1512 S BATAVIA AVENUE
GENEVA, IL 60134

630-232-0104

Test Report

www.riverbankacoustics.com

FOUNDED 1918 BY
WALLACE CLEMENT SABINE

SPONSOR: **EUREKA**
Montréal, Quebec, Canada

Sound Absorption
RAL™-A22-262

CONDUCTED: 2022-06-17

ON: MILL-XL 4279U-35

TEST METHODOLOGY

Riverbank Acoustical Laboratories™ is accredited by the U.S. Department of Commerce, National Institute of Standards and Technology (NIST) under the National Voluntary Laboratory Accreditation Program (NVLAP) as an ISO 17025:2017 Laboratory (NVLAP Lab Code: 100227-0) and for this test procedure. The test reported in this document conformed explicitly with ASTM C423-22: "Standard Test Method for Sound Absorption and Sound Absorption Coefficients by the Reverberation Room Method." A description of the measurement procedure and room specifications are available upon request. The results presented in this report apply to the sample as received from the test sponsor.

INFORMATION PROVIDED BY SPONSOR

The test specimen was designated by the sponsor as MILL-XL 4279U-35. The following nominal product information was provided by the sponsor prior to testing. The accuracy of such sponsor-provided information can affect the validity of the test results.

Product Under Test

Product Name:	MILL-XL
Product Code:	4279U-35
Nominal Dimensions:	Diameter @ 1143 mm (45 in.)
	Thickness @ 889 mm (35 in.)
Total Surfaces:	17.64 m^2 (189.81 ft^2)
Manufacturer:	Eureka

SPECIMEN MEASUREMENTS & TEST CONDITIONS

Through a full external visual inspection performed on the test specimen, Riverbank personnel verified the following information:

Top Hub

Diameter:	1165 mm (45.875 in.)
Thickness:	2.03 mm (0.0799 in.)
Overall Weight:	14.97 kg (33 lbs)

Bottom Hub

Diameter:	1165 mm (45.875 in.)
Depth:	140 mm (5.5 in.)
Overall Weight:	12.13 kg (26.75 lbs)

Structural Columns

Dimensions:	6 columns @ 25 mm (1 in.) wide by 25 mm (1 in.) long
Depth:	597 mm (23.5 in.)
Overall Weight:	1.59 kg (3.5 lbs)

Felt Panels

Dimensions:	48 fins @ 117.48 mm (4.625 in.) wide by 889 mm (35 in.) deep
Thickness:	9.27 mm (0.365 in.)
Overall Weight:	8.96 kg (19.75 lbs)

Physical Measurements (per object)

Dimensions:	1.17 m (46.0 in) wide by 1.17 m (46.0 in) long
Thickness:	0.89 m (35.0 in)
Weight:	37.65 kg (83.0 lbs)

Test Environment

Room Volume:	291.98 m³
Temperature:	21.6 °C ± 0.0 °C (Requirement: ≥ 10 °C and ≤ 5 °C change)
Relative Humidity:	56.15 % ± 0.1 % (Requirement: ≥ 40 % and ≤ 5 % change)
Barometric Pressure:	98.9 kPa (Requirement not defined)

The single sound absorbing object had an exposed surface area of 5.41 m^2 (58.2 ft^2). The total exposed surface area of all sound-absorbing objects was 5.41 m^2 (58.2 ft^2).

MOUNTING METHOD

Non-Standard Mounting: The specimen is a single sound absorbing object suspended from cables such that the closest face is located approximately 610 mm (24 in.) from the horizontal test surface. This approximates the mounting method of a typical ceiling installation.

Figure 1 – Specimen mounted in test chamber

Figure 2 – Specimen mounted in test chamber

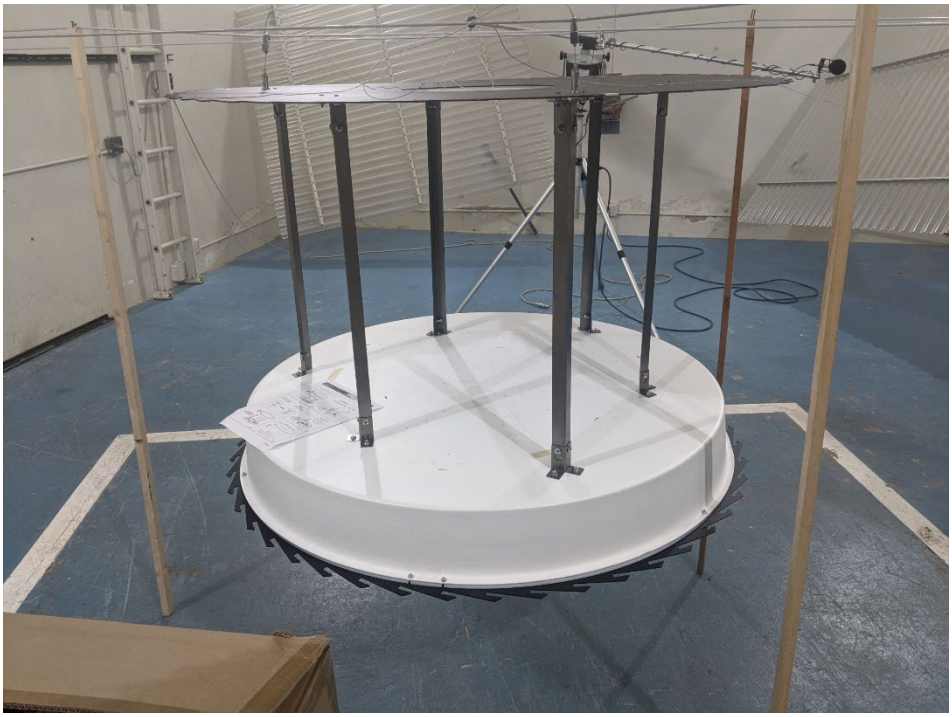

Figure 3 – Specimen top and bottom hubs connected by "V" columns

Figure 4 – Individual specimen fin prior to installation to hub

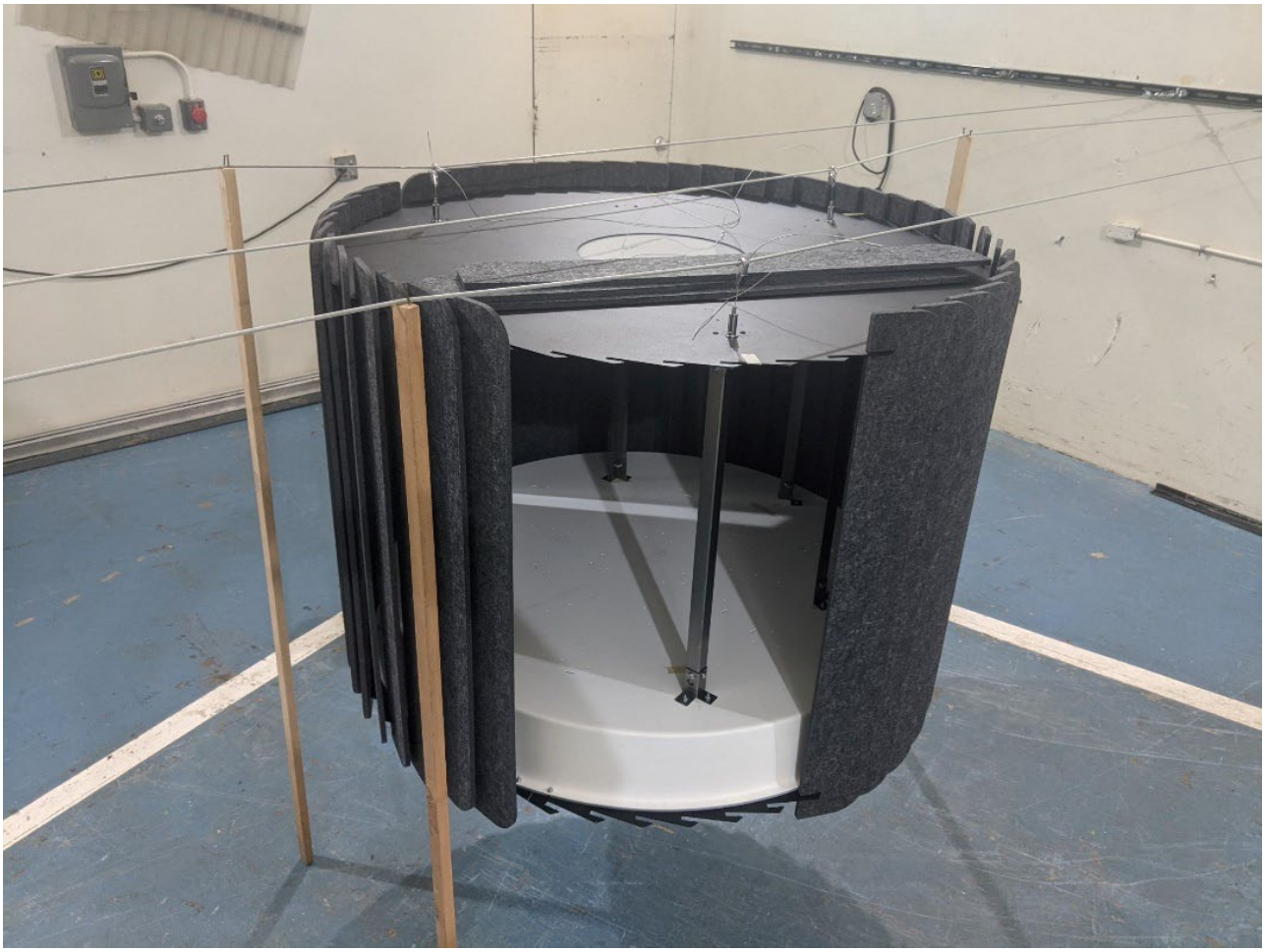

Figure 5 – Specimen fins partially installed to hub

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TEST RESULTS

Note: There is currently no standardized method for calculating Absorption Coefficients from spaced object absorbers. The sound absorption performance of spaced object absorbers should not be compared directly with specimens tested as a single rectangular area (e.g. mounting types A, E, etc.).

1/3 Octave Center Frequency	Total Absorption		Absorption per Object	
(Hz)	(m^2)	(Sabins)	(m^2 / Object)	(Sabins / Object)
100	1.18	12.66	1.18	12.66
** 125	1.45	15.61	1.45	15.61
160	1.44	15.53	1.44	15.53
200	1.16	12.54	1.16	12.54
** 250	1.81	19.44	1.81	19.44
315	1.90	20.48	1.90	20.48
400	2.28	24.51	2.28	24.51
** 500	2.54	27.35	2.54	27.35
630	2.98	32.05	2.98	32.05
800	3.18	34.26	3.18	34.26
** 1000	3.49	37.57	3.49	37.57
1250	3.82	41.07	3.82	41.07
1600	4.00	43.09	4.00	43.09
** 2000	4.10	44.15	4.10	44.15
2500	4.11	44.24	4.11	44.24
3150	4.10	44.14	4.10	44.14
** 4000	4.08	43.90	4.08	43.90
5000	4.02	43.29	4.02	43.29

Tested by Marc Sciaky
Marc Sciaky
Senior Experimentalist

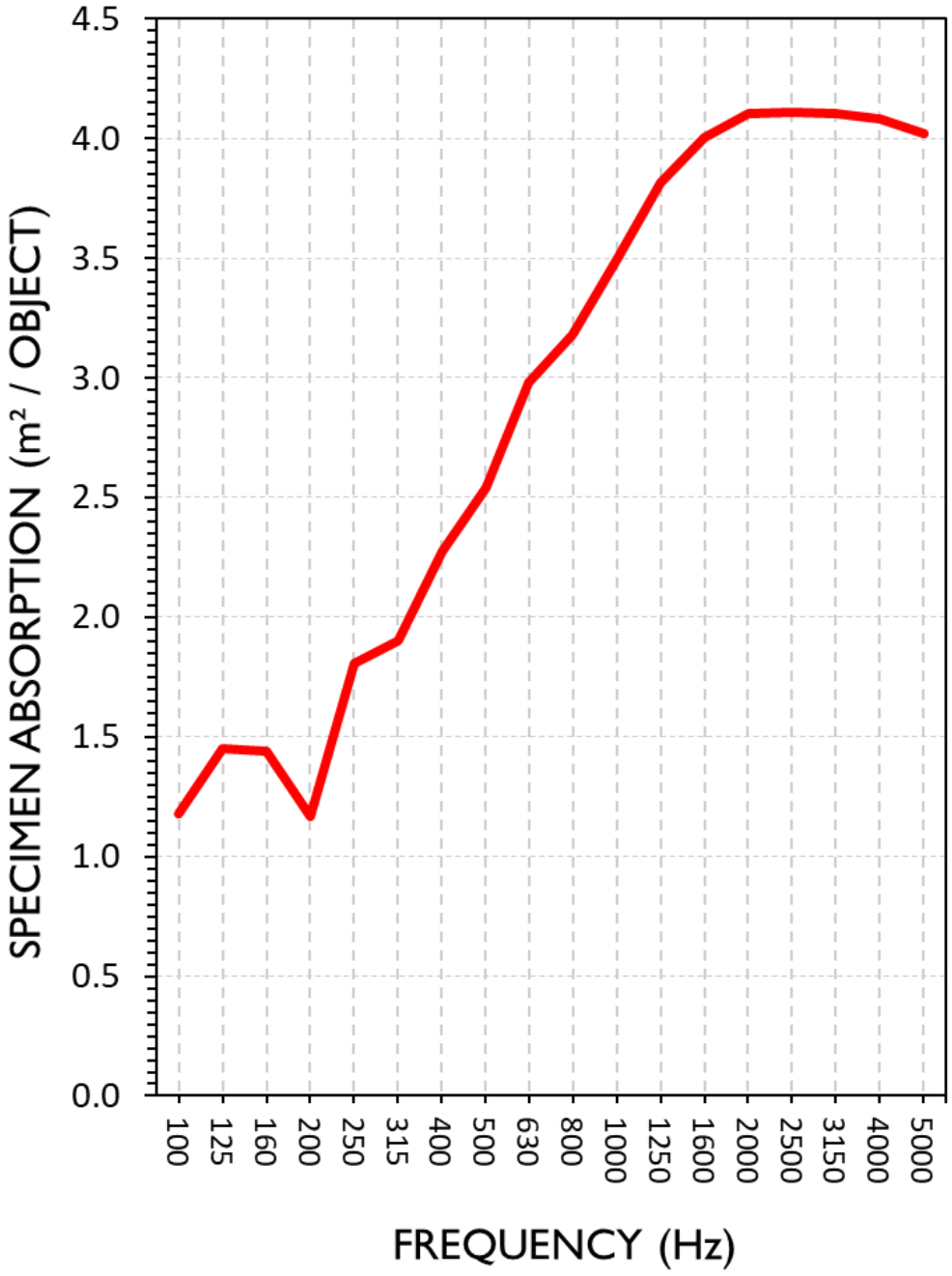
Report by Keith Kimberling
Keith Kimberling
Test Engineer

Approved by
Eric P. Wolfram
Laboratory Manager

Digitally signed by
Eric P Wolfram
Date: 2022.07.05
12:56:17 -05'00'

SOUND ABSORPTION REPORT

MILL-XL 4279U-35



APPENDIX A: Extended Frequency Range Data

Specimen: MILL-XL 4279U-35 (See Full Report)

The following non-accredited data were obtained in accordance with ASTM C423-22, but extend beyond the defined frequency range of 100Hz to 5,000Hz. These unofficial results are representative of the RAL test environment only and intended for research & comparison purposes.

1/3 Octave Band Center Frequency (Hz)	Total Absorption (m^2)	Total Absorption (Sabins)	Absorption per Object (m^2 / Object)	Absorption per Object (Sabins / Object)
31.5	0.63	6.76	0.63	6.76
40	-0.20	-2.10	-0.20	-2.10
50	0.67	7.17	0.67	7.17
63	0.15	1.57	0.15	1.57
80	-0.02	-0.23	-0.02	-0.23
100	1.18	12.66	1.18	12.66
125	1.45	15.61	1.45	15.61
160	1.44	15.53	1.44	15.53
200	1.16	12.54	1.16	12.54
250	1.81	19.44	1.81	19.44
315	1.90	20.48	1.90	20.48
400	2.28	24.51	2.28	24.51
500	2.54	27.35	2.54	27.35
630	2.98	32.05	2.98	32.05
800	3.18	34.26	3.18	34.26
1000	3.49	37.57	3.49	37.57
1250	3.82	41.07	3.82	41.07
1600	4.00	43.09	4.00	43.09
2000	4.10	44.15	4.10	44.15
2500	4.11	44.24	4.11	44.24
3150	4.10	44.14	4.10	44.14
4000	4.08	43.90	4.08	43.90
5000	4.02	43.29	4.02	43.29
6300	4.11	44.27	4.11	44.27
8000	4.06	43.74	4.06	43.74
10000	3.99	42.97	3.99	42.97
12500	3.34	35.91	3.34	35.91

APPENDIX B: Instruments of Traceability

Specimen: MILL-XL 4279U-35 (See Full Report)

Description	Model	Serial Number	Date of Certification	Calibration Due
System 1	Type 3160-A-042	3160-106968	2021-07-01	2022-07-01
Bruel & Kjaer Mic And Preamp A	Type 4943-B-001	2311428	2021-07-13	2022-07-13
Bruel & Kjaer Pistonphone	Type 4228	2781248	2021-08-13	2022-08-13
EXTECH Hygro 959	SD700	A099959	2022-03-22	2023-03-22

APPENDIX C: Revisions to Original Test Report

Specimen: MILL-XL 4279U-35 (See Full Report)

Date	Revision
2022-07-05	Original report issued

END

Riverbank Acoustical Laboratories
1512 S. Batavia Ave.
Geneva, IL 60134-3302

Tel: 630-232-0104
Fax: 630-232-0138
Email: RAL@riverbankacoustics.com

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Report Referenced: **RAL™-A22-262**

CONDUCTED: 2022-06-17

ON: MILL-XL 4279U-35 (See Full Test Report for Details)

Appendix D to ASTM C423 Sound Absorption Test
Non-standard calculation of equivalent NRC Rating and Absorption Coefficients from spaced absorbers

At this time, ASTM C423 does not provide a standard method for determining absorption coefficients of spaced object absorbers. Tests of a set of sound absorbing objects spaced apart from each other will yield higher absorption rates than a specimen joined together as a single patch (A-Mount or E-Mount). For this reason it is unfair to provide NRC or absorption coefficient ratings for specimens that consist of a spaced set of absorbers. Despite this, the architectural industry has expressed great demand for a simple "single number" rating for these treatments. Likewise, acoustical consultants desire equivalent absorption coefficient data for use in acoustical modeling software. The following is an attempt to appease these demands until ASTM develops a standard method for calculation. Several alternate non-standard calculation methods are provided. Riverbank Acoustical Laboratories prefers method 1. Rating titles for these methods are prepended with the word “Apparent”. These rating names and their associated acronyms are provided by RAL and shall not be misconstrued as originating from any current standard.

Method 1) Apparent Sound Absorption Coefficient calculated from extended test specimen envelope
The total sound absorption yielded by the specimen is divided by the surface area of the test surface covered by the suspended objects, including intermediate spaces, with additional added area to allow theoretical extrapolation for larger arrays. This method is not applicable in this case. Apparent sound absorption coefficients, and subsequently the Apparent Noise Reduction Coefficient (A*NRC) and Apparent Sound Absorption Average (A*SAA) ratings, are calculated using this surface area based on the methods described in ASTM C423-17. This may be the most accurate method for comparing object arrays to ceiling tile products. The apparent sound absorption coefficient data can be assigned to a single horizontal surface or plane in acoustical modeling software for approximation of object array performance. Such approximations rely on the assumptions that object spacing is similar to that of the tested array across the entire surface, that gaps are negligibly small between adjacent rows of objects if the test specimen consists of a single row, and that the installation occurs over a perfectly reflective surface material.

Method 2) Apparent Sound Absorption Coefficient calculated from total exposed surface area of specimen
The total sound absorption yielded by the specimen is divided by the total surface area of all exposed specimen faces, treating the object as a cylinder (5.41 m^2 (58.2 ft^2) per object x 1 objects = 5.41 m^2 (58.2 ft^2) total surface area). Apparent sound absorption coefficients, and subsequently the Apparent Noise Reduction Coefficient (A*NRC) and Apparent Sound Absorption Average (A*SAA) ratings, are calculated using this surface area based on the methods described in ASTM C423-17. This method shows the actual absorption occurring at the exposed surfaces but does not provide a fair comparison with materials mounted as a uniform patch (in A-mount or E-mount).

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Geneva, IL 60134-3302

Tel: 630-232-0104
Fax: 630-232-0138
Email: RAL@riverbankacoustics.com

Appendix D (continued)

Method 3) Apparent Sound Absorption Coefficient calculated from one face per object

The total sound absorption yielded by the specimen is divided by the surface area of one side of one large face for each object in the specimen. This method is not applicable in this case. Apparent sound absorption coefficients, and subsequently the Apparent Noise Reduction Coefficient (A*NRC) and Apparent Sound Absorption Average (A*SAA) ratings, are calculated using this surface area based on the methods described in ASTM C423-17. This method is favored by some material manufacturers since it yields very high NRC figures, but does not provide a fair comparison with other ceiling tile or wall panel products. Riverbank Acoustical Laboratories recommends that results obtained from this method be used for research and comparison purposes only; such results should not be used for marketed claims of product performance.

Method 4) Apparent Sound Absorption Coefficient calculated from specimen envelope without extension

The total sound absorption yielded by the specimen is divided by the rectangular test surface area covered by the suspended objects, including intermediate spaces. This method is not applicable in this case. Apparent sound absorption coefficients, and subsequently the Apparent Noise Reduction Coefficient (A*NRC) and Apparent Sound Absorption Average (A*SAA) ratings, are calculated using this surface area based on the methods described in ASTM C423-17. While similar in concept to Method 1, attempting to model any array larger than the tested specimen using these results would imply instances of adjacent objects with zero spacing scattered throughout the extrapolated array. Riverbank Acoustical Laboratories recommends that results obtained from this method be used for research and comparison purposes only; such results should not be used for marketed claims of product performance.

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Appendix D: Data Note: See full test report for details of mounting position, spacing, and configuration, as these parameters greatly affect sound absorption performance.

Specimen Absorption (ft^2)			Method 1	Method 2	Method 3	Method 4
Freq. (Hz)	Sabins	Sabins / Object	Apparent Abs. Coefficient From Total Coverage Area N/A	Apparent Abs. Coefficient From Total Exposed Surface Area (58.2 ft^2)	Apparent Abs. Coefficient From One Face per Object N/A	Apparent Abs. Coefficient From Unextended Envelope Area N/A
31.5	6.76	6.76	N/A	0.12	N/A	N/A
40	-2.10	-2.10	N/A	-0.04	N/A	N/A
50	7.17	7.17	N/A	0.12	N/A	N/A
63	1.57	1.57	N/A	0.03	N/A	N/A
80	-0.23	-0.23	N/A	0.00	N/A	N/A
100	12.66	12.66	N/A	0.22	N/A	N/A
125	15.61	15.61	N/A	0.27	N/A	N/A
160	15.53	15.53	N/A	0.27	N/A	N/A
200	12.54	12.54	N/A	0.22	N/A	N/A
250	19.44	19.44	N/A	0.33	N/A	N/A
315	20.48	20.48	N/A	0.35	N/A	N/A
400	24.51	24.51	N/A	0.42	N/A	N/A
500	27.35	27.35	N/A	0.47	N/A	N/A
630	32.05	32.05	N/A	0.55	N/A	N/A
800	34.26	34.26	N/A	0.59	N/A	N/A
1,000	37.57	37.57	N/A	0.65	N/A	N/A
1,250	41.07	41.07	N/A	0.71	N/A	N/A
1,600	43.09	43.09	N/A	0.74	N/A	N/A
2,000	44.15	44.15	N/A	0.76	N/A	N/A
2,500	44.24	44.24	N/A	0.76	N/A	N/A
3,150	44.14	44.14	N/A	0.76	N/A	N/A
4,000	43.90	43.90	N/A	0.75	N/A	N/A
5,000	43.29	43.29	N/A	0.74	N/A	N/A
6,300	44.27	44.27	N/A	0.76	N/A	N/A
8,000	43.74	43.74	N/A	0.75	N/A	N/A
10,000	42.97	42.97	N/A	0.74	N/A	N/A
12,500	35.91	35.91	N/A	0.62	N/A	N/A
		Apparent NRC:	**N/A**	**0.55**	**N/A**	**N/A**
		Apparent SAA:	**N/A**	**0.55**	**N/A**	**N/A**

Prepared by _____
Keith Kimberling
Test Engineer