



Mineral Reserves Reporting

A retrospective look at where we've been, where we are today, and ethics in reserves reporting



Outline

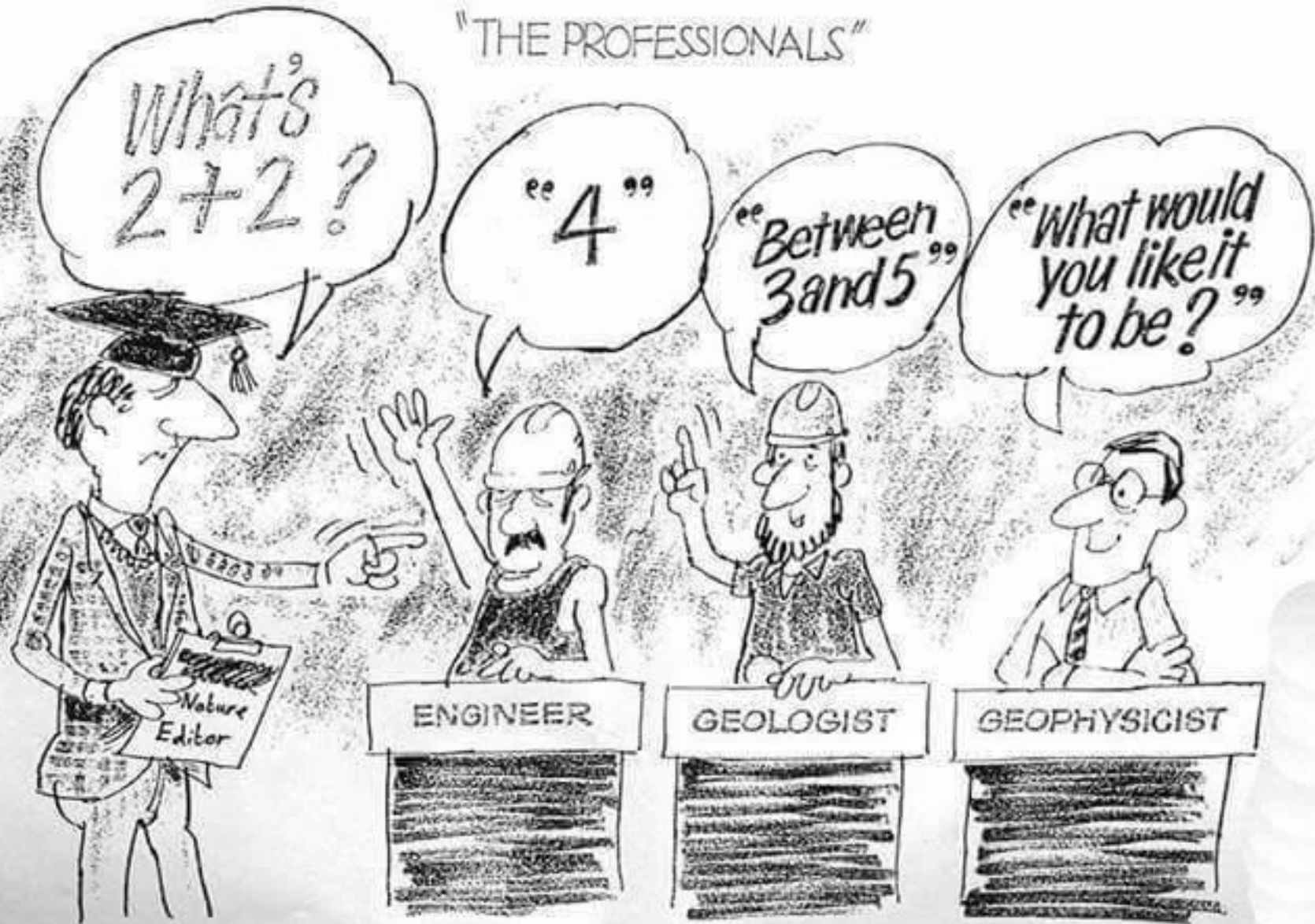
- Resources & Reserves Reporting
 - Historical templates & guides: *The evolving paradigms and why we should care.*
- SEC Industry Guide 7 Update
- General Reporting
 - Requirements for Competent Persons
 - The Liability Paradigm
 - Ethics in reporting

Presenter's Notes

- This presentation presents the views of Brian Groff, and is not a presentation of/by the SME.
- The views herein represent an interpretation of the evolution of mineral reserves reporting, and the current CRIRSCO family of codes
- Insomuch as is possible, all statements herein are supported in the factual records
- Other Competent Persons may have differing views, especially those from other industries or other reporting jurisdictions than one's own.

MY OWN PARADIGM ON RESOURCE AND RESERVES HAS CHANGED OVER THE PAST SEVERAL YEARS, AND ESPECIALLY OVER THE PAST YEAR!!

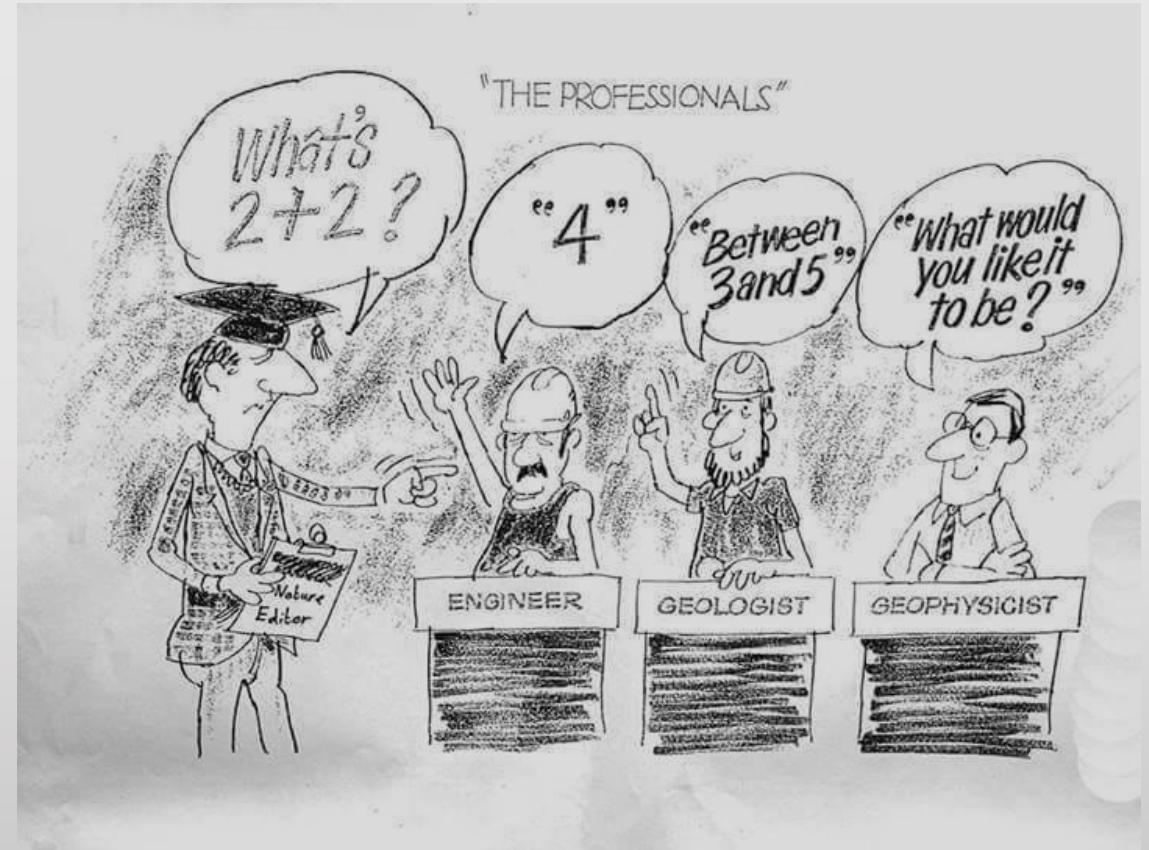
"THE PROFESSIONALS"



As Engineers, we are taught that any answer we provide must be correct, and that all material assumptions must be stated with transparency.

As Competent/Qualified Persons, we cannot classify mineral reserves with assumptions or conditions in place that leave doubt about the ability to extract the resource under consideration. Our job is to establish certainty.

Reserves, by definition, require the highest level of confidence in reporting. **However, there is uncertainty in any estimate. They are all wrong, either too high or too low. The greater the amount of time involved in the estimated mine life, the greater the amount of uncertainty.**





Mineral Reserves Reporting

- USGS Circular 831: Principles of a Resource/Reserve Classification for Minerals
 - Published in 1980, Replaced USGS Bulletin 1450-A (1976)
 - Emphasized reporting of both geologic and economic factors.
- USGS Circular 891: Coal Resource Classification System of the USGS
 - Published in 1983, Replaced USGS Bulletin 1450-B (1976)
 - Bulletin 1450-B contained depth and thickness requirements for coal classification.
 - Basis for the familiar ¼-mile, ¾-mile, and 3-mile ranges from drillholes for classification into measured, indicated, and inferred categories.
 - Hypothetical and speculative categories exist beyond 3-miles.
 - Hierarchy of Coal Resources and Reserves

Resource/Reserve Classification

Principles of a Resource/Reserve Classification for Minerals

Through the years, geologists, mining engineers, and others operating in the minerals field have used various terms to describe and classify mineral resources,... Some of these terms have gained wide use and acceptance, although they are not always used with precisely the same meaning.

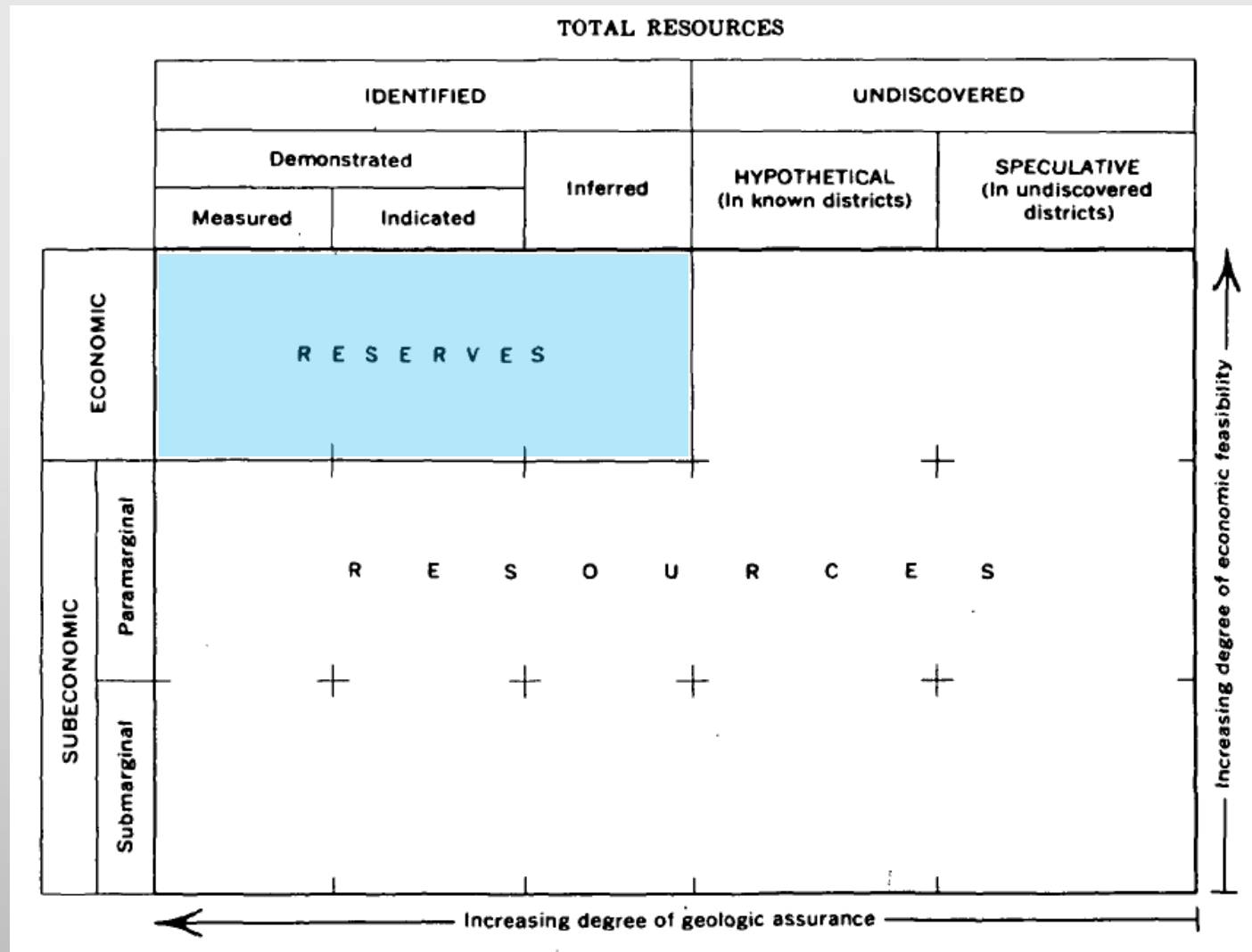
Staff members of the U.S. Bureau of Mines and the U.S. Geological Survey collect information about the quantity and quality of all mineral resources, but from different perspectives and with different purposes.



Sample Site Spacing

PRB Coal example	USGS/USBM Circ. 891, etc.	Mining Industry SME, SEC, etc.
Measured/ Proven	0.25 mile	0.125 mile
Indicated/ Probable	0.75 mile	0.5 mile
Inferred/ Possible	3.0 miles	Too speculative

1976 Classification (1450-A)



1980 Classification (Circ. 831)

RESOURCES OF (commodity name)

[A part of reserves or any resource category may be restricted from extraction by laws or regulations (see text)]

AREA: (mine, district, field, State, etc.) UNITS: (tons, barrels, ounces, etc.)

Cumulative Production	IDENTIFIED RESOURCES		UNDISCOVERED RESOURCES		
	Demonstrated		Inferred	Probability Range (or)	
	Measured	Indicated		Hypothetical	Speculative
ECONOMIC	Reserves		Inferred Reserves	+	-
MARGINALLY ECONOMIC	Marginal Reserves		Inferred Marginal Reserves	+	-
SUB- ECONOMIC	Demonstrated Subeconomic Resources		Inferred Subeconomic Resources	+	-

Other Occurrences	Includes nonconventional and low-grade materials
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Author: _____ Date: _____

(1981) Form S-18 and (1992) Securities Act Industry Guide 7

Guide 7.

(a) *Definitions.* The following definitions apply to registrants engaged or to be engaged in significant mining operations:

- (1) *Reserve.* That part of a mineral deposit which could be economically and legally extracted or produced at the time of the reserve determination.

Note: Reserves are customarily stated in terms of “ore” when dealing with metalliferous minerals; when other materials such as coal, oil, shale, tar, sands, limestone, etc. are involved, an appropriate term such as “recoverable coal” may be substituted.

- (2) *Proven (Measured) Reserves.* Reserves for which (a) quantity is computed from dimensions revealed in outcrops, trenches, workings or drill holes; grade and/or quality are computed from the results of detailed sampling and (b) the sites for inspection, sampling and measurement are spaced so closely and the geologic character is so well defined that size, shape, depth and mineral content of reserves are well-established.
- (3) *Probable (Indicated) Reserves.* Reserves for which quantity and grade and/or quality are computed from information similar to that used for proven (measure) reserves, but the sites for inspection, sampling, and measurement are farther apart or are otherwise less adequately spaced. The degree of assurance, although lower than that for proven (measured) reserves, is high enough to assume continuity between points of observation.
- (4)
 - (i) *Exploration State* — includes all issuers engaged in the search for mineral deposits (reserves) which are not in either the development or production stage.
 - (ii) *Development Stage* — includes all issuers engaged in the preparation of an established commercially minable deposit (reserves) for its extraction which are not in the production stage.
 - (iii) *Production Stage* — includes all issuers engaged in the exploitation of a mineral deposit (reserve).

1980 Classification: Translated to IG7

RESOURCES OF (commodity name)
 [A part of reserves or any resource category may be restricted from extraction by laws or regulations (see text)]
 AREA: (mine, district, field, State, etc.) UNITS: (tons, barrels, ounces, etc.)

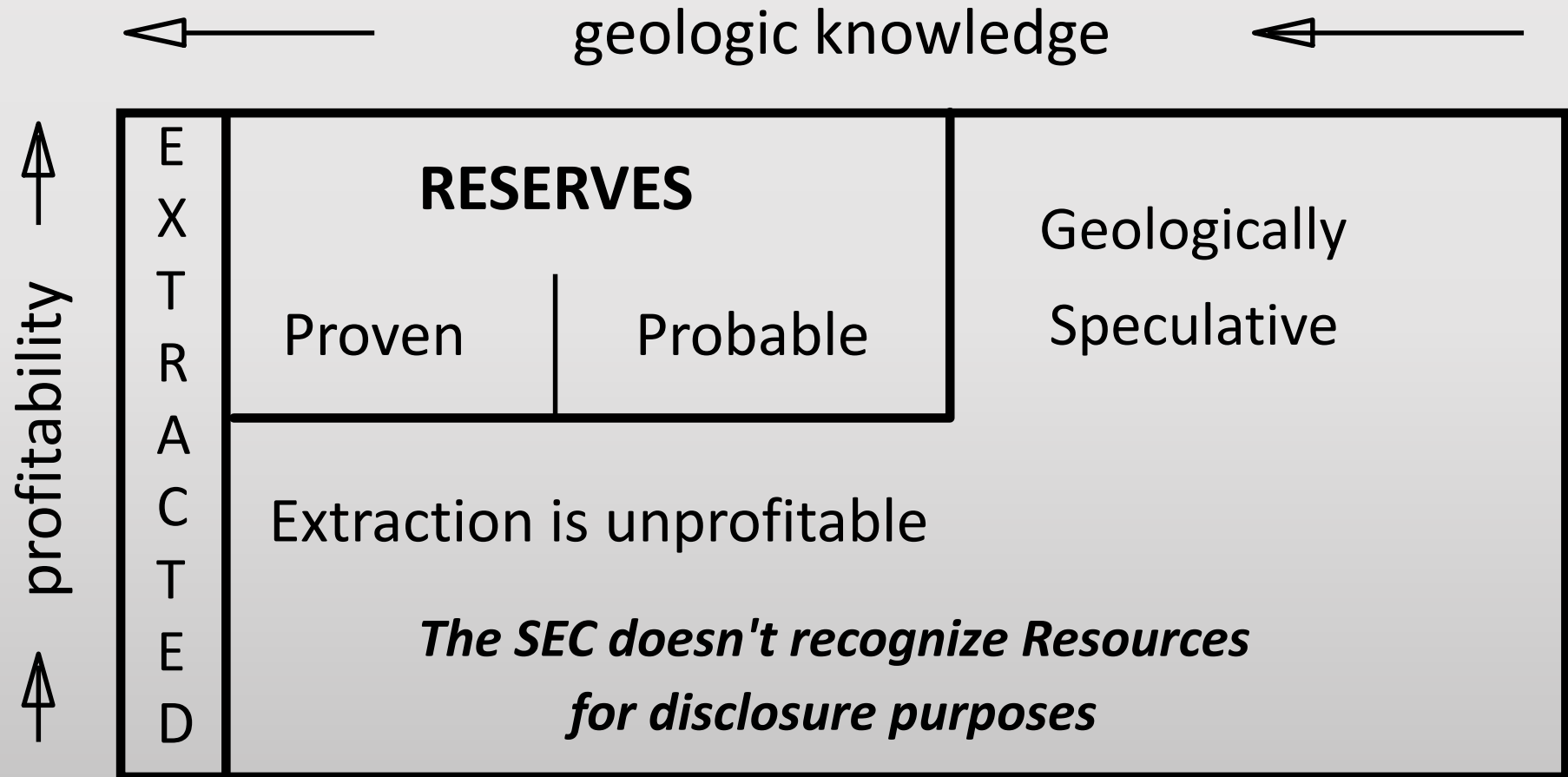
Cumulative Production	IDENTIFIED RESOURCES			UNDISCOVERED RESOURCES	
	PROVEN / PROBABLE		Inferred	Probability Range (or)	
	Measured	Indicated		Hypothetical	Speculative
ECONOMIC	Reserves		Inferred Reserves	+	-
MARGINALLY ECONOMIC	Marginal Reserves		Inferred Marginal Reserves		
SUB-ECONOMIC	Demonstrated Subeconomic Resources		Inferred Subeconomic Resources	+	-

Other Occurrences Includes nonconventional and low-grade materials

Author: _____ Date: _____

Cannot report Resources!

SEC Reserve Chart



Source: David Abbott, Jr., CPG – Consulting Geologist LLC



From the SEC

In reporting reserves you are limited to the terms "reserve," "proven reserves," and "probable reserves," as defined in Industry Guide 7. Do not use other terms or systems of reporting reserves, such as "geological reserves," "demonstrated reserves," or "reserve base." Also, reserves must be adequately drilled, sampled and characterized such that the size, shape, depth and coal content is established in accordance with industry criteria for proven and probable reserves.

Sample Letter Sent to Coal Mine Operators

The following letter on was sent on February 22, 2001 to registrants identified as being primarily coal mine owners or operators. All registrants with coal mining subsidiaries or operations should consider this letter in the preparation of their filings with the Commission.

Name
Chief
XYZ
Address

Financial

Officer
Corporation

Dear Chief Financial Officer:

This letter pertains to all registrants who own or operate coal mines and properties, and who are required to file periodic reports with the SEC. We remind you that under Industry Guide 7, reserves are defined as "[t]hat part of a mineral deposit which could be economically and legally extracted or produced at the time of the reserve determination." This guidance must be followed in reporting reserves in your annual reports. We note that some companies are still reporting "reserve base" estimates, which may contain economic and sub-economic coal deposits. Also, some companies may be reporting non-recoverable or geologically inferred coal deposits in their reserve estimates.

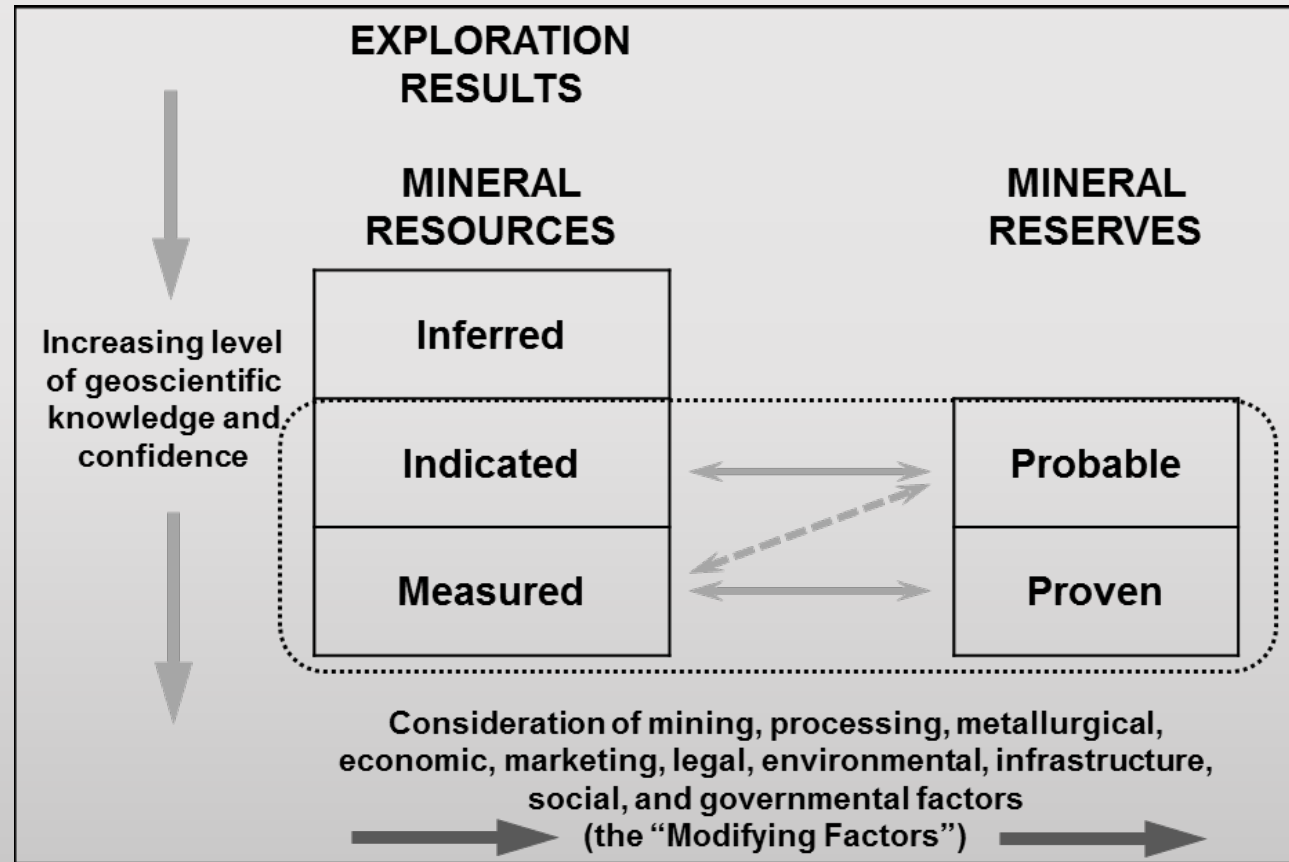
In reporting reserves you are limited to the terms "reserve," "proven reserves," and "probable reserves," as defined in Industry Guide 7. Do not use other terms or systems of reporting reserves, such as "geological reserves," "demonstrated reserves," or "reserve base." Also, reserves must be adequately drilled, sampled and characterized such that the size, shape, depth and coal content is established in accordance with industry criteria for proven and probable reserves.

We note that some coal reserve estimators concentrate on the geologic existence of reserves, but pay inadequate attention to the legal, economic and technical limitations that may keep coal from being mined. We have found that some companies have improperly included non-recoverable coal located in mine pillars, and under rivers, railroads, highways, buildings, power lines and other structures in their reported reserves. Occasionally, companies have improperly included non-recoverable coal left in the roof and floor of underground mines. Also, uneconomic small seams, or uneconomic seams of poor quality/unmarketable coal in surface mines have been improperly included. Finally, some companies forget to deduct wash plant losses in their estimates of recoverable coal.

Please ensure that you have taken all legal, economic and technical factors into account, and that you are using only those categories defined in Industry Guide 7 to report your reserves. You may refer to Industry Guide 7 at our website on the Internet at <http://www.sec.gov/divisions/corpfin/forms/industry.htm#exguide7> for further clarification.

If you have questions regarding this matter, contact the undersigned at (202)942-1870.

Today: CRIRSCO Classification



In existence since early 1991 when Working Party #79 of the SME Planning Committee delivered its report to the SME Board of Directors. Ref. Mining Engineering magazine, April 1991.

Today: CRIRSCO Classification

- Resources, Reserves, and Exploration Results may be reported.
 - Resources may or may not be reported inclusive of Reserves. Check reporting requirements in your jurisdiction.
- Resources
 - “...a Mineral Resource is *not an inventory* of all mineralization drilled or sampled, regardless of cut-off grade, likely mining dimensions, location, or continuity; rather it is a realistic estimate of mineralization which, under assumed and justifiable technical and economic conditions, might become economically extractable.” (SME Guide 2017)
- Reserves
 - “Mineral Reserves are those portions of Mineral Resources that result in an estimated tonnage and grade that, in the opinion of the Competent Person making the estimates, can be the basis of an economically viable project after taking account of all relevant *Modifying Factors*.” (SME Guide 2017)

Today: SME “Table 2”

Capital Cost Category	Scoping Study	Prefeasibility Study	Feasibility Study
Basis of Estimate to include the following areas: Civil/structural, architectural, piping/HVAC, electrical, instrumentation, construction labor, construction labor productivity, material volumes/amounts, material/equipment, pricing, infrastructure	Order-of-magnitude, based on historic data or factoring. Engineering <5% complete.	Estimated from historic factors or percentages and vendor quotes based on material volumes. Engineering at 5 to 15% complete.	Detailed from engineering at 15% to 25% complete, estimated material take-off quantities, and multiple vendor quotations.
Contractors	Included in unit cost or as a percentage of total cost.	Percentage of direct cost by area for contractors; historic for subcontractors.	Written quotes from contractor and subcontractors.
Engineering, procurement, and construction management (EPCM)	Percentage of estimated construction cost.	Percentage of detailed construction cost.	Engineered estimate derived from first principles.
Pricing	FOB mine site, including taxes and duties.	FOB mine site, including taxes and duties.	FOB mine site, including taxes and duties.
Owner’s costs	Historic estimate.	Estimate from experience, factored from similar project.	Estimate prepared from detailed zero-based budget.
Environmental compliance	Factored from historic estimate.	Estimate from experience, factored from similar project.	Estimate prepared from detailed zero-based budget for design engineering and specific permit requirements.

Capital Cost Category	Scoping Study	Prefeasibility Study	Feasibility Study
Escalation	Not considered.	Based on Company's current budget percentage.	Based on cost area with risk.
Accuracy Range	± 50%.	± 25%.	± 15%.
Contingency Range (allowance for items not specified in scope that will be needed)	± 25%.	± 15%.	± 10% (actual to be determined based on risk analysis).
Operating Cost Category	Scoping Study	Prefeasibility Study	Feasibility Study
Basis	Order-of- magnitude estimate.	Quantified estimates with some factoring.	Describes the basis of the estimate; detailed from zero-based budget; minimal factoring.
Operating quantities	General.	Specific estimates with some factoring.	Detailed estimates.
Unit costs	Based on historic data for factoring.	Estimates for labor, power, and consumables, some factoring.	Letter quotes from vendors; minimal factoring
Operating Cost Category	Scoping Study	Prefeasibility Study	Feasibility Study
Accuracy Range	± 35%.	± 25%.	± 15%.
Contingency Range (allowance for items not specified in scope that will be needed)	± 25%.	± 15%.	± 10% (actual to be determined based on risk analysis).

Source: 2017 SME Guide

Where to find the SME Guide

2017
Update

<http://www.smenet.org/>

The screenshot shows the SME website interface. At the top, there is a navigation bar with links for SHOPPING CART, STORE, FULL CALENDAR, CONTACT US, JOIN, and LOGIN. The main navigation menu includes About SME, Membership, Events & Professional Development, Students, and Publications & Resources. The 'Publications & Resources' menu is expanded, showing a grid of categories: Overview, For Educators, Resources, and Publications. The 'Resources' category is highlighted with a red arrow, and the 'SME Guide for Reporting' link is also highlighted with a red arrow. The 'Publications' category lists various journals and magazines. The 'For Authors & Reviewers' section includes links for submitting papers and reviewing technical papers. A search bar is located in the top right corner of the page.



SEC Industry Guide 7 Update

Subtitle: Lessons in patience? OR 15+ years of effort in five minutes?



COMMITTEE FOR MINERAL RESERVES INTERNATIONAL REPORTING STANDARDS

- A committee of the Council of Mining and Metallurgical Institutions (CMMI) was established in 1994
 - Australia, Canada, South Africa, United Kingdom, United States
- The purpose was to create a set of **standard international definitions** for the **public reporting** of Exploration Results, Mineral Resources and Mineral Reserves, modeled on the existing JORC Code (Australia).
 - Provisional Agreement was reached in 1997 (the Denver Accord)
 - Geneva, 1999, an agreement was reached to incorporate the CMMI definitions into the International Framework Classification for Reserves and Resources (UNFC), developed by the United Nations Economic Commission for Europe.
- Cairns, 2002, the Committee for Mineral Reserves International Reporting Standards (CRIRSCO) was established.
 - The first CRIRSCO template was published in 2003
 - New Standard Definitions were added in 2012, and the current template is the November 2013 version.

US Securities and Exchange Commission



- Industry Guide 7 (IG7) written in 1981 and is the core SEC disclosure rule governing U.S. entities with mineral properties.
 - While the international community was standardizing definitions, IG7 was becoming increasingly outdated and out-of-sync with the rest of the world.
- SME met with SEC [staff](#) in April of 2003 in an attempt to change IG7.
- In 2004, the SME formed the SEC Reserves Working Group / SME Resources and Reserves Committee. Recommendations were submitted to the SEC in April 2005.
 - The SEC had no comment.
 - SME continued onward and wrote the 2007 SME Guide.
- Presidential Executive Order 13579 was issued on July 14, 2011.
 - *Retrospective Analysis of Existing Rules*
 - All independent agencies were given 120 days to release a plan to the public for prioritizing its review of regulatory policies.

US Securities and Exchange Commission



- On September 12, 2011, the SEC solicits comments from the public to assist the SEC in developing its plan. Comments would be due by October 6, 2011. (File S7-36-11)
 - SME responds with another request to update IG7
 - <https://www.sec.gov/comments/s7-36-11/s73611-45.pdf>
- In December, 2011, representatives from industry meet with SEC staff members to discuss amending IG7.
 - AMEC, Newmont, Pincock Allen and Holt, JT Boyd, SME
 - *Hey, we've been working with the SEC for eight years already, you have a Presidential Executive Order, amend IG7 or a formal legal petition will be filed under Rules of Practice 192(a).*
- In October, 2012, the SME filed a formal legal petition under Rule 192(a) of the Rules of Practice to Secretary Elizabeth Murphy of the SEC to amend IG7.
 - <https://www.sec.gov/rules/petitions/2012/petn4-654.pdf>

US Securities and Exchange Commission



- SEC lacked the manpower to change IG7, so they turned to SME to locate an academic fellow for a 1-year term to assist the SEC.
 - In February, 2015, Dr. Kwame Awuah-Offei was named SEC Mining Engineering Academic Fellow.
- June, 2016, the SEC publishes its proposed rule. The rule is nearly 300 pages long. The public is given 60 days to review it and provide comment. There were 122 questions that the SEC sought responses to.
 - Federal Register, Vol. 81, No. 123
 - SEC File No. S7-10-16
- Kwame's fellowship was coming to an end, and so to give Kwame an opportunity to review and discuss SME's comments with the SEC, SME submitted their comments ahead of the deadline.
 - <https://www.sec.gov/comments/s7-10-16/s71016-6.pdf>
 - <https://www.sec.gov/comments/s7-10-16/s71016-25.pdf>



US Securities and Exchange Commission



- November, 2016, Donald J. Trump becomes President Elect of the United States.
 - Policy: For every new rule, two old rules are eliminated.
- NMA meets with **Commissioners** Piwowar (Acting Chairman), Stein, and Bartels to discuss their comments. (Nov. 18, 2016)
 - NMA has also been an advocate for the rule change.
<http://www.countoncoal.org/factSheets/FactSheet-SECReportingStandards.pdf> from June, 2014.
 - Piwowar instructs the NMA to come up with a solution.
- NMA and SME begin working to improve reporting standards.
 - Lee Terry becomes new counsel to SME Reserves Committee. Lee Terry was an Attorney Adviser to the SEC for 4 years ('78-'82).
 - Also on the SME Resources and Reserves committee is David Abbott Jr., who was a Regional Geologist for the SEC for 21 years ('75-'96).

Summary

- Industry, SME and others have advocated a change to IG7 for more than 15 years.
- The SEC June 2016 proposed S-K 1300 was NOT what was advocated for.
- NMA, SME, and industry members have worked diligently in 2017 to propose an [IG7 revision](#) for the mining industry, by the mining industry.
 - Registrants will have the ability to optionally report Exploration Targets and Mineral Resources. (NEW)
 - SME Guide is incorporated by reference only. (NEW)
 - Emphasis on brevity in disclosure (same as current IG7).
 - Assets may be grouped by business/market segment (same as current IG7).
 - Technical information (e.g. summary technical reports) needed for SEC understanding of properties and business should be submitted as Supplemental Information, subject to Rule 83 confidentiality and FOIA. (same as current IG7).



Questions



General Reporting

Topics to be aware of

Requirements for Competent Persons

- Competent Person (CP) requirement was introduced in 1999.
- Must be a *Registered Member* of SME or approved Recognized Professional Organization (RPO).
 - State licensed Professional Engineers are recognized (U.S. and Canada)
 - *Certified Professional Geologists* (CPG) of AIPG are recognized
 - ~~Some State Board Registered Geologists~~
- **A competent person must have a minimum of five years relevant experience the style of mineralization and type of deposit under consideration and in the activity which that person is undertaking.**
 - Best to have multiple CPs with different expertise.
 - *Relevant experience* is up to the CP to determine – must feel satisfied that they can face their peers and demonstrate competence.
- Refer to the 2014/2017 SME Guide for complete guidance.

Competency

SME Guide, 2017, Clause 10

“Competent Persons should be satisfied in their own minds that they could face their peers and demonstrate competence in the commodity, type of deposit and situation under consideration. If doubt exists, the person should either seek opinions from appropriately experienced colleagues or decline to act as a Competent Person.”

Liability of Competent Persons

- In the June 2016 Proposed Rule, “the qualified person would be subject to the liability as an expert for any untrue statement or omission of a material fact contained in the technical report summary under Section 11 of the Securities Act.”
 - QP’s/Experts could be held individually liable, just as corporate officers or directors can be held liable for false or misleading statements.
 - Similar to certifications under the Sarbanes-Oxley Act of 2002.
 - No provision for the QP to disclaim work from outside experts.
 - No provision for multiple QP’s to certify in their individual areas of expertise.
 - QP’s had to be **individually named** on SEC filings, further exposing them to liability.
- How to limit an individual’s liability in our (U.S.) highly litigious society?

Ethics

- Reciprocity with other CRIRSCO members (i.e. RPO's)
 - Check with the reporting code for current list of RPO's in the particular jurisdiction.
 - Advisable to include a natural CP/QP when reporting.
 - Members may be disciplined by other jurisdictions and will also, by reciprocity, be disciplined by SME for conduct deemed to be unprofessional.

Ethical Situations

- Pressure to increase “Proven Reserves” without full confidence in geology and/or economics.
 - Projects will either proceed or be tabled indefinitely based on the results of a Reserve statement. Jobs may be created, or may be lost.
 - Compensation to the Competent Person may/may not be contingent upon the results of the study.
 - There may be preconceived Reserve estimates that the Competent Person is expected to “Prove.”
 - Expectations will be different, depending on whether the Competent Person is *independent* or *internal* to the company for which Reserves are being reported.

Ethical Situations

- Downward pressure on the cost for producing Code Compliant reports. From the independent consultant's perspective:
 - Conflict of interest between *getting the work* and completing the work within the context of current paradigms.
 - Insufficient manpower to report mineral reserves (i.e. not enough Competent Persons for the study)
 - The changing paradigm of "Competency" (e.g. needs and budgets will be different for industrial minerals vs. precious metals, are there really enough people assigned to the job?).

Ethical Situations

- Insufficient analysis of markets and economics to declare *Proven Reserves*.
 - Declaring completion of a **Feasibility** Study when the work is only at **Scoping** or **Prefeasibility** level.
 - Economic/financial modeling lacks the confidence required by Table 2 of the SME Guide.
 - Changing paradigm of “Feasibility Study”; for CP’s, and for executives.
 - The increasing need for statements of *Probability*.



Questions



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