



“Creating Value from Waste™” in Canada’s Oil Sands

Titanium Corporation’s Submission to the Standing Committee on Natural Resources

November 29, 2012

Scott Nelson

President and Chief Executive Officer

Titanium Corporation

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Canada

Dear Committee Members,

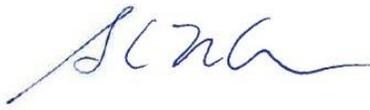
Thank you for your consideration and for allowing us to present the following submission to this committee.

Canada's energy sector is facing serious challenges including growing new oil and gas supplies in the United States, opposition to pipeline projects to export markets and price discounts affecting higher cost marginal crudes, particularly the oil sands. Canada's oil sands industry is the subject of wide spread environmental concerns threatening the industries social license to operate.

These issues combine to threaten Canada's future development of energy resources and the country's economic prosperity. Projects like Titanium's address a number of these issues and must be moved ahead rapidly with support by government stakeholders. Titanium appreciates the opportunity to appear before the Standing Committee on Natural Resources and is pleased to submit the information that follows.

Respectfully,

Scott Nelson

A handwritten signature in blue ink, appearing to read "S. Nelson", written in a cursive style.

President and Chief Executive Officer
Titanium Corporation

Executive Summary

The following is an executive summary of the submission made to the Standing Committee on Natural Resources by Titanium Corporation on November 29, 2012.

Recommendations:

1. The Canadian Government lend its support to achieving the economic and environmental benefits of a new minerals industry, increased resource recovery and improved environmental performance.
2. Relevant ministries such as Natural Resources, Environment and International Trade take an interest and determine how they can expedite the first project moving forward.

About Titanium Corporation:

- Titanium Corp. is a research and development company based in Edmonton, Alberta that commercializes oil sands technologies that are creating a new minerals industry.
- Titanium is a federally incorporated Canadian Company that is publicly listed on the Venture Exchange in Toronto (TSX.V: TIC)
- With offices in Edmonton and Calgary, Titanium works with research partners at leading centres throughout Canada.
- Titanium's "Creating Value from Waste™" technologies are designed to unlock world class minerals contained in the Alberta oil sands and improve the environment.
- The innovative technologies recover heavy minerals such as zircon and titanium, lost bitumen and solvent. This recovery reduces the environmental impact of tailings ponds.
- The heavy minerals of interest in the oil sands are zircon and titanium.
 - Zircon is a hard, heat resistant sand used mainly in the manufacture of ceramic tile. The price of zircon has more than doubled over the past three years.
 - Titanium is mainly used to make pigment for paints and plastics. The base price for titanium produced from mines has doubled in the past two years.
- To date, shareholders have invested over \$50 million and the Alberta and federal governments have injected \$10 million of grant funding into Titanium Corporation.

Benefits of Titanium`s Technology:

- Titanium`s technology will recover 80% of the bitumen and solvent, and 95% of the valuable heavy mineral concentrates from froth treatment tailings.
- The company projects that its technology could generate new resource revenue of over \$1 billion a year – increasing to \$2.5 billion a year with future growth of the industry.
- A new export industry would also be created for Canada - one that would see the export of valuable minerals to emerging economies in Asia, particularly China.
- Environmental benefits of Titanium`s technology include reducing volatile organic compound emissions by 80%, greenhouse gas emissions by 5% and improving the water quality in tailings ponds.
- Recovering lost resources from tailings waste streams is low cost and economical at approximately one third the cost of developing new resources within the oil sands.

Government Support Needed:

- Titanium is focused on fiscal programs being developed by the Government of Alberta that would provide clarity on the terms and royalty rates for the recovery of minerals and bitumen from oil sands tailings.
- The Government of Canada is invested in the success of Titanium having provided \$6.3 million in grant funding to the company over the past two years.
- Titanium has developed successful relationships with potential partners who would bring project execution, operational expertise, marketing and financing to the venture.
- Titanium believes that its new technology offers a compelling economic and environmental value proposition.
- The technology developed by Titanium addresses environmental concerns and economic impacts related to the Alberta oil sands.
- The company urges federal leaders to help it move forward with the commercialization of technology that will benefit all Canadians.

Submission to the Standing Committee on Natural Resources

Our Mission: To “Create Value from Waste™” by recovering minerals, bitumen and solvents from oil sands tailings thereby reducing environmental impacts.

Company Overview: Titanium Corporation is a research and development company that commercializes new and innovative oil sands technologies that are leading to a new minerals industry in Canada. Titanium is a federally incorporated Canadian Company that is publicly listed on the Venture Exchange in Toronto. With offices in Edmonton and Calgary, Titanium works with research partners at leading centres throughout Canada as well as pilot operations in Alberta at CanmetENERGY in Devon and oil sands sites in Fort McMurray.

History: Scientists employed by Titanium have worked collaboratively with industry, government and private research organizations to conceive, develop and test the best available technologies for large scale remediation of one of the most complex oil sands tailings streams – “froth treatment tailings.” Six patents have been filed. These new innovative technologies recover valuable heavy minerals such as zircon and titanium, lost bitumen and solvent. This recovery significantly reduces the air, water and land environmental impacts of oil sands tailings. Shareholders have invested over \$50 million and the Alberta and federal governments have injected \$10 million of grant funding.

Results that benefit all Canadians: Implementation of Titanium’s technology will recover 80% of the bitumen and solvent, and 95% of the valuable heavy mineral concentrates from froth treatment tailings. At today’s level of oil sands mining operations, implementation would generate new resource revenue of over \$1 billion per year, increasing to \$2.5 billion per year with future growth of the industry. As well, a new export industry would be created for Canada - one that would see the export of valuable minerals to emerging economies in Asia, particularly China. Environmental benefits are also significant, reducing volatile organic compound (VOC) emissions by 80%, greenhouse gas emissions (GHG) by 5% and improving tailings water quality and lessen river water consumption by 25%.

Cost Efficient and Profitable: Recovering incremental lost resources from tailings waste streams is low cost and economical at approximately one third the cost of developing new resources in the oil sands. Capital costs of tailings recovery of \$30,000 per flowing barrel compares with \$80,000 for new mines; operating costs of \$11 per barrel compare with \$23 for new mine production. New facilities costing in the range of \$400 million constructed at large oil sands mining sites would generate estimated IRR’s of 23%.

Titanium Corporation’s “Creating Value from Waste™ (CVW™)” technologies are designed to unlock world class minerals contained in the Athabasca oil sands, recover lost bitumen and solvents being discharged to tailings ponds, and deliver important environmental improvements. The following sections describe this exciting opportunity.

The Oil Sands Industry:

At remote mining sites in Northern Alberta, oil sands deposits closest to the surface are open pit mined to recover over 90% of the contained bitumen. Oil sand's mining is conducted at an unprecedented scale with individual sites mining up to one million tonnes daily using 100 tonne shovels and 400 tonne capacity trucks. Mined ore contains 8-12% bitumen. Following mining, a hot water slurry, flotation and settling "extraction" process is employed to liberate bitumen from sands into a more concentrated "bitumen froth" containing ~65% bitumen. Heavy minerals are also concentrated in bitumen froth due to their oleophilic nature. Bitumen froth is then further processed in a "froth treatment" facility where a hydrocarbon solvent is added. Froth treatment uses gravity separation processes to remove water and solids, including the heavy minerals, from bitumen froth. The tailings from froth treatment, which are the focus of Titanium's technology, contain lost bitumen, solvent and valuable heavy minerals.

After mining, extraction and froth treatment, bitumen is either upgraded onsite to high quality synthetic crude oil or diluted and sent by pipeline to refineries in Canada and the United States. Canada's oil sands production currently averages about 1.4 million barrels per day. Production is well on the way to doubling in the next decade and then tripling with total capital investments in excess of \$150 billion predicted over the next decade. Heavy minerals contained in oil sands tailings and bitumen, and solvents discharged to ponds, will therefore increase significantly in the coming years.

Focused Research and Development Programs:

Recovering valuable heavy minerals, starting with zircon, has been a multi-year quest of Titanium. Over a period of seven years, from research and development through demonstration piloting, the company has invested over \$50 million to unlock this world class resource. Over twenty research and development projects were conducted by the company in cooperation with research and testing firms across Canada. The Alberta and federal governments have injected \$10 million of grant funding into these projects to assist with innovation aimed at the recovery of lost commodities, creation of a new minerals industry, and reduced environmental impacts. In 2011, Titanium successfully completed a 12 month, \$15 million demonstration pilot for three of the oil sands producers which was the culmination of its multi-year development program.

While heavy minerals recovery from tailings has been Titanium's primary objective, the company's value proposition is much broader. Valuable heavy minerals are just one of the commodities lost in oil sands tailings. A typical operating site experiences 2-3% losses of bitumen, together with associated hydrocarbon solvents (used in bitumen froth treatment) in tailings. The discharge of bitumen and hydrocarbon solvents to tailings ponds contributes to volatile organic compound (VOC) and greenhouse gas emissions (GHG) at oil sands sites. After remediation by Titanium's Creating Value from Waste™ technology, the quality of tailings stream water is improved to standards for recycle in services currently consuming fresh river water, thereby reducing river water consumption. The oil sands industry is under widespread criticism for its environmental footprint and new technology is viewed as the pathway to improved performance.

Titanium's technology has been prioritized in the recently released Technology Roadmap and Action Plan by the Canadian Oil Sands Innovation Alliance ("COSIA"). COSIA is a new organization formed by the oil sands industry to accelerate technology innovation and application in areas of tailings, land, water and air.

Increased Resource Recovery and Reduced Environmental Footprint

Titanium's technologies have been developed and demonstrated to recover 95% of heavy mineral concentrates (HMC) and 80% of lost bitumen and solvents which will significantly reduce emissions of volatile organic compounds (VOC's) and greenhouse gas emissions (GHGs). In addition to the environmental improvements, the recovered minerals, bitumen and solvents represent increased valuable resource recoveries. Installation of the company's technologies at existing mining sites, shown in the table below, has potential to recover over eight million barrels per year of bitumen and 800,000 barrels of solvent. The combined value of recovered resources exceeds \$1 billion per year at today's mining production rates. With planned expansions and new mines, recoveries could exceed \$2.5 billion per year in the next decade.

The following table sets out the total annual economic and environmental benefits of implementing Titanium's technology now and in the future:

Economic Potential	2012		2020	
	Recovery	Revenues	Recovery	Revenues
Zircon	170,000 tonnes/y	\$340M	400,000 tonnes/y	\$800M
Bitumen	28,000 bpd	\$700M	70,000 bpd	\$1.8B
Total Annual		\$1.0B		\$2.6B
Capital Investment	Total Cumulative	\$1.5B	Total Cumulative	\$3B
Environmental Benefits (annual)				
Environmental Benefits (annual)	2012		2020	
	Reduction	Rate	Reduction	Rate
VOC	60 kt/y	80%	151 kt/y	80%
CO ₂ e	0.8 Mt/y	5.6%	2.4 MT/y	5.6%
NO _x	1.9 kt/y	4.2%	5.8 kt/y	4.2%
Water	25 Mm ³	25%	75 Mm ³	25%

A New Industry for Canada:

The heavy minerals of interest in the oil sands are zircon and titanium. Zircon is a very hard, heat resistant sand used in the manufacture of ceramic tile (55%), refractory/foundry material (25%), chemicals and metals. World- wide annual consumption is approximately 1.3 million tons with China (45%) and Europe (22%) the major markets. Australia (43%) and South Africa (20%) are the world's largest zircon producers. There is currently no zircon production in Canada and minor production in the US. The price of zircon has more than doubled over the past three years to US\$2,400 per ton due to increased demand from emerging economies.

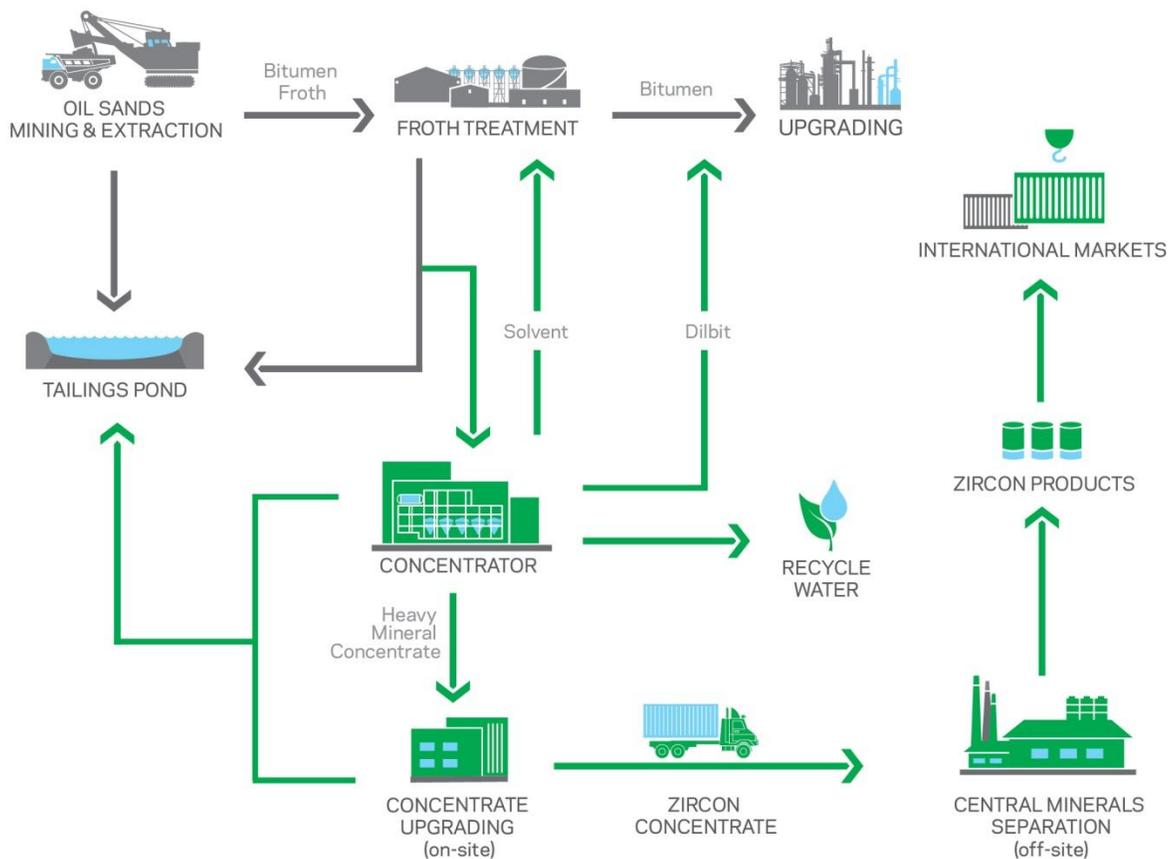
Titanium is mainly used to make pigment (88%) for paints and plastics where it's white, refractive qualities act as a protective coating. Titanium metals represent 6% of titanium use. Annual world demand for titanium is 6.5 million tons produced in Australia (20%), China (17%) and South Africa (16%). Canada produces about 13% of the world titanium in Quebec at a Rio Tinto mine for export. China consumes 43% of the world's titanium followed by the US (25%) and Europe (24%). Titanium's value varies widely depending on its purity or TiO₂ content.

The majority of titanium is beneficiated or manufactured into higher TiO₂ products like slag and synthetic rutile. The base prices for ilmenite, the titanium produced from mines is in the range of \$300 per ton. Prices have doubled in the past two years. Due to its high value, the company plans to first produce zircon for export.

Integration with Oil Sands Operations:

Titanium's technology has been designed to seamlessly integrate with oil sands operations. The technology is designed to intercept froth treatment tailings before they are discharged to tailings ponds. New facilities to be constructed are comprised of three plants: on-site concentrator to recover heavy mineral concentrates, bitumen, solvent and water; on-site concentrate upgrader to produce zircon concentrate; and an offsite mineral separation plant to produce zircon products. Recovered bitumen and solvent would be returned to the oil sands operators' plant. Final mineral products would be shipped in containers by train to export points and by ship to international markets. The construction and operation of these facilities is likely to involve joint ventures among the oil sands firms, Titanium Corporation and its strategic partners.

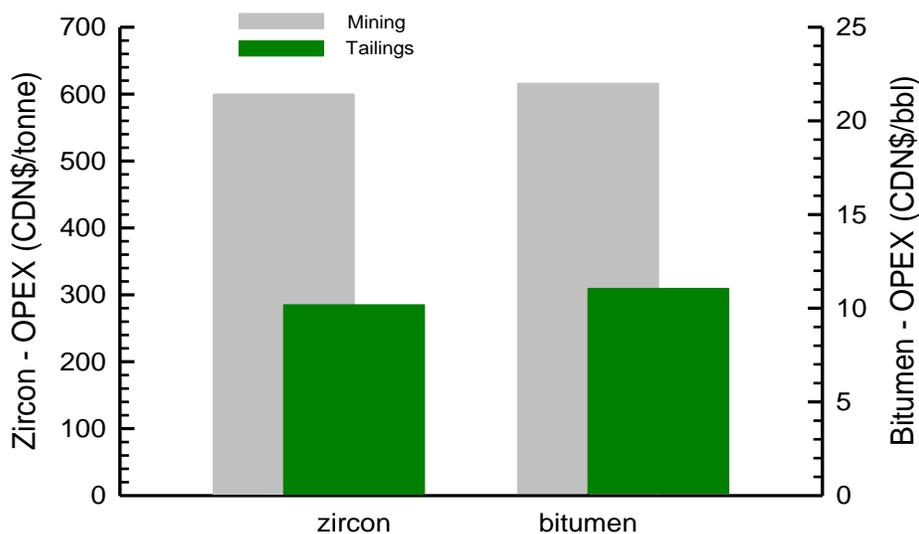
The following diagram illustrates the integration of Titanium's technology with oil sands operations:



Cost Efficient with Attractive Economics:

During the research and development phase, the company brought in SNC-Lavalin as its engineering partner to design the demonstration pilot. SNC-Lavalin then scaled up this design to full scale, site-specific facilities with preliminary engineering and cost estimating. Combined onsite concentrator and offsite minerals separation facilities for a large oil sands operation are currently estimated in the range of \$400 million. SNC-Lavalin estimates a two year construction period following final engineering. Project economics are robust with recoveries of bitumen, solvent and minerals producing attractive returns in the range of 23%.

The costs associated with recovering valuable products from oil sands waste streams (dark bars) are significantly lower than new mining projects (light bars) as illustrated below (company estimates):



Stakeholder Support Needed:

Titanium is reliant on the oil sands industry and the Government of Alberta moving forward with agreements for new onsite facilities and fiscal terms. Implementing Titanium's technology involves the construction of large facilities on oil sands sites. New fiscal programs are required for minerals and bitumen recovered from tailings as these resource recoveries are not covered under current regulations.

Titanium is taking steps to move forward and is concerned with the delays being encountered. Detailed project information has been provided to the oil sands firms for their review over the past year following the end of the demonstration pilot. The company is currently focused on fiscal programs being developed by the Government of Alberta that would provide clarity on terms and royalty rates for the recovery of minerals and bitumen from tailings. The Government of Canada is invested in the success of Titanium with \$6.3 million in SDTC grant funding provided over the past two years. The company has developed relationships with potential partners who would bring project execution, operational expertise, marketing and financing to the venture.

Following successful research and development and demonstration piloting, the company believes that its new technology offers a compelling economic and environmental value proposition. It speaks to widespread environmental concerns and economic impacts. We urge all stakeholders to join us and help move forward with commercialization to achieve benefits for Canadians.

Recommendations:

1. The Canadian Government lend its support to achieving the economic and environmental benefits of a new minerals industry, increased resource recovery and improved environmental performance. The Canadian economy and the environment will both be rewarded.
2. Relevant ministries such as Natural Resources, Environment and International Trade take an active interest and determine how they can expedite the first project moving forward.