Proposed Improvements to NI-43-101

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Background

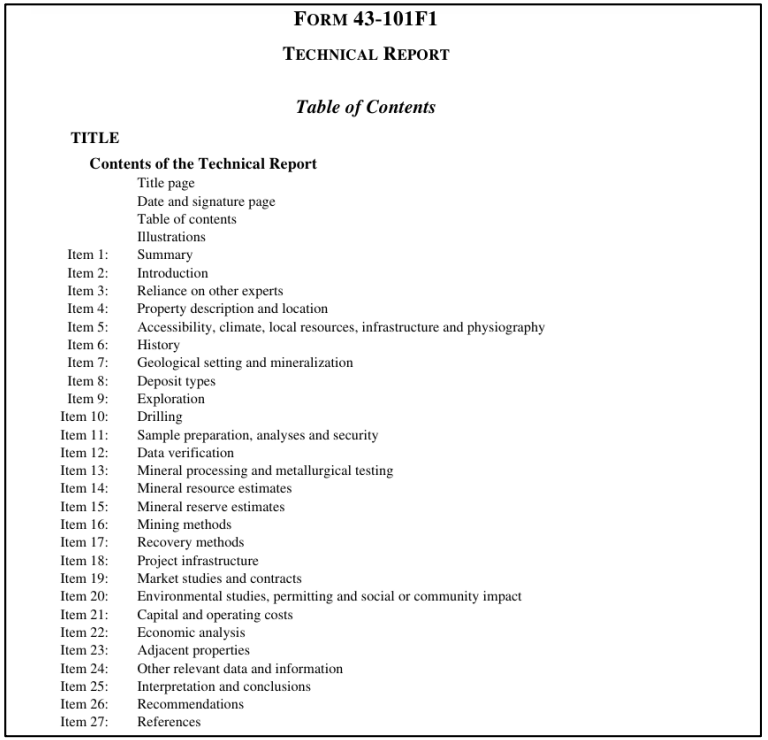
- In 1993, Bre-X Minerals claimed a huge gold discovery in Busang, Indonesia, sending its market value soaring from a few million dollars to nearly $6 billion as reported gold resources ballooned and its share price rocketed.
- Skepticism grew in 1997 when Bre-X resisted major partners, and due diligence drilling by Freeport-McMoRan revealed that Bre-X's spectacular assay results were not reproducible and had likely been fabricated by "salting" samples, exposing the discovery as a fraud that cost investors millions.
- The scandal highlighted serious weaknesses in mining disclosure and regulation, prompting the Canadian Securities Administrators to develop and implement National Instrument 43-101 in 2001, mandating standardized reporting, CIM-compliant resource and reserve definitions, and oversight by Qualified Persons.
- Subsequent amendments in 2005 and 2011 refined key definitions (e.g., historical estimates, early-stage exploration properties, acceptable foreign codes) and enhanced Form F1 to better address advanced projects and economic studies.
- Although NI 43-101 has remained unchanged since 2011, a 2022 CSA consultation paper signaled further revisions to address stakeholder concerns, and the authors now propose recommendations for consideration in the anticipated update.

Problem Statement

- The authors support using a structured template for NI 43-101 technical reports but argue that the current Form F1, unchanged since 2011, now needs updating and enhancement.
- They believe the existing table of contents, while broadly covering most mining projects, omits key aspects, particularly for advanced projects, such as geotechnical design, waste management, and mine closure, which warrant dedicated chapters given their economic, safety, and ESG importance.
- They also contend that the chapter order is illogical, noting that reserves should be reported only after mine planning and economic analysis, not before.
- Finally, they suggest that the numerous geology-focused chapters could be streamlined into fewer sections to improve clarity and efficiency without sacrificing technical rigor.

Technical Report: Objective

"The objective of the technical report is to provide a summary of material scientific and technical information concerning mineral exploration, development, and production activities on a mineral property that is material to an issuer. This Form (Form 43-101F1) sets out the requirements for the preparation and content of a technical report."



FORM 43-101F1

TECHNICAL REPORT

Table of Contents

TITLE

Contents of the Technical Report

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Current Outlines

- Form 43-101F1, prescribes a 27-chapter table of contents for Technical Reports.
- Chapters are defined as “Mandatory” and “Advanced Properties”,
- Items 1–14 and 23–27 are mandatory for all reports and items 15–22 required only for advanced property reports such as PEAs, PFSs, and FSs (with PEAs potentially omitting some of 15–22).
- The chapters can be grouped into four thematic blocks:
  - chapters 1–6, covering summary, introduction, and general information;
  - chapters 7–12 and 14, focused on geology and exploration;
  - chapters 13 and 15–22, addressing engineering and economic aspects; and
  - four final chapters dealing with conclusions, recommendations, and references.
- The Form explicitly requires authors to follow this prescribed table of contents when preparing Technical Reports.

	Form 43-101F1 Technical Report, Table of Contents	Current Reporting Requirement[1]
1	Summary	Mandatory
2	Introduction	Mandatory
3	Reliance on Other Experts	Mandatory
4	Property Description and Location	Mandatory
5	Accessibility, Climate, Local Resources, Infrastructure and Physiography	Mandatory
6	History	Mandatory
7	Geological Setting and Mineralization	Mandatory
8	Deposit Types	Mandatory
9	Exploration	Mandatory
10	Drilling	Mandatory
11	Sample Preparation, Analyses and Security	Mandatory
12	Data Verification	Mandatory
13	Mineral Processing and Metallurgical Testing	Mandatory
14	Mineral Resource Estimates	Mandatory
15	Mineral Reserve Estimates	Advanced Properties
16	Mining Methods	Advanced Properties
17	Recovery Methods	Advanced Properties
18	Project Infrastructure	Advanced Properties
19	Market Studies and Contracts	Advanced Properties
20	Environmental Studies, Permitting and Social or Community Impact	Advanced Properties
21	Capital and Operating Costs	Advanced Properties
22	Economic Analysis	Advanced Properties
23	Adjacent Properties	Mandatory
24	Other Relevant Data and Information	Mandatory
25	Interpretation and Conclusions	Mandatory
26	Recommendations	Mandatory
27	References	Mandatory

Proposed Changes

	Form 43-101F1: Technical Report, Table of Contents
1	Summary
2	Introduction
3	Reliance on Other Experts
4	Property Description and Location
5	Accessibility, Climate, Local Resources, Infrastructure and Physiography
6	History
7	Geological Setting and Mineralization
8	Deposit Types
9	Exploration
10	Drilling
11	Sample Preparation, Analyses and Security
12	Data Verification
13	Mineral Processing and Metallurgical Testing
14	Mineral Resource Estimates
15	Mineral Reserve Estimates
16	Mining Methods
17	Recovery Methods
18	Project Infrastructure
19	Market Studies and Contracts
20	Environmental Studies, Permitting and Social or Community Impact
21	Capital and Operating Costs
22	Economic Analysis
23	Adjacent Properties
24	Other Relevant Data and Information
25	Interpretation and Conclusions
26	Recommendations
27	References

	Proposed changes for Form 43-101F1: Technical Report, Table of Contents
1	Summary
2	Introduction
3	Reliance on Other Experts
4	4+5+23: Property Description
5	History
6	7+8: Geology
7	9+10+11+12: Exploration
8	Mineral Resource Estimates
9	Mineral Processing and Metallurgical Testing
10	Recovery Methods
11	Ground Engineering
12	Mining (input parameters, optimization, designs and scheduling)
13	Project Infrastructure and general site layout
14	Waste management (tailing, waste rocks, water, closure, etc.)
15	Environmental Studies, Permitting and Social or Community Impact
16	Mine closure
17	Capital and Operating Costs
18	Market Studies and Contracts
19	Other Relevant Data and Information
20	Economic Analysis
21	Mineral Reserve Estimates
22	Interpretation and Conclusions
23	Recommendations
24	References

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Unchanged Items

The following items are in good standing and do not require major changes or modifications. However, their order in the table of contents may need adjustment.

- Item 1 “Summary”
- Item 2 “Introduction”
- Item 3 “Reliance on Other Experts”
- Item 6 “History”. This item will be moved up to item 5.
- Item 13 “Mineral Processing and Metallurgical Testing”. This item will be moved up to item 8.
- Item 14 “Mineral Resource Estimate”. This item will be moved to item 10.
- Item 15 “Mineral Reserve Estimate”. This item will be moved to item 21.
- Item 16 “Mining Methods”. This item will be moved to item 12.
- Item 17 “Recovery Methods”. This item will be moved to item 11.
- Item 18 “Project Infrastructure”. This item will be moved to item 13.
- Item 19 “Market Studies and Contracts”. This item will be moved to item 18.
- Item 20 “Environmental Studies, Permitting and Social or Community Impact”. This item will be moved to item 15
- Item 21 “Capital and Operating Costs”. This item will be moved to item 17.
- Item 22 “Economic Analysis”. This item will be moved to item 20.
- Item 24 “Other Relevant Data and Information”. This item will be moved to item 19.
- Item 25 “Interpretation and Conclusions”. This item will be moved to item 22.
- Item 26 “Recommendations”. This item will be moved to item 23.
- Item 27 “References”. This item will be moved to item 24.

Merged Items

- Item 4 is the initial chapter that describes the property and provides information about its location. Since items 5 and 23 also cover closely related information, they can be merged into a single chapter with item 4.
  - Item 23 “Adjacent Properties” can be a subsection of item 4 “Property Description and Location”.
  - Also, item 5 “Accessibility, Climate, Local Resources, Infrastructure and Physiography” can be merged with item 4.

- For ease of use, the authors recommend naming item 4 "Property Description."

Merged Items

- Item 7 is the initial chapter that describes the geological setting and mineralization, followed by Item 8, which details deposit types. These two items can be combined into a single item, as both subjects are closely related.

- Items 9 to 12 pertain to exploration activities, including drilling, sampling, and quality control. As these topics are all part of the same activity in the process of developing a mining project, they can be consolidated into a single item.

Added Items

- The geotechnical aspects of the project and waste management are two major areas that are inadequately represented in the NI-43-101 reports. Each of these areas has independent Qualified Persons (QPs) responsible for them.
- Currently, geotechnical engineering is typically reported under the mining sections, while waste management is included in the environmental section.
- These two fundamental areas deserve greater weighting, so we recommend creating separate chapters for each instead of including them in other chapters. This change will enhance the transparency of the reports and make it easier for readers to locate the subjects they are interested in. Therefore, we suggest adding the following items:
  - Item 11: Ground engineering
  - Item 14: Waste management
  - Item 16: Mine closure

Ground Engineering

- This chapter would discuss the formulation of the ground engineering input parameters for the mine design. This includes related technical information on the site setting, investigations, data collection, testwork, ground characterization, spatial modelling, design, and analyses conducted.
  - Describe the methodology used in the assessment of the project.
- Note that the term ‘Ground Engineering’ has been used because the related disciplines can be variably referred to with titles such as geotechnical engineering, soil mechanics, rock mechanics, geological engineering, depending on factors such as property ground conditions, jurisdiction and personal preference.

Waste Management

- This chapter is to discuss the current or proposed waste management planning and designs that ensure physical and chemical stability over the planned life of each facility.
- Associated water management designs are also to be provided. The design basis (including geotechnical specifications) of the potential tailing dams, low grade ore stockpiles, waste rock dumps, overburden stockpiles and any other waste facilities is to be discussed in this chapter.
- Site-specific geochemical management criteria for metal leaching and acid rock drainage (ML/ARD) potential used to manage wastes are also described.
- Operating and capital cost assessment for waste and water management are to be providing including costs for water treatment if required.

Mine Closure

- In this chapter, the design basis for closure is to be provided (for example, LDI 2024) including requirements for end land use, reclamation and environmental criteria such as water, air quality and visual objectives for mine closure are to be described.
- The design basis must consider expectations of indigenous peoples, regulators, and other rightsholders.
- A closure cost estimate is to be provided.

Proposed Table of Contents

- The chapters are arranged in a more logical sequence that better reflects the progression of a mineral resource and mining project.
- Related items are consolidated, making the document easier to follow and reducing repetition.
- New stand-alone chapters have been introduced to fully address key elements that are essential to a mining project.

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