

APEGM Progress Report for :

Period beginning: May 4, 2009 and ending: Sep 30, 2009. (5 months)

Submission Date: Dec 30, 2010

Supervisor: P.Eng. Submitted on Dec 31, 2010

Period Employer:

Job Title: Engineering Summer Student

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

My four month Engineering summer student position was my first real exposure to a chemical plant. Aside from plant tours, I had no prior chemical plant experience. Throughout this placement, I gained experience not only in Engineering and design principles, but also in general mechanical principles. This summer position allowed me to feel much more comfortable in my last year of university, as well as entering my full time job after school.

Prior to starting any work in the Canexus plant, I was given an orientation, followed by safety instruction. I was asked to read a variety of safety booklets, watch a number of safety videos, and sit down with our plant safety supervisor to discuss general plant safety. I learned that safety is paramount in the chemical industry, and that even if it means lost production and revenue, safety always comes first.

Once I had completed my safety training, I was given a couple of detailed plant tours by my supervisor, the Senior Process Engineer at the plant, Mike. Mike took me through the various areas of the plant, introduced me to the operators, and showed me some aspects of what the safety supervisor had explained, such as electrical hazard, and goggle lines. The Brandon plant has underwent a number of expansions, and has grown substantially since it began. Mike took me to both the new, and older areas of the plant, and contrasted the similarities and the differences.

In my second week, after I had completed my safety training, I spent my days with the operators to better understand their jobs and responsibilities in the plant. A good relationship and rapport with the operators is extremely important, as I found out while working and communicating with them daily. I spent this short stint learning some of what they do on a daily basis. It served me well in my understanding of how the plant operates. This also gave me a chance to learn practical mechanical lessons, such as the procedure in turning on a pump, the different types of valves in the plant, and an introduction into different instrumentation for process monitoring used in chemical plants. The operators also introduced me to the DCS system which Canexus utilizes to monitor and operate the plant.

Once I had spent some time with the operators, Mike gave me a number of projects that would aid in my understanding of the plant, as well as streamline, or improve efficiency in the process. The projects I was given also gave me an understanding of how the sequence of plant modifications take place, and the time associated with implementing these changes. The Canexus plant, like any chemical plant, is extremely complex in nature. Due to this fact, the projects that I was given were very area specific, and did not incorporate all parts of the plant at the same time.

I was given a number of projects that allowed me to gain Engineering work experience. These projects included.

-Monitoring the chemical consumptions in the ion exchange systems in the plant. The ion exchange systems are used to remove hardness from the brine that is used in the sodium chlorate production process. Excess hardness will precipitate on the electrolytic cells in the plant, and reduce electrical efficiency. The ion exchange resin is regenerated once it becomes exhausted. Once the resin is exhausted, it is taken offline, and undergoes a process by which acid is added to remove the hardness in the resin, followed by a caustic solution to regenerate the resin. It was my responsibility to monitor how much caustic and acid was used per regeneration, and to ensure that the correct amount was added. Different ion exchange resins were used previously, which required different amounts of acid and caustic be added per regeneration. I calculated how much of each were required, and adjusted the pump strokes accordingly.

-Design and implement a piping change to one part the plant. This piping change allowed different pumps with higher pumping rates to be used in the process, and also allow gravimetric equalization of the tanks when required. The project gave me an understanding of drain locations, double block and bleed systems, and pumping rates. This project required a HAZOP meeting, in which Mike and I chaired. The HAZOP meeting revealed the double block and bleed valves importance that I overlooked.

-Install a valve that would allow a length of pipe to be drained. Sodium chlorate will harden in a pipe if it remains stagnant and is allowed to cool. The valve installation aided in plant operability. Once the valve was installed, the line was able to be drained after use, which allowed for liquor transfer between plants.

-Perform a cost-benefit analysis on a piping change. The piping change would ensure that plant liquor that was previously treated for pH optimization and hypochlorite destruction would not be returned upstream of the chemical addition point and be treated again. After analysis of the volume of liquor that is retreated, I found that after the capital cost of the required piping and valves, the proposed change did not warrant installation at that time.

-Perform an inventory of flammable chemicals in storage, and determine if the flammable chemical storage handling was sufficient. I examined the different classes of flammable materials, and determined whether ventilation and air sweeps were sufficient. This project evolved out of a process safety audit.

-I learned how to read P&IDs. I was able to follow the P&IDs to determine how control systems were installed, as well as learn overall plant layout. I also learned the various symbols associated with P&IDs.

-I was asked to convert logic diagrams into simplified block flow diagrams. The logic diagrams showed the interlocks of various systems in the plant. The objective was to give the operators a simpler flow chart than was presented in the logic diagrams in order to assess problems with various systems. This project also gave me a greater understanding of how systems in the plant operate.

In order to complete the projects I was assigned, I utilized a variety of computer programs to gather information, monitor plant operating conditions, and display my findings. I learned how to navigate through the DCS and how it is used to operate the plant. Throughout my months at Canexus, I spent several hours on the DCS monitoring current plant conditions. The DCS allowed me to monitor plant conditions such as temperatures, flow rates, stream compositions, pressures, tank levels, and pH. I learned how alarm monitoring is performed, and why certain values are chosen for alarms. I also learned the applications of alarm interlocks, and general DCS logic. Process history was monitored using a historian program that allows process variables to be trended back in time. This allowed me to monitor how the plant had run in the past and from that knowledge, I was able to tell if anything had changed, or was no longer operating how it was intended to. I found the historian program to be extremely useful in aiding to my understanding of daily operations in the plant. I used Microsoft Excel in order to compile any data which I was monitoring, and display my results in a chart, or graphical format.

Supervisor Agrees.

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.

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.

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

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

Supervisor 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.

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

Oral Presentations:

I implemented a piping change in one section of the plant. It was my responsibility to inform the operators that would be running the system of the changes. Prior to meeting with the operators, I had prepared a list of what the changes were, the implications of the changes, and when the new piping was to be utilized. I had an informal meeting with each shift, and explained the changes.

Written Documents:

I was not required to complete any written documents, but at the end of the summer, I summarized the work I had completed during the my term for my supervisor Mike Burgoyne.

Interaction with Others:

I was able to practice my communication, teamwork, and interpersonal skills everyday I was at work. I consider the Canexus plant in Brandon to be an intimate plant. The office building, the plant, and the maintenance building are all on site. This allowed me to interact with all of the staff, and gain experience in all aspects of the job. I was able to hear, and express ideas freely, and learn aspects of the job from a technical, as well as practical point of view.

Other:

Supervisor Agrees.

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

My summer position did not have me directly having to consider the social implications of my work. I did, however, learn about product specifications, and the type of purity that was required in the final product. I learned about aspects of the process that could potentially affect the final product, and steps that were taken to eliminate the risks of sending off-spec product to our buyers. I learned what the lab tests that the operators must perform before sending any product out of the plant.

Supervisor Agrees.

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

Collaborating with operators, maintenance staff, and engineers in order to complete projects. For example, one of the piping changes I was in charge of required that I first understand the system. This resulted in me having to communicate with everyone at the plant. Mainly:

- Consulting a couple of engineers to determine how this would affect the operability of the plant, and why this change would help.
- Asking the operators how this system has run in the past, and whether it has been an issue for them.
- Holding a MOC and HAZOP meeting with a number of members of the office staff to assess the risks, and determine what could be done to mitigate them.
- Consulting with the maintenance staff, explaining the change that was requested, and ensuring that they had an understanding of the proposed change.

Supervisor Agrees.

6. Examples of my ability to assume responsibility include:

I was assigned a number of projects by my supervisor at the start of the work term, and throughout the summer. Whenever possible, I completed them. I used all of the resources I could, and did not consider the projects completed until I was confident that the work I had presented was accurate.

Supervisor Agrees.

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

N/A

Supervisor Agrees.

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

After graduation, I would like to learn more of the technical aspects of the job. I plan to interact more with office staff, operators and maintenance staff to determine exactly how the plant is intended to run, and learn the intricacies of each system.

I do not consider myself competent in the mechanical and practical aspects of the job. In my four months exposure, I have not learned enough in this area, simply due to lack of exposure.

Overall, I would say I need more experience in all areas of engineering, above and beyond the four months that I obtained this year in order to feel competent in any area of the plant.

Supervisor Agrees.

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

Supervisor: I [redacted] P.Eng [redacted] (First Registered: Feb 25, 2009)

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

The statements [redacted] made are accurate and reflect the work he did during the summer before his last year of education. The dates on this report need to be changed to accurately reflect an end date of August 31, 2009 and not September 2009.

In my opinion, during this reporting period, (May 4, 2009 - Sep 30, 2009) (5 months), [redacted] has completed an equivalent of 4 months full time experience.

Please show my comments to the MIT.
