



Electricity Engineers'
Association

EEA 2018 Professional Development Award Report

National Electricity Contractors Association Conference (NECA)
Philadelphia, USA
27th September – 14th October 2018

To: EEA Members

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Subject: USA Trip overview 27th September > 14th October 2018

Background

In 2014 I attended the International Lineman's Rodeo in Kansas, an Arc Flash Train the trainer course, U-Pole factory and field crew visits.

This 2018 visit was arranged to see what improvements have been made to the Health and Safety systems through field and company visits, identify any new and updated training initiatives, investigate new technologies and trends at the National Electrical Contractors Association conference and attend the International Lineman Safety conference and Rodeo.

Thanks must be extended to the Electricity Engineers' Association for their contribution towards this trip as I was the recipient of the EEA Professional Development Award 2018.

Executive Summary

Health and Safety is improving but still very much an ad hoc approach compared to what the New Zealand electricity industry is used to.

The numbers - 75 US Workplace fatalities per year from exposure to electricity, over 1200+ workers admitted to burns centers / hospitals for electrical burns, 2000+ electrical injuries requiring days away from work. 31% of these from the Installation, Maintenance, Repair areas and 25% from Construction, Excavations.

Biggest contributor is burns from clothing that ignites in arc flash events. There has been a significant improvement in the wearing of Arc rated clothing since my 2014 visit due to changes in the NFPA 70e standard. Flammable undergarments are still a big issue, polyester known about for some time, but cotton undergarments have been identified as a contributor to injuries if they ignite. No industry mandated requirements around Arc rated clothing and choice comes down to company policy or individuals' choice.

Our PPE standards align more to Canada from what has been observed, Arc rated and Hi Vis compliance requirements similar to ours.

Training of linemen is held in very high regard and sign off of completion taken very seriously.

I liken it to the All Black ethos where you're a custodian of the jersey, lineman qualification held in the same regard and your protecting the lineman brand by only signing off those that are fully competent.

There is no industry body that qualifies lineman, however the Department of Labor authorize training programmes as appropriate. Programmes can be designed at a company or provider level and duration of qualification requirements range from 4 to 8 years, examples;

- **Louisiana:** Licensed at the state level; requires 8,000 hrs on-the-job experience and 1,000 classroom hours
- **Maryland:** Licensed at the county level, requirements vary
- **West Virginia:** Must have at least 4 years of electrical work experience

Ninety percent of work is conducted live (Primary voltages) a number of accidents are occurring during de-energised work as there seems to be a lack of understanding around isolation and grounding principles along with little or no procedural guidance.

The approach to documented work procedures, tailgates is hit and miss with some companies having these, however, during the past two visits to the States I am yet to see evidence of these existing.

An overview of each component of the trip is detailed in the following sections, should you require any further information or explanation to any aspect of this report then please contact me directly.

NECA - National Electrical Contractors Association Conference

NECA Overview - 119 local chapters located across the United States. On the national level, NECA supports the electrical contracting industry through advocacy, education, research, and standards development. At the local level, each NECA chapter is an independently chartered organization with autonomy to elect officers, determine priorities, set member dues and service charges, and help negotiate labor agreements with their local International Brotherhood of Electrical Workers (IBEW) union(s).

The International Brotherhood of Electrical Workers (IBEW) is a labour union that represents nearly 750,000 workers and retirees in the electrical industry in the United States.

Seems to be a very much them and us between Union and Non-Union people - some are very passionate about this, others more forgiving and of the view it just happens to be which area / company you join and what agreement they do / don't have that determines whether your union or not.

The Conference focused on building a stronger Union environment and skillset within the union. NECA seems to be a very strong organization with good support from major suppliers within the States. Real drive to assist companies to show productivity and safety improvements to secure contracts over non NECA competitors.

The NECA vision is to increase members market share by 10% by 2025, currently sitting at 35-43% market share.

Attended numerous non-technical seminars that were informative and supported the things we are doing in NZ - Mentoring, Training, Retaining and Developing Leaders.

Real focus on attracting the right people in to your business, utilising the right technology - smartphones - everyone is using mobile devices to check job applications, apply online.

1 hour sessions attended:

- Developing company leaders through mentoring
- Recruiting: It's time for a new approach
- A look at NFPA 70e 2018 significant changes
- Developing tomorrows leaders today
- Leveling the playing field
- Recruiting: Retaining and growing employees

NFPA 70e session informative around updates to NFPA 70e - seems NECA / IBEW have very good documentation to support industry. Technical workshops inside the trade show were more of a sales pitch on products - informative but didn't give a balanced view.

Trade show floor very focussed on large electrical construction (multi-story building fit-out), some very interesting systems and analysis on improving productivity of electricians. Example, GrayBar an Electrical Supply Product Distribution Company that specialises in Chain Management.

Tuesdays programme was cut very short due to President Trump attending the closing part of the conference, he spoke for about 40mins, emphasizing his policies but also acknowledging the Electrical Industry and NECA's commitment to creating 60,000 more jobs over the next 5 years. Seems US policy (Trump's) is very inward looking and about protecting the American markets and workers. Some of the policies that are working in favour of contractors is the ability to depreciate purchases over 1 year, increasing staff numbers, tax cuts (personal).



A summary of President Trump's speech can be found here <https://www.ecmweb.com/neca-show-coverage/president-trump-wraps-neca-2018-convention>

Summary: A good conference. Trade show floor was very focussed towards large electrical fit out innovations / systems and productivity improvements.

What came through loud and clear from my visit 4 years ago is the drive to improve safety - seems companies are starting to apply good safety procedures as this now relates to contract retention and award. (Again, this is Electrician focused)

NWLTC – Northwest Lineman Training College

Northwest Lineman Training College has 4 Campus's across the USA (Idaho, California, Texas, Florida) Started in August 1993 by Aaron Howell, In Idaho and called Northwest, expanded to the East Coast so now generally referred to as NLC.

Florida Campus has been open for several years and runs numerous courses, recently expanded in to a Gas Training facility to complement existing business.

All material - written and film is developed by NLC, they have their own video channel <https://www.linemanchannel.com/> which hosts a large number of training videos. A free resource.

Main programmes run by NLC are:

Electrical Line worker Programme (ELP)

15-week programme that people pay to attend at a cost of about \$15k per student plus tools \$3k. Intakes have on average 60 candidates each term. (3 terms per year)

Course covers all basic lineman requirements as well as interview and resume techniques.

No guarantee of work at the end of this, but as it is a 15-week full immersion into Lineman life / work it pretty much secures you a job as an apprentice over an off the street applicant should you apply.

(NLC Student statistics 77% employed in the trade, 11% unwilling to relocate but were offered jobs in the trade) 88% success rate

Lineman apprentice programme (LAP)

These are 4 years in total and two options available to businesses that utilise this service.

Option 1: Full distance learning, all training material supplied, and businesses run their trainees through this in its entirety - Cost \$602 per module per trainee, 4 modules over 4 years

Option 2: Distance learning with 2 weeks per year at NLC campus

Both options are recognised by US Department of Labour (DOL) and can be used to obtain DOL Journeyman Certification

Those attending on campus courses are provided material and must complete all Pre-Work and study guides - those that turn up without this being completed are sent home.

Course cost per year for on campus attendance (2weeks) \$3495

Other electrical courses offered - (all distance learning)

- Substation Technician
- System Operator
- Meter Technician
- Transmission Technician
- Journeyman Refresher

Gas Training

A full setup (in field) has been developed with a complete gas subdivision (mini houses) where trainees start from cable / pipe locating to trenching (digger training), pipe laying, fusion welding, meter installs through to commissioning and testing. All completed with Air Pressure to simulate a live gas environment.

This is supported by a full classroom setup from learning pipe fusion, meter install & testing through to pilot lighting in a more controlled situation.

Secondary courses

- Crew Leadership
- Rubber Glove Certification
- Digger Derrick Certification
- Advanced Transformers

ELP Summary: Like a taster course that Connexis use to run but students pay to attend, at the end of 15-weeks candidates that attended this course would be productive on a line crew from day one.

LAP Summary: Material provides to students by way of folders is very comprehensive.

All course have at least 144 hours of academic learning per year (excluding any on the job components)

These courses are supported by videos on the link mentioned above along with the option of online testing.

Overall Summary: A very enlightening day with a very professional company focussed on delivering quality training, very passionate about ensuring that candidates they train are not only competent in the skills they have learnt but also have the right attitude.

NLC will fail candidates from the 15-week course if they believe they don't have the right Skills, Knowledge and Attitude to succeed in industry.

Lakeland Electricity

Host - Robert Padgett - Snr Lineman Trainer, Lineman Hall of Fame inductee, Co Founder of international lineman museum - an interesting guy with an absolute passion for anything lineman, avid collector of insulators and old HV cutouts.

Lakeland Electricity started in 1889, is a municipal (customer owned) 250sq mile area, approximately 250k connections, generate own electricity from two plants x1 coal fired, x 1 natural gas - network supported by interconnection with nearby utilities if required.

System Control

Full smart meters installed across the network providing real time data, including consumer power outages, these link directly to fault dispatch and report outages before the consumer can report it. (consumers never call in no powers)

OSI SCADA system just installed in Control Room (Open Systems International), previous system like our old schematic boards with taped lines representing feeders.

Control room seem overstaffed for the amount of work they do, however this maybe because any recloser block applied to the line needed two controllers to approve these, reviewed on separate screens to ensure same result before applying recloser block.

Stores

\$17m of stock held in store, no full stock takes undertaken due to size of stores, however cycle counting completed.

Stores have 6 staff undertaking pick and pack, receipting of inward goods plus a manager and office administrator.

All job materials are received via computer (generally in order of isle / ready for picking)

Pre-storm season counts taken before storms and orders placed in advance based on history and projections. During storm events bucket numbers are created and all materials booked to this. What isn't used is booked back in to the store and off the bucket number.

Any excess stock retained and utilised throughout the year on other works.

Lakeland Electricity were affected by Hurricane Irma (10 days of restoration), afternoon thunderstorms can cause significant damage as well

Field Visit

Crew undertaking conductor replacement (HV) with the existing HV still live, good quality equipment allowing works to be completed in this fashion. All work completed out of EWP's (single man)

Dielectric boots being utilised on jobsite, however all other PPE was non-standard - long sleeves for the guys aloft and short sleeves for those on the ground, no special high vis requirements for working on the road.



Orlando Utilities Commission (OUC)

Hosts - James Alexander (Electric Technical Training), Darrel Hamilton (Trainer - Retired)

OUC founded in 1923, municipal (customer owned)

2300 miles of electric lines, 246k customers, 2nd Largest Municipality in Florida (14th USA), generation from Coal, Natural Gas, Landfill Gas, Solar Fully smart metered network giving realtime data, just introducing self-healing networks - S&C trip savers, automated switches.

Training

Lineman qualification 8 years from start to topping out (full qualification) includes all aspects of line work Underground, Overhead (including hot stick and Gloving) LV and HV cable jointing to 39kV, some transmission. Qualification broken into following components with a graduated pay scale, each level created a milestone - 4 yrs Apprentice, 1.5yrs each for - Level 3, 2, 1

Requirement of 700+ hours of class room training over 8 years plus on the job sign offs.

Sign offs taken very seriously (sacred) students must fully complete the task before being signed off. This task completion is without any outside assistance / guidance.

Capstone exam at the end of 8 years - activities very detailed and prescriptive with each task taken as a separate item.

OUC 8-year programme is not recognised by any authority - OUC requirement only, other companies hold OUC training in high regard.

Plant and Equipment

Over 700 pieces of plant and equipment with big trucks leased and turned over every 5 years, small trucks owned by OUC (Utes) all automatic vehicles. All vehicle servicing done at OUC.

Just fitting hour meters to trucks to manage Preventative Maintenance- trucks idle all day long.

General Policies & Conditions

Lineman rate at top out \$43.10, x1.5 time overtime including Saturday and Sundays at x2

Fatigue - 16 hours day max, no other limits (no formal fatigue policy)

D&A Policy - Random testing for 20 people to get tested and only 10 of those randomly selected go for official LAB testing. Policy requires post incident but rarely enforced, no consideration for synthetic drugs. They've had people refuse tests and resign.

OUC don't apply any OSHA rules - government can't sue government is the view, apply company rules as guiding principles only.

On the Job, Crews

Focus is on keeping the lights on, work live nearly 100% of the time.

No pre-start job briefings conducted, very ad hoc, some crews do but, majority don't bother. No procedures or processes, view is lineman have been trained as such are competent to undertake activities.

Only processed activity was for switching - lock out and tag out

4-man crews made up of x2 EWP's, x1 Crane rigging truck, Foreman Ute
Totally multi skilled crew can be doing a HV gloving job one day and then running cable and undertaking HV jointing the next

HR

Currently have 15 vacancies for qualified linemen, brought in 20 staff and retained only 4 of those.

Competing with contractors offering better benefits and less requirement for qualification (4 years to qualification instead of 8 years) impacted the above retention, looking at introducing scaled sign on bonuses.

Several contractors - PIKE, Terrys Electric co inhabit the OUC yard and undertake work for OUC (Not enough OUC linemen)

PPE

Electrical Gloves tested every 30 days, but no mandated testing regime - lineman decided that 30 days was appropriate, each staff member issued with several pairs of each class of glove.

Recently company mandated the move from short sleeve to long sleeve tops, only reason for change was skin cancer risk.

General workwear not required to be arc rated, just cotton

Storm Response

During the visit OUC were preparing crews to send off on Hurricane restoration (Michael) - pre-staging crews to just outside projected storm path (Tallahassee)

Hurricane Irma - 500 outside staff came to help OUC

Hurricane Charlie 2004 - 900 outside staff assisted (linemen / vegetation)

Big afternoon lightning storms can cause significant damage to the network.

International Lineman's Rodeo & Health and Safety Conference

Ronnie Hindsman – Personal Injury

A lineman at Sam Houston Electric, who made contact with the primary (HV) conductor whilst holding the EWP controls, the neutral conductor had caught on boom resulting in a phase to ground contact. This was meant to be a de-energised job.

The Foreman went to cut the HV jumper to isolate the line but came back to truck to get safety glasses, Ronnie thought it had been disconnected and went aloft to begin work.

Although there was policy around gloves ground to ground Ronnie wasn't wearing them that day. Company made changes to policy to mandate testing of lines and grounding, voltage detectors were purchased for every truck.

As a result of this accident Ronnie lost both his arms.

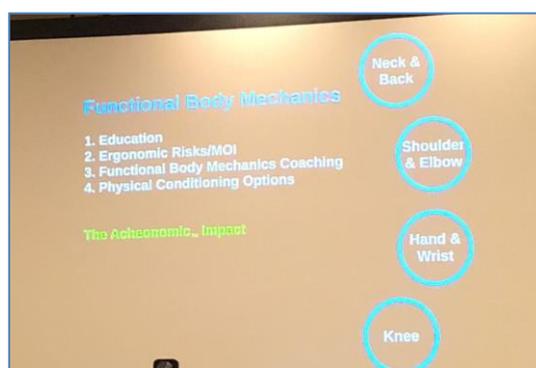


Tony Kaczowski, Insite Health - Lineman are a working athlete

Very similar to the Electrix linefit and fit4work programmes run by the Distribution Services Division.

Their studies supported the findings Electrix identified in the 2011 linefit paper, that Neck, Back, Shoulder and Knees are problematic areas for linemen and that general ergonomics are hard to apply to our industry due to varied and unusual work positions.

Focus should be on stretching, physical conditioning and coaching related to functional movements.



Safety Panel Discussion (active participation from the audience)

Topics of discussion

1. What training is undertaken for drivers for towing trailer and backing?
 - Some with company policies around spotters for backing, back into car spaces, dash cams, cameras are only tools.
 - Smith Driving course - <https://www.drivedifferent.com/>
2. Training for journeyman
 - Seem to be contracting out large jobs
 - Now churning out maintenance lineman
 - Network companies focusing on troublework
3. How important is it to mentor apprentices?
 - No refreshers for lineman so how can they train apprentices
 - Contractors you're getting apprentice lineman not journeyman (referring to lack of training)
4. Rubber goods and manufacturers not holding stock 32-week lead times

5. Are you using non reclosing for live work
 - 10-69 OSHA standard?
 - Hotline tag 8milli seconds to lock out vrs 1/2 second on reclose
 - Don't take hotline tags as a safety measure just means won't reclose on you
6. What are your best practice for storm repair
 - Safety, analysis,
 - Critical services, Largest number followed by ones and two
7. Fatigue
 - Common is 16/8 16hrs on 8hrs rest
8. Other than accident rate what should I look for in a hiring company
 - 36/48 month training programme minimum
 - Have a curriculum
 - Most a 4-year programme now, use to be based on hours 8000, but overtime meant you could be done in 2
 - Then have 4 years post qual to be a really good lineman 8 yr investment

Hector Speaks – Dog Bite prevention www.hectorspeaks.com

Hector spoke for nearly 2 hours on dog bite prevention techniques but also to be careful around people setting you up for failure, videoing your actions and then trying to sue the company.

20+ people per year are killed in the States from dog attacks.

PPE - Scott Margolin - Tyndale

Stop wearing fuel - end of question.

Cotton not as good as it's meant to be, keeps reigniting, burns hotter, heavier therefore more fuel. Wording around cotton, don't mandate just state if you wear undergarment must be non-melting.

Studies have shown that clothing has minimal impact on heat stress lack of hydration, not taking appropriate breaks and health are larger contributing factors to this issue.

AR flame resistant only, FR rated for life of the equipment.

Testing regime of various standards to determine AR / FR rating – number of washes before material is tested, no knowledge of how it performs after additional washing.

ASTM1959 - 3 washes

ASTM1506 - 25 washes

NFPA 2112 – 100 washes

Don't use fabric softener is a wax and wax is flammable.

Grounding - Len Jeniceks (T&D grounding)

Information source on grounding, no one place to go to get all information various standards apply across industry. (USA)

OSHA 1910.269, 1926 Sub Part V

IEEE Std 1048-1993

NESC ANSI C2

APPA Safety manual

There has been a big increase in step and touch potential understanding, guidance that workers should remain 10ft clear from any structure being worked on for Step and Touch potential, any closer than this then workers must wear Dielectric footwear and gloves.

APPA rule for gloves is now cradle to cradle or ground to ground.
OSHA standards state that EPZ must be applied.

When in doubt follow company rules - interesting comment as I thought you'd follow OSHA then company.

Cleaning of the grounding connection and conductor is paramount-reference in osha standards.

Hotline clamp has no fault current rating - this is not sufficient.

ASTM standard states must use Ferrell's on grounds not just connecting in to cable clamp.

Hugh Hogland

Further information on cotton as an undergarment:

In an arc flash event if you're wearing 8 cal clothing with cotton on as an undergarment the cotton won't catch alight until double the cal rating. Therefore, if the event was a 16 cal event then there is a possibility that the cotton ignites.

As above with polyester then clothing will melt to you at the same or less of clothing cal rating.

8 cal clothing with 8cal event then polyester will melt to you.

Check where fabric is manufactured as not all fabrics are equal, ensure you obtain test certificates for the material.

Trade show

Tradeshow focused towards lineman, PPE, tools and equipment.

Several products identified that can assist the Electrix business, this information has been forwarded on to various Business Unit managers for follow up.

Lineman Rodeo

The International Lineman's Rodeo event is held on a Saturday which allows families to attend. Crews are only required to bring their PPE, and usually a hand cart to pull this along to each event.

All poles are pre-stood and equipment supplied from manufacturers.

There are no trade stalls or tents as these are present at the Health and Safety conference and tradeshow. Shuttle buses run from the various hotels out to the event grounds.

Over 200 3-man teams compete over 6 events, there are also 300 individual apprentices competing in their own series of events.

Clean up of Hurricane Michael meant that 30+ teams that were registered to attend failed to show due to the clean-up operations in Florida.

