

Report in Case No. 09-WBI-0301: SCL Security Upgrades

Between March, 2009 and June, 2010, the Seattle Ethics and Elections Commission (“SEEC”) reviewed and investigated several reports from Seattle City Light (“SCL”) employees under the Whistleblower Protection Code. These reports expressed concerns that SCL security upgrades were being accomplished in ways that endangered public health and safety.

When the SEEC receives a Whistleblower report, staff first makes an initial inquiry to determine whether there is a reason to believe that “improper governmental action” may have occurred.¹ If so, SEEC staff opens an investigation. At the conclusion of the investigation, the Whistleblower Code requires that the Executive Director notify the whistleblower(s) of the investigative findings, and if improper governmental conduct has been established, “report the nature and details of the activity” to the whistleblower, the head of the department, and in some circumstances the Mayor and City Council. SMC 4.20.830(C).

ISSUES INVESTIGATED

The first report lodged with the SEEC involved the lack of required grounding on a temporary perimeter fence installed at SCL’s Bothell substation. Finding reason to believe that improper governmental conduct may have occurred, SEEC staff launched an investigation.

During the course of the investigation, staff received additional reports from City employees regarding other SCL security upgrades. SEEC staff expanded the inquiry, and completed an investigation on the two additional reports that also alleged dangers to public health and safety. These reports alleged:

- Failure to provide proper grounding at the Queen Anne Communication Tower when new fencing was installed in mid 2008, and
- Failure to provide proper grounding of new fencing on the west boundary of the SCL South Seattle Service Center in 2009.

FINDING

Although SCL did act to resolve the safety concerns associated with two of these projects, and is currently resolving the third, staff nevertheless finds that two of these three

¹ “Improper governmental action” means any action by a City officer or employee that is undertaken in the performance of the officer's or employee's official duties, whether or not the action is within the scope of employment, and:

- a. Violates any state or federal law or rule or City ordinance, and, where applicable, King County ordinances, or
- b. Constitutes an abuse of authority, or
- c. Creates a substantial or specific danger to the public health or safety, or
- d. Results in a gross waste of public funds.

SMC 4.20.850(C)

projects did create substantial and specific dangers to public health and safety for periods of time, and therefore constituted improper governmental actions.

FACTUAL BACKGROUND

Security Updates: In the wake of the September 11, 2001 attack on New York City, securing the nation's critical infrastructure took on new urgency. Under the 2005 Energy Policy Act, the Federal Energy Regulatory Commission empowered the North American Electric Reliability Corporation ("NERC") to define and enforce standards to ensure the stability and safety of the bulk electric power system. NERC's mandatory standards apply to many of SCL's power generation and transmission facilities.

In 2004, SCL completed two separate facility vulnerability assessments. These assessments were conducted in-house by SCL and by a consultant, CH2M Hill. Based on the assessments, SCL scheduled upgrades for the substations known as the Massachusetts Street (Mass Street) Substation, located in Seattle's SODO neighborhood, and the Bothell Substation, located in Snohomish County. Other upgrades would follow the completion of these two.

Grounding and safety: Electrical substation safety is a paramount concern addressed in several industry codes and standards. These regulations cover all aspects of substation design and operation, and specifically address grounding. The major grounding rules and regulations include the mandatory standards promulgated and codified as the National Electrical Safety Code (NESC) and the National Electrical Code (NEC), both based on Institute of Electrical Engineers (IEEE) standards. Additional rules and regulations have been promulgated by several state and federal agencies, including the Federal Occupational Safety and Health Administration and the Washington State Department of Labor and Industries. Grounding is complex and requires the involvement – in all phases of the design, construction, alteration and operation of a substation – of licensed electrical engineers, professional engineering technical staff, and the highly trained electrical crews who on a day-to-day basis run the high voltage electrical substations.

High voltage electricity usually enters a substation through overhead transmission lines. These lines are connected to various pieces of station equipment necessary to distribute electricity to utility customers. The voltages associated with the lines and substation equipment can, in the event of a short circuit or fault (such as a fallen line or a transformer malfunction), create a deadly high voltage charge which courses through the earth. This highly dangerous situation occurs due to the difference between the normal, ambient voltage, and the transient high voltage created by the fault (also known as voltage potential).

When a fault occurs, the electrical current travels underground outward from the fault location. "Grounding" entails equalizing the electrical potential across the current's path, or equalizing the voltage potential between a person touching or standing on an object (touching a fence or standing on the substation earth) with the current travelling through the ground at their feet. These two types of dangers are often referred to as "touch potential" and "step potential." If a person is standing in the pathway of an electrical fault, and the electrical potential between the person and the electrical current in the earth is not equalized, a high voltage fault could lead to severe burns or even death.

Grounding a substation yard equalizes, to the extent possible, the voltage potential, and diminishes the risk of serious injury or death. Grounding is accomplished by laying a conductive copper mesh mat (also known as a “ground grid”) under the substation equipment and extending the ground grid from potential fault sources to the perimeter fence. Mandatory grounding does not stop at the substation’s perimeter fence. Because the fence could be energized by a fault, and may be within reach of a person standing outside of the fence, the ground grid must extend to a distance of three feet outside of the substation fence to offer protection.

Every conductive surface in the path of the electrical fault must be “tied” to the ground grid through a process called “bonding.” For example, a fence post driven into the ground within the zone where an electrical fault would dangerously energize the surrounding ground (thus energizing the post during a fault) must be attached or “bonded” to the ground grid. The bonding will equalize the electrical potential of the earth and the fence post at the point the post is energized.

SCL standards require this bonding process to be done in one of two ways; by cad welding or by a compression connection. In most circumstances a conductive wire is (1) connected on one end to the buried ground grid, (2) brought to the surface (forming a “pig tail”), and (3) attached to the fence post. This process is repeated at fence posts located at intervals specified by electrical engineers in their design. If this procedure is not followed, the fence is not adequately grounded.

Collaboration between those who design, construct, alter and operate a substation is essential to preserving a safe environment for SCL employees and the public. SCL’s long history, however, can make these projects difficult. First, many SCL facilities have been operational for decades. They may have been altered on several occasions. Plans that reflect these historic alterations or additions – for example, modifications to a substation fence, or changes in what underlies the property such as metal conduits – may not be readily available or collected in one place, or illustrated on a single drawing or plan. This makes the job of ensuring safety more challenging, and at times requires on-site work to uncover and assess existing conditions. Secondly, changes in regulations occurring over decades present challenges. What may have met the safety standards in 1965 will not – given the increase in capacity of the stations, new technology and advances in engineering – meet the current safety requirements. Melding systems from several generations can present challenges for SCL’s engineers.

The Bothell Substation Security Upgrade

In late 2005, Mary Junttila, an experienced member of the Engineering Project Management team, was assigned to manage the security upgrade at the Bothell substation. The Bothell substation was the second security upgrade project – following the Mass Street project – undertaken by SCL. Bothell is both a transmission and generation facility, and is located on approximately 14 acres in Snohomish County. Once located in a rural area, it now sits directly across the street from a large residential subdivision.

Initially, SCL had expected to begin the security upgrade by the end of 2005. Interviews with SCL employees and review of documentation show that SCL engineers suggested early and continual involvement of SCL electrical engineering professionals, and that Junttila heeded this

advice. Most participants agreed that a well-defined project scope, reviewed and approved by engineering, as well as a construction schedule delineating the responsibilities of SCL and the contractors, was necessary to keep the project on track both in terms of cost and time.

Work did not begin in 2005.

In 2006, SCL hired a new Director of Security and Emergency Management, Roger Serra. Serra's background did not include prior work experience with electrical utilities. He had previously been Chief of Police at the University of Washington and with Snohomish County Department of Emergency Management. In February 2006, the outgoing acting director, Sue Mar, e-mailed Serra with her suggestions regarding scheduling and project cost for the Bothell security upgrade. Mar suggested the project be broken into two different phases, and that the project be undertaken with the same procedures as would any other large public works project, instead of the chosen method of using a non-bid vendor contract.²

Six months later, in August 2006, Junttila echoed the planning advice, writing in an e-mail that she felt "compelled to vehemently recommend that we rethink the Site 2 scope and schedule."

Serra did not follow Mar and Junttila's advice.

In September 2006, personnel from SCL engineering, stations operations and project management briefed Serra on the issues associated with a complex substation project, using the Mass Street Project as a case study. Based on project management experience at Mass Street, engineering staff recommended that future projects have a defined design and contract scope, and a detailed construction schedule, specifically taking into consideration the need to schedule substation crew resources for mandatory safety watch and required inspections. Meeting notes suggest that Security and Emergency Management understood these concerns, but regarded the need for construction completion to be the top priority. In addition to the need to bring SCL facilities into compliance with NERC standards, SCL needed to spend encumbered City funds as well as available federal funds for the security work.

Meetings to scope the Bothell project continued throughout 2006, and included staff from Substations Engineering, Substation Operations, and Security and Emergency Management, as well as the outside vendor working as the general contractor. Key personnel from Substations Engineering included Raj Kochhar, who the Acting Director of Energy Engineering Delivery designated as the project engineer on the project; Portia Romero, who was tasked with designing alterations or additions to the grounding system; and Leonard Piha, the contact for lighting and associated electrical issues (i.e. poles and power supply); and Rajinder Rai, who supervised all three employees. SCL engineers continued to urge that a fully developed design and contract scope, along with clear delineation of contractor responsibilities and SCL responsibilities, be completed before work on the 14-acre project began.

² Mass Street had used the same vendor contract. Before work at Bothell began, the vendor contract was amended to allow for its use in the Bothell project.

In 2007, SCL made several safety-related decisions pertaining to the new fencing at Bothell:

- Subcontractors would provide grounding tabs on each replaced fence pole;
- Saddle clamps would be used to ground temporary fencing by placing clamps on the tops and bottoms - effectively bonding the fence to the existing grounding grid;
- End-sections of the temporary fence would be attached to an existing permanent pole, thus bonding them to the existing grounding system;
- SCL qualified electrical workers would ground the permanent fence;
- The general contractor would purchase copies of the NESC, NEC and IEEE codes;
- Safety observers would be used, as required by SCL policy and standards, and
- The general contractor would supply a safety plan for review by SCL prior to work beginning on the fencing project.

In January 2008, with the upgrade approximately two years behind schedule, Serra named Tom Parks as the new project manager. Parks had previously been involved in SCL facility projects. At a January 30, 2008 meeting, Junttila introduced Parks as the new Bothell project manager. Minutes of the meeting indicate that the team discussed fencing, including whether to change fencing subcontractors, and the need to employ a fencing subcontractor experienced in grounding issues and grounding tabs.

As the new project manager, Parks suspended the regular planning meetings involving personnel from Substations Engineering and Substation Operations that Junttila had instituted, eliminating the chief avenue for SCL engineers to remain involved in planning for the Bothell upgrade.

On September 3, 2008, Piha visited the Bothell substation. He found fencing contractors working in the yard, a temporary fence erected, and a new perimeter fence partially in place. He also found the temporary fence was not grounded. Alarmed that basic and necessary safety standards were not being met, he immediately reported his concerns to Raj Kochhar and Portia Romero in Stations Engineering.

Romero visited the site the following day. She told SEEC staff that she was shocked to find the fencing already under construction. She immediately began designing a grounding plan.

Parks's failure to communicate with SCL engineers regarding fence grounding was one of two significant factors leading to the failure to ensure proper grounding on the perimeter fence. Work should not have begun without Romero, Kochhar or Rai's approval of a fence design and the required grounding plan, which would have included safety considerations regarding both the new and temporary fences. Parks says that he assumed that Piha was communicating about grounding with the engineers. (Piha is not an engineer.)

The other leading factor was Parks's failure to communicate regarding substation crew schedules. Under SCL standards, as well as State and Federal regulations, substation personnel were *required* to act as safety watch for the fencing contractors. They also had to ground each

new section of fencing on a daily basis. At the same time, they were responsible for performing their full-time responsibilities to ensure the operational reliability of the Bothell substation.

Substation personnel stopped the fencing contractor's work early each day so that preliminary grounding of the new fence could be done. This conflict between the substation crew and the fencing contractor led the contractor to complain that only about 20 percent of the projected work could be completed each day, which would likely result in the fence work extending beyond the original contract term. The contractor threatened legal action. Without the benefit of budgeted overtime within the Operation group and Parks's inability to offer overtime to crews, time pressure mounted.

In a September 18th e-mail, SCL Bothell substations personnel wrote seeking advice on how to provide safety, maintain the station, and meet the project demands without affecting other stations or operations in general. In reply, a senior SCL electrical engineer wrote:

"My advice would be that if fence grounding cannot be completed in a timely fashion, then the project should be shut down until work [grounding] can be done. Safety, not project schedule, is our highest priority."

The situation was not resolved until Substations Operations augmented the number of crew members at the Bothell substation by taking personnel from other stations and hiring temporary workers. Work to ground the temporary fence began on or about September 18. That means that for approximately two weeks, the temporary fence was not properly grounded.

Queen Anne Communications Tower:

The Queen Anne Communications Tower (the "Tower") requires a grounding system since it can discharge a dangerous amount of static electricity. When the Tower discharges its accumulated static electricity, the potential voltage level, like that of a substation, has the potential to cause injury or death.

After receiving a complaint that Parks was charged with upgrading the Tower and did not engage or otherwise communicate regarding possible safety issues associated with the security upgrade of the Tower, SEEC staff was able to determine that fencing of the Tower occurred sometime in the first half of 2008. Parks told staff that he was not involved in this project, and the SEEC has no records to the contrary.

The lack of grounding was reported to Substations Engineering staff in September or October 2008. Portia Romero was directed to design a grounding system which met regulatory requirements. Romero's design not only provided the Tower and its environs with adequate grounding, but also upgraded the Tower's grounding system to meet current standards. Work grounding the Tower was completed shortly after the lack of grounding was reported to Substations Engineering.

South Service Center Projects:

In September 2008, work on the Spokane Street viaduct required SCL to vacate a large employee parking lot located on Fourth Avenue immediately south of Spokane Street. To accommodate the need for South Seattle Service Center (SSC) employee parking, SCL moved a pole yard and constructed a new parking lot at Diagonal Street South and Fourth Avenue South. SCL established a footpath, separated by the substation fence to the east and a Burlington Northern (BN), train yard on the west, to provide access to the SSC building from the new parking lot. The parking lot was fenced and gated, and the fence connected to the South Seattle Substation boundary fence.

Phase 1: The Parking Lot

In late September, 2008, Tom Parks took over management of the fencing of the new employee lot designed by John Ovitt of Facilities. He proposed to Substations engineers Rajinder Rai and Portia Romero that the fencing contractor make the ground connections and any repairs needed to the substation grounding mat. The engineers agreed, so long as each connection was, per SCL standards, inspected by SCL electrical constructors.

Parks, in an e-mail dated September 29, 2008, specifically requested the South substation personnel be made available to “implement engineering’s grounding specifications.” Personnel were made available.

The SSC parking lot fencing was completed in accordance with the plans approved by Substations Engineering in less than two months.³

Phase 2: Additional Fencing

In early 2009, Parks began working on the second phase of fencing at the SSC. This fencing was to traverse 1,300 feet along the west side of the SCL property, bordering the substation on one side and the open, unsecured BN train yard on the other. The project also incorporated an asphalt walkway used by SCL employees to travel between the parking lot and the main SSC building.

The new fencing attached to the existing substation fence. Attaching the new fence to the substation fence raised the same grounding issues raised by the Bothell fencing and the employee parking lot fencing projects.

³ SEEC staff did receive a report that Parks, despite alerting the fencing contractor, failed to alert substation crews of toxic dirt in the area in which crews performed cad welding to ground the new parking lot fence and repair damage caused by the fencing contractor to the grounding mat. The act of cad welding done in the contaminated soil carried with it the possibility of releasing toxic fumes. SCL Safety personnel were alerted by the substation personnel who had worked in the dirt. Safety found that the soil had been certified by the EPA as toxic, tested the involved SCL electrical constructors and found all to be free from contamination. Parks told SEEC staff that he was not involved with the project when substation crews did the cad welding. SEEC staff, satisfied with the efforts of SCL Safety personnel, did not investigate further.

John Ovitt of SCL Facilities designed the Phase 2 fencing. The fence design was approved by an SCL Substation engineer, who drew up and included in the approved plans a Fiberglass Fence Design Standard. Parks was given the design in May, 2009. The design has the following required specifications:

- Grounds from the fence to the ground mat [were to be made] at forty foot intervals;
- Connection to the ground mat [was to be made] through cad welding;
- Inspection of the efficacy of the connections [was to be done] by SCL electrical constructors, and
- Electrical isolation [between the substation fence and the remaining fence stretching to the north of the property] was to be done by installation of several four foot wide fiberglass panels.

On June 3, 2009, Parks and members of Substations Engineering met with the fencing contractor and reviewed an updated fence drawing, grounding changes, SCL clearance issues, and BN safety issues. Fencing was completed by an outside contractor, who left the property sometime between July 1 and July 3, 2009.

On July 9, 2009, Wanda Davis, an SCL Substations acting crew chief, walked the newly installed fence, and found numerous discrepancies between the design and the installed fence. In an e-mail, she wrote:

“After the South Stations Safety Meeting, I inspected the newly installed fence at SSC (that is a continuation of the South Substation fence). What I found is;

- The fiberglass electrical isolation barrier section is not installed.
- The spacing of the pigtails that extend from the ground mat to the posts exceeds the 40’ distances from pigtail to pigtail. *The pig tails that are there are not connected to the posts.*
- The pig tail cad weld connections (that connect to the ground mat) *cannot be inspected because they are now encased in concrete.*
- There are fiberglass posts installed in the ground that will (I believe) hold the future fiberglass panels, *however, there are two pieces of metal fencing that bypass the posts and is [sic] chained across the opening.*

Therefore, the entire new fence is conductive and ungrounded and violates the NESC.

There is no evidence that any contractors are continuing to work on this project.

In other words, no contractors, no equipment, no materials, etc
This is a significant safety hazard and needs to be corrected ASAP.”
[Emphasis added].

Within seven minutes of receiving Davis’s e-mail, Rai replied that he and Romero would visit the site that afternoon to try their “best to mitigate the immediate and long-term risk and hazards with the ongoing fencing project.” Ovitt, after receiving a copy of the Davis’ email,

noted that some sort of barrier was needed to secure the facility but that he could not “comment on the grounded pigtail connections not being installed but would forward [the concern] onto Security for review.”

The following day, after a meeting at the site, the SCL Carpentry Shop agreed to drop work in progress, remove the twenty foot metal barrier, and replace it with a plywood barrier. This quick response mitigated the risks associated with the fencing project.

In addition to the discrepancies noted by the crew chief, engineering discovered that substation crew members did not inspect any of the grounding connections, above or below ground, as required by SCL standards and Engineering’s design approval.

In an e-mail, Parks wrote that the subcontractor had used non-SCL electrical workers qualified in high voltage to do the grounding. Romero asked the contractor for a letter confirming that the ground connections were made according to industry standards. The contractor never provided that written assurance.

On August 17, 2009, Parks wrote in an e-mail to Phil Schroeder at the South substation that the contractor “did not perform any test on the welds beyond the standard quality control check for an exothermic weld on cable – they rapped the connection with a hammer...”

On August 19, Parks e-mailed Jeff Joy, head of Energy Delivery Operations, explaining that he had tested nine connections with the “hammer test” at “the direction of stations engineering.” Parks acknowledged, though, that the connections on the later portions of the fence were not inspected to insure proper bonding to the grounding mat.

Romero, of Stations Engineering, told us that she did not authorize Parks – who is neither an engineer nor an electrical constructor – to inspect welds or hit them with a hammer.

On August 26, Rai suggested either removing the connections and reattaching them after testing, or digging through the new asphalt walkway and bringing up the cad weld connections for inspection.

On August 27, Rai’s suggested cures became moot when a south substation crew chief walked the west fence. The crew chief found cracks in the above ground cad weld connections – calling into question the efficacy of the connections between the grounding mat pig tails and the fence.

The crew chief also questioned the placement of the temporary plywood barrier. After reviewing the plans approved by Substations Engineering, the crew chief found that the opening for the fiberglass panels – which were to serve as the necessary break in the conductive metal fencing to insure an interruption of an injurious or deadly flow of electricity resulting from high voltage electrical fault at the substation – had been placed several yards south of the approved plans. They were on top of the substation grounding grid, rendering the fiberglass design ineffective from a safety perspective.

Over the next several months, SCL’s Energy Delivery and Operations divisions worked to determine the best way to resolve the Phase 2 safety issue. After reviewing multiple different drawings of the site spanning six decades, SCL crews conducted an on-site excavation. Based on

the excavation, SCL decided to re-ground the 1,300 feet of fencing on the west property line. SCL drew up plans to complete the remediation by running two grounding cables along the fence line, one inside and one three feet outside the fence line, both of which were bonded to the station's grounding system and inspected by qualified electrical constructors.

Roger Serra left SCL in December of 2009.

SEEC closed its investigation in June 2010, after receiving notice that remediation work had been completed in May. Staff later learned, however, that remediation work had been completed only on that side of the fence located on SCL property. Negotiations between SCL and BN were completed in January 2011 with an agreement signed allowing SCL crews to access BN property to finish the remediation. This remediation work is still being scheduled.

FINDINGS

The Whistleblower Protection Code defines "improper governmental action" to include "[a]ny action by a City officer or employee that is undertaken in the performance of the officer's or employee's official duties...and...[c]reates a substantial or specific danger to the public health or safety." The Code does not define "substantial or specific danger," but the State Whistleblower Protection statute does include the following definition: "Substantial and specific danger' means a risk of serious injury, illness, peril or loss to which the exposure of the public is a gross deviation from the standard of care or competence which a reasonable person would observe in the same situation." RCW 42.40.020(8).

The Executive Director finds that Tom Parks, while performing his official duties as project manager of the Bothell Substation fence installation, failed to ensure grounding of the temporary perimeter fence. This was a gross deviation from the standard of care that a reasonable person would observe, and created a substantial danger to public health and safety.

The Executive Director further finds that Mr. Parks bears primary responsibility for creating a substantial danger to public health and safety in his management of Phase 2 of the South Service Center fencing project.

Parks disputes the characterization of these grounding issues as creating a substantial or specific danger to public health or safety, and disputes the Executive Director's conclusion that he bears primary responsibility for the situation.

The Executive Director recognizes the tremendous pressures placed upon SCL as a City department, and Mr. Parks as a City employee, to accomplish these security upgrades as rapidly, and at as little cost, as possible. But nevertheless, after reviewing the staff's investigation, the Director concludes that SCL and Mr. Parks did not adequately protect public health and safety in the completion of these upgrades.

CONCLUSION

SEEC staff stresses in closing that the safety issues described in this report regarding the Bothell Substation have all been resolved by SCL, and that SCL is actively pursuing the resolution of the issues surrounding Phase 2 of the South Service Center.

Staff repeatedly heard from employees that they were hopeful that the outcome of this investigation would cause SCL leadership to support the additional investment of time, expertise and resources necessary to insure an effective and efficient collaborative process for the planning and execution of future upgrades. With security upgrades in the pipeline (but on hold due to the depressed economy) for another eight substations, SEEC staff encourages SCL's leadership to take its employees' input to heart.

Finally, staff would like to acknowledge not only those SCL employees who stepped forward to report their concerns regarding public safety, but also those committed SCL employees who diligently and with generosity gave staff the benefit of their substantial expertise, open minds and patience to help conclude this investigation.