

Appendix B – Glossary of Terms Relevant to the CIM LPGMP

This appendix serves as support documentation for the CIM LPGMP. The terms are explained as they apply to application of these guidelines.

accuracy – the degree to which an estimate or measurement is free from error.

acid mine drainage (AMD) – a sulphuric acid solution produced when water chemically reacts with sulphide minerals (in waste rock, for example,) in the presence of oxygen (that is, air,) and common bacteria. AMD often contains dissolved metals that may pose a threat to humans and to wild flora and fauna.

backfill – a material sometimes prepared with the tailings stream from a process plant and used to fill the mined cavities in underground operations to provide local ground support to the operations.

basis of estimate – a formal document produced by a cost estimator which establishes how the estimate is performed.

bench scale testwork – testwork that is performed at the laboratory scale where sample mass used in the testwork is typically less than 10 kg and can be processed in equipment handled by an individual. This level of work is usually done on a batch basis rather than a continuous basis.

beneficiation – the process of upgrading material by froth flotation, gravity separation or another method into a concentrate in which the minerals are not physically changed.

bleed stream – a minor stream of material that is removed from a recirculating process flow to prevent the accumulation of material in the recirculating flow and thus to maintain a material balance in the circuit.

block flow diagram – a simplified representation of a process showing major unit operations and without representation of individual pieces of equipment.

budgetary quotation – a preliminary cost quotation provided by a vendor qualified to supply a particular type of equipment or service.

bullion – gold or silver or other precious metals at a high level of purity.

capital cost – the estimate that indicates the cost of engineering, procuring and installing equipment on suitable foundations and in an appropriate building along with all piping, electrical, instrumentation, infrastructure and other items sufficient to provide a workable facility.

category of study – engineering studies are generally classified in three levels – scoping (or preliminary economic assessment), prefeasibility and feasibility – which reflect the level of detail and accuracy used to produce these studies.

chain of sample custody – denotes the procedure where a sample is processed through an unbroken trail of accountability that ensures the physical security of the sample, data and records. This system helps to prevent accidental or willful contamination or loss of the sample or manipulation of records and allows the determination of who had control of the sample or information if such should ever happen.

classification – a process by which the solid particles in a stream are separated into two or more separate streams according to the particle size.

comminution – that process where the mined material containing mineralization of economic interest is reduced in size from a coarse size, through crushing and/or grinding, to a finer size suitable for concentration or extraction.

community response – in the circumstance used in this document, the response of the communities that might be impacted by a processing development can be of great significance. Community response should be determined to support the various environmental permitting processes.

complexity – in the process sense, complexity involves the preparation (through comminution, etc.), concentration (through flotation, etc.), or extraction (through agitation leaching, etc.), and the degree to which these may be made difficult by the mineralogy or the range of variability of the material processed.

concentrate – where minerals in a material have been upgraded sufficiently to produce a product suitable for downstream processing or sale.

concentration method – a process that reduces the mass of the material hosting the minerals of economic interest, such that the grade or quality of the product is increased relative to that of the process feed.

conceptual process development – a very high level of process development that establishes a general method to process plant feed to recover minerals or to extract metal to produce a saleable product.

construction execution plan – is typically provided in a feasibility study to define the schedule of cost expenditures and construction activities for the facilities presented in the study.

contingency – on direct and indirect capital, with the exception of Owner's Costs, contingency is the allocation of costs to cover items or functions needed for the completion of the project but not specifically included in the cost estimate within the defined scope of the project. It should be clearly understood that the contingency allowance will be spent and that it is not intended to cover scope changes.

continuity of recovery – where the recovery from a mineral deposit can be continuously met to an economic level the operating life of the project.

control and operating strategy – is typically provided in a feasibility study to indicate the philosophy of detecting and responding to variability within the process operating parameters.

credibility of testing laboratory – a testing laboratory is credible if it meets the requirements of relevant standards published by the International Organization for Standards (ISO) or equivalent. Credibility is further established when the Practitioner has audited the testwork directly through a visit to the testing facilities and/or performed a review of documents provided by the laboratory covering the testwork. The Practitioner may also be able to establish, from their peers or others, that the laboratory has a solid reputation for delivering reliable results.

cut-off grade level – the grade of the element or component of economic interest which, if exceeded, means that the material can be mined and processed at a profit, or, if not exceeded, means the material in question is classified as waste.

defensible estimate – in this context, a defensible estimate at a prescribed study level is one where sufficient work has been performed to successfully defend the estimate if it should be questioned by external or independent peer reviews, regulators, or due diligence providers.

demonstration scale work – testwork to justify a large capital expenditure in cases where a process is novel or process feed variance is extreme. A demonstration plant is recommended to accurately assess operating performance on a scale that mimics commercial scale operation more closely than typical pilot plants, and which produces a quantity of product allowing comprehensive assessment by customers.

design criteria – the information that provides the facts and assumptions upon which the design and the production results are based.

differential flotation – a process used for the concentration of minerals whereby minerals are recovered into separate concentrate products.

dilution – the inclusion of rock containing little or no economic mineralization that, by necessity, is extracted along with the mineralized material in the mining process, subsequently lowering the overall grade of the mined material.

direct capital – the total costs of materials, equipment and subcontracted work permanently incorporated into the final facility plus the direct craft labour employed in the installation of these materials and equipment items.

domain – commonly known as a geometallurgical unit, defined as a mineral assemblage that has a common lithological and mineralogical composition and that is expected to have a specific metallurgical response.

Domain composites – those groups of point samples combined into a composite to represent a domain.

Due diligence – an investigation, audit, or review performed to confirm facts or details of a matter under consideration.

Economic production cost – the cost of producing the product, accounting for the repayment of the cost of capital and that of operating costs (including any off-site treatment of the product).

Effluent – an outflowing of water or an aqueous solution to a natural body of water, from a structure such as a wastewater treatment plant, sewer pipe, or industrial outfall.

Environmental factors – insofar as processing is concerned, those factors associated with the processing of mineralized material, disposal of solid and aqueous waste products, and treatment of gaseous effluents to comply with standards set by the controlling government jurisdiction.

Equipment list – typically, a list of equipment required in the process plant, which will vary in depth and detail according to the level of study which it supports.

estimate – the estimation of costs as part of determining the viability of building and operating a process facility.

expatriates – the term referring to those workers that are not native to the jurisdiction in which the mineralized body is found.

extraction method – a physical or chemical method used to extract a metal or a mineral product from mineralized material to produce a marketable product.

external or independent peer review – a review conducted by peers, intended to confirm that a reasonable interpretation of scientific and testing information supports the design.

factored comparison – a type of estimate used at the preliminary level, which is based on comparing a proposed facility to an analogous situation with, as necessary, modifications for throughput, location, date, or other factors.

finished product – a saleable product achieved by elemental extraction, which has a high enough level of purity to be marketable.

flotation – a process used for the concentration of minerals.

geological environment – from the processing perspective, a geological setting that implies a characteristic metallurgical response or level of complexity (e.g., Mississippian type lead deposits, Athabasca Basin type uranium deposits).

grade – the quantity of the mineralized material expressed as a mass fraction of the specific component. Units are commonly %, ppm, g/t, and oz/t and need to be carefully defined.

hazard – the intrinsic property of a hazardous substance or physical situation with potential for a dangerous deleterious effect on human health and/or the environment.

HAZOP – a hazard and operability study done in a structured and systematic examination of a planned or existing system to identify hazards and risks.

HVAC – the heating, ventilation and air conditioning of a space.

hydrometallurgical treatment – the treatment of a mineralized material by selectively dissolving materials and applying other processing steps to produce a desired product.

indirect capital – typically includes EPCM (Engineering, Procurement and Construction Management), Third Party Consultants, Construction Facilities, Construction Services, Construction Site Operation, Freight, Vendor Support, First Fills and Spares.

infrastructure support – those systems such as water, power, roads, camps and logistics that are used to support the operation of a property.

installation cost – the component of the capital cost that includes labour and material cost of installing equipment at a site.

intent of sample representativity – a sample is selected based on its ability to represent some form of mineralization and this term indicates the use of the sample.

intermittent stream – a stream of material that does not flow on a continuous basis, but which is provided as part of the process system to allow flexibility in the distribution of the sub-unit products.

labour – comprised of staff and non-staff personnel, labour is one of the principal costs items making up the total operating expense of a property.

leaching – a process used for the extraction or removal of metals or other components by dissolution.

level of confidence – the term used to express the belief in the reliability of the information.

level of recovery – usually expressed in quantitative terms and referring to that fraction of valuable material that is recovered to the saleable product.

list identifying sample source and attributes – in these documents, a list identifying the original spatial location of the sample, its grade and any other attributes that are involved in its selection as being representative.

local weather – that local weather and climate that is a consideration in the design of process facilities, in particular, climatic and seasonal extremes.

logistical capability – the capacity of the infrastructure or company systems to provide transportation, storage and control of materials and equipment.

logistical execution plan – a plan typically included in a feasibility study that identifies key aspects (including cost) of transporting materials and equipment to site.

major equipment – the more massive or important items of equipment within a process plant.

marketing – an activity involving the sale of a product.

material take-offs – quantity information based on materials usage in the construction of facilities, which is used to estimate capital costs – typically estimated for civil works, concrete, steel, etc.

mineral beneficiation method – the method used to concentrate the valuable minerals for further processing, or into a saleable product.

mineralogy – the study of the minerals and their interrelationships with each other.

novel approach – an approach that has not been previously applied commercially in an industrial situation for that particular type of resource.

operating cost – the operating expense of concentrating or extracting the product, and is typically composed of power, labour, reagents, consumables, and spare parts costs.

optimization factor testing – the optimization of a process that involves modifying the parameters but not the basic technology to find an optimum process point.

ore – a mineralized material that can be mined and processed profitably.

orebody complexity – when the orebody demonstrates a high degree of variability in process response, either spatially or within domains.

owner's costs – typically include Pre-operations personnel and training, Pre-Production and Initial Production Mine Equipment, Mine Pre-stripping, Mine Development, Owner's Project Team, Insurance, Housing, Permitting, Commissioning, Corporate and Owner's Contingency.

peer – an individual with education and experience similar to the Practitioner.

penalty elements – those constituents of the saleable product that carry a negative economic impact for the purchaser and could result in product rejection by the purchaser.

pilot plant scale work – testwork to support design and estimation activities, which is performed continuously on a relatively small scale (but at a larger scale than laboratory bench scale testwork), typically incorporating all recycle streams, to emulate unit operations and predict steady state performance of a full-scale process plant.

point sample – a sample that is derived from a continuous interval of material in a specific location.

power draw – the level of power consumption expected by a particular piece of equipment.

preconcentration – application of equipment and process to reject material that is sub-economic and thereby reduce the mass of material subjected to concentration processes.

problematic material – any material that requires a level of treatment that is beyond the level normally considered for a typical ore of that commodity, sometimes called “refractory material”.

process concept – the grouping of unit operations such as comminution and flotation to alter a mineralized unit to concentrate or extract a product of value.

process design criteria – the detailed information necessary to support a process concept at the higher levels of study.

process flow diagram (PFD) – the description of the process facilities in graphic fashion showing essentially all major process equipment and flows.

P&IDs – diagrams that are used to detail piping and instrumentation/control devices within a process facility.

project execution and constructability – a component of feasibility studies that helps refine the cost and impact of installing equipment within the process facilities.

proof of concept – a preliminary set of tests demonstrating that an unconventional or atypical process has the possibility of providing a solution to a particular problem.

proof of economic and technical viability – tests that are performed to provide design information supporting the use of an atypical process as a solution to a particular problem.

proof of applicability – tests to support the use of an atypical process indicating the ability to handle variations.

QA/QC procedures – those systematic procedures that are used to validate the control and testing of samples in a specified manner.

reagents – those chemicals that are used in concentration or extraction processes to enable the production of a saleable product.

representative sample – sample(s) selected to effectively capture specific chemical or physical attributes such as grade, mineralogy, hardness for domains, geometallurgical units, or designated portions of a mineral deposit.

saleable product – product that can be a concentrate, an intermediate process product (e.g. precipitate), a finished metal product (e.g., copper cathode), or bullion that can be sold into a commodities market or to an end-user.

sampling protocol – those procedures that describe how sampling is performed and to what level of diligence.

sample selection and collection – the procedure that shows how and why certain samples were collected as being representative.

sizing influences – those process characteristics that determine what equipment to use in the design.

smelting treatment – a pyrometallurgical treatment of concentrate or metal product to recover material to a product of higher marketability.

Solvent Extraction (SX) – a process in which an aqueous solution containing an element of interest is contacted with an immiscible organic solution (solvent) that preferentially extracts the element of interest, which can subsequently be removed from the solvent into an aqueous solution, allowing the solvent to be recycled and the extracted element of interest further processed.

spatial density – the level of sample concentration within a particular volume of space of the mineralized zone.

spatial location – the location of samples within the mineralized zone.

stream densities – the concentration of material mass in a slurry stream.

subject matter expert – is a person with extensive knowledge or ability based on research, experience, or occupation in a particular area of study.

summary design criteria – a basic level of design criteria used at scoping level indicating throughput, level of recovery and concentrate grade or final product quality.

supporting equipment and systems – those systems (e.g., pressurized air) that do not alter the mineralization, but which provide support to the process equipment.

sustaining capital – the periodic addition of capital to the process plant that is required to maintain operations at existing levels.

SX/EW – a two-stage process to extract metal ions from a low-grade leach solution using a solvent extraction process and then recovering the metal from the strip solution by electrowinning (EW).

tailings – uneconomic material produced by a mineral processing plant which is disposed of in a manner meeting government regulation, and which usually involves a permanent impoundment facility.

throughput – the amount of material that is processed through a facility based on an hour, a calendar day, a month or a year.

tonnage – the amount of material available in the mineralized deposit that is subject to economic processing.

variability samples – those samples, which may be point or composite, that cover the range of mineralization quality, grade, or location within the volume of the mineralized deposit that is to be treated.