CANADIAN CONSULTING
ENGINEERING AWARDS 2013

GENIVAR

POPLAR CREEK
90-10 W4M

NATURAL RESOURCES, MINING, INDUSTRY & POWER CATEGORY

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PROJECT SUMMARY

E-T Energy is engaged in the business of developing, operating, producing and selling recoverable bitumen found in the Athabasca oil sands deposits using the ET-DSP in-situ method of production. GENIVAR was awarded the task of delivering the engineering, procurement and start up support for Step 3 Test of the E-T Pilot plant. As a result of the electro thermal method of production, GENIVAR had to generate a unique measurement and gathering system to allow E-T Energy to produce oil at a significantly smaller energy cost per barrel than conventional methods.

GENIVAR had to demonstrate specialized engineering principles to pump the raw emulsion of bitumen and water through the field lines to the tank farm using progressive cavity pumps.

PROJECT HIGHLIGHTS

The Poplar Creek project consisted of a bitumen extraction well array, a new tank farm, metering station and de-bottle-necking of the existing battery for the design production and flow of 500b/d. The Athabasca Oil Sands in this specific area of production have a capacity of resources that are too deep for surface mining and too shallow for steam assisted gravity drainage (SAGD). The supplied power distribution system has allowed E-T Energy to extract these resources that were previously inaccessible. The engineering principles and techniques used by GENIVAR had to be specific to the thermo electric procedure used to extract the oil sands from the reservoir.

The electrodes are used to heat the bitumen in the reservoir, decreasing the viscosity and allow it to flow to the surface more easily. GENIVAR had to demonstrate specialized engineering principles to pump the raw emulsion of bitumen and water through the field lines to the tank farm using progressive cavity pumps. Gas associated with the bitumen at the subsurface pump is collected at the casing, then measured and vented at the tank farm. In a standard SAGD facility, high pressure steam is able to heat the bitumen to temperatures that make it much more viscous, at Step 3, the electrodes we able to heat the water/bitumen to approximately 80 degrees making it more difficult to flow up through the pipe.

Victaulic piping is a mechanical bolting coupling that engages into grooves and uses a gasket seal.

GENIVAR had to customize a Victaulic mechanical piping system to simplify construction and avoid costly field fabrication through welding, fitting and typical testing procedures. The piping rack had to be “floating” and somewhat portable along with the coupled victaulic piping.

COMPLEXITY

The formations in the Athabasca Oil Sands are highly permeable and contain significant amounts of in situ formation water. This process uses an electrical current to heat the formation water to 130°C while utilizing the formation pressure to prevent the water from flashing to steam. Heat is transferred to the oilsands by conduction. This project is distinguishable from other similar projects in that it doesn’t require the typical surface equipment used in standard bitumen separation. The site does not require boilers to create the high pressure steam injected into a formation in a SAGD facility or the massive separators used in group well productions.

This project differs from similar projects in that the featured piping solution was done using the Victaulic parts which is a mechanically bolted coupling that would engage into grooved and feature a gasket seal. This removed the need for welding, weld testing procedures and other costs associated with traditional pipe fitting practices.

GENIVAR assembled a mass based metering system where each of the production tanks were equipped with direct mass measurement load cell devices so that mass measurement can be recorded before and after production flows to the battery.

SOCIAL AND ECONOMIC BENEFITS

Because of the ET-DSP process being much more simple than mining and SAGD, the surface facilities are significantly less expensive. ET-DSP does not require high pressure steam lines, tailings pongs, large separation vessels, boilers and truck/shovel equipment. This in turn lowers the required engineering hours to complete the project and the manpower to maintain the facility’s day to day operation.

Economic benefits

The project required significantly less equipment than a traditional extraction facility. As a result the project had less man hour and engineering hour requirements. Due to the simplistic nature of the piping, the project had reduced design specifications and did not require welding contractors, or any of the testing and regulatory provisions that are included with standard welding procedures.

With this technology being relatively unproven in Alberta, it gives GENIVAR an opportunity to familiarize itself with electro thermal technology and become the benchmark for ET-DSP engineering projects.

Social benefits

There are many social benefits associated with oil production in Alberta. Oilsands projects like this one are vibrant job creators and represent a massive and growing tax base for municipalities, provincial and federal. Over the next 25 years, fully developed oil sands would generate 3.3 trillion in economic activity, up to 700,000 jobs annually and hundreds of billions in tax revenues to the provincial and federal governments. These taxes will help fund social programs like health, education and pensions.

With this engineering solution executed, there allows the ability to produce oil from formations that until this time were deemed not economically feasible to exploit.

ENVIRONMENTAL IMPACT

The Poplar Creek facility demonstrates the minor environmental impact of ET-DSP technology in comparison to conventional methods of oil extraction. A small footprint compared to a surface mine and significantly lesser carbon dioxide emissions than a SAGD facility. This project has been executed in an time of mounting environmental pressure, including issues surrounding water, GHG emissions and land disturbances. This pilot is an environmentally friendly, energy efficient and economic producer of oil sands through the use of the Electro-thermal Dynamic Stripping Process, (ET-DSPTM), a technology used in the environmental industry to remediate contaminated soil and groundwater. The transfer to oil sands production will demonstrate an alternative method with the potential to eliminate direct on-site greenhouse gas emissions using electricity and minimal water.

McDaniel & Associates Consultants Ltd estimates over 189 billion barrels of oil are currently stranded at depths which are too deep to open pit mine, yet too shallow for SAGD. This project addresses not only the sustainability of natural resource production in North America, but also doing so with insignificant emissions anticipated to create carbon credits, repaid production, upfront capital reduction and a rapid remediation of produced acreage.

MEETING CLIENT'S NEEDS

The main goals of the client were to have a well field piping layout and integration of the measurement tanks and required instrumentation with the piping layout completed. A control system for the well field and existing battery completed. De-bottleneck the existing battery to treat up to 500 b/d of dilbit emulsion. GENIVAR was able to design a measurement system as per E-T and Total agreement and specified measurement equipment that allowed for a mass energy balance between the injection wells and the production wells. The goal to build the facility as portable as possible was met by using Victaulic piping construction and a "floating" pipe rack.

E-T Energy signed an agreement with Total E&P Canada Ltd to obtain detailed energy and material balance for the Et-DSPTM technology performance on step 3 of the Poplar Creek facility. The step is part of the Pilot study and the project was treated very as cost sensitive. Step 3 was designed to prove the well site array layout, and would it work consistently to allow for expansion of the project.