XPS Bulletin
ISSUE 14 – SUMMER 2015

# Quality Work … the Value of Doing the Right Thing

In today's competitive and challenging commodity market, mine, mill, smelter, refinery operators, explorers and service providers alike continue to seek ways to reduce costs to maintain margins and improve project economics.

This can be a good thing….as it enables us to look critically at our systems, processes and cost structures to be more efficient and find ways to do "more with less".

There is however a temptation to avoid some of the steps that are inherently critical for risk mitigation in the interest of reducing costs. The impact of skipping these risk mitigation steps can potentially lead to poor start-ups, premature failures and underperforming plants and processes which ultimately have the opposite outcome. There is also a tendency to choose the lowest price for a service without assessing the short and long term costs of low quality and inexperience.

The consequences of these decisions can be significant and impact our stakeholders, our employees, communities and reputation of our industry.

XPS has long been recognized as a "quality shop", providing unmatched quality in test services, plant support, interpretation of data and practical recommendations. We have looked closely at our business, reduced our costs and in turn reduced our prices for many of our technical services. We have not, however, departed from our belief that a quality service is essential and should not be compromised.

Some examples of XPS quality service are described in this edition of the XPS Bulletin; Quality Assurance in fabrication of equipment for capital projects, improving accuracy of on-line process measurements, GeoMetallurgy ahead of flowsheet development, maintaining professional licenses, using advanced mineralogical techniques for designing flowsheets and understanding the fundamentals in extractive metallurgy projects.

At XPS, we continue to offer value for money, we continue to look for ways to be more cost competitive and we pledge to continue to maintain a high quality technical service for our clients. The value we add far outweighs the cost and we look forward to discussing ways we can contribute to the financial success of your project and operation.

We wish you and your team a safe and productive H2 2015.

*Dominic Fragomeni, P.Eng., FCIM*
*Director, XPS*

*See back cover!...Hope to see you at COM in Toronto, August 23-26, 2015!! We will be at Booth #303 and also chairing technical sessions and delivering several informative technical papers.*

# In this issue



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# Quality Assurance in Capital Projects

One of the main outcomes of a capital project is the reliability of a new plant, system or equipment. During 20 years of experience working in various capital projects for the mining industry, XPS has investigated failures which have caused significant losses to owners, in many cases amounting to millions of dollars and almost jeopardizing entire projects. Often, failures were related to faulty design, shop fabrication and/or construction. Therefore, significant opportunities exist in the mining industry to improve the success rate of capital projects, improve on-line time at start-up, minimize the occurrence of unplanned maintenance due to equipment failures, and all this with positive contributions to health and safety.

This article is an introduction to Quality Assurance (QA) and presents a few case studies that can be used to describe XPS' QA approach in action during testing and design, fabrication and construction.

## What is QA?

Several definitions of quality assurance can be found in the literature. In general, all definitions agree that quality assurance comprises all those planned and systematic actions necessary to provide adequate confidence that a structure, system, or component will perform satisfactorily in service.

This means that quality assurance is not limited to inspections during the fabrication of a product or after a product is delivered to the owner, but it involves activities such as ensuring that the right equipment or product, materials, design, best engineering and fabrication practices are used.

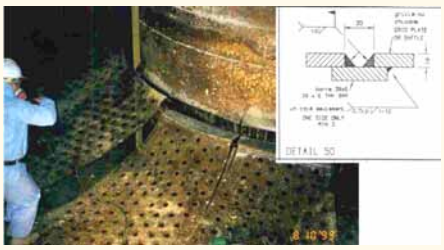
## Case Study #1: Materials selection of leaching tanks during the design stage

During the expansion of a zinc leaching operation, new equipment was added to an existing plant to recover precious metals from leaching residues. The most critical part of the expansion was the fabrication and construction of three new leach tanks. The environment consisted of leaching the residue with a solution containing 100g/l $H_2SO_4$ at 95°C, redox potential = 350mV and maximum chloride content of 50ppm. Another section of the plant had similar leaching tanks operating at approximately 80g/l $H_2SO_4$ at 90°C. The old tanks were lined with acid resistant masonry and respective membrane. However, the owner requested that the new tanks had to be built using metallic materials only. Corrosion tests of candidate materials were performed with solution from the old tanks with their parameters adjusted to the new conditions. The alloys tested were 904L, 254SMO, Zeron 100, 20Cb3, and Inconel 625. The selection of some of the candidate materials was based on experience in similar environments. Following the corrosion tests, alloy 904L was selected. The QA program for the tanks proceeded with detailed design review, inspections during fabrication and construction. However, the QA program was restricted to the tanks only. Approximately three weeks into commissioning, leaks developed along pipelines, valves and flowmeters, all due to corrosion. The photo (right) illustrates a corroded pipe spool at the tank discharge line. The condition of the tanks became the main concern since failure of the tanks would lead to a major shutdown and re-assessment of the project. Corroded pipe spools, valves and flowmeters were sent to the Materials Technology laboratory of XPS for analysis. The analysis indicated that all corroded components were made of stainless steel type 316 rather than the 904L alloy used for the tank. The tanks were emptied and inspected and no corrosion was found. In conclusion, an adequate QA program was implemented during the tank fabrication but little attention was paid to ancillary equipment. All corroded equipment was replaced with 904L alloy.

*Corroded pipe spool from high acid leach tank*

## Case Study #2: Inspection during construction

A sulfuric $SO_2$ gas converter from a sulfuric acid plant failed only a few months after it went into service causing a prolonged smelter shutdown. The failure consisted of the collapse of one catalyst bed, consequently causing the converter to lose its functionality. The equipment had to be opened and the catalyst removed to facilitate equipment inspection. Inspection revealed that one of the longitudinal welds connecting two bed segments had failed causing the bed to collapse. Close examination showed that the failed weld was intermittent instead of continuous. However, the construction drawings clearly specified continuous welds and provided clear weld design details. The photo (right) depicts the collapsed bed and the weld design detail from the fabrication drawing. The investigation clearly showed that in this case the material selection, design and specifications were all properly done. However, the project lacked proper surveillance during construction. The lesson learned here is that the QA cycle has to be complete, from the initial project development to execution. The exclusion of one QA step can lead to costly consequences.

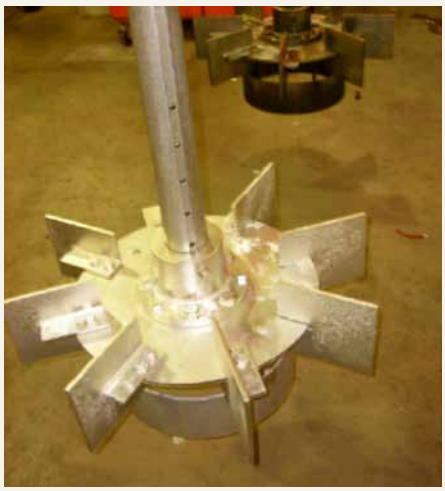


*Catalyst bed failure*

## Case Study #3: Materials selection during pilot testing and design

During the development of a new hydrometallurgical process for precious metal recovery, questions were raised regarding the compatibility of various materials of construction with the process. This is not uncommon in the development stage of any new process particularly when process conditions are outside existing operations experience. In this case, the high pressure acid leaching (HPAL) was performed in batches with acid concentration, redox potential and chloride concentration of the solution dittering considerably from other HPAL operation with acid concentrations higher than 250mg/l. Initially, candidate metallic materials were tested in pilot plant autoclaves which closely simulated the process conditions, including solution chemistry, temperature and pressure. During these tests, it was concluded that some candidate alloys had acceptable corrosion resistance for ancillary equipment such as valves, agitators and spargers, however, they were not suitable for the shell fabrication, due to requirements for pressure containment and overall autoclave performance. An alloy test program was initiated and served to support ancillary equipment selection. During the testing, a decision was made to include acid resistant masonry and mortars in the program and to consider the feasibility of designing the autoclave shell with masonry lined carbon steel complete with membrane materials. Finding the proper acid resistant brick, mortar and membrane materials was very challenging due to the high acid concentrations. Tests were performed in autoclaves and specimens were exposed to both the vapor and liquid zones of the pilot autoclave. Following the autoclave tests, all specimens were submitted to SEM and chemical analysis as well as mechanical testing. The test duration was approximately two months and cost approximately $150K CAD. The final material selection for the autoclave lining was based on the tests results and the total cost of the plant was $60M CAD. During the plant commissioning only minor problems were found at the autoclave cover seal. This was rapidly overcome and no other major problems were observed.

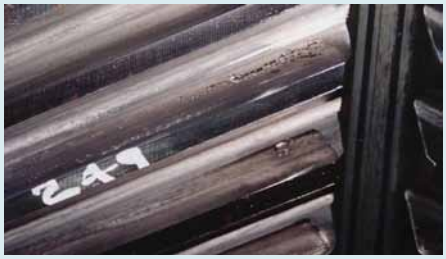
*Autoclave shell*



*Mixer and shaft*

## Case Study #4: Inspection during gear fabrication

After the failure of a hoist bull gear from an underground mine, a new fabricated gear was installed and started to develop progressive pits on its teeth face immediately after it went into service. The photo (right) depicts the details of progressive pitting on one tooth of the newly installed gear. Only the original drawing and performance parameters had been used as procurement documents. Therefore, no quality assurance dossier was delivered with the gear. The gear hub and spokes were made of welded carbon steel while the rim was made of quenched and tempered low alloy steel and welded onto the spokes. The gear supplier initially suggested that the pitting was due to normal run in. However, the owner and the supplier decided to perform weekly inspections to assess the progression of the pitting damage. After three months in operation it was concluded that the pits were in fact progressive pitting, which could lead the gear to catastrophic failure. Nothing had been changed in the mine regarding the hoist loading and speed as well as the lubrication system. The gear had also been replaced in kind with exactly the same dimensions as the original one. Close examination revealed that the pitting damage followed a pattern, being very pronounced every sixth tooth. Therefore, there was evidence of potential dimensional errors on the gear which had most likely originated during the gear fabrication. A detailed dimensional inspection was then performed on site and the results indicated that some teeth were thicker than others. Furthermore, the thicker teeth followed a pattern of every sixth tooth, consistent with the pitting pattern. The supplier then proceeded to inspect its own gear cutting equipment and the defective teeth were traced back to off-spec cutting tools. Another gear had to be fabricated to replace the defective one. The lesson learned here is that a proper QA procedure, which included dimensional checks of the fabricated gear, would have prevented the failure. Since then, a detailed specification has been used for the procurement of bull gears, which amongst other things has requirements for inspection and testing plans, including detailed dimensional inspections at the fabrication shop.



*Progressive pitting damage on gear tooth face*

*For XPS Materials Technology support QA during testing, design, fabrication, construction.*
*Please contact Wilson Pascheto, Manager XPS Materials Technology at wilson.pascheto@xps.ca for more details.*

# XPS and Rosemont Geometallurgical Development

The Process Mineralogy team at XPS has been working closely with Hudbay Minerals since August of 2014 in support of their Rosemont project in Tucson, Arizona.

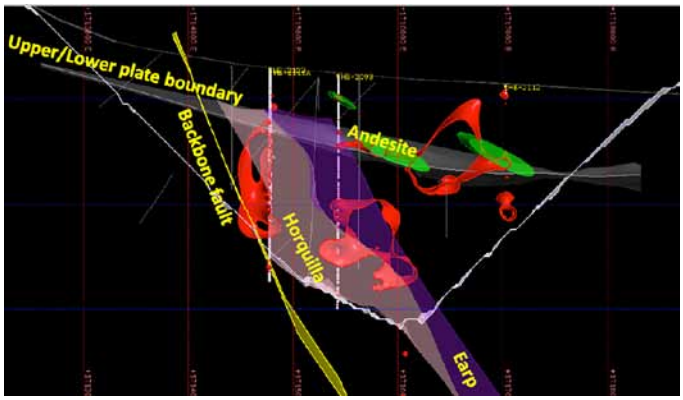
The Rosemont project is a large Cu-Skarn/Porphyry deposit with variable mineralogy and mineralization. After the initial phases of data review were completed, a multiphase geometallurgical testwork program was established to create a robust database of mineralogical, geochemical and metallurgical data to advance the processing and flowsheet design criteria.

The initial phase of variability testing was carried out in late 2014 to early 2015. The first phase of work has provided a foundation for the geometallurgical interpretation and has helped to define a path forward for the project team.

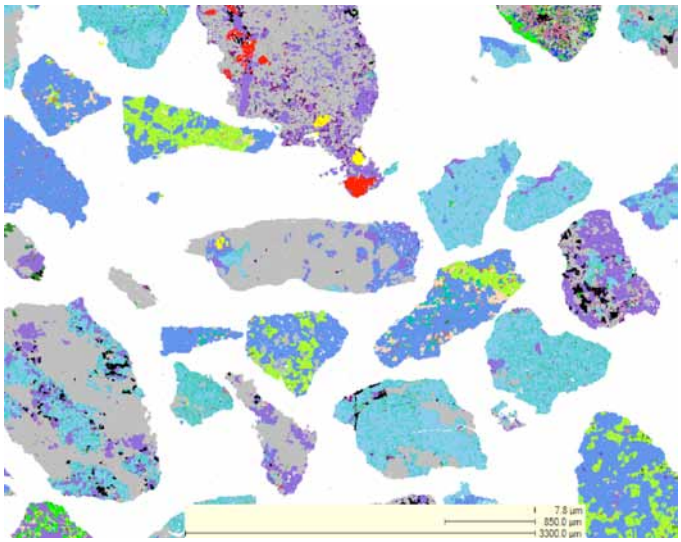
The testwork database has integrated a combination of representative sampling, geochemistry, detailed quantitative mineralogy (QEMSCAN), XRD-CEC, ore hardness data (BWi, SPI, JK drop weight) and lab-scale flotation testing. The interpretation of the combined dataset has resulted in defined geospatial links between the deposit geology and key metallurgical factors which and are now being further tested and modelled. These links and geomet proxies have helped to better define the geometallurgical populations within the ore zone and have improved the understanding of processing variability overall as it relates to throughput and recovery modelling.

The geometallurgical populations are the foundation for subsequent phases of flowsheet development testing and mineralogical testwork which is currently underway at XPS and expected to be completed in the third quarter of 2015.

*For further information on Geometallurgical Unit Definition, contact Jorge Oliveira at jorge.oliveira@xps.ca*




*Cross-section through the Rosemont deposit (planned pit shell in white). Modelling of Geomet domains from established Geomet proxies (red).*



*QEMSCAN image of +850µm fraction.*

# XPS Crushing and Blending Plant Reaches a Milestone

One of the most labour intensive and overlooked steps in any laboratory and pilot testing metallurgical program is the preparation of crushed, blended and homogenized ore samples. Lab and pilot programs typically use drill core that is limited in availability and costly to acquire, and must be preserved to avoid oxidation. “Over-crushing” must be avoided as it tends to affect metallurgical response, typically reducing recoveries.

Lab and pilot sample mass requirements can range from 20-30 kg up to several tonnes. Sampling statistics and testing requirements usually require the sample to be crushed to <2-3 mm, yet the target is to stay as close as possible to the nominal top-size without excessive generation of fines. For this to occur, staged crushing and screening is essential. The process from drill core to test sample or assaying is not just “breaking rock”! It is the first step that is critical to success of any lab or pilot evaluation or metal accounting exercise.

Avoidance of mass loss is required during the sample crushing and blending process. A quantitative assessment of mass loss in every processing stage serves as part of the QC process, since it helps to assure that samples are not biased by excessive dust losses, or cross contaminated by mass hold-over between samples. Equipment needs to be completely run out and cleaned between each sample, and the starting and ending masses carefully recorded. Control of contamination also involves elimination of contamination with greases, oils and foreign objects that in some cases may originate from the crushing equipment itself. Following periodic maintenance the crushing equipment needs to be crushed out with a sacrificial sample to carry away any fugitive contaminants.

In 2005/06 XPS configured, engineered and built a complete fine Crushing and Blending Plant at the XPS Centre. The plant is equipped with a primary 8x10 Denver jaw crusher, a Rocklabs Boyd jaw crusher, variable speed conveyors, and

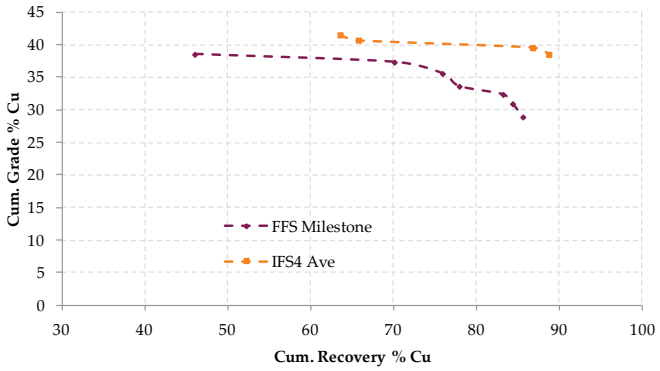
# XPS Flowsheet Development Using Process Mineralogy

XPS have been performing flowsheet development testwork in 2014 on a copper project in Africa.
The specific objective was to design a flowsheet with improved metallurgical performance, reduced capital cost and therefore a more robust business case for years 0-5 at startup and 6-15 thereafter.

The investigation used our state-of-the art Process Mineralogy toolbox, including high-confidence flotation testing, ultrafine sizing of flotation test products, and qualitative and quantitative mineralogy. A series of rougher kinetic flotation tests was performed across a range of grinds, considerably supported by detailed mineralogy on the drill core and flotation test products, to develop the simpler flowsheet. The full flowsheet was then prototyped and adjusted with further flotation tests, resulting in a 3% gain in copper recovery as well as a 9% gain in copper concentrate grade as compared to the previous flowsheet. The grade of silica in the final concentrate was also reduced from 26 to 14%, a significant change that will improve marketability of the concentrate or make smelter technology selection easier.

The details of this new flowsheet developed at XPS will be used for designing the 3Mtpa concentrator which will treat ore from the first five years of mining. The change in copper grade-recovery curves from the old to the new flowsheet figure (right).

This project demonstrated the value of Process Mineralogy in flowsheet development and is one example of how XPS can improve business performance in either greenfields projects or plant optimisation.




*Old (FFS Milestone) and New (IFS4) Copper Grade-Recovery curves to saleable Concentrate*

*"It has been a pleasure managing this test work program over the last year, working with the XPS team who have made the execution of our test work roadmap seamless. The professionalism, attention to detail and outstanding quality of work is appreciated from our metallurgical team without which the optimised circuit we have now would not have been possible".*

*Contact: Dr. Norman O. Lotter, Consulting Metallurgist*
*norman.lotter@xps.ca,*
*and Ms. Elizabeth Whiteman, Senior Geoscientist*
*elizabeth.whiteman@xps.ca*

two sets of interstage screens, one on the circulating load and the other on final crusher product. The plant can process up to 150 kg/hr of -100 mm feed to -2mm top size with a normal size distribution. The plant is designed for easy cleaning to avoid any contamination and has the required dust collection to ensure safety of the operators.

Once the sample is crushed, blending devices are used to homogenize and distribute the samples into individual and identical 2, 5 or 10 kg charges. The conical Vreico-Nauta blending technology used at XPS comes from the pharmaceutical industry and has been applied to mineral processing. The Vreico-Nauda blenders ensure the same consistency expected in pharmaceuticals to ore samples for testing and assaying. Homogenized solids from the blenders is distributed into representative sample aliquots by means of spin rifflers. Using this technology XPS has prepared samples for multiple projects and ore types including nickel, porphyry copper, rare earth, lead-zinc, chromite, in quantities ranging from 150 kg to 8000 kg. Using the same equipment, XPS has also prepared meticulously blended ore samples that serve as standards for metallurgical accounting.

*(top) Typical size reduction for flotation testwork involves crushing drillcore down to 100% passing 100 mesh; however, other feed and product sizes can be accommodated.*

*(bottom) XPS Crushing Plant (Primary Jaw)*

*Please contact Gregg Hill at gregg.hill@xps.ca to discuss your crushing, blending and sample preparation needs.*


*Natural Resources and FedNor Minister Greg Rickford initiated the siren at the Toronto Stock Exchange on Thursday, with a few friends including Mika Muinonen, XPS Manager Extractive Metallurgy and Dominic Fragomeni, Director XPS.*

# XPS Continues Support of Ring of Fire Process Development

Anyone who says the federal government isn't doing anything to advance development of the Ring of Fire hasn't been paying attention.

Natural Resources Minister Greg Rickford initiated the siren at the opening of business on Thursday May 14th at the Toronto Stock Exchange to mark National Mining Week, a celebration of Canada's leadership and expertise in the industry.

The minister hand-picked a who's who of "movers and shakers" from Northern Ontario to accompany him at the ceremony and they met in a round-table session afterward to discuss mining in the Ring of Fire. In attendance was Mika Muinonen, Manager, XPS Extractive Metallurgy and Dominic Fragomeni, Director XPS, Frank Smeenk, President and Chief Executive Officer of KWG Resources, and Alan Coutts, President and CEO of Noront Resources.

Rickford, who is also minister of the Federal Economic Development Initiative for Northern Ontario, said the theme of mining week this year is "Innovation in Canada's Mineral Development Model."

"In today's world, innovation is the price of admission, the prerequisite for success," said Rickford.

The Conservatives' Economic Action Plan 2015 pledged $23 million over five years for the further development of the technology and innovation required to develop rare earth elements and chromite.

"This will be critical as the Ring of Fire moves forward," he said. XPS has been collaborating with NRCan, Canmet, industry and peer groups in charting the course for these programs in both rare earths and chromite. XPS position in chromite processing is well known as we have been working with KWG Resources in the testing and development of a novel direct reduction technology for Ring of Fire chromite and with Cliffs (now Noront) in the assessment of conventional DC smelting technologies complete with techno-economic analysis.

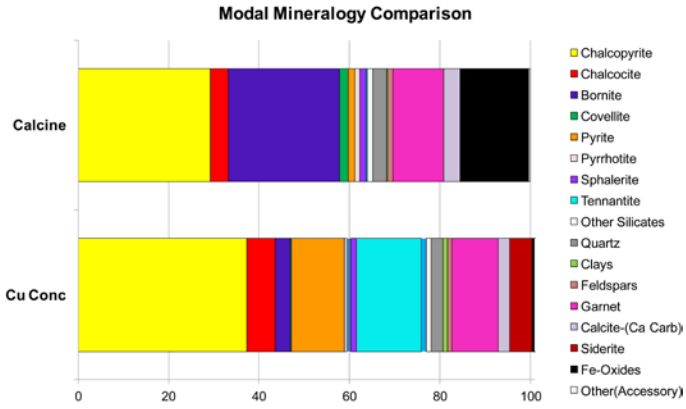
XPS is proud to be a part of this historic initiative to develop these game changing technologies which will ultimately benefit all Canadians.

*Dominic Fragomeni*
*Director, XPS*
*dominic.fragomeni@xps.ca*

# When Extractive Metallurgy meets Quantitative Mineralogy … Sparks Fly!!

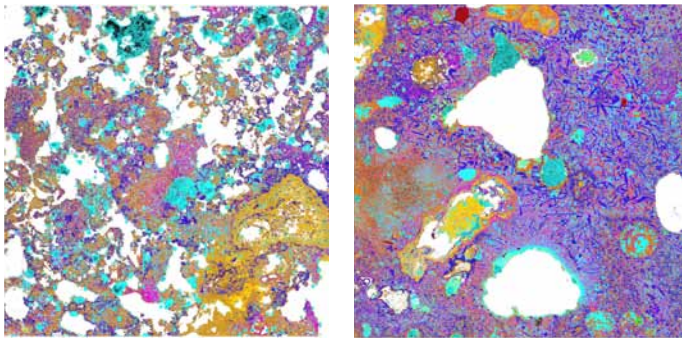
The capabilities of the world class mineralogical facilities at XPS are well known in the international mineral processing community, but are more of a closely guarded secret amongst extractive metallurgy practitioners. Perhaps it is time to change that...

While extractive metallurgists have been using microscopic examination as a diagnostic tool for many years, and Scanning Electron Microscopes equipped with EDX capabilities are routinely used, to date relatively little use has been made of the power of the QEMSCAN coupled with a Microprobe (EPMA) to solve intricate metallurgical problems. At XPS this has been slowly changing in recent years and after some notable initial successes, the Extractive Metallurgy group has made increasing use of the mineralogical power of the QEMSCAN-Microprobe power to provide a level of diagnostic and analytical detail.




*Roaster Feed Modal Mineralogy*

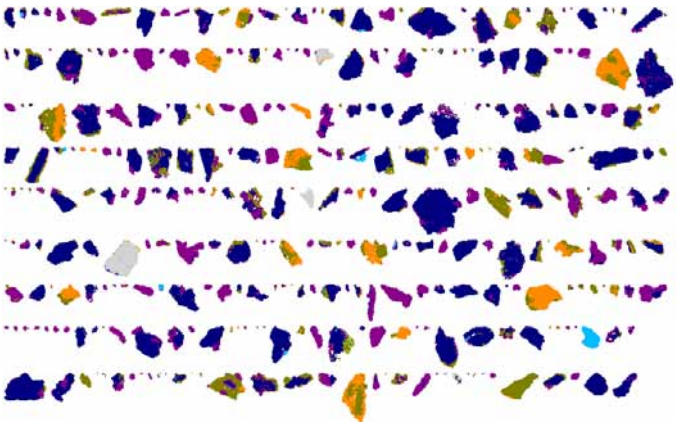
Initial work to characterise some rather tricky arsenic –bearing roaster feeds, reported at COM 2014 were followed by a solution to a particularly sticky (literally) sinter problem also reported at last year's Conference of Metallurgists in Vancouver.



*QEMSCAN Images*

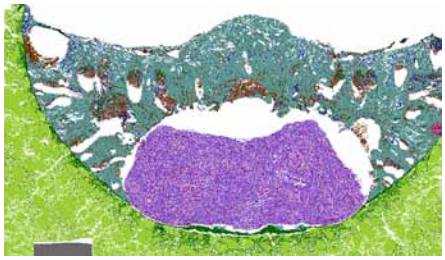
*Good Sinter* *Bad Sinter*

Ground-breaking work in an innovative direct reduction process developed for chromite ores from the Ring of Fire was readily interpreted by QEMSCAN analysis of the reaction products, helping to unravel the novel underlying reaction mechanism.



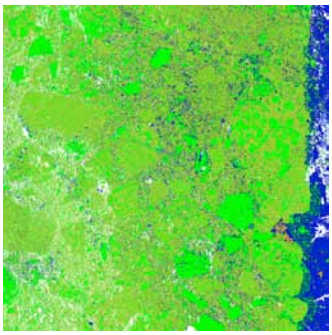
*QEMSCAN Images - Chrome particles from the novel direct reduction process*

Recent work for Taseko revolved around aluminothermic reduction of a niobium-rich concentrate to produce a limited quantity of high grade ferro-niobium. The small scale of the experiments proved challenging for conventional chemical analyses, but QEMSCAN and probe analyses allowed metal accounting balances to close within 1% as well as providing vital detail on the temperatures achieved by providing very detailed slag phase analyses, and refractory slag reactions impossible to resolve by other means.



*QEMSCAN Image – FerroNiobium Product*

Most recently, the technique has found a new niche application-analysis of refractory brick compatibility with process slags: The sensitivity of the analysis has revealed microstructural changes taking place in the refractory along with detailed chemistry of the alteration material. This is a significant advance over the traditional element mapping via SEM EDX, as not only is the special association of elements obtained but the precise stoichiometry of the reaction products is revealed as well. This provides the refractory engineer and the process metallurgist with key information to improve refractory brick formulations to meet demanding process conditions.



*QEMSCAN Image – Gopher Refractory Brick*

*For further information on the use of quantitative mineralogy to support extractive metallurgy, contact Mika Muinonen at mika.muinonen@xps.ca or Lori Kormos at lori.kormos@xps.ca.*

# RFID Based Location Tracking in an Underground Mine

If you're in a discussion with someone about tagging and tracking in underground mining you're probably talking about it in the context of a ventilation-on-demand system, but is that all that underground tracking can do?

Tagging and tracking in underground mines has become a necessary component of a ventilation-on-demand (VOD) system. The location of vehicles and personnel are detected and a specified air flow requirement is delivered. Without accurate location data this would prove very challenging if not impossible. Significant energy savings come from VOD systems as only the required air is provided and not an assumed at a higher 'catch-all' rate. When all mine zones are managed in this way, the surface fresh air fans can be slowed, reducing energy consumption which is significant given that fan power consumption is a function of its speed to the power three!

Vehicle location was one of the first unintended consequences of a full coverage tracking system designed for VOD systems. Prior to this system, underground workers would begin the shift by searching for their scoop, MINECAT® or loader. Since inception, the worker could step off the cage and find his machine. The productivity benefit is obvious along with improvements in morale and worker satisfaction.

## How it works and the benefits….

The full-coverage implementation strategy uses a network of access-points creating an almost seamless wireless coverage, where a tagged person's or suggest vehicle's location can be pinpointed practically in real-time with an accuracy of a few metres. This strategy is hardware intensive. A simpler tracking implementation employs 'choke-points' or gates. With this approach a number of hotspots are identified in the mine to define or demarcate a zone. When a tagged person or vehicle is detected going through a gate or choke-point that person/vehicle would be assumed present in the associated zone. A time stamp is recorded each time a tag goes through the choke-point in real-time.

The choke-point approach can be a more cost-effective introduction to tagging and tracking at a mine. Choke-points can be located at a re-muck, the bottom of a chute, the top of an ore pass or the top and bottom of a busy ramp. By tagging critical muck-moving vehicles, using a choke-point based system, it's now possible to monitor how efficiently these vehicles are moving muck (ore or waste). With a mine level that's limited by ramp geography, or where the number of vehicles being present in a zone is limited, perhaps due to ventilation, data from a choke-point based tracking system can give invaluable information that can lead to a much more efficient vehicle deployment plan, minimizing wait times and maximizing muck haulage. Mine economics can be further improved by determining when there is more value in moving waste and when there's more value in moving ore. This can then lead to ore pass and waste pass hold up management, and help further understand, and optimise, material handling underground.

# Kidd Creek Mill – B Division Primary and Secondary Cyclone Feed Flow Measurement

Measurement of primary and secondary cyclone feed flow has been very difficult in the past and is important in obtaining maximum grinding efficiency at optimal power consumption.
As part of the ongoing improvements to the grinding circuit performance at the Kidd Mill, new cyclone feed flow measurements were installed (Dec. 2014). Process Control assisted with options for the new instruments, and a decision was made to use CiDRA SONARtrac meters for this application.

The main objective was to improve measurement of the circulating load in the ball mills.

Circulating load was previously calculated in the DCS using certain steady state assumptions combined with the Rod Mill feed rate and density measurements in the Primary circuit. The XPS Process Control Group were able to demonstrate from operating data and several surveys that the error using this method could be as much as 40%.

Directly measuring cyclone feed flow greatly simplifies the circulating load calculation and eliminates the inaccurate assumptions. The improved measurements will be closely monitored and evaluated and potentially incorporated into modified grinding control strategies.

Another benefit answers the question ‘Where did my parts go?’. Underground mine workings can become complex and difficult to navigate. Typically, ‘temporary storage’ locations and numerous warehouses are used. If we know when material is put on the cage, what level it was off-loaded and at which warehouse it was deposited, keeping track of essential parts can be simplified. By attaching a tag to the palette before leaving surface, with appropriate tag detection sensors at the collar, shaft stations and warehouses makes material tracking simpler.

The same principles can be applied to concentrators processing ore from various mines. For example, placing a bucketful of small passive tags into a scoop bucket before the load is dumped into an ore pass could act as a marker for a given ore type. With the right detector at the feed of the concentrator, the marker can act as a prompt for a different feed, and hence the processing approach can be adjusted accordingly.

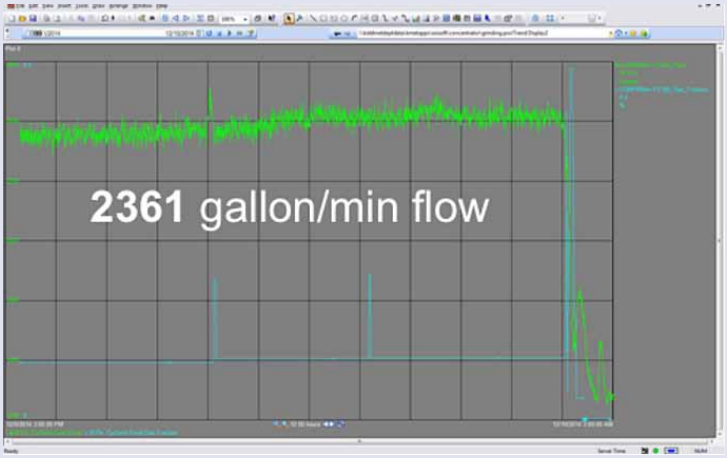
There are other examples where tagging and tracking can assist in improving mine operations with various approaches depending on complexity and value contribution of the system. For a full implementation of a VOD system, each vehicle and person underground must carry a tag. The tracking system’s location system must be hosted on a powerful server class computer. The number of tags alone will require a maintenance system and sufficient resources to manage them. The mine infrastructure will also require an extensive coverage with wireless access-points again with the appropriate maintenance commitment. In many mines, the energy savings and improvements in air flow, where required, present a compelling business case.

A choke-point based tracking system can also be used to manage specific productivity challenges at lower cost. This can also be a simple start point for a full coverage tracking system which can be implemented as the mine’s needs develop.


*For more information on implementation of RFID tracking systems, contact Ron Bose, Chief Engineer, Process Control at ron.bose@xps.ca*

Glencore use over 140 SONARtrac instruments for flow measurement in 17 different operating plants/sites, worldwide with excellent results

*Alan Hyde*
*alan.hyde@xps.ca*





*The starting gun! In Glencore/XPS Yellow, Alison Cummings (Sudbury INO), Mika Muinonen (XPS) and Tamara Beaton (Sudbury INO)*

# Participate in the Sudbury Rocks!!! Race, Run or Walk for Diabetes

Once again this year, XPS Consulting & Testwork Services and Sudbury INO called on their employees to participate in the Sudbury Rocks!!! Race, Run or Walk for Diabetes, which took place on Sunday, May 10.

Aligned with the spirit of the Health Enhancement Program and to build off the success of the Healthy Weight Challenge, all employees and their families were encouraged to participate in either the 5 kilometre (km), 10 km, half-marathon, full-marathon or the full-marathon team relay. Participants could choose to either walk or run with the exception of the full-marathon relay, which was designed as a race (and certainly not for the faint of heart!).

The event, celebrating its 10th anniversary, was made all the more special as it landed on Mother's Day and event organizers incorporated ways to celebrate mothers too.

As usual, the Sudbury Rocks!!! Race, Run or Walk for Diabetes was a huge success and proved to be more than an event to test one's health and well-being, but to connect with others in the community for a noble cause: the Canadian Diabetes Association.

The Canadian Diabetes Association is leading the fight against diabetes by helping people with diabetes live healthy lives while they work to find a cure.




*Top: Mika Muinonen (XPS),*

*Middle: Pat Greasley (XPS),*

*Bottom: Lindsay Scruton, Connor Anderson, Brittni Rorison, Ryan Marcotte (Employees' children) and Phil Thwaites (XPS)*

# Professional Licensing and Practice at XPS

XPS Consulting & Testwork Services has carried a Certificate of Authorisation by Professional Engineers of Ontario (PEO) and by the Association of Professional Gesoscientists of Ontario (APGO) since 2007. These licenses are mandatory for the offering and performance of professional engineering and geoscience services to the public in Ontario, and are supported by professionals working in the business. Licensed XPS employees include a total of 11 professional engineers (including 1 designated Consulting Engineer) and 2 professional geoscientists.

XPS encourages licensing through training modules, or assignments and coaching, that offer the professional trainee relevant experience under licensed supervision that would satisfy the licensing requirements of both the PEO and APGO to achieve P.Eng., P.Geo. and CET status.

June 2014 saw the appointment of Dr. Norman Lotter, P.Eng., Consulting Metallurgist, as a Designated Consulting Engineer by the PEO. This appointment recognizes his independent practice of professional engineering for clients under the Certificate of Authorisation granted to XPS.

May 2015 saw the appointment of Dr. Naseeb Adnan, P.Eng., Process Control Engineer, as a Professional Engineer. We congratulate Naseeb on this fine professional achievement. We also congratulate Michael Blouin, Ing., who received his Québec licence recently, and will be applying for a licence transfer to Ontario in June.

Another two XPS employees have filed applications for a Professional Engineering licensing in 2015. These are: Tony Deng and Rajan Pandher. Two more professionals are preparing their applications for the new Limited Licence with the PEO, which will become available from June 2015.

XPS supports licensing through these professional associations as we believe it benefits our clients and promotes career development for our valued employees.

*Dominic Fragomeni, P.Eng., Director*
*dominic.fragomeni@xps.ca, 1-705-699-3400 x 3492*


# Announcement

I am pleased to announce that effective June 1, 2015, Dan Falcioni will be joining XPS as a Senior Materials Engineer.

Dan is a graduate of Laurentian University where he holds a Bachelor of Metallurgical Engineering.

Dan has over 11 years of experience in many facets of industrial mining and metallurgical technology, process development and laboratory work. Dan joined XPS as an EIT in 2004 and graduated into the Materials Technology group where he began to build expertise in the acid plant inspections, failure analysis, asset entitlement and principals of wear. Dan joined Novenco in 2012 where he continued to build expertise in refractory maintenance, specification and installation across a variety of industries including mining and pulp and paper. Dan is a licensed Professional Engineer in Ontario and is a certified API Storage Tank and API 936 Refractory Installation Inspector.

Dan brings a competence in materials engineering and complements the depth of XPS Materials Technology Group. His ability to work collaboratively with his peers and site operations and maintenance personnel is clearly recognised.

Please join me in welcoming Dan back to XPS and wish him the best in his future career endeavours.

*Wilson Pascheto*
*Manager*
*XPS Materials Technology Group*

# Announcement

I am pleased to announce that Wilson Pascheto recently received the 2015 CIM Distinguished Lecturer Award for his industry leading expertise in Materials Technology.

Wilson is currently the Manager of the Materials Technology Group at XPS Consulting & Testwork Services where he has advanced to increasing responsibility over the last 20 years. Wilson holds a Bachelor of Metallurgical Engineering from Mackenzie University in Brazil and a Master's of Materials of Engineering from McMaster University, Ontario.

Wilson has 30 years of plant and laboratory experience in the fields of corrosion, wear, welding, mechanical properties of materials, materials testing and selection, failure investigations, research and development in the areas of metals, polymers, ceramics and composites. Wilson has been directly involved in quality assurance activities for major capital projects in the mining industry related to smelters, concentrators, mines and hydrometallurgical operations. He trains company engineers in QA/QC for capital projects as part of Design for Six Sigma.

Wilson has performed over 1,000 failure investigations ranging from small components to industrial scale equipment from all facets of the mining industry.

His presentation entitled, "Materials Technology in the Mining Industry, Opportunities and Challenges" is available to CIM Branches across Canada.

Wilson joins Norman Lotter, XPS Consulting Metallurgist and Phil Thwaites, XPS Manager Process Control and EIT Program as previous winners of this award.

Join me in congratulating Wilson on this well-deserved recognition.

*Dominic Fragomeni*
*Director*
*XPS Consulting & Testwork Services*

# XPS Consulting & Testwork Services

A GLENCORE COMPANY

XPS is a licensed metallurgical consulting, technology and test services business offering industry leading expertise in orebody characterisation, flowsheet development, operational support, growth initiatives and asset integrity management for most commodities including gold, nickel, copper, zinc, PGEs, rare earths, chromite and industrial minerals.

COM 2015 CIM ICM
CONFERENCE OF METALLURGISTS
MET SOC

## XPS @ COM 2015!!

Mika Muinonen, Manager Extractive Metallurgy is chair of the Torstein Utigard Memorial Symposium

Wilson Pascheto, Manager Materials Technology is 2015 CIM Distinguished Lecturer and is presenting in the Materials Technology Symposium

XPS is the proud sponsor of the 2015 Airey Award

Come by our Booth #303 on the Trade Show floor

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Virginia Lawson - virginia.lawson@xps.ca

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Wilson Pascheto - wilson.pascheto@xps.ca

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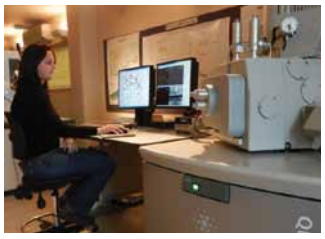
Virginia Lawson - virginia.lawson@xps.ca


## eXpert Process Solutions

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