

Joanna Sofield

Chief Regulatory Officer

Phone: (604) 623-4046

Fax: (604) 623-4407

regulatory.group@bchydro.com

August 5, 2008

Ms. Erica M. Hamilton
Commission Secretary
British Columbia Utilities Commission
Sixth Floor – 900 Howe Street
Vancouver, BC V6Z 2N3

Dear Ms. Hamilton:

**RE: British Columbia Utilities Commission (BCUC)
British Columbia Hydro and Power Authority (BC Hydro)
Reporting of Forced Outage
Downtown Vancouver Outage – July 2008**

BC Hydro writes in response to the BCUC letter of July 21, 2008, directing that BC Hydro submit an interim report on the downtown Vancouver power outage that occurred July 14-17, 2008.

The proposed scope of the final report was described in BC Hydro's letter to the BCUC on July 23, 2008. While BC Hydro is able to provide the following preliminary information, some of the information contained in this interim report may change or be amended as the investigation continues.

BC Hydro confirms that an independent cable expert from Manitoba Hydro will review BC Hydro's findings and bring a peer utility perspective to the report.

BC Hydro also plans to retain additional industry experts to provide advice and review BC Hydro's findings in other specialized areas of the investigation, including risk mitigation opportunities. These independent experts will play key roles throughout this investigation, and they will be drawn from various backgrounds to ensure a broad range of experience is available.

BC Hydro will submit its further report by September 16, 2008 as requested in the BCUC's letter of July 21, 2008.

Summary description of incident

On Monday, July 14, 2008, at 8:54 a.m., a circuit failed in a manhole in the 500-block of Richards Street in downtown Vancouver. An ensuing underground fire caused additional circuits to fail, representing approximately 2,000 customers (metered services). A total of 14 circuits were destroyed by the fire.



Restoration response

BC Hydro crews and municipal fire and police personnel promptly responded to the scene. The Vancouver Fire Department concluded that both the air quality and high temperature in the manhole made it initially inaccessible to BC Hydro crews. At approximately 4:30 p.m. on July 14, 2008 nearly eight hours after the fire broke out, the Vancouver Fire Department determined that the air quality had improved sufficiently and the temperature was low enough to allow BC Hydro crews to enter the manhole to conduct a damage assessment. Crews entered the manhole and confirmed that 14 circuits had been destroyed.

By approximately 5:00 p.m. BC Hydro crews initiated the restoration process, which included removing damaged cables, cleaning the manhole, repairing the ducts, pulling in new cable, splicing the cables, testing and energizing the new cables and re-energizing service to customers.

Power was restored to the first customers by the evening of July 14, 2008 and service to approximately half of all customers was restored within 24 hours. With crews working around the clock, service to approximately 90 per cent of customers was restored within 48 hours, and service to the last customer (Skytrain Stadium Station) was restored at approximately 6:00 p.m. on Thursday, July 17, 2008.

Safety and environmental considerations

BC Hydro personnel attended the scene to address primary safety and environmental concerns during the outage related to poor air quality, electrical hazards, and interaction with area residents and passersby. The underground fire caused smoke and heat to accumulate in the manhole where the failure occurred. This created an environment that was unfit for BC Hydro crews. Once the fire department assessed that the manhole was safe to enter, BC Hydro began the restoration process.

Fire suppression water was released from the manhole/vault through a drain which is connected to a Metro Vancouver combined storm water/sanitary sewer that discharges to the Iona Sewage Treatment Plant.

McRae's Environmental Services Ltd., a local firm which provides vacuum and high pressure cleaning units for municipal, storm and sanitary sewer lines and catch basins, was retained to remove residual water and debris (such as used syringes) from the primary manhole as well as adjacent manholes.

BC Hydro kept Environment Canada apprised of the situation and also liaised with the City of Vancouver's and Metro Vancouver's sewer-use bylaw departments regarding the wash water from the fire fighting.

Repairs undertaken

Working within the confined space of a manhole, BC Hydro crews removed and then replaced nearly four kilometers of underground cable to restore power to all customers.

Specifically, BC Hydro completed the following repairs:

- Removed 3,672 meters of various cable types;
- Removed 69 meters of Underground Residential Distribution (URD) cable;
- Installed 3,672 meters of Cross Link PolyEthylene (XLPE) 500KCM Copper Feeder;
- Installed 69 meters of URD cable;
- Installed 20 XLPE-XLPE Straight splices (x3);
- Installed 10 XLPE-Paper Insulated Lead Covered(PILC) Heat Shrink Transition splices (x3);
- Installed 2 XLPE "wye" (1 cable in, 2 cables out) splices. (600 amp dead break elbows x18);
- Installed 3 terminations at TP (terminal pole – a pole that is the transition between our overhead system and underground system) pole on URD cable;
- Installed 1 straight splice on URD cable (x3);
- Installed new neutral cable in all four directions from manhole and rebuilt all manhole bonding and grounding;
- Rebuilt all racking in manhole; and
- Cleaned the five affected manholes with McRae's Environmental Services.

Maintenance and testing

The manhole where the fire occurred was last inspected in January 2008. In its final report, BC Hydro will provide details on the specific maintenance and testing for the cables in the affected manhole, in addition to details of the overall testing program.

In general, BC Hydro's manhole inspection program is described below.

Prior to 2004, routine manhole inspections were conducted by BC Hydro on an "opportunity" basis, meaning when a crew was doing specific work in a manhole, or in the immediate area, a visual inspection was undertaken. However, no tests were conducted during an inspection. Replacement of cables was based on the fault history of the cable, without any prior condition testing. This program was not considered to be cost-effective because many segments of replaced cable were in good or excellent condition.

In 2004, BC Hydro initiated a Detailed Condition Assessments (DCA) program. This program requires a thorough investigation by Powertech Labs Inc. of the manhole structure, cables and accessories. The assessment uses a combination of different techniques including visual inspection, electrical testing and metallurgical assessments.

BC Hydro's current manhole inspection program identifies cable and splice defects to maintain safe and reliable operation of the feeder. The inspections consist of a visual review of all equipment in the manhole and the use of infra-red temperature guns to detect hot spots. The crews also use a radio frequency partial discharge detector to ensure the work environment is safe. Typical problems identified during inspections include: electrically leaky cable splices, leaky cable terminations, collapsed splices and cables displaced off the rack.

Circuits selected for condition assessment go through a prioritization process based on the importance of the circuit, service conditions, number of faults and expert opinion. The intention of the program is to have an inspection frequency of one year, three years or five years depending on the condition of the feeder and the importance of the circuit. (Many utilities practice blanket replacement based on the number of recorded faults.) Defective cables or components identified by the DCA are compiled as a work package by BC Hydro's engineering group and sent to the BC Hydro's cable department for execution and follow up. Since the DCA program started in 2004, BC Hydro has completed assessments of 971 manholes.

Root Cause Investigation

The root cause of the downtown Vancouver outage remains under investigation.

However, the material retrieved from the affected manhole has been shipped to the Powertech testing lab for forensic analysis. This aspect of the investigation will:

- Carry out thermal analysis on XLPE samples obtained from manhole and from the ducts;
- Carry out chemical analysis on gas and soot samples obtained from manhole. Obtain gas samples from adjacent manholes for chemical analysis;
- Examine cables that were pulled out from the ducts and obtain suitable samples to identify age; and carry out thermal analysis; and
- Carry out metallurgical analysis on connectors of splices and plugs.

In addition to the above analysis, BC Hydro is reviewing:

- the load, switching and protective relay history of the affected circuits over the several week period leading up to the failure;
- photographic documentation for the affected manhole; and
- the physical layout for the duct bank.

The results of all testing and analysis will be made available to the independent experts for their review. Material not consumed or destroyed during this testing will be retained for a time in the event further questions or issues arise.

BC Hydro is also interviewing the cable pullers to determine if they noticed any blistering and charring on the cables as they were pulling them out of the ducts.

BC Hydro will provide more information about root causes of the downtown outage in its final report, and will describe any risk mitigation actions that are identified as a result of this investigation.

Customers impacted

At the peak of the downtown outage, approximately 2,000 customers (20 per cent of the downtown core) were without power. The following table provides preliminary details of the outage duration for those customers.

Affected Circuit¹	Day and Time of Restoration and Outage Duration^{2,3}	Number of Customers (Meters) Affected
A	Wednesday 14:20 53:66 hours	251
B	Wednesday 05:06 44:52 hours	723
C	Wednesday 15:08 54:54 hours	1
D	Wednesday 14:45 53:91 hours	48
E	Wednesday 17:30 56:76 hours	No customers affected – used as part of restoration plan
F	Wednesday 20:00 59:46 hours	551
G	Partial Restoration Wednesday 18:45 57.91 hours Full circuit restoration Sunday 13:00 148:46 hours	No customers affected – used as part of restoration plan
H	Wednesday 21:59 61:05 hours	1
I	Thursday 03:54 67:00 hours	44
J	Thursday 14:50 79:96 hours	4
K	Thursday 17:40 80:86 hours	1
L	Friday 19:56 107:02 hours	259
M	Friday 19:56 107:02 hours	23
N	Friday 23:05 110:51 hours	45

¹ Labeled A to N for the purpose of this report only.

² Outage occurred on Monday, July 14, 2008 at 08:54.

³ Times indicate when circuits were repaired. However, power was restored to all customers by the evening of July 17, 2008 using a combination of other non-damaged circuits, some repaired circuits and switching to standby circuits.

Communications

During the restoration process, BC Hydro's Key Account Managers were in contact with their customers to provide regular updates regarding the status of the outage and the estimated time of restoration. This was particularly helpful in the case of where some customers were able to communicate their willingness and ability to remain on their own backup systems, which allowed BC Hydro to focus on restoring power to other customers.

BC Hydro also provided outage updates to the public, media, customers and BC Hydro employees via BC Hydro's media spokespersons and senior management, BC Hydro's website, BC Hydro's call center, news releases, letters to customers, internal employee messaging, and phone messaging.

Given the nature and location of the outage, the incident received major media coverage for three consecutive days. Initially the media's focus was on what happened, who was involved in the response and what customers were doing to cope. The focus then shifted to getting the perspectives of different stakeholders and experts. BC Hydro's preliminary review of media during the incident tracked extensive newspaper, television and radio coverage.

BC Hydro President and CEO, Bob Elton, also appeared on CBC radio's morning show to thank customers for their patience and answer questions about the outage and BC Hydro's response to it. An opinion piece by Mr. Elton appeared in the *Vancouver Sun* on July 25, 2008.

BC Hydro emergency response

BC Hydro activated its Corporate Emergency Center (CEC) at approximately 11:00 a.m. on July 14, 2008. The emergency center remained in activation 24-hours a day until power was restored to all customers and all damaged circuits were repaired. The CEC was de-activated at approximately 4:00 p.m. on Sunday, July 20, 2008.

BC Hydro will provide more information about its emergency response in its final report.

Requests for customer compensation

As stated publicly on several occasions during and since the downtown Vancouver power outage, BC Hydro re-affirms that it is not liable for losses caused by the power outage, as the following excerpt from BC Hydro's electric tariff makes clear:

Terms and Conditions 9.7:

BC Hydro will endeavor to provide a regular and uninterrupted supply of Electricity but it does not guarantee a constant supply of Electricity or the maintenance of unvaried frequency or voltage and shall not be responsible or liable for any loss, injury, damage or expense caused by or resulting from any interruption, termination, failure or defect in the supply of Electricity, whether caused by the negligence of BC Hydro, its servants, agents or otherwise, unless the loss, injury, damage or expense is directly resulting from the willful misconduct of BC Hydro, its servants, or agents provided, however, that BC Hydro, its servants and agents are not responsible for any loss of profit, loss of revenues or other economic loss even if the loss is directly resulting from the willful misconduct of BC Hydro, its servants or agents.

In its final report, BC Hydro will provide information on the compensation terms, conditions and practices of other jurisdictions during service interruptions.

Planning Criteria

BC Hydro's final report may identify revised planning criteria for the design of future underground circuits based on the findings of this investigation and other reports and studies. In addition, it is expected that risk mitigation opportunities will be identified in existing underground circuits and associated manholes. The timeframe to determine the scope of such improvements may require a separate addendum to this report beyond the September 16, 2008 date for the investigation report.

For further information regarding BC Hydro's investigative process, please contact the undersigned.

Yours sincerely,

A handwritten signature in black ink, appearing to read 'J. Sofield', written in a cursive style.

Joanna Sofield
Chief Regulatory Officer