SOUTHWEST RESEARCH INSTITUTE
CALIBRATION LABORATORY
MEMORANDUM

March 21, 2005

To: KEN CHIANG DIV20 B57

From: Walt Hill, Metrology Group Leader
Institute Calibration Laboratory

Subject: Status of Calibration Supplier

Manufacturer/Model: TROEMNER 1G
Description: WEIGHT, CLASS 2
Serial Number: 66665
Asset Number: 011115
Work Order Number: 303063075
Date Calibrated: March 16, 2005
Supplier: TROEMNER, THOROFARE NJ - NVLAP - 856 686-1600
Remarks: TROEMNER CERT. # 313672-1.

(✓) Supplier is on the Approved Suppliers List (ASL).

( ) Supplier is not on the Approved Suppliers List.

(✓) Calibration is ISO 17025 accredited.

( ) Calibration is not ISO 17025 accredited.

( ) There is no known supplier to meet ISO 17025 accreditation at this time.

Please notify the Institute Calibration Laboratory, extension 5215, of any discrepancies with the item or calibration documentation.

Attachment(s) 1

TROEMNER
Henry Troemner LLC

Calibration Certificate

201 Wolf Drive • P.O. Box 87 • Thorofare, NJ 08086-0087 • Phone: 856-686-1600 • Fax: 856-686-1601 • www.troemner.com • e-mail: troemner@troemner.com

Weight

Certificate Number 313672-1
Date of Calibration 16-MAR-2005

SECTION 1: NAME AND ADDRESS OF CUSTOMER

End user
Southwest Research Inst.
6220 Culbera Road
San Antonio TX 78238-5166

Client
Southwest Research Inst. (TX)
P.O.Box 28510
Attn: Accounts Payable
San Antonio TX 78228-0510

SECTION 2: APPROVED SIGNATORY

Katharine Ellison

SECTION 3: PERSON PERFORMING WORK

Stephanie Foyle

SECTION 4: CERTIFICATE INFORMATION

Description of Masses: Troemner S/S S/K 1g Individual Weight

Accuracy Class	: ASTM E617-97 Class 2	Date Received	: 04-MAR-2005
Order Number	: 579498ROM	Date of Calibration	: 16-MAR-2005
Construction	: Two Piece	Date of Issue	: 16-MAR-2005
Material	: Stainless Steel	Weight Range	: 1g

SECTION 5: ENVIRONMENTAL CONDITIONS DURING TEST

Temperature: 21.80°C Pressure: 761.71 mm Hg Relative Humidity: 42%

SECTION 6: PERTINENT INFORMATION

The Weights listed on this calibration report have been compared to reference mass standards that are directly traceable to the National Institute of Standards and Technology under Test No. 822/270236-04.

Reference standards and balances used to perform the calibration are listed in Section 10.

The weights calibrated for this report have been calibrated in accordance with Troemner's calibration process. The calibration performed meets Level II criteria as described in the NIST/NVLAP Technical Guide 150-2.

This calibration also meets specifications as outlined in ISO 9001, ISO/IEC 17025, ANSI/NCSL Z540-1-1994, NCR Document 10CFR50 Appendix B, and applicable documents.

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SECTION 7: TRUE MASS (MASS IN VACUUM) CALIBRATION DATA

Nominal Mass Value	Serial Number	True Mass As Found	True Mass As Left	Density[1] of Weight	Uncertainty (+ or -)
1 g	66665	1.000011 g	1.000011 g	8.0300 g/cm^3	0.005 mg

1 Density is assumed unless otherwise stated

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SECTION 8: MASS IN AIR CALIBRATION VALUE VS. REFERENCE DENSITY 8000 kg m $^{-3}$

Nominal Mass Value	Serial Number	---- Conventional Mass Value ---- As Found	As Left	Uncertainty (+ or -)	Tolerance (+ or -)
1 g	66665	1.000011 g	1.000011 g	0.005 mg	0.0540 mg

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SECTION 9: MASS IN AIR CALIBRATION DATA VS. REFERENCE DENSITY 8000 kg m^{-3}

Nominal Mass Value	Serial Number	-- Conventional Mass Correction -- As Found	As Left	Uncertainty (+ or -)	Tolerance (+ or -)
1 g	66665	0.011 mg	0.011 mg	0.005 mg	0.0540 mg

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SECTION 10: CALIBRATION PROCEDURE DATA

Nominal Mass Value	Serial Number	Standard Set No.	Cal Due	Balance Used	Cal Due	Procedure Used
1 g	66665	S116	03/31/05	UMT5/6-116	03/31/05	A-B-A

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SECTION 11: GENERAL INFORMATION

This calibration was performed in Troemner's High Precision Level I Mass Metrology Laboratory at 201 Wolf Drive, Thorofare, New Jersey 08086 unless otherwise noted on page one. The internal procedures used are CAL-CLASSI, CAL-MMAP, and NIST HB145.

SECTION 12: DEFINITIONS AND TERMS

MASS IN A VACUUM - The mass of a weight as if it were measured in a vacuum. Also known as True Mass.

MASS IN AIR - The conventional value of the result of weighing in air, in accordance to International Recommendation OIML R 33. For a weight taken at 20° C, the conventional mass is the mass of a reference weight of a density of 8000 kg•m^{-3} which it balances in air of a density of 1.2 kg•m^{-3}.

AS FOUND MASS IN A VACUUM - The measured value of the mass(es) as they were received by Troemner. If the customer requires cleaning prior to calibration, the after cleaning value would be reported.

AS LEFT MASS IN A VACUUM - The measured value of the mass(es) after they were adjusted, repaired or replaced when necessary. The As Found Mass in a Vacuum will equal the As Left Mass in a Vacuum if the mass(es) did not require adjustment, repair or replacement.

NOMINAL MASS - The mass value as marked on the weight.

CORRECTION - The difference between the mass value of a weight and its nominal value. A positive correction indicates that the mass value is greater than the nominal value by the amount of the correction.

AS FOUND CONVENTIONAL MASS CORRECTION - The conventional correction of the result, as it was received by Troemner, of weighing in air in accordance to International Recommendation R 33. For a weight taken at 20° C, the conventional mass is the mass of a reference weight of density 8000 kg•m^{-3} which it balances in air density of 1.2 kg•m^{-3}. If the customer requires cleaning prior to calibration, the after cleaning correction would be reported.

AS LEFT CONVENTIONAL MASS CORRECTION - The conventional correction of the result, after adjust-, ment repair, or replacement of weighing in air in accordance to International Recommendation R 33. For a weight taken at 20° C, the conventional mass is the mass of a reference weight of density 8000 kg•m^{-3} which it balances in air density of 1.2 kg•m^{-3}. The As Found will equal the As Left Conventional Mass Correction if the mass(es) did not require adjustment, repair or replacement.

UNCERTAINTY - The error in assignment of the correction due to the measurement process. Uncertainty is calculated in accordance with UKAS document M3003 using a coverage factor of $k = 2$ ($k = 2$ defines an interval having a level of confidence of approximately 95 percent). The error does not include the effects of magnetism. *(continued on next page)*

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SECTION 12: DEFINITIONS AND TERMS (continued)

TOLERANCE - Defines the limits in which the correction value and the uncertainty must fall to meet the tolerance specification for the given Class.

AS FOUND CONVENTIONAL MASS VALUE - The measured value of the mass(es) as they were received by Troemner, of weighing in air in accordance to International Recommendation R 33. For a weight taken at 20° C, the conventional mass is the mass of a reference weight of density 8000 $kg \cdot m^{-3}$ which it balances in air density of 1.2 $kg \cdot m^{-3}$. If the customer requires cleaning prior to calibration, the after cleaning value would be reported. F denotes Out of Tolerance Weight.

AS LEFT CONVENTIONAL MASS VALUE - The measured value of the mass(es) after they were adjusted, repaired or replaced when necessary, of weighing in air in accordance to International Recommendation R 33. For a weight taken at 20° C, the Conventional Mass is the mass of a reference weight of density 8000 $kg \cdot m^{-3}$ which it balances in air density of 1.2 $kg \cdot m^{-3}$. The As Found will equal the As Left Conventional Mass Value if the mass(es) did not require adjustment, repair or replacement.

ASTM E617-97* - Weights meet the tolerance specification for ASTM E617-97. Weights 2kg - 1g screened for magnetism using a Gaussmeter.