Job: Electrician

Description:	The Electrician's have two roles on site; they alternate working in each role on a shift by shift basis. The System Electrician is responsible for monitoring and troubleshooting the operations of the electrical systems at the various berths on the premise. The Maintenance Electrician is responsible for completing programed maintenance tasks and repairs across the premise as is indicated by work orders.

Essential Duties

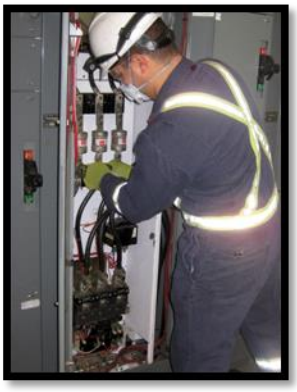
A. System Electrician: monitoring and troubleshooting the operations of the electrical systems.

a. Working in the control/electrical room(s) to monitor the daily operations of the conveyer systems that are used to move product at each berth.
b. Troubleshooting and evaluating solutions to operations issues, in conjunction with the Millwright.

Computer monitors and various electrical boxes are utilized to run and troubleshoot operations issues on the conveyer lines at each berth.		

B. Maintenance Electrician

a. Completing static checks of switches and gears in the control room.
b. Completing static checks and a visual inspection of the electrical system along the conveyer line.
c. Completing a running check of the conveyer.
d. Complete other maintenance/repair duties.

Photo is of an Electrician completing a static check of the electrical system in the control room, a programed maintenance task.		

Shift Schedule:

Electrician's are on shift twenty-four hours per day. Shift schedules on the waterfront include a thirty minute meal break and two fifteen minute coffee breaks. At Kinder Morgan shift times are from 8:00 a.m. to 4:30 p.m., 4:30 p.m. to 1:00 a.m., and 1:00 a.m. to 8:00 a.m.

Description of Essential Job Duties

1. System Electrician: monitoring and troubleshooting operations of the electrical system.

Frequency:

- The Electrician's are responsible for the monitoring and troubleshooting the daily operations of the conveyer systems at each berth. Any issues that arise are communicated to the Millwright via radio, and together the Electrician and Millwright troubleshoot and solve the issues that arise to allow the system to operate in a safe and effective manner.

Equipment:

- System Electrician's utilize some small hand tools over the course of the day, if assisting to complete a physical repair of the electrical system. Small hand tools that are most commonly used include: a merger, Allen keys, wrenches and a current test stick. More often the Millwright will complete the physical repair, while the Electrician assists by monitoring the computer system that analyses the operating system at each berth.
- The System Electrician utilizes specialized software and a radio to communicate information to the appropriate personal.
- Personal Protective Equipment includes:
    - Steel toed boots
    - Coveralls with reflective markings
    - Gloves
    - Ear protection
    - Hard-hat (as required)
    - Respiratory mask (as required)
    - Protective eyewear (as required)

Environmental/ Psychosocial Factors:

- The System Electrician is typically situated alone in an electrical control room. To get to the control room the Electrician must walk across the premise; the walk may include going over catwalks or railway tracks, or over uneven ground surfaces. As they are required to walk outdoors occasional exposure to cold, hot or wet weather temperatures may occur throughout the day. The Electrician is required to follow the requirements for PPE in the various work areas across the premise.
- The electrical control room has a buzzing noise, which the Electrician is continuously exposed to. The control room is equipped with concrete flooring, and florescent overhead lighting.
- The System Electrician has a high level of self-supervision and accountability, however they do frequently troubleshoot, collaborate and communicate with the Millwright on duty.

Essential Job Demands:

The System Electrician's job duties are fairly routine on a daily basis, although the specific control room and environmental set up varies depending on the berth that the worker is assigned to.

- **Monitoring and troubleshooting:**

  The System Electrician is responsible for watching the computer system, to ensure that the conveyer system is properly operating. If the conveyer drifts from one side to the other, or stops functioning appropriately the computer system will notify the Electrician of the location of the error.

  Once the location of the error has been identified, the Electrician notifies the Millwright by radio of the error and its location. The Electrician must also power-off any active electrical components in the area to avoid a backlog on the conveyer, and as this could affect the Millwrights safety while he/she completes the repair. Once the Millwright has cleared the systems error the Electrician will power-on the system, and continue to monitor the operations to ensure that the system is properly functioning.

  To power-off and power-on the various electrical systems that are running, the Electrician must turn the switches on and off from inside of the control room. If scheduled as a System Electrician for their shift, the worker is not typically required to leave the control room. The Electrician is able to sit or stand typically as they desire, although weight bearing demands are required to power-off and power-on the various electrical systems.

Physical and Postural Demands:

A	Reaching			Equipment	To operate switches or utilize small hand tools.
Duration	Throughout the entirety of work	Frequency	Occasional	Force	Variable

Description:

- Forward reaching or vertical reaching while standing is required to operate switches in the control room.
- Reaching demands are typically completed unilaterally at inner and outer ranges. Periodic exposure to overhead level reaching is required for up to thirty seconds at a time.

B	Hand Functions			Equipment	To operate switches, use a keyboard, or utilize small hand tools.
Duration	Throughout the entirety of work shift.	Frequency	Frequent	Force	Variable

Description:

- Grasping and manipulating is required for handling tools, for manipulating switches and to operate radio buttons. A combination of power grasps, palmer grasps, tripod pinches and finger manipulations are required. Fine and medium prehension is necessary for operating radio buttons, a computer mouse and for keyboarding tasks.
- Most work demands are completed unilaterally, however some level of bilateral upper extremity coordination is required.

C	Sitting			Equipment	While viewing a computer monitor.
Duration	For periods of up to two and a half hours at a time.	Frequency	Frequent to constant	Force	N/A

Description:

- A stool is situated in each electrical room; the Electrician will typically sit while monitoring the computer software (although they may stand and/or take micro-postural breaks if desired).

D	Standing			Equipment	While operating electrical control switches.
Duration	For periods of up to two and a half hours at a time.	Frequency	Occasional to frequent	Force	N/A

Description:

- A combination of static and dynamic standing for periods of up to two and a half hours at a time may be completed; workers have the option to sit or stand while monitoring the operations system.

E	Walking			Equipment	N/A
Duration	For periods of up to fifteen minutes at a time.	Frequency	Occasional	Force	N/A

Description:

- Walking is encountered to get to and from the electrical control room at the beginning and ending of each shift, and as desired during break times.
- Ground surfaces are at times uneven and require walking across metal grating, railway tracks, or loose debris.

F	Climbing			Equipment	Stairs
Duration	Single flights of stairs.	Frequency	Occasional	Force	Body weight

Description:

- To get to and from the various electrical control rooms, the Electrician may need to navigate single flights of stairs.

G	Low Level Posturing			Equipment	N/A
Duration	Approximately thirty seconds.	Frequency	Rare	Force	Body weight

Description:

- Dynamic low level posturing is required if powering-on or off switches at or below knee level.

H	Balancing			Equipment	N/A
Duration	Throughout the entirety of the work shift.	Frequency	Frequent	Force	N/A

Description:

- Two foot dynamic standing balance is required for all job tasks involving standing, walking, climbing and reaching.

2. Maintenance Electrician: complete programed maintenance tasks and repairs across the premise.

Frequency:

- The Maintenance Electrician is responsible completing programed maintenance duties, and subsequent repairs of the electrical systems across the premise. The Maintenance Electrician completes numerous maintenance and repair duties each week, as indicated by the work orders prepared by the foreman.

Equipment:

- Maintenance Electrician's utilize some small hand tools over the course of the day, when assessing and/or repairing components of the electrical systems. Tools most often utilized by the Maintenance Electrician include: a merger, Allen keys, wrenches and a current test stick.
- The Maintenance Electrician communicates information to the other Electrician's or the Millwright's as required by a handheld radio.
- Personal Protective Equipment includes:
    - Steel toed boots
    - Coveralls with reflective markings
    - Gloves
    - Ear protection (as required)
    - Hard-hat (as required)
    - Respiratory mask (as required)
    - Protective eyewear (as required)

Environmental/ Psychosocial Factors:

- The Maintenance Electrician typically works with a partner to complete programed maintenance tasks, as one worker will complete a physical check of the conveyer line/berth, while the other stays in the control room and completes corresponding visual checks of the computer system.

- Depending on the specific location of the premise that the Electrician's are assigned to working on, they may be able to drive to a work location. Alternatively they may be required to walk across the premise; this walk may include going over metal grating, over railway tracks, or over uneven ground surfaces. As they are required to walk outdoors occasional exposure to cold, hot or wet weather temperatures may occur throughout the day. The Electrician is required to follow the requirements for PPE in the various work areas across the premise.
- The electrical control rooms that the Electricians work within have a buzzing noise. The control rooms are equipped with concrete flooring, and florescent overhead lighting.
- When entering and working in the berths, some odors from high concentrate zinc and lead are present. Additionally, the lighting is considerably dimmer and a flashlight is required to visually inspect aspects of the electrical system.
- The Maintenance Electrician has a high level of self-supervision and accountability, however they do frequently troubleshoot and communicate with the Millwright on duty.

Essential Job Demands:

The Maintenance Electrician's job duties vary on a daily basis, as the job demands are highly variable depending on the particular work order that is assigned. As was previously noted the Electrician's are responsible for the maintenance and repair of all electrical systems located on the premise.

- **Completing static checks of switches and gears in the control room:**

  Prior to commencing any maintenance or inspection work the Maintenance Electrician will complete a static check of the various switches and gears located in the control room. This process takes approximately ten minutes to complete, and requires the Electrician to perform dynamic reaching to all levels, and periodic stooping and low level posturing. The purpose of completing a static check is to ensure that the control boxes are functionally operating, to complete this task a voltmeter is utilized. Additionally, during the static check the Electrician will turn off the electrical systems that power the conveyer line.

- **Completing static checks along the conveyer line:**

  Following the static check in the control room, one of the two Electricians' will enter the berth to complete a static check of the operating system. To assess the various components of the conveyer system, they may be required to climb up to 136 stairs, climb ladders, and walk over various surfaces. While completing the static check the Electrician will communicate with their partner in the control room to ensure that the computer and alarm systems are operating correctly.

  While completing the static check of the conveyer line the Electrician will complete a visual inspection of the full work area, making note of any safety considerations, burnt out light bulbs or malfunctioning equipment. Any issues that are noted are later reported to the foreman, and separate work orders are completed to assign this work.

- **Completing a running check of the conveyer:**

  After completing the static checks of the control room and conveyer line a running check is completed. During the running check one Electrician remains at the conveyer line, while the other is situated in the control room. They will again ensure that the system is appropriately running and that the alarm systems associated with malfunctions are correctly identified by the computer system.

Note: completing the full static and running check will take between ninety minutes and two hours to complete.

- **Other maintenance tasks:**

  The Electricians are responsible for all electrical systems across the premise, thereby they will complete repair work as indicated by work orders. Repair or maintenance work tasks that are typically indicated include: replacing light bulbs/ballasts, replacing or repairing pump systems, rewiring malfunctioning electrical components, and/or replacing malfunctioning switches or gears.

Physical and Postural Demands:

A	Reaching			Equipment	Often while using tools.
Duration	Throughout the entirety of work shift.	Frequency	Frequent to constant	Force	Variable

Description:

- Forward reaching or vertical reaching from standing, kneeling, or crouching, is routinely encountered with concurrent exposure to forceful arm functions (such as pushing, pulling, grasping or handling).
- Certain postural demands allow the Electrician to adjust or modify the proximity of their work (i.e. using a ladder, or by moving closer to the work by stooping, kneeling, or crouching).
- Reaching demands may be completed at both inner and outer ranges and are primarily completed below shoulder level. Some exposure to overhead unilateral and bilateral reaching is required for periods of up to three minutes at a time.

B	Hand Functions			Equipment	Often while using tools.
Duration	Throughout the entirety of work shift.	Frequency	Constant	Force	Variable

Description:

- Grasping and manipulating is required while handling tools, at both inner and outer ranges.
- Most work duties require a combination of bilateral reaching, handling, and upper extremity coordination.
- A combination of power grasps, palmer grasps, tripod pinches and finger manipulations are required. Fine and medium prehension is necessary (ability to handle and manipulate objects with ones hands and fingers) for handling small items, for ensuring bolts are secure, and when completing wiring demands.

C	Sitting			Equipment	For driving.
Duration	For periods of up to fifteen minutes at a time.	Frequency	Occasional	Force	N/A

Description:

- Sitting is required while driving the company truck on site; all areas of the premise can be accessed within fifteen minutes of driving.

D	Standing			Equipment	
Duration	For periods of up to two and a half hours at a time.	Frequency	Constant	Force	N/A

Description:

- A combination of static and dynamic standing is required for periods of up to two and a half hours at a time.
- Ground surfaces include inclined surfaces, concrete surfaces, asphalt surfaces, and metal grating.

E	Walking			Equipment	N/A
Duration	For periods of up to two and a half hours.	Frequency	Frequent to constant	Force	Maybe carrying a tool bag weighting twenty pounds.

Description:

- Walking along the conveyer line is required on a constant basis, while completing static and dynamic checks. Walking is relatively slow and is self-paced.

F	Climbing			Equipment	Vertical ladders or stairways.
Duration	Flights of up to 136 stairs, up to four times per day.	Frequency	Occasional	Force	Body weight, and possibly while carrying tools (up to twenty pounds).

Description:

- Depending on the location of the assigned work, the Electrician may need to access areas at the top of stairways, such as when accessing the numerous conveyer systems/Silos at the dock site. This requires the Electrician to climb up to 136 stairs at a time. The Electrician may need to take three to four trips up and down the stairs on a given day.
- The Electrician may work off of a vertical ladder depending on the project being completed; the rungs of a ladder are typically 12” apart.

G	Bending/Stooping			Equipment	Often while operating tools.
Duration	For periods of up to fifteen minutes continuously.	Frequency	Frequent	Force	N/A

Description:

- Sustained mild and moderate range stooping is routinely encountered while completing repair duties. Both supported and unsupported trunk postures are encountered, such demands are encountered from standing, crouching and kneeling positions. The Electrician is able to take postural breaks as is required.
- Sustained severe range stooping is rarely encountered as the Electrician will typically kneel or crouch to complete low level demands; however, dynamic severe range stooping is likely if assessing enclosed spaces along a conveyer system.
- Awkward trunk positions are encountered throughout the workday, more often if working in enclosed spaces or around large structures (i.e. bending, rotation and lateral flexion). Awkward trunk postures are likely to be required for approximately five minutes at a time, however the Electrician can take postural breaks as is required.

H	Twisting/Spinal Mobility			Equipment	Often while operating tools.
Duration	Brief dynamic movements.	Frequency	Occasional	Force	N/A

Description:

- Twisting and side bending are encountered while working and reaching to the side, reaching to high work levels and/or when working on ladders.
- The Electrician is able to take postural breaks as is required.

I	Neck Movements			Equipment	
Duration	Throughout the entirety of the work shift.	Frequency	Frequent to constant	Force	N/A

Description:

- Sustained periods of downward gazing (cervical flexion) are required while working below shoulder level.
- Overhead work demands typically require upward gazing (cervical extension), in conjunction with some level of right and left rotation.
- Neck rotation movements are routinely encountered while scanning the work surface and work environment; these movements are not repetitive.

J	Low Level Posturing			Equipment	Often while operating tools.
Duration	For periods of up to thirty minutes at a time.	Frequency	Occasional to frequent	Force	N/A

Description:

- Sustained low level postures are encountered for periods of up to thirty minutes at a time, while completing maintenance and repair duties. Low level posturing demands include: kneeling, crouching, crawling, lying on the ground surface, at times on metal grating. These demands are often encountered in conjunction with stooping and handling demands.

K	Balancing			Equipment	Ladders and man lifts.
Duration	Throughout the entirety of the work shift.	Frequency	Constant	Force	N/A

Description:

- Two foot dynamic standing balance is required for all job tasks involving standing, walking, lifting, carrying, stooping, climbing and reaching.
- Balancing at heights (i.e. from a ladder or in a man-lift) may be required on an occasional to frequent basis. When working from a ladder or man-lift, stooping, lateral spinal flexion, and forward reaching are likely to be encountered.

L	Driving			Equipment	Truck with an automatic transmission.
Duration	For periods of up to fifteen minutes.	Frequency	Occasional	Force	N/A

Description:

- Driving times should not exceed fifteen minutes at a time, to gain access to all areas of the premise.

M	Lifting			Equipment	Materials such as light fixtures.
Duration	N/A: Not typically repetitive.	Frequency	Occasional	Loads	Up to 50 lbs. loads.

Description:

- Lifting is required between floor and overhead level, of loads weighing up to 50 lbs.
- Items lifted vary in size and shape, if the Electrician deems an item too heavy or awkward they are able to request assistance from a coworker.

N	Carrying			Equipment	Tool bag.
Duration	Variable distances.	Frequency	Occasional	Loads	Approximately 20 lbs.

Description:

- Carrying of a tool bag is required during several work duties, the Electrician's tool kit typically weighs about 20 lbs.

O	Pushing/Pulling			Equipment	Cables
Duration	For periods of up to ten minutes at a time.	Frequency	Occasional	Force	Up to medium levels of force.

Description:

- Pulling is required if new cable wires are required for a particular job demand, running cables requires a hand over hand pulling movement.
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NOTE:

"limited", refers to NOC guidelines – Handling loads up to 11 lbs.
"light", refers to NOC guidelines – Handling loads between 11-22 lbs.
"medium", refers to NOC guidelines – Handling loads between 22 – 44 lbs.
"heavy", refers to NOC guidelines – Handling loads greater than 44 lbs.

"continuous", refers to activities that are, on a cumulative basis, performed for 67-100% of the work day
"frequent", refers to activities that are, on a cumulative basis, performed for 33-66% of the work day
"occasional", refers to activities that are, on a cumulative basis, performed for 0-33% of the work day

"mild stooping" – flexion at the hip/waist up to approximately 20°; "moderate stooping" – flexion at the hip/waist between approximately 20°& 45°; "severe stooping" – flexion at the hip/waist greater than approximately 45°

"inner-range reaching" within a forearm's reach; "outer-range reaching" the arm extends away from the body

Overall Strength Category: Medium Strength Capacity with aspects of Heavy Strength Capacity work.

X Functional Demands with MSI Potential

Electrician

Back

- Combinations of forward and lateral flexion are required during maintenance and repair duties.

Shoulder

- Some handling of materials and tools at outer ranges is required.

Elbow/Wrist

- Forceful gripping of various tools and materials is required throughout the course of the workday.

Knees

- Stair climbing of up to 136 stairs may be encountered up to four times per day, while carrying materials and/or tools.
- Sustained low level posturing demands are encountered (project specific) for up to thirty minutes at a time; low level posturing may be completed on metal grating.

✓ Strategies to Minimize MSI

Electrician

Back

- Try to perform stretches during break times, or go for a walk during break times.
- If a job task requires frequent or sustained forward bending of the spine, gently stretch the back and shoulders for symptom management.

Shoulder

- Whenever possible position the body close to the work that needs to be completed to avoid unnecessary forward reaching at outer ranges.
- Utilize a ladder or step stool as applicable to minimize exposure to overhead work.

Elbow/Wrist

- Perform wrist and forearm stretches periodically throughout the day, this will promote blood flow to the muscles in the arms and hands.

Knees

- Try to alter positions when working in low level postures (i.e. alternate working with the right or left knee up).
- Wear gel knee pads when working in low level postures for more than five minutes at a time.
- Try to perform stretches during break times, or go for a walk during break times.

Physical Demands Summary Table

Job Demands:		Max. Weight (lbs.)	Duration per exposure h=hrs s=secs, m=mins	Frequency	Comments
STRENGTH	Lifting/ Carrying	50 lbs.		O	Lifting and carrying demands are not associated with Systems Electrician work.
	Pushing/Pulling		10m	O	Medium push and pull forces are required to run new cable wires.
	Supporting Body		2m	O	Climbing ladders, or stairs.
	Gripping/Handling			C	Forceful palmer and pinch grasps are required; multiple tools and materials are handled.
	Fine Motor Skills			C	Fine and medium prehension constantly required.
POSTURE & MOBILITY	Sitting		2.5h	O/C	Constant sitting on a stool during System Electrician work, with postural breaks as required.
	Driving		15m	O	
	Standing		2.5h	C	Ground surfaces vary, up to constant standing/walking during Maintenance Electrician duties.
	Walking		2.5h	F	Self paced walking.
	Bending/Stooping		15m	F	Mild to moderate stooping demands are routinely encountered. Rare and brief exposure to severe stooping is encountered.
	Sustained Crouching/ Kneeling		30m	O/F	Postural breaks can be taken as required.
	Climbing Stairs			O	Up to 136 stairs are required to access some conveyer areas; flights of stairs may be encountered while carrying tools and supplies. Flights may be climbed 4-5 times per day (not a daily requirement).
	Climbing Ladders			O	
	Balancing			C	Some work from a ladder or man-lift is required, often in conjunction with outer range reaching or stooping.
	Throwing			N	
	Overhead Reach		3m	O	
ENVIRONM'T	Exposure to Elements		2.5h	C	If repair sites are located outdoors.
	Uneven Surfaces			O	When walking outdoors in various areas of the premise.
	Proximity to moving objects			C	When travelling across the dock and when driving.
	Vibration (upper extremity)			R	
	Vibration (whole body)			R	

Frequency Ratings

N: Never
R: Rare - Not daily or up to 1% of shift (<5mins/day)
O: Occasional - 1%-33% of shift (up to 2.5hrs)
F: Frequent - 34%-67% of shift (2.5-5hrs)
C: Constant ->67% of shift (>5hrs)

Considerations for return to work programing:

1. The System Mechanic is not required to complete any lifting, carrying or pushing/pulling demands. This position requires periodic and brief exposure to reaching demands and low level posturing, and it is permit able for the worker to sit/stand as required for symptom management.
2. Kneepads are available for completing low level work demands.
3. A man-lift can often be utilized rather than a ladder, to minimize carrying, climbing and balancing demands.
4. Programed maintenance tasks have Electricians often work with a partner; therefore assistance can be sought for more physically demanding work demands.