• **Disclosure for companies quoted on stock exchanges.**
  - Objectives: Reliable, transparent information for investors and potential investors
  - CRIRSCO standards

• **Governmental, inter-governmental, or NGO reporting of mineral resource estimates and forecasts.**
  - Objectives: Reliable mineral inventory to underpin minerals policies (especially cross border e.g. Europe), available to exploration and mining companies to attract inward investment and exploration activity
  - UN Framework Classification
INTERNATIONAL STANDARDS
Overview

- Key definitions and terminology used for reporting *solid mineral* reserves and resources (and exploration results) within these two classification systems have been aligned through extensive co-operative efforts between CRIRSCO and UNECE since the mid 1990s.

- A parallel collaboration between SPE and UNECE for *oil and gas*, with the PRMS classification.
CRIRSCO serves as an international advisory body without legal authority, relying on its constituent members to ensure regulatory and disciplinary oversight at a national level.

All CRIRSCO Standards follow the same set of principles and use the same classification.

The CRIRSCO family of codes and standards currently includes:

- **JORC** (Australasia)
- **NI43-101 & CIM Definition Standards** (Canada)
- **SAMREC/SAMVAL** (South Africa)
- **PERC** (Europe)
- **SME** (United States)
- **Comisión Minera de Chile** (Chile)
- **NAEN** (Russia)

Several other candidate member countries.
CRIRSCO – a short history

- 1994 Sun City: CRIRSCO formed, 5 members (CMMI Mineral Definitions Working Group)
- 1997 “Denver Accord”: agreed definitions
- 1998-9 Geneva: CRIRSCO / UNECE agreement
- 2002 CMMI disbanded. **CRIRSCO is now a partner of, and partly funded by ICMM**
- 2006 CRIRSCO Template published
- 2010 Russian national system mapped to CRIRSCO
- 2011 UNFC-2009 with full CRIRSCO mapping
- Chile joined in 2004; Russia joined in 2011; several other candidate members
CRIRSCO standards in use ...
CRIRSCO’s scope and aims

- **SCOPE:** All solid minerals (metals, gemstones, bulk commodities, aggregates, industrial minerals, energy minerals such as coal and uranium)

- **AIM:** Promoting International Best Practice in the Public Reporting of Mineral Exploration Results, Mineral Resources and Mineral Reserves
  - International consensus on reporting standards
  - Encourages consistent and high quality reporting – through maintenance of Competent Person standards

- **USERS** of CRIRSCO-family standards: the minerals industry
  - Including - Mining Companies, Financial Institutions, Stock Exchange Regulators, Governments, Shareholders
CRIRSCO standards quantify, qualify, and categorize mineral assets on the basis of the data, models and criteria.

Objective: Reliable mineral resources/reserves inventory to underpin mineral estimates used by mining companies to attract investment and promote exploration and development activity.

Public Reports are prepared by or under the supervision of a Competent Person (Qualified Person in Canada) who signs off and takes personal responsibility. Agreements to recognize professional organizations internationally (RPO)

A clear distinction between resources and reserves.

Excludes “uneconomic” and “undiscovered” materials
The CRIRSCO Template

• The set of standard definitions and principles common to all CRIRSCO reporting standards

• ‘Template’ is used to indicate that this document is a model for code development and does not constitute a ‘code’ with legal or other regulatory force.

• Advisory only - national codes take precedence.

• Intended to assist countries to produce new codes consistent with international best practice.

• A consolidated version of national codes that may be used in comparisons with other international reporting systems.
• The core of the various standards is practically identical (and becoming ever more closely aligned)
• Inclusion of national regulatory requirements provides small but important differences
• But for the geoscientist, a report prepared under one national standard can readily be referenced to the requirements of another: they all use an identical classification
A Public Report must be based on work that is the responsibility of suitably qualified and experienced persons who are subject to an enforceable professional code of ethics and rules of conduct – within a recognised professional association or professional registration system.

- Discipline of professionals is by their professional associations.
- Discipline of companies listing and relying on the report is through the stock exchange regulator.
CRIRSCO Classification

Exploration Results

MINERAL RESOURCES

- Inferred
- Indicated
- Measured

Increasing level of geological knowledge and confidence

MINERAL RESERVES

- Probable
- Proved

Application of mining, processing, metallurgical, economic, marketing, legal, environmental, infrastructure, social, and governmental factors (the “Modifying Factors”).
UNFC = United Nations Framework Classification for Fossil Energy and Mineral Reserves and Resources

Development started in the 1990s by UNECE and proceeds under a global mandate from the UN Economic and Social Council.

Intended as a classification for resources of fossil energy and mineral resources.

Active participation of CRIRSCO from 1998.
A Generic Classification Framework for solid minerals and oil and gas.

An important tool for global and governmental communication.

Not a Public Reporting Standard - no underlying principles as a reporting standard, no securities recognition.

No Certification of Competency – does not define a Competent Person who takes personal responsibility for estimates.

Includes “Undiscovered” & “Uneconomic” material.

Provides a neutral framework for mapping from/to complete reporting systems (such as CRIRSCO and PRMS).
United Nations Framework Classification

Animated presentation
Extractive activities

MINERAL RESOURCES
- Inferred
- Indicated
- Measured

MINERAL RESERVES
- Probable
- Proved

Increasing level of geological knowledge and confidence

Application of mining, processing, metallurgical, economic, marketing, legal, environmental, infrastructure, social, and governmental factors (the "Modifying Factors").

Exploration projects
- E3
- F3
- F4

Potentially commercial and non-commercial projects
- G1
- G2
- G3
- F2

Commercial projects
- E1
- E3
- F1

Potentially commercial projects
- G1

Non-commercial projects
- G2

Exploration projects
- G3

Additional quantities in place
- E4

Other combinations
- E5

Extracted quantities
- E6

Socio-economic viability
- E7
- E8
- E9
- E10

Commercial projects
- E1
- E3

Sales
Non-sales
Comparison: CRIRSCO and UNFC

• CRIRSCO resource categories are mapped to corresponding UNFC categories (i.e. there is common terminology)

• The CRIRSCO Template is the set of commodity-specific definitions in UNFC for all solid minerals
CRIRSCO – UNFC mapping
CRIRSCO – UNFC mapping

Exploration Results

MINERAL RESOURCES

- Inferred
- Indicated
- Measured

Application of mining, processing, metallurgical, economic, marketing, legal, environmental, infrastructure, social, and governmental factors (the “Modifying Factors”).

MINERAL RESERVES

- Probable
- Proved
CRIRSCO – UNFC mapping

Exploration Results

MINERAL RESOURCES

- Inferred
- Indicated
- Measured

MINERAL RESERVES

- Probable
- Proved

Increasing level of geological knowledge and confidence

Application of mining, processing, metallurgical, economic, marketing, legal, environmental, infrastructure, social, and governmental factors (the “Modifying Factors”).

Sales Production

Non-sales Production

Socio-economic viability

Project feasibility

Geological knowledge
Mineralisation beyond “Inferred”

What about other UNFC categories?

Exploration Results
- MINERAL RESOURCES
  - Inferred
- Indicated
- Measured
- Probable
- Proved

Consideration of mining, metallurgical, economic, marketing, legal, environmental, infrastructure, social and governmental factors (the “Modifying Factors”).
Mineralisation beyond “Inferred”

Increasing level of geological knowledge and confidence

Undiscovered Unrecoverable

Exploration Results

MINERAL RESOURCES
Inferred

Discovered not economic and Discovered unrecoverable

Consideration of mining, metallurgical, economic, marketing, legal, environmental, infrastructure, social and governmental factors (the “Modifying Factors”).

MINERAL RESERVES

Indicated → Probable

Measured → Proved
Mineralisation beyond “Inferred”

Excluded from CRIRSCO:
• No “pie in the sky”
• Must have “reasonable prospects for eventual economic extraction”
Excluded from CRIRSCO:
• No “pie in the sky”
• Must have “reasonable prospects for eventual economic extraction”

But … … may be needed for resource management and policy formulation … CRIRSCO reporting does not address non-sales production
• Not a question of “competition” or “choice” between the CRIRSCO reporting system and the UN Framework Classification.

• UNFC provides a big umbrella within which consistent and comparable public reporting can be carried out at a range of scales and for a range of purposes and national mineral inventories can be developed and maintained.

• If users find it easier to follow the CRIRSCO classification, they can do so in full confidence that this is also compliant with UNFC.
Use of UNFC

• Decisions on **disclosure and quality assurance** are independent from decisions on **classification**.
  • CRIRSCO addresses both.
  • UNFC-2009 requires preparers and users to agree.

• UNFC provides a method for **governments and NGOs** to incorporate published industry data (using the CRIRSCO classification) into **databases, mineral inventories, etc.**

• Provides a mechanism for **companies** to use a **standardised internal classification** beyond the publicly reported CRIRSCO categories.
• On 26 April 2013, the UNECE Expert Group on Resource Classification (EGRC) reached consensus on:
  • **Specifications for UNFC 2009.** CRIRSCO and SPE (and its PRMS partners) were thanked for their ongoing support and cooperation in providing the solid minerals- and petroleum-specific specifications for UNFC-2009 respectively.
  • **Technical Advisory Group** to be established (governance and technical advice)
  • UNFC-2009 to be applied also to nuclear fuel and renewable energy resources
  • **Consensus was reached under a global mandate with broad representation from both UNECE and non-UNECE member states.** EU was well represented.
Thoughts on data integrity

- Using UNFC does not compromise the reliability of reports.
- CRIRSCO provides the specifications for UNFC categories which map to the CRIRSCO classification: these include strict Competence requirements.
- For UNFC categories which do not map to CRIRSCO, the reporting guidance has yet to be defined, but should include Competence requirements at least as strict.
• CRIRSCO standards require all publicly declared resources to have **reasonable prospects for eventual economic extraction** (i.e. NO “pie in the sky” – NOT an inventory of all mineralisation regardless of economics)

• Short and medium term planning should use resources and reserves reported under CRIRSCO standards as a solid and reliable basis

• Longer term planning can simply migrate to UNFC, with the inclusion of prospective estimates of mineral potential
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• CRIRSCO – http://www.crirasco.com
• UNFC-2009 - http://www.unece.org/energy/se/reserves.html
• UNFC email: reserves.energy@unece.org