

Personal Contributions to the Project

This engineering design project was done as part of the 31st WERC Environmental Design Contest hosted by New Mexico State University. Our project was “Task #5: Treatment Process for Reusing and Recycling Produced Water.”

My role in this project was the research coordinator and my responsibilities were to lead the initial research into oil separation techniques for the fracturing water and eventually develop a bench scale model to remove contaminants in the water. Acting in this role, I chose our eventual technology, Coagulation/Flocculation, and determined the best polymer flocculant to use for our process. In addition to this I designed and performed our first batch-wise jar testing, at first as a proof of concept, and later to determine the optimal amounts of both coagulant and flocculant.

After the group all agreed on this technology, I led the building of our continuous bench scale design alongside my colleague Marcos Rodriguez. We both designed and constructed this apparatus and developed operating procedures in order to clean 18 L/hour of fracking water using our bench scale model.

Together with my colleagues Colton Rogers and Loc Huynh, we scaled up our flocculation chambers and dissolved air flotation unit from our bench scale design to the full scale design and priced these pieces of equipment. From that I performed the economic analysis including the Fixed Capital Investment calculations, the cash flow analysis, and the Internal Rate of Return analysis. In addition to the economic analysis, I researched the cost of operating labor for this process and developed a total operating cost for both a permanent location and a mobile operation for our water treatment process.

After completion of the report, I assisted with the creation of the poster and participated alongside my colleagues in a poster presentation, a formal presentation and a “Shark Tank” style business pitch during the WERC competition from April 11-14th. At the end of the competition, we won 1st place in our division, Task 5, and won 2nd place in the business pitch contest. More details including the full report are shown in the Appendix.