Brammer Standard Company, Inc.

Certificate of Analysis

B.S. SP-B

Zinc Spelter Reference Material

	Certified Value[1]	Estimate of Uncertainty[2]
Al	**0.141**	0.004
Fe	**0.025**	0.003
Pb	**0.021**	0.002
Sb	**0.061**	0.001
Cu	**<0.002**	
Sn	**<0.001**	

Analysis listed as percent by weight.

[1] The certified value listed is the present best estimate of the true value based on the results of an interlaboratory testing program.

[2] The uncertainties listed are based on value judgments of the material inhomogeneity and the 95% confidence interval. The half-width confidence interval C(95%) is shown on page 2.

See reverse side for more information.

Certificate Number SP-B-091597-p1

Brammer Standard Company, Inc., 14603 Benfer Road, Houston, TX 77069-2895
Telephone (281) 440-9396 Fax (281) 440-4432

BS SP-B Certificate Number SP-B-091597-p2

Lab Nr.	Method	Al	Fe	Pb	Sb	Cu	Sn
1	ICP	0.142	0.027	0.021	0.061	<0.01	<0.01
2	ICP	0.139	0.0246	0.0193	0.0602	0.0002	<0.0005
3	ICP	0.141	0.0255	0.0196	0.0608	0.0002	<0.0002
4	XRF	0.145		0.026	0.061		
4a	DCP	0.143	0.025	0.025	0.060		
5	ICP	0.132	0.020	0.019		<0.001	<0.001
6	AAS	0.136	0.025	0.019		0.0001	<0.001
7	AAS,ICP		0.027	0.020		<0.0005	
8	XRF	0.143	0.022	0.020	0.059	0.001	
9	AAS	0.144	0.029	0.020	0.062		
Average		0.1406	0.0250	0.0209	0.0606		
Standard Deviation		0.0042	0.0027	0.0025	0.0009		
Certified		0.141	0.025	0.021	0.061	<0.002	<0.001
C(95%)		0.0032	0.0021	0.0018	0.0009		

C(95%) = (t x sd)/√n The half-width confidence interval, where t is the appropriate Student's t value, sd is the interlaboratory standard deviation, and n is the number of acceptable mean values. For further information regarding the confidence interval for the certified value see ISO Guide 35:1989 section 4.

Co-operating Laboratories: The co-operating laboratories were:

Armco Technology Center, Middletown, Ohio
Bethlehem Steel Corporation, Homer Research Laboratories, Bethlehem, Pennsylvania
J. Dirats and Co., Inc., Westfield, Massachusetts
Charles C. Kawin Company, Maywood, Illinois
Climax Research Services, Farmington Hills, Michigan
Andrew S. McCreath & Son, Inc., Harrisburg, Pennsylvania
LTV Steel Company Inc., East Chicago, Indiana
U.S. Steel, Gary, Indiana
VHG Laboratories, Inc., Manchester, New Hampshire

Analysis: Chemical analyses were made on chips prepared by a lathe from the cross-section of continuous cast bars in accordance with ASTM Standard Practice E 59. The laboratories participating in the testing normally followed the requirements of ISO Guide 25. The individual values listed above are the average of each analyst's results. Methods of analysis used were a combination of ASTM Standard Practices E 663, E 1479, plus additional ICP, DCP, AA, and XRF spectrometric methods. The following Certified Reference Materials were used to validate the analytical data listed above: NIST 631, BCS 194E, GBW 02701, 02702, 02703.

Certification Process: The requirements of ISO Guide 31, ISO Guide 34, ISO Guide 35, and ASTM Standard Guides E 1724 and E 1831 were followed for the preparation of this reference material and certificate of analysis. This is a reference material as defined by ISO Guide 30.

Homogeneity: This Reference Material was tested for homogeneity using ASTM Standard Method E 826 and found acceptable.

Source: This material was melted and cast by Zincaloy, Inc., Mississauga, Ontario, Canada.

Description and Use: This Reference Material is in the form of chips. It is intended for use in analytical chemistry methods using acids for dissolution.

Size: This Reference Material is only available in 50 gram units.

Safety Notice: A Material Safety Data Sheet (MSDS) is not required for this material. This material will not release or otherwise result in exposure to a hazardous chemical, under normal conditions of use.

Inquiries concerning this Reference Material should be directed to:

Brammer Standard Co., Inc.
14603 Benfer Road
Houston, Texas 77069-2895 USA

Phone: (281) 440-9396
Fax: (281) 440-4432

Certified by: _____ on September 15, 1997.
G. R. Brammer

By Certificate Number R-021, the Quality System of Brammer Standard Company, Inc., is registered to ISO 9002 by the American Association for Laboratory Accreditation (A2LA).

Brammer Standard Company's Chemical Laboratory is accredited to ISO Guide 25 by A2LA. (Certificate Number 656.01)

References:

ASTM documents available from ASTM, 1916 Race Street, Philadelphia, PA, 19103.

E 59 - 93 Standard Practice for Sampling Steel and Iron for Determination of Chemical Composition

E 663 - 85 Standard Practice for Flame Atomic Absorption Analysis.

E 826 - 85 (Reapproved 1990) Standard Practice for Testing Homogeneity of Materials for the Development of Reference Materials.

E 1479 - 92 Standard Practice for Describing and Specifying Inductively-Coupled Plasma Optical Emission Spectrometers.

E 1724 - 95 Standard Guide for Testing and Certification of Metal and Metal-Related Reference Materials.

E 1831 - 97 Standard Guide for Preparing Certificates for Reference Materials.

ISO Guides available from American National Standards Institute, 11 West 42nd St., 13th Floor, New York, NY 10036.

ISO Guide 25 (Third edition, 1990), General requirements for the competence of calibration and testing laboratories.

ISO Guide 30 (Second edition, 1991), Terms and definitions used in connection with reference materials.

ISO Guide 31 (First edition, 1981), Contents of certificates of reference materials.

ISO Guide 33 (First edition, 1989), Uses of certified reference materials.

ISO Guide 34 (First edition, 1996), Quality system guidelines for the production of reference materials.

ISO Guide 35 (Second edition, 1989), Certification of reference materials - General and statistical principles.

Other useful documents available from NIST, U.S. Department of Commerce, Gaithersburg, MD 20899.

NIST Special Publication 260-100, Handbook for SRM Users

NIST Special Publication 829, Use of NIST Standard Reference Materials for Decisions on Performance of Analytical Chemical Methods and Laboratories