# **Argex TiO2 Technology – Pressing to the Finish Line**

**May 2016** 



#### **Executive Summary**

- Innovative chemical process solution for the production of high-grade Titanium Dioxide (TiO2) for use in paint, plastics, cosmetics and other applications
- Strong new management and technical team with hands on experience building processing plants
- Start up of full commercial plant with 25,000 tons/annum TiO2 targeted for 2019
- Competitive operating costs below US \$1,500/tonne of TiO2, compared to US \$2,500/tonne for conventional processes
- More environmentally friendly process
- By-product credits for Ferric Chloride (FeCl3) to further decrease costs
- Forecast growth in global pigments market expected to reach \$32 B by 2023
- Solid Relationship with End-Users



#### Solid Technical and Financial Leadership

**Mazen Alnaimi -** The largest investor in Argex, supporting the technical development and financing of Argex technology. Experienced with designing and building chemical, petrochemical and metal processing plants. Built strong technical and financing teams and managed projects exceeding US\$1 billion in the Middle East, Europe, Asia, and North America.

**Carroll Moore -** Seasoned process engineer with four decades of experience in petroleum, chemical and business development activities. Expertise covers technology, construction, marketing, operations and financing of projects. Carroll Moore has been directly involved in business development with Mazen Alnaimi for chemicals, refining and technical processing.

**Raouf Ghali -** Three decades of experience in finance, compliance and public markets. Premier negotiator in technology and mining business transactions, instrumental in attracting critical financing and new technical team for Argex turnaround. Key Argex investor. Active in B2B transactions in the mining and specialty metals space.



#### Interim Board of Directors

Mazen Haddad - Chairman of the Board of Directors and Interim CEO

Formerly President of Township Capital Inc. from 2005 until 2010. Formerly Chairman of SGI Properties Canada Fund L.P., and past Vice-President of SGI Capital Corporation.

#### Florian Rais - Director

Founder of Far Investments Inc. and Partner at Tangent Venture, a private equity investment firm in London, England. He is also a Director of Blue Wall Shipping Limited and China Motors Ltd. Mr. Rais holds a B.A. and M.B.A. from the University of Lausanne Business School.

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Steve Hollanda - Director

**Lyon Rich -** Director



### Due Diligence - January to May 2016

- Detailed investigation and understanding of all technical aspects of the technology. Comprehensive review of all legal and technical documentation
- Detailed walk-through of the existing 7kg/day demonstration plant, methodical analysis of each element of the flow sheet
- Extensive interviews and engagements with previous technical team and other key employees
- External expert consultations to assess each steps of the process, including but no limited to: feedstock mineralogy, leaching technologies, process engineering, hydrolysis, chemical morphology, calcination and product finishing steps
- Review of contracts including offtake and marketing agreements; interaction with end-users and market experts
- Assessment of intellectual property and proprietary know-how



# Due Diligence – January to May 2016 (cont'd)

- Assessment of cost estimates and impact of critical process parameters
- Discussions with third party vendors and assessment of equipment requirements and price lists to determine soundness of capital estimates
- Analysis of supply and demand assumptions of previous corporate and consultants financial models. Performed market analysis
- Reviewed and analyzed assessment reports of third party firms on validity of technology
- Investigated company financial situation including reporting of payables, corporate expenses, debt and liabilities by qualified accountants and auditors
- Assessment of restructuring options regarding debenture holders and creditors. Discussions with debt holders and major shareholders of the company



#### What has been achieved to date

- Innovative TiO2 extraction process
- Significant proprietary knowhow obtained from over two years of demonstration plant operations
- Production of industry quality TiO2 samples
- Lowest operating cost compared to existing methods
- Significant environmental advantages over competitive processes
- Successfull restructuring
- Private Placement financing (Phase I)



#### The Path Forward

- Re-start existing laboratory at Valleyfield, Quebec to optimize and confirm process parameters, necessary to obtain consistent and continous production of industrial quality TiO2
- Design and perform advanced simulation models (with full heat and material balance) of commercial plant
- Construction and successfull commissioning of the pilot plant at a 1:2000 scale, and production of industrial quality TiO2
- Commissioning and completion of Bankable Feasibility Study (BFS) for the 25,000 tpy TiO2 plant
- Financing: Phase 2 CDN \$15 Million; Phase 3 for the construction of pilot plant and commercial plant, based on BFS



#### **Estimated Timeline to Production**

		2016		2017									2018	2019							
	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	2016	2019
Re-start of lab operations																					
Validation of the technology – design database and product quality																					
Financing																					
Simulation model to contracted engineering for Full Basic Engineering Package for Pilot Plant (scale 1:2000) and for commercial plant																					
EPC contractor to produce FEL-4 and bid out construction contract																					
Financing																					
Construction of 25,000 tonne commercial plant and start-up by the end of 2019																					



# **Summary**

Low-cost TiO<sub>2</sub> technology with OPEX of less than \$1,500 USD/metric tonne

Pigment grade TiO2 for paint

Offtake contract with PPG Industries and distribution agreement with Helm U.S. Corp.

More environmentally-friendly technology, saleable by-products

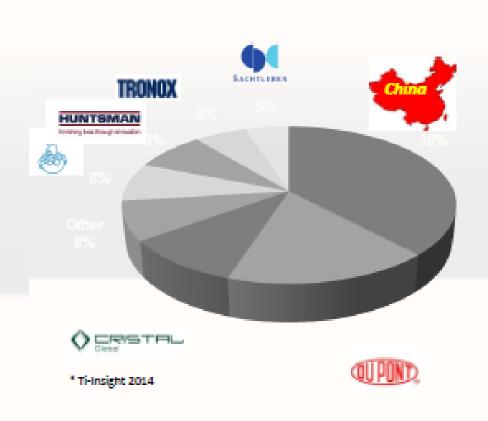
6.4 million tonne/ year market – first Argex plant capacity of 25,000 tonnes

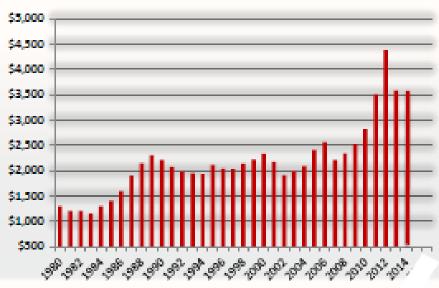


# TiO<sub>2</sub> CURRENT SNAPSHOT OF THE INDUSTRY

Global TiO, Production Breakdown\*

TiO<sub>2</sub> Global Price History\*







## TiO<sub>2</sub> CURRENT SNAPSHOT



The most-used white pigment



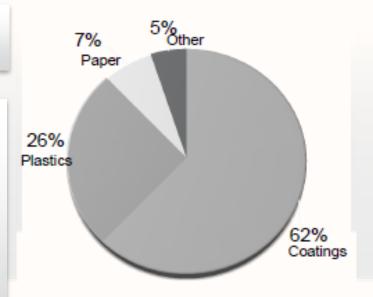
Non-toxic and environmentally friendly



The most important properties are:

- Opacity
- Brightness
- Gloss
- Tone (white) and under-tone (color)
- Weather resistant and durable
- Abrasiveness

#### **End Uses – 2013**<sup>1</sup>



<sup>1</sup>TI Insight 2014



# Revenue and Costs of Major TiO2 producers

Revenue \$US/t	2009	2010	2011	2012	2013	Average
Tronox	2,629	2,581	3,346	3,480	2,993	3,006
Kronos	2,841	2,767	3,533	4,214	3,655	3,402
Huntsman	2,151	2,308	3,194	3,301	2,670	2,725
Rockwood	3,514	3,401	4,260	4,278	-	3,863
Average	2,784	2,764	3,583	3,818	3,106	3,211
COGS \$US/t	2009	2010	2011	2012	2013	Average
COGS \$US/t	<b>2009</b> 2,329	<b>2010</b> 1,966	<b>2011</b> 2,058	<b>2012</b> 2,493	<b>2013</b> 2,799	Average 2,329
						_
Tronox	2,329	1,966	2,058	2,493	2,799	2,329
Tronox Kronos	2,329 2,273	1,966 2,174	2,058 2,376	2,493 3,013	2,799 3,253	2,329 2,618

Source: Euro Pacific Canada



#### THE ARGEX PROCESS

	Sulphate	Chloride	Argex
Raw material cost (\$/ton of TiO <sub>2</sub> feed)	<b>Low</b> Ilmenite	<b>High</b> Rutile	<b>Low</b> Ilmenite
Flexibility in processing raw material	Limited (Cr, V)	Limited (Mn, Mg, size)	High flexibility
Capital expenditure	Medium	High	Low
Operational costs	Medium	High	Low
Environmental	High	Medium	Low
TiO <sub>2</sub> Pigment production	Rutile/Anatase	Rutile	Rutile/Anatase



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