

SGS STATEMENT OF CAPABILITIES FOR URANIUM

SGS' EXPERTISE IN URANIUM PROJECT DEVELOPMENT

SGS Minerals Services provides a comprehensive range of testwork services for the uranium exploration and mining industries. Our extensive global network of geochemical laboratories and metallurgical testing facilities support the technologies used today for the exploration and treatment of uranium.

Our uranium expertise started in the uranium exploration booms of the 1950's and the 1970's and has continued to present day. As well, we have developed the expertise and stringent safety infrastructure needed to work with this commodity. As a result, SGS is the international lab of choice for uranium exploration services.

OBJECTIVES

At the broadest level, SGS provides the following services for uranium project development:

- Internationally accepted health and safety procedures (e.g. transportation, handling and disposal).
- Geophysical expertise to define anomalies and initiate ground surveys
- Geochemical surveys and analysis including Mobile Metal Ion geochemistry (MMI™)
- Exploration services management
- Geological target selection and mapping including EXPLOMIN™
- Database management
- Orebody modeling and reserve estimation
- NI 43-101 Technical Report and audits

- Environmental sustainability services including baseline studies and acid rock drainage programs
- High definition mineralogy by QEMSCAN®, electron probe, image analysis and XRD.
- Metallurgical testing at the bench or pilot scale
- SGS Geometallurgy Framework
- Stage 1 and 2 Sampling and domain definition
- Flowsheet development
- Stage 3 Metallurgical testing / Parameter definition

COMMINATION TESTING, MODELING AND CIRCUIT SPECIFICATION.

Physical mineral separation/beneficiation including gravity, magnetic and electrostatic separation.

FLOTATION

Hydrometallurgical (chemical) separation including leaching and solvent extraction.

- Stage 4 Multivariate model definition
- Stage 5 Multivariate spatial model generation (populating the block model or mine plan)
- Stage 6 Joint mining and mineral processing optimization
- Pilot plants
- In-plant support including metallurgical commissioning, water treatment, audits, benchmarking, optimization and metallurgical accounting
- On-site laboratory facilities
- Production forecasting using geometallurgical principles

URANIUM HEALTH AND SAFETY PROCEDURES

SGS has worked with uranium for over 50 years. We have stringent handling and safety procedures that include receiving, handling, testing, disposing and short-term storage of NORM substances. Due to the safety concerns with uranium and the additional protocols that are needed, our uranium testing is focused into three labs internationally including:

- Perth, Australia – geochemical analysis, metallurgical testing
- Lakefield, Ontario, Canada – geochemical analysis, metallurgical testing, containment facilities
- Johannesburg, South Africa – geochemical analysis, metallurgical testing

At these sites, we have screening procedures for all samples and containment areas for high uranium material. SGS radiation safety protocols are based on the Canadian Guidelines for the Management of Naturally Occurring Radioactive Materials. A policy of "ALARA" (As Low as Reasonably Achievable) has been adopted.



SHIPPING

Transport Canada considers samples containing radioactive concentrations greater than 70 kBq/Kg to be “dangerous goods”. SGS follows Transportation of Dangerous Goods – CLASS 7 Regulations and Canadian Nuclear Safety Commission (CNSC) Packaging Guidelines. If it is relevant to change these practices to meet other international standards, we will be happy to comply.

RECEIVING

All shipments will be measured for total radioactivity. All shipments determined to be NORM (up to 18 micro sieverts) are handled and prepared using standard NORM safety procedures. All material exceeding our prescribed action level (> 18 micro sieverts=Effective Dose) will require special NORM management handling and preparation in our containment booth and a surcharge will be applied.

TESTING

If needed, SGS’ lab in Lakefield, Canada has a fully serviced containment booth. Under SGS’ standard operating procedures we require NORM MANAGEMENT CLASSIFICATION

When our threshold action level is exceeded, NORM samples are prepared in a separately ventilated and supplied air containment booth. Our staff is continuously monitored for radiation exposure levels, with a maximum yearly exposure as set by Health Canada. SGS conducts this testing to ensure exposures are “as low as reasonably achievable” (ALARA).

DISPOSAL

Low level radioactive material (NORM) is returned to you at cost. No long term storage is allowed. In Canada, disposal of yellowcake and precipitates can be arranged using a subcontracted waste disposal firm.

GEOPHYSICAL INTERPRETATION AND SURVEYS

SGS has the capability to provide interpretation and target generation from geophysical surveys. Geophysical datasets can be combined with a variety of satellite imagery as well as geological and geochemical dataset in a GIS environment, thus allowing an integrated interpretation of the data for target generation.



GEOCHEMICAL SURVEYS AND ANALYSIS

SGS’s experienced analytical professionals and technicians can provide

bankable test results for your uranium project. We are licensed to perform uranium analyses at our Perth Australia, Lakefield Canada and Johannesburg, South Africa facilities. Services that we offer include:

- Sample preparation
- Mobile metal ion leach and analysis
- Sample digestion (aqua regia leach, multi-acid digest, sodium peroxide or borate fusion, lithium metaborate fusion)
- Laboratory analysis including XRF, ICP-AES, ICP-MS and NAA
- Major elements and pathfinder element analysis including B, As, V, Ni, Co, Cr, Mo, Pb and Zn
- Proper disposal and short term storage
- Wide variety of additional determinations

A selection of our recent geochemical expertise selected for uranium includes:

CLIENT	DEPOSIT	LOCATION	DESCRIPTION OF WORK
URAMIN	Bakouma	Central African Republic	Geochemical and Metallurgical testing
AREVA	Bakouma	Central African Republic	Geochemical and Metallurgical testing
Bannerman Resources	Goanikontes	Namibia	Onsite Sample Preparation and Geochemical analysis
URAMIN	Trekopje	Namibia	Geochemical and Metallurgical testing
SOLEX	Juliaca	Peru	Onsite Sample Preparation and Geochemical analysis
Tournigan Mining	Kuriskova	Slovakia	Geochemical and Metallurgical testing
Uranium One	Aflease Mine	South Africa	Onsite Analytical Laboratory
URAMIN	Ryst Kuil	South Africa	Geochemical and Metallurgical testing
Anglogold Ashanti	Various	South Africa	Geochemical analysis
Harmony Gold	Various	South Africa	Geochemical analysis

ORIENTATION SURVEYS AND PROGRAM EXECUTION

Before a geochemical survey of any type is undertaken, it is important that the technique is tested using a properly designed Orientation Survey at a small scale over a known area of mineralization. This will ensure the applicability and optimization of survey parameters such as soil horizon chosen, screening protocols, etc. An SGS Orientation Survey consists of a single transect over a known target, with dense site spacing and multiple samples collected from each sample pit. It must be done over a known exploration target such as an identified mineralized zone, structure, or geophysical anomaly. The final, optimal distance between sample sites will be dictated by the type and size of mineral deposit being explored.

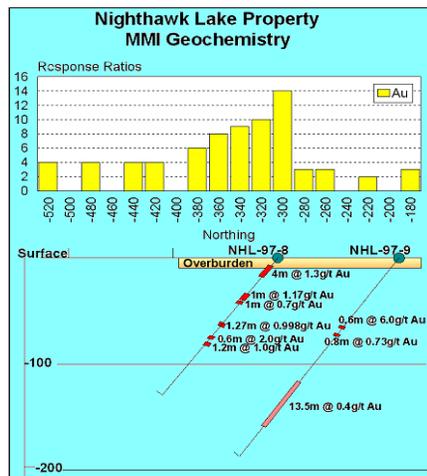


MMI ANALYSIS

MMI™ is a powerful geochemical exploration tool that enables companies to explore areas that have previously been unsuccessful for surface geochemistry. MMI™ measures mobile metal ions, including uranium, in surface soils. These mobile metal ions are released from ore bodies and travel upward toward the surface. Using sophisticated chemical processes and instrumentation, MMI™ is able to measure these ions, in surface soils, to determine accurately where buried mineralization is located.

We had over 300 clients perform MMI™ analysis on many projects and, at the present time, we are running MMI™ on several thousand samples for uranium projects in Niger.

More information can be found on our website.



When enough samples are collected, they are batched and sent to an ISO/IEC 17025 accredited SGS lab licensed to receive uranium samples for extraction and analysis. When analysis is complete, the sample and quality control data is reported. The QC data will be inspected and, when found acceptable, the data is plotted and interpreted.



A selection of our MMI expertise selected for uranium:

CLIENT	DEPOSIT	LOCATION	DESCRIPTION OF WORK
Homeland Uranium		Nigeria	MMI Geochem analysis
Western Energy	Various	Nevada	MMI Geochem analysis
UES Corp		Saskatchewan	MMI Geochem analysis
Golden Yellow		Australia	MMI Geochem analysis
Shoreham Resource	Bear Head Lake	Ontario	MMI Geochem analysis

GEOCHEMICAL SURVEY

Geochemical surveys consist of several steps. First, SGS will perform the sampling on a regular grid (e.g. 100m x 50m spacing). Coverage usually extends from ground suspected to be anomalous off onto background. Approx 250g of coarsely sieved sample are normally collected.

EXPLORATION SERVICES MANAGEMENT

From the initial planning to the logging and testing of core samples, the logistics of exploration programs require specialized expertise to increase their odds of achieving success. SGS provides expert geological exploration services and successful exploration management for many commodities, including uranium. Having completed consulting projects on five continents from tropical to arctic climates, our geologists have the expertise to assist you with all aspects of your exploration project.

Depending on your mandate, experienced SGS geologists can provide turnkey professional services for your exploration program or act as your technical advisor. As your trusted technical partner, we can provide you with the geological consulting and exploration management services you need including:

- Topographic surveys and base map plotting
- Supervision of line cutting and claim staking
- Layout of reference grids
- Geological target delineation and mapping
- Trenching and sampling
- Determination of drill hole and trench locations
- Supervision of drill programs including core logging and sampling
- Domain definition and sampling for metallurgical purposes

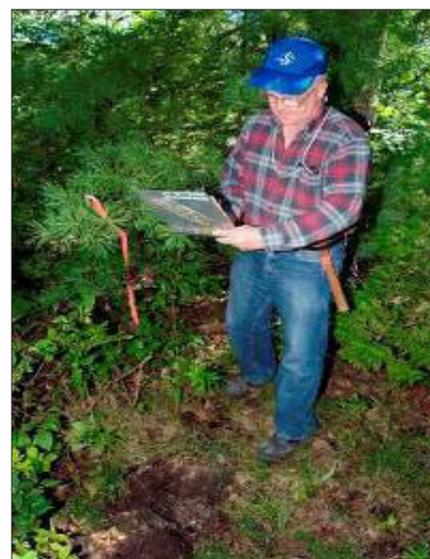
Our goal is to ensure that in all sampling work, either by us, or a subcontractor, that your samples are representative and advance your project in a cost-efficient manner. Rest assured that the entire chain-of-custody for your samples and core will be managed with SGS efficiency and integrity to ensure timely, accurate results.

GEOLOGICAL TARGET SELECTION AND MAPPING

The ultimate success of geological projects is predicated on detailed geological mapping and geologic interpretation. Complementary to this are the mineralogical and petrographic assessments that tease out the fine detail that make a project.

The SGS geological teams use a GIS system to assemble datasets from a variety of sources (geophysical, satellite imagery, geological and geochemical) and use this as the basis for target generation. These targets can be followed up by reconnaissance ground surveys using ground geophysics, radiometrics, geological mapping, geochemical sampling (MMI samples, soils, stream sediments, vegetation, termite mounds etc as dictated by the local terrain).

In deeply covered areas, some initial drilling can be done with mechanical augers to sample the subcrop. Field portable tools such as handheld XRF and PIMA may also be used if required in complex geological situations. Evaluation of this data will then lead to the selection of drill targets.



At this stage of the program we can supervise both the initial and large scale follow-up drill campaigns, providing detailed core logging and sampling for geochemical and mineralogical studies.

We can assist you with the following services:

- Target selection
- Geologic mapping at regional and local scales
- Exploration mineralogy (EXPLOMIN™) and petrography
- Computerization of geological data
- Drill-hole database management
- Digitizing, drafting and section plotting
- Customized treatment of data and custom-programming of data-centric applications

CLIENT	LOCATION	DESCRIPTION OF WORK
Lac Calcite	Saguenay, Quebec	Camp and drill program management
Labrador Iron Ore Mines	Shefferville, Quebec	Drill program management
Industrial Minerals Ltd	Mattawa, Ontario	Field program and drill management program
Gerymont Ltd	Marbleton, Quebec	Drill program management
Greyfont Ltd	Bedford, Quebec	Camp and drill management program

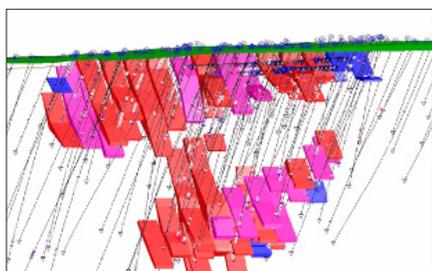
DATABASE MANAGEMENT

At SGS we understand that accurate resource and reserve models are based on properly managed and verified databases. Utilizing the experience and skill of our geologists and statisticians along with state-of-the-art computer software, we can provide you with complete and confidential data management solutions for your exploration program. We will verify your existing geologic database and ensure the new sample databases established meet your program requirements and industry best practice.

Additionally, we offer extensive consulting services including mapping of your geologic data and geologic interpretation

We offer significant database management and mapping expertise and can assist you with the following services:

- Database creation, standardization and validation
- Computerization of geological data
- Digitizing, drafting and section plotting
- Data conversion from various sources
- Customized treatment of data and custom-programming of data-centric applications
- Drill-hole database management
- Geologic mapping from regional to local scale
- Topographic surveys and base map plotting



OREBODY MODELLING AND RESERVE ESTIMATION

As your exploration project advances into the resource development phase, SGS offers you complete orebody modeling and resource estimation services using geostatistical techniques.

At SGS, an orebody-modeling project starts with a critical review of existing drill hole and surface or underground sample data as well as maps and plans with current geological interpretation.

Drill hole and/or sample databases are set-up to suit all the quantitative and qualitative information necessary to build a reliable resource model. Typically we will construct a geological and resource model from various data sources using the following steps:

- Database creation, standardization and validation
- Section plotting and interactive geological modeling
- Geostatistical analysis and block modeling
- Resource estimation and classification

Accurate resource estimation by a Qualified Person (QP) is an essential part of due diligence and a key part of your commitment to industry standard best practices as outlined in National Instrument 43-101 or the Joint Ore Reserves Committee (JORC). SGS is an experienced leader in geostatistical techniques and will ensure your resource estimations are done to accuracy and integrity demanded by these standards.

The following experience list for uranium has been derived from our broader list.

CLIENT	DEPOSIT	LOCATION	ACTIVITY
Areva	Mid West A	Canada	Resource Estimate
Areva	Shea Creek	Canada	Audit of resource
Brinex	Michelin & Kite	Canada	Geostatistical evaluation
Rocky Mountain Energy	N. Canning	USA	Resource estimate
Urangesellschaft Canada	Kigvak, Baggs	Canada	Resource estimate
Uranerz	Key lake	Canada	Resource estimate & simulation studies
Canada Wide Mines	Mid West Lake	Canada	Resource estimate
Aquitaine Mining Corp	Gruy	Canada	Resource estimate

NI 43 101 TECHNICAL REPORTS AND AUDITS

National Instrument 43-101 (NI 43-101) is a strict guideline developed by the Canadian Securities Administrators (CSA) that governs industry best practices and how issuers disclose technical and scientific information. It requires that all disclosure be in a “Technical Report” of fixed outlined and be compiled based on advice of a “qualified person”.

SGS has geological engineers who can act as your Qualified Persons. They can prepare technical reports, resource audits and certifications compliant with the NI 43-101. Our expert services may include a review of your current resource estimate, exploration titles, QA/QC programs, and the quality and integrity of your drill hole database.

Our NI 43-101 audit services involve analyzing the data, procedures, calculations and results used to complete ore reserve calculations. You can then submit our conclusions and recommendations for NI 43-101 compliance. As part of a control analysis we may undertake a verification of the geological model and database to:

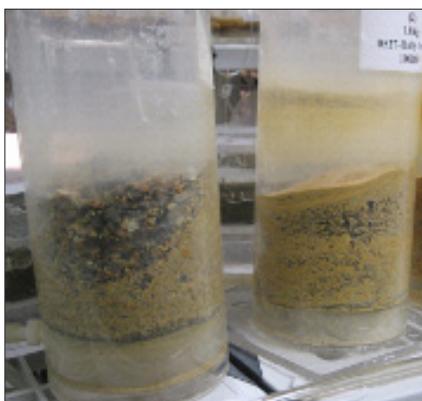
- Validate the resource estimation parameters
- Estimate your resource’s classification
- Give appropriate recommendations relative to the project (drilling of additional holes, revised use of geostatistics and resource estimation parameters, etc.)

ENVIRONMENTAL SUSTAINABILITY

BASELINE ENVIRONMENTAL STUDIES

SGS has successfully completed many environmental baseline studies. No matter what jurisdiction you operate in, SGS the expertise needed to:

- Collect, summarize and analyze the applicable laws, regulations and guidelines and ensure your program is compliant.
- Inventory and analyze the natural environment information such as climate and meteorology, air quality, surface water, biological and ecological environment.
- Determine and respect land use patterns and requirements.
- Characterize and address any potential contaminant transport mechanisms.
- Document and reduce environmental and health impacts.



ACID ROCK DRAINAGE AND RELATED TESTING (ACID-BASE ACCOUNTING AND HUMIDITY CELLS)

Acid rock drainage is the outflow of acidic water from mining operations including waste rock, tailings, and exposed surfaces in open pits and underground workings. SGS has been providing practical ARD solutions for the mining industry since 1998. We have developed a reputation as an organization with exceptional understanding of acid rock drainage and can provide you with the following services in the detection and control of ARD:

- Site investigation before, during, or after mining operations to ensure the scope of your ARD situation is completely understood
- Comprehensive laboratory analysis of effluent for the prediction and characterization of ARD
- Complete design and pilot scale testing of ARD treatment processes
- Construction management, commissioning, and start-up of water treatment solutions

ACID ROCK DRAINAGE TESTING

The characterization of the acid-producing potential of ores is vital for the management of ARD and the prevention of long-term environmental liabilities. SGS offers a wide range of laboratory testing services to assist you in the preparation of environmental impact studies and to help with the prediction of ARD problems. Whether you are in the early characterization and prevention stage or a more advanced remediation phase, SGS can help you ensure your ARD problems are dealt with in an effective and environmentally responsible manner.

CLIENT	DEPOSIT	LOCATION	ACTIVITY
Areva	Somair	Niger	Technical Report NI 43-101

Our laboratories can provide you with extensive analysis including:

- Static acid rock drainage tests using:
- Modified Acid Base Accounting (Lawrence, 1989)
- EPA Standard Acid Base Accounting (Sobek et al., 1978)
- Net Acid Production (NAP) test
- Net Acid Generation (NAG) test

Diagnostic mineralogy to identify: sulphur mineral speciation, non-iron bearing sulphides, and the reactivity of sulphide minerals using:

- QEMSCAN
- X-Ray diffraction (XRD)
- EXPLMIN™
- Optical microscopy
- Kinetic acid rock drainage tests
- Standard humidity cell testing (ASTM D5744-96)
- Column testing (sub-aqueous, sub-aerial)

METALLURGICAL TESTING

SGS develop and demonstrate bankable flowsheets and processes for environmentally sustainable metal and mineral extraction processing. These flowsheets are confirmed on-site through bench and pilot plant testing programs that are internationally recognized by the mining, engineering and financial communities.

With SGS Minerals Services, your metallurgical testing program will:

- Result in a practical, cost effective, environmentally sound flowsheet
- Provide data for capital and operating cost estimates
- Generate higher value through improved recovery or cost savings
- Provide bankable milestones to maximize financing options

A small selection of our experience list containing projects selected for uranium metallurgy.

Code:

lab = Laboratory test work

GRA = Gravity

MAG = Magnetic separation

FLT = Flotation

MIN = Mineralogy

ROAST = Roasting

LCH = Leaching

PPT = Precipitation

SX = Solvent extraction

CLIENT	DEPOSIT	LOCATION	PROCESS
Pele Mountain	Elliot Lake	Canada	LCH
Triex Minerals Corp	Athabasca Basin	Canada	LCH
Wright Eng	Kayelekera	Malawi	lab, LCH, IX
Midwest Uranium/Melis	Midwest Lake	Canada	lab, IX, Mo extraction
Urangesellschaft Canada	Baker Lake	Canada	lab, LCH, SX, PPT, effluent treatment
Midwest Joint Venture	Midwest Lake	Canada	lab, SX, PPT, effluent treatment, Cu/Ni extraction
Midwest Joint Venture	Midwest Lake	Canada	lab, LCH, SX, PPT, effluent treatment
Atomic Energy Canada		Canada	Grinding
Mintaco Ltd	Wolly	Canada	lab, LCH, SX, PPT, effluent treatment
Minatco Ltd	Midwest Lake	Canada	lab, LCH, SX, PPT, effluent treatment
Cameco/Uranerz	MacClean Lake	Canada	lab, LCH, SX, effluent treatment
Cameco	Key Lake	Canada	PP, LCH, FLT, SX, PPT, on-site pilot plant, develop control system
Recovery Dynamics	Unknown	USA	lab, LCH, SX, PPT, ROAST, Zr/Ta recovery
Fission Mines	Unknown	Canada	lab, FLT, MAG
Halo Uranium Mines	Halo	Canada	lab, GRA
Cameco	McArthur River	Canada	Crushing, scrub, screen

SGS GEOMETALLURGICAL FRAMEWORK

The SGS Geometallurgy Framework adds value to the on-going development of exploration projects and operating mines by providing an on-going evaluation and compilation of critical technical parameters and documenting several sources of uncertainty associated with these measurements.

The SGS Geometallurgy Framework is a technological platform that integrates the geological, mining, metallurgical, environmental, marketing and economic aspects of projects. All of these factors are used since they are fundamental components of the project development process. The SGS Geometallurgy Framework uses state of the art approaches to define the optimal and robust mineral processing flowsheet for the projected life-of-mine, based on

- Geological aspects (e.g. rock type, alteration suite, structure etc)
- Chemical controls
- Mineralogical components
- Textural characteristics
- Metallurgical performance (e.g. recovery, throughput, costs etc)
- Environmental parameters

SGS Geometallurgy Framework is implemented by using joint multi-disciplinary client and SGS Minerals Services approach which stresses teamwork and communication. It will define the optimum and combined geological, mining, mineral processing, environmental, marketing, economics and corporate strategies which will maximize the project value while minimizing and documenting the several sources of uncertainties.

Ore variability impacts on plant performance and therefore has direct financial implications. Geometallurgy significantly reduces the impact of spatial uncertainty in mine planning because it documents the variability in a deposit. The geometallurgical approach uses a six stage “SGS Geometallurgical Framework” to group activities:

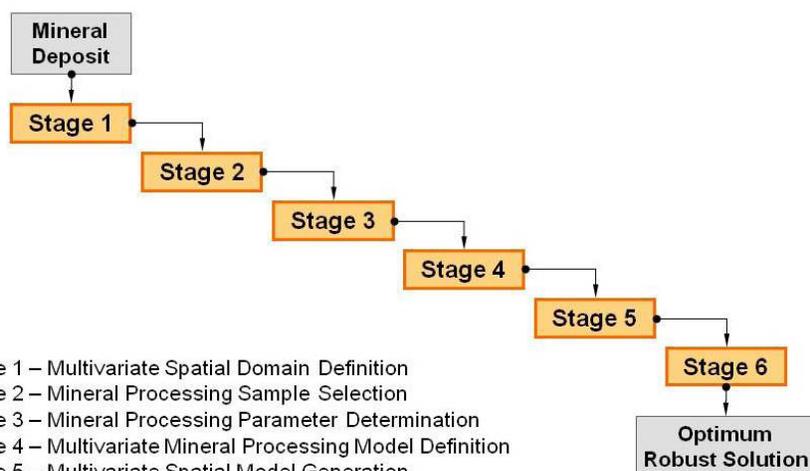
- Stage 1 – Multivariate Spatial Domain Definition
- Stage 2 – Sample Selection
- Stage 3 – Parameter Determination (Metallurgical Testing)
- Stage 4 – Multivariate Model Definition
- Stage 5 – Multivariate Spatial Model Generation using the Block Model or Mine Plan
- Stage 6 – Joint Mining and Mineral Processing Optimization

In Stage 1, regions (domains) of like characteristics are defined. Then, in Stage 2, a number of test samples are chosen, based on the distribution of the domains. Metallurgical testing occurs in Stage 3. The various parameters are then correlated using accepted geostatistical techniques in Stage 4. This data is populated onto the block model in Stage 5. Then computer programs and mathematical models are used to generate economic parameters such as throughput, grind size, grade and recovery which are used to model the deposit with respect to cash flow and future mining strategies in Stages 6.

Such a geometallurgical approach lowers project risk by enabling:

- Rigorous documentation of geological and mineralogical factors that impact on metallurgical performance and grindability
- Plant design that recognizes the inherent variability of the deposit
- Forecasting of production parameters such as plant throughput, grade, recovery, P80 and concentrate grade on a quarterly or yearly basis, with a statistical confidence interval
- Optimization of plant performance with respect to ore variability
- Effective mining of the ore over the entire mine life
- Optimized mine resource and plant performance
- Maximize the Net Present Value whilst minimizing risk.

It documents risk and assigns probabilities to various risk levels through its use of Monte Carlo analysis and conditional simulation.



- Stage 1 – Multivariate Spatial Domain Definition
- Stage 2 – Mineral Processing Sample Selection
- Stage 3 – Mineral Processing Parameter Determination
- Stage 4 – Multivariate Mineral Processing Model Definition
- Stage 5 – Multivariate Spatial Model Generation
- Stage 6 – Joint Mining and Mineral Processing Optimization

Stages of the Geometallurgy Framework

STAGE 1. DOMAIN DEFINITION

Stage 1 of the Geometallurgical Framework involves defining spatial domains with similar geological, chemical, mineralogical and textural characteristics. This is done by integrating the extensive information present in the drillhole database.

This database can consist of many components, some of which are listed in the chart on the right.

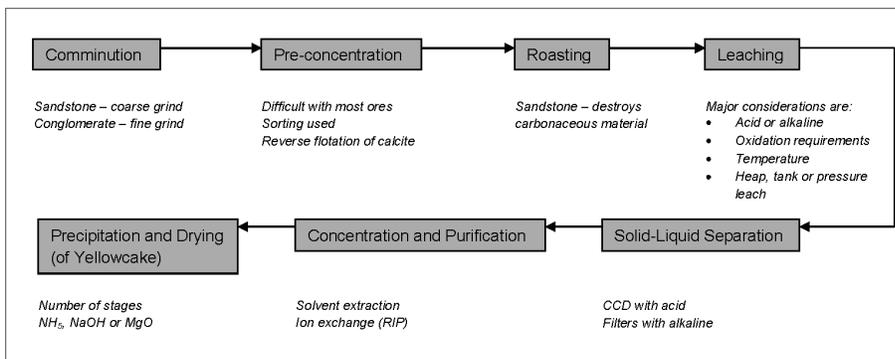
This extended data base is compiled with its geographic coordinates, verified and then treated statistically to define domains important to metallurgy (grade, recovery, grindability, flotability etc.). The domains are then grouped into clusters. Typically this takes 3-14 days, depending on the quality of the database, consistency of the information and the complexity of the deposit.

STAGE 2. SAMPLE SELECTION

Stage 2 involves collecting representative samples from various domains throughout the deposit. This ensures that samples are distributed in a regular fashion throughout as much as the deposit as is available. The domains are as defined in Stage 1 and take into account sample access, and the various geological, chemical, mineralogical, textural and statistical parameters used in Stage 1. It is not unusual for domains related to flotation be separate from those related to grinding.

The information gathered in Stage 1 is also used at Stage 2 to guide compositing – ensuring the samples used for flowsheet development are appropriate and the best estimate of the ore variability. Typically Stage 2 takes 2-5 days, depending on the number of domains within the mineral deposit.

FIELD PARAMETERS	GEOCHEMICAL PARAMETERS	MINERALOGY
ROCK TYPE (LITHOLOGY)	Commodity elements (e.g. Cu, Zn)	EXPLOMIN™ data
ALTERATION SUITE	Precious metals (e.g. Au, PGE)	Modal Mineralogy
MINERALOGY	Pathfinder elements	Grain size
MACROSCOPIC TEXTURES	Major elements	Mineral association data
MEASUREMENTS DONE DIRECTLY ON CORE (MAGNETIC, SUSCEPTIBILITY, RADIOMETRICS,)	Rare earth elements	
STRUCTURAL FEATURES	Trace elements	Mineral textures



Typical Uranium Processing Flowsheet

FLWSHEET DEVELOPMENT

Flowsheet development is typically performed at the laboratory “bench”. Based on the initial determination of specific ore parameters (e.g. grain size, mineralogy), the various options that might be applicable are evaluated. A conceptual flowsheet is developed which is further tested and optimized. Developing and testing the most effective processing flowsheet reduces the technical risk associated with metal recovery.

SGS Minerals Services’ metallurgical groups’ flowsheets are recognized by the global financial community for their quality and the integrity of their recommendations.

For new projects, flowsheet development precedes much more costly activities such as feasibility-stage pilot plant testing. It provides the flexibility to assess a wide variety of reagents, dosages, residence times etc to ensure optimal grade and recovery.

STAGE 3. METALLURGICAL TESTING/ PARAMETER DEFINITION

SGS has more than 65 years of metallurgical testing. We have fully equipped laboratories capability of bench or pilot scale testing on each continent. With over 1000 metallurgical professionals, we design bankable flowsheets, perform comprehensive variability testing and complete fully integrated pilot plants for the international exploration and mining community.

COMMINATION

SGS Minerals Services supports the minerals and chemical industries in the design and operation of efficient crushing and grinding circuits using both power and model-based methods. We design circuits and provide operating advice to maximize milling efficiency, considering both steel and power consumption. Our practical experience also ensures that we recommend circuit configurations that offer ease of operation and maximum flexibility.

SGS Minerals Services' engineers have experience in operating SAG mill plants and have operated over 500 pilot-plant SAG circuits. This hands-on experience fosters a practical view of the design and operation of grinding circuits.

SGS Minerals Services can complete the following grindability tests:

- SPI (Sag Pressure Index) Test
- Bond Ball Mill Grindability Test
- Bond Impact Test
- Abrasion Test
- JK Drop-Weight Test
- MacPherson Autogenous Grindability Test
- MacPherson 18" Mill Test

Well-instrumented pilot-scale autogenous grinding circuits, ball and rod mill circuits, and crushing circuits are also available for testing and design purposes. In-plant audits allow modeling and simulation of existing plants to assist in optimization. Rotary scrubbers and attrition scrubbers are also available.

PHYSICAL MINERAL SEPARATION

Separation of certain minerals can be efficiently achieved by taking advantage of their physical, electrical and magnetic properties. For example, uranium, mineral sands, coal, and diamonds are some minerals that use at least one of these extraction processes.

- **Gravity Separation**
SGS has a variety of spiral test rigs, and our accessory equipment allows sizing of feeds, multiple spiral stages, and recycling of products. Other gravity separation equipment, such as shaking tables, Falcon and Knelson centrifugal separators, Mozley MGS units, and hydrosizers, are also available.
- **Magnetic and Electrostatic Separation**
A full range of magnetic separators is available for uranium, including wet and dry rolls, a batch (ferrous wheel) separator which uses permanent magnets, and a custom-built WHIMS (wet high intensity magnetic separator) machine. Other magnetic equipment can be obtained from suppliers by special arrangement. A Davis tube separator is available for assessing the magnetic content of samples.

FLOTATION

SGS has extensive experience with flotation. We can integrate, design, fabricate, commission, maintain and troubleshoot flotation circuits. We have been involved in the design and construction of uranium flotation circuits globally.

Successful flotation involves proper liberation, adding the proper reagents to induce selected minerals to become hydrophobic (water repelling) or hydrophilic (water attracting). Aeration (bubbles) is added through spargers at the bottom of the flotation cell

The bubbles attract and then float the hydrophilic minerals, leaving the hydrophobic component in the underflow as tailings. Once the flowsheet has been fine tuned and optimized, we provide you with circuit options that trade-off upfront capital expenditure and/or operating flexibility with grade-recovery performance.

HYDROMETALLURGY

Hydrometallurgy is concerned with the principles and practice of the aqueous extraction of metals from natural or recycled resources and their subsequent recovery into useable products by means of environmentally sound and cost effective processes. Leaching rates, reagent consumption, temperature requirements and gas/pressure requirements can be determined through hydrometallurgical leaching test work including bench-scale autoclave work.

Conducting metallurgical leach testing can provide an indication of reagent costs, equipment requirements, indication of metallurgical amenability to leaching and also provide environmental considerations due to deleterious elements or even ARD.

- **Leaching and Precipitation**
SGS has extensive leaching experience ranging from simple batch leaching and column leaching, through to complex pressure acid leaching pilot plant campaigns.
- Batch leaching can be conducted in shake flasks or agitated tanks under controlled conditions.
- Continuous leaching can be done in a number of pilot configurations using the tankage and solid/liquid separation equipment available.
- A number of precipitation reactors are available.

Solvent Extraction

SGS has conducted extensive solvent extraction testwork, ranging from simple batch shakeout tests to extended operation of a complex integrated SX/EW circuit. Much of this work has focused on nickel, cobalt and copper, while our Australian facility has conducted SX tests on vanadium, including pilot plant operation. In this process, vanadium was leached in sulphuric acid and extracted using D2EHPA to finally produce vanadium pentoxide as a product. This process is very similar to uranium extraction.

Selected Hydrometallurgical Experience:

STAGE 4. MULTIVARIATE MODEL DEFINITION

During Stage 4, we develop relationships between parameters that measure metallurgical criteria. These relationships can be arithmetic, linear or non-linear. The best parameters are those that simply and directly relate a metallurgical parameter (e.g. recovery) to another parameter (e.g. mineralogy). These other parameters can be known as “proxies”. For some examples, please see below.

These relationships can then be used to calculate ore variability throughout the deposit. Several weeks are needed to determine these relationships at Stage 4.

STAGE 5. MULTIVARIATE SPATIAL MODEL GENERATION (POPULATING THE BLOCK MODEL OR MINE PLAN)

In Stage 5, metallurgical and related data is populated onto the block model or mine plan using state of the art deterministic and stochastic statistical techniques. This is broadly similar to the current practice of distributing grade data into blocks across a deposit, but involves metallurgical, geotechnical and environmental data etc. Four or more weeks are needed to do this, depending on complexity.

STAGE 6. JOINT MINING AND MINERAL PROCESSING OPTIMIZATION

In Stage 6, we use the data present in the block model to generate mining, metallurgical, environmental, marketing, economics and corporate strategies that will maximize the project value. As well, because we have used conditional simulation, we can determine the uncertainty associated with various options. This is state-of-the-art – currently no other group can do such predictions.

We can apply optimization to:

- Pre Production decisions typically made during feasibility
- Mill design scenarios
- Operational costing
- Capital equipment selection
- Comparing mining strategies
- NPV optimizations
- Production decisions made during operation
- Monthly production forecasting
- Capital equipment scheduling
- Operational cost optimization
- Managing expansions and long term changes in ore grades
- Generating market-appropriate materials
- Toll milling scenarios

CLIENT	DEPOSIT	LOCATION	ACTIVITY
Pele Mountain	Elliot Lake	Canada	LCH
Triex Minerals Corp	Athabasca Basin	Canada	LCH
Midwest Joint Venture	Midwest Lake	Canada	lab, LCH, SX, PPT, effluent treatment
Cameco	Key Lake	Canada	PP, LCH, FLT, SX, PPT, on-site pilot plant, develop control system,
Wright Eng	kayelekera	Malawi	lab, LCH, IX
Recovery Dynamics	Confidential	USA	lab, LCH, SX, PPT, ROAST, Zr/Ta recovery
Urangesellschaft Canada	Baker Lake	Canada	lab, LCH, SX, PPT, effluent treatment

Code: MIN = Mineralogy
 lab = Laboratory test work ROAST = Roasting
 GRA = Gravity LCH = Leaching
 MAG = Magnetic separation PPT = Precipitation
 FLT = Flotation SX = Solvent extraction

METALLURGICAL PARAMETER	RELATED PARAMETER (PROXY PARAMETER)
Grindability	Rock Hardness
Flotation	Grain size measurement
Concentrate grade	Ore minerals present

PILOT PLANT TESTING

Pilot testing is the best way to reduce risk associated with a new flowsheet or flowsheet changes. It will generate the data needed to design the full scale plant. As well, existing operations can be simulated at the pilot scale to evaluate new technologies or address problems without interrupting production. In a pilot plant, the actual process is constructed from appropriately sized equipment and the testing involves virtually all of the issues that a full processing plant will have to deal with.

SGS employs engineers having a combination of operating plant experience and laboratory/piloting experience. This is a rare combination in the industry and provides a much broader experience base than those that have exclusive exposure to either operating plants or laboratory/piloting testing.

Typical activities that can be undertaken during pilot testing include:

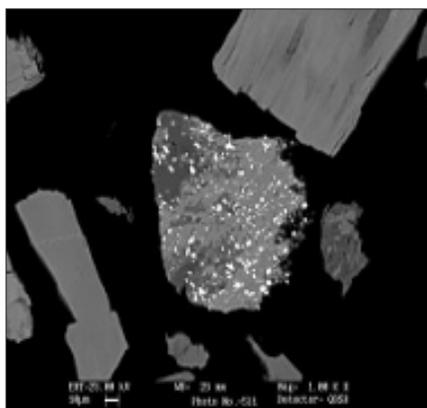
- Establish flowsheet viability. This is especially important for complex deposits, those utilizing new or unusual technologies or projects that are located in high risk areas
- Fine-tune flowsheet parameters
- Demonstrate continuous integrated operation
- Evaluate the impact of local water supply
- Develop a water balance
- Quantify the impact of ore variability
- Produce byproducts for specialized testing (e.g. environmental assessments)
- Generate bulk samples for market evaluation
- Train critical mill staff

HIGH DEFINITION MINERALOGY

Understanding how the ore and gangue minerals behave in the metallurgical processing requires qualitative and quantitative knowledge of ore and waste minerals present and their textures and associations.

SGS Minerals Services has years of experience in measuring and quantifying uranium minerals using High Definition techniques such as X-Ray diffraction, QEMSCAN®, spectral, image and optical analysis.

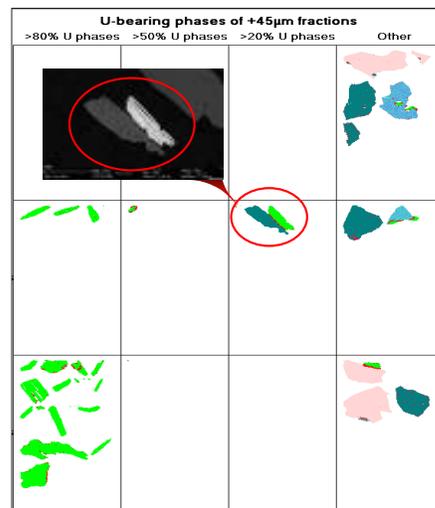
Uranium-bearing samples are typically analysed by QEMSCAN® Bulk Mineralogical Analysis (BMA) in conjunction with Specific Mineral Search (SMS). BMA analysis is used to identify and quantify the bulk modal mineral of the sample and SMS analysis is used to specifically search and measure particles with high average atomic mass (typically U-bearing minerals). This is a cost effective approach to measure a statistically representative number of U-bearing particles that allows for meaningful and representative mineral liberation, association, deportment and grade vs. recovery data to be determined.



The SGS facility in Perth comprises of 5 state-of-the-art QEMSCAN® instruments that can detect U-bearing minerals at resolutions as low as 1 µm and grade as low as 0.1 % U₃O₈.

The “value-add” of our mineralogical services is the key to unlocking your project’s potential and can provide you with:

- Modal Mineralogy – mineral identification and relative abundance
- (for instance, a grain of brannerite to the top right)
- Elemental Department
- Grain Size Estimation
- Mineral Associations
- Liberation and locking (area % and surface area %) (for instance, table on lower right showing image grid of locking characteristics)



IN-PLANT SUPPORT

Operational improvements can improve grade, recovery or create maintenance or other time efficiencies. SGS Minerals Services can work with you to:

- Thoroughly evaluate your on-site operations without bias or special interest so you can access the best available technology
- Give you innovative workable alternatives to bottlenecks in your plant
- Provide short-term metallurgical commissioning assistance during start-up
- Assist with training or provide resources to assist with transitions.

From periodic technical auditing to troubleshooting to complete on-site daily metallurgical management, SGS Minerals Services can support on-site operations. Whether it's initiating a new project, re-starting an old mill or maximizing your performance from an existing mill, we are able to provide world-class technical support to ensure constant optimal mill throughput and metallurgy. SGS Minerals Services can support your operation in a way that best suits your needs and budget.

METALLURGICAL COMMISSIONING

SGS' metallurgical commissioning experience means that our expert systems provide you with a proven methodology and a well respected team of mineral processing consultants to aid in the development of your plant control strategy. Our goal is to get your metallurgical plant and staff generating the producing the recoveries and throughput we got when developing your flowsheet in the laboratory.

Our training methodology is progressive and inclusive. Everyone in your mill must be included in the system's development and maintenance if it is to produce the product grade anticipated in the feasibility study. In-depth training and equipment installation support ensures that your entire team is ready to assume the responsibility of operating the mill. This means that you will have an effective, safe start-up for your uranium processing circuit.

AUDITS & OPTIMIZATION

SGS routinely provides audit and optimization programs for existing grinding circuits to ensure maximum efficiency. Working directly with your plant staff to understand the practical aspects of your operation, we will review of your mine plan and historical data analysis and perform on-site testing and evaluation. The scope of each project is different and tailored to the owner's request.

SGS can support:

- **Product Testing**
Ore preparation usually consists of some form of crushing, grinding, screening and/or classification. SGS can assist with sampling, size analyses, chemical analysis, and other standard tests. When slurry or material flow is critical, thickening and filtration studies and rheology assessments can be performed, on in-plant streams or samples shipped to our facilities.
- **Audit to Increase Plant Throughput**
Increasing plant throughput often improves profitability. Audits of the grinding and flotation areas can help address this. Throughputs in the flotation area can be improved by reducing recycle loads, flotation rates or magnetic or gravity separation performance. This may be achieved by changing reagent regimes, improvement of feed particle size, and better control of pulp densities.

- **Grinding Studies**

Grinding is usually one of the more prominent bottlenecks in plant activities. SGS Minerals Services can perform detailed grinding studies, using both power-based methods, and simulation-based methods to help yield increased throughput, and/or improve fineness-of-grind.

- **Audit to Improve Metallurgical Performance**

In more complex plants, a metallurgical audit can often indicate where improvements in plant performance can be achieved. For instance, a mineralogical study of various plant streams using techniques such as QEMSCAN® or image analysis can highlight liberation problems, or areas with poor recovery. Improvement studies can then be focused in these areas. If necessary, samples can be taken and metallurgical studies performed on-site and at our facilities. We use the equipment and reagents in the plant, or assess alternative reagents or techniques. If necessary, we can make improvements in an on-site pilot plant using a small feed stream taken from the critical part of the operation.

WATER TREATMENT

SGS can help you develop a truly sustainable water management plan. We have the technical expertise to provide effective mitigating strategies and innovative, practical solutions that reduce the environmental impact of your uranium operations. SGS will work you during and after project start-up to ensure on-going operational excellence and help provide modifications and calibrations as required.

Our water treatment experts will conduct the following procedures to ensure your water treatment project is completed in an efficient and affordable manner by performing:

- Plant or site audit and recommendations
- Laboratory testing
- Pilot-scale testing when necessary
- Design and engineering of water treatment solutions
- Construction management

METALLURGICAL ACCOUNTING

Metallurgical accounting is an on-going process that involves sampling, analyzing and accounting for the metal that enters and exits your metallurgical plant. Just as monetary accounting provides the necessary framework for financial decisions, metallurgical accounting provides the diagnostic information required for effective metallurgical decisions, and informed marketing, sales and corporate planning. Properly designed metallurgical accounting procedures are a powerful tool that can provide insight and remedial measures for:

- Production variability
- Unexplained material losses and gains
- Process inefficiencies
- Production forecasting problems.

Our staff are independent process experts with extensive testing and plant expertise. They have the ability to establish and optimize your metallurgical accounting process to ensure your metal throughputs meet corporate requirements.

ON-SITE LABORATORY FACILITIES

Outsourcing of your mine-site laboratories allows you to allocate capital and staff more efficiently, concentrate on core competencies and ensure that the uranium data you base important decisions upon is accurate and consistent. The impartiality of a third party outsourcing partner ensures the results are transparent and meet regulatory

reporting requirements such as specific government regulations, NI 43-101 and JORC.

SGS currently operates more than 100 on-site laboratories for clients. We apply the same principles, procedures and quality standards to our outsourced laboratories that we do to our commercial labs. With SGS designing, staffing and operating on-site labs for clients, it ensures that you have a full scope of capabilities for the fast turn-around of accurate, reliable and data you need to run and optimize your plant operations.

A portion of our on-site lab experience selected for uranium:

CLIENT	DEPOSIT	LOCATION	DESCRIPTION OF WORK
Bannerman Resource	Goanikontes	Namibia	Onsite sample preparation and geochemical analysis
SOLEX	Juliaca	Peru	Onsite sample preparation and geochemical analysis
Uranium One	Aflease Mine	South Africa	Onsite Analytical Laboratory

PRODUCTION FORECASTING USING CEET

SGS Minerals Services has extensive experience using geometallurgical technology for production forecasting applications. The application of geometallurgical technology to production forecasting results in a more rigorous and reliable forecast. Geometallurgical production forecasts consider geological, metallurgical, mineralogical and chemical influences on recovery, instead of simply relying on chemical assays.

Data is entered into Process Access, an electronic data platform, and then cross linked with processing models such as CEET® (Comminution Economic Evaluation Tool) and FLEET® (Flotation Economic Evaluation Tool).

The orebody is then virtually mined in a block-by-block fashion using the computer models. The data highlights times of smooth operation and periods when production will experience challenges, giving operational staff time to address these challenges and minimize the effects on productivity and profitability.

Since 1999, SGS has completed over 300 CEET® comminution benchmarking projects. CEET® is an internet-based software tool that enables accurate design and forecasting of plant throughputs, operating costs and grind quality. Capital investment and production planning decisions can thus be based on well-defined representative data sets representing the block model. CEET® links the grinding circuit design model with the mine resource block model to:

- Ensure throughput tonnage targets are consistently achieved
- Determine best circuit design for the ore body and mine plan

- Improve revenue-stream predictions for both budgeting and metal sales
- Optimize the mine plan for throughput and grind quality
- Minimize capital investment & operating costs for desired production rates
- Trade off capital investment with variance in throughput
- Quantify uncertainty arising from throughput predictions.

SUMMARY & CONCLUSIONS

SGS brings a step-by-step approach and stringent safety structure to uranium production to turning our expertise into profitable plant performance. Our areas of expertise in uranium include extensive understanding of:

- Health and safety in field and laboratory settings, particularly as related to radioactive materials
- Geophysical expertise to define anomalies and initiate ground surveys
- Geochemical surveys, analysis and data interpretation
- Exploration program planning and logistics
- Geology of uranium deposits, particularly those of the roll front type
- Uranium mineralogy
- Ore variability and geometallurgy
- Metallurgical testing for uranium including geometallurgy, flowsheet development and piloting
- Product testing
- Plant improvements in materials handling or operations.

SGS offers you the unique advantage of combined skill sets and industry expertise that you won't find anywhere else. The wide range of services we offer to the uranium industry helps to maximize the economics of your operation, ensuring higher product quality, improved recovery, reduced costs and greater revenue.

SGS Minerals Services can help to:

- Generate successful exploration programs in a timely and productive fashion
- Design cost effective and environmentally sustainable metallurgical flowsheets
- Improve production throughput
- Optimize safe operations
- Reduce costs
- Enhance product quality
- Increased revenues.

CONTACT INFORMATION

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WHEN YOU NEED TO BE SURE

SGS