Operating Experience Summary

U.S. Department of Energy
Office of Environment, Safety and Health
OE Summary 2006-02
March 14, 2006

Inside This Issue

Helping the field succeed with safe and reliable operations.

Inadequate Independent Verification Results in Lockout/Tagout Error

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On January 12, 2006, at the Hanford Spent Nuclear Fuels Project, a stationary operating engineer (operator) placed a lockout/tagout on the wrong circuit breaker in a 480-volt motor control center, and the independent verifier failed to identify the mistake. There were no injuries as a result of this event because the correct circuit breaker had previously been opened. However, this event is significant because failure to correctly perform independent verification undermines an essential step in the lockout/tagout process that ultimately ensures worker protection. (ORPS Report EM-RL--PHMC-SNF-2006-0003)

In support of construction activities, planners prepared a lock and tag to isolate perimeter lighting to allow forklift operation in the vicinity of the 480-volt power supply for the lighting. After the tagout was prepared, the operator, along with an independent verifier and a craft electrician, went to the motor control center to implement the lockout. The electrician opened the correct circuit breaker and performed a Safe Condition Check on the load side of the circuit breaker. The operator then left the area for a few minutes to get the tagout authorization form, the tag, and a lockbox. When he returned, he applied the lock and tag to the circuit breaker immediately to the left of the designated circuit breaker. The independent verifier then verified the placement of the lock and tag, but he failed to notice that the lock and tag were placed on a circuit breaker labeled as SPARE instead of on the circuit breaker labeled as 100 KE PERIMETER LIGHTS (see Figure 1-1).

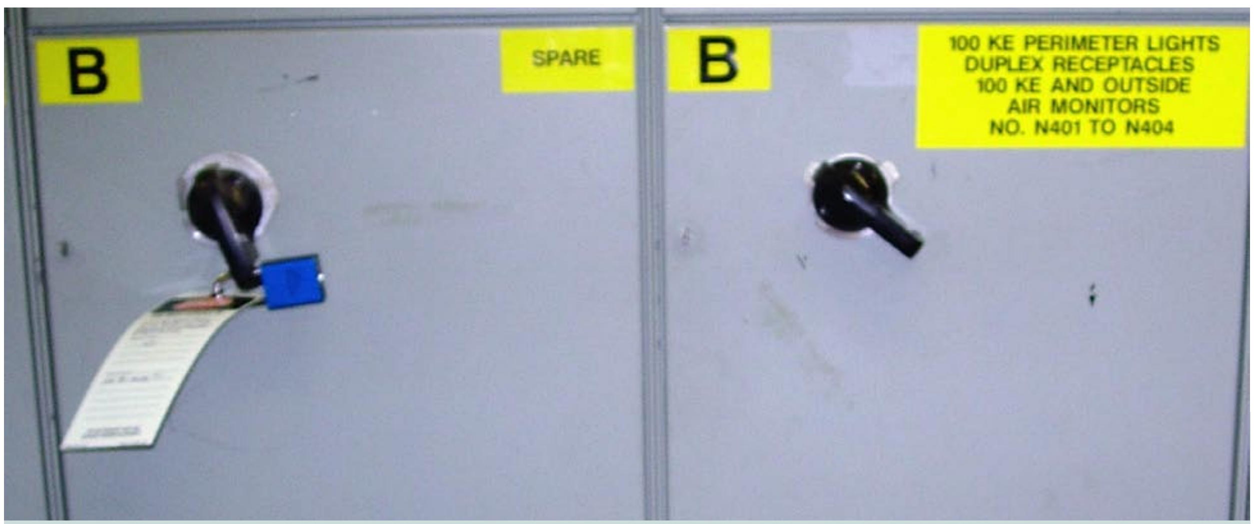

Figure 1-1. Side-by-side circuit breakers showing the lock and tag on the SPARE

After the lockout/tagout was placed, the craft electrician installed a required jumper (power line to ground) downstream of the circuit breaker. As part of this task, he was supposed to verify that the lock and tag were correctly placed before installing the jumper and placing his lock and tag on the lockbox. He failed to catch the operator's mistake. In fact, three people had an opportunity to catch the error but failed to do so. The error was later caught by construction electricians who were in the process of hanging their authorized worker locks on the lock box.

A causal analysis of this event has not been completed, but it is known that the operator who placed the lock and tag was not paying attention to what he was doing and failed to catch his own mistake.

The craft electrician also installed a jumper downstream of a circuit that was open but had not been put into an electrically safe condition (i.e., not locked out). The shift operations manager was also supposed to perform a walkdown of lockout/tagouts, but this was not done.

What is probably most germane is that the operator, verifier, and electrician had all performed similar work before, and they worked as a group when looking at the task order, the tag, and the motor control center. So, in reality, the verifier was not totally independent of the group when he performed his verification.

Independent verification is the practice of checking a given task for conformance to established criteria by a qualified person other than the one who performed the task. This is important because no matter how proficient a worker may be, mistakes can be made. The premise is that it is unlikely that two workers will independently make the same mistake. Independent verification is normally separated by distance and time to insulate the verifier from the performance of the task.

Although independent verification is primarily associated with the performance of lockout/tagouts, the practice is also effective in preventing mistakes during component and system alignments or verification of critical calculations. Closely related to independent verification is the practice of self-checking, a risk management tool designed to reduce human error by focusing the worker's attention on the details of the task at hand.

Prevent Events

Management

- Is independent verification incorporated into existing operating activities at your site?
- Have all personnel who perform verifications received specific training and qualification on the systems they will verify?
- Have all personnel who perform verifications trained on the techniques for verifying component position or status?
- Do facility operating guidelines identify specific systems, structures, and components that require independent verification?
- Do facility procedures provide instructions for independent verification techniques?

Supervisors and Workers

- Is the requirement to perform independent verification identified in the work control documents along with specific instructions?
- Are independent verification instructions addressed in pre-job briefings, such that the personnel involved are identified and the methods that will be used are understood?
- Are the methods or techniques used to perform independent verification capable of verifying compliance with the operational criteria without changing the position or status of the equipment?
- Is the independent verifier knowledgeable on the system/component and its configuration?
- Does the independent verifier practice self-checking techniques and have a questioning attitude?
- Does the independent verifier understand the safety role and the importance of maintaining independence while conducting the verification?

Because workers are vulnerable to distraction and complacency, as well as emotional and physical stresses that can affect judgment and performance, the practice of self-checking and the use of independent verification can be the last defensive barrier to error.

The following two events are additional examples of inadequate independent verification.

On October 3, 2005, at the Fernald Closure Project, operators placed and independently verified a lock and tag on the wrong valve when preparing to clear a clog in a large gate valve on a cement delivery system. The lockout/tagout required isolation of the air supply to the pneumatic actuator on the gate valve. Instead of locking and tagging the ball valve in the air supply line to the actuator, the operators tagged another ball valve that had been abandoned in place. Although the abandoned valve had the same number as the correct valve, it had a tag indicating that it was no longer in service. The tag had been applied after the valve was replaced during a system modification. The operators could also see the air line was isolated and plugged. (ORPS Report EM-OH-FCP-FFI-FEMP-2005-0034; final report filed 11/17/2005)

Investigators determined that a walkdown of the equipment area was not performed, as required by the lockout/tagout procedure, and that the correct valve probably would have been identified had there been a walkdown. Instead, a qualified operator hung the lock and tag on the wrong valve, and another qualified operator verified the lock and tag on the wrong valve, even though the valve was clearly labeled "abandoned in place" and was connected to an air supply line that was plugged.

On January 27, 2005, at the Savannah River Site, an inadvertent transfer occurred between tanks at the F-Canyon because a valve that should have been locked and tagged closed was actually open. The valve is located well above the floor in a congested piping area and is positioned using a mechanical chain. The operator who installed the lockout/tagout was not in the correct position when he manipulated the chain and incorrectly assumed the direction in which to operate the valve. The operator who performed the independent verification did not perform an adequate check to verify that the valve was closed because he had witnessed the entire valve manipulation and was not physically separated by location or time during the installation of the lockout/tagout. He incorrectly assumed the valve was properly positioned and did not perform any additional checks to detect the error. (ORPS Report EM-SR--WSRC-FCAN-2005-0001; final report filed 02/14/2005)

DOE Order 5480.19, *Conduct of Operations Requirements for DOE Facilities*, states that DOE policy is to operate DOE facilities in a manner to ensure an acceptable level of safety and to ensure procedures are in place to control conduct of operations. Chapter X, "Independent Verification," states that independent verification programs should provide a high degree of reliability in ensuring the correct positioning of components. The Order defines independent verification as "the act of checking a component position independent of the activities related to establishing the position of the component." Guidelines for implementing independent verifications can be found in DOE-STD-1036-93, *Guide to Good Practices for Independent Verification*. The Standard provides specific guidance on verification techniques in section 4.3.

These occurrences underscore the importance of applying disciplined conduct of operations to the implementation of lockout/tagouts. A properly executed independent verification is one of the most effective barriers to an incorrect lockout/tagout. Emphasis by managers and supervisors on verification by an independent, qualified individual can significantly reduce the likelihood of personnel errors.

KEYWORDS: *Independent verification, lockout/tagout, conduct of operations, self-checking*

ISM CORE FUNCTIONS: *Define the Scope of Work, Analyze the Hazards, Develop and Implement Hazard Controls*

Noise Overexposures Result in Short-Term Hearing Loss

2

A recent event at Los Alamos National Laboratory (LANL) resulted in workers experiencing short-term hearing loss. In addition, both Brookhaven National Laboratory (BNL) and Idaho National Laboratory (INL) have reported noise overexposure events in recent months. According to NIOSH, noise-induced hearing loss is one of the most common occupational diseases—a disease that is both permanent and irreversible, but also 100 percent preventable when hearing protectors or engineering controls are used.

On December 14, 2005, at LANL, two employees experienced auditory distortion and ringing in their ears as a result of being exposed to noise from an annunciator during testing of a new fire protection system. The employees were transported to the site medical facility for evaluation, and both were diagnosed with a short-term hearing loss injury. Fortunately, neither worker is expected to have permanent hearing loss. (ORPS Report NA--LASO-LANL-RADIOCHEM-2005-0007)

The employees worked in different areas of the facility and experienced hearing problems at different times. Although one worker was diagnosed with minimal short-term hearing loss, the other had redness and a small amount of blood in his ear canal. Following this incident, noise-level testing was performed in the areas where the workers experienced the problem, as well as in other areas of concern. Testing indicated that the highest recordable noise level was 104 dBA (decibels Acoustic). OSHA hearing protection standards state that noise limits cannot exceed 82 dBA for a continuous 8-hour exposure and cannot exceed 115 dBA for intermittent noise.

Critique members determined that all work associated with the fire protection upgrade program was properly planned and coordinated. They believe that, because the horns on the newly installed system are louder than those on the old system, building tenants may not have been fully aware of how loud the annunciator would be. In the future, fire protection testing will be scheduled after normal work hours to minimize the number of people exposed to annunciator noise. The LANL Hearing Conservation Program identifies tasks that could expose workers to increased noise levels. Under the program, these workers are monitored using noise dosimeters to ensure they are not exposed to harmful noise levels.

The BNL noise overexposure event occurred on January 18, 2006. A detailed analysis of sampling data from a noise survey indicated that two workers might have been exposed to excessive noise levels. The data showed that sources in a high bay adjacent to a pump room operate at levels above the 85 dBA ACGIH Threshold Limit Value (TLV®) and that levels in the general work area are just below 80 dBA. Both workers went to the site clinic for audiometric testing and entered the medical surveillance program, which requires annual audiograms. (ORPS Report SC--BHSO-BNL-BNL-2006-0002)

The workers usually worked part of the day in the pump room, which is a posted high noise-level area, and they wore both hearing protection and noise dosimeters. When they were not working in the posted area, however, they normally did not wear hearing protection and were not monitored. After discussions with the two workers about their daily work pattern, investigators determined that they could not rule out an overexposure because of the combination of multiple elevated noise sources. To alleviate the problem, the workbench where the workers spend their non-pump time was moved to a noise-shielded area, and sound-deadening material was installed around the work bench area.

Noise levels from heavy equipment operations resulted in worker noise overexposures at INL. On September 21, 2005, an Industrial Hygienist (IH) determined that two equipment operators had been exposed to unprotected noise levels in excess of 85 dBA, most likely from hammering operations being conducted inside the shell of a building being demolished. The workers were inside an enclosed equipment cab when the exposures occurred. An audiometric evaluation indicated that neither worker experienced a hearing loss. (ORPS Report EM-ID--CWI-LANDLORD-2005-0009)

Based on initial noise monitoring of the hammer several days before the incident, the boundary for hearing protection was extended. In addition, operators in enclosed cabs were required to wear hearing protection when the hammer was in use. However, the operators believed the cabs protected them from exterior noise, so they requested an exclusion from the hearing protection requirement on the basis that using it made it difficult for them to communicate via radio.

Without informing management, the IH agreed to the operators' request. He believed the addition of the hammer would not significantly increase cab noise levels, which monitoring data showed were within the acceptable range. The IH directed the operators to wear noise dosimeters to confirm that noise levels in the cab had remained below the 85-dBA TLV, but when he analyzed the data, he found that the TLV had been exceeded.

Investigators determined that the direct cause of the noise overexposure was that the IH permitted the operators to work without hearing protection even though management had instructed that it be worn. The IH was aware of management direction to use hearing protection in the equipment cabs, but he assumed he was permitted to change the requirement. However, management had increased the requirements based on changes in equipment and changes in conditions that would result in increased noise, and their direction should have been heeded. The IH was counseled on the consequences of this incident and his roles and responsibilities relative to PPE, as well as on the need to keep management informed.

What We Hear at Various Decibel Levels

0 dB	Faintest sound heard by human ear
30 dB	Whisper, quiet library
60 dB	Normal conversation, sewing machine, typewriter
90 dB	Lawnmower, shop tools, truck traffic (8 hours per day maximum exposure to protect 90 percent of people)
100 dB	Chainsaw, pneumatic drill, snowmobile (2 hours per day maximum exposure without protection)
115 dB	Sandblasting, loud rock concert, auto horn (15 minutes per day is the maximum exposure without protection)
140 dB	Gun muzzle blast, jet engine (Noise causes pain and even brief exposure injures unprotected ears. Maximum allowed noise **with** hearing protection)

Figure 2-1. Sample signage indicating requirement for hearing protection

Acoustic trauma can occur from one single event and may result in immediate and significant hearing loss. Habitual exposure to noise above 85 dBA will cause a gradual hearing loss in many individuals, and louder noises will accelerate this damage. That is why it is essential to ensure the use of hearing protection in an excessively loud environment. High-noise areas need to be properly posted to warn workers and identify the need for hearing protection. An example sign is shown in Figure 2-1.

Removing hazardous noise from the workplace (e.g., installing a muffler or building an acoustic barrier) is the most effective way to prevent noise-induced hearing loss. Hearing protectors, such as ear plugs and ear muffs, should be used when it is not feasible to otherwise reduce noise to a safe level. Hearing protection devices are labeled with a Noise Reduction Rating (NRR) that helps determine how much reduction in noise is provided. Earplugs are generally rated NRR 22 and are sufficient for decibel levels of 85 dBA.

NIOSH recommends hearing loss prevention programs for all workplaces with hazardous levels of noise. These programs should include noise assessments, engineering controls, audiometric monitoring of workers' hearing, and appropriate use of hearing protectors. NIOSH also recommends that such programs include worker education, careful recordkeeping, and scheduled program evaluations. Under OSHA regulations, employers are required to reduce the noise at the source through

Prevent Events

Management

- Have you developed and administered a Hearing Conservation Program and are personnel trained on the elements of this program?
- Have you identified locations and equipment where high noise levels are suspected?
- Have you identified all employees and workers who may have had high noise exposures?
- Do you have the necessary technical expertise and equipment to identify work areas and equipment where noise levels equal or exceed 85 dBA?
- Are work areas and equipment resurveyed when noise levels have changed because of facility or equipment modifications?
- Have you posted signs on doors to areas where equipment consistently generates noise levels in excess of 85 dBA?

Supervisors and Workers

- Do you monitor and enforce the use of hearing protection devices when they are required?
- Do you implement administrative controls for hearing protection?
- Do you enforce the use of engineering controls as applicable?
- Do you consider high-noise conditions as a hazard when planning work?
- Do you ensure that workers who could be exposed to excessive noise levels participate in hearing protection training?
- Are at-risk workers medically monitored for hearing loss?
- Do you use hearing protection when required?
- Do you report changing conditions that could impact personal noise exposures to management?

engineering solutions, but if that is not possible or economically feasible, using hearing protection as a temporary solution is acceptable. OSHA requires a hearing conservation program if the TWA noise level exceeds 85 dBA.

The NIOSH website contains a wealth of information on noise and hearing protection including information on choosing the correct hearing protection, solutions for reducing workplace noise, and current research on noise and hearing loss. Requirements regarding noise exposure and hearing protection for general industry can be found in OSHA Standard 1910.95, Occupational Noise Exposure. Table G-16 of the Standard lists permissible noise exposure levels.

These events demonstrate that using hearing protection is essential when workers may be exposed to noise above the approved OSHA and ACGHI thresholds. Workers should never circumvent the requirement to use hearing protection, and supervisors and managers should take all precautions to ensure that the risk to worker hearing is minimized, including providing sound-proofing and barriers when necessary. Activities such as testing fire system annunciators should be scheduled for a time when employees are not working in buildings to prevent inadvertent noise overexposures.

KEYWORDS: *Hearing protection, hearing loss, noise overexposure, earplugs, noise dosimeter, hearing conservation*

ISM CORE FUNCTIONS: *Analyze the Hazards, Develop and Implement Hazard Controls*

Working Safely with Acids

3

On August 15, 2005, the DOE Los Alamos Site Office Manager appointed a Type B Accident Investigation Board to analyze the June 2005, chemical exposures of two post-doctoral employees. The employees were cleaning laboratory glassware using aqua regia (a mixture of hydrochloric and nitric acids) when the exposure occurred. Figure 3-1 shows a re-enactment of the event that demonstrates how the vapors passed through the workers' breathing zone. Both employees exhibited symptoms of acid vapor exposure, and one was hospitalized for 6 days with pneumonia and fluid in the right lung. (ORPS Report NA--LASO-LANL-RADIOCHEM-2005-0005)

The Board determined that the accidental overexposure was preventable. The lessons learned from identified deficiencies in hazard analysis and work execution are applicable across the Complex. Key deficiencies included the following.

- The integrated work document specified that work with aqua regia was to be performed within a hood. However, the laboratory where the employees were working did not have an operational hood, so they decided to substitute a portable ventilation system designed for welding fume control. The Board determined that the portable system did not provide adequate protection.
- Neither of the employees was familiar with the hazards of preparing and using aqua regia or with developing integrated work documents.
- The work authorization document did not indicate that working with aqua regia was a highly hazardous activity. In fact, if the hazards had been graded "high" instead of "moderate," safety and health professionals would have been involved in planning the job.

A search of the ORPS database shows that more than 40 events involving acid exposures were reported in the past 5 years. Half of these occurrences resulted in acid burns or exposures to acid mists, including four incidents resulting in serious injuries requiring hospital treatment. The remaining cases were acid spills or leaks, unexpected exothermic reactions, and unsafe conditions that had the potential for exposure but did not result in an injury.

Figure 3-1. Re-enactment of event showing how vapor passed through workers' breathing zone

Because acid is extremely dangerous when it comes in contact with skin, effective work planning is required to ensure that workers are adequately protected by PPE. During D&D operations at Savannah River on February 22, 2005, for example, a small amount of acidic liquid dripped onto a worker's bare wrist while he was cutting a section of pipe, burning him badly. Although the worker was wearing an acid suit and gloves, his skin was exposed between the PPE suit sleeve and glove when he reached up to grip the pipe. Planners should consider requiring longer gloves when work involves activities that could result in unprotected areas of the body being exposed to acid. (ORPS Report EM-SR--WSRC-FDP-2005-0003)

Acid also presents an inhalation danger; therefore, both correct PPE and situational awareness are crucial to worker safety, as the following examples show.

In February 2005, Los Alamos National Laboratory physicians determined that two probationary workers had been exposed to hydrochloric acid vapors approximately 2 years earlier. The workers, who were performing a cutting/etching task, were issued respirators with HEPA cartridges instead of the acid-gas cartridges specified in the Hazard Control Plan. Neither they nor their supervisor knew enough about the dangers or the cartridges to exchange them or to stop work. As a result of wearing the incorrect cartridges, one worker suffered decreased lung function and has since been reassigned to another job. (ORPS Report NA--LASO-LANL-FIRNGHELAB-2005-0005)

Situational awareness probably prevented multiple acid-related worker injuries at the National Energy Technology Laboratory-Pittsburgh last year. On June 7, 2005, an alert Lead Operator stopped an acid transfer after he noticed vapor mist in a stairwell. All personnel were immediately evacuated, and temporary auxiliary ventilation was set up to prevent future

Prevent Events

Management

- Is there central site ownership for chemical safety and do employees know where to go for consistent analysis and advice on job-specific acid hazards?
- Does our site have the expertise or access to resources to cope with the complex aspects of chemical safety?
- Do workers have easy access to safety equipment such as PPE, showers, and eyewash facilities?
- Is safety equipment inspected in accordance with regulations?
- What training is provided to laboratory personnel and other workers who handle acids?

Supervisors and Workers

- Is the MSDS in the immediate work area for quick reference, and have you read it?
- Do you know what good practices are when working with acids?
- Have you been adequately trained to recognize, identify, mitigate, and control hazards associated with acids?
- Who is the contact for chemical safety information and assistance?
- Who are the acid hazards SMEs?
- Do you have the appropriate PPE for safely handling acids?
- Where are the closest safety showers and eyewash facilities?
- Where can you find guidelines for proper storage and disposal of acids and their wastes?
- Do you know how to transport acids safely?

vapor buildup. Investigators determined that as hydrochloric acid was being pumped from the cool basement of a wastewater treatment facility to the warmer treatment area, temperature variations caused acid vapor mist to collect in the stairwell between the two floors. (ORPS Report FE-HQ--GOPE-NETLPIT-2005-0003)

It is important to realize that acids are incompatible with many materials. For example, concentrated acids can be highly exothermic when mixed with water, which can result in splatter or mist. Mixing acids with alkali solutions, carbides, chlorates, or nitrates can result in violent exothermic reactions or explosions. On August 29, 2005, at Sandia National Laboratory, an employee mixed hydrogen peroxide and ammonium hydroxide, which is used as an aggressive etch. The resulting explosion blew apart a glass vial inside the fume hood, embedding shards of glass in the worker's hands. (ORPS Report NA--SS-SNL-1000-2005-0009)

High concentrations of phenol (carbolic acid) can cause death by inhalation, ingestion, or absorption through the skin. Phenol's life-threatening capability has never been demonstrated so strongly as in the June 18, 2005, fatality at the Bayer Material Sciences plastics manufacturing facility in Baytown, Texas. A maintenance mechanic, who had worked at the facility for 15 years, died from exposure to phenol used in the plastics process.

The mechanic and two co-workers disconnected a "sea container" from a pump and mistakenly left a valve closed. When the mechanic completed his task, he removed his PPE and entered a decontamination shower just as the system started. However, because the workers had not opened the valve when disconnecting the container, pressure built up in the pipes and a gasket ruptured. Phenol in the pipes poured down on the worker, who died on the way to the hospital. A subsequent OSHA investigation determined that the procedure the workers followed to disconnect the container was unclear.

Supervisors should ensure that workers have access to all pertinent Material Safety Data Sheets and have reviewed them before performing work. Information on working with acids can also be obtained from site safety and health offices.

A DOE Environment, Safety and Health Bulletin, *Working Safely with Acids* (Issue 2005-12), contains additional information about precautions to take when working with acids, as do the following online sources:

- OSHA Standard 29 CFR 1910.119, *Process Safety Management of Highly Hazardous Chemicals*. Appendix A is a list of hazardous chemicals with their threshold quantity;
- OSHA Standard 1910 Subpart Z, *Toxic and Hazardous Substances*;
- Document 14.8, *Working Safely with Corrosive Chemicals*, of the Lawrence Livermore National Laboratory Environment, Safety and Health Manual http://www.llnl.gov/es_and_h/hsm/doc_14.08/doc14-08.html; and
- The Canadian Centre for Occupational Health and Safety publication, *How Do I Work Safely with Corrosive Liquids and Solids?* http://www.ccohs.ca/oshanswers/prevention/corrosi1.html.

Acid exposures, injuries, and spills can be avoided. Safe work with acids requires adequate hazard analysis and work planning far enough in advance to allow for additional Industrial Hygienist review and possible support. Once work starts, workers must be alert and take proper precautions. The Prevent Events text box is intended for use at morning or work-unit meetings or at pre-job briefings to communicate key industry experience. Anyone with questions on the safe handling of acids may contact Dr. Bill McArthur at 301-903-9674 or e-mail bill.mcarthur@eh.doe.gov.

KEYWORDS: *Acid, vapors, acid burns, inhalation, PPE*

ISM CORE FUNCTIONS: *Analyze the Hazards, Develop and Implement Hazard Controls*

Unrevealed Health Issues Result in Injuries and Fatalities

4

Being fit for duty means reporting to work mentally and physically fit to perform safely, responsibly, productively, and reliably.

Worker safety is a mutual responsibility between worker and employer. When a worker fails to disclose a health issue, whether physical or psychological, managers and supervisors cannot accurately assess the worker's ability to perform assigned work. More importantly, however, failure to communicate health-related information that impacts fitness for duty can have serious consequences.

A prime example that chillingly illustrates the dangers of unrevealed health-related issues is the 2003 Staten Island Ferry crash, one of the worst mass-transit disasters in New York history. Eleven passengers were killed, and dozens more were injured, when the pilot at the helm blacked out and hit a concrete maintenance pier at full speed. Figure 4-1 shows the damage to the interior of the ferry. The pilot pleaded guilty to negligent manslaughter and was sentenced to 18 months in prison.

The pilot, who was suffering from extreme fatigue and taking painkillers, stated at his sentencing hearing that he "will regret for the rest of my life that I did not just call in sick." He also admitted that he had concealed his high blood pressure and a prescription for a powerful painkiller when renewing his pilot's license. Either disclosure could have disqualified him from service.

A search of the ORPS database revealed that undisclosed health issues have led to both injuries and fatalities among DOE workers, as well.

On May 2, 2005, at the East Tennessee Technology Park Environmental Restoration Operations, a subcontractor radiological control technician lost control of his vehicle and struck a post and a jersey wall. Witnesses stated that the vehicle was traveling at a high rate of speed as it veered off the road and that after the accident the driver acted confused and could not remember what had happened. A passenger in the vehicle stated that the driver appeared to be in a trance-like condition as the vehicle increased speed and that he apparently did not attempt to negotiate

Figure 4-1. Interior of Staten Island ferry post-accident (AP photo)

the curve. The passenger received a laceration to the top of his scalp; the driver was treated and released. (ORPS Report EM-ORO--BJC-K25ENVRES-2005-0012; final report issued August 16, 2005)

Investigators performed a post-incident inspection of the brakes and accelerator, as well as reviewing maintenance and inspection records, and found nothing to indicate mechanical problems. They concluded that drugs were not involved in the incident and believe that a non-occupational health condition, which the driver had not reported to his supervisor, led to the accident.

Corrective actions for this incident included restricting the driver from operating company-owned vehicles or machinery and restricting him from any work at unprotected heights. In addition, the subcontractor required all workers to read the workplace substance abuse policy to reinforce their responsibility to report any medical conditions.

A fatal ladder fall at the Hanford Site may also have been the result of an unrevealed health issue. On July 15, 2004, a subcontract worker was found motionless at the bottom of a ladder he had been using while removing screws from the aluminum trim of an office trailer. The worker was later pronounced dead on arrival at the local medical center. While conducting a Type A Accident Investigation, investigators learned that the employee, who had outpatient surgery 3 days before the accident, had collapsed twice at home on the day following the surgery and had complained to co-workers that he was feeling dizzy on the day of the accident. (ORPS Report EM-RL--PHMC-GENERAL-2004-0005)

Investigators learned that on July 13, only 1 day after the worker underwent outpatient surgery under general anesthesia, he returned to work and worked for about 4 hours. Later that evening he vomited and collapsed twice. He also stopped taking his post-surgery medication.

Being fit for duty means reporting to work mentally and physically fit to perform safely, responsibly, productively, and reliably.

On the morning of the accident, the worker had been removing decking and placing it in a trailer for disposal. At about 9 A.M., he spoke with another employee and remarked about the heat and having felt dizzy twice while working that morning. Someone also noticed that the worker looked pale and hot later in the morning, and after lunch the worker again remarked about the heat and how he wished he could remain in the air-conditioned trailer. However, no one was sufficiently alerted to his condition to stop the work, and he moved on to perform the work task involving the ladder. The worker's manager told investigators that he was not made aware of the surgery, the collapse, or the dizziness. Because the worker was alone when the accident occurred, it is not clear what led to the accident, but the worker's medical condition may have been a contributing factor. OE Summary 2004-18 details the Type A accident investigation of this fatality.

Another fatality traced to a worker not disclosing pertinent health information occurred in 1995 at Pantex. (ORPS Report DP-ALO-AO-MHC-PANTEX-1995-0223) A Security Police Officer collapsed while running on an exercise track to satisfy qualification requirements. He was taken to the hospital, placed on life support systems, and later died. The officer had signed his annual fitness sign-off form, certifying that he had no health concerns or changes in medication since his medical examination about a month earlier; however, he had bronchitis and was using a bronchodilator that had recently been prescribed by his physician. Investigators determined that the officer's failure to report a change in his health condition, as required, led to the fatality. Had he reported the change in his health status, he would have been prohibited from taking the qualification test.

Primary responsibility for fitness for duty rests with the worker. Like the ferry pilot, who said at his sentencing, "I was on the wheel. I was responsible," each worker must be responsible for ensuring that any health issue that could impact his or her ability to perform is disclosed. In addition, workers should not attempt to perform even routine work tasks when they suspect they may not be physically or mentally fit to do so.

When a worker discloses health information that can impact fitness for duty to a supervisor, accommodations (such as those made post-incident in the May 2005, vehicle accident) can be made to ensure the safety of the worker or (as in the case of the ferry pilot) those whose lives may depend on a worker. Supervisors should take note of any unusual behaviors exhibited by workers that could indicate a health problem. If a worker fails to take personal responsibility for reporting such issues, supervisors must take prompt appropriate action, including devising reasonable modifications to work assignments.

A supervisor should request a fitness-for-duty evaluation if one or more of the following occurs:

- a worker identifies a medical condition as the cause of a performance problem;
- behavior is observed that is not typical of the worker;
- concern exists about whether the worker can perform in a safe and reliable manner; or
- a worker requests a medically based accommodation.

The Department's Office of Human Reliability Programs within the Office of Health has the responsibility for monitoring worker health and fitness for duty through annual medical and psychological assessments for individuals in certain positions critical to national security or worker and community safety. Program elements are derived from 10 CFR, Part 712, Human Reliability — Physical & Mental Fitness-for-Duty Program.

These events point out the importance of workers notifying managers and supervisors of any illness or change in health status that might affect their own safety or that of their co-workers. Supervisors should be alert to any change in worker performance that could indicate a health-related issue and should ensure that workers are promptly evaluated by the appropriate health professionals. Co-workers should also report any behaviors that appear to indicate that a worker is experiencing a physical or mental health issue.

KEYWORDS: *Fitness for duty, fatality, health condition, ladder, fall, vehicle accident*

ISM CORE FUNCTIONS: *Develop and Implement Hazard Controls, Provide Feedback and Improvement*

The Office of Environment, Safety and Health, Office of Corporate Performance Assessment publishes the Operating Experience Summary to promote safety throughout the Department of Energy complex by encouraging the exchange of lessons-learned information among DOE facilities.

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Commonly Used Acronyms and Initialisms

Agencies/Organizations	
ACGIH	American Conference of Governmental Industrial Hygienists
ANSI	American National Standards Institute
CPSC	Consumer Product Safety Commission
DOE	Department of Energy
DOT	Department of Transportation
EPA	Environmental Protection Agency
INPO	Institute for Nuclear Power Operations
NIOSH	National Institute for Occupational Safety and Health
NNSA	National Nuclear Security Administration
NRC	Nuclear Regulatory Commission
OSHA	Occupational Safety and Health Administration
SELLS	Society for Effective Lessons Learned

Units of Measure	
AC	alternating current
DC	direct current
psi (a)(d)(g)	pounds per square inch (absolute) (differential) (gauge)
RAD	Radiation Absorbed Dose
REM	Roentgen Equivalent Man
TWA	Time Weighted Average
v/kv	volt/kilovolt

Job Titles/Positions	
RCT	Radiological Control Technician

Authorization Basis/Documents	
JHA	Job Hazards Analysis
NOV	Notice of Violation
SAR	Safety Analysis Report
TSR	Technical Safety Requirement
USQ	Unreviewed Safety Question

Regulations/Acts	
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
D&D	Decontamination and Decommissioning
DD&D	Decontamination, Decommissioning, and Dismantlement
RCRA	Resource Conservation and Recovery Act
TSCA	Toxic Substances Control Act

Miscellaneous	
ALARA	As low as reasonably achievable
HEPA	High Efficiency Particulate Air
HVAC	Heating, Ventilation, and Air Conditioning
ISM	Integrated Safety Management
MSDS	Material Safety Data Sheet
ORPS	Occurrence Reporting and Processing System
PPE	Personal Protective Equipment
QA/QC	Quality Assurance/Quality Control
SME	Subject Matter Expert