an emergency treatment permit granted by the State of Colorado.

Worker Splashed with Sulfuric Acid when Hose Disconnects (NE): (ID--LITC-ATR-1996-0011) On May 28, at INEL, a pipefitter, who was wearing a full acid suit, face shield, and goggles, was sprayed with concentrated sulfuric acid while working on acid distribution piping. The flushing effort, which was controlled by an approved work order, called for attaching a length of hose to a barbed pipe nipple and routing the other end of the hose to a narrow-necked carboy designed to collect chemicals. The bulk acid storage tank is pressurized with approximately 10 psig of instrument air and was intended to be the source of pressure for this portion of the flushing procedure. When the first of two block valves was cracked open, the unclamped hose was forced off the barbed pipe nipple and a spurt of acid was ejected

upward to the ceiling. A few drops of acid from the ceiling fell on the back of the pipefitter's acid suit and dripped onto his neck. Another worker, who was only wearing safety goggles, sensed the nearby acid mist, but was not injured.

Electric Tube Furnace Explosion (FE): (CH--AMES-AMES-1996-0002) On May 22, at AMES Laboratory, four sealed fused silica tubes, each containing a mixture of niobium and red phosphorus were being heated in an electric tube furnace to react the material and form niobium phosphide. The researcher adjusted the furnace controller to ramp up the temperature. Shortly after leaving and closing the door to the unoccupied room where the furnace was located, one of the silica tubes shattered breaking the other tubes and quartz lining. Small amounts of glass shards and reacted and unreacted product were discharged from the open ends of the tube furnace on to the laboratory bench, floor, and an unoccupied desk located next to the laboratory bench. There were no barriers on the open ends of the tube furnace. A light colored haze was present in the room for a short time. There were no injuries or exposure of personnel.

Vapor Released in Laboratory and into Adjacent Offices (FE): (HQ--GOPE-NIPER-1996-0007) On May 16, at NIPER, while performing an interfacial tension measurement on a sample of dicyclopentidiene, research personnel momentarily turned the fumehood ventilation off to get an accurate sample measurement. While the ventilation was off, the sample vapors were released into the laboratory and entered the air handling core which dispersed the vapor into adjacent offices. Release of the vapor caused several office employees to develop headaches and nausea.

Employees Exposed to Hazardous Vapors from Opened Lab Pack (EM): (OH-FN-FERM-FEMP-1996-0030) On May 30, at Fernald, employees were packaging electrical waste items that were staged in a hazardous material storage locker for shipment. A total of five personnel were involved in the packaging operation; four workers and one Quality Assurance (QA) Inspector. The supervisor of the QA Inspector arrived and noticed three Hazardous Material "lab packs" located in the locker adjacent to the electrical waste. Each lab pack had a generic label stating "Warning: This container may contain hazardous waste or substances." Within the lab packs were sealed glass jars of unused reagent chemicals including isopropyl ether. The lab packs did not have National Fire Protection Association Hazard Communication labels, however, the jars inside the lab pack did. Out of curiosity, the supervisor opened the lid on one of the lab packs to inspect the contents. The supervisor was not aware that these three lab packs were not part of the hazardous waste shipment being prepared and not covered by the work plan governing this task. Immediately after the lid was opened, the supervisor noticed a "slight chemical odor" and closed the lid. Subsequently, two of the workers in the locker noticed a strong chemical odor and experienced eye, nose, and throat irritation. The two employees advised their coworkers to evacuate the locker. The two employees reported to Site Medical Services for treatment.

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

Note to Distribution:

This document is being electronically distributed. If you want to receive the document electronically and/or to be removed from the hard copy distribution list, to add another person, or to change your address, please contact **John Usher** 516-344-2096, Fax: 516-344-3957, E-mail: usher@bnl.gov at Brookhaven National Laboratory.

Web conversion by: Joe Carbonaro
Web page design: Joseph Kahn