Gabrielle Casey  
**Personal Contribution to WERC Team Honors Project (Task 4)**  
**Recovery of Water and Salt from Hyper-Saline Mine Waters using Freeze Crystallization**

The project and task that I was a part of executing was Task 4 in the list of tasks in the 2019 WERC Environmental Design contest: Recovery of Water and Salt from Hyper-Saline Mine Water using Freeze Crystallization. On this particular project, I was on a team with Patsy Ann Dawson, Miriam Gonzalez, Ibrahim Guiga, Vince Sayarath and Clara Somerville. My personal contribution revolved around being the Research Coordinator. In the beginning stages of research on our task, I did a lot of background research on freeze crystallization itself, how the process works, if it was being used in industry and how we could implement it with Freeport-McMoRan (the company that sponsored this project). I also helped Clara, our Team Leader, organize the research that everyone else was doing on other topics and aspects of freeze crystallization. Along with the rest of my team, I was back on campus a week early before the spring semester of classes started so that we could get a jump start on our research project and come together on ideas on how to design our process.

When our team entered into the lab to create our bench scale process, I helped design our bench scale process and as the research coordinator, ran experiments and trial runs with my team as we tested the validity of the freeze crystallization process. Our team realized during our project that freeze crystallization was not the most efficient process to use so we brainstormed two alternative methods for completing the task: a 5-stage multiple effect evaporator and a stand-alone reverse osmosis process. After our team had made our full scale design of a freeze crystallization process, I helped make sure our bench scale was an effective representation of our full scale. Our experiments and bench scale process trial runs took anywhere between 4-6 hours to fully complete and I helped coordinate shifts for who would be running the experiment at a given time.

Mid-way through our project and research, our team had a conference call with the task writer from Freeport McMoRan. Resulting from that call, our team was invited to take a trip to a Freeport mine in Miami, Arizona to gain insight on our task and get a better understanding of how our project could actually help Freeport McMoRan implement something into industry. I was one of the four team members that drove to Miami, Arizona to partake in the mine visit.
There I got to ask questions on research concerns our team had and receive come clarification on what parts of the task Freeport really wanted emphasized in our project.

Coming back from the Miami mine trip, I continued to contribute many hours in the lab helping run the research experiments. Our team also had a three hour and two hour meeting every week on Mondays and Fridays, respectively, with our mentors and project advisers. I was present at those meetings every week. As we moved further into the design process, the competition in New Mexico was fast approaching. I led in outlining our written report and also helped write multiple parts of it. The part I had the most emphasis on were the environmental concerns and impacts of our process specifically in Arizona. Our written report was due multiple weeks before the competition so it had top priority in getting finished. Our team spent long hours revising and editing our report after multiple revisions we received from our research mentors. I helped in the writing and editing process and then finally submitting the paper on its due date to the competition.

After the report was finished, I contributed to making our presentation as well as help review our team poster that was made to have in our bench scale set up at the design competition. Along with making slides for the presentation, I was one of the three team members that presented our research to the judges at the competition. I presented our outline of how we got to our final solution as well as background research we did and a site overview of the mine tour. I also helped answer some judges’ questions during the presentation. After the presentation finished, I helped to present the poster when the judges came to see our bench scale process during the competition. Our team came back with a first place award in our task and I was very proud of the work we put into this project. We had a task, started without knowing what direction to take and accomplished the goals of what the task asked for. The tangible experience through the WERC program was very helpful and prepared me for future projects.