PROVIDING OIL SPILL CONTAINMENT IN A REMOTE AREA

An environmental assessment was carried out on a utility's substation built in the early 1980s in northern Alberta. This substation consists of two transformers each containing approximately 70,000 liters of mineral oil.

This substation is in a remote area, unmanned and on the banks of a river.

The site was deemed to be at high risk due to the fact that the transformers on site contain a very large amount of oil and, second, the site is very near a river. Due to the possibility of damage to the environment and monetary penalties that this could bring, the utility came to the conclusion that it was in their best interest to determine a preventive solution that would be most compatible with the site.

This substation supplies a vast amount of electricity in the northern Alberta area and it was not possible to take the two transformers off line to install a secondary oil spill containment system.

Any secondary oil spill containment system had to effectively work in all weather conditions, given the remoteness of the location.

Given that utilities everywhere have less manpower than in the past, little or no maintenance of any secondary oil spill containment system was also a criterion.

Research by the utility was done on various types of secondary oil containment systems. Given that the transformers had to remain energized and that the system had to function in all weather conditions down to –50 C, the utility came to the conclusion that the SorbwebPlus secondary oil containment system offered by Albarrie Canada Limited was the only choice. The utility's insurance company also examined the SorbwebPlus system and deemed that the SorbwebPlus system was a viable option for not just this particular substation but all of their substations for secondary oil containment.

SorbwebPlus is a no maintenance passive system, which can be installed around existing energized transformers and will function in all-severe weather conditions. It is designed to contain 110% of the volume of oil within the transformers along with a historical 24-hour rainfall over the past 25 years.

Albarrie was the general contractor for the complete job, including the installation of a firewall between the two transformers.

The installation of the SorbwebPlus secondary oil system required that Albarrie take into consideration all cable trays within the perimeter of the containment system, including a concrete subsurface cable tray (trewna). We also, given the area that was available to the

SorbwebPlus system had to lower the grounding grid from 0.5 meters to one meter. All this had to be accomplished while the transformers were live.

Inasmuch as there was to be installed a firewall between the two transformers, two containment systems had to be built one for each of the transformers.

The substation sloped towards the river at a three-degree angle, requiring the excavation of the containment system for leveling; this eliminated the contour of the land causing the oil to spill out of one side.

The soils were determined through an independent laboratory to be permeable, therefore no special drainage system had to be designed. SorbwebPlus is designed to allow the permeation of water in the form of precipitation or melted snow into the subsoil.

If the soil had been impermeable, a drainage system can be built underneath the SorbwebPlus to move the water away from the containment system.

Upon excavation, the cable trays (which ran along the surface of the containment) had to be supported with wooden planks. Upon reaching the 0.5-meter depth the grounding grid had to be exposed so that there would be no damage to the grid. The grid was made visible so that further excavation could be made down to the 1-meter depth.

Further excavation was necessary between the two secondary oil containments for the two transformers to allow for a foundation that would support the firewall. The two containment systems would abut to the foundation of the firewall.

A surface cable tray ran through the foundation for the firewall, so allowance was made for passage of the cable tray through the foundation. This would later be sealed preventing any seepage of oil from one containment system to the other.

Slings lifted the cables in the trewna and the trewna was lined with the oil mat to prevent any seepage of oil into the ground as the bottom of the trewna was earth. Once lined, the cables were then replaced and the top of the trewna was sealed with concrete lids.

Once excavation was completed, the grounding grid was dropped to the 1-meter depth. As the substation was built in the early 1980s, upgrades to the grounding grid were done at the same time.

All the excavated areas were installed with the SorbwebPlus system. This includes the impermeable liner around the perimeter and the special oil mat at the bottom of the containment which will seal upon contact with oil, yet if no oil is present, will allow the passage of water into the subsoil.

Once the SorbwebPlus system was installed, rock was added to the system. The rock was 19 mm to 38 mm in diameter, which typically gives a void area of 40 to 45%. It is this void area that the 110% of oil within the transformer and the 25-year, 24-hour rainfall event will be contained in the event of a catastrophe. The layer of rock serves as an effective retardant in the event of fire.

The firewall completed the entire installation.

The high risk for this substation was eliminated with the addition of a no-maintenance, passive, secondary oil containment system which operates in any severe weather conditions.