Peer Review

Group 5, ENGSCI 263

Summary

We are peer reviewing group 10’s proposal for the project: Thermal Recovery for Bitumen. Their proposal consists of 6 sections; introduction, contribution to modelling study, previous literature, given data, conceptual model and assumptions and derivation. The proposal begins with a brief introduction which describes the problem regarding the safety of bitumen extraction. A list of stakeholders and potential outcomes of the project are also included in the introduction. The contribution to modelling study section follows, they discuss points regarding the temperature and pressure of the well undergoing the extraction process. The team is aiming to determine the temperature of bitumen to ensure that there are no toxic organics leeched in the groundwater. Monitoring temperature is crucial to satisfy stakeholder needs and will allow them to gain insight on pressure in the system. Previous literature included resources such as research papers from Canada, the group utilised these papers to provide useful information implemented in the model design. Following the previous literature section is the given data, this includes a concise analysis of the data provided from the Saleski Pilot in Canada. There was a brief description of data from a similar pilot project in New Zealand which was followed with an explanation that temperature and pressure both exhibit their characteristic relationships. There are two conceptual models, one for steam injection and one for extraction/drainage. These conceptual models are explained in the assumptions and derivation section, this is where equations for the injection phase and production phase are derived. These were derived from Darcy's law and equations which were found from the resources in the previous literature section.

Assessment

While the introduction section well identifies stakeholders and possible outcomes of the project, it does not explain the advantages of the project, the practical uses of bitumen or why the project ought to occur. The introduction also does not touch on how the project arose, and does not mention the oil and gas exploration ban, a key legal feature of the project. When talking about the modelling study, pressure and temperature are clearly defined as necessary elements with reasonable explanations. The group also highlights some key trends in the given data. However, they do not mention the conditions of the experiments from which the data was collected, such as the number of injection periods or the depth of the well. Also, Figure 3 which represents data from the pilot project in New Zealand, has plots with different time ranges which makes comparisons difficult. The sketch of the conceptual model demonstrates the injection/production and drainage well, but does not describe or explain the processes occurring within the system. Finally, the derivation of the equations for temperature and pressure wells accounted for the change in dynamic viscosity with appropriate citation. The chosen model was justified with adequate assumptions and derivation.

Recommendations

Overall, the given report managed to cover the required major aspects of the design proposal. However, we found that there were a few points that should have been included to make this proposal better. Firstly, the proposal failed to mention the New Zealand government as a stakeholder. Seeing that the NZ government is a key stakeholder which recently removed the ban on Oil and Gas exploration, the results of this study could impact further decisions on the ban of Oil and Gas exploration. Secondly, we noticed that the group mentions the plots from the Saleski pilot in Canada as given data. This is not true, as we have not been given any data from the injection wells (I1C and I2C) and the given data from the Pressure wells has less data points than the ones shown from the screenshotted plots from the study. The data from the pilot project in New Zealand could also have been visualized better. Plotting the graphs under the same x-axis would make the timeseries relationships easier to understand. Lastly, we found the diagram of the conceptual model hard to understand. Some written explanation for the given diagrams would have been appreciated.