

1 Perimeter Road, Suite 200 Manchester, NH 03103 Phone - (603) 935-4100 FAX - (603) 935-4101 E-mail – ILAP@ARMI.com Web - www.ARMI.com

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.

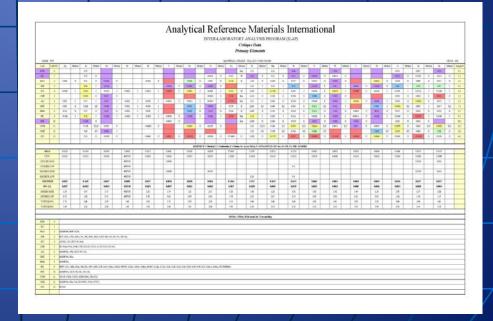
"The ILAP Process" Distribution to Selected ILAP Participants (Cont.) All Participating Laboratories Demonstrate Traceability to NIST, or another NMI. Selection Is Dependent on Analysis Methodology. Traditional wet chemistry Titrimetry, Plating, etc. Instrumental dissolution methods AA, GF-AA, ICP, DCP, 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.

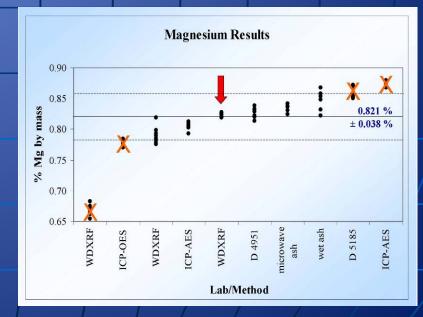
- Data are evaluated for statistical validity.
- Outliers and suspect data are evaluated for bias.
- Outliers and suspect data are returned to the laboratories on the critique data form for additional testing.
 Traceability data and significant figures are also noted.



"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 <u>ALL</u> participating laboratories.
 - Final value assignment, and 95% confidence interval included

Participating Laboratories Review <u>ALL</u> Data.

- <u>ALL</u> data are reviewed for method biasing.
- <u>ALL</u> 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.

"Certificate of Analysis" Produced and Issued.

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Hard by William 12 Berry, President General Manager

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"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



