

## Appendix B – Glossary of Terms Used in the Best Practice Guidelines in Mineral Processing

This appendix serves as support documentation for the CIM Best Practice for Process Guidelines as produced by the CMP. The terms are explained as they apply within these documents.

**accuracy** – the degree to which the condition (estimate in this document) is free from error

**assessment** – a determination of how a characteristic of the mineralization responds to a factor

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

**bench scale testwork** – testwork that is performed at the laboratory scale where sample mass is typically less than 10kg and can be processed in equipment handled by an individual. This level of work may range from testing within glassware to testing in small heap leach test columns

**beneficiation** – the process of upgrading material by flotation or another method into a concentrate where the minerals are not physically changed except by size

**bleed stream** – a minor stream of material that is not part of the principal process flow but is used to maintain the balance of a process

**block flow diagram** – a simplified representation of a process where there is no representation of equipment attempted

**budgetary quotations** – a request for cost information that is sent to a vendor qualified to supply either a particular type of equipment or service

**bullion** – gold or silver metal, which is formed into a bar at a high level of purity

**capital cost** – the estimate that indicates the cost of engineering, procuring and installing equipment within a facility

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

**chain of sample custody** – denotes the procedure where sample is processed through an unbroken trail of accountability that ensures the physical security to samples, data and records. This system helps to prevent accidental or willful contamination and allows the determination of who had control of the samples or information when it happened

**classification** – the process by which the characteristic (typically size) of a particle is used to direct the particle into differing streams

**comminution** – that process where the mineralization of economic interest is reduced in size from the mined size to a size suitable for concentration or extraction

**community response** – in the particular circumstance used in this document, the QP indicates if there are objections to the use of the process (e.g. cyanidation), or the tailings disposal methods, by persons in the locale of the process facilities and tailings management facilities.

**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 interests such that the grade or quality of the product is increased relative to that of the mill feed

**conceptual process development** – the level of process development that establishes a method to either concentrate minerals to a saleable level or extract metal to a saleable product level

**construction execution plan** – is typically provided in a feasibility study to refine the level of cost and time of building a facility presented in the prefeasibility level

**continuity of recovery** – where the recovery within a mineral deposit can be continuously met to an economic level considering the flow of material to the process system during the life of mine and in particular during the initial payback period of the mine

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

**credibility of testing lab** – a testing lab is considered to be credible where the QP for Process has audited the testwork directly through a visit to the testing facilities. Where a visit is not possible, the QP for Process must determine from documents provided, and from his peers and others, that the lab has a solid reputation of delivering reliable results

**cut-off grade level** – the level of grade of the economic element, which distinguishes whether the material in question is classified as waste or can be treated for an economic profit

**defensible estimate** – in this context, a defensible estimate at a prescribed study level is one where sufficient work has been performed to defend to due diligence providers the level of report accuracy

**demonstration scale work** – testwork to justify a large capital expenditure in cases where a process is novel or ore variance is extreme; a demonstration plant may be necessary 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 for comprehensive assessment

**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 that by necessity is removed along with the ore in the mining process, subsequently lowering the grade of the ore material within economic ore material

**domain** – commonly known as geometallurgical units or end members defined as mineral assemblages that have a common mineralogical feature 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** – a level of examination or approach which considers a subject to a level of detail as outlined in the NI 43-101 definition of Objective Standard of Reasonableness

**economic production cost** – the cost of producing the product, taking into account the repayment and cost of capital and that of operating costs (including off-site treatment of the product)

**environmental factors** – those factors associated with the transformation of material by processing, which subsequently requires proper disposal to comply with standards set by the controlling government jurisdiction

**equipment list** – typically a list of major equipment that is recognized to be part of the process plant and which will vary in depth and detail according to the level of study which it supports

**estimate** – the estimation of economic costs to determine the viability of building a facility and operating it

**expatriates** – the term referring to the labour component that is not native to the jurisdiction in which the mineralized body is found

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

**extraction method** – involves the use of a physical or chemical method to extract a metal by leaching or smelting to a finished metal product

**external or independent Peer Review** – that level of review conducted by peers, which confirms a reasonable interpretation of scientific and testing information to support the design

**factored comparison** – a type of estimate used at the preliminary level, which is based on comparing to an analogous situation with modification for throughput or other factors

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

**flotation** – a process used for the concentration of minerals especially within base metal systems

**geological environment** – from the perspective of process, a geological setting that implies a characteristic metallurgical response or level of complexity (e.g. Mississippian type lead ore deposits)

**grade** – the quality of the economic material within the ore expressed as a mass fraction of the material

**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** – that treatment of the material by dissolving materials in aqueous media to ultimately provide a product from mineralization

**infrastructure support** – those systems such as water, power 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** – sample is selected on the basis of its ability to represent some condition of the mineralization and this term indicates the use the sample

**intermediate metal products** – those products that are not concentrates but metal products (e.g. precipitates, etc.) that can be sold into a specialty market for transformation into a saleable product

**intermittent stream** – a stream of material that does not operate on a continual basis but which is provided to the process system to allow flexibility in the distribution of the sub-unit products

**labour** – one of the principal costs associated with defining the operating expenses of a property. It is comprised of staff and non-staff positions

**leaching** – a process used for the extraction of metals by dissolution within precious and base metal systems

**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 equipment within a process plant that either modifies or concentrates the process material

**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 costs

**measurement - Metric System** – as the NI 43-101 is a Canadian system, the Metric system of measures is used to provide quantities in the report

**measurement - US Conventional** – a widely used system of measures that is used to supplement the information provided by the Metric system

**mineral beneficiation method** – the method used to concentrate the valuable minerals into a saleable product

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

**mineralization hardness** – the resistance of the mineralization to breakage by common comminution methods such as crushing and grinding

**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, 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

**orebody complexity** – where the orebody demonstrates either a high degree of variance spatially or within domains as to process response

**peer** – that individual who has similar educational and experience to the QP for Process

**penalty elements** – those constituents of the saleable product that carry a negative economic impact or the possibility of incurring product rejection by the purchaser

**pilot plant scale work** – testwork to support design and estimation activities, which is performed continuously on a small scale, 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 at a particular piece of equipment

**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** – the description of the process facilities in graphic fashion showing major process equipment and flows

**P&IDs** – piping and instrumentation diagrams that are used to detail the interaction of flows within a process facility

**problematic material** – any material that requires a level of treatment that is beyond the level normally considered for a typical ore of that type

**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 to enable the production of a saleable product

**representative sample** – sample(s) selected to capture specific chemical or physical attributes such as grade, mineralogy and 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

**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

**summary design criteria** – a basic level of design criteria used at scoping level indicating throughput, level of recovery and concentrate grade

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

**tailings** – uneconomic material (produced by a mineral processing plant) which is disposed of in a manner meeting government regulation and which may involve a permanent impoundment facility or which may involve the discharge of material to the environment in a manner regulated by the government authority .

**throughput** – the amount of material that is processed through a facility on the basis of a calendar day, month or 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 delineate the response of the mineralized deposit due to a change in mineralization quality, grade, or location