Confidential
Report

Tar Sands Project Due Diligence
Phase 2 – Pilot Plant Testing Program

September 2015

Prepared for
Deutsche Bank Securities Inc.

Nexant

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Section 1 Introduction

Deutsche Bank Securities Inc. ("DB") retained Nexant to provide technical due diligence support to DB relating to a closed-loop, solvent based system being developed by MCW Energy Group Limited ("MCW") for separating tar from sand in Utah oil-wet tar sands. Phase 2 of the due diligence, the findings of which are contained in this report, covered:

- Finalize 250 BPD Pilot Plant Testing Program
- Visit Pilot Plant to review its operation and observe its operation during the test program
- Quantify Pilot Plant operating cost (opex) for each grade of ore tested
- Report results of Pilot Plant Testing Program

Specific activities performed included:

- Site visit to Pilot Plant by two of Nexant's personnel
- Performed Pilot Plant Test Program
- Reporting on Pilot Plant Operation and results of Testing Program

Nexant's Phase 2 due diligence activities did not include identifying changes to the design of the pilot plant that would improve the safety of its operation, its efficiency/cost structure or its compliance with environmental regulations.

Activities during subsequent phases of technical due diligence to support DB may include some or all of the following activities:

- Assess plans for two 2,500 BPD plants and opine on the reasonableness of the scale-up plans
- Review and assess the reasonableness of capex budget and projected operating costs for the 2,500 BPD plants

2.1 INTRODUCTION

Nexant's team visited MCW's pilot plant between August 18 and 21, 2015 to observe the pilot plant's operation, and to perform test runs as per the Pilot Plant Testing Program to determine its opex for a range of ore grades. The results of the observation and Testing Program are presented in this report.

2.2 PILOT PLANT OPERATIONS

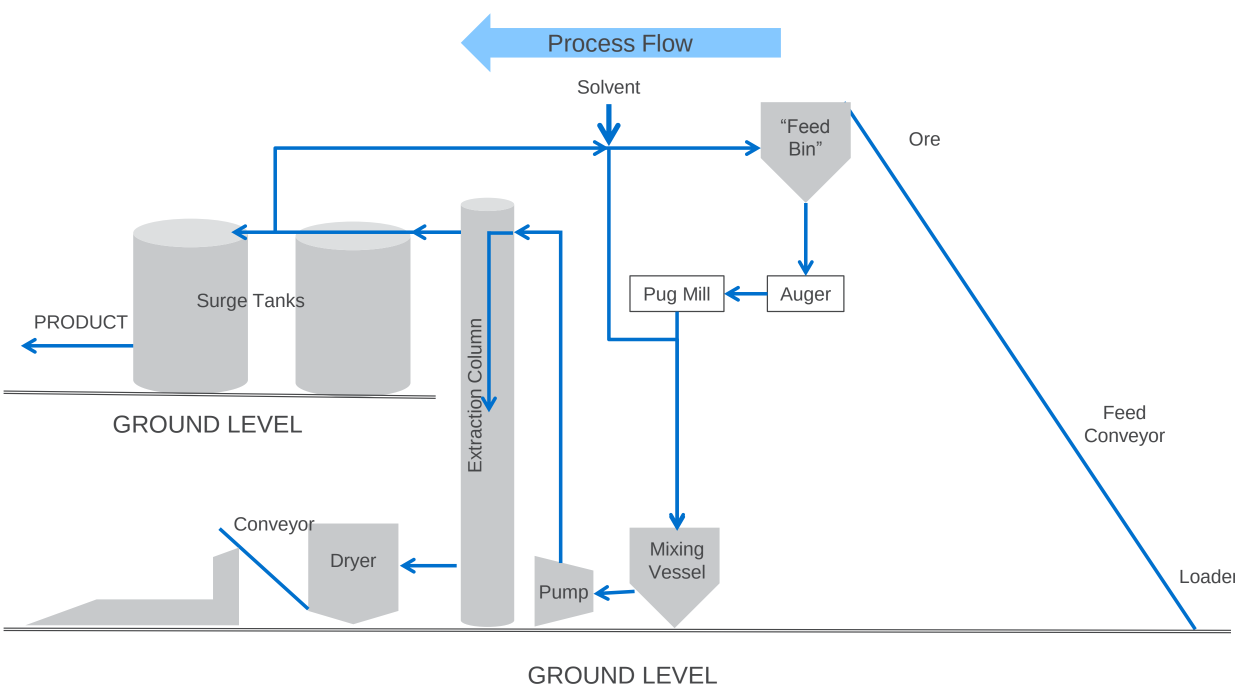
2.2.1 Overall Observations

The pilot plant demonstrated that it is able to process a range of raw ore and blended ore into saleable product. Overall the process operated as it was designed, and is capable of operating batchwise on a regular basis without significant failures or issues. There are minor issues that were observed during the visit, most of which MCW is addressing. The issues are discussed in more depth in this report. The issues observed are pump failure, dryer pluggage, and product solids removal. Nexant understands that this is a pilot plant and these issues are common and resolvable. However, it is important to comment that resolution is important for the next step of MCW's development, the design of a 2,500 barrel per day (BPD) plant.

The design of the 250 BPD pilot plant is reasonably simple and flexible, as shown at a high level in Figure 2.1. It is able to use a range of solvent qualities from the market, and able to process ores with a range of hydrocarbon concentrations. The processing steps are straight forward and common. The challenge, which MCW seems to be addressing, is the handling of the material – the raw ore, intermediate slurry, and dryer solids. MCW appears to be taking steps to manage the material handling issues by direct testing and experience.

Figure 2.1 Basic High Level Pilot Plant Design

(Note: directions of flow are modified to show the flow from right to left)



The purpose of the MCW process is to extract fungible hydrocarbons (HC) from the “tar sands” or ore that is mined from the ground. It accomplishes this by using a condensate solvent in a series of vessels in a batch process. The purported value-add is removing these hydrocarbons and incorporating them into an oil product. The MCW product is comprised of the purchased condensate with the extracted HC dissolved or blended into it, with the condensate accounting for roughly 90 percent of the final product on a volumetric basis. In effect, the condensate solvent is also used as a diluent and the product is a crude oil /condensate blend. The 250 BPD pilot plant exhibited an extraction capacity between 15 and 45 BPD of HC on a prorated daily basis during the Testing Program, varying between runs and HC content in the ore.

2.2.2 Process Description and Observations

2.2.2.1 Pre-Mix Equipment

The process starts with the raw ore piles that were transported from the mine site via truck. The raw ore is moved from a pile on the ground to a large conveyer by a large track excavator with a two yard bucket. As shown in Figure 2.2, the bucket has a special design feature that utilizes a series of rollers that partially breaks up the raw ore as it is loaded on the conveyer. Also, the bucket rollers are operated to distribute the quantity of ore delivered to the conveyer to prevent bulk quantities from overloading the receiving feed bin at the discharge end of the conveyer. An operator is required to operate the excavator, and a second operator was stationed at the end of the conveyer to open the feed bin and observe the ore entering the feed bin.

Figure 2.2 Excavator and Bucket

During the August 18 – 21 test run the excavator and loading of the feed bin occurred between once and twice per hour. MCW states that they can run four excavator loads per hour at near maximum operating capacity. At that rate they well exceed the pilot plant capacity of 250 BPD of the crude oil/condensate product.

The feed bin, shown at the end of the conveyer in Figure 2.3, receives the raw ore and mixes it with solvent. The solvent helps the raw ore to flow through the metered auger and pug mill, then into the mixing vessel. The metered auger controls the flow of slurry from the feed bin to the pug mill with a variable speed drive. The pug mill shown in Figure 2.4 mixes and further breaks down clumps of ore, so that the solvent can better dissolve the crude oil.

Figure 2.3 East View of Plant

Figure 2.4 Pug Mill

2.2.2.2 Mixing Vessel and Transfer Pump

The slurry from the pug mill is fed into the mixing vessel, where the majority of the crude oil is dissolved in the solvent. The top of the mixing vessel and agitator drive are shown in Figure 2.5. The solvent and solids are mixed with a large agitator and continuous pump around loop that partially fluidizes the slurry solids. The mixing tank operates at atmospheric pressure and ambient temperature. It has the capability to be heated if necessary due to cold winter temperature or for faster dissolution of the crude oil. The mixing tank has special internals to promote removal of rocks that are in the raw ore. Periodically the mixing tank is cleaned due to the build-up of solids. This is due to the difficulty of holding the fast settling solids in liquid suspension. MCW has added multiple nozzles on the side of the tank to provide for continued operation as the solids build up in the bottom.

Figure 2.5 Mixing Vessel

The majority of the crude oil is dissolved in the mixing vessel before it is pumped to the extraction column. The pump is a diaphragm pump, which uses air pressure on one side of the diaphragm to push the slurry. The air does not contact the slurry. The diaphragm pump is used because other pump types have failed. This is an area of concern as the dirt and rocks in the slurry are a challenge to handle.

The loading of the raw ore onto the conveyer and through to the mixing tank is a batch process. After each batch is pumped from the mixing tank, a volume of solvent is refilled from the solvent surge tank into the mixing tank. The solvent is recycled as many times as necessary to concentrate the solvent with the raw ore to the product specification, at which time it would be considered a product. The quantity of raw ore that the mixing tank can handle and the residence time required to dissolve the crude oil controls and limits the processing rate or capacity of the pilot plant.

2.2.2.3 Extraction Column

The slurry (ore and solvent) is routed to the top of the extraction column. The extraction column shown in Figure 2.6 is primarily a separator to separate the ore solids from the hydrocarbon (HC) liquid (HC - solvent with dissolved crude oil). A unique method developed by MCW provides for a water layer in the column, which separates the solids from the HC. The solids sink through the water layer, while the HC floats. This is a simple, but effective, method implemented by MCW. While pumping the slurry from the mixing tank into the column, the HC continuously overflows from the column top and into one of the surge tanks. The solids sink to the bottom of the extraction column and build a level. Once a sufficient level of solids is developed, the solids are transferred from the bottom of the column via a screw conveyer into the dryer. The water layer remains in place, but is slowly lost due to wetting of the solids. Operators maintain the appropriate level of HC, water and solids in the extraction column.

Figure 2.6 Extraction Column

2.2.2.4 Surge Tanks

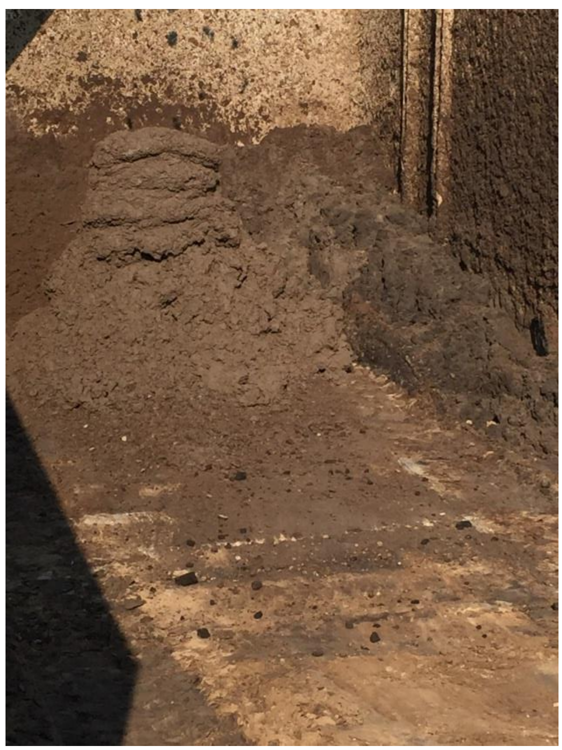
The solvent overflow from the top of the extraction column is routed back to the surge tank. MCW currently has two surge tanks, which are used for this purpose. As previously mentioned the solvent is routed from the surge tank back to the mixing vessel, through the column top, and back to the surge tank until it meets the product's desired API (density) specification.

2.2.2.5 Dryer

The dryer shown in Figure 2.7 receives the wet solids. The wetness is both water and residual HC. The dryer has two levels which dry the solids in two stages. Indirect steam is primarily used to heat the solids to promote the drying, and direct steam is available as needed. MCW has decided to dry the solids to a damp feel and not bone dry, as shown in Figure 2.8. This is to prevent wind from blowing the dust from the solids around the plant.

Figure 2.7 Dryer

Figure 2.8 Dried Solids



Nexant observed that the solids tend to get plugged in the dryer, which requires operators to open the dryer to free the material. Also the damp solids have a HC odor to them. MCW has tested the damp solids and reports that it is acceptable for proper disposal at the mining site.

2.2.2.6 *Vacuum Pump, Air Cooler, and Vent Stack*

A vacuum pump continuously draws gasses from the dryer and other equipment. The gasses (both HC and water vapor) are drawn through an air cooler to condense the HC and water. The air cooler seems to perform its job as there was no visually noticeable HC venting from the vent stack, although a visual observation of the vent stack is not an adequate method to verify the efficacy of the air cooler.

2.2.2.7 *Rectification Column/Reboiler*

The rectification column/reboiler is no longer used as part of the day to day processing. The reboiler is used for special runs when the product's API gravity needs to be lowered (i.e., a more concentrated product). The reboiler can be run independently of the main process. This allows for continued operations, while the special reboiler is concentrating a product tank. This process configuration is different than the one shown in the P&IDs and process description that were provided to Nexant during its Phase 1 due diligence.

2.2.2.8 *Centrifuge*

MCW has recently added a centrifuge to the process. During the test runs the centrifuge was used to remove trace solids from the product. The trace solids concentration is a specification of the product and is termed BS&W (basic sediment and water). As the centrifuge is a recent addition, it needs improved operation and integration with the process. An alternative to removing the trace solids and meeting the BS&W specification, per MCW, is to allow the trace solids to settle. MCW states that this requires several days and is planning on additional tankage to provide for the necessary product storage time.

2.2.2.9 *Instrumentation*

MCW has taken steps to add instrumentation to many sections of the process. Some instrumentation was in the process of being installed during the test run. The instrumentation will provide valuable information to the operators, reduce labor cost, and document the process via data collection and recording.

2.2.3 **Conclusions**

MCW has a unique process that is continuing to evolve based on their experience operating the pilot plant. Instrumentation for measurement and data collection is lacking, but is being implemented on a piecemeal basis. Understanding that this is a pilot plant, it is very important to finalize and define the design and equipment for the 2,500 BPD plant. To date there is continued process improvements and modifications.

Illustrating the changes being made, Nexant notes differences between the process observed and the one described to Nexant during its Phase 1 due diligence. The major differences were

- The solvent/condensate was not recycled during the test runs as assumed for the Phase 1 due diligence, during which MCW provided a process description called "Technology Overview" that states that they "recycle 99% of the solvent from the processed oil sands"
- The "Technology Overview" document states that an alcohol is used as part of the process for extraction, but no alcohol was used during the test runs
- The P&ID, which is labeled "as built" as of 6-3-15, and was a primary source of information for Nexant's Phase 1 desktop review includes a reboiler in the process to separate solvent from the product. However, the reboiler was not part of the process during the test runs.

3.1 INTRODUCTION

Nexant was on-site at the Pilot Plant to monitor the Testing Program from August 18 to 21, 2015. Three tests were performed with various grades of raw ore. The raw ore grades were 4.75 percent, a blend of 4.75 percent and 11.3 percent, and 10.6 percent. Each of the grades was processed until an acceptable API (between 42 and 44) was achieved. The results of the test runs, material usage, utility consumption, and operating costs are presented in this section.

3.2 TEST RESULTS SUMMARY

Nexant derived the process' operating cost from two perspectives: 1) the cost of extracting hydrocarbons from tar sands (ore) and 2) the cost of the product that MCW is selling in the market. Section 3.2.1 addresses the cost of the hydrocarbons that are extracted from the ore, on a dollar per barrel of extracted hydrocarbon basis. The cost of the product sold by MCW (i.e., the blend of extracted hydrocarbons and purchased condensate) is derived in Section 3.2.2 on a dollar per barrel of product basis.

3.2.1 Operating Cost of Oil Extracted From Ore

Based on data collected during the Testing Program and assumptions where data was not available from MCW, Nexant derived the cost of the hydrocarbons extracted from the ore during the Testing Program test runs. The operating costs for the three test runs and the cost per barrel of HC extracted from the ore are presented in Table 3.1. The derivation of the labor costs and utilities are described in detail in Section 3.3. In Table 3.1, the solvent loss is estimated at 0.5 percent of the solvent inventory at the start of the respective run. The HC in the ore is estimated based on ore density, an assumed HC density of 10 API, and the tested level (percent by weight) of HC in the ore.

Table 3.1 MCW Pilot Plant Process Operating Cost Analysis – Cost of Extracted Hydrocarbons

Based on Quantity of HC Extracted from Ore

	TEST RUN 1		TEST RUN 2		TEST RUN 3	
	4.75% Ore		4.75%/11.3% Ore Blend		10% Ore	
	Cost (US$)	% Cost	Cost (US$)	% Cost	Cost (US$)	% Cost
Operator Labor	1,156	38%	1,047	38%	813	35%
Site Management	462	15%	462	17%	462	20%
Maintenance Labor	211	7%	191	7%	148	6%
Raw Ore	159	5%	153	6%	151	6%
Solvent	33	1%	31	1%	29	1%
Electricity	198	6%	138	5%	162	7%
Propane	337	11%	305	11%	237	10%
Nitrogen	73	2%	60	2%	65	3%
Water	8	0%	5	0%	4	0%
Water Delivery	124	4%	83	3%	62	3%
Diesel Fuel	62	2%	54	2%	44	2%
Rental Equipment	247	8%	224	8%	174	7%
Total Cost per Run	3,070		2,752		2,350	
Total Cost per BBL of HC Extracted from Ore	**270**		**149**		**97**	

The cost analysis presented in Table 3.1 indicates that the cost to extract HC from the ore ranges between $97 and 270 per barrel. The cost on this basis is largely insensitive to prevailing crude oil prices since only the cost of propane and diesel fuel, minor contributors to the total cost during the test runs, are impacted by oil prices.

3.2.2 Operating Cost of Product to Be Sold

The operating costs (opex) for the three test runs are again presented in Table 3.2, but this time showing the cost per barrel of the product being sold (i.e., the blend of extracted hydrocarbons and purchased condensate). The opex cost totals show that the low ore grade at 4.75 percent concentration of HC cost $33.4 per barrel (BBL) of product, the cost for the mixed blend with 4.75 percent and 11.3 percent HC cost was $31.4 per BBL of product, and the more typical ore with 10.6 percent HC had a cost of $31.3 per BBL of product. These costs are primarily influenced by the cost of purchased condensate ($24.2 per barrel during the test runs), which is heavily dependent on prevailing crude oil prices.

Table 3.2 MCW Pilot Plant Process Operating Cost Analysis – Cost of Product To Be Sold

Based on Quantity of Product Sold

	TEST RUN 1 4.75% Ore		TEST RUN 2 4.75%/11.3% Ore Blend		TEST RUN 3 10% Ore	
	Cost (US$)	% Cost	Cost (US$)	% Cost	Cost (US$)	% Cost
Operator Labor	1,156	12%	1,047	12%	813	10%
Site Management	462	5%	462	5%	462	6%
Maintenance Labor	211	2%	191	2%	148	2%
Raw Ore	159	2%	153	2%	151	2%
Solvent	6,514	68%	6,211	70%	5,848	72%
Electricity	198	2%	138	2%	162	2%
Propane	337	4%	305	3%	237	3%
Nitrogen	73	1%	60	1%	65	1%
Water	8	0%	5	0%	4	0%
Water Delivery	124	1%	83	1%	62	1%
Diesel Fuel	62	1%	54	1%	44	1%
Rental Equipment	247	3%	224	3%	174	2%
Total Cost per Run	9,551		8,933		8,169	
Total Cost per BBL of Product	**33.4**		**31.4**		**31.3**	

The summary of the data from the test runs is presented in Table 3.3. For each run, it shows the run duration to produce a tank of product, the raw material quantities, and the utilities consumed. Each of the runs, although not operating a full 24 hours, produced more than 250 barrels of product. More detailed explanations are described later in the report.

Table 3.3 Test Run Data

	TEST RUN 1		TEST RUN 2		TEST RUN 3	
Start of Run	18-Aug	3:30 PM	19-Aug	6:15 PM	20-Aug	6:30 PM
End of Run	19-Aug	10:00 AM	20-Aug	11:00 AM	21-Aug	9:30 AM
Operating Time (hours)	18.50		16.75		13.00	
Raw Ore Concentration	4.75%		4.75 & 11.3%		10.6%	
Raw Ore Processed (tons)	41.2		40.2		39.8	
Raw Ore Processed (bucket loads)	20		16		14	
Solvent Initial Volume (BBL)	269		257		242	
Product Final Volume (BBL)	286		284		261	
Utility Consumptions						
Electricity (kWh)	1,066		740		870	
Propane (gallons)	253		229		178	
Nitrogen (CCF)	19		16		17	
Water (BBL)	40		27		20	
Diesel Fuel (gallons)	26		22		18	

3.3 TEST RUN DISCUSSIONS

3.3.1 Raw Ore, Solvent and Duration of Runs

The raw ore concentrations were analyzed by an outside lab at 4.75 percent, a blend at 8 percent, and 10.6 percent for Test Runs 1, 2, and 3, respectively. The concentration of the HC is in chunks or lumps mixed with sand, dirt, and clay. Thus the actual concentration of HC in the raw ore is somewhat subjective to where the sample was taken. In general, a low grade ore, blended grade, and typical grade were processed for the test runs.

The API gravity and BS&W of the condensate used as solvent were different for each of the test runs. MCW does not have control over the quality of the condensate received as it is sourced from a distributor. The good side of this is that MCW's process is able to produce a product using a range of condensate qualities.

The duration of the test run was based on producing a tank (roughly 250 barrels) of product that met the product specifications. This was accomplished during test durations of 18.5, 16.75, and 13 hours, respectively, for the three test runs. The start of each test run was delayed beyond the scheduled starting times due to the ore grade change-over, pump issues, extra product testing time, and other process issues. Once each test run began, they ran straight through without delay or process problems.

3.3.2 Product Quality Considerations

The product was obtained from the process described in Section 2. The process continued with the addition of raw ore until the desired API gravity of the product was achieved. The target API was roughly 42 – 44, at which time the test run was declared complete. A second specification, BS&W (solids), also must be met before the product can be sold. Test Runs 1 and 3 had BS&W results that were too high for a saleable product, whereas Test Run 2 met the BS&W specification of less than 1%. For Test Runs 1 and 3 to meet the product specification further processing was required. The solids that are measured in the BS&W test originate from the raw ore, which has clay as part of its composition. The clay is very fine, which increases the BS&W during processing.

To lower the BS&W to meet the specification, the product in the tank had to be routed through a centrifuge. The centrifuge had a fine mesh screen, in the micron size, to separate the fine solids from the liquid product. It took roughly two shifts to reduce the solids enough to meet the BS&W specification. Nexant did not include these extra hours in the test run process time. The centrifuge hours were not included for Test Run 1 and Test Run 3 because the centrifuge was run in parallel with the continued operation of the subsequent runs. If the centrifuge time were included it would add excessive hours to the duration of the main process and result in unrepresentative test results. Also, MCW has alternative plans to remove the solids to meet the BS&W specification. They plan to add additional product storage to allow for additional product residence time and settling of the solids. This method would not require additional labor hours or utility consumption. This seems a logical approach, but was not shown or verified during the test runs. The centrifuge operation's electrical usage was included into the cost per run.

Nexant spoke with the buyer of the product via conference call while at the pilot plant site. The primary buyer is Pinnacle Co., and they purchase throughout the area for distribution to the oil pipeline. The buyer stated that the specifications for API are 38 – 48, with the BS&W specification of 1.0 as tested via a specified procedure. MCW has the flexibility to have a higher API than targeted in the test runs, but during the test runs it was important to have a consistent product specification, and one that comfortably met the product specs. Other buyers that may have a lower API specification can be accommodated by using the alternative process with the rectifier reboiler as described in Section 2.2.2.7. Since time permitted during its last day at the pilot plant, Nexant observed the operation of the reboiler for a short duration. It appeared to be a reasonably straight forward process, but does require the time of one experienced operator.

3.3.3 Labor and Site Supervision Cost

The labor cost for the test runs was based on three operators per shift plus an additional two hours for an operator to perform lab tests. Nexant also allocated the Site Supervisor's time of eight hours per day to the test run because he is integral to the operation of the process. MCW provided the hourly cost for each of the operators and the Site Supervisor, and advised that fringe benefits of 20 percent applied to everyone. The operator labor cost per run was calculated by determining the daily cost for all three shifts and the extra person's hours, then proportionating the daily cost to the run duration. This means that the operator's labor cost was only counted during the test run, and not in between the runs. The labor cost for the Site Supervisor was eight hours per test run, since each run took less than 24 hours. An estimate of labor needed for maintenance during prolonged operation of the plant was added to the cost to account for plant maintenance and repairs.

3.3.4 Raw Ore Delivered Cost

The operating cost to load and deliver the raw ore from the mine was provided by MCW. Nexant accepted the cost as reasonable, and did not verify the source of the costs. Nexant added the rental cost of the front end loader to the cost of the delivered ore.

3.3.5 Solvent Cost

The cost of the condensate/solvent of $24.2 per barrel is based on the deliveries received for the test run. Specifically the cost of two condensate deliveries was averaged to establish the cost of the solvent during the test runs. At the start of each run, the solvent tank level was measured and converted to a quantity of BBLs. The same method was used for the product volume. For Test Runs 1 and 2, there was additional product volume in the feed bin which was included in the total product BBLs. For Test Run 3, there was additional product volume in the mixing tank, and it was included into the total BBLs.

3.3.6 Utilities

The utilities consumed during the test runs were electricity, propane, nitrogen, water, and diesel fuel. The electricity was measured directly from the electrical meter. The electrical usage was allocated to each run directly by reading the meter. The electrical usage during the downtime between runs was included in the consumption for the specific run. For Test Run 1 and Test Run 3, the centrifuge operation's electrical consumption was also allocated to their respective runs.

The propane is used as fuel in the boiler to generate steam. The steam is primarily used in the solids dryer to evaporate excess HC and partially dry the solids. The steam is also used to heat the solvent tanks to approximately 80 degrees F, which is more important in winter conditions. MCW has the option of heating the solvent to a higher temperature to process the ore faster, but this was not tested during the test runs. The propane level measurement was read once per day in the morning. This is due to the warming of the propane in the tank and loss of accuracy of the measurement. The total propane consumed during the test runs was calculated, then allocated to each test run proportionately based on its respective run duration.

The nitrogen is used to purge the tanks and equipment, and prevent air from mixing with the solvent vapor. The nitrogen measurement was taken by reading the pressure of the cylinder and based on the cylinder volume the usage was calculated. The nitrogen usage, similar to the propane, was totaled for the entire runs, and then allocated proportionately based on test run duration.

The water level was measured each shift in the water tank. The water is used in the steam boiler and to maintain the extraction column water level. The water use was allocated to each run by the direct measurement and start of each test run. The overall water usage during the entire test period was allocated to one of the three runs.

The diesel fuel is used in the track excavator, skid steer loader, and rented air compressor. The usage of the diesel was based on operating hours of the equipment and estimated consumption per hour, then based on the duration of the runs.

3.3.7 Rental Equipment

MCW rents several pieces of equipment for the pilot plant operation. The rental costs were allocated to each run based on the duration of the respective runs. The rental equipment included in the costs is: skid steer loader, manlift, air compressor, flood lights, and the nitrogen cylinder trailer.

3.4 COST REDUCTION OPPORTUNITIES

MCW has identified several areas to reduce opex. They include the following:

- Increase throughput above the test run levels by processing more excavator loads of ore per hour. With an average grade of ore and continuous operation, this seems reasonable to achieve, but the actual process capacity limit is yet to be determined. Increasing the throughput by loading say two buckets of ore per hour instead of the approximately one bucket loaded each hour during the tests would result in a significant reduction in the MCW process' operating costs per barrel
- Use the purchased condensate/solvent as the fuel in multi-fuel boiler. The condensate is less expensive than propane and readily available. Thus, the boiler operating cost could be reduced
- Opex rental costs could be converted to capital costs by purchasing the equipment. In the near term, the obvious item to purchase is an air compressor. The purchase of the currently rented equipment will reduce the long term cost of the pilot plant.

There are numerous other opportunities, all of which need to be identified and included in the design of the 2,500 BPD plant.

3.5 CONCLUSIONS

MCW has a unique process that demonstrated its ability to process a range of raw ore qualities using solvents having a range of API gravities. The pilot plant operators and Site Supervisor are skilled in the operation of the process, and overcame the challenges observed during the test runs. As already stated in the report, it is important for MCW to finalize the design of the process to provide a solid basis for the design of the 2,500 BPD plant.

Nexant derived the process' operating cost from two perspectives:

- The cost of extracting hydrocarbons from tar sands (ore)
- The cost of the product that MCW is selling in the market

The operating costs during the three test runs using these two approaches are summarized in Table 3.4. Pilot plants typically have relatively high unit costs due to their low throughputs and poor economies of scale, which result in high unit fixed costs. The operating costs for the MCW process shown in Table 3.4 reflect such poor economies of scale.

Table 3.4 MCW Pilot Plant Process Production Cost Summary
US Dollars per barrel

	TEST RUN 1	TEST RUN 2	TEST RUN 3
Cost of:	*4.75% Ore*	*4.75%/11.3% Ore Blend*	*10% Ore*
Extracted Hydrocarbon	270	149	97
Product Being Sold	33.4	31.4	31.3

The cost of extracting hydrocarbons from the ore is a key parameter since the major objective of the MCW process is to extract hydrocarbons from tar sands and most of its equipment is devoted to this objective. The cost on this basis is largely insensitive to prevailing crude oil prices.

The cost of the product being sold, which effectively is a blend of the extracted hydrocarbons and the purchased condensate with the condensate accounting for approximately 90 percent of the blend, reflects the combined cost of extracting hydrocarbons from the ore and purchasing condensate. As a result, the cost of purchased condensate ($24.2 per barrel during the test runs) has the most influence on this cost and this cost is heavily dependent on prevailing crude oil prices.

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