2007 Professional Development Award Report

Harvey O'Sullivan, Harvey O'Sullivan Consulting Ltd

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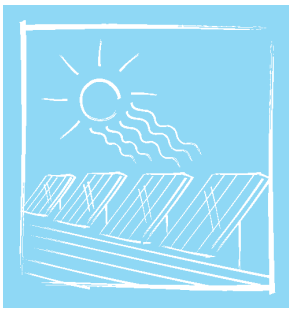

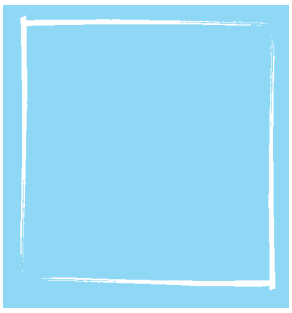

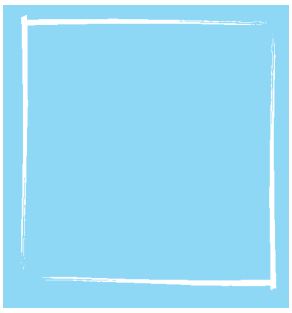

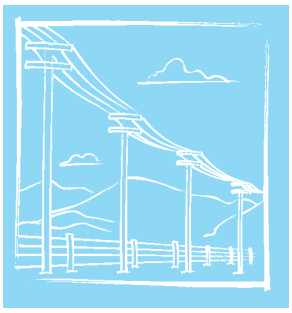

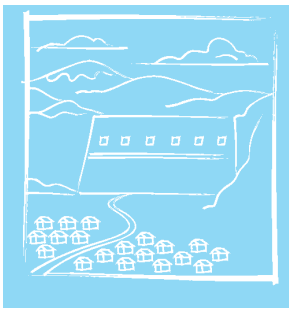

Engineering Excellence

eea | Electricity Engineers' Association

Award Recipient

Harvey O'Sullivan, Harvey O'Sullivan Consulting Ltd

Event Attended & Companies Visited

The award was primarily made for attendance at the Edison Electric Institute Spring Safety & Health Conference. The travel opportunity was also used to meet with representatives of Hydro Quebec and Hydro One.

Programme

EEI Conference	29 April to 2 May 2007	Long Beach, California
Hydro Quebec	11 May 2007	Montreal, Canada
Hydro One	14 May 2007	Toronto, Canada

Acknowledgement

I would like to record my appreciation to the EEA for granting me this award. The conference attended and meetings held have provided me with valuable information and contacts which will assist me in my work for the industry.

Objectives

As well as attendance at the Safety & Health Conference, two specific topics were researched during the trip, being;

- Work on poles and creation of equipotential zones
- Marking of equipment in switchyards.

The establishment of contacts with practitioners in the North American industry was also an objective.

1. EEI Safety & Health Conference

The Edison Electric Institute (EEI) website describes the EEI as:

The Edison Electric Institute (EEI) is the association of U.S. shareholder-owned electric companies. Our members serve 95 percent of the ultimate customers in the shareholder-owned segment of the industry, and represent approximately 70 percent of the U.S. electric power industry. We also have more than 65 International electric companies as Affiliate members, and more than 170 industry suppliers and related organizations as Associate members.

Organized in 1933, EEI works closely with all of its members, representing their interests and advocating equitable policies in legislative and regulatory arenas. In its leadership role, EEI provides advocacy, authoritative analysis, and critical industry data to its members, Congress, government agencies, the financial community and other opinion-leader audiences. EEI provides forums for member company representatives to discuss issues and strategies to advance the industry and to ensure a competitive position in a changing marketplace.

The EEI holds two Safety & Health Conferences per year (Spring & Fall). Attendee numbers were approximately 180, although this was reported as the highest attendee numbers experienced. Attendees included representatives of all sectors, and notable was the apparently equal representation of the generation sector. There was also a notable representation of 'industrial hygienists' who focussed on issues such as contaminants, confined spaces, diseases etc and have a specific technical stream. There was a trade exhibition, but on a small scale.

Many of the conference topics were relevant to NZ, with the marginal topics being those associated with North American legislation and OSHA. However, even these topics had relevance in being able to observe how they are handled, and how OSHA is managed/responded to.

Key conference topics included;

- The BP Texas City Refinery Explosion, presented by a BP representative.
- Washington Update, on a number of current issues receiving the attention of the legislators, including NFPA 70E and arc flash hazards.
- Supervisor Safety Leadership, an address by Southern California Edison about their supervisor programme.
- Hexavalent Chromium issues
- Predicted OSHA Rulemaking on beryllium and silica
- Presentation of the EEI annual safety statistics data
- Contractor Safety Management (An industry panel)
- Public Safety Programmes (An industry panel)
- Industrial Hygiene Case Studies
- Arc Flash (An industry panel describing how various companies are addressing the issue)
- Citations/Accidents Review (Several presentations on recent accidents)

In addition to the presentations, the opportunity was available to meet and talk with practitioners from across North America. Some very useful discussions were held with a number of people.

Key Points on Selected Topics

(i) Texas City Refinery

A BP representative gave a presentation on BP's response to the Texas City Refinery accident in March 2005. BP supports the Baker Report issued in Jan 2007. They see it as a valuable gift to the industry. (Available at www.bp.com/bakerpanelreport)

After the explosion the refinery was shut by Hurricane Rita and is presently only 50% operational.

BP has four focus areas, being;

- Leadership
- Managing process safety as an integrated and comprehensive system.
- Process safety
- People, for process safety knowledge and expertise, and a process safety culture.

BP believe that the accident may have been prevented by promoting people with operational experience.

(ii) Hazardous Materials

With regard to hazardous materials, there is focus on;

- Beryllium, but not much is happening as its presence is not significant in the industry. There is some in flyash, but it is not being found in manufactured articles.
- Crystalline silica, mainly in flyash.
- Hexavalent chromium. This is the current focus of attention. The primary exposure from this is the vapours from welding of chromium containing steels,

eg stainless steel. The issue is inhalation of the vapour, and grinding etc is not an issue as it requires high temperature to form the hexavalent chromium. There is also some presence in flyash. Obligations for managing exposure come into force in North America in Nov 2006, but there is litigation underway between OSHA and other parties. (Overheads and procedural information available)

(iii) Supervisor Safety Leadership

Southern California Edison presented an outline of their programme for supervisor safety leadership. They offered to provide the course materials and handouts if requested. The SCE focus is on safety norms, beliefs and practices by getting supervisors to facilitate the change. They believe that middle management is reluctant to change.

(Overheads available)

(iv) EEI Safety Statistics Report

The EEI gave a presentation of their 2006 safety statistics data. Participation in providing statistics has risen from 40 to 75%. Their key KPI is 'OSHA recordable' accidents.

A copy of the EEI report was obtained for information (confidential), and has been passed to the EEA.

(Overheads available)

(v) Contractor Safety Management

Presentations made by three companies.

One company refers to near miss reporting as 'good catches', for which they have a "Golden Glove Award".

(Overheads available)

(vi) Public Safety

Presentation made by Southern California Edison on their public safety programme. They have set up alliances for public safety, with two advantages being networking, and leverage on resources. The speaker gave guidance on how to set up alliances, which they have done with unions, workers compensation, growers, TV stations, ham radio, fire agencies, US Postal Service etc.

(Overheads available)

(vii) Arc Flash

A number of company representatives provided their current position on dealing with arc flash. Arc flash hazard management in North America is still a current and major issue, and while some companies are dealing with it, others haven't started. In North America compliance with NFPA 70E is mandated by OSHA for those to whom NFPA 70E applies. NFPA 70E does not apply to the ESI, although there are moves to include the ESI in the scope of NFPA 70E, a move which the ESI is strongly resisting.

Some examples of decisions/positions;

- Duke Energy is using 4 cal/cm2 for all LV where arc flash is possible.
- Duke Energy is following NESC Table 410-1 and using ArcPro. (They believe that NFPA 70E will be excessively conservative)
- Otter Tail Power Company is not following NFPA 70E, but is looking at NESC 2007.
- National Grid. Still to do all their assessments, but are using ArcPro. In New England their standard protection is 15cal/cm2, but 4 of their 45 stations require more than 20cal/cm2. In New York the standard protection is 5-10cal/cm2, and 35 of the 48 stations require additional protection.
- DTE Energy operate distribution and generation only. They require 8cal/cm2 for access to their substations. DTE determined distances which their employees would need to stay away from the arc source to match the level of protection used. DTE had also received a citation from OSHA quoting the need to comply with NFPA 70E, which DTE refuted.

In separate discussion with Duke Energy, it was explained to me that NESC requires arc flash assessment, but doesn't say how it is carried out, hence most are using ArcPro for the calculation in transmission and distribution, and IEEE 1584 for indoor and generation stations. NFPA 70E is specific on what to do and how to calculate the exposure, but it does not have to be applied to utilities.

(Overheads available)

(viii) NFPA 70E

As well as the arc flash issues mentioned above, an extension of NFPA 70E to the electricity supply industry would have major consequences for the industry. The impact of losing exclusion from NFPA 70E was presented. The industry uses the National Electrical Safety Code (NESC), which is less prescriptive than NFPA 70E.

(ix) Lead exposure during cable splicing in underground vaults

Presentation not attended, but overheads available.

(x) Citations and Accidents

A number of presenters gave a description (in so far as they could) of accidents which have recently occurred.

Two of the accidents related to coal fired boilers, and one to an explosion of a hydrogen storage cylinder. (Information on these accidents has been provided to Genesis, Huntly.)

A fourth event was presented by National Grid and relates to failure of potted porcelain cutouts. This information is to be posted on the EEA website.

(Overheads available)

2. Information on Specific Practices

Several discussions were held regarding practices for marking of equipment and/or working on poles. In addition to the discussions with Hydro Quebec and Hydro One described below, the following key points were noted.

(i) Work on Poles

In North America OSHA has mandated that when work is carried out on poles an equipotential zone (EPZ) is established. The accepted method of providing an

EPZ on a wooden pole is the use of a pole cluster, and this practice is universal. Some companies have developed doubts about the effectiveness of a pole cluster on its own, and have undertaken specific research on the conductivity of poles. One company reported using half inch spikes on the id of its pole clusters to provide penetration below the surface.

North American practice for wood pole climbing is to use gaffs or crampons. Concrete poles are generally accessed only by EWPs.

In North America a supply neutral on distribution up to 70kV is commonly used, thus providing an effective and suitably rated earth connection for worksite earths. Ground spiking is generally used in conjunction with the supply neutral.

One large company in particular has carried out research work on wood pole conductivity. The company person responsible was present at the conference and brief discussions were held with him on the work they had undertaken. (Further contact has been made since returning to NZ)

A video on equipotential zones has been prepared by the Electrical & Utilities Safety Association in Toronto, and a copy is being requested.

(ii) Marking of Equipment

One major transmission company spoken to uses marking of equipment in switchyards in addition to permit area boundary marking. The marking includes marking at elevation.

3. Meeting With Hydro Quebec (HQ)

(i) Marking of equipment

The objective of the discussion was to determine the principles which HQ use to determine how marking of equipment in switchyards and elsewhere is carried out, and the practices used.

Note (Not part of discussion): By way of background, a video was handed out to attendees at a conference in Vancouver in about 1996, a copy of which was obtained by a Transpower employee who attended. Based on the video a marking system was developed and trialled in NZ. The EEA is in the process of drafting a Guide on Marking based on the HQ marking system.

The marking system used in HQ was explained. The marking is applied in switchyards only, and is not used on towers etc.

The key principles are to provide a visual indication, and to ensure workers remain outside the MAD. Marking is a routine and mandatory practice in switchyards and is used on all jobs. Marking identifies the area which the worker must not move out of.

(More detailed report available).

(ii) Poles and Equipotential Zones

The objective of the discussion was to determine the practices applied by HQ for work on poles and towers for the creation of equipotential zones.

HQ require earthing at each place of work at all times. They have a written procedure for all temporary earthing on poles and structures from which they explained each diagram.

For pole work HQ focus on two key principles;

- Creation of an equipotential zone for the worker
- Providing the minimum resistance for the earth fault current to provide for the safety of those on the ground, ie ensure the earth potential rise is minimal at the pole.

HQ is particular about the entry to and exit from an equipotential zone. The base of the pole will typically have a conductive grid bonded to the equipotential zone, and then an insulated mat for gaining access to/from the equipotential zone. If the conductor break is mid-span the conductive mat has its own earth spike, as well as being bonded to the conductor.

(More detailed report available)

4. Meeting With Hydro One

Some material was made available by Hydro One.

(i) Marking of equipment

HO mark only the permit area in switchyards as is done in NZ. Other than the ground level marker they do not use any elevated or additional marking.

If distances to live equipment are too small they take additional equipment out of service. They have sufficient redundancy to be able to remove the additional equipment from service.

The permit area marker for energy hazards is orange, and for physical hazards is yellow.

On towers with a live circuit when work is being carried out, HO mark the arms carrying the live circuit.

Most work at height in switchyards is done via EWP.

(ii) Poles and Equipotential Zones

HO do not use three phase earths. All leads are single. No concrete poles.

(iii) Arc Flash Hazards

HO issue staff with protective clothing rated for general arc flash hazards outdoors. They are in the process of evaluating arc flash hazards across a wider range of applications.

5. Issues of Relevance to NZ

The key topic areas covered of relevance to NZ include;

- Arc flash
- Hexavalent chromium
- Work on poles
- Marking in switchyards.

<u>Application of Information to NZ Situation</u>

The information and knowledge obtained has been, or will be applied in the following ways;

1. Work on Poles

   - Information will be shared with the company carrying out pole research to validate the research carried out in NZ on poles.
   - Practices in the EEA Guide for Work on De-Energized Overhead Conductors will be compared to equivalent practices understood to be followed in North America.

2. Marking in Switchyards

   The EEA has been preparing a guide for marking in switchyards for some time and some key topics were becoming difficult to resolve. The discussions with Hydro Quebec in particular have resolved those issues, and the Guide is now approved for publication.

3. Arc Flash

   A perspective on arc flash hazards and how they are managed was obtained. This perspective will be used in developing guidance and strategies on arc flash for SS&P Group consideration.

4. Hexavalent Chromium

   Having identified hexavalent chromium as a key issue, research is to be carried out to determine what response the NZ ESI should consider for its management.

5. Personal Contacts

   Personal contacts were established and these will be maintained.

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