Prepared by: Jennifer Yorke B. Sc. (Hons Kin)
Completed: August 18, 2006

Traffic, Line & Utility - Task Analysis

Job Task	Brief Task Analysis	Photo of Task
Materials Handling - Gather items for the task from the warehouse - Place the materials into the truck - Drive to the worksite - Unload the equipment at the site as necessary - After work is complete, load unused materials and waste - Return to the warehouse and unload the truck	- Items lifted are a max. weight of 30 Kg. Materials above 23 Kg are to be lifted by at least 2 workers as per NIOSH standards [1] - Materials handling is concentrated at the beginning and end of line & utility work, therefore there is adequate time for muscular recovery between materials handling tasks as they are low repetition [2] - Driving for approx. 30 min/trip - A cluttered worksite & wet weather increase the potential for falls when handling materials [3]	
Transformer Inspections – Padmounts - Check work order to determine which transformers need to be inspected - Map out a route - Gather padmount inspection forms - Drive to the first site - Unlock the padlock and remove the security bolt with a ratchet - Open the lid - Communicate with partner to complete the inspection sheet - Refasten the bolt and secure the lock - Drive to the next padmount	- Task involves inspecting 40-50 padmounts/day to a total of 1200 a year - It takes approx. 15-20 min to complete a padmount inspection form - Only natural lighting is available for this task. CCOHS recommends a lighting value of at least 100 lux. (This will prevent squinting). Flashlight use on overcast days may be helpful [4] - Driving for short periods of time – approx. 1 min between padmounts - Communication between partners is essential to complete the task - Crouching/kneeling to inspect padmount (approx. 2-3min per padmount inspection). Approx. 15 min between each padmount inspection minimizing fatigue build up [7] - Task mostly requires thought, with minimal physical exertion	
Transformer Inspections – Submersibles - Check work order to determine which transformers need to be inspected - Map out a route - Gather submersible inspection forms - Drive to the first site - Remove the security bolts from the floor grate and lift out the grate - Unlock the submersible lid - Lift the hinged submersible	- Task involves inspecting 40 submersible transformers/day to a total of 300 a year. - It takes approx. 15-20 min to complete a submersible inspection form - Only natural lighting is available for this task. CCOHS recommends a lighting value of at least 100 lux. (This will prevent squinting). Flashlight use on overcast days may be helpful [4] - Driving for short periods of time – approx. 2 min between submersibles - Communication between partners is	

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lid and place it on the ground - Communicate with partner to complete the inspection sheet - Close the submersible lid - Secure the lock, replace the grate and refasten the bolts - Sweep up any debris - Drive to the next submersible	essential to complete the task - Crouching/kneeling to inspect submersible (approx. 2-3min per submersible inspection). Approx. 15 between each submersible inspection minimizing fatigue build up [7] - Opening the lid on the submersible transformer requires two workers lifting with approx. 170 Kg of force (85 Kg of force/person). Materials above 23 Kg are to be lifted by at least 2 workers as per NIOSH standards [1]	
Digging Holes for Pole Installation – Auger - Determine what lines/utilities are buried in the ground. If the digging site is clear of lines/utilities, use an auger - Line up the site for digging - Drive the auger truck into position - Steady the truck by releasing the stabilizing legs - Set a thick plastic tarp down beside the area that will be augered - Swing the auger arm into position and release the auger - Begin augering the hole - Bring the auger up out of the hole occasionally and clear debris from the auger - Shovel removed dirt away from the augered hole onto the tarp - Remove the auger and clear it of debris - Return the auger to its traveling position - Release the truck's stabilizing legs - Use the truck's hoist to lift the tarp of excess dirt and load it into a dump truck	- Shoveling is completed with a flexed spine (lumbar and cervical). A flexed spine has a decreased ability to withstand shear and compressive forces, increasing the risk of a spinal injury [5] - On dry days, augering can produce dust – inhalation can be minimized through use of a mask - Shoveling requires repetitive motion of the shoulder and flexion of the lumbar spine. Moderate – Heavy task: for every 2 sec of shoveling, a worker requires 2-3 sec of rest [6,7] - When operating the auger, the worker must remain vigilant to ensure the safety of all workers and to ensure that the hole is dug to specifications. Prolonged vigilance tasks may cause mental fatigue [7]	

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Job Task	Brief Task Analysis	Photo of Task
Digging Holes for Pole Installation – Hydrovac - If the state of the ground being excavated is unknown, use the Hydrovac - Line up the site for digging - Drive the Hydrovac into position - Steady the truck by releasing the stabilizing legs - Swing the Hydrovac arm into position - Begin Hydrovacing the hole - Monitor the state of the hole being Hydrovaced - Return the Hydrovac to its traveling position - Release the truck's stabilizing legs	- On dry days, augering can produce dust – inhalation can be minimized through use of a mask - When operating the Hydrovac, the worker must remain vigilant to ensure the safety of all workers and to ensure that the hole is dug to specifications. Prolonged vigilance tasks may cause mental fatigue [7]	

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Traffic, Line & Utility - Task Analysis

Job Task	Brief Task Analysis	Photo of Task
Pole Installation - Line up the site for digging - Drive the bucket lift truck into position - Drive a second truck into position - Steady both trucks by releasing stabilizing legs - Have one electrician work in the lift bucket (ensure his/her harness is secured) - Fill the second bucket with rubber line insulators - Raise the lift bucket. The electrician in the bucket engages the bucket wire holder to move the pre-existing line so there is room to maneuver the new pole during installation - The electrician in the bucket covers the electrical lines that could potentially come in contact with the pole being installed with the rubber insulators. The electrician also grounds the electrical wires - Swing the second truck's arm into position - Tie a rope around the pole to be installed (lying on the ground) and attach it to the arm of the second truck - Determine which side of the pole is the face. Mark it and then insulate the pole - Engage the arm of the second truck. As it lifts the pole guide it into place - Fill the area around the pole with lime fill while hydraulically tamping area - Remove the rope and insulation around the pole and return the second truck to its traveling position - The electrician in the bucket removes the rubber insulation on the wires and also disengages the wire holder and descends - Return all equipment to its original position	- Electrical poles installed are approx. 55-60' in length - Over 50% of bucket lift work is completed with a flexed (lumbar) spine due to the bucket impeding a worker's ability to maneuver into certain positions. A flexed spine has a decreased ability to withstand shear and compressive forces, increasing the risk of a spinal injury [5] - When working on electrical lines, the electrician is required to wear thick anti-shock electrical gloves. Gloves reduce grip strength by 20-40%. Therefore the worker must increase their hand force output to accomplish each task, increasing their risk of developing a hand injury [7]. A power grasp is required for 25-50% of the tasks involved in pole installation - 5-10 min of hydraulic tamping - CCOHS recommends reducing continuous vibration to the body as much as possible through rest, anti-vibration gloves & tool re-design to reduce potential for hand-arm vibration injuries [6] - Hydraulic tamping requires static contraction of shoulder & forearm musculature. Prolonged static contraction can cause muscle fatigue & injury as blood flow is constricted [2] - Shoveling is completed with a flexed spine (lumbar and cervical). A flexed spine has a decreased ability to withstand shear and compressive forces, increasing the risk of a spinal injury [5] - Filling the area around the pole with lime produces dust – inhalation can be minimized through use of a mask - Shoveling requires repetitive motion of the shoulder and flexion of the lumbar spine. Moderate – Heavy task: for every 2 sec of shoveling, a worker requires 2-3 sec of rest [6,7] - The potential for contact with electrical lines exists. Therefore electrical workers should be cautious and take adequate safety precautions during pole installations	   

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Traffic, Line & Utility - Task Analysis

Job Task	Brief Task Analysis	Photo of Task
Line Transfer/Pole Framing - Drive the bucket lift truck into position - Steady the truck by releasing the stabilizing legs - Work with a partner – one in the bucket, one on the ground - Gather materials and climb into the bucket - Have the partner on the ground toss up needed equipment - Secure the harness to the lift and put on anti-shock gloves - Engage the lift and ascend to the worksite - Sleeve the existing line - Drill new holes into the (new) pole to secure new insulators - Secure the insulators to the pole with bolts - Use a web hoist to bring the old line and the new line together - Re-dead the new line - Attach the newly connected line to the insulator - Descend in the lift and put away all equipment	- Over 50% of bucket lift work is completed with a flexed (lumbar) spine due to the bucket impeding a worker's ability to maneuver into certain positions. A flexed spine has a decreased ability to withstand shear and compressive forces, increasing the risk of a spinal injury [5] - When working on electrical lines, the electrician is required to wear thick anti-shock electrical gloves. Gloves reduce grip strength by 20-40%. Therefore the worker must increase their hand force output to accomplish each task, increasing their risk of developing a hand injury [7]. A power grasp is required for 25-50% of the tasks involved in pole installation - Communication between partners is essential to complete the task - There is always the potential for contact with electrical lines. Therefore electrical workers should be cautious and take adequate safety precautions when doing pole framing or line transfers - Drilling: CCOHS recommends reducing continuous vibration to the body as much as possible through rest, anti-vibration gloves & tool re-design to reduce potential for hand-arm vibration injuries [6] - Drilling requires static contraction of shoulder & forearm musculature. Prolonged static contraction can cause muscle fatigue & injury as blood flow is constricted [2] - Ratchet: Repetitive supination / pronation of wrist increasing potential for a wrist/forearm injury [2]	  

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Job Task	Brief Task Analysis	Photo of Task
Traffic Light Installation/Replacement - Drive the bucket lift truck into position - Steady the truck by releasing the stabilizing legs - Put traffic pylons around the truck to re-direct traffic - Prepare the traffic light: Place light casing on the ground or on the truck platform. Cut the light casing border to size. Place the border on the light casing and secure it with screws. Attach the lights to the casing. Connect the lights to the lights main wires. - Lay out the traffic light pole - Climb into the bucket lift and secure the harness - Tie a rope to the old traffic light and secure it to the bucket to prevent the light from falling - Remove the old traffic light with a ratchet - Remove the old light. Rest the light on the bucket while descending. Pass the old light to the partner on the ground - Ascend and begin to remove the light pole - Spray rusted bolts with an oil spray to loosen them - Remove old bolts and pull the pole out of the bracket. Rest the pole on the bucket and descend. Pass the old pole to the partner on the ground - Ascend and remove the traffic pole anchor with a ratchet or hacksaw - Drill new anchor holes - Place a new bracket onto the pole with a ratchet - Descend and pick up a new traffic pole. Rest it on the bucket and ascend. Insert the traffic pole into the new	- Over 50% of bucket lift work is completed with a flexed (lumbar) spine due to the bucket impeding a worker's ability to maneuver into certain positions. A flexed spine has a decreased ability to withstand shear and compressive forces, increasing the risk of a spinal injury [5] - Communication between partners is essential to complete the task - There is always the potential for contact with electrical lines. Therefore electrical workers should be cautious and take adequate safety precautions when doing pole framing or line transfers - Close proximity to traffic. Workers must be especially cautious when re-directing traffic and when walking on/near the road - Drilling: CCOHS recommends reducing continuous vibration to the body as much as possible through rest, anti-vibration gloves & tool re-design to reduce potential for hand-arm vibration injuries [6] - Drilling requires static contraction of shoulder & forearm musculature. Prolonged static contraction can cause muscle fatigue & injury as blood flow is constricted [2] - Ratchet & screwdriver: Repetitive supination / pronation of wrist increasing potential for a wrist/forearm injury [2] - Minimal hammer work - Adhesive used to loosen rusted bolts is toxic; work is completed outside in an open area - Stripping wire: Wrist in ulnar deviation; firm hand grasp with quick extension of wrist. The wrist is in ulnar deviation, which is an unwanted posture [2, 8] - Lifting materials up to 20 Kg in weight - Noise levels above 80 dBA constitute a risk for hearing loss. Excessive noise from traffic and machinery can be dampened with ear protection	   

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Job Task	Brief Task Analysis	Photo of Task
bracket and secure it with bolts - Descend and pick up a new traffic light. Rest it on the bucket and ascend. Slide the wire through the traffic pole, level the light, bolt the light to the traffic pole and cap the end of the traffic pole **If the traffic light is being placed directly onto a pole:** - Thread traffic light wire into the pole - At the base of the pole, remove the cap that covers the wire access - Pull out the new wires - Cut and strip the new wires. Attach them to the existing wires - Return the wires to the pole and replace the panel cover - Remove the old wires via the access on the sidewalk and replace and secure the sidewalk cover	- Please see above	

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Traffic, Line & Utility - Task Analysis

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