

Date Tue, 11 Jan 2000 123223 -0700

From Meredith Brown racer@lanl.gov

Subject: Blue Alert- Recovery of Bulging Drum

Title: Blue Alert- Recovery of a Bulging Drum

Identifier 1999-ID-INEEL-439 Date 11-18-99

Lesson Learned Statement- Vendor recommendations/precautions should be subjected to a hazard review before performing them. In this event, a baking soda/water cleaning solution (a weak reducing agent) was collected in the same drum with cutting oil/water (an inorganic base and organic hydrocarbon) that had been drained from the milling machinery. Following the mixing of these chemicals, the drum was sealed and over-pressurization occurred. Note use of a vented container was not specified in the vendor recommendations Work planning was not involved in the oil replacement process which resulted in the mixing of chemicals and the overfilling of the drum. Waste Generation Services (WGS) subsequently received and stored the drums unaware of the baking soda content and the over-filled condition.

Discussion of Activities- On 06/28/99, a bulging drum was identified during a daily INEEL facility drum inspection. The content was believed to be a water-soluble oil. The drum was located in a portion of an Idaho Nuclear Technology and Engineering Center (INTEC) facility designed and used for drum storage. A planning meeting was conducted to determine the controls, resources and equipment required for a safe recovery of the over-pressurized drum. Preliminary discussions centered on past experiences and the previous training personnel have received in dealing with bulging drums (i.e., remote penetration of the lid of the drum with a device powered by compressed gas). It was known that this type device and technique had been used successfully 5 times in the past 6 months at other facilities. The material vented during the puncture could either be captured through the device, or released to the environment. Items in the planning included verification of the contents of the bulging drum, removal of 8 adjacent drums, venting the drum, capturing the vented liquid, re-packing the drum, and specifying the Personal Protective Equipment (PPE) to be worn by personnel involved in venting or capturing of vented material. Based on the contents of the drum being water-soluble oil, the safety significance was primarily injury to a worker in the vicinity of the drum if it should rupture and a portion of the drum should strike the worker. The oil released would require cleanup of the immediate surrounding area.

Analysis- The response strategy was divided into two phases Phase 1 would require inspecting and photographing both the bulging drum and other drums in the bay. Phase 2 would require venting the drum using a remotely operated tool powered by compressed gas and then over-packing the bulging 50-gallon drum into a DOT 85-gallon drum. Phase 1 did confirm the identification and the contents of the bulging drum as non-hazardous water-soluble oil with a pH of 8. Three other drums having a similar machine oil and baking soda combination were found to be undamaged during the inspection. A mockup for the phase 2 venting operation was performed using the drum-venting device on an empty drum. The venting device punch was modified to permit venting of the contents via two fittings and plastic tubing. Just before the bulging drum

was vented, a sharp "pop" was heard indicating that the contents of the drum were under significant pressure. Dark oil was observed venting from the drum through the plastic tubing into an adjacent 30-gallon drum. Shortly after the venting, the bulging drum was loaded into an over-pack DOT 85 gallon drum. The venting and over-pack operations were observed by DOE facility representatives and DNFSB contractor personnel. A change from the current machine shop milling equipment cutting oil (now in the drums) to one that is more environmentally friendly oil was in progress. The oil-change process was a one-time occurrence for this facility, but the lessons learned may be applicable to other facilities. Machine shop personnel were following the manufacturer's directions for cleaning residual cutting oil from the milling machinery sumps and destroying an odor causing bacteria using a mixture of baking soda and water. Baking soda had been proven to be effective in both destroying odor causing bacteria and removing residual oils from cooling systems using a water soluble oil. The baking soda/water solution and cutting oil from the cleaning process were collected in the same drum that already contained the old oil/water (approximately a 50:1 ratio - water to oil) drained from the equipment. Shop personnel performed the oil replacement process without work planning involvement and consequently WGS personnel were not consulted before packaging the waste material. Shop personnel overfilled (less than 10% head space) one drum and the amount of baking soda in the mixture was sufficient to create enough carbon dioxide to over-pressurize the sealed drum. The recovery of the over-pressurized drum was completed successfully. The following items were noted in the recovery - No approved recovery procedure for that facility for over-pressurized drums existed though a procedure was available from a facility that had previously vented drums with the venting device. Work control was established by two detailed pre-job briefs and Safe Work Permit instructions for venting and the over-pack of the drum. The personnel performing the recovery had used the venting device previously. The venting device vendor manual did not address all facets of the venting device assembly and use. For example, the installation of alternate punches was not addressed, and the operators were forced to use a screwdriver to vent the operating cylinder to allow installation of a punch having factory installed vent fittings. Even though the venting device vendor's manual established a strict limit for gas pressure to the operating cylinder, the vendor's nitrogen pressure regulator was not a calibrated device. The venting device vendor's manual did not appear to address the need for a punch gasket to permit a controlled vent discharge. However, the operators understood the vent device operation well enough from past experience to install the gasket anyway.

Recommended Actions- This event was initiated by a seemingly simple shop routine requiring no work planning or package. The potential hazards and costs stemming from this event could have been avoided or lessened by the following 1. Vendor recommendations/precautions should be subjected to a hazard review prior to mixing of chemicals. 2. Work planning for any activity producing a waste stream should include Waste Generation Services recommendations to ensure all requirements for waste disposal are addressed in the work package. 3. The topic Mixing of Chemicals and applicable lessons learned should be reviewed/discussed with employees who mix chemicals in containers for storage or disposal. 4. Facility Managers that are responsible for the storage of chemicals or process waste in sealed container (e.g., drum) should evaluate the need for a recovery procedure/plan and training from an over-pressurization condition. It is important to keep in mind when developing any recovery plan that the pH, flammability, etc., of the drum's content should be considered when determining the extent of the hazard. For a facility with a fixed chemical hazard list, a permanent procedure should be considered. Facilities

working with new or changing chemical hazards routinely, should use the integrated safety management process for each event on a case by case basis.

Priority Descriptor BLUE

Functional Category(s) (DOE) Emergency Management, Maintenance, Operations,
Packaging and Transportation, Safety, Training and Qualification, Management

Functional Category(s) (User-Defined) Emergency Management, Maintenance,
Operations, Packaging and Transportation, Safety, Training and Qualification, Management

Originator Bechtel BWXT Idaho, LLC

Contact J. Williams (208) 526-6467, wjs@inel.gov

Authorized Derivative Classifier D. F. Clafin, 208-526-1199, dfc@inel.gov

Reviewing Official W. F. Steinke, 208-526-6546, wfc@inel.gov

Keywords drum, bulging, waste

References N/A