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Subject: Yellow Alert: Welding Operation Injury

Title: Yellow Alert- Burn Injury Sustained During Welding Operation

Identifier: 2000-LA-LANL-ESH7-0006 Date: 07/28/2000

LESSONS LEARNED: Although welder safety training and welding procedures normally include prohibitions against allowing combustible/flammable material near welding operations, they may not specifically address the issue of flammable residue from cleaning solvents or oils. The introduction of combustible/flammable materials during cleaning activities was overlooked in this incident, resulting in personal injury to an experienced welder. The Laboratory has updated their site-wide welder training to address residue hazards.

DISCUSSION: A mechanical technician operating a tungsten inert gas arc welder sustained first and second degree burns on his forearm and hand while modifying a stainless steel drum. He was transported to the local emergency room by a coworker, and subsequently referred to a burn and trauma center for outpatient treatment. The technician had been assigned to reweld joints that had failed a helium leak detection test. A coworker cleaned the interior of the drum with ethanol to remove suspected oil residue and set the drum upside down to drain into a waste container. After it had drained and dried, the coworker set the cleaned drum upright on a work cart. The drums are not normally cleaned with ethanol, but the workers were concerned that residue from the first weld attempt might interfere with the second attempt to leak test the vessel. Neither the technician nor the coworker recognized that the cleaning activities could introduce unanalyzed hazards. The technician did not purge the cleaned drum with an inert gas, which would have prevented inclusions due to oxidation in the weld as well as control hazards associated with use of flammable solvents in the cleaning process. Nor did the technician inspect the container to be certain that it was clean and dry before he ignited the welding torch after donning a welder's hood and smock, and cotton gloves. When the technician began welding, ethanol vapor ignited and vented through a hole in the drum, burning his forearm and hand. A worker across the hall heard a loud noise and entered the welding shop to investigate. The worker found the injured technician, who had turned the welding torch off and removed his smoldering glove.

ANALYSIS: Purging was not required by the tube-to-vessel-fillet welding instruction the technician was using, which did not include a checklist of approved steps to complete fillet welds. Investigators also determined that the Laboratory's welding safety self-study course did not address cleaning containers using solvents or purging vessels and tubing as a safety precaution. The study material was updated to include a discussion of hazards associated with welding on vessels and tubing, and a recommendation for purging with an inert gas as a routine safety procedure. The fillet welding instruction was revised to require workers to purge vessels and tubes with argon gas. A checklist of approved container assembly steps was also developed that included criteria for satisfactory completion of each step.

RECOMMENDATIONS: Revise welding training materials as necessary to include information regarding potential hazards associated with cleaning items to be welded and the use

of purging as a safety precaution. Ensure that welding instructions include appropriate purging requirements and cleaning precautions. Consider developing checklists for welding operations to help prevent the inadvertent introduction of unanalyzed activities.

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DOE FUNCTIONAL CATEGORY: Occ. Safety & Health

WORK ACTIVITY: Welding, Burning, Hot Work

HAZARDS: Other

KEYWORDS: welding, purging, residue

REFERENCES: ALO-LA-LANL-TSTA-1999-0001

FOLLOW-UP ACTIONS: Information in this report is accurate to the best of our knowledge. As a means of measuring the effectiveness of this report, please contact the originator of significant action(s) taken as a result of this report or of any technical inaccuracies you find. Your feedback is appreciated.