



# **BASELINE SOUND STUDY OF THE WHARF BOSTON EXPANSION PROJECT**

**REVISION 2** TOPICAL REPORT RSI-3144



**PREPARED FOR**

Wharf Resources (USA), Inc.  
10928 Wharf Road  
Lead, South Dakota 57754

**SEPTEMBER 2022**





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## 1.0 INTRODUCTION

Wharf Resources (USA), Inc. (Wharf) has proposed to expand its existing gold mine operations in the area known as the Boston Expansion, located on the southern edge of the Wharf Mine along the Portland Ridgeline. This area is approximately 4 miles west of Lead, South Dakota, in Lawrence County. The proposed permit area consists of approximately 47.4 acres of private land located in Sections 2 and 3, Township 4 North, Range 2 East. Figure 1-1 shows the expansion study area. The blue outline represents the current permitted mine boundaries for Wharf and Golden Reward, and the pink outline represents the proposed Boston Expansion permit area.

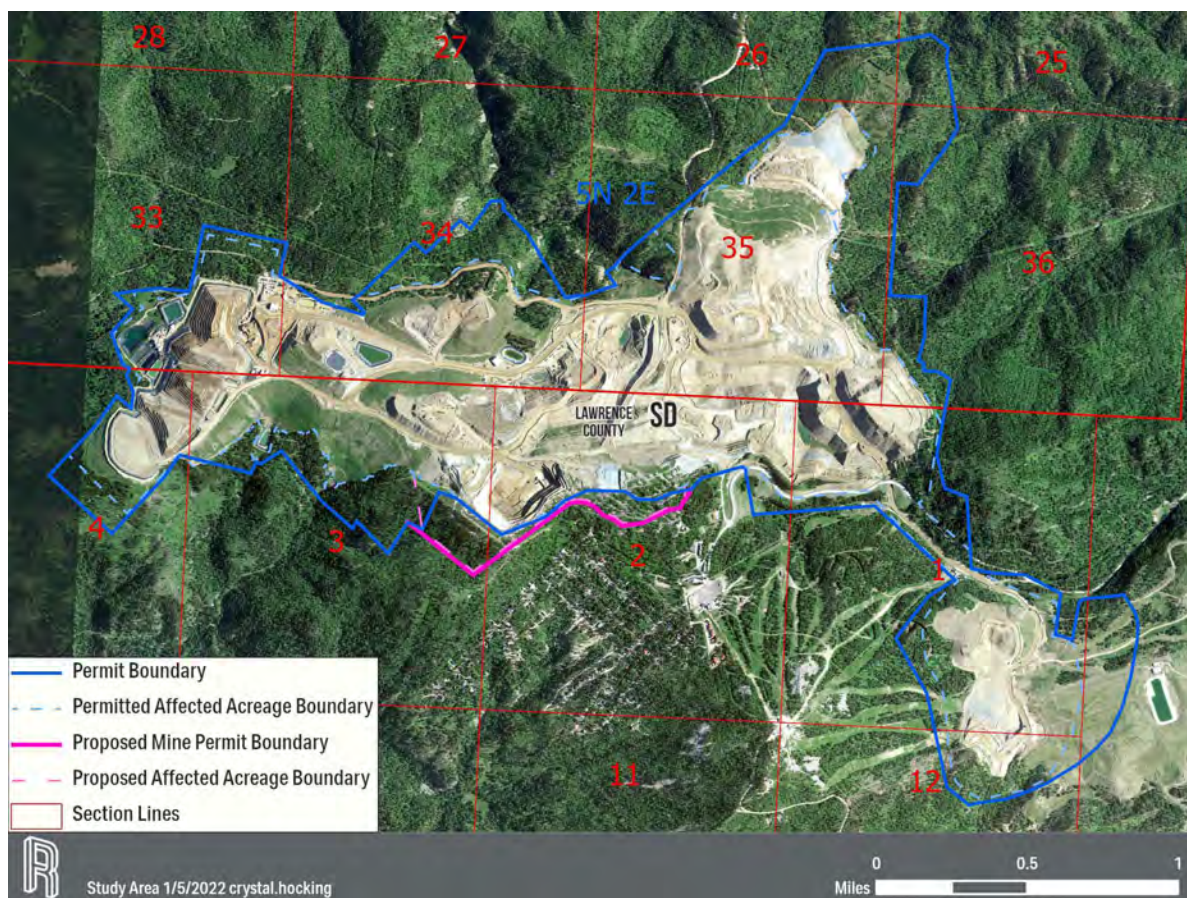


Figure 1-1. Boston Expansion Baseline Study Area Map.

A baseline environmental study in the Boston Expansion area was completed per the requirements of the South Dakota Department of Agriculture and Natural Resources (SD DANR). The SD DANR mining rules, Administrative Rules of South Dakota (ARSD) 74:29, and South Dakota Codified Law (SDCL) 45-6B require a baseline sampling plan to characterize baseline sound adequately. SDCL 45-6B-92 states that the reclamation plan shall describe and address critical resources that are potentially affected by the mining operation, including noise at "areas near potential receptors including residences and recreational areas."



In fulfillment of SDCL 45-6B-92 and the baseline sampling plan for the Boston Expansion area, a sound study was conducted. To evaluate current sound conditions as work progresses along the Portland Ridgeline and the Flossie Pit, Wharf installed two Sonitus EM2030-A fully automated, remote sound meters in April 2021. Monitoring is still active as of this report. RESPEC also conducted a supplemental sound study with handheld instruments at nearby noise receptors on 4 separate days (July 13, July 20, and July 28, 2021, and May 3, 2022). The purpose of this report is to summarize the existing or baseline sound near the proposed mining expansion based on data collected by RESPEC and Wharf and compare those data to historical data collected during previous sound investigations.

This report is organized to optimize available information and understanding of the sound surrounding the site. Chapter 2.0 summarizes previous sound studies at the Wharf Mine, and the methodology used to conduct the study is presented in Chapter 3.0. A discussion of the results is presented in Chapter 4.0, and Chapter 5.0 provides a summary of this study. References are cited in Chapter 6.0. The report concludes with site photographs in Appendix A, tables and plots of RESPEC data in Appendix B, and plots of the Wharf sound data over the review period in Appendix C.

## 2.0 PREVIOUS INVESTIGATIONS

Several pertinent baseline sound-level studies have been performed near the Wharf Mine. The last study was performed in 2010 by Dr. Charles Kliche, and the other two studies were both performed by MartyAnn Apa in 1987 and 1992. A study was also conducted by John Erickson in 1988–1989. A summary of the studies is as follows:

- / **1987** – A sound study was conducted for the Golden Reward Mine in 1987 [Apa, 1987]. Sound measurements were obtained at 12 locations in and around Golden Reward's proposed open pit. The report concluded "average background noise levels from all sites fall within or near environmental levels for rural areas." Noise levels were highest at sites along roadways where vehicle traffic contributed to the overall sound levels.
- / **1988/1989** – The study conducted by Erickson [1988] aimed to quantify sound from mine operations regarding receptors outside of the mine boundary. A subsequent report by Apa [1989] analyzed Erickson's 1988 data. These reports concluded that mine-related sound (excluding blasting) was 35 to 50 decibels (dB) and would be expected to have minimal effect on nearby dwellings.
- / **1992** – The 1992 sound study conducted by Apa was for the Clinton Expansion. For this study, sound measurements were taken at ten locations around the proposed Clinton Expansion. The report concluded that sound levels at eight of the ten sites were typical for rural areas. At the other two sites, sound readings 10 to 15 dB higher than background noise were caused by high winds and local and highway traffic noise [Apa, 1993].
- / **2010** – A baseline sound study was conducted in 2010 for the Green Mountain/Golden Reward Expansion. Measurements were taken at 11 locations on four dates in July and August 2010 (some of these locations coincided with monitoring locations in Apa [1993]). The results from this study indicated that most sound levels were typical for rural area forests. Most higher levels of sound were from wind, wildlife (i.e., birds), or traffic. The only verifiable mine activity sounds were related to a backup alarm, water truck, lowboy trailer, and general shift changes in mine traffic [Kliche, 2010].



## 3.0 METHODOLOGY

This study includes sound measurements collected by Wharf and RESPEC. RESPEC conducted a complementary sound-monitoring program to confirm that sound data collected by Wharf were accurate and to expand the monitored area.

### 3.1 WHARF MONITORING

To evaluate current sound conditions as work progresses along the Portland Ridgeline and the Flossie Pit, Wharf installed two Sonitus EM2030-A fully automated, remote sound meters in April 2021, as shown in Figure 3-1. These meters are located at the Terry Peak Ski area overflow parking lot (meter 1249, Site SND-06) and south of the closest residence (meter 1248, Site SND-05). The installation locations were selected with respect to proximity to the housing development and Wharf-owned properties. These sound meters were factory calibrated and then installed by Wharf staff.



Figure 3-1. Wharf Sound-Monitoring Location Map.

Beginning on April 20, 2021, data have been collected at 5-minute-average intervals. Data recorded include  $LA_{eq}$ ,  $LA_{max}$ ,  $LA_{10}$ ,  $LA_{90}$ ,  $LC_{eq}$ ,  $LC_{max}$ ,  $LC_{10}$ , and  $LC_{90}$ .<sup>1</sup> These functions are measured simultaneously with the A-weighted and C-weighted frequencies. When readings over 60 dB are

<sup>1</sup> Chapter 7.0 contains a glossary of terms.



measured, sound clips are automatically recorded to capture the source of the sound. For this report, 3 months of Wharf sound data from 2021 (i.e., April 20, 2021, through July 27, 2021) and three 2-week periods of data (October 1 through 15, 2021; January 1 through 15, 2022; and April 24 through May 8, 2022) were reviewed and analyzed. Wharf intends to conduct continuous sound monitoring for the foreseeable future.

### 3.2 RESPEC MONITORING

RESPEC performed an independent sound-monitoring study in July 2021 and May 2022. RESPEC's study was intended to (1) serve as third-party verification that Wharf's sound meters were adequately representing local noise levels and (2) compare historic sound levels with current conditions. RESPEC sound-monitoring locations are shown in Figure 3-2 and described in Table 3-1. Site photographs are included in Appendix A. The locations of RESPEC sound-monitoring sites were established to provide paired locations with the two Wharf sound-monitoring stations (meters 1248 and 1249) and several of the same locations measured by Kliche [2010]. Corresponding historical monitoring sites are noted in Table 3-1. However, the 2021 monitoring locations may not be exactly coincident with the corresponding historical monitoring site. For example, monitoring location SND-05 was at the site of Wharf meter 1248 and is within a few hundred feet but not in the exact location as Kliche's Point 9. Location SND-07 was added in May 2022 based on SD DANR comments on April 13, 2022; this location provides additional spatial coverage within the Lost Camp subdivision, and the added May 2022 data provides additional temporal data.

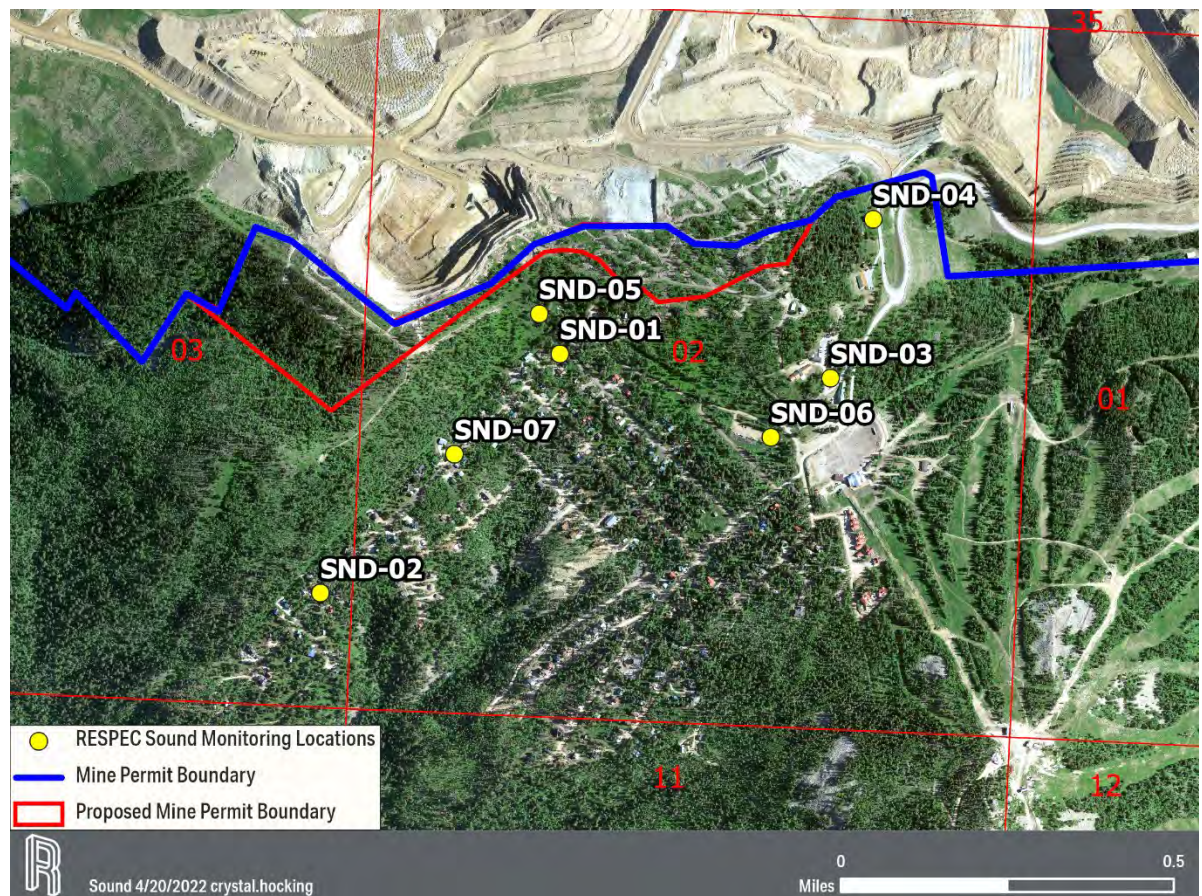


Figure 3-2. RESPEC Sound-Monitoring Location Map.

Table 3-1. Sound-Monitoring Locations

Point	Location Description	Corresponding Historical Monitoring Site
SND-01	Intersection of Last Chance Trail and Whitetail Trail	Kliche [2010] – Point 1
SND-02	Last Chance Trail (south end)	Kliche [2010] – Point 2
SND-03	Parking Lot of Barefoot Condos	Kliche [2010] – Point 10
SND-04	Terry Valley Road District Storage Shop	Near Kliche [2010] – Point 4
SND-05	End of Moose Trail at Residence	Wharf Meter 1248 Near Kliche [2010] – Point 9
SND-06	East End of Terry Peak Overflow Parking Lot	Wharf Meter 1249
SND-07	Last Chance Trail (southwest of intersection with Antelope Trail)	N/A

All sound-level measurements were made using the handheld portable instrument Instantel Micromate, as shown in Figure 3-3. The Micromate can simultaneously measure the following sound levels:  $LA_{max}$ ,  $LA_{min}$ ,  $LA_{50}$ ,  $LA_{90}$ , and  $LA_{eq}$ . These functions are measured simultaneously with the A-weighted frequency. The Micromate is equipped with communications software that allows configuring the instrument to download plots of measurements for reporting purposes.

RESPEC conducted monitoring at each point for an approximate 10-minute period on five events over 4 separate days (July 13, 20, and 28, 2021, and May 3, 2022). The monitoring periods during RESEPC's sound study were selected as representative time intervals or samples of current (pre-Boston Expansion) sound at receptors surrounding the mine area, specifically sounds within the Lost Camp subdivision. The nominal 10-minute monitoring period was chosen by RESPEC in an effort to follow the methodology of the sound study conducted by Kliche [2010]; monitoring conducted by Apa [1993] was conducted for discrete periods of 18 minutes. RESPEC's survey intentionally targeted a blast event and daytime periods of known mine activity but RESPEC does not purport that the 10-minute sampling intervals captured all sounds from all mining impacts at all times. RESPEC's sound study was conducted to supplement Wharf's sound data, which is continuous year-round sound monitoring.

On July 13, 2021, locations were field verified, and monitoring was conducted during midday, which included a monitoring event that coincided with a blast event at 12 p.m. Each location was monitored twice on July 13, 2021. Monitoring was conducted in the afternoon of July 20, 2021, and the third monitoring event was conducted midmorning on July 28, 2021. Monitoring was conducted midday on May 3, 2022. Decibel levels for common environments and sounds are provided in Table 3-2. Results are provided and discussed in Chapter 4.0.

Sound decreases with distance from the source and is primarily influenced by topography and line of sight. Physical barriers such as trees and vegetation, ridges, and buildings all reduce the propagation of sound waves and, hence, perceived sound. Sound measurements are minimally impacted by various weather conditions that affect sound propagation. For instance, a temperature decrease raises the noise level at a receptor and a humidity decrease lowers the noise. When wind speeds are high, a receptor standing downwind of the source will hear noise louder than a listener standing upwind of the source. These increases or decreases are most impactful to receptors 0.5 mile from the source but are within a 3-dB range, or barely detectable to the human ear. For receptors closer to the noise source, the



effects of weather are insignificant. For the vast majority of outdoor sound measurements, the weather itself (i.e., wind) creates more noise than the influence it has on sound wave propagation [Attenborough et al., 2007].



Figure 3-3. Instantel Micromate Sound-Level Meter.

Table 3-2. Sound Sources and Average Decibels  
[Apa, 1989]

Source	dBA
Pneumatic Drill	100
Noisy Factory on Urban Street	80–90
Heavy Truck	70–80
Business Office	60–70
Conversation Speech	50–65
Living Room	40
Rural Area Forest	25–30

## 4.0 RESULTS AND DISCUSSION

### 4.1 RESPEC RESULTS

The results of RESPEC's sound monitoring in July 2021 and May 2022 are presented in Table 4-1, and plots of the monitoring data are included in Appendix B. A summary of sound at each monitoring location is provided in the following text:

- / **SND-01:** Site SND-01 is located at the intersection of Last Chance and Whitetail Trail. This site is generally a busier intersection within the subdivision; traffic was observed during all of the monitoring events. On July 28, 2021, the equivalent continuous sound  $LA_{eq}$  was the highest value of any monitoring (61.5 dBA) and the highest maximum reading (86.9 dBA); during this monitoring period, several all-terrain vehicles (ATVs) and other vehicles drove immediately adjacent to the meter. Wharf heavy equipment was barely audible (40–45 dBA) on July 28, 2021, when no traffic was present. The maximum sound ranged from 61.0 to 86.9 dBA. In addition to traffic and ATVs, other observed sounds at this site included wind, thunder, birds, distant construction noise from within the subdivision, and an airplane.
- / **SND-02:** This site, located on southern Last Chance Trail, is the quietest site with some of the lowest average readings. Sounds included vehicle traffic, wind, wildlife, and distant construction/chainsaw noises within the subdivision. The maximum sound ranged from 56.5 to 69.3 dBA. No noises attributable to the mine were observed.
- / **SND-03:** The parking lot at the Barefoot Resort condos was a relatively noisy site. During two monitoring events in July 2021, landscaping activities (lawnmowing and weed eating) were occurring in the area. On July 13, 2021, a family created noise in the parking lot by unlocking, opening, and closing doors and driving their vehicle that was parked in the lot. Additional sounds included wind, voices, traffic, and insects. No noises attributable to the mine were observed. The maximum sound ranged from 59.6 to 74.0 dBA.
- / **SND-04:** Located just outside the entrance to Wharf and near Highway 473 and adjacent to the Terry Valley Road District storage shop, this site had consistent light traffic, which included notable ATV traffic, during monitoring. Other noises included wind, wildlife, plane, helicopter, semi brakes, and a truck backup alarm. The maximum sound ranged from 68.7 to 77.8 dBA.
- / **SND-05:** This site is a paired location with Wharf meter 1248 located southeast of the closest residence to the Boston Expansion. The first monitoring event on July 13, 2021, was during a scheduled blast, and noises included the blast and pre- and postblast emergency sirens; the maximum sound was 61.5 dBA, and  $LA_{eq}$  was 39.4 dBA on that date. Noises associated with the mine (trucks and/or possible drilling operations) were audible on July 28, 2021, with equivalent continuous sound ( $LA_{eq}$ ) of 50.7 dBA. Other observed noises included wind, wildlife, thunder, voices, and distant traffic and chainsaws within the subdivision. The maximum sound ranged from 55.1 to 62.9 dBA.
- / **SND-06:** This site is a paired location with Wharf meter 1249 located on the east side of the Wharf-owned overflow ski parking lot. Most noises were distant traffic and construction along the roads and within the subdivision. No noises attributable to the mine were observed. Other observed noises included wind, wildlife, airplanes, truck backup alarms within the overflow,

Table 4-1. Sound-Monitoring Data

Site I.D.	Time Start Monitoring (M/D/Y H:M)	Monitoring Duration (min:sec)	Maximum Reading (L <sub>max</sub> )	Minimum Reading (L <sub>min</sub> dBA)	Average of the Readings (L <sub>50</sub> dBA)	Sound Level Just Exceeded for 90% of the Measurement Period (L <sub>90</sub> dBA)	Equivalent Continuous Sound Level (L <sub>eq</sub> dBA)
SND-01	7/13/2021 11:21	09:57	65.6	33.4	38	36	42.8
SND-01	7/13/2021 13:45	10:42	66.4	37	45	41	48.8
SND-01	7/20/2021 12:14	09:52	61	37.1	44	39	47
SND-01	7/28/2021 10:29	16:00	86.9	37.3	44	41	61.5
SND-01	5/3/2022 12:45	10:50	74.7	36.8	46	43	50.9
SND-02	7/13/2021 11:03	10:29	68.3	33.2	37	36	43.4
SND-02	7/13/2021 13:31	10:22	59.2	35.4	42	38	43.3
SND-02	7/20/2021 12:28	10:15	69.3	34	40	36	47.7
SND-02	7/28/2021 10:49	10:55	67.6	33	36	34	44.2
SND-02	5/3/2022 12:30	10:31	56.5	35	44	40	46.1
SND-03	7/13/2021 10:44	09:56	74	41.7	51	48	52.6
SND-03	7/13/2021 13:14	10:04	59.6	39.3	47	44	48.4
SND-03	7/20/2021 13:06	10:57	59.8	35.6	43	38	46.5
SND-03	7/28/2021 9:38	10:08	66.2	36.3	46	40	51.2
SND-03	5/3/2022 11:15	11:40	66.7	34.6	48	41	50.9
SND-04	7/13/2021 10:27	10:18	71.8	41.7	50	46	54.3
SND-04	7/13/2021 13:01	09:52	68.7	32.6	39	35	46.7
SND-04	7/20/2021 11:35	10:15	75.1	35.9	48	39	55.9
SND-04	7/28/2021 9:24	10:10	77.8	34.6	45	38	57.9
SND-04	5/3/2022 10:56	12:09	73.6	35.1	47	40	54.5
SND-05	7/13/2021 11:50	15:04	61.5	32.6	36	35	39.4
SND-05	7/13/2021 14:00	10:20	55.1	40.1	45	43	46.1
SND-05	7/20/2021 11:54	15:35	55.8	36.6	41	39	42.3
SND-05	7/28/2021 10:12	12:59	62.2	38	50	47	50.7
SND-05	5/4/2022 11:58	10:27	62.9	37.3	48	44	48.4
SND-06	7/13/2021 12:14	10:05	71.4	33.4	40	37	51.8
SND-06	7/13/2021 14:17	10:14	63.9	40	48	43	49.1
SND-06	7/20/2021 12:51	10:01	59	35.4	42	39	44.1
SND-06	7/28/2021 9:51	10:22	51.8	34.9	39	37	40.5
SND-06	5/3/2022 11:31	14:13	60.3	33.7	42	38	45.0
SND-07	5/3/2022 12:15	10:52	67.2	31.7	45	38	47.7
SND-07	5/3/2022 13:55	13:12	78.7	<30.0	42	37	55.1

D/M/Y = day/month/year

H:M:S = hours:minutes:seconds

min:sec = minutes:seconds.

parking lot, and the hum of a generator that powers a temporary portable office trailer currently being used by Montana Dakota Utilities Co. (MDU) for project staging in the parking lot. The maximum sound ranged from 51.8 to 71.4 dBA.

- / **SND-07:** Site SND-07 is located on Last Chance Trail, approximately 360 feet southwest of the intersection with Antelope Trail and southeast of the Boston Expansion. The maximum sound recorded ranged from 67.2 to 78.7 dBA. Noises at this site were predominantly related to local traffic within the subdivision. Other noises included light wind, wildlife, distant voices and music, and distant noises related to construction within the subdivision (skid steer, hammering, and chop saw). No noises attributable to the mine were observed.

The overall range in sound measurements collected by RESPEC ranged from 31.7 to 86.9 dB. The maximum sound levels were brief momentary highs and related to traffic in almost every instance.  $LA_{eq}$  values ranged from 39.4 to 61.5 dB, which are equivalent to the sound levels found in a typical living room or a busy office setting (see Table 3-2).

## 4.2 WHARF RESULTS

As part of this investigation, RESPEC reviewed sound-monitoring data collected by Wharf with emphasis on comparing simultaneous measurements by Wharf and RESPEC, as well as a review of a select period of data during fall and winter. Wharf has been monitoring sound at two meters (i.e., meters 1248 and 1249) located at the closest residence and the overflow parking lot. Monitoring data have been collected at 5-minute-average intervals since April 20, 2021. RESPEC reviewed Wharf sound data collected during the following four time periods:

- / April 20 through July 27, 2021
- / October 1 through 15, 2021
- / January 1 through 15, 2022
- / April 24 through May 8, 2022.

Note, meter 1249 was offline from April 23 through 30, 2021, because the 3G data connector was not properly transmitting data. Sound data from over the review period are plotted in Appendix C; additional Wharf data from over the period of record are available in electronic format upon request. Wharf's sound meters record a sound clip for each measurement over 60 dBA. RESPEC's staff listened to a selection of sound clips with a focus on the events with the highest readings and those that coincided with the time period in which Wharf typically conducts blasts.

A summary of the sound data collected by Wharf between April 20 through July 27, 2021, is provided in Tables 4-2 and 4-3. Over this time period, sound levels ranged from 22.87 to 103.03 dB at meter 1248. Sixty 5-minute intervals recorded sound levels exceeding 85 dBA. Over one-half of these recordings occurred during the late afternoon or evening hours; few, if any, records were triggered during times typical of blast events (12 p.m. to 4 p.m.). Wharf does not conduct blasting after 4:30 p.m. or in the evening. Based on the review of sound clips of events exceeding 85 dBA, most high-sound levels are associated with thunderstorms, wind, wildlife, voices, or vehicles. Sound levels at meter 1249 were generally similar. Sound readings ranged from 22.78 to 101.73 dBA, and 49 readings exceeded 85 dBA.

A summary of data over the 2-week period from April 24 through May 8, 2022, is provided in Tables 4-2 and 4-3. Over this time period, sound levels ranged from 24.0 to 97.2 dBA at meter 1248. Nine 5-minute intervals recorded sound levels exceeding 85 dBA. Sound levels at meter 1249 were generally similar, with sound readings that ranged from 22.66 to 97.44 dBA and 25 readings that exceeded 85 dBA. The majority of these high-sound recordings occurred during midday hours with a few night readings, and all recordings RESPEC listened to were associated with weather events (wind, rain, and thunder) that occurred on April 24 and 29, 2022.

In general, Wharf sound data for 2-week periods in October 2021 and January 2022 are relatively similar in magnitude and sources of sound compared to sound data collected at the periods that were chosen for review as overlapping RESPEC's data described above. Maximum and minimum sound levels during these periods are summarized in Tables 4-2 and 4-3.

**Table 4-2. Summary of Wharf Sound Data From Meter 1248**

	April 20–July 27, 2021	October 1–15, 2021	January 1–15, 2022	April 24–May 5, 2022
Duration (days)	99	15	15	12
Smallest LA <sub>90</sub> Value (dBA)	22.87	22.88	24.28	24
Maximum (dBA)	103.03	103.74	97.33	97.2
Smallest LA <sub>eq</sub> (dBA)	24.77	23.98	24.51	25.24
Largest LA <sub>eq</sub> (dBA)	74.52	97.01	65.06	76.31
No. of Readings Exceeding 85 dBA	60	57	7	9

**Table 4-3. Summary of Wharf Sound Data From Meter 1249**

	April 20–July 27, 2021	October 1–15, 2021	January 1–15, 2022	April 24–May 5, 2022
Duration (days)	99	15	15	12
Smallest LA <sub>90</sub> Value (dBA)	22.78	34.07	26.7	22.66
Maximum (dBA)	101.73	74.06	82.35	97.44
Smallest LA <sub>eq</sub> (dBA)	23.33	29.73	28.91	23.27
Largest LA <sub>eq</sub> (dBA)	78.87	100.15	62.03	76.15
No. of Readings Exceeding 85 dBA	49	4	0	0

At Site SND-05 and meter 1248, all of the LA<sub>max</sub> and LA<sub>eq</sub> values measured by RESPEC were within the range of values recorded by Wharf, as shown in Table 4-4. LA<sub>eq</sub> values for RESPEC and Wharf data were similar, and all values were within a few decibels of each other; however, L<sub>max</sub> values measured by RESPEC were lower than the highest Wharf-measured values except for on May 3, 2022. Site SND-05/1248 was intentionally monitored during a blast to monitor blast noise and compare



monitoring instruments. At the time of the blast (approximately 12:03 p.m. on July 13, 2021), the  $LA_{max}$  value was 66.3 dBA at Wharf meter 1248 compared to an  $LA_{max}$  value of 61.5 dBA at Site SND-05.

Site SND-06 was a paired location with meter 1249 at the overflow parking lot.  $LA_{eq}$  values for RESPEC and Wharf data were similar, and all values were within a few decibels of each other, as shown in Table 4-4. During the first three monitoring events, the  $LA_{max}$  data collected were similar. However, on July 28, 2021, Wharf meter 1249 had an  $LA_{max}$  value of 74.72 dBA and RESPEC measured an  $LA_{max}$  value of only 51.8 dBA.

Discrepancies between datasets may be caused by differences in instrument type, calibration, meter height, or other unaccounted metrics. Wharf's continuous sound meters and recordings appear to be working adequately and will serve to provide reliable sound data into the foreseeable future.

### 4.3 HISTORICAL DATA COMPARISON

Data collected by Kliche [2010] for the paired sites that RESPEC monitored for this investigation are provided in Table 4-5. Sound levels measured in 2021–2022 were generally similar to those measured in 2010. Site SND-01/Point 1 was slightly noisier (higher average maximum sound) in 2021–2022 compared to 2010, although  $LA_{50}$  values were of similar magnitude. At SND-03/Point 10,  $L_{50}$  levels were higher on average in 2021–2022, and at SND-05/Point 9, the average  $LA_{eq}$  values were slightly higher in 2021–2022. During 2010, most peak sounds were associated with “wind, wildlife (woodpeckers) or far off traffic noise” that included motorcycles [Kliche, 2010].

Table 4-4. Site SND-05 and Wharf Meter 1248 Sound-Data Comparison

Time Start (M/D/Y H:M)	Duration (min:sec)	LA <sub>max</sub> (dBA)	LA <sub>eq</sub> (dBA)
7/13/2021 11:50	15:04	61.5	39.4
7/13/2021 11:55	5:00	54.57	41.39
7/13/2021 12:00	5:00	47.32	35.81
7/13/2021 12:05	5:00	66.3	42.08
7/13/2021 14:00	5:00	52.57	43.15
7/13/2021 14:00	10:20	55.1	46.1
7/13/2021 14:05	5:00	68.57	47.8
7/13/2021 14:10	5:00	50.73	46.66
7/20/2021 11:54	15:35	55.8	42.3
7/20/2021 11:55	5:00	74.45	47.84
7/20/2021 12:00	5:00	60.49	43.64
7/20/2021 12:05	5:00	50.21	44.31
7/20/2021 12:10	5:00	49.86	44.42
7/28/2021 10:10	5:00	58.16	53.45
7/28/2021 10:12	12:59	62.2	50.7
7/28/2021 10:15	5:00	75.8	54.26
7/28/2021 10:20	5:00	64.43	53.84
7/28/2021 10:25	5:00	67.58	50.96
5/3/2022 11:55	5:00	50.93	44.74
5/3/2022 11:58	10:27	62.9	48.4
5/3/2022 12:00	5:00	58.57	48.06
5/3/2022 12:05	5:00	55.5	49.8

Wharf data in blue text; RESPEC data in black text.

Table 4-5. Site SND-06 and Wharf Meter 1249 Sound-Data Comparison

Time Start (M/D/Y H:M)	Duration (min:sec)	L <sub>Amax</sub>	L <sub>Aeq</sub>
7/13/2021 12:14	10:05	71.4	51.8
7/13/2021 12:15	5:00	59.09	41.87
7/13/2021 12:20	5:00	72.41	56.74
7/13/2021 14:17	10:14	63.9	49.1
7/13/2021 14:20	5:00	61.99	49.35
7/13/2021 14:25	5:00	67.05	51.64
7/20/2021 12:50	5:00	54.44	45.31
7/20/2021 12:51	10:01	59	44.1
7/20/2021 12:55	5:00	58.59	45.92
7/20/2021 13:00	5:00	52.7	43.89
7/28/2021 9:50	5:00	56.74	41.73
7/28/2021 9:51	10:22	51.8	40.5
7/28/2021 9:55	5:00	74.72	46.83
7/28/2021 10:00	5:00	49.93	41.96
5/3/2022 11:30	5:00	68.3	51.47
5/3/2022 11:31	14:13	60.3	45
5/3/2022 11:35	5:00	53.03	43.68
5/3/2022 11:40	5:00	55.1	43.9
5/3/2022 11:45	5:00	60.25	43.91

Wharf data in blue text; RESPEC data in black text.

Table 4-6. Sound-Monitoring Data From Kliche [2010]

Kliche Site I.D. (RESPEC Site I.D.)	Date (M/D/Y)	Maximum Sound (dB)	Minimum Sound (dB)	LA <sub>50</sub>
Point 1 (SND-01)	7/5/2020	78.5	31.2	40.4
	7/13/2010	63.3	28.4	41.6
	7/27/2010	42.5	38.4	35
	7/27/2010	53.5	41.4	46
Point 2 (SND-02)	7/5/2020	67.4	29.5	37.7
	7/13/2010	67.5	25.1	38.1
	7/27/2010	52.8	26.9	29.4
	7/27/2010	53	37.6	43.1
Point 10 (SND-03)	7/5/2020	67	32.3	38.1
	7/13/2010	59.8	33.5	41.6
	7/27/2010	60.2	36	42.3
	7/27/2010	70.3	45	47.8
Point 4 (SND-04)	7/5/2020	84.4	34	39.2
	7/13/2010	75.3	28.4	34.2
	7/27/2010	61.9	34.5	41.1
	7/27/2010	73	42.9	48.9
Point 9 (SND-05)	7/5/2020	74.9	27.7	35.4
	7/13/2010	60.4	29.2	34.5
	7/27/2010	61.6	37.3	37.7
	7/27/2010	49.7	41.2	46

## 5.0 SUMMARY

Wharf installed two fully automated, remote sound meters in April 2021 and has been conducting continuous sound monitoring since that time. RESPEC conducted sound monitoring at seven points for approximate 10-minute periods; monitoring occurred on 4 separate days (July 13, 20, and 28, 2021; and May 3, 2022). The locations of RESPEC sound-monitoring sites were established to provide paired locations with the two Wharf sound-monitoring stations (meters 1248 and 1249) as well as several of the same locations measured by Kliche [2010].

The sound measurements collected by RESPEC ranged from less than 30 to 86.9 dB. The maximum sound levels were brief momentary highs and related to local traffic in almost every instance. Equivalent continuous sound levels ( $L_{eq}$ ) ranged from 39.4 to 61.5 dB. These  $L_{eq}$  levels are equivalent to that found in a typical living room or a busy office setting.

Compared to 2010 sound data [Kliche 2010], noise in the area is slightly higher. ATV usage seems to have significantly increased in the last decade, and much of the noise in 2021–2022 is attributed to ATVs and traffic. Other sounds observed were related to wind, wildlife, airplanes, thunder, construction, and mining activities.

The only verifiable recorded mine activities were at Site SND-05. A scheduled blast event at the Flossie Pit was recorded on July 13, 2021; the blast as well as the pre- and postblast sirens were audible. On July 28, 2021, noise associated with the mine operations just over the hill was audible, which included trucks and possible drilling operations; on that date, the maximum sound recorded was 62.2 dBA.

Under the proposed Boston Expansion, the existing pit highwall will be pushed back to the south approximately 400 feet and some trees and vegetation will be removed. Noise is expected to temporarily increase for initial blasts at the top of the Portland Ridgeline and will then likely return to current baseline levels after the upper benches are complete.

Sound decreases with distance from the source and is primarily influenced by topography and line of sight. Minimal areas south of Wharf or within the Lost Camp subdivision have a line of sight of the Boston Expansion area. Locations at greater distances from mining activity are further protected by physical barriers such as trees and vegetation, ridges, and buildings.

Most residents can expect mining noises to continue at present levels because the Boston Expansion will not increase current noise levels. The closest few residents in the northwestern-most corner of the subdivision nearest the Boston Expansion could expect temporary increases in mining noise associated with vegetation removal, berm construction, and initial blasts at the top of the Portland Ridgeline. After the upper benches are complete, noise levels are expected to return to near-present conditions.

Sound that results from mining activities may be mitigated by leaving some natural screening such as trees and topographic features in place as long as possible without disrupting the mining sequence. Because tree clearing will be limited to the area necessary for pit construction, the remaining trees will



provide a screen and reduce noise. In addition to natural topography, an 8-foot berm around a large portion of the expansion will provide some noise reduction.

## 6.0 REFERENCES

**Apa, M., 1987.** *Background Sound Analysis for Proposed Mining Site*, prepared for Golden Reward Mining Company, Lead, SD.

**Apa, M., 1989.** *Impact Analysis of Sound Level Study*, prepared for Wharf Resources, Lead, SD.

**Apa, M., 1993.** *Baseline Sound Level Studies for Wharf Resources Clinton Extension*, prepared for Wharf Resources, Lead, SD.

**Attenborough, K., K.M. Li, and K. Horoshenkov, 2007.** *Predicting Outdoor Sound*, Taylor & Francis Group, London and New York.

**Erickson, J. D., 1988.** *Wharf Resources Mining Company Sound Level Study*, prepared for Wharf Resources, Lead, SD.

**Kliche, C. A., 2010.** *Background Sound-Level Study Wharf Resources for the Golden Reward and Wharf Mine Expansions*, prepared for Wharf Resources (USA) Inc., Lead, SD, by South Dakota School of Mines and Technology, Rapid City, SD.

## 7.0 GLOSSARY

Term	Definition
A-Weighted Frequency	The A-weighting curve is used extensively for general-purpose noise measurements
LA <sub>eq</sub>	A-weighted, equivalent continuous sound level
LA <sub>max</sub>	A-weighted, maximum sound level
LA <sub>min</sub>	A-weighted, minimum sound level
LA <sub>10</sub>	The A-weighted, sound level just exceeded for 10 percent of the measurement period and calculated by statistical analysis
LA <sub>50</sub>	The A-weighted, sound level just exceeded for 50 percent of the measurement period and calculated by statistical analysis
LA <sub>90</sub>	The A-weighted, sound level just exceeded for 90 percent of the measurement period and calculated by statistical analysis
C-Weighted Frequency	C-weighting is used for high-level measurements and peak sound pressure levels. Approximately following the 100 phon curve; also written as dB(C) or dBC
LC <sub>eq</sub>	C-weighted, equivalent continuous sound level
LC <sub>max</sub>	C-weighted, maximum sound level
LC <sub>10</sub>	The C-weighted, sound level just exceeded for 10 percent of the measurement period and calculated by statistical analysis
LC <sub>90</sub>	The C-weighted, sound level just exceeded for 90 percent of the measurement period and calculated by statistical analysis





# APPENDIX A

## SITE PHOTOGRAPHS





Figure A-1. Site SND-01.





Figure A-2. Site SND-02.





Figure A-3. Site SND-03.









Figure A-5. Site SND-05.





Figure A-6. Site SND-06.



**Figure A-7.** Site SND-07. Photograph is oriented looking northwest toward the Boston Expansion. Photo taken November 21, 2022 by Wharf staff.





# APPENDIX B

## RESPEC MONITORING DATA PLOTS

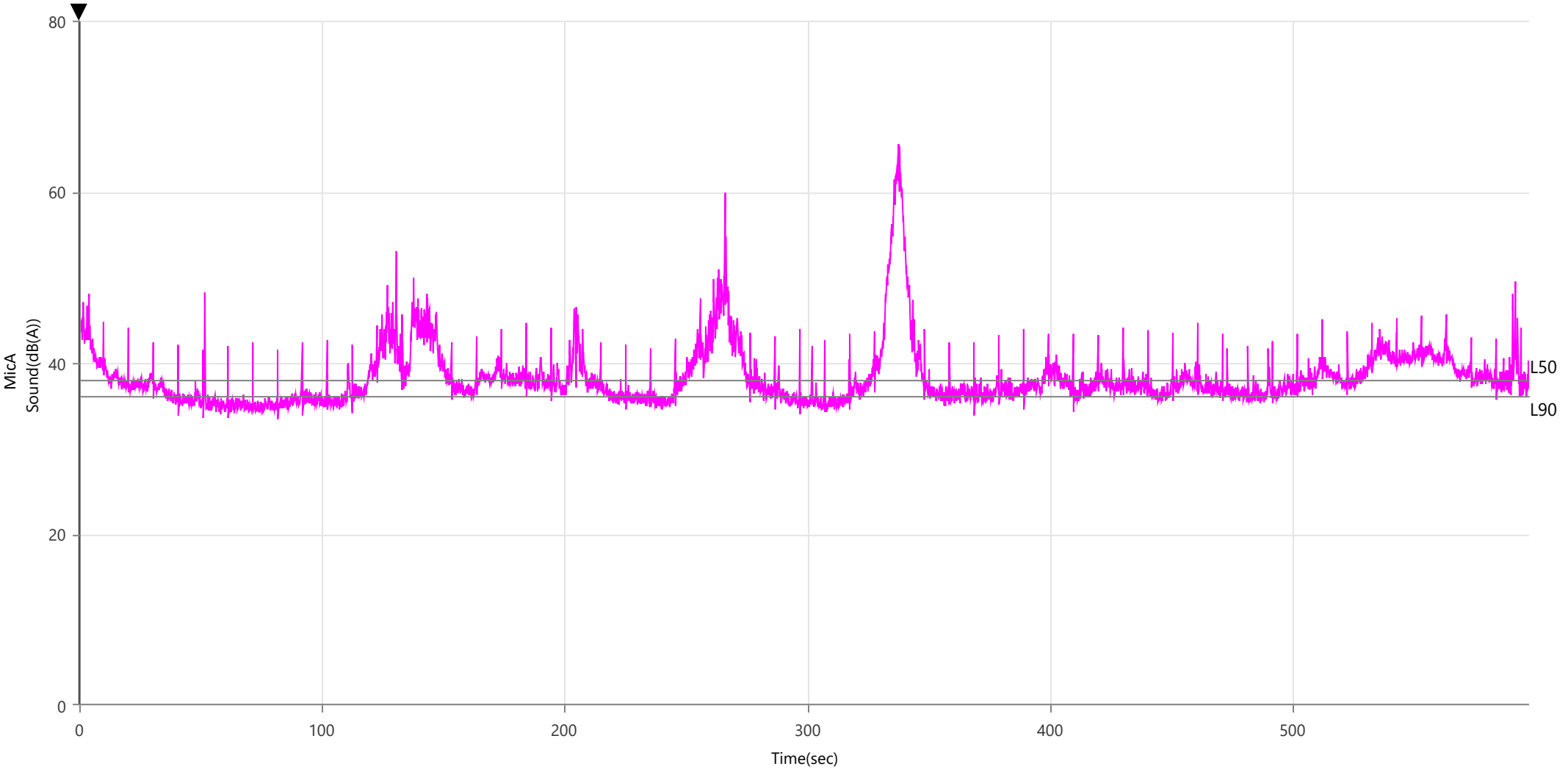




Waveform Trigger Source	Manual at July 13, 2021 11:21:18	Serial Number	UM14409
Pre-Trigger/Record Time	0.00 sec/597.5 sec (Fixed)	Model Number	Micromate ISEE 10.90
Sample Rate	1024 sps	Battery Level	3.8 volts
Setup File Name	UM14409.MMB	Unit Calibration	March 22, 2021 by Instantel
Operator	SND1	Microphone Calibration	UA10072, July 6, 2021 by Instantel
		Event File Name	UM14409_20210713112118.IDFW
		USB Sensor Support	Disabled

Post Event Notes    No text to be displayed.

Sound Level Microphone	A-Weight Fast
LMax	65.6 dB(A)
Time (Relative to Trigger)	337.663 sec
	LMin    L50    L90
Sound(dB(A))	33.4    38    36
Sensor Check	✓ Passed
Test Amplitude	1180 mv

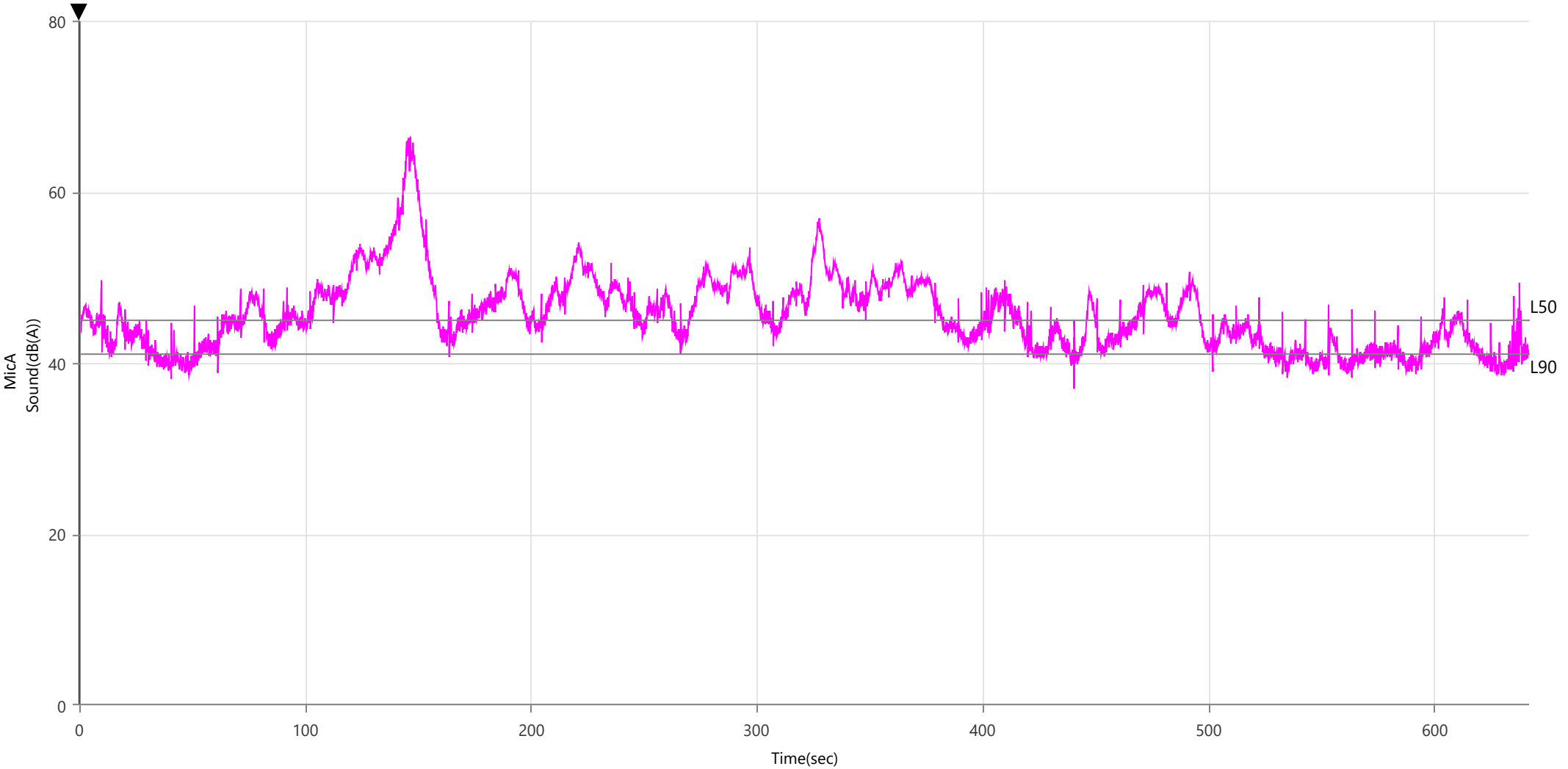




Waveform Trigger Source	Manual at July 13, 2021 13:45:24	Serial Number	UM14409
Pre-Trigger/Record Time	0.00 sec/642.0 sec (Fixed)	Model Number	Micromate ISEE 10.90
Sample Rate	1024 sps	Battery Level	3.8 volts
Setup File Name	UM14409.MMB	Unit Calibration	March 22, 2021 by Instantel
Operator	SND1	Microphone Calibration	UA10072, July 6, 2021 by Instantel
		Event File Name	UM14409_20210713134524.IDFW
		USB Sensor Support	Disabled

Post Event Notes    No text to be displayed.

Sound Level Microphone	A-Weight Fast
LMax	66.4 dB(A)
Time (Relative to Trigger)	146.681 sec
	LMin    L50    L90
Sound(dB(A))	37.0    45    41
Sensor Check	✔ Passed
Test Amplitude	1199 mv

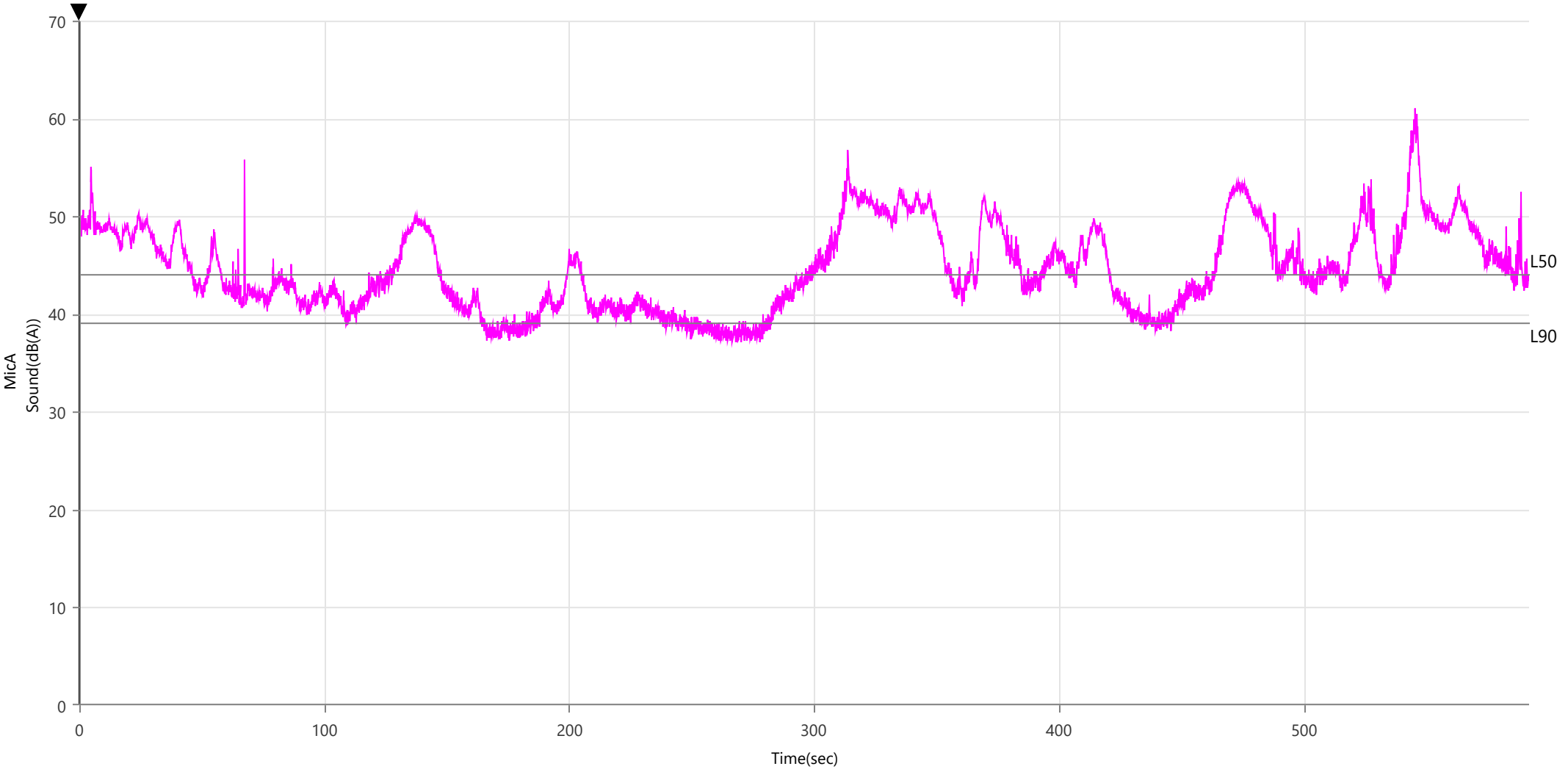




Waveform Trigger Source	Manual at July 20, 2021 12:14:21	Serial Number	UM14409
Pre-Trigger/Record Time	0.00 sec/592.0 sec (Fixed)	Model Number	Micromate ISEE 10.90
Sample Rate	1024 sps	Battery Level	3.8 volts
Setup File Name	UM14409.MMB	Unit Calibration	March 22, 2021 by Instantel
Operator	SND1	Microphone Calibration	UA10072, July 6, 2021 by Instantel
		Event File Name	UM14409_20210720121421.IDFW
		USB Sensor Support	Disabled

Post Event Notes No text to be displayed.

Sound Level Microphone	A-Weight Fast
LMax	61.0 dB(A)
Time (Relative to Trigger)	545.492 sec
	LMin L50 L90
Sound(dB(A))	37.1 44 39
Sensor Check	✓ Passed
Test Amplitude	1190 mv





Waveform Trigger SourceManual at July 28, 2021 10:29:05

Pre-Trigger/Record Time0.00 sec/959.5 sec (Fixed)

Sample Rate1024 sps

Setup File NameUM14409.MMB

OperatorSND1

Serial NumberUM14409

Model NumberMicromate ISEE 10.90

Battery Level3.8 volts

Unit CalibrationMarch 22, 2021 by Instantel

Microphone CalibrationUA10072, July 6, 2021 by Instantel

Event File NameUM14409\_20210728102905.IDFW

USB Sensor SupportDisabled

Post Event Notes No text to be displayed.

Sound Level Microphone

LMax86.9 dB(A)

Time (Relative to Trigger)930.637 sec

LMin37.3

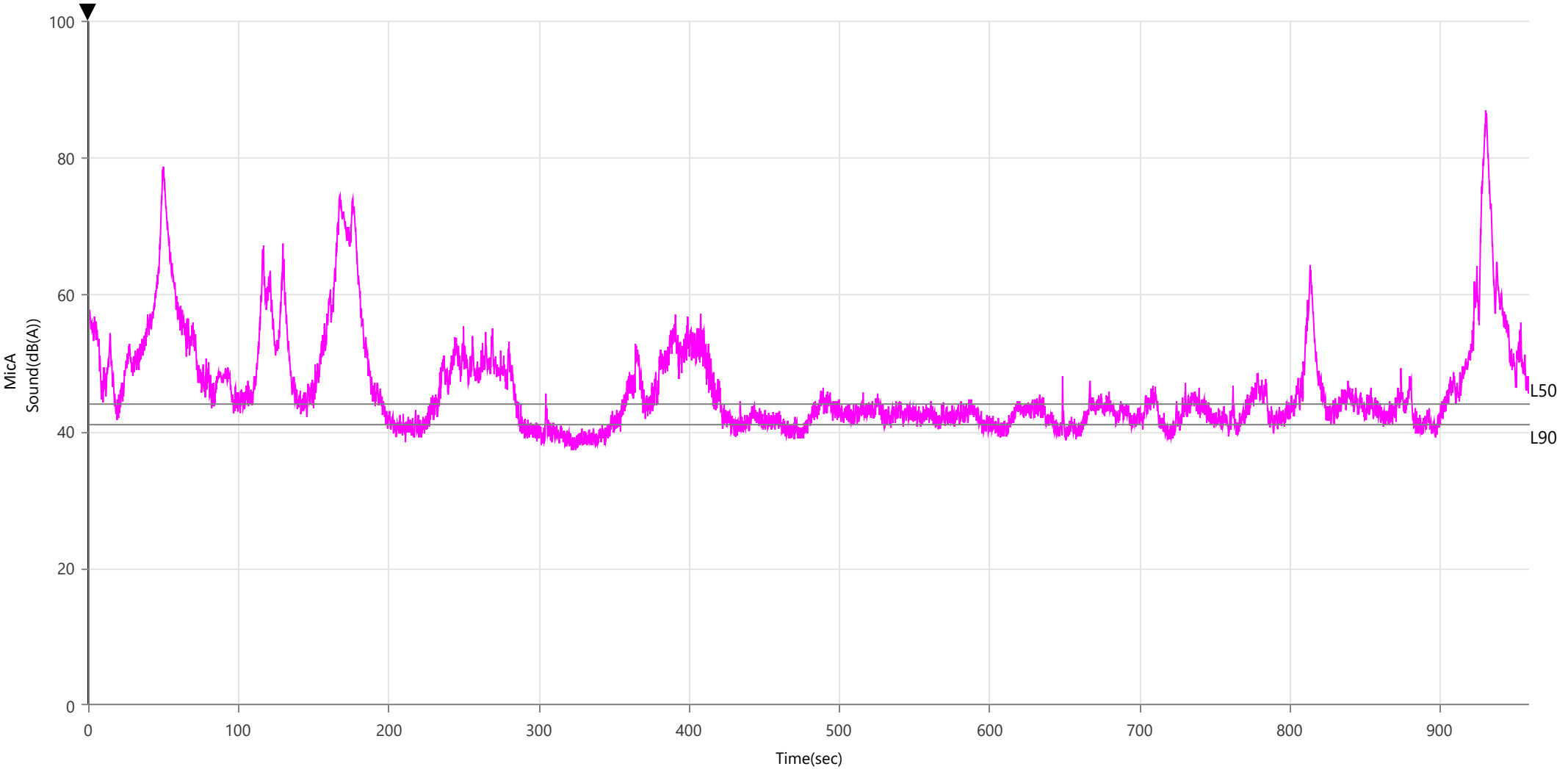
L5044

L9041

Sound(dB(A))

Sensor Check✔ Passed

Test Amplitude1197 mv





Waveform Trigger SourceManual at May 3, 2022 12:45:21

Pre-Trigger/Record Time0.00 sec/649.5 sec (Fixed)

Sample Rate1024 sps

Setup File NameUM15175.MMB

OperatorSND1

Serial NumberUM15175

Model NumberMicromate ISEE 10.90

Battery Level3.8 volts

Unit CalibrationMay 14, 2021 by Instantel

Microphone CalibrationUA10073, April 18, 2022 by Field Calibration

Event File NameUM15175\_20220503124521.IDFW

USB Sensor SupportDisabled

Notes

Location

ClientWHARF

Company

General Notes

Extended NotesNo text to be displayed.

Post Event NotesNo text to be displayed.

Sound Level Microphone

LMax74.7 dB(A)

Time (Relative to Trigger)137.029 sec

LMin36.8

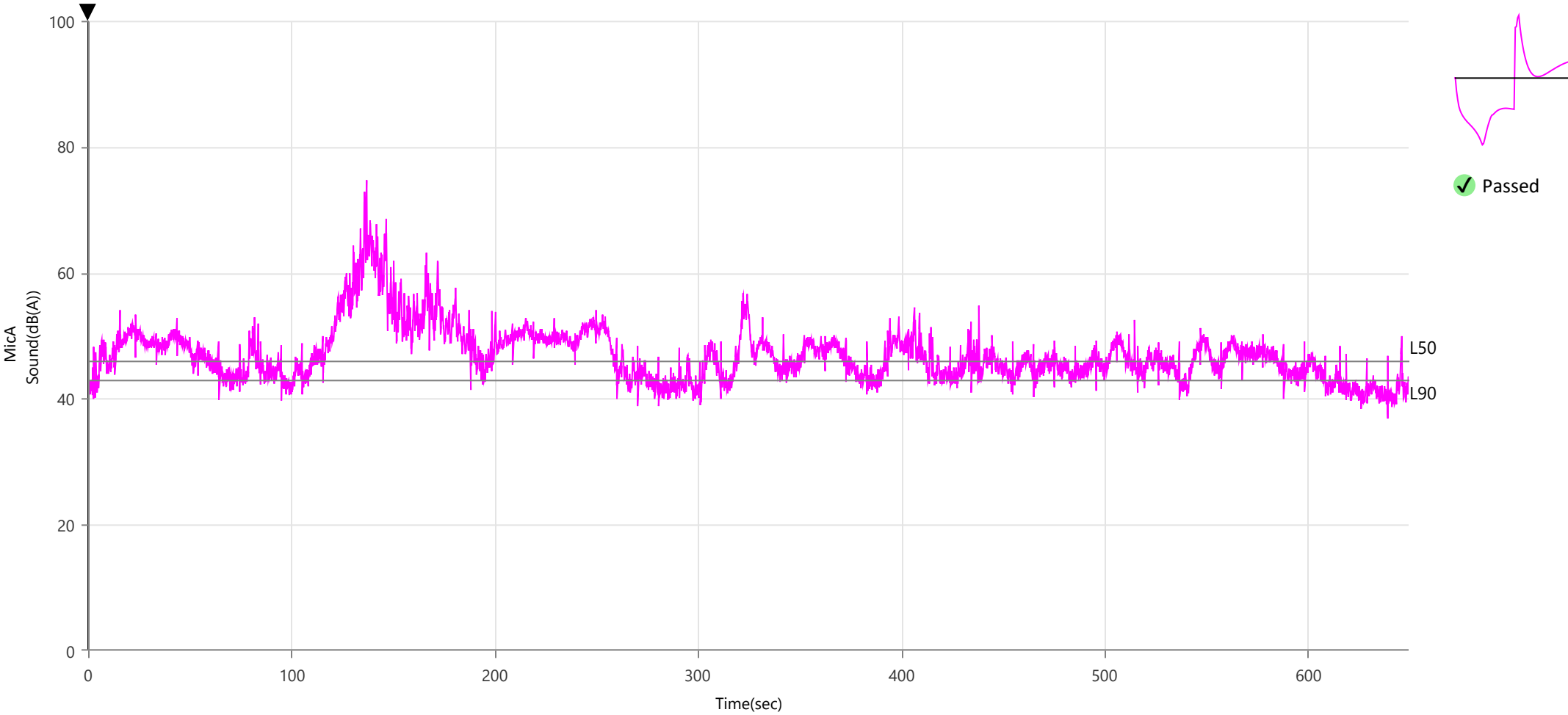
L5046

L9043

Sound(dB(A))

Sensor Check✔ Passed

Test Amplitude782 mv

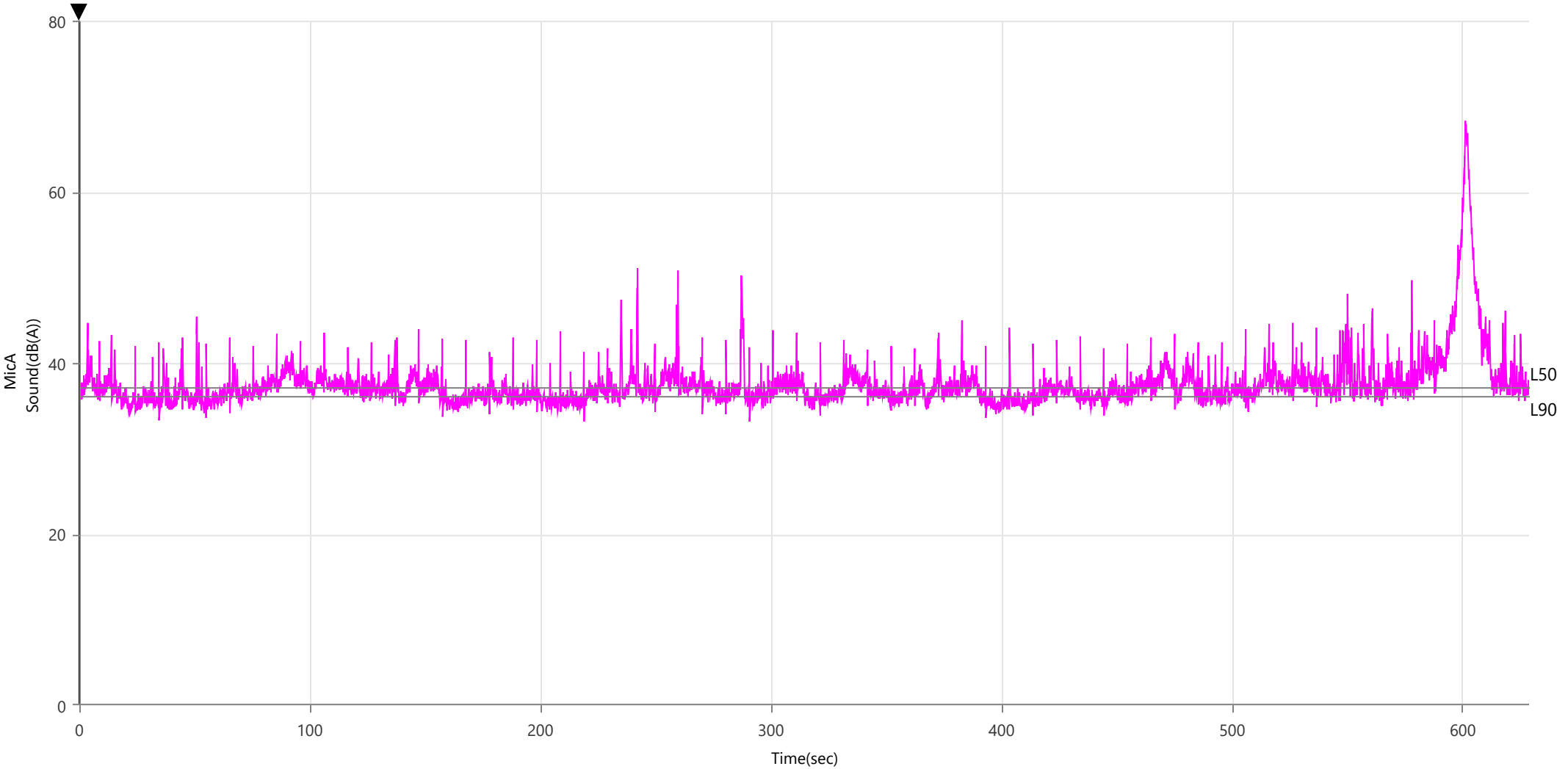




Waveform Trigger Source	Manual at July 13, 2021 11:03:40	Serial Number	UM14409
Pre-Trigger/Record Time	0.00 sec/629.0 sec (Fixed)	Model Number	Micromate ISEE 10.90
Sample Rate	1024 sps	Battery Level	3.8 volts
Setup File Name	UM14409.MMB	Unit Calibration	March 22, 2021 by Instantel
Operator	SND2	Microphone Calibration	UA10072, July 6, 2021 by Instantel
		Event File Name	UM14409_20210713110340.IDFW
		USB Sensor Support	Disabled

Post Event Notes    No text to be displayed.

Sound Level Microphone	A-Weight Fast
LMax	68.3 dB(A)
Time (Relative to Trigger)	601.438 sec
	LMin    L50    L90
Sound(dB(A))	33.2    37    36
Sensor Check	✓ Passed
Test Amplitude	1180 mv

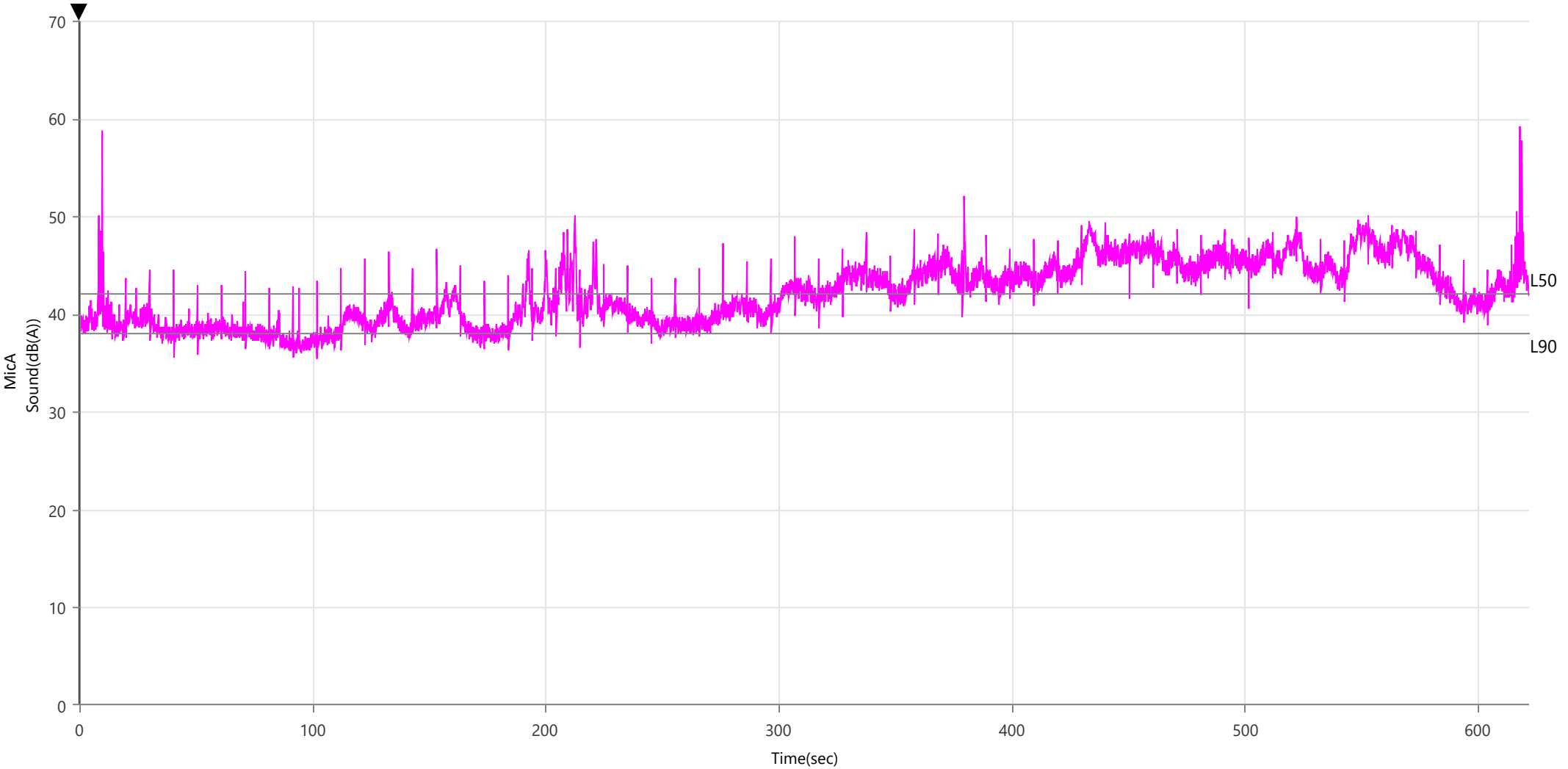




Waveform Trigger Source	Manual at July 13, 2021 13:31:30	Serial Number	UM14409
Pre-Trigger/Record Time	0.00 sec/622.0 sec (Fixed)	Model Number	Micromate ISEE 10.90
Sample Rate	1024 sps	Battery Level	3.8 volts
Setup File Name	UM14409.MMB	Unit Calibration	March 22, 2021 by Instantel
Operator	SND2	Microphone Calibration	UA10072, July 6, 2021 by Instantel
		Event File Name	UM14409_20210713133130.IDFW
		USB Sensor Support	Disabled

Post Event Notes    No text to be displayed.

Sound Level Microphone	A-Weight Fast
LMax	59.2 dB(A)
Time (Relative to Trigger)	618.120 sec
	LMin    L50    L90
Sound(dB(A))	35.4    42    38
Sensor Check	✔ Passed
Test Amplitude	1199 mv



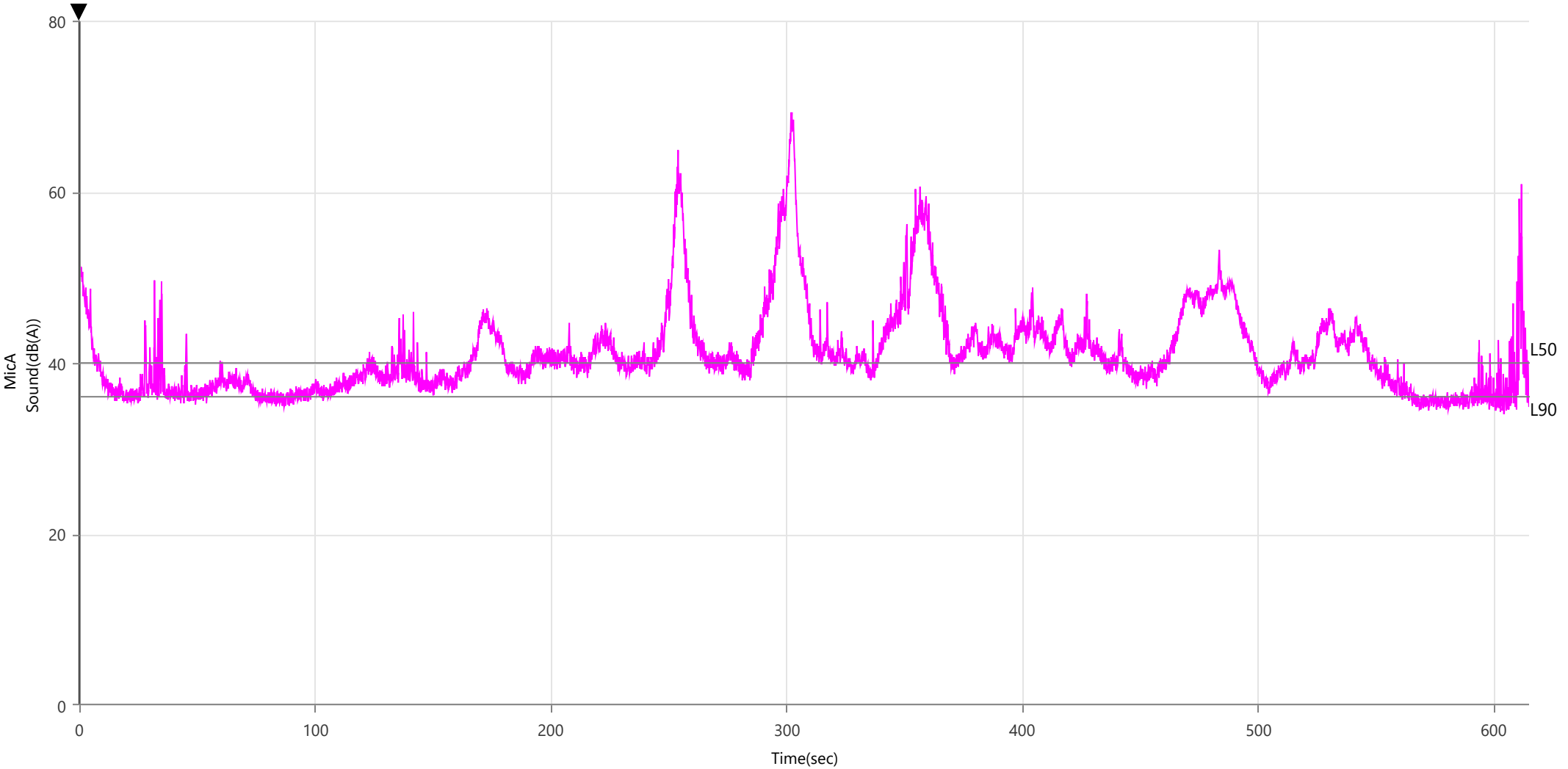




Waveform Trigger Source	Manual at July 20, 2021 12:28:35	Serial Number	UM14409
Pre-Trigger/Record Time	0.00 sec/615.0 sec (Fixed)	Model Number	Micromate ISEE 10.90
Sample Rate	1024 sps	Battery Level	3.8 volts
Setup File Name	UM14409.MMB	Unit Calibration	March 22, 2021 by Instantel
Operator	SND2	Microphone Calibration	UA10072, July 6, 2021 by Instantel
		Event File Name	UM14409_20210720122835.IDFW
		USB Sensor Support	Disabled

Post Event Notes    No text to be displayed.

Sound Level Microphone	A-Weight Fast
LMax	69.3 dB(A)
Time (Relative to Trigger)	301.983 sec
	LMin    L50    L90
Sound(dB(A))	34.0    40    36
Sensor Check	✔ Passed
Test Amplitude	1190 mv

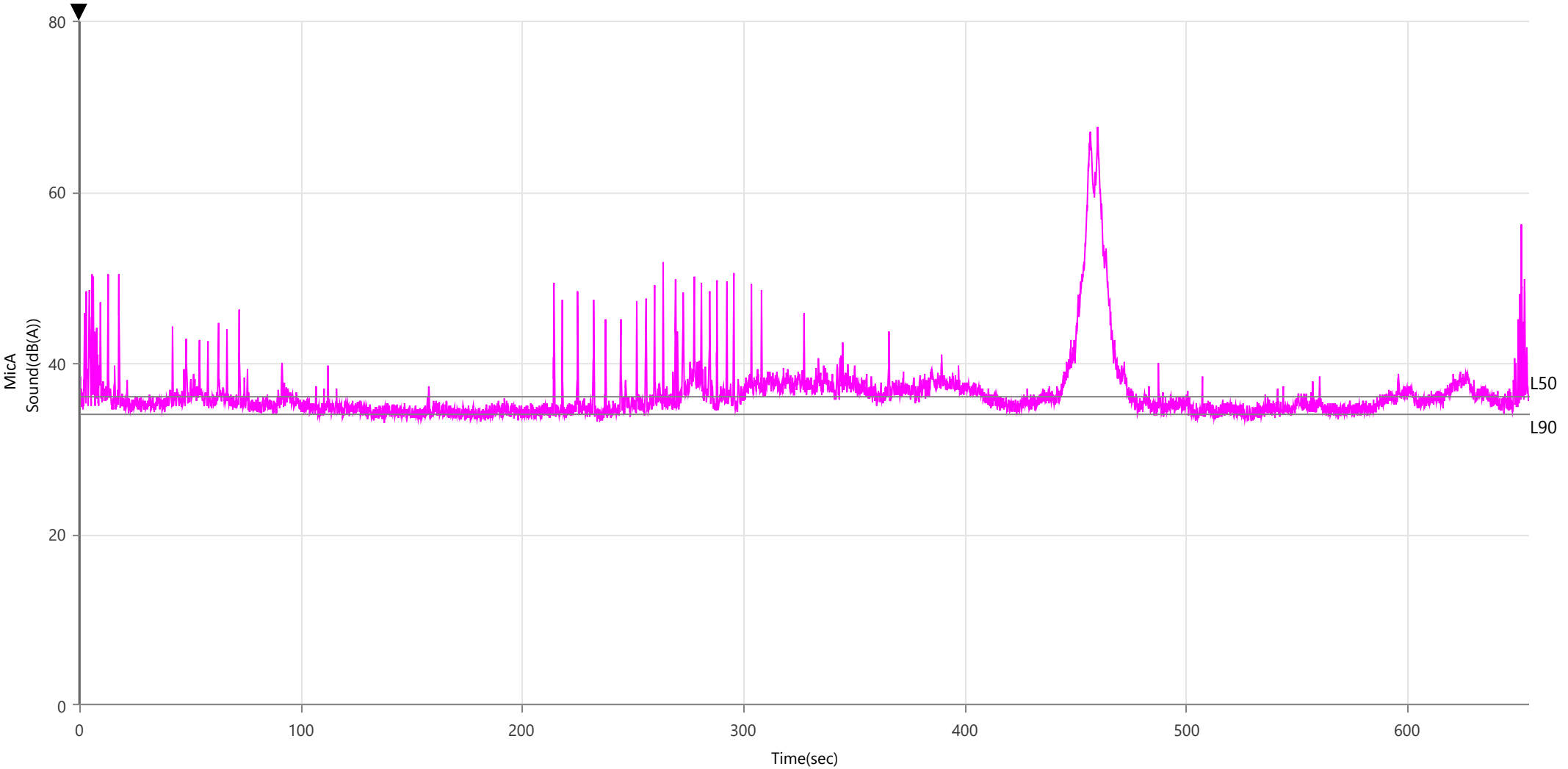




Waveform Trigger Source	Manual at July 28, 2021 10:49:00	Serial Number	UM14409
Pre-Trigger/Record Time	0.00 sec/655.0 sec (Fixed)	Model Number	Micromate ISEE 10.90
Sample Rate	1024 sps	Battery Level	3.8 volts
Setup File Name	UM14409.MMB	Unit Calibration	March 22, 2021 by Instantel
Operator	SND2	Microphone Calibration	UA10072, July 6, 2021 by Instantel
		Event File Name	UM14409_20210728104900.IDFW
		USB Sensor Support	Disabled

Post Event Notes    No text to be displayed.

Sound Level Microphone	A-Weight Fast
LMax	67.6 dB(A)
Time (Relative to Trigger)	460.111 sec
	LMin    L50    L90
Sound(dB(A))	33.0    36    34
Sensor Check	✔ Passed
Test Amplitude	1197 mv





Waveform Trigger SourceManual at May 3, 2022 12:30:25

Pre-Trigger/Record Time0.00 sec/631.5 sec (Fixed)

Sample Rate1024 sps

Setup File NameUM15175.MMB

OperatorSND2

Serial NumberUM15175

Model NumberMicromate ISEE 10.90

Battery Level3.8 volts

Unit CalibrationMay 14, 2021 by Instantel

Microphone CalibrationUA10073, April 18, 2022 by Field Calibration

Event File NameUM15175\_20220503123025.IDFW

USB Sensor SupportDisabled

Notes

Location

ClientWHARF

Company

General Notes

Extended NotesNo text to be displayed.

Post Event NotesNo text to be displayed.

Sound Level Microphone

LMax56.5 dB(A)

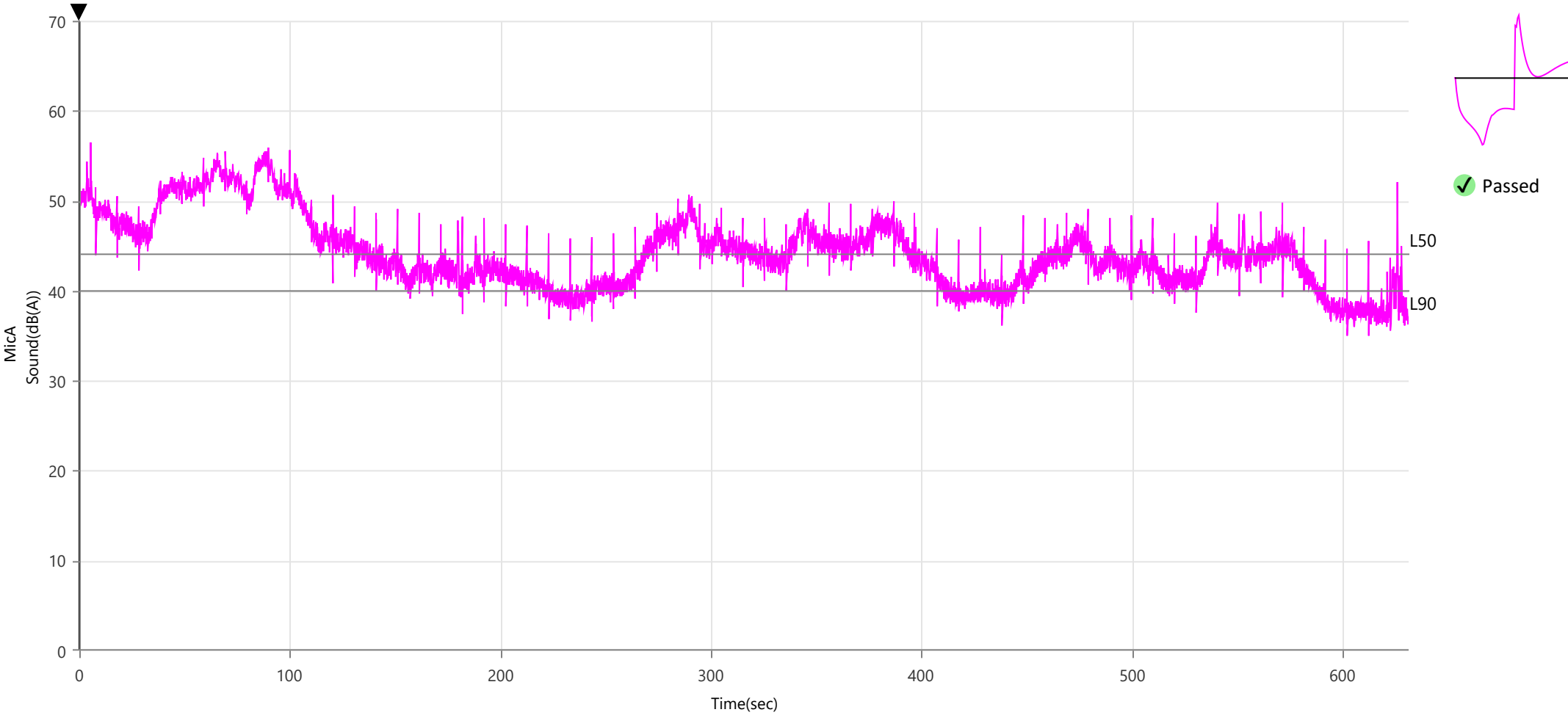
Time (Relative to Trigger)5.431 sec

LMinL50L90

35.04440

✓ Passed

809 mv

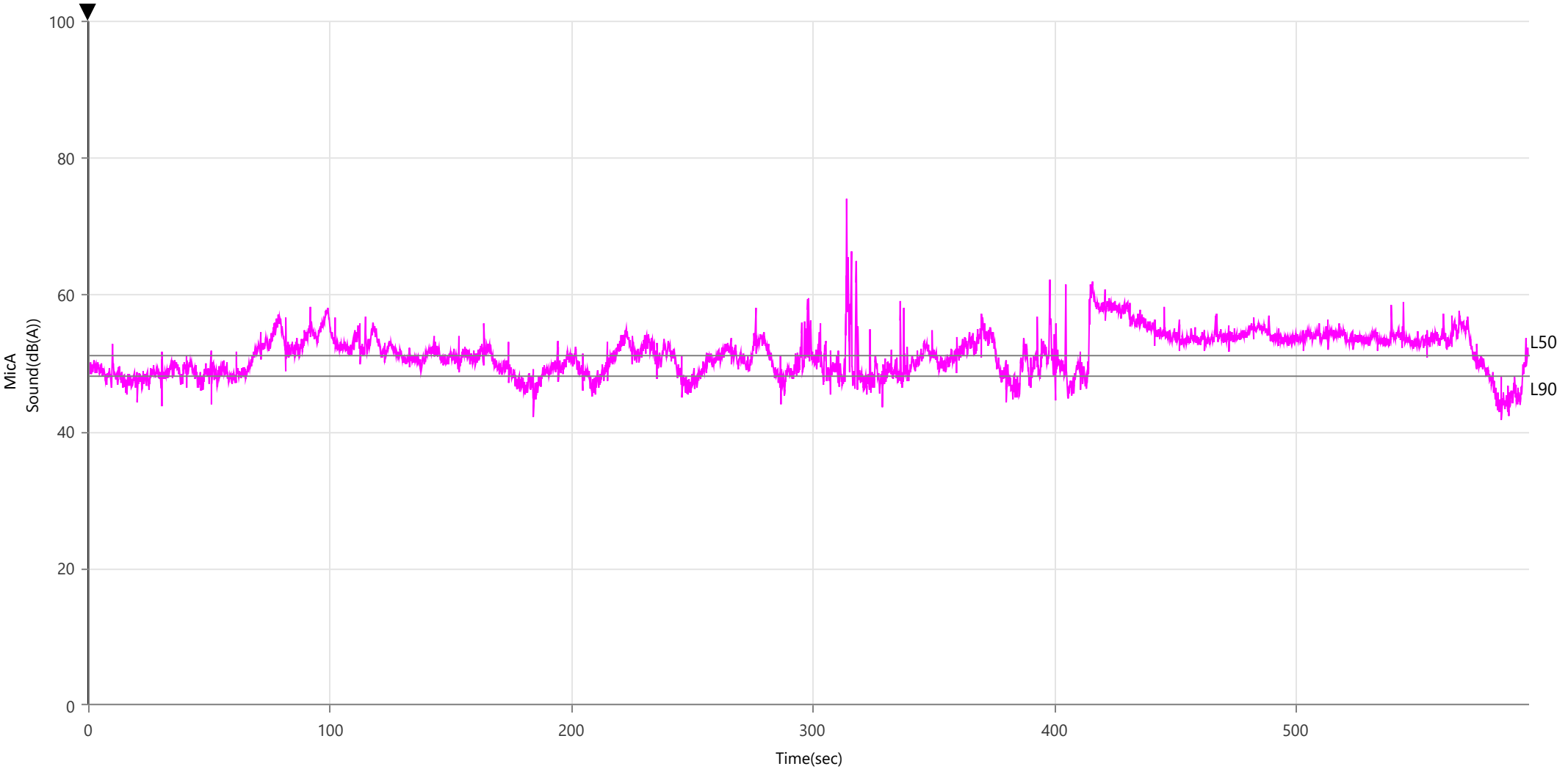




Waveform Trigger Source	Manual at July 13, 2021 10:44:15	Serial Number	UM14409
Pre-Trigger/Record Time	0.00 sec/596.5 sec (Fixed)	Model Number	Micromate ISEE 10.90
Sample Rate	1024 sps	Battery Level	3.8 volts
Setup File Name	UM14409.MMB	Unit Calibration	March 22, 2021 by Instantel
Operator	SND3	Microphone Calibration	UA10072, July 6, 2021 by Instantel
		Event File Name	UM14409_20210713104415.IDFW
		USB Sensor Support	Disabled

Post Event Notes    No text to be displayed.

Sound Level Microphone	A-Weight Fast
LMax	74.0 dB(A)
Time (Relative to Trigger)	314.033 sec
	LMin    L50    L90
Sound(dB(A))	41.7    51    48
Sensor Check	✔ Passed
Test Amplitude	1180 mv



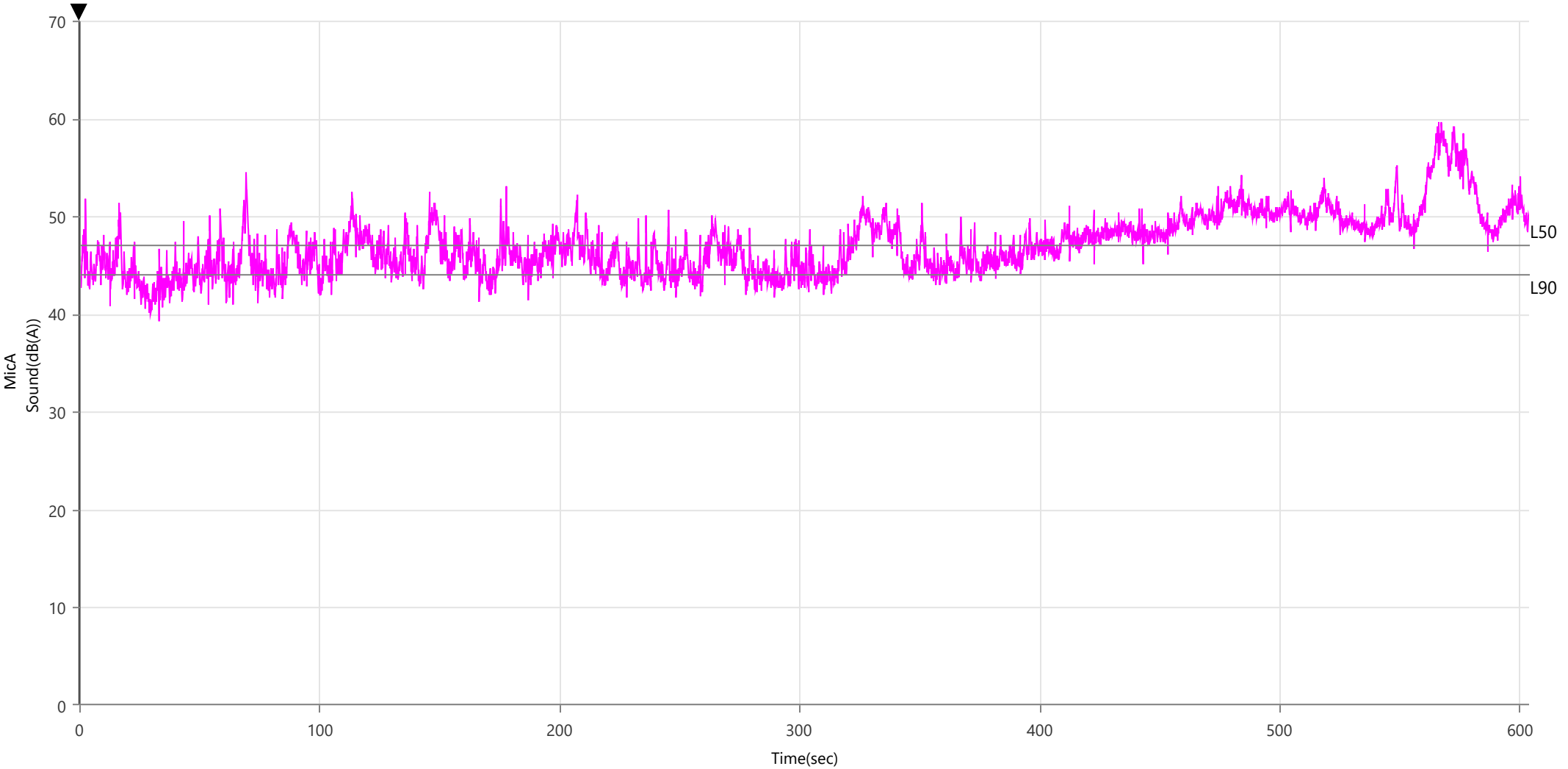




Waveform Trigger Source	Manual at July 13, 2021 13:14:00	Serial Number	UM14409
Pre-Trigger/Record Time	0.00 sec/604.0 sec (Fixed)	Model Number	Micromate ISEE 10.90
Sample Rate	1024 sps	Battery Level	3.8 volts
Setup File Name	UM14409.MMB	Unit Calibration	March 22, 2021 by Instantel
Operator	SND3	Microphone Calibration	UA10072, July 6, 2021 by Instantel
		Event File Name	UM14409_20210713131400.IDFW
		USB Sensor Support	Disabled

Post Event Notes No text to be displayed.

Sound Level Microphone	A-Weight Fast
LMax	59.6 dB(A)
Time (Relative to Trigger)	566.364 sec
	LMin L50 L90
Sound(dB(A))	39.3 47 44
Sensor Check	✓ Passed
Test Amplitude	1199 mv

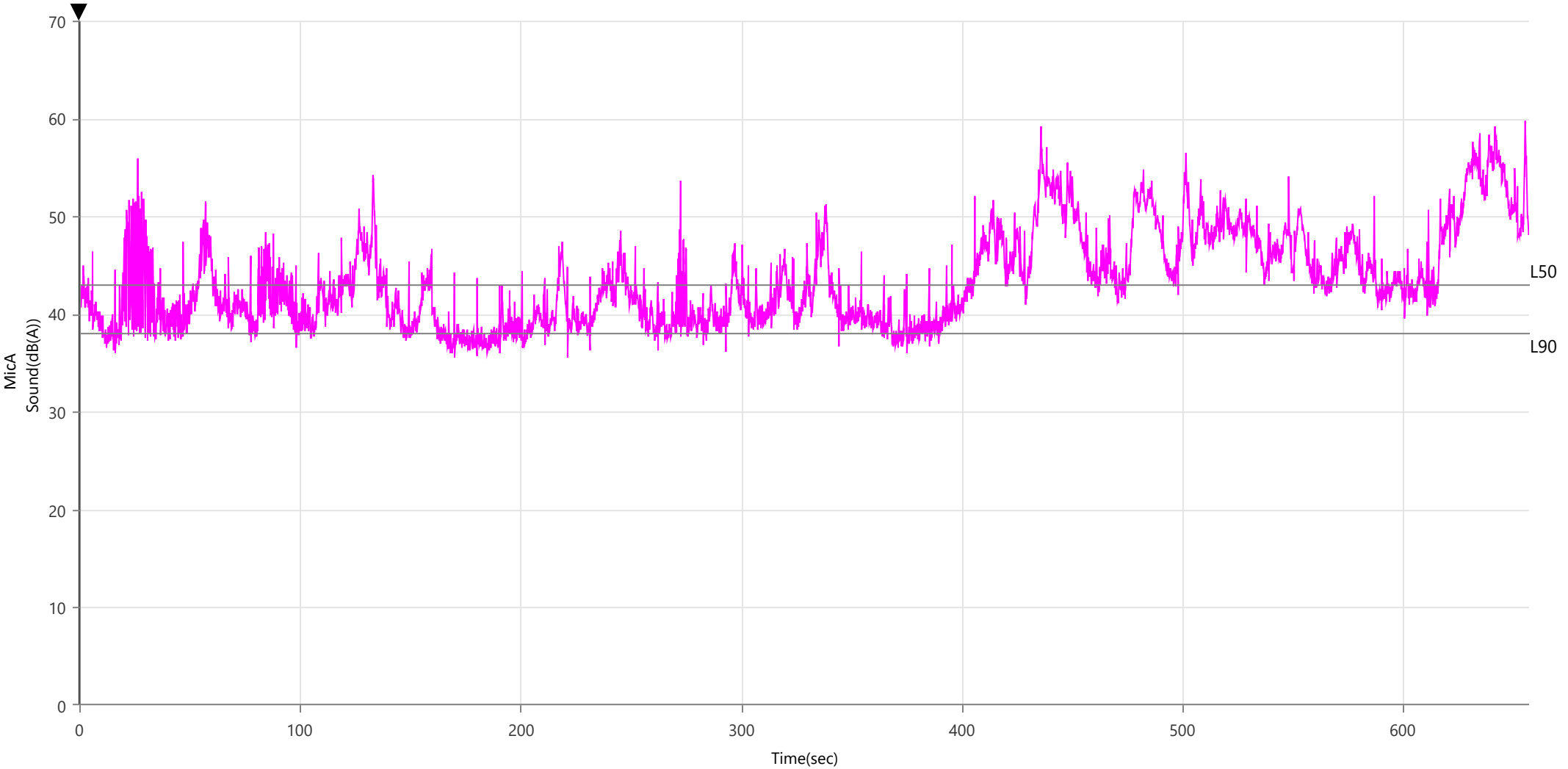




Waveform Trigger Source	Manual at July 20, 2021 13:06:30	Serial Number	UM14409
Pre-Trigger/Record Time	0.00 sec/657.0 sec (Fixed)	Model Number	Micromate ISEE 10.90
Sample Rate	1024 sps	Battery Level	3.8 volts
Setup File Name	UM14409.MMB	Unit Calibration	March 22, 2021 by Instantel
Operator	SND3	Microphone Calibration	UA10072, July 6, 2021 by Instantel
		Event File Name	UM14409_20210720130630.IDFW
		USB Sensor Support	Disabled

Post Event Notes No text to be displayed.

Sound Level Microphone	A-Weight Fast
LMax	59.8 dB(A)
Time (Relative to Trigger)	655.325 sec
	LMin L50 L90
Sound(dB(A))	35.6 43 38
Sensor Check	Passed
Test Amplitude	1170 mv





Waveform Trigger SourceManual at July 28, 2021 09:38:00

Pre-Trigger/Record Time0.00 sec/608.0 sec (Fixed)

Sample Rate1024 sps

Setup File NameUM14409.MMB

OperatorSND3

Serial NumberUM14409

Model NumberMicromate ISEE 10.90

Battery Level3.8 volts

Unit CalibrationMarch 22, 2021 by Instantel

Microphone CalibrationUA10072, July 6, 2021 by Instantel

Event File NameUM14409\_20210728093800.IDFW

USB Sensor SupportDisabled

Post Event Notes No text to be displayed.

Sound Level Microphone

LMax66.2 dB(A)

Time (Relative to Trigger)16.605 sec

LMin36.3

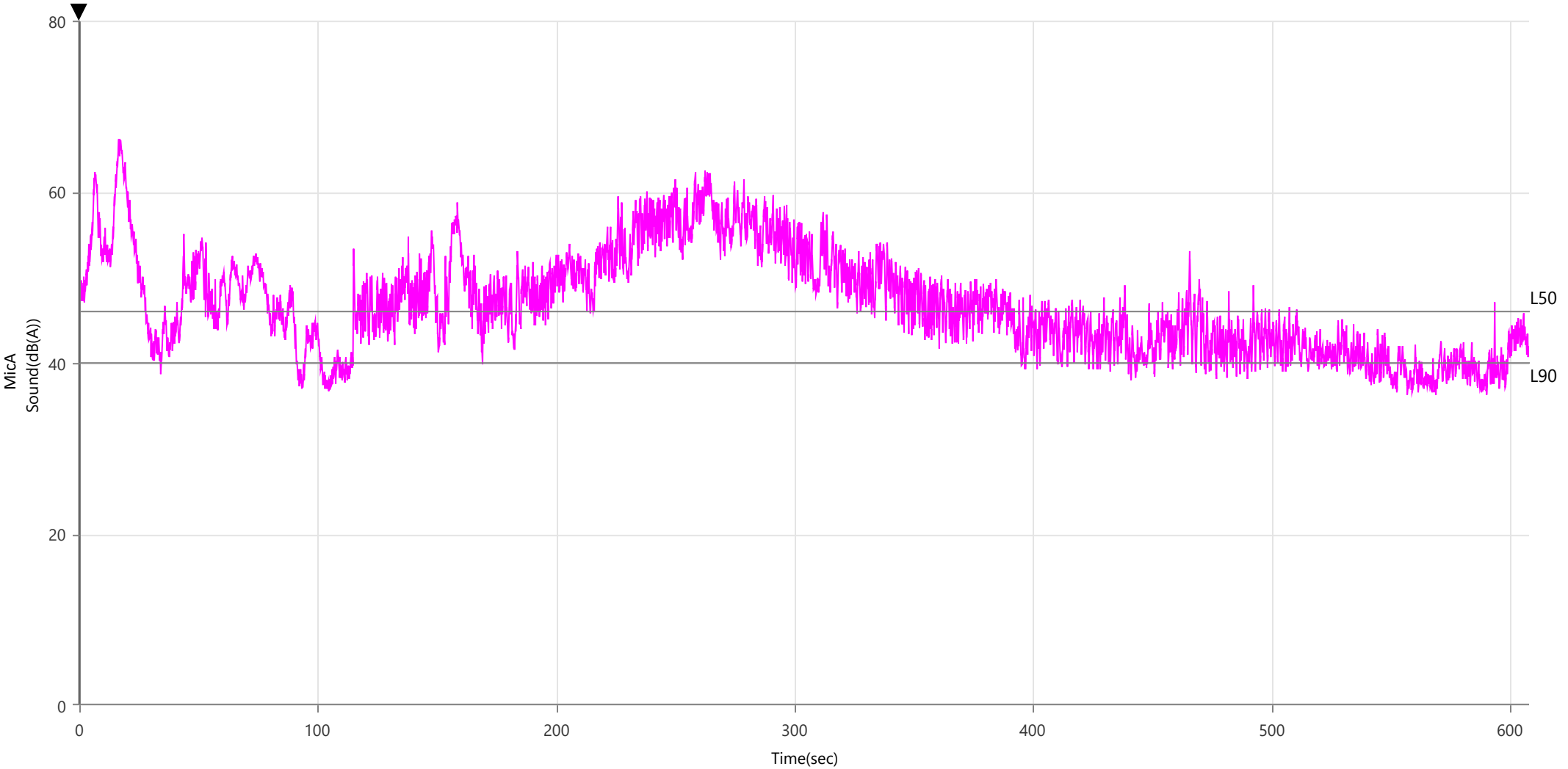
L5046

L9040

Sound(dB(A))

Sensor Check✔ Passed

Test Amplitude1197 mv





Waveform Trigger SourceManual at May 3, 2022 11:15:25

Pre-Trigger/Record Time0.00 sec/700.0 sec (Fixed)

Sample Rate1024 sps

Setup File NameUM15175.MMB

OperatorSND3

Serial NumberUM15175

Model NumberMicromate ISEE 10.90

Battery Level3.8 volts

Unit CalibrationMay 14, 2021 by Instantel

Microphone CalibrationUA10073, April 18, 2022 by Field Calibration

Event File NameUM15175\_20220503111525.IDFW

USB Sensor SupportDisabled

Notes

Location

ClientWHARF

Company

General Notes

Extended NotesNo text to be displayed.

Post Event NotesNo text to be displayed.

Sound Level Microphone

LMax66.7 dB(A)

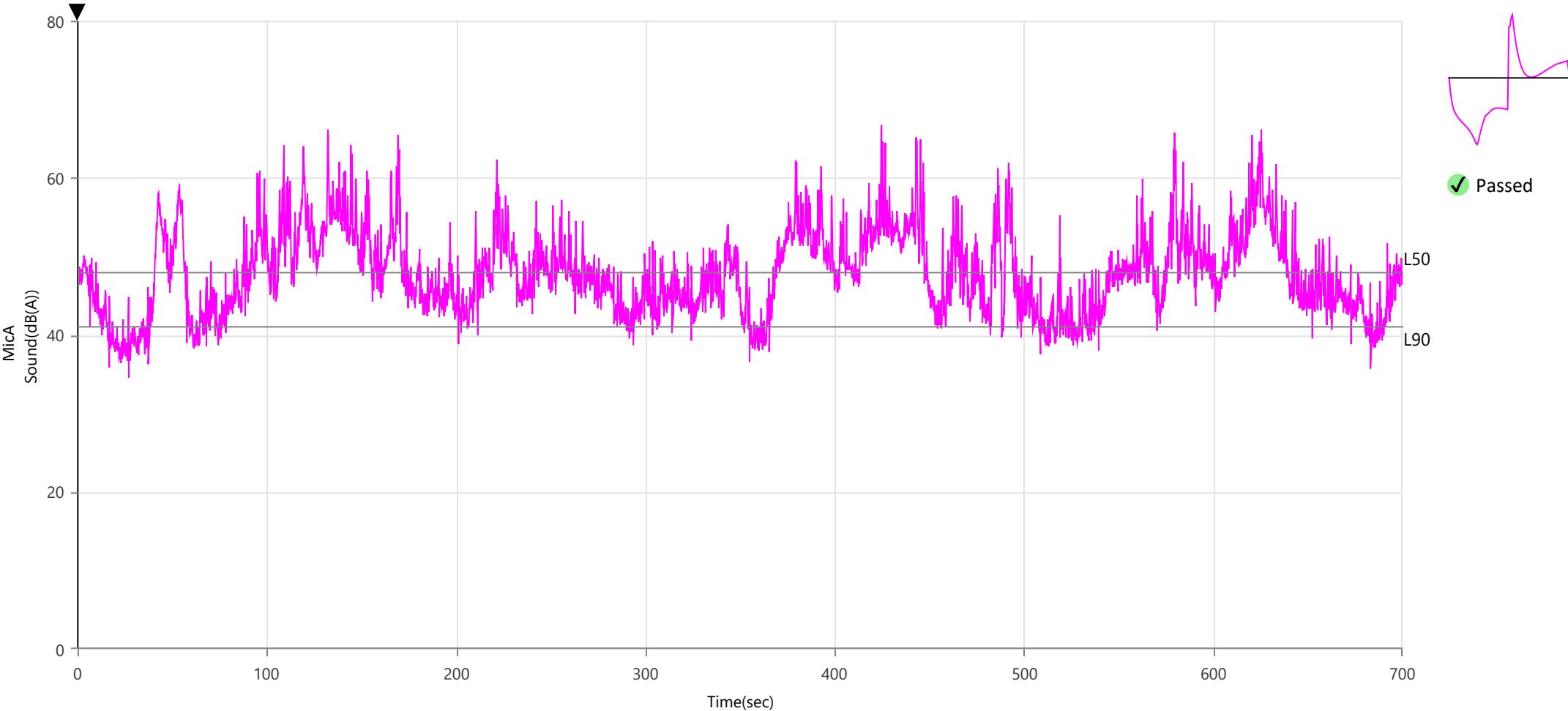
Time (Relative to Trigger)424.725 sec

LMinL50L90

34.64841

✓ Passed

Test Amplitude793 mv



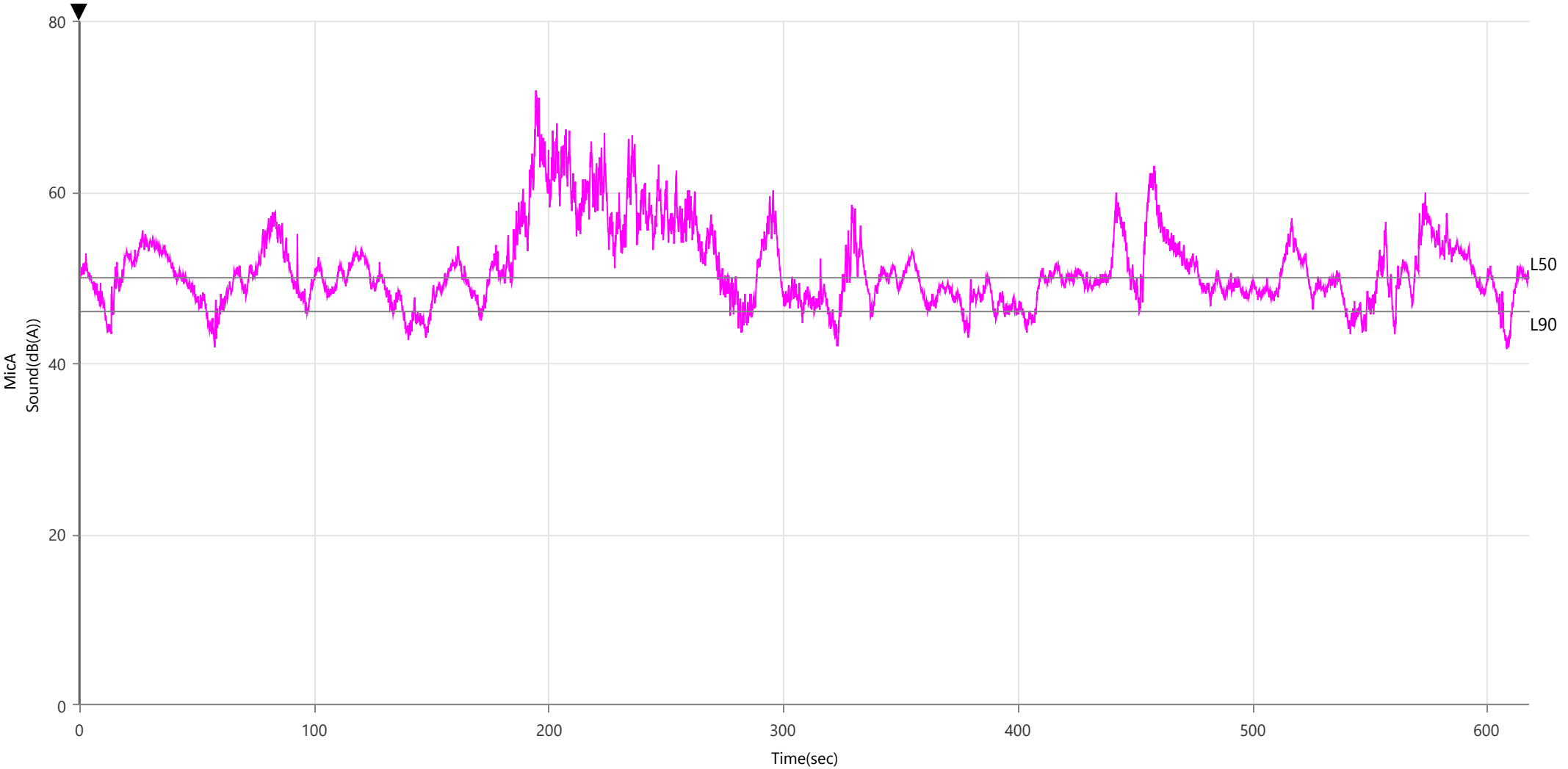




Waveform Trigger Source	Manual at July 13, 2021 10:27:14	Serial Number	UM14409
Pre-Trigger/Record Time	0.00 sec/618.0 sec (Fixed)	Model Number	Micromate ISEE 10.90
Sample Rate	1024 sps	Battery Level	3.8 volts
Setup File Name	UM14409.MMB	Unit Calibration	March 22, 2021 by Instantel
Operator	SND4	Microphone Calibration	UA10072, July 6, 2021 by Instantel
		Event File Name	UM14409_20210713102714.IDFW
		USB Sensor Support	Disabled

Post Event Notes No text to be displayed.

Sound Level Microphone	A-Weight Fast
LMax	71.8 dB(A)
Time (Relative to Trigger)	194.642 sec
	LMin L50 L90
Sound(dB(A))	41.7 50 46
Sensor Check	Passed
Test Amplitude	1206 mv

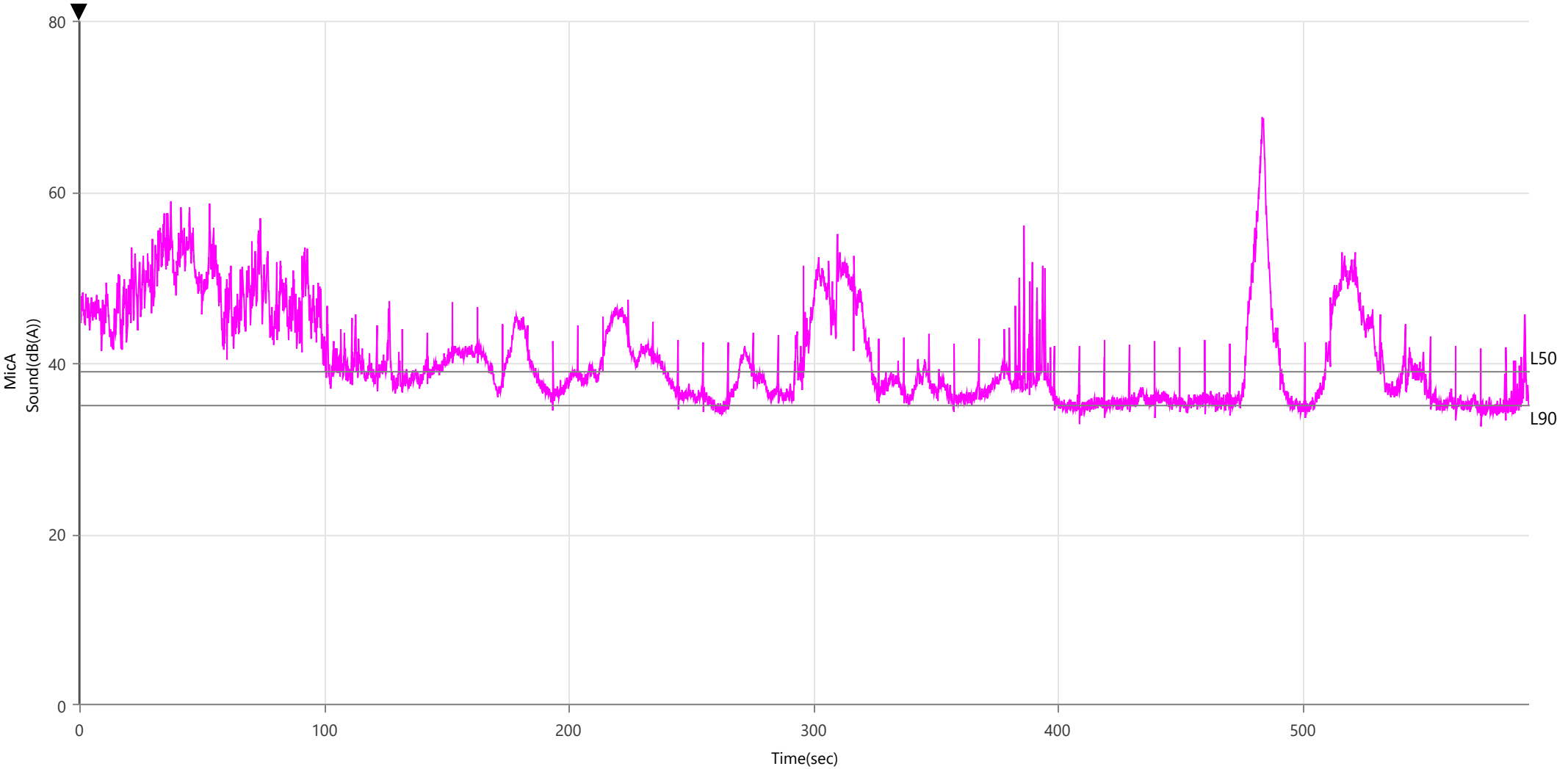




Waveform Trigger Source	Manual at July 13, 2021 13:01:13	Serial Number	UM14409
Pre-Trigger/Record Time	0.00 sec/592.5 sec (Fixed)	Model Number	Micromate ISEE 10.90
Sample Rate	1024 sps	Battery Level	3.8 volts
Setup File Name	UM14409.MMB	Unit Calibration	March 22, 2021 by Instantel
Operator	SND4	Microphone Calibration	UA10072, July 6, 2021 by Instantel
		Event File Name	UM14409_20210713130113.IDFW
		USB Sensor Support	Disabled

Post Event Notes    No text to be displayed.

Sound Level Microphone	A-Weight Fast
LMax	68.7 dB(A)
Time (Relative to Trigger)	483.424 sec
	LMin    L50    L90
Sound(dB(A))	32.6    39    35
Sensor Check	✓ Passed
Test Amplitude	1199 mv

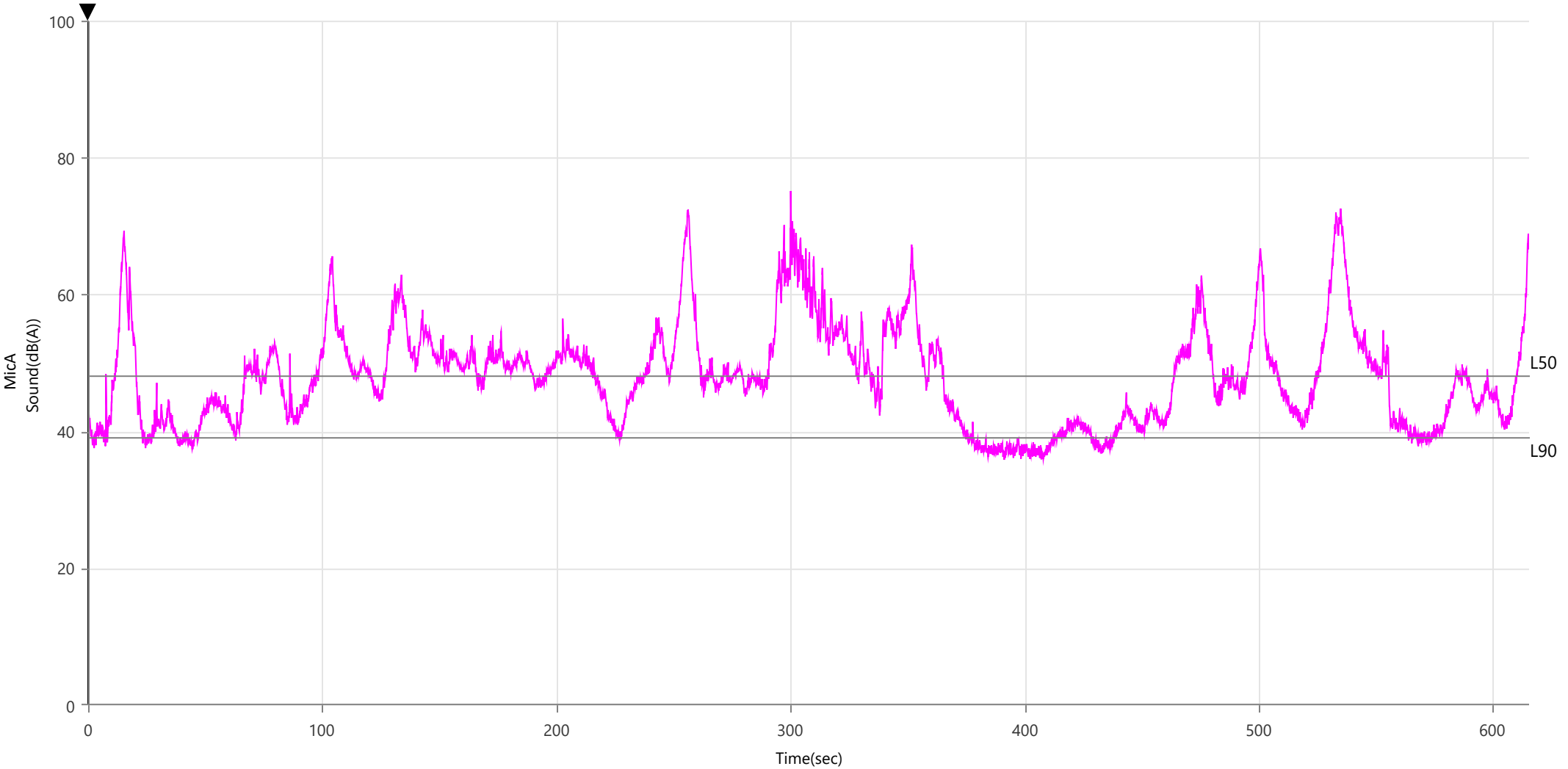




Waveform Trigger Source	Manual at July 20, 2021 11:35:51	Serial Number	UM14409
Pre-Trigger/Record Time	0.00 sec/615.5 sec (Fixed)	Model Number	Micromate ISEE 10.90
Sample Rate	1024 sps	Battery Level	3.8 volts
Setup File Name	UM14409.MMB	Unit Calibration	March 22, 2021 by Instantel
Operator	SND4	Microphone Calibration	UA10072, July 6, 2021 by Instantel
		Event File Name	UM14409_20210720113551.IDFW
		USB Sensor Support	Disabled

Post Event Notes    No text to be displayed.

Sound Level Microphone	A-Weight Fast
LMax	75.1 dB(A)
Time (Relative to Trigger)	300.163 sec
	LMin    L50    L90
Sound(dB(A))	35.9    48    39
Sensor Check	✓ Passed
Test Amplitude	1190 mv

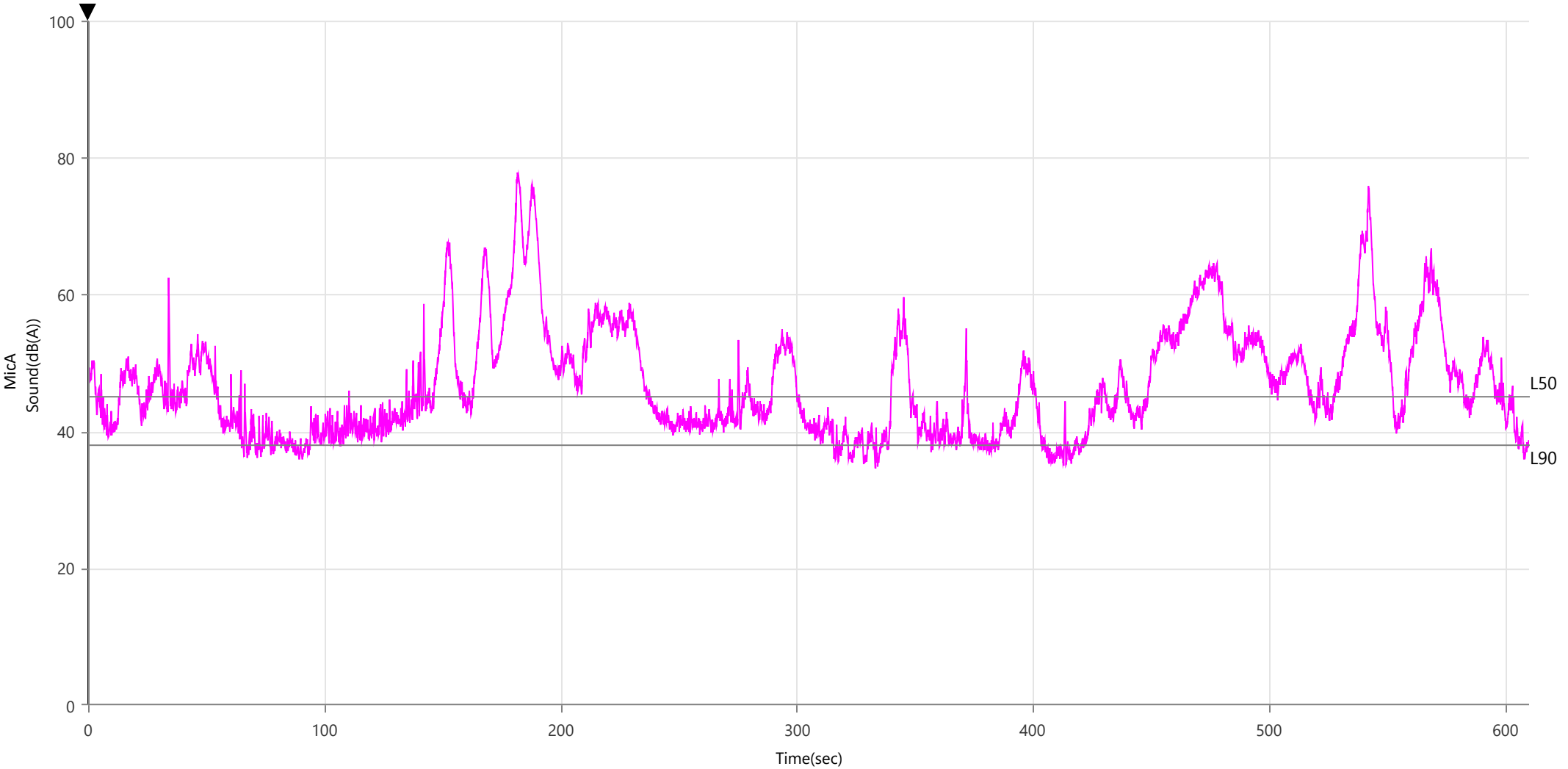




Waveform Trigger Source	Manual at July 28, 2021 09:24:00	Serial Number	UM14409
Pre-Trigger/Record Time	0.00 sec/610.0 sec (Fixed)	Model Number	Micromate ISEE 10.90
Sample Rate	1024 sps	Battery Level	3.8 volts
Setup File Name	UM14409.MMB	Unit Calibration	March 22, 2021 by Instantel
Operator	SND4	Microphone Calibration	UA10072, July 6, 2021 by Instantel
		Event File Name	UM14409_20210728092400.IDFW
		USB Sensor Support	Disabled

Post Event Notes    No text to be displayed.

Sound Level Microphone	A-Weight Fast
LMax	77.8 dB(A)
Time (Relative to Trigger)	181.805 sec
	LMin    L50    L90
Sound(dB(A))	34.6    45    38
Sensor Check	✔ Passed
Test Amplitude	1197 mv





Manual at May 3, 2022 10:56:56  
0.00 sec/729.5 sec (Fixed)  
1024 sps  
UM15175.MMB  
SND4

Serial Number  
Model Number  
Battery Level  
Unit Calibration  
Microphone Calibration  
Event File Name  
USB Sensor Support

UM15175  
Micromate ISEE 10.90  
3.8 volts  
May 14, 2021 by InstanTEL  
UA10073, April 18, 2022 by Field Calibration  
UM15175\_20220503105656.IDFW  
Disabled

## Notes

Location  
Client  
Company  
General Notes

WHARF

**Extended Notes** No text to be displayed.

**Post Event Notes** No text to be displayed.

### Sound Level Microphone

LMax  
Time (Relative to Trigger)

### A-Weight Fast

73.6 dB(A)

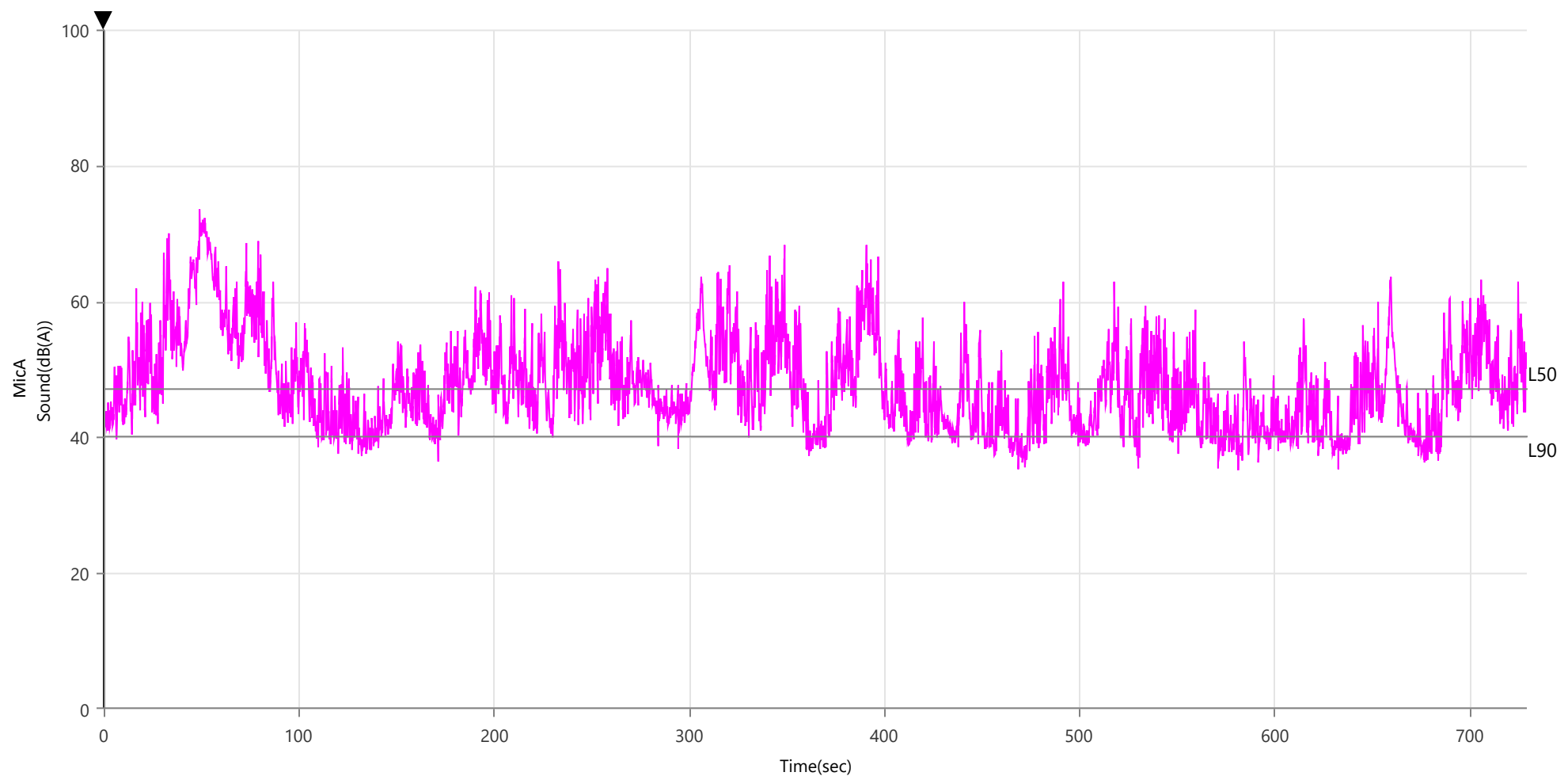
49.177 sec

**LMin      L50      L90**

35.1 47

✓ Passed

802 mv



## Sensor Check

✓ Passed

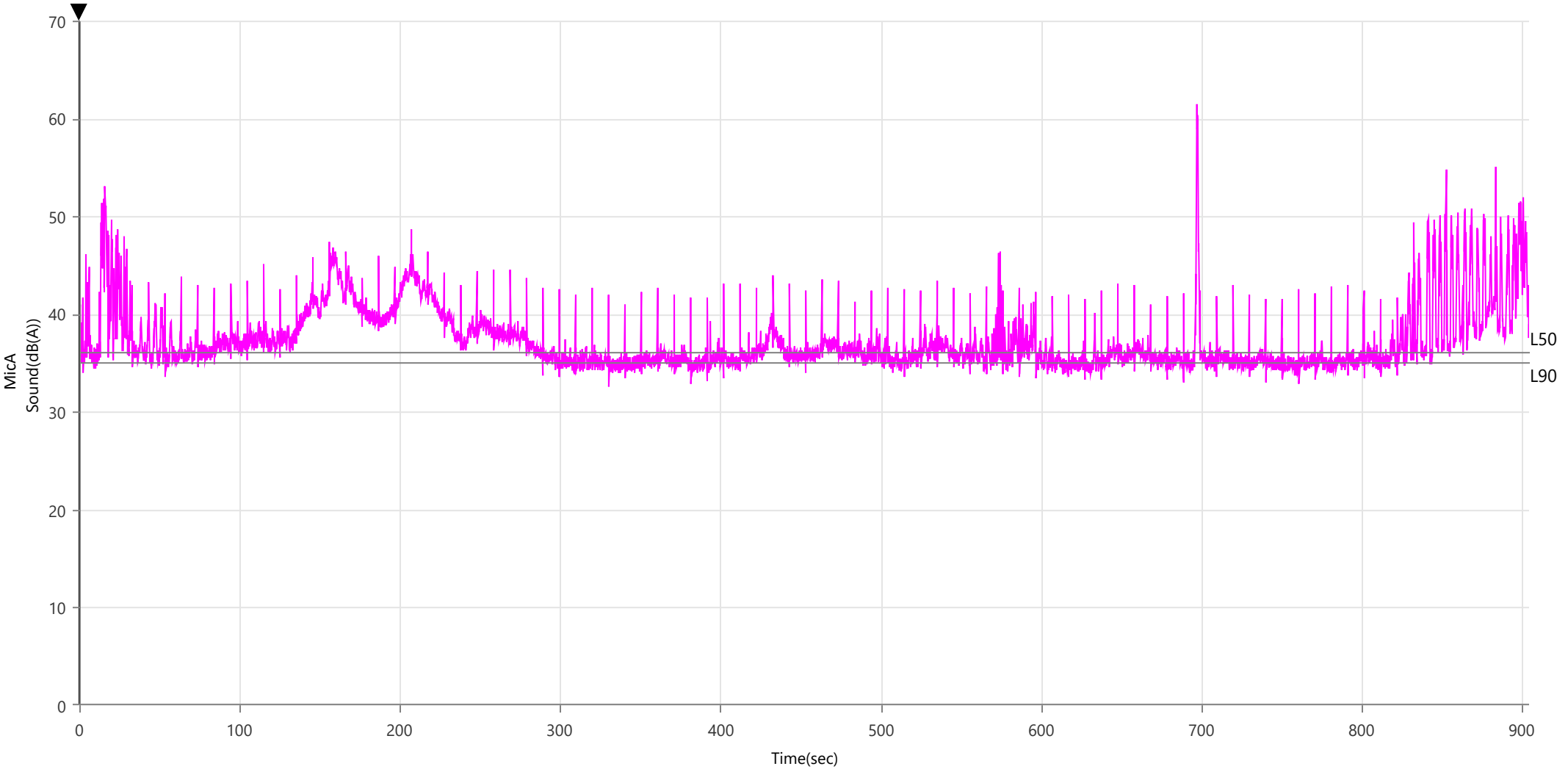




Waveform Trigger Source	Manual at July 13, 2021 11:50:00	Serial Number	UM14409
Pre-Trigger/Record Time	0.00 sec/904.5 sec (Fixed)	Model Number	Micromate ISEE 10.90
Sample Rate	1024 sps	Battery Level	3.8 volts
Setup File Name	UM14409.MMB	Unit Calibration	March 22, 2021 by Instantel
Operator	SND5	Microphone Calibration	UA10072, July 6, 2021 by Instantel
		Event File Name	UM14409_20210713115000.IDFW
		USB Sensor Support	Disabled

Post Event Notes No text to be displayed.

Sound Level Microphone	A-Weight Fast
LMax	61.5 dB(A)
Time (Relative to Trigger)	697.345 sec
	LMin L50 L90
Sound(dB(A))	32.6 36 35
Sensor Check	✓ Passed
Test Amplitude	1187 mv

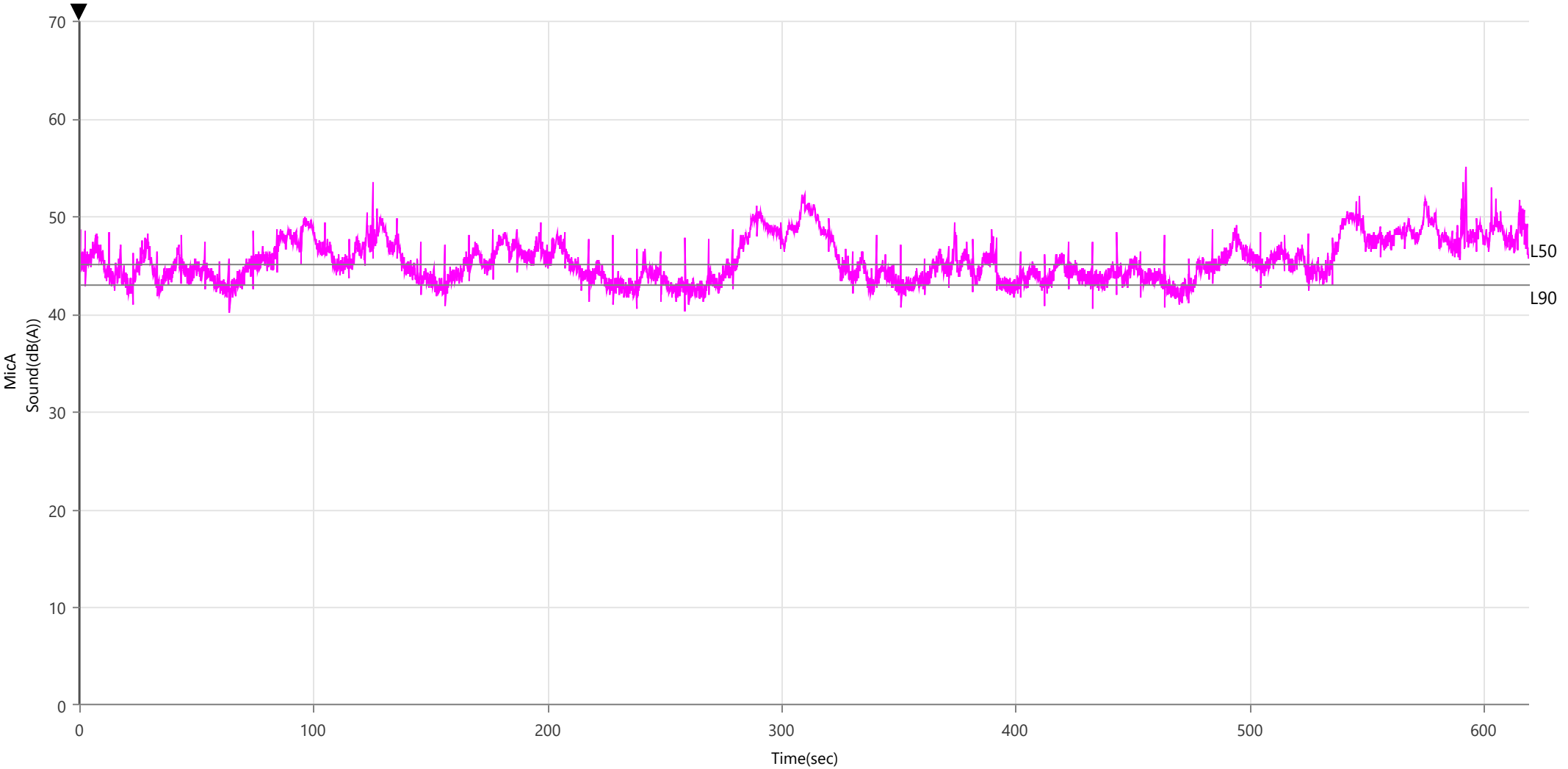




Waveform Trigger Source	Manual at July 13, 2021 14:00:35	Serial Number	UM14409
Pre-Trigger/Record Time	0.00 sec/619.5 sec (Fixed)	Model Number	Micromate ISEE 10.90
Sample Rate	1024 sps	Battery Level	3.8 volts
Setup File Name	UM14409.MMB	Unit Calibration	March 22, 2021 by Instantel
Operator	SND5	Microphone Calibration	UA10072, July 6, 2021 by Instantel
		Event File Name	UM14409_20210713140035.IDFW
		USB Sensor Support	Disabled

Post Event Notes    No text to be displayed.

Sound Level Microphone	A-Weight Fast
LMax	55.1 dB(A)
Time (Relative to Trigger)	592.579 sec
	LMin    L50    L90
Sound(dB(A))	40.1    45    43
Sensor Check	✔ Passed
Test Amplitude	1199 mv

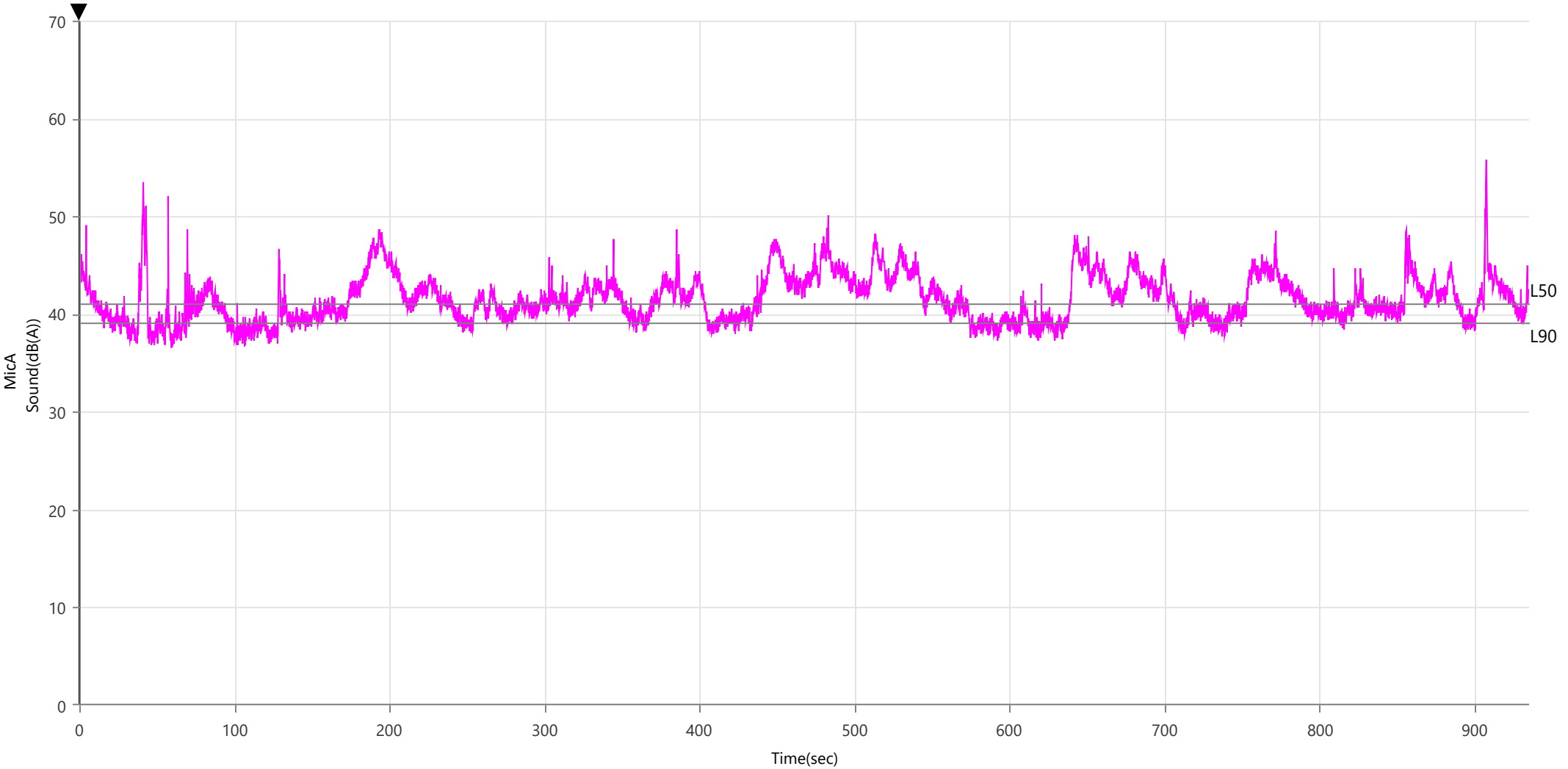




Waveform Trigger Source	Manual at July 20, 2021 11:54:30	Serial Number	UM14409
Pre-Trigger/Record Time	0.00 sec/935.0 sec (Fixed)	Model Number	Micromate ISEE 10.90
Sample Rate	1024 sps	Battery Level	3.8 volts
Setup File Name	UM14409.MMB	Unit Calibration	March 22, 2021 by Instantel
Operator	SND5	Microphone Calibration	UA10072, July 6, 2021 by Instantel
		Event File Name	UM14409_20210720115430.IDFW
		USB Sensor Support	Disabled

Post Event Notes    No text to be displayed.

Sound Level Microphone	A-Weight Fast
LMax	55.8 dB(A)
Time (Relative to Trigger)	907.447 sec
	LMin    L50    L90
Sound(dB(A))	36.6    41    39
Sensor Check	✔ Passed
Test Amplitude	1190 mv

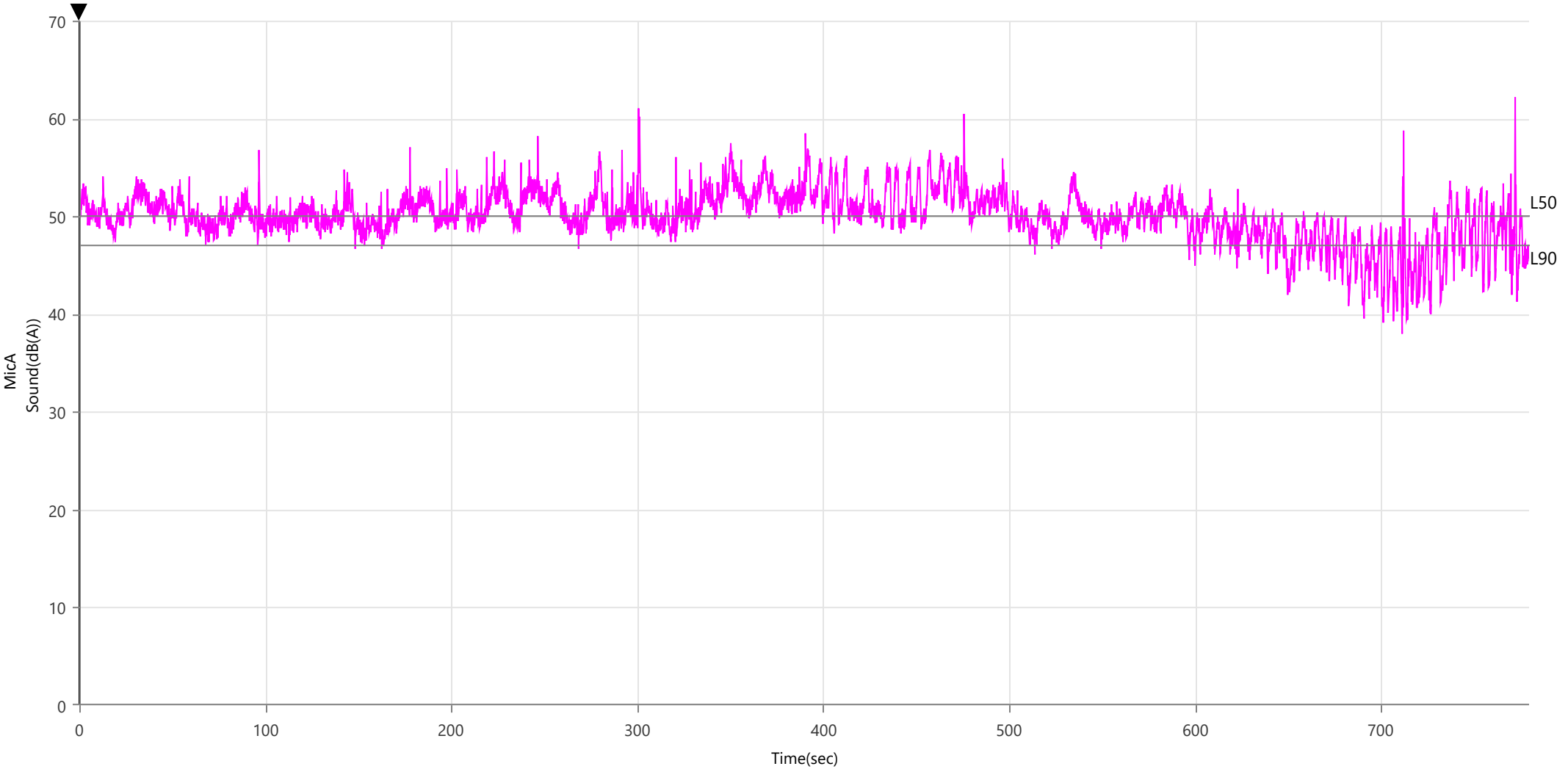




Waveform Trigger Source	Manual at July 28, 2021 10:12:01	Serial Number	UM14409
Pre-Trigger/Record Time	0.00 sec/779.5 sec (Fixed)	Model Number	Micromate ISEE 10.90
Sample Rate	1024 sps	Battery Level	3.8 volts
Setup File Name	UM14409.MMB	Unit Calibration	March 22, 2021 by Instantel
Operator	SND5	Microphone Calibration	UA10072, July 6, 2021 by Instantel
		Event File Name	UM14409_20210728101201.IDFW
		USB Sensor Support	Disabled

Post Event Notes    No text to be displayed.

Sound Level Microphone	A-Weight Fast
LMax	62.2 dB(A)
Time (Relative to Trigger)	772.068 sec
	LMin    L50    L90
Sound(dB(A))	38.0    50    47
Sensor Check	✔ Passed
Test Amplitude	1197 mv





Waveform Trigger SourceManual at May 3, 2022 11:58:17

Pre-Trigger/Record Time0.00 sec/627.0 sec (Fixed)

Sample Rate1024 sps

Setup File NameUM15175.MMB

OperatorSND5

Serial NumberUM15175

Model NumberMicromate ISEE 10.90

Battery Level3.8 volts

Unit CalibrationMay 14, 2021 by Instantel

Microphone CalibrationUA10073, April 18, 2022 by Field Calibration

Event File NameUM15175\_20220503115817.IDFW

USB Sensor SupportDisabled

Notes

Location

ClientWHARF

Company

General Notes

Extended NotesNo text to be displayed.

Post Event NotesNo text to be displayed.

Sound Level Microphone

LMax62.9 dB(A)

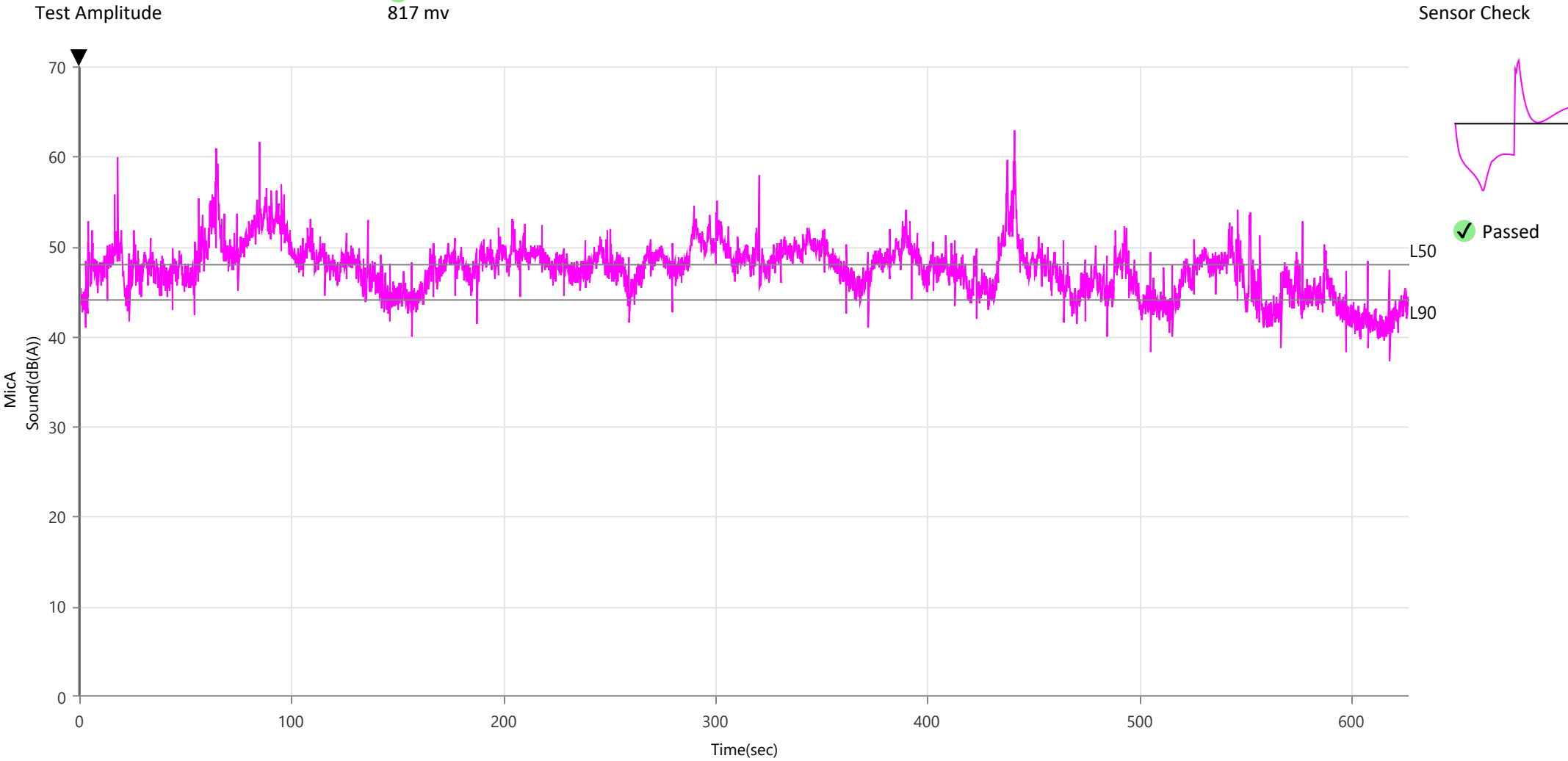
Time (Relative to Trigger)441.181 sec

LMinL50L90

37.34844

✓ Passed

Test Amplitude817 mv



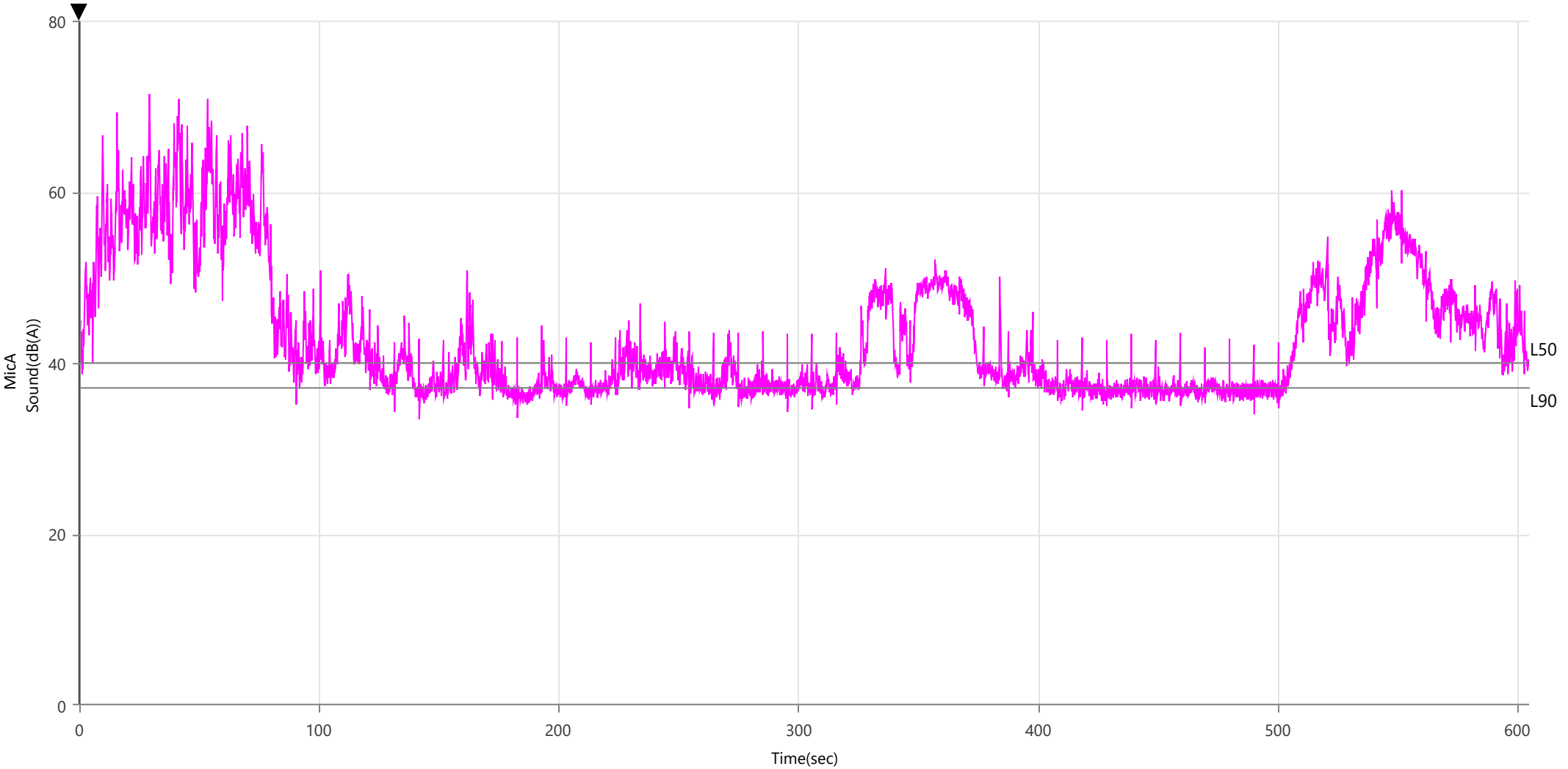




Waveform Trigger Source	Manual at July 13, 2021 12:14:58	Serial Number	UM14409
Pre-Trigger/Record Time	0.00 sec/605.0 sec (Fixed)	Model Number	Micromate ISEE 10.90
Sample Rate	1024 sps	Battery Level	3.8 volts
Setup File Name	UM14409.MMB	Unit Calibration	March 22, 2021 by Instantel
Operator	SND6	Microphone Calibration	UA10072, July 6, 2021 by Instantel
		Event File Name	UM14409_20210713121458.IDFW
		USB Sensor Support	Disabled

Post Event Notes    No text to be displayed.

Sound Level Microphone	A-Weight Fast
LMax	71.4 dB(A)
Time (Relative to Trigger)	29.267 sec
	LMin    L50    L90
Sound(dB(A))	33.4    40    37
Sensor Check	✓ Passed
Test Amplitude	1187 mv

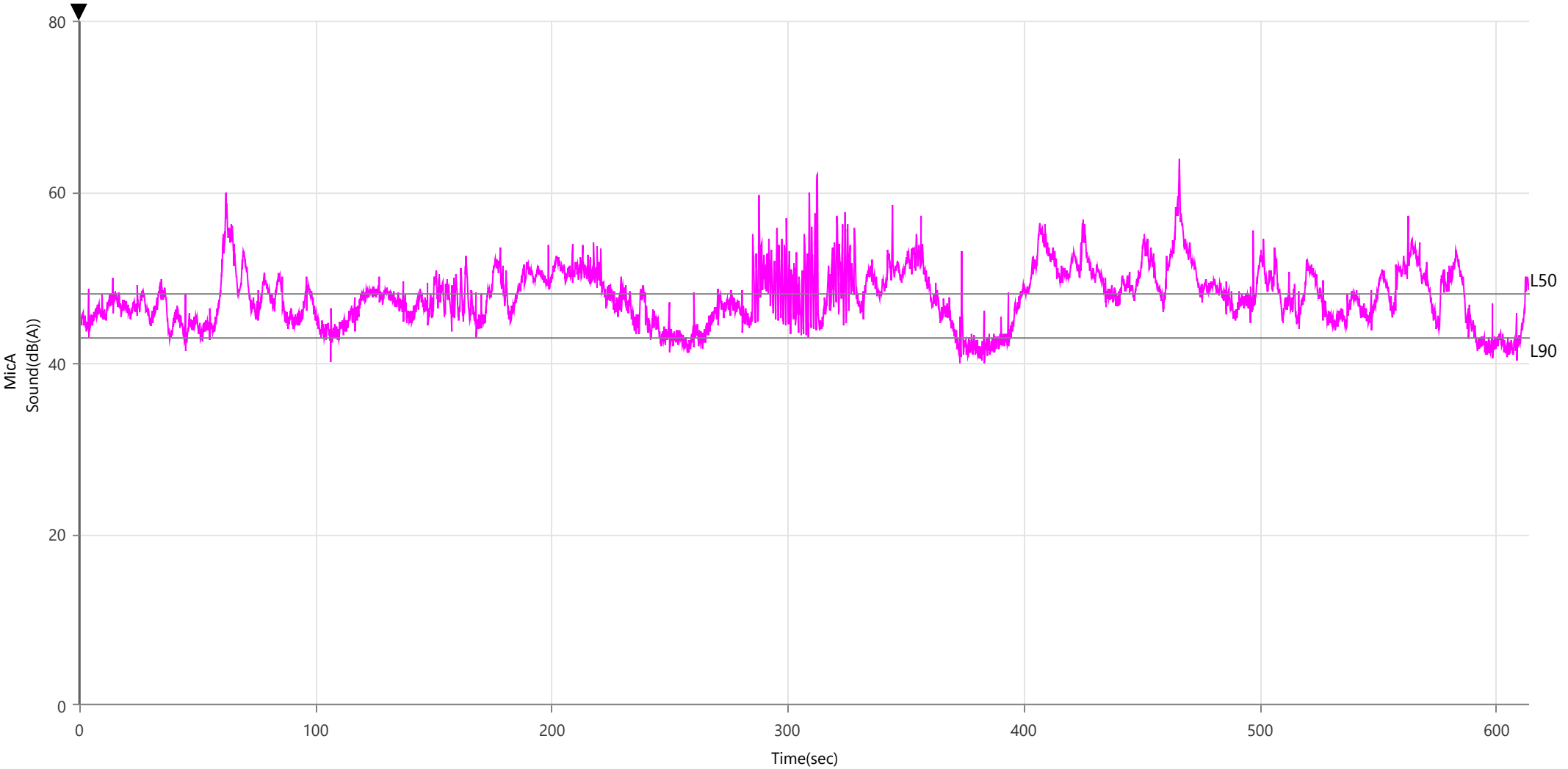




Waveform Trigger Source	Manual at July 13, 2021 14:17:23	Serial Number	UM14409
Pre-Trigger/Record Time	0.00 sec/614.0 sec (Fixed)	Model Number	Micromate ISEE 10.90
Sample Rate	1024 sps	Battery Level	3.8 volts
Setup File Name	UM14409.MMB	Unit Calibration	March 22, 2021 by Instantel
Operator	SND6	Microphone Calibration	UA10072, July 6, 2021 by Instantel
		Event File Name	UM14409_20210713141723.IDFW
		USB Sensor Support	Disabled

Post Event Notes    No text to be displayed.

Sound Level Microphone	A-Weight Fast
LMax	63.9 dB(A)
Time (Relative to Trigger)	465.956 sec
	LMin    L50    L90
Sound(dB(A))	40.0    48    43
Sensor Check	✔ Passed
Test Amplitude	1199 mv

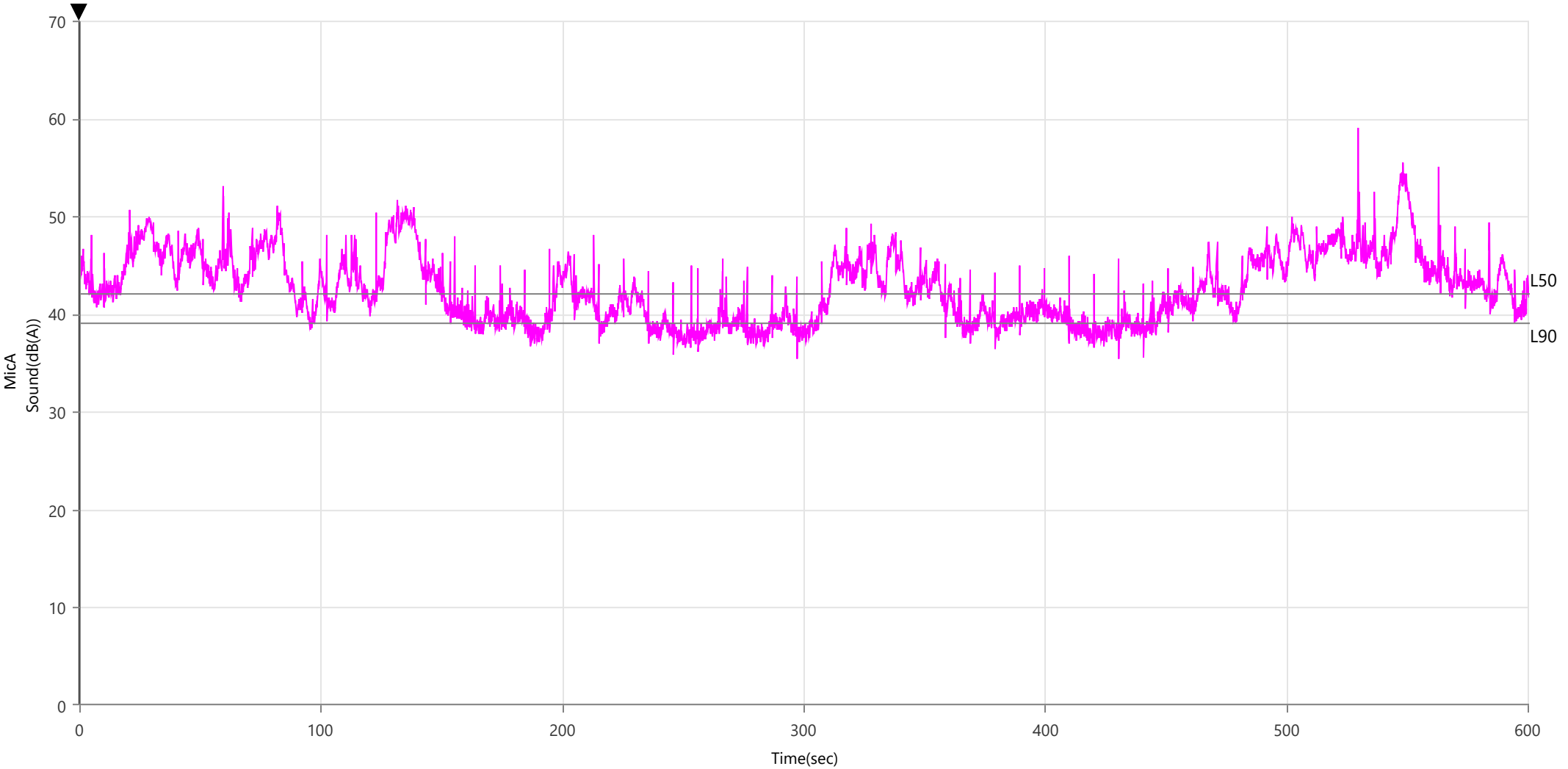




Waveform Trigger Source	Manual at July 20, 2021 12:51:32	Serial Number	UM14409
Pre-Trigger/Record Time	0.00 sec/600.5 sec (Fixed)	Model Number	Micromate ISEE 10.90
Sample Rate	1024 sps	Battery Level	3.8 volts
Setup File Name	UM14409.MMB	Unit Calibration	March 22, 2021 by Instantel
Operator	SND6	Microphone Calibration	UA10072, July 6, 2021 by Instantel
		Event File Name	UM14409_20210720125132.IDFW
		USB Sensor Support	Disabled

Post Event Notes No text to be displayed.

Sound Level Microphone	A-Weight Fast
LMax	59.0 dB(A)
Time (Relative to Trigger)	529.771 sec
	LMin L50 L90
Sound(dB(A))	35.4 42 39
Sensor Check	✓ Passed
Test Amplitude	1170 mv





Waveform Trigger Source

Pre-Trigger/Record Time

Sample Rate

Setup File Name

Operator

Manual at July 28, 2021 09:51:40

0.00 sec/622.0 sec (Fixed)

1024 sps

UM14409.MMB

SND6

Serial Number

Model Number

Battery Level

Unit Calibration

Microphone Calibration

Event File Name

USB Sensor Support

UM14409

Micromate ISEE 10.90

3.8 volts

March 22, 2021 by Instantel

UA10072, July 6, 2021 by Instantel

UM14409\_20210728095140.IDFW

Disabled

Post Event Notes

No text to be displayed.

Sound Level Microphone

LMax

Time (Relative to Trigger)

Sound(dB(A))

Sensor Check

Test Amplitude

A-Weight Fast

51.8 dB(A)

50.931 sec

LMin

L50

L90

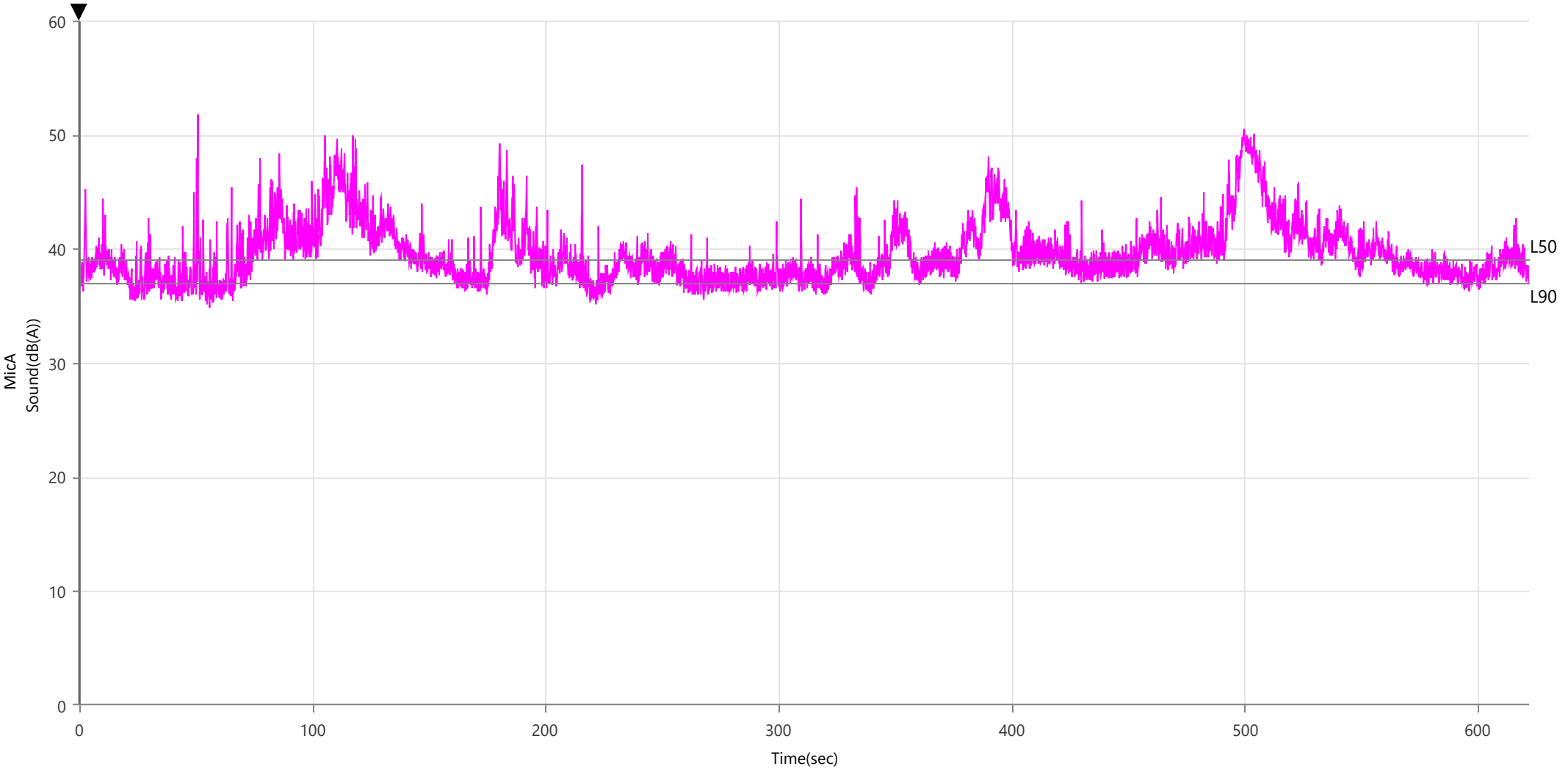
34.9

39

37

Passed

1197 mv





Waveform Trigger SourceManual at May 3, 2022 11:31:15

Pre-Trigger/Record Time0.00 sec/853.0 sec (Fixed)

Sample Rate1024 sps

Setup File NameUM15175.MMB

OperatorSND6

Serial NumberUM15175

Model NumberMicromate ISEE 10.90

Battery Level3.8 volts

Unit CalibrationMay 14, 2021 by Instantel

Microphone CalibrationUA10073, April 18, 2022 by Field Calibration

Event File NameUM15175\_20220503113115.IDFW

USB Sensor SupportDisabled

Notes

Location

ClientWHARF

Company

General Notes

Extended NotesNo text to be displayed.

Post Event NotesNo text to be displayed.

Sound Level Microphone

LMax60.3 dB(A)

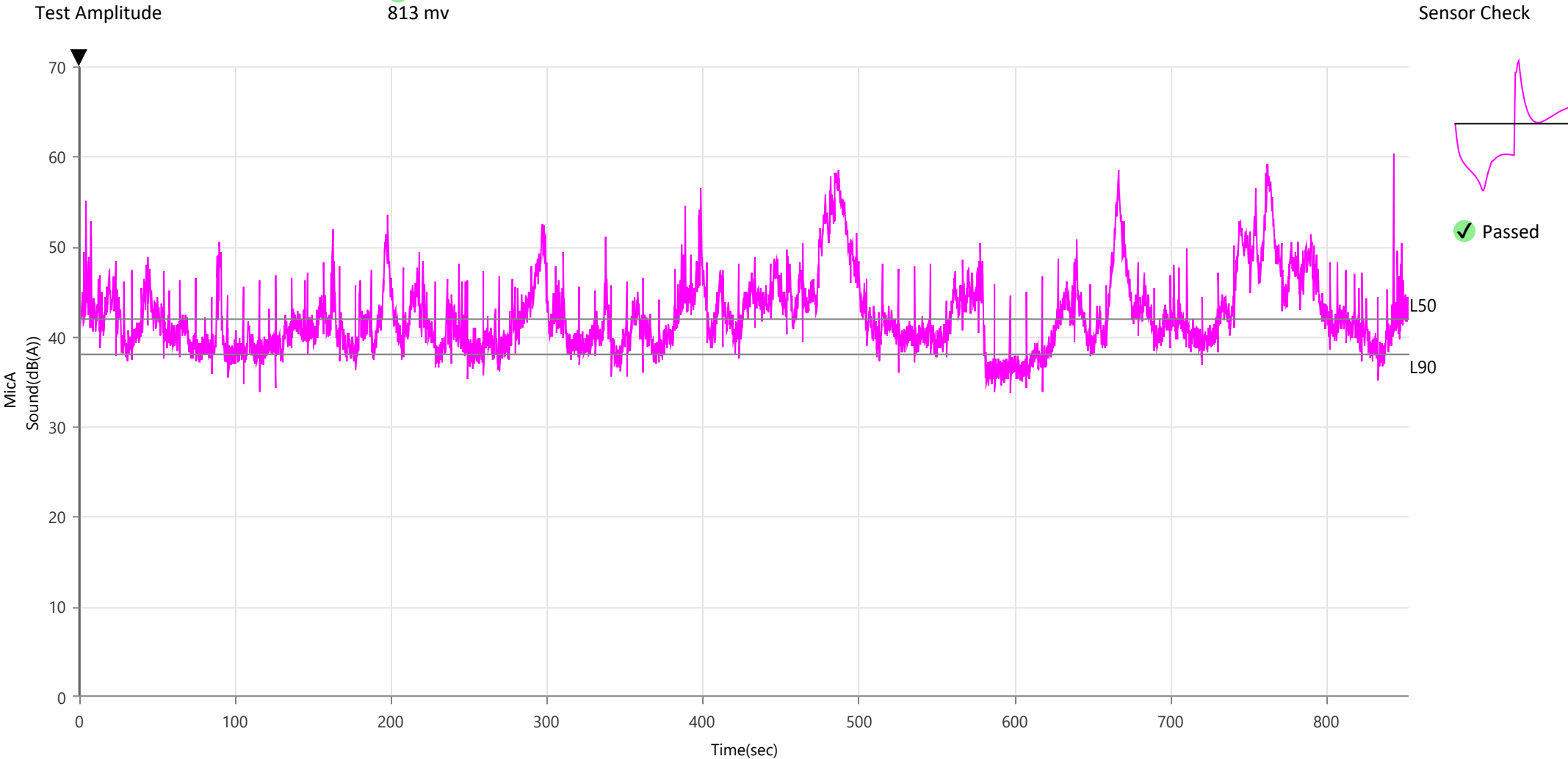
Time (Relative to Trigger)843.602 sec

LMinL50L90

33.74238

✓ Passed

813 mv







Waveform Trigger Source	Manual at May 3, 2022 12:15:45	Serial Number	UM15175
Pre-Trigger/Record Time	0.00 sec/652.0 sec (Fixed)	Model Number	Micromate ISEE 10.90
Sample Rate	1024 sps	Battery Level	3.8 volts
Setup File Name	UM15175.MMB	Unit Calibration	May 14, 2021 by Instantel
Operator	SND7	Microphone Calibration	UA10073, April 18, 2022 by Field Calibration
		Event File Name	UM15175_20220503121545.IDFW
		USB Sensor Support	Disabled

Notes

Location

Client WHARF

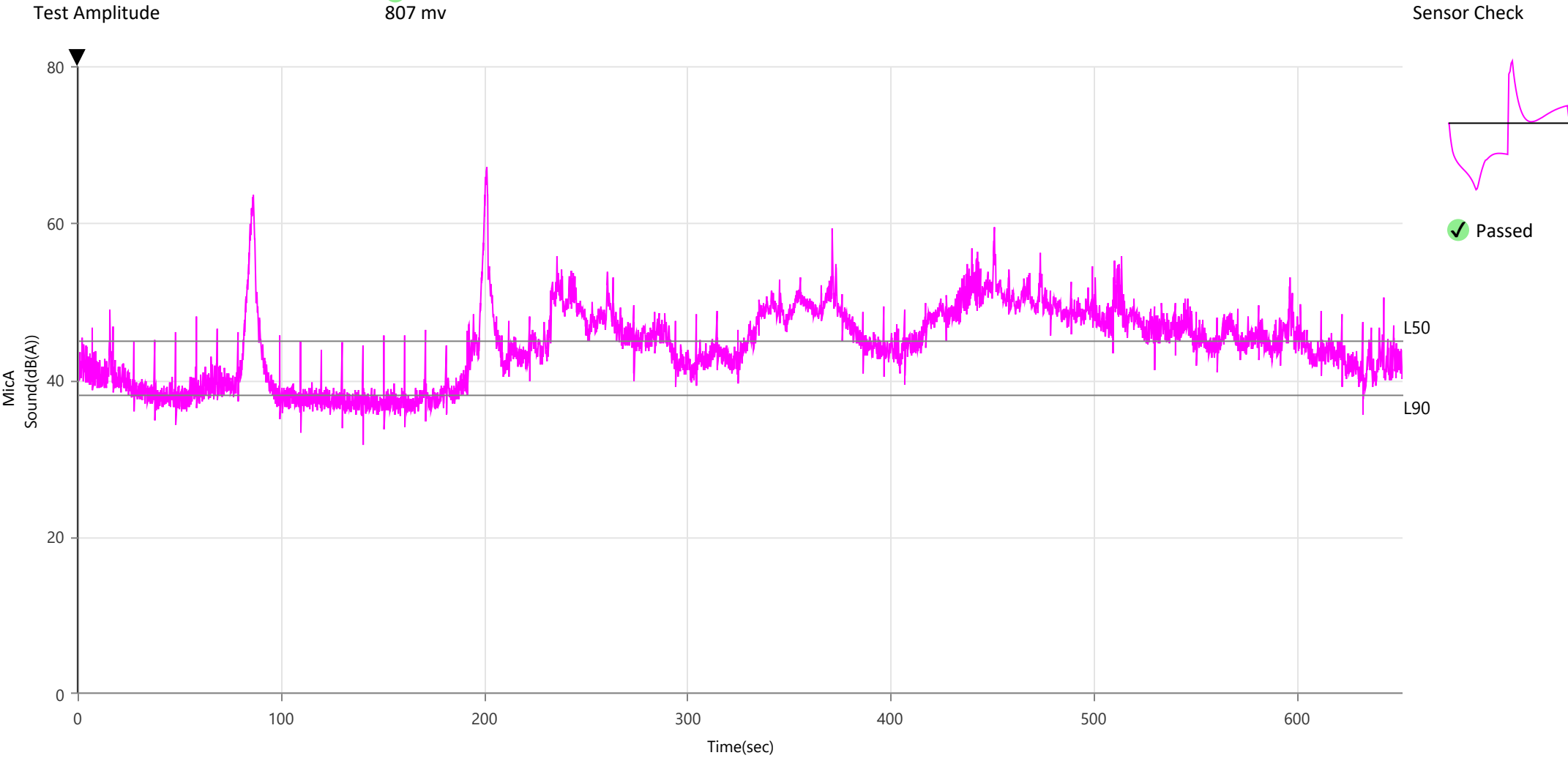
Company

General Notes

Extended Notes No text to be displayed.

Post Event Notes No text to be displayed.

Sound Level Microphone	A-Weight Fast
LMax	67.2 dB(A)
Time (Relative to Trigger)	201.445 sec
	LMin L50 L90
Sound(dB(A))	31.7 45 38
Sensor Check	✓ Passed
Test Amplitude	807 mv





Waveform Trigger SourceManual at May 3, 2022 13:55:50

Pre-Trigger/Record Time0.00 sec/792.0 sec (Fixed)

Sample Rate1024 sps

Setup File NameUM15175.MMB

OperatorSND7

Serial NumberUM15175

Model NumberMicromate ISEE 10.90

Battery Level3.8 volts

Unit CalibrationMay 14, 2021 by Instantel

Microphone CalibrationUA10073, April 18, 2022 by Field Calibration

Event File NameUM15175\_20220503135550.IDFW

USB Sensor SupportDisabled

Notes

Location

ClientWHARF

Company

General Notes

Extended NotesNo text to be displayed.

Post Event NotesNo text to be displayed.

Sound Level Microphone

LMax78.7 dB(A)

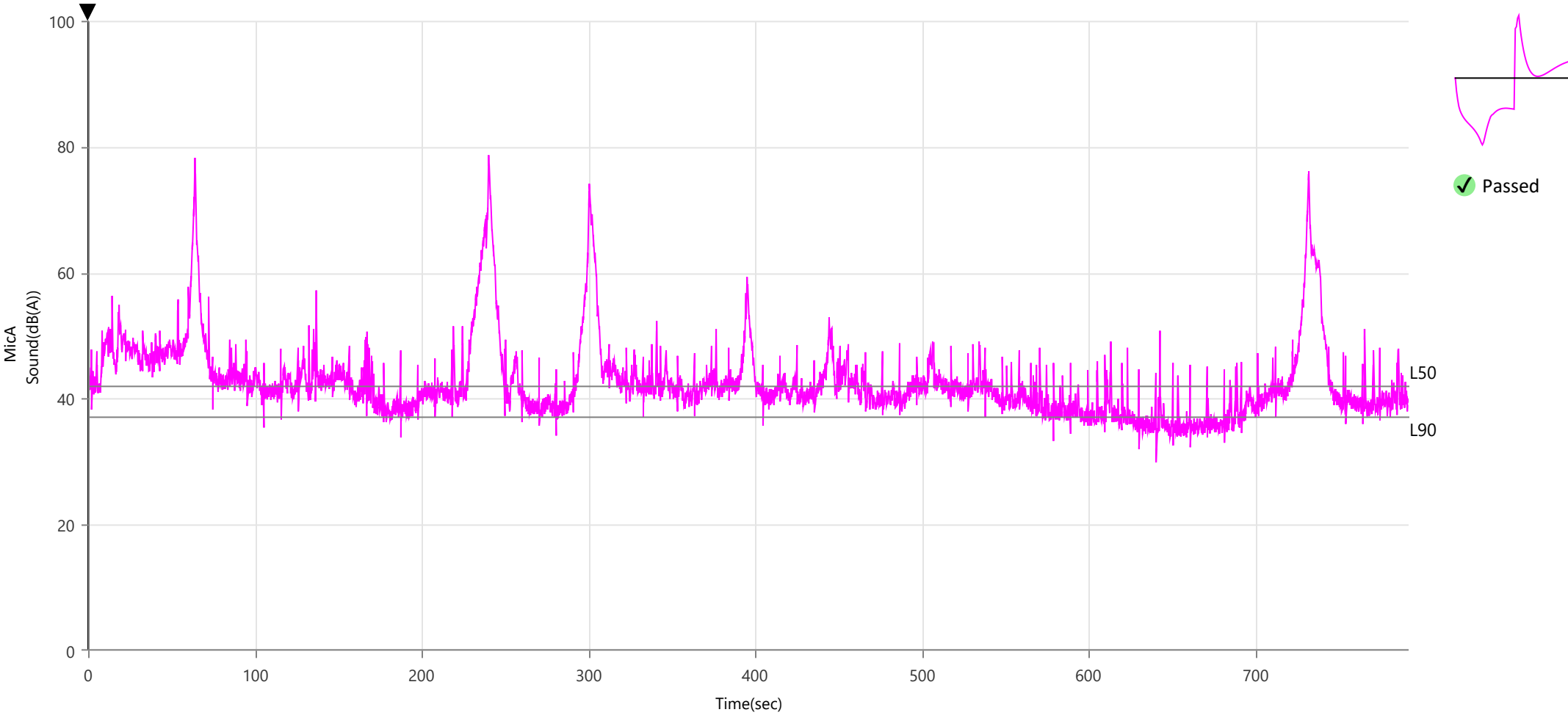
Time (Relative to Trigger)240.281 sec

LMinL50L90

<304237

✓ Passed

Test Amplitude799 mv



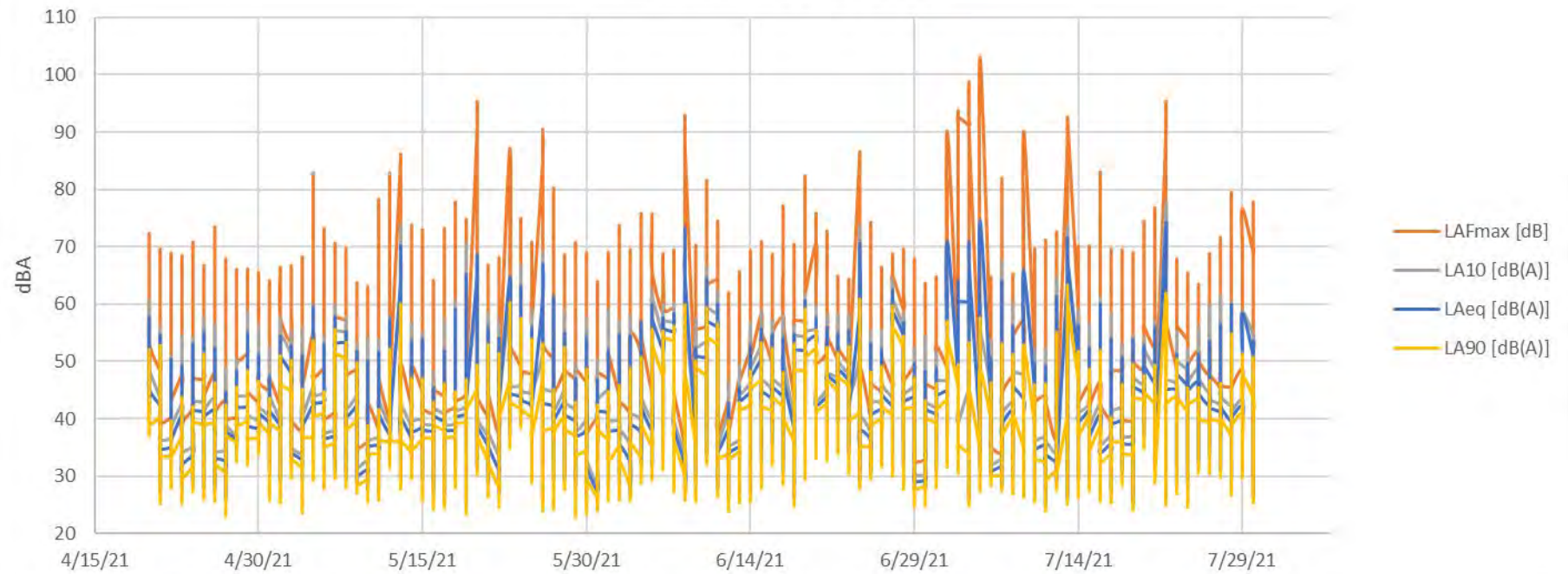


# APPENDIX C

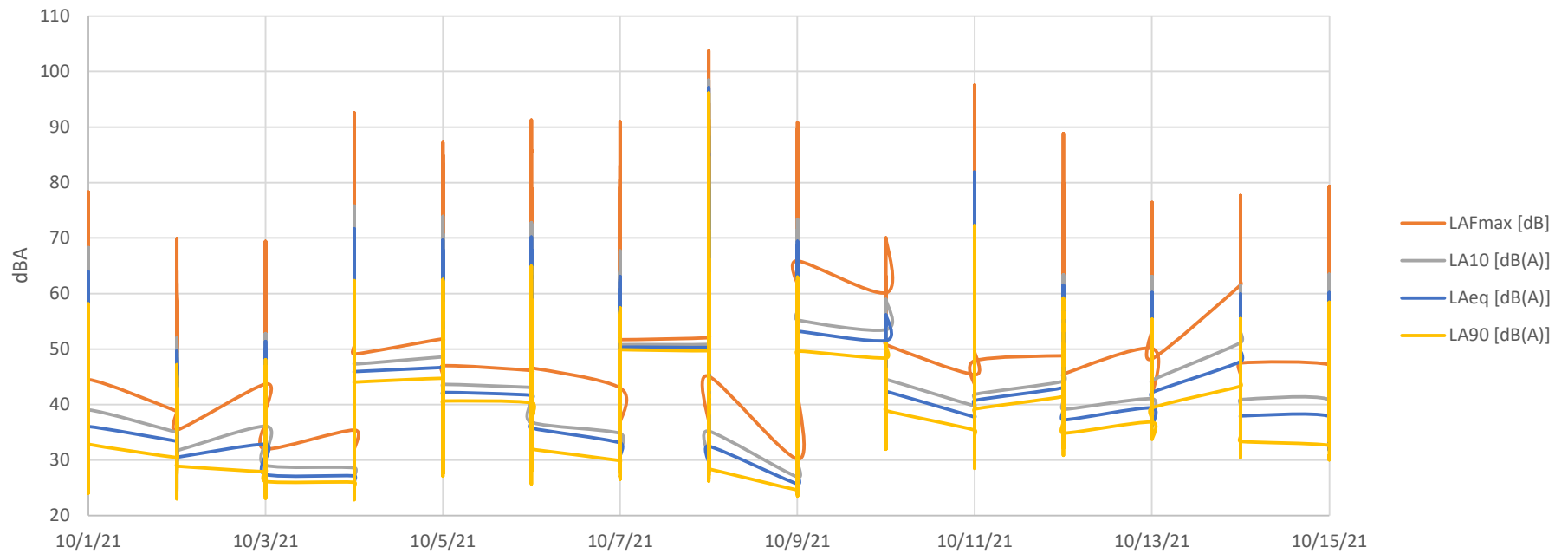
## WHARF MONITORING DATA PLOTS



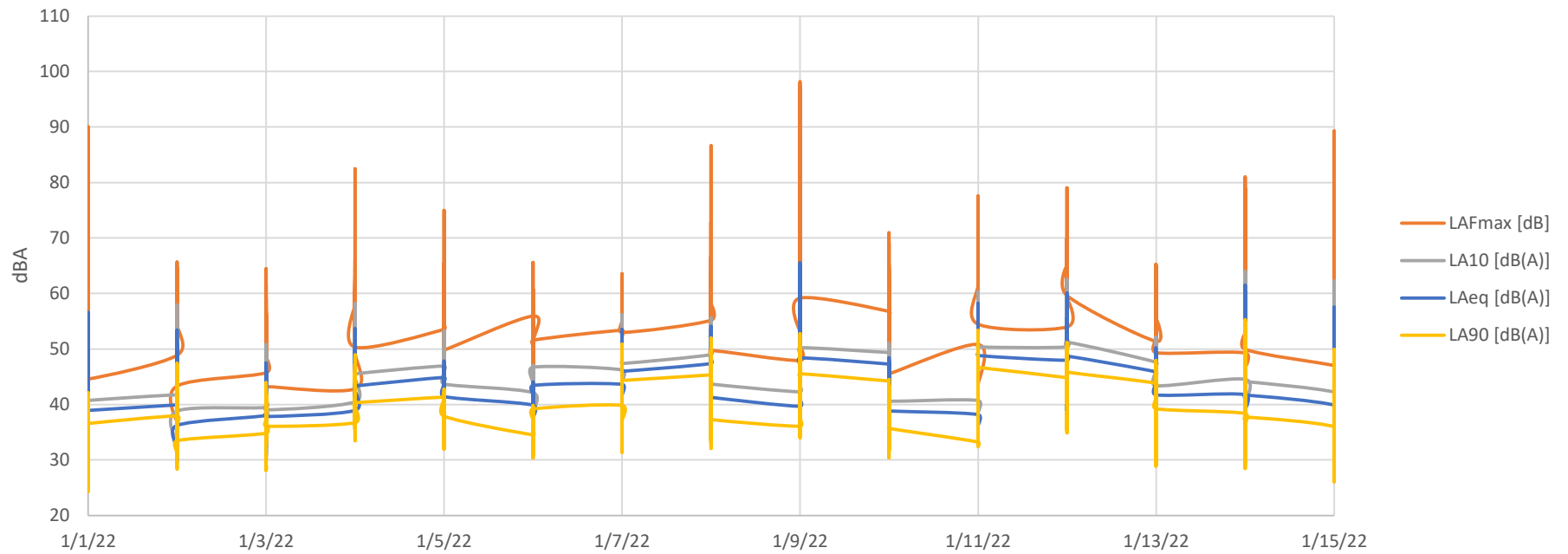
Wharf Sound Site 1248  
April 20 - July 30, 2021



Wharf Sound Site 1248  
October 1-15, 2021

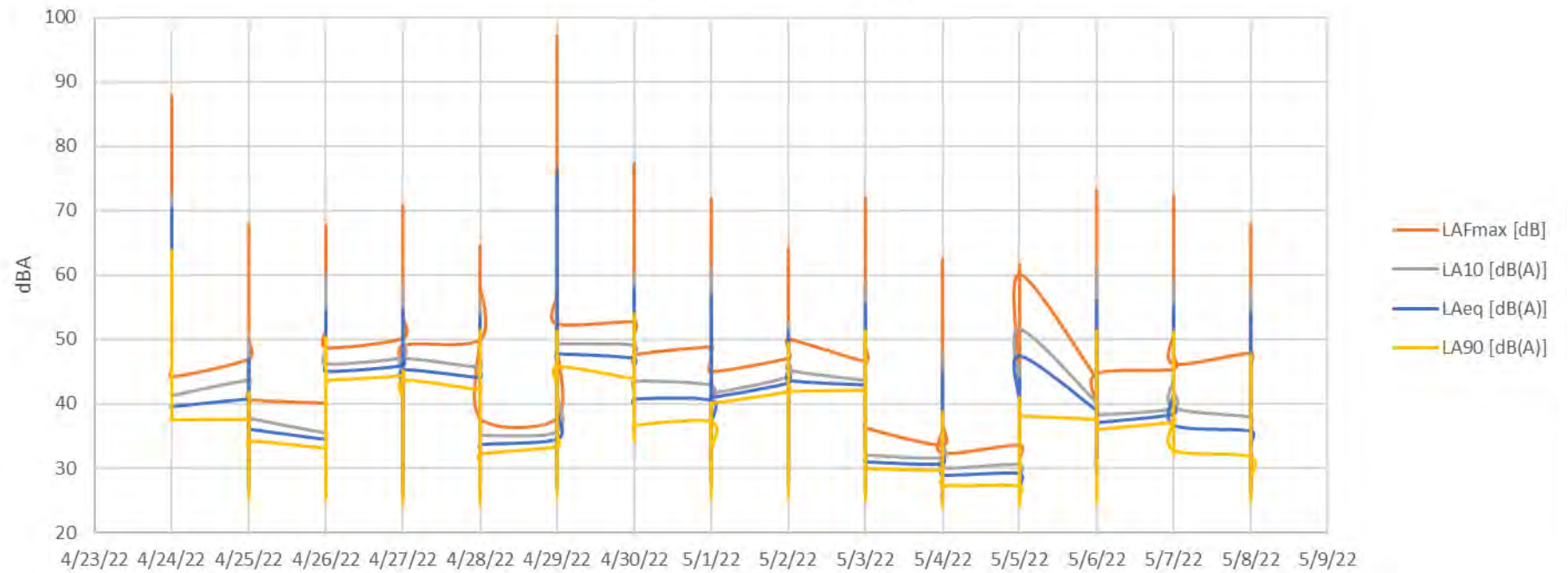


Wharf Sound Site 1248  
January 1-15, 2022

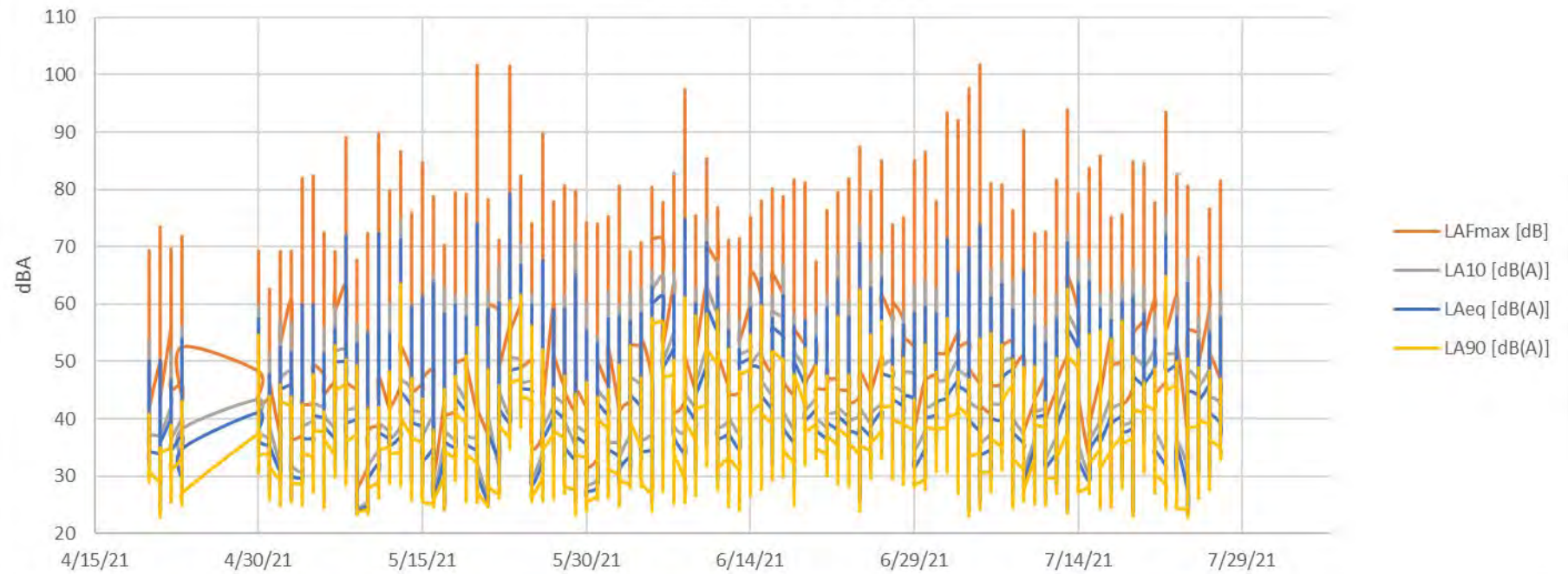




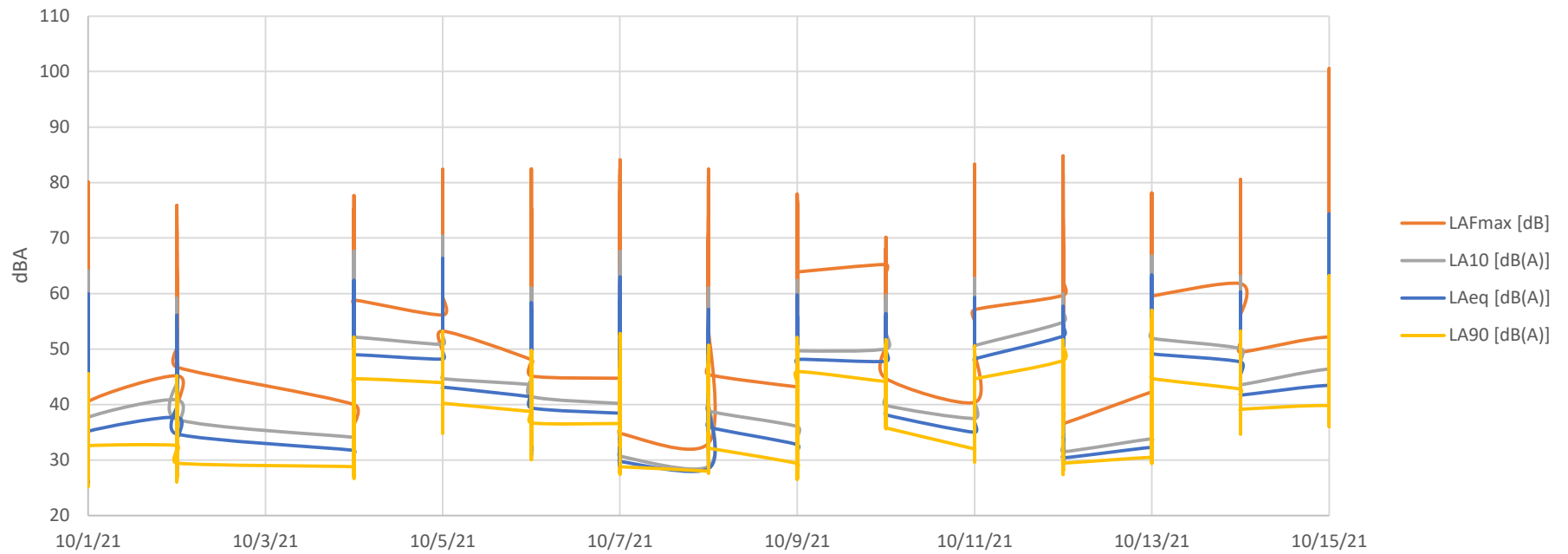
Wharf Sound Site 1248  
April 24 - May 8, 2022



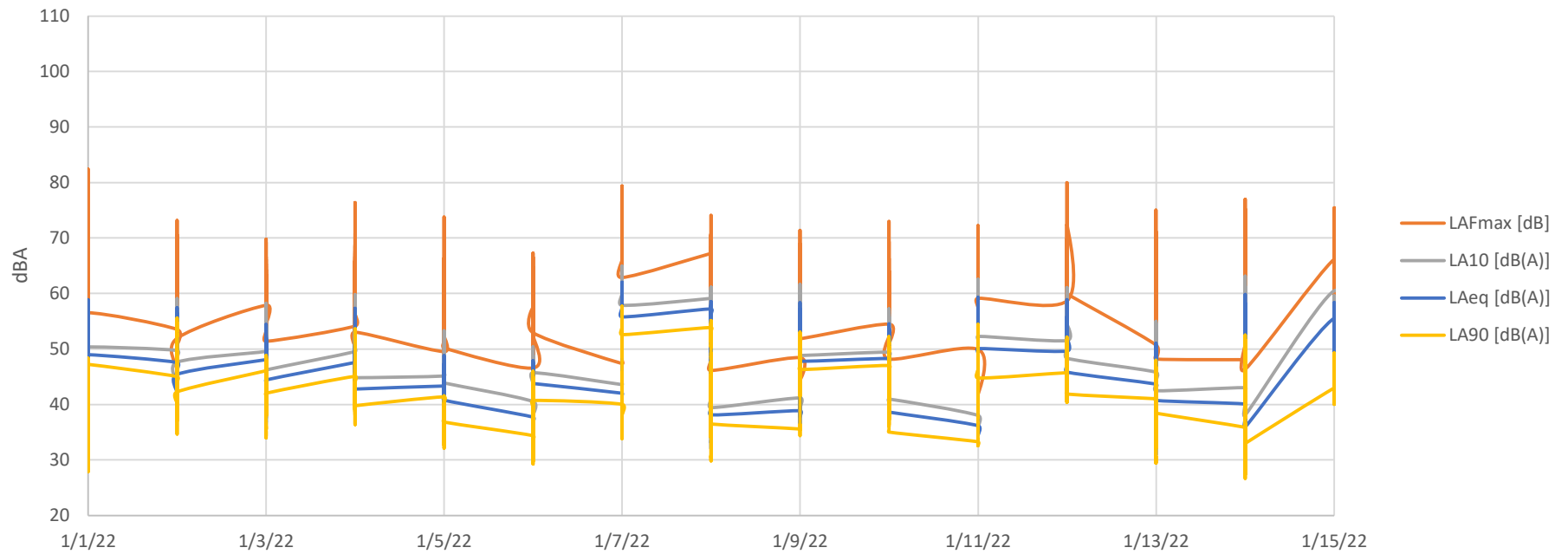
Wharf Sound Site 1249  
April 20 - July 30, 2021



Wharf Sound Site 1249  
October 1-15, 2021



Wharf Sound Site 1249  
January 1-15, 2022



Wharf Sound Site 1249  
April 24 - May 8, 2022

