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

OPERATING EXPERIENCE SUMMARY

Office of Environment, Safety and Health

Summary 2002-03
February 11, 2002

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 2002-03

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PROCESS FOR E-MAIL NOTIFICATION OF NEW OE SUMMARIES

We are pleased to announce that you can now receive e-mail notification whenever a new edition of the OE Summary is published. It's simple and fast! To sign up and have the OE Summary notification delivered to your e-mail inbox, you must first sign up for a MY ES&H PAGE on the ES&H Information Portal. Once you have signed up for a MY ES&H PAGE, you have the opportunity to access additional helpful information.

Here are the simple steps to obtain a MY ES&H PAGE login, and then the OE Summary notification.

1. Go to: http://tis.eh.doe.gov/portal/home.htm
2. Select "MY ES&H Page."
3. Select "Create an Account."
4. Select a User Name and Password. Be sure to repeat your selected password in the "Confirm Password" box provided. Selecting an easy-to-remember User Name, such as your name (you may have spaces in your User Name), though you can use any User Name you desire.
5. Once you have successfully logged on to MY ES&H Page, you will receive instructions on how to choose Brokers to customize your view of the ES&H Information Portal. To sign up for OE Summary, select "Choose Brokers" across the top toolbar, or click on the last "Click Here" to personalize your My ES&H Page.
6. When you receive the list of brokers (in alphabetical order), select the broker entitled "OE Summary" by clicking in the box to the left of the title. You may also select any other brokers you would like to see on your My ES&H Page. Once you have finished selecting brokers, click "Finish" to go to your personalized My ES&H Page.
7. Enter your e-mail address in the OE Summary gadget and choose your e-mail type. DOE Lotus Notes users should select "Plain Text" as your e-mail type.
8. Click Submit to sign up for the OE Summary Mailing.

You may choose to remove yourself from the OE Summary mail notification, edit your e-mail address, or sign up again at a later date. Simply keep the OE Summary Broker on your My ES&H Page, or re-add the Broker following the steps illustrated above, starting with step #5. The OE Summary Broker will display a message when your My ES&H Page is displayed, stating whether or not you are currently signed up to receive the OE Summary Mailings.

Instructions for Changing your E-mail Address or E-mail Type on the OE Summary Mailing List

1. Add the OE Summary Broker to your My ES&H Page if it is not already a chosen broker.
2. Edit your e-mail address or change your e-mail type and select "Submit."

Instructions for Removal from OE Summary Notification Mailing

1. Add the OE Summary Broker to your My ES&H Page if it is not already a chosen broker.
2. Click "Remove."

If you have any questions or problems signing up for the e-mail notification, please contact Steve Simon at (301) 903-5615, or e-mail address steve.simon@eh.doe.gov.

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EVENTS

1. UNAUTHORIZED WORK CAUSES ELECTRICAL NEAR MISS

On October 3, 2001, at the Brookhaven National Laboratory (BNL), a worker used a high-voltage hotstick to open three fused cutouts in a 2,300-volt Westinghouse switchgear cabinet without authorization to do so, without checking for voltage, and without wearing personal protective equipment (PPE). Workers were preparing to replace an induction regulator located in Building 901 (Cyclotron). The line side of the fused cutouts was energized, but there was no load on the circuit. There were no injuries. However, because of the potential for serious personnel injury, the facility manager reported this occurrence as a near miss. A final report was filed on January 29, 2002, which provides additional information and insight into the incident. (ORPS Report CH-BH-BNL-BNL-2001-0026)

In preparation for the induction regulator replacement, towerline workers were sent to inspect the Westinghouse switchgear cabinet (Figure 1). During this inspection a Chemistry Department worker, who was not part of the inspection team, opened the fused cutouts on his own initiative to facilitate the inspection. This individual followed verbal procedures he had been given earlier by a now-retired cyclotron operator, who had informed him that opening contacts in the power circuit de-energized the fuses. Believing the circuit was de-energized, the worker did not check for voltage and was not wearing appropriate PPE.

Figure 1. Westinghouse switchgear cabinet showing fuses and their recommended rating

The towerline workers and the BNL supervisor who were in an adjacent room and who witnessed only the opening of the third fused cutout explained the seriousness of the work activity and the need to use proper PPE to the BNL worker and to his supervisor. The towerline workers notified their supervisor and the Plant Engineering Environmental Safety and Health Coordinator.

In the course of the inspection, the towerline workers addressed additional equipment issues related to the transformer room. These issues involved a missing view port in a switchgear cabinet, out-of-date labels, and inadequate space for the switchgear cabinets. As a result of this inspection, the Laboratory Electrical Safety Officer locked out the 2,300-volt Westinghouse switchgear cabinet equipment.

The direct cause of the incident was that the worker performed hazardous work without adequate work planning and control. The worker failed to recognize that the activity required a pre-job hazard review and formal authorization, and opened the fused cutouts on his own initiative.

The worker's supervisor failed to ensure that the worker had been properly trained in this activity, and that any verbal instructions needed to be reviewed and proceduralized.

The following are some corrective actions that have been implemented as a result of this event.

- Facility management reviewed this incident with personnel in the departments and groups involved with cyclotron operations to emphasize the necessity of proceduralized work planning before carrying out any verbal procedures, as well as the need to review procedures associated with legacy facilities.
- Chemistry Department personnel received a memo emphasizing the necessity of reviewing work practices associated with legacy equipment to ensure worker safety, and that work cannot be carried out without proper work planning.
- Maintenance personnel replaced the glass that was missing from the view port on the rectifier cabinet before the circuit was re-energized.

This occurrence illustrates the inadequacy of verbal procedures, particularly those involving infrequently used equipment. Procedures need to be formally documented to ensure that work can be performed safely.
Management needs to emphasize to workers that work cannot be carried out without formal authorization, appropriate procedures, and task-specific controls in place. In addition, management needs to ensure that legacy equipment is inspected before it is used, and, wherever appropriate, brought up to current codes.

KEYWORDS: *Electrical, switchgear cabinet, personal protective equipment*

ISM CORE FUNCTIONS: *Analyze the Hazard, Develop and Implement Hazard Controls, Perform Work within Controls*

2. BLOWOUT FROM CONDUIT ELECTRICAL FAULT DAMAGES EQUIPMENT

On October 19, 2001, at the Y-12 Plant, a 2,300-volt cable shorted out in an underground conduit connected to Building 9404-13. The electrical fault apparently caused an arc that super-heated and rapidly expanded air in the conduit. The percussive impact from the resulting pressurized plume of gas and soot that vented from the conduit destroyed a connecting switchgear cabinet, and blew out all windows in the building. The building was not occupied, as is normally the case, and no one was hurt. However, because of the possibility of personnel being inside the building and being injured, the contractor reported this as a near miss. (ORPS Report ORO--BWXT-Y12SITE-2001-0041)

The electrical fault led to a loss of power and subsequently reduced plant air and steam pressures at other buildings. An investigation traced the power loss to the electrical fault in the underground conduit. The investigation found that where the conduit connected aboveground in Building 9404-13, considerable damage had occurred. The rear cover of an electrical enclosure added onto a switchgear cabinet had blown off, and the metal framework surrounding the enclosure was bent. The cabinet showed evidence of a plume of soot venting from one of the two underground conduits connected to it. There was no evidence of electrical arcing in the cabinet or on the above-ground exterior of the conduits. Investigators found that all eight windows in the building were blown out, as were the plywood covers for two louvered attic vents.

A subsequent electrical evaluation found no significant flaws in the design of the cable and wiring that would have caused the event. However, evaluators recommended that ground detection be added and that the relay time settings on the breakers for the main electrical power lines into the building be readjusted.

A mechanical evaluation of the electrical enclosure concluded that fasteners holding its rear cover were weak and failed almost immediately, allowing the full force of the expanded air from the conduit to blow out from the enclosure with enough impact to blow out the windows and vent covers. Steel clips were

used to fasten the screws holding the cabinet covers, rather than nuts. Such clips cannot hold a significant load.

The evaluation concluded that had the fasteners been stronger, the switchgear cabinet and its added-on electrical enclosure would have contained more of the hot pressurized air before failure. This would have allowed some expansion and cooling of the air within the cabinet and reduced its hazard outside the cabinet. Vents in two areas of the cabinet access panel would have delayed the full release of the blown-out air. The evaluation also concluded that had the add-on enclosure been six-sided (as required by the Underwriters' Laboratories, Inc. standard UL 50, *Enclosures for Electrical Equipment)* rather than four-sided, it would have held at least twice the volume of heated air before it failed.

At this time, the contractor has yet to develop formal lessons learned and corrective actions. However, the contractor has begun replacing metal clips with nuts in its switchgear cabinets. This occurrence demonstrates that in addition to an electrical shock hazard, the faulting of high-voltage cables can cause rapid pressurization of air inside conduits and create a blowout hazard away from the immediate area of the fault. Electrical cabinets and fasteners should be designed appropriately to minimize the impact from such events.

KEYWORDS: *electrical cabinet, switchgear, metal clip fasteners, conduit, blowout*

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

3. NEAR MISS WHEN 963-POUND GLASS PROJECTION SCREEN FALLS

On January 16, 2002, at the Los Alamos National Laboratory (LANL), a 963-pound glass projection screen, costing $17,180, fell and shattered while being transported to an auditorium. The broken pieces of the glass projection screen remained almost entirely contained within the projection film membrane that encased it (Figure 1). A subcontractor worker received a minor wrist injury while attempting to stabilize the falling screen with his hand. Laboratory management reported this as a near-miss occurrence. (ORPS Report ALO-LA-LANL-CMPTRDIV-2002-0001).

Figure 1: Shattered glass projection screen lying on top of cart

The glass projection screen, which measured 9 feet high by 16 feet long by about three-quarters of an inch thick, was positioned on a wheeled cart frame constructed from bolted Unistrut® metal framing (Figure 2). Suction cups were mounted on a platform to secure the glass. A motor-driven Dayton actuator tube assembly (screw jack) provided the means to raise or lower one side of the support platform from a horizontal position to an upright position. With the projection screen loaded on the cart outdoors in a vertical orientation, subcontractor workers moved it to the building entryway where it was to be tilted to fit through a doorway. As they re-oriented the projection screen to an angle of 45 degrees to fit through the doorway, a plastic bushing that moved along a threaded bolt within the actuator assembly failed (Figure 3). The entire glass projection screen quickly fell to a horizontal orientation on the cart

Figure 2. The Unistrut® cart

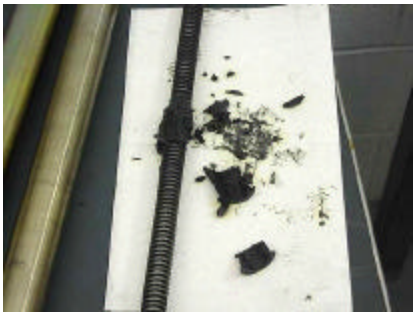

Figure 3. The failed bushing

and shattered. A representative from the projection screen manufacturer was on site overseeing the installation at the time of the incident.

The facility representative stated that the projection screen transport subcontractors had not developed a hazard analysis for the screen installation work. Furthermore, the LANL Health and Safety team contacted the manufacturer of the actuator tube assembly and learned that it was rated for only 600 pounds. The cart did not have a rating posted on it because it was a "homemade" cart by a different glass subcontractor from a previous job that had not been consulted regarding this installation. Had the glass projection screen fallen into the hallway rather than outside the entryway, the potential for injuring more workers was high because there were more workers in the hallway waiting to help guide it. The narrow doorway forced the workers to stand at both sides of the projection screen and out of the path of the falling glass.

This occurrence illustrates the consequences of using equipment for which the capacity rating (in this case, weight capacity) is unknown. It underscores the need for hazard analyses and for better oversight of subcontractors.

KEYWORDS: *Under-rated equipment, fall hazards, glass installations*

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

4. SUSPECT/COUNTERFEIT BOLTS IDENTIFIED THROUGH INFORMATION SHARING

On January 24, 2002, at Argonne National Laboratory – West (ANL-W), a Quality Assurance (QA) representative conducted an inspection of ratchet-type tie-down straps and identified some with suspect/counterfeit bolts in Building 783. ANL-W initiated this inspection of their rigging gear as a result of information in a Brookhaven National Laboratory (BNL) ORPS report. There were no personnel injuries or equipment damage as a result of this condition. However, failure of suspect/counterfeit fasteners installed on tie-down devices could result in shifted or dropped loads, endangering personnel and DOE property. (ORPS Report CH-AA-ANLW-ANLW-2002-0001)

ANL-W Waste Management personnel received notification that suspect/counterfeit bolts had been discovered in the handles of ratchet-type tie-down straps at BNL and reported in ORPS. This notification was forwarded to the ANL-W Material Services Section. A sample inspection was conducted of bolts in ratchet-type tie-down straps (Figure 1) located in Building 783. After identifying several suspect bolts, the Material Services foreman contacted an ANL-W QA representative. The QA representative inspected the bolts and confirmed that they were suspect/counterfeit.

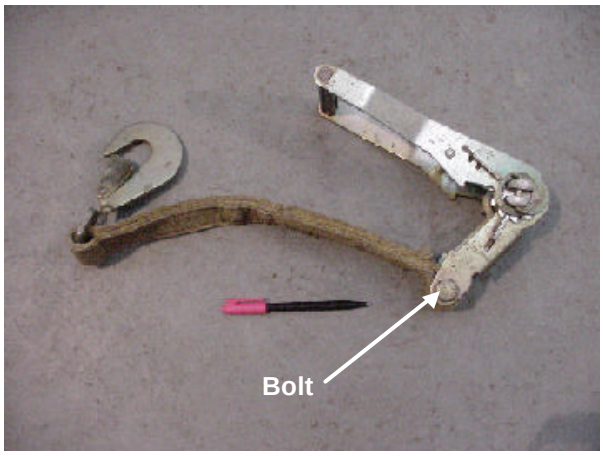

Figure 1: Ratchet tie-down strap with suspect/ counterfeit bolt

None of the suspect/counterfeit bolts (Figure 2) were attached to a load or in use at the time of this inspection, and none showed any sign of failure or deformation. Thirty tie-down straps containing

Figure 2: Close-up of suspect/counterfeit bolt

suspect/counterfeit bolts were segregated and removed from service. Actions are being taken to determine whether there are more of these tie-down straps on site.

On November 11, 2001, BNL Plant Engineering received a DOE Quality Assurance Working Group Data Collection Sheet from the BNL Quality Office. The Sheet indicated that a Bechtel Hanford, Inc. (BHI) QA engineer found some suspect/counterfeit bolts in tie-down ratchet strap assemblies. BNL Plant Engineering inspected these assemblies and found and verified two suspect bolts on January 7, 2002. (ORPS Report CH-BH-BNL-PE-2002-0001) As of January 23, QA personnel in the Collider Accelerator Department had identified suspect/counterfeit bolts in eight ratchet strap assemblies. The ratchet assemblies are in excellent condition, and there was no evidence of damage or stress. However, the potential for failure of these devices could be viewed as resulting in a substantial safety hazard.

The DOE Quality Assurance Working Group Data Collection Sheet was based on a November 11, 2001 final occurrence report from Richland (ORPS Report RL--BHI-GENAREAS-2001-0005). On August 30, 2001, a BHI QA engineer noted a series of nylon tie-downs on a flatbed trailer that had been used by a BHI subcontractor. Because these types of tie-downs had been discovered to contain suspect/counterfeit parts in the past, the QA engineer inspected the ratcheting mechanism and noted that the markings on the ½-inch x 3-inch bolts with retainer nuts corresponded to the imported Grade 8 fasteners identified in Stanford Linear Accelerator Center Environment, Safety, and Health Bulletin 09c, dated March 1996. A total of four tie-down ratchet straps, all measuring 2 inches wide by 27 feet long, were identified with suspect parts. One of these straps came from ITW Cargo-Safe (model number 10M), two were from Allied International (model number 82392F), and one was from Old Truck Straps, Inc. (model number DLD 11M MBS)

Since January 1, 2001, 10 reports have been filed in ORPS, including the three summarized here that are related to the discovery of suspect/counterfeit bolts in ratchet tie-down straps. These are listed in Table 1.

Table 1. ORPS Reports Related to Suspect/Counterfeit Bolts in Ratchet Tie-Down Straps

Date	Occurrence Report Number and Title
01/24/2002	ID--BBWI-CFA-2002-0001; Suspect Counterfeit Fastener Discovered During Receipt Inspection
01/23/2002	CH-AA-ANLW-ANLW-2002-000; Suspect/Counterfeit Bolts Identified in Ratchet Type Tie-Down Straps
01/21/2002	RFO--KHLL-WSTMGTOPS-2002-0001; Suspect/Counterfeit Bolts Discovered On Ratchet Straps (Roll-Up)
01/07/2002	CH-BH-BNL-PE-2002-0001; Suspect Bolts Found in Ratchet Strap Assemblies (Roll Up)
09/20/2001	HQ--BSYM-YMSGD-2001-0008; Suspect/Counterfeit Fasteners found in Ratchet Tie-Down Strap Assemblies
08/30/2001	RL--BHI-GENAREAS-2001-0005; Suspect/Counterfeit Truck Tie-Downs
02/07/2001	RL--PHMC-SNF-2001-0007; CVD/NCR on suspect counterfeit bolts on helium bottle tie down strap
02/06/2001	HQ--TRYM-YMSGD-2001-0002; Suspect/Counterfeit Fasteners found in Ratchet Tie-Down Straps
01/30/2001	RL--PNNL-PNNLBOPER-2001-0001; Suspect/Counterfeit Bolts Discovered in Tie-Down Straps
01/10/2001	RL--PHMC-FSS-2001-0001; Suspect/Counterfeit Hold Bolts for Strapping Devices

The following lessons learned were identified by BHI management.

- Personnel should be aware that materials that do not conform to standards, such as ASTM or SAE, are available. In the case of bolting materials, it is not unusual to find bolts that do not meet these standards (suspect), or that have been falsely marked (counterfeit) individually, or as parts of other assemblies at receipt or in use.

- Suspect/counterfeit materials are not limited to bolts and fasteners. Circuit breakers, explosion-proof motors, pipe fittings, and automotive parts have been found that do not conform to standards. Quality Control/Materials Control personnel should inspect materials and assemblies that may affect the safety of personnel, to ensure that suspect or counterfeit items are not accepted or used.

The Office of Environment, Safety and Health encourages the sharing of information and lessons learned on events and issues that are important to safety. The identification of the suspect/counterfeit bolts in similar equipment at various sites and facilities demonstrates the benefits from information sharing throughout the DOE complex.

KEYWORDS: *Suspect/counterfeit bolts, ratchet tie-down strap*

ISM CORE FUNCTIONS: *Analyze the Hazard, Provide Feedback and Continuous Improvement*

REQUEST FOR GOOD PRACTICES ON EXCAVATION AND ELECTRICAL PENETRATION SAFETY

Because of an increased frequency of electrical intrusion events across the DOE complex during the third and fourth quarters of calendar year 2001, the Office of Performance Assessment and Analysis is requesting information from DOE and subcontractor offices about good practices in excavation and electrical penetration safety. During this period there were 24 events, as opposed to 12 events in the same period in calendar year 2000. The scope of electrical intrusion events includes accidental contact or penetration of underground utilities and embedded or hidden utilities within structures (i.e., walls, floors, and ceilings). These good practices should come from facility programs that have been successful in preventing penetration-type incidents. Effective corrective actions and good practices should be supported with data that demonstrate their success. We intend to compile this information and share it throughout the DOE complex by publishing a special report in the near future.

In issue 2001-09 of the OE Summary (published November 6, 2001), the Operating Experience Group summarized 16 events where the safety of workers performing excavation and electrical penetration work was jeopardized. OE Engineers reviewed the 16 reports that occurred during a 15-week period between July and October 2001, and learned that five were from excavation and 11 were from cutting and drilling activities. Problems included inaccurate as-built drawings, procedure noncompliance (e.g., not hand-digging as required), blind penetrations, lack of zero-energy checks, and inadequate component marking during electrical conduit demolition.

The Office of Performance Assessment and Analysis is committed to enhancing customer satisfaction through continuous improvement of its products and services, including the Operating Experience Summary and reports to environment, safety, and health managers. We are also committed to taking a more proactive approach to some of the safety issues facing the DOE complex. Our request for good practices is a step in this direction. We plan to take this approach in the future with other safety issues.

Individuals wishing to respond to this request may contact Frank Russo, (301) 903-1114 or at frank.russo@eh.doe.gov, or Skip Searfoss, (301) 428-1493 or at gsearfoss@parallaxnet.com.

KEYWORDS: *Excavation, electrical penetration, conduit, cable, trenching, core drilling*

ISM CORE FUNCTION: *Provide Feedback and Continuous Improvement*

STOP-USE AND RECALL NOTICE ON FALL PROTECTION EQUIPMENT

On October 17, 2001, Mine Safety Appliances Company (MSA) issued a stop–use and recall notice concerning MSA Surety Sure-Stop™ Shock Absorbers that were manufactured from May through October of 2001. MSA is currently investigating a reported incident involving a Surety Sure-Stop lanyard. Their initial finding is that the lanyard was improperly manufactured. Although the lanyard appeared to be functional, it provided no fall-arrest protection to the user. MSA is issuing this notice to all purchasers of products that could contain this manufacturing defect. MSA is asking all users to immediately remove these affected fall protection components from service.

Upon examination of the lanyard involved in the incident, MSA found that there was an error in the stitching that secures one end of the shock absorber to the remainder of the lanyard. Because this joint is glued in preparation for applying the stitches and the shock absorber sleeve covers this area, this lanyard appeared functional. Even if the user tugged sharply on the lanyard, the assembly would still have appeared secure. However, a lanyard in this condition is not functional, and provides no fall-arrest protection to the user.

This notice involves all MSA Surety Sure-Stop shock absorbers and components that use the Sure-Stop shock absorber. This includes the following MSA Surety fall protection products.

- MSA Surety Sure-Stop lanyards
- MSA Surety Gravity harnesses with integral Sure-Stop shock absorbers
- MSA Surety Sure-Grab rope grab/fall arrester
- Certain kits containing the MSA Surety Sure-Stop shock absorber

This notice affects only those MSA Surety Sure-Stop shock absorbers manufactured from May through October of 2001. It does not affect MSA Surety products manufactured outside this time period or any products labeled “Surety Manufacturing & Testing LTD.” The manufacturing date applies to the shock absorber only, and does not apply to the complete system or other system components.

MSA recommends locating all fall protection components that use a Sure-Stop shock absorber and inspecting them to determine the date of manufacture. The date of manufacture is located on the label affixed to the shock absorber sleeve (Figure 1). If this date is within the affected range or if the date cannot be determined, the shock absorber is subject to this notice and must be removed from service.

If you have any of the recalled products, contact MSA Customer Service to make arrangements for the return and inspection of all affected products at 1-800-MSA-2222. MSA says that the equipment used to inspect returned products will not require disassembly of the shock absorber; however, it will conclusively determine whether the stitching is present. MSA will affix a green adhesive label around the shock absorber to identify inspected shock absorbers. The label will read “Accepted for Use.” If the stitching is not present, MSA will replace the

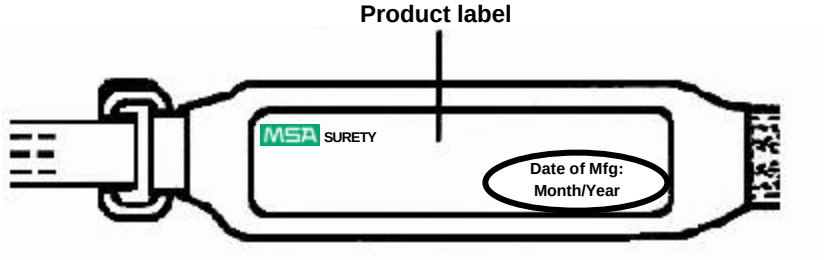

Figure 1: Label Location on Shock Absorber Sleeve

system component containing the shock absorber. All replacement items will have a label pack with specifications and warnings attached.

A copy of the recall notice (in PDF format) with a complete list of products that contain MSA Surety Sure-Stop™ Shock Absorbers can be obtained from the MSA homepage on the Internet at http://www.msanet.com/msanorthamerica/msaunitedstates/Notices.

KEYWORDS: *Fall protection, lanyard, shock absorber, MSA, recall*

ISM CORE FUNCTIONS: *Provide Feedback and Continuous Improvement*