



OPERATING EXPERIENCE SUMMARY



U.S. Department of Energy

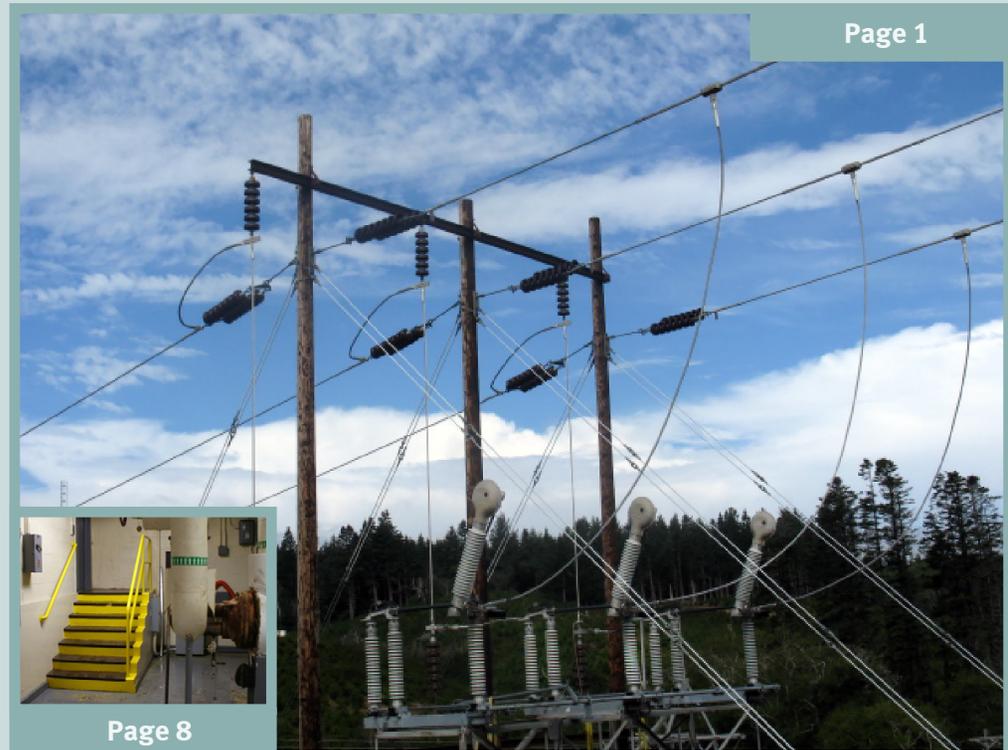
Office of Environment, Health, Safety and Security

OE Summary 2014-03

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Wilson Construction Company Crew Foreman Receives Fatal Shock During Transmission Line Rebuild Project

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On the morning of July 30, 2013, a Wilson Construction Company (WCC) Crew Foreman received a fatal shock while preparing to remove a jumper from a sectionalizing disconnect switch on the Bonneville Power Administration's (BPA) Bandon-Rogue Number (No.) 1, 115-kilovolt (kV) line in Curry County, Oregon. An Accident Investigation Board (Board) was appointed to perform a thorough investigation to determine the causes of the event and make recommendations for corrective actions that would prevent recurrence.

Background

The construction contract had been awarded to WCC for the rebuild of miles 1 through 46 of the Bandon-Rogue No. 1, 115-kV transmission line, including removal and replacement of structures, components, guys, anchors, and conductors. Work also included upgrades to certain existing switches, improvement of access roads, and disposal of removed components. Jacobs Engineering Group Inc. (Jacobs) had been awarded a contract to provide onsite construction administration and inspection services. Aerotek was contracted to supply supplemental professional staff to augment BPA's internal resources. In December 2011, BPA determined there was warranty work that needed to be completed to correct workmanship deficiencies in the original construction. It was also determined during this time that switch stands in four of the mile segments needed to be replaced because they had been incorrectly located due to an error in the original drawings.

WCC was awarded the corrective work contract, and Jacobs continued its work as well. The work included providing a Quality Assurance Representative (QAR) and ensuring contrac-

tor compliance with contract requirements. The WCC Master Agreement required that a Clearance Holder be assigned to hold a daily job briefing and hazard analysis and to direct the application of protective grounds, maintain a log of the locations and time of application/removal of all grounds, and act as the person in charge in the Supervisor's absence. The Clearance Holder was Crew Foreman 1 (CF-1).

The evening before the event, CF-1 received a work clearance from the BPA dispatcher. All three terminals of the Port Orford-Rogue section, including the Geisel Monument Tap, were cleared and tagged: the Rogue Substation ground switch was closed; the Coos-Curry ground switch at the Geisel Monument Tap was open; and there was no ground switch at Port Orford Substation.

The Event

At 0700 on the morning of the event, the work crews assembled at the materials yard located near U.S. Route 1, where a general safety meeting was conducted, including discussion of grounding for the Geisel worksite. Personnel attending from WCC were the Site Superintendent (SI), Quality Assurance/Quality Control/Safety Audit Manager (QA/QC), CF-1 and -2 (CF-2), Journeyman Linemen 1 (JL-1) and -2 (JL-2), and Equipment Operators 1 (EO-1) and -2 (EO-2). Jacobs was originally represented by QAR-1; however, QAR-1 introduced QAR-2 and then left for vacation. Aerotek was represented by a Construction Manager (CM).

Following the general meeting, CF-1 and CF-2 discussed grounding, but decided to finish the discussion at the Geisel worksite before work began. The crews then traveled to the Geisel worksite and conducted a job briefing, including a Task Hazard Analysis (THA).

That briefing included everyone except WCC QA/QC. The plan of the day was to relocate two of the 115-kV sectionalizing disconnect switches. The six men would break into two crews to

The Task Hazard Analysis (THA) covers the hazards associated with the tasks the work procedures involved, special precautions, energy sources, personal protective equipment requirements, hazard elimination or control measures, and the Emergency Action Plan for the site. Each employee and any visitors to the worksite must sign the THA to verify that they have reviewed and understand the hazards.

WCC Safety Manual
February 2013

work: Crew 1 (CF-1, JL-1, and EO-1) at switch 46/6 and Crew 2 (CF-2, JL-2, and EO-2) at switch 46/5.¹ Figure 1-1 shows the Geisel Monument Tap worksite.

After the job briefing, the WCC SI left the site to work at another location. CF-1 and CF-2 continued their discussion about how each of them planned to the grounding operation at their respective work locations, and CF1 believed the discussion was complete. However, Journeyman Lineman 1 (JL-1) also discussed grounding with CF-2 and heard CF-2 express a dif-

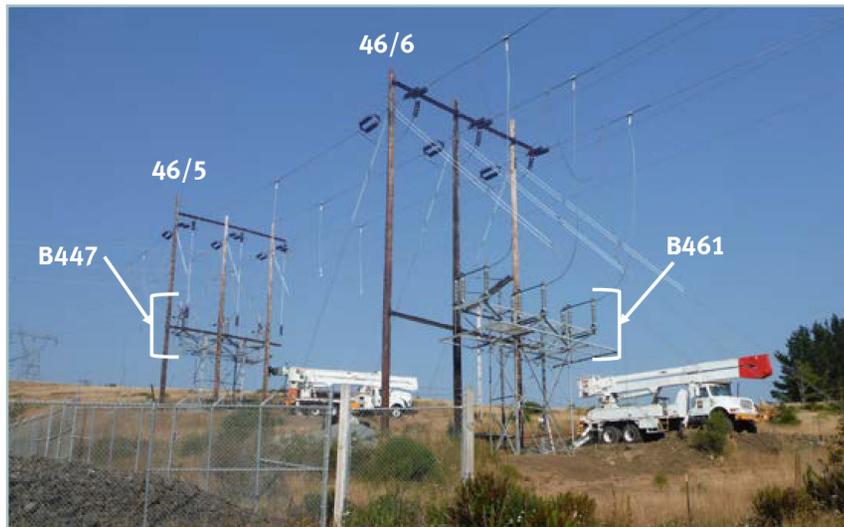


Figure 1-1. Geisel Monument Tap worksite

ferent opinion on the way to ground the worksite as he walked away. Neither man elevated the difference of opinion to the SI for resolution because he had left the site. In the SI's absence, CF-1 (as the Clearance Holder) should have been in charge and responsible for resolving differences of opinion. However, there had been no clear delegation of authority to him.

After discussing their coworker's differing opinions, CF-1 and JL-1 isolated their 46/6 worksite from the 46/5 worksite by opening the conductor jumpers. Because CF-1 emphasized getting grounded and isolated, Crew 1 performed the following actions before CF-1 and JL-1 started work.

- Established and installed a three-phase ground set on the overhead line above worksite 46/6.
- Established an equipotential zone (EPZ) to protect Crew 1 from electrical shock caused by differences in electric potential between objects in the work area.
- Took a *step and touch voltage measurement*.

In a typical *step and touch* application, the transmission line is de-energized and bonded to the tower for safety. However, the transmission line acts like a very large antenna and can pick up large amounts of energy that must be shunted to earth ground. If the tower ground is faulty, the ground potential may rise, resulting in a dangerous condition.

Crew 2 established a three-phase ground set on the overhead line above worksite 46/5, but they did not take a *step and touch voltage measurement* at the worksite 46/5 ground rod or establish an EPZ to protect from difference in electric potential. At about 0930, JL-2 was in the bucket truck removing the sectionalized jumper on A-Phase while CF-2 climbed to the top of the switch stand to attach lift slings that were suspended from

¹ The numbers indicate that the structures are located 46 miles from Bandon Substation and are the fifth and sixth structures in mile 46.

the crane. Once the lift slings were placed and pulled up snug, CF-2 positioned himself to assist in the removal of the blade end sectionalizing jumper on B-phase.

At approximately 0945, CF-2 made contact with a difference of potential across the blade end insulator stack and received an electrical shock. (Structure 46/5 Switch B447 is shown below in Figure 1-2).

Emergency Response

CF-2's team members heard him yell and turned to see him "hung up" on the switch. EO-2 saw an arc between CF-2's leg and the bottom of the switch, realized CF-2 had been shocked, and yelled, "We have a man on fire!" EO-1 called 911 and gave them the GPS coordinates obtained from the THA, and EO-2 began moving equipment to clear the driveway so the Emergency Medical Services (EMS) vehicle could access the worksite. CF-1 grabbed his harness and ran to help. He assessed the situation before climbing the structure and

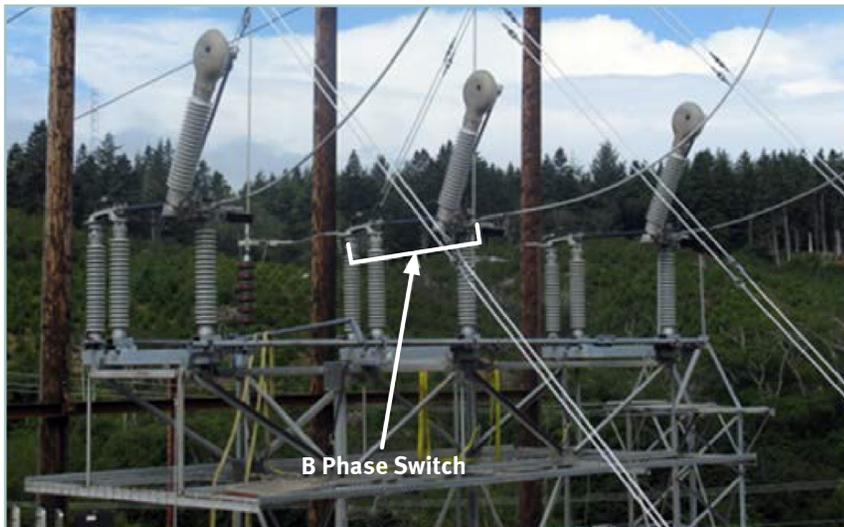


Figure 1-2. Structure 46-5

realized he had to stay below the live parts of the disconnect to begin climbing to CF-2's location. JL-2, who was operating a bucket truck, positioned his jib load line over CF-2 in preparation for a rescue. CF-1 climbed the switch structure to CF-2's location and attempted cardiopulmonary resuscitation (CPR), giving CF-2 a few rescue breaths and chest compressions. However, CF-2's position (lying backwards belted to the rotating insulator stack on B-Phase) and location made CPR difficult, so CF-1 rigged CF-2 to the job line and lowered him to the ground. There JL-1 began CPR and continued until EMS personnel arrived on the scene. EMS personnel applied an Automated External Defibrillator to CF-2 before loading him on a stretcher and taking him down the hill to the ambulance. At 1010, CF-2 was transported to Curry General Hospital, where he was pronounced dead at 1051.

Preservation of the Accident Scene

Because of electrical dangers, WCC immediately performed a safety assessment of the scene to determine if it could be safely entered to take measurements of step and touch and other voltages. WCC collected documentation, took statements, and secured the accident scene. The BPA Chief Operator and BPA Safety Manager responded to the scene on the day of the accident, but BPA did not establish an Accident Investigation Board until August 7, 2013. Although DOE Order 225.1B, *Accident Investigations*, allows the Power Marketing Administrators to opt out of compliance with its requirements, the Department of Energy (DOE) Chief Health, Safety and Security Officer strongly encouraged the Acting BPA Chief Operating Officer to investigate and report. The delay in doing so, coupled with unclear roles and responsibilities, hampered custody and control of the accident scene and immediate access to witnesses and documentation used in the work processes. Difficult communication channels on the part of both BPA and the contractors resulted in the Board being unable to interview key witnesses and ascertain crucial information.



The Investigation

Work Planning and Control

The *WCC Safety Manual* contains mandatory minimum requirements for dealing with the principal hazards inherent in daily work activities. In the course of the investigation, the Board found three areas of the Manual that were relevant to the accident. These areas, in order of the work to be performed, are (1) Job Briefing, (2) Responsibility for Safety (supervisors and trained workers), and (3) Grounding.

Job Briefing

Through the THA and employee statements and interviews, the Board concluded that the crew held and documented a job briefing that reflected the day's task breakdown, potential hazards, and hazard control measures. *Although the job briefing was documented and Crew 2 attended it, Crew 2 did not perform the required hazard control measures of "test with meter, install proper EPZ grounds." Crew 1, however, did follow the hazard control measures.*

The BPA Site Specific Safety Plan (SSSP) in effect at the time of the accident instructs employees to install a visible, three-phase short and ground (Master Ground). In addition, the SSSP requires the Clearance Holder to maintain a log of the location of all grounds installed during the work. *Although Crew 1 installed a ground and created an EPZ, Crew 2 did not install a ground.*

Section 11 of the *WCC Safety Manual* specifically states that "Employee protection consists of two components: a Master Ground and a worksite Equipotential Zone (EPZ)." The General Work Practices section reiterates that the standard method of protection for the employee is installing Master Grounds and creating an EPZ, then provides steps on how to do so.

Responsibility for Safety – Supervisors and Trained Workers

Section 11 of the *WCC Safety Manual* states that supervisors shall be held accountable for all incidents on their job or under their supervision. The Manual also states that employees have the responsibility to immediately report all unsafe or hazardous conditions or other safety concerns to their supervisor and to thoroughly understand the work to be done. To comply with these WCC requirements, both CF-2 and JL-1 should have elevated their discussion to the SI. They held differing opinions on the grounding method, and it appeared to the Board that there was no consensus on the way to ground the two worksites, which for all practical purposes were identical. As a result, Crew 1 installed the necessary grounding to mitigate the hazardous condition, but Crew 2 did not. In addition, Crew 1 performed a step and touch measurement prior to going to work, but Crew 2 did not.

Based on the information presented, the Board found that the difference of opinion between CF-2 and JL-1 should have been elevated to the SI for resolution. However, the SI had left Geisel immediately after the job briefing to off-load a truck at the materials yard. The Board determined that if the SI had been involved with the follow-up discussion between CF-2 and JL-1 at Geisel, the EPZ differences of opinion should have been resolved. The WCC QA/QC had been at Geisel, but he had not attended the job briefing; he had been in his truck on a conference call during CF-2 and JL-1's discussion, and left the worksite shortly after his conference call. He returned only after being notified that there had been an accident. The Board also found that there was no one person in charge of the worksite after the SI left the work location. Even though there were two crew foremen (CF-1 and CF-2) at the scene, and CF-1 was the Clearance Holder, there was no clear delegation of authority to a single individual. Having one person clearly in charge could have resolved the EPZ differences between CF-2 and JL-1.



The Board also noted that a conflict exists between Jacobs' roles and responsibilities for safety as written in the Master Contract and Contract Release 100. For example, while Section B.5 requires Jacobs to "[v]erify safety requirements are in place as shown in the Site Specific Safety Plan," Section B.12 relieves Jacobs of "any responsibility or liability for the safety of persons or property as may be affected by construction work." In addition, although Jacobs was responsible for ensuring that outages were scheduled, for example, Jacobs was not responsible for any techniques, sequences, or the safety of persons or property during the construction work. That responsibility was solely the contractor's (WCC). As a result, when the WCC SI and QA/QC were not present, no one from Jacobs had the responsibility of safety backup.

Section 11 of the *WCC Safety Manual* requires several actions from employees, including the following.

- Immediately report all unsafe or hazardous conditions or other safety concerns to the Supervisor.
- Understand the safety and health hazards specific to their job assignment.
- Before starting a job, thoroughly understand the work to be done, their part in the work, and the safety rules that apply. If an employee is in doubt about their ability to perform the work, they shall notify their supervisor immediately.

Despite those requirements, neither JL-1 nor CF-2 contacted the SI to request a resolution to the difference of opinion.

The Board reviewed the training records of CF-2 that WCC provided. Although the records demonstrated that CF-2 had graduated from Northwest Lineman College and had attended WCC-sponsored courses since then, there was not sufficient evidence to enable the Board to determine if CF-2 possessed all the skills and knowledge necessary to perform the work safely.

In any case, the Board determined that on the day of the accident, CF-2 did not establish an EPZ as required.

Grounding

Section 11 of the *WCC Safety Manual* specifically states, "Employee protection consists of two components: a Master Ground and a worksite Equipotential Zone (EPZ)." And later in the same paragraph it states, "The Master Ground and the EPZ may be at the same location, or the Master Ground may be at a remote location from the work area. It is important to understand that BOTH components should be in effect while work is being performed. They are essential to provide the employee with the maximum protection currently available." The General Work Practices section reiterates that the standard method of protection for the employee is installing Master Grounds and creating an EPZ and provides steps on how to do so. Figure 1-3, from the Occupational Safety and Health Administration (OSHA) website, is a simplified depiction of an EPZ.

The SSSP also includes direction for portable protective grounds. Crew 1 understood the hazards and its part in mitigating the hazards and installed master grounds (a ground from structure B461 to the ground rod), established an EPZ, and performed a step and touch measurement. Crew 2, however, either did not understand the hazards or did not understand the safety rules. Crew 2 installed master grounds but did not establish an EPZ or perform a step and touch measurement. The event calls into question the training and whether it adequately covered or tested the SSSP and WCC manuals and procedures for safe work.

Post-Accident Testing

The Board requested BPA Transmission Line Engineering Services to estimate the induction on Bandon-Rogue No. 1, 115-kV line from the nearby Fairview-Rogue No. 1, 230-kV line in order to determine and document the induction at worksite

46/5. A computer model was set up using the loading factors that had been recorded the day of the accident. The computer model estimated the induced open-circuit voltage on the 115 kV line to remote earth at 3,334 V.

The Board confirmed that the actual measurements taken and the results of the computer modeling were in agreement. Both measurements and modeling showed that hazardous voltages and currents could be expected to be present on the de-energized Bandon-Rogue No. 1, 115-kV line due to the close proximity of the Fairview-Rogue No. 1, 230-kV line. The presence of this hazardous potential reinforces the need for workers to continuously monitor step and touch voltages and to establish and work within an EPZ.

Causes

The *direct cause* of an accident is the immediate event or condition that caused the accident. The Board determined that the accident's *direct cause* was that CF-2 made contact with a difference of potential across the blade end insulator stack.

Root causes are causal factors that, if corrected, would prevent recurrence of the same or similar accidents. Root causes may be derived from several contributing causes and are higher-

An **equipotential zone** is a work zone in which the worker is protected from electric shock from differences in electric potential between objects in the work area. These differences in potential can be caused by induced voltage, line re-energization, or lightning.

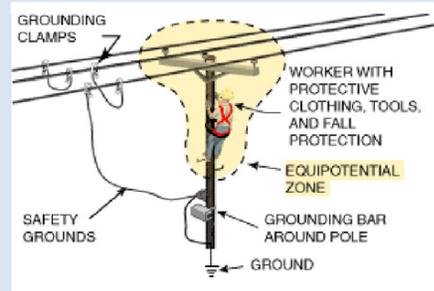


Figure 1-3. Establishing an equipotential zone or EPZ

order, fundamental causes that address classes of deficiencies rather than single problems or faults. The Board determined that the *root cause* of this accident was Crew 2's failure to establish an EPZ.

Contributing Causes (CC) are events that, collectively with other causes, increase the likelihood of an accident, but do not individually cause the accident. CCs may be long-standing conditions or a series of prior events that alone were not sufficient to cause the accident, but were necessary for it to occur. The Board identified 11 CCs. Those most relevant to this article are listed below.

- The grounding system installed at worksite 46/5 did not ensure that all structures/components were bonded to establish an EPZ, so uncontrolled and unrecognized electrical potential existed. (CC-1)
- Failure to test and monitor *step and touch* voltage did not identify the high electrical potential that existed at worksite 46/5. (CC-2)
- Failure to follow the hazard control measures in the THA resulted in failure to create an EPZ and was a lost opportunity for Crew 2 to identify and mitigate any hazardous electrical potential in the work area. (CC-4)
- A difference of opinion between CF-1 and CF-2 was not elevated to the SI and, thus, did not result in an EPZ being established at Crew 2's worksite. (CC-5)
- Defects in workmanship required WCC to initiate warranty actions. (CC-10)

The Board requested, but was not provided with, medical evidence or clinical diagnoses to substantiate that there were no fitness-for-duty issues related to CF-2's health that may have contributed to the accident. The Board did not have access to autopsy results.



Findings and Recommendations

The Board identified the facts of the accident and analyzed those facts to determine what happened, why it happened, and the actions BPA must take in order to prevent recurrence. Through analysis, the Board identified 18 findings and made 15 recommendations. Those most relevant to this article are listed in the table on the right, and additional details can be found in Section 5.1 of the Board's report.

The Board's final report is available at <http://energy.gov/ehss/downloads/accident-investigation-july-30-2013-electrical-fatality-bandon-rogue-no-1-115kv-line>.

KEYWORDS: BPA, lineman, journeyman, equipotential zone, EPZ, fatality, step and touch, voltage, shock, arc, Accident Investigation Board

ISM CORE FUNCTIONS: Define the Scope of Work, Analyze the Hazards, Develop and Implement Hazard Controls, Perform Work within Controls, Provide Feedback and Improvement

BOARD'S FINDINGS	BOARD'S RECOMMENDATIONS
F2: The delay in appointing an AI Board resulted in difficulties collecting evidence, conducting interviews, and securing and preserving the scene.	R1: The Board recommends that BPA evaluate the need to include contractor accidents into the BPA protocol for investigations.
F4: There is not a clear understanding that all personnel have the authority to temporarily suspend work due to imminent danger or safety issues.	R3: The Board recommends...language in all master contracts...that personnel have the authority to temporarily suspend work due to imminent danger or safety issues without the fear of reprisal.
F8: The difference of opinion between CF2 and JL1 should have been elevated to the SI for resolution. F9: If the SI had been involved with the follow-up discussion between CF2 and JL1 at Geisel, the EPZ differences of opinion should have been resolved. F10: The QA/QC left the worksite prior to the discussion between CF2 and JL1. F11: There was no one person in charge of the worksite after the SI left the work location.	R8: The Board recommends that WCC management establish a clear delegation of authority at work locations when the SI is not physically present to make decisions.
F13: Crew 2 did not install a ground between 46/5S and the driven ground rod, thus failing to establish an EPZ between all conductive parts. F14: Neither Crew 1 nor Crew 2 installed master grounds between either of their work locations (B447 or B461) and the Geisel Monument Tap section.	R10: The Board recommends that WCC management ensure all workers follow the documented grounding procedures outlined in WCC's Safety Manual and the Site Specific Safety Plan (SSSP) posted onsite. R11: The Board recommends that WCC management establish and implement a formal training program on all grounding processes and procedures.

Fall Down Stairs at DOE Headquarters Results in Federal Employee Fatality

2

On June 1, 2013, a Department of Energy (DOE) Facility Management Specialist (FMS1) fell from the stairs in a mechanical equipment room (MER 7) at the DOE Headquarters (HQ) in Germantown, Maryland (Figure 2-1). The worker was hospitalized due to severe head injuries and died weeks later. An Accident Investigation Board (Board) was appointed to perform a thorough investigation to determine the causes of the event and Judgments of Need (JON) to prevent recurrence.

Events Leading to the Accident

The Employee's Health

In May 2010, FMS1 suffered a stroke in his home that left him paralyzed from the neck down and required several months of recovery and rehabilitation to regain mobility. Five months



Figure 2-1. DOE HQ in Germantown, MD

later, FMS1 submitted an email with a doctor's letter requesting approval to return to duty but work from home. His supervisor, the Federal Building Manager (FBM), denied the request because the job requirements necessitated a physical presence to support facility operations. On November 22, 2010, FMS1 delivered to the FBM a doctor's letter recommending his return to full duties, and he returned to work on a limited basis. When he returned to work in November, FMS1 had limited mobility and traveled with a walker or cane. No accommodations were discussed or implemented.

By January 2011, FMS1 had returned to work full time; he continued to use a walker or cane and had a handicap parking permit. Although the FBM instructed FMS1 not to go on ladders or on the building roof—normal duties of an FMS1—this limitation was not formally documented. In addition, the Office of Human Capital (HC) was not involved in any return-to-work or fitness-for-duty reviews or in a reasonable accommodation process. There is no record that when FMS1 returned to work part time a return-to-work or fitness-for-duty review was performed. He needed a walker or cane, and when going up and down stairs, he placed two feet per step and held the handrail with both hands. No accommodations were discussed and his position description (PD) remained unchanged after his stroke.

Missed Opportunities

Failure to revise the PD was not the only missed opportunity to evaluate FMS1's abilities and handicap. Following his return to work full time, FMS1 was involved in two work-related accidents. In August 2011, he slipped while exiting a DOE-owned van and hurt his left knee, which was reported to the Computerized Accident/Illness Reporting System (CAIRS), and he filed for Worker's Compensation. That claim was denied by the Department of Labor, but the accident was reported to the Office of Industrial Hygiene and Safety in the Office of Management (MA). In March 2013, FMS1 tripped over a pallet while

performing an inspection, sending him to the Occupational Health Clinic with cut hands and arms. Neither he nor his supervisor initiated an accident report for that event. These two events were missed opportunities for management to question his mobility and safety.

The Event

In May 2013, an emergency generator electrical upgrade project began at the Germantown Main Building. The upgrade was planned to occur over several months, including weekends. During the weeks prior to the accident, the FBM discussed roles, requirements, and weekend coverage with his team, including FMS1. The FBM required a Federal employee from his staff to provide governmental oversight of the electrical outage and related scheduled weekend work, and FMS1 accepted the assignment to provide oversight of the lockout/tagout (LOTO) and other work in MER 6. The assignment included the expectation that FMS1 would go inside MER 6 to inspect the Load Center, requiring him to use the stairs down into the room.

The morning of the event, coworkers observed that FMS1 was alert and moving about using his walker. Electronic door records for MER 6 indicate that FMS1 and the Building Electrician (electrician) entered at 7:25 a.m. During that time period, the electrician saw FMS1 go up and down the stairs to the room, using his cane, more than once. He offered assistance out of concern for FMS1's stability, but was rebuffed. Shortly afterward, the electrician left the area to perform other tasks.

At 8:20 a.m., FMS1 requested that the electrician and Building Engineer (engineer) meet him at MER 7 to review the power connections on the sump pump because Federal personnel were discouraged from entering the MERs alone. The engineer opened the door to MER 7. Based on information the Board obtained from interviews, FMS1 left his walker in the hallway, waited for the other two men to precede him, and entered

MER 7 using his cane. The floor and stairs were dry, the room was well lit, and most equipment was off, allowing normal conversation. (Figure 2-2 shows MER 7 stairs.) As the engineer and electrician proceeded into and across MER 7, FMS1 remained on the landing and gave them instructions.

The electrician turned toward FMS1 when he heard a thud, saw he had fallen, and went to his aid; the engineer also turned toward FMS1 when he heard the electrician calling out FMS1's name. Both of them stated that FMS1 did not cry out or make any other noise as he fell. FMS1 was unresponsive, lying fully extended face down on the cement floor, his head away from the stairs, his left arm and hand up to his head, and his cane and right arm beneath him, all of which strongly suggested that he was at or near the bottom of the stairs when he fell. (Figure 2-3 depicts the MER 7 floor plan post-accident.)

The electrician attempted to call 911 on his cell phone but did not have a signal, so he left to summon help. After the electrician left the room, the engineer called 911 on his cell phone.

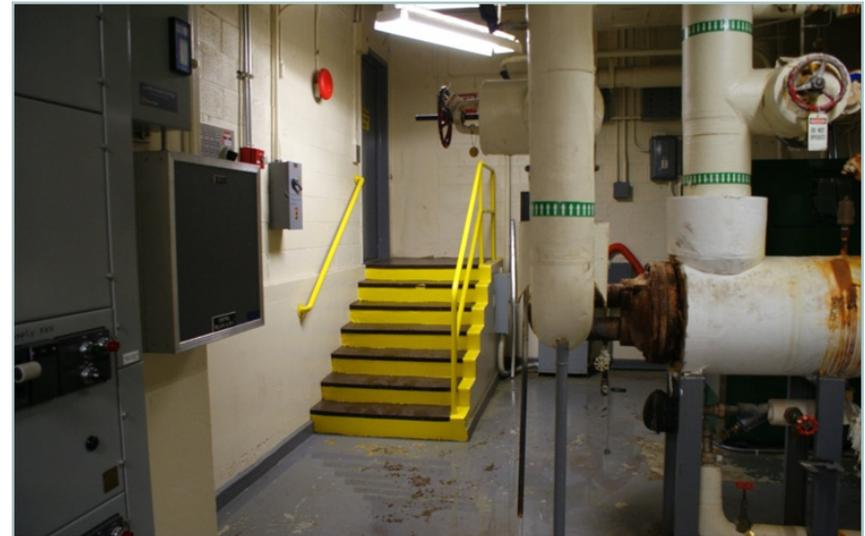


Figure 2-2. MER 7 entrance stairs

Neither realized there was a wall phone in MER 7, nor did they know that they should have called DOE Central Alarm Station at 166 instead of attempting to contact Montgomery County Emergency Medical Services (EMS) emergency at 911. A contractor working nearby in MER 6, who was an off-duty Emergency Medical Technician, began first aid. When the Montgomery County EMS responded, FMS1 was conscious and talking but appeared to be confused. He was taken to a hospital and admitted to the trauma center, where he was determined to have a fractured skull, orbital bone, and nose, and was in a coma. Nineteen days later, hospital life support was suspended, and FMS1 was transferred to hospice care, where he died on June 24, 2013.

The Investigation

There were no eyewitnesses to the fall and the scene was not preserved. As a result, the Board could not determine what caused the fall, but considered the following possibilities.

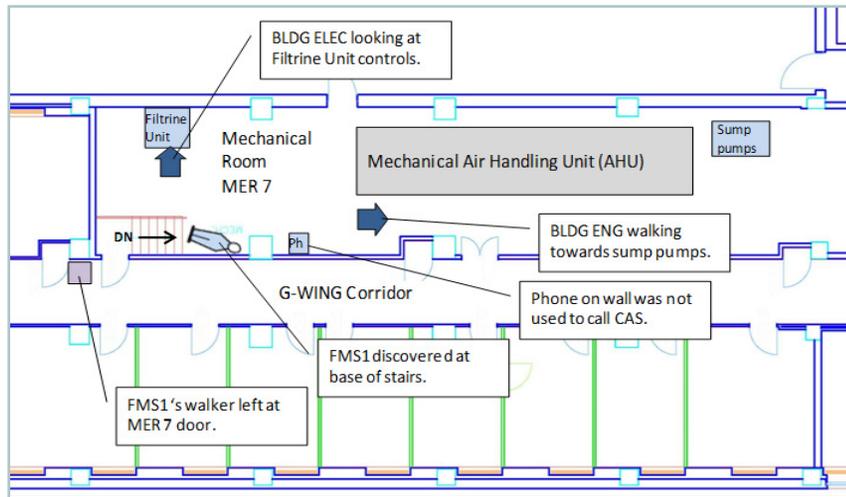


Figure 2-3. MER 7 floor plan showing location of accident victim

- FMS1 may have fallen due only to his physical limitations.
- FMS1 may have caught his foot on the rail post at the top of the stairs because the toe board was missing. However, the position in which he landed at the bottom of the stairs suggests he did not fall from a higher level (i.e., the landing).
- FMS1 may have tripped on a torn stair tread cover.
- FMS1, leading with his cane, may have lost his balance on the bottom step because the rise of the last step was not consistent with the others and presented an unexpected condition.

Causes

The Board determined that the *direct cause* of the accident was that FMS1 fell while descending the stairs or transitioning from the stairs to the floor, striking his head on the floor and sustaining a fatal head injury. The location of his feet and body indicated that he had fallen at or near the bottom of the stairs and not at the top.

The *root cause* was that effective fitness-for-duty processes and requirements do not exist at DOE Headquarters for Federal employees returning to work from a non-work-related injury or illness.

The Board identified six *contributing causes*, as outlined below.

1. A reasonable accommodation, such as a medical flexi-place agreement or position description revision, was not provided; a request to work from home was denied.
2. A formal, documented review of FMS1's fitness for duty did not occur.
3. FMS1 was assigned duties that included entering and transiting stairs in MERs without a formal review of his physical capabilities.



4. Clear responsibilities and guidance did not exist for conducting oversight of the fitness-for-duty and return-to-work processes.
5. Management systems weaknesses existed because oversight of the fitness-for-duty and return-to-work processes and the Federal Employee Occupation Safety and Health program had not been conducted.
6. The MER 7 stairs were not in compliance with codes and standards, and were not in optimum condition for traversing.

Judgments of Need

The Board identified 14 JONs they determined to be the managerial controls and safety measures necessary to prevent or minimize the probability or severity of a recurrence of this type of accident. The five JONs most pertinent to this article are outlined below.

1. The Office of Environment, Health, Safety and Security (AU) needs to ensure that procedures are developed and implemented to preserve accident scenes.
2. AU needs to revise DOE Order 440.1B, *Federal Employee Occupational Safety and Health Program*, to include specific requirements for fitness-for-duty and return-to-work processes for work related and non-work related injuries/illnesses.
3. HC needs to develop and implement effective and formal fitness-for-duty and return-to-work programs for Federal employees.
4. HC needs to develop and conduct training for supervisors and employees related to the fitness-for-duty and return-to-work processes.

5. MA needs to strengthen and formalize its process for implementing work restrictions for its employees that extend beyond verbal instruction. These restrictions could include removal of electronic access for certain areas.

Human Performance Factors

Within DOE, most serious events do not happen during high-hazard or complex operations because workers are paying attention and many people are involved. Most serious events occur during so-called “routine” work, such as going up on a roof, entering a MER, or walking down stairs. It is during these routine operations that focus on safe behaviors is crucial because distractions can have such serious consequences. Opportunities for error must be identified and additional controls put into place to provide a second barrier to failure. Once these controls are instituted and followed, they can help prevent recurrence. A Human Performance analysis performed after the event identified 48 instances of human errors associated with management system barrier weaknesses and changes in conditions.

After the initial illness (FMS1’s spinal stroke), both the FBM and FMS1 desired FMS1 to return to full duty as soon as possible. FBM made a decision to return the employee to duty without benefit of appropriate independent review of the employee’s medical limitations and scope of duties. This decision, made in absence of clear standards and clear supervisory responsibilities regarding return to work and fitness for duty for non-work-related illness or injury, may have led to an assumption that FMS1 was fully able to meet the requirements of his PD, without documented accommodations.



Corrective Actions

The JONs discussed earlier are linked directly to the causal factors, which are derived from the facts and analysis. Together, they form the basis for corrective action plans that line management must develop. The Secretary of Energy directed the development of return-to-work guidance as a result of this Accident Investigation. *Guidance Clarifying the Criteria for Returning to Work after Injury or Significant Illness for Federal Employees: A List of Frequently-Asked Questions* was published March 24, 2014. The document is available for internal access on the DOE website at https://powerpedia.energy.gov/wiki/Return_to_Work and is posted for general readership on the Operating Experience Wiki at http://operatingexperience.doe-hss.wikispaces.net/file/detail/Final_Return_to_Work_Guidance_2014.pdf.

The Board's final report is available at: <http://energy.gov/ehss/downloads/accident-investigation-june-1-2013-stairway-fall-resulting-federal-employee-fatality>.

KEYWORDS: Fitness for duty, return to work, position description, fall, fatality, stairs, mechanical equipment room, MER, Germantown, HQ, Facility Management Specialist, Accident Investigation Board

ISM CORE FUNCTIONS: Define the Scope of Work, Analyze the Hazards, Develop and Implement Hazard Controls, Perform Work within Controls, Provide Feedback and Improvement



The Office of Environment, Health, Safety and Security (AU), 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.

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