Office of Environment, Safety and Health • U.S. Department of Energy • Washington, DC 20585

OPERATING EXPERIENCE SUMMARY

Office of Environment, Safety and Health

Summary 2001-06

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

To issue the Summary in a timely manner, EH relies on preliminary information such as daily operations reports, notification reports, and, time permitting, conversations with cognizant facility or DOE field office staff. If you have additional pertinent information or identify inaccurate statements in the Summary, please bring this to the attention of Frank Russo, 301-903-1845, or Internet address Frank.Russo@eh.doe.gov, so we may issue a correction.

The OE Summary can be used as a DOE-wide information source as described in Section 5.1.2, DOE-STD-7501-99, *The DOE Corporate Lessons Learned Program*. Readers are cautioned that review of the Summary should not be a substitute for a thorough review of the interim and final occurrence reports.

Operating Experience Summary 2001-06

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EVENTS

1. TYPE B INVESTIGATION OF WORKER BURNED BY HOT WATER

On September 7, 2001, an Oak Ridge National Laboratory worker was burned by the accidental spray of hot water from a tunnel port washer at Building 9210 (the "Mouse House") at the Y-12 site. The worker suffered first-degree burns to her waist and legs, second-degree burns around her feet, and was hospitalized for over a week. The Oak Ridge Operations Office has begun a Type B investigation of the accident. When the investigation is completed, the OE Summary will discuss its major findings and conclusions. (ORPS Report ORO--ORNL-X10LIFESCI-2001-0005)

2. INCORRECT PERSONAL PROTECTIVE EQUIPMENT USED FOR POWER LINE MAINTENANCE

On August 8, 2001, at the Idaho National Engineering and Environmental Laboratory (INEEL), a maintenance crew reattached an energized, 480-volt, overhead electric power line to a utility pole in the Waste Reduction Operations Complex (WROC) without wearing the correct personal protective equipment (PPE). The crew used a standard aerial lift and wore only leather gloves, safety glasses and hard hats as PPE. The crew completed the work without incident. However, safety experts later determined that insulated gloves and a lift with an insulated bucket should have been used for the task. Based on the perceived risk from using improper electrical PPE, the contractor categorized this occurrence as a near miss. (ORPS Report ID--BBWI-WROC-2001-0001)

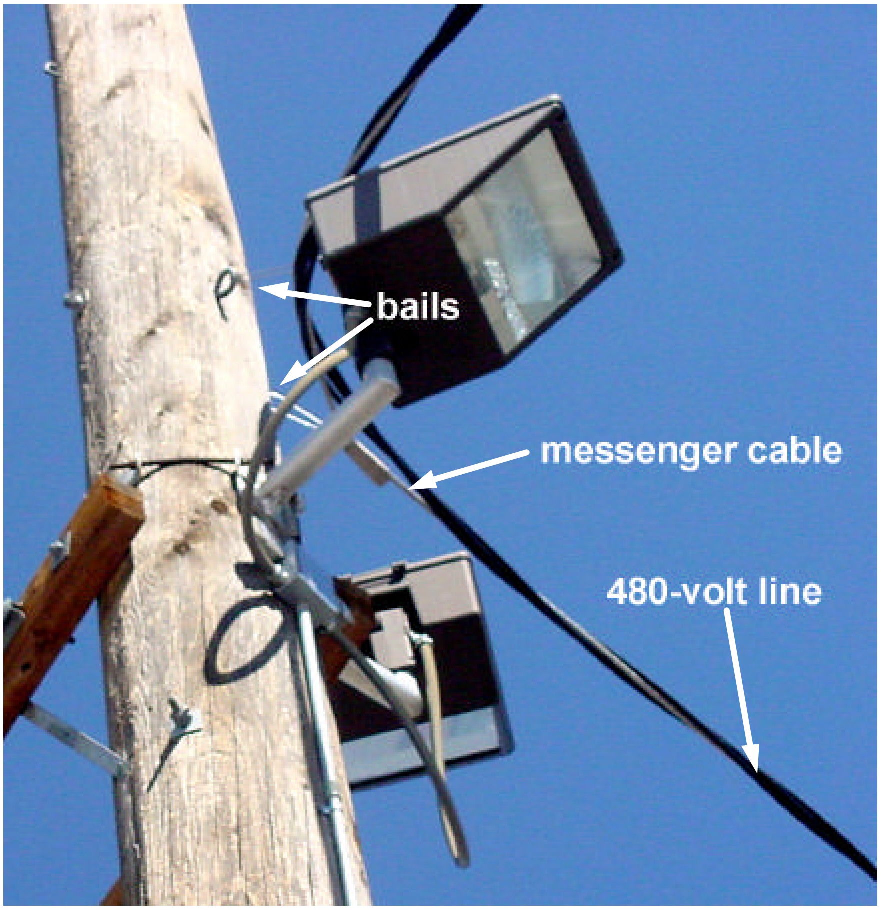

Figure 1. The upper messenger cable bail was reattached to the utility pole

In January 2001, workers reported that one of two messenger cable bails holding a 480-volt power line to a utility pole at the WROC was loose. Facility management decided that the job of reattaching the bail to the pole would involve little risk, and assigned this to the electricians in its maintenance organization rather than to utility workers in its power management organization. A craft foreman, electrician, and electrician's helper walked down and planned the task. They assumed that the power line's Tri-Plex wiring was sufficiently insulated to prevent an electric shock hazard, and thus saw no need for special electrical PPE. On August 8, 2001, the electrician's helper was raised in an aerial lift (Genie Lift), and used a rope to pull the line's messenger cable and reattach the bail to the utility pole (the upper bail shown in Figure 1).

As the maintenance crew completed the task, a site electrical safety subject matter expert observed that improper PPE had been used, leading to this occurrence being reported and categorized as a near miss. The National Fire Protection Association (NFPA) *National Electric Code,* NFPA 70, does not recognize Tri-Plex wiring as being insulated; thus, for this task, the *Standard for Electrical Safety Requirements for Employee Workplaces,* NFPA 70E, would have required the use of rubber gloves and an insulated lift bucket. It is important to note that the NFPA developed these codes for all work done by electricians; however, the codes do not clearly address work on outside electrical power lines. Had an electrical utilities crew done the work, it would have been obliged to follow the guidance specified in the Institute of Electrical and Electronics Engineers' *National Electric Safety Code*. That code was developed specifically to protect workers during installation and maintenance of electric supply and communication lines.

Meetings and evaluations held following this event revealed confusion and significant differences of opinion in interpreting the safety requirements in NFPA 70 and 70E for utility work. Preliminary causal analyses identified breakdowns in the work planning process that bypassed review and approval by the safety and engineering organizations, which would have correctly interpreted the appropriate electrical safety code and the PPE required for the task.

This occurrence illustrates the importance of integrating engineering and safety reviews with craft planning, especially when safety code requirements are complex and difficult to interpret.

KEYWORDS: *Electrical hazard, overhead electrical lines, work planning, personal protective equipment*

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

3. INADEQUATE PREVENTIVE MAINTENANCE RESULTS IN LEAD-ACID BATTERY EXPLOSIONS

On July 16, 2001, at the Idaho National Engineering and Environmental Laboratory (INEEL), a battery used to start a diesel fire pump exploded during a maintenance startup of the pump. The mechanic starting the pump was sprayed with battery fragments and a small amount of battery acid, but was not injured. There have also been a number of other battery explosions reported recently. The explosions caused equipment damage and the shutdown of operations. Two other batteries exploded upon startup, most likely because of poor maintenance, and one exploded during a high load and was also attributed to poor maintenance. (ORPS Reports SR--WSRC-SSD-2001-0010, SR--WSRC-FSSDGEN-2001-0001, SR--WSRC-FSSDGEN-2001-0004, and ID-BBWI-RWMC-2001-0016)

An investigation into the INEEL incident indicated that the cause was an end-of-life failure, and revealed that one cell in this battery was low on electrolyte, which was discovered during the quarterly Preventive Maintenance (PM) conducted six weeks before the explosion. The cell needed to be filled in order to allow a hydrometer reading to be taken, likely indicating a bad cell.

As a lead-acid battery ages, the corrosion layer on battery plates increases in thickness, causing the distance between the plates to narrow and the potential for cell degradation to increase. The battery voltage drop causes the charger to produce more current to normalize the voltage as a cell degrades. The increased current could boil off electrolyte in the cell, causing the top of the plates to be exposed, providing an air gap that can allow for arcing.

Figure 1 illustrates the inside of the battery that exploded at INEEL, revealing warped plates and chemical buildup across the plates.

The chemical buildup across the top of the plates, as shown in Figure 2, was sufficient to allow an arc to occur between the negative and positive plates because of low electrolyte levels. The high demand of starting the diesel engine caused an arc that ignited the hydrogen gas in the battery, resulting in the explosion.

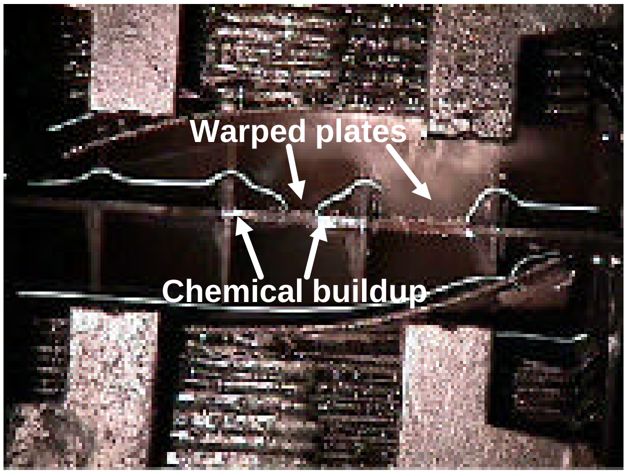

Figure 1. The battery that exploded at Idaho

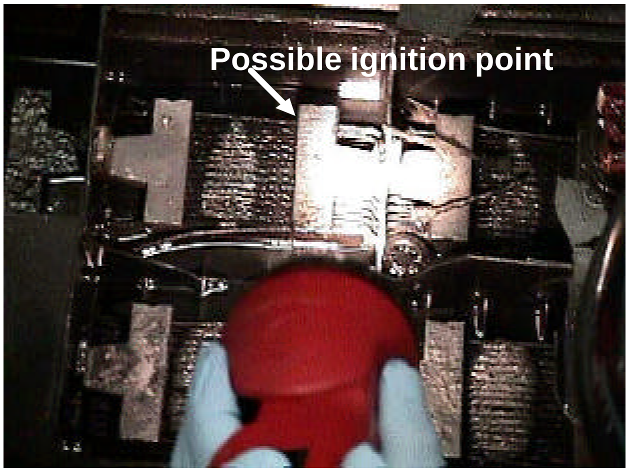

Figure 2. Excess chemical buildup across the top of the plates in the battery can cause arcing

Both failures at Savannah River involved maintenance-free batteries manufactured for Ingersoll-Rand by Douglas Battery Manufacturing Company (DBMC), although the batteries were identified with Ingersoll-Rand labels. The batteries were 36 months old. Each failure occurred during an attempt to start the air compressor engine, and in both cases, resulted in both ends of the batteries rupturing. Protective covers were in place prior to starting the unit, which prevented possible injury to personnel. Batteries manufactured by DBMC have led to four Lessons Learned transmittals within the past year (Special Information Notices 2000-24, 2001-03, and 2001-47, and Bulletin 2001-02).

Lead-acid batteries over five years old that are used in static applications (i.e., where the battery does not get moved or jostled), have the greatest risk of this type of failure. Battery replacement should be considered for any lead-acid battery over five years old unless the manufacturer specifies a longer or shorter service life. Further details on this and other lessons learned can be found in the Lessons Learned database, which can be accessed at the EH website (http://tis.eh.doe.gov/ll/listdb.html) under the "Yellow Alerts" section, item number 2001-INEEL-156.

Facility management should identify all lead-acid batteries in use, especially those used in static applications and give serious consideration to replacement if the battery is over five years old. It may not be feasible, however, to immediately replace every lead-acid battery in use that is over five years old.

Implementing the following measures may reduce the risk to personnel and equipment and assist in the proper maintenance of existing batteries.

- If a battery is housed in a protective box, personnel should ensure that the box and lid are intact and well vented before use.

- A charging voltage of about 2.4 volts or greater across any single cell is enough to produce explosive gases. When the electrolyte bubbles, that is an indication that water is being converted into explosive hydrogen and oxygen. It is important that personnel set the voltage of a battery charging system within the prescribed specifications.

- Consider the use of temporary barriers, especially for batteries that are located adjacent to control panels or in high-traffic areas.
- To avoid confusion, personnel should not place maintenance-type and maintenance-free batteries in the same battery compartment or use them on the same piece of equipment.
- When servicing a maintenance-type battery, personnel should check electrolyte levels and replace lost water. Electrolyte levels should be maintained at the proper level; that is, filled to the bottom of the filler tube, if slotted, or just below the bottom of the filler tube if not slotted.
- Battery chargers should be sized appropriately, operated properly, and set to prevent overcharging the battery and generating excessive amounts of hydrogen gas. Variable-rate chargers should reduce amperage to a minimal level when batteries are fully charged.
- Personnel should check the maintenance history of each battery for trends in parameters such as specific gravity, electrolyte levels, and water addition requirements that permit early identification of faulty cells.
- PM procedures should be periodically reviewed to ensure early detection of cells that have degraded. The procedures used to verify battery condition should check the specific gravity of each cell and provide the pass/fail criteria based on expected parameters and differences between cells (typically a difference in specific gravity between cells of more than 0.05 is unacceptable).

These events illustrate the importance of properly tracking, scheduling, and conducting surveillance tests and inspections. Guidance on battery surveillance requirements is provided in the Institute of Electrical and Electronics Engineers (IEEE) Standard 450-1987, *IEEE Recommended Practice for Maintenance, Testing, and Replacement of Large Lead Storage Batteries for Generating Stations and Substations*. DOE facility managers should review their battery PM programs and compare them to the recommendations in DOE/DP-0124T, *Augmented Evaluation Team Final Report - Emergency and Backup Power Supplies at Department of Energy Facilities*.

Personnel who track and schedule surveillances, inspections, and calibrations must ensure that any changes, such as testing frequency or personnel responsible for performing the testing, do not adversely affect equipment performance or violate facility requirements. Attachment 1 to DOE Order 5480.22, *Guidelines for Technical Safety Requirements*, describes the purpose of surveillance requirements and states that each surveillance shall be performed within the specified interval. General Principle 1 states: "A system is considered operable as long as there exists assurance that it is capable of performing its specified safety function(s)." DOE-HDBK-1084-95, *Primer on Lead-Acid Storage Batteries*, provides information on the operation, construction, and maintenance of lead-acid batteries. The Handbook also provides information on the hazards associated with storage batteries and recommended precautions. Information on battery chargers and charging operations is provided in the Maintenance section.

KEYWORDS: *Battery explosion, battery charging, electrolysis*

ISM CORE FUNCTIONS: *Analyze the Hazards, Develop and Implement Hazard Controls, Provide Feedback and Continuous Improvement*

4. WORKER KNOCKED UNCONSCIOUS BY EXTERIOR BUILDING PANEL

On August 21, 2001, at the Los Alamos National Laboratory, a worker performing decontamination and decommissioning activities was rendered unconscious when an asbestos transite panel measuring 5 feet by 11 feet and weighing 80 pounds unexpectedly fell and struck him on the top of the head. The worker was taken to the Los Alamos Medical Center, examined, and released. He sustained a minor contusion on his right shoulder. (ORPS Report ALO-LA-LANL-WASTEMGT-2001-0010)

Two subcontractor workers were removing asbestos transite panels from a building exterior with the aid of a scissors lift. Figure 1 illustrates the building exterior from which the panels were being removed. The workers were wearing the required personal protective equipment for the job, which included steel-toed boots, hard hats, safety glasses, Tyvek coveralls, gloves, and respirators, but no fall protection gear. The scissors lift was located approximately 40 feet above the ground, two feet from the building, and within

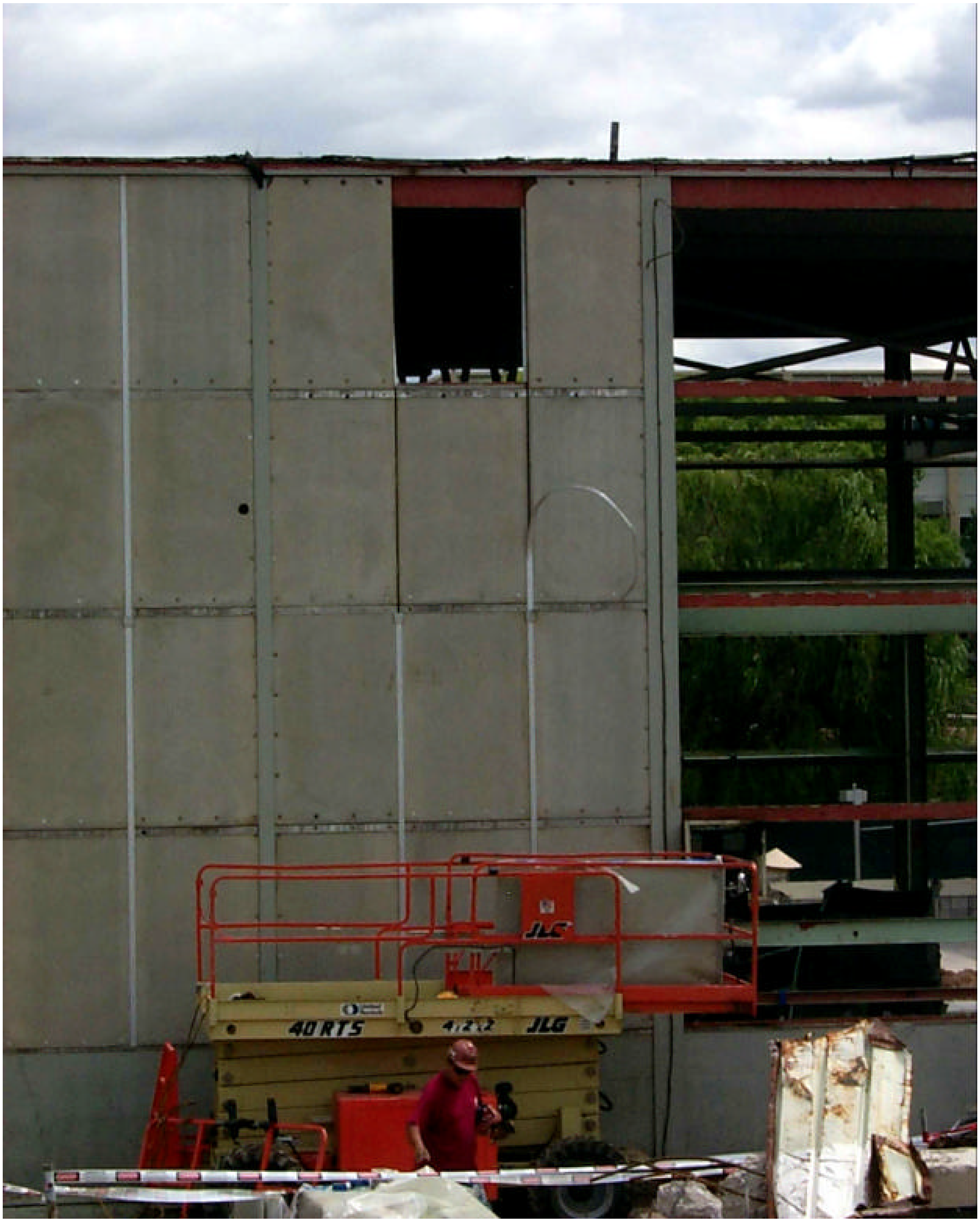

Figure 1. Building showing the empty slot from which the panel fell and struck the worker

two feet below the bottom of the panel. The workers had momentarily lost communication with one another to ensure that one was bracing the panel while the other attempted to free it. Because of this lack of communication, both workers were pulling on the left and right sides of the bottom of the panel. The panel unexpectedly became loose and pivoted into the top of the scissors lift, where it struck the worker who was working to the left of the panel. The worker was knocked unconscious to the floor of the scissors lift platform for approximately one minute. He was taken to a medical center for treatment and later released.

Immediate actions taken included implementation of a subcontractor stop-work order and a review of the accident and safety ramifications of the accident. The procedure for removing the panels was also reviewed. Based on the results of a preliminary investigation, the site safety officer noted that no specific hazards and hazard controls were documented in the Site-Specific Health and Safety Plan (SSHASP). The direct cause of the accident is believed to be due to a lapse in communication, which was hampered by the respirators that the workers were wearing. This accident had the potential for a far more serious injury than what occurred; for example, the weight of the panel could have knocked the worker off of the raised scissors lift.

A search of ORPS reports from the past two years found two similar occurrences. On July 24, 2000, at INEEL, construction workers were moving a 58,000-pound boiler when it shifted on the cribbing, allowing it to fall approximately six inches. A worker who was placing rollers under the boiler was placed at a higher risk of injury when the boiler fell to the floor. The root cause of the mishap was inadequate hazard controls; the worker was allowed to work too closely to the boiler during the lifting operation. (ORPS Report ID--BBWI-LANDLORD-2000-0020). On January 31, 2001, at the Strategic Petroleum Reserve's Big Hill Site, a wire line lubricator assembly was dropped from an elevated position while being hoisted. The root cause of this event was inattention to detail on the part of the rigger and the operator. The rigger and operator were not effectively communicating visually and verbally during the lift. (ORPS Report HQ--SPR-BH-2001-0001).

The August 21, 2001 accident at Los Alamos reiterates the importance of identifying all hazards and implementing adequate hazard controls. For operations that require workers to wear personal protective equipment, such as respirators, a work plan needs to be developed that includes effective non-verbal and verbal communication.

KEYWORDS: *Lift operations, communication, personal protective equipment*

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

5. FALSE ALARMS FROM CRITICALITY MONITOR CAUSE EVACUATIONS

Twice on August 22, 2001 and once on August 31, 2001, alarms from in Buildings K-903 and K-33 at the East Tennessee Technology Park (ETTP) caused workers to evacuate the buildings. Investigators found no evidence of high radiation after each event and concluded that the cause for the alarms was spurious. (ORPS Reports ORO--BNFL-K33-2001-0012 and ORO--BNFL-K33-2001-0016)

At 3:15 AM on August 22, 2001, an RCAAS instrument cluster in the Supercompactor Facility (Building K-903) set off criticality alarms in that facility and in Building K-33. About 150 workers evacuated. Because of the long time required to recharge the nitrogen gas supplies for the alarms, the contractor released this night shift and the following 400-person day shift from work. Instrumentation personnel replaced and retested modules in the instrument cluster and declared the RCAAS to be operable. However, at 6:19 PM that day, the same instrument cluster again triggered alarms, and again the night shift evacuated and was released from work. After each event, investigators measured only very low levels of radiation near the RCAAS instrument cluster, and determined that radiation had not triggered the alarms.

The investigators discovered that the instrument cluster that triggered the spurious alarms was vulnerable to radio waves. That is, while most criticality monitors are mounted high, the instrument cluster had been installed at a lower level, within easy contact of workers using hand-held radios. The investigators found that transmissions from a hand-held radio placed next to the instrument cluster could trigger the RCAAS alarms. The contractor installed personnel barriers around the instrument cluster to prevent future influence by radios. At 2:35 PM on August 31, 2001, the same instrument cluster triggered the RCAAS alarms and workers in Buildings K-903 and K-33 evacuated. Again, investigators found no source of radiation, and this time radiation recorders recently placed in the area showed radiation levels remained normal throughout the event. The new investigation included reenacting the ongoing work in the area (changing HEPA filters), but could find no obvious cause for the false alarm, now that there are barriers against radio transmission. The contractor replaced more components associated with the instrument cluster in the hope that this would eliminate the undiscovered cause.

Although recent ORPS reports show few similar occurrences, spurious alarms were more common five to ten years ago, and were often caused by radio waves. For example, in two separate occurrences during May 1994, workers evacuated a building at the Savannah River Solid Waste Disposal Facility (SWDF) when hand-held radios inadvertently caused a radiation monitor to alarm. After the first event, the monitor was mounted higher and a file cabinet was placed underneath to restrict worker contact. However, a maintenance worker again triggered alarms and an evacuation when he placed his radio on top of the file cabinet to respond to a call. (ORPS Reports SR--WSRC-SLDHZD-1994-0012, SR--WSRC-SLDHZD-1994-0015, and OE Weekly Summary 94-20). OE Weekly Summary 94-22 discusses several other cases in which radios set off alarms and Nuclear Regulatory Commission Information Notices 83-83 and 91-60 address nuclear plant concerns regarding radios and alarms.

Although the exact cause of the ETTP false alarms is still undetermined, the discovery of a criticality monitor's vulnerability to radio waves, plus radio-related experience at other facilities, indicate that alarm design and installation need to address the effects of radio transmissions. The administrative control of devices emitting radio waves might also be considered.

KEYWORDS: *Radiation monitor, criticality monitor, radio, false alarm*

ISM CORE FUNCTION: *Provide Feedback and Continuous Improvement*

6. CENTRAL SPRINKLER TO REPLACE O-RING SPRINKLERS

Central Sprinkler Company (Central), an affiliate of Tyco Fire Products LP, of Lansdale, PA, and the U.S. Consumer Product Safety Commission (CPSC) are announcing a voluntary replacement program. A limited number of sprinkler models with O-ring seals sold by Gem Sprinkler Co. and Star Sprinkler, Inc. are included in the program. Central Sprinkler will provide parts and labor to replace 35 million fire sprinklers with O-ring seals. Further information and details of the recall may be found at http://www.sprinklerreplacement.com.

Central initiated this action because it discovered that these sprinklers with O-ring seals could degrade over time. The sprinkler heads can corrode, or minerals, salts, and other contaminants in water can affect the rubber O-ring seals. These factors could cause the sprinkler heads to fail to activate in response to a fire. Laboratory testing has indicated that the majority of the sprinklers would operate in a fire situation; however, some sprinklers required higher water pressure to activate than may be available in some buildings.

U.S. Consumer Product Safety Commission Release # 01-201 describes the recall, and can be found at their web site http://www.cpsc.gov.

This replacement program includes two kinds of sprinklers, “wet” and “dry.” Figures 1 and 2 illustrate sprinklers of each type that are included in the replacement program. “Wet” sprinklers are installed in piping that is filled with water. “Dry” sprinklers are used in areas that may be exposed to very cold temperatures, and the exposed piping does not contain water. These sprinklers were installed nationwide in a wide variety of buildings including houses, apartments, hospitals, daycare facilities, schools, dormitories, nursing homes, hotels, parking garages, supermarkets, warehouses, and office buildings. Figure 3 illustrates other sprinkler types manufactured by Central that are subject to the recall.

Figure 1. A Central Sprinkler “wet” model GB, subject to replacement under the program.

Figure 2. A Central Sprinkler “dry” model A-1

Central has received four reports of “wet” O-ring sprinkler heads failing to activate during a fire situation and nine similar reported failures of “dry” O-ring sprinkler heads. These failures resulted in property damage claims ranging from $1,000 to more than $100,000.

The Central “wet” sprinkler models with O-ring seals that are covered by this program were manufactured between 1989 and 2000. Specific model numbers are listed in Table 1 below.

AFFECTED MODELS CENTRAL "WET" SPRINKLERS (Manufactured from 1989-2000)					
GB	GB4-FR	GB-R1	BB2	ELOC	ELO-GB QR
GB-J	GB4-EC	GB-RS	BB3	ESLO	LD
GB-1	GB4-QREC	GB-R	SD1	ELO SW-20	K17-231
GB-ALPHA	GB-20	ROC	SD2	ELO SW-24	Ultra K17
GB4	GB-20 QR	BB1 17/32	SD3	ESLO-20 GB	ELO-16 GB
GB-QR	GB-LO	BB2 17/32	HIP	ELO-231 GB	GB MULTI-LEVEL
GBR-2	LF	BB3 17/32	WS	ELO-GB	GB-QR MULTI-LEVEL
GB-EC	GBR	BB1	ELO-LH	ELO-231 GBQR	ELO-16 GB FR

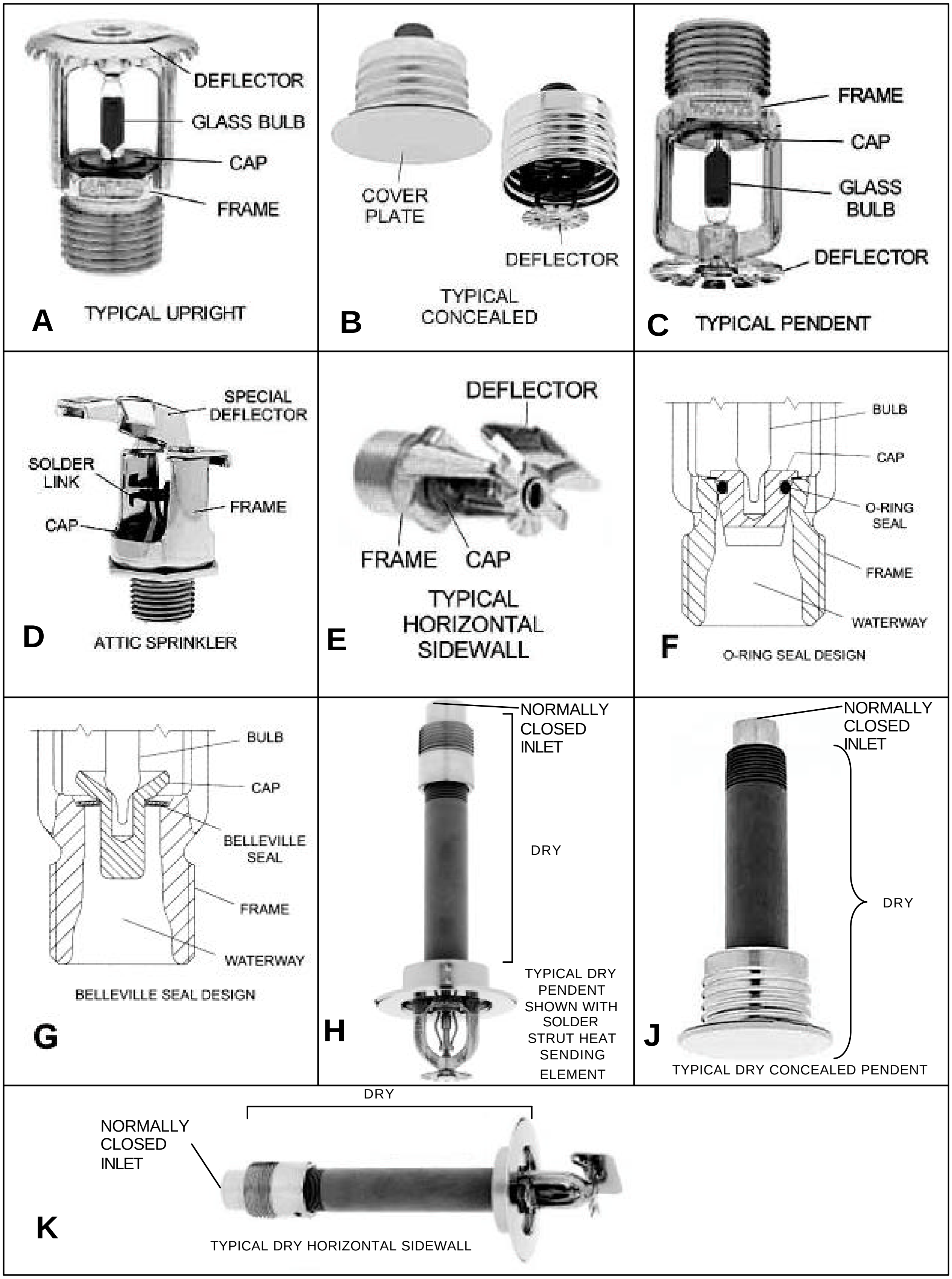

Figure 3. Sprinkler heads included in the recall

The “dry” sprinkler models subject to recall were manufactured from the mid-1970s through 2001, and affected model numbers are listed in Table 2.

CENTRAL "DRY" SPRINKLERS (Manufactured from Mid-1970s-2001)			
A-1	GB	GB4-EC	ELO-16 GB
H-1	GB-QR	GB4-QREC	ELO-16 GB FR
J	GB4	ELO-231 GB	
K	GB4-FR	ELO-GB QR	

The program also covers approximately 167,000 Gem and Star brand sprinklers with O-rings. The Gem brand sprinklers were model number F927, and were manufactured between 1995 and 2001. The Star brand sprinklers were manufactured between 1996 and 1998, and included model numbers ME-1, SG, SG-QR, Q, and Q-QR.

If you have any questions about how to complete the forms or how to identify the O-ring seal sprinkler heads involved in this program, please call the Customer Service Hotline at 1-866-505-8553 from 9 AM to 7 PM EST.

EH has issued a Safety & Health Hazard Alert on this topic, which may be found at http://tis.eh.doe.gov/docs/hha/links.html.

7. DOE CITES ARGONNE NATIONAL LABORATORY-EAST FOR NUCLEAR SAFETY VIOLATIONS

On August 14, 2001, DOE issued a Preliminary Notice of Violation (PNOV) against the University of Chicago (UC), contractor of the Argonne National Laboratory-East (ANL-E). This action is a result of a series of procedural nuclear safety violations in Work Control Requirements, and Radiation Safety Program implementation. (ORPS Report CH-AA-ANLE-ANLEER-2000-0008). An investigation by ANL-E and EH-10 into an uncontrolled release event during a repackaging operation last fall identified the deficiencies in the UC program.

On October 26, 2000, personnel were repackaging legacy radioactive waste as part of a decontamination and decommissioning (D&D) project. The work involved removing several containers from a 55-gallon drum and placing them in separate 5-gallon cans as part of a waste segregation activity. The last item to be handled was a container that held five vials of radium-226 in a hydrochloric acid solution, with a total activity of 8 millicuries. The container was opened revealing three broken vials. The two unbroken vials were broken in order to release their contents into the container along with the other broken vials and some absorbent tissue. Sodium hydroxide was added to neutralize the hydrochloric acid along with water to absorb the heat generated during neutralization. The container was then filled with a drying material, capped, and placed in a drum. Void-filler was added to the drum, but the drum lid was not set in place. Qualified radiation workers wearing Tyvex suits and respirators fitted with “combo” filters performed the work inside a contamination control tent equipped with local high-efficiency particulate air (HEPA) ventilation. The work had been authorized by a project-approved radiological work permit (RWP). As the operation with the radium source was being completed, a health physics technician detected airborne contamination. All personnel exited the tent area and proceeded to a portal radiation monitor along with other individuals who were in a separate, but connected area. Before entering the portal monitor, the individuals had removed their radiation protective clothing and respirators and left them in the controlled area. They entered the portal monitor wearing their work clothes. The portal monitor indicated that all individuals were radioactively contaminated. ANL-E health physics personnel responding to the incident suspected the contamination was caused by radon gas. They directed individuals to remove their work clothes, take showers, get dressed in clean Tyvex suits, and go to another facility for whole-body counting. ANL-E subsequently estimated that the Committed Effective Dose Equivalents for the seven individuals exposed during this incident were 106, 95, 55, 10, 9.7, 5.2, and 3.2 mrem.

An ANL-E investigation committee identified two root causes associated with the event: (1) D&D management failed to recognize that the workers performing the D&D work did not have the knowledge or the experience to plan the radioactive source work properly, including the identification of hazards and the development and implementation of adequate controls; and (2) management failed to ensure the implementation of the RWP process and the ALARA review process. The RWP process and the ALARA review process that were used on the D&D project did not provide an adequate level of safety review and analysis for the work involving the radium source. The radon hazards associated with the radium source were not understood by subcontractor and project management personnel; therefore, appropriate radon control measures were not specified on the RWP, and the requirement for a Division-level or a Laboratory-level ALARA review was not identified. In addition, the RWP process that was in use at the D&D project was no longer in compliance with ANL-E environment, safety and health (ES&H) requirements, which required review by ANL-E health physics personnel.

The PNOV addresses violations in three sections as follows:

Section I of the PNOV describes violations associated with the failure to properly identify the radiological hazards involved with opening vials containing radium solutions. Specifically, ANL-E management's use of off-site radiation safety personnel who were inexperienced in working with radium; failure to adequately develop and maintain the D&D project's authorization basis; and not use available information regarding a previous radon contamination event that could have prevented the worker contaminations.
Severity Level II. Civil Penalty – $55,000 (exempted)

Section II describes violations associated with work controls for stabilizing radium solutions at the D&D project. These include ANL-E management's failure to maintain two workers' respiratory protection qualifications, and failure to prepare an acceptable work plan for stabilizing radium solutions in accordance with site requirements. Severity Level II. Civil Penalty – $55,000 (exempted)

Section III of the PNOV describes violations in administrative controls to maintain radiation exposures as low as reasonably achievable. These are associated with Laboratory management failing to determine the limitations of off-site radiation safety personnel before they became involved in the planning of and carrying out the radium solution stabilization, and by allowing a deficient work plan to be used that contributed to the radon release. Severity Level II. Civil Penalty – $55,000 (exempted)

The management at ANL-E has completed a number of corrective actions to date including providing training to project managers and project specialists on D&D safety requirements, and requiring that ES&H documentation for a D&D project is reviewed and revised so as to maintain a current description of the hazards present. Additionally, a new approach to readiness reviews or assessments was adopted. The readiness review or readiness assessment team will be chaired by the Associate Division Director responsible for environmental management projects, and will include the D&D ES&H Coordinator and individuals having a relevant safety background but not associated with the actual project.

Management also required additional training and instituted an improved RWP review cycle to ensure all division and subcontractor work is in compliance with ES&H requirements of ANL-E.

Other management actions included providing a guidance document for the actions to be taken if legacy radioactive material, other hazardous material, or previously unidentified hazards are discovered at a D&D project, including stop-work authority and use. Additional guidance was provided to personnel in order to recognize work tasks they are not qualified to perform.

Management also required that project-specific emergency response plans be developed for radiological contamination incidents and other incidents, and these plans need to be exercised on a quarterly basis. The emergency response plan for the D&D project did not address the potential radiological emergency situations. Because these emergencies were not acknowledged in the emergency response plan, personnel were not trained and drilled on the appropriate emergency actions to be taken.

The Price-Anderson Amendments Act of 1988 requires the Energy Department to undertake regulatory enforcement actions against contractors for violations of its nuclear safety requirements. The program is implemented by the Office of Price-Anderson Enforcement. This action was taken with the support and participation of the Department's Argonne Area Office, which will ensure that the corrective actions are fully implemented. Additional details can be found on the Internet at http://tis.eh.doe.gov/enforce.

KEYWORDS: *Enforcement, Price-Anderson Amendments Act, radon, airborne contamination*

ISM CORE FUNCTIONS: *Analyze the Associated Hazards, Develop and Implement Hazard Controls, Provide Feedback and Continuous Improvement*