The Canadian Oil Sands and GLENSOL

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Table Contents

0. Introduction

We are a dedicated team of specialists led by Directors, Fritz Greub and Dali Tambo. Our vision is to change the oil industry upstream, downstream and the transportation of oil through pipelines in an environmentally and more efficient way.

Specialized in separating oil from sand. Glensol application's are proven by Laboratory tests and limited field tests. Tests certificates are available upon request.

The Glensol application has been approved by the Kuwaiti Environmental department. GLENSOL PTY Ltd. is a reg. Company in South Africa and with the chamber of commerce of Kuwait where it is represented by IMCO Kuwait.

We engaged with METSO South Africa, to test if our application works on a industrial scale. November 2006 a test trail was run at METSO Johannesburg. The test result was less then 1% oil in the sand. The sand scrubber used is a model of the same as used in Canada's oils and fields of Alberta.

Glensol looks forward to working with interested parties with the capacity to join us in commercializing our unique product.

The following document gives insight into the potential for Glensol's additive to impact positively on operations in the Canadian Oil Sands, Venezuelan Tar Sands or American Shale Sands.

The Intellectual Property for Glensols Envirokleen is owned by Fritz Greub and Dali Tambo, it is held in Escrow.

1. Executive summary

Alberta's oil sands are one of the world's largest hydrocarbon deposits with proven accessible reserves of over 178 billion barrels. Constituted mainly by bitumen mixed with water and sand, it has not been economically viable to develop this massive resource until recently.

1.1

Source: Alberta Energy and Utilities Board 1.Source: Oil & Gas Journal;

Worldwide Report: Worldwide Reserves Increase as Production Holds Steady; Marilyn Radler; December 23, 2002

Located in north eastern Alberta, the oil sands can be exploited by both open pit mining and in situ methodologies. Mining projects, which have lower marginal production costs are much more capital intensive. Originally oil sands mining involved the use of bucket wheels which have now gone by the way side in favour of shovel/truck combinations which are significantly less expensive. There are two main in situ methods used in the oil sands today Cyclic Steam Stimulation and Steam Assisted Gravity Drainage. Both of these methods rely on using intense amounts of natural gas to heat up water which is injected into the ground. By decreasing the viscosity, the bitumen is able to be extracted. Glensols cold fusion process allows operators to dramatically reduce the viscosity of the bitumen whilst at the same time separating the sand and clay from the bitumen.

There are massive benefits to be derived from Glensols Cold Fusion application for oil sands producers including:

- Huge reduction in operating costs.
- 60% reduction in natural gas usage in separation phase.
- Natural gas prices have risen 80% recently.
- Dramatically reduced tailings
- Huge reduction in Green House Gas Emissions
- No infrastructural change or investment is required

After extraction it is necessary to separate the sand and water from the resource. With Glensols additives there is no Slurry – separated Bitumen, Sand/Clay and water (see Metso Test 2007)

Then the remaining bitumen is often upgraded to Synthetic Crude Oil (SCO). Since most refiners are not equipped to handle heavy crude blends, this step is critical for the marketing of the product. However, oil sands producers have been very successful as convincing refiners to take various bitumen blends (e.g. dilbit – a blend of diluent and bitumen) which meet pipeline requirements.

The total supply costs of a typical mining/upgrading operation are between C$22 and C$28 to produce a barrel of SCO. For most in situ technologies the supply costs are about C$13 –C$20 to produce a barrel of bitumen. Total supply cost includes production costs, capital costs and a nominal rate of return for investors. Under this cost structure, oil sands producers can make between 10% and 12% rate of return with a WTI price of $24/barrel. Glensols additive will significantly reduce total supply costs and increase profitability and competitiveness.

One of the key challenges currently facing oil sands producers is the risk of capital cost overruns due to low worker productivity. This occurs because there are limited numbers of qualified trades people and poor project management. Companies have worked hard to use materials more efficiently and now build projects in modular phases.

The other challenge facing producers, in particular CSS and SAGD producers is their reliance on natural gas, which can constitute almost 60% of their production costs. Emerging technologies are being developed (e.g. Toe-to-Heel-Air-Injection, VAPEX and the Nexen/OPTI project) to directly address this issue. None have the capacity – cost savings, and benefits of envirokleen. All involve considerable infrastructural adaption and investment. Glensols envirokleen works using current infrastructure.

With world crude demand steadily growing and conventional oil reserves in decline, Alberta's oil sands stand to figure prominently in international energy markets.

2. What are oil sands?

2.1

Alberta Chamber of Resources

Oil sands are a combination of bitumen, quartz sand, clay, water and trace minerals. The exact proportions of these constituents vary from deposit to deposit but in general, Alberta oil sand will be approximately 75%-80% inorganic materials (sand, clay and minerals), 3%5% water with bitumen content ranging from 10% to about 18%. The key characteristic of Alberta oil sands that makes them economically recoverable is that the bitumen is encapsulated by water molecules. Figure 1 (following page) shows this graphically. This makes separation of the bitumen from the other constituents feasible from an economical perspective. It also means Glensols additive can penetrate the water and oil in order to separate in cold fusion.

While discovered over 100 years ago, development of this vast resource has only occurred over the about the last 38 years. This is because bitumen, while a highly concentrated source of energy, is difficult to use in its current state. Due to its high viscosity and weight, it must be mixed with diluents in order for it to be suitable for transportation by pipeline to refineries. Our additive decreases the viscosity of the bitumen and no additional diluents are needed. Furthermore whilst being transported by pipeline our additive is separating the bitumen from the clay and sand.

2.2

3. Billions invested

To date, four of the five largest publicly traded oil companies in the world – Royal Dutch/ Shell, ExxonMobil, Chevron Texaco and TotalFina – have invested or committed to invest billions of dollars in oil sands development.

Alberta's oil sands have become a frequent destination for foreign politicians, bureaucrats and energy executives seeking to see firsthand the scale of the resources.

3.1

"When you know that 80 percent of the oil sands is recoverable (using current extraction technologies), you have unleashed the potential for a massive number of projects," says Wilf Gobert, vice-chairman of Calgary-based investment dealer Peters & Co.

In the United States, where the oil sands have registered among federal energy officials and lawmakers, Sen. Orrin Hartch of Utah, one of the most influential Republicans on Capitol Hill, gave a ringing endorsement to the oil sands during October when he said the northern Alberta resources means Canada "will inevitably overtake Saudi Arabia as the world's oil giant. It means that the United States can enjoy a new gigantic Sources of oil from a friendly neighbor."

David Conover, the U.S energy department's assistant secretary for international affairs, echoed Hatch's sentiment by conceding the United States will not be able to meet its future energy needs without the oil sands.

3.2

Area and bitumen resource of Alberta's oil sands deposits.
3.3

Crude oil production in Alberta 1995 -2014
4. Bitumen recovery and upgrading technologies

The hydrocarbon component of the oil sands, crude bitumen, must be separated from the sand, other mineral materials and formation water before it is delivered to downstream upgraders or refineries.
4.1

Shallow oil sands deposits, less than about 250 feet (75 m) to the top of the oil sands zone, are exploited using surface mining to recover ore-grade oil sands, which are then delivered to an extraction plant for separation of bitumen from the sand, other minerals and connate water. Deep oil sands, greater than about 250 feet (75 m) to the top of the oil sands zone, are exploited using in situ recovery techniques, whereby the bitumen is separated from the sand in situ ("in place") and produced to the surface through wells drilled into the oil sands reservoir.
4.2

Source: Japan Canada Oil Sands Ltd.

Schematic of a steam assisted gravity drained (SAGD) operation.
5. Alberta's deposits

The bulk of Alberta's oil sands are located in 54,400 sq. mile section in the north eastern part of the province. Figure 5.1 shows the three major deposits – Cold Lake, Athabasca and Peace River. Each of these deposits has its geological characteristics which dictate which exploitation methods would be most effective.
5.1

5.2

Photo: Melina Mara 2005, The Washington post. Reprinted with permission

For example, in Athabasca oil sands region there are large portions of the deposit with little overburden implying that an open pit mining operation would be the most efficient means of extraction. In Cold Lake, there are CHOPS (Cold Heavy Oil Production with Sand) operations where bitumen is extracted with vertical wells. SAGD production occurs in all three areas where the overburden is substantial. In the case of Alberta's oil sands the depth of the overburden is typically lower in the eastern part of the deposit gradually becoming deeper moving west. Figure 5.3 illustrates this by looking at Alberta's geological structure.
5.3

6. Oil Sands Projects: Infrastructure and Technology

Huge investments were necessary in order to transform Canada's oil sands in a success story. Scientific research, technological innovation supported by a dynamic industry with a wide ranging support infrastructure contributed to a continual improvement in efficiency of crude oil extraction from oil sands.

Two main groups of methods have been developed to recover the bitumen deposits:

- Integrated Mining/Upgrading Plants: feasible for bitumen deposits that are close to the surface.

- In-situ recovery: for the bitumen deposits buried too deeply for mining to be economic. The methods mostly used for in-situ recovery are steam assisted gravity drainage (SAGD) or cyclic steam stimulation (CSS).

6.1 Integrated Mining/Upgrading Plants

A mining open-pit development implies removal of the overburden. First the water-laden muskeg that covers much of the area must be drained then removed along with trees and other vegetation. The actual overburden consisting of different types of rocks (mostly clay and barren sand) is then removed and deposited into previously mined-out areas. The actual oil sands are typically 40 to 60 meters thick and sitting on top of relatively flat limestone.

The initial mining equipment used consisted of huge draglines, bucket-wheel excavators and conveyors for oil sands transportation. This equipment was difficult to redeploy in the mine and it was also vulnerable to interruption in service that occurred in harsh weather conditions especially in the winter months. Beginning with the 1990s this equipment started to be replaced by trucks and power shovels.

The truck and shovel method proved to be much more flexible and less vulnerable in terms of service interruptions. 58 cubic yard capacity buckets and trucks up to 400 tons capacity are used today to move oil sands out of the mine site to the feeder/crusher. An important innovation, the cyclofeeder, contributed to a significant increase in the efficiency of the process. A cyclofeeder is a massive vessel (approx. 35 meters tall) in which the oil sands are further crushed and mixed with hot water to form a slurry that can be transported through a pipeline to the extraction plant.

The development of hydrotransportation brought three main benefits:

- Allows some separation of bitumen from the oil sands as the slurry moves through the pipeline
- Glensols additive allows total separation of bitumen from the oil sands as the slurry moves through the pipeline.
- Much more flexibility on the terrain because pipelines can follow uneven surfaces more easily than vehicles •
- Lower energy extraction: because of the partial separation that takes place during the hydro-transport, operating temperatures can be reduced to 50 degrees Celsius or less
- Dramatically lower energy extraction: because of almost total separation occurring during the hydro-transport, operating temperatures can be reduced to room temperature or below.

6.2 Extraction

In this stage, oil sand is being slurried by steam hot water (85 Celsius degrees) and caustic soda to condition it for bitumen separation. If oil sand ore is received to the processing plant through the pipeline, the necessary temperature is lower. Large pieces of materials such as rocks and lumps of clay are separated using vibrating screens then the slurry is diluted in pump boxes and pumped to Primary Separation Vessels (PSV).

The bitumen rises at the surfaces as a froth and is being skimmed off while the sand settles to the bottom. The froth is further processed by a flotation unit that separates air-bitumen bubbles from the water. Naphta is added as a diluent and the mixture enters a high speed centrifuge to complete the separation. Diluted bitumen is sent to the upgrading unit while the separated material is removed as "tailings slurry" and pumped into holding ponds.

Innovations to this traditional method include Tailings Oil Recovery (TOR) units in order to recover bitumen from tailings discharged by PSV and Diluent Recovery Units to recover naphta from all froth treatment tailings. Both were developed by Syncrude. At the same time, for a better mechanical separation Suncor developed inclined plate settlers (IPS) and disc centrifuges. Due to these innovations, today's extraction processes are able to extract about 91 percent of the bitumen compared to 84 percent in the past.

With Envirokleen in use its ability to separate the sand, oil, and water means no slurry and clean sand i.e sand with less than 2% oil content, post separation. Therefore even as the industry grows, tailings ponds will be decreasing in size and can now be cleaned over time with Envirokleen.

6.1

6.2

The oil sands are the single largest contributor to GHG emissions growth in Canada.
6.3

Photo: David Dodge, The Pembina Institute

Oil sands operators rely on large amounts of fresh water to extract the bitumen from the oil sands.

At the extraction plant, bitumen is separated from the sand, other minerals and connate water using variations on the hot water extraction process, developed by Dr. Karl Clark of the Alberta Research Council in the 1920s. Considerable effort is underway to reduce the energy required for bitumen extraction.

Envirokleen would use less than 50% of the energy of the traditional 80ºC hot water extraction process.
6.4

Photo: Chris Evans, The Pembina Institute

Tailing ponds already cover an area of land greater than 50 square kilometres.

Tailings are a by-product of the oil sands extraction process. After bitumen extraction, the tailings, a mixture of water, sand, silt and fine clay particles, are pumped to a settling basin. Tailings also contain residual bitumen that is not recovered and residual solvents used in the extraction process. Coarse tailings settle rapidly and can be restored to a dry surface for reclamation. Fine tailings, consisting of slow-settling clay particles and water, are more problematic. The industry is expending considerable effort to overcome the challenges associated with tailings disposal and ultimate site reclamation.

Approximately six cubic metres of tailings are created for every cubic metre of bitumen produced. The tailings are compromised of 3-5 cubic metres of water and approximately 1.5 cubic metres of fluid fine tailings. Syncrude's Southwest Sand Storage (SWSS) Facility is one of the three largest dams in the world.

Existing tailings ponds can be seen from space. Syncrude's Mildred Lake tailings pond contains more than 400 million m^3 of tailings, enough to fill 160,000 Olympic-size swimming pools. Suncor's mining operations include nine tailings ponds that cover an area of 2,280 hectares.
6.5

Photo L Dan Woynillowicz, The Pembina Institute

Tailings ponds pose a number of environmental risks including the migration of pollutants into the groundwater system and the leakage into the surrounding soil and surface water.
7. In situ bitumen recovery

In general, the heavy, viscous nature of the bitumen means that it will not flow under normal reservoir temperature and pressure conditions. For recovery of bitumen from deep deposits, the bitumen viscosity must be reduced in situ to increase the mobility of bitumen in the reservoir.

This enables flow to wellbores that bring the bitumen to the surface. Bitumen viscosity can be reduced in situ by increasing reservoir temperature or injecting solvents. Steam-based thermal recovery is the primary recovery technique used in Athabasca, Cold Lake and Peace River.

The industry is conducting fields test with other in situ recovery methods including solvent-based recovery, co-injection of steam and solvents, and in situ combustion.

Our technique involves up to 80% less steam and Envirokleen as solvent.

Bitumen can be produced from some oil sands reservoirs using primary recovery or "cold production"; no external energy is applied to the reservoir to mobilize the bitumen in the reservoir.

Several primary recovery projects are operating in the Athabasca (Wabasca), Cold Lake, and Peace River Oil Sands Areas. Early production in the Cold Lake area was ridden with problems caused by extreme wear on the pumps used to bring bitumen to the surface. Beginning in the early 1990s, introduction of the progressing cavity pump represented a significant innovation, with the new equipment being better suited to handle sand. Operators found that producing sand along with the bitumen, especially early in a well's life, was conducive to higher production rates.

This was because a system of preferential fluid flow paths, or "wormholes", were formed and expanded in the reservoir as the sand was produced. This resulted in significantly higher production rates, lower operating costs and improved economics. This type of production technology is commonly referred to as cold heavy oil production with sand (CHOPS). Recovery factors range from three to ten percent using CHOPS in this area.

8. This differs from Envirokleen Cold Fusion

- As an example we have 1 sand corn which is surrounded with oil.
- The Envirokleen Additive is added and penetrates the oil layer.
- The Envirokleen Additive penetrated the oil.
- After adding water, the Envirokleen Additive amalgamates oil with water.
- The sand corn is surrounded by the Oil-Water-Mix.
- After the separations process we have Bitumen/Waste Water and clean sand

9. Other in situ recovery technologies

Because of the high energy and water consumption associated with steam-based thermal recovery techniques, the industry is conducting field trials of modified and new in situ recovery technologies. These include:

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VAPEX: (Vapour Extraction) the injection of a vaporized hydrocarbon solvent instead of steam into the reservoir with injection and production via horizontal well-pairs

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Testing of SAGD is underway, but large-scale commercial application of SAGD has not yet occurred in Cold Lake

-

THAI: (Toe to Heel Air Injection) in situ combustion using vertical air injection wells and horizontal production wells

-

Hybrid processes: injection of both steam and hydrocarbon solvents or gases into the Reservoir

None of these compare with the capacity of Envirokleen which dramatically reduces energy and water consumption and cost. At the same time production is accelerated whilst environmental impact becomes negligible.
10. Carbon Emissions and Trading

- Glensol additive by working in 'cold fusion' allows for huge reductions in Greenhouse Gas.
- The Carbon Trading Market is doubling size each year. And may reach $200 Billion by 2010.
- More than $40 Billion of carbon dioxide permits will be traded this year.
- More than $40 Billion of carbon dioxide permits will be traded this year.
- Peter C. Fusaro, Chairman of Global Change Associates, an energy consulting groups says
- – "Conservatively, we think it's going to be worth $3 Trillion in 20 years.
- Almost every major firm with an energy trading desk is active in the carbon market.
- The conception of emissions trading or "cap & trade", is simple: Companies that produce carbon dioxide and the Greenhouse Gas emissions receive credits that give them the right to emit a certain amount.
- Companies that emit less carbon than their credits allowance can profit by selling any excess credits on the open market, while those that exceed their emission allowance have to make up the difference or face heavy fines.

Allowing the free trade of permits incentivises companies that can cut their emissions cheaply, to do so. It allows those that would incur huge bills in cutting emissions to buy credits/permits – ensuring the lowest cost to the economy.

The overall number of: -Emissions permits are set low enough to force a cut in emissions whilst ensuring that the market is liquid enough to buy and sell permits when needed.

- Carbon prices follow natural gas, oil prices etc.
- E.g. Higher Natural gas prices mean utilities switch more electricity production to coal – powered stations; but coal is more polluting, so the price of carbon climbs.
- This volatility attracts hedge funds, many are already involved in energy trading.
- Where companies emissions reduction plans are insufficient to meet their caps they are allowed to offset.
- Offsetting allows environmental schemes that reduce carbon emission in the other countries to generate credits that they can then sell through the European Trading Scheme.

11. Market watch (Special Report) May 16 2007

- Green Investors or Green Funds are investing heavily in companies involved with alternative energy and environmentally friendly products and services, and scooping up initial public offerings of promising "clean tech"

ventures.

- "It was just a year ago where we would have somebody arguing with us over whether or not the market would ever follow green investing, " says Jack Robinson, co-manager of the Winslow Green Growth Fund". "What a difference a year makes!"

- The value of clean energy related IPO's hit $4.1 billion in 2006 compared with $1.6 billion a year earlier, reports Lux Research, a research firm, which also found venture capitalists pumping $1.5 billion into clean-energy firms in 2006, up 141% from $623 million in 2005.

- "Some companies getting funded are going to have long time horizons to reach profitability – There are others that are already profitable and those seem to be getting rich valuations".

Advantages of Glensols Envirokleen Technology

- The Canadian Oil Sands are the largest contributor to Greenhouse Gas emissions in Canada.

- The Canadian oil sands are the largest consumer of Natural Gas in Canadian Industry.

- The pace of production in the oil sands is dictated by the speed with which bitumen can be separated from sand.

- Glensol have a product with the capacity to reduce dramatically Greenhouse Gas emissions from oil sands projects whilst increasing the speed of production.

- Glensol have a product that will greatly enhance "energy efficiency" and save costs associated with Natural Gas usage in the separation phase.

- Glensols product will turn oil companies that are currently exceeding their credit allowances into sellers of carbon credits due to their lower emissions even whilst expanding their Barrel per day output!

Oil Sands Industry Challenges that Glensols Additive addresses.

The oil sands industry is working hard to overcome many challenges:

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Environmental impact: water consumption; air emissions including greenhouse gases and criteria air contaminants; water consumption; liquid waste disposal including tailings from mining operations are all serious environmental issues.

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Energy consumption: the industry's substantial external energy requirements are currently being met using purchased natural gas; natural gas prices are high and volatile due to North American supply shortages.

-

Project costs: many projects have experienced serious cost overruns; the industry is working hard to reduce both capital and operating costs.

- Diluent supply: condensate, the traditional blending agent for pipeline-delivery of Non-upgraded bitumen to market, is in limited supply.

Problems
Envirokleen Solution

-Production of Slurry.
-No Production of Slurry, where they produce slurry we produce Bitumen.

-Water consumption. (1 barrel of oil requires 5 barrels of water)
-Water consumption is reduced. (1 barrel of oil requires 3 barrels of water)

-Large volumes of chemical usage.
-Chemical usage reduced up to 50%.

-Extensive use of Machinery.
-Machinery for production and separation of slurry is not needed.

-High maintenance costs
-See above

-High cost and usage and natural gas
-Reduced cost and usage of natural gas and energy.

-Time consuming extraction process.
-Faster extraction process of Bitumen, water and Sand/clay. Due to cold fusion process.

-Dirty Sand Pits.
-Reduction by 90% of oil polluted sand pits.

-Massive Greenhouse Gas emissions.
-Massive reduction in Greenhouse Gas emission.

-Generation of enormous volumes of liquid waste – stored in vast toxic lakes.
-Reduction of toxic waste by 30%.

12. Conclusion
GLENSOL Offers:

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A competent management team.

-

A product that solves economically important problems relating to resource constraints.

-

A product that addresses large global markets.

-

A product that possesses sustainable competitive advantage.

-

A product that has a strong value proposition with multiple drivers.

-

A product that is fully researched scientifically tested and full proof.

- Comprehensive scientific laboratory tests have been conducted the results of which are available upon request.

13. Metso test
Attritioning Testwork Report

- Client: Envirokleen

- Date: 24th April 2007

- Project: Test of separating oil and sand from oily sand with Envirokleen Additive

- Volume: The volume of each test is 850g.

- Feed: The solids is oil Soiled sand that was supplied from Kuwait. SG of the solids 2,8

- After preliminary tests on the 21st November, we agreed on doing three tests using the sample that was supplied by the client to show what effects the Envirokleen additive had on the oily sand.

- The first two tests completed without additive.

- Test one was screened at –1mm.

- Test two was the same but screened at –5mm.

Test
Solids ml
Water ml
% Solids
Additive ml
Time
Sample no Slurry

1
385

465
70
None
7.5
213

2
385
465
70
None
7.5
313

- The third tests completed with additive.

- Test three was screened it to –1mm.

Test
Solids ml
Water ml
% Solids
Additive ml
Time
Sample No Water

3
385
465
70
0.46
7.5
413

Result

Test 1 (one) resulted in a oily sludge there was minimum separation and the finer particles were suspended in the sludge and there was minimum separation (even after two days). There was a small layer of water on top.

Photos of oil sand Sample 213

Test 2 (two) also became a oily sludge and a lot more settlement of the larger particles, some of the sand particles looked clean but there was a lot of oil still visible, there was also a lot of 'tar lumps' visible after the solids were washed out. A small layer of water was visible.

Photos of oil sand Sample 313

Test 3 (three) resulted in a visible difference from the two previous tests. With the Envirokleen additive the water was a dirty brown colour. Most (if not all) the solids settled and the dirty water was poured off, leaving the solids behind. 750ml of water was added to the solids and mixed (shaken) which resulted in the water turning brown. This was repeated another two times. After the sand was dried it was clean but there are still a number of Black particles.

Photos of oil sand Sample 413

Photos of dried sand from Sample 413
Conclusion

Visibly it was shown that the Envirokleen additive liberates the sand from the oil and the oil seems to de-solve in the water, using a concentration 1ml to 1litre. The sand from test three was tested to determine what concentration of oil was present in the sand by J. Muller laboratories, it was found that there was 0,93% oil residue in the sand (see results below). The sand sample that was used was not of the same sand that will be treated in Kuwait, Fritz Grueb indicated that there was a lot of "Tar Lumps" present, which I can confirm.

This test was preliminary and detailed test work will have to be completed before equipment sizing and selection can take place. Tests were completed using a D12 Flotation machine with the attritioning attachments.

This test report will be followed by a more in-depth Report for Metso Minerals.
Prepared by:

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15. J Muller