



# SOUTHWEST RESEARCH INSTITUTE®

6220 Culebra Road, P.O. Drawer 28510  
Institute Quality Systems  
Institute Calibration Laboratory  
Phone: 210-522-5215 Fax 210-522-4834



## Certificate of Calibration

**Submitted By:** DIV20  
**Address:** B57  
**Contact:** DON BANNON  
**Manufacturer Model:** METTLER UMT2  
**Description:** BALANCE  
**Serial No:** 211001-142  
**Asset No:** 002028  
**Procedure:** BALANCES & SCALES, DEC/04

**Work Order:** 303068575  
**Date Issued:** Apr 5, 2006  
**Calibration Date:** Apr 5, 2006  
**\*Calibration Due:** Oct 5, 2006  
**Calibration Location:** B57  
**Environment:** Temp. 72.0°F Hum. 34 %RH  
**\*\*Data Type:** FOUND-LEFT

This certificate documents traceability to the National Institute of Standards and Technology (NIST) and the International System of Units (SI). The Laboratory quality system conforms to ISO/IEC 17025, 1999, ANSI/NCCL Z540-1-1994 and relevant requirements of the ISO 9000-2000 standard. This certificate shall not be reproduced, except in full, without the written approval of the Southwest Research Institute Calibration Laboratory. This certificate shall not be used to claim product endorsement by Southwest Research Institute, American Association for Laboratory Accreditation (A2LA) or any agency of the U. S. Government. Results of this calibration relate only to the instrument described above at the time of calibration and does not imply any long term stability of the instrument.

\*Determined by the customer, does not imply the instrument will remain within tolerance as any number of factors may cause an out-of-tolerance condition before this date. \*\*Found/Left = adjustment and/or repair was not required, As Left = adjusted and/or repaired was required. The client has sole responsibility for determination of in-/out-of-tolerance or compliance/noncompliance. See Remarks or attached Measurement Report with the same Work Order number for data.

Reported uncertainty calculated in accordance with the ISO "Guide to the Expression of Uncertainty in Measurement" (GUM) and represents an expanded uncertainty with a coverage factor of k=2 to approximate a 95% confidence level.

**Remarks:** None

### Standards Used

| Asset No. | Serial No. | Manufacturer | Model     | Description                | Cal Due    |
|-----------|------------|--------------|-----------|----------------------------|------------|
| 005566    | B0113L004  | MERIAN       | A0030P    | PRESSURE GAUGE, ABSOLUTE   | Apr 10, 06 |
| 007290    | T4830007   | VAISALA      | HM34F     | HUMIDTY/ TEMPERATURE METER | Apr 11, 06 |
| 010442    | A007       | RICE LAKE    | 10MG-100G | WEIGHT SET, CLASS 1        | Apr 26, 06 |

120  
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Q200605160006  
Instrument calibration record for Mettler  
Balance, Model # Mettler UMT2, Serial #  
211001-142 (04/05/2006)

*Don Bannon*  
Reviewed by: blt ( ) jrg ( ) pwc ( ) wgh ( )

Metrology Technician

*Jude Morin*  
Measurements by: Jude Morin

Metrology Technician

Southwest Research Institute  
Calibration Laboratory  
Measurement Report

|   |            |               |         |             |           |
|---|------------|---------------|---------|-------------|-----------|
| Work Order:   | 303068575  | Manufacturer: | Mettler | Technician: | jim       |
| Asset Number:   | 002028     | Model:        | UMT2    | Cal Date:   | 05-Apr-06 |
| Serial Number:  | 211001-142 | Type:         | Balance |             |           |
| Remarks: Manufacturer does not provide corner load specifications. Corner load readings are without pass or fail indications. |            |               |         |             |           |
| Ambient Conditions  |            | 72 ° F        | 34 % RH | 14.41 PSIA  |           |

| Function/Range | Test Point | TI Reading | Difference | +/-Limit   | +/-Uncertainty | Found/Left |
|----------------|------------|------------|------------|------------|----------------|------------|
|                | micrograms | micrograms | micrograms | micrograms | micrograms     | Result     |
| Repeatability  |            |            |            |            |                |            |
| 1              | 1000000.0  | 1000016.8  |            |            |                |            |
| 2              | 1000000.0  | 1000016.5  |            |            |                |            |
| 3              | 1000000.0  | 1000016.6  |            |            |                |            |
| 4              | 1000000.0  | 1000016.7  |            |            |                |            |
| 5              | 1000000.0  | 1000015.9  |            |            |                |            |
| 6              | 1000000.0  | 1000016.5  |            |            |                |            |
| 7              | 1000000.0  | 1000016.3  |            |            |                |            |
| 8              | 1000000.0  | 1000016.7  |            |            |                |            |
| 9              | 1000000.0  | 1000016.6  |            |            |                |            |
| 10             | 1000000.0  | 1000016.3  |            |            |                |            |
| Std Deviation  |            | 0.26       |            | 0.50       |                | Pass       |
| Linearity      | 0.0        | 0.0        | 0.0        | 2.0        | 0.034          | Pass       |
|                | 199993.8   | 199993.2   | -0.6       | 2.0        | 0.034          | Pass       |
|                | 399995.7   | 399996.2   | 0.5        | 2.0        | 0.034          | Pass       |
|                | 600005.9   | 600005.2   | -0.7       | 2.0        | 0.034          | Pass       |
|                | 800007.8   | 800007.6   | -0.2       | 2.0        | 0.034          | Pass       |
|                | 1000016.2  | 1000016.0  | -0.2       | 2.0        | 0.034          | Pass       |
|                | 1200010.0  | 1200010.9  | 0.9        | 2.0        | 0.034          | Pass       |
|                | 1400011.9  | 1400012.8  | 0.9        | 2.0        | 0.034          | Pass       |
|                | 1600022.1  | 1600021.5  | -0.6       | 2.0        | 0.034          | Pass       |
|                | 1800024.0  | 1800025.6  | 1.6        | 2.0        | 0.034          | Pass       |
|                | 2000022.8  | 2000021.5  | -1.3       | 2.0        | 0.034          | Pass       |

End of Report

**SOUTHWEST RESEARCH INSTITUTE  
CALIBRATION LABORATORY  
MEMORANDUM**

**April 27, 2006**

**To:** DON BANNON DIV20 B57

**From:** 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:** 303068138

**Date Calibrated:** April 13, 2006

**Supplier:** TROEMNER, THOROFARE NJ - NVLAP - 856 686-1600

**Remarks:** TROEMNER CERT. # 356803A-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 contact the Institute Calibration Laboratory, extension 5215, if you have any questions about the condition of this equipment or calibration documentation.

Attachment(s) 7

m:\nonasl2.rpt Rev Nov. 15, 2005

120 --- Q200605160007

Instrument calibration record for Troemner  
Weight Class 2, Model # 1G, Serial # 66665  
(04/13/2006)

# Calibration Certificate

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Page 1 of 7 Pages  
**Weight**

## SECTION 1: NAME AND ADDRESS OF CUSTOMER

Certificate Number 356803A-1  
Date of Calibration 13-APR-2006

### End user

Southwest Research Institute  
9503 West Commerce  
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

Joan Ginder

## SECTION 4: CERTIFICATE INFORMATION

Description of Masses: Troemner Weight

|                |                        |                     |               |
|----------------|------------------------|---------------------|---------------|
| Accuracy Class | : ASTM E617-97 Class 2 | Date Received       | : 29-MAR-2006 |
| Order Number   | : 684265R              | Date of Calibration | : 13-APR-2006 |
| Construction   | : Two Piece            | Date of Issue       | : 13-APR-2006 |
| Material       | : Stainless Steel      | Weight Range        | : 1g          |

## SECTION 5: ENVIRONMENTAL CONDITIONS DURING TEST

Temperature: 21.53°C      Pressure: 760.94 mm Hg      Relative Humidity: 44%

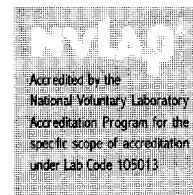
## SECTION 6: PERTINENT INFORMATION

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 I 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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**Weight**

## NAME AND ADDRESS OF CUSTOMER

Certificate Number 356803A-1  
Date of Calibration 13-APR-2006

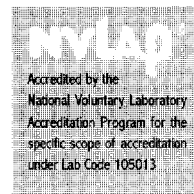
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## SECTION 7: TRUE MASS (MASS IN VACUUM) CALIBRATION DATA

| Nominal<br>Mass Value | Serial<br>Number | ----- True Mass<br>As Found | -----<br>As Left | Density <sup>1</sup><br>of Weight | Uncertainty<br>(+ or -) |
|-----------------------|------------------|-----------------------------|------------------|-----------------------------------|-------------------------|
| 1 g                   | 66665            | 1.000010 g                  | 1.000010 g       | 8.0300 g/cm <sup>3</sup>          | 0.005 mg                |

<sup>1</sup> Density is assumed unless otherwise stated



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**Weight**

Certificate Number 356803A-1  
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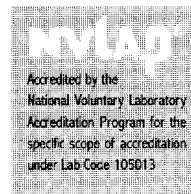
**NAME AND ADDRESS OF CUSTOMER**

End user  
 Southwest Research Institute  
 9503 West Commerce  
 San Antonio TX 78238-5166

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

**SECTION 8: MASS IN AIR CALIBRATION VALUE VS. REFERENCE DENSITY 8000 kg m<sup>-3</sup>**

| Nominal<br>Mass Value | Serial<br>Number | ---- Conventional Mass Value ---- |            | Uncertainty<br>( + or - ) | Tolerance<br>( + or - ) |
|-----------------------|------------------|-----------------------------------|------------|---------------------------|-------------------------|
|                       |                  | As Found                          | As Left    |                           |                         |
| 1 g                   | 66665            | 1.000010 g                        | 1.000010 g | 0.005 mg                  | 0.0540 mg               |



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**Weight**

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Date of Calibration 13-APR-2006

### End user

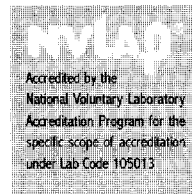
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9503 West Commerce  
San Antonio TX 78238-5166

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## SECTION 9: MASS IN AIR CALIBRATION DATA VS. REFERENCE DENSITY 8000 kg m<sup>-3</sup>

| Nominal<br>Mass Value | Serial<br>Number | -- Conventional Mass Correction -- |                 | Uncertainty<br>( + or - ) | Tolerance<br>( + or - ) |
|-----------------------|------------------|------------------------------------|-----------------|---------------------------|-------------------------|
|                       |                  | As Found                           | As Left         |                           |                         |
| <b>1 g</b>            | <b>66665</b>     | <b>0.010 mg</b>                    | <b>0.010 mg</b> | <b>0.005 mg</b>           | <b>0.0540 mg</b>        |



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**Weight**

## NAME AND ADDRESS OF CUSTOMER

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## SECTION 10: CALIBRATION PROCEDURE DATA

| Nominal<br>Mass Value | Serial<br>Number | Standard<br>Set No. | Cal<br>Due | Balance<br>Used | Cal<br>Due | Procedure<br>Used |
|-----------------------|------------------|---------------------|------------|-----------------|------------|-------------------|
| 1 g                   | 66665            | S106                | 05/31/06   | UMT-5-106       | 06/30/06   | 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<sup>-3</sup> which it balances in air of a density of 1.2 kg m<sup>-3</sup>.

**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<sup>-3</sup> which it balances in air density of 1.2 kg m<sup>-3</sup>. 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 adjustment, 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<sup>-3</sup> which it balances in air density of 1.2 kg m<sup>-3</sup>. 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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**Weight**

Certificate Number 356803A-1

Date of Calibration 13-APR-2006

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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·m<sup>-3</sup> which it balances in air density of 1.2 kg·m<sup>-3</sup>. 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·m<sup>-3</sup> which it balances in air density of 1.2 kg·m<sup>-3</sup>. 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.

## SECTION 13: ADDENDUM

Weight(s) Pass Visual Inspection