

ExxonMobil/XTO Summer 2014 Internship

Presently, I am entering my junior year in chemical engineering after completing a successful spring semester where I took ChE 301 (Thermodynamics I) and ChE 305 (Fluid Mechanics) here at New Mexico State University (NMSU). I am not originally from Las Cruces, NM. I am a born and raised United States Air Force daughter and I have had the chance to live all across America. I never expected to enter into the engineering discipline as I always had my sights set towards the medical field. My plans changed when I learned about the opportunities a chemical engineering degree could provide me in the medical discipline and in so many other fields I had never considered, including the oil and gas industry.

Thus far, my engineering experience has been nothing short of incredible, as I have had the chance to work as a research engineer in NMSU's Reduced Gravity & Biomechanics Lab where we studied the effects of gravity on astronaut training. I have also had the opportunity to support the new Aggie Innovation Space, our university's very own engineering development center promoting creativity and student innovation. These opportunities have given me a strong skill set in leadership, problem solving, critical thinking, interpersonal communication, and networking leading to my internship with ExxonMobil.

One of the most important concepts I learned as a summer intern was how important it is for students, like myself, to have the chance to step out of the classroom and apply our knowledge in a real world environment. My internship

with ExxonMobil allowed me to do just that and gain engineering experience with an industry leader.

This summer I had the unique experience to work for ExxonMobil and support the recently acquired company known as XTO. The objective of my summer was to increase my knowledge of oil and gas operations in the west Texas Permian Basin; where I applied my engineering understanding to facility design at several XTO field sites. During my internship I was given two primary projects. The first of which was a sub-battery expansion and the second was a tank battery expansion. These two projects gave me the chance to do a significant amount of technical work as I looked at what kind of equipment upgrades would be needed to meet increased production rates in these areas. My objective was to take these projects from concept, through the engineering design and to the approval for funding.

The scope of my projects included a sub-battery and a tank-battery. A sub-battery is the first stage of fluid separation once the crude oil production leaves the well. At the sub-battery the fluid is separated into the oil, water and gas phases. The oil and water are directed to the tank-battery for additional separation before the oil is sold and the water is re-injected into the ground. Finally, the gas is directed to a third-party sales line.

These projects required a significant amount of engineering design, as I had to consider the increased production rates given to me by the reservoir engineers and determine if the rates could be accommodated within the current facility design. This required me to calculate the current capacity of the facilities by creating piping

and instrument diagrams (P&IDs) for both sites. The P&IDs allowed me to understand what equipment was on site, the size of the pipelines, and where we could tie-in additional equipment. Bottlenecking, or restricted flow within the facility in either the pipelines or separation vessels, was an important consideration as I looked at the flow capacities of the present sites. I utilized a vessel sizing tool to determine how much production the current separators could handle and what sized separator would need to be installed to meet the new production rates. My chemical engineering background, specifically my fluid mechanics studies, became very useful as I considered the type of flow, the velocities, and the amount of pressure drop across a specific length of pipeline. This understanding allowed me to determine the proper sized pipeline for that site. I also had to understand the economics behind my decisions, in that I needed to ensure I was not over designing with oversized pipeline. I also had to consider several different pipeline configurations to guarantee the lowest construction and material cost.

Throughout the entire engineering process I communicated with a range of individuals throughout the ExxonMobil and XTO organization structural, to included operation, production, engineering and senior management. I worked alongside engineers with 30+ years of experience that taught me fundamental engineering design concepts and also helped ensure that I considered all options throughout my design process. Throughout the design process I coordinated with the lease operators in charge of the sub-batteries and tank batteries, and ultimately presented them with my proposed facility design. Engaging with operations ensured

that we considered their perspective throughout the design process. I spent significant amounts of time in the field working alongside the construction foreman throughout the building process of a water injection station. Additionally, during my time in the field I observed fracking, acid and perforation operations at an oil well site. These opportunities allowed me to gain a substantial amount of hands on experience, and provided me with a strong foundation for the technical work I was assigned.

Safety is a priority for ExxonMobil and XTO both in the office and in the field. Throughout the summer I sat in on safety meetings at the field offices. Before I was allowed to work in the field I was required to complete hydrogen sulfide (H₂S) safety training. During this training I learned the importance of being aware of your surroundings and the proper use of personal protective equipment (PPE). Many of the fields I worked in this summer contained the poisonous gas, H₂S, and these areas required the use of a H₂S monitor in addition to the regular PPE. I personally learned the importance of proper PPE when my monitor alarmed while I working in the field. I followed the proper safety procedure and moved crosswind and out of the area. This situation taught me the importance of being aware of my surroundings and the potential dangers in any field or workspace I enter. I also participated in ExxonMobil's Loss Prevention Observation (LPO) program by filling out an observation card on a time after I intervened to ensure another engineer had their H₂S monitor turned on. This summer truly demonstrated the importance of safety and its relevance both in the field and everyday life. I believe my awareness

has significantly increased and I hope to take my safety experiences back to NMSU this semester.

A summer internship is truly an experience that allows students to apply their knowledge in industry. This summer provided me with the unique opportunity to learn about the oil and gas industry and its potential career opportunities. I strongly recommend all students to seek out opportunities to gain industry experience. An short-term internship is a the time to have an open mind and experience industries you may have never considered to apply what you are learning in class to help you will grow as an engineer and as a person.