ANALYTICAL REFERENCE MATERIALS INTERNATIONAL

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Part of **LGC Standards**

"Capabilities and Requirements of a Commercial CRM Producer"

Partnering with Industry to Produce Certified Reference Materials

Industry & CRM Producers Working Together for the Improvement of Science and Technology

“Capabilities and Requirements”

Presentation Outline

- Listening to the Needs of Industry
- Financial Considerations
- ILAP Participation
- ‘Win – Win – Win’ Scenario
- The ILAP Process (Protocol)

“Capabilities and Requirements”

Listening to the Needs of Industry

- ARMI Continually Looks for Opportunities to Produce CRMs That Are Needed by Industry.
- We Utilize Input From Our:
  - Worldwide customer base
  - Distributor network
  - Instrument manufacturers,
  - Exhibitions & trade shows
  - Organizations that support metals development & analysis, for example NIST, ASTM and various metal societies.

“Capabilities and Requirements”

Financial Considerations

- The Need for New and Replacement CRMs Must Be Blended With the Cost of Producing Them.
- The Expected Sales Volume, Per Unit Time, Must Be Such That the Costs, Per CRM, are Recouped Over a Period of a Few Years.
- For Most CRMs, the “Certification Process” Is the Majority of the Cost, and by Far, the Most Time Consuming.

“Capabilities and Requirements”

ILAP Participation

- The Dozens of Labs That Are Involved in the ILAP Group Make the Certification Process Not Only Possible, but Also Financially Feasible.
- The Labs Perform the Analyses on a Totally Volunteer Basis.
- The Process Is Accomplished Concurrently Among the Labs.
- This Makes It Possible to Produce Reasonably Priced CRMs in a Timely Fashion.

“Capabilities and Requirements”

Win - Win - Win Scenario

- The Labs Participate to Provide Needed CRMs.
  - The companies involved in the ILAP process almost always need the CRMs to augment their analytical capabilities.
- The Main Benefit Is to the Analytical Industry.
  - ARMI produces many CRMs unique to the analysis community.

“The ILAP Process”
Outline

- Material Selection and Acquisition.
- Selection of ILAP Participants
- Distribution to ILAP Participants
- Data Gathering and Critique Process (Phase I & II)
- Value Assignment, Final Critique (Phase III)
- Final Acceptance, and Certification of Analysis

"The ILAP Process"

Material Acquisition – Many Diverse Sources

- Material Acquired From Industry Suppliers (COTS)
- Material Donated by Industry.
- Produced by Industry to Our Specified Recipes.
- Material Supplied Through Our '90/10 Share Program'.

"The ILAP Process"
Distribution to Selected ILAP Participants

- CRM Material Is Prepared for Analysis.
  - Material is cut into solids and pins, and is chipped.
- 12 Laboratories Are Hand Selected for Analysis.
  - 45% from alloy specific producers.
  - 45% from established commercial labs.
  - 10% from general industry, including NIST.
- Laboratory Participation Is Totally Voluntary.

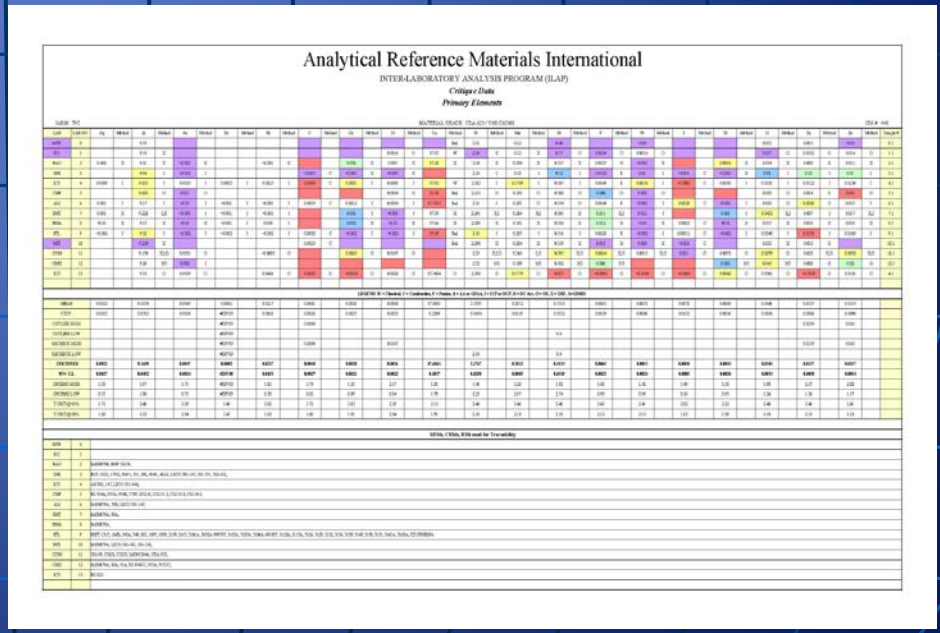
"The ILAP Process"

Distribution to Selected ILAP Participants (Cont.)

- All Participating Laboratories Demonstrate Traceability to NIST, or another NMI.
- Selection Is Dependent on Analysis Methodology.
  - Traditional wet chemistry
    - Titrimetry, Plating, etc.
  - Instrumental dissolution methods
    - AA, GF-AA, ICP, DCP, etc.
  - Traditional instrumental techniques
    - AES, XRF, IGF, etc.
  - Non-traditional instrumental techniques
    - GD-AES, DCA-AES, GD-MS, ICP-MS, etc.

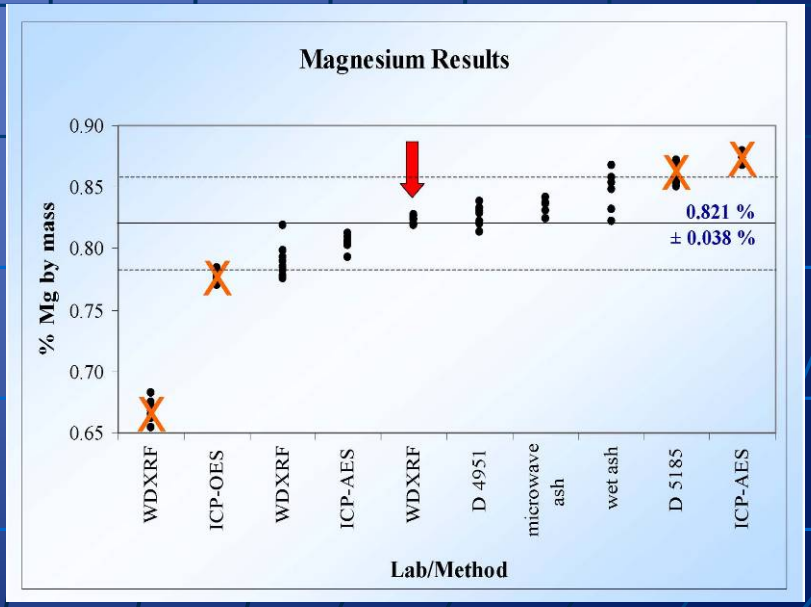
“The ILAP Process”
Data Gathering (Phase I)

- RAW Data Forms are Submitted to ARMI.
  - Data are evaluated for statistical validity.
  - Outliers and suspect data are evaluated for bias.
  - Outliers and suspect data are returned to the laboratories on the critique data form for additional testing.
  - Traceability data and significant figures are also noted.



"The ILAP Process"
Critique Process (Phase II)

- Critique Data Forms are Submitted to ARMI.
  - Resubmitted data are evaluated for statistical validity.
  - Suspect data are permanently annotated and removed from statistical analysis.
  - Remaining data evaluated for method biasing.
  - Final value assignment is generated.
  - A 95% confidence interval is calculated.



"The ILAP Process"
Final Acceptance (Phase III)

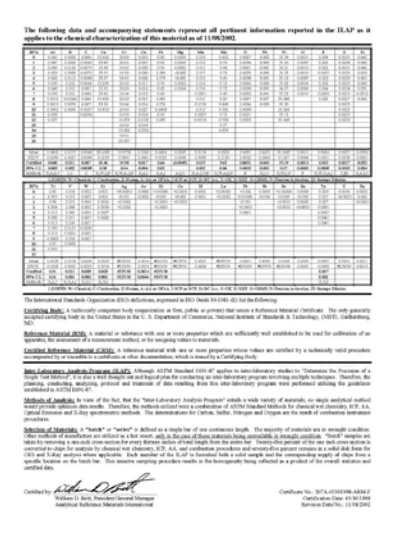
- Final Acceptance of Reported Critiqued Data.
  - Final critique (review) forms are submitted to *ALL* participating laboratories.
    - Final value assignment, and 95% confidence interval included

- Participating Laboratories Review *ALL* Data.
  - *ALL* data are reviewed for method biasing.
  - *ALL* data are reviewed for statistical validity.
  - Industry experts evaluate and comment on the data.

“The ILAP Process”

Certification of Analysis (C of A)

- All ILAP Comments Are Reviewed
  - Data changes made if necessary.
  - Value assignment modified if necessary.
  - Additional testing performed if needed.
- “**C**ertificate of **A**nalysis” Produced and Issued.



"The ILAP Process"
Material Matrices

- Stainless, & High Temperature Steels (SHTS)
- Carbon, Low Alloy, & Tool Steels (CLATS)
- Copper, Brass, & Bronze Alloys (CBBA)
- Nickel Alloys
- Cobalt Alloys
- Titanium & Zirconium Alloys
- Aluminum Alloys

"The ILAP Process"
Advantages of the ILAP Process

- The Advantages of the ILAP Process Are:
  - Voluntary labs, no monetary or need-generated biases.
  - 'Industry Experts' help certify the material.
  - Analysis is performed by a diverse group of analysts, with a diverse group of analysis techniques providing CRMs without a method bias and for General Use.
  - Materials are generally certified within 12-24 months.
  - CRMs are produced based on industry needs.

“Capabilities and Requirements”

Summary

- The ILAP Process
  - Voluntary labs
  - Industry experts
  - Diverse group of analysts
  - Certification process takes ~1-2 years
  - CRMs based largely on industry needs
- Win – Win – Win Scenario
  - ARMI has products (CRMs)
  - Analytical industry has many new CRMs
  - Labs have needed CRMs to support their business