NEBRASKA
Good Life. Great Roots.
DEPARTMENT OF AGRICULTURE

Nebraska Standards Laboratory
3721 West Cuming St.
Lincoln, NE 68524
(402)-471-2087

Director of Agriculture
Steve Wellman
P.O. Box 94947
Lincoln, NE 68509-4947
(402) 471-2341
www.nda.nebraska.gov

Calibration Certificate of Mass

Calibration Date: December 4, 2019 | **Certificate Number:** 2019-144-1

Submitted By:
FSCP Area 75
3721 West Cuming St.
Lincoln, NE 68524

Point of Contact: JT Shaw
Ph. 402-471-3422
email: *james.shaw@nebraska.gov*
PO Number: N/A

Test Item(s): (20)-1000, (20)-50, (20)-25 & (2)-15lb weights
Serial Number(s): See Next Page
Manufacture: Various
Condition: Good (some wear)

Artifact(s) Description:

Date Received: December 3, 2019
ID / Asset Number: FSCP Area 75
Class Specification: NIST Class F
Material: Cast iron

Reference Standards Used:	Procedure Used:	Equipment Used:
NSL lb standards	NIST HB 6969, SOP 8 (2018)	Mettler XPR32003
	Metrologist: JPL	Mettler XP 604

Environmental Cond. **Temp:** 20 °C **Pressure:** 762.5 mmHg **Relative Humidity:** 50 %

Pertinent Information

- The artifact(s) listed in this document have been found and/or left within the maximum permissible error for the specification stated above, except as noted. An artifact is considered in-compliance when the correction plus the measurement uncertainty is equal to or less than the maximum permissible error. RED print indicates an out-of-compliance reading. All of the tolerances and specifications were evaluated according to ASTM E617 (2018) and/or NIST HB 105-1 (2019).

- All corrections stated in this report correlate to a “Conventional Mass” (CM), also known as "apparent mass”, scale verses 8.0 g/cm³ reference mass density and an air density of 1.2 mg/cm³ at 20 °C.

Traceability Statement

The artifact(s) described in this certificate have been compared to the Standards of the State of Nebraska. The Standards of the State of Nebraska are traceable to the International System of Units (SI) through the National Institute of Standards and Technology (NIST) and are part of a comprehensive measurement assurance program for ensuring continued accuracy and measurement traceability within the level of uncertainty reported by this laboratory. The calibration number for this certificate is the only unique calibration number to be used in referencing measurement traceability for the artifact(s) described in this certificate.

Uncertainty Statement

The combined standard uncertainty includes uncertainties reported for the standard, uncertainties associated with the measurement process, uncertainties for any observed deviations from reference values which are less than surveillance limits and the standard uncertainty for any uncorrected errors associated with air buoyance corrections. The combined standard uncertainty is multiplied by a coverage factor (k), to give the expanded uncertainty, which defines an interval with a 95.45 percent level of confidence. The expanded uncertainty presented in this report is consistent with the *Guide to the Expression of Uncertainty in Measurement (2008, revised 2012)*. Some components of the calibration can be evaluated through a Type A evaluation, or the method of evaluation of uncertainty by the statistical analysis (standard deviation) from the observations taken. Magnetic testing has not been performed, therefore, there are no components for the effects of it in the uncertainty budget.

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Calibration Date: December 4, 2019 | **Certificate Number:** 2019-144-1

Calibration Results

Nominal Mass	Serial Number / ID	As Found Conventional Mass Correction (g)	Adjusted (Y/N)	As Left Conventional Mass Correction (g)	Uncertainty ± (g)	(*k*) factor	NIST Class F MPE ± (g)	Assumed Density (g/cm³)
15 lb	WM15-21	2.056	Y	0.356	0.083	2	0.68	7.2
15 lb	WM15-22	1.646	Y	0.261	0.083	2	0.68	7.2
25 lb	WM25-33	1.09	Y	0.10	0.14	2	1.1	7.2
25 lb	WM25-39	2.15	Y	0.16	0.14	2	1.1	7.2
25 lb	WM25-43	0.03	N	0.03	0.14	2	1.1	7.2
25 lb	WM25-48	2.24	Y	0.41	0.14	2	1.1	7.2
25 lb	WM25-49	1.67	Y	0.24	0.14	2	1.1	7.2
25 lb	WM25-50	2.52	Y	0.38	0.14	2	1.1	7.2
25 lb	WM25-80	2.04	Y	0.08	0.14	2	1.1	7.2
25 lb	WM25-81	2.74	Y	0.14	0.14	2	1.1	7.2
25 lb	WM25-82	2.20	Y	0.52	0.14	2	1.1	7.2
25 lb	WM25-83	1.62	Y	0.23	0.14	2	1.1	7.2
25 lb	WM25-84	2.55	Y	0.36	0.14	2	1.1	7.2
25 lb	WM25-85	1.36	Y	0.13	0.14	2	1.1	7.2
25 lb	WM25-86	2.43	Y	0.46	0.14	2	1.1	7.2
25 lb	WM25-87	1.04	Y	0.33	0.14	2	1.1	7.2
25 lb	WM25-91	0.58	N	0.58	0.14	2	1.1	7.2
25 lb	WM25-93	0.49	N	0.49	0.14	2	1.1	7.2
25 lb	WM25-94	-0.03	N	-0.03	0.14	2	1.1	7.2
25 lb	WM25-95	-0.21	N	-0.21	0.14	2	1.1	7.2
25 lb	WM25-104	3.13	Y	0.28	0.14	2	1.1	7.2
25 lb	WM25-124	0.72	N	0.72	0.14	2	1.1	7.2
50 lb	OPI-C7	0.65	N	0.65	0.28	2	2.3	7.2
50 lb	OPI-C-8	0.77	N	0.77	0.28	2	2.3	7.2
50 lb	OPI-C-9	0.90	N	0.90	0.28	2	2.3	7.2
50 lb	OPI-C17	0.96	N	0.96	0.28	2	2.3	7.2
50 lb	OPI-C-24	1.05	N	1.05	0.28	2	2.3	7.2
50 lb	OPI-C-36	0.46	N	0.46	0.28	2	2.3	7.2
50 lb	OPI-C39	1.57	N	1.57	0.28	2	2.3	7.2
50 lb	OPI-C49	-0.19	N	-0.19	0.28	2	2.3	7.2
50 lb	SF-C21	1.57	N	1.57	0.28	2	2.3	7.2
50 lb	WM50-40	-0.38	N	-0.38	0.28	2	2.3	7.2
50 lb	WM50-41	-0.02	N	-0.02	0.28	2	2.3	7.2
50 lb	WM50-70	-0.31	N	-0.31	0.28	2	2.3	7.2
50 lb	WM-50-415	-0.15	N	-0.15	0.28	2	2.3	7.2
50 lb	WM-C-A13	0.51	N	0.51	0.28	2	2.3	7.2
50 lb	WM-C-A14	-0.16	N	-0.16	0.28	2	2.3	7.2
50 lb	WM-C-A17	1.45	N	1.45	0.28	2	2.3	7.2
50 lb	WM-C-A18	1.32	N	1.32	0.28	2	2.3	7.2
50 lb	WM-C-A20	0.35	N	0.35	0.28	2	2.3	7.2
50 lb	WM-OPI-C23	0.65	N	0.65	0.28	2	2.3	7.2
50 lb	WM-OPI-C32	1.22	N	1.22	0.28	2	2.3	7.2
1000 lb	2193	-25.0	N	-25.0	5.6	2.009	45	7.2
1000 lb	A-2	-16.4	N	-16.4	5.6	2.009	45	7.2
1000 lb	A-5	-38.7	Y	9.1	5.6	2.009	45	7.2
1000 lb	A-6	7.9	N	7.9	5.6	2.009	45	7.2
1000 lb	BA-14	-15.7	N	-15.7	5.6	2.009	45	7.2
1000 lb	OA3	-19.0	N	-19.0	5.6	2.009	45	7.2
1000 lb	OA4	-20.0	N	-20.0	5.6	2.009	45	7.2
1000 lb	OA5	-25.4	N	-25.4	5.6	2.009	45	7.2
1000 lb	OA6	-30.6	N	-30.6	5.6	2.009	45	7.2
1000 lb	OA10	3.3	N	3.3	5.6	2.009	45	7.2
1000 lb	OA13	-14.0	N	-14.0	5.6	2.009	45	7.2
1000 lb	OA14	-30.1	N	-30.1	5.6	2.009	45	7.2
1000 lb	OA16	-14.4	N	-14.4	5.6	2.009	45	7.2
1000 lb	OA17	-11.9	N	-11.9	5.6	2.009	45	7.2
1000 lb	OA19	-14.7	N	-14.7	5.6	2.009	45	7.2
1000 lb	OPI-A1	-12.1	N	-12.1	5.6	2.009	45	7.2
1000 lb	OPI-A11	-43.4	Y	8.4	5.6	2.009	45	7.2
1000 lb	OPI-A12	-35.6	N	-35.6	5.6	2.009	45	7.2

Conversion Factors

1 ounce (avoirdupois) (oz) = 28.349 52 g
1 pound (avoirdupois) (lb) = 453.592 37 g exactly

Joel P. Lavicky *Metrologist*

12/26/2019
Date of Issue

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Calibration Date:	**12/2/2019**	***Certificate of Calibration of Volume Transfer***	**Certificate Number:**	**2019-144-2**

Items Submitted:

Quantity	Nominal Volume	Manufacturer	Type
2	5 gal	Seraphin	Test Measure 4" Neck

Submitted By: FSCP Area 75
3721 West Cuming St.
Lincoln, NE 68524

POC: JT Shaw
402-471-3422
james.shaw@nebraska.gov

Test Results

Nominal Volume	Serial Number	Material	Cubical Coefficient of Expansion (/°F)	**As Found Volume Delivered @ 60 °F**	**As left Volume Delivered @ 60 °F**	Uncertainty (U)	(*k*)
5 gal	43872	SS	0.0000265	**5.0008 gal**	**5.0008 gal**	0.0010 gal	2.12
5 gal	43935 H	SS	0.0000265	**4.9995 gal**	**4.9995 gal**	0.0010 gal	2.12

The data in this report only applies to those items specifically listed on this report.

Volume delivered at 60˚F after a 30 second pour and 10 second drain for test measures. For provers a 30 second drain time would apply.

Conversion Factors:

1 gal = 231 in³
1 gal = 3.785 412 E-03 m³

Traceability Statement:

The artifact(s) described in this report have been compared to the Standards of the State of Nebraska. The Standards of the State of Nebraska are traceable to the International System of Units (SI) through the National Institute of Standards and Technology (NIST) and are part of a comprehensive measurement assurance program for ensuring continued accuracy and measurement traceability within the level of uncertainty reported by this laboratory. The calibration number for this report is the only unique calibration number to be used in referencing measurement traceability for the artifact(s) described in this report.

Uncertainty Statement:

The combined standard uncertainty includes uncertainties reported for the standard, uncertainties associated with the measurement process, uncertainties for any observed deviations from reference values which are less than surveillance limits and the standard uncertainty for any uncorrected errors. The combined standard uncertainty is multiplied by a coverage factor (*k*), to give the expanded uncertainty, which defines an interval with a 95.45 percent level of confidence. The expanded uncertainty presented in this report is consistent with the Guide to the Expression of Uncertainty in Measurement (2008, revised 2012). Some components of the calibration can be evaluated through a Type A evaluation, or the method of evaluation of uncertainty by the statistical analysis (standard deviation) from the observations taken.

Pertinent Information:

The artifact(s) listed above have been found and/or left within the maximum permissible error for the specification stated above, except as noted. An artifact is considered in-compliance when the correction plus the measurement uncertainty is equal to or less than the maximum permissible error. All of the tolerances and specifications were evaluated according to NIST HB 105-3 (2010).

Condition of Item(s) Submitted for Calibration:
Good

Laboratory Reference Standard Used;
5 gal SP NE 1586

Treatment of Item(s) before Calibration:
Tested as Found

Procedure Used:
NISTIR 7383, SOP 19 (2016)

Environmental conditions at time of calibration:

Temp ˚C	20.2	Humidity %	48.8
Pressure mmHg	764.29		

Water temperature at time of calibration:
55.31 °F

Date Submitted: 12/2/2019

Joel P. Lavicky — 12/2/2019

Joel P. Lavicky, Metrologist — Date:

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Calibration Date: 12/3/2019

Certificate of Calibration of Volume Transfer

Certificate Number: 2019-144-3

Items Submitted:

Quantity	Nominal Volume	Manufacturer	Type
3	5 gal	SMI	"Special" J Prover

Submitted By: FSCP Area 75
3721 West Cuming St.
Lincoln, NE 68524

POC: JT Shaw
402-471-3422
james.shaw@nebraska.gov

Test Results

Nominal Volume	Serial Number	Material	Cubical Coefficient of Expansion (/°F)	**As Found Volume Delivered @ 60 °F**	**As left Volume Delivered @ 60 °F**	Uncertainty (U)	(*k*)
5 gal	144	SS	0.0000265	**4.99868 gal**	**4.99868 gal**	0.00095 gal	2.05
5 gal	145	SS	0.0000265	**4.99886 gal**	**4.99886 gal**	0.00095 gal	2.05
5 gal	146	SS	0.0000265	**4.99992 gal**	**4.99992 gal**	0.00095 gal	2.05

The data in this report only applies to those items specifically listed on this report.

Volume delivered at 60˚F after a 30 second pour and 10 second drain for test measures. For provers a 30 second drain time would apply.

Conversion Factors:

1 gal = 231 in³
1 gal = 3.785 412 E-03 m³

Traceability Statement:

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Uncertainty Statement:

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Pertinent Information:

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Condition of Item(s) Submitted for Calibration:
Good

Treatment of Item(s) before Calibration:
Tested as Found

Environmental conditions at time of calibration:

Temp ˚C	19.6	Humidity %	51.6
Pressure mmHg	760.73		

Laboratory Reference Standard Used;
5 gal SP NE 1586

Procedure Used:
NISTIR 7383, SOP 19 (2016)

Water temperature at time of calibration:
54.99 °F

Date Submitted: 12/3/2019

Joel P. Lavicky, Metrologist

12/26/2019
Date:

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Calibration Certificate of Mass

Calibration Date: December 4, 2019 | **Certificate Number:** 2019-144-4

Submitted By: FSCP Area 75
3721 West Cuming St.
Lincoln, NE 68524

Point of Contact: JT Shaw
Ph. 402-471-3422
email: *james.shaw@nebraska.gov*
PO Number: N/A

Test Item(s): lb weight kit
Serial Number(s): WM-6C98
Manufacture: Tromner
Condition: Good (some wear)

Artifact(s) Description:

Date Received: December 3, 2019
ID / Asset Number: FSCP Area 75
Class Specification: NIST Class F
Material: SS & AL

Reference Standards Used:
NSL lb standards

Procedure Used:
NIST HB 6969, SOP 8 (2018)

Metrologist:
JPL

Equipment Used:
Sartorius CC10000S
Mettler AT 106
Sartorius CC 1201
Sartorius CCE6

Environmental Cond. **Temp:** 22.2 °C **Pressure:** 765.81 mmHg **Relative Humidity:** 49 %

Pertinent Information

- The artifact(s) listed in this document have been found and/or left within the maximum permissible error for the specification stated above, except as noted. An artifact is considered in-compliance when the correction plus the measurement uncertainty is equal to or less than the maximum permissible error. RED print indicates an out-of-compliance reading. All of the tolerances and specifications were evaluaed according to ASTM E617 (2018) and NIST HB 105-1 (1990).

- All corrections stated in this report correlate to a “Conventional Mass” (CM), also known as "apparent mass”, scale verses 8.0 g/cm³ reference mass density and an air density of 1.2 mg/cm³ at 20 °C.

Traceability Statement

The artifact(s) described in this certificate have been compared to the Standards of the State of Nebraska. The Standards of the State of Nebraska are traceable to the International System of Units (SI) through the National Institute of Standards and Technology (NIST) and are part of a comprehensive measurement assurance program for ensuring continued accuracy and measurement traceability within the level of uncertainty reported by this laboratory. The calibration number for this certificate is the only unique calibration number to be used in referencing measurement traceability for the artifact(s) described in this certificate.

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Calibration Date: December 4, 2019 | **Certificate Number:** 2019-144-4

Calibration Results

Nominal Mass	Serial Number / ID	As Found Conventional Mass Correction (g)	Adjusted (Y/N)	As Left Conventional Mass Correction (g)	Uncertainty ± (g)	(*k*) factor	NIST Class F MPE ± (g)	Assumed Density (g/cm³)
10 lb		0.139	n	0.139	0.054	2	0.45	7.84
5 lb		0.068	n	0.068	0.028	2	0.23	7.84
2 lb		0.039	n	0.039	0.011	2	0.091	7.84
2 lb	*	0.049	n	0.049	0.011	2	0.091	7.84
1 lb		0.0355	n	0.0355	0.0083	2	0.07	7.84
0.5 lb		0.0311	n	0.0311	0.0054	2	0.045	7.84
0.2 lb		0.0082	n	0.0082	0.0022	2	0.018	7.84
0.2 lb	*	0.0089	n	0.0089	0.0022	2	0.018	7.84
0.1 lb		0.0043	n	0.0043	0.0011	2	0.0091	7.84
0.05 lb		0.00223	n	0.00223	0.00054	2	0.0045	7.84
0.02 lb		0.00080	n	0.00080	0.00022	2	0.0018	7.84
0.02 lb	*	0.00077	n	0.00077	0.00022	2	0.0018	7.84
0.01 lb		0.00065	n	0.00065	0.00018	2	0.0015	7.84
0.005 lb		0.00071	n	0.00071	0.00014	2	0.0012	2.7
0.002 lb		0.00054	n	0.00054	0.00011	2	0.00087	2.7
0.002 lb	*	0.00009	n	0.00009	0.00011	2	0.00087	2.7
0.001 lb		0.000210	n	0.000210	0.000083	2	0.0007	2.7

Conversion Factors

1 ounce (avoirdupois) (oz) = 28.349 52 g
1 pound (avoirdupois) (lb) = 453.592 37 g exactly

Joel P. Lavicky *Metrologist*

12/26/2019
Date of Issue

*The results in this certificate only applies to those item specifically listed in this certificate. This certificate cannot be considered complete unless it contains **all** pages. This document may not be reproduced except in **full**, without the written consent of the Nebraska Standards Laboratory.*

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Calibration Certificate of Mass

Calibration Date: December 4, 2019 | **Certificate Number:** 2019-144-5

Submitted By: FSCP Area 75
3721 West Cuming St.
Lincoln, NE 68524

Point of Contact: JT Shaw
Ph. 402-471-3422
email: *james.shaw@nebraska.gov*
PO Number: N/A

Test Item(s): (1) Metric weight kit
Serial Number(s): WM-2-89-2
Manufacture: Tromner
Condition: Good (some wear)

Artifact(s) Description:

Date Received: December 3, 2019
ID / Asset Number: FSCP Area 75
Class Specification: NIST Class F
Material: Stainless Steel

Reference Standards Used:
OPI & /Den Metric

Procedure Used:
NIST HB 6969, SOP 8 (2018)
Metrologist:
JPL

Equipment Used:
Sartorius CC10000S
Sartorius CC 1201
Mettler AT 106
Sartorius CCE6

Environmental Cond. **Temp:** 22.35 °C **Pressure:** 760.095 mmHg **Relative Humidity:** 49.5 %

Pertinent Information

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- All corrections stated in this report correlate to a “Conventional Mass” (CM), also known as "apparent mass”, scale verses 8.0 g/cm³ reference mass density and an air density of 1.2 mg/cm³ at 20 °C.

Traceability Statement

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Calibration Date: December 4, 2019

Certificate Number: 2019-144-5

Calibration Results

Nominal Mass	Serial Number / ID	As Found Conventional Mass Correction (g)	Adjusted (Y/N)	As Left Conventional Mass Correction (g)	Uncertainty ± (g)	(*k*) factor	NIST Class F MPE ± (g)	Assumed Density (g/cm³)
2 kg	K3	-0.070	n	-0.070	0.024	2	0.2	7.84
1 kg		0.051	n	0.051	0.012	2	0.1	7.84
500 g		0.0497	n	0.0497	0.0083	2	0.07	7.84
200 g		0.0148	n	0.0148	0.0048	2	0.04	7.84
200 g	*	0.0121	n	0.0121	0.0048	2	0.04	7.84
100 g		-0.0034	n	-0.0034	0.0024	2	0.02	7.84
50 g		0.0014	n	0.0014	0.0012	2	0.01	7.84
20 g		0.00110	n	0.00110	0.00048	2	0.004	7.84
20 g	*	0.00104	n	0.00104	0.00048	2	0.004	7.84
10 g		0.00077	n	0.00077	0.00024	2	0.002	7.84
5 g		-0.00011	n	-0.00011	0.00018	2	0.0015	7.84

Conversion Factors

1 ounce (avoirdupois) (oz) = 28.349 52 g
1 pound (avoirdupois) (lb) = 453.592 37 g exactly

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