Operating Experience Summary

Office of Health, Safety and Security

U.S. Department of Energy
Office of Health, Safety and Security
OE Summary 2010-08
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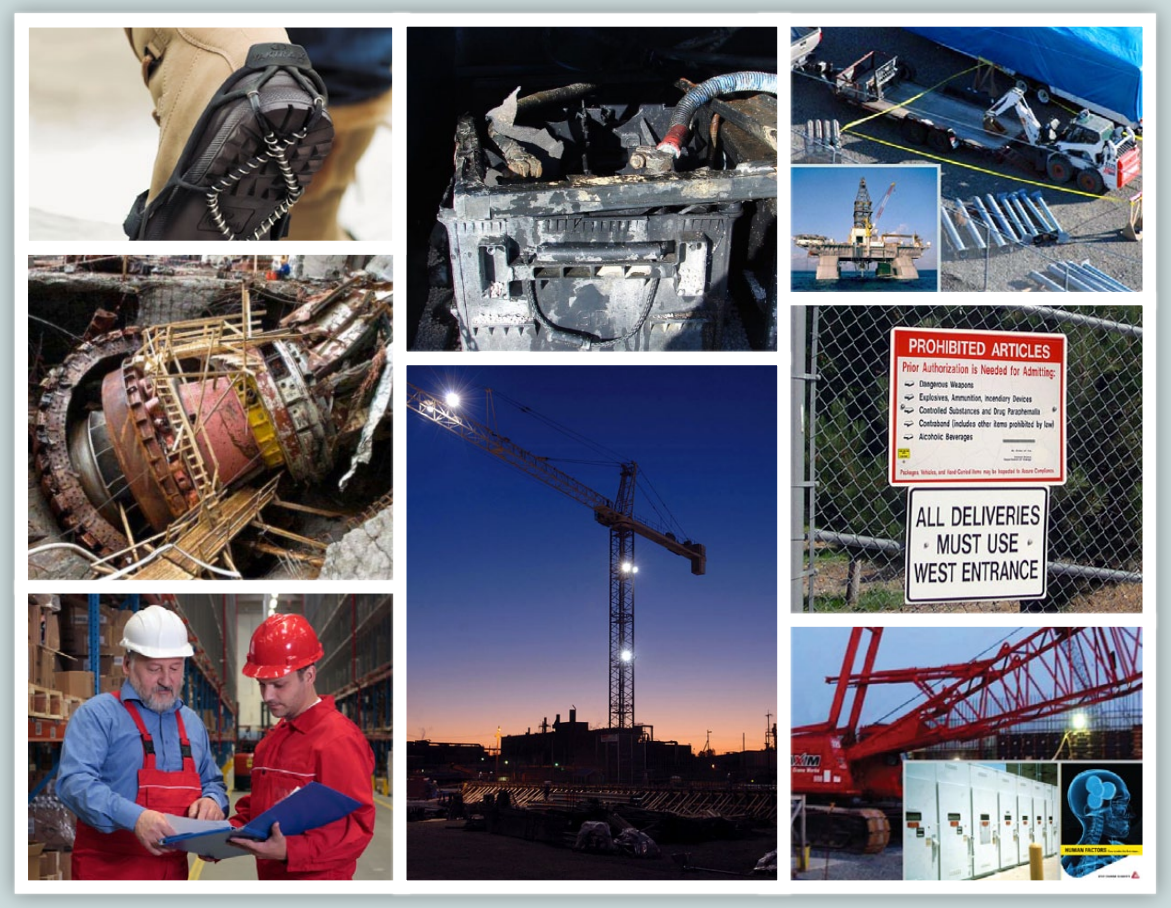


1 Are You Prepared? Winter Is Here!

Last year's weather extremes across the country contributed to record-breaking rain and snowfall in some areas, with drought and flooding in others. According to the annual "Winter Outlook" released in October by the National Oceanic and Atmospheric Administration, the Pacific Northwest should brace for a colder and wetter than average winter, while most of the south and southeast will be warmer and drier than average through February 2011. But no matter where you live and work, the weather is already changing, so now is a good time to take stock of plant, property, equipment, and policies to prepare for what winter has in store for Department of Energy (DOE) sites this year.

Useful tips for managing winter weather policies and procedures are featured in *Operating Experience (OE) Summary* 2010-03, Article 2, "Now is the Time to Start Implementing Winter Weather Good Practices," which can be found at http://www.hss.doe.gov/csa/analysis/oesummary/oesummary2010/OES_2010-03.pdf.

The following events provide more information on last winter's events across the DOE Complex.

Equipment Damage

On January 8, 2010, at the Idaho Cleanup Project (ICP), the temperature was minus 22° F early in the morning when workers had difficulty starting the diesel engine of a mobile crane. After several unsuccessful attempts to start the engine, they connected a portable battery charger, instead of an automatic battery charger (which should have been used), to the two, 12-volt crane batteries. As the workers began to charge the batteries, one battery failed catastrophically, spreading battery acid and debris that resulted in a nearby worker receiving three small burns to his forehead. This event is discussed in more detail in *OE Summary* 2010-03, Article 1, "Battery Explodes While Charging," which can be found at http://www.hss.doe.gov/csa/analysis/oesummary/oesummary2010/2010-03-01.pdf. (ORPS Report EM-ID--CWI-RWMC-2010-0001; final report issued February 22, 2010)

In another event, at Los Alamos National Laboratory (LANL), on December 28, 2009, workers observed icing on a cooling tower during compliance testing. As a result of the icing, freeze damage prevented a valve from closing, which allowed a continuous flow of water into the tower base and overflow to the effluent discharge and outflow. (ORPS Report NA--LASO-LANL-FIRNGHELAB-2010-0001; final report issued January 6, 2010)

Vehicle Accidents

When operating vehicles during inclement weather, workers need to maintain vigilance at all times. In areas where winter conditions are typically mild, or where bad weather conditions can occur with little notice, workers might be lulled into a false sense of security about the safety of driving conditions and thus be caught off guard and ill-prepared.

On January 22, 2010, at the Nevada National Security Site (NNSS), a site snow plow and a privately owned vehicle were involved in an accident on a highway adjacent to the site. At the time of the accident, a winter storm warning was in effect. Heavy snow, mixed with rain, and wind gusts up to 40 mph caused low visibility and potentially hazardous driving conditions. A passenger in the privately owned vehicle, which carried two site workers leaving for the day, sustained serious injury to his right arm. (ORPS Report NA--NVSO-NST-NTS-2010-0003; final report issued March 3, 2010)

On February 1, 2010, at the Y-12 National Security Complex, a worker was dragged by his vehicle, an older model truck without a shift/gear interlock, thus allowing the gears to be shifted without simultaneously pressing on the brake pedal. With the vehicle in Park, but without the parking brake engaged, the worker exited the vehicle to de-ice the back window. As he exited, his left foot slipped on the ice and he flailed with both hands to avoid a fall. He had nearly righted himself when the truck began to roll backwards approximately 60 feet. His right leg and foot were caught in the truck, causing him to fall, and he was dragged by the vehicle. Fortunately, another worker witnessed the situation and applied the vehicle's brake, so the employee was not injured. Whenever practical, vehicles should be equipped with a shift/gear interlock so that the brake pedal *must be depressed* in order to shift from the Park position. Vehicles that do not have this feature should have a readily visible decal cautioning drivers that this feature is not present. (ORPS Report NA--YSO-BWXT-Y12SITE-2010-0005; final report issued April 7, 2010)

Slips, Trips, and Falls

During the winter, freezing, thawing, and re-freezing conditions make it easy for ice to become a problem, possibly resulting in slips, trips, and falls, as demonstrated by the following events that occurred at LANL in January and February 2010.

- A worker wearing lug-soled boots, and on the lookout for ice, slipped on black ice under an inch of snow while retrieving instruments and supplies from his vehicle. He tore the tendons in his left rotator cuff, requiring surgery. (ORPS Report NA--LASO-LANL-HEMACHPRES-2010-0001; final report issued March 3, 2010)
- A worker, wearing flat shoes enhanced with ice cleats, slipped and fell in a site parking lot following a winter storm that had led to freeze-thaw-refreeze conditions. She sustained a broken right leg. (ORPS Report NA--LASO-LANL-PHYSTECH-2010-0004; final report issued April 16, 2010)
- A military liaison officer slipped on a few inches of snow over ice and fell, even though he was wearing footwear with proper treading. He struck his head on the concrete and suffered a small subarachnoid hemorrhage that resulted in work restrictions for several weeks. (ORPS Report NA--LASO-LANL-PHYSTECH-2009-0009; final report issued January 26, 2010)
- A worker walking in the parking lot between two vehicles slipped and fell, sustaining multiple fractures to his left leg. The worker reported that he had stepped off a curb onto the pavement into what he thought was water that turned out to be black ice. (ORPS Report NA--LASO-LANL-PHYSTECH-2010-0001; final report issued March 19, 2010)

Avoiding Winter-Weather Events

Taking useful freeze protection measures now that include increasing surveillance of building pipelines, flow lines, and safety-related equipment during periods of extreme cold will go a long way toward avoiding winter-related woes. Act now to check heating systems to ensure that sufficient heat is delivered to keep sprinkler systems intact during idle periods. Outside storage pads, unheated storage areas, and outdoor circuits should also be inspected, and systems that have outdoor components or vehicles that are currently out of use should also be included in inspections.

If equipment batteries freeze because of negative temperatures, be aware that battery charging is not a one-size-fits-all activity. Charging batteries and jump-starting mobile equipment can lead to battery damage, electrolyte splashing, and hydrogen explosions. Workers must follow the manufacturer-specific procedures and protocol for charging and jump-starting equipment. They should stop work before performing such procedures and identify any special circumstances or conditions.

It is important for all workers to be vigilant about where they step during icy conditions. Shoe cleats (Figure 1-1) or other protective shoe or boot grips, which some sites provide to their workers, are helpful; but be aware that their use does not ensure safety, as shown by the events above that occurred at LANL last winter. Workers also need to be cognizant of changing conditions and use properly cleared paths when walking between buildings or other pathways where there may be unrecognized hazards during winter months.

Figure 1-1. Boot grips or cleats such as the Yaktrax® shown here can help make walking on snow and ice safer, but are still no guarantee that slips, trips and falls will not occur.

After initial snow- and ice-clearing activities are completed, workers should be asked to help identify hazards in common areas (e.g., paths, formal walking areas, and parking lots) and report them to management. Leaving vehicles in parking lots during snow events can lead to the formation of ice hazards many days after the initial snow fall because the parking lot cannot be totally cleared of snow. Check your site's snow removal policy to see if, when, and where vehicles should be relocated to accommodate snow-clearing procedures. Carrying a bag of ice melt in vehicles, positioned so that it can be reached by the driver to toss on icy and snowy areas before getting out of the vehicle, can also help prevent slips and falls in icy areas.

Weather changes can occur suddenly. If your work requires remote inspections, take along a two-way radio, and be sure to alert co-workers that you are traveling offsite, letting them know your path of travel and your expected time of return. Therefore, if you have not reported in when expected, a search and rescue team can be dispatched to your stated location.

Winter Weather Planning – What Managers Can Do

The text box on the following page shows some of the corrective actions reported to the Department's Occurrence Reporting and Processing System database, including those from events discussed in this article.

Additional tips for managing winter weather challenges are available from the Los Alamos and Idaho sites and from Bruce Power, a Canadian company. These tips are posted on DOE's Operating Experience Wiki (http://operatingexperience.doe-hss.wikispaces.net) and can be accessed via the following links.

- LANL's PowerPoint presentation entitled *Winter is Approaching* at http://operatingexperience.doe-hss.wikispaces.net/file/view/LANLWinter+is+Approaching+-+Slips%2C+Trips%2C+Falls+and+Lab+Closure+and+Delay+Processes+2010.ppt.
- Idaho National Laboratory's minutes from the 2010 *INL Winter Safety Preparation Round Table* at http://operatingexperience.doe-hss.wikispaces.net/file/view/Idaho+Winter+Round+Table+Agenda+and+Minutes+2010.doc.
- Bruce Power's *Just in Time Operating Experience Document*, B-OPEX-00079, entitled "Winter Slips and Falls – Watch Your Footing," at http://operatingexperience.doe-hss.wikispaces.net/file/view/Bruce+Power+JIT+OPEX-00079+-+Winter+Walking+Slips%2C+Trips%2C+%26+Falls.pdf.

- Bruce Power's *Just in Time Operating Experience Document*, B-OPEX-00106, entitled "Winter Driving – Traveling Safely On and Off Site," at http://operatingexperience.doe-hss.wikispaces.net/file/view/Bruce+Power+JIT+OPEX-00106+Winter+Driving.pdf.

Additional Resources

For winter weather readiness dealing with challenges unique to DOE nuclear facility management, see DOE Guide 433.1-1, *Nuclear Facility Maintenance Management Program Guide for Use with DOE O 433.1*, at http://www.hss.energy.gov/nuclearsafety/ns/reg/g4331-1.pdf.

DOE's Office of Health, Safety and Security Causal Analysis Review, *Winter Hazards, Site Safety Measures and Worker Injuries*, published December 10, 2008, can be accessed at http://www.hss.energy.gov/CSA/CausalAnalysisReview_WinterHazards_121008.pdf.

General winter driving and vehicle readiness tips are available at the American Automobile Association website at http://aaaexchange.com and The Weather Channel website at http://www.weather.com/activities/driving/drivingsafety/drivingsafetytips/snow.html.

Lessons Learned

These events help remind DOE management and workers to take precautions against the additional hazards found in and around the workplace when increases in precipitation meet with freezing temperatures. Managers should ensure that current policies, procedures, and work-planning efforts reflect lessons learned from previous inclement weather events and that systems with outdoor components or vehicles parked outdoors for long periods of time are included in freeze protection planning and maintenance programs. In addition to taking precautions to ensure that buildings, systems, and equipment are not negatively impacted by inclement weather, employees need to be reminded to take precautions to avoid injuries from slips, trips, falls, and vehicle accidents in treacherous weather conditions.

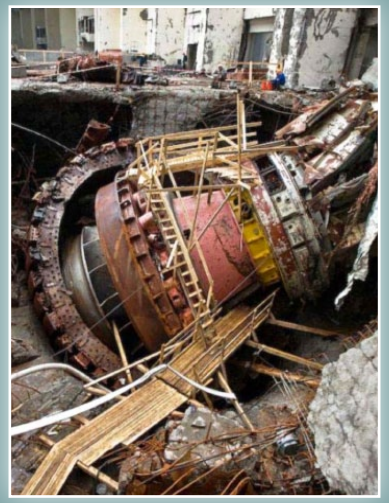
KEYWORDS: Winter, freeze protection, ice, snow removal, batteries, valves, slips, trips, falls, injuries, vehicle safety

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

Suggested Management Actions

1. As inclement weather unfolds, write a management note to all department employees reminding them to be aware of their surroundings and to adjust their actions as appropriate for immediate conditions.
2. Remind all employees to wear appropriate shoes, boots, and traction devices when walking outdoors.
3. Remind all employees to watch for slick surfaces inside and outside and report them to management.
4. Provide shoe cleats to field personnel.
5. Make sure snow removal equipment is working and inspected for freeze-protection concerns.
6. Obtain snow- and ice-melting products and distribute them to workers who drive company vehicles. Some sites expand this program to include all workers.
7. Review your site's overall winter weather policies for effectiveness, and be sure the information has been issued site-wide to all workers.
8. Reiterate the slips, trips, and falls hazard program and the site closure and opening policy at pre-job briefings.
9. Set policy for routinely inspecting low points of paths and parking areas for potholes and other hazards where employees walk and drive, and for back-grading these areas as identified.
10. Direct the effective placement of snow-removal equipment in common areas to allow for quick mitigation of trouble spots.
11. Issue two-way radios to personnel working in remote locations.

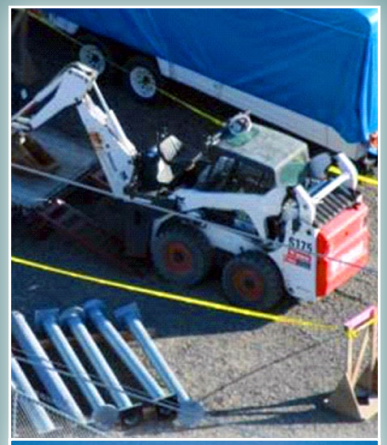
Operating Experience Summary Articles Published in 2010

OE Summary 2010-01	Article Title	Event	Lessons Learned
	Russian Hydroelectric Plant Accident: Lessons to Be Learned	A catastrophic water hammer occurred at the Sayano-Shushenskaya Hydroelectric Plant in Khakassia, Russia, resulting in devastating damage to the plant and 75 fatalities. (http://www.hss.energy.gov/csa/oec/docs/LL_from_Accident_at_Russia's_Hydroelectric_Plant.pdf)	*Budget constraints, a lack of hazards recognition and back-up systems for catastrophic failures, along with many other issues, caused this event. Identification of possible catastrophic failure modes, implementing hazard controls, and proper emergency planning could have saved lives.*
	Incorrect Jumper Cable Connection on Battery Causes Arc Flash and Electrical Burn	An arc flash occurred when an electrician short-circuited a large battery bank, resulting in second-degree burns to both of the electrician's hands. (ORPS Report NE-ID--BEA-RTC-2009-0002)	*Incorrectly identifying work as "routine" may result in circumventing procedures put in place to ensure that all hazards are identified and controlled.*

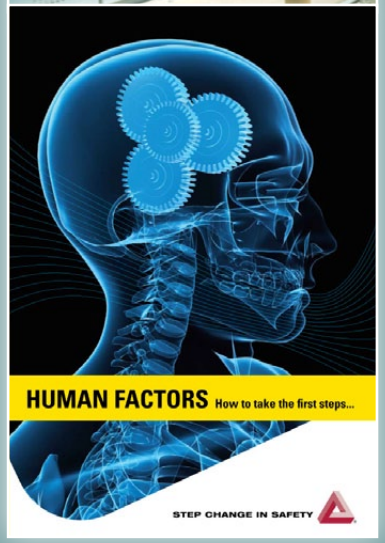
OE Summary 2010-02	Article Title	Event	Lessons Learned
	Haste Makes Waste — Procurement Gone Wrong	Incorrect parts were ordered from the vendor, processed through the procurement group, and accepted by the receipt inspection group as a result of incorrect assumptions and perceived schedule pressures. (ORPS Report NA--LASO-LANL-CMR-2009-0009)	*Personnel must stay focused at all times on the tasks being performed and pay special attention to ensuring that work is being performed per applicable policies and/or procedures.*

OE Summary 2010-03	Article Title	Event	Lessons Learned
	**Battery Explodes While Charging**	A crane oiler charging batteries on a mobile crane with a manual, portable charger was splattered with acid when one of the batteries exploded. (ORPS Report EM-ID--CWI-RWMC-2010-0001)	*It is important to correctly analyze the skill and knowledge needed for a work task before assigning workers to perform the work and to provide workers with the training necessary to perform the task safely.*
	Now Is the Time to Start Implementing Winter Weather Good Practices	A winter weather management good practice from the Kansas City Plant (KCP) offers a host of winter hazard mitigation measures that can be implemented well before winter arrives. (Lessons Learned ID: 2010-KCP-0001)	*The good practice implemented at KCP provides a useful model for other sites across the Complex: identify the issues; use multiple communication methods to increase hazard awareness; and develop a standard, repeatable approach to managing adverse weather conditions.*

OE Summary 2010-04	Article Title	Event	Lessons Learned
	**Nuclear Facility Construction Noncompliances: Parts 1–3**	This three-part series details an HSS Office of Enforcement investigation of noncompliances that led to the fabrication and installation of safety significant or safety class Structures, Systems, and Components (in both new construction and major modifications of DOE nuclear facilities) that did not meet specifications or requirements. (N/A)	*Based on an analysis of the construction issues, the Office of Enforcement determined that the primary causes were related to the failure of DOE prime contractors to adequately flow down requirements to their subcontractors and/or the failure of the prime contractors to provide sufficient nuclear safety oversight of their subcontractors.*

OE Summary 2010-05	Article Title	Event	Lessons Learned
 	Fatal Accident at White Bluffs Substation: The Investigation Results	A contractor heavy equipment operator loading a Bobcat® skid-steer loader onto a transport trailer became trapped between a backhoe attachment and the loader and died from the injuries he sustained. (ORPS Report EM-RL--GORL-DDSC-2010-0002)	*Proper planning and preparation for work play a major role in preventing accidents. A thorough pre-job briefing should always be performed to describe specific job tasks and address all potential hazards, error-likely situations, and possible consequences. Chances for error increase when an unfamiliar situation is encountered or when something unanticipated occurs.*
	Department of the Interior Identifies Safety Measures in the Wake of the Deepwater Oil Spill	An explosion and fire erupted on an offshore drilling rig (Deepwater Horizon) in the Gulf of Mexico, killing 11 crew members and spilling oil into the Gulf for nearly 3 months. (N/A)	*It is important for the DOE community to monitor the Deepwater Horizon catastrophe because of its effects on our country and to reflect on lessons that the accident might offer for safety in DOE operations. Significant information concerning lessons learned identified from the Deepwater Horizon accident is available on the Operating Experience Wiki at http://operating-experience.doe-hss.wikispaces.net/Deepwater+Horizon+Accident.*

OE Summary 2010-06	Article Title	Event	Lessons Learned
	**Unintentional Firearm Discharge During Training: The Investigation Results**	During training being conducted by a subcontractor at the HAMMER (Hazardous Materials Management and Emergency Response) Training Facility, a student unintentionally discharged a loaded handgun. (ORPS Report EM-RL--MSC-GENERAL-2009-0002)	*When performing risk and hazard analyses, it is important to consider Human Performance Improvement (HPI) elements, such as the halo effect, and to verify that proper controls are in place to mitigate "hidden" hazards stemming from inaccurate assumptions and misperceptions. In addition, any time real or replica weapons will be displayed or handled, it is essential to perform basic checks to ensure that they cannot be fired unintentionally.*
	Cold and Dark Does Not Always Mean Safe: Be Alert for Unanticipated Conditions	An asbestos worker clearing snow from the roof of a building at Los Alamos National Laboratory severed an energized extension cord. The worker incorrectly assumed the cord was part of the original electrical system for the building, which he believed had been terminated because the building was designated "cold and dark." (ORPS Report NA--LASO-GOLA-BOPLASO-2010-0001)	*Workers assigned to tasks in so-called "cold and dark" facilities should not assume that all hazards have been removed and should be ready to stop work and re-assess the situation, if necessary. Because the lack of a complete operating history for facilities labeled "cold and dark" may lead to unanticipated discoveries, steps should be taken during the life of a facility to prevent unexpected occurrences.*

OE Summary 2010-07	Article Title	Event	Lessons Learned
	Type B Accident Investigation Results—Serious Hand Injury While Lubricating Crane Cable	A subcontractor apprentice crane operator was lubricating a crane boom cable when the lubricating rag came in contact with the cable and his hand was pulled into a sheave pinch point, crushing his fingers. (ORPS Report EM-SR--PSC-SWPF-2009-0010)	*Pre-job briefings must identify the work scope and hazards, detail methods for performing the task, and ensure that work will be performed in accordance with information in the operator's manual or best industry practices. Participation in a job site review before work begins is also helpful in identifying hazards and provides an additional opportunity to implement controls before beginning work.*
	Are You Working on the Right Equipment? The Danger of "Look-Alikes"	Two events involving look-alike components highlight the risk to workers when they inadvertently remove look-alike equipment rather than the planned equipment. There were no injuries in either event; however, both events could have caused an electrical shock or worse. (ORPS Report EM-RL--MSC-S&W-2010-0001; ORPS Report NE-ID--BEA-ATR-2010-0004)	*Because of the potential for an injury when working on look-alike equipment, it is essential to ensure that the correct equipment is clearly identified in the work order (and work package) and that equipment is labeled correctly so it can be identified in the field. It is also essential that workers make no assumptions and ensure that they have double-checked labels, compared the equipment they intend to work on with photos in the work package, and performed zero energy checks before work begins.*
	Human Factors – How to Take the First Steps	*Human Factors – How to Take the First Steps* aims to raise awareness and understanding of human factors in accident causation, provides useful tools that managers and workers at all organizational levels can use, and discusses organizational safety culture and its influence on human performance and human behavior at work. (http://operatingexperience.doe-hss.wikispaces.net/file/view/Human+factors+-+How+to+ Take+the+ First+Steps.pdf)	*Human and organizational factors lie at the root of serious incidents. If we can recognize when these factors arise in our activities, we can learn how to manage them and prevent harm to our workers.*

OE Summary 2010-08	Article Title	Event	Lessons Learned
	Are You Prepared? Winter Is Here!	Now is a good time to take stock of plant, property, equipment, and policies to prepare for what winter has in store for Department of Energy (DOE) sites this year.	*Managers should ensure that current policies, procedures, and work-planning efforts reflect lessons learned from previous inclement weather events and that systems with outdoor components or vehicles parked outdoors for long periods of time are included in freeze protection planning and maintenance programs. In addition to taking precautions to ensure that buildings, systems, and equipment are not negatively impacted by inclement weather, winter weather programs for employees need to be developed and initiated to prevent injuries from slips, trips, falls, and vehicle accidents in treacherous weather conditions.*

The Office of Health, Safety and Security (HSS), Office of 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, HSS relies on preliminary information such as daily operations reports, notification reports, and 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 Mr. William Roege, (301) 903-8008, or e-mail address William.Roege@hq.doe.gov, so we may issue a correction. If you have difficulty accessing the Summary on the Web (http://www.hss.energy.gov/csa/analysis/oesummary/index.html), please contact the Information Center, (800) 473-4375, for assistance. We would like to hear from you regarding how we can make our products better and more useful. Please forward any comments to Mr. Roege at the e-mail address above.

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