Exploration Data and Exploration Targets

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INTRODUCTION

In 2016 the concept of Exploration Results, Exploration Targets and Mineralisation was presented at the SAMREC/SAMVAL Companion Volume Conference (Emperors Palace). This was an explanation of Clauses 20-22 of the 2016 SAMREC Code. It was subsequently published in the December 2017 edition of the Journal of the Southern African Institute of Mining and Metallurgy (Marshall, 2017). Over the last four years, a number of issues have arisen as to the understanding of especially the terms Exploration Data and the Exploration Targets that they support. This paper seeks to clarify those concepts.

In a presentation in 2020 (Jeffress, 2020), it was noted that Exploration Results can have a significant effect on Company valuations, with company share prices often jumping substantially on the announcement of positive results. This comment highlights how important the public perception and impact of exploration data and results can be to a minerals company. Consequently, it is fundamentally important that authors and readers alike understand the concepts, especially with respect to the level of confidence that can be ascribed to terms.

Exploration Data and Information

The term "exploration data and information" is introduced in Clause 20 of the 2016 SAMREC Code (SAMREC, 2016). It is the data relating to survey, geological, geophysical, geochemical, sampling, drilling, trenching, analytical testing, assaying, mineralogical, metallurgical and other information, where available. Diamond-specific data may include information relating to microdiamond recoveries, kimberlitic indicator minerals ("KIMs), diamond sales/values and size frequency distribution ("SFDs"). Coal-specific data may include information on moisture content, volatiles, ash, sulphur content and calorific values. Even historical data and data from adjacent or nearby properties may be included under specific circumstances, as noted in Clause 20.

There is a subtle difference between data and information. Data are the facts or details from which information is derived. Individual pieces of data are rarely useful alone. For data to become information, data needs to be put into context. Data are simply unprocessed facts or figures which may contain bits of information. When data are processed, interpreted, organized, structured or presented so as to make them meaningful or useful, they are called information. Information provides context for data (Diffen, 2020). For the purposes of this paper, however, the term "data" will be used to include both data and information.

In any exploration programme, exploration data is typically generated in two phases – desktop study and initial prospecting/reconnaissance programme. In some cases, these phases for two separate operations and in other instances, they may run concurrently and be combined in one "exploration programme". This concept is fundamental to understanding the relationships between exploration

data and exploration targets – which one comes first, and which one supports the other. One of the most common misunderstandings is whether "exploration data supports an exploration target or if a target has to exist to create exploration data?" The simple answer is – both!

Figure 1 is a simplified infographic that shows how exploration data and information are related to both Conceptual Exploration Targets and Pre-Resource Mineralisation. Exploration data and information included in and/or generated by desktop studies can be used to generate or identify Conceptual Exploration Targets, in which case, the data comes before and supports the Target. Once the Target has been identified, it can be prospected, leading to the generation of actual, project-specific data and information – the Target comes before and supports the data/information. Such data and information can then be used to support Pre-Resource Mineralisation, itself an "advanced" Exploration target. This idealised straight-line progression is simplified for the sake of explanation – in reality, of course, there would be multiple feedback loops at all stages of the process.

Both varieties of data and targets are useful for major and junior companies to report exploration progress or identify their exploration pipeline in a public document.

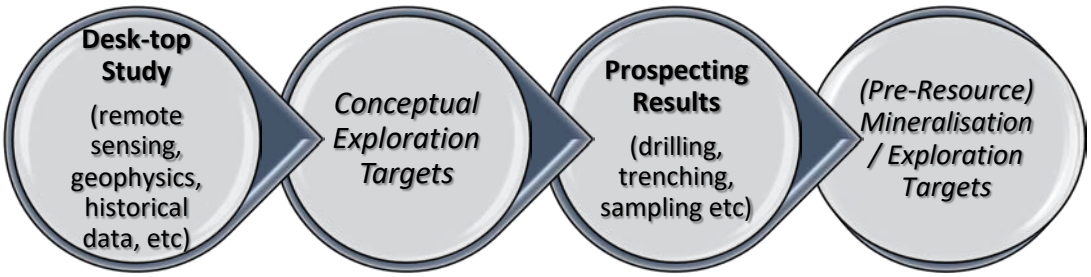

Figure 1 Exploration Data/Information is typically generated in two phases – through a desk-top study and through a prospecting programme.

Desk-Top Studies and Conceptual Exploration Targets

The data that is generally gathered in a desktop study typically includes different scales of satellite imagery, aerial reconnaissance, geophysical surveys, historical results, data from known deposits and various types of geological and mineralisation models. It may also include regional soil or river sampling grids, extensive KIM sampling programmes (in the case of a kimberlite exploration programme) to try and identify a plot of land or concession on which a conceptual exploration target might exist. In other instances, it might include the generation of theoretical brownfields targets adjacent to an already existing mine.

The emphasis in this phase of target generation is to identify areas that can be prospected further – Conceptual Exploration Targets. Such targets (SAMREC Code Clause 21) need not represent any discovered mineralisation and need not imply reasonable prospects for eventual economic extraction ("RPEEE"). In other words, this variety of Exploration Target may be purely conceptual or theoretical, with the proviso that there must be a realistic likelihood that the commodity and mineralisation type could occur in the specified target area.

Whilst RPEEE does not need to exist at the conceptual exploration target stage, it would be foolhardy (but not contrary to the letter of SAMREC) for a company to generate targets in an area where such is unlikely to occur at any stage – for example, a company that generates targets in the Amazon

rainforest or the centre of a large metropolitan area may simply be looking for trouble, since they may never be able to convert such targets into Mineral Resource projects. *"Pie-in-the-sky"* projects – projects that refer to theoretical targets that also are unrecoverable (i.e. have no RPEEE in the foreseeable future), such as mining asteroids in space, recovering sulphur from fumaroles, extracting gold and silver from geysers, or mining diamonds at 100km depth may not be reported in a Public Report. Such undiscovered and unrecoverable projects (including those that may never approach RPEEE) would best be described in terms of the United Nations Framework Classification (UNFC) as part of the company's inventory and not reported in a Public document.

Historical data and data from adjacent or nearby properties may be included if the Competent Person can justify their use. If information from an adjacent property is being used to justify the generation of a target along strike, then some physical evidence of assumed continuity must also be provided. Simply because a project property is adjacent to an existing mine (or known geological occurrence) does not, in itself, provide justification of continuity. History is littered with examples where structural features have resulted in mineralised zones not being where they may have otherwise been expected. The term "some physical evidence" is not defined in SAMREC but needs to be explained and justified by the Competent Person in respect of each individual project.

Conceptual Targets may also include anomalies generated by non-invasive prospecting techniques such as (but not limited to) local geophysical, geochemical or mineralogical surveys on a property owned by a company or individual. Any of these anomalies remain purely conceptual until they have been supported by exploration (i.e., by identification of outcrop, drilling, trenching and sampling, etc.). For the avoidance of doubt – even geophysical anomalies down- or along-strike of an existing geological feature or orebody, remain purely target features until confirmed by drilling (or similar).

Using the applicable data and information a conceptual target can be identified. When describing it in a Public Report, the Competent Person must:

- Clearly describe the rationale for the selection (or identification) of the target, including the geological model on which it is based, as well as justification for any statements of conceptual quantity and quality.
- Include the intended exploration work programme to explore for the target, detailing the extent of the proposed exploration activities, the planned timeframe and the anticipated costs.
- Provide a rationale for any conceptual or target quantities and qualities that may be expected.

Physical Prospecting and Pre-Resource Exploration Targets (Mineralisation)

Once a conceptual target has been identified, physical prospecting takes place to verify that the target exists and begins to obtain data regarding quantity and quality that may eventually lead to the estimation of a Mineral Resource. Until sufficient technical data has been collected and RPEEE has been identified, the Exploration Target may not be described as a Mineral Resource (not even as a "low-confidence Mineral Resource", which term is not SAMREC-compliant).

SAMREC has introduced the term "Mineralisation" to describe this variety of Exploration Target. Mineralisation is defined as "*a concentration (or occurrence) of material of possible economic interest, in or on the Earth's crust, for which quantity and quality cannot be estimated with sufficient confidence to be defined as a Mineral Resource"* (SAMREC Clause 21). Since RPEEE need not be demonstrated yet, Mineralisation is still not classified as a Mineral Resource and can only be reported in Public Reports under Exploration Results.

Any statements of potential quantity, quality and content of Mineralisation (Pre-Resource Mineralisation, Exploration Target) must:

- Be substantiated, including a detailed explanation of the basis for the statement and a description

of the process used to determine the grade and tonnage/volume ranges used

- Include a proximate statement with the same prominence, that the potential quantity, quality and content, as appropriate, are conceptual in nature, that there has been insufficient exploration to define a Mineral Resource and that it is uncertain if further exploration could result in the determination of a Mineral Resource.

Where a statement includes information relating to quantities and qualities, these must be presented as ranges and must be presented as approximation reflecting the lack of reliable data. The term "ranges" has no statistical significance and refers only to the variation between the lowest and highest relevant Exploration Results.

An example of reporting of Exploration Results containing both Conceptual Exploration Targets and pre-Resource Mineralisation is the 2018 press release by Five Star Diamonds Limited regarding their Catalao Project in Goias State, Brazil (Intrado Global Newswire), 2018). This press release makes reference to the discovery of (*inter alia*) four Exploration Targets CAT-11A, B, C and E (Figure 2). This diagram highlights two geophysical anomalies (CAT-11A and B) that have been identified as kimberlite pipes by drilling and two anomalies (CAT-11C and E) that have not been drill tested and are referred to only as targets.

If these targets were being reported under SAMREC, the drilled pipes could be classified as (pre-Resource) Mineralisation, while the anomalies would be Conceptual Exploration Targets. All features would still be reported under Exploration Results. If the company chose to disclose information on potential volumes, grades and values, they would describe any geophysical survey data, KIM data, drillhole results, microdiamond analyses, etc. and possible correlations of these data with CAT-01 (nearby kimberlite for which a CIM-compliant Indicated Mineral Resource is available).

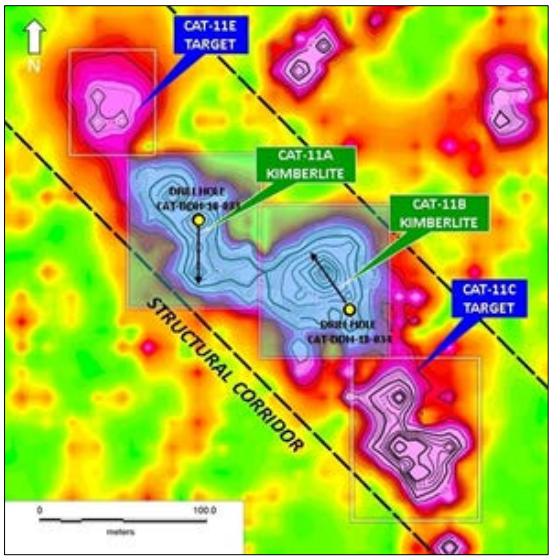

Figure 2 Magnetic response over CAT-11 targets/pipes (Intrado Global Newswire, 2018)

REPORTING REQUIREMENTS FOR EXPLORATION RESULTS

These have been detailed in Marshall (2017) and will be summarised (quoted) here for ease of reference.

In terms of Clause 21, anything classified as an Exploration Target must not be expressed so as to be misrepresented or misconstrued as an estimate of a Mineral Resource or Mineral Reserve. Details of the Exploration Target may not form part of a Mineral Resource statement or be included in a tabulation of Mineral Resources or Mineral Reserves. Exploration Targets may not be included in a Technical Study (at Scoping, Pre-Feasibility, or Feasibility level) and may not be converted to Mineral Reserves (Clauses 21, 43-46). They may not be included in economic assessments or discounted cash flow (DCF) models, nor be included in valuations based on Income Approaches. Given the levels of uncertainty surrounding the supporting data, the quantity (volume or tonnage) or quality (grade and value) of an Exploration Target may not be reported as a 'headline statement' in a Public Report (Clause 22).

When discussing Exploration Targets, the CP must clearly describe the rationale for such selection, including the geological model on which it is based. Any statement referring to potential quantity, quality, and content, as appropriate, must be substantiated and include a detailed explanation of the basis for the statement. This must be followed by a proximate statement, with the same prominence, that the potential quantity, quality, and content, as appropriate, are conceptual in nature, that there has been insufficient exploration to define a Mineral Resource and that it is uncertain if further exploration could result in the determination of a Mineral Resource. 'Same prominence' is defined as the same font type and size and 'proximate location' is defined as the cautionary statement being included in the same paragraph as, or immediately following, the reported statement. The cautionary statement may not be by way of a footnote, nor will a general disclaimer elsewhere in the disclosure document satisfy this requirement. This cautionary statement must, further, be made each time the statement of potential quantity, quality, and content is presented.

Any statement referring to quantity and quality must reflect the lack of reliable data. Where the statement includes information relating to ranges of tonnages and grades, these must be represented as approximations. The conceptual nature of the statements must be expressed either through the use of 'order of magnitude', including appropriate descriptive terms (such as 'approximately', 'in the order of', etc.) or as 'ranges', which is defined as the variation between the lowest and highest relevant Exploration Results – the use of ranges in this context has no statistical relevance.

Estimates of potential quantity and quality should, preferably, be made in terms of volume (or area) and not mass/tonnage. If, however, target tonnages are reported, then the preliminary estimates, or the basis of assumptions, made for bulk density must be stated. The explanatory text must include a description of the process used to determine the grade and tonnage ranges describing the Exploration Target or Mineralisation.

Appropriate rounding should be used to express the level of uncertainty of the estimates. By way of example, 'approximately one to two million tons at a grade of 3-5% Cu' or 'an Exploration Target of more than 100 million tons of coal in excess of 16 MJ/kg for power generation markets' would be acceptable, but not "2 ±0.2 million tonnes". When estimates are quoted, statements of both quantity and quality must be provided. It is not permissible to quote one without the other.

In addition, any discussion of Exploration Targets must include the intended exploration work programme to explore for the target, detailing the extent of the proposed exploration activities, the planned timeframe, and the anticipated costs. Public Reporting of an Exploration Target shall not be done unless supported by exploration. Without an explicit exploration work programme, Public Reporting of an Exploration Target must be regarded as being solely speculative (Clause 21).

Clause 20 further notes that in discussions of Exploration Targets on properties adjacent to, or nearby, properties of known mineralisation, at least some physical evidence of assumed continuity of the mineralisation on the property of interest must be presented by the CP.

Fundamentally, Public Reports of Exploration Results must contain sufficient information to allow a considered and balanced judgement of their significance (Jeffress, 2020). If authors of such reports understand the nuances of the data and information that go into generating the targets that comprise/contribute to such Exploration Results, then it will be to their own advantage and that of their readers and investors.

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