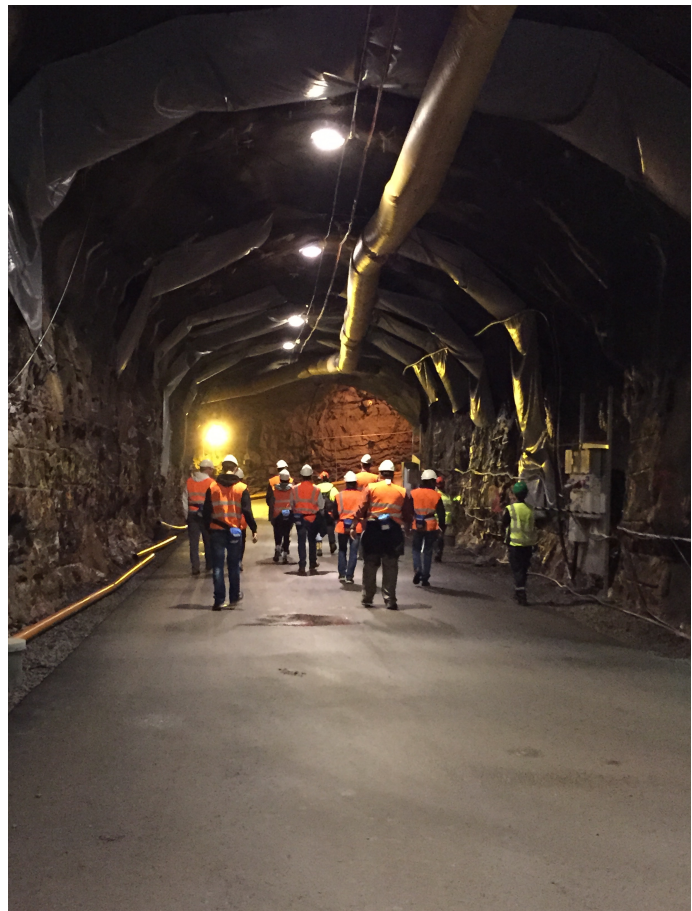


Day 10 – SKB Research Facility in Oskarshamn, Sweden

We spent the previous two nights staying in Fagelfors because it was much closer to Oskarshamn than Stockholm is so we would have a shorter drive to visit the SKB research facility. We packed up from the previous two nights, loaded up into our two vans and departed for our day in Oskarshamn. We arrived early for our tour of the facility so we had to wait for about 20 minutes for our tour guide to arrive and set up for us. Once our tour guide was set up we started by having an hour-long presentation on SKB and the work they are doing at the nuclear waste research facility we were soon to enter. The presentation informed us on the SKB's plans to develop a new and more permanent facility to predominantly house spent nuclear fuel rods used in Sweden's nuclear reactors. The facility was to be constructed at the site in Forsmark where we had toured earlier in our trip.

Once the presentation was over and we had all had our fair share of coffee we headed down over 1,000 feet underground to observe where SKB was conducting experiments on necessary techniques that will be required when construction begins on their new Forsmark storage facility. The drive to where we were to unload off of the bus was approximately three kilometers long. After arming ourselves with the necessary safety gear we exited the bus and were given a tour of the underground laboratory.

The laboratory consisted of a main road used for transportation in and out with various other chambers connected to this main road that were the locations of most of the experiments taking place at this facility. Once in the tunnel we walked to one of these tunnels used for experiments to learn about some of the research they are doing at this facility. We learned about how they were experimenting with the process of hydraulic fracturing as a possible way to increase the rate of tunneling for the new facility. The experiment had already been conducted, but there was a tunnel that had been dug that had been fractured before the tunneling to see if hydraulically fracturing the rock would be an economically efficient way to construct the new facility in Forsmark.



Our Tour Group Navigating the Tunnels Over 1,000 Feet Underground

After seeing this experiment and various others, we were taken to an area where they were storing the vehicle that was going to be used in their new Forsmark storage facility to transport the copper canisters that the fuel rods were to be stored in. The vehicle was to be completely unmanned when fully operational. The vehicle's size was similar to a large fire engine that had been modified to ride on four-foot in diameter tires while maintaining the same ride height. The copper canisters that it would be transporting and storing are 10 meters in length so it had been expertly modified to be able to handle the weight of the canister and it had the equipment on board that would be able to place one of



Copper Canister that Houses Spent Fuel Rods

these canisters in its designated location. After seeing these experiments and a few more, we were directed to the bottom of the entire complex, approximately 1,500 feet below sea level. Here we entered elevators and went into the above ground laboratory area and were given a presentation by a geomechanics expert that works at the facility.

The presentation was quite interesting, it was very technical and gave great insight into what they are trying to accomplish at this research facility. The main point of study for the presenter was the fractures that were in the rock around the tunnel system. The presentation covered material that the petroleum and natural gas engineering students had studied the previous semester in our GEOSC 454 class. The main principal I was able to understand was that they were looking at the stress fields of the rock surrounding the site. The research site was picked due to its similarity to the site at Forsmark, and here they hoped to learn

about the structure of the bedrock that would be encountered at the permanent storage facility in Forsmark. The scientists and engineers used the data from the experiments to determine fracture gradients and eventually to map all of the fractures that were in the bedrock at the research site. This helps with many aspects of the tunneling and drilling process that will occur when construction begins at the permanent storage facility in Forsmark. After the presentation was complete we loaded up back into the vans and drove out of Sweden, back to Copenhagen where we would spend the night.

This day was one of the most memorable of the entire time we were in Scandinavia studying for our research projects. It gave us the insight into how much work it takes to permanently store nuclear waste. It also gives one a sense of confidence towards the efforts the world is making to make our planet as clean and healthy as it deserves to be. I believe this tour exemplified what the trip was all about, it showed that Scandinavian countries are front runners in sustainable and safe energy usage and that the world should start paying attention to what these countries are doing.