APEGM Progress Report for: #30798 - John E[illegible]a EIT

Period beginning: **Feb 16, 2007** and ending: **May 13, 2011. (50.5 months)**

Submission Date: Jan 4, 2012
Supervisor: [illegible]), Submitted on Jan 5, 2012
Mentor: [illegible]), Submitted on Jan 20, 2012
Period Employer: Vale, Thompson, MB, Canada
Job Title: Electrical/Instrumentation Supervisor

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1. Give a description of the Engineering work experience you have obtained during this reporting period. Include information supporting the rest of your answers.

As an Electrical/Instrumentation supervisor I was involved in following projects:

2.1.1 Initiated project, conducted installation and participated in 2/D18 Variable Frequency Drive commissioning

Information regarding operational context:

2/D18 pump is a critical pump in flotation and grinding circuits. This pump pumps 24-28 banks roughers tails to #3 Head Tank. The slurry flows to #6 Unit Cyclones where the oversized slurry is subject to final re-grind in #6 Ball Mill. The regrind circuit accounts for 1% Nickel recovery for the Mill which has a significant economic value. The regrind circuit is not operational when 2/D18 pump is not in service. The pump could be run on a bypass circuit using an across the line starter/contactor. While running the pump without speed control, the pump will cavitate as the sump will go empty from time to time. Due to large discharge pipe (14") and high head pressure the slurry inside the discharge pipe will start flowing back to the pump, creating a "hammering" effect, which was destroying the pump sleeve in maximum 3 days. As a result the entire pump had to be taken apart every three days and a new sleeve installed. The cost of the sleeve was 2200 dollars and two of the best mechanics were required to perform this job with total duration of 16 hour (double shift). During pump repairs the regrind circuit was not operational. Besides the 1% production loss the un-recovered nickel was pumped directly to the tailings pond, having an important environmental impact, polluting the environment and creating issues with pH control in the pond.

The existing VFD (variable frequency drive) was in service for over 10 years. It was manufactured by Siemens and it was never reliable. The replacement parts were very expensive and hard to get, as the equipment was already obsolete.

The VFD failed in the spring of 2007 shortly after I was appointed Electrical/Instrumentation supervisor for the Mill department. Because this equipment was so important for plant operation immediate action was required to correct the situation.

I performed extensive tests and troubleshooting on VFD, to identify the defective parts (components). Existing drawings were not up to date and troubleshooting was extremely difficult because of lack of proper documentation (drawings). Once defective components were identified and ordered I realized that I have to look at other options, besides repairing and replacing electronic components for obsolete equipment.

There were several VFDs installed in the plant, different sizes and manufacturers, but there was no strategy in place in using a single type of VFD. The benefits of standardized equipment are minimum inventory, better qualified employees, improved communication with equipment supplier and better technical support.

I performed a case study and I determined that maintaining the existing equipment in service was not a viable option, from several points of view: environmental, economic, reliability, serviceability (required resources to maintain equipment operational).

I raised an Engineering Request for Vale Inco Central Engineering Department. I explained the importance of the equipment and the value of replacing it and I received support and resources for this project.

Specific tasks performed for this project:
• Participated with engineering team in the selection process
• Reviewed partial design and final design – confirm customer acceptance
• Scheduled job execution
• Performed quality acceptance when the materials were delivered on site. Due to the size of the equipment and improper handling, the equipment was damaged during shipment.
• I returned damaged equipment to manufacturer, to have it inspected and tested.
• Reviewed test results for the equipment before it was shipped back on site
• Performed equipment inspection upon receiving on site. The equipment was not damaged during shipment this time.
• Made arrangements with riggers to move the equipment inside the switch room.
• As this was a high risk job I performed a Job Safety Analysis with the rigging department before moving the equipment in location and removing the old one.
• I lead the execution of the project, minimizing the amount of downtime
• I took part in equipment commissioning along with Engineering Department representative
• Returned equipment to service once commissioning process was complete
• Implemented required maintenance strategies
• Updated equipment information (archived equipment register for the old VFD)
• Set up spare parts for the newly installed VFD

2.1.2 Upgrade for Woodchip screen in the Mill

This was a project I started a few weeks before I changed my job and work as Electrical/Instrumentation supervisor. As I initiated this project I had to lead it to completion.

Operating context:

The Woodchip screen in a trash screen installed on single line conveyor. The purpose of this screen is to remove pieces of plastic, wood, steel, oversized ore (slabs) from the crushed material. The crushed material is – ½" and the screen had 4" openings to allow the ore to go through fast and reject all oversized ore or trash.

The screen was 10' x 6' and it was split in two sections. The top part had a heavy rubber panel (4' x 6') which was subject to high impact and wear as the ore flow was from 500 tph to 1000 tph. The lower part had a wire mesh panel (6' x 6') which was wearing out on the top part only, just under the rubber panel where there was still some large amount of ore flow. The wire mesh panel was wearing out very fast, requiring replacement every month. This job was a high risk job due to limited headroom, working above an open hole (discharge chute was very high), severe dusty environment and heavy load (as the wire mesh was ½" steel, it was very heavy and hard to handle. If the screen was not operational of if the worn panels were not replaced in time, the trash would not be separated, creating numerous upstream process problems.

Tasks completed for this project:

- completed financial business case for the project
- identified various costing alternatives
- made final recommendation for the proposed solution
- conducted HSE review
- researched available equipment
- contacted various suppliers, discussed design details and product performance requirements
- received quotations
- placed firm order for equipment
- reviewed and approved final drawings and approved for construction
- conducted equipment receiving, inspection and installation
- performed equipment commissioning
- transferred equipment ownership to operations
- set up critical spare parts list
- completed final report for the management team at the end of the project

2.1.3 Improved reliability of Synchronous motors starters (1500 HP)

The Mill has 9 synchronous motors (1500 HP each). Three of those motors are fed from starters dating around 1950 and 6 of them from starters dating around 1970. Due to the age of the equipment, improper maintenance, improper parts etc. the equipment was highly unreliable. Over the years the problems were most prevalent on #3 Ball Mill and #4 Ball Mill. At the end of 2006 - beginning of 2007 growing problems were encountered on all 9 units. This was causing severe production issues, pressure on existing electrical resources (electricians and engineers) and high costs.

As an Electrical Supervisor I took the following actions during the 4+ years I was in this position:

1. I established a working relationship with a Professional Engineer specialized in synchronous motors starters. He performed on site service as well as components repairs and reverse engineering.

• I contacted the P. Eng and made arrangements for a site visit, to assist in diagnosing of electrical problems on all nine Westinghouse Synchronous Motor controls for the Ball and Rod Mills. A study of our system along with a detailed report proved that those starters were neglected for too long. I understood that to maintain those drives operational a strategy was required, along with constant time, effort and money. I presented the strategy I put together to my supervisor who gave me full support in this matter.

• Control cards repairs and contract change

The components for those drives were obsolete and they had to be repaired as new ones were not available for sale. The service for those repairs was provided by a company that was not qualified to perform such repairs. In order to eliminate poor quality repairs I had to change the way the plant was doing business. I directed all components repairs to a new, qualified and reliable supplier (Single Sourcing).

Some of the repairs done by the previous supplier were not done properly, resulting in extended downtime and high costs. Repaired cards, considered spares were found as not working when installed, creating serious reliability problems and delays. Some components installed by previous supplier were not suitable for the application, had improper characteristics or were faulty at the time of replacement, leading to future failures and damage to other modules. No repair reports were provided by the previous supplier or bench simulation data for the repaired ones.

Detailed reports of the repairs performed on faulty cards were standard requirement for the new contract, along with tests results and bench simulations.

Once the repairs were made by the supplier I have chosen this was no longer a problem. The rebuilt cards worked every time and they were very reliable in operation.

• +/- 24 VDC Westinghouse PPS-1 power supplies upgrade

I worked closely with above mentioned Professional Engineer and assisted with development and fabrication of updated power supplies, performed design reviews and customer acceptance for newly developed models.
We agreed upon fabrication of a prototype power supply, designed for high-voltage isolation using transformers high-potted to 4kVrms to ensure safe continuous use on the three phase exciter and rotor circuits. The output of the new power supplies was regulated using Switched Mode Power technology and rated for 1.5A continuous(the original power supplies were rated 1A and non-regulated).The new power supplies were designed for industrial use. All printed circuit board creep age and clearances were designed to meet CSA standard C22.2 No.0.2-93 for a pollution degree of 1.
I committed to testing the prototype on site; perform various tests and monitoring before preceding with the fabrication of 6 more power supplies.
I conducted the installation and commissioning of the prototype power supply and provided feedback to Professional Engineer. After one month of operation (testing) the new design was proved very reliable, very stable, with excellent results. I placed the order for 6 more units. All power supplies were replaced and a spare unit was stored on hand. This improved the reliability of the equipment substantially, as there was less voltage variation for the cards in the control circuit.

• I organized training sessions for the Mill electricians (classroom and field). This process was repeated three times during those 4 years as there were new electricians and apprentices coming on board and they never had any exposure to similar equipment. Proper training was a very important part of the success of this strategy. Members of Vale Central engineering were invited and took this training, too.
• During troubleshooting on those starters it was noticed that the coils for MX relays (Westinghouse BFD51 with 24VDC coils) were measuring high resistance (62 Ohm). I sourced replacement relays (industrially rated for high-voltage, high-current), ordered and coordinated the installation of those relays. I updated equipment information and documented changes.
• During the field investigation on #3 Ball Mill it was noticed that the induced rms voltage was about 632Vrms on start (900V peak). I reviewed data sheet for the FD SCR (Fast Discharge SCR) used (2N3888) and I discovered that it was rated 175 Amp average, 400V peak SCR. Based on this information it was obvious that the current FD SCR used on this starter was subject to voltage well in excess of its ratings. I was not able to find any records on when the current FD SCR was installed. Upon detailed investigation on the other units I discovered that different FD SCRs were used, with PIV ratings from 400V to 900V peak. There was no consistency on components, although all motors were identical. As the voltage induced on start up was well above the rating of those components the replacement and standardization of those components was required.

I sourced and replaced all FD SCRs with new devices Powerex T600161804BT with a much higher PIV rating (1600V).Once the new (proper) components were installed I updated the Application Parts List for this equipment and properly recorded all changes made and documented the reasons for those changes.

• Implemented a repair/replacement schedule for all cards cages for the Slypsyn starters.

Changing pots on site is challenging due to the difficulty in getting at the wiring without partially dismantling the card cage. As this job was a time consuming and difficult to execute in the field, I made arrangements to send a unit that was missing the majority of the components (over the years the components were removed and used and the cards cage was abandoned in a spare parts cabinet in the switch room) for a complete overhaul. I requested to have this unit restored and have missing components on this card cage replaced with new ones.
As the original parts on the cage were obsolete, they were replaced with newer, more readily available components that were suitable to installation on the existing mounts and also exceeded the OEM electrical specifications. Once the overhauled cards cage was received on site I conducted the installation and testing of the new unit. I monitored the operation of the new cards cage for a month and once proved reliable I sent the removed unit out for overhaul. The program continued until all cages were overhauled and a new, rebuilt spare was available on hand.
In this process I worked closely with the P. Eng. as wiring on some of the cages was modified from the original design over the years. As the units were installed in different starters (replacing other ones) we had to ensure they will be standardized and work in any of the starters. Field modifications (re-wiring) were required in some of the starters. I conducted and kept track of all field changes. At the end of this process all cards cages were identical and internal wiring for all starters was restored to the original design.
The new cards cages proved to be very reliable and we did not encounter any problems with them since.

• Initiated re-engineering of new pulse transformers for the rectifier circuit.

During field troubleshooting it was identified that one of the secondary winding on the rectifier's phase pulse transformer was open circuited. Fortunately there was one spare pulse transformer available on site and the missing pulse on the DC waveform was solved. When I tried to order new pulse transformers I discovered that they were obsolete (Westinghouse 7C7A895-G01 TYPE 80907). New pulse transformers with the same characteristics were not available to order anywhere in Canada.
I sent a RFP to the Professional Engineer. I analyzed proposed solution and conducted design review and provided customer acceptance. I initiated a Management of Change process. A set of three transformers were fabricated and I conducted the replacement and commissioning. I conducted several tests and I monitored their performance for a few months. Once the transformers were field proven I ordered replacement units for all 6 starters that had Slipsyn starters (including a full spare set). All transformers were upgraded – this was an important factor in improving equipment reliability. I upgraded equipment information and the Parts List for future reference.

2. I also worked with Vale Central Engineering group on this project. Most of the collaboration with Vale Engineering Group was around motors protection. An important role of Central Engineering group was technical support for field investigations and troubleshooting when the Mill resources were not able to diagnose and correct the problems. Central Engineering group had specialized tools for monitoring and troubleshooting. This specialized equipment was extremely helpful in some instances. Over the years the Mill was relying heavily on Central Engineering support for field troubleshooting. Once all the preventive and corrective actions I put together were implemented the Central Engineering support for troubleshooting was eliminated. Their service was focused on implementing proactive measures (Example: state of the art protection systems for those motors). I initiated motors protection program in collaboration with Vale Central Engineering Department. The overload relays for existing motors were electro mechanic relays which were causing serious problems and nuisance trips and did not offer proper protection for the 1500 HP motors. General Electric Multilin 369 were installed on all units and all parameters were set according to motor data and operating characteristics. I coordinated the installation of the new 369 Multilin on all 6 starters. The commissioning of the last two starters was finished during 2011 Summer Shutdown, shortly after I moved to another department.

3. As part of the motors maintenance I established working relationship with General Electric Winnipeg. The service provided by General Electric was site service and reverse engineering for obsolete parts.

• I implemented a motors maintenance program for all 9 motors: PDMA testing every year and dry ice cleaning, painting and PDMA testing every second year. This service was performed by General Electric Winnipeg. When this program was started I was able to establish a baseline of the actual condition of those motors.
• I worked with General Electric in reverse engineering and manufacturing of new brush holders for the slip rings brushes. The old brush holders were badly overheated over the years and the tensioners for the brushes were at the end of adjustment, without providing required pressure 4-4.5 PSI for 2-1/2" X 3/4" X 1-1/4" brushes. I sent samples of the existing brush holders to Winnipeg for measurements as there were no drawings available for them (when the equipment was under mechanical repairs so the down time was minimized). I selected a new design for the new brusholders – constant pressure brush holders. One of the main advantages for the selected (new) type of brusholders was that no pressure adjustment was required any longer. The new brush holders allowed me to select longer brushes. I selected a longer brush 3" X 3/4" X 1-1/4" which provided a longer life (expected replacement time is more than one year). I coordinated the installation of the new brush holders on 4 of the 9 motors (General Electric motors) and inspected the installation before returning equipment to service. Upon implementation proper brush/slip ring contact was established along with proper tension. The brush holders for the remaining 5 motors (Tamper motors)were being designed and manufactured when I moved to Capital Projects department.

4. Other tasks completed to increase the reliability of the operation of the synchronous motors:

• I developed testing procedures and maintenance strategies for starter and breakers
• I initiated and coordinated the installation of heat exhaustion fans on starters doors. High temperature inside the starter cabinets was causing nuisance trips and premature components failure. As the switch room is not provided with air conditioner the temperature inside the cabinets reaches +60C during the summer months. Upon installation of heat exhaustion fans the temperature inside the cabinets doesn't exceed +40C.
• I developed a procedure and coordinated the replacement (for the first time) of salient poles on site. Once a rotor pole gets grounded due to insulation failure, it requires immediate replacement or repairs, to avoid motor damage (in case a second pole gets grounded). In the past the motors were shipped to Winnipeg or Edmonton to have the poles replaced. I developed a repair procedure on site, which was successfully implemented and saved a huge amount of money and minimized equipment downtime. In the past it took at least three months to remove a motor, ship it to a repair shop, perform required repairs, ship it back, install it, align the drive and test the motor. The procedure I developed minimizes the repair time to only two weeks. Spare North and South coils were engineered and manufactured and stored on site. In case of a pole failure, the faulty pole is removed and shipped along with the new coil to a repair shop in Edmonton. The new coil is installed on the core of the pole and shipped back on site. The shop time is limited to removing the old coil and installation of the new one. The site repairs can be done in one full day once the pole is received. Along with shipping time, the maximum time until the motor is put back on service is 2 weeks.
• I developed and implemented sound maintenance procedures for synchronous motors and starters at specific time intervals.
• I initiated, planned and led to execution the clean up of synchronous motors bases and installation of Teflon doors at the entrance openings to avoid accidental flooding and material build up inside the motor bases. Some of the motors bases had a large amount of ore and sand build up, making impossible to access them and perform maintenance. The power and field cables were covered with ore and sand, subject to deterioration or damage (voltage for power cables is 4160VAC and voltage for field cables is 250 VDC).
• I initiated, planned and led to execution the fabrication and installation of lightweight roofs for all

motors located on the North side of the Mill isle, to prevent accidental spillage (from cyclones located on the floor above) contaminate and damage those motors. Accidental spillages (cyclones plug ups) are not common occurrences but when they take place a large amount of slurry is leaking from the floor above the motors located on the North side of the Mill isle. The roofs installed divert any material (water, slurry, ore) to the sides of the motor bases. They are easy to remove for maintenance procedures and easy to install back in place.

2.1.4 Managed internal, external and engineering resources during 2008 fire

A large fire took place in the Mill on May 2008. Due to the fire the high voltage cables feeding 3 of the Mill transformers and a large amount of power and control cables for Crushing Plant equipment were damaged.
The damage caused by fire made the Crushing Plant un-operational with serious impact on the entire Manitoba Division. The Crushing Plant is the entry point for the ore in the Mill. Without any ore coming to the Mill, the Smelter and the Refinery were not able to operate for long time due to the lack of material to process (nickel concentrate produces in the Mill).

As an Electrical/Instrumentation supervisor I was in charge of the crisis team responsible for the reactivation of electrical and instrumentation equipment.

Two of the transformers for the Crushing Plant were temporarily fed from an alternate power supply.

I developed and implemented a procedure to limit the equipment that can be operated, so the shared load on this line will not exceed rated capacity. Only required equipment to crush on a single line circuit was supposed to be operational at any given time.

In order to develop this procedure I made a list of all equipment required to operate in order to start and maintain production and I compiled power requirements for all this equipment. I sent the information to Central Engineering Electrical Department which confirmed the equipment can be operated without exceeding capacity of the line circuit. When the equipment was operational I coordinated more tests to confirm my calculations were accurate. The actual measurement (result) was in line with my estimates.

I directed the troubleshooting and field repairs. I coordinated not only Mill resources but also resources (electricians) from different plants (Refinery, T1 mine, T3 mine) which were provided to help overcome this crisis.

I organized and conducted JSAs (Job Safety Analysis) for all performed tasks and made sure all work was performed in a safe manner. As the site was damaged by fire I made all resources aware or the site conditions, made them aware of extra hazards in work area, required PPE, etc.

I developed and Action List and I reviewed it with all internal and external resources, to ensure consistency in communication and efforts.

Top priority on the Action List was making this area safe for access for other crews (non electrical resources – mechanics, riggers, structural workers, and operators). All burnt cables were identified and isolated from the power supplies. All lighting circuits were restored. The area was declared safe for access in less than 16 hours.

I kept track and highlighted (red marked) all changes done during the restoration process. Some circuits had to be completely modified in order to start up the equipment. The biggest challenge was outdated drawings and lack of information on some of the circuits. All changes and modifications were recorded and information was provided to Central Engineering to update the drawings.

During this time I worked long hours (12-16 hours/day) for about a month. The time and effort were very rewarding. The partial production was started three days after the fire (on a single crushing circuit), with the first ore crushed by a mobile crushing station outside of the Mill. After a few more days we were able to start the crushers and resume production at half capacity. In a month the Crushing Plant was fully operational @ 80% capacity. The construction and repairs for one of the crushing circuits (#1 Leg) took over one year, as this was the worst affected by the fire and extended structural and mechanical work was required before this circuit was operational.

The support provided by Vale Central Engineering Department was an important factor for the success of this project. I had constant communication with Central Engineering during this period of time.

2.1.5 Crushing Plant lighting upgrade

Background Information: As an electrical supervisor I put a lot of time and energy in equipment standardization. I noticed that a relatively small area in the Mill (Crushing Plant) had several types of lights. I initiated an inventory of existing lights. When I received the data I realized that the only way to improve lighting in this area and minimize the effort to maintain existing installation was to standardize to a single type of light fixture. There were in total 14 different lights fixtures installed in this area, with lights ranging from incandescent, to high pressure sodium, metal halide, mercury and fluorescent and wattage ranging from 60 Watt to 400 Watt.

When I performed a field investigation to determine the type of light fixture that would work for this area I discovered that the main problem of having so many different lights was that wrong light bulbs were being used in some locations, which caused severe overheating of the conductors. Some sections of the lighting circuits were damaged by the fire we had in the Crushing Plant and required complete replacement. The conductors for the existing lights were run using rigid conduit and the insulation on all conductors was damaged by heat from overloaded circuits over the years. As a result the insulation was friable and there was high probability to have damaged conductors inside the conduit. The installation was not safe and immediate action was required to correct it.

Tasks completed for this project:

• Determined required number of circuits – in my calculations I included all lighting circuits but I also introduced dedicated circuits for receptacles in all work areas. I ensured there was an even distribution of receptacles for all areas, to minimize the use of long extension cords and eliminate the need to run extension cords from one level to another.
• Implemented the use of GFCI as standard for all new circuits - as there were a couple of areas with high humidity (basement area)
• Selected lighting panel for this application. I selected an ITE 100 AMP, 120/208 Volt 3 Phase Panel
• A new transformer was required for this project. I determined the size of the transformer according to the size of the selected panel. I ordered a Hammond 45 KVA; 600 Volt primary 208/120 Volt secondary. The chosen unit was a sealed unit, to avoid dust or water contamination (PN P045PBKF)
• Determined the size of the conductors, required lengths, required connectors and hardware
• Determined location of the transformer - I calculated the existing load on MCCs for this area and determined which rack would be appropriate to feed the transformer for the new panel.
• Determined the size of the disconnect switch for the transformer
• Determined the size of the fuses
• Designed the layout of the new lights circuits and receptacles circuits
• Placed order for all required materials
• Wrote detailed scope of work (planned the job)
• Led the project to execution – installation of the new circuits, decommissioning and removal of the old circuits, proper disposal of the old lights

• Updated equipment information and made arrangements for drawings upgrade.
• Conducted field visit and installation inspection with ESA (Electrical Safety Authority)

As an immediate result once the project was implemented, the housekeeping in this area improved dramatically. The moral of the people working in this area improved.

2.1.6 Initiated, provided support for Engineering and coordinated the installation of new remote control system for 35T crane in the Mill

The Mill isle crane is key equipment for the plant. It is a 35T crane with an auxiliary 10T hoist. The crane is widely used for maintenance and operational work every day.

The old remote system (receiver and transmitter) was not very reliable over the years and there were a couple of incidents with high potential for injury or fatality. The last incident occurred in early 2008, when an operator lost control of the crane. The bridge did not respond to remote control and the bridge kept traveling West with a large load attached to 10T hoist. The load did not hit anything in its way as the control for the 10T hoist was still operational and the operator had time to lift the load to clear running equipment (Ball Mills). The crane bridge hit the stop blocks on the West end of the isle at full speed, coming to a complete stop.

I witnessed the incident, as I was on the Grinding deck at the time of the incident.

I secured the area immediately to prevent unauthorized personnel enter under the suspended load.

I notified my supervisors and mines inspector. I formed a team and started an incident investigation immediately. Upon field investigation it was found that all contactors and relays on the bridge were functioning properly, but the signals from the remote were not activating some controls (bridge control).

I removed the remote from service, conducted a full inspection of the crane from electrical point of view. I notified Mechanical Engineering and Structural Engineering departments and made arrangements to have the crane inspected before returning it to service. Once all inspections were finished, the crane was returned to service, cab operation only. I coordinated decommissioning of the receiving unit on the crane and sent it to manufacturer along with the remote for future testing.

As this remote control system had similar problems in the past, I initiated an engineering request to upgrade existing system with a new, more reliable one.

As part of this project I worked with Engineering Department in identifying the requirements for the new system and provided support for field investigations. I was also part of the team that provided customer acceptance for the proposed system. I took part in PHA meeting for the installation and commissioning of the new system.

I also participated in the commissioning of the new remote along with a representative from the supplier of the new system and one representative from Vale Central Engineering. During the commissioning some intermediate relays were not operating properly as they were not in use for a long time. I coordinated field troubleshooting and made required adjustments. Before returning the crane to remote operation I ordered and coordinated the replacement of all intermediate relays for the control circuit.

The new installation proved to be very reliable as we never had another incident with the new system.

2.1.7 Initiated, determined requirements, coordinated field work and implemented preventive maintenance for Mill power transformers

Thompson Mill has 18 power transformers in use, ranging from 1500 KVA/600V to 5000 KVA/4160V. A large number of those transformers are dating 1950 and 1970. Although those transformers were very reliable, there were no maintenance strategies in place and the minimum maintenance performed on those units was basic maintenance, consisting mostly in "topping up the oil" and visual inspections.

I recognized this as a deficiency and I developed an action plan. As Vale electricians did not have the required tools and knowledge to perform test and maintenance work on those transformers, I sourced this work to outside companies (General Electric, ABB, and Siemens).

During each Summer Shutdown I scheduled maintenance work for each group of transformers (6 substations). As this was a long term project I submitted budget proposals every year, to ensure there is money in the budget for this project.

I was also involved with the Divisional Transformers Maintenance program, which was a program launched division wide for the Transformers Maintenance. As part of the team I was involved in developing standard procedures for transformers inspections, best maintenance practices, determining maintenance intervals, selection of service suppliers etc.

Tasks completed for this project:

• I submitted requests for proposals to different service suppliers from Canada.
• I reviewed their offers (a minimum 3 proposals were required in order to award the contract)
• Selected the service supplier
• Placed the order
• Made arrangements for site equipment
• Created work schedule
• Coordinated work execution
• Received and reviewed test results
• Developed and implemented standard maintenance procedures for all transformers
• Compiled data from the maintenance reports and took required action
• Initiated and coordinated the installation of silica gel breathers on all power transformers
• Researched, made recommendations, ordered and coordinated the installation of pressure relief valves for transformers

2.1.8 Initiated, determined requirements and coordinated lighting upgrade for the Mill isle

The lights for the Mill isle were Mercury Vapor lights. The mercury vapor lights are not very energy efficient lights. Also as the light bulbs were aging, their light output was decreasing substantially while still using the same amount of power. Frequent bulbs replacement to maintain same light intensity at the floor level was not a solution, as the disposal and handling of mercury vapor lights requires a lot of attention, to avoid environmental pollution.

As this type of lights is phased out and they are not environmentally friendly I took initiative to replace existing lights with new, energy efficient Metal Halide lights. Working with Manitoba Hydro under Power Smart program, I determined which light would qualify for the rebate and would provide better lighting for the Mill isle. An important factor in implementing this project was power saving alone: before implementing this upgrade there were 96 lights (400 W) in use. After implementation, there were only 32 lights (400 W) in use and the amount of light increased by 30% at the floor level. The lights are on 24/7 365 days/year.

Another important factor in this upgrade was the ballasts for the mercury vapor lights. The ballasts for those lights were old and gradually starter to fail. Beside the high cost, the ballasts were extremely heavy (dual ballasts) and they were located just under the ceiling, high in the air, making their replacement a very high risk job.

Manitoba Hydro provided different options for the new lights. I selected the most beneficial one for the long term operation but also for minimum maintenance. The new high bay light fixtures were high quality fixtures, which required no maintenance once installed.

I conducted a Job Safety Analysis with the electrical resources in order to identify all hazards associated with this task and we reviewed the action plan before started the switchover.

I led this job to implementation and there were only 2 rows of light left to replace at the time I moved to my new job. The implementation took a long time, as it could be done only when the 35Ton crane was not in use for an extended period of time, to maximize the efficiency of electrical resources.

I updated equipment information and finalized the Parts List for the new lights.

2.1.9 Initiated, determined requirements and coordinated the upgrade of lighting panel by Column J4 (North of Sandplant)

The lighting panel installed on column J4 was outdated, badly corroded and had several circuits with multiple wires under a single breaker (overloaded). The faceplate of the panel was missing and I installed a lock on the panel door to prevent unqualified personnel to open it and be exposed to bare, liver circuits. Some of the conductors going through the cement floor to circuits in the basement were completely corroded and had exposed copper at the floor level. This is a wet area and this condition was not safe.

I instructed Mill electricians to immediately disconnect the 4 circuits going through the concrete floor and to feed those circuits from a different panel, recently installed (mentioned above, see 2.1.5). The 4 spare breakers were used to relocate some of the circuits that were doubled under other breakers as a temporary measure.

I determined the location of the new lighting transformer and panel (by column J3). As a transformer I determined that a sealed unit would work best in the work environment (a lot of dust and subject to accidental water or slurry leaks). I used the same type of panel used in above mentioned project (2.1.5) in order to standardize the new equipment. As power supply for the new transformer I selected a switch rack located in #2 Switch Room, which proved to have enough space and available power to install the new equipment. The selection of this rack was also based on the frequency of switching this rack on/off since the majority of the lights in this area were fed from this panel.

All new lights installed for the Mill isle (see above mentioned project 2.1.8) were fed from the new panel. The circuits for the old lights from the old panel were disconnected. The remaining circuits were scheduled to be transferred to the new panel and the old panel was supposed to be decommissioned at the end of this process.

This project was in progress at the time I moved to my new job and there were 4 more circuits to be moved to the new panel before the old panel could be removed from service.

I left written instructions (to my replacement) for the initiation of an Engineering Request, to have the drawings updated and archived (to reflect the new installation) and coordination of a site visit with Electrical Safety Authority for an installation inspection and field certification.

2.1.10 Initiated, participated in equipment selection process, reviewed engineering recommendations and provided customer acceptance OSCA air conditioner

The DCS room (process control equipment) and OSCA (on stream analyzer) are located in the same room. The environment for this room is supposed to be dust free, constant temperature and low humidity for optimum operation of the most important equipment in the Mill.

The air conditioner for this room was old and unreliable, with long periods of down time and expensive maintenance. As the problems were reoccurring on a regular basis, the process control equipment was at risk.

Tasks performed for this project:

• I initiated an Engineering Request to Vale Central Engineering department in determining the size and the characteristics of the replacement equipment.
• Participated along with engineers from the Mechanical department in a review of available equipment and selection of the replacement unit:
• Ordered the new air conditioner
• Conducted the removal and disposal of the old unit. I made arrangements to have an air conditioner specialist on site to properly remove the cooling fluid in order to minimize environmental pollution. (ABCO Supply)
• Participated in meetings with engineers for scope of work definition
• I made arrangements for unit commissioning once installed
• Contacted ABCO for commissioning (commissioning is included in price paid for the unit)
• Forwarded all information to Planning Department in order to create a new equipment number for the new unit, archive the old unit, implement maintenance procedures and create parts lists.

2.1.11 Initiated, participated in kick off meeting, conducted site visit, high level design requirements for the fresh air intake for #2A Switch room (Truck Dump system)

The newest Switch Room for the Mill equipment (#2A Switch Room) is located in an extremely dusty environment. At the design stage and execution (2003) the Switch Room did not incorporate a positive pressure air system.

As a result, extremely fine, conductive nickel dust entered the switch room. The electrical and instrumentation equipment located inside the switch rooms requires clean environment. The electrical and electronic components were covered in dust and started to fail, creating production issues but also posed a serious safety issue, with possible catastrophic consequences.
As first step I implemented a regular clean up (vacuum cleaning) of all equipment on a quarterly basis. This helped a bit but it was not enough to provide a safe operating environment for this equipment.

I initiated and Engineering Request with Vale Central engineering to have a fresh air intake fan installed for this switch room.

I participated in kick off meeting and engineering PHR. I made arrangements for a pressure test, in order to determine the exact size of the intake fan, to ensure positive pressure.

The pressure test took place a week after I moved to my new role. Meantime the engineering part is progressing well and this job should be implemented early 2012.

Supervisor Agrees.

Mentor Agrees: While I have not confirmed every detail of what is written above, I have checked and confirmed the major details

2. Please check the following options that apply:

2.1: During this reporting period, I have applied theory in:

- ✓ Analysis/Interpretation
- ✓ Project Design/Synthesis
- ✓ Testing/Verification
- ✓ Implementation

Supervisor Agrees.
Mentor Agrees: In his role of supervisor John had to deal with all of the above as he assigns work and follows up on progress

2.2: I have obtained experience by:

- ✓ Studying or being exposed to existing Engineering works
- ✓ Applying Designs as part of larger systems
- ✓ Experiencing the limitations of Engineering designs
- ✓ Experiencing time as a factor in the Engineering process

Supervisor Agrees.
Mentor Agrees: John was actively involved in resolving challenges arising from current demands on older systems etc

2.3: I was exposed to the following areas of Engineering management:

- ✓ Planning
- ✓ Scheduling
- ✓ Budgeting
- ✓ Supervision
- ✓ Project Management
- ✓ Risk Assessment

Supervisor Agrees.
Mentor Agrees.

2.4: I was required to make decisions based on professional and ethical responsibilities to:

- ✓ The Public
- ✓ The Profession
- ✓ The Client and/or Employer
- ✓ Co-Workers
- ✓ The Environment

Supervisor Agrees.
Mentor Agrees: As with the other reports, I question the use of the word "public". Based on the responses public relates to the operational personnel and not the "General Public"

3. Describe any activities that have improved your Communication, Teamwork, or Interpersonal Skills in the following areas:

Oral Presentations:
As an electrical supervisor I had a lot of exposure to oral presentations and public speaking. This included but is was not limited to daily line up meetings (where I had to present a safety topic every second day and present the work schedule for the day to a group of 20-30 employees), weekly safety meetings (safety presentations and review of safety statistics), staff meetings, scheduling meetings.

Written Documents:
As an electrical supervisor I developed a large number of procedures, work packages, Engineering Requests, technical documentation, requests to suppliers, reports to management team, recommendations, etc. My writing improved substantially during this period of time.

Interaction with Others:
During this period of time I had the opportunity to work with all employees from the Mill but also with employees from other departments. My network of professionals on site increased substantially and I was able to get support from other plants and provide support to other plants in numerous occasions. I established a good, professional work relationship with all employees and colleagues. I also interacted on a regular basis with consultants, suppliers, manufacturers, professionals from other mines across Canada, local and provincial authorities (Mines Inspector, Mines Electrical Inspector).

Other:

Supervisor Agrees.
Mentor Agrees.

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4. During this period, I had to consider the social implications of my work in the following areas:

1. One of the most important projects I initiated and executed was the replacement of 2/D18 VFD. As the old VFD was not working properly, the slurry did not return to the regrind circuit, causing 1% nickel recovery loss. The 1% nickel loss was a serious environmental threat, causing long term environmental pollution. Understanding the serious implications of this condition, I expedited this project and led it to execution very successfully, to minimize the downtime of this pump.
2.Several lighting upgrade projects in the Mill had an important energy saving impact, by using energy efficient lights and light bulbs that were not that harmful to the environment. The mercury vapor lights and ballasts were replaced with new metal halide lights. All T12 fluorescent lights were upgraded to modern, energy efficient T8. This not only created energy saving opportunities for long term, but also improved the quality of light in the workplace, with significant positive impact on Mill employees.

Supervisor Agrees: This project was focused on the recovery and production losses. Environmentally, this nickel would settle out. There is no soluble nickel generated to the enviroment. The project was still a very important one due to total production and revenue losses to the company.

Mentor Agrees.

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5. Examples of my ability to work effectively as part of a team, during this period, include:

1.I was team member or team lead in several improvement projects, both in the Mill and within Manitoba Division. I participated in standardization of transformers maintenance team, which had representatives from each department. At the end of this program, the documentation and procedures developed were implemented division wide, with excellent results.
2. Several projects required a close work relationship with Vale Engineering Department, Professional Engineers from outside of the company, consultants and consulting companies. As an electrical supervisor I was always involved from the very beginning until the full implementation of most of the projects. Constant, clear communication along with well defined objectives and milestones made the majority of the projects very successful.

Supervisor Agrees: continued to develop his team building skills through this period. John brings alot of energy to his projects and due to this fact he had to figure out where to channel it to get the best results. All team members react differently to his type of energy. ohn continued to learn what motivated different people in the project.

Mentor Agrees.

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6. Examples of my ability to assume responsibility include:

1.During 2008 fire I took the initiative to conduct and oversee all electrical and instrumentation repairs in the area affected by the fire. This was in addition to my regular job duties, as the plant returned to normal operation in short period of time and maintenance work, equipment inspections and repairs were undergoing in all areas of the plant. I also assumed responsibility for creating a safe work area, so other teams can access it without being exposed to electrical hazards. I managed to accomplish my goals by working extremely long hours for a long period of time. Extraordinary circumstances required extraordinary action.
2. When I decided to replace a salient pole on a synchronous motor rotor on site (for the first time in the Mill) I assumed a huge responsibility. The procedure I developed was reviewed with electrical professional engineers on site and it was approved for execution. I coordinated the field work and made all arrangements for shop fabrications.

Supervisor Agrees: has no issues assuming resposibilty. He researched his projects well and they were successful beacuse he involved the right people. During the fire he was a valuable member to have on the team. It was critical to get the building back on line as soon as possible. He spent many extra hours getting this done.

Mentor Agrees.

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7. I have shown progress since the last report (where applicable) as follows:

1.Dealing with complex projects. The projects I was involved with required complex skills and knowledge, with multiple disciplines involved. As the majority of the work was done on equipment used for production,the planning and the execution of those projects was critical, in order to minimize the downtime and minimize the impact to operations.
2.Working on several projects at a time. In my previous position I was working on a project at a time, on top of the regular job duties. In this position I was involved in several projects at any moment, along with regular job duties. The majority of the projects were improvement projects I initiated, but there were also projects initiated by other departments where I had an important role and input.
3.Mentoring and leading employees (13 direct reports).I was able to establish a fantastic work relationship with people working for me.I mentored and developed a lot of new and young employees

during this period of time, with excellent results.

Supervisor Agrees: was able to develop his relationships and learned how to develop the people who reported directly to him. His crew enjoyed working for him and they were very efficient. He mentored his peole into supervisory roles.

Mentor Agrees.

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8. I feel myself to be lacking in exposure to, or requiring improvement in, the following areas:

I feel myself to be lacking in exposure to large, long term, multidisciplinary projects. A role in Capital Projects group would be benefit for my professional development.

Supervisor Agrees: This would help John develop his skills even more. John worked very well involving smaller projects in the Mill which was familair to him. He can develop even further if he can work on bigger projects outside his comfort zone.

Mentor Agrees: Current role and responsibilities will lead to gaining this experience

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9. I would like to provide the following additional, relevant information:

During this period of time I completed the Maintenance Management Professional program and I registered as a MMP. In preparation for my next role (in Project Management) I started a complex and long training in Project Management.

Supervisor: (Never Registered in Manitoba)

I am qualified to comment on the quality of this MIT's work because:

John was a direct report for a number of years. I worked with Joh n as a resource on a number of the projects he was involved in.

I make the following evaluation and recommendation regarding the progress report for this MIT:

John has developed and continues to develop during his time here at Vale. He will eventually be a person who can develop in to upper management if he wishes that to happen. He is knowledgeable in several feilds on the maintenance and project side of things. It would benefit him to get some experience in the production. He was unable to get his experience in the mill due to manpower constraints.

In my opinion, during this reporting period, (Feb 16, 2007 - May 13, 2011) (50.5 months), John has completed an equivalent of *50.5* months full time experience.

Please show my comments to the MIT.

Mentor: (First Registered:)

I make the following evaluation and recommendation regarding the progress report for this MIT:

John has completed and secured his PMP designation. He is currently in the PMO group at Thompson Manitoba

In my opinion, during this reporting period, (Feb 16, 2007 - May 13, 2011) (50.5 months), [illegible] has completed an equivalent of 50.5 months full time experience.

Please show my comments to the MIT.
