Brammer Standard Company, Inc.

Certificate of Analysis

B.S. 954A

CDA Copper Alloy 954

Copper	85.64	Silicon	0.029
Tin	0.033	Manganese	0.10
Lead	0.016	Phosphorus	0.012
Zinc	0.30	Arsenic	(0.006)
Iron	3.50	Antimony	0.001
Nickel	0.20	Carbon	0.004
Aluminum	10.17	Sulfur	<0.0001

(analysis listed as percent by weight)

Some of the co-operating laboratories were:

Brammer Standard Co. Inc., Houston, Texas
Colonial Metals, Columbia, Pennsylvania
J. Dirats and Co., Inc., Westfield, Massachusetts
Metals Analysis Inc., Huntington Park, California
Technical Service Laboratories Inc., Mississauga, Ontario, Canada
VHG Labs, Manchester, New Hampshire

See data on reverse side.

Certificate No. 954A-060591

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

B.S. No. 954A Certificate Number 954A-060591

Analysis	Cu	Sn	Pb	Zn	Fe	Ni	Al	Si
1	85.532	0.025	0.013	0.278	3.42	0.196	10.09	0.021
2	85.62	0.029	0.013	0.285	3.45	0.20	10.148	0.026
3	85.63	0.030	0.016	0.294	3.50	0.202	10.165	0.027
4	85.78	0.034	0.018	0.299	3.52	0.203	10.18	0.031
5		0.034	0.020	0.305	3.533	0.21	10.20	0.033
6		0.039		0.31	3.55	0.21	10.23	0.034
7		0.039				0.215		
Average	85.641	0.0329	0.0160	0.295	3.496	0.205	10.169	0.0287
Std Dev	0.103	0.0052	0.0031	0.012	0.051	0.007	0.048	0.0049
Certified	85.64	0.033	0.016	0.30	3.50	0.20	10.17	0.029

Analysis	Mn	P	As	Sb	Ag	C	S
1	0.094	0.011	0.004	0.00062	0.023	0.004	<0.0001
2	0.096	0.012	0.004	0.00087		0.0041	<0.0001
3	0.098	0.012	0.0062	0.001		0.0046	
4	0.098	0.013	0.0075				
5	0.10	0.014	0.008				
6	0.10						
7	0.100						
8	0.102						
Average	0.099	0.0124	0.0059	0.0008		0.0042	
Std Dev	0.003	0.0011	0.0019	0.0002		0.0003	
Certified	0.10	0.012	(0.006)	0.001		0.004	<0.0001

Chemical analyses were made on millings from cross-sections of the bars. The individual values listed above are the average of each analyst's results.

Methods of analysis used were a combination of ASTM Standard Methods E 54-80, E 62-89, E 478-89a, plus additional ICP, and AA spectrometric methods. The following Certified Reference Materials were used to validate the analytical data listed above: NIST SRM 871, SRM 872; German BAM 227, BAM 228, BAM 361; British BCS 183/4, and Brasilian IPT 10A, IPT 15.

This Reference Material was tested for homogeneity using ASTM Standard Method E 826 and found acceptable. It was also examined by optical emission spectrometry and found to be compatible with the following NIST Certified Reference Materials: NIST SRM 1111 through 1117.

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. Phone: (281) 440-9396
14603 Benfer Road Fax: (281) 440-4432
Houston, Texas 77069-2895 USA

Certified by: _____ on June 5, 1991.
G. R. Brammer