ATTACHMENT B

Description of Technical Terms

To help understand the analysis and recommendations made in this report, the following is a brief discussion of technical noise terms.

Sound pressure level is expressed on a logarithmic scale in units of decibels (dB). Since the scale is logarithmic, a sound that is twice the sound pressure level as another will be three decibels (3 dB) higher.

The noise data and analysis in this report have been given in terms of frequency distribution. The levels are grouped into octave bands. Typically, the centre frequencies for each octave band are 31.5, 63, 125, 250, 500, 1000, 2000, 4000 and 8000 Hertz (Hz.). The human ear responds to the pressure variations in the atmosphere that reach the ear drum. These pressure variations are composed of different frequencies that give each sound we hear its unique character.

It is common practice to sum sound levels over the entire audible spectrum (i.e., 20 Hz to 20 kHz) to give an overall sound level. However, to approximate the hearing response of humans, each octave band measured has a weighting applied to it. The resulting “A-weighted” sound level is often used as a criterion to indicate a maximum allowable sound level. In general, low frequencies are weighted higher, as human hearing is less sensitive to low frequency sound.

Environmental noise levels vary over time, and are described using an overall sound level known as the L_{eq}, or energy averaged sound level. The L_{eq} is the equivalent continuous sound level, which in a stated time, and at a stated location, has the same energy as the time varying noise level. It is common practice to measure L_{eq} sound levels in order to obtain a representative average sound level. The L_{90} is defined as the sound level exceeded for 90% of the time and is used as an indicator of the “ambient” noise level.

ATTACHMENT C

Noise Data

Name	ID	Frequency (Hz)									
		31.5	63	125	250	500	1000	2000	4000	8000	A
HVAC*	HVAC	80	82	83	82	79	79	74	71	62	83
Large Exhaust*	EX	89	91	92	90	85	80	74	73	66	87
Ventilation Opening*	VENT	93	86	83	84	82	78	76	70	57	83
Dust Collector	DC	106	104	102	99	101	96	92	89	82	102
Welding Fume Hood	WFH	38	51	64	72	83	88	86	76	69	91
BioFilter	BF	92	94	95	93	88	83	77	76	69	90
PUMP	PUMP	107	105	107	101	104	97	99	95	93	106
Diesel Generator (Cummins)	DGen	82	82	98	106	112	112	111	108	103	117
Generator	GEN	104	112	119	105	98	88	85	83	82	105
Generator Exhaust	GENEX	74	85	95	87	90	91	94	92	91	99
Loader	LOAD	116	125	117	106	104	103	102	97	87	109
Chipper	CHIP	97	109	106	108	112	114	112	106	97	118
Conveyor	CONV	89	92	96	95	92	88	85	78	71	94
Compost Turner	COMP	106	116	114	108	109	104	103	98	93	111
Compost Aerator**	AERTR	99	99	99	98	93	89	83	78	76	95
Screen	SCRN	105	101	98	97	96	98	99	97	93	104
Air Classifier	AIRC	106	116	114	108	109	104	103	98	93	111
Truck Idle*	TRKI	99	102	94	93	88	91	96	85	75	98
Flare	FLR	76	82	89	95	99	98	98	93	97	104
Haul Truck Movements*	TKM	91	101	102	98	100	98	96	91	87	103
Dump Truck	DUMPT	103	105	112	107	104	103	102	93	92	108
Grader CAT12	GRDR	118	122	113	113	113	110	109	108	101	116
Dozer CATD6	DOZR6	105	109	114	112	106	103	103	96	88	110
Excavator	EXCV	101	106	103	105	100	96	97	91	83	103
Skidsteer (Backhoe)	BKHOE	104	103	97	85	87	88	86	78	67	92
Leachate Truck Pumping	LTKP	103	104	107	99	102	105	106	101	99	111
Leachate Truck Movements	LTKM	98	103	104	100	95	99	98	93	89	104

Notes:

*Data measured at Miller Waste Management Facility - East Gwillimbury.

**Calculated using airflow data. Golder's database was used for all other noise sources.

ATTACHMENT D

Nomenclature

NOISE SOURCE SUMMARY TABLE NOMENCLATURE

Source Location

O – Located/installed outside the building, including on the roof

I – Located/installed inside the building

Sound Characteristics

S – Steady

Q – Quasi Steady Impulsive

I – Impulsive

B – Buzzing

T – Tonal

C – Cyclic

Noise Control Measures

S – Silencer, acoustic louver, muffler

A – Acoustic lining, plenum

B – Barrier, berm, screening

L – Lagging

E – Acoustic enclosure

O – Other

U – Uncontrolled

ATTACHMENT E

Equipment Calibration

PCB PIEZOTRONICS
A PCB GROUP COMPANY

Certificate of Calibration and Conformance

Certificate Number 2012-159876

Instrument Model 2900, Serial Number 0983, was calibrated on 29MAY2012. The instrument meets factory specifications per Procedure D0001.8146, ANSI S1.11 1986, ANSI S1.4 1983, ANSI S1.9-1996 Class 1, IEC 651-Type 1 1979, and IEC 804-Type 1 1985, IEC1043-1993 Class 1 when normalized.

Instrument found to be in calibration as received: YES
Date Calibrated: 29MAY2012
Calibration due:

Calibration Standards Used

MANUFACTURER	MODEL	SERIAL NUMBER	INTERVAL	CAL. DUE	TRACEABILITY NO.
Larson Davis	LDSigGn/2209	0662/0114	12 Months	20JAN2013	2012-154016

Reference Standards are traceable to the National Institute of Standards and Technology (NIST)

Calibration Environmental Conditions

Temperature: 22 ° Centigrade

Relative Humidity: 27 %

Affirmations

This Certificate attests that this instrument has been calibrated under the stated conditions with Measurement and Test Equipment (M&TE) Standards traceable to the U.S. National Institute of Standards and Technology (NIST). All of the Measurement Standards have been calibrated to their manufacturers' specified accuracy / uncertainty. Evidence of traceability and accuracy is on file at Provo Engineering & Manufacturing Center. An acceptable accuracy ratio between the Standard(s) and the item calibrated has been maintained. This instrument meets or exceeds the manufacturer's published specification unless noted.

This calibration complies with the requirements of ISO 17025 and ANSI Z540. The collective uncertainty of the Measurement Standard used does not exceed 25% of the applicable tolerance for each characteristic calibrated unless otherwise noted.

The results documented in this certificate relate only to the item(s) calibrated or tested. A one year calibration is recommended, however calibration interval assignment and adjustment are the responsibility of the end user. This certificate may not be reproduced, except in full, without the written approval of the issuer.

"As received" data is the same as shipped data.

Signed: 

Technician: Sean Childs

Provo Engineering and Manufacturing Center, 1681 West 820 North, Provo, Utah 84601
Toll Free: 888.258.3222 Telephone: 716.926.8243 Fax: 716.926.8215
ISO 9001-2008 Certified

PCB PIEZOTRONICS
A PCB GROUP COMPANY

Certificate of Calibration and Conformance

Certificate Number 2012-159574

Microphone Model 2560, Serial Number 3462, was calibrated on 21MAY2012. The microphone meets factory specifications per Test Procedure D0001.8167.

Instrument found to be in calibration as received: YES
Date Calibrated: 21MAY2012
Calibration due:

Calibration Standards Used

MANUFACTURER	MODEL	SERIAL NUMBER	INTERVAL	CAL. DUE	TRACEABILITY NO.
Larson Davis	2900	0575	12 Months	14JUN2012	2011-144882
Larson Davis	2559	3034LF	12 Months	15AUG2012	2011-147516
Larson Davis	PRM915	0102	12 Months	16AUG2012	2011-147581
Larson Davis	PRM902	0206	12 Months	16AUG2012	2011-147576
Larson Davis	PRM902	0529	12 Months	07SEP2012	2011-148677
Larson Davis	PRM902	0528	12 Months	07SEP2012	2011-148679
Larson Davis	MTS1000 / 2201	1000 / 0100	12 Months	09SEP2012	SM090911-3
Hewlett Packard	34401A	3146A62099	12 Months	15NOV2012	5436054
Larson Davis	2559	2504	12 Months	13DEC2012	18736-1
Larson Davis	PRM916	0102	12 Months	22DEC2012	2011-153087
Larson Davis	CAL250	42630	12 Months	04JAN2013	2012-153336

Reference Standards are traceable to the National Institute of Standards and Technology (NIST)

Calibration Environmental Conditions

Environmental test conditions as printed on microphone calibration chart.

Affirmations

This Certificate attests that this instrument has been calibrated under the stated conditions with Measurement and Test Equipment (M&TE) Standards traceable to the U.S. National Institute of Standards and Technology (NIST). All of the Measurement Standards have been calibrated to their manufacturers' specified accuracy / uncertainty. Evidence of traceability and accuracy is on file at Provo Engineering & Manufacturing Center. An acceptable accuracy ratio between the Standard(s) and the item calibrated has been maintained. This instrument meets or exceeds the manufacturer's published specification unless noted.

This calibration complies with the requirements of ISO 17025 and ANSI Z540. The collective uncertainty of the Measurement Standard used does not exceed 25% of the applicable tolerance for each characteristic calibrated unless otherwise noted.

The results documented in this certificate relate only to the item(s) calibrated or tested. A one year calibration is recommended, however calibration interval assignment and adjustment are the responsibility of the end user. This certificate may not be reproduced, except in full, without the written approval of the issuer.

"AS RECEIVED" data is the same as shipped data.

Signed: Abraham Ortega
Technician: Abraham Ortega

Provo Engineering and Manufacturing Center, 1681 West 820 North, Provo, Utah 84601
Toll Free: 888.258.3222 Telephone: 716.926.8243 Fax: 716.926.8215
ISO 9001-2008 Certified

Larson Davis

Larson-Davis 1/2" Microphone Calibration Chart
Model: 2560 Serial Number: 3462

Open Circuit Sensitivity @ 1015.2 mbar & 251.19 Hz
-27.14 dB re 1V/Pascal
43.96 mV/Pascal
+1.12 K_0 (-dB re 50 mV/Pascal)

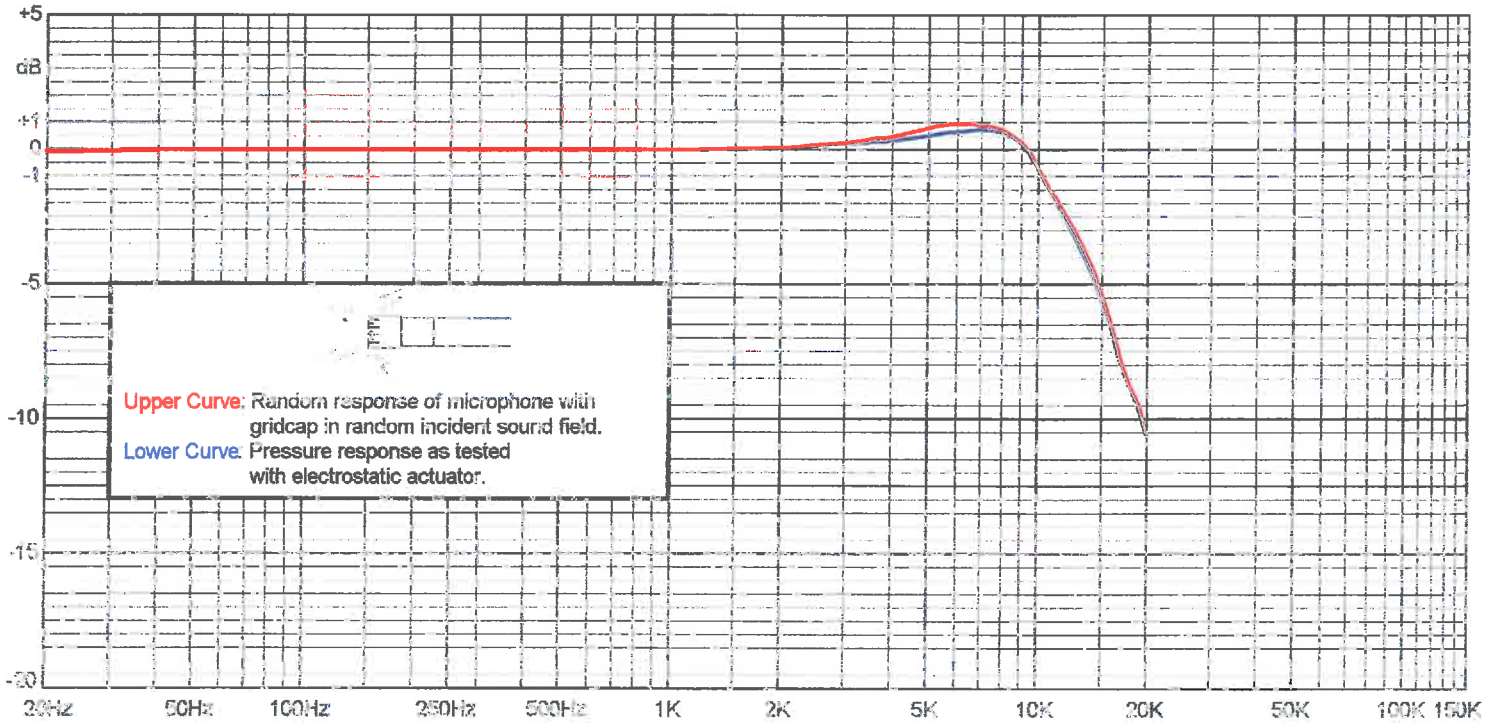
Expanded Uncertainty @ ~95% confidence level
0.18 dB

Capacitance @ 251.2 Hz
20.5 pF

Lower Limiting Frequency
-3 dB @ 1.12 Hz

Test Conditions:

Polarization Voltage	200 V
Ambient Pressure	1015.2 mbar
Temperature	23.6 °C
Relative Humidity	37.2 %



Frequency Response (0 dB @ 251.19 Hz)
Random and actuator response with reference to level at 251.19 Hz

Freq (Hz)	Upper (dB)	Lower (dB)	Freq (Hz)	Upper (dB)	Lower (dB)	Freq (Hz)	Upper (dB)	Lower (dB)	Freq (Hz)	Upper (dB)	Lower (dB)	Freq (Hz)	Upper (dB)	Lower (dB)
19.95	-0.07	-0.07	501.19	-0.01	-0.01	1883.65	0.07	0.06	4216.97	0.58	0.39	9440.61	-0.09	-0.15
25.12	-0.04	-0.04	630.96	-0.01	-0.01	1995.26	0.08	0.07	4466.84	0.66	0.43	10000.00	-0.74	-0.82
31.62	-0.01	-0.01	794.33	0.00	-0.00	2113.49	0.10	0.08	4731.51	0.75	0.48	10592.54	-1.39	-1.49
39.81	0.00	-0.00	1000.00	0.00	0.00	2238.72	0.11	0.09	5011.87	0.83	0.53	11220.19	-1.89	-2.01
50.12	0.00	0.00	1059.25	0.01	0.01	2371.37	0.16	0.14	5308.84	0.91	0.59	11885.02	-2.51	-2.68
63.10	0.01	0.01	1122.02	0.01	0.01	2511.89	0.18	0.15	5623.41	0.95	0.64	12589.25	-3.06	-3.28
79.43	0.01	0.01	1188.50	0.01	0.01	2660.73	0.20	0.17	5956.62	0.94	0.66	13335.21	-3.72	-3.98
100.00	0.01	0.01	1258.93	0.03	0.02	2818.38	0.23	0.18	6309.57	0.95	0.70	14125.38	-4.47	-4.72
125.89	0.00	0.00	1333.52	0.03	0.02	2985.38	0.27	0.21	6683.44	0.94	0.73	14962.36	-5.43	-5.64
158.49	0.00	0.00	1412.54	0.04	0.03	3162.28	0.32	0.24	7079.46	0.91	0.73	15848.93	-6.52	-6.68
199.53	0.00	0.00	1496.24	0.04	0.03	3349.65	0.36	0.26	7498.94	0.84	0.70	16788.04	-7.78	-7.90
251.19	0.00	0.00	1584.89	0.05	0.04	3548.13	0.42	0.30	7943.28	0.73	0.63	17782.80	-8.71	-8.82
316.23	0.00	-0.00	1678.80	0.06	0.05	3758.37	0.43	0.30	8413.95	0.53	0.45	18836.49	-9.42	-9.53
398.11	-0.01	-0.01	1778.28	0.06	0.05	3981.07	0.50	0.34	8912.51	0.28	0.21	19952.62	-10.54	-10.62

Abraham Ortega 21MAY2012
Larson-Davis Model 9700 ES Microphone Calibration System

PCB PIEZOTRONICS
A PCB GROUP COMPANY

Certificate of Calibration and Conformance

Certificate Number 2012-160328

Instrument Model 900C, Serial Number 1573, was calibrated on 11JUN2012. The instrument meets factory specifications per Procedure D0001.8200.

Instrument found to be in calibration as received: NO
Date Calibrated: 11JUN2012
Calibration due:

Calibration Standards Used

MANUFACTURER	MODEL	SERIAL NUMBER	INTERVAL	CAL. DUE	TRACEABILITY NO.
Hewlett Packard	34401A	US36033460	12 Months	20JUN2012	5254394
Larson Davis	LDSigGn/2209	0617 / 0104	12 Months	16JAN2013	2012-153792

Reference Standards are traceable to the National Institute of Standards and Technology (NIST)

Calibration Environmental Conditions

Temperature: 22 ° Centigrade

Relative Humidity: 25 %

Affirmations

This Certificate attests that this instrument has been calibrated under the stated conditions with Measurement and Test Equipment (M&TE) Standards traceable to the U.S. National Institute of Standards and Technology (NIST). All of the Measurement Standards have been calibrated to their manufacturers' specified accuracy / uncertainty. Evidence of traceability and accuracy is on file at Provo Engineering & Manufacturing Center. An acceptable accuracy ratio between the Standard(s) and the item calibrated has been maintained. This instrument meets or exceeds the manufacturer's published specification unless noted.

This calibration complies with the requirements of ISO 17025 and ANSI Z540. The collective uncertainty of the Measurement Standard used does not exceed 25% of the applicable tolerance for each characteristic calibrated unless otherwise noted.

The results documented in this certificate relate only to the item(s) calibrated or tested. A one year calibration is recommended, however calibration interval assignment and adjustment are the responsibility of the end user. This certificate may not be reproduced, except in full, without the written approval of the issuer.

See "as received" data.

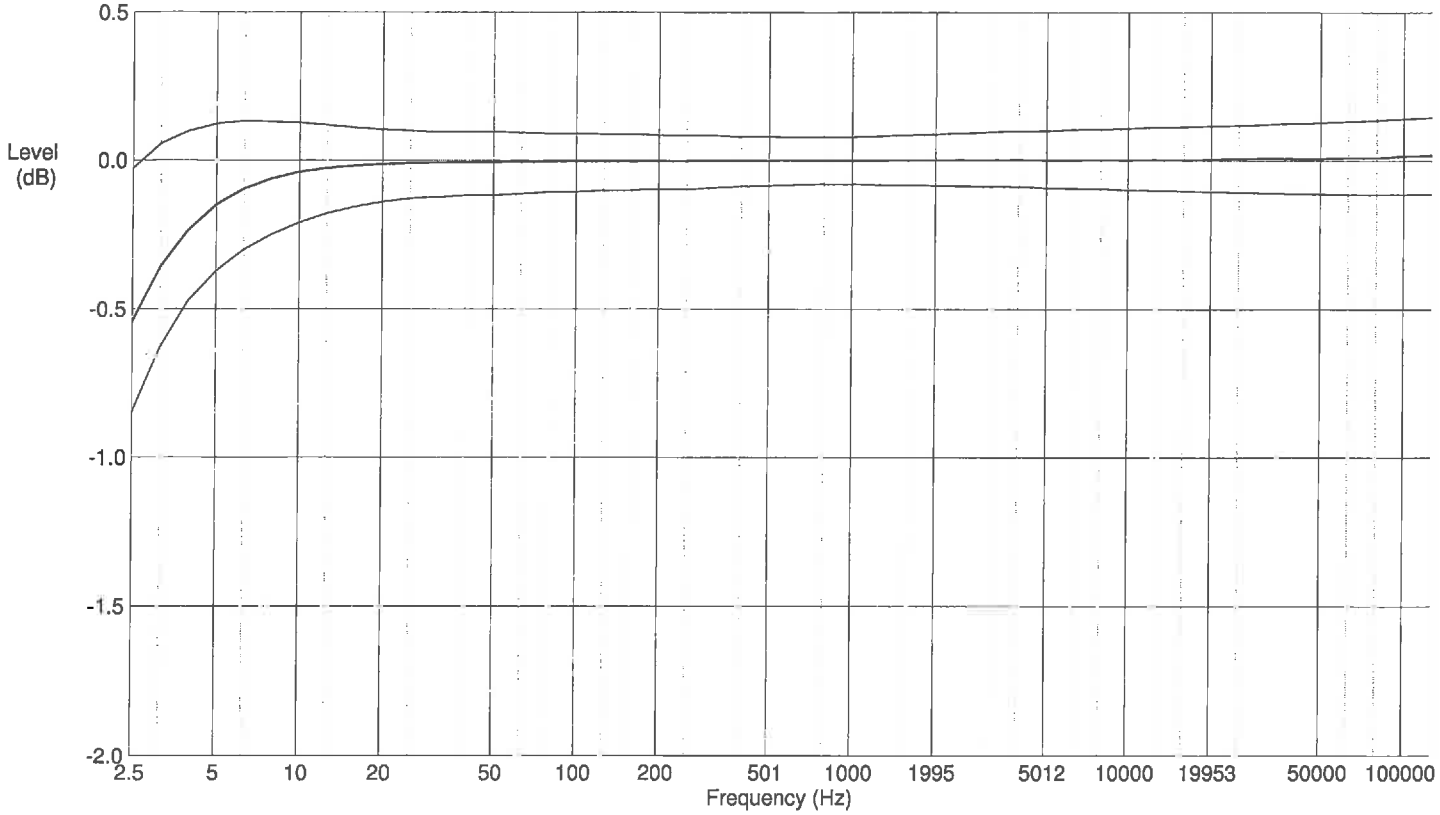
Signed: 

Technician: Sean Childs

Provo Engineering and Manufacturing Center, 1681 West 820 North, Provo, Utah 84601
Toll Free: 888.258.3222 Telephone: 716.926.8243 Fax: 716.926.8215
ISO 9001-2008 Certified

Preamplifier Model: 900C Serial Number: 1573
Certificate of Electrical Conformance

Frequency response of this model 900C preamplifier was tested at a level of 1 Vrms with 18pF microphone capacitance and driving a short cable. Output level at 1kHz is 0.9802 Vrms (-0.173 dBV), uncertainty 0.033 dB. Results are displayed relative to the level at 1kHz.



Freq (Hz)	Measured (dB)	Uncert (dB)	Tolerance (dB)	Freq (Hz)	Measured (dB)	Uncert (dB)	Tolerance (dB)
2.51	-0.54	0.075	-0.03, -0.85	630.96	0.00	0.016	+0.08, -0.08
3.16	-0.36	0.058	+0.06, -0.63	794.33	0.00	0.016	+0.08, -0.08
3.98	-0.24	0.058	+0.10, -0.47	1000.00	0.00	0.016	+0.08, -0.08
5.01	-0.15	0.036	+0.12, -0.37	1258.90	0.00	0.016	+0.08, -0.08
6.31	-0.10	0.036	+0.13, -0.30	1584.90	0.00	0.016	+0.09, -0.08
7.94	-0.06	0.036	+0.13, -0.25	1995.30	0.00	0.016	+0.09, -0.09
10.00	-0.04	0.016	+0.13, -0.21	2511.90	0.00	0.016	+0.09, -0.09
12.59	-0.03	0.016	+0.12, -0.18	3162.30	0.00	0.016	+0.10, -0.09
15.85	-0.02	0.016	+0.11, -0.16	3981.10	0.00	0.016	+0.10, -0.09
19.95	-0.01	0.016	+0.10, -0.14	5011.90	0.00	0.016	+0.10, -0.09
25.12	-0.01	0.016	+0.10, -0.13	6309.60	0.00	0.016	+0.10, -0.09
31.62	-0.01	0.016	+0.10, -0.12	7943.30	0.00	0.016	+0.11, -0.10
39.81	-0.01	0.016	+0.09, -0.12	10000.00	0.00	0.016	+0.11, -0.10
50.12	-0.01	0.016	+0.10, -0.12	12589.00	0.00	0.016	+0.11, -0.10
63.10	-0.00	0.016	+0.09, -0.11	15849.00	0.00	0.016	+0.11, -0.10
79.43	-0.00	0.016	+0.09, -0.11	19953.00	0.01	0.016	+0.12, -0.10
100.00	-0.00	0.016	+0.09, -0.11	25250.00	0.01	0.022	+0.12, -0.11
125.89	-0.00	0.016	+0.09, -0.10	31500.00	0.01	0.022	+0.12, -0.11
158.49	-0.00	0.016	+0.09, -0.10	39750.00	0.01	0.022	+0.13, -0.11
199.53	-0.00	0.016	+0.09, -0.10	50000.00	0.01	0.022	+0.13, -0.11
251.19	-0.00	0.016	+0.09, -0.10	63000.00	0.01	0.047	+0.13, -0.11
316.23	-0.00	0.016	+0.08, -0.09	79500.00	0.01	0.047	+0.14, -0.11
398.11	-0.00	0.016	+0.08, -0.09	100000.00	0.02	0.047	+0.14, -0.12
501.19	-0.00	0.016	+0.08, -0.09	126000.00	0.02	0.063	+0.14, -0.12

Noise floor data: 1kHz (1/3 Octave) = 0.35 uV, -9.0 dBuV, uncertainty = 0.47 dB
Flat (20Hz-20kHz) = 3.5 uV, 10.8 dBuV, uncertainty = 0.47 dB
Awt = 1.8 uV, 4.9 dBuV, uncertainty = 0.46 dB

Uncertainties are given as expanded uncertainty at ~95% confidence interval (k = 2).

Technician: Sean Childs Test Date: 11JUN2012