FORM 43-101F1
TECHNICAL REPORT
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INSTRUCTIONS

(1) The objective of the technical report is to provide scientific and technical information concerning mineral exploration, development and production activities on a mineral property that is material to an issuer. This Form sets out specific requirements for the preparation and contents of a technical report. Item 25 of this Form includes additional requirements for technical reports on development and production properties.

(2) Terms used and not defined in this Form that are defined or interpreted in National Instrument 43-101 Standards of Disclosure for Mineral Projects (the "Instrument") shall bear that definition or interpretation. In particular, the terms "mineral resource" and "mineral reserve" and the categories of each are defined in the Instrument. In addition, a general definition instrument has been adopted as National Instrument 14-101 Definitions which contains definitions of certain terms used in more than one national instrument. Readers of this Form shall review both these national instruments for defined terms.

(3) The author preparing the technical report shall use the headings of the Items in this Form. If unique or infrequently used technical terms are required, clear and concise explanations shall be included.

(4) No disclosure need be given in respect of inapplicable items and, unless otherwise required by this Form, negative answers to items may be omitted. Disclosure included under one heading is not required to be repeated under another heading.

(5) The technical report is not required to include the information required in Items 6 through 11 of this Form to the extent that the required information has been previously filed in a report for the property being reported on, the previous report is referred to in the technical report and there has not been any change in the information.

CONTENTS OF THE TECHNICAL REPORT

Item 1: **Title Page** - Include a title page setting out the title of the technical report, the general location of the mineral project, the name(s) and the professional designation(s) of the authors and the effective date of the technical report.

Item 2: **Table of Contents** - Provide a table of contents listing the contents of the technical report, including figures and tables.

Item 3: **Summary** - Provide a summary which briefly describes the property, its location, ownership, geology and mineralization, the exploration concept, the status of exploration, development and operations and the author's conclusions and recommendations.

Item 4: **Introduction and Terms of Reference** - Include a description of

(a) the terms of reference;

(b) the purpose for which the technical report was prepared;

(c) the sources of information and data contained in the technical report or used in its preparation, with citations if applicable; and

(d) the extent of field involvement of the qualified person.

Item 5: **Disclaimer** - If the author of all or a portion of the technical report has relied on a report, opinion or statement of legal or other experts who are not qualified persons for information concerning legal, environmental, political or other issues and factors relevant to the technical report, the author may include a disclaimer of responsibility in which the author identifies the report, opinion or statement relied upon, the maker of that report, opinion or statement, the extent of reliance and the portions of the technical report to which the disclaimer applies.

Item 6: **Property Description and Location** - To the extent applicable, with respect to each property reported on, describe

(a) the area of the property in hectares or other appropriate units;

(b) the location, reported by section, township, range mining division or district, municipality, province, state, country and National Topographic System designation or Universal Transverse Mercator (UTM) system, as applicable, or by latitude and longitude;

(c) the claim numbers or equivalent, whether they are patented or unpatented, or the applicable characterization in the jurisdiction in which they are situated, and whether the claims are contiguous;

(d) the nature and extent of the issuer's title to, or interest in, the property including surface rights, the obligations that must be met to retain the property, and the expiration date of claims, licences or other property tenure rights;

(e) whether or not the property has been legally surveyed;

(f) the location of all known mineralized zones, mineral resources, mineral reserves and mine workings, existing tailing ponds, waste deposits and important natural features and improvements, relative to the outside property boundaries by showing the same on a map;

(g) to the extent known, the terms of any royalties, back-in rights, payments or other agreements and encumbrances to which the property is subject;

(h) to the extent known, all environmental liabilities to which the property is subject; and

(i) to the extent known, the permits that must be acquired to conduct the work proposed for the property, and if the permits have been obtained.

Item7: **Accessibility, Climate, Local Resources, Infrastructure and Physiography** - With respect to each property reported on, describe

(a) topography, elevation and vegetation;

(b) the means of access to the property;

(c) the proximity of the property to a population centre, and the nature of transport;

(d) to the extent relevant to the mineral project, the climate and the length of the operating season; and

(e) to the extent relevant, the sufficiency of surface rights for mining operations, the availability and sources of power, water, mining personnel, potential tailings storage areas, potential waste disposal areas, heap leach pad areas and potential processing plant sites.

Item 8: **History** - To the extent known, with respect to each property reported on, describe

(a) the prior ownership of the property and ownership changes;

(b) the type, amount, quantity and results of exploration and/or development work undertaken by the owners and any previous owners;

(c) historical mineral resource and mineral reserve estimates, including the reliability of the historical estimates and whether the estimates are in accordance with the categories set out in sections 1.3 and 1.4 of the Instrument; and

(d) any production from the property.

INSTRUCTION: *If a reporting system other than the one stipulated by the Instrument has been used, the author shall include an explanation of the differences and reliability.*

Item 9: **Geological Setting** - Include a description of the regional, local and property geology.

Item 10: **Deposit Types** - Describe the mineral deposit type(s) being investigated or being explored for and the geological model or concepts being applied in the investigation and on the basis of which the exploration program is planned.

Item 11: **Mineralization** - Describe the mineralized zones encountered on the property, the surrounding rock types and relevant geological controls, detailing length, width, depth and continuity, together with a description of the type, character and distribution of the mineralization.

Item 12: **Exploration** - Describe the nature and extent of all relevant exploration work conducted by, or on behalf of, the issuer on each property being reported on, including

(a) results of surveys and investigations, and the procedures and parameters relating to the surveys and investigations;

(b) an interpretation of the exploration information;

(c) a statement as to whether the surveys and investigations have been carried out by the issuer or by a contractor and, if the latter, identifying the contractor; and

(d) a discussion of the reliability or uncertainty of the data obtained in the program.

Item 13: **Drilling** - Describe the type and extent of drilling including the procedures followed and a summary and interpretation of all results. The relationship between the sample length and the true thickness of the mineralization must be stated, if known, and if the orientation of the mineralization is unknown, state this.

Item 14: **Sampling Method and Approach** - Include

(a) a description of sampling methods and details of location, number, type, nature and spacing or density of samples collected, and the size of the area covered;

(b) identification of any drilling, sampling or recovery factors that could materially impact the accuracy and reliability of the results;

(c) a discussion of the sample quality and of whether the samples are representative and of any factors that may have resulted in sample biases;

(d) a description of rock types, geological controls, widths of mineralized zones and other parameters used to establish the sampling interval and identification of any significantly higher grade intervals within a lower grade intersection;and

(e) a list of individual samples or sample composites with values and estimated true widths.

Item 15: **Sample Preparation, Analyses and Security** - Describe sample preparation methods and quality control measures employed prior to dispatch of samples to an analytical or testing laboratory, the method or process of sample splitting and

reduction, and the security measures taken to ensure the validity and integrity of samples taken, including

(a) if any aspect of the sample preparation was conducted by an employee, officer, director or associate of the issuer;

(b) details regarding sample preparation, assaying and analytical procedures used, including the sub-sample size, the name and location of the analytical or testing laboratories and whether the laboratories are certified by any standards association and the particulars of any certification;

(c) a summary of the nature and extent of all quality control measures employed and check assay and other check analytical and testing procedures utilized, including the results and corrective actions taken; and

(d) a statement of the author's opinion on the adequacy of sampling, sample preparation, security and analytical procedures.

Item 16: **Data Verification** - Include a discussion of

(a) quality control measures and data verification procedures applied;

(b) whether the author has verified the data referred to or relied upon, referring to sampling and analytical data;

(c) the nature of and any limitations on such verification; and

(d) the reasons for any failure to verify the data.

Item 17: **Adjacent Properties** - A technical report may include information concerning an adjacent property if

(a) such information was publicly disclosed by the owner or operator of the adjacent property;

(b) the source of the information and any relationship of the author of the information on the adjacent property to the issuer is identified;

(c) the technical report states that its author has been unable to verify the information and, in bold face type, that the information is not necessarily indicative of the mineralization on the property that is the subject of the technical report;

(d) the technical report clearly distinguishes between mineralization on the adjacent property and mineralization on the property being reported on; and

(e) if any historical estimates of mineral resources and mineral reserves are included in the technical report, they are disclosed in accordance with section 2.4 of the Instrument.

Item 18: **Mineral Processing and Metallurgical Testing** - Where mineral processing and/or metallurgical testing analyses have been carried out, include the results of testing and details of sample selection representativity and testing and analytical procedures.

Item 19: **Mineral Resource and Mineral Reserve Estimates** - Each technical report on mineral resources and mineral reserves shall

(a) use only the applicable mineral resource and mineral reserve categories set out in sections 1.3 and 1.4 of the Instrument;

(b) report each category of mineral resources and mineral reserves separately and if both mineral resources and mineral reserves are disclosed, state the extent, if any, to which mineral reserves are included in total mineral resources;

(c) not add inferred mineral resources to the other categories of mineral resources;

(d) disclose the name, qualifications and relationship, if any, to the issuer of the qualified person who estimated mineral resources and mineral reserves;

(e) include appropriate details of quantity and grade or quality for each category of mineral resources and mineral reserves;

(f) include details of the key assumptions, parameters and methods used to estimate the mineral resources and mineral reserves;

(g) include a general discussion on the extent to which the estimate of mineral resources and mineral reserves may be materially affected by any known environmental, permitting, legal, title, taxation, socio-economic, marketing, political or other relevant issues;

(h) identify the extent to which the estimates of mineral resources and mineral reserves may be materially affected by mining, metallurgical, infrastructure and other relevant factors;

(i) use only indicated mineral resources, measured mineral resources, probable mineral reserves and proven mineral reserves when referring to mineral resources or mineral reserves in an economic evaluation that is used in a preliminary feasibility study or a feasibility study of a mineral project;

(j) state the grade or quality, quantity and category of the mineral resources and mineral reserves if the quantity of contained metal is reported; and

(k) when the grade for a polymetallic mineral resource or mineral reserve is reported as metal equivalent, report the individual grade of each metal, and consider and report the recoveries, refinery costs and all other relevant conversion factors in addition to metal prices and the date and sources of such prices.

INSTRUCTIONS

(1) The methods and procedures to be used in estimating mineral resources and mineral reserves are the responsibility of the authors preparing the estimate.

(2) A statement of quantity and grade or quality is an estimate and shall be rounded to reflect the fact that it is an approximation.

(3) An issuer that is incorporated or organized in a foreign jurisdiction may file a technical report that utilizes the mineral resource and mineral reserve categories of the JORC Code, USGS Circular 831 or IMM system provided that a reconciliation to the mineral resource and mineral reserve categories referred to in sections 1.3 and 1.4 of the Instrument is filed with the technical report and certified by the author. The reconciliation shall also address the confidence levels required for the categorizations of mineral resources and mineral reserves.

Item 20: **Other Relevant Data and Information** - Include any additional information or explanation necessary to make the technical report understandable and not misleading.

Item 21: **Interpretation and Conclusions** - Include the results and reasonable interpretations of all field surveys, analytical and testing data and other relevant information. Discuss the adequacy of data density and the data reliability as well as any areas of uncertainty. A technical report concerning exploration information shall include the conclusions of the author. The author must discuss whether the completed project met its original objectives.

Item 22: **Recommendations** - If successive phases of work are recommended, each phase must culminate in a decision point. The recommendations shall not apply to more than two phases of work. The recommendations shall state whether advancing to a subsequent phase is contingent on positive results in the previous phase. Provide particulars of the recommended programs and a breakdown of costs for each phase. A technical report that contains recommendations for expenditures on exploration or development work on a property shall include a statement by a qualified person that, in the qualified person's opinion, the character of the property is of sufficient merit to justify the program recommended.

Item 23: **References** - Include a detailed list of all references cited in the technical report.

Item 24: **Date** - Include the effective date of the technical report on both the title page and the page of the technical report that is signed. The date of signing must also be included on the signature page.

Item 25: **Additional Requirements for Technical Reports on Development Properties and Production Properties** - Technical reports on development properties and production properties shall also include

(a) Mining Operations - information and assumptions concerning the mining method, metallurgical processes and production forecast;

(b) Recoverability - information concerning results of all test and operating results relating to the recoverability of the valuable component or commodity and amenability of the mineralization to the proposed processing methods;

(c) Markets - information concerning the markets for the issuer's production and the nature and material terms of any agency relationships;

(d) Contracts - a discussion of whether the terms of mining, concentrating, smelting, refining, transportation, handling, sales and hedging and forward

sales contracts or arrangements, rates or charges are within market parameters;

(e) Environmental Considerations - a discussion of bond posting, remediation and reclamation;

(f) Taxes - a description of the nature and rates of taxes, royalties and other government levies or interests applicable to the mineral project or to production, and to revenues or income from the mineral project;

(g) Capital and Operating Cost Estimates - capital and operating cost estimates, with the major components being set out in tabular form;

(h) Economic Analysis - an economic analysis with cash flow forecasts on an annual basis using proven mineral reserves and probable mineral reserves only, and sensitivity analyses with variants in metal prices, grade, capital and operating costs;

(i) Payback - a discussion of the payback period of capital with imputed or actual interest;

(j) Mine Life - a discussion of the expected mine life and exploration potential.

Item 26: Illustrations

(a) Technical reports shall be illustrated by legible maps, plans and sections. All technical reports shall be accompanied by a location or index map and more detailed maps showing all important features described in the text. In addition, technical reports shall include a compilation map outlining the general geology of the property and areas of historical exploration. The location of all known mineralization, anomalies, deposits, pit limits, plant sites, tailings storage areas, waste disposal areas and all other significant features shall be shown relative to property boundaries. Maps, drawings and diagrams that have been created by the author, in whole or in part, and that are based on the work that the author has done or supervised, shall be signed and dated by the author. Where information from other sources, either government or private, is used in preparing these maps or diagrams, the source of the information shall be named.

(b) If adjacent or nearby properties have an important bearing on the potential of the property under consideration, their location and any mineralized

structures common to two or more such properties shall be shown on the maps.

(c) If the potential merit of a property is predicated on geophysical or geochemical results, maps showing the results of surveys and their interpretations shall be included in the technical report.

(d) Maps shall include a scale in bar form and an arrow indicating North. Information taken from government maps or from drawings of other engineers or geoscientists shall be acknowledged on the map.