Naval Base Kitsap at Bangor
EHW-1 Pile Replacement Project

Final Acoustic Monitoring Report

BANGOR, WASHINGTON

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NAVFAC
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Acronyms and Abbreviations

BA	Biological Assessments
dB	decibel(s)
dB re 1 μPa	dB referenced to a pressure of 1 microPascal
dBA	decibels A-weighted
EHW	Explosives Handling Wharf
ESA	Endangered Species Act
ft	foot/feet
Hz	Hertz
IHA	Incidental Harassment Authorization
MID	Mid-Channel Vessel outside WRA
MMPA	Marine Mammal Protection Act
NBK	Naval Base Kitsap at Bangor
RFT	Un-Manned Raft near Toandos
RMS	Root Mean Square
SLM	Sound Level Meter(s)
SPL	Sound Pressure Level
SSP	Strategic Systems Programs
TPP	Test Pile Program
U.S.	United States
WRA	Waterfront Restricted Area

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Executive Summary

Underwater and airborne acoustic measurements were recorded as part of the Explosive Handling Wharf #1 (EHW-1) Pile Replacement Project (PRP) located at Naval Base Kitsap (NBK) at Bangor, Washington. Acoustic data was collected during vibratory pile driving and extraction activities between October 4, 2011 and October 27, 2011. Regulatory permits and consultations completed for this project identified several terms, conditions, and metrics which the Navy was required to comply with as part of this project.

In compliance with the Endangered Species Act (ESA), the Navy completed consultations with the U.S. Fish and Wildlife Service (USFWS) and the National Marine Fisheries Service (NMFS). The Navy received two Letters of Concurrence from the USFWS (8 June, 2010 and 5 August, 2010). Two Letters of Concurrence were also received from the NMFS Northwest Region (14 May, 2010 and 2 September, 2010). In compliance with the Marine Mammal Protection Act (MMPA) the Navy received an Incidental Harassment Authorization (IHA) from NMFS headquarters signed on 17 May, 2011 and a revised IHA signed on 24 October, 2011. The mitigation and monitoring requirements in these documents were met through three monitoring plans: the Acoustic Monitoring Plan, the Marine Mammal Monitoring Plan, and the Marbled Murrelet Monitoring Plan. This report addresses all acoustic requirements from both agencies and all permits and consultations.

This section briefly summarizes the major conditions and metrics agreed to during the ESA consultation and MMPA permit process. In addition, the IHA specifically listed reporting requirements. There are too many to include here in the Executive Summary, but a "road map" or "Where to Find Guide" is provided at the end of the section to identify where in the document this information can be found.

Table ES-1 provides the duration of project activities.

Table ES-1. Duration of General Project Activity

Activity Described	Actual Duration	Notes	Requesting Agency
Project Duration: 14 days for installation/ 21 days for removal	14 days of installation/ 2 days of removal	Up to 14 days for installation and up to 21 days for extraction were authorized	NMFS/USFWS
In-water work between 16 July and 31 October	4 October to 27 October	None	NMFS/USFWS
28 hours of vibratory hammer installation	12 hours, 11min overall/ 12 seconds to 26 minutes per pile	28 piles * 1 hour for installation equals 28 hours authorized.	NMFS/USFWS
21 hours of vibratory extraction	1 hour, 40 min/ 14 seconds to 9 minutes per pile	42 piles * 30 minutes for removal equals 21 hours authorized.	NMFS/USFWS
Up to 5 days of impact pile driving/one per day	0 days/0 piles	No impact pile driving (proofing) was necessary	NMFS/USFWS

Table ES-2 describes general project restrictions from the ESA consultations and the MMPA permit.

Table ES-2. General Project Restrictions

Restriction Described	Actual	Notes	Requesting Agency
All piles will be installed using a vibratory hammer and up to 5 piles may be proofed.	Complied as requested.	No piles were proofed. 100% were installed with a vibratory hammer.	NMFS/USFWS
Sound attenuation device must be used for impact pile driving.	N/A	No impact pile driving.	NMFS/USFWS
Soft start procedures will be followed for vibratory and impact pile driving.	Complied as requested.	NA for impact as none was conducted.	NMFS/USFWS

The "road map" or "Where to Find Guide" is provided below for reporting requirements listed in the IHA:

- Size and type of piles **(Section 3, Table 1)**
- A detailed description of the sound attenuation systems used, including design specifications for the bubble curtains **(NA, no impact pile driving)**
- The impact or vibratory hammer force (energy rating) used to drive or extract the piles, and the make and model of the hammer **(Section 2)**
- Description of the sound monitoring equipment **(Section 2)**
- Distance between hydrophones and pile **(Section 3, Table 1)**
- Depth of the hydrophones **(Section 2, Figure 4)**
- Depth of water in which the pile was driven **(Section 3)**
- Depth into the substrate that the pile was driven **(Section 3)**
- Physical characteristics of the bottom substrate into which the piles were driven **(Section 3)**
- Ranges and means for peak, RMS, and SELs for each pile **(Section 4, Table 2, NA for peak and SEL)**
- Ambient underwater sound pressure level(s) reported in RMS **(Appendix B)**
- The results of the airborne noise measurements including the dBA and unweighted. **(Section 3, Tables 3 and Table 8, Appendix C)**
- Airborne acoustical data will be provided in 1/3 octave bands in the frequency range of 10 and 20 kHz **(Appendix C)**

- Results of the acoustic measurements, including the frequency spectrum, ranges and means including standard deviation/error for peak and RMS SPLs, single-strike and cumulative SEL for both projects for pile installation and pile removal **(No single strike or SEL, as no impact pile driving. Other is in Section 3, Appendix B)**
- The report will provide underwater acoustical data between 10 Hz and 20 kHz in 1/3 octave bands and by depth of hydrophone as possible **(Section 3, Appendix B)**
- Vibratory monitoring results will include the maximum and overall average RMS calculated from 10-second RMS values during the drive of the pile **(Appendix B)**
- Description of any observable marine mammal, fish, or bird behavior in the immediate area and, if possible, correlation to underwater sound levels occurring at that time **(Section 5)**

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Section 1 Introduction

This report summarizes acoustic measurements collected by Illingworth & Rodkin, Inc. (I&R) for the Explosive Handling Wharf-1 (EHW-1) Pile Replacement Project conducted between October 4 and 27, 2011. Under subcontract to HDR, I&R was tasked to conduct hydroacoustic and airborne monitoring at several locations during the installation and removal of piles for EHW-1 at the Naval Base Kitsap (NBK) at Bangor waterfront, on the Hood Canal within Kitsap County, Washington.

The purpose of the EHW-1 Pile Replacement Project was to remove and install piles and associated structures to maintain the structural integrity of the wharf (DON 2011). As part of the United States (U.S.) Navy's sea-based strategic deterrence mission, the U.S. Navy Strategic Systems Programs (SSP) directs research, development, manufacturing, test, evaluation, and operational support for the TRIDENT Fleet Ballistic Missile (TRIDENT) program. SSP currently utilizes the existing EHW-1 to accomplish its mission. Repairs and maintenance were needed so that the operational requirements of the TRIDENT program are met. Implementation of the EHW-1 Pile Replacement project overlapped with a portion of another project, the EHW-2 Test Pile Program (TPP). As a result, acoustic monitoring for EHW-1 overlapped with Phase 2 of TPP monitoring. This report concentrates on the Acoustic Monitoring for the EHW-1 project. The acoustic monitoring results from the TPP are presented in a separate report. Acoustic monitoring was based on guidelines established in the EHW-1 Acoustic Monitoring Plan (**Appendix A**).

Project Area

NBK at Bangor is located on the eastern shoreline of Hood Canal approximately 20 miles due west of Seattle, Washington (**Figure 1**). NBK at Bangor provides berthing and support services to United States (U.S.) Navy submarines and other fleet assets. EHW-1 is located within the northern portion of NBK at Bangor's waterfront restricted area (WRA). The entire NBK at Bangor waterfront, as well as the adjacent water areas in the Hood Canal, is restricted to the general public.

The wharf is a U-shaped concrete (**Figure 2**) structure built in 1977 for ordnance handling operations in support of the Trident Submarine squadron home ported at NBK at Bangor (DON 2011). EHW-1 consists of two 100-foot access trestles and a main pier deck which measures approximately 700 feet (ft) in length and is approximately 500 ft wide. The wharf is supported by both 16-inch and 24-inch diameter hollow octagonal pre-cast concrete piles (approximately 130 ft in length) (DON 2011).

Objectives

Purpose of Acoustic Monitoring Program

The purpose of the EHW-1 acoustical monitoring was to collect underwater and airborne sound level information at distant locations during vibratory pile installation and removal. In addition to acoustical monitoring during pile driving events, marine species monitoring was also required, but is discussed in a separate report.

Figure 1. Project Vicinity Map

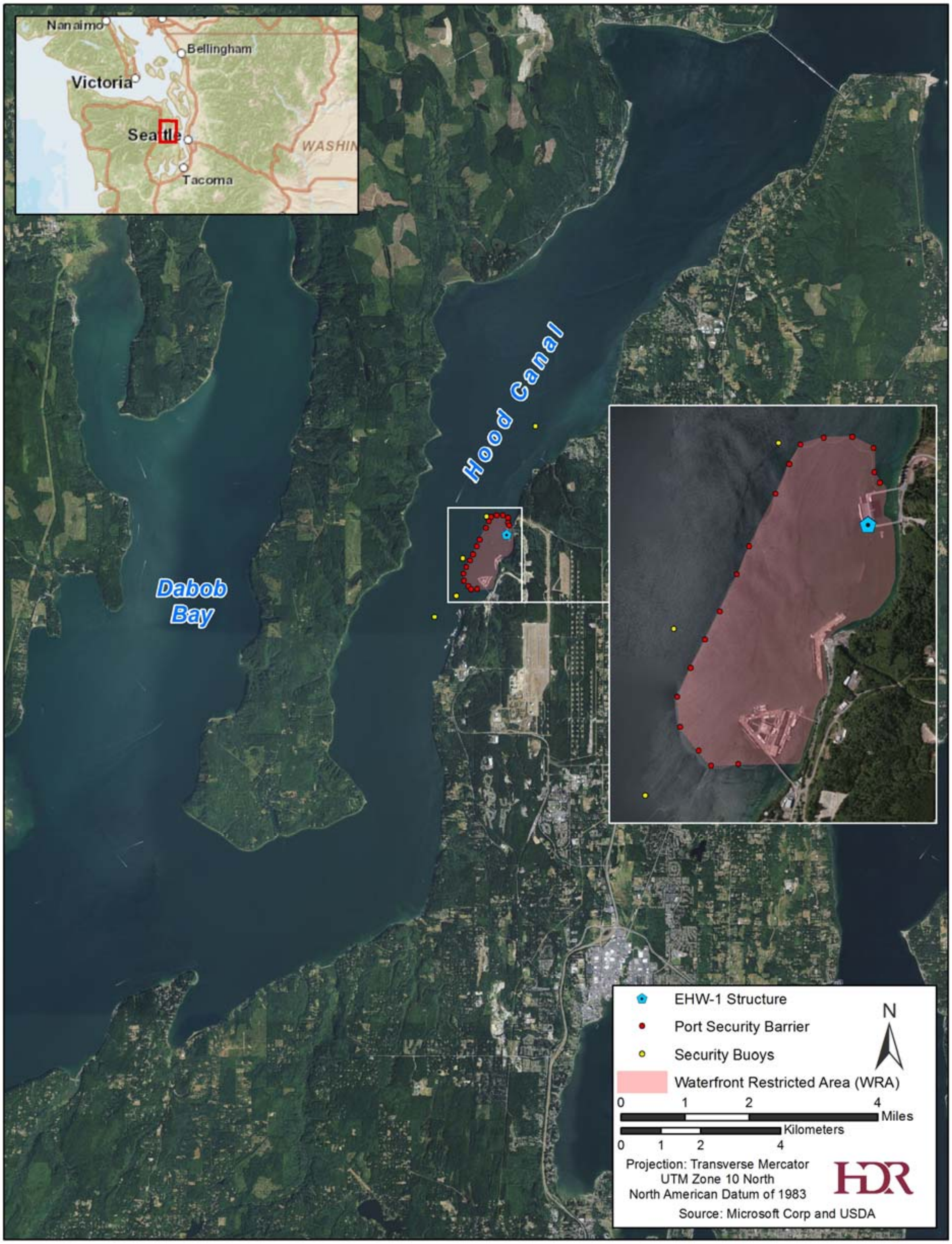

Figure 2. EHW-1 Project Area

The Navy developed the acoustical monitoring plan to support BAs and IHAs for the purpose of this project as well as for the TPP project.

Work Plan Objectives

The objectives for EHW-1 were established by the Navy in the U.S. Navy Test Pile Program and Explosives Handling Wharf-1 Pile Replacement Project Naval Base Kitsap at Bangor Waterfront: Final Acoustic Monitoring Plan (Plan). The Plan provided a protocol for both airborne and hydroacoustic measurements during pile driving operations. Within this report, the main objectives for monitoring during EHW-1 are as follows:

1. **Underwater Injury Zones:** Using measurement data, compute the distance to where the following underwater sound levels occur:
    a. 180 dB (decibels) RMS (Root Mean Square) isopleths for cetaceans;
    b. 190 dB RMS isopleths for pinnipeds;

    Note: Analysis by others using data collected by at the pile driving barge
2. **Underwater Behavioral Buffer Zones:** Using measurement data, compute the distance to where the following sound levels occur:
    c. 120 dB RMS for marine mammals during vibratory driving;
3. **Airborne Behavioral Buffer Zones:** Using measurement data, compute the distance to where the following airborne sound levels occur:
    d. 100 dB (assumed to be an RMS level) for all pinnipeds except harbor seals
    e. 90 dB (assumed to be an RMS level) for harbor seals.
4. **Ambient Measurements:** Measure sound levels before and after pile driving events to determine ambient conditions.

The Monitoring Plan objectives also included: a) determining the rate of sound propagation based on the differences in sound level measured at the various positions during pile driving, and (b) evaluating measured sound levels during the “soft start” to levels at the beginning of pile driving events. These objectives were accomplished during TPP and are discussed in the Acoustic Monitoring Report for TPP.

Terminology

This report uses specialized terminology related to underwater sound and technical aspects of the monitoring program. Unless otherwise stated, underwater sound pressure is defined as sound pressure level (SPL) in decibels (dB) referenced to one microPascal (re 1 µPa). Airborne sound pressure is defined as sound pressure level (SPL) in decibels (dB) referenced to 20 microPascals (20 µPa). Un-weighted sound level data is from the Sound Level Meter (SLM) using the Z-weighted filter, which is the current standard for unfiltered broadband frequency spectra. A-weighted data are also from the SLM using the A-weighting filters that de-emphasize the very low and very high frequency components of the measured sound.

Several noise metrics are used to describe sounds in the environment. Two common descriptors used to describe underwater sounds from pile installation projects are the peak sound pressure and the root-mean square (RMS) sound pressure level. The peak sound pressure is the instantaneous maximum of the absolute positive or negative pressure and is presented in this report as dB re 1 μPa. The RMS sound pressure level is also presented in dB re 1 μPa and is averaged over a defined time period. The appropriate time period to average for the RMS computation varies by the type of sound (e.g., pulsed or continuous). For vibratory pile installation and removal at EHW-1, RMS sound pressure levels were computed over consecutive 10-second intervals.

Section 2 Methods and Equipment

For EHW-1, underwater sound and airborne measurements were conducted during the installation or removal of 45 steel piles. Underwater measurements were made for vibratory installation and removal of piles at three different locations ranging from 55 meters from the pile to more than 3,900 meters from the pile, with the exception of a 10,000-meter distance measurement on October 5, 2011. This provided for a better understanding of how the sound propagates underwater at this location and helped to determine the regulatory limits for such construction. This section discusses the details of the test procedures and the equipment used during testing.

Overview of Acoustic Monitoring Program

EHW1 Pile Operations

Pile driving operations were conducted October 4-27, 2011 for the EHW-1 project. A total of 45 steel piles were subject to installation or extraction during this project. This 45 pile total consisted of 36 piles installed (28 new permanent piles and 8 temporary falsework piles), and 9 piles extracted. There were 55 pile driving events (36 piles installed) and 10 pile removal events (9 piles were removed) all conducted with a vibratory hammer.

The new permanent production piles were 30-inch Outside Diameter (OD) open ended steel piles with wall thicknesses of 0.50 inches and lengths of 43 to 58 meters. In subsequent tables and text, production piles supporting the new walkway are denoted by the prefix “W” (W1 - W12) and replacement wharf piles are denoted by the prefix “EHW” (EHW1 - EHW16). Falsework piles are denoted by the prefix “FW” (FW1 - FW8) and were 16-inch OD open-end steel piles with variable and undetermined wall thickness. Some original walkway piles were extracted and those and other piles extracted were 12-inch and 24-inch piles and may be denoted by the prefix “RX” or “EX” in the pile name. Falsework piles are intended for temporary use to support scaffolding to guide installation of permanent piles.

Pile-driving equipment was provided and operated by Manson Construction Co. One vibratory hammer (APE 200-6) was utilized during the project. The APE 200-6 has a drive force of up to 542 kips or 271 tons.

Soft-starts were used prior to operation of the vibratory hammer to mitigate acoustical effects. Frequently, there was multiple pile driving events separated by short intervals of several minutes. Soft starts were not done in this instance. An air bubble curtain system was not used during pile driving at EHW-1 because all pile driving utilized a vibratory pile driver, and sound attenuation devices were not required for vibratory driving for the EHW-1 project.

Hydroacoustic Measurements

Two hydrophones were typically used to take underwater measurements at each of the three measurement locations. Each hydrophone was positioned at a different depth: typically 10 meters deep (referred to as “Mid” depth) and approximately 20 to 30 meters, or 2 to 3 meters above the bottom in water shallower than 30 meters (referred to as “Deep” depth). A two-channel system within the WRA was positioned on a vessel that ranged from 55 to 1,450 meters from EHW-1, typically between 100 and 170 meters. Measurements were also conducted outside the WRA at two other locations with distances beyond 700 meters from EHW-1. Mitigation procedures that exist currently, such as soft-starts (or ramp-ups), were implemented as well. While all reasonable efforts were made to capture data during pile driving, all events were not captured at all positions. This was due to a variety of factors, including equipment failures/damage, transportation issues, timing limitations, environmental conditions, or communication system failures.

Airborne Operations

At the beginning of the EHW-1 project, there were three microphone systems used by I&R to collect airborne data on each construction day. One microphone was located on the WRA vessel, which ranged from 55 to 1,450 meters from the pile. This microphone started collecting data at the beginning of each drive and measured constantly throughout the drive. The other two airborne monitors were stationary land-based systems to the north and south of the project site and the distance from the pile being driven ranged from 123 to 556 meters. These systems measured levels every day and night for several consecutive days at a time. Both systems were unattended. On October 7, 2011, the south stationary airborne system was removed.

Background Ambient Monitoring

Background ambient measurements were collected to determine baseline conditions for underwater testing. Ambient data were collected several times throughout each testing day to characterize background noise as environmental and testing conditions changed. Ambient data were collected at each measurement location prior to and/or following most pile driving events.

Deviations from the Work Plan

Adjustments in the implementation of the details of the Work Plan were necessary for a variety of reasons, including changes in the construction schedule, changes in the Navy's scheduled "red days" (days when no in-water work was permitted due to security or operational restrictions), efforts to maximize pile driving efficiency, better understanding of the sound field produced by the pile driving and unaffiliated with pile driving, and biological variables. Environmental conditions (i.e., wind, waves and currents) were the primary factor affecting the ability to measure pile driving sounds at distant positions for this study. As information was gained and team efficiency improved with experience at the project site, adjustments were made to limit monitoring activities to only what were needed to establish compliance. The major deviations are discussed below. Other minor deviations will be discussed in the appropriate sections.

Under the Work Plan, sound measurements were to be based on sounds over the frequency range of 10 to 20,000 Hertz (Hz). However, there was considerable low-frequency instrumentation noise that affected the measurements, especially those measurements made at positions outside the WRA. The low frequency noise was due mostly to strumming caused by tension created on the hydrophone cables from current and waves. All attempts to minimize strumming were made. However, many of the measurement days had moderate winds, tidal currents and waves that created noise. Due to excessive noise at the lower frequency bands not consistent with the pile driving, the frequency range was modified for all locations.

The frequency spectra for data collected on three separate days were examined to identify an appropriate frequency range that would capture the acoustic energy from vibratory pile installation, but reduce the contribution of non-pile-driving noise. Where the vibratory pile-driving signal was high, the contribution of the background noise was confined to the lowest frequencies. At more distant positions, the amplitude of the pile-driving signal was relatively low as compared to the background noise, so the contribution of background noise was more critical. The frequency spectra for vibratory pile-driving signals near the pile indicated fairly broadband sound made up of considerable low-frequency sound content (i.e., below 20 Hz) that did not propagate outside the WRA to the mid-channel. On the other hand, the distant positions outside the WRA show the effect of low-frequency ambient sound around 100 to 120 dB at these very low frequencies (less than 50 Hz). To illustrate the effect of low-frequency content on the overall un-weighted sound level, the sound level was plotted by time for three different frequency ranges: 10 to 20,000 Hz, 20 to 20,000 Hz and 50 to 20,000 Hz. The RMS levels for each frequency range were plotted to assess the effect on the overall SPL calculation from the different frequency ranges

The Spectra plots clearly show that low-frequency ambient noise masks the sound levels resulting from pile driving at the distant positions (see **Figure 3**). For this reason, the computation of overall RMS sound pressure levels outside the WRA was based on the measured sound content between 50 and 20,000 Hz. Inside the WRA the pile-driving signal is 20 to 40 dB higher than outside the WRA improving the signal to noise relationship. Sound pressure levels inside the WRA were found to be best characterized by sound measured from 20 to 20,000 Hz.

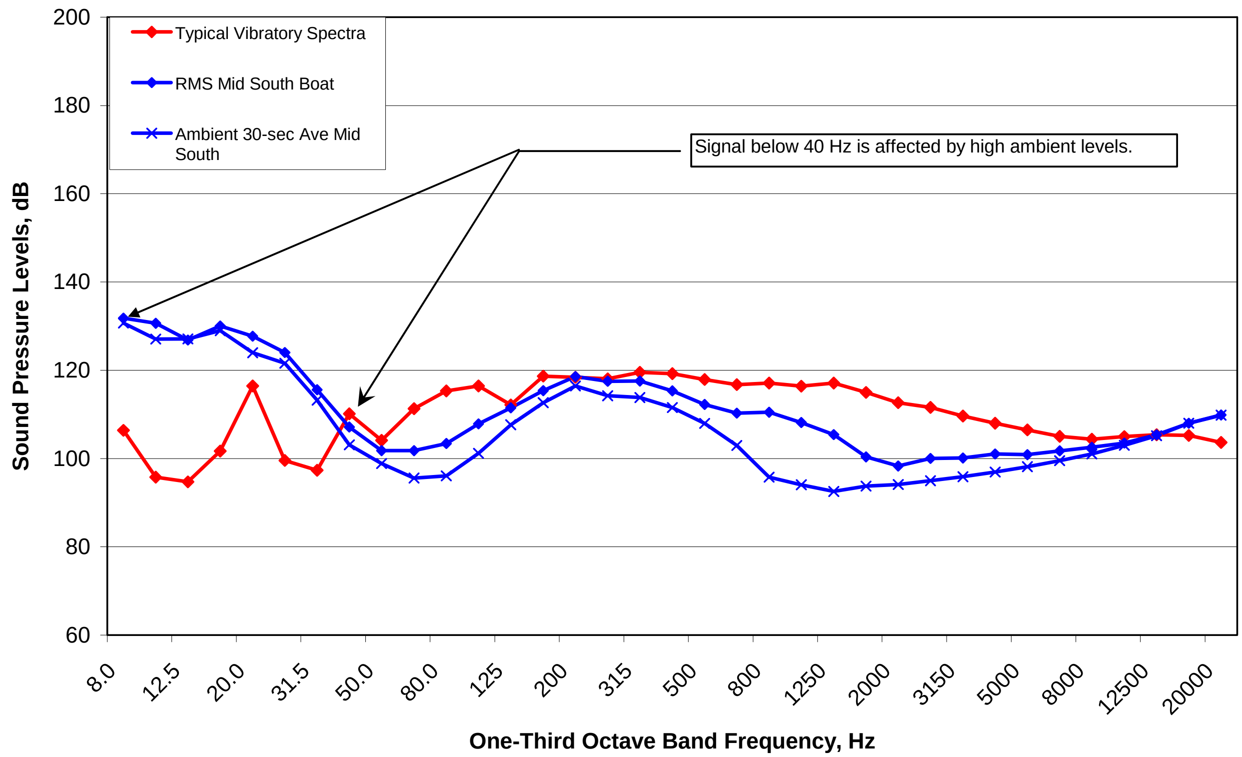

Figure 3. Sample of low Frequency Levels

Hydroacoustic Measurement Methods and Equipment

Monitoring Equipment

The sound pressure levels encountered during the EHW-1 monitoring program ranged from about 168 dB RMS at 65 meters during vibratory pile driving to around 95 - 100 dB RMS in quiet ambient conditions outside the WRA when there was no pile driving.

For attended systems, Reson Model TC-4013 and Reson Model TC-4033 hydrophone signals were fed into Larson Davis Model 831 Precision Sound Level Meters (LDL 831). The LDL 831 then outputs the signal to a Marantz Model PMD660 solid-state digital data recorder (SSR). The output gain of the LDL 831 can be adjusted in one 20 dB step to properly record the signal on the SSR. For unmanned systems that involved signal recordings only, PCB Multi-Gain amplifiers (Model 480M122) were used with the hydrophones and in-line charge to voltage conditioners. The multi-gain amplifier provides the ability to increase the signal strength (i.e., add gain) so that measurements are made within the dynamic range of the instruments used to analyze the signals. Two types of hydrophones were used due to the differences in sensitivity and the availability of equipment for this program.

The TC-4013 hydrophone is about 13 dB less sensitive than the TC-4033 and better suited for measuring higher sound levels without overloading the measurement system. For this reason, these hydrophones were used inside the WRA. The TC-4033 hydrophones have a greater sensitivity and are better suited for the measurement of low-level signals, and therefore, were deployed at positions farther from the pile driving where low-amplitude signals were expected.

During vibratory driving, the 1-second interval sound pressure levels (L_{eq}) were measured either "live," using the LDL 831, or subsequently analyzed from SSR recordings. The Larson Davis Model 831 SLM provided measurements of the un-weighted results for each data type, including the one-third octave band spectra for the 1-second L_{eq}. Additional subsequent analyses of the acoustical signals were performed using the Larson Davis Model 831 SLMs, as well.

Underwater Sound Descriptors

The acoustic monitoring program reports data in several required formats, depending on the type of pile driving and the type of acoustic measurement. Both the removal and installation of the piles was completed with a vibratory pile driver/extractor that produces a continuous type of sound.

Vibratory driving data reporting includes the average one-third octave band frequency spectrum over the entire pile driving event and the average sound pressure level (L_{eq}) over the entire pile-event, which would be the RMS level. Additionally, the 1-second L_{eq} data during the pile driving events were averaged in 10-second intervals, frequency spectra were also generated from the 1-second and 10-second L_{eq} and the maximum 1-second and 10-second L_{eq}.

Underwater Sound Measurement Positions

Under the terms of EHW-1 project, hydrophones were positioned at three measurement locations: one within the WRA and two outside the WRA. For each location, hydrophones were attached to a weighted line that was deployed from the surface. Tension on the hydrophone signal lines was minimized to reduce strumming noise. However, it was not possible to eliminate all strumming effects during conditions with strong wind, waves and strong currents. **Figure 4** shows the general location of each acoustic measurement position.

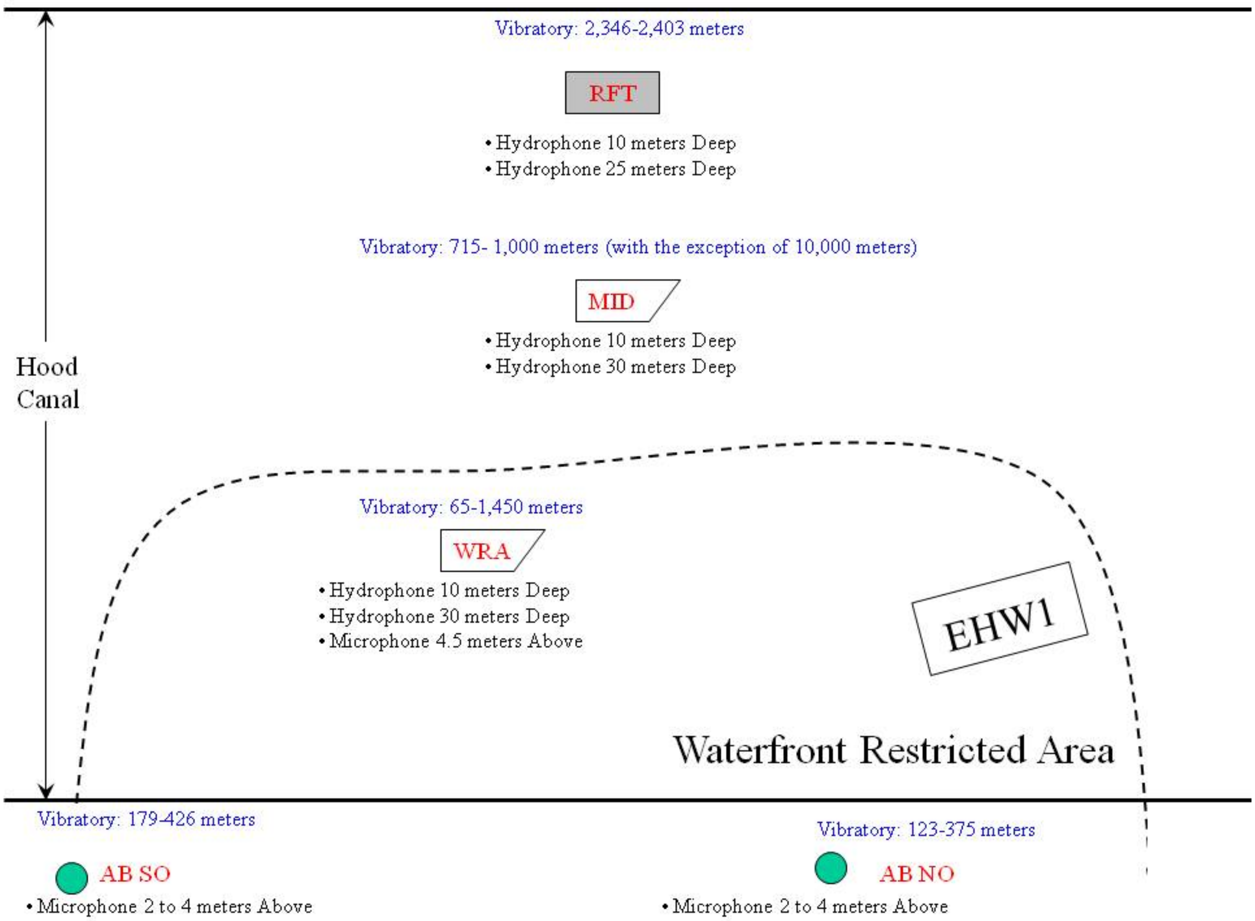

Figure 4. Measurement Positions by I&R during EHW-1

Vessel inside WRA (WRA). Two hydrophones were deployed to depths of 10 and 30 meters from a vessel that anchored during pile driving at various locations within the WRA. The distances from EHW-1 ranged from 55 to 1,450 meters.

Mid-Channel Vessel outside WRA (MID). Two hydrophones were deployed from a vessel that drifted or was anchored in the channel of the Hood Canal just outside the WRA. Hydrophones were deployed at depths of approximately 10 and 30 meters. Water depth was typically in excess of 75 meters. For the majority of EHW-1, MID remained in the vicinity of the WRA fence (i.e., beyond ± 800 meters from the pile driving), typically around the yellow buoys. But there were times when MID was positioned as close as 715 meters and as far as 10,000 meters from EHW-1.

Un-manned Raft near Toandos (RFT). The RFT position was an unattended system deployed from an anchored inflatable raft in about 18- to 20-meter-deep water. Hydrophones were deployed at 10- and 17-meter depths. Data was recorded and analyzed subsequently. Distances from EHW-1 ranged from about 2,350 to 2,400 meters throughout EHW-1.

Underwater System Acoustic Calibration

The hydroacoustic measurement systems were calibrated prior to use in the field with a G.R.A.S. Type 42AA pistonphone and hydrophone coupler. A pistonphone is an acoustical calibrator used to generate a precise sound pressure for the calibration of instrumentation microphones. The pistonphone, when used with the hydrophone coupler, produces a continuous 145.3 dB (re 1 μPa) tone for the TC-4013 hydrophones and 136.4 dB (re 1 μPa) tone for the TC-4033 hydrophones at 250 Hz. The tone measured by the SLM is recorded at the beginning of the recordings. The system calibration status was checked at the beginning of each measurement day by both measuring the calibration tone and recording the tone on the SSR. The pistonphones were certified at an independent facility.

All field notes were recorded in water-resistant field notebooks. Such notebook entries include calibration notes, measurement positions (i.e., distance from source, depth of sensor), measurement conditions (e.g., currents, sea conditions, etc.), system gain settings, and the equipment used to make each measurement. Notebook entries were copied after each measurement day and filed for safekeeping. Digital recordings were also copied and stored for subsequent analysis, if needed.

Underwater Sound Measurement Data Management

Following each day of measurements, digital data captured by the SLMs were downloaded to computer systems for WRA and MID, These data were converted and stored in tabulated spreadsheets. The primary function for this data was to provide accurate live readings. These readings from the SLMs were also periodically recorded in field notebooks and the entire drive was recorded digitally on a solid state recorder at the two manned locations With extended memory capacity, the SLM data were used as the primary data acquisition systems. The SSR recordings for RFT were run through the LDL 831 SLMs following each day of testing. During real-time data acquisition and post-testing recording analysis the technicians would listen to the signals to ensure that high quality data was measured (no noise interference) and that the dominant source was the pile driving. At times, there were relatively strong currents that caused tension on the sensor line and created noise that is referred to as “strumming.” Strumming did affect some measurements made at the distant positions where the pile driving levels were lower. To the extent possible strumming was filtered from the reported data.

Hydroacoustic Compliance Tests

Measurements from the monitoring events were used to assess at what distance the results fall below the defined metrics for vibratory driving. These estimations were evaluated at both hydrophone depths for each pile size.

Airborne Testing Methods and Materials

The following sections describe methods and materials used in monitoring airborne sounds produced by pile driving. Airborne sound levels were measured at three positions to begin the project. Then on October 7, 2011 the south position was abandoned. One position was on the WRA vessel. The primary fixed position on land was located within the north edge of the WRA at the shoreline.

Monitoring Equipment and Calibration

Airborne measurements were made using ½-inch G.R.A.S. Model 40AQ pre-polarized random incidence microphones. The signals were fed into the LDL 831 SLMs. The systems were calibrated with a Larson Davis Model CAL200 Acoustic Calibrator. For the airborne measurements on the WRA vessel, the microphone was calibrated at the beginning and end of each day. The microphones located on the shore were not taken down daily. Instead, they remained in position for several consecutive days without disturbance. These systems were calibrated prior to installation and following removal. Pre-event and post-event levels were within 0.1 dB.

Airborne Sound Descriptors

Un-weighted and A-weighted airborne data were collected and analyzed for EHW-1. During data collection, 1-second intervals were used for measuring airborne L_{eq} data. The maximum level of the "fast" RMS meter response from each 1-second interval was also identified (L_{max}). The frequency spectra were also generated for the airborne data.

Airborne Sound Measurement Positions

Microphones to measure airborne sound levels were placed in two locations:

WRA Vessel (AB-WRA). A system for monitoring airborne noise levels was fixed to the WRA vessel that was used to make underwater sound measurements and marine mammal observations. The AB-WRA was attached to the WRA vessel at a height of 4.5 meters above the water. This system was not ideal since the boat makes noise and marine mammal observers frequently made noise near the microphone, particularly radio communications, contaminating results.

Land-Based Monitoring Positions (AB-NO and AB-SO). The land-based microphone was placed at the northern shoreline of the WRA in the construction zone. AB-NO and AB-SO were positioned approximately 2 to 4 meters above the ground and ranged from 123 to 556 meters from the pile driving. This system included a weather-protected microphone. AB-SO was not used after October 7, 2011.

Airborne Sound Measurement Data Management

Acoustic data recorded from the stationary airborne monitoring systems were downloaded infrequently due to access issues. The WRA microphone acquired data throughout the duration of each testing day. The AB-NO microphone recorded airborne data for several consecutive days at a time and were accessed approximately once every 2 weeks.

Airborne Compliance Tests

Measurements from each monitoring event were analyzed to determine at what distance the levels fall below the defined metrics.

Section 3 Description of Measurement Results

Underwater sound measurements were conducted for 65 vibratory pile driving events and one event on October 4, 2011 where the pile could not be removed due to clearance issues in the EHW-1 building. These events included both the installation and removal of piles. Airborne sound measurements were made for each of these events. This section presents examples of acoustical data collected during the EHW-1. **Appendix B** contains the results of underwater monitoring for all the vibratory pile driving. The airborne data are provided in **Appendix C**. The results are summarized in **Section 4**. **Table 1** summarizes all the pile driving activities and monitoring events. A monitoring event consists of a pile being installed or removed, and any time there was a break of more than 10 minutes during the process of removing or installing a pile a new event is analyzed.. The depth of the water in which the piles were driven ranged from 44 to 65 feet. The depth into the substrate that the piles were driven ranged from 20 to 60 feet. The physical characteristics of the bottom substrate are silty alluvium overlaying silty sand substrata.

Example of Underwater Sound Data During Vibratory Pile Installation/Removal

Vibratory Pile Installation

Vibratory pile-driving acoustical data are provided in graphical and tabular format in **Appendix B**. A time history plot of the 1-second sound pressure levels is provided for each position (shown on one chart for comparative purposes). **Figure 5** shows an example of the time history plot contained in **Appendix B** for a vibratory pile installation that occurred on October 15, 2011. In this example, pile EHW-9 a 30-inch pile was installed using the APE 200-6 vibratory hammer. There were three soft starts and approximately 9 minutes of vibratory driving completed. The first soft start was at 11:28:42 and the actual driving started at 11:33:20 and stopped at 11:42:06. **Figure 5** shows the sound pressure levels for the Down-depth hydrophones at each of the three measurement locations. The average RMS was calculated by taking the average of the 10-second RMS levels for the entire event, not including the soft starts. The average RMS was calculated for the one-third octave band frequencies of 20 to 20,000 Hz for the measurement location within the WRA and for frequencies of 50 to 20,000 Hz outside the WRA. These values are shown in **Figure 5** by the large squares. Also shown in **Figure 5** are the measured distances of each measurement from EHW-9 at the time of the event. The information in **Figure 5** correlates to those summarized in **Table 2**.

Figures 6 through 8 show the frequency spectra (based on the 1-second RMS) over the entire pile-driving event, the maximum 10-second average spectrum, and a 30-second average spectrum of the ambient noise just before the pile driving started for all three measurement locations. Plots of the RMS levels and the corresponding spectra for the remaining pile-driving events are provided in **Appendix B**, as is a more comprehensive summary table of all the measured results for both deep and mid-depths. The RMS values calculated over the entire pile-driving event, together with the measured distances of each location from the pile, were used to determine the propagation effects during pile driving and the distance at which the 120 dB limit occurred.

Table 1. Pile Specifications for Piles Installed and Removed at EHW-1

Date	Pile	Pile Size	Coordinates	IMP/VIB IN/VIB OUT	Distance from Pile to Acoustic Recording Location			Start Time	Stop Time	Total Driving Time[2]
					WRA	MID	Raft			
10/4/2011	Inside Pile EHW	30"	N47°45.215" W122°43.468"	No Drive	150	821	2346	9:06:33	9:10:42 [1]	0:04:09
10/5/2011	BP1 (EHW-14)	30"	N47°45.215" W122°43.468"	VIB IN	170	10000	2346	8:29:53	8:32:01	0:02:08
	BP2 (EHW-15)	30"	N47°45.215" W122°43.468"	VIB IN	170	10000	2346	8:35:36	8:36:36	0:01:00
10/7/2011	RX5[3]	12"	N47°45.199" W122°43.435"	VIB OUT	118	1895	2395	9:29:17	9:34:09	0:04:52
	RX6[3]	12"	N47°45.215" W122°43.468"	VIB OUT	118	1850	2371	9:40:31	9:40:53	0:00:22
	RX7[3]	12"	N47°45.215" W122°43.468"	VIB OUT	118	1850	2371	9:43:30	9:43:42	0:00:12
	RX8[3]	24"	N47°45.211" W122°43.453"	VIB OUT	150	1865	2365	14:24:18	14:33:30	0:09:12
	RX1[3]	24"	N47°45.201" W122°43.426"	VIB OUT	117	1898	2403	15:00:31	15:08:25	0:07:54
	FW1	16"	N47°45.201" W122°43.426"	VIB IN	120	1898	2403	16:55:37	17:02:40	0:07:03
	FW2	16"	Coordinates not Provided	VIB IN	120	1898	2403	17:15:49	17:19:25	0:03:36
	FW3	16"	Coordinates not Provided	VIB IN	120	1898	2403	17:31:49	17:36:07	0:04:18
	FW4	16"	Coordinates not Provided	VIB IN	120	1898	2403	17:43:36	17:46:46	0:03:10
10/8/2011	FW5	16"	N47°45.204" W122°43.461"	VIB IN	100	885	2359	8:43:33	8:51:03	0:07:30
	FW6	16"	N47°45.204" W122°43.461"	VIB IN	100	885	2359	9:01:45	9:05:03	0:03:18
	FW7	16"	N47°45.204" W122°43.461"	VIB IN	100	885	2359	9:11:52	9:14:11	0:02:19
	FW8	16"	N47°45.204" W122°43.461"	VIB IN	100	885	2359	9:19:13	9:27:23	0:08:10

Date	Pile	Pile Size	Coordinates		IMP/VIB IN/VIB OUT	Distance from Pile to Acoustic Recording Location			Start Time	Stop Time	Total Driving Time[2]
						WRA	MID	Raft			
10/10/2011	W6	30"	Coordinates not Provided		VIB IN	87	995	2374	13:30:46	13:39:27	0:08:41
	W5	30"	Coordinates not Provided		VIB IN	65	995	2374	13:57:17	14:03:46	0:06:29
	W4	30"	Coordinates not Provided		VIB IN	65	995	2374	14;16:28	14:23:32	0:07:04
	W6 Revib	30"	Coordinates not Provided		VIB IN	87	995	2374	14:25;20	14:25:51	0:00:31
	W3	30"	Coordinates not Provided		VIB IN	65	995	2374	14:34:50	14:40:39	0:05:49
	W5 Revib	30"	Coordinates not Provided		VIB IN	55	995	2374	14:45:39	14:54:04	0:08:25
	W11	30"	Coordinates not Provided		VIB IN	115	1025	2403	16:14:03	16:24:49	0:10:46
	W12	30"	Coordinates not Provided		VIB IN	115	1025	2403	16:41:25	16:52:37	0:11:12
10/11/2011	W2	30"	N47 45.204	W122 43.451	VIB IN	146	850	2368	8:56:08	9:04:30	0:08:22
	W1	30"	N 47 45.204	W 122 43.449	VIB IN	135	850	2368	9:21:31	9:25:49	0:04:18
	W7	30"	N 47 45.196	W 122 43.449	VIB IN	130	869	2387	10:53:25	11:05:03	0:11:38
	W9	30"	N 47 45.196	W 122 43.446	VIB IN	130	869	2387	11:13:03	11:23:02	0:09:59
	W10	30"	N 47 45.197	W 122 43.450	VIB IN	122	857	2374	12:20:32	12:31:05	0:10:33
	W8	30"	N 47 45.197	W 122 43.447	VIB IN	130	869	2387	14:01:22	14:11:03	0:09:41
	EHW16	30"	Coordinates not Provided		VIB IN	159	835	2355	16:51:02	17:07:23	0:16:21
									17:13:31	17:27:36	0:14:05
									17:37:56	17:49:15	0:11:19
10/12/2011	EHW12 Battered	30"	N 47 45.214	W 122 43.455	VIB IN	167	1000	NO RAFT[4]	10:58:53	11:39:47	0:40:54
	EHW13 Battered	30"	N 47 45.215	W 122 43.457	VIB IN	1450	1000	NO RAFT[4]	14:57:57	15:20:19	0:22:22
	EHW10 Battered	30"	N 47 45.214	W 122 43.457	VIB IN	1450	1500	NO RAFT[4]	17:47:52	18:14:26	0:26:34
10/13/2011	EHW10 Battered	30"	N 47 45.214	W 122 43.457	VIB IN	1448	3935	2357	9:57:49	10:06:14	0:08:25
									10:32:06	10:45:48	0:13:42
	EHW7 Plumb	30"	N 47 45.212	W 122 43.457	VIB IN	1445	3933	2358	13:01:23	13:07:00	0:05:37
									13:21:34	13:46:55	0:25:21
	EHW5	30"	N 47 45.213	W 122 43.452	VIB IN	1449	3940	2365	13:55:36	14:34:08	0:38:32

Date	Pile	Pile Size	Coordinates		IMP/VIB IN/VIB OUT	Distance from Pile to Acoustic Recording Location			Start Time	Stop Time	Total Driving Time[2]
						WRA	MID	Raft			
10/14/2011	EHW6 Plumb	30"	N 47 45.213	W 122 43.454	VIB IN	1063	890	2361	12:32:50	13:05:34	0:32:44
	EHW5 Cont from 10/13	30"	N 47 45.213	W 122 43.452	VIB IN	1065	890	2365	13:07:52	13:10:43	0:02:51
	EHW4	30"	N 47 45.211	W 122 43.455	VIB IN	1059	890	2359	13:16:31	13:34:33	0:18:02
	EHW3	30"	N 47 45.211	W 122 43.457	VIB IN	1060	890	2361	13:42:03	13:47:09	0:05:06
	EHW1	30"	N47°45.215" W122°43.468"		VIB IN	1063	890	2365	13:51:50	13:57:14	0:05:24
									14:21:35	14:35:56	0:14:21
	EHW3	30"	N 47 45.211	W 122 43.457	VIB IN	1060	890	2361	16:46:11	17:01:47	0:15:36
10/15/2011	EHW2	30"	N 47 45.211	W 122 43.454	VIB IN	1068	3540	2363	10:25:17	10:45:27	0:20:10
	EHW9	30"	N 47 45.214	W 122 43.455	VIB IN	1068	1120	2360	11:28:42	11:42:06	0:13:24
									11:56:19	11:57:12	0:00:53
	EHW8	30"	N 47 45.215	W 122 43.452	VIB IN	210	1124	2363	12:54:35	13:11:31	0:16:56
10/17/2011	EHW14 Revib	30"	N 47 45.216	W 122 43.453	VIB IN	275	2221	2361	14:52:06	14:59:31	0:07:25
									15:25:46	15:32:32	0:06:46
	EHW15Revib	30"	N 47 45.216	W 122 43.455	VIB IN	275	2220	2357	15:58:46	16:05:33	0:06:47
									16:27:34	16:39:14	0:11:40
10/19/2011	EHW11	30"	N 47 45.215	W 122 43.453	VIB IN	155	1096	2362	11:59:25	12:04:53	0:05:28
									12:22:02	12:28:29	0:06:27
10/21/2011	W8 Revib	30"	N 47 45.197	W 122 43.437	VIB IN	143	715	2387	14:43:13	14:51:24	0:08:11
	W10 Revib	30"	N 47 45.197	W 122 43.434	VIB IN	143	715	2387	14:53:59	14:58:38	0:04:39
	W1 Revib	30"	N 47 45.204	W 122 43.449	VIB IN	143	701	2368	14:58:43	15:09:30	0:10:47
	W2 Revib	30"	N47 45.204	W122 43.451	VIBIN	143	701	2368	15:11:56	15:15:29	0:03:33
	W3 Revib	30"	N 47 45.197	W 122 43.447	VIB IN	132	715	2374	15:37:01	15:39:51	0:02:50
	W4 Revib	30"	N 47 45.197	W 122 43.450	VIB IN	132	715	2374	16:00:34	16:11:39	0:11:05
	W5 Revib	30"	N 47 45.196	W 122 43.446	VIB IN	132	715	2374	16:13:55	16:16:47	0:02:52
	W6 Revib	30"	N 47 45.196	W 122 43.449	VIB IN	132	715	2374	16:18:14	16:21:54	0:03:40

Date	Pile	Pile Size	Coordinates		IMP/VIB IN/VIB OUT	Distance from Pile to Acoustic Recording Location			Start Time	Stop Time	Total Driving Time[2]
						WRA	MID	Raft			
10/27/2011	W7 Revib	30"	Coordinates not Provided		VIB IN	183	880	2355	9:55:24	10:03:08	0:07:44
	W9 Revib	30"	N 47 45.196	W 122 43.449	VIB IN	150	885	2374	10:05:17	10:08:51	0:03:34
	W12 Revib	30"	N 47 45.197	W 122 43.447	VIB IN	150	885	2374	10:12:52	10:18:33	0:05:41
	W11 Revib	30"	N 47 45.197	W 122 43.450	VIB IN	150	885	2374	10:21:04	10:26:12	0:05:08
	EX3[3]	12"	Coordinates not Provided, piles part of the old walkway		VIB OUT	180	880	2355	11:24:13	11:25:58	0:01:45
	EX4[3]	12"	Coordinates not Provided, piles part of the old walkway		VIB OUT	180	880	2355	11:28:00	11:28:14	0:00:14
	EX3[3] – REDO	12"	Coordinates not Provided, piles part of the old walkway		VIB OUT	180	880	2355	11:31:00	11:31:18	0:00:18
	EX5[3]	12"	Coordinates not Provided, piles part of the old walkway		VIB OUT	180	880	2355	11:49:48	11:52:38	0:02:50
	EX6[3]	12"	Coordinates not Provided, piles part of the old walkway		VIB OUT	180	880	2355	11:58:49	12:02:13	0:03:24

Notes:

[1] Pile was not driven. Hammer was setup on a permanent pile inside EHW-1, however, due to space limitations as a result of the tidal elevation the hammer could not be turned on and no pile driving occurred on October 4th;

[2] Total Driving times include Soft Starts

[3] RX and EX naming conventions represent fender piles which were extracted

[4] NO RAFT – raft was unable to be deployed due to weather conditions.

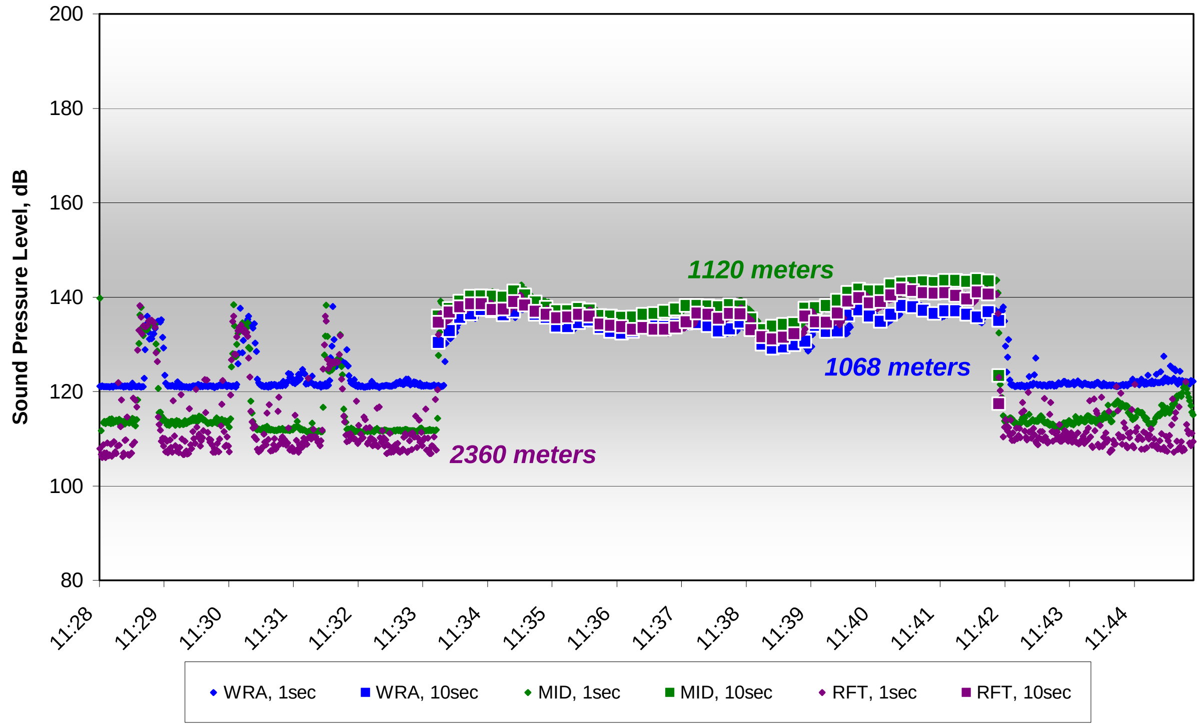

Figure 5. 1-second and 10-second Average Data for EHW-9 11:28 - 11:44, at Down Position on October 15, 2011

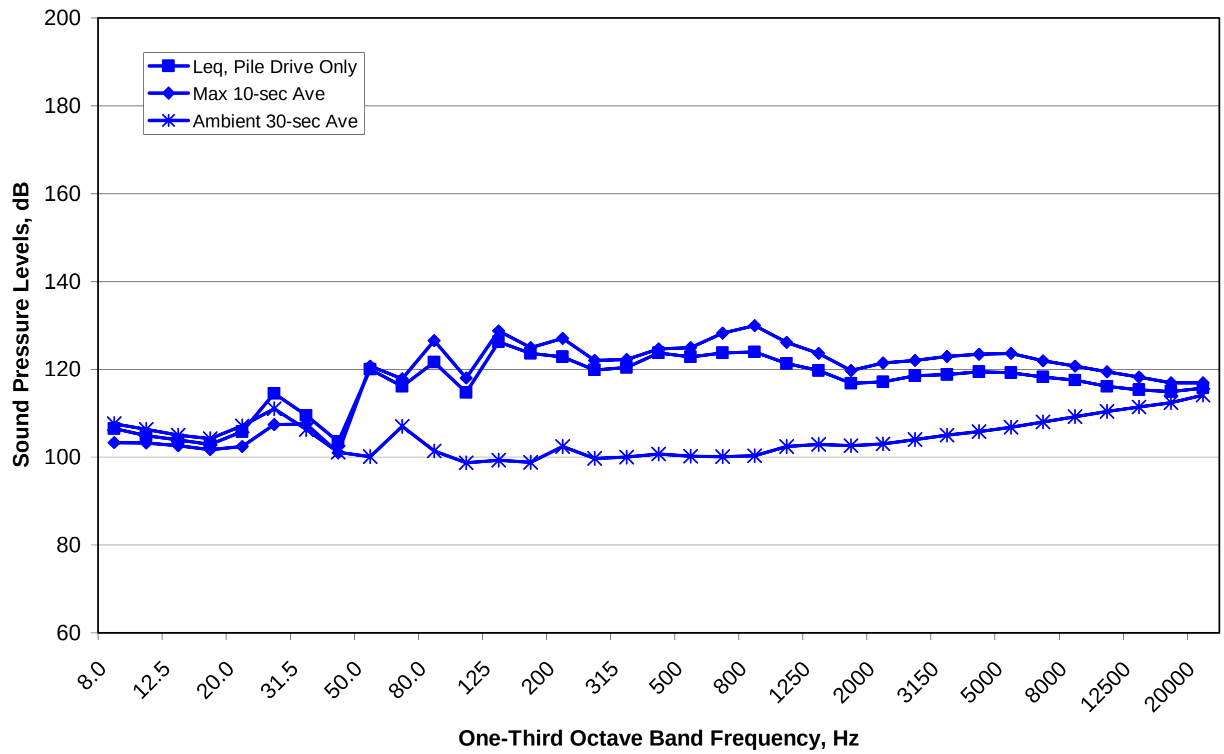

Figure 6. Spectral Data Measured at the WRA Location during EHW-9, 11:28 - 11:42, at the Down Position on October 15, 2011

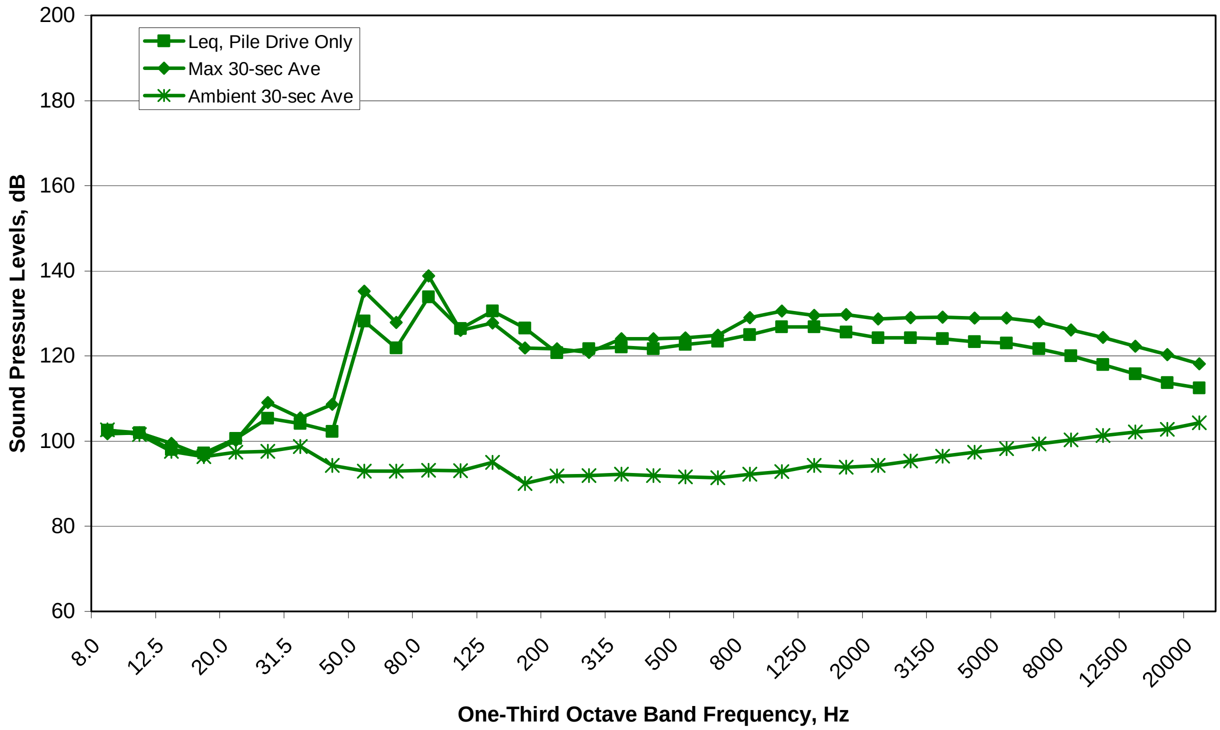

Figure 7. Spectral Data Measured at the WRA Location during EHW-9, 11:28 - 11:42, at the Down Position on October 15, 2011

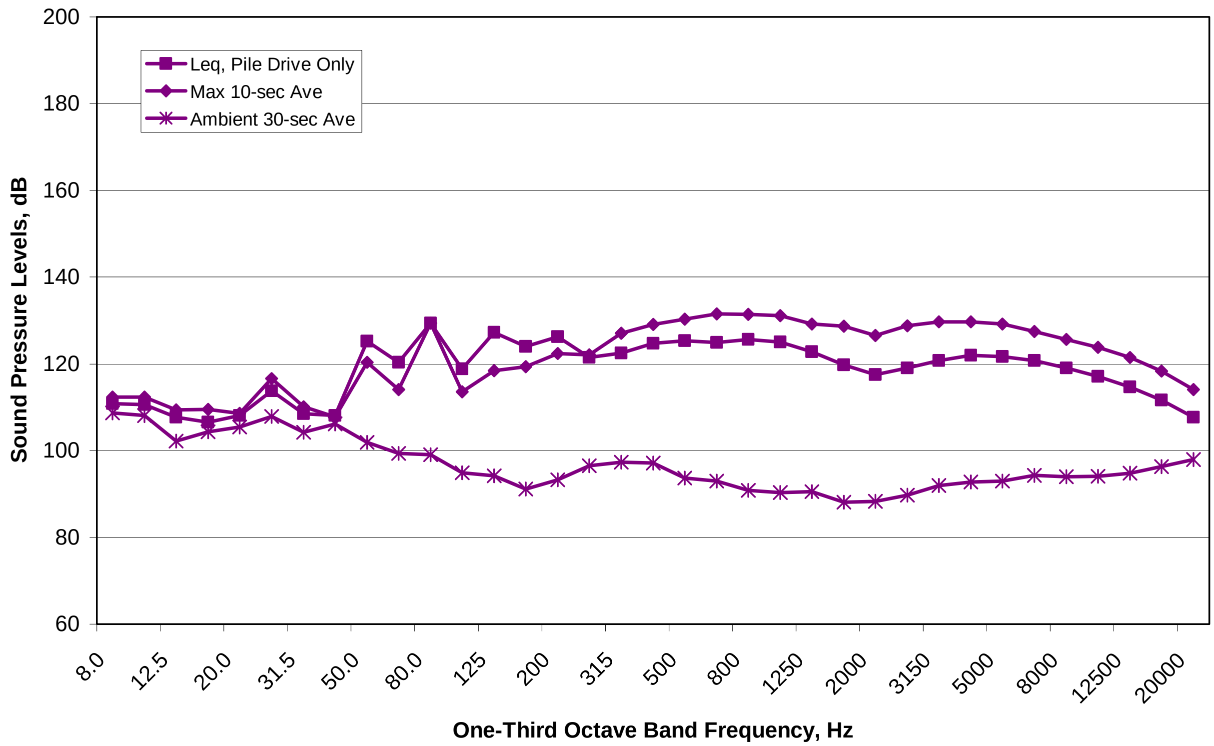

Figure 8. Spectral Data Measured at the RFT Location during EHW-9, 11:28 - 11:42, at the Down Position on October 15, 2011

Vibratory Pile Removal

Similar to the vibratory installation events, vibratory removal events were also analyzed by calculating L_{eq} for the high energy driving sequence(s). Such a removal event took place on October 7, 2011 with the soft starts beginning at 15:00:31 and the event ending at 15:08:25 when pile RX1 was removed with the APE 200-6 vibratory hammer. There were three soft-starts. This was not always the case. If the interval between events was less than 30 minutes, the soft starts were not required. During this event, continuous operation took place throughout the time period, but as was usual with removal events, final energy levels were significantly greater than the mid-section of the drive. At some of the distant recording locations the levels during the removal were as low as ambient levels measured before and after the removal. The 1-second L_{eq} time history for RX1 and the 10-second averages during the pile-removal event are shown in **Figure 9** for each of the measurement locations at the mid-depth hydrophone position. The distances of each measurement location from RX1 are also shown in **Figure 9**.

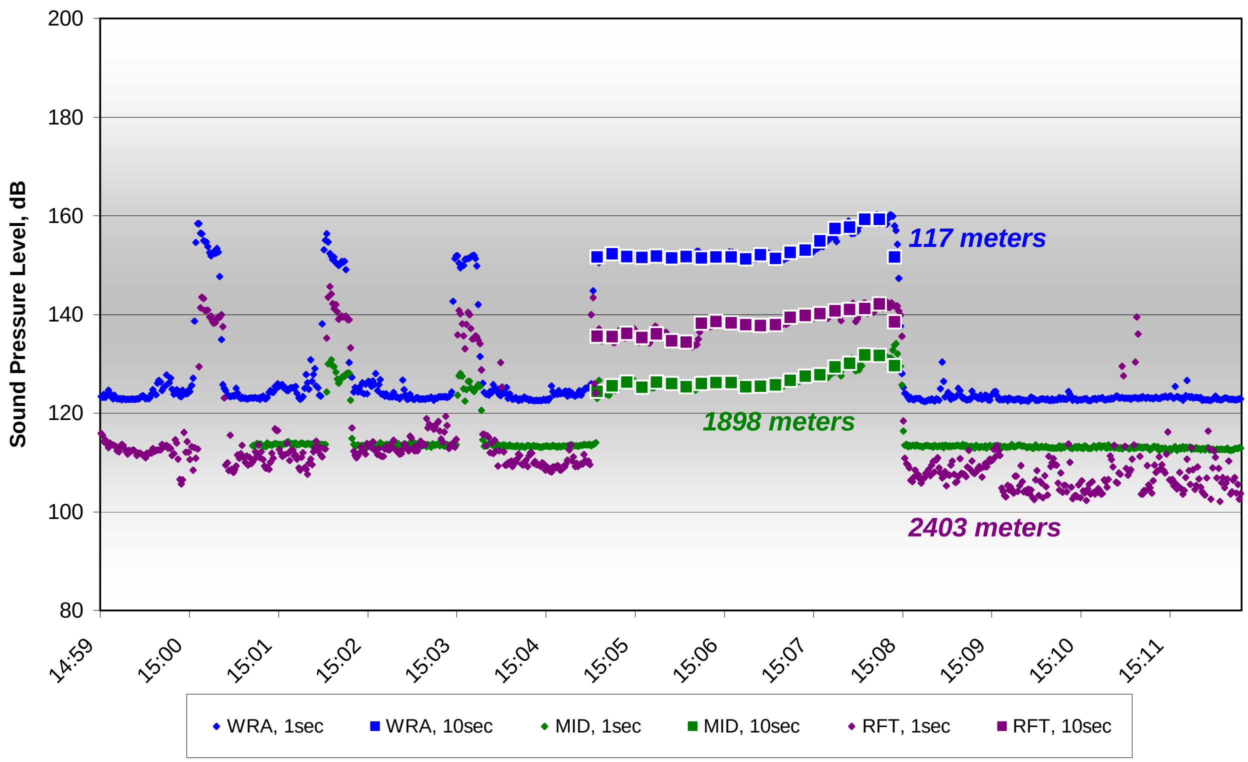

Figure 9. 1-second and 10-swecond Average Data for Removal of RX1

Figures 10 through 12 show the frequency spectra that characterize the results measured at each location, as well as the summary table of results. All figures and a comprehensive results summary table are provided in **Appendix B**. The distances from each pile to the 120 dB limit for each of the vibratory removal events were calculated from the results described here.

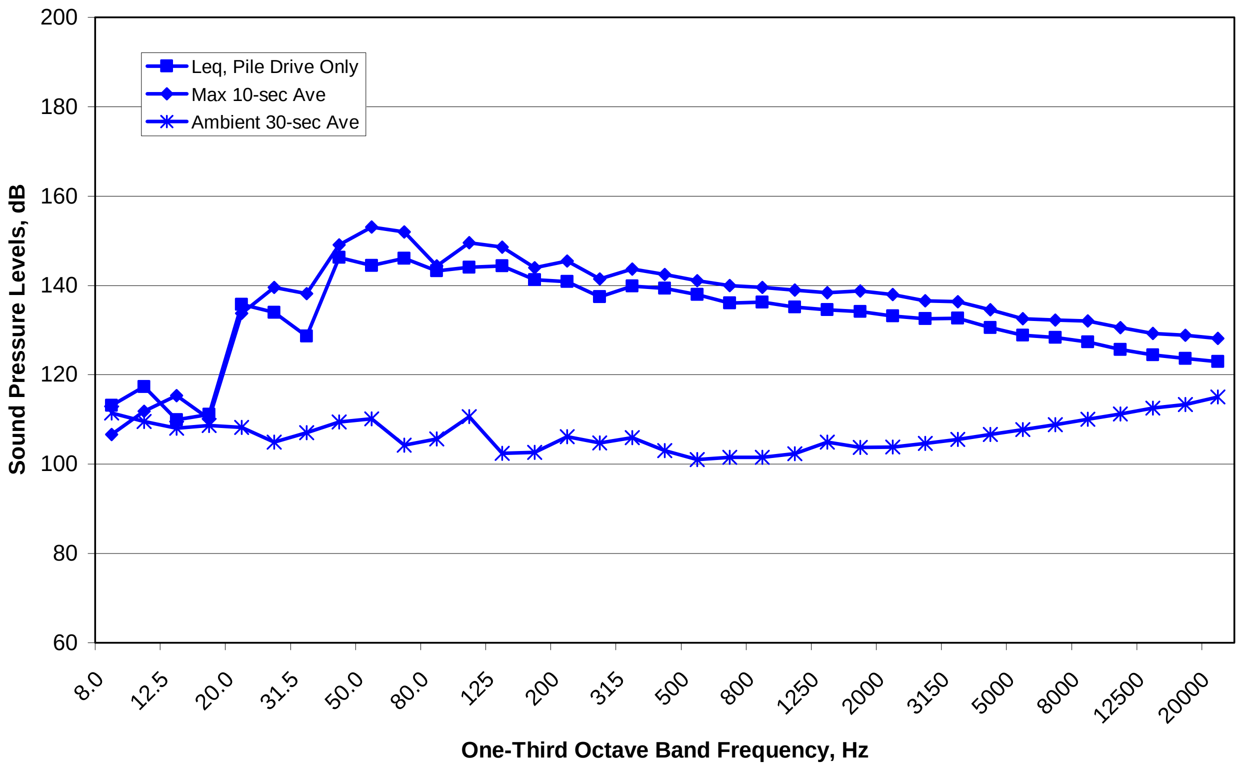

Figure 10. Spectral Data at the WRA

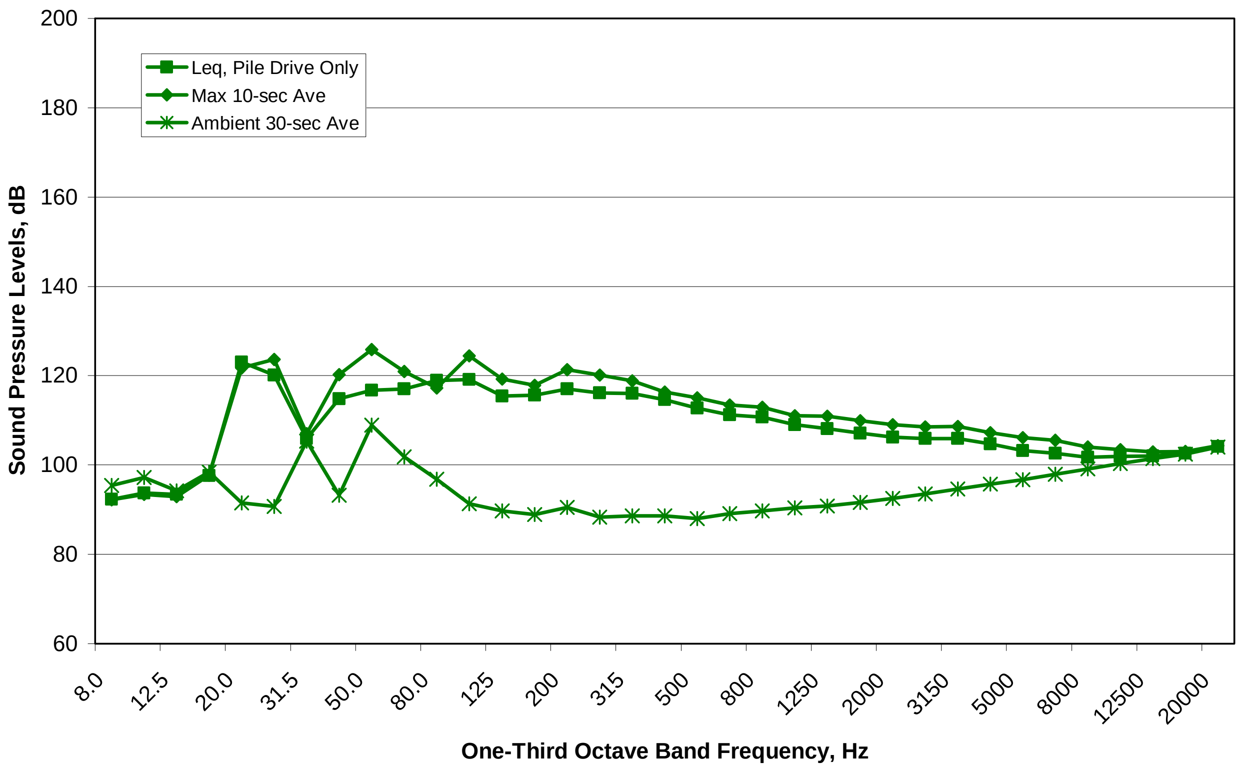

Figure 11. Spectral Data Measured at the Mid Position

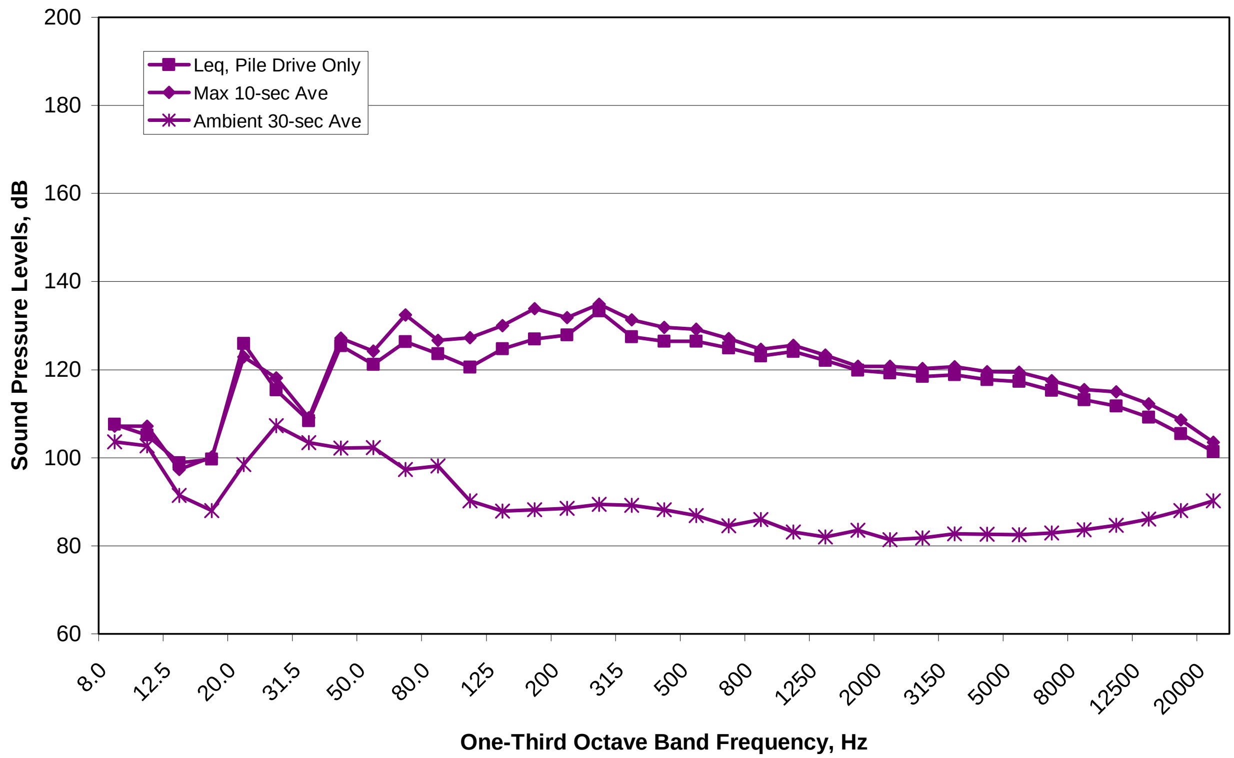

Figure 12. Spectral Data Measured at the RFT Location

Example of Airborne Sound Data

Airborne sound data are provided in graphical and tabular format in **Appendix C**. The reference pressure for airborne sound levels (dB) is 20 microPascals. Time history plots of the 1-minute L_{eq} and L_{max} sound levels are provided for each position (shown on one chart for comparative purposes). **Figures 13 and 14** present examples of the time history plots contained in **Appendix C** for the airborne un-weighted L_{eq} and L_{max} and A-weighted L_{eq} and L_{max} data that occurred on October 10, 2011. In this example, pile W-6 was installed using the APE 200-6 vibratory hammer. The airborne data were collected in 1-second increments and were analyzed continuously from the start of the pile driving event (13:31) through its conclusion (13:40). The un-weighted and A-weighted L_{eq} was calculated by taking the energy average of the spectral information between the frequency bands of 25 to 20,000 Hz for the period of time specific to the pile driving event. The un-weighted and A-weighted L_{max} represent the maximum level recorded. **Figures 13 and 14** also show the measured distances of each microphone from W-6 at the time of the event.

Figures 15 and 16 show the frequency spectra (based on the 1-second L_{eq} and L_{max}) over the entire pile-driving event for both un-weighted and A-weighted data. Three-minute average spectra of the ambient noise taken just before the pile driving event are also shown. The spectra for the two measurement locations are provided. Similar plots of the L_{eq} and L_{max} levels, as well as the corresponding spectra for the remaining pile driving events and a comprehensive summary table are provided in **Appendix C**.

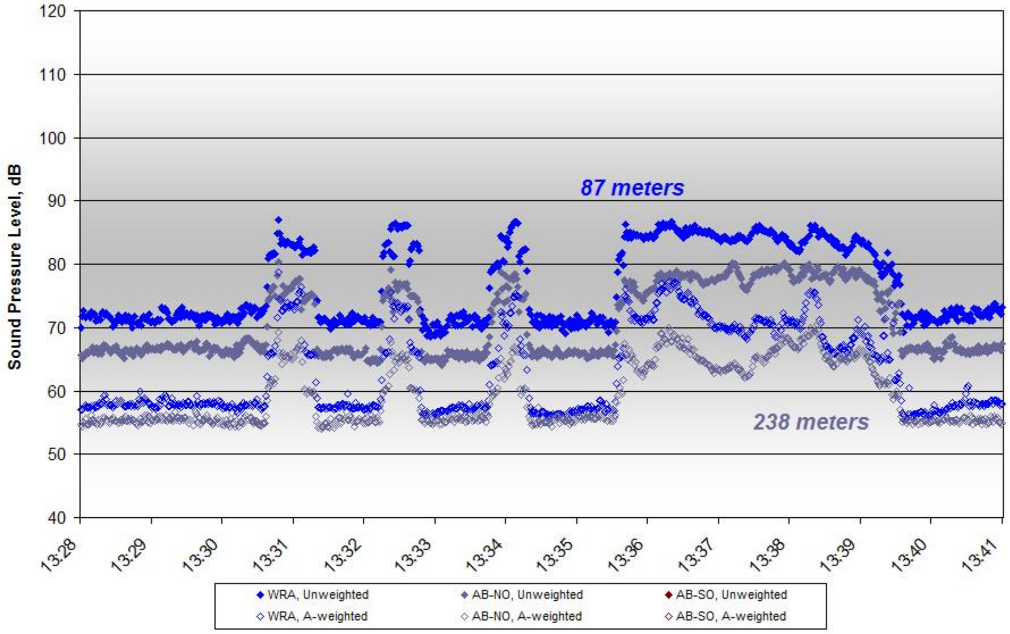

Figure 13. 1-second Unweighted and A-weighted L_{eq} at W-6, 13:30-13:40, on Airborne Microphones on October 10, 2011

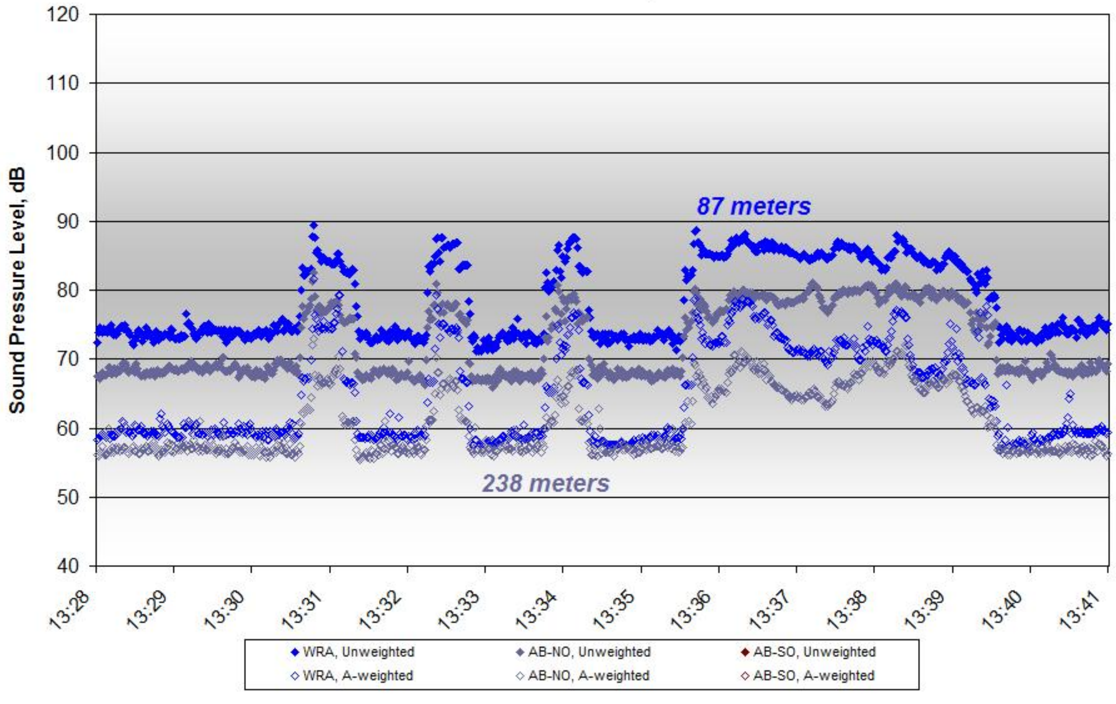

Figure 14. 1-second Unweighted and A-weighted L_{max} at W-6, 13:30-13:40, on Airborne Microphones on October 10, 2011

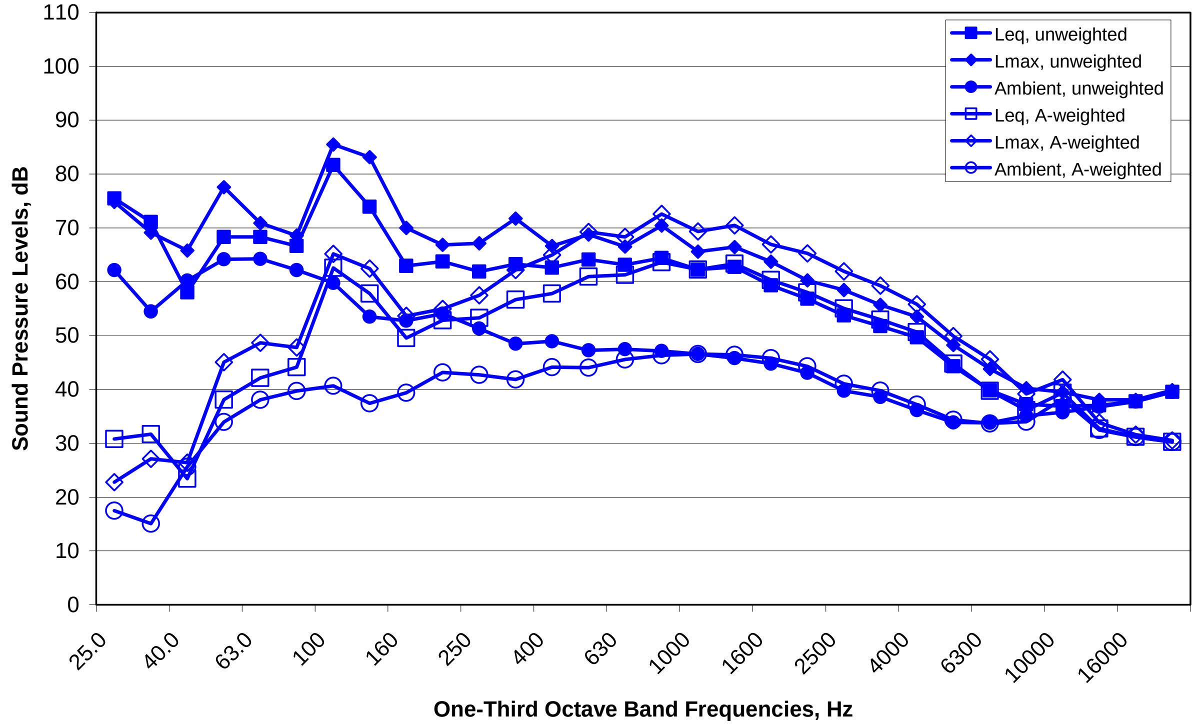

Figure 15. Average 1-second L_{eq} and Maximum 1-Second L_{max} Spectra at the WRA Microphone during W-6, 13:30 – 13:40 on October 10, 2011

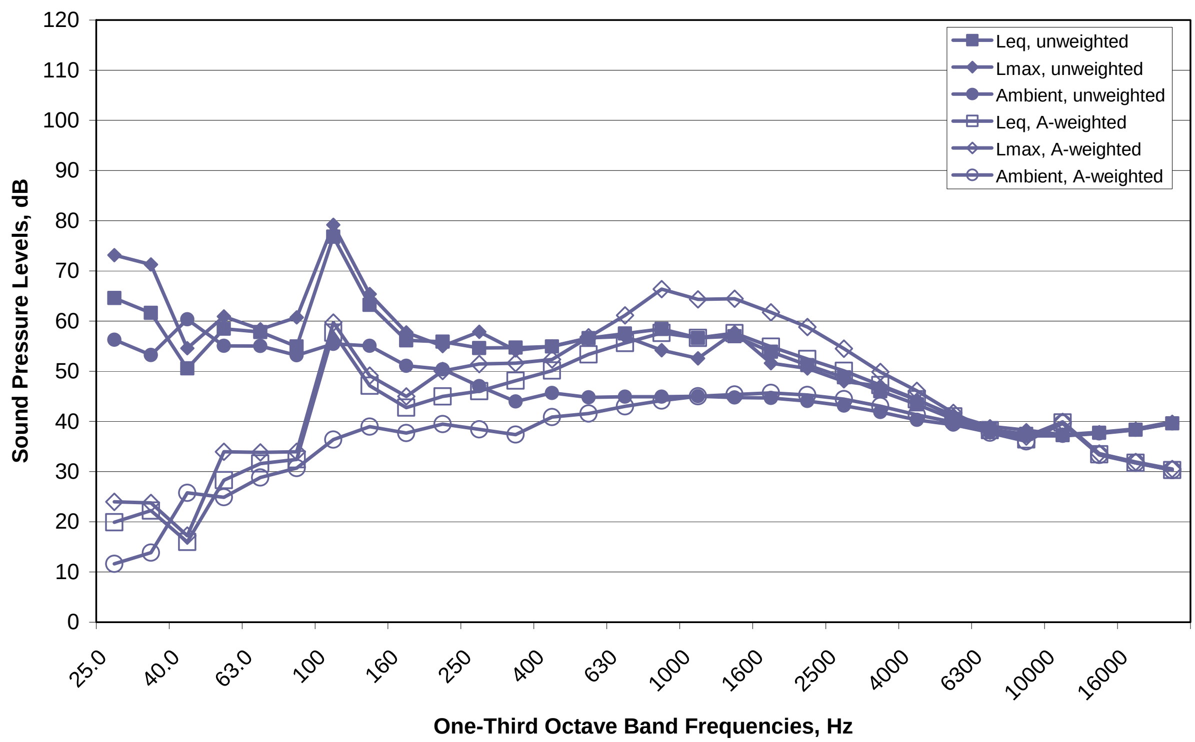

Figure 16. Average 1-second L_{eq} and Maximum 1-Second L_{max} Spectra at the AB-NO Microphone during W-6, 13:30 – 13:40 on October 10, 2011

Example of Ambient Underwater Sound Data

Ambient levels were measured prior to and following pile driving events at each of the distant measurement locations. Although ambient measurements were made prior to and after pile driving at the position inside the WRA, this system was set up to measure higher pile driving sounds than the systems outside the WRA. As a result, levels before and after pile driving conditions likely reflect instrument background levels rather than ambient conditions. Typically, measurements began several minutes before pile driving and continued several minutes after pile driving (see Time History Plots in **Appendix B**). There were exceptions when monitoring boats were forced to maneuver just prior and/or after pile driving.

If pile driving levels were abnormally high due to inadequate testing conditions, such as strong water currents, the same high levels would appear in the ambient data, as well, and prove not to be caused by pile driving. Furthermore, by taking ambient measurements before and after pile driving events, effects of the changing environmental conditions on the results were observed. These ambient data are discussed in the pile driving results sections. Ambient data was also acquired outside the WRA during “red days” when no piles were driven. The ambient data were analyzed as RMS levels over a given time period. **Figure 17** represents typical ambient data from the 1-second L_{eq} measurements taken at the mid-level and deep depths when the vessel was located approximately 1,900 meters from the job site, which corresponds to the Mid channel location. The 1-second data shown in the figure was calculated by summing the energy in the frequency bands from 50 to 20,000 Hz, which is the same frequency range used to calculate the L_{eq} values during pile driving at these distances. **Figure 18** shows the full spectra of the ambient measurements from 8 to 20,000 Hz. The table included on the spectra plots summarizes the overall 1-second L_{eqs} calculated for different frequency band ranges, as well as the maximum 10-second average measured during the testing period.

The data in the figures was collected on October 7, 2011, from 15:08 to 15:12. Conditions during ambient testing were overcast and little water disturbance. Overall RMS levels calculated over the entire four-minute measurement duration were approximately 123 dB at the deep depth and 116 dB at the mid-depth for the WRA location and 113 dB at the deep depth and 110 dB at the mid-depth for the Mid location. The frequency spectra shown in **Figure 18** indicate that ambient levels are fairly equal across the spectra with higher levels below 100 Hz and above 2,000 Hz. Ambient results varied with the testing conditions throughout the course of EHW-1. These variations during any given pile driving event are discussed in the subsequent sections. The results showed here reflected calm conditions with relatively light currents.

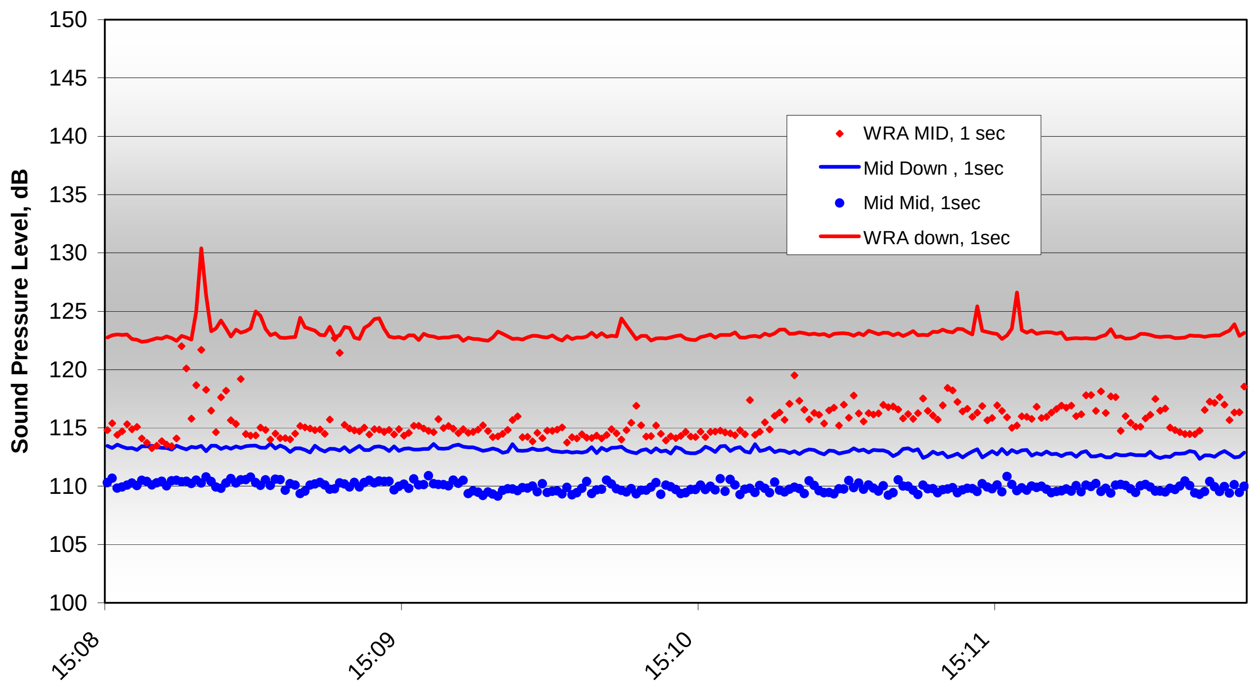

Figure 17. Typical Quiet Ambient Levels Measured from 50 to 20,000 Hz on October 7, 2011, 1,898 meters from the Job Site

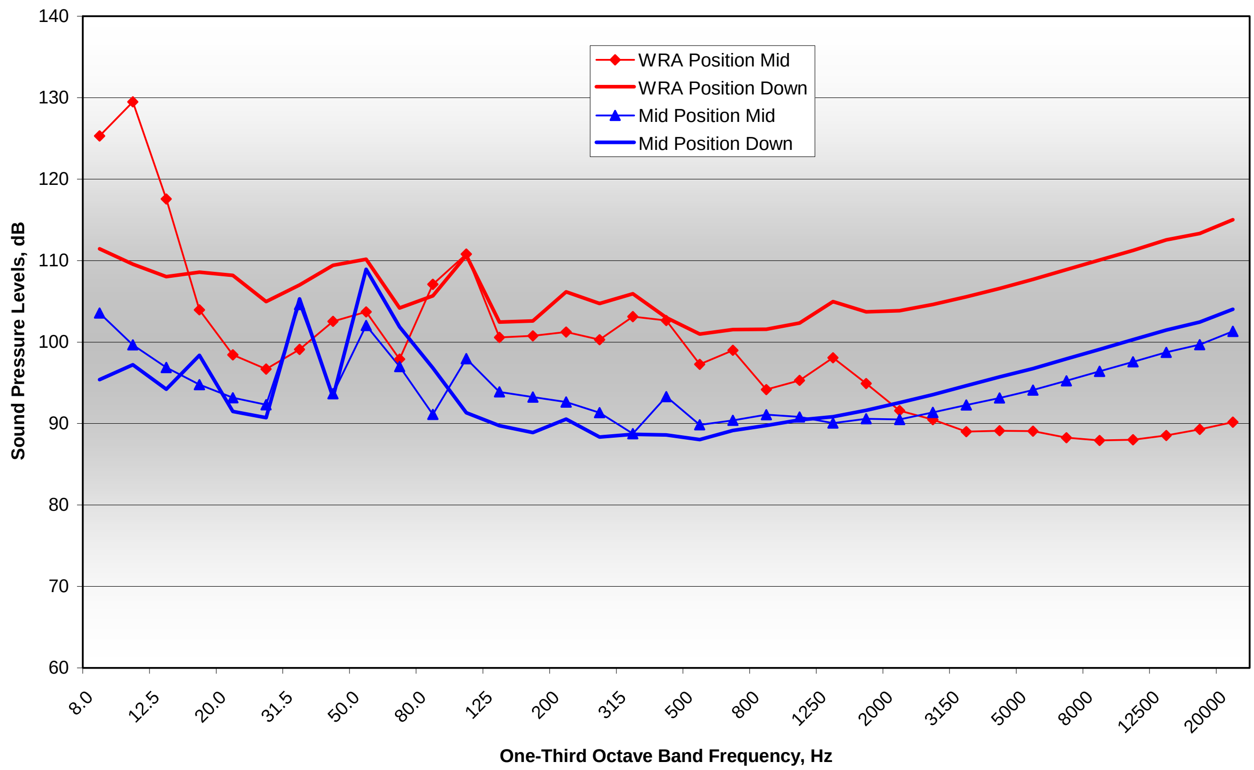

Figure 18. Ambient Spectra Measured on October 7, 2011, 1,898 meters from the Job Site

Section 4 Discussion of Results

This section presents the discussion of the results of the acoustic monitoring for EHW-1. Monitoring data are analyzed and summarized. The results are then evaluated with respect to the Work Plan objectives summarized in **Section 1**.

Pile driving activities and acoustic monitoring events are summarized in **Table 2**. During pile driving, vessel positions were recorded and compared to the location of EHW-1 to obtain the approximate distances from the piles to the measurement locations. Distances to the vessels were also measured directly with an infrared range finder when possible. The approximate distances from the piles to the land based microphone and RFT hydrophones were determined by comparing the coordinates of the measurement locations to the location of EHW-1.

Summary of Underwater Sound Monitoring Data

Vibratory Pile Driving

Vibratory pile driving that took place in EHW-1 between October 4, 2011 and October 27, 2011 consisted of 45 piles driven in 55 installation events and 9 piles removed in 10 vibratory removal events. Sound levels generated by both vibratory installations and removals varied considerably during the driving or removal of an individual pile, and from pile to pile. This section discusses the results of the data analysis performed for vibratory pile driving events.

Each vibratory event initiated with a "soft-start" procedure. This was implemented to minimize the effects of the pile driving. During soft-start, the vibratory hammer started at reduced energy before engaging in high energy vibration. For the RMS calculation, only the time period of maximum energy was used; the soft-starts were not analyzed. Likewise, no pile driving breaks lasting longer than a minute were analyzed. If a pile was driven in two or more high energy sequences containing a break lasting longer than 10 minutes, multiple events were analyzed. These criteria were implemented due to changing testing conditions and vessel positioning.

During vibratory driving, vessel positions were recorded and compared to the coordinates of each pile (summarized in **Table 1**) to obtain the distances from the piles to the hydrophone measurement locations. **Table 2** summarizes the distances for each vibratory driving event.

Table 2 summarizes the daily results of RMS sound pressure levels measured during vibratory pile driving throughout EHW-1. Data are summarized for each measurement location and shown separately for the mid-depth and the down-depth. It was not possible to calculate the distances to the 190 dB RMS level and 180 dB RMS level, the injury thresholds for marine mammals, with any confidence due to the lack of data measured close to the piles. The distances to the injury thresholds can be found the report prepared by Robert Miner Dynamic Testing, Inc. who monitored levels close-in to the piles (**Appendix D)**. Distances to those threshold levels werenot included in **Table 2**. The estimated distances to the 120 dB RMS levels to the north and to the south are shown in the table for each day of driving. The average sound level over the duration of the pile driving event, and the maximum level during the pile driving event, are shown at each depth and each location for which data was obtained. The RMS sound pressure levels were averaged in consecutive 10-second periods throughout each pile driving event.

Table 2. Summary of Sound Levels During Vibratory Pile Installation and Removal

Event Description	Start Time	Stop Time	Sensor	Measured Sound Pressure Level - RMS						Calculated distance to 120 dB RMS (meters)
				WRA Boat		Mid Channel		Raft		
				Ave	Max	Ave	Max	Ave	Max	
10/4/2011										
Inside Pile EHW1	9:06:33	9:10:42 [1]	Mid	127	129	115	116	117	120	755
			Down	128	131	116	117			
				150		821		2346		
10/5/2011										
BP1 (EHW-14)	8:29:53	8:32:01	Mid	141	146					4,312
			Down	144	150					
				170						
BP2 (EHW-15)	8:35:36	8:36:36	Mid	146	147	132	133			3,802
			Down	148	149	135	136			
				170		650				
10/7/2011										
RX5	9:29:17	9:34:09	Mid	144	150	121	122	128	131	5,462
			Down	145	152	123	124	128	133	
				118		1895		2395		
RX6	9:40:31	9:40:53	Mid	150	153			131	134	5,858
			Down	150	153			132	135	
				118		1850		2371		
RX7	9:43:30	9:43:42	Mid	149	152	126	129	132	135	South ± 7,000 (Land)
			Down	149	152	126	129	133	136	North 7,700
				118		1850		2371		
RX8	14:24:18	14:33:30	Mid	152	155	125	128	134	136	South ± 7,000 (Land)
			Down	154	156	128	132	136	138	North 10,800
				150		1850		2371		
RX1	15:00:31	15:08:25	Mid	151	155	123	126	136	138	11,833
			Down	153	158	127	131	138	141	North 10,800
				117		1898		2403		
FW1	16:55:37	17:02:40	Mid	146	151	121	125	130	135	7,182
			Down	147	151	123	130	129	134	North 10,800
				120		1898		2403		
FW2	17:15:49	17:19:25	Mid	142	148	119	136	128	134	7,669
			Down	145	150	121	127	127	133	North 10,800
				120		1898		2403		
FW3	17:31:49	17:36:07	Mid	142	153	119	124	128	136	7,700
			Down	144	153	120	127	127	135	North 10,800
				120		1898		2403		
FW4	17:43:36	17:46:46	Mid	146	149	118	123	130	135	7,022
			Down	146	154	120	126	129	135	North 10,800
				120		1898		2403		
10/8/2011										
FW5	8:43:33	8:51:03	Mid	146	153	129	137	127	134	9,816
			Down	146	152	130	137	135	141	North 10,800
				100		885		2359		
FW6	9:01:45	9:05:03	Mid	145	154	126	134	124	127	7,715
			Down	145	153	128	136	132	139	North 10,800
				100		885		2359		
FW7	9:11:52	9:14:11	Mid	144	154	128	137			5,415
			Down	144	154	127	136			

Event Description	Start Time	Stop Time	Sensor	Measured Sound Pressure Level - RMS						Calculated distance to 120 dB RMS (meters)
				WRA Boat		Mid Channel		Raft		
				Ave	Max	Ave	Max	Ave	Max	
10/8/2011 (continued)										
				100		885				
FW8	9:19:13	9:27:23	Mid	144	151	126	132			4,294
			Down	144	153	127	136			
				100		885				
10/10/2011										
W6	13:30:46	13:39:27	Mid	155	163	132	139			11,307
			Down	158	164	136	140			North 10,800
				87		995				
W5	13:57:17	14:03:46	Mid	154	162	131	139			9,932
			Down	157	164	134	142			North 10,800
				65		995				
W4	14;16:28	14:23:32	Mid	151	167	129	146			South ± 7,000 (Land)
			Down	152	168	131	148			North ± 13,000 (Land)
				65		995				
W6 - REVIB	14:25:20	14:25:51	Mid	155	165	135	142			South ± 7,000 (Land)
			Down	155	162	137	144			North ± 13,000 (Land)
				87		995				
W3	14:34:50	14:40:39	Mid	154	161	130	137			8,717
			Down	155	163	134	142			
				65		995				
W5 - REVIB	14:34:50	14:40:39	Mid	146	156	123	124			2,876
			Down	147	158	123	127			
				55		995				
W11	16:14:03	16:24:49	Mid	149	159	132	142			11,747
			Down	152	159	134	143			
				115		1025				
W12	16:41:25	16:52:37	Mid	143	152	127	136			6,070
			Down	146	154	129	137			
				115		1025				
10/11/2011										
W2	8:56:08	9:04:30	Mid	147	155	131	141	116	128	9,380
			Down	149	156	135	145	118	132	
				146		850		2368		
W1	9:21:31	9:25:49	Mid	147	159	129	140	114	127	11,567
			Down	149	157	133	141	130	140	
				135		850		2368		
W7	10:53:25	11:05:03	Mid	148	154	132	139	120	135	10,934
			Down	150	155	134	140	132	139	
				130		869		2387		
W9	11:13:03	11:23:02	Mid	147	155	132	143	118	133	South ± 7,000 (Land)
			Down	149	160	134	144	133	143	North ± 13,000 (Land)
				130		869		2387		
W10	12:20:32	12:31:05	Mid	148	155	127	132			5,860
			Down	149	157	130	134			
				122		857				
W8	14:01:22	14:11:03	Mid	145	153	123	128			4,791

Event Description	Start Time	Stop Time	Sensor	Measured Sound Pressure Level - RMS						Calculated distance to 120 dB RMS (meters)
				WRA Boat		Mid Channel		Raft		
				Ave	Max	Ave	Max	Ave	Max	
10/11/2011 (continued)										
			Down	147	155	126	133	125	132	
				130		869		2387		
10/12/2011										
EHW12	10:58:53	11:39:47	Mid	147	152	130	138			8,722
			Down	151	157	133	139			
				167		1000				
EHW13	14:57:57	15:20:19	Mid	129	134	131	141			11,016
			Down	133	140	133	141			
				1450		1000				
EHW10	17:47:52	18:14:26	Mid	127	138	122	136			South ± 7,000 (Land)
			Down	132	140	124	138			North 11,900
				1450		1500				
10/13/2011										
EHW10	9:57:49	10:06:14	Mid	134	139	131	134	137	141	South ± 7,000 (Land)
			Down	138	141	132	135	139	142	North ± 13,000 (Land)
				1448		3985		2357		
EHW10 - Cont.	10:32:06	10:45:48	Mid	127	132	125	130	128	133	South ± 7,000 (Land)
			Down	130	133	125	131	129	134	Notrh 9,900
				1448		3985		2357		
EHW7	13:01:23	13:07:00	Mid	136	139	136	139	138	140	South ± 7,000 (Land)
			Down	137	140	137	139	137	139	North ± 13,000 (Land)
				1445		3933		2358		
EHW7 - Cont.	13:21:34	13:46:55	Mid	135	143	134	143	139	147	South ± 7,000 (Land)
			Down	136	145	136	143	138	145	North ± 13,000 (Land)
				1445		3933		2358		
EHW5	13:55:36	14:34:08	Mid	135	144	134	144	138	145	South ± 7,000 (Land)
			Down	137	144	136	142	136	141	North ± 13,000 (Land)
				1449		3940		2365		
10/14/2011										
EHW6	12:32:50	13:05:34	Mid	131	138	132	140			South ± 7,000 (Land)
			Down	135	140	135	142	135	141	North ± 13,000 (Land)
				1063		890		2361		
EHW5	13:07:52	13:10:43	Mid	135	138	133	135			South ± 7,000 (Land)
			Down	138	142	134	139	135	140	North ± 13,000 (Land)
				1065		890		2365		

Event Description	Start Time	Stop Time	Sensor	Measured Sound Pressure Level - RMS						Calculated distance to 120 dB RMS (meters)
				WRA Boat		Mid Channel		Raft		
				Ave	Max	Ave	Max	Ave	Max	
10/14/2011 (continued)										
EHW4	13:16:31	13:34:33	Mid	132	139	134	140			South ± 7,000 (Land)
			Down	136	142	138	144	138	143	North ± 13,000 (Land)
				1059		890		2359		
EHW3	13:42:03	13:47:09	Mid	134	134	133	133			South ± 7,000 (Land)
			Down	137	137	136	136			North 9,600
				1060		890				
EHW1	13:51:50	13:57:14	Mid	125	132	126	132			
			Down	131	136	128	134	131	136	North 9,300
				1063		890		2365		
EHW1 - Cont.	14:21:35	14:35:56	Mid	131	140	131	138			South ± 7,000 (Land)
			Down	138	143	134	140	134	142	North ± 13,000 (Land)
				1063		890		2365		
EHW3	16:46:11	17:01:47	Mid	134	139	133	138			South ± 7,000 (Land)
			Down	140	143	138	143			North ± 13,000 (Land)
				1060		890		2361		
10/15/2011										
EHW2	10:25:17	10:45:27	Mid	133	143	115	118	138	144	South ± 7,000 (Land)
			Down	135	143	114	117	136	142	North ± 13,000 (Land)
				1068		3540		2363		
EHW9	11:28:42	11:42:06	Mid	133	138	136	143	138	143	South ± 7,000 (Land)
			Down	135	139	139	144	136	142	North ± 13,000 (Land)
				1068		1120		2360		
EHW9 - Cont.	11:56:19	11:57:12	Mid	136	139	138	140	140	142	South ± 7,000 (Land)
			Down	137	139	141	143	139	142	North ± 13,000 (Land)
				1068		1120		2360		
EHW8	12:54:35	13:11:31	Mid	147	152	132	140	137	142	South ± 7,000 (Land)
			Down	149	155	135	140	135	140	North ± 13,000 (Land)
				210		1124		2363		
10/17/2011										
EHW14	14:52:06	14:59:31	Mid	146	148	138	140	139	142	South ± 7,000 (Land)
			Down	152	153	141	144			North ± 13,000 (Land)
				275		2221		2361		

Event Description	Start Time	Stop Time	Sensor	Measured Sound Pressure Level - RMS						Calculated distance to 120 dB RMS (meters)
				WRA Boat		Mid Channel		Raft		
				Ave	Max	Ave	Max	Ave	Max	
10/14/2011 (continued)										
EHW14 - Cont.	15:25:46	15:32:32	Mid	148	150	139	142	140	142	South ± 7,000 (Land)
			Down	152	153	141	143			North ± 13,000 (Land)
				275		2221		2361		
EHW15	15:58:46	16:05:33	Mid	145	146	133	135	132	133	South ± 7,000 (Land)
			Down	148	149	135	137			North 10,700
				275		2220		2357		
EHW15 - Cont.	16:27:34	16:39:14	Mid	144	151	132	144	138	146	South ± 7,000 (Land)
			Down	148	155	136	145			North ± 13,000 (Land)
				275		2220		2357		
10/19/2011										
EHW11	11:59:25	12:04:53	Mid	147	150	133	137	136	140	South ± 7,000 (Land)
			Down	152	155	137	140	138	141	North ± 13,000 (Land)
				155		1096		2362		
EHW11 - Cont.	12:22:02	12:28:29	Mid	151	153	133	136	140	142	South ± 7,000 (Land)
			Down	153	155	139	140	140	145	North ± 13,000 (Land)
				155		1096		2362		
10/21/2011										
W-8	14:43:13	14:51:24	Mid	153	157	131	136			6,899
	14:43:13	14:51:24	Down	152	156	132	136			
				143		715				
W-10	14:53:59	14:58:38	Mid	155	158					South ± 7,000 (Land)
			Down	155	159					North 12,200
				143						
W-1	14:58:43	15:09:30		144	152	126	137			5,242
			Mid	146	152	124	137			
			Down	143		715				
W-2	15:11:56	15:15:29		147	153	129	135			4,984
			Mid	147	152	128	135			
			Down	143		701				
W-3	15:37:01	15:39:51				120	122			821
			Mid			119	120			
			Down			715				
W-4	16:00:34	16:11:39		143	153	122	137			5,246
			Mid	145	154	123	135			
			Down	132		715				
W-5	16:13:55	16:16:47	Mid	150	153	127	135			5,199
			Down	150	155	128	135			
				132		715				
W-6	16:18:14	16:21:54	Mid	151	154	131	135			5,643
			Down	153	155	132	135			
				132		715				

Event Description	Start Time	Stop Time	Sensor	Measured Sound Pressure Level - RMS						Calculated distance to 120 dB RMS (meters)
				WRA Boat		Mid Channel		Raft		
				Ave	Max	Ave	Max	Ave	Max	
10/27/2011										
W7	9:55:24	10:03:08	Mid			137	138	141	143	South ± 7,000 (Land)
			Down	160	161	143	144			North ± 13,000 (Land)
				183		880		2355		
W9	10:05:17	10:08:51	Mid			131	137	134	138	South ± 7,000 (Land)
			Down	151	154	137	140			North 10,400
				150		885		2374		
W12	10:12:52	10:18:33	Mid			135	138	137	140	South ± 7,000 (Land)
			Down	152	156	137	140			North 12,000
				150		885		2374		
W11	10:21:04	10:26:12	Mid			136	142	139	141	South ± 7,000 (Land)
			Down	153	157	139	144			North ± 13,000 (Land)
				150		885		2374		
EX3	11:24:13	11:25:58	Mid	145	147	127	130	131	133	4,706
			Down	146	147	130	131			
				180		880		2355		
EX4	11:28:00	11:28:14	Mid	139	148	124	129	128	132	4,566
			Down	140	148	127	131			
				180		880		2355		
EX3 - Cont.	11:31:00	11:31:18	Mid	142	142	121	121	128	128	2,754
			Down	143	144	127	127			
				180		880		2355		
EX5	11:49:48	11:52:38	Mid	128	152	129	136	134	138	South ± 7,000 (Land)
			Down	128	151	135	139			North 8,800
				180		880		2355		
EX6	11:58:49	12:02:13	Mid	128	151	129	134	134	136	South ± 7,000 (Land)
			Down	129	150	136	139			North 7,700
				180		880		2355		

Notes:

[A] RMS Sound levels during vibratory driving analyzed in 10 sec periods "Max" is the maximum level for any 10 sec. period "Avg" is the average of the 10 sec.periods over the duration of the pile driving events.

[B] Based on best available data for each pile driving event

The detailed results of every measurement are presented in **Appendix B**. These data were carefully reviewed to evaluate the data gathered during each measurement. In many cases, measured sound levels outside the WRA were similar to ambient or background levels[1]. As a result, levels from pile driving were not discernable from background during many distant measurements. Where instrumentation-related effects or background noise was believed to influence measured sound levels, the levels are reported as being less than the measured level. This accounts for the potential influence of ambient noise. Similarly, where estimated distances to the 120 dB RMS are believed to include the potential influence of ambient noise in the measurements, these distances have been indicated with a 'less than' symbol. The large variation in distances to the 120 dB threshold level exemplifies the sensitivity of this prediction to small changes in the sound level. Ideally, ambient noise levels should be at least 10 dB below the signal level in order to not influence the measurement of the pile driving noise. This was rarely the case when measuring pile driving sound levels of less than about 125 dB.

Summary of Airborne Sound Monitoring Data

Airborne sound levels were measured and analyzed as both A-weighted and un-weighted levels. Airborne sound levels were measured in 1-second intervals throughout each work day on the WRA boat, and continuously at the land-based monitoring site. The maximum sound level measured during each event was used to estimate the distances to the marine mammal behavioral threshold levels.

The airborne measuring microphones were affected by pile driving noise, other construction activities, and other noise sources including patrol boats, monitoring boats, and intermittent sources such as voices and radio communications. The level of these noises and their frequency of occurrence depended upon the noises that were being generated in proximity to each of the measuring microphones. It was, therefore, not possible to correlate data between the different locations. Noise levels from competing sources with the pile driving were frequently at levels equal to or above the noise level generated by the pile driving activities. This does not mean those sources are louder, just that they produced higher amplitude noise at some of the microphones. While vibratory driving may be clearly audible from the construction barge to humans, the low-frequency contribution from engines and other construction equipment may contribute significantly to the un-weighted sound levels that are measured prior, during and after pile driving. This compromises the use of these data for predicting attenuation of the vibratory sound levels, since the competing sources are at different distances than the vibratory pile driving sounds.

The results of daily monitoring of air-borne sound levels during vibratory pile driving are summarized in **Table 3**. The table shows the average and maximum sound levels during each pile driving event measured at the WRA boat and on-shore position(s). The distances between the pile and the other microphone positions were estimated as previously described. Maximum sound levels during vibratory driving typically resulted from non-vibratory pile driving sources. On the WRA boat, the primary source was radio communications carried on by the marine mammal monitor who frequently stood near the air-borne microphone. The north shore position was less affected by non-construction related sources.

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1 Background could be noise from current, wind and wave effects causing strumming, or ambient levels, or a combination of both.

Table 3. Summary of Airborne Sound Levels During Pile Driving

Event Description	Weighting	Measured Sound Pressure Level - RMS						Calculated distance (m) to 100 dB RMS	Calculated distance (m) to 90 dB RMS
		WRA Boat		North Shore		South Shore			
		Ave	Max	Ave	Max	Ave	Max		
Date:	**10/4/2011**								
Inside Pile EHW1	Unweighted	N/A	N/A	69	75	74	79	15	50
	A-weighted	N/A	N/A	59	63	55	62		
	Distance(m)	150		265		527			
Date:	**10/5/2011**								
BP1	Unweighted	78	85	73	79	66	71	29	92
	A-weighted	67	77	64	72	54	60		
	Distance(m)	170		265		527			
BP2	Unweighted	81	86	73	77	68	73	33	105
	A-weighted	70	78	61	67	54	59		
	Distance(m)	170		265		527			
Date:	**10/7/2011**								
RX5	Unweighted	78	89	N/A	N/A	Meter Removed 10/5/2011		34	109
	A-weighted	68	82	N/A	N/A				
	Distance(m)	118							
RX6	Unweighted	83	90	N/A	N/A			37	117
	A-weighted	71	83	N/A	N/A				
	Distance(m)	118							
RX7	Unweighted	78	83	N/A	N/A			16	52
	A-weighted	66	73	N/A	N/A				
	Distance(m)	118							
RX8	Unweighted	79	87	N/A	N/A			33	105
	A-weighted	66	79	N/A	N/A				
	Distance(m)	150							
RX1	Unweighted	N/A	N/A	N/A	N/A				
	A-weighted	N/A	N/A	N/A	N/A				
	Distance(m)	117							
FW1	Unweighted	79	85	N/A	N/A			22	68
	A-weighted	68	75	N/A	N/A				
	Distance(m)	120							
FW2	Unweighted	80	84	N/A	N/A			18	58
	A-weighted	65	76	N/A	N/A				
	Distance(m)	120							
FW3	Unweighted	81	87	N/A	N/A			28	88
	A-weighted	67	79	N/A	N/A				
	Distance(m)	120							
FW4	Unweighted	83	85	N/A	N/A			22	68
	A-weighted	66	74	N/A	N/A				
	Distance(m)	120							
Date:	**10/8/2011**								
FW5	Unweighted	75	80	N/A	N/A			10	30
	A-weighted	64	73	N/A	N/A				
	Distance(m)	100							
FW6	Unweighted	76	82	N/A	N/A			12	38
	A-weighted	64	70	N/A	N/A				
	Distance(m)	100							
FW7	Unweighted	75	81	N/A	N/A			11	36
	A-weighted	64	69	N/A	N/A				
	Distance(m)	100							

Event Description	Weighting	Measured Sound Pressure Level - RMS				Calculated distance (m) to 100 dB RMS	Calculated distance (m) to 90 dB RMS
		WRA Boat		North Shore			
		Ave	Max	Ave	Max		
Date:	**10/8/2011 Cont.**						
FW8	Unweighted	73	83	N/A	N/A	14	44
	A-weighted	63	78	N/A	N/A		
	Distance(m)	100					
Date:	**10/10/2011**						
W6	Unweighted	84	89	78	81	24	76
	A-weighted	72	79	66	72		
	Distance(m)	87		238			
W5	Unweighted	83	89	78	84	18	56
	A-weighted	73	81	67	73		
	Distance(m)	65		238			
W4	Unweighted	84	94	79	85	32	102
	A-weighted	72	81	65	84		
	Distance(m)	65		238			
W6 - Revib	Unweighted	82	87	79	83	19	60
	A-weighted	74	80	67	73		
	Distance(m)	87		238			
W3	Unweighted	83	89	79	84	19	61
	A-weighted	72	77	65	70		
	Distance(m)	65		238			
W5 - Revib	Unweighted	80	90	79	83	17	54
	A-weighted	68	77	63	69		
	Distance(m)	55		238			
W11	Unweighted	82	87	78	88	26	83
	A-weighted	67	75	65	75		
	Distance(m)	115		238			
W12	Unweighted	78	86	75	86	23	73
	A-weighted	68	79	65	74		
	Distance(m)	115		238			
Date:	**10/11/2011**						
W2[1]	Unweighted	80	89	78	81	28	89
	A-weighted	65	78	64	70		
	Distance(m)	146		250			
W1[1]	Unweighted	78	86	78	82	32	102
	A-weighted	68	77	66	74		
	Distance(m)	135		250			
W7[1]	Unweighted	88	100	79	84	37	117
	A-weighted	68	78	66	75		
	Distance(m)	130		230			
W9[1]	Unweighted	82	97	78	86	48	152
	A-weighted	68	83	66	80		
	Distance(m)	130		230			
W10[1]	Unweighted	94	109	79	85	42	132
	A-weighted	70	77	67	74		
	Distance(m)	122		230			
W8[1]	Unweighted	85	98	80	85	40	128
	A-weighted	68	76	66	72		
	Distance(m)	130		230			

Event Description	Weighting	Measured Sound Pressure Level - RMS				Calculated distance (m) to 100 dB RMS	Calculated distance (m) to 90 dB RMS
		WRA Boat		North Shore			
		Ave	Max	Ave	Max		
Date:	**10/11/2011 Cont.**						
EHW16[1]	Unweighted	86	101	75	83	38	120
	A-weighted	69	78	64	71		
	Distance(m)	159		272			
	Unweighted	87	100	73	80	26	83
	A-weighted	69	76	64	71		
	Distance(m)	159		272			
	Unweighted	89	104	73	86	56	178
	A-weighted	70	79	63	74		
	Distance(m)	159		272			
Date:	**10/12/2011**						
EHW12	Unweighted	82	89	N/A	N/A	45	144
	A-weighted	73	85	N/A	N/A		
	Distance(m)	167					
EHW13[2]	Unweighted	71	83	N/A	N/A	--	--
	A-weighted	69	82	N/A	N/A		
	Distance(m)	1450					
EHW10[2]	Unweighted	73	85	N/A	N/A	--	--
	A-weighted	64	85	N/A	N/A		
	Distance(m)	1450					
Date:	**10/13/2011**						
EHW10[2]	Unweighted	77	82	N/A	N/A	--	--
	A-weighted	63	81	N/A	N/A		
	Distance(m)	1448					
	Unweighted	72	85	N/A	N/A	--	--
	A-weighted	61	85	N/A	N/A		
	Distance(m)	1448					
EHW7[2]	Unweighted	81	87	N/A	N/A	--	--
	A-weighted	69	77	N/A	N/A		
	Distance(m)	1445					
	Unweighted	79	90	N/A	N/A	--	--
	A-weighted	66	76	N/A	N/A		
	Distance(m)	1445					
EHW5	Unweighted	80	89	N/A	N/A	--	--
	A-weighted	71	88	N/A	N/A		
	Distance(m)	1449					
Date:	**10/14/2011**						
EHW6[2]	Unweighted	75	84	N/A	N/A	--	--
	A-weighted	67	76	N/A	N/A		
	Distance(m)	1063					
EHW5[2]	Unweighted	75	81	N/A	N/A	--	--
	A-weighted	66	73	N/A	N/A		
	Distance(m)	1065					
EHW4[2]	Unweighted	73	81	N/A	N/A	--	--
	A-weighted	66	77	N/A	N/A		
	Distance(m)	1059					
EHW3[2]	Unweighted	N/A	N/A	N/A	N/A	--	--
	A-weighted	N/A	N/A	N/A	N/A		
	Distance(m)	1060					

Event Description	Weighting	Measured Sound Pressure Level - RMS				Calculated distance (m) to 100 dB RMS	Calculated distance (m) to 90 dB RMS
		WRA Boat		North Shore			
		Ave	Max	Ave	Max		
Date:	**10/14/2011 Cont.**						
EHW1[2]	Unweighted	74	81	N/A	N/A	--	--
	A-weighted	68	78	N/A	N/A		
	Distance(m)	1063					
	Unweighted	76	84	N/A	N/A	--	--
	A-weighted	67	80	N/A	N/A		
	Distance(m)	1063					
EHW3[2]	Unweighted	82	86	N/A	N/A	--	--
	A-weighted	68	76	N/A	N/A		
	Distance(m)	1060					
Date:	**10/15/2011**						
EHW2[2]	Unweighted	75	86	N/A	N/A	--	--
	A-weighted	66	77	N/A	N/A		
	Distance(m)	1068					
EHW9[2]	Unweighted	76	87	N/A	N/A	--	--
	A-weighted	66	75	N/A	N/A		
	Distance(m)	1068					
	Unweighted	N/A	N/A	N/A	N/A	--	--
	A-weighted	N/A	N/A	N/A	N/A		
	Distance(m)	1068					
EHW8	Unweighted	80	89	N/A	N/A	60	189
	A-weighted	74	85	N/A	N/A		
	Distance(m)	210					
Date:	**10/17/2011**						
EHW14	Unweighted	77	84	N/A	N/A	45	143
	A-weighted	68	83	N/A	N/A		
	Distance(m)	275					
	Unweighted	80	90	N/A	N/A	86	272
	A-weighted	73	88	N/A	N/A		
	Distance(m)	275					
EHW15	Unweighted	77	89	N/A	N/A	73	231
	A-weighted	66	79	N/A	N/A		
	Distance(m)	275					
	Unweighted	77	84	N/A	N/A	44	139
	A-weighted	66	79	N/A	N/A		
	Distance(m)	275					
Date:	**10/19/2011**						
EHW11	Unweighted	79	87	N/A	N/A	35	110
	A-weighted	71	83	N/A	N/A		
	Distance(m)	155					
	Unweighted	81	89	N/A	N/A	43	137
	A-weighted	68	86	N/A	N/A		
	Distance(m)	155					
Date:	**10/21/2011**						
W8	Unweighted	82	91	N/A	N/A	53	168
	A-weighted	64	71	N/A	N/A		
	Distance(m)	143					
W10	Unweighted	82	91	N/A	N/A	52	164
	A-weighted	66	71	N/A	N/A		
	Distance(m)	143					

Event Description	Weighting	Measured Sound Pressure Level - RMS				Calculated distance (m) to 100 dB RMS	Calculated distance (m) to 90 dB RMS
		WRA Boat		North Shore			
		Ave	Max	Ave	Max		
Date:	**10/21/2011 Cont.**						
W1	Unweighted	84	97	N/A	N/A	96	302
	A-weighted	63	71	N/A	N/A		
	Distance(m)	143					
W2	Unweighted	83	94	N/A	N/A	75	237
	A-weighted	63	72	N/A	N/A		
	Distance(m)	143					
W3	Unweighted	N/A	N/A	N/A	N/A		
	A-weighted	N/A	N/A	N/A	N/A		
	Distance(m)						
W4	Unweighted	80	92	N/A	N/A	50	159
	A-weighted	63	73	N/A	N/A		
	Distance(m)	132					
W5	Unweighted	79	86	N/A	N/A	26	83
	A-weighted	63	71	N/A	N/A		
	Distance(m)	132					
W6	Unweighted	79	96	N/A	N/A	86	273
	A-weighted	65	72	N/A	N/A		
	Distance(m)	132					
Date:	**10/27/2011**						
W7	Unweighted	N/A	N/A	N/A	N/A		
	A-weighted	N/A	N/A	N/A	N/A		
	Distance(m)	183					
W9	Unweighted	N/A	N/A	N/A	N/A		
	A-weighted	N/A	N/A	N/A	N/A		
	Distance(m)	150					
W12	Unweighted	N/A	N/A	N/A	N/A		
	A-weighted	N/A	N/A	N/A	N/A		
	Distance(m)	150					
W11	Unweighted	N/A	N/A	N/A	N/A		
	A-weighted	N/A	N/A	N/A	N/A		
	Distance(m)	150					
EX3	Unweighted	76	83	N/A	N/A	26	81
	A-weighted	61	71	N/A	N/A		
	Distance(m)	180					
EX4	Unweighted	77	81	N/A	N/A	20	62
	A-weighted	62	71	N/A	N/A		
	Distance(m)	180					
EX3	Unweighted	75	81	N/A	N/A	21	65
	A-weighted	62	71	N/A	N/A		
	Distance(m)	180					
EX5	Unweighted	70	78	N/A	N/A	14	45
	A-weighted	59	75	N/A	N/A		
	Distance(m)	180					
EX6	Unweighted	74	81	N/A	N/A	20	65
	A-weighted	60	74	N/A	N/A		
	Distance(m)	180					

Notes:
[1] Airborne data on WRA boat not valid due to contamination from rain
[2] WRA boat was too far from pile driving, sounds were generated by sources other than pile driving.

The measurements from the WRA boat were normalized to 100 meters, for comparison purposes. The normalized maximum un-weighted sound levels ranged from 80 dB to 98 dB. Maximum A-weighted sound levels ranged from 69 decibels A-weighted (dBA) to 92 dBA at the normalized distance of 100 meters from the pile. Sound levels averaged over the duration of the vibratory pile driving events were typically 10 dB +/- lower than the maximum levels. Just as with underwater sound levels, maximum levels occurred for short periods near the beginning and/or the end of a vibratory event.

Evaluation of Work Plan Objectives

The objectives of the Work Plan for EHW-1 addressed in this report are:

1. Define the size of underwater behavioral buffer zones.
2. Define the size of air-borne behavioral buffer zones.

The following discussion addressing the behavioral zones is organized into underwater and airborne sections.

Underwater Behavioral Buffer Zone

(a) 120 dB RMS for all marine mammals (vibratory driving).

The behavioral threshold is defined by the average sound level over the duration of the pile driving event from vibratory driving. Data in **Table 2** were used to determine the overall relationships of RMS sound levels versus distance for the EHW-1 project. The acoustic spreading loss curves for each of these conditions are shown in **Figures 19 through 22**. The transmission coefficients were then used to calculate overall distances to the various threshold levels.

The distances to where RMS sound pressure levels were 120 dB or higher reported in **Table 4** represent the estimated distances by computing the propagation rate from all measurements for an average pile size as determined during EHW-1. This provides an overall distance, but not a distance that would be based on an upper or lower bound number. While the summarized data in **Table 4** shows the calculated distances to the 120-dB RMS sound pressure level ranged from 5,400 to beyond 17,000 meters, the calculated day to day estimated range was from 718 meters to beyond 7,000 meters, limited to land at 7,000 to the south and 13,000 meters to the north. The estimated distances to the 120-dB RMS sound pressure level were beyond 17,000 meters, but measurements were never made at distances greater than 10,000 meters. It is important to note that measurements of vibratory pile driving during EHW-1 were limited to the WRA vessel, a mid-channel position, and the raft located about ±2,500 meters from EHW-1. Background was typically the result of current or wave action when the background level exceeded 120 dB.

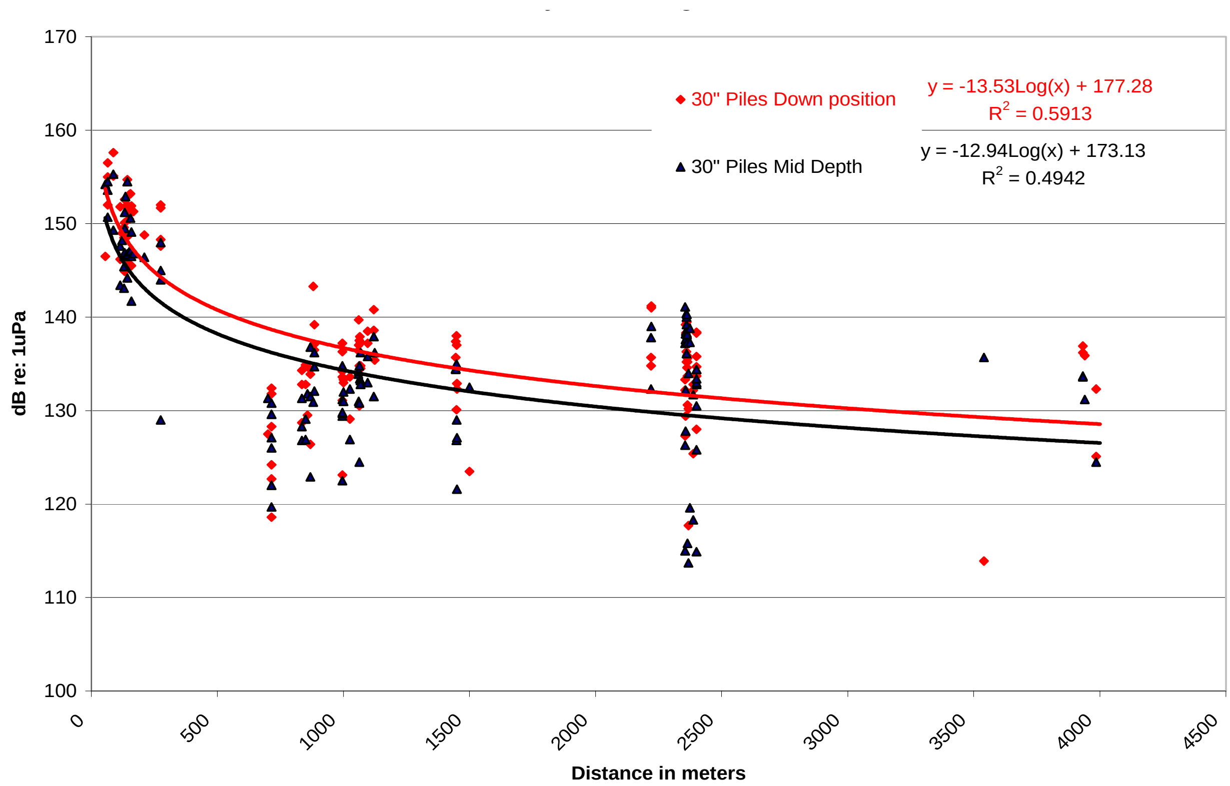

Figure 17. Acoustic Spreading Loss of RMS Levels – 30-inch Piles with Vibratory Hammer

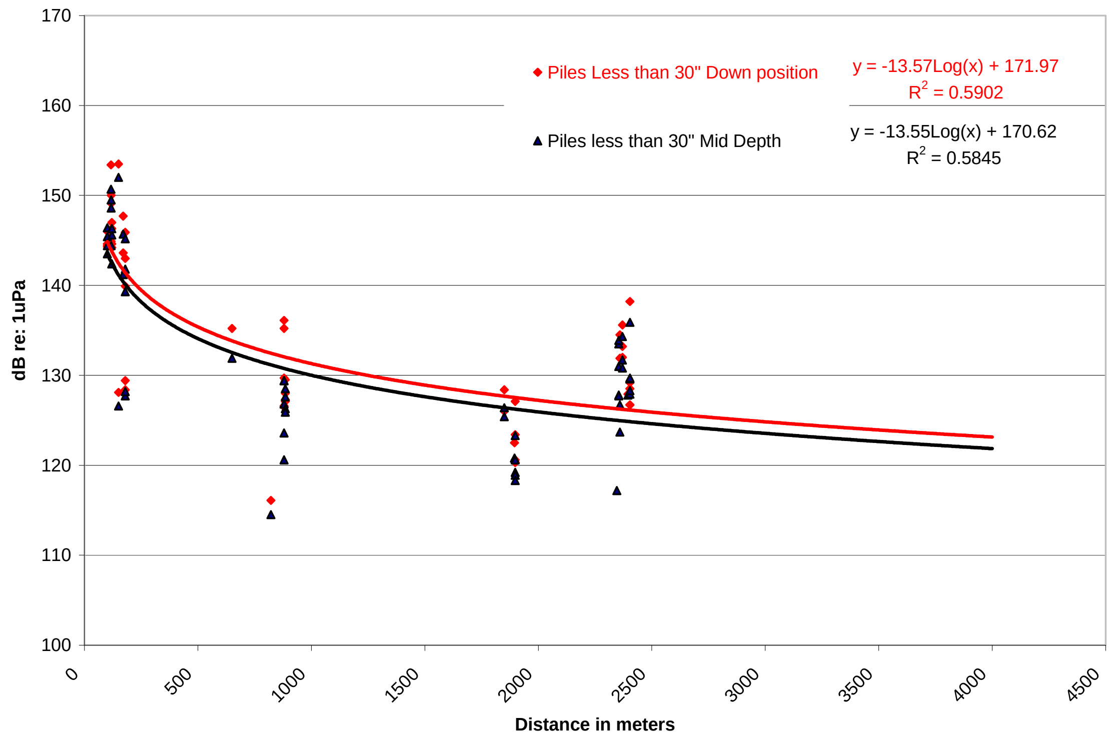

Figure 18. Acoustic Spreading Loss of RMS Levels – Piles less than 30" with Vibratory Hammer

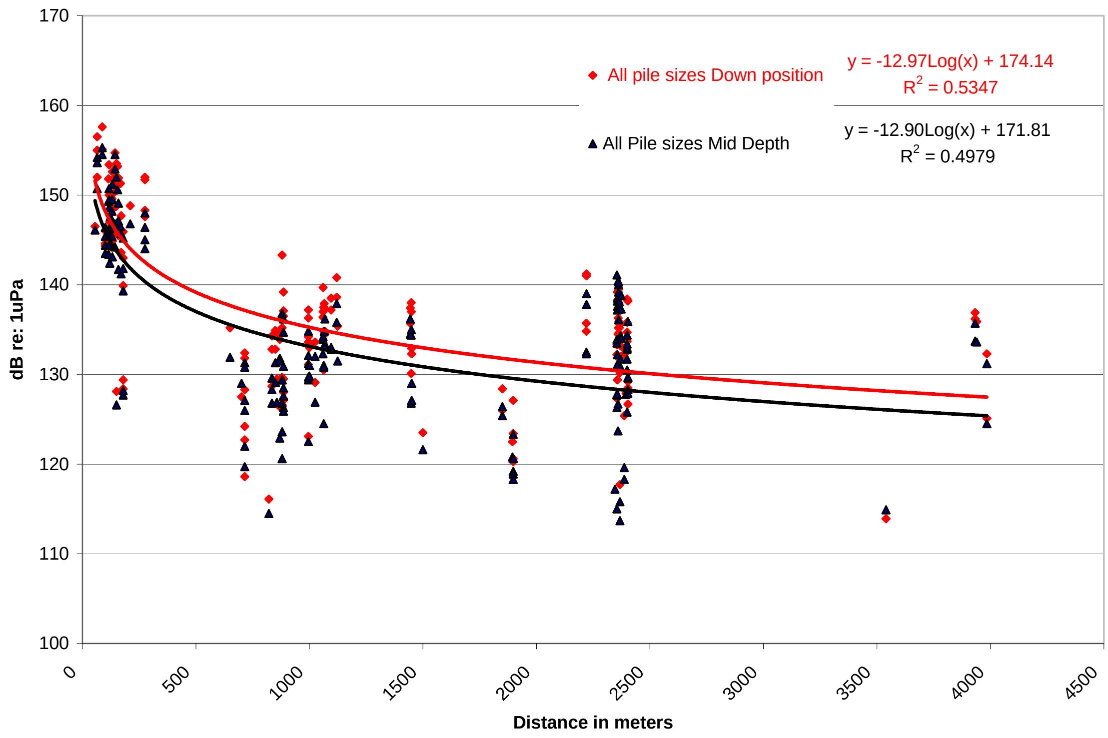

Figure 19. Acoustic Spreading Loss of RMS Levels – All Pile Sizes Piles with Vibratory Hammer

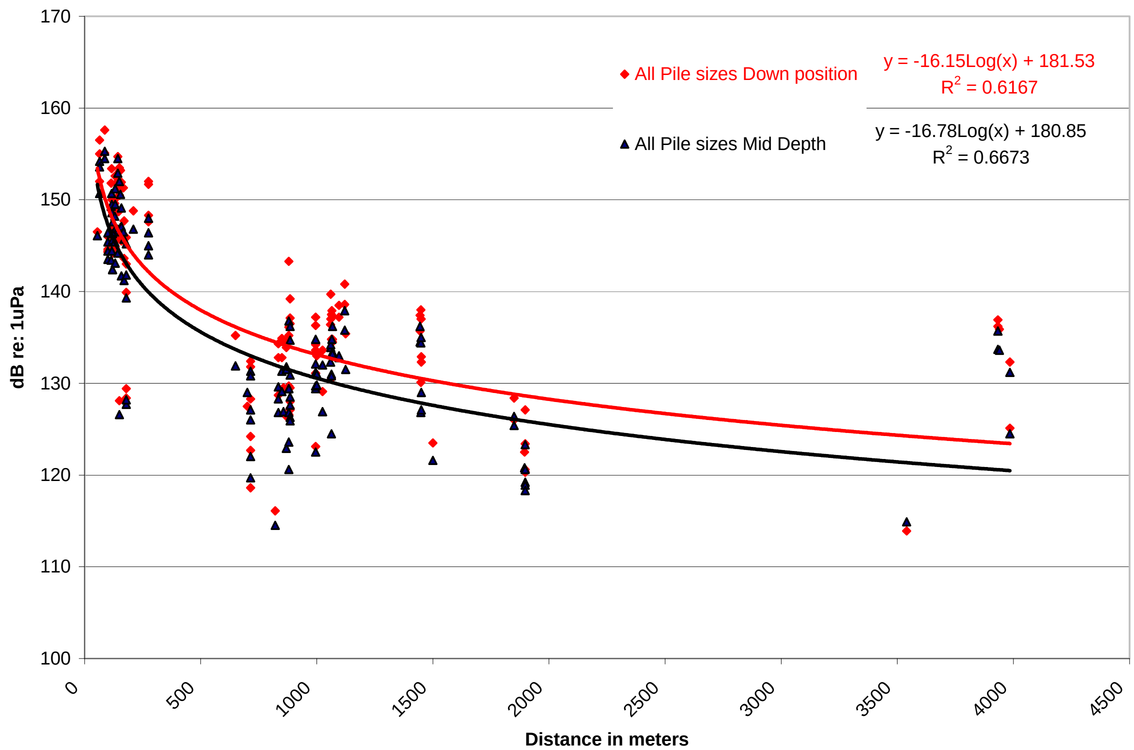

Figure 20. Acoustic Spreading Loss of RMS Levels – All Pile Sizes Piles with Vibratory Hammer Excluding RFT Data

Table 4. Distances to 120 dB RMS Sound Level Threshold From Vibratory Pile Driving

Pile Size	Distance (meters)	
	100 dB	90 dB
	120	120
Less than 30" Piles	6,813	5,481
30" Piles	17,167	12,793
All Sizes	14,998	10,411
All Piles Without the Raft Data	6,498	4,252

Airborne Behavioral Buffer Zones

The measurement data are used to compute the distances to the boundaries of behavioral buffer zones defined by the following air-borne sound levels:

(a) Air-borne behavioral buffer zone – 100 dB for all pinnipeds except harbor seals; and

(b) Air-borne behavioral buffer zone – 90 dB for harbor seals.

Table 5 shows the distances to the air-borne sound thresholds during vibratory pile driving. The table also shows the sound levels that were predicted prior to EHW-1 and the corresponding distances to the threshold levels. Distances were calculated from the best available air-borne data, assuming a standard air-borne sound propagation loss of 6 dB per doubling of distance from the source (20 $\log_{10}$).

Table 5. Distances to Airborne Sound Level Thresholds From Vibratory Pile Driving

Vibratory Pile Driving		Distance (meters)	
Threshold		100 dB	90 dB
30" Piles	Max	96	302
	Min	10	17
	Average	44	138
Piles less than 30"	Max	37	117
	Min	10	10
	Average	22	69
All Piles	Max	96	302
	Min	10	30
	Average	35	111

Comparison of "Soft-Start" Sound Levels to Levels during Driving

Pile installation and removal activities included soft-start procedures during the installation or removal of the pile with a vibratory hammer. Soft-starts were not required when there were fewer than 30 minutes between pile driving events. Following the soft starts, the pile was driven to completion. Soft-starts were intended to provide an opportunity for nearby marine mammals to voluntarily leave the area. For vibratory driving, there was a short period of several seconds of vibratory hammer operation, three times, again each separated by about a 1-minute interval.

Table 6 shows all of the measurement results during vibratory driving. Data in **Table 6** are provided for first, second, and third soft-starts for each representative pile driving event. Sound levels were typically lower during soft-starts than at the initiation of either a pile driving event or a pile removal. There were a couple of instances when the soft-start levels were higher than sound levels at the initiation of the drive. In summary, soft starts produced sound levels that could be slightly higher but generally lower than sounds that occurred when continuous driving commenced.

Table 6. Comparison of Soft Start Levels and Levels at Start of Vibratory Pile Driving

Difference [A] in RMS dB (re:1µPa)															
Pile	Pile Size	Soft Starts												Start Drive	
		1				2				3					
		Mid		Down		Mid		Down		Mid		Down		Mid	Down
BP1 (EHW-14)	30"	152	3	149	5	148	-1	144	0	152	3	144	0	149	144
RX5	12"	150	3	150	3	151	4	151	4	148	1	150	3	147	147
RX8	24"	145	-6	147	-5	147	-4	150	-2	148	-3	149	-3	151	152
RX1	24"	153	5	155	3	151	3	152	0	149	1	151	-1	148	152
FW1	24"	135	-8	137	-8	138	-5	140	-5	138	-5	140	-5	143	145
FW5	16"	133	-13	136	-10	134	-12	136	-10	140	-6	142	-4	146	146
W6	30"	150	-5	151	-10	150	-5	153	-8	155	0	160	-1	155	161
W11	30"	150	-8	153	-5	150	-8	153	-5	156	-2	156	-2	158	158
W2	30"	NA	NA	147	6	NA	NA	146	5	146	2	146	5	144	141
W7	30"	149	-1	154	0	152	2	156	2	150	0	153	-1	150	154
W10	30"	153	0	154	0	154	1	154	0	148	-5	148	-6	153	154
W8	30"	150	-1	152	-2	153	2	154	0	152	1	154	0	151	154
EHW13	30"	141	-6	146	-5	142	-5	148	-3	143	-4	150	-1	147	151
EHW12	30"	148	-1	149	-3	144	-5	146	-6	149	0	150	-2	149	152
EHW13	30"	121	-11	128	-12	123	-9	127	-13	129	-3	138	-2	132	140
EHW10	30"	NA	NA	NA	NA	138	2	138	2	137	1	136	0	136	136
EHW10	30"	137	-1	138	-2	138	0	139	-1	139	1	140	0	138	140
EHW7	30"	133	-6	132	-7	129	-10	130	-9	136	-3	136	-3	139	139
EHW6	30"	130	-2	131	-3	127	-5	135	1	130	-2	134	0	132	134
EHW3	30"	134	-4	135	-6	134	-4	135	-6	136	-2	139	-2	138	141
EHW2	30"	131	-7	132	-6	129	-9	130	-8	134	-4	135	-3	138	138
EHW9	30"	134	2	134	4	135	3	135	5	130	-2	131	1	132	130
EHW8	30"	146	-6	144	-11	142	-10	146	-9	146	-6	151	-4	152	155
EHW14	30"	141	1	141	-3	143	3	144	0	144	4	146	2	140	144
EHW15	30"	149	6	152	5	148	5	152	5	147	4	152	5	143	147
EHW11	30"	151	1	156	1	148	-2	153	-2	150	0	156	1	150	155
W8	30"	154	2	154	2	152	0	152	0	152	0	152	0	152	152
W7	NA	NA	NA	156	-1	NA	NA	156	-1	NA	NA	159	2	NA	157
Average Difference			-3		-3		-3		-2		-1		-1		
[A] Difference between RMS level at the beginning of drive and average level during soft starts NA - Data not available															

Section 5 Summary of Findings

This section summarizes the major findings with respect to underwater sound levels during vibratory pile-driving activities. Prior to the EHW-1 work predictions of sound exposure were used to estimate the potential impacts to fish and marine mammals. This section compares those results and summarizes findings with respect to use of soft starts prior to the continuous pile driving.

Estimates of Safety or Harassment Zones Based on Monitored Data

Section 4 of this report provides estimates of the safety and harassment zones for each pile monitored. Those data were used to estimate impacts of the EHW-1 upon marine mammals.

Underwater Sounds from Vibratory Pile Driving

Typical vibratory pile driving during the EHW-1 resulted in sound levels that varied considerably through the driving periods. Vibratory sounds underwater were characterized by the measurement of RMS sound pressure levels. During the EHW-1, there were 65 vibratory driving events (i.e., installation or removal of piles) that were measured. During the EHW-1 project the near source levels (at 10 meters) were measured by Robert Miner Dynamic Testing, Inc. (see **Appendix D**). Only average RMS sound pressure levels measured at the mid distance (WRA Boat data) and distant level (Raft and Mid channel boat data) were used to calculate propagation rates shown in **Table 7**. Based on these data, the following findings were made:

- The near source levels were reported in a separate letter dated March 3, 2012 to Manson Construction and Engineering Company and prepared by Robert Miner Dynamic Testing, Inc. The closest measurement location that I&R measured was at the WRA boat location. The distances ranged from 65 meters to 1,450 meters with the majority of the measurements within 200 meters. The maximum level measured was 158 dB at 87 meters for piles less than 30-inches in diameter and 154 dB at 150 meters for 30-inch diameter piles.
- Prior to the EHW-1, the 120-dB behavioral disturbance zone for vibratory driving sounds was predicted to extend out along the main channel about 13,300 meters north where it would end at land in Squamish Harbor and about 7,500 meters south where it would end at Toandos Peninsula. The most distant measurement was 3,995 meters where sound levels were 125 dB. However, there were measurements closer than 3,995 meters where measured sound levels did not exceed 120 dB. The data collected during the EHW-1 cannot accurately estimate the extent of the 120-dB harassment zone, because of the large variability in measured sounds from drive to drive and the enormous size of the area. The data do, however, indicate that levels were not louder than those predicted for the project. Although most measurements were made within the zone predicted to have levels above 120 dB, the measurements made outside of the zone had levels less than 120 dB.
- Using the average WRA Boat measured level and the average propagation rates from measured vibratory sound levels for all piles; the calculated distance to the 120 dB zone was 5,481 to 17,167 meters.

- The measured sound levels at the raft were higher than would have been anticipated when comparing them to the sound pressure levels measured at the Mid Channel boat. When using the data from the raft the propagation loss was much lower than typical levels measured at other project locations. Measured sound levels at the RFT location were typically higher than the MID Channel position, which was closer. This may have been due to the configuration of the bottom of the Hood Canal from the pile driving location across to the raft. The canal is very deep (±400 feet) in the center and has a steep rise to a shallow area where the raft was located (±70 feet). This rise could cause the sound pressure wave to be locally compressed and allow for the higher measured levels. When the raft data is not used to calculate the regression curves the average propagation rate was calculated to be 16.47 Log_{10}, which is more in line with the expected rate. Using this propagation rate the distance to the 120-dB is between 4,252 and 6,498 meters.
- Sound levels during soft starts were typically lower than those levels at the initiation and completion of continuous vibratory driving. However, levels during continuous driving varied considerably and were at times lower than those produced during the soft starts. It is difficult to assign a level that describes how much lower the soft start sound levels were than continuous levels.

Table 7. Acoustic Spreading Loss Rates

Pile Size	Acoustic Spreading Loss	
	Down	Mid Depth
Less than 30" Piles	13.57	13.55
Average	13.56	
30" Piles	13.53	12.94
Average	13.24	
All Sizes	12.97	12.90
Average	12.94	
All Piles Without the Raft Data	16.15	16.78
Average	16.47	

Airborne Sounds

The BA for the EHW-1 was unclear in what metrics were to be used for the analysis of the airborne noise impacts. RMS can be described in several manners (i.e. RMS $_{Lmax}$, RMS_{Leq} or for any averaged time period). There are significant differences in the sound level between the different descriptors. For this analysis the RMS $L_{eq\ (driving\ event)}$ level was used for comparison with the airborne vibratory driving thresholds in the BA. This is the energy average of 1-second RMS levels, averaged over the duration of the driving event.

Airborne Sounds from Vibratory Pile Driving

The primary concern with the airborne noise from vibratory pile driving is the behavioral buffer zone for marine mammals. **Table 8** provides a summary of the distances to the average RMS L_{eq} threshold criteria based on the levels measured near the source (WRA Boat) and a 20 Log_{10} (6 dB per doubling distance) propagation rate. For the vibratory driving portion of the project the sound pressure level was predicted to be 98 dB (unweighted) at 11 meters, for all piles. Based on these measured data, the following findings are made:

- Closest airborne measurements were from the WRA boat. At times on the WRA boat there was interference from communication between the different marine mammal monitors and there were environmental influences (i.e., wind and rain) that had an effect on the levels measured. The land based system did not have the same problems that the WRA boat system had; however, there were environmental influences and other non pile-driving sources affecting the measurements (i.e. other construction levels from equipment closer to the microphone and Naval operations). For these reasons the data were analyzed carefully and any data that appeared to be affected was not used in calculating the distances to the threshold criteria.
- Prior to the EHW-1, the distance to the 100 dB (unweighted) harassment zone was predicted to extend 9 meters from the piles. Based on the measurement of average RMS L_{eq} levels and applying a 20 Log_{10} propagation rate, the zone was 16 meters from the pile for all pile sizes.
- Prior to the EHW-1, the distance to the 90 dB (unweighted) harassment zone for harbor seals was predicted to extend 28 meters from the pile. Based on the measurement of average levels, and applying a 20Log_{10} propagation rate, the zone was 51 meters for all pile sizes.

Table 8. Airborne RMS Levels for Vibratory Pile Driving at WRA Boat (dB re 20 µPa) All Data From Various Distances Normalized to 100 meters

	Distance (meters)			RMS_{Lmax} [1]		RMS_{Leq} [1]	
	100 dB	**90 dB**		**Z-weighted**	**A-weighted**	**Z-weighted**	**A-weighted**
Max	16	51	**Max**	98	90	86	80
Min	<10	14	**Min**	80	69	69	63
Average	10	33	**Average**	87	78	79	68
			Stdev	3.63	4.46	3.98	3.85

[1] - Data Normalized to 100 feet

Section 6 Recommendations

The experience gained during the EHW-1 provides insight into how future monitoring efforts in the Hood Canal at the Naval Base should be conducted. Due to the complexities of the environment and security concerns, there are several aspects to consider when planning acoustic monitoring in this area. Water depth is relatively deep in most areas of Hood Canal. The bottom surfaces near the Naval Base slope considerably into the main channel, so the bottom is quite complex. As a result, sound propagates differently for different piles or toward different directions (in terms of direction and depth). It is difficult to assign a specific propagation rate that could be applied to all piles.

Pile driving activities associated with the EHW-1 lasted about one month. All of the pile driving involved vibratory pile installation or pile removal. As a result, the majority of the monitoring tasks involved measuring pile driving sounds at relatively far distances from the piles that were being driven. In particular, there was considerable effort devoted to measuring the level where the sound level from vibratory pile installation or removal was 120 dB RMS. This level is near ambient levels (depending on location and other non-project activity) and not easily discernable from background noise caused by currents and waves or ambient conditions.

Several important lessons were learned and recommendations for future monitoring activities are provided below:

1. Since vibratory pile driving without a bubble curtain produces similar maximum levels for each pile, there is not a need to measure every pile or even a large number of piles. The EHW-1 project provides an extensive data set for piles that are vibrated, as well as the range that levels vary during a pile installation or removal activity with a vibratory driver.
2. The EHW-1 acoustic monitoring effort involved measurements at or near where sound levels were expected to be near 120 dB RMS. This was found to be problematic, because background noise levels often approached or exceeded 120 dB due to currents or waves. The extent of the 120 dB level varied by pile and most likely by position. Future monitoring efforts should focus on measuring at locations closer to pile where there are higher levels (e.g., 130 to 140 dB) and calculating the distances to where 120 dB might be using modeling techniques. Alternatively, very distant measurements should only be attempted during the appropriate conditions (i.e., light currents and calm water conditions).
3. Boats that serve as shared platforms for acoustic and other monitoring will have a lower success rate gathering valid acoustic data. Therefore, the consequences of not fulfilling monitoring requirements should be considered when there are competing monitoring objectives.
4. The construction area includes numerous noise sources. Although pile driving is typically the loudest source of noise, it is difficult to characterize from other construction sounds. In order to characterize airborne levels, the measurement positions and methods must be carefully selected to minimize, if possible, other sound sources such as generators or compressors, the construction crane and boats operating in the area. Using unattended SLMs to make these measurements, which were problematic to access, made

this task difficult with a low success rate for each pile driving event. Airborne measurements of pile driving should be conducted as a separate task utilizing some attended measurements during pile-driving events. Since airborne sound levels from pile driving are fairly consistent and the sound propagation rates are pretty well understood, this effort should only involve a select number of pile driving events.

Section 7 List of Preparers

This section lists all people who helped prepare this report.

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Section 8 Acknowledgements

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Section 9 References

DoN (Department of Navy) (2011). Final Environmental Assessment. Explosives Handing Wharf 1 Pile Replacement Project Naval Base Kitsap at Bangor Silverdale WA. Submitted to National Marine Fisheries Service, Silver Spring, Maryland.

HDR Inc. 2012. Naval Base Kitsap at Bangor EHW-1 Pile Replacement Project, Bangor, Washington. Draft Marine Mammal Monitoring Report. Prepared for Naval Facilities Engineering Northwest, Silverdale, WA. April 2012.

Illingworth & Rodkin Inc. 2012. Naval Base Kitsap at Bangor Test Pile Program, Bangor, Washington. Draft Marine Acoustic Monitoring Report. Prepared for HDR Inc., San Diego, CA and Naval Facilities Engineering Northwest, Silverdale, WA. February 2012.

APPENDIX A

ACOUSTIC MONITORING PLAN

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U.S. Navy Test Pile Program and
Explosives Handling Wharf-1 Pile Replacement Project
Naval Base Kitsap at Bangor Waterfront

FINAL ACOUSTIC MONITORING PLAN

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May 2011

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INTRODUCTION

This Acoustic Monitoring Plan (Plan) provides a protocol for conducting airborne and hydroacoustic measurements of pile-driving operations during the Test Pile Program (TPP) and Explosives Handling Wharf-1 (EHW-1) Pile Replacement Project. This Plan was developed to support the respective Biological Assessment (BA) and Incidental Harassment Authorization (IHA) compliance documents for each project. Both sets of documents provide a more in-depth discussion on the modeling assumptions and calculations for each project, and are incorporated here by reference. There are multiple acoustic measurement objectives which are described in more detail below.

Both the Test Pile Program and the EHW-1 Pile Replacement Project will be conducted at Naval Base Kitsap (NBK) at Bangor, Washington. The purpose of the Test Pile Program is to acquire accurate geotechnical and sound propagation data to validate design concepts, construction methods, and environmental analyses for the proposed second Explosives Handling Wharf (EHW-2), as well as other future projects at the NBK Bangor waterfront. The purpose of the EHW-1 Pile Replacement Project would be to remove and install piles and associated structures to maintain the structural integrity of the existing wharf. Repairs and maintenance at EHW-1 are needed due to deterioration of the structure and are necessary to maintain the functionality of the wharf and to support the operational requirements of the TRIDENT program.

NBK-Bangor is located on the Hood Canal approximately 20 miles due west of Seattle, Washington (Figure 1-Vicinity Map). NBK-Bangor provides berthing and support services to United States (U.S.) Navy submarines and other fleet assets.

Objectives:

The objectives for acoustic monitoring for both the Test Pile Program and the EHW-1 Pile Replacement project are similar. However, due to differences in the ESA consultation process for each project, acoustic monitoring requirements for ESA-listed fish and the marbled murrelets were not required for the EHW-1 project, but were required for the Test Pile Program. Both projects required acoustic monitoring to support the marine mammal permitting. Unless explicitly delineated below, the objectives generally apply for both projects.

The Navy will collect airborne and underwater acoustic measurements to:

1. **Empirically verify the modeled injury and behavioral disturbance zones.** These zones are also referred to as shutdown and buffer zones (respectively). These injury and behavioral disturbance zones are defined by criteria established by the regulatory agencies for marine mammals, fish, and marbled murrelets. Each zone encompasses the area within the underwater or airborne isopleth. Some zones require a shutdown of pile driving and others do not (e.g. injury zones for fish). See definitions below.

a. **Underwater Injury Zones:**
   i. **Shutdown (Injury) Zone**: 180 dB re 1 µPa rms isopleth for cetaceans; 190 dB re 1 µPa rms for pinnipeds.
   ii. In addition, for the TPP project, USFWS applied a new 183 SEL injury threshold for marbled murrelets. This injury threshold cannot be identified in real-time as it is a cumulative metric. It may be possible to empirically verify the actual SEL zone at the end of every impact pile driving day assuming that daily data processing can occur. The daily SEL will be included in the final report, whether or not daily processing is available. During the project, the shutdown zone was calculated (estimated) based on the number of impacts strikes per day. For TPP, the shutdown zone is 197 meters rounded up to 200 meters. For EHW-1, the injury metric was 180 dB peak and that shutdown zone was estimated to be 300 meters with an added 100 meter buffer for a total shutdown zone of 400 meters.
   iii. **Non-Shutdown Injury Zone:**
      1. While there are three injury isopleths for fish 206 dB peak; 187 dB re: $1 \mu Pa^2 \cdot sec$ (cumulative SEL) for fish greater than or equal to 2 grams; and 183 dB re: $1 \mu Pa^2 \cdot sec$ (cumulative SEL) for fish less than 2 grams, no shutdowns are required for fish in these zones.

b. **Airborne Injury Zones:**
   i. The current airborne injury level used for marbled murrelets is 92 dBA, however shutdowns are not required.
   ii. There is no airborne injury threshold for marine mammals, only a disturbance threshold discussed below.

c. **Underwater Buffer (behavioral disturbance) Zone:**
   i. The behavioral disturbance or buffer zone includes the area within the 160 dB re 1 µPa rms isopleth for marine mammals during impact pile driving, 120 dB re 1 µPa rms during vibratory pile driving and 150 dB re 1 µPa rms isopleth for marbled murrelets and fish. Shutdowns are not required for species seen in these zones, but a recording of the species behavior is required per the Marine Mammal Monitoring Plan and Marbled Murrelet Monitoring Plan.
   ii. The 120 dB behavioral disturbance isopleth for marine mammals from vibratory pile driving is modeled to extend for many miles. However, the Navy does not expect the 120 dB zone to actually extend as far as depicted in the BA and IHA. This large area also defined the Action Area in the BA (Figure 2), as it was assumed that this level would be above ambient conditions. If ambient conditions are louder than the 120 threshold then the threshold is less meaningful to the species because existing conditions would be louder. Therefore, the Navy will conduct acoustic monitoring during vibratory pile driving in order to determine the actual distance to the 120-dB isopleth for behavioral harassment or to background levels, whichever is greater.

d. **Airborne Buffer (behavioral disturbance) Zone:**

i. The distance to marine mammal airborne disturbance thresholds would be measured. These are currently 100 dB rms re 20 μPa (unweighted) for all pinnipeds except harbor seals. For harbor seals the threshold is 90 dB rms re 20 μPa (unweighted).

ii. There is no airborne behavioral threshold for marbled murrelets.

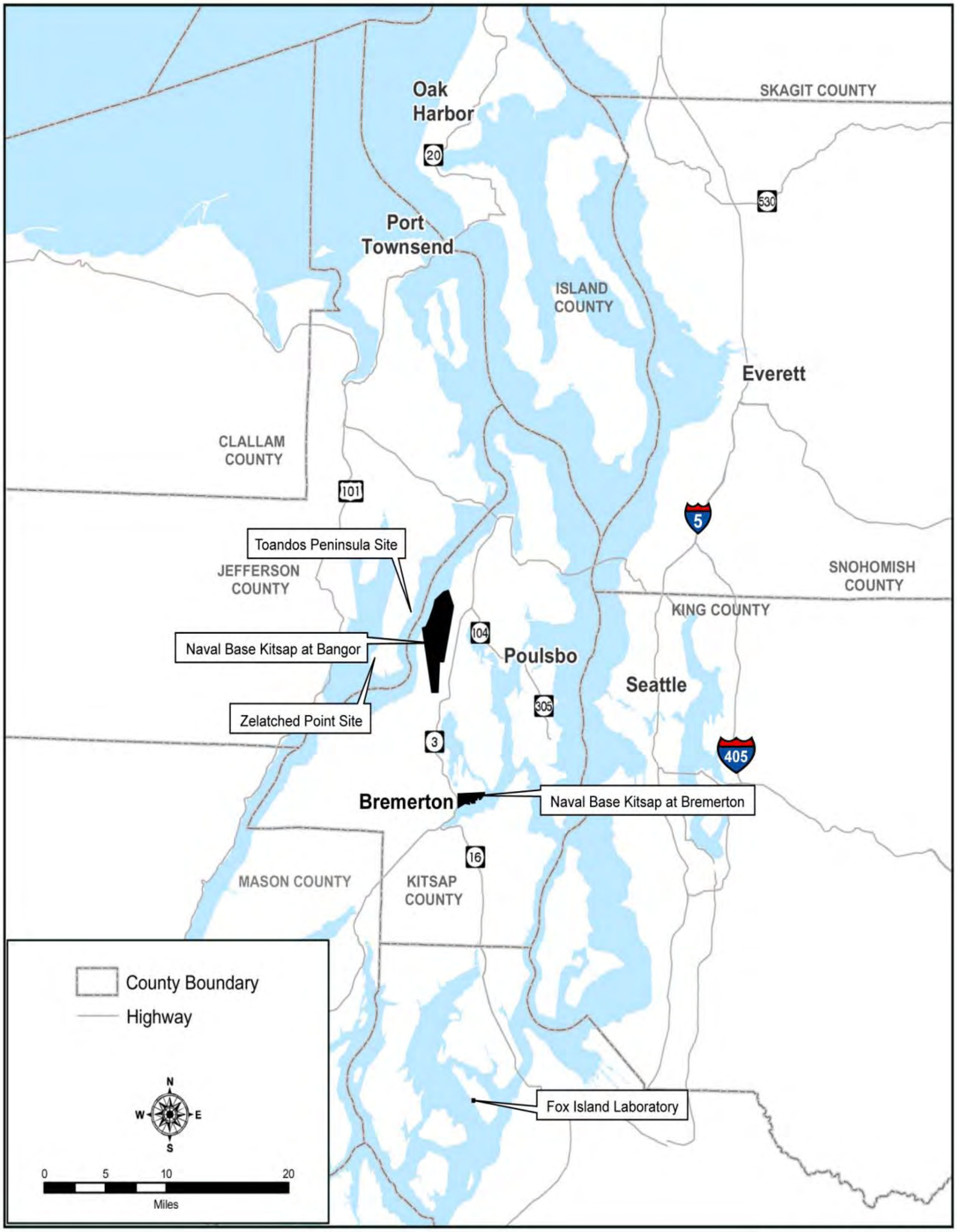
2. **To collect airborne and underwater ambient measurements.** Ambient conditions, both airborne and underwater, would be measured at the project site in the absence of construction activities to determine background sound levels.

3. **To determine the spreading loss occurring at the project location.**

4. **To measure the sound pressure levels produced by the use of the soft start technique to test the effectiveness of this method at reducing the sound levels during the initial stages of driving a pile**. The use of a soft start is currently requested by the regulators as a mitigation measure, but there is little data depicting the sound pressure levels produced by the soft start technique to verify its effectiveness.

5. **To determine the relative effectiveness of the sound attenuation system(s) (such as a bubble curtain) to verify noise reduction underwater as part of the Test Pile Program.** The modeling described in the BA and IHA documents assumes a 10 dB reduction in the initial sound pressure levels from use of properly deployed sound attenuation system. The only way to verify if in fact that level of reduction is achieved is to shut off the sound attenuation system for one minute and collect recordings during that time. The Navy proposes to test 7 piles for one minute each with the sound attenuation device temporarily turned off. Execution of this proposal will be dependent upon approval from USFWS as part of the Navy's ESA consultation for the Test Pile Program.

6. **To test the effectiveness of using a sound attenuation system with a vibratory hammer as part of the Test Pile Program.** This will be tested during the driving of three vibratory piles (one of each pile size).



(Source: Navy 2002; ESRI 2000)

Figure 1 Vicinity Map

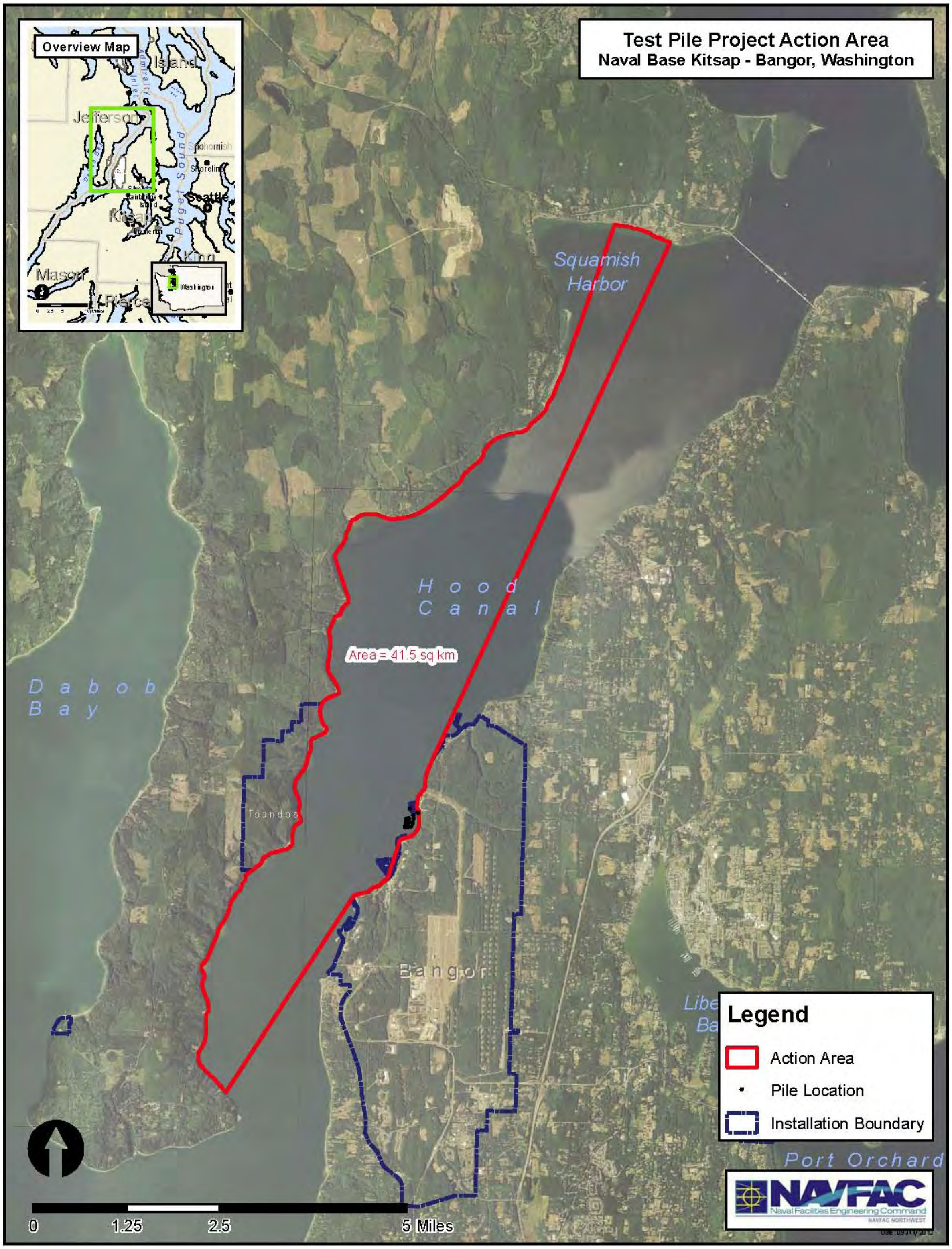


Figure 2 Action Area

The entirety of NBK-Bangor, including the land areas and adjacent water areas in Hood Canal, is restricted from general public access (Figure 3 Restricted Areas). Two Waterfront Restricted Areas (WRA) are associated with NBK-Bangor, Naval Restricted Areas 1 and 2 (33 CFR 334.1220). Naval Restricted Area 1 covers the area north and south along the Hood Canal encompassing the NBK-Bangor waterfront. The regulations associated with Naval Restricted Area 1 state that no person or vessel shall enter this area without permission from the Commander, Naval Submarine Base Bangor, or his/her authorized representative. Naval Restricted Area 2 encompasses the waters of Hood Canal within a circle of 1,000 yards diameter. The project area for both TPP and EHW-1 is located inside this WRA and depicted on Figure 3 in yellow.

Figure 3 Restricted Areas with Project Area Highlighted

PROJECT AREA

The project area is within the Hood Canal hydrologic unit code (HUC) #17110018 and the Water Resource Inventory Area 15 (Kitsap). The proposed TPP and EHW-1 repairs will occur on the northwest corner of NBK. The TPP will occur immediately south and west of Explosive Handling Wharf #1 (EHW-1) and north of the Marginal Wharf (Figure 4) inside the WRA. The proposed EHW-1 Pile Replacement Project will occur on the southwest corner of the existing Explosive Handling Wharf (Figure 5).

Figure 4 Test Pile Program Project Area

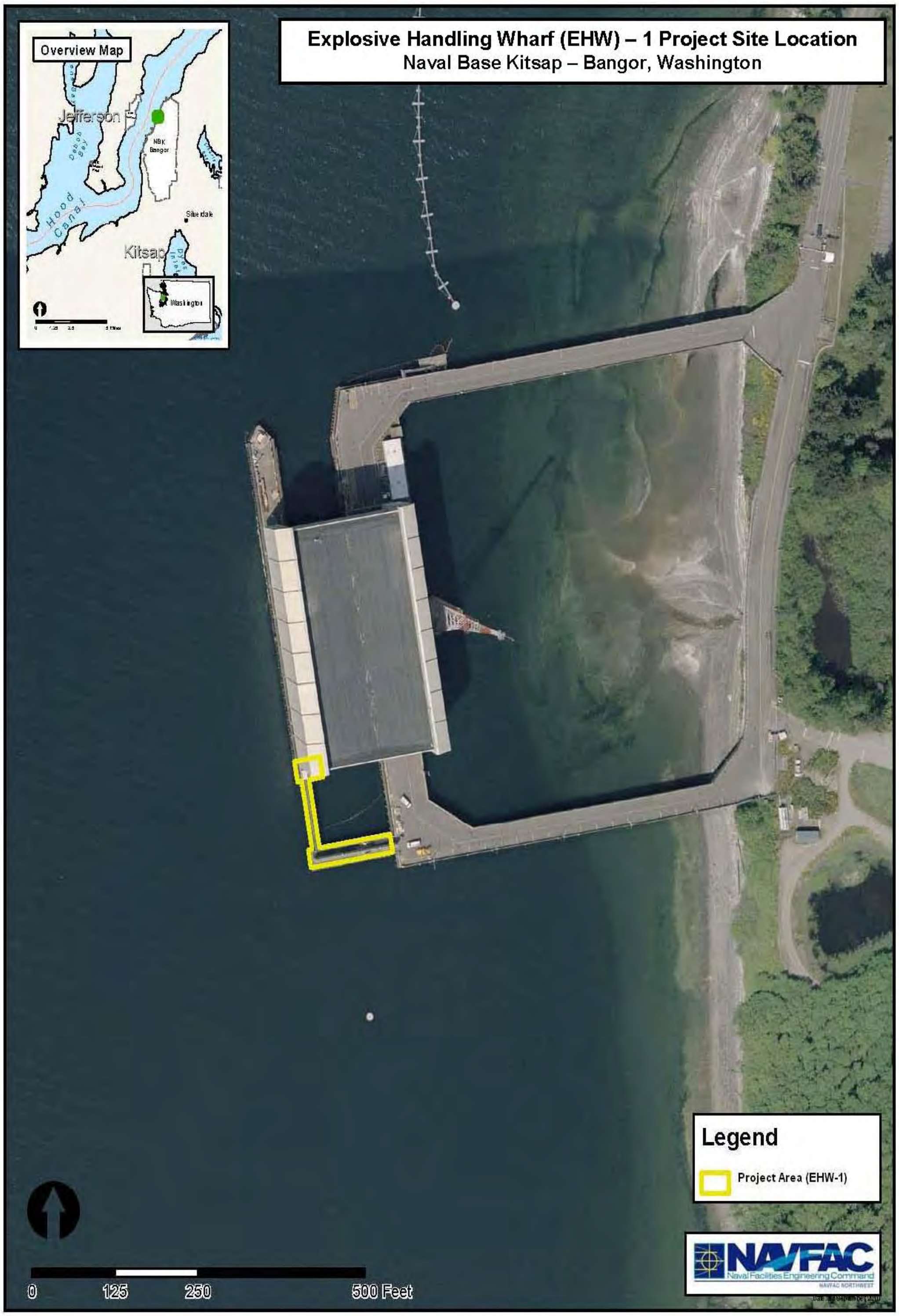


Figure 5 EHW-1 Project Area

PILE INSTALLATION LOCATION

Figure 6 indicates the location of the 29 piles to be driven for the TPP.

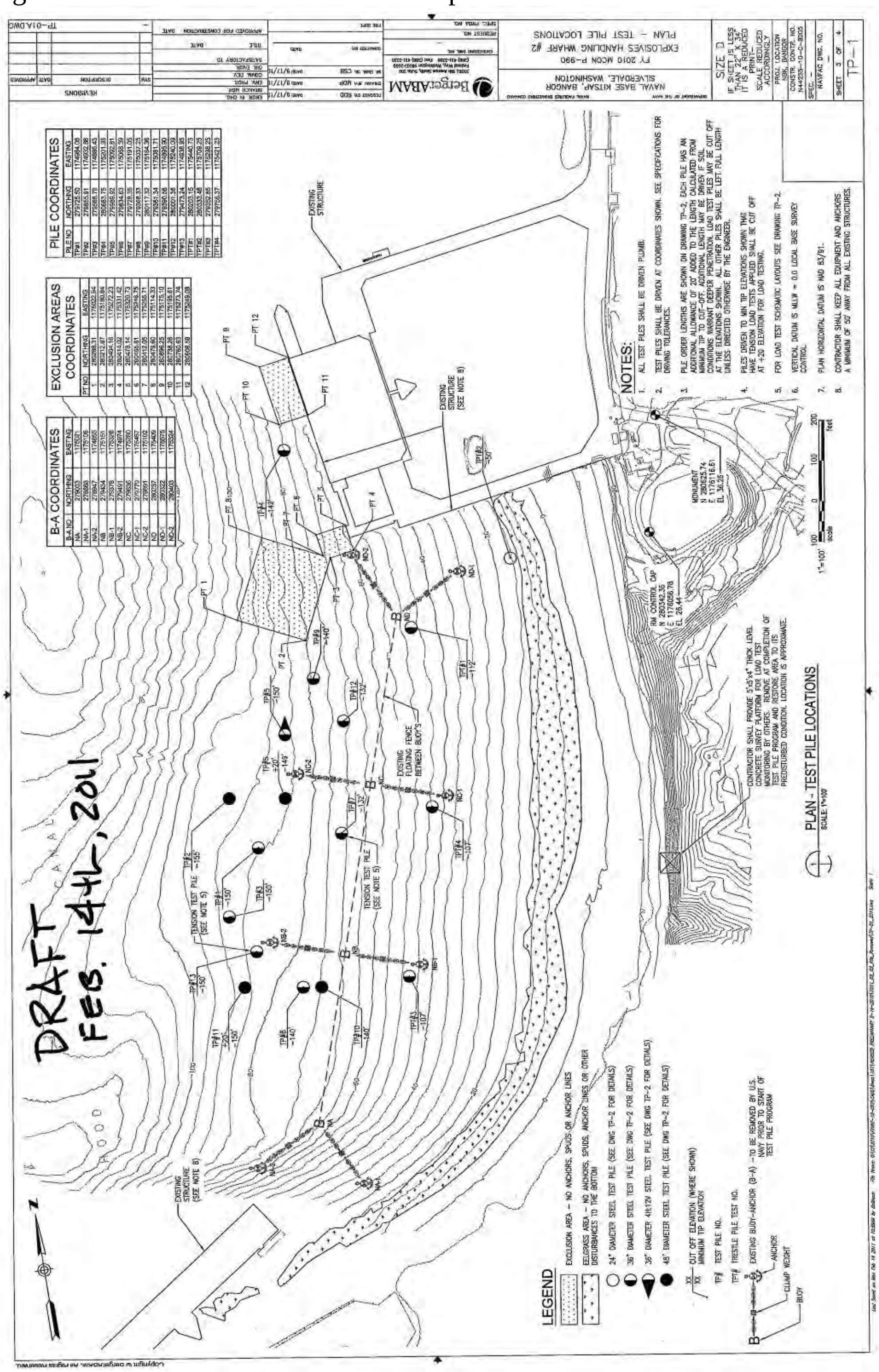


Figure 6 Test Pile Program Pile Installation Locations

Figure 7 provides a detailed graphic of the installation and removal activities that will occur at the EHW-1 Pile Replacement Project location.

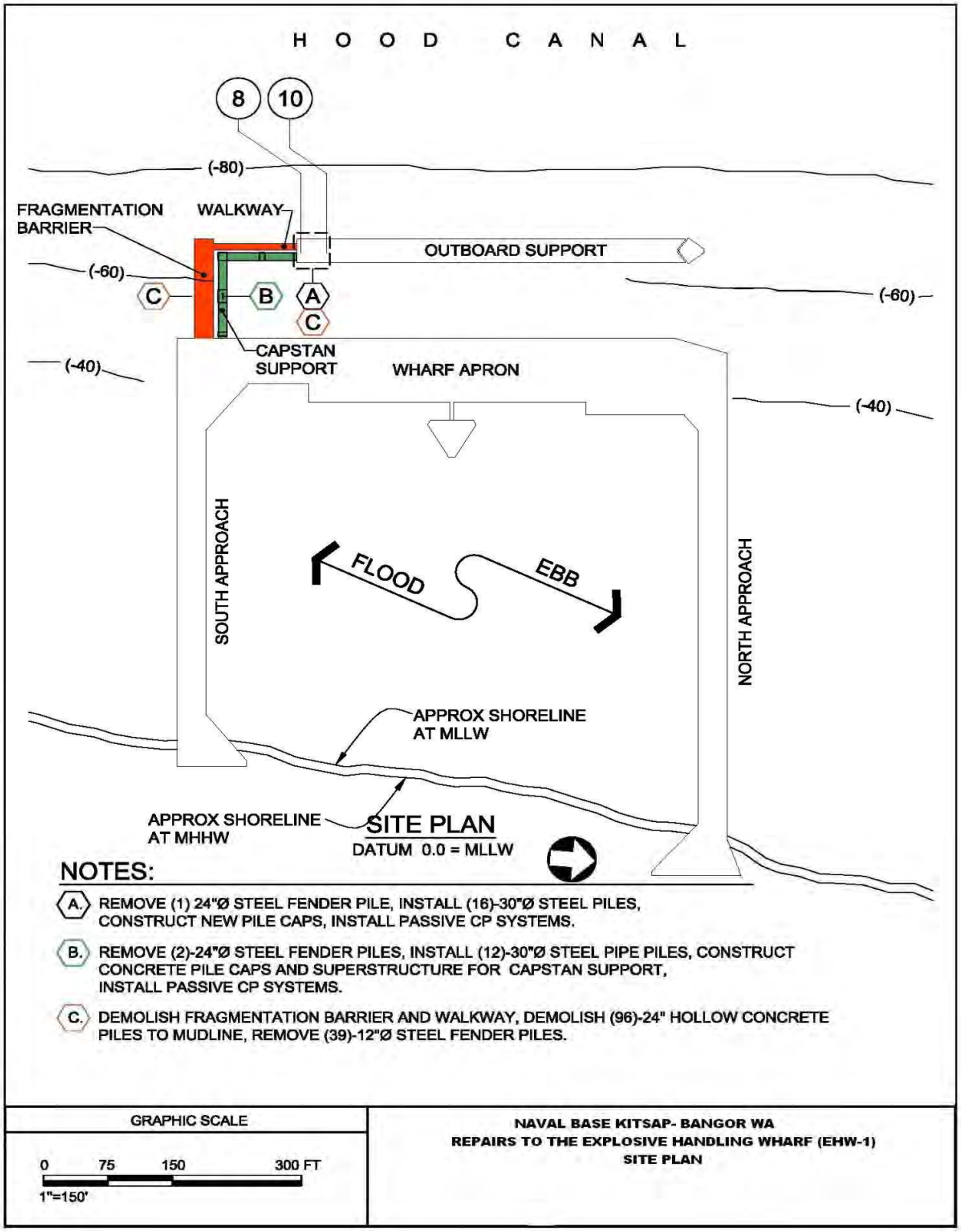


Figure 7 EHW-1 Pile Replacement Project Activities and Location

PILE INSTALLATION METHODS

Test Pile Program:

The Navy proposes to install and remove up to 29 test and reaction piles, conduct testing on select piles, and measure in-water noise propagation during pile installation and removal (Table 1). During the TPP, the Navy will test the effectiveness of existing soft-start (ramp-up) mitigation procedures currently in place for impact and vibratory hammers. The Navy will also use hydroacoustic monitoring to test the effectiveness of various noise attenuation devices, such as bubble curtains (both confined and unconfined) and temporary noise attenuation piles (TNAPs), during impact pile driving to determine the degree to which these measures will reduce energy levels emitted. For a description of these sound attenuation devices, including TNAPs, please see the Environmental Assessment. The presence and behavior of marine mammals and birds, especially alcids and Endangered Species Act-listed marbled murrelets, will also be monitored during pile installation and removal. Geotechnical and noise data collected during pile installation and removal will be integrated into the design, construction, and environmental planning for the Navy's proposed EHW-2.

Table 1
Test Pile Program Implementation Plan

Test Pile NO	Suggested Driving Sequence	Pile Type	Vibrate & Impact	Driving Shoe/End Hardening	Tension Load Test
TP#1	TBD	36"Ø x 3/4"T x 175'L	X	CUTTING SHOE *1	
TP#2	TBD	36"Ø x 3/4"T x 180'L	X	NONE	
TP#3	TBD	36"Ø x 3/4"T x 170'L	X	WELDED END HARDENING *2	
TP#4	TBD	36"Ø x 3/4"T x 195'L	X	NONE	
TP#5	TBD	48"Ø x 1"T x 195'L	X	CUTTING SHOE *1	
TP#6	TBD	48"Ø x 1"T x 185'L	X	WELDED END HARDENING *2	
TP#7	TBD	36"Ø x 3/4"T x 170'L	X	CUTTING SHOE *1	X
TP#8	TBD	36"Ø x 3/4"T x 185'L	X	WELDED END HARDENING *2	
TP#9	TBD	36"Ø x 3/4"T x 190'L	X	CUTTING SHOE *1	
TP#10	TBD	36"Ø x 3/4"T x 180'L	X	CUTTING SHOE *1	X
TP#11	TBD	48"Ø x 1"T x 175'L	X	NONE	
TP#12	TBD	36"Ø x 3/4"T x 180'L	X	WELDED END HARDENING *2	
TP#13	TBD	48"Ø x 1"T x 175'L	X	NONE	

Test Pile NO	Suggested Driving Sequence	Pile Type	Vibrate & Impact	Driving Shoe/End Hardening	Tension Load Test
TTP #1	TBD	24"Ø x 5/8"T x 115'L	X	CUTTING SHOE *1	
TTP #2	TBD	36"Ø x 1"T x 150'L	X	NONE	
TTP #3	TBD	36"Ø x 1"T x 145'L	X	WELDED END HARDENING *2	
TTP #4	TBD	36"Ø x 1"T x 150'L	X	NONE	

*1 – Inside edge cutting shoe
*2 –Welded end hardening using 90 ksi weld material
TP# - Test Pile Number (See figure 2-2 for locations)
Ø – Diameter of the test piles
L – Length = Mudline + 60' Embedment + 20 MLLW cut off + 20" Driving Allowance
T – Wall thickness
TBD – To Be Determined

The Test Pile coordinates are provided in Table 2.

Table 2
Test Pile Program Pile Location (NAD 83, ft)

PILE COORDINATES		
PILE NO	NORTHING	EASTING
TP#1	279725.50	1174984.06
TP#2	279855.91	1174932.88
TP#3	279964.19	1175021.60
TP#4	280683.75	1175201.93
TP#5	279989.92	1175092.81
TP#6	279834.63	1175068.39
TP#7	279728.35	1175191.05
TP#8	279629.57	1175175.52
TP#9	279311.95	1175073.94
TP#10	279361.34	1175081.71
TP#11	279390.56	1174895.90
TP#12	279448.97	1174868.36
TP#13	279473.24	1174938.95
TPT#1	280203.15	1175440.73
TPT#2	280333.46	1175709.25
TPT#3	279352.85	1175298.25
TPF#1	279610.34	1175416.49
TPF#2	279905.65	1175463.32

EHW-1 Pile Replacement Project:

Under the Navy's proposed action, ninety six 24-inch diameter concrete piles would be removed, thirty nine 12-inch steel fender piles would be removed and three 24-inch diameter steel fender piles would be removed. In addition, a total of twenty eight 30-inch diameter hollow, open-ended steel pipe piles would be installed and filled with concrete on the southwest corner of EHW-1. All concrete piles would be removed with a pneumatic chipping hammer or other similar concrete demolition tool. All of the steel pipe piles would be installed/removed with a vibratory hammer, rather than an impact hammer. Based on the Navy's experience replacing piles during previous repair cycles at the EHW-1 facility, the Navy feels that use of a vibratory hammer would be sufficient; the impact hammer has yet to be required to accomplish installation. However, during pile installation, depending on local geotechnical site conditions, some piles may be driven (proofed[1]) for the final few feet with an impact hammer. During typical construction projects, impact proofing is only required every 4-5 piles. Per consultation with USFWS under the ESA, impact pile driving (which would only take place during proofing) would not occur on more than five days for the duration of any pile driving window and no more than one pile would be proofed in a given day. Furthermore, impact pile driving, or proofing, would be limited to 15 minutes per pile (up to five piles total). All piles driven by an impact hammer would be surrounded by a bubble curtain or other sound attenuation device over the full water column to minimize in-water noise. The presence and behavior of marine mammals and birds, especially alcids and Endangered Species Act-listed marbled murrelets, will be monitored during pile installation and removal activities.

METHODOLOGY

The following section describes the methodology to be implemented to achieve the acoustic monitoring objectives of the EHW-1 Pile Replacement Project and the Test Pile Program. The two projects have nearly identical acoustic measurement requirements. Therefore, the Acoustic Monitoring Plan was developed by the Navy taking into consideration the similar logistical (temporal), environmental (i.e. bathymetry, current speed etc.) (spatial), and security requirements. As a result, the acoustic monitoring locations and methodologies for each project are the same.

To take advantage of the allocation of resources that will be deployed in the same area and to meet logistical and security constraints that are in place within the WRA regarding the number of vessels and personnel that are allowed inside, assets deployed in this area will be used to fulfill the acoustic monitoring requirements of both projects. For instance, the hydroacoustic monitoring boat which will be inside the WRA will take "spot-recordings" for each project. Also, hydrophones and microphones recording the ambient underwater and airborne conditions present at the NBK waterfront would be utilized by both projects. However, hydrophones and microphones which are being used to record reference data for each pile will be separate for each project. For instance, each pile will have its own hydrophone recording at 10 meters from the

[1] "Proofing" is driving the pile the last few feet into the substrate to determine the capacity of the pile. The capacity during proofing is established by measuring the resistance of the pile to a hammer that has a piston with a known weight and stroke (distance the hammer rises and falls) so that the energy on top of the pile can be calculated. The blow count in "blows per inch" is measured to verify resistance, and pile compression capacities are calculated using a known formula.

source for underwater measurements and ~50 feet from the source for airborne measurements. Additionally, since the size of far-field action area for each project is expected to be similar, acoustic and protected species (i.e. marine mammals and marbled murrelet) monitors in this area will also be utilized for both projects. A monitoring coordinator will identify to the marine species monitoring team and acoustic team which hammer is operating (the hammer from the TPP or the hammer from EHW-1). This will allow each project to report separately the acoustic results specific to the piles from that project.

In considering the locations for the stationary and vessel-based hydrophones the Navy also took into account environmental factors (bathymetry, current speed, and vessel traffic, etc.) that may affect monitoring. Figure 8 shows the approximate bathymetry for Hood Canal. Due to depths, currents, and vessel transits in the Hood Canal, certain locations were not suitable for stationary hydrophone placement. Therefore, multiple vessels will be used to characterize the far-field sounds outside of the WRA from vibratory and impact pile driving. These vessels will not be stationary, but moving throughout the Hood Canal to characterize sound fields. Per security requirements, all vessels outside the WRA will remain outside the WRA for the duration of the TPP or EHW-1 project.

Far-field monitoring will occur for all pile types and installation/removal methods. We would note that even if the Navy reduces the number of platforms at some point in the project, there will always be far-field monitoring. Based on the acoustic monitoring plan the following underwater hydrophones would be on-site during the duration of the project - 10 meters for each pile, the hydroacoustic vessel inside the WRA (50-400 meters), and at minimum, one far-field hydrophone (i.e. either stationary in the middle or far side of Hood Canal or from a vessel with the capability to take recordings at various points in the far-field area).

There is one vessel proposed to be inside the WRA to measure the near-field sounds. Per security requirements, all vessels will be swept and cleared before being allowed to enter the WRA. All equipment will be inspected before being allowed to enter the WRA. The near-field vessel must remain inside the WRA for the duration of the TPP or EHW-1 Project. The vessels will not be allowed to transit in/out of the WRA daily or weekly. If the vessel inside the WRA needs to be replaced due to mechanical failure of some kind (engine, propeller etc.) the replacement vessel must be swept and cleared before entering the WRA.

All personnel associated with the acoustic, marine mammal, and marbled murrelet monitoring will follow the requirements and commands of the Officer in Charge of security for the WRA.

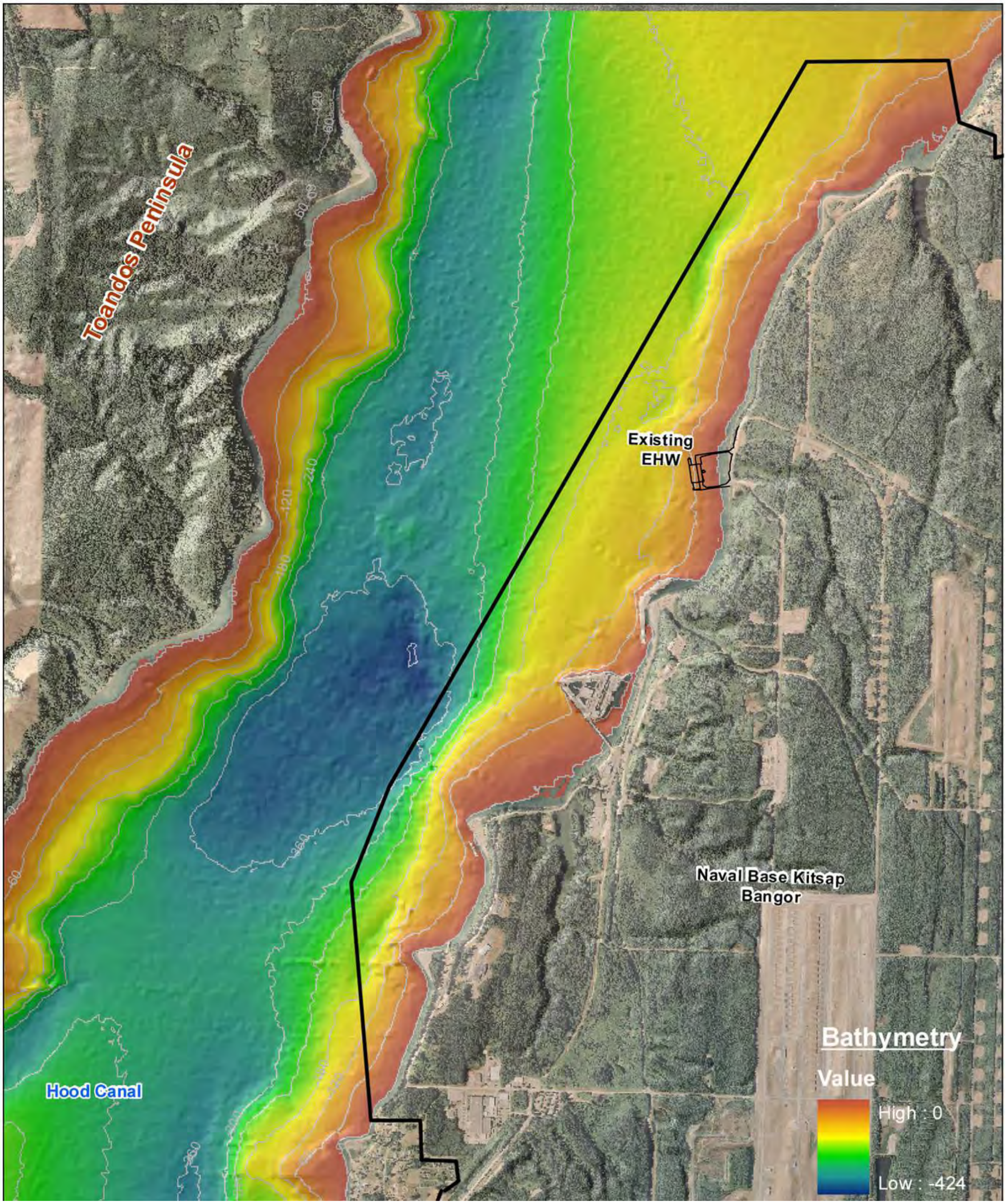


Figure 8 NBK Bangor Bathymetry and Topographic Relief

Acoustic Measurement Locations:

Hydrophones are proposed to be located in the following areas and are shown on Figure 9-Acoustic and Marine Mammal Monitoring Locations.

Stationary Hydrophones:

- A stationary 2-channel hydrophone recording system will be suspended from the pile driving barge 10 meters from the pile being driven, for each pile driven as part of either the TPP or EHW-1 Project. This data is not real-time. One hydrophone would be placed at approximately mid-depth and the other at a position closer to the bottom. Because the hydrophones would be supported from a floating platform, the depth with respect to the bottom would vary due to tidal changes and current effects. This is assumed to be a continuous recording of the pile being driven, but will be verified by contractor equipment availability. The data will be analyzed after the completion of the projects.
- Prior to monitoring, a standard depth sounder will record depth before pile driving commences and then be turned off so as not to interfere with acoustic monitoring. The hydrophone will be attached to a nylon cord or a steel chain if the current is swift enough to cause strumming of the line. The nylon cord or chain will be attached to an anchor that will keep the line 10 meters from the pile. The nylon cord or chain will be attached to a float or tied to a static line at the surface 10 meters from the pile. The distance will be measured by a tape measure, where possible, or a range-finder. There will be a direct line of acoustic transmission through the water column between the pile and the hydrophone in all cases.
- A stationary 2-channel hydrophone array will be deployed near the Toandos Peninsula at approximately 1800 – 2400 meters from the pile from an anchored floating raft (Figure 10-Toandos Floating Raft with Hydrophones). The rafts are about 4-5 feet long and tied to an anchored mooring ball. This data is not real-time. The Toandos hydrophones are assumed to be a continuous recording of the piles being driven, but will be verified by contractor equipment availability.
- One hydrophone would be placed at approximately mid-depth under neutral tide conditions (mean water depth) and the other at a position approximately 2 feet above the bottom during low tide. Because the Toandos hydrophones would be supported from a floating platform, the depth with respect to the bottom would vary due to tidal changes and current effects.
- The hydrophones include a 35 foot to 100 foot signal line. The Sound Level Meters (SLMs) log the data and it is it downloaded after the event. They also include recorders so the event is recorded for subsequent analysis.
- The Toandos raft and anchor point would be marked with a visible buoy and any necessary lighting. The raft would be equipped with a weatherproof, water resistant instrument case that houses a digital recording device, power supply, and charge converter. Two hydrophones would be strung from the raft and connected to a weighted signal line. The purpose for two depths would be to provide an indication of differences in ambient and pile driving sound near the bottom and at approximately mid-depth.

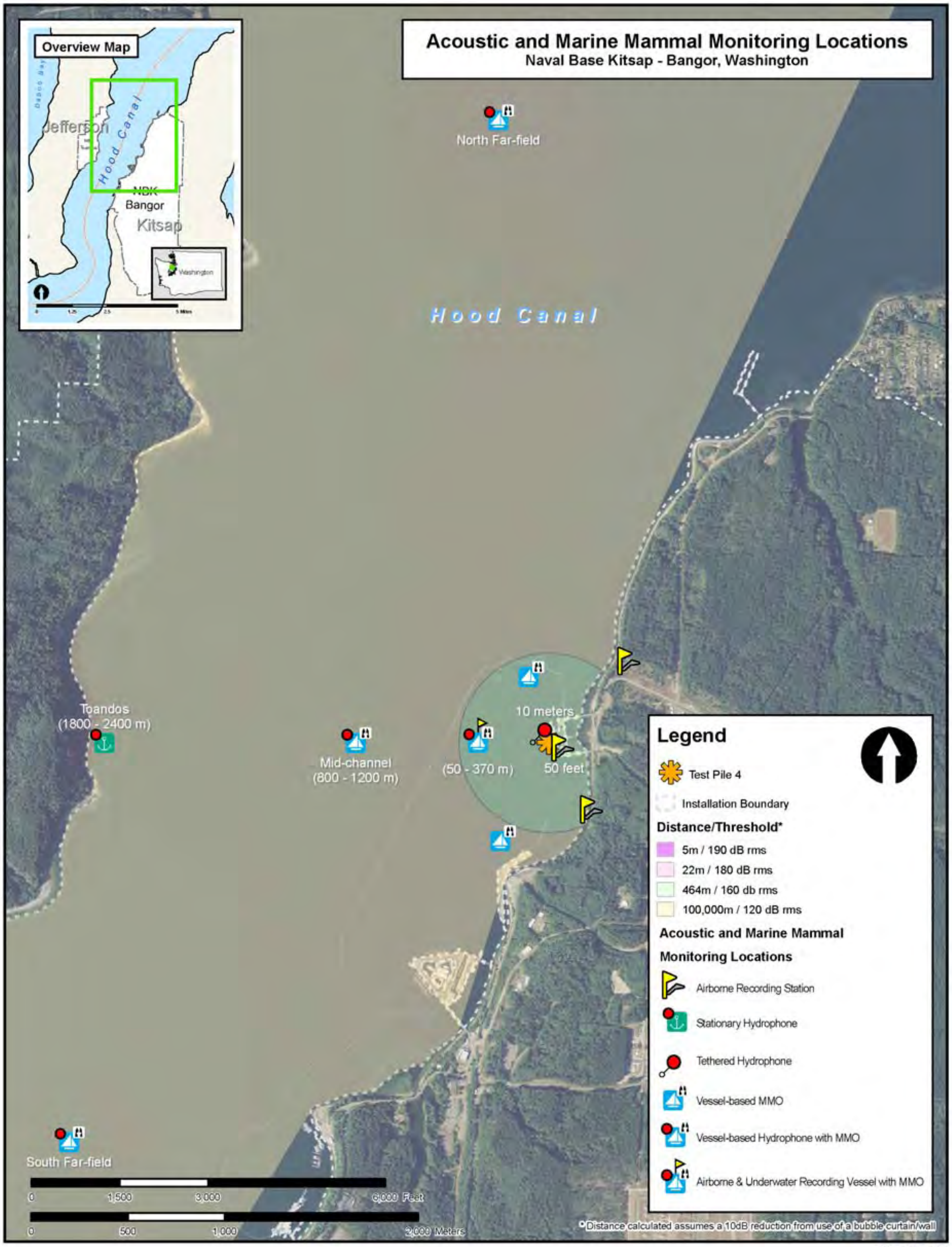
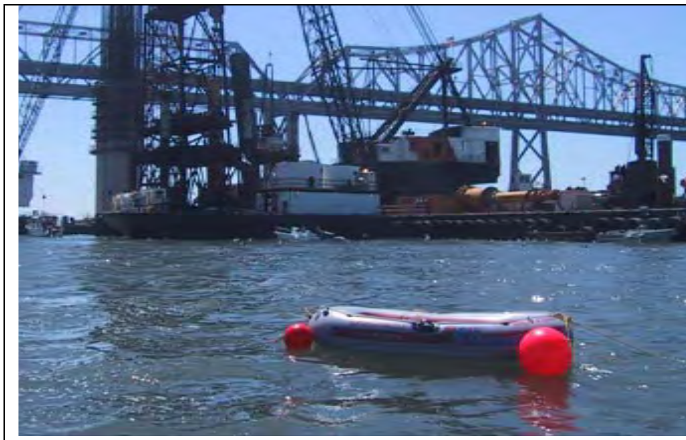
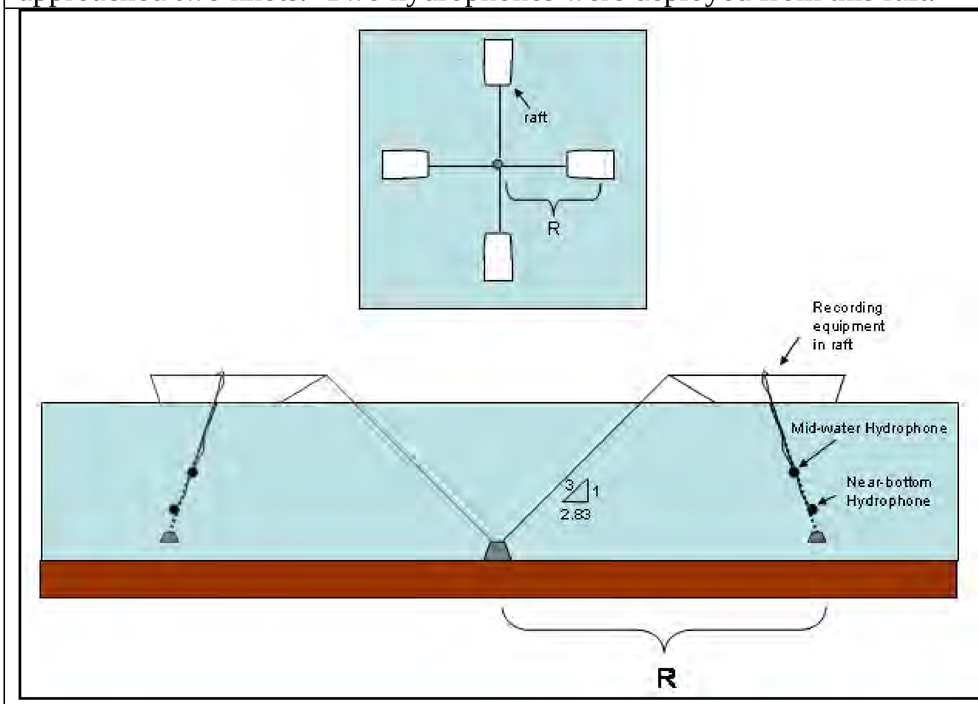


Figure 9 Acoustic and Marine Mammal Monitoring Locations



A raft deployed in a busy work area of San Francisco Bay where current speeds approached two knots. Two hydrophones were deployed from this raft.



Schematic of raft deployment, showing the range of positioning due to current effects

Figure 10 Toandos Floating Raft with Hydrophones

- Noise effects on the all hydrophones (stationary and vessel based) will influence the measurement noise floor. The primary noise effects will be flow noise and cable strumming during stronger tidal currents. Both of these effects will be minimal around slack tide periods that would occur for about 2 hours, four times per day. Flow noise cannot be reduced or eliminated and the effect will be dependent on the strength of the current and the strength of ambient sounds. Strumming sounds will be reduced by minimizing signal cable tension (i.e. attaching the signal lines to a separately weighted line) and isolating the signal cables from direct contact with the current.
- The hydrophone calibration will be checked at the beginning of each day of monitoring activity.

Stationary Microphones:

- For each pile being driven as part of either the TPP or EHW-1 project, a stationary microphone will be located on the pile driving barge at ~50 feet from the pile being driven to record airborne measurements. This data is not real-time. It will be recorded and analyzed after the completion of the projects. The microphone will be located so that there is a direct line of acoustic transmission through the air between the microphone and the pile in all cases.
- Two land-based microphones are proposed to measure the airborne sound levels north and south of the project area. The locations shown on Figure 9 are approximate and will be determined by ease of access (terrain restrictions and presence of a road) and security permission.
- The microphones will be calibrated at the beginning of each day of monitoring activity.

Vessel-based Hydrophones:

- One acoustic vessel with a 2-channel hydrophone array will be inside the WRA to monitor near-field and real-time isopleths for marine mammals, fish, and marbled murrelets.
- The SLMs provide real time output, but they provide an estimate of pulse RMS because they would be based on a fixed time constant whereas the marine mammal RMS for pulses (impact pile strikes) is based on the duration of the pulse, which is usually 50 – 70 milliseconds and the impulse setting of the SLM is 35 milliseconds. So the SLM would slightly overestimate the pulse RMS.
- For vibratory sounds, the SLMs can measure in real time because the sounds are continuous and are not sensitive to the time constant.
- This vessel will also have an airborne microphone for recording airborne sounds. This vessel must remain inside the WRA and will be moored inside the WRA in the evenings, possibly tied up to the pile driving barge (mooring still to be determined).
- Three acoustic vessels all proposed to deploy a 2-channel hydrophone array will be used outside the WRA to collect data on the far-field sound levels (the 120 dB zone). These are currently proposed to be in real-time, subject to equipment availability. These vessels must remain outside the WRA for the duration of the project and must be moored outside of the WRA in the evenings. After the first few weeks of the project (when the majority of the testing will occur for the TPP), two of these vessels will no longer be needed. In the first few weeks of the TPP, these vessels will be used to identify where the 120 isopleth is located. Once that task has been accomplished, they will be removed from the project effort.
- During all vessel-based recordings (inside or outside the WRA), the engine and any depth or fish finders must be off. The vessel goes temporary silent and is drifting. The spot recordings will be made and the hydrophone pulled back on board the vessel. Then the vessel will move to another location. The continuous noise recordings of the piles will occur from the 10 meter stationary hydrophone and the Toandos recorder. All other vessel-based hydrophones are “spot-recordings.” The duration of the spot recordings will determined by the acoustician in the field and based on current site conditions and type of pile driving activity occurring.

Measures to Meet Objectives:

1. **Empirically verify the modeled injury and behavioral disturbance zones.**
    a. Underwater sound pressure levels would be continuously monitored during the entire duration of each pile being driven from at least one hydrophone location.
    b. Most sound pressure levels will be monitored in real time. Some data will be collected and analyzed after the project is completed. For example the stationary hydrophones at 10 m and the stationary hydrophones at Toandoes will not be real-time.
    c. Sound levels will be measured in Pascals, which are easily converted to decibel units (e.g. 1000 Pascals = 180 dB).
    d. Monitoring equipment will be set to a minimum frequency range of 10 Hz to 20 KHz and a minimum sampling rate of 44,000 Hz. To facilitate further analysis of data, the underwater signal will be recorded as a text file (.txt) or other compatible format (e.g., .xls).
    e. Underwater acoustic measurements will be coordinated with the Pile Driving Engineer on the barge to be certain that the acousticians are aware of when the pile driving will be initiated and when it is completed. This is especially important for the far-field locations that will not be within line-of-site of the pile driving barge and will not be able to see flags being raised for initiation or cessation of pile driving. Coordination will be with radios and cell phones for far-field locations and with radios, cell phones, and flags for near-field measurements.
    f. During vibratory pile driving the far-field vessels will begin "searching" for the actual 120 dB isopleths at approximately 3 kilometers. They will adjust their position (closer/farther) from the pile location based on the real-time measurements. The 120 dB isopleth is expected to be miles closer than the result modeled.

2. **To collect airborne and underwater ambient measurements.** Ambient conditions, both airborne and underwater, would be measured at the project site in the absence of construction activities to determine background sound levels.
    a. Underwater ambient levels are intended to be recorded over the frequency range from 10 Hz to 20 kHz. Ambient conditions will be recorded for one minute every hour of the work day, for one week of each month of the TPP.
    b. Measurements will be taken at varying distances from the source (i.e., pile).
    c. Airborne levels would also be recorded as unweighted and A-weighted and reported in both. Airborne sounds will be recorded over the entire work day. In addition, USFWS requested that airborne sound be taken in such a way to determine the SEL, Leq, and Lmax. The plan is to measure the Leq over 1 minute intervals so we can provide the Leq for the driving event (e.g. 5 -15 min). This is for vibratory and impact pile driving. So if it takes 5 minutes, then we will have a 5 min Leq. If it takes 15 min, then we'll have a 15 min Leq. SEL: The sound descriptor SEL represents the sound in an event or all the accumulated energy for an event, like a dose. The event could be a single pile strike, a pile driving event,

a period of time, etc. Unless directed otherwise, the Navy will provide the SEL for the driving of a pile (impact or vibratory).

   d. These measurements will begin at the standard airborne distance of 50 feet from the source (first measurement on the pile driving barge) and extend outward in 50 foot increments as possible. For areas over the water, the acoustic vessel (which will have a microphone on board) will attempt to collect measurements as close to the 50 foot intervals as possible.
   e. The land-based microphones currently proposed north and south of the existing EHW-1 will also collect information necessary to characterize the airborne sound fields and determine the distances to the marine mammal and marbled murrelet isopleths.

3. **To determine the underwater spreading loss occurring at the project location**.
   a. Three vessels outside the WRA will be used to collect measurements on the far-field locations. Data will be collected in such a way as to report the levels in peak, rms, and SEL and determine if 15 log is appropriate in this area or if a higher or lower transmission loss constant is applicable.
   b. In addition to the vessels which will be moving throughout the Action Area trying to determine the distance to the 120 dB threshold, the stationary hydrophone at Toandos Peninsula will provide information necessary to determine if sound levels are above or below the behavioral threshold for fish. Certain nearshore areas along Toandos Peninsula are considered critical habitat for certain fish species. As such, this data station will provide information on whether or not critical habitat and nearshore areas are receiving sounds at or below the disturbance threshold for fish. Injury levels are not expected in this nearshore area along Toandos Peninsula.

4. **To measure the sound pressure levels produced bythe use of the soft start technique to test the effectiveness of this method at reducing the sound levels during the initial stages of driving a pile**.
   a. Underwater acoustic measurements will be coordinated with the Pile Driving Engineer on the barge to be certain that the acousticians are aware of when the pile driving will be initiated so they may record the soft start sounds. This will be implemented using a radio, cell phone, and green and red flags. The pile driving engineer will wait until they have received confirmation from the acousticians that the recordings are ready to begin before the Engineer commences the soft start. The Engineer will notify the acousticians when the soft start is complete.

5. **To determine the relative effectiveness of the sound attenuation system(s) (such as a bubble curtain) to verify noise reduction underwater as part of the Test Pile Program.**
   a. While all pile driving with different sound attenuation systems will be recorded, it will not be possible to determine the 10 dB reduction modeled unless the sound attenuation system (eg. bubble curtain) is turned off temporarily. The Navy is in consultation with USFWS regarding the specifics of this test, the current proposal is to turn the sound attenuation device off for one minute, for up to 7 piles

towards the end of pile driving for each pile. The sound produced during successive strikes at the end of pile driving are expected to be most consistent and are also likely to be the highest sound levels produced during impact pile driving since resistance to driving will be greatest when the pile is close to its embedment depth.

6. **To test the effectiveness of using a sound attenuation system with a vibratory hammer as part of the Test Pile Program.**
    a. This will be tested during the driving of three vibratory piles (one of each size). The sound attenuation system proposed for this test is a bubble curtain, but other technologies may be tested as well if possible.

Additional Considerations:

<u>Timing and Consolidation of Testing Objectives:</u>

In order to reduce environmental impacts to wildlife from impact pile driving, as well as to create efficiencies in the TPP schedule and maximize use of assets to reduce cost, the Navy will try to do all pile testing without an impact hammer during the first several weeks of the TPP in late July and early August. This will allow unattenuated impact pile driving (testing only) to occur when the fewest marbled murrelets are expected to be present in the action area. The testing of the soft-start, sound attenuation device efficiency during vibratory pile driving of all pile sizes, and the sound attenuation system on and off during impact pile driving will all occur in the initial weeks of the TPP. The acoustic team and marine mammal team will work cooperatively to identify and monitor the isopleths. Once the actual in-site measurements have been made in the initial weeks and the isopleths zones identified, the measurement and monitoring effort will be adaptively managed accordingly. It is expected that two far-field acoustic vessels will not be necessary past the initial first 3 weeks. One acoustic vessel will remain in Hood Canal and serve as a MMO platform. The raft at Toandos may remain for the duration of the project if it is found to be collecting useful data from that location (approximately 2 miles away from the project site). The Toandos hydrophone is not real-time. The hydrophone string located 10 meters from the pile being driven will remain on site and record data from each pile. This hydrophone is also not real-time.

<u>Baseline Environmental and Construction Equipment Data:</u>

Prior to and during the pile driving activity, environmental data will be gathered, such as wind speed and direction, air temperature, humidity, surface water temperature, water depth, wave height, weather conditions, and other factors that could contribute to influencing the underwater sound levels (e.g., aircraft, boats, etc.). Start and stop time of each pile-driving event will be recorded. The start and stop time at which the sound attenuation device is turned on and off will be recorded, if this is approved by USFWS.

The contractor will supply the acoustics specialist with the substrate composition, hammer model and size, hammer energy settings and any changes to those settings during the piles being monitored, depth pile driven, blows per foot for the piles monitored, and total number of strikes to drive each pile that is monitored.

Equipment:

Table 3 details the equipment that will be used to monitor underwater and airborne sound pressure levels. All applicable equipment will have National Institute of Standards and Technology (NIST) traceable calibration.

Table 3
Equipment for Acoustic Sound Monitoring

Item	Specifications	Quantity	Description	Usage
Hydrophone with 35 to 100 feet of cable	Reson Model TC-4013 with Receiving Sensitivity- 211dB ±3dB re 1V/µPa or Reson Model TC-4033 with –Sensitivity 203 dB re V/µPa	8	 TC-4013  TC-4033	Capture underwater sound pressures and convert to voltages that can be recorded/analyzed by other equipment.
Signal Conditioning Amplifier	PCB Model 422E13 charge converter Amplifier Gain- 0.1 mV/pC to 10 V/pC Transducer Sensitivity Range- 10^{-12} to 10^{3} C/MU	8		Adjust signals from hydrophone to levels compatible with recording equipment.
Multi-gain signal conditioner	PCB Model 480M122 battery-powered signal conditioning (multi-gain)	8		

Item	Specifications	Quantity	Description		Usage
Portable Digital Audio Recorder (2-channel)	Sampling Rate- 44K Hz or greater	4		Several models available with similar specifications	Records audio signals received by hydrophone.
SLM Battery Power	9-volt batteries	34	9-volt small batteries (e.g., Duracell)		Provides power to Multi-gain signal conditioner (3 each) and SLM (1 each)
Digital Audio Recorder Battery power	12-volt gel-cell battery 2.5 to 25 amp-hour	4	12-volt portable battery		Provides power to digital audio recorders
Digital Audio Recorder Battery power	2.5-volt batteries	20	Provides internal battery to digital audio recorders		Internal battery
Weather-proof enclosure	Pelican case to protect from water and weather	4	Pelican case approximately 20-inches L x 18 inches W, 8 inches D		Houses underwater data acquisition, storage and power equipment
Microphone (free field type)	Range- 30 – 120 dBA Sensitivity- -29 dB ± 3 dB (0 dB = 1 V/Pa)	1	Connected to Sound Level Meter		Monitoring airborne sounds from pile driving activities (if not raining).
ANSI Type 1 Sound Level Meter or Laptop computer	Compatible with digital analyzer	1	Equipped with ½-inch diameter microphone described above		Measures received acoustic signals and outputs analog audio signal to digital audio recorder

Item	Specifications	Quantity	Description	Usage
Calibrator (pistonphone-type)	Accuracy- IEC 942 (1988) Class 1	1		Calibration check of hydrophone and microphone in the field. Includes hydrophone and microphone calibrator coupler
Weighted line/chain marked in 5-foot increments to attach hydrophone and anchoring weights.	-	1		Takes the strain off of the hydrophone cables preventing damage.
Various surface floats.	Buoys and raft for each unattended measurement position	Up to 3		To keep the hydrophone at the appropriate position. Raft is attached to anchored bouy and equipped with hydrophone kit..

Item	Specifications	Quantity	Description	Usage
				
2-channel system showing SLMs, Multi-gain amplifiers, 12-volt battery and headphones			Hydrophones used to measure underwater sounds	

SIGNAL PROCESSING

Post-analysis of the sound level signals will include determination of the maximum absolute value of the instantaneous pressure within each strike, Root Mean Square (RMS) value for each pile strike, mean and standard deviation/error of the RMS for all pile strikes of each pile, rise time, number of strikes per pile and per day, number of strikes exceeding 206 dB_{peak}, number or percent of individual strikes exceeding 183 dB Sound Exposure Level (SEL) and 187 dB SEL, SEL of the pile strike with the maximum absolute peak sound pressure, mean SEL, and cumulative SEL (cumulative SEL = single strike SEL + 10*log (# hammer strikes)) and a frequency spectrum both with and without mitigation (if approved), between a minimum of 10 and 20,000 Hz for up to eight successive strikes with similar sound levels. Calculation methodology is provided in Appendix A. When possible the single strike SEL for each hammer strike will be estimated and then these values will be accumulated for the cumulative SEL value (See Appendix A).

ANALYSIS

Analysis of the data from the San Francisco-Oakland Bay Bridge Pile Driving Demonstration project indicated that 90 percent of the acoustic energy for most pile driving impulses occurred over a 50- to 100-millisecond period with most of the energy concentrated in the first 30 to 50 milliseconds (Illingworth and Rodkin, Inc. 2001). The RMS values computed for this project will be computed over the duration between where 5 percent and 95 percent of the energy of the pulse occurs. Cumulative energy levels and SEL will be calculated from the data between 5 and 95 percent of the energy of the individual pulse. The SEL energy plot will assist in interpretation of the single-strike waveform. The single-strike SEL, along with the total number of strikes per pile and per day, will be used to calculate the cumulative SEL for each pile and each 24-hour period.

In addition a waveform analysis of the individual absolute peak pile strikes will be performed to determine any changes to the waveform with the sound attenuation devices. A comparison of the frequency content with and without noise attenuation will be conducted (if approved). Units of underwater sound pressure levels will be dB re: 1 micropascal and units of SEL will be re: 1 $micropascal^2sec$.

An analysis of the change in the waveform and sound levels with and without the sound attenuation device (if approved) will be conducted.

REPORTING

A draft report, including data collected and summarized from all phases, will be submitted to the Navy, USFWS, and NMFS within 60 days of the completion of hydroacoustic monitoring. The results will be summarized in graphical form and include summary statistics and time histories of impact sound values for each pile. A final report will be prepared and submitted to the Navy, USFWS, and NMFS within 30 days following receipt of comments on the draft report from the Navy. A daily email report will be sent to USFWS and NMFS on days when impact pile driving occurs. The preliminary “real-time” results of where the isopleths were located will be provided to the Services for the days when impact pile driving occurs. If there are any “showstoppers” then the Navy will call USFWS and NMFS immediately.

The final report will include:

- Size and type of piles;
- A detailed description of the sound attenuation devices used, including design specifications for the bubble curtains (or other devices used during TPP);
- The impact or vibratory hammer force (energy rating) used to drive or extract the piles, and the make and model of the hammer;
- Description of the sound monitoring equipment;
- Distance between hydrophones and pile;
- Depth of the hydrophones and depth of water at hydrophone locations;
- Distance from the pile to the water’s edge;
- Depth of water in which the pile was driven;
- Depth into the substrate that the pile was driven;
- Physical characteristics of the bottom substrate into which the piles were driven;
- The total number of strikes to drive each pile and for all piles driven during a 24-hour period;
- Total number of strikes to drive each pile that is monitored;
- Ranges and means for peak, RMS, and SELs for each pile;
- Ambient underwater sound pressure level(s) reported in RMS;
- The results of the airborne noise measurements including the dBA, unweighted, Lmax, Leq, and SEL. Airborne acoustical data will be provided in 1/3 octave bands in the frequency range of 10 and 20 kHz;
- Results of the acoustic measurements, including the frequency spectrum, ranges and means including standard deviation/error for peak and RMS SPLs, single-strike and cumulative SEL for both projects for pile installation and pile removal;
- The report will provide underwater acoustical data between 10 Hz and 20 kHz in 1/3 octave bands and by depth of hydrophone as possible;
- Results of the monitoring with and without the attenuation system for impact and vibratory testing (TPP only), as well as a comparison of sound pressure levels recorded during the use of a soft start when the hammer is operating at reduced capacity versus sound pressure levels recorded when the hammer is operating at normal capacity to determine the amount of sound pressure level reduction from this mitigation measure;
- An estimation of the number of strikes that exceeded the cumulative SEL threshold and an estimation of the distance at which the peak and cumulative SEL values reach the respective thresholds and the distance at which the RMS values reach the relevant marine life thresholds and background sound levels;
- Vibratory monitoring results will include the maximum and overall average RMS calculated from 30-second RMS values during the drive of the pile;
- Description of any observable marine mammal, fish, or bird behavior in the immediate area and, if possible, correlation to underwater sound levels occurring at that time.

REFERENCES

Illingworth & Rodkin, Inc. 2001. Final Data Report: Noise and Vibration Measurements Associated with the Pile Demonstration Project for the San Francisco-Oakland Bay Bridge East Span. August 2001.

APPENDIX A

Calculation of Cumulative SEL

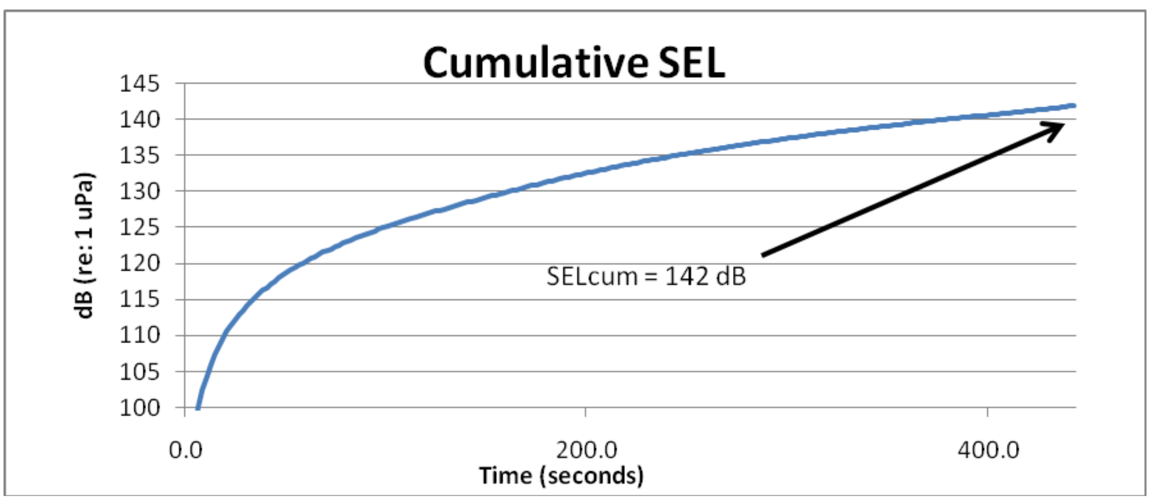
An estimation of individual SEL values can be calculated for each pile strike by calculating a 1-second Leq for each individual pile strike. As can be seen in equation 1 below the SEL is essentially a subset of the LEQ function. When the time interval for the Leq is set to one second it is equal to the SEL. The accumulated SEL values produced by calculating a 1 second Leq for each pile strike can then be accumulated for each pile strike.

Calculating a cumulative SEL from individual SEL values cannot be accomplished simply by adding each SEL decibel level arithmetically. Because these values are logarithms they must be added logarithmically. Perhaps the easiest method for adding decibels logarithmically

$$L_{eq,T} = 10\lg\left(\frac{1}{T}\int_0^T \frac{p^2(t)}{p_0{}^2}dt\right) \quad dB \quad = \quad SEL = 10\lg\left(\int_{-\infty}^{\infty} \frac{p^2(t)}{p_0{}^2}dt\right) \quad dB \qquad \text{(eq. 1)}$$

Calculating a cumulative SEL from individual SEL values cannot be accomplished simply by adding each SEL decibel level arithmetically. Because these values are logarithms they must first be converted to antilogs and then accumulated. Perhaps the easiest method for this is to divide each SEL decibel level by 10 and then take the antilog. This will convert the decibels to units of microPascals. Paste these values into a spreadsheet and then sort from smallest to largest value. In a separate column starting with the second row of these values add this value to the one above it and then repeat this process to the last row of data. The last value in this column is the cumulative SEL in units of microPascals squared second. Next convert the microPascal values to dBSEL by dividing each value by the total number of values and calculating the log base 10 of each of these values, then multiply by 20 to get dBSEL.

It is recommended that you also plot these values on a cumulative plot such as the one below.

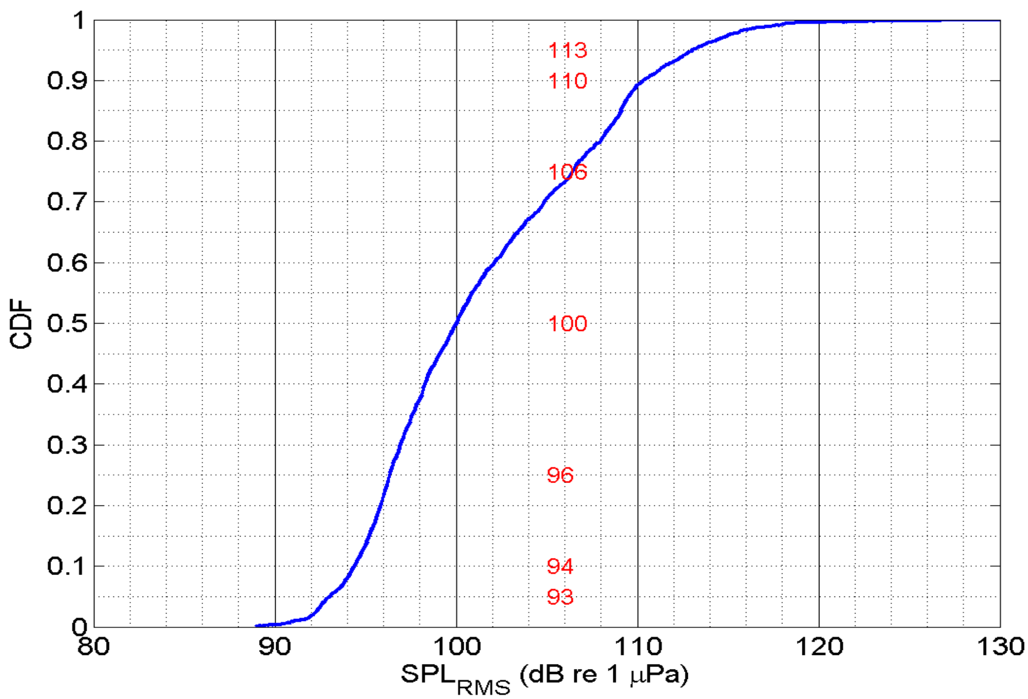


APPENDIX B

Calculation of a Cumulative Distribution Function and Plot for Background Sound Level Analysis

Data from three full 24-hour cycles (minimum) are used to calculate a 30-second Root Mean Square (RMS) value for each 30-second period for the entire dataset. The RMS should be calculated for both the full frequency range recorded as well as a separate dataset which has been passed through a high pass filter thus eliminating those frequencies below 1000 Hz. These datasets are then grouped into 24-hour periods. To determine if the data is approximately log-normal in distribution, each 24-hour period is plotted as a Probability Density Function (PDF). Each 24-hour period can be plotted on the same PDF plot. The plots should be approximately log normal in distribution and thus can be used in the further analysis. Each day of data should have an approximately Gaussian sigmoid shape, the differences between them and the ideal might be hard to spot, but the sigmoid from day to day will show noticeable variation. Data which does not approximate a log normal distribution should be excluded from further analysis.

The Cumulative Distribution Function (CDF) plot is obtained by plotting the normalized cumulative sum vs. the bin location. You can also get the PDF from plotting the normalized bin count vs. the bin location. The normalized bin count is obtained by dividing the count column by (number of data points multiplied by the space between 2 consecutive bins). This provides the integral of the PDF equal to 1. See: http://www.vertex42.com/ExcelArticles/mc/Histogram.html



APPENDIX B

VIBRATORY PILE DRIVING RESULTS

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APPENDIX B – VIBRATORY PILE DRIVING RESULTS

10/4/2011 – Inside Pile EHW1 (Vibratory Installation)

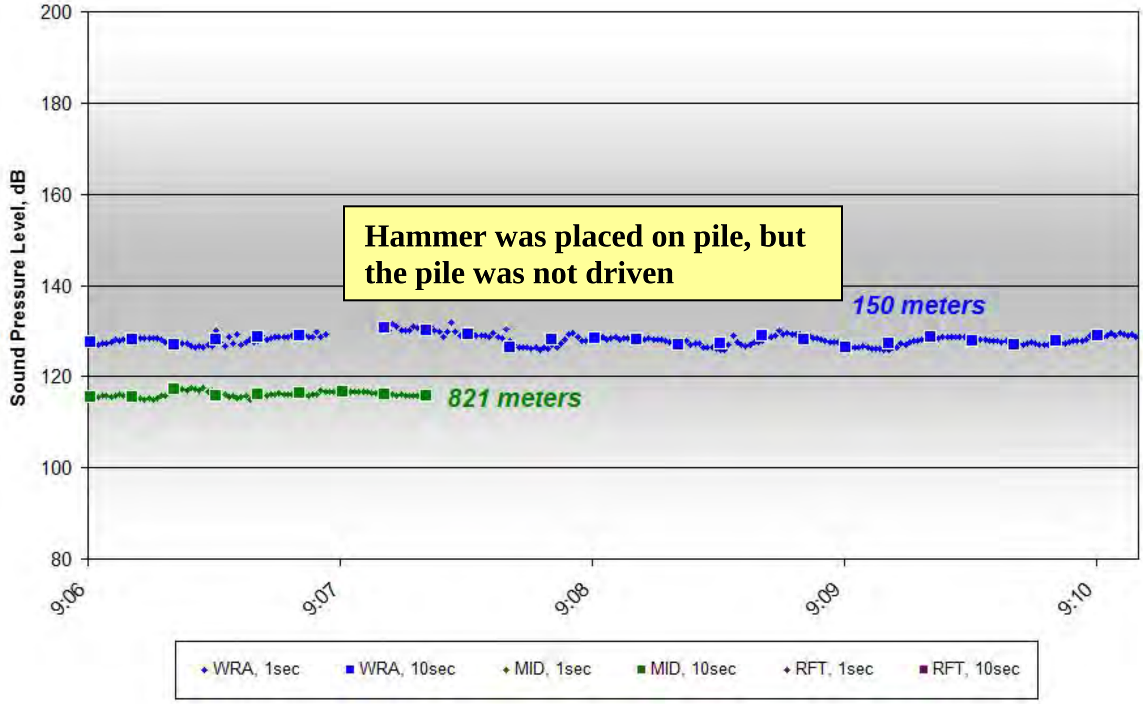

Figure B1. One-second and 10-second Average Data for Inside Pile EHW1, 9:06-9:10, Measured at Depths of 17-30 meters on October 4, 2011

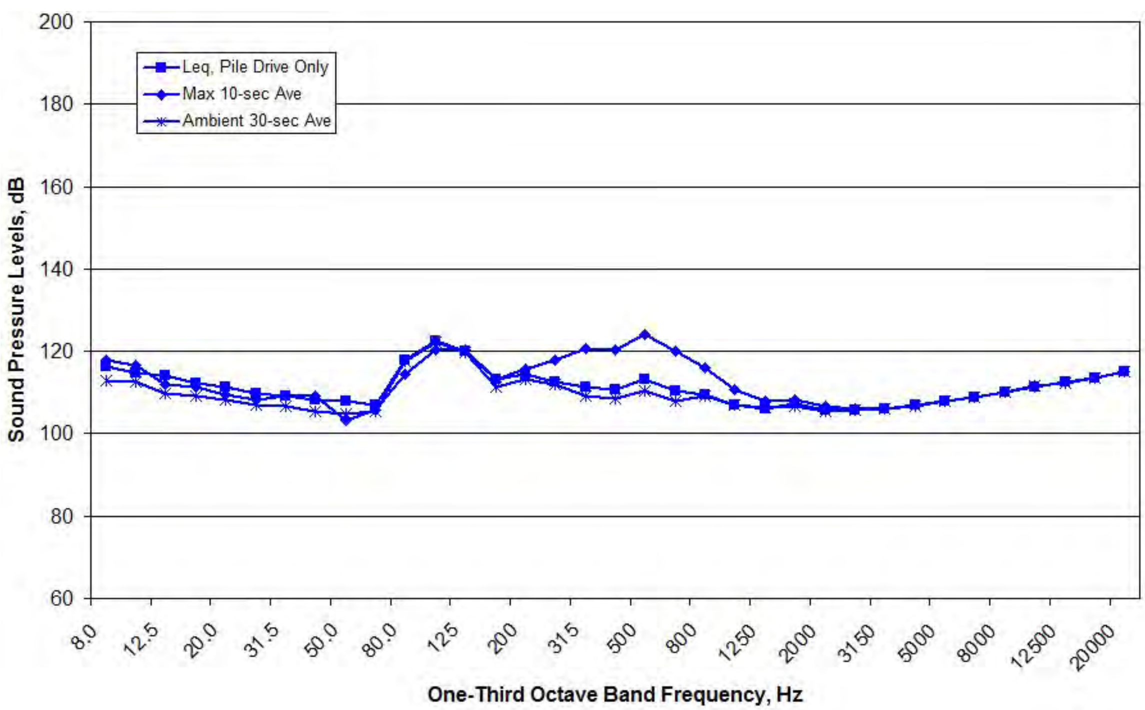

Figure B2. Spectral Data Measured at the WRA Location during Inside Pile EHW1, 9:06-9:10, Measured at Depths of 30 meters on October 4, 2011

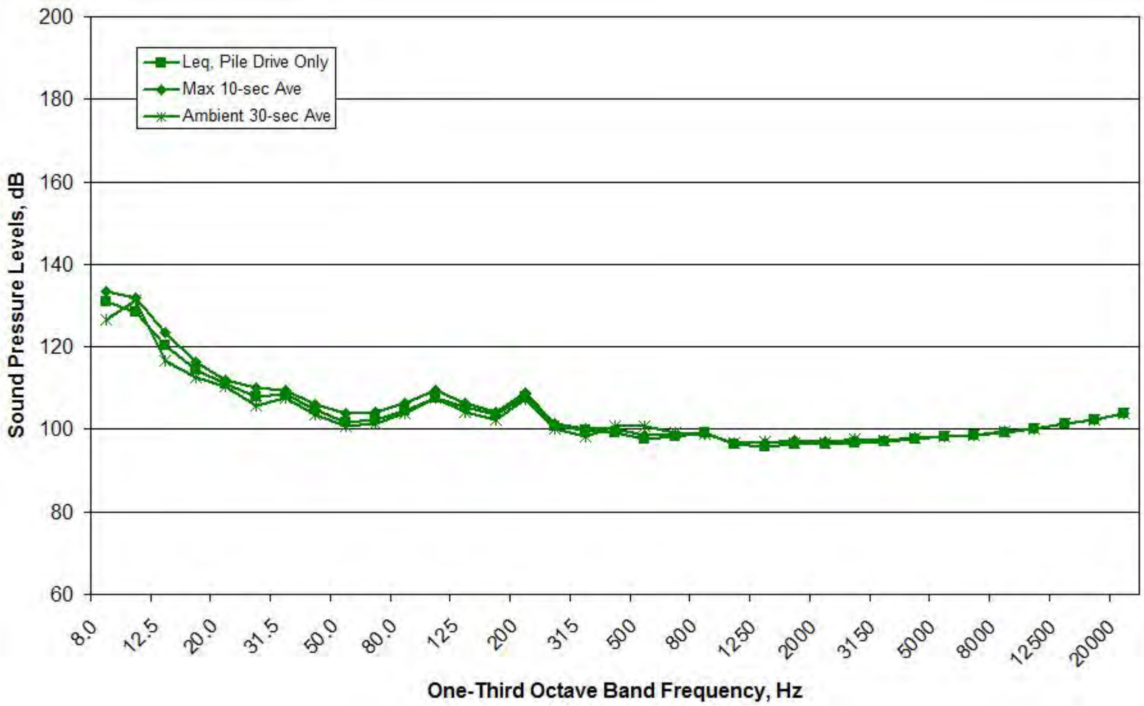

Figure B3. Spectral Data Measured at the MID Location during Inside Pile EHW1, 9:06-9:10, Measured at Depths of 30 meters on October 4, 2011

NO DATA AVAILABLE – EQUIPMENT MALFUNCTION

Figure B4. Spectral Data Measured at the RFT Location during Inside Pile EHW1, 9:06-9:10, Measured at Depths of 17 meters on October 4, 2011

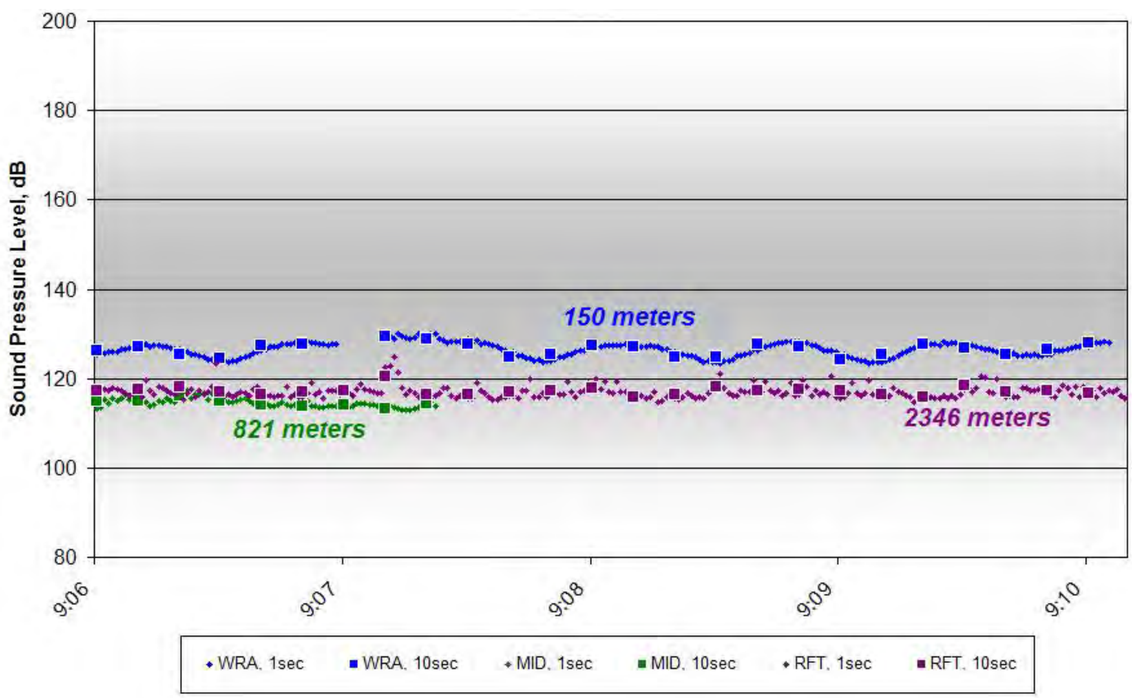

Figure B5. One-second and 10-second Average Data for Inside Pile EHW1, 9:06-9:10, Measured at Depths of 10 meters on October 4, 2011

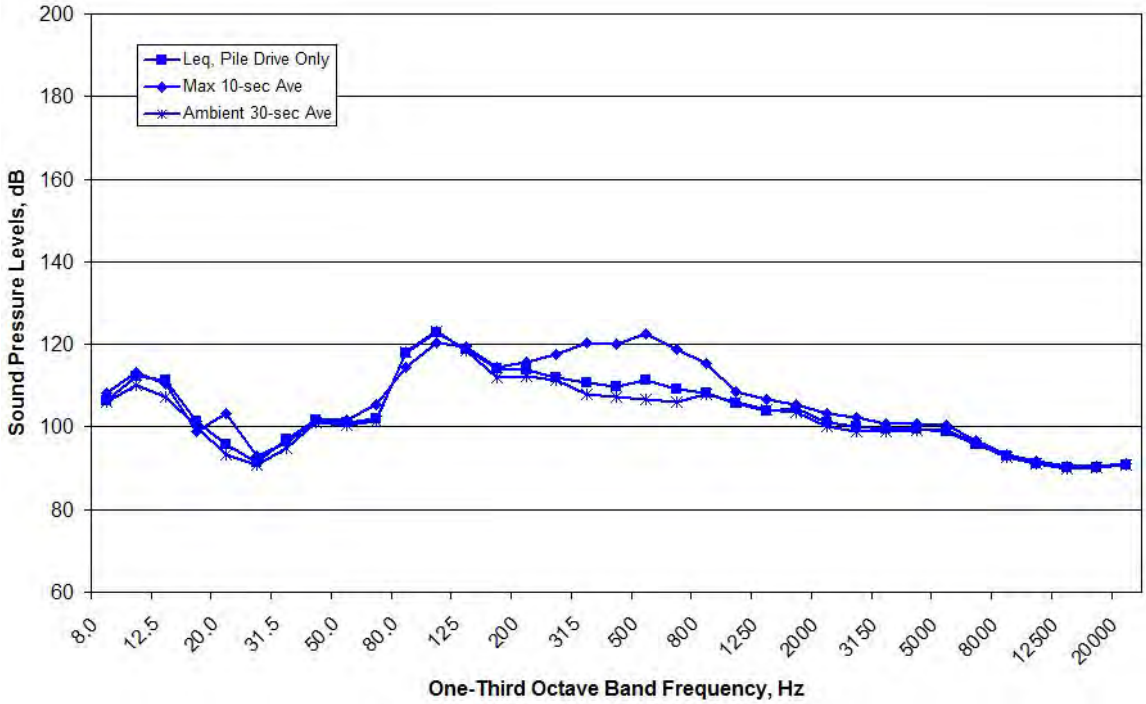

Figure B6. Spectral Data Measured at the WRA Location during Inside Pile EHW1, 9:06-9:10, Measured at Depths of 10 meters on October 4, 2011

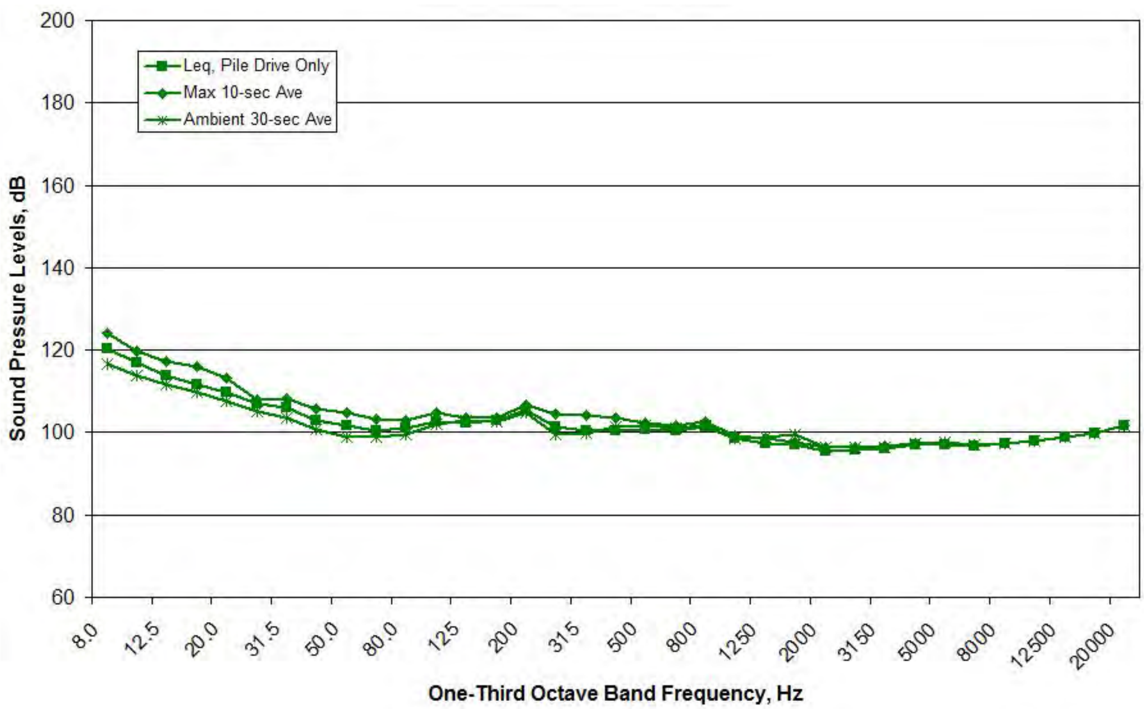

Figure B7. Spectral Data Measured at the MID Location during Inside Pile EHW1, 9:06-9:10, Measured at Depths of 10 meters on October 4, 2011

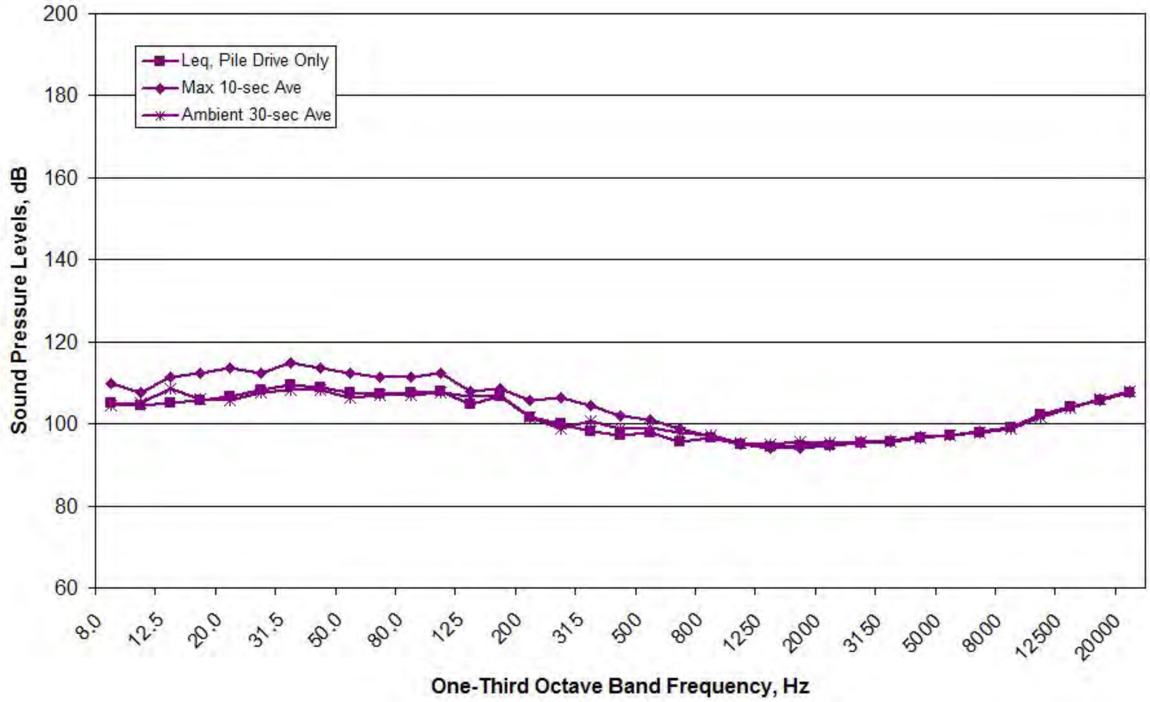

Figure B8. Spectral Data Measured at the RFT Location during Inside Pile EHW1, 9:06-9:10, Measured at Depths of 10 meters on October 4, 2011

10/5/2011 – EHW1 BP1 (Vibratory Installation)

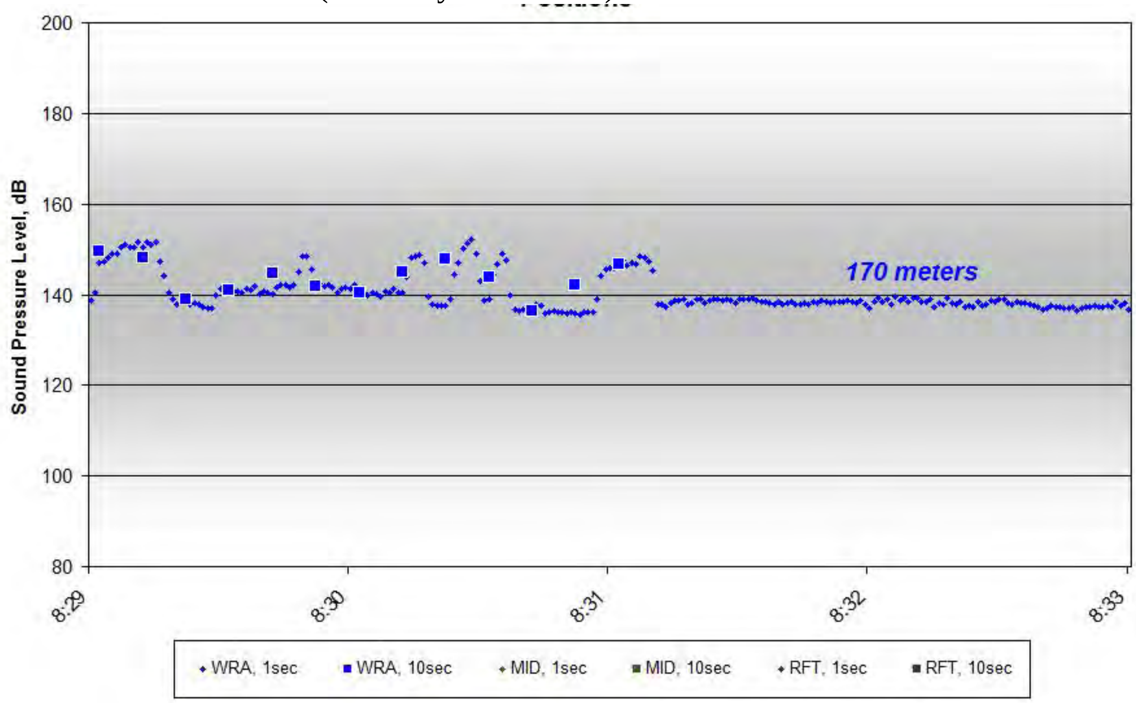

Figure B9. One-second and 10-second Average Data for EHW1 BP1, 8:29-8:32, Measured at Depths of 17-30 meters on October 5, 2011

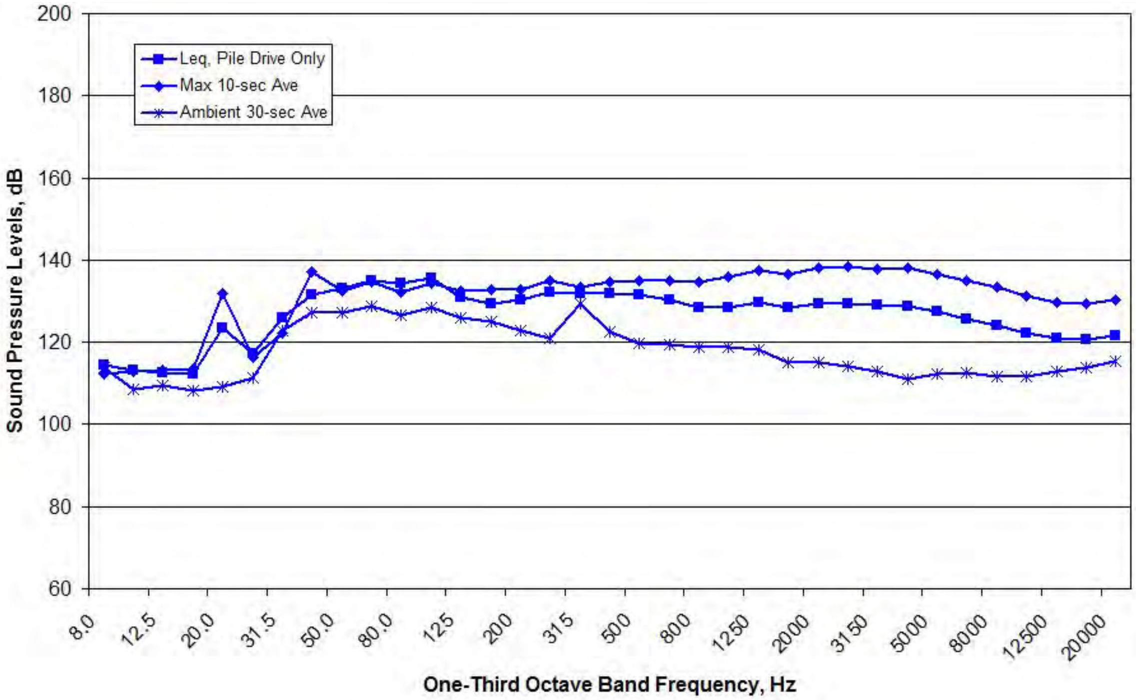

Figure B10. Spectral Data Measured at the WRA Location during EHW1 BP1, 8:29-8:32, Measured at Depths of 30 meters on October 5, 2011

NO DATA AVAILABLE – METERS SHUT OFF DURING TESTING

Figure A11. Spectral Data Measured at the MID Location during EHW1 BP1, 8:29-8:32, Measured at Depths of 30 meters on October 5, 2011

NO DATA AVAILABLE – EQUIPMENT MALFUNCTION

Figure B12. Spectral Data Measured at the RFT Location during EHW1 BP1, 8:29-8:32, Measured at Depths of 17 meters on October 5, 2011

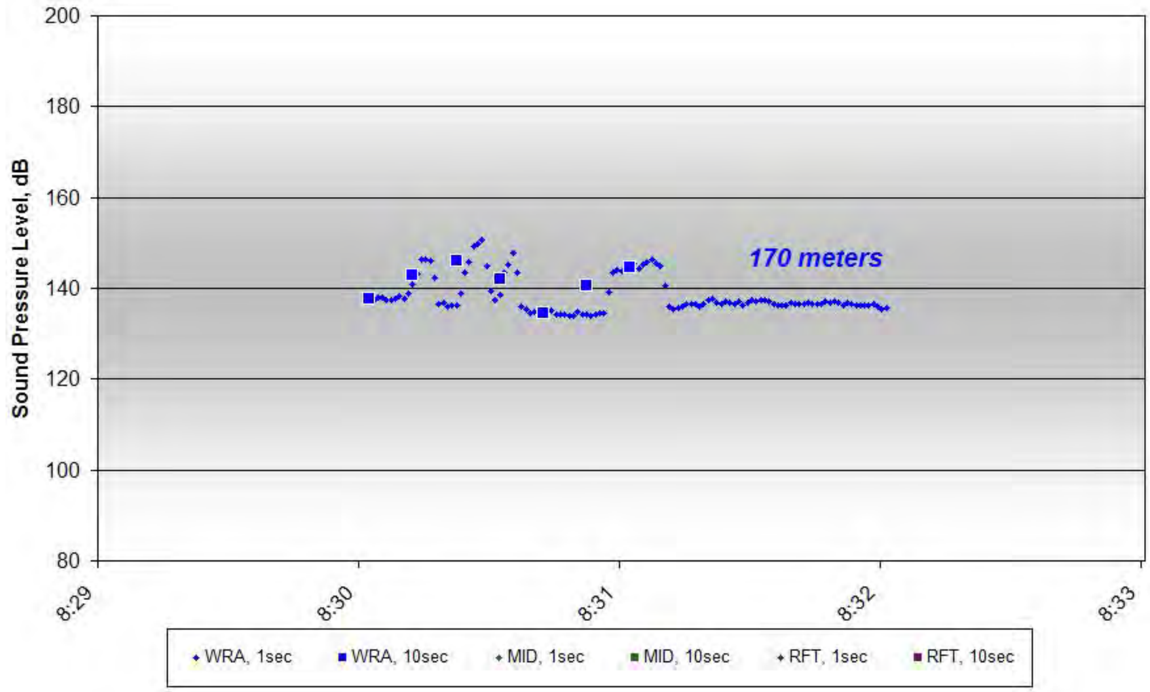

Figure B13. One-second and 10-second Average Data for EHW1 BP1, 8:29-8:32, Measured at Depths of 10 meters on October 5, 2011

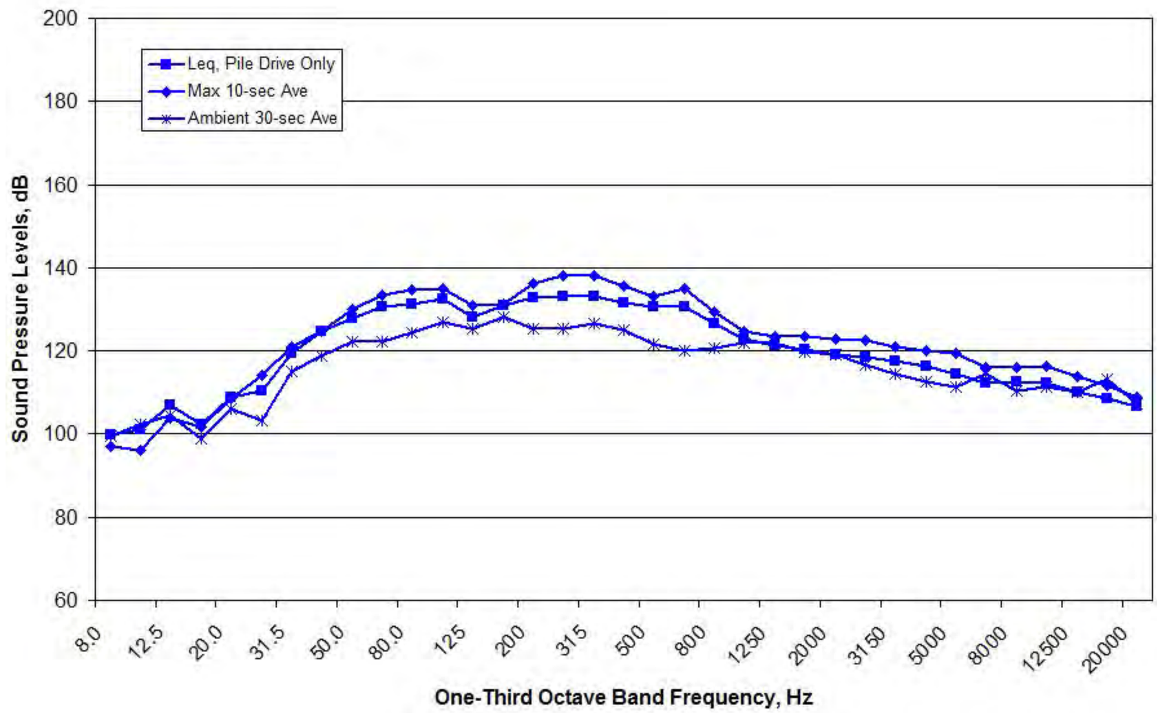

Figure B14. Spectral Data Measured at the WRA Location during EHW1 BP1, 8:29-8:32, Measured at Depths of 10 meters on October 5, 2011

NO DATA AVAILABLE – METERS SHUT OFF DURING TESTING

Figure B15. Spectral Data Measured at the MID Location during EHW1 BP1, 8:29-8:32, Measured at Depths of 10 meters on October 5, 2011

NO DATA AVAILABLE – ROUGH ENVIRONMENTAL CONDITIONS

Figure B16. Spectral Data Measured at the RFT Location during EHW1 BP1, 8:29-8:32, Measured at Depths of 10 meters on October 5, 2011

EHW1 BP2 (Vibratory Installation)

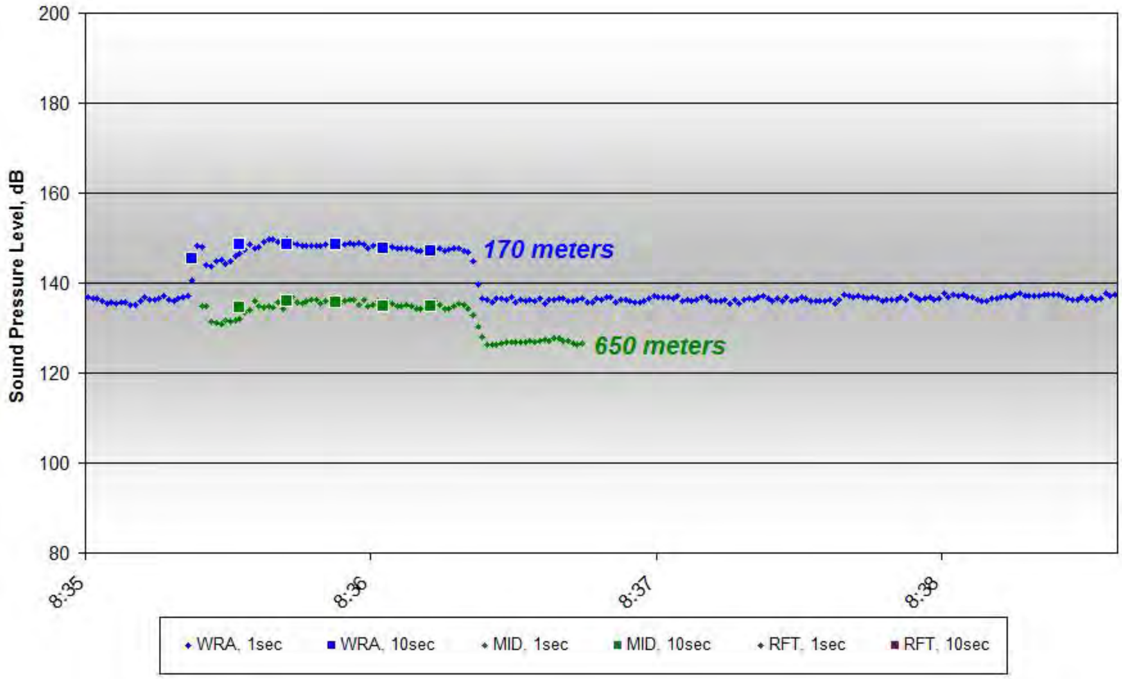

Figure B17. One-second and 10-second Average Data for EHW1 BP2, 8:35-8:36, Measured at Depths of 17-30 meters on October 5, 2011

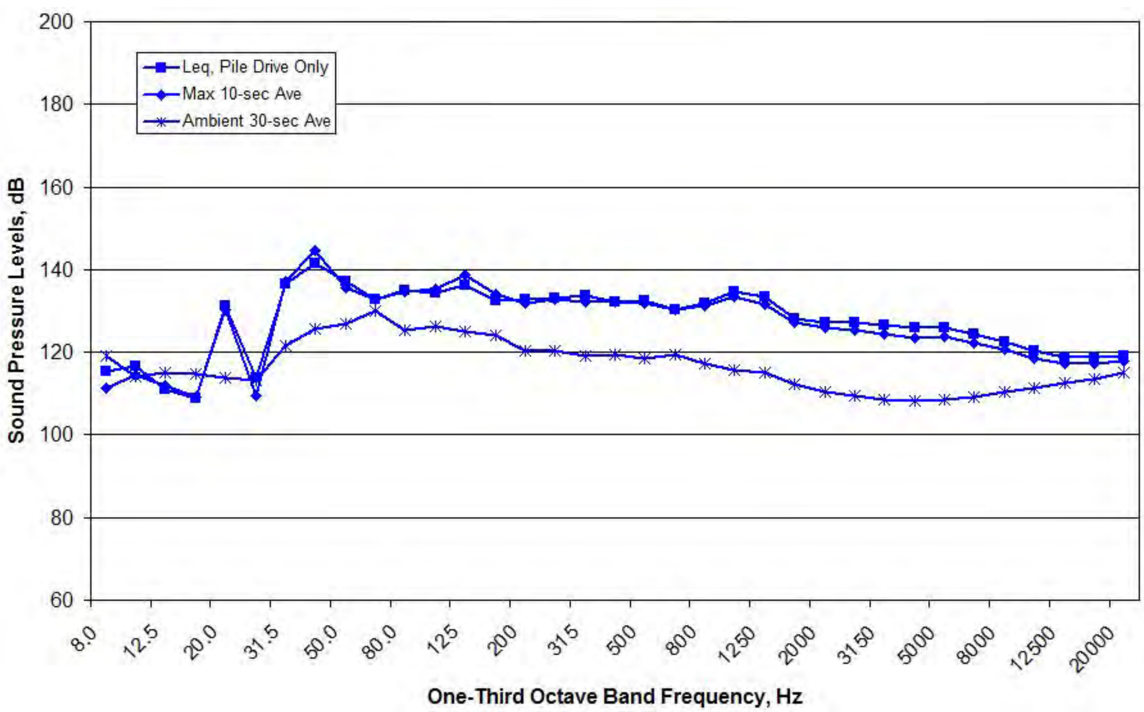

Figure B18. Spectral Data Measured at the WRA Location during EHW1 BP2, 8:35-8:36, Measured at Depths of 30 meters on October 5, 2011

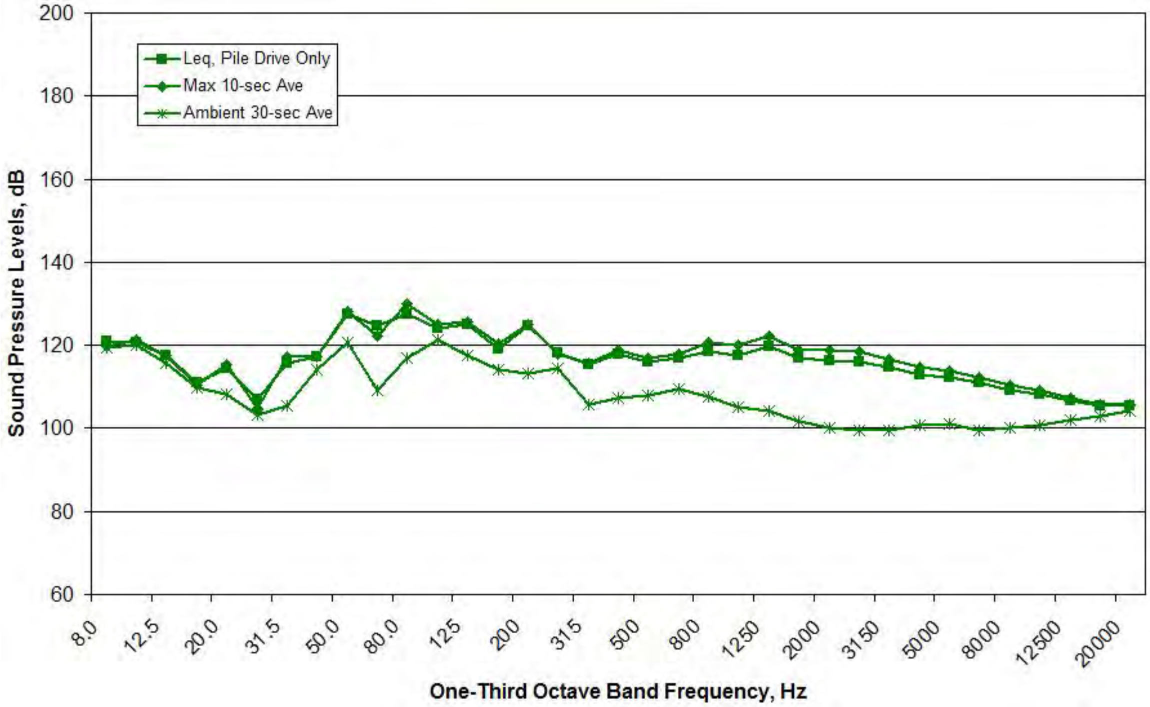

Figure B19. Spectral Data Measured at the MID Location during EHW1 BP2, 8:35-8:36, Measured at Depths of 30 meters on October 5, 2011

NO DATA AVAILABLE – ROUGH ENVIRONMENTAL CONDITIONS

Figure B20. Spectral Data Measured at the RFT Location during EHW1 BP2, 8:35-8:36, Measured at Depths of 17 meters on October 5, 2011

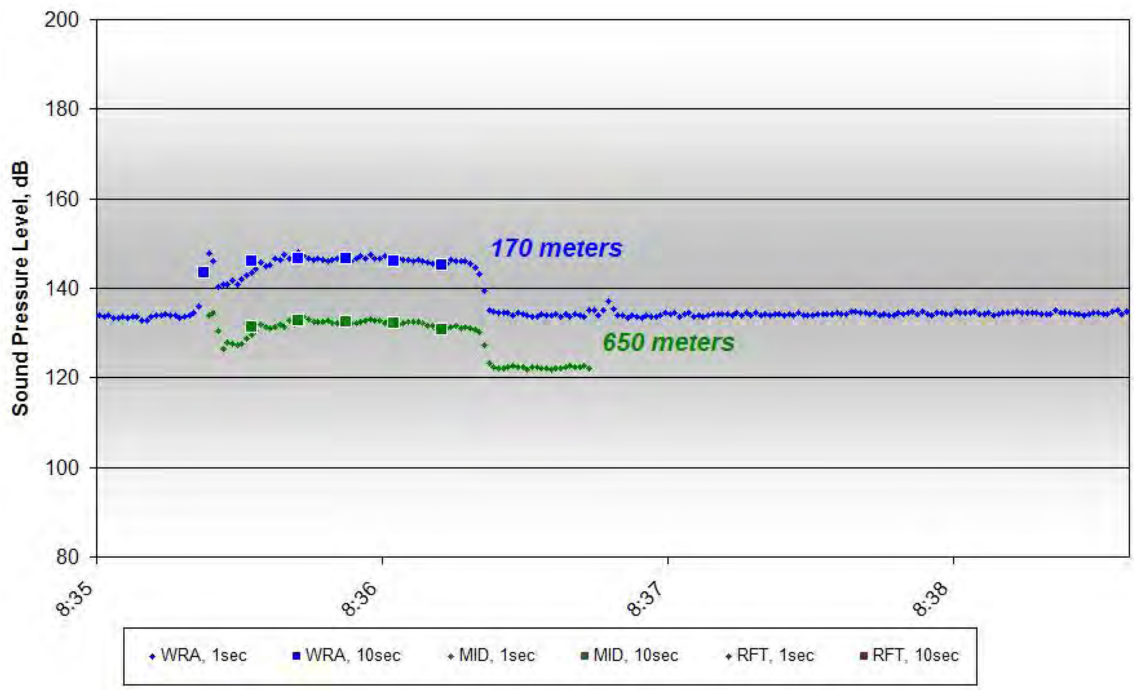

Figure B21. One-second and 10-second Average Data for EHW1 BP2, 8:35-8:36, Measured at Depths of 10 meters on October 5, 2011

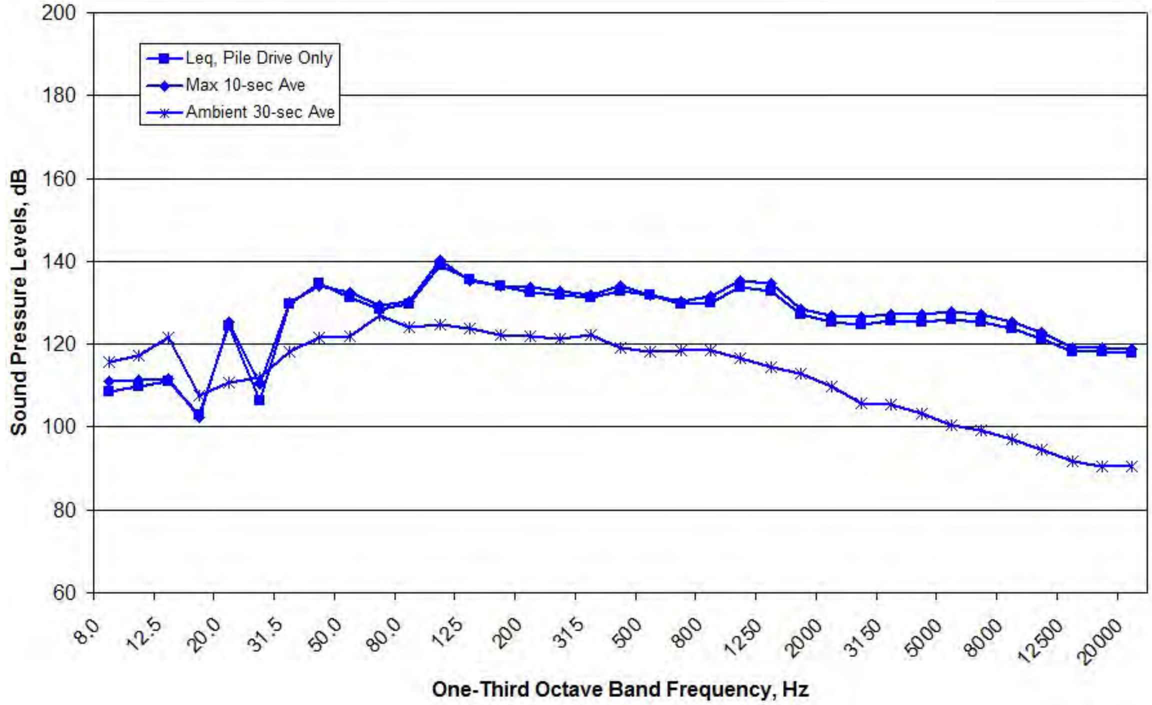

Figure B22. Spectral Data Measured at the WRA Location EHW1 BP2, 8:35-8:36, Measured at Depths of 10 meters on October 5, 2011

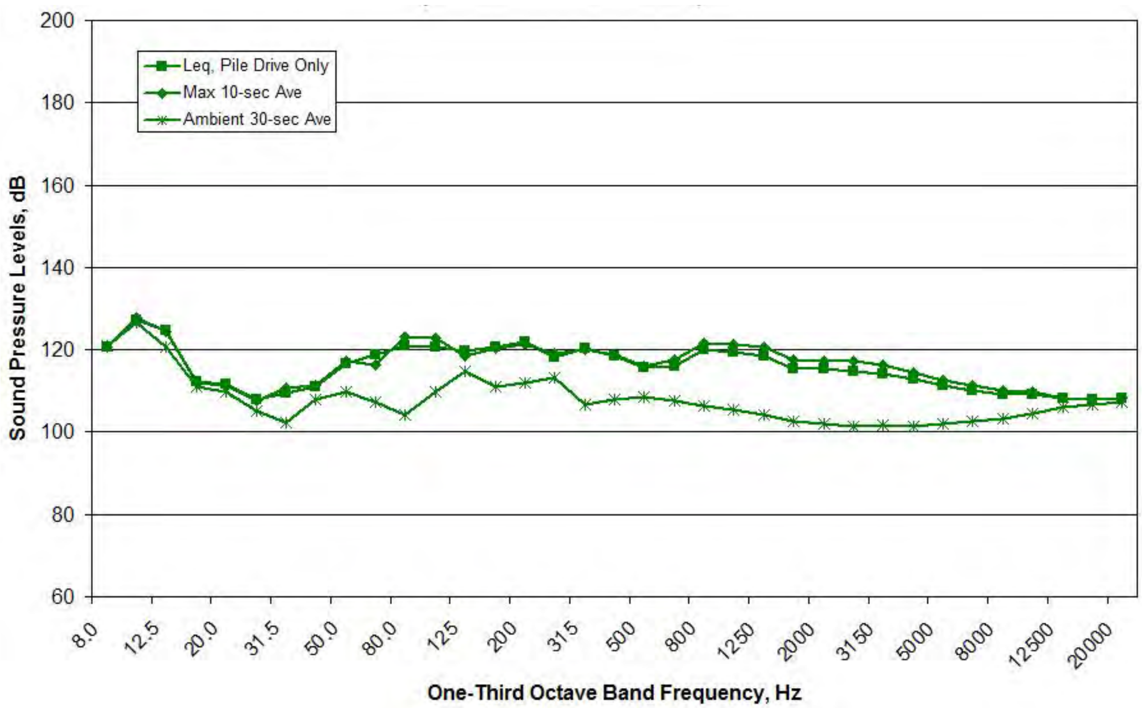

Figure B23. Spectral Data Measured at the MID Location during EHW1 BP2, 8:35-8:36, Measured at Depths of 10 meters on October 5, 2011

NO DATA AVAILABLE – ROUGH ENVIRONMENTAL CONDITIONS

Figure B24. Spectral Data Measured at the RFT Location during EHW1 BP2, 8:35-8:36, Measured at Depths of 10 meters on October 5, 2011

10/7/2011 – EHW1 RX5 (Vibratory Installation)

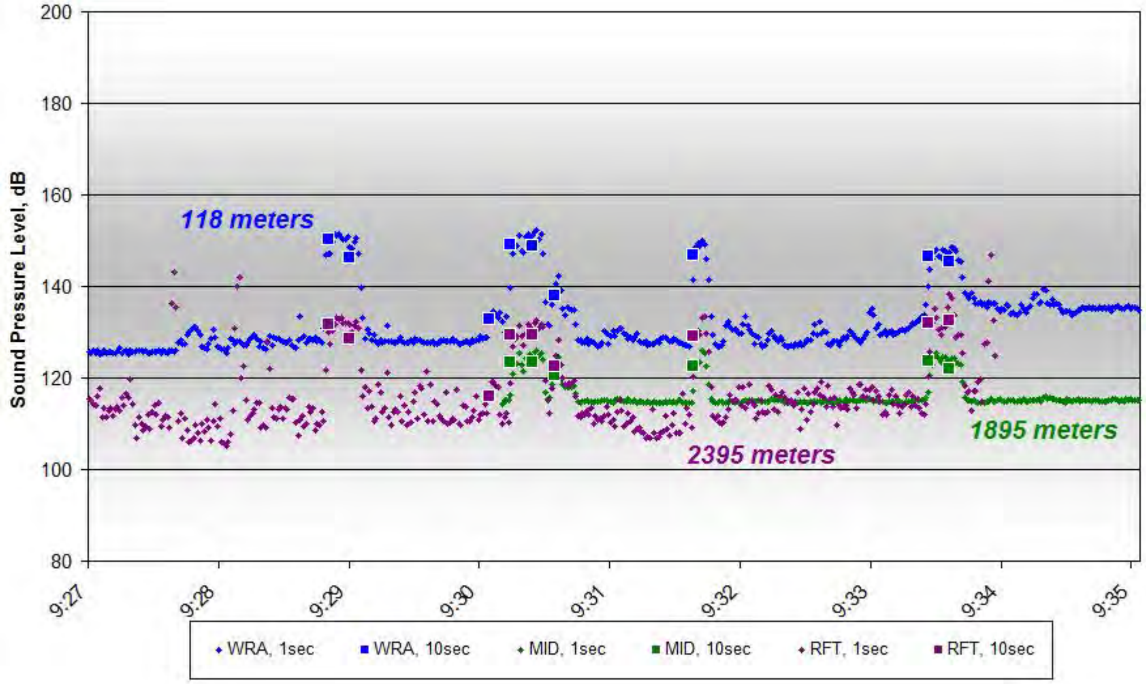

Figure B25. One-second and 10-second Average Data for EHW1 RX5, 9:29-9:34, Measured at Depths of 17-30 meters on October 7, 2011

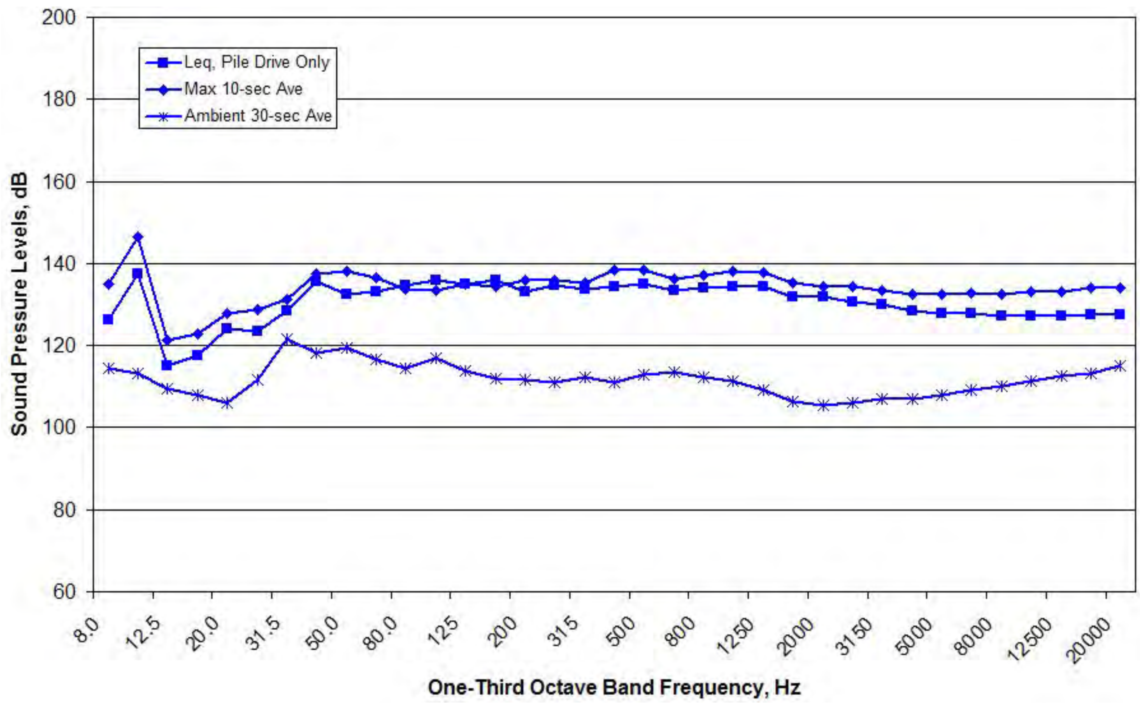

Figure B26. Spectral Data Measured at the WRA Location during EHW1 RX5, 9:29-9:34, Measured at Depths of 30 meters on October 7, 2011

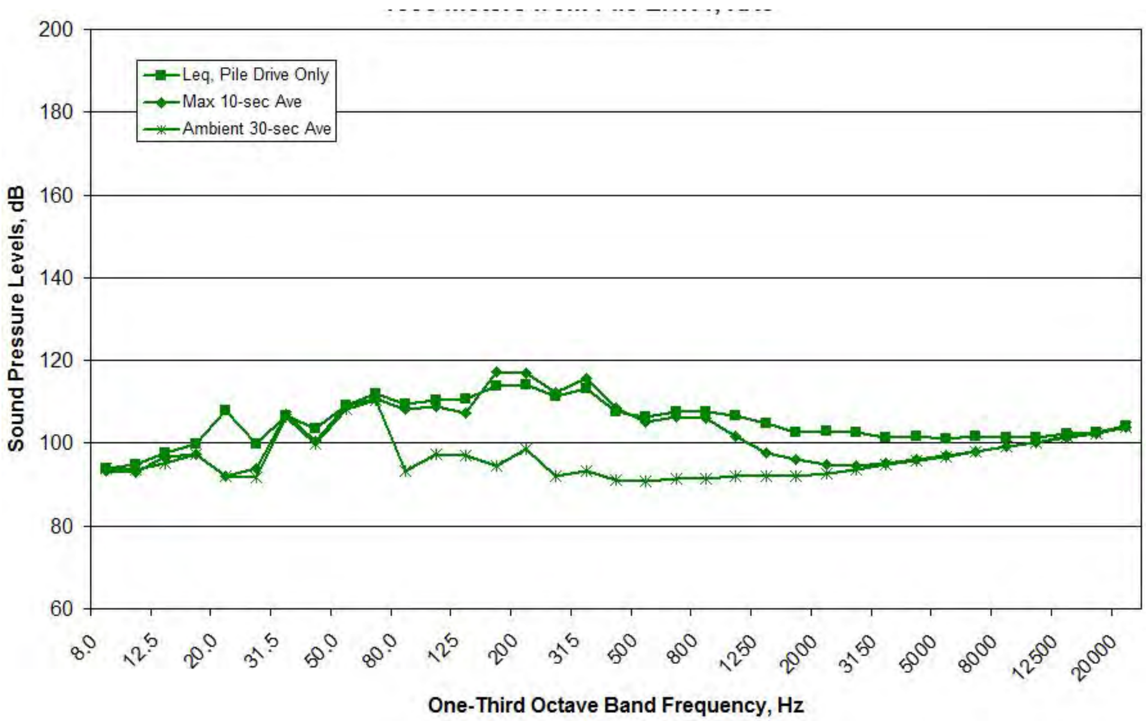

Figure B27. Spectral Data Measured at the MID Location during EHW1 RX5, 9:29-9:34, Measured at Depths of 30 meters on October 7, 2011

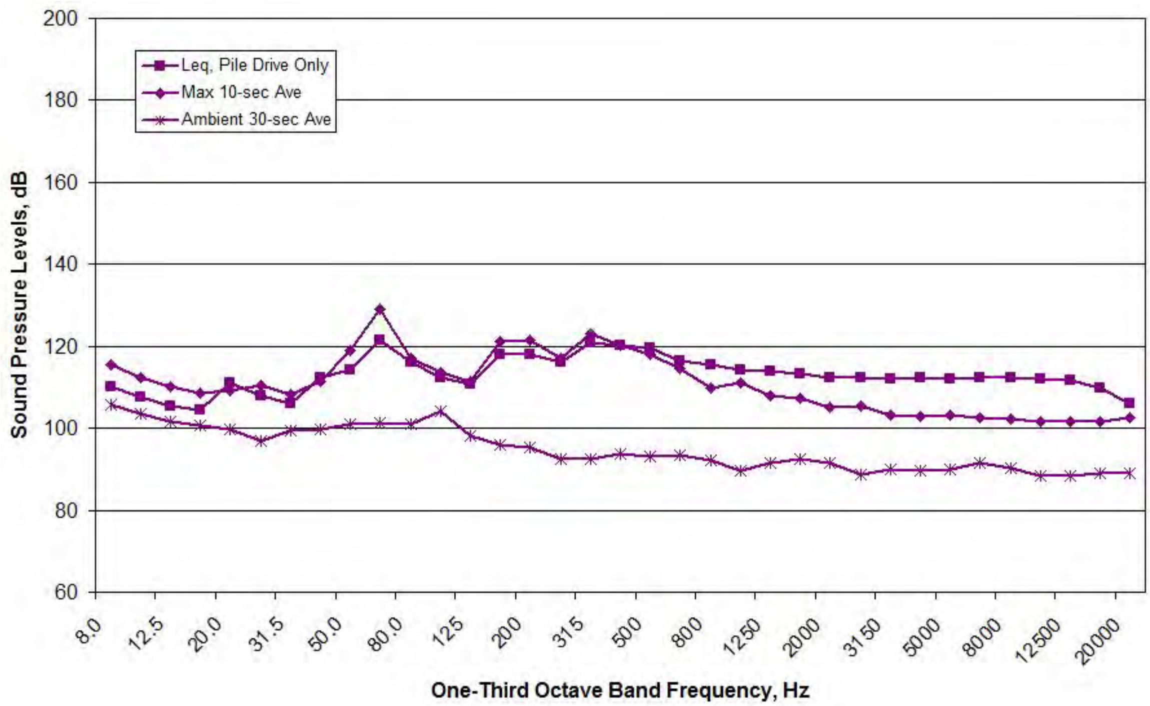

Figure B28. Spectral Data Measured at the RFT Location during EHW1 RX5, 9:29-9:34, Measured at Depths of 17 meters on October 7, 2011

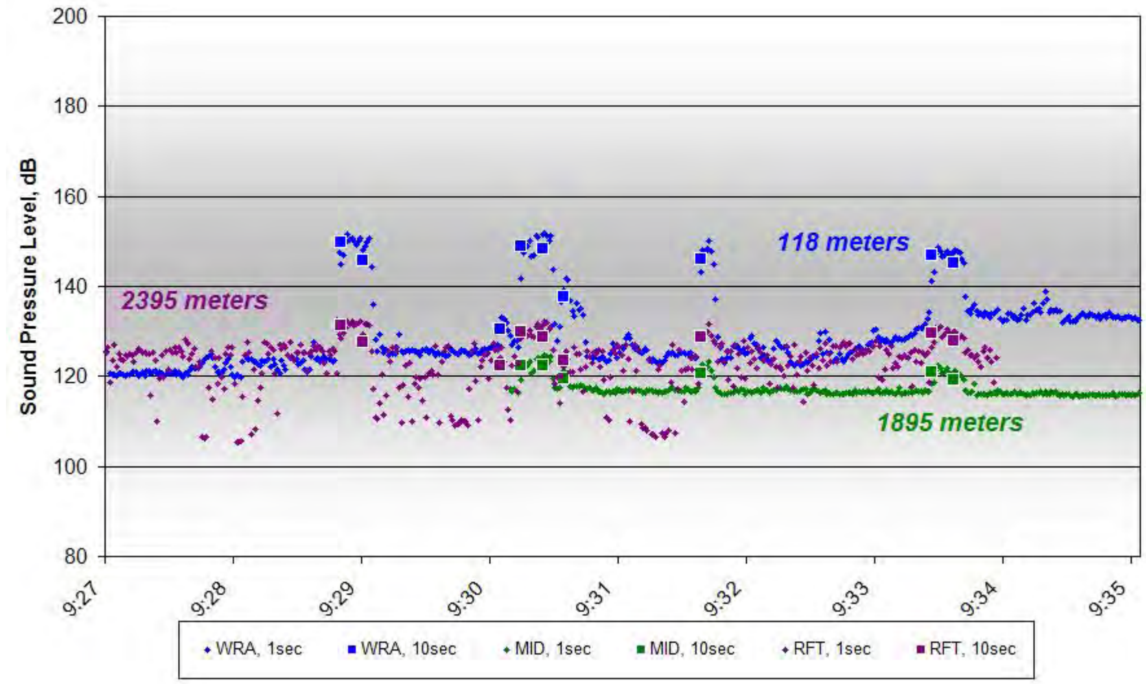

Figure B29. One-second and 10-second Average Data for EHW1 RX5, 9:29-9:34, Measured at Depths of 10 meters on October 7, 2011

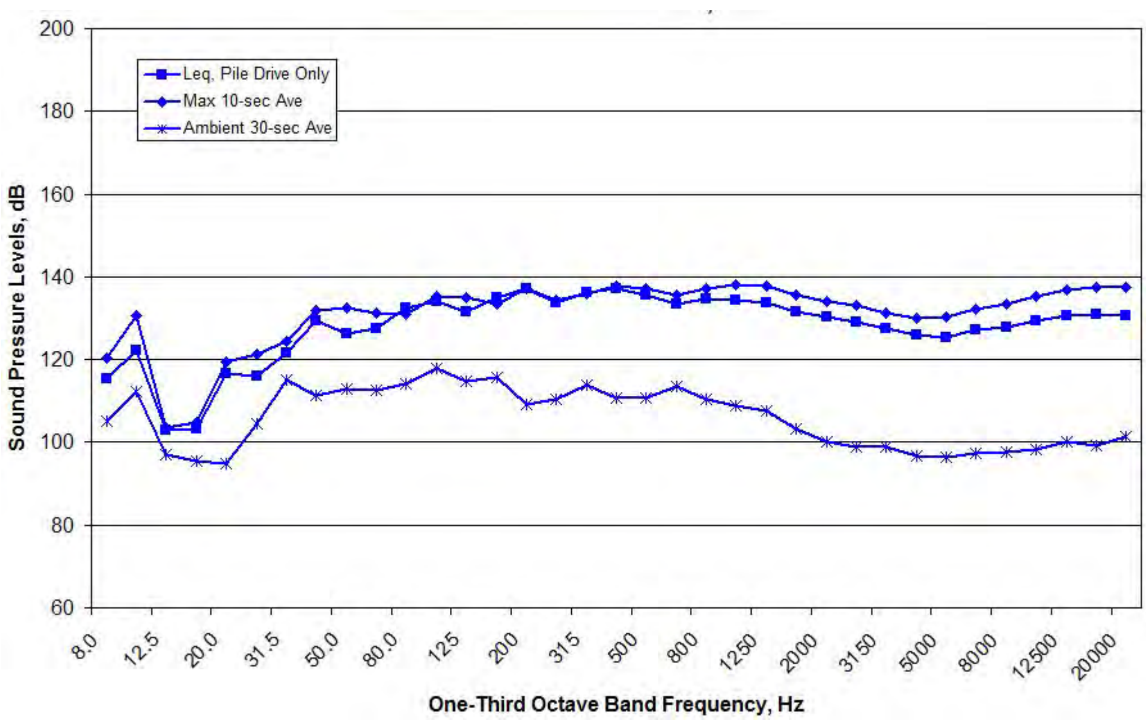

Figure B30. Spectral Data Measured at the WRA Location during EHW1 RX5, 9:29-9:34, Measured at Depths of 10 meters on October 7, 2011

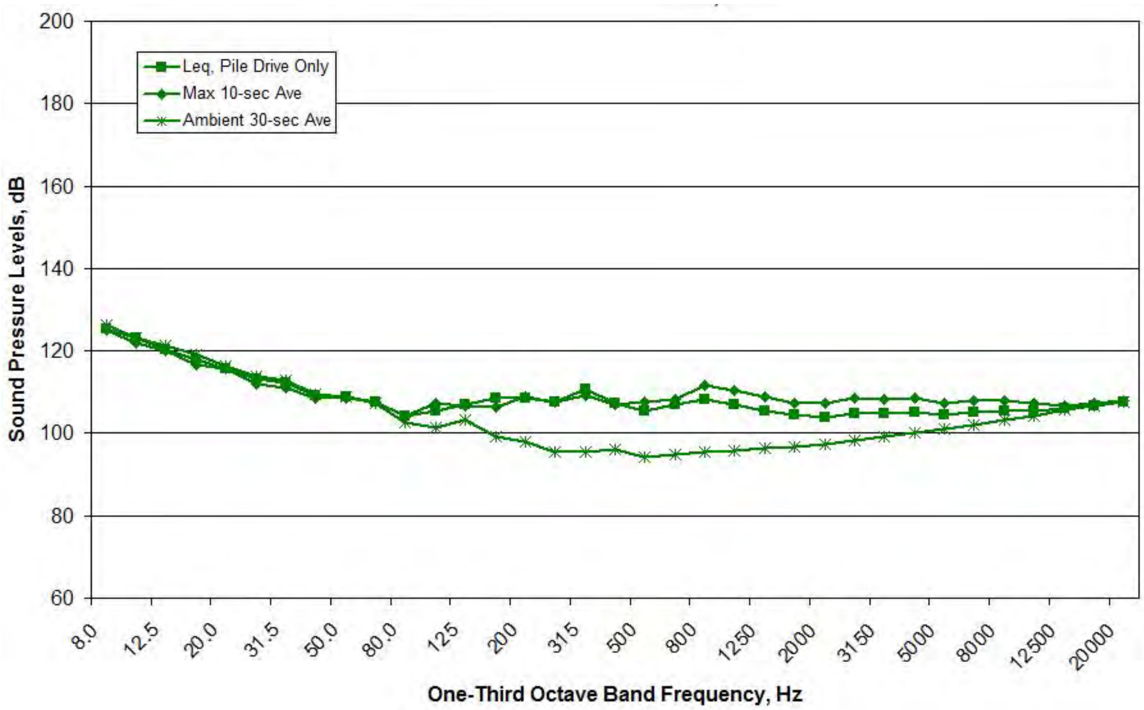

Figure B31. Spectral Data Measured at the MID Location during EHW1 RX5, 9:29-9:34, Measured at Depths of 10 meters on October 7, 2011

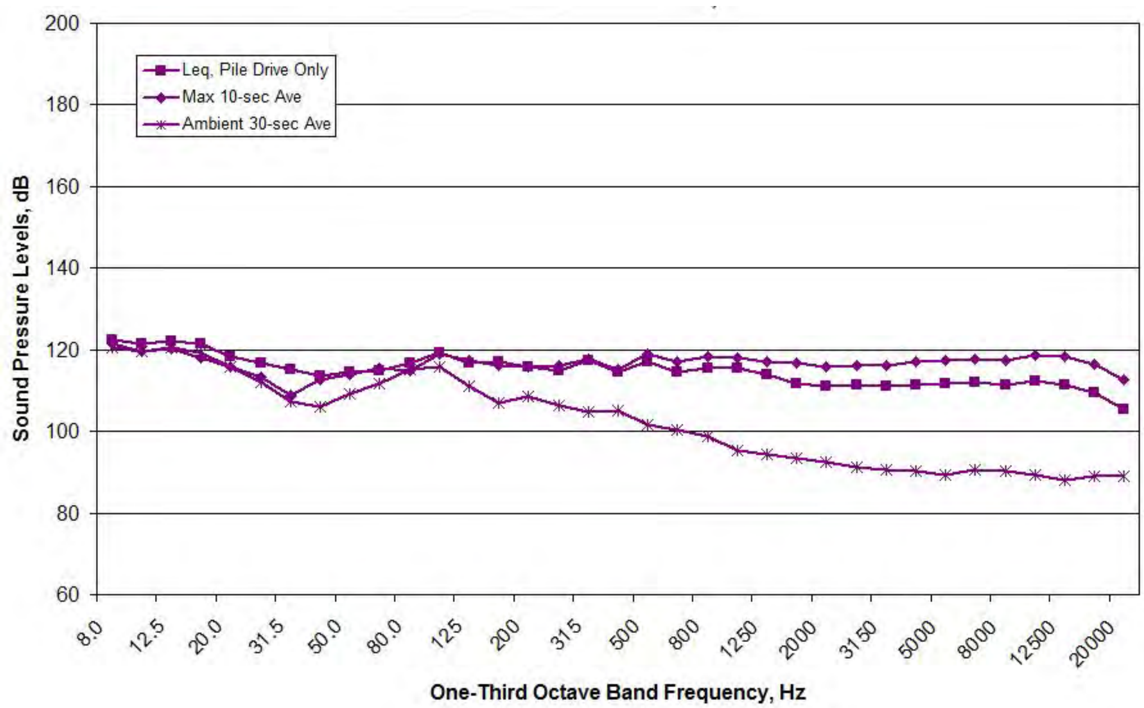

Figure B32. Spectral Data Measured at the RFT Location during EHW1 RX5, 9:29-9:34, Measured at Depths of 10 meters on October 7, 2011

EHW1 RX6 (Vibratory Installation)

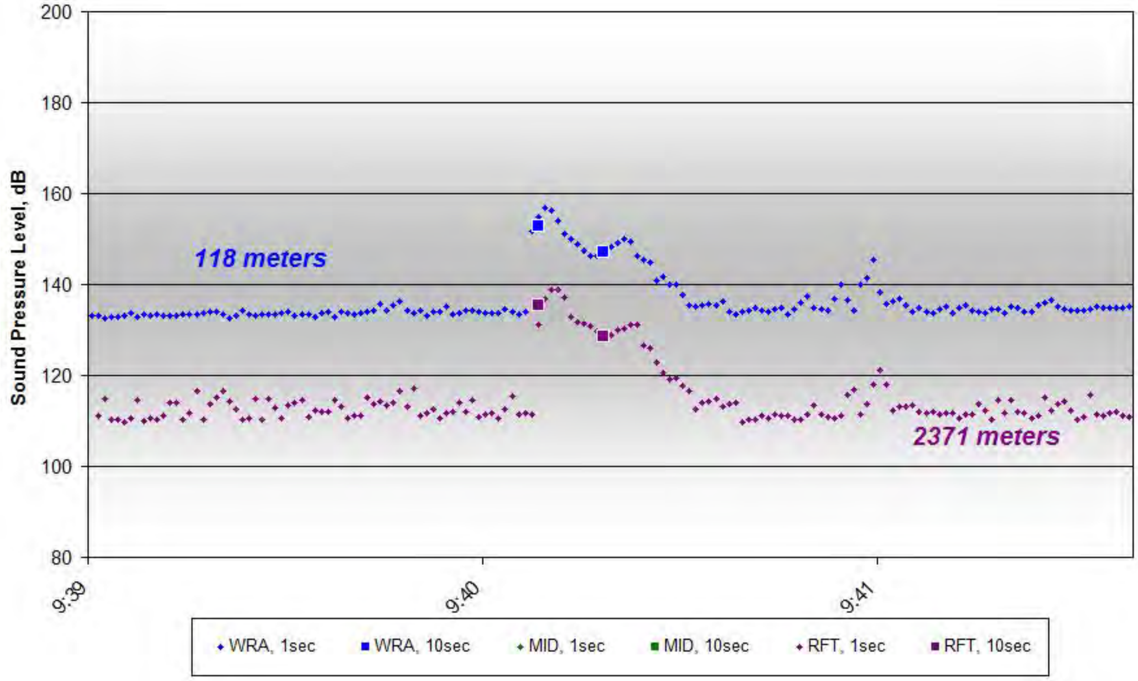

Figure B33. One-second and 10-second Average Data for EHW1 RX6, 9:40:31-9:40:53, Measured at Depths of 17-30 meters on October 7, 2011

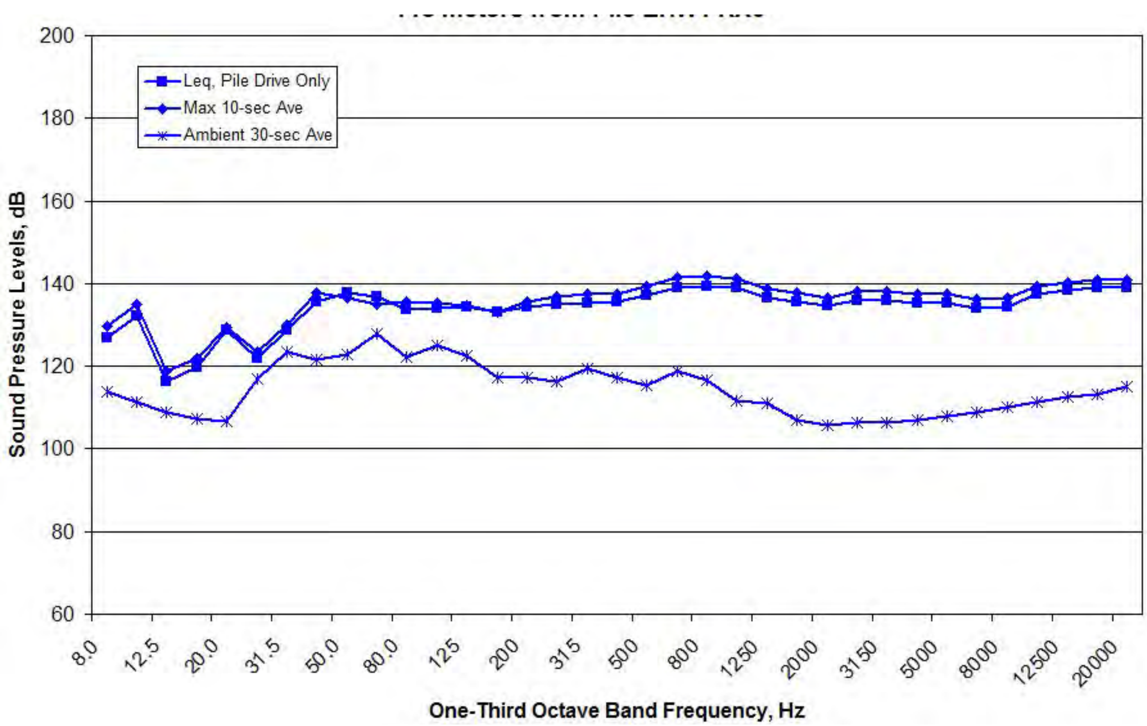

Figure B34. Spectral Data Measured at the WRA Location during EHW1 RX6, 9:40:31-9:40:53, Measured at Depths of 30 meters on October 7, 2011

NO DATA AVAILABLE

Figure B35. Spectral Data Measured at the MID Location during EHW1 RX6, 9:40:31-9:40:53, Measured at Depths of 30 meters on October 7, 2011

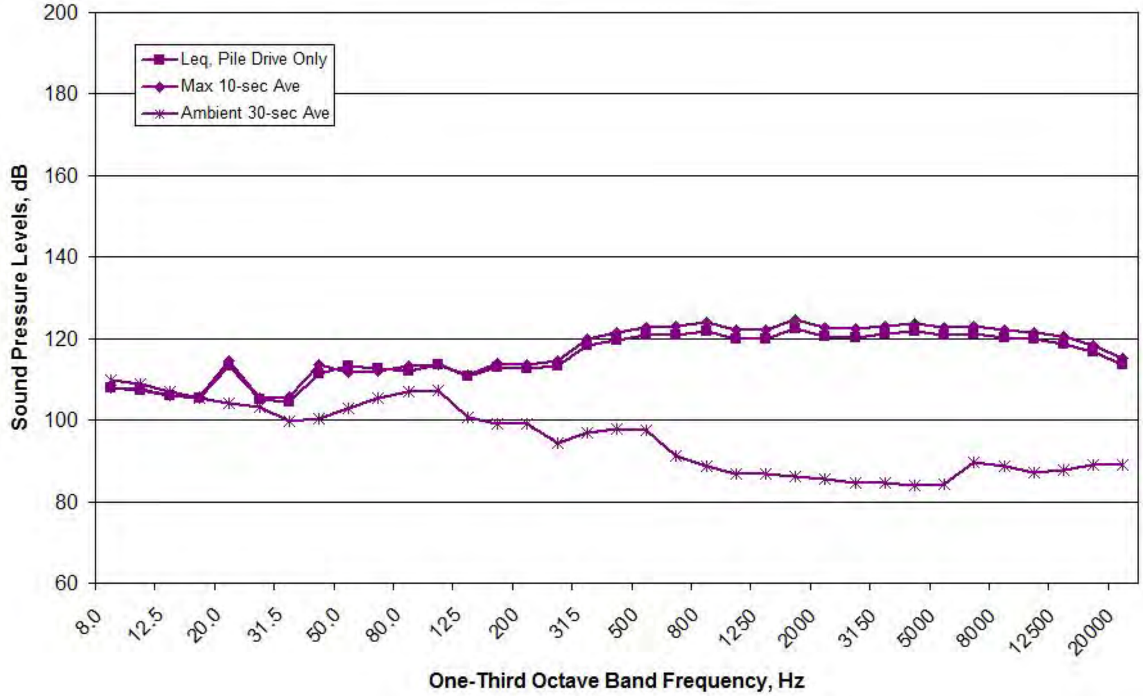

Figure B36. Spectral Data Measured at the RFT Location during EHW1 RX6, 9:40:31-9:40:53, Measured at Depths of 17 meters on October 7, 2011

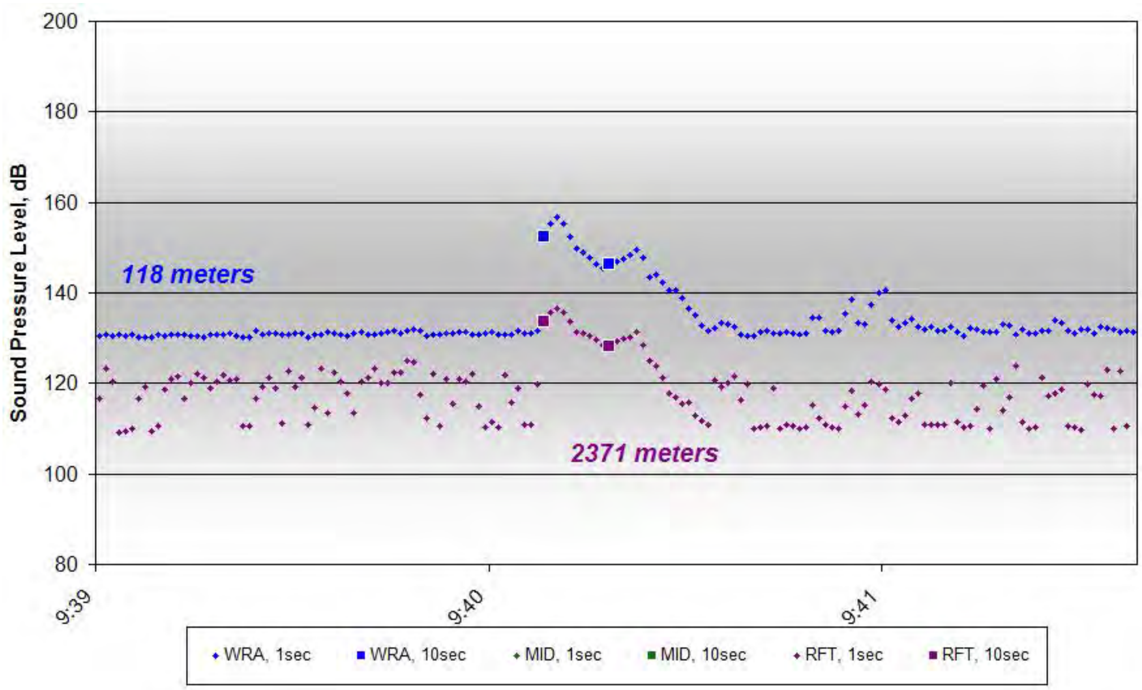

Figure B37. One-second and 10-second Average Data for EHW1 RX6, 9:40:31-9:40:53, Measured at Depths of 10 meters on October 7, 2011

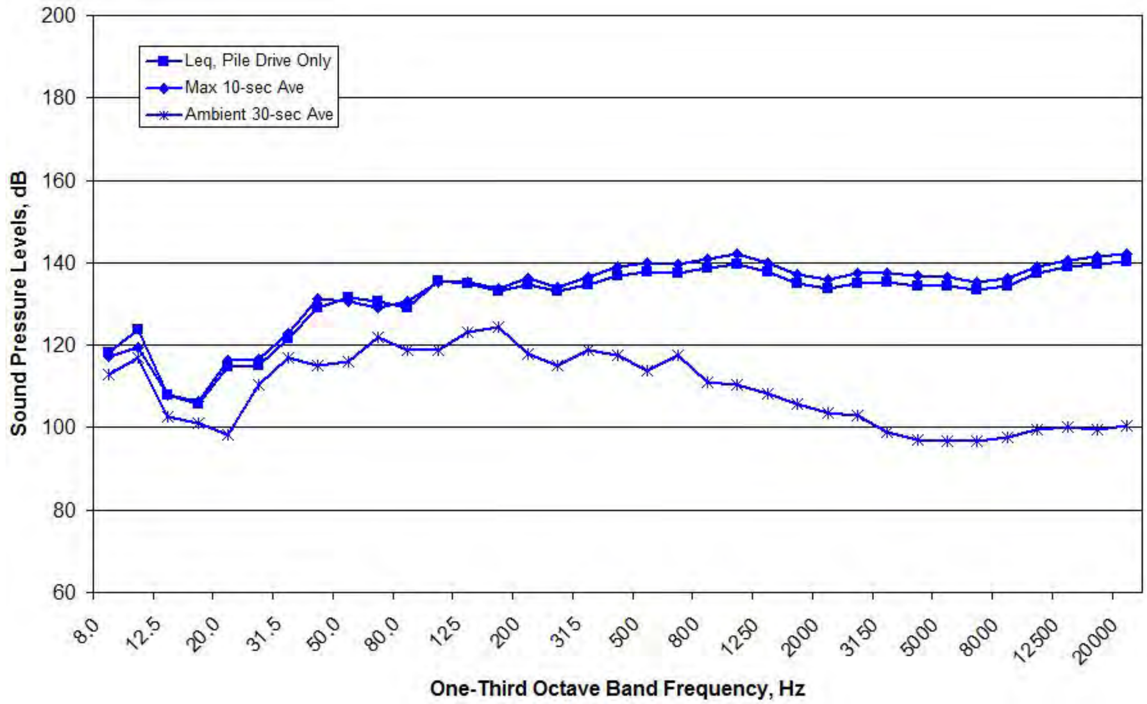

Figure B38. Spectral Data Measured at the WRA Location EHW1 RX6, 9:40:31-9:40:53, Measured at Depths of 10 meters on October 7, 2011

NO DATA AVAILABLE

Figure B39. Spectral Data Measured at the MID Location during EHW1 RX6, 9:40:31-9:40:53, Measured at Depths of 10 meters on October 7, 2011

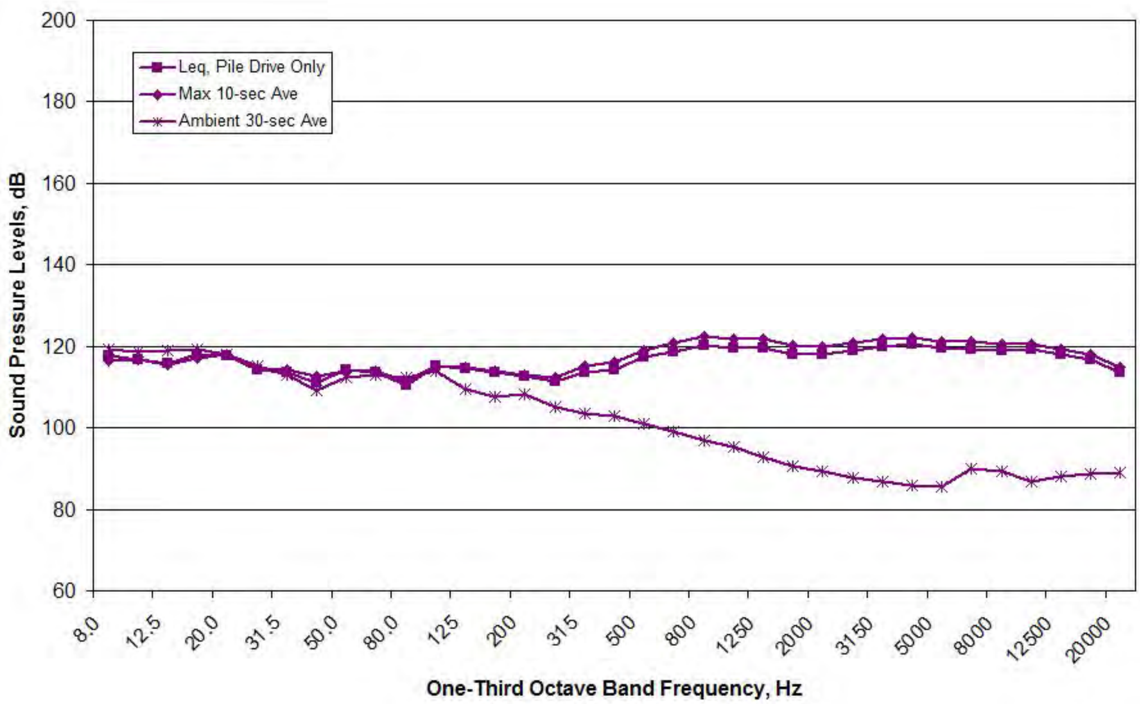

Figure B40. Spectral Data Measured at the RFT Location during EHW1 RX6, 9:40:31-9:40:53, Measured at Depths of 10 meters on October 7, 2011

EHW1 RX7 (Vibratory Installation)

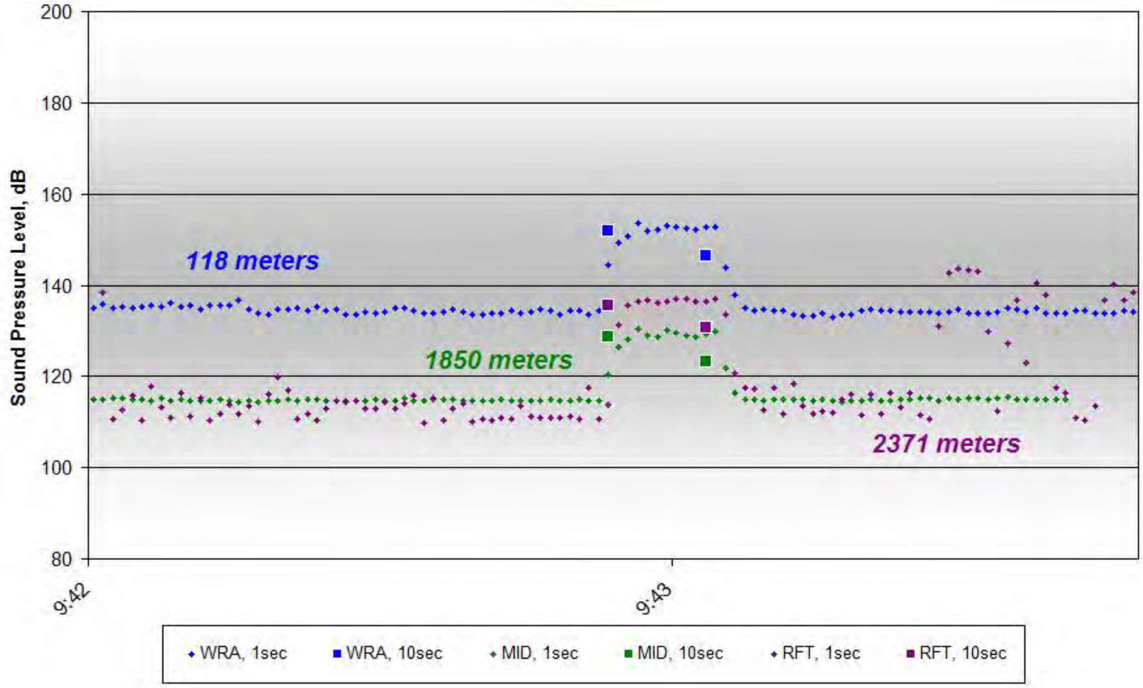

Figure B41. One-second and 10-second Average Data for EHW1 RX7, 9:43:30-9:43:42, Measured at Depths of 17-30 meters on October 7, 2011

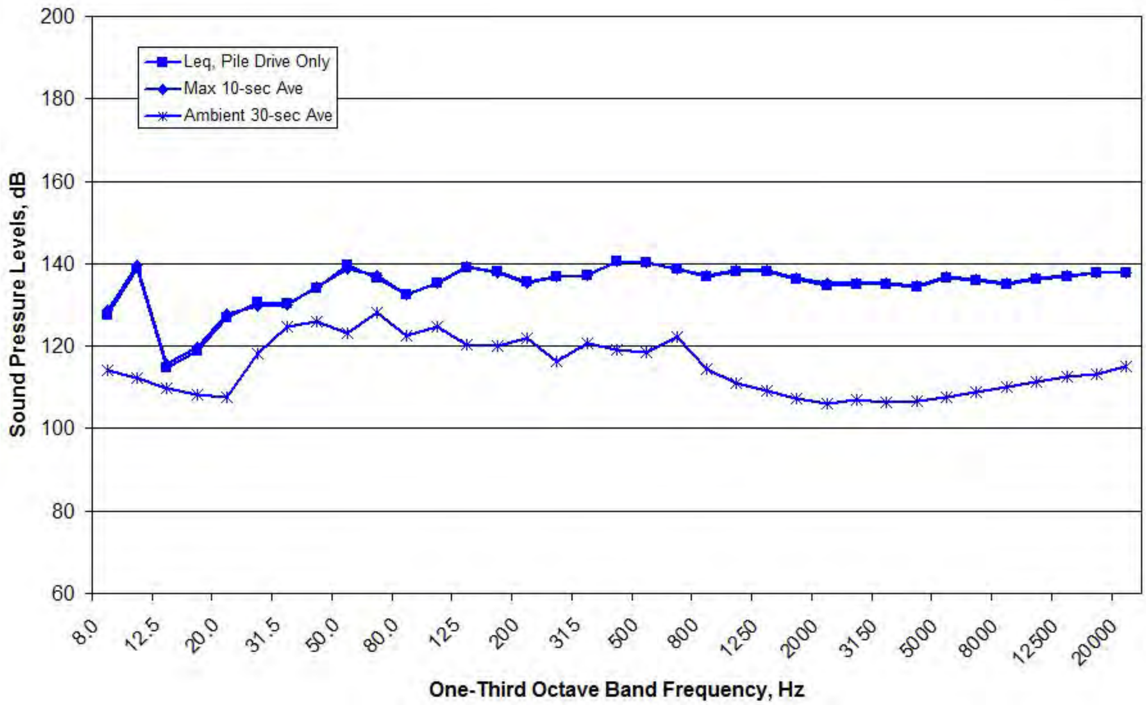

Figure B42. Spectral Data Measured at the WRA Location during EHW1 RX7, 9:43:30-9:43:42, Measured at Depths of 30 meters on October 7, 2011

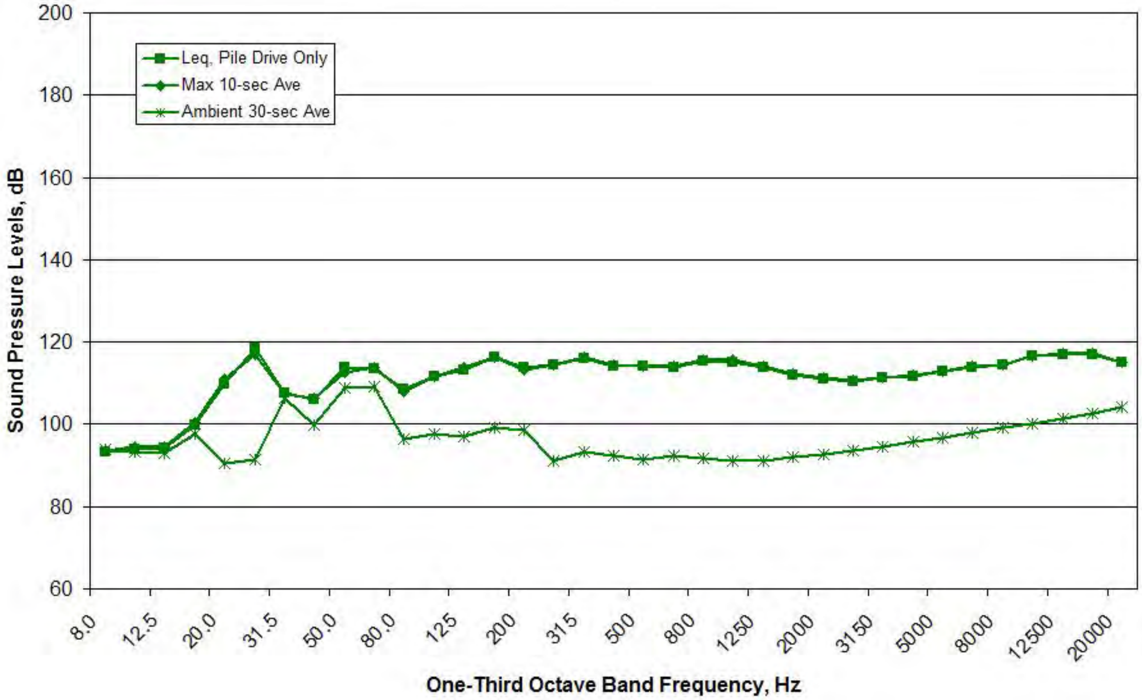

Figure B43. Spectral Data Measured at the MID Location during EHW1 RX7, 9:43:30-9:43:42, Measured at Depths of 30 meters on October 7, 2011

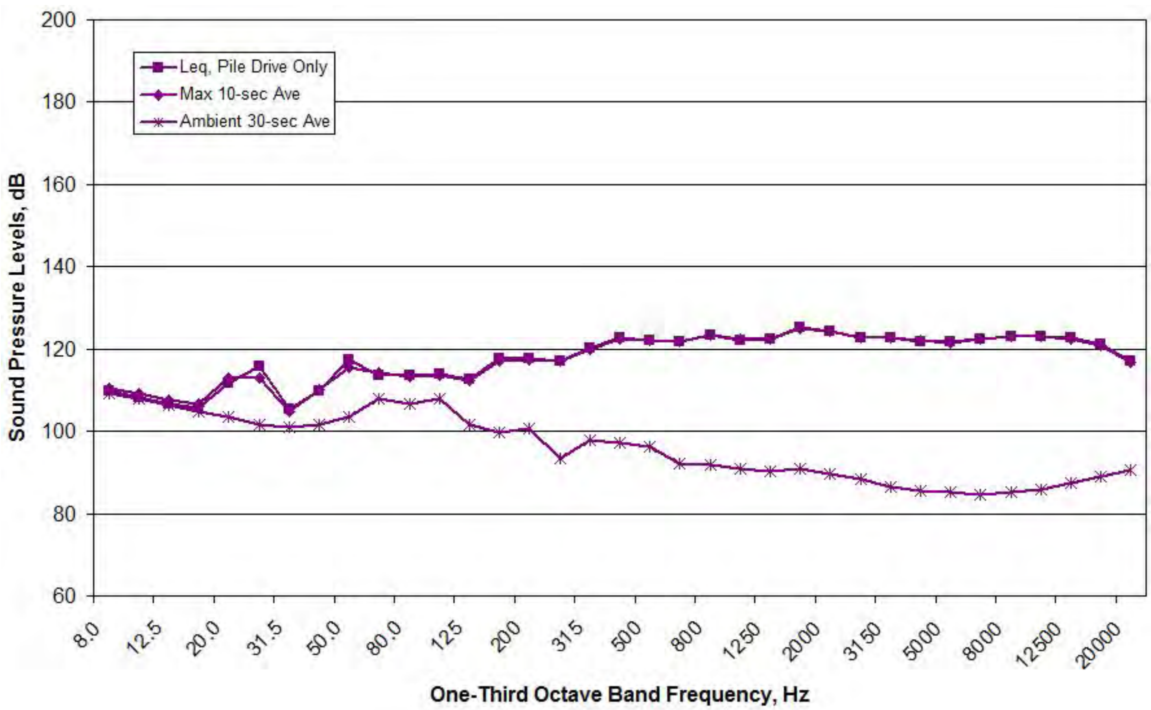

Figure B44. Spectral Data Measured at the RFT Location during EHW1 RX7, 9:43:30-9:43:42, Measured at Depths of 17 meters on October 7, 2011

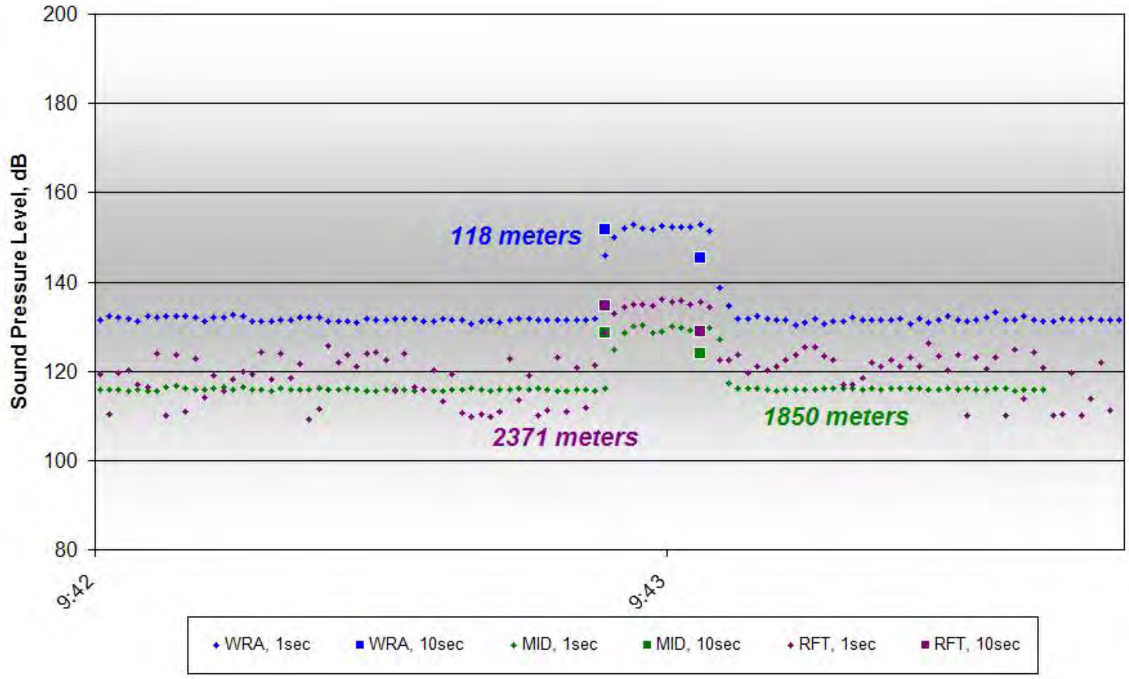

Figure B45. One-second and 10-second Average Data for EHW1 RX7, 9:43:30-9:43:42, Measured at Depths of 10 meters on October 7, 2011

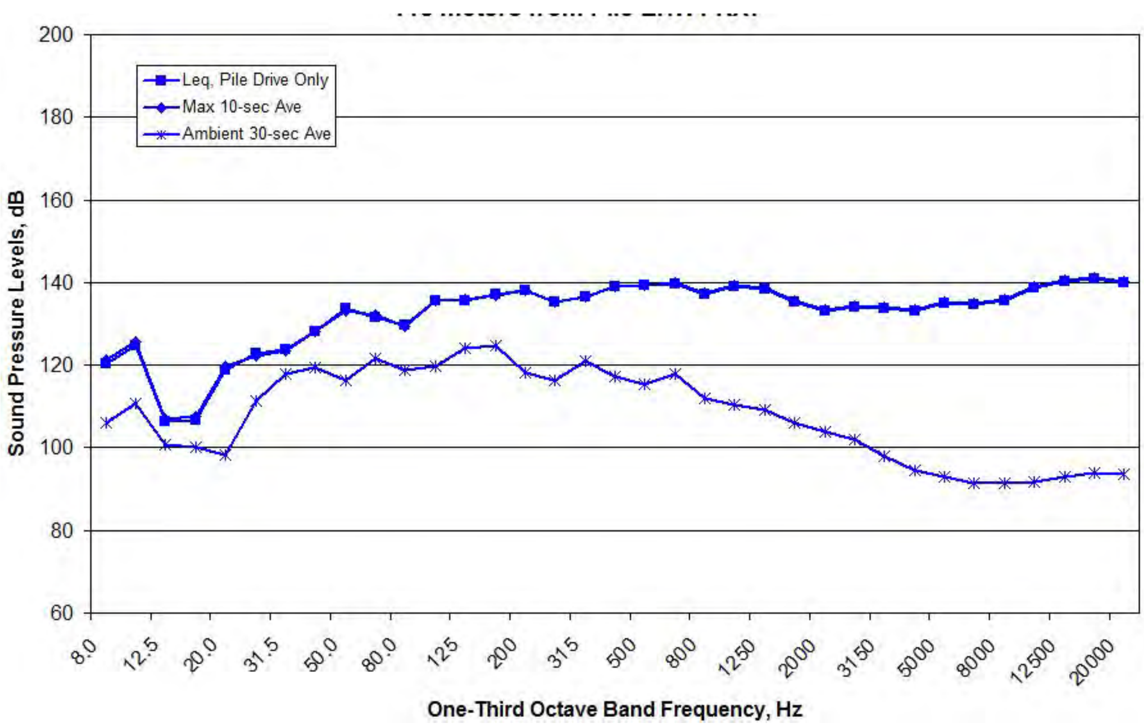

Figure B46. Spectral Data Measured at the WRA Location during EHW1 RX7, 9:43:30-9:43:42, Measured at Depths of 10 meters on October 7, 2011

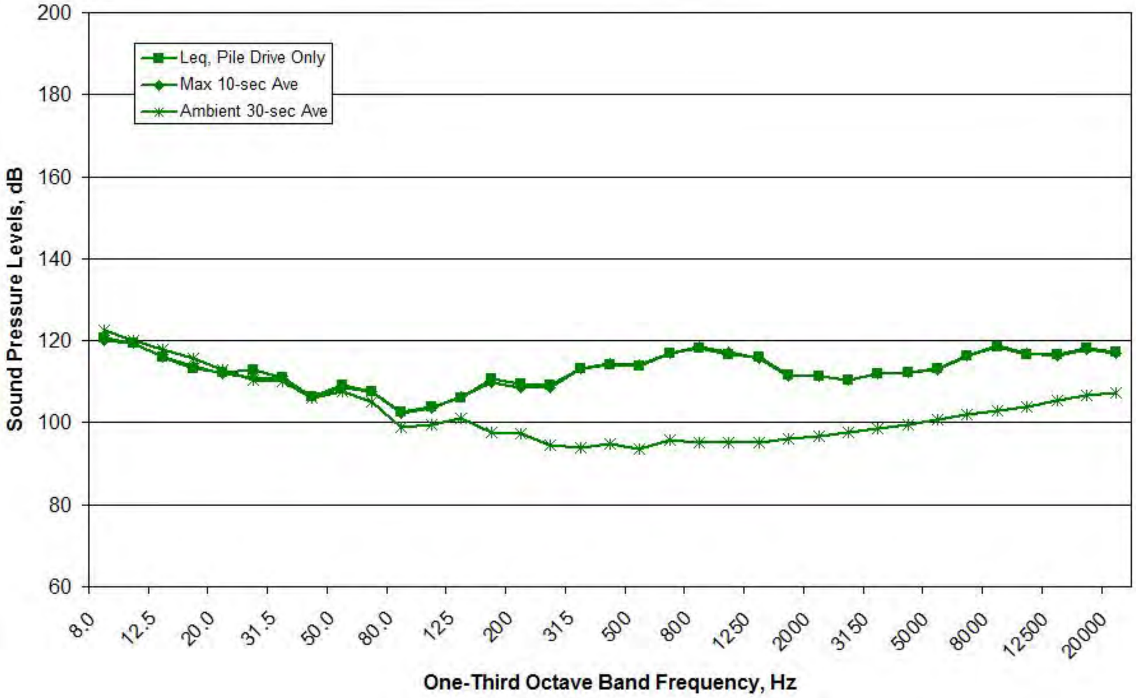

Figure B47. Spectral Data Measured at the MID Location during EHW1 RX7, 9:43:30-9:43:42, Measured at Depths of 10 meters on October 7, 2011

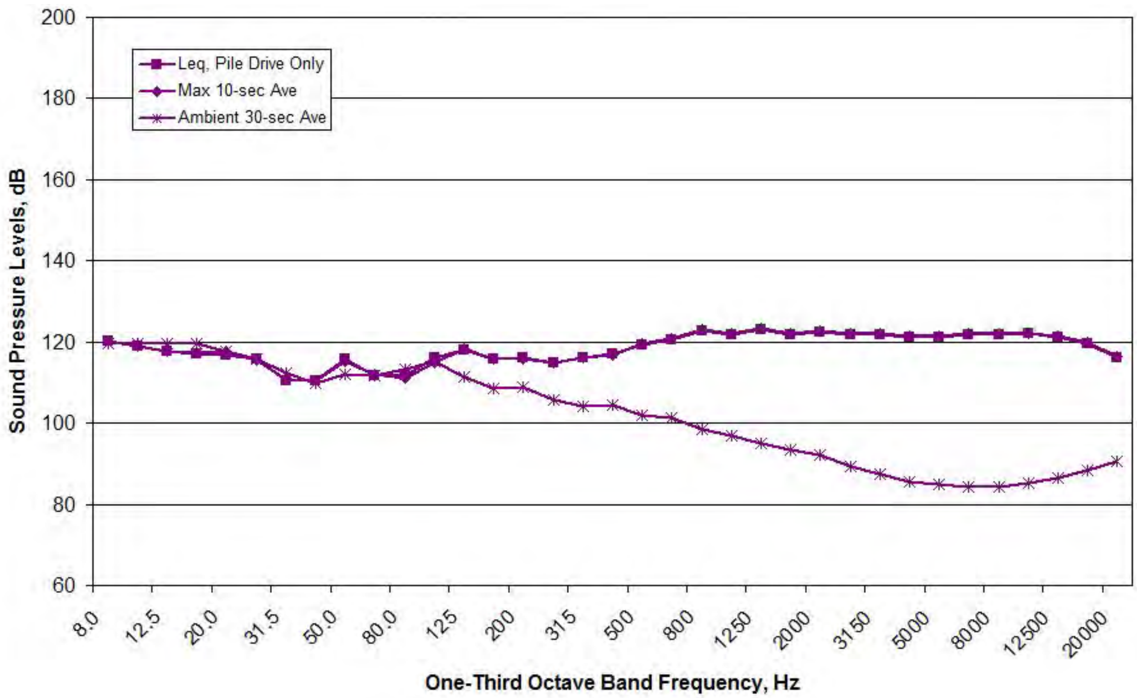

Figure B48. Spectral Data Measured at the RFT Location during EHW1 RX7, 9:43:30-9:43:42, Measured at Depths of 10 meters on October 7, 2011

EHW1 RX8 (Vibratory Installation)

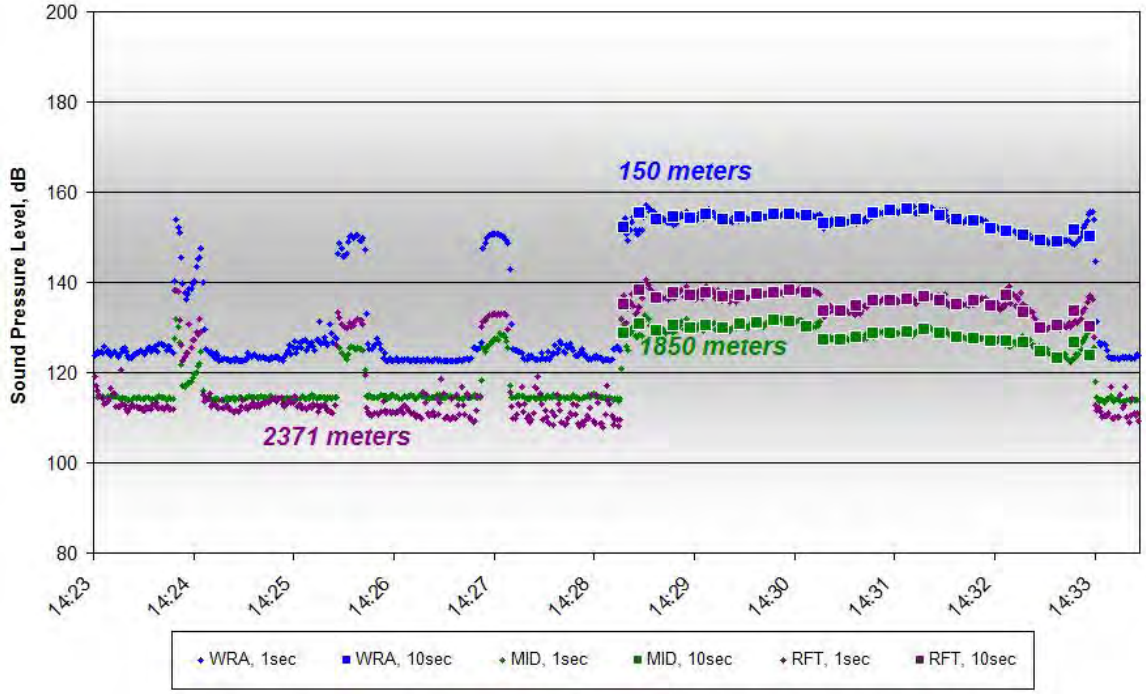

Figure B49. One-second and 10-second Average Data for EHW1 RX8, 14:24-14:33, Measured at Depths of 17-30 meters on October 7, 2011

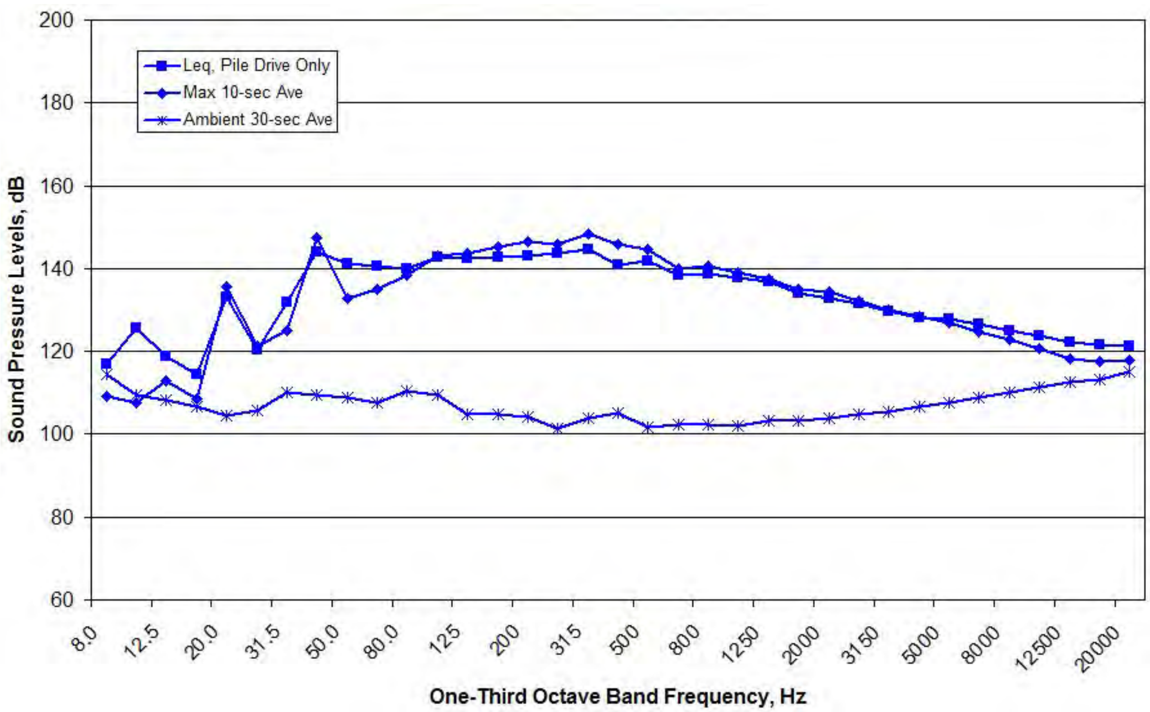

Figure B50. Spectral Data Measured at the WRA Location during EHW1 RX8, 14:24-14:33, Measured at Depths of 30 meters on October 7, 2011

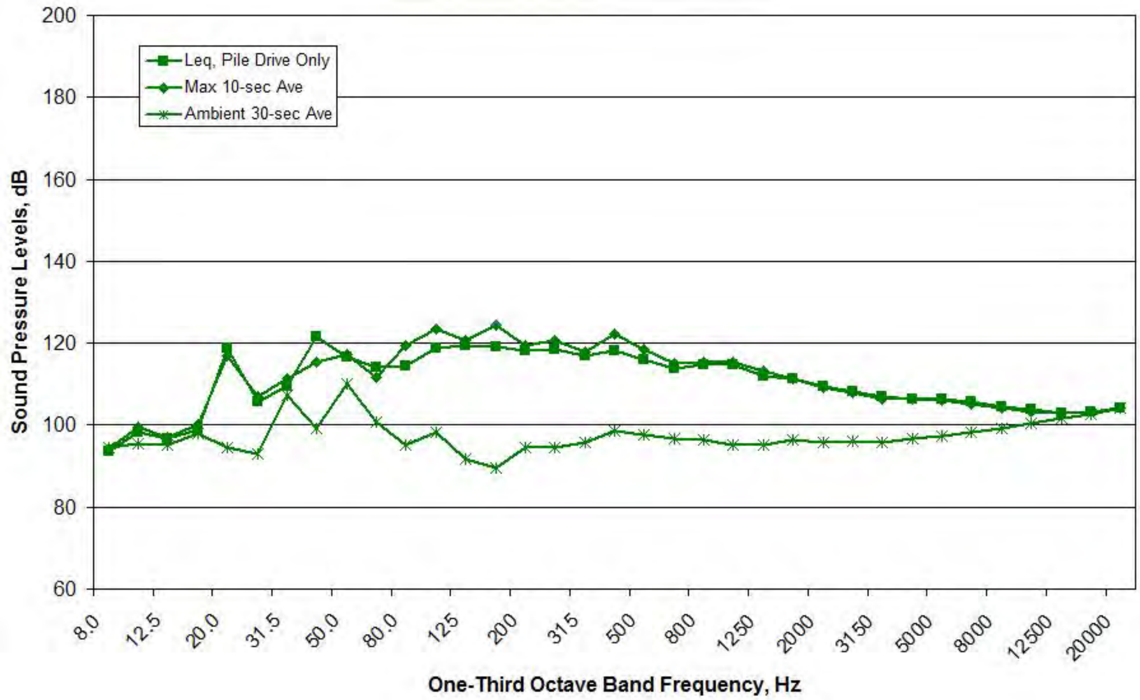

Figure B51. Spectral Data Measured at the MID Location during EHW1 RX8, 14:24-14:33, Measured at Depths of 30 meters on October 7, 2011

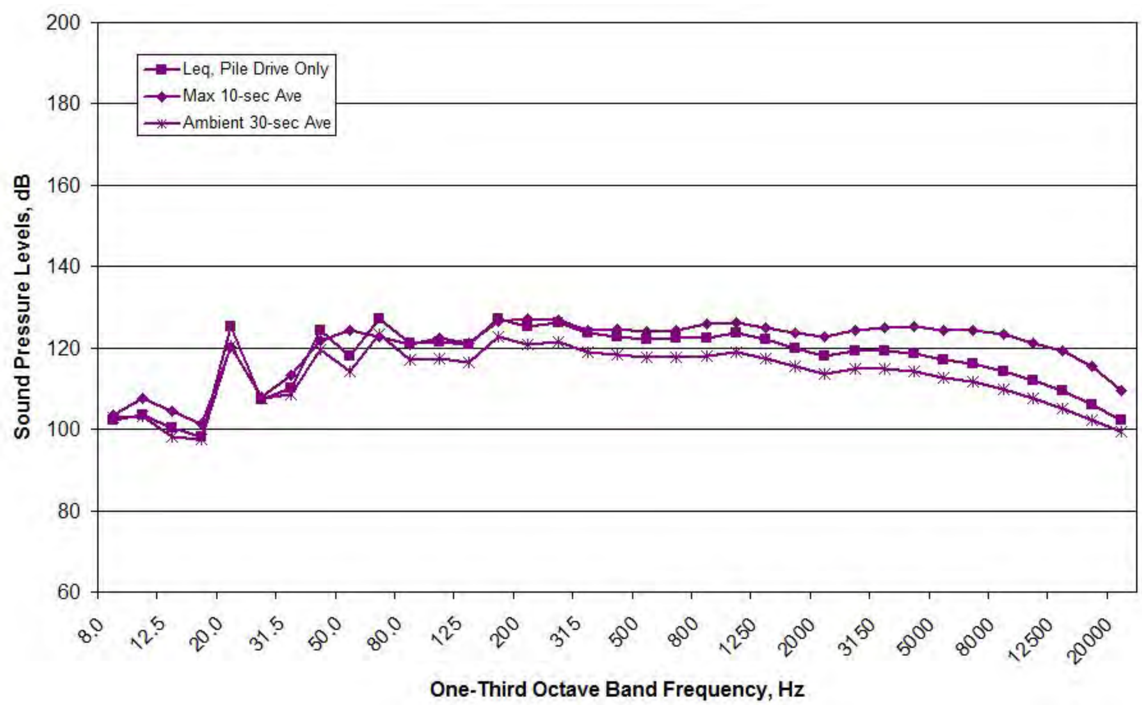

Figure B52. Spectral Data Measured at the RFT Location during EHW1 RX8, 14:24-14:33, Measured at Depths of 17 meters on October 7, 2011

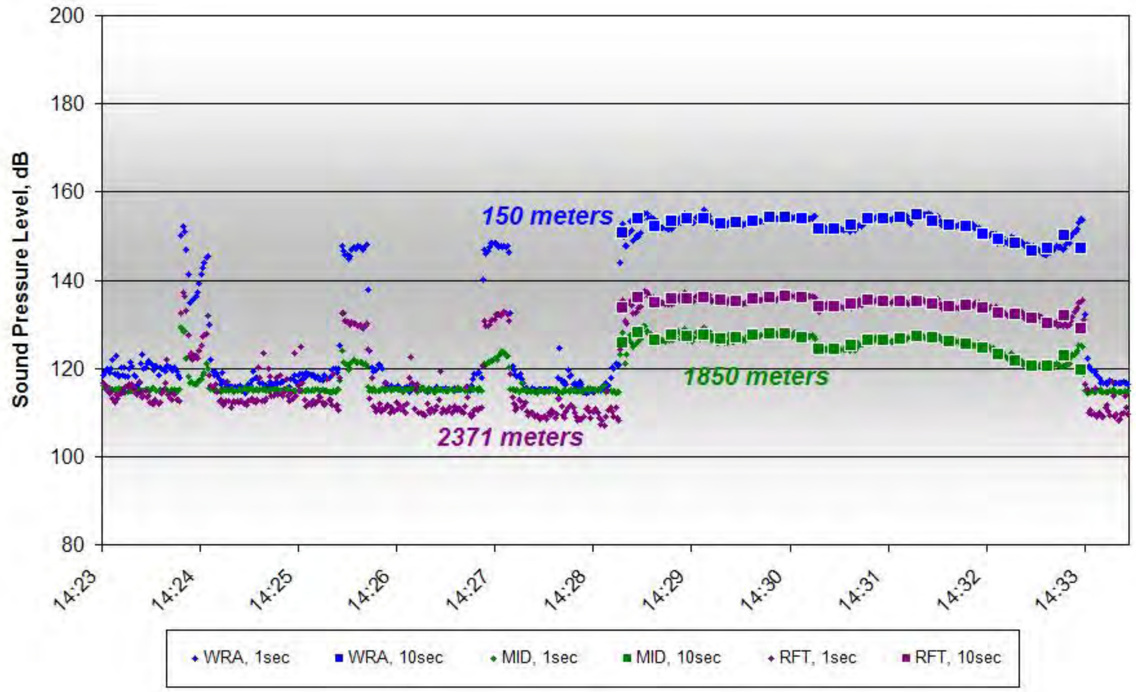

Figure B53. One-second and 10-second Average Data for EHW1 RX8, 14:24-14:33, Measured at Depths of 10 meters on October 7, 2011

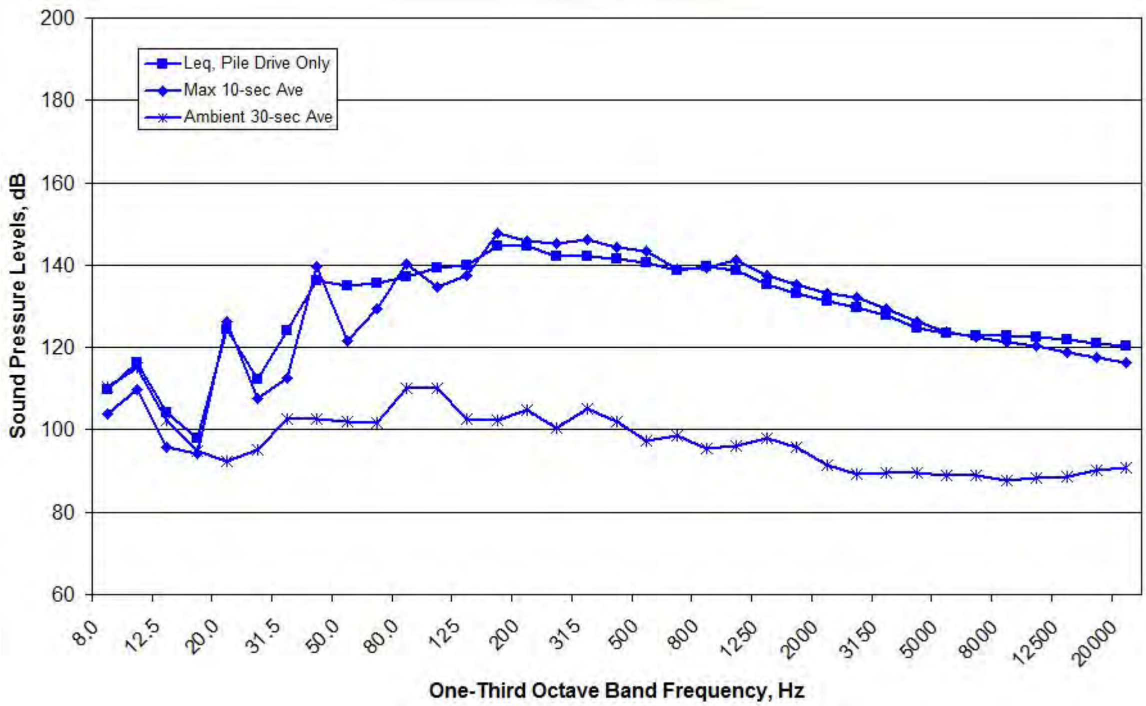

Figure B54. Spectral Data Measured at the WRA Location EHW1 RX8, 14:24-14:33, Measured at Depths of 10 meters on October 7, 2011

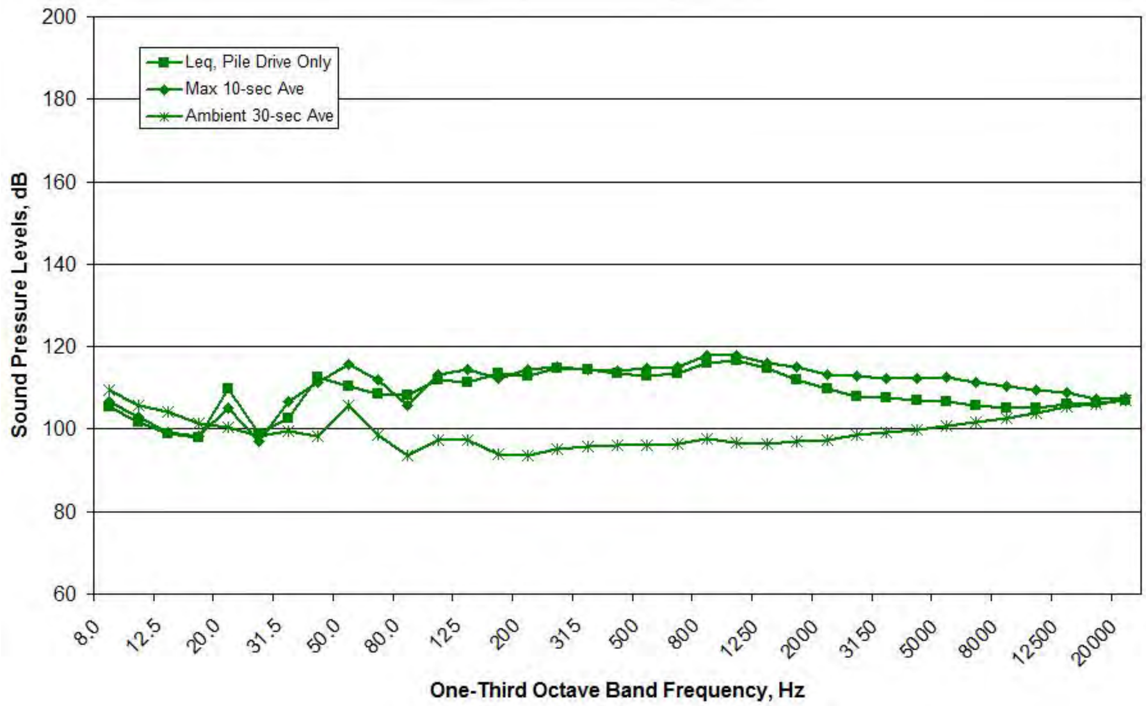

Figure B55. Spectral Data Measured at the MID Location during EHW1 RX8, 14:24-14:33, Measured at Depths of 10 meters on October 7, 2011

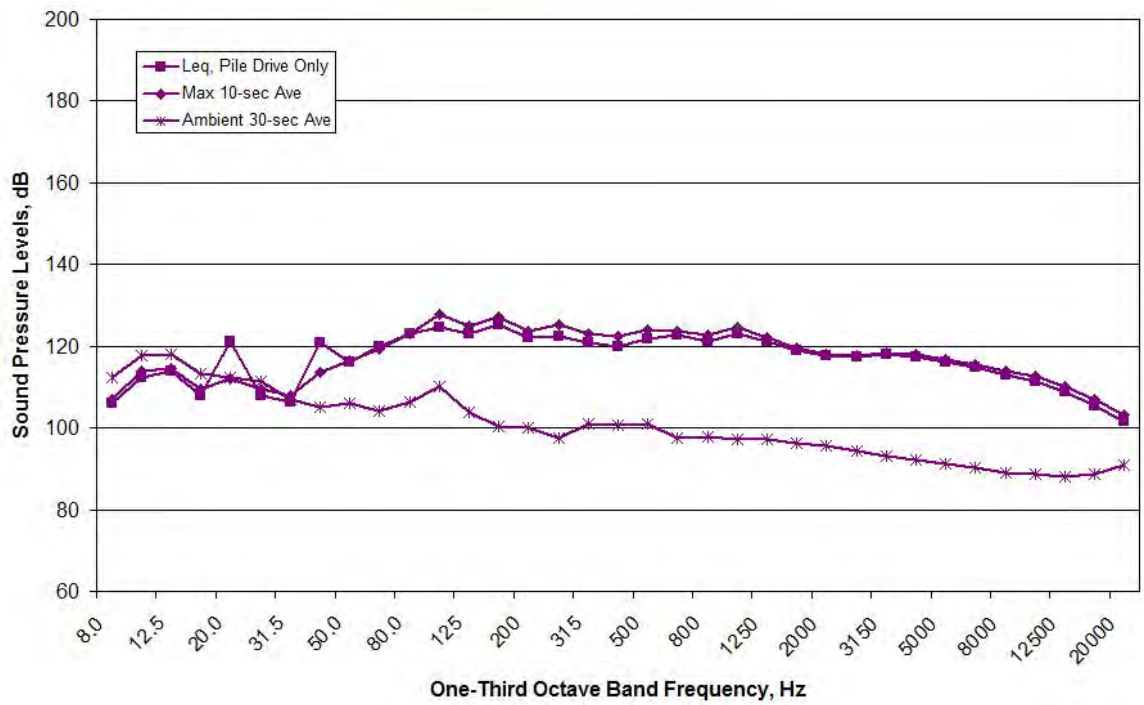

Figure B56. Spectral Data Measured at the RFT Location during EHW1 RX8, 14:24-14:33, Measured at Depths of 10 meters on October 7, 2011

EHW1 RX1 (Vibratory Installation)

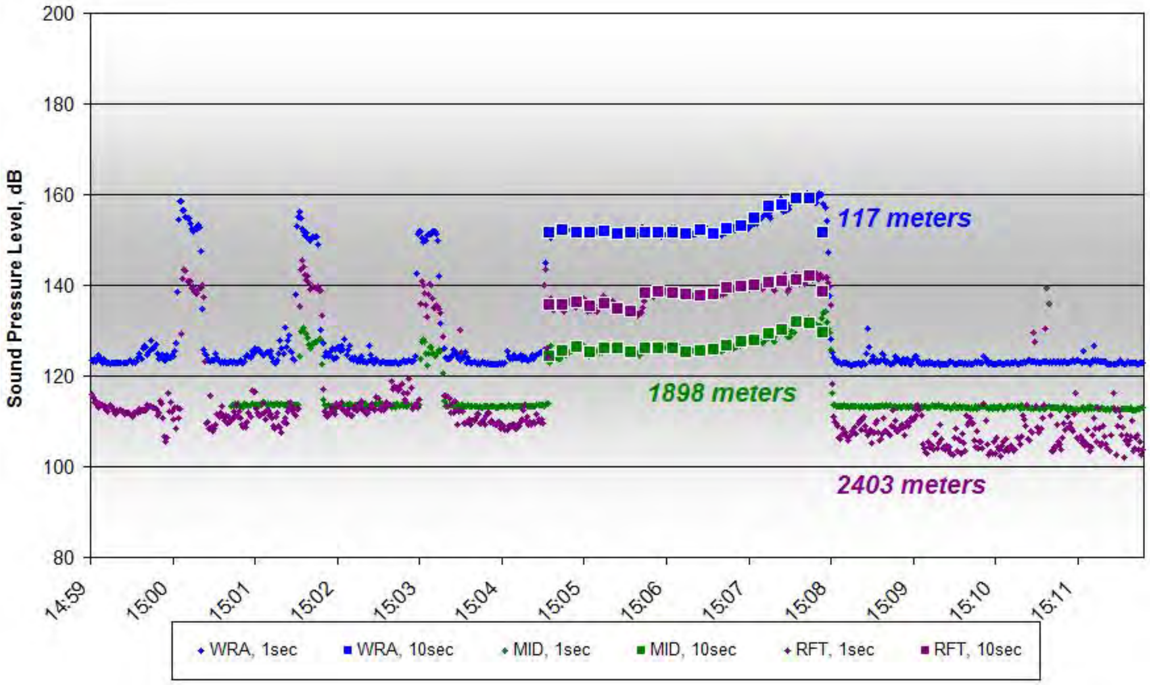

Figure B57. One-second and 10-second Average Data for EHW1 RX1, 15:00-15:08, Measured at Depths of 17-30 meters on October 7, 2011

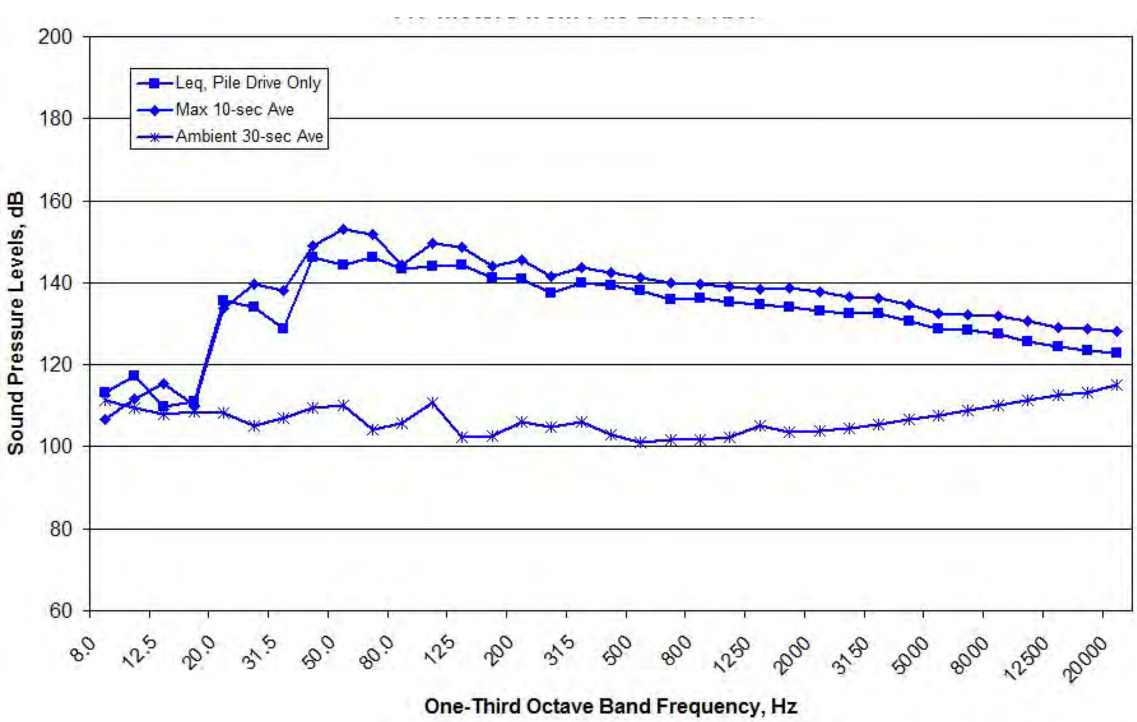

Figure B58. Spectral Data Measured at the WRA Location during EHW1 RX1, 15:00-15:08, Measured at Depths of 30 meters on October 7, 2011

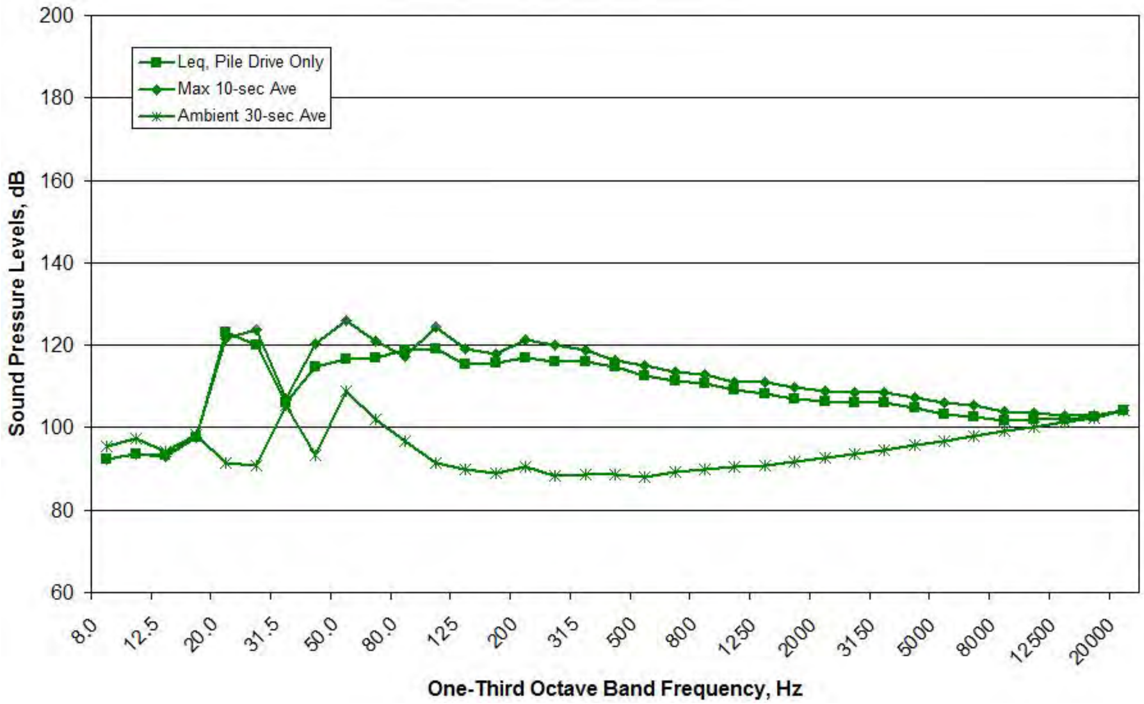

Figure B59. Spectral Data Measured at the MID Location during EHW1 RX1, 15:00-15:08, Measured at Depths of 30 meters on October 7, 2011

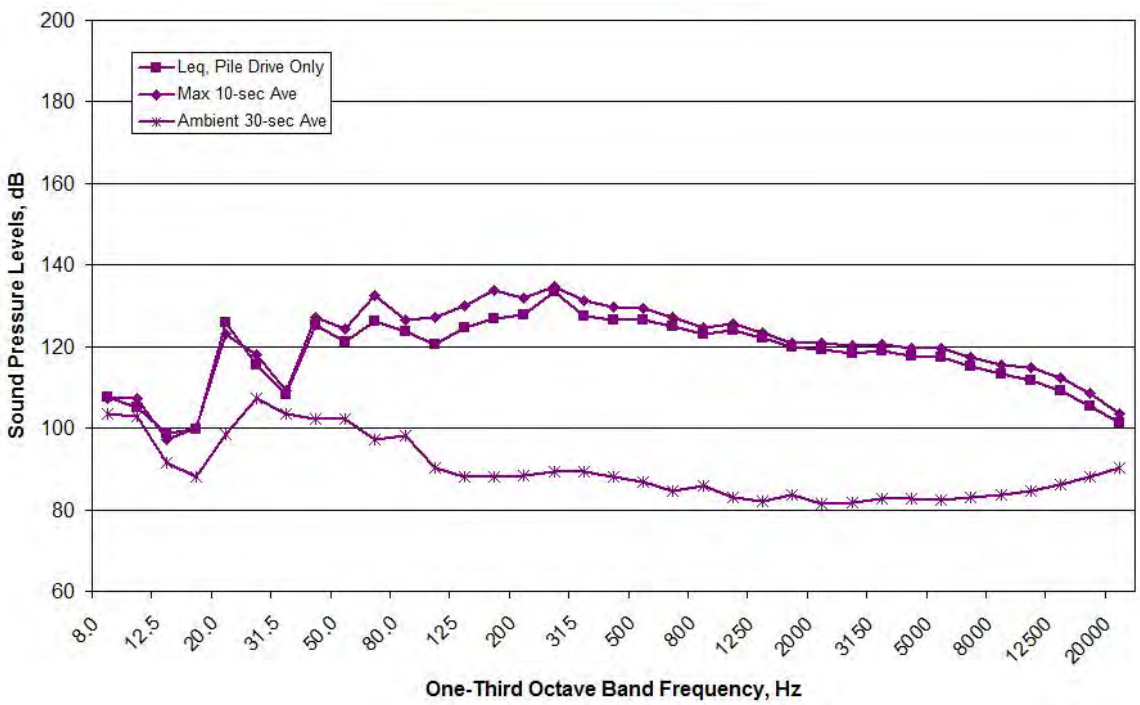

Figure B60. Spectral Data Measured at the RFT Location during EHW1 RX1, 15:00-15:08, Measured at Depths of 17 meters on October 7, 2011

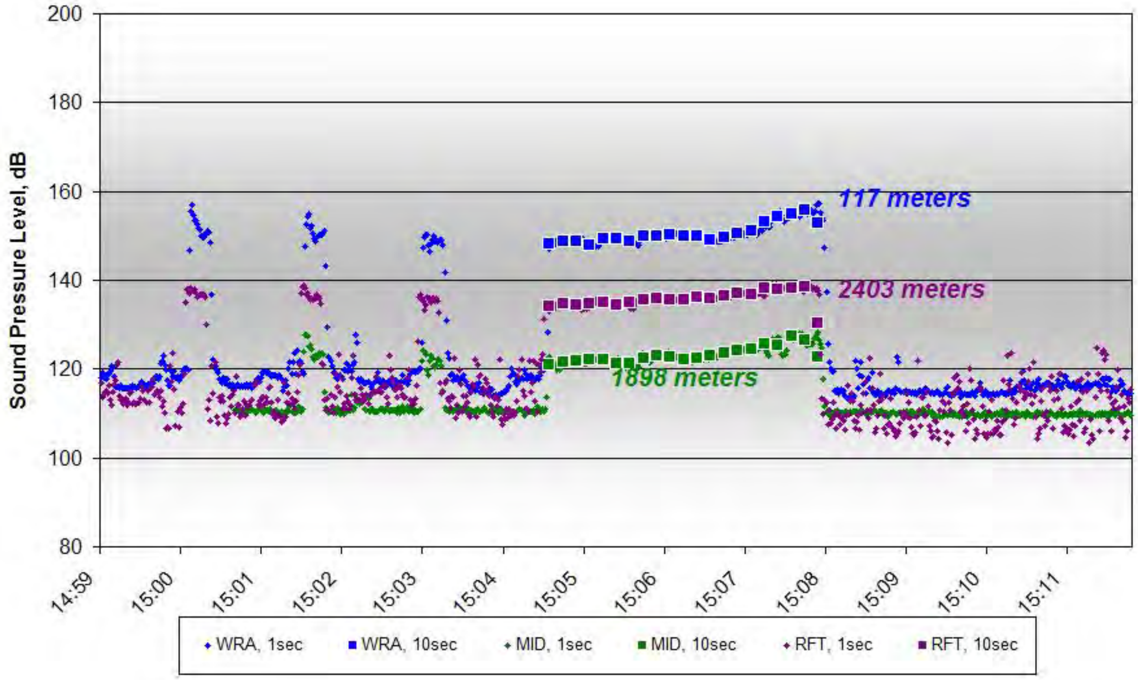

Figure B61. One-second and 10-second Average Data for EHW1 RX1, 15:00-15:08, Measured at Depths of 10 meters on October 7, 2011

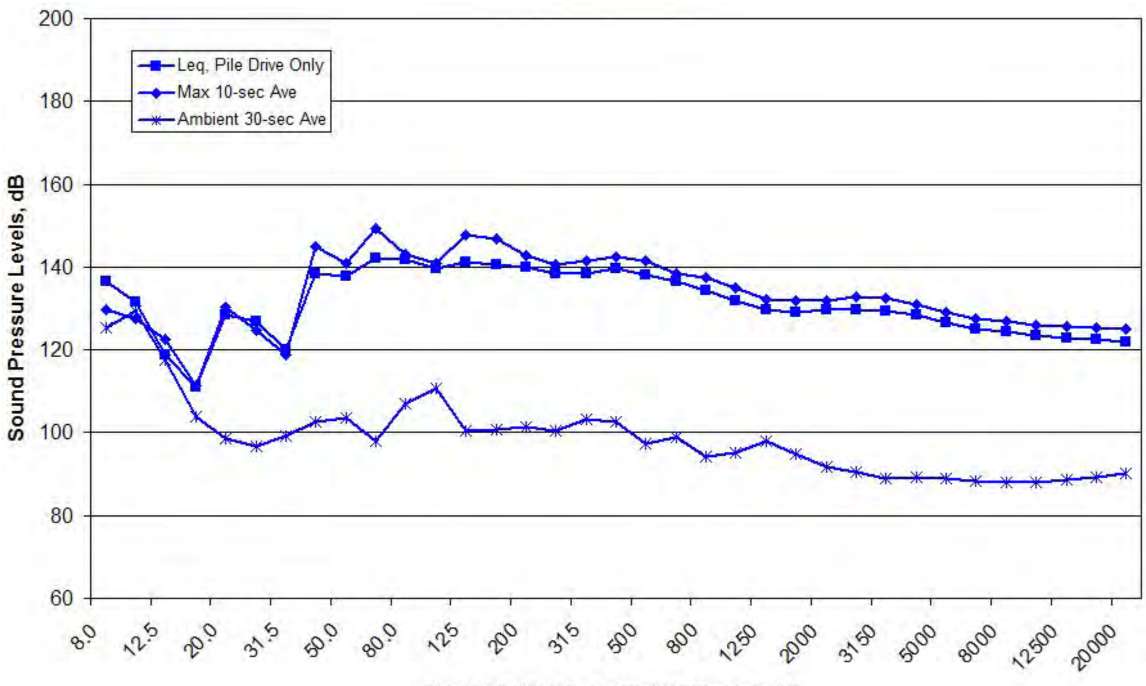

Figure B62. Spectral Data Measured at the WRA Location during EHW1 RX1, 15:00-15:08, Measured at Depths of 10 meters on October 7, 2011

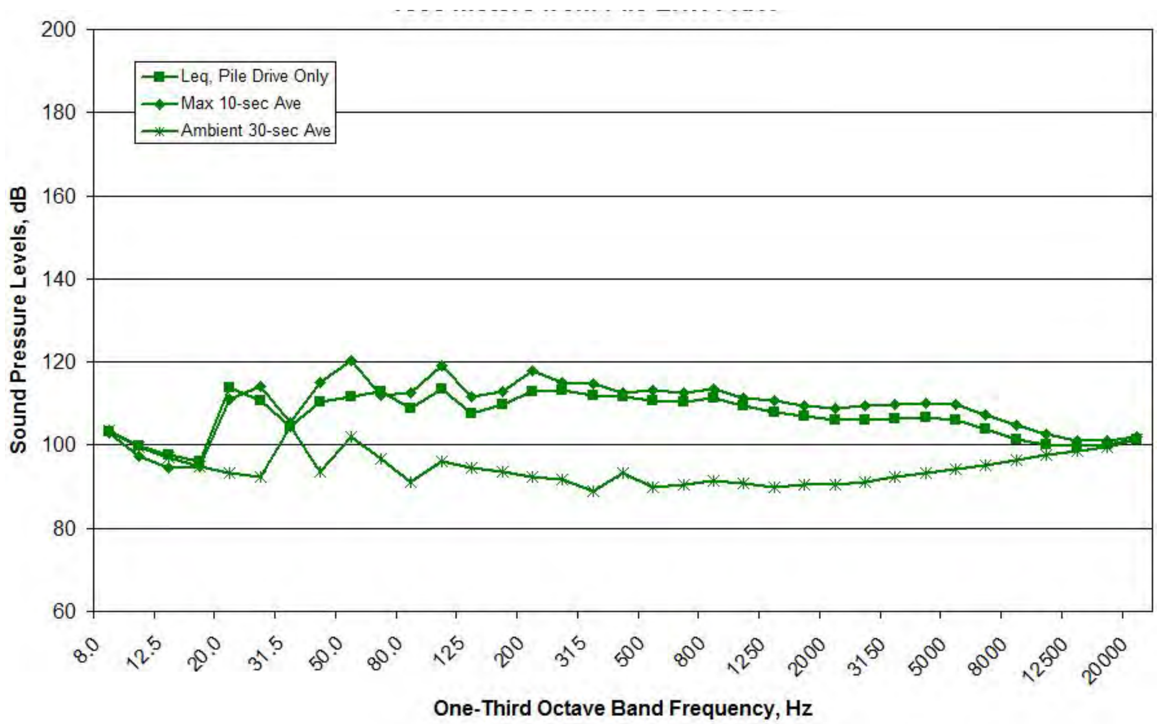

Figure B63. Spectral Data Measured at the MID Location during EHW1 RX1, 15:00-15:08, Measured at Depths of 10 meters on October 7, 2011

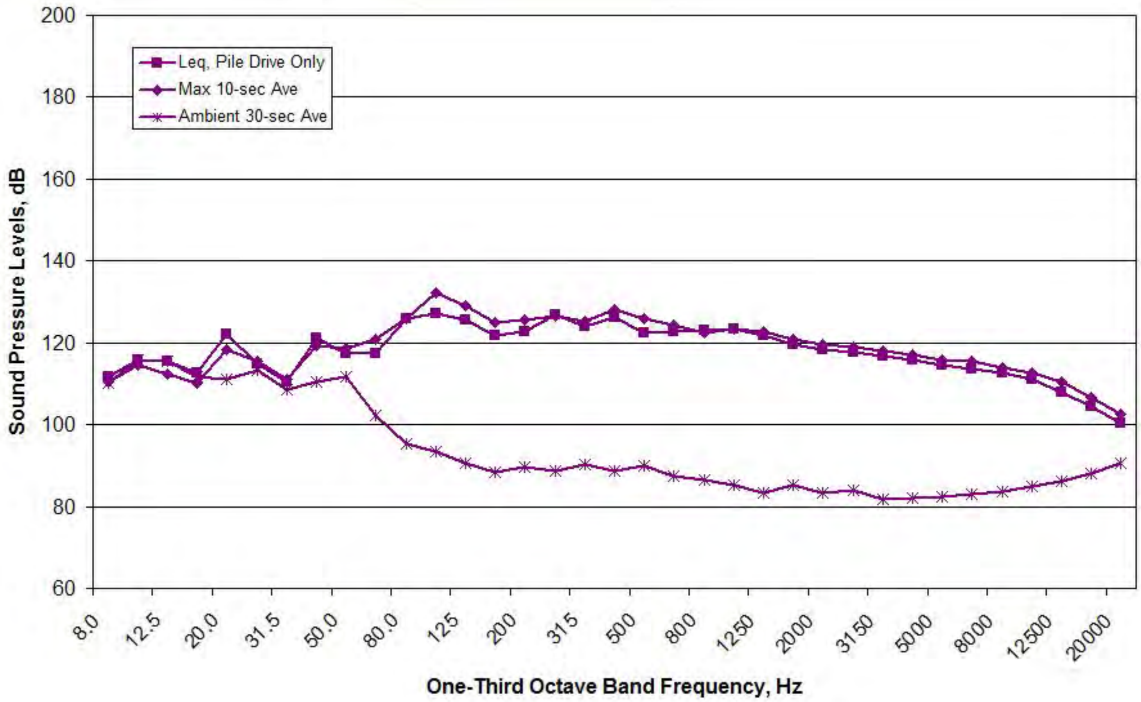

Figure B64. Spectral Data Measured at the RFT Location during EHW1 RX1, 15:00-15:08, Measured at Depths of 10 meters on October 7, 2011

EHW1 FW1 (Vibratory Installation)

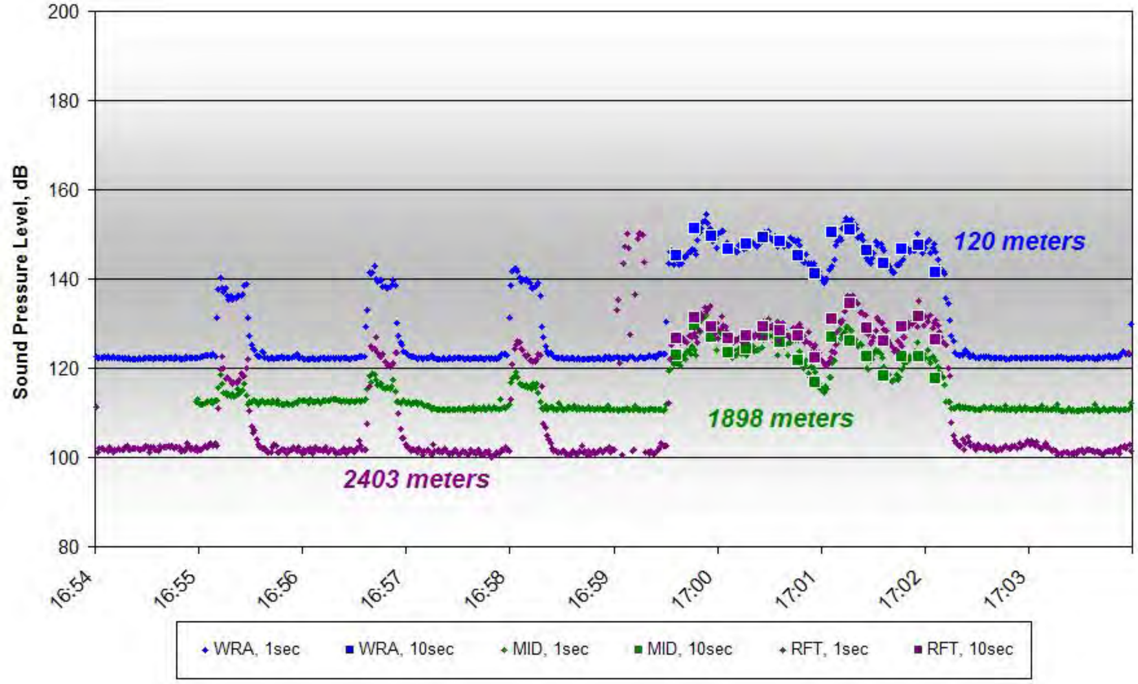

Figure B65. One-second and 10-second Average Data for EHW1 FW1, 16:55-17:02, Measured at Depths of 17-30 meters on October 7, 2011

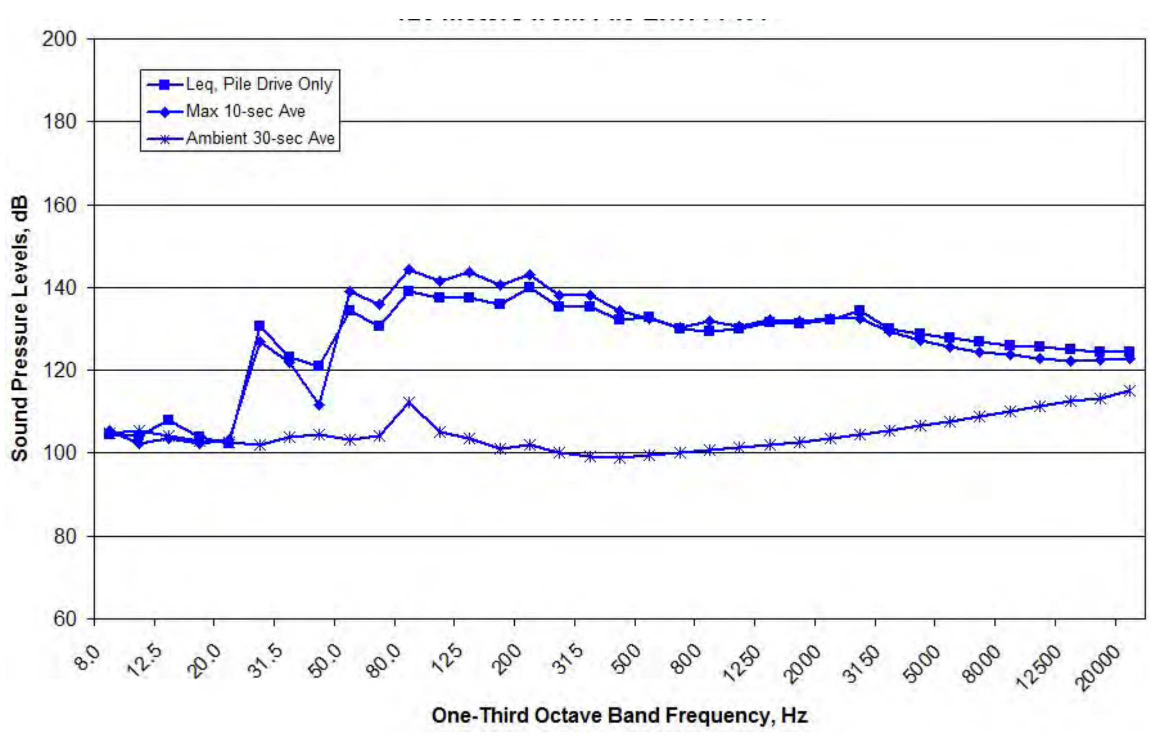

Figure B66. Spectral Data Measured at the WRA Location during EHW1 FW1, 16:55-17:02, Measured at Depths of 30 meters on October 7, 2011

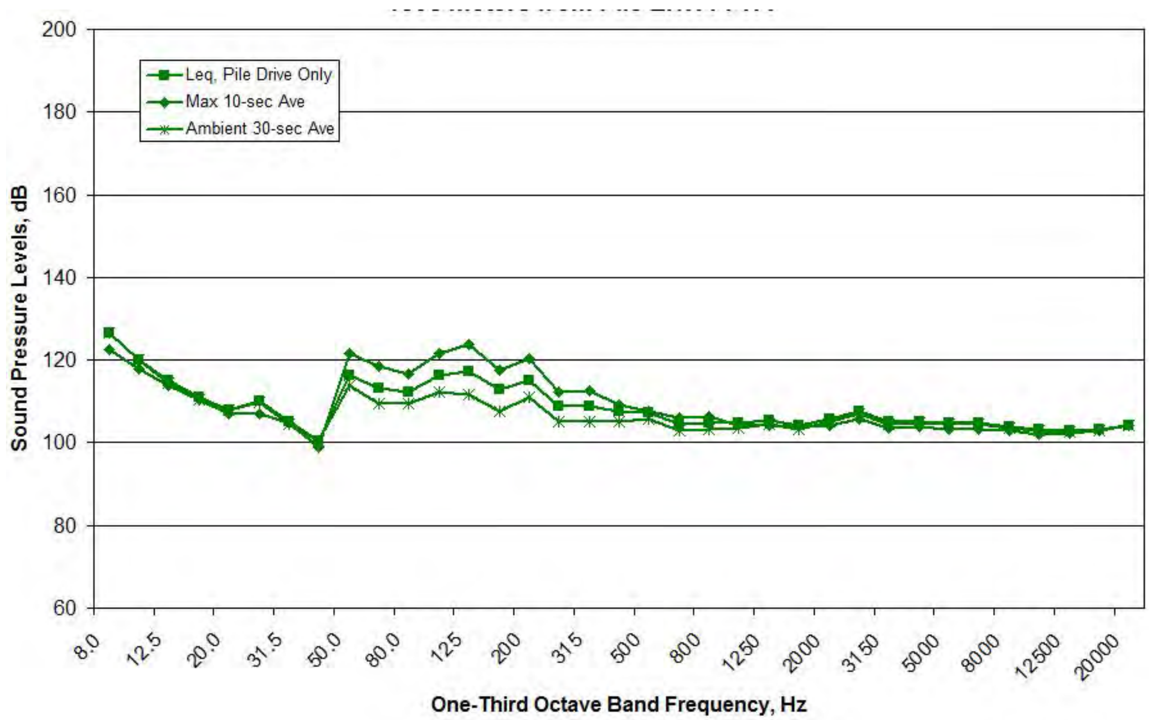

Figure B67. Spectral Data Measured at the MID Location during EHW1 FW1, 16:55-17:02, Measured at Depths of 30 meters on October 7, 2011

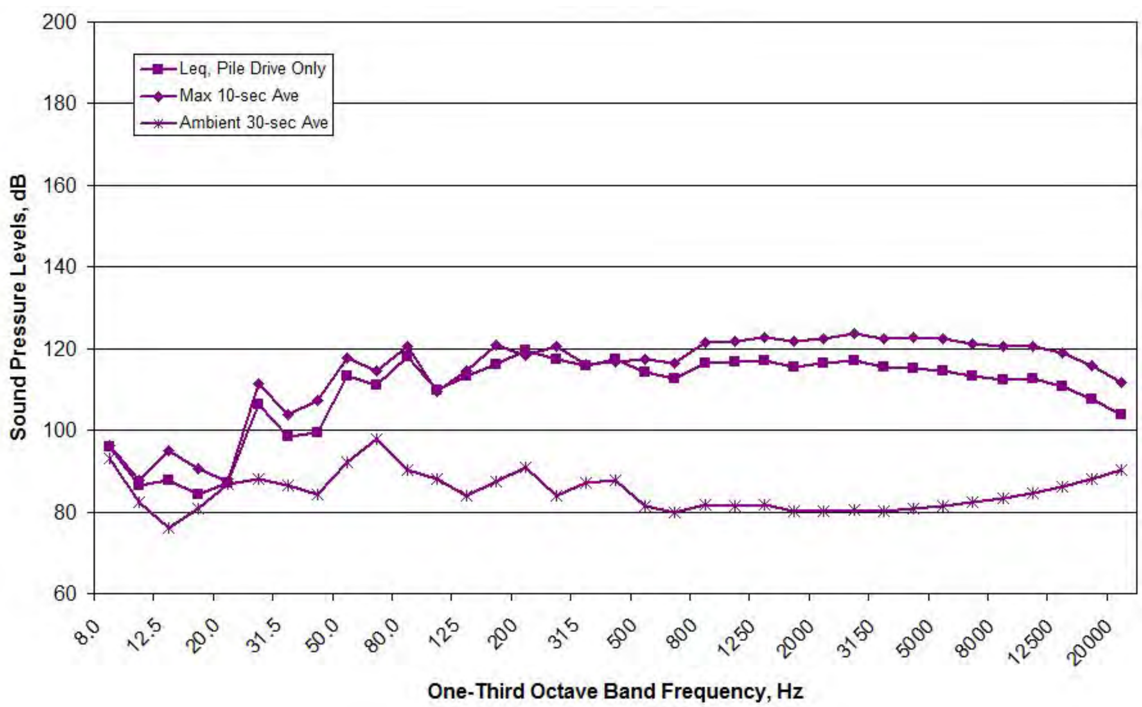

Figure B68. Spectral Data Measured at the RFT Location during EHW1 FW1, 16:55-17:02, Measured at Depths of 17 meters on October 7, 2011

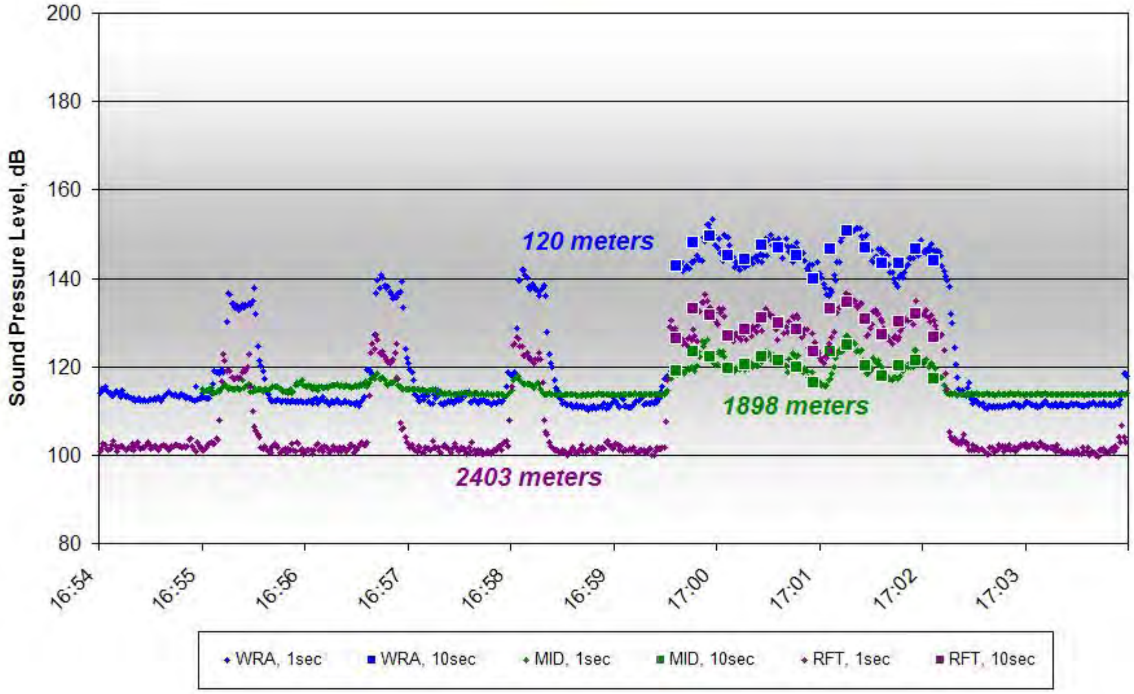

Figure B69. One-second and 10-second Average Data for EHW1 FW1, 16:55-17:02, Measured at Depths of 10 meters on October 7, 2011

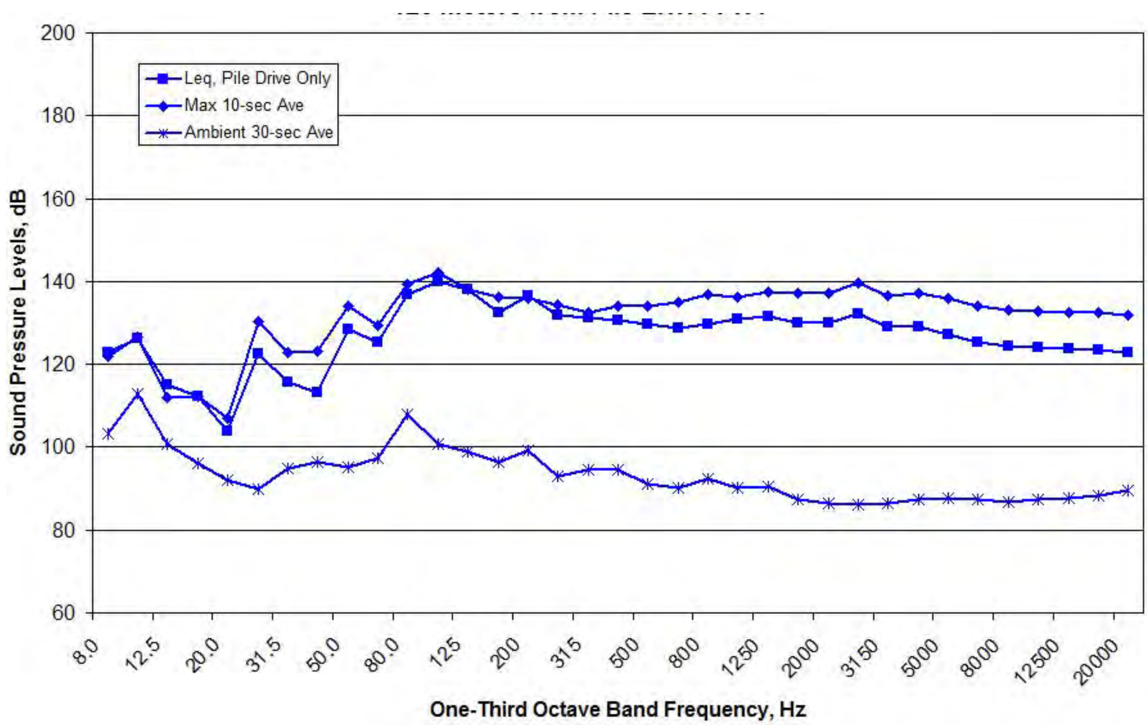

Figure B70. Spectral Data Measured at the WRA Location EHW1 FW1, 16:55-17:02, Measured at Depths of 10 meters on October 7, 2011

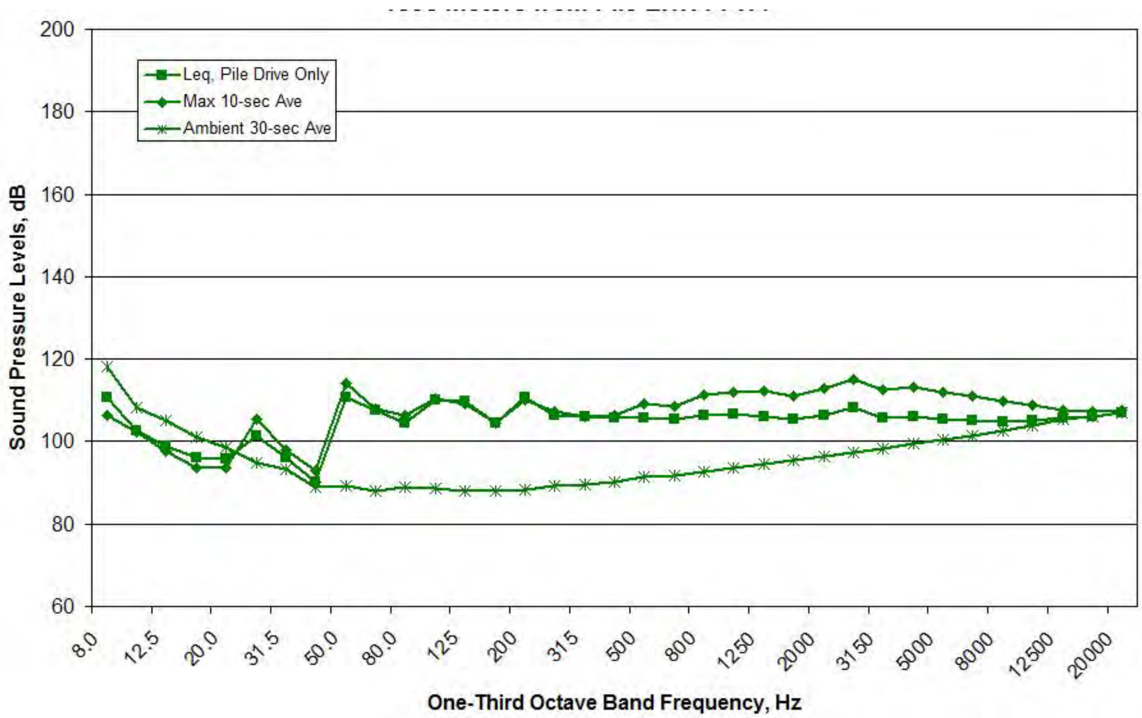

Figure B71. Spectral Data Measured at the MID Location during EHW1 FW1, 16:55-17:02, Measured at Depths of 10 meters on October 7, 2011

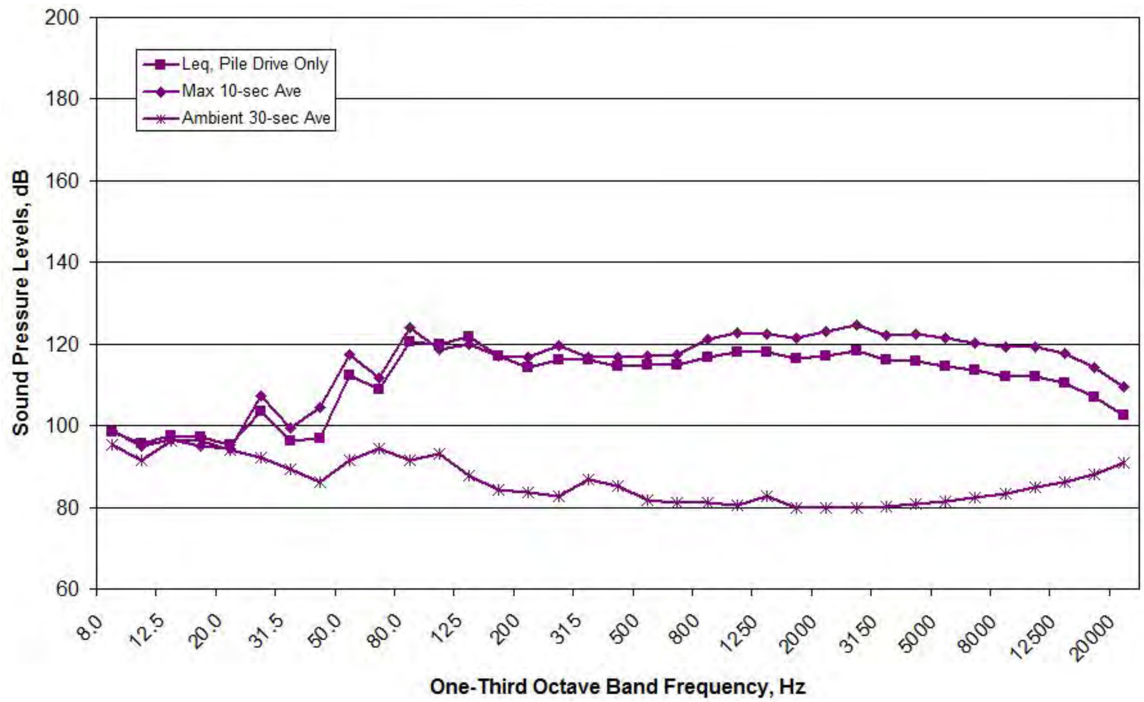

Figure B72. Spectral Data Measured at the RFT Location during EHW1 FW1, 16:55-17:02, Measured at Depths of 10 meters on October 7, 2011

EHW1 FW2 (Vibratory Installation)

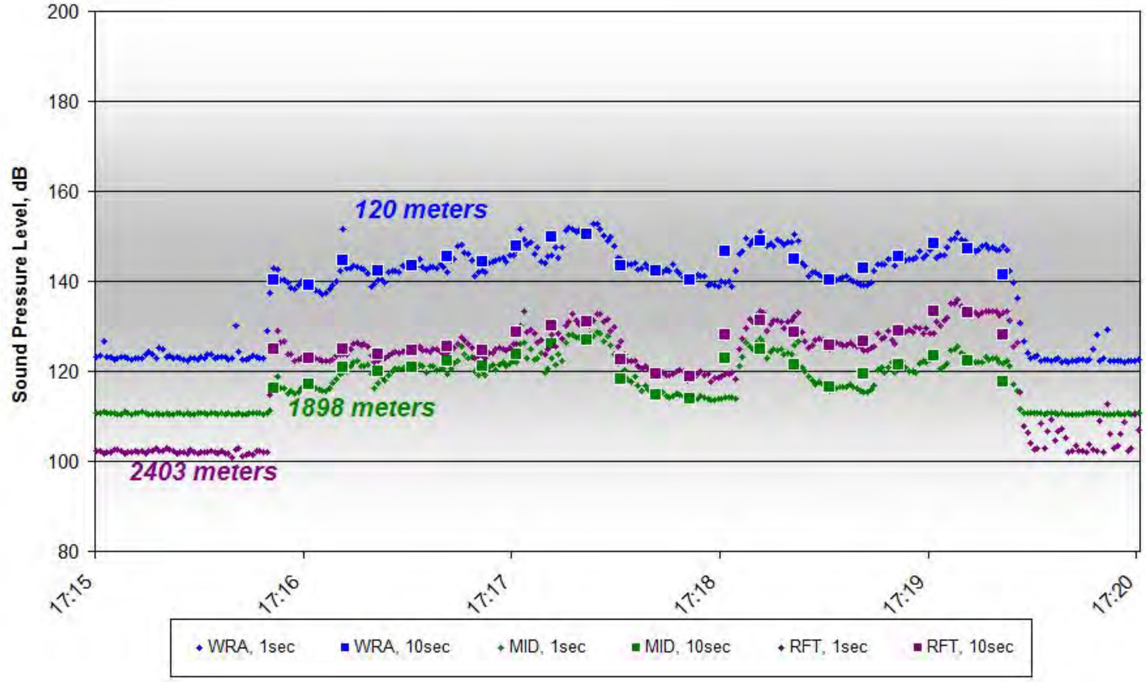

Figure B73. One-second and 10-second Average Data for EHW1 FW2, 17:15-17:19, Measured at Depths of 17-30 meters on October 7, 2011

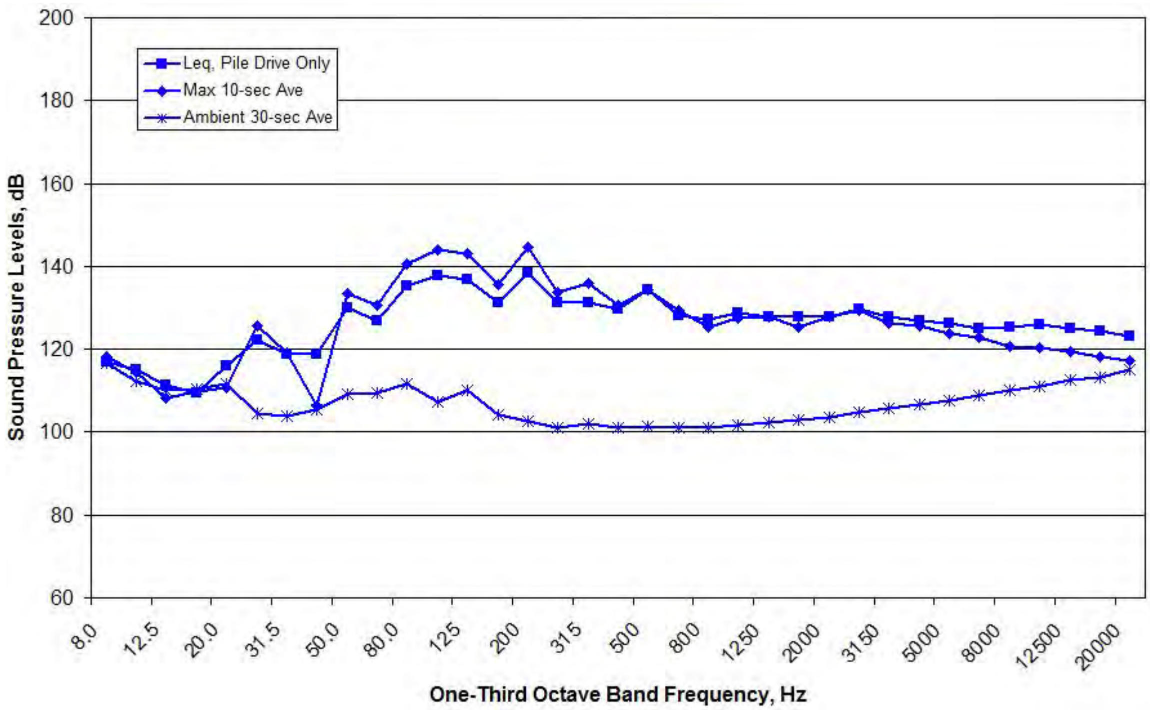

Figure B74. Spectral Data Measured at the WRA Location during EHW1 FW2, 17:15-17:19, Measured at Depths of 30 meters on October 7, 2011

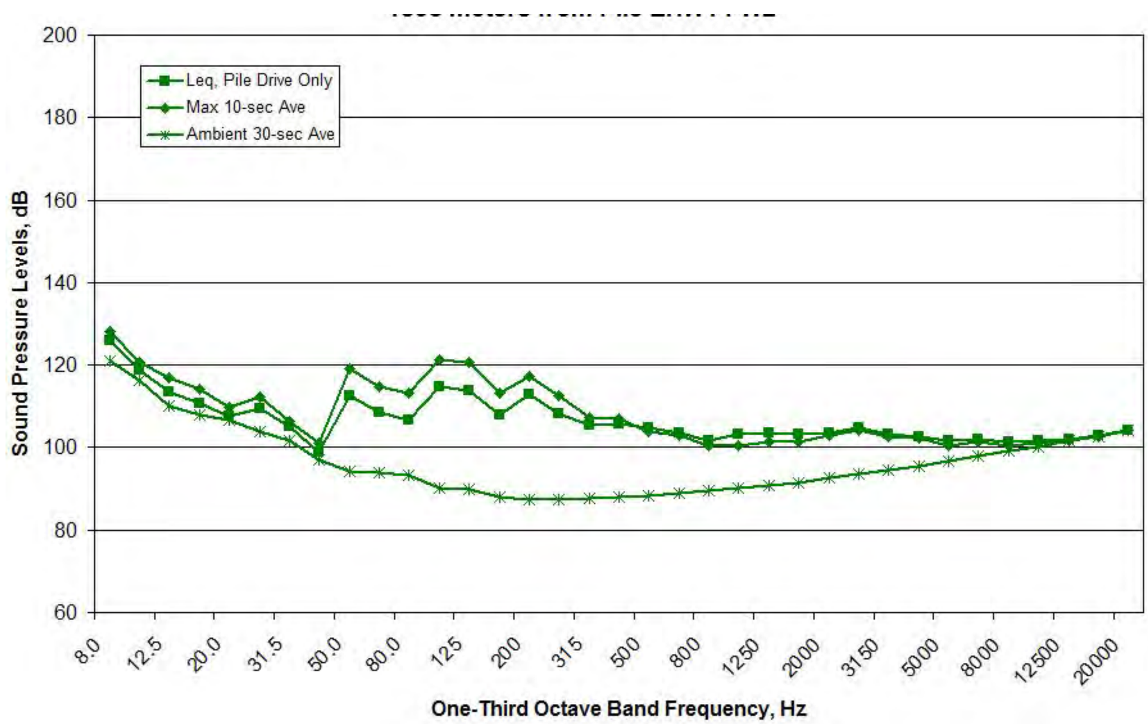

Figure B75. Spectral Data Measured at the MID Location during EHW1 FW2, 17:15-17:19, Measured at Depths of 30 meters on October 7, 2011

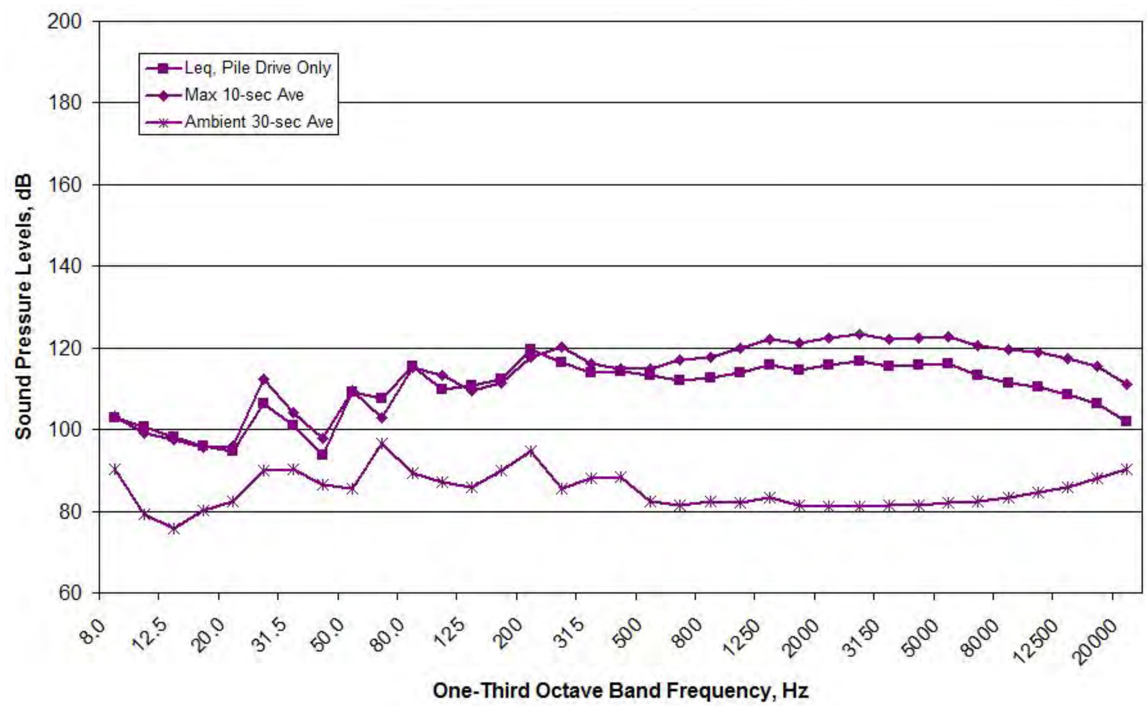

Figure B76. Spectral Data Measured at the RFT Location during EHW1 FW2, 17:15-17:19, Measured at Depths of 17 meters on October 7, 2011

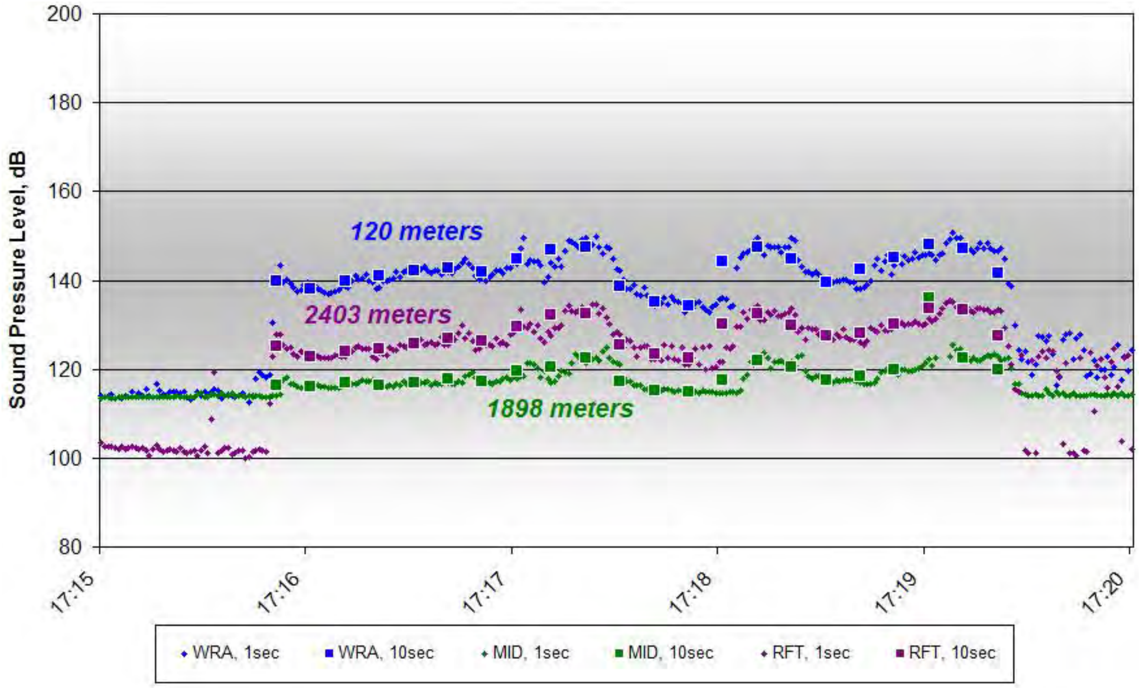

Figure B77. One-second and 10-second Average Data for EHW1 FW2, 17:15-17:19, Measured at Depths of 10 meters on October 7, 2011

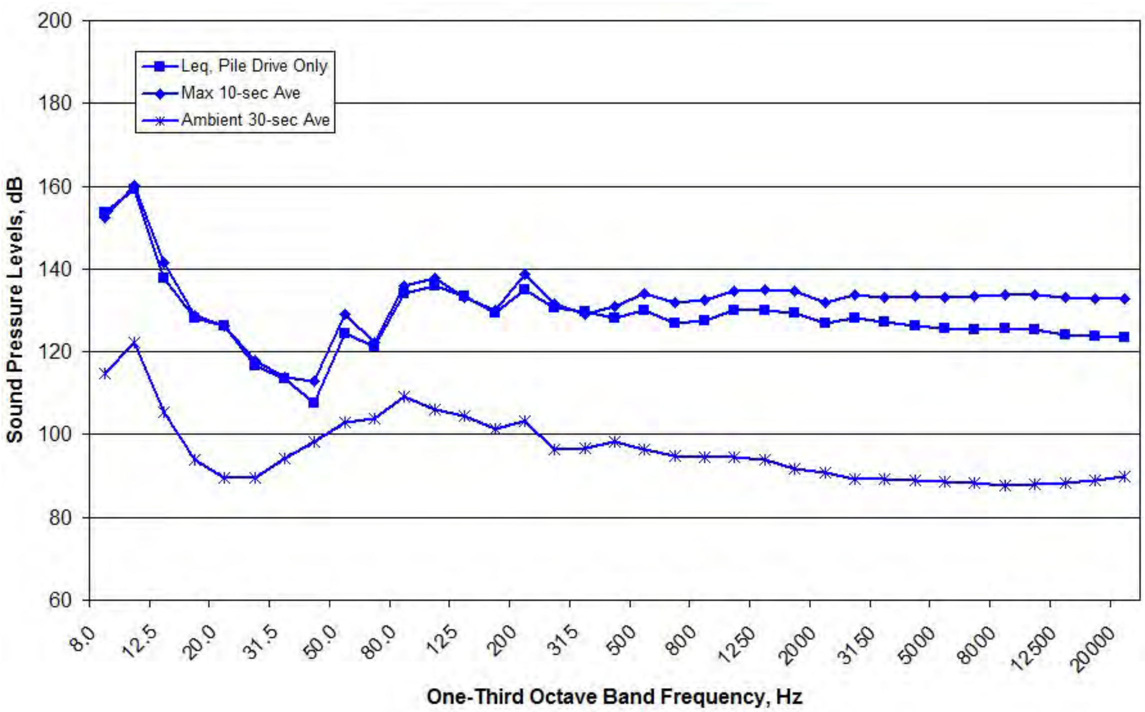

Figure B78. Spectral Data Measured at the WRA Location EHW1 FW2, 17:15-17:19, Measured at Depths of 10 meters on October 7, 2011

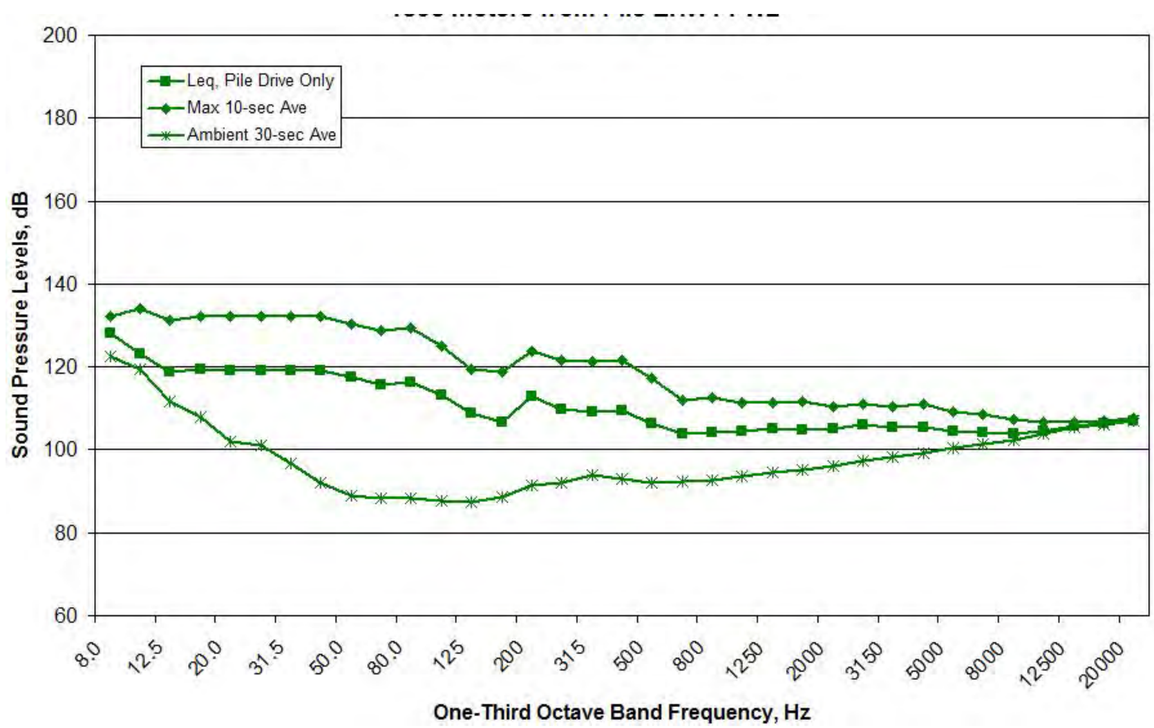

Figure B79. Spectral Data Measured at the MID Location during EHW1 FW2, 17:15-17:19, Measured at Depths of 10 meters on October 7, 2011

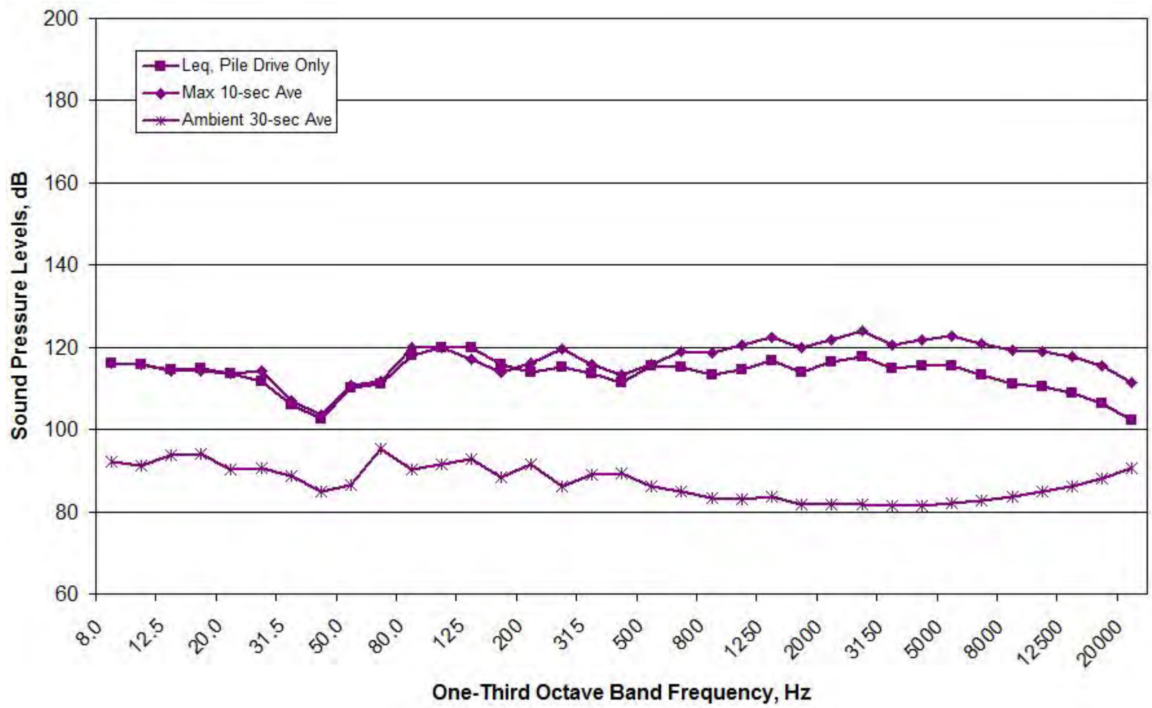

Figure B80. Spectral Data Measured at the RFT Location during EHW1 FW2, 17:15-17:19, Measured at Depths of 10 meters on October 7, 2011

EHW1 FW3 (Vibratory Installation)

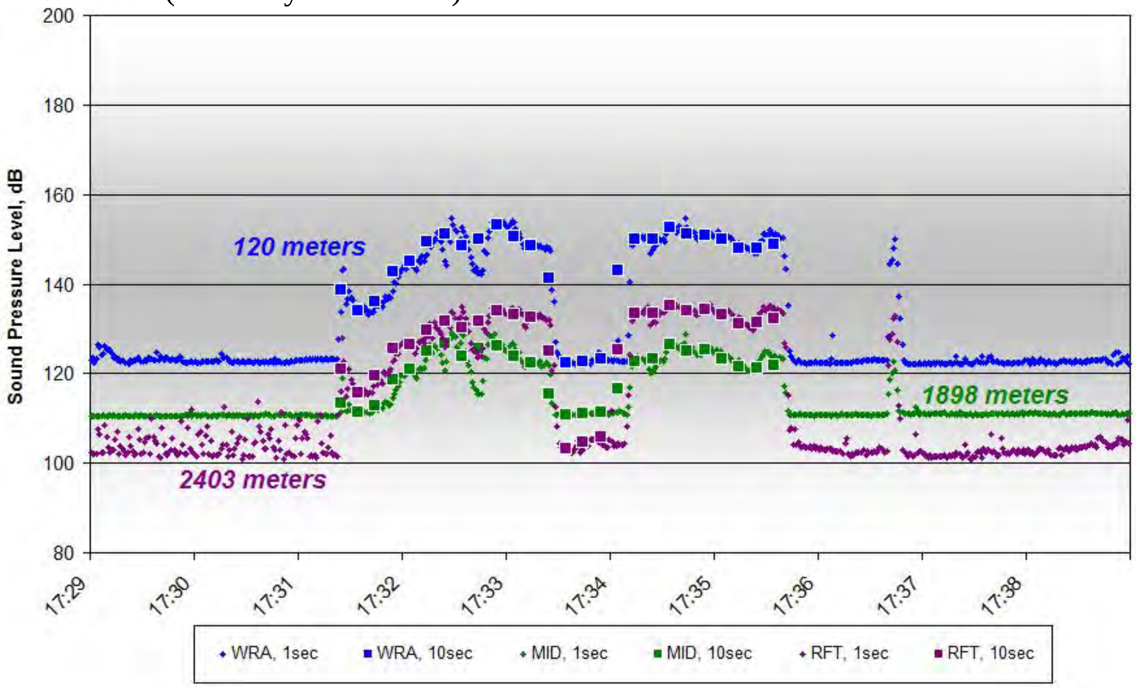

Figure B81. One-second and 10-second Average Data for EHW1 FW3, 17:31-17:36, Measured at Depths of 17-30 meters on October 7, 2011

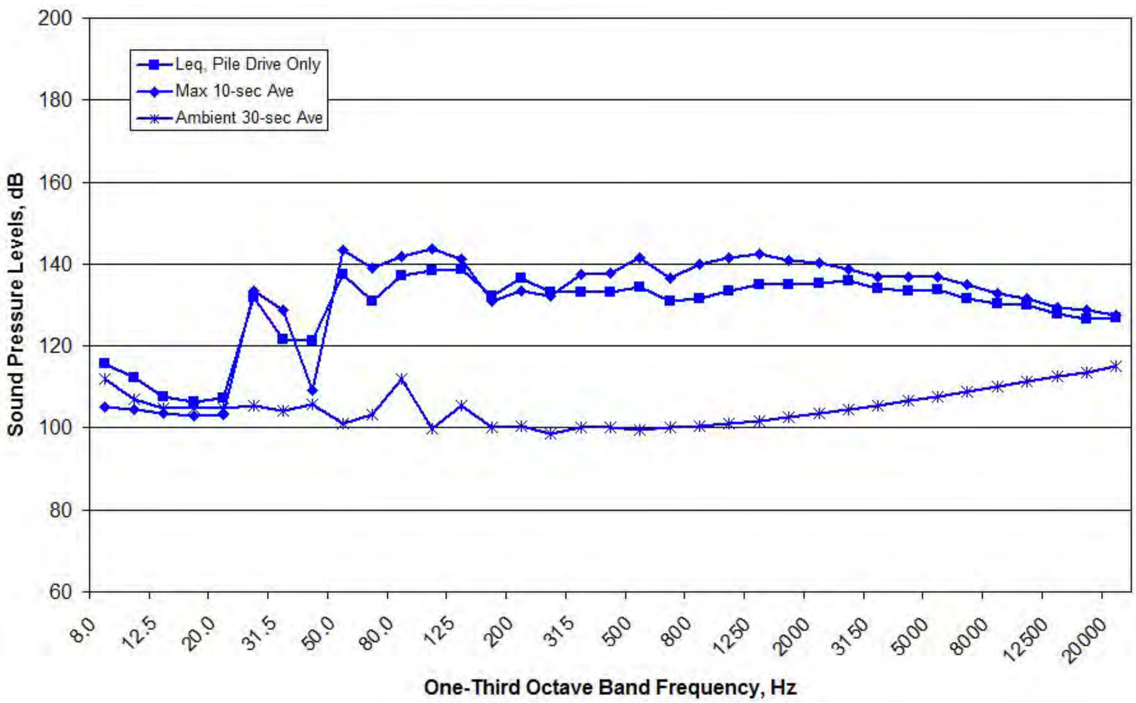

Figure B82. Spectral Data Measured at the WRA Location during EHW1 FW3, 17:31-17:36, Measured at Depths of 30 meters on October 7, 2011

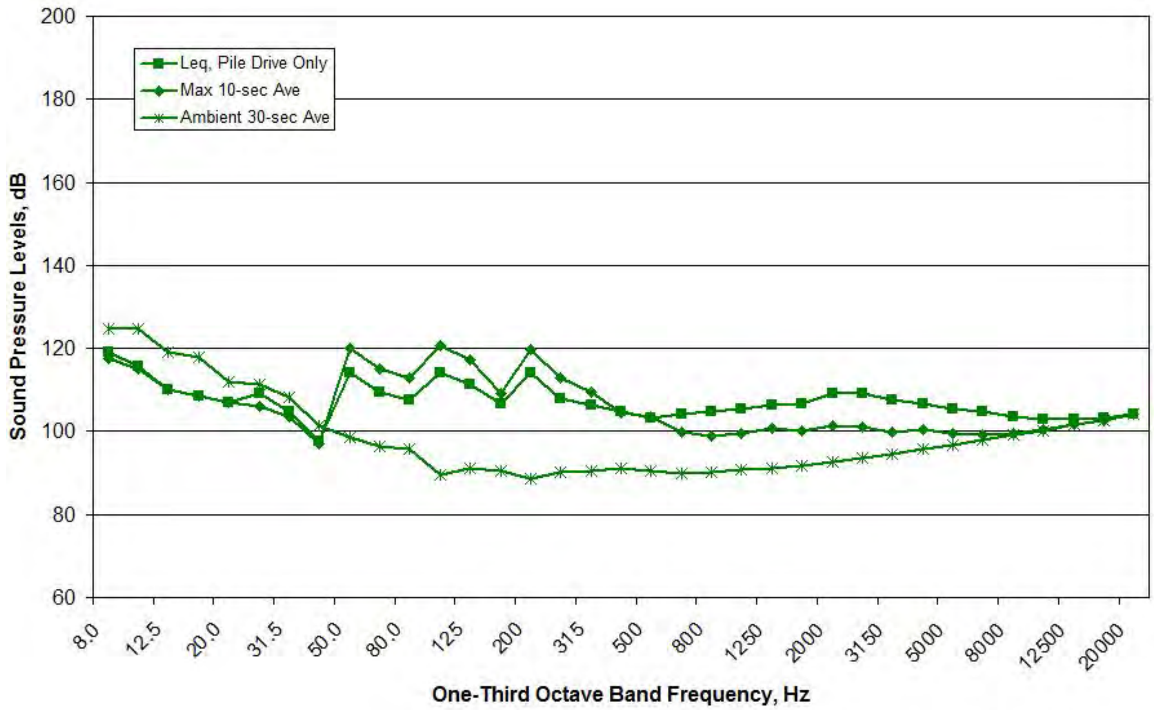

Figure B83. Spectral Data Measured at the MID Location during EHW1 FW3, 17:31-17:36, Measured at Depths of 30 meters on October 7, 2011

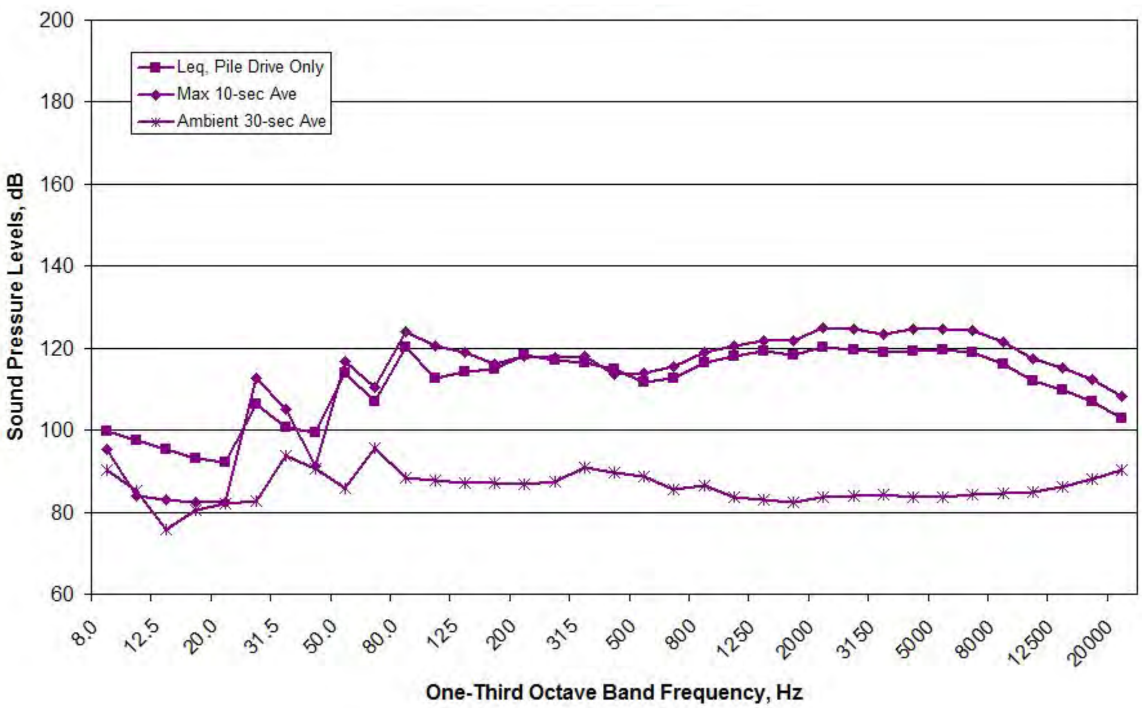

Figure B84. Spectral Data Measured at the RFT Location during EHW1 FW3, 17:31-17:36, Measured at Depths of 17 meters on October 7, 2011

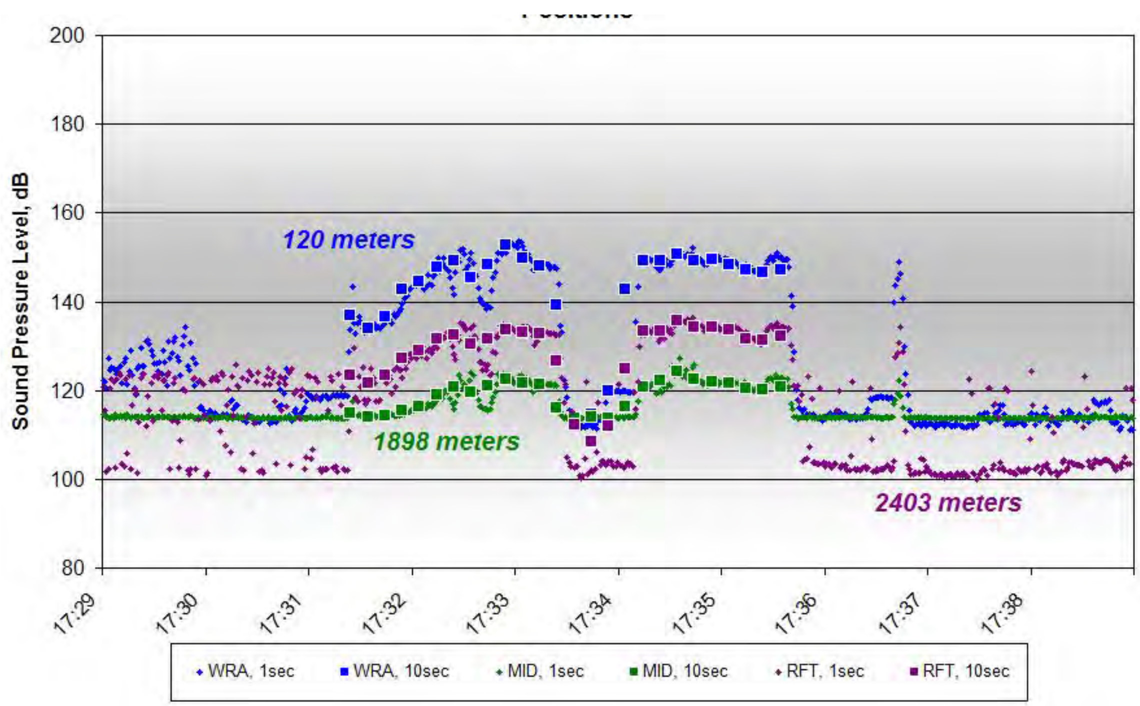

Figure B85. One-second and 10-second Average Data for EHW1 FW3, 17:31-17:36, Measured at Depths of 10 meters on October 7, 2011

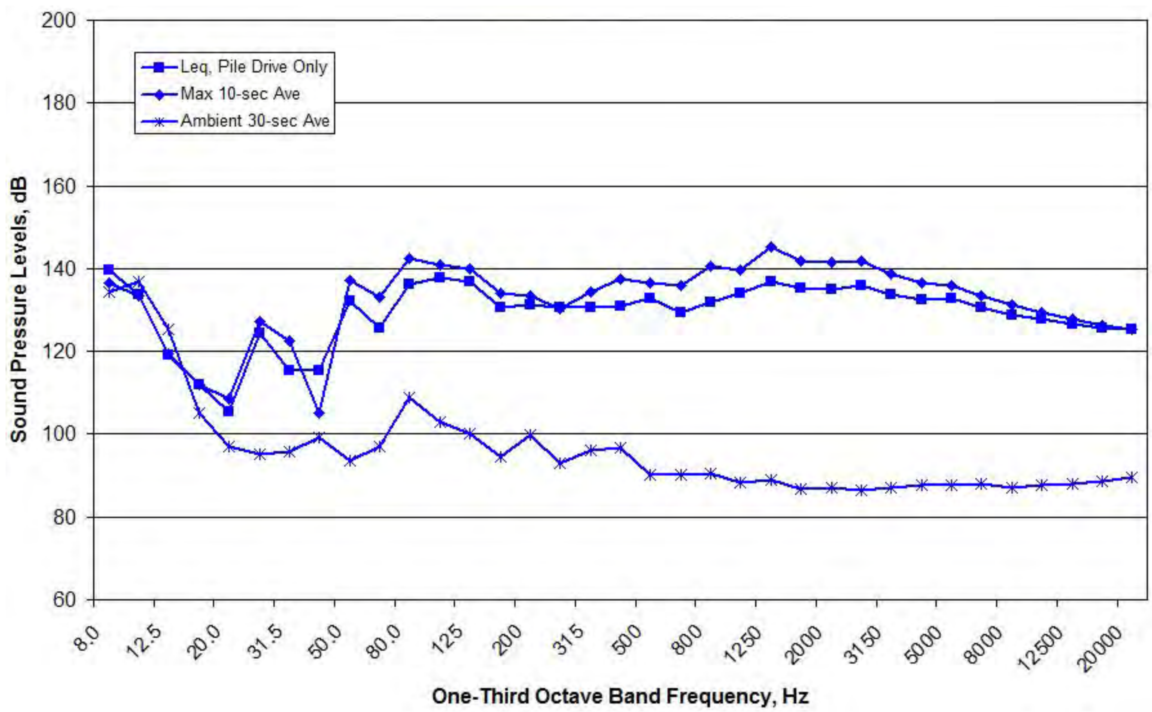

Figure B86. Spectral Data Measured at the WRA Location EHW1 FW3, 17:31-17:36, Measured at Depths of 10 meters on October 7, 2011

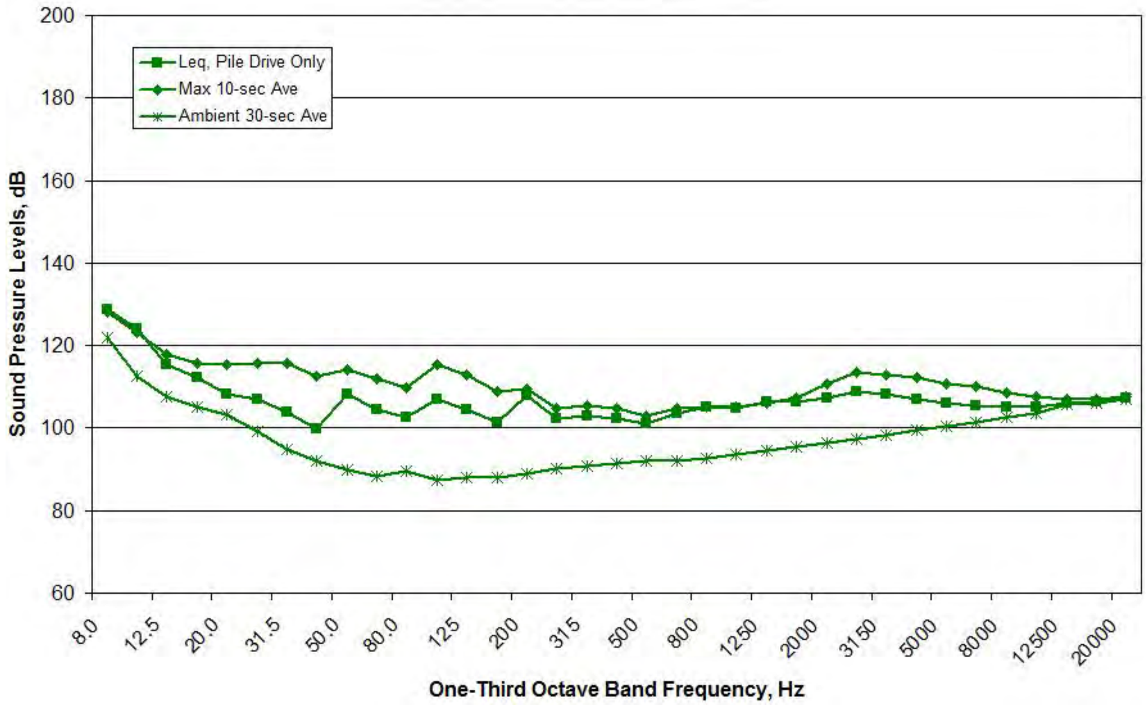

Figure B87. Spectral Data Measured at the MID Location during EHW1 FW3, 17:31-17:36, Measured at Depths of 10 meters on October 7, 2011

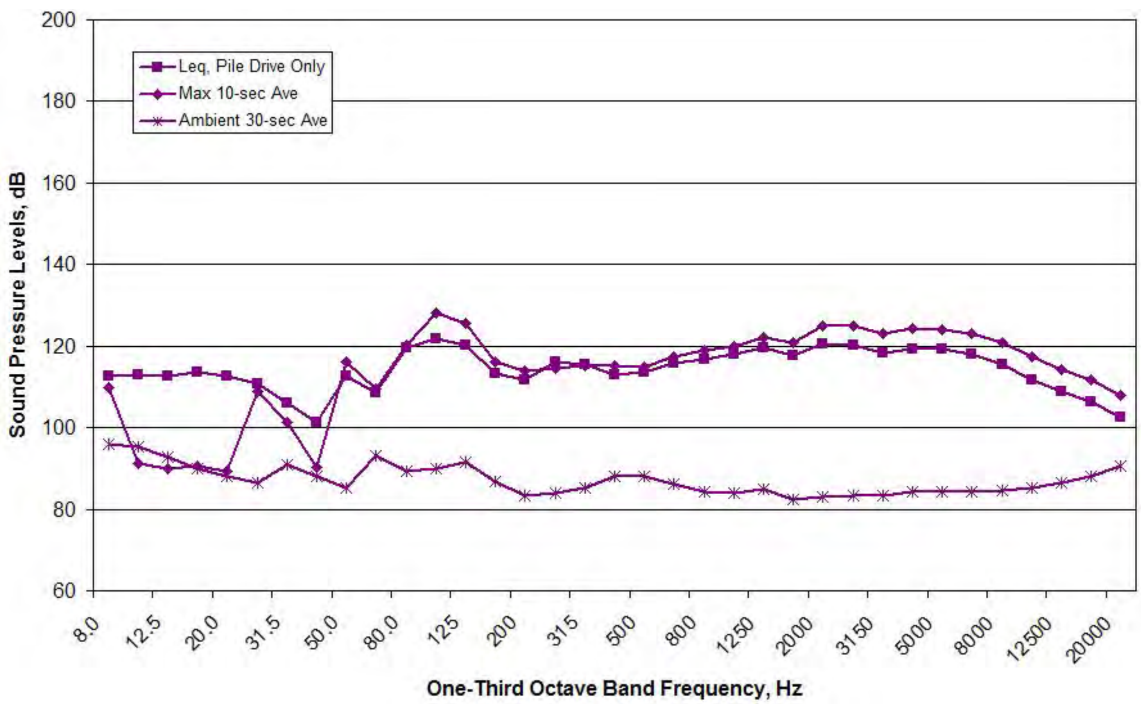

Figure B88. Spectral Data Measured at the RFT Location during EHW1 FW3, 17:31-17:36, Measured at Depths of 10 meters on October 7, 2011

EHW1 FW4 (Vibratory Installation)

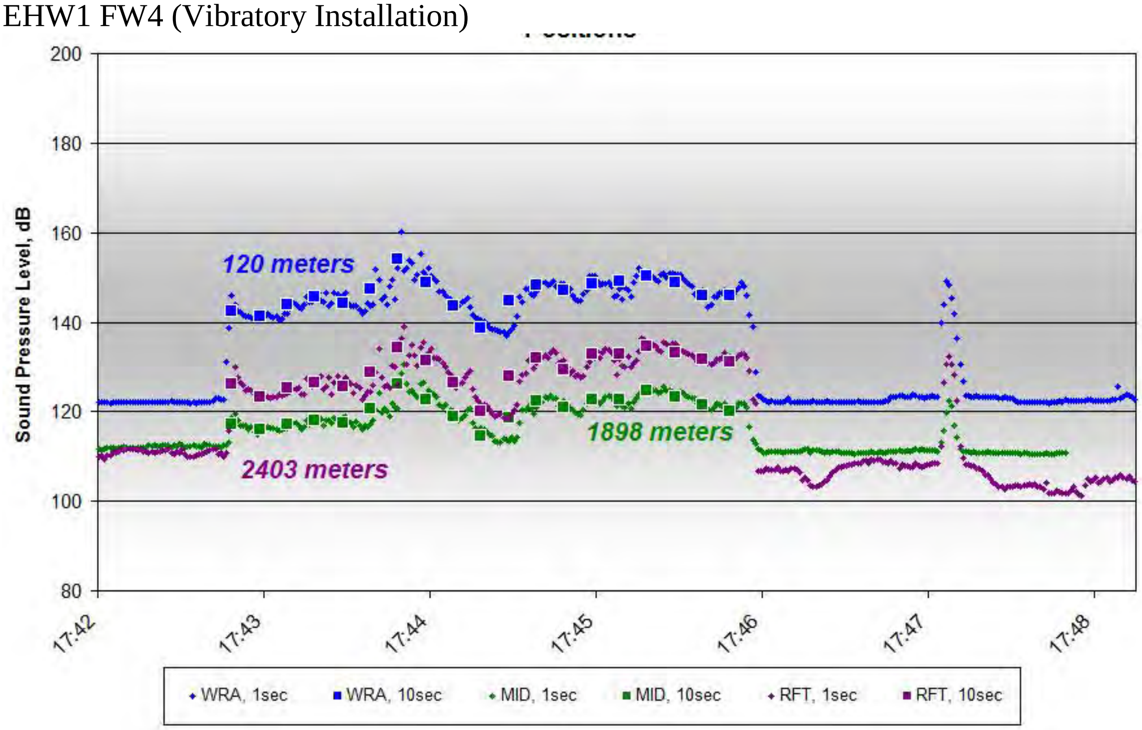

Figure B89. One-second and 10-second Average Data for EHW1 FW4, 17:43-17:46, Measured at Depths of 17-30 meters on October 7, 2011

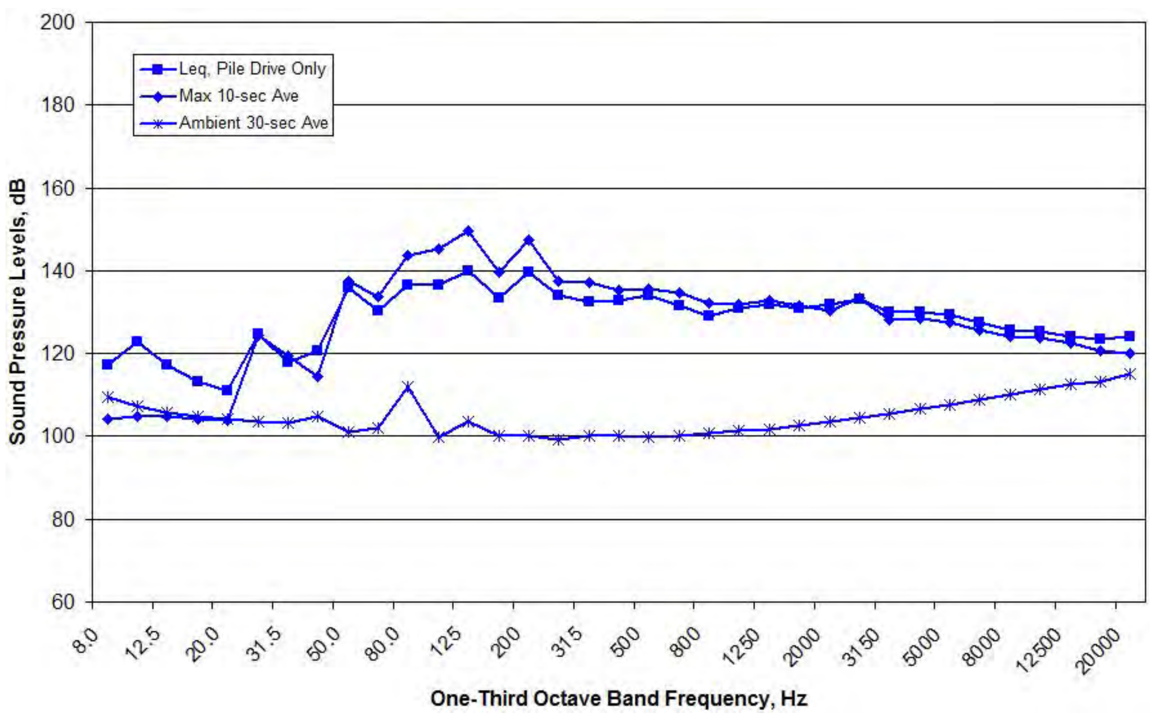

Figure B90. Spectral Data Measured at the WRA Location during EHW1 FW4, 17:43-17:46, Measured at Depths of 30 meters on October 7, 2011

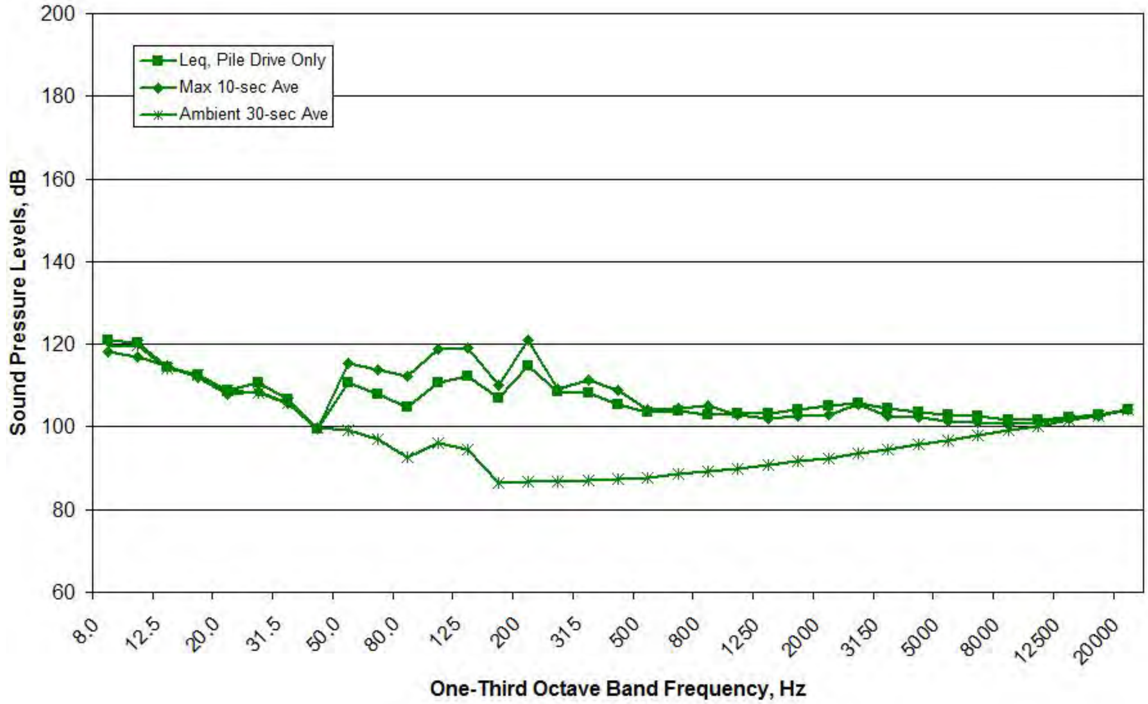

Figure B91. Spectral Data Measured at the MID Location during EHW1 FW4, 17:43-17:46, Measured at Depths of 30 meters on October 7, 2011

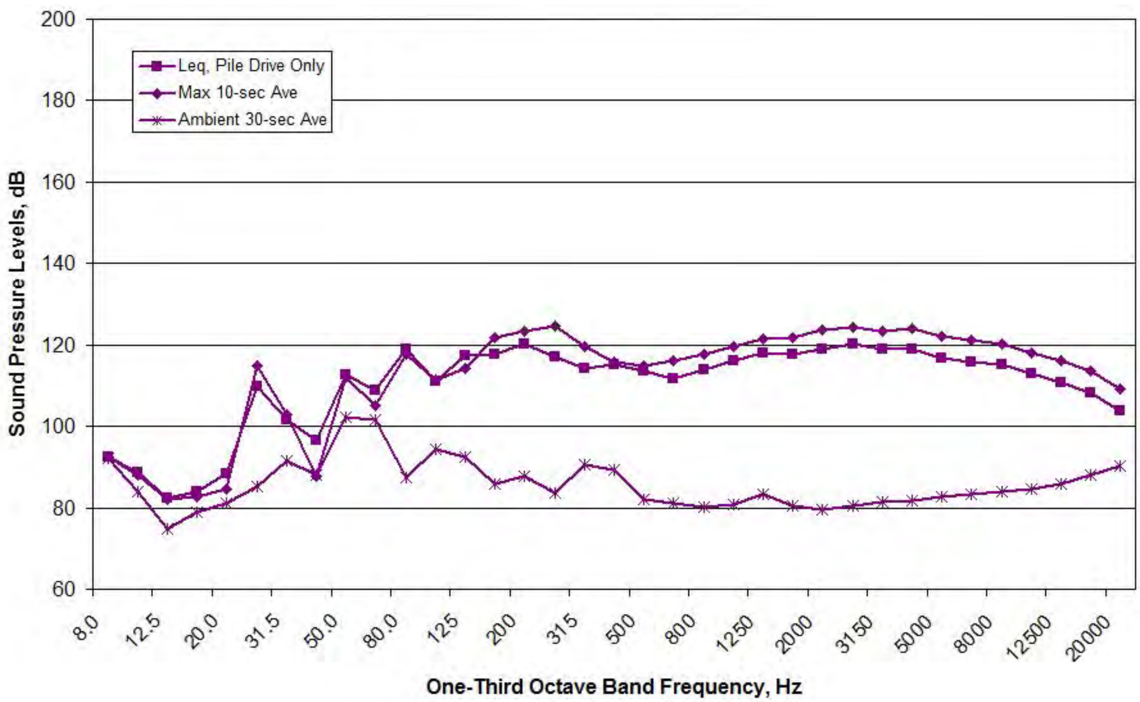

Figure B92. Spectral Data Measured at the RFT Location during EHW1 FW4, 17:43-17:46, Measured at Depths of 17 meters on October 7, 2011

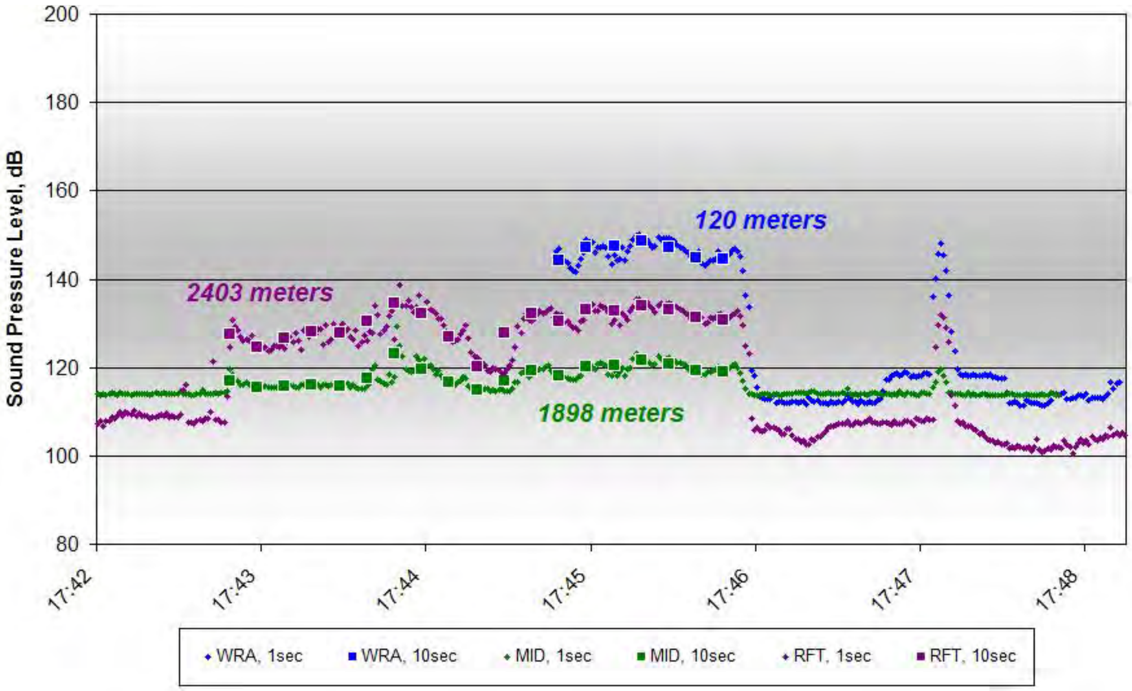

Figure B93. One-second and 10-second Average Data for EHW1 FW4, 17:43-17:46, Measured at Depths of 10 meters on October 7, 2011

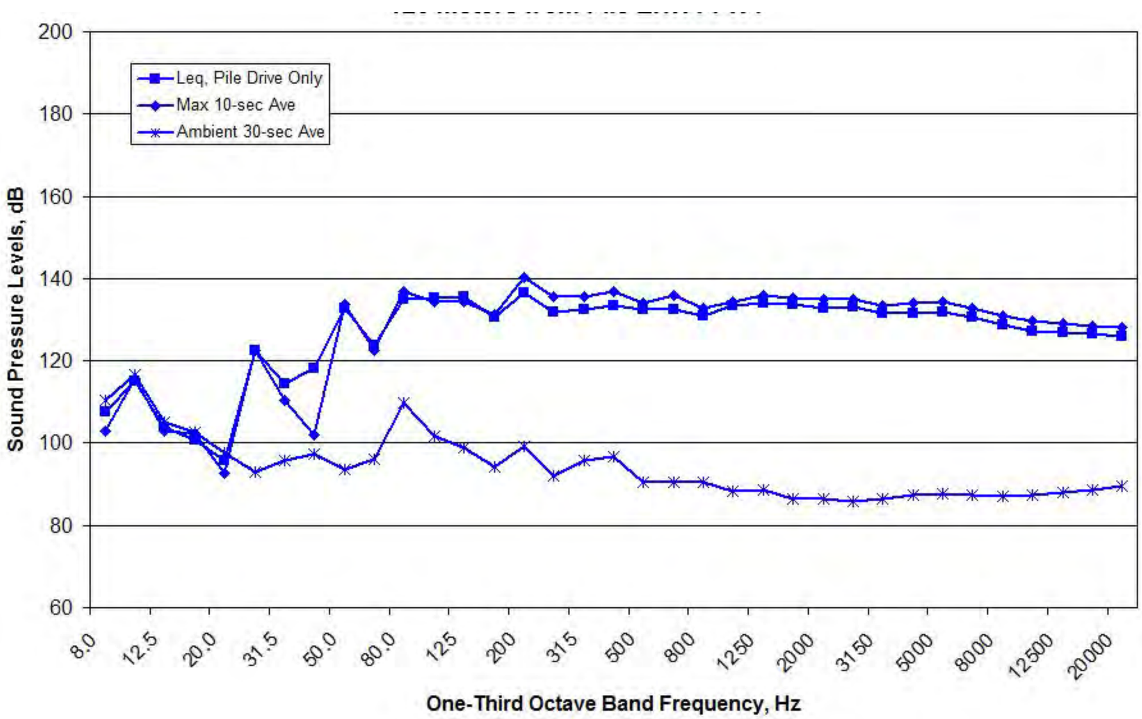

Figure B94. Spectral Data Measured at the WRA Location EHW1 FW4, 17:43-17:46, Measured at Depths of 10 meters on October 7, 2011

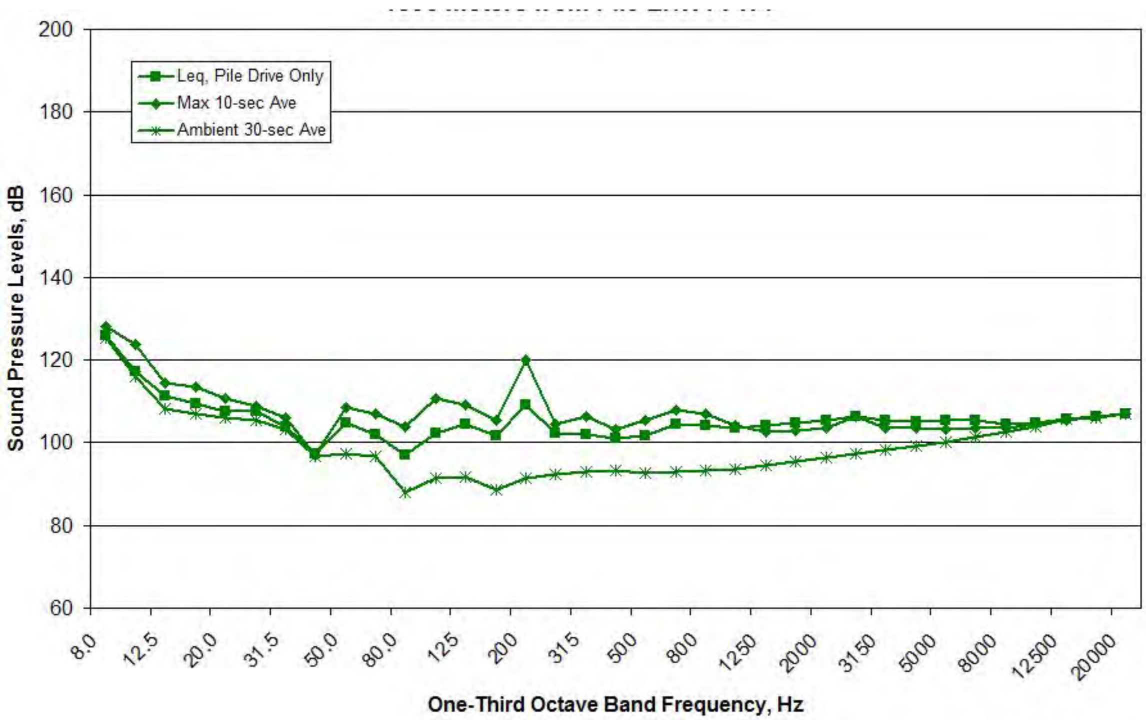

Figure B95. Spectral Data Measured at the MID Location during EHW1 FW4, 17:43-17:46, Measured at Depths of 10 meters on October 7, 2011

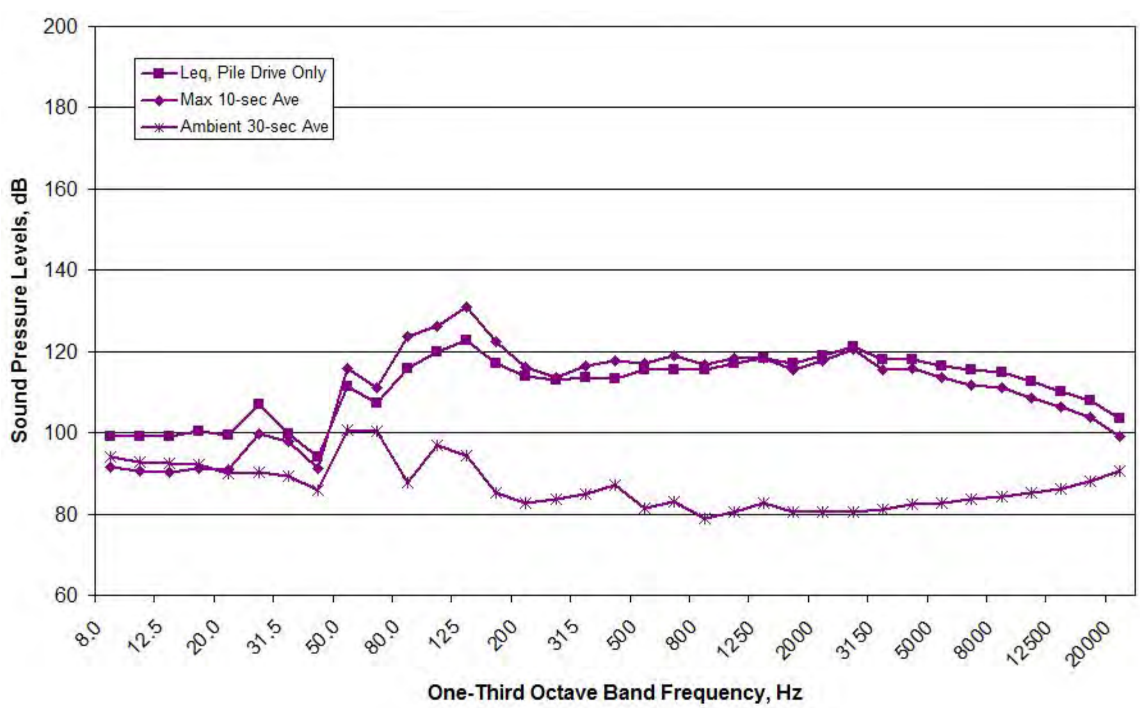

Figure B96. Spectral Data Measured at the RFT Location during EHW1 FW4, 17:43-17:46, Measured at Depths of 10 meters on October 7, 2011

10/8/2011 – EHW1 FW5 (Vibratory Installation)

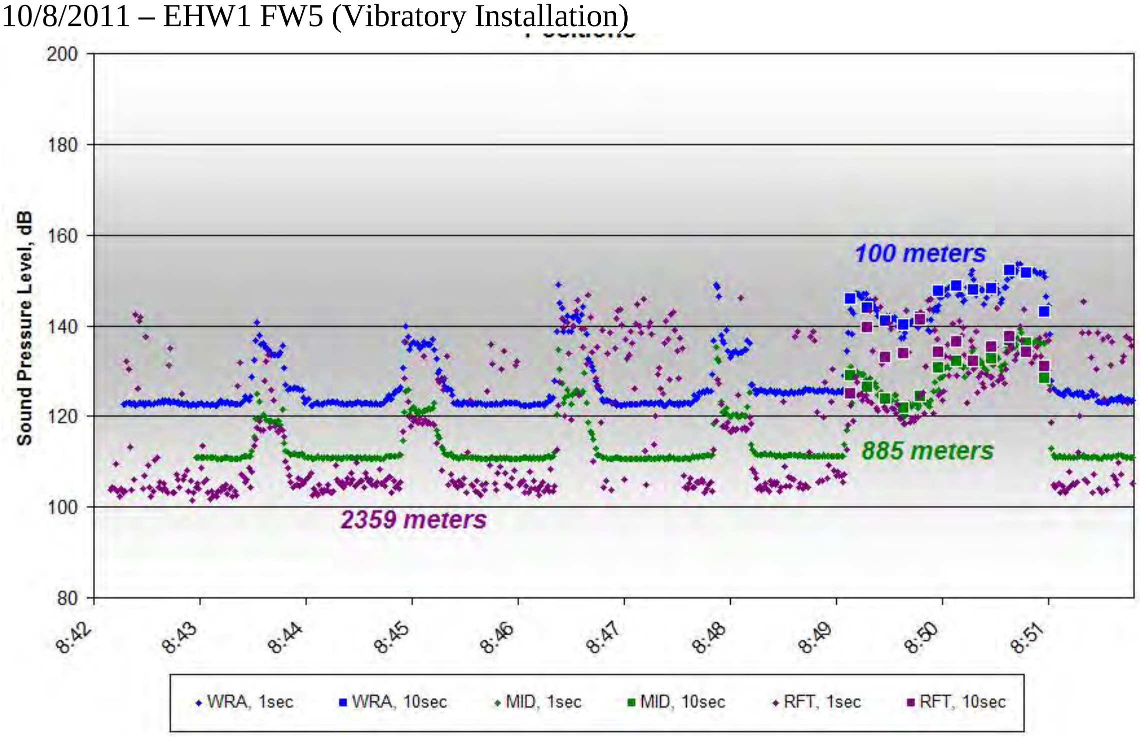

Figure B97. One-second and 10-second Average Data for EHW1 FW5, 8:43-8:51, Measured at Depths of 17-30 meters on October 8, 2011

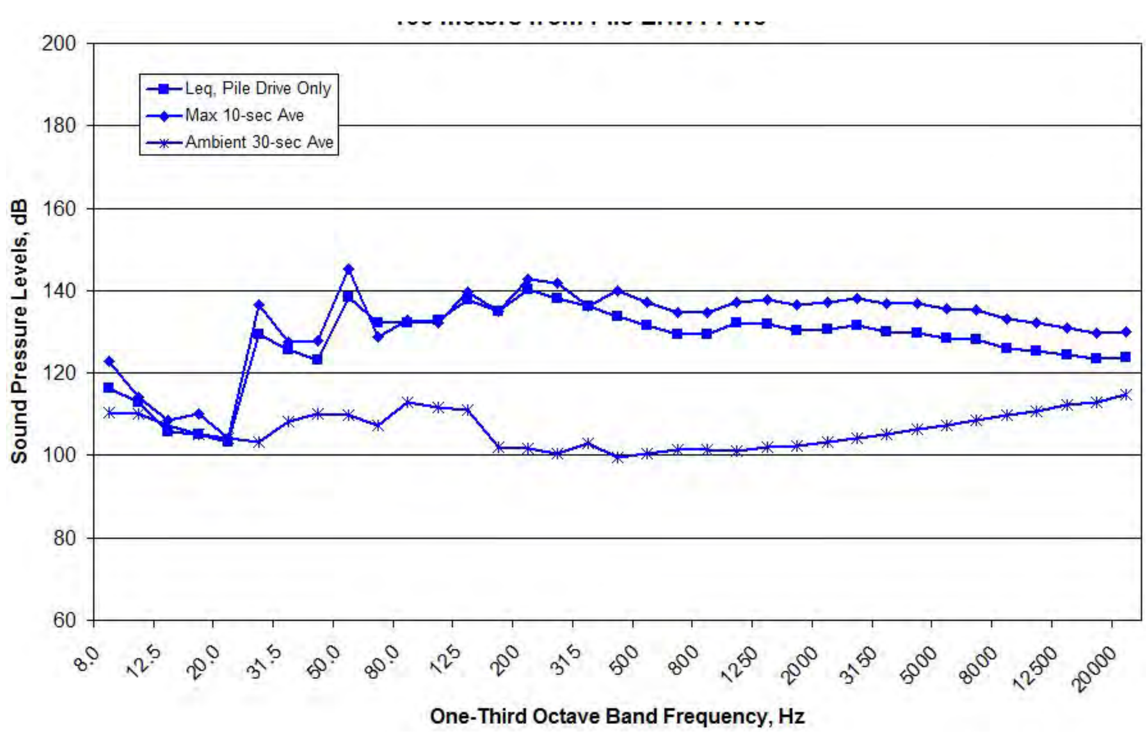

Figure B98. Spectral Data Measured at the WRA Location during EHW1 FW5, 8:43-8:51, Measured at Depths of 30 meters on October 8, 2011

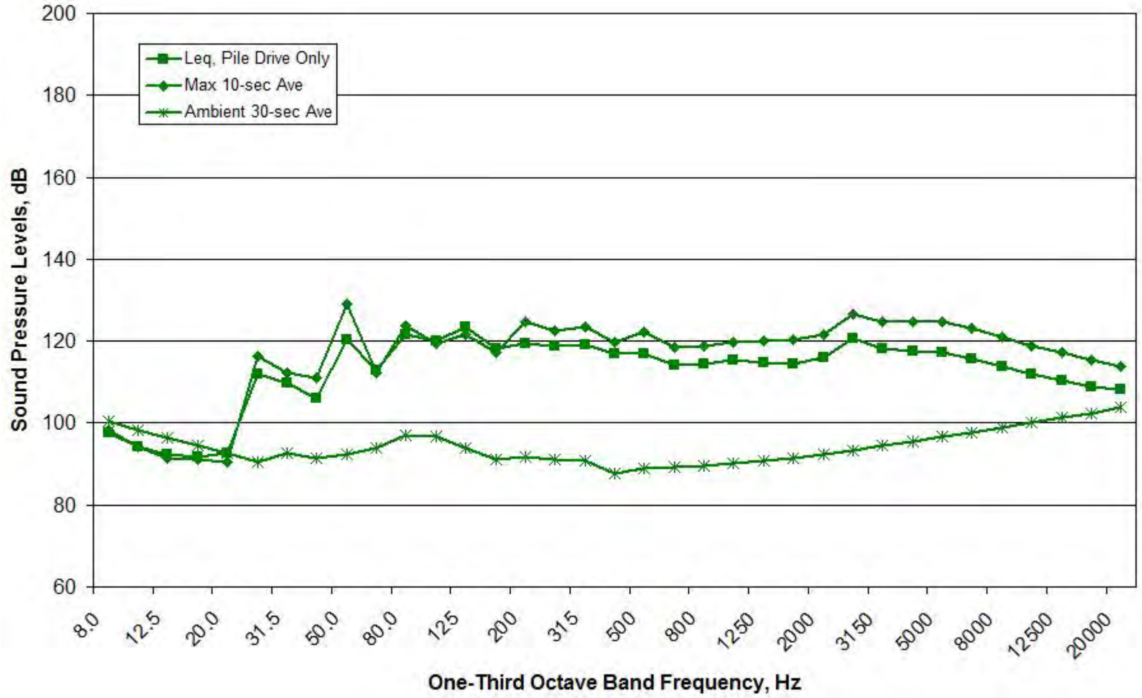

Figure B99. Spectral Data Measured at the MID Location during EHW1 FW5, 8:43-8:51, Measured at Depths of 30 meters on October 8, 2011

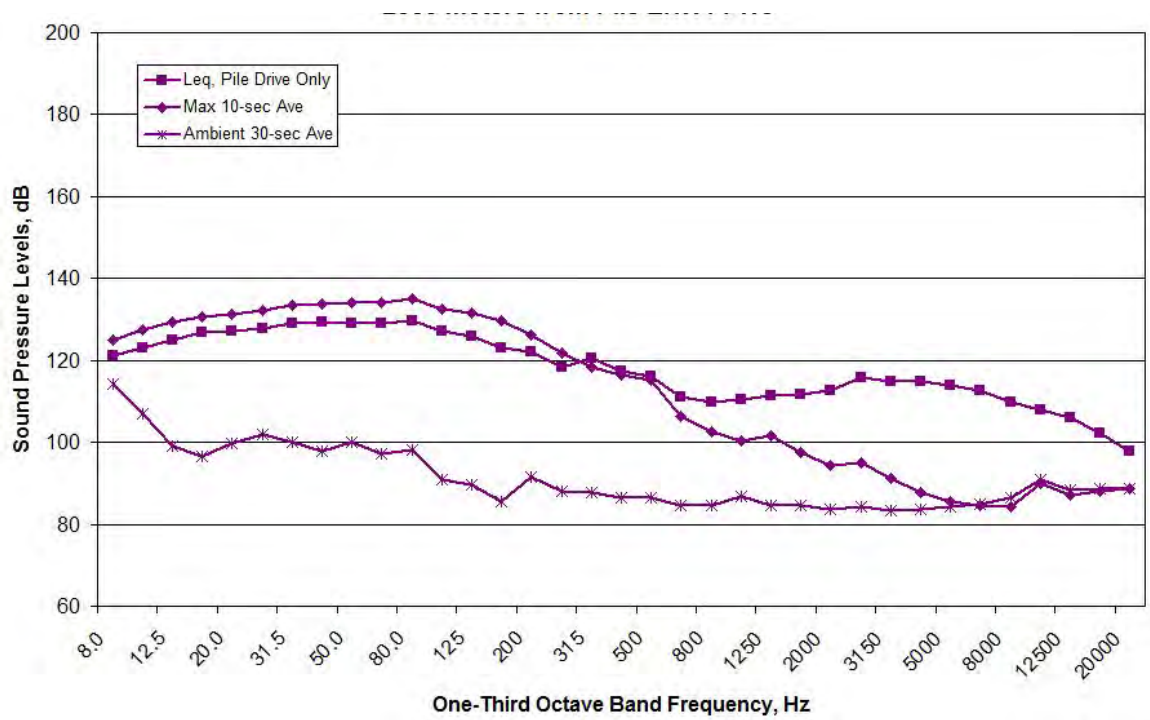

Figure B100. Spectral Data Measured at the RFT Location during EHW1 FW5, 8:43-8:51, Measured at Depths of 17 meters on October 8, 2011

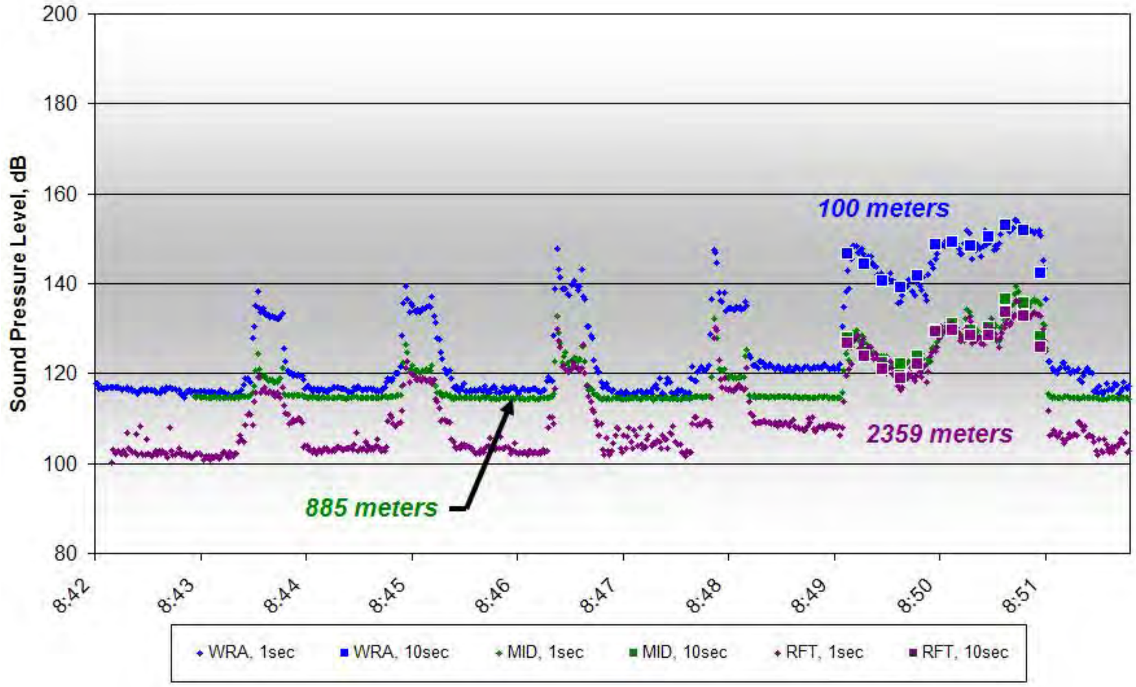

Figure B101. One-second and 10-second Average Data for EHW1 FW5, 8:43-8:51, Measured at Depths of 10 meters on October 8, 2011

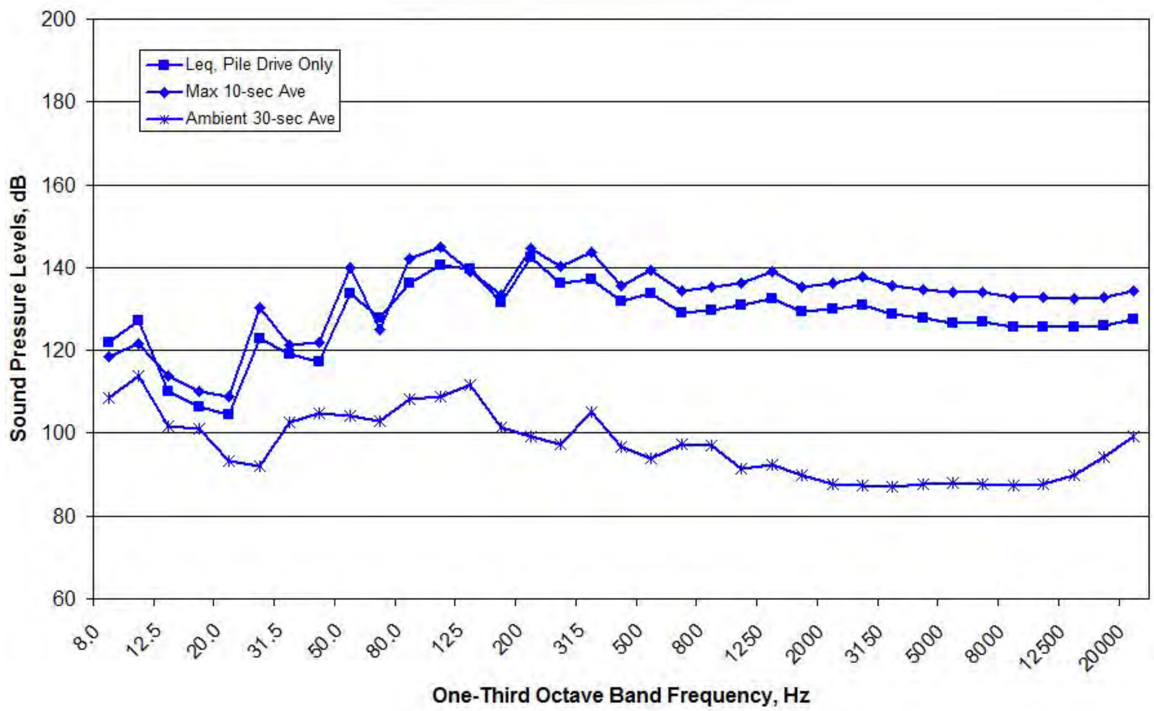

Figure B102. Spectral Data Measured at the WRA Location during EHW1 FW5, 8:43-8:51, Measured at Depths of 10 meters on October 8, 2011

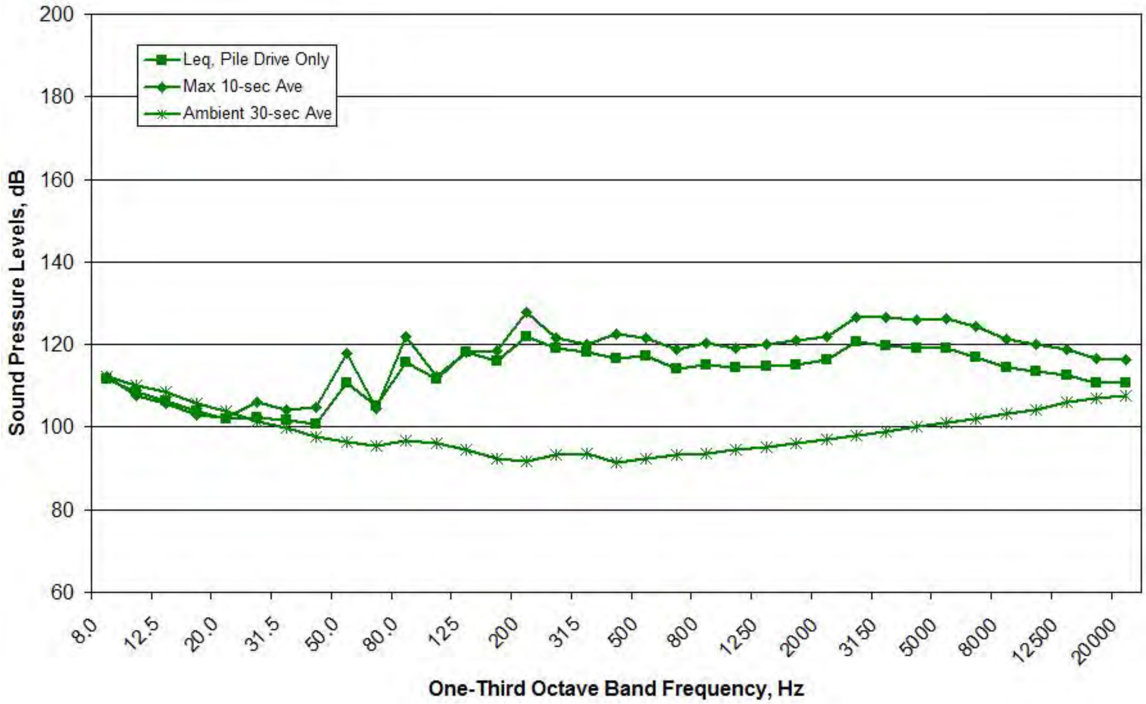

Figure B103. Spectral Data Measured at the MID Location during EHW1 FW5, 8:43-8:51, Measured at Depths of 10 meters on October 8, 2011

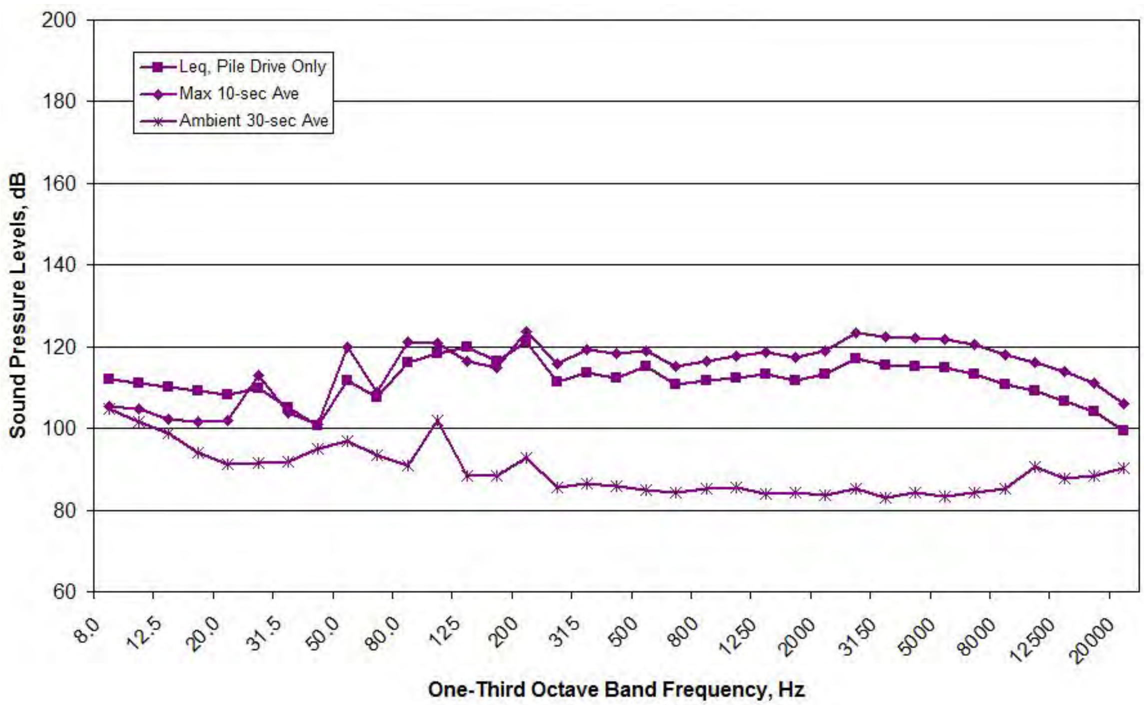

Figure B104. Spectral Data Measured at the RFT Location during EHW1 FW5, 8:43-8:51, Measured at Depths of 10 meters on October 8, 2011

EHW1 FW6 (Vibratory Installation)

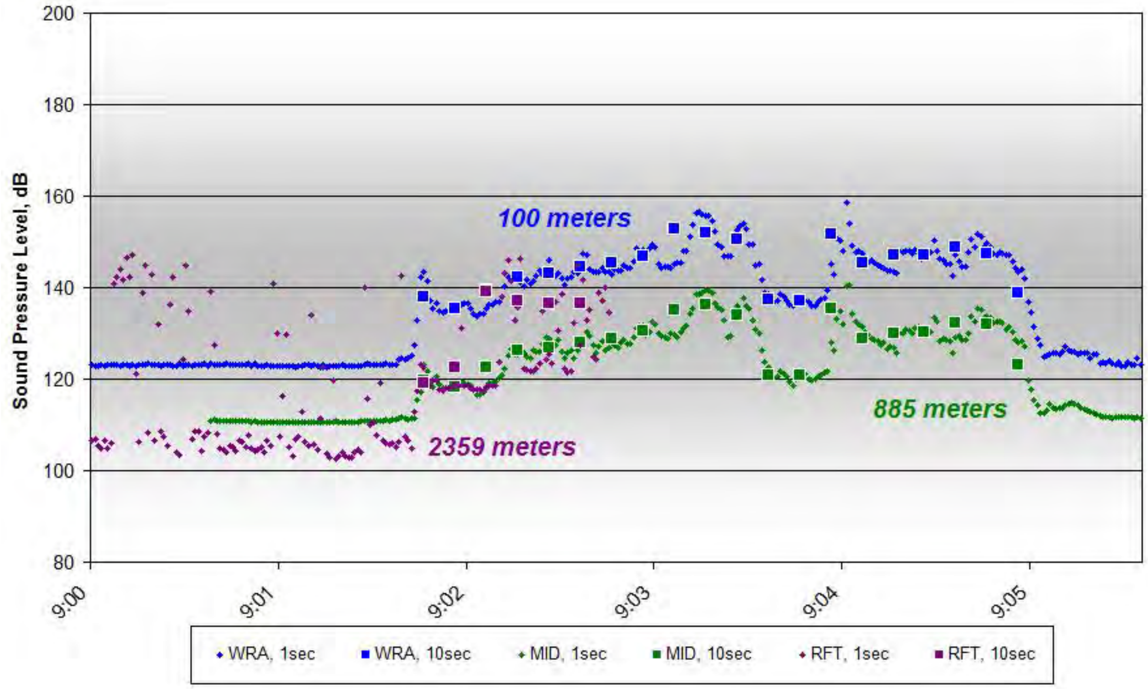

Figure B105. One-second and 10-second Average Data for EHW1 FW6, 9:01-9:05, Measured at Depths of 17-30 meters on October 8, 2011

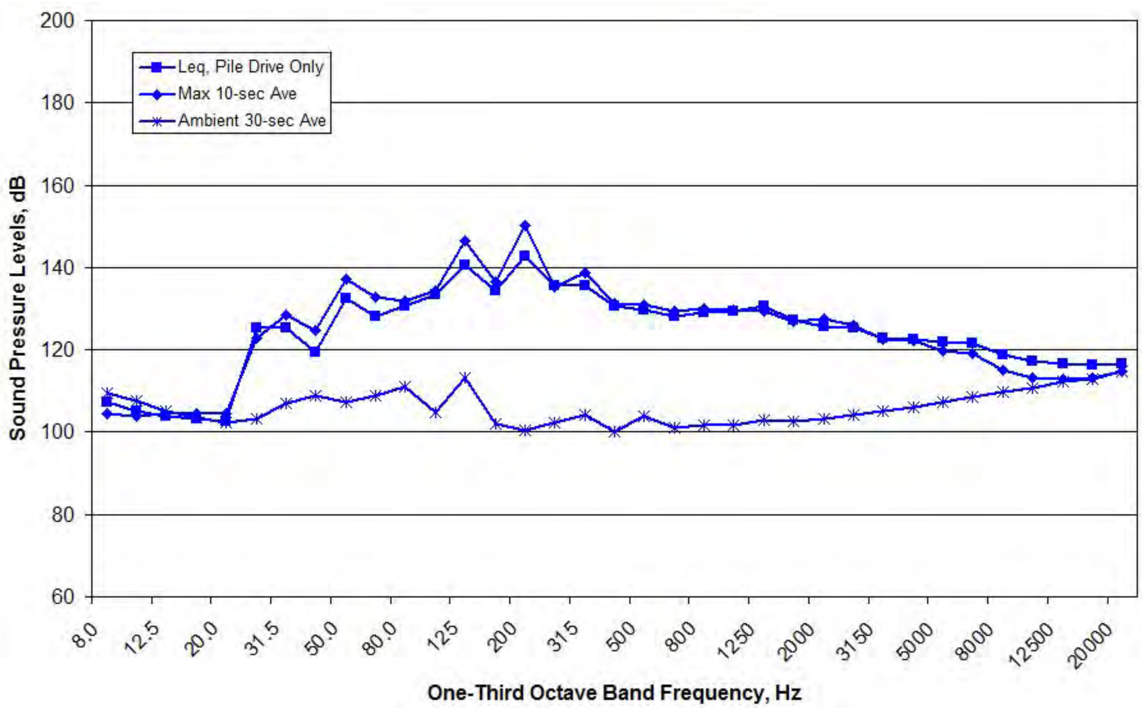

Figure B106. Spectral Data Measured at the WRA Location during EHW1 FW6, 9:01-9:05, Measured at Depths of 30 meters on October 8, 2011

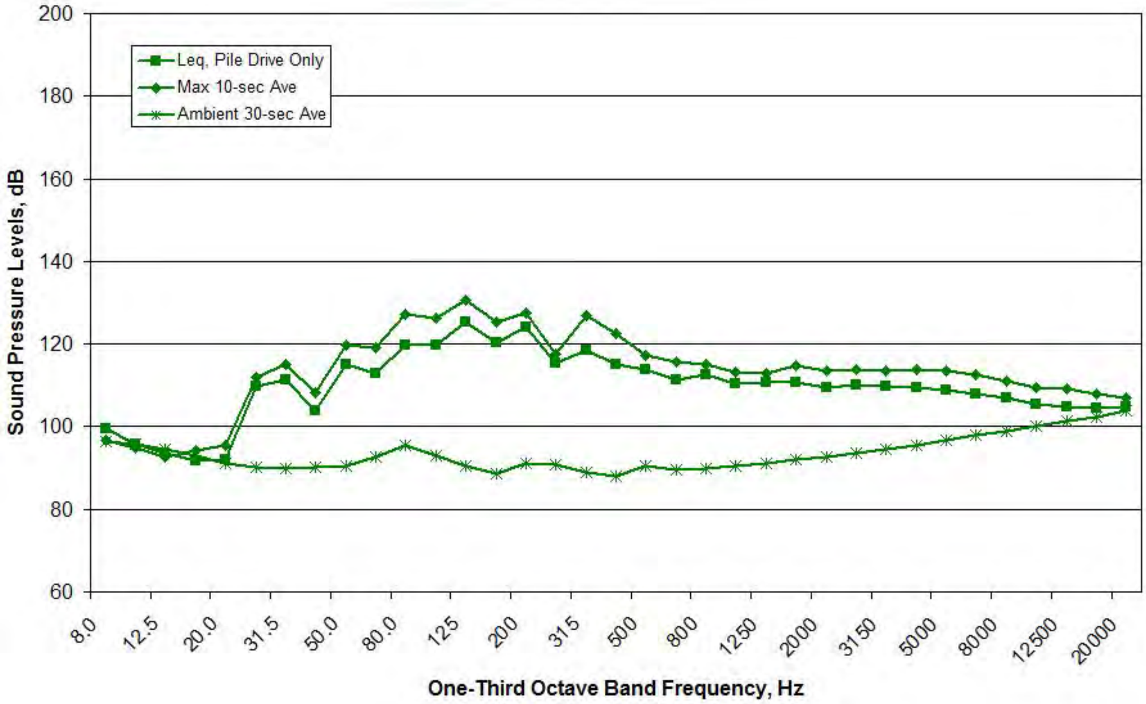

Figure B107. Spectral Data Measured at the MID Location during EHW1 FW6, 9:01-9:05, Measured at Depths of 30 meters on October 8, 2011

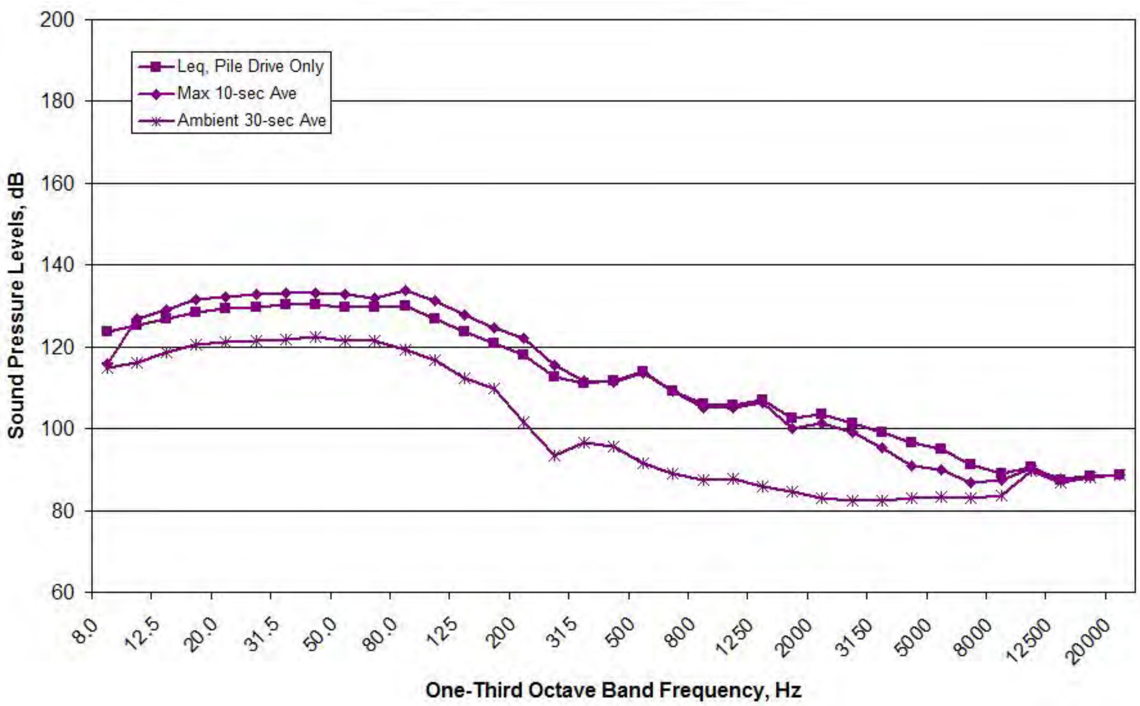

Figure B106. Spectral Data Measured at the RFT Location during EHW1 FW6, 9:01-9:05, Measured at Depths of 17 meters on October 8, 2011

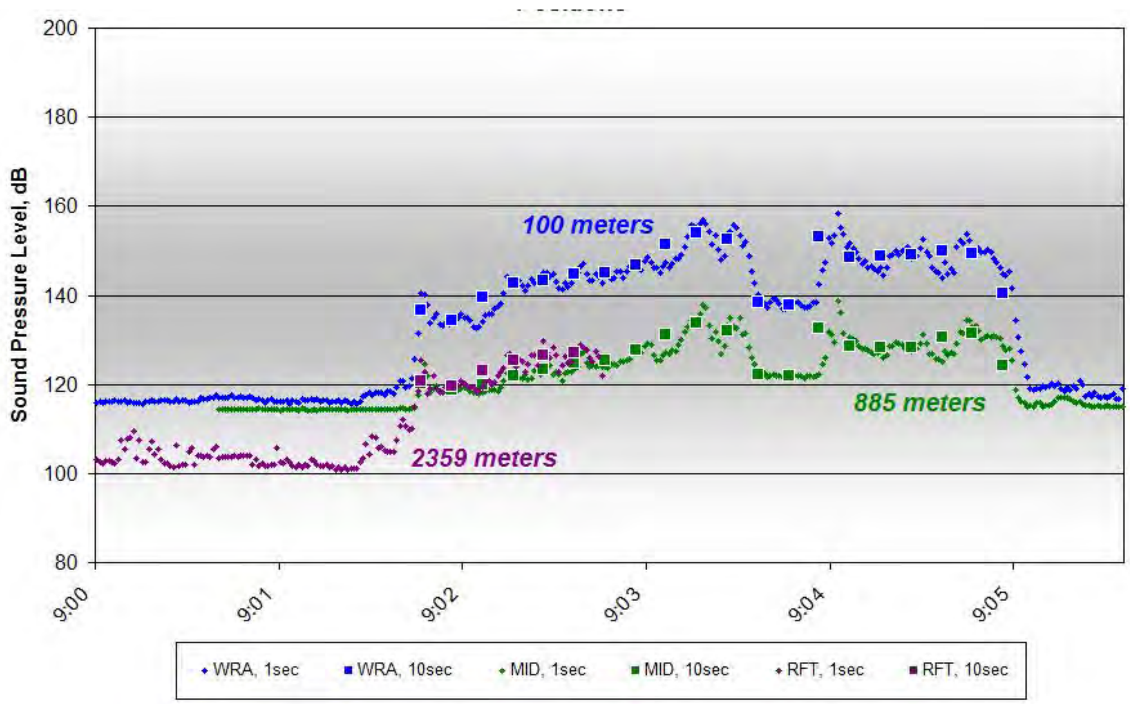

Figure B109. One-second and 10-second Average Data for EHW1 FW6, 9:01-9:05, Measured at Depths of 10 meters on October 8, 2011

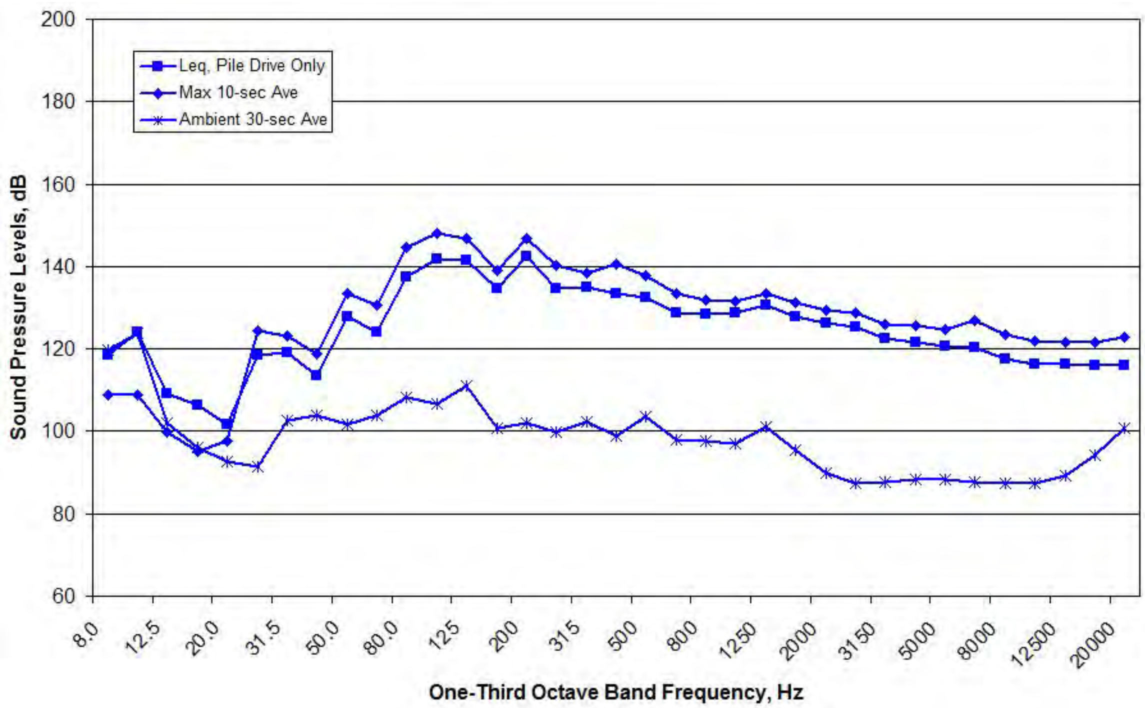

Figure B110. Spectral Data Measured at the WRA Location EHW1 FW6, 9:01-9:05, Measured at Depths of 10 meters on October 8, 2011

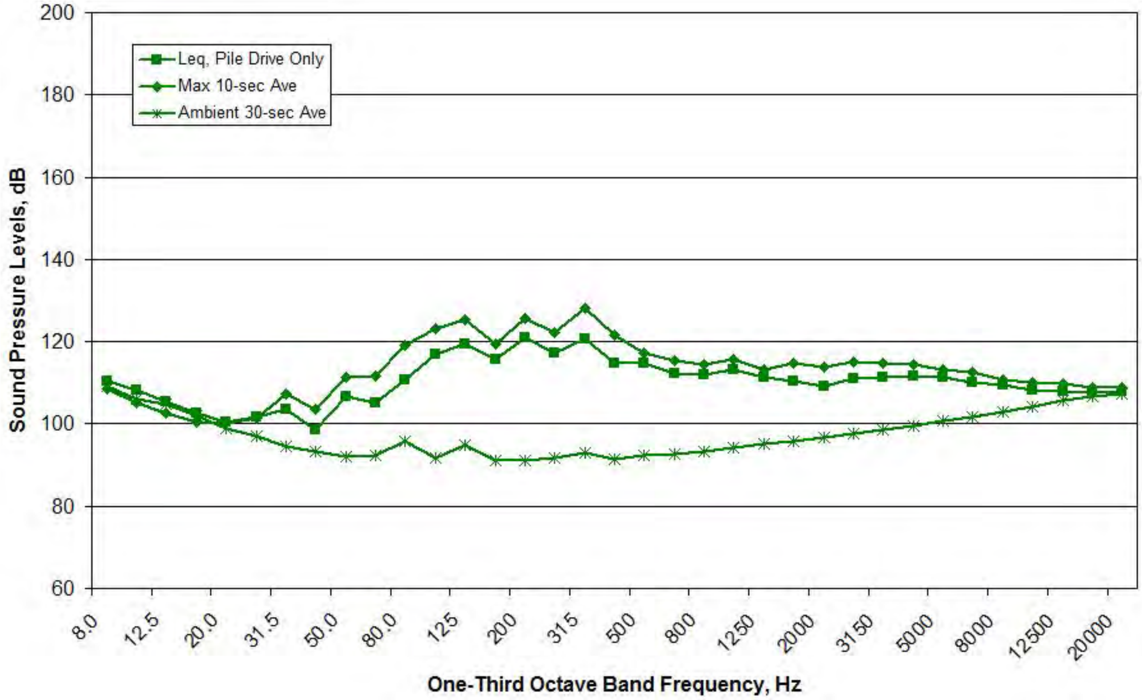

Figure B111. Spectral Data Measured at the MID Location during EHW1 FW6, 9:01-9:05, Measured at Depths of 10 meters on October 8, 2011

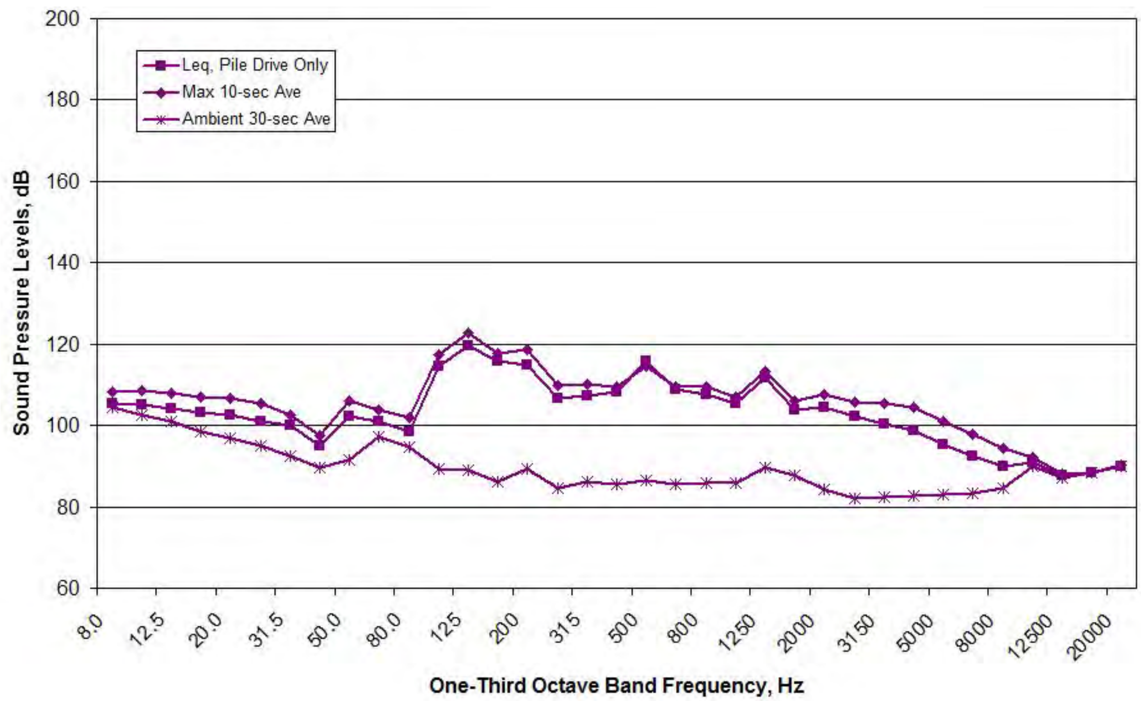

Figure B112. Spectral Data Measured at the RFT Location during EHW1 FW6, 9:01-9:05, Measured at Depths of 10 meters on October 8, 2011

EHW1 FW7 (Vibratory Installation)

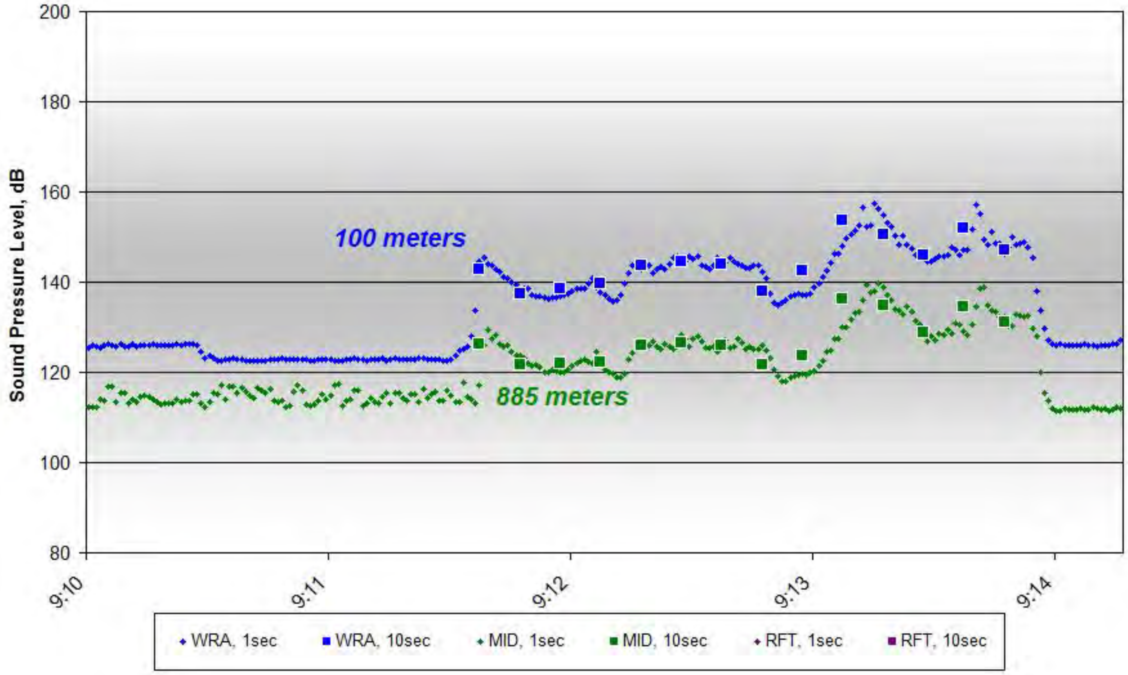

Figure B113. One-second and 10-second Average Data for EHW1 FW7, 9:11-9:14, Measured at Depths of 17-30 meters on October 8, 2011

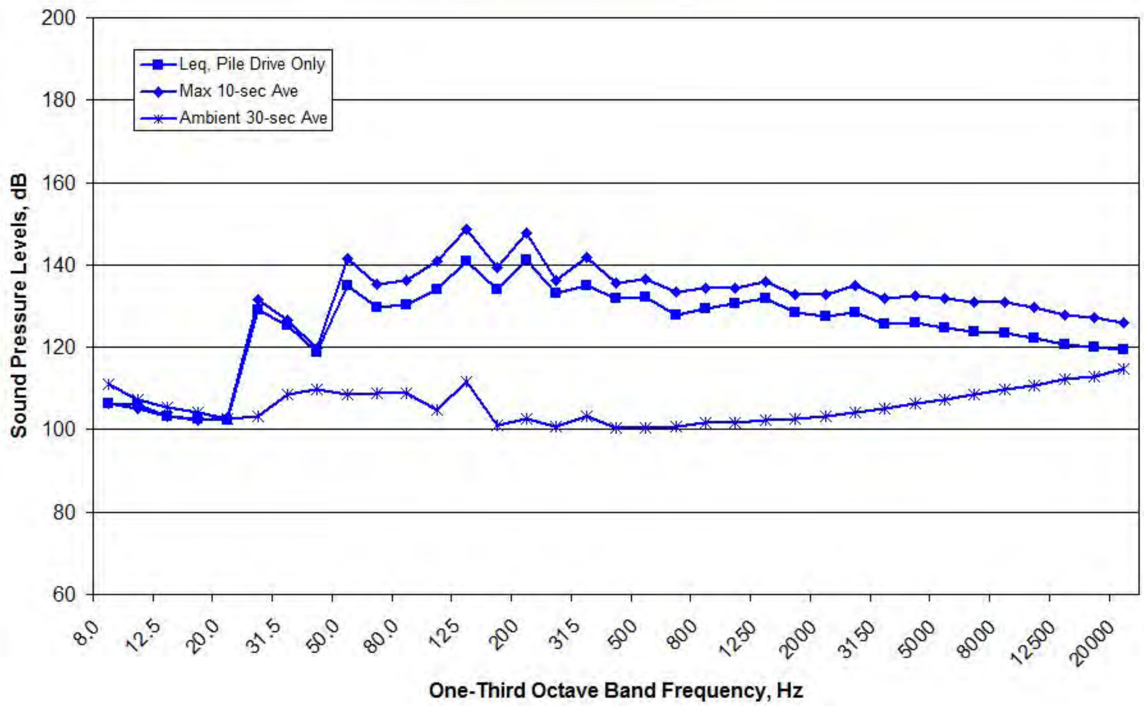

Figure B114. Spectral Data Measured at the WRA Location during EHW1 FW7, 9:11-9:14, Measured at Depths of 30 meters on October 8, 2011

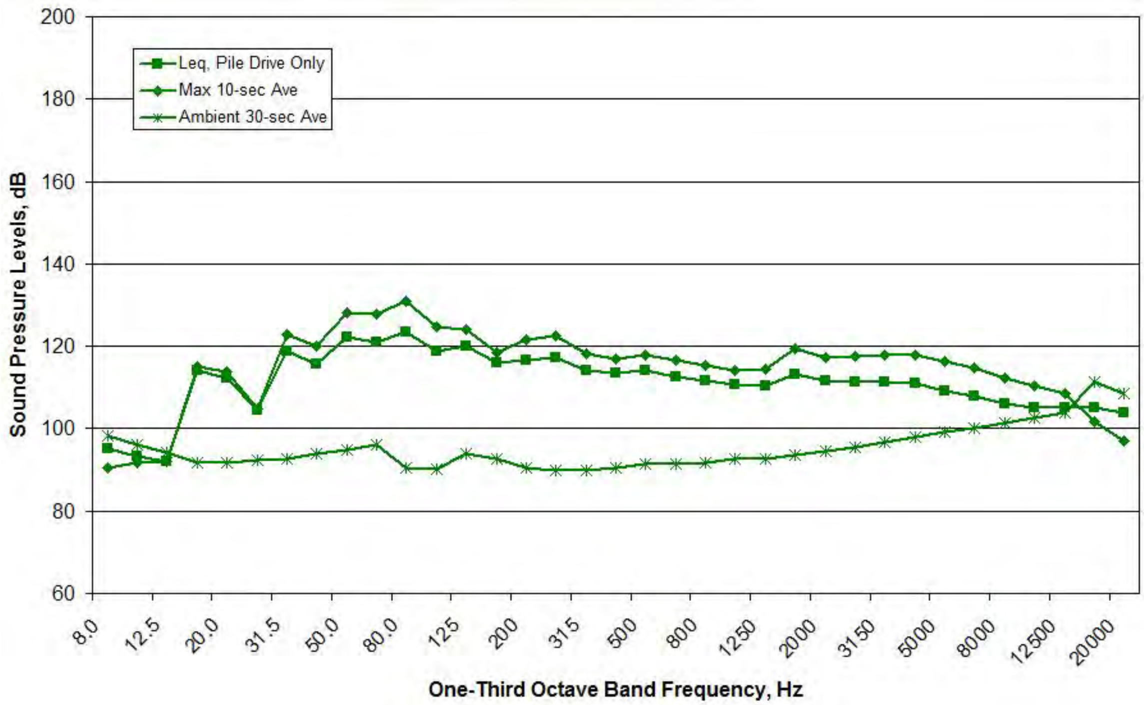

Figure B115. Spectral Data Measured at the MID Location during EHW1 FW7, 9:11-9:14, Measured at Depths of 30 meters on October 8, 2011

NO DATA AVAILABLE – DATA NOT USEABLE

Figure B116. Spectral Data Measured at the RFT Location during EHW1 FW7, 9:11-9:14, Measured at Depths of 17 meters on October 8, 2011

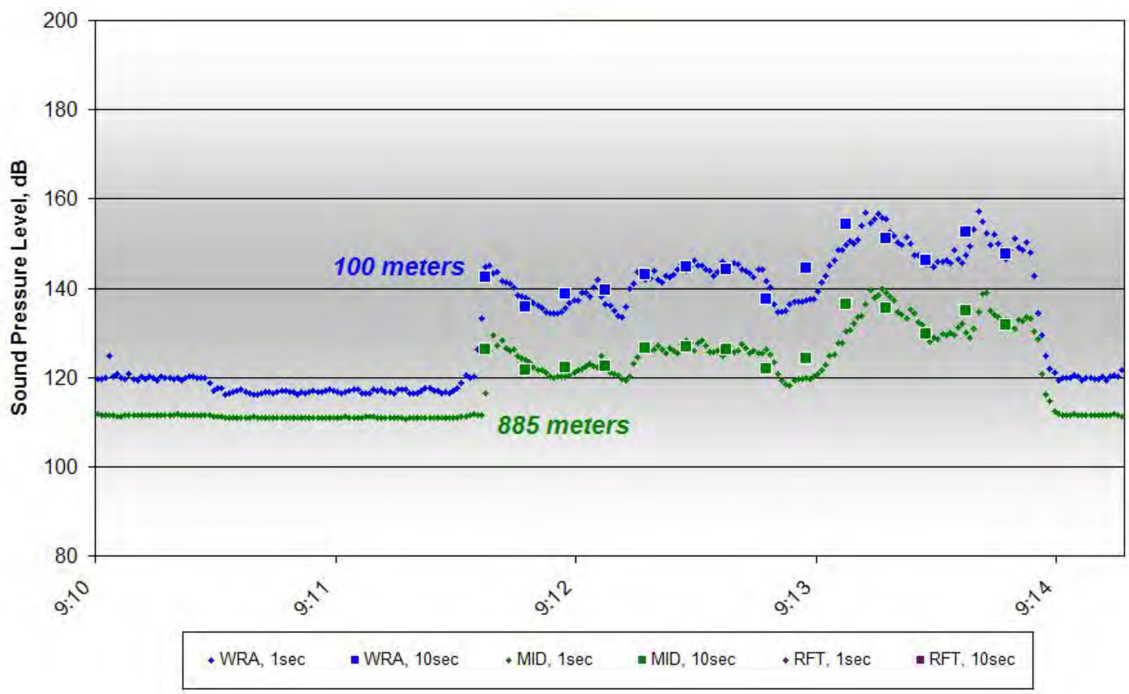

Figure B117. One-second and 10-second Average Data for EHW1 FW7, 9:11-9:14, Measured at Depths of 10 meters on October 8, 2011

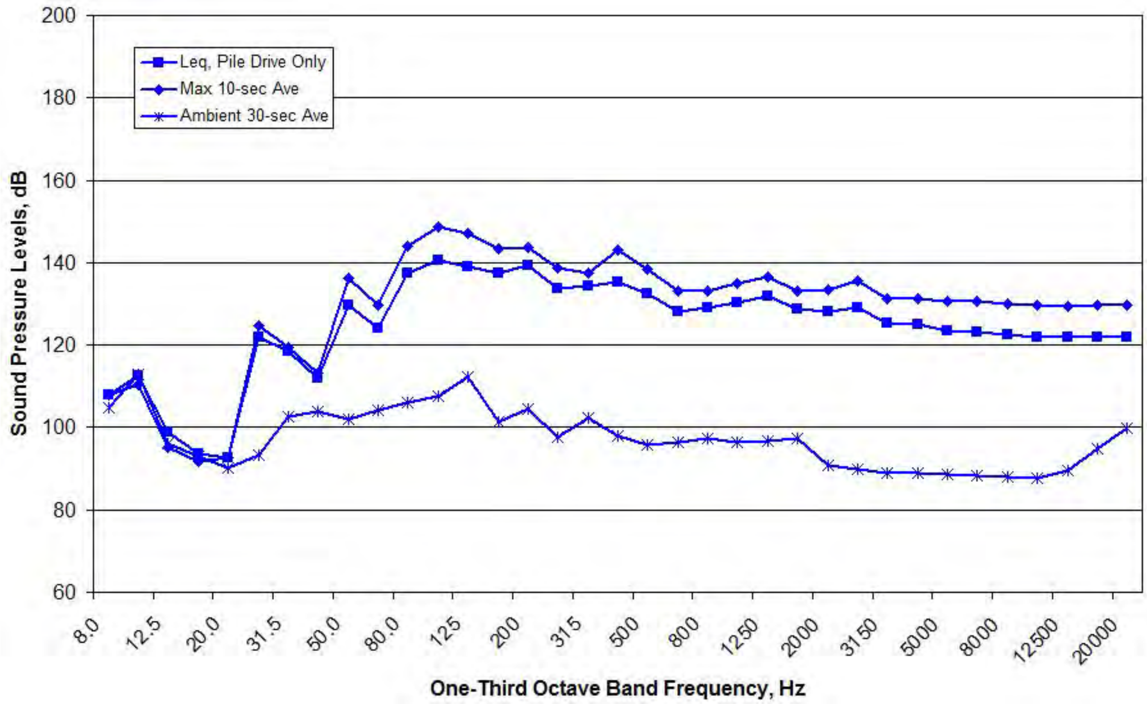

Figure B118. Spectral Data Measured at the WRA Location during EHW1 FW7, 9:11-9:14, Measured at Depths of 10 meters on October 8, 2011

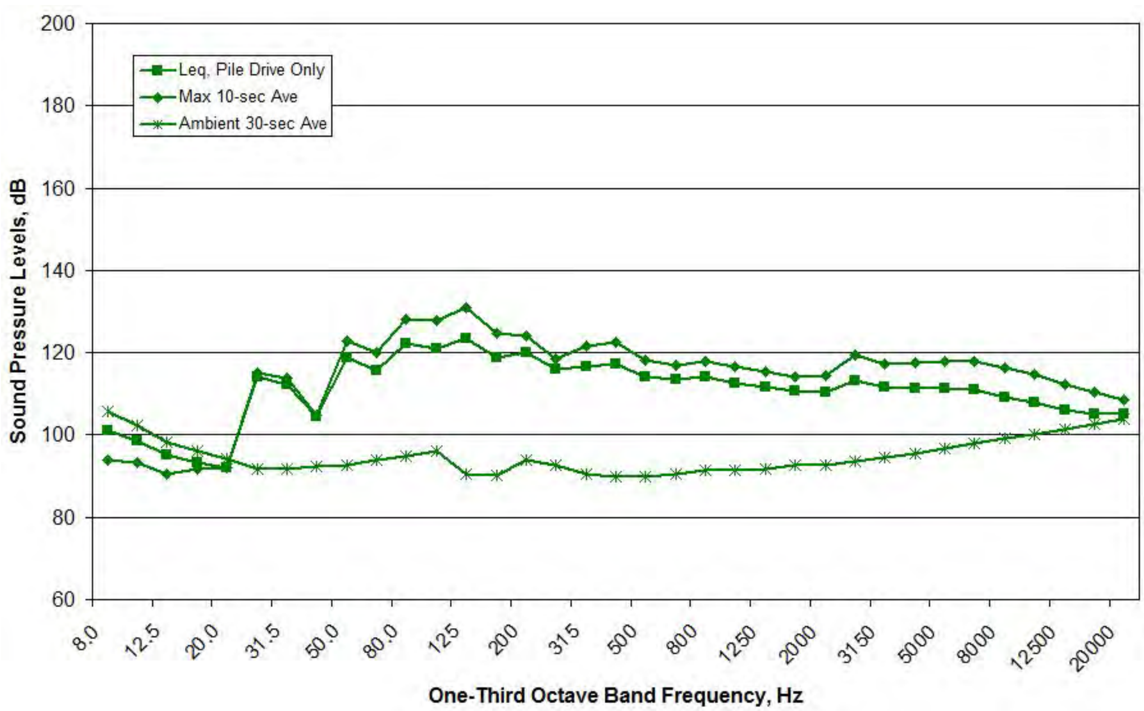

Figure B119. Spectral Data Measured at the MID Location during EHW1 FW7, 9:11-9:14, Measured at Depths of 10 meters on October 8, 2011

NO DATA AVAILABLE – DATA NOT USEABLE

Figure B120. Spectral Data Measured at the RFT Location during EHW1 FW7, 9:11-9:14, Measured at Depths of 10 meters on October 8, 2011

EHW1 FW8 (Vibratory Installation)

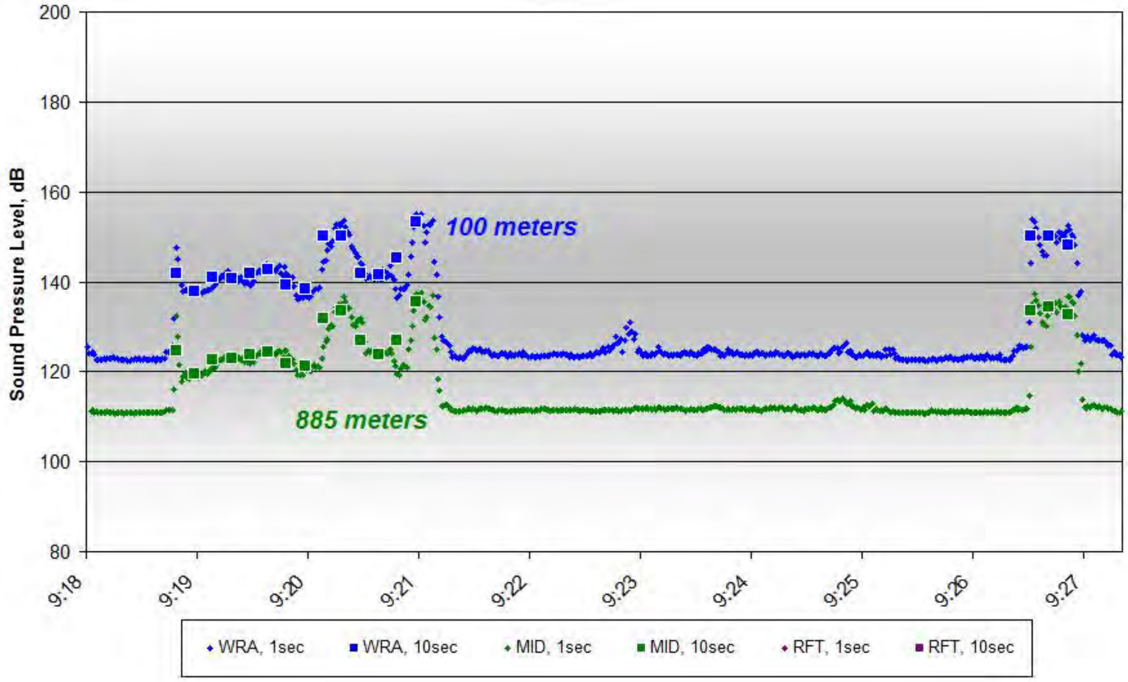

Figure B121. One-second and 10-second Average Data for EHW1 FW8, 9:19-9:27, Measured at Depths of 17-30 meters on October 8, 2011

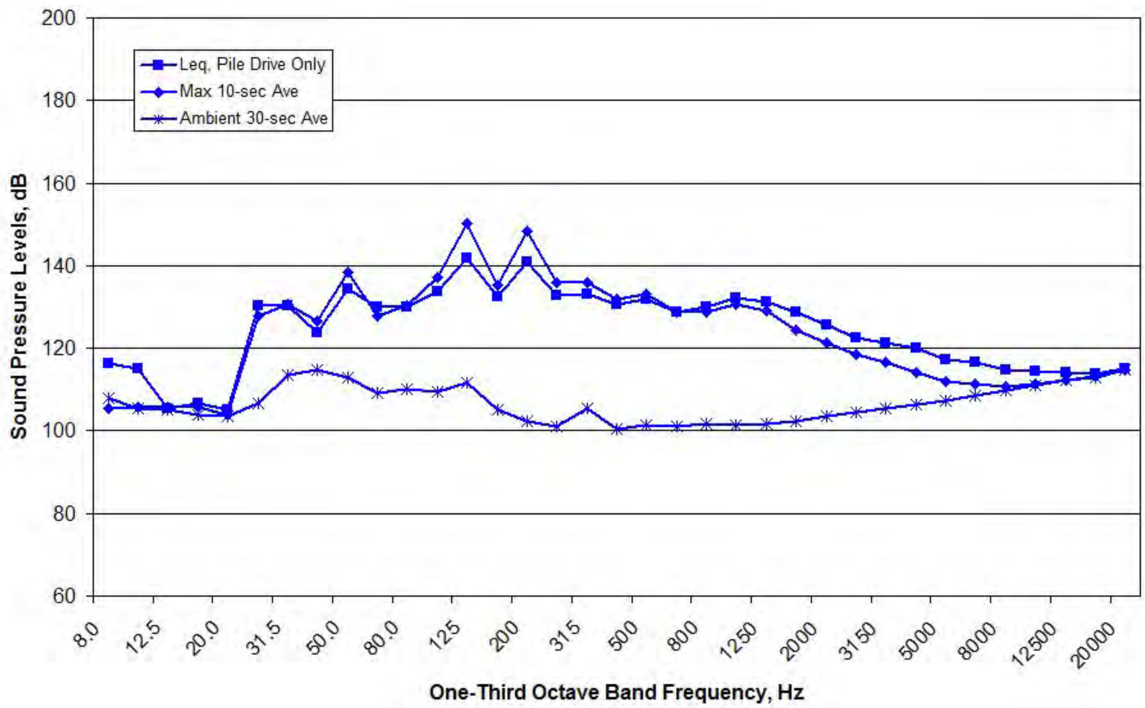

Figure B122. Spectral Data Measured at the WRA Location during EHW1 FW8, 9:19-9:27, Measured at Depths of 30 meters on October 8, 2011

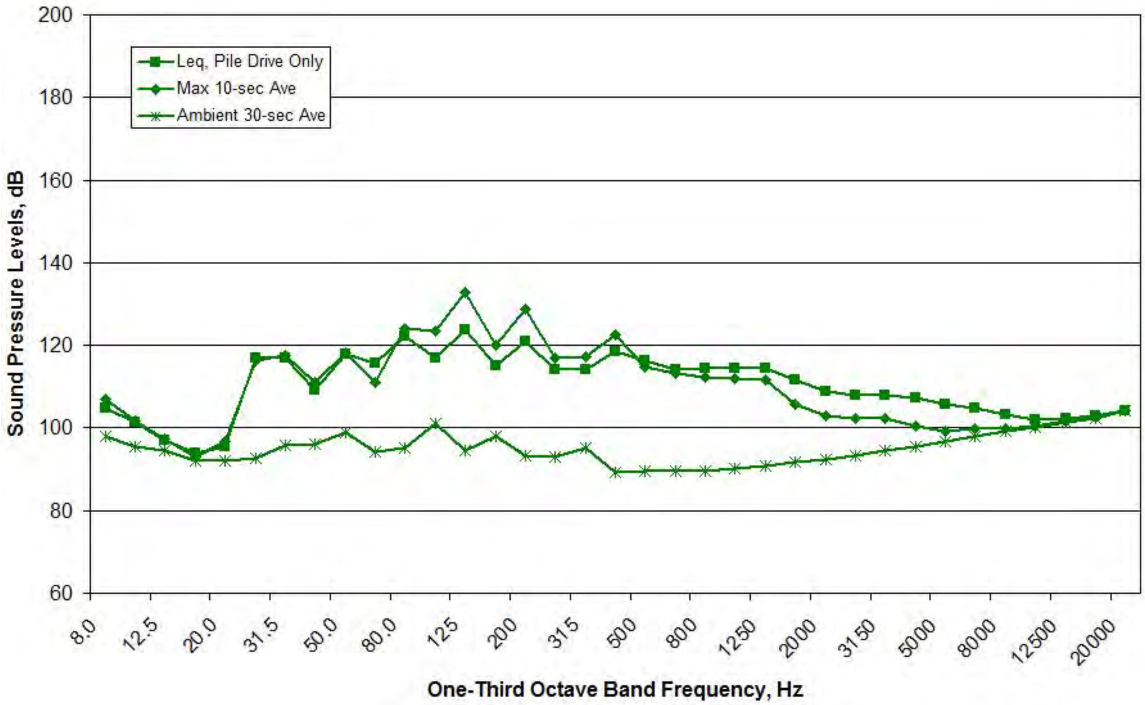

Figure B123. Spectral Data Measured at the MID Location during EHW1 FW8, 9:19-9:27, Measured at Depths of 30 meters on October 8, 2011

NO DATA AVAILABLE – DATA NOT USEABLE

Figure B124. Spectral Data Measured at the RFT Location during EHW1 FW8, 9:19-9:27, Measured at Depths of 17 meters on October 8, 2011

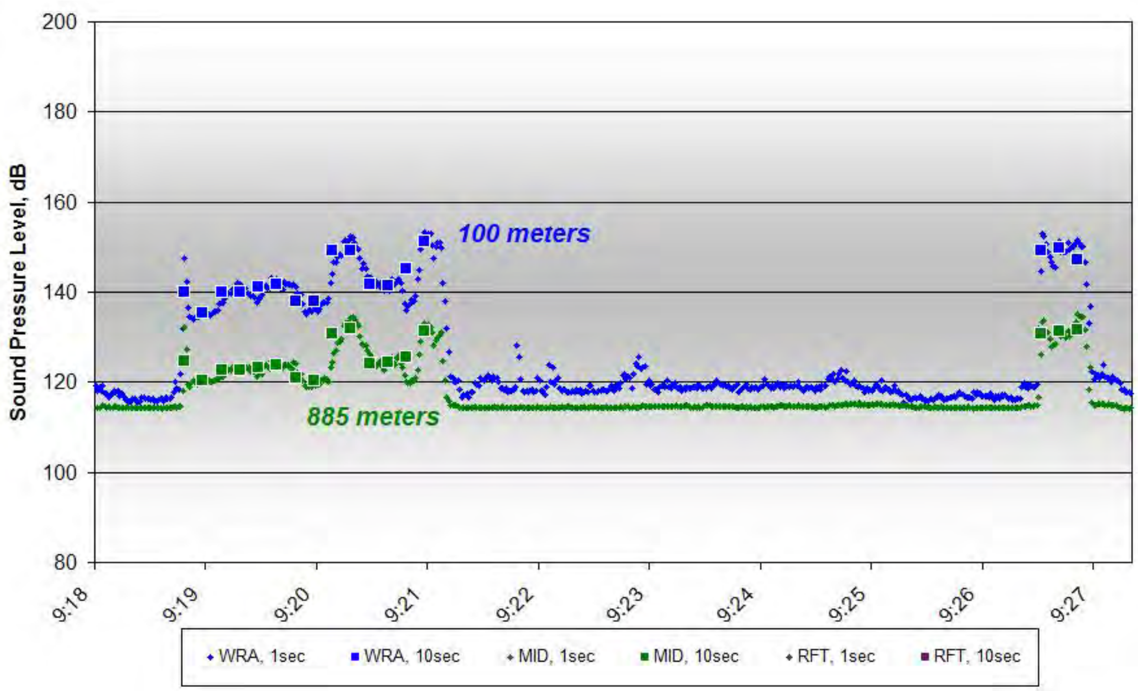

Figure B125. One-second and 10-second Average Data for EHW1 FW8, 9:19-9:27, Measured at Depths of 10 meters on October 8, 2011

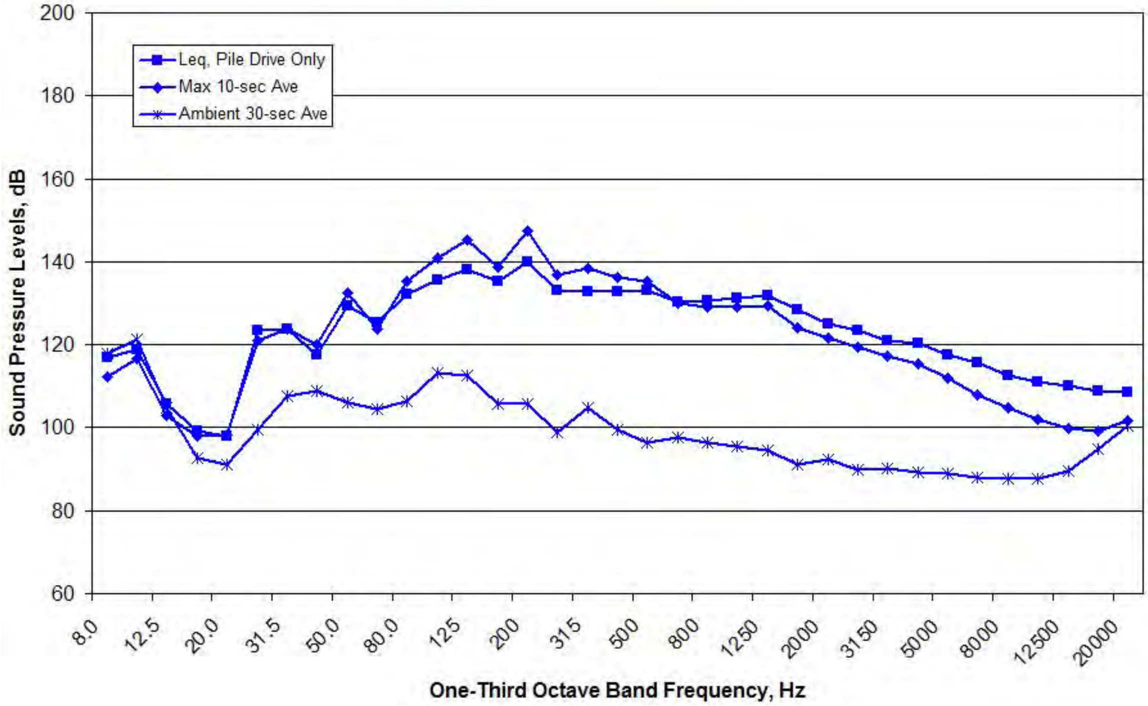

Figure B126. Spectral Data Measured at the WRA Location EHW1 FW8, 9:19-9:27, Measured at Depths of 10 meters on October 8, 2011

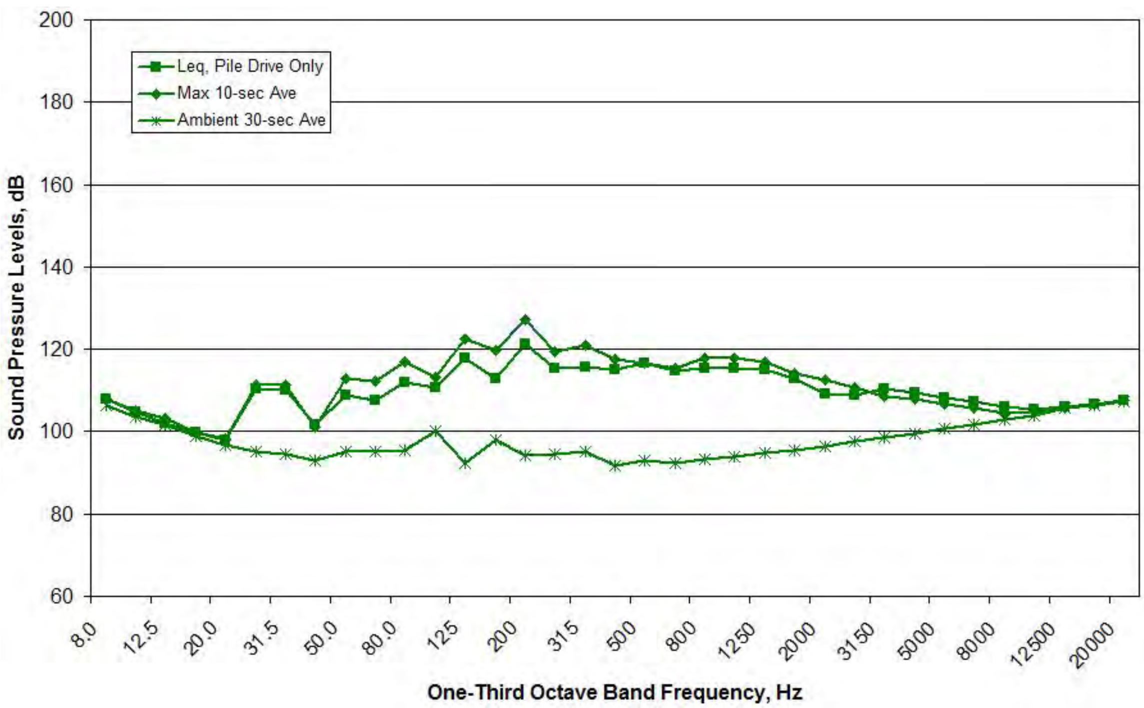

Figure B127. Spectral Data Measured at the MID Location during EHW1 FW8, 9:19-9:27, Measured at Depths of 10 meters on October 8, 2011

NO DATA AVAILABLE – DATA NOT USEABLE

Figure B128. Spectral Data Measured at the RFT Location during EHW1 FW8, 9:19-9:27, Measured at Depths of 10 meters on October 8, 2011

10/10/2011 – W6, 13:30-13:39 (Vibratory Installation)

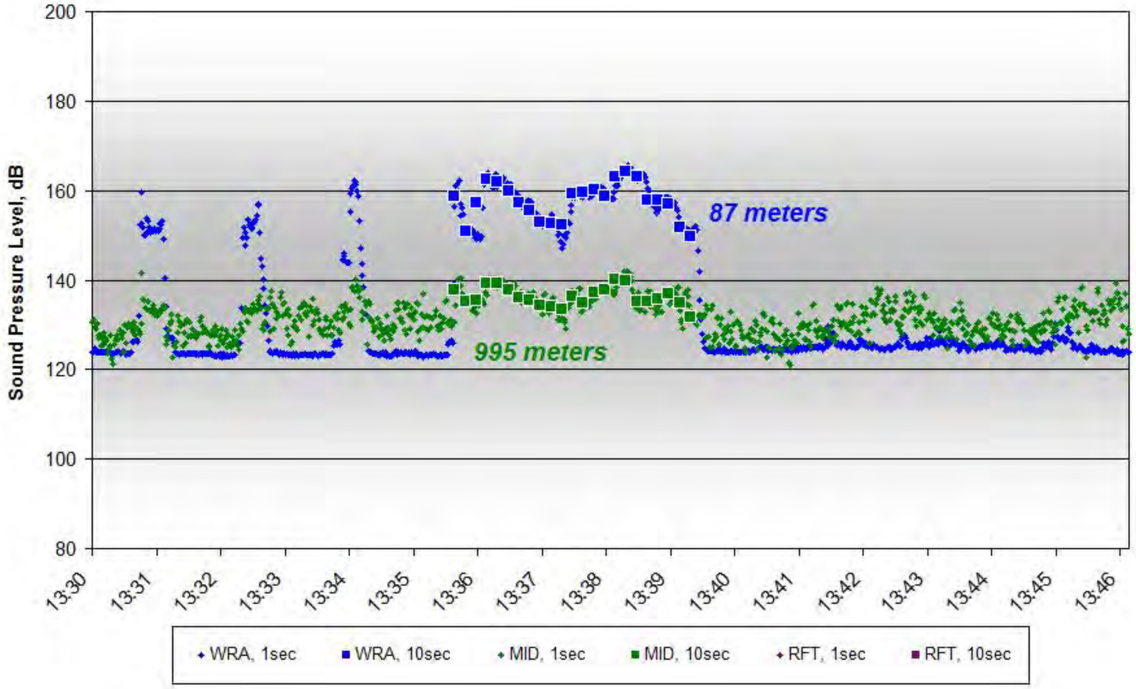

Figure B129. One-second and 10-second Average Data for W6, 13:30-13:39, Measured at Depths of 17-30 meters on October 10, 2011

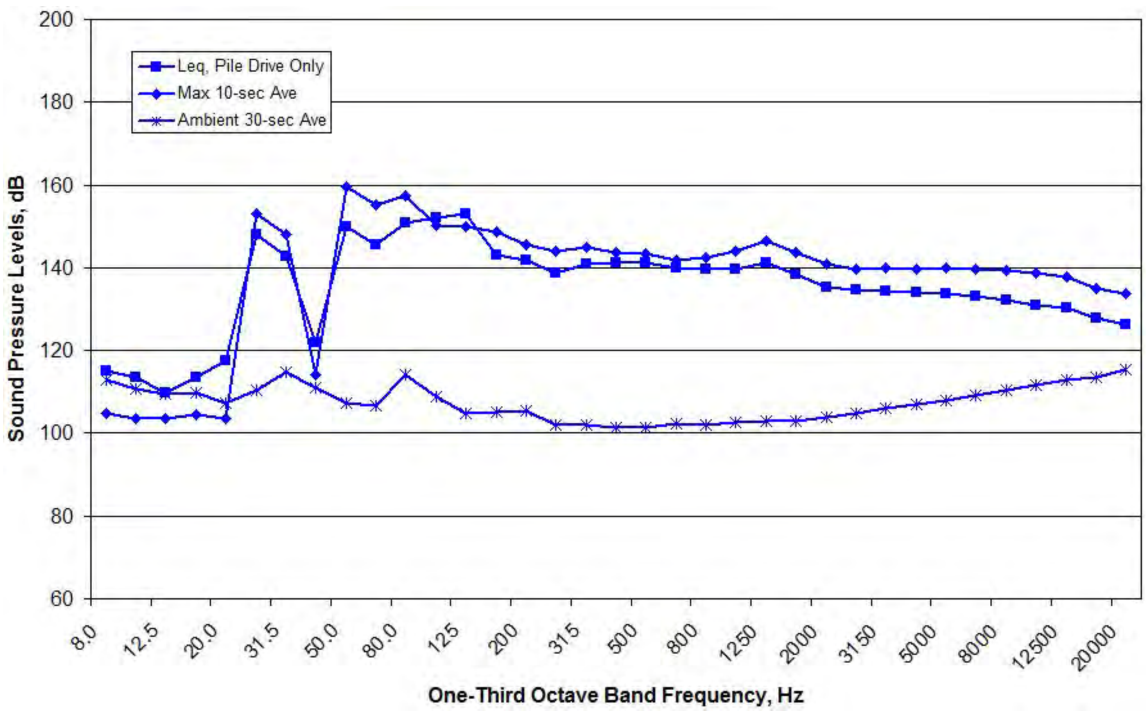

Figure B130. Spectral Data Measured at the WRA Location during W6, 13:30-13:39, Measured at Depths of 30 meters on October 10, 2011

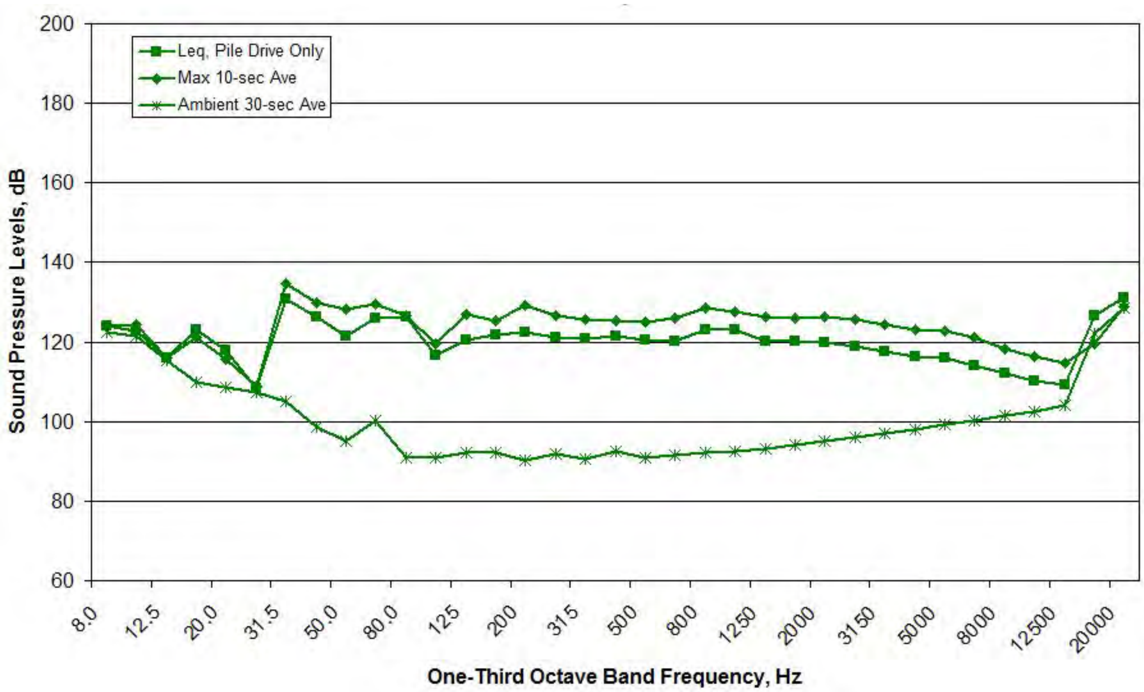

Figure B131. Spectral Data Measured at the MID Location during W6, 13:30-13:39, Measured at Depths of 30 meters on October 10, 2011

NO DATA AVAILABLE

Figure B132. Spectral Data Measured at the RFT Location during W6, 13:30-13:39, Measured at Depths of 17 meters on October 10, 2011

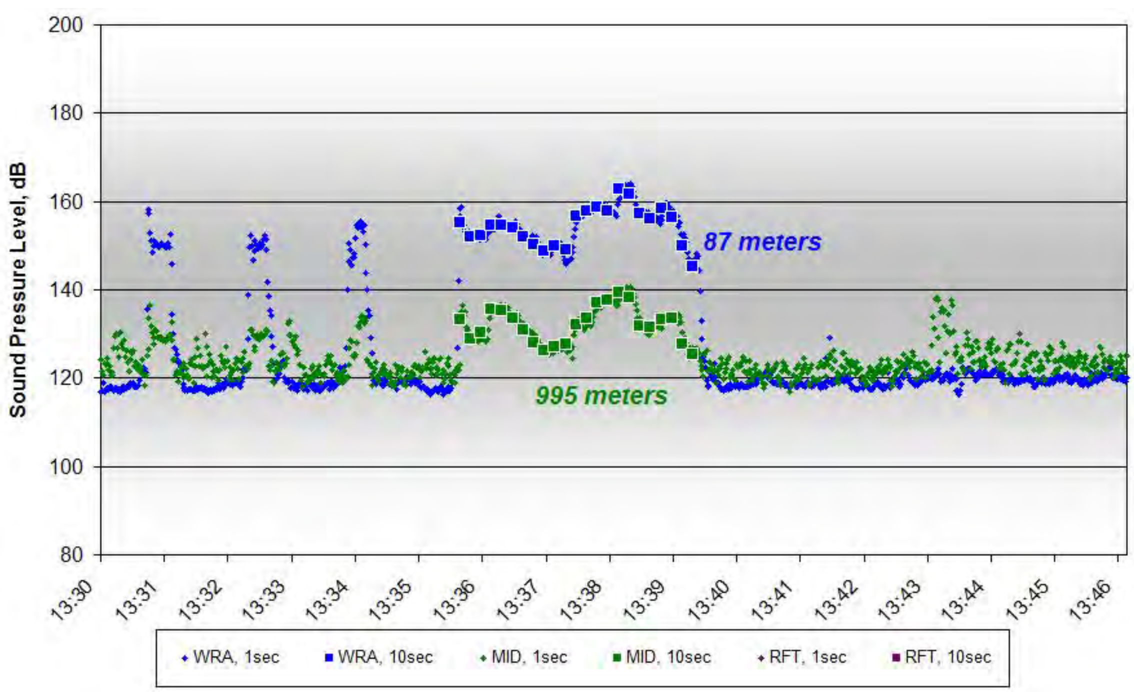

Figure B133. One-second and 10-second Average Data for W6, 13:30-13:39, Measured at Depths of 10 meters on October 10, 2011

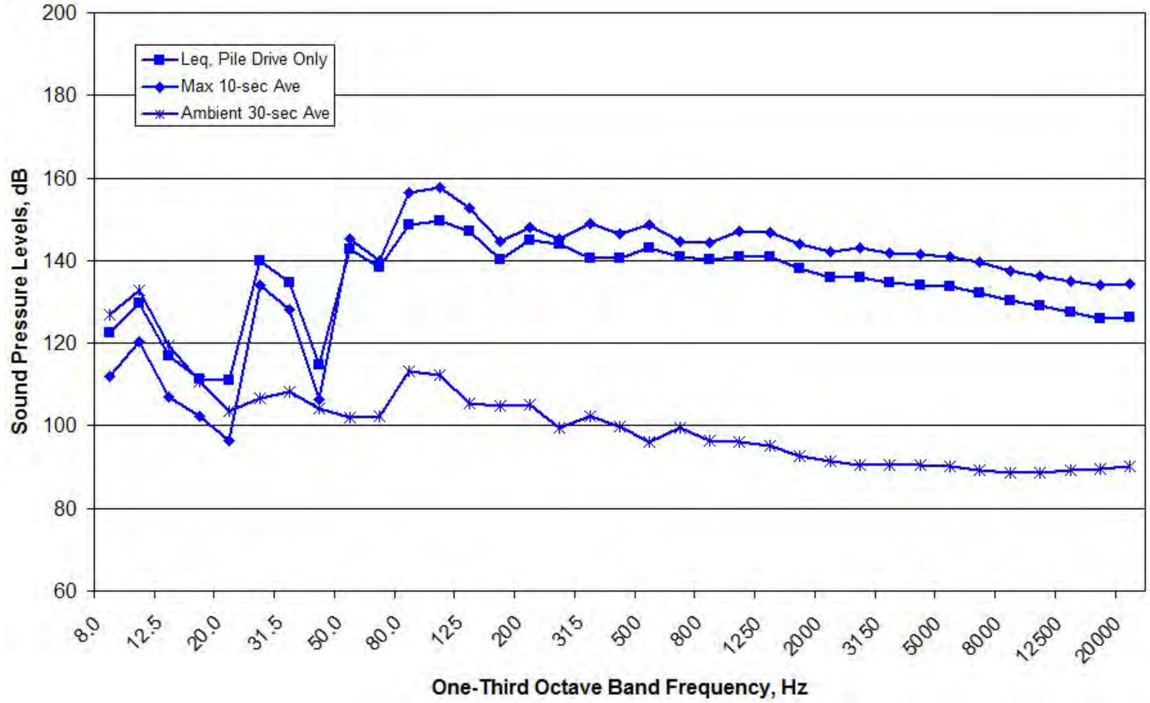

Figure B134. Spectral Data Measured at the WRA Location during W6, 13:30-13:39, Measured at Depths of 10 meters on October 10, 2011

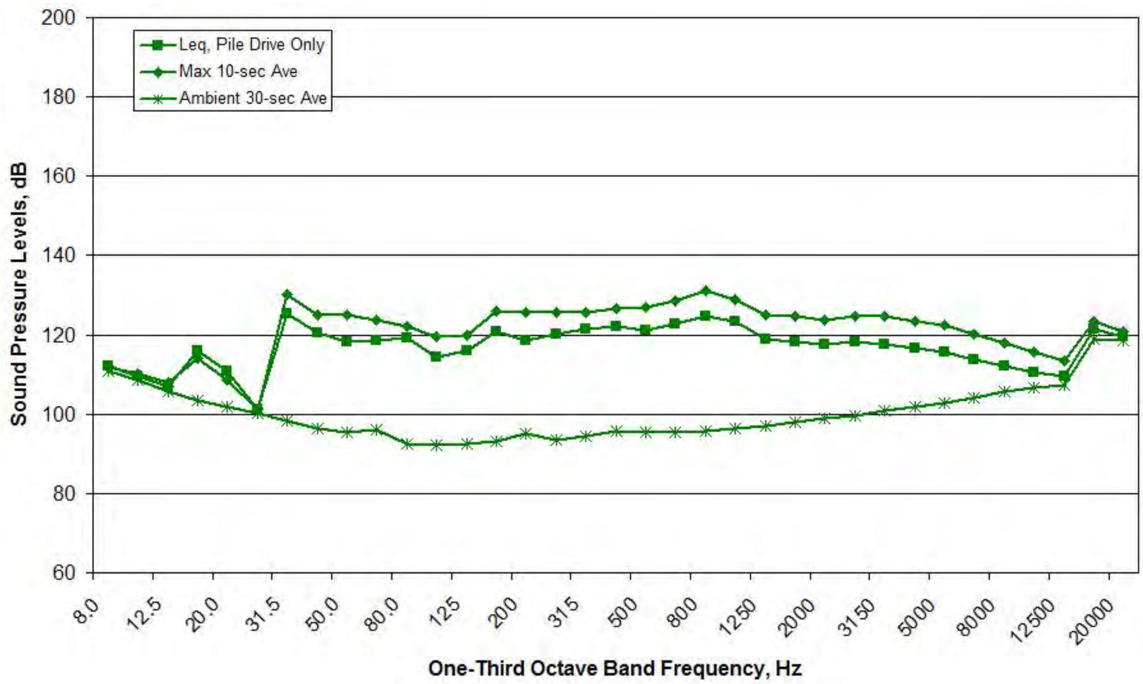

Figure B135. Spectral Data Measured at the MID Location during W6, 13:30-13:39, Measured at Depths of 10 meters on October 10, 2011

NO DATA AVAILABLE

Figure B136. Spectral Data Measured at the RFT Location during W6, 13:30-13:39, Measured at Depths of 10 meters on October 10, 2011

W5, 13:57-14:03 (Vibratory Installation)

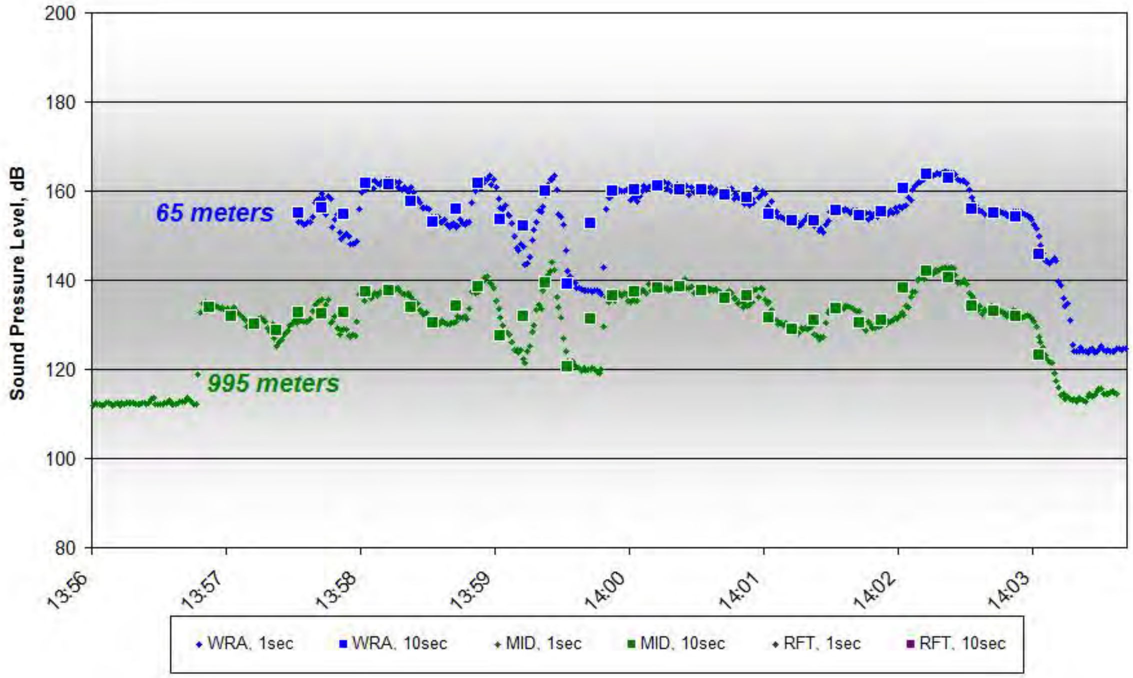

Figure B137. One-second and 10-second Average Data for W5, 13:57-14:03, Measured at Depths of 17-30 meters on October 10, 2011

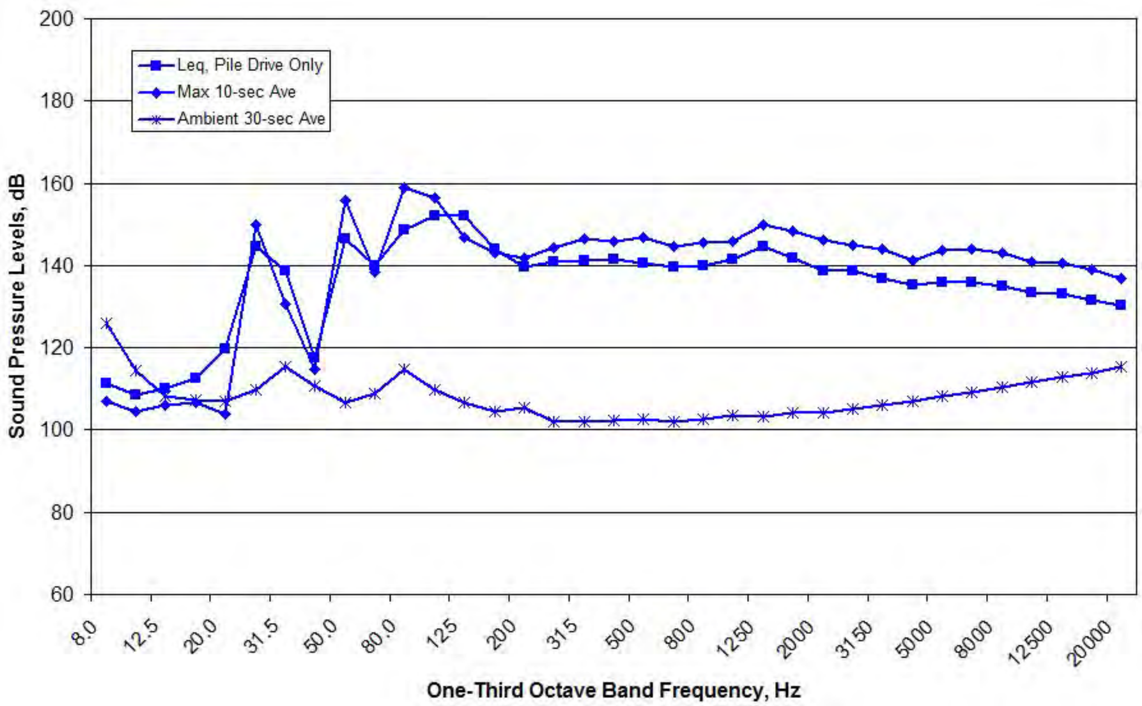

Figure B138. Spectral Data Measured at the WRA Location during W5, 13:57-14:03, Measured at Depths of 30 meters on October 10, 2011

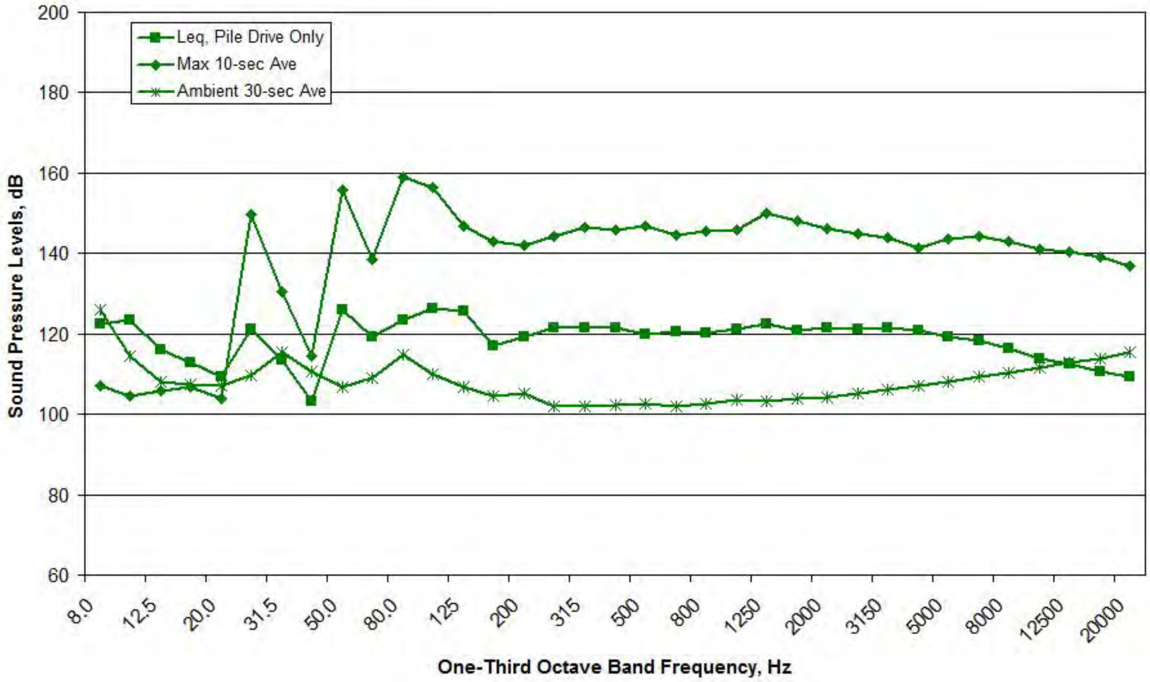

Figure B139. Spectral Data Measured at the MID Location during W5, 13:57-14:03, Measured at Depths of 30 meters on October 10, 2011

NO DATA AVAILABLE

Figure B140. Spectral Data Measured at the RFT Location during W5, 13:57-14:03, Measured at Depths of 17 meters on October 10, 2011

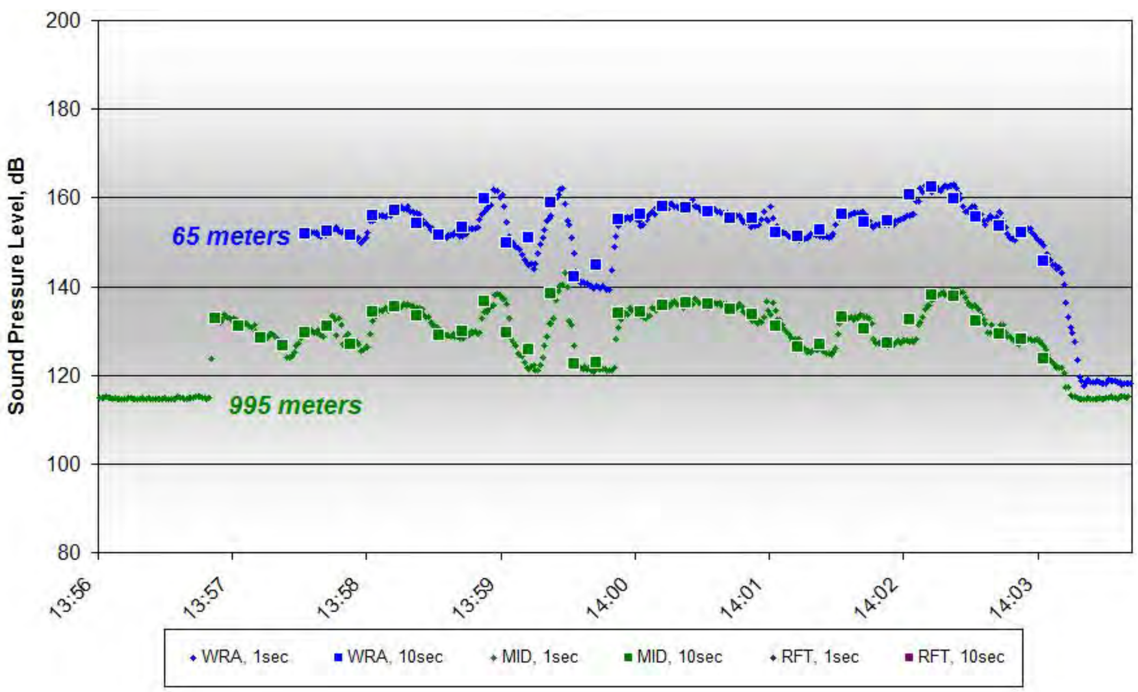

Figure B141. One-second and 10-second Average Data for W5, 13:57-14:03, Measured at Depths of 10 meters on October 10, 2011

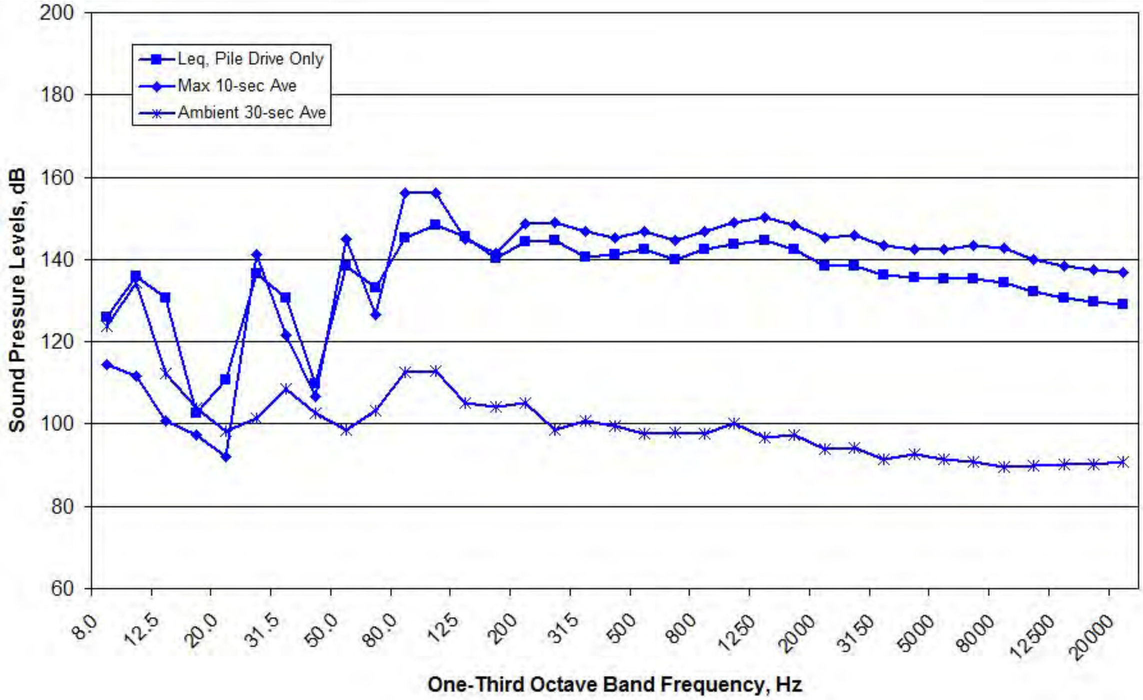

Figure B142. Spectral Data Measured at the WRA Location W5, 13:57-14:03, Measured at Depths of 10 meters on October 10, 2011

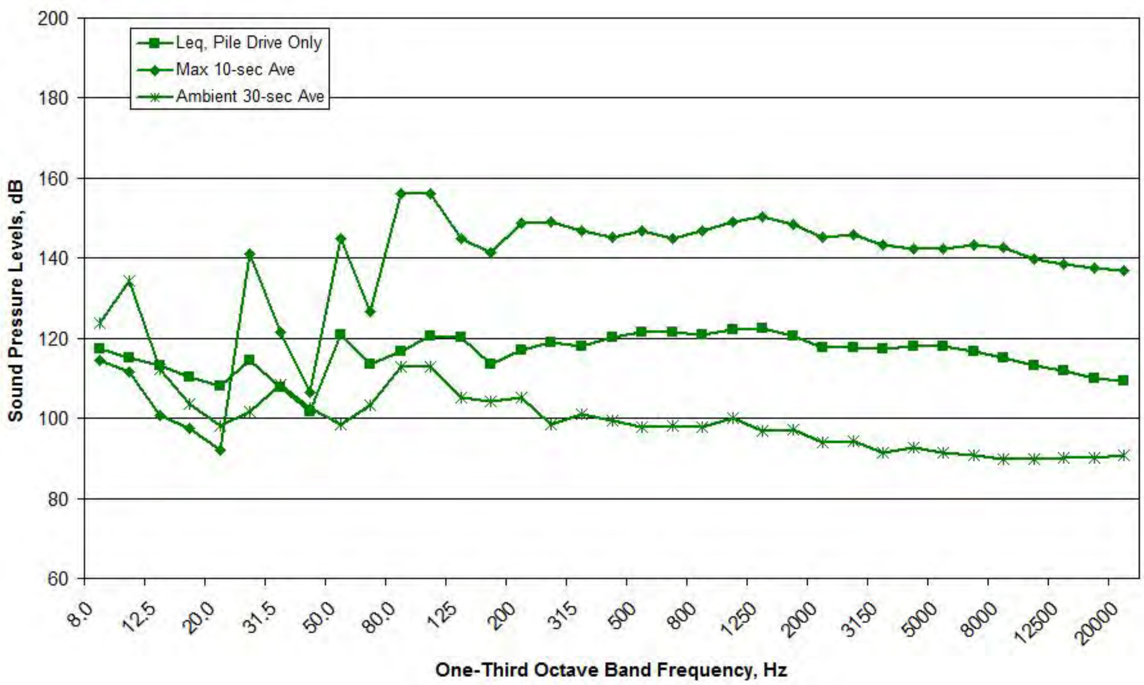

Figure B143. Spectral Data Measured at the MID Location during W5, 13:57-14:03, Measured at Depths of 10 meters on October 10, 2011

NO DATA AVAILABLE

Figure B144. Spectral Data Measured at the RFT Location during W5, 13:57-14:03, Measured at Depths of 10 meters on October 10, 2011

W4 (Vibratory Installation)

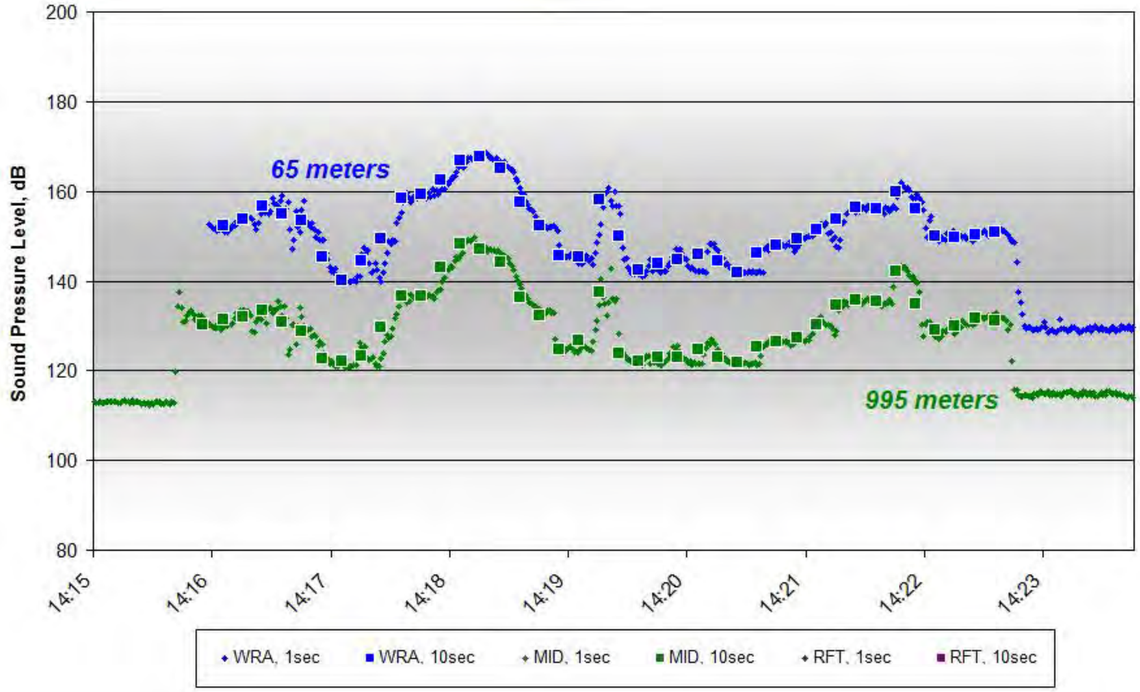

Figure B145. One-second and 10-second Average Data for W4, 14:16-14:23, Measured at Depths of 17-30 meters on October 10, 2011

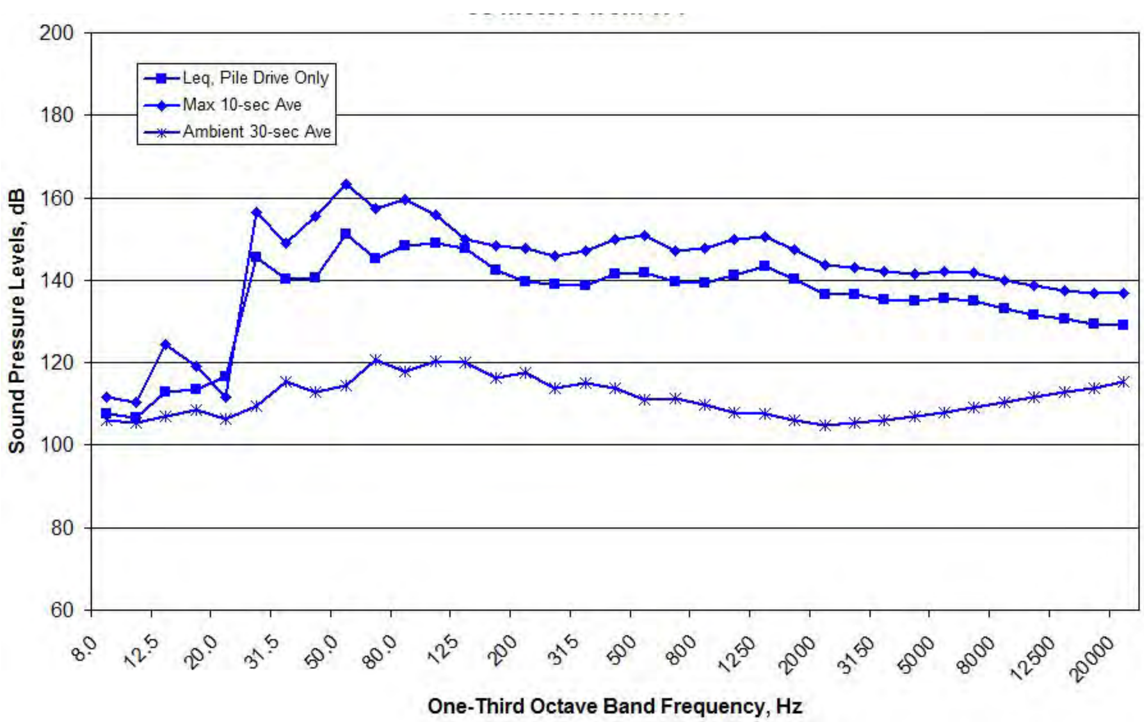

Figure B146. Spectral Data Measured at the WRA Location during W4, 14:16-14:23, Measured at Depths of 30 meters on October 10, 2011

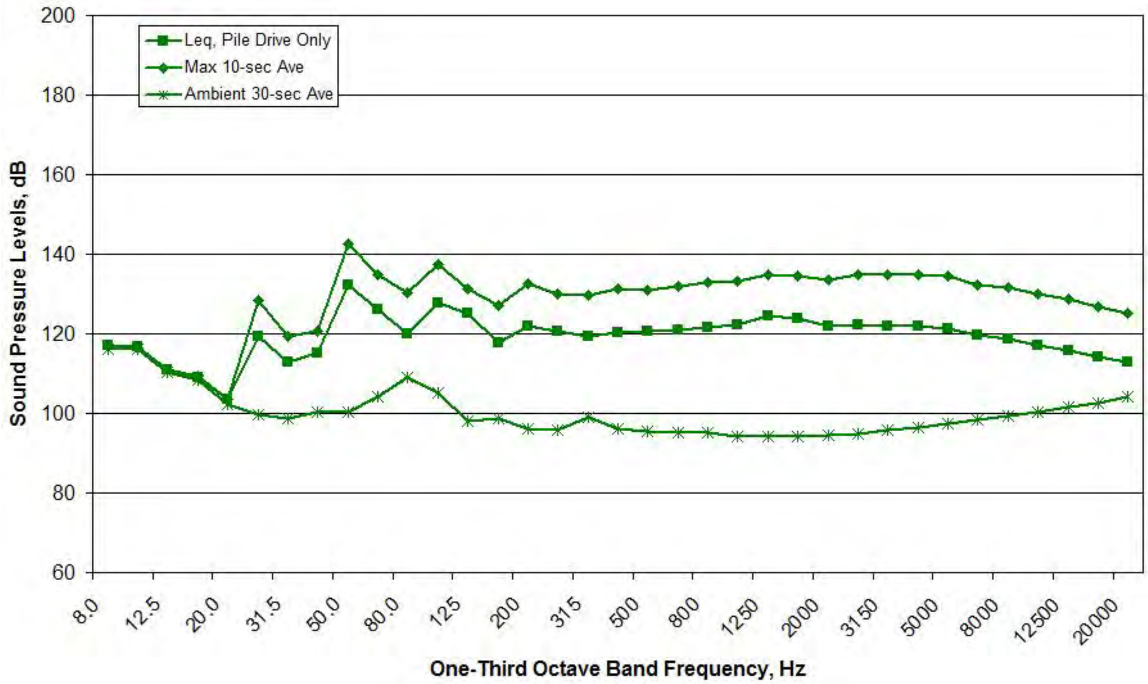

Figure B147. Spectral Data Measured at the MID Location during W4, 14:16-14:23, Measured at Depths of 30 meters on October 10, 2011

NO DATA AVAILABLE

Figure B148. Spectral Data Measured at the RFT Location during W4, 14:16-14:23, Measured at Depths of 17 meters on October 10, 2011

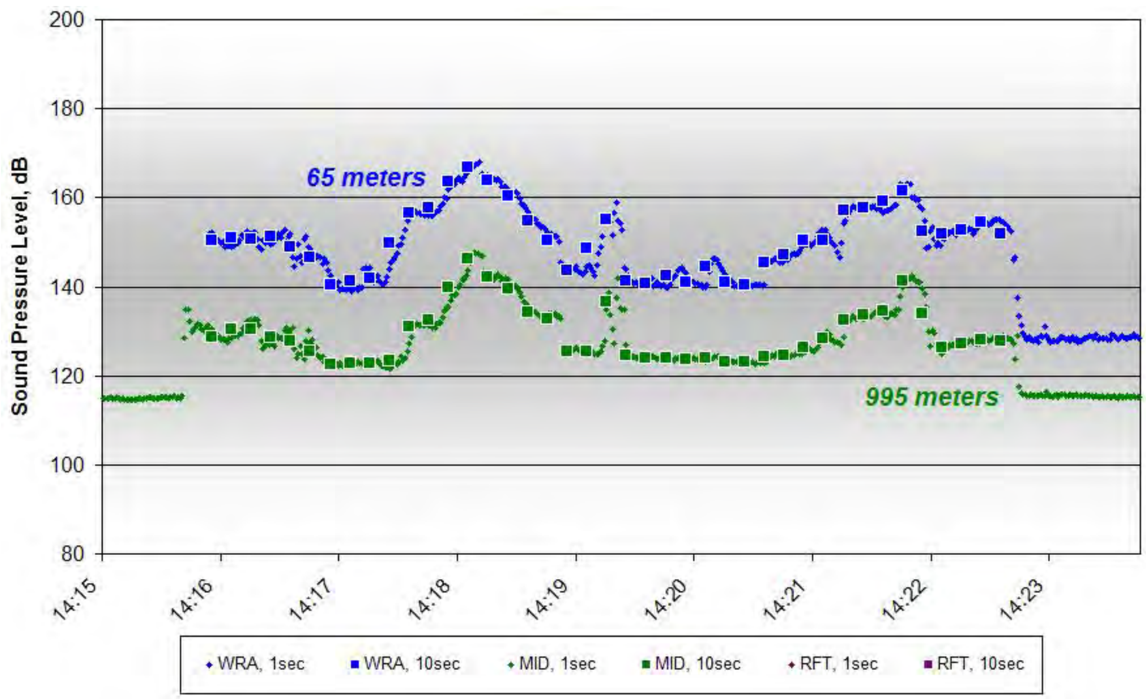

Figure B149. One-second and 10-second Average Data for W4, 14:16-14:23, Measured at Depths of 10 meters on October 10, 2011

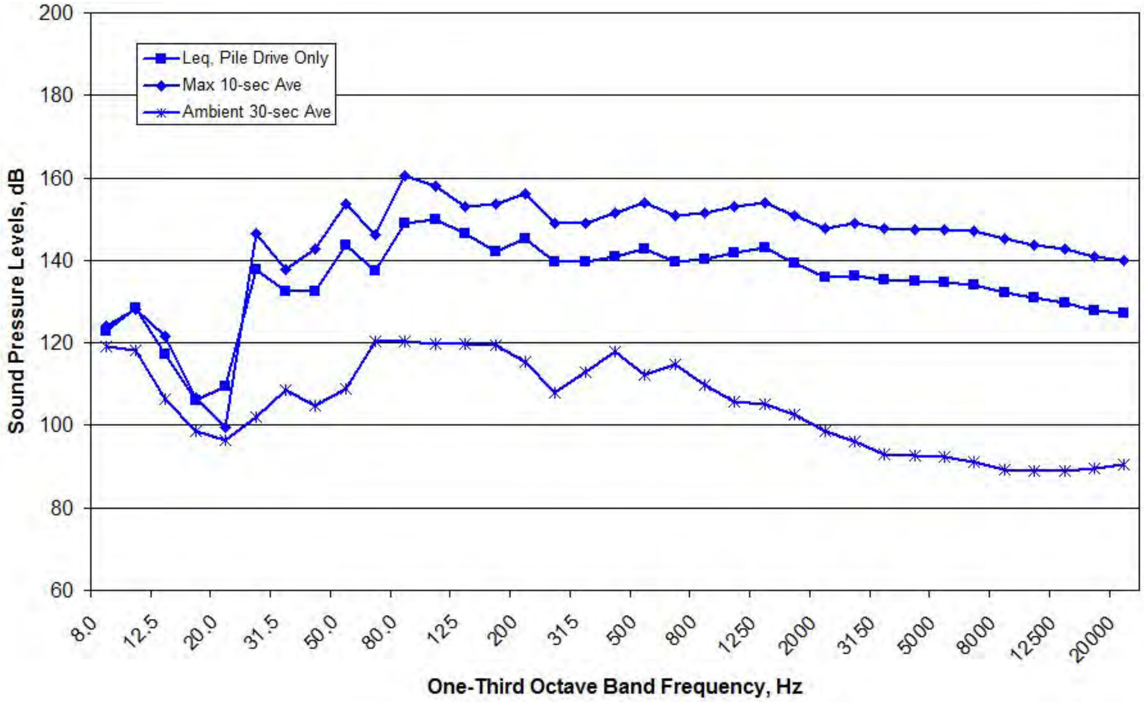

Figure B150. Spectral Data Measured at the WRA Location during W4, 14:16-14:23, Measured at Depths of 10 meters on October 10, 2011

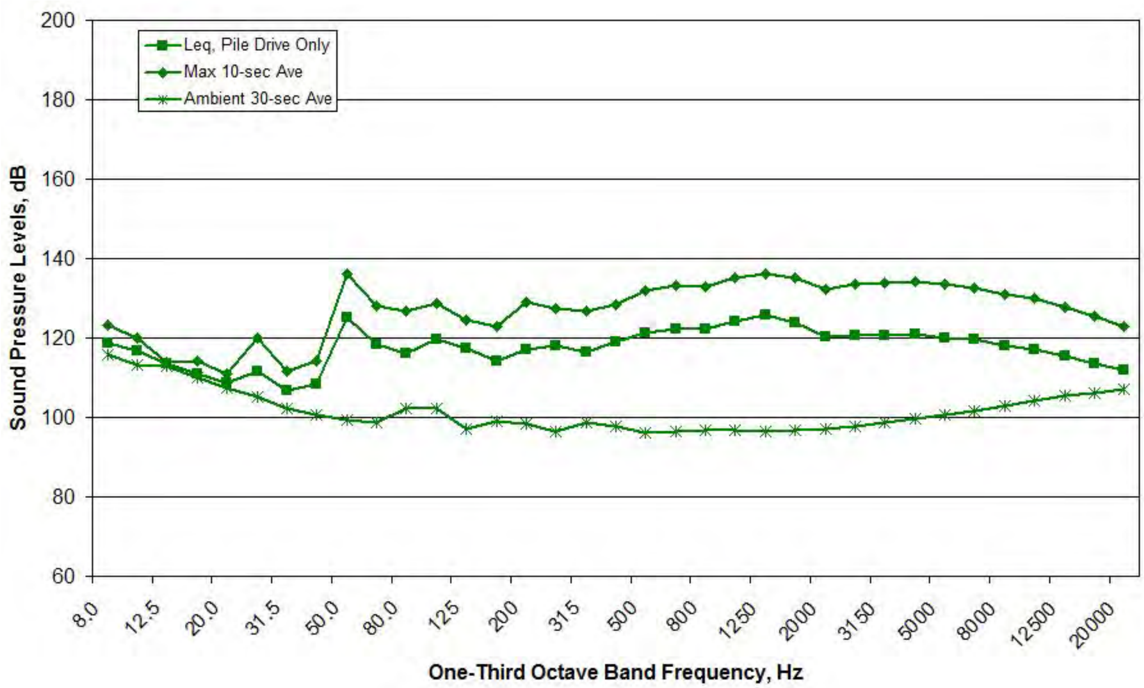

Figure B151. Spectral Data Measured at the MID Location during W4, 14:16-14:23, Measured at Depths of 10 meters on October 10, 2011

NO DATA AVAILABLE

Figure B152. Spectral Data Measured at the RFT Location during W4, 14:16-14:23, Measured at Depths of 10 meters on October 10, 2011

W6, 14:24-14:25 (Vibratory Installation)

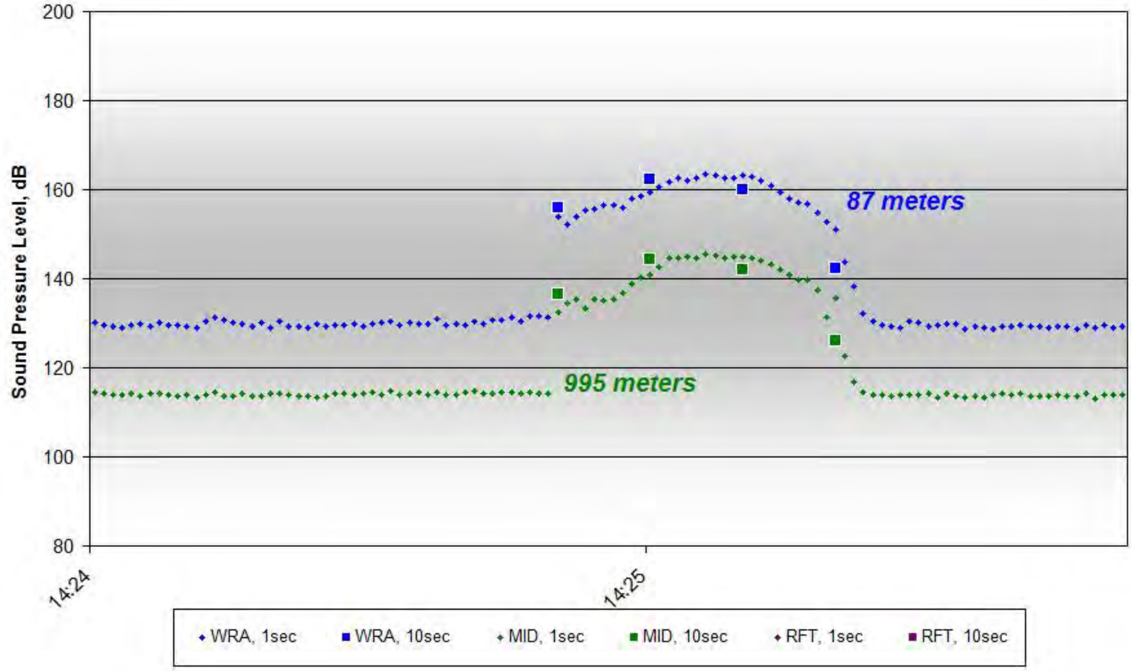

Figure B153. One-second and 10-second Average Data for W6, 14:25:20-14:25:51, Measured at Depths of 17-30 meters on October 10, 2011

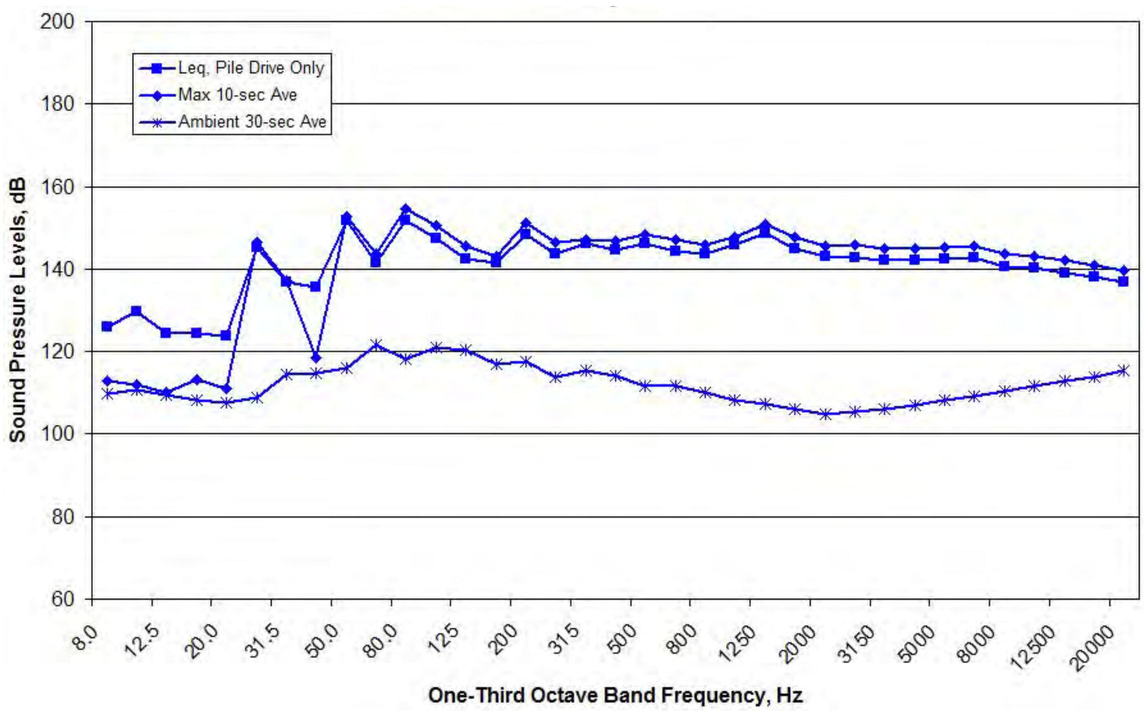

Figure B154. Spectral Data Measured at the WRA Location during W6, 14:25:20-14:25:51, Measured at Depths of 30 meters on October 10, 2011

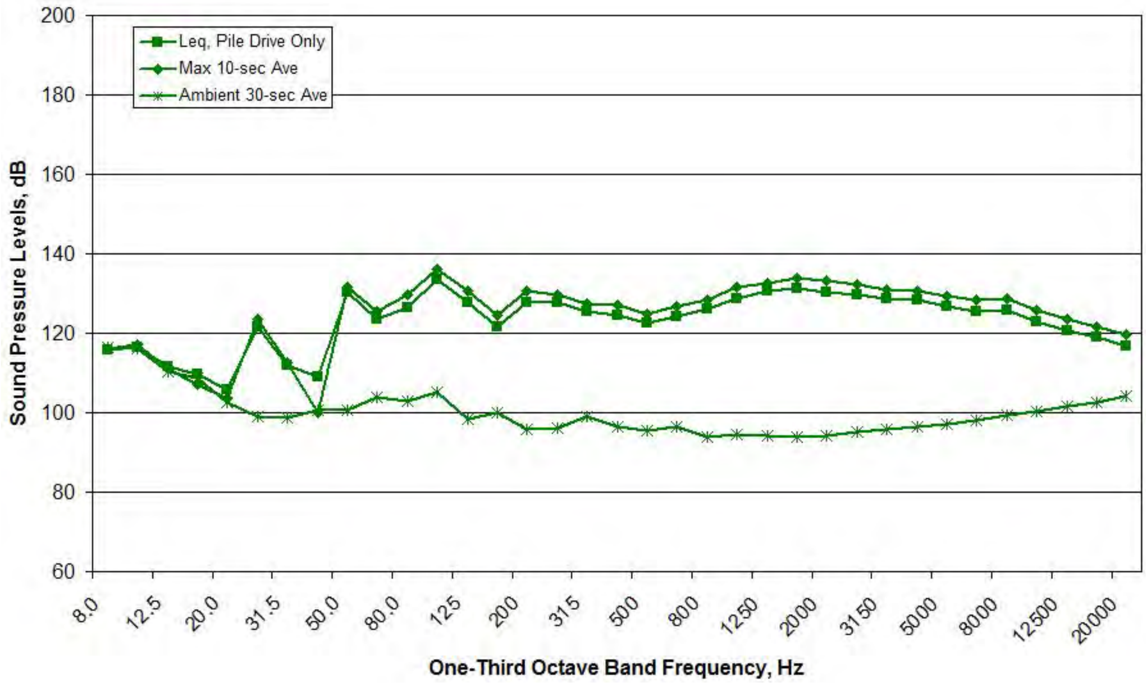

Figure B155. Spectral Data Measured at the MID Location during W6, 14:25:20-14:25:51, Measured at Depths of 30 meters on October 10, 2011

NO DATA AVAILABLE

Figure B156. Spectral Data Measured at the RFT Location during W6, 14:25:20-14:25:51, Measured at Depths of 17 meters on October 10, 2011

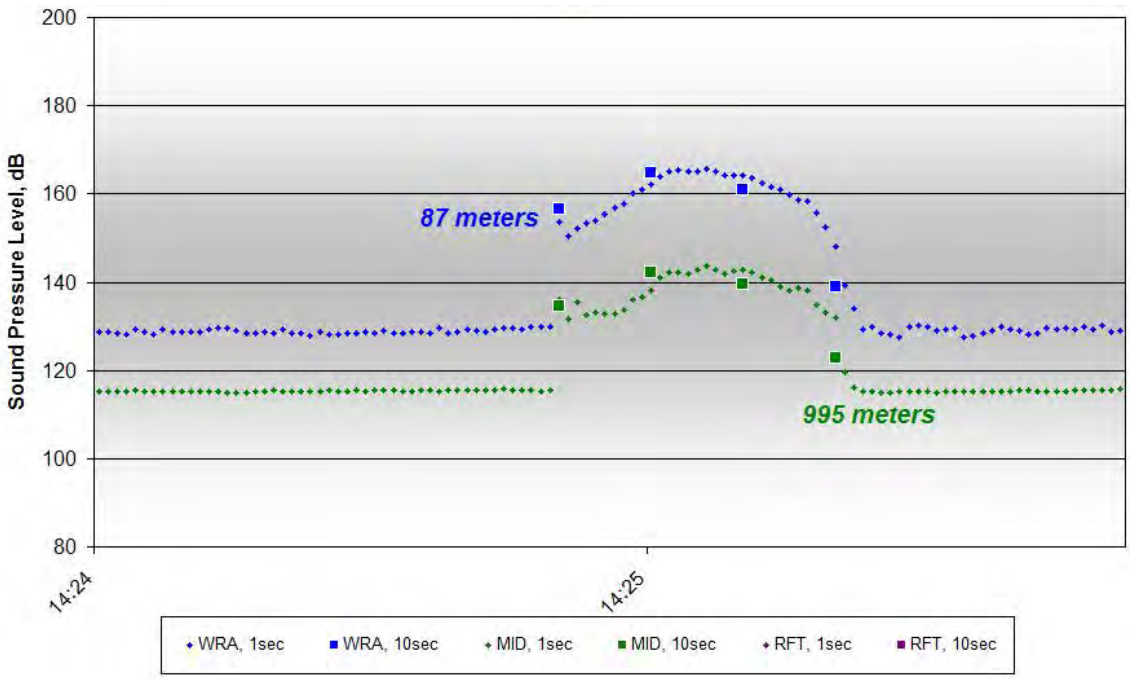

Figure B157. One-second and 10-second Average Data for W6, 14:25:20-14:25:51, Measured at Depths of 10 meters on October 10, 2011

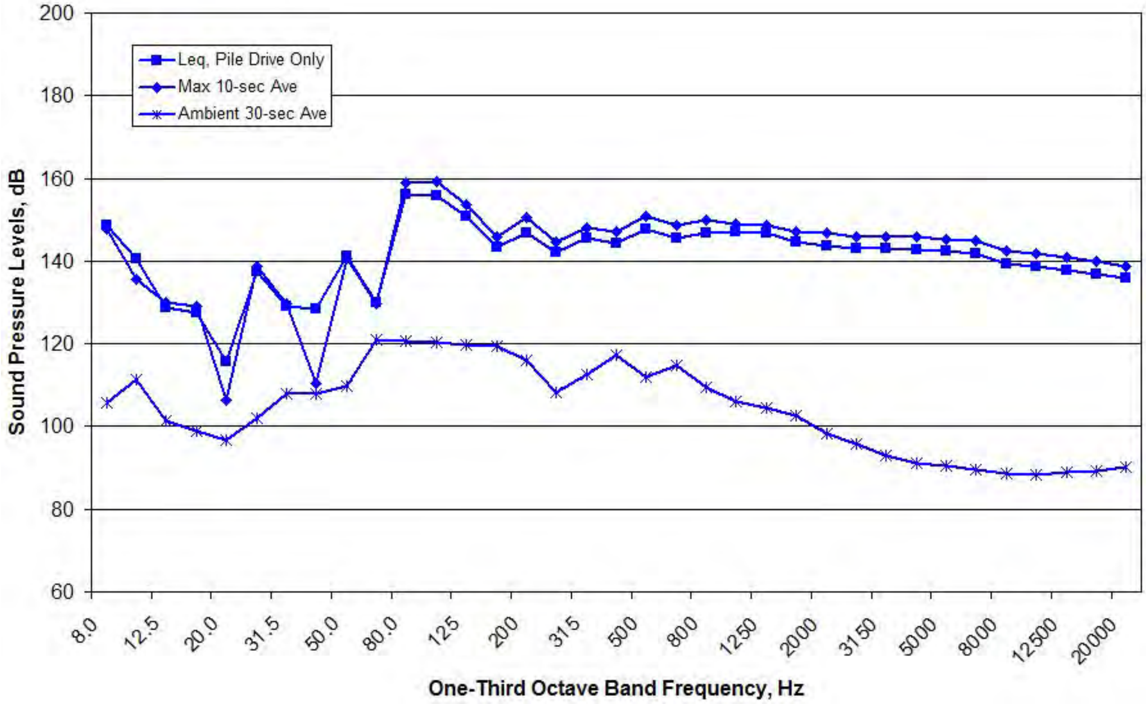

Figure B158. Spectral Data Measured at the WRA Location W6, 14:25:20-14:25:51, Measured at Depths of 10 meters on October 10, 2011

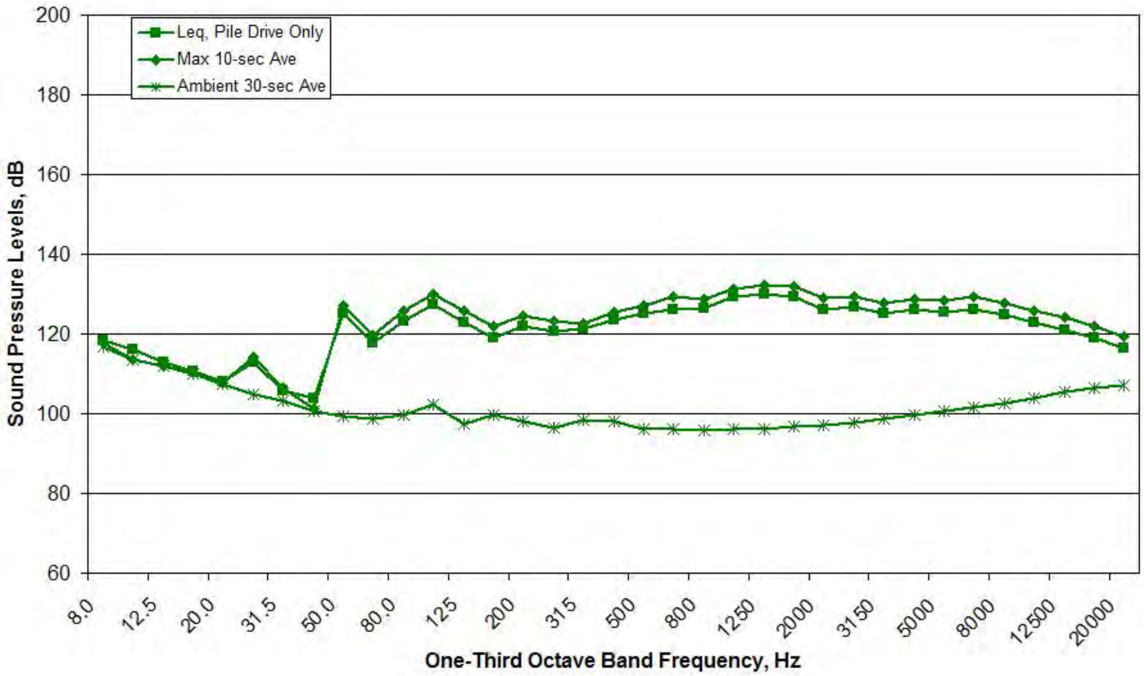

Figure B159. Spectral Data Measured at the MID Location during W6, 14:25:20-14:25:51, Measured at Depths of 10 meters on October 10, 2011

NO DATA AVAILABLE

Figure B160. Spectral Data Measured at the RFT Location during W6, 14:25:20-14:25:51, Measured at Depths of 10 meters on October 10, 2011

W3 (Vibratory Installation)

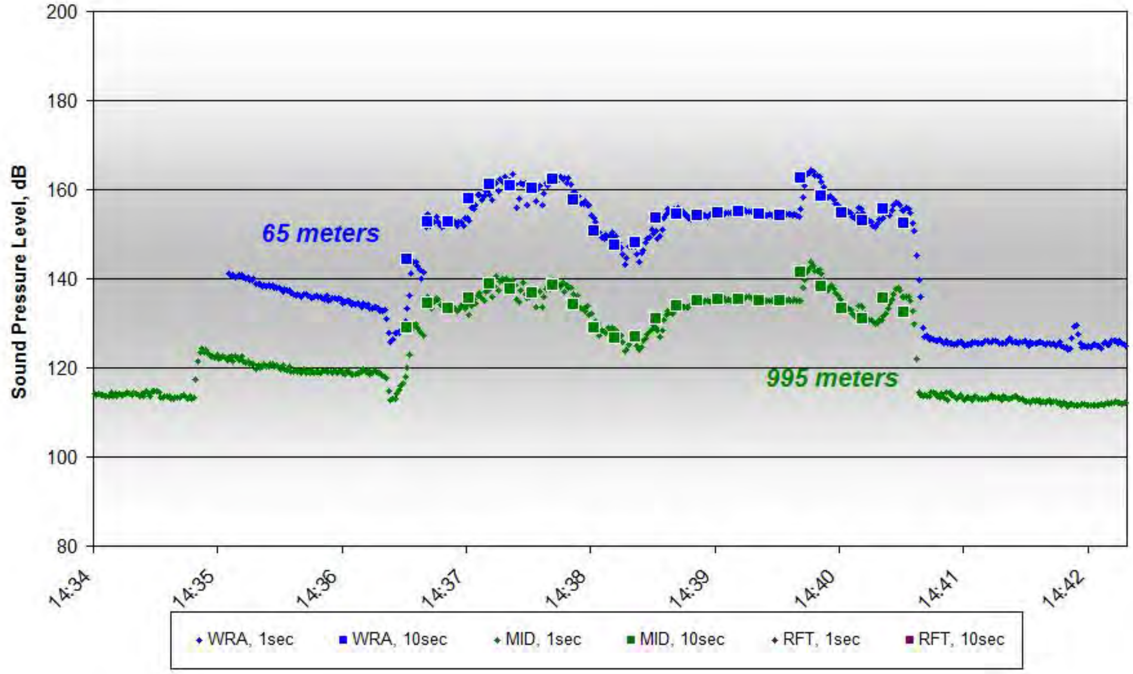

Figure B161. One-second and 10-second Average Data for W3, 14:34-14:40, Measured at Depths of 17-30 meters on October 10, 2011

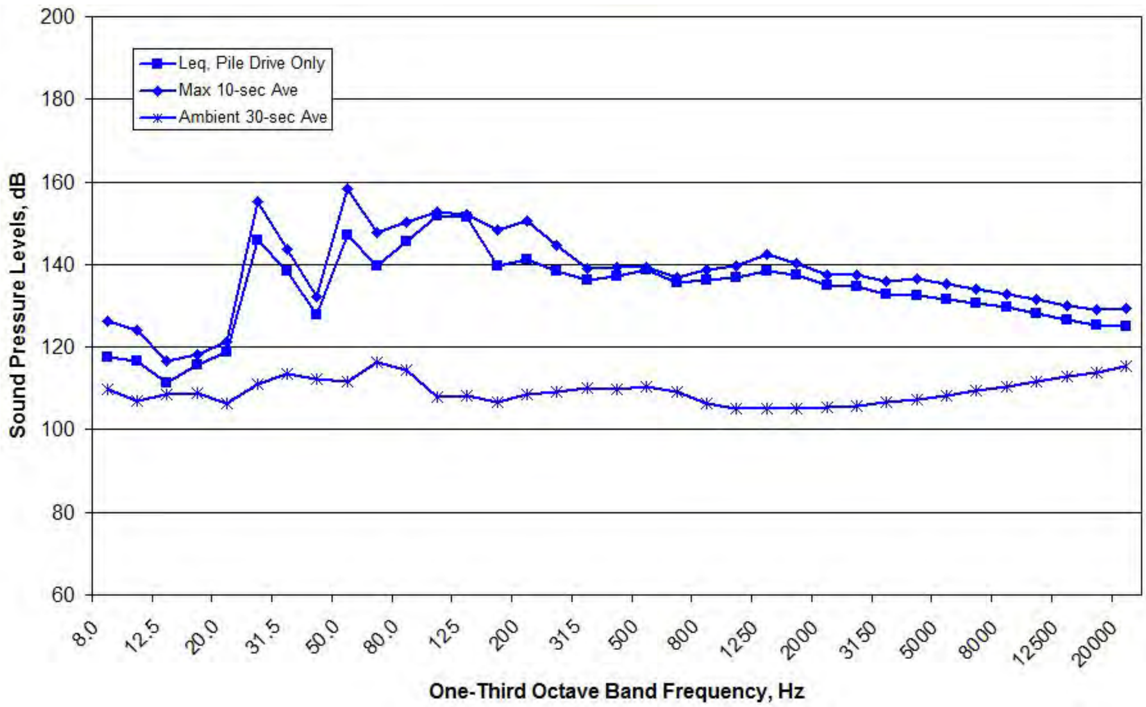

Figure B162. Spectral Data Measured at the WRA Location during W3, 14:34-14:40, Measured at Depths of 30 meters on October 10, 2011

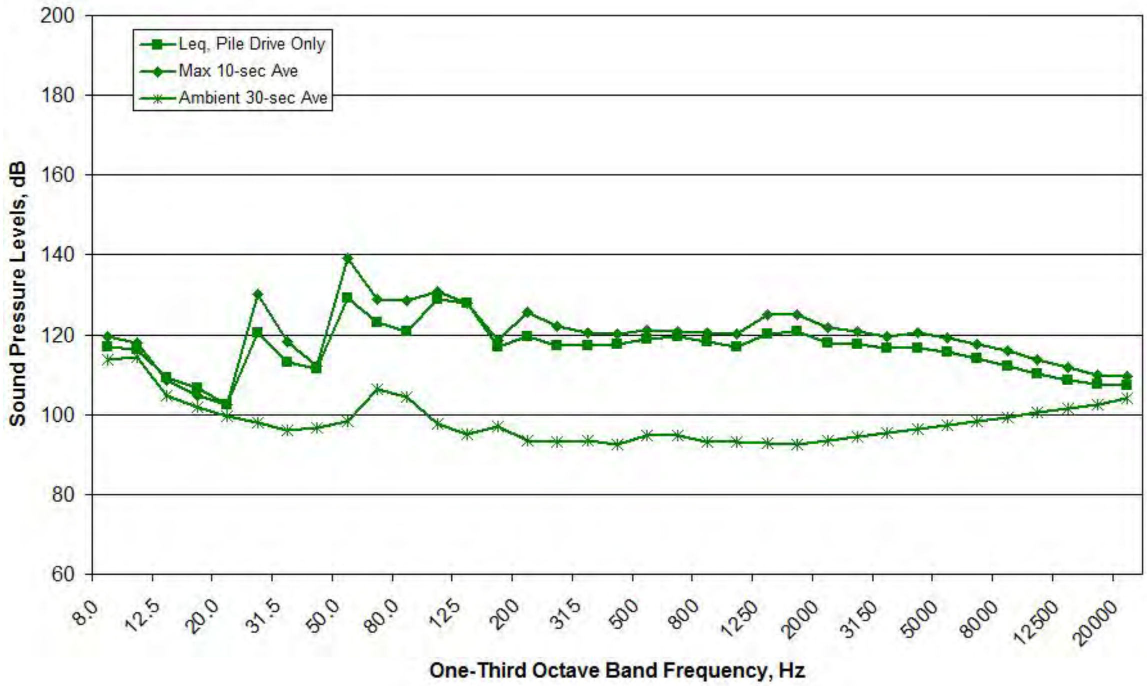

Figure B163. Spectral Data Measured at the MID Location during W3, 14:34-14:40, Measured at Depths of 30 meters on October 10, 2011

NO DATA AVAILABLE

Figure B164. Spectral Data Measured at the RFT Location during W3, 14:34-14:40, Measured at Depths of 17 meters on October 10, 2011

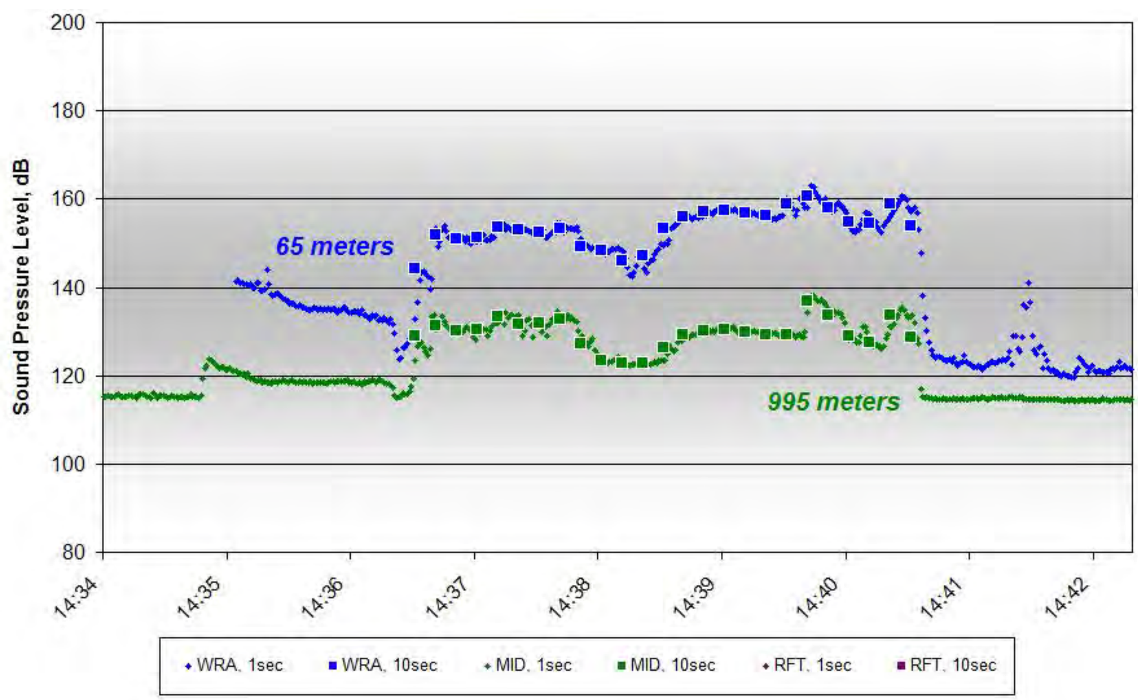

Figure B165. One-second and 10-second Average Data for W3, 14:34-14:40, Measured at Depths of 10 meters on October 10, 2011

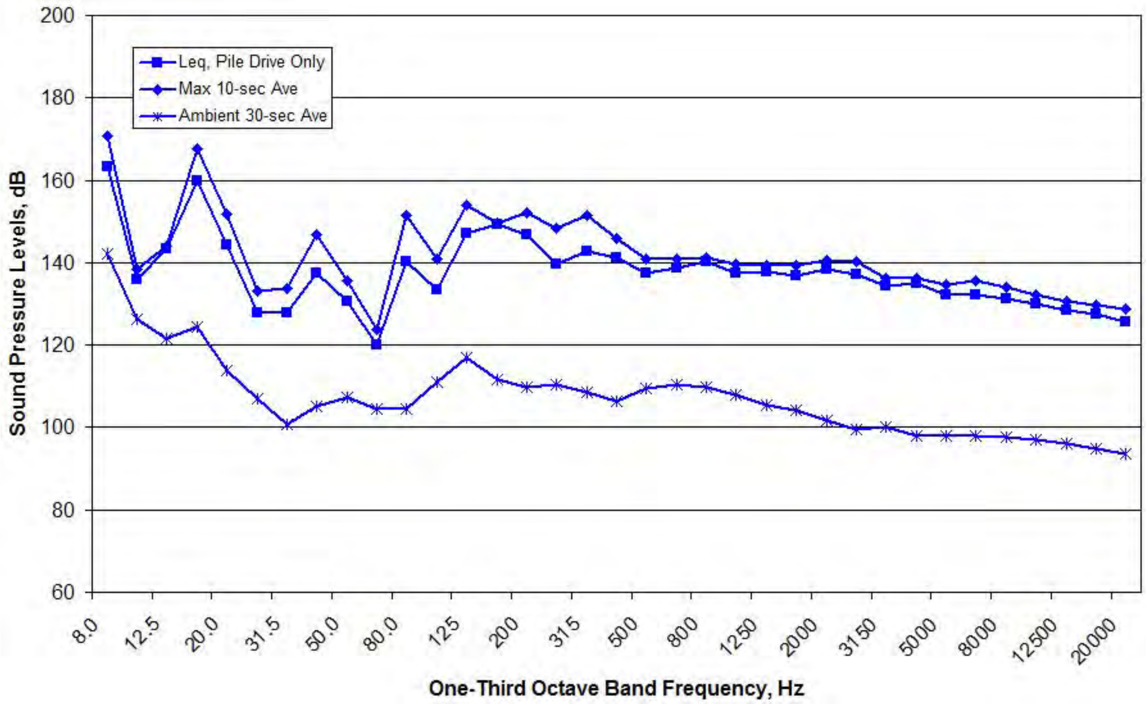

Figure B166. Spectral Data Measured at the WRA Location during W3, 14:34-14:40, Measured at Depths of 10 meters on October 10, 2011

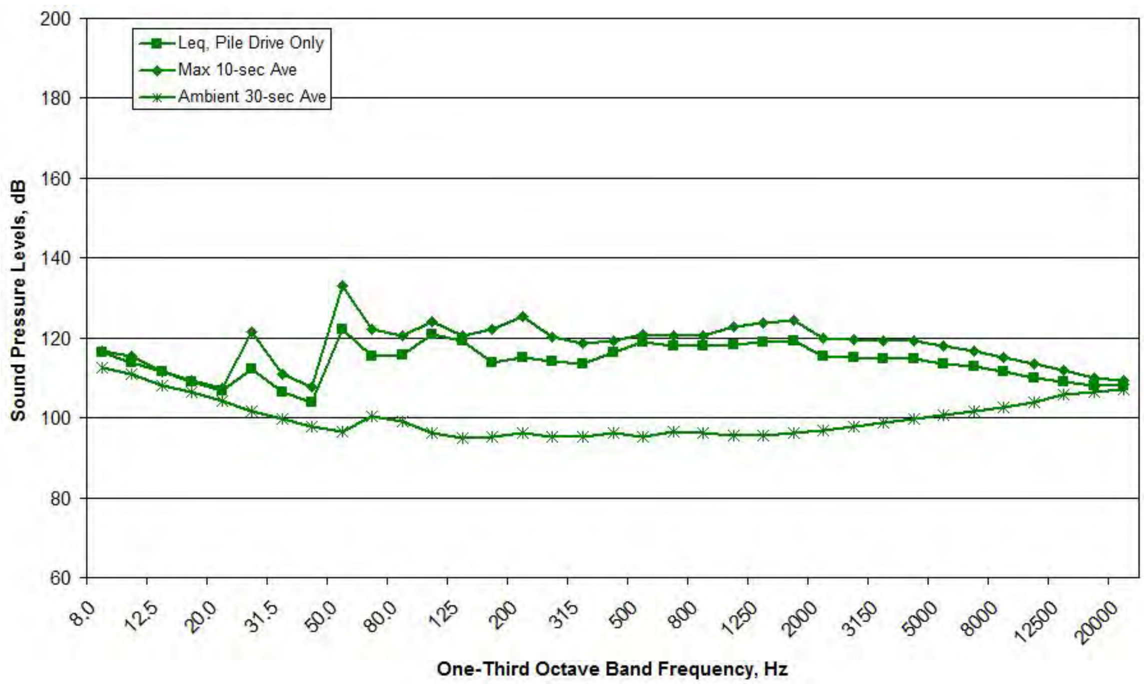

Figure B167. Spectral Data Measured at the MID Location during W3, 14:34-14:40, Measured at Depths of 10 meters on October 10, 2011

NO DATA AVAILABLE

Figure B168. Spectral Data Measured at the RFT Location during W3, 14:34-14:40, Measured at Depths of 10 meters on October 10, 2011

W5, 14:45-14:54 (Vibratory Installation)

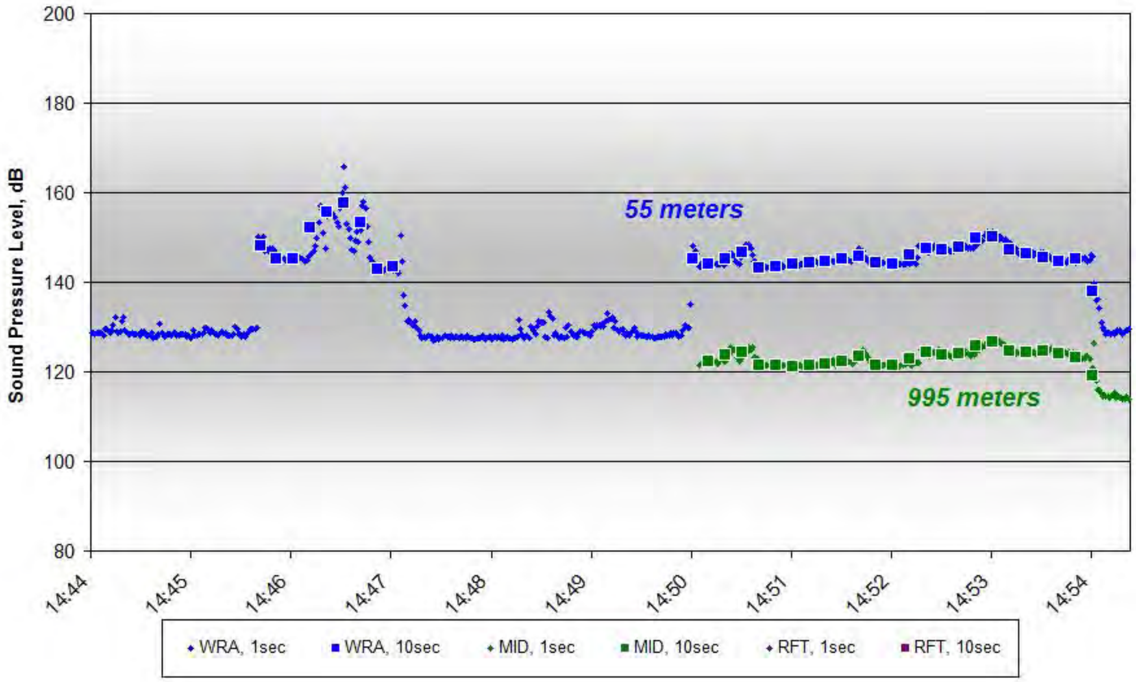

Figure B169. One-second and 10-second Average Data for W5, 14:45-14:54, Measured at Depths of 17-30 meters on October 10, 2011

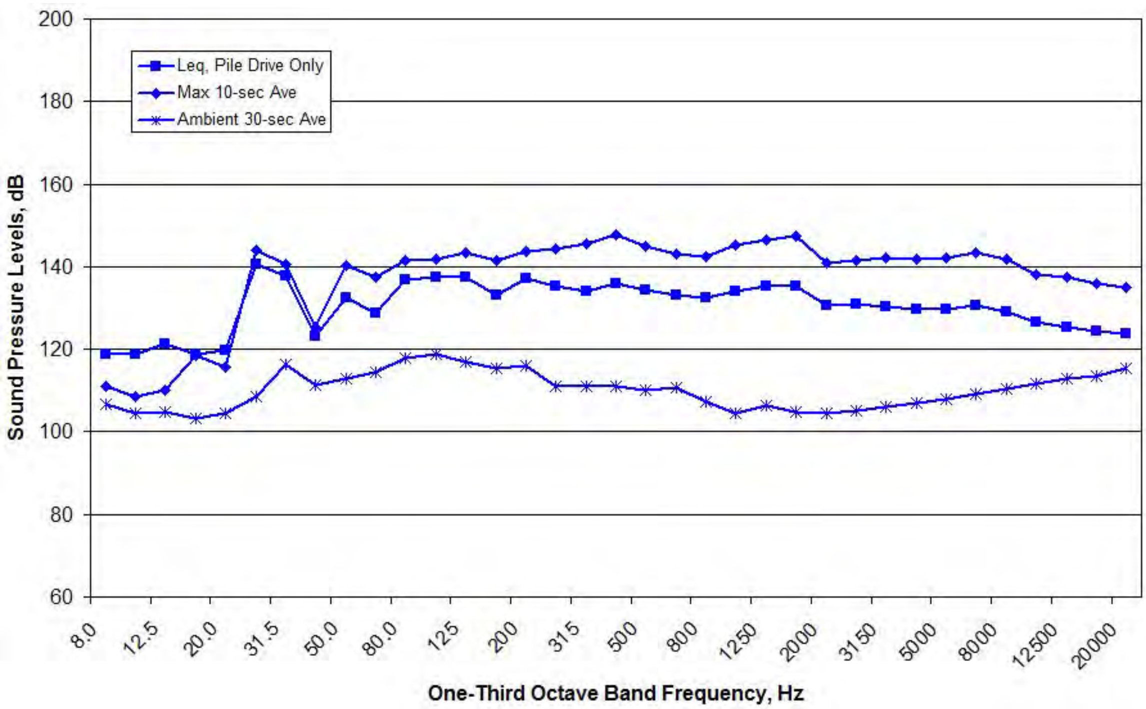

Figure B170. Spectral Data Measured at the WRA Location during W5, 14:45-14:54, Measured at Depths of 30 meters on October 10, 2011

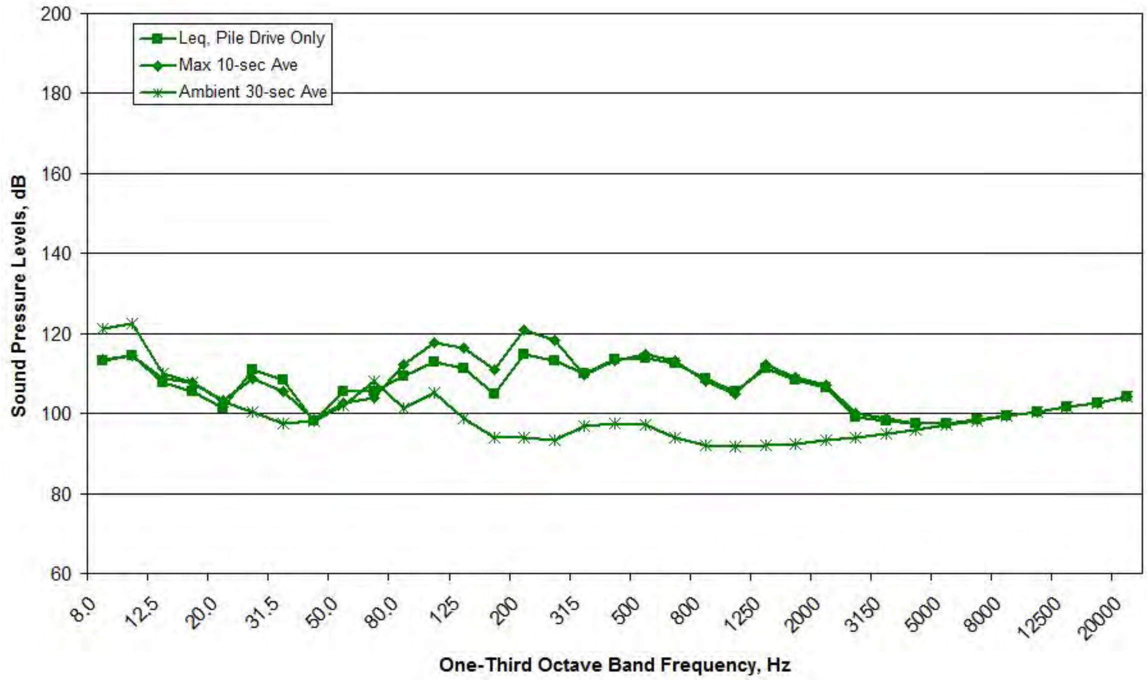

Figure B171. Spectral Data Measured at the MID Location during W5, 14:45-14:54, Measured at Depths of 30 meters on October 10, 2011

NO DATA AVAILABLE

Figure B172. Spectral Data Measured at the RFT Location during W5, 14:45-14:54, Measured at Depths of 17 meters on October 10, 2011

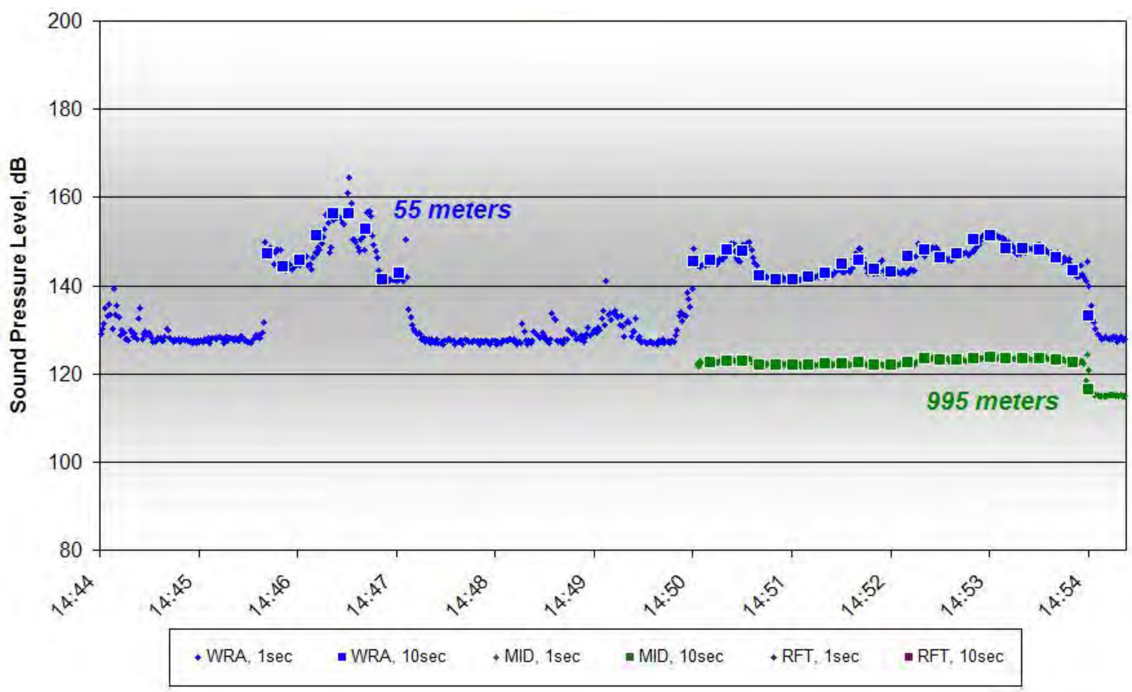

Figure B173. One-second and 10-second Average Data for W5, 14:45-14:54, Measured at Depths of 10 meters on October 10, 2011

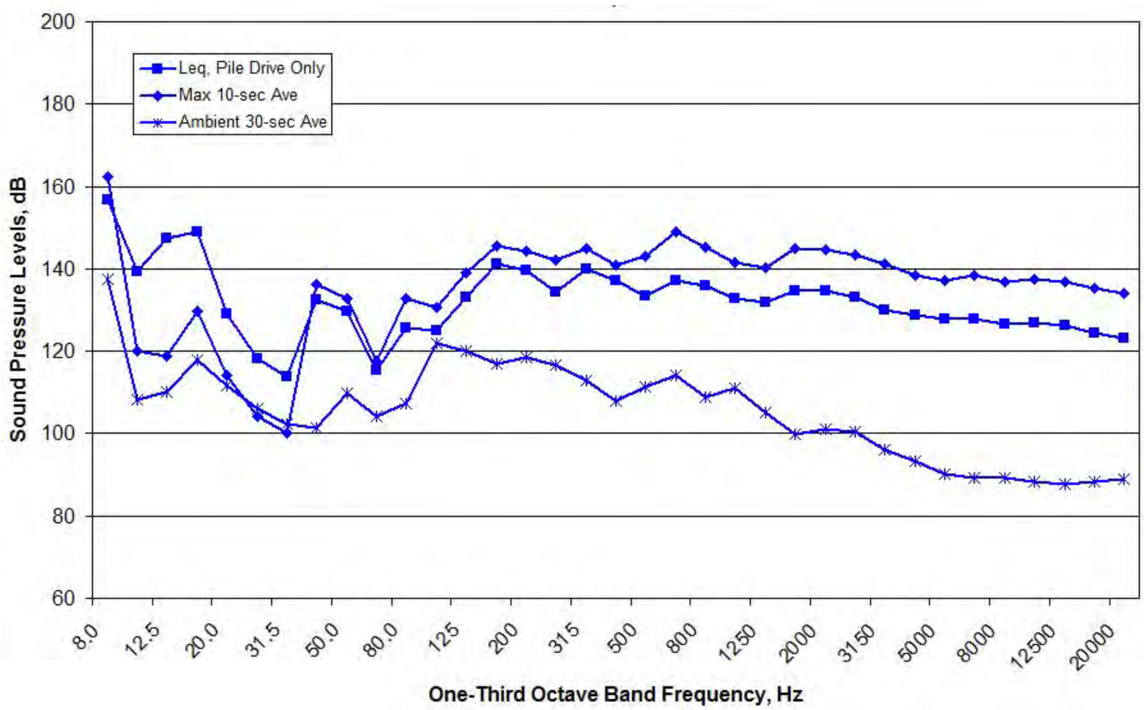

Figure B174. Spectral Data Measured at the WRA Location W5, 14:45-14:54, Measured at Depths of 10 meters on October 10, 2011

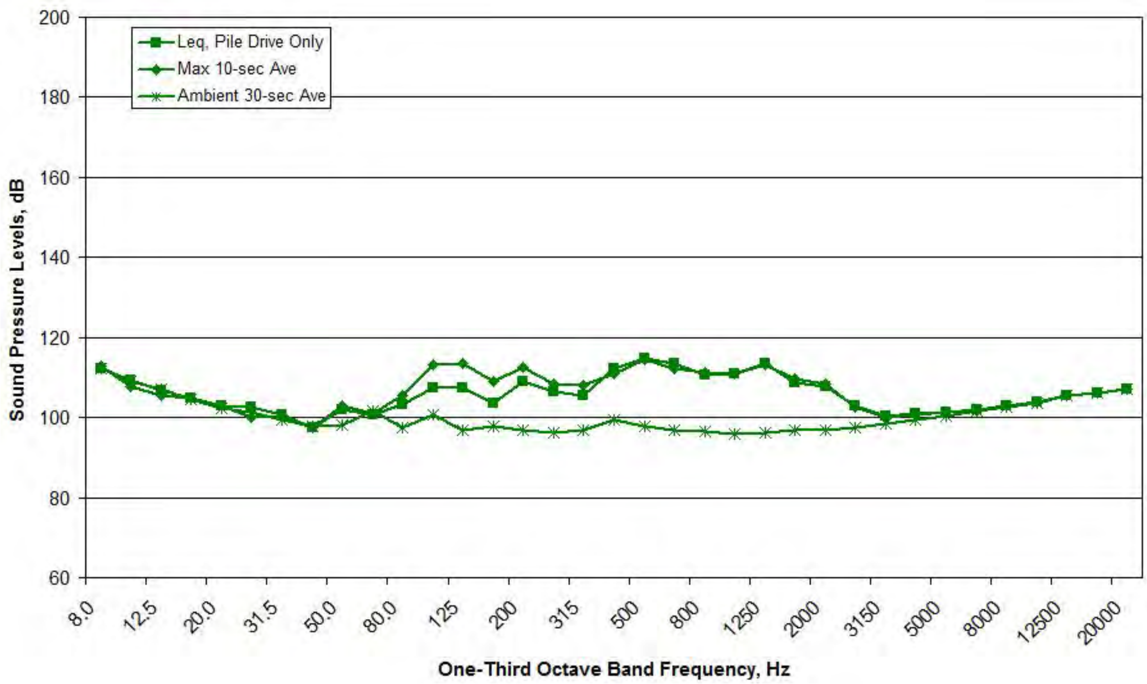

Figure B175. Spectral Data Measured at the MID Location during W5, 14:45-14:54, Measured at Depths of 10 meters on October 10, 2011

NO DATA AVAILABLE

Figure B176. Spectral Data Measured at the RFT Location during W5, 14:45-14:54, Measured at Depths of 10 meters on October 10, 2011

W11 (Vibratory Installation)

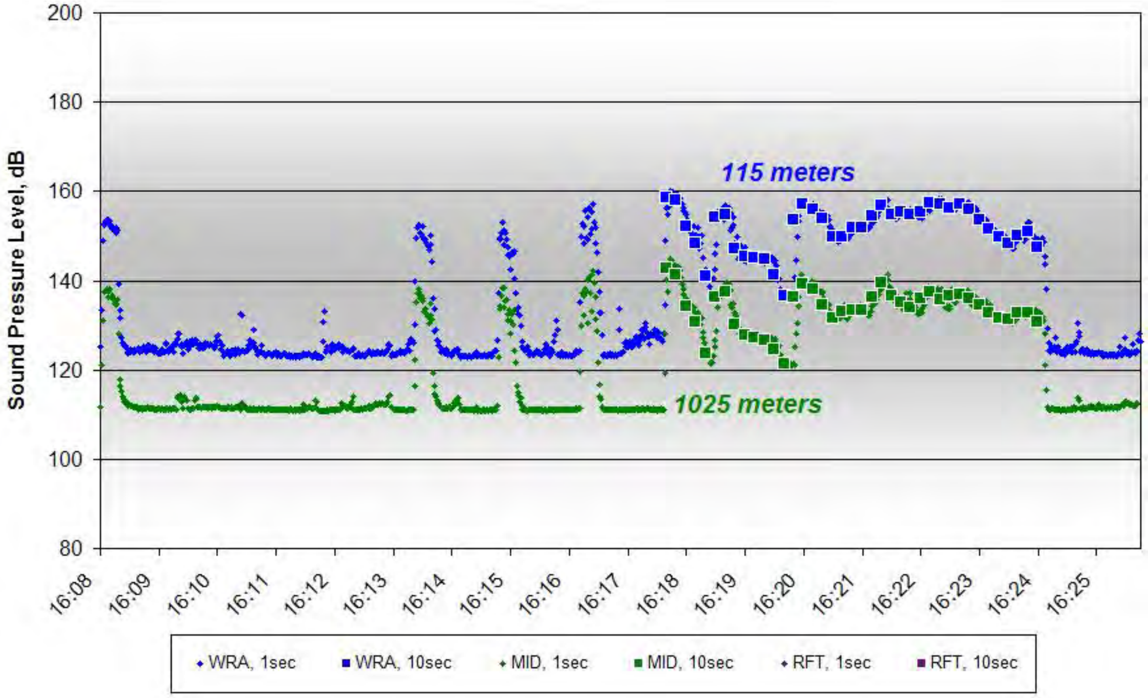

Figure B177. One-second and 10-second Average Data for W11, 16:14-16:24, Measured at Depths of 17-30 meters on October 10, 2011

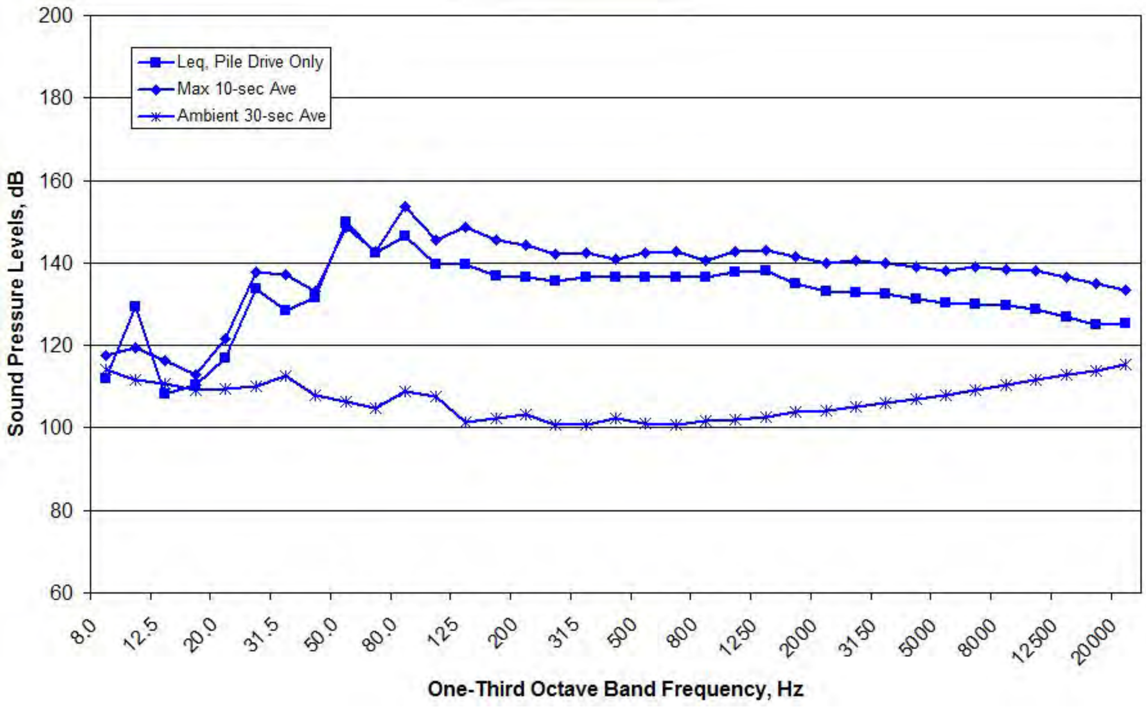

Figure B178. Spectral Data Measured at the WRA Location during W11, 16:14-16:24, Measured at Depths of 30 meters on October 10, 2011

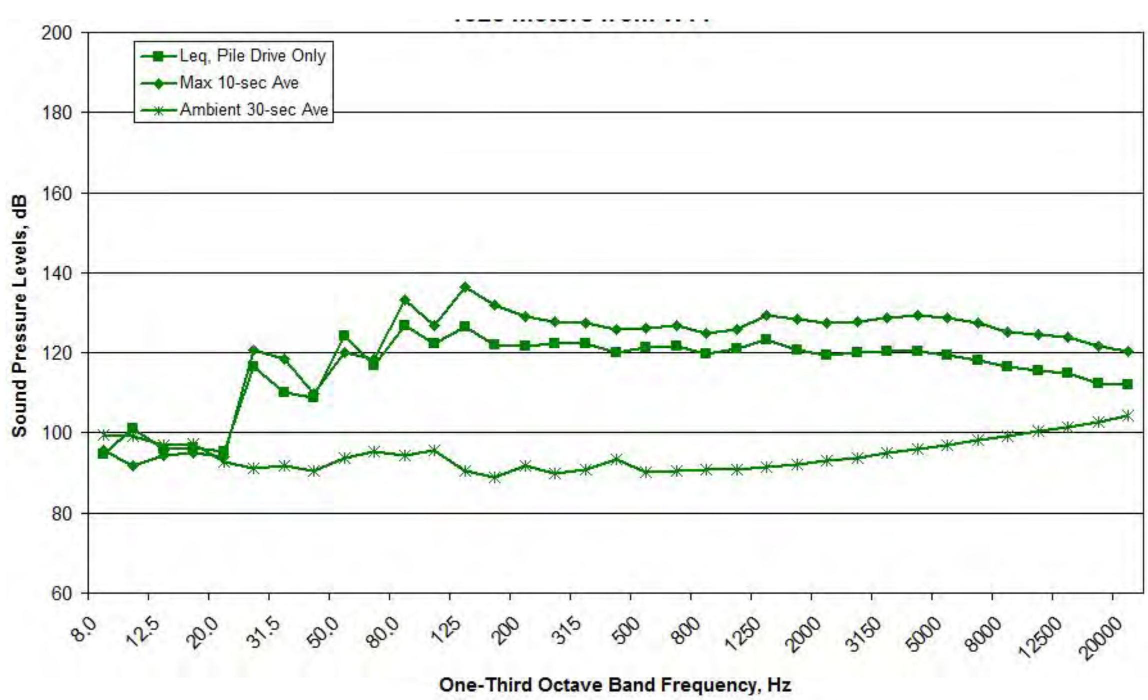

Figure B179. Spectral Data Measured at the MID Location during W11, 16:14-16:24, Measured at Depths of 30 meters on October 10, 2011

NO DATA AVAILABLE

Figure B180. Spectral Data Measured at the RFT Location during W11, 16:14-16:24, Measured at Depths of 17 meters on October 10, 2011

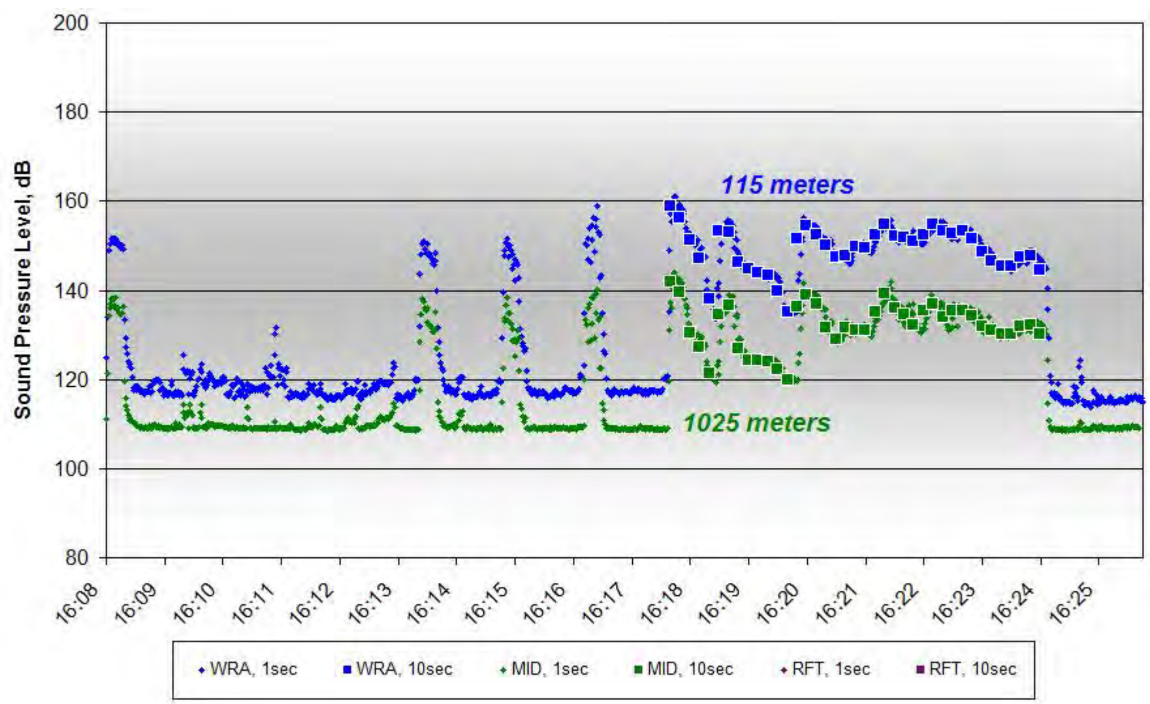

Figure B181. One-second and 10-second Average Data for W11, 16:14-16:24, Measured at Depths of 10 meters on October 10, 2011

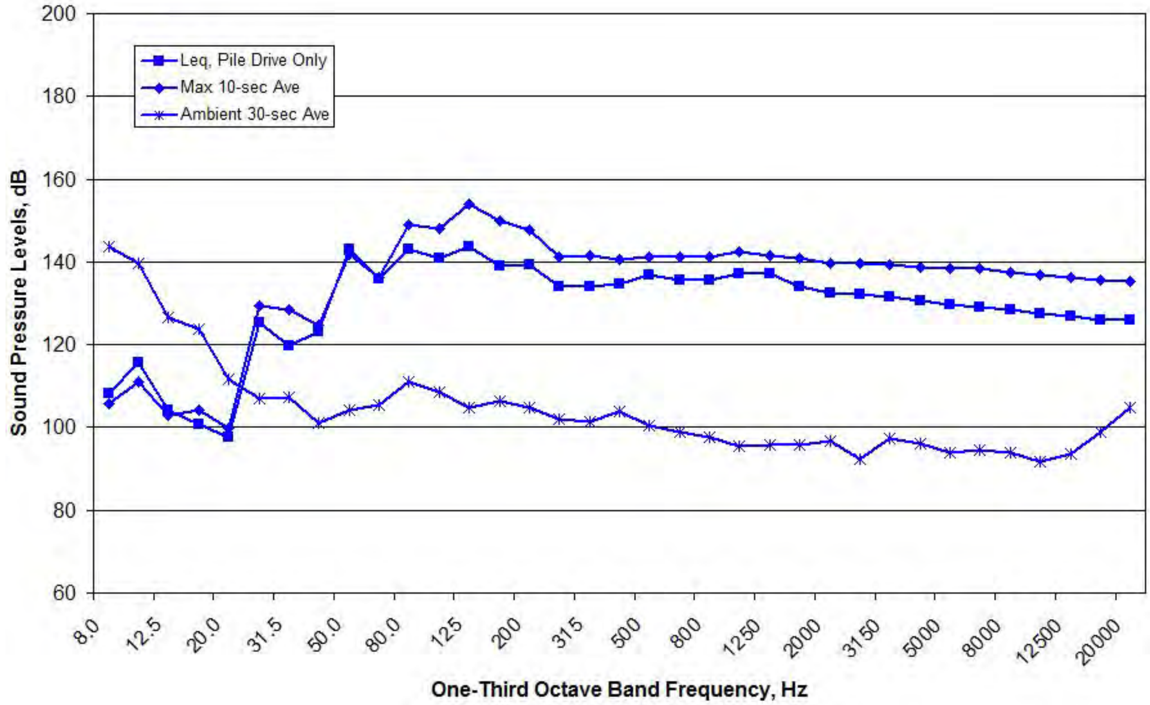

Figure B182. Spectral Data Measured at the WRA Location during W11, 16:14-16:24, Measured at Depths of 10 meters on October 10, 2011

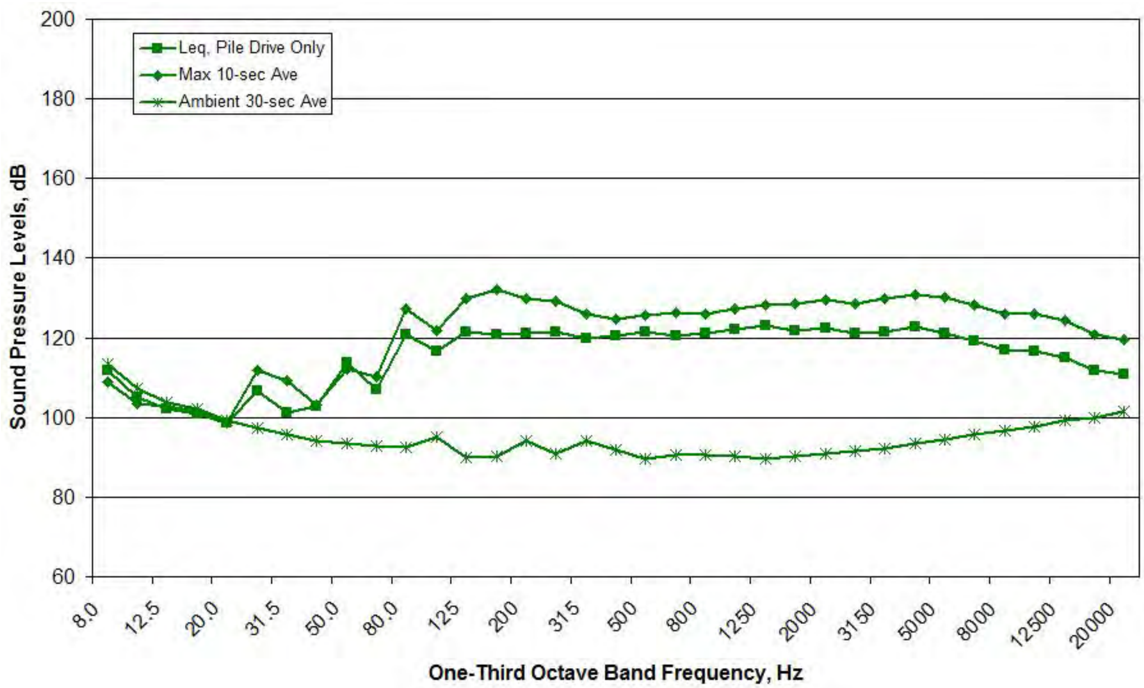

Figure B183. Spectral Data Measured at the MID Location during W11, 16:14-16:24, Measured at Depths of 10 meters on October 10, 2011

NO DATA AVAILABLE

Figure B184. Spectral Data Measured at the RFT Location during W11, 16:14-16:24, Measured at Depths of 10 meters on October 10, 2011

W12 (Vibratory Installation)

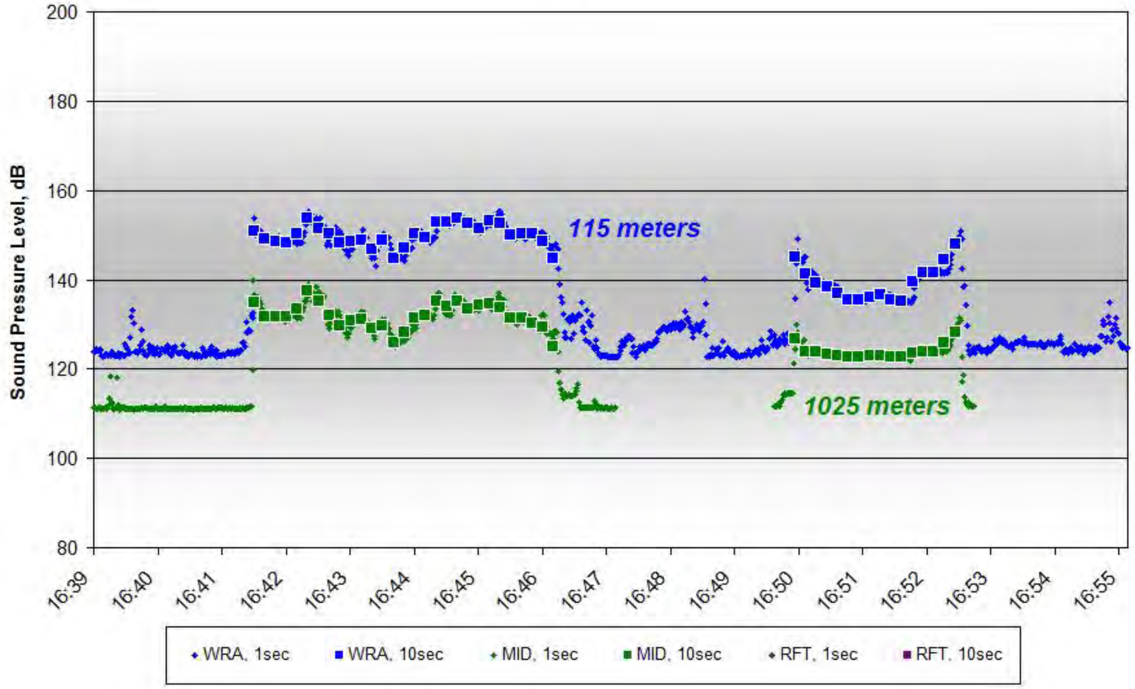

Figure B185. One-second and 10-second Average Data for W12, 16:41-16:52, Measured at Depths of 17-30 meters on October 10, 2011

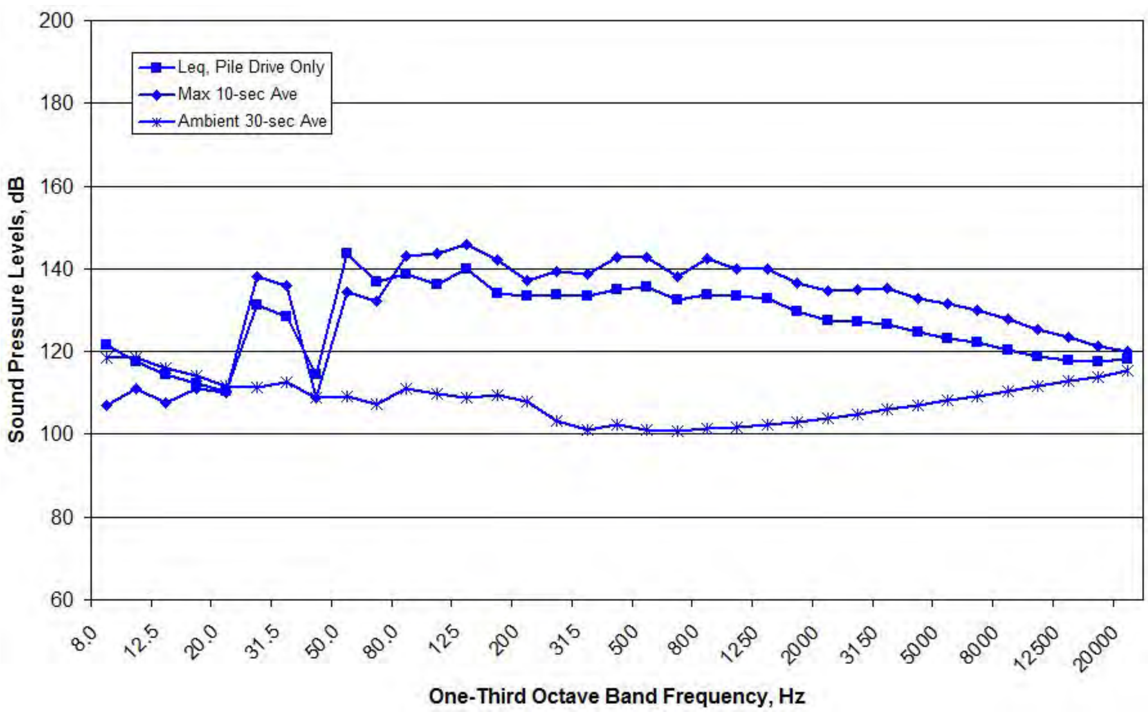

Figure B186. Spectral Data Measured at the WRA Location during W12, 16:41-16:52, Measured at Depths of 30 meters on October 10, 2011

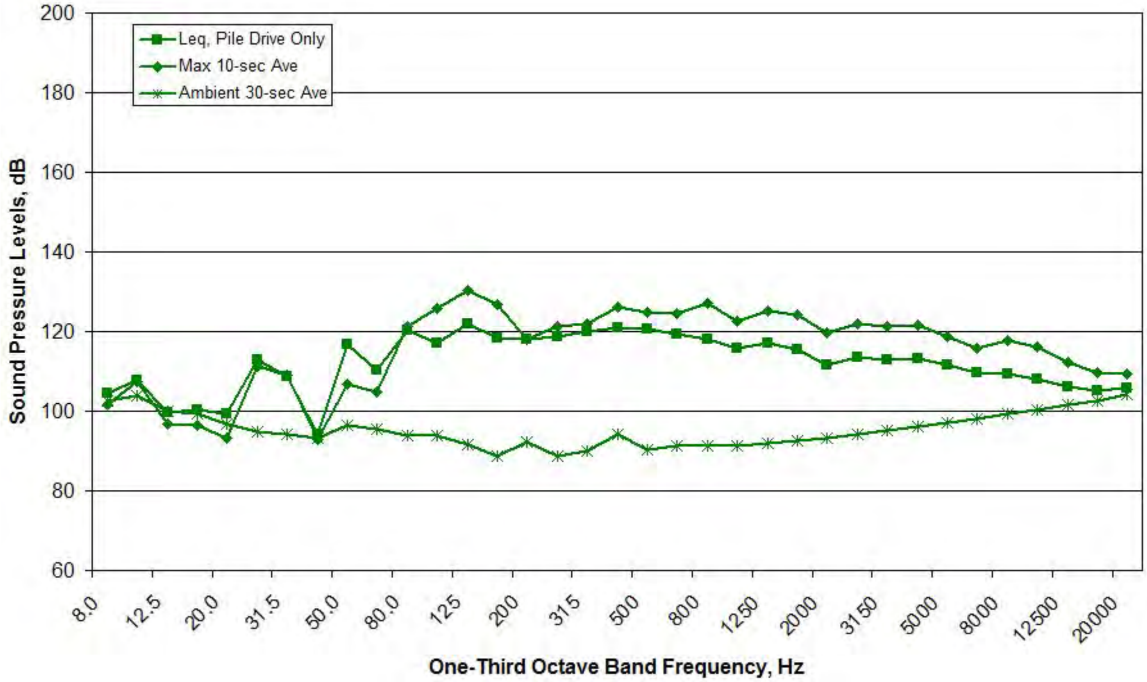

Figure B187. Spectral Data Measured at the MID Location during W12, 16:41-16:52, Measured at Depths of 30 meters on October 10, 2011

NO DATA AVAILABLE

Figure B188. Spectral Data Measured at the RFT Location during W12, 16:41-16:52, Measured at Depths of 17 meters on October 10, 2011

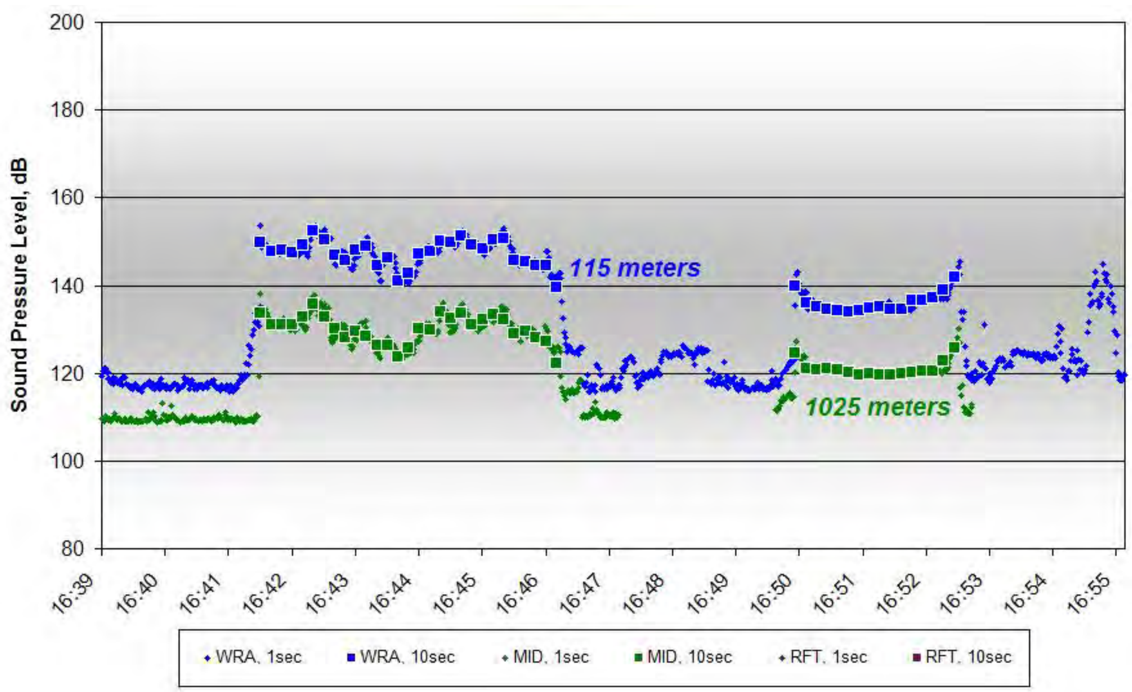

Figure B189. One-second and 10-second Average Data for W12, 16:41-16:52, Measured at Depths of 10 meters on October 10, 2011

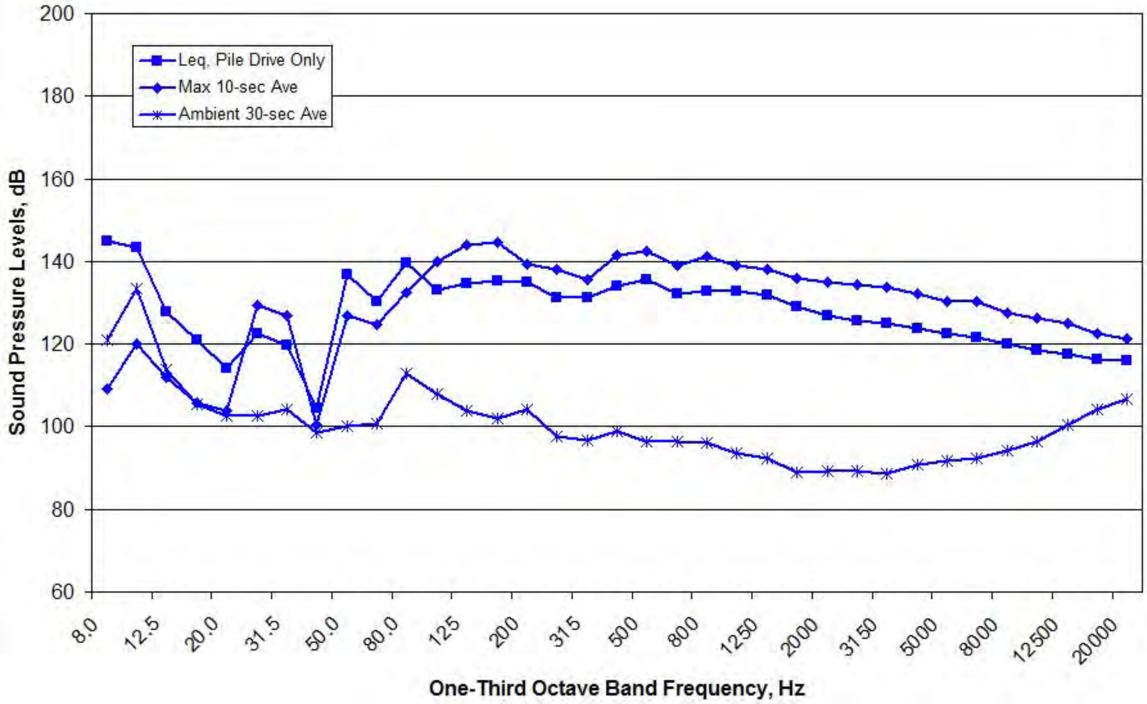

Figure B190. Spectral Data Measured at the WRA Location W12, 16:41-16:52, Measured at Depths of 10 meters on October 10, 2011

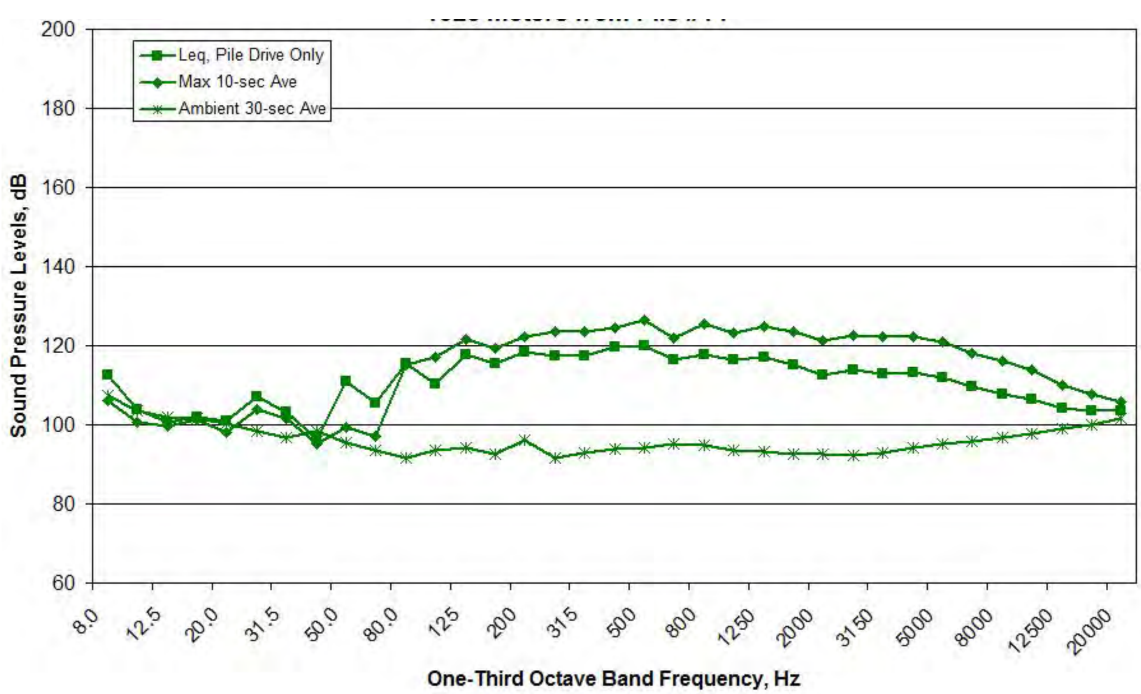

Figure B191. Spectral Data Measured at the MID Location during W12, 16:41-16:52, Measured at Depths of 10 meters on October 10, 2011

NO DATA AVAILABLE

Figure B192. Spectral Data Measured at the RFT Location during W12, 16:41-16:52, Measured at Depths of 10 meters on October 10, 2011

10/11/2011 – W2 (Vibratory Installation)

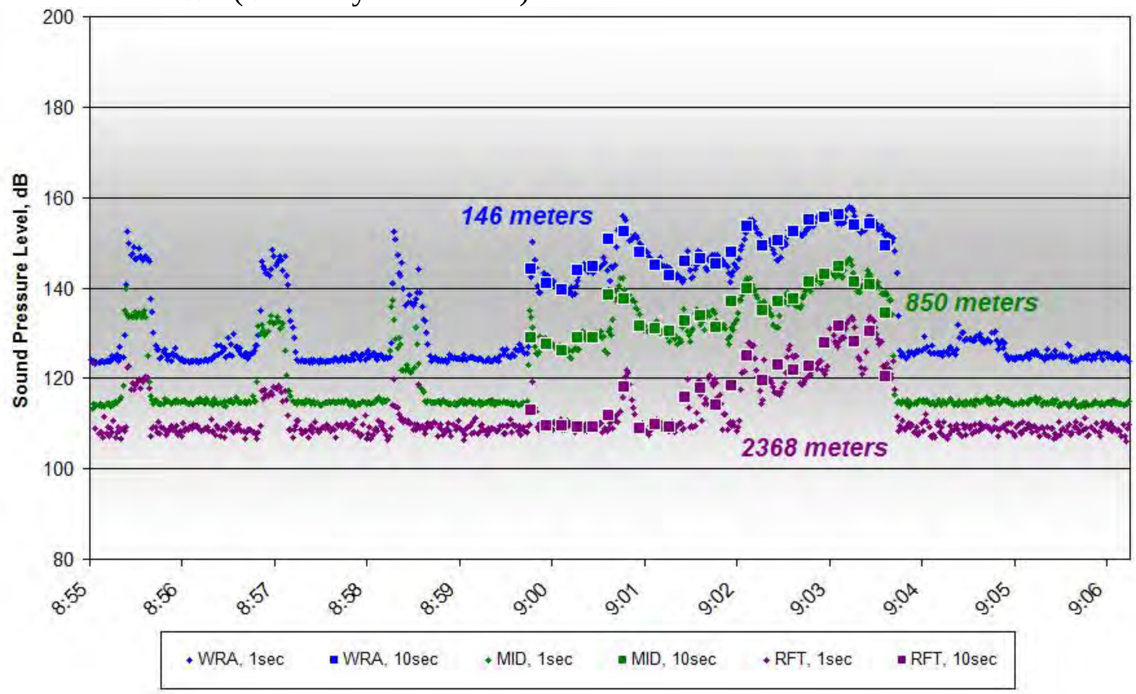

Figure B193. One-second and 10-second Average Data for W2, 8:56-9:04, Measured at Depths of 17-30 meters on October 11, 2011

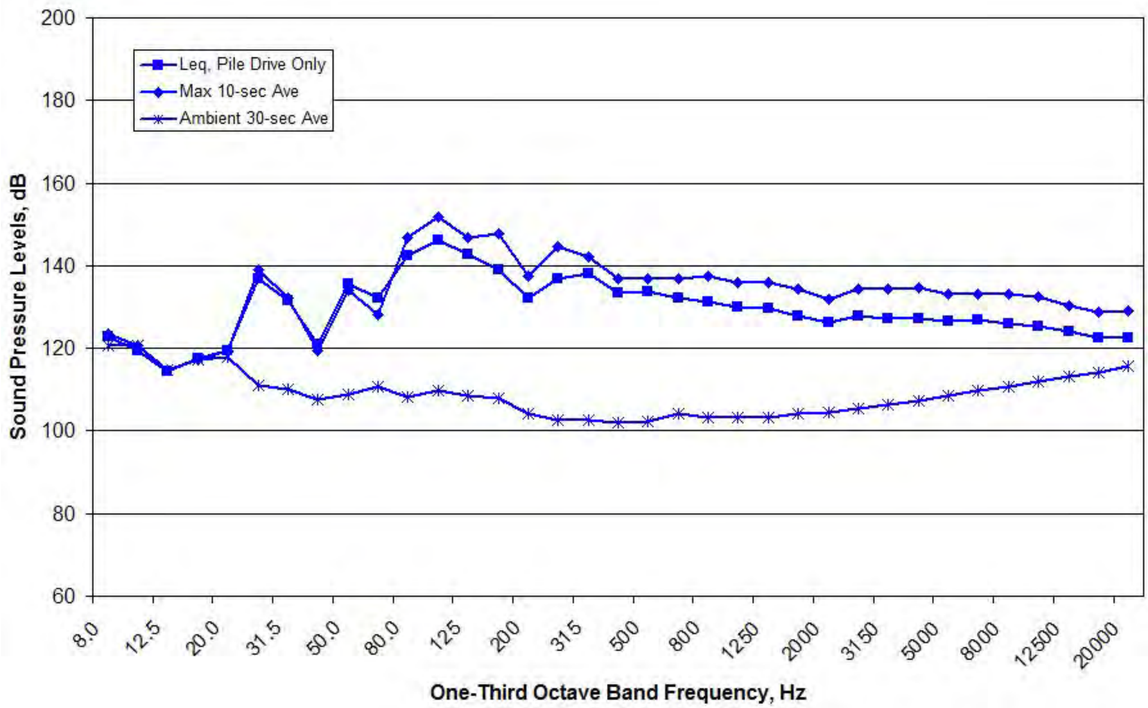

Figure B194. Spectral Data Measured at the WRA Location during W2, 8:56-9:04, Measured at Depths of 30 meters on October 11, 2011

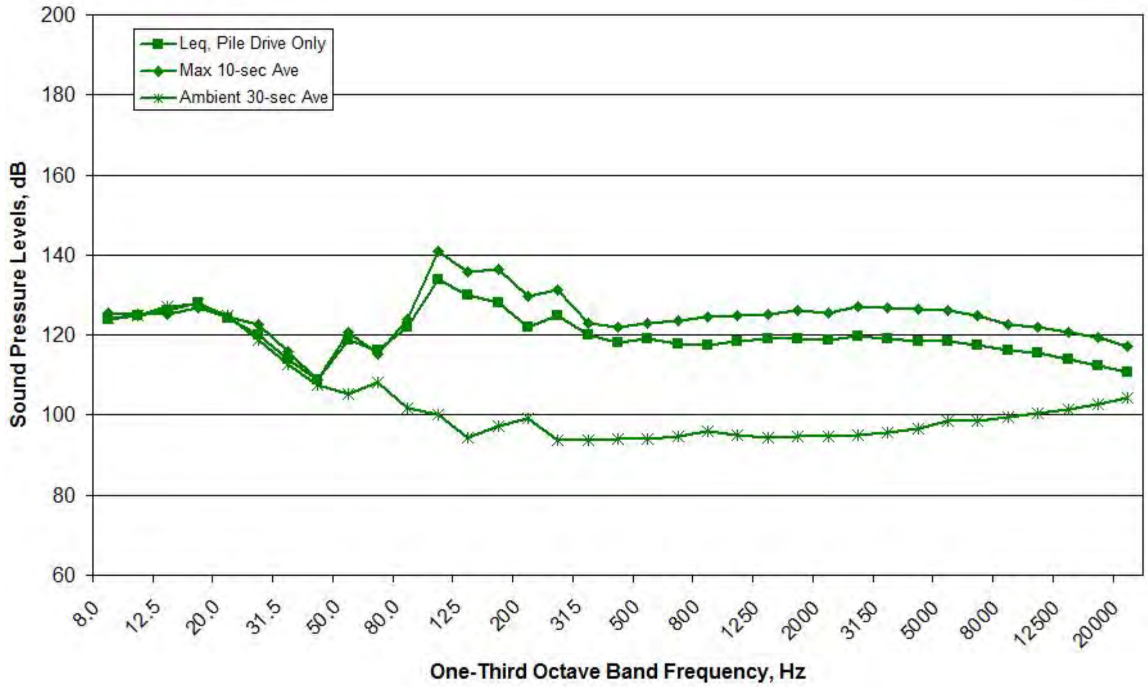

Figure B195. Spectral Data Measured at the MID Location during W2, 8:56-9:04, Measured at Depths of 30 meters on October 11, 2011

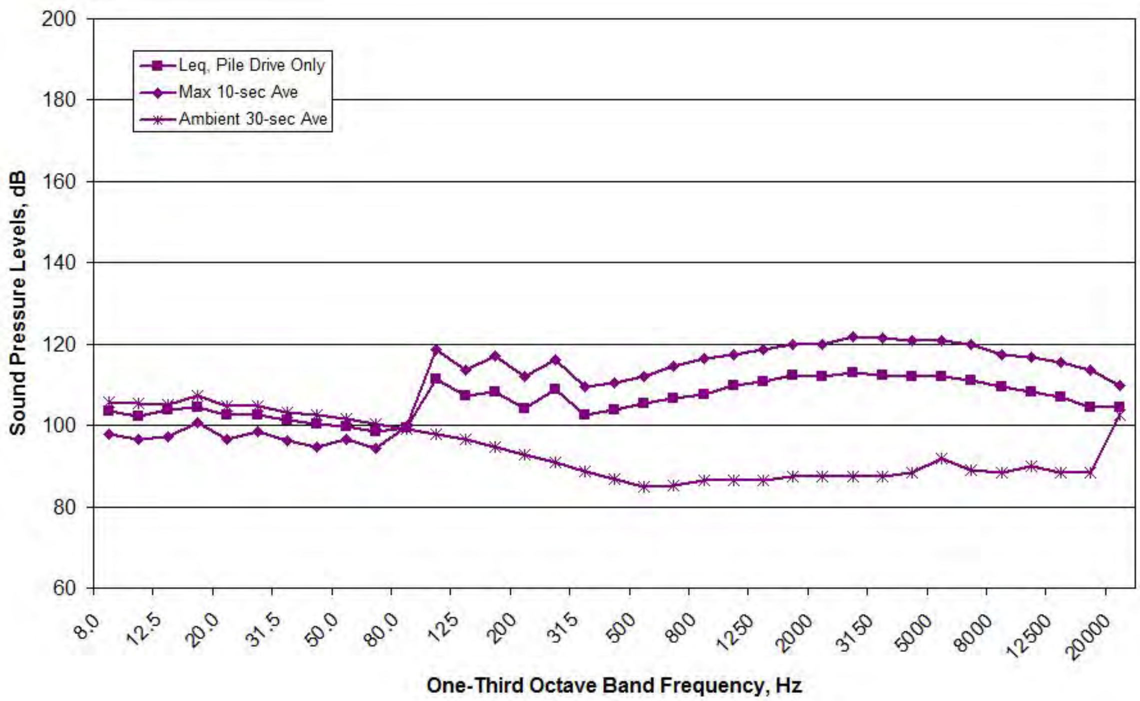

Figure B196. Spectral Data Measured at the RFT Location during W2, 8:56-9:04, Measured at Depths of 17 meters on October 11, 2011

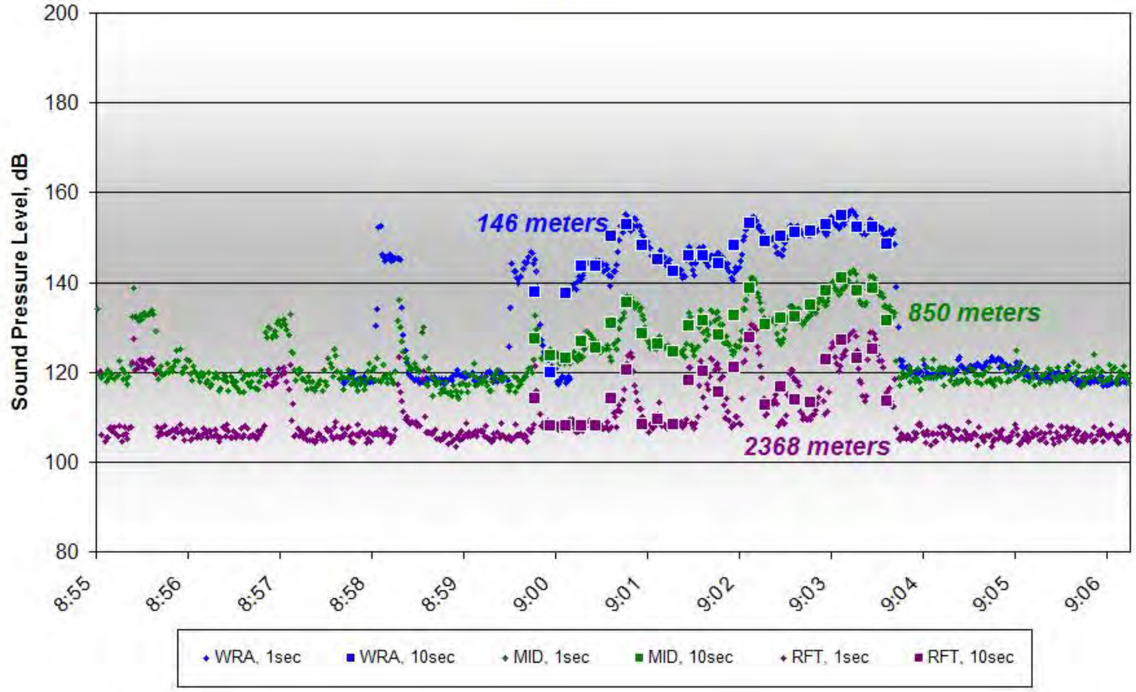

Figure B197. One-second and 10-second Average Data for W2, 8:56-9:04, Measured at Depths of 10 meters on October 11, 2011

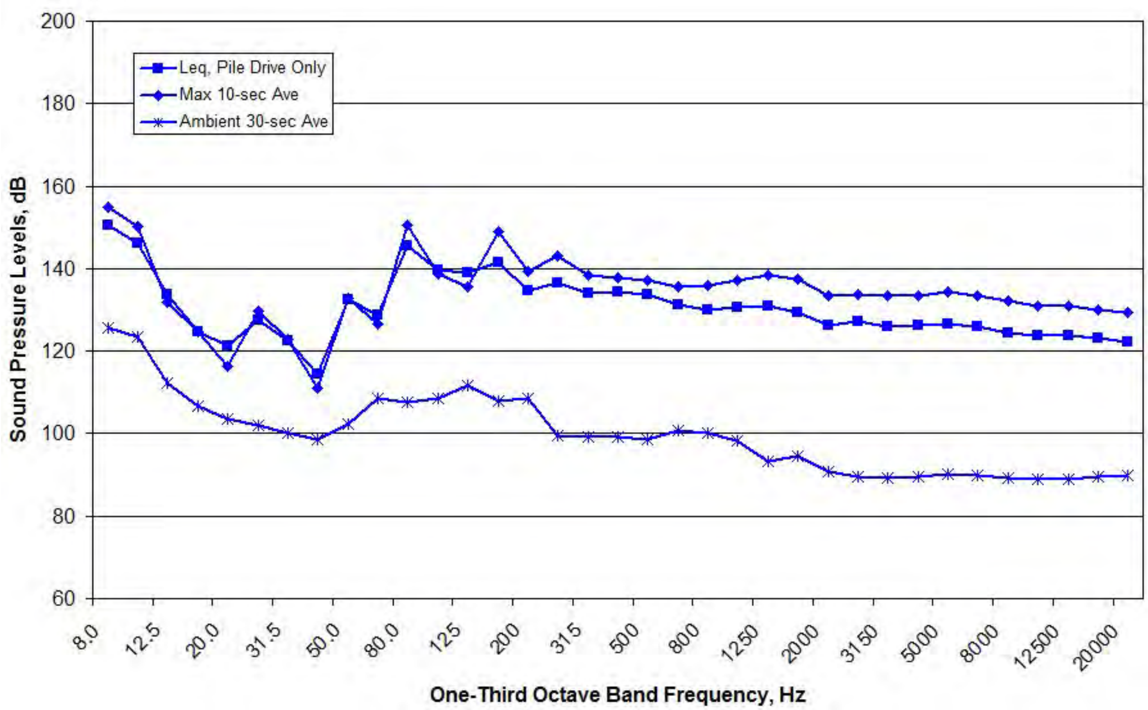

Figure B198. Spectral Data Measured at the WRA Location during W2, 8:56-9:04, Measured at Depths of 10 meters on October 11, 2011

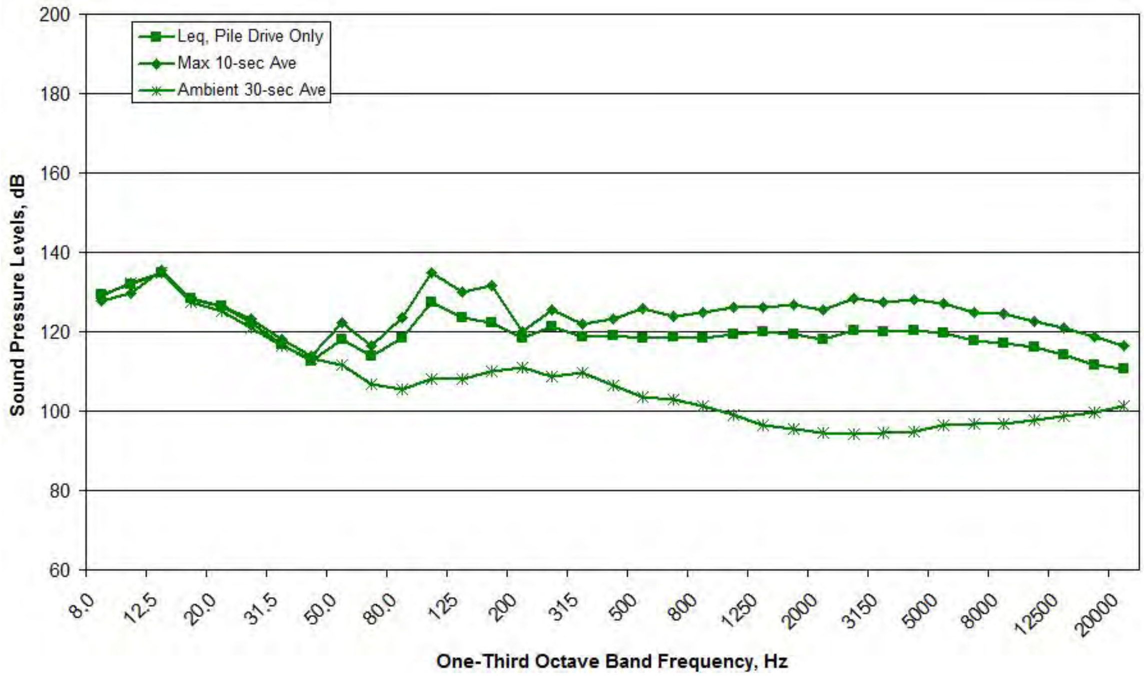

Figure B199. Spectral Data Measured at the MID Location during W2, 8:56-9:04, Measured at Depths of 10 meters on October 11, 2011

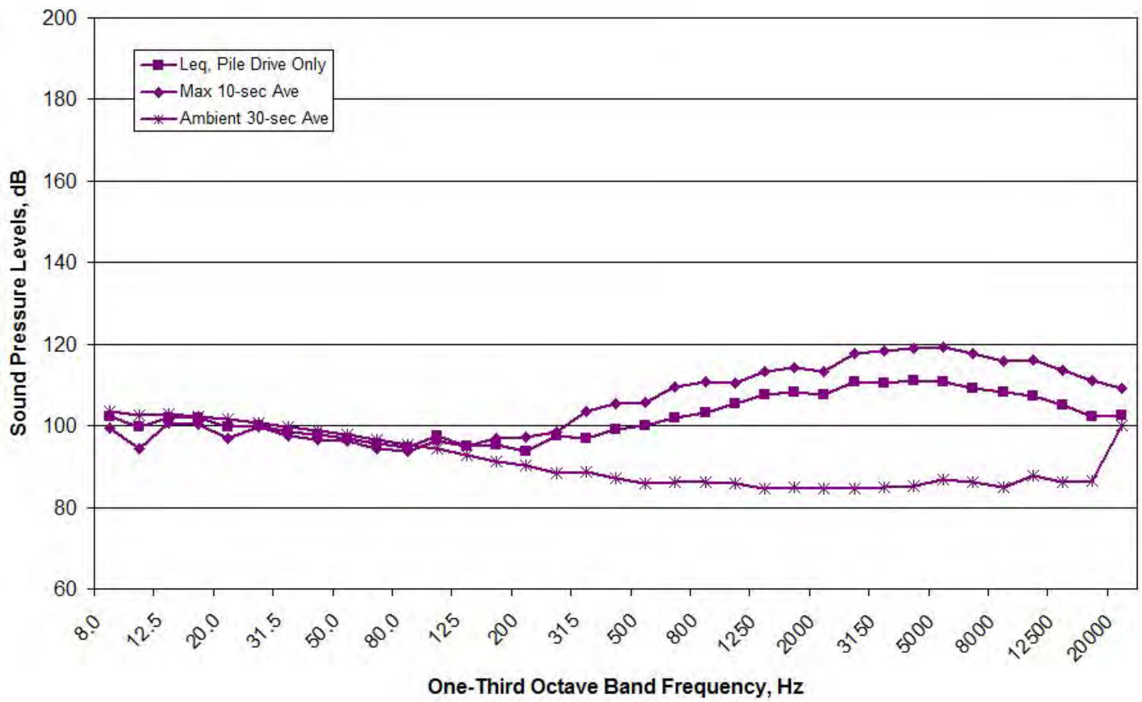

Figure B200. Spectral Data Measured at the RFT Location during W2, 8:56-9:04, Measured at Depths of 10 meters on October 11, 2011

W1 (Vibratory Installation)

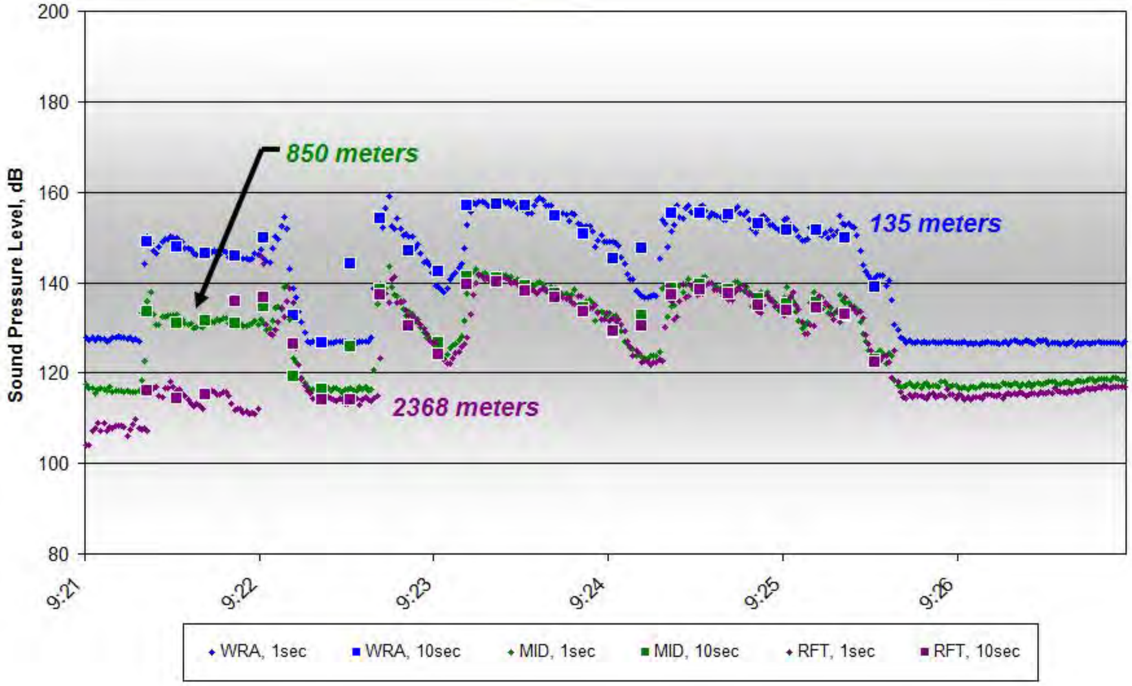

Figure B201. One-second and 10-second Average Data for W1, 9:21-9:25, Measured at Depths of 17-30 meters on October 11, 2011

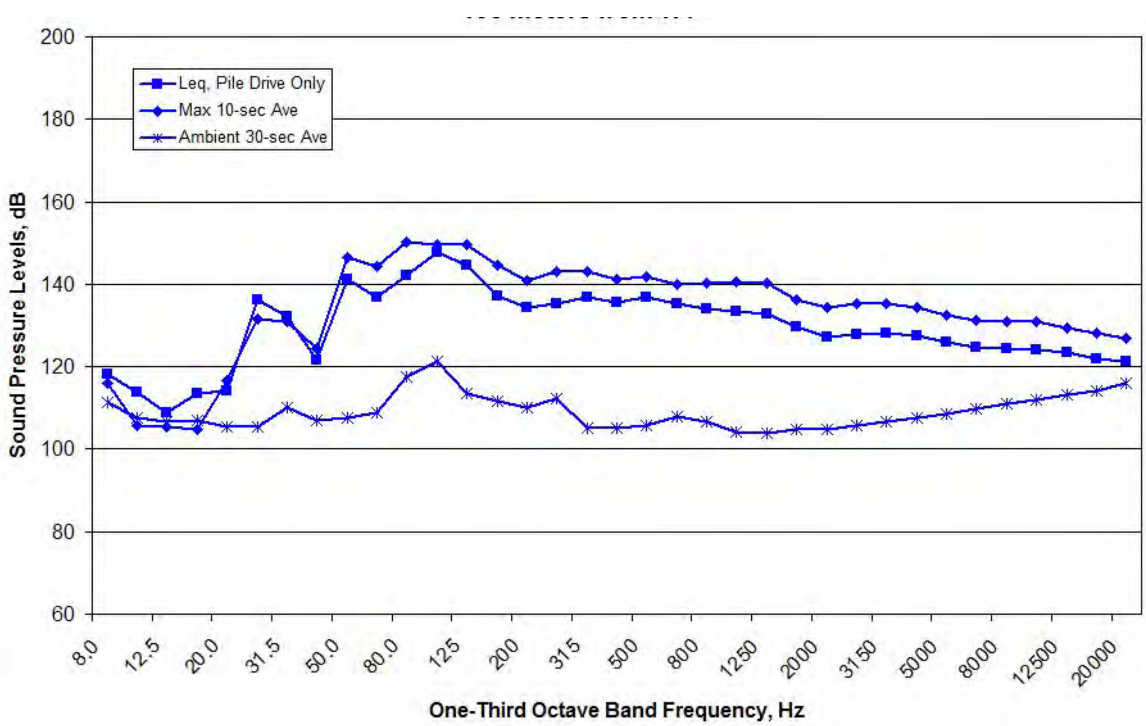

Figure B202. Spectral Data Measured at the WRA Location during W1, 9:21-9:25, Measured at Depths of 30 meters on October 11, 2011

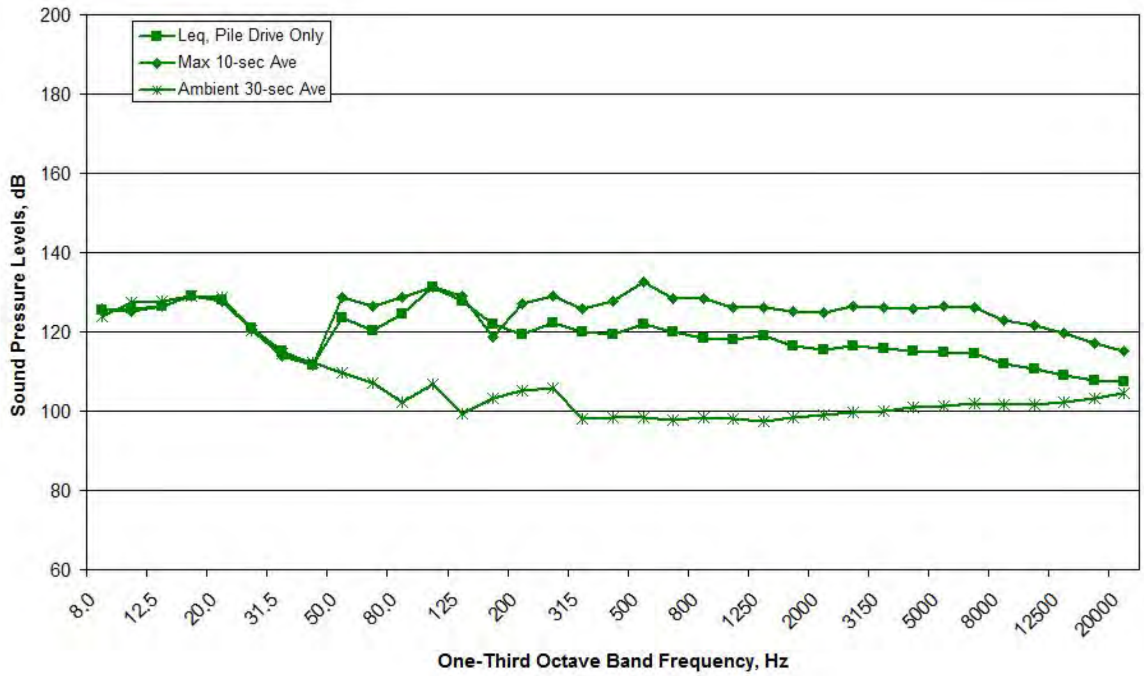

Figure B203. Spectral Data Measured at the MID Location during W1, 9:21-9:25, Measured at Depths of 30 meters on October 11, 2011

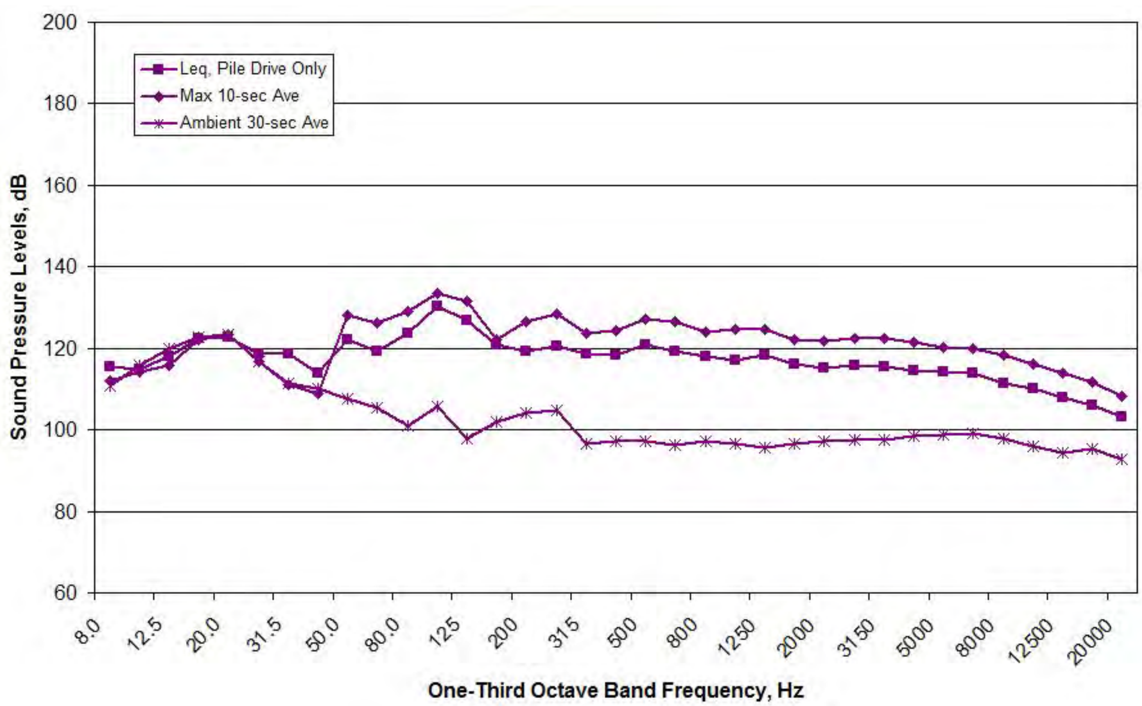

Figure B204. Spectral Data Measured at the RFT Location during W1, 9:21-9:25, Measured at Depths of 17 meters on October 11, 2011

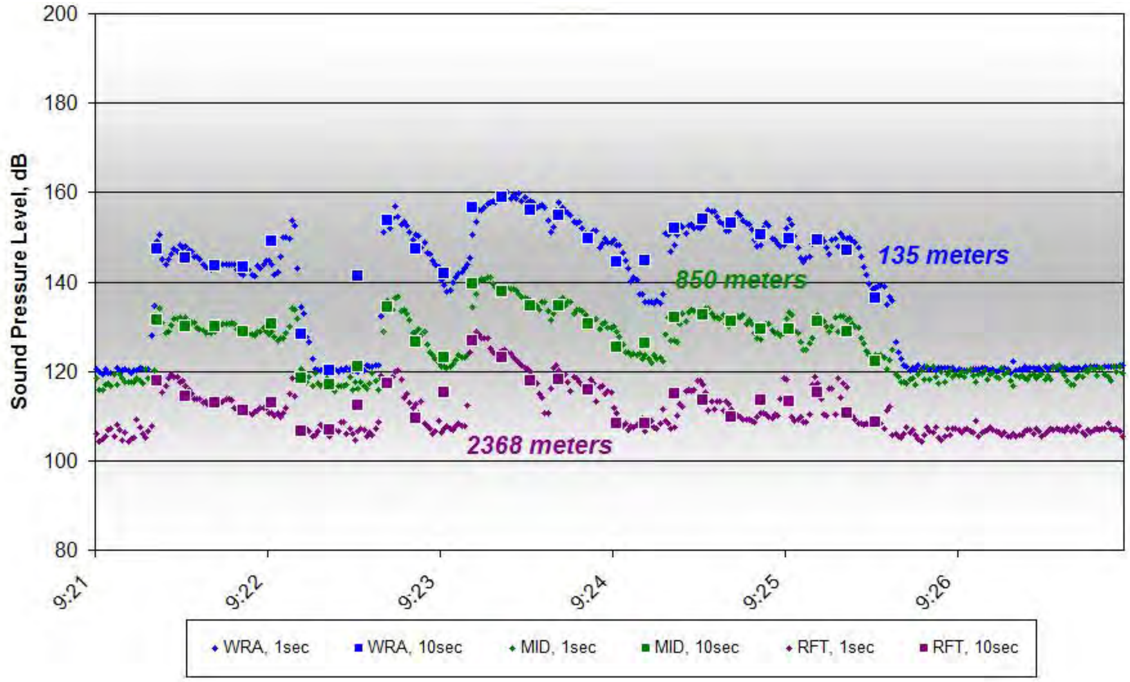

Figure B205. One-second and 10-second Average Data for W1, 9:21-9:25, Measured at Depths of 10 meters on October 11, 2011

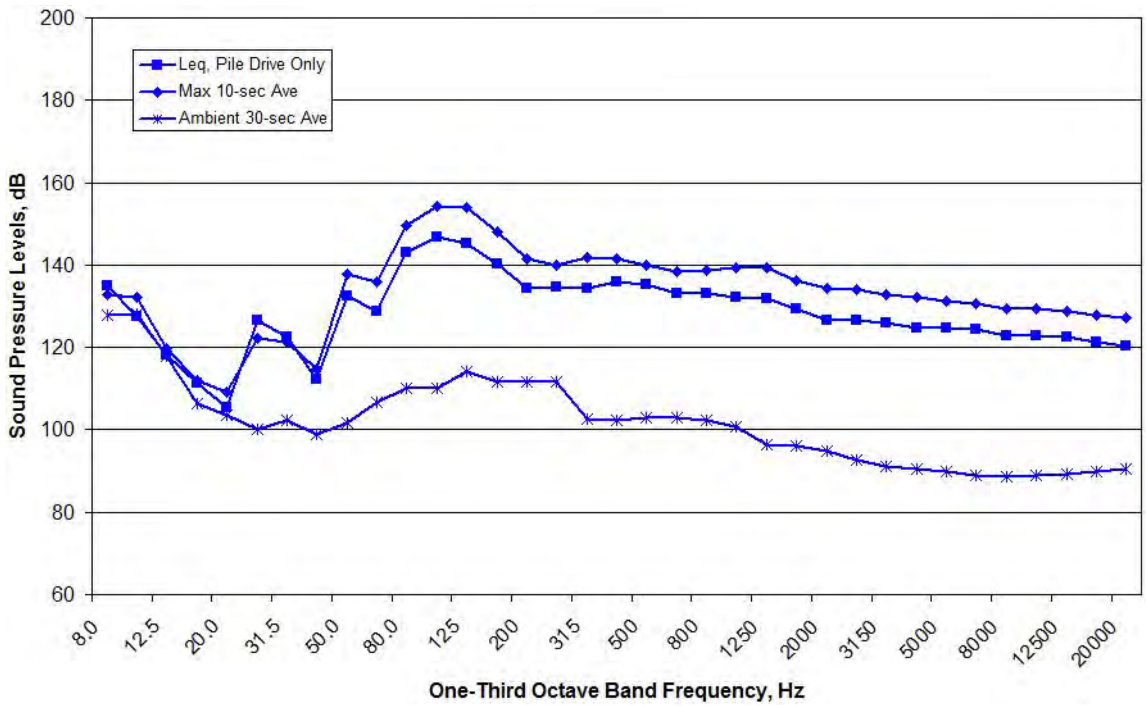

Figure B206. Spectral Data Measured at the WRA Location W1, 9:21-9:25, Measured at Depths of 10 meters on October 11, 2011

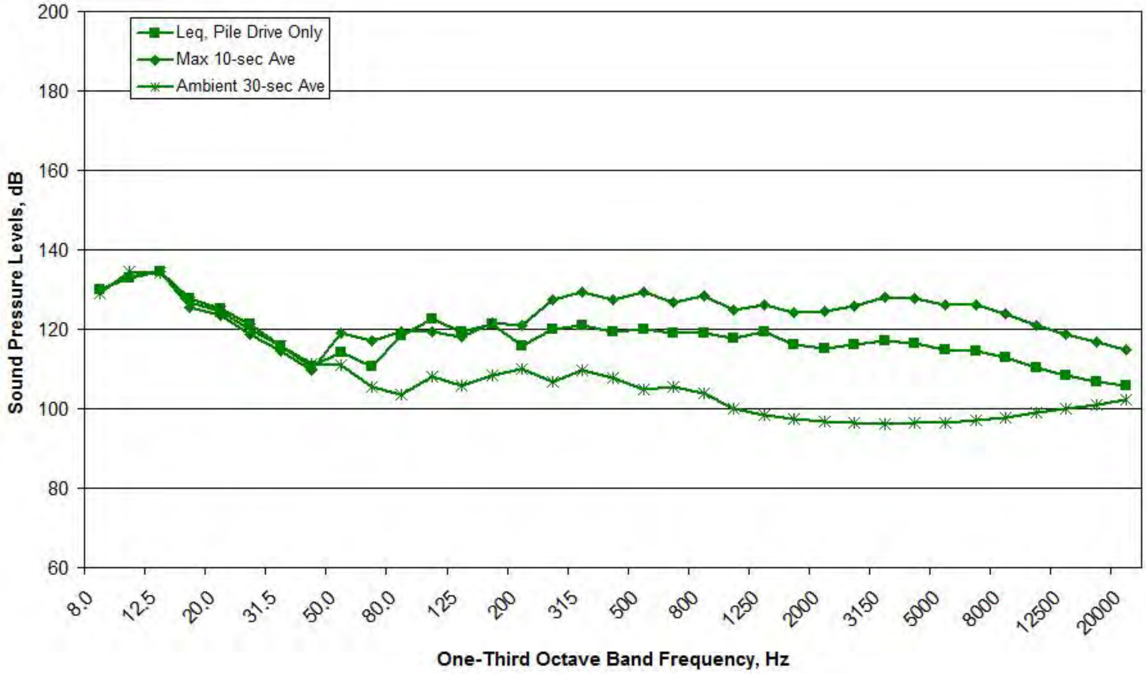

Figure B207. Spectral Data Measured at the MID Location during W1, 9:21-9:25, Measured at Depths of 10 meters on October 11, 2011

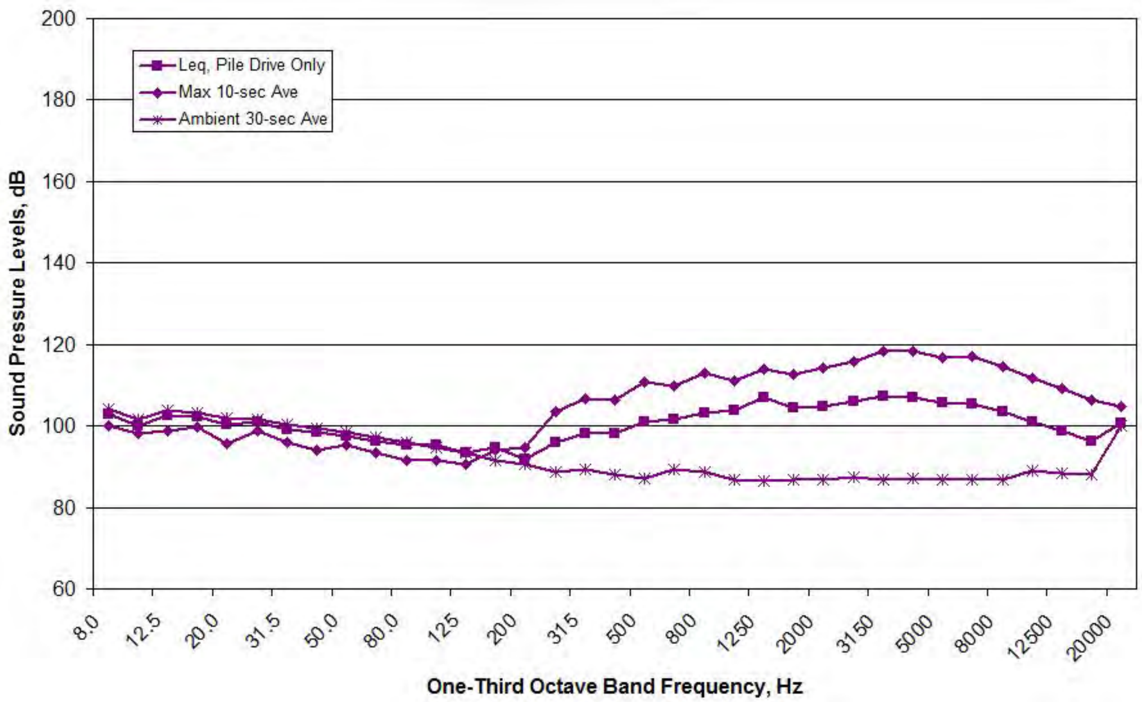

Figure B208. Spectral Data Measured at the RFT Location during W1, 9:21-9:25, Measured at Depths of 10 meters on October 11, 2011

W7 (Vibratory Installation)

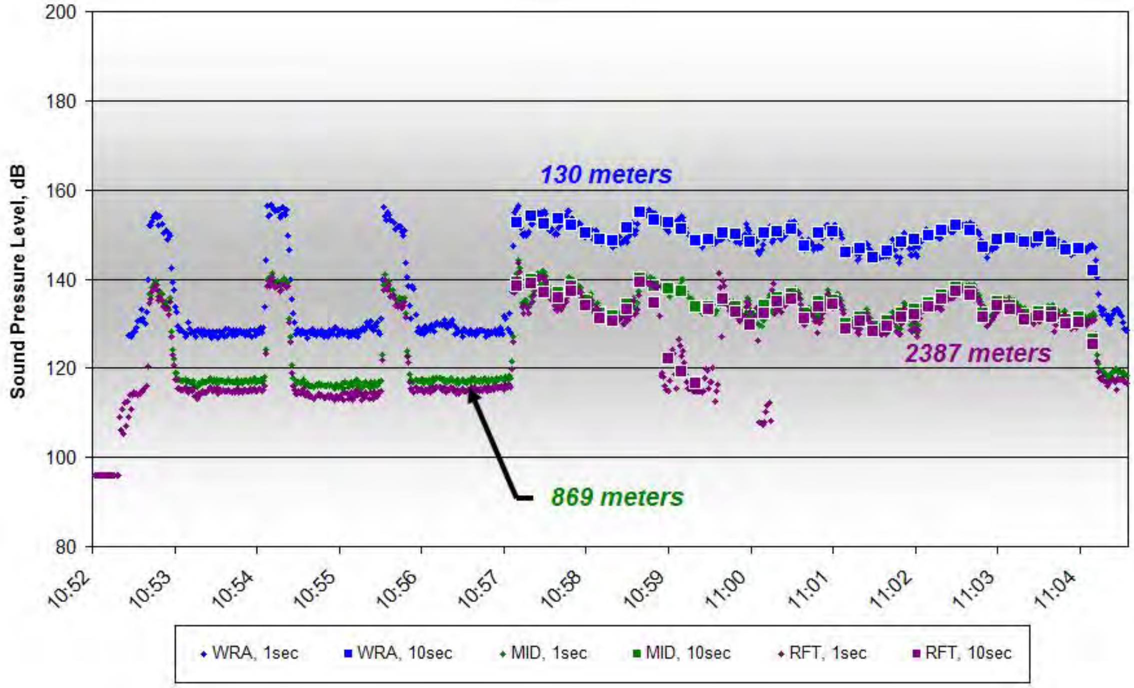

Figure B209. One-second and 10-second Average Data for W7, 10:53-11:05, Measured at Depths of 17-30 meters on October 11, 2011

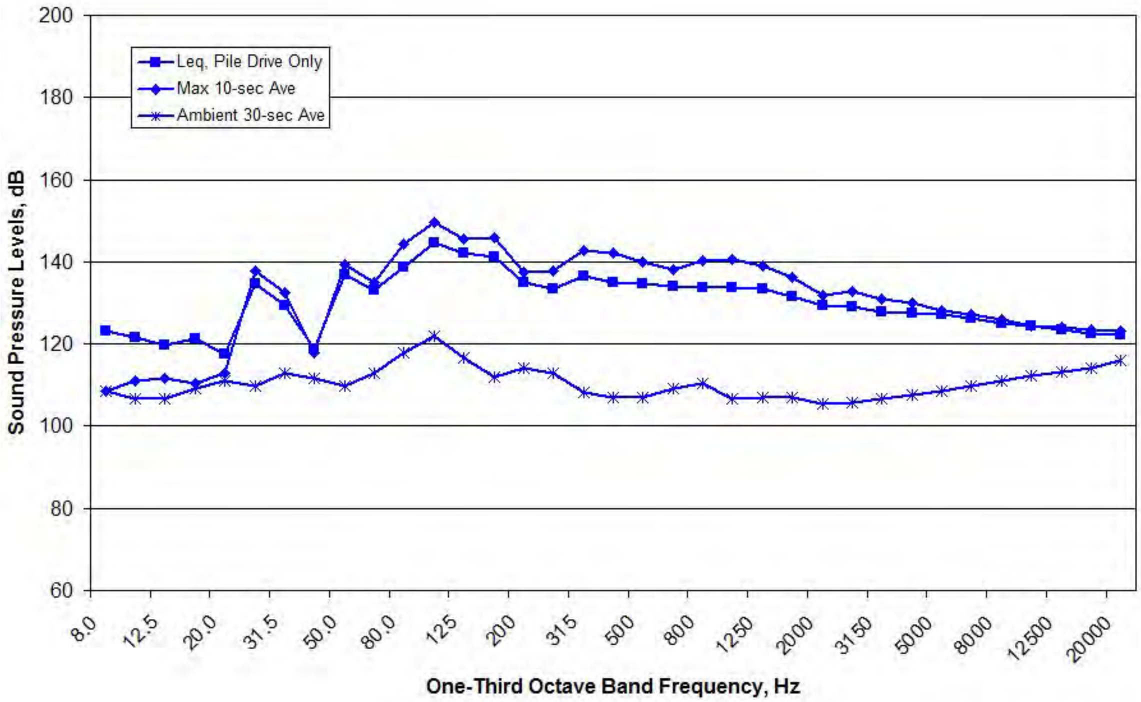

Figure B210. Spectral Data Measured at the WRA Location during W7, 10:53-11:05, Measured at Depths of 30 meters on October 11, 2011

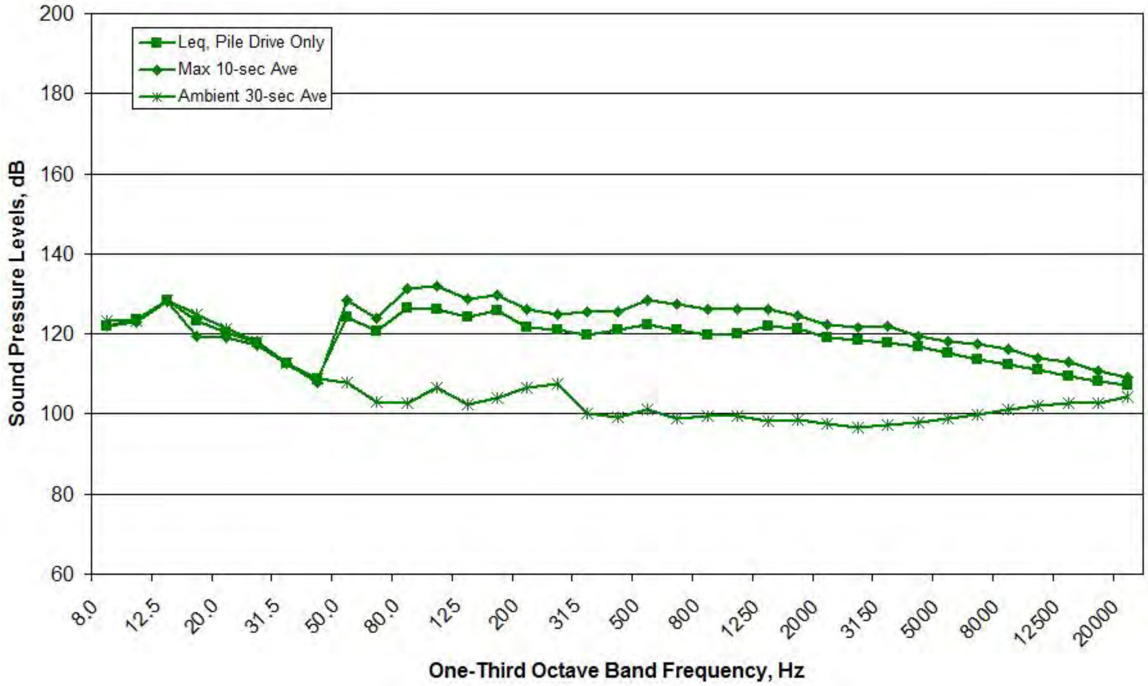

Figure B211. Spectral Data Measured at the MID Location during W7, 10:53-11:05, Measured at Depths of 30 meters on October 11, 2011

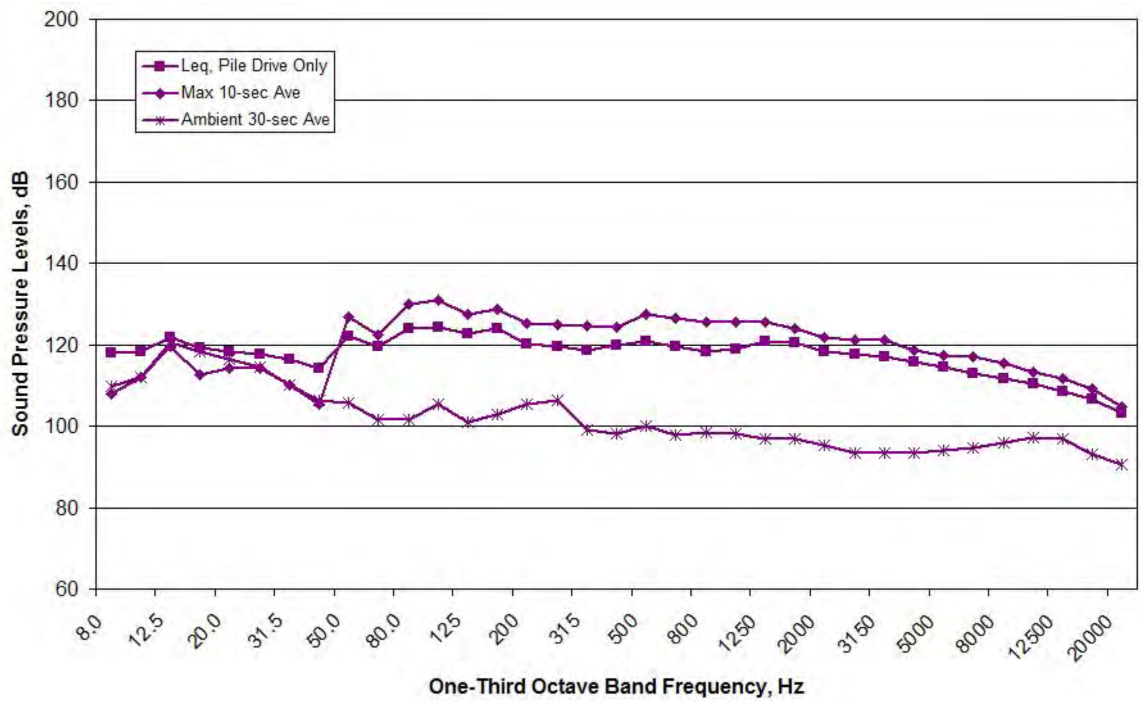

Figure B212. Spectral Data Measured at the RFT Location during W7, 10:53-11:05, Measured at Depths of 17 meters on October 11, 2011

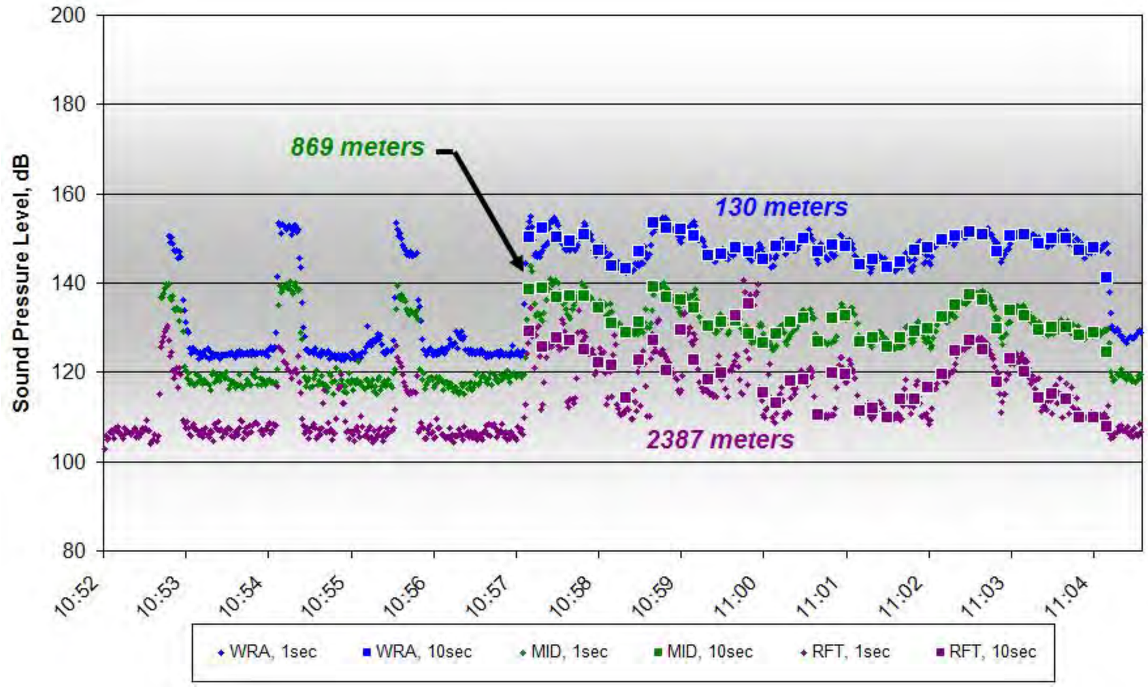

Figure B213. One-second and 10-second Average Data for W7, 10:53-11:05, Measured at Depths of 10 meters on October 11, 2011

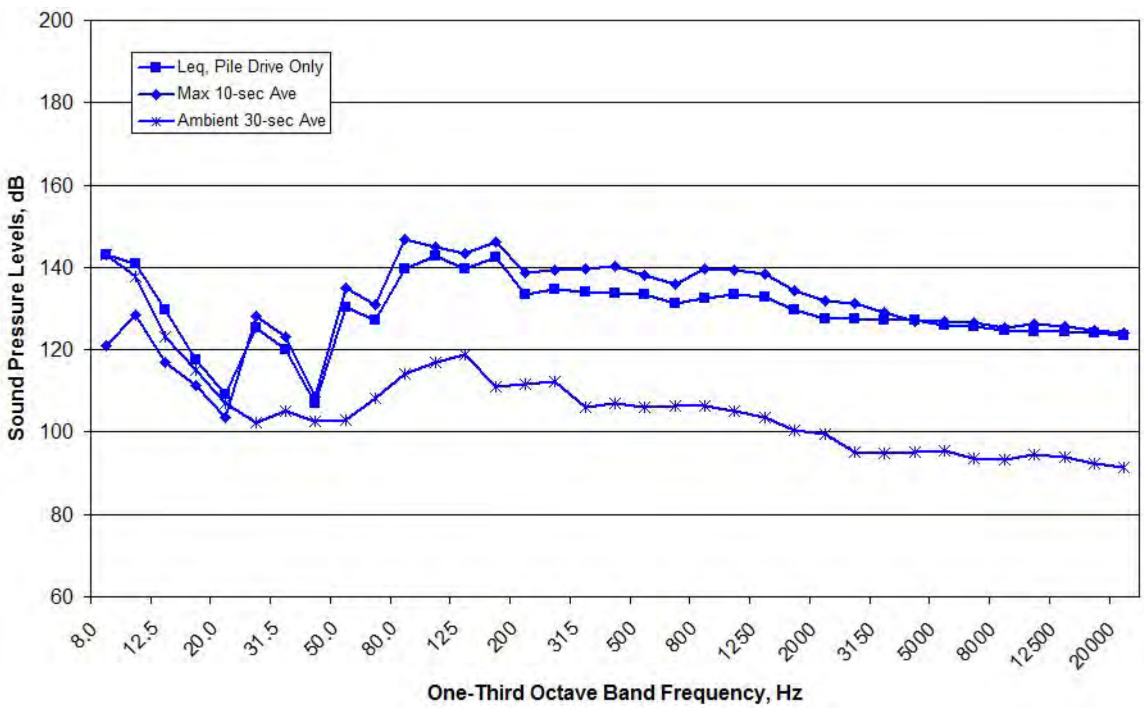

Figure B214. Spectral Data Measured at the WRA Location during W7, 10:53-11:05, Measured at Depths of 10 meters on October 11, 2011

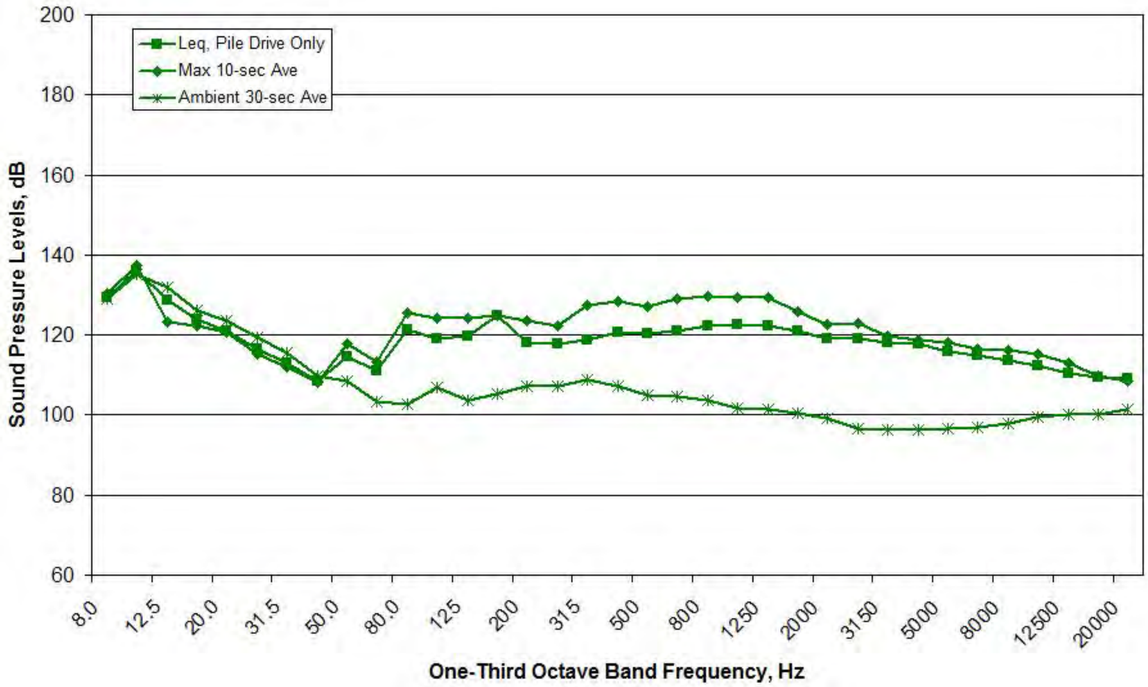

Figure B215. Spectral Data Measured at the MID Location during W7, 10:53-11:05, Measured at Depths of 10 meters on October 11, 2011

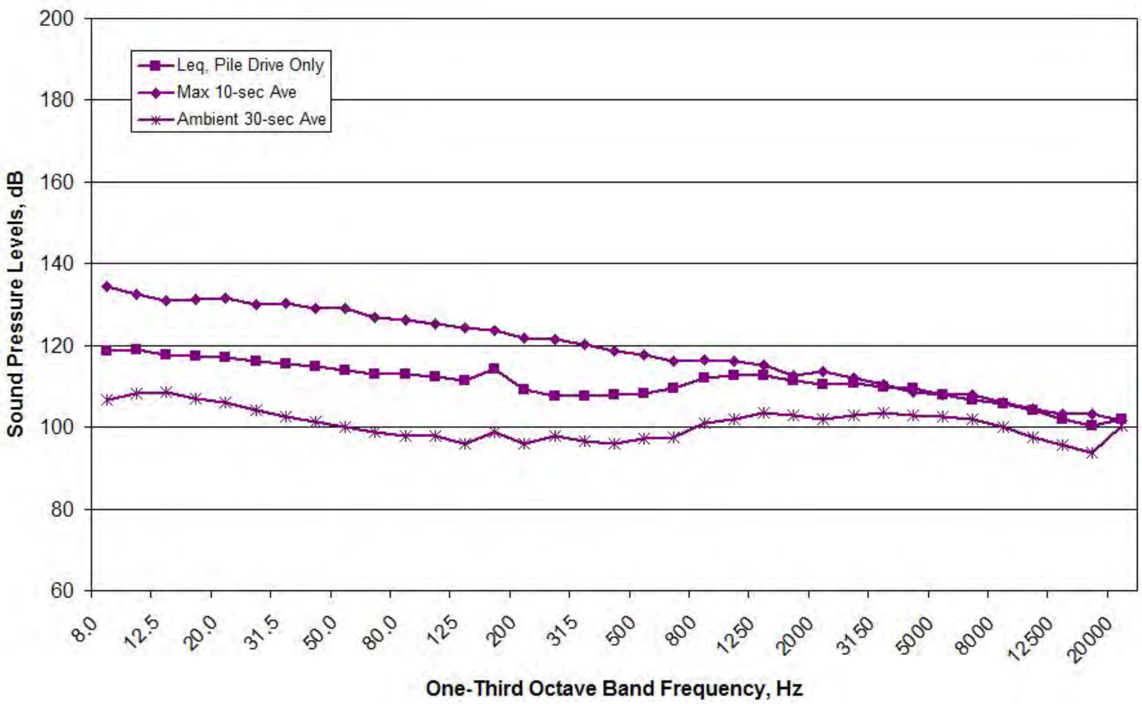

Figure B216. Spectral Data Measured at the RFT Location during W7, 10:53-11:05, Measured at Depths of 10 meters on October 11, 2011

W9 (Vibratory Installation)

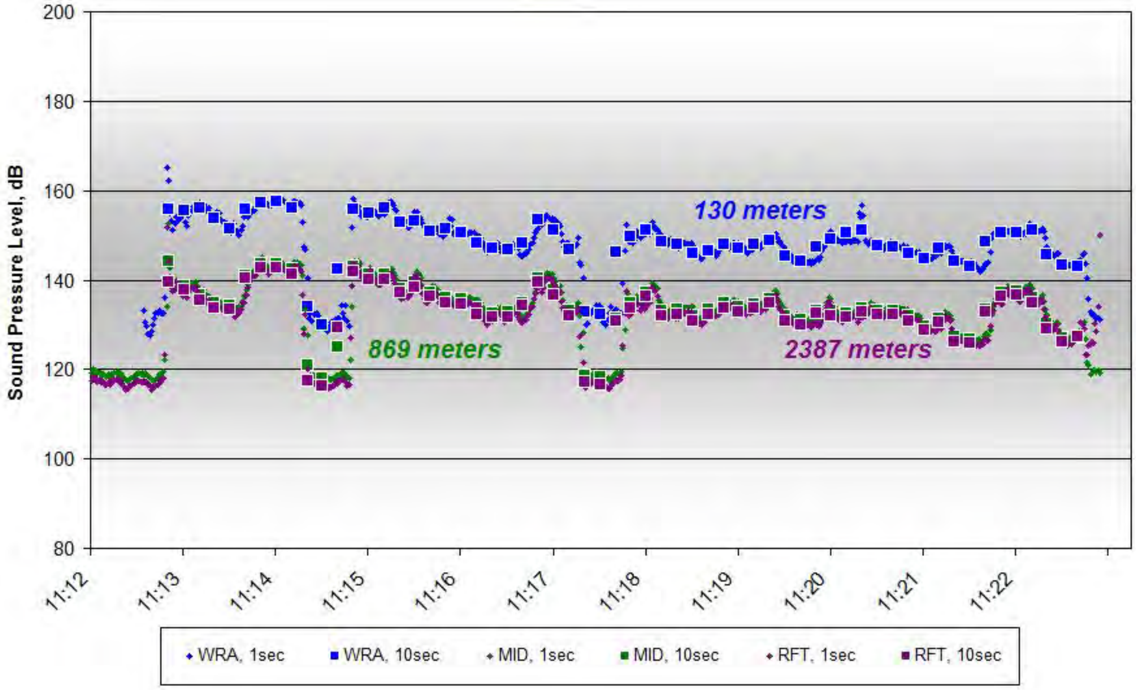

Figure B217. One-second and 10-second Average Data for W9, 11:13-11:23, Measured at Depths of 17-30 meters on October 11, 2011

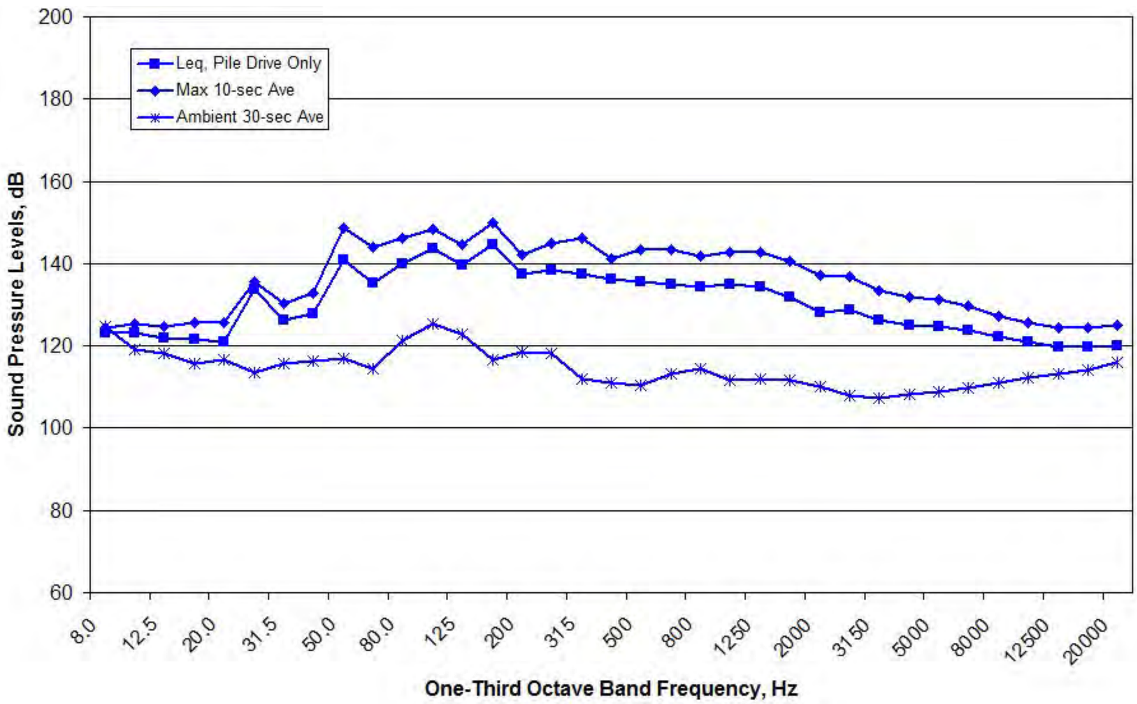

Figure B218. Spectral Data Measured at the WRA Location during W9, 11:13-11:23, Measured at Depths of 30 meters on October 11, 2011

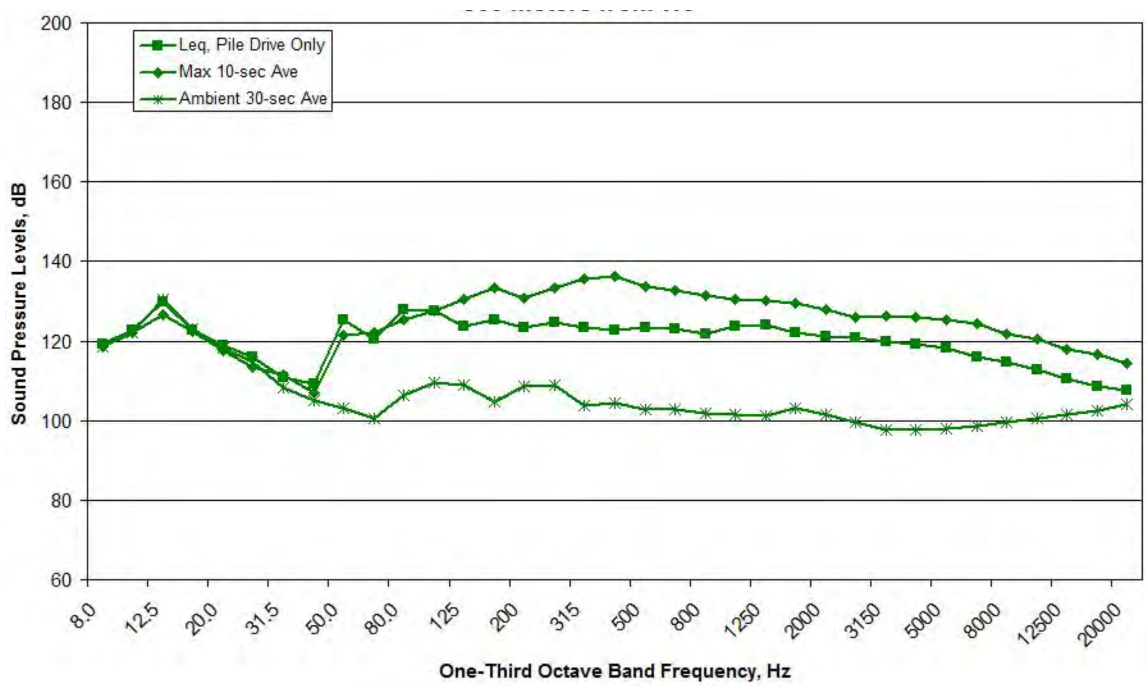

Figure B219. Spectral Data Measured at the MID Location during W9, 11:13-11:23, Measured at Depths of 30 meters on October 11, 2011

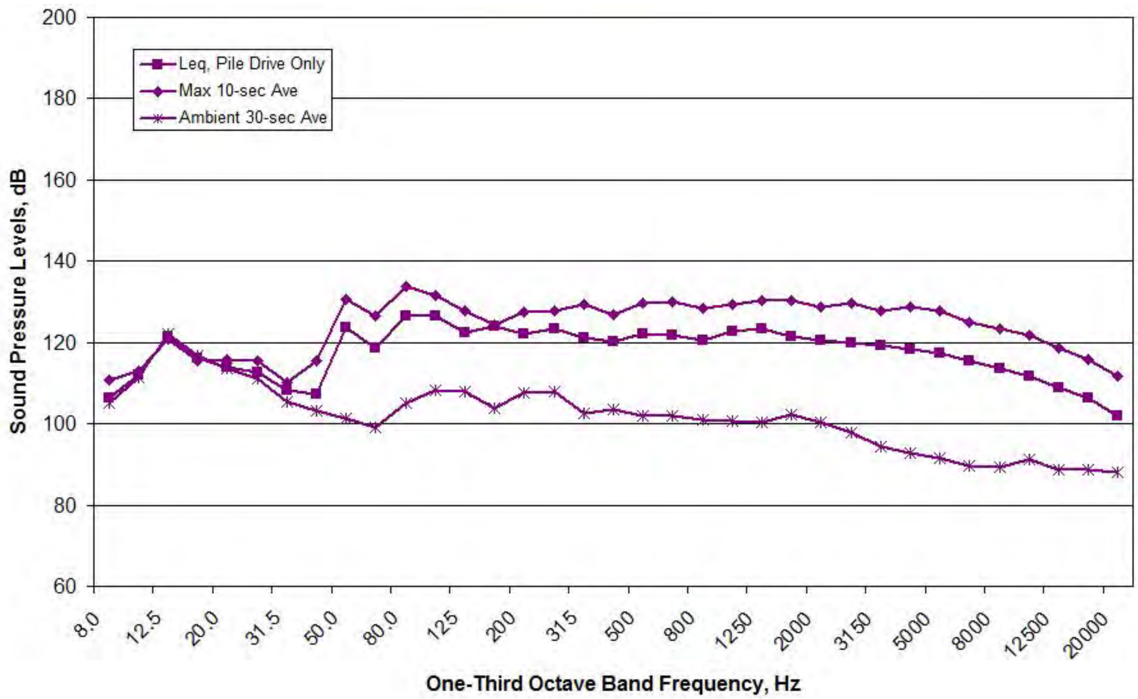

Figure B220. Spectral Data Measured at the RFT Location during W9, 11:13-11:23, Measured at Depths of 17 meters on October 11, 2011

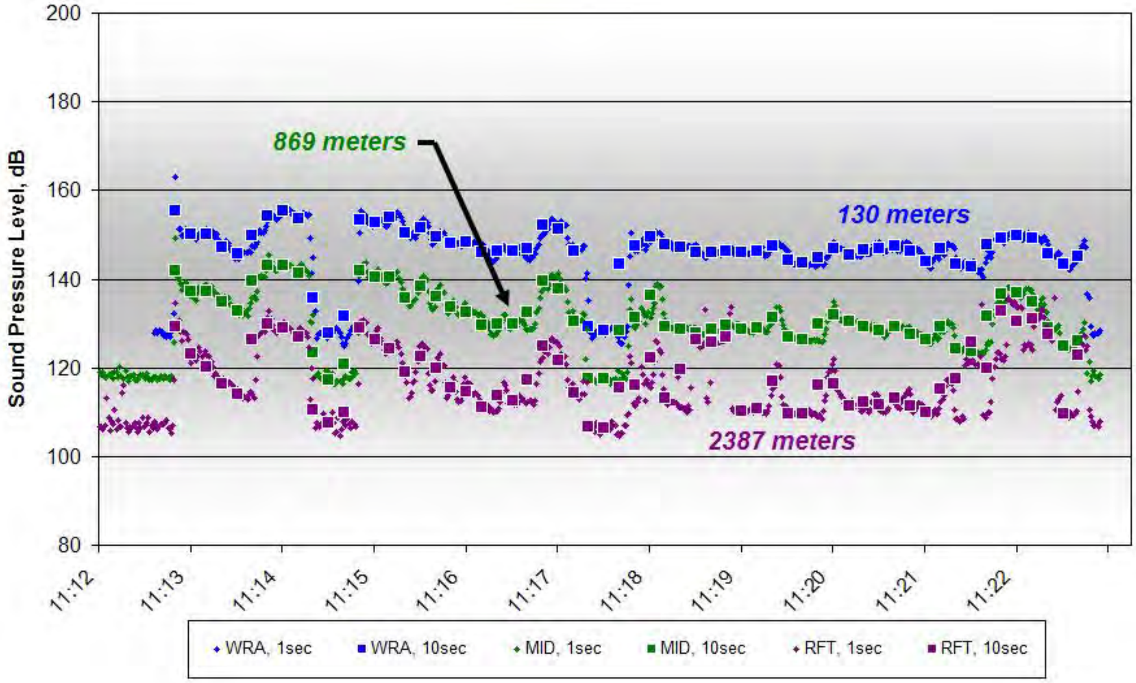

Figure B221. One-second and 10-second Average Data for W9, 11:13-11:23, Measured at Depths of 10 meters on October 11, 2011

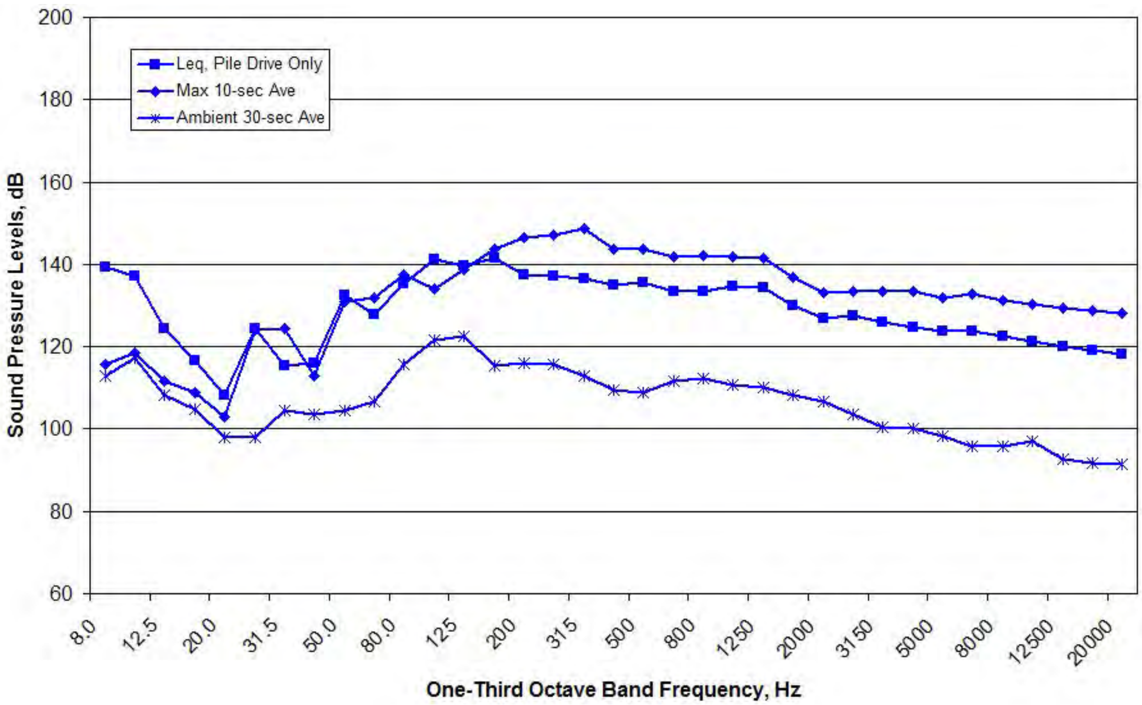

Figure B222. Spectral Data Measured at the WRA Location W9, 11:13-11:23, Measured at Depths of 10 meters on October 11, 2011

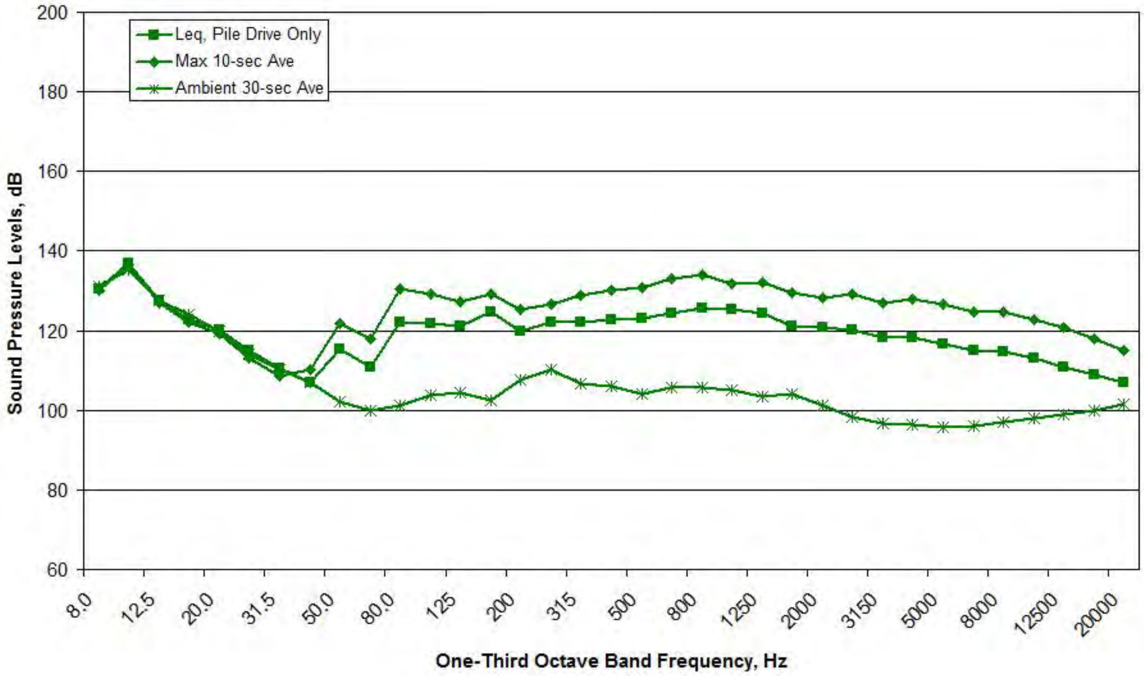

Figure B223. Spectral Data Measured at the MID Location during W9, 11:13-11:23, Measured at Depths of 10 meters on October 11, 2011

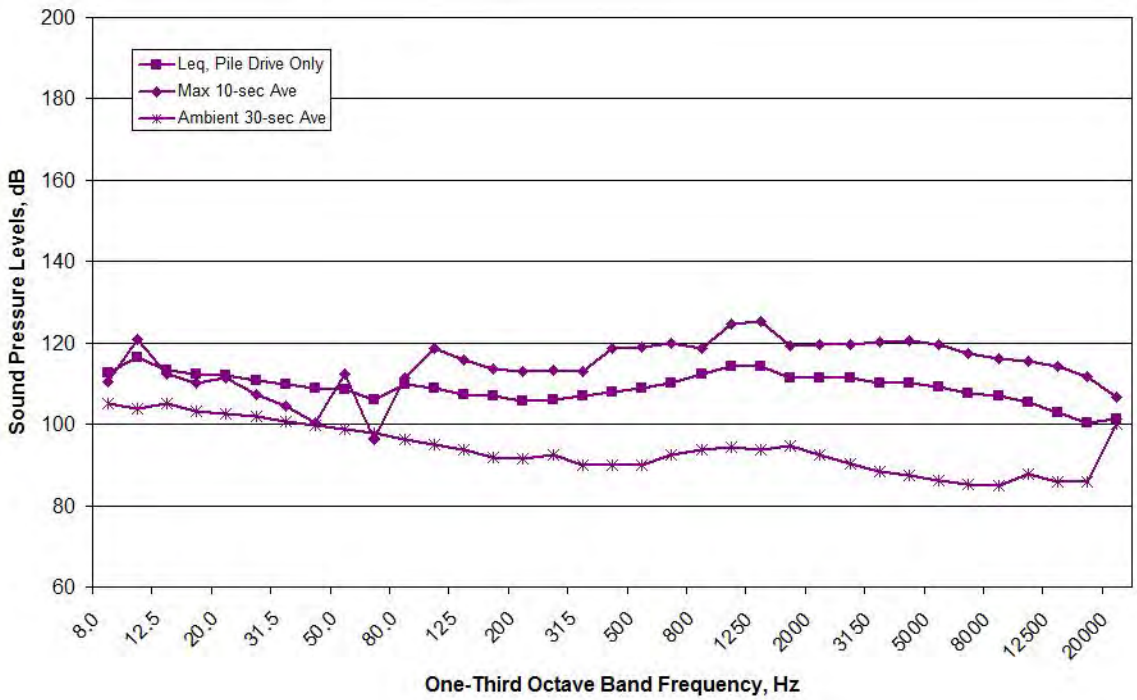

Figure B224. Spectral Data Measured at the RFT Location during W9, 11:13-11:23, Measured at Depths of 10 meters on October 11, 2011

W10 (Vibratory Installation)

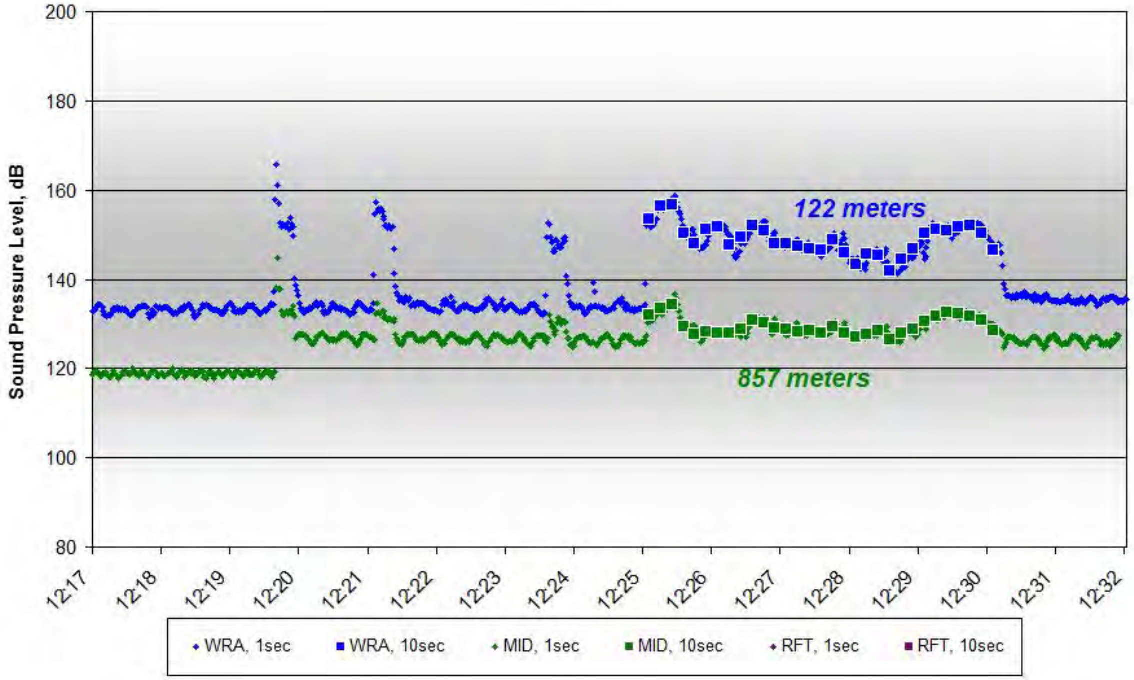

Figure B225. One-second and 10-second Average Data for W10, 12:20-12:31, Measured at Depths of 17-30 meters on October 11, 2011

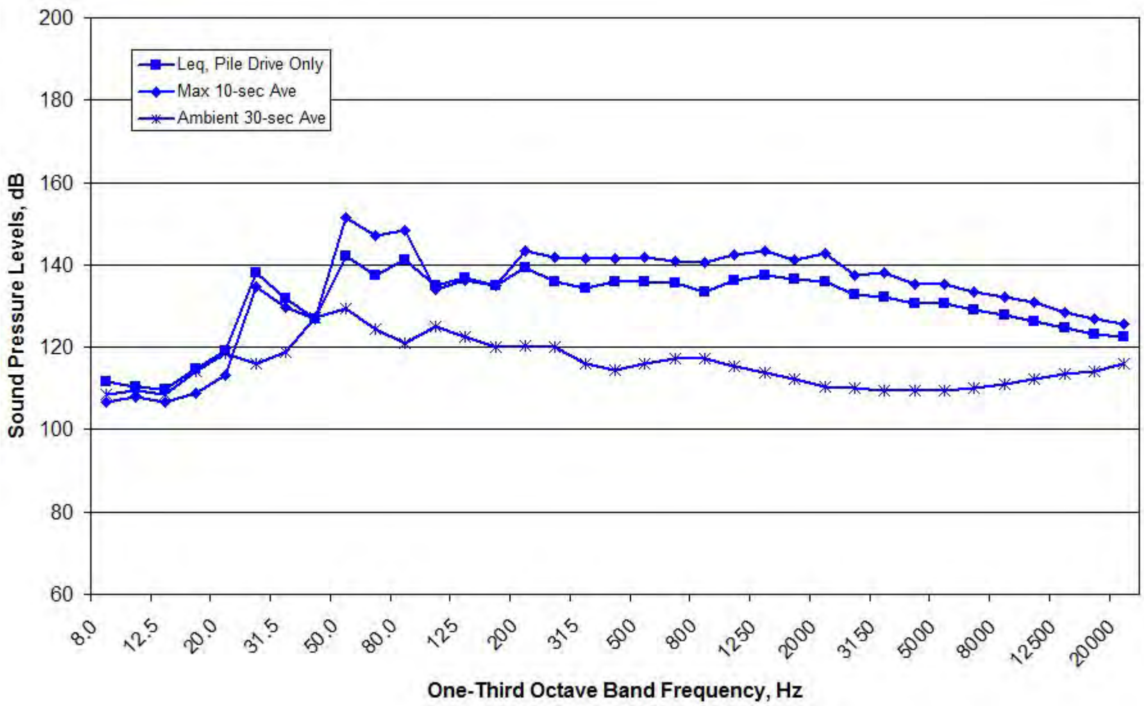

Figure B226. Spectral Data Measured at the WRA Location during W10, 12:20-12:31, Measured at Depths of 30 meters on October 11, 2011

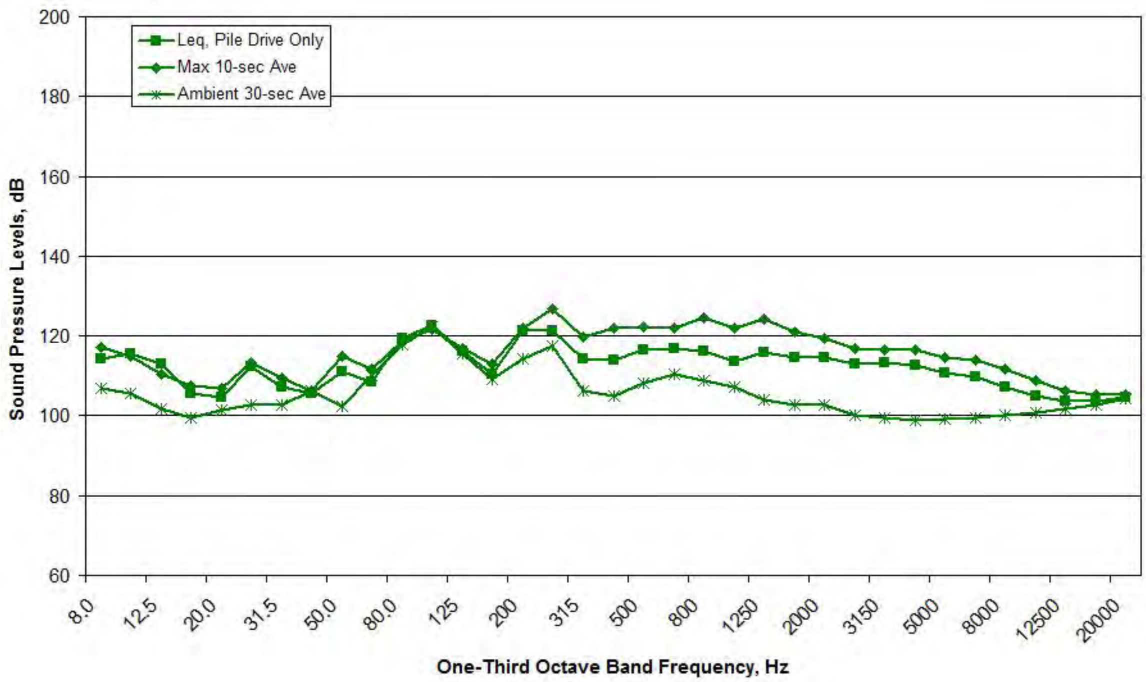

Figure B227. Spectral Data Measured at the MID Location during W10, 12:20-12:31, Measured at Depths of 30 meters on October 11, 2011

NO DATA AVAILABLE – DATA NOT USEABLE

Figure B228. Spectral Data Measured at the RFT Location during W10, 12:20-12:31, Measured at Depths of 17 meters on October 11, 2011

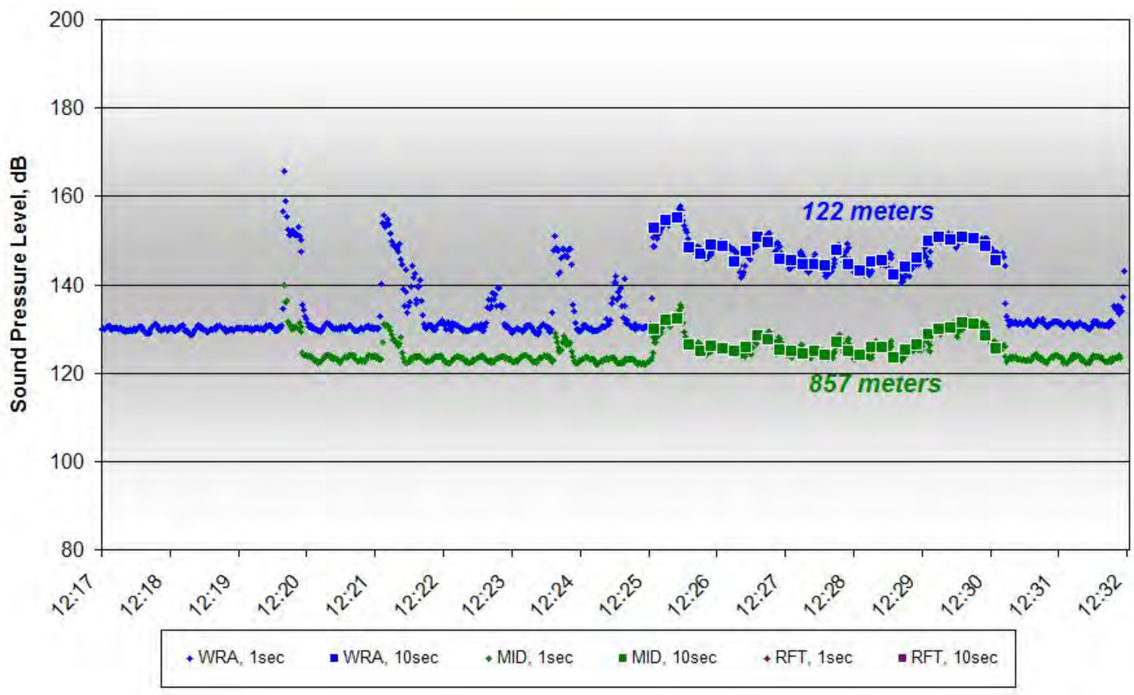

Figure B229. One-second and 10-second Average Data for W10, 12:20-12:31, Measured at Depths of 10 meters on October 11, 2011

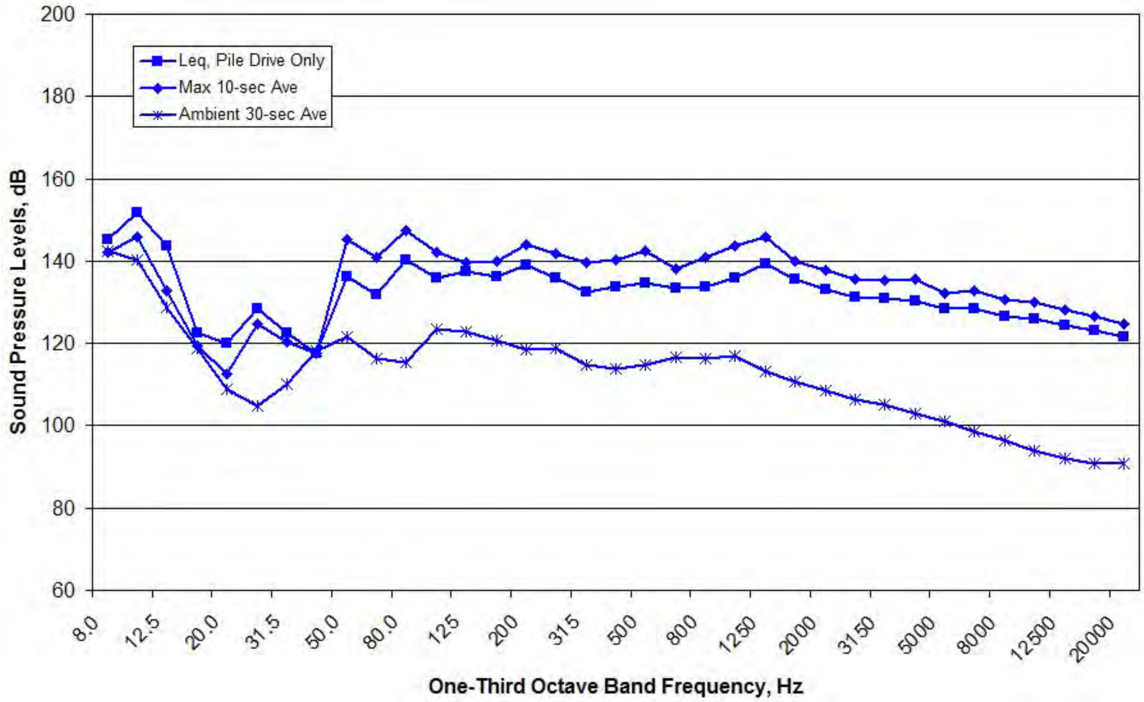

Figure B230. Spectral Data Measured at the WRA Location during W10, 12:20-12:31, Measured at Depths of 10 meters on October 11, 2011

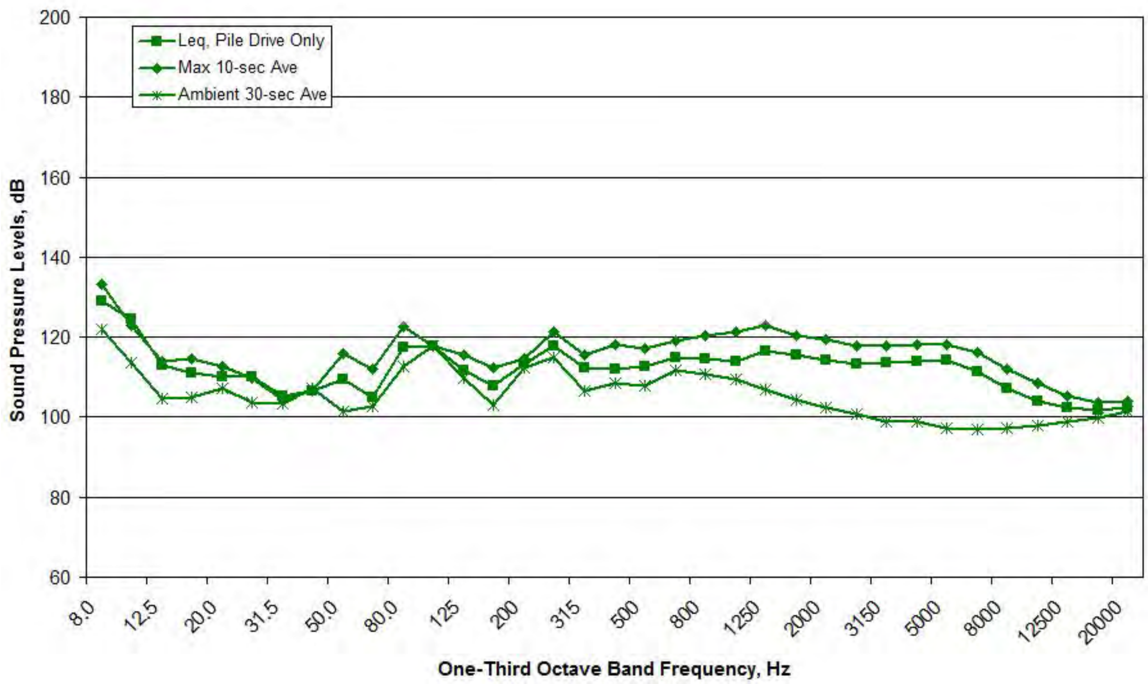

Figure B231. Spectral Data Measured at the MID Location during W10, 12:20-12:31, Measured at Depths of 10 meters on October 11, 2011

NO DATA AVAILABLE – DATA NOT USEABLE

Figure B232. Spectral Data Measured at the RFT Location during W10, 12:20-12:31, Measured at Depths of 10 meters on October 11, 2011

W8 (Vibratory Installation)

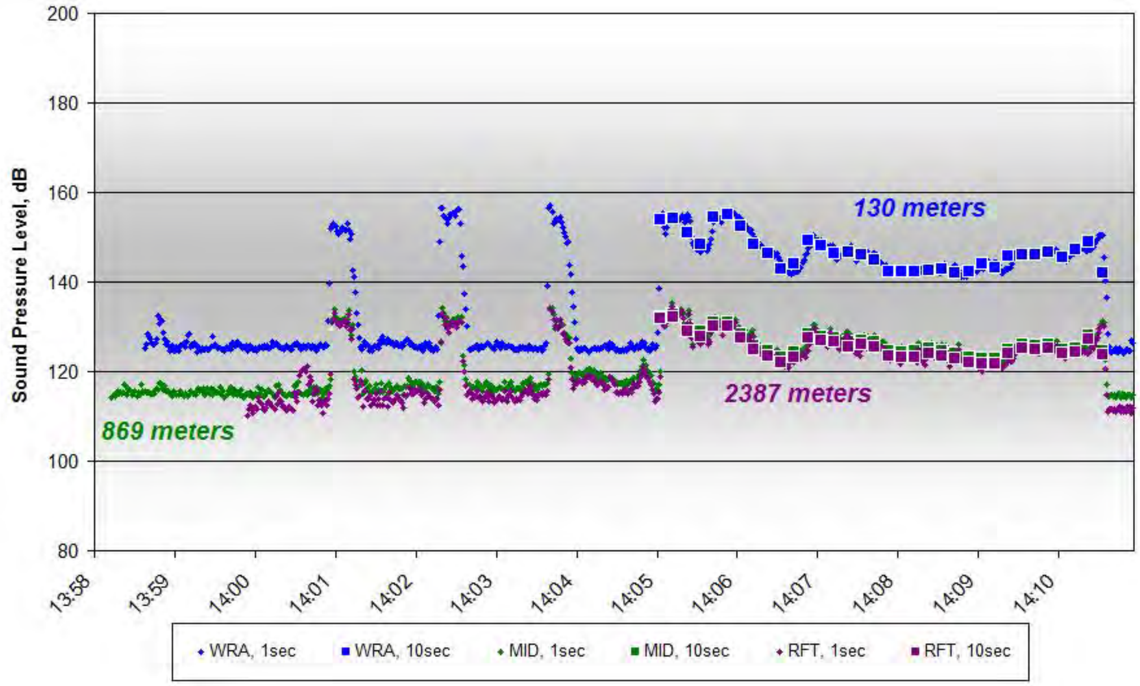

Figure B233. One-second and 10-second Average Data for W8, 14:01-14:11, Measured at Depths of 17-30 meters on October 11, 2011

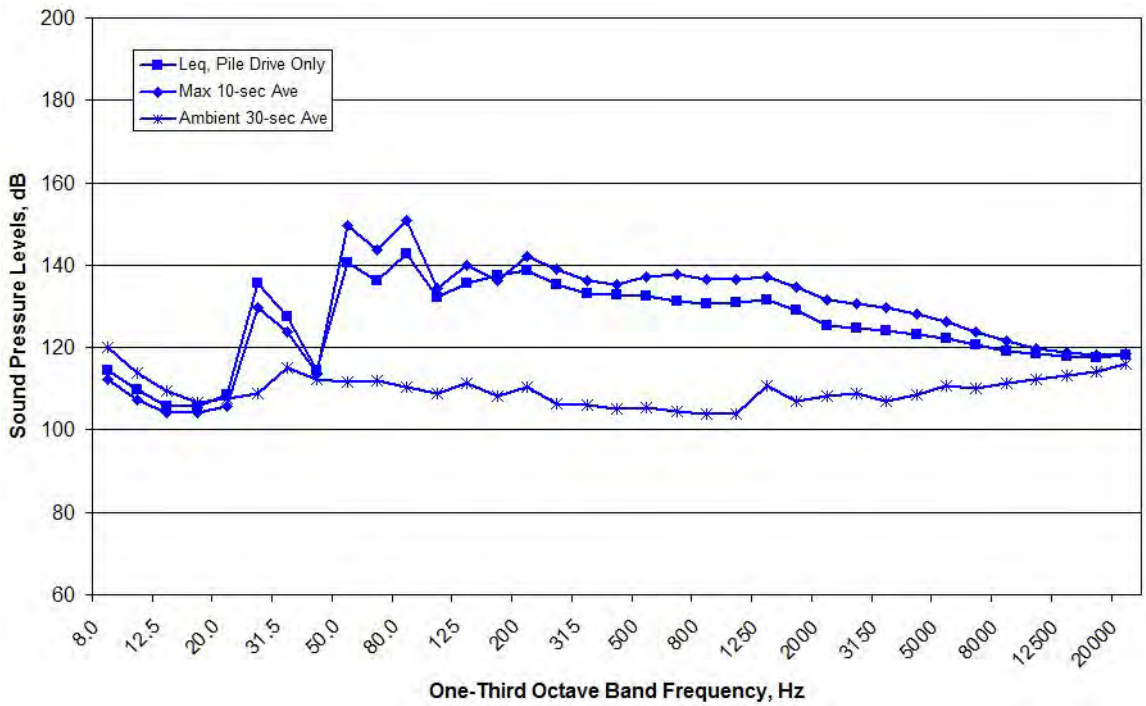

Figure B234. Spectral Data Measured at the WRA Location during W8, 14:01-14:11, Measured at Depths of 30 meters on October 11, 2011

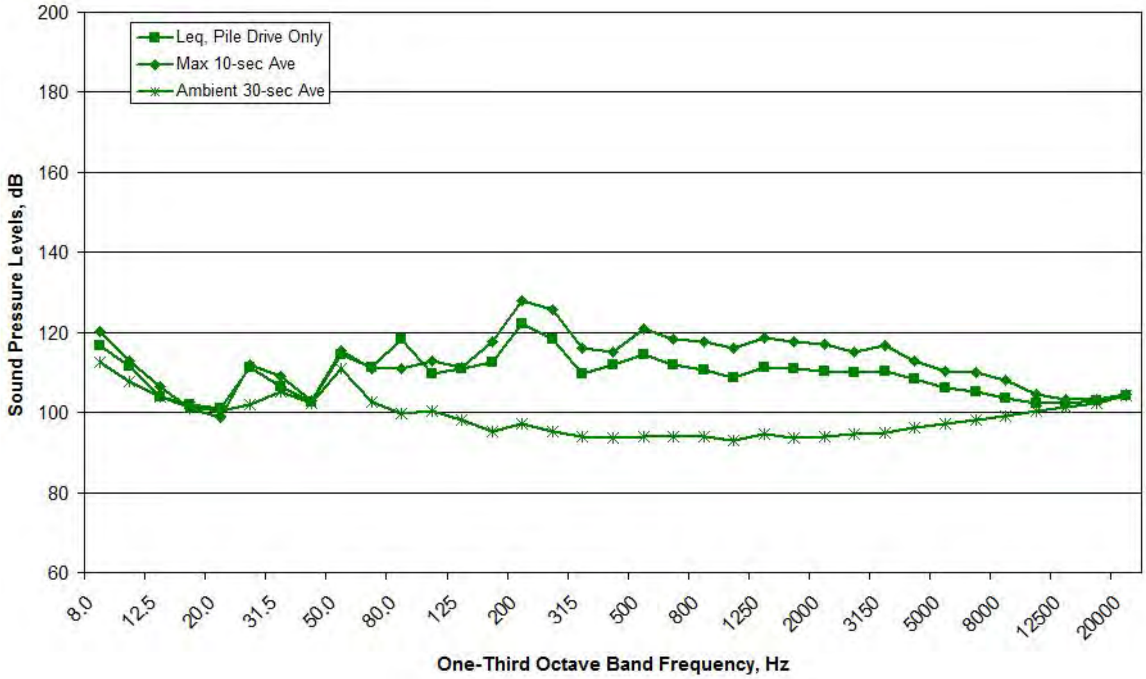

Figure B235. Spectral Data Measured at the MID Location during W8, 14:01-14:11, Measured at Depths of 30 meters on October 11, 2011

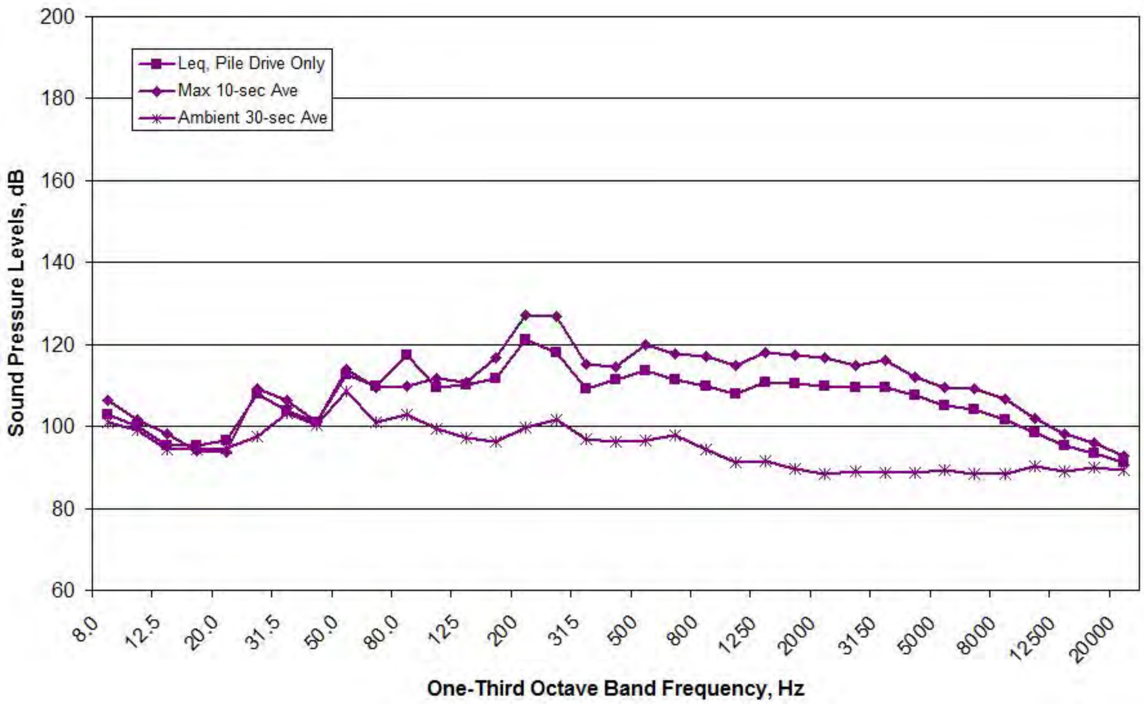

Figure B236. Spectral Data Measured at the RFT Location during W8, 14:01-14:11, Measured at Depths of 17 meters on October 11, 2011

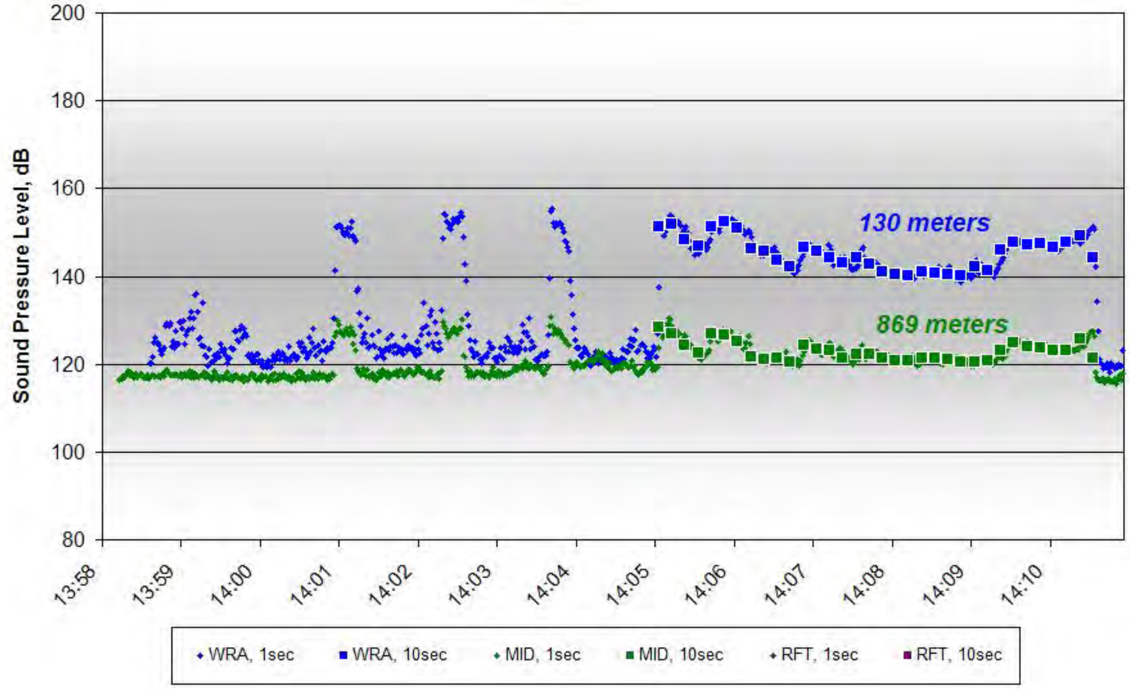

Figure B237. One-second and 10-second Average Data for W8, 14:01-14:11, Measured at Depths of 10 meters on October 11, 2011

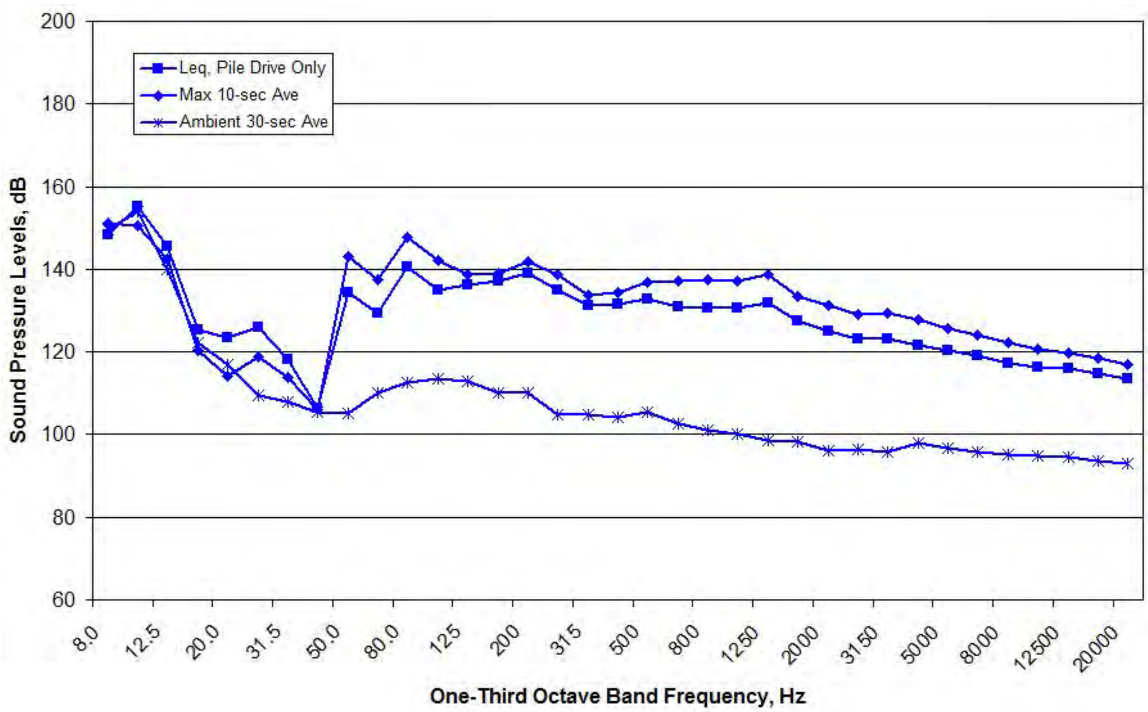

Figure B238. Spectral Data Measured at the WRA Location W8, 14:01-14:11, Measured at Depths of 10 meters on October 11, 2011

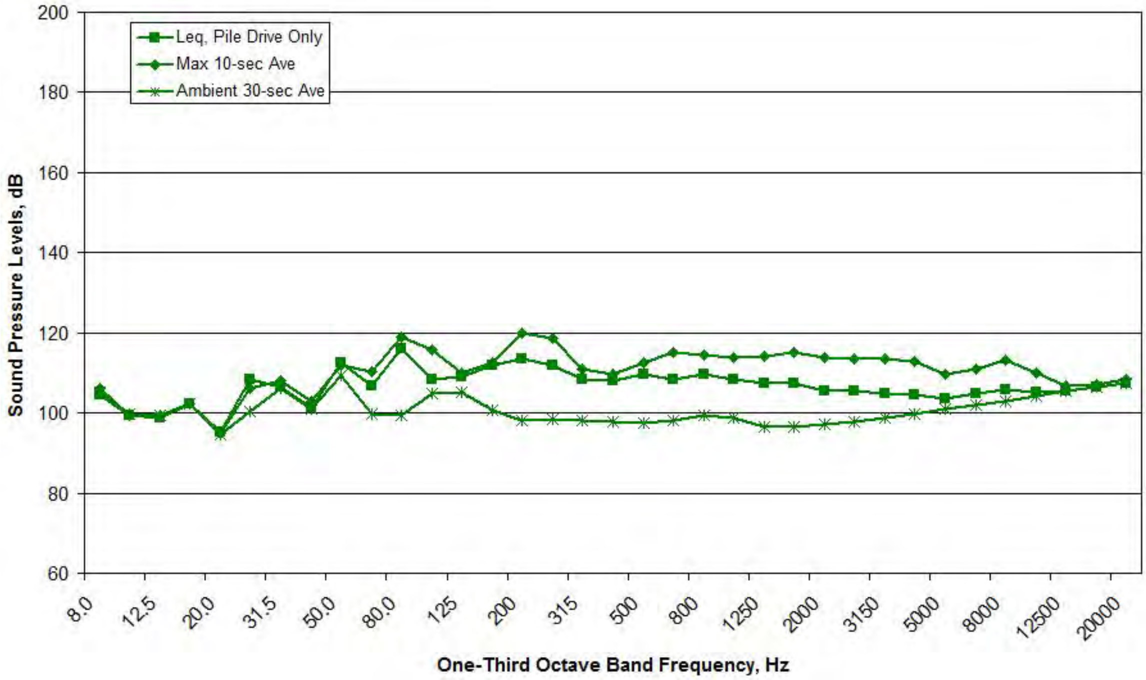

Figure B239. Spectral Data Measured at the MID Location during W8, 14:01-14:11, Measured at Depths of 10 meters on October 11, 2011

NO DATA AVAILABLE – DATA NOT USEABLE

Figure B239. Spectral Data Measured at the RFT Location during W8, 14:01-14:11, Measured at Depths of 10 meters on October 11, 2011

EHW16, 16:51-17:07 (Vibratory Installation)

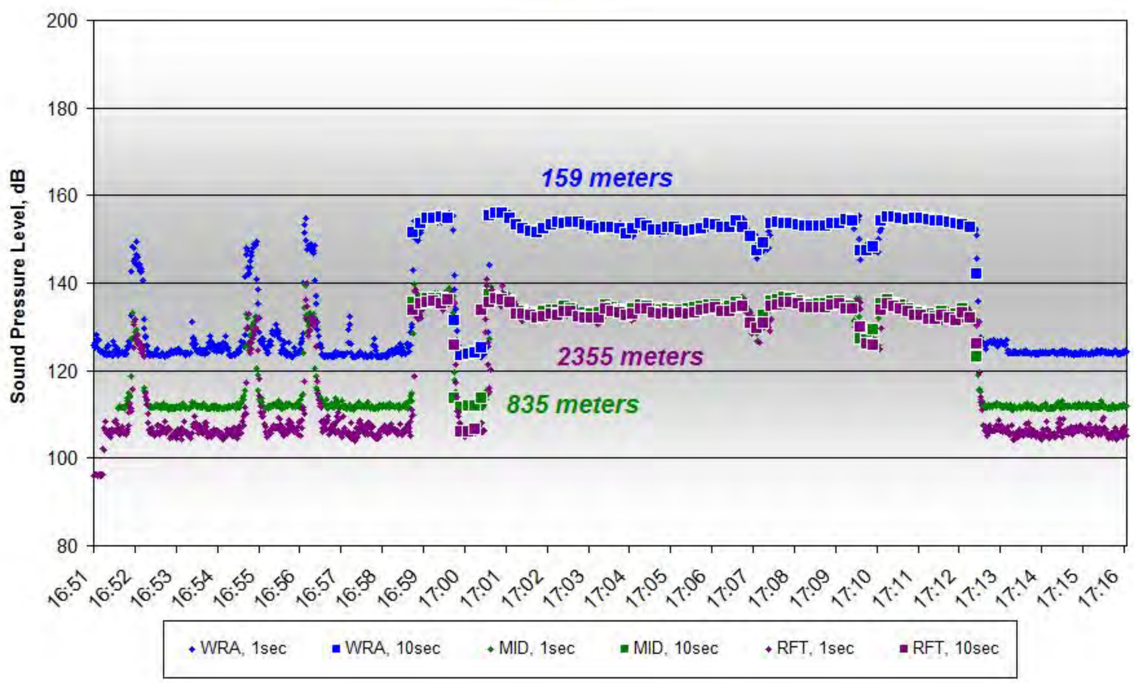

Figure B239. One-second and 10-second Average Data for EHW16, 16:51-17:49, Measured at Depths of 17-30 meters on October 11, 2011

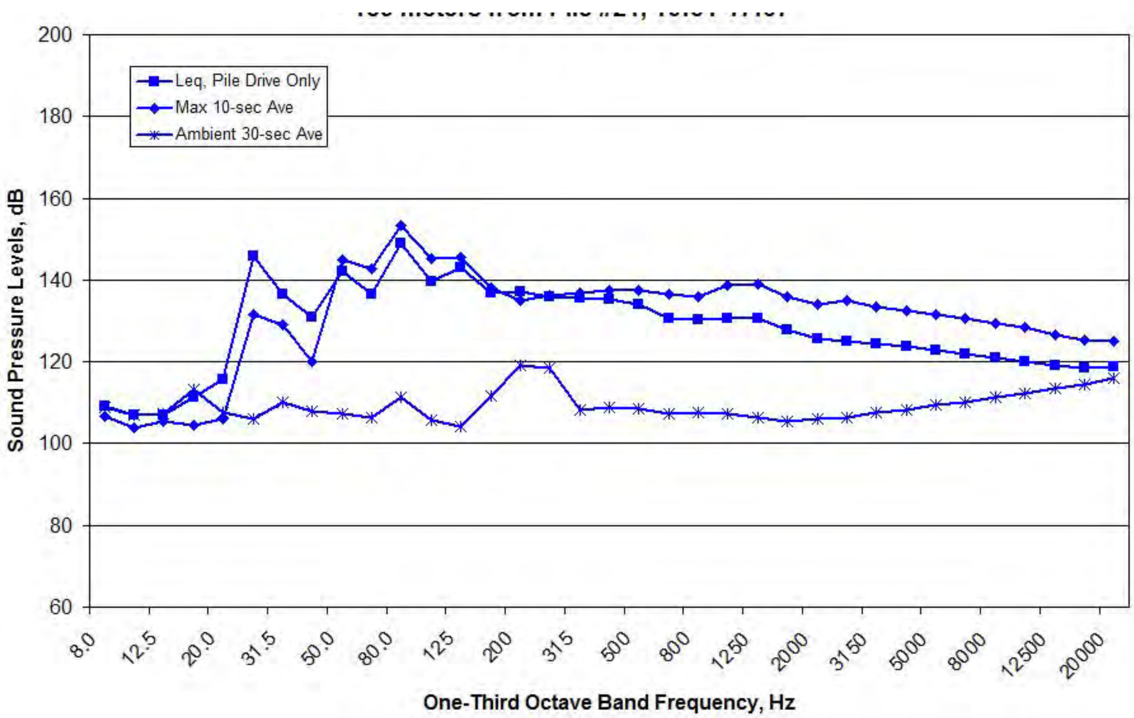

Figure B240. Spectral Data Measured at the WRA Location during EHW16, 16:51-17:07, Measured at Depths of 30 meters on October 11, 2011

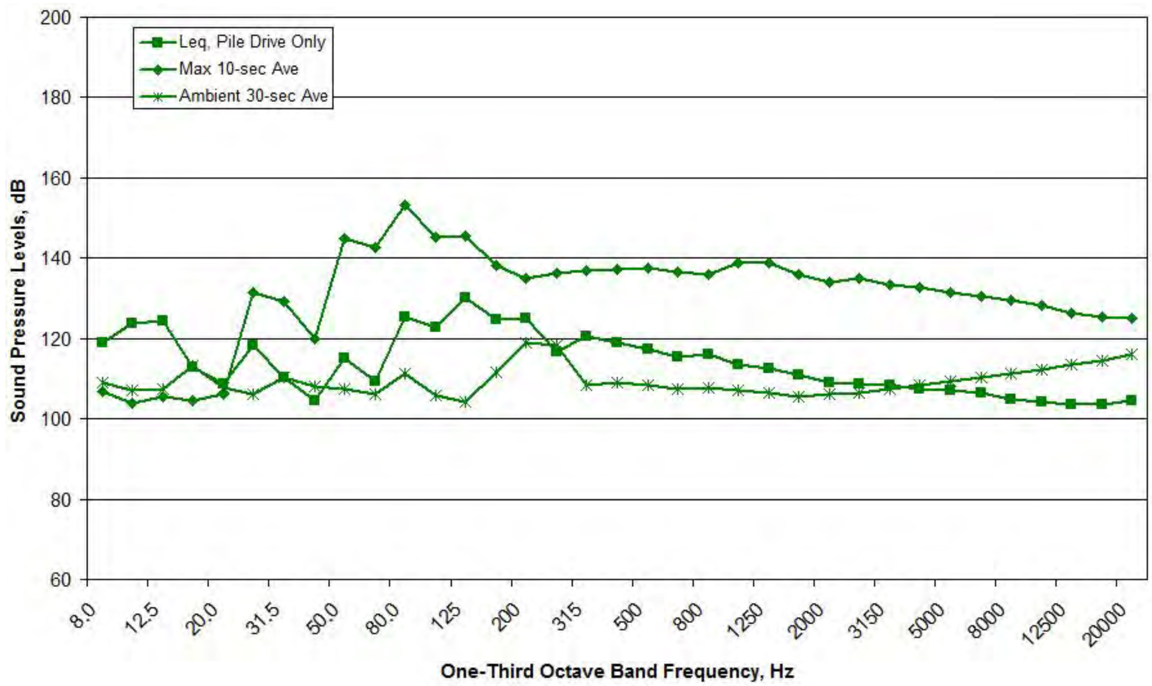

Figure B241. Spectral Data Measured at the MID Location during EHW16, 16:51-17: 07, Measured at Depths of 30 meters on October 11, 2011

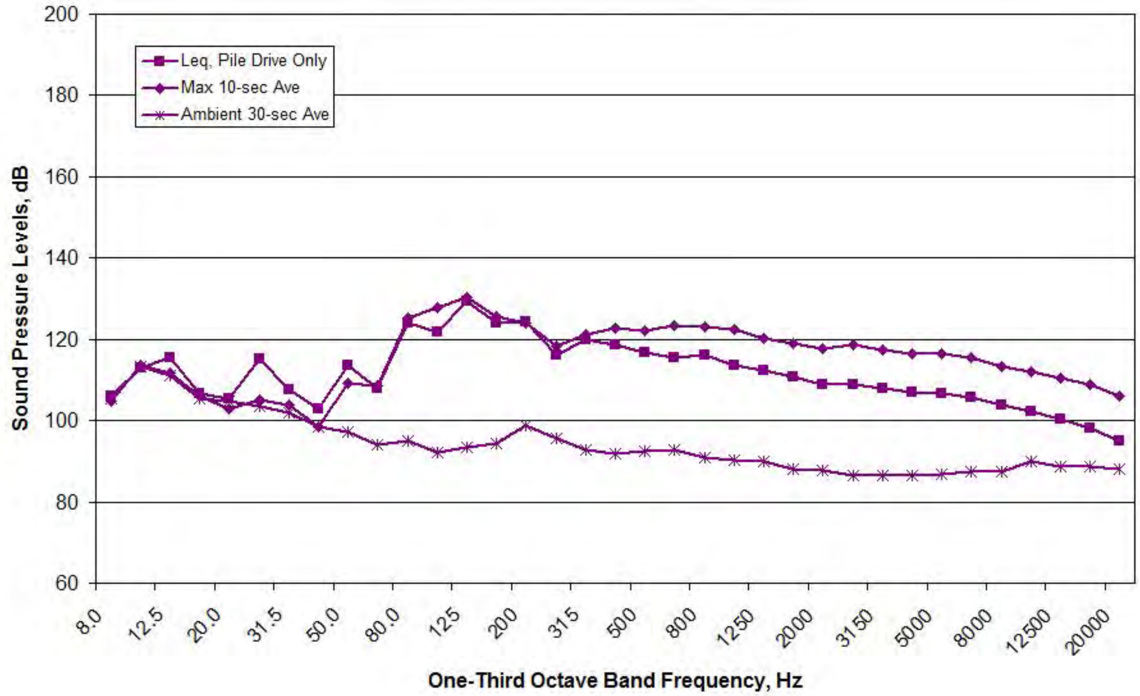

Figure B242. Spectral Data Measured at the RFT Location during EHW16, 16:51-17: 07, Measured at Depths of 17 meters on October 11, 2011

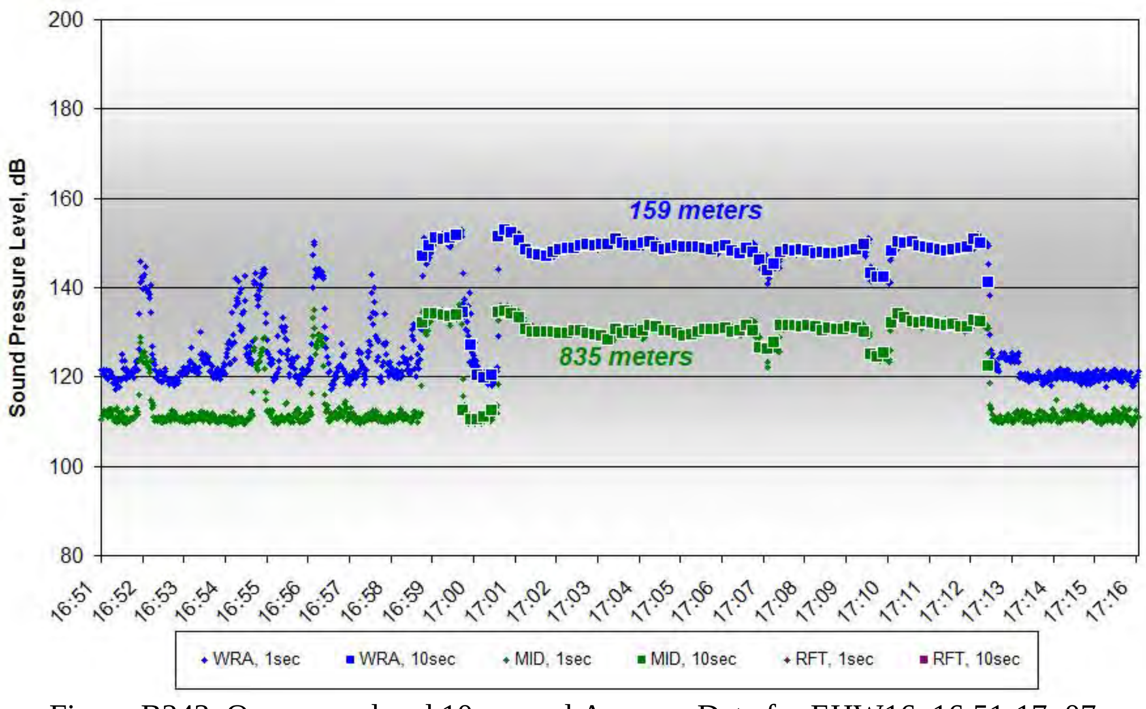

Figure B243. One-second and 10-second Average Data for EHW16, 16:51-17: 07, Measured at Depths of 10 meters on October 11, 2011

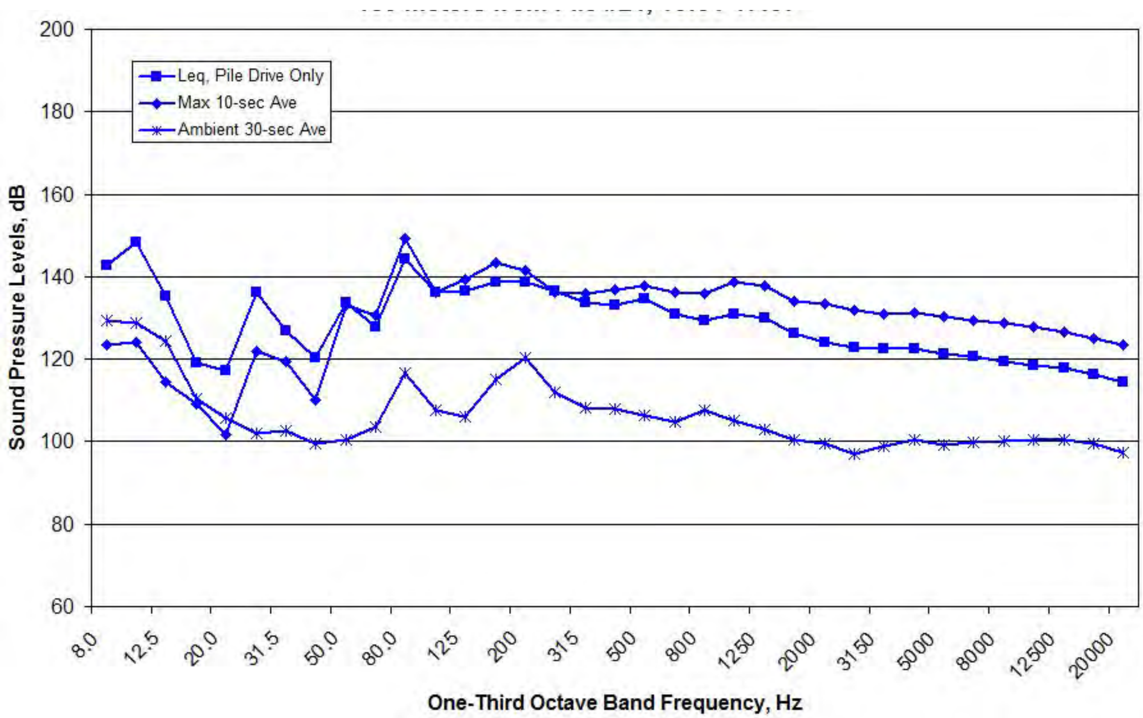

Figure B244. Spectral Data Measured at the WRA Location during EHW16, 16:51-17: 07, Measured at Depths of 10 meters on October 11, 2011

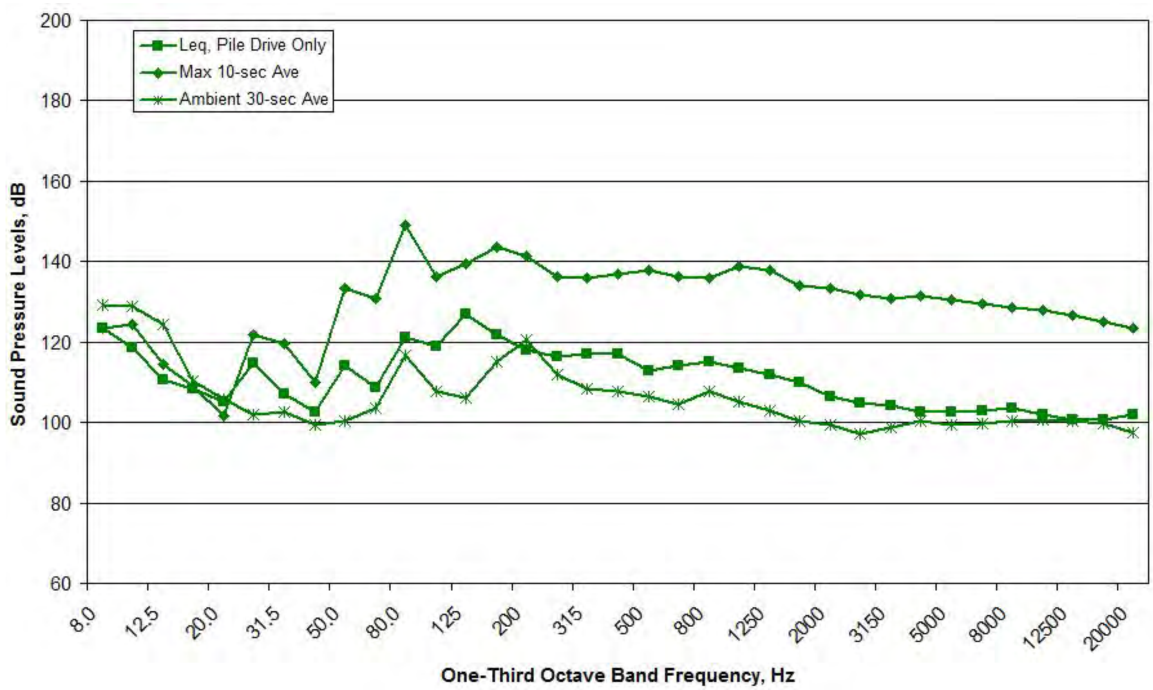

Figure B245. Spectral Data Measured at the MID Location during EHW16, 16:51-17: 07, Measured at Depths of 10 meters on October 11, 2011

NO DATA AVAILABLE – DATA NOT USEABLE

Figure B246. Spectral Data Measured at the RFT Location during EHW16, 16:51-17: 07, Measured at Depths of 10 meters on October 11, 2011

EHW16, 17:13-17:27 (Vibratory Installation)

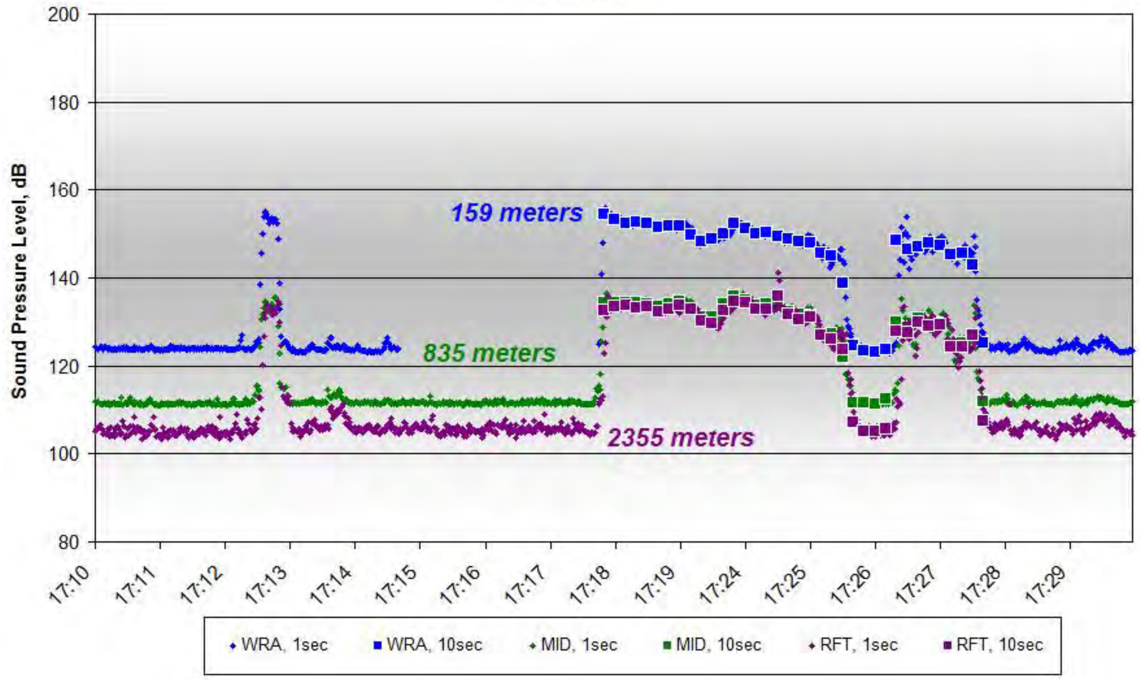

Figure B247. One-second and 10-second Average Data for EHW16, 17:13-17:27, Measured at Depths of 17-30 meters on October 11, 2011

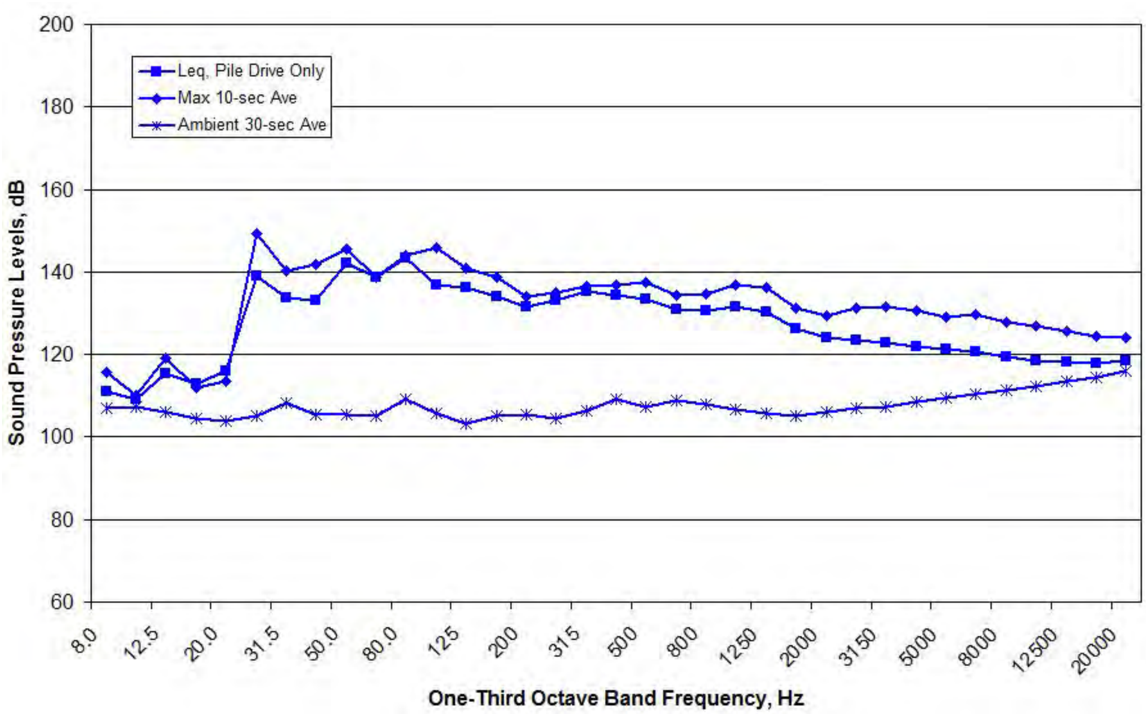

Figure B248. Spectral Data Measured at the WRA Location during EHW16, 17:13-17:27, Measured at Depths of 30 meters on October 11, 2011

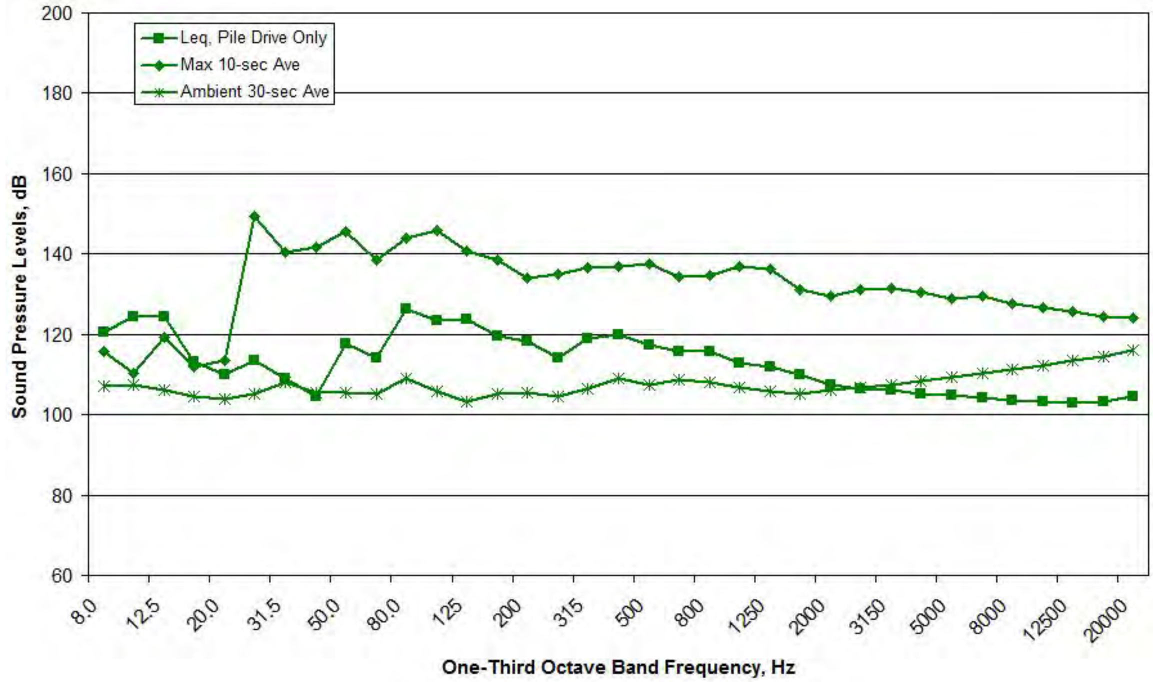

Figure B249. Spectral Data Measured at the MID Location during EHW16, 17:13-17:27, Measured at Depths of 30 meters on October 11, 2011

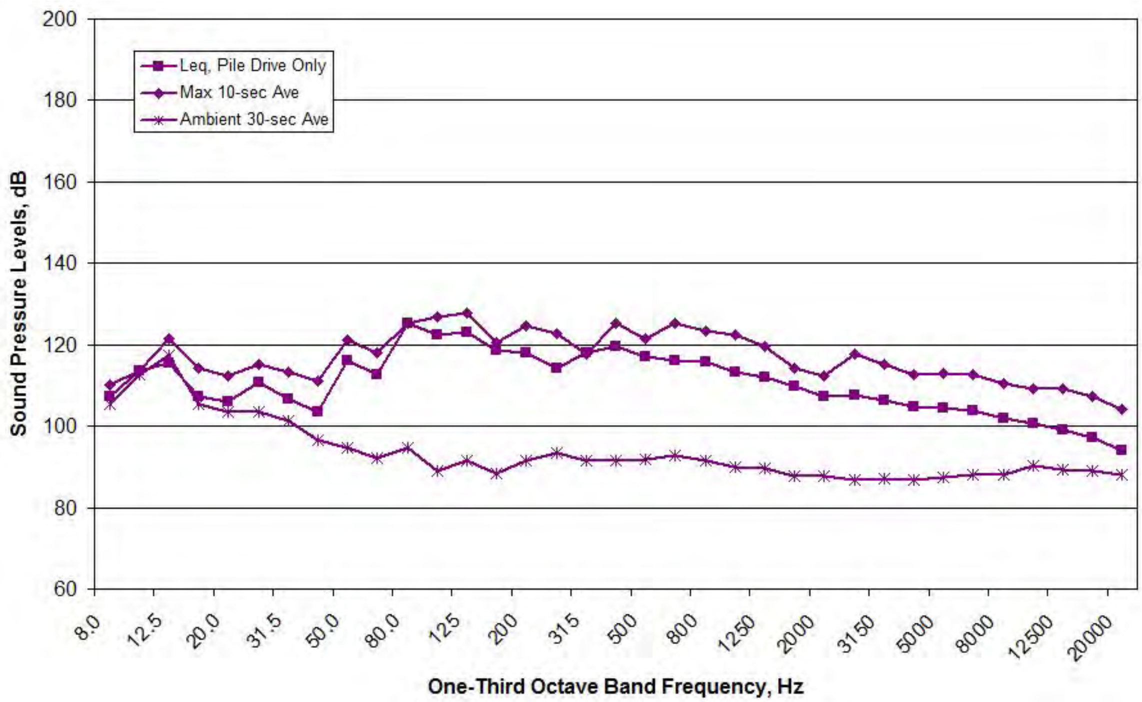

Figure B250. Spectral Data Measured at the RFT Location during EHW16, 17:13-17:27, Measured at Depths of 17 meters on October 11, 2011

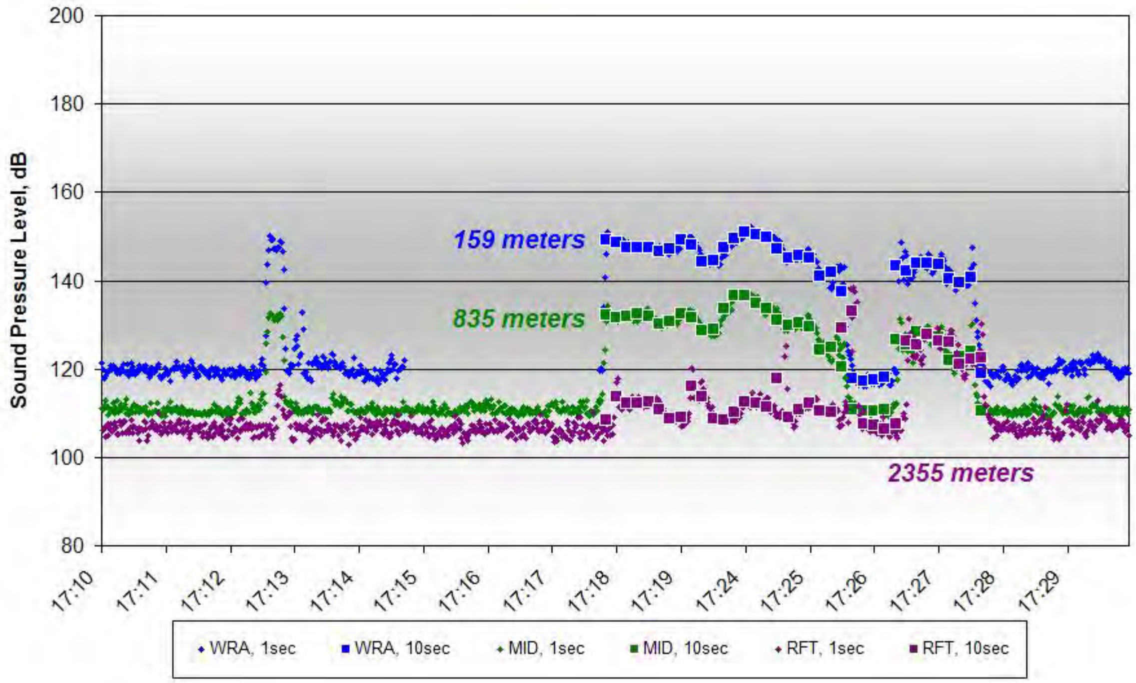

Figure B251. One-second and 10-second Average Data for EHW16, 17:13-17:27, Measured at Depths of 10 meters on October 11, 2011

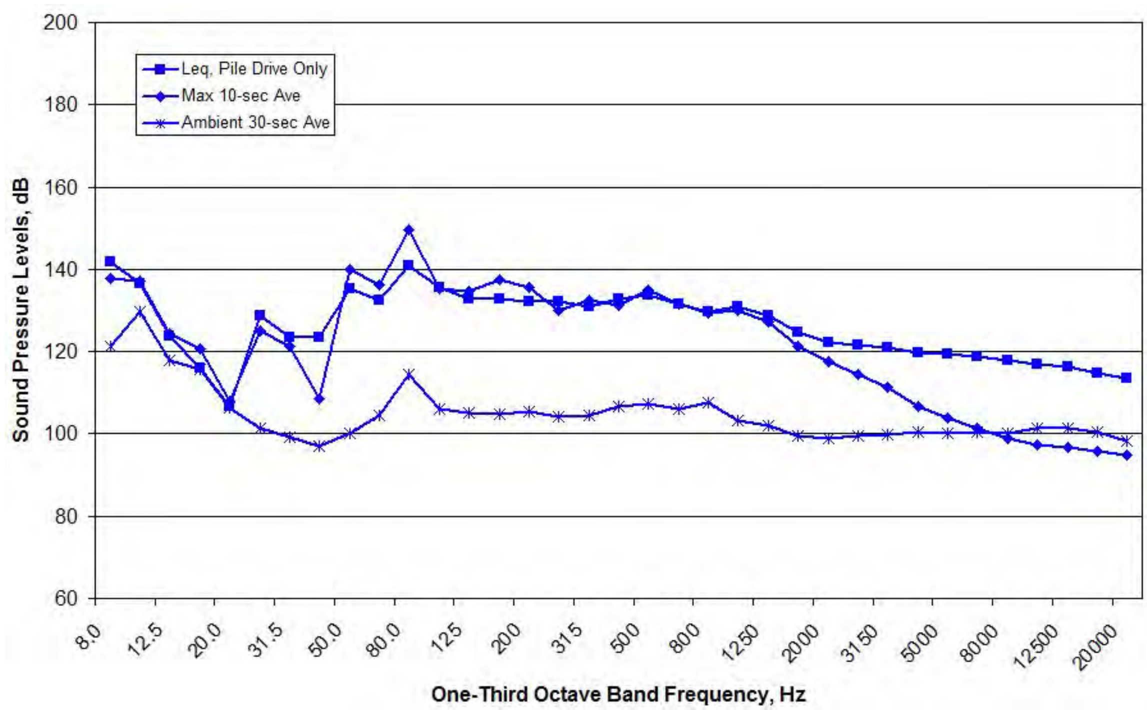

Figure B252. Spectral Data Measured at the WRA Location during EHW16, 17:13-17:27, Measured at Depths of 10 meters on October 11, 2011

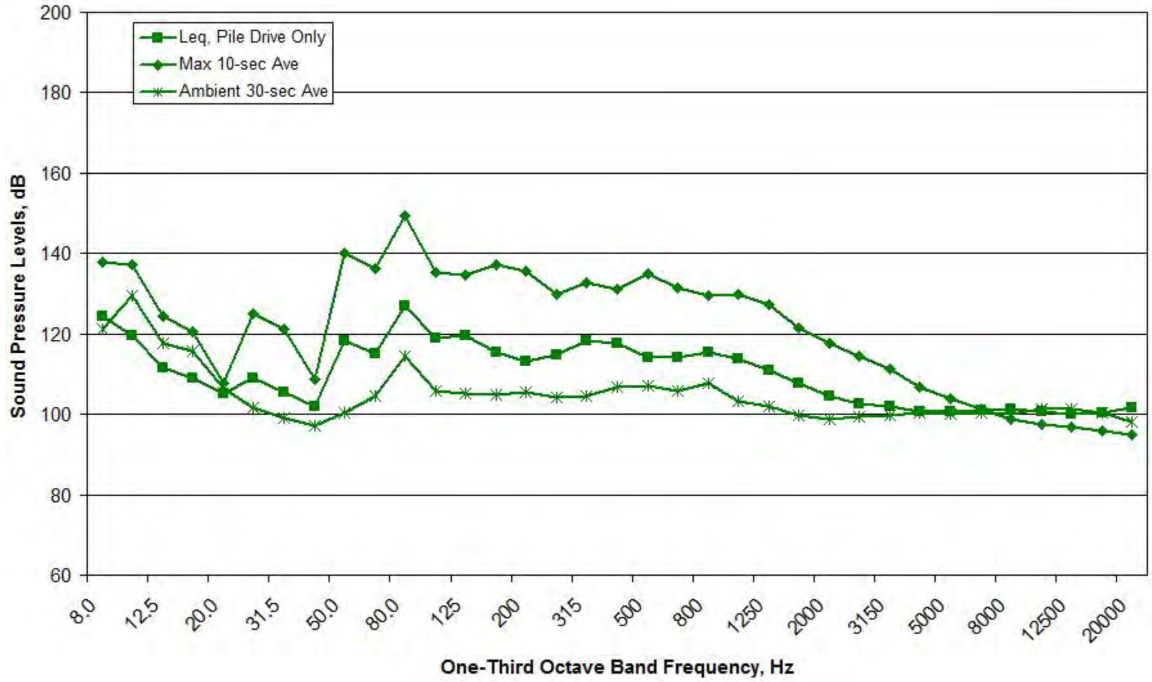

Figure B253. Spectral Data Measured at the MID Location during EHW16, 17:13-17:27, Measured at Depths of 10 meters on October 11, 2011

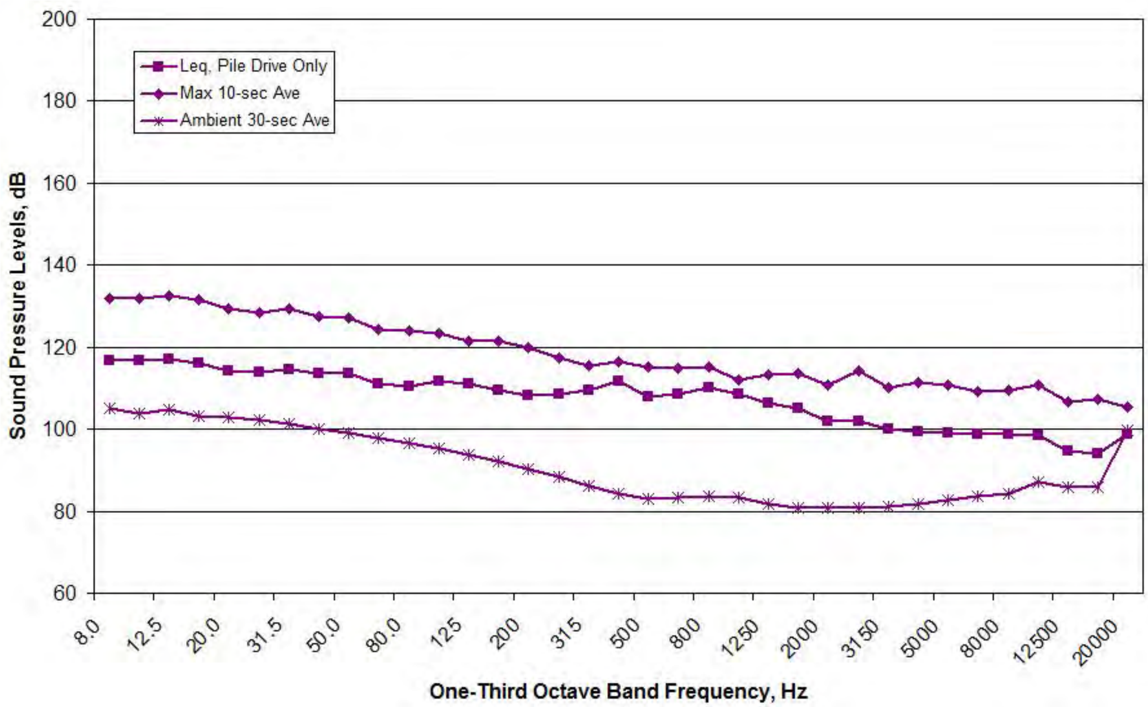

Figure B254. Spectral Data Measured at the RFT Location during EHW16, 17:13-17:27, Measured at Depths of 10 meters on October 11, 2011

EHW16, 17:37-17:49 (Vibratory Installation)

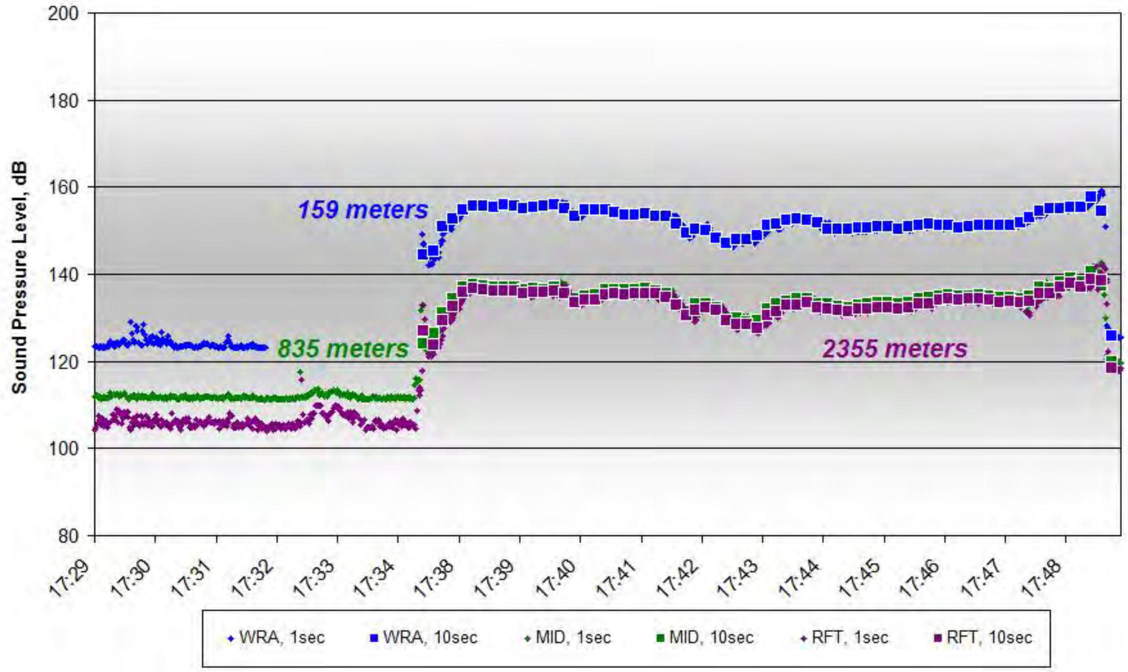

Figure B255. One-second and 10-second Average Data for EHW16, 17:37-17:49, Measured at Depths of 17-30 meters on October 11, 2011

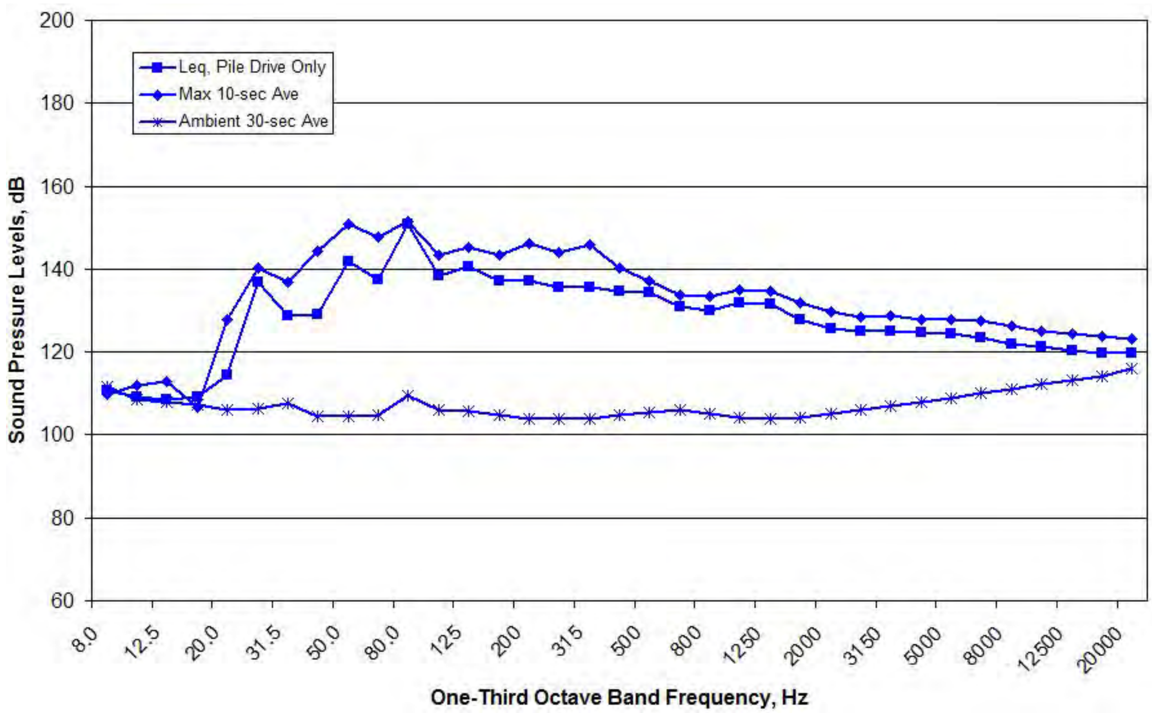

Figure B256. Spectral Data Measured at the WRA Location during EHW16, 17:37-17:49, Measured at Depths of 30 meters on October 11, 2011

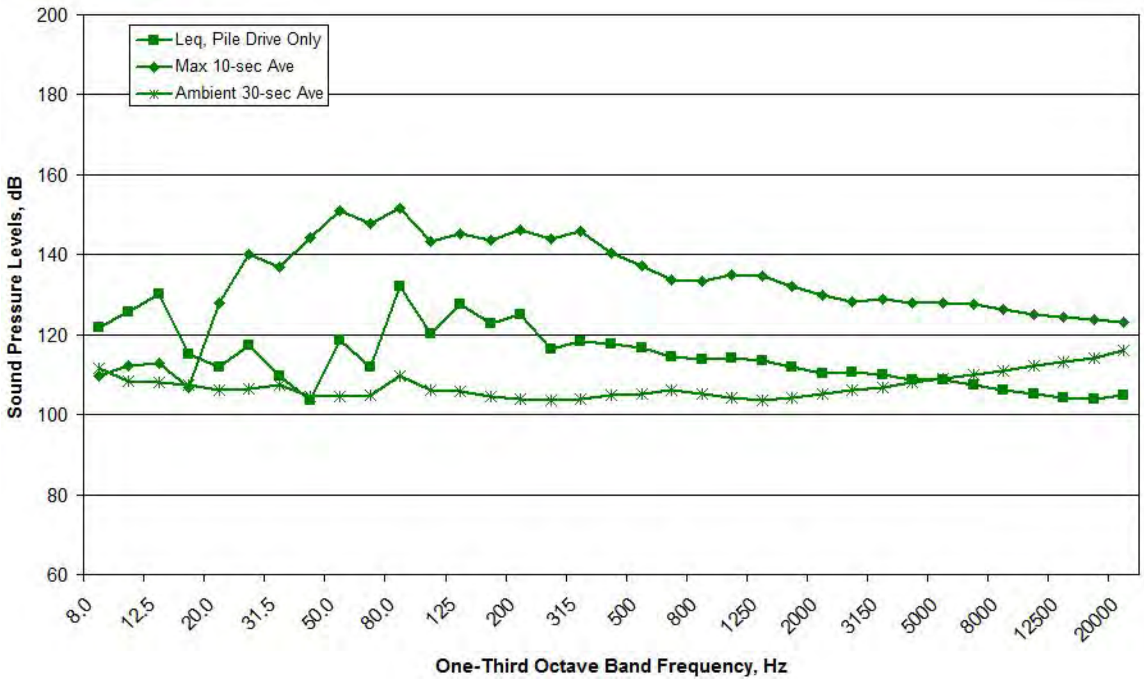

Figure B257. Spectral Data Measured at the MID Location during EHW16, 17:37-17:49, Measured at Depths of 30 meters on October 11, 2011

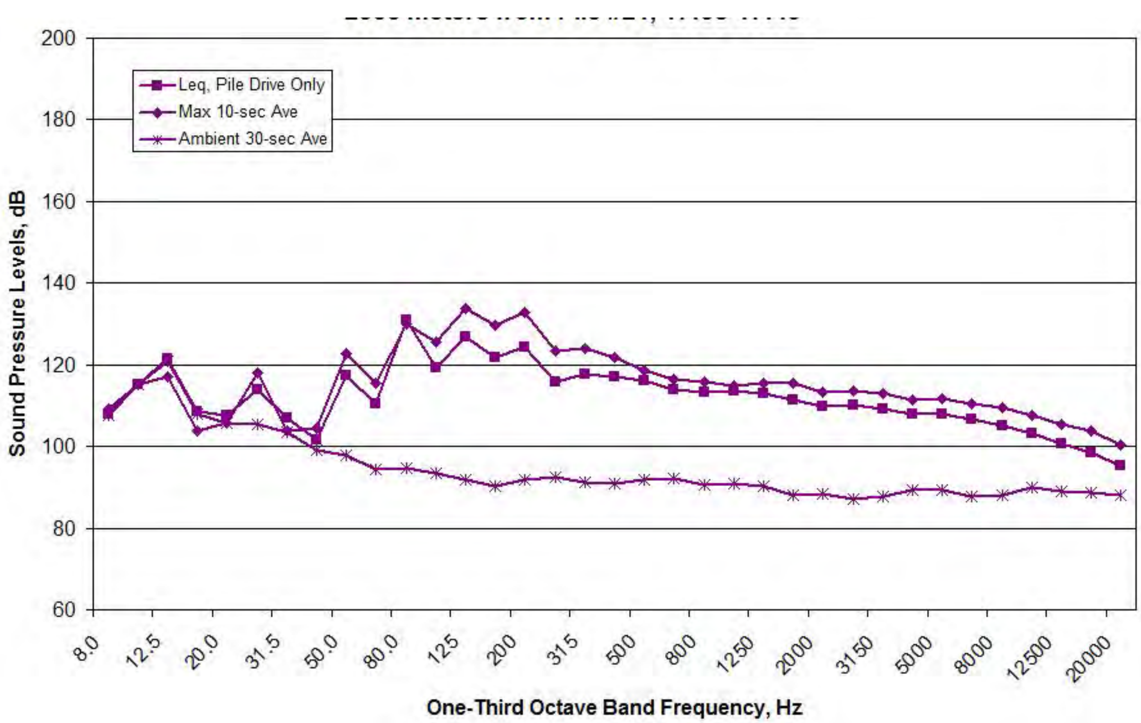

Figure B258. Spectral Data Measured at the RFT Location during EHW16, 17:37-17:49, Measured at Depths of 17 meters on October 11, 2011

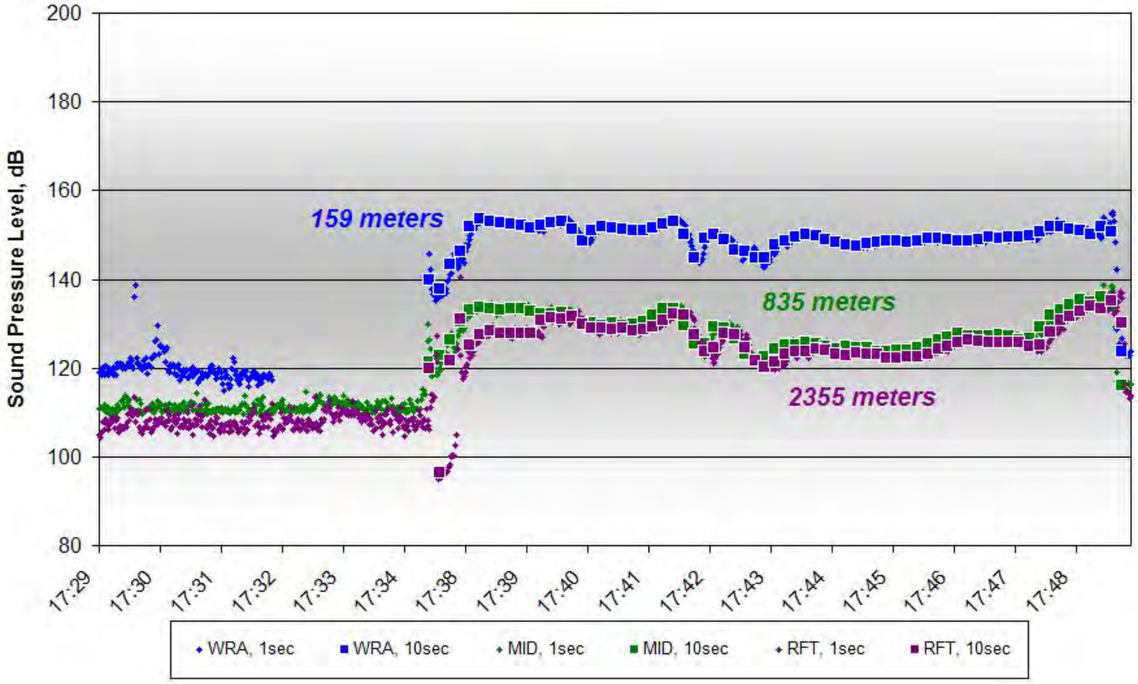

Figure B259. One-second and 10-second Average Data for EHW16, 17:37-17:49, Measured at Depths of 10 meters on October 11, 2011

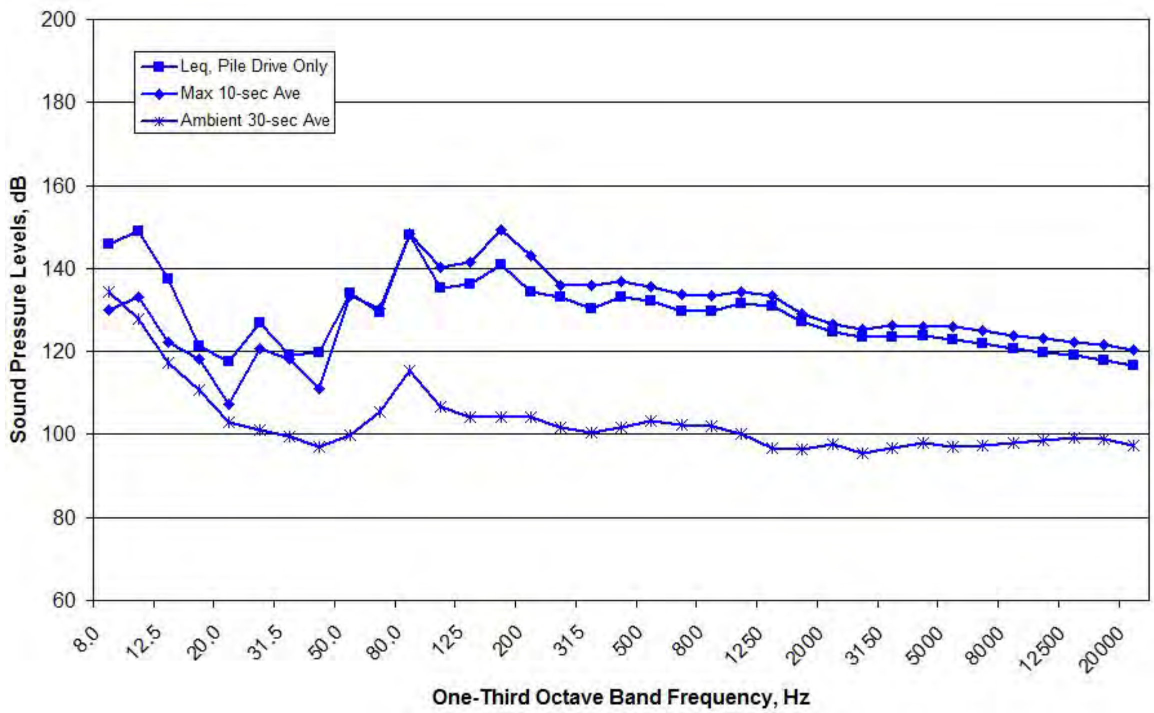

Figure B260. Spectral Data Measured at the WRA Location during EHW16, 17:37-17:49, Measured at Depths of 10 meters on October 11, 2011

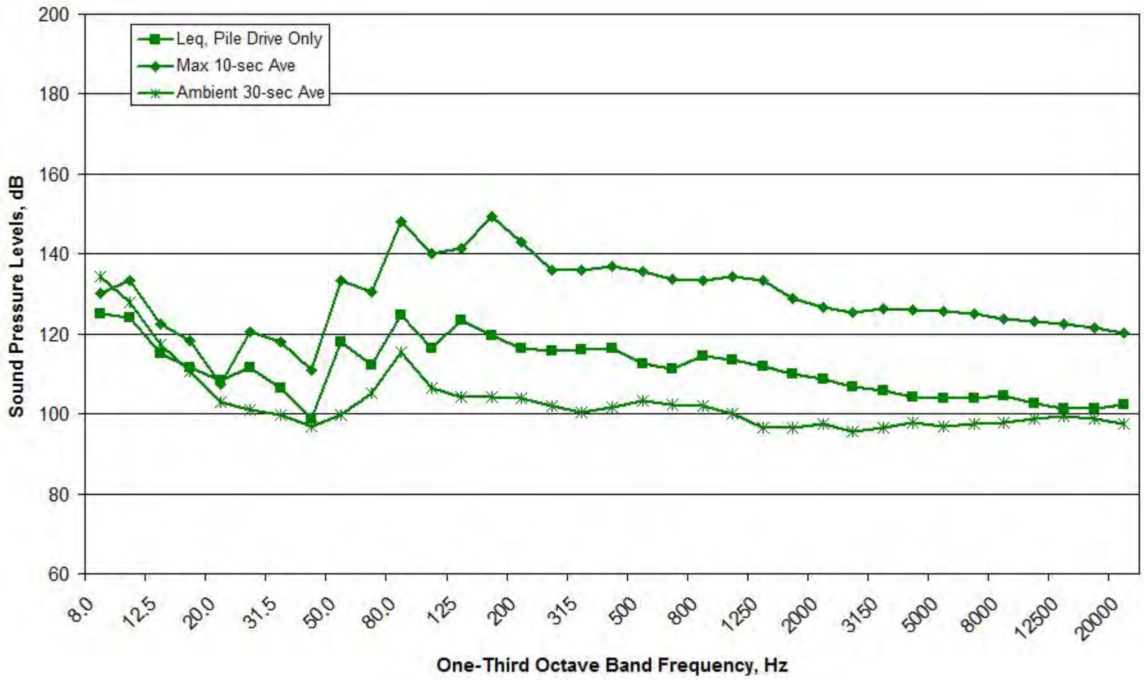

Figure B261. Spectral Data Measured at the MID Location during EHW16, 17:37-17:49, Measured at Depths of 10 meters on October 11, 2011

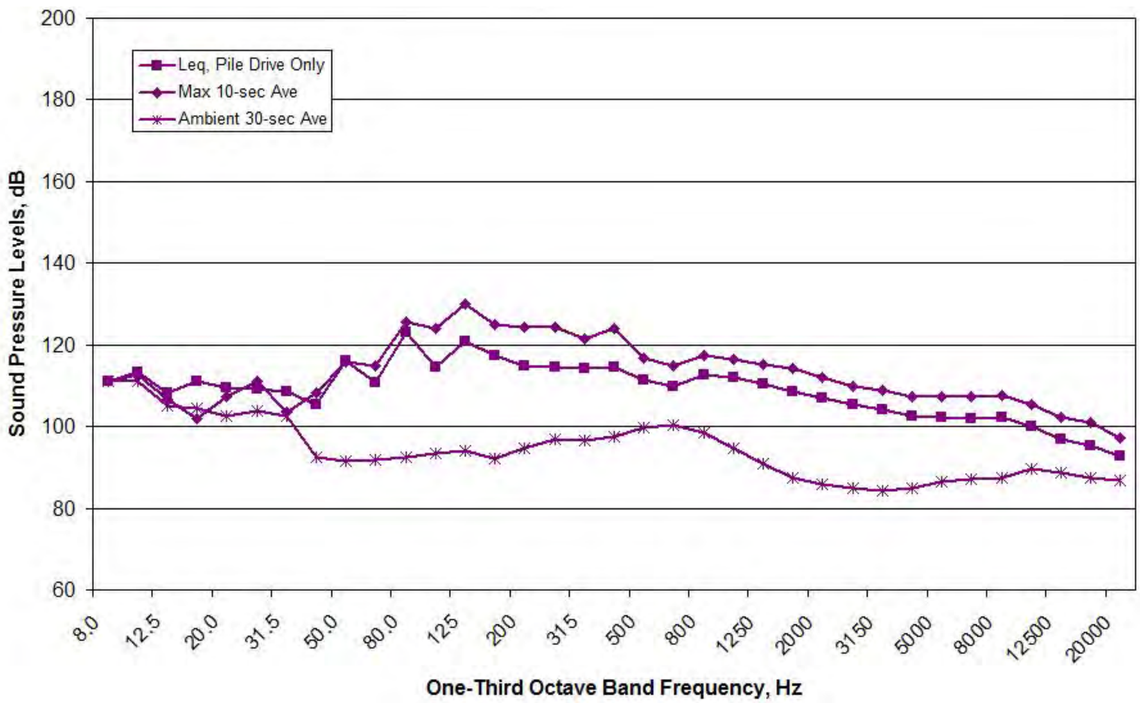

Figure B262. Spectral Data Measured at the RFT Location during EHW16, 17:37-17:49, Measured at Depths of 10 meters on October 11, 2011

10/12/2011 – EHW12, Batter (Vibratory Installation)

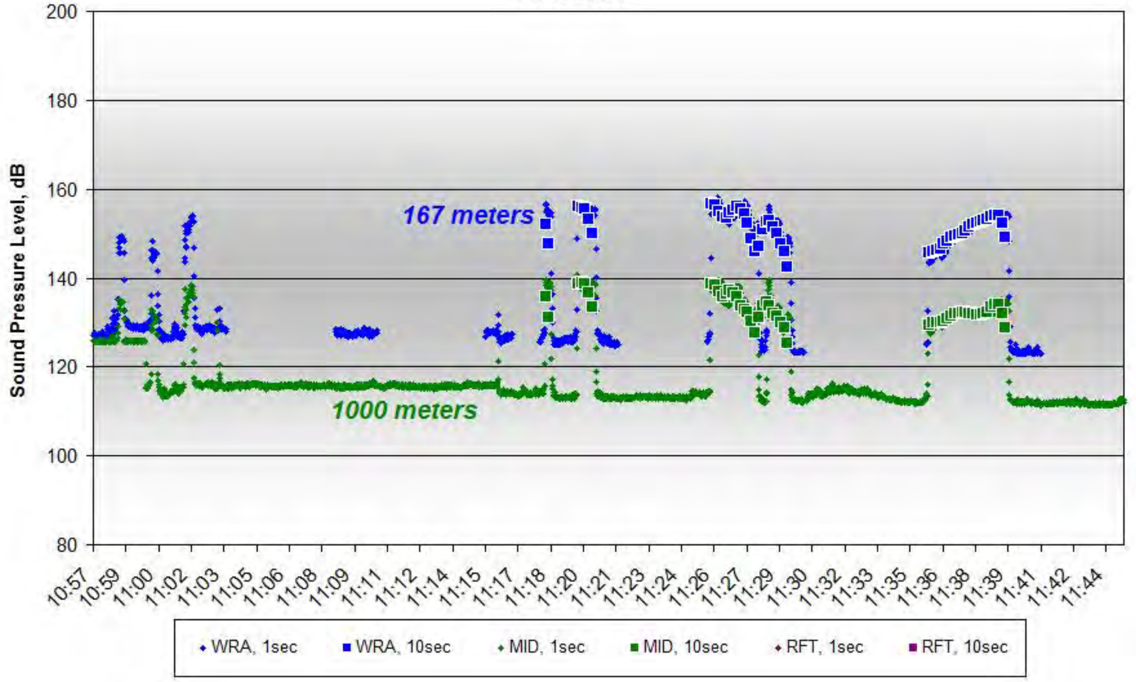

Figure B263. One-second and 10-second Average Data for EHW12, Batter, 10:58-11:39, Measured at Depths of 17-30 meters on October 12, 2011

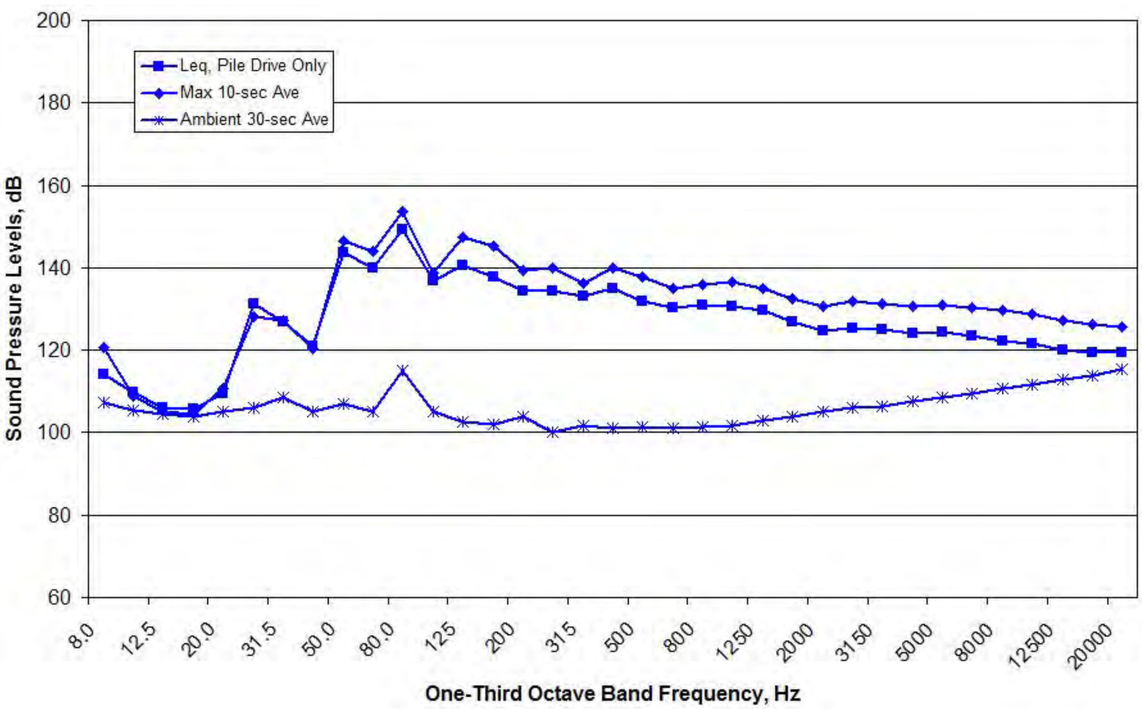

Figure B264. Spectral Data Measured at the WRA Location during EHW12, Batter, 10:58-11:39, Measured at Depths of 30 meters on October 12, 2011

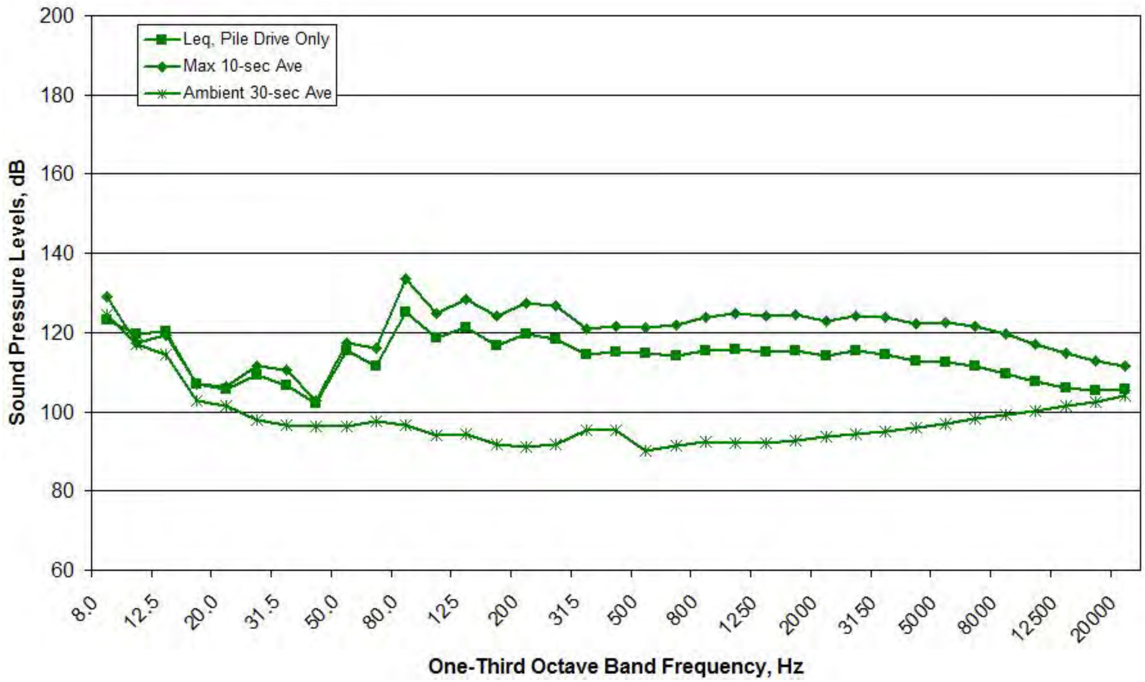

Figure B265. Spectral Data Measured at the MID Location during EHW12, Batter, 10:58-11:39, Measured at Depths of 30 meters on October 12, 2011

NO DATA AVAILABLE

Figure B266. Spectral Data Measured at the RFT Location during EHW12, Batter, 10:58-11:39, Measured at Depths of 17 meters on October 12, 2011

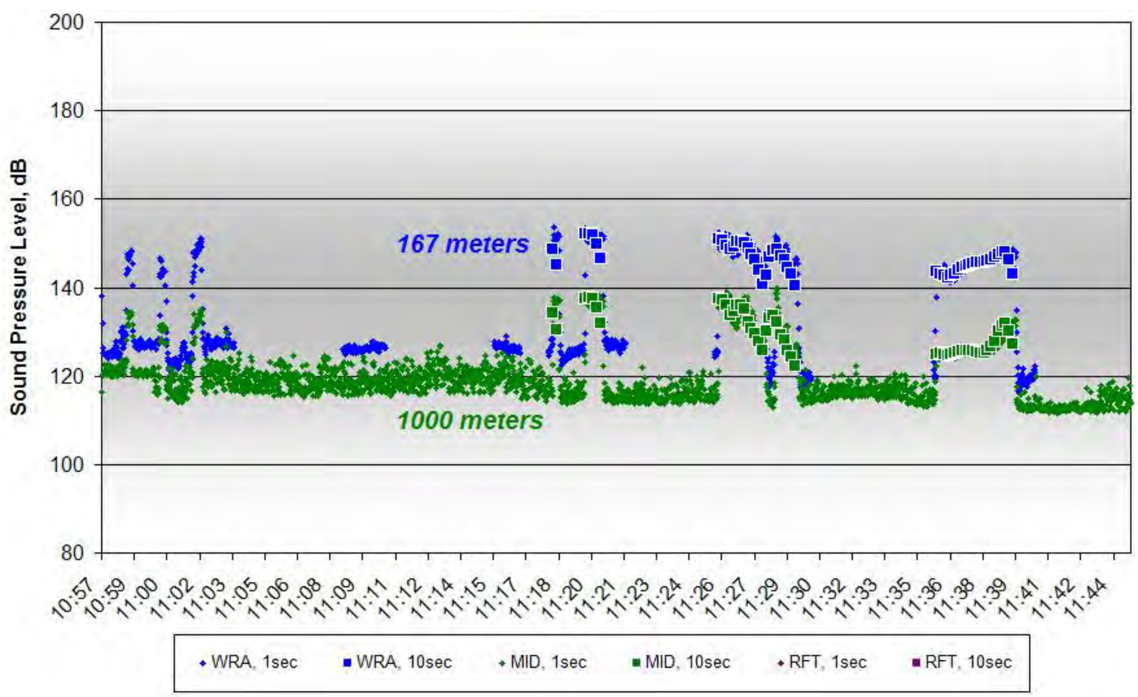

Figure B267. One-second and 10-second Average Data for EHW12, Batter, 10:58-11:39, Measured at Depths of 10 meters on October 12, 2011

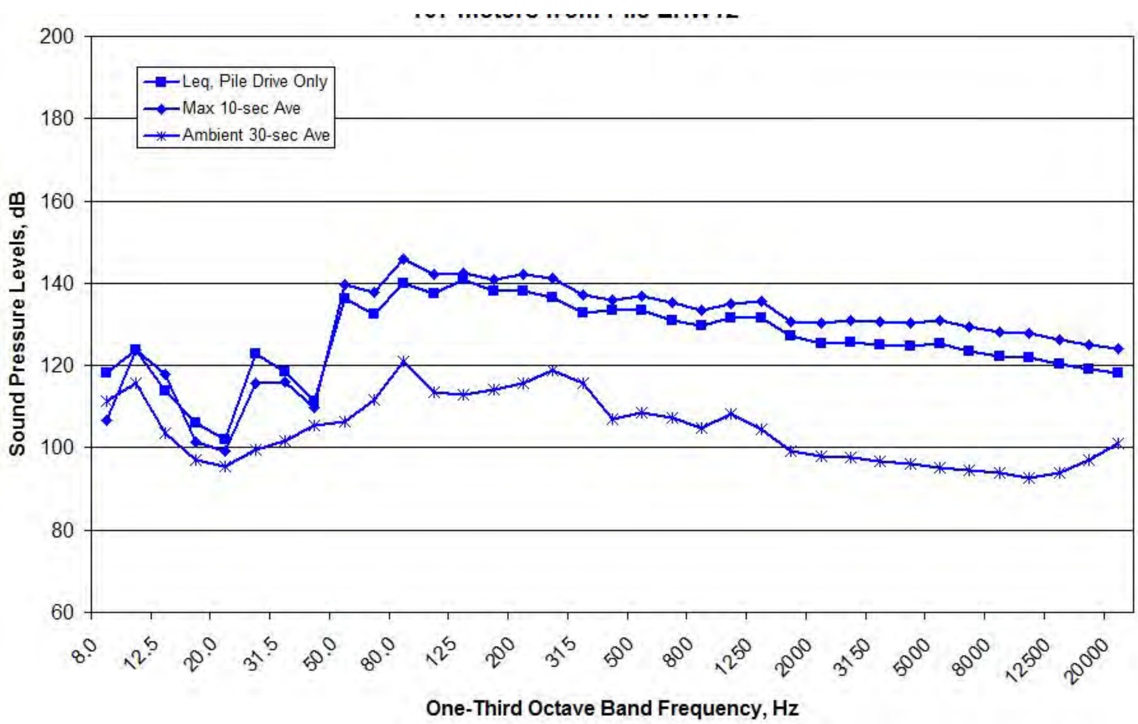

Figure B268. Spectral Data Measured at the WRA Location during EHW12, Batter, 10:58-11:39, Measured at Depths of 10 meters on October 12, 2011

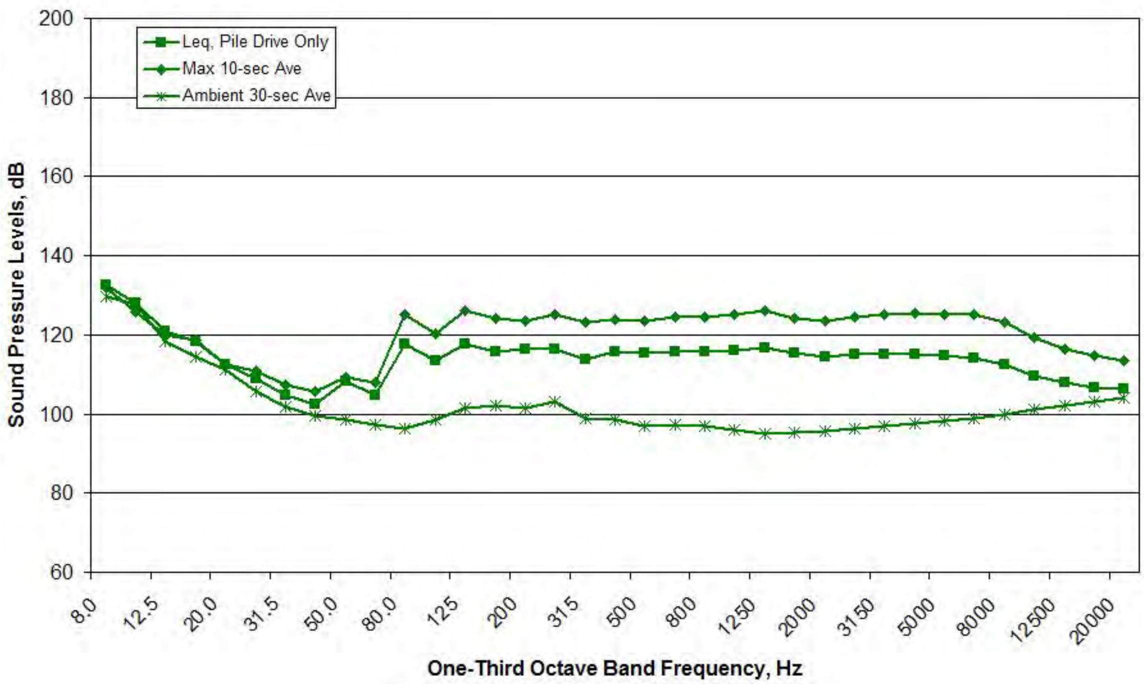

Figure B269. Spectral Data Measured at the MID Location during EHW12, Batter, 10:58-11:39, Measured at Depths of 10 meters on October 12, 2011

NO DATA AVAILABLE

Figure B270. Spectral Data Measured at the RFT Location during EHW12, Batter, 10:58-11:39, Measured at Depths of 10 meters on October 12, 2011

EHW13, Batter (Vibratory Installation)

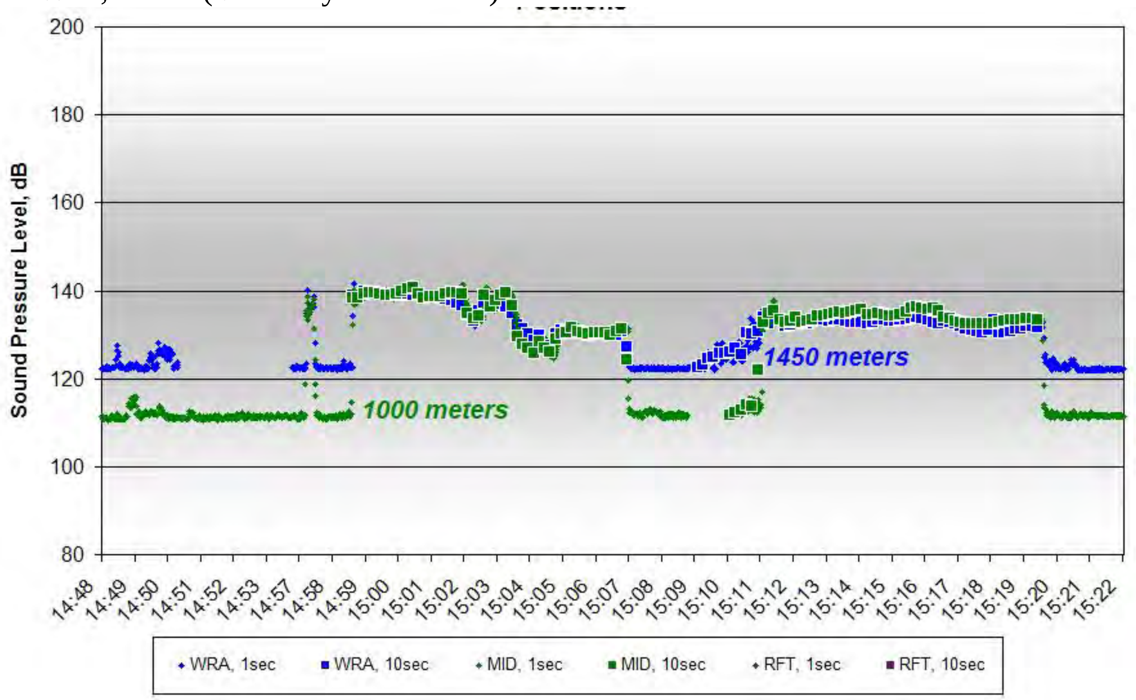

Figure B271. One-second and 10-second Average Data for EHW13, Batter, 14:57-15:20, Measured at Depths of 17-30 meters on October 12, 2011

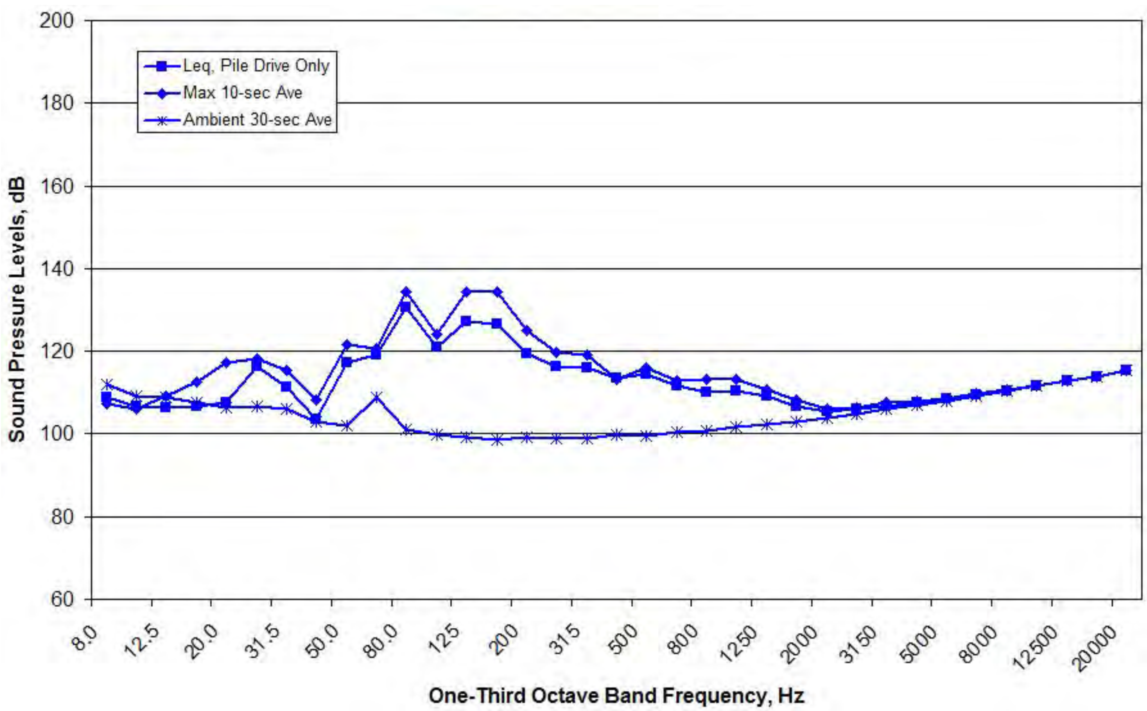

Figure B272. Spectral Data Measured at the WRA Location during EHW13, Batter, 14:57-15:20, Measured at Depths of 30 meters on October 12, 2011

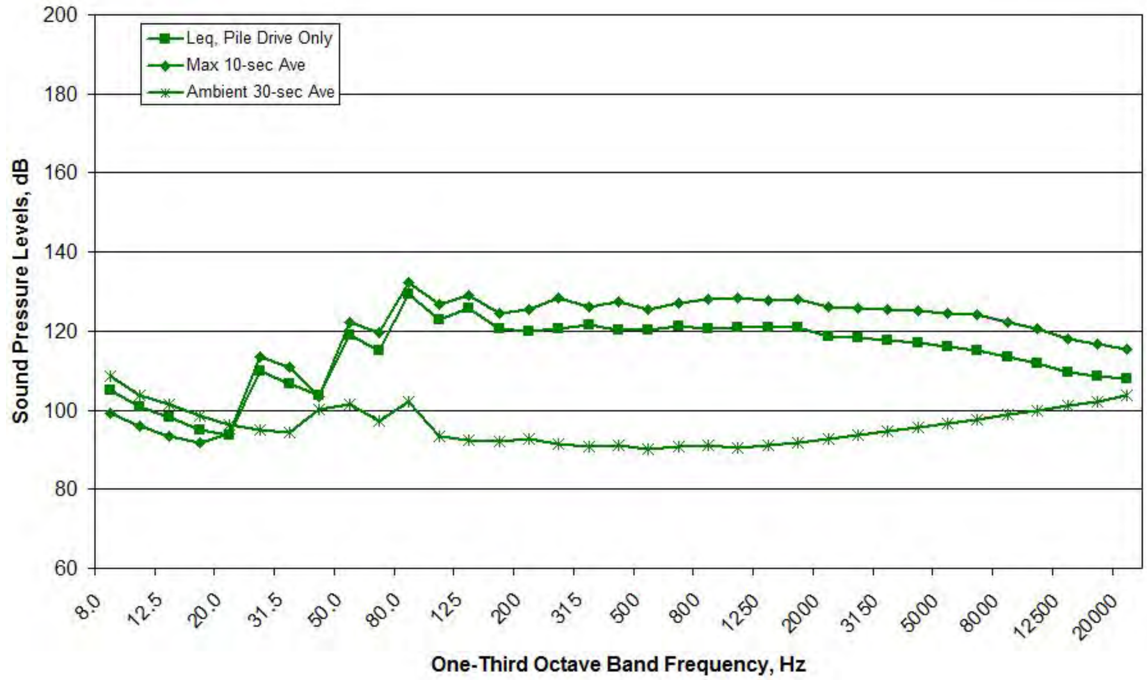

Figure B273. Spectral Data Measured at the MID Location during EHW13, Batter, 14:57-15:20, Measured at Depths of 30 meters on October 12, 2011

NO DATA AVAILABLE

Figure B274. Spectral Data Measured at the RFT Location during EHW13, Batter, 14:57-15:20, Measured at Depths of 17 meters on October 12, 2011

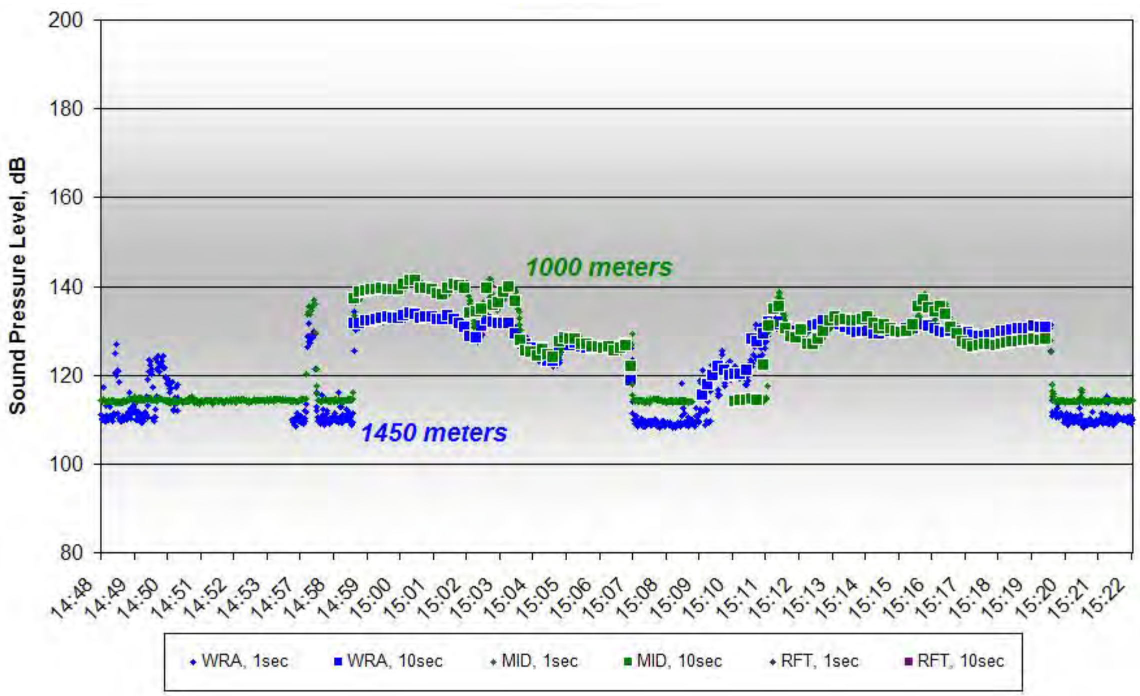

Figure B275. One-second and 10-second Average Data for EHW13, Batter, 14:57-15:20, Measured at Depths of 10 meters on October 12, 2011

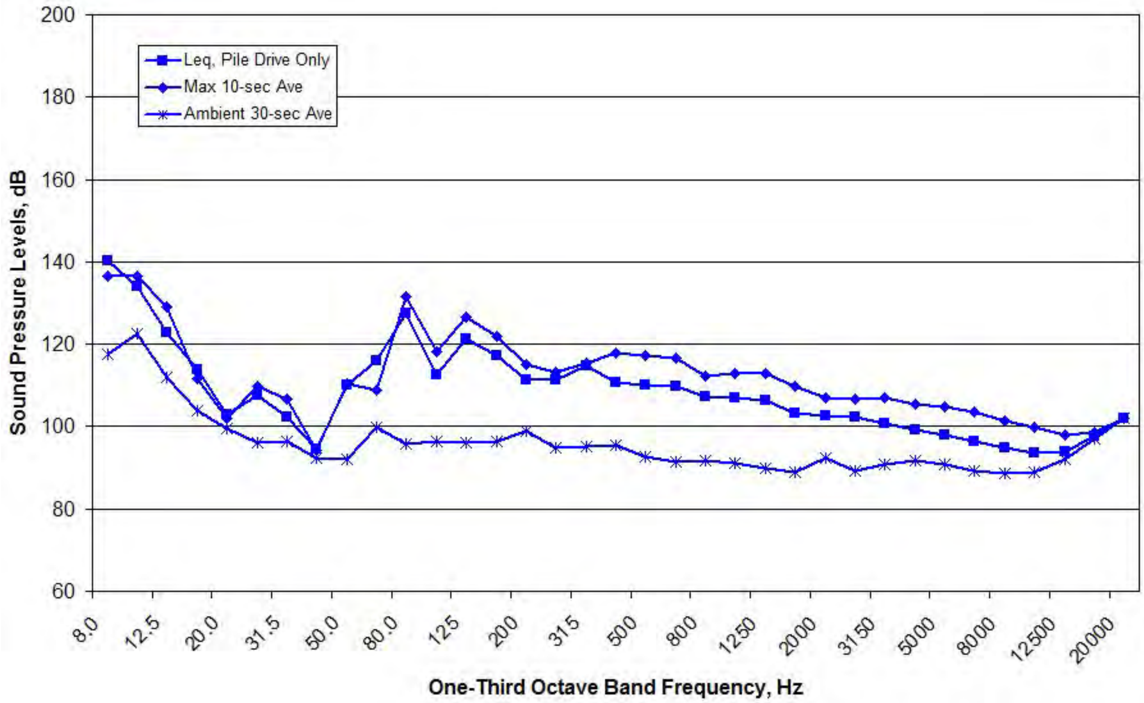

Figure B276. Spectral Data Measured at the WRA Location EHW13, Batter, 14:57-15:20, Measured at Depths of 10 meters on October 12, 2011

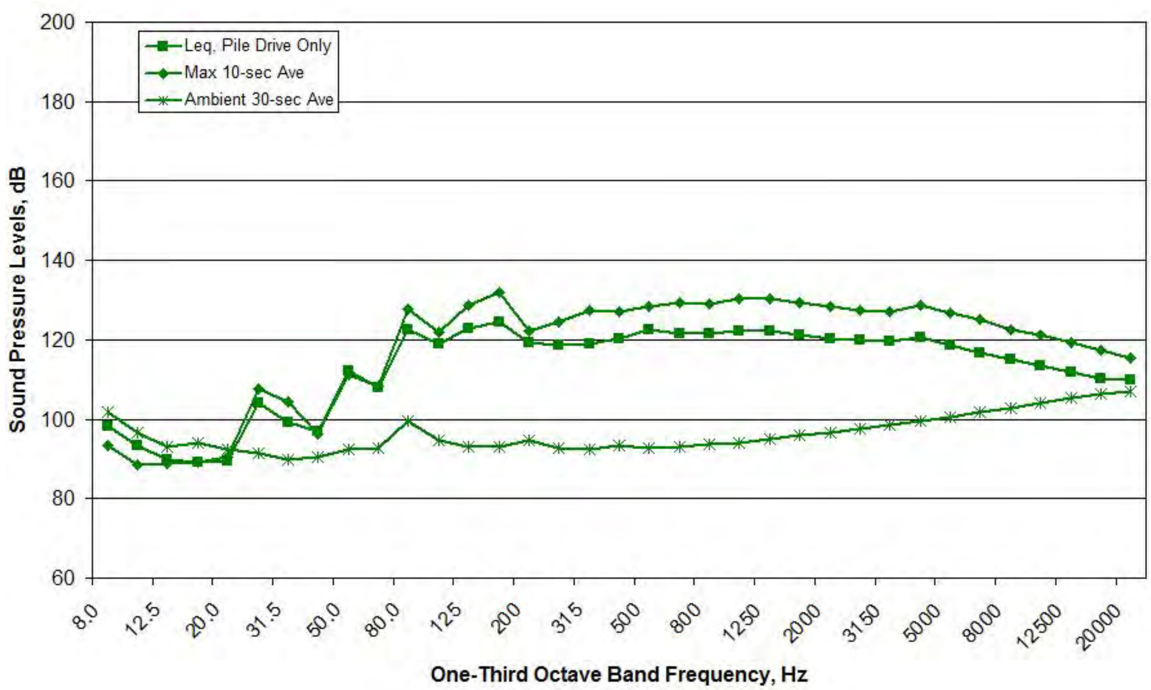

Figure B277. Spectral Data Measured at the MID Location during EHW13, Batter, 14:57-15:20, Measured at Depths of 10 meters on October 12, 2011

NO DATA AVAILABLE

Figure B278. Spectral Data Measured at the RFT Location during EHW13, Batter, 14:57-15:20, Measured at Depths of 10 meters on October 12, 2011

EHW10, Batter (Vibratory Installation)

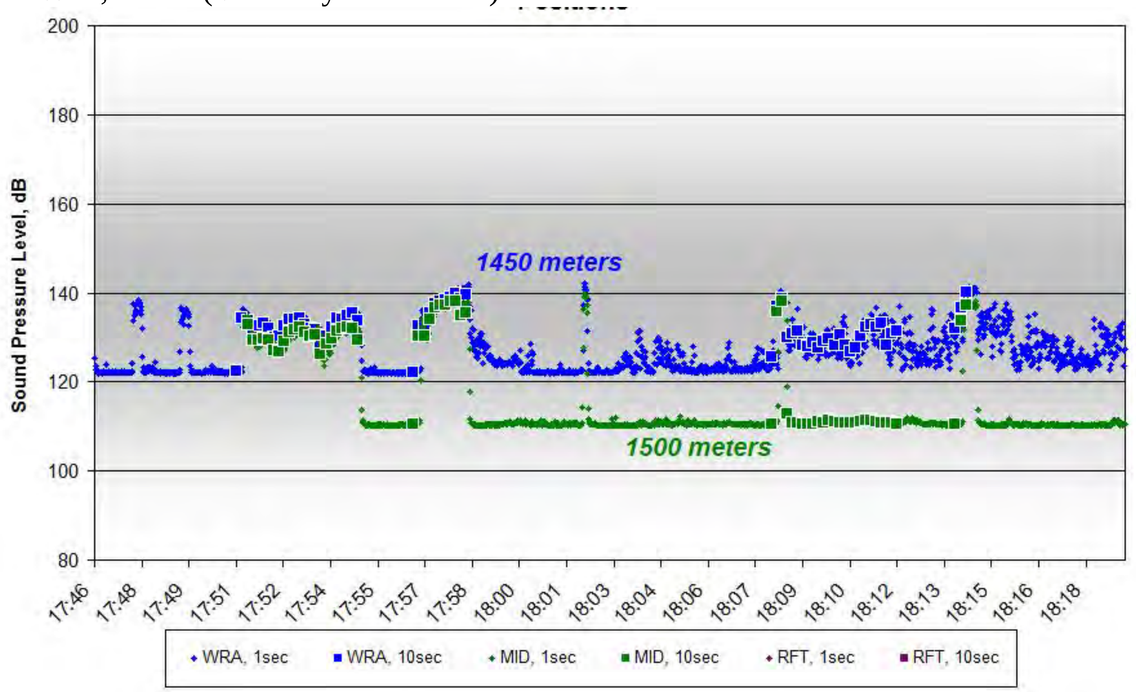

Figure B279. One-second and 10-second Average Data for EHW10, Batter, 17:47-18:14, Measured at Depths of 17-30 meters on October 12, 2011

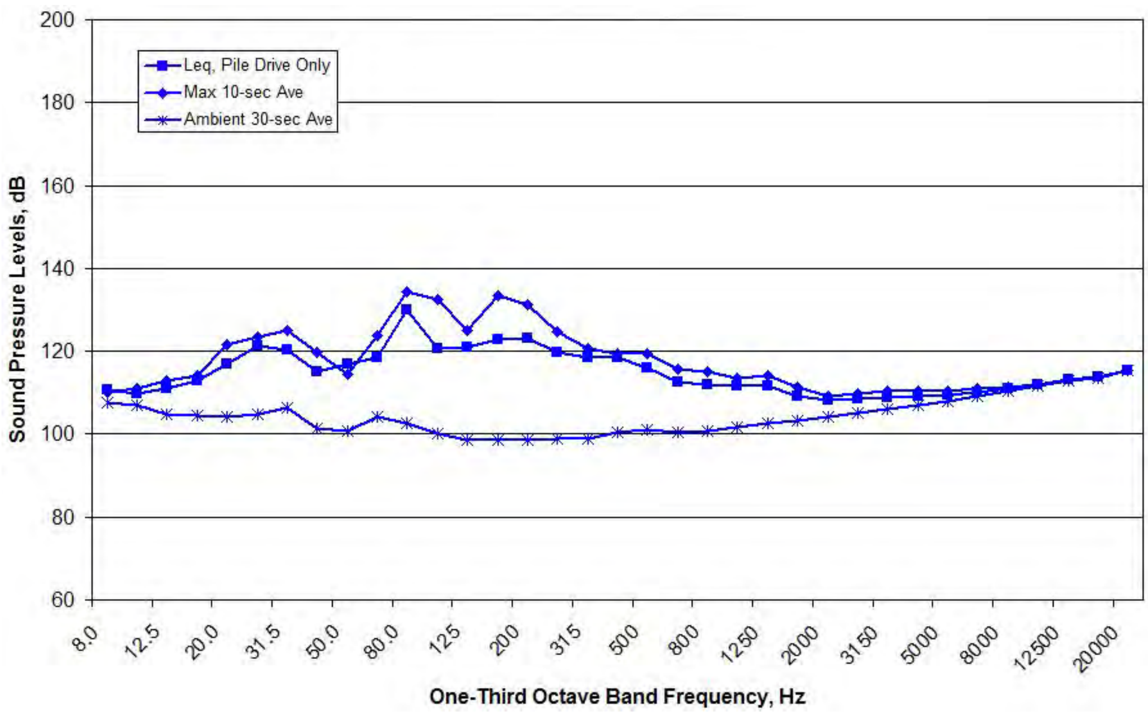

Figure B280. Spectral Data Measured at the WRA Location during EHW10, Batter, 17:47-18:14, Measured at Depths of 30 meters on October 12, 2011

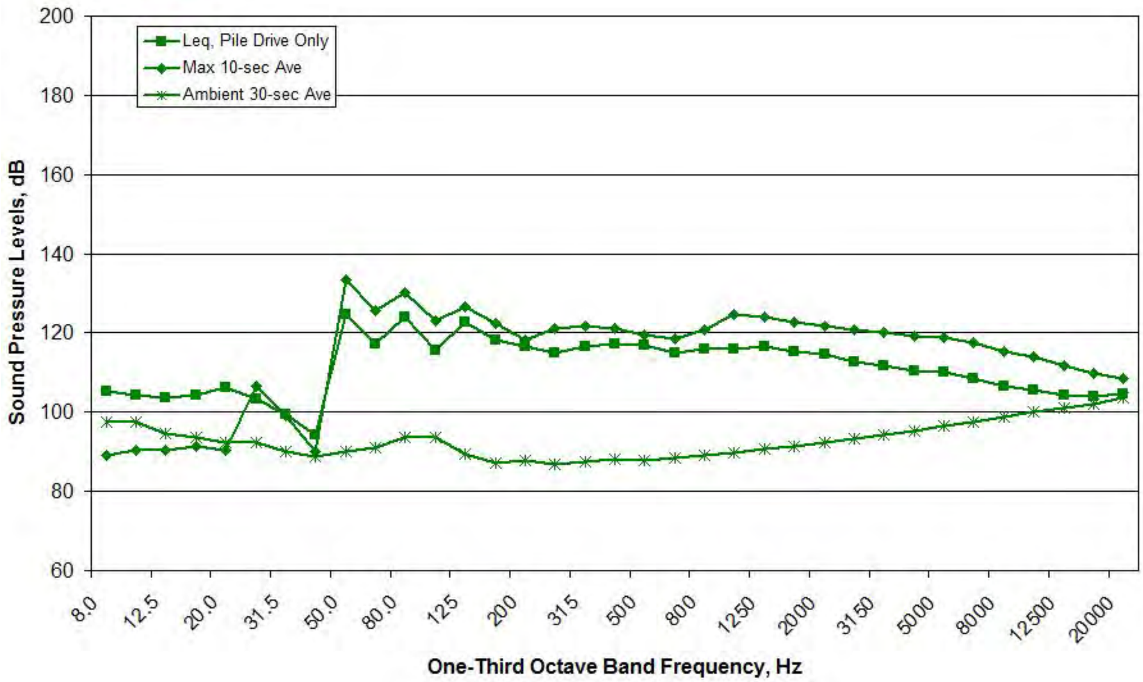

Figure B281. Spectral Data Measured at the MID Location during EHW10, Batter, 17:47-18:14, Measured at Depths of 30 meters on October 12, 2011

NO DATA AVAILABLE

Figure B282. Spectral Data Measured at the RFT Location during EHW10, Batter, 17:47-18:14, Measured at Depths of 17 meters on October 12, 2011

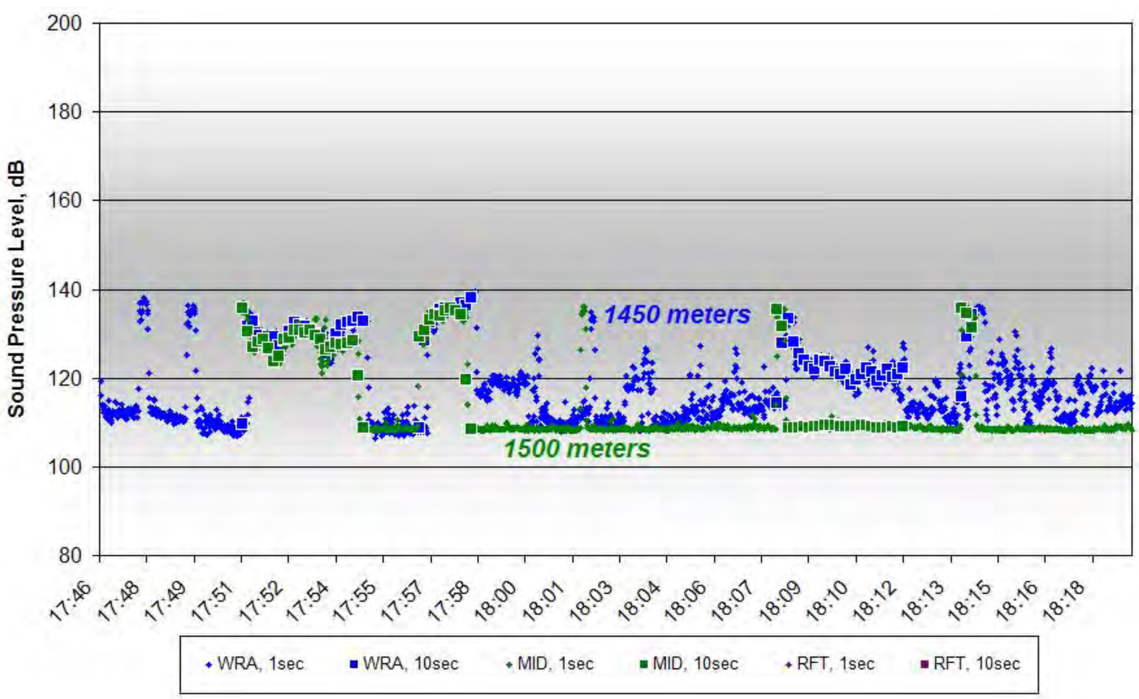

Figure B283. One-second and 10-second Average Data for EHW10, Batter, 17:47-18:14, Measured at Depths of 10 meters on October 12, 2011

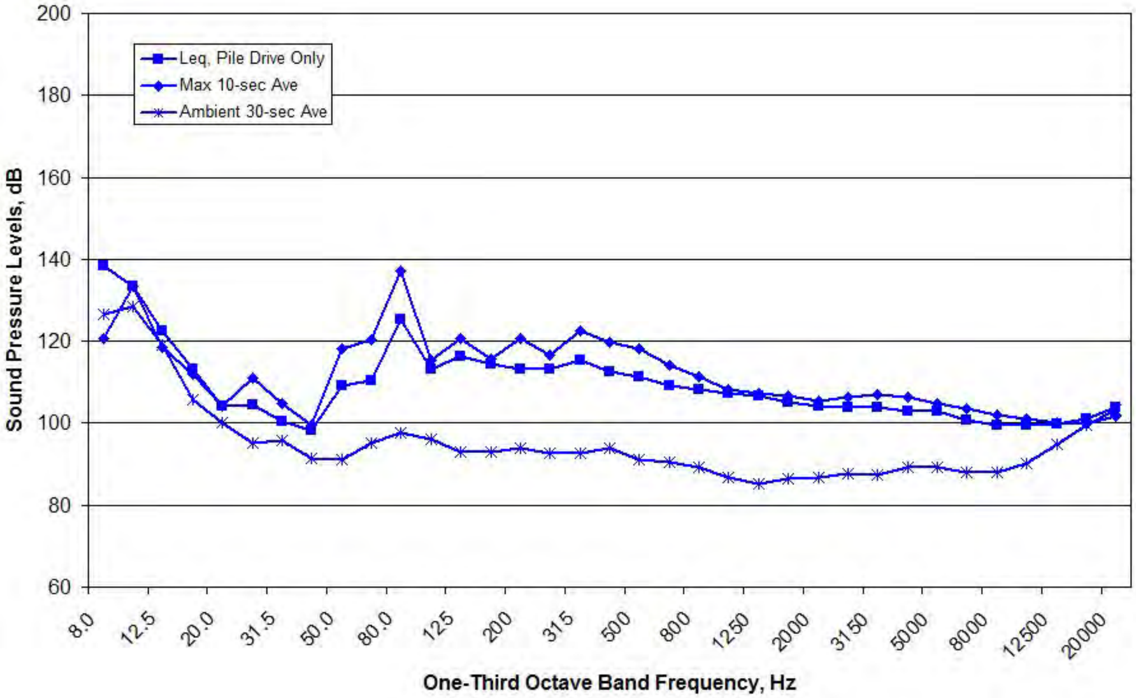

Figure B284. Spectral Data Measured at the WRA Location during EHW10, Batter, 17:47-18:14, Measured at Depths of 10 meters on October 12, 2011

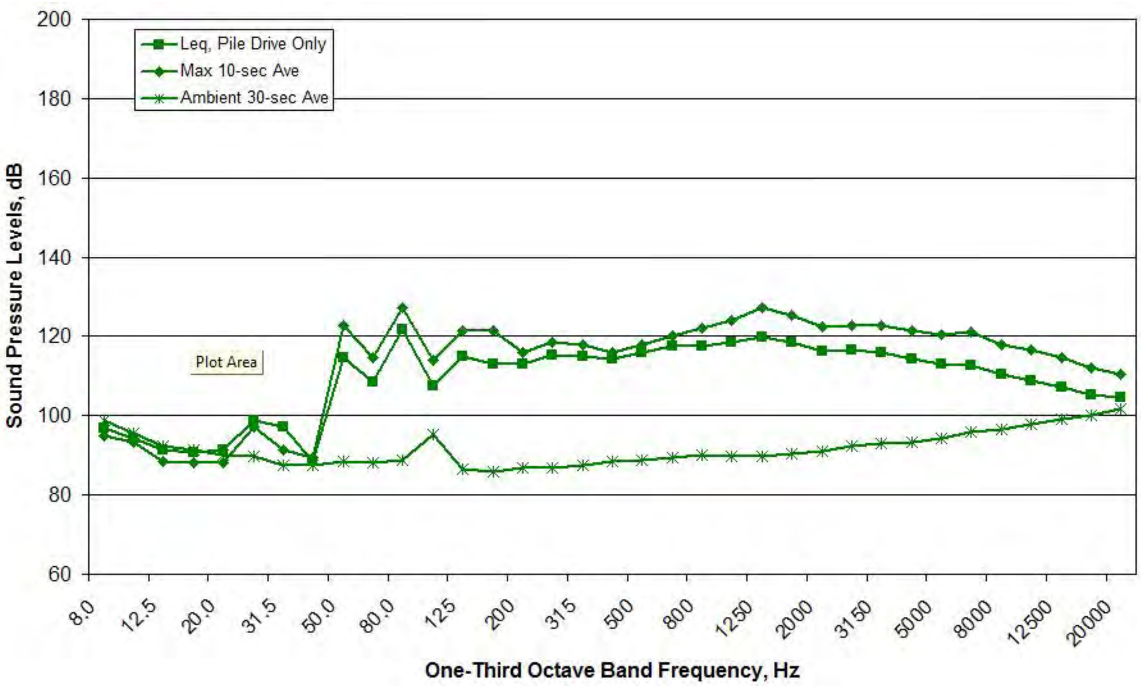

Figure B285. Spectral Data Measured at the MID Location during EHW10, Batter, 17:47-18:14, Measured at Depths of 10 meters on October 12, 2011

NO DATA AVAILABLE

Figure B286. Spectral Data Measured at the RFT Location during EHW10, Batter, 17:47-18:14, Measured at Depths of 10 meters on October 12, 2011

10/13/2011 – EHW10, Batter, 9:57-10:06 (Vibratory Installation)

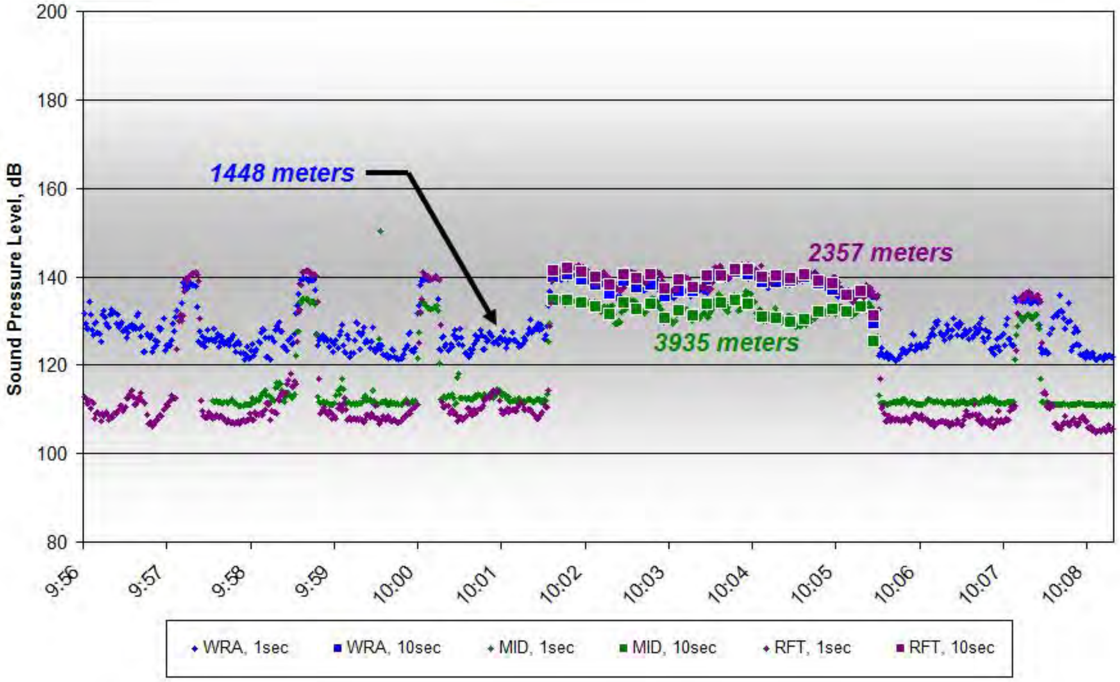

Figure B287. One-second and 10-second Average Data for EHW10, Batter, 9:57-10:06, Measured at Depths of 17-30 meters on October 13, 2011

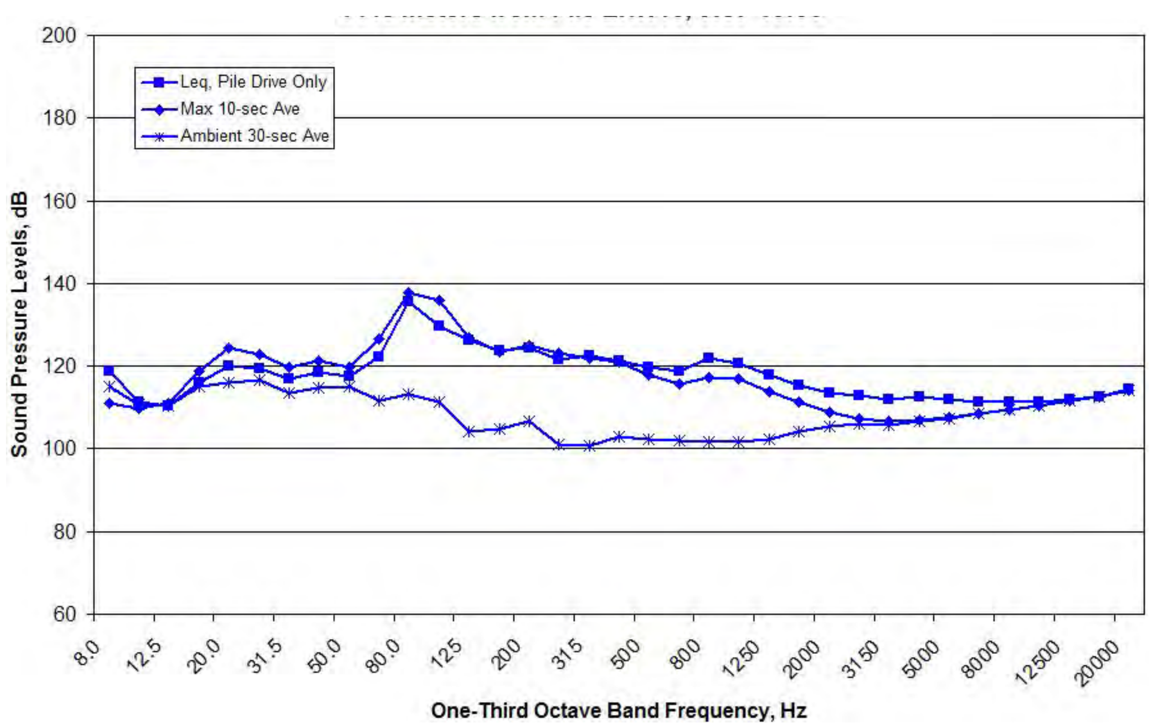

Figure B288. Spectral Data Measured at the WRA Location during EHW10, Batter, 9:57-10:06, Measured at Depths of 30 meters on October 13, 2011

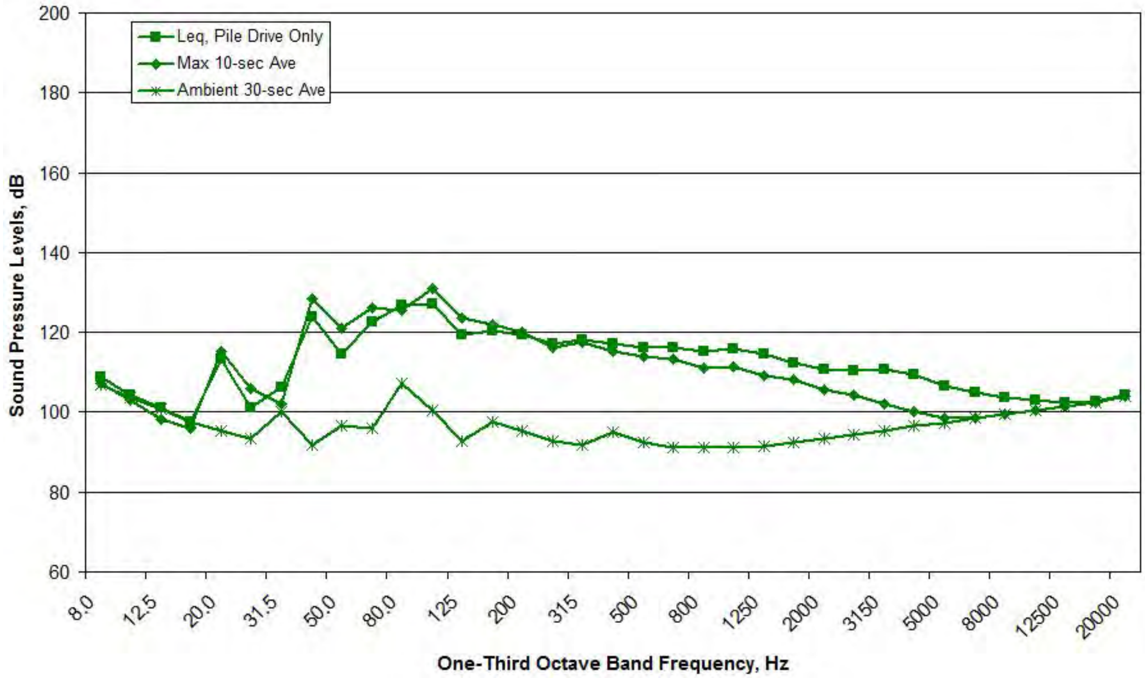

Figure B289. Spectral Data Measured at the MID Location during EHW10, Batter, 9:57-10:06, Measured at Depths of 30 meters on October 13, 2011

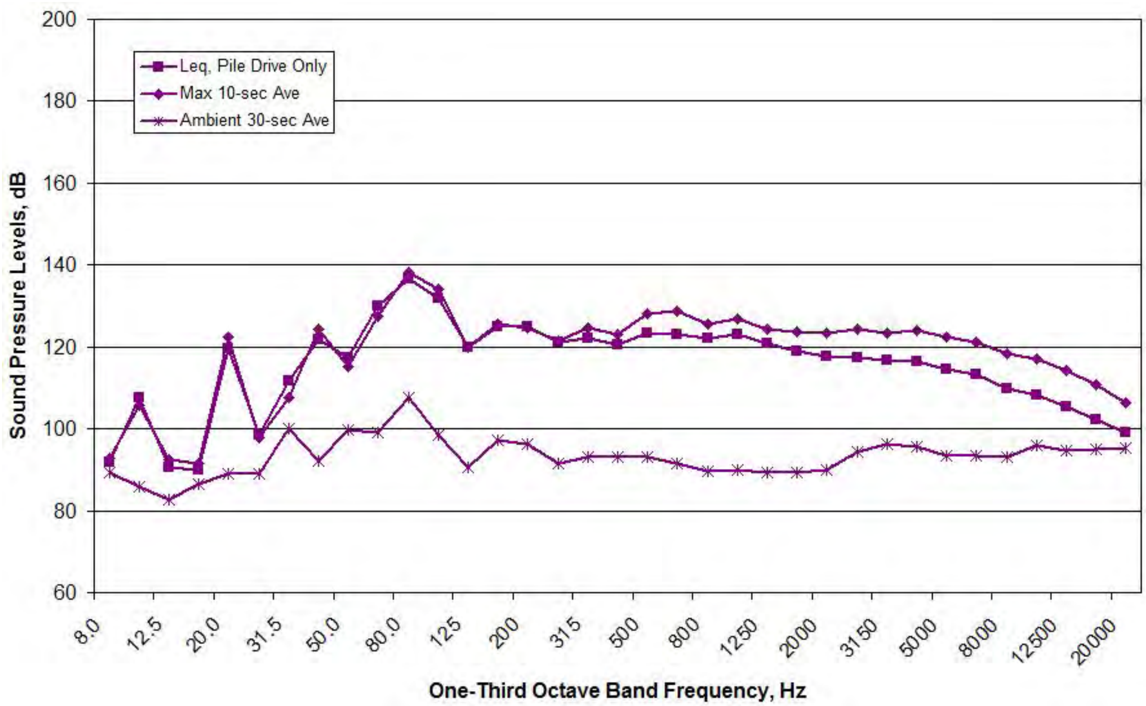

Figure B290. Spectral Data Measured at the RFT Location during EHW10, Batter, 9:57-10:06, Measured at Depths of 17 meters on October 13, 2011

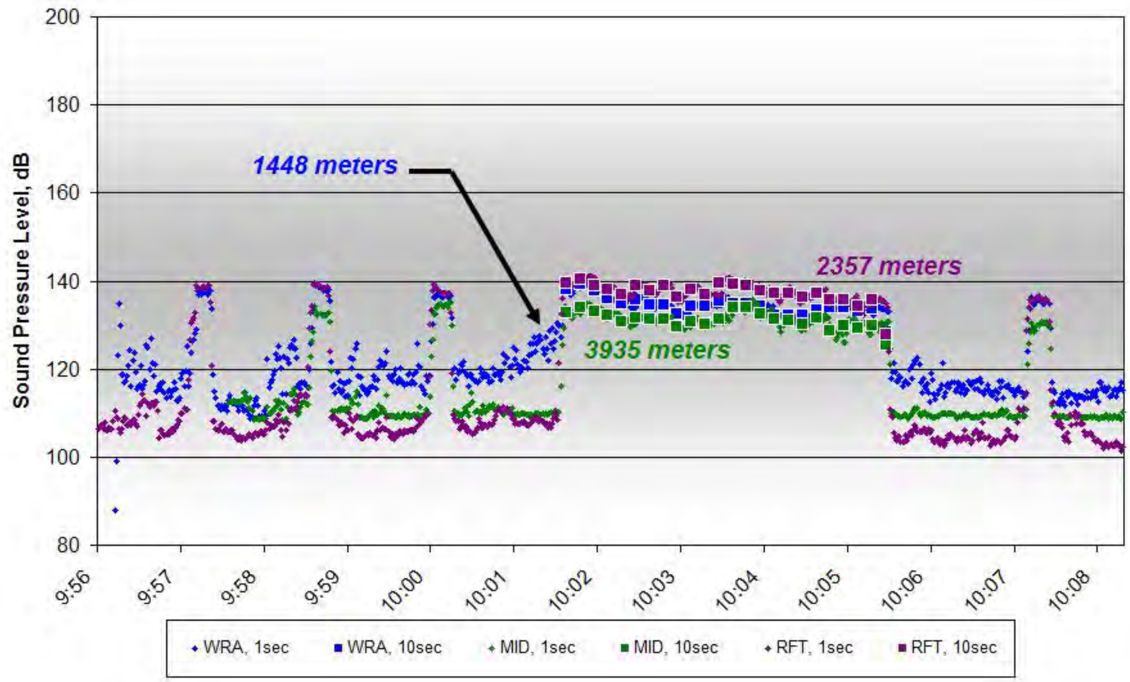

Figure B291. One-second and 10-second Average Data for EHW10, Batter, 9:57-10:06, Measured at Depths of 10 meters on October 13, 2011

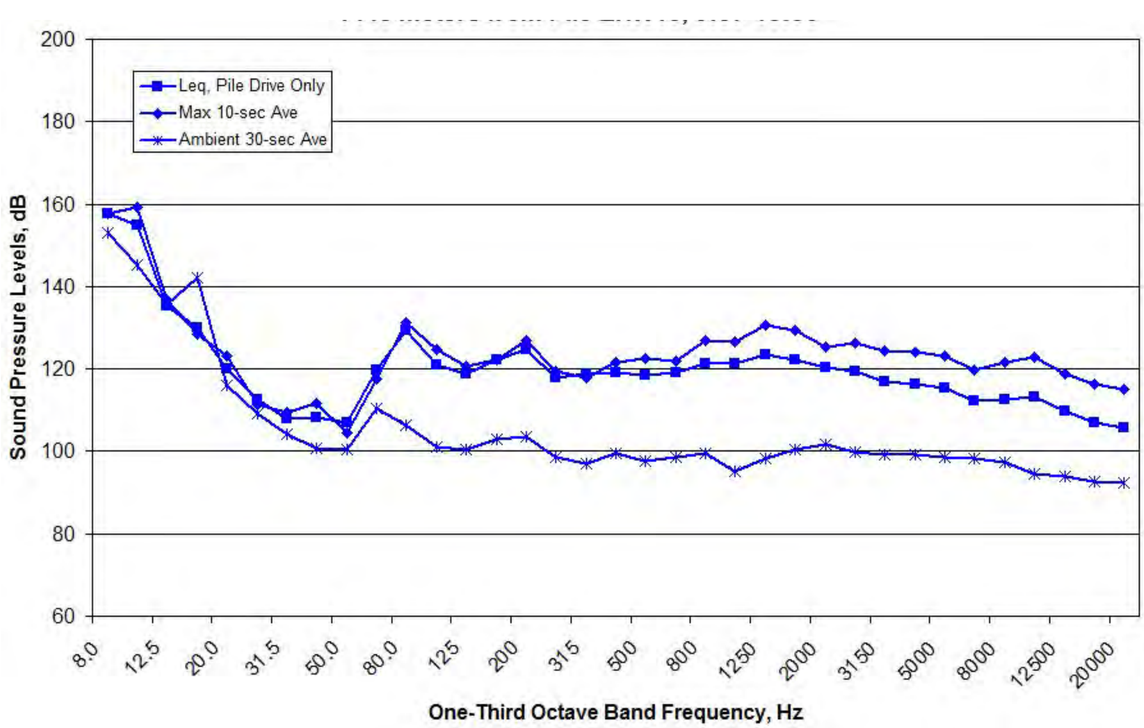

Figure B292. Spectral Data Measured at the WRA Location during EHW10, Batter, 9:57-10:06, Measured at Depths of 10 meters on October 13, 2011

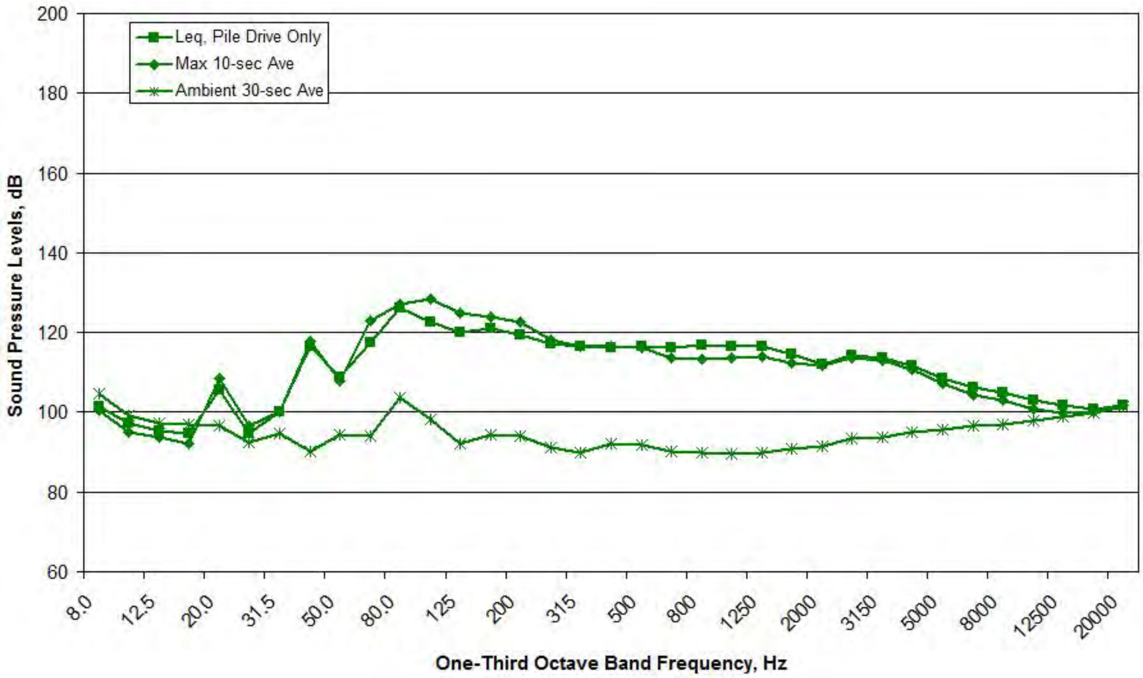

Figure B293. Spectral Data Measured at the MID Location during EHW10, Batter, 9:57-10:06, Measured at Depths of 10 meters on October 13, 2011

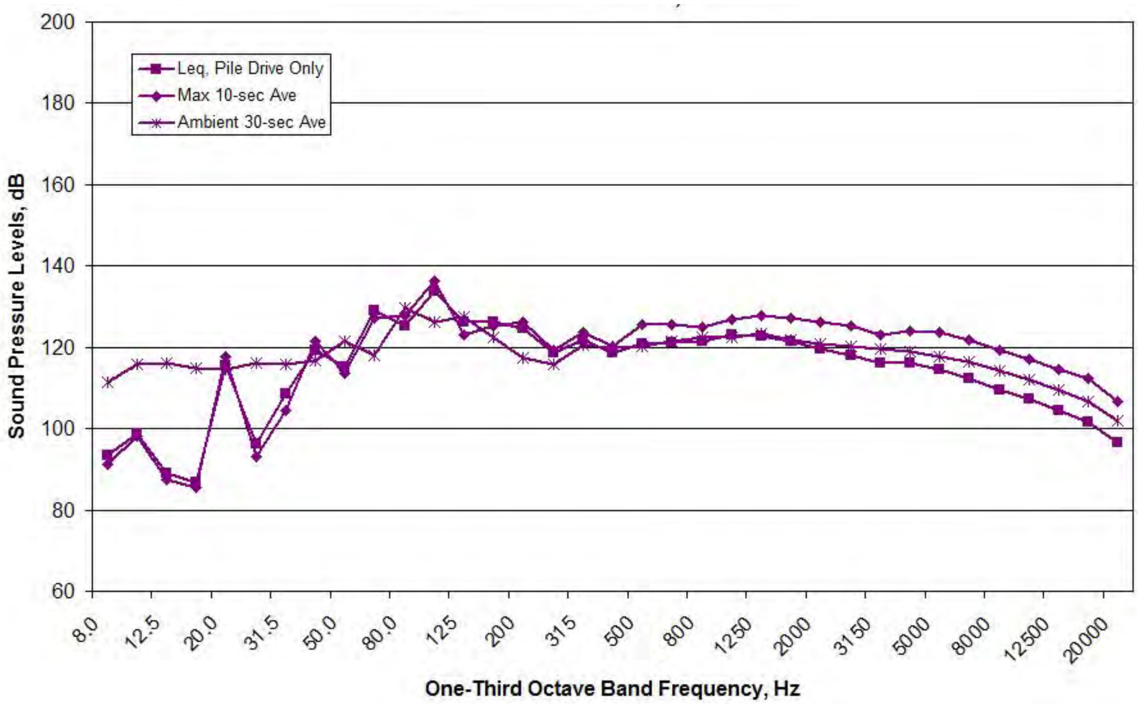

Figure B294. Spectral Data Measured at the RFT Location during EHW10, Batter, 9:57-10:06, Measured at Depths of 10 meters on October 13, 2011

EHW10, Batter, 10:32-10:45 (Vibratory Installation)

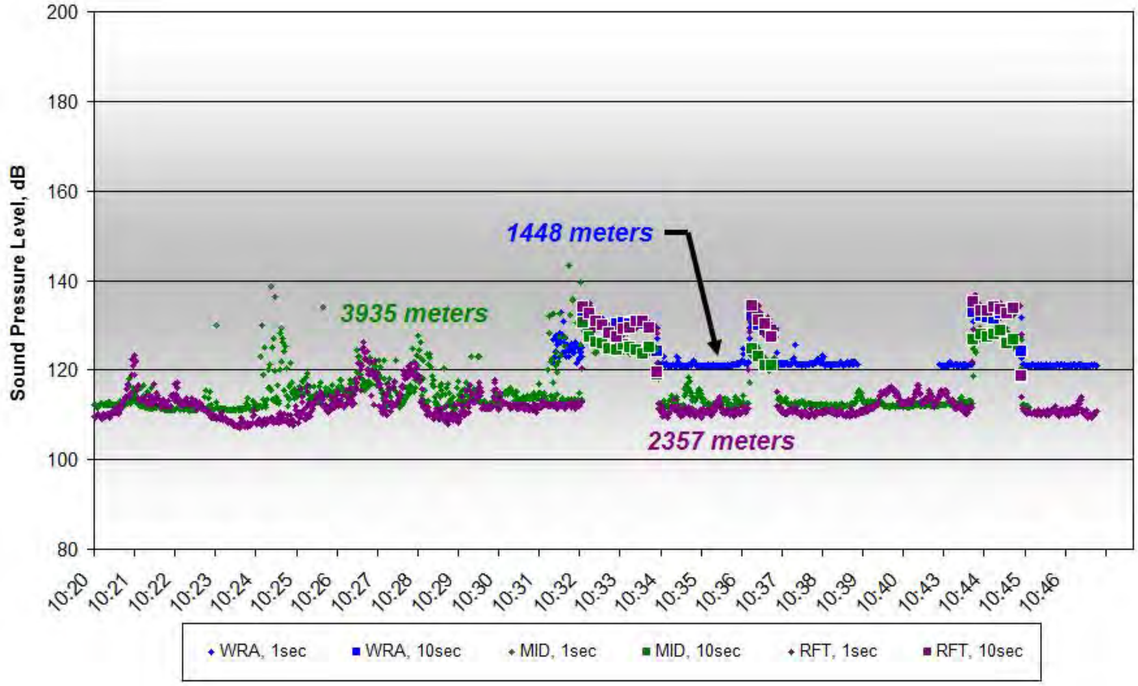

Figure B295. One-second and 10-second Average Data for EHW10, Batter, 10:32-10:45, Measured at Depths of 17-30 meters on October 13, 2011

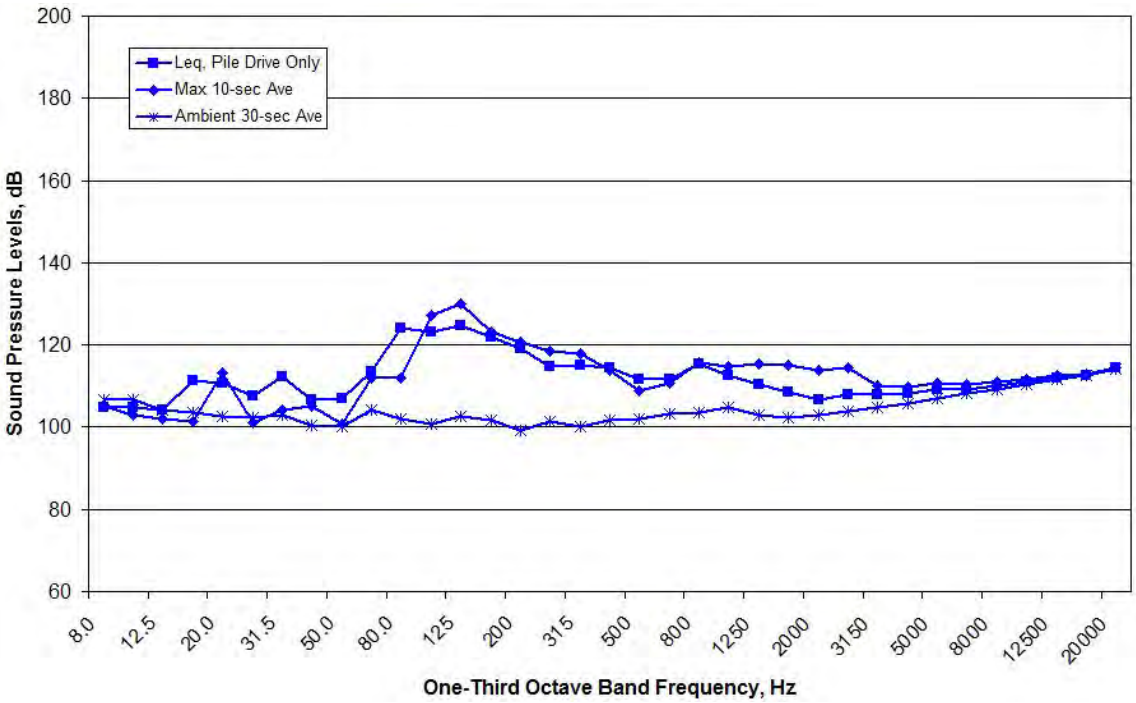

Figure B296. Spectral Data Measured at the WRA Location during EHW10, Batter, 10:32-10:45, Measured at Depths of 30 meters on October 13, 2011

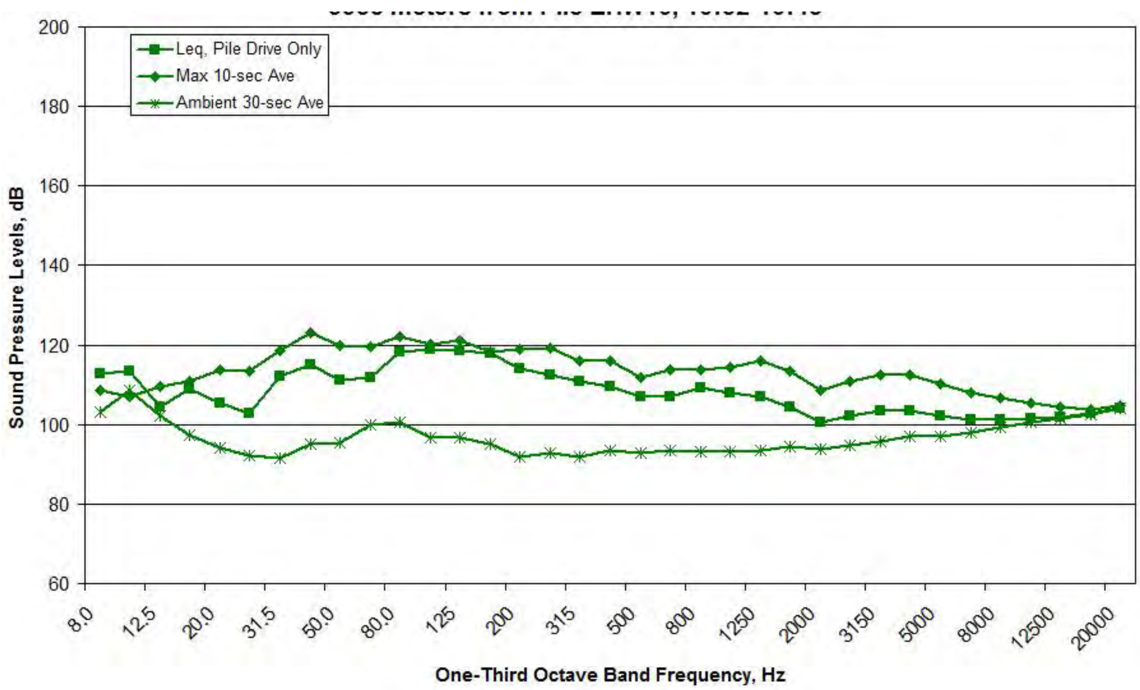

Figure B297. Spectral Data Measured at the MID Location during EHW10, Batter, 10:32-10:45, Measured at Depths of 30 meters on October 13, 2011

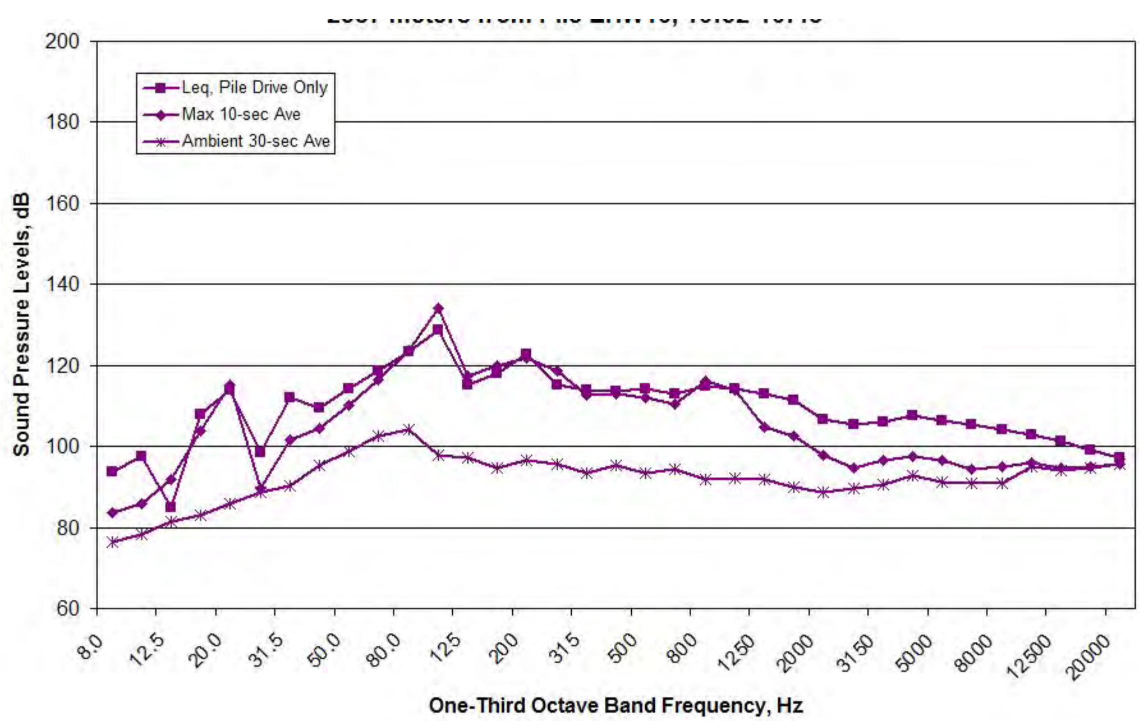

Figure B298. Spectral Data Measured at the RFT Location during EHW10, Batter, 10:32-10:45, Measured at Depths of 17 meters on October 13, 2011

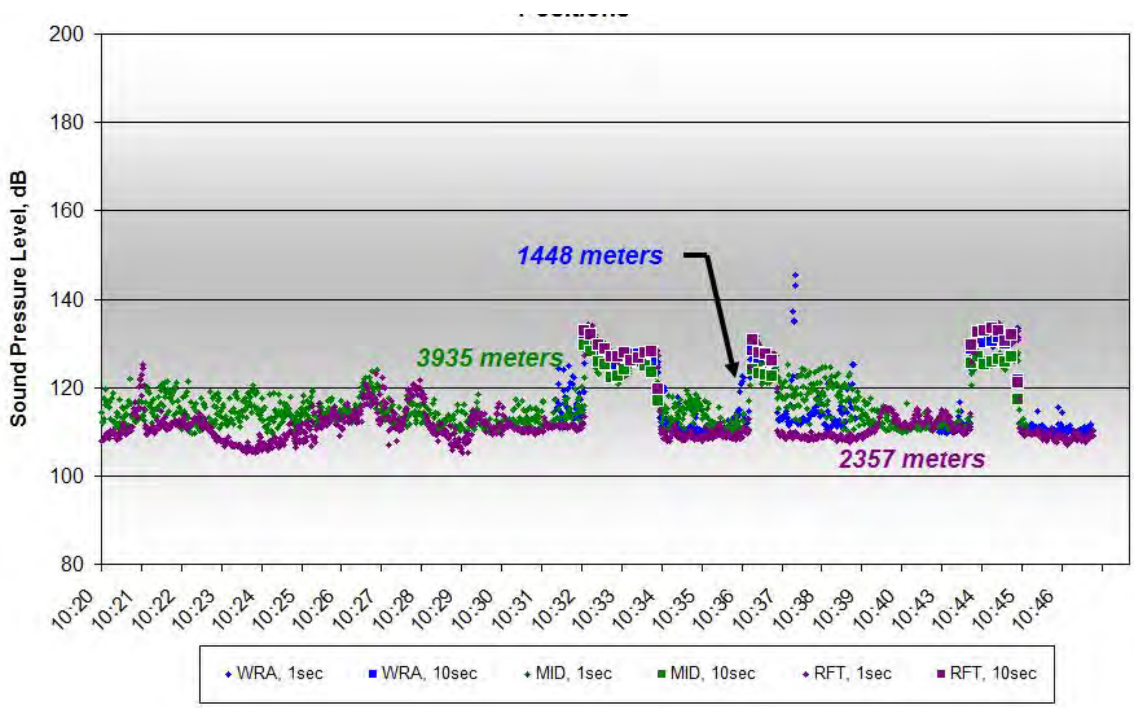

Figure B299. One-second and 10-second Average Data for EHW10, Batter, 10:32-10:45, Measured at Depths of 10 meters on October 13, 2011

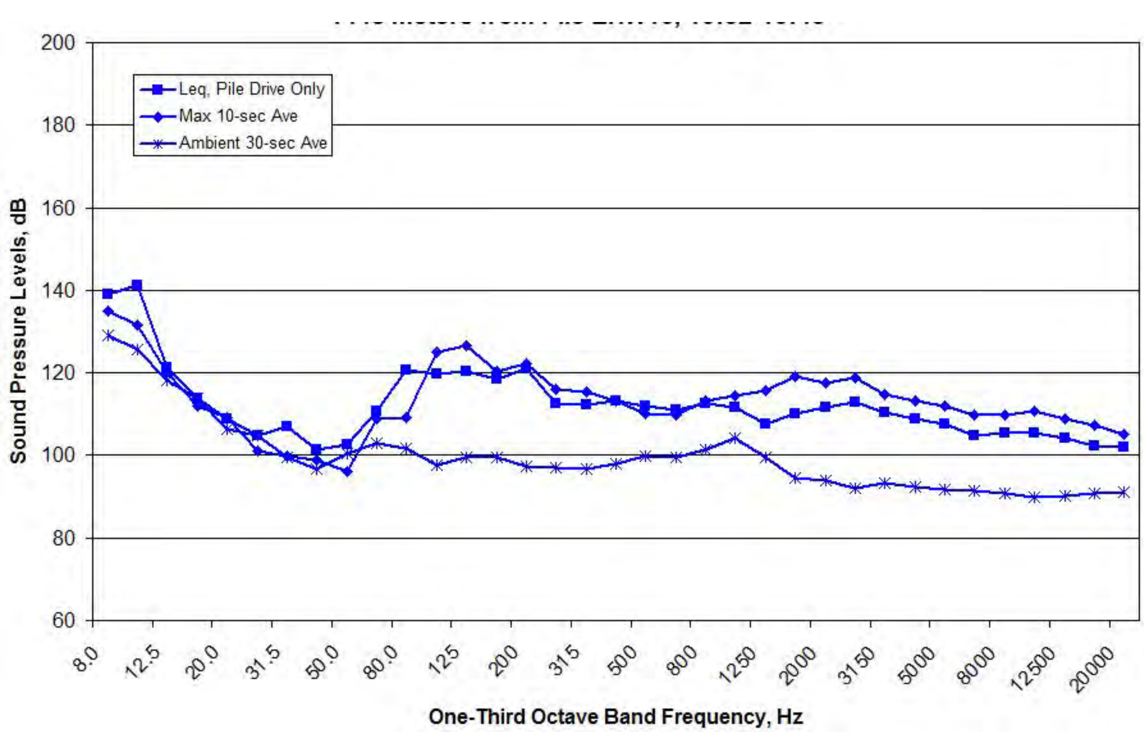

Figure B300. Spectral Data Measured at the WRA Location EHW10, Batter, 10:32-10:45, Measured at Depths of 10 meters on October 13, 2011

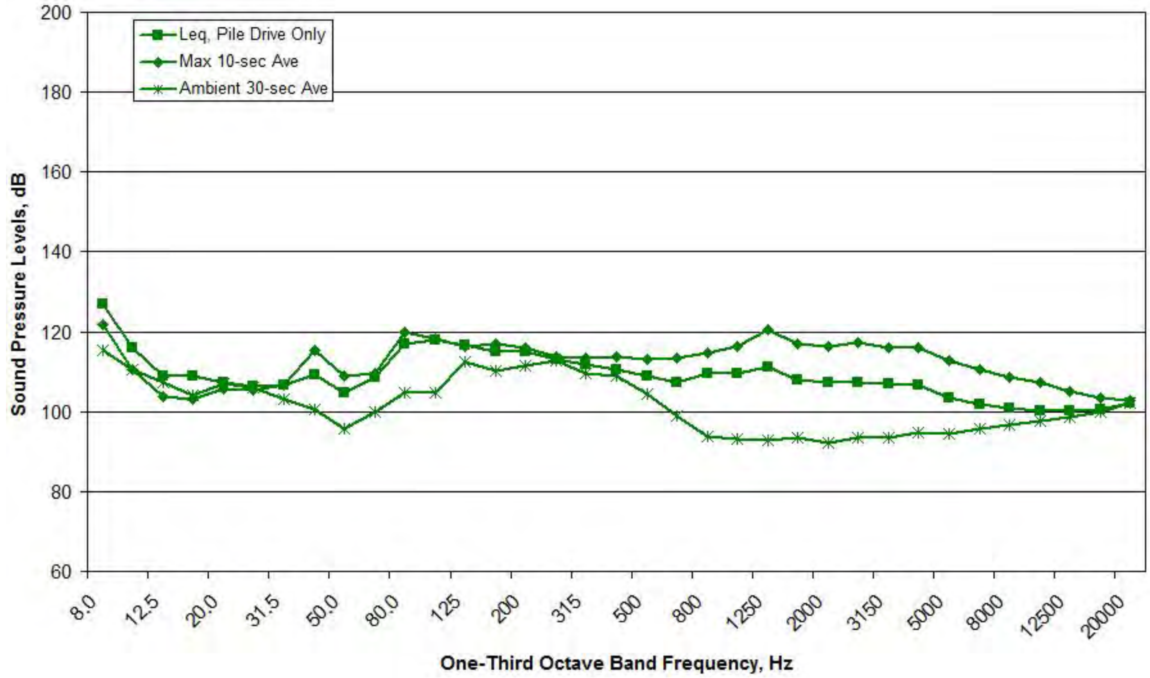

Figure B301. Spectral Data Measured at the MID Location during EHW10, Batter, 10:32-10:45, Measured at Depths of 10 meters on October 13, 2011

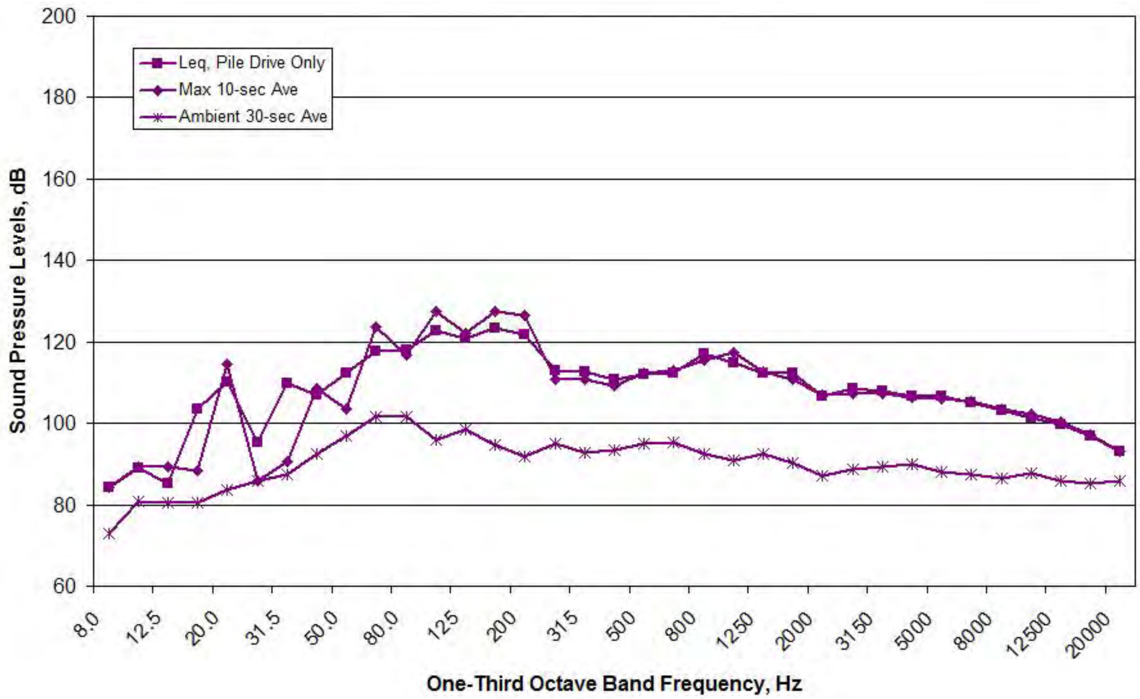

Figure B302. Spectral Data Measured at the RFT Location during EHW10, Batter, 10:32-10:45, Measured at Depths of 10 meters on October 13, 2011

EHW7, Plumb, 13:01-13:07 (Vibratory Installation)

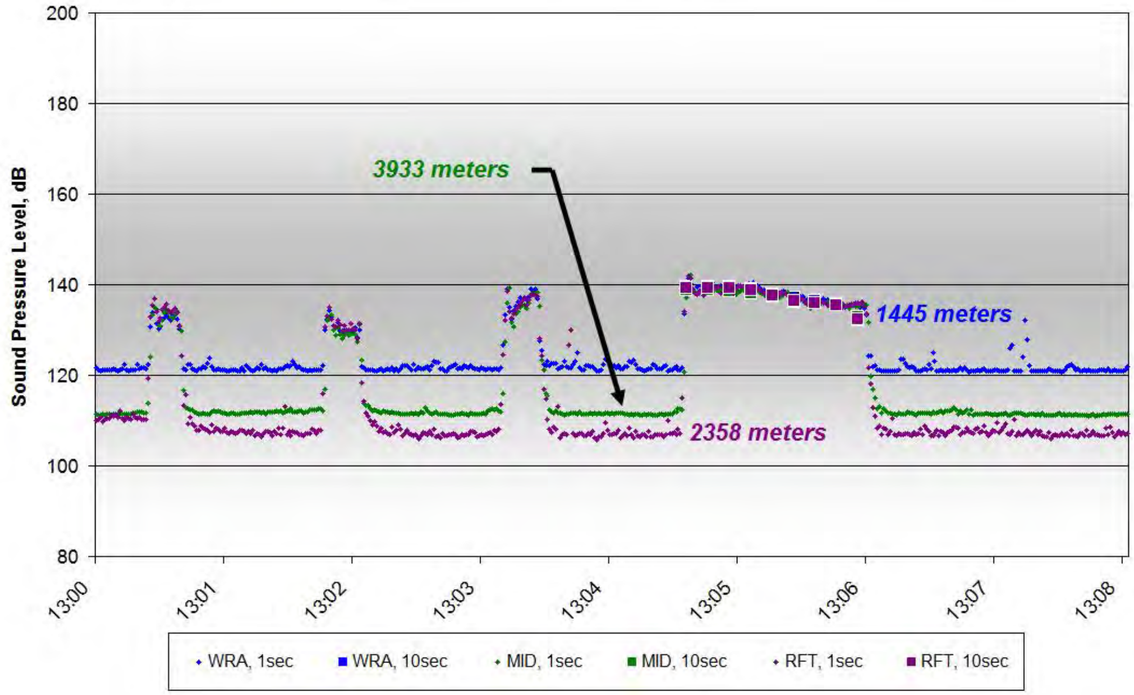

Figure B303. One-second and 10-second Average Data for EHW7, Plumb, 13:01-13:07, Measured at Depths of 17-30 meters on October 13, 2011

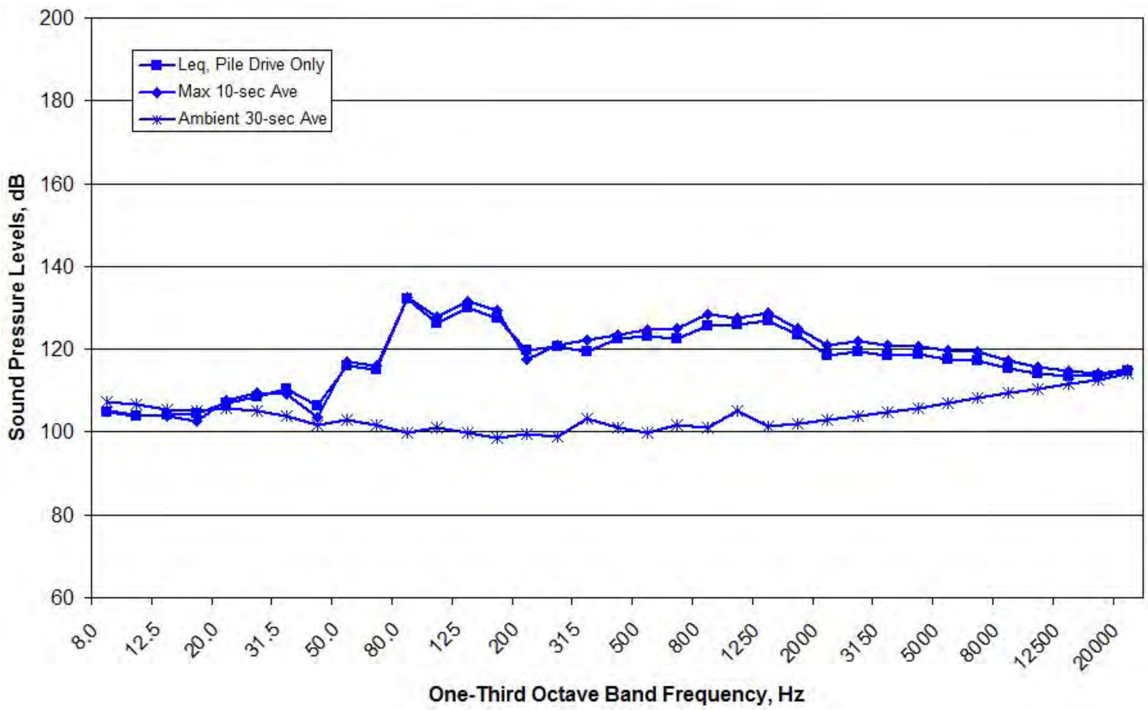

Figure B304. Spectral Data Measured at the WRA Location during EHW7, Plumb, 13:01-13:07, Measured at Depths of 30 meters on October 13, 2011

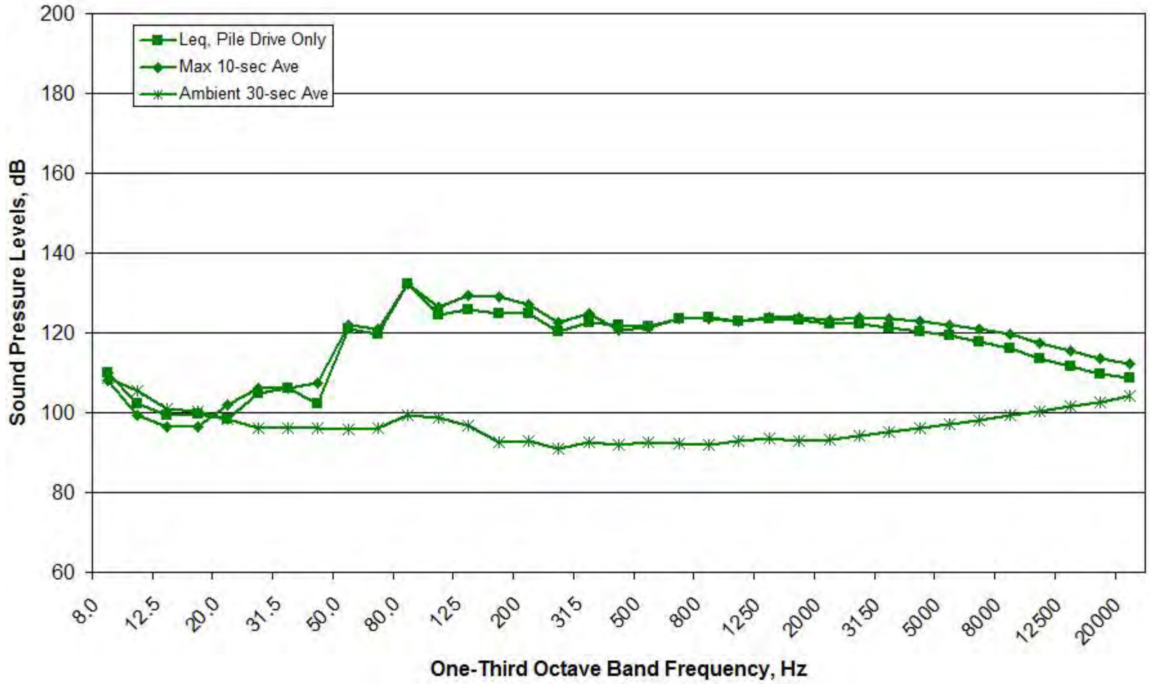

Figure B305. Spectral Data Measured at the MID Location during EHW7, Plumb, 13:01-13:07, Measured at Depths of 30 meters on October 13, 2011

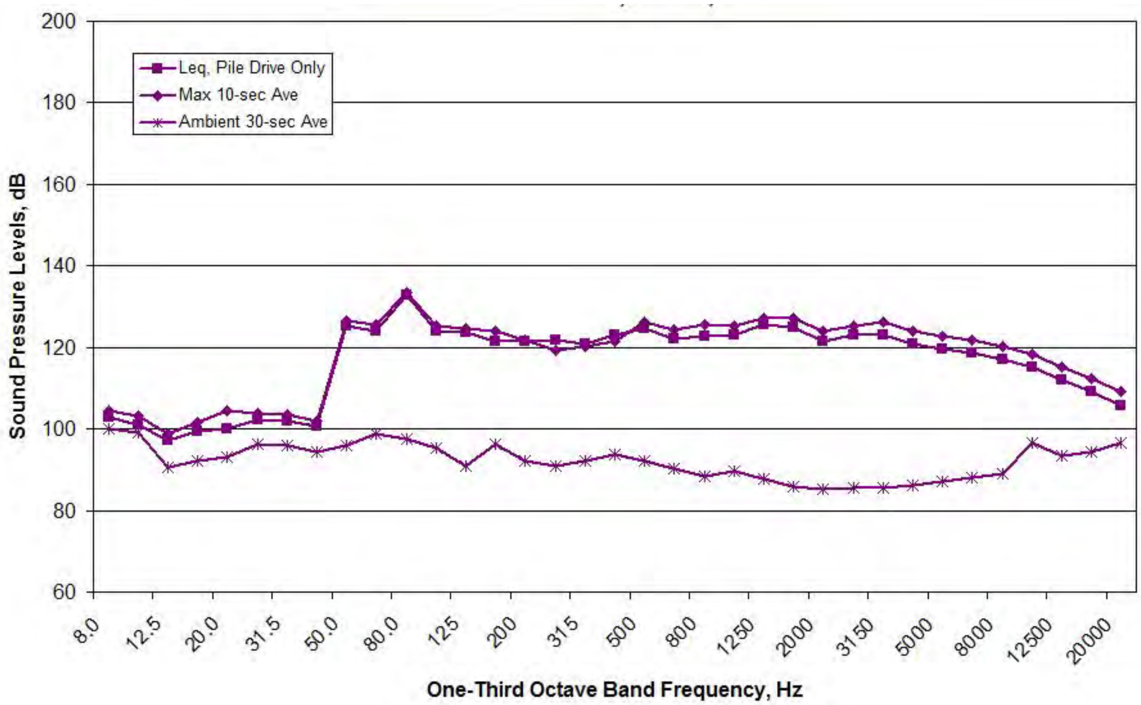

Figure B306. Spectral Data Measured at the RFT Location during EHW7, Plumb, 13:01-13:07, Measured at Depths of 17 meters on October 13, 2011

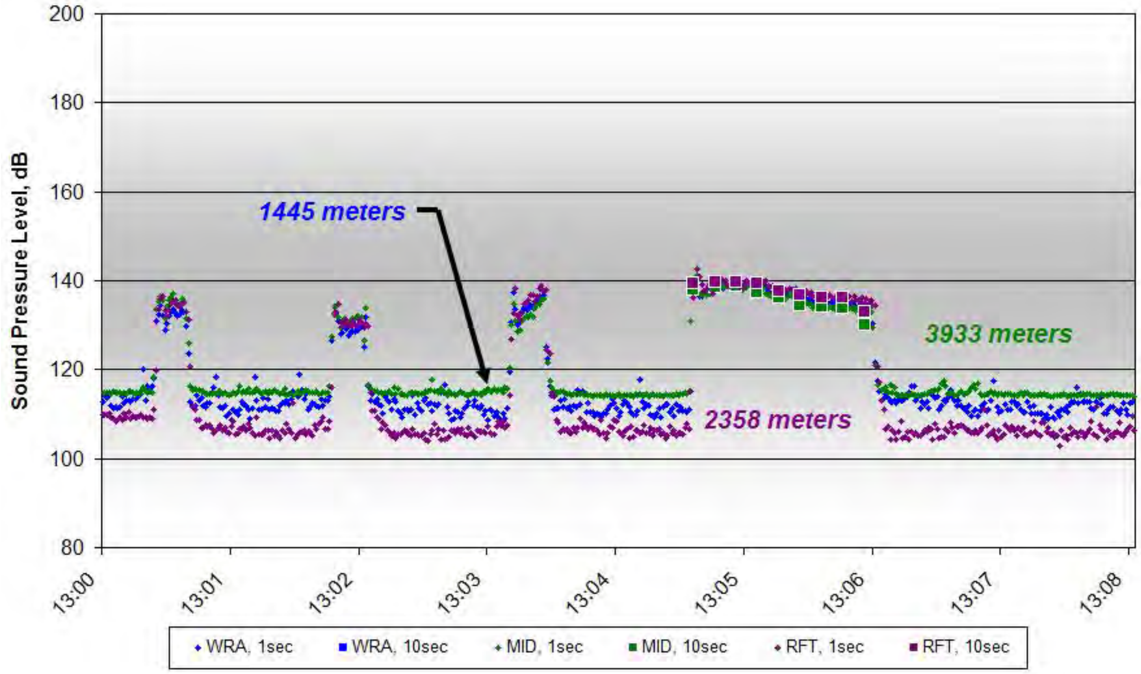

Figure B307. One-second and 10-second Average Data for EHW7, Plumb, 13:01-13:07, Measured at Depths of 10 meters on October 13, 2011

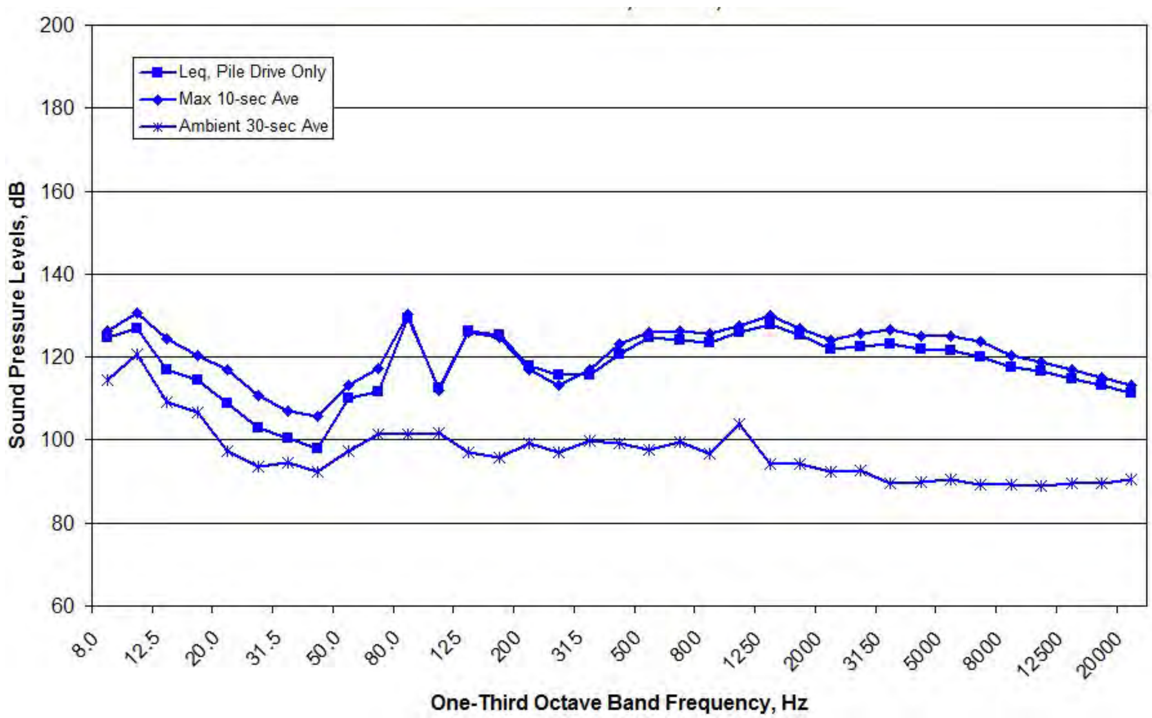

Figure B308. Spectral Data Measured at the WRA Location during EHW7, Plumb, 13:01-13:07, Measured at Depths of 10 meters on October 13, 2011

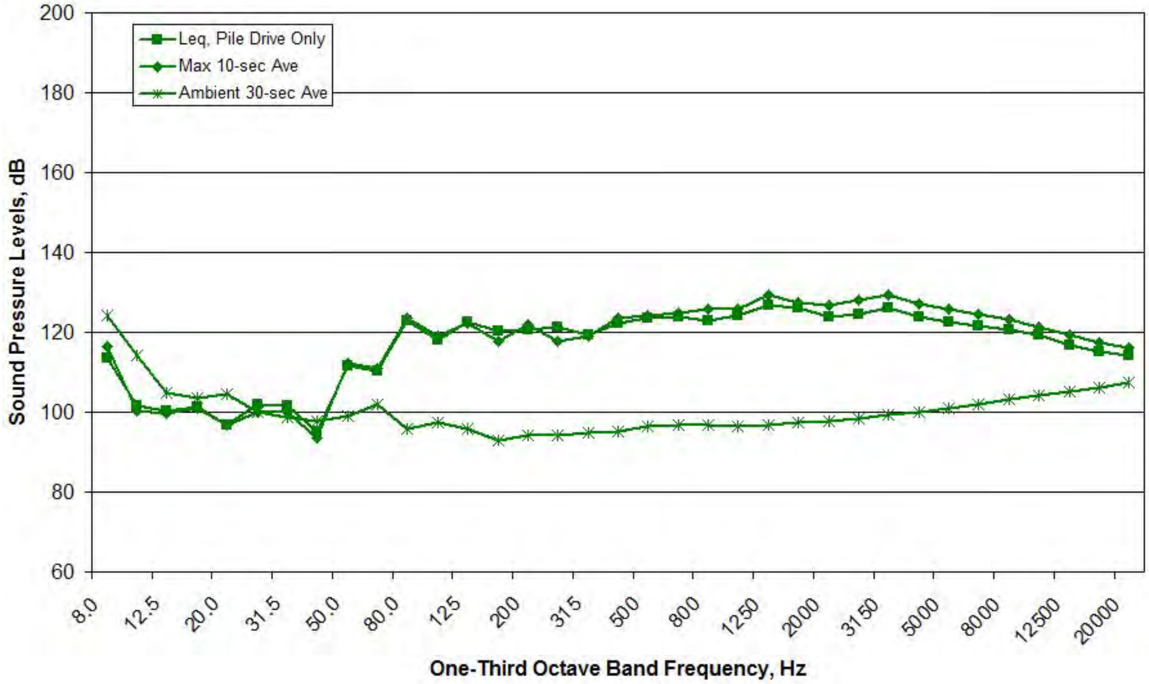

Figure B309. Spectral Data Measured at the MID Location during EHW7, Plumb, 13:01-13:07, Measured at Depths of 10 meters on October 13, 2011

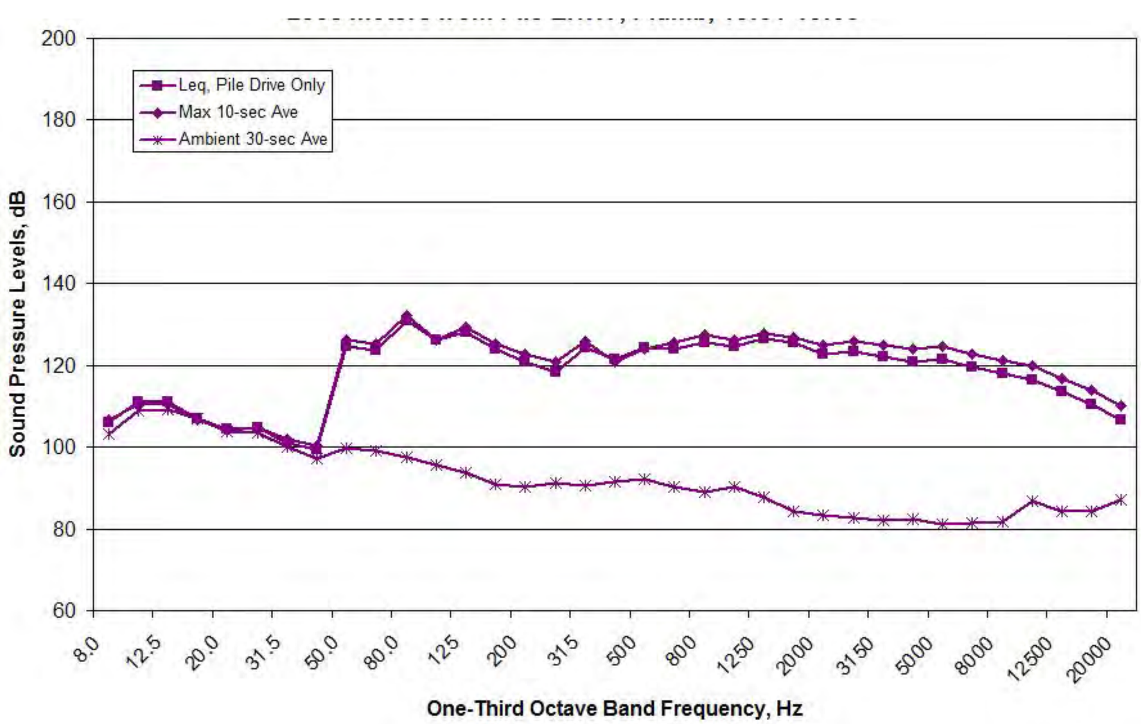

Figure B310. Spectral Data Measured at the RFT Location during EHW7, Plumb, 13:01-13:07, Measured at Depths of 10 meters on October 13, 2011

EHW7, 13:21-13:46 (Vibratory Installation)

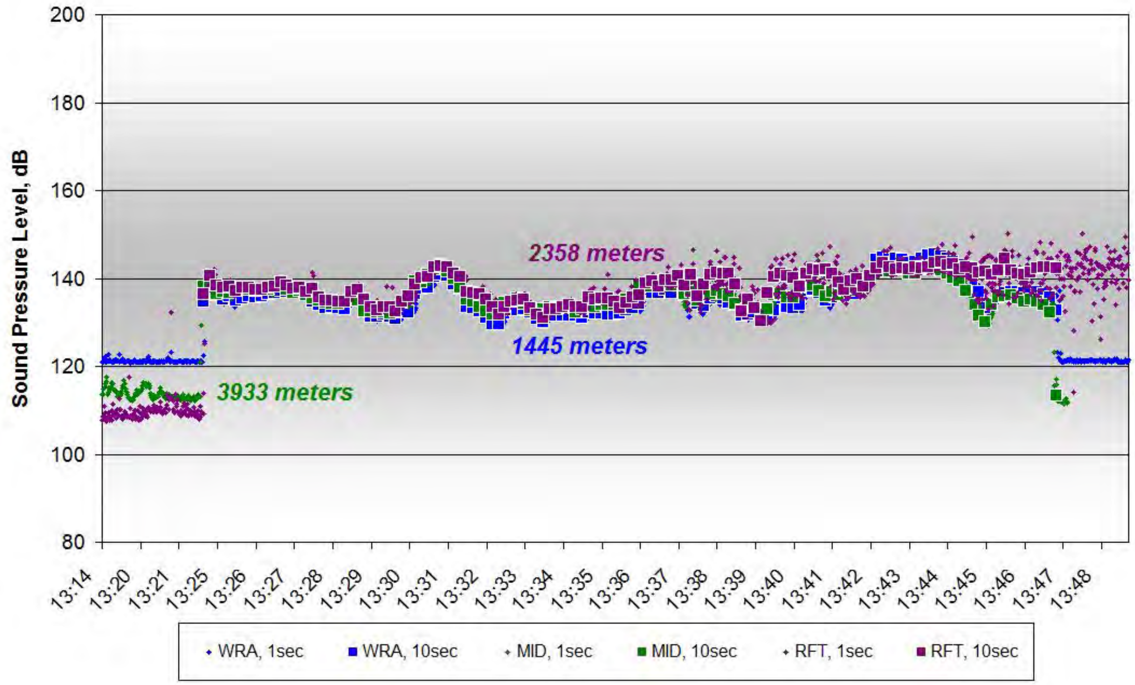

Figure B311. One-second and 10-second Average Data for EHW7, 13:21-13:46, Measured at Depths of 17-30 meters on October 13, 2011

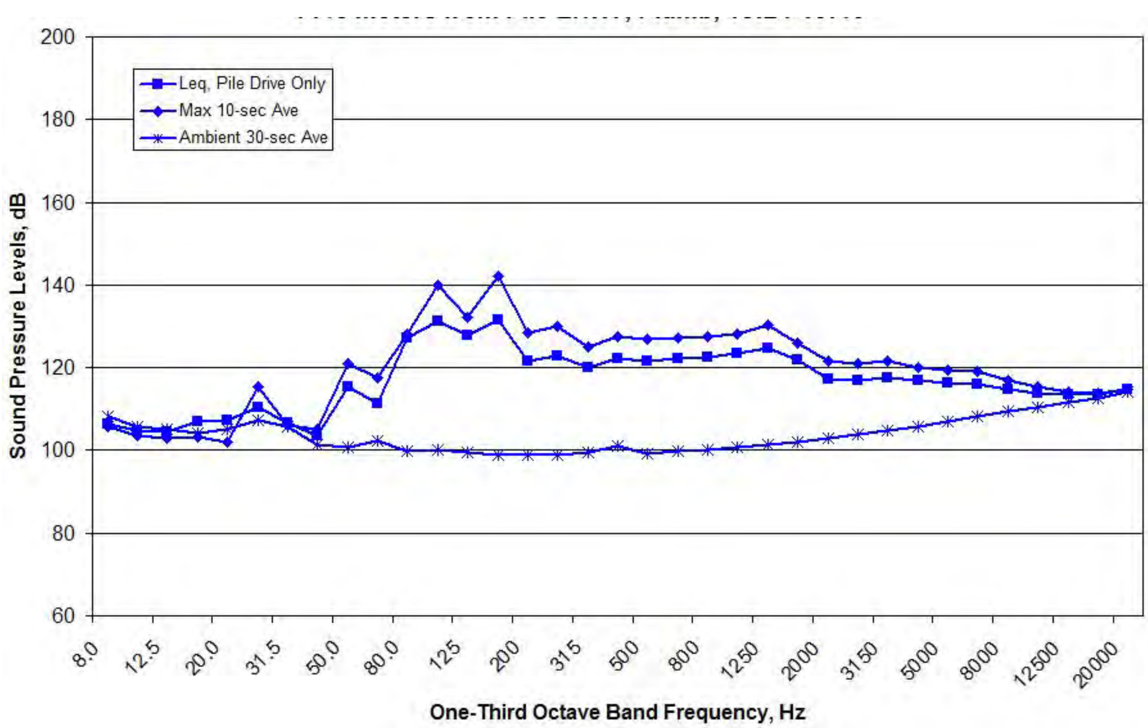

Figure B312. Spectral Data Measured at the WRA Location during EHW7, 13:21-13:46, Measured at Depths of 30 meters on October 13, 2011

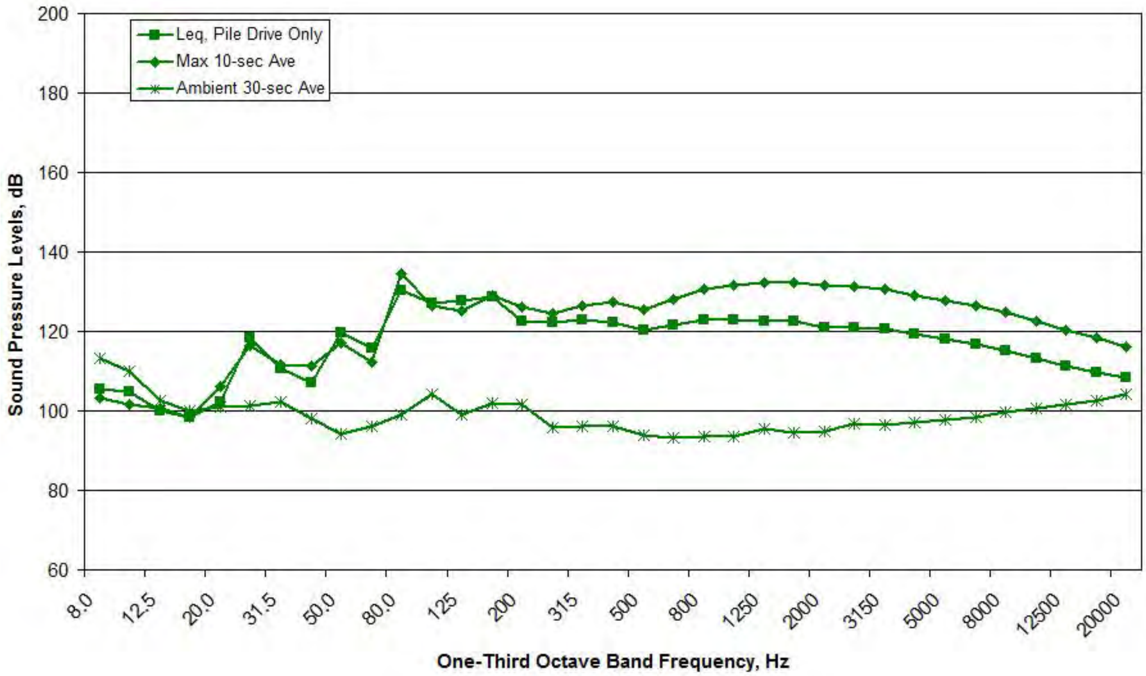

Figure B313. Spectral Data Measured at the MID Location during EHW7, 13:21-13:46, Measured at Depths of 30 meters on October 13, 2011

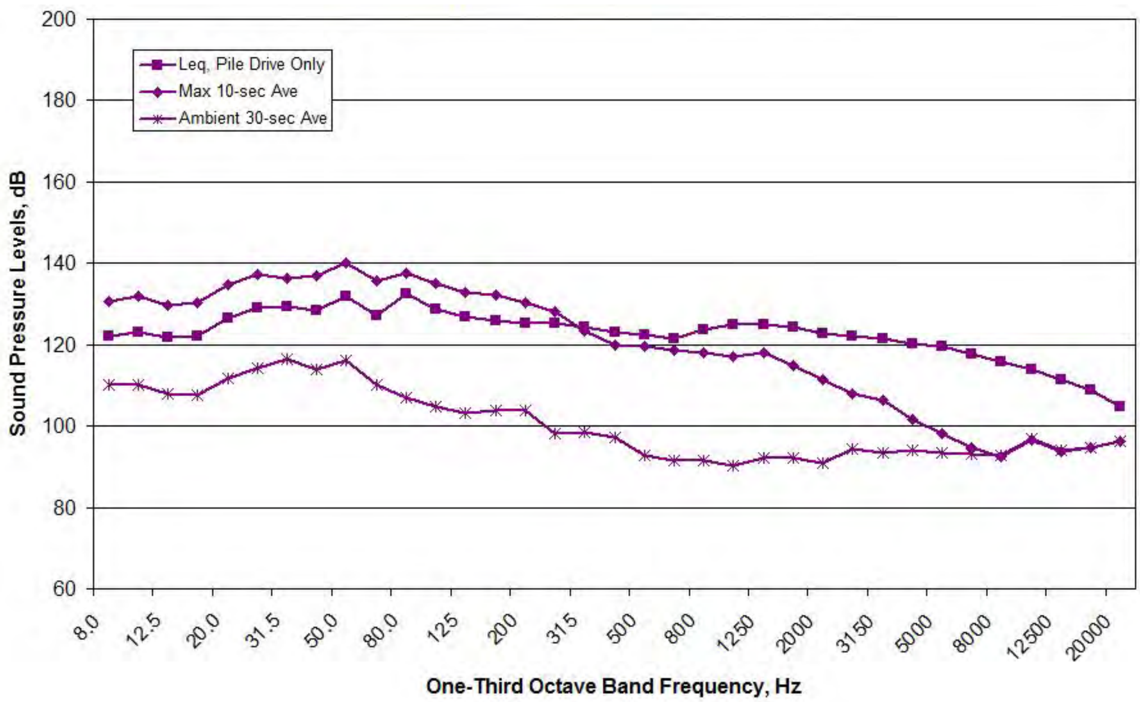

Figure B314. Spectral Data Measured at the RFT Location during EHW7, 13:21-13:46, Measured at Depths of 17 meters on October 13, 2011

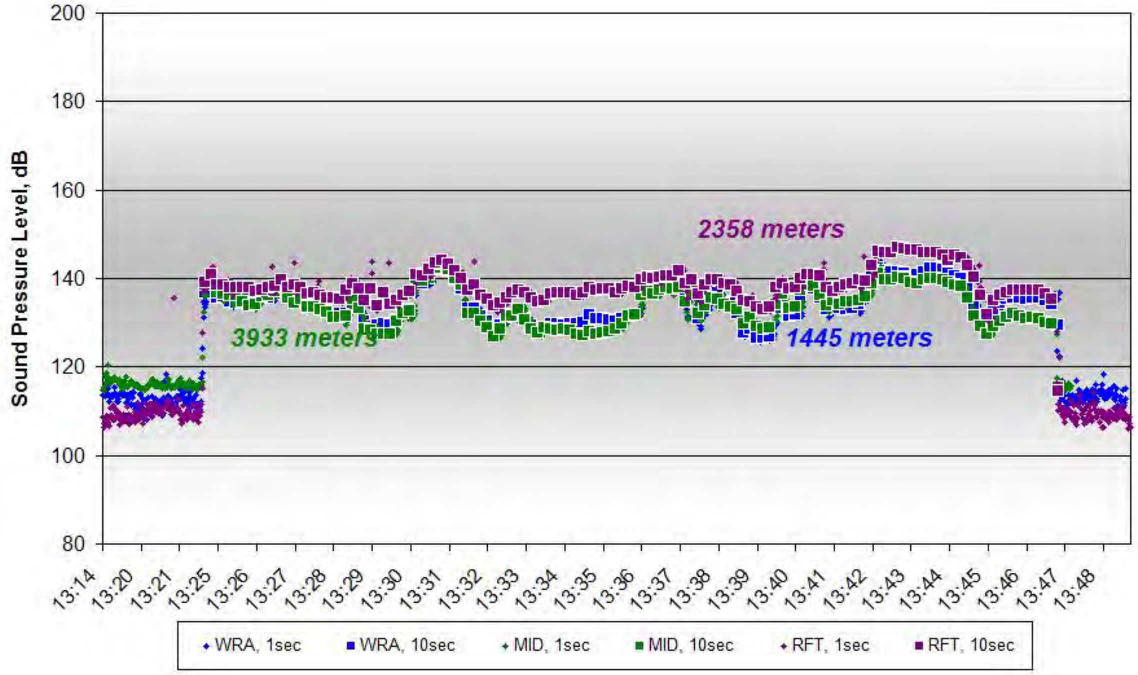

Figure B315. One-second and 10-second Average Data for EHW7, 13:21-13:46, Measured at Depths of 10 meters on October 13, 2011

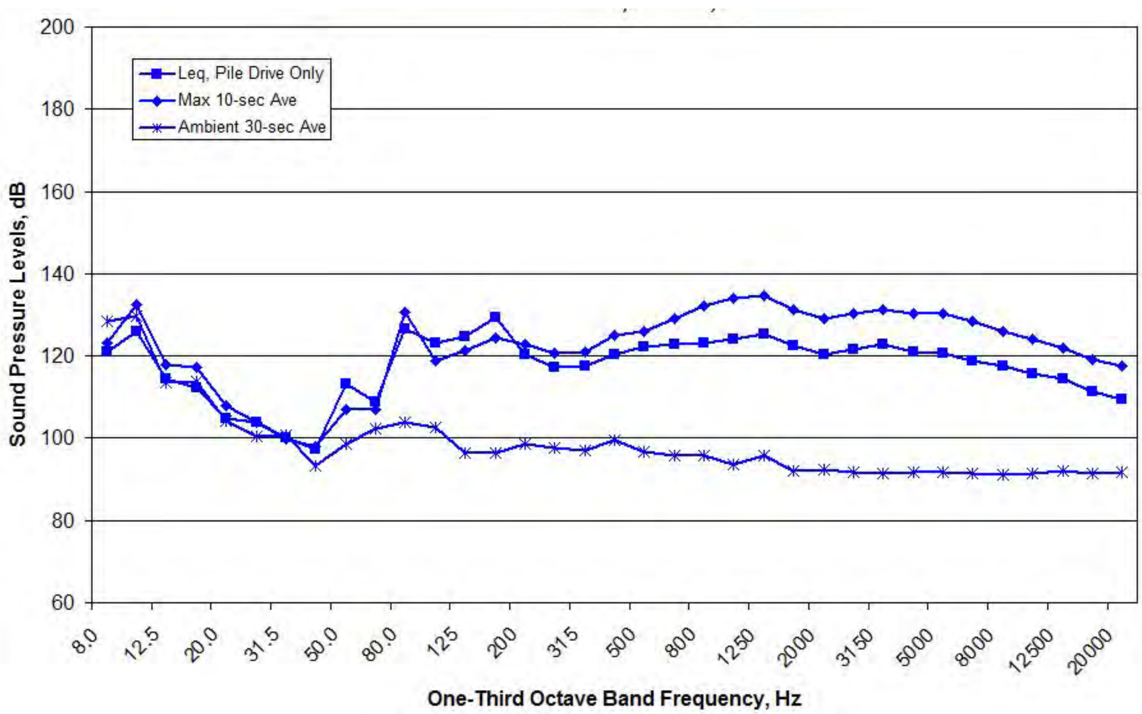

Figure B316. Spectral Data Measured at the WRA Location during EHW7, 13:21-13:46, Measured at Depths of 10 meters on October 13, 2011

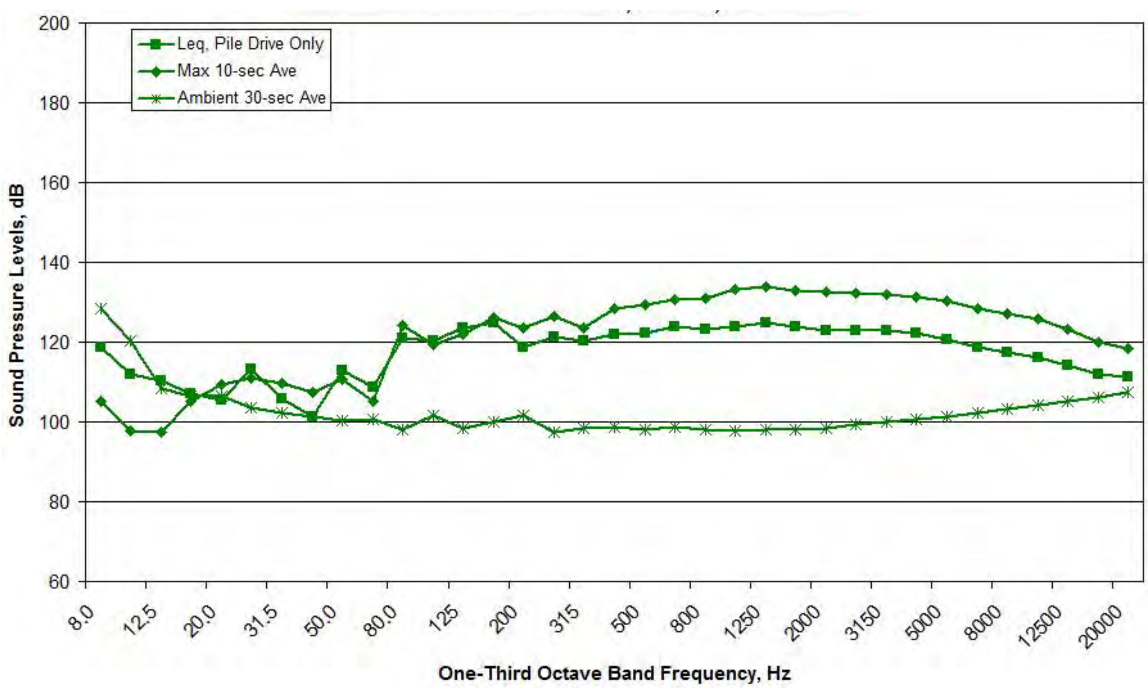

Figure B317. Spectral Data Measured at the MID Location during EHW7, 13:21-13:46, Measured at Depths of 10 meters on October 13, 2011

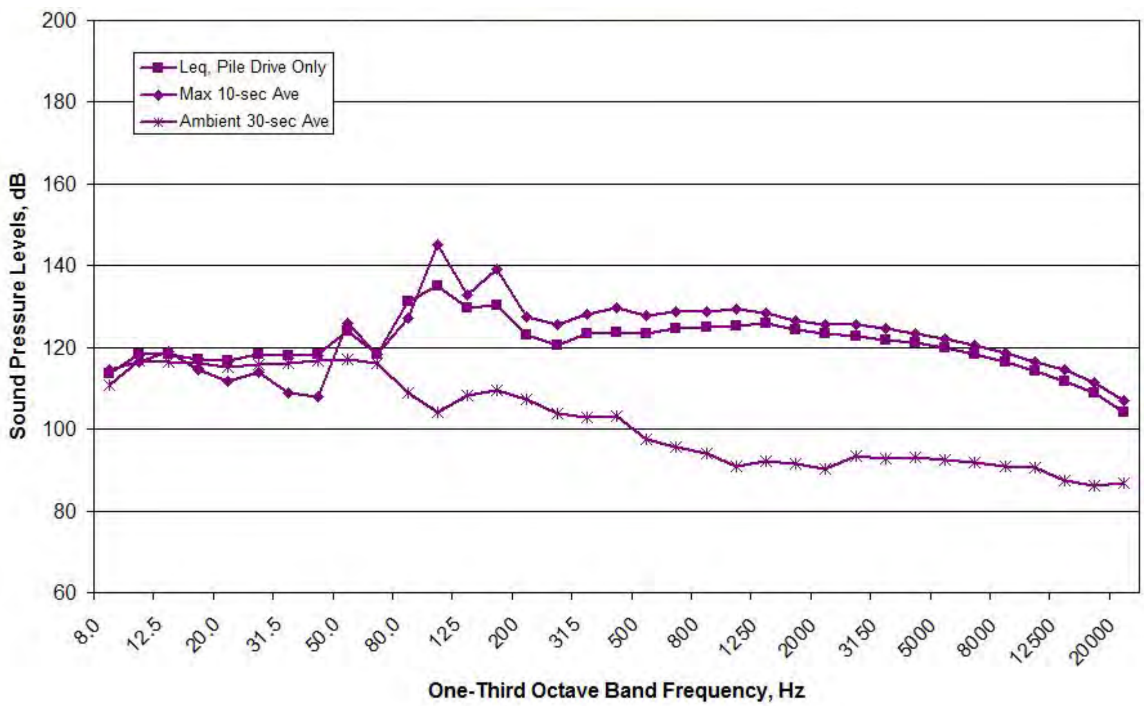

Figure B318. Spectral Data Measured at the RFT Location during EHW7, 13:21-13:46, Measured at Depths of 10 meters on October 13, 2011

EHW5 (Vibratory Installation)

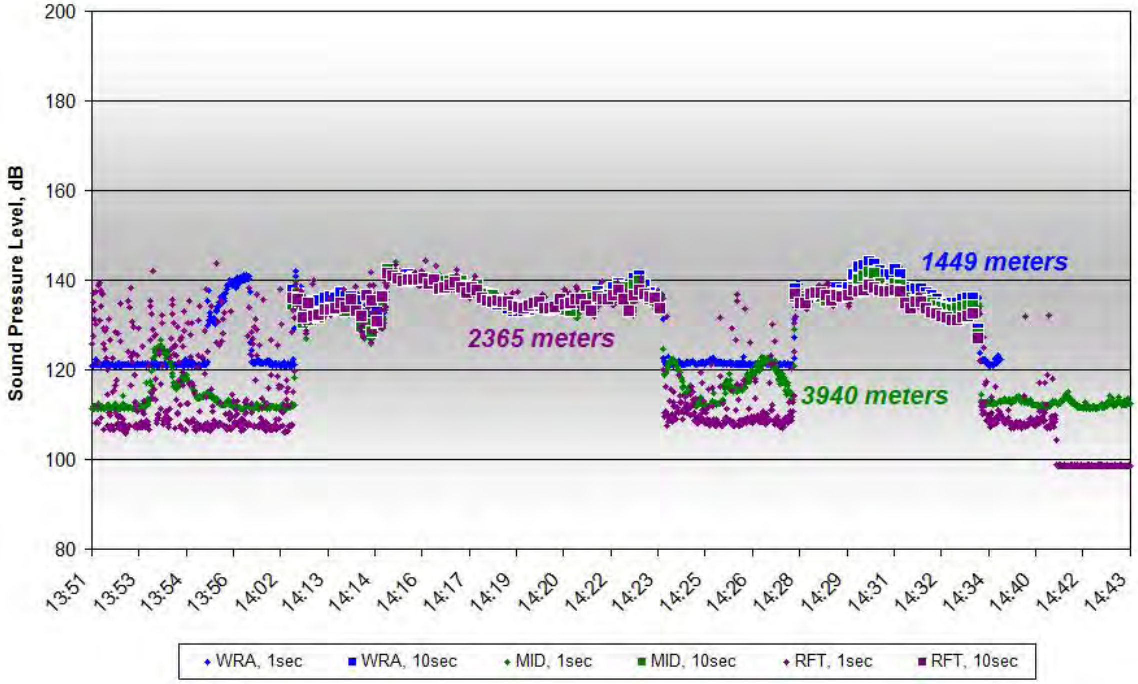

Figure B319. One-second and 10-second Average Data for EHW5, 13:55-14:34, Measured at Depths of 17-30 meters on October 13, 2011

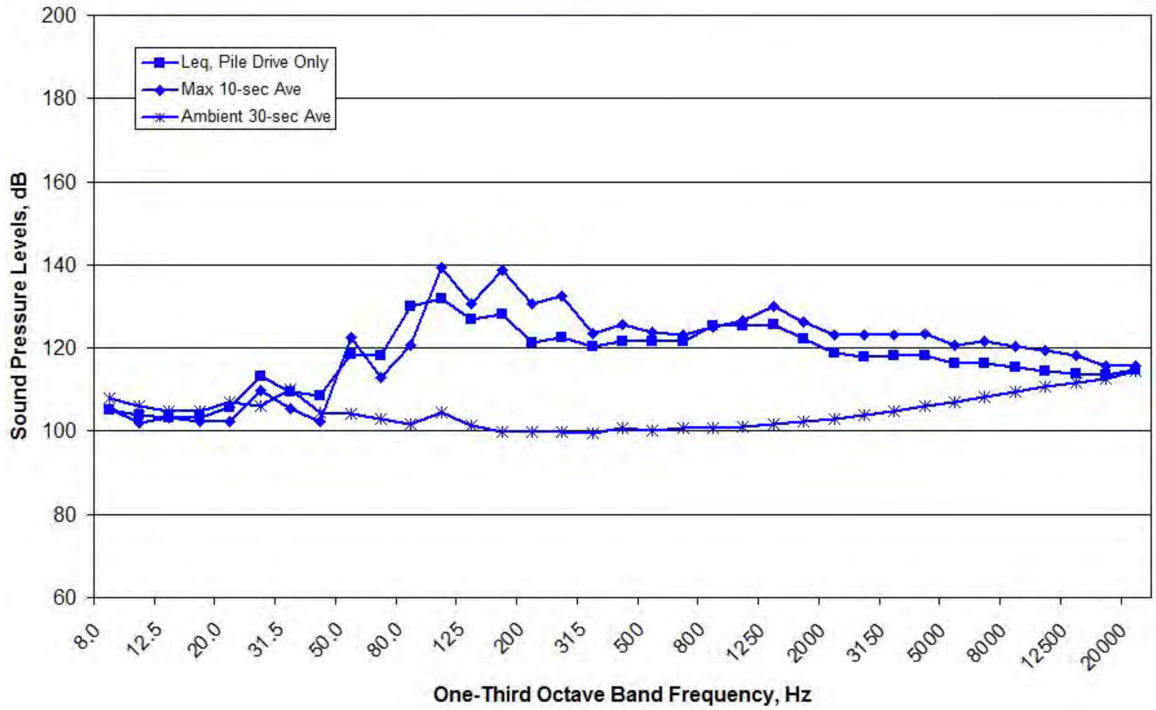

Figure B320. Spectral Data Measured at the WRA Location during EHW5, 13:55-14:34, Measured at Depths of 30 meters on October 13, 2011

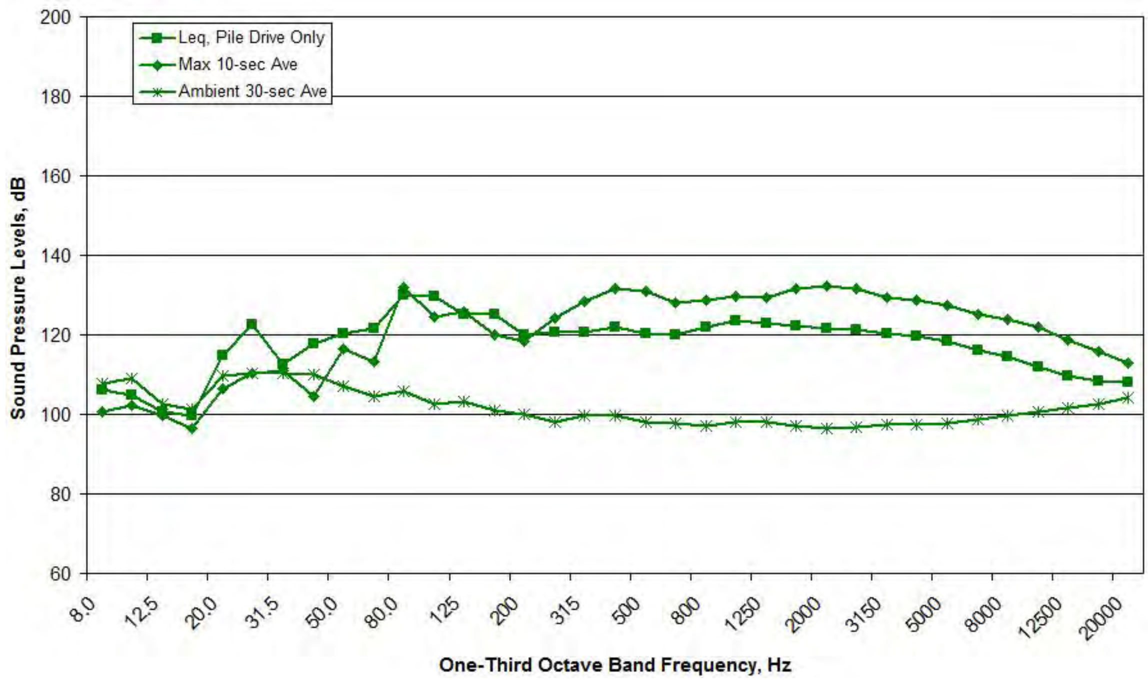

Figure B321. Spectral Data Measured at the MID Location during EHW5, 13:55-14:34, Measured at Depths of 30 meters on October 13, 2011

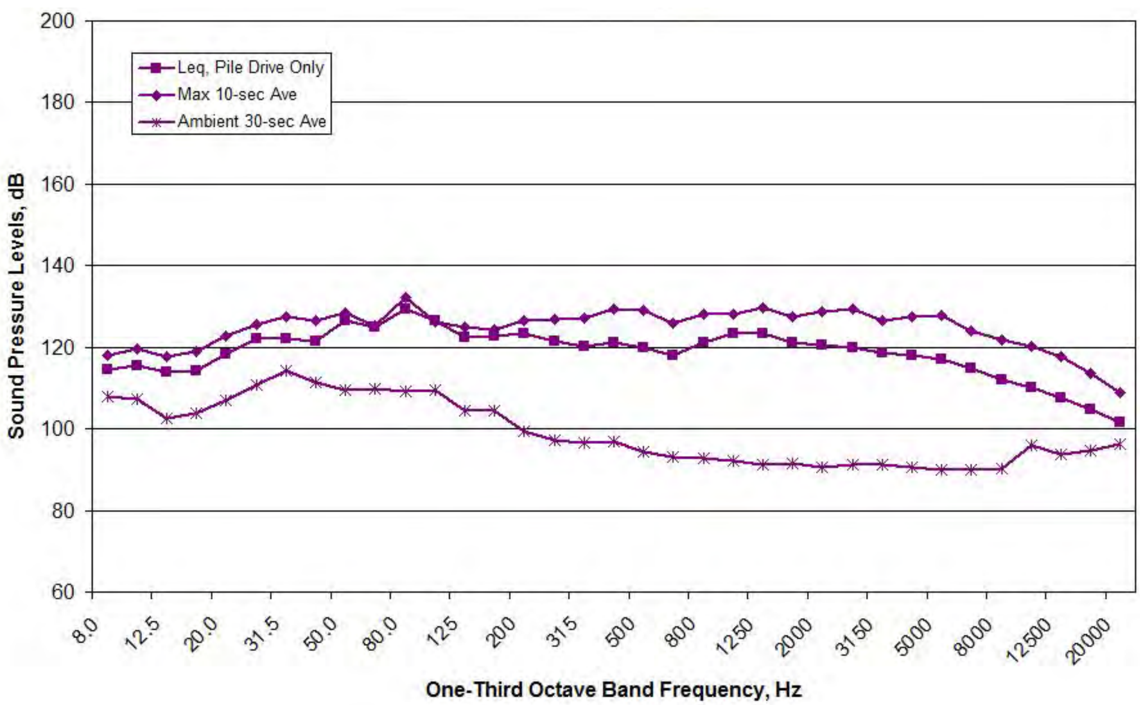

Figure B322. Spectral Data Measured at the RFT Location during EHW5, 13:55-14:34, Measured at Depths of 17 meters on October 13, 2011

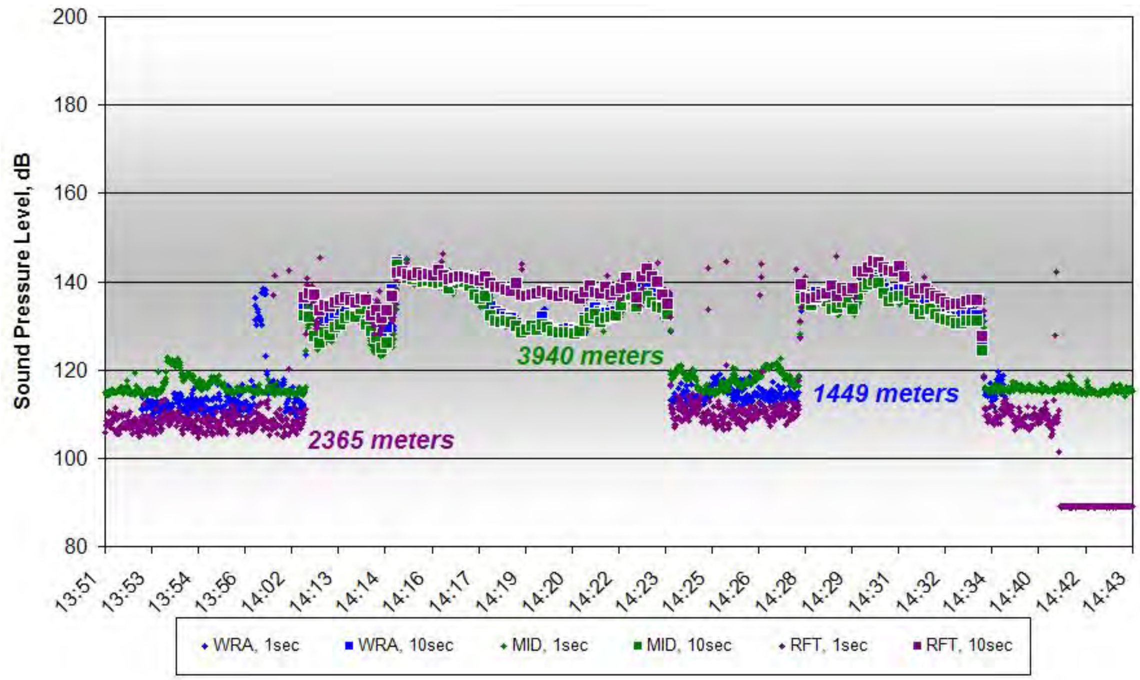

Figure B323. One-second and 10-second Average Data for EHW5, 13:55-14:34, Measured at Depths of 10 meters on October 13, 2011

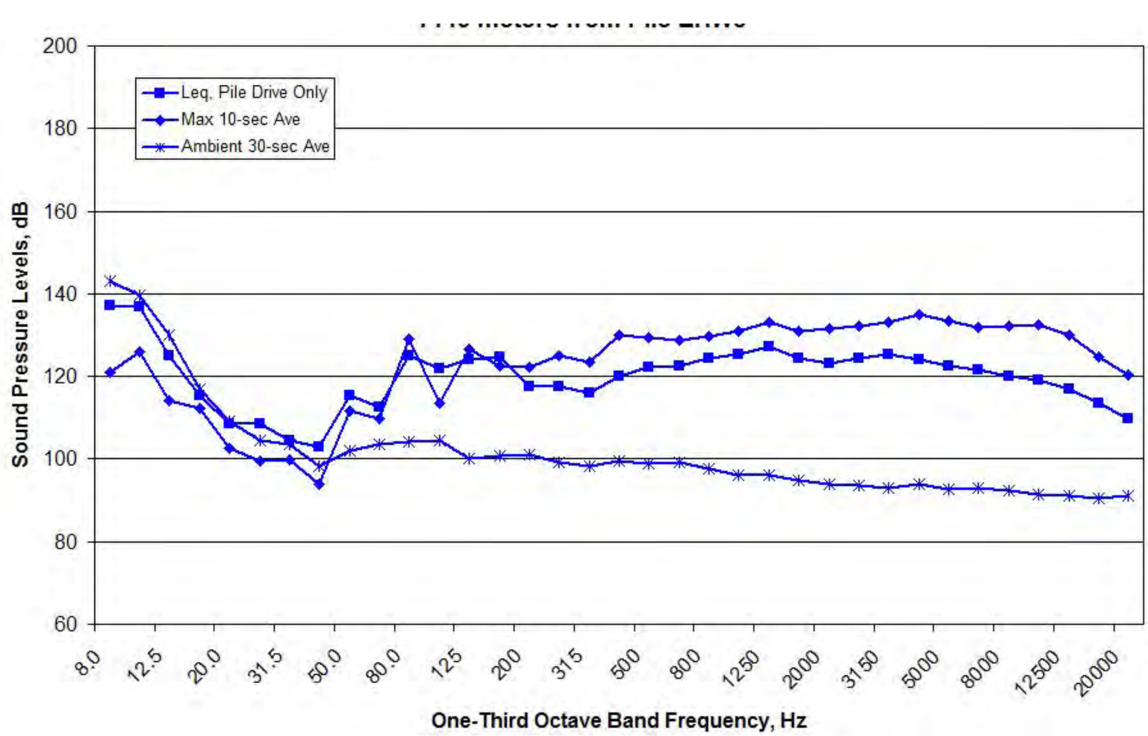

Figure B324. Spectral Data Measured at the WRA Location EHW5, 13:55-14:34, Measured at Depths of 10 meters on October 13, 2011

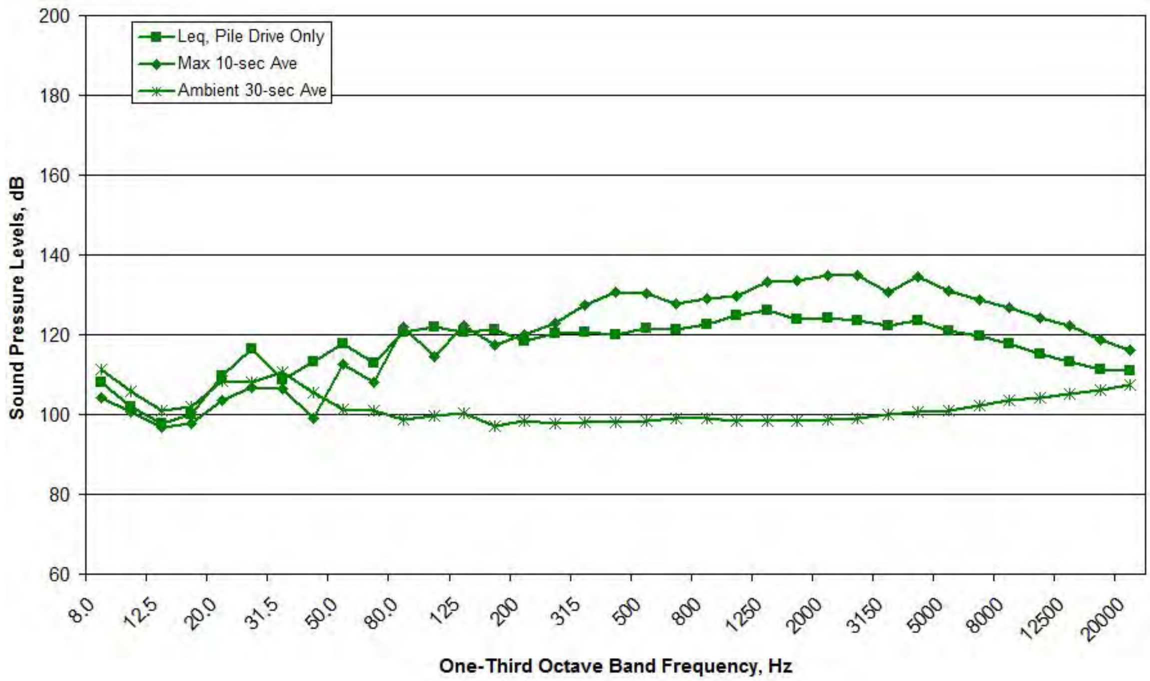

Figure B325. Spectral Data Measured at the MID Location during EHW5, 13:55-14:34, Measured at Depths of 10 meters on October 13, 2011

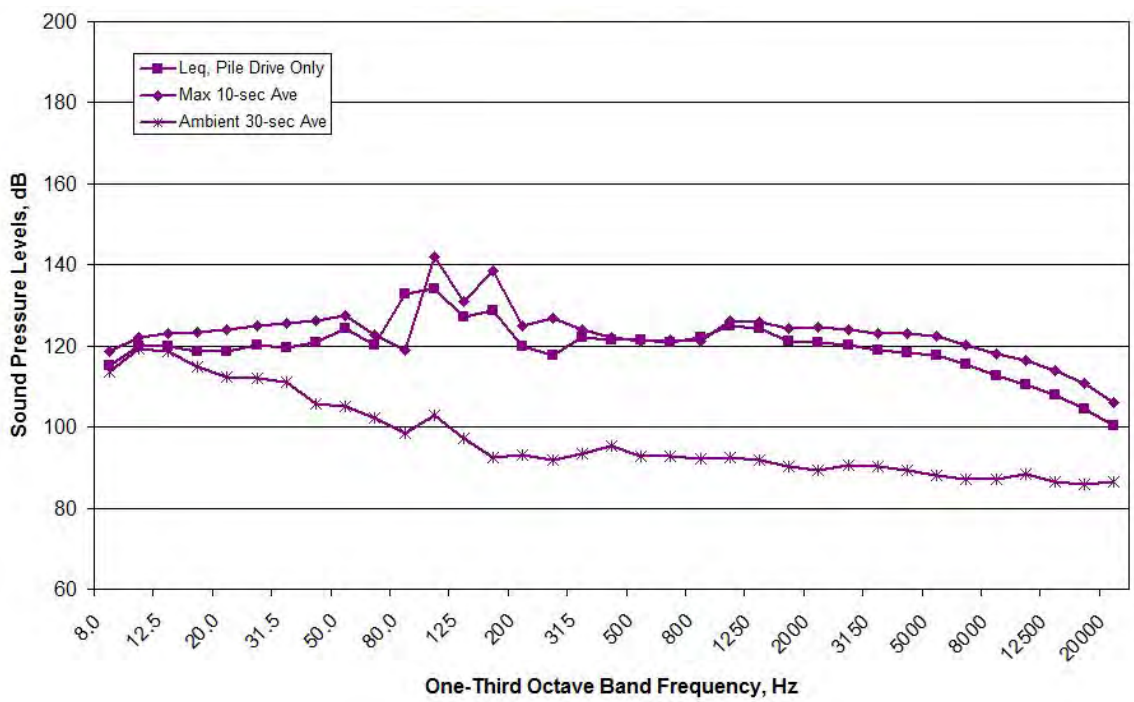

Figure B326. Spectral Data Measured at the RFT Location during EHW5, 13:55-14:34, Measured at Depths of 10 meters on October 13, 2011

10/14/2011 – EHW6, Plumb (Vibratory Installation)

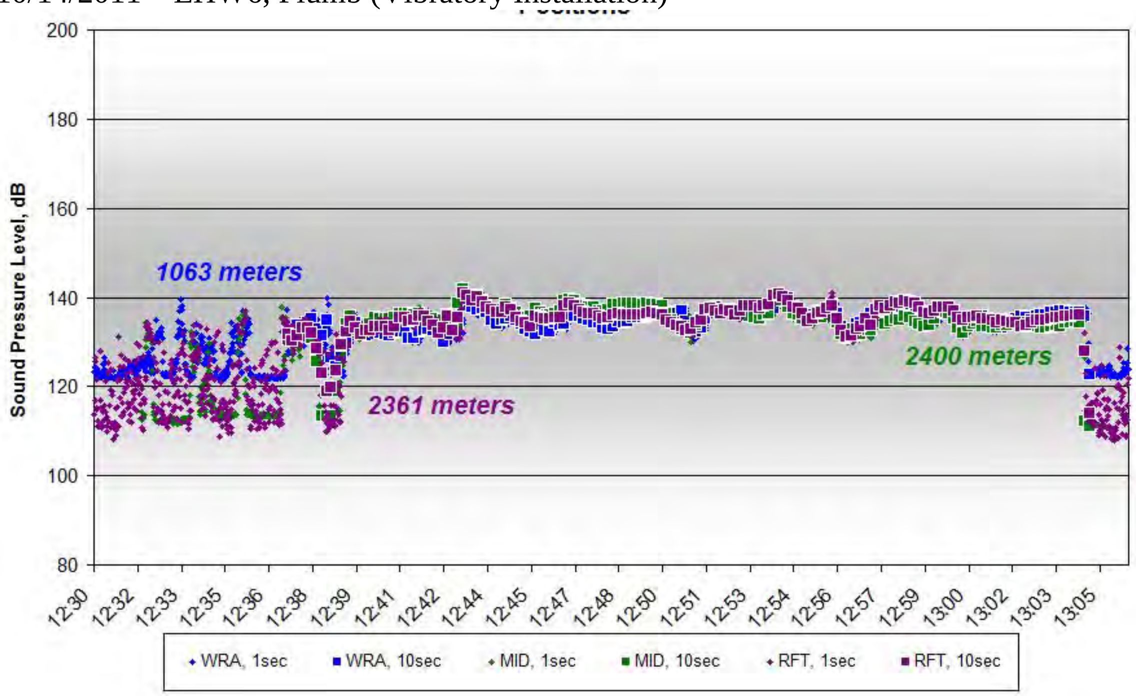

Figure B327. One-second and 10-second Average Data for EHW6, Plumb, 12:32-13:05, Measured at Depths of 17-30 meters on October 14, 2011

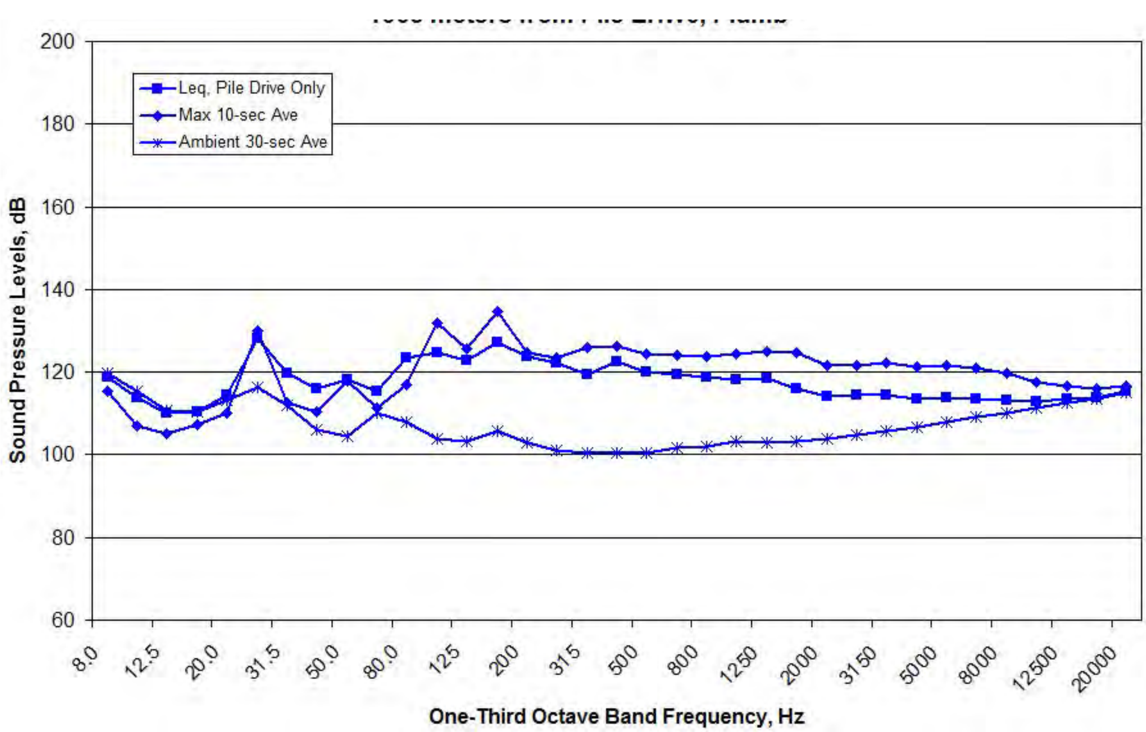

Figure B328. Spectral Data Measured at the WRA Location during EHW6, Plumb, 12:32-13:05, Measured at Depths of 30 meters on October 14, 2011

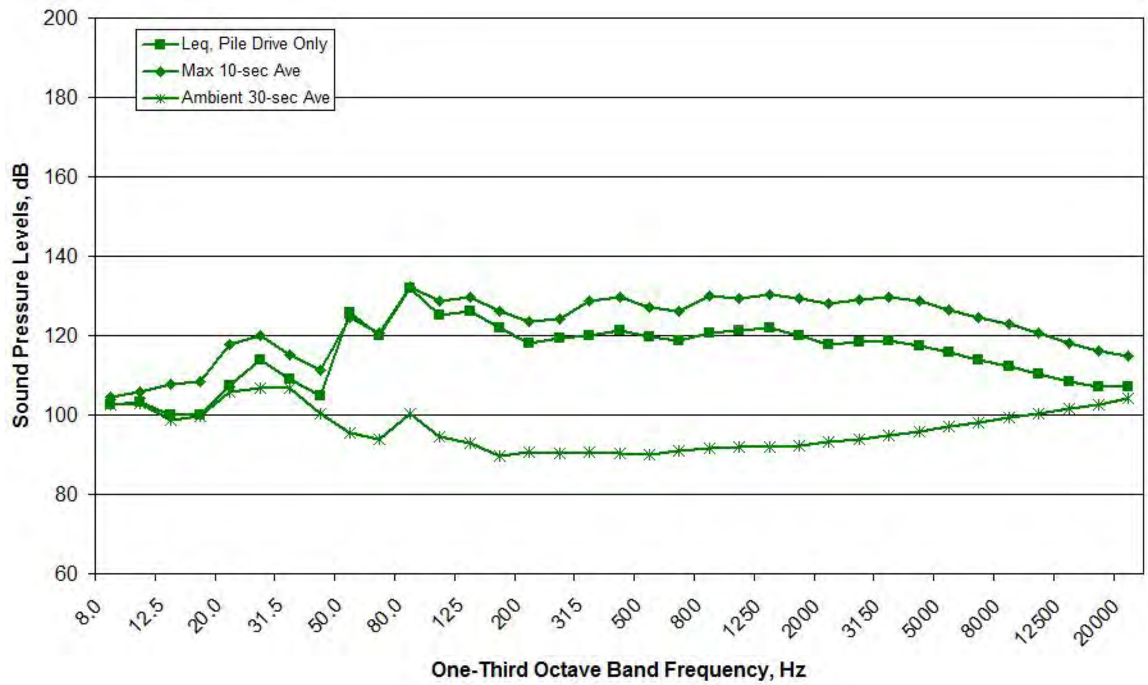

Figure B329. Spectral Data Measured at the MID Location during EHW6, Plumb, 12:32-13:05, Measured at Depths of 30 meters on October 14, 2011

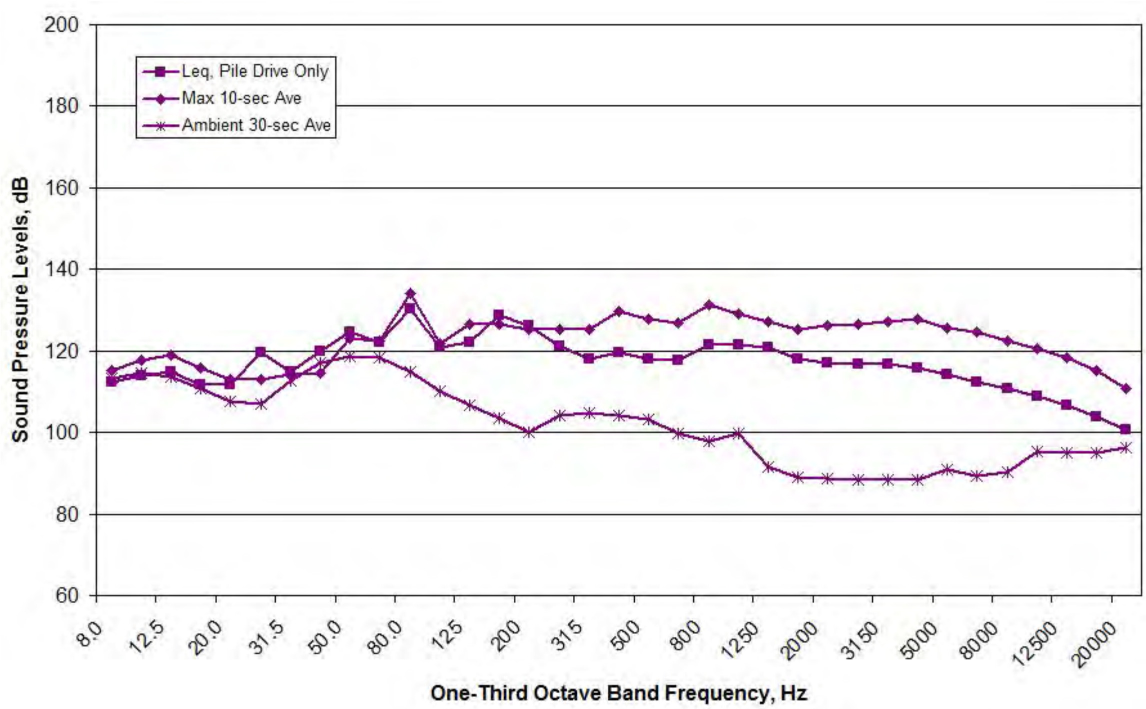

Figure B330. Spectral Data Measured at the RFT Location during EHW6, Plumb, 12:32-13:05, Measured at Depths of 17 meters on October 14, 2011

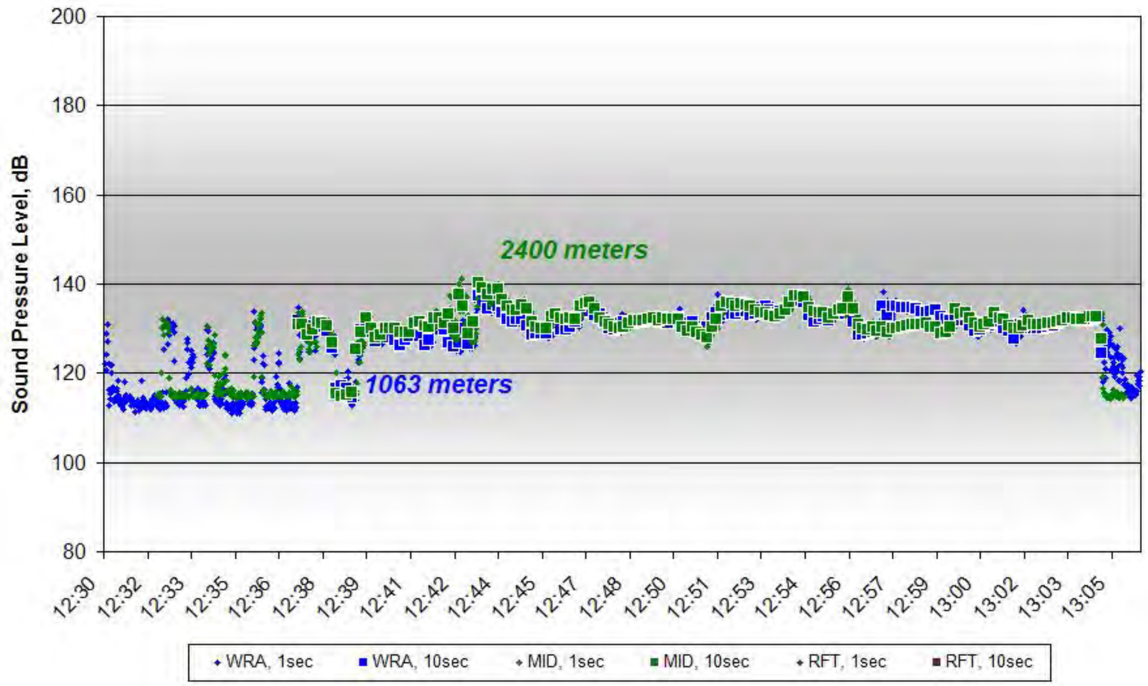

Figure B331. One-second and 10-second Average Data for EHW6, Plumb, 12:32-13:05, Measured at Depths of 10 meters on October 14, 2011

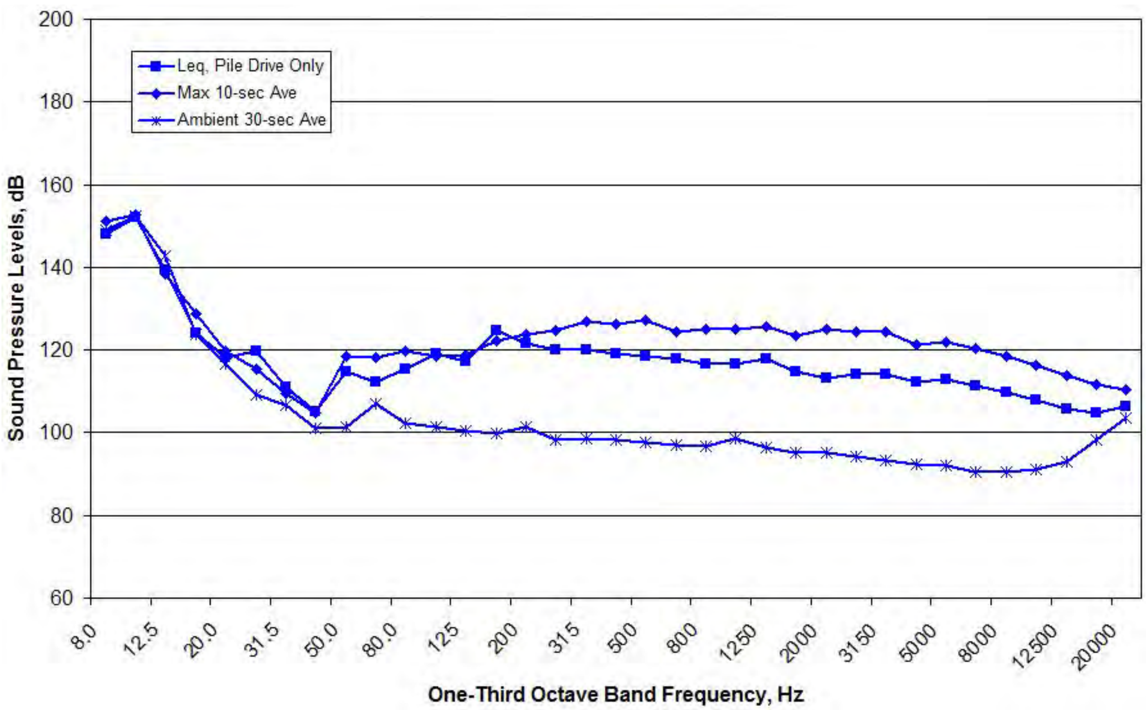

Figure B332. Spectral Data Measured at the WRA Location during EHW6, Plumb, 12:32-13:05, Measured at Depths of 10 meters on October 14, 2011

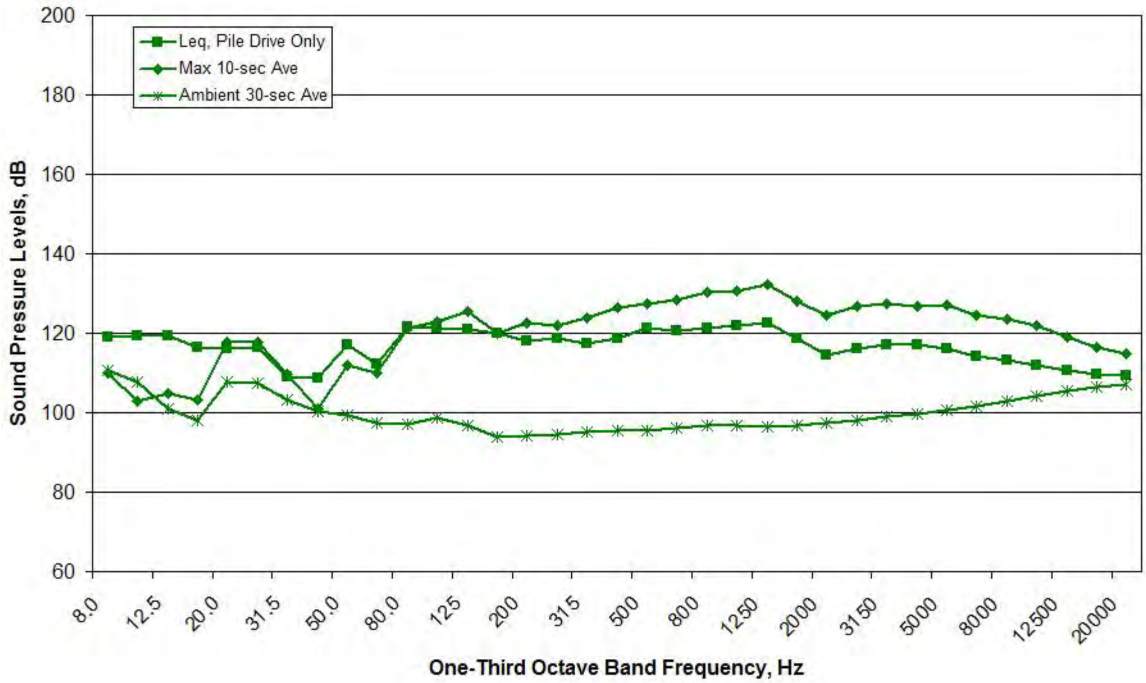

Figure B333. Spectral Data Measured at the MID Location during EHW6, Plumb, 12:32-13:05, Measured at Depths of 10 meters on October 14, 2011

NO DATA AVAILABLE – TOO MUCH ELECTRONIC NOISE

Figure B334. Spectral Data Measured at the RFT Location during EHW6, Plumb, 12:32-13:05, Measured at Depths of 10 meters on October 14, 2011

EHW5 (Vibratory Installation)

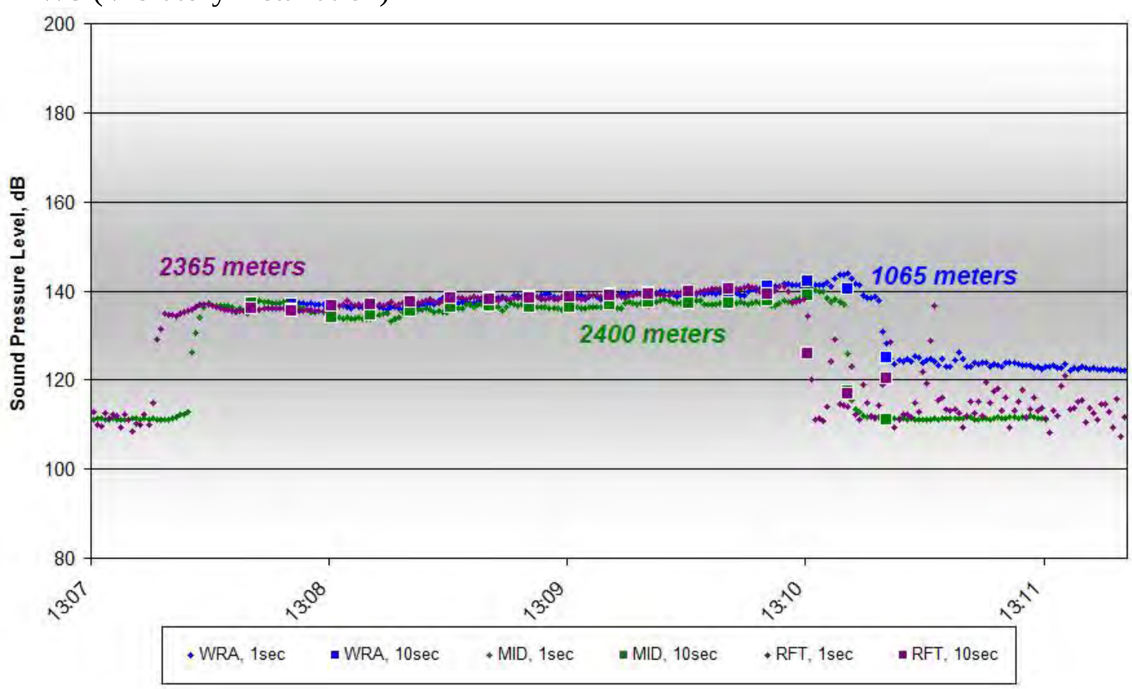

Figure B335. One-second and 10-second Average Data for EHW5, 13:07-13:10, Measured at Depths of 17-30 meters on October 14, 2011

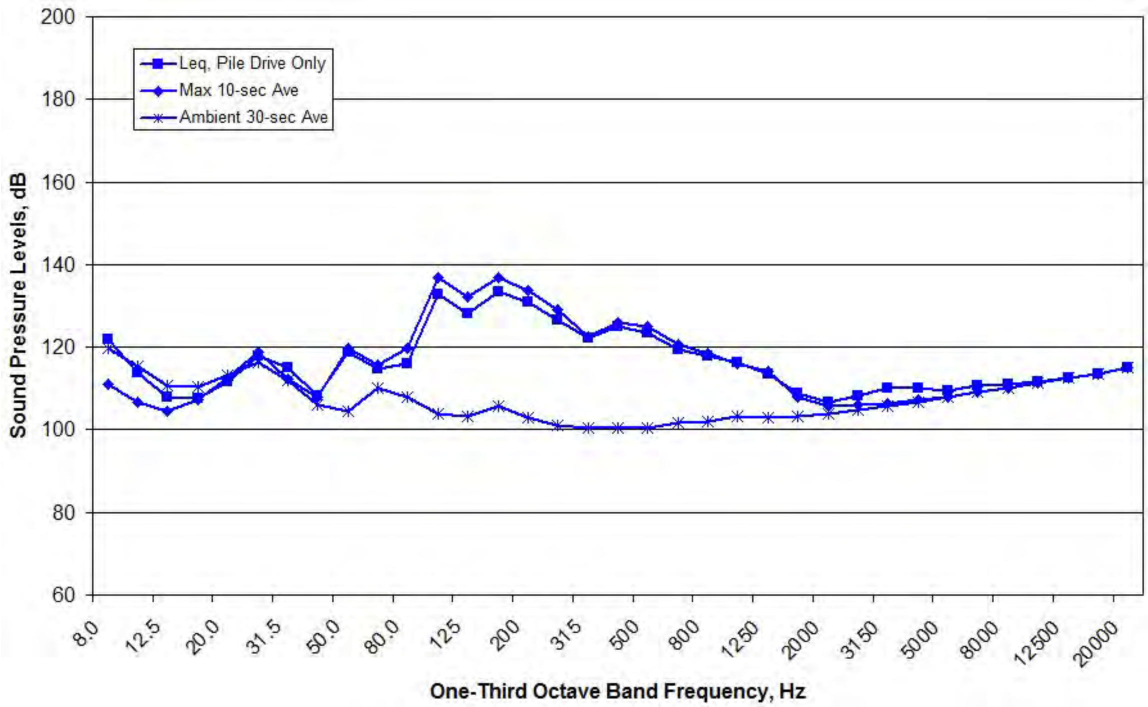

Figure B336. Spectral Data Measured at the WRA Location during EHW5, 13:07-13:10, Measured at Depths of 30 meters on October 14, 2011

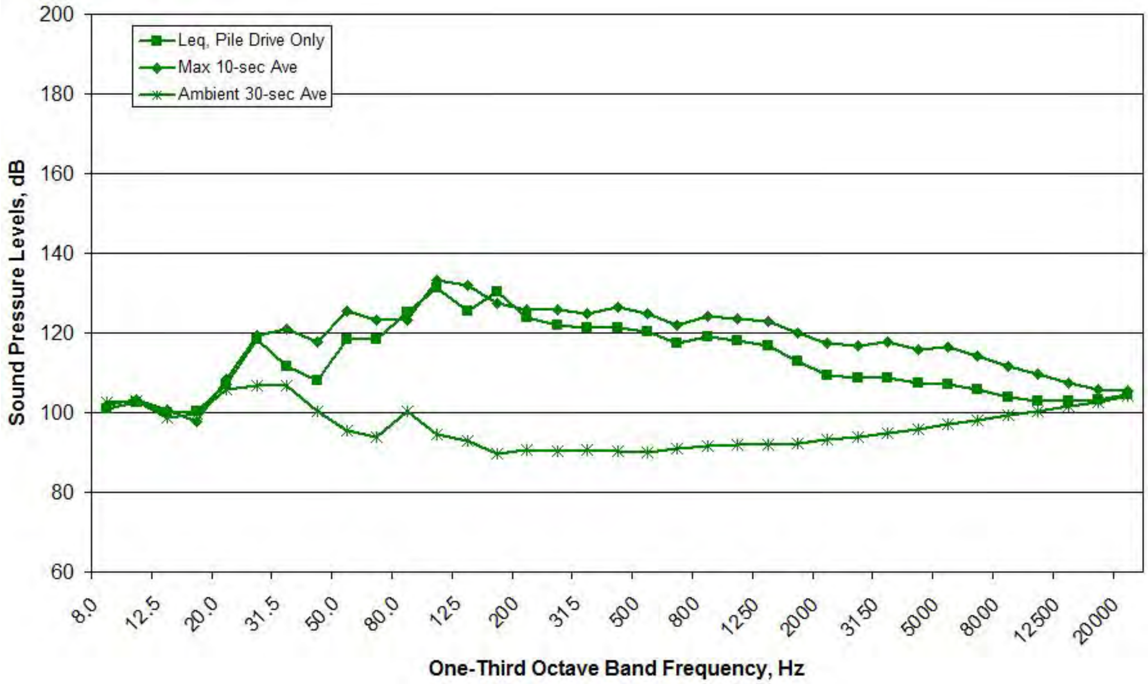

Figure B337. Spectral Data Measured at the MID Location during EHW5, 13:07-13:10, Measured at Depths of 30 meters on October 14, 2011

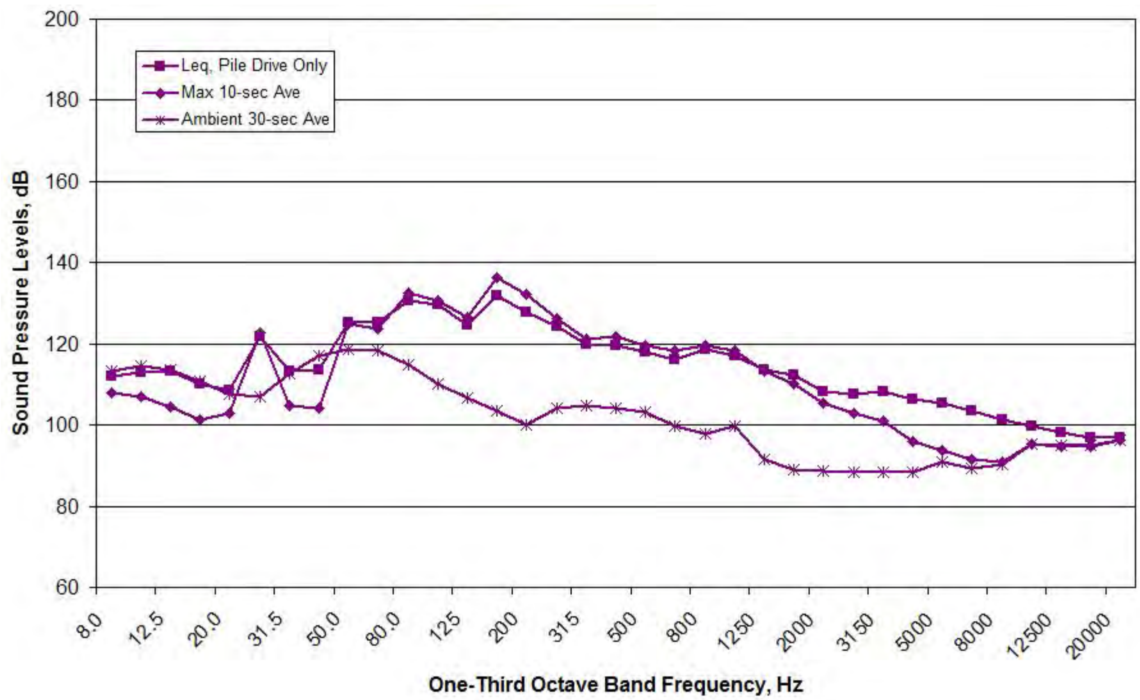

Figure B338. Spectral Data Measured at the RFT Location during EHW5, 13:07-13:10, Measured at Depths of 17 meters on October 14, 2011

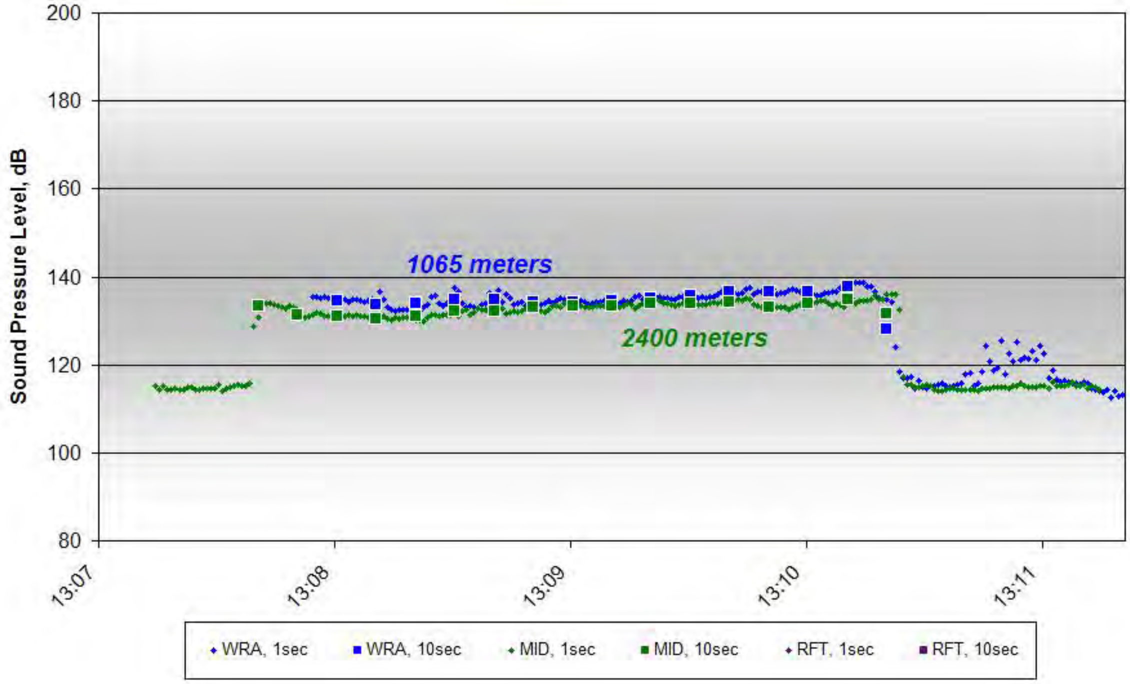

Figure B339. One-second and 10-second Average Data for EHW5, 13:07-13:10, Measured at Depths of 10 meters on October 14, 2011

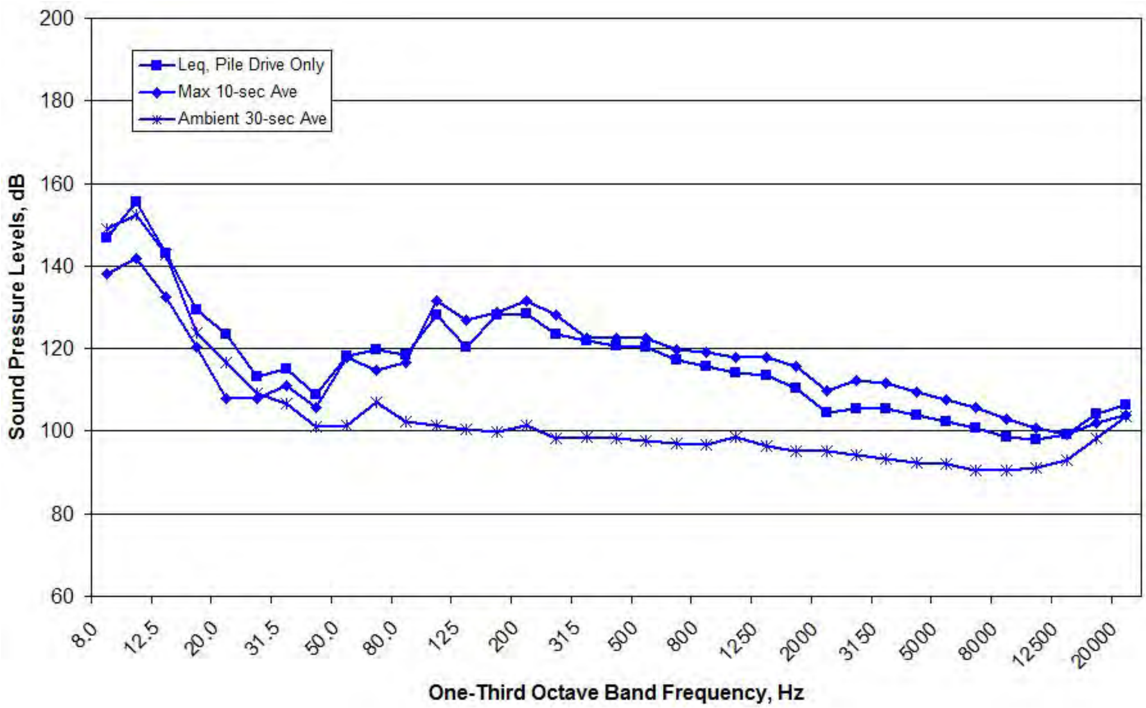

Figure B340. Spectral Data Measured at the WRA Location during EHW5, 13:07-13:10, Measured at Depths of 10 meters on October 14, 2011

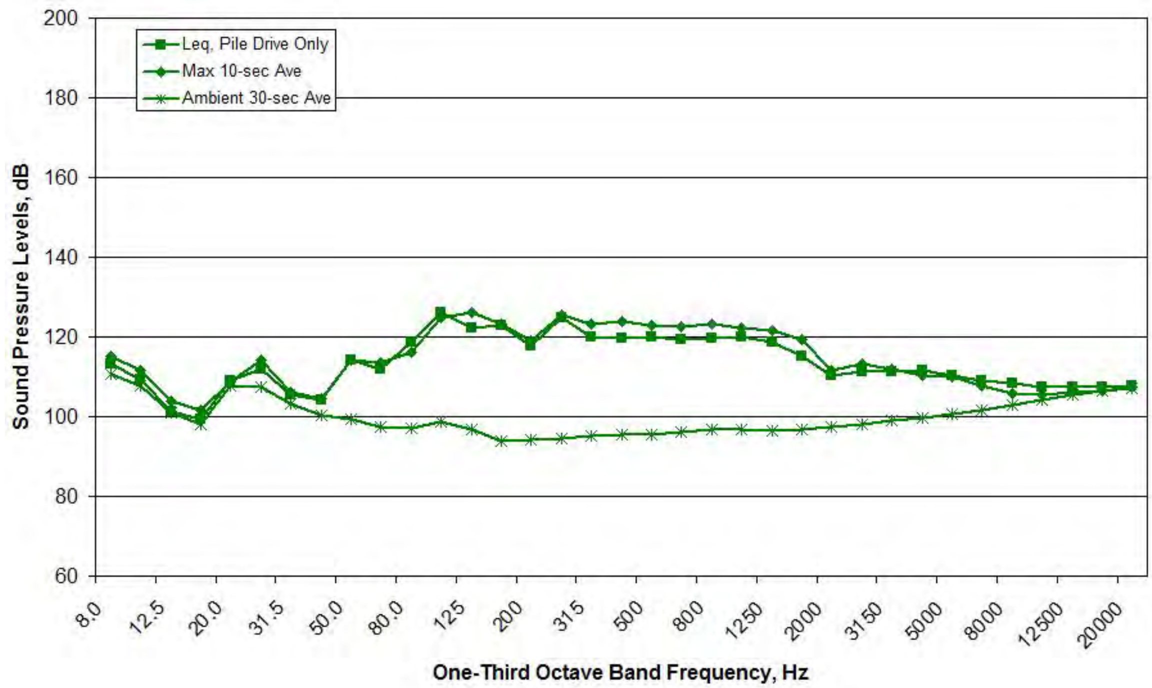

Figure B341. Spectral Data Measured at the MID Location during EHW5, 13:07-13:10, Measured at Depths of 10 meters on October 14, 2011

NO DATA AVAILABLE – TOO MUCH ELECTRONIC NOISE

Figure B342. Spectral Data Measured at the RFT Location during EHW5, 13:07-13:10, Measured at Depths of 10 meters on October 14, 2011

EHW4 (Vibratory Installation)

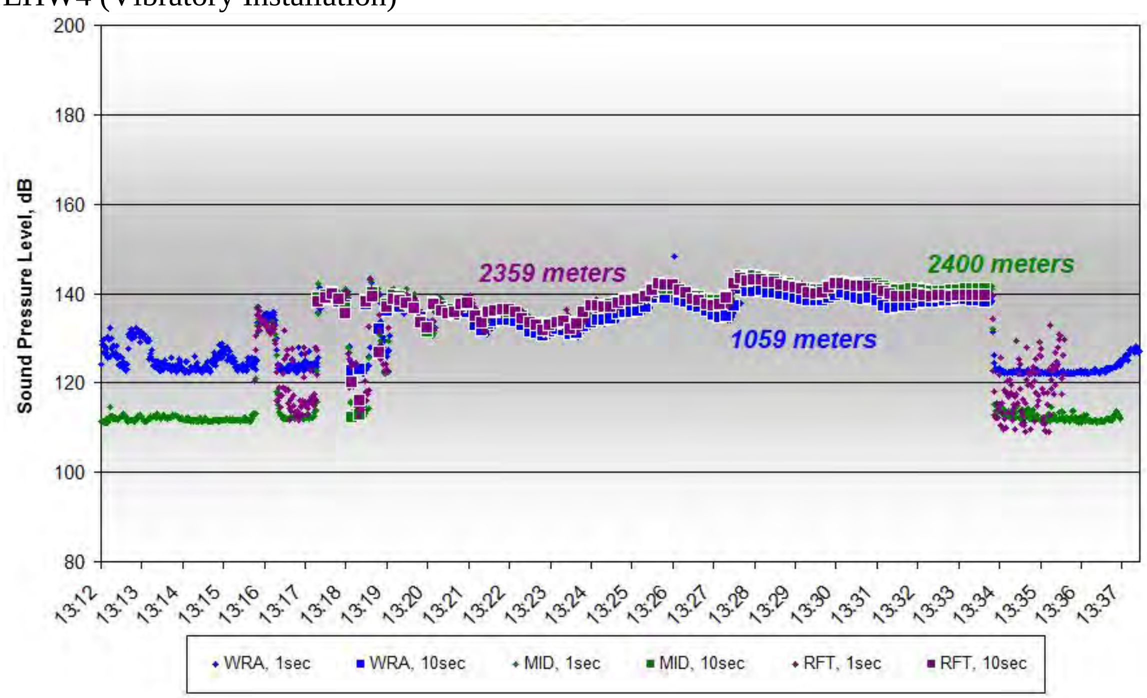

Figure B343. One-second and 10-second Average Data for EHW4, 13:16-13:34, Measured at Depths of 17-30 meters on October 14, 2011

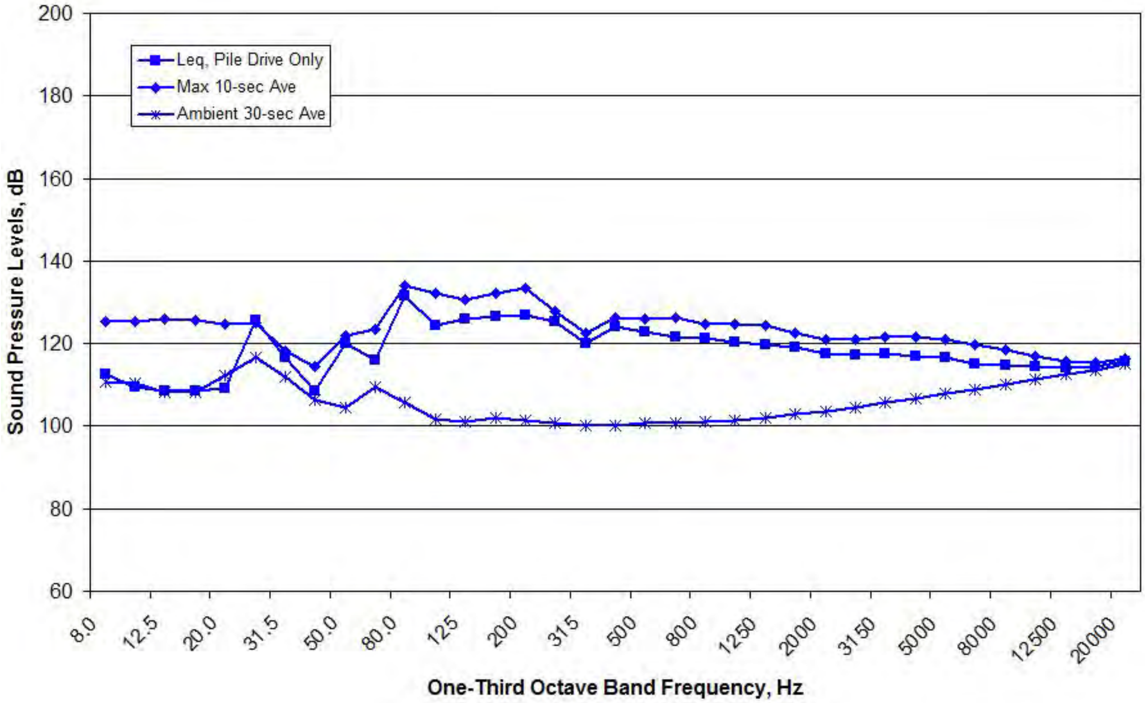

Figure B344. Spectral Data Measured at the WRA Location during EHW4, 13:16-13:34, Measured at Depths of 30 meters on October 14, 2011

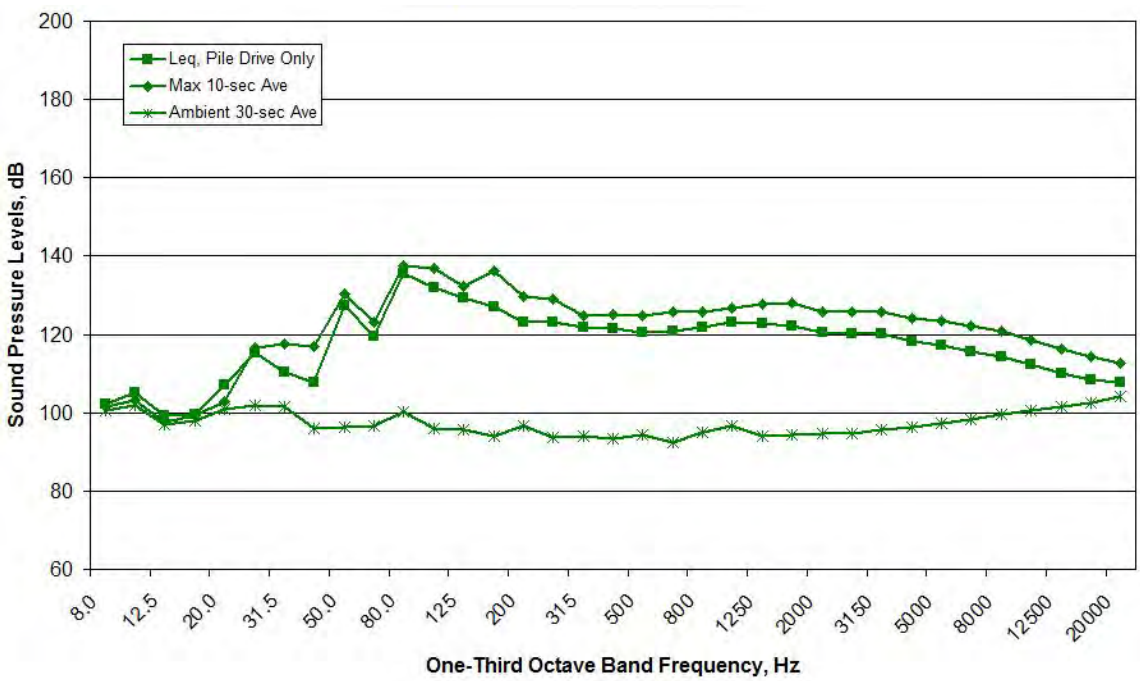

Figure B345. Spectral Data Measured at the MID Location during EHW4, 13:16-13:34, Measured at Depths of 30 meters on October 14, 2011

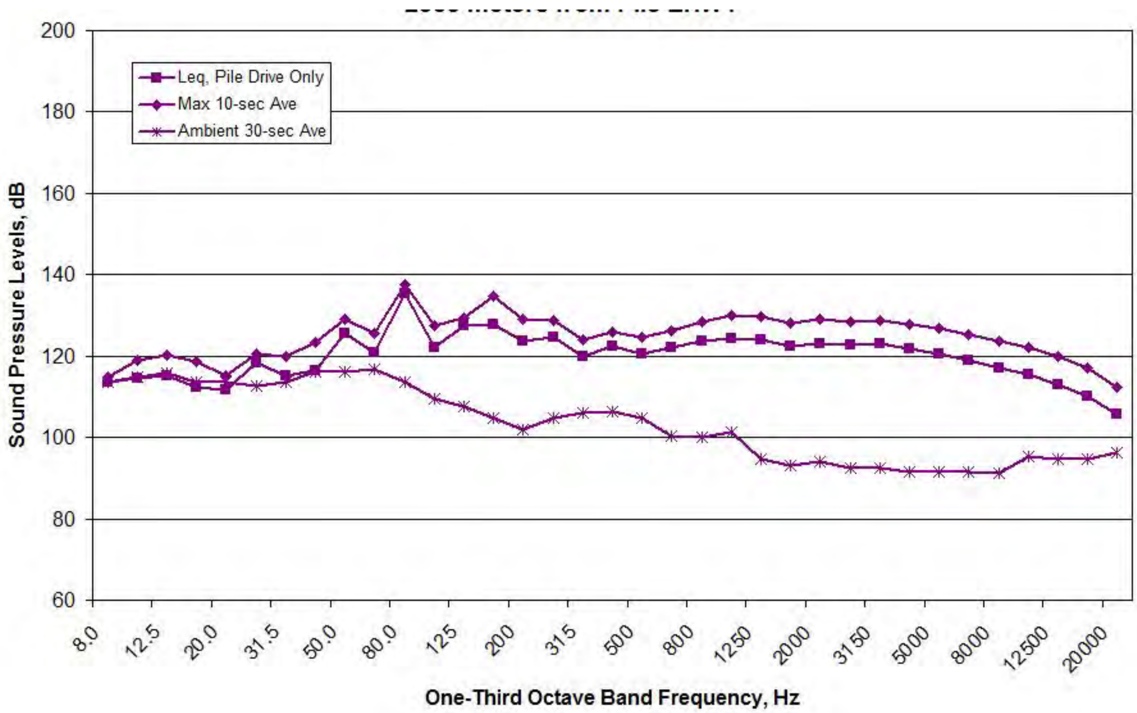

Figure B346. Spectral Data Measured at the RFT Location during EHW4, 13:16-13:34, Measured at Depths of 17 meters on October 14, 2011

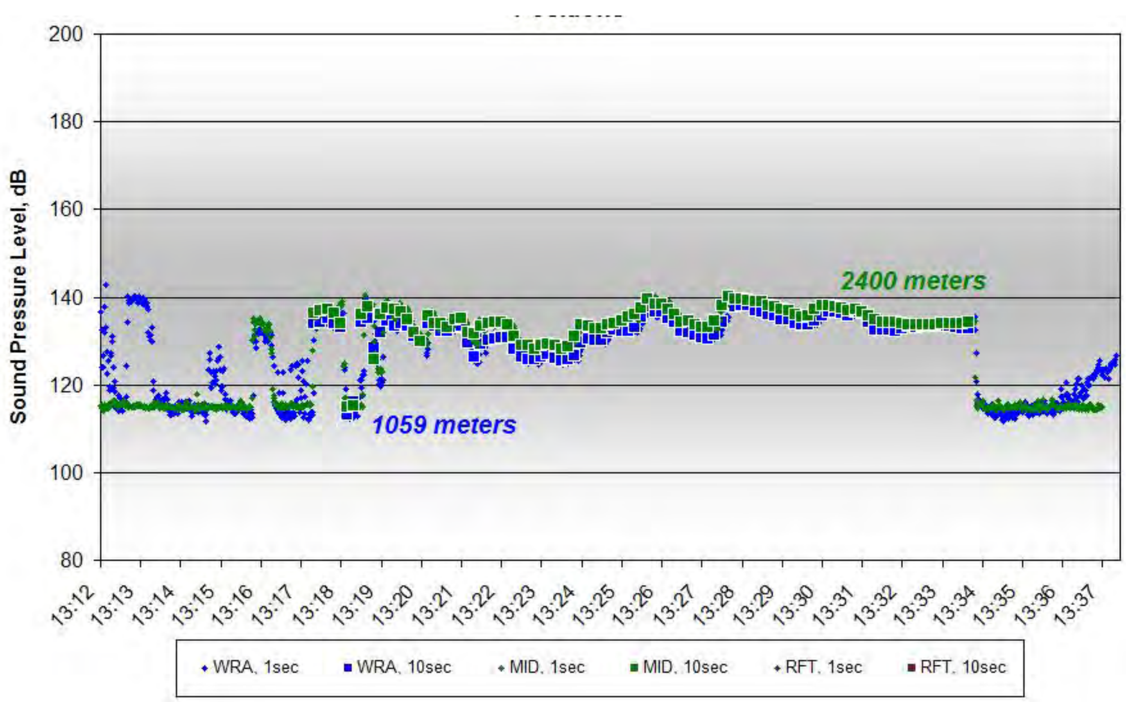

Figure B347. One-second and 10-second Average Data for EHW4, 13:16-13:34, Measured at Depths of 10 meters on October 14, 2011

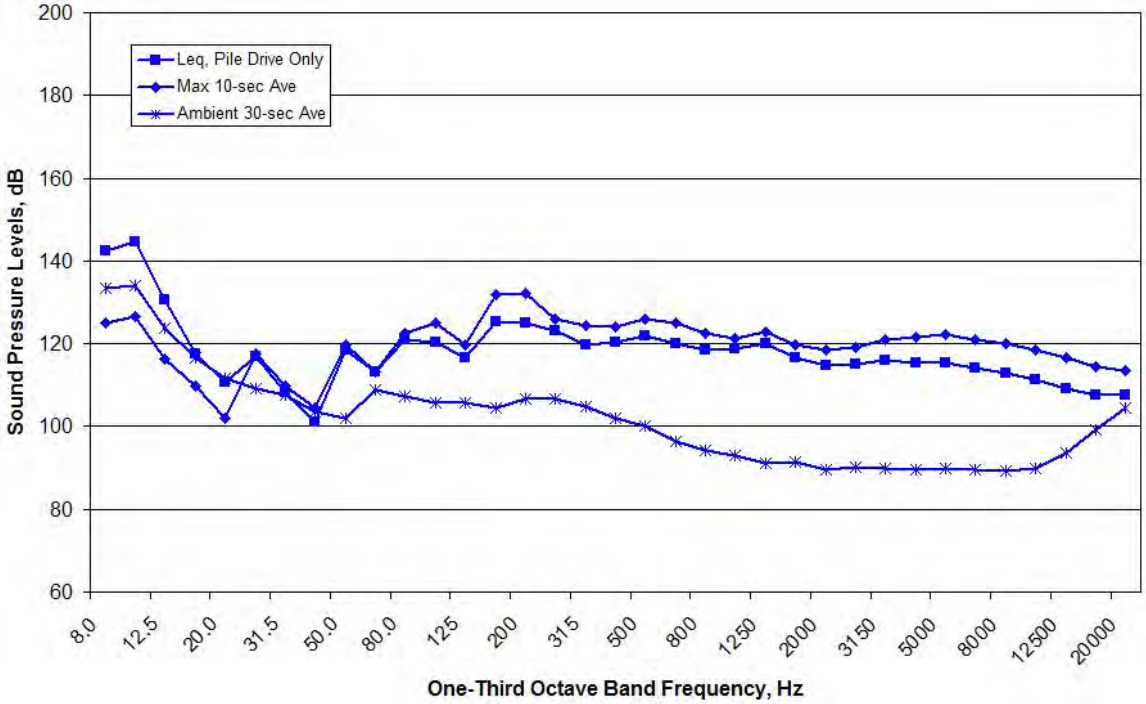

Figure B348. Spectral Data Measured at the WRA Location during EHW4, 13:16-13:34, Measured at Depths of 10 meters on October 14, 2011

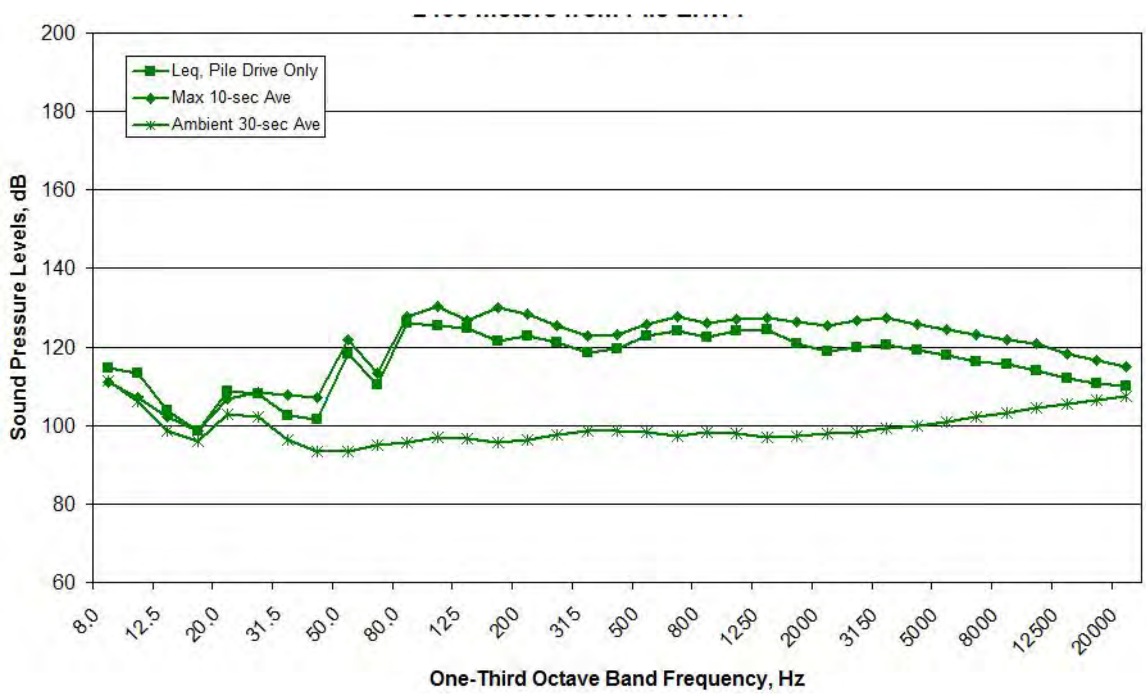

Figure B349. Spectral Data Measured at the MID Location during EHW4, 13:16-13:34, Measured at Depths of 10 meters on October 14, 2011

NO DATA AVAILABLE – TOO MUCH ELECTRONIC NOISE

Figure B350. Spectral Data Measured at the RFT Location during EHW4, 13:16-13:34, Measured at Depths of 10 meters on October 14, 2011

EHW3, 13:42-13:47 (Vibratory Installation)

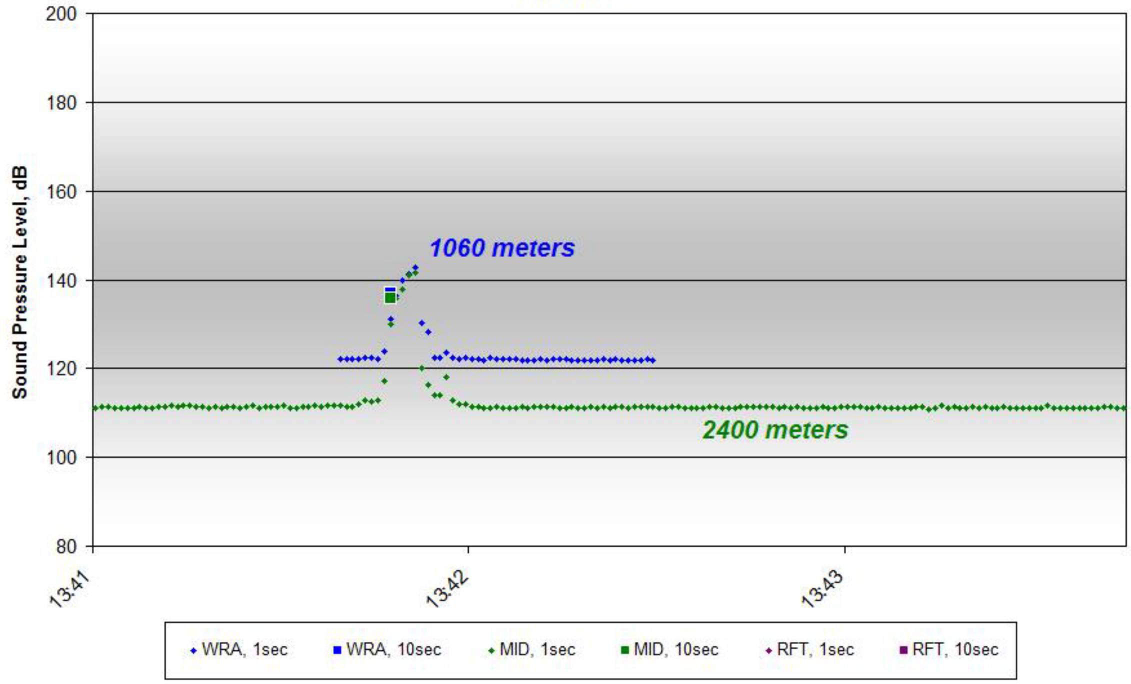

Figure A351. One-second and 10-second Average Data for EHW3, 13:42-13:47, Measured at Depths of 17-30 meters on October 14, 2011

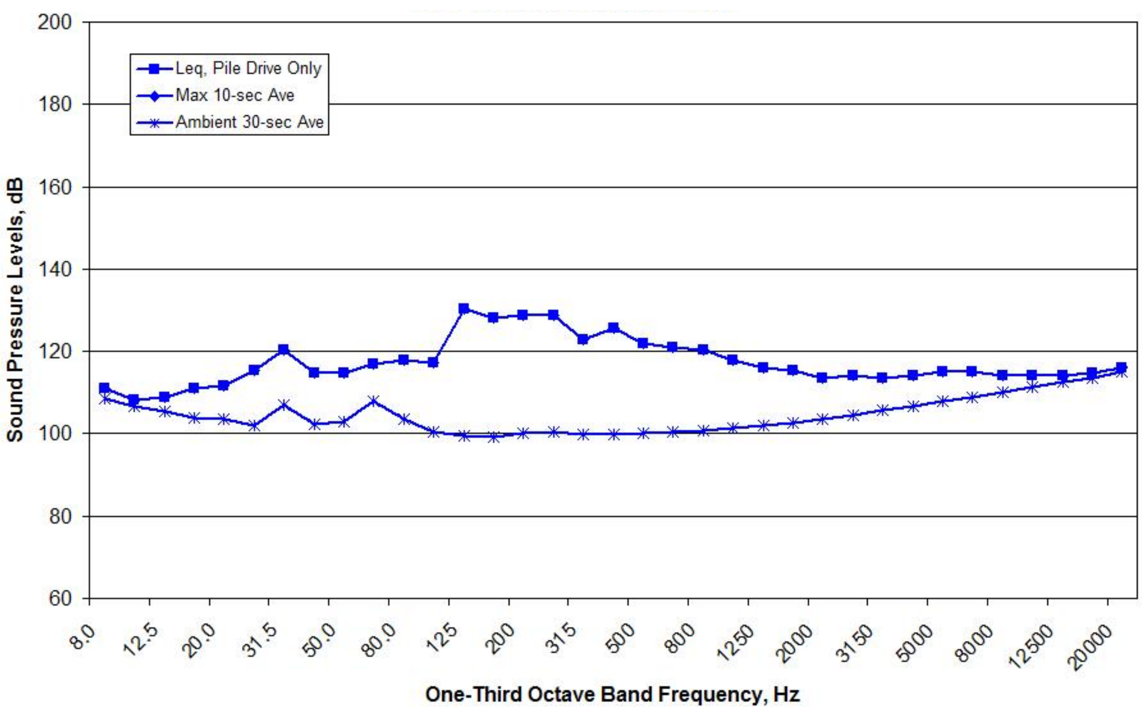

Figure A352. Spectral Data Measured at the WRA Location during EHW3, 13:42-13:47, Measured at Depths of 30 meters on October 14, 2011

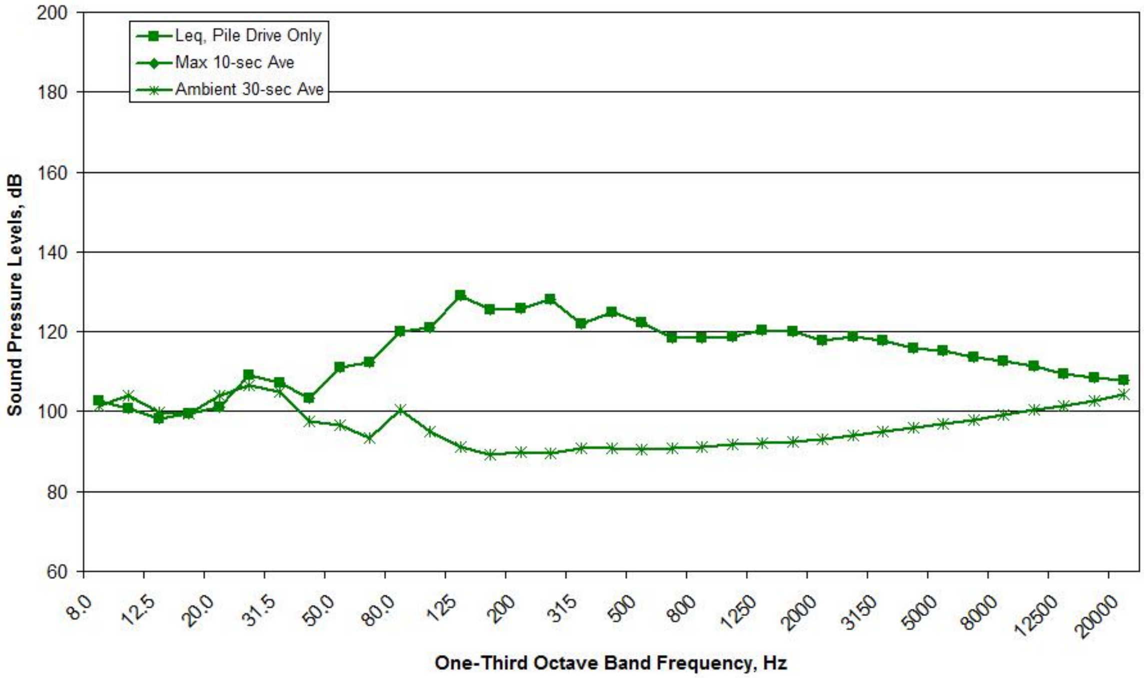

Figure A353. Spectral Data Measured at the MID Location during EHW3, 13:42-13:47, Measured at Depths of 30 meters on October 14, 2011

NO DATA AVAILABLE

Figure A354. Spectral Data Measured at the RFT Location during EHW3, 13:42-13:47, Measured at Depths of 17 meters on October 14, 2011

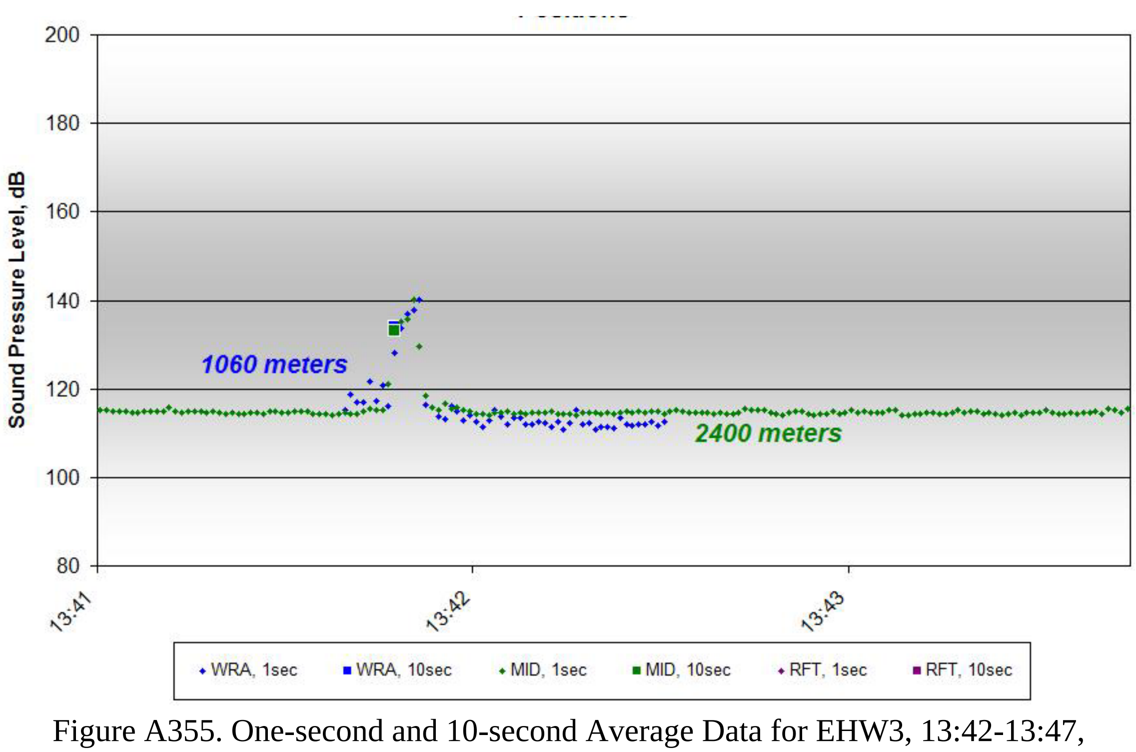

Figure A355. One-second and 10-second Average Data for EHW3, 13:42-13:47, Measured at Depths of 10 meters on October 14, 2011

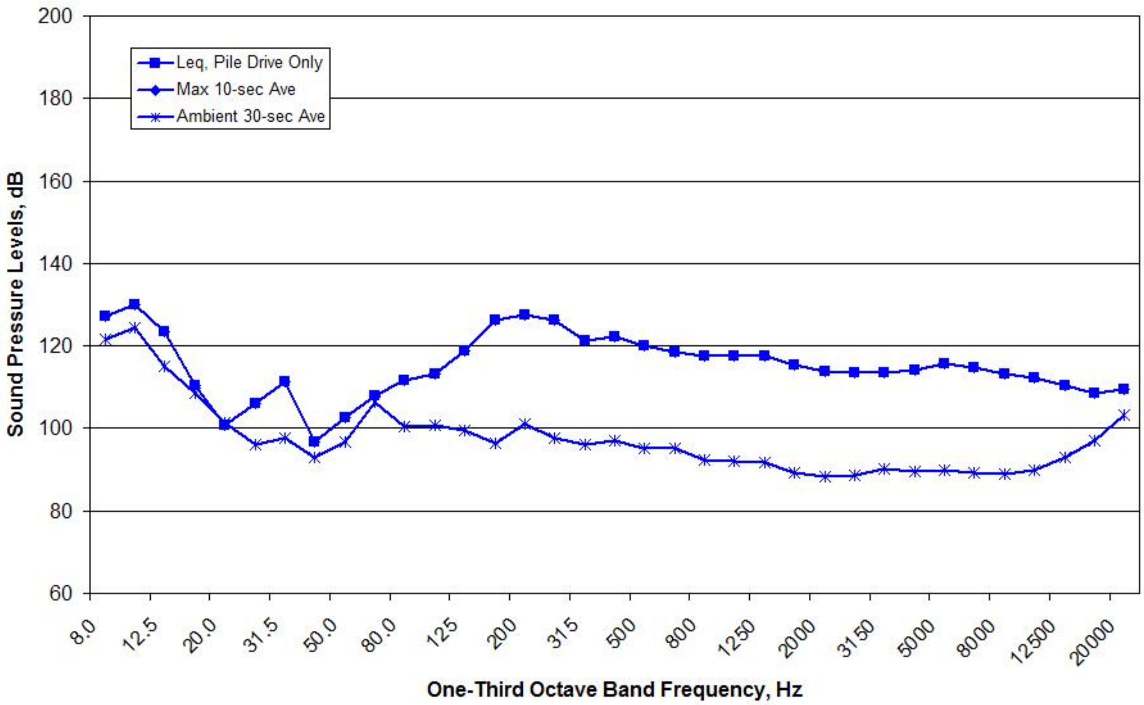

Figure A356. Spectral Data Measured at the WRA Location during EHW3, 13:42-13:47, Measured at Depths of 10 meters on October 14, 2011

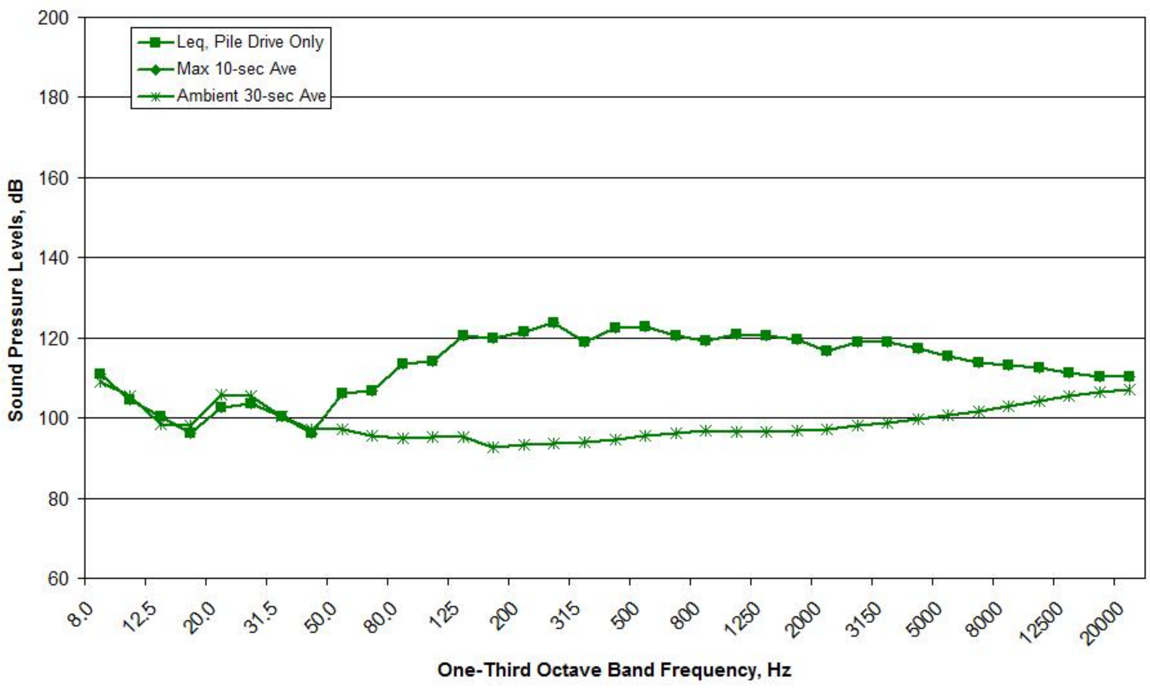

Figure A357. Spectral Data Measured at the MID Location during EHW3, 13:42-13:47, Measured at Depths of 10 meters on October 14, 2011

NO DATA AVAILABLE – TOO MUCH ELECTRONIC NOISE

Figure A358. Spectral Data Measured at the RFT Location during EHW3, 13:42-13:47, Measured at Depths of 10 meters on October 14, 2011

EHW1, 13:51-13:57 (Vibratory Installation)

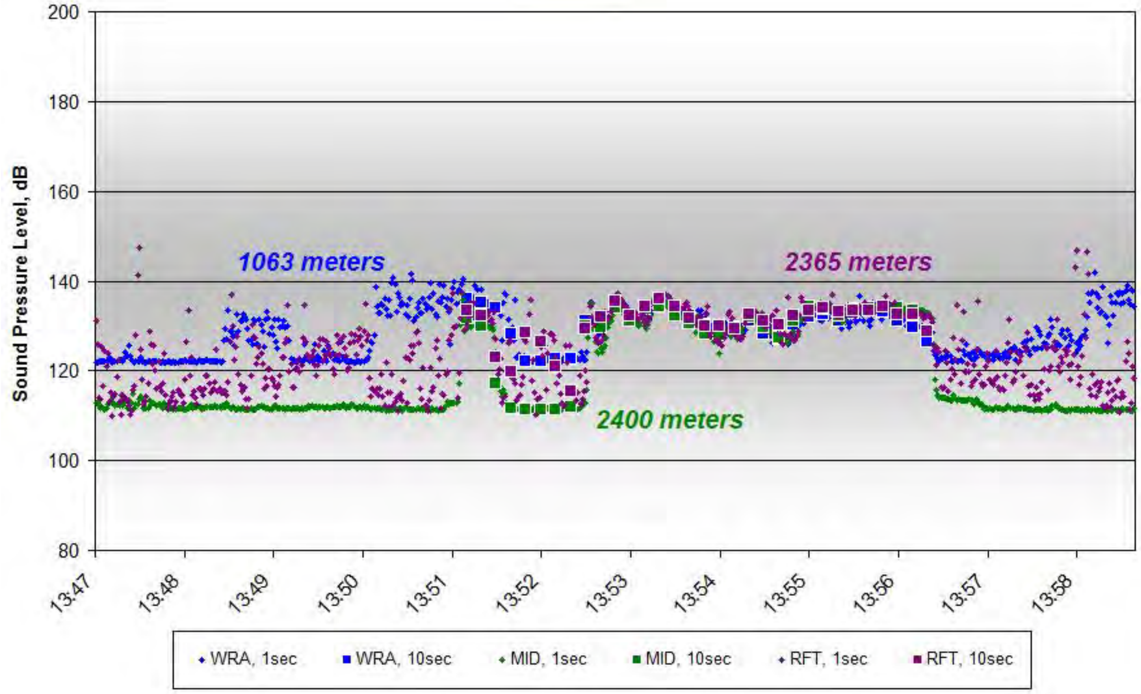

Figure B359. One-second and 10-second Average Data for EHW1, 13:51-13:57, Measured at Depths of 17-30 meters on October 14, 2011

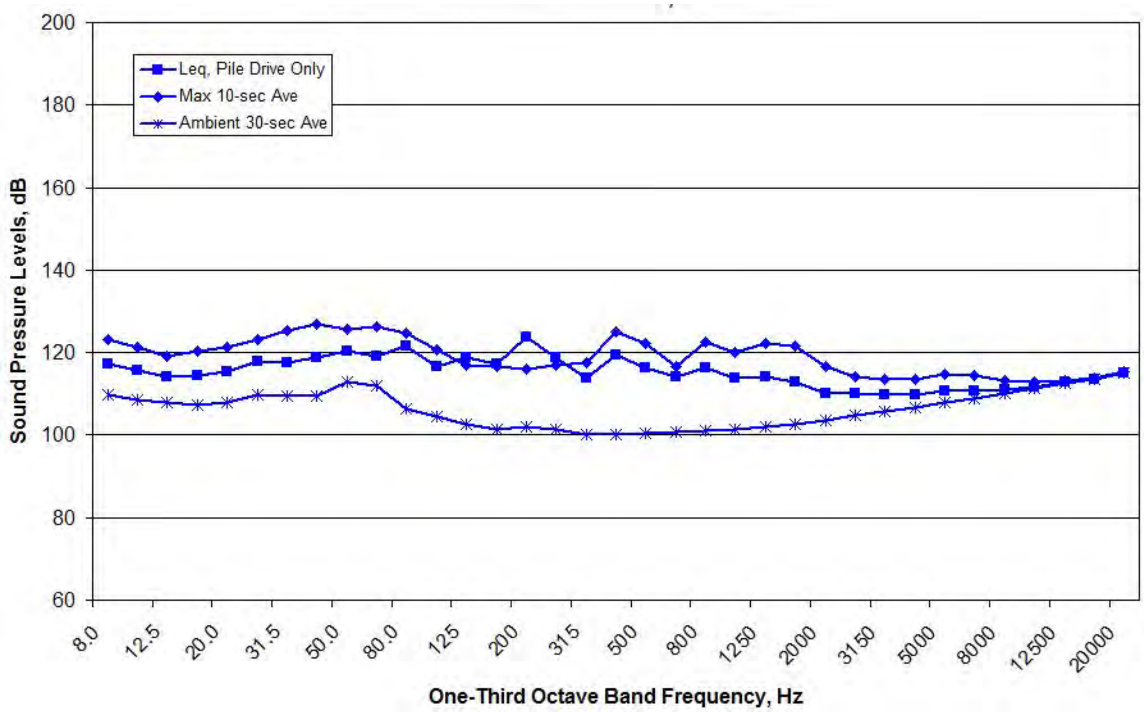

Figure B360. Spectral Data Measured at the WRA Location during EHW1, 13:51-13:57, Measured at Depths of 30 meters on October 14, 2011

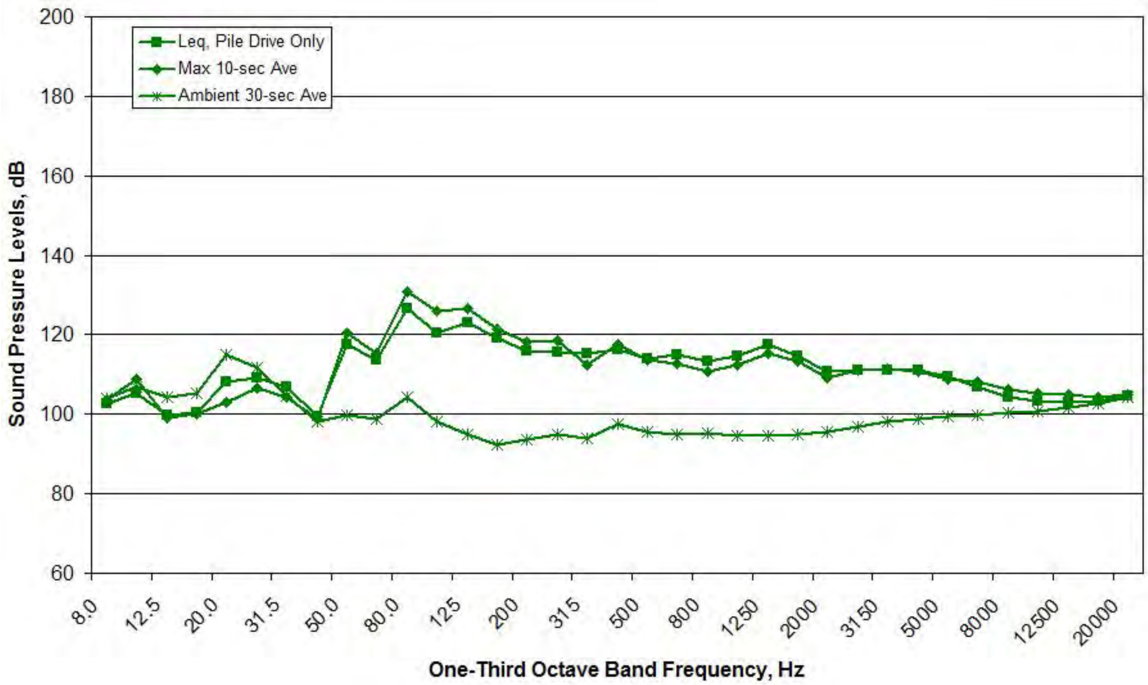

Figure B361. Spectral Data Measured at the MID Location during EHW1, 13:51-13:57, Measured at Depths of 30 meters on October 14, 2011

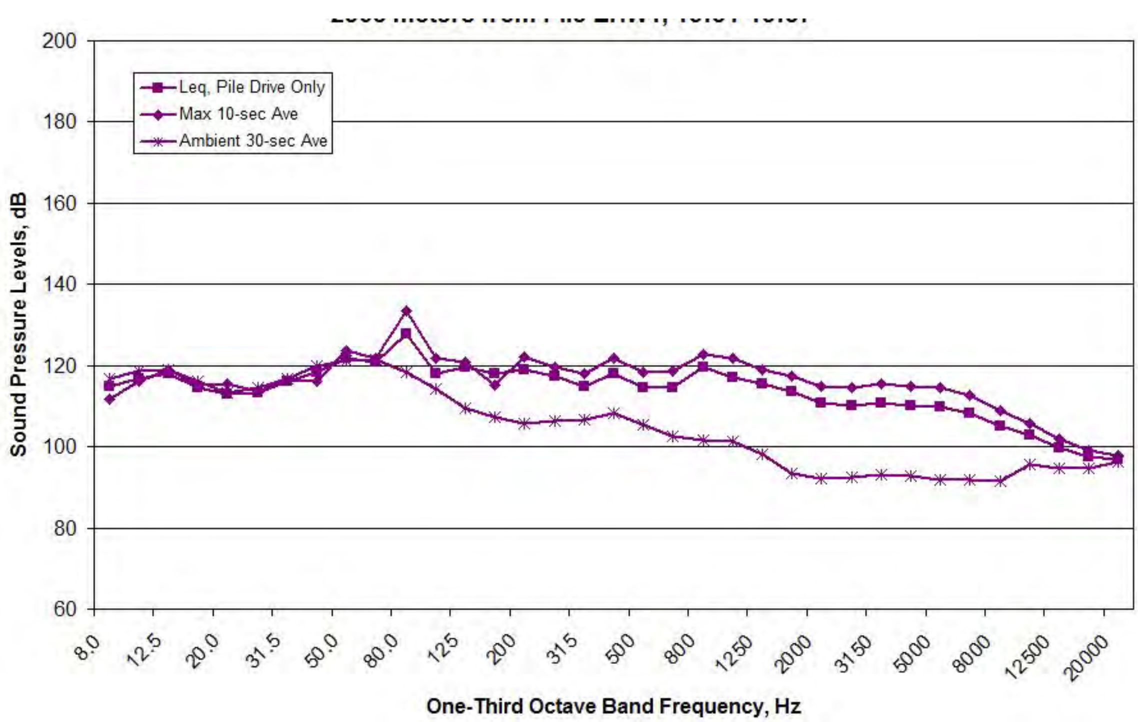

Figure B362. Spectral Data Measured at the RFT Location during EHW1, 13:51-13:57, Measured at Depths of 17 meters on October 14, 2011

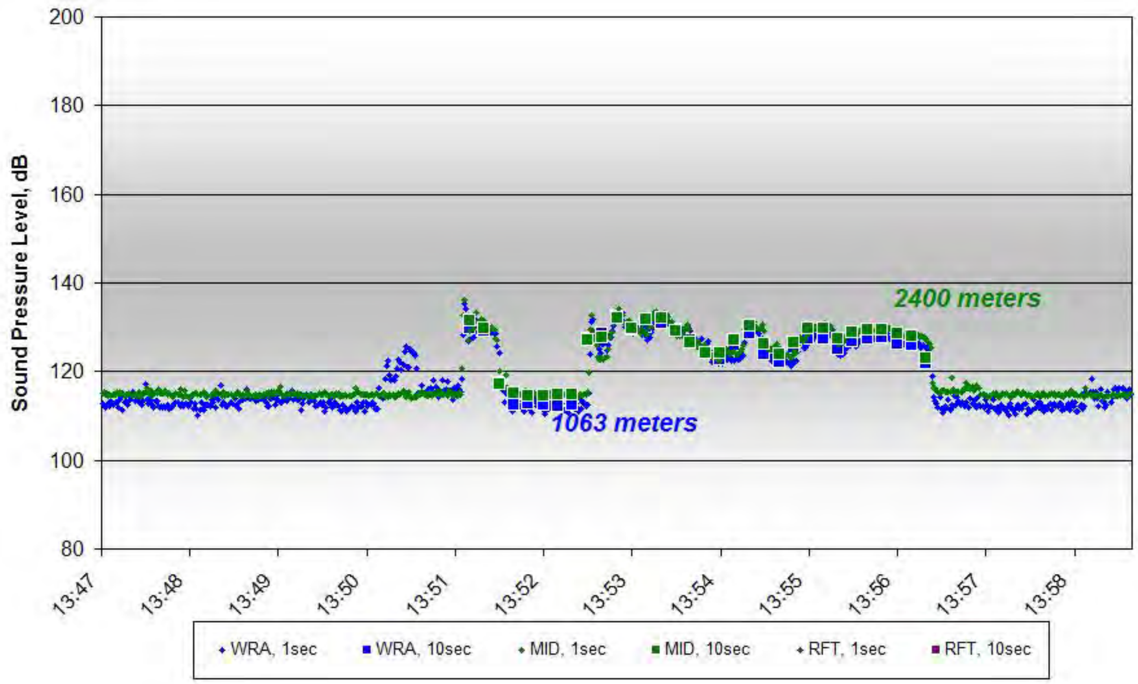

Figure B363. One-second and 10-second Average Data for EHW1, 13:51-13:57, Measured at Depths of 10 meters on October 14, 2011

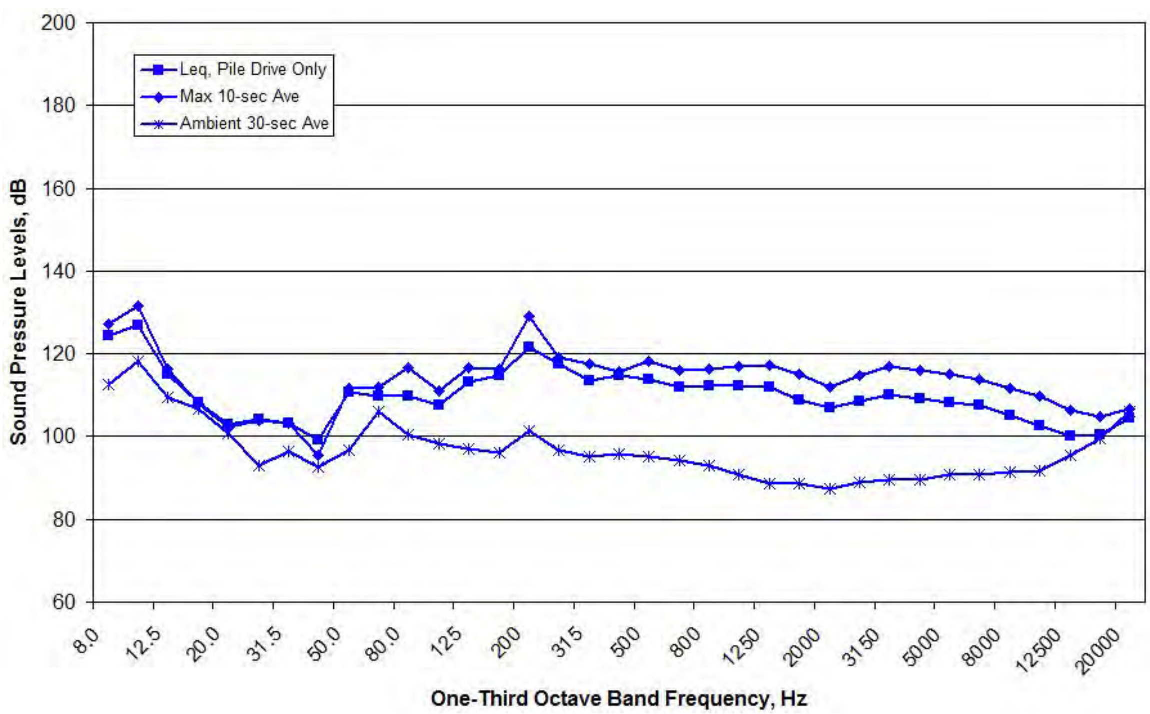

Figure B364. Spectral Data Measured at the WRA Location during EHW1, 13:51-13:57, Measured at Depths of 10 meters on October 14, 2011

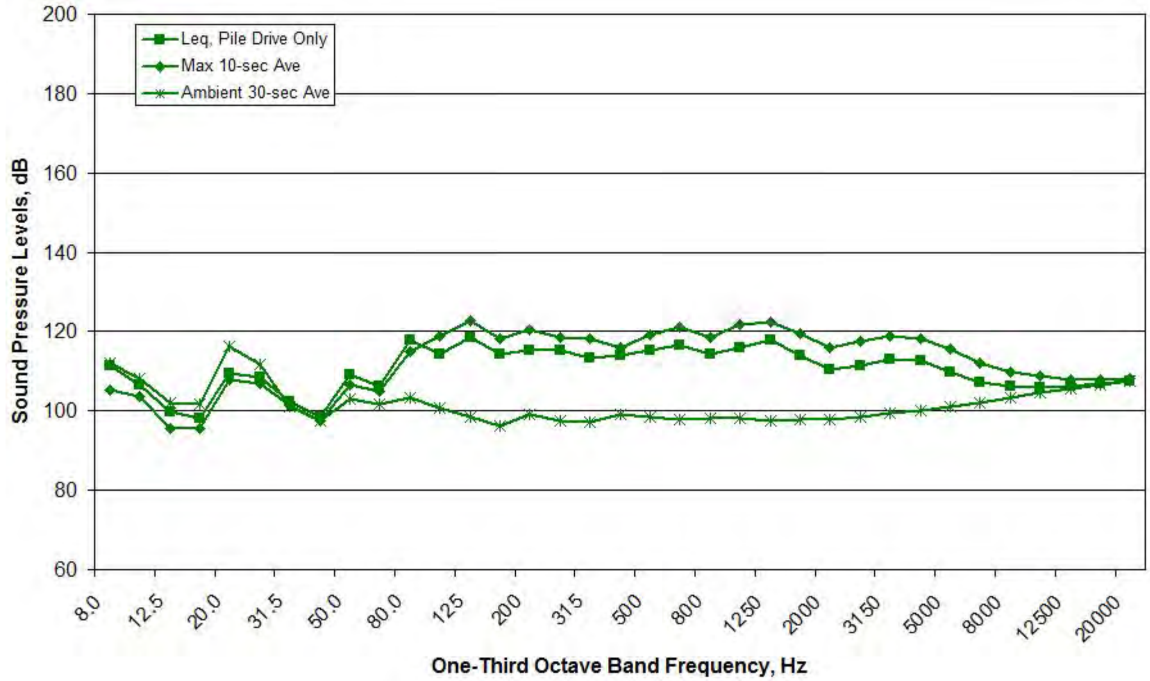

Figure B365. Spectral Data Measured at the MID Location during EHW1, 13:51-13:57, Measured at Depths of 10 meters on October 14, 2011

NO DATA AVAILABLE – TOO MUCH ELECTRONIC NOISE

Figure B366. Spectral Data Measured at the RFT Location during EHW1, 13:51-13:57, Measured at Depths of 10 meters on October 14, 2011

EHW1, 14:21-14:35 (Vibratory Installation)

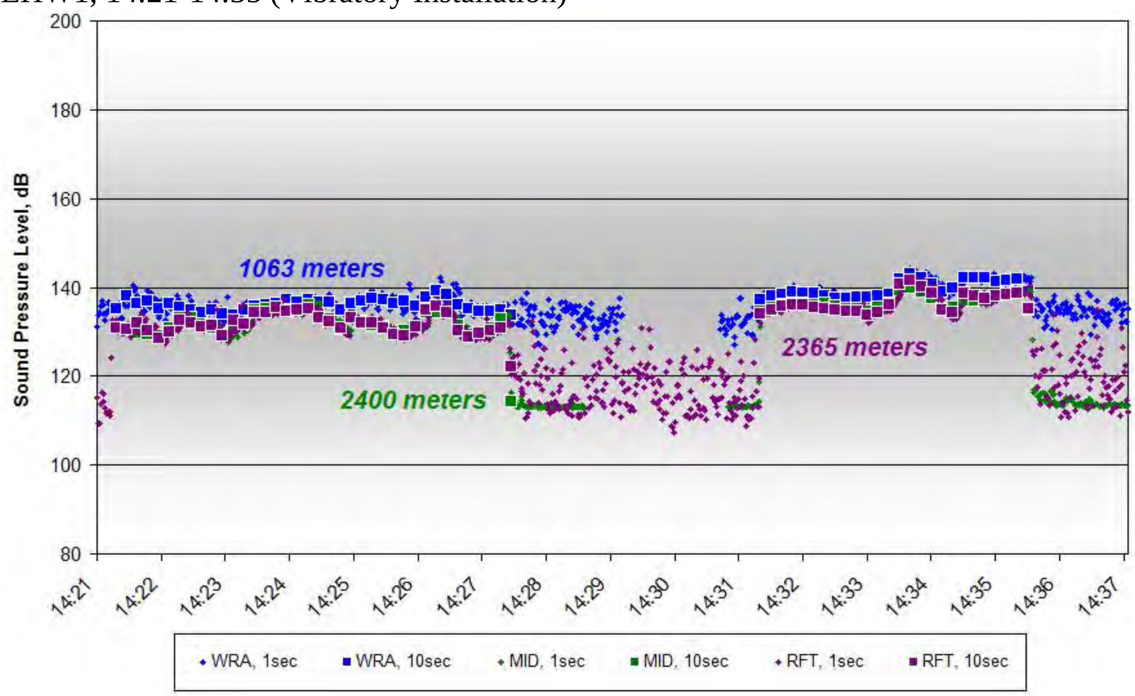

Figure B367. One-second and 10-second Average Data for EHW1, 14:21-14:35, Measured at Depths of 17-30 meters on October 14, 2011

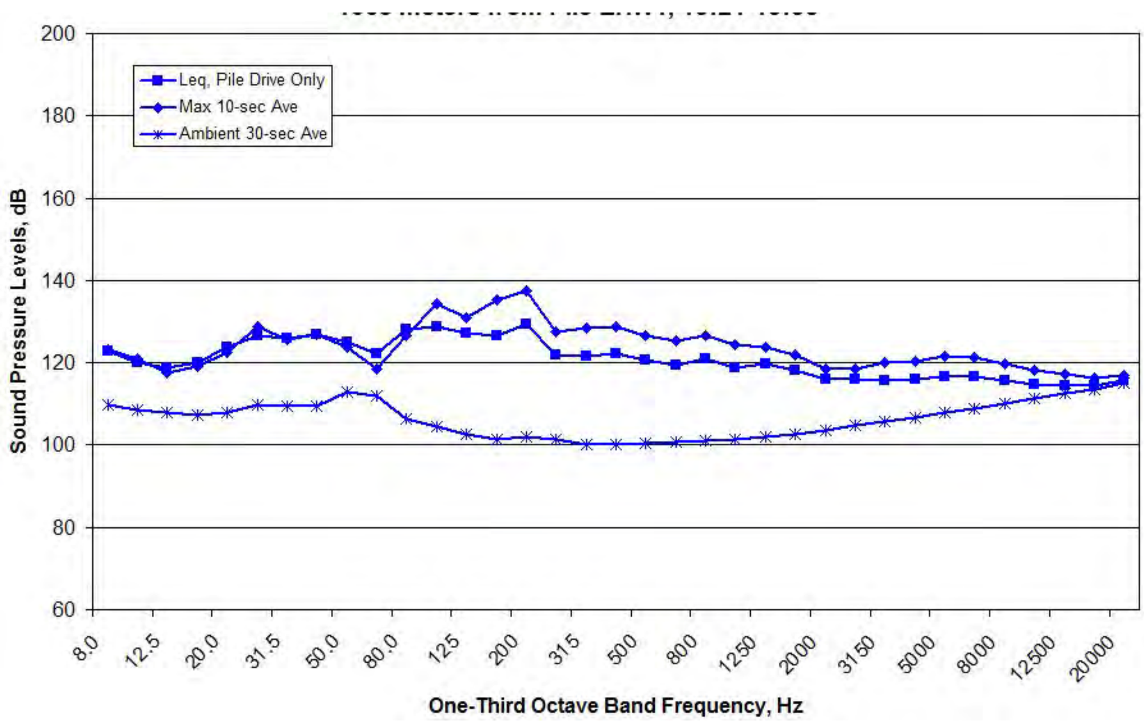

Figure B368. Spectral Data Measured at the WRA Location during EHW1, 14:21-14:35, Measured at Depths of 30 meters on October 14, 2011

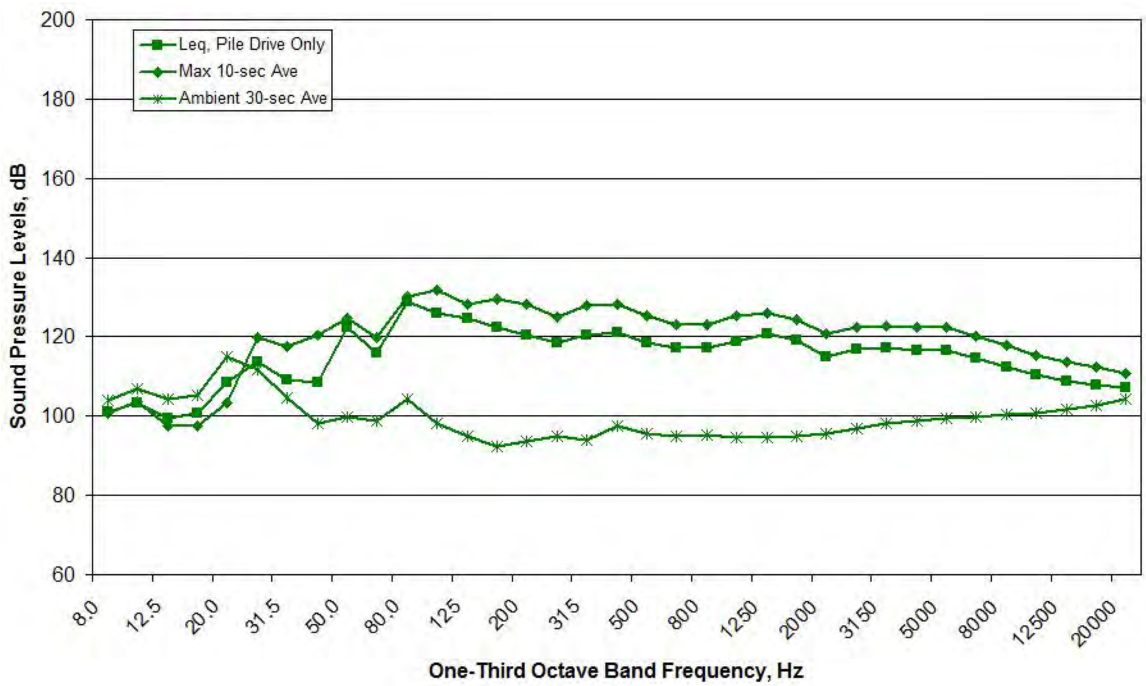

Figure B369. Spectral Data Measured at the MID Location during EHW1, 14:21-14:35, Measured at Depths of 30 meters on October 14, 2011

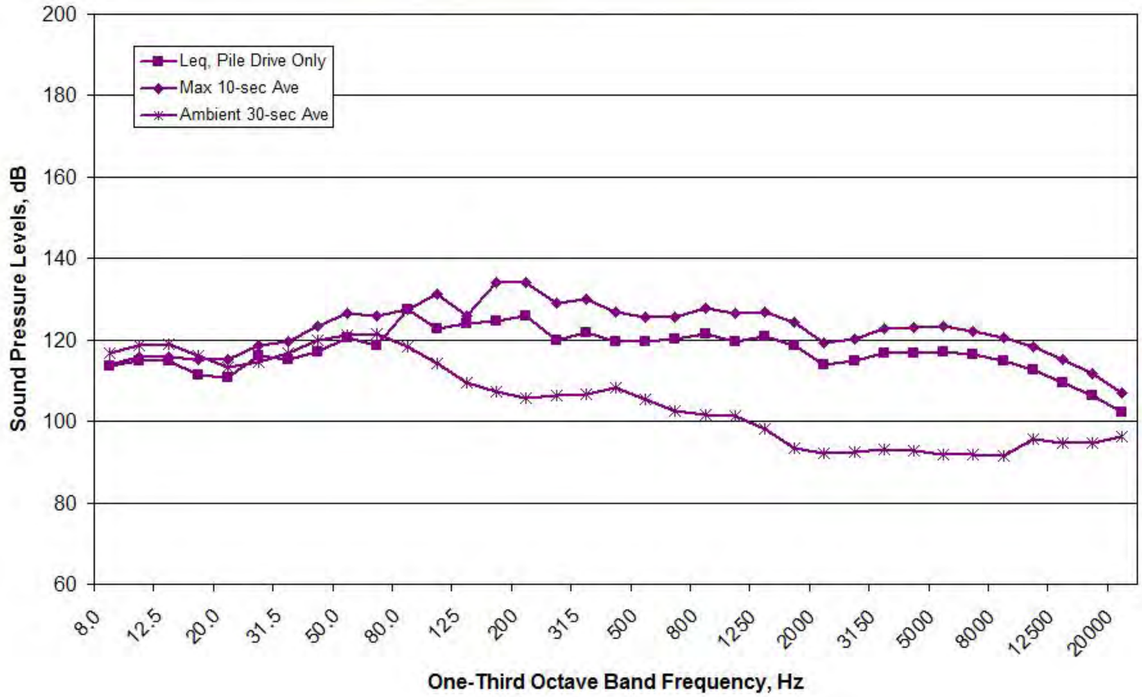

Figure B370. Spectral Data Measured at the RFT Location during EHW1, 14:21-14:35, Measured at Depths of 17 meters on October 14, 2011

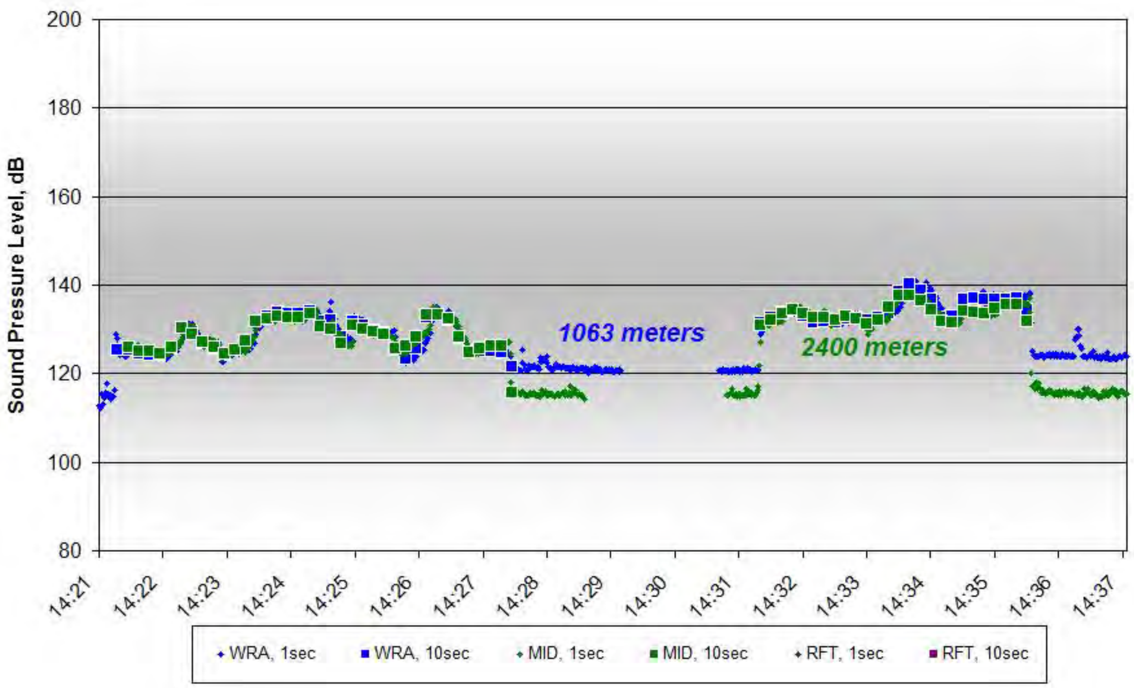

Figure B371. One-second and 10-second Average Data for EHW1, 14:21-14:35, Measured at Depths of 10 meters on October 14, 2011

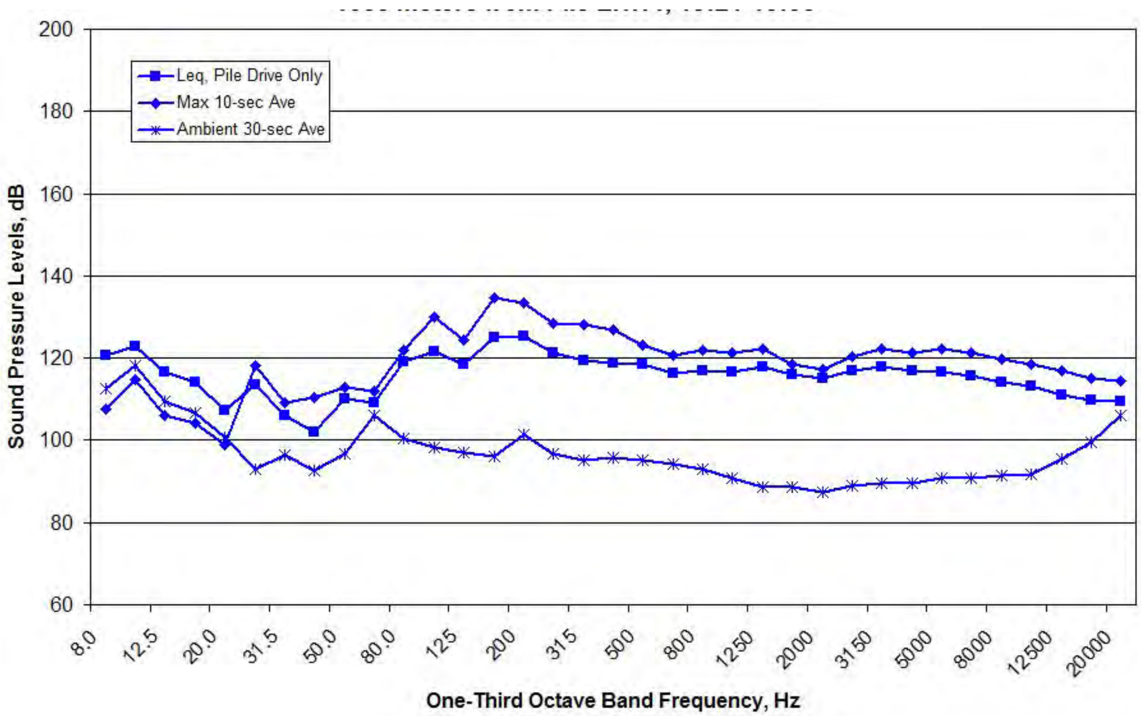

Figure B372. Spectral Data Measured at the WRA Location during EHW1, 14:21-14:35, Measured at Depths of 10 meters on October 14, 2011

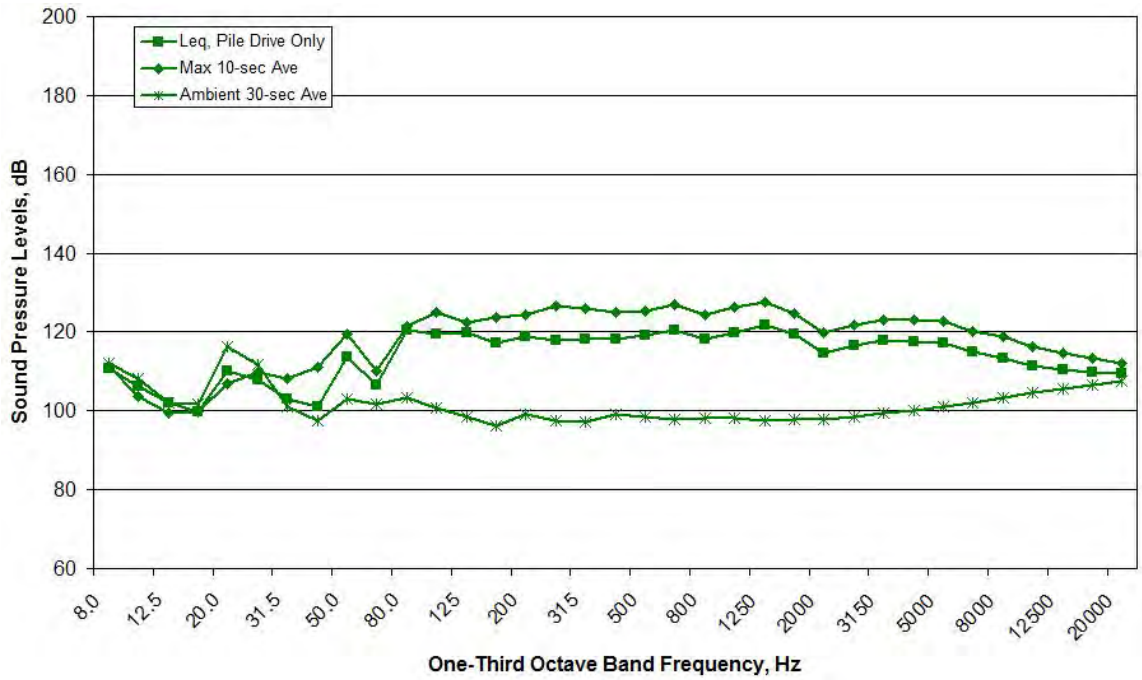

Figure B373. Spectral Data Measured at the MID Location during EHW1, 14:21-14:35, Measured at Depths of 10 meters on October 14, 2011

NO DATA AVAILABLE – TOO MUCH ELECTRONIC NOISE

Figure B374. Spectral Data Measured at the RFT Location during EHW1, 14:21-14:35, Measured at Depths of 10 meters on October 14, 2011

EHW3, 16:45-17:01 (Vibratory Installation)

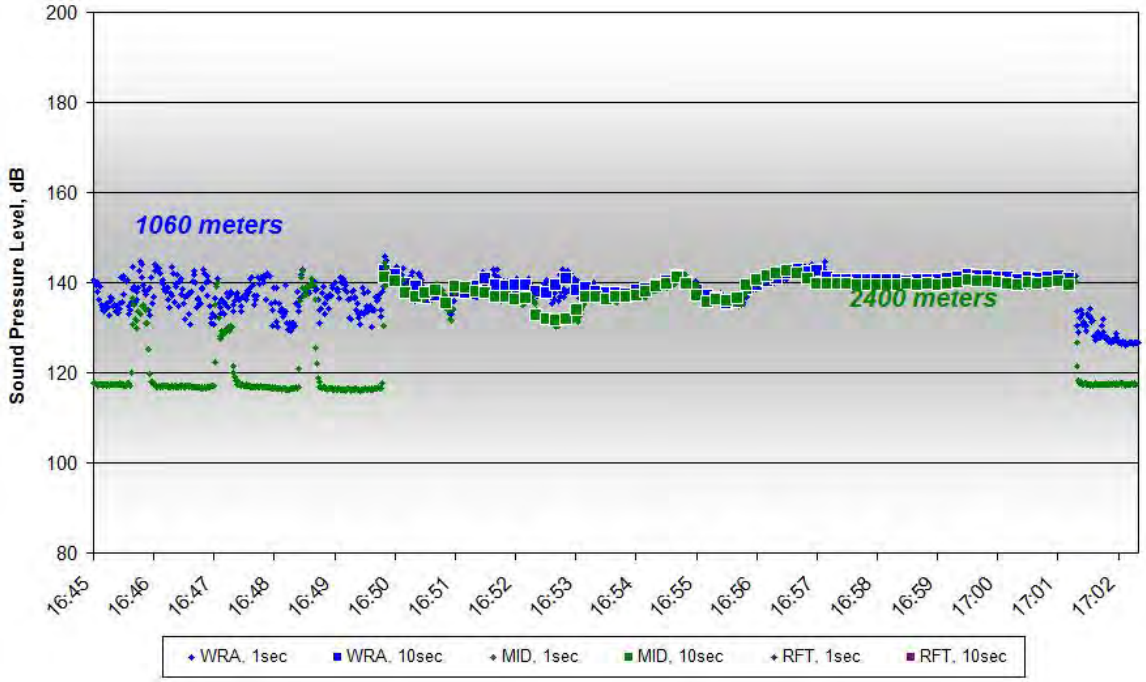

Figure B375. One-second and 10-second Average Data for EHW3, 16:45-17:01, Measured at Depths of 17-30 meters on October 14, 2011

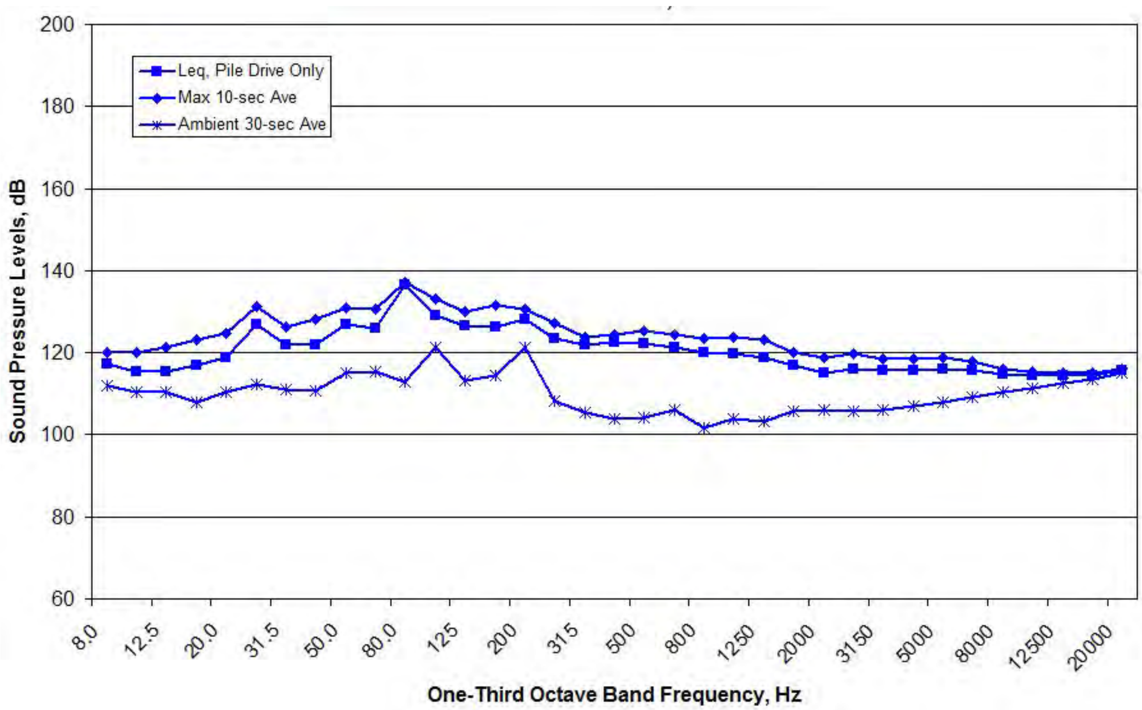

Figure B376. Spectral Data Measured at the WRA Location during EHW3, 16:45-17:01, Measured at Depths of 30 meters on October 14, 2011

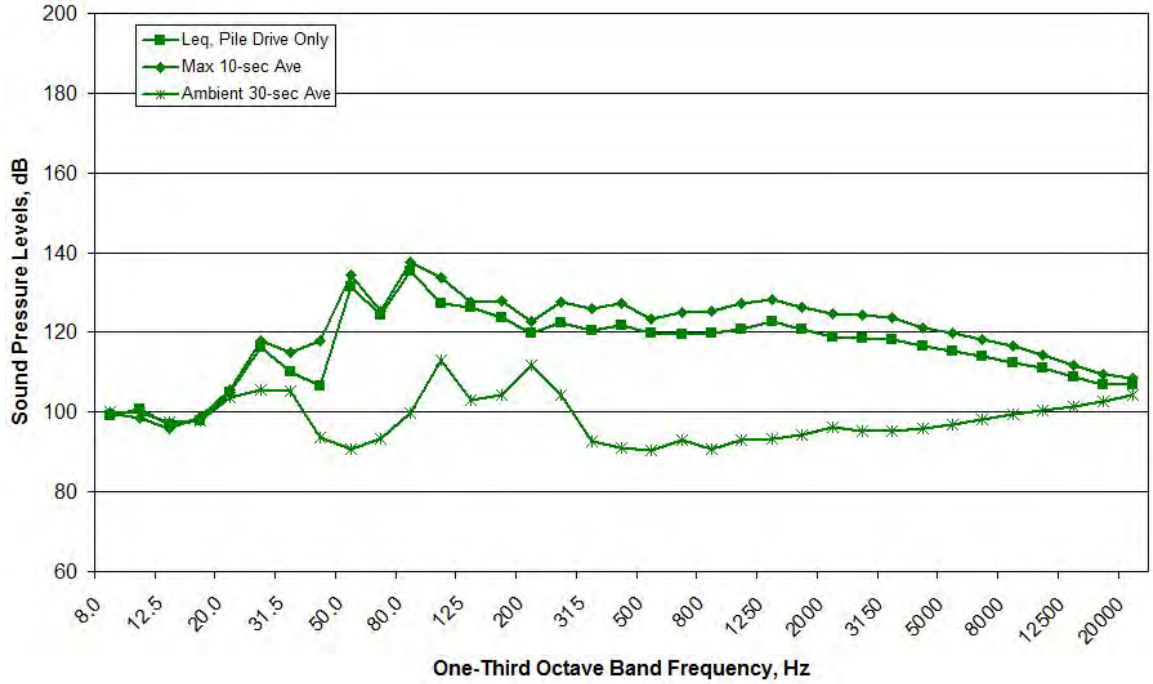

Figure B377. Spectral Data Measured at the MID Location during EHW3, 16:45-17:01, Measured at Depths of 30 meters on October 14, 2011

NO DATA AVAILABLE – BAD DATA

Figure B378. Spectral Data Measured at the RFT Location during EHW3, 16:45-17:01, Measured at Depths of 17 meters on October 14, 2011

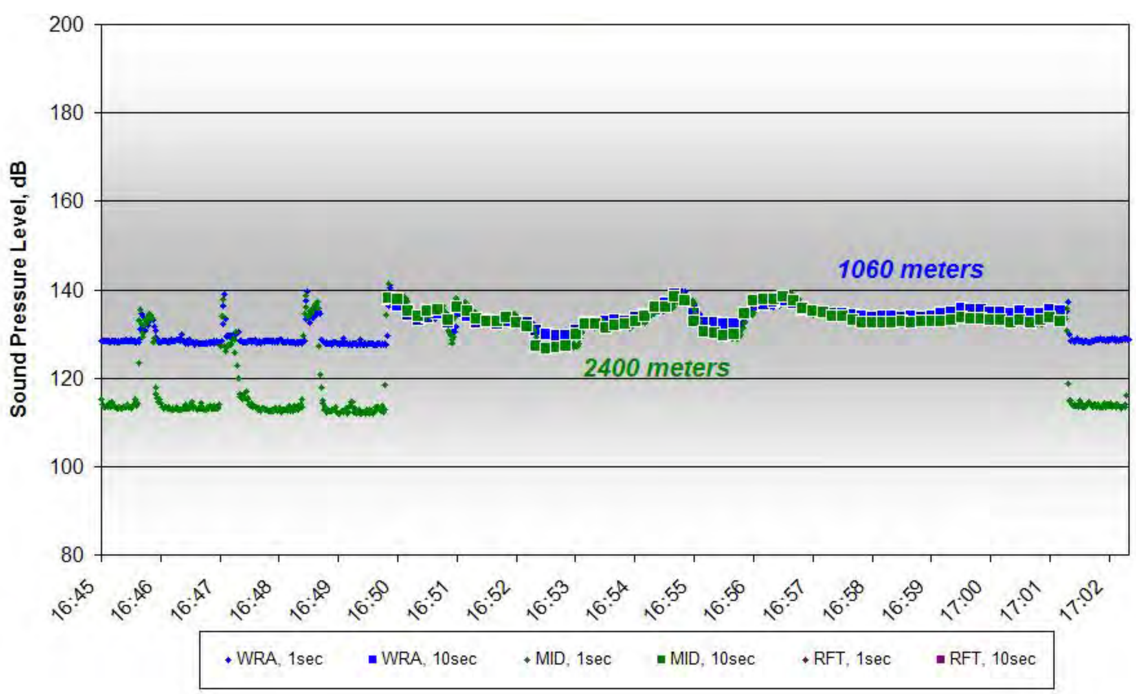

Figure B379. One-second and 10-second Average Data for EHW3, 16:45-17:01, Measured at Depths of 10 meters on October 14, 2011

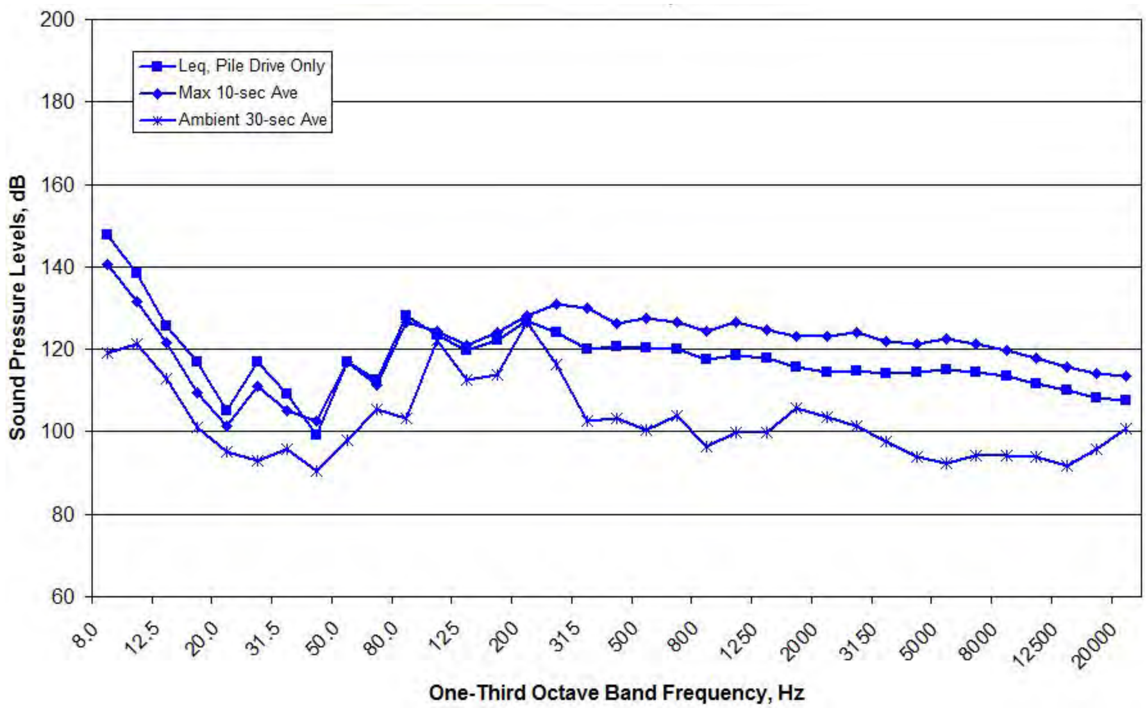

Figure B380. Spectral Data Measured at the WRA Location during EHW3, 16:45-17:01, Measured at Depths of 10 meters on October 14, 2011

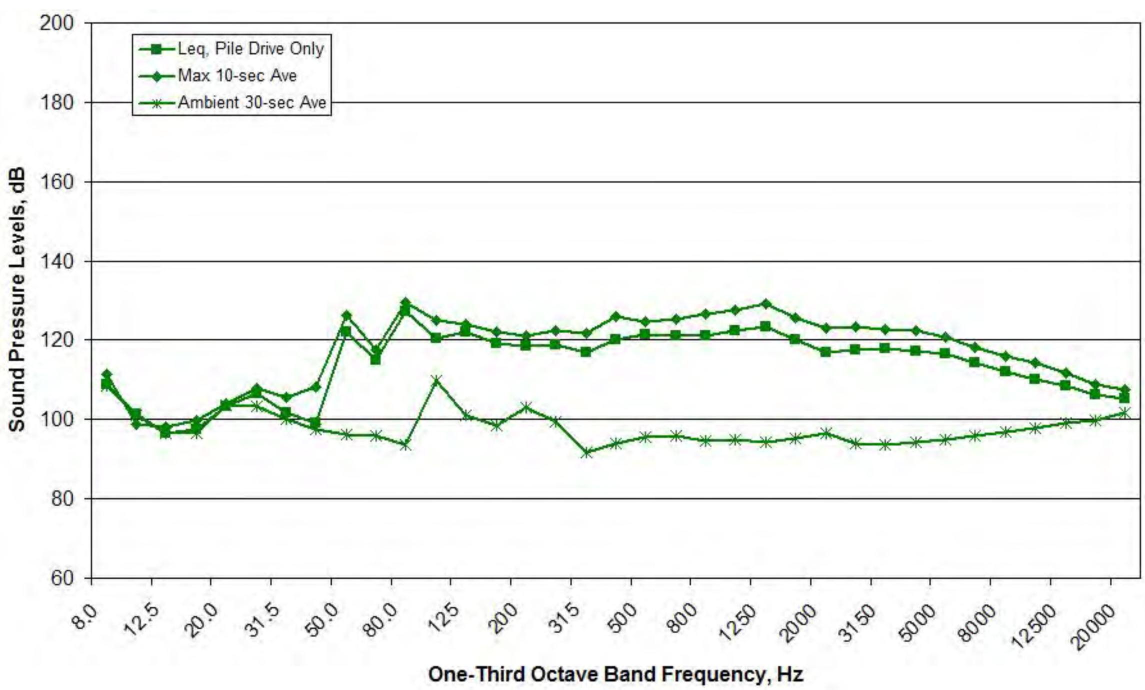

Figure B381. Spectral Data Measured at the MID Location during EHW3, 16:45-17:01, Measured at Depths of 10 meters on October 14, 2011

NO DATA AVAILABLE – BAD DATA

Figure B382. Spectral Data Measured at the RFT Location during EHW3, 16:45-17:01, Measured at Depths of 10 meters on October 14, 2011

10/15/2011 – EHW2 (Vibratory Installation)

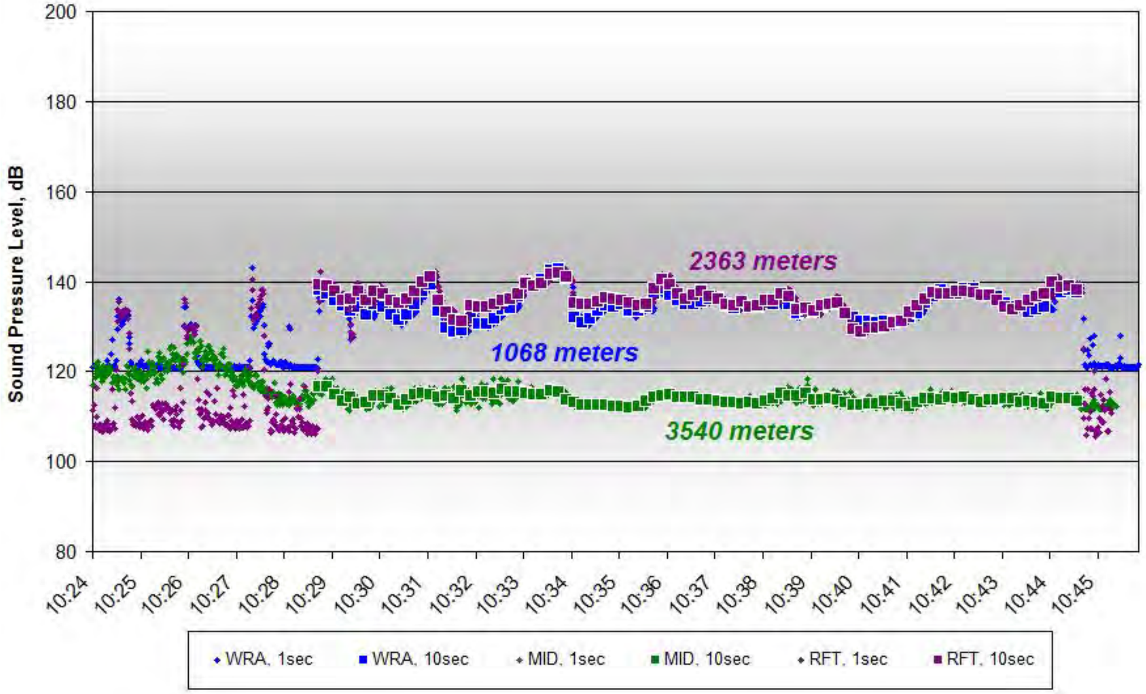

Figure B383. One-second and 10-second Average Data for EHW2, 10:25-10:45, Measured at Depths of 17-30 meters on October 15, 2011

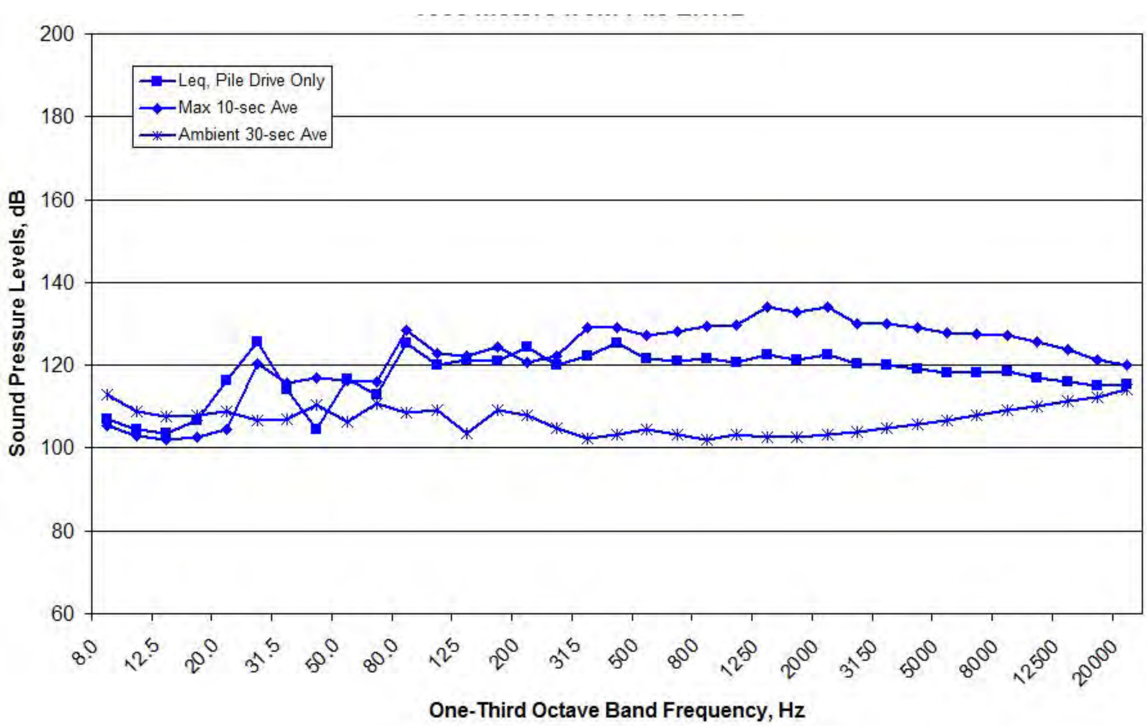

Figure B384. Spectral Data Measured at the WRA Location during EHW2, 10:25-10:45, Measured at Depths of 30 meters on October 15, 2011

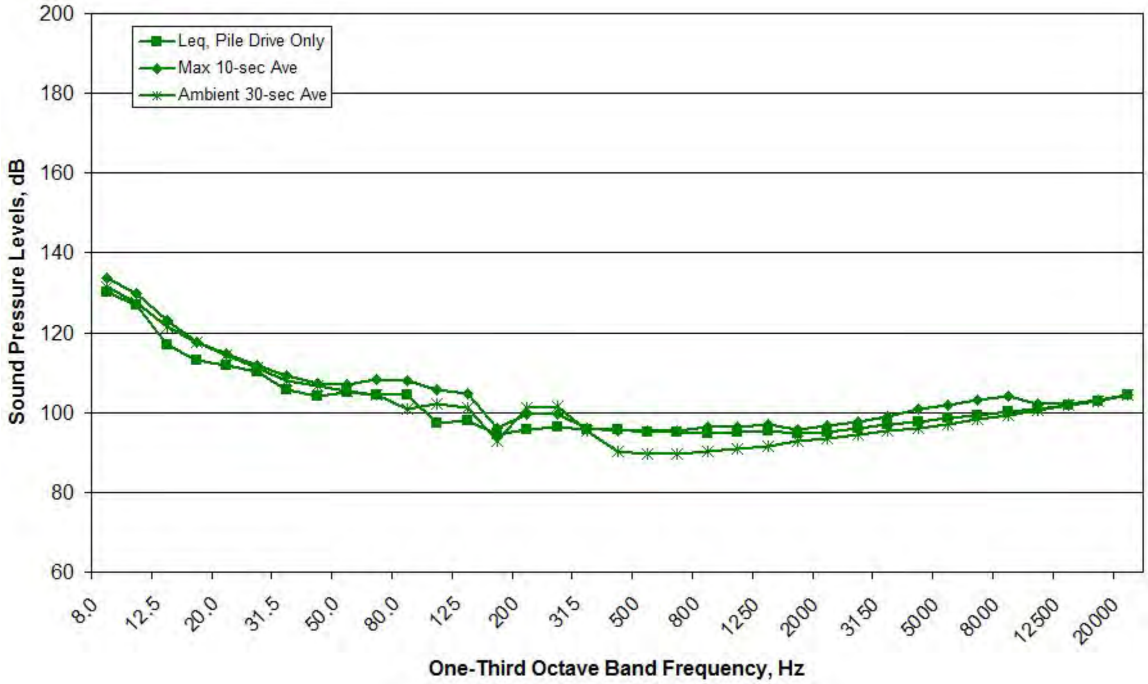

Figure B385. Spectral Data Measured at the MID Location during EHW2, 10:25-10:45Measured at Depths of 30 meters on October 15, 2011

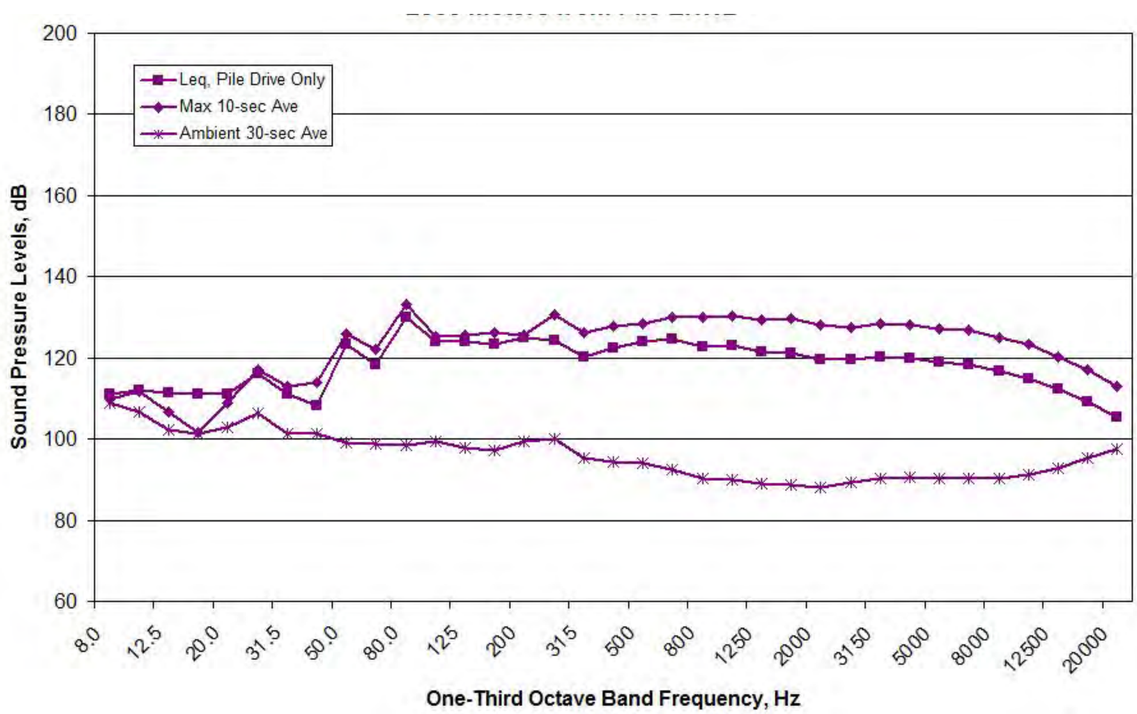

Figure B386. Spectral Data Measured at the RFT Location during EHW2, 10:25-10:45, Measured at Depths of 17 meters on October 15, 2011

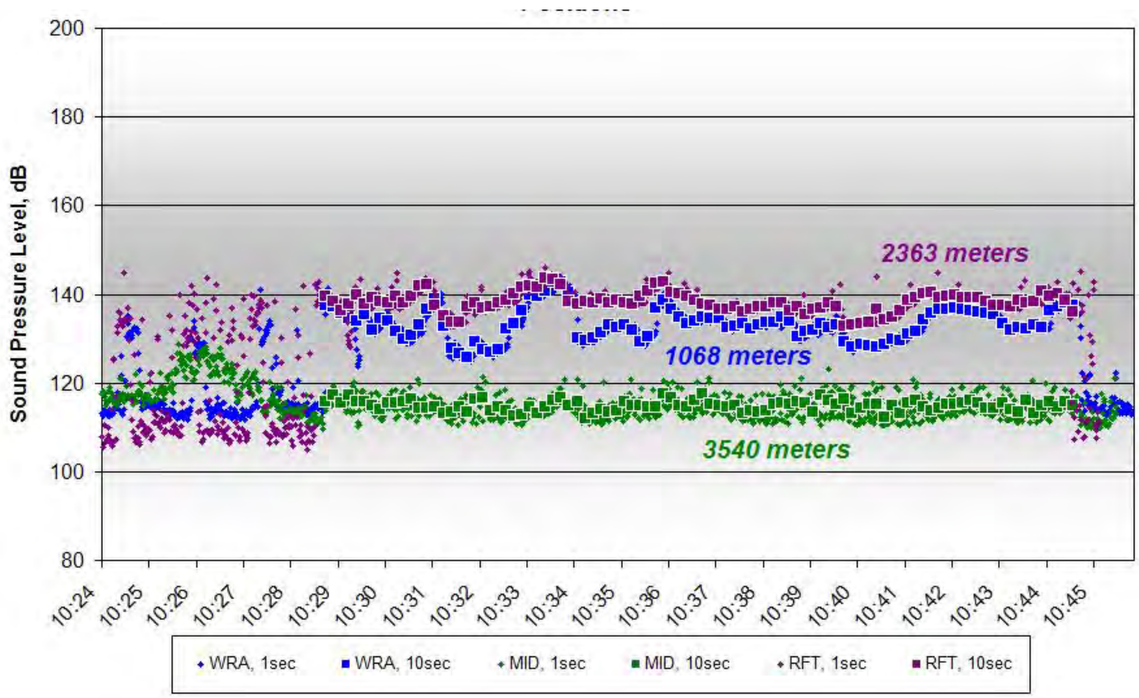

Figure B387. One-second and 10-second Average Data for EHW2, 10:25-10:45, Measured at Depths of 10 meters on October 15, 2011

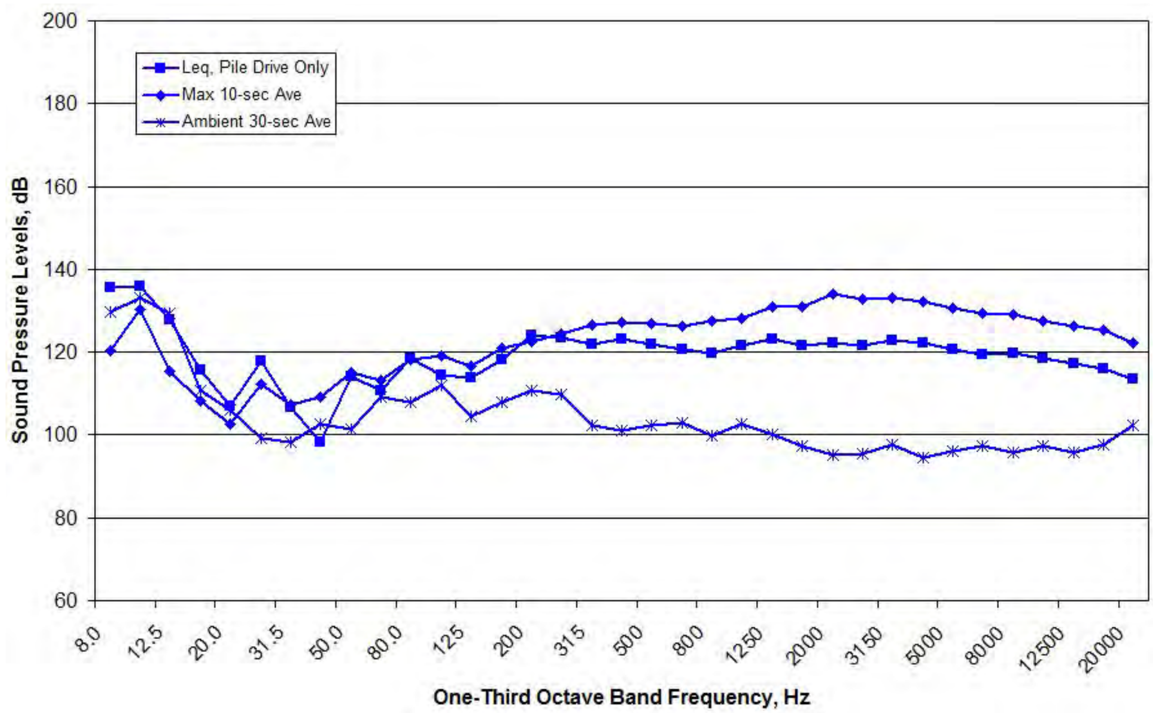

Figure B388. Spectral Data Measured at the WRA Location during EHW2, 10:25-10:45, Measured at Depths of 10 meters on October 15, 2011

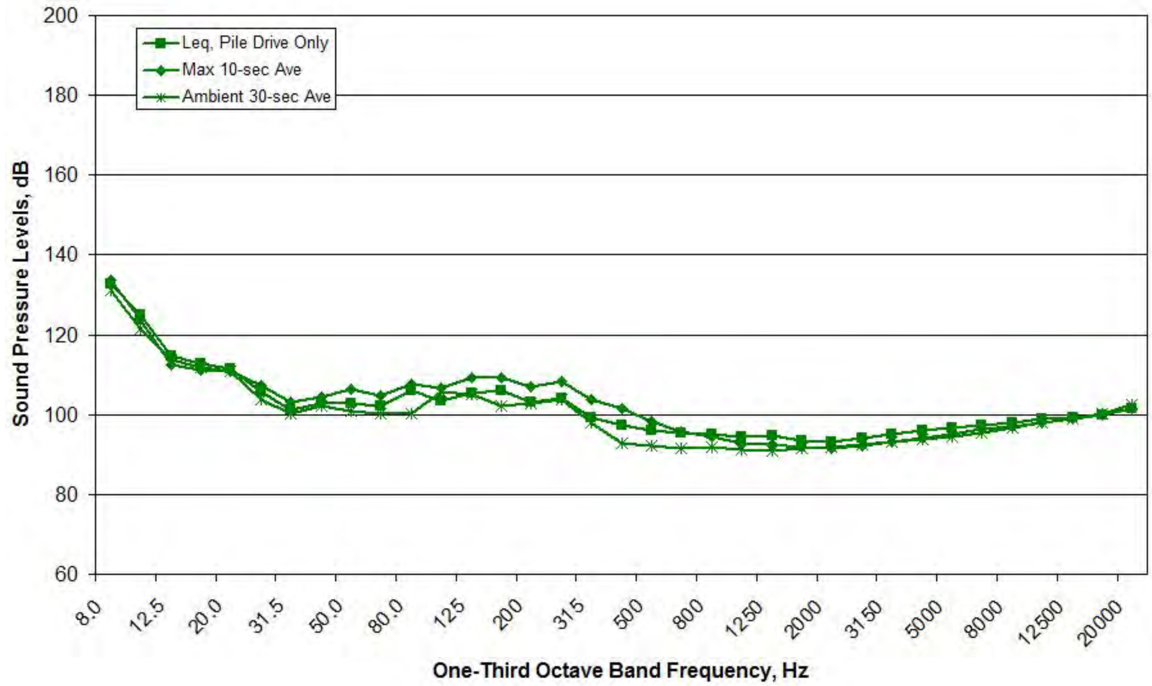

Figure B389. Spectral Data Measured at the MID Location during EHW2, 10:25-10:45, Measured at Depths of 10 meters on October 15, 2011

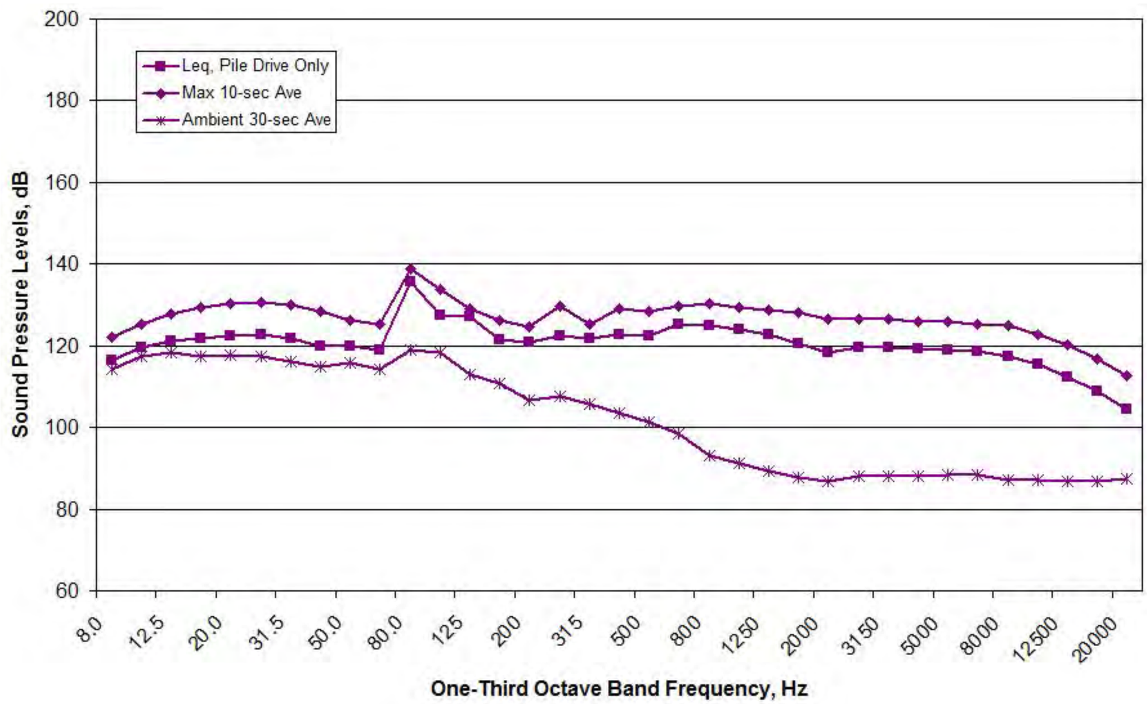

Figure B390. Spectral Data Measured at the RFT Location during EHW2, 10:25-10:45, Measured at Depths of 10 meters on October 15, 2011

EHW9, 11:28-11:42 (Vibratory Installation)

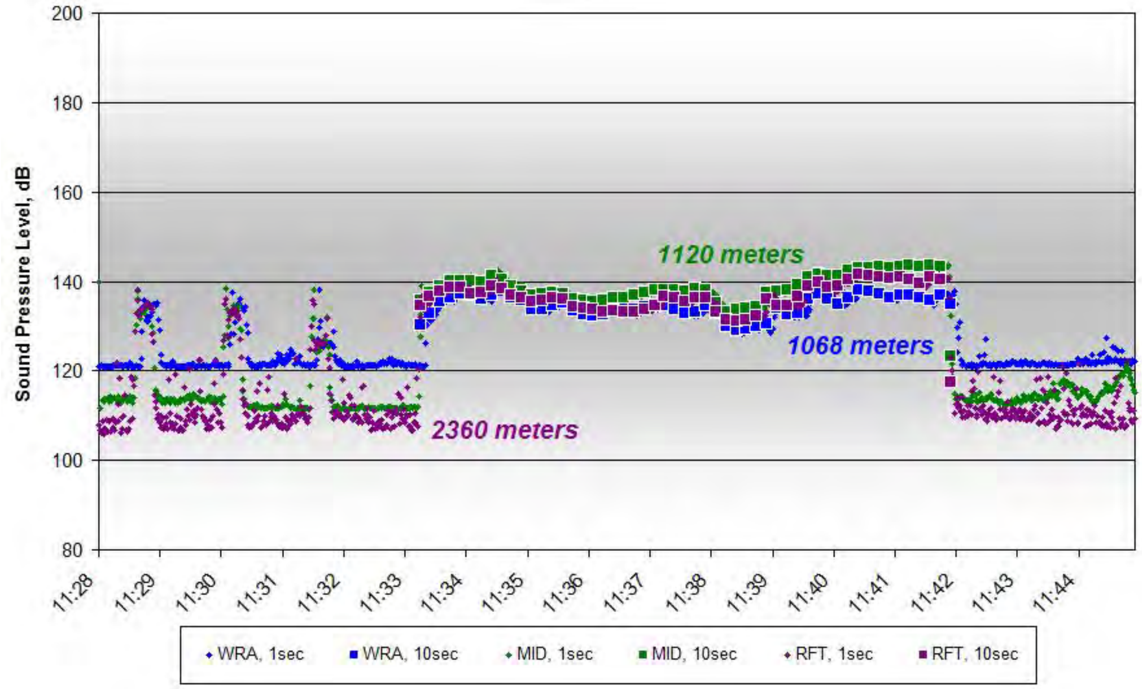

Figure B391. One-second and 10-second Average Data for EHW9, 11:28-11:42, Measured at Depths of 17-30 meters on October 15, 2011

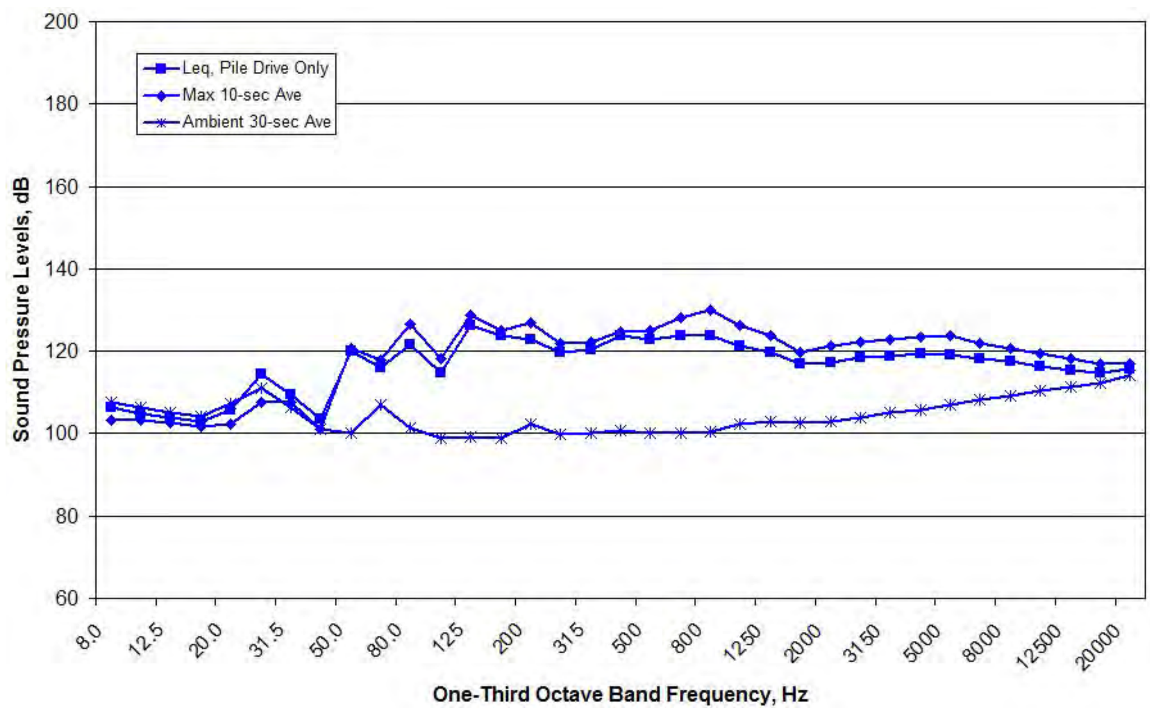

Figure B392. Spectral Data Measured at the WRA Location during EHW9, 11:28-11:42, Measured at Depths of 30 meters on October 15, 2011

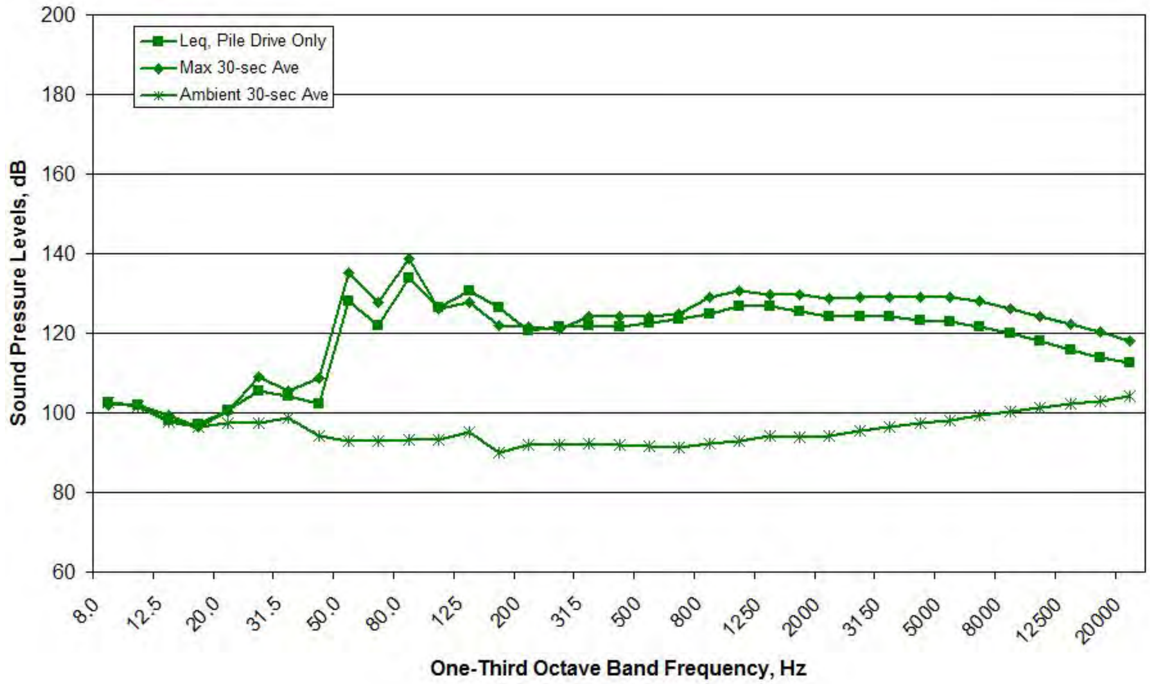

Figure B393. Spectral Data Measured at the MID Location during EHW9, 11:28-11:42, Measured at Depths of 30 meters on October 15, 2011

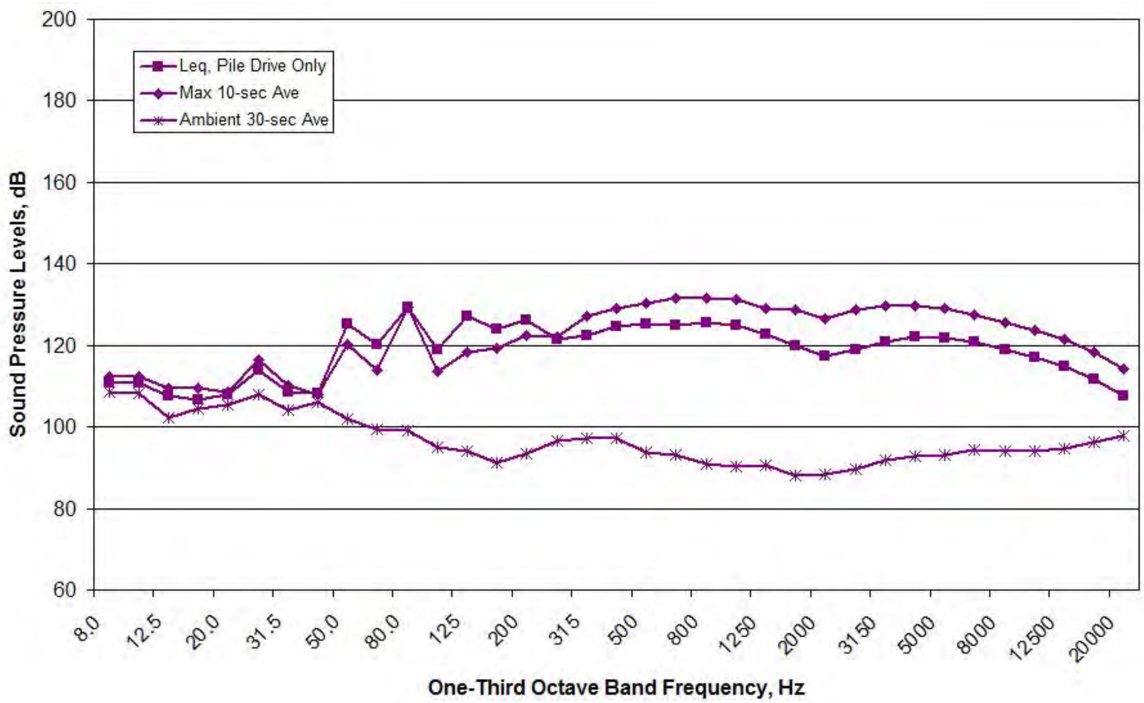

Figure B394. Spectral Data Measured at the RFT Location during EHW9, 11:28-11:42, Measured at Depths of 17 meters on October 15, 2011

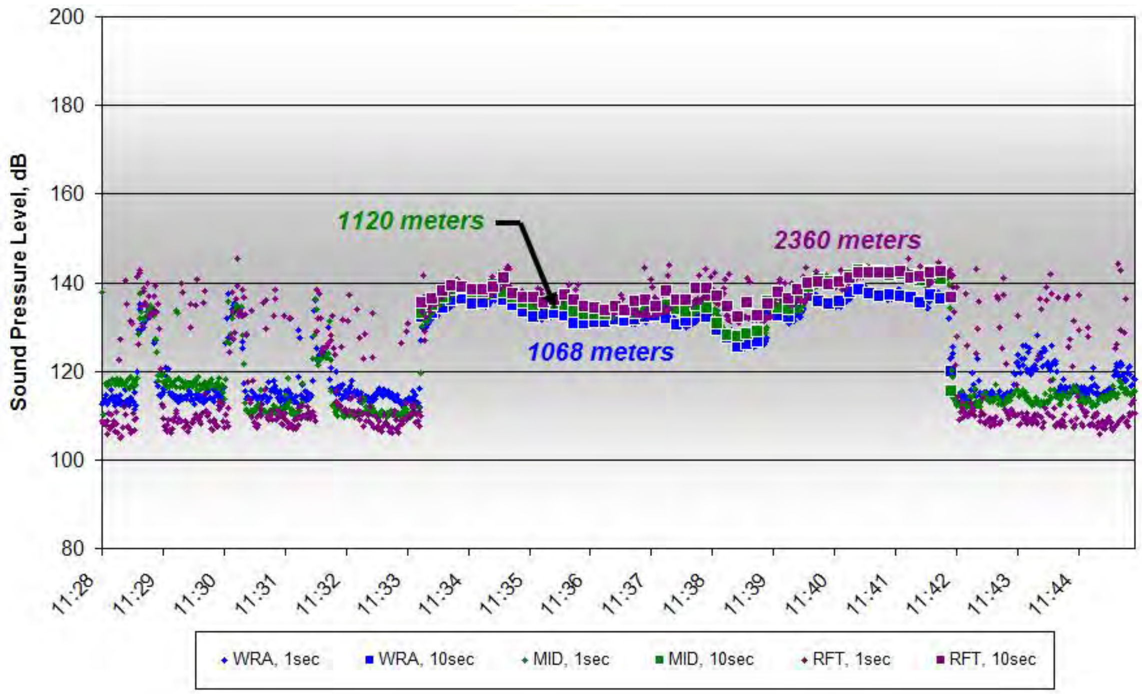

Figure B395. One-second and 10-second Average Data for EHW9, 11:28-11:42, Measured at Depths of 10 meters on October 15, 2011

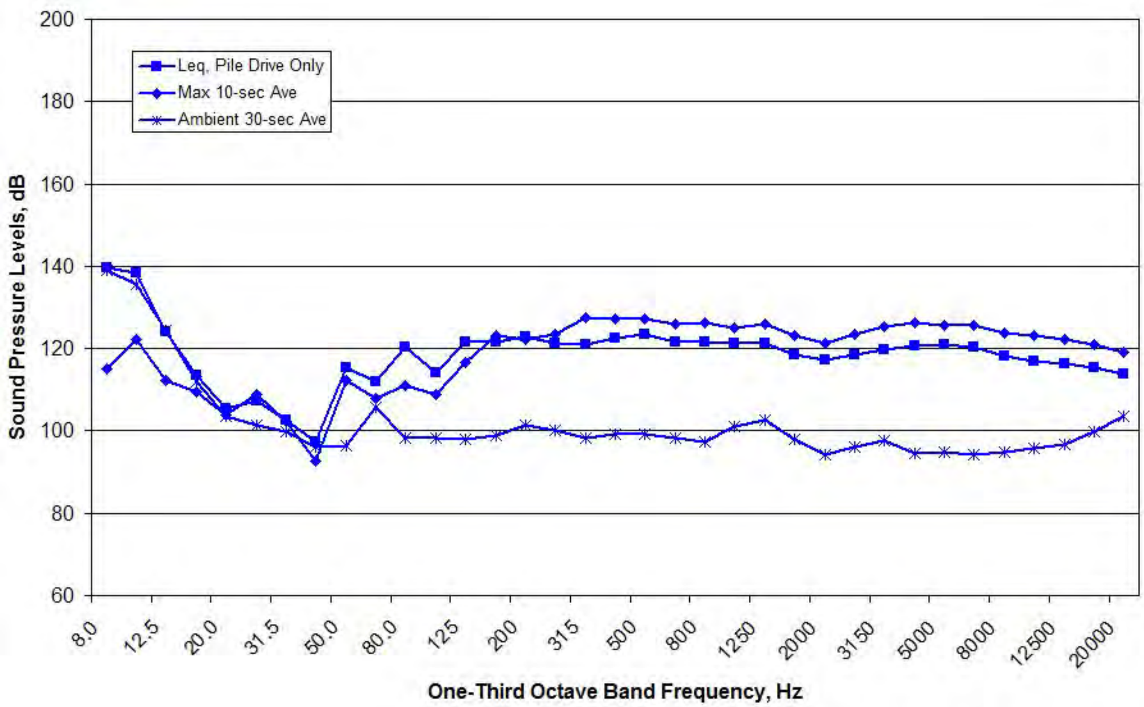

Figure B396. Spectral Data Measured at the WRA Location during EHW9, 11:28-11:42, Measured at Depths of 10 meters on October 15, 2011

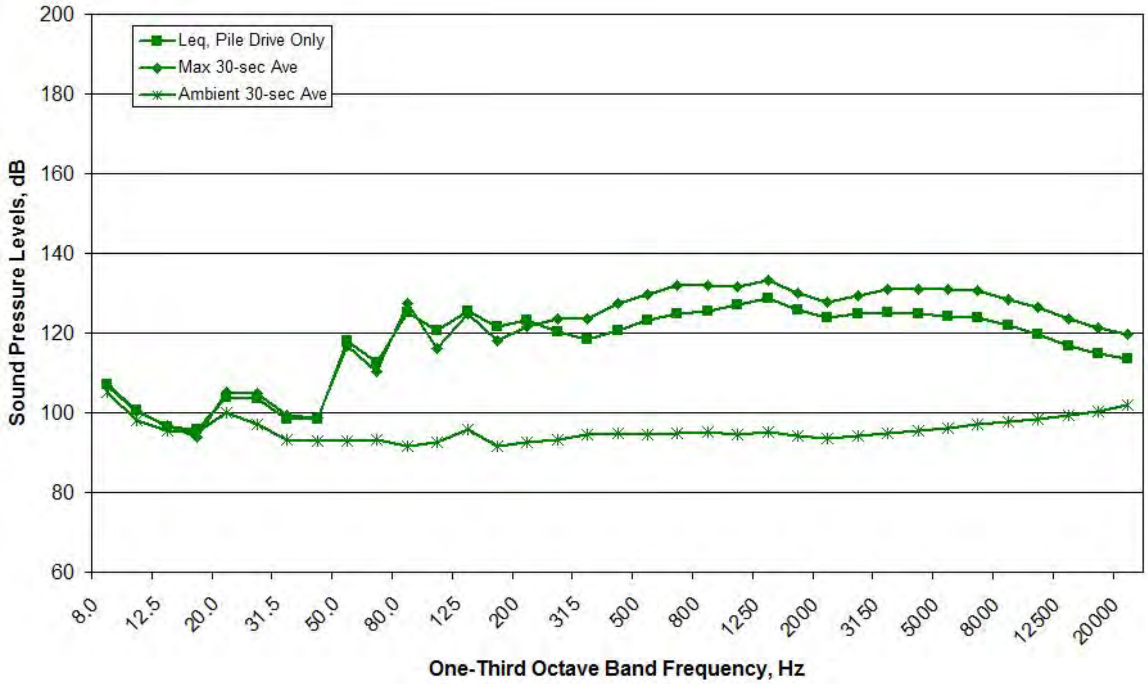

Figure B397. Spectral Data Measured at the MID Location during EHW9, 11:28-11:42, Measured at Depths of 10 meters on October 15, 2011

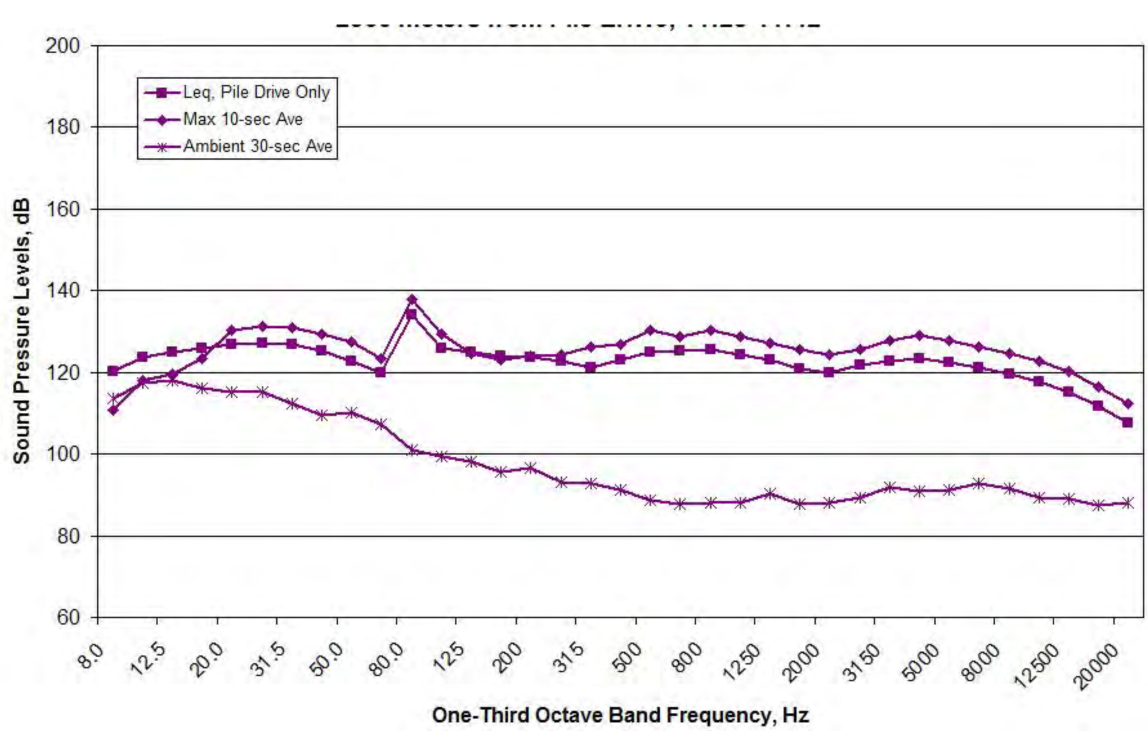

Figure B398. Spectral Data Measured at the RFT Location during EHW9, 11:28-11:42, Measured at Depths of 10 meters on October 15, 2011

EHW9, 11:56-11:57 (Vibratory Installation)

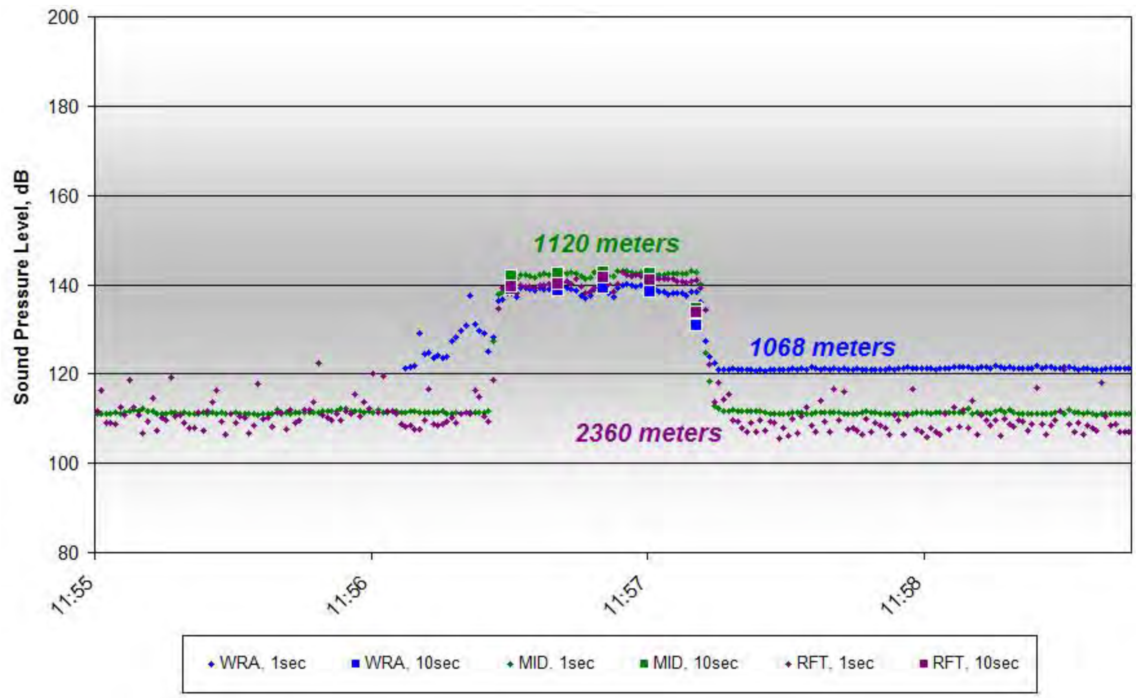

Figure B399. One-second and 10-second Average Data for EHW9, 11:56-11:57, Measured at Depths of 17-30 meters on October 15, 2011

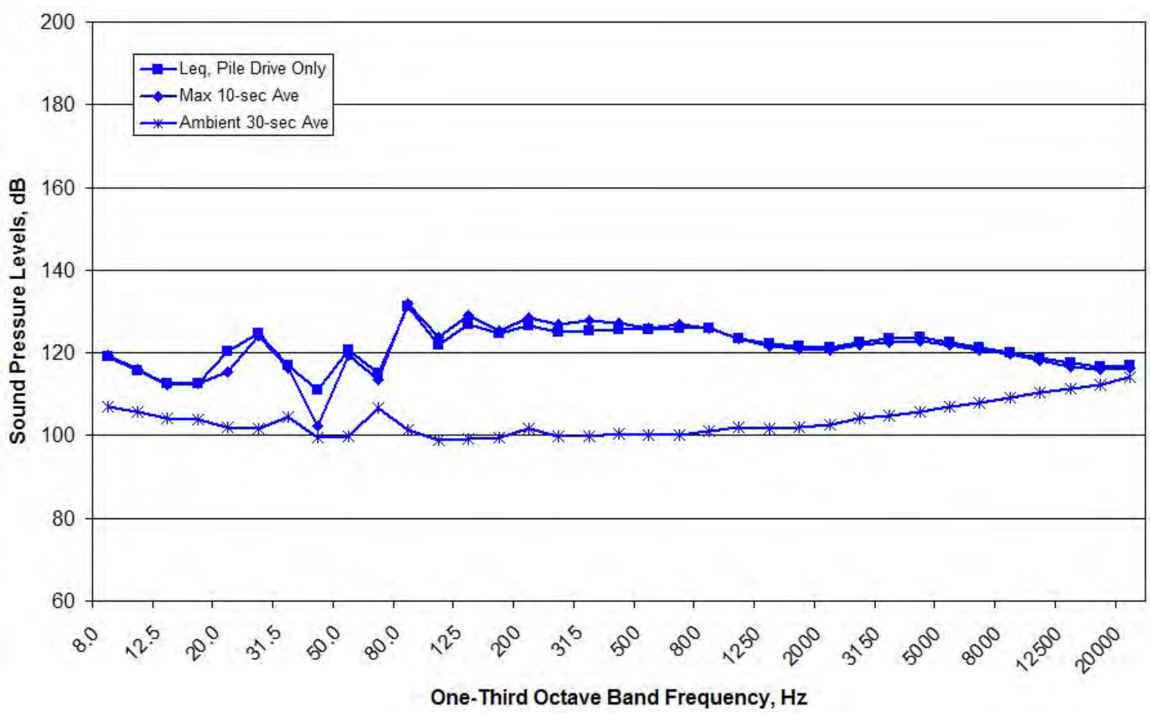

Figure B400. Spectral Data Measured at the WRA Location during EHW9, 11:56-11:57, Measured at Depths of 30 meters on October 15, 2011

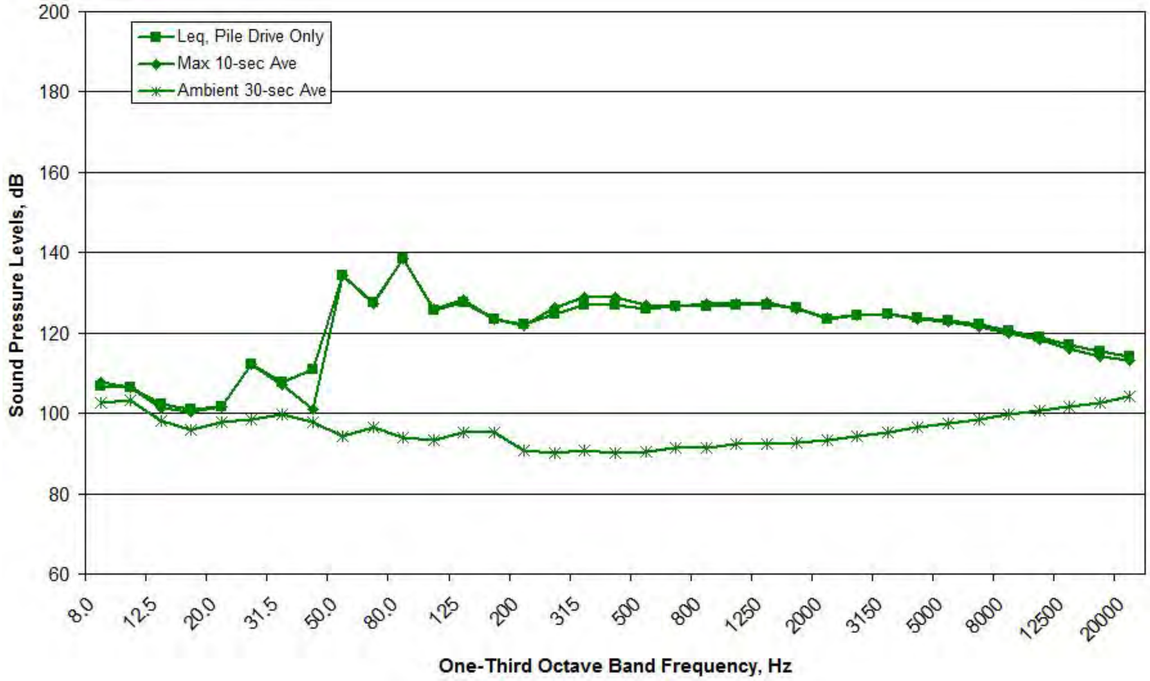

Figure B401. Spectral Data Measured at the MID Location during EHW9, 11:56-11:57, Measured at Depths of 30 meters on October 15, 2011

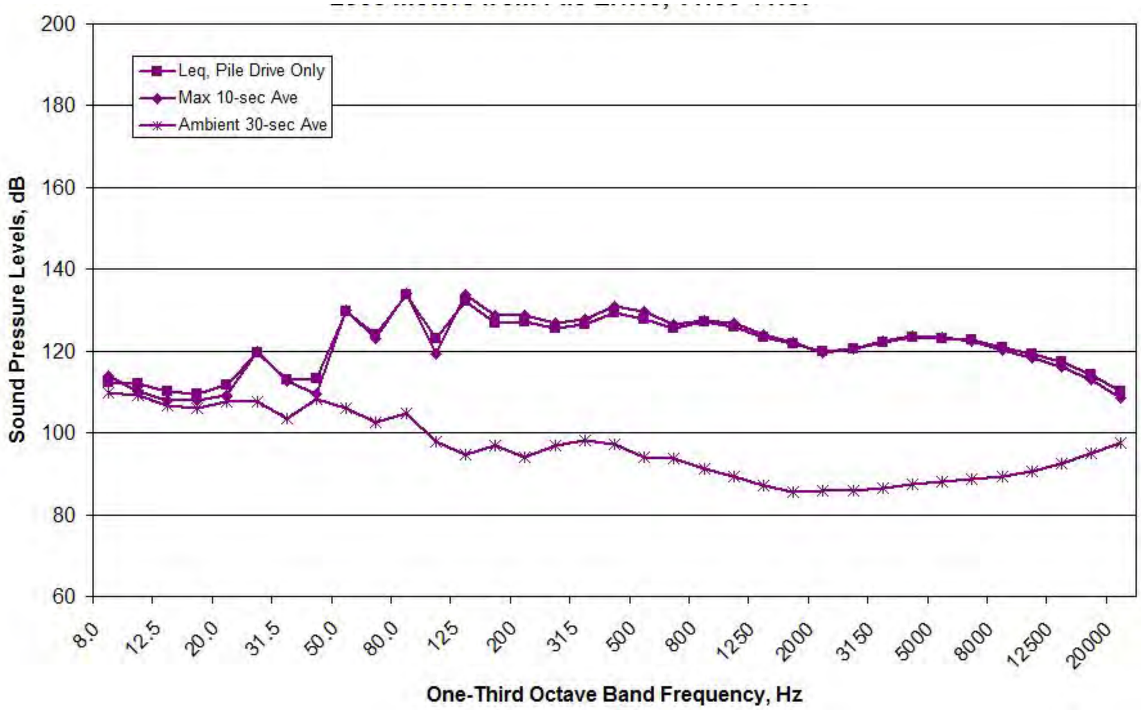

Figure B402. Spectral Data Measured at the RFT Location during EHW9, 11:56-11:57, Measured at Depths of 17 meters on October 15, 2011

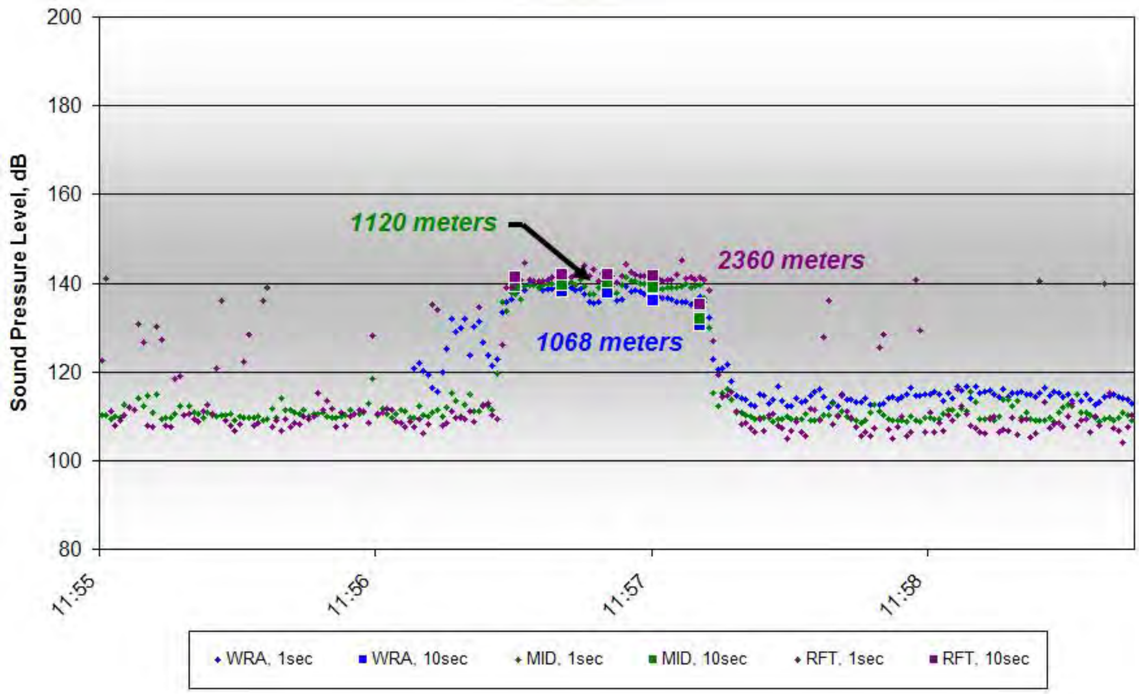

Figure B403. One-second and 10-second Average Data for EHW9, 11:56-11:57, Measured at Depths of 10 meters on October 15, 2011

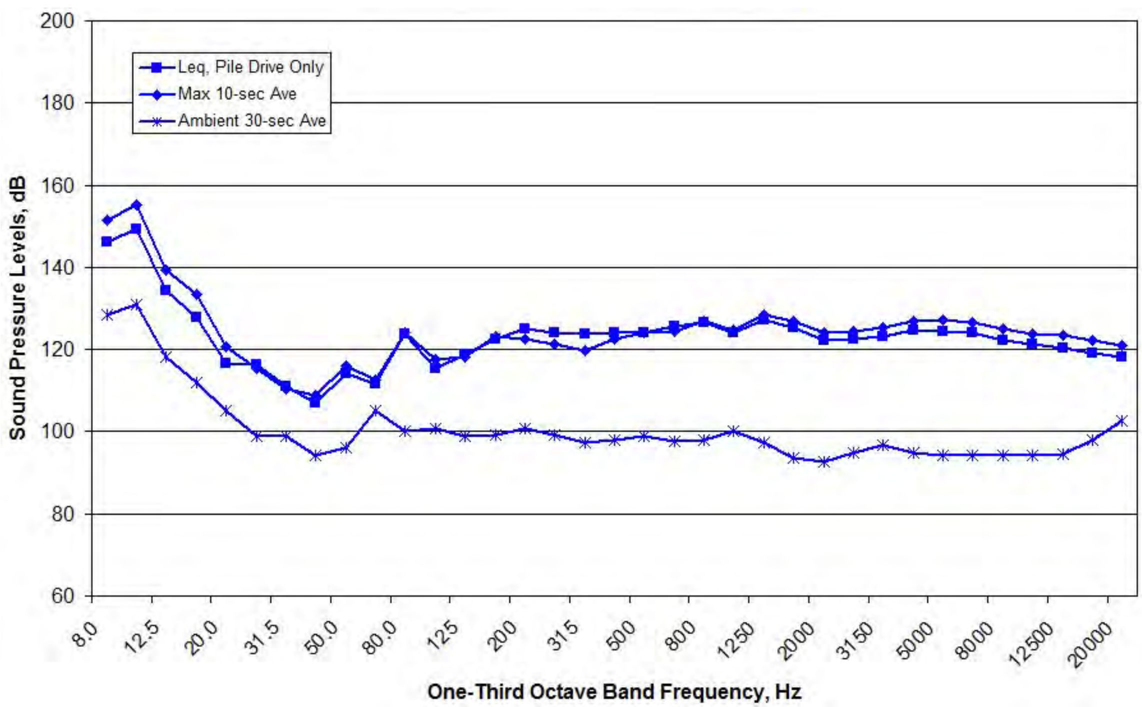

Figure B404. Spectral Data Measured at the WRA Location during EHW9, 11:56-11:57, Measured at Depths of 10 meters on October 15, 2011

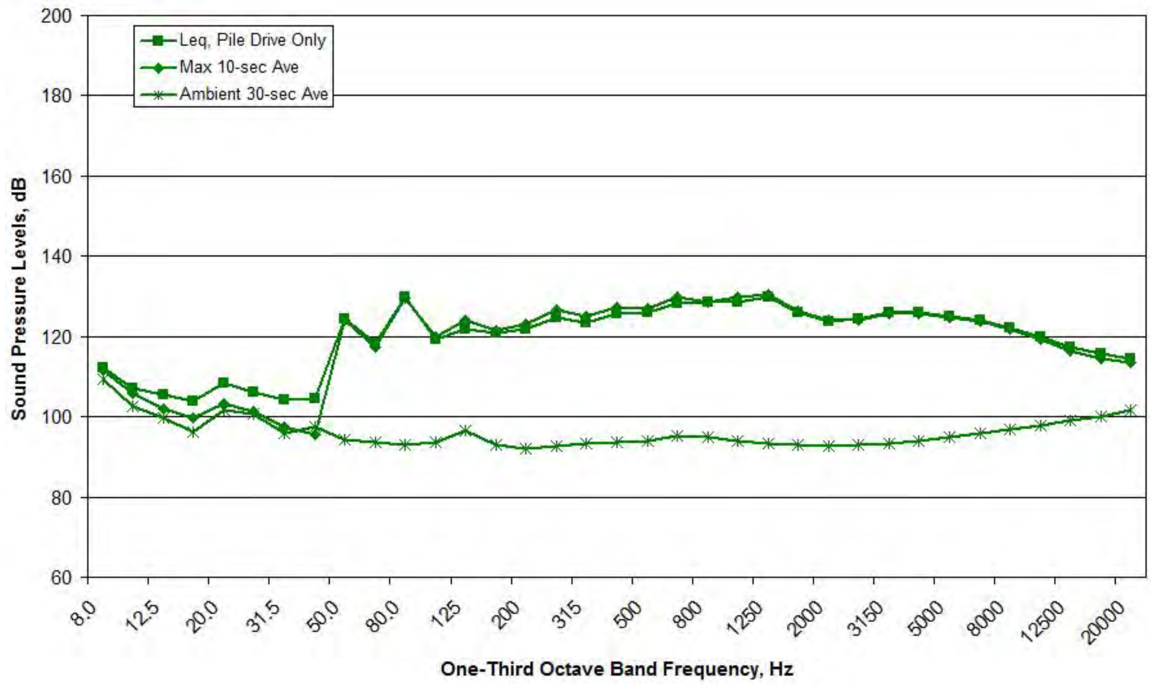

Figure B405. Spectral Data Measured at the MID Location during EHW9, 11:56-11:57, Measured at Depths of 10 meters on October 15, 2011

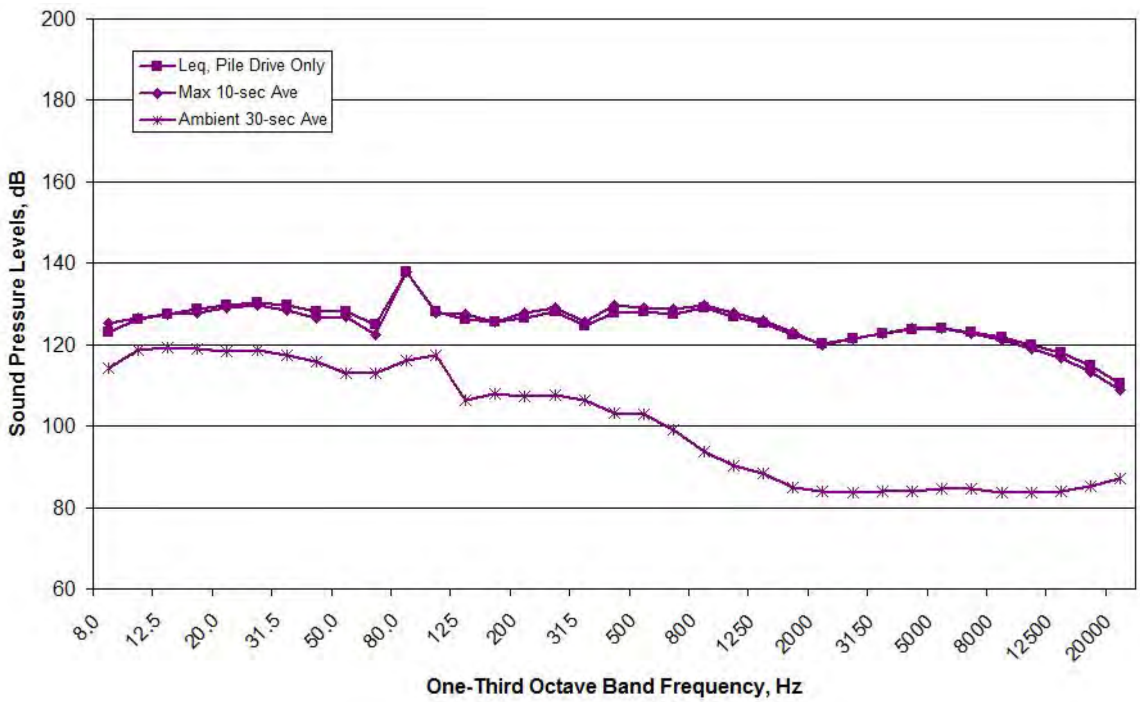

Figure B406. Spectral Data Measured at the RFT Location during EHW9, 11:56-11:57, Measured at Depths of 10 meters on October 15, 2011

EHW8 (Vibratory Installation)

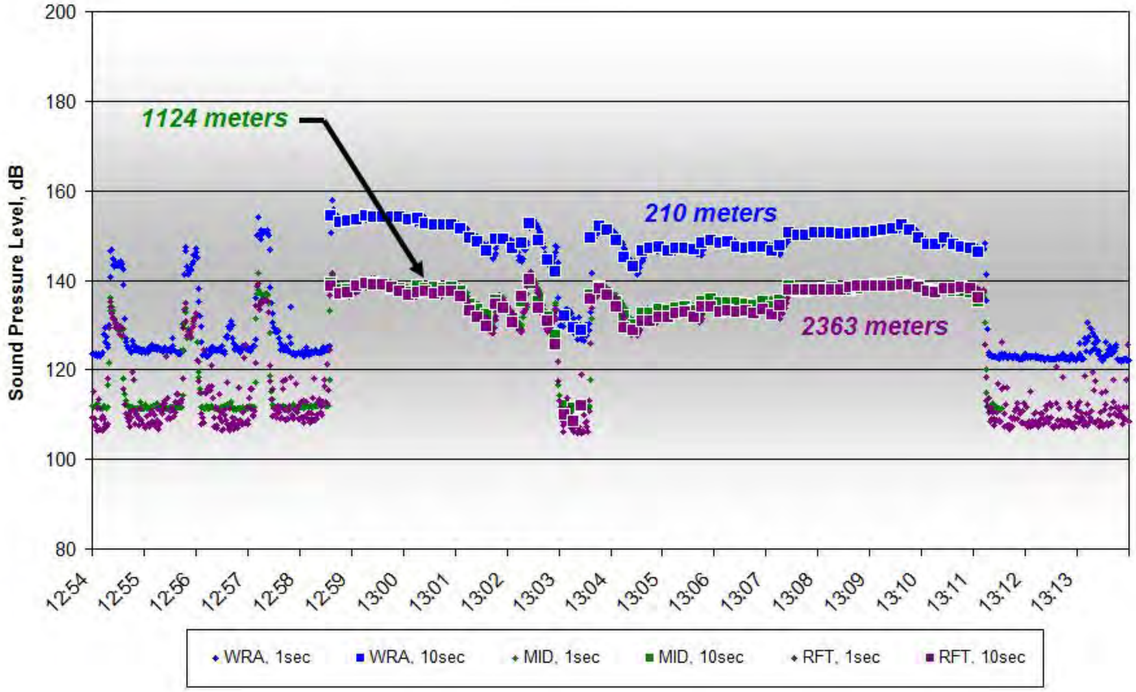

Figure B407. One-second and 10-second Average Data for EHW8, 12:54-13:11, Measured at Depths of 17-30 meters on October 15, 2011

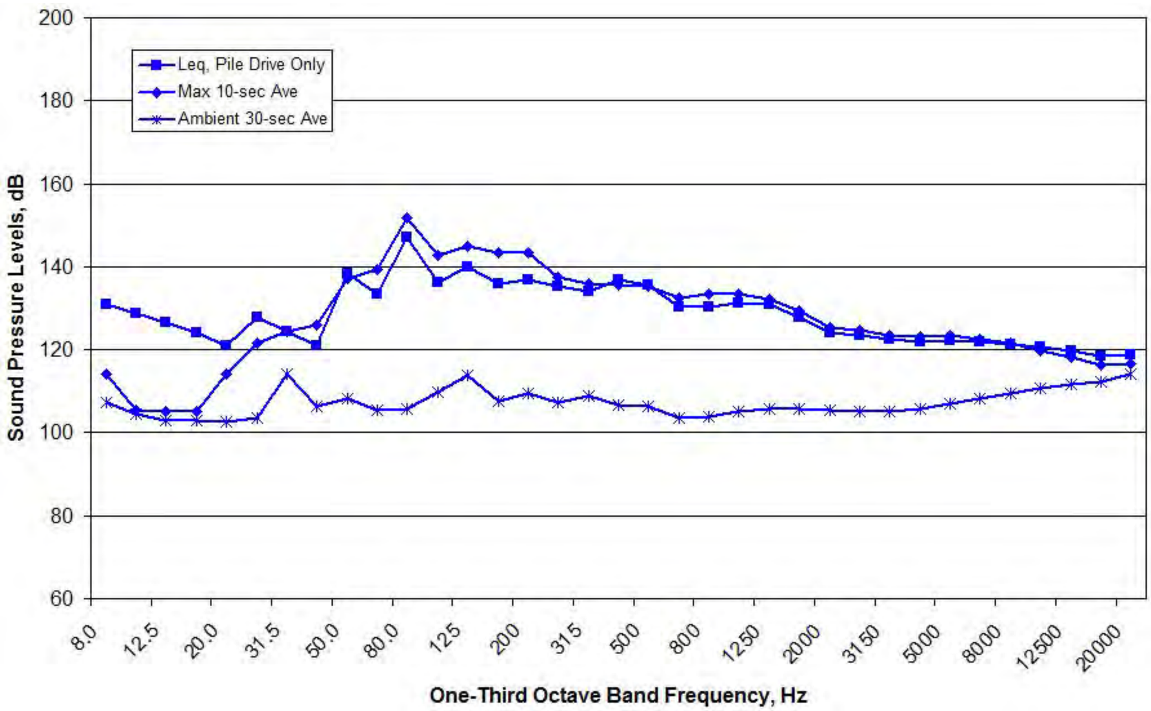

Figure B408. Spectral Data Measured at the WRA Location during EHW8, 12:54-13:11, Measured at Depths of 30 meters on October 15, 2011

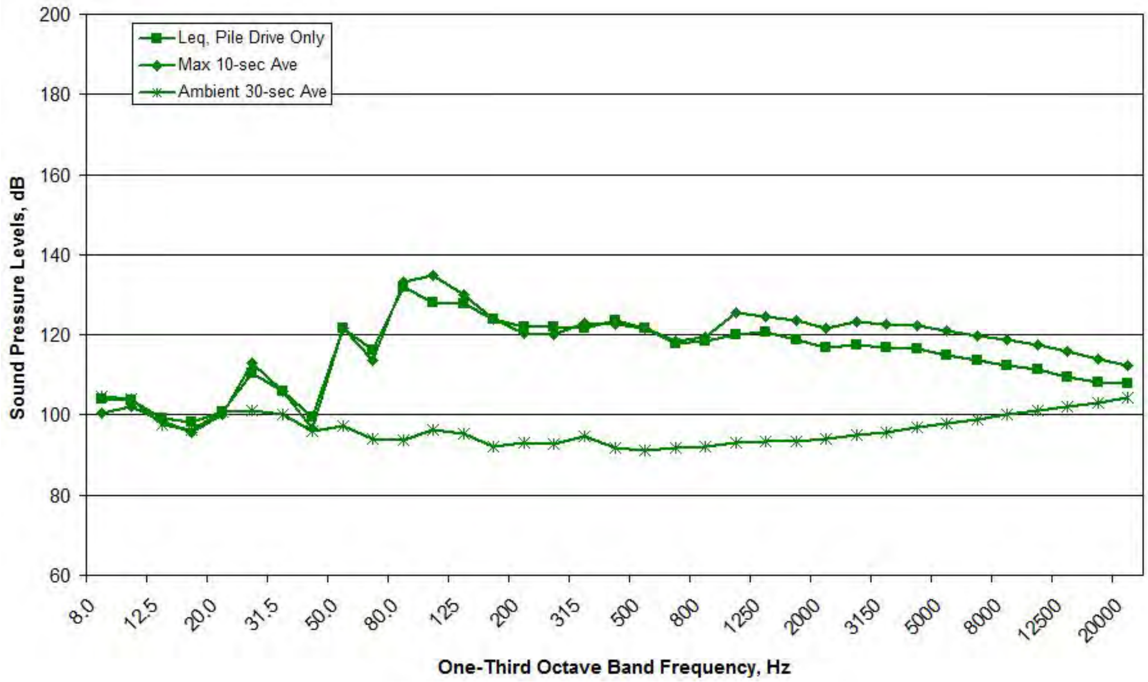

Figure B409. Spectral Data Measured at the MID Location during EHW8, 12:54-13:11, Measured at Depths of 30 meters on October 15, 2011

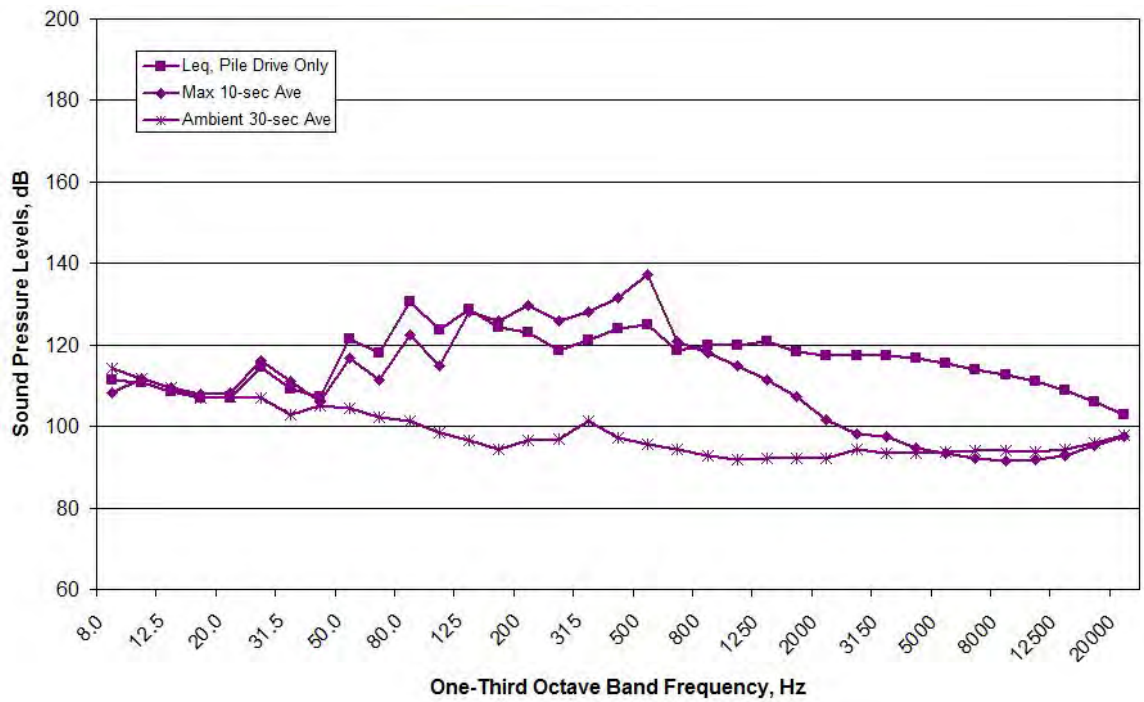

Figure B410. Spectral Data Measured at the RFT Location during EHW8, 12:54-13:11, Measured at Depths of 17 meters on October 15, 2011

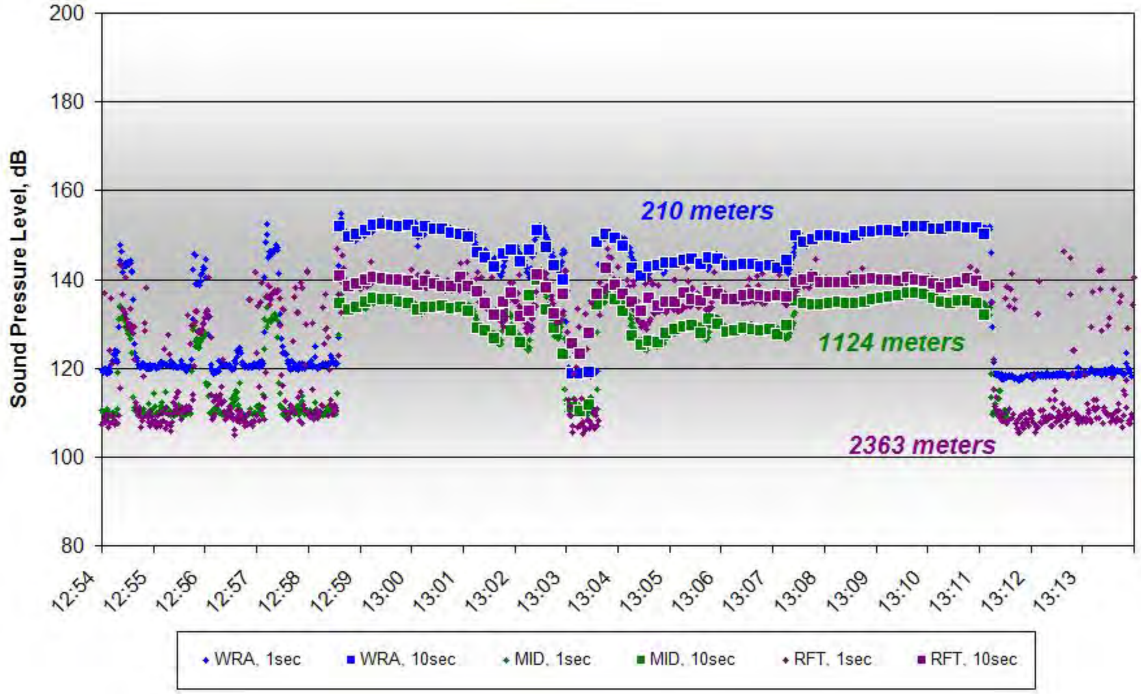

Figure B411. One-second and 10-second Average Data for EHW8, 12:54-13:11, Measured at Depths of 10 meters on October 15, 2011

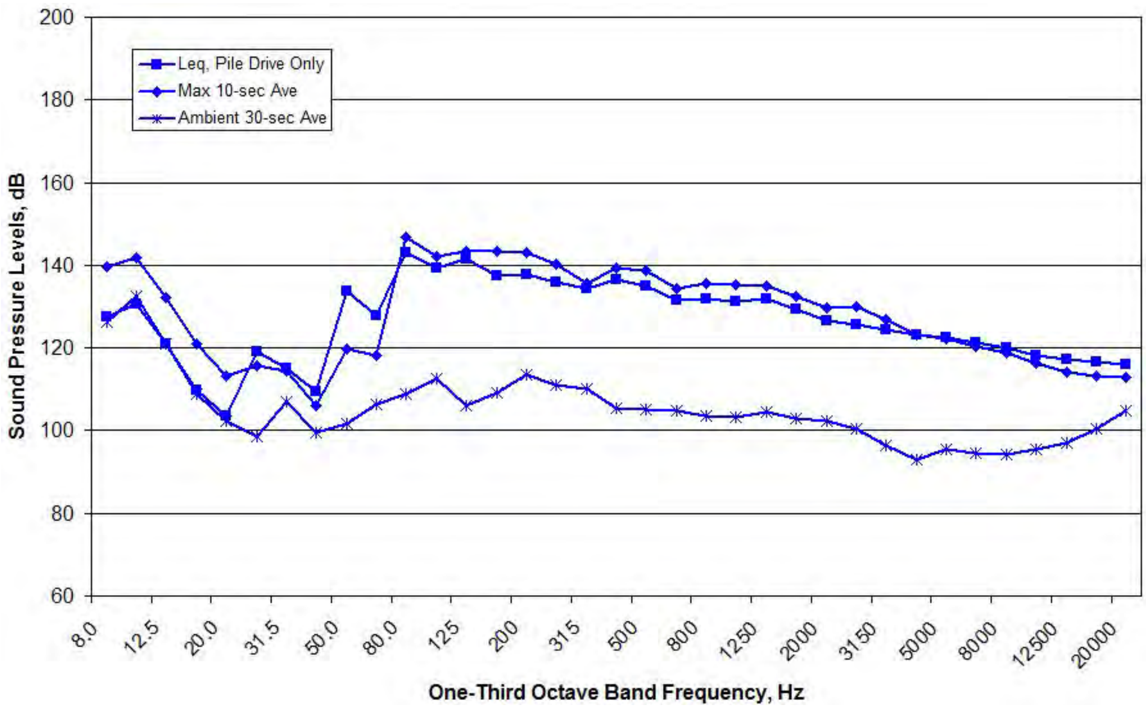

Figure B412. Spectral Data Measured at the WRA Location during EHW8, 12:54-13:11, Measured at Depths of 10 meters on October 15, 2011

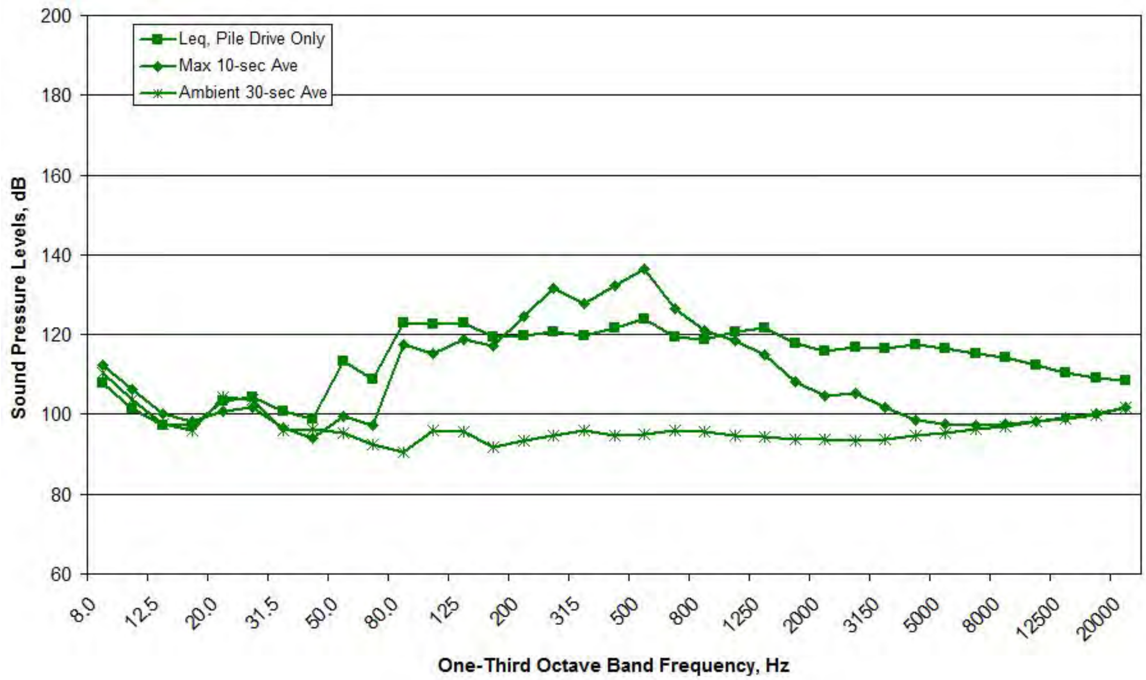

Figure B413. Spectral Data Measured at the MID Location during EHW8, 12:54-13:11, Measured at Depths of 10 meters on October 15, 2011

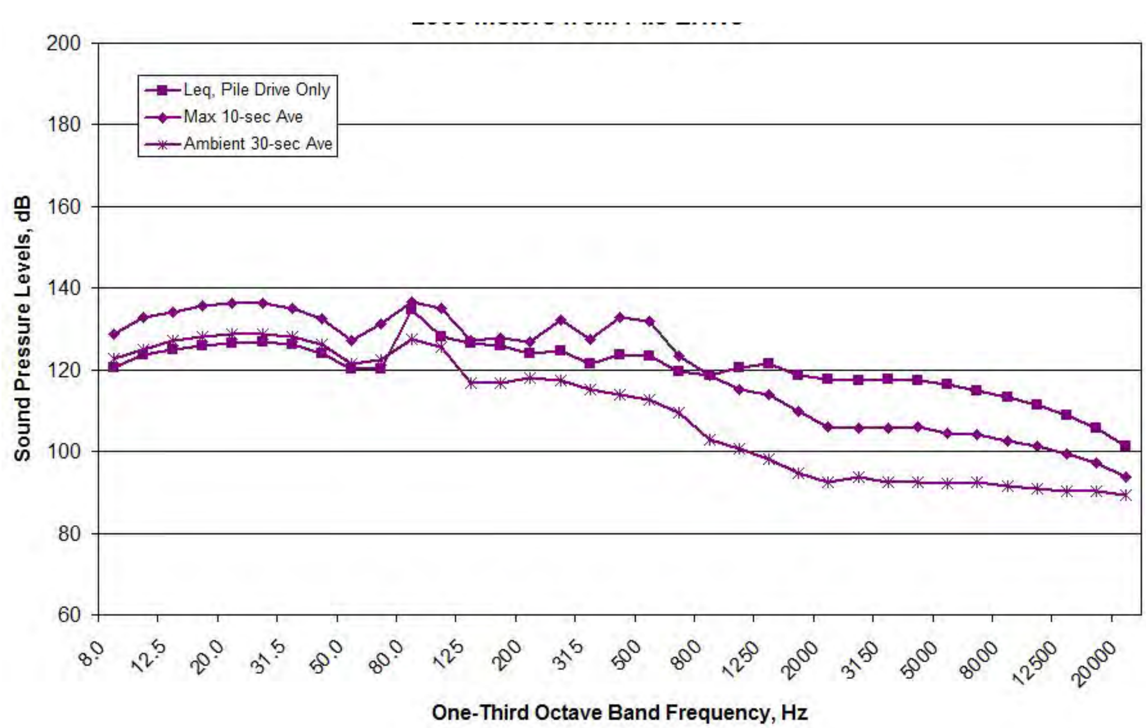

Figure B414. Spectral Data Measured at the RFT Location during EHW8, 12:54-13:11, Measured at Depths of 10 meters on October 15, 2011

10/17/2011 – EHW14, 14:52-14:59 (Vibratory Installation)

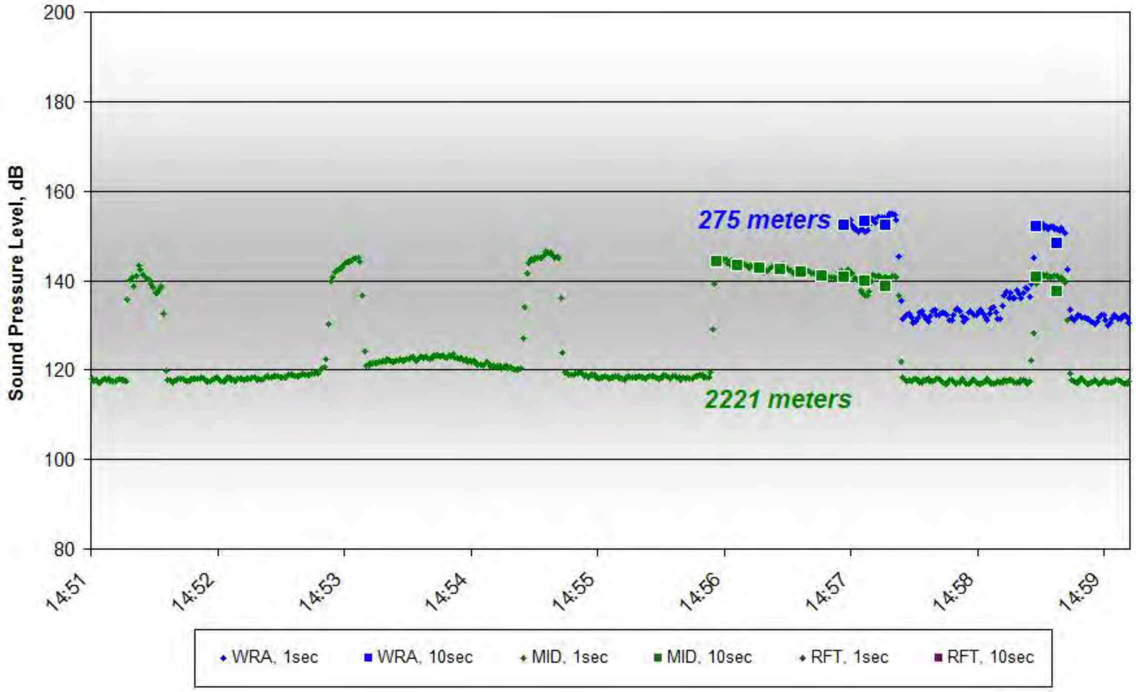

Figure B415. One-second and 10-second Average Data for EHW14, 14:52-14:59, Measured at Depths of 17-30 meters on October 17, 2011

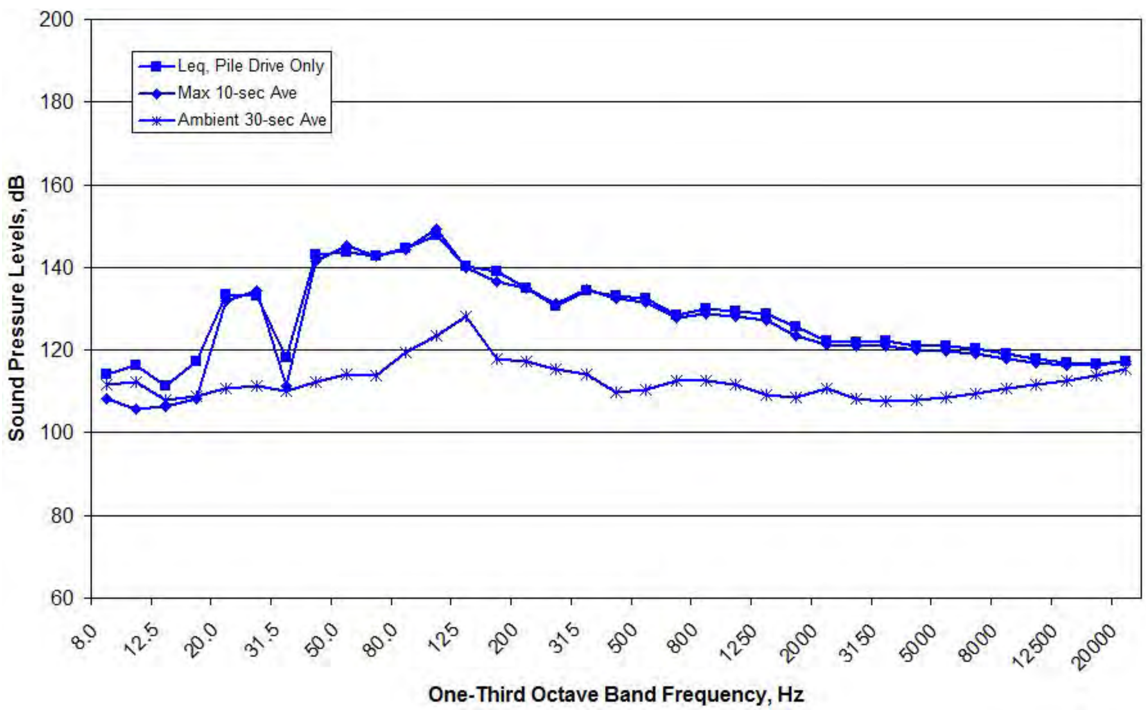

Figure B416. Spectral Data Measured at the WRA Location during EHW14, 14:52-14:59, Measured at Depths of 30 meters on October 17, 2011

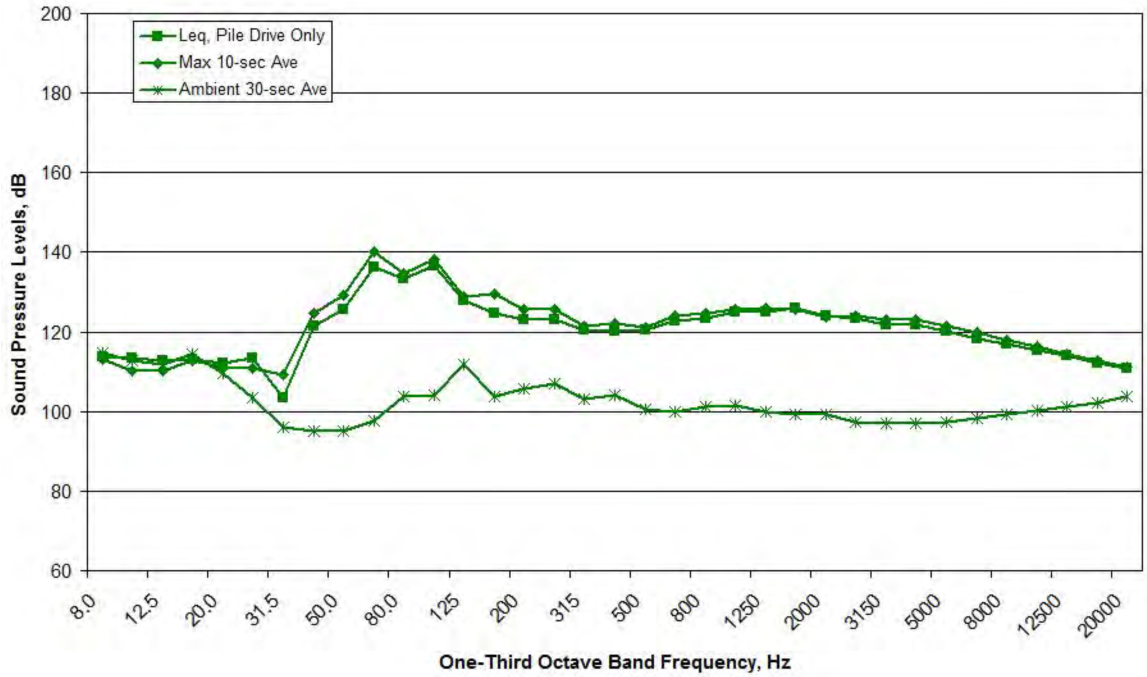

Figure B417. Spectral Data Measured at the MID Location during EHW14, 14:52-14:59, Measured at Depths of 30 meters on October 17, 2011

NO DATA AVAILABLE – BAD RECORDINGS

Figure B418. Spectral Data Measured at the RFT Location during EHW14, 14:52-14:59, Measured at Depths of 17 meters on October 17, 2011

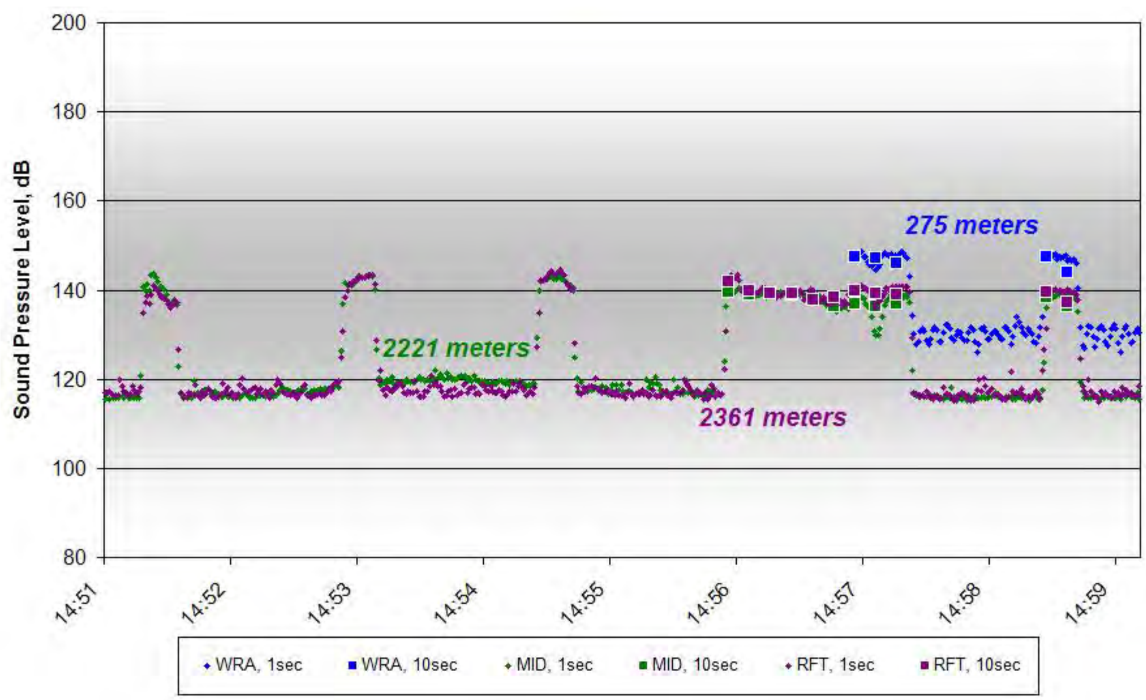

Figure B419. One-second and 10-second Average Data for EHW14, 14:52-14:59, Measured at Depths of 10 meters on October 17, 2011

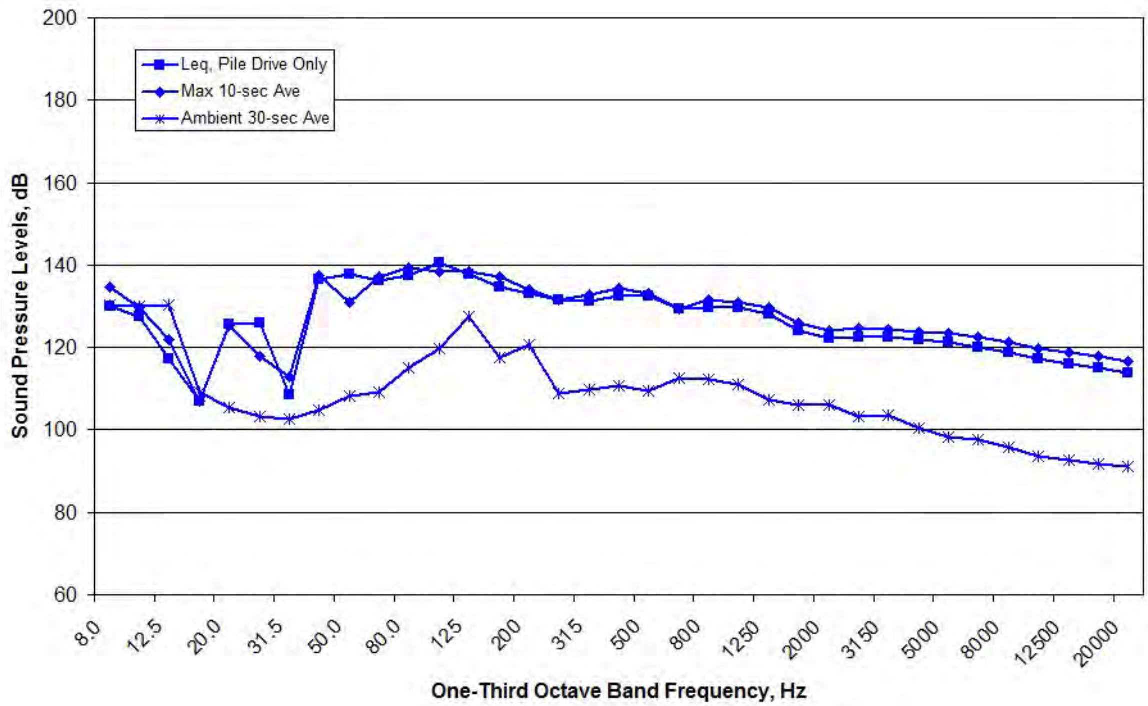

Figure B420. Spectral Data Measured at the WRA Location during EHW14, 14:52-14:59, Measured at Depths of 10 meters on October 17, 2011

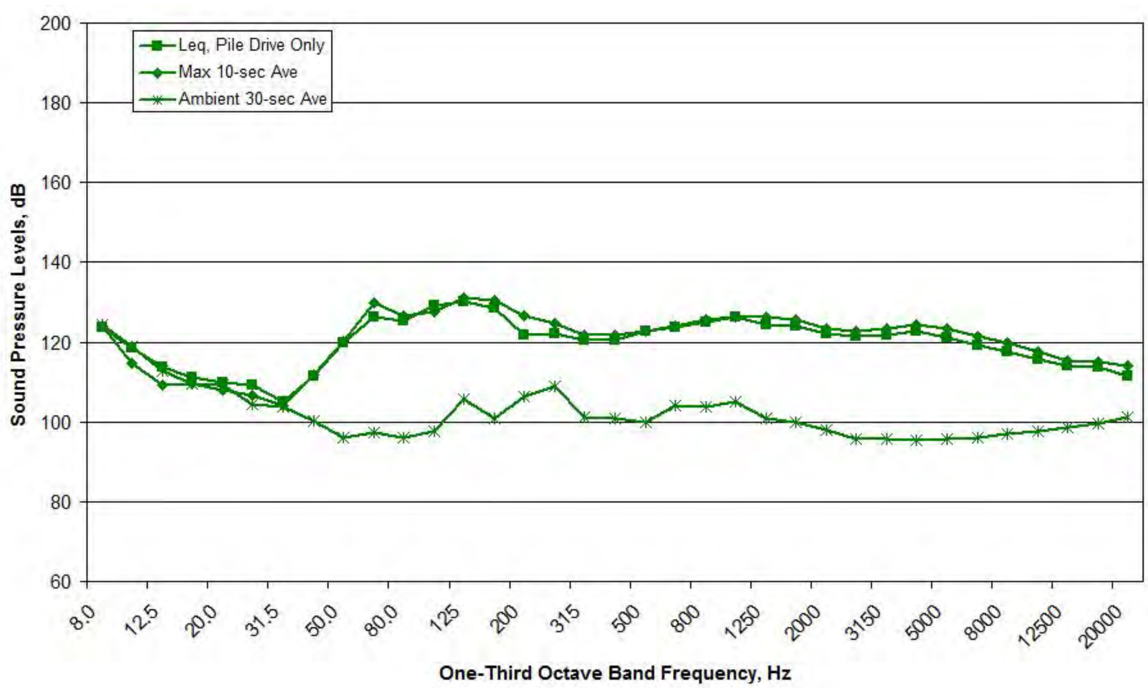

Figure B421. Spectral Data Measured at the MID Location during EHW14, 14:52-14:59, Measured at Depths of 10 meters on October 17, 2011

NO SPECTRA DATA AVAILABLE

Figure B422. Spectral Data Measured at the RFT Location during EHW14, 14:52-14:59, Measured at Depths of 10 meters on October 17, 2011

EHW14, 15:25-15:32 (Vibratory Installation)

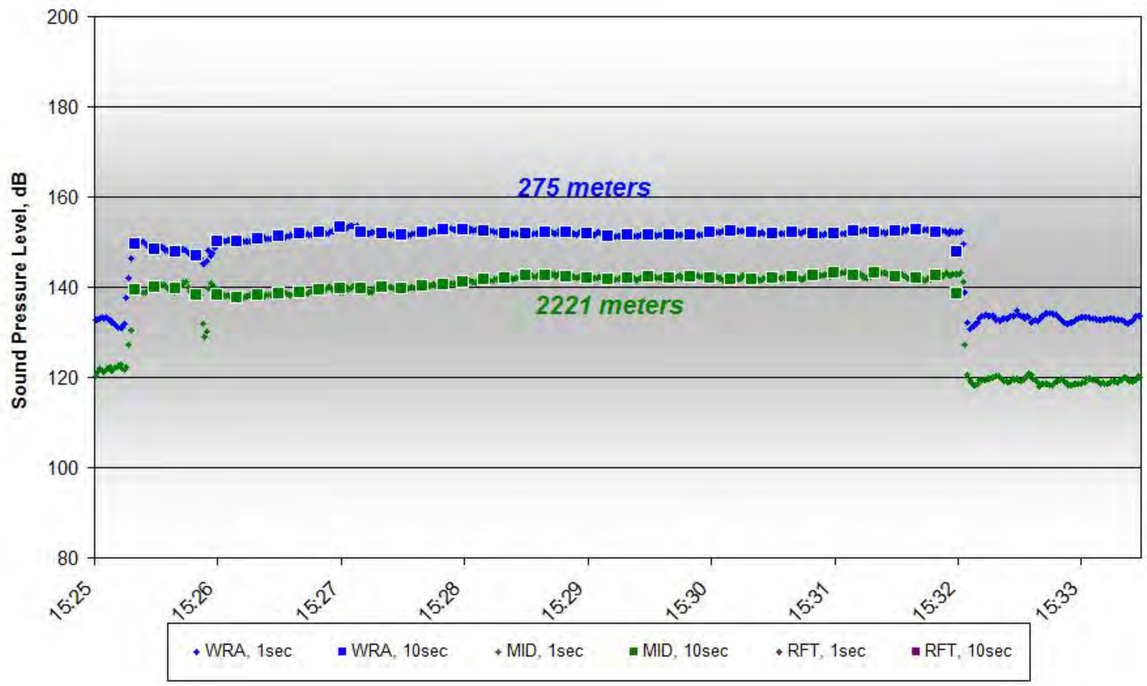

Figure B423. One-second and 10-second Average Data for EHW14, 15:25-15:32, Measured at Depths of 17-30 meters on October 17, 2011

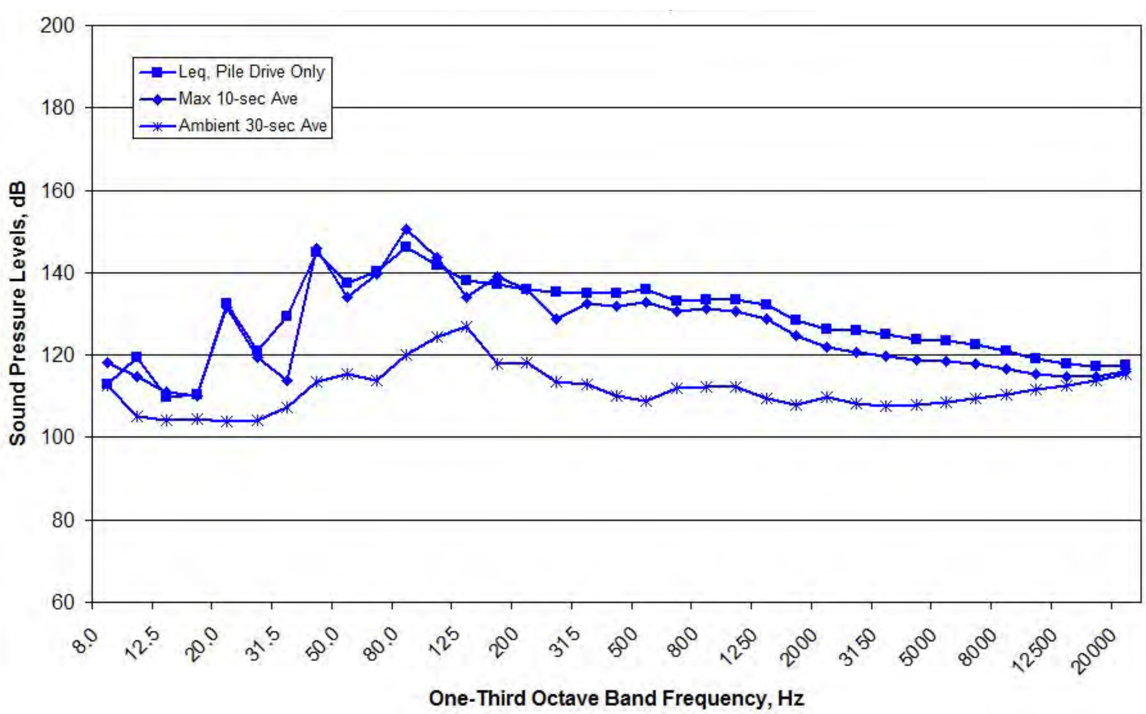

Figure B424. Spectral Data Measured at the WRA Location during EHW14, 15:25-15:32, Measured at Depths of 30 meters on October 17, 2011

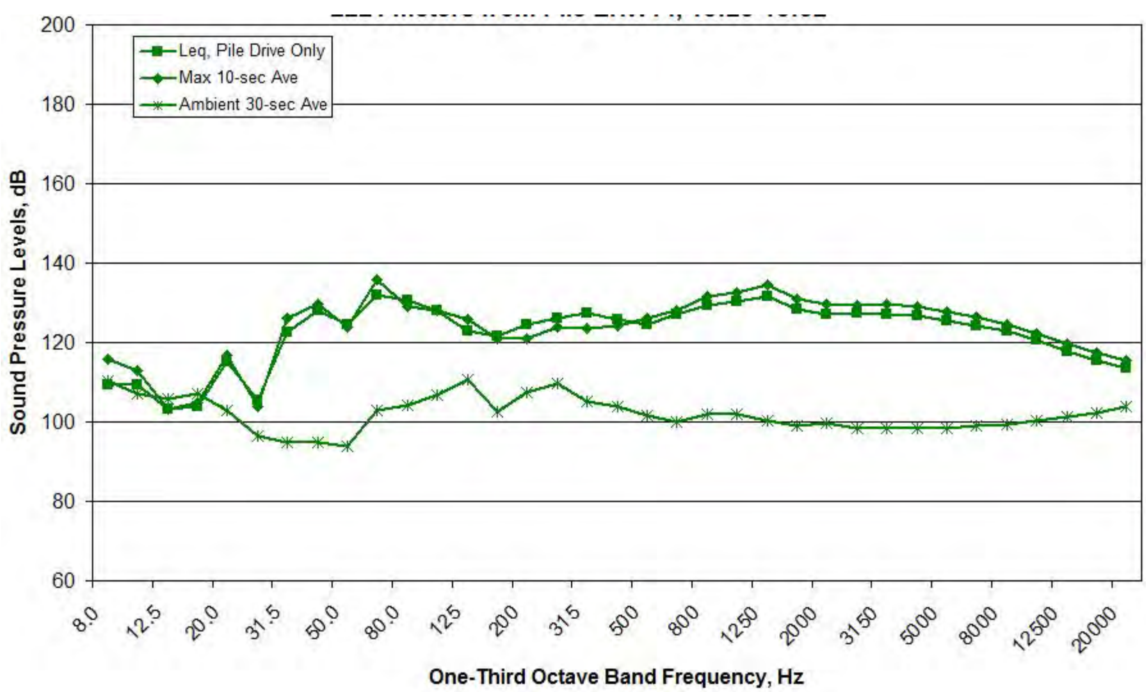

Figure B425. Spectral Data Measured at the MID Location during EHW14, 15:25-15:32, Measured at Depths of 30 meters on October 17, 2011

NO DATA AVAILABLE – BAD RECORDINGS

Figure B426. Spectral Data Measured at the RFT Location during EHW14, 15:25-15:32, Measured at Depths of 17 meters on October 17, 2011

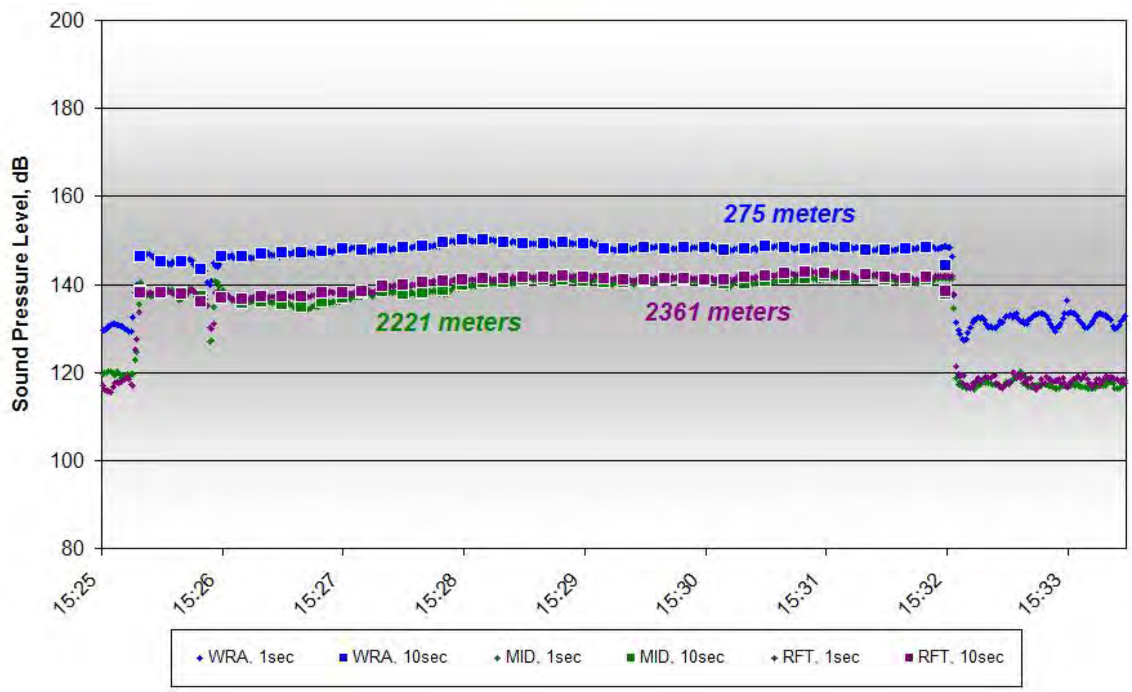

Figure B427. One-second and 10-second Average Data for EHW14, 15:25-15:32, Measured at Depths of 10 meters on October 17, 2011

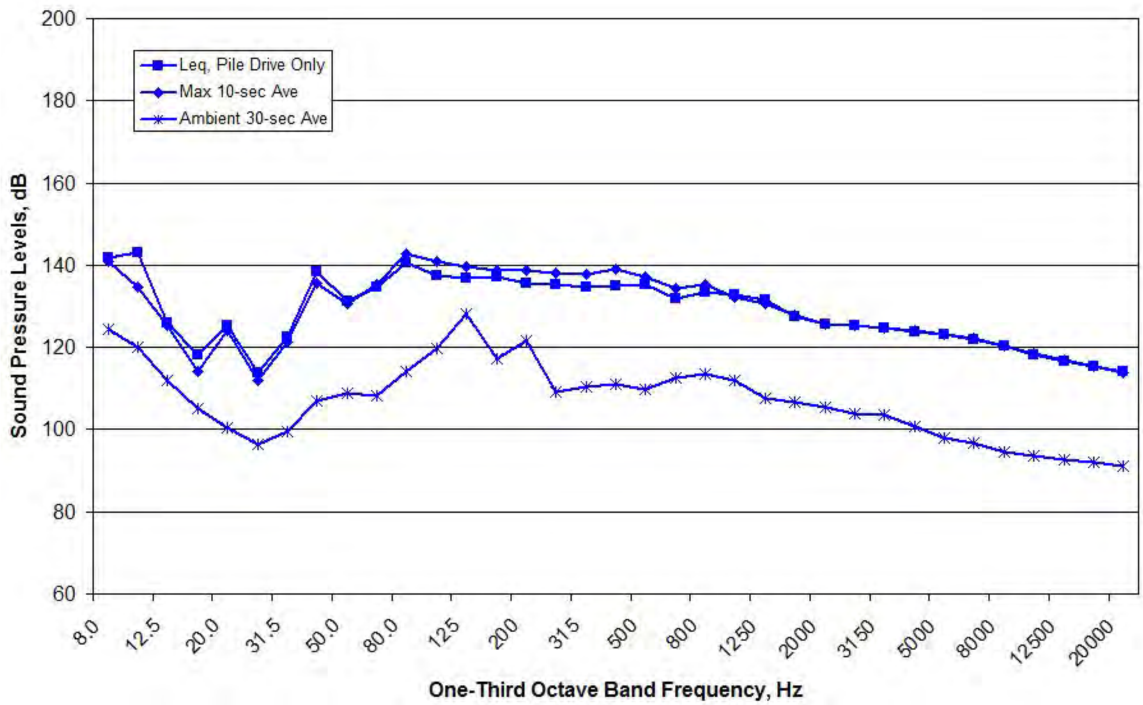

Figure B428. Spectral Data Measured at the WRA Location during EHW14, 15:25-15:32, Measured at Depths of 10 meters on October 17, 2011

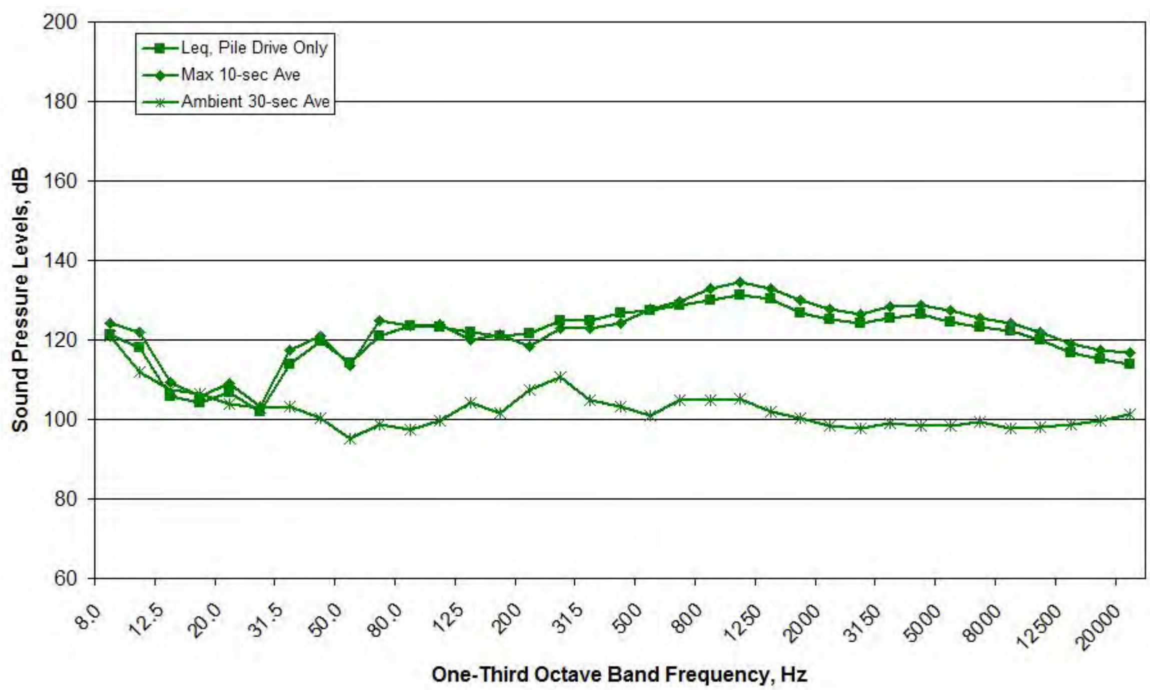

Figure B429. Spectral Data Measured at the MID Location during EHW14, 15:25-15:32, Measured at Depths of 10 meters on October 17, 2011

NO SPECTRA DATA AVAILABLE

Figure B430. Spectral Data Measured at the RFT Location during EHW14, 15:25-15:32, Measured at Depths of 10 meters on October 17, 2011

EHW15, 15:58-16:05 (Vibratory Installation)

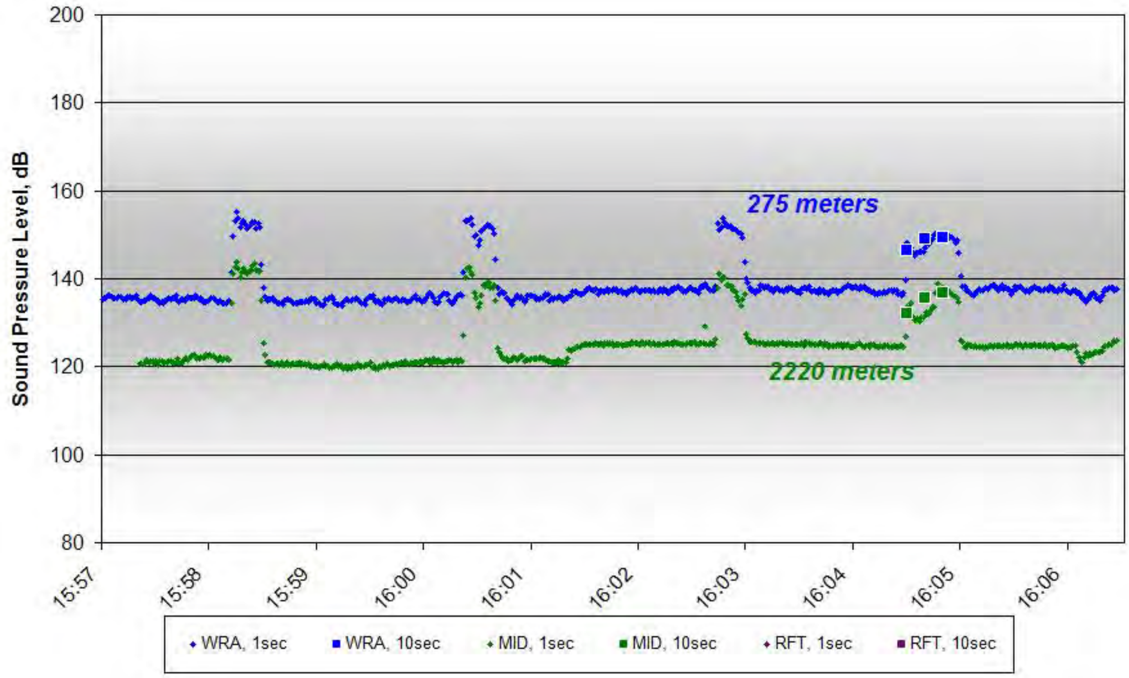

Figure B431. One-second and 10-second Average Data for EHW15, 15:58-16:05, Measured at Depths of 17-30 meters on October 17, 2011

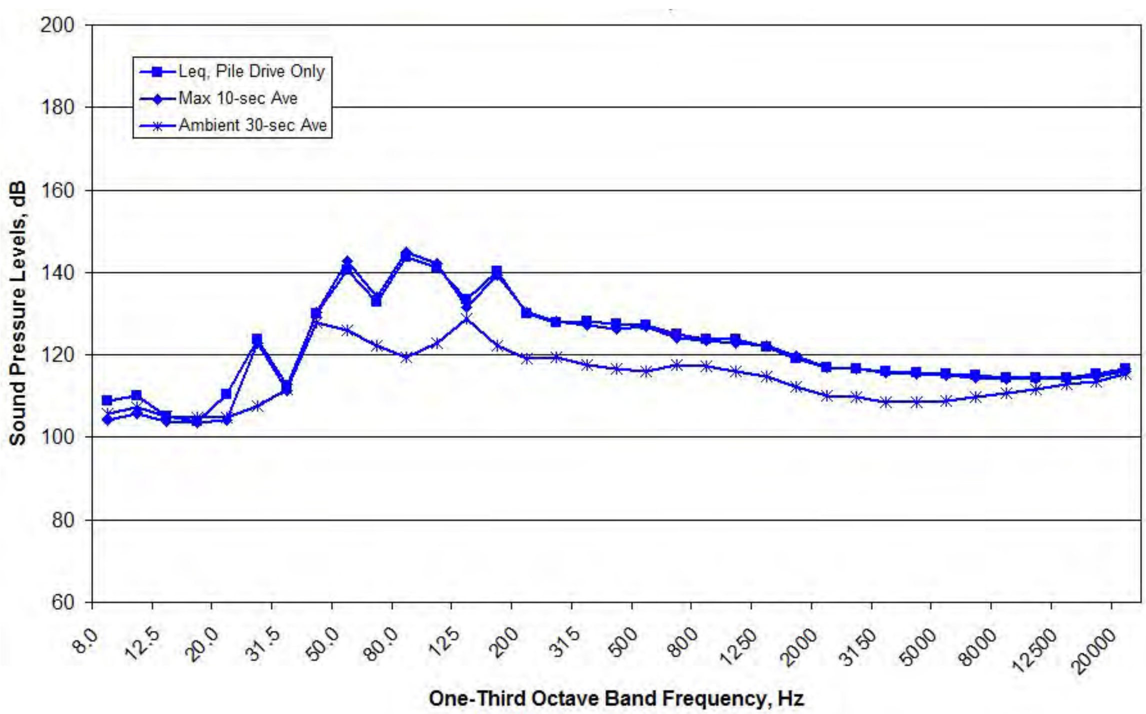

Figure B432. Spectral Data Measured at the WRA Location during EHW15, 15:58-16:05, Measured at Depths of 30 meters on October 17, 2011

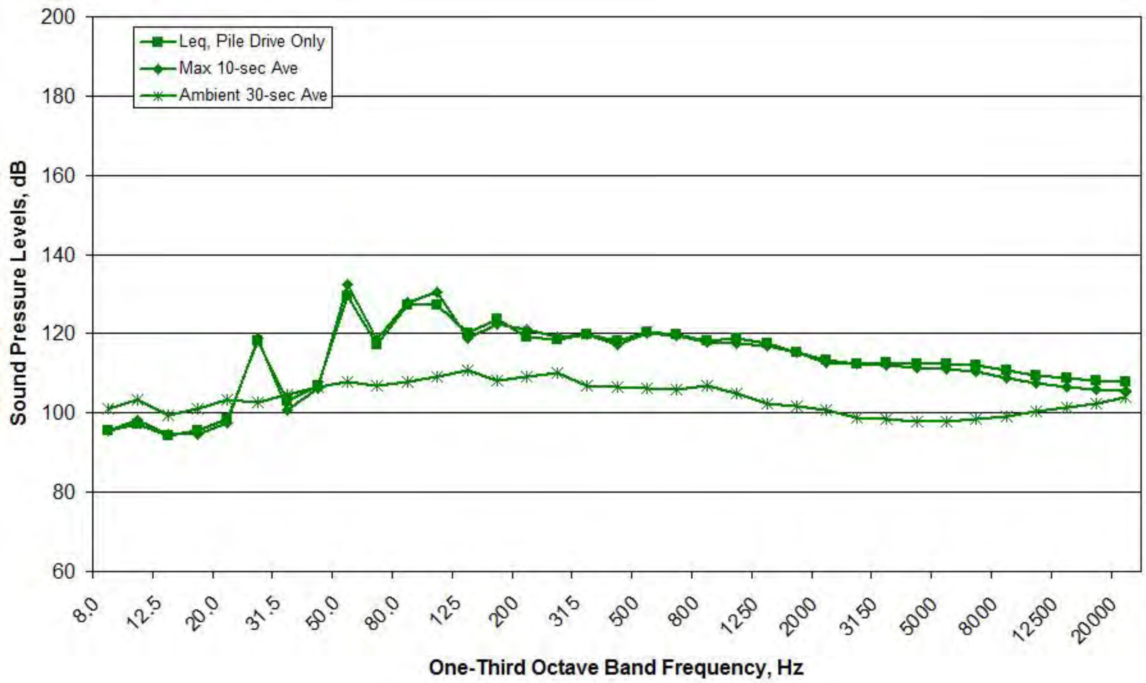

Figure B433. Spectral Data Measured at the MID Location during EHW15, 15:58-16:05, Measured at Depths of 30 meters on October 17, 2011

NO DATA AVAILABLE – BAD RECORDINGS

Figure B434. Spectral Data Measured at the RFT Location during EHW15, 15:58-16:05, Measured at Depths of 17 meters on October 17, 2011

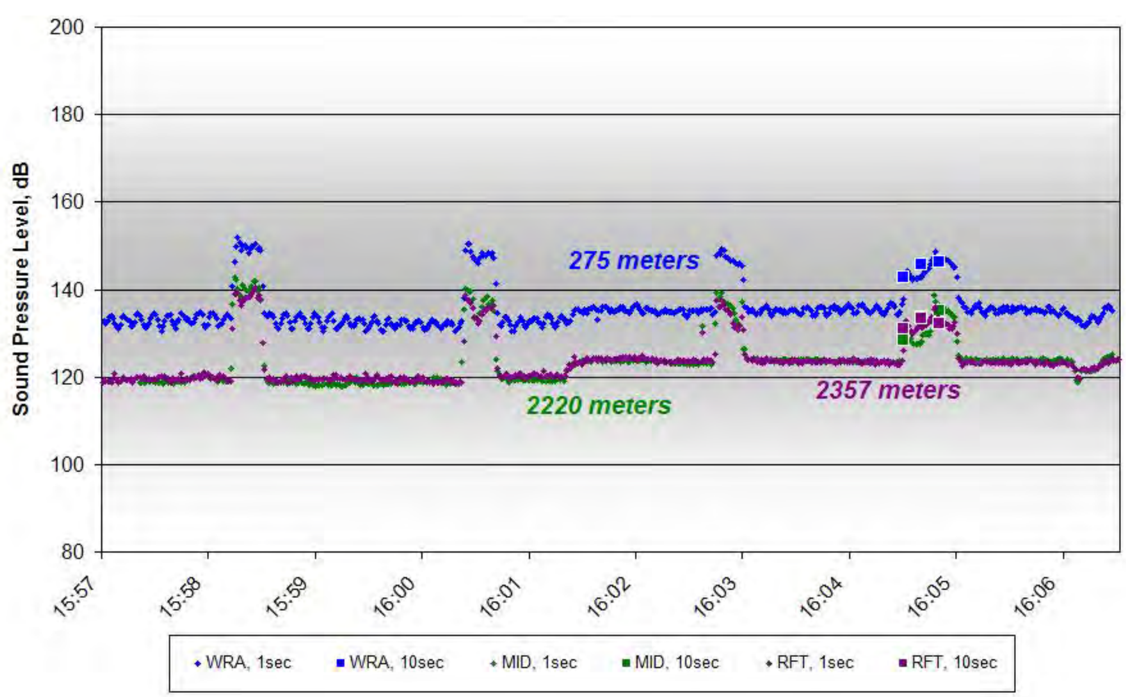

Figure B435. One-second and 10-second Average Data for EHW15, 15:58-16:05, Measured at Depths of 10 meters on October 17, 2011

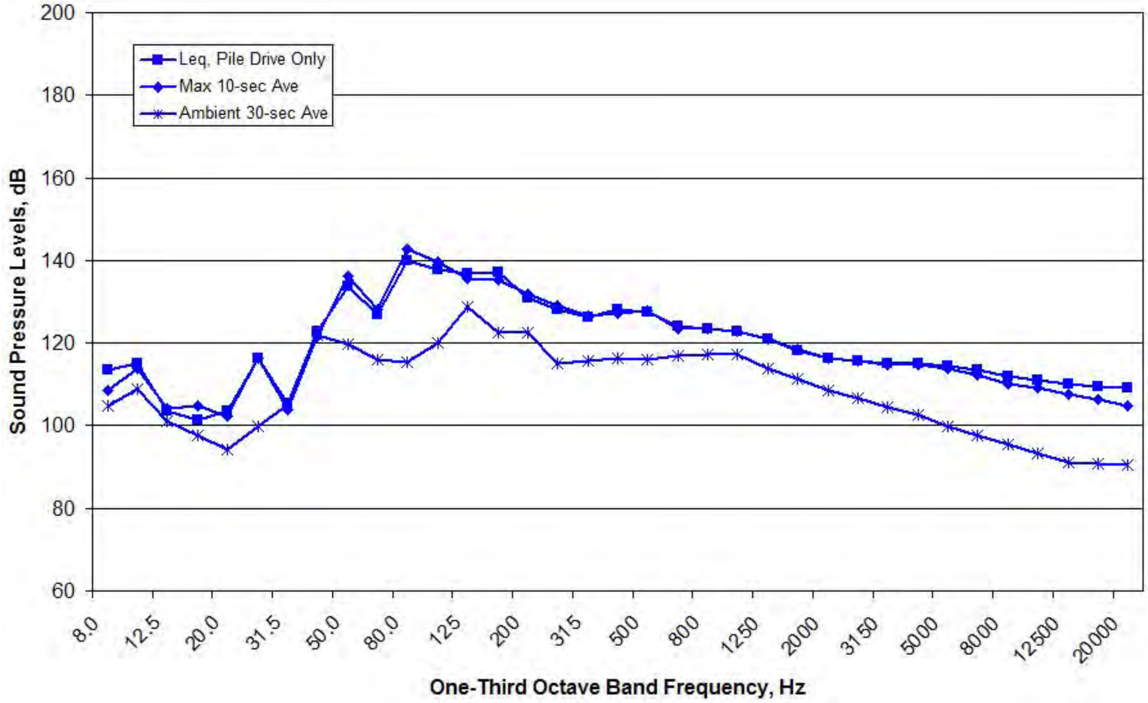

Figure B436. Spectral Data Measured at the WRA Location during EHW15, 15:58-16:05, Measured at Depths of 10 meters on October 17, 2011

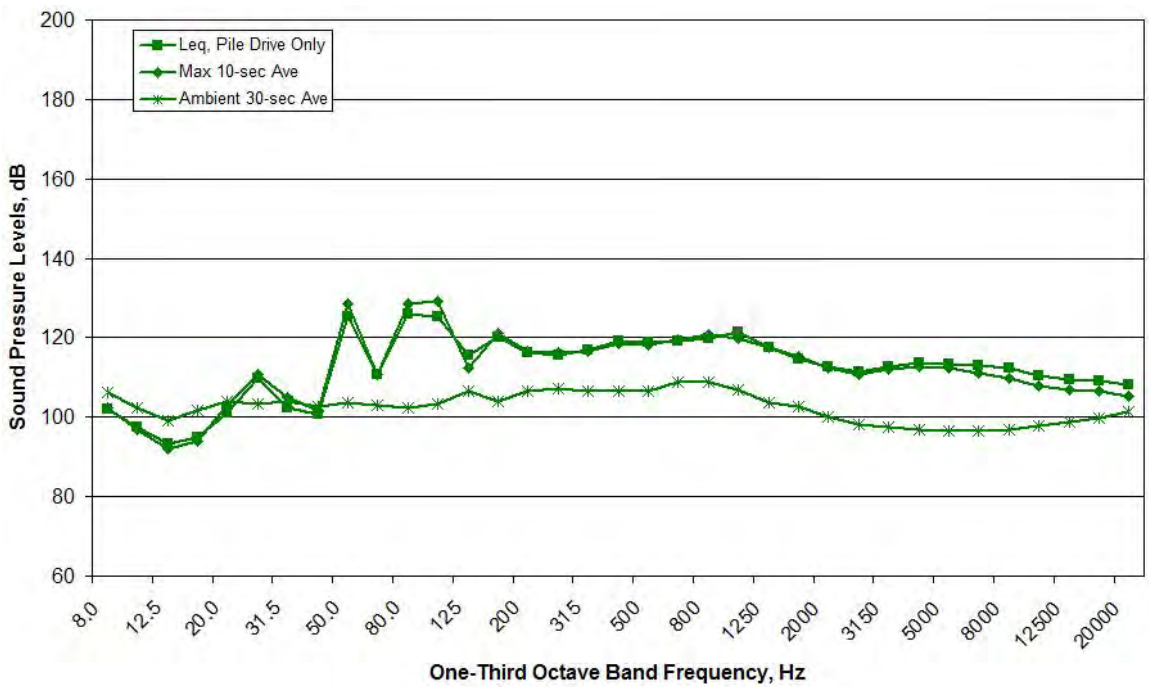

Figure B437. Spectral Data Measured at the MID Location during EHW15, 15:58-16:05, Measured at Depths of 10 meters on October 17, 2011

NO SPECTRA DATA AVAILABLE

Figure B438. Spectral Data Measured at the RFT Location during EHW15, 15:58-16:05, Measured at Depths of 10 meters on October 17, 2011

EHW15, 16:27-16:39 (Vibratory Installation)

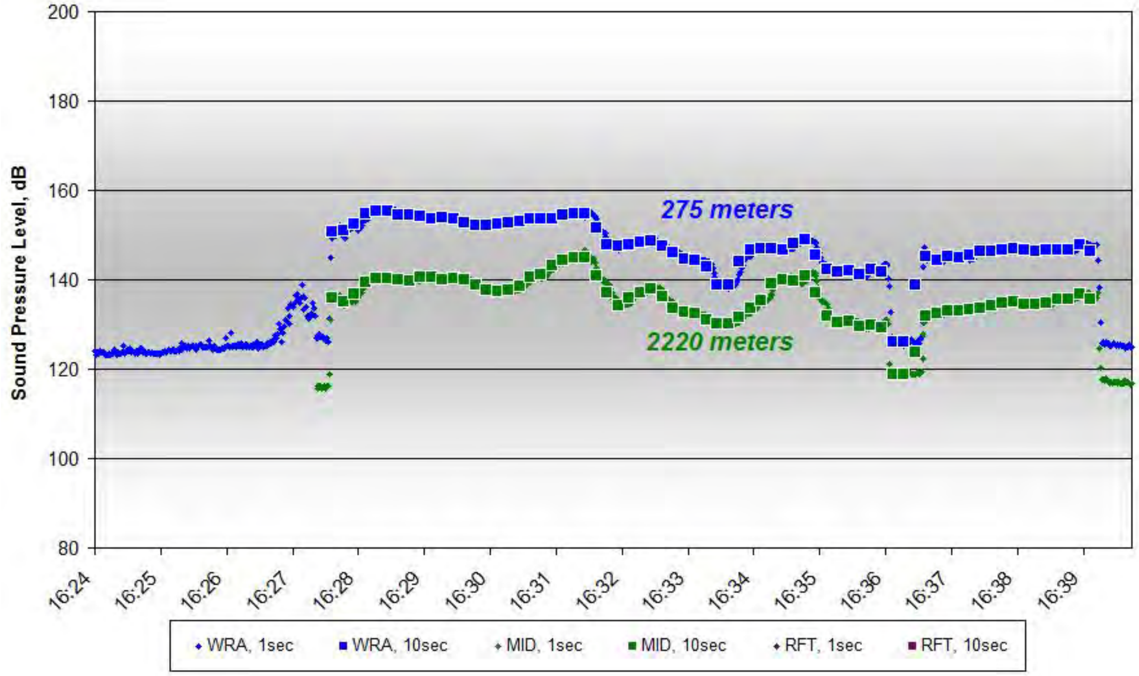

Figure B439. One-second and 10-second Average Data for EHW15, 16:27-16:39, Measured at Depths of 17-30 meters on October 17, 2011

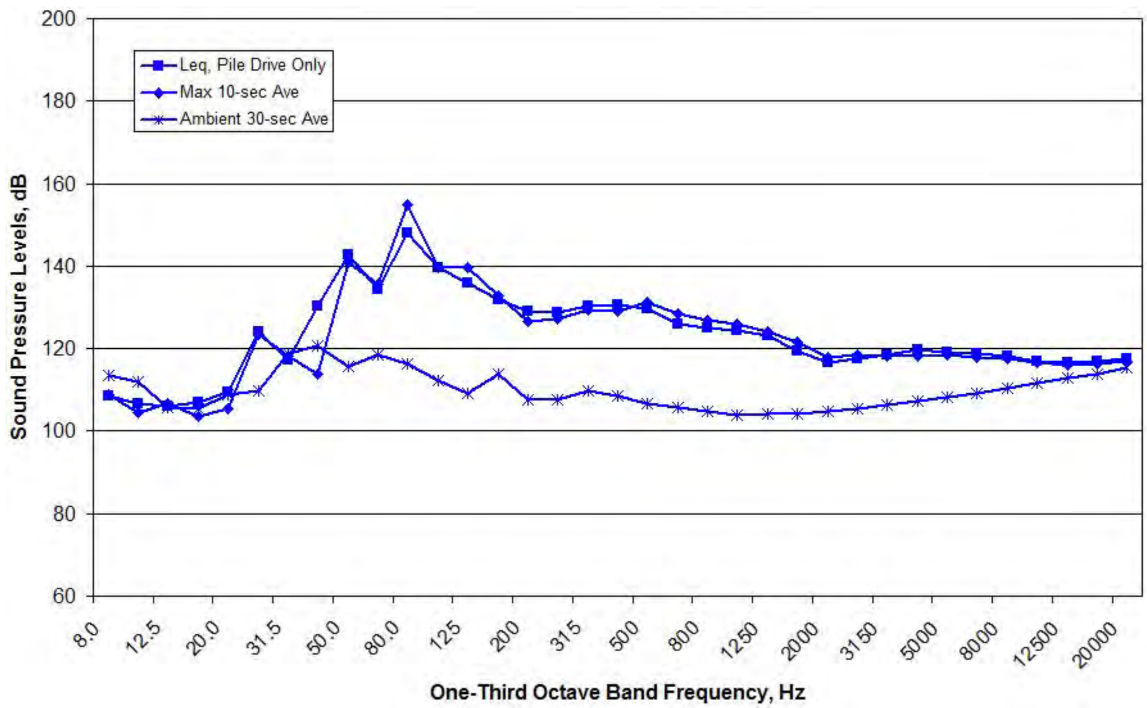

Figure B44. Spectral Data Measured at the WRA Location during EHW15, 16:27-16:39, Measured at Depths of 30 meters on October 17, 2011

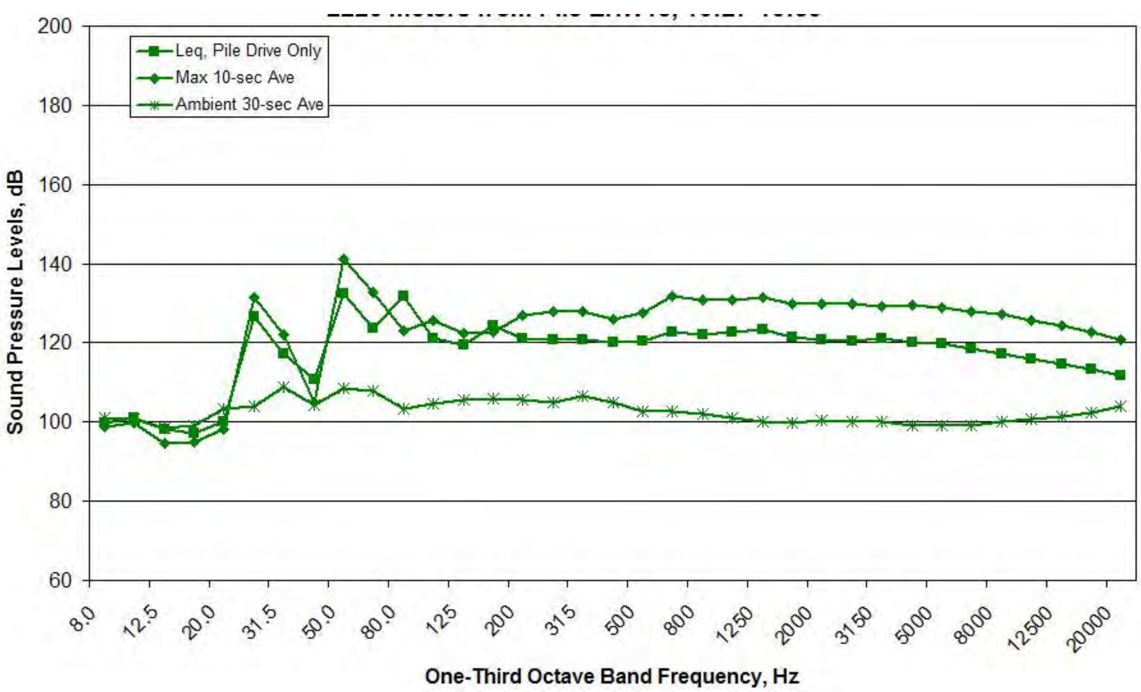

Figure B441. Spectral Data Measured at the MID Location during EHW15, 16:27-16:39, Measured at Depths of 30 meters on October 17, 2011

NO DATA AVAILABLE – BAD RECORDINGS

Figure B442. Spectral Data Measured at the RFT Location during EHW15, 16:27-16:39, Measured at Depths of 17 meters on October 17, 2011

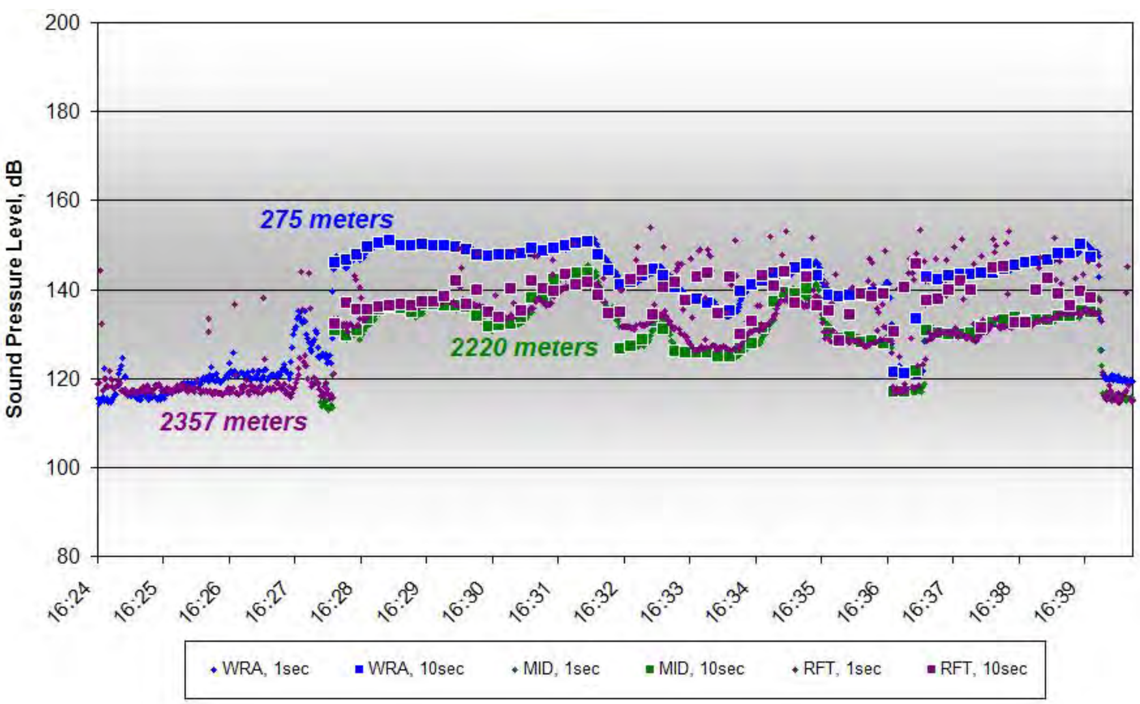

Figure B443. One-second and 10-second Average Data for EHW15, 16:27-16:39, Measured at Depths of 10 meters on October 17, 2011

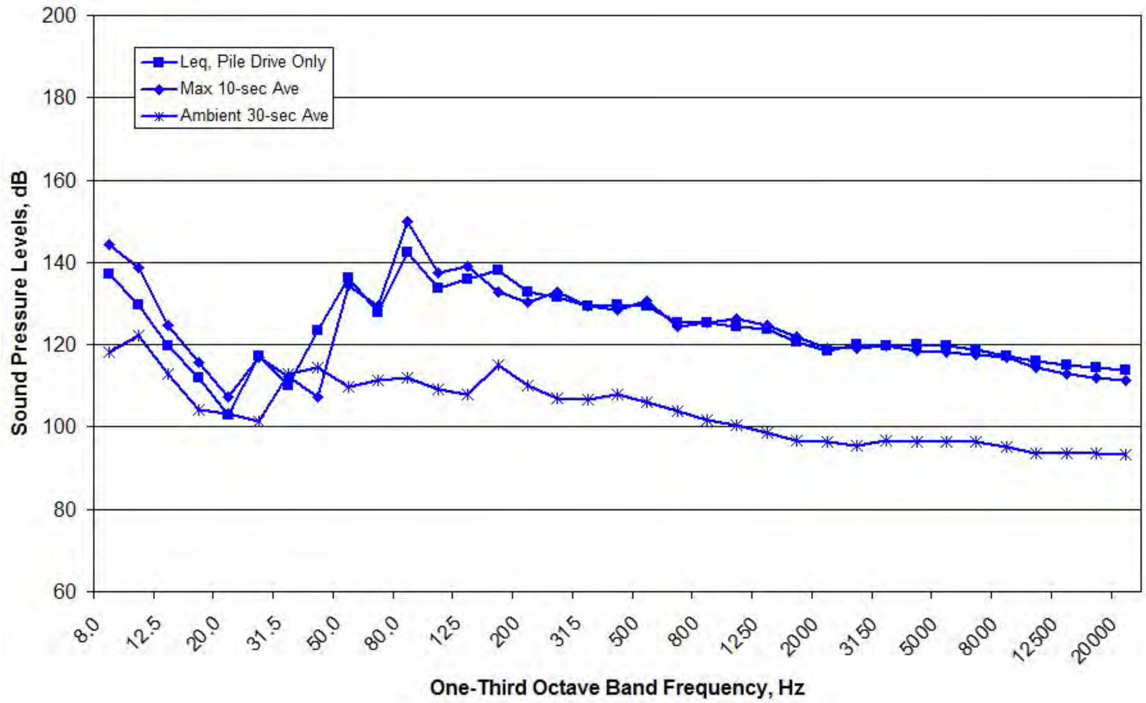

Figure B444. Spectral Data Measured at the WRA Location during EHW15, 16:27-16:39, Measured at Depths of 10 meters on October 17, 2011

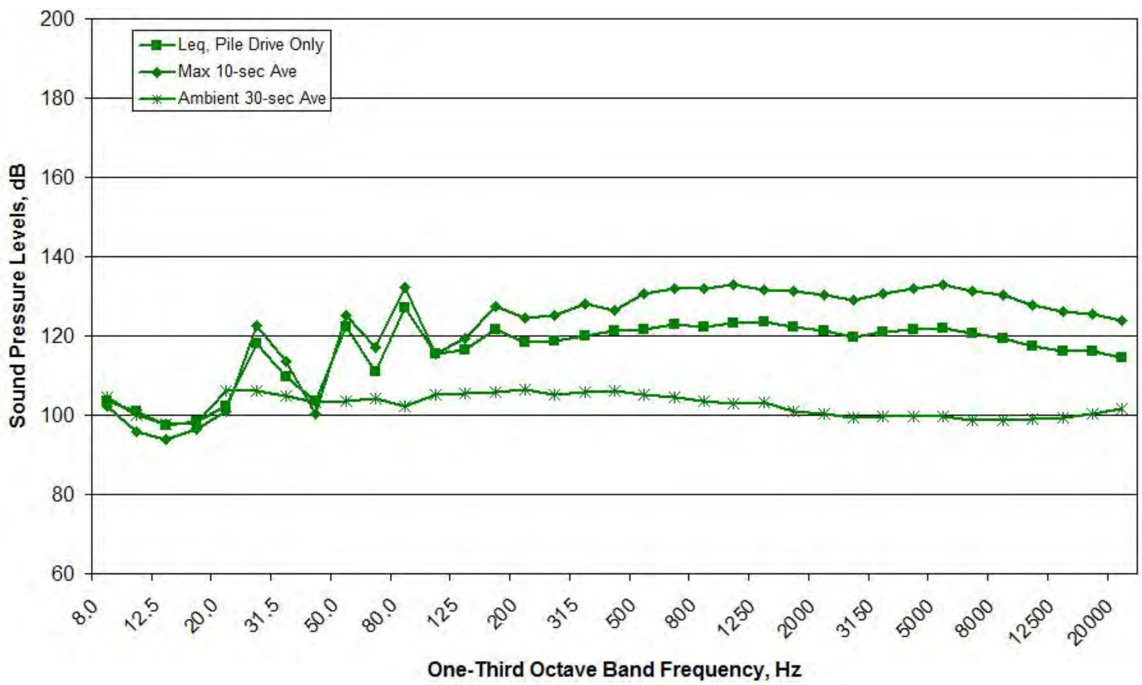

Figure B445. Spectral Data Measured at the MID Location during EHW15, 16:27-16:39, Measured at Depths of 10 meters on October 17, 2011

NO SPECTRA DATA AVAILABLE

Figure B446. Spectral Data Measured at the RFT Location during EHW15, 16:27-16:39, Measured at Depths of 10 meters on October 17, 2011

10/19/2011 – EHW11, 11:59-12:04 (Vibratory Installation)

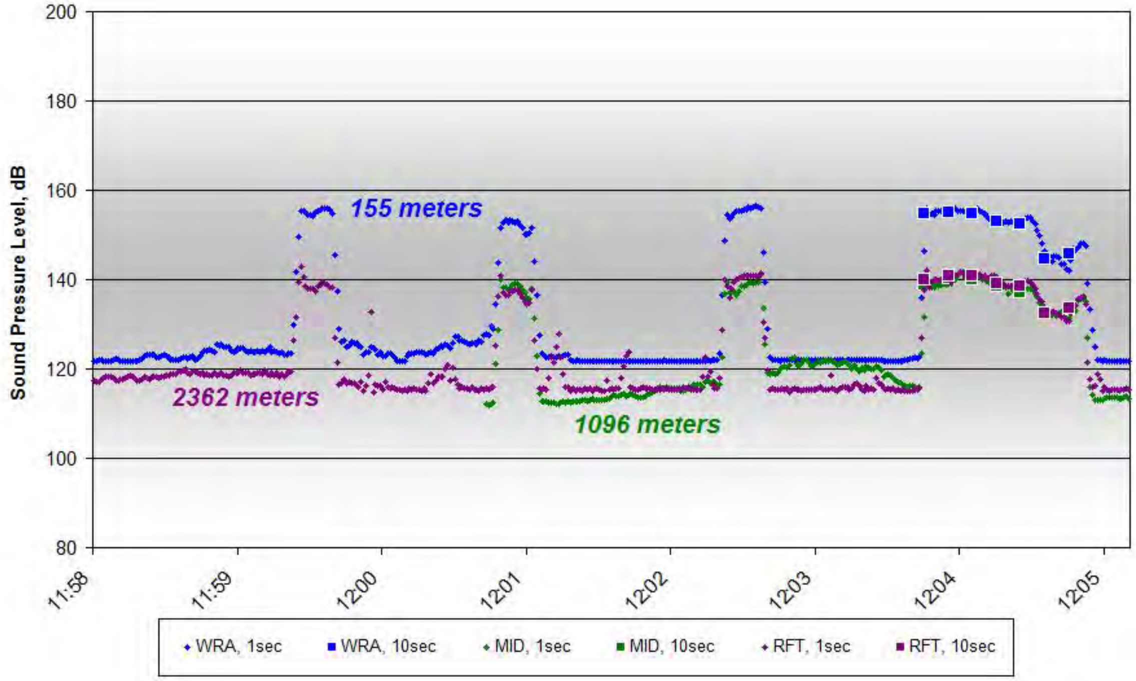

Figure B447. One-second and 10-second Average Data for EHW11, 11:59-12:04, Measured at Depths of 17-30 meters on October 19, 2011

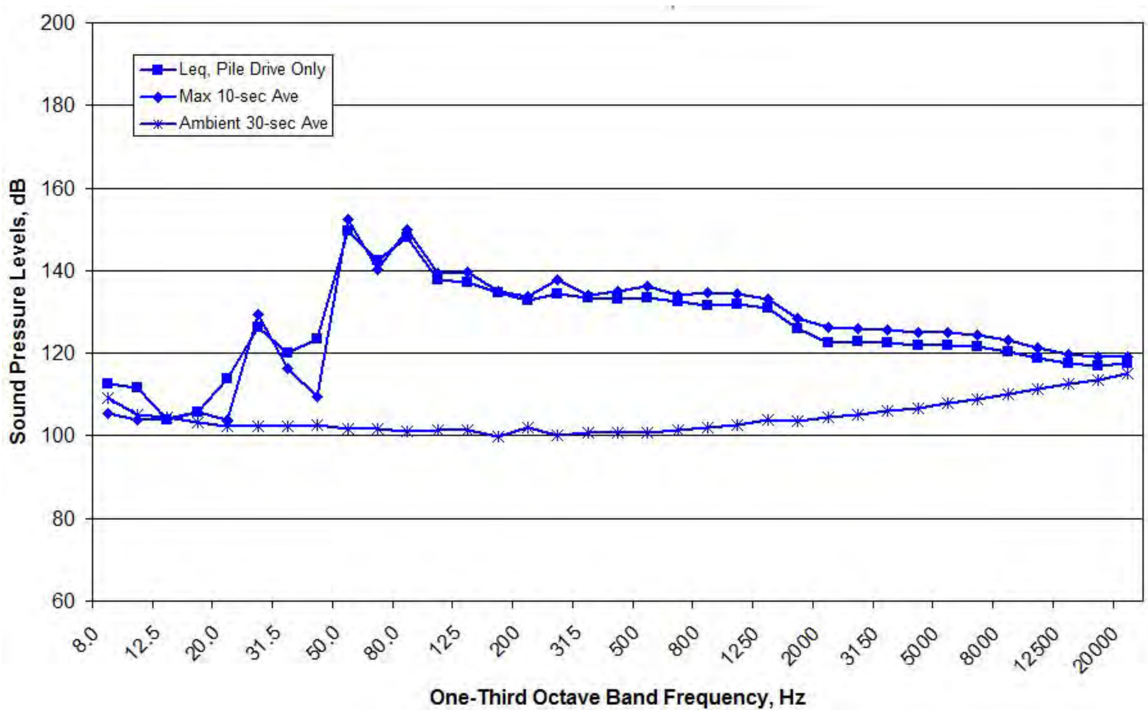

Figure B448. Spectral Data Measured at the WRA Location during EHW11, 11:59-12:04, Measured at Depths of 30 meters on October 19, 2011

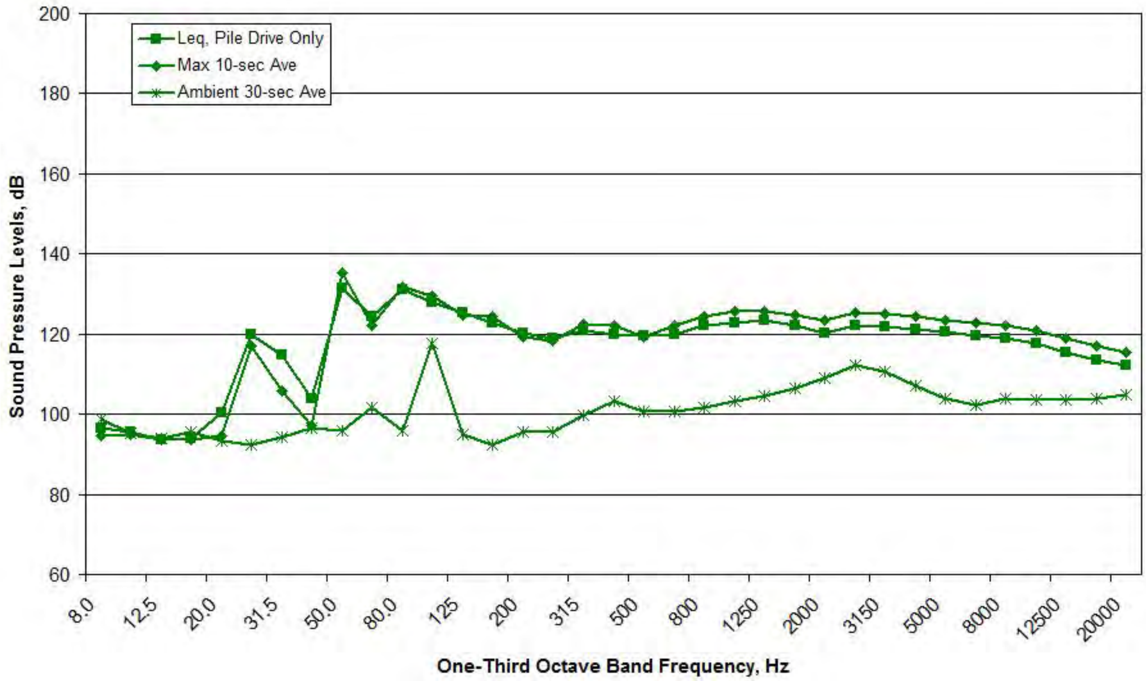

Figure B449. Spectral Data Measured at the MID Location during EHW11, 11:59-12:04, Measured at Depths of 30 meters on October 19, 2011

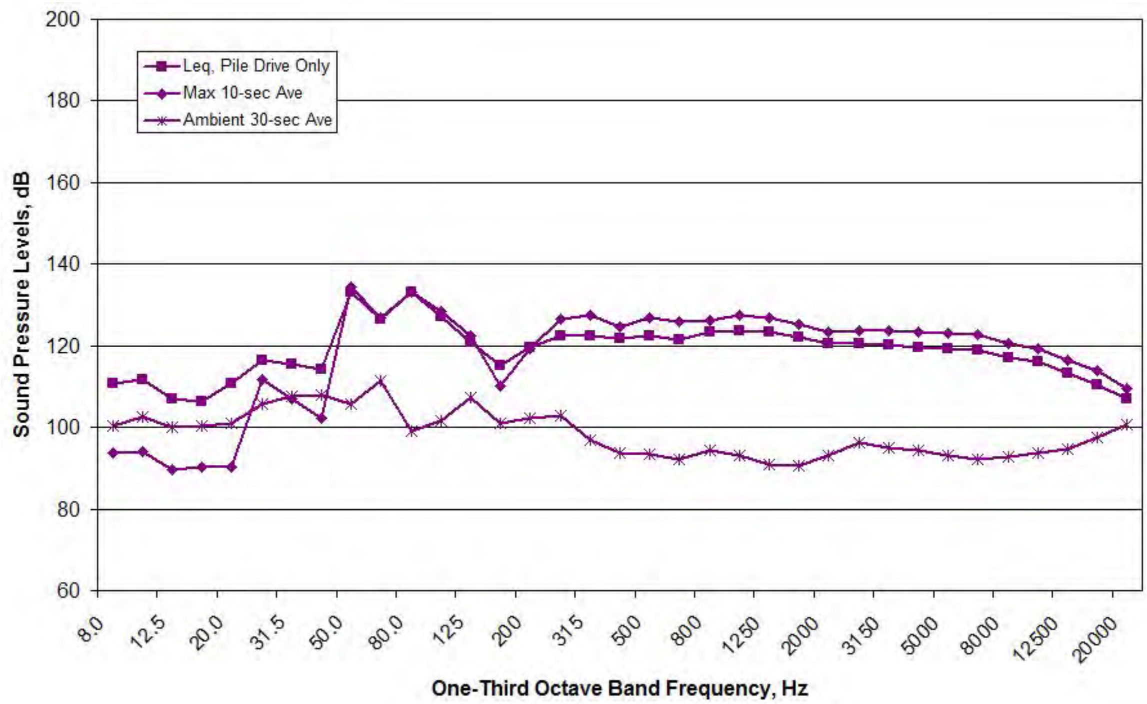

Figure B450. Spectral Data Measured at the RFT Location during EHW11, 11:59-12:04, Measured at Depths of 17 meters on October 19, 2011

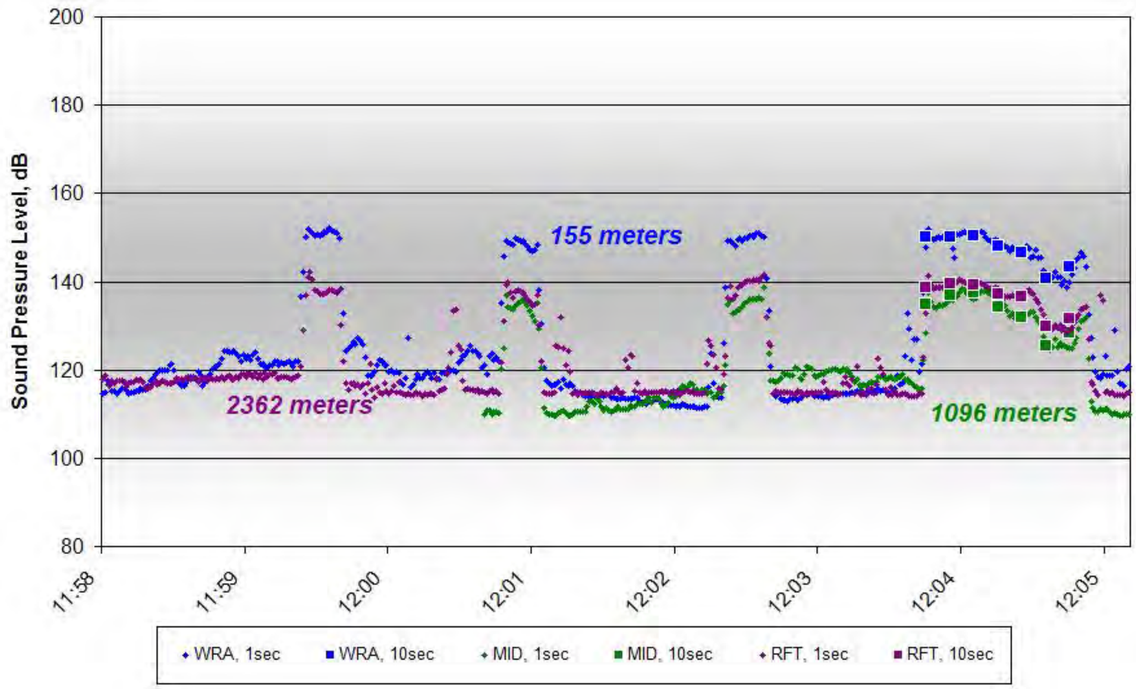

Figure B451. One-second and 10-second Average Data for EHW11, 11:59-12:04, Measured at Depths of 10 meters on October 19, 2011

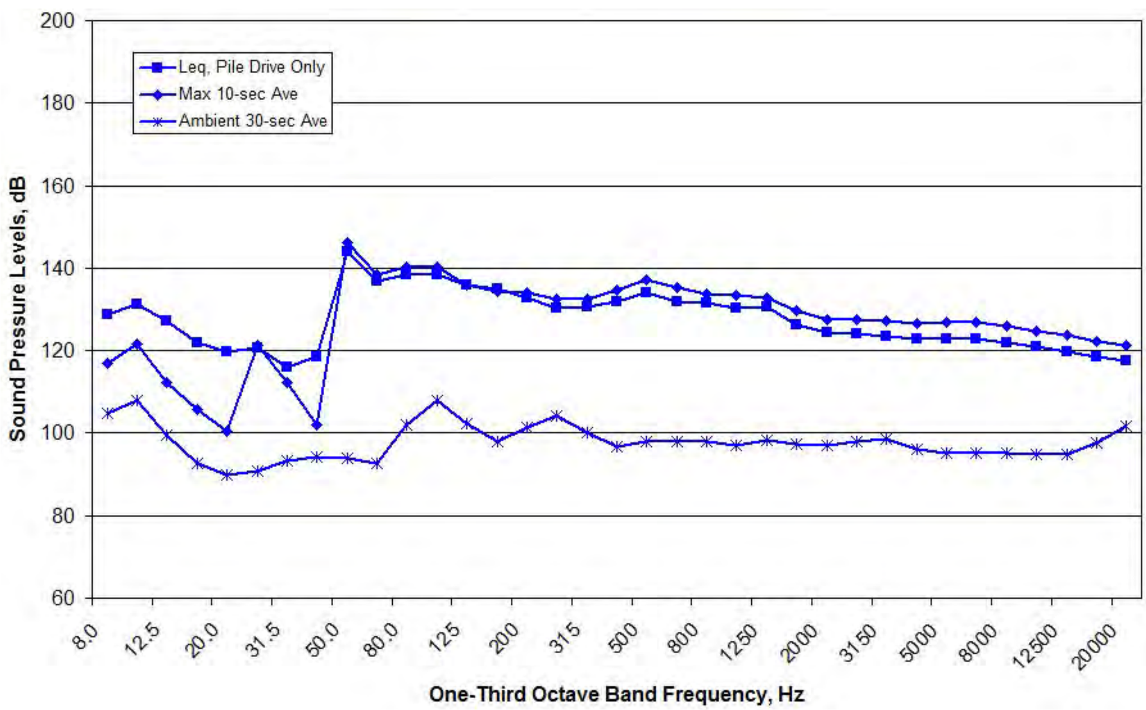

Figure B452. Spectral Data Measured at the WRA Location during EHW11, 11:59-12:04, Measured at Depths of 10 meters on October 19, 2011

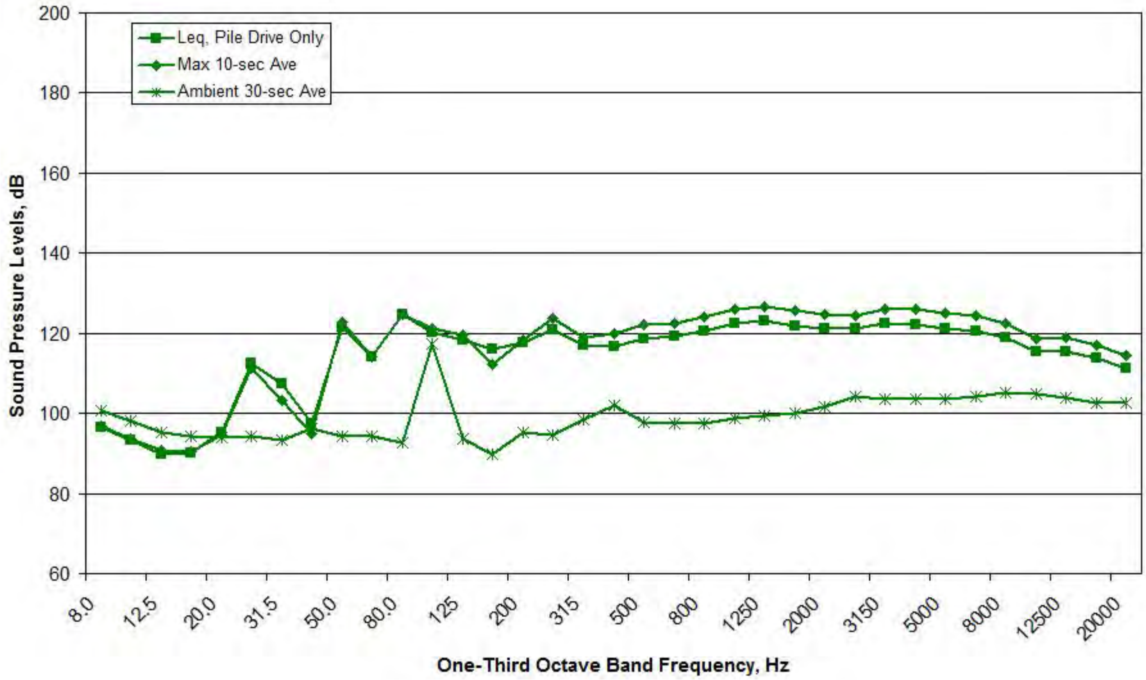

Figure B453. Spectral Data Measured at the MID Location during EHW11, 11:59-12:04, Measured at Depths of 10 meters on October 19, 2011

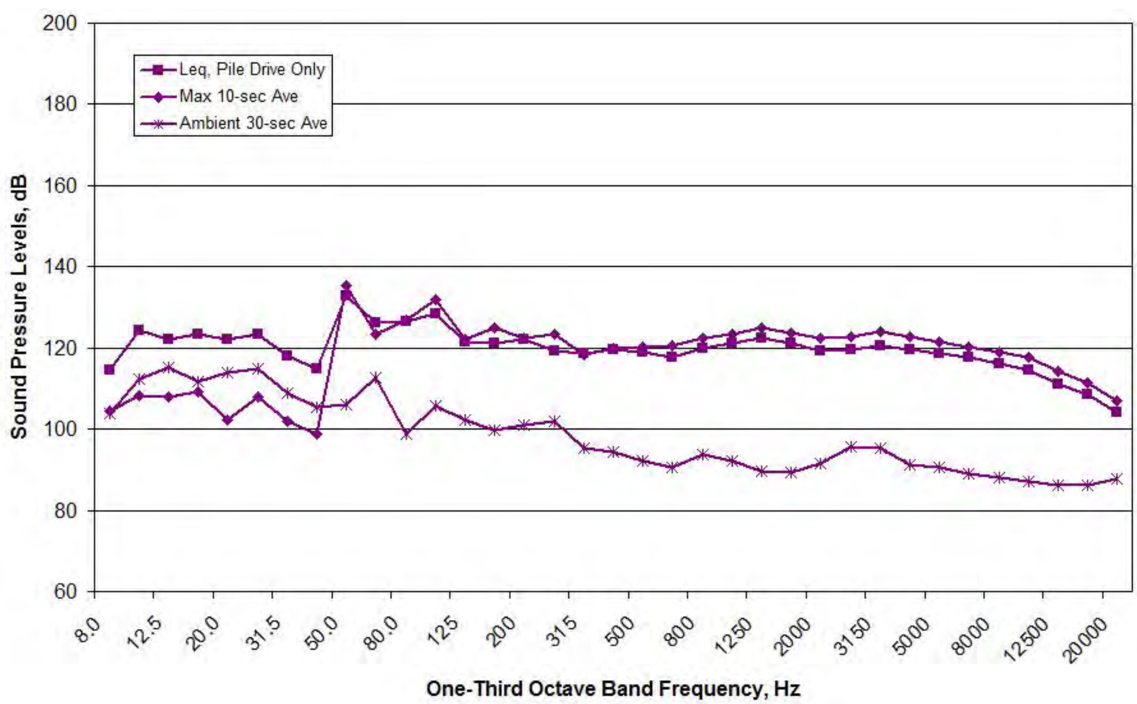

Figure B454. Spectral Data Measured at the RFT Location during EHW11, 11:59-12:04, Measured at Depths of 10 meters on October 19, 2011

EHW11, 12:22-12:28 (Vibratory Installation)

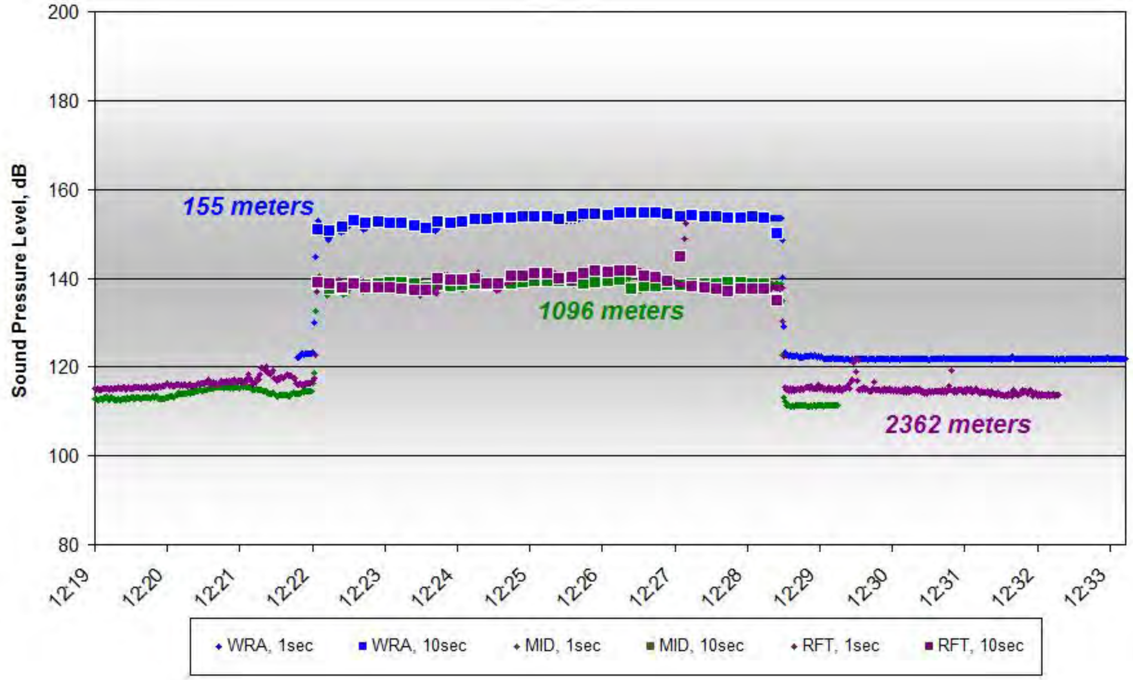

Figure B455. One-second and 10-second Average Data for EHW11, 12:22-12:28, Measured at Depths of 17-30 meters on October 19, 2011

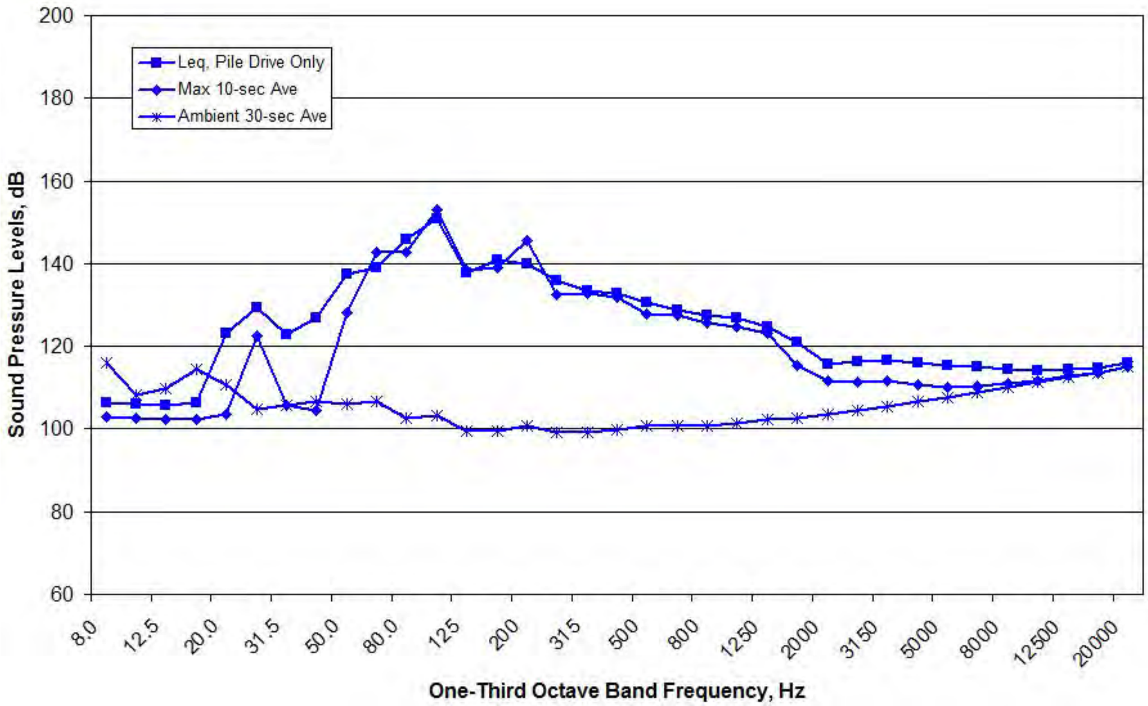

Figure B456. Spectral Data Measured at the WRA Location during EHW11, 12:22-12:28, Measured at Depths of 30 meters on October 19, 2011

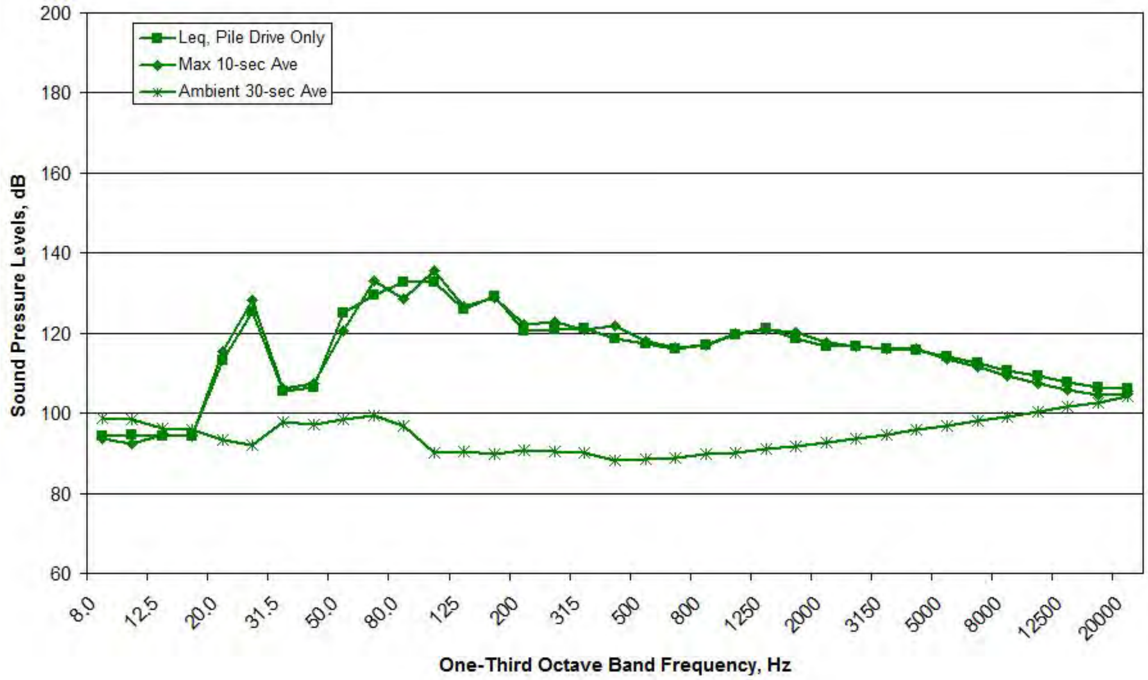

Figure B457. Spectral Data Measured at the MID Location during EHW11, 12:22-12:28, Measured at Depths of 30 meters on October 19, 2011

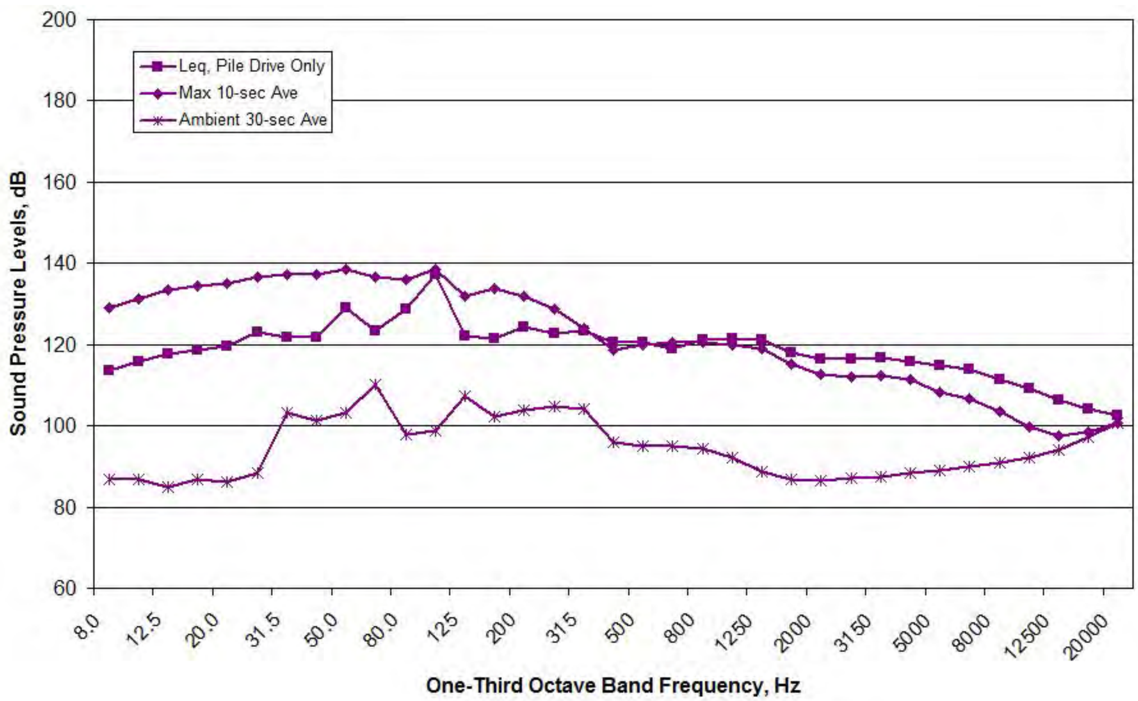

Figure B458. Spectral Data Measured at the RFT Location during EHW11, 12:22-12:28, Measured at Depths of 17 meters on October 19, 2011

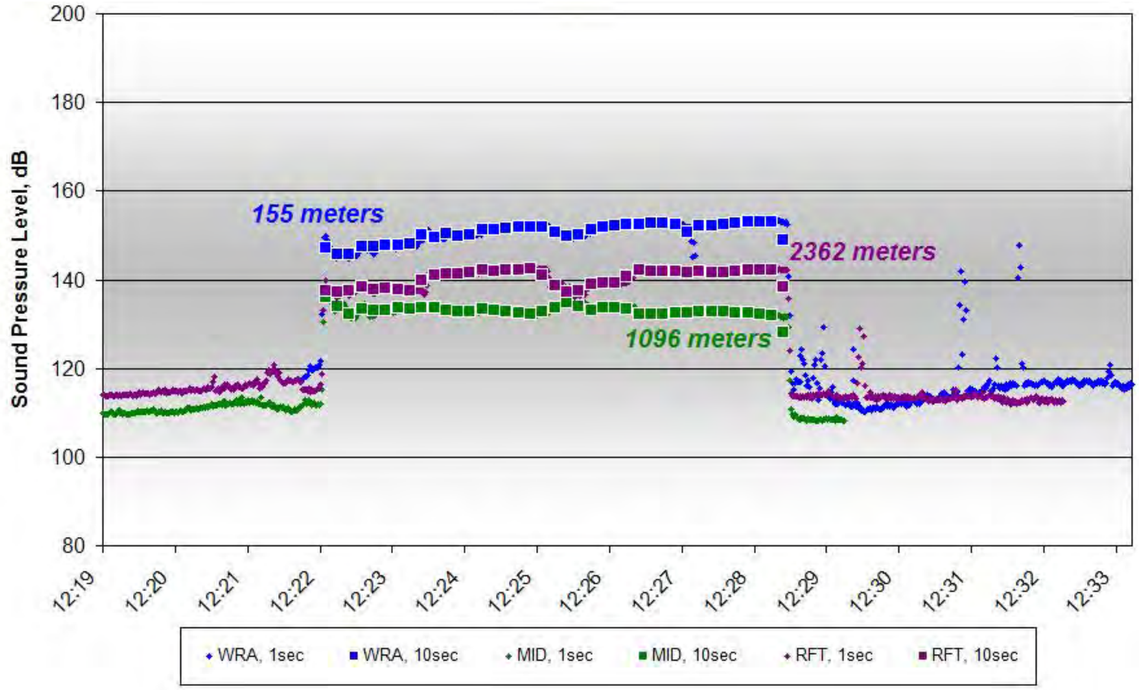

Figure B459. One-second and 10-second Average Data for EHW11, 12:22-12:28, Measured at Depths of 10 meters on October 19, 2011

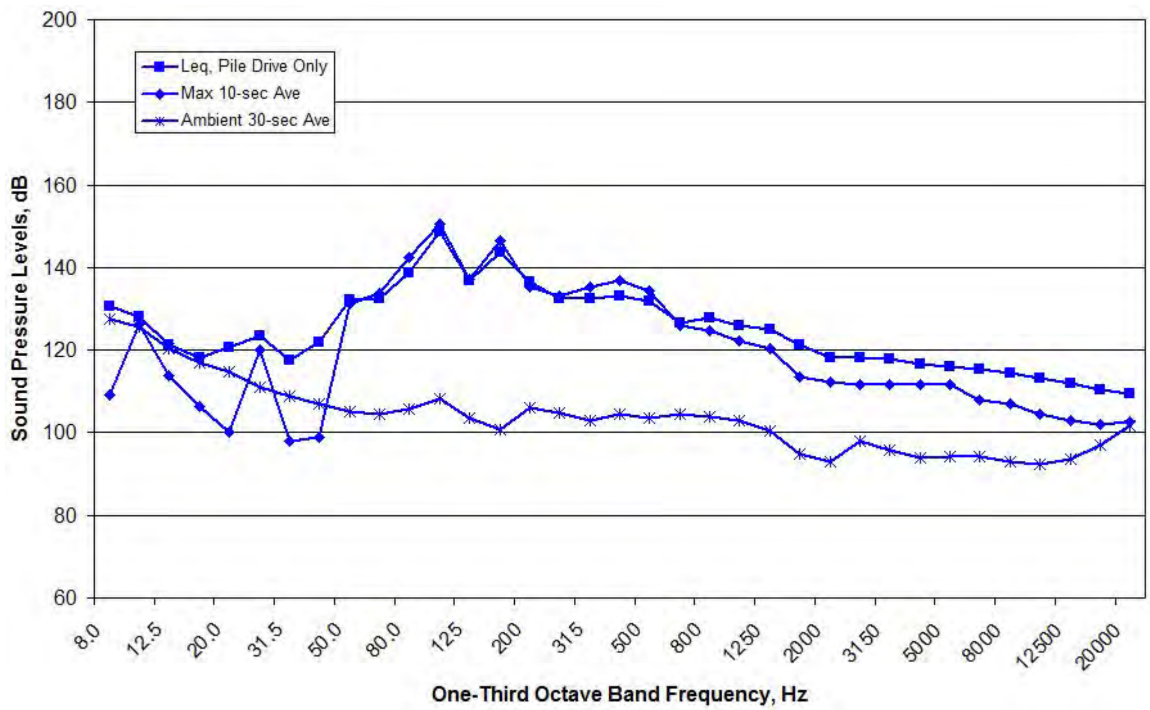

Figure B460. Spectral Data Measured at the WRA Location during EHW11, 12:22-12:28, Measured at Depths of 10 meters on October 19, 2011

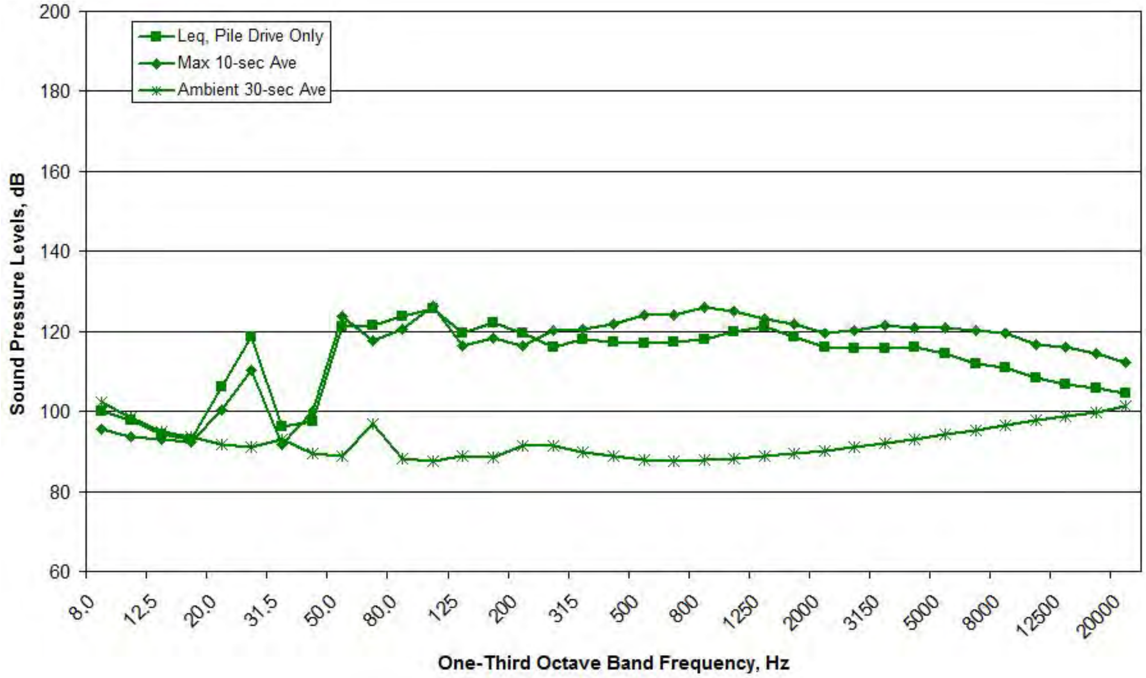

Figure B461. Spectral Data Measured at the MID Location during EHW11, 12:22-12:28, Measured at Depths of 10 meters on October 19, 2011

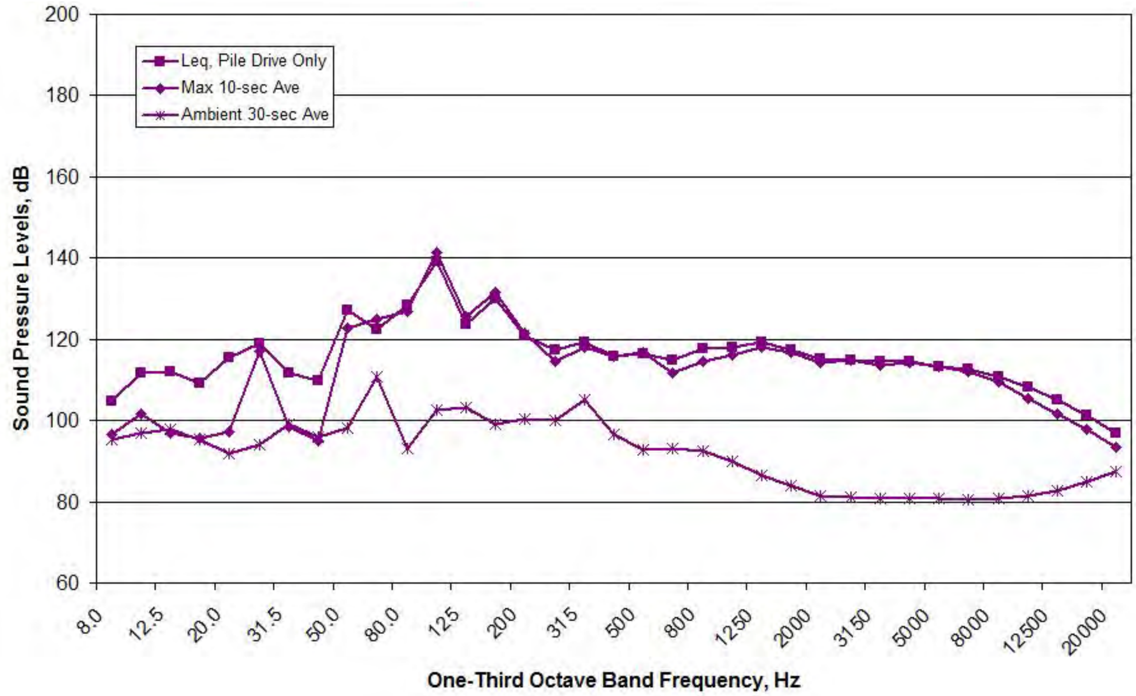

Figure B462. Spectral Data Measured at the RFT Location during EHW11, 12:22-12:28, Measured at Depths of 10 meters on October 19, 2011

10/21/2011 – W8 (Vibratory Installation)

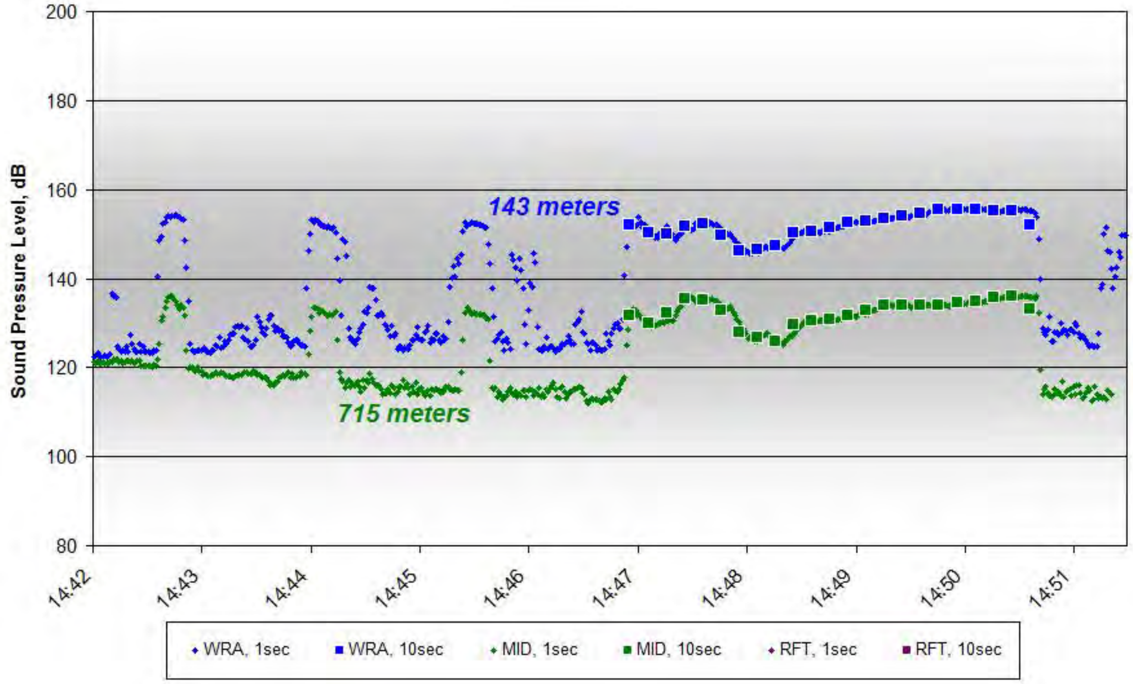

Figure B463. One-second and 10-second Average Data for W8, 14:43-14:51, Measured at Depths of 17-30 meters on October 21, 2011

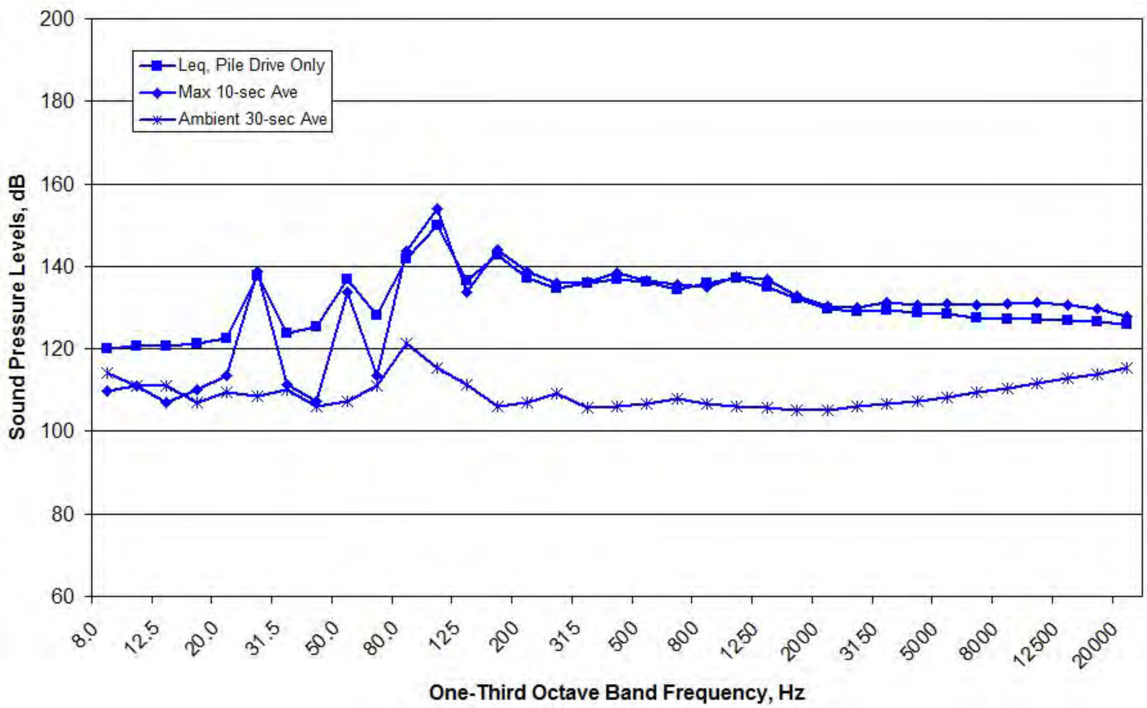

Figure B464. Spectral Data Measured at the WRA Location during W8, 14:43-14:51, Measured at Depths of 30 meters on October 21, 2011

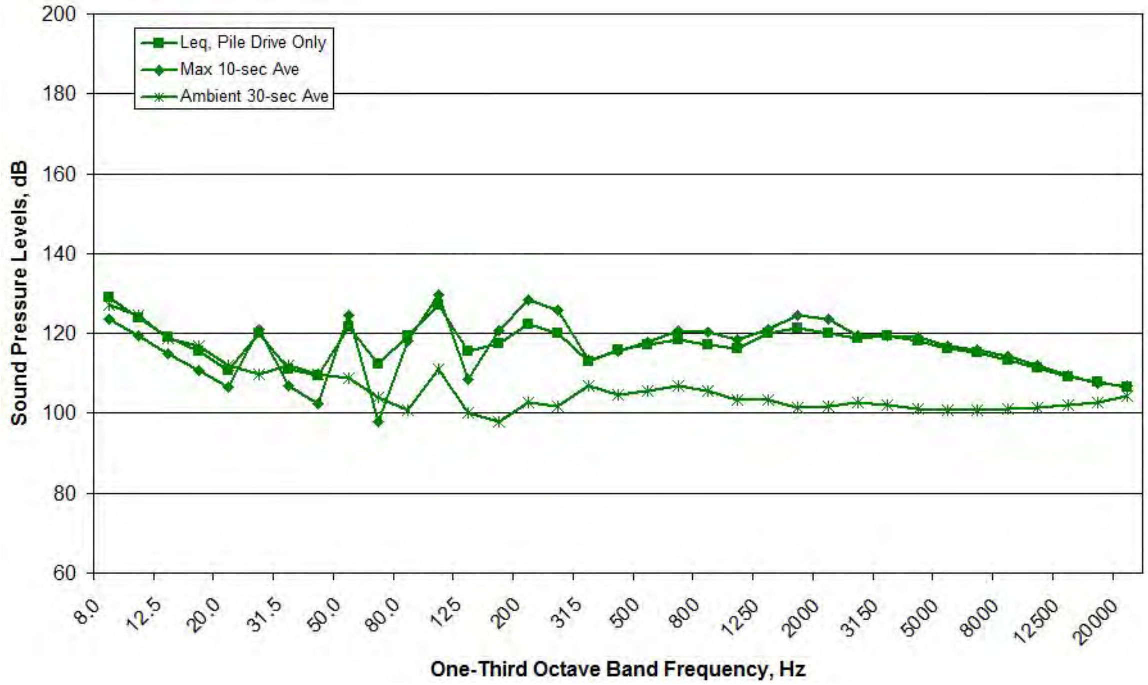

Figure B465. Spectral Data Measured at the MID Location during W8, 14:43-14:51, Measured at Depths of 30 meters on October 21, 2011

NO DATA AVAILABLE

Figure B466. Spectral Data Measured at the RFT Location during W8, 14:43-14:51, Measured at Depths of 17 meters on October 21, 2011

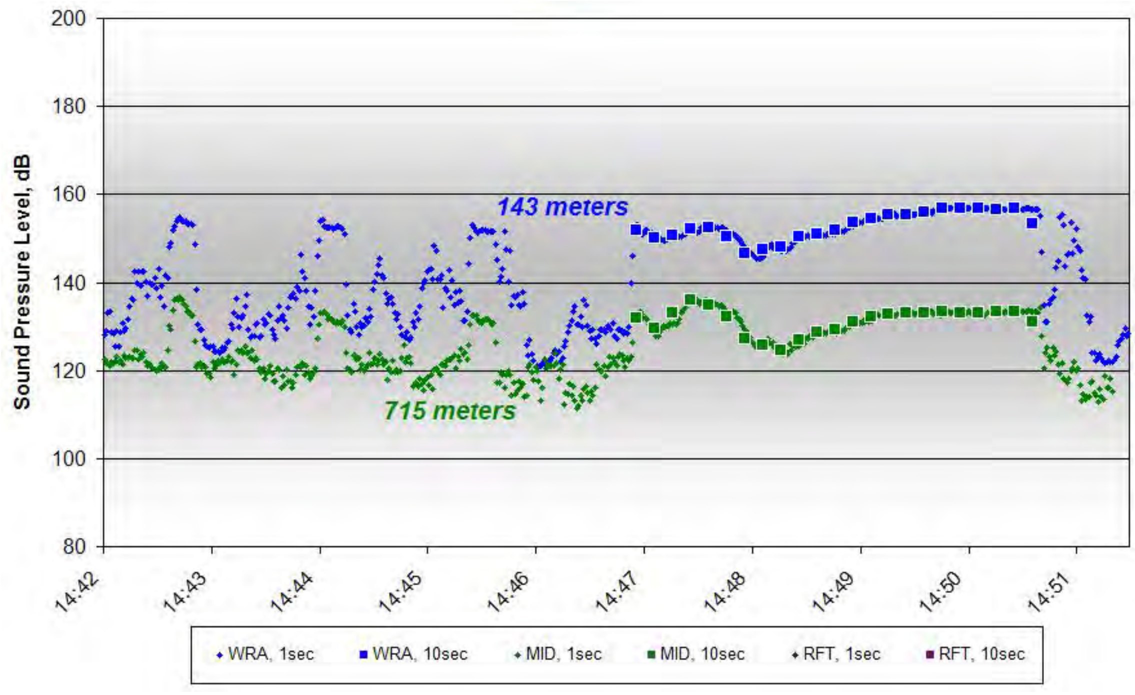

Figure B467. One-second and 10-second Average Data for W8, 14:43-14:51, Measured at Depths of 10 meters on October 21, 2011

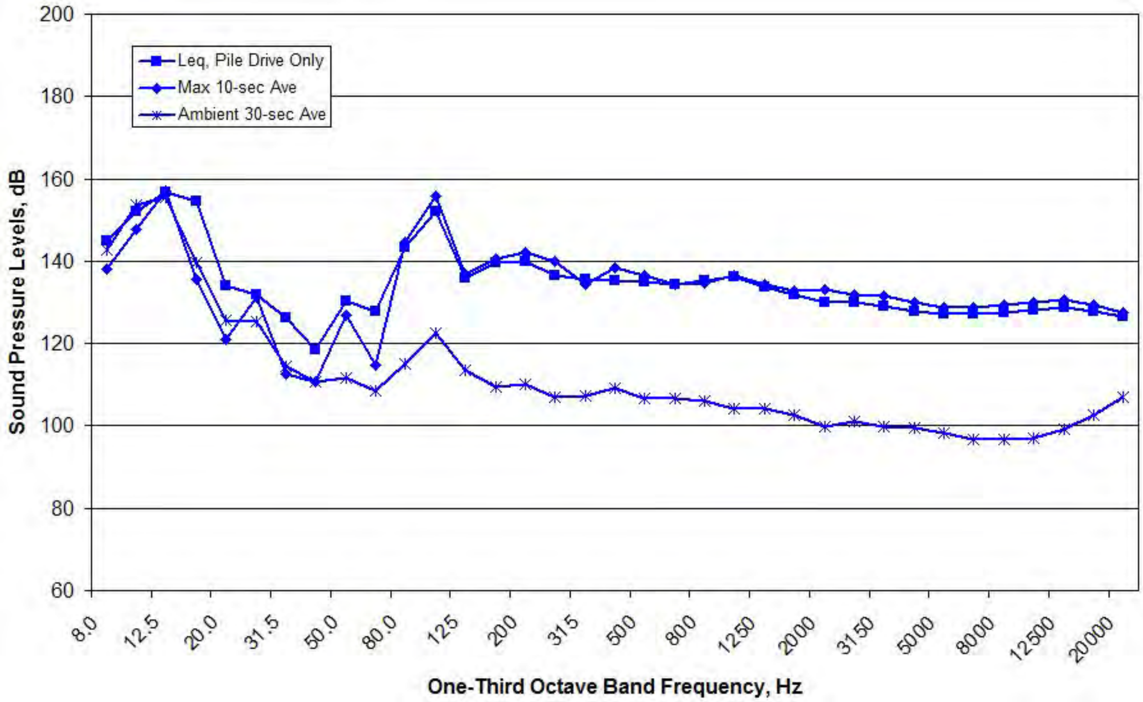

Figure B468. Spectral Data Measured at the WRA Location during W8, 14:43-14:51, Measured at Depths of 10 meters on October 21, 2011

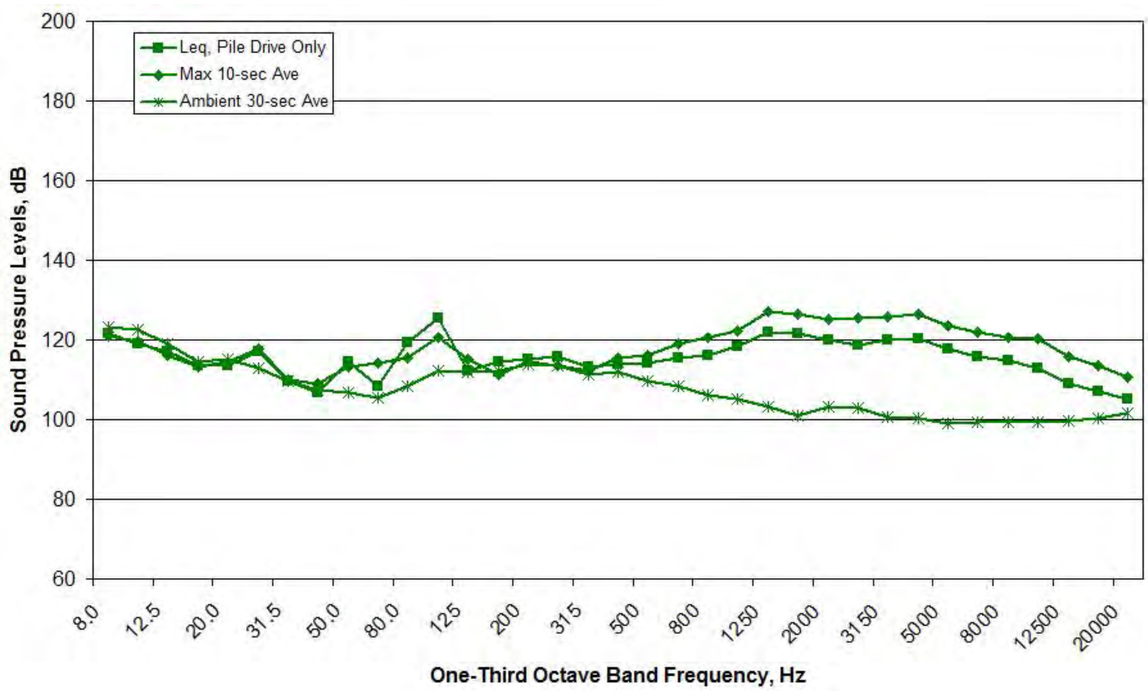

Figure B469. Spectral Data Measured at the MID Location during W8, 14:43-14:51, Measured at Depths of 10 meters on October 21, 2011

NO DATA AVAILABLE

Figure B470. Spectral Data Measured at the RFT Location during W8, 14:43-14:51, Measured at Depths of 10 meters on October 21, 2011

W10 (Vibratory Installation)

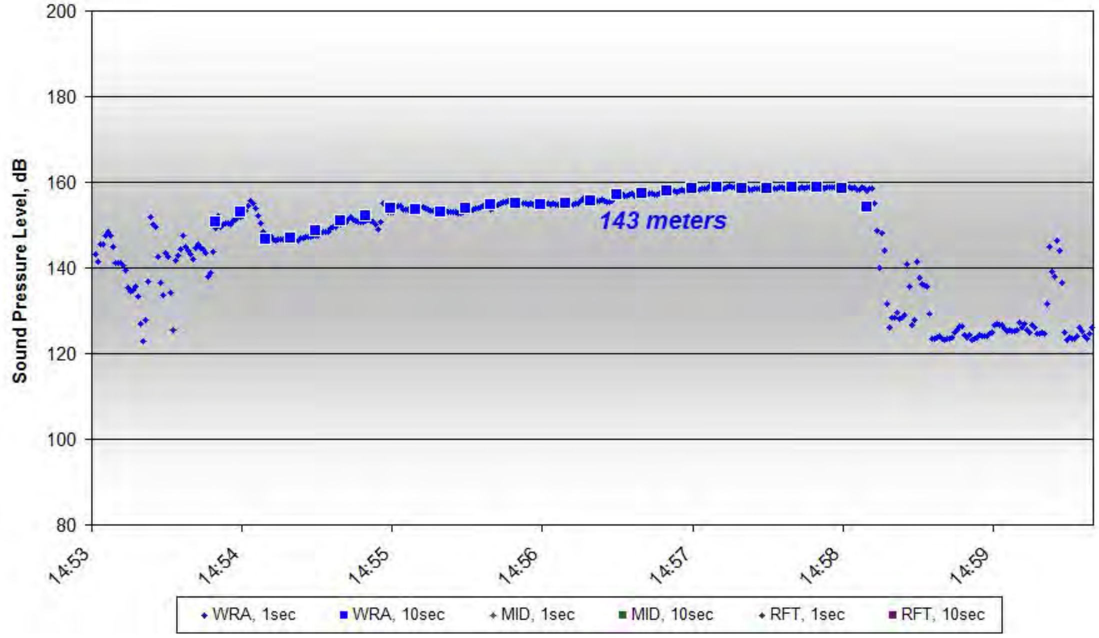

Figure B471. One-second and 10-second Average Data for W10, 14:53-14:58, Measured at Depths of 17-30 meters on October 21, 2011

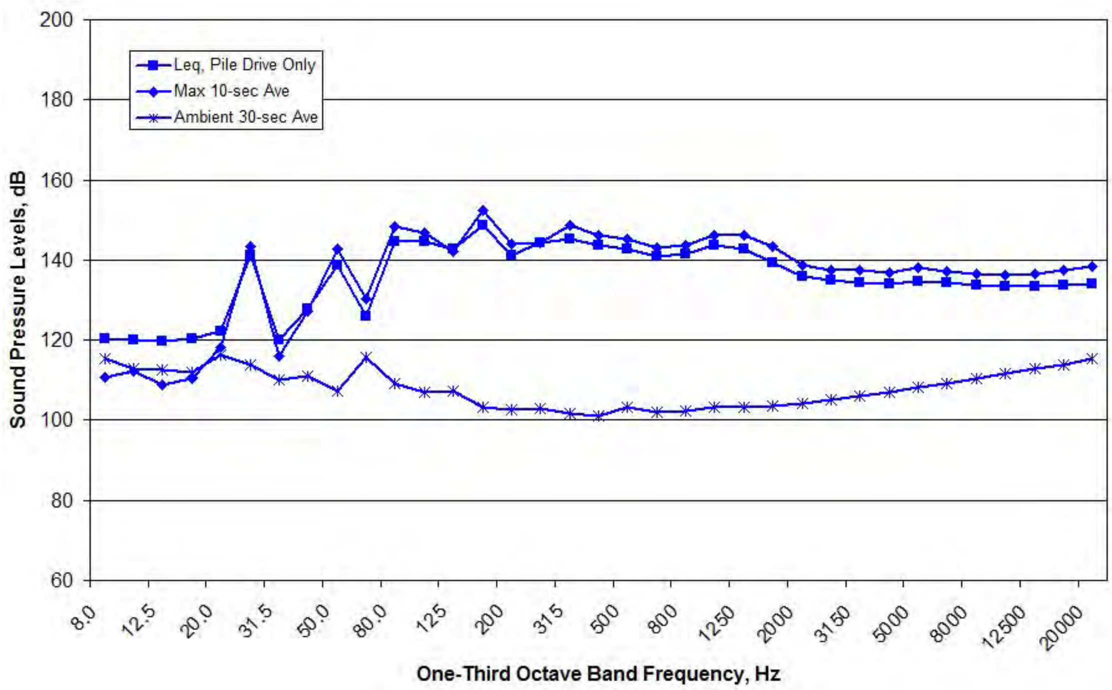

Figure B472. Spectral Data Measured at the WRA Location during W10, 14:53-14:58, Measured at Depths of 30 meters on October 21, 2011

NO DATA AVAILABLE

Figure B473. Spectral Data Measured at the MID Location during W10, 14:53-14:58, Measured at Depths of 30 meters on October 21, 2011

NO DATA AVAILABLE

Figure B474. Spectral Data Measured at the RFT Location during W10, 14:53-14:58, Measured at Depths of 17 meters on October 21, 2011

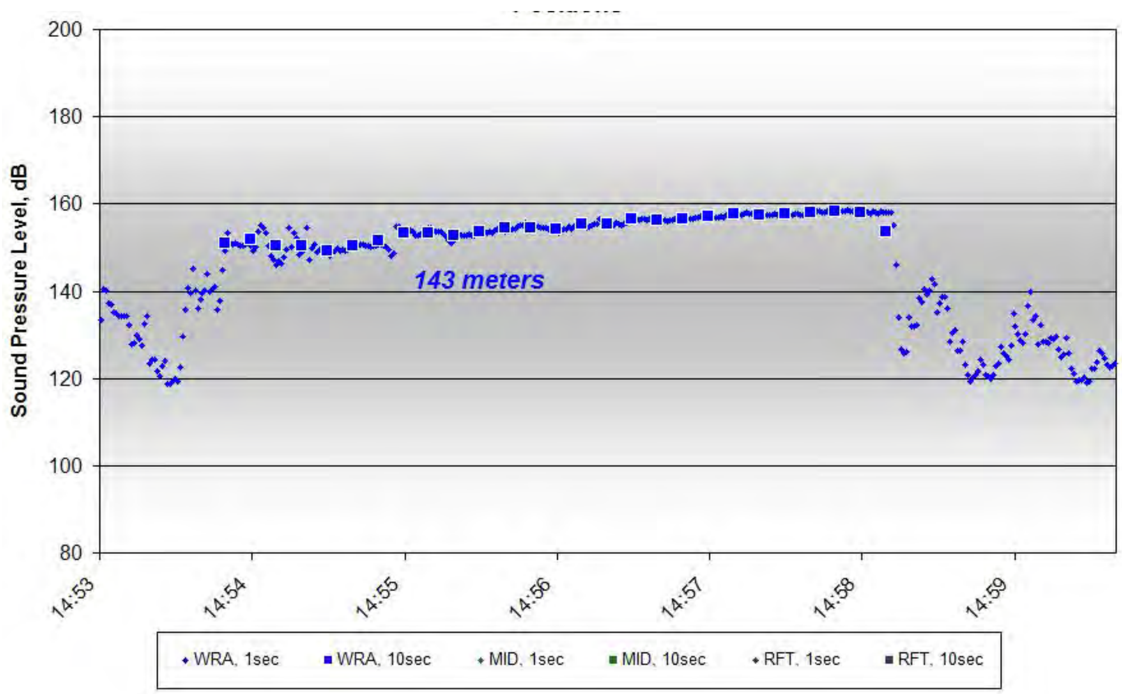

Figure B475. One-second and 10-second Average Data for W10, 14:53-14:58, Measured at Depths of 10 meters on October 21, 2011

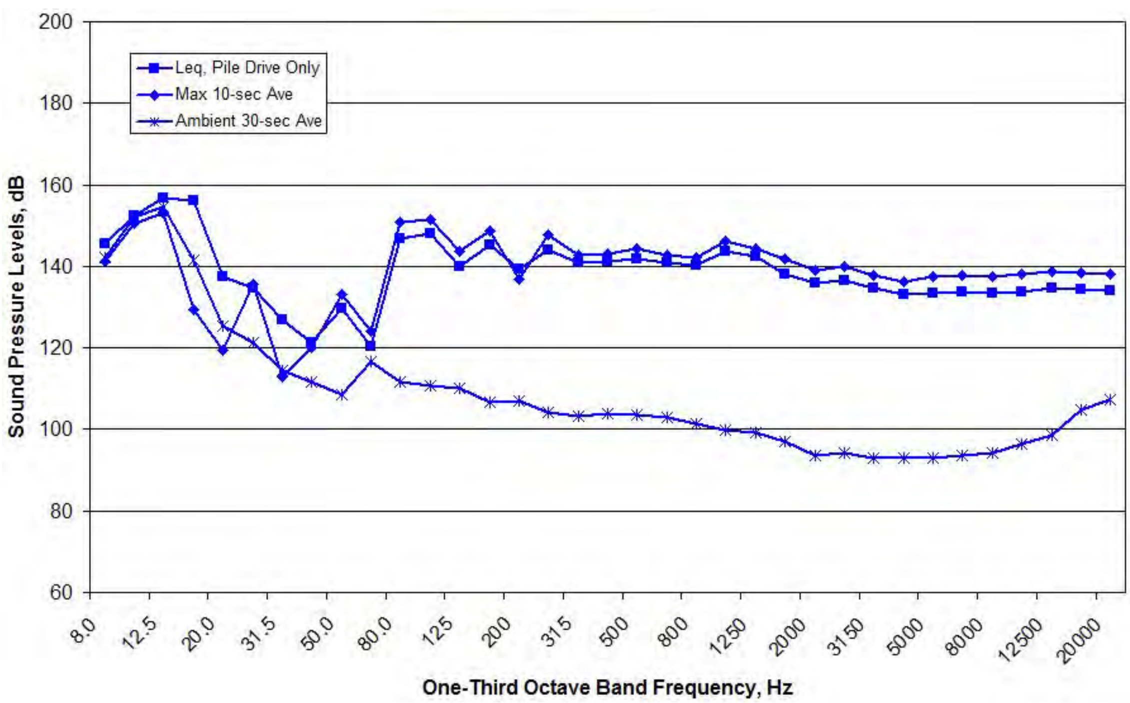

Figure B476. Spectral Data Measured at the WRA Location during W10, 14:53-14:58, Measured at Depths of 10 meters on October 21, 2011

NO DATA AVAILABLE

Figure B477. Spectral Data Measured at the MID Location during W10, 14:53-14:58, Measured at Depths of 10 meters on October 21, 2011

NO DATA AVAILABLE

Figure B478. Spectral Data Measured at the RFT Location during W10, 14:53-14:58, Measured at Depths of 10 meters on October 21, 2011

W1 (Vibratory Installation)

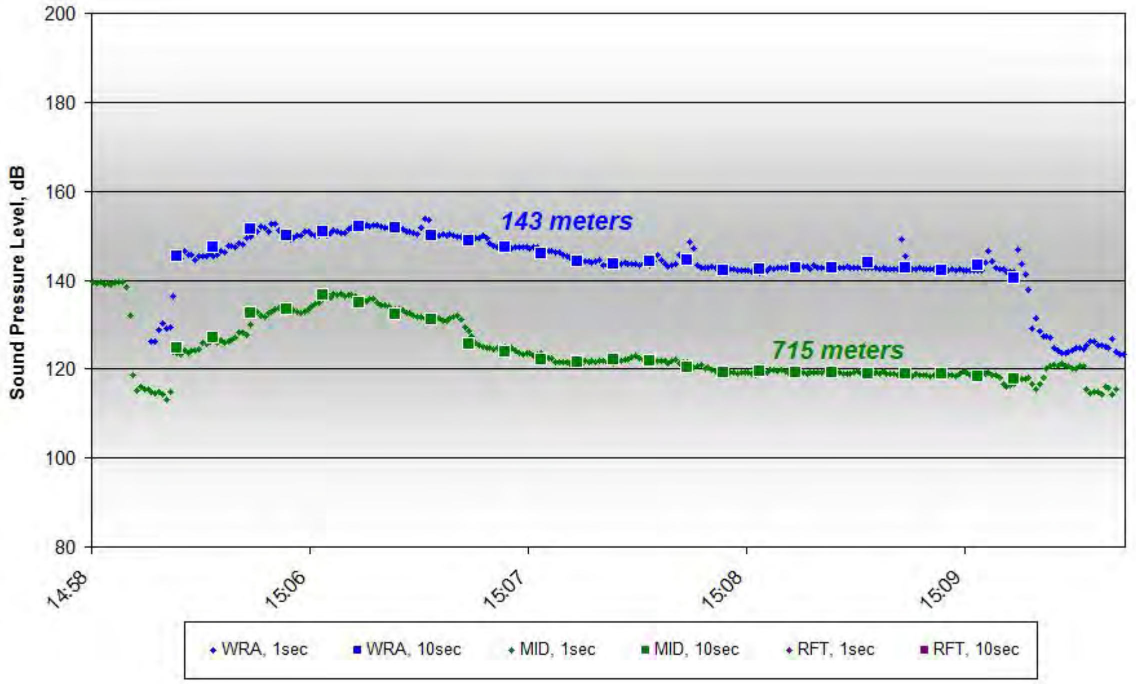

Figure B479. One-second and 10-second Average Data for W1, 14:58-15:09, Measured at Depths of 17-30 meters on October 21, 2011

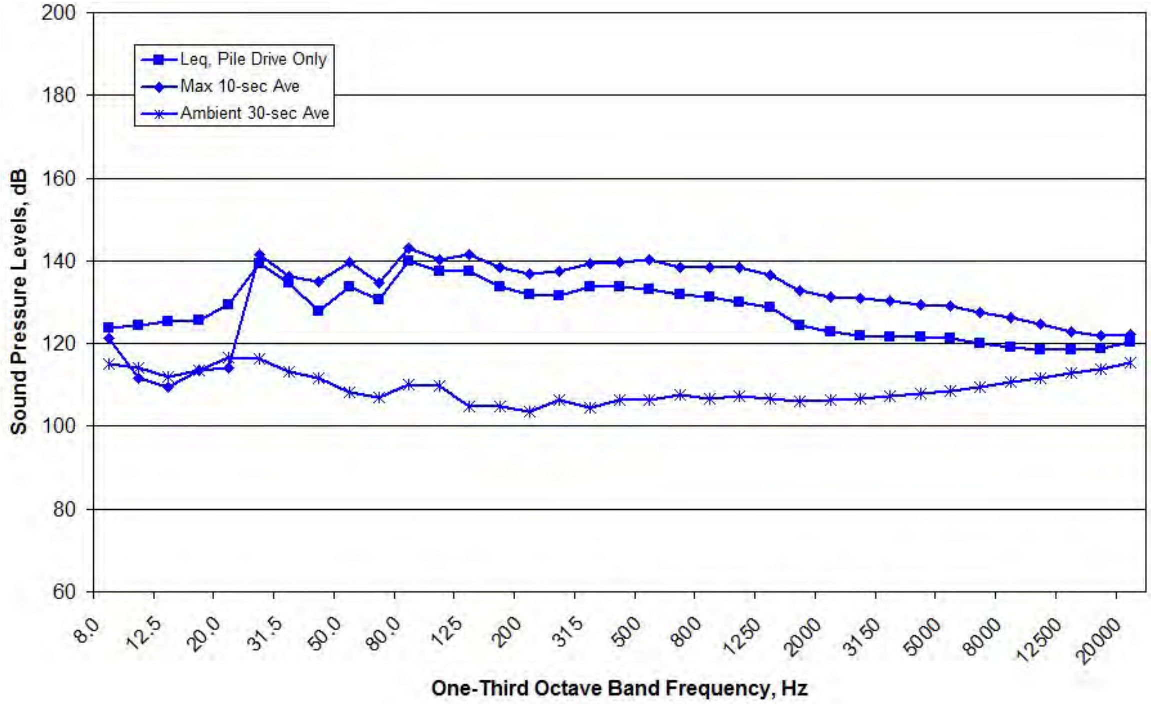

Figure B480. Spectral Data Measured at the WRA Location during W1, 14:58-15:09, Measured at Depths of 30 meters on October 21, 2011

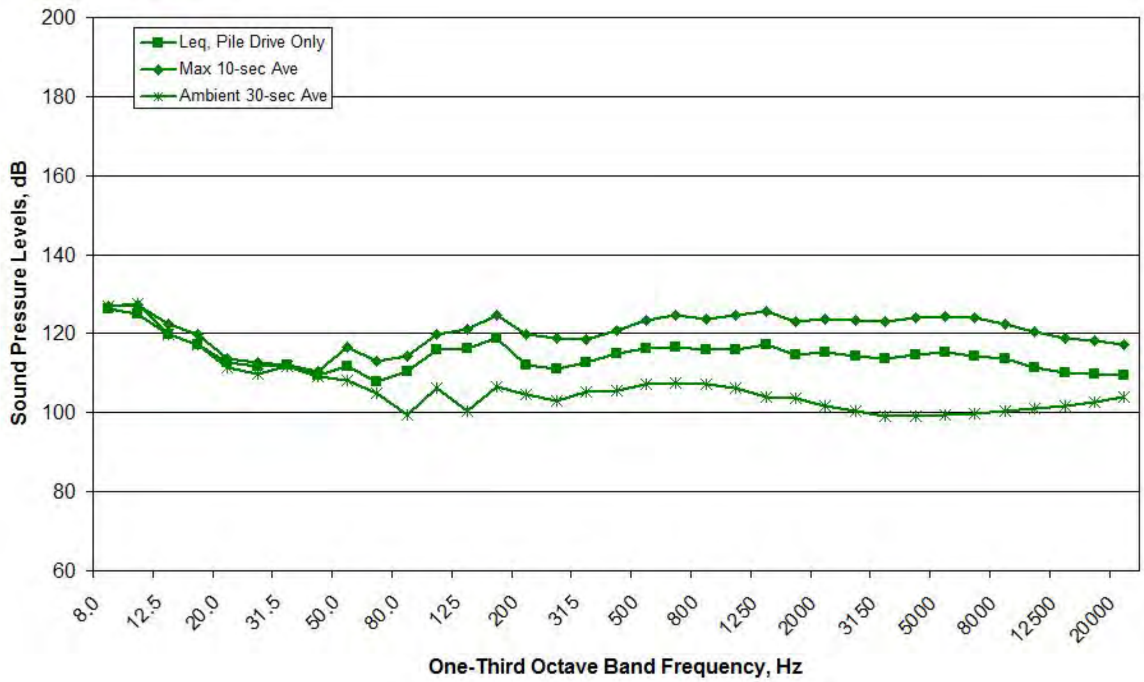

Figure B481. Spectral Data Measured at the MID Location during W1, 14:58-15:09, Measured at Depths of 30 meters on October 21, 2011

NO DATA AVAILABLE

Figure B482. Spectral Data Measured at the RFT Location during W1, 14:58-15:09, Measured at Depths of 17 meters on October 21, 2011

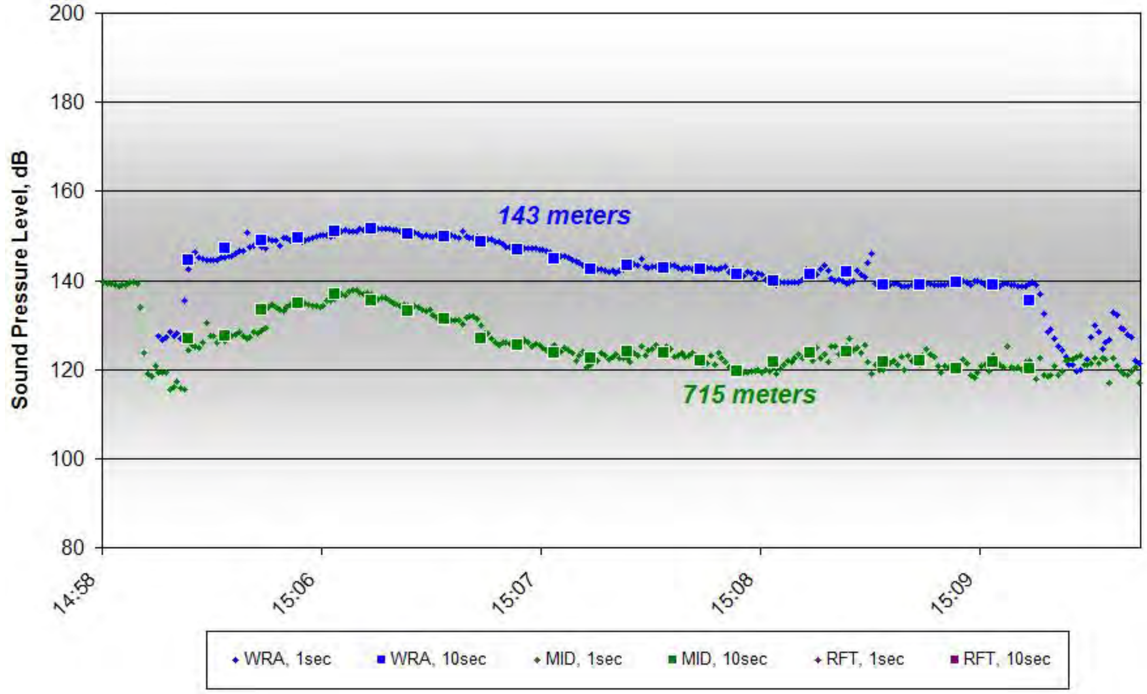

Figure B483. One-second and 10-second Average Data for W1, 14:58-15:09, Measured at Depths of 10 meters on October 21, 2011

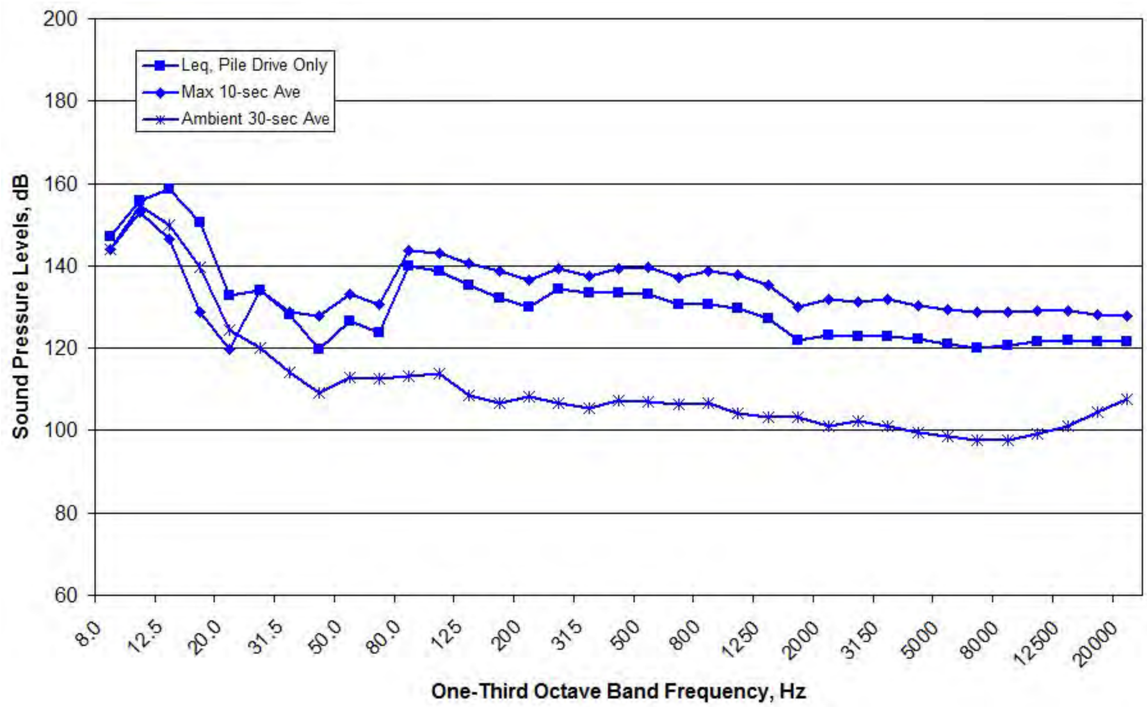

Figure B484. Spectral Data Measured at the WRA Location during W1, 14:58-15:09, Measured at Depths of 10 meters on October 21, 2011

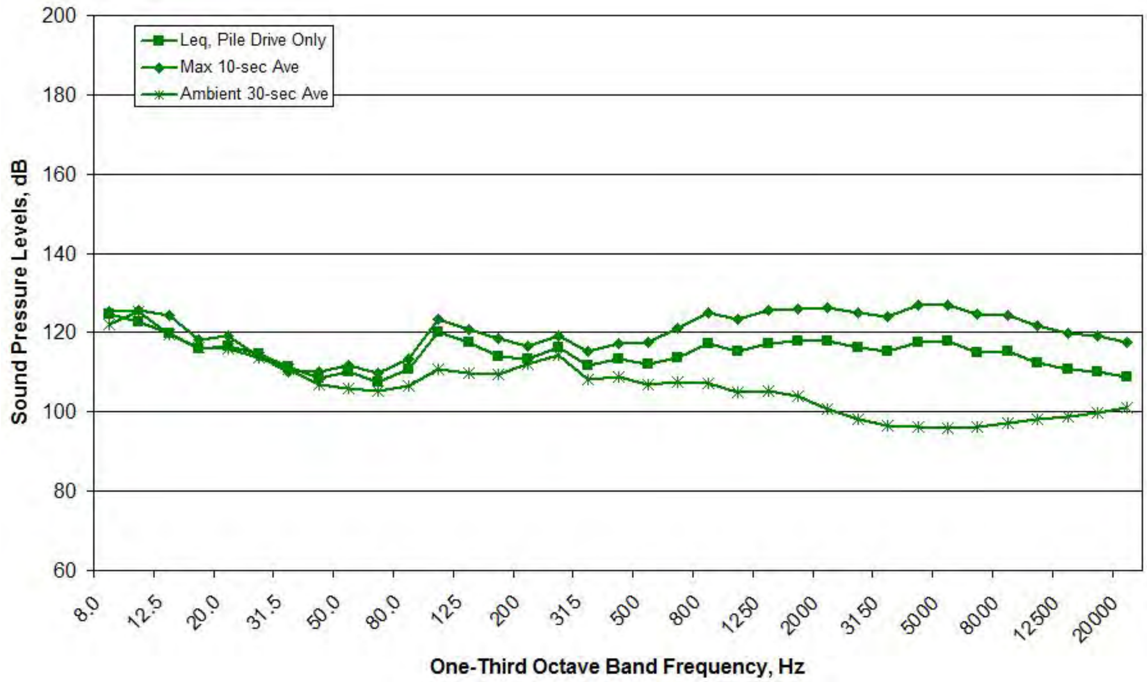

Figure B485. Spectral Data Measured at the MID Location during W1, 14:58-15:09, Measured at Depths of 10 meters on October 21, 2011

NO DATA AVAILABLE

Figure B486. Spectral Data Measured at the RFT Location during W1, 14:58-15:09, Measured at Depths of 10 meters on October 21, 2011

W2 (Vibratory Installation)

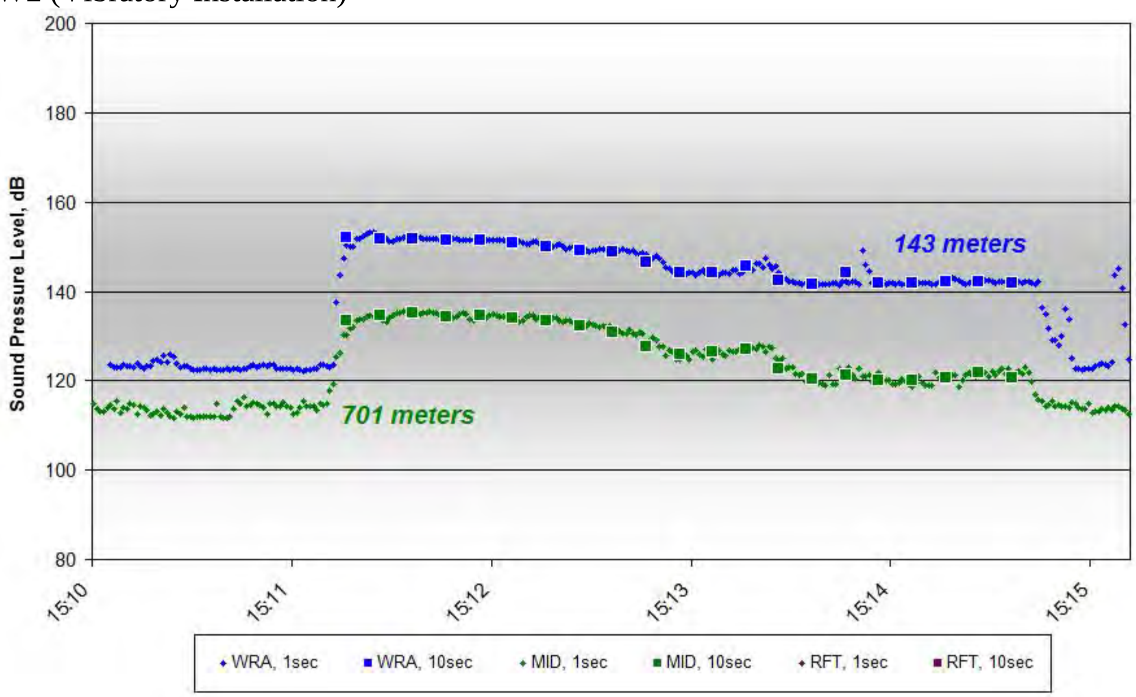

Figure B487. One-second and 10-second Average Data for W2, 15:11-15:15, Measured at Depths of 17-30 meters on October 21, 2011

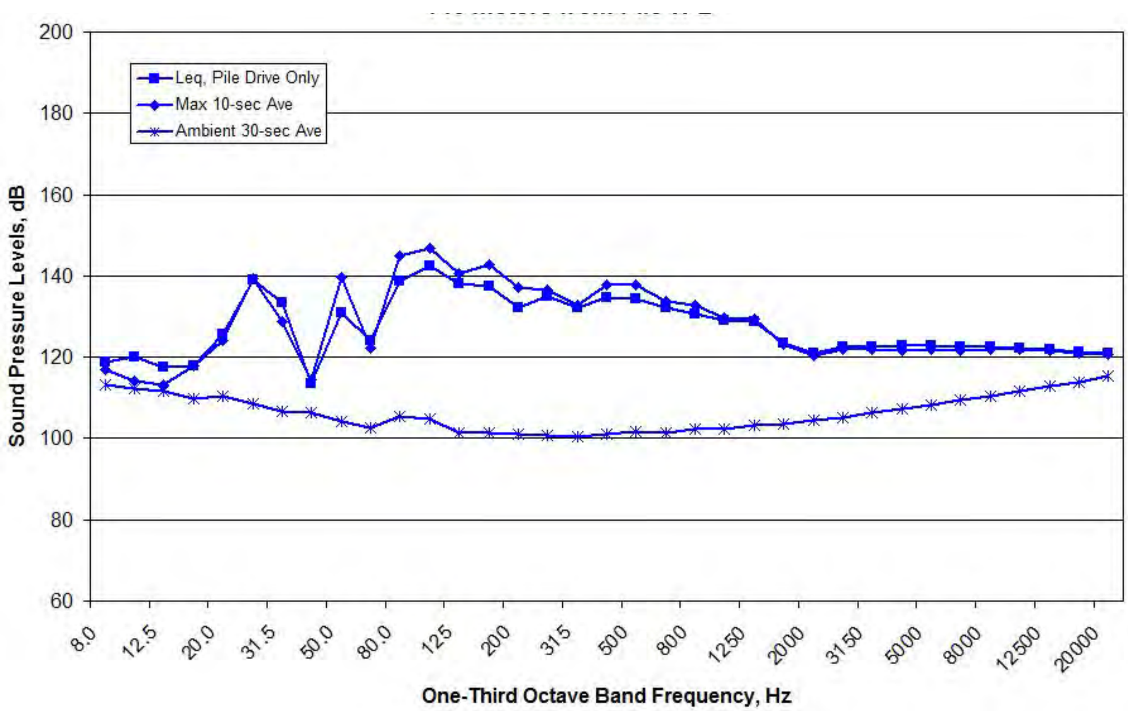

Figure B488. Spectral Data Measured at the WRA Location during W2, 15:11-15:15, Measured at Depths of 30 meters on October 21, 2011

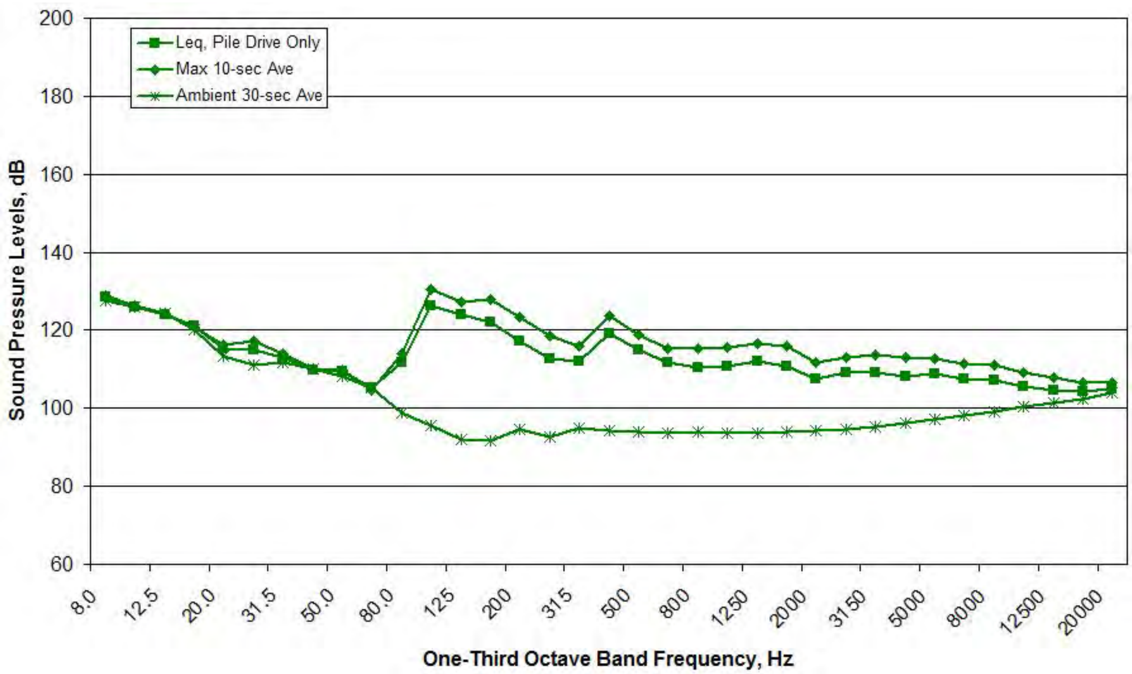

Figure B489. Spectral Data Measured at the MID Location during W2, 15:11-15:15, Measured at Depths of 30 meters on October 21, 2011

NO DATA AVAILABLE

Figure B490. Spectral Data Measured at the RFT Location during W2, 15:11-15:15, Measured at Depths of 17 meters on October 21, 2011

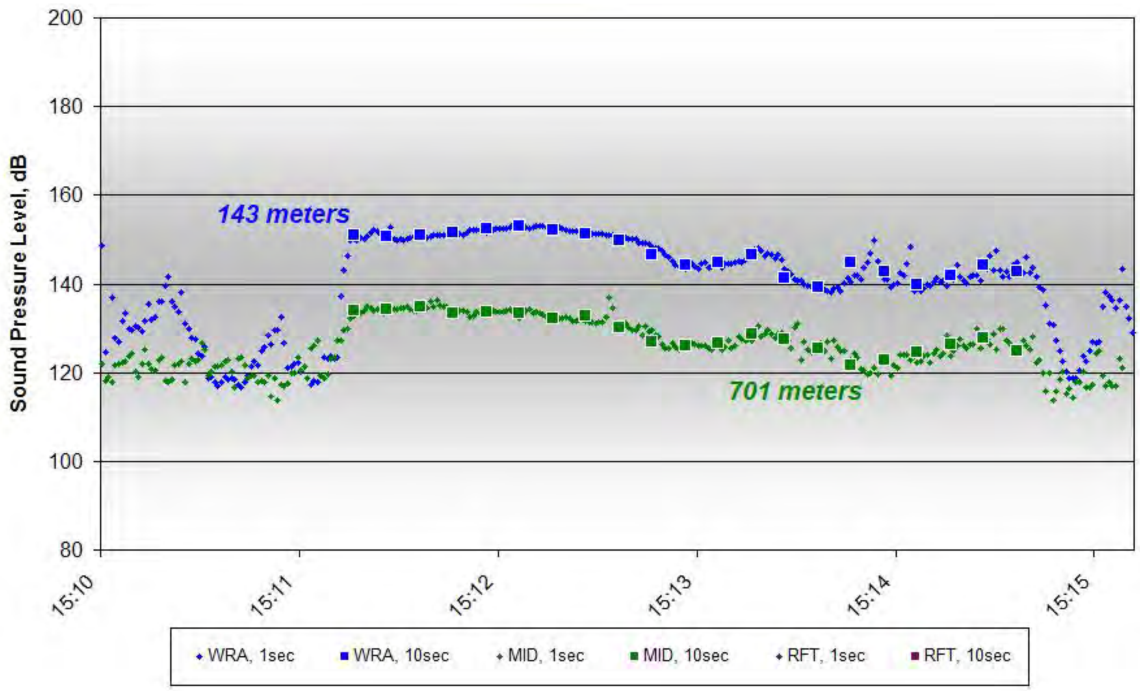

Figure B491. One-second and 10-second Average Data for W2, 15:11-15:15, Measured at Depths of 10 meters on October 21, 2011

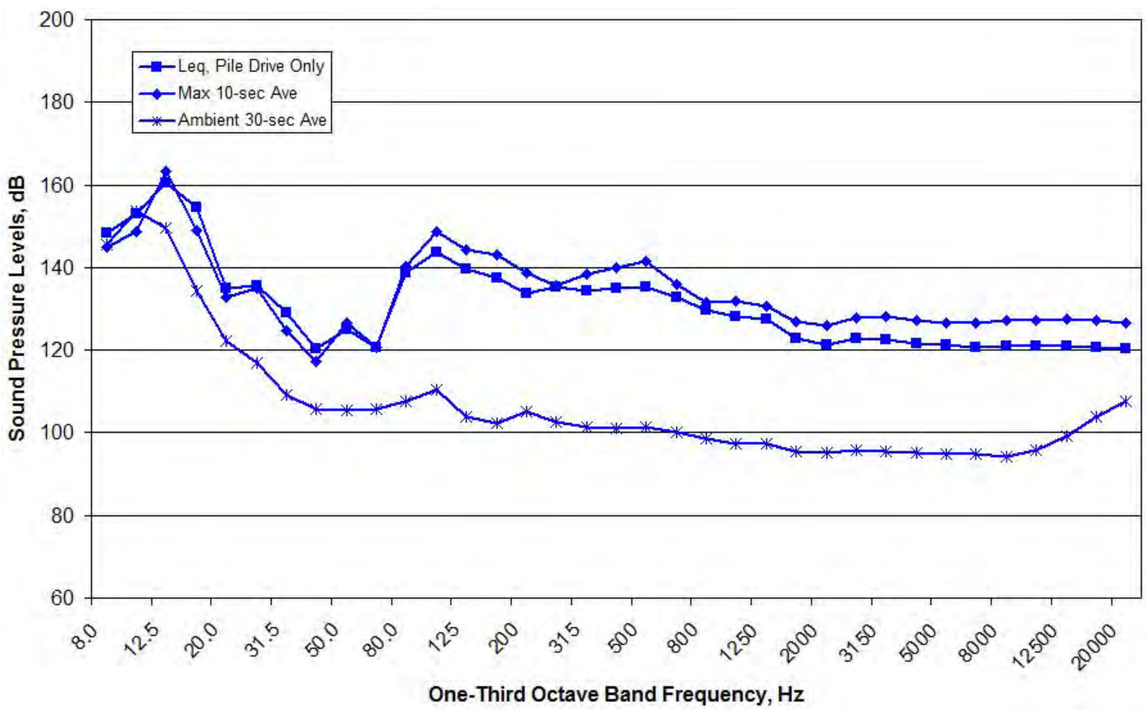

Figure B492. Spectral Data Measured at the WRA Location during W2, 15:11-15:15, Measured at Depths of 10 meters on October 21, 2011

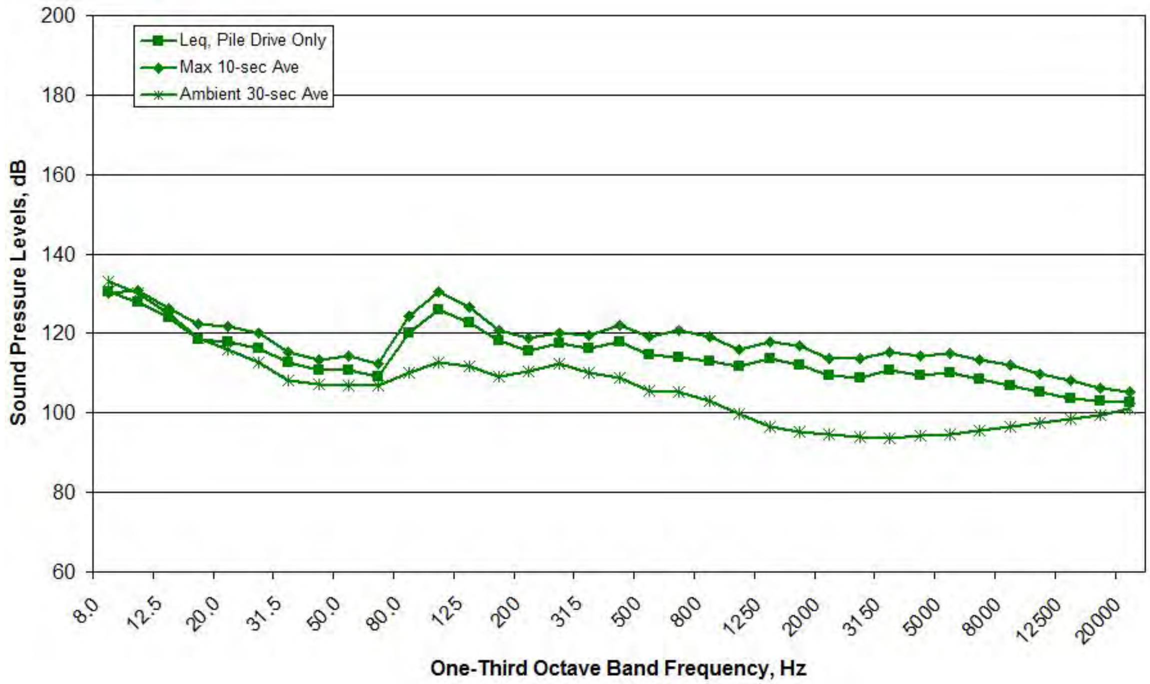

Figure B493. Spectral Data Measured at the MID Location during W2, 15:11-15:15, Measured at Depths of 10 meters on October 21, 2011

NO DATA AVAILABLE

Figure B494. Spectral Data Measured at the RFT Location during W2, 15:11-15:15, Measured at Depths of 10 meters on October 21, 2011

W3 (Vibratory Installation)

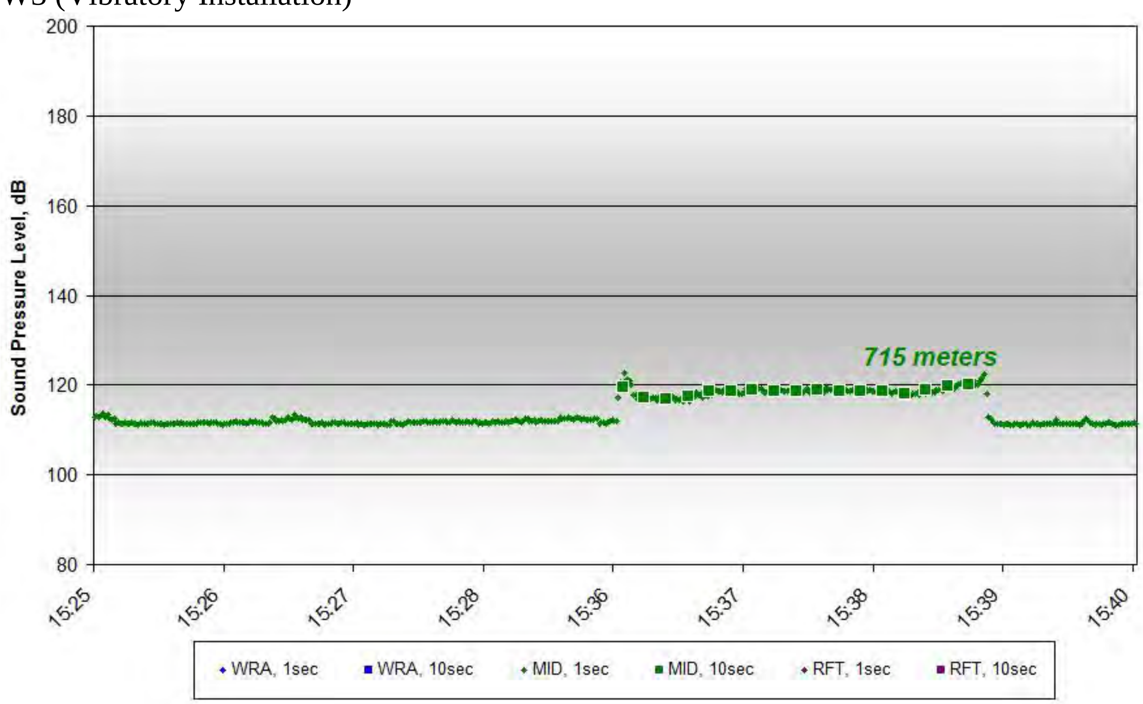

Figure B495. One-second and 10-second Average Data for W3, 15:37-15:39, Measured at Depths of 17-30 meters on October 21, 2011

NO DATA AVAILABLE

Figure B496. Spectral Data Measured at the WRA Location during W3, 15:37-15:39, Measured at Depths of 30 meters on October 21, 2011

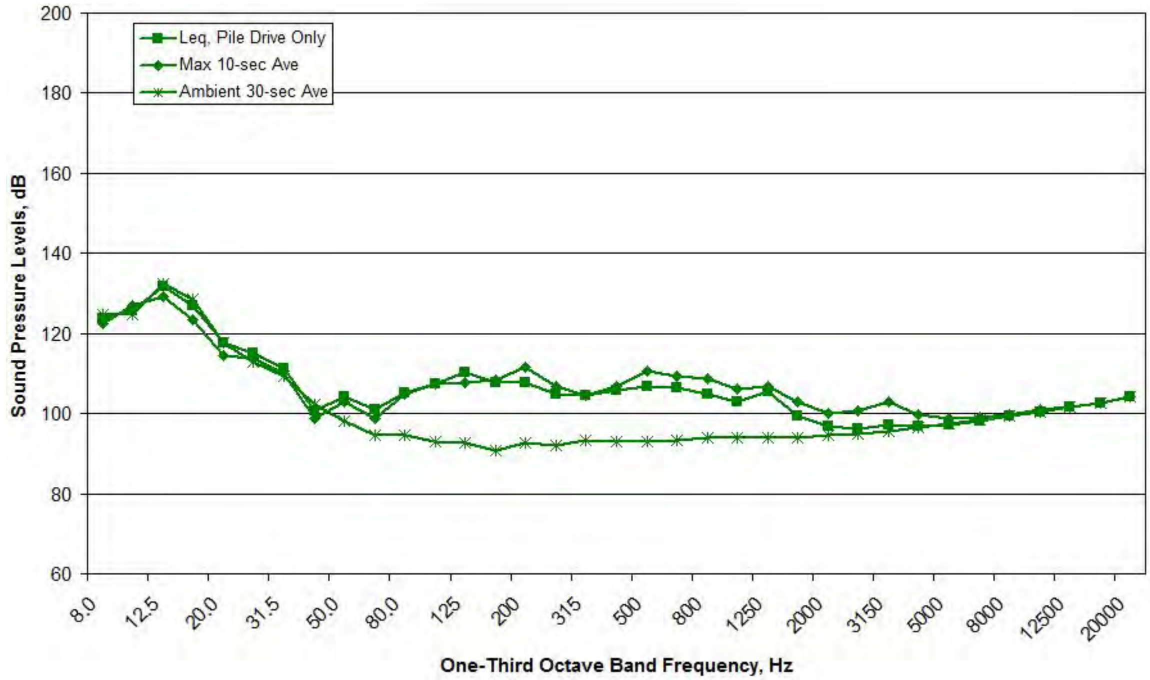

Figure B497. Spectral Data Measured at the MID Location during W3, 15:37-15:39, Measured at Depths of 30 meters on October 21, 2011

NO DATA AVAILABLE

Figure B498. Spectral Data Measured at the RFT Location during W3, 15:37-15:39, Measured at Depths of 17 meters on October 21, 2011

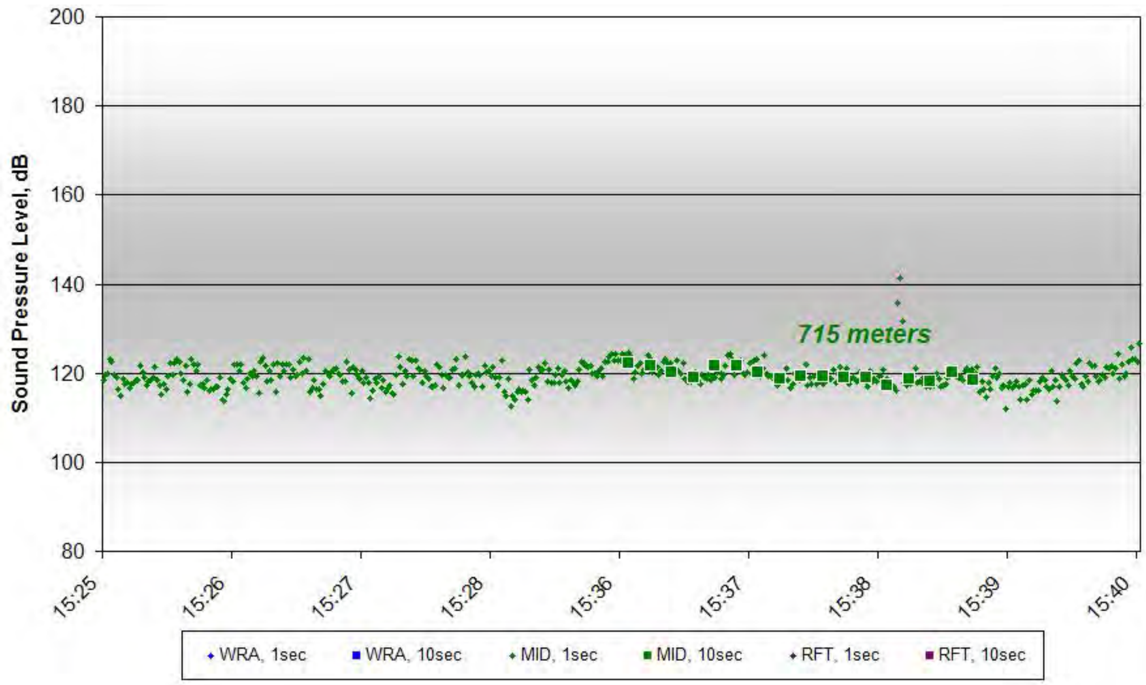

Figure B499. One-second and 10-second Average Data for W3, 15:37-15:39, Measured at Depths of 10 meters on October 21, 2011

NO DATA AVAILABLE

Figure B500. Spectral Data Measured at the WRA Location during W3, 15:37-15:39, Measured at Depths of 10 meters on October 21, 2011

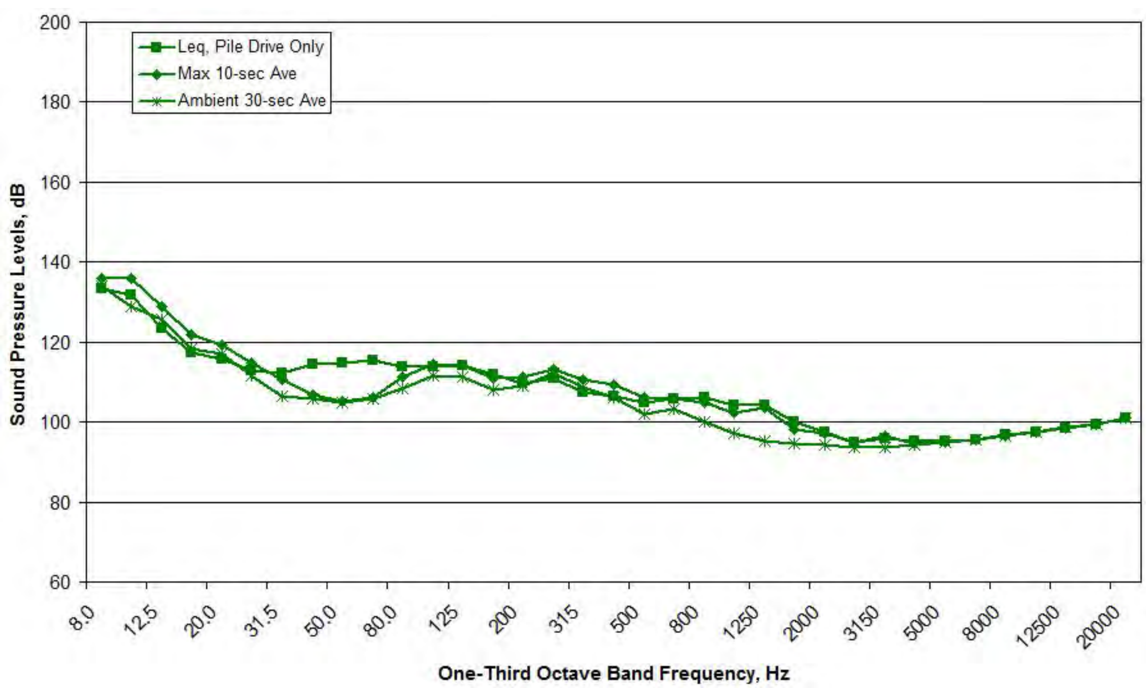

Figure B501. Spectral Data Measured at the MID Location during W3, 15:37-15:39, Measured at Depths of 10 meters on October 21, 2011

NO DATA AVAILABLE

Figure B502. Spectral Data Measured at the RFT Location during W3, 15:37-15:39, Measured at Depths of 10 meters on October 21, 2011

W4 (Vibratory Installation)

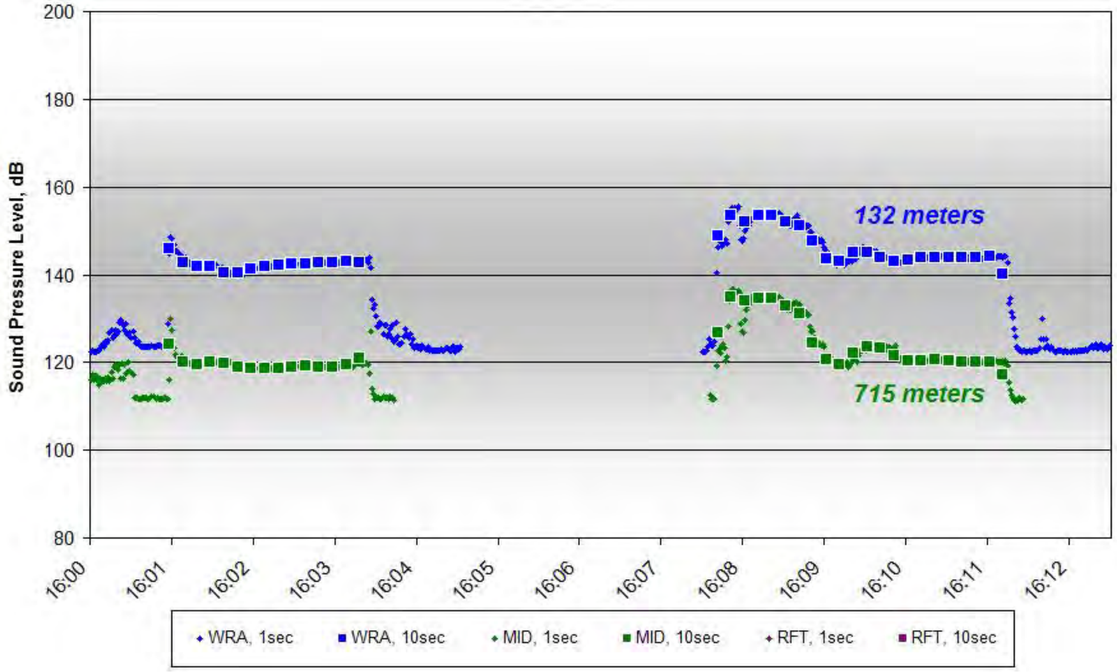

Figure B503. One-second and 10-second Average Data for W4, 16:00-16:11, Measured at Depths of 17-30 meters on October 21, 2011

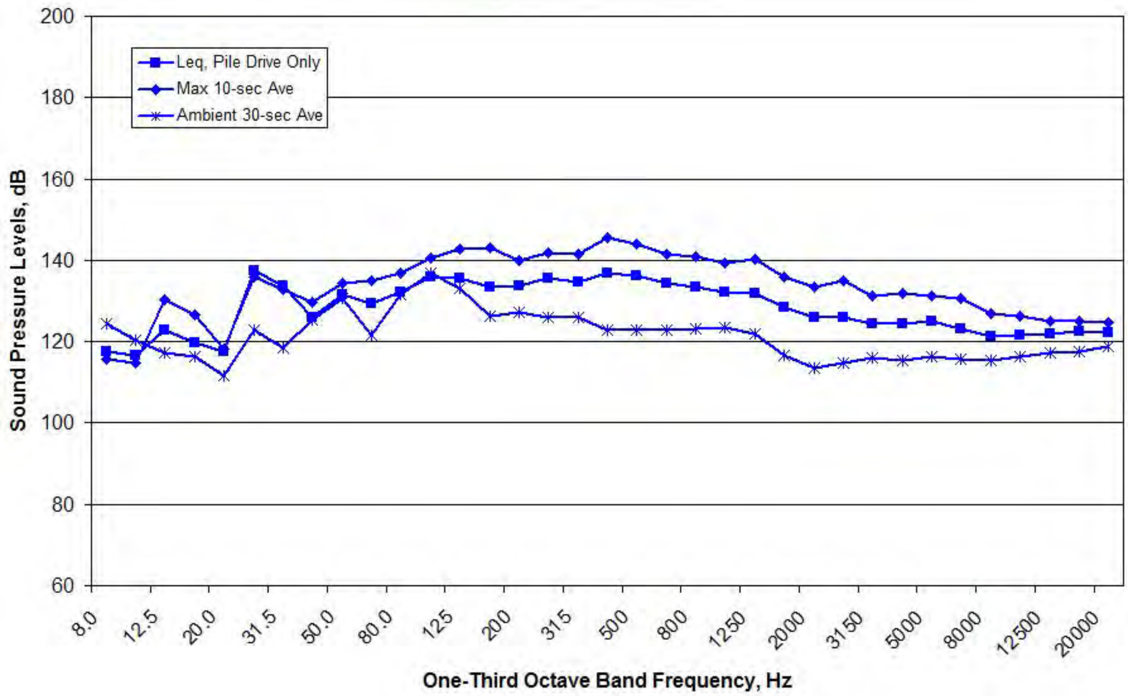

Figure B504. Spectral Data Measured at the WRA Location during W4, 16:00-16:11, Measured at Depths of 30 meters on October 21, 2011

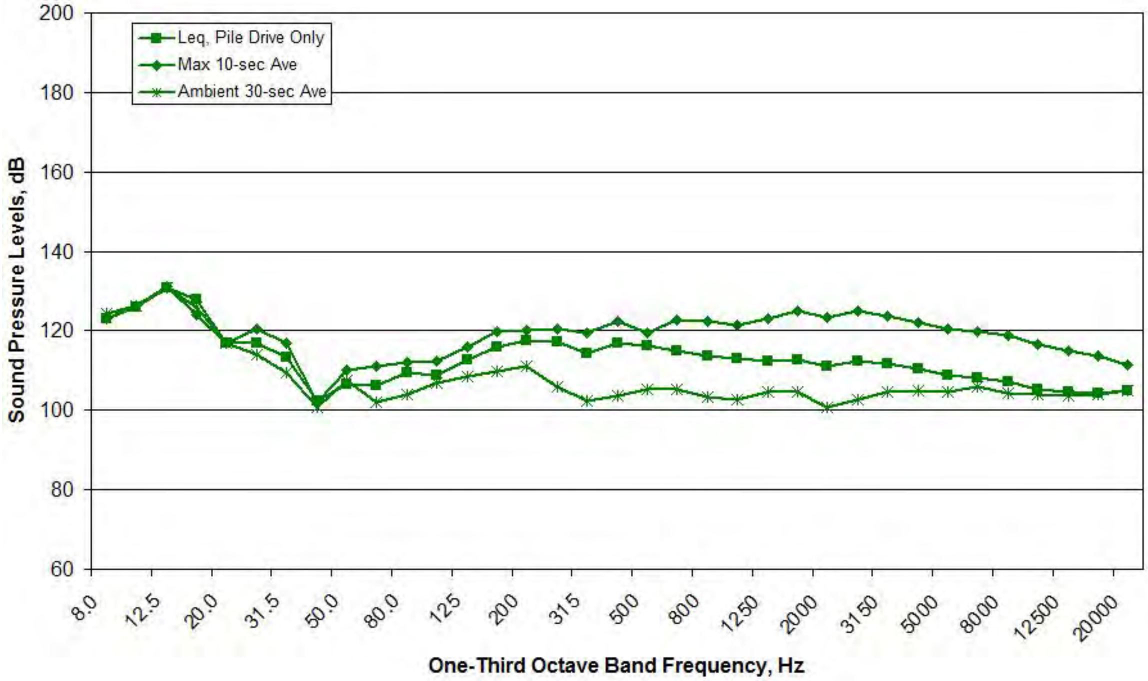

Figure B505. Spectral Data Measured at the MID Location during W4, 16:00-16:11, Measured at Depths of 30 meters on October 21, 2011

NO DATA AVAILABLE

Figure B506. Spectral Data Measured at the RFT Location during W4, 16:00-16:11, Measured at Depths of 17 meters on October 21, 2011

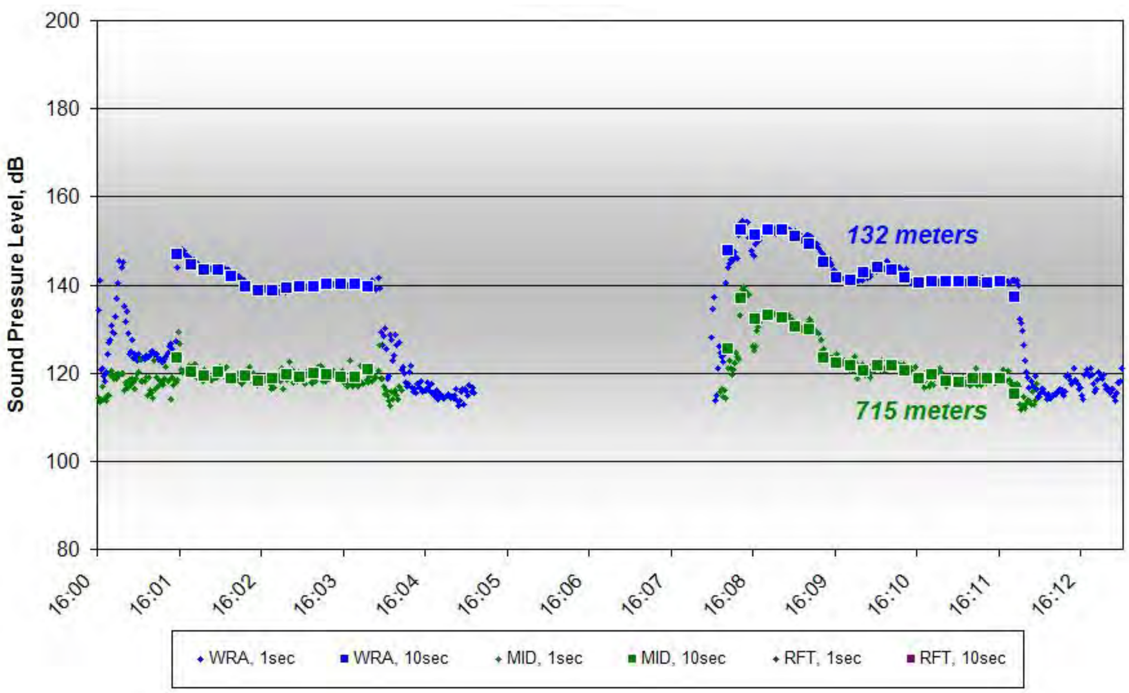

Figure B507. One-second and 10-second Average Data for W4, 16:00-16:11, Measured at Depths of 10 meters on October 21, 2011

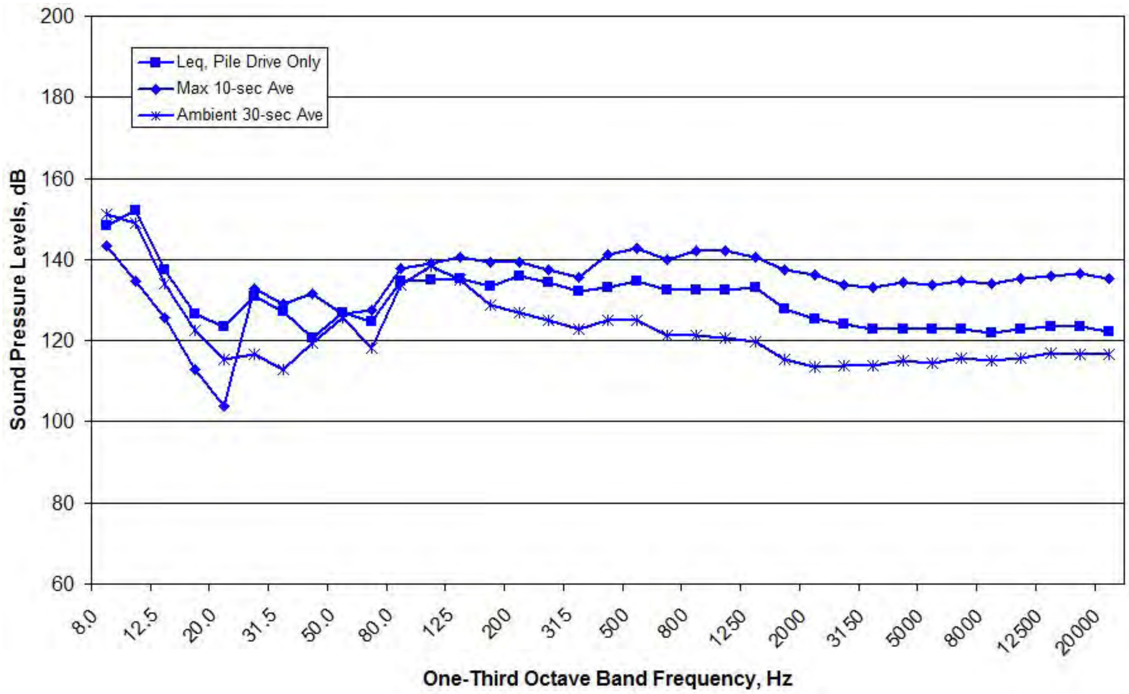

Figure B508. Spectral Data Measured at the WRA Location during W4, 16:00-16:11, Measured at Depths of 10 meters on October 21, 2011

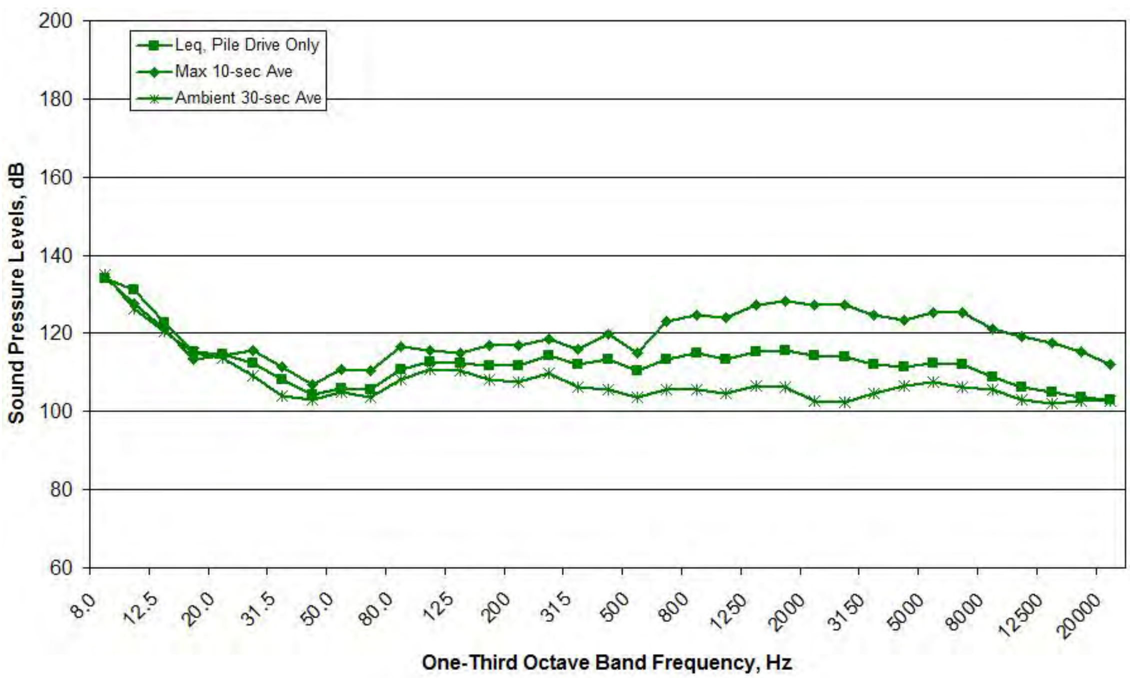

Figure B509. Spectral Data Measured at the MID Location during W4, 16:00-16:11, Measured at Depths of 10 meters on October 21, 2011

NO DATA AVAILABLE

Figure B510. Spectral Data Measured at the RFT Location during W4, 16:00-16:11, Measured at Depths of 10 meters on October 21, 2011

W5 (Vibratory Installation)

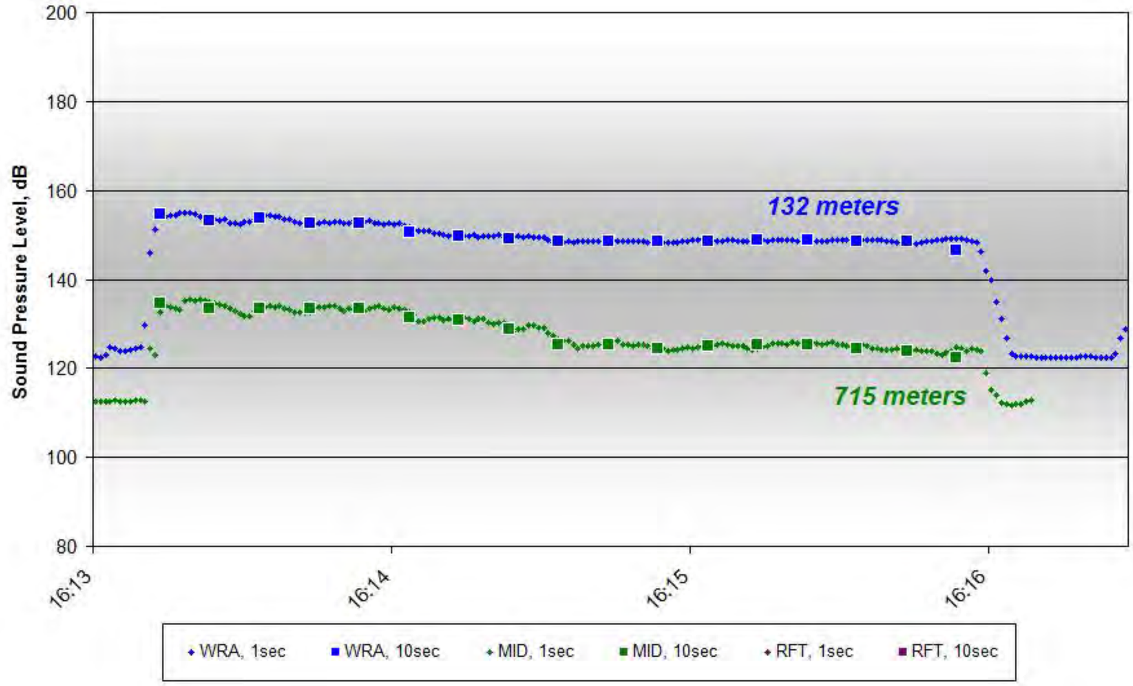

Figure B511. One-second and 10-second Average Data for W5, 16:13-16:16, Measured at Depths of 17-30 meters on October 21, 2011

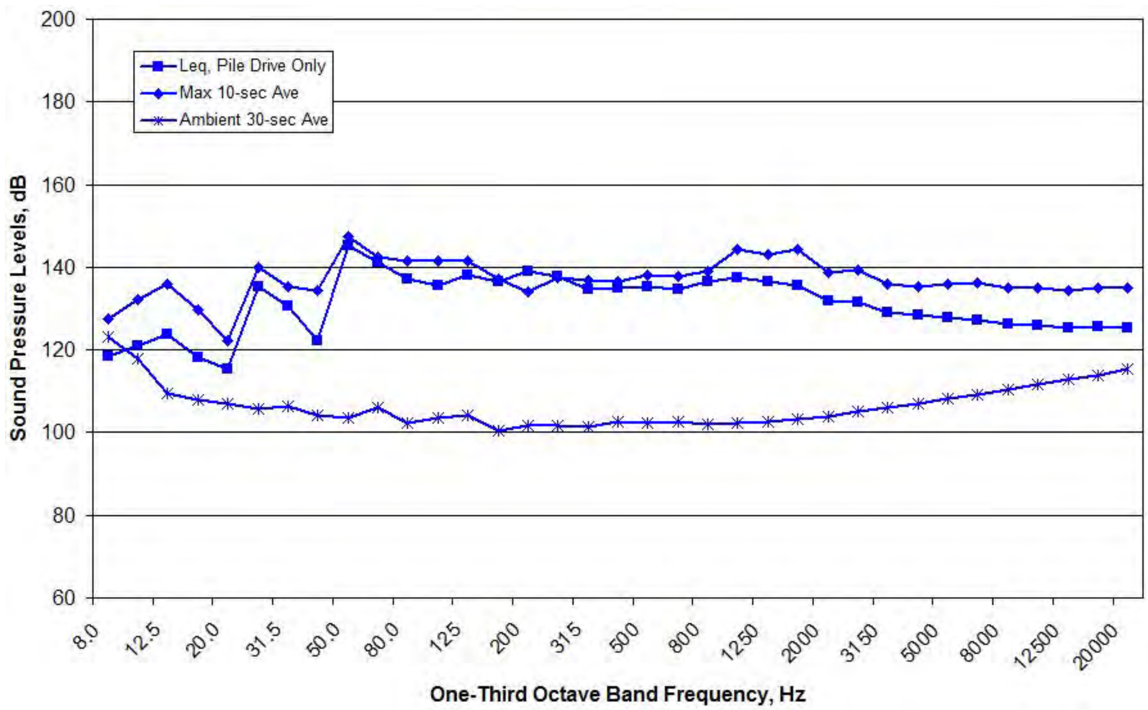

Figure B512. Spectral Data Measured at the WRA Location during W5, 16:13-16:16, Measured at Depths of 30 meters on October 21, 2011

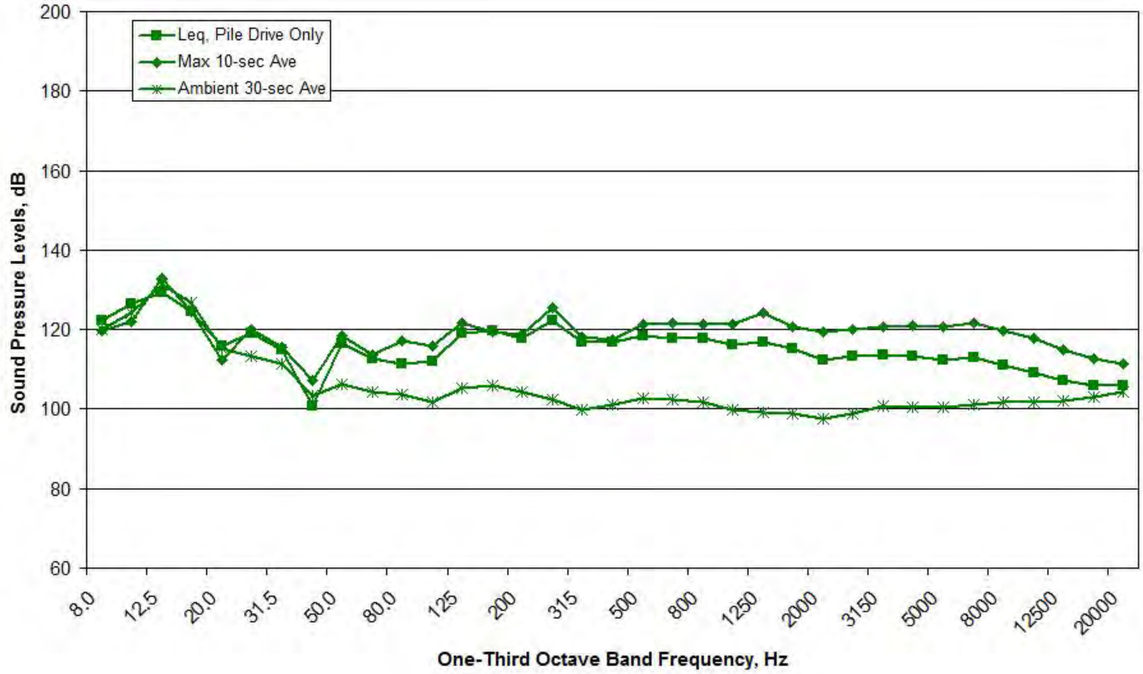

Figure B513. Spectral Data Measured at the MID Location during W5, 16:13-16:16, Measured at Depths of 30 meters on October 21, 2011

NO DATA AVAILABLE

Figure B514. Spectral Data Measured at the RFT Location during W5, 16:13-16:16, Measured at Depths of 17 meters on October 21, 2011

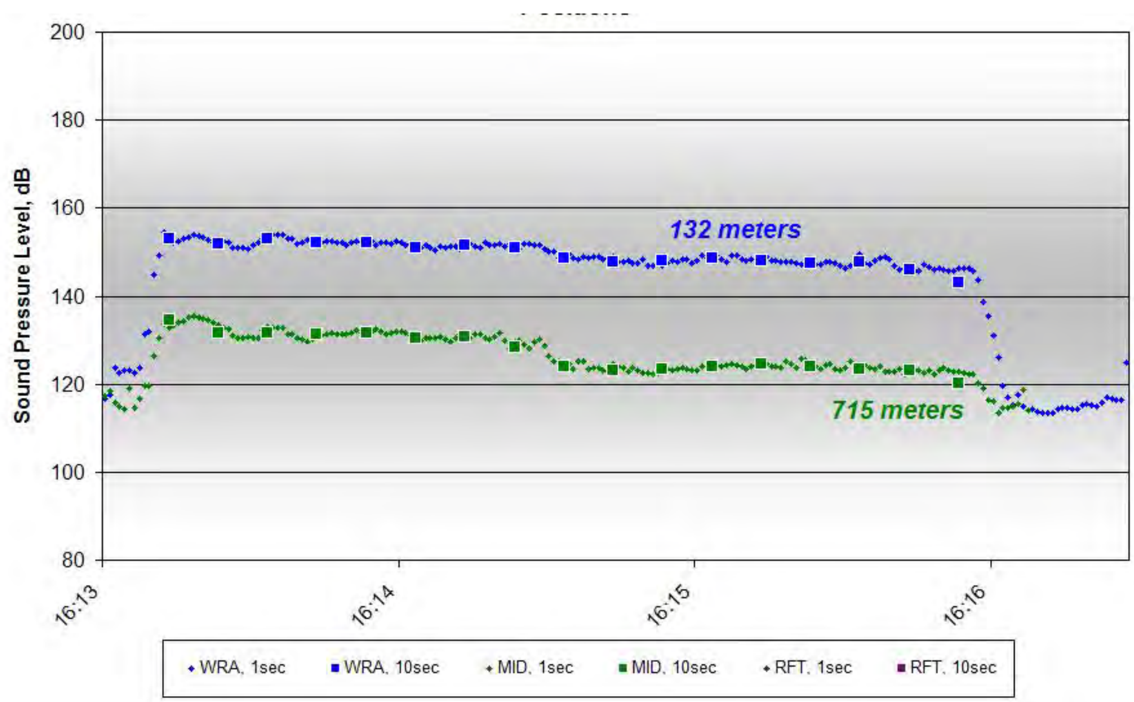

Figure B515. One-second and 10-second Average Data for W5, 16:13-16:16, Measured at Depths of 10 meters on October 21, 2011

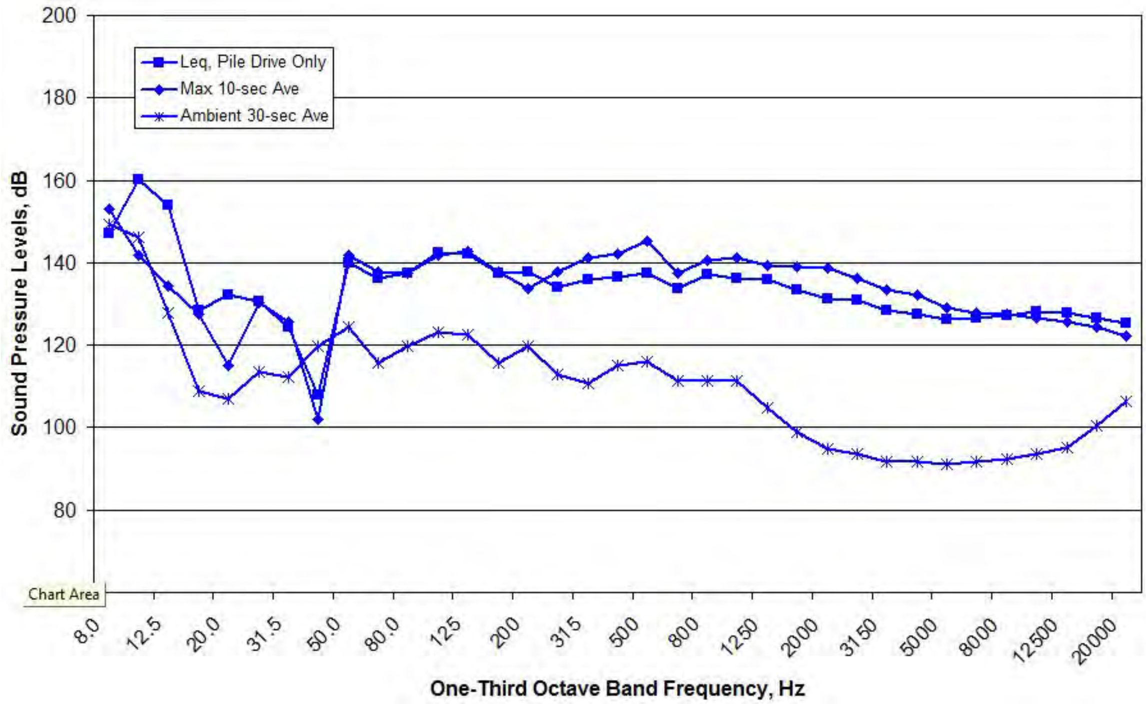

Figure B516. Spectral Data Measured at the WRA Location during W5, 16:13-16:16, Measured at Depths of 10 meters on October 21, 2011

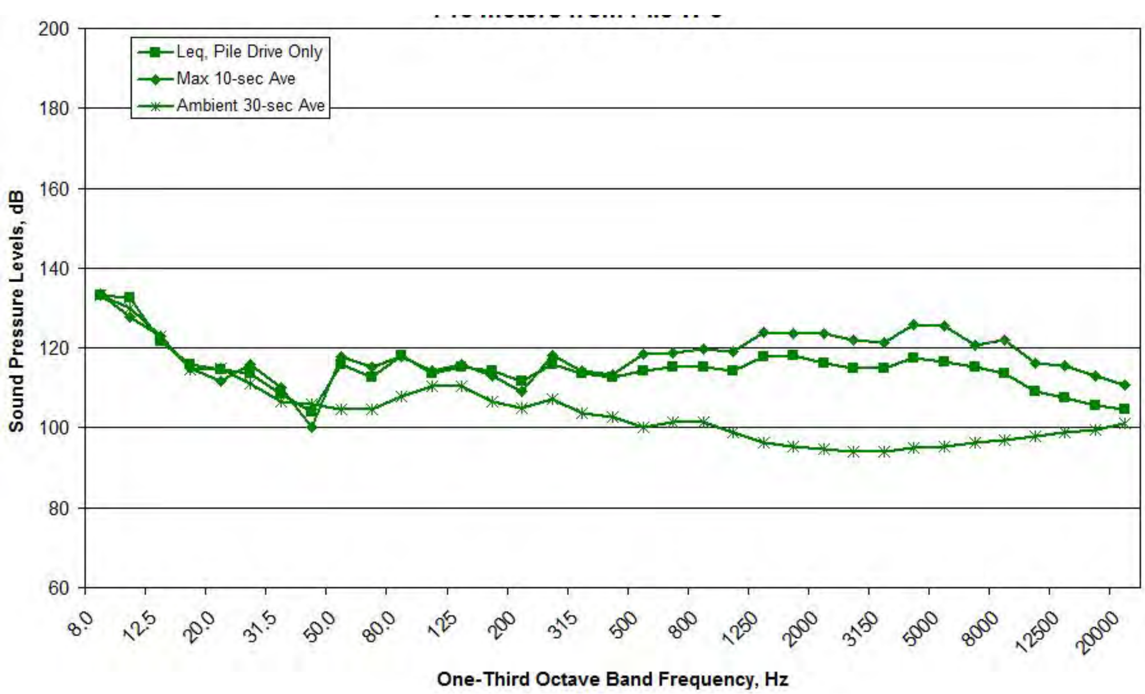

Figure B517. Spectral Data Measured at the MID Location during W5, 16:13-16:16, Measured at Depths of 10 meters on October 21, 2011

NO DATA AVAILABLE

Figure B518. Spectral Data Measured at the RFT Location during W5, 16:13-16:16, Measured at Depths of 10 meters on October 21, 2011

W6 (Vibratory Installation)

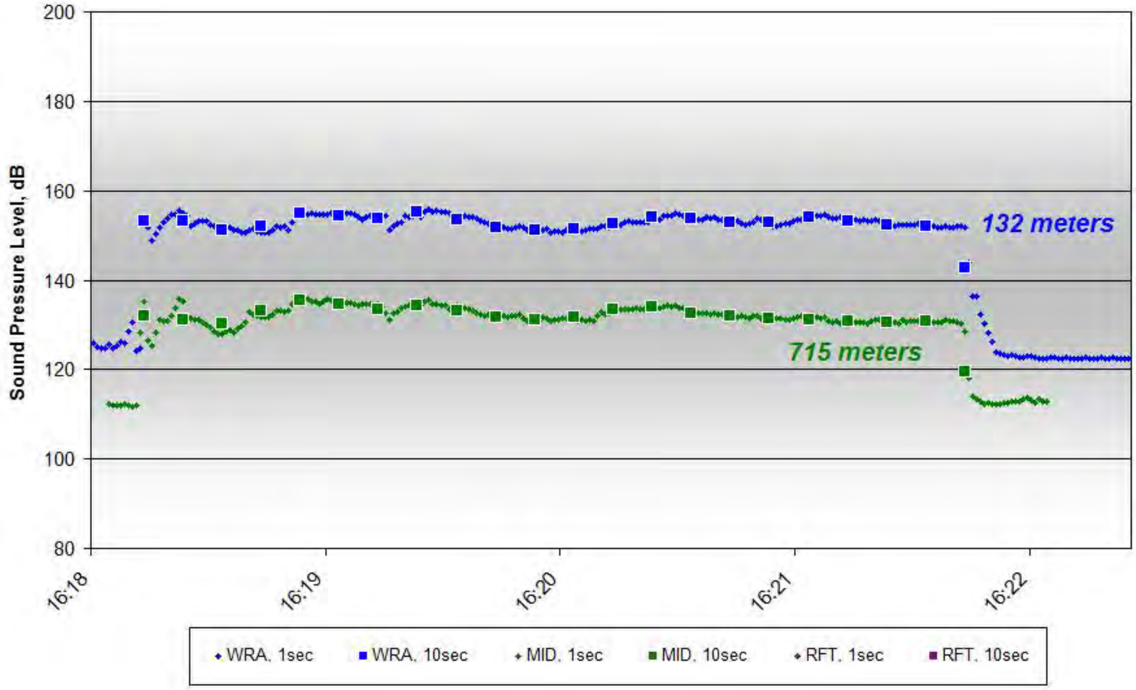

Figure B519. One-second and 10-second Average Data for W6, 16:18-16:21, Measured at Depths of 17-30 meters on October 21, 2011

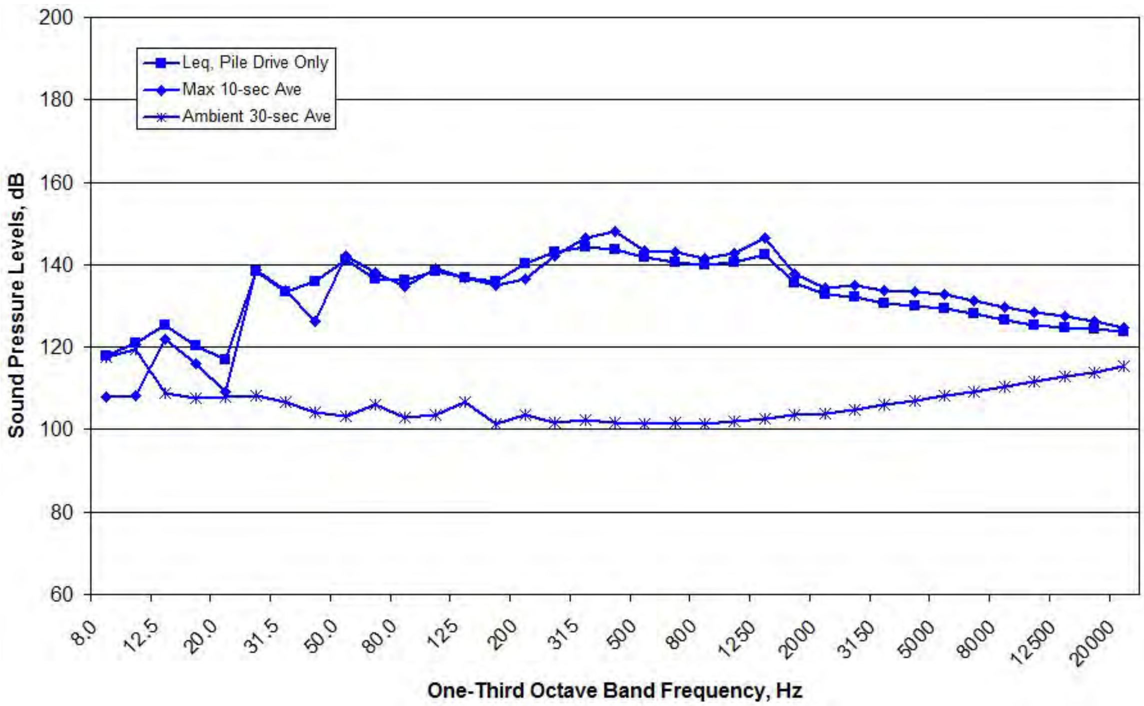

Figure B520. Spectral Data Measured at the WRA Location during W6, 16:18-16:21, Measured at Depths of 30 meters on October 21, 2011

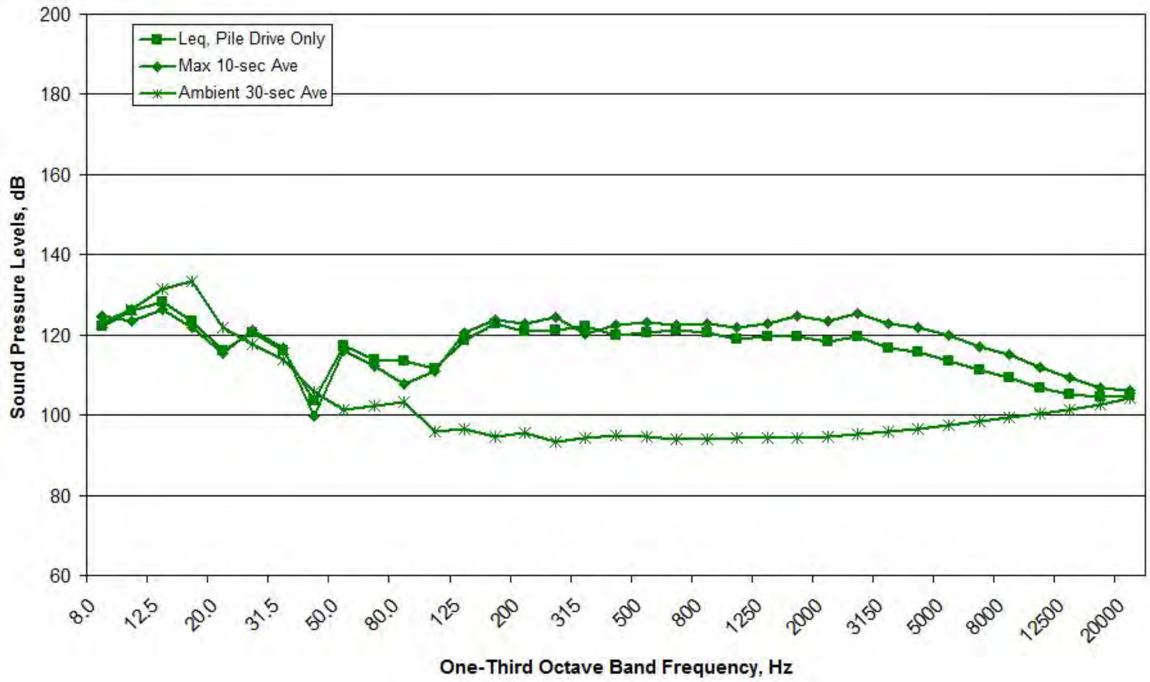

Figure B521. Spectral Data Measured at the MID Location during W6, 16:18-16:21, Measured at Depths of 30 meters on October 21, 2011

NO DATA AVAILABLE

Figure B522. Spectral Data Measured at the RFT Location during W6, 16:18-16:21, Measured at Depths of 17 meters on October 21, 2011

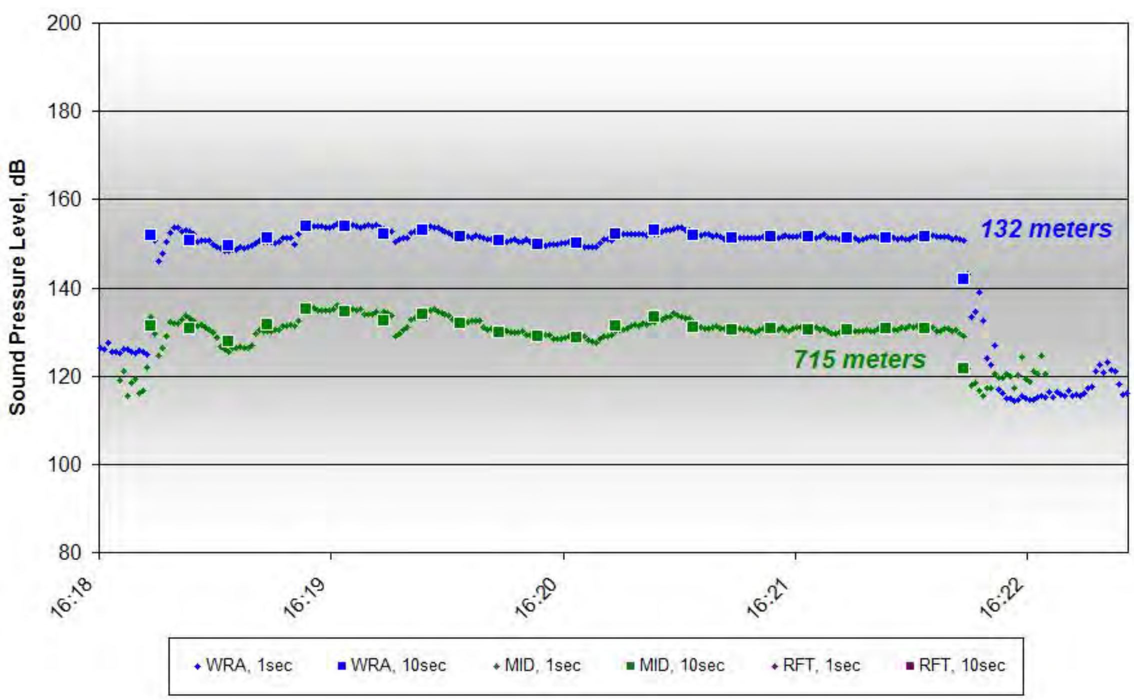

Figure B523. One-second and 10-second Average Data for W6, 16:18-16:21, Measured at Depths of 10 meters on October 21, 2011

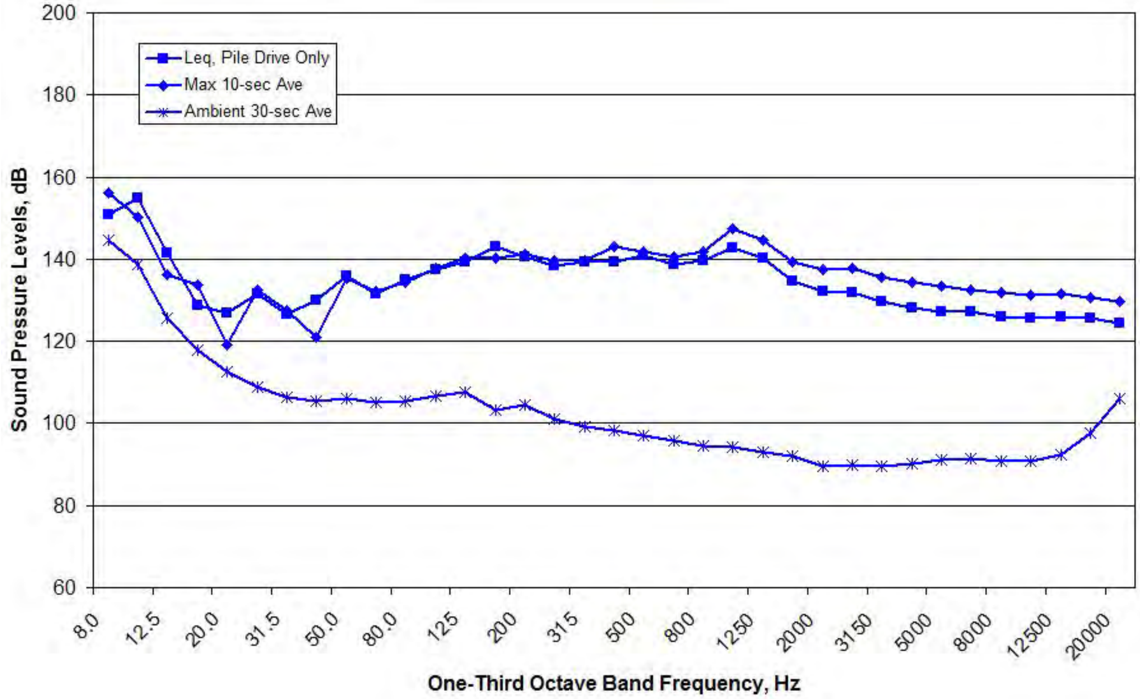

Figure B524. Spectral Data Measured at the WRA Location during W6, 16:18-16:21, Measured at Depths of 10 meters on October 21, 2011

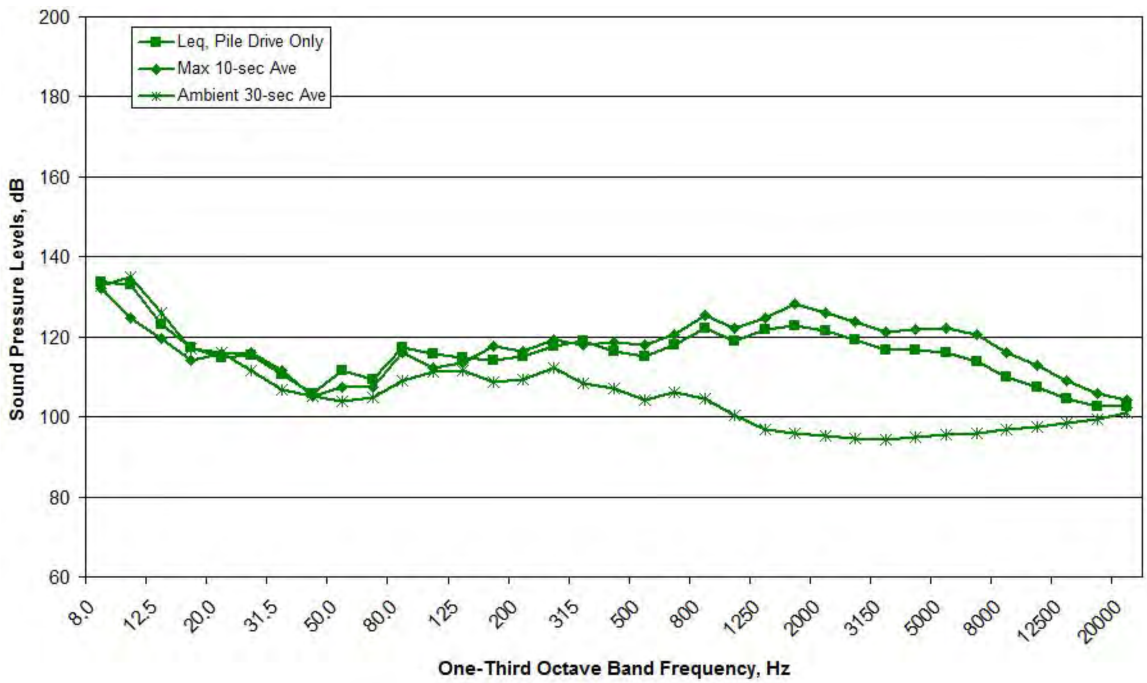

Figure B525. Spectral Data Measured at the MID Location during W6, 16:18-16:21, Measured at Depths of 10 meters on October 21, 2011

NO DATA AVAILABLE

Figure B526. Spectral Data Measured at the RFT Location during W6, 16:18-16:21, Measured at Depths of 10 meters on October 21, 2011

10/27/2011 – W7 (Vibratory Installation)

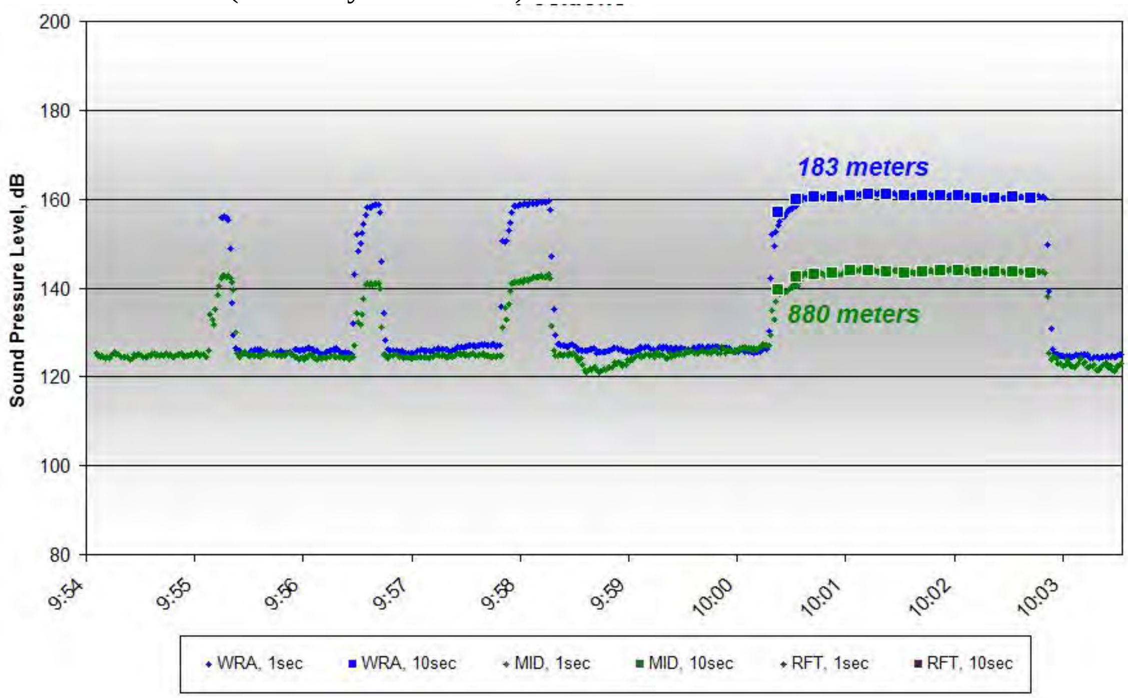

Figure B527. One-second and 10-second Average Data for W7, 9:55-10:03, Measured at Depths of 17-30 meters on October 27, 2011

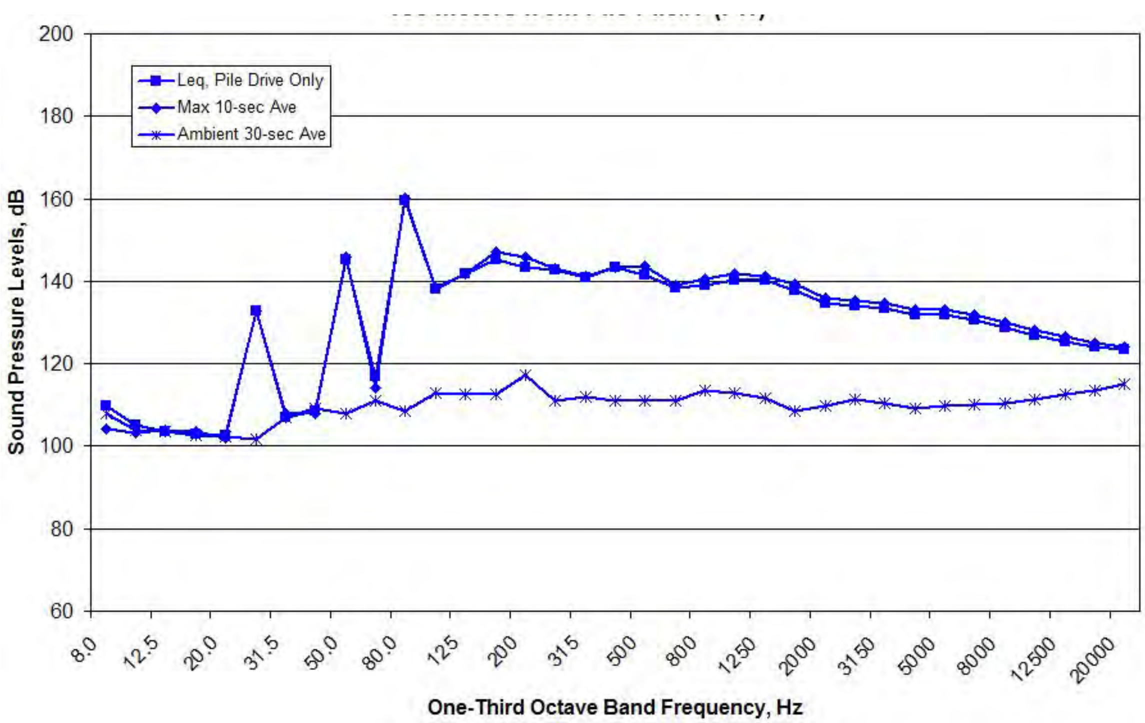

Figure B528. Spectral Data Measured at the WRA Location during W7, 9:55-10:03, Measured at Depths of 30 meters on October 27, 2011

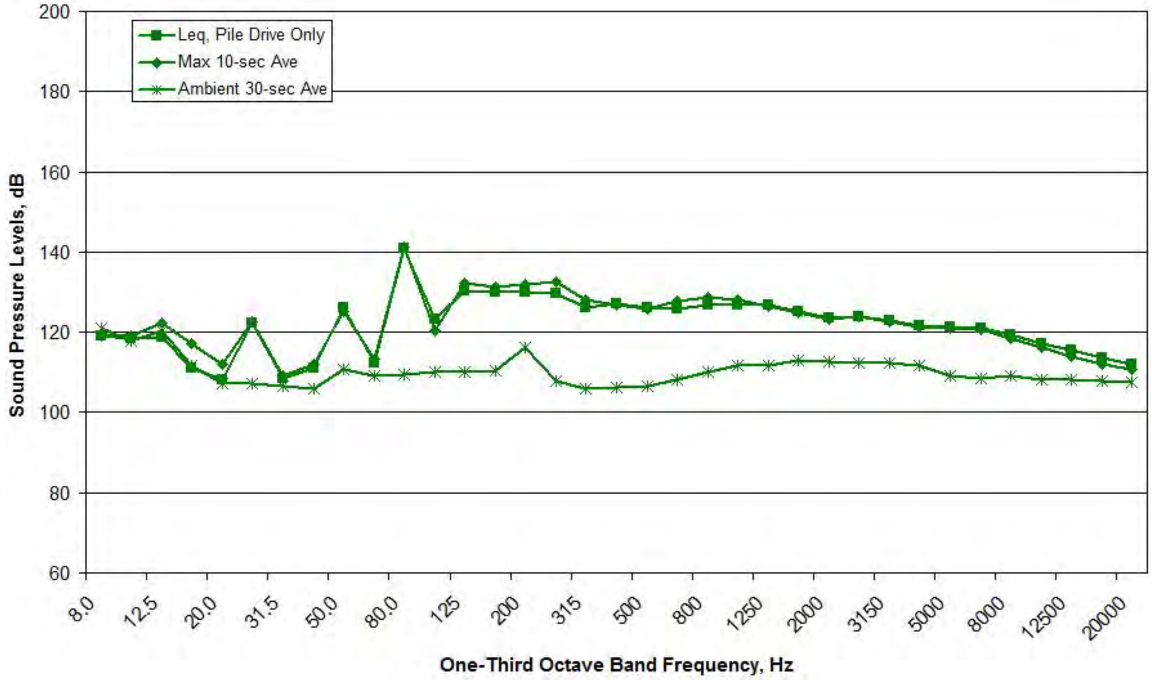

Figure B529. Spectral Data Measured at the MID Location during W7, 9:55-10:03, Measured at Depths of 30 meters on October 27, 2011

NO DATA AVAILABLE

Figure B530. Spectral Data Measured at the RFT Location during W7, 9:55-10:03, Measured at Depths of 17 meters on October 27, 2011

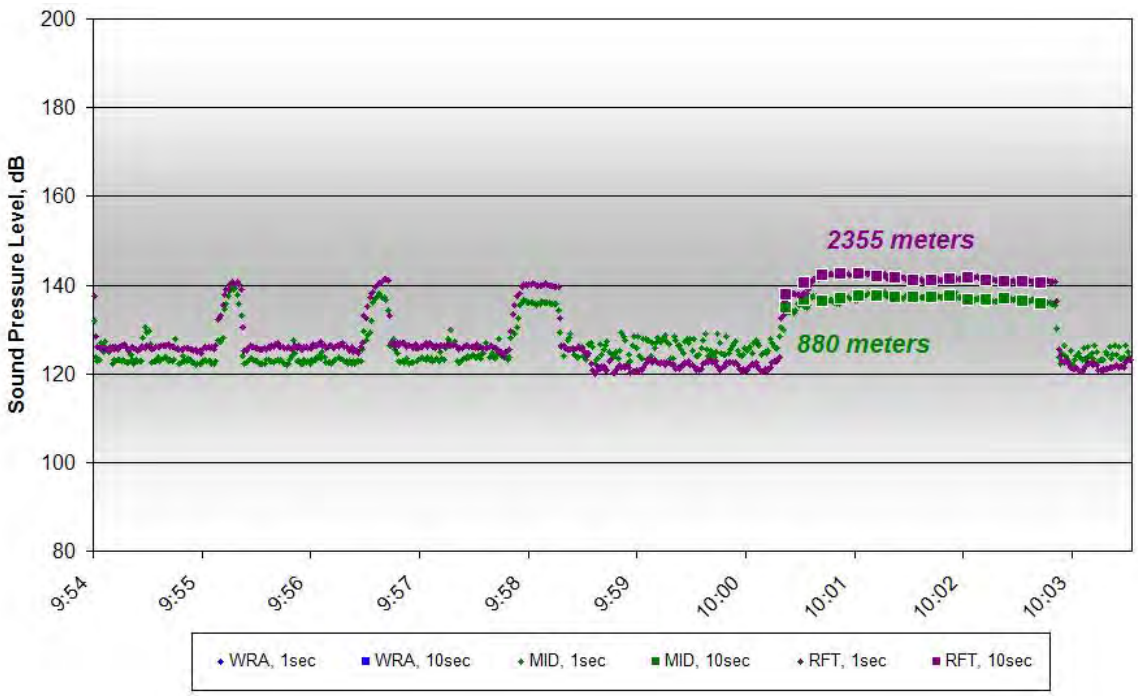

Figure B531. One-second and 10-second Average Data for W7, 9:55-10:03, Measured at Depths of 10 meters on October 27, 2011

NO DATA AVAILABLE

Figure B532. Spectral Data Measured at the WRA Location during W7, 9:55-10:03, Measured at Depths of 10 meters on October 27, 2011

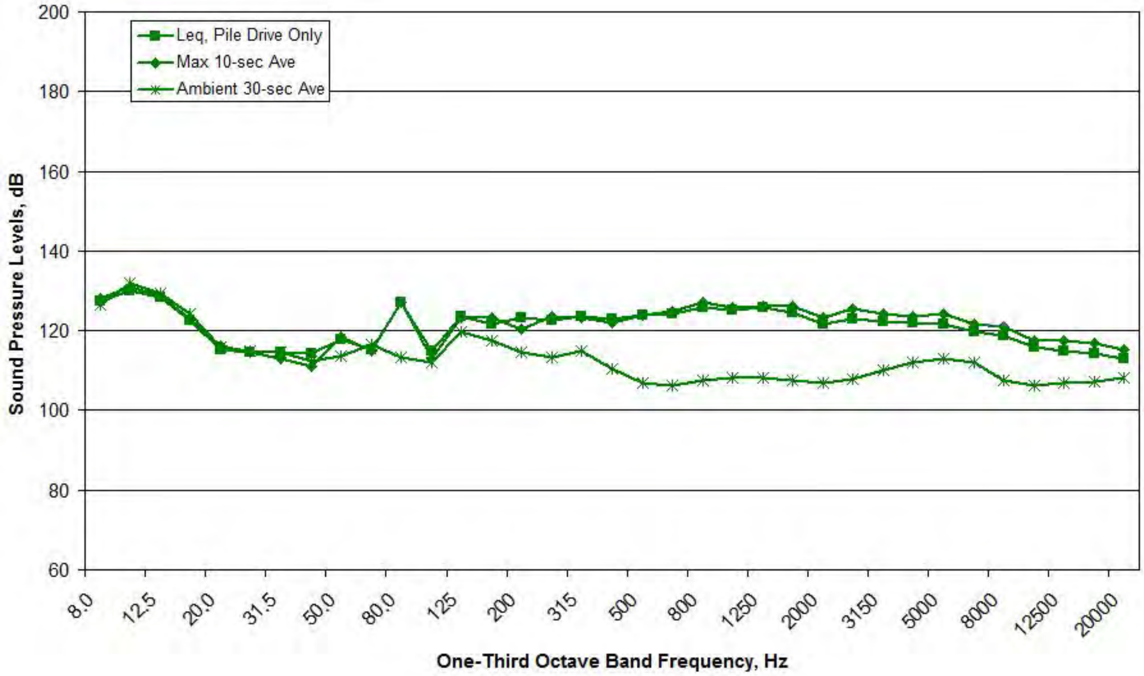

Figure B533. Spectral Data Measured at the MID Location during W7, 9:55-10:03, Measured at Depths of 10 meters on October 27, 2011

NO SPECTRA DATA AVAILABLE

Figure B534. Spectral Data Measured at the RFT Location during W7, 9:55-10:03, Measured at Depths of 10 meters on October 27, 2011

W9 (Vibratory Installation)

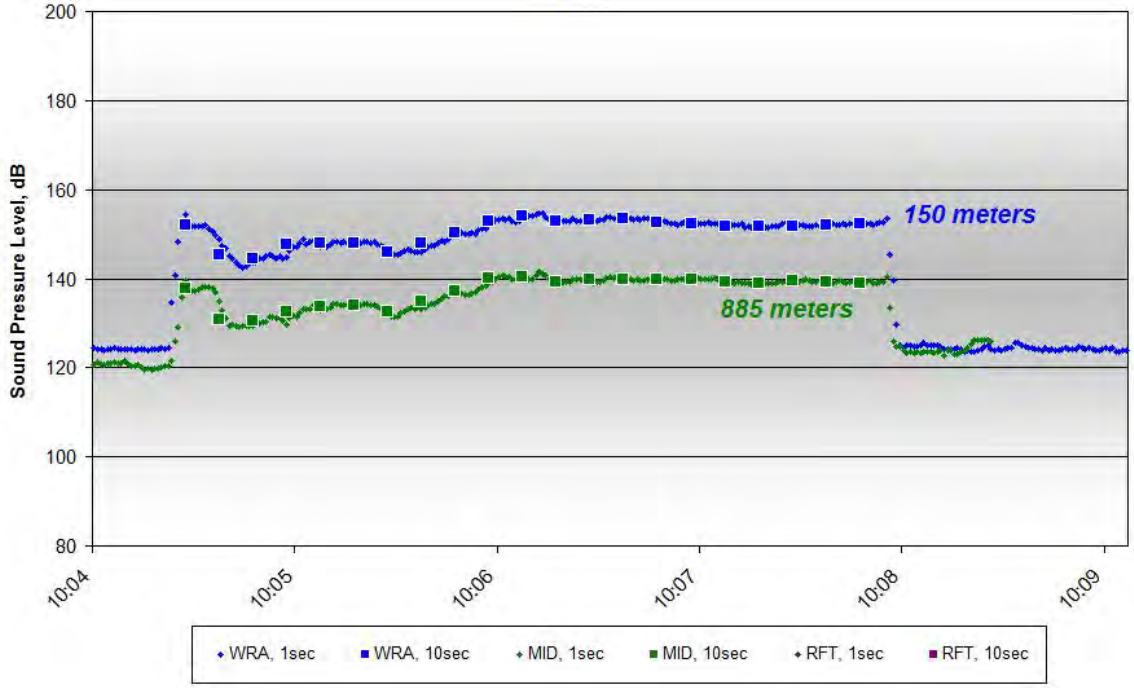

Figure B535. One-second and 10-second Average Data for W9, 10:05-10:08, Measured at Depths of 17-30 meters on October 27, 2011

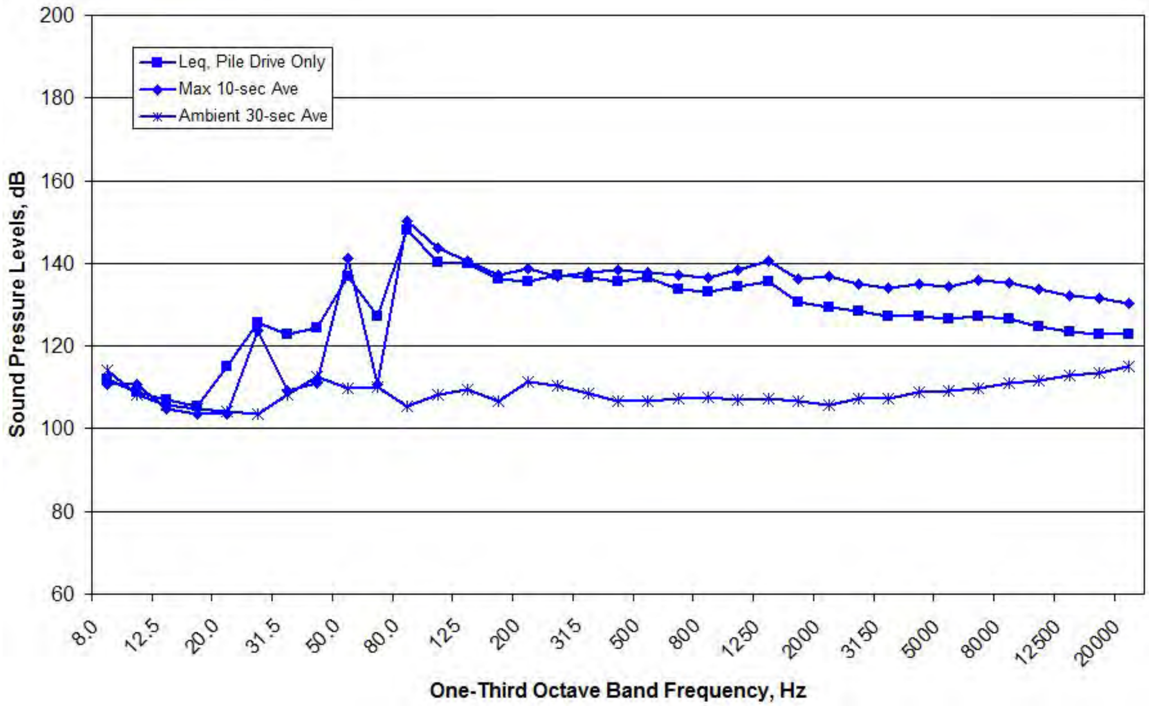

Figure B536. Spectral Data Measured at the WRA Location during W9, 10:05-10:08, Measured at Depths of 30 meters on October 27, 2011

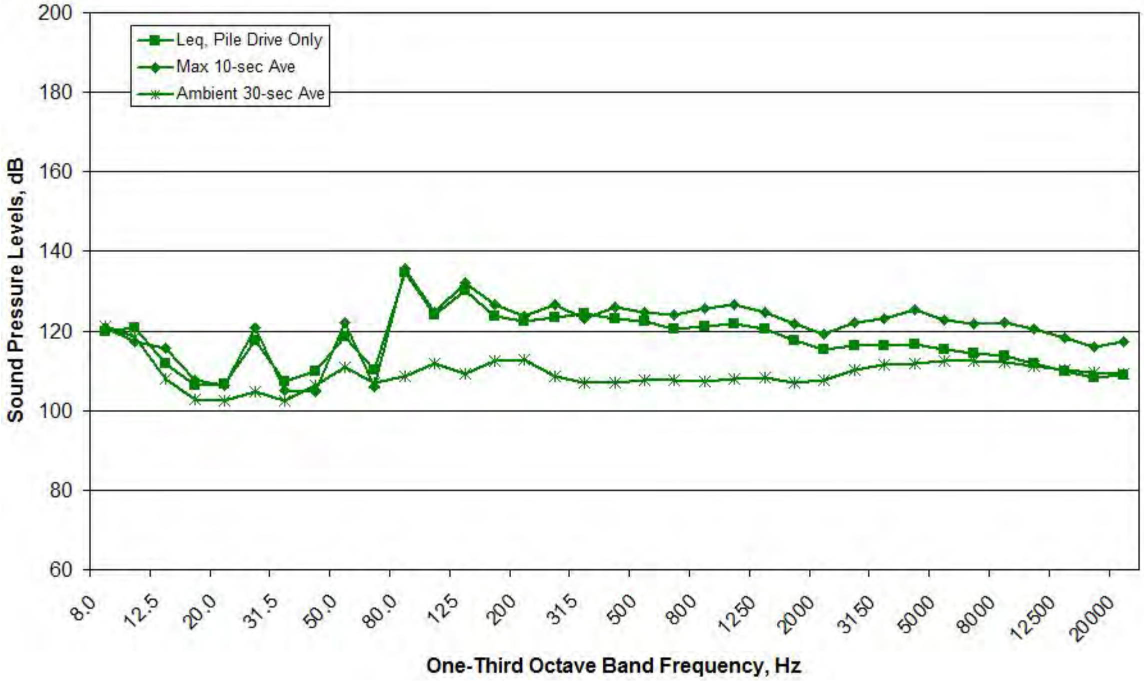

Figure B537. Spectral Data Measured at the MID Location during W9, 10:05-10:08, Measured at Depths of 30 meters on October 27, 2011

NO DATA AVAILABLE

Figure B538. Spectral Data Measured at the RFT Location during W9, 10:05-10:08, Measured at Depths of 17 meters on October 27, 2011

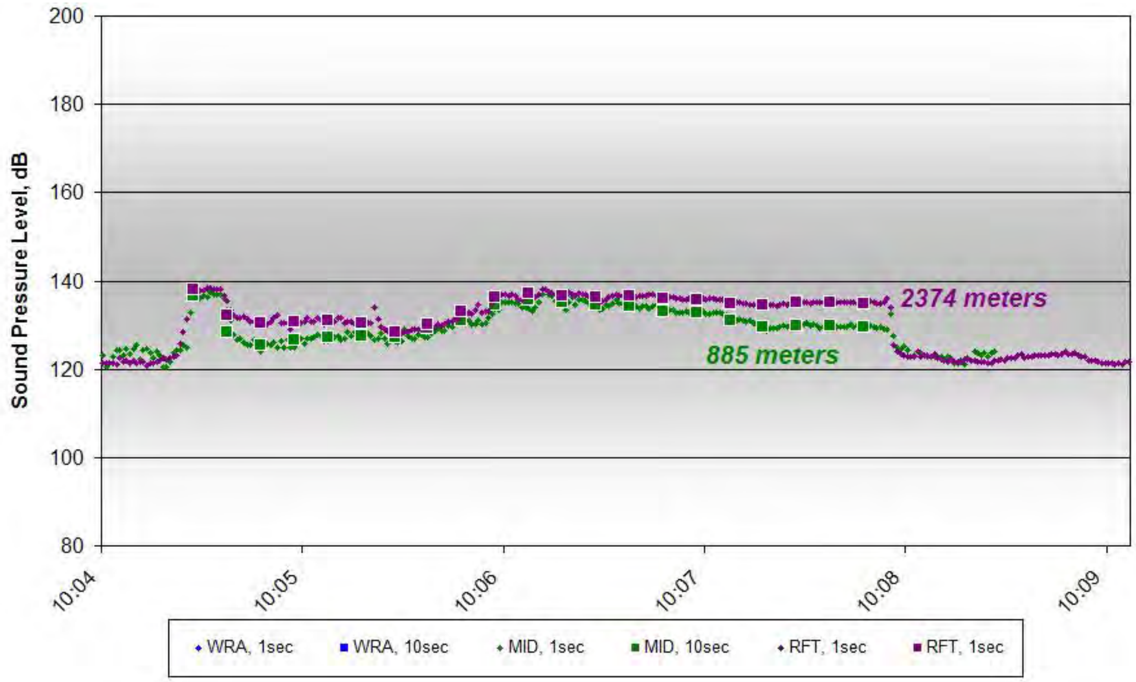

Figure B539. One-second and 10-second Average Data for W9, 10:05-10:08, Measured at Depths of 10 meters on October 27, 2011

NO DATA AVAILABLE

Figure B540. Spectral Data Measured at the WRA Location during W9, 10:05-10:08, Measured at Depths of 10 meters on October 27, 2011

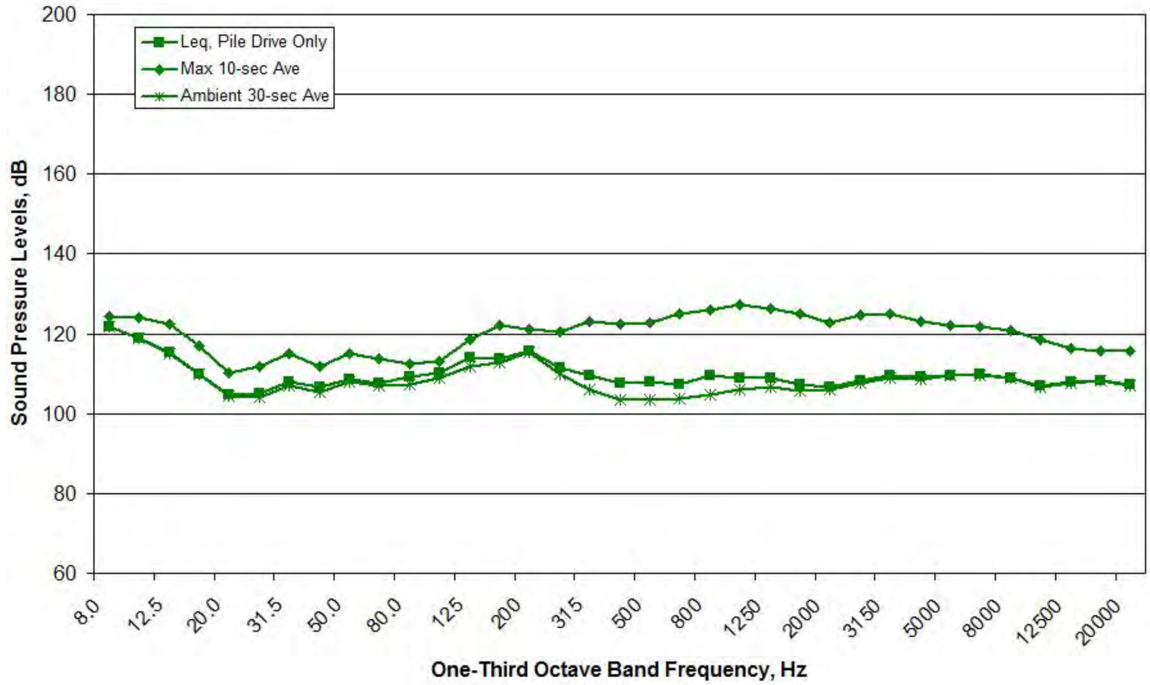

Figure B541. Spectral Data Measured at the MID Location during W9, 10:05-10:08, Measured at Depths of 10 meters on October 27, 2011

NO SPECTRA DATA AVAILABLE

Figure B542. Spectral Data Measured at the RFT Location during W9, 10:05-10:08, Measured at Depths of 10 meters on October 27, 2011

W12 (Vibratory Installation)

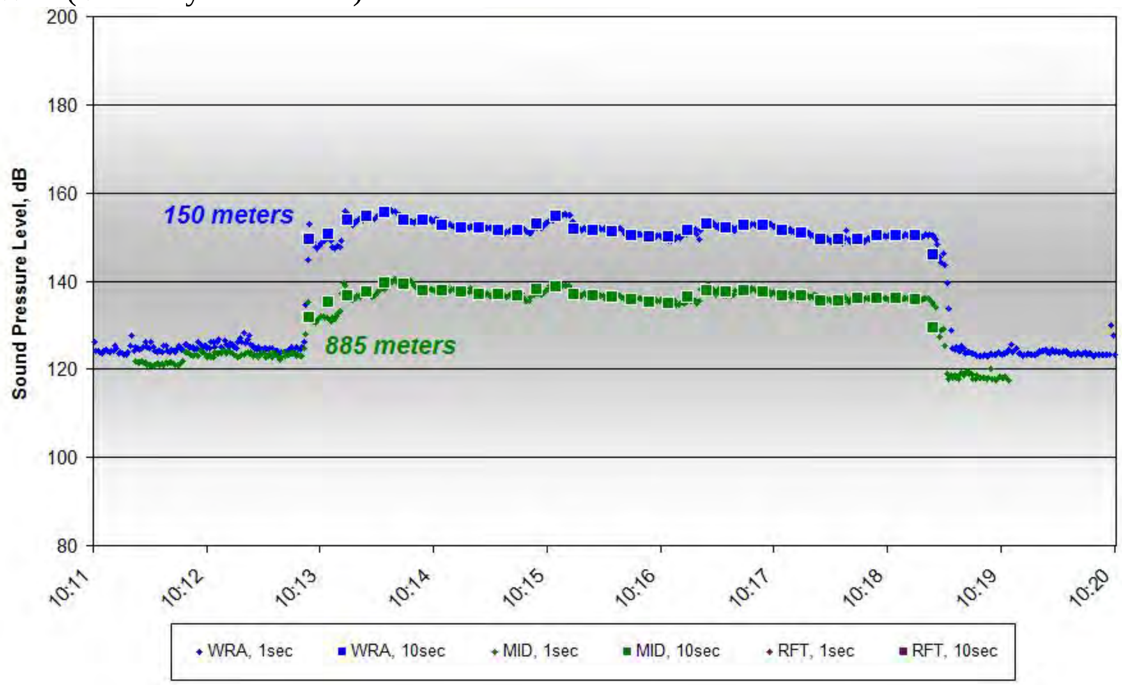

Figure B543. One-second and 10-second Average Data for W12, 10:12-10:18, Measured at Depths of 17-30 meters on October 27, 2011

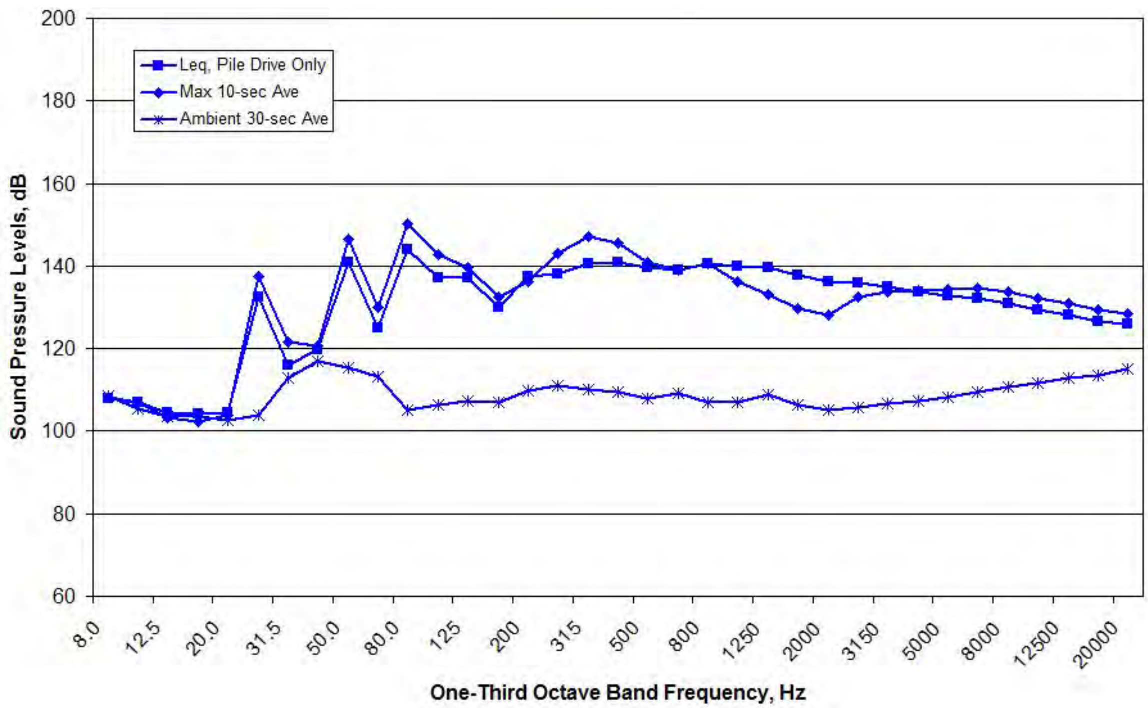

Figure B544. Spectral Data Measured at the WRA Location during W12, 10:12-10:18, Measured at Depths of 30 meters on October 27, 2011

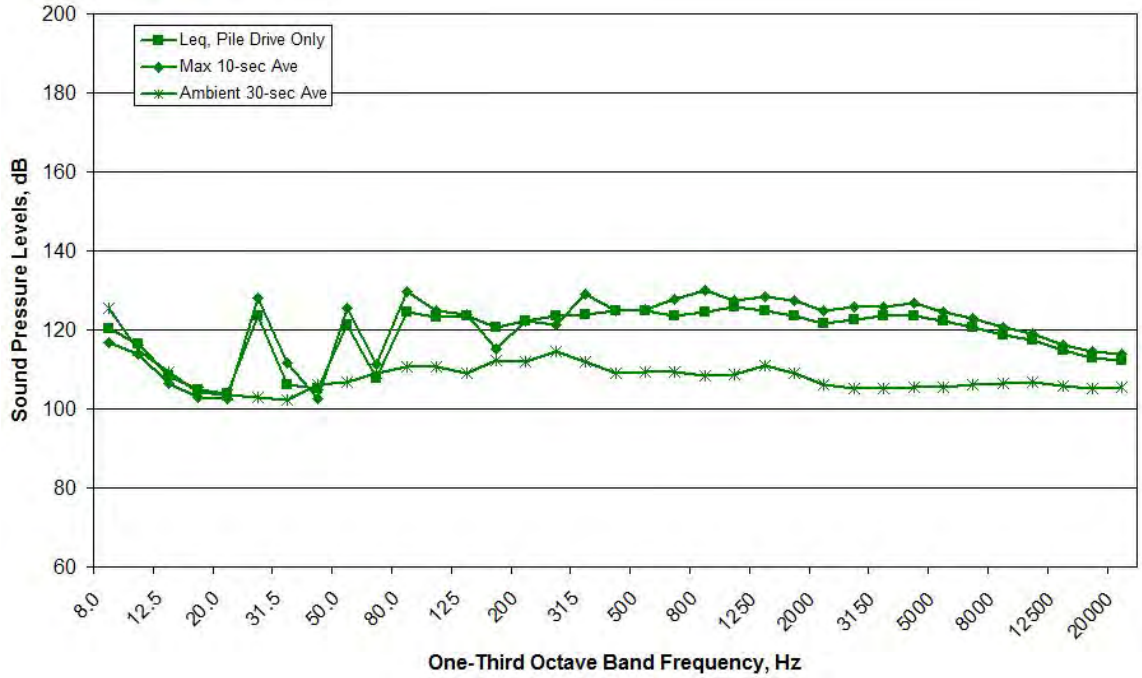

Figure B545. Spectral Data Measured at the MID Location during W12, 10:12-10:18, Measured at Depths of 30 meters on October 27, 2011

NO DATA AVAILABLE

Figure B546. Spectral Data Measured at the RFT Location during W12, 10:12-10:18, Measured at Depths of 17 meters on October 27, 2011

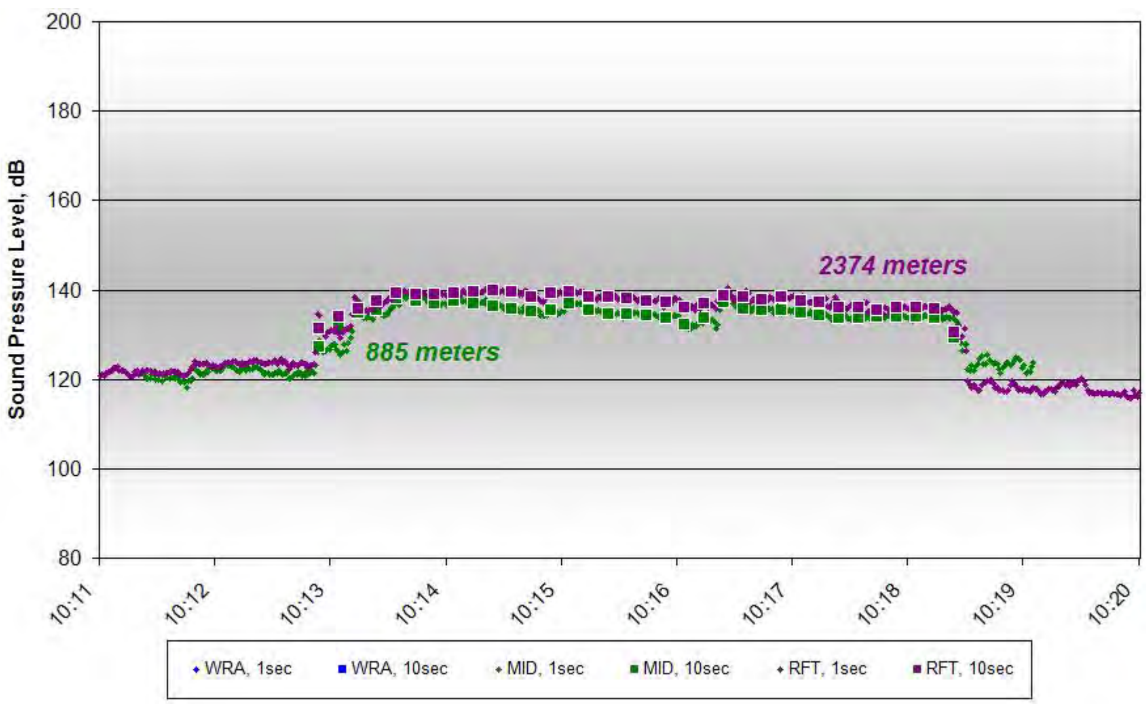

Figure B547. One-second and 10-second Average Data for W12, 10:12-10:18, Measured at Depths of 10 meters on October 27, 2011

NO DATA AVAILABLE

Figure B548. Spectral Data Measured at the WRA Location during W12, 10:12-10:18, Measured at Depths of 10 meters on October 27, 2011

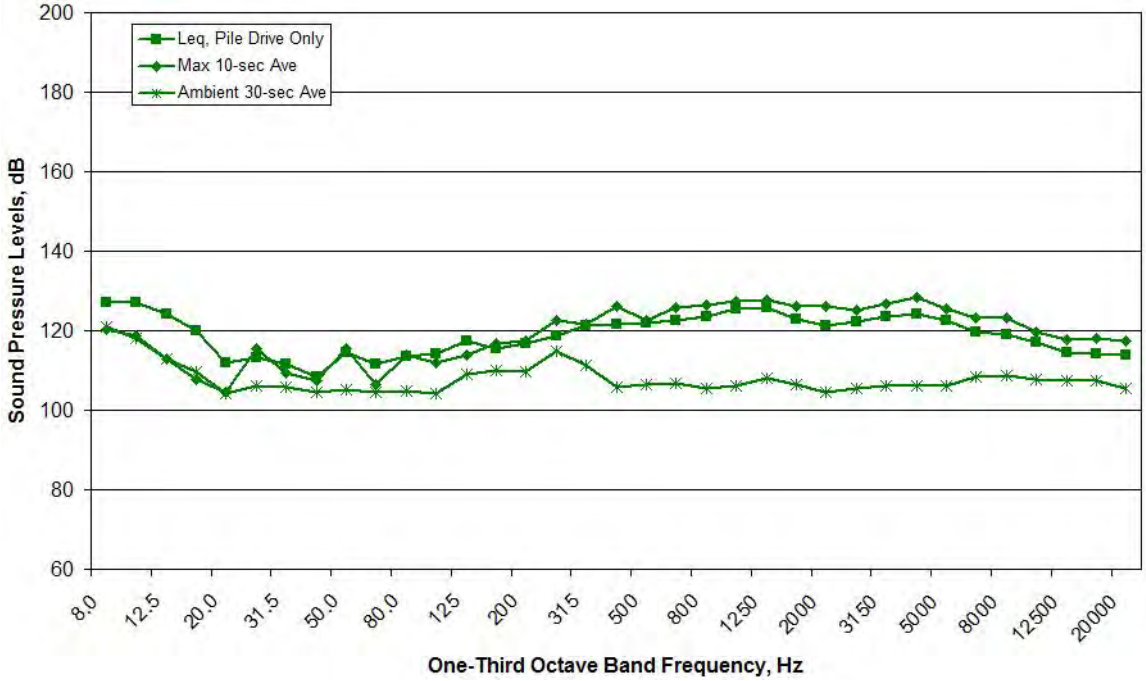

Figure B549. Spectral Data Measured at the MID Location during W12, 10:12-10:18, Measured at Depths of 10 meters on October 27, 2011

NO SPECTRA DATA AVAILABLE

Figure B550. Spectral Data Measured at the RFT Location during W12, 10:12-10:18, Measured at Depths of 10 meters on October 27, 2011

W11 (Vibratory Installation)

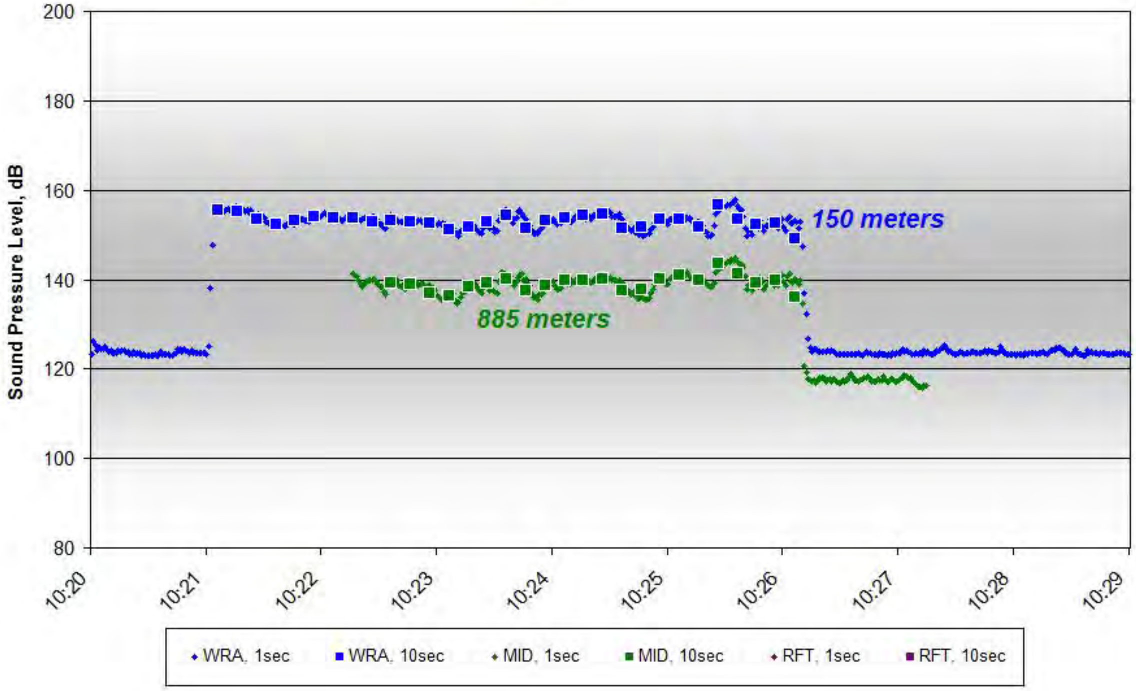

Figure B551. One-second and 10-second Average Data for W11, 10:21-10:26, Measured at Depths of 17-30 meters on October 27, 2011

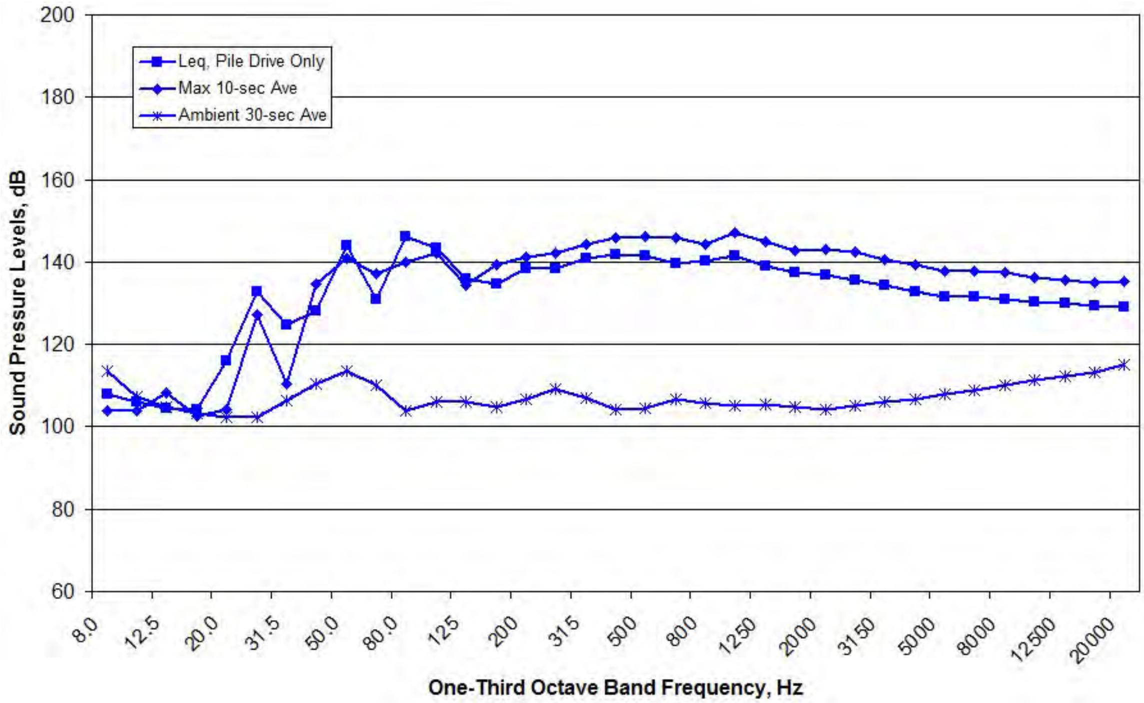

Figure B552. Spectral Data Measured at the WRA Location during W11, 10:21-10:26, Measured at Depths of 30 meters on October 27, 2011

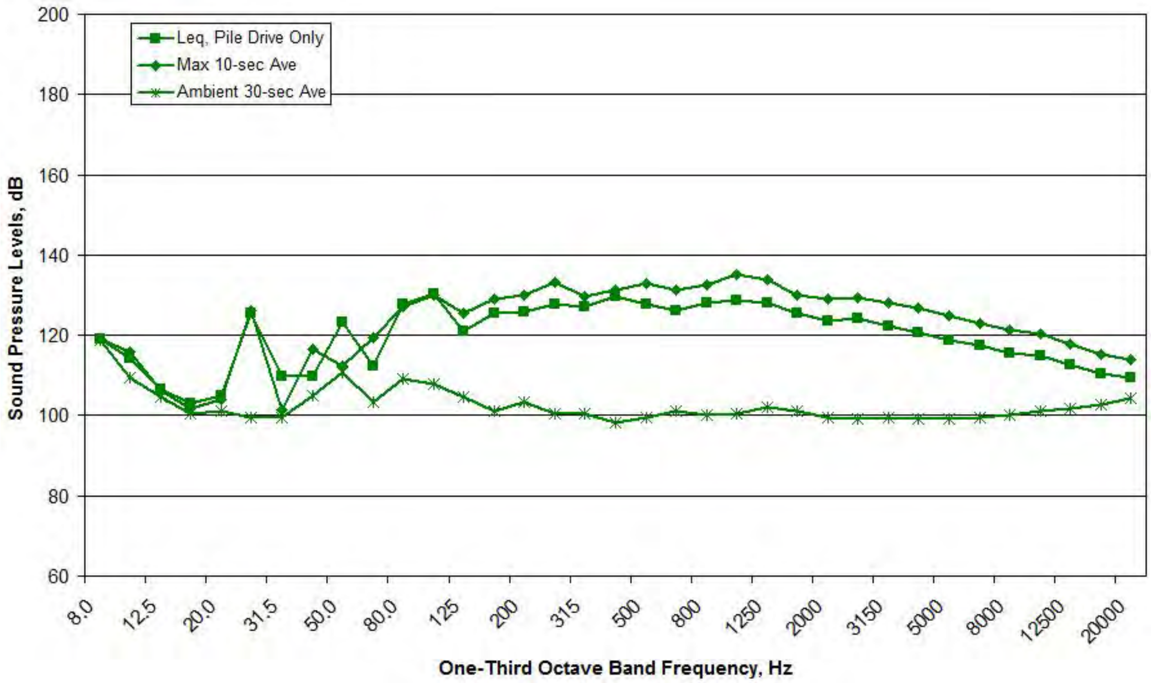

Figure B553. Spectral Data Measured at the MID Location during W11, 10:21-10:26, Measured at Depths of 30 meters on October 27, 2011

NO DATA AVAILABLE

Figure B554. Spectral Data Measured at the RFT Location during W11, 10:21-10:26, Measured at Depths of 17 meters on October 27, 2011

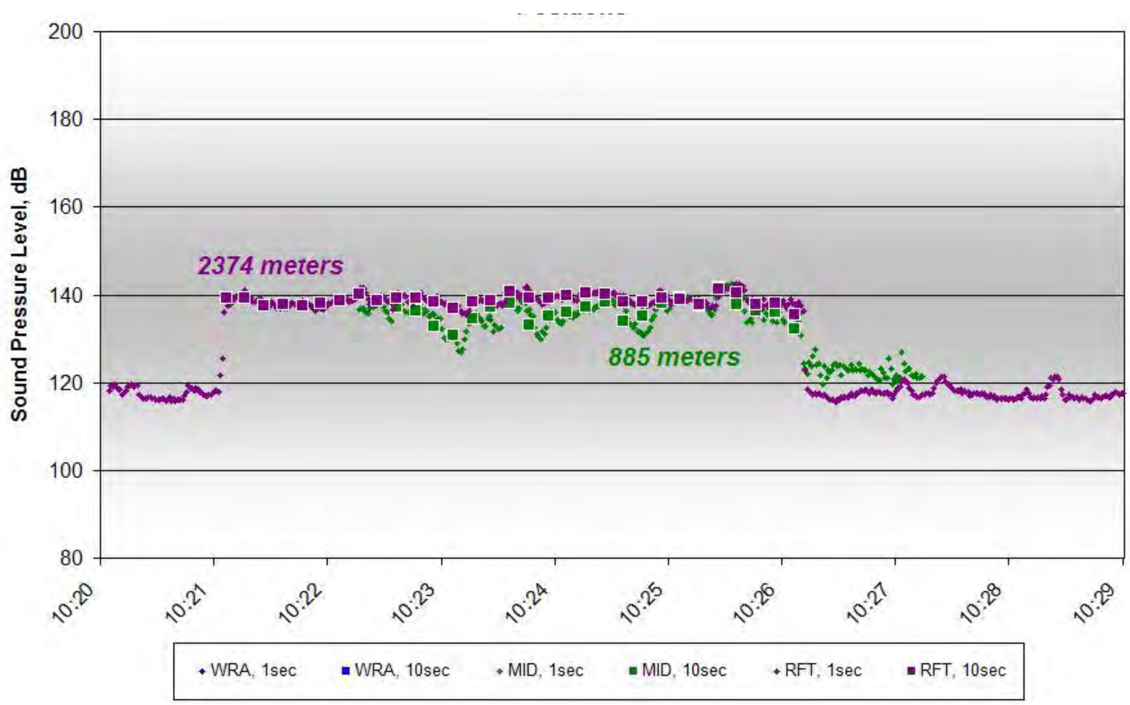

Figure B555. One-second and 10-second Average Data for W11, 10:21-10:26, Measured at Depths of 10 meters on October 27, 2011

NO DATA AVAILABLE

Figure B556. Spectral Data Measured at the WRA Location during W11, 10:21-10:26, Measured at Depths of 10 meters on October 27, 2011

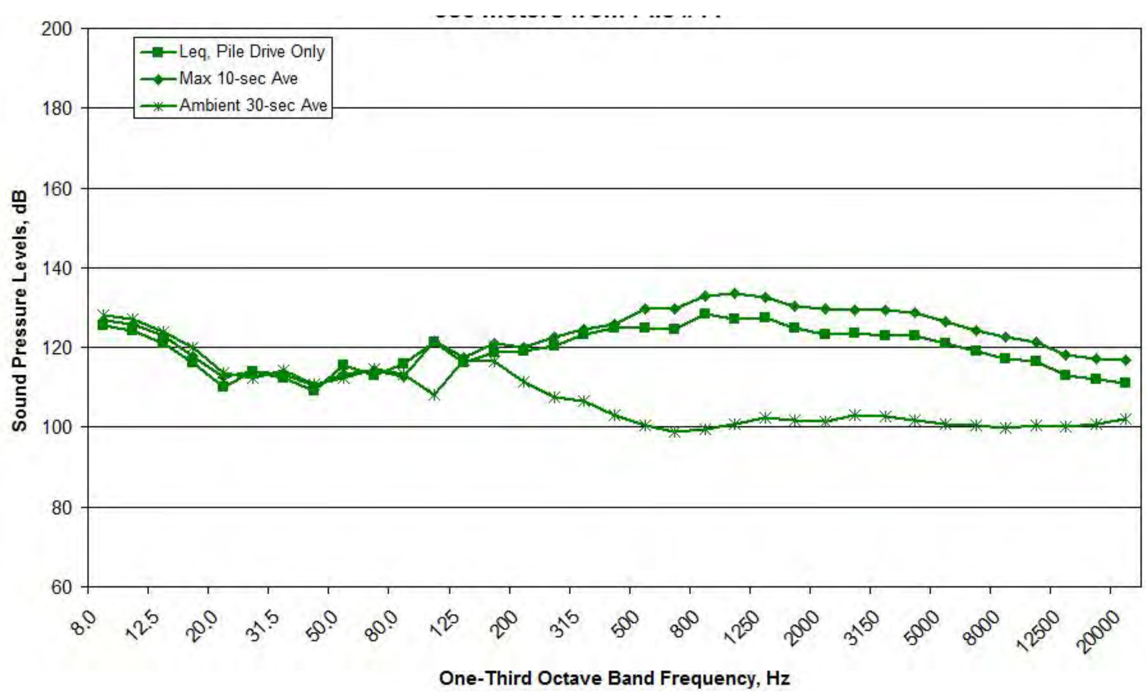

Figure B557. Spectral Data Measured at the MID Location during W11, 10:21-10:26, Measured at Depths of 10 meters on October 27, 2011

NO SPECTRA DATA AVAILABLE

Figure B558. Spectral Data Measured at the RFT Location during W11, 10:21-10:26, Measured at Depths of 10 meters on October 27, 2011

EX3, 11:24-11:25 (Vibratory Extraction)

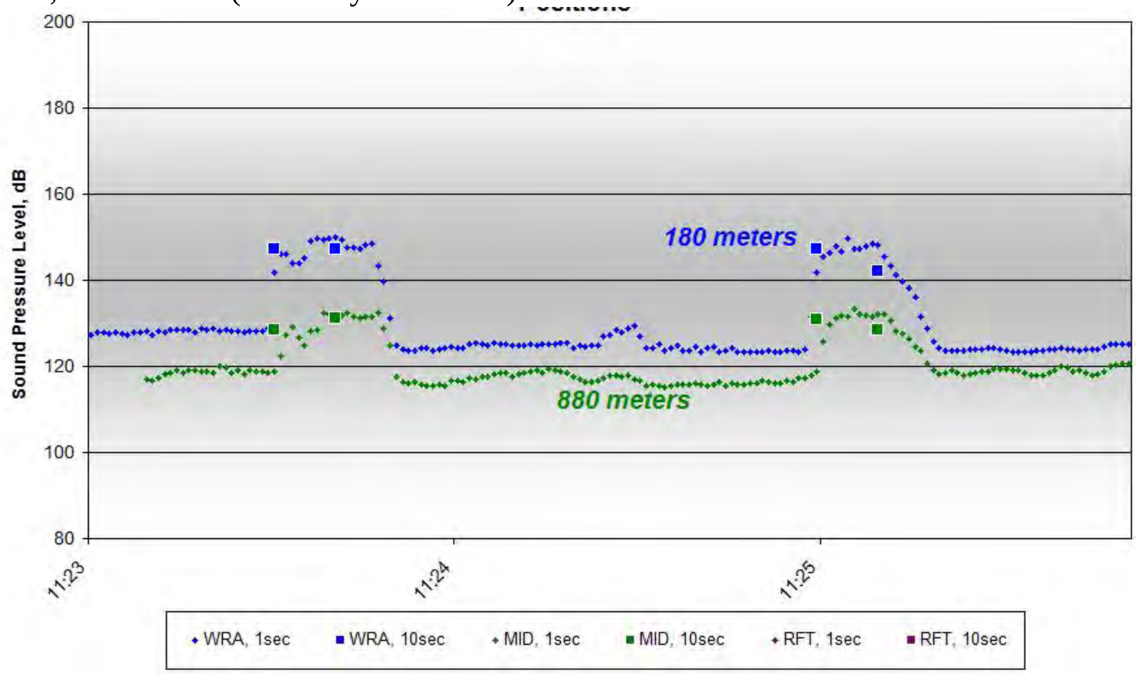

Figure B559. One-second and 10-second Average Data for EX3, 11:24-11:25, Measured at Depths of 17-30 meters on October 27, 2011

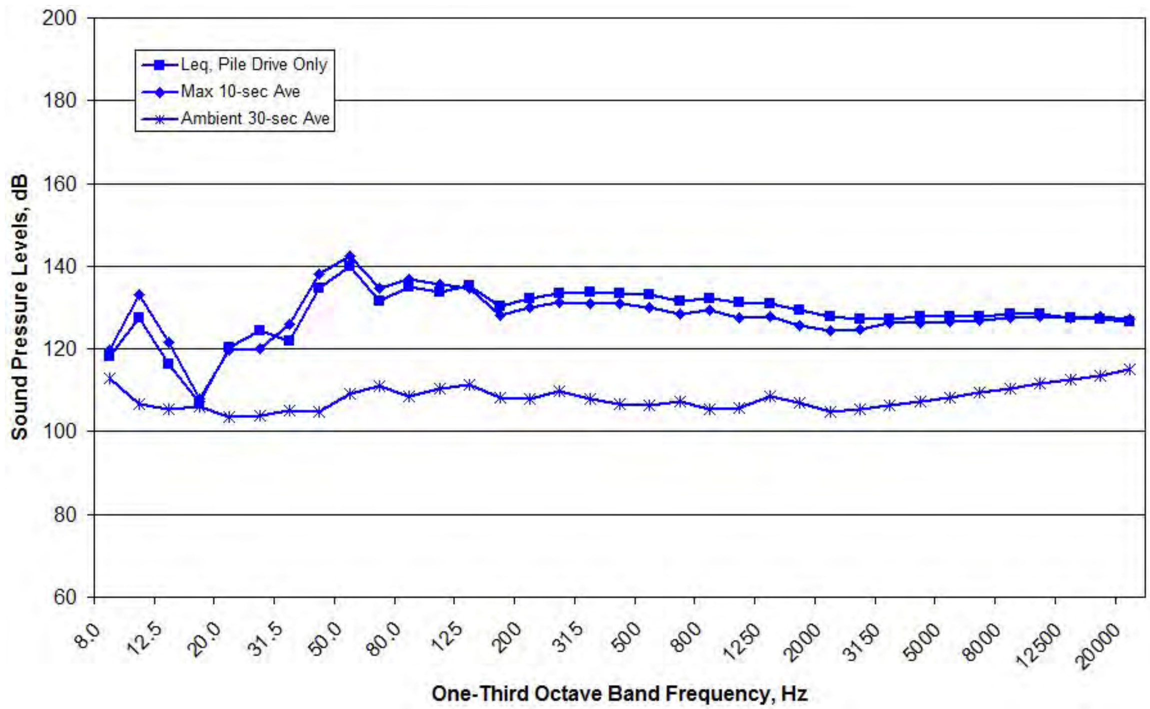

Figure B560. Spectral Data Measured at the WRA Location during EX3, 11:24-11:25, Measured at Depths of 30 meters on October 27, 2011

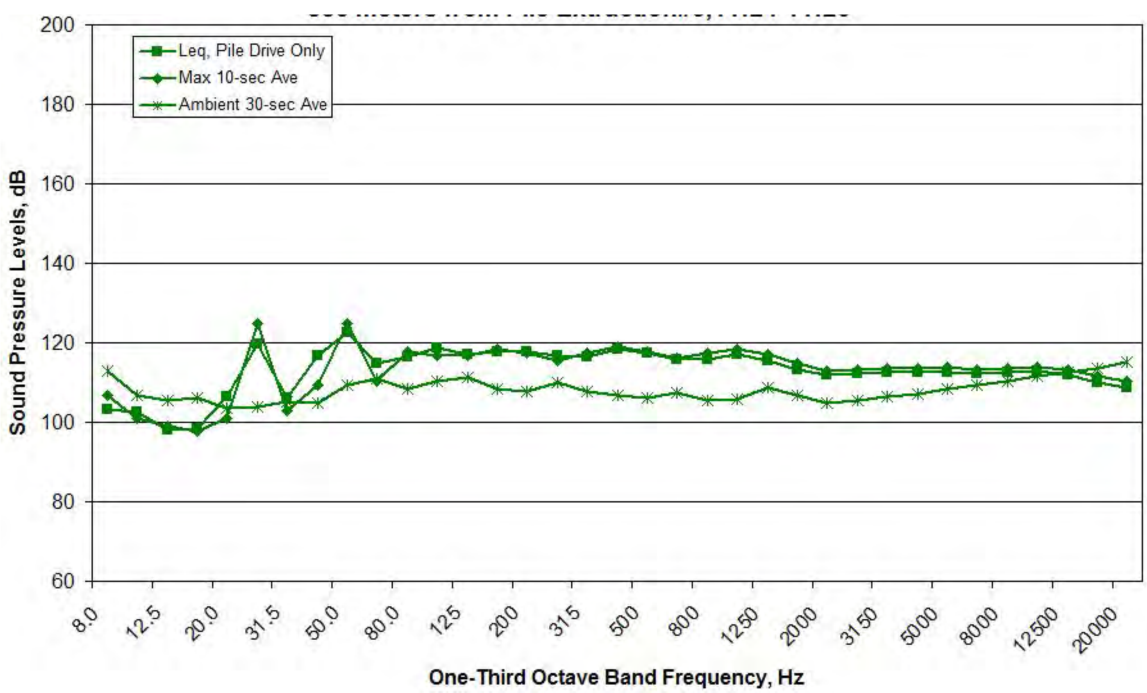

Figure B561. Spectral Data Measured at the MID Location during EX3, 11:24-11:25, Measured at Depths of 30 meters on October 27, 2011

NO DATA AVAILABLE

Figure B562. Spectral Data Measured at the RFT Location during EX3, 11:24-11:25, Measured at Depths of 17 meters on October 27, 2011

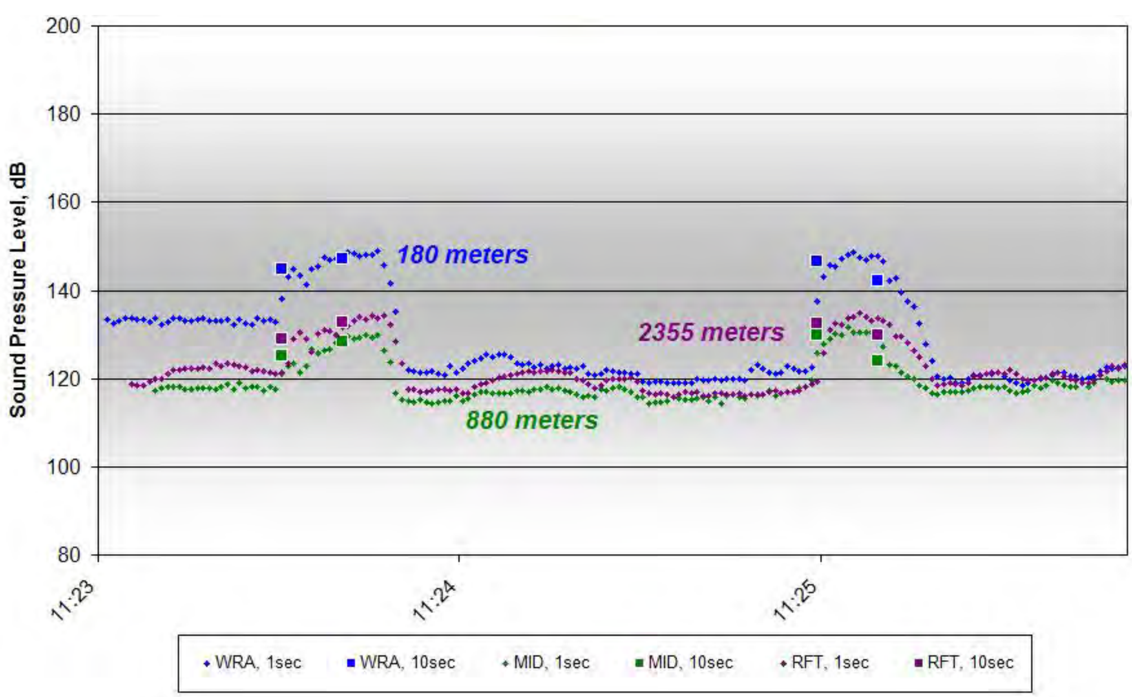

Figure B563. One-second and 10-second Average Data for EX3, 11:24-11:25, Measured at Depths of 10 meters on October 27, 2011

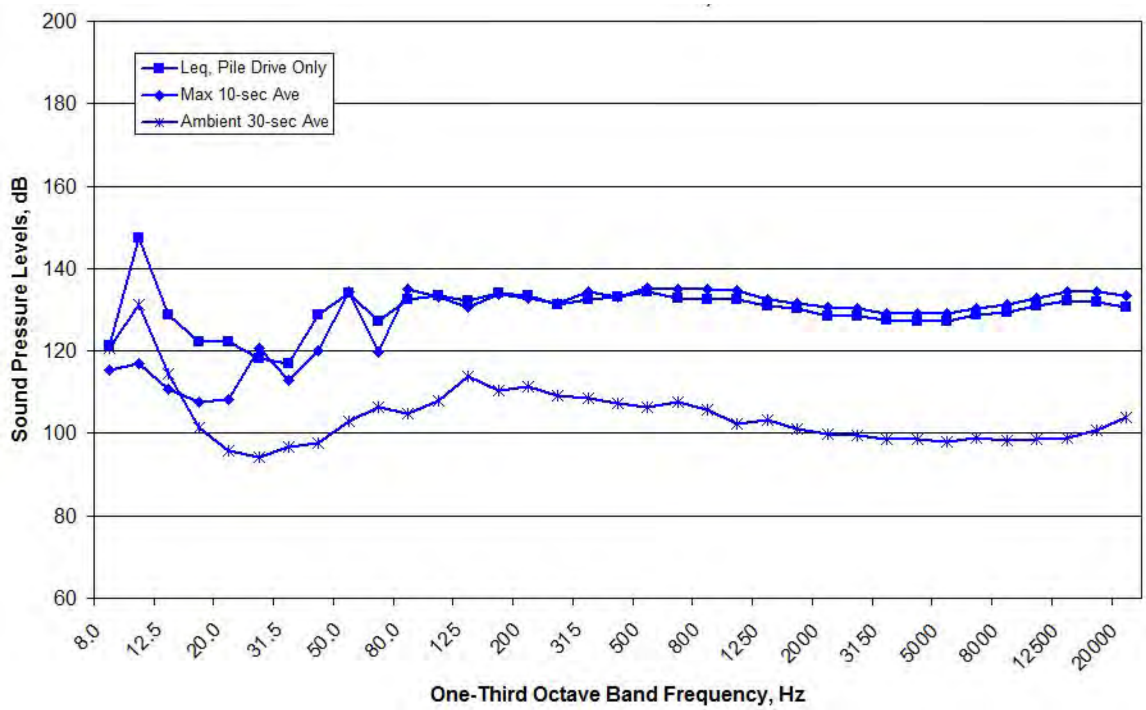

Figure B564. Spectral Data Measured at the WRA Location during EX3, 11:24-11:25, Measured at Depths of 10 meters on October 27, 2011

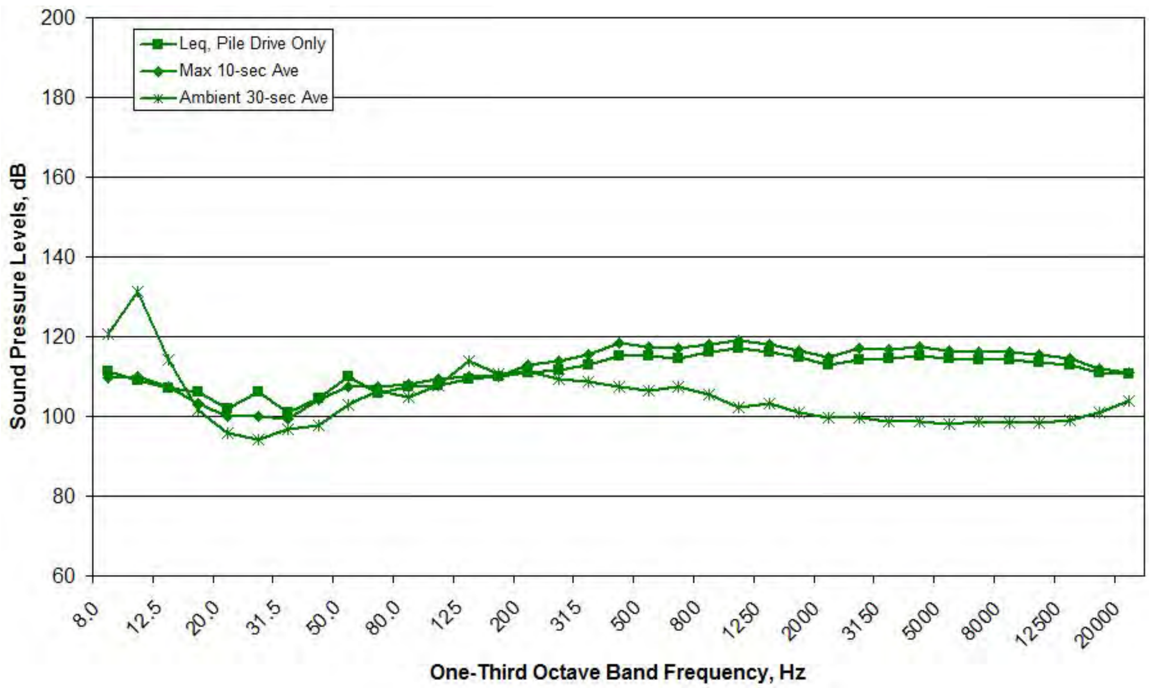

Figure B565. Spectral Data Measured at the MID Location during EX3, 11:24-11:25, Measured at Depths of 10 meters on October 27, 2011

NO SPECTRA DATA AVAILABLE

Figure B566. Spectral Data Measured at the RFT Location during EX3, 11:24-11:256, Measured at Depths of 10 meters on October 27, 2011

EX4 (Vibratory Extraction)

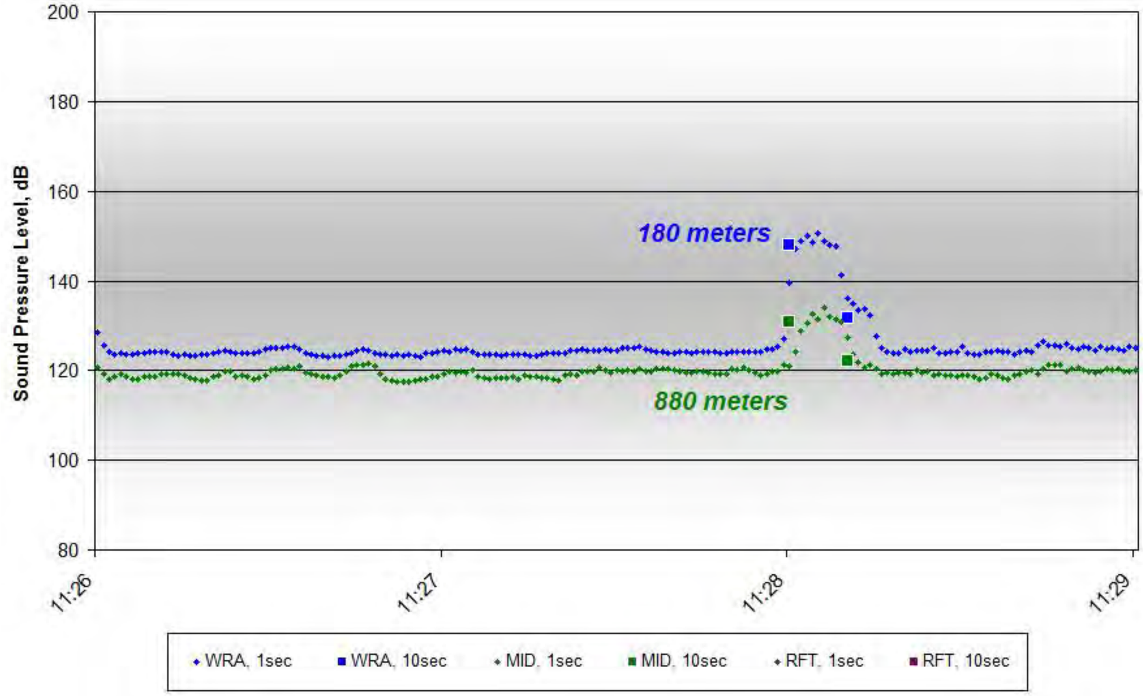

Figure B567. One-second and 10-second Average Data for EX4, 11:28:00-11:28:14, Measured at Depths of 17-30 meters on October 27, 2011

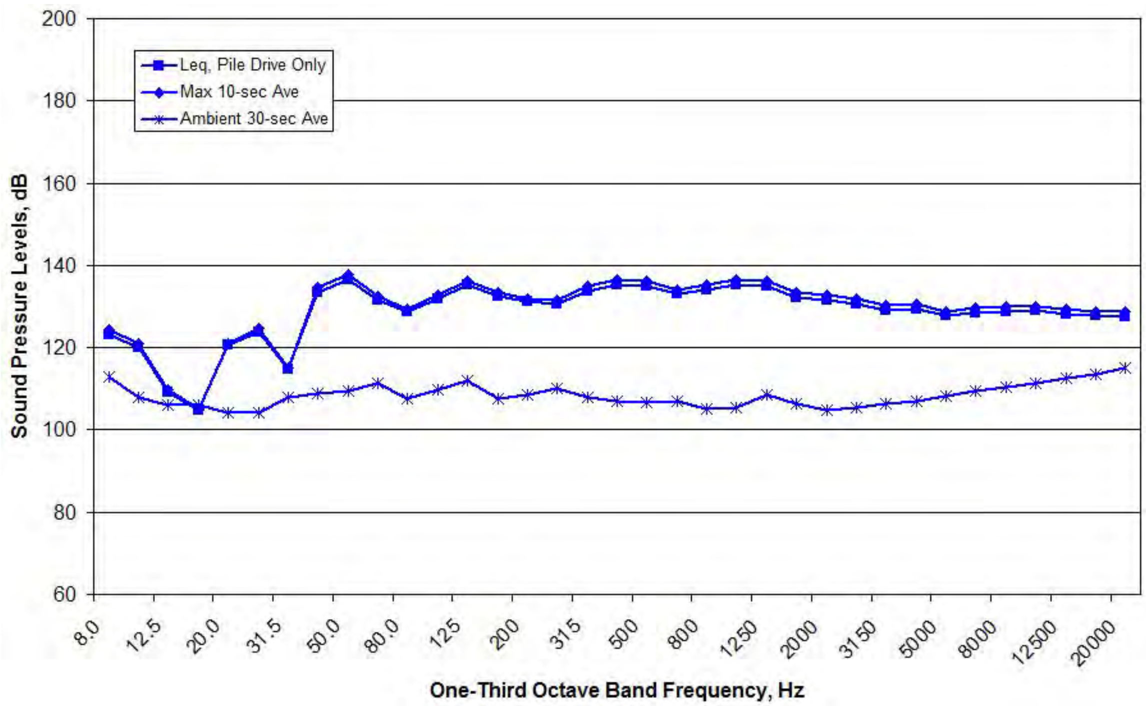

Figure B568. Spectral Data Measured at the WRA Location during EX4, 11:28:00-11:28:14, Measured at Depths of 30 meters on October 27, 2011

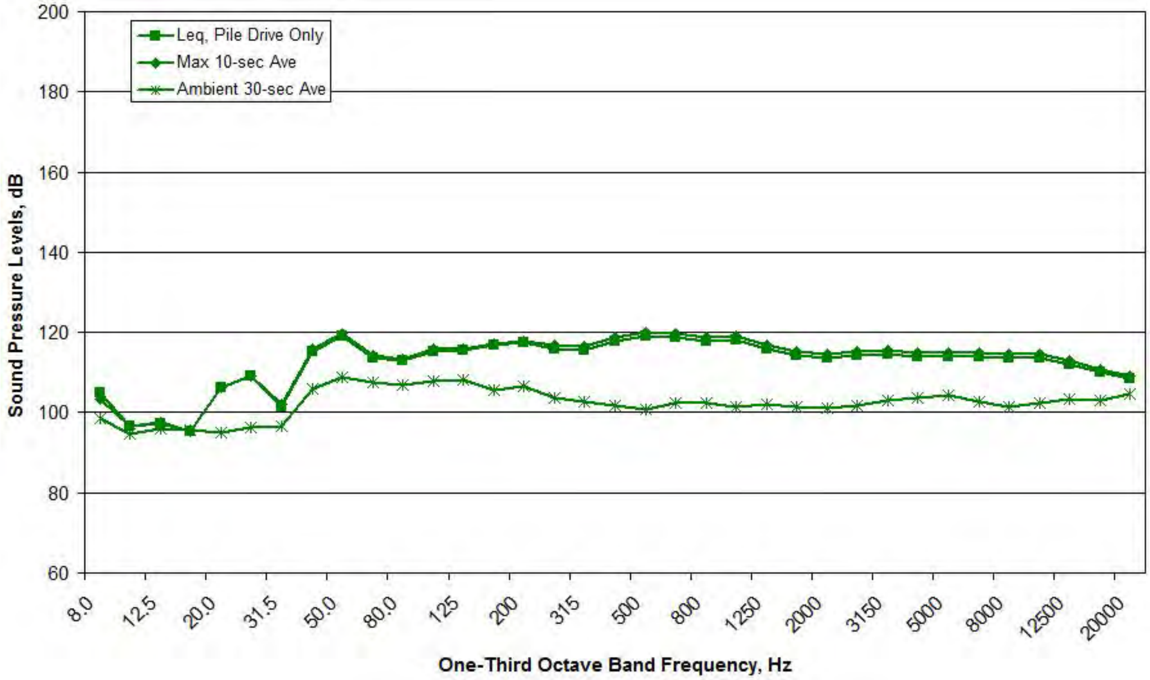

Figure B569. Spectral Data Measured at the MID Location during EX4, 11:28:00-11:28:14, Measured at Depths of 30 meters on October 27, 2011

NO DATA AVAILABLE

Figure B570. Spectral Data Measured at the RFT Location during EX4, 11:28:00-11:28:14, Measured at Depths of 17 meters on October 27, 2011

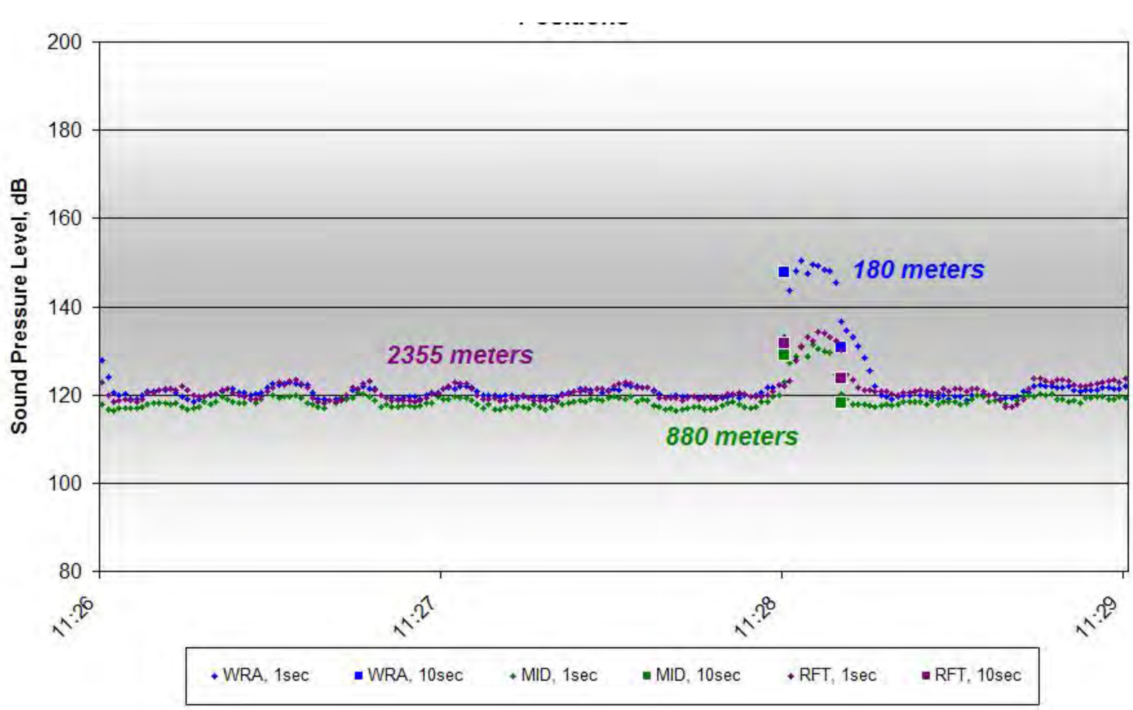

Figure B571. One-second and 10-second Average Data for EX4, 11:28:00-11:28:14, Measured at Depths of 10 meters on October 27, 2011

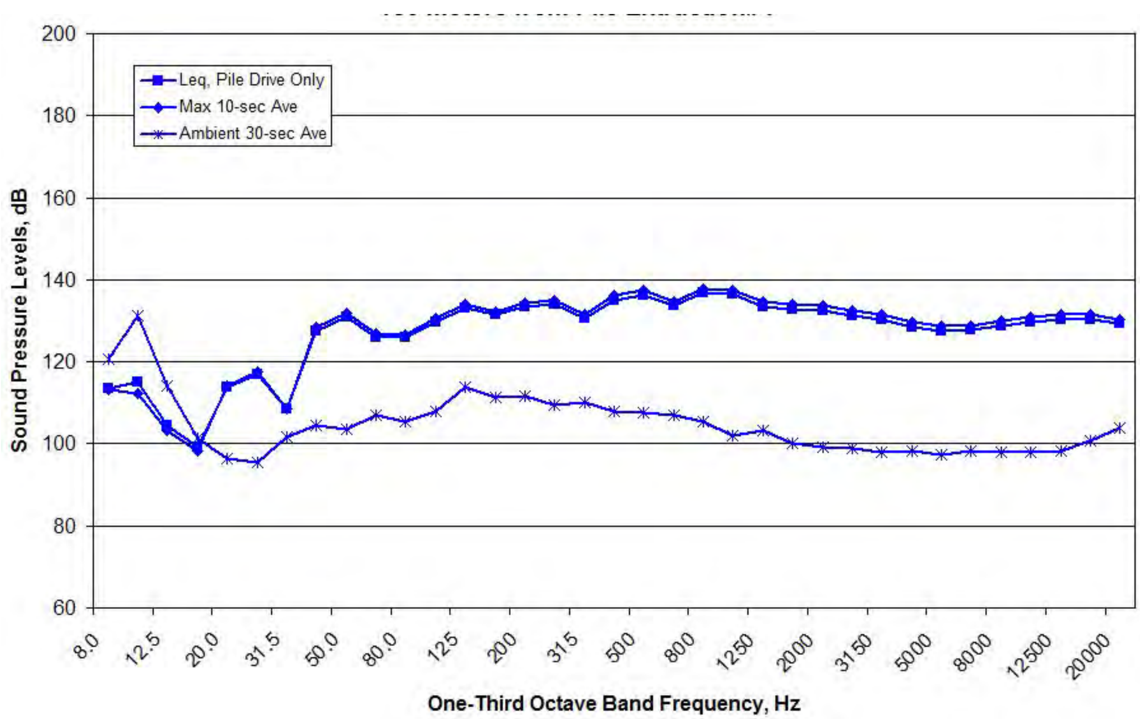

Figure B572. Spectral Data Measured at the WRA Location during EX4, 11:28:00-11:28:14, Measured at Depths of 10 meters on October 27, 2011

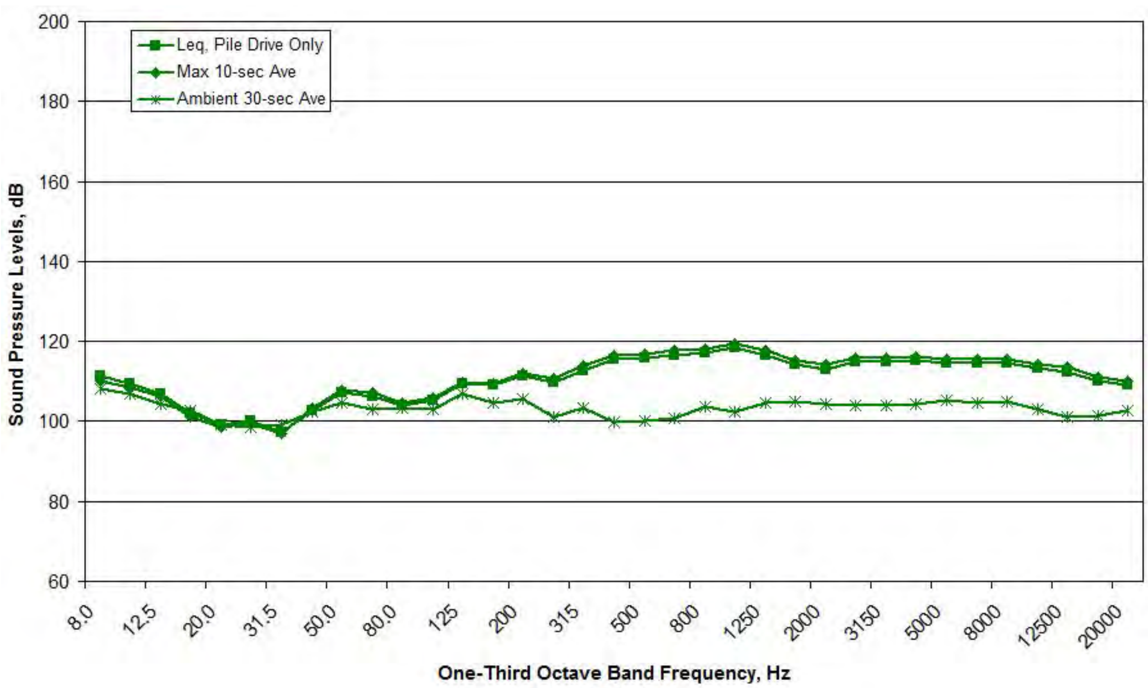

Figure B573. Spectral Data Measured at the MID Location during EX4, 11:28:00-11:28:14, Measured at Depths of 10 meters on October 27, 2011

NO SPECTRA DATA AVAILABLE

Figure B574. Spectral Data Measured at the RFT Location during EX4, 11:28:00-11:28:14, Measured at Depths of 10 meters on October 27, 2011

EX3, 11:31:00-11:31:18 (Vibratory Extraction)

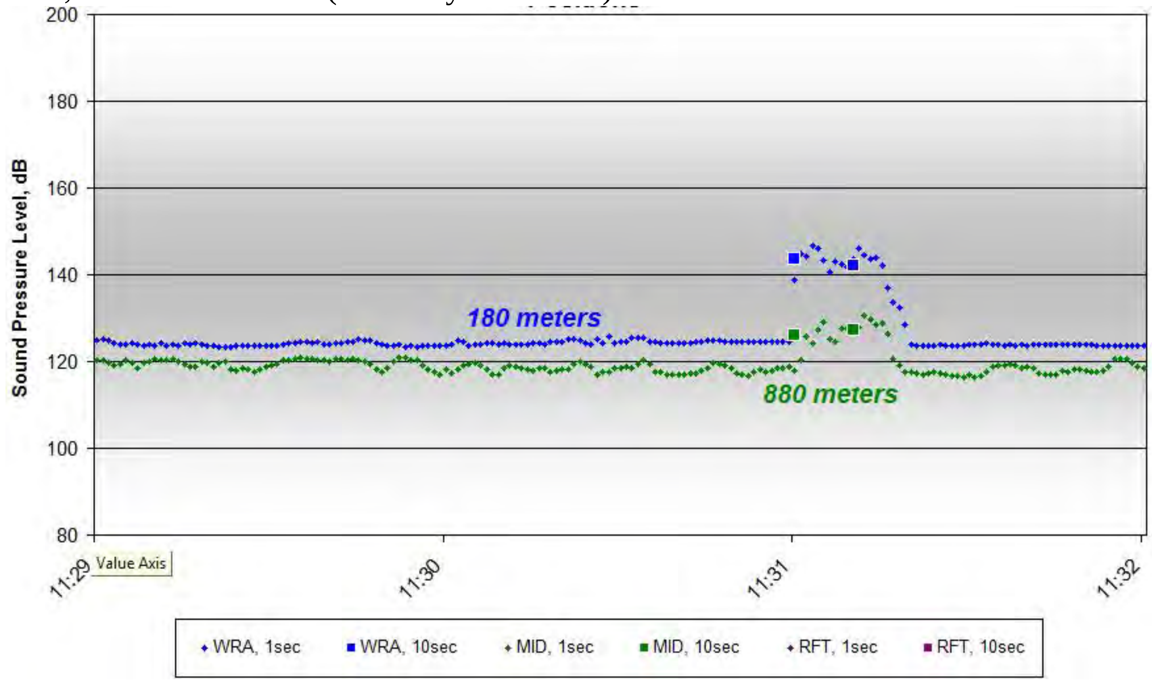

Figure B575. One-second and 10-second Average Data for EX3, 11:31:00-11:31:18, Measured at Depths of 17-30 meters on October 27, 2011

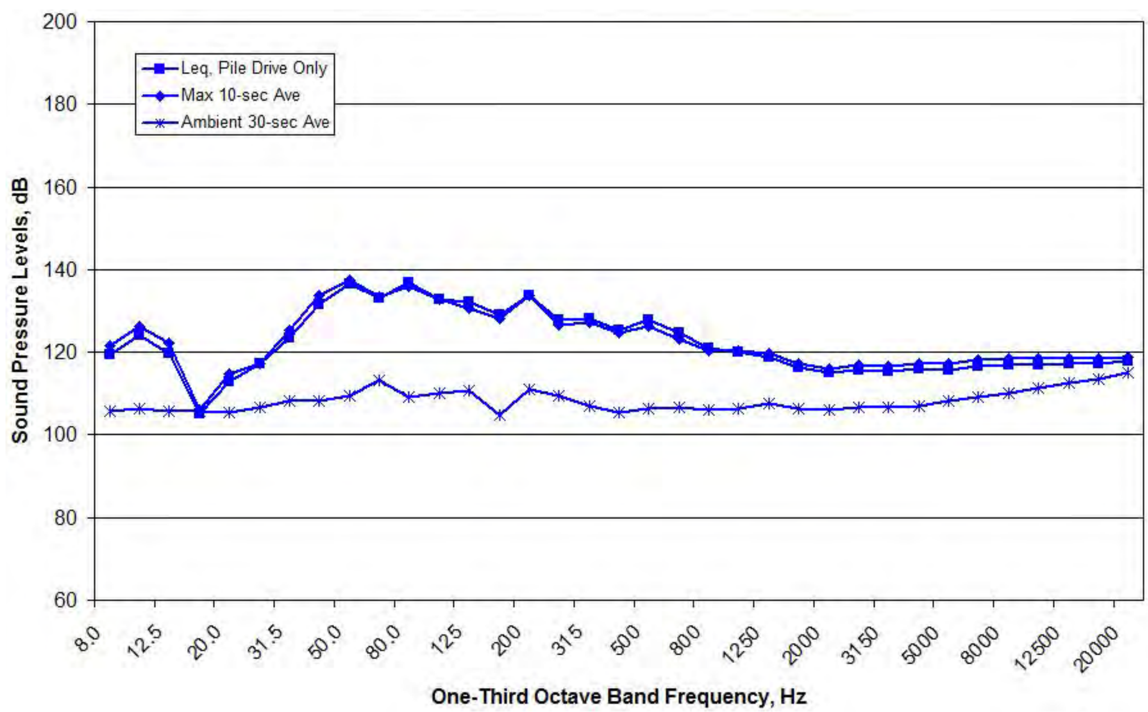

Figure B576. Spectral Data Measured at the WRA Location during EX3, 11:31:00-11:31:18, Measured at Depths of 30 meters on October 27, 2011

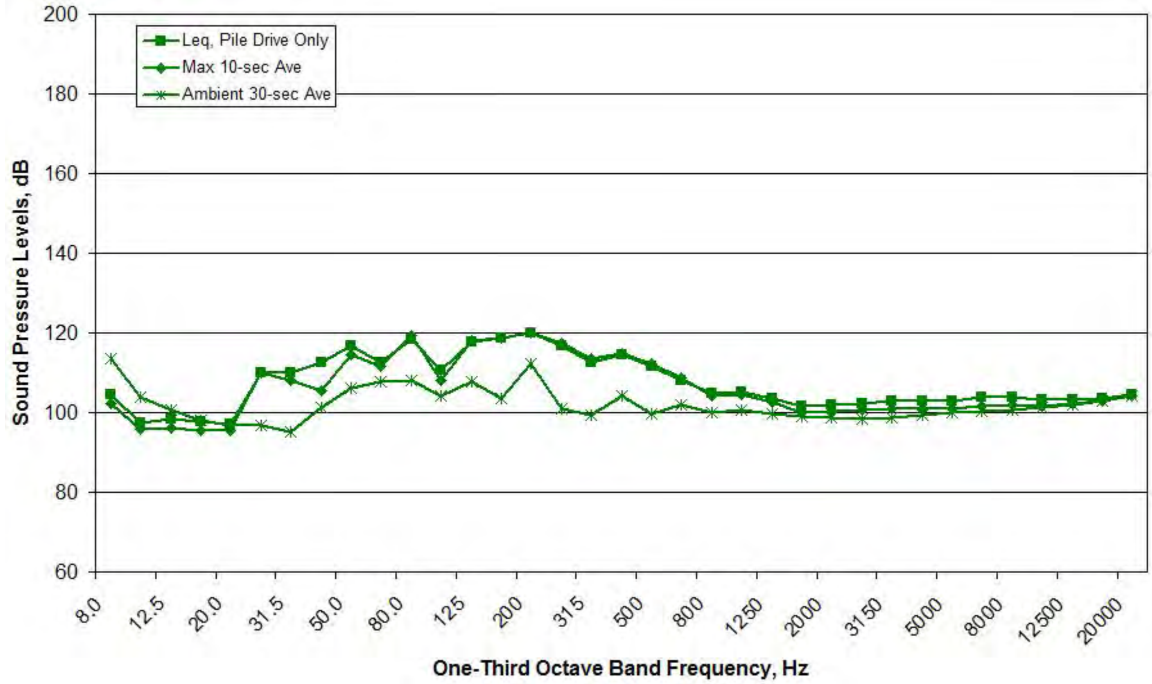

Figure B577. Spectral Data Measured at the MID Location during EX3, 11:31:00-11:31:18, Measured at Depths of 30 meters on October 27, 2011

NO DATA AVAILABLE

Figure B578. Spectral Data Measured at the RFT Location during EX3, 11:31:00-11:31:18, Measured at Depths of 17 meters on October 27, 2011

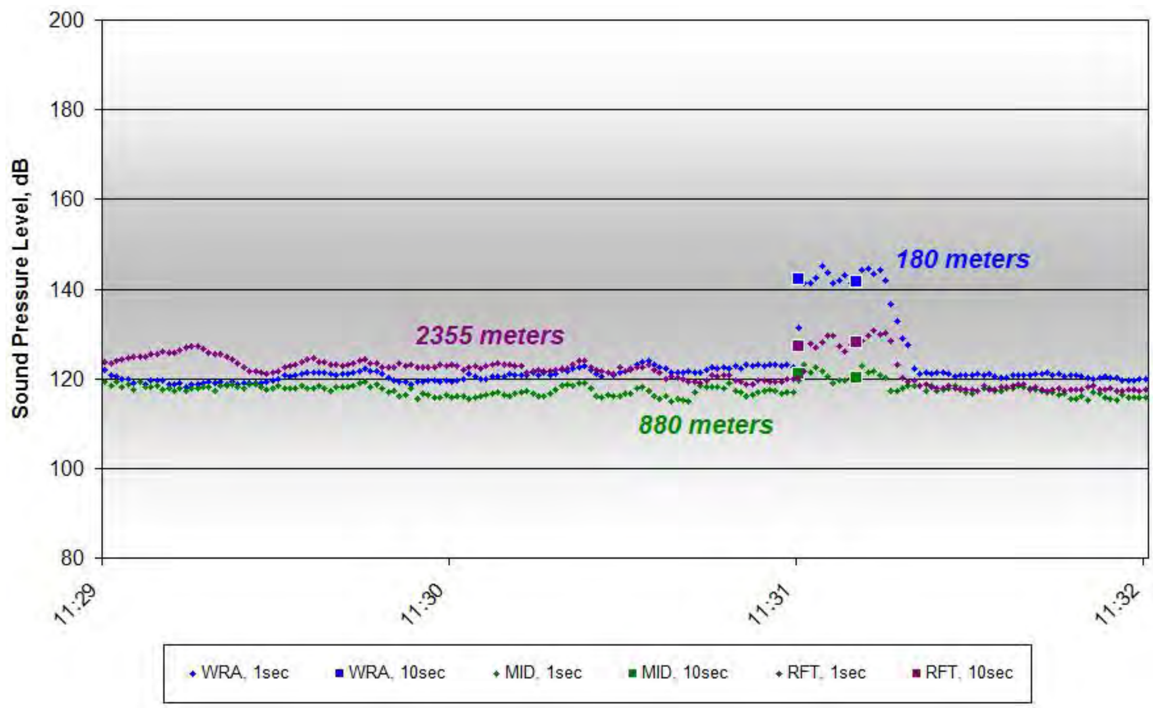

Figure B579. One-second and 10-second Average Data for EX3, 11:31:00-11:31:18, Measured at Depths of 10 meters on October 27, 2011

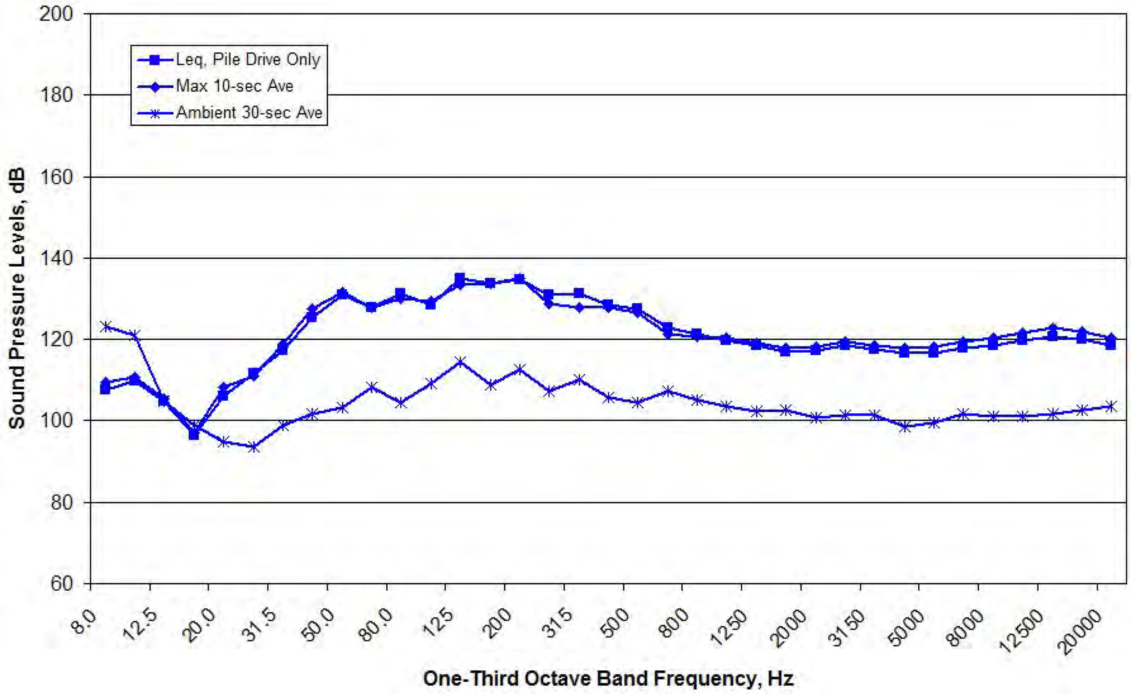

Figure B580. Spectral Data Measured at the WRA Location during EX3, 11:31:00-11:31:18, Measured at Depths of 10 meters on October 27, 2011

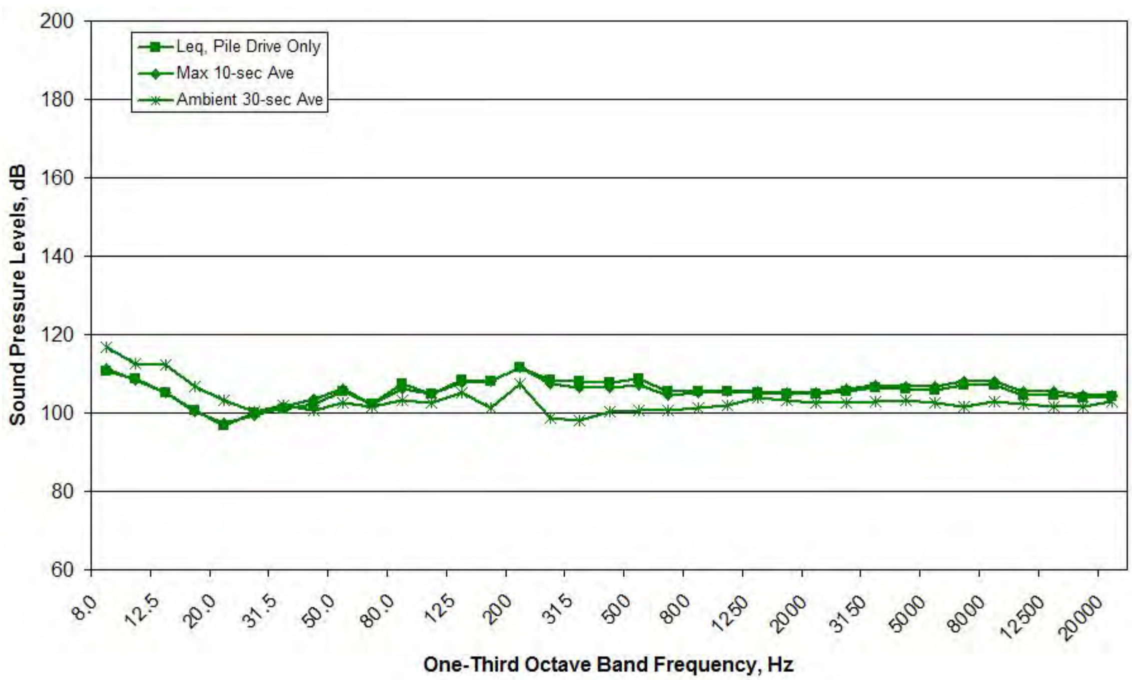

Figure B581. Spectral Data Measured at the MID Location during EX3, 11:31:00-11:31:18, Measured at Depths of 10 meters on October 27, 2011

NO SPECTRA DATA AVAILABLE

Figure B582. Spectral Data Measured at the RFT Location during EX3, 11:31:00-11:31:18, Measured at Depths of 10 meters on October 27, 2011

EX5 (Vibratory Extraction)

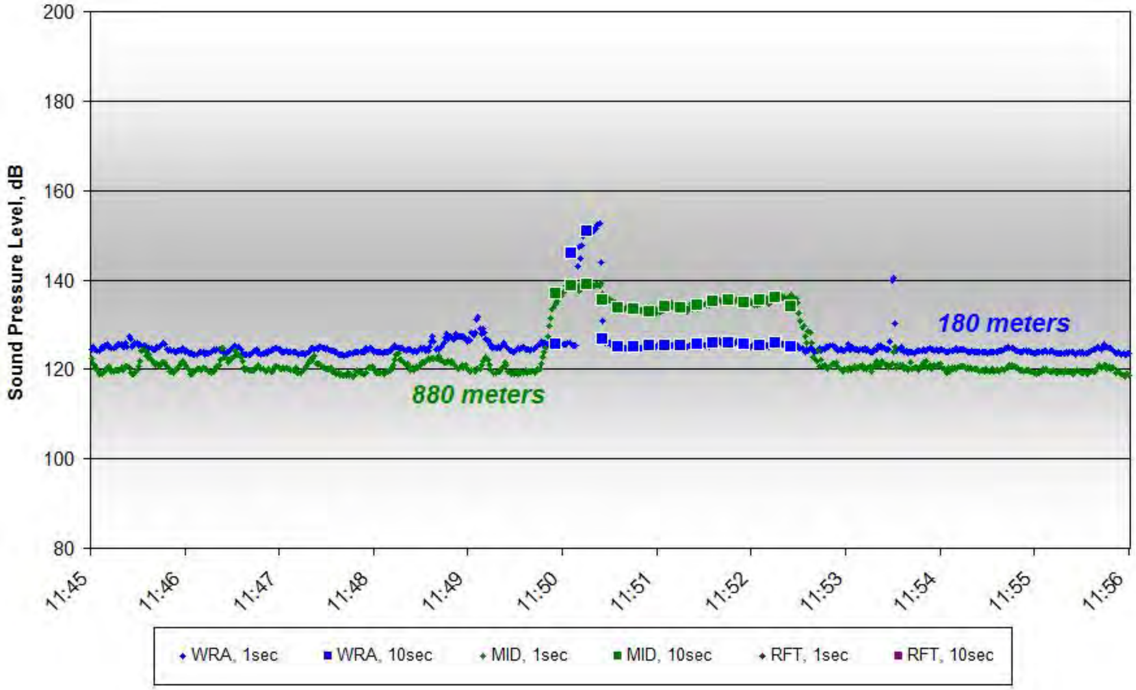

Figure B583. One-second and 10-second Average Data for EX5, 11:49-11:52, Measured at Depths of 17-30 meters on October 27, 2011

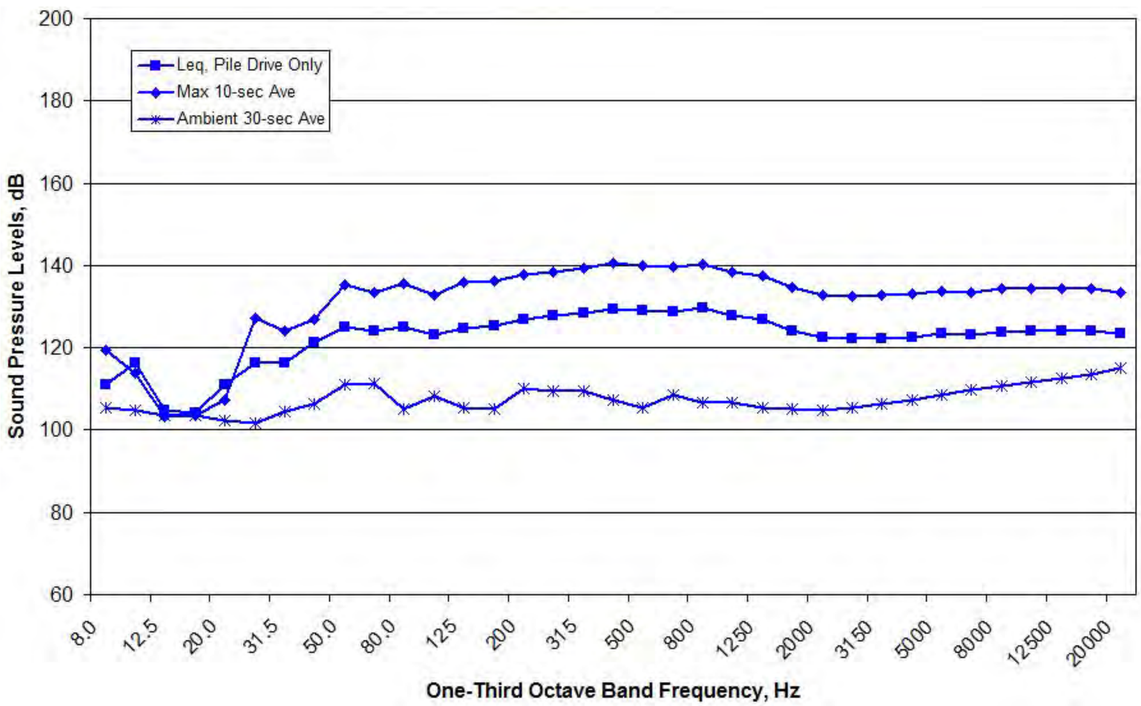

Figure B584. Spectral Data Measured at the WRA Location during EX5, 11:49-11:52, Measured at Depths of 30 meters on October 27, 2011

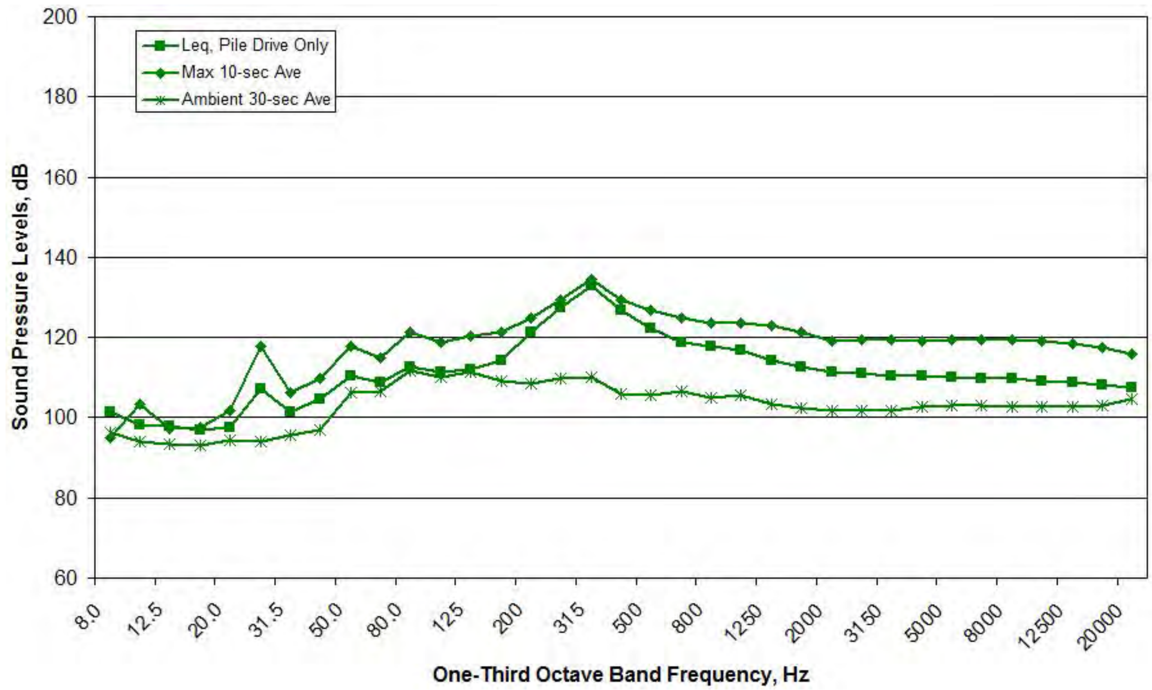

Figure B585. Spectral Data Measured at the MID Location during EX5, 11:49-11:52, Measured at Depths of 30 meters on October 27, 2011

NO DATA AVAILABLE

Figure B586. Spectral Data Measured at the RFT Location during EX5, 11:49-11:52, Measured at Depths of 17 meters on October 27, 2011

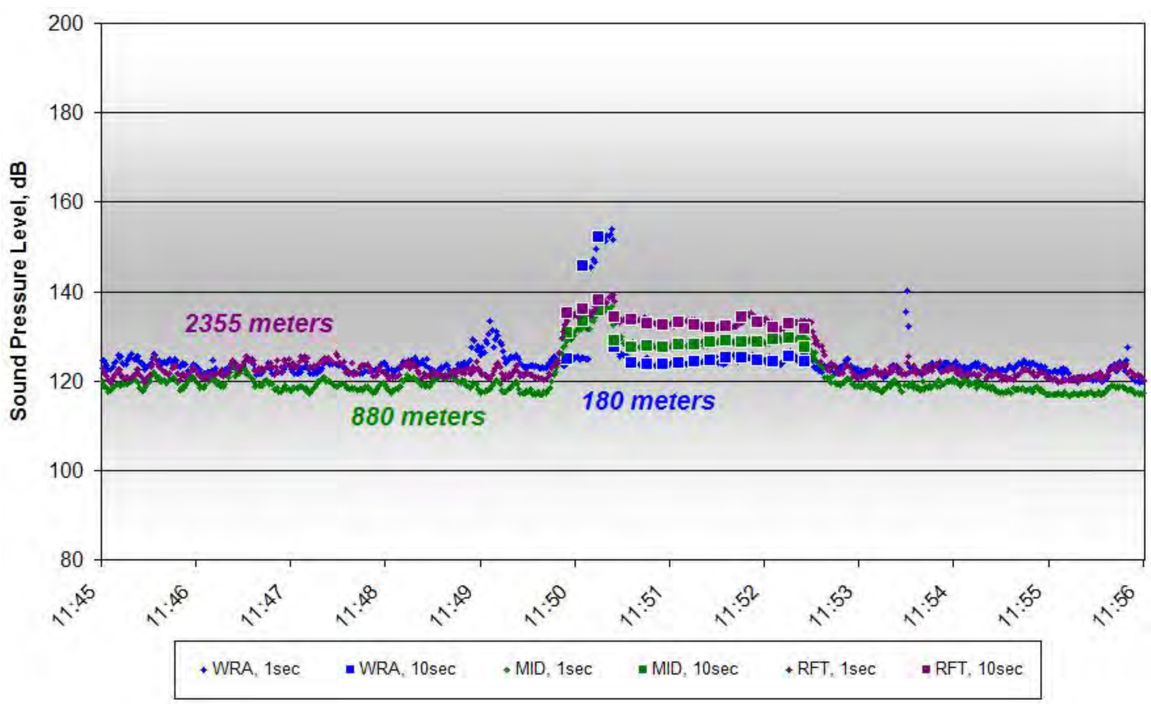

Figure B587. One-second and 10-second Average Data for EX5, 11:49-11:52, Measured at Depths of 10 meters on October 27, 2011

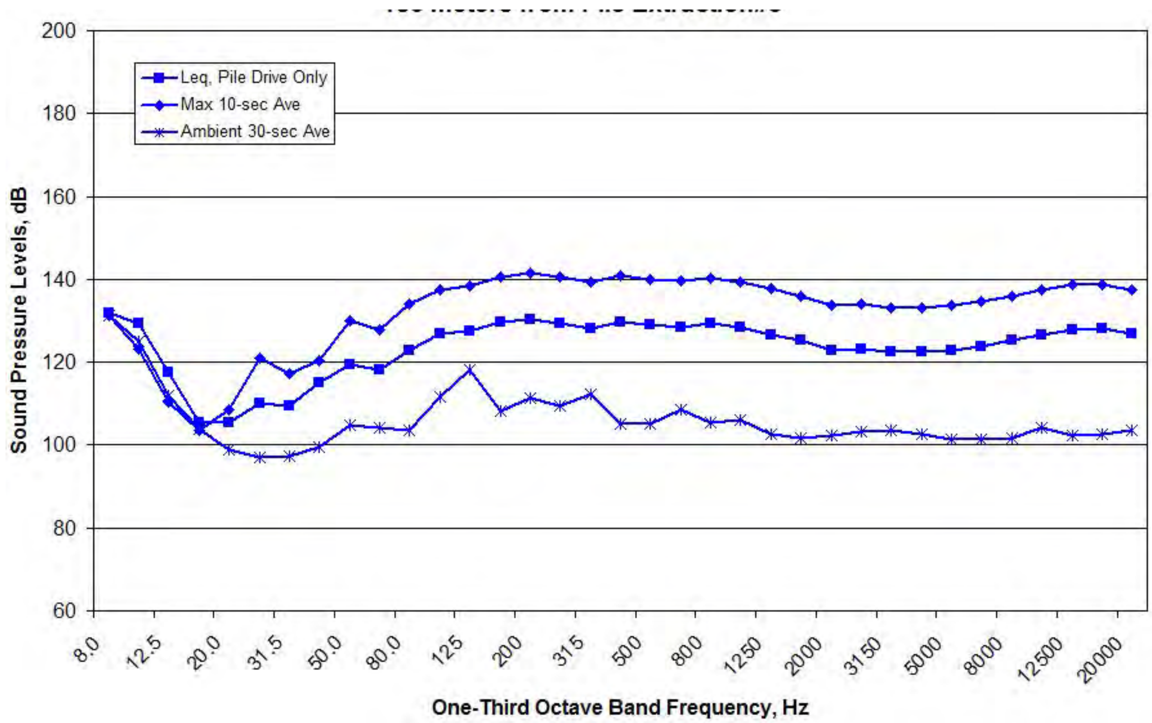

Figure B588. Spectral Data Measured at the WRA Location during EX5, 11:49-11:52, Measured at Depths of 10 meters on October 27, 2011

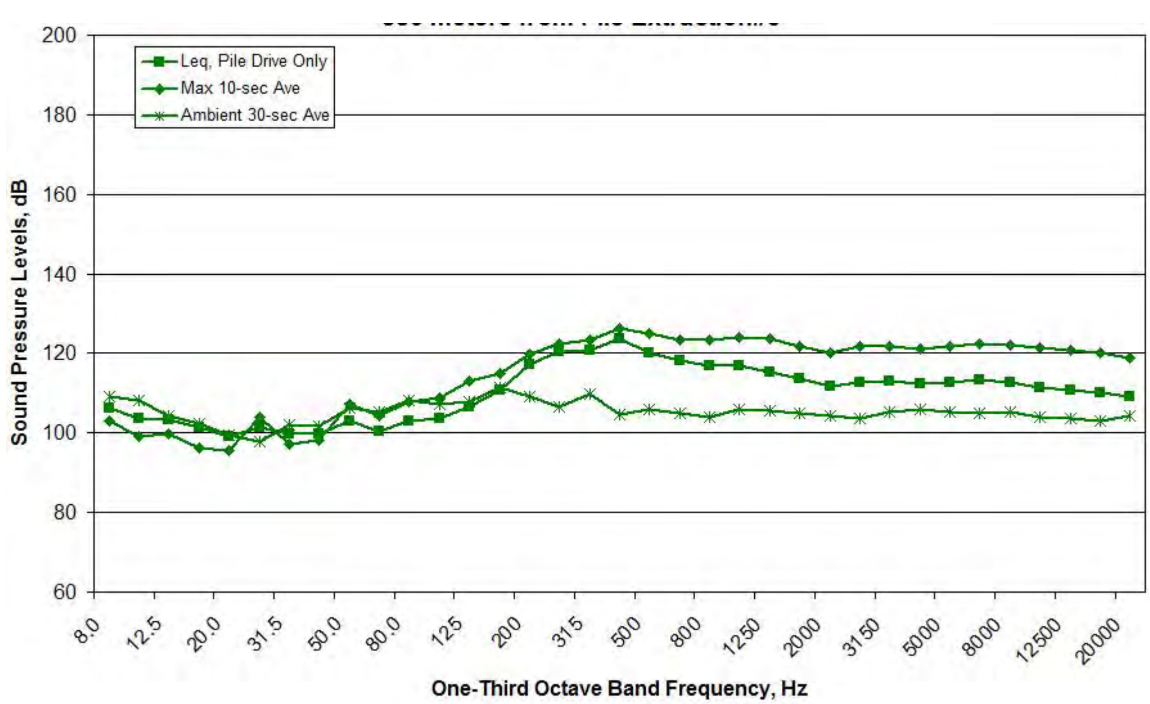

Figure B589. Spectral Data Measured at the MID Location during EX5, 11:49-11:52, Measured at Depths of 10 meters on October 27, 2011

NO SPECTRA DATA AVAILABLE

Figure B590. Spectral Data Measured at the RFT Location during EX5, 11:49-11:52, Measured at Depths of 10 meters on October 27, 2011

EX6 (Vibratory Extraction)

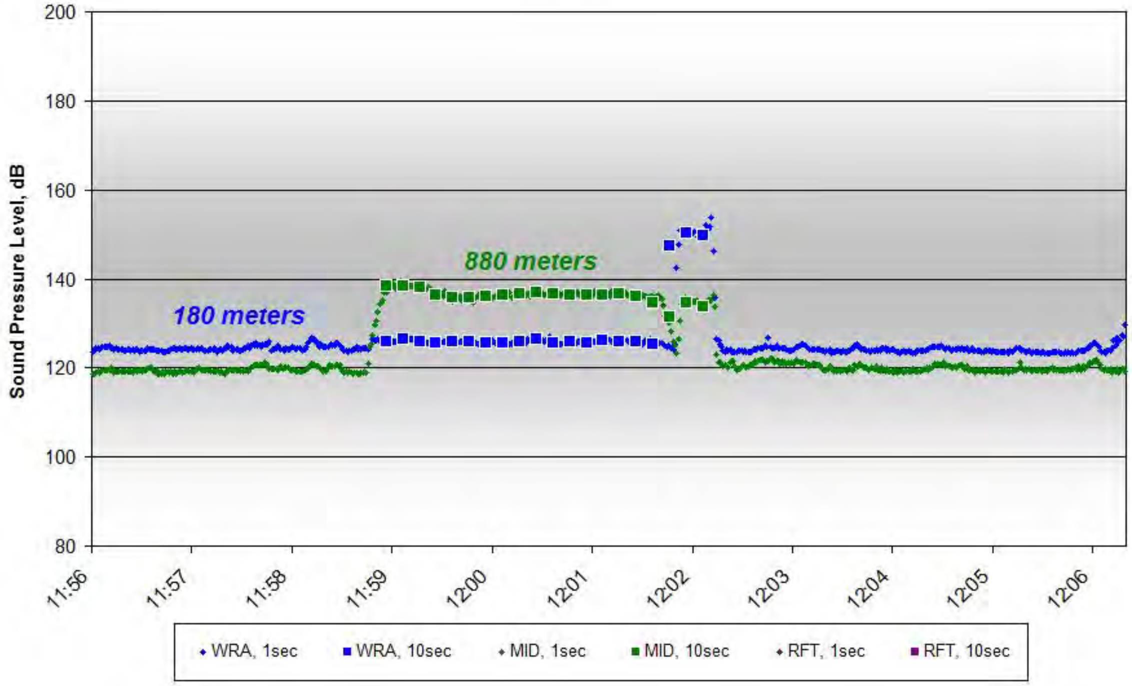

Figure B591. One-second and 10-second Average Data for EX6, 11:58-12:02, Measured at Depths of 17-30 meters on October 27, 2011

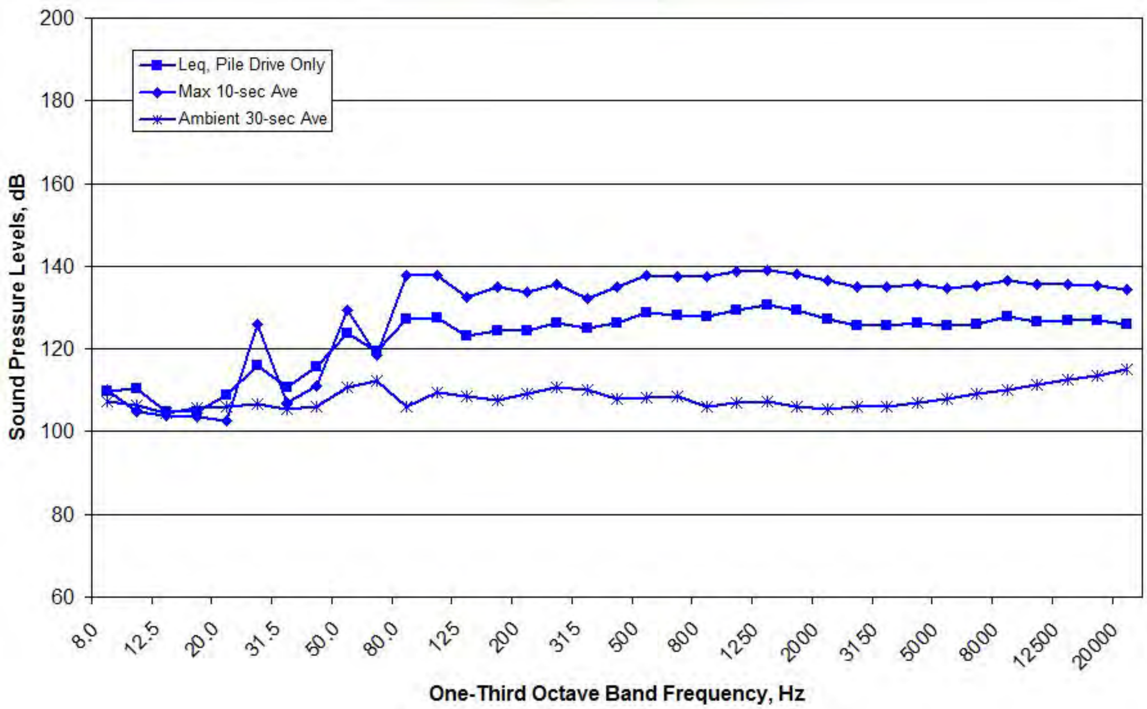

Figure B592. Spectral Data Measured at the WRA Location during EX6, 11:58-12:02, Measured at Depths of 30 meters on October 27, 2011

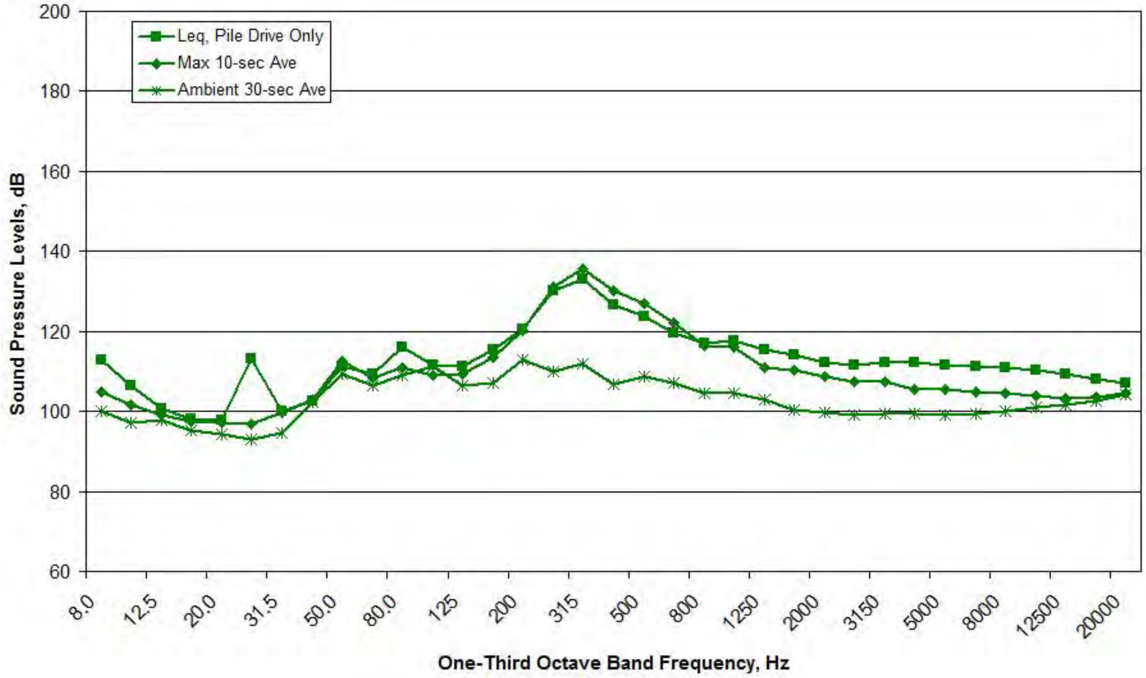

Figure B593. Spectral Data Measured at the MID Location during EX6, 11:58-12:02, Measured at Depths of 30 meters on October 27, 2011

NO DATA AVAILABLE

Figure B594. Spectral Data Measured at the RFT Location during EX6, 11:58-12:02, Measured at Depths of 17 meters on October 27, 2011

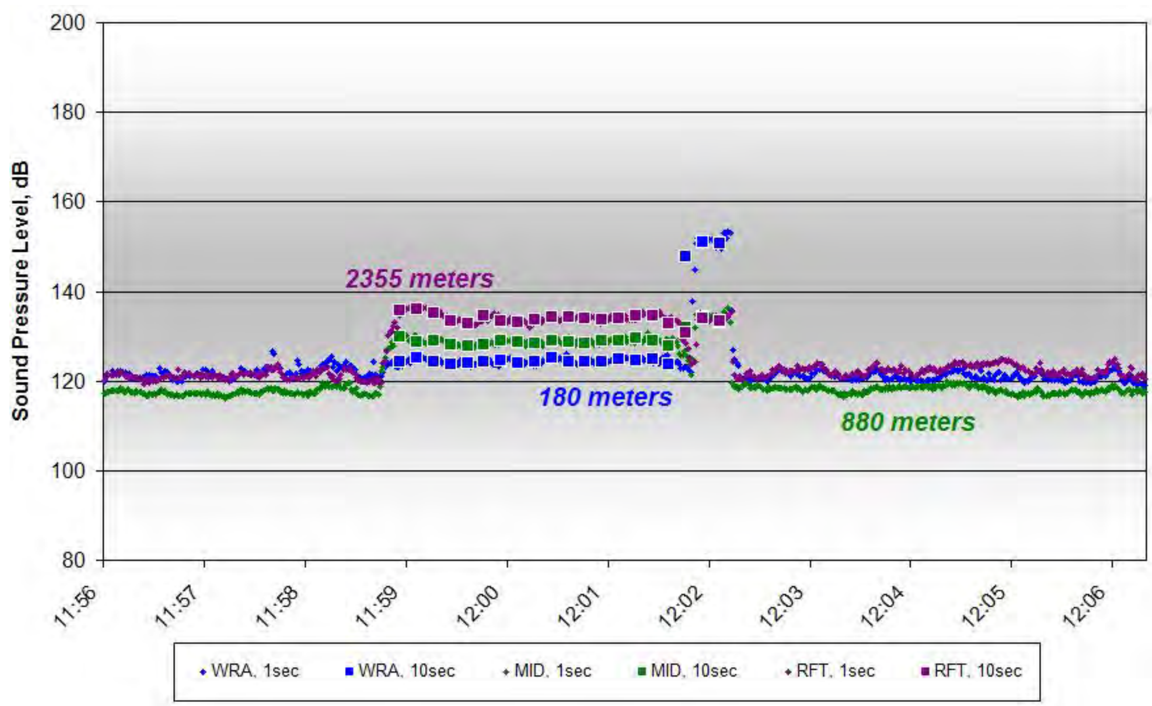

Figure B595. One-second and 10-second Average Data for EX6, 11:58-12:02, Measured at Depths of 10 meters on October 27, 2011

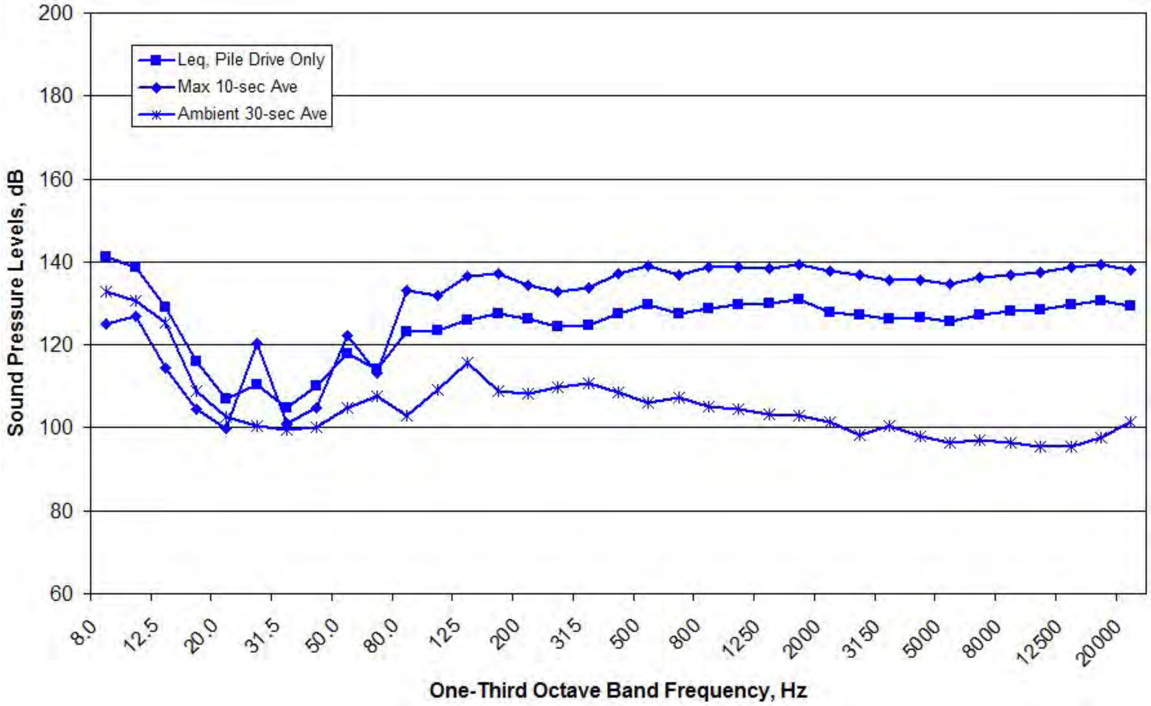

Figure B596. Spectral Data Measured at the WRA Location during EX6, 11:58-12:02, Measured at Depths of 10 meters on October 27, 2011

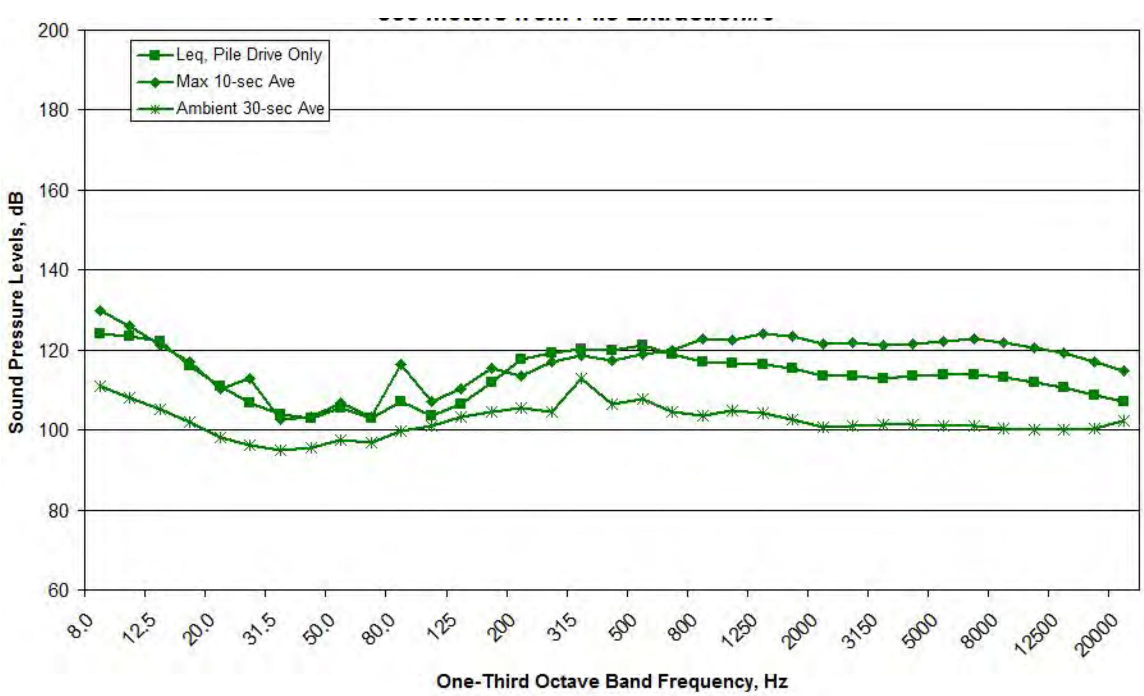

Figure B597. Spectral Data Measured at the MID Location during EX6, 11:58-12:02, Measured at Depths of 10 meters on October 27, 2011

NO SPECTRA DATA AVAILABLE

Figure B598. Spectral Data Measured at the RFT Location during EX6, 11:58-12:02, Measured at Depths of 10 meters on October 27, 2011

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APPENDIX C

AIRBORNE RESULTS

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APPENDIX C – AIRBORNE MICROPHONE RESULTS

10/4/2011 – Inside Pile EHW1

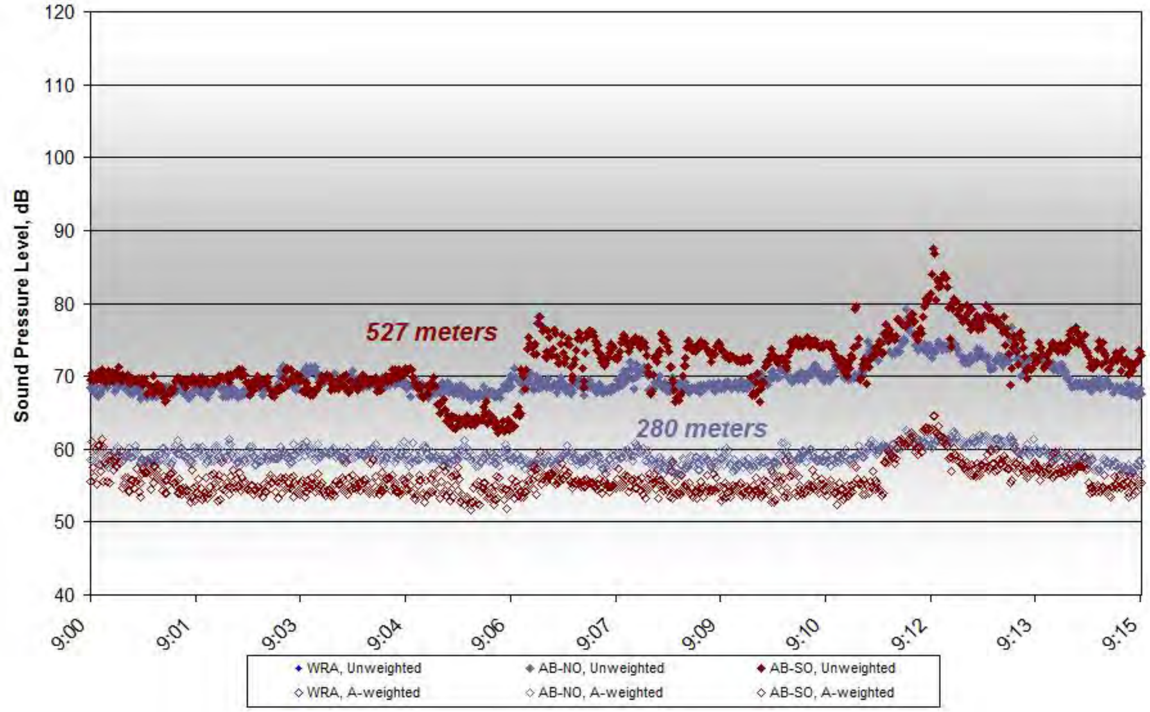

Figure C1. One-second Unweighted and A-weighted Leq Level Data at Inside Pile EHW1, 9:06-9:10, on October 4, 2011

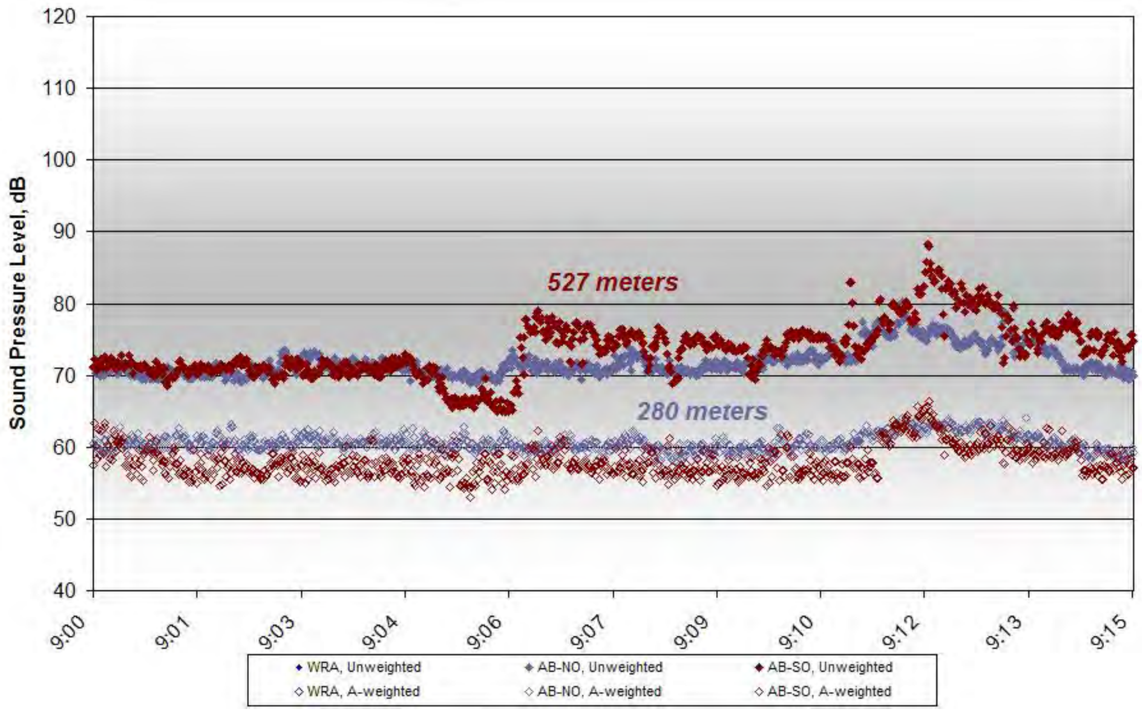

Figure C2. One-second Unweighted and A-weighted Lmax Level Data at Inside Pile EHW1, 9:06-9:10, on October 4, 2011

NO DATA AVAILABLE

Figure C3. Average One-second Unweighted and A-weighted Spectral Data Measured at the WRA Location during Inside Pile EHW1, 9:06-9:10, on October 4, 2011

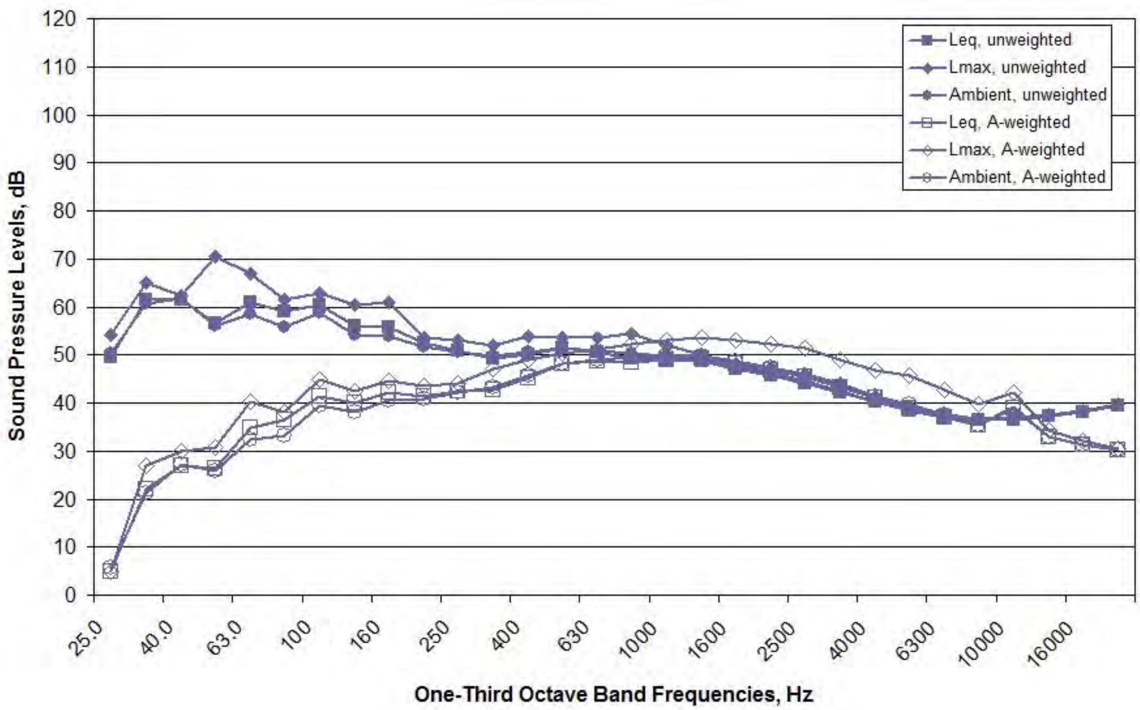

Figure C4. Average One-second Unweighted and A-weighted Spectral Data Measured at the AB-NO Location during Inside Pile EHW1, 9:06-9:10, on October 4, 2011

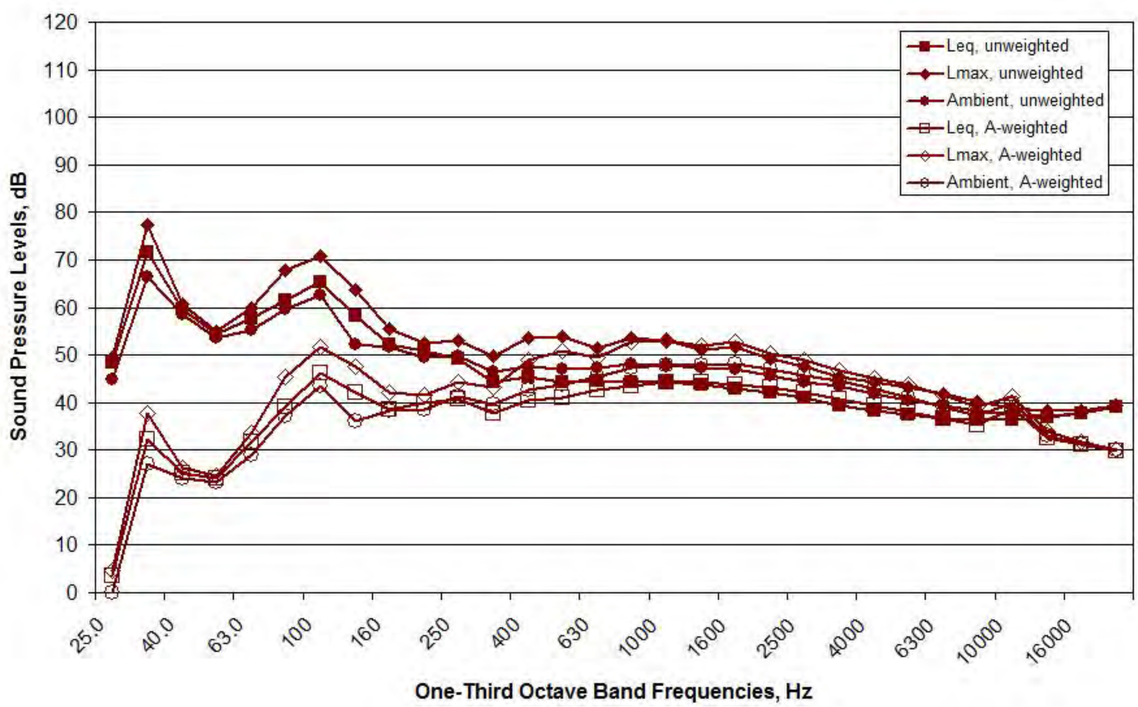

Figure C5. Average One- second Unweighted and A-weighted Spectral Data Measured at the AB-SO Location during Inside Pile EHW1, 9:06-9:10, on October 4, 2011

10/5/2011 – EHW1 BP1

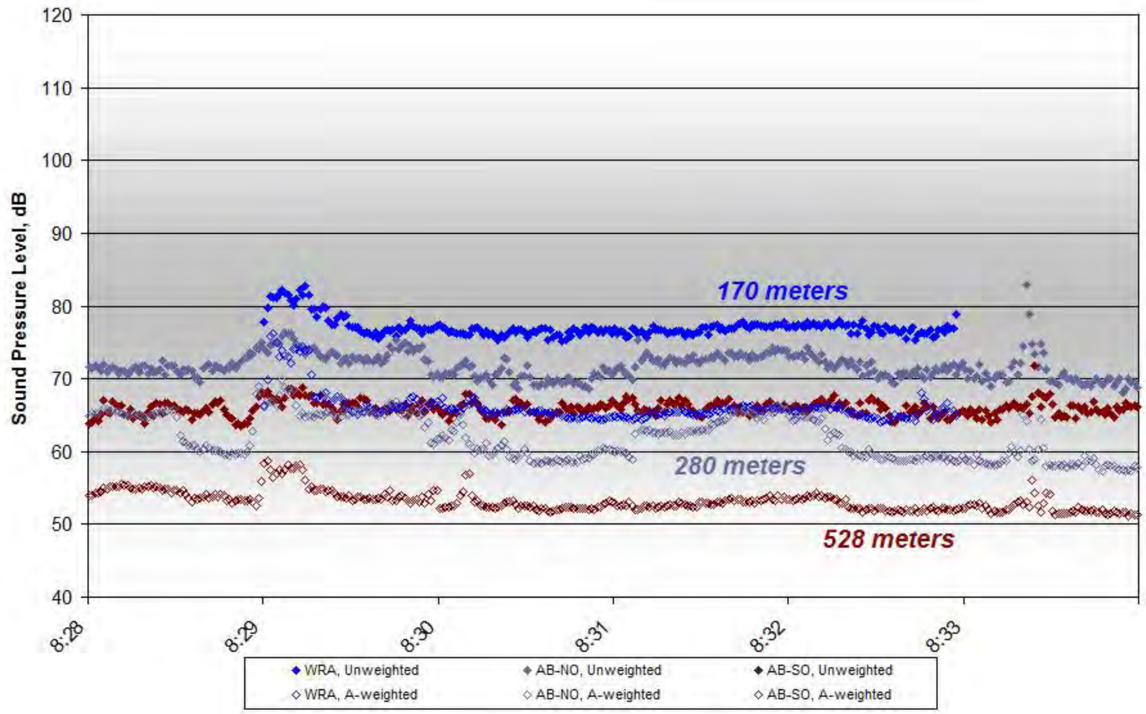

Figure C6. One-second Unweighted and A-weighted Leq Level Data at EHW1 BP1, 8:29-8:32, on October 5, 2011

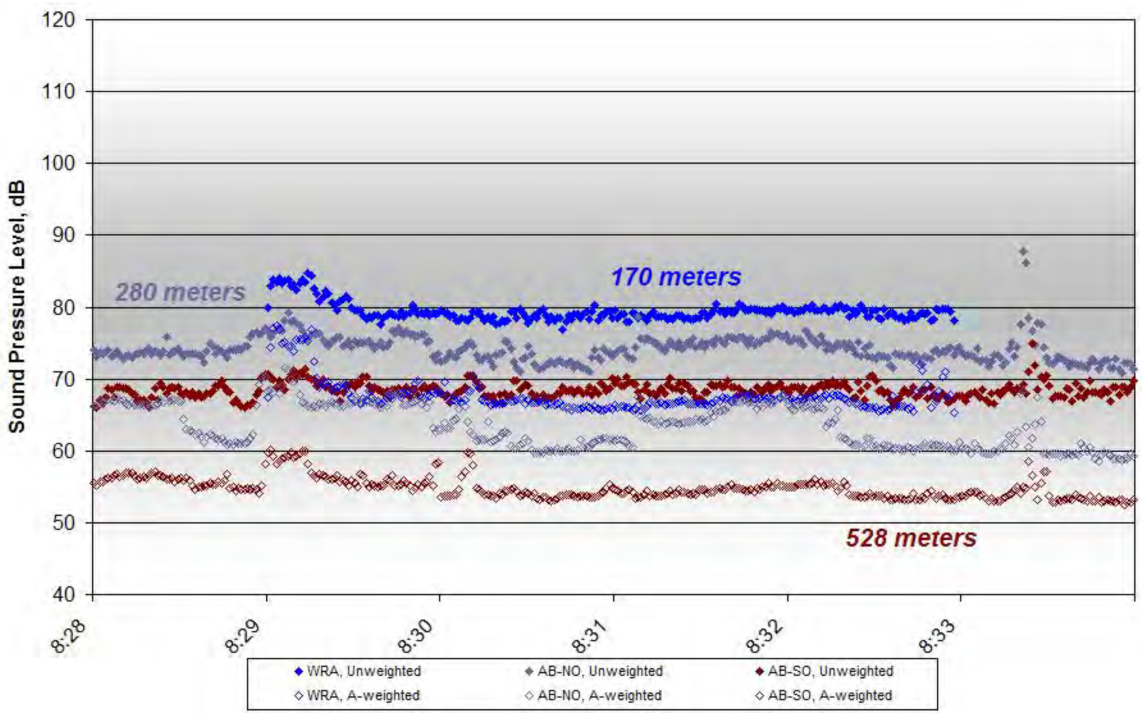

Figure C7. One-second Unweighted and A-weighted Lmax Level Data at EHW1 BP1, 8:29-8:32, on October 5, 2011

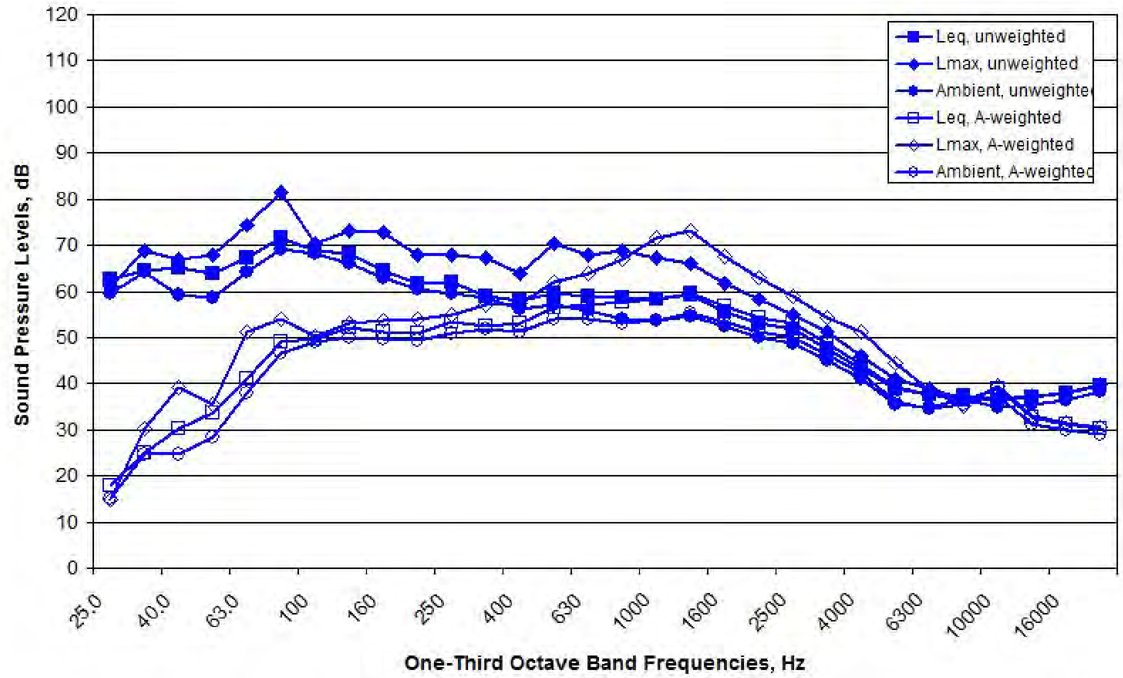

Figure C8. Average One-second Unweighted and A-weighted Spectral Data Measured at the WRA Location during EHW1 BP1, 8:29-8:32, on October 5, 2011

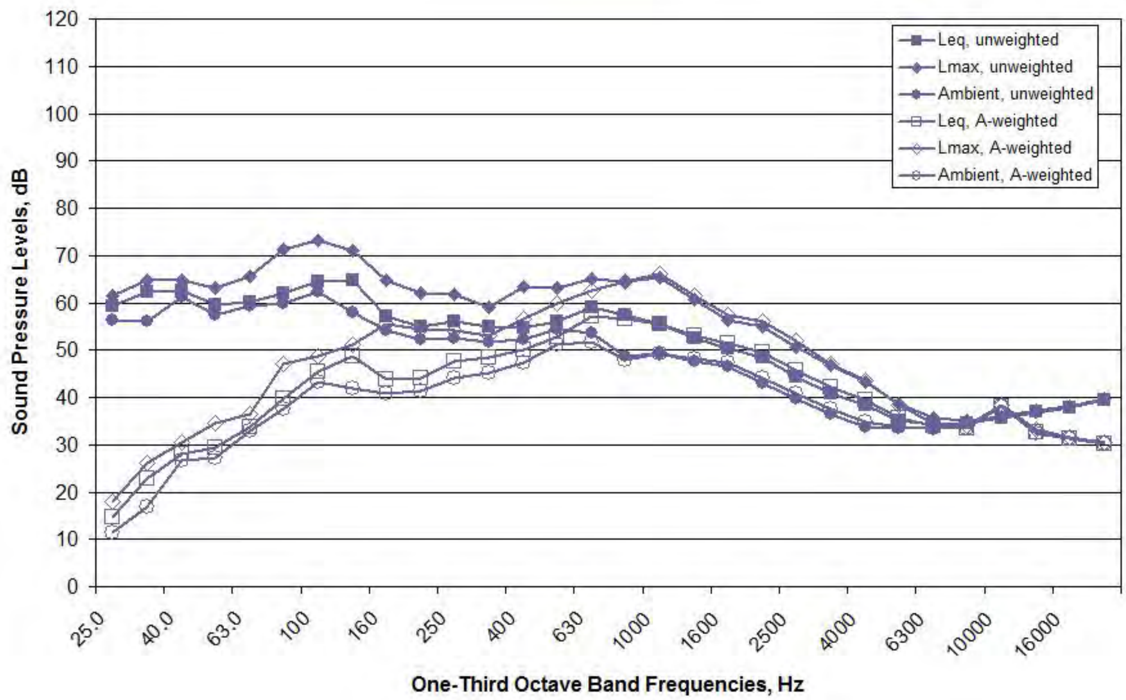

Figure C9. Average One-second Unweighted and A-weighted Spectral Data Measured at the AB-NO Location during EHW1 BP1, 8:29-8:32, on October 5, 2011

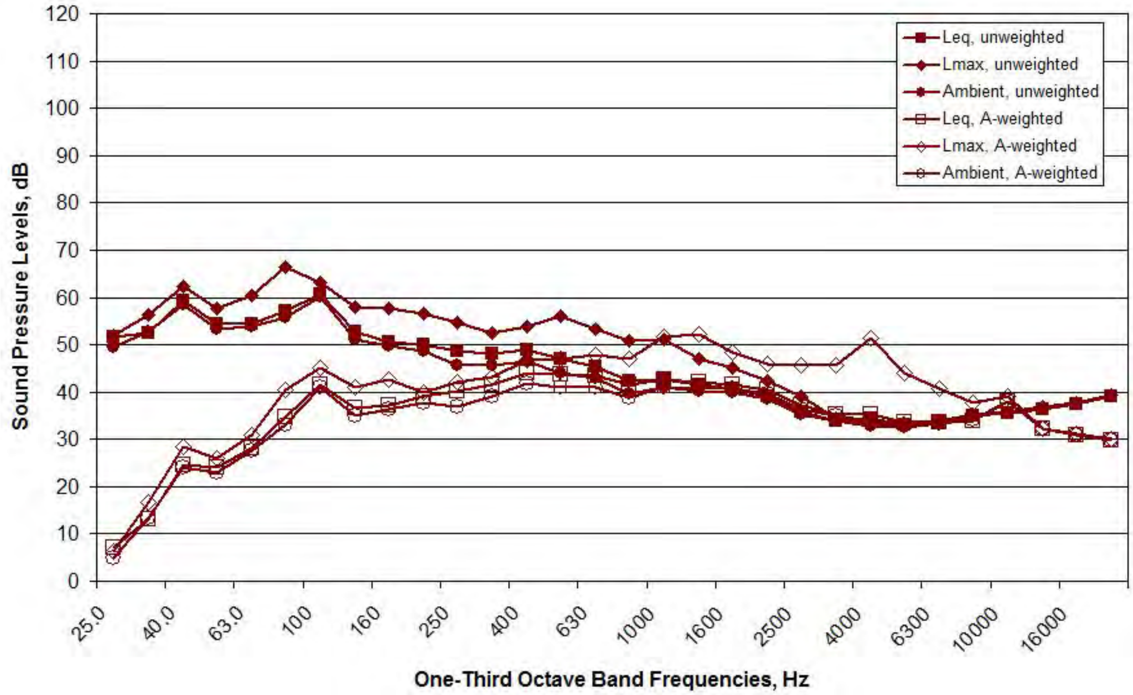

Figure C10. Average One- second Unweighted and A-weighted Spectral Data Measured at the AB-SO Location during EHW1 BP1, 8:29-8:32, on October 5, 2011

EHW1 BP2

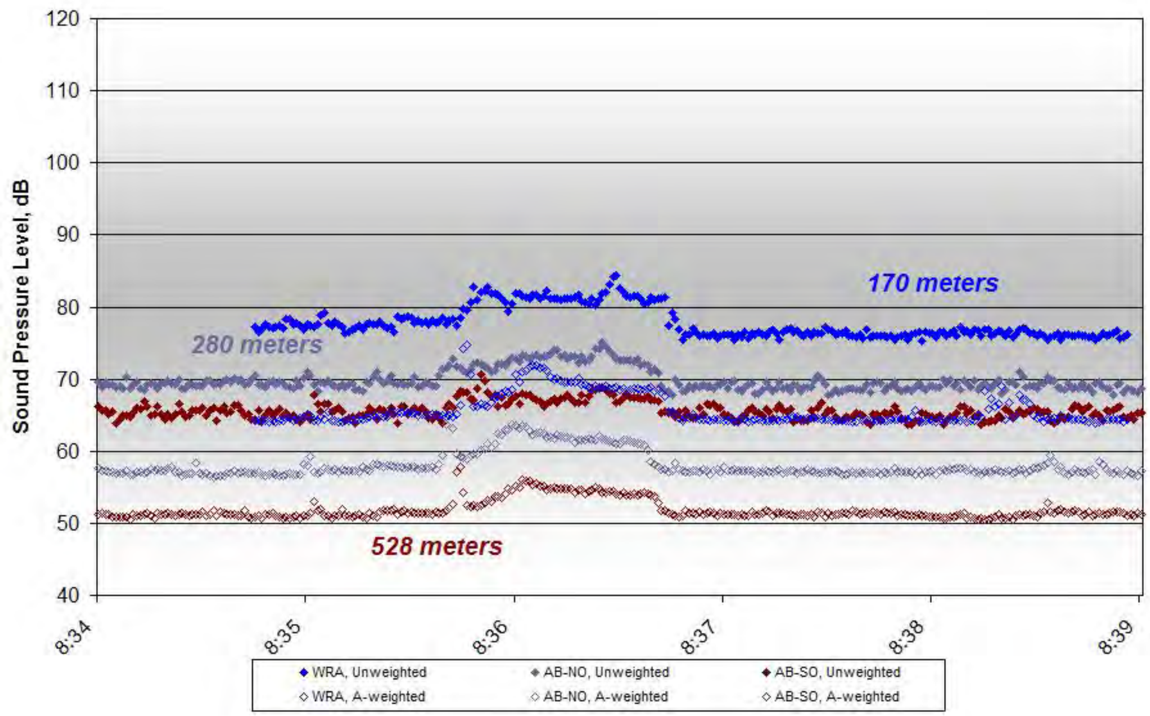

Figure C11. One-second Unweighted and A-weighted Leq Level Data at EHW1 BP2, 8:35-8:36, on October 5, 2011

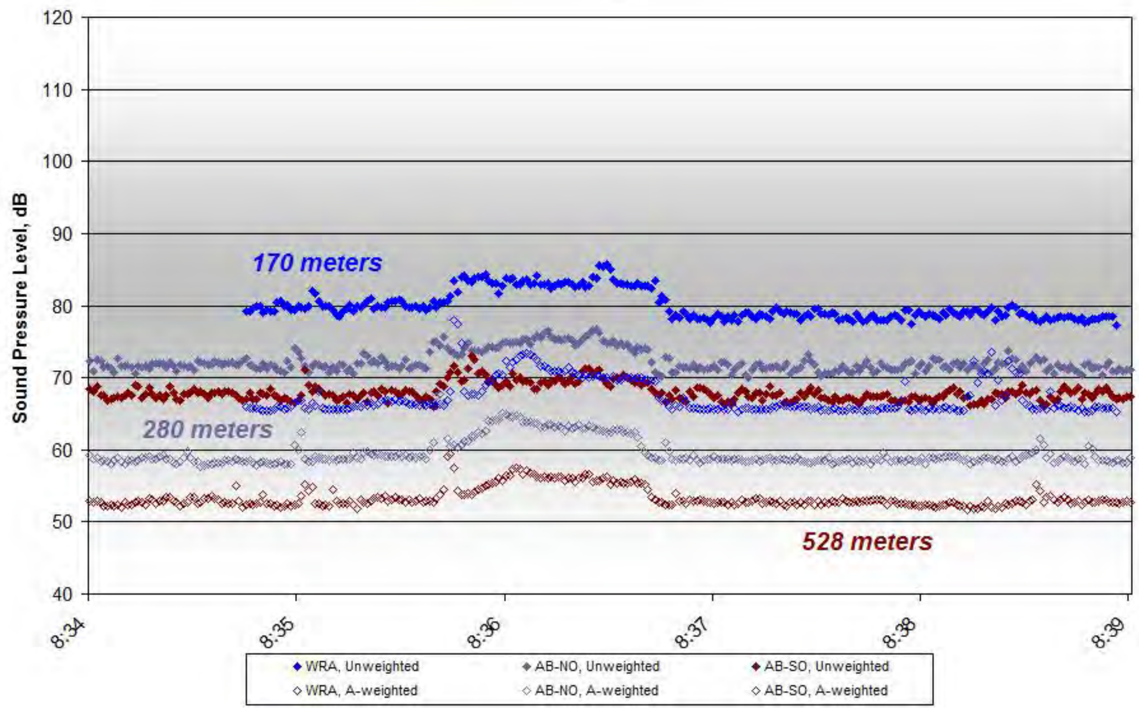

Figure C12. One-second Unweighted and A-weighted Lmax Level Data at EHW1 BP2, 8:35-8:36, on October 5, 2011

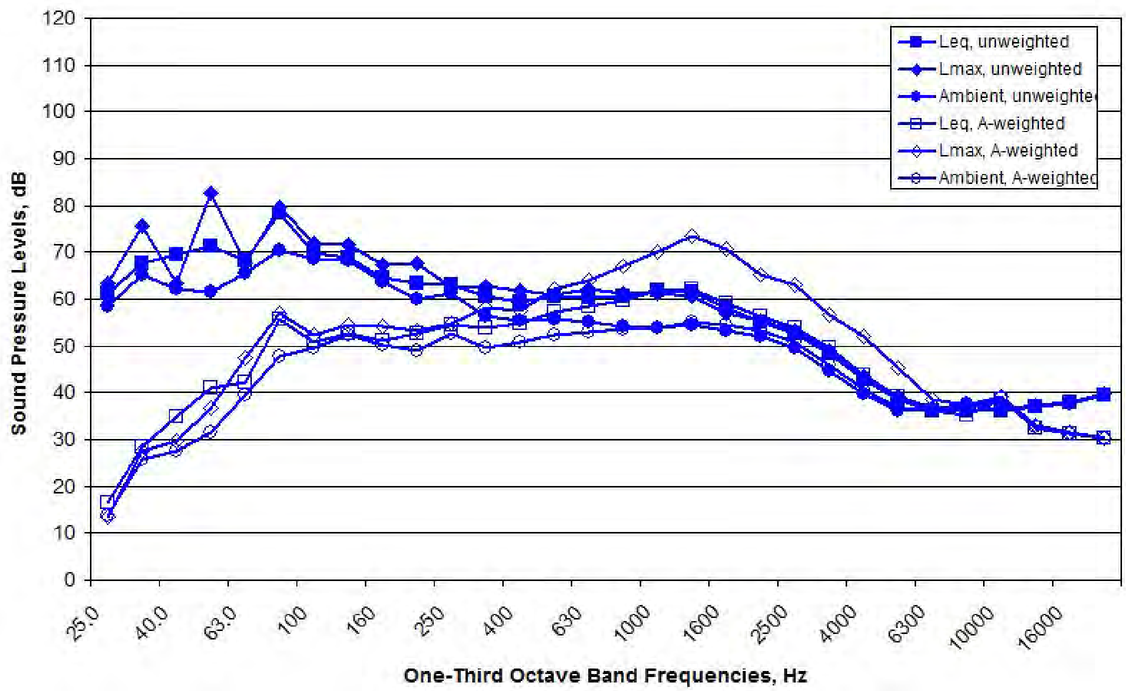

Figure C13. Average One-second Unweighted and A-weighted Spectral Data Measured at the WRA Location during EHW1 BP2, 8:35-8:36, on October 5, 2011

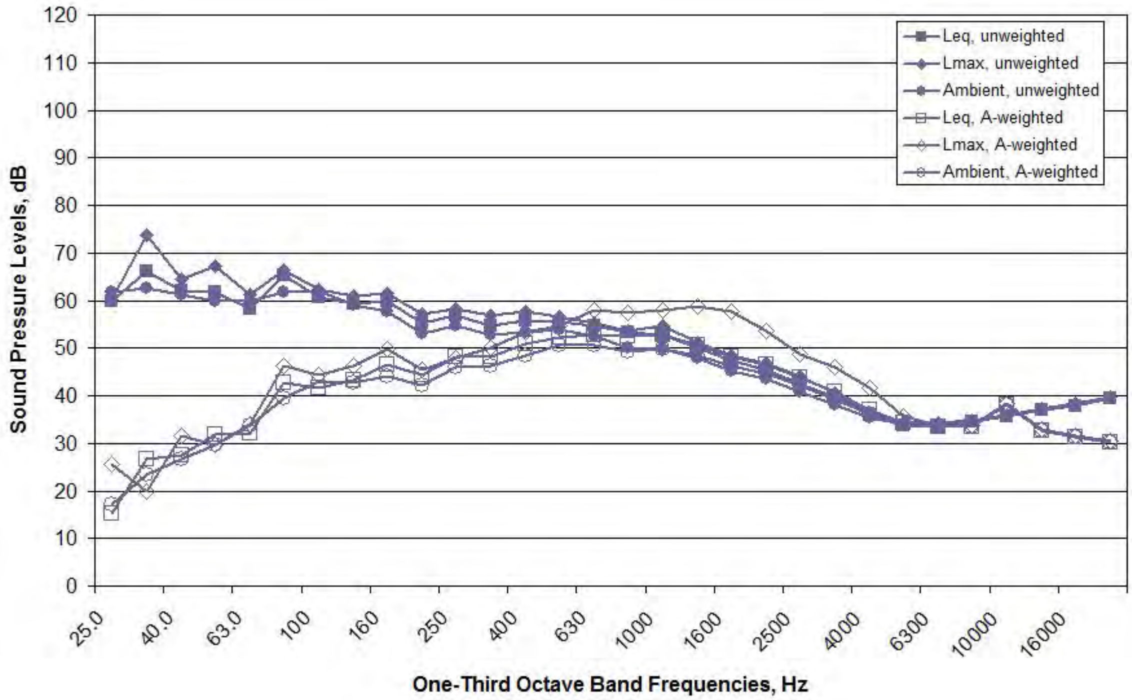

Figure C14. Average One-second Unweighted and A-weighted Spectral Data Measured at the AB-NO Location during EHW1 BP2, 8:35-8:36, on October 5, 2011

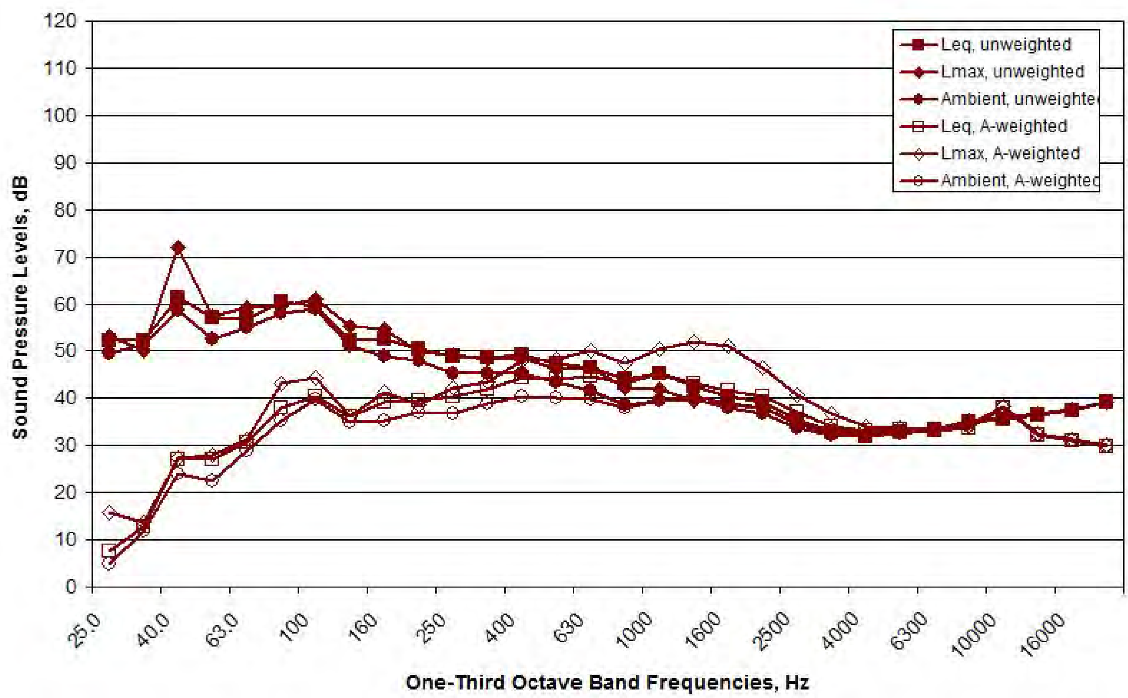

Figure C15. Average One- second Unweighted and A-weighted Spectral Data Measured at the AB-SO Location during EHW1 BP2, 8:35-8:36, on October 5, 2011

10/7/2011 – EHW1 RX5

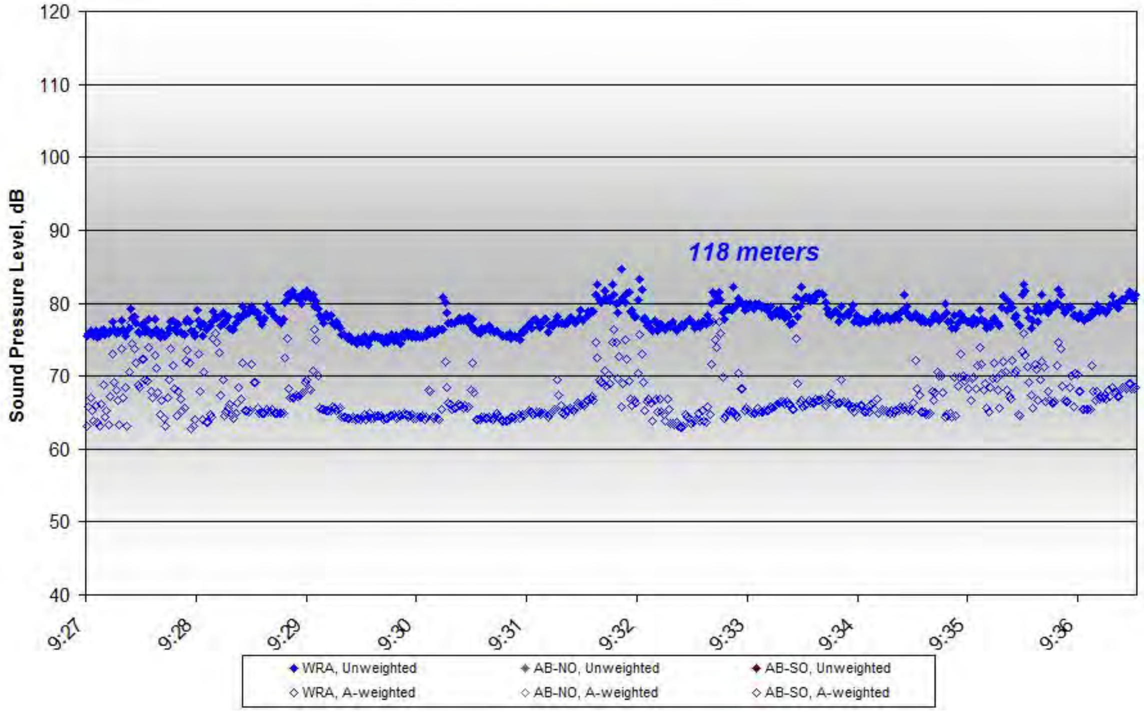

Figure C16. One-second Unweighted and A-weighted Leq Level Data at EHW1 RX5, 9:29-9:34, on October 7, 2011

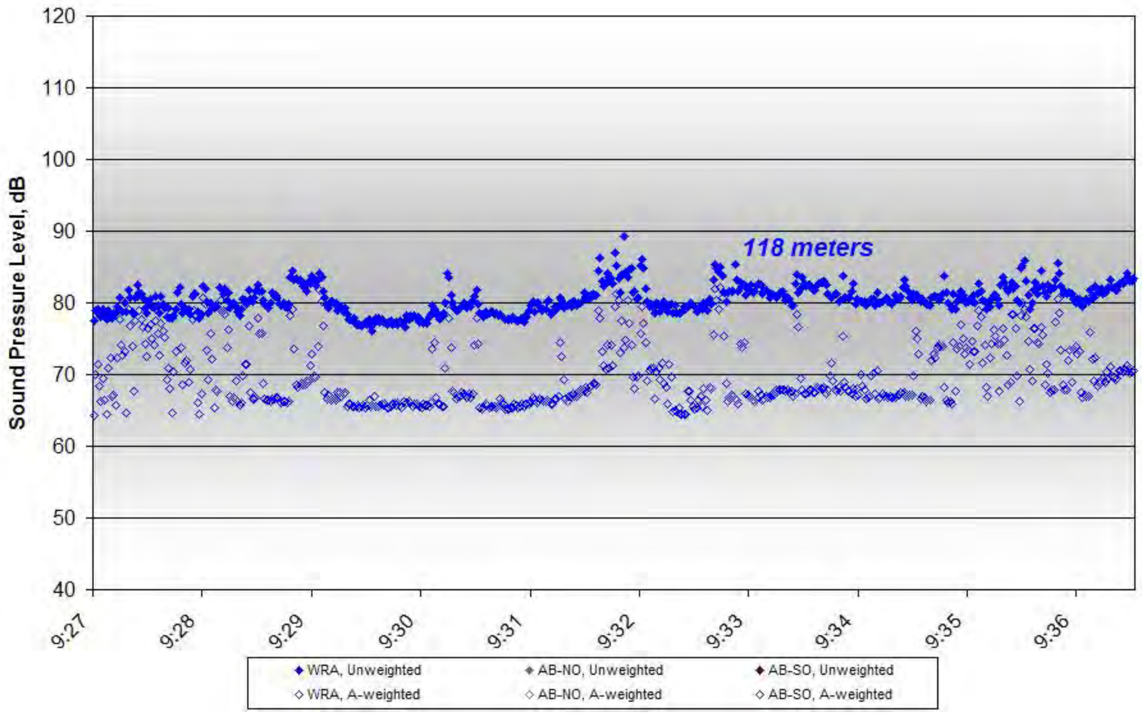

Figure C17. One-second Unweighted and A-weighted Lmax Level Data at EHW1 RX5, 9:29-9:34, on October 7, 2011

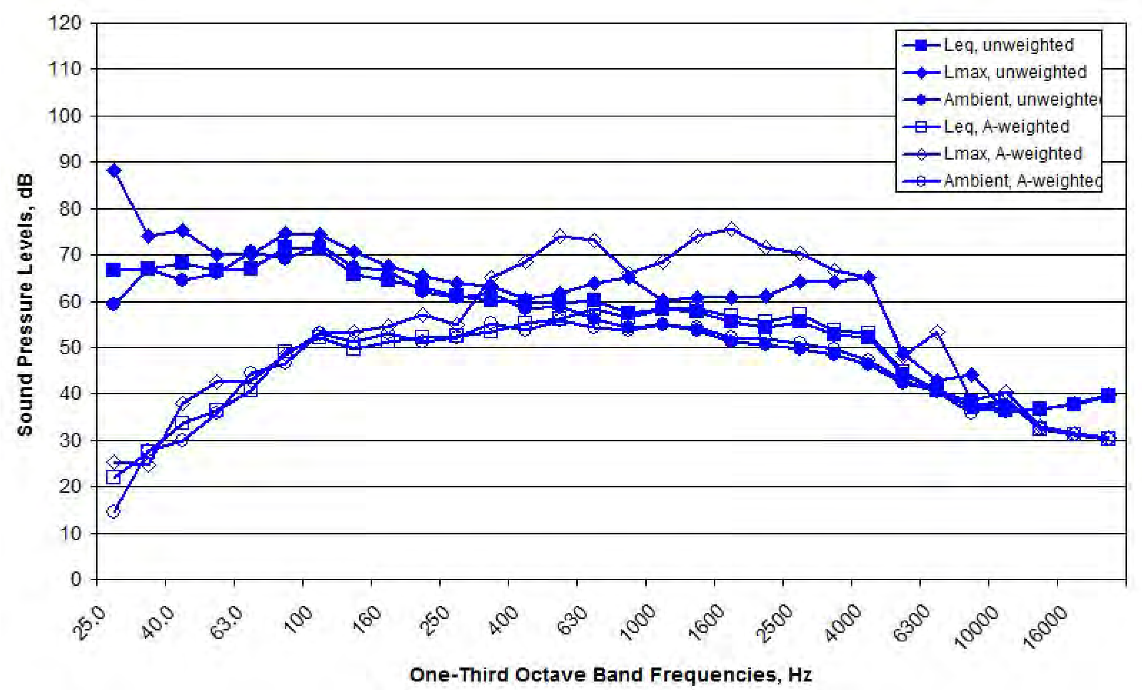

Figure C18. Average One-second Unweighted and A-weighted Spectral Data Measured at the WRA Location during EHW1 RX5, 9:29-9:34, on October 7, 2011

NO DATA AVAILABLE

Figure C19. Average One-second Unweighted and A-weighted Spectral Data Measured at the AB-NO Location during EHW1 RX5, 9:29-9:34, on October 7, 2011

NO DATA AVAILABLE

Figure C20. Average One- second Unweighted and A-weighted Spectral Data Measured at the AB-SO Location during EHW1 RX5, 9:29-9:34, on October 7, 2011

EHW1 RX6

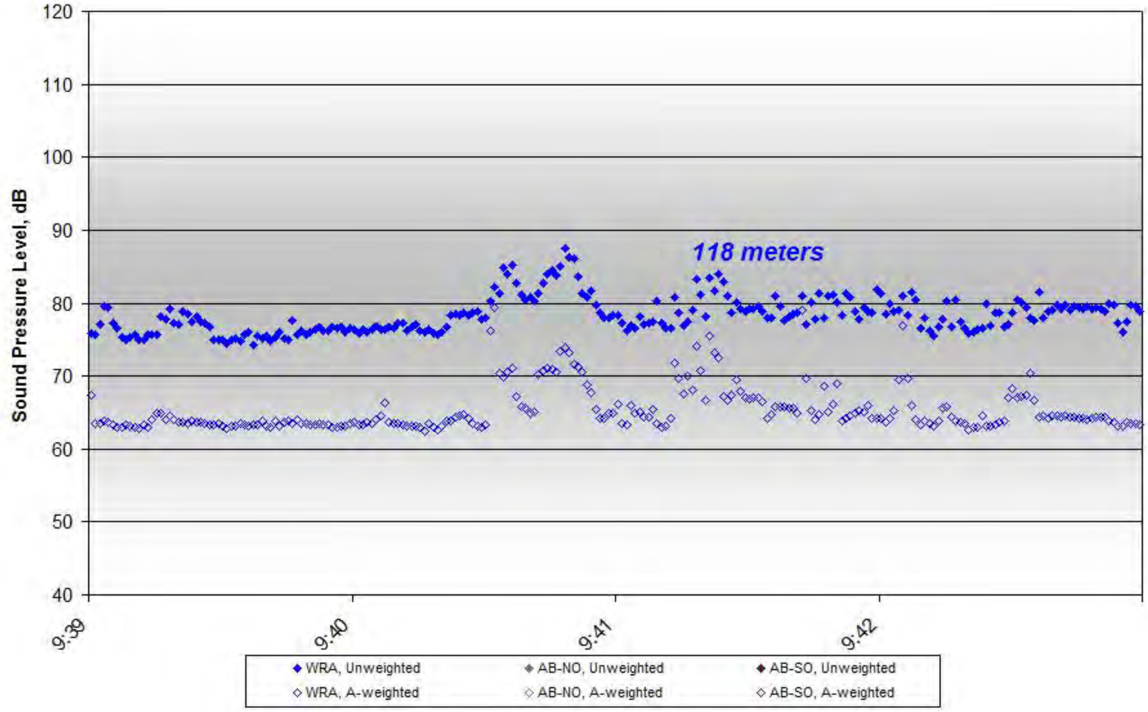

Figure C21. One-second Unweighted and A-weighted Leq Level Data at EHW1 RX6, 9:40-9:40, on October 7, 2011

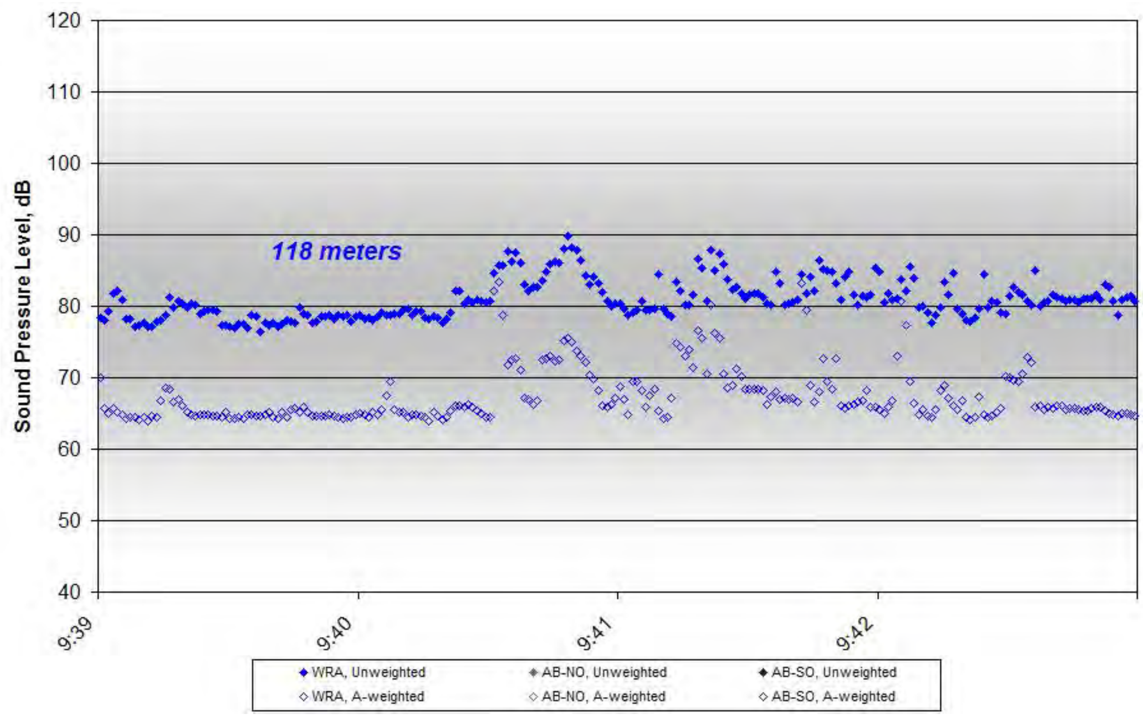

Figure C22. One-second Unweighted and A-weighted Lmax Level Data at EHW1 RX6, 9:40-9:40, on October 7, 2011

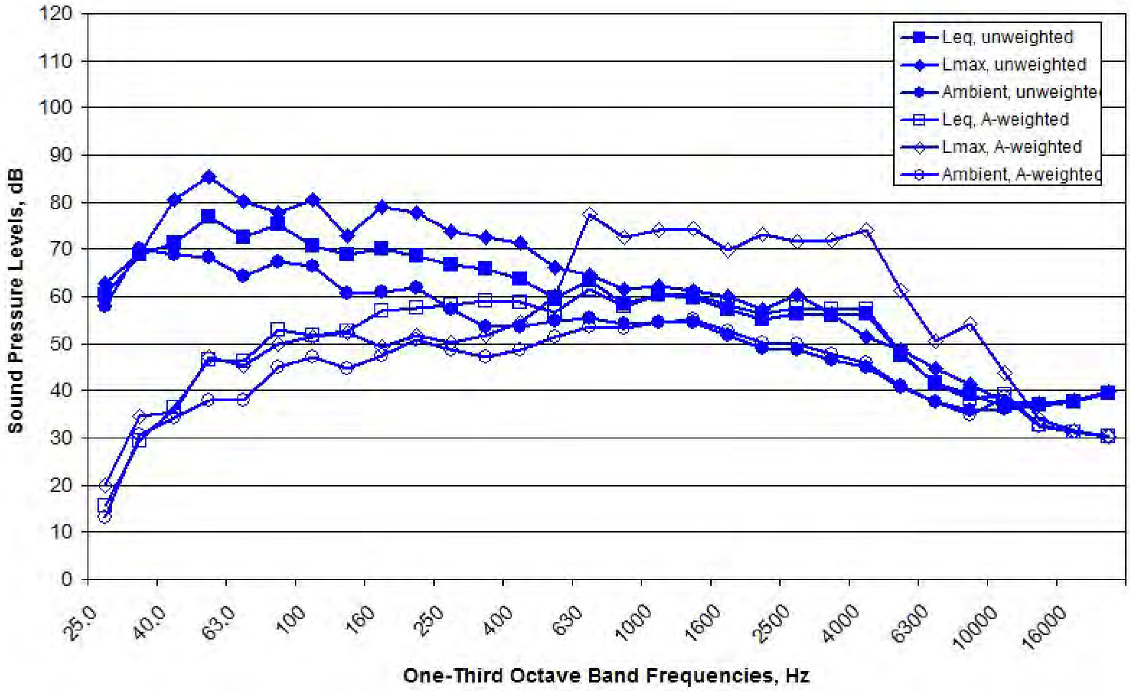

Figure C23. Average One-second Unweighted and A-weighted Spectral Data Measured at the WRA Location during EHW1 RX6, 9:40-9:40, on October 7, 2011

NO DATA AVAILABLE

Figure C24. Average One-second Unweighted and A-weighted Spectral Data Measured at the AB-NO Location during EHW1 RX6, 9:40-9:40, on October 7, 2011

NO DATA AVAILABLE

Figure C25. Average One- second Unweighted and A-weighted Spectral Data Measured at the AB-SO Location during EHW1 RX6, 9:40-9:40, on October 7, 2011

EHW1 RX7

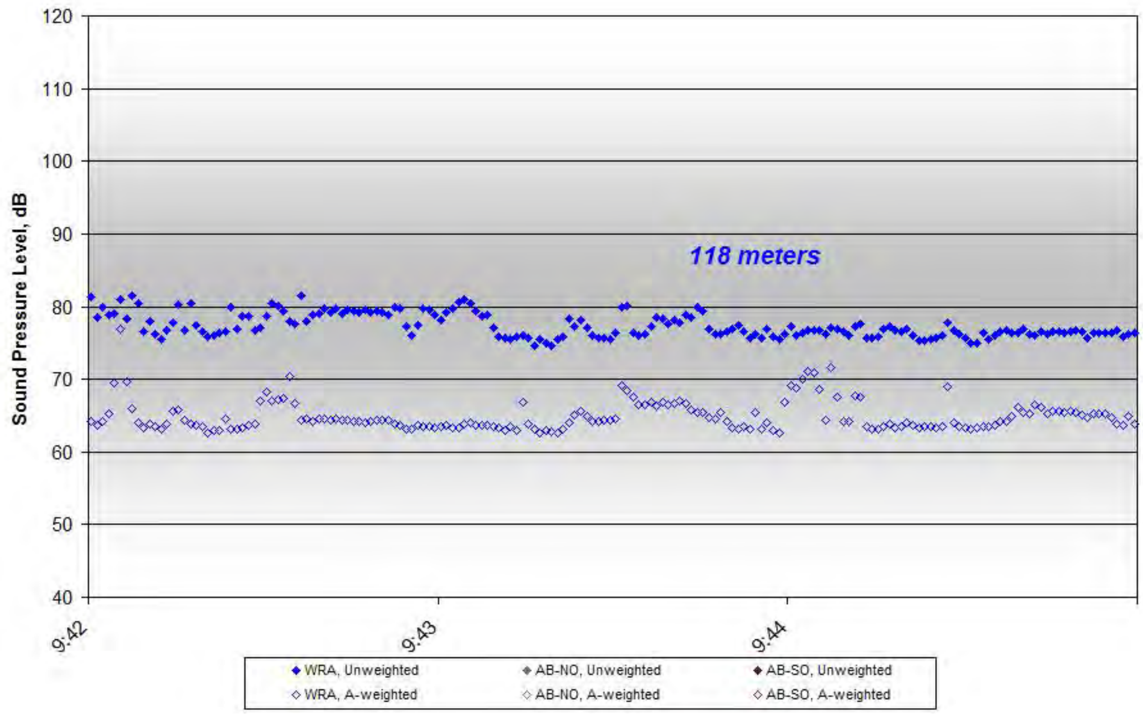

Figure C26. One-second Unweighted and A-weighted Leq Level Data at EHW1 RX7, 9:43-9:43, on October 7, 2011

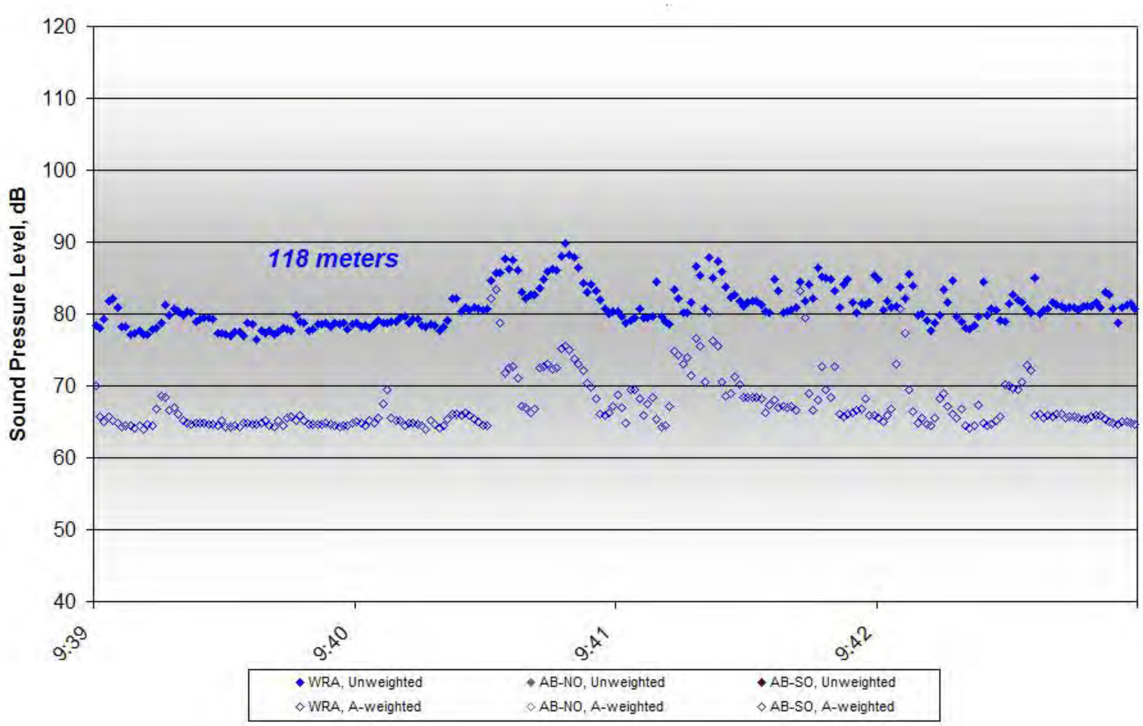

Figure C27. One-second Unweighted and A-weighted Lmax Level Data at EHW1 RX7, 9:43-9:43, on October 7, 2011

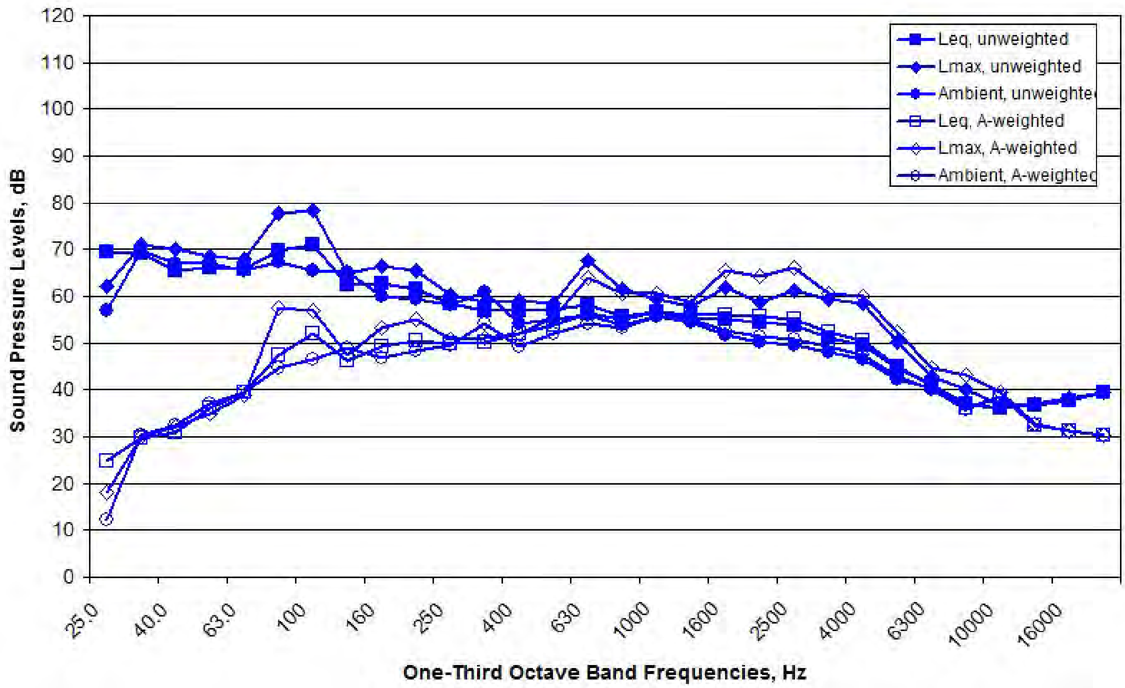

Figure C28. Average One-second Unweighted and A-weighted Spectral Data Measured at the WRA Location during EHW1 RX7, 9:43-9:43, on October 7, 2011

NO DATA AVAILABLE

Figure C29. Average One-second Unweighted and A-weighted Spectral Data Measured at the AB-NO Location during EHW1 RX7, 9:43-9:43, on October 7, 2011

NO DATA AVAILABLE

Figure C30. Average One- second Unweighted and A-weighted Spectral Data Measured at the AB-SO Location during EHW1 RX7, 9:43-9:43, on October 7, 2011

EHW1 RX8

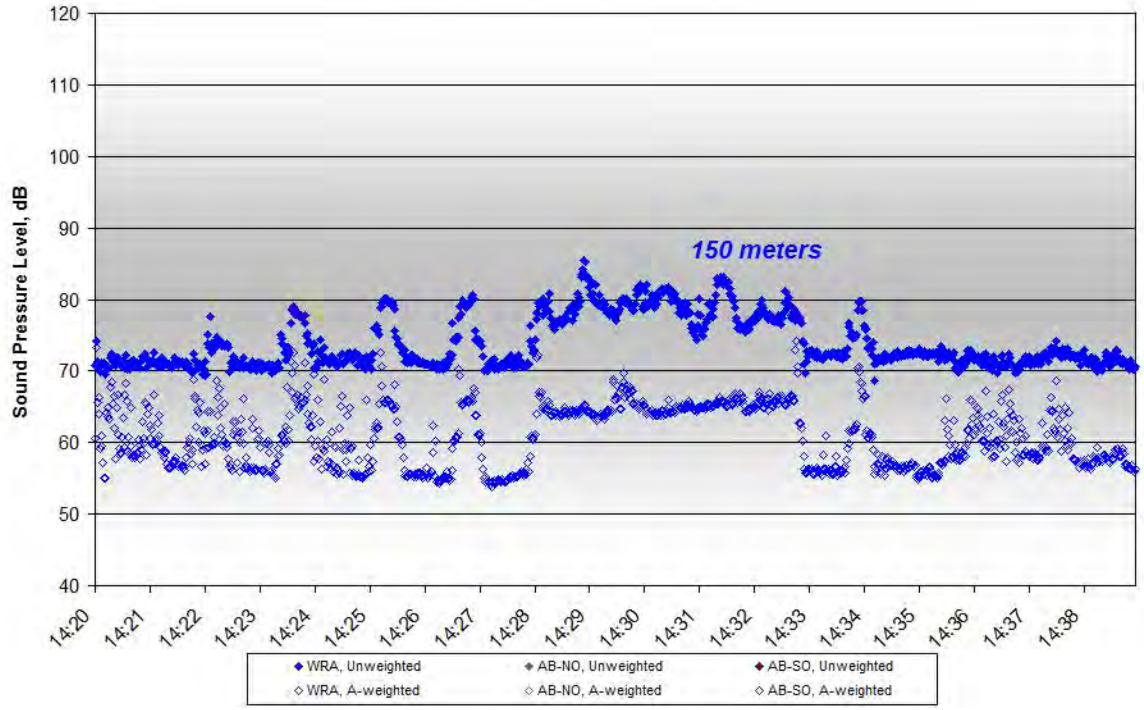

Figure C31. One-second Unweighted and A-weighted Leq Level Data at EHW1 RX8, 14:24-14:33, on October 7, 2011

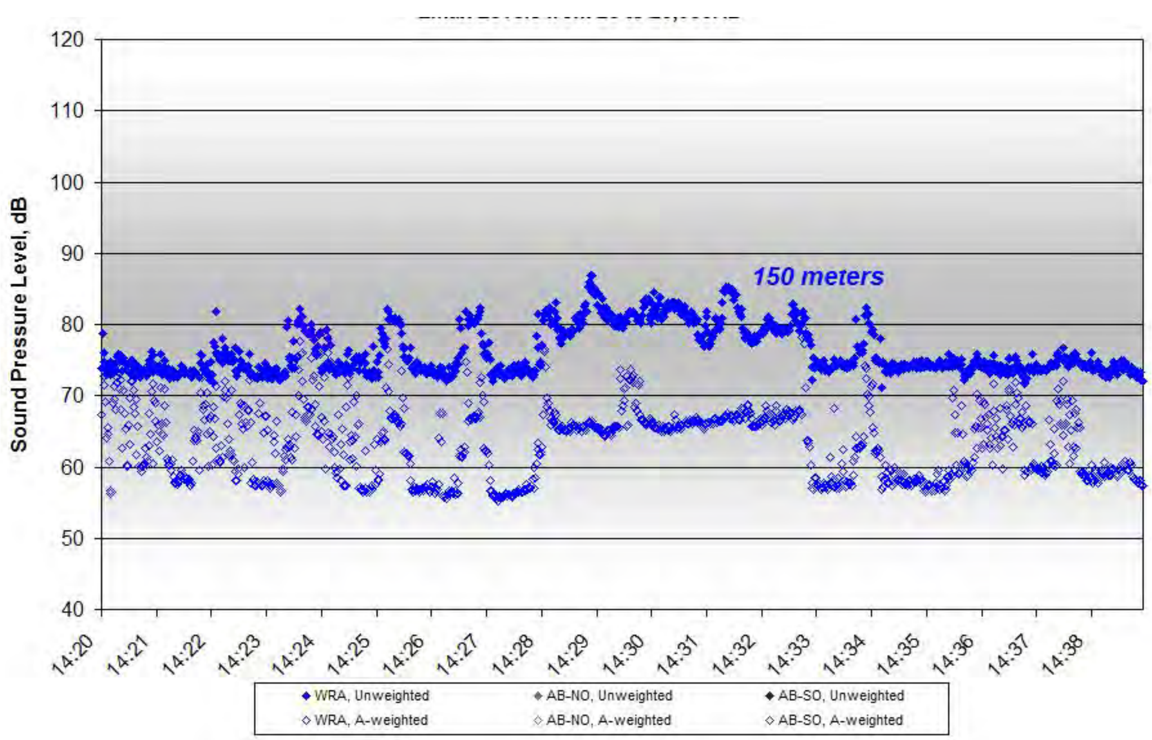

Figure C32. One-second Unweighted and A-weighted Lmax Level Data at EHW1 RX8, 14:24-14:33, on October 7, 2011

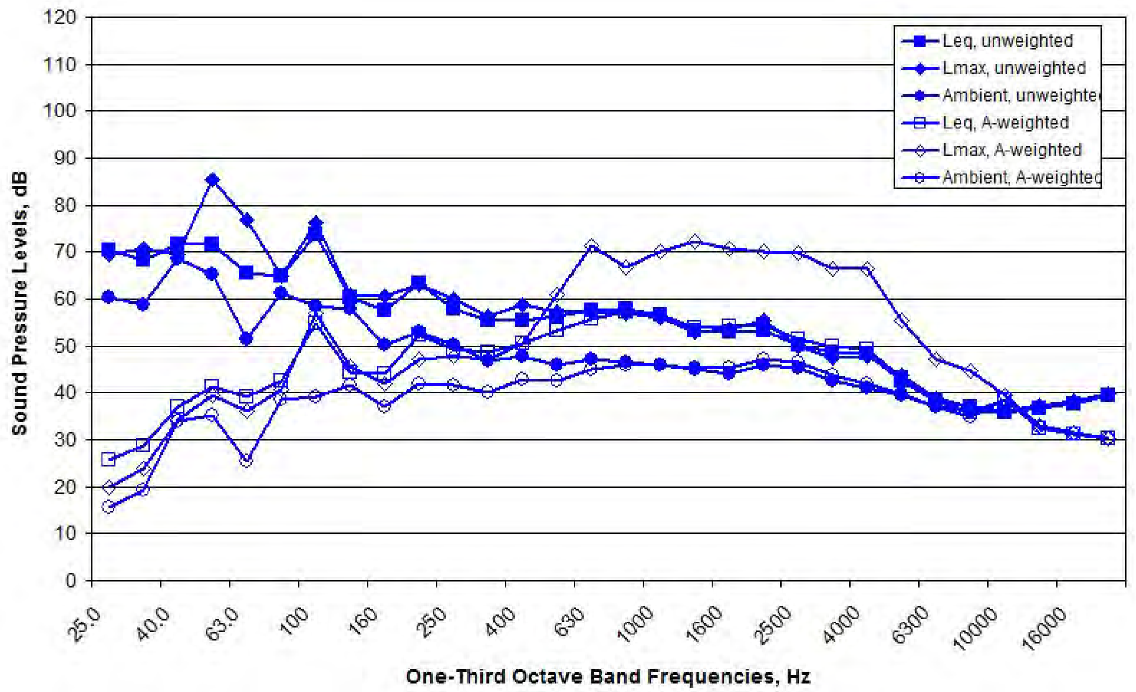

Figure C33. Average One-second Unweighted and A-weighted Spectral Data Measured at the WRA Location during EHW1 RX8, 14:24-14:33, on October 7, 2011

NO DATA AVAILABLE

Figure C34. Average One-second Unweighted and A-weighted Spectral Data Measured at the AB-NO Location during EHW1 RX8, 14:24-14:33, on October 7, 2011

NO DATA AVAILABLE

Figure C35. Average One- second Unweighted and A-weighted Spectral Data Measured at the AB-SO Location during EHW1 RX8, 14:24-14:33, on October 7, 2011

EHW1 RX1

NO DATA AVAILABLE

Figure C36. One-second Unweighted and A-weighted Leq Level Data at EHW1 RX1, 15:00-15:08, on October 7, 2011

NO DATA AVAILABLE

Figure C37. One-second Unweighted and A-weighted Lmax Level Data at EHW1 RX1, 15:00-15:08, on October 7, 2011

NO DATA AVAILABLE

Figure C38. Average One-second Unweighted and A-weighted Spectral Data Measured at the WRA Location during EHW1 RX1, 15:00-15:08, on October 7, 2011

NO DATA AVAILABLE

Figure C39. Average One-second Unweighted and A-weighted Spectral Data Measured at the AB-NO Location during EHW1 RX1, 15:00-15:08, on October 7, 2011

NO DATA AVAILABLE

Figure C40. Average One- second Unweighted and A-weighted Spectral Data Measured at the AB-SO Location during EHW1 RX1, 15:00-15:08, on October 7, 2011

EHW1 FW1

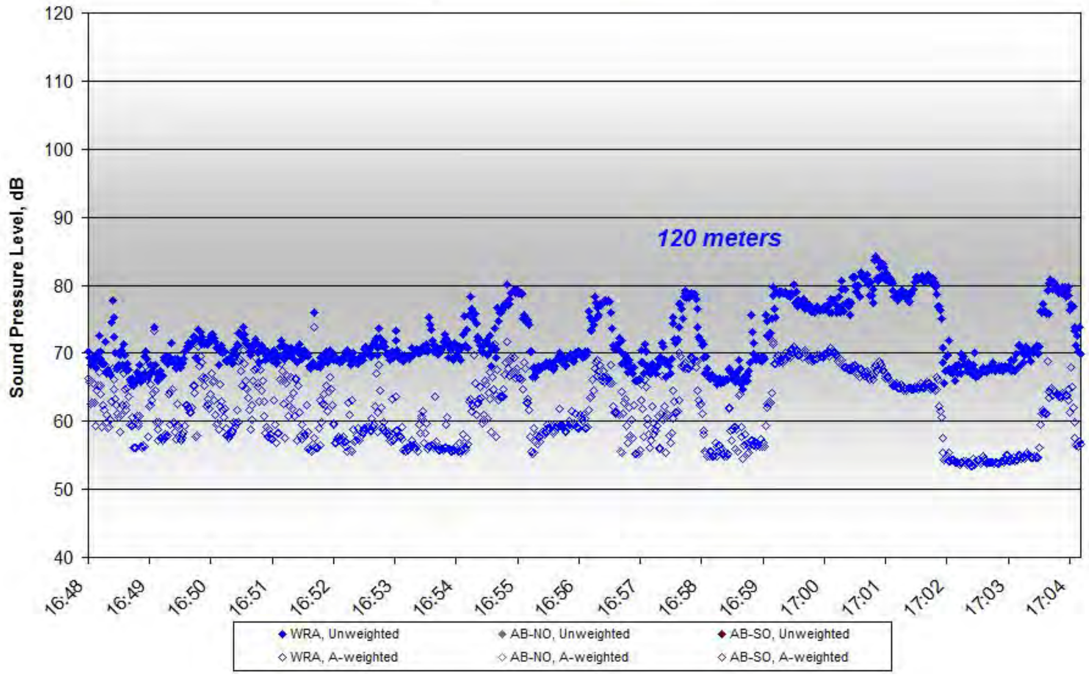

Figure C41. One-second Unweighted and A-weighted Leq Level Data at EHW1 FW1, 16:55-17:02, on October 7, 2011

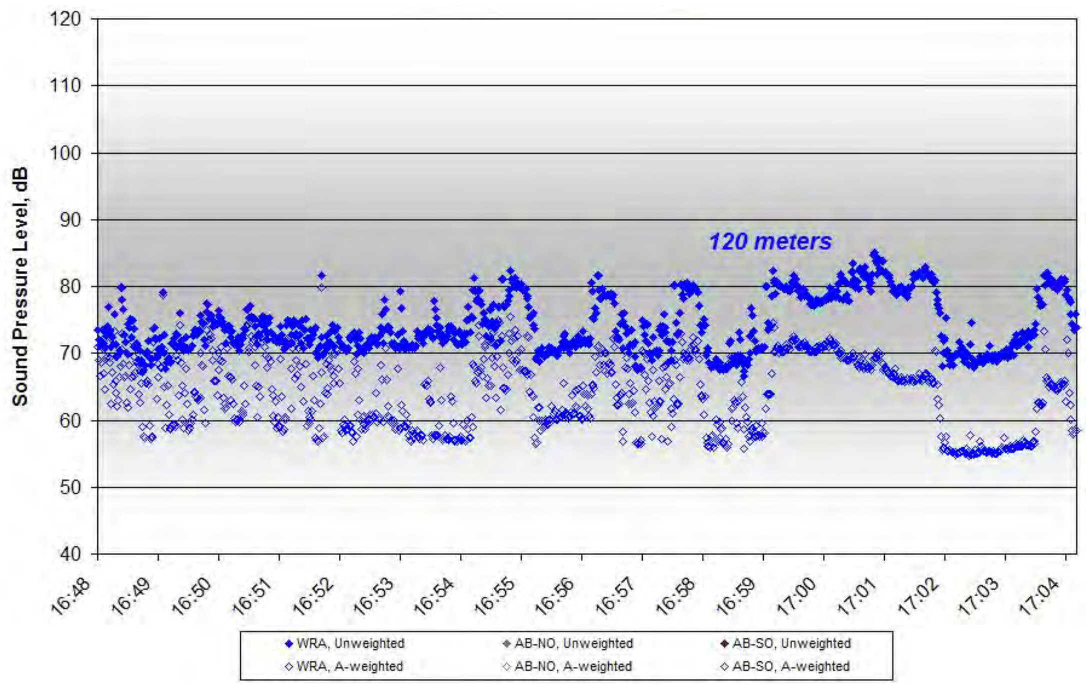

Figure C42. One-second Unweighted and A-weighted Lmax Level Data at EHW1 FW1, 16:55-17:02, on October 7, 2011

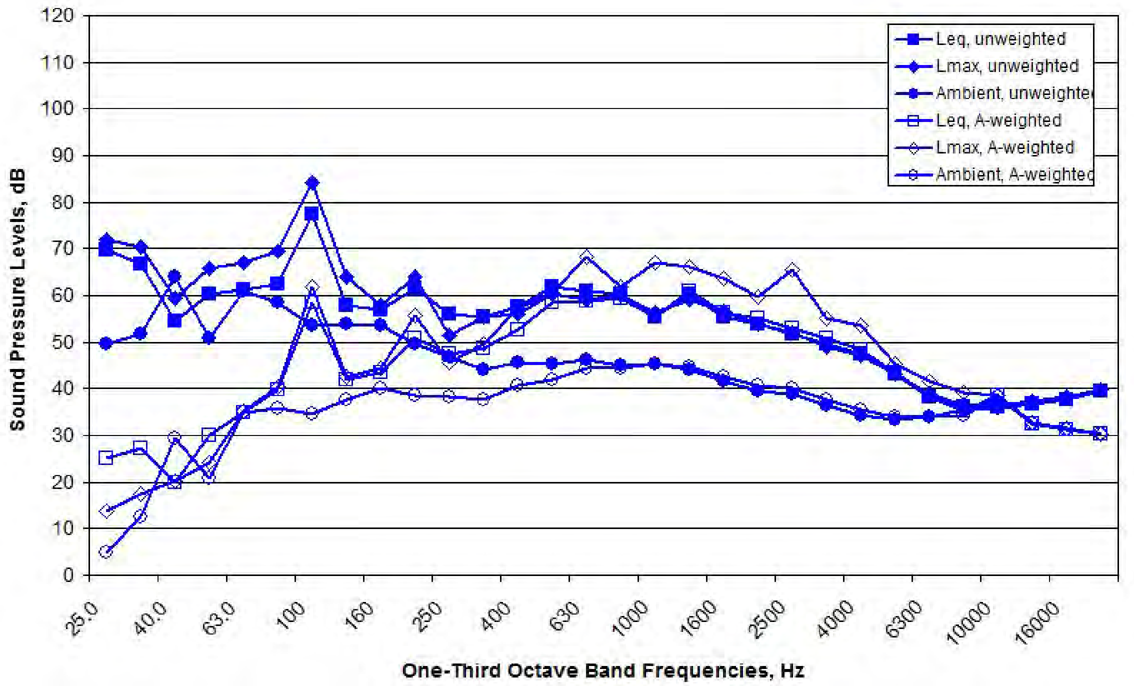

Figure C43. Average One-second Unweighted and A-weighted Spectral Data Measured at the WRA Location during EHW1 FW1, 16:55-17:02, on October 7, 2011

NO DATA AVAILABLE

Figure C44. Average One-second Unweighted and A-weighted Spectral Data Measured at the AB-NO Location during EHW1 FW1, 16:55-17:02, on October 7, 2011

NO DATA AVAILABLE

Figure C45. Average One- second Unweighted and A-weighted Spectral Data Measured at the AB-SO Location during EHW1 FW1, 16:55-17:02, on October 7, 2011

EHW1 FW2

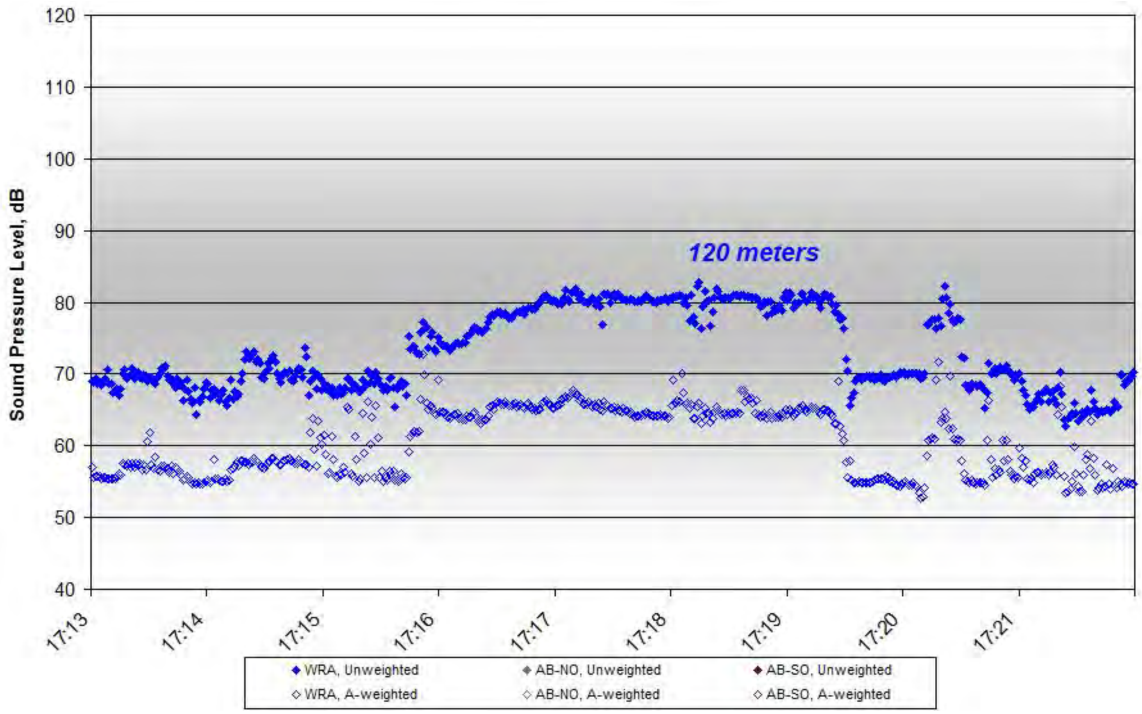

Figure C46. One-second Unweighted and A-weighted Leq Level Data at EHW1 FW2, 17:15-17:19, on October 7, 2011

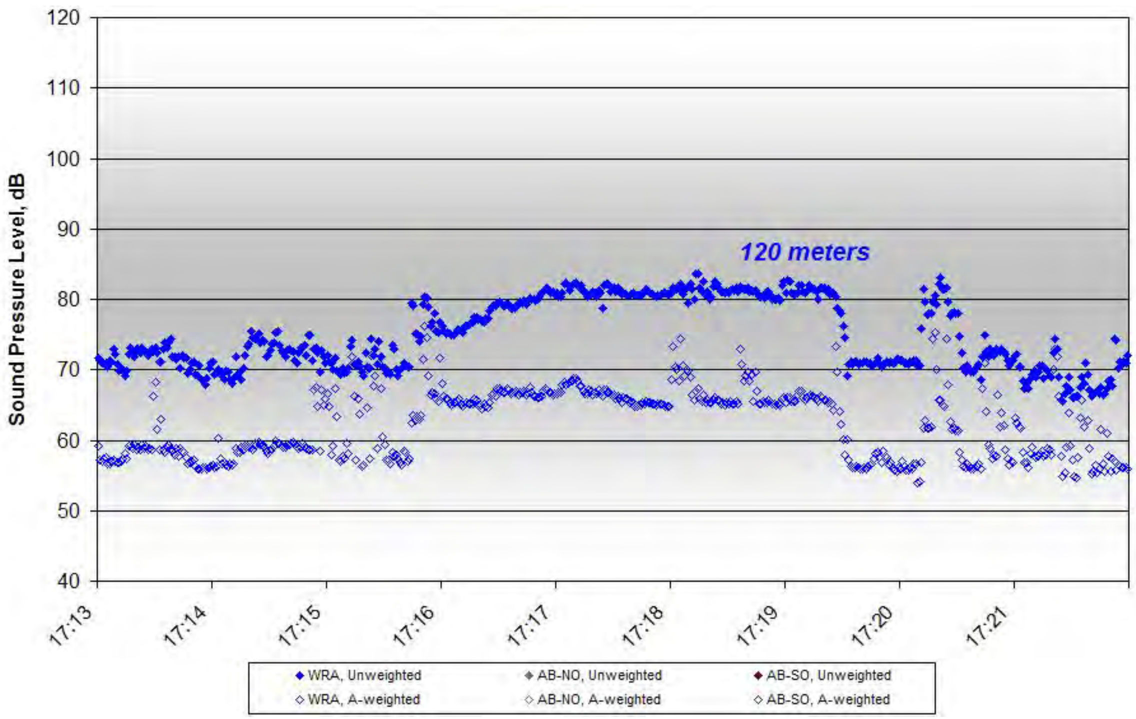

Figure C47. One-second Unweighted and A-weighted Lmax Level Data at EHW1 FW2, 17:15-17:19, on October 7, 2011

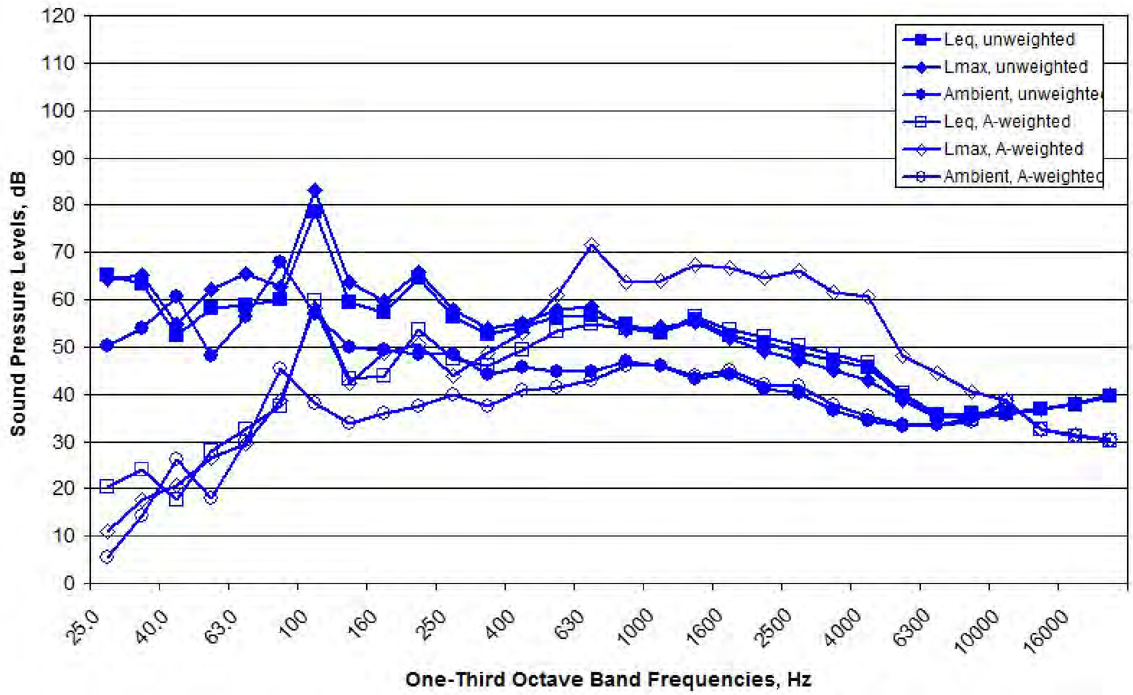

Figure C48. Average One-second Unweighted and A-weighted Spectral Data Measured at the WRA Location during EHW1 FW2, 17:15-17:19, on October 7, 2011

NO DATA AVAILABLE

Figure C49. Average One-second Unweighted and A-weighted Spectral Data Measured at the AB-NO Location during EHW1 FW2, 17:15-17:19, on October 7, 2011

NO DATA AVAILABLE

Figure C50. Average One- second Unweighted and A-weighted Spectral Data Measured at the AB-SO Location during EHW1 FW2, 17:15-17:19, on October 7, 2011

EHW1 FW3

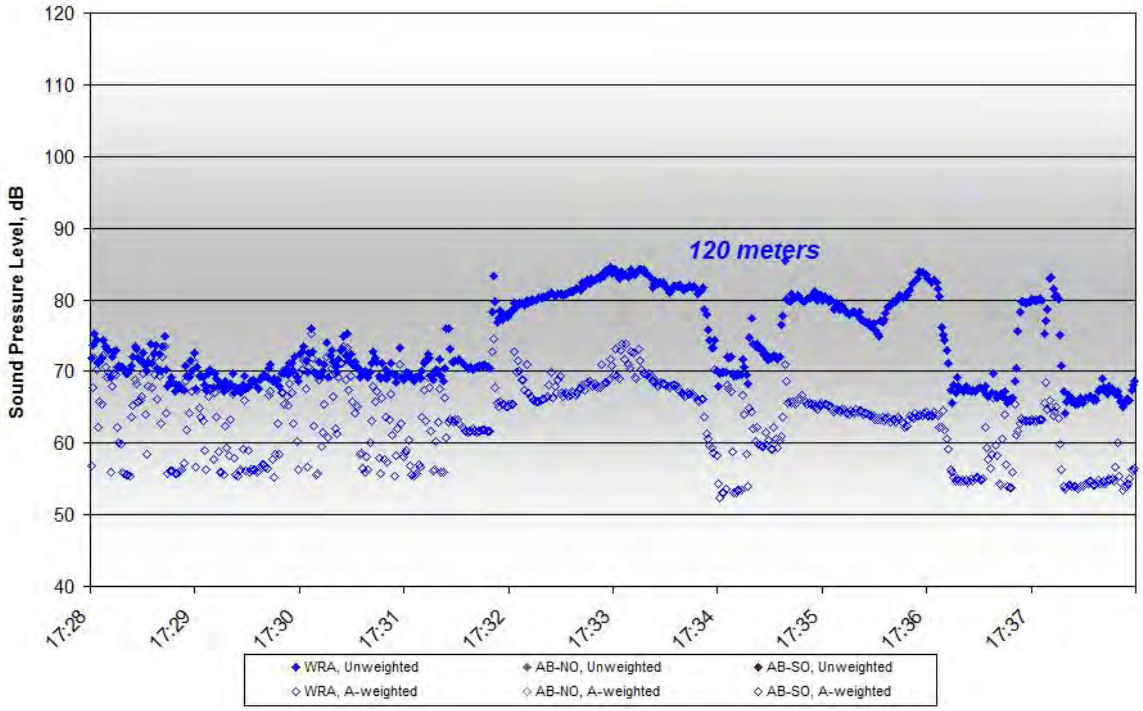

Figure C51. One-second Unweighted and A-weighted Leq Level Data at EHW1 FW3, 17:15-17:19, on October 7, 2011

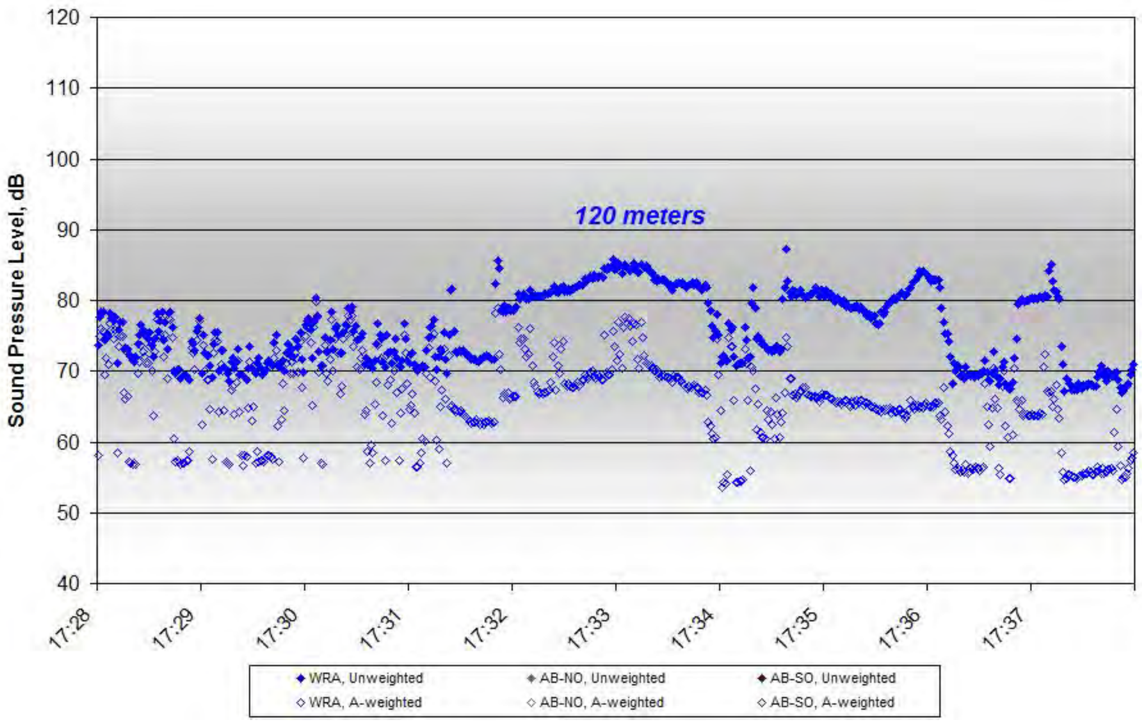

Figure C52. One-second Unweighted and A-weighted Lmax Level Data at EHW1 FW3, 17:15-17:19, on October 7, 2011

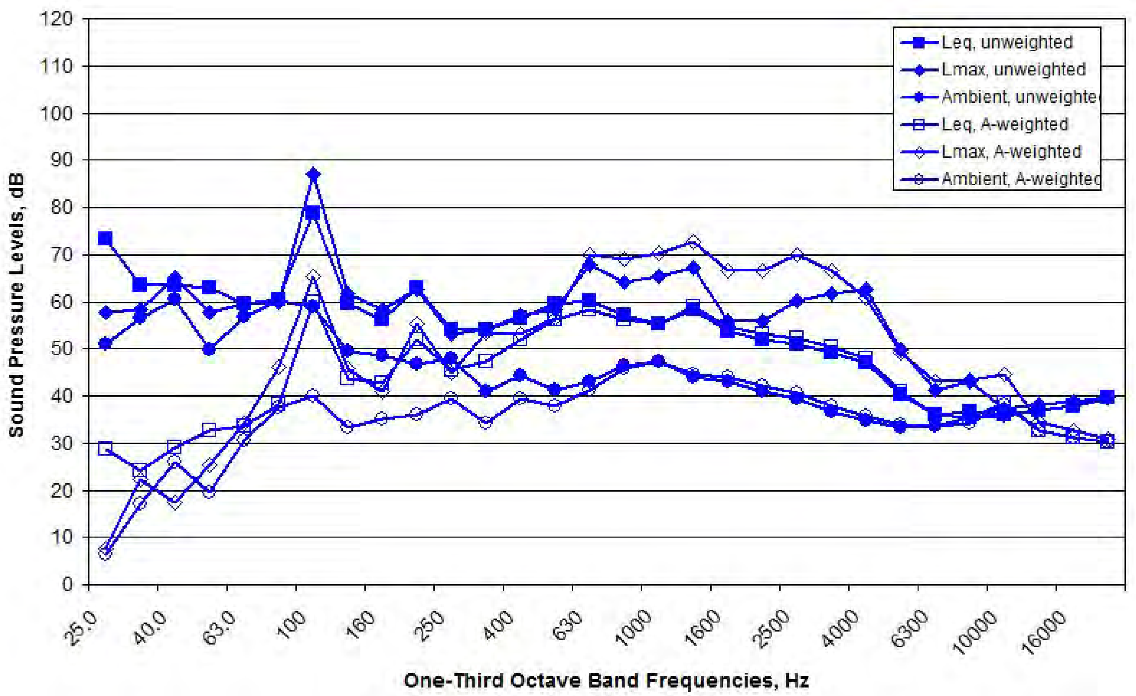

Figure C53. Average One-second Unweighted and A-weighted Spectral Data Measured at the WRA Location during EHW1 FW3, 17:15-17:19, on October 7, 2011

NO DATA AVAILABLE

Figure C54. Average One-second Unweighted and A-weighted Spectral Data Measured at the AB-NO Location during EHW1 FW3, 17:15-17:19, on October 7, 2011

NO DATA AVAILABLE

Figure C55. Average One- second Unweighted and A-weighted Spectral Data Measured at the AB-SO Location during EHW1 FW3, 17:15-17:19, on October 7, 2011

EHW1 FW4

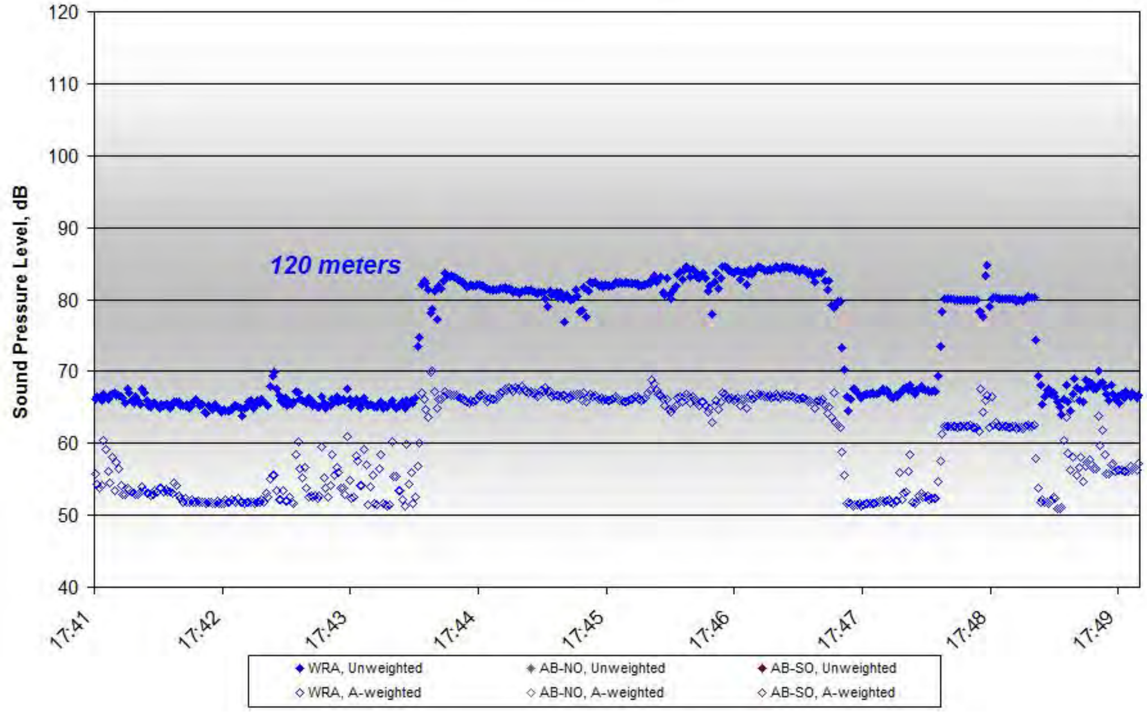

Figure C56. One-second Unweighted and A-weighted Leq Level Data at EHW1 FW4, 17:43-17:46, on October 7, 2011

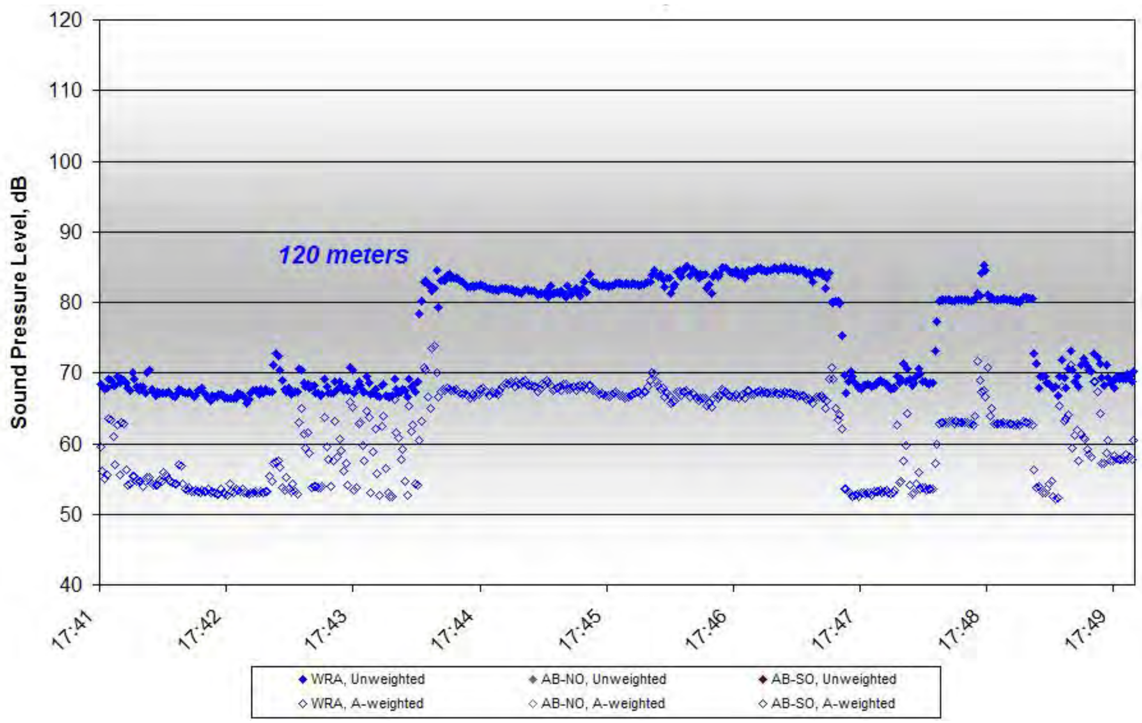

Figure C57. One-second Unweighted and A-weighted Lmax Level Data at EHW1 FW4, 17:43-17:46, on October 7, 2011

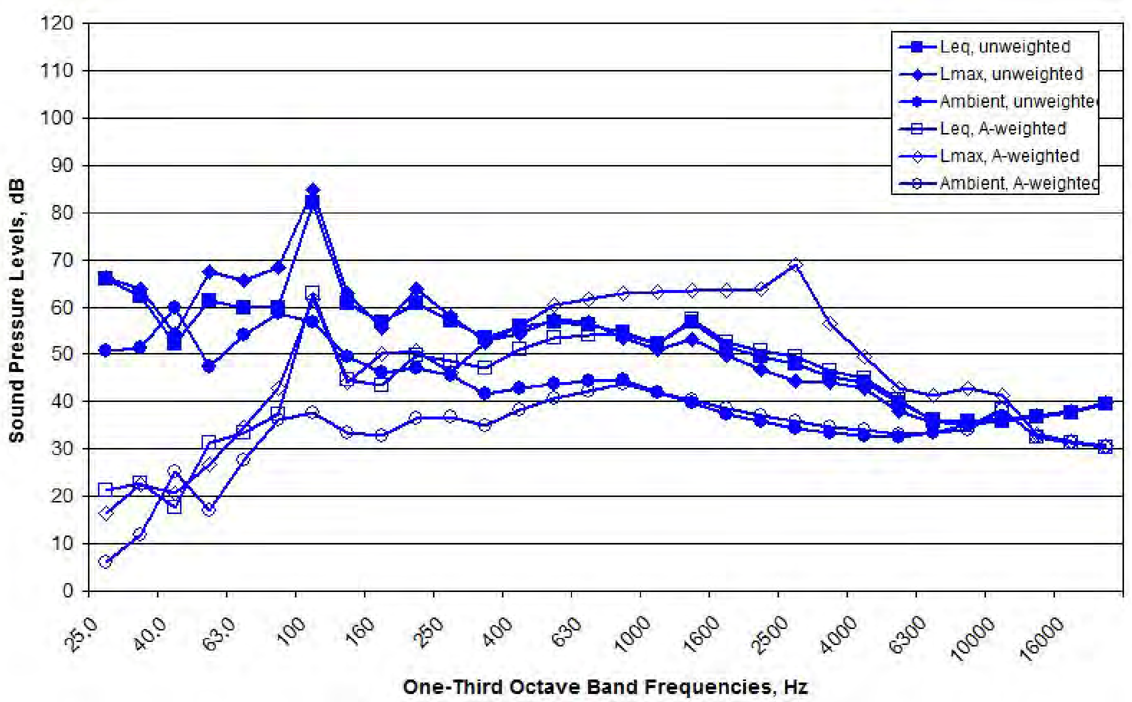

Figure C58. Average One-second Unweighted and A-weighted Spectral Data Measured at the WRA Location during EHW1 FW4, 17:43-17:46, on October 7, 2011

NO DATA AVAILABLE

Figure C59. Average One-second Unweighted and A-weighted Spectral Data Measured at the AB-NO Location during EHW1 FW4, 17:43-17:46, on October 7, 2011

NO DATA AVAILABLE

Figure C60. Average One- second Unweighted and A-weighted Spectral Data Measured at the AB-SO Location during EHW1 FW4, 17:43-17:46, on October 7, 2011

10/8/2011 – EHW1 FW5

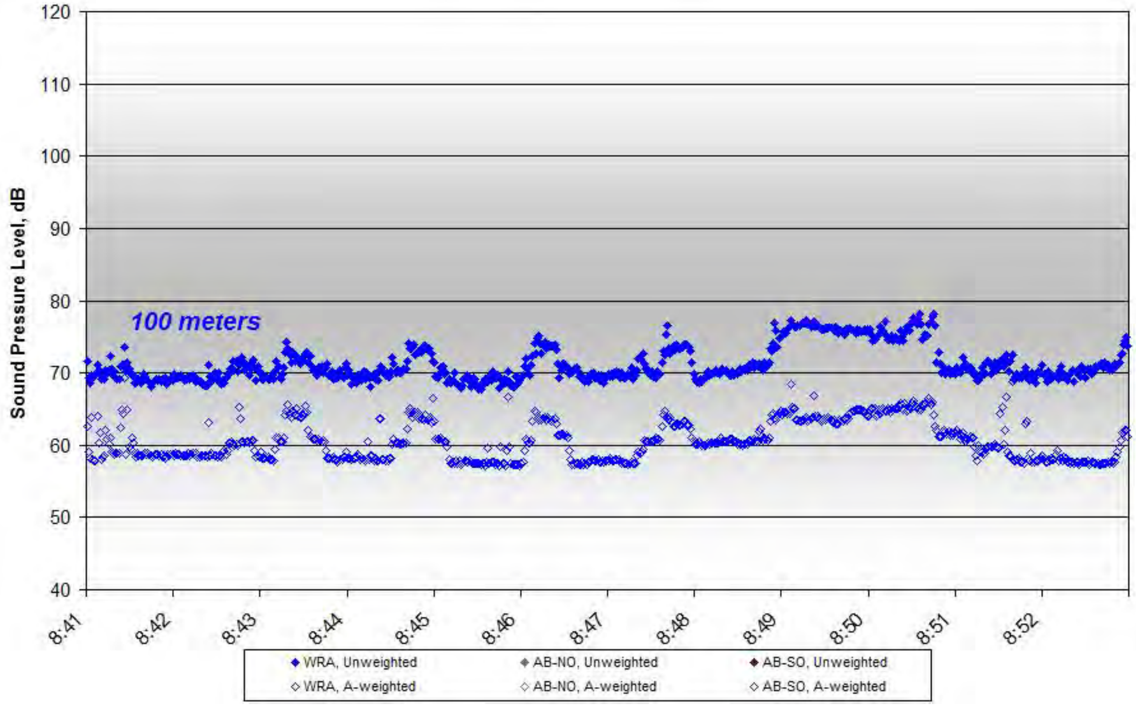

Figure C61. One-second Unweighted and A-weighted Leq Level Data at EHW1 FW5, 8:43-8:51, on October 8, 2011

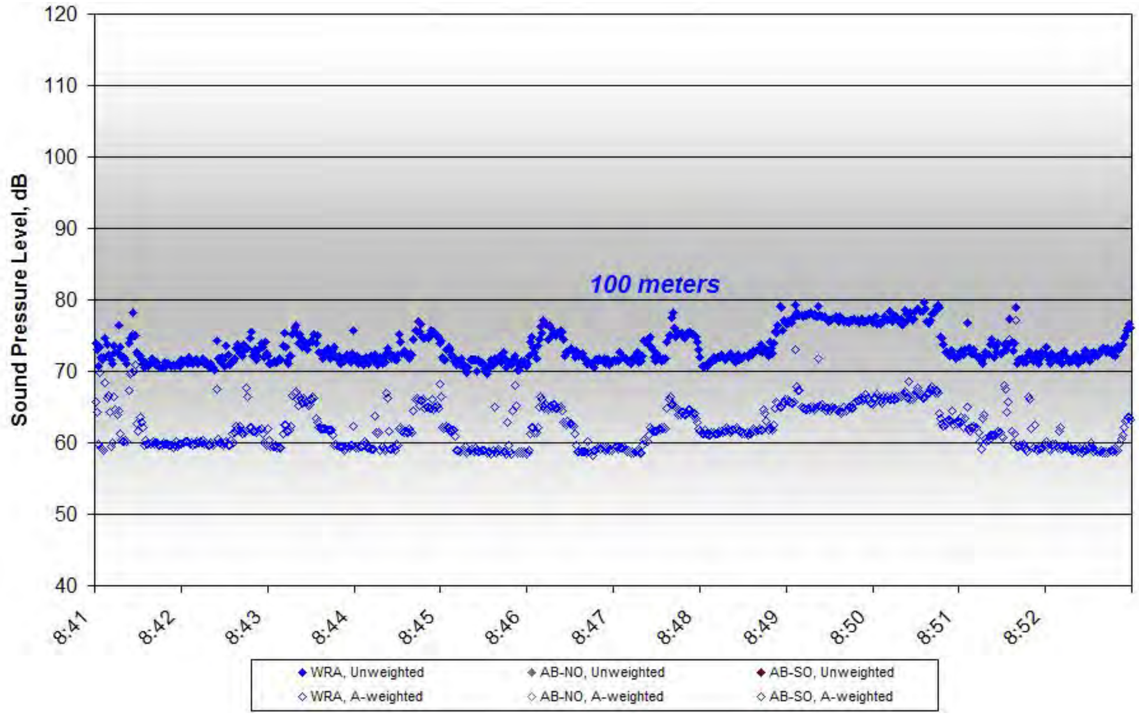

Figure C62. One-second Unweighted and A-weighted Lmax Level Data at EHW1 FW5, 8:43-8:51, on October 8, 2011

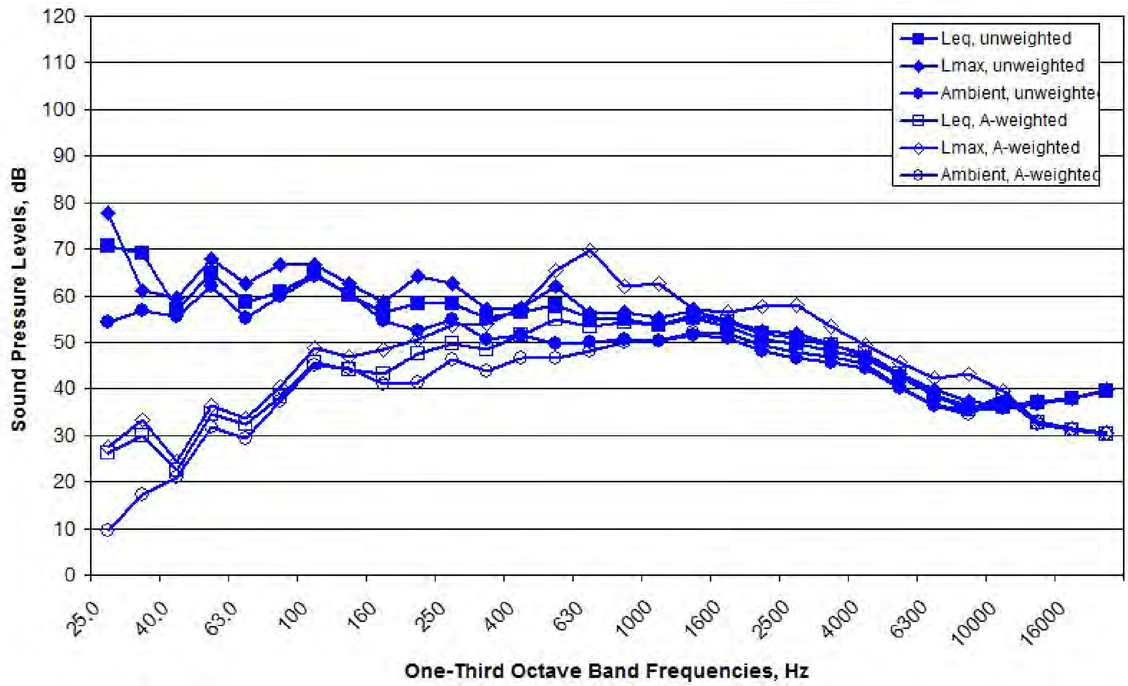

Figure C63. Average One-second Unweighted and A-weighted Spectral Data Measured at the WRA Location during EHW1 FW5, 8:43-8:51, on October 8, 2011

NO DATA AVAILABLE

Figure C64. Average One-second Unweighted and A-weighted Spectral Data Measured at the AB-NO Location during EHW1 FW5, 8:43-8:51, on October 8, 2011

NO DATA AVAILABLE

Figure C65. Average One- second Unweighted and A-weighted Spectral Data Measured at the AB-SO Location during EHW1 FW5, 8:43-8:51, on October 8, 2011

EHW1 FW6

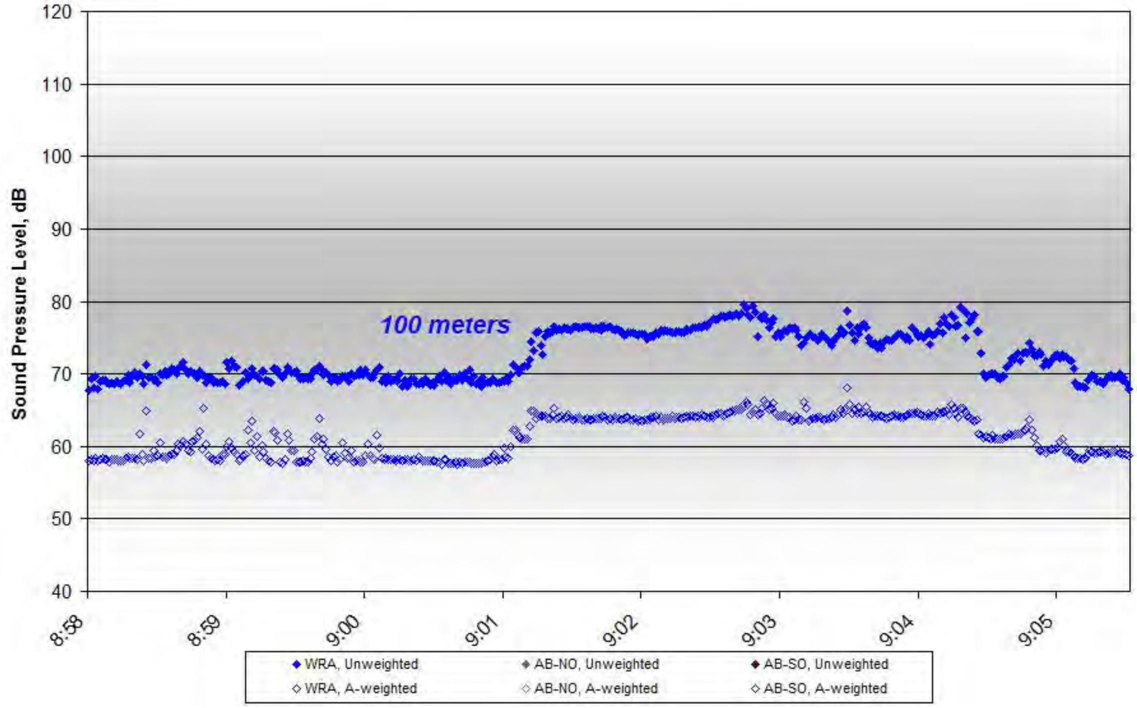

Figure C66. One-second Unweighted and A-weighted Leq Level Data at EHW1 FW6, 9:01-9:05, on October 8, 2011

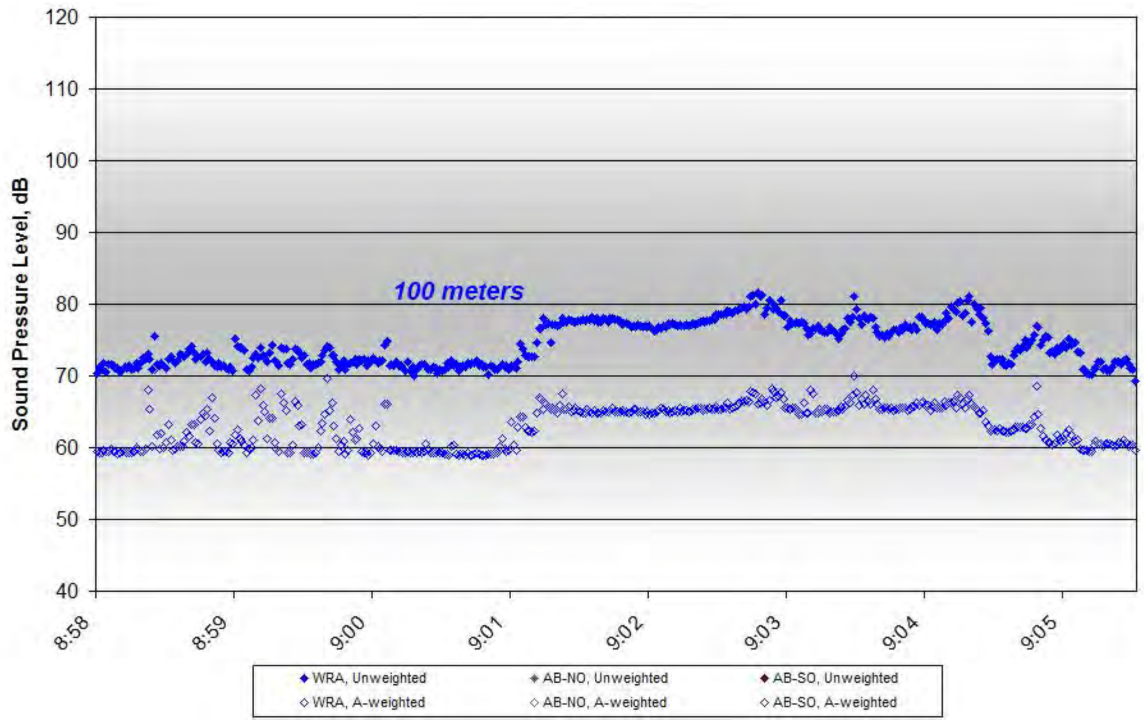

Figure C67. One-second Unweighted and A-weighted Lmax Level Data at EHW1 FW6, 9:01-9:05, on October 8, 2011

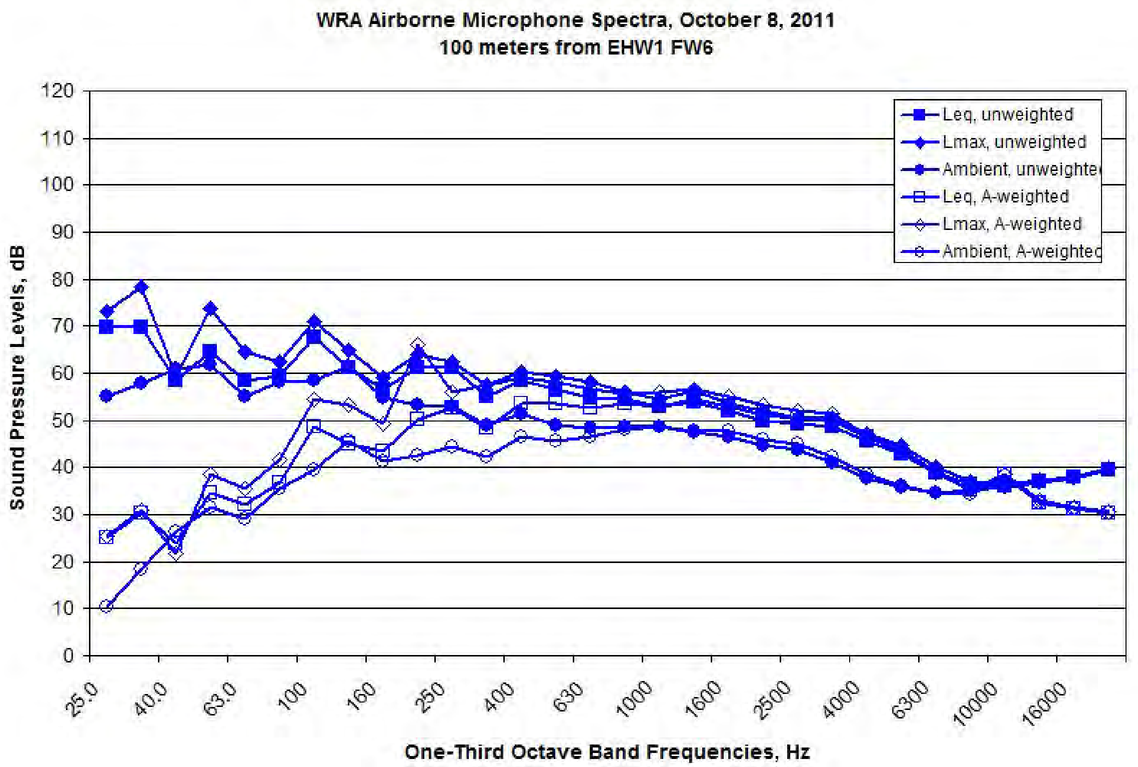

Figure C68. Average One-second Unweighted and A-weighted Spectral Data Measured at the WRA Location during EHW1 FW6, 9:01-9:05, on October 8, 2011

NO DATA AVAILABLE

Figure C69. Average One-second Unweighted and A-weighted Spectral Data Measured at the AB-NO Location during EHW1 FW6, 9:01-9:05, on October 8, 2011

NO DATA AVAILABLE

Figure C70. Average One- second Unweighted and A-weighted Spectral Data Measured at the AB-SO Location during EHW1 FW6, 9:01-9:05, on October 8, 2011

EHW1 FW7

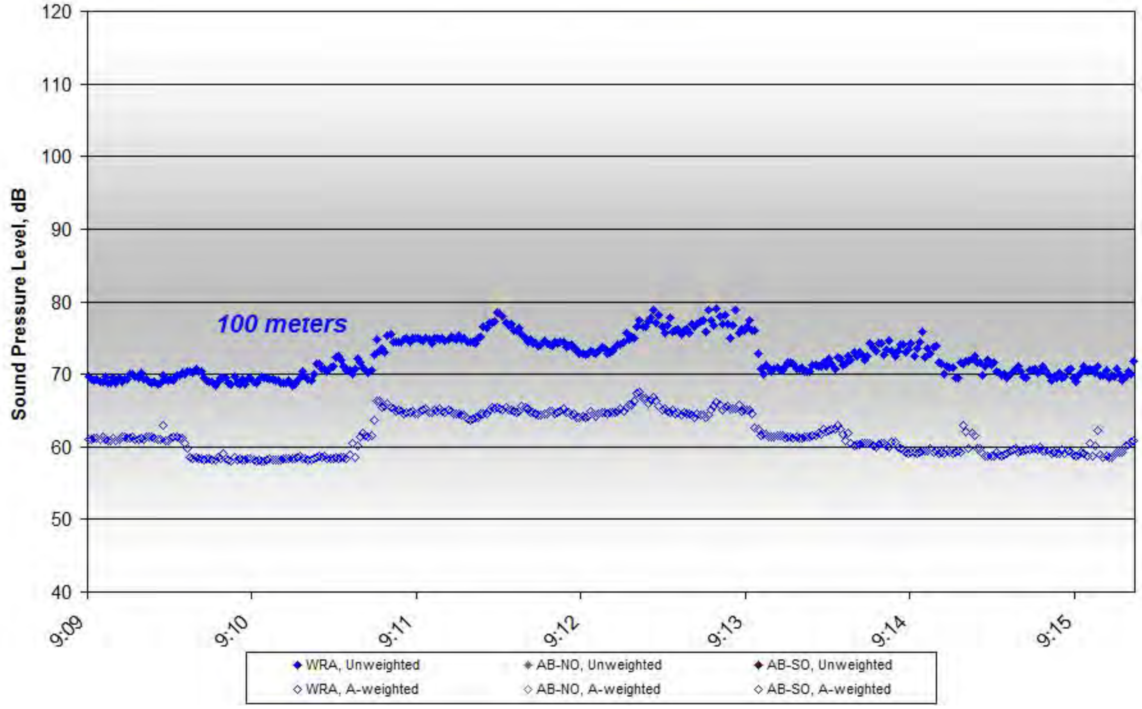

Figure C71. One-second Unweighted and A-weighted Leq Level Data at EHW1 FW7, 9:11-9:14, on October 8, 2011

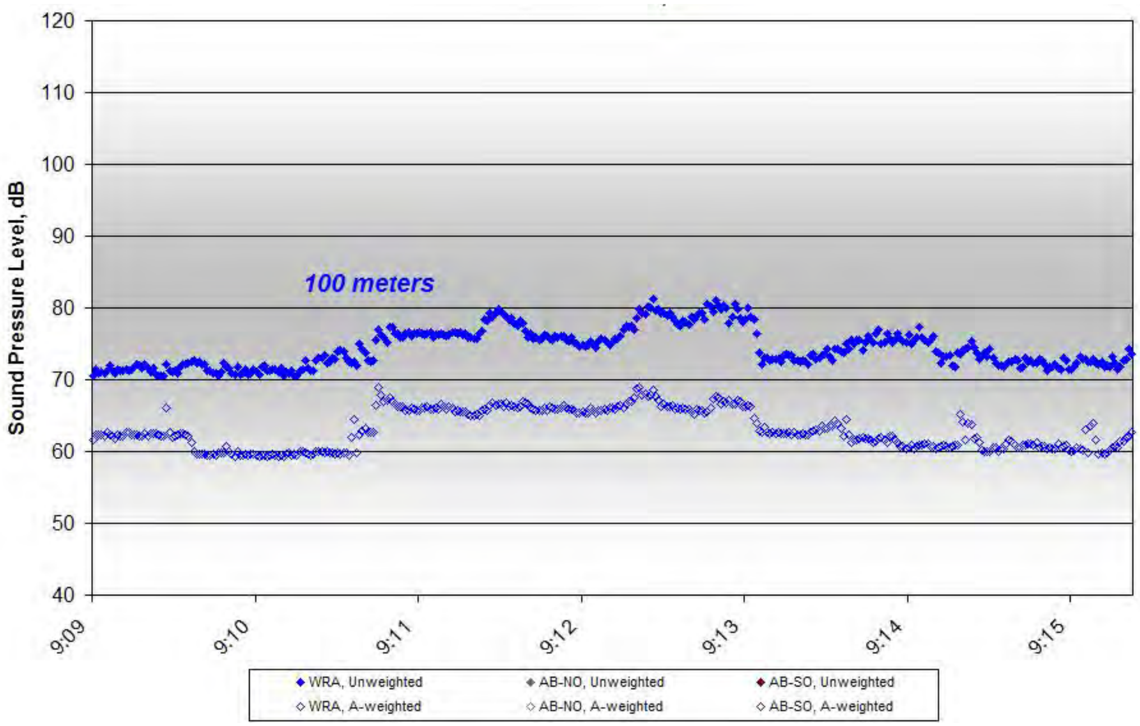

Figure C72. One-second Unweighted and A-weighted Lmax Level Data at EHW1 FW7, 9:11-9:14, on October 8, 2011

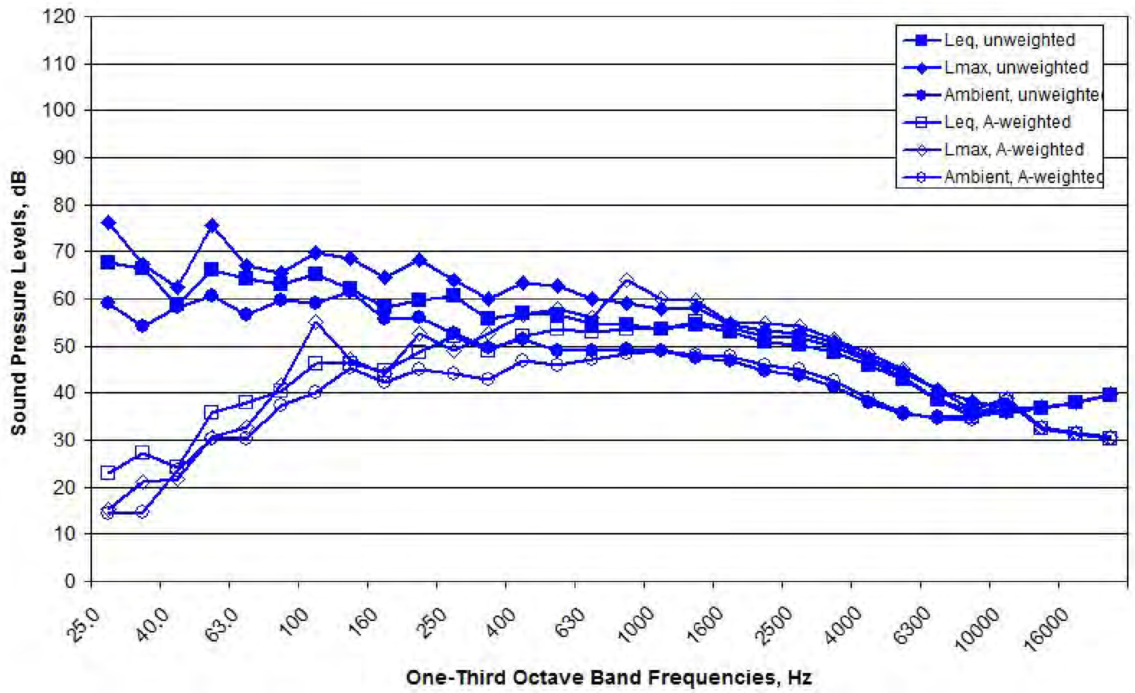

Figure C73. Average One-second Unweighted and A-weighted Spectral Data Measured at the WRA Location during EHW1 FW7, 9:11-9:14, on October 8, 2011

NO DATA AVAILABLE

Figure C74. Average One-second Unweighted and A-weighted Spectral Data Measured at the AB-NO Location during EHW1 FW7, 9:11-9:14, on October 8, 2011

NO DATA AVAILABLE

Figure C75. Average One- second Unweighted and A-weighted Spectral Data Measured at the AB-SO Location during EHW1 FW7, 9:11-9:14, on October 8, 2011

EHW1 FW8

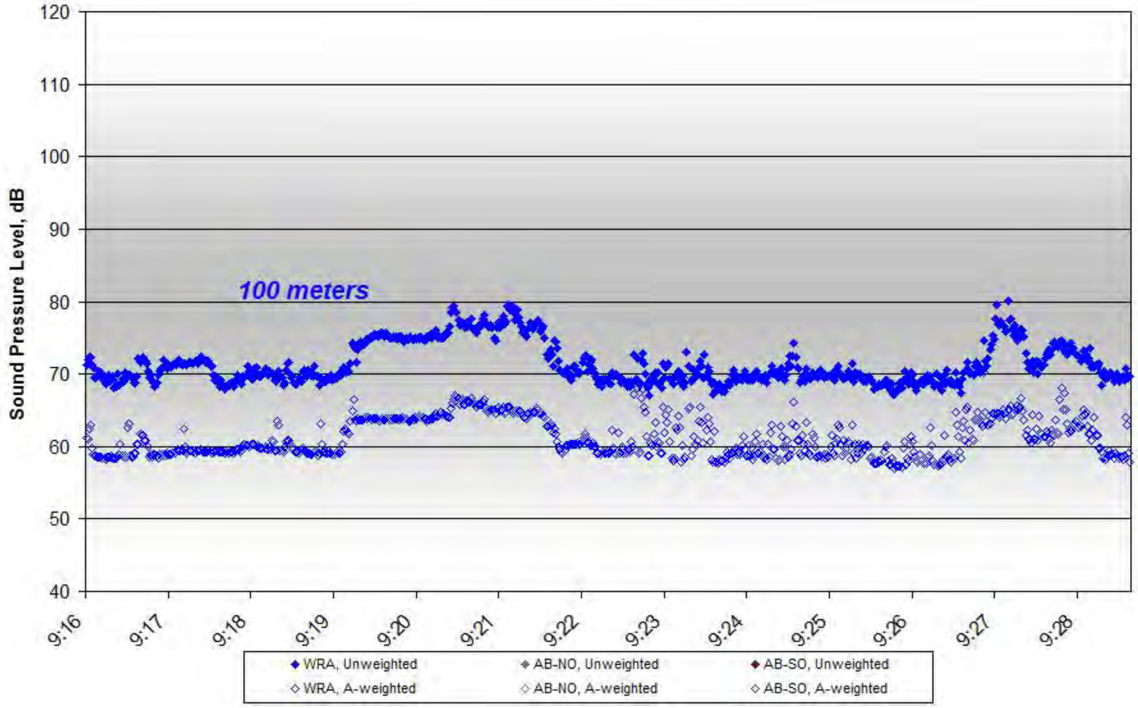

Figure C76. One-second Unweighted and A-weighted Leq Level Data at EHW1 FW8, 9:19-9:27, on October 8, 2011

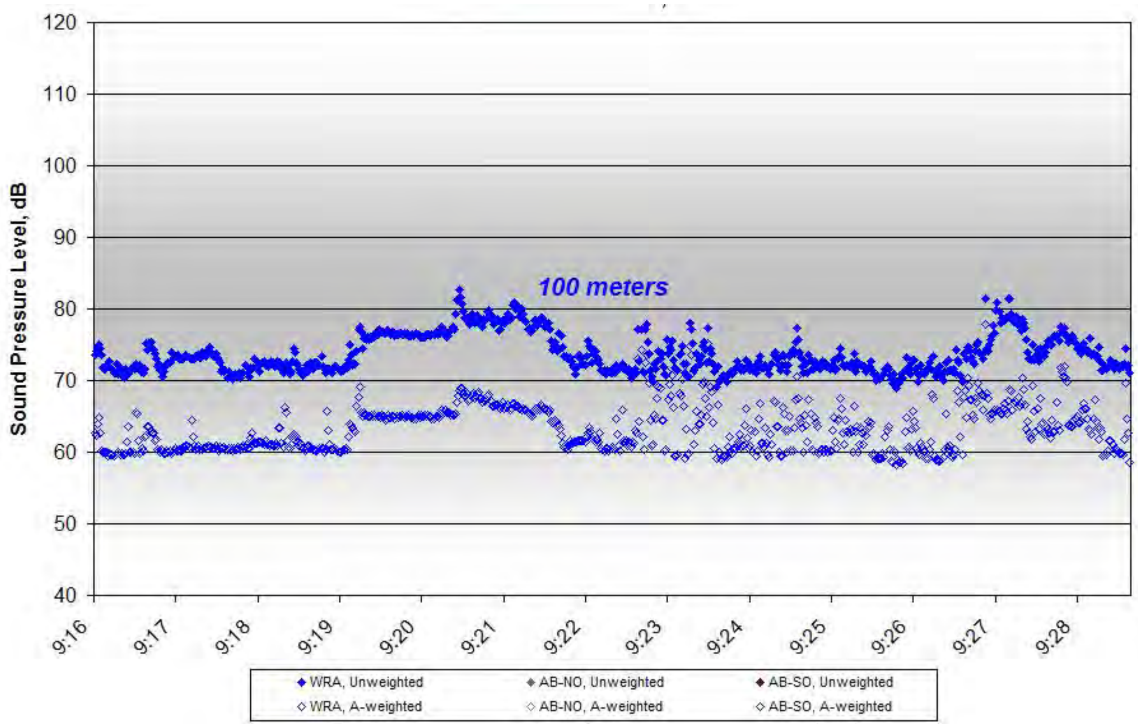

Figure C77. One-second Unweighted and A-weighted Lmax Level Data at EHW1 FW8, 9:19-9:27, on October 8, 2011

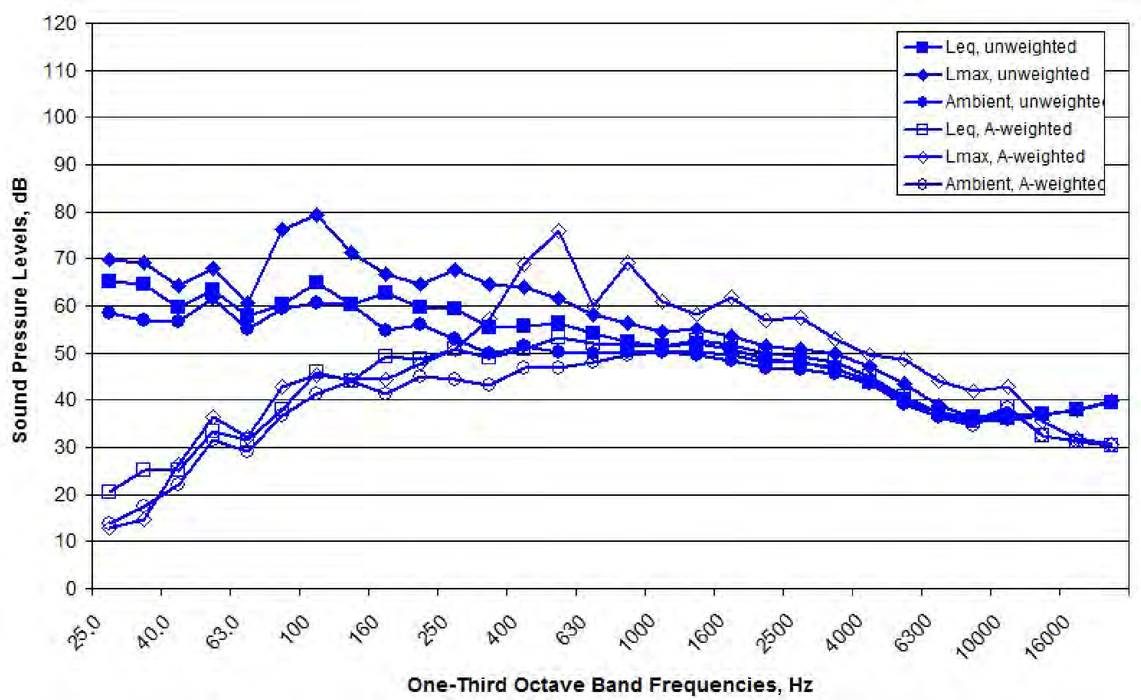

Figure C78. Average One-second Unweighted and A-weighted Spectral Data Measured at the WRA Location during EHW1 FW8, 9:19-9:27, on October 8, 2011

NO DATA AVAILABLE

Figure C79. Average One-second Unweighted and A-weighted Spectral Data Measured at the AB-NO Location during EHW1 FW8, 9:19-9:27, on October 8, 2011

NO DATA AVAILABLE

Figure C80. Average One- second Unweighted and A-weighted Spectral Data Measured at the AB-SO Location during EHW1 FW8, 9:19-9:27, on October 8, 2011

10/10/2011 – W6, 13:30-13:39

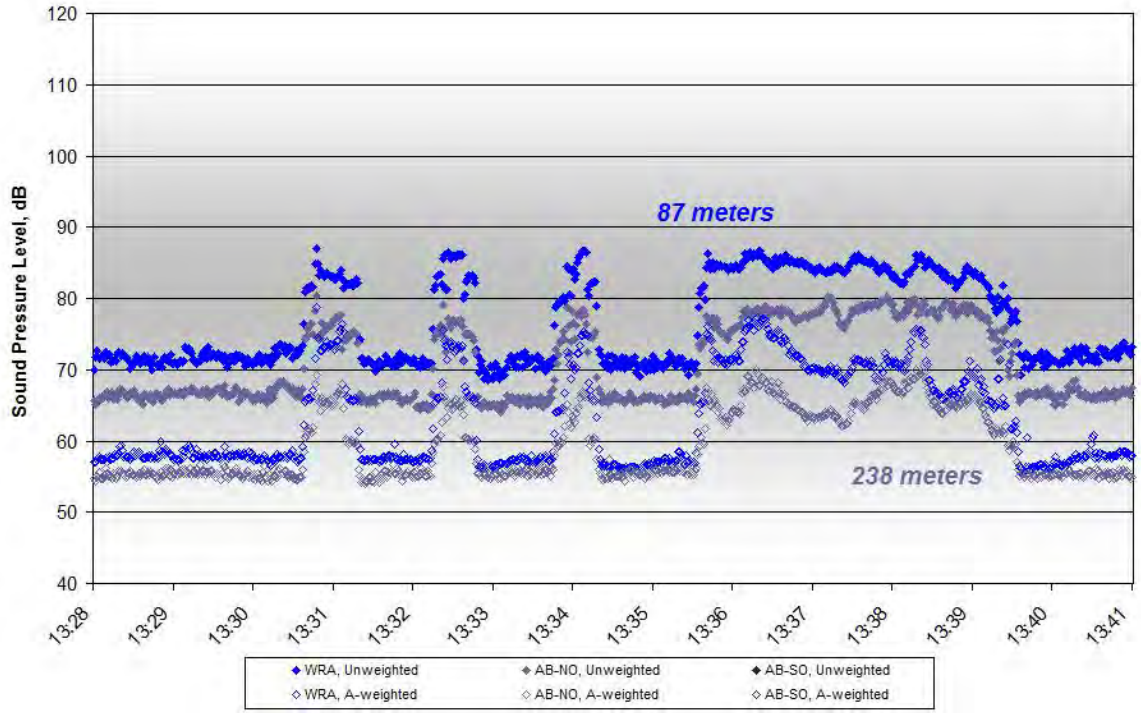

Figure C81. One-second Unweighted and A-weighted Leq Level Data at W6, 13:30-13:39, on October 10, 2011

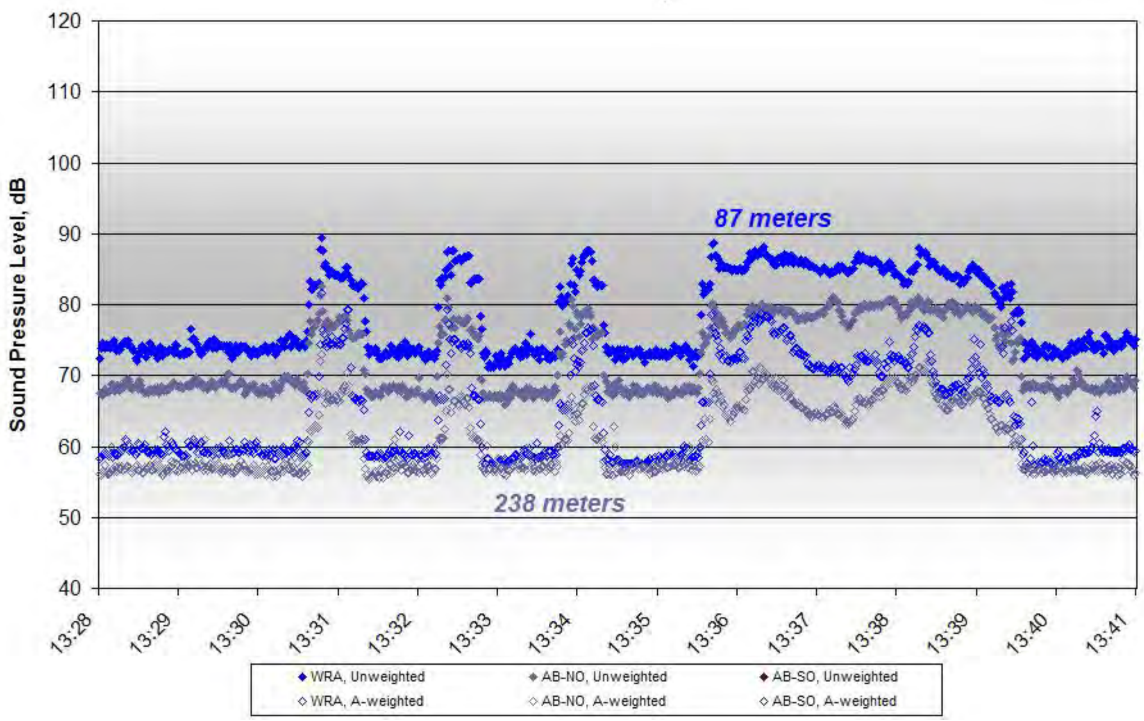

Figure C82. One-second Unweighted and A-weighted Lmax Level Data at W6, 13:30-13:39, on October 10, 2011

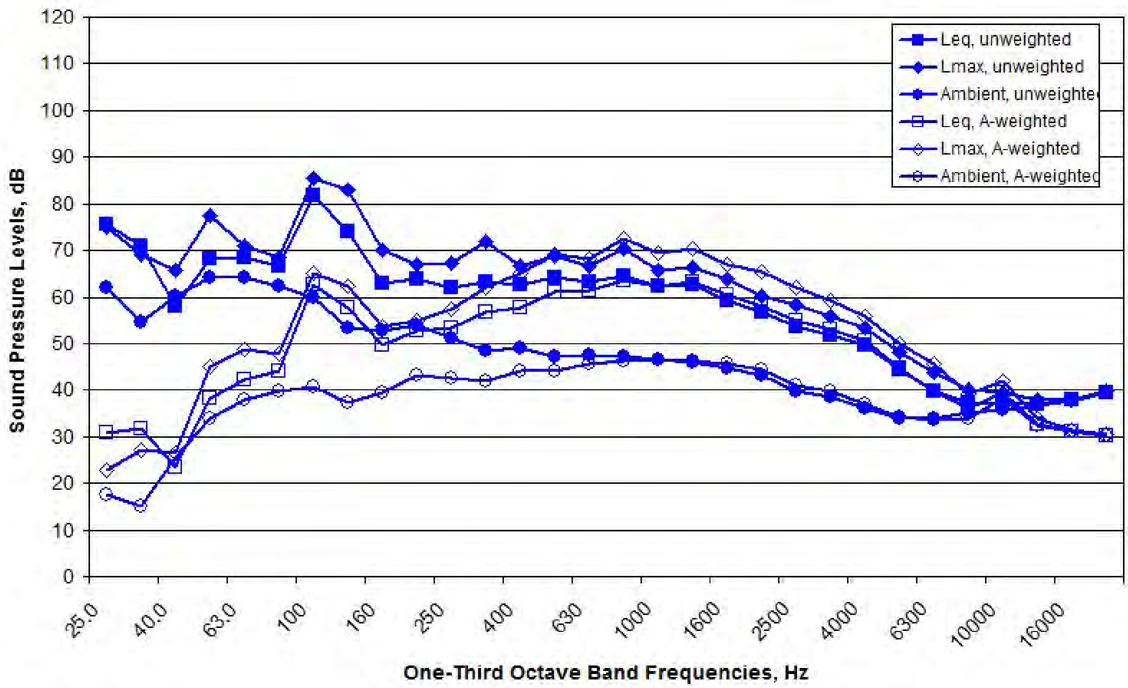

Figure C83. Average One-second Unweighted and A-weighted Spectral Data Measured at the WRA Location during W6, 13:30-13:39, on October 10, 2011

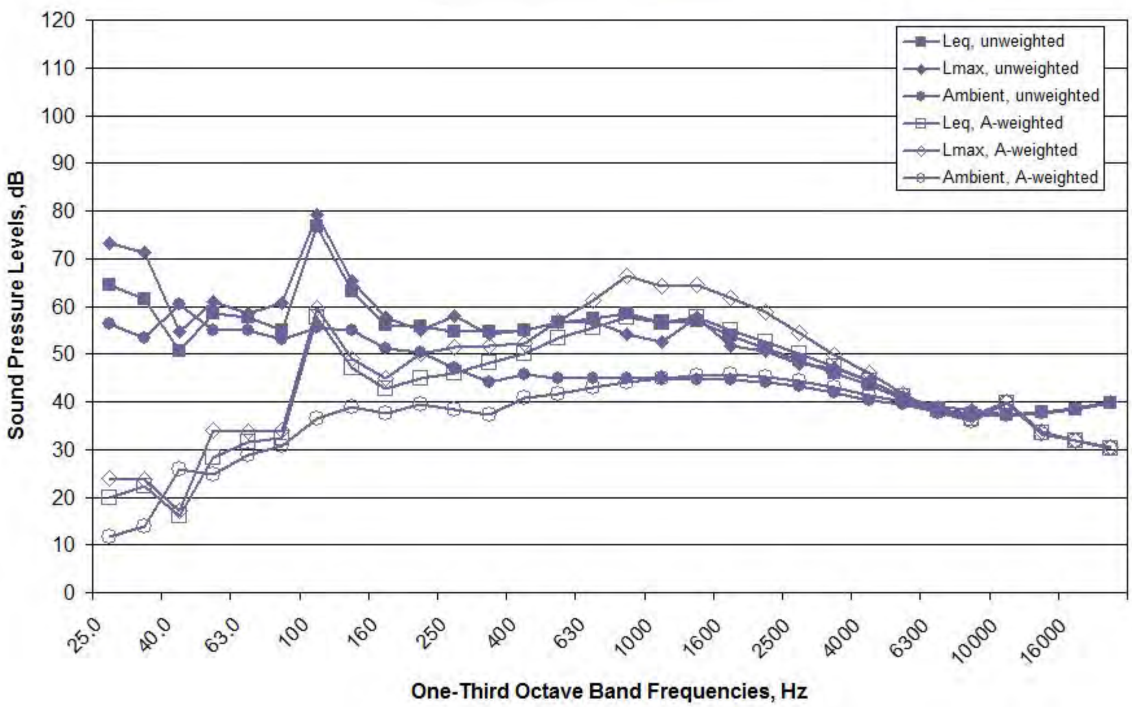

Figure C84. Average One-second Unweighted and A-weighted Spectral Data Measured at the AB-NO Location during W6, 13:30-13:39, on October 10, 2011

NO DATA AVAILABLE

Figure C85. Average One- second Unweighted and A-weighted Spectral Data Measured at the AB-SO Location during W6, 13:30-13:39, on October 10, 2011

W5, 13:57-14:03

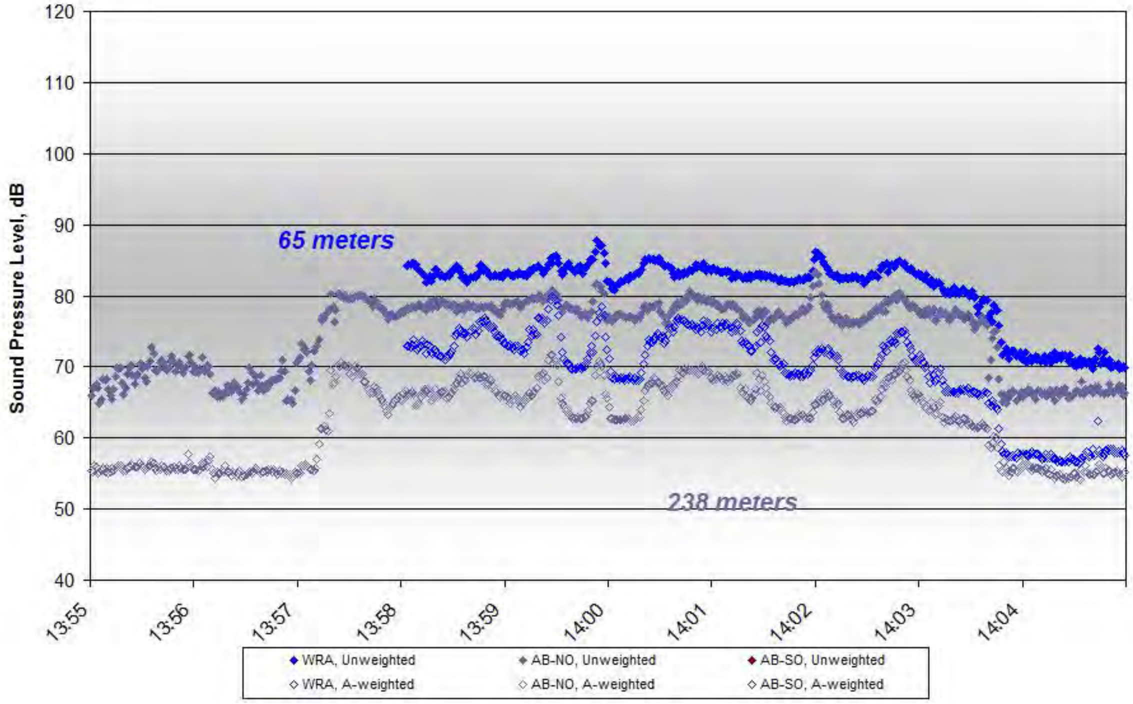

Figure C86. One-second Unweighted and A-weighted Leq Level Data at W5, 13:57-14:03, on October 10, 2011

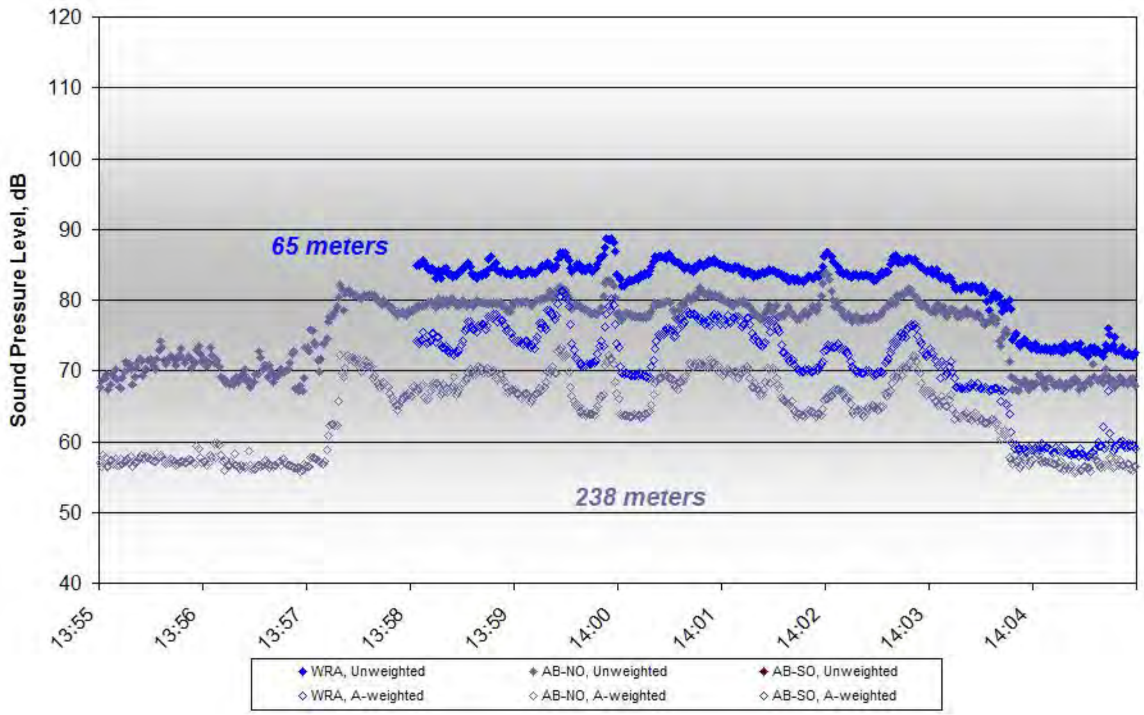

Figure C87. One-second Unweighted and A-weighted Lmax Level Data at W5, 13:57-14:03, on October 10, 2011

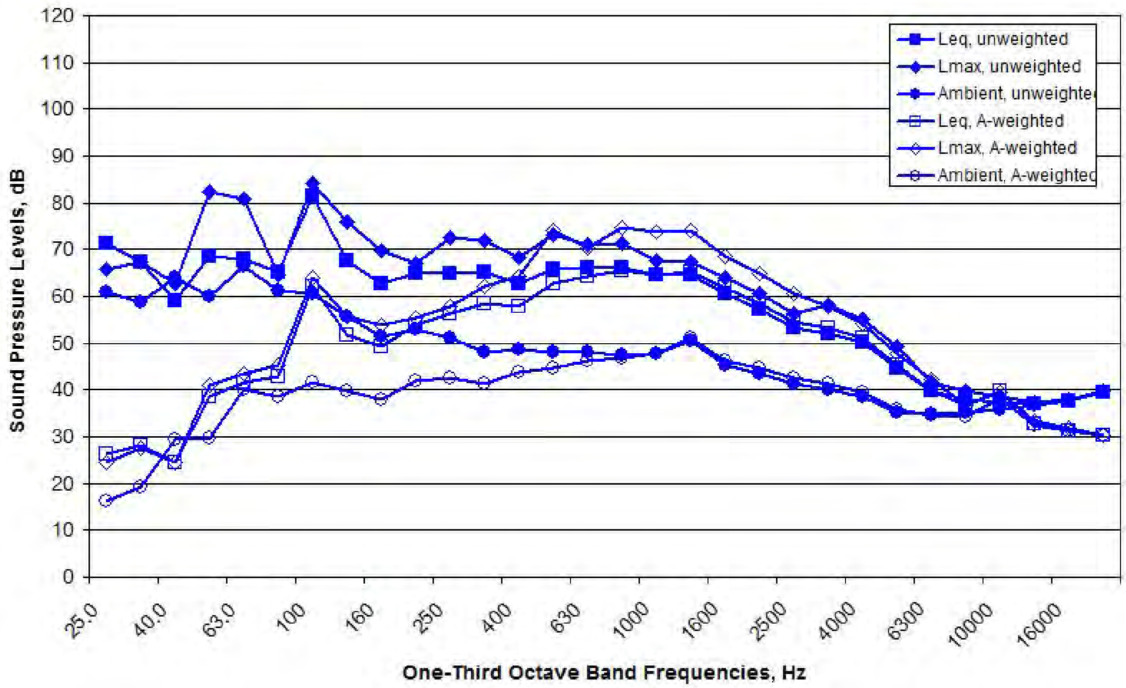

Figure C88. Average One-second Unweighted and A-weighted Spectral Data Measured at the WRA Location during W5, 13:57-14:03, on October 10, 2011

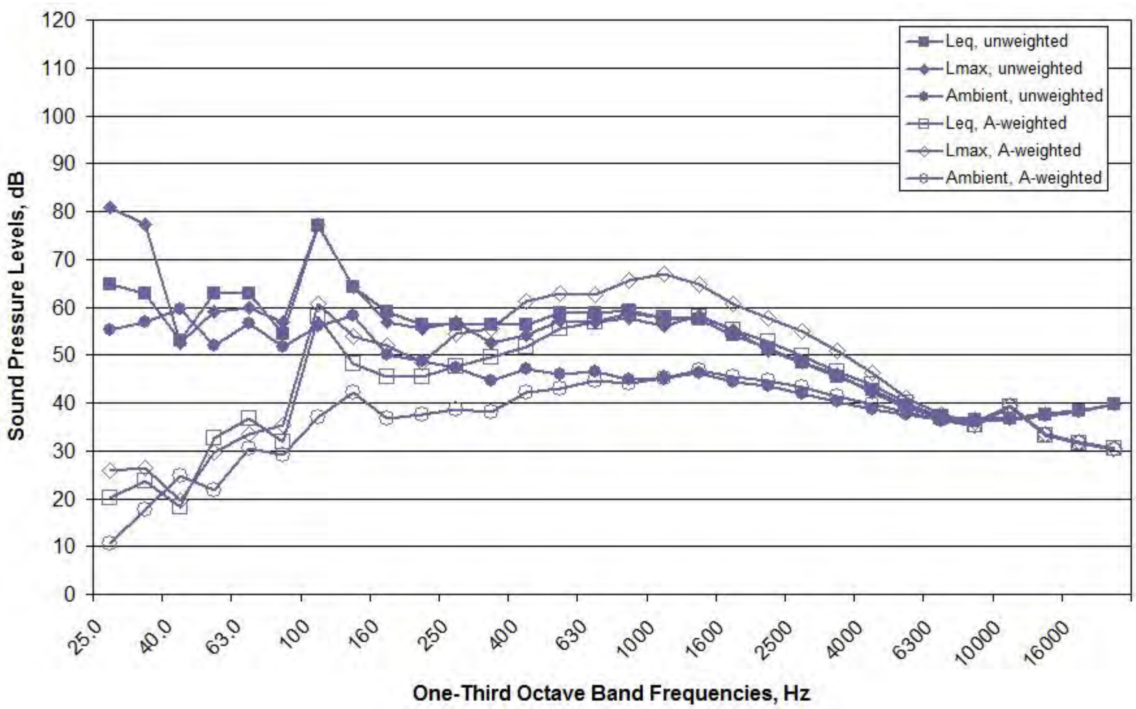

Figure C89. Average One-second Unweighted and A-weighted Spectral Data Measured at the AB-NO Location during W5, 13:57-14:03, on October 10, 2011

NO DATA AVAILABLE

Figure C90. Average One- second Unweighted and A-weighted Spectral Data Measured at the AB-SO Location during W5, 13:57-14:03, on October 10, 2011

W4

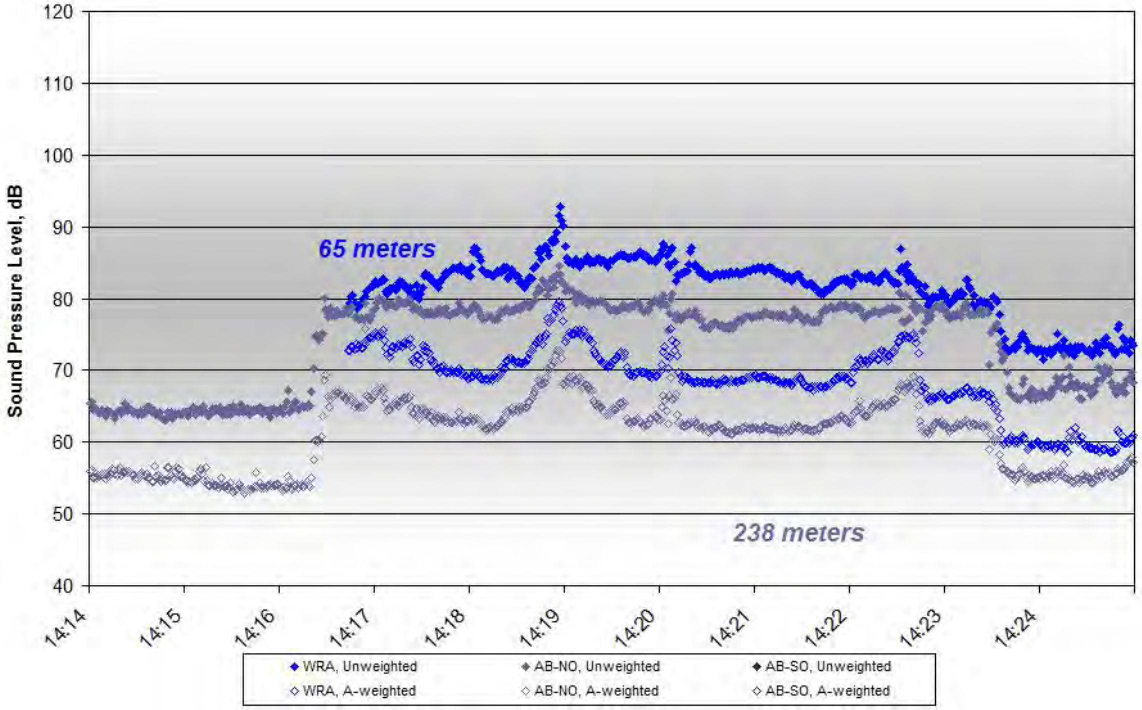

Figure C91. One-second Unweighted and A-weighted Leq Level Data at W4, 14:16-14:23, on October 10, 2011

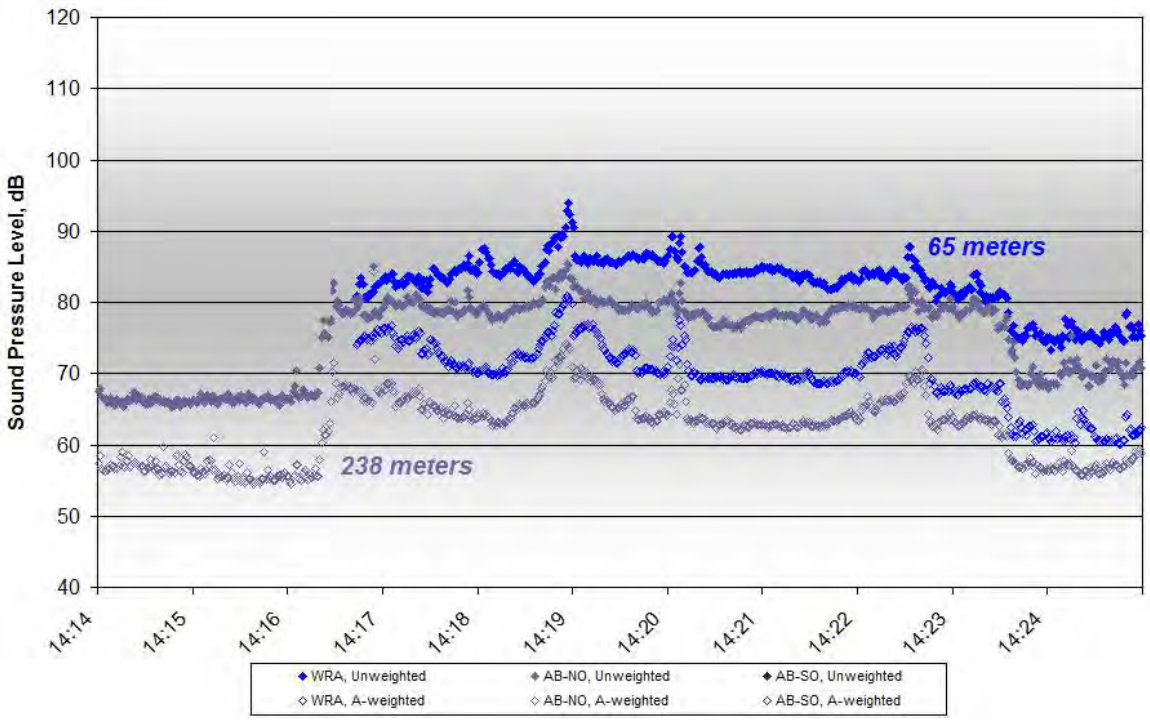

Figure C92. One-second Unweighted and A-weighted Lmax Level Data at W4, 14:16-14:23, on October 10, 2011

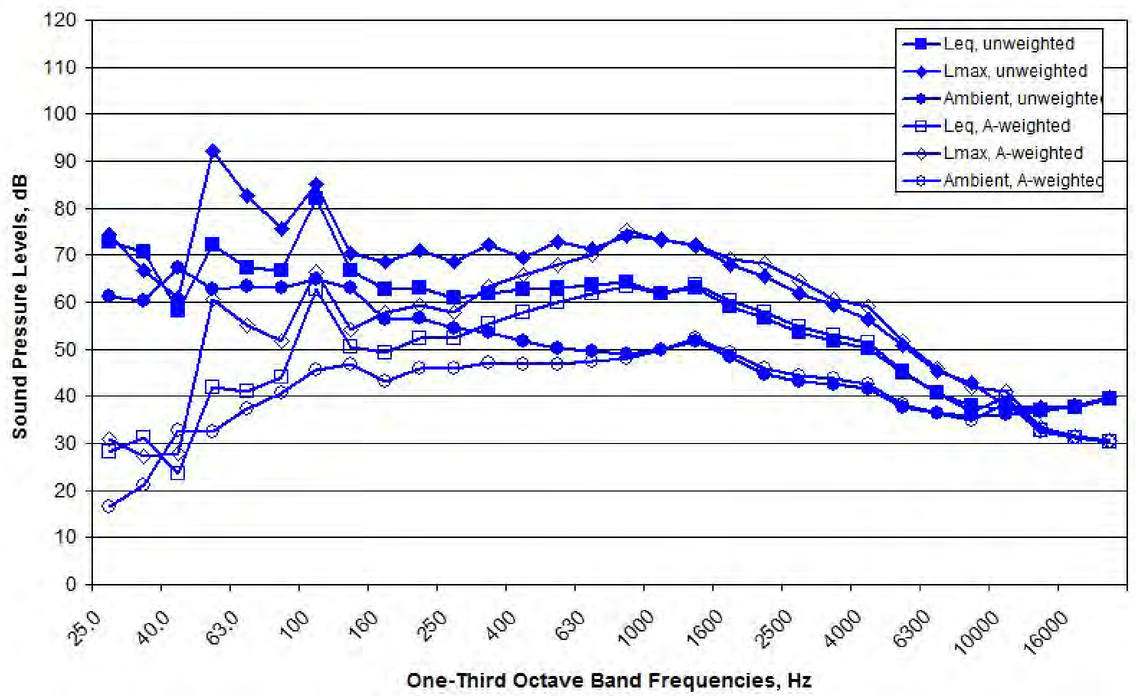

Figure C93. Average One-second Unweighted and A-weighted Spectral Data Measured at the WRA Location during W4, 14:16-14:23, on October 10, 2011

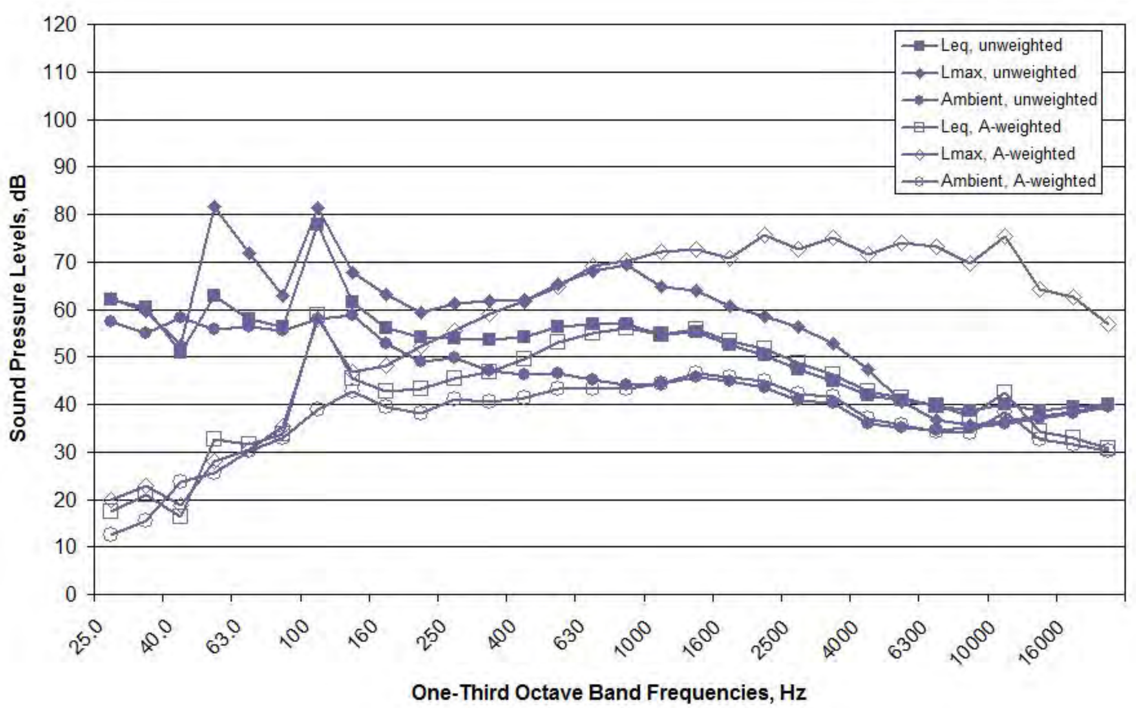

Figure C94. Average One-second Unweighted and A-weighted Spectral Data Measured at the AB-NO Location during W4, 14:16-14:23, on October 10, 2011

NO DATA AVAILABLE

Figure C95. Average One- second Unweighted and A-weighted Spectral Data Measured at the AB-SO Location during W4, 14:16-14:23, on October 10, 2011

W6, 14:25-14:25

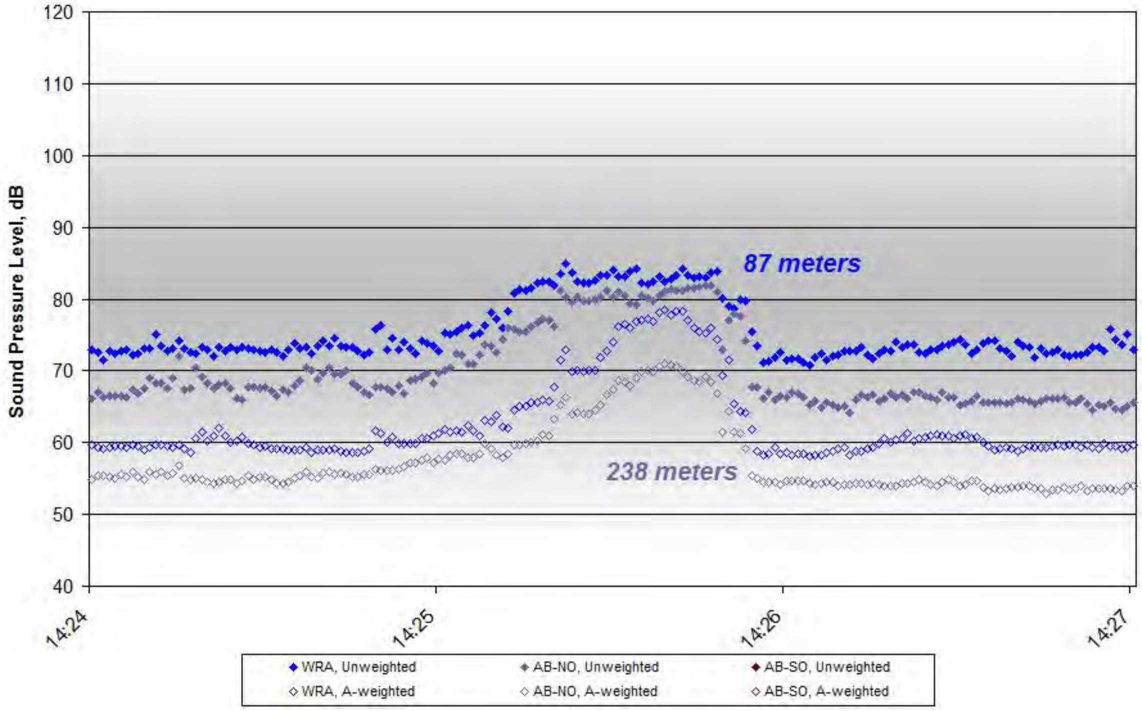

Figure C96. One-second Unweighted and A-weighted Leq Level Data at W6, 14:25-14:25, on October 10, 2011

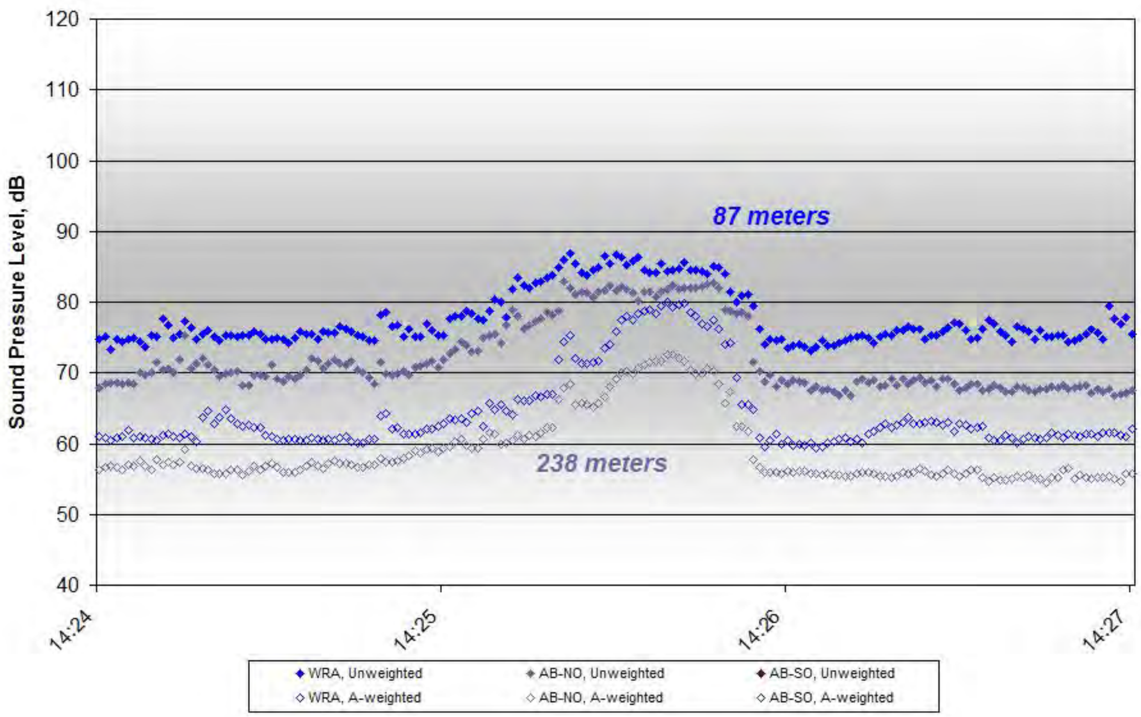

Figure C97. One-second Unweighted and A-weighted Lmax Level Data at W6, 14:25-14:25, on October 10, 2011

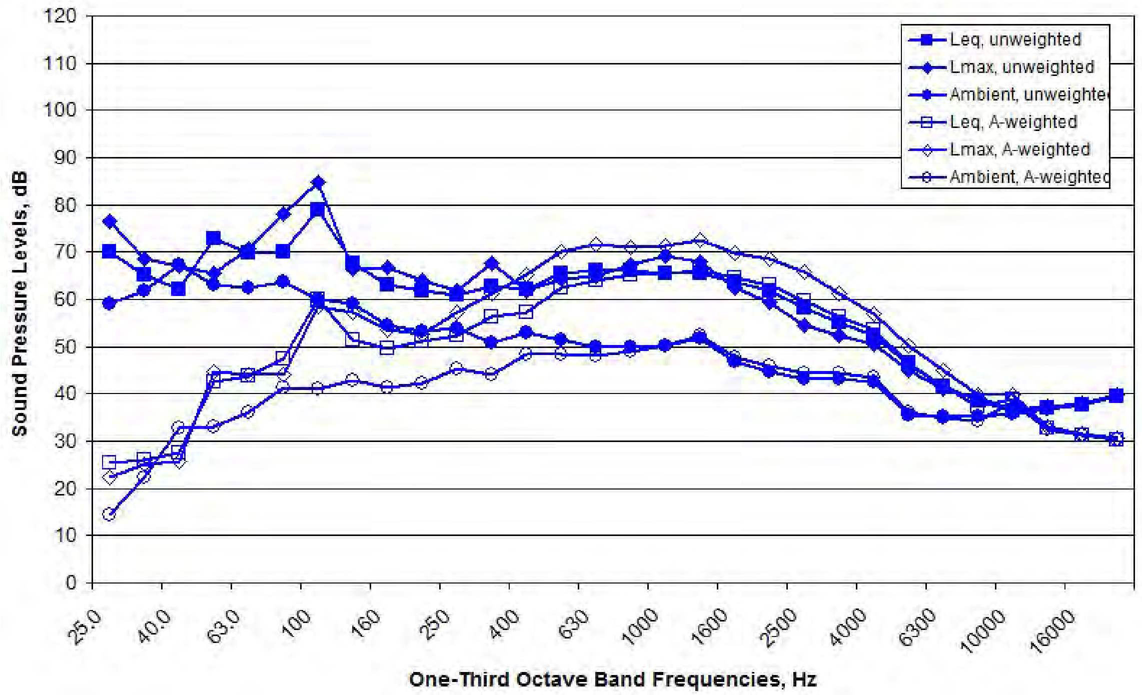

Figure C98. Average One-second Unweighted and A-weighted Spectral Data Measured at the WRA Location during W6, 14:25-14:25, on October 10, 2011

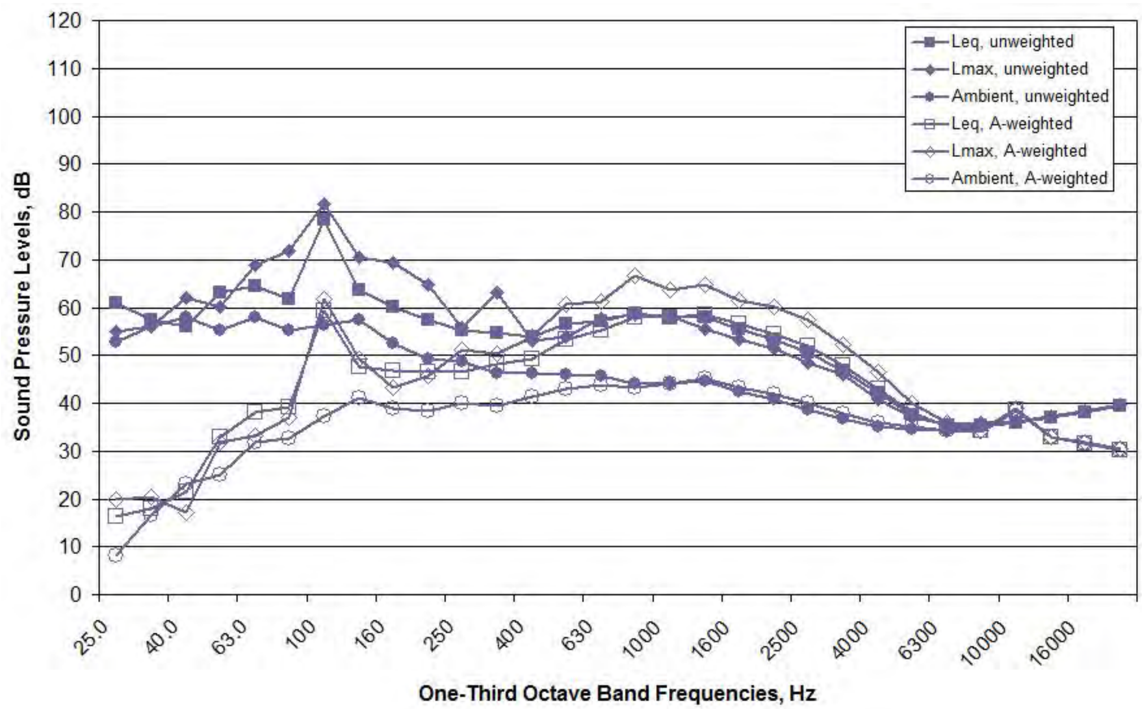

Figure C99. Average One-second Unweighted and A-weighted Spectral Data Measured at the AB-NO Location during W6, 14:25-14:25, on October 10, 2011

NO DATA AVAILABLE

Figure C100. Average One- second Unweighted and A-weighted Spectral Data Measured at the AB-SO Location during W6, 14:25-14:25, on October 10, 2011

W3

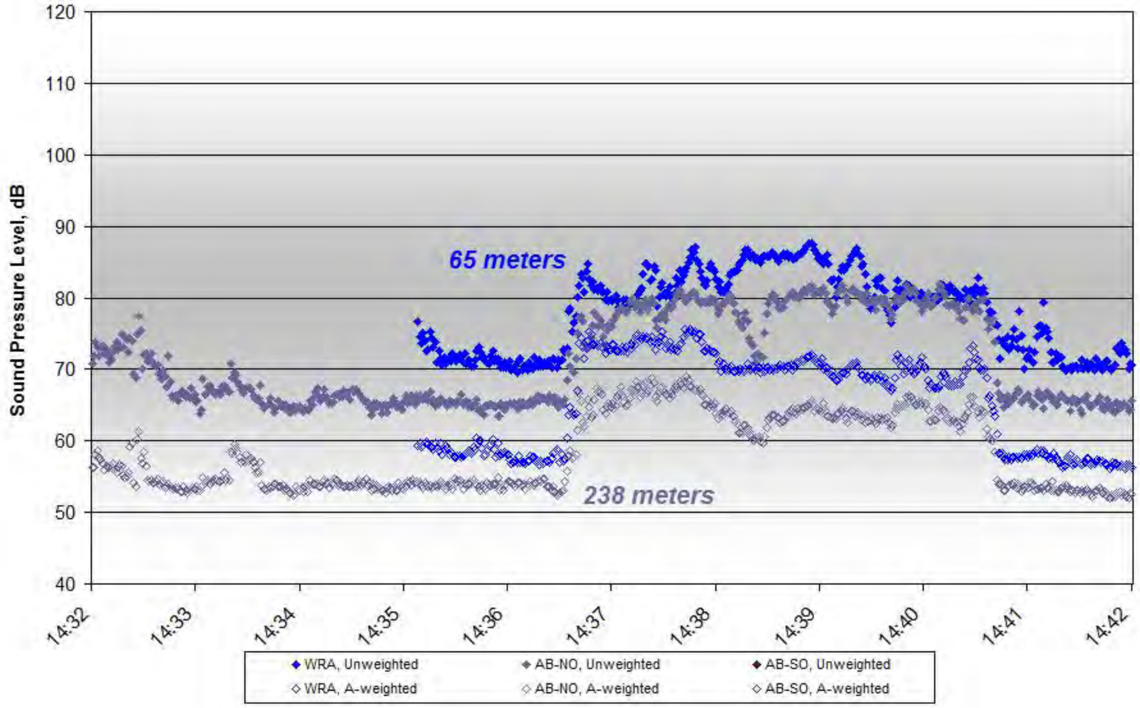

Figure C101. One-second Unweighted and A-weighted Leq Level Data at W3, 14:34-14:40, on October 10, 2011

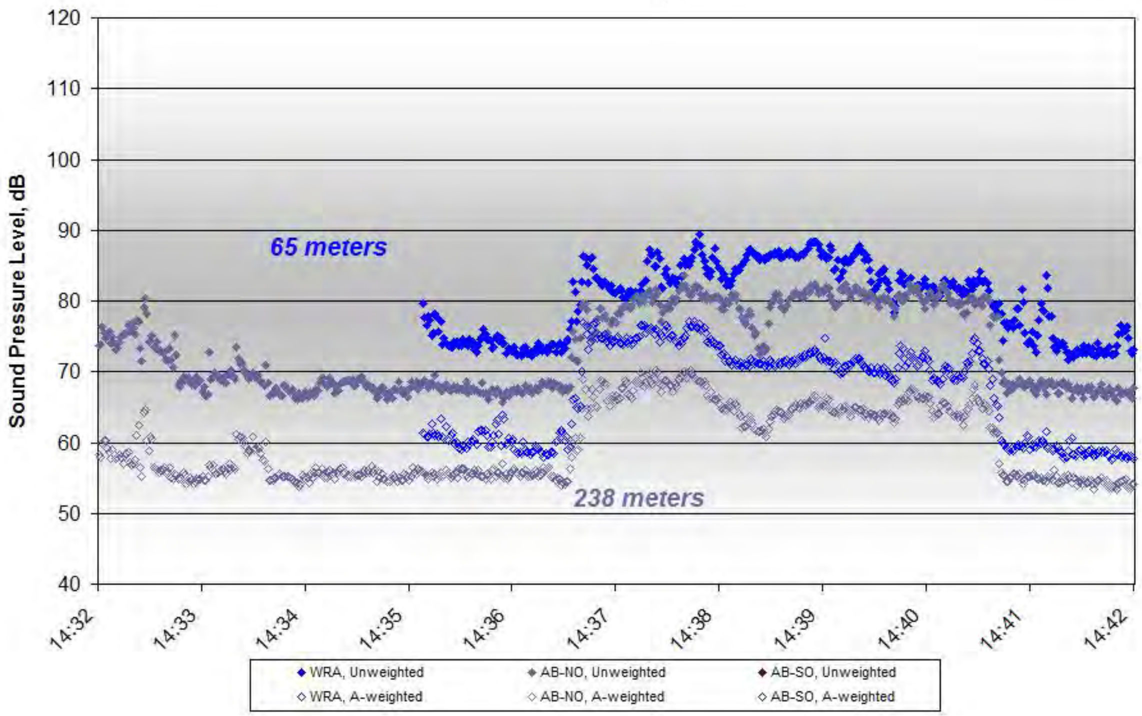

Figure C102. One-second Unweighted and A-weighted Lmax Level Data at W3, 14:34-14:40, on October 10, 2011

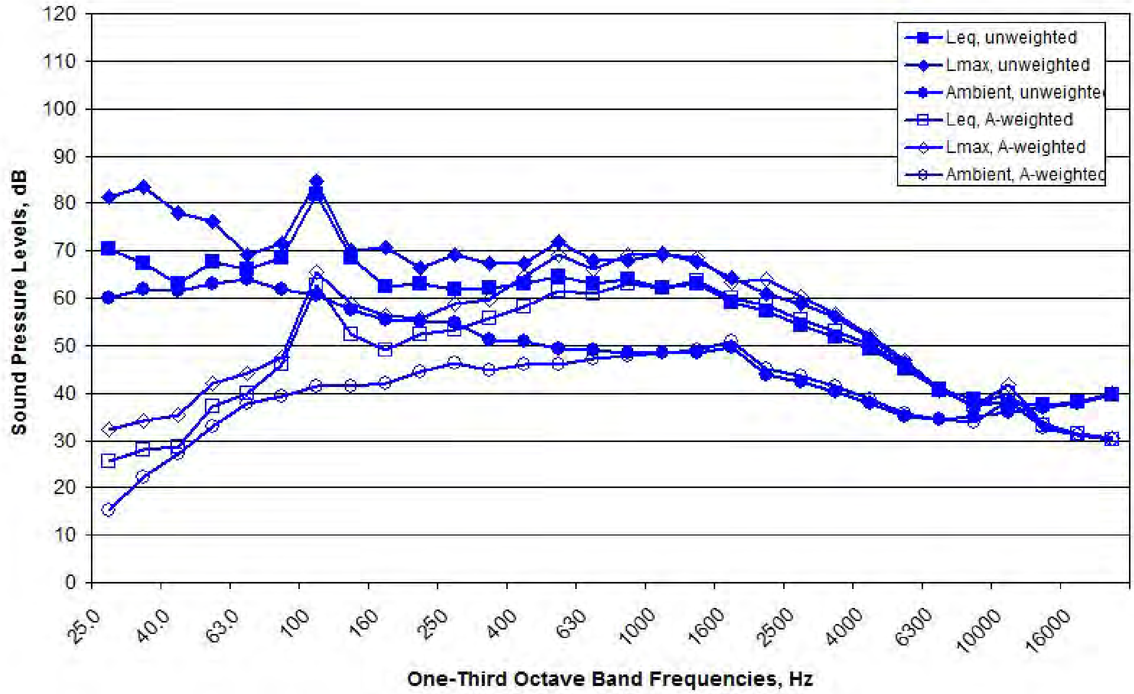

Figure C103. Average One-second Unweighted and A-weighted Spectral Data Measured at the WRA Location during W3, 14:34-14:40, on October 10, 2011

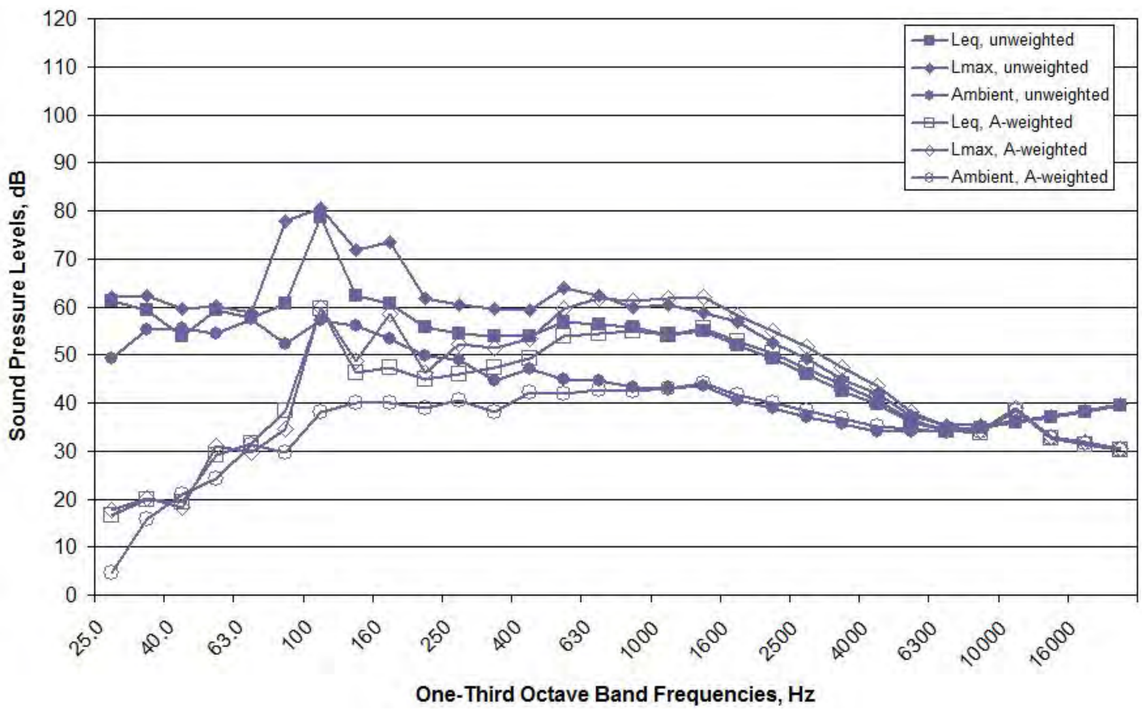

Figure C104. Average One-second Unweighted and A-weighted Spectral Data Measured at the AB-NO Location during W3, 14:34-14:40, on October 10, 2011

NO DATA AVAILABLE

Figure C105. Average One- second Unweighted and A-weighted Spectral Data Measured at the AB-SO Location during W3, 14:34-14:40, on October 10, 2011

W5, 14:45-14:54

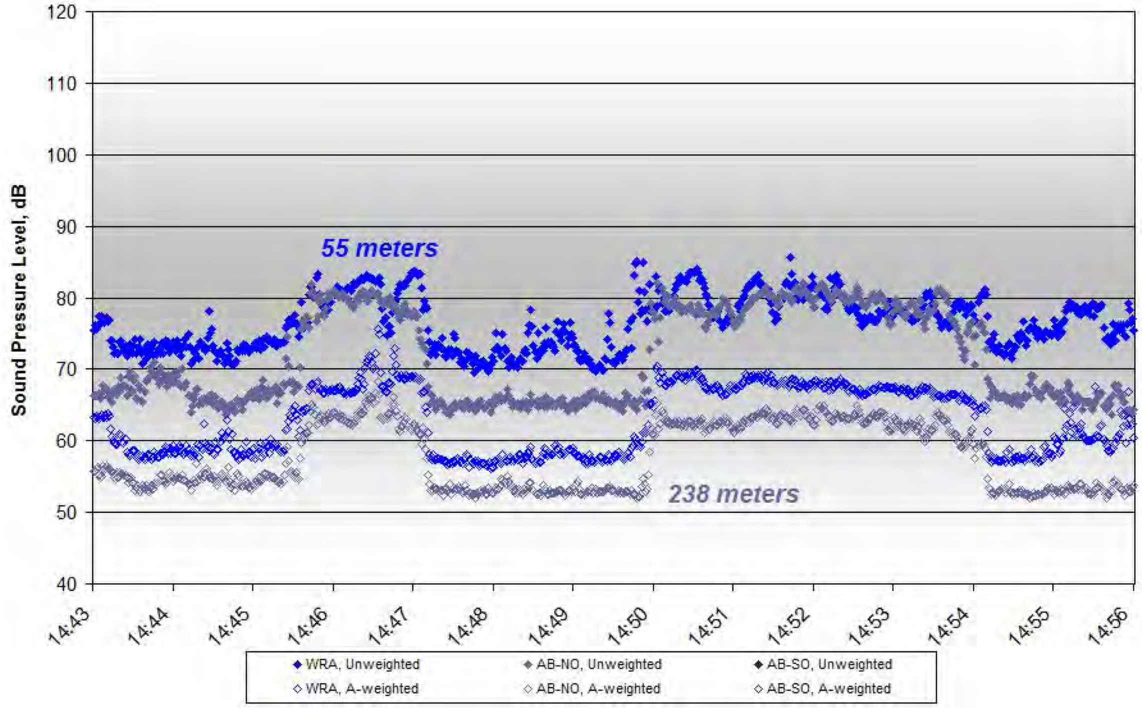

Figure C106. One-second Unweighted and A-weighted Leq Level Data at W5, 14:45-14:54, on October 10, 2011

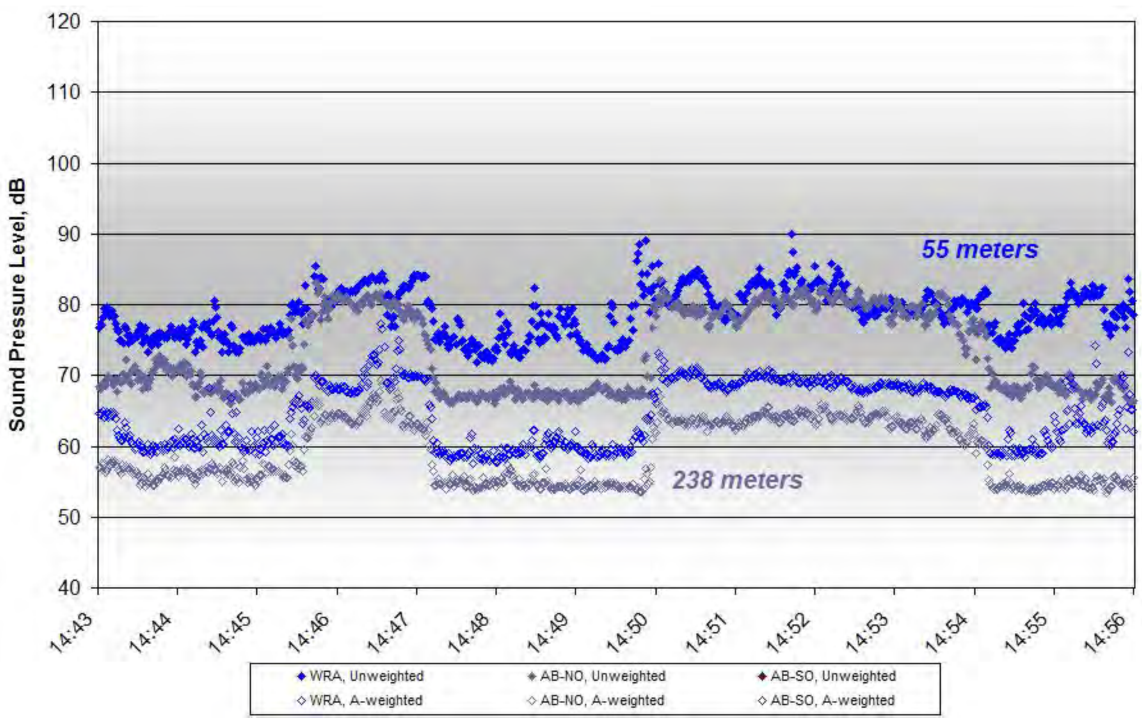

Figure C107. One-second Unweighted and A-weighted Lmax Level Data at W5, 14:45-14:54, on October 10, 2011

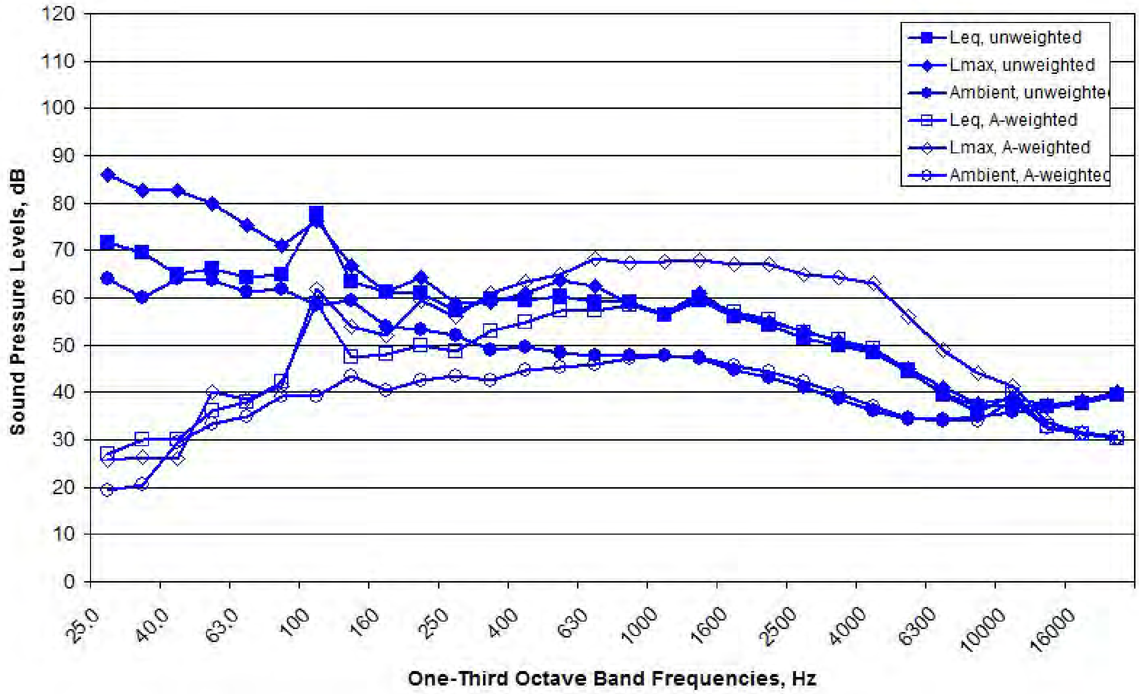

Figure C108. Average One-second Unweighted and A-weighted Spectral Data Measured at the WRA Location during W5, 14:45-14:54, on October 10, 2011

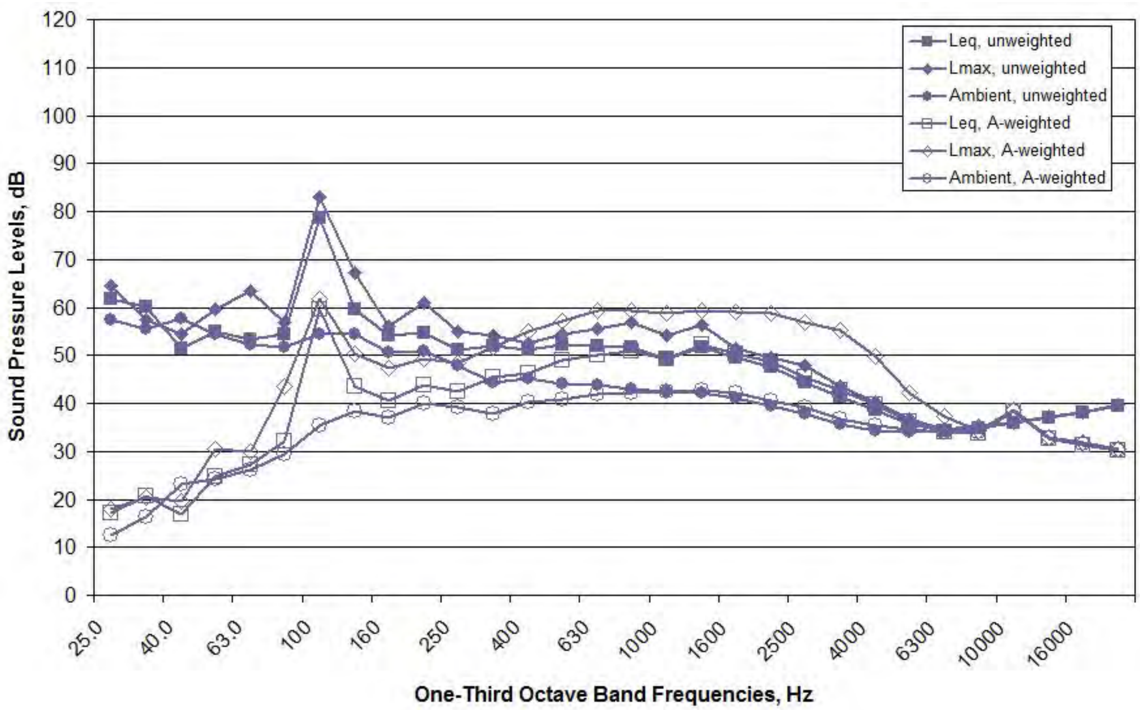

Figure C109. Average One-second Unweighted and A-weighted Spectral Data Measured at the AB-NO Location during W5, 14:45-14:54, on October 10, 2011

NO DATA AVAILABLE

Figure C110. Average One- second Unweighted and A-weighted Spectral Data Measured at the AB-SO Location during W5, 14:45-14:54, on October 10, 2011

W11

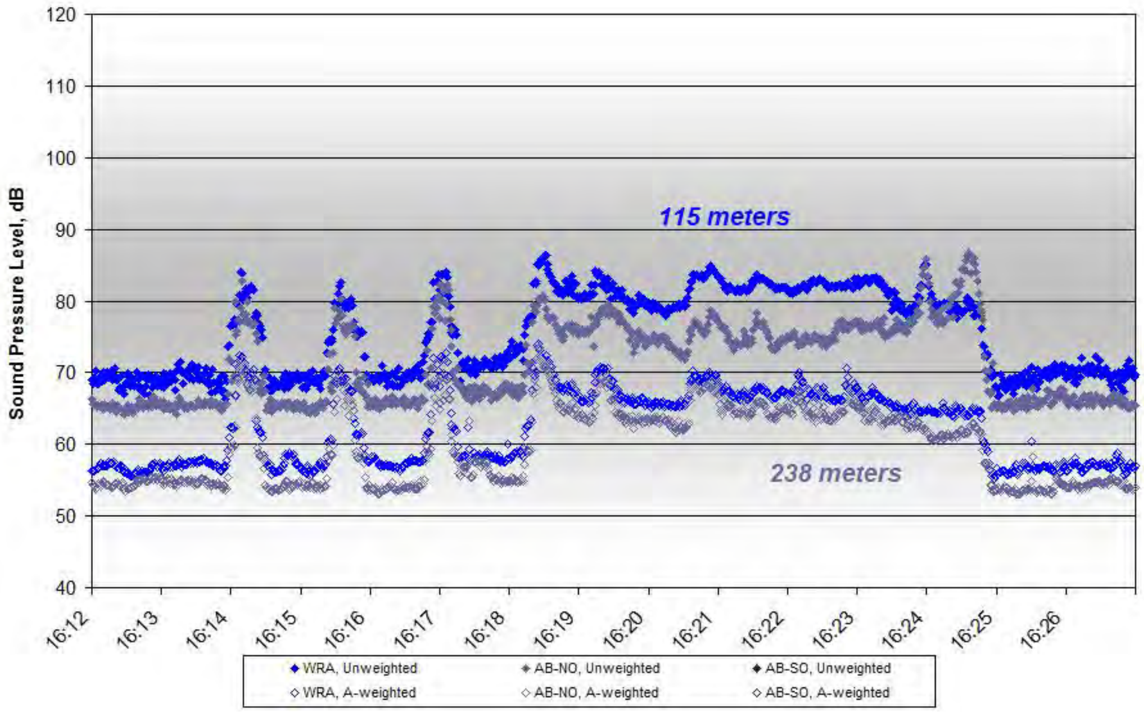

Figure C111. One-second Unweighted and A-weighted Leq Level Data at W11, 16:14-16:24, on October 10, 2011

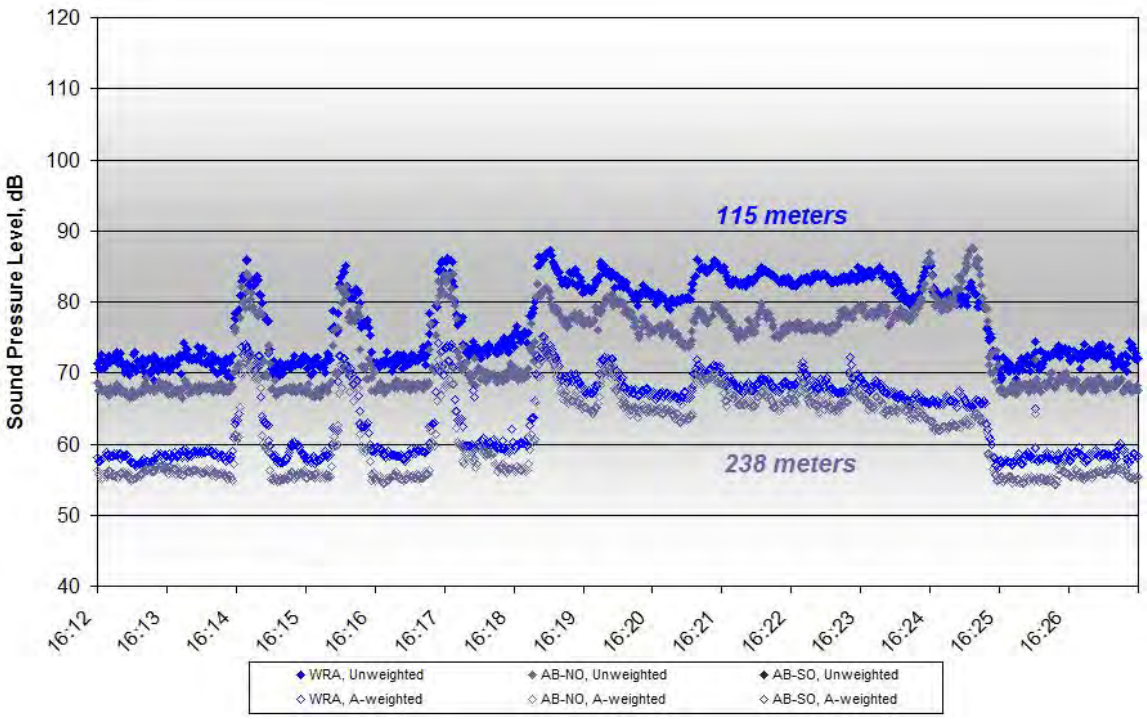

Figure C112. One-second Unweighted and A-weighted Lmax Level Data at W11, 16:14-16:24, on October 10, 2011

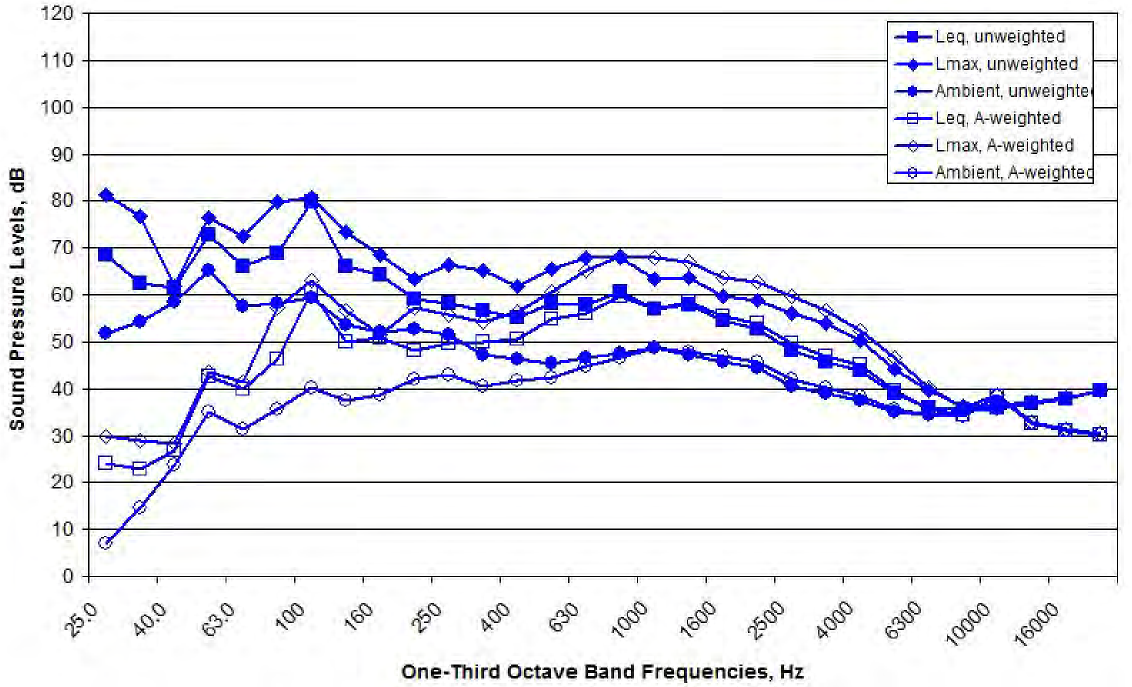

Figure C113. Average One-second Unweighted and A-weighted Spectral Data Measured at the WRA Location during W11, 16:14-16:24, on October 10, 2011

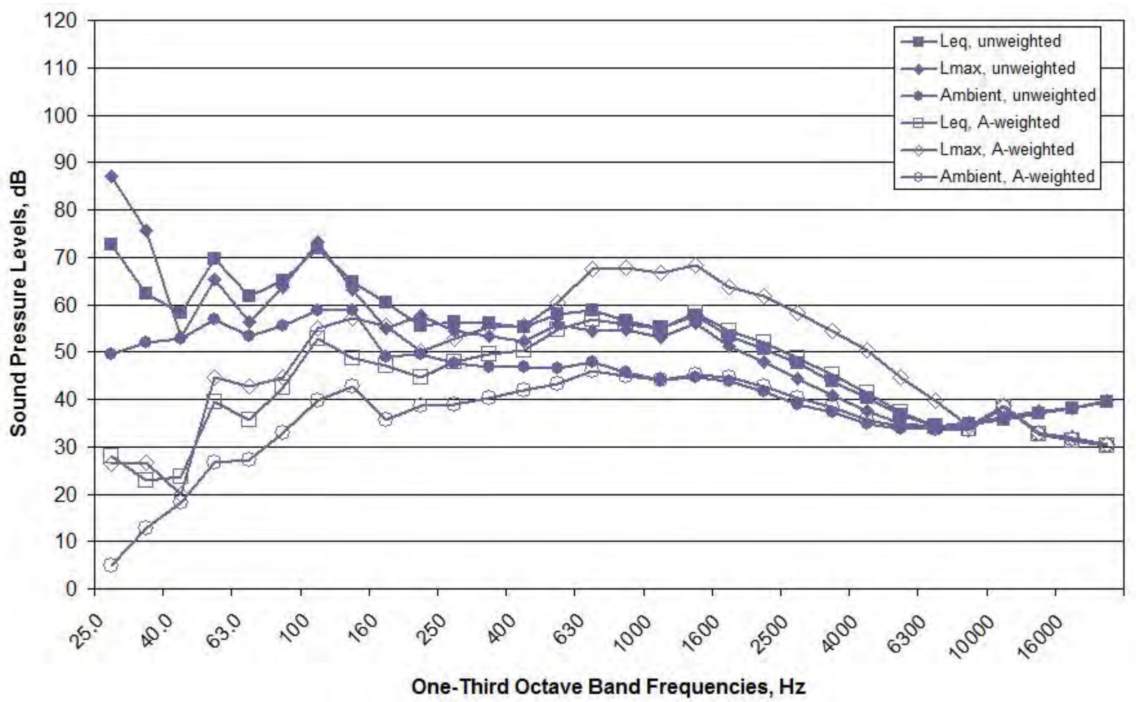

Figure C114. Average One-second Unweighted and A-weighted Spectral Data Measured at the AB-NO Location during W11, 16:14-16:24, on October 10, 2011

NO DATA AVAILABLE

Figure C115. Average One- second Unweighted and A-weighted Spectral Data Measured at the AB-SO Location during W11, 16:14-16:24, on October 10, 2011

W12

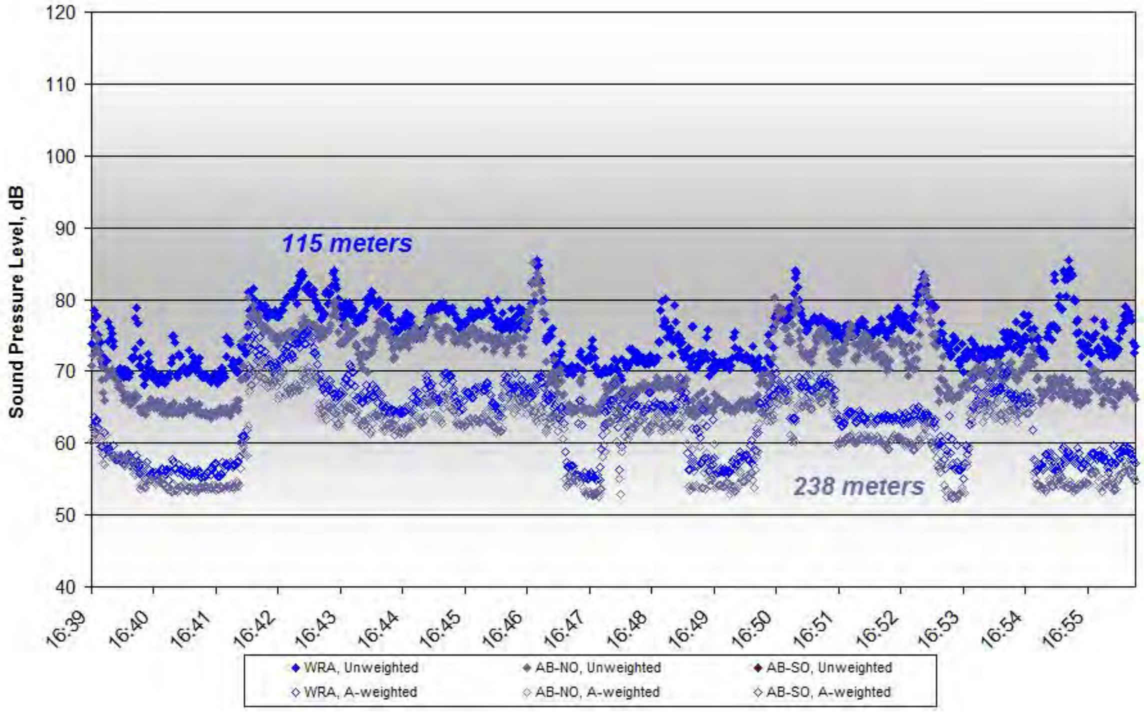

Figure C116. One-second Unweighted and A-weighted Leq Level Data at W12, 16:41-16:52, on October 10, 2011

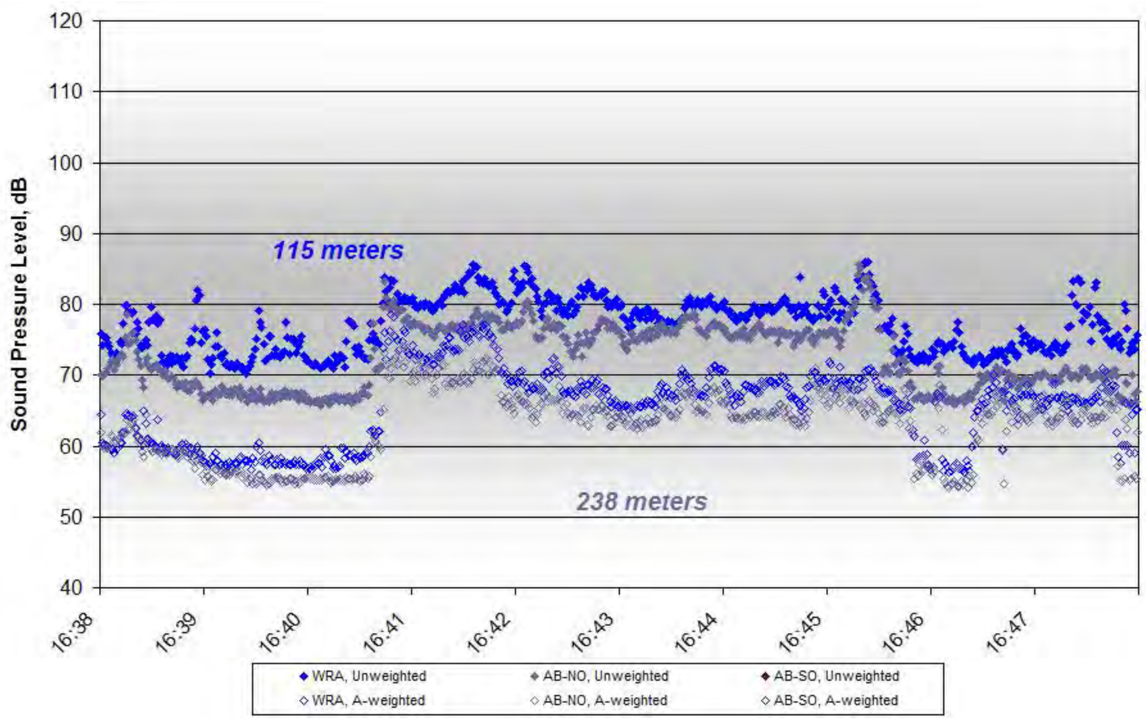

Figure C117. One-second Unweighted and A-weighted Lmax Level Data at W12, 16:41-16:52, on October 10, 2011

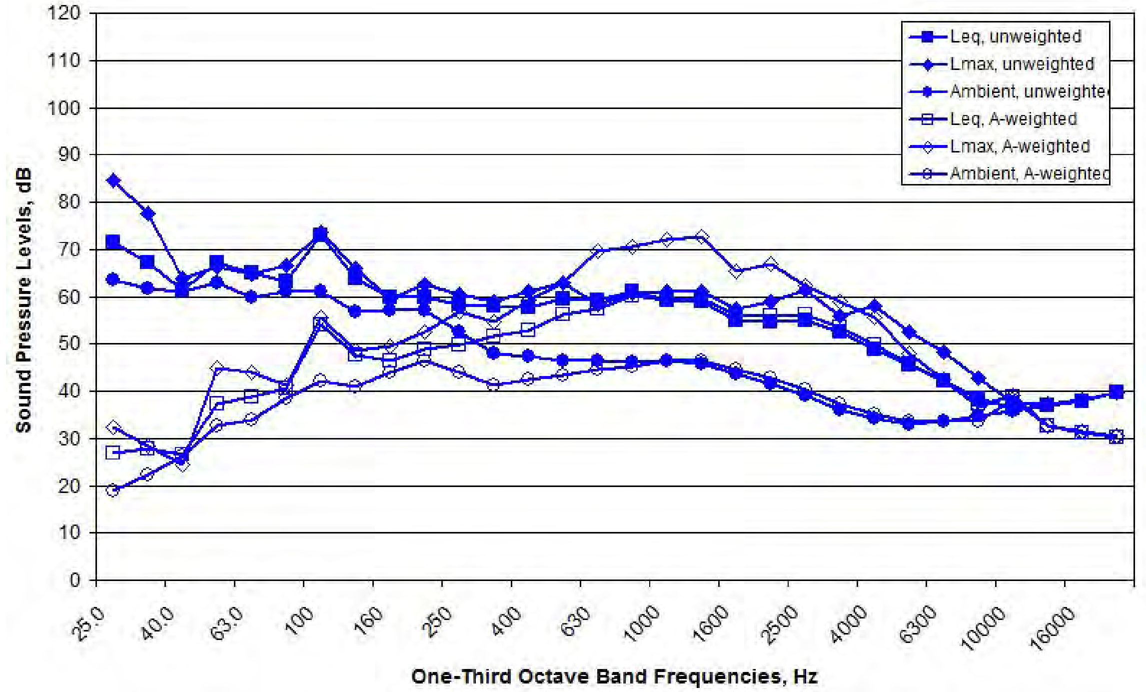

Figure C118. Average One-second Unweighted and A-weighted Spectral Data Measured at the WRA Location during W12, 16:41-16:52, on October 10, 2011

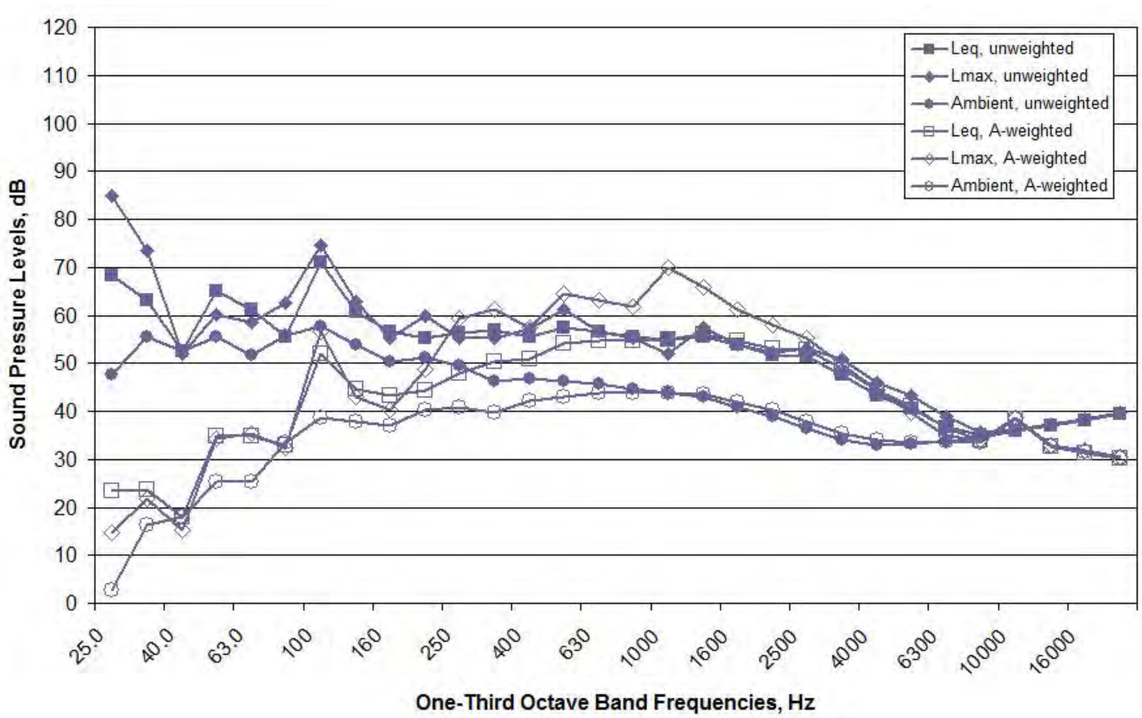

Figure C119. Average One-second Unweighted and A-weighted Spectral Data Measured at the AB-NO Location during W12, 16:41-16:52, on October 10, 2011

NO DATA AVAILABLE

Figure C120. Average One- second Unweighted and A-weighted Spectral Data Measured at the AB-SO Location during W12, 16:41-16:52, on October 10, 2011

10/11/2011 – W2

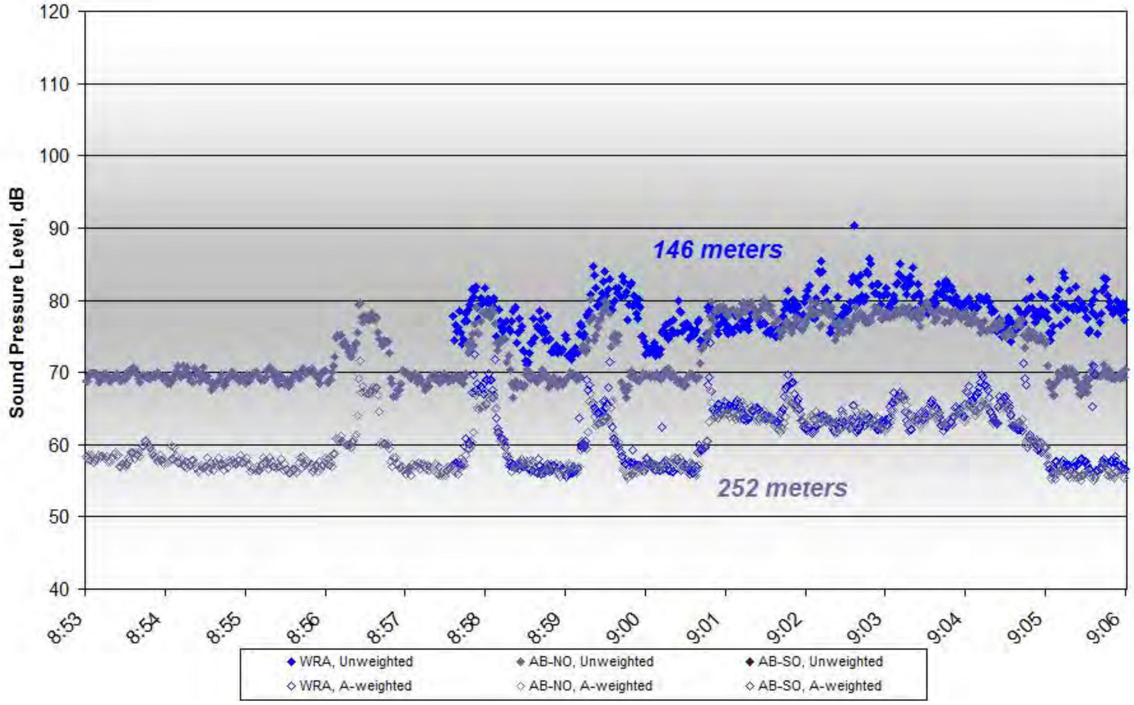

Figure C121. One-second Unweighted and A-weighted Leq Level Data at W2, 8:56-9:04, on October 11, 2011

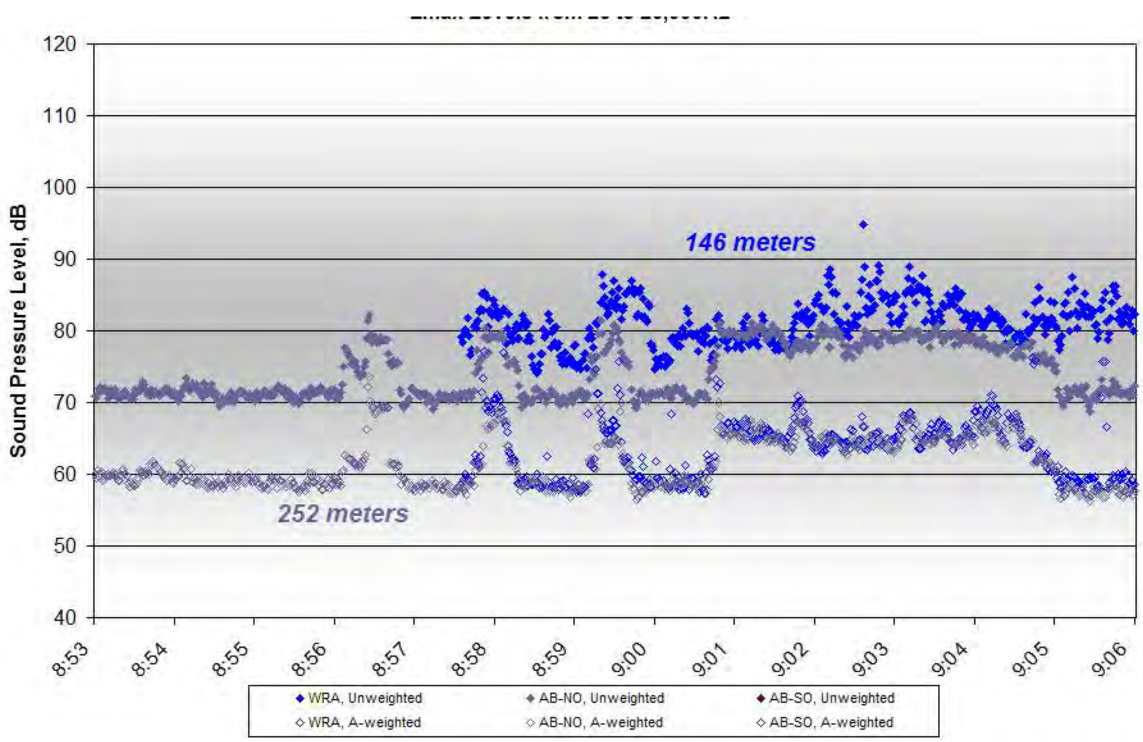

Figure C122. One-second Unweighted and A-weighted Lmax Level Data at W2, 8:56-9:04, on October 11, 2011

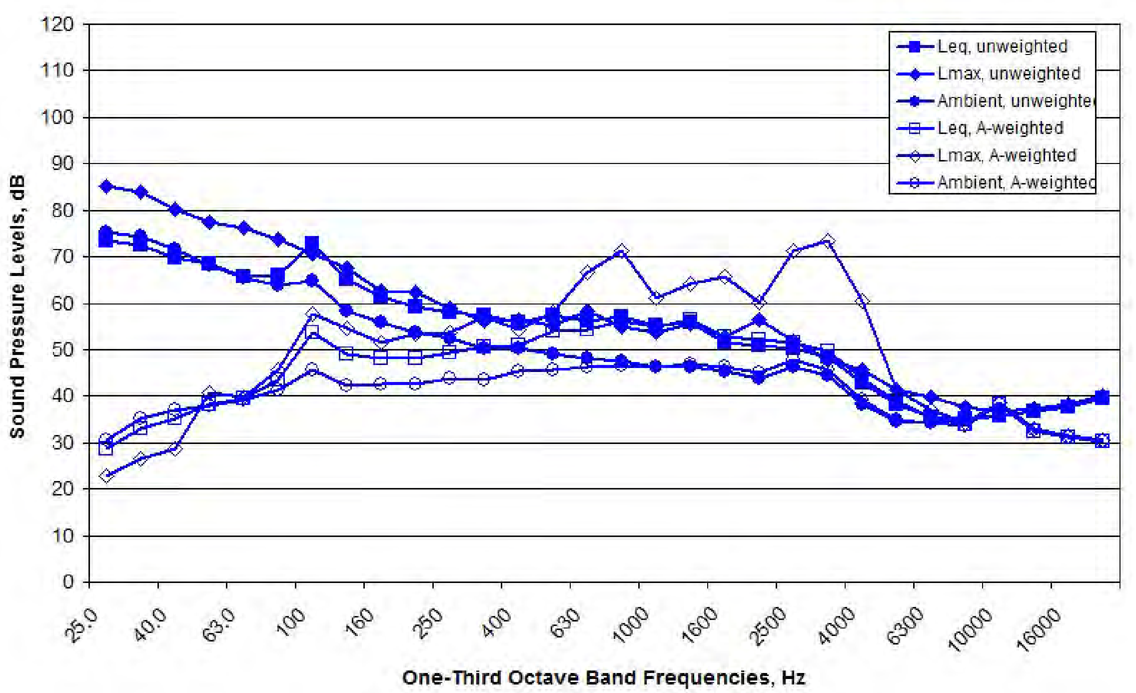

Figure C123. Average One-second Unweighted and A-weighted Spectral Data Measured at the WRA Location during W2, 8:56-9:04, on October 11, 2011

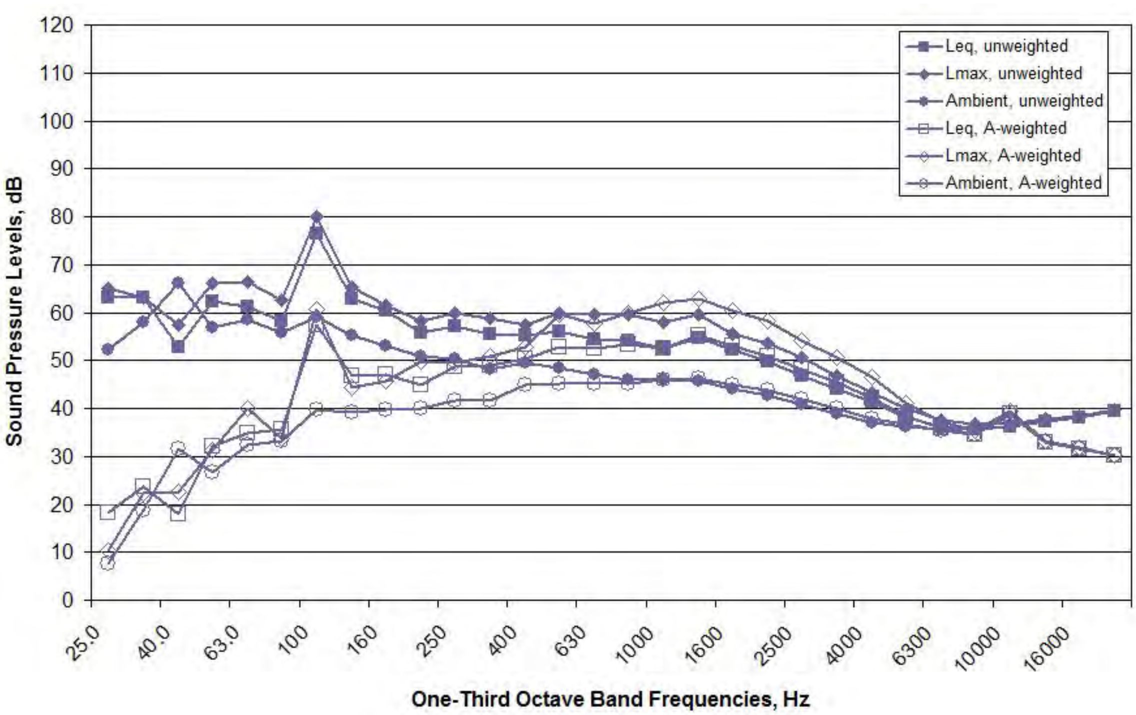

Figure C124. Average One-second Unweighted and A-weighted Spectral Data Measured at the AB-NO Location during W2, 8:56-9:04, on October 11, 2011

NO DATA AVAILABLE

Figure C125. Average One- second Unweighted and A-weighted Spectral Data Measured at the AB-SO Location during W2, 8:56-9:04, on October 11, 2011

W1

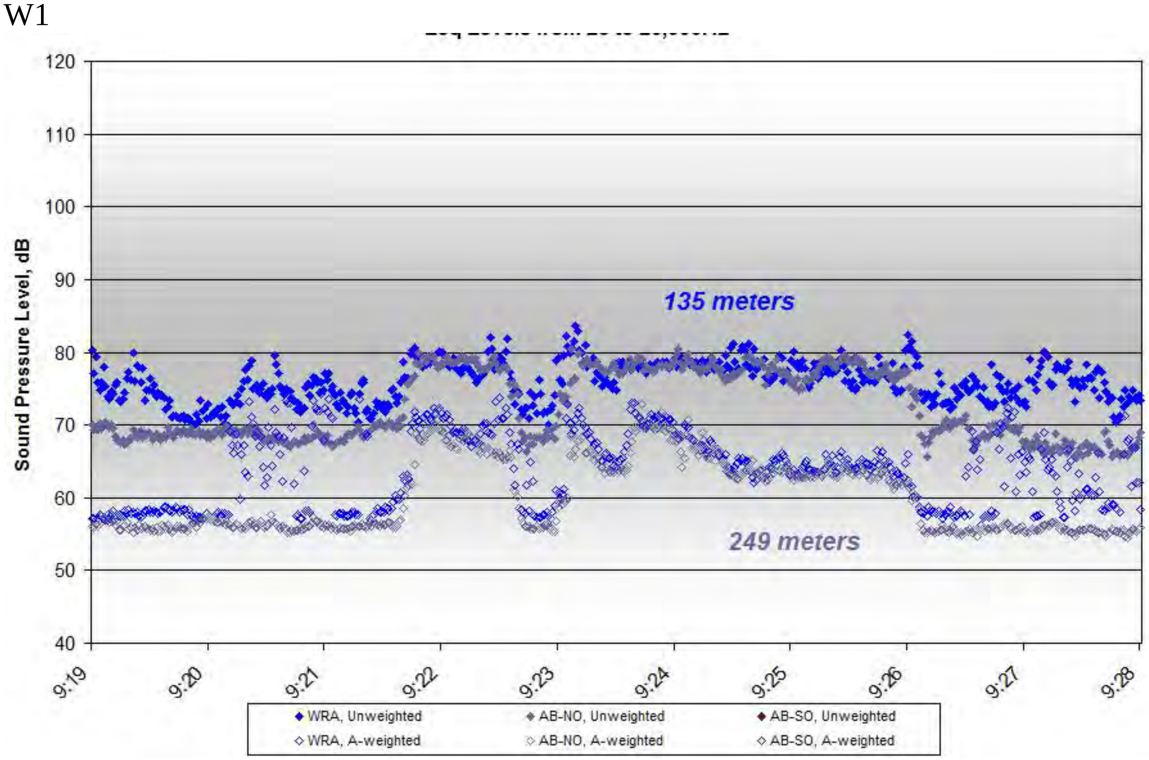

Figure C126. One-second Unweighted and A-weighted Leq Level Data at W1, 9:21-9:25, on October 11, 2011

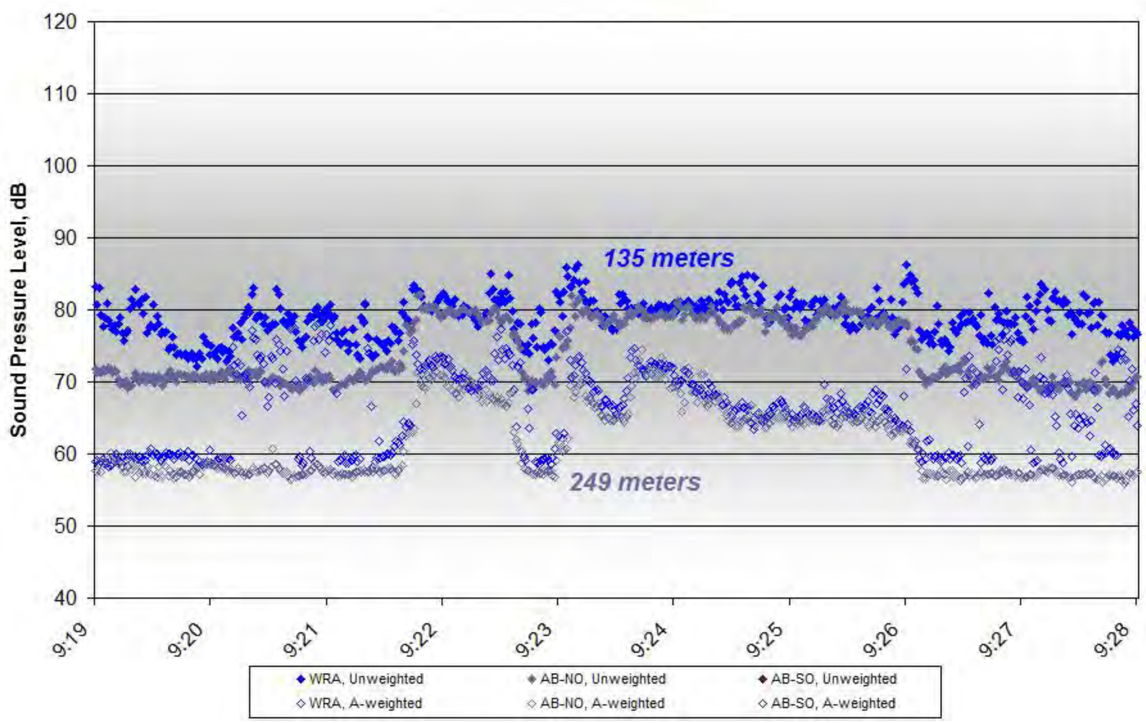

Figure C127. One-second Unweighted and A-weighted Lmax Level Data at W1, 9:21-9:25, on October 11, 2011

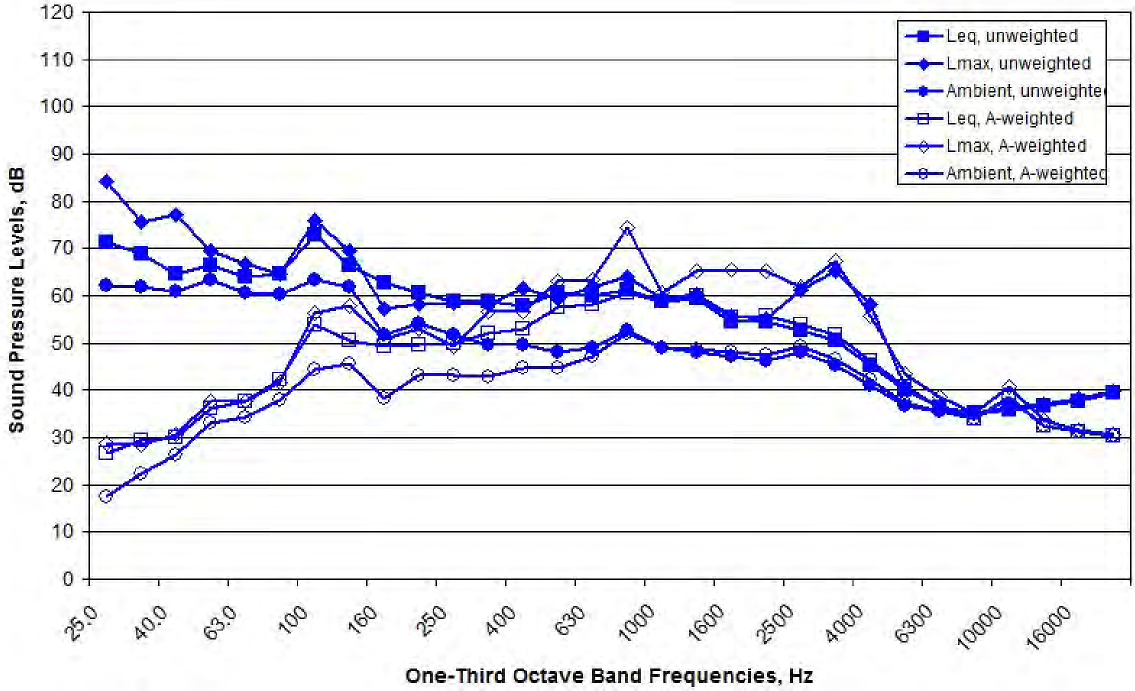

Figure C128. Average One-second Unweighted and A-weighted Spectral Data Measured at the WRA Location during W1, 9:21-9:25, on October 11, 2011

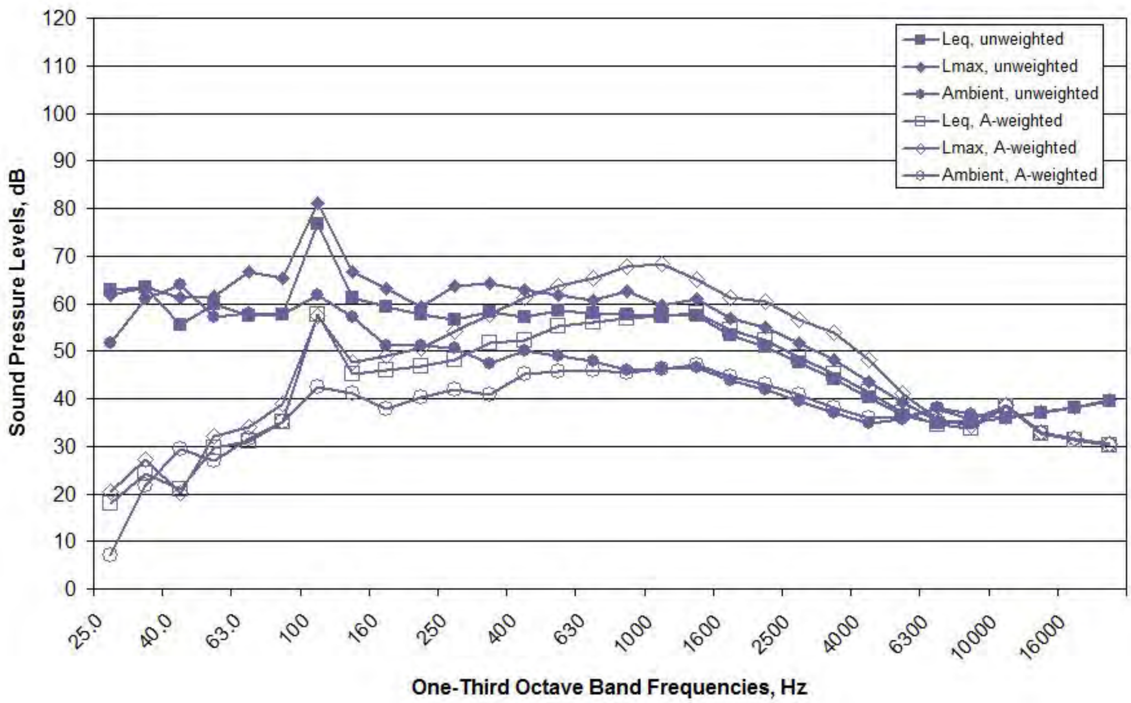

Figure C129. Average One-second Unweighted and A-weighted Spectral Data Measured at the AB-NO Location during W1, 9:21-9:25, on October 11, 2011

NO DATA AVAILABLE

Figure C130. Average One- second Unweighted and A-weighted Spectral Data Measured at the AB-SO Location during W1, 9:21-9:25, on October 11, 2011

W7

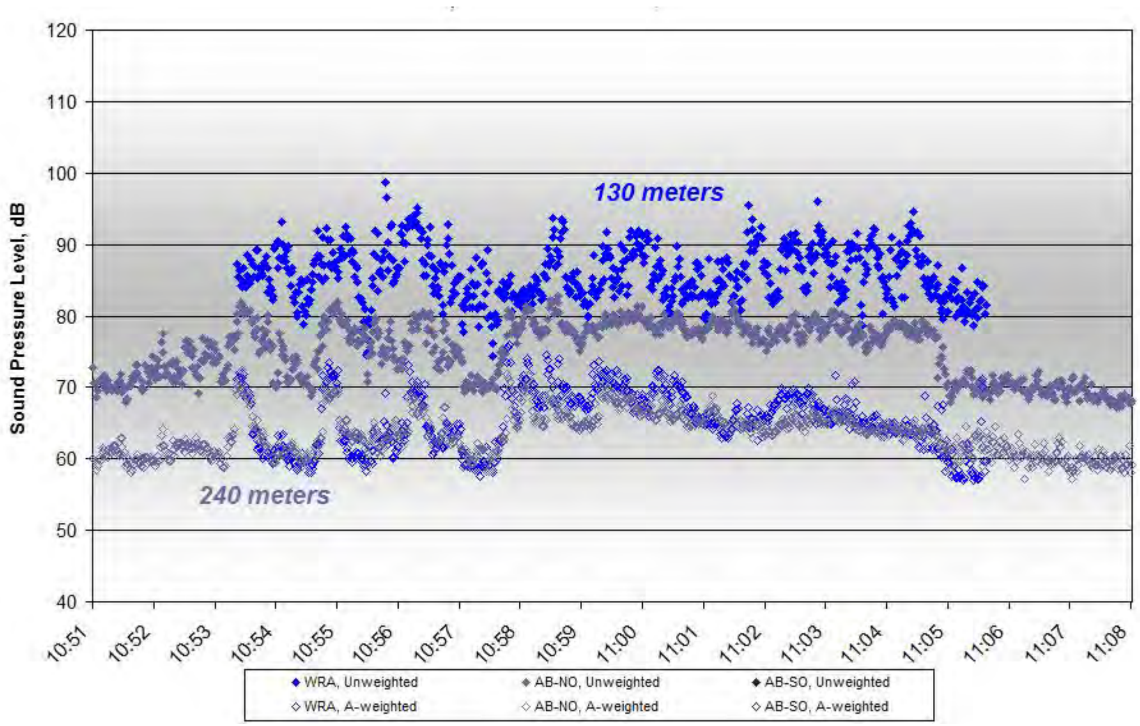

Figure C131. One-second Unweighted and A-weighted Leq Level Data at W7, 10:53-11:05, on October 11, 2011

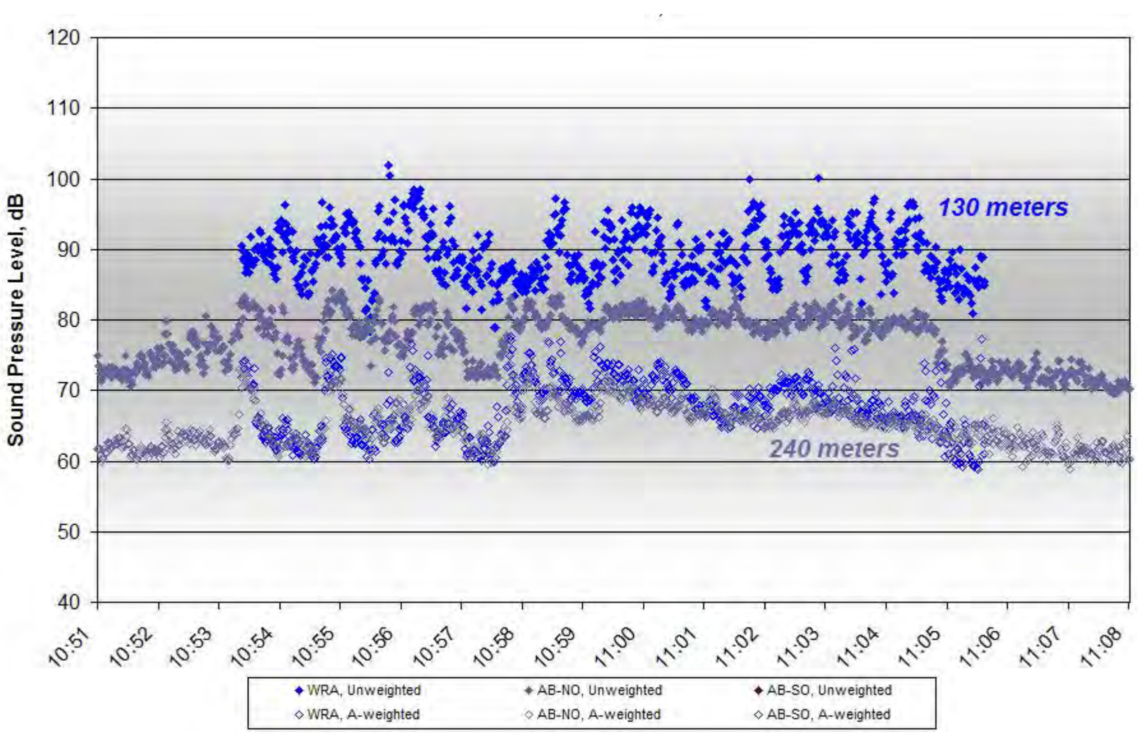

Figure C132. One-second Unweighted and A-weighted Lmax Level Data at W7, 10:53-11:05, on October 11, 2011

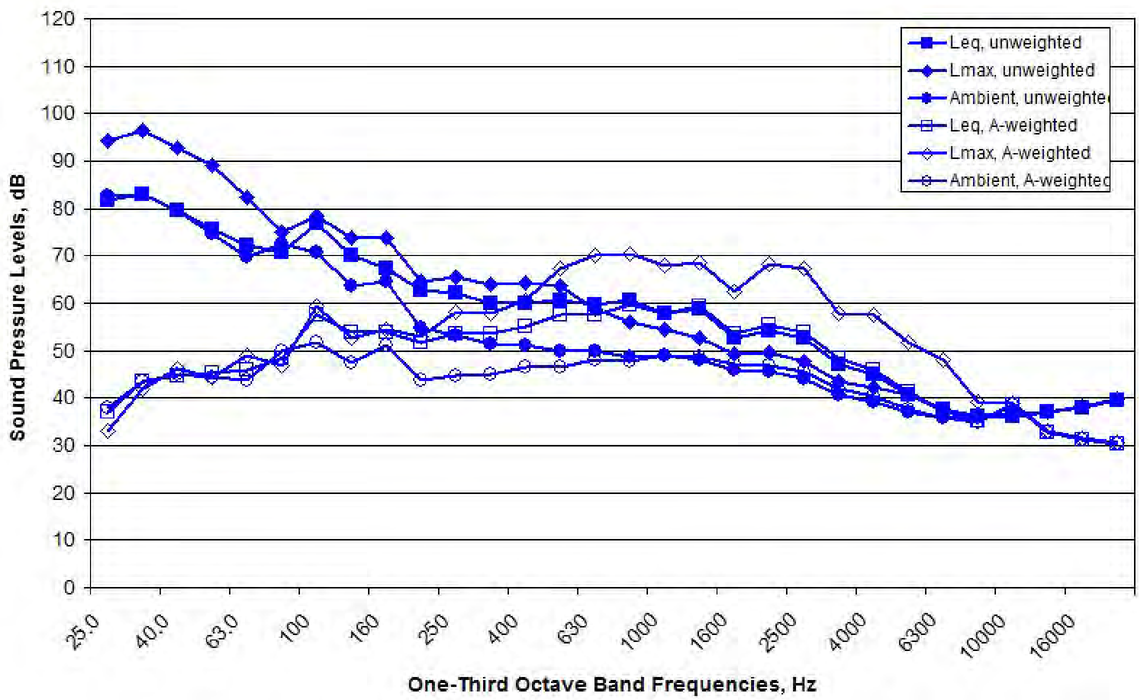

Figure C133. Average One-second Unweighted and A-weighted Spectral Data Measured at the WRA Location during W7, 10:53-11:05, on October 11, 2011

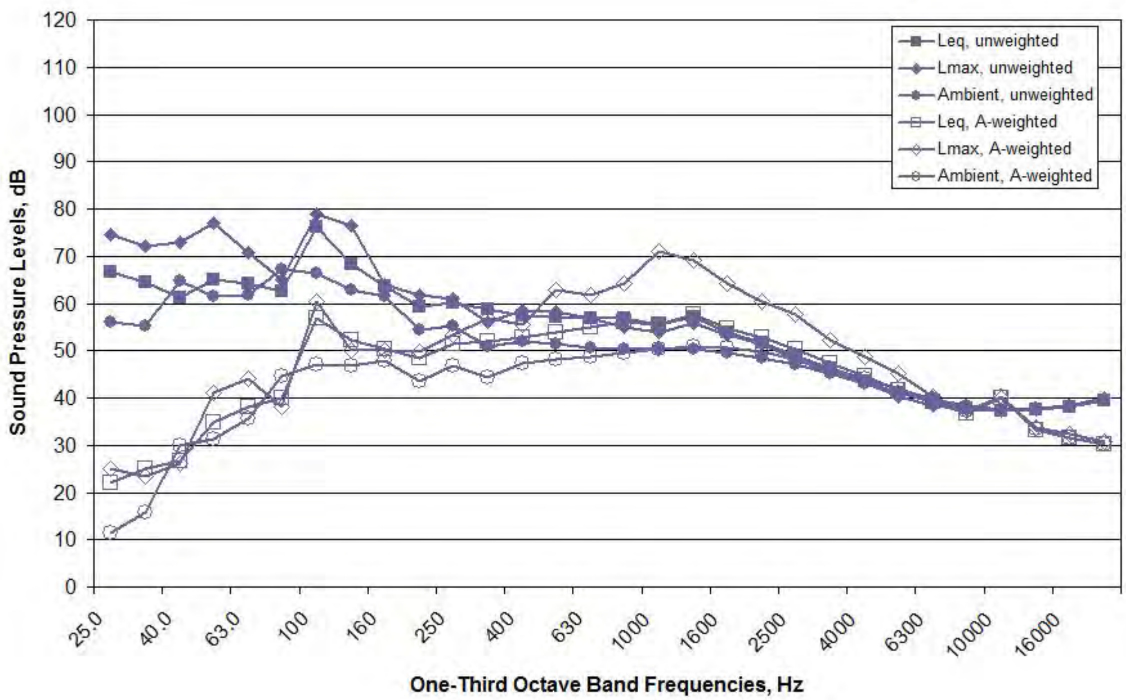

Figure C134. Average One-second Unweighted and A-weighted Spectral Data Measured at the AB-NO Location during W7, 10:53-11:05, on October 11, 2011

NO DATA AVAILABLE

Figure C135. Average One- second Unweighted and A-weighted Spectral Data Measured at the AB-SO Location during W7, 10:53-11:05, on October 11, 2011

W9

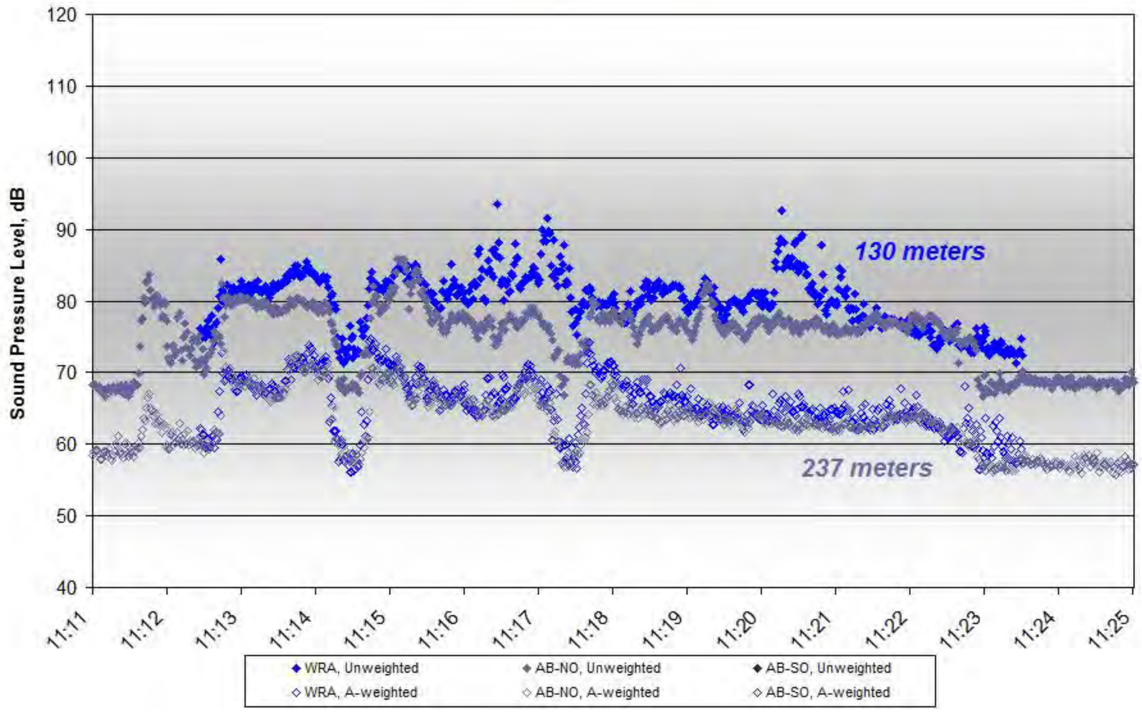

Figure C136. One-second Unweighted and A-weighted Leq Level Data at W9, 11:13-11:23, on October 11, 2011

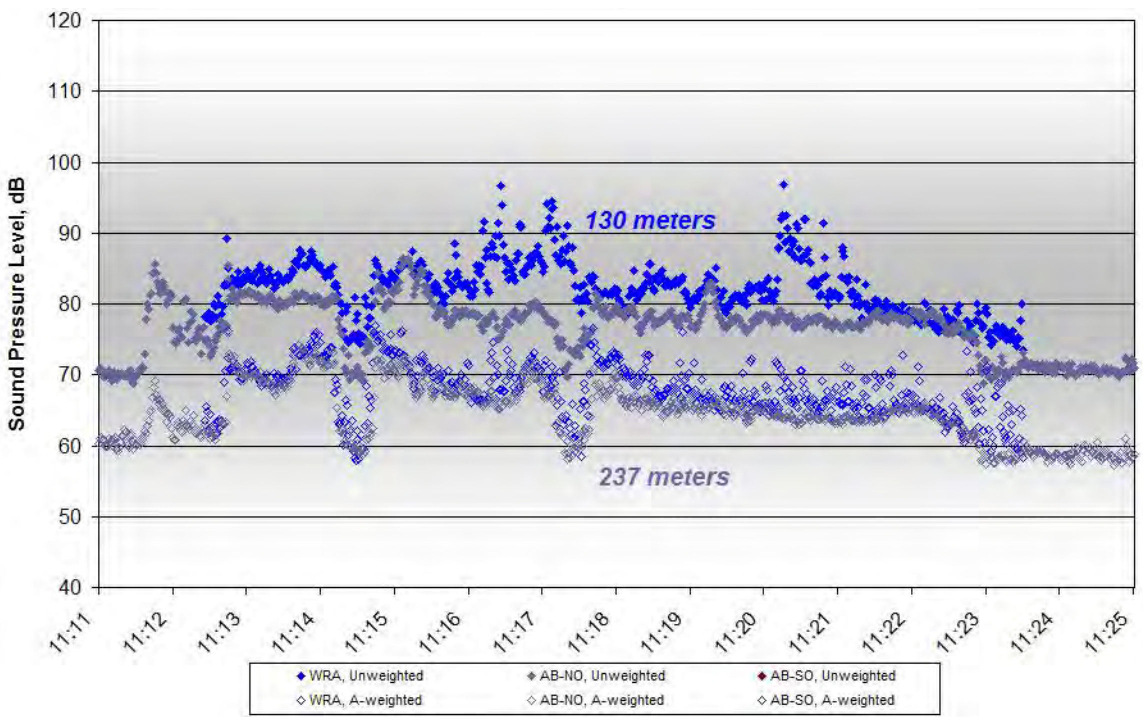

Figure C137. One-second Unweighted and A-weighted Lmax Level Data at W9, 11:13-11:23, on October 11, 2011

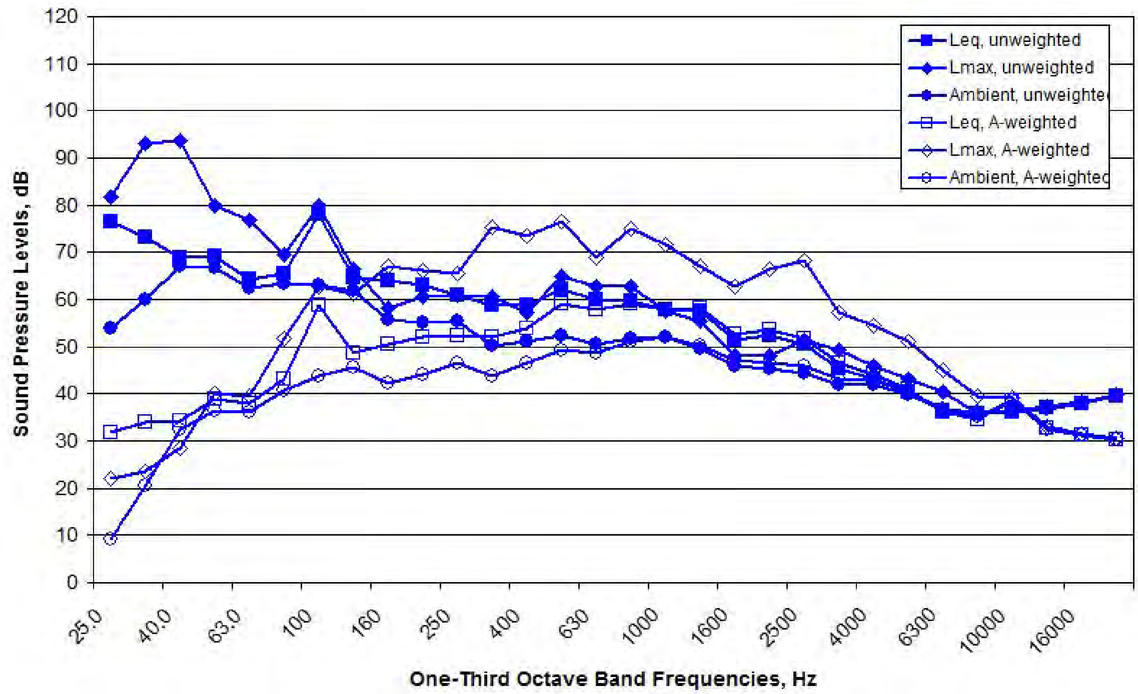

Figure C138. Average One-second Unweighted and A-weighted Spectral Data Measured at the WRA Location during W9, 11:13-11:23, on October 11, 2011

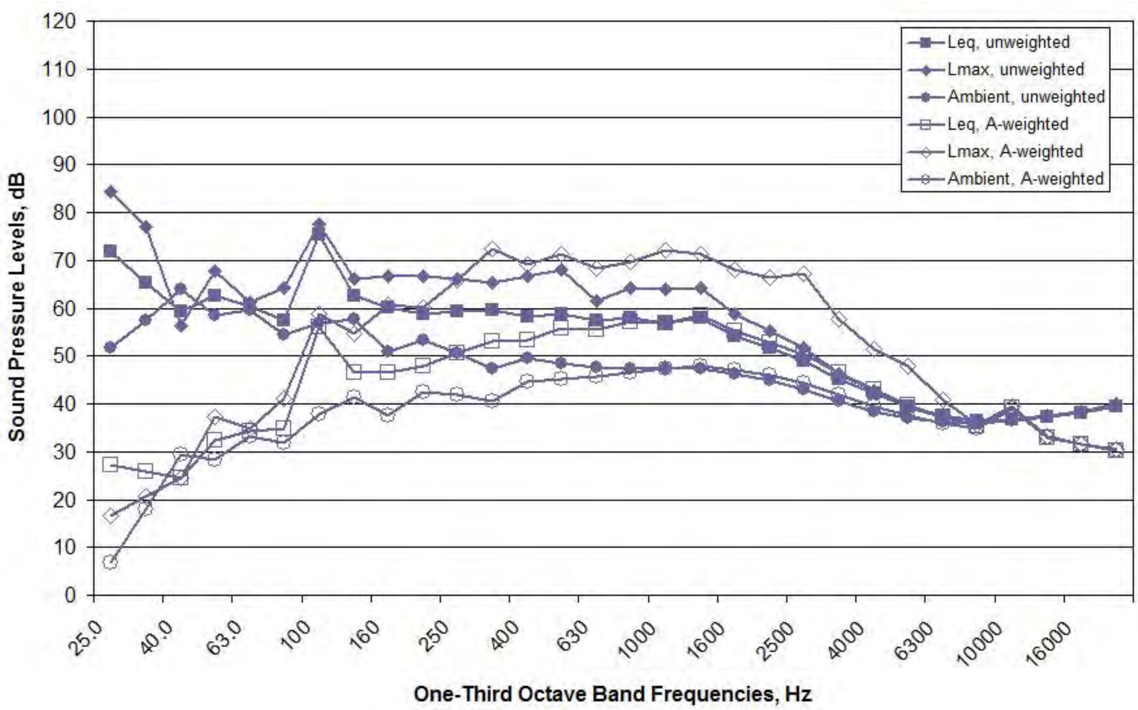

Figure C139. Average One-second Unweighted and A-weighted Spectral Data Measured at the AB-NO Location during W9, 11:13-11:23, on October 11, 2011

NO DATA AVAILABLE

Figure C140. Average One- second Unweighted and A-weighted Spectral Data Measured at the AB-SO Location during W9, 11:13-11:23, on October 11, 2011

W10

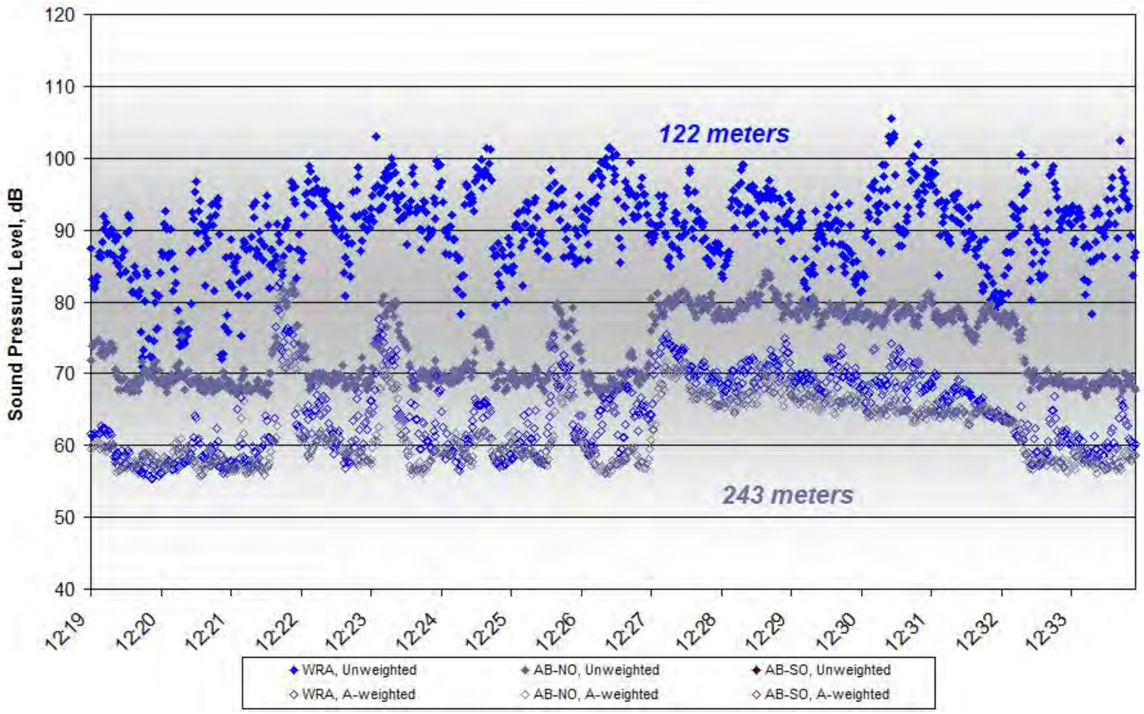

Figure C141. One-second Unweighted and A-weighted Leq Level Data at W10, 12:20-12:31, on October 11, 2011

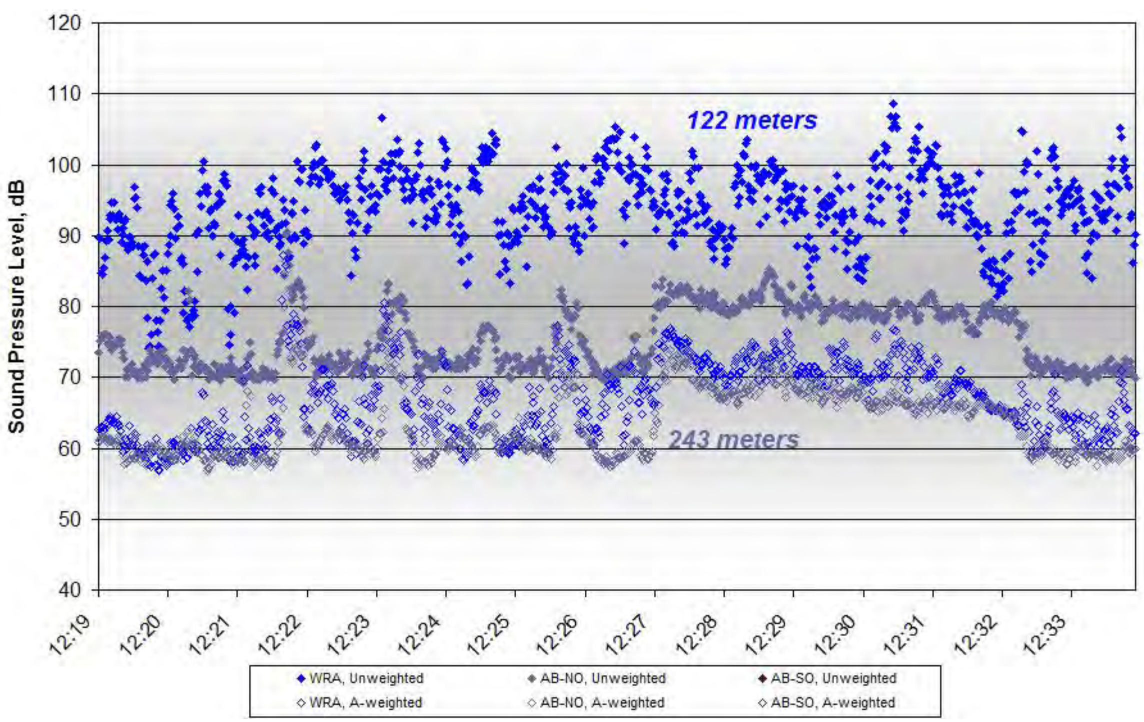

Figure C142. One-second Unweighted and A-weighted Lmax Level Data at W10, 12:20-12:31, on October 11, 2011

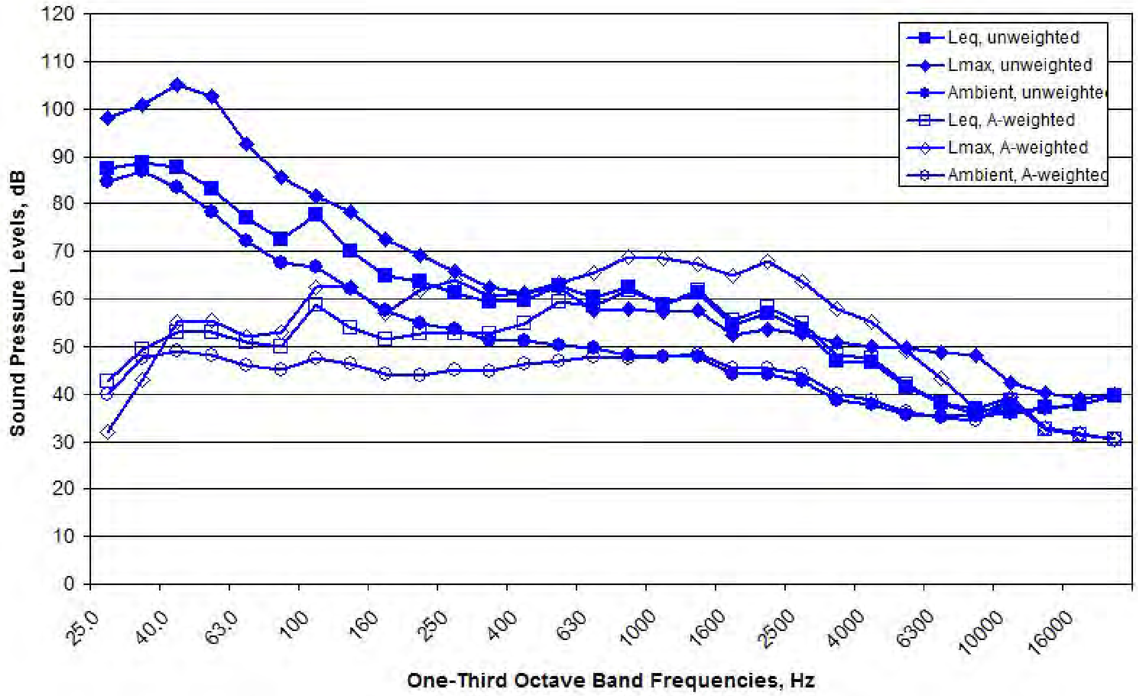

Figure C143. Average One-second Unweighted and A-weighted Spectral Data Measured at the WRA Location during W10, 12:20-12:31, on October 11, 2011

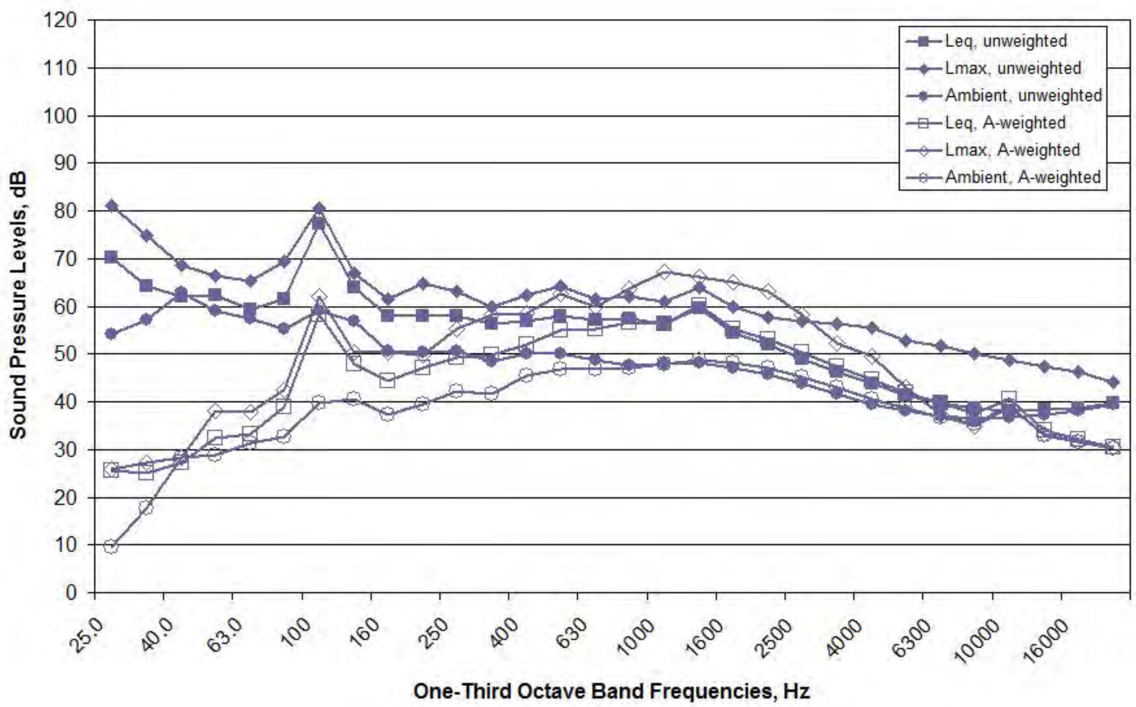

Figure C144. Average One-second Unweighted and A-weighted Spectral Data Measured at the AB-NO Location during W10, 12:20-12:31, on October 11, 2011

NO DATA AVAILABLE

Figure C145. Average One- second Unweighted and A-weighted Spectral Data Measured at the AB-SO Location during W10, 12:20-12:31, on October 11, 2011

W8

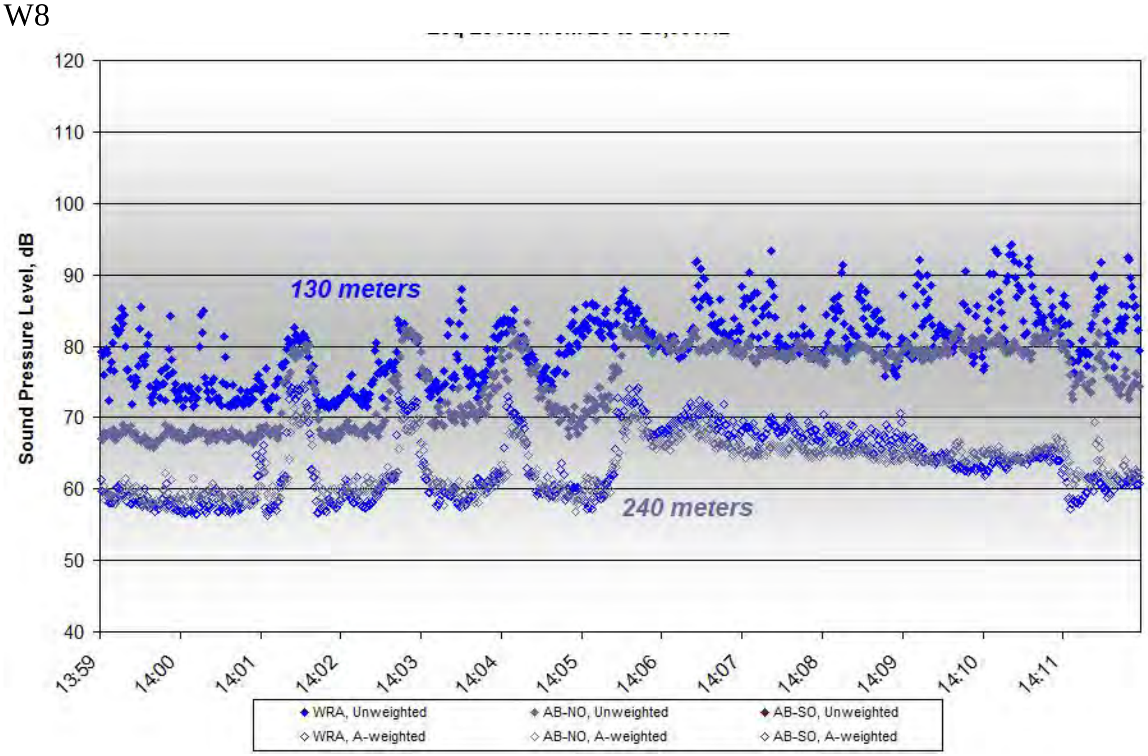

Figure C146. One-second Unweighted and A-weighted Leq Level Data at W8, 14:01-14:11, on October 11, 2011

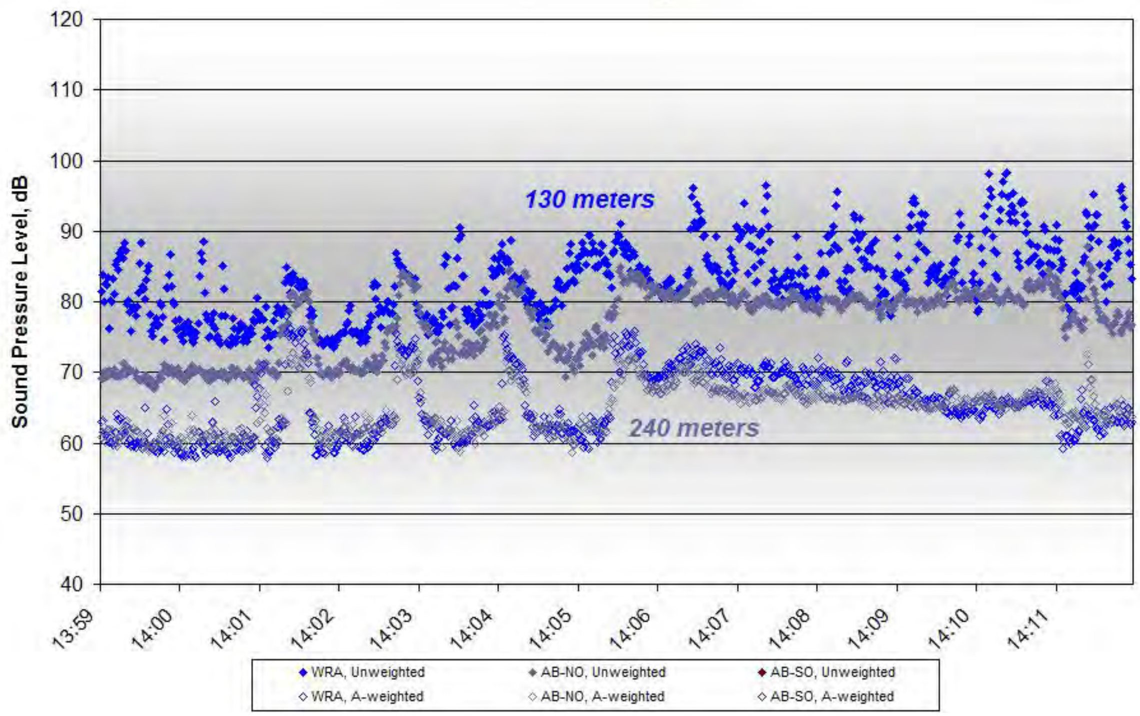

Figure C147. One-second Unweighted and A-weighted Lmax Level Data at W8, 14:01-14:11, on October 11, 2011

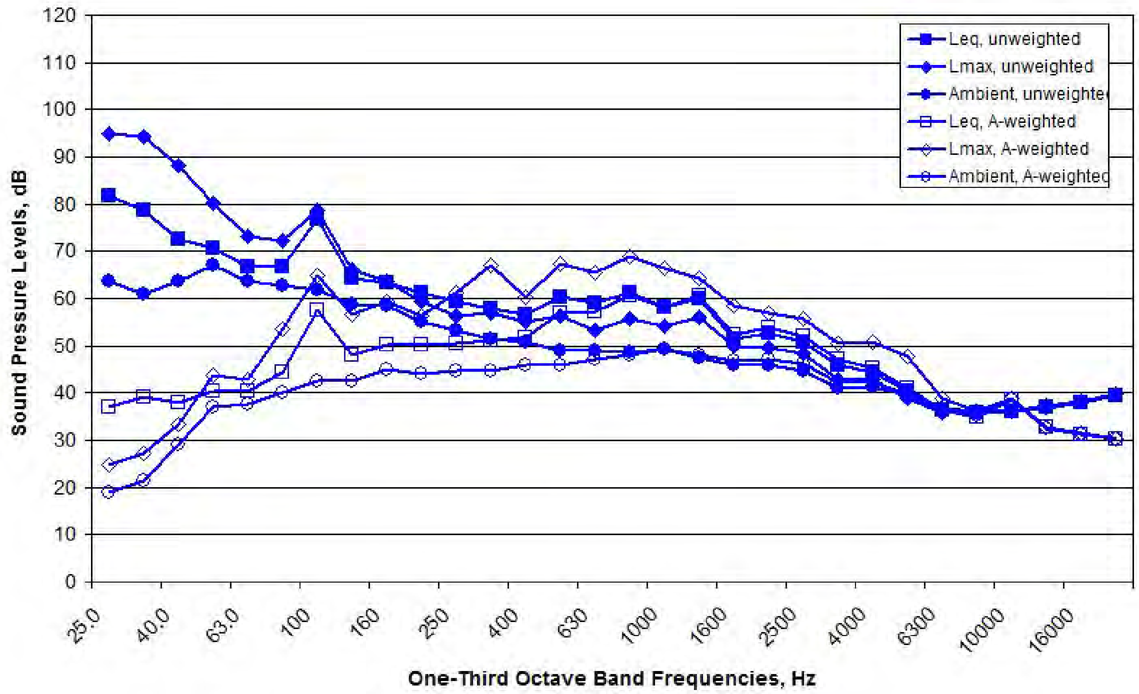

Figure C148. Average One-second Unweighted and A-weighted Spectral Data Measured at the WRA Location during W8, 14:01-14:11, on October 11, 2011

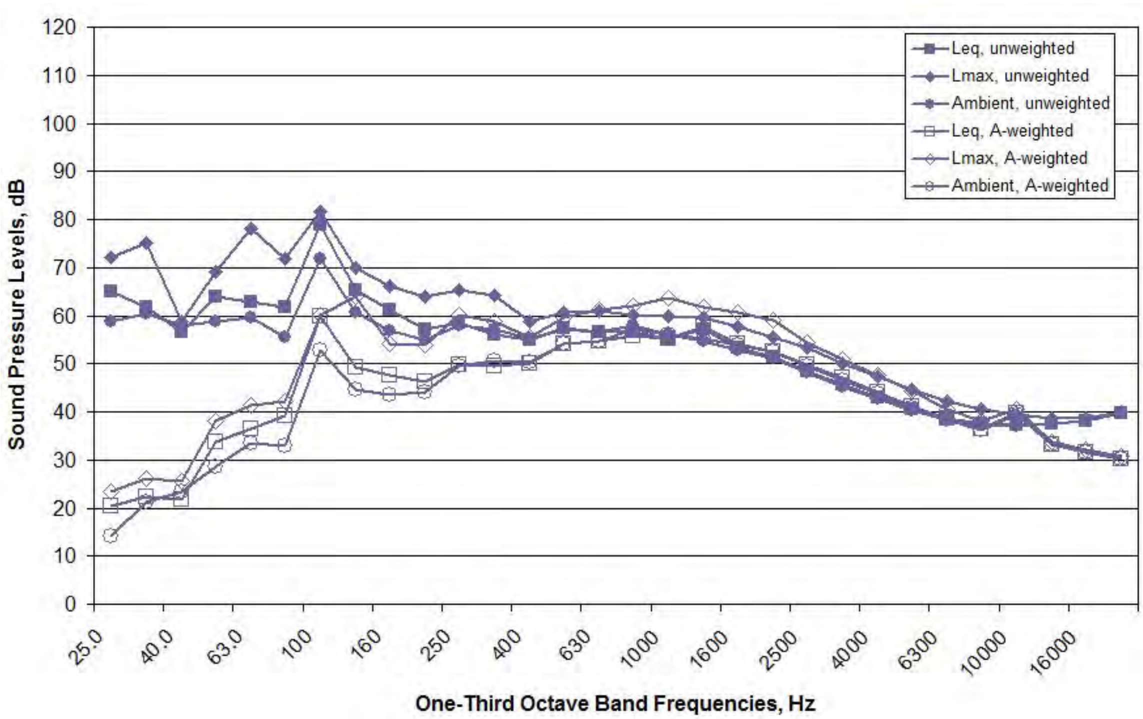

Figure C149. Average One-second Unweighted and A-weighted Spectral Data Measured at the AB-NO Location during W8, 14:01-14:11, on October 11, 2011

NO DATA AVAILABLE

Figure C150. Average One- second Unweighted and A-weighted Spectral Data Measured at the AB-SO Location during W8, 14:01-14:11, on October 11, 2011

EHW16, 16:51-17:12

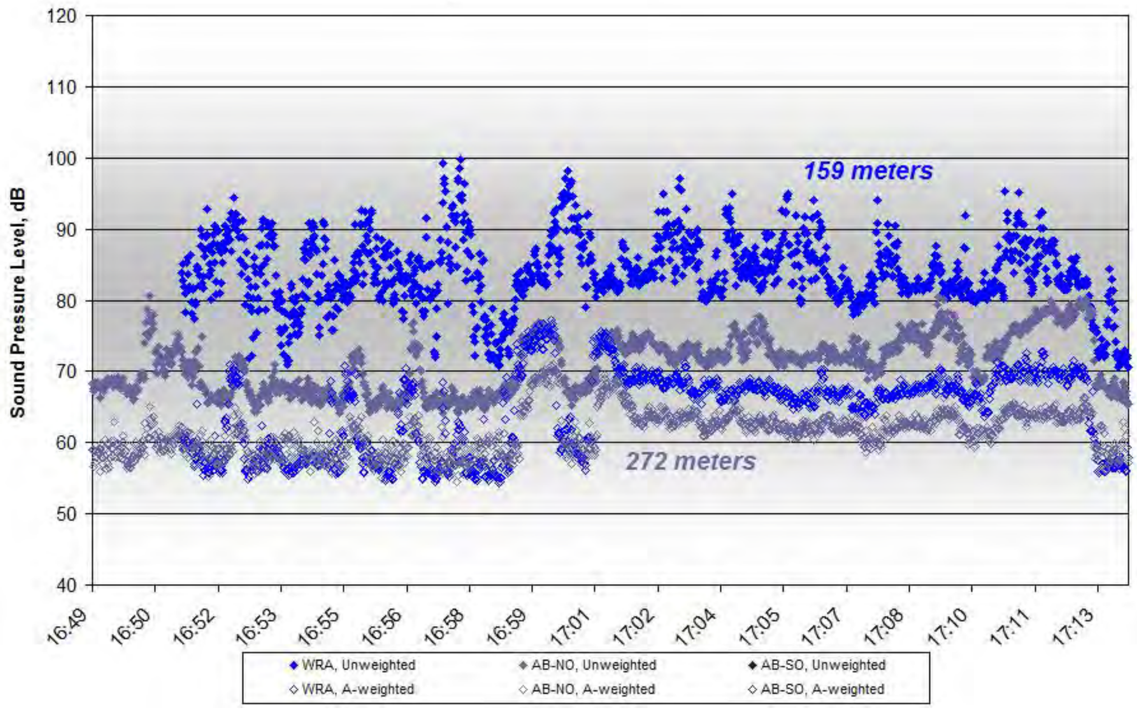

Figure C151. One-second Unweighted and A-weighted Leq Level Data at EHW16, 16:51-17:12, on October 11, 2011

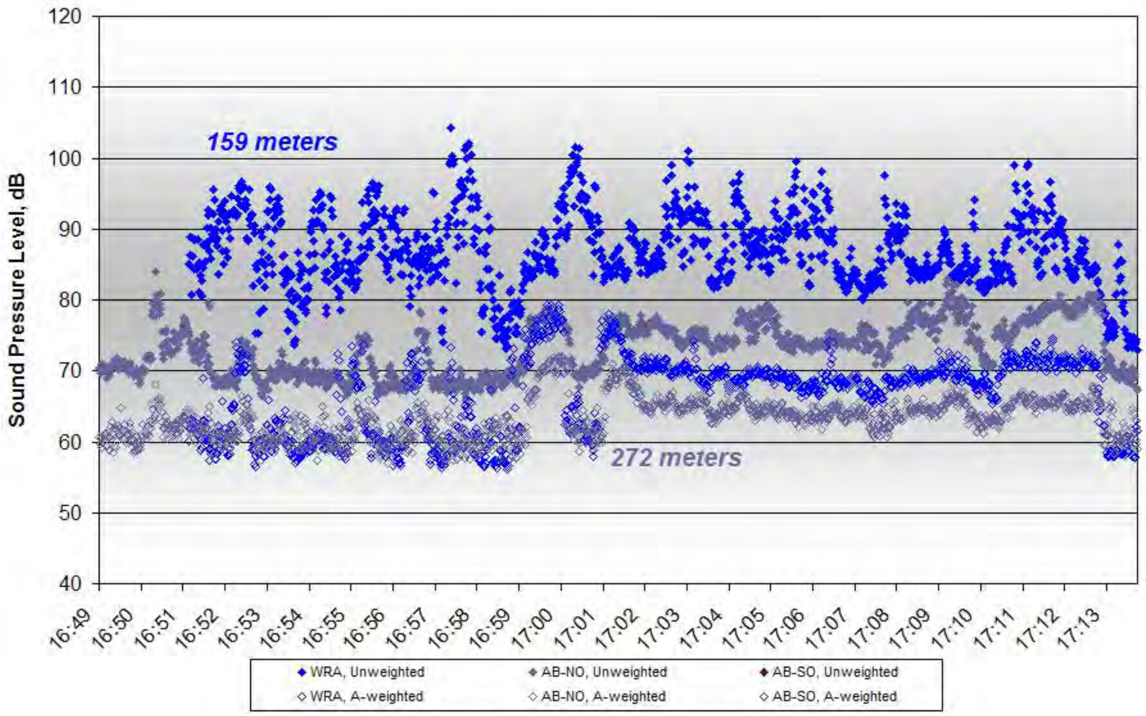

Figure C152. One-second Unweighted and A-weighted Lmax Level Data at EHW16, 16:51-17:12, on October 11, 2011

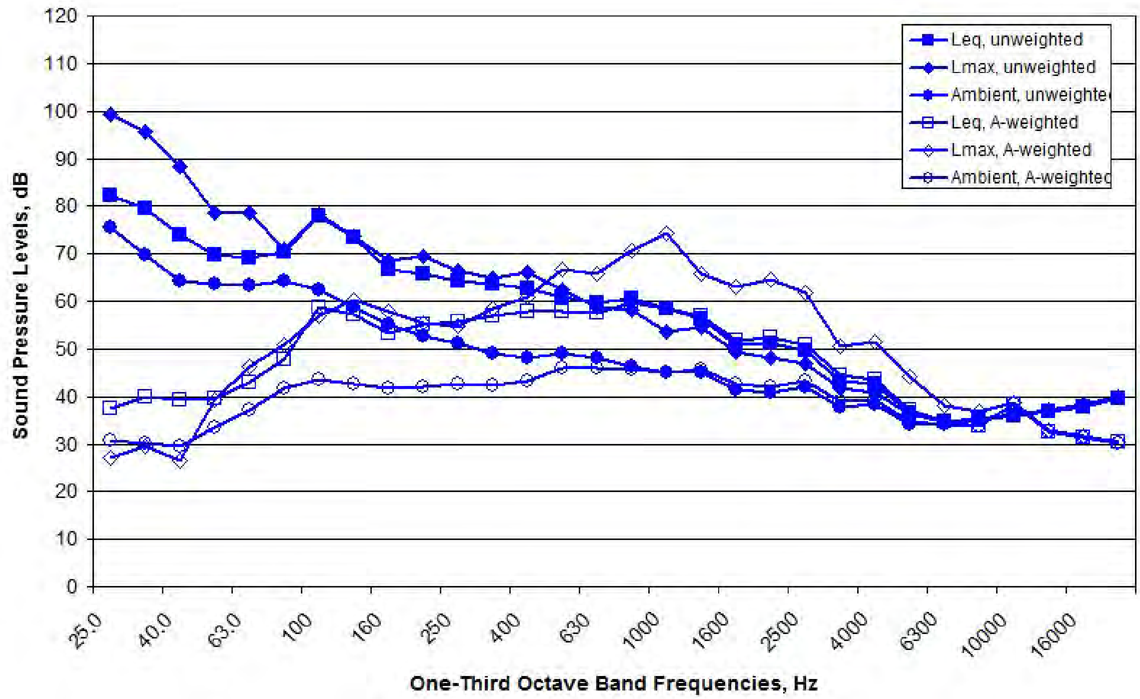

Figure C153. Average One-second Unweighted and A-weighted Spectral Data Measured at the WRA Location during EHW16, 16:51-17:12, on October 11, 2011

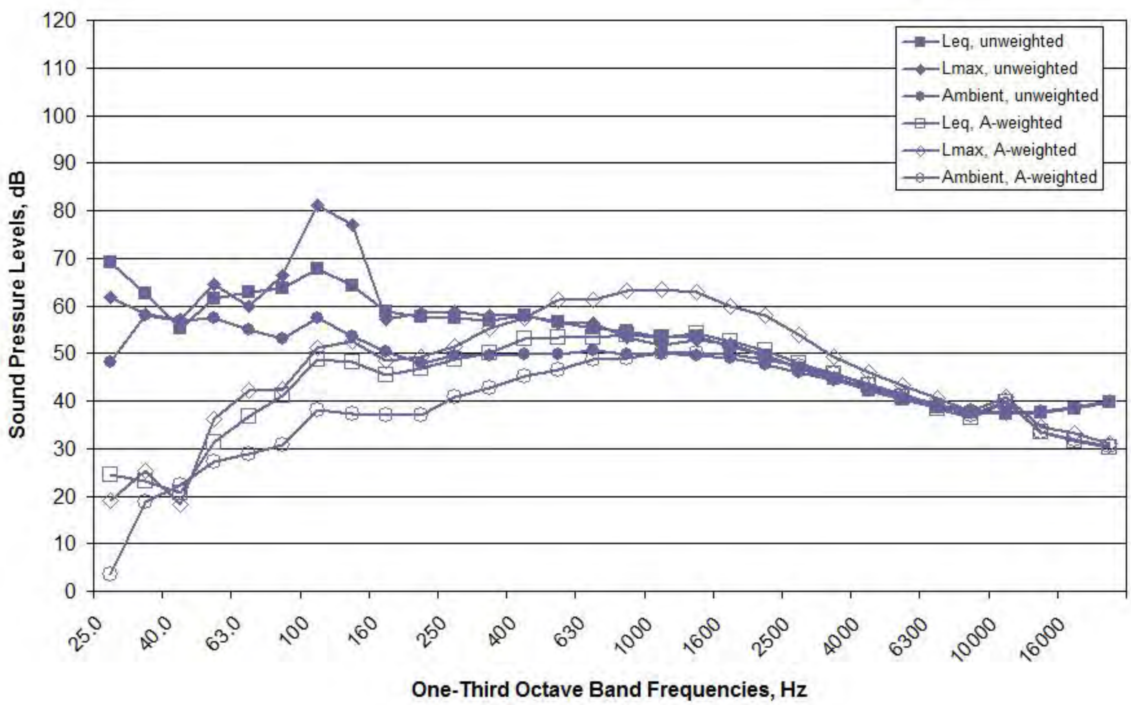

Figure C154. Average One-second Unweighted and A-weighted Spectral Data Measured at the AB-NO Location during EHW16, 16:51-17:12, on October 11, 2011

NO DATA AVAILABLE

Figure C155. Average One- second Unweighted and A-weighted Spectral Data Measured at the AB-SO Location during EHW16, 16:51-17:12, on October 11, 2011

EHW16, 17:13-17:30

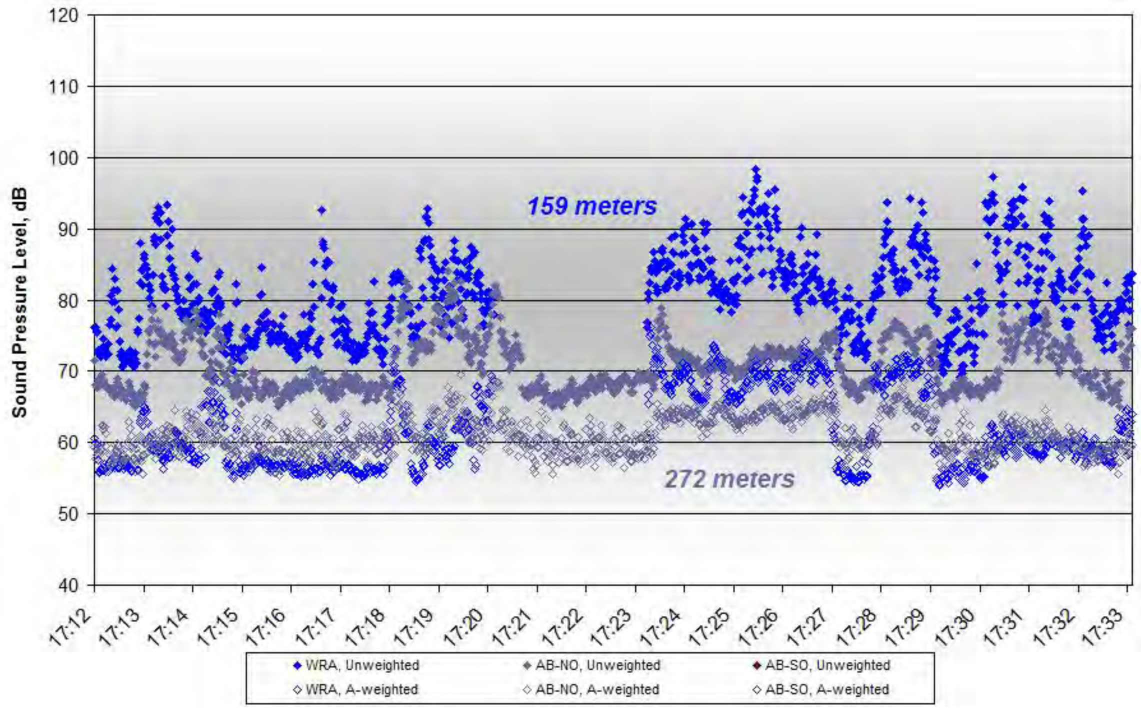

Figure C156. One-second Unweighted and A-weighted Leq Level Data at EHW16, 17:13-17:30, on October 11, 2011

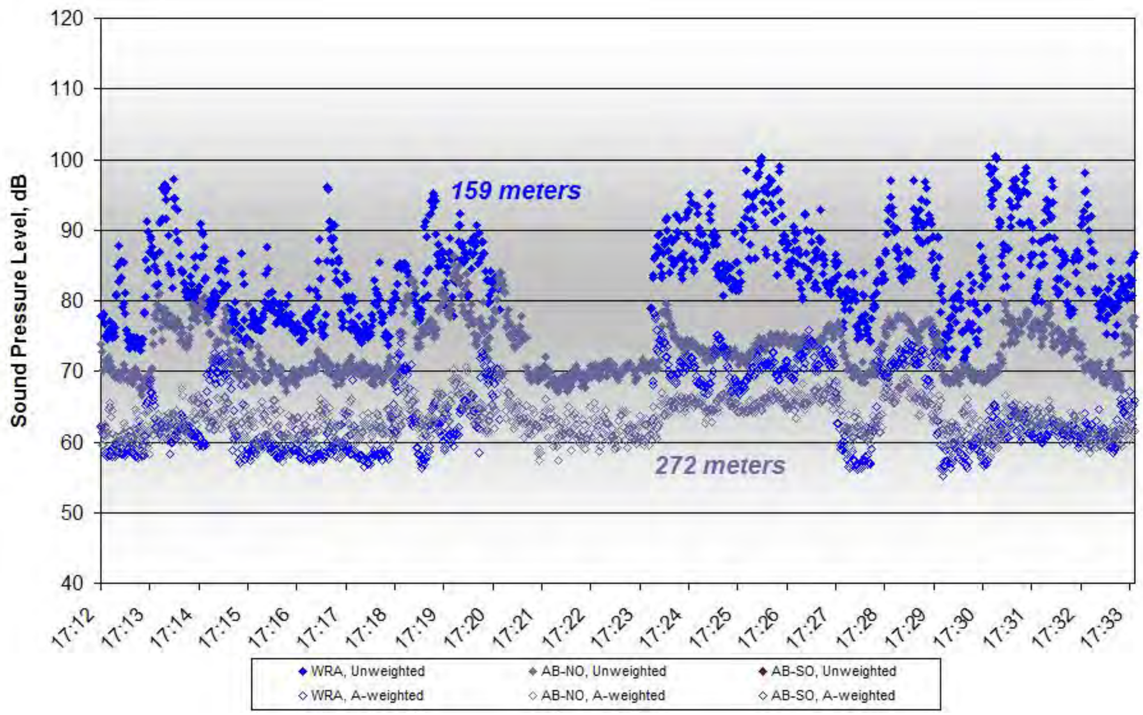

Figure C157. One-second Unweighted and A-weighted Lmax Level Data at EHW16, 17:13-17:30, on October 11, 2011

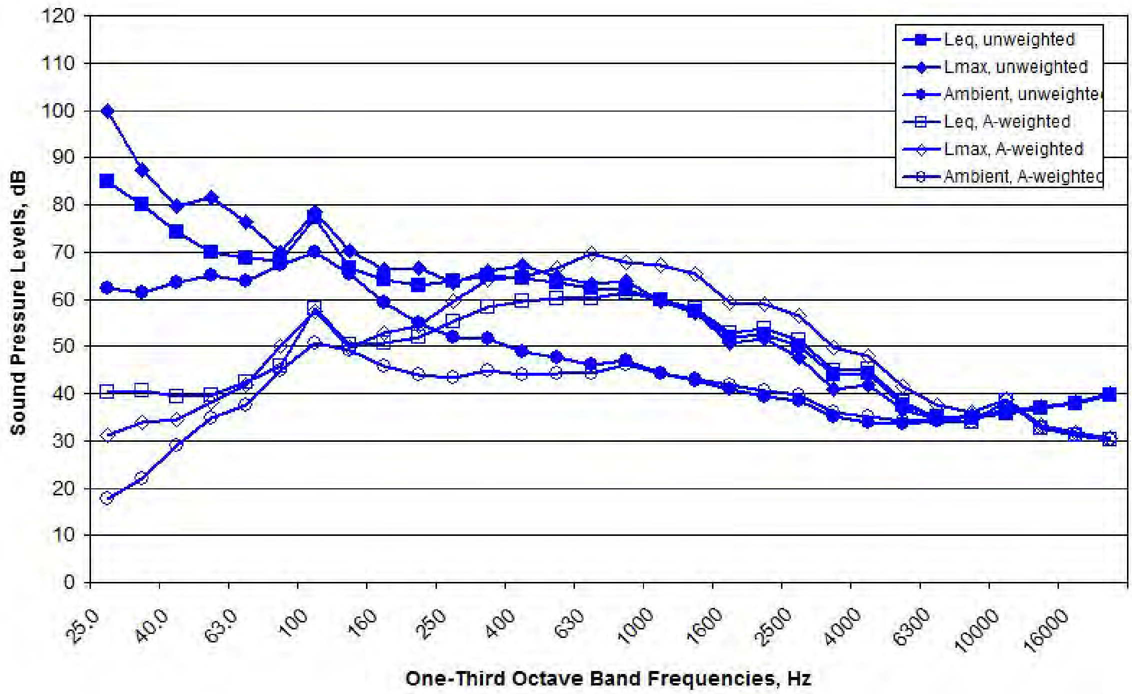

Figure C158. Average One-second Unweighted and A-weighted Spectral Data Measured at the WRA Location during EHW16, 17:13-17:30, on October 11, 2011

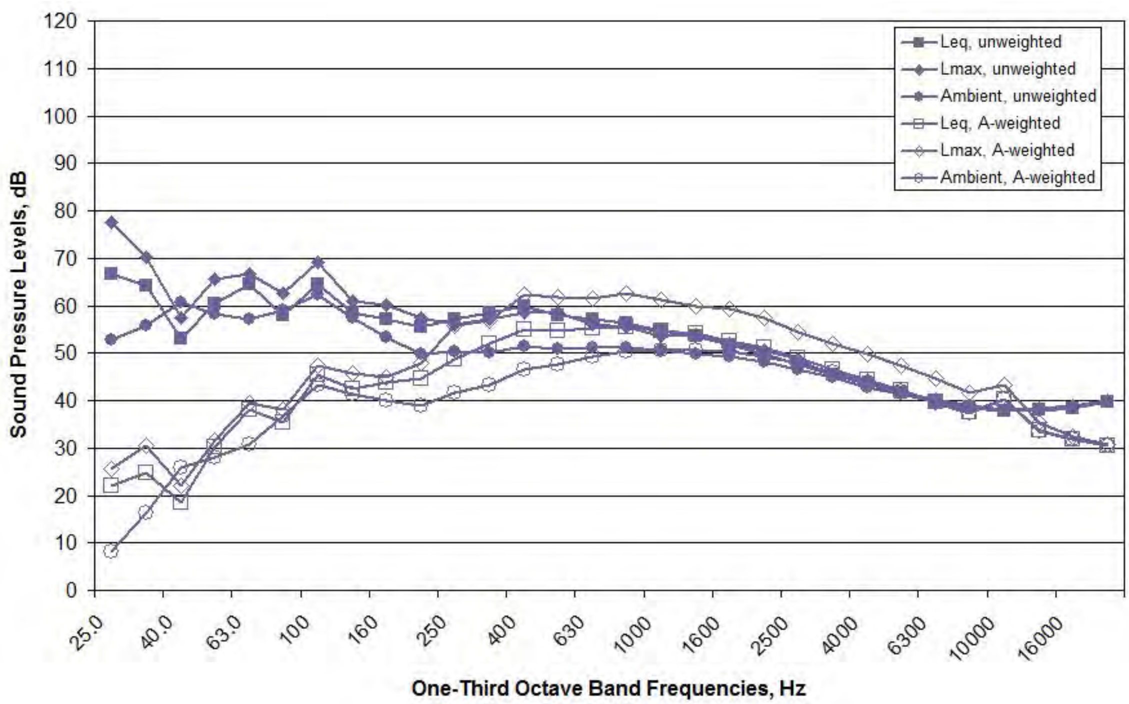

Figure C159. Average One-second Unweighted and A-weighted Spectral Data Measured at the AB-NO Location during EHW16, 17:13-17:30, on October 11, 2011

NO DATA AVAILABLE

Figure C160. Average One- second Unweighted and A-weighted Spectral Data Measured at the AB-SO Location during EHW16, 17:13-17:30, on October 11, 2011

EHW16, 17:37-17:49

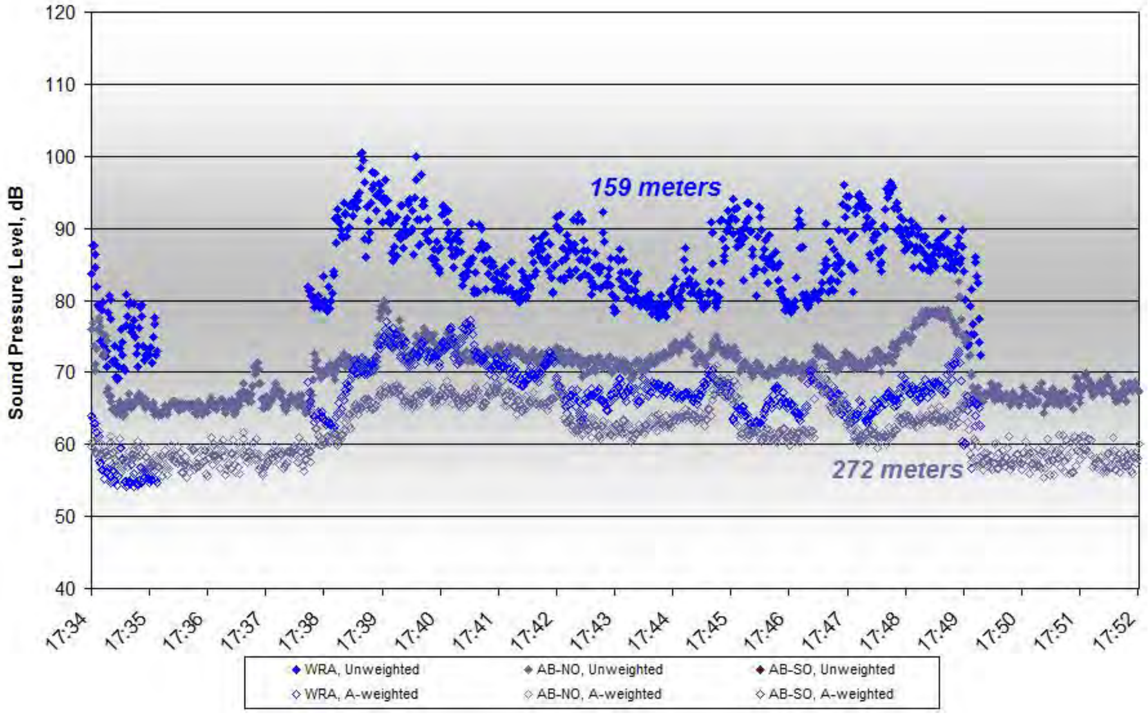

Figure C161. One-second Unweighted and A-weighted Leq Level Data at EHW16, 17:37-17:49, on October 11, 2011

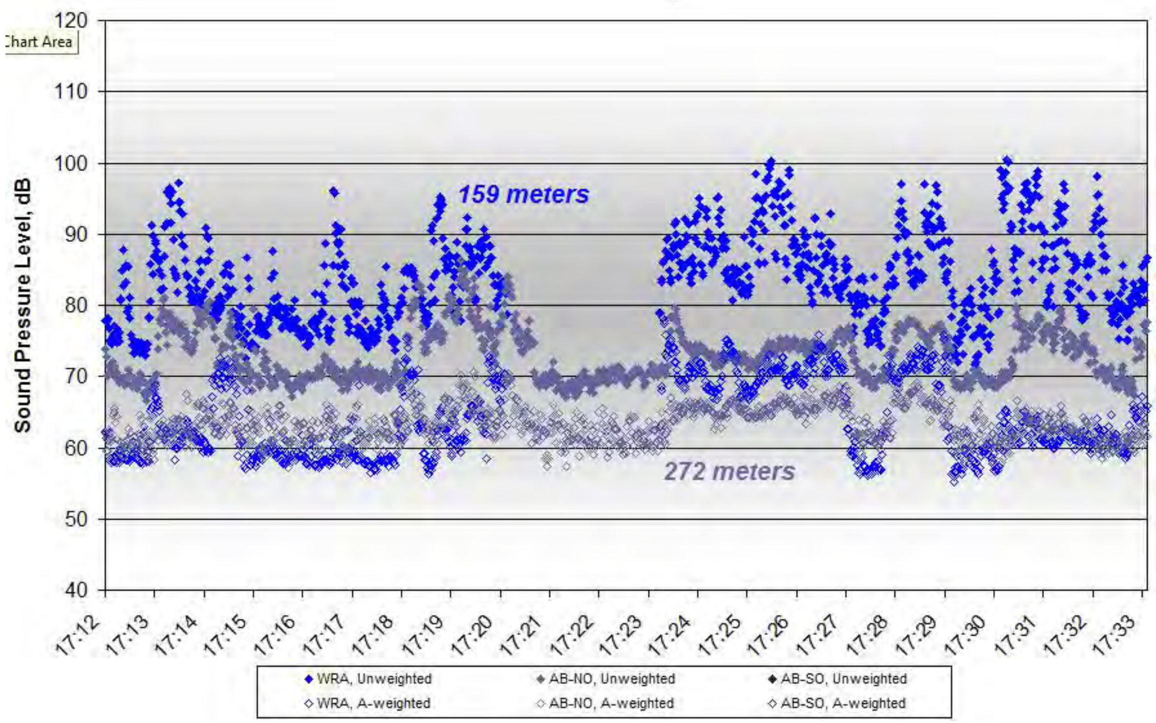

Figure C162. One-second Unweighted and A-weighted Lmax Level Data at EHW16, 17:37-17:49, on October 11, 2011

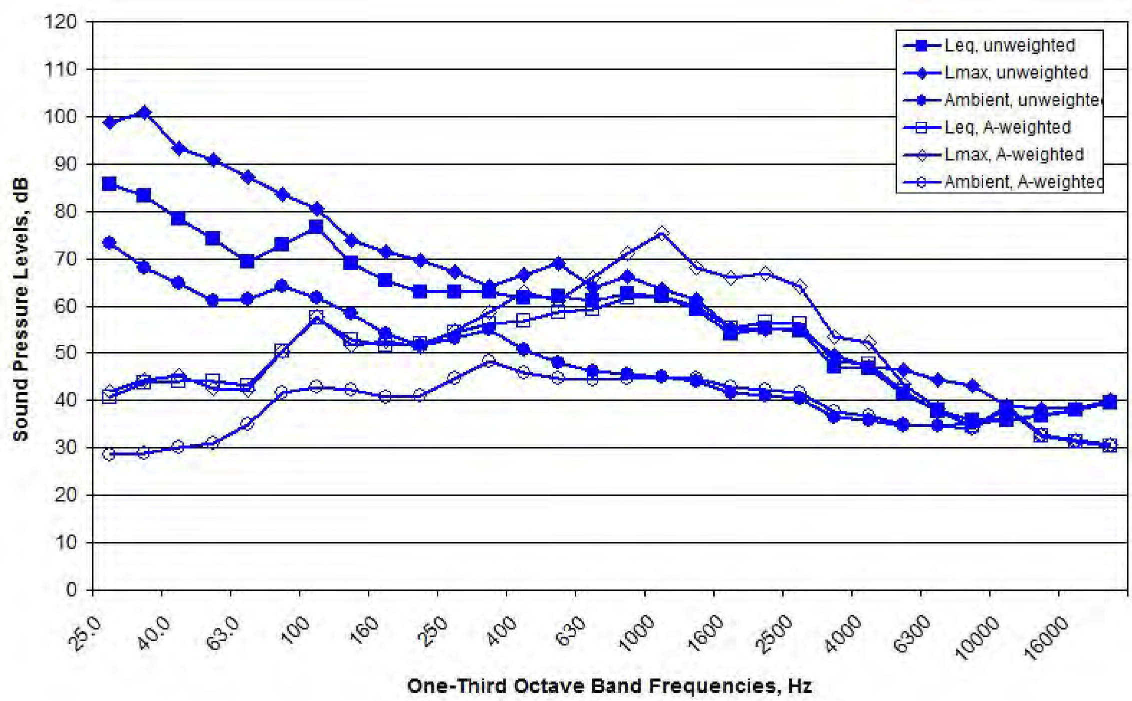

Figure C163. Average One-second Unweighted and A-weighted Spectral Data Measured at the WRA Location during EHW16, 17:37-17:49, on October 11, 2011

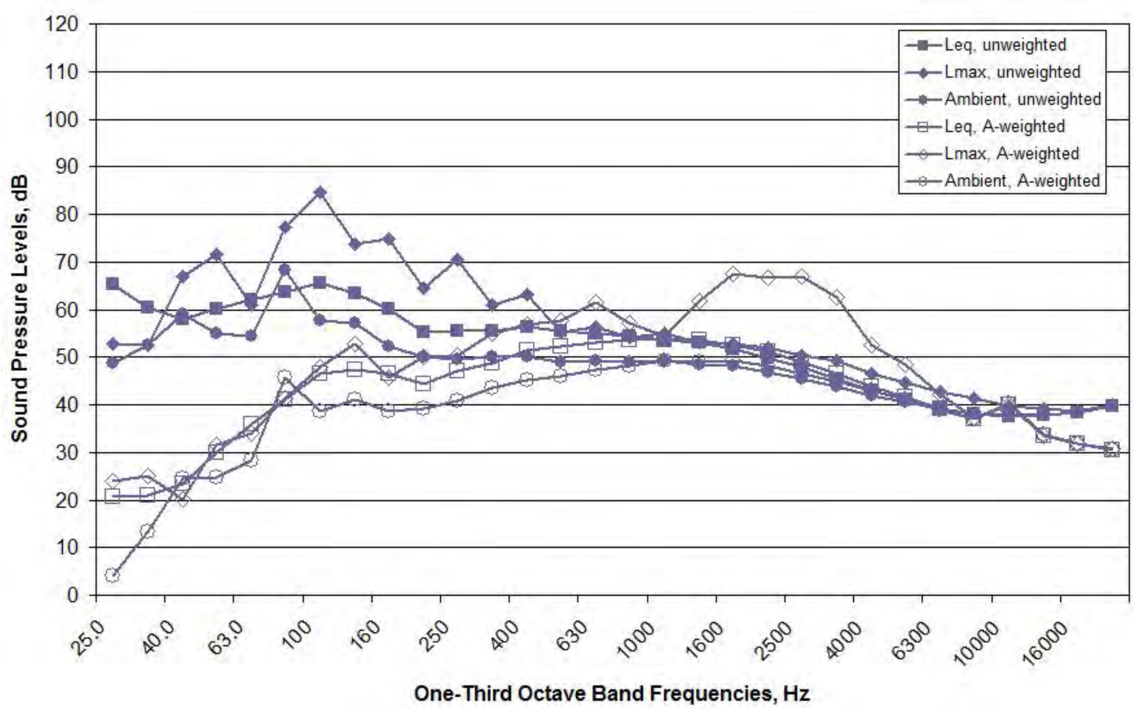

Figure C164. Average One-second Unweighted and A-weighted Spectral Data Measured at the AB-NO Location during EHW16, 17:37-17:49, on October 11, 2011

NO DATA AVAILABLE

Figure C165. Average One- second Unweighted and A-weighted Spectral Data Measured at the AB-SO Location during EHW16, 17:37-17:49, on October 11, 2011

10/12/2011 – EHW12, Batter

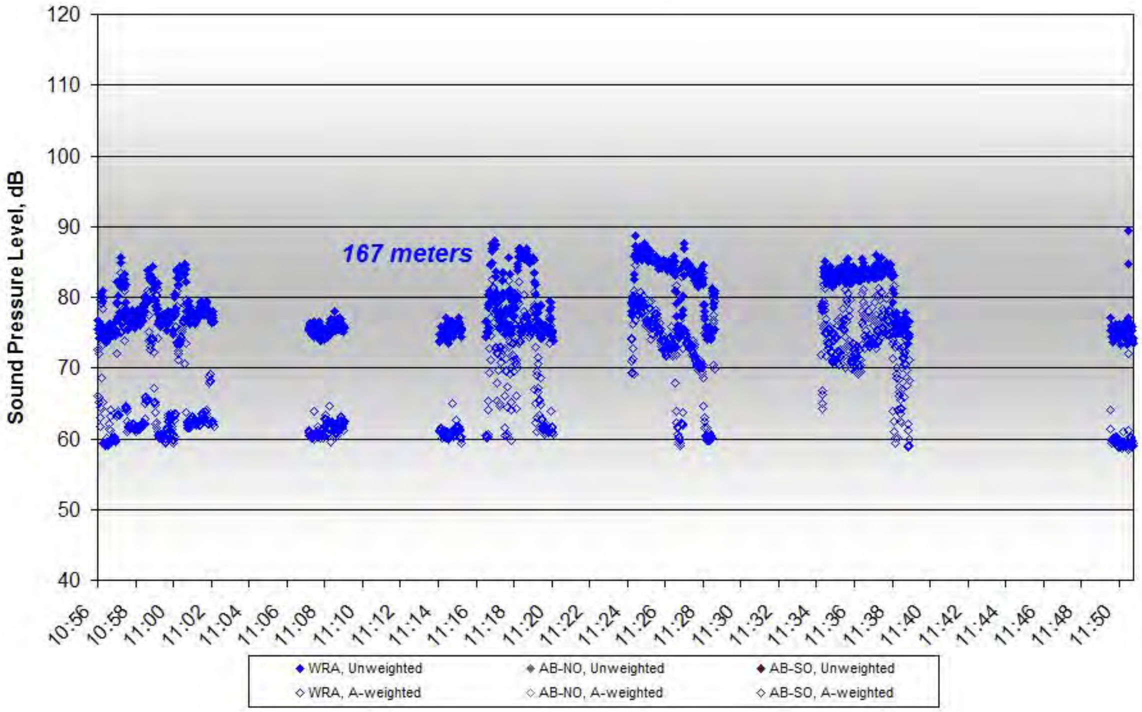

Figure C166. One-second Unweighted and A-weighted Leq Level Data at EHW12, Batter, 10:58-11:39, on October 12, 2011

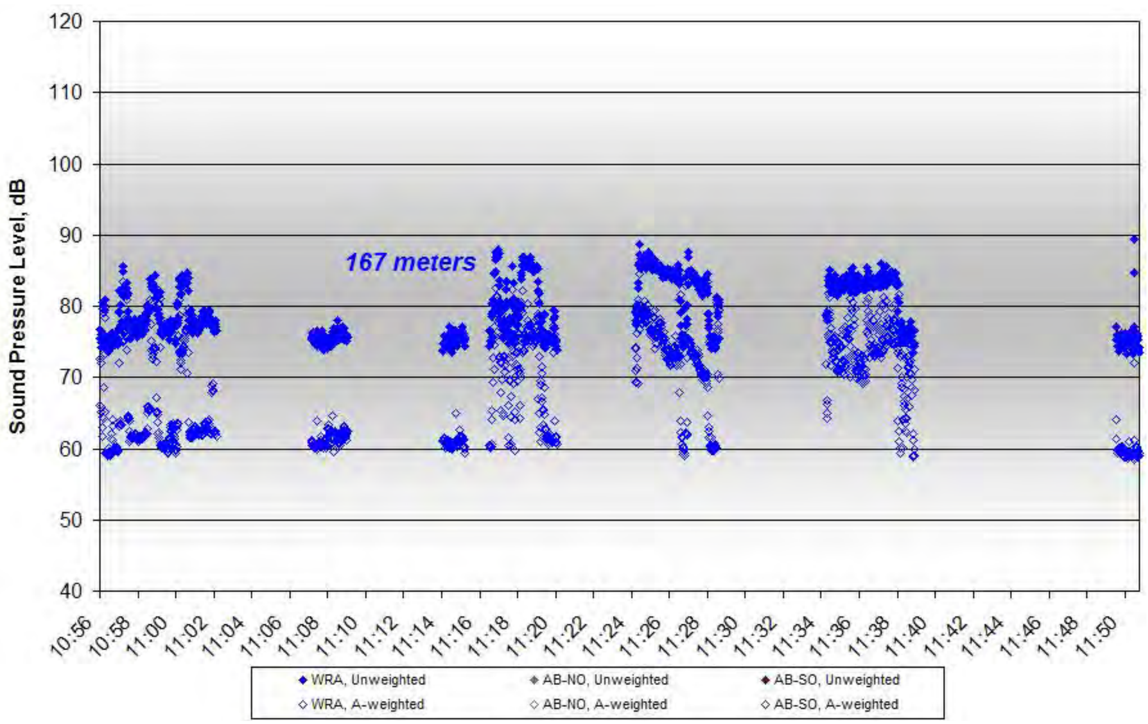

Figure C167. One-second Unweighted and A-weighted Lmax Level Data at EHW12, Batter, 10:58-11:39, on October 12, 2011

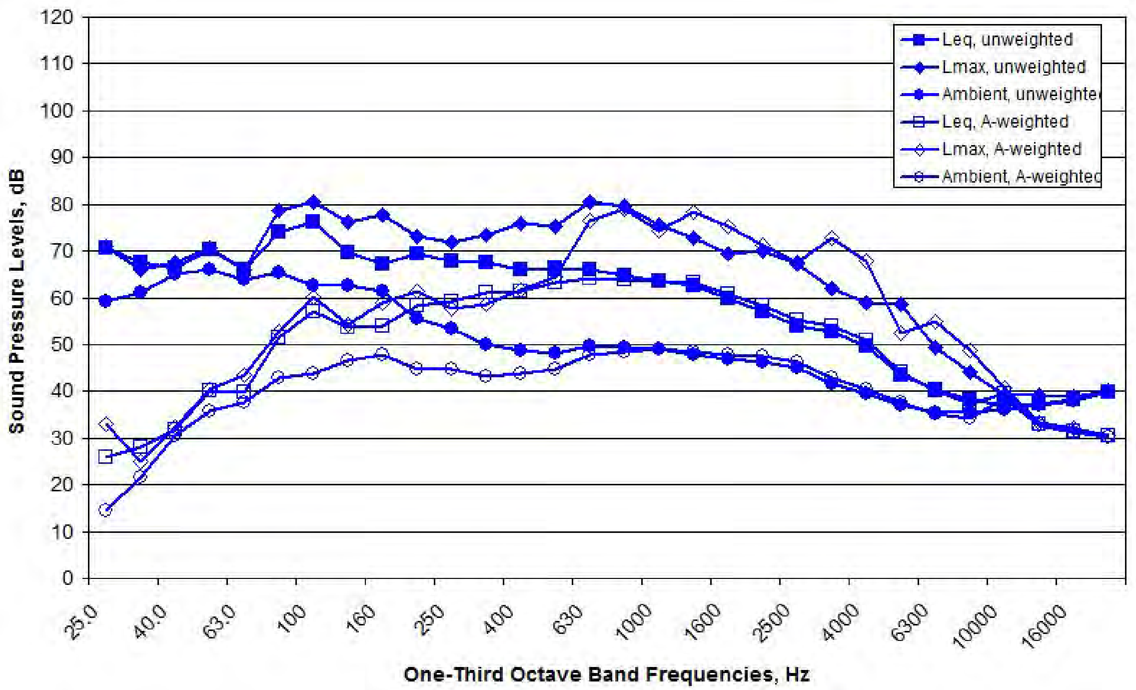

Figure C168. Average One-second Unweighted and A-weighted Spectral Data Measured at the WRA Location during EHW12, Batter, 10:58-11:39, on October 12, 2011

NO DATA AVAILABLE

Figure C169. Average One-second Unweighted and A-weighted Spectral Data Measured at the AB-NO Location during EHW12, Batter, 10:58-11:39, on October 12, 2011

NO DATA AVAILABLE

Figure C170. Average One- second Unweighted and A-weighted Spectral Data Measured at the AB-SO Location during EHW12, Batter, 10:58-11:39, on October 12, 2011

EHW13, Batter

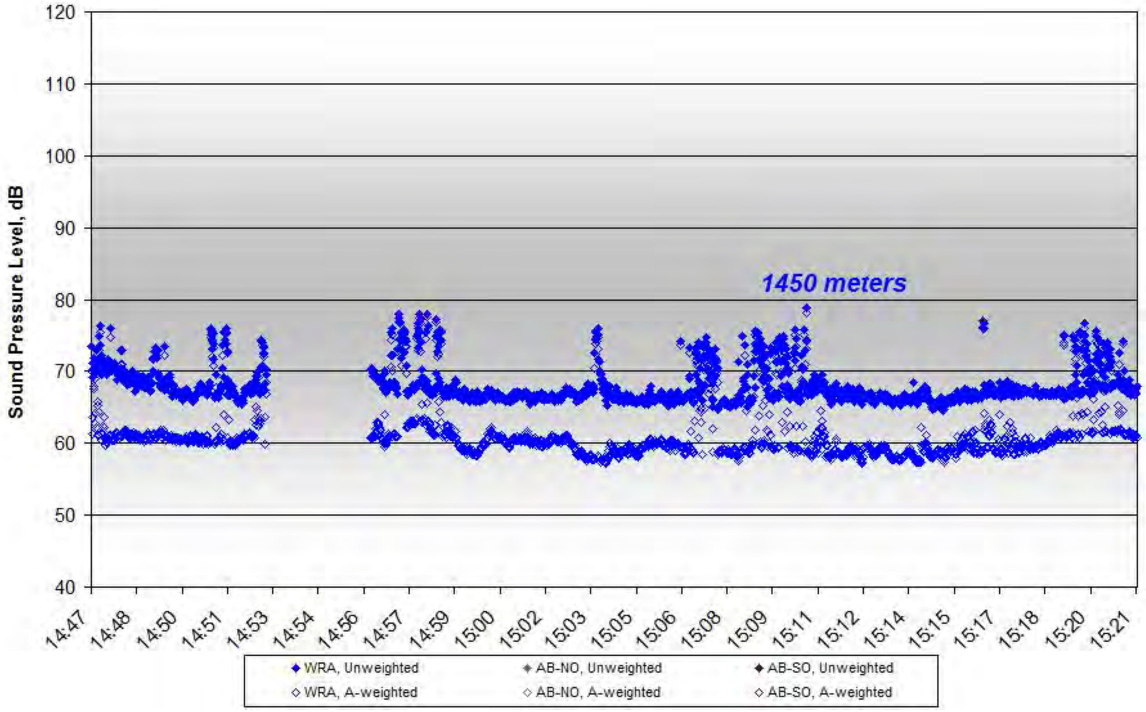

Figure C171. One-second Unweighted and A-weighted Leq Level Data at EHW13, Batter, 14:57-15:20, on October 12, 2011

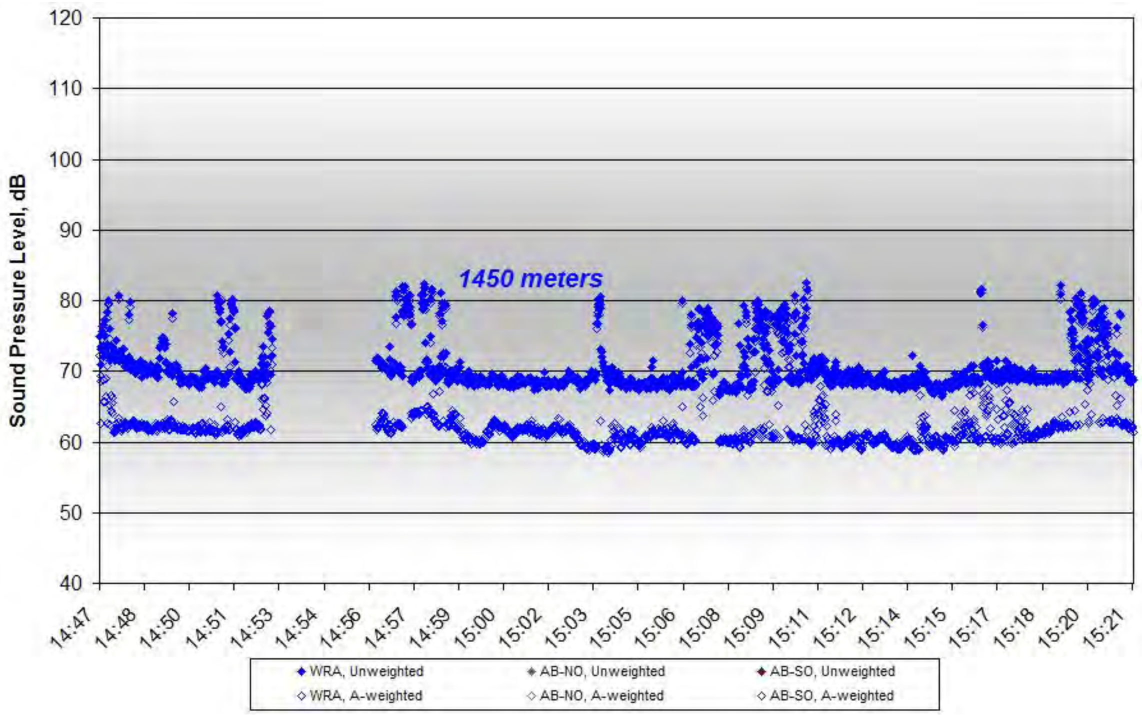

Figure C172. One-second Unweighted and A-weighted Lmax Level Data at EHW13, Batter, 14:57-15:20, on October 12, 2011

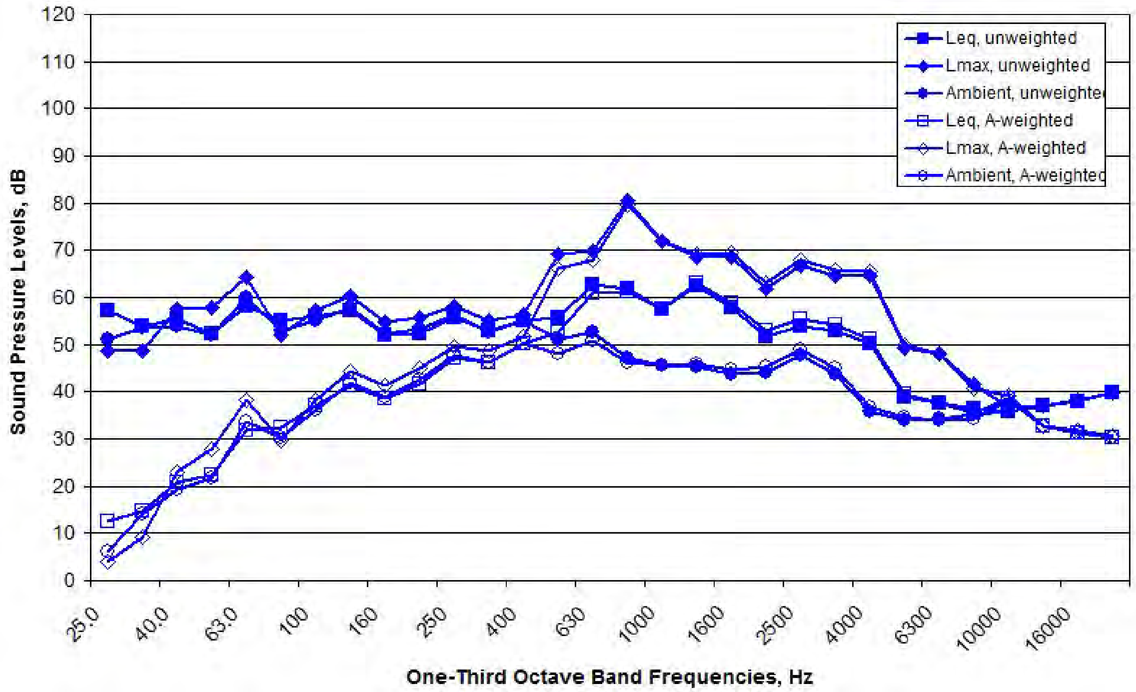

Figure C173. Average One-second Unweighted and A-weighted Spectral Data Measured at the WRA Location during EHW13, Batter, 14:57-15:20, on October 12, 2011

NO DATA AVAILABLE

Figure C174. Average One-second Unweighted and A-weighted Spectral Data Measured at the AB-NO Location during EHW13, Batter, 14:57-15:20, on October 12, 2011

NO DATA AVAILABLE

Figure C175. Average One- second Unweighted and A-weighted Spectral Data Measured at the AB-SO Location during EHW13, Batter, 14:57-15:20, on October 12, 2011

EHW10, Batter

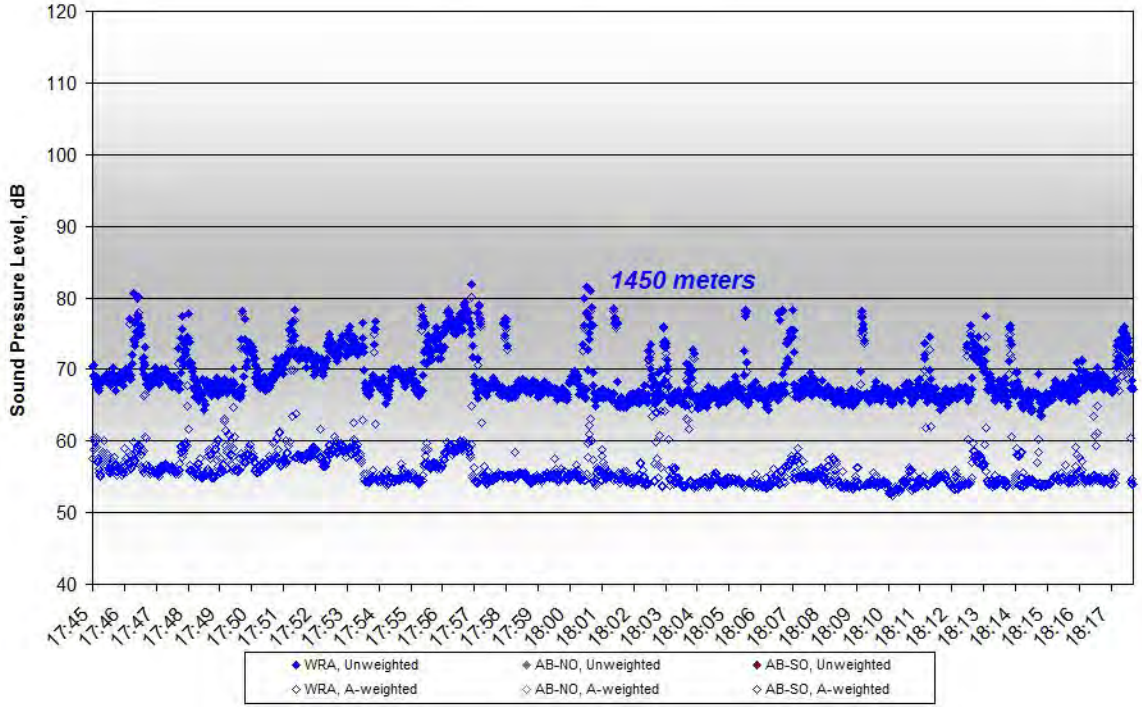

Figure C176. One-second Unweighted and A-weighted Leq Level Data at EHW10, Batter, 17:47-18:14, on October 12, 2011

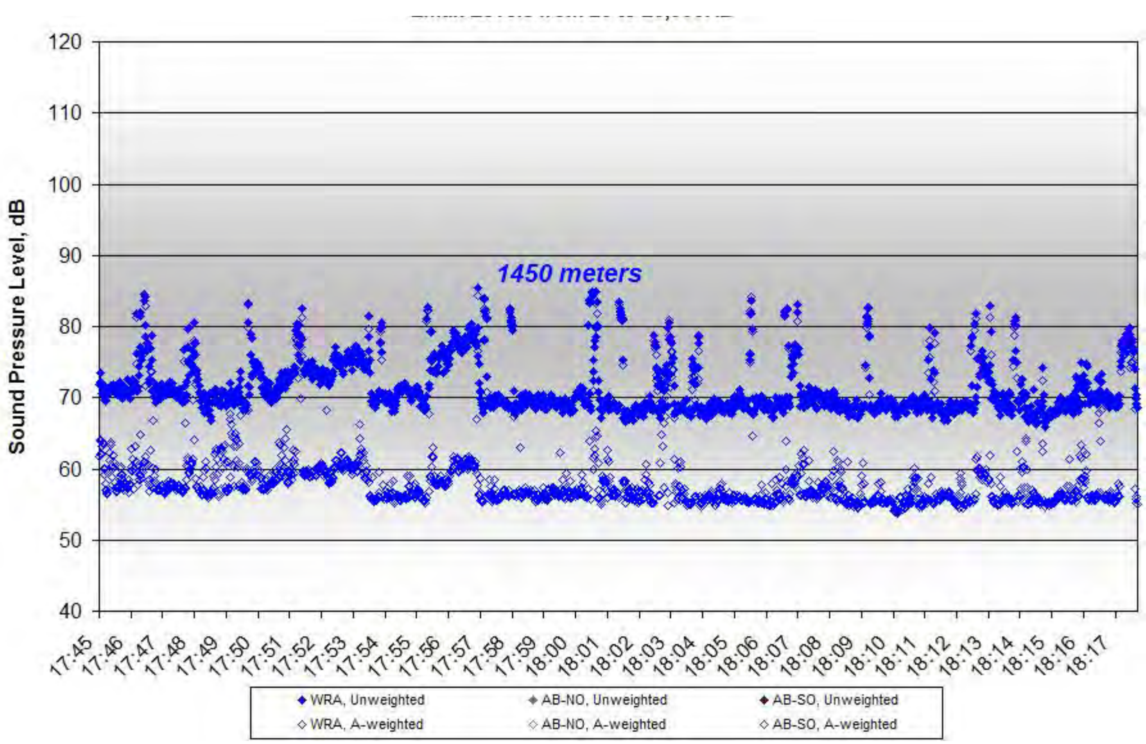

Figure C177. One-second Unweighted and A-weighted Lmax Level Data at EHW10, Batter, 17:47-18:14, on October 12, 2011

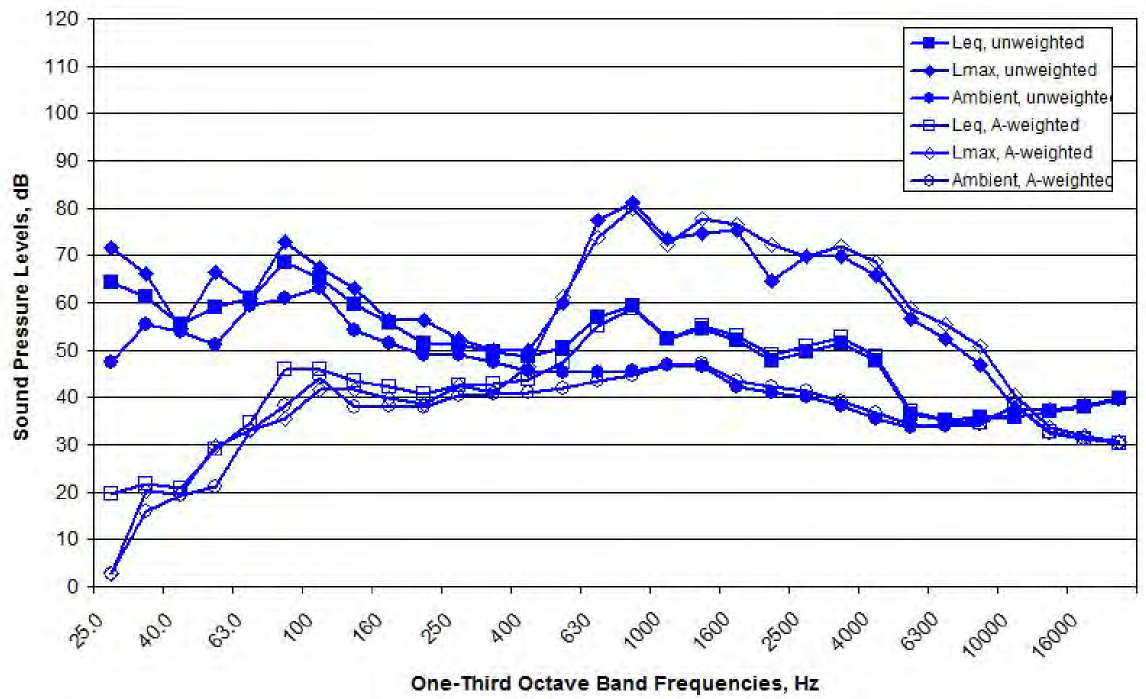

Figure C178. Average One-second Unweighted and A-weighted Spectral Data Measured at the WRA Location during Pile #21, Batter, 17:37-17:49, on October 12, 2011

NO DATA AVAILABLE

Figure C179. Average One-second Unweighted and A-weighted Spectral Data Measured at the AB-NO Location during EHW10, Batter, 17:47-18:14, on October 12, 2011

NO DATA AVAILABLE

Figure C180. Average One- second Unweighted and A-weighted Spectral Data Measured at the AB-SO Location during EHW10, Batter, 17:47-18:14, on October 12, 2011

10/13/2011 – EHW10, Batter, 9:57-10:06

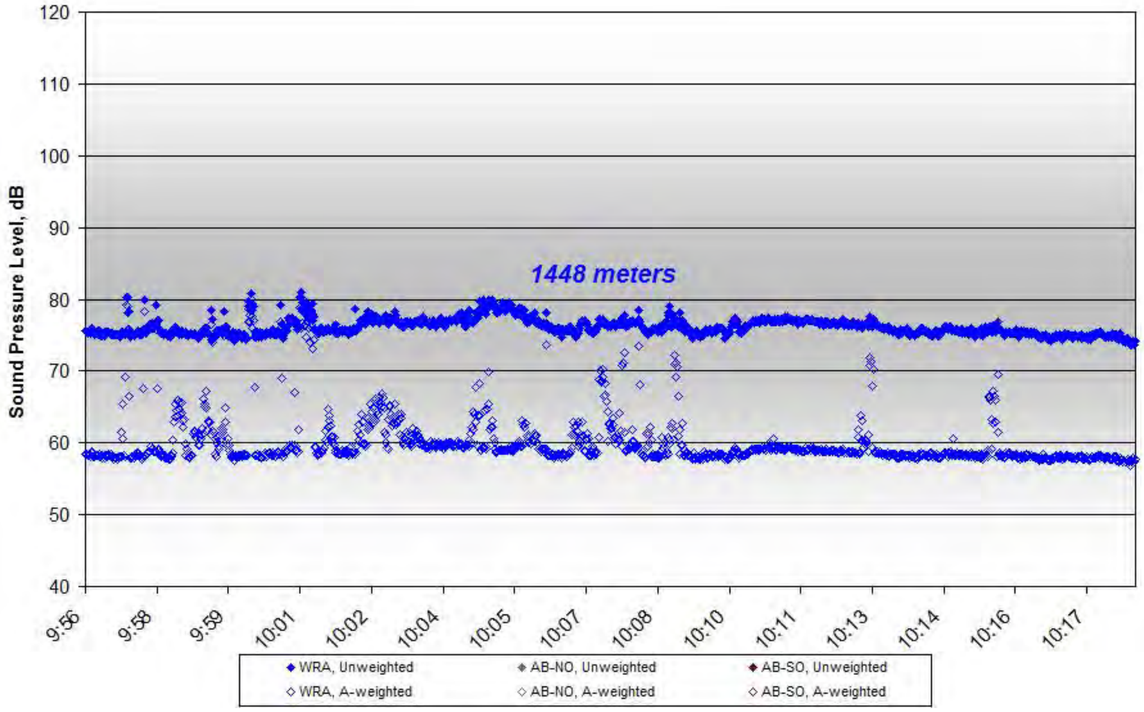

Figure C181. One-second Unweighted and A-weighted Leq Level Data at EHW10, Batter, 9:57-10:06, on October 13, 2011

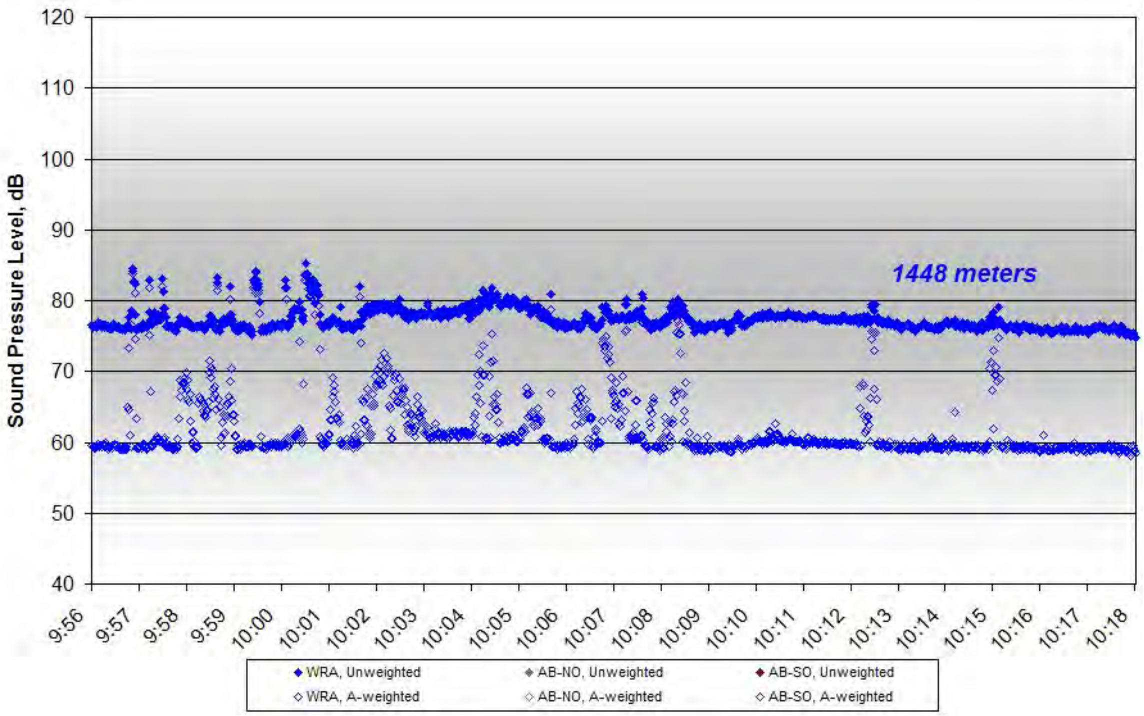

Figure C182. One-second Unweighted and A-weighted Lmax Level Data at EHW10, Batter, 9:57-10:06, on October 13, 2011

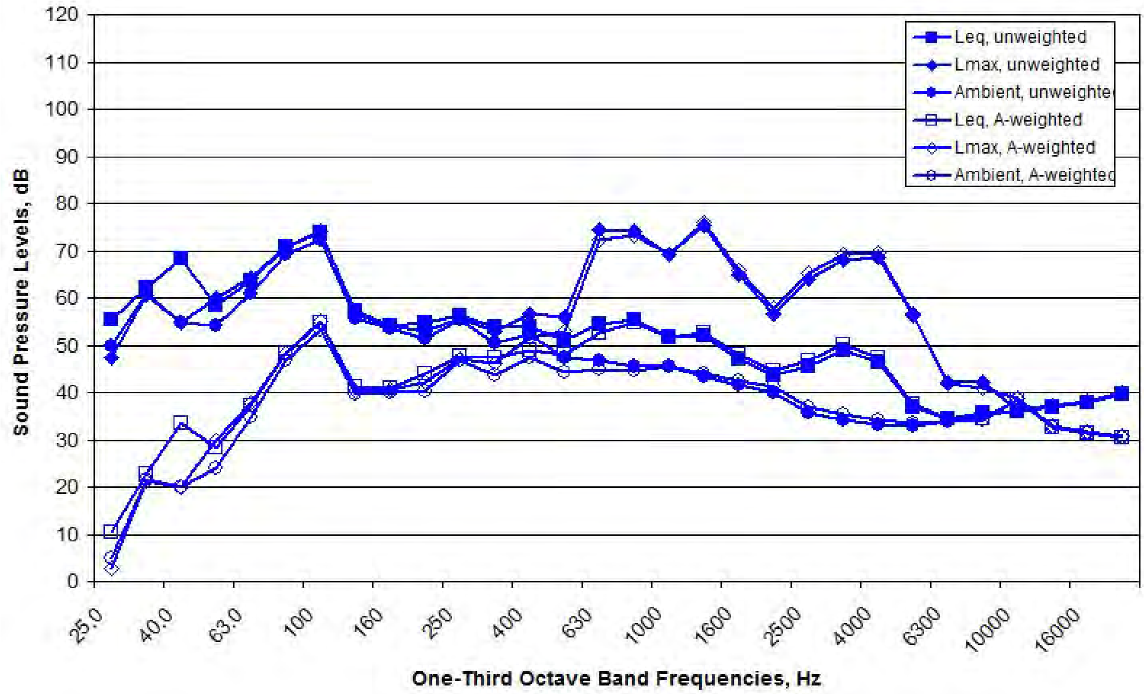

Figure C183. Average One-second Unweighted and A-weighted Spectral Data Measured at the WRA Location during EHW10, Batter, 9:57-10:06, on October 13, 2011

NO DATA AVAILABLE

Figure C184. Average One-second Unweighted and A-weighted Spectral Data Measured at the AB-NO Location during EHW10, Batter, 9:57-10:06, on October 13, 2011

NO DATA AVAILABLE

Figure C185. Average One- second Unweighted and A-weighted Spectral Data Measured at the AB-SO Location during EHW10, Batter, 9:57-10:06, on October 13, 2011

EHW10, Batter, 10:32-10:45

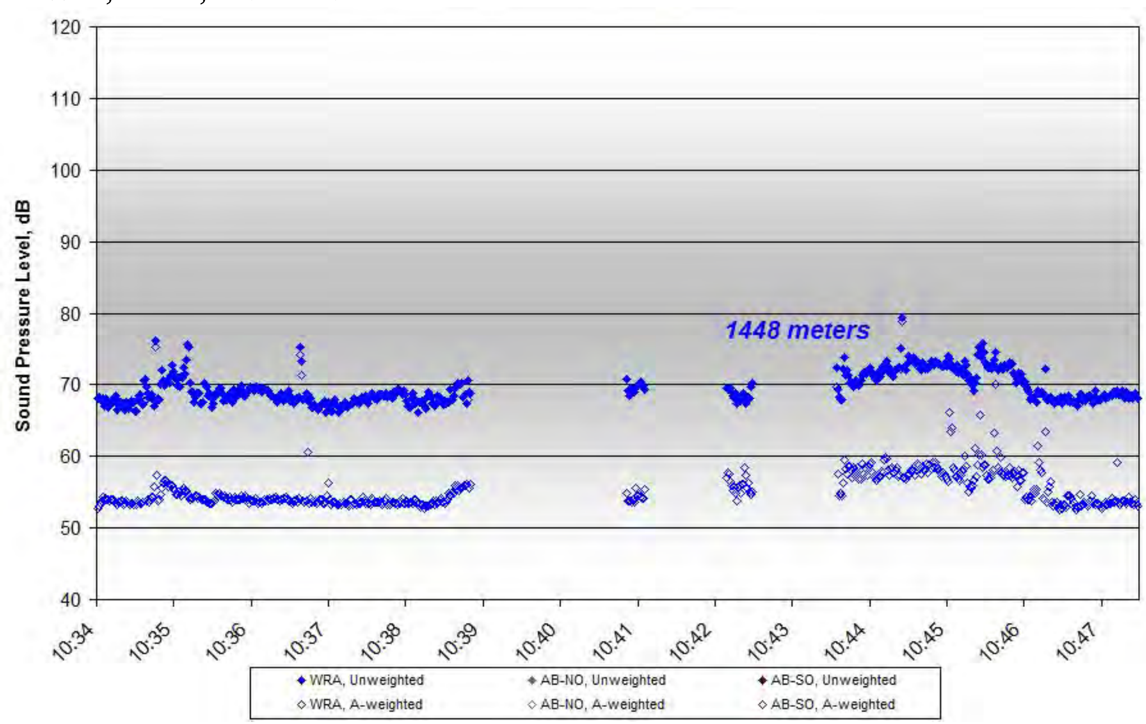

Figure C186. One-second Unweighted and A-weighted Leq Level Data at EHW10, Batter, 10:32-10:45, on October 13, 2011

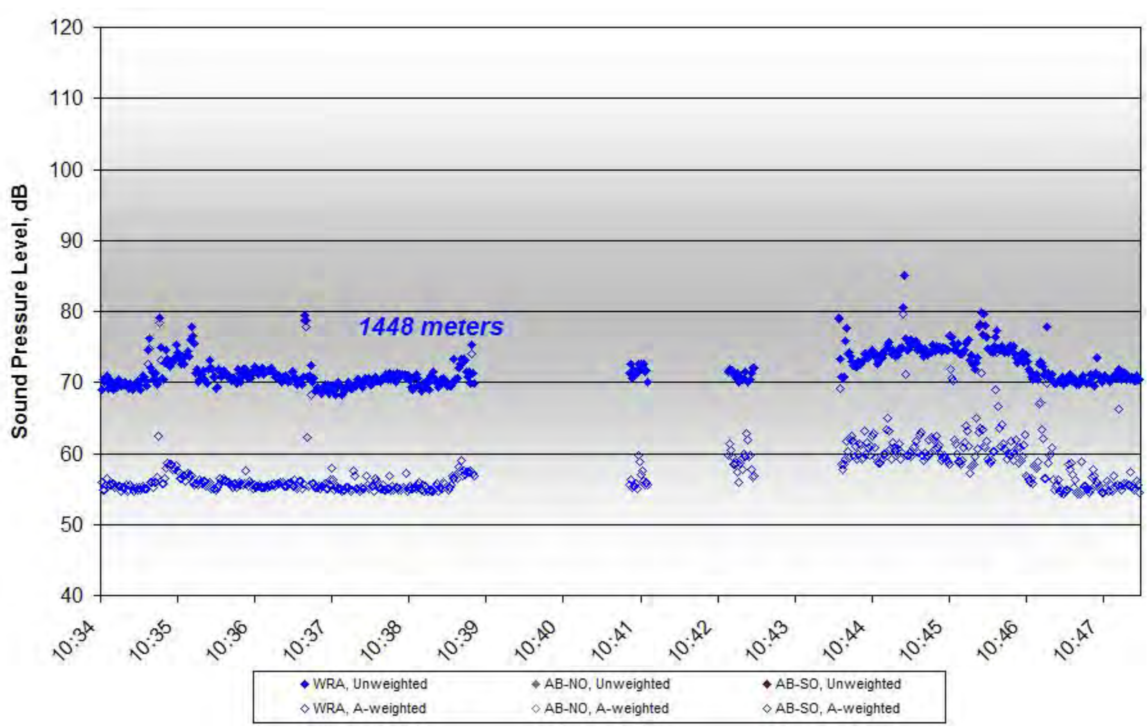

Figure C187. One-second Unweighted and A-weighted Lmax Level Data at EHW10, Batter, 10:32-10:45, on October 13, 2011

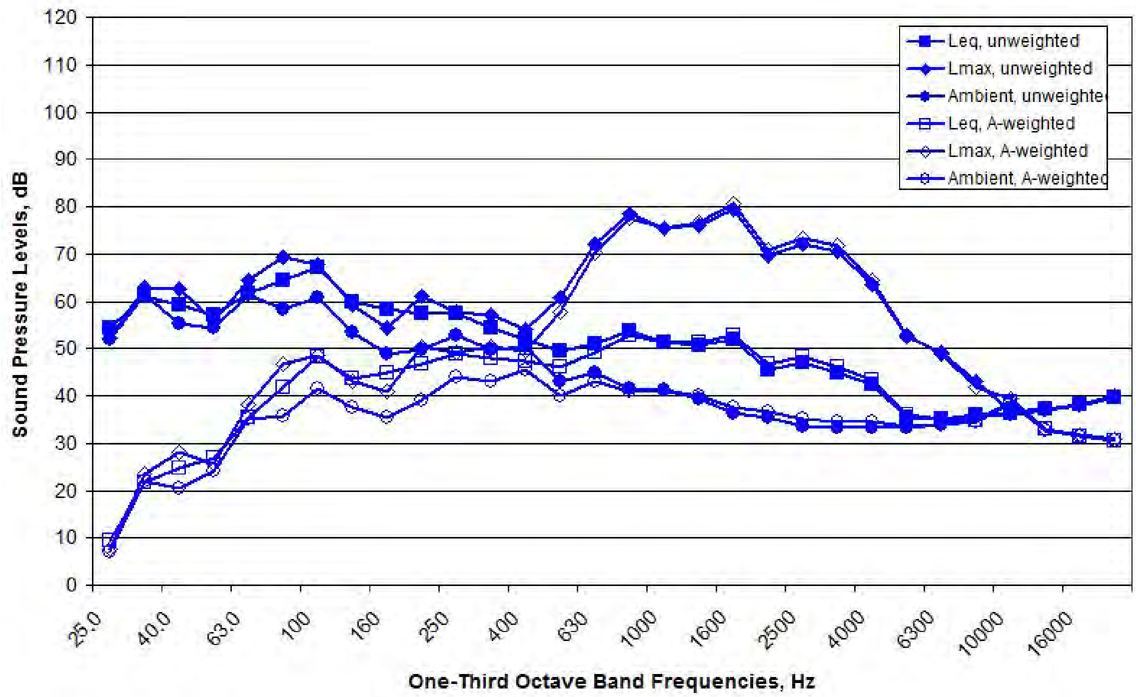

Figure C188. Average One-second Unweighted and A-weighted Spectral Data Measured at the WRA Location during EHW10, Batter, 10:32-10:45, on October 13, 2011

NO DATA AVAILABLE

Figure C189. Average One-second Unweighted and A-weighted Spectral Data Measured at the AB-NO Location during EHW10, Batter, 10:32-10:45, on October 13, 2011

NO DATA AVAILABLE

Figure C190. Average One- second Unweighted and A-weighted Spectral Data Measured at the AB-SO Location during EHW10, Batter, 10:32-10:45, on October 13, 2011

EHW7, Plumb, 13:01-13:07

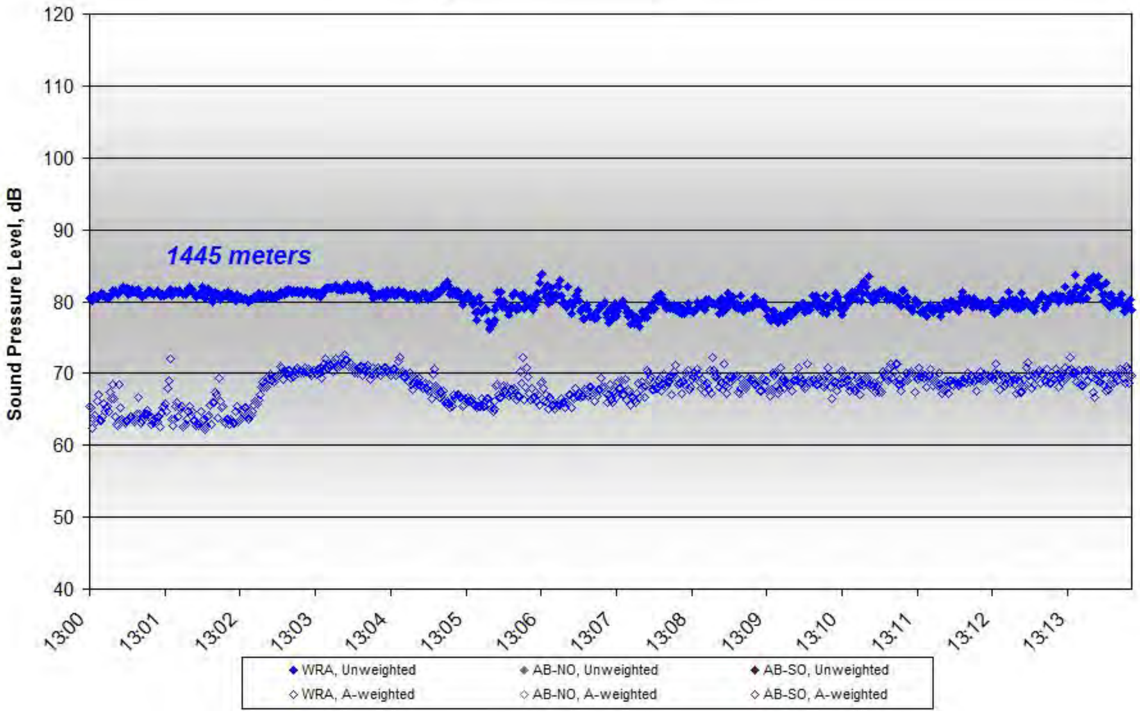

Figure C191. One-second Unweighted and A-weighted Leq Level Data at EHW7, Plumb, 13:01-13:07, on October 13, 2011

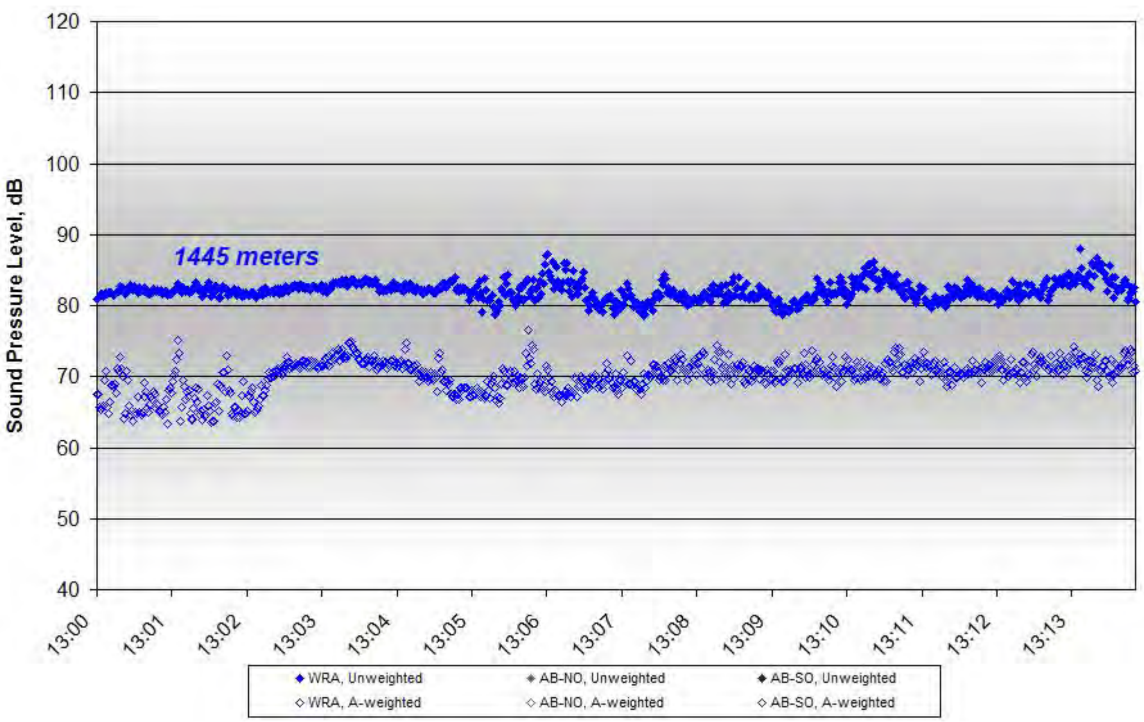

Figure C192. One-second Unweighted and A-weighted Lmax Level Data at EHW7, Plumb, 13:01-13:07, on October 13, 2011

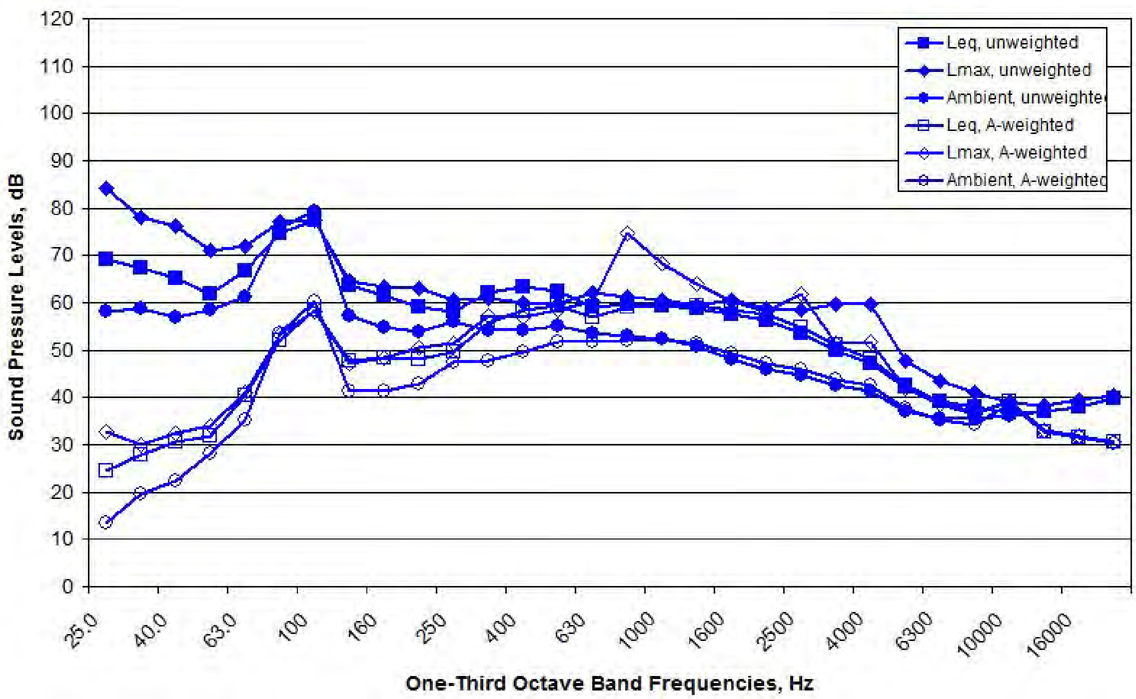

Figure C193. Average One-second Unweighted and A-weighted Spectral Data Measured at the WRA Location during EHW7, Plumb, 13:01-13:07, on October 13, 2011

NO DATA AVAILABLE

Figure C194. Average One-second Unweighted and A-weighted Spectral Data Measured at the AB-NO Location during EHW7, Plumb, 13:01-13:07, on October 13, 2011

NO DATA AVAILABLE

Figure C195. Average One- second Unweighted and A-weighted Spectral Data Measured at the AB-SO Location during EHW7, Plumb, 13:01-13:07, on October 13, 2011

EHW7, Plumb, 13:21-13:46

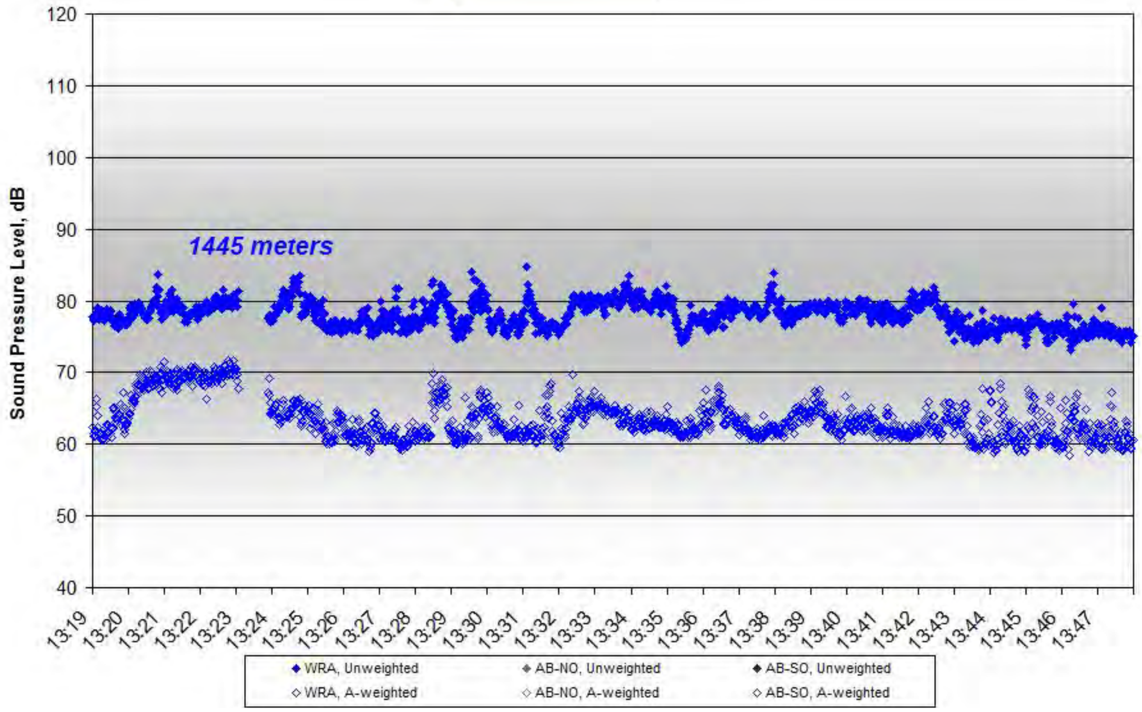

Figure C196. One-second Unweighted and A-weighted Leq Level Data at EHW7, Plumb, 13:21-13:46, on October 13, 2011

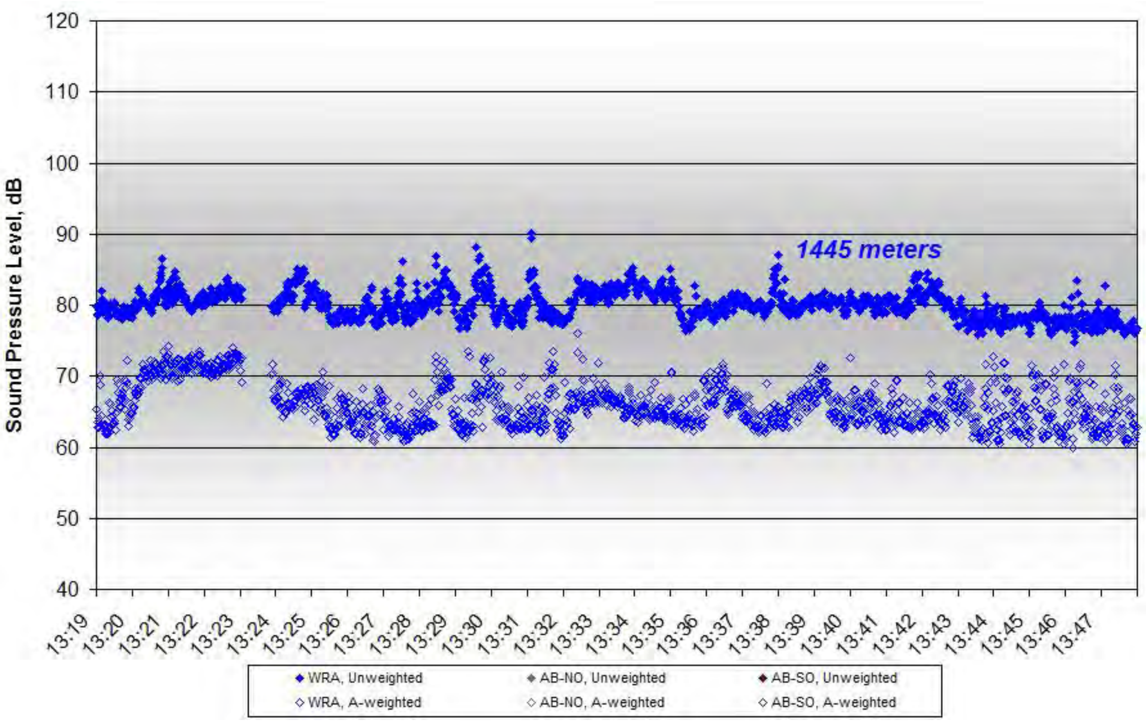

Figure C197. One-second Unweighted and A-weighted Lmax Level Data at EHW7, Plumb, 13:21-13:46, on October 13, 2011

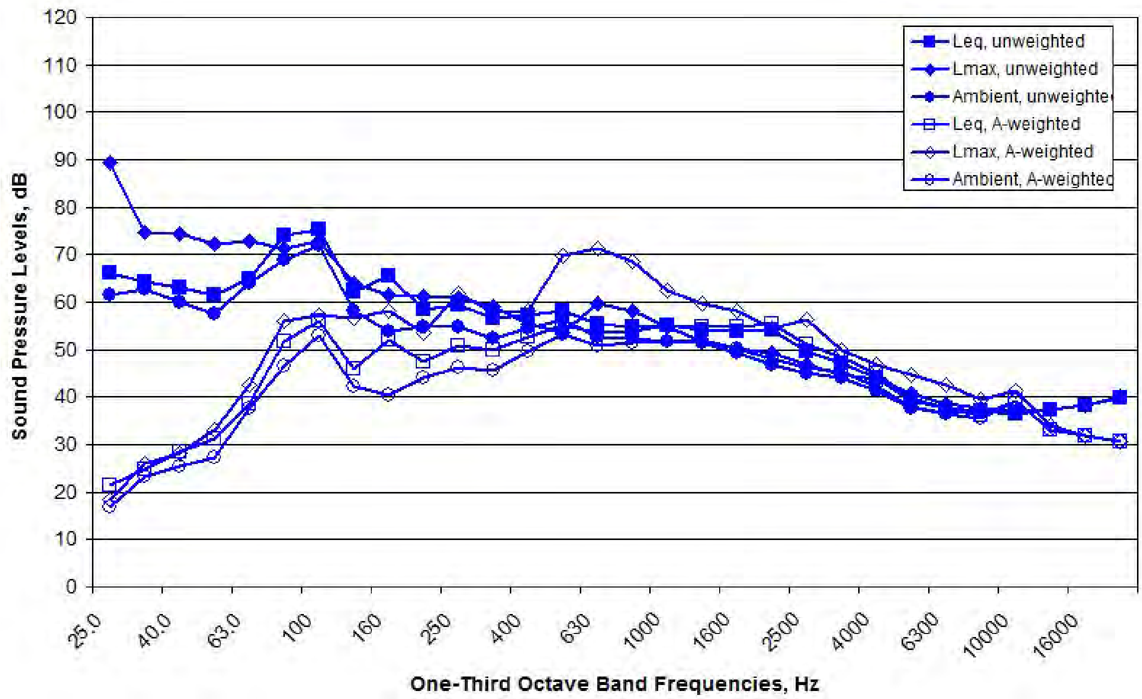

Figure C198. Average One-second Unweighted and A-weighted Spectral Data Measured at the WRA Location during EHW7, Plumb, 13:21-13:46, on October 13, 2011

NO DATA AVAILABLE

Figure C199. Average One-second Unweighted and A-weighted Spectral Data Measured at the AB-NO Location during EHW7, Plumb, 13:21-13:46, on October 13, 2011

NO DATA AVAILABLE

Figure C200. Average One- second Unweighted and A-weighted Spectral Data Measured at the AB-SO Location during EHW7, Plumb, 13:21-13:46, on October 13, 2011

EHW5

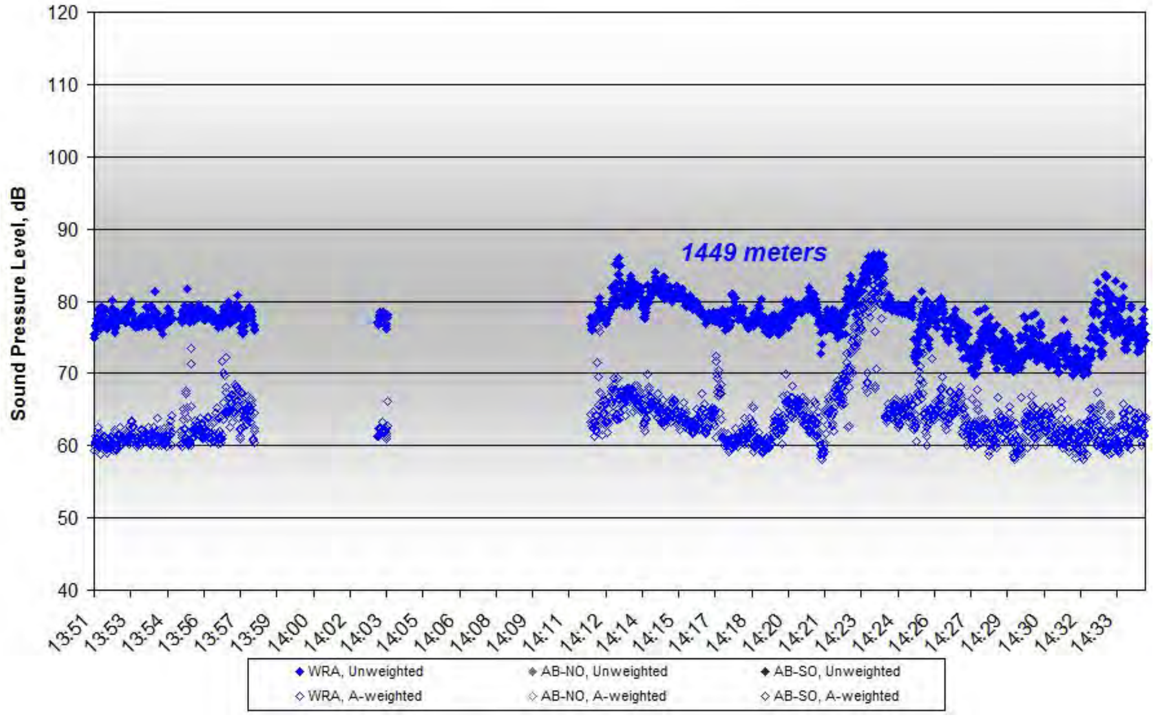

Figure C201. One-second Unweighted and A-weighted Leq Level Data at EHW5, 13:55-14:34, on October 13, 2011

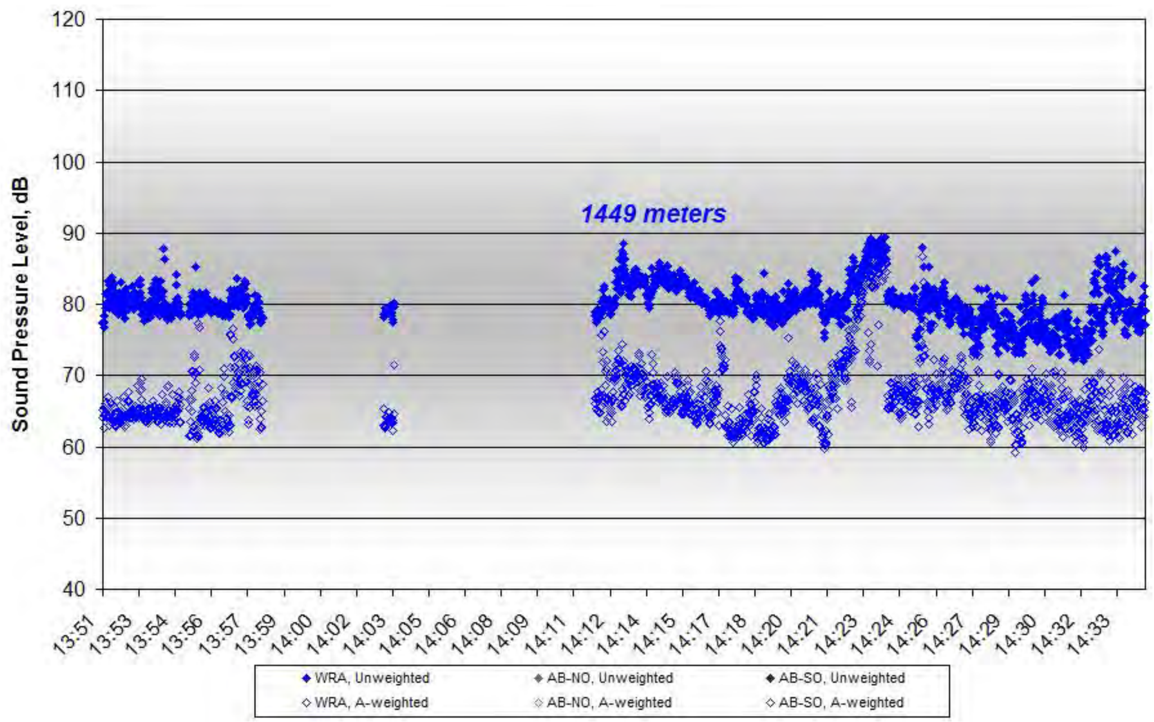

Figure C202. One-second Unweighted and A-weighted Lmax Level Data at EHW5, 13:55-14:34, on October 13, 2011

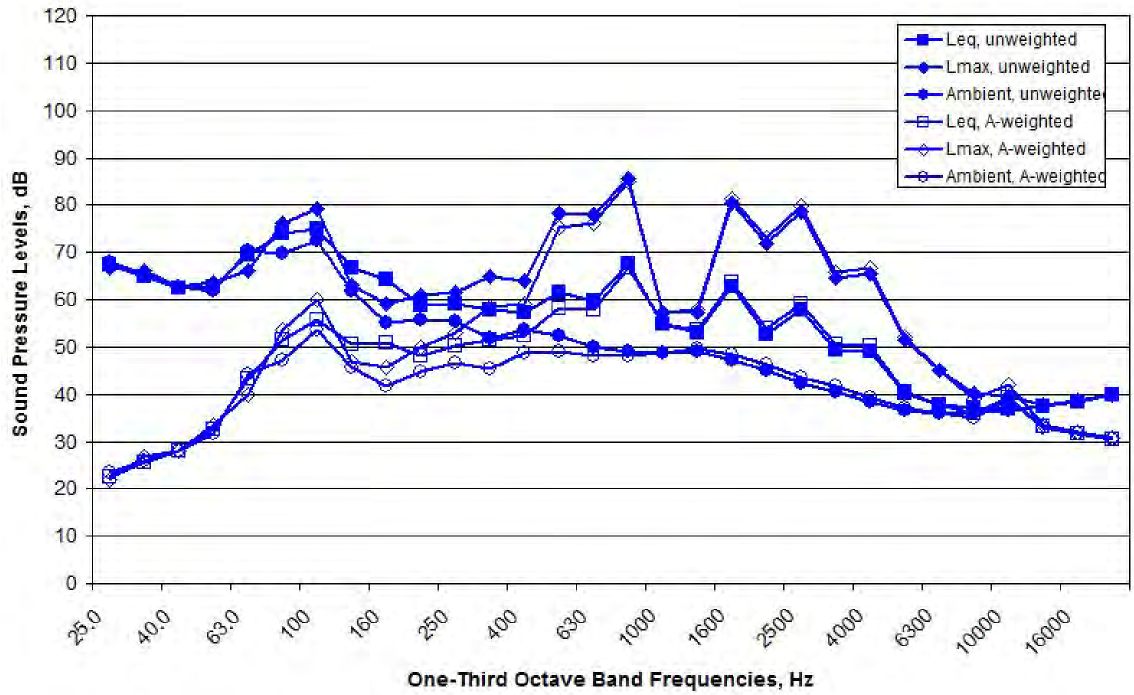

Figure C203. Average One-second Unweighted and A-weighted Spectral Data Measured at the WRA Location during EHW5, 13:55-14:34, on October 13, 2011

NO DATA AVAILABLE

Figure C204. Average One-second Unweighted and A-weighted Spectral Data Measured at the AB-NO Location during EHW5, 13:55-14:34, on October 13, 2011

NO DATA AVAILABLE

Figure C205. Average One- second Unweighted and A-weighted Spectral Data Measured at the AB-SO Location during EHW5, 13:55-14:34, on October 13, 2011

10/14/2011 – EHW6, Plumb

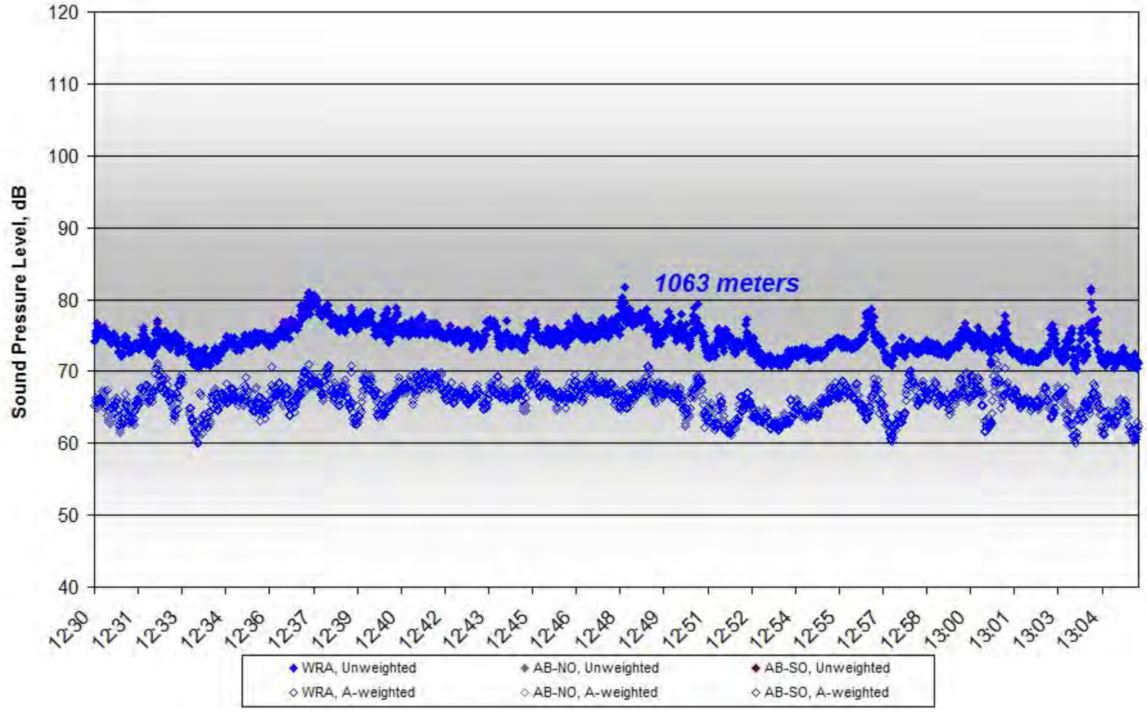

Figure C206. One-second Unweighted and A-weighted Leq Level Data at EHW6, Plumb, 12:32-13:05, on October 14, 2011

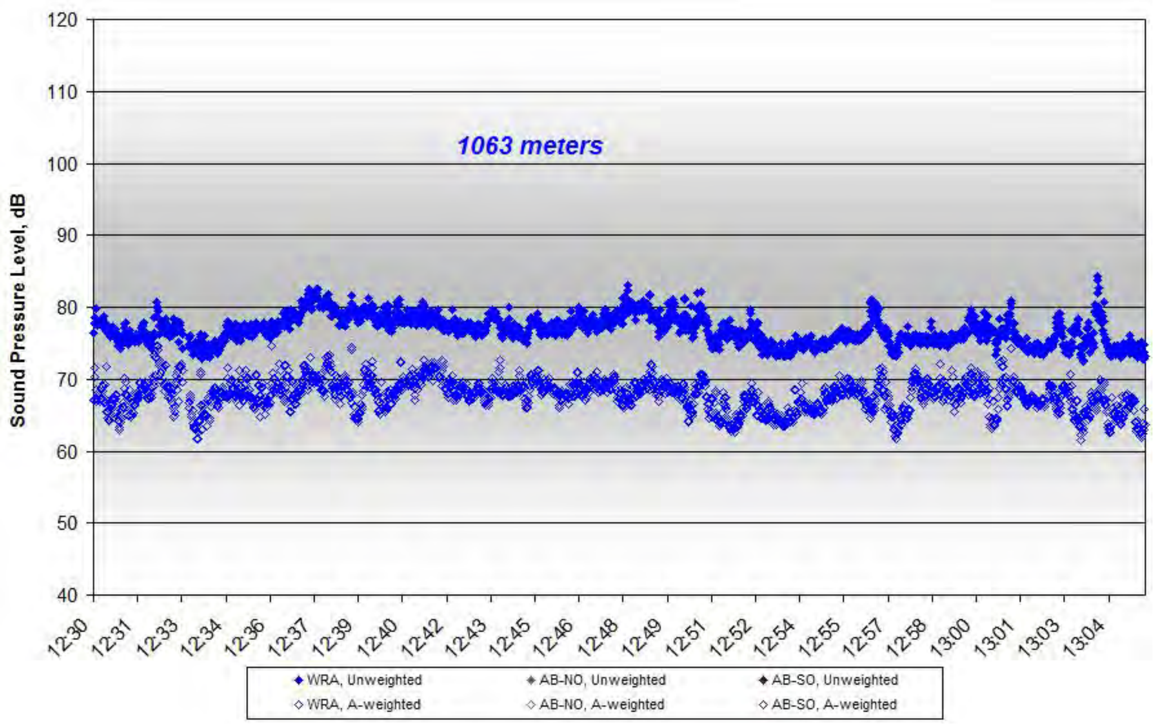

Figure C207. One-second Unweighted and A-weighted Lmax Level Data at EHW6, Plumb, 12:32-13:05, on October 14, 2011

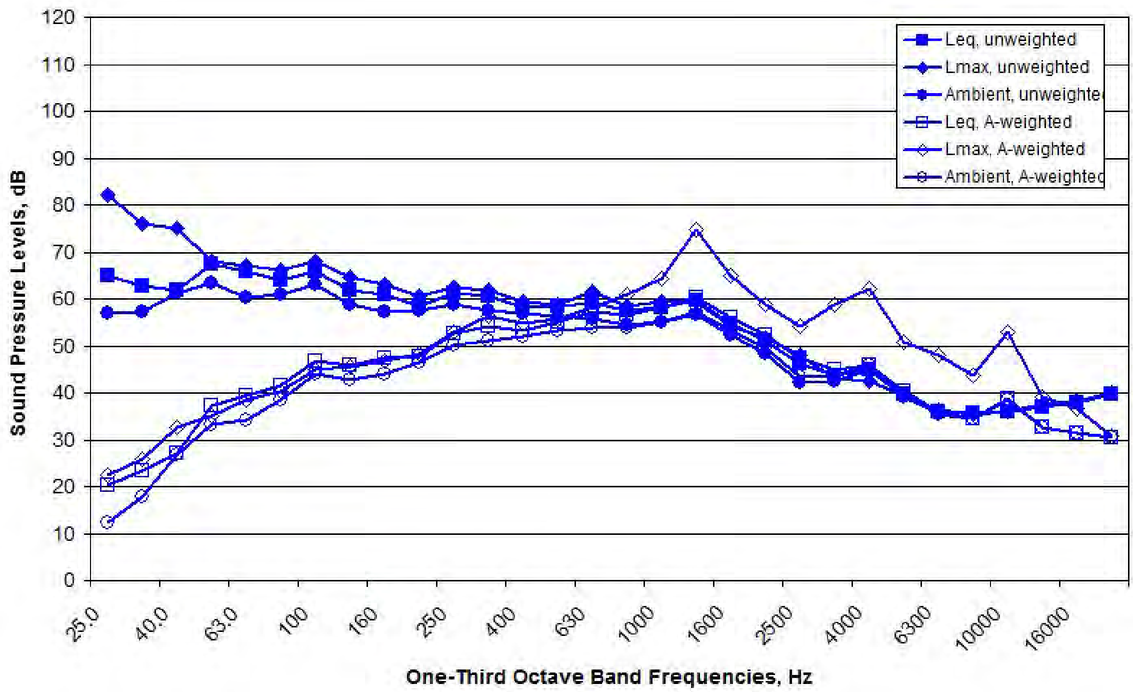

Figure C208. Average One-second Unweighted and A-weighted Spectral Data Measured at the WRA Location during EHW6, Plumb, 12:32-13:05, on October 14, 2011

NO DATA AVAILABLE

Figure C209. Average One-second Unweighted and A-weighted Spectral Data Measured at the AB-NO Location during EHW6, Plumb, 12:32-13:05, on October 14, 2011

NO DATA AVAILABLE

Figure C210. Average One- second Unweighted and A-weighted Spectral Data Measured at the AB-SO Location during EHW6, Plumb, 12:32-13:05, on October 14, 2011

EHW5

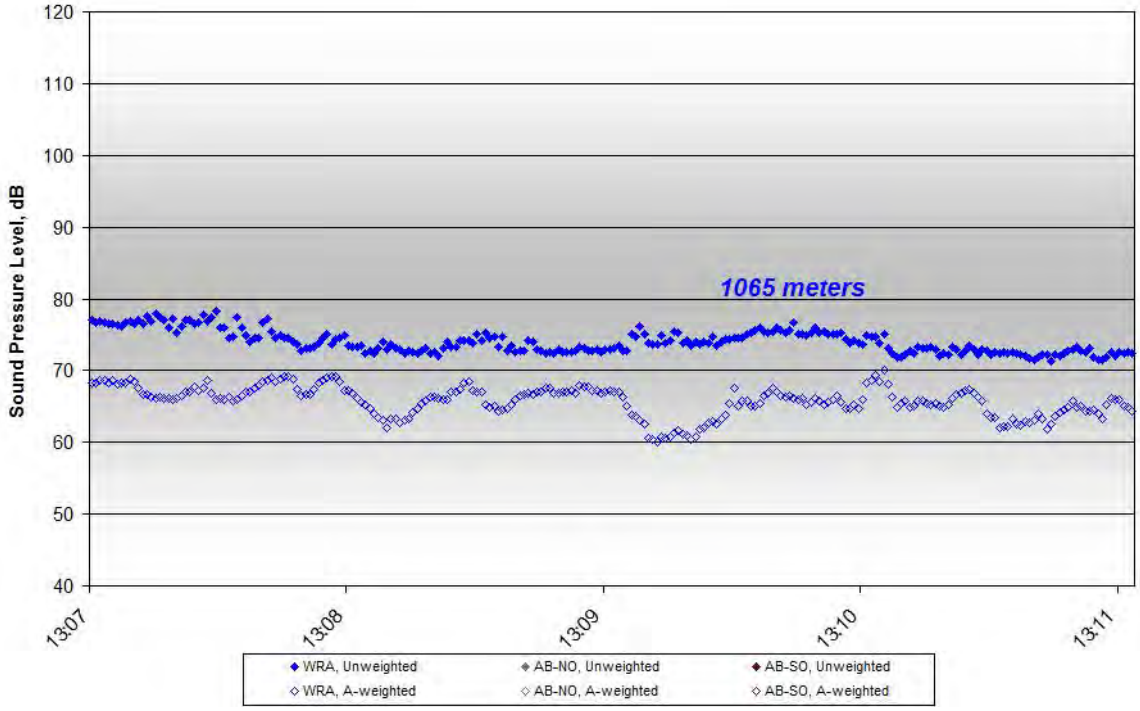

Figure C211. One-second Unweighted and A-weighted Leq Level Data at EHW5, 13:07-13:10, on October 14, 2011

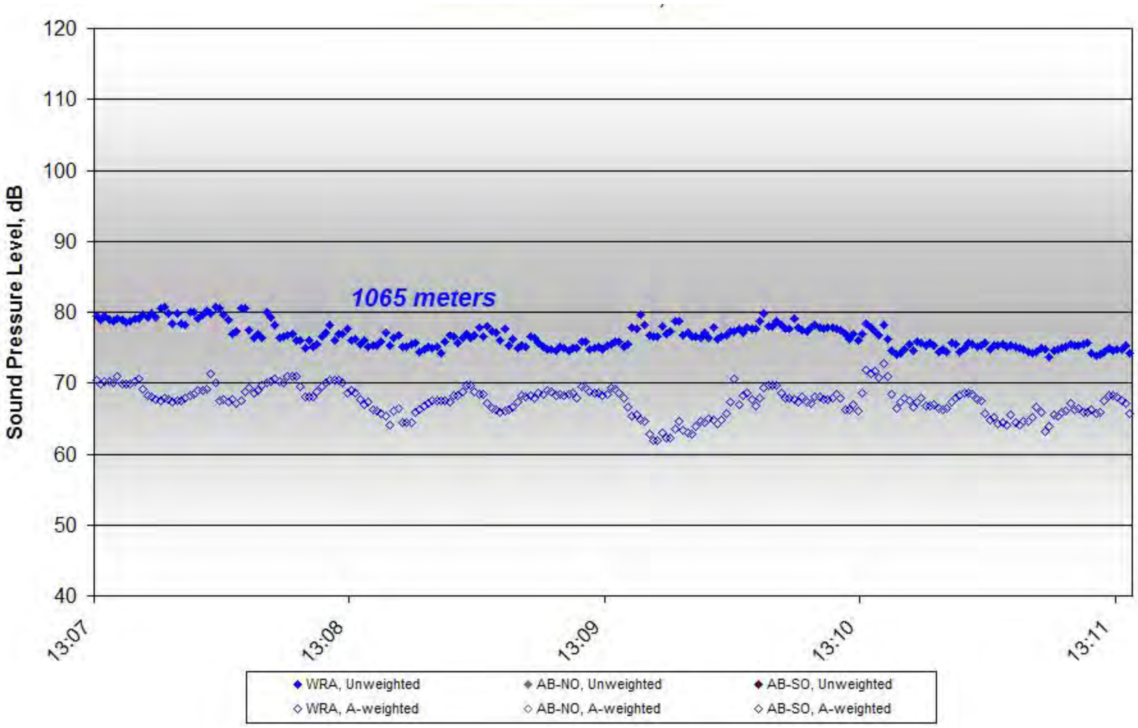

Figure C212. One-second Unweighted and A-weighted Lmax Level Data at EHW5, 13:07-13:10, on October 14, 2011

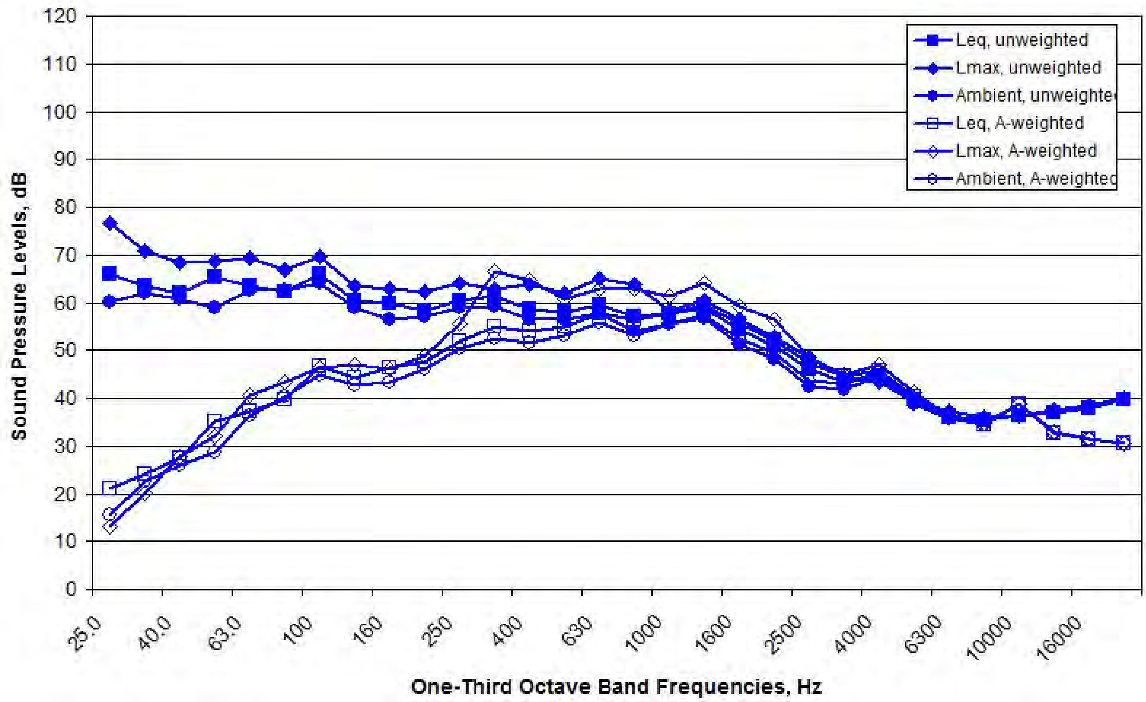

Figure C213. Average One-second Unweighted and A-weighted Spectral Data Measured at the WRA Location during EHW5, 13:07-13:10, on October 14, 2011

NO DATA AVAILABLE

Figure C214. Average One-second Unweighted and A-weighted Spectral Data Measured at the AB-NO Location during EHW5, 13:07-13:10, on October 14, 2011

NO DATA AVAILABLE

Figure C215. Average One- second Unweighted and A-weighted Spectral Data Measured at the AB-SO Location during EHW5, 13:07-13:10, on October 14, 2011

EHW4

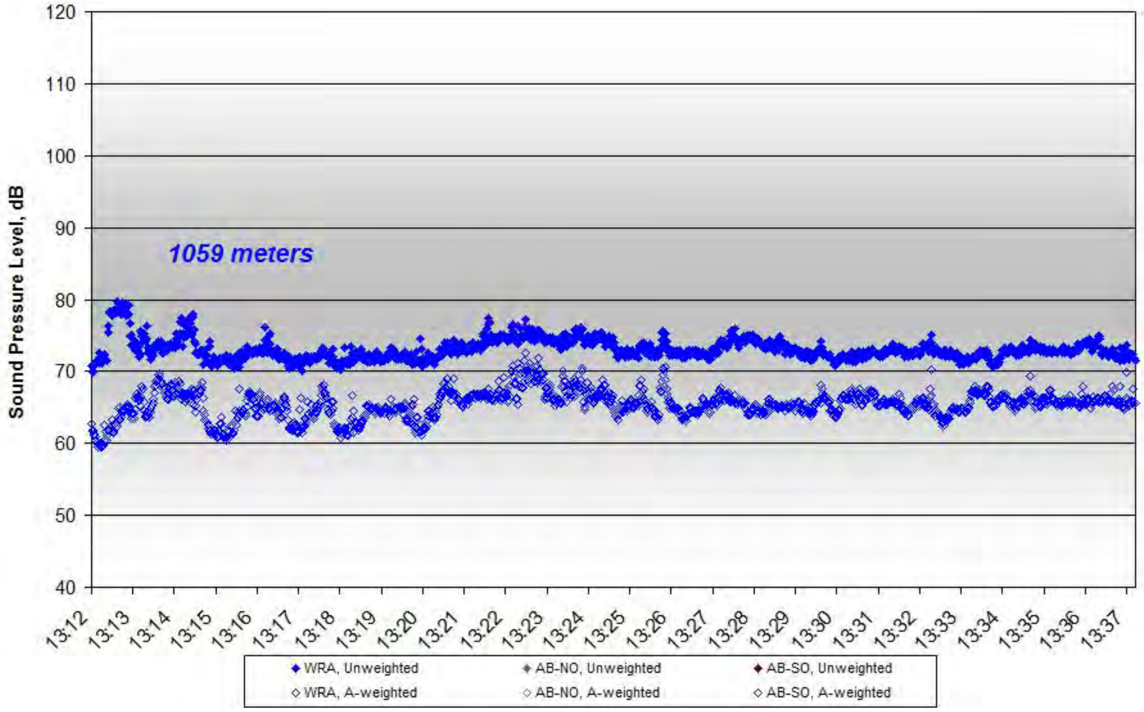

Figure C216. One-second Unweighted and A-weighted Leq Level Data at EHW4, 13:16-13:34, on October 14, 2011

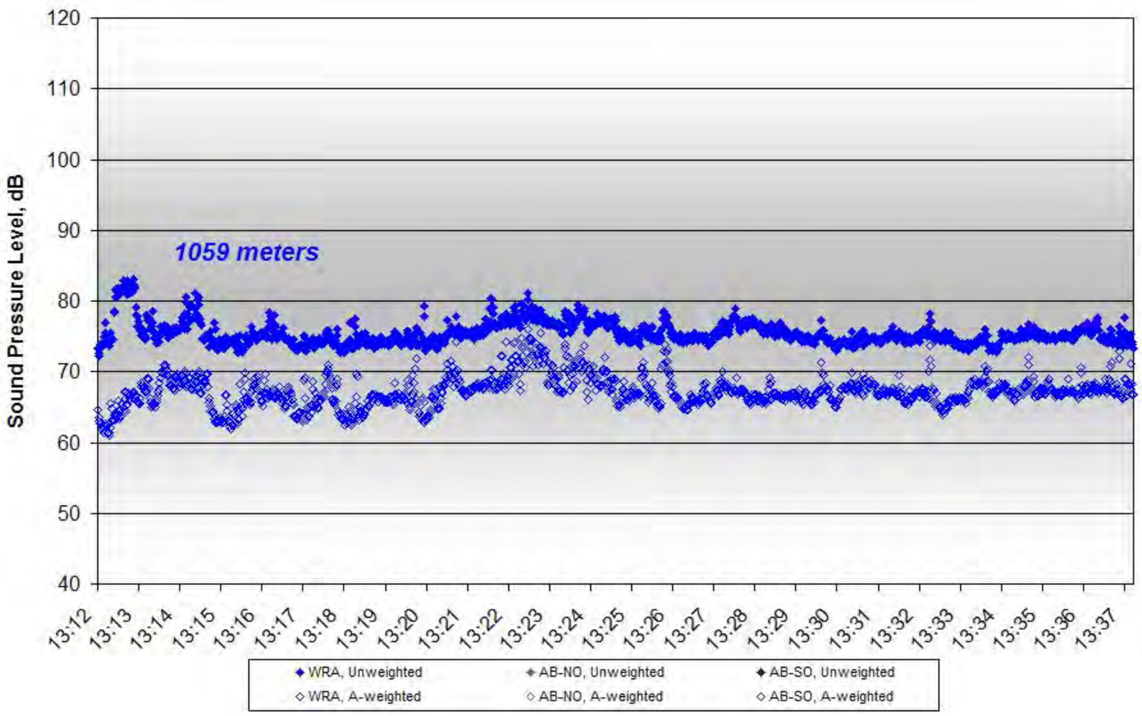

Figure C217. One-second Unweighted and A-weighted Lmax Level Data at EHW4, 13:16-13:34, on October 14, 2011

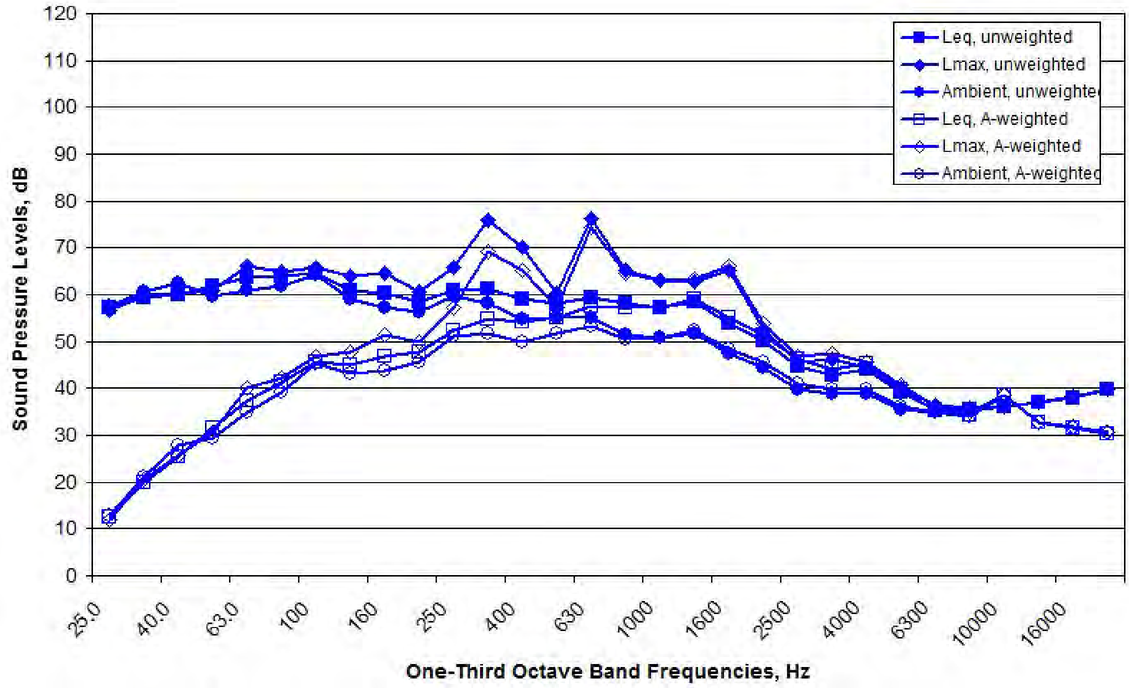

Figure C218. Average One-second Unweighted and A-weighted Spectral Data Measured at the WRA Location during EHW4, 13:16-13:34, on October 14, 2011

NO DATA AVAILABLE

Figure C219. Average One-second Unweighted and A-weighted Spectral Data Measured at the AB-NO Location during EHW4, 13:16-13:34, on October 14, 2011

NO DATA AVAILABLE

Figure C220. Average One- second Unweighted and A-weighted Spectral Data Measured at the AB-SO Location during EHW4, 13:16-13:34, on October 14, 2011

EHW3, 13:42-13:47

NO DATA AVAILABLE

Figure C221. One-second Unweighted and A-weighted Leq Level Data at EHW3, 13:42-13:47, on October 14, 2011

NO DATA AVAILABLE

Figure C222. One-second Unweighted and A-weighted Lmax Level Data at EHW3, 13:42-13:47, on October 14, 2011

NO DATA AVAILABLE

Figure C223. Average One-second Unweighted and A-weighted Spectral Data Measured at the WRA Location during EHW3, 13:42-13:47, on October 14, 2011

NO DATA AVAILABLE

Figure C224. Average One-second Unweighted and A-weighted Spectral Data Measured at the AB-NO Location during EHW3, 13:42-13:47, on October 14, 2011

NO DATA AVAILABLE

Figure C225. Average One- second Unweighted and A-weighted Spectral Data Measured at the AB-SO Location during EHW3, 13:42-13:47, on October 14, 2011

EHW1, 13:51-13:57

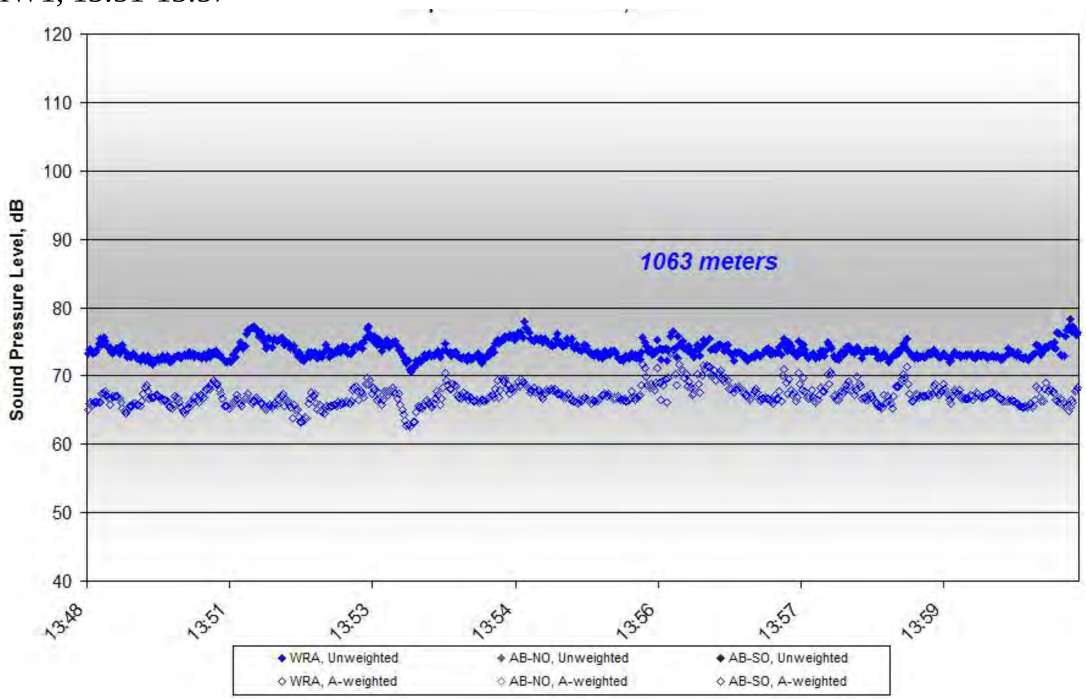

Figure C226. One-second Unweighted and A-weighted Leq Level Data at EHW1, 13:51-13:57, on October 14, 2011

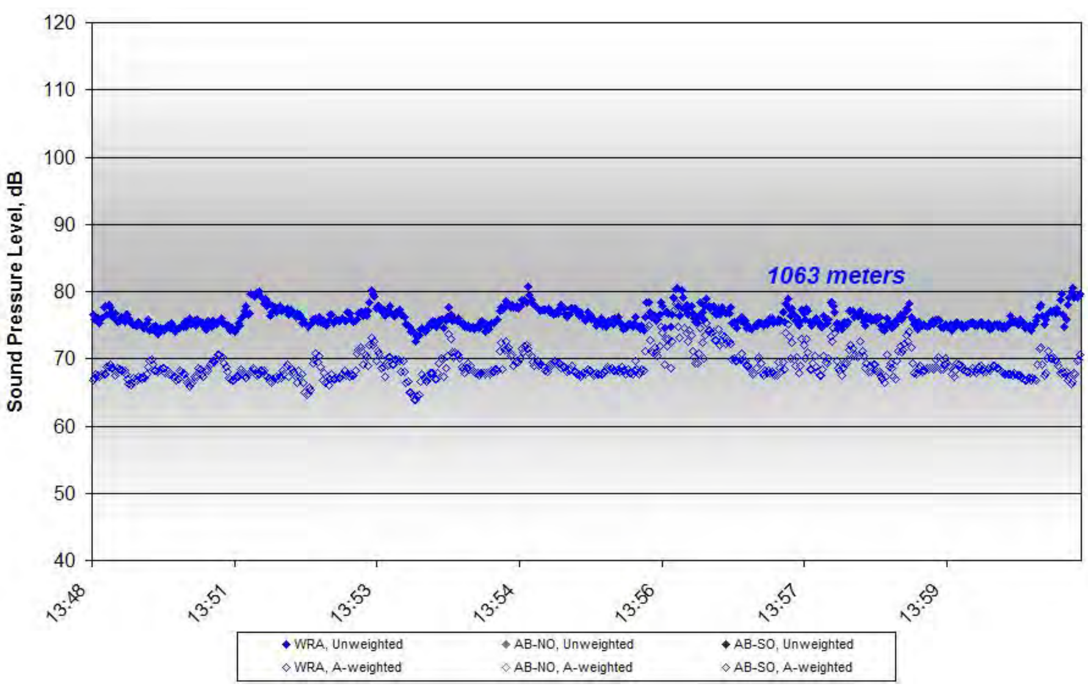

Figure C227. One-second Unweighted and A-weighted Lmax Level Data at EHW1, 13:51-13:57, on October 14, 2011

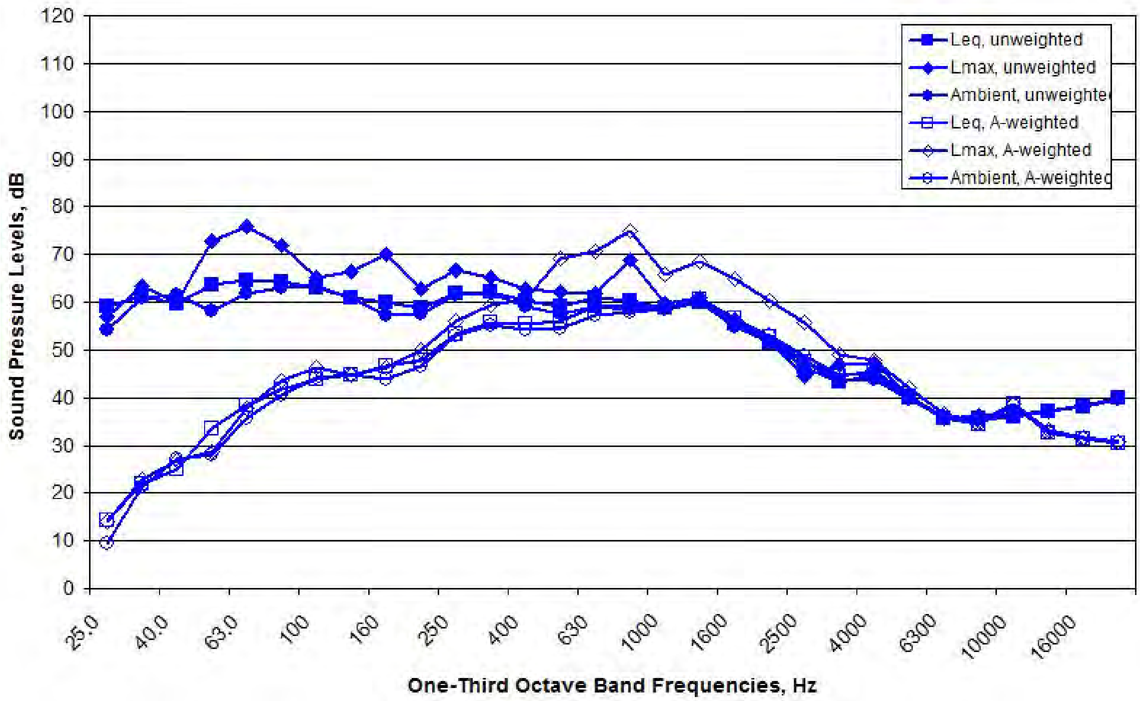

Figure C228. Average One-second Unweighted and A-weighted Spectral Data Measured at the WRA Location during EHW1, 13:51-13:57, on October 14, 2011

NO DATA AVAILABLE

Figure C229. Average One-second Unweighted and A-weighted Spectral Data Measured at the AB-NO Location during EHW1, 13:51-13:57, on October 14, 2011

NO DATA AVAILABLE

Figure C230. Average One- second Unweighted and A-weighted Spectral Data Measured at the AB-SO Location during EHW1, 13:51-13:57, on October 14, 2011

EHW1, 14:21-14:35

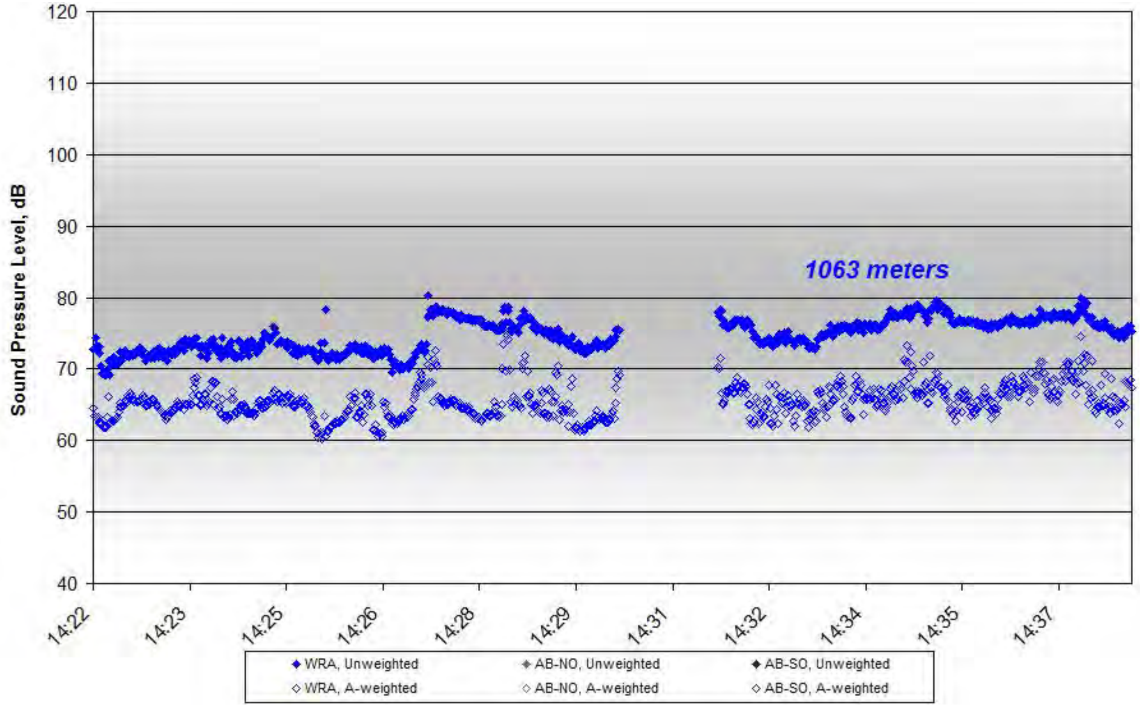

Figure C231. One-second Unweighted and A-weighted Leq Level Data at EHW1, 14:21-14:35, on October 14, 2011

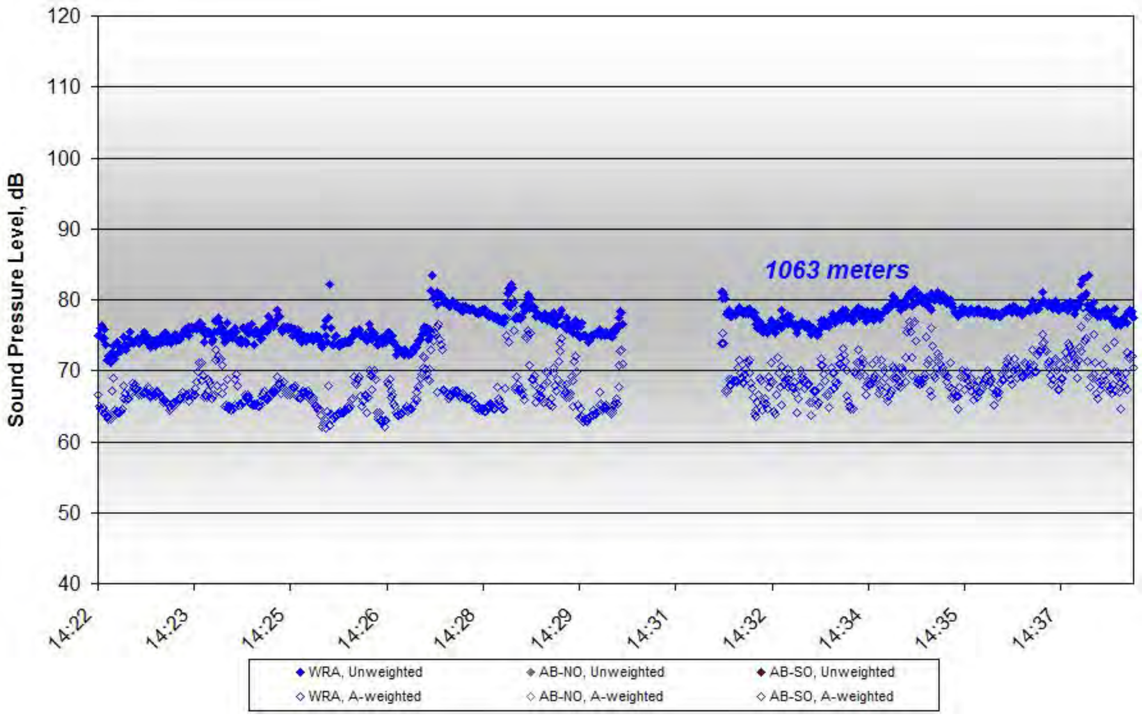

Figure C232. One-second Unweighted and A-weighted Lmax Level Data at EHW1, 14:21-14:35, on October 14, 2011

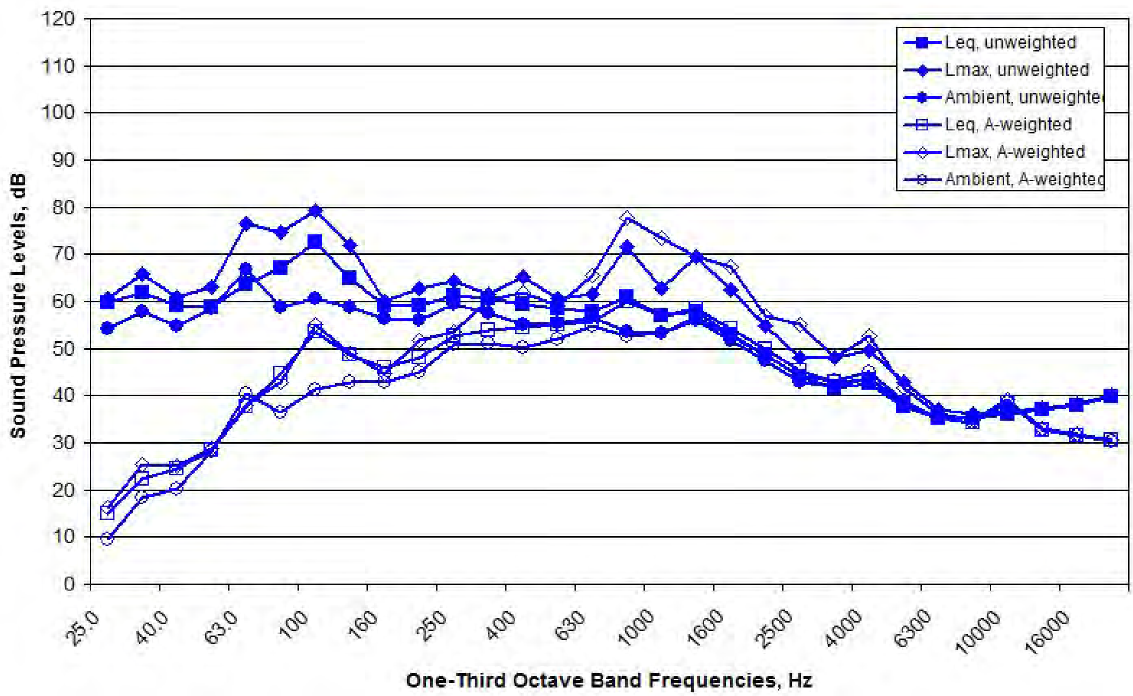

Figure C233. Average One-second Unweighted and A-weighted Spectral Data Measured at the WRA Location during EHW1, 14:21-14:35, on October 14, 2011

NO DATA AVAILABLE

Figure C234. Average One-second Unweighted and A-weighted Spectral Data Measured at the AB-NO Location during EHW1, 14:21-14:35, on October 14, 2011

NO DATA AVAILABLE

Figure C235. Average One- second Unweighted and A-weighted Spectral Data Measured at the AB-SO Location during EHW1, 14:21-14:35, on October 14, 2011

EHW3, 16:46-17:01

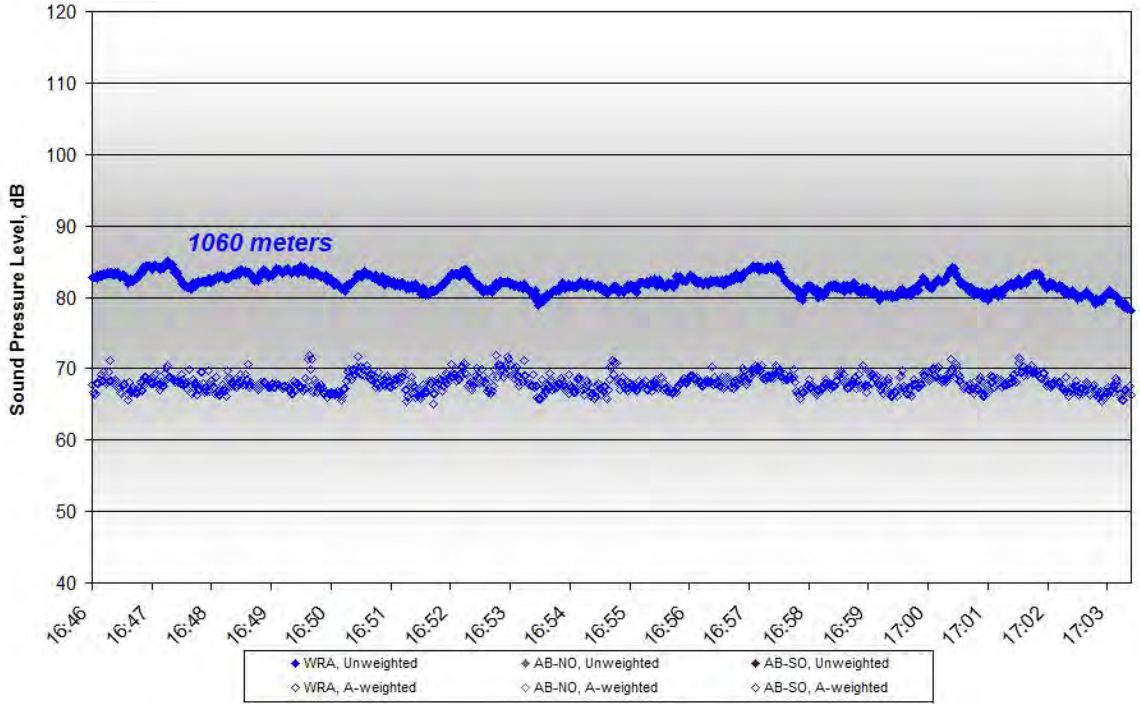

Figure C236. One-second Unweighted and A-weighted Leq Level Data at EHW3, 16:46-17:01, on October 14, 2011

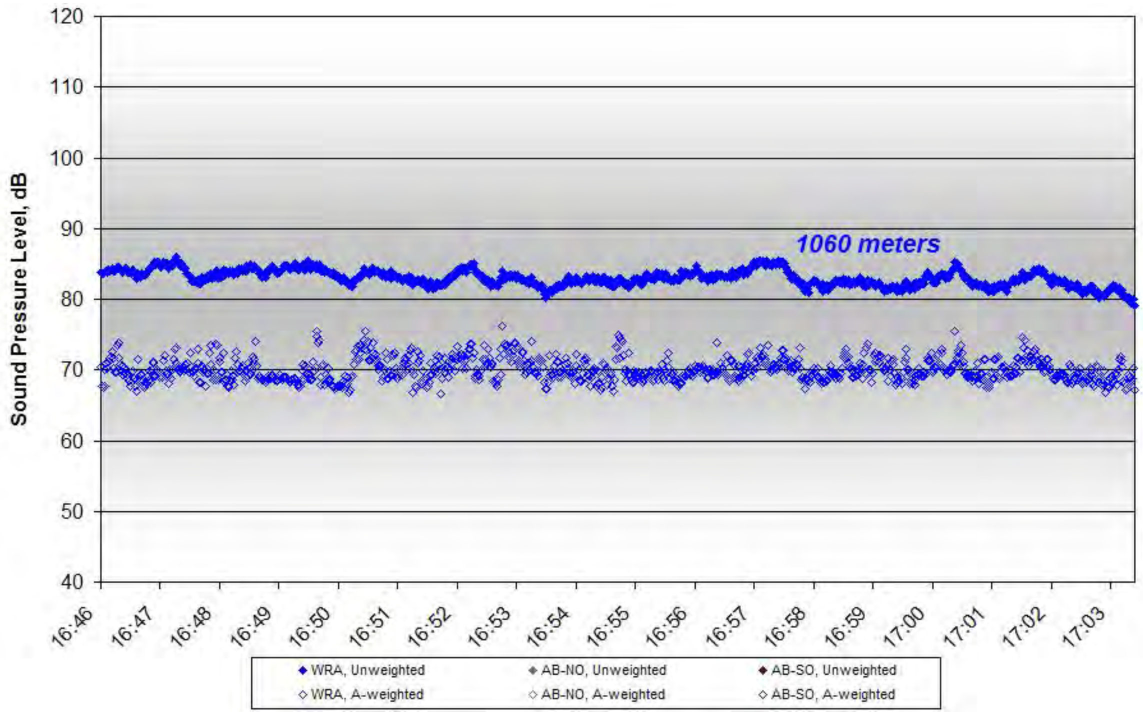

Figure C237. One-second Unweighted and A-weighted Lmax Level Data at EHW3, 16:46-17:01, on October 14, 2011

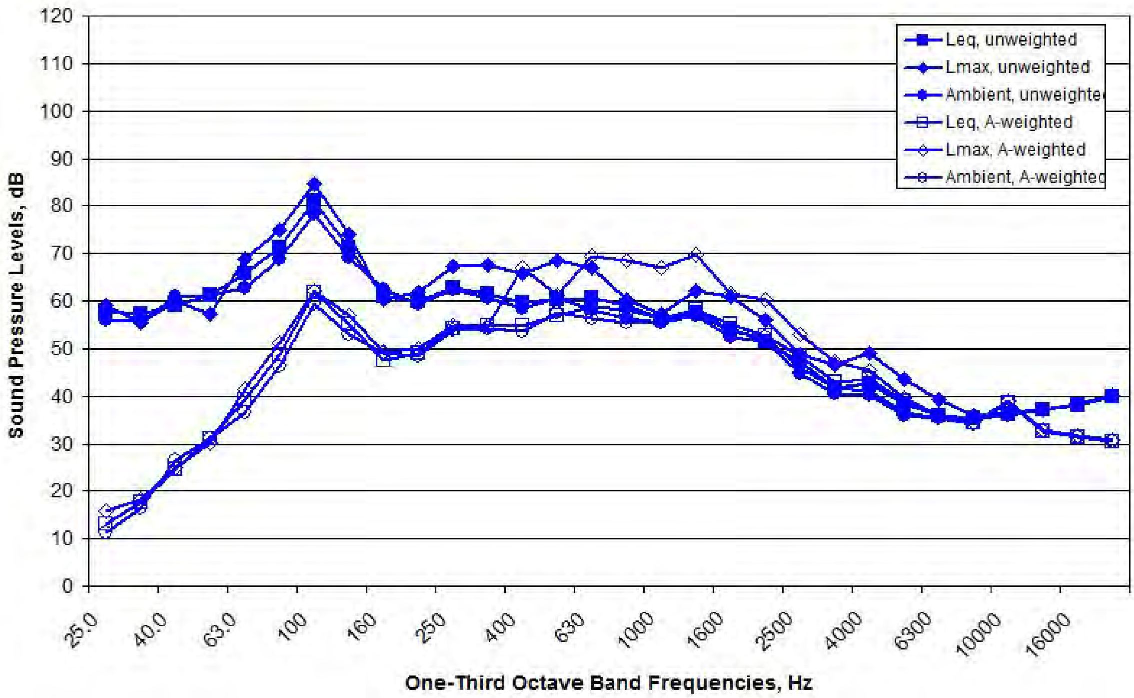

Figure C238. Average One-second Unweighted and A-weighted Spectral Data Measured at the WRA Location during EHW3, 16:46-17:01, on October 14, 2011

NO DATA AVAILABLE

Figure C239. Average One-second Unweighted and A-weighted Spectral Data Measured at the AB-NO Location during EHW3, 16:46-17:01, on October 14, 2011

NO DATA AVAILABLE

Figure C240. Average One- second Unweighted and A-weighted Spectral Data Measured at the AB-SO Location during EHW3, 16:46-17:01, on October 14, 2011

10/15/2011 – EHW2

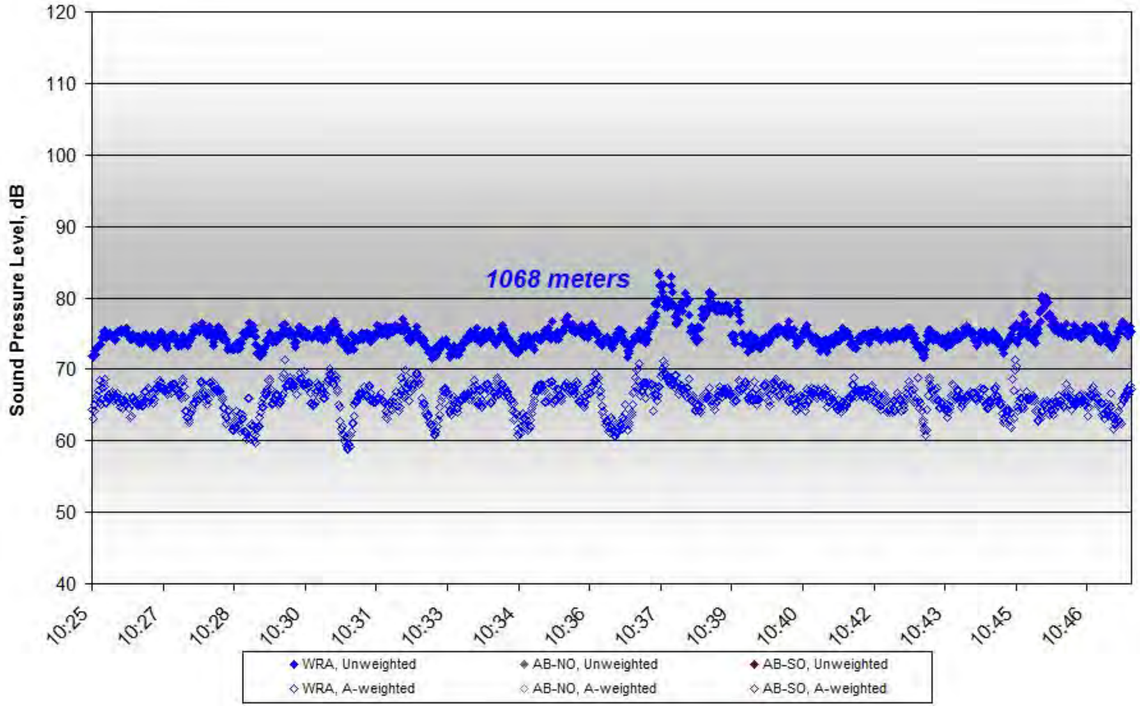

Figure C241. One-second Unweighted and A-weighted Leq Level Data at EHW2, 10:25-10:45, on October 15, 2011

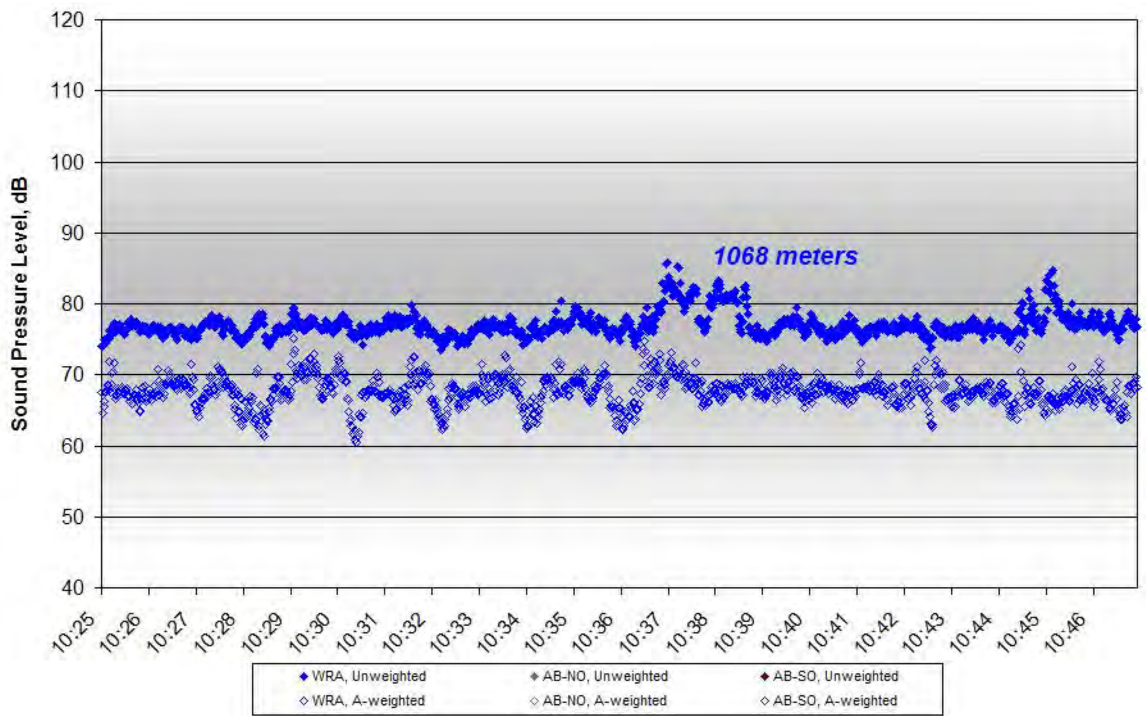

Figure C242. One-second Unweighted and A-weighted Lmax Level Data at EHW2, 10:25-10:45, on October 15, 2011

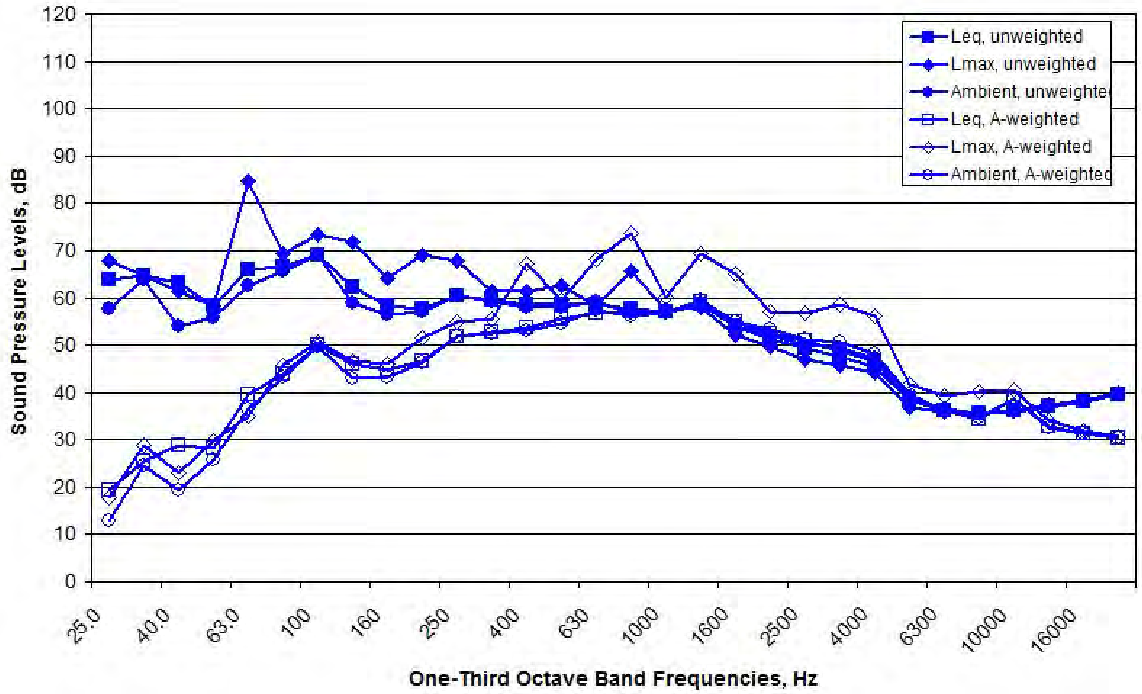

Figure C243. Average One-second Unweighted and A-weighted Spectral Data Measured at the WRA Location during EHW2, 10:25-10:45, on October 15, 2011

NO DATA AVAILABLE

Figure C244. Average One-second Unweighted and A-weighted Spectral Data Measured at the AB-NO Location during EHW2, 10:25-10:45, on October 15, 2011

NO DATA AVAILABLE

Figure C245. Average One- second Unweighted and A-weighted Spectral Data Measured at the AB-SO Location during EHW2, 10:25-10:45, on October 15, 2011

EHW9, 11:28-11:42

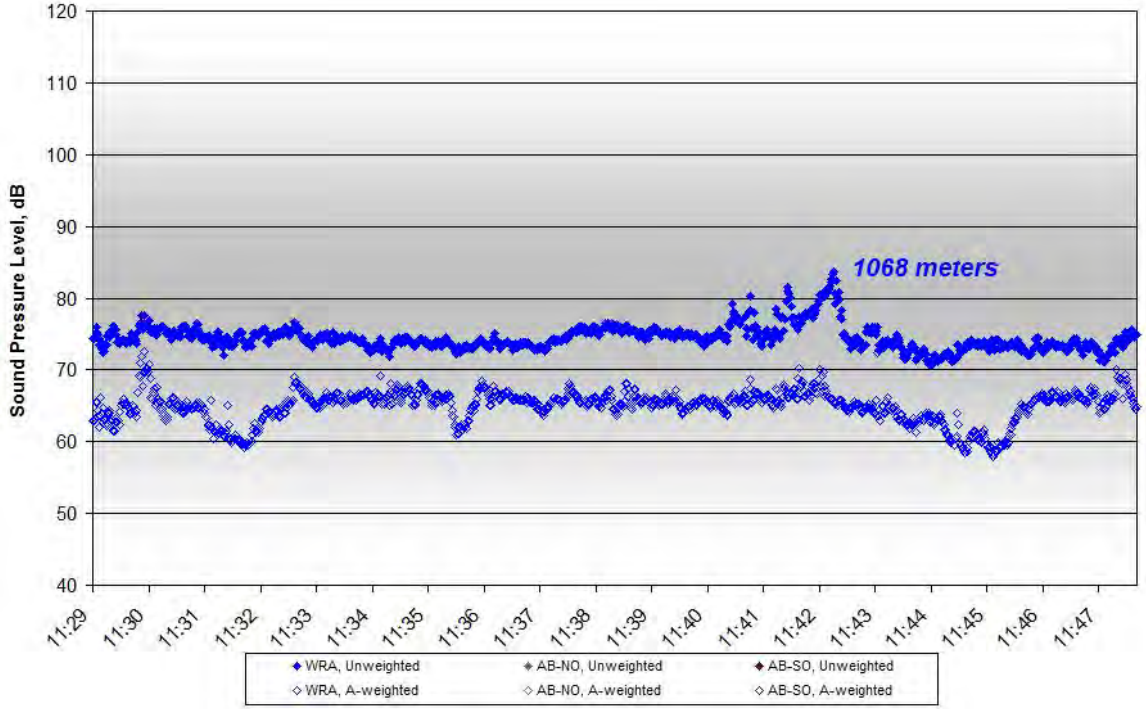

Figure C246. One-second Unweighted and A-weighted Leq Level Data at EHW9, 11:28-11:42, on October 15, 2011

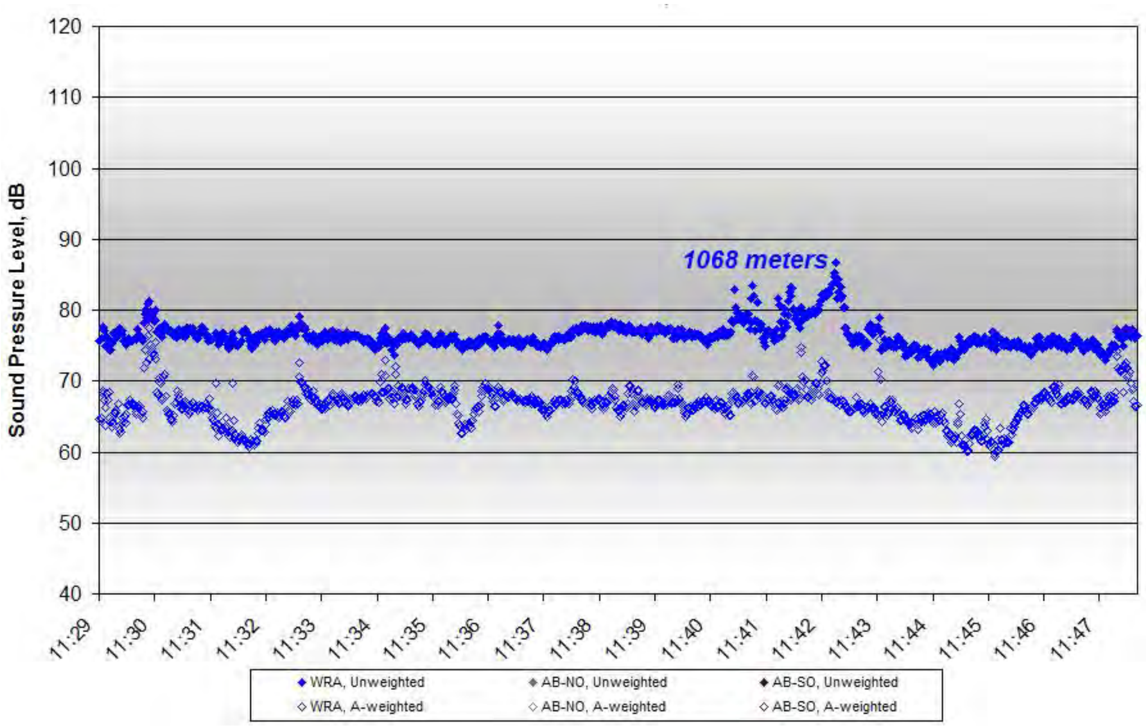

Figure C247. One-second Unweighted and A-weighted Lmax Level Data at EHW9, 11:28-11:42, on October 15, 2011

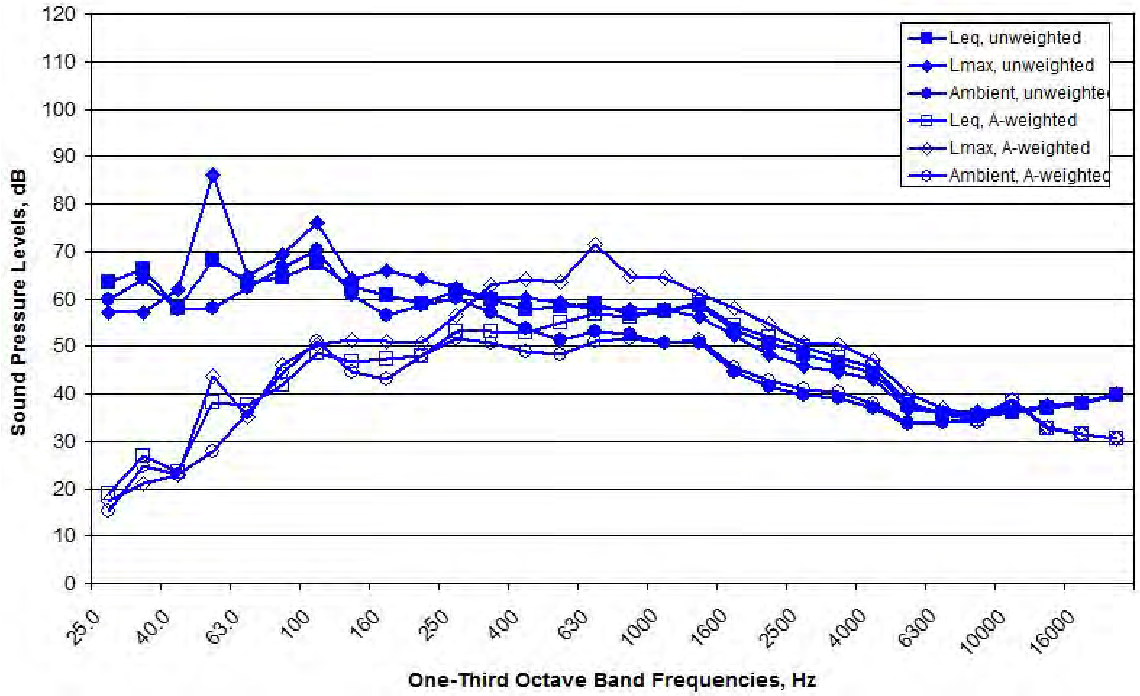

Figure C248. Average One-second Unweighted and A-weighted Spectral Data Measured at the WRA Location during EHW9, 11:28-11:42, on October 15, 2011

NO DATA AVAILABLE

Figure C249. Average One-second Unweighted and A-weighted Spectral Data Measured at the AB-NO Location during EHW9, 11:28-11:42, on October 15, 2011

NO DATA AVAILABLE

Figure C250. Average One- second Unweighted and A-weighted Spectral Data Measured at the AB-SO Location during EHW9, 11:28-11:42, on October 15, 2011

EHW9, 11:56-11:57

NO DATA AVAILABLE

Figure C251. One-second Unweighted and A-weighted Leq Level Data at EHW9, 11:56-11:57, on October 15, 2011

NO DATA AVAILABLE

Figure C252. One-second Unweighted and A-weighted Lmax Level Data at EHW9, 11:56-11:57, on October 15, 2011

NO DATA AVAILABLE

Figure C253. Average One-second Unweighted and A-weighted Spectral Data Measured at the WRA Location during EHW9, 11:56-11:57, on October 15, 2011

NO DATA AVAILABLE

Figure C254. Average One-second Unweighted and A-weighted Spectral Data Measured at the AB-NO Location during EHW9, 11:56-11:57, on October 15, 2011

NO DATA AVAILABLE

Figure C255. Average One- second Unweighted and A-weighted Spectral Data Measured at the AB-SO Location during EHW9, 11:56-11:57, on October 15, 2011

EHW8

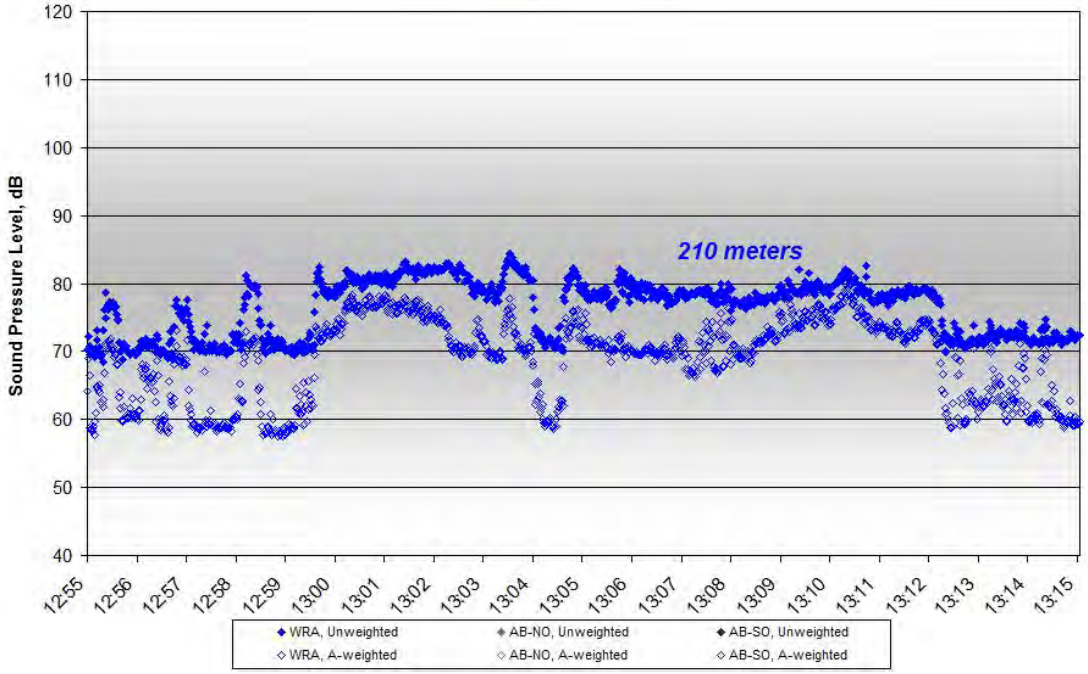

Figure C256. One-second Unweighted and A-weighted Leq Level Data at EHW8, 12:54-13:11, on October 15, 2011

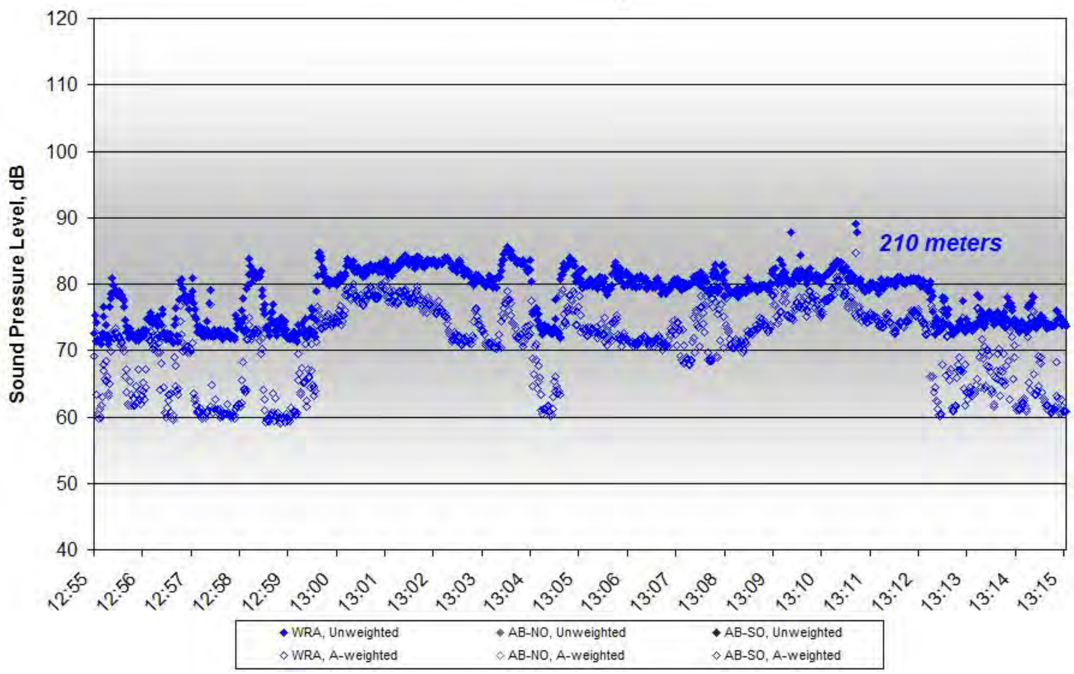

Figure C257. One-second Unweighted and A-weighted Lmax Level Data at EHW8, 12:54-13:11, on October 15, 2011

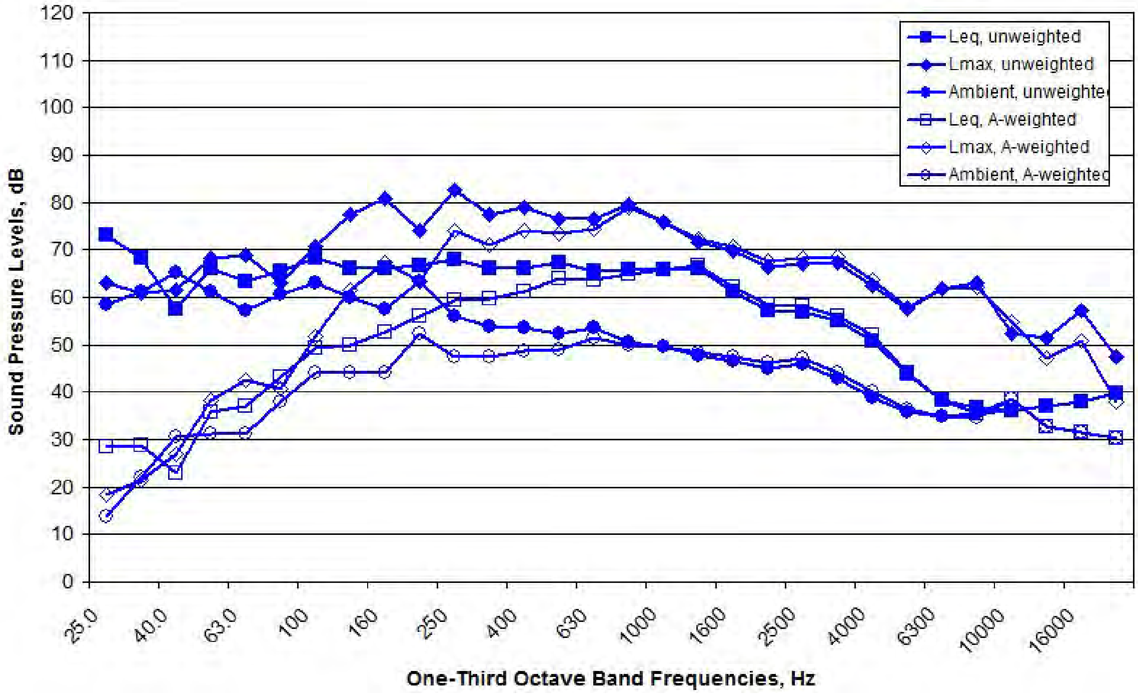

Figure C258. Average One-second Unweighted and A-weighted Spectral Data Measured at the WRA Location during EHW8, 12:54-13:11, on October 15, 2011

NO DATA AVAILABLE

Figure C259. Average One-second Unweighted and A-weighted Spectral Data Measured at the AB-NO Location during EHW8, 12:54-13:11, on October 15, 2011

NO DATA AVAILABLE

Figure C260. Average One- second Unweighted and A-weighted Spectral Data Measured at the AB-SO Location during EHW8, 12:54-13:11, on October 15, 2011

10/17/2011 – EHW14, 14:52-14:59

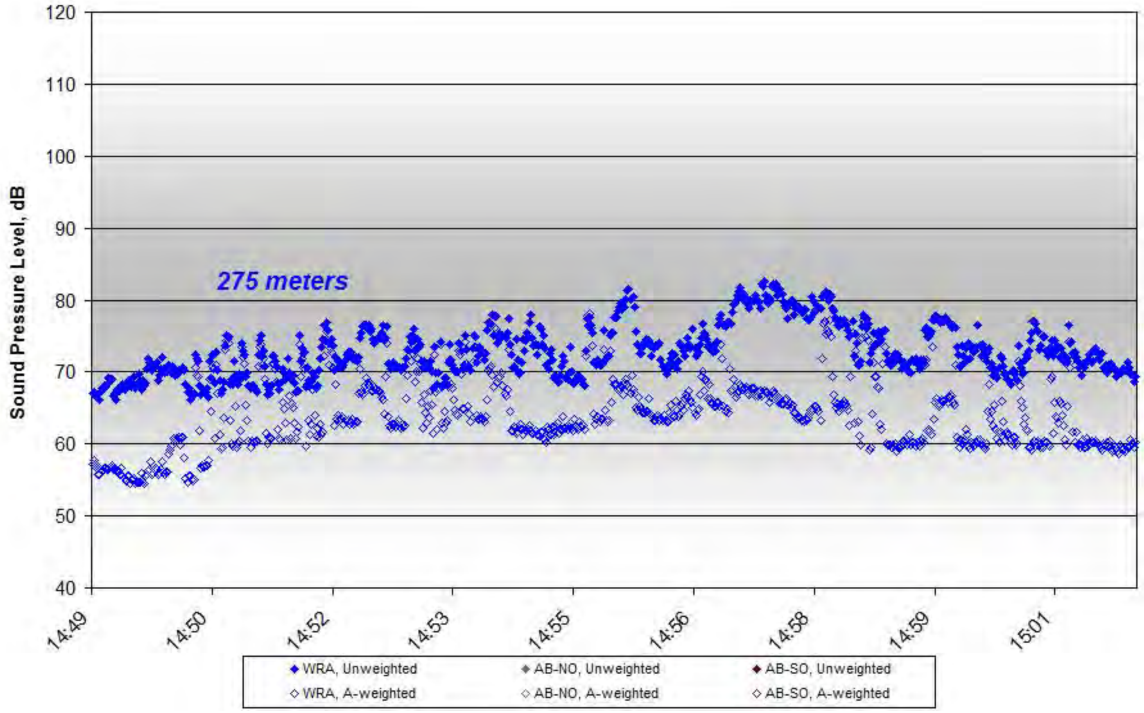

Figure C261. One-second Unweighted and A-weighted Leq Level Data at EHW14, 14:52-14:59, on October 17, 2011

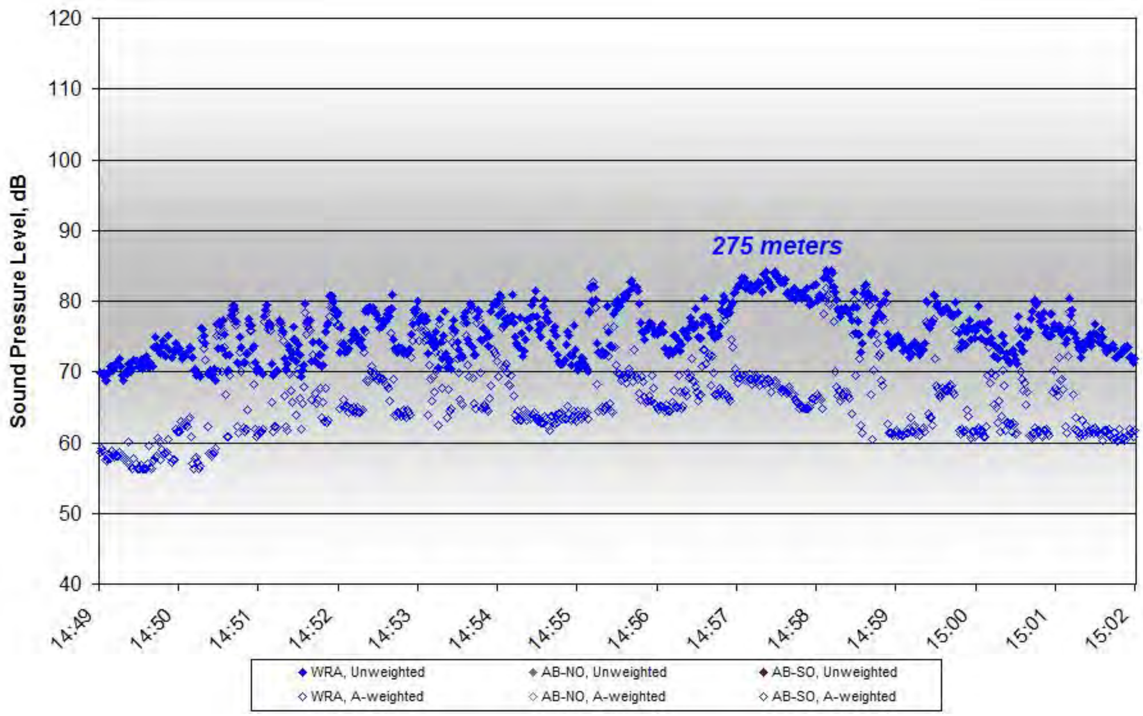

Figure C262. One-second Unweighted and A-weighted Lmax Level Data at EHW14, 14:52-14:59, on October 17, 2011

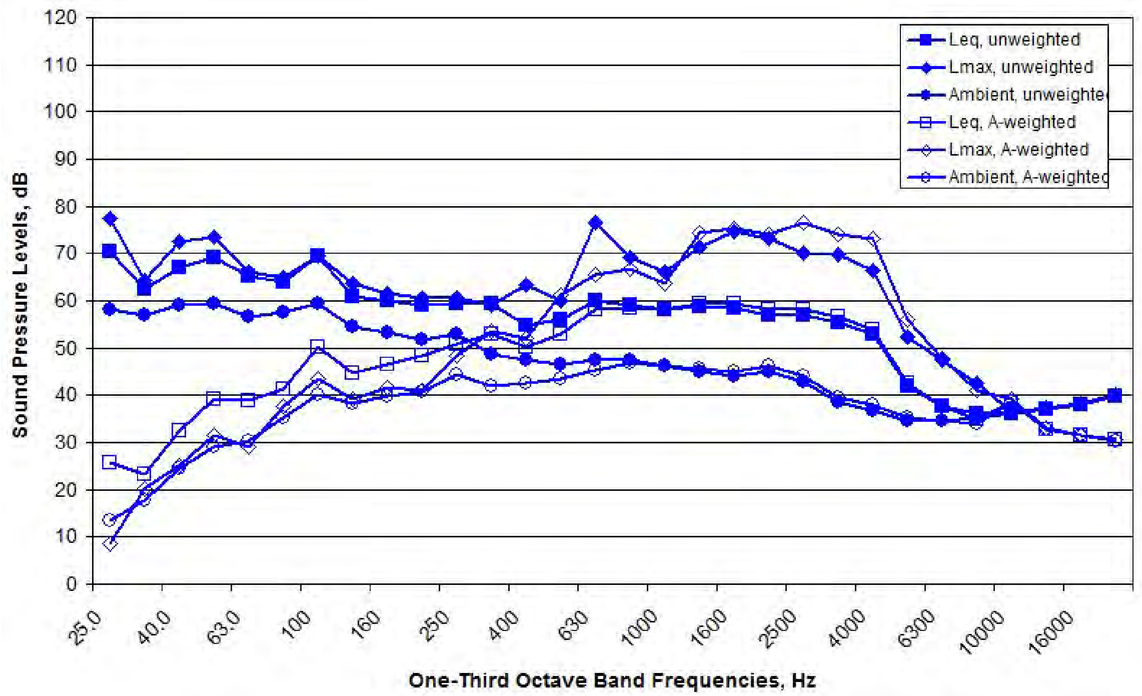

Figure C263. Average One-second Unweighted and A-weighted Spectral Data Measured at the WRA Location during EHW14, 14:52-14:59, on October 17, 2011

NO DATA AVAILABLE

Figure C264. Average One-second Unweighted and A-weighted Spectral Data Measured at the AB-NO Location during EHW14, 14:52-14:59, on October 17, 2011

NO DATA AVAILABLE

Figure C265. Average One- second Unweighted and A-weighted Spectral Data Measured at the AB-SO Location during EHW14, 14:52-14:59, on October 17, 2011

EHW14, 15:16-15:32

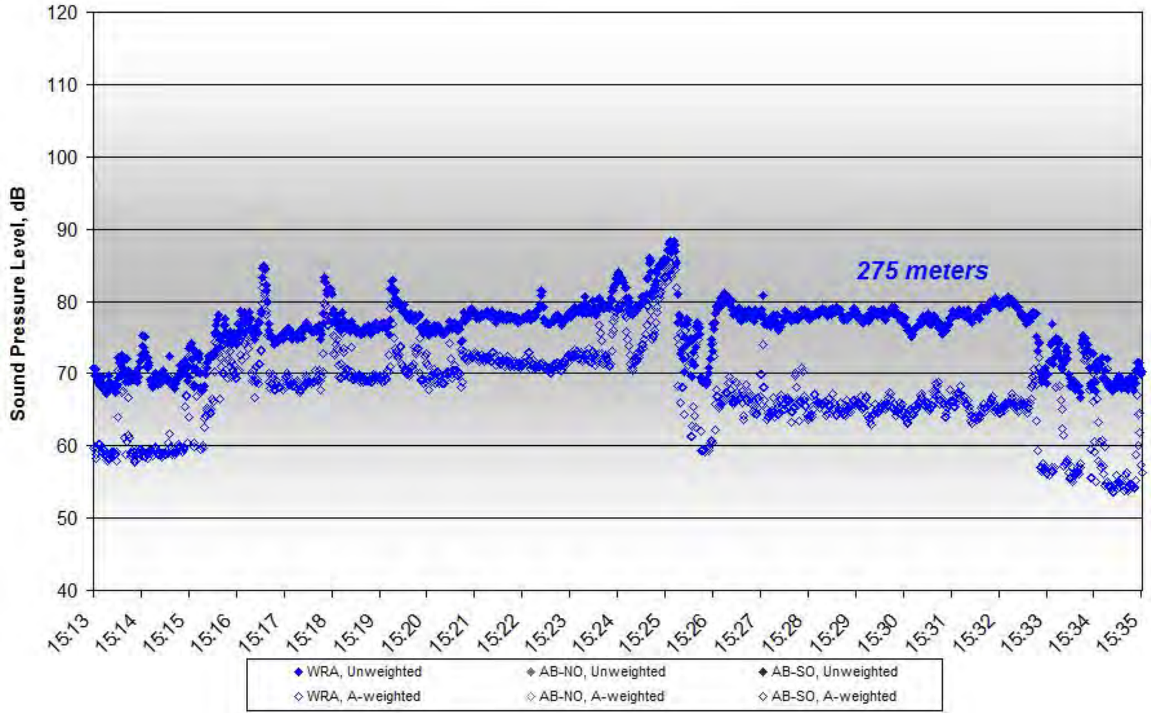

Figure C266. One-second Unweighted and A-weighted Leq Level Data at EHW14, 15:16-15:32, on October 17, 2011

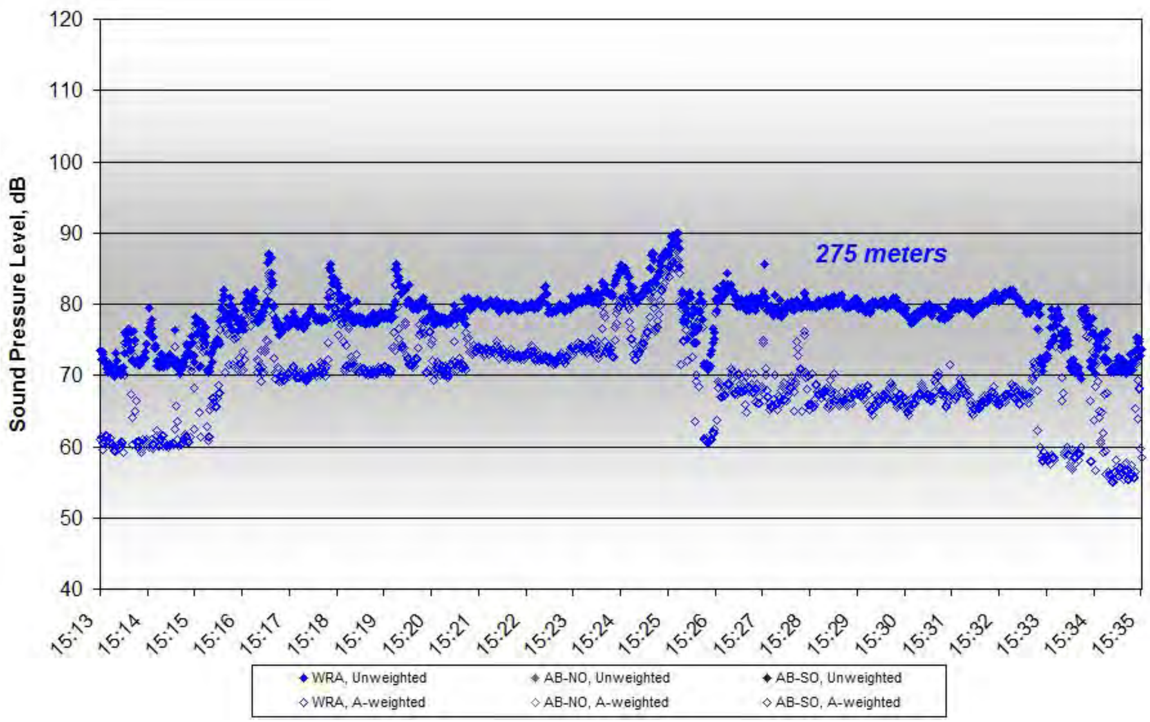

Figure C267. One-second Unweighted and A-weighted Lmax Level Data at EHW14, 15:16-15:32, on October 17, 2011

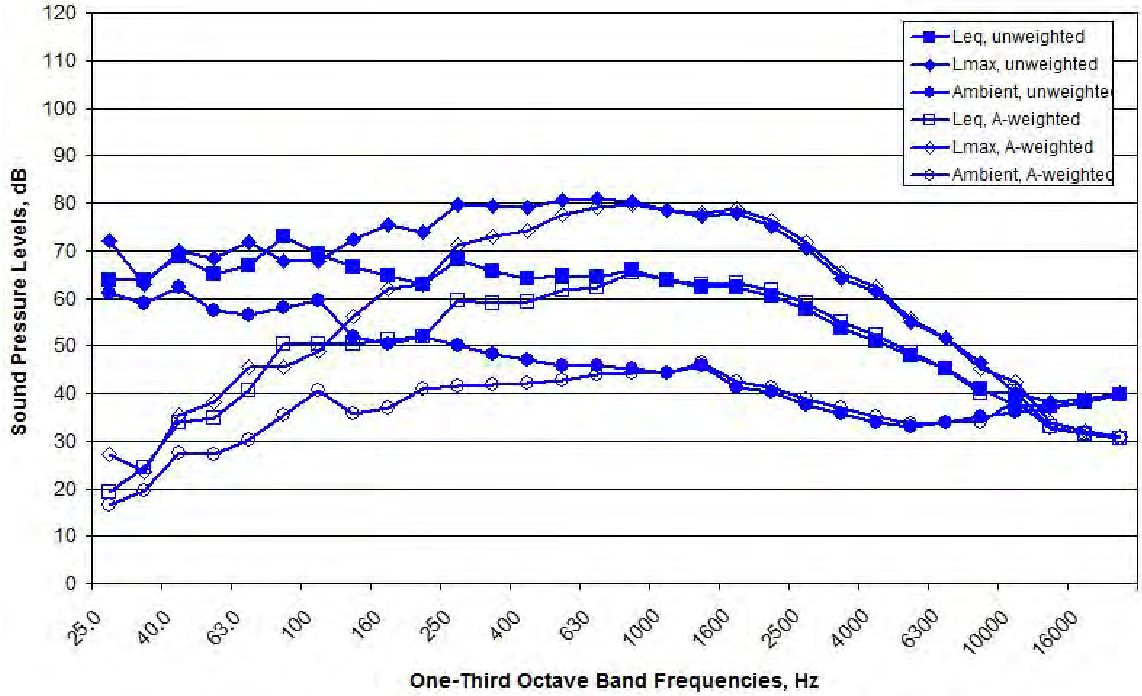

Figure C268. Average One-second Unweighted and A-weighted Spectral Data Measured at the WRA Location during EHW14, 15:16-15:32, on October 17, 2011

NO DATA AVAILABLE

Figure C269. Average One-second Unweighted and A-weighted Spectral Data Measured at the AB-NO Location during EHW14, 15:16-15:32, on October 17, 2011

NO DATA AVAILABLE

Figure C270. Average One- second Unweighted and A-weighted Spectral Data Measured at the AB-SO Location during EHW14, 15:16-15:32, on October 17, 2011

EHW15, 15:58-16:05

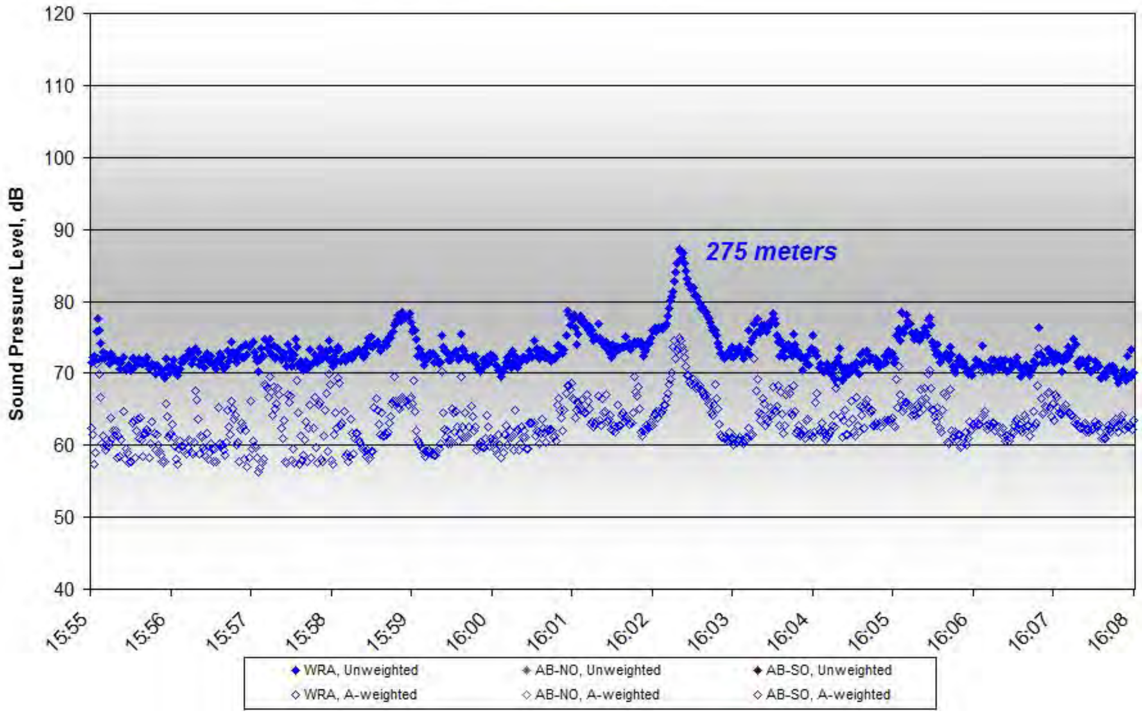

Figure C271. One-second Unweighted and A-weighted Leq Level Data at EHW15, 15:58-16:05, on October 17, 2011

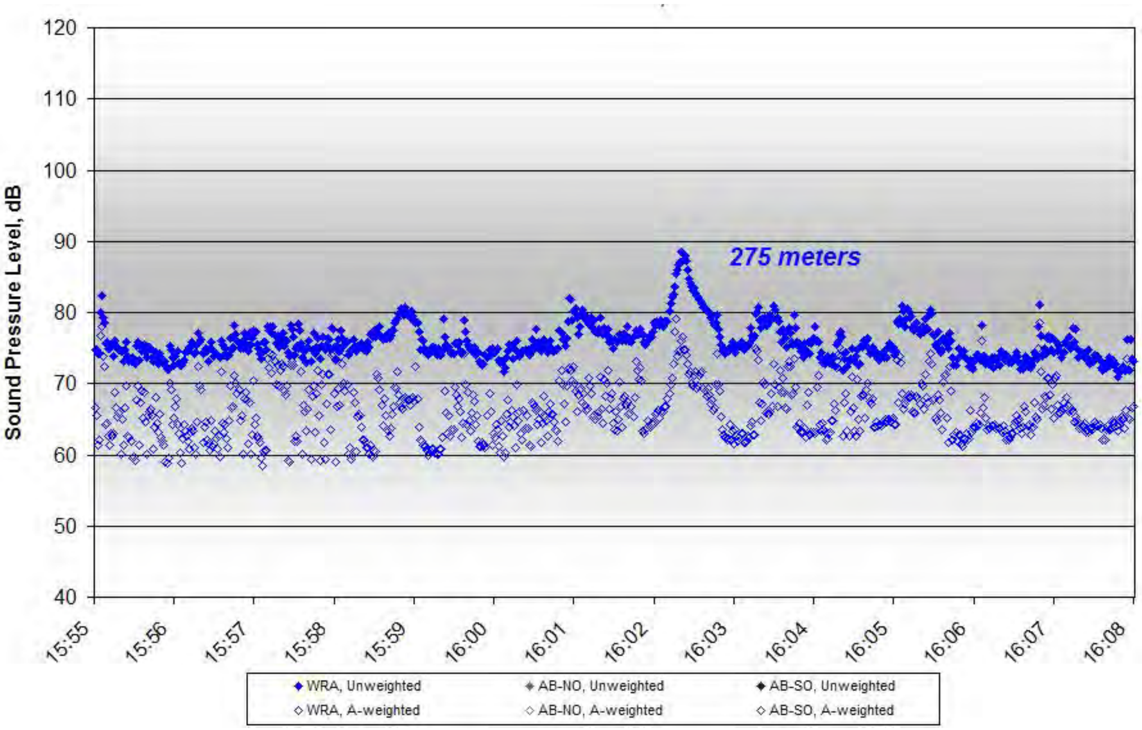

Figure C272. One-second Unweighted and A-weighted Lmax Level Data at EHW15, 15:58-16:05, on October 17, 2011

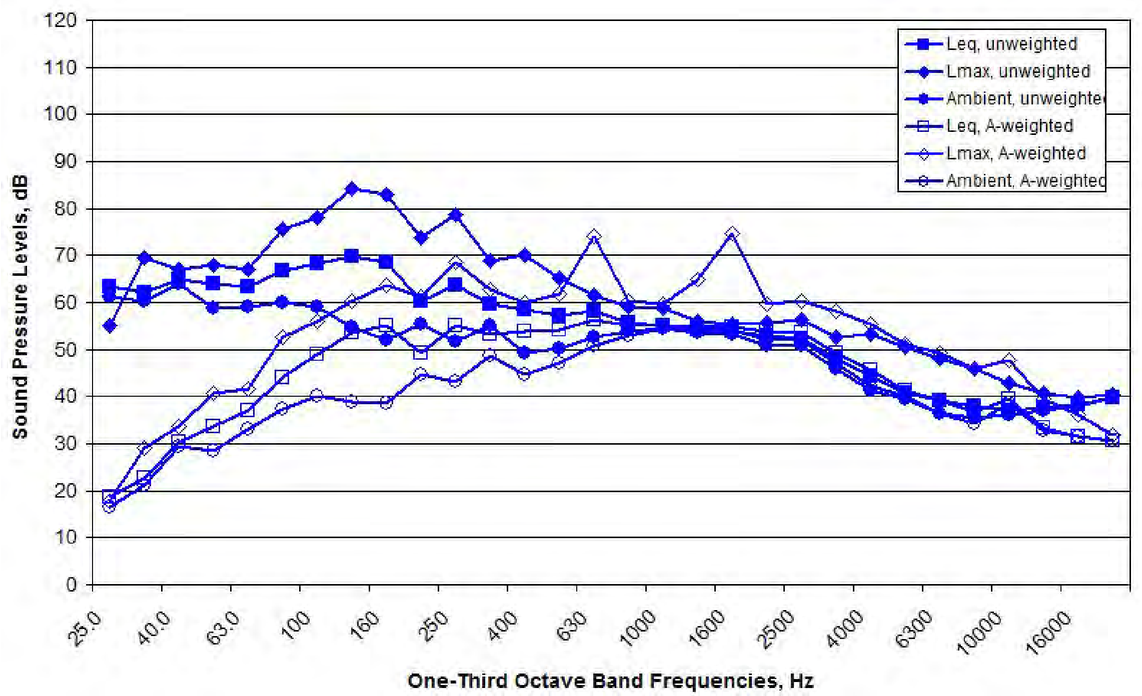

Figure C273. Average One-second Unweighted and A-weighted Spectral Data Measured at the WRA Location during EHW15, 15:58-16:05, on October 17, 2011

NO DATA AVAILABLE

Figure C274. Average One-second Unweighted and A-weighted Spectral Data Measured at the AB-NO Location during EHW15, 15:58-16:05, on October 17, 2011

NO DATA AVAILABLE

Figure C275. Average One- second Unweighted and A-weighted Spectral Data Measured at the AB-SO Location during EHW15, 15:58-16:05, on October 17, 2011

EHW15, 16:27-16:39

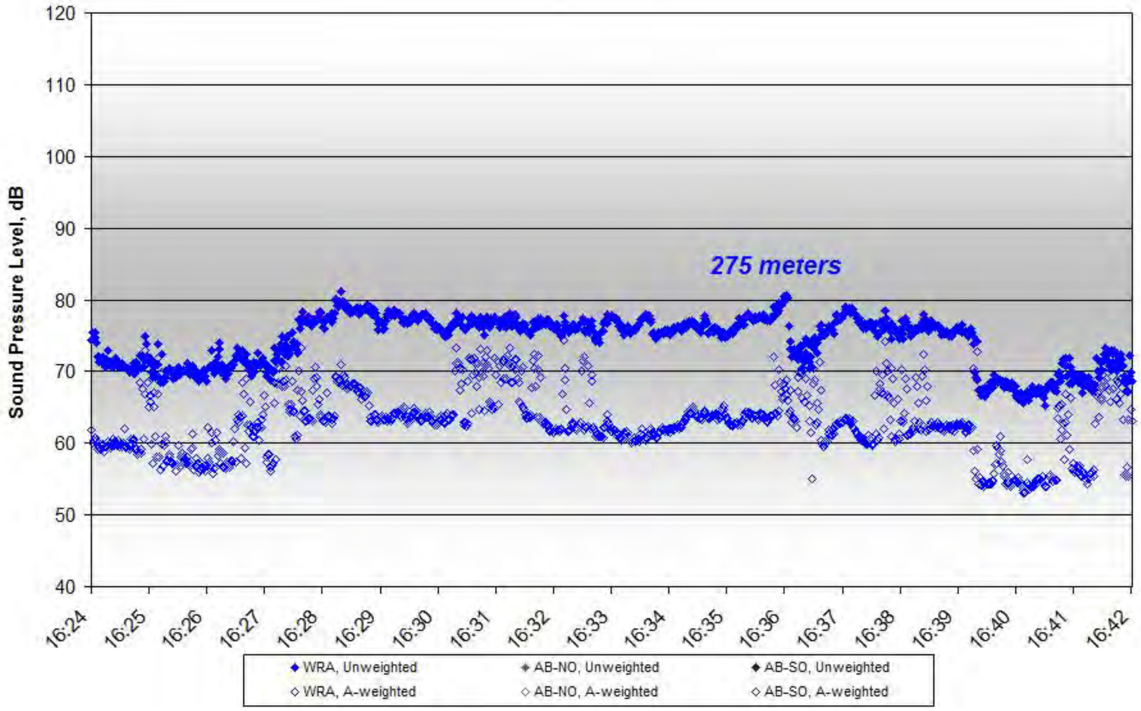

Figure C276. One-second Unweighted and A-weighted Leq Level Data at EHW15, 16:27-16:39, on October 17, 2011

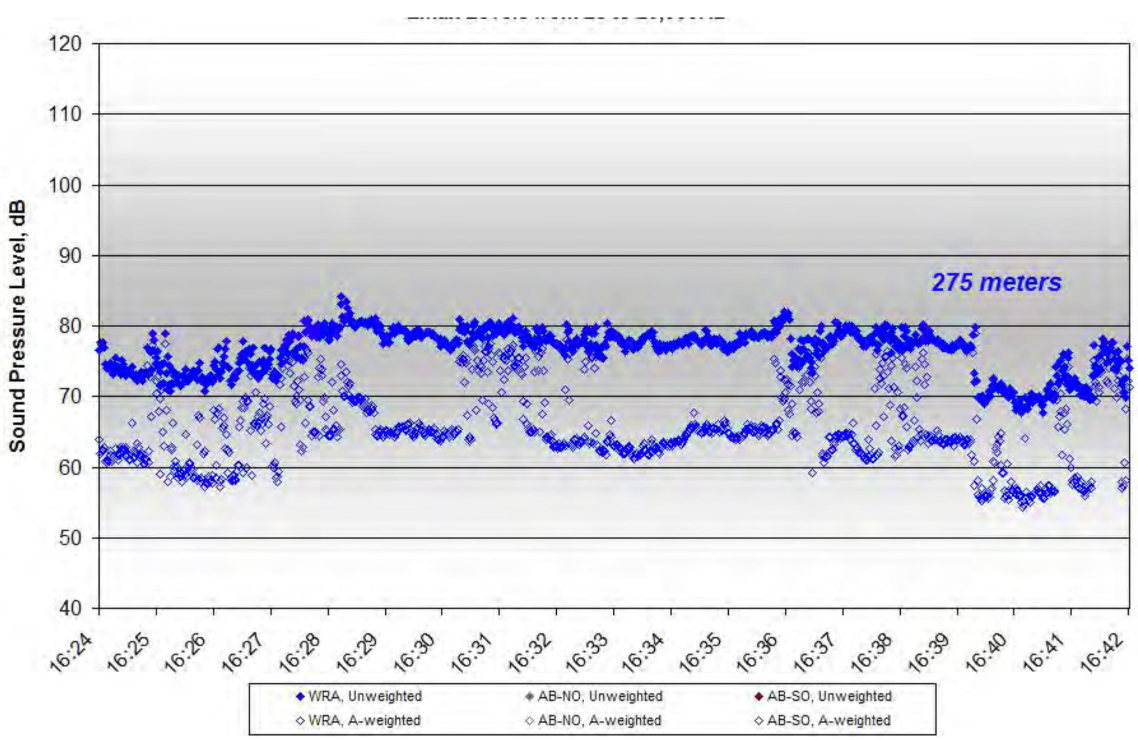

Figure C277. One-second Unweighted and A-weighted Lmax Level Data at EHW15, 16:27-16:39, on October 17, 2011

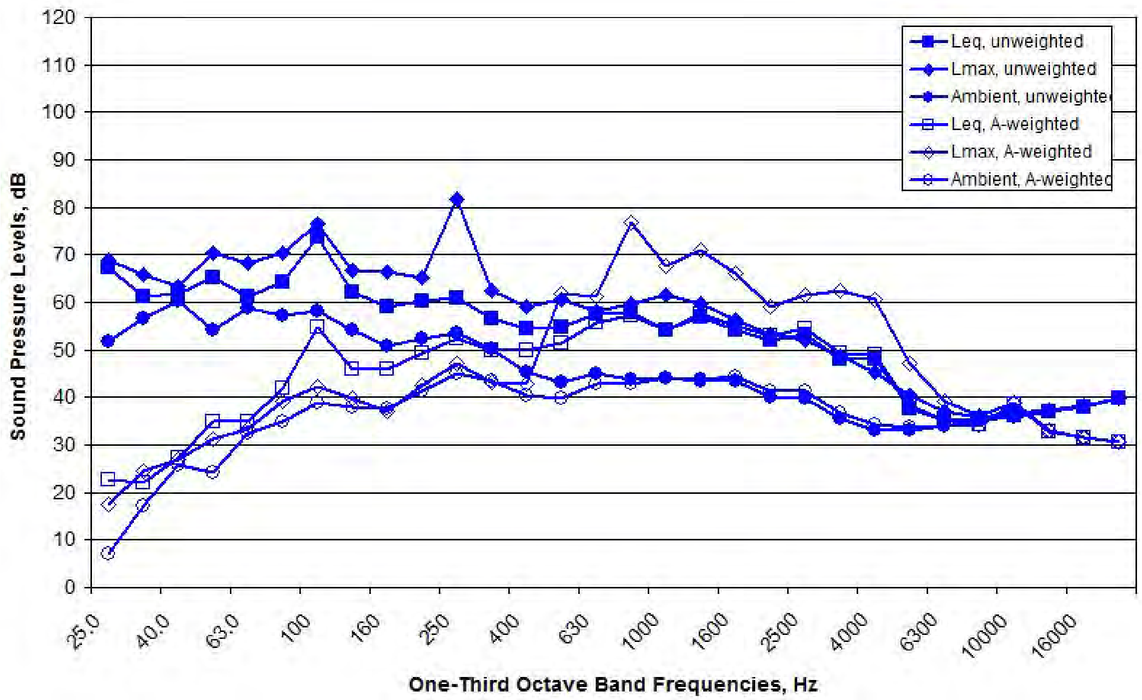

Figure C278. Average One-second Unweighted and A-weighted Spectral Data Measured at the WRA Location during EHW15, 16:27-16:39, on October 17, 2011

NO DATA AVAILABLE

Figure C279. Average One-second Unweighted and A-weighted Spectral Data Measured at the AB-NO Location during EHW15, 16:27-16:39, on October 17, 2011

NO DATA AVAILABLE

Figure C280. Average One- second Unweighted and A-weighted Spectral Data Measured at the AB-SO Location during EHW15, 16:27-16:39, on October 17, 2011

10/19/2011 – EHW11, 11:59-12:04

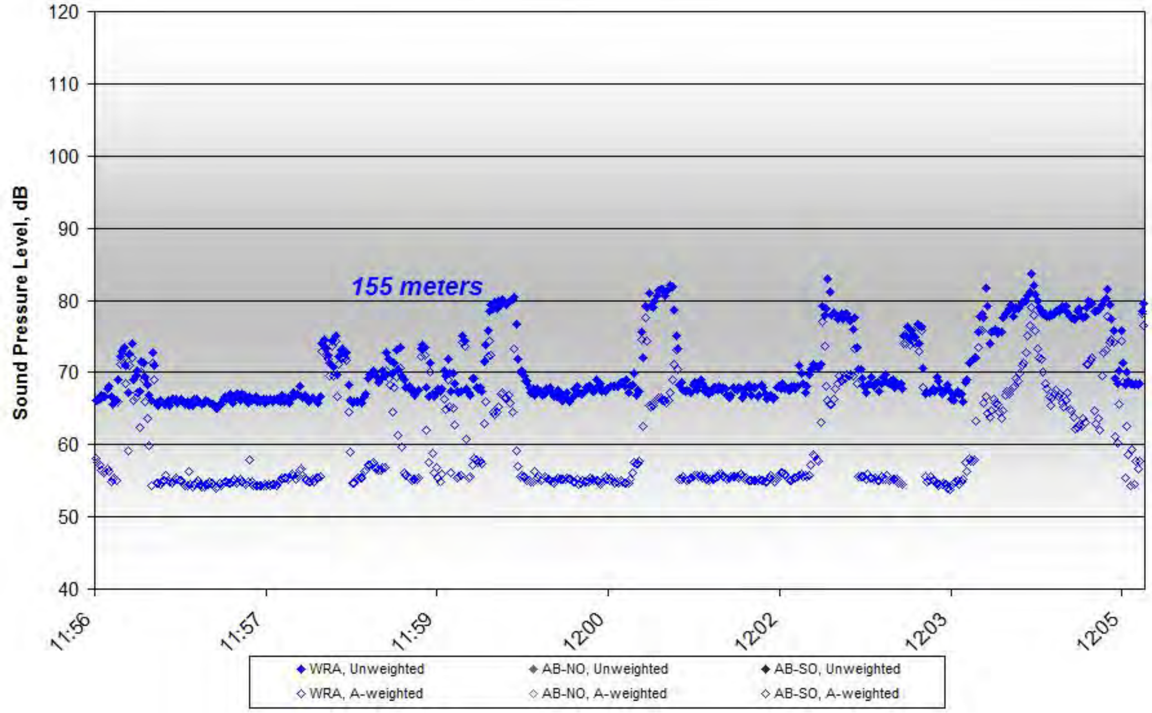

Figure C281. One-second Unweighted and A-weighted Leq Level Data at EHW11, 11:59-12:04, on October 19, 2011

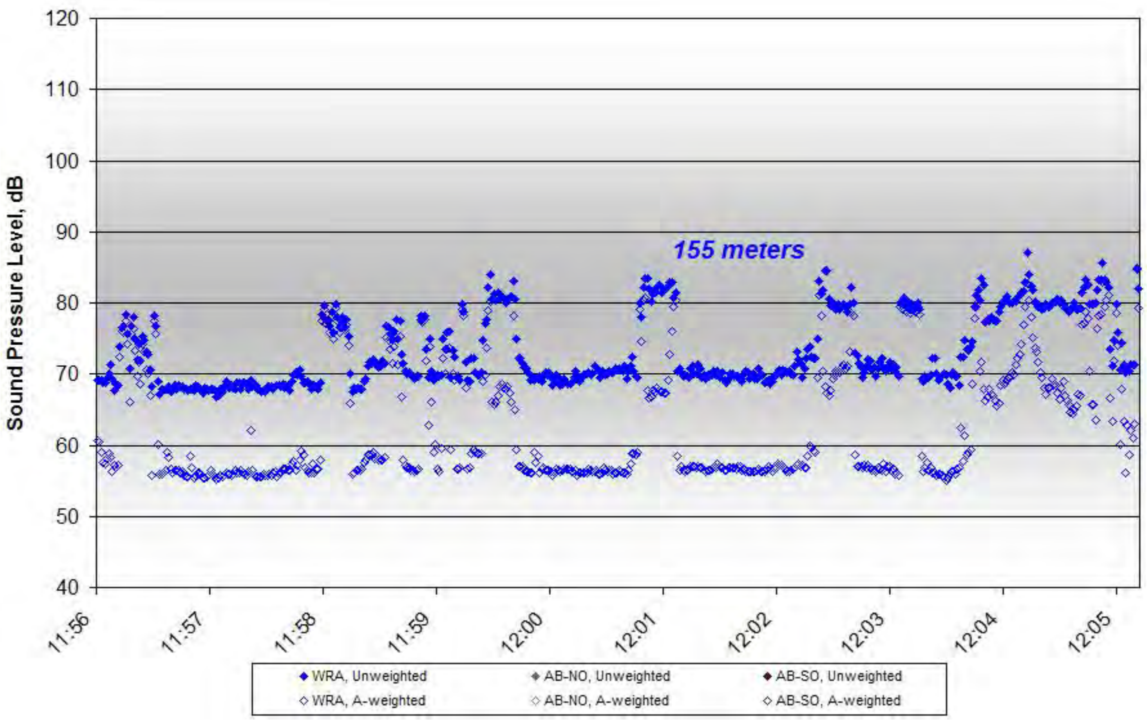

Figure C282. One-second Unweighted and A-weighted Lmax Level Data at EHW11, 11:59-12:04, on October 19, 2011

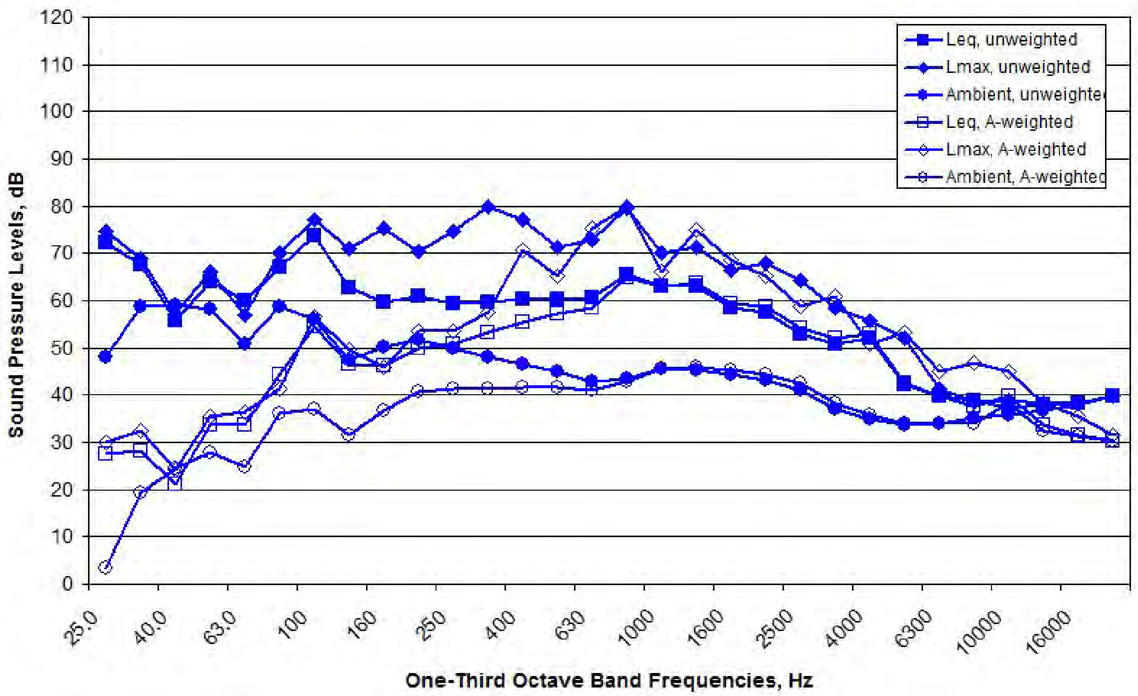

Figure C283. Average One-second Unweighted and A-weighted Spectral Data Measured at the WRA Location during EHW11, 11:59-12:04, on October 19, 2011

NO DATA AVAILABLE

Figure C284. Average One-second Unweighted and A-weighted Spectral Data Measured at the AB-NO Location during EHW11, 11:59-12:04, on October 19, 2011

NO DATA AVAILABLE

Figure C285. Average One- second Unweighted and A-weighted Spectral Data Measured at the AB-SO Location during EHW11, 11:59-12:04, on October 19, 2011

EHW11, 12:22-12:28

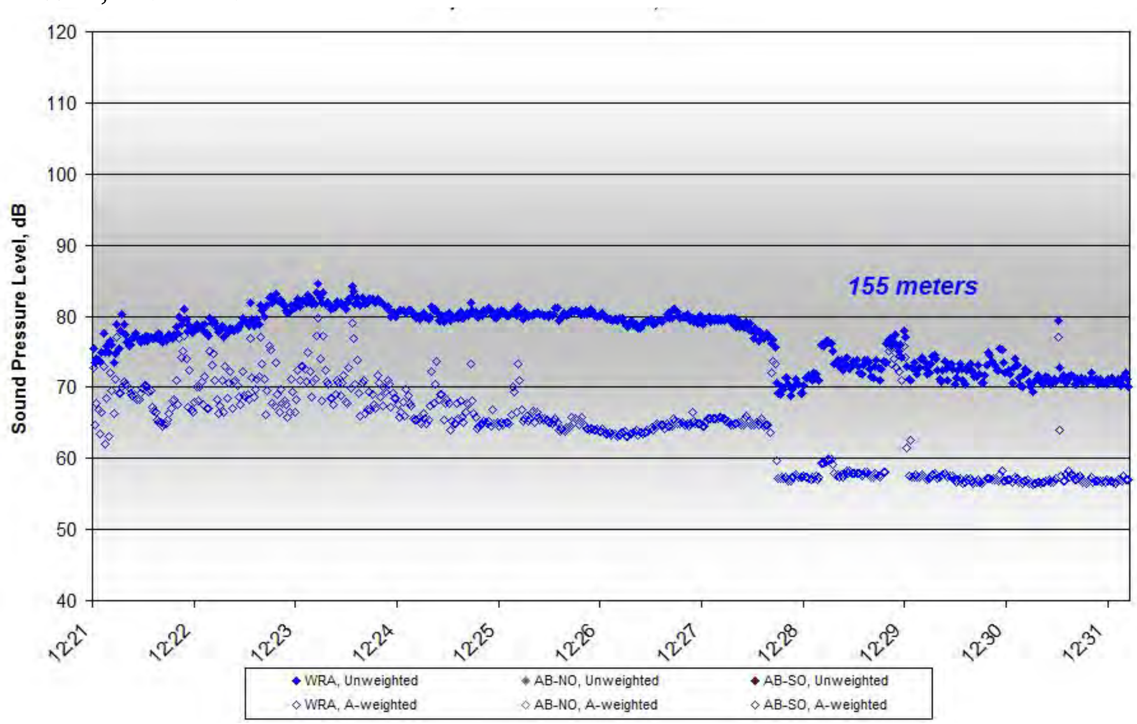

Figure C286. One-second Unweighted and A-weighted Leq Level Data at EHW11, 12:22-12:28, on October 19, 2011

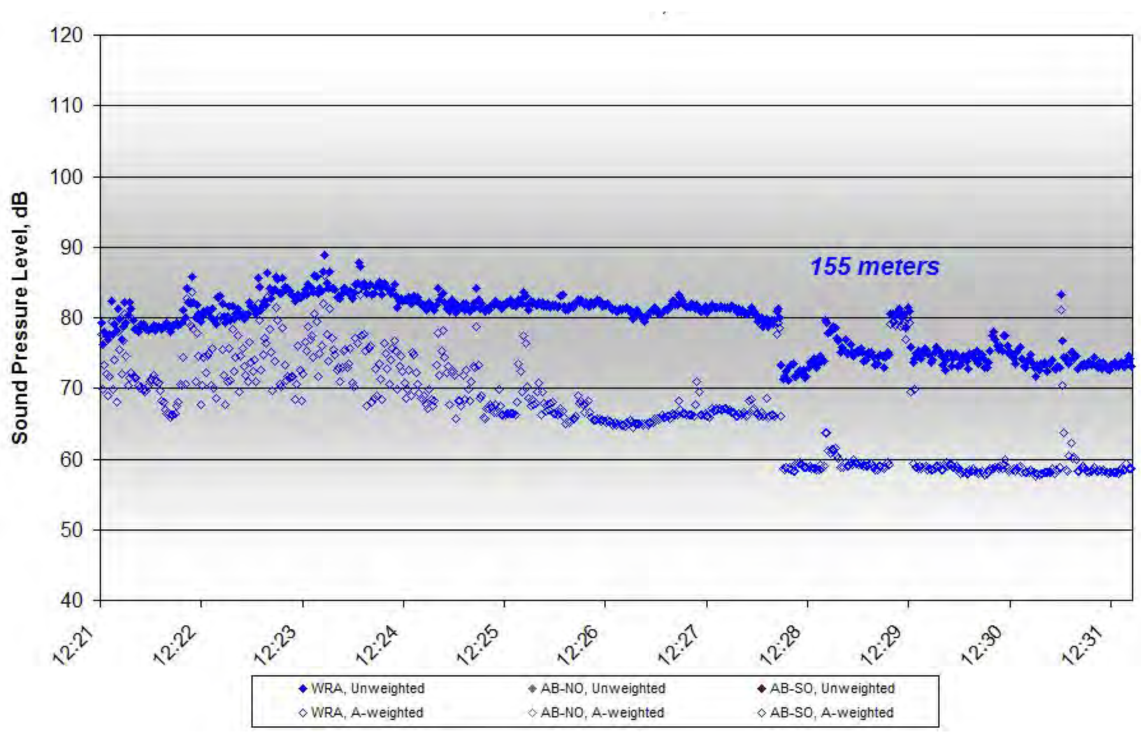

Figure C287. One-second Unweighted and A-weighted Lmax Level Data at EHW11, 12:22-12:28, on October 19, 2011

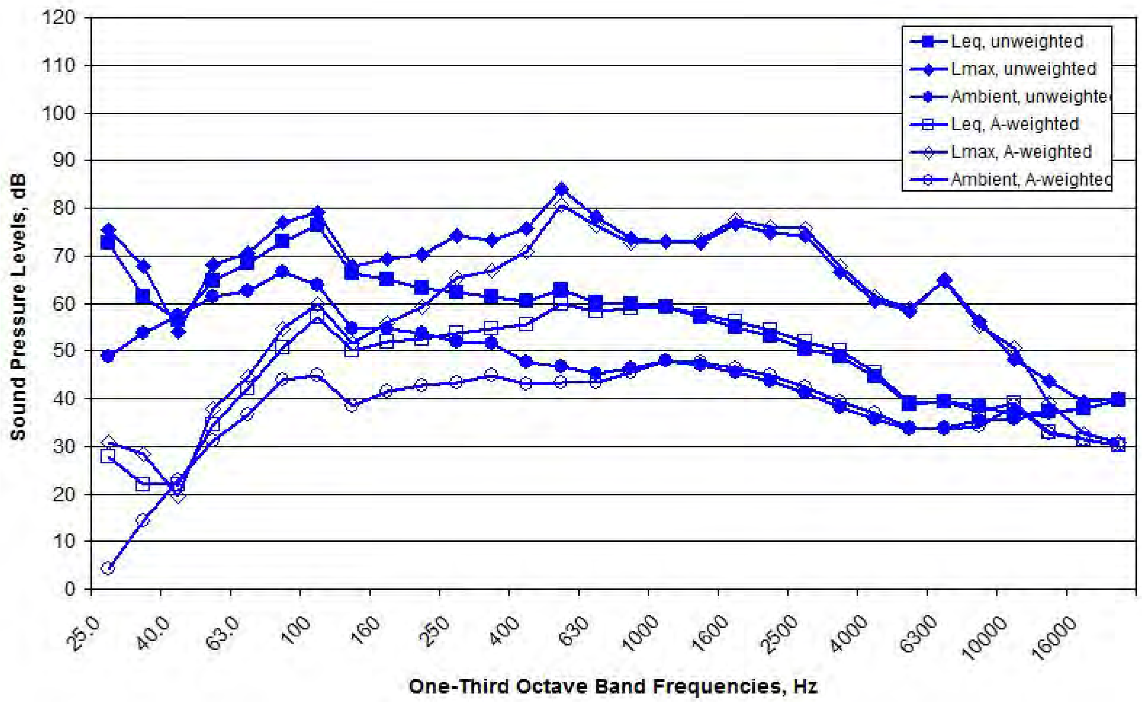

Figure C288. Average One-second Unweighted and A-weighted Spectral Data Measured at the WRA Location during EHW11, 12:22-12:28, on October 19, 2011

NO DATA AVAILABLE

Figure C289. Average One-second Unweighted and A-weighted Spectral Data Measured at the AB-NO Location during EHW11, 12:22-12:28, on October 19, 2011

NO DATA AVAILABLE

Figure C290. Average One- second Unweighted and A-weighted Spectral Data Measured at the AB-SO Location during EHW11, 12:22-12:28, on October 19, 2011

10/21/2011 – W8

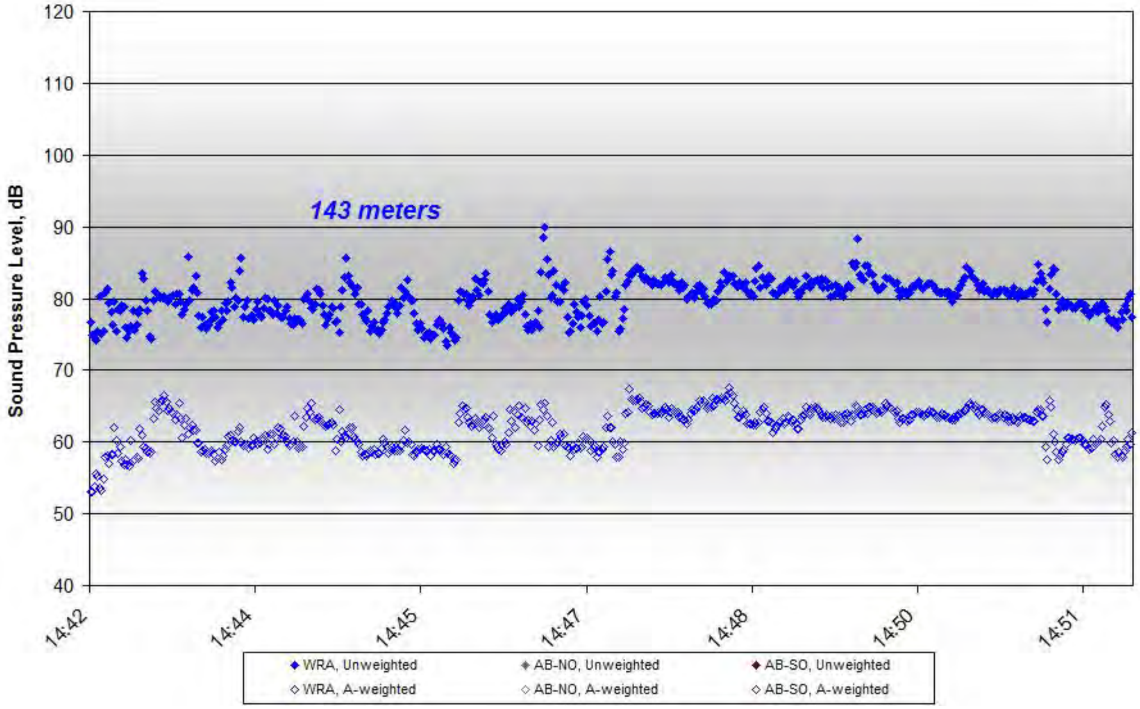

Figure C291. One-second Unweighted and A-weighted Leq Level Data at W8, 14:43-14:51, on October 21, 2011

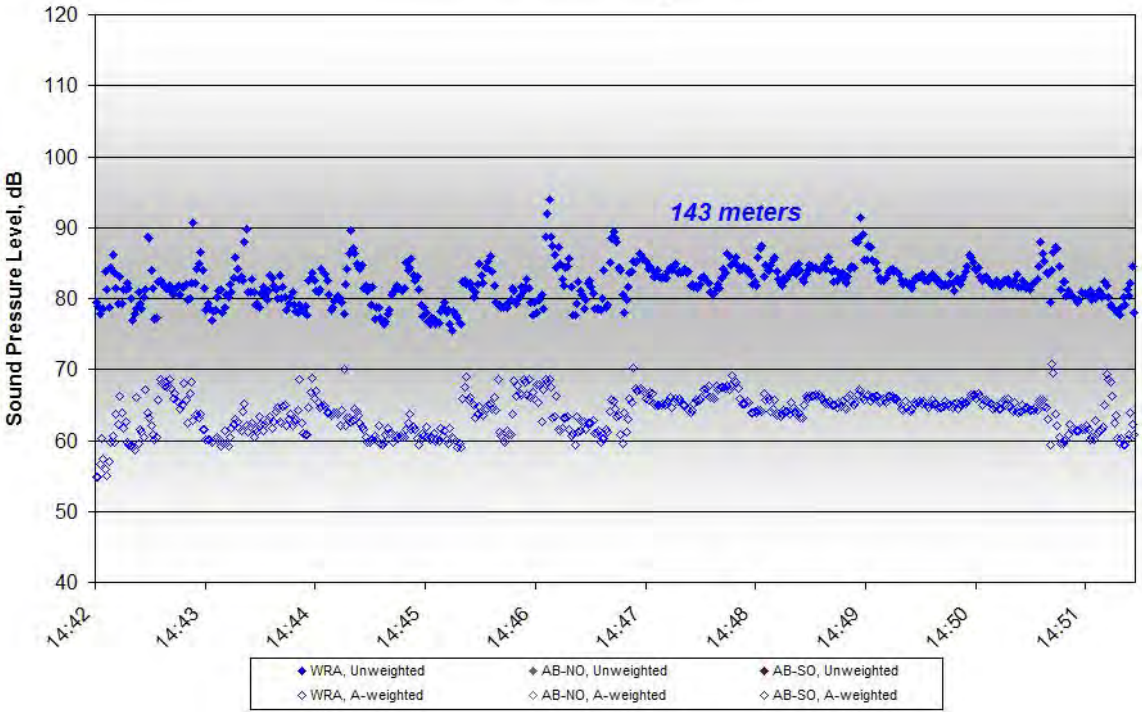

Figure C292. One-second Unweighted and A-weighted Lmax Level Data at W8, 14:43-14:51, on October 21, 2011

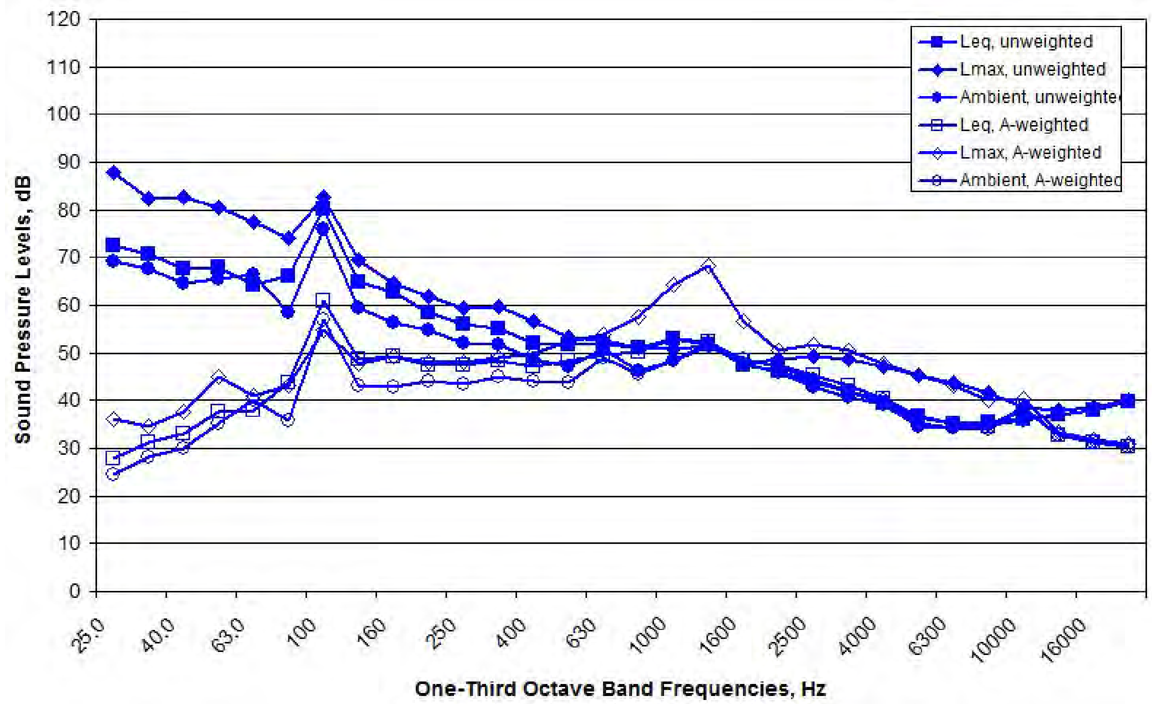

Figure C293. Average One-second Unweighted and A-weighted Spectral Data Measured at the WRA Location during W8, 14:43-14:51, on October 21, 2011

NO DATA AVAILABLE

Figure C294. Average One-second Unweighted and A-weighted Spectral Data Measured at the AB-NO Location during W8, 14:43-14:51, on October 21, 2011

NO DATA AVAILABLE

Figure C295. Average One- second Unweighted and A-weighted Spectral Data Measured at the AB-SO Location during W8, 14:43-14:51, on October 21, 2011

W10

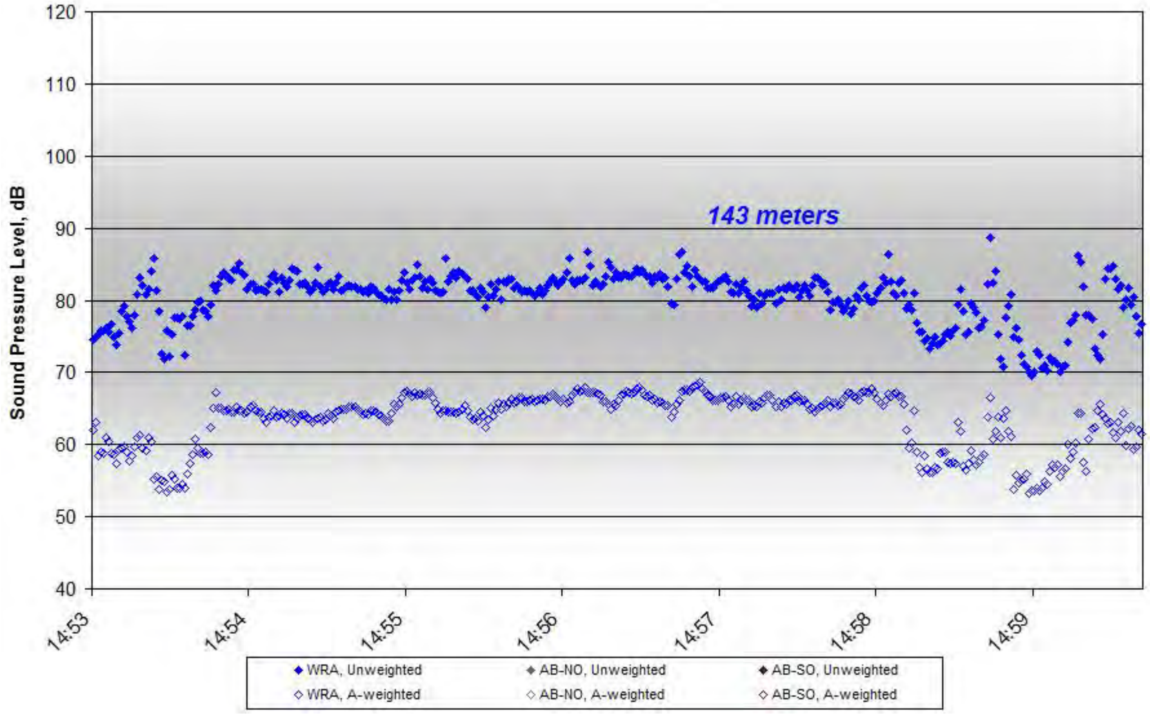

Figure C296. One-second Unweighted and A-weighted Leq Level Data at W10, 14:53-14:58, on October 21, 2011

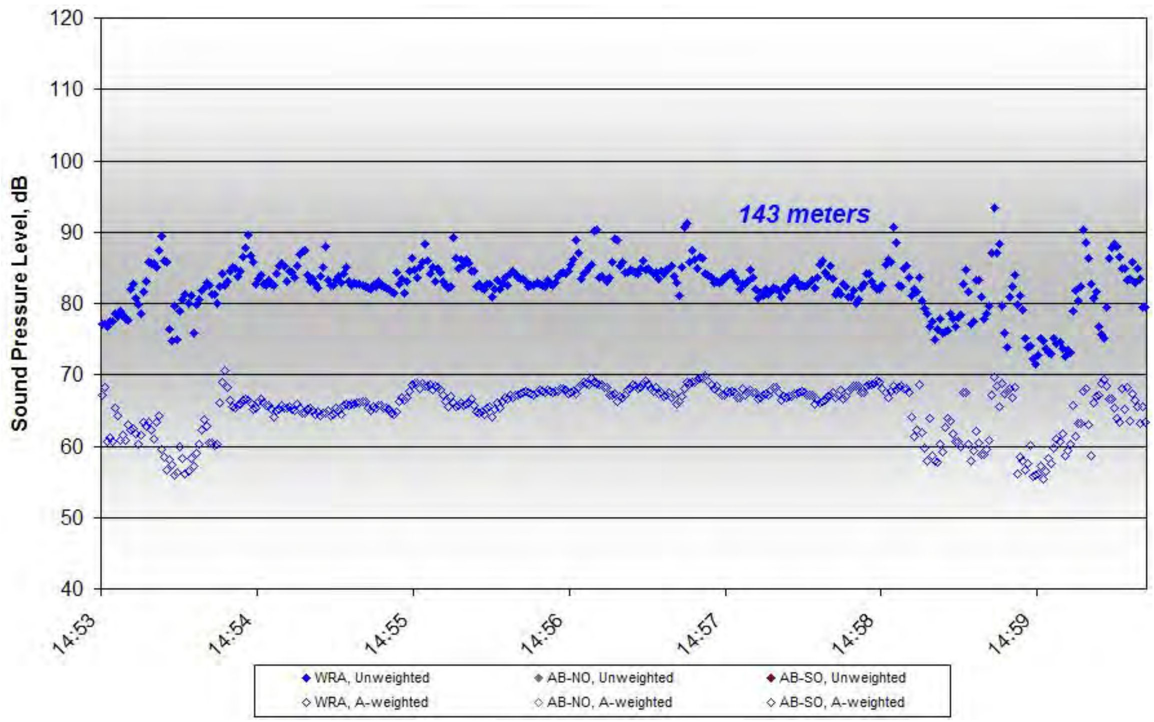

Figure C297. One-second Unweighted and A-weighted Lmax Level Data at W10, 14:53-14:58, on October 21, 2011

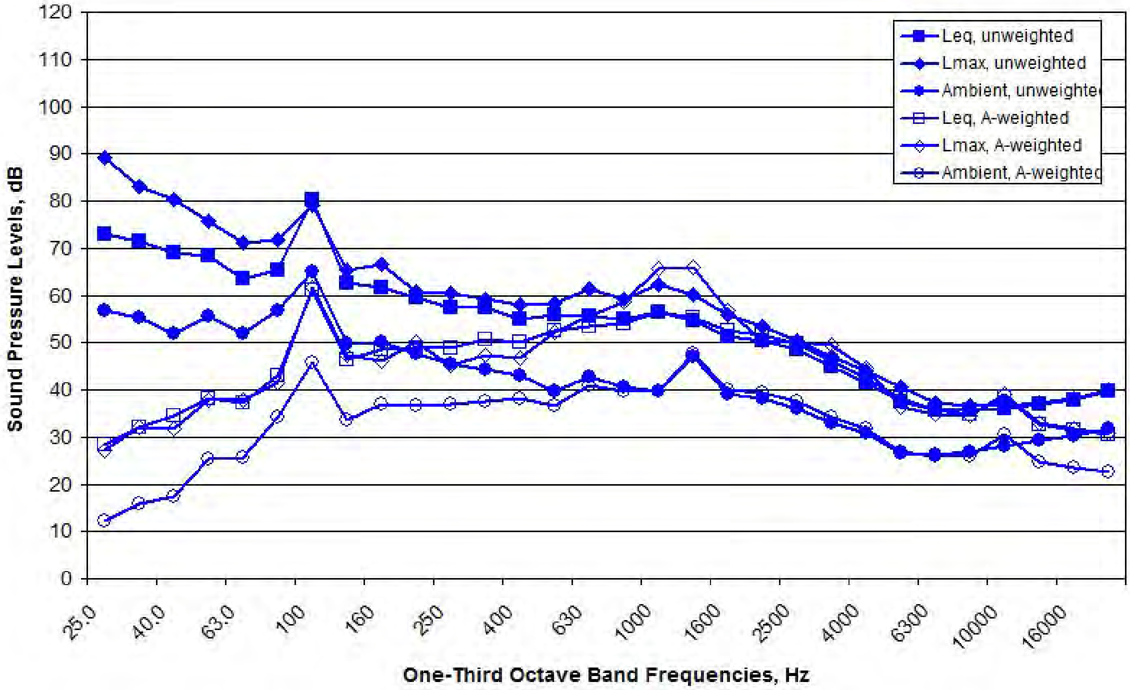

Figure C298. Average One-second Unweighted and A-weighted Spectral Data Measured at the WRA Location during W10, 14:53-14:58, on October 21, 2011

NO DATA AVAILABLE

Figure C299. Average One-second Unweighted and A-weighted Spectral Data Measured at the AB-NO Location during W10, 14:53-14:58, on October 21, 2011

NO DATA AVAILABLE

Figure C300. Average One- second Unweighted and A-weighted Spectral Data Measured at the AB-SO Location during W10, 14:53-14:58, on October 21, 2011

W1

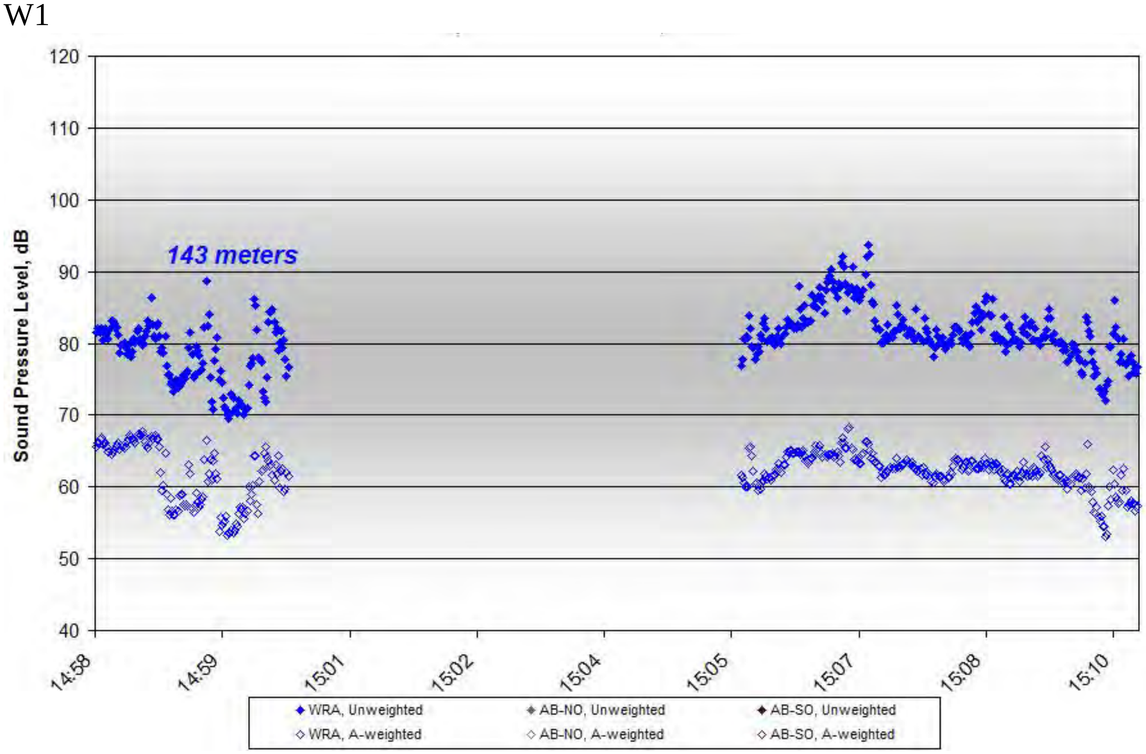

Figure C301. One-second Unweighted and A-weighted Leq Level Data at W1, 14:58-15:09, on October 21, 2011

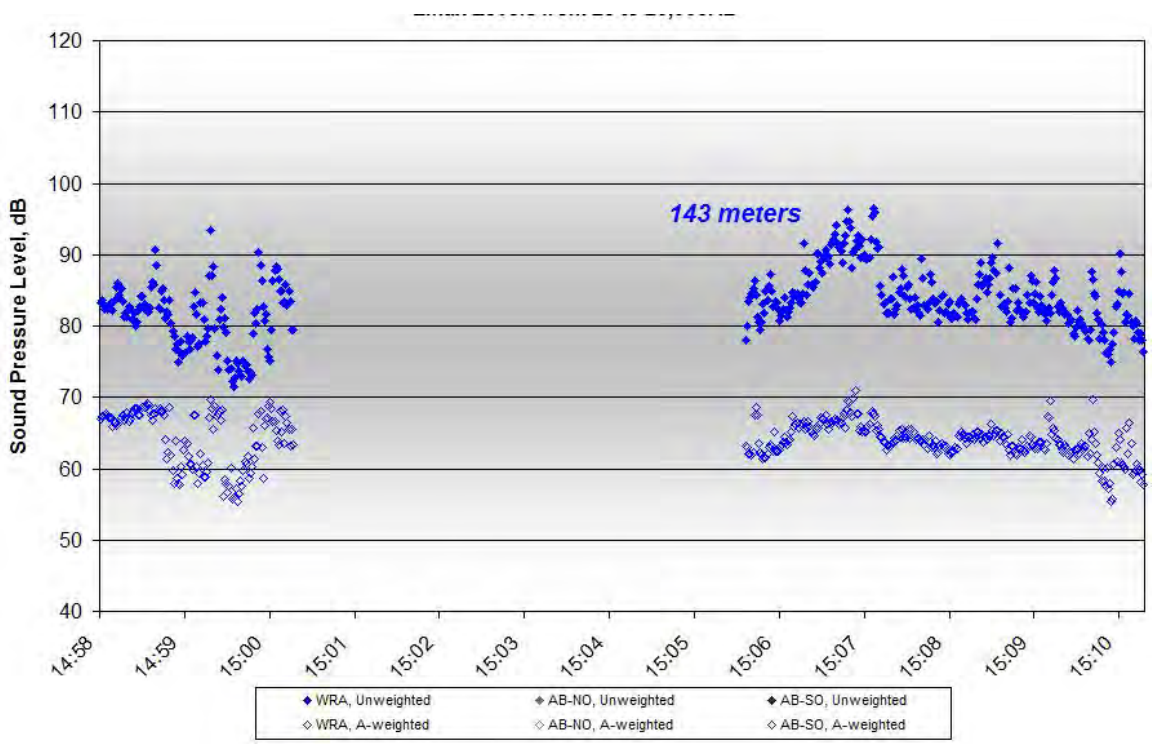

Figure C302. One-second Unweighted and A-weighted Lmax Level Data at W1, 14:58-15:09, on October 21, 2011

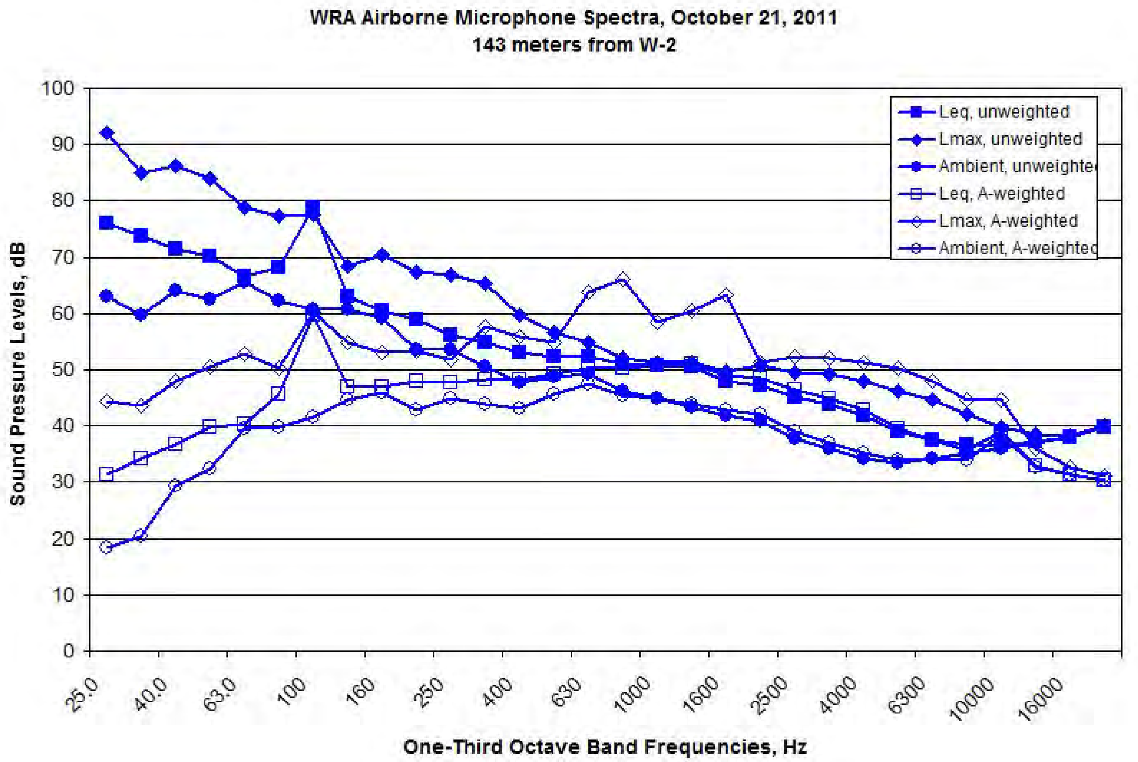

Figure C303. Average One-second Unweighted and A-weighted Spectral Data Measured at the WRA Location during W1, 14:58-15:09, on October 21, 2011

NO DATA AVAILABLE

Figure C304. Average One-second Unweighted and A-weighted Spectral Data Measured at the AB-NO Location during W1, 14:58-15:09, on October 21, 2011

NO DATA AVAILABLE

Figure C305. Average One- second Unweighted and A-weighted Spectral Data Measured at the AB-SO Location during W1, 14:58-15:09, on October 21, 2011

W2

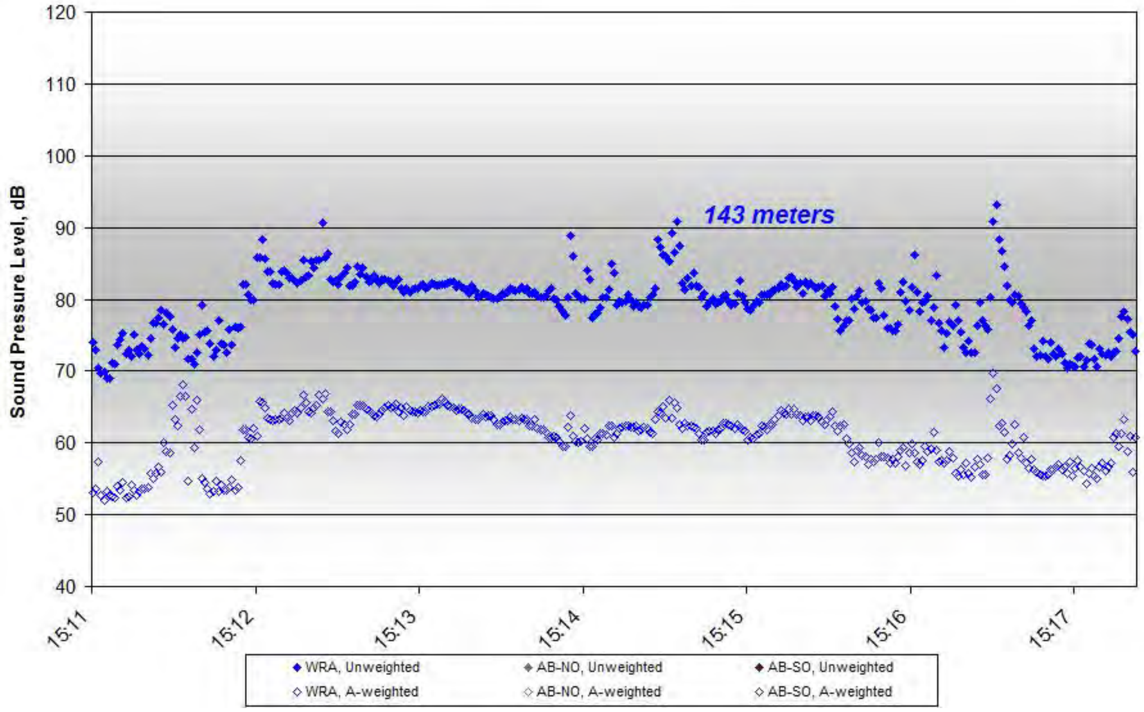

Figure C306. One-second Unweighted and A-weighted Leq Level Data at W2, 15:11-15:15, on October 21, 2011

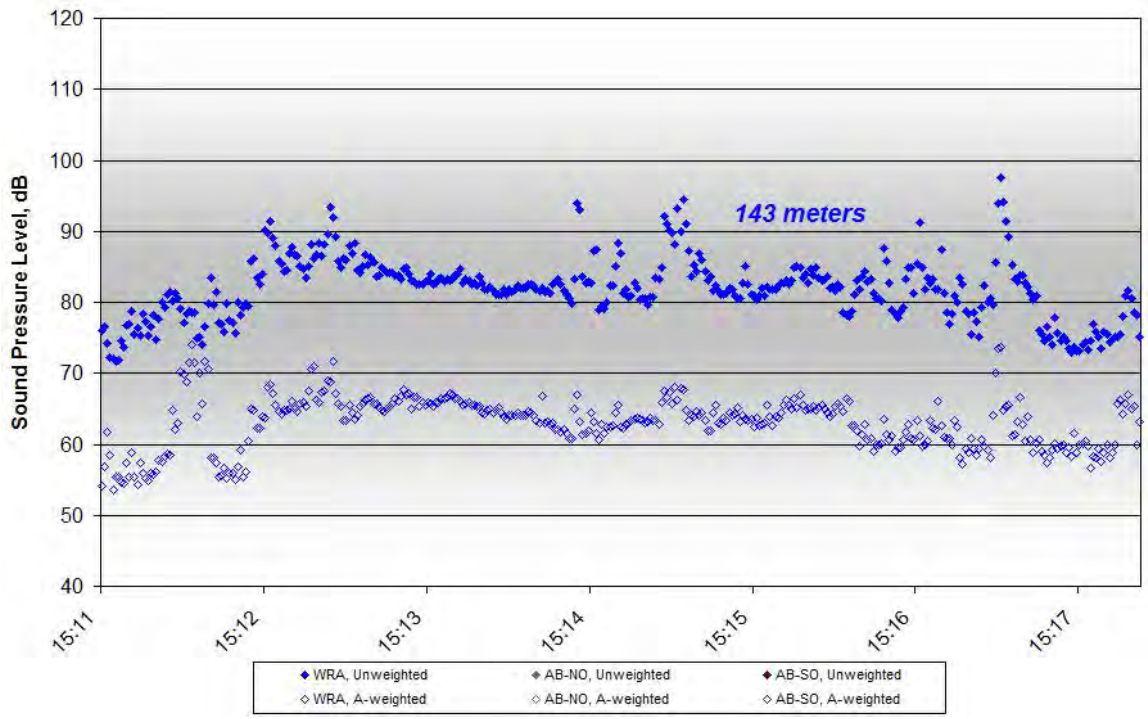

Figure C307. One-second Unweighted and A-weighted Lmax Level Data at W2, 15:11-15:15, on October 21, 2011

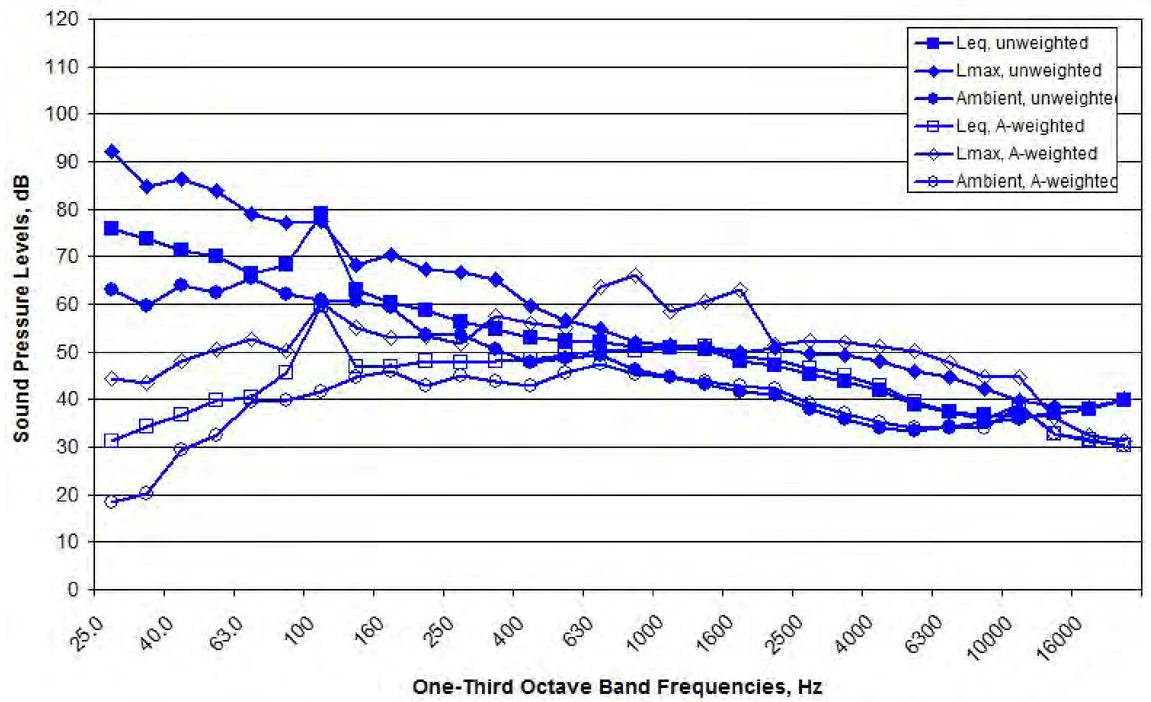

Figure C308. Average One-second Unweighted and A-weighted Spectral Data Measured at the WRA Location during W2, 15:11-15:15, on October 21, 2011

NO DATA AVAILABLE

Figure C309. Average One-second Unweighted and A-weighted Spectral Data Measured at the AB-NO Location during W2, 15:11-15:15, on October 21, 2011

NO DATA AVAILABLE

Figure C310. Average One- second Unweighted and A-weighted Spectral Data Measured at the AB-SO Location during W2, 15:11-15:15, on October 21, 2011

W3

NO DATA AVAILABLE

Figure C311. One-second Unweighted and A-weighted Leq Level Data at W3, 15:37-15:39, on October 21, 2011

NO DATA AVAILABLE

Figure C312. One-second Unweighted and A-weighted Lmax Level Data at W3, 15:37-15:39, on October 21, 2011

NO DATA AVAILABLE

Figure C313. Average One-second Unweighted and A-weighted Spectral Data Measured at the WRA Location during W3, 15:37-15:39, on October 21, 2011

NO DATA AVAILABLE

Figure C314. Average One-second Unweighted and A-weighted Spectral Data Measured at the AB-NO Location during W3, 15:37-15:39, on October 21, 2011

NO DATA AVAILABLE

Figure C315. Average One- second Unweighted and A-weighted Spectral Data Measured at the AB-SO Location during W3, 15:37-15:39, on October 21, 2011

W4

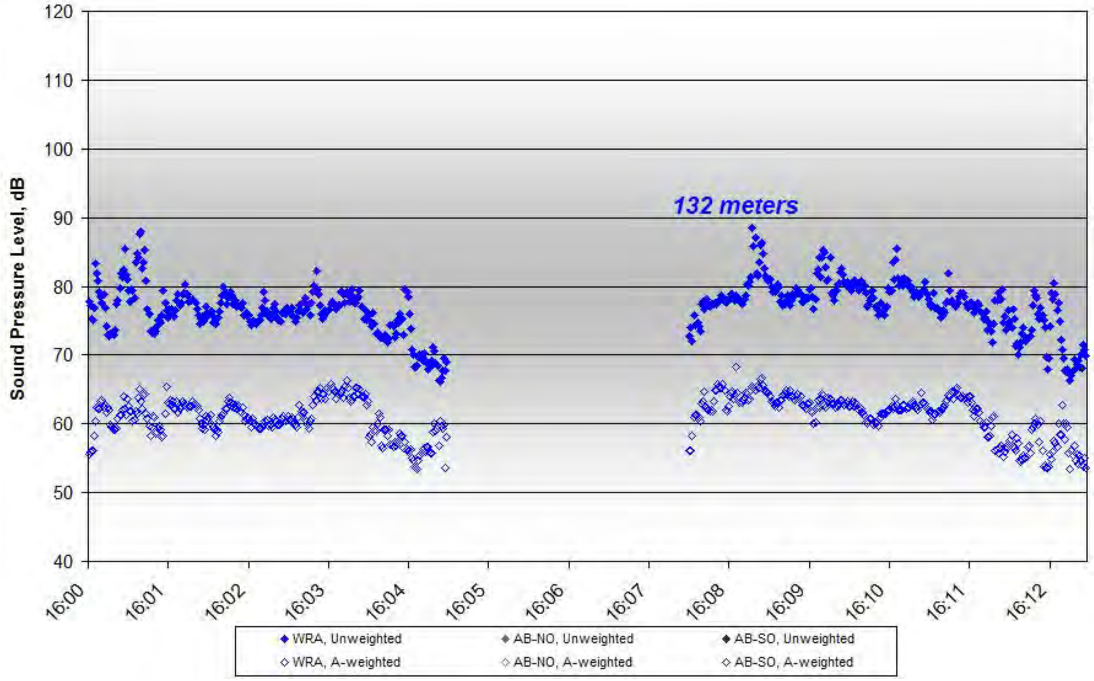

Figure C316. One-second Unweighted and A-weighted Leq Level Data at W4, 16:00-16:11, on October 21, 2011

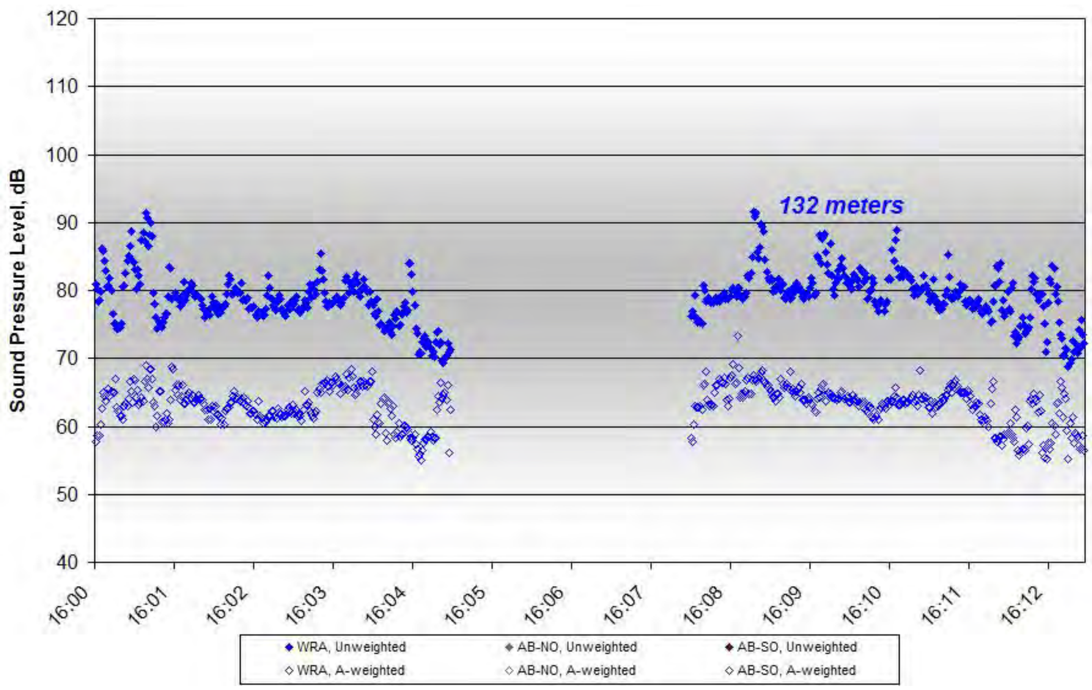

Figure C317. One-second Unweighted and A-weighted Lmax Level Data at W4, 16:00-16:11, on October 21, 2011

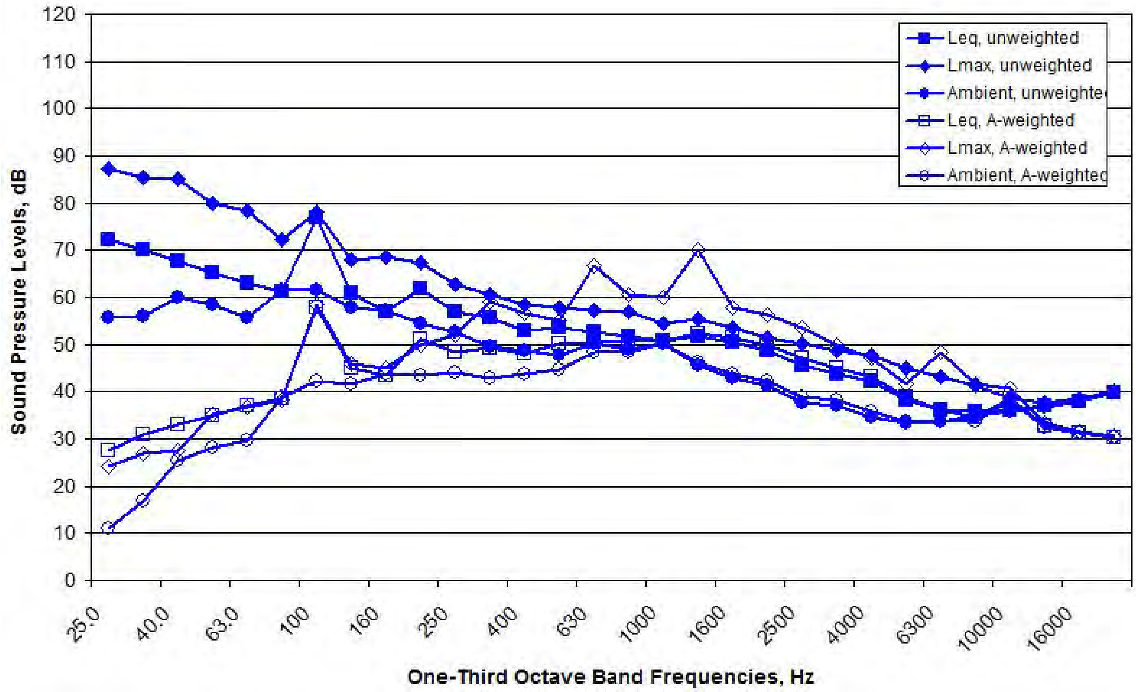

Figure C318. Average One-second Unweighted and A-weighted Spectral Data Measured at the WRA Location during W4, 16:00-16:11, on October 21, 2011

NO DATA AVAILABLE

Figure C319. Average One-second Unweighted and A-weighted Spectral Data Measured at the AB-NO Location during W4, 16:00-16:11, on October 21, 2011

NO DATA AVAILABLE

Figure C320. Average One- second Unweighted and A-weighted Spectral Data Measured at the AB-SO Location during W4, 16:00-16:11, on October 21, 2011

W5

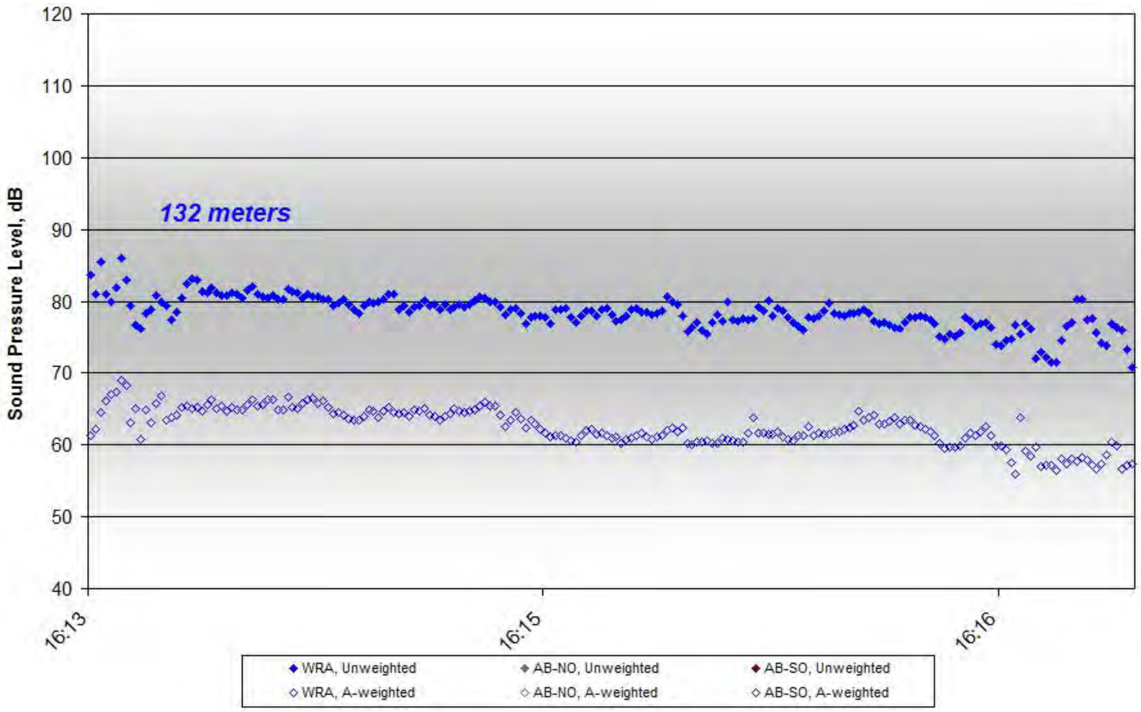

Figure C321. One-second Unweighted and A-weighted Leq Level Data at W5, 16:13-16:16, on October 21, 2011

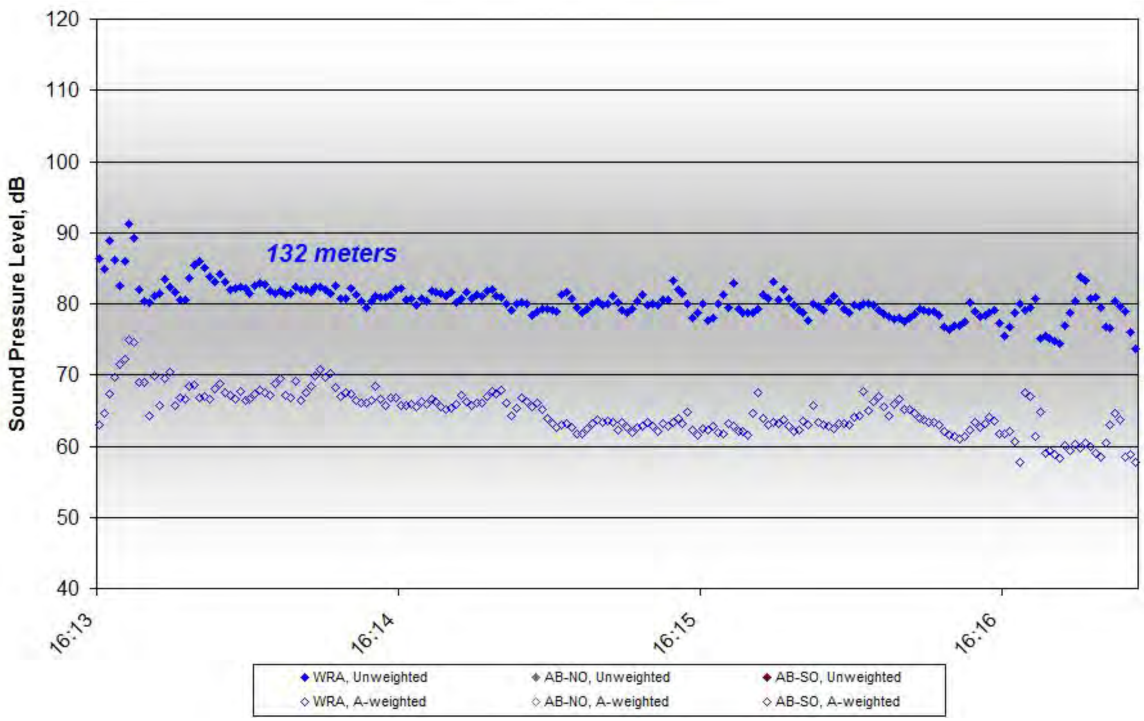

Figure C322. One-second Unweighted and A-weighted Lmax Level Data at W5, 16:13-16:16, on October 21, 2011

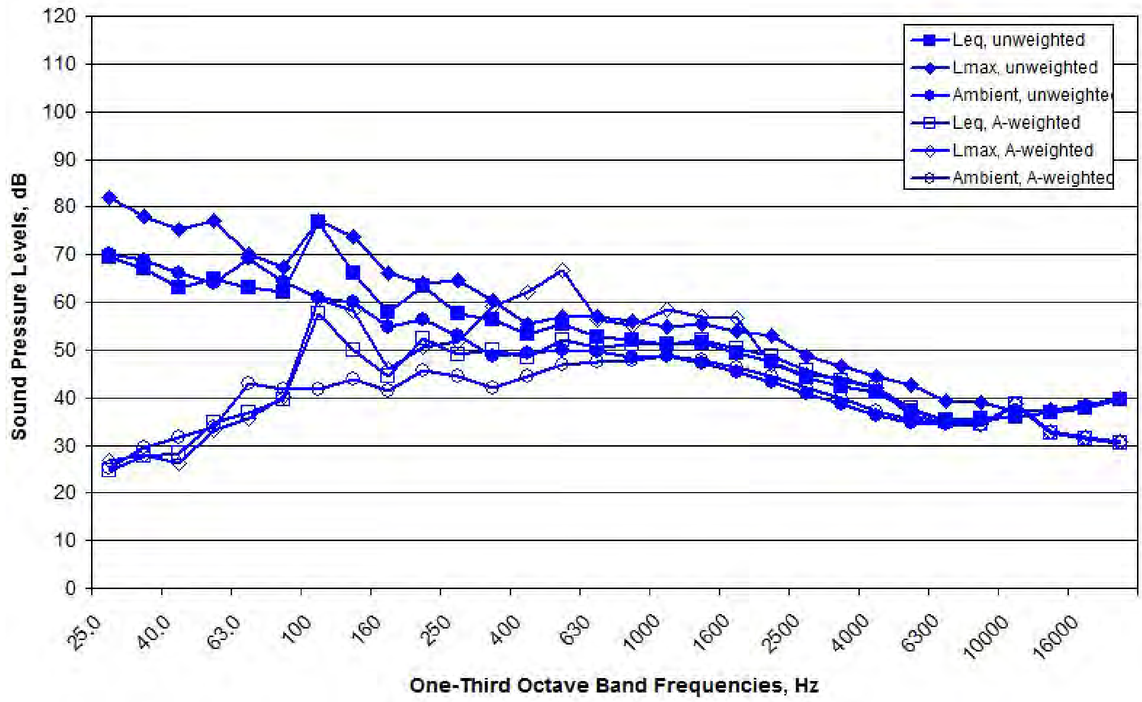

Figure C323. Average One-second Unweighted and A-weighted Spectral Data Measured at the WRA Location during W5, 16:13-16:16, on October 21, 2011

NO DATA AVAILABLE

Figure C324. Average One-second Unweighted and A-weighted Spectral Data Measured at the AB-NO Location during W-5, 16:13-16:16, on October 21, 2011

NO DATA AVAILABLE

Figure C325. Average One- second Unweighted and A-weighted Spectral Data Measured at the AB-SO Location during W5, 16:13-16:16, on October 21, 2011

W6

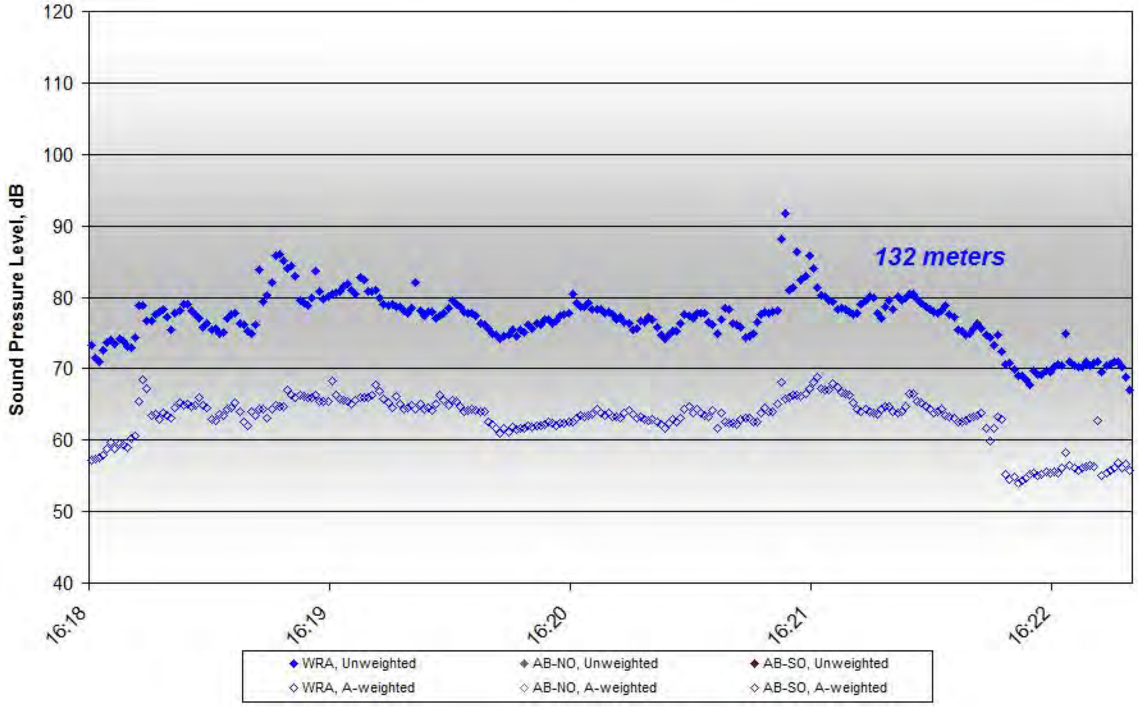

Figure C326. One-second Unweighted and A-weighted Leq Level Data at W6, 16:18-16:21, on October 21, 2011

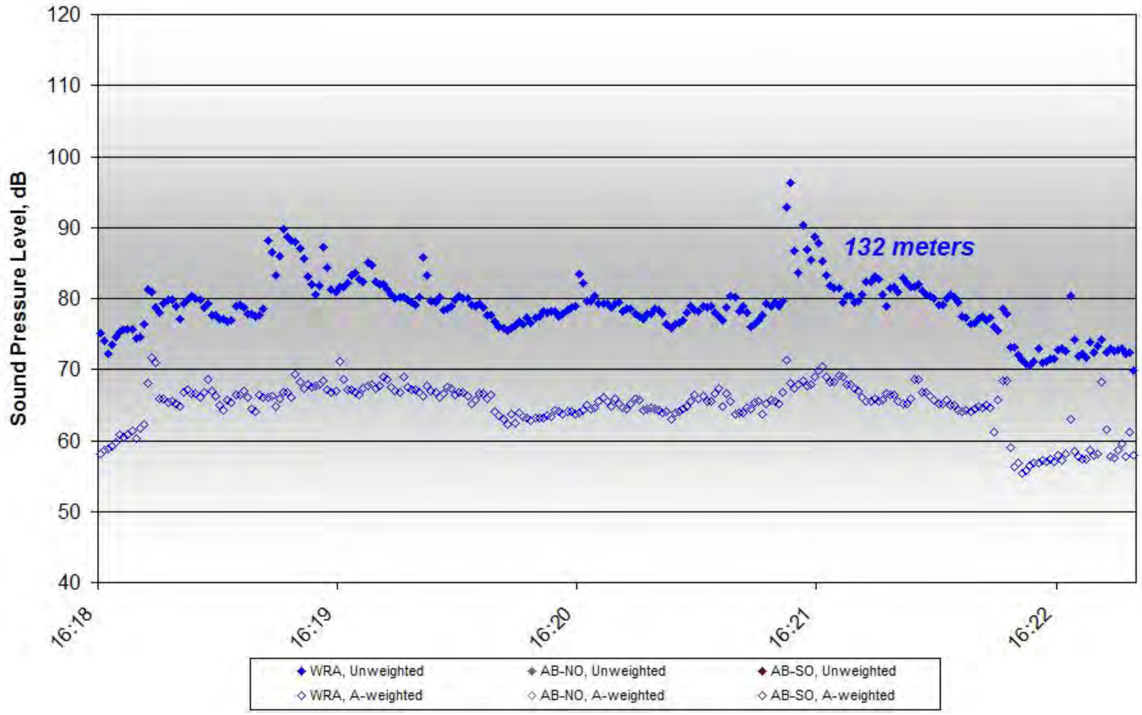

Figure C327. One-second Unweighted and A-weighted Lmax Level Data at W6, 16:18-16:21, on October 21, 2011

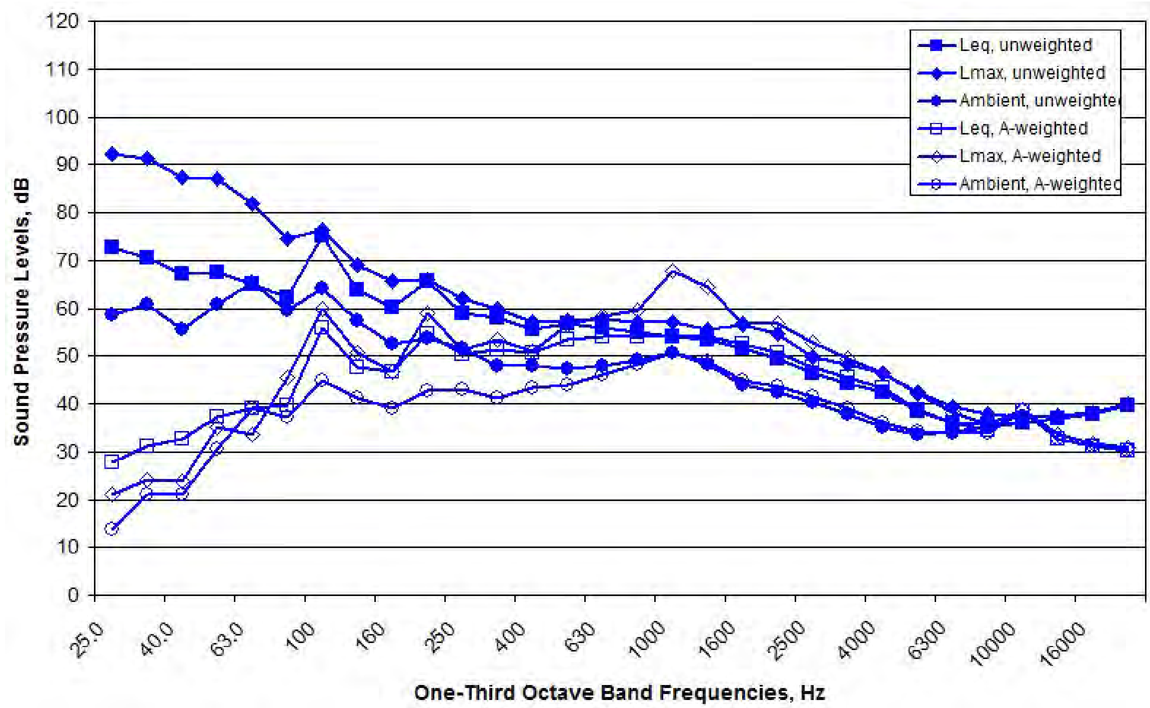

Figure C328. Average One-second Unweighted and A-weighted Spectral Data Measured at the WRA Location during W6, 16:18-16:21, on October 21, 2011

NO DATA AVAILABLE

Figure C329. Average One-second Unweighted and A-weighted Spectral Data Measured at the AB-NO Location during W6, 16:18-16:21, on October 21, 2011

NO DATA AVAILABLE

Figure C330. Average One- second Unweighted and A-weighted Spectral Data Measured at the AB-SO Location during W6, 16:18-16:21, on October 21, 2011

10/27/2011 – W7

NO DATA AVAILABLE

Figure C331. One-second Unweighted and A-weighted Leq Level Data at W7, 9:55-10:03, on October 27, 2011

NO DATA AVAILABLE

Figure C332. One-second Unweighted and A-weighted Lmax Level Data at W7, 9:55-10:03, on October 27, 2011

NO DATA AVAILABLE

Figure C333. Average One-second Unweighted and A-weighted Spectral Data Measured at the WRA Location during W7, 9:55-10:03, on October 27, 2011

NO DATA AVAILABLE

Figure C334. Average One-second Unweighted and A-weighted Spectral Data Measured at the AB-NO Location during W7, 9:55-10:03, on October 27, 2011

NO DATA AVAILABLE

Figure C335. Average One- second Unweighted and A-weighted Spectral Data Measured at the AB-SO Location during W7, 9:55-10:03, on October 27, 2011

W9

NO DATA AVAILABLE

Figure C336. One-second Unweighted and A-weighted Leq Level Data at W9, 10:05-10:08, on October 27, 2011

NO DATA AVAILABLE

Figure C337. One-second Unweighted and A-weighted Lmax Level Data at W9, 10:05-10:08, on October 27, 2011

NO DATA AVAILABLE

Figure C338. Average One-second Unweighted and A-weighted Spectral Data Measured at the WRA Location during W9, 10:05-10:08, on October 27, 2011

NO DATA AVAILABLE

Figure C339. Average One-second Unweighted and A-weighted Spectral Data Measured at the AB-NO Location during W9, 10:05-10:08, on October 27, 2011

NO DATA AVAILABLE

Figure C340. Average One- second Unweighted and A-weighted Spectral Data Measured at the AB-SO Location during W9, 10:05-10:08, on October 27, 2011

W12

NO DATA AVAILABLE

Figure C341. One-second Unweighted and A-weighted Leq Level Data at W12, 10:12-10:18, on October 27, 2011

NO DATA AVAILABLE

Figure C342. One-second Unweighted and A-weighted Lmax Level Data at W12, 10:12-10:18, on October 27, 2011

NO DATA AVAILABLE

Figure C343. Average One-second Unweighted and A-weighted Spectral Data Measured at the WRA Location during W12, 10:12-10:18, on October 27, 2011

NO DATA AVAILABLE

Figure C344. Average One-second Unweighted and A-weighted Spectral Data Measured at the AB-NO Location during W12, 10:12-10:18, on October 27, 2011

NO DATA AVAILABLE

Figure C345. Average One- second Unweighted and A-weighted Spectral Data Measured at the AB-SO Location during W12, 10:12-10:18, on October 27, 2011

W11

NO DATA AVAILABLE

Figure C346. One-second Unweighted and A-weighted Leq Level Data at W11, 10:21-10:26, on October 27, 2011

NO DATA AVAILABLE

Figure C347. One-second Unweighted and A-weighted Lmax Level Data at W11, 10:21-10:26, on October 27, 2011

NO DATA AVAILABLE

Figure C348. Average One-second Unweighted and A-weighted Spectral Data Measured at the WRA Location during W11, 10:21-10:26, on October 27, 2011

NO DATA AVAILABLE

Figure C349. Average One-second Unweighted and A-weighted Spectral Data Measured at the AB-NO Location during W11, 10:21-10:26, on October 27, 2011

NO DATA AVAILABLE

Figure C350. Average One- second Unweighted and A-weighted Spectral Data Measured at the AB-SO Location during W11, 10:21-10:26, on October 27, 2011

EX3, 11:24-11:25

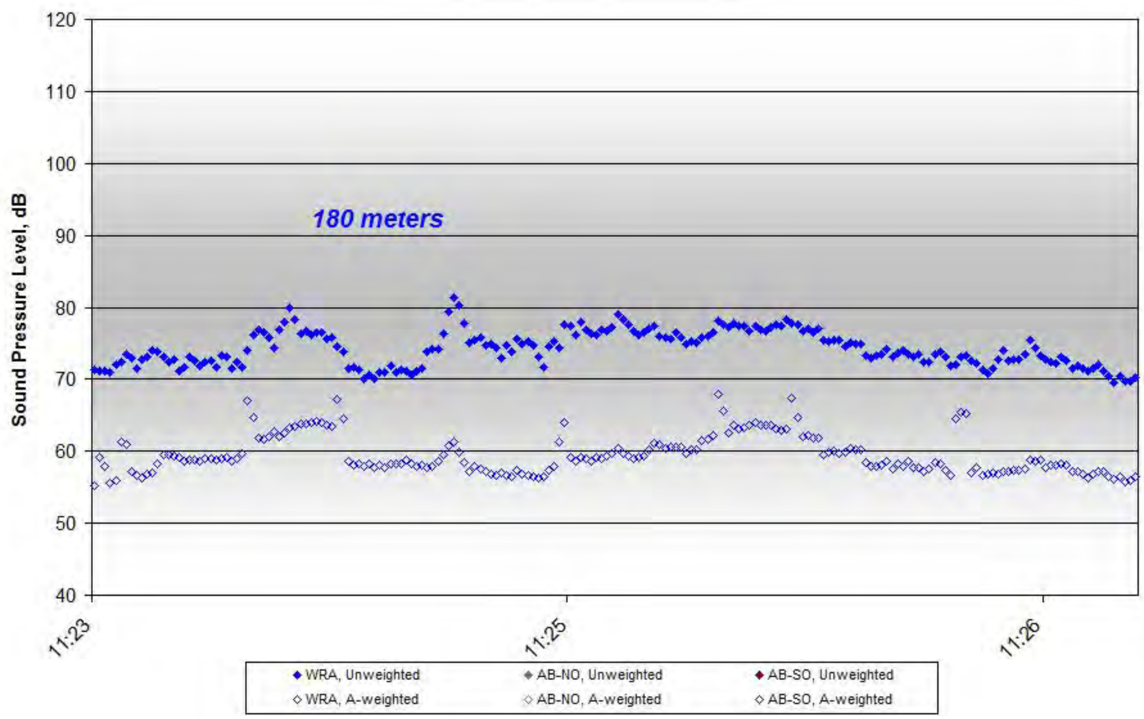

Figure C351. One-second Unweighted and A-weighted Leq Level Data at EX3, 11:24-11:25, on October 27, 2011

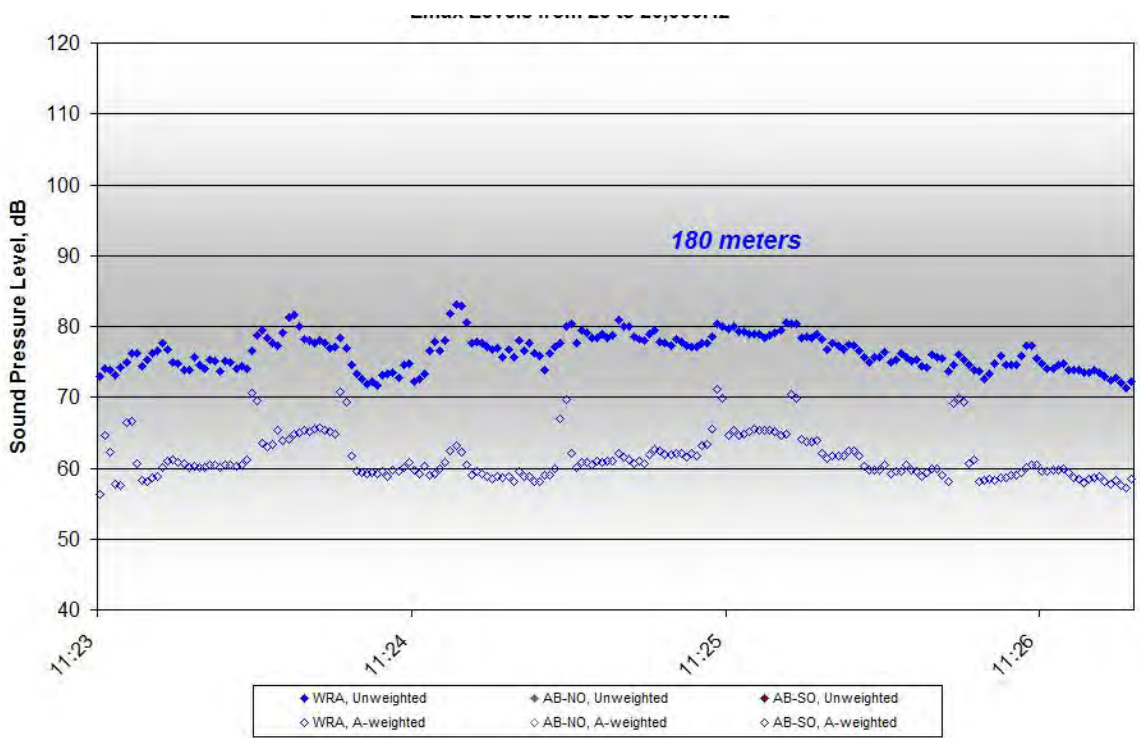

Figure C352. One-second Unweighted and A-weighted Lmax Level Data at EX3, 11:24-11:25, on October 27, 2011

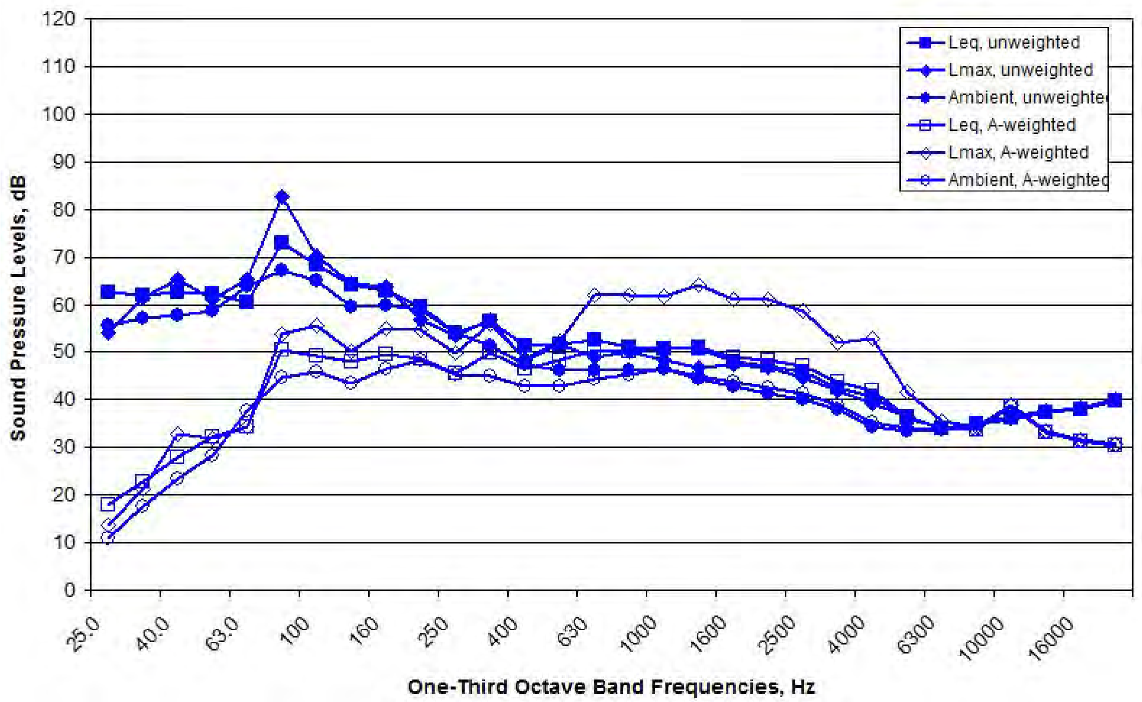

Figure C353. Average One-second Unweighted and A-weighted Spectral Data Measured at the WRA Location during EX3, 11:24-11:25, on October 27, 2011

NO DATA AVAILABLE

Figure C354. Average One-second Unweighted and A-weighted Spectral Data Measured at the AB-NO Location during EX3, 11:24-11:25, on October 27, 2011

NO DATA AVAILABLE

Figure C355. Average One- second Unweighted and A-weighted Spectral Data Measured at the AB-SO Location during EX3, 11:24-11:25, on October 27, 2011

EX4

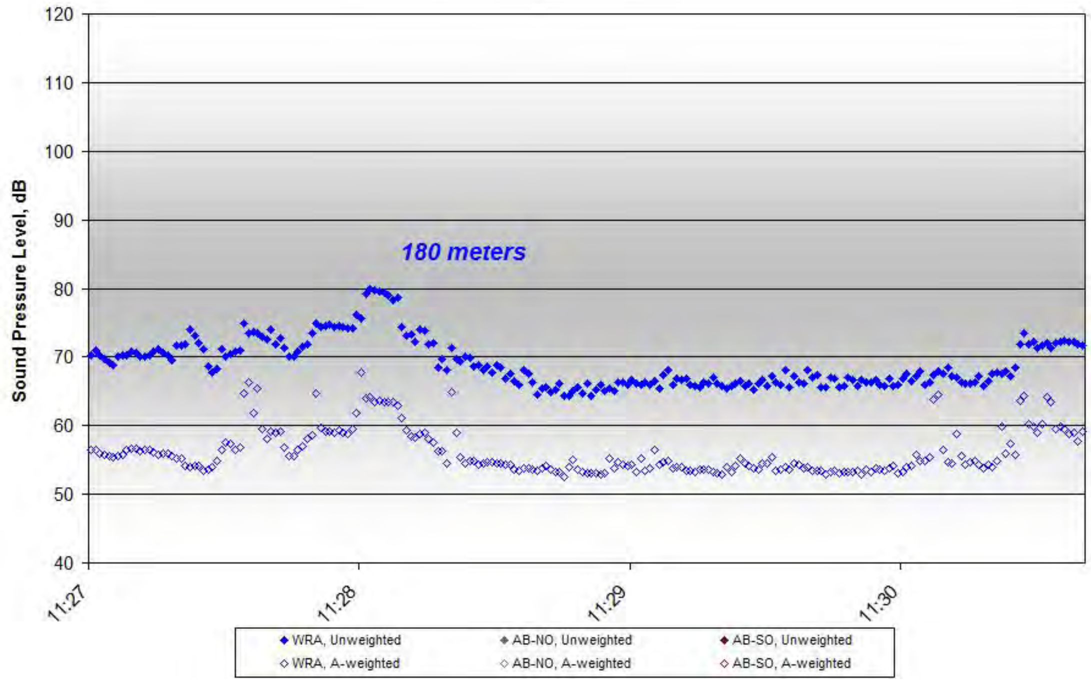

Figure C356. One-second Unweighted and A-weighted Leq Level Data at EX4, 11:28-11:28, on October 27, 2011

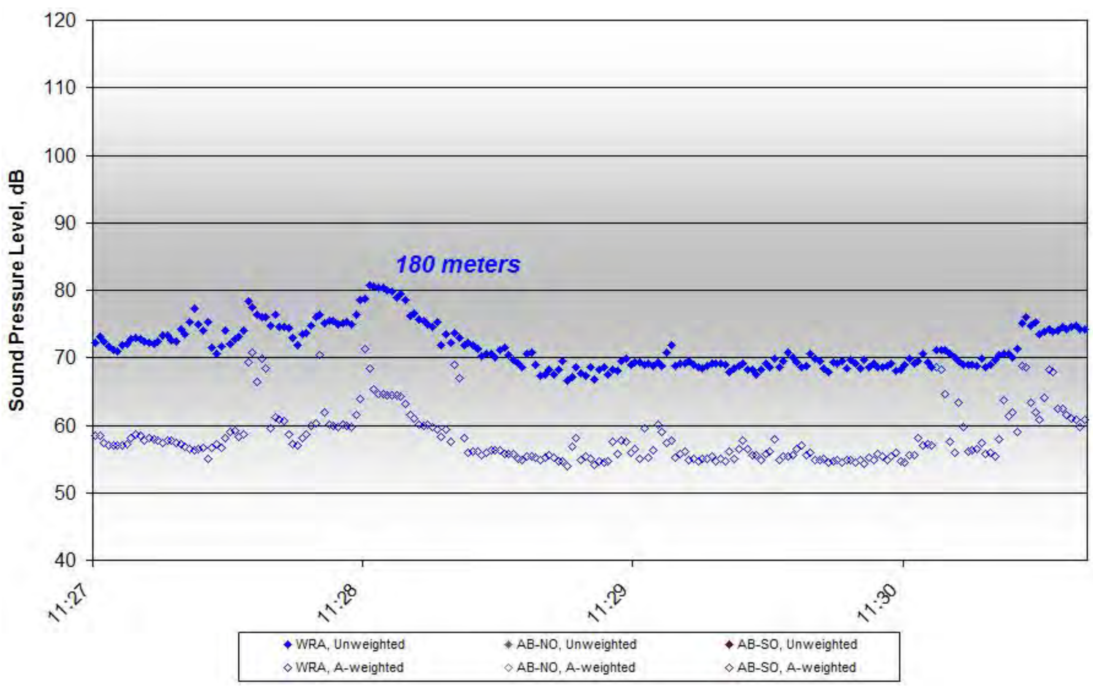

Figure C357. One-second Unweighted and A-weighted Lmax Level Data at EX4, 11:28-11:28, on October 27, 2011

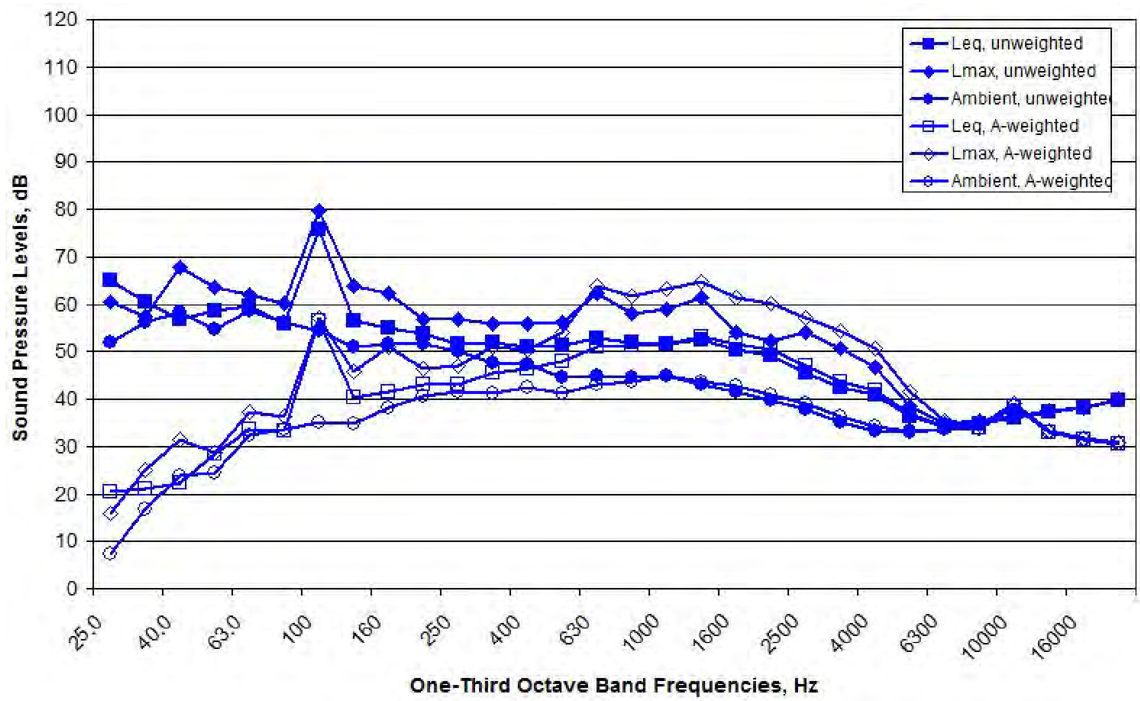

Figure C358. Average One-second Unweighted and A-weighted Spectral Data Measured at the WRA Location during EX4, 11:28-11:28, on October 27, 2011

NO DATA AVAILABLE

Figure C359. Average One-second Unweighted and A-weighted Spectral Data Measured at the AB-NO Location during EX4, 11:28-11:28, on October 27, 2011

NO DATA AVAILABLE

Figure C360. Average One- second Unweighted and A-weighted Spectral Data Measured at the AB-SO Location during EX4, 11:28-11:28, on October 27, 2011

EX3, 11:31-11:31

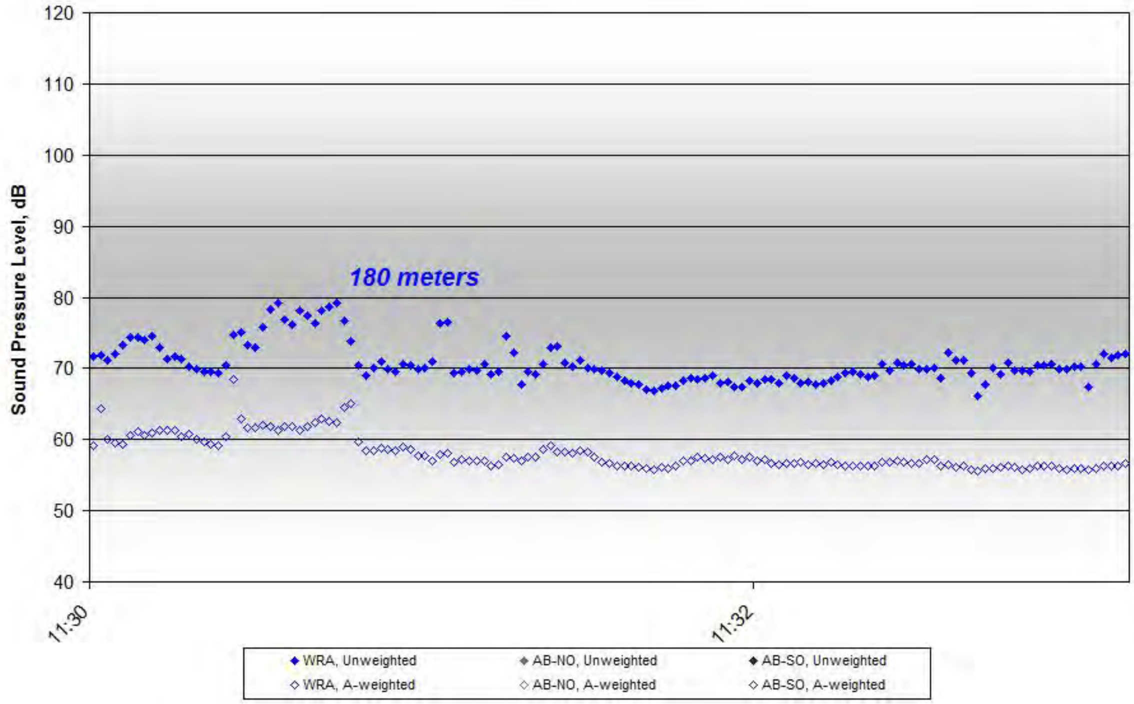

Figure C361. One-second Unweighted and A-weighted Leq Level Data at EX3, 11:31-11:31, on October 27, 2011

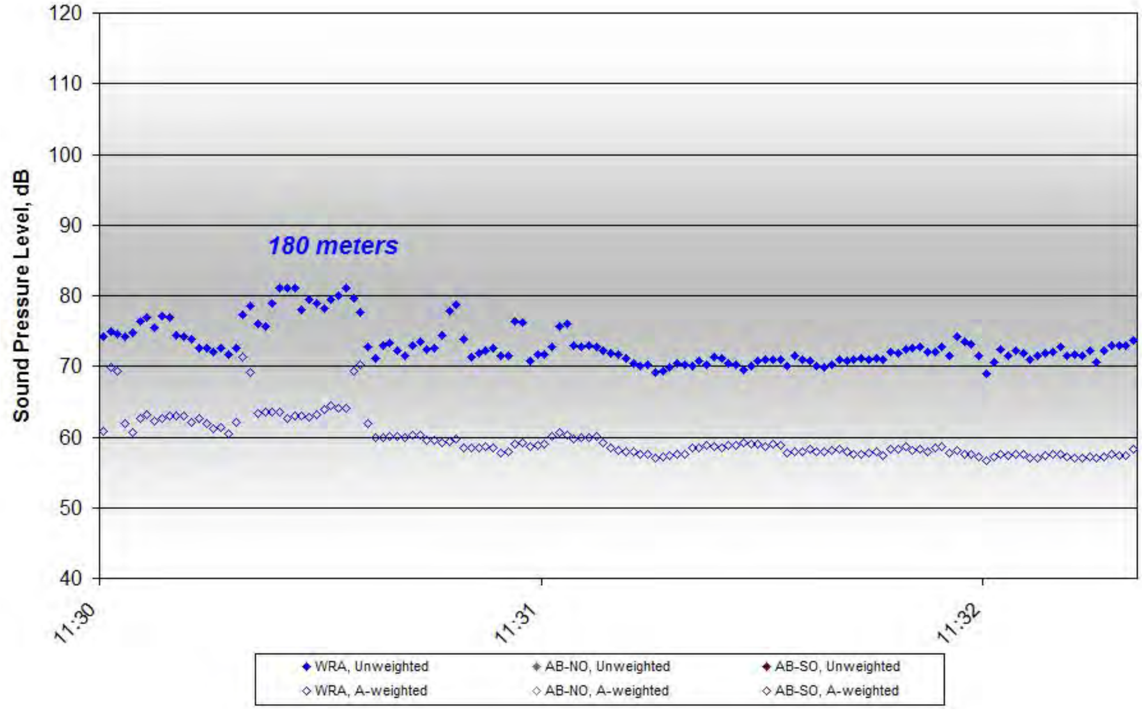

Figure C362. One-second Unweighted and A-weighted Lmax Level Data at EX3, 11:31-11:31, on October 27, 2011

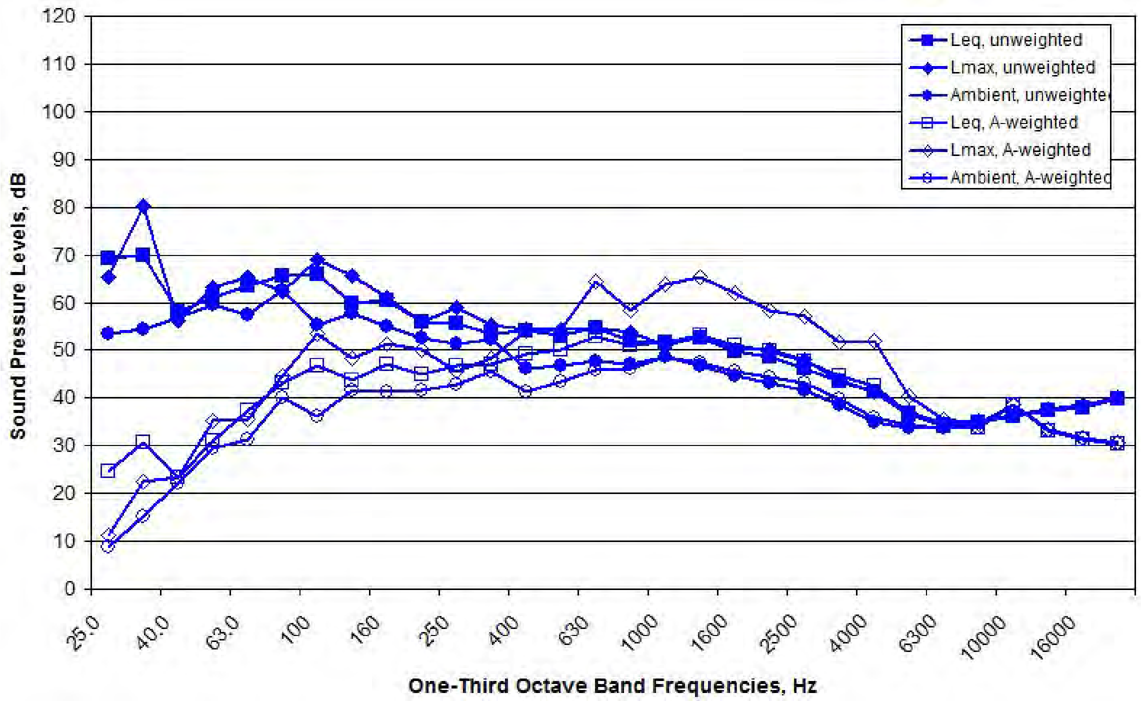

Figure C363. Average One-second Unweighted and A-weighted Spectral Data Measured at the WRA Location during EX3, 11:31-11:31, on October 27, 2011

NO DATA AVAILABLE

Figure C364. Average One-second Unweighted and A-weighted Spectral Data Measured at the AB-NO Location during EX3, 11:31-11:31, on October 27, 2011

NO DATA AVAILABLE

Figure C365. Average One- second Unweighted and A-weighted Spectral Data Measured at the AB-SO Location during EX3, 11:31-11:31, on October 27, 2011

EX5

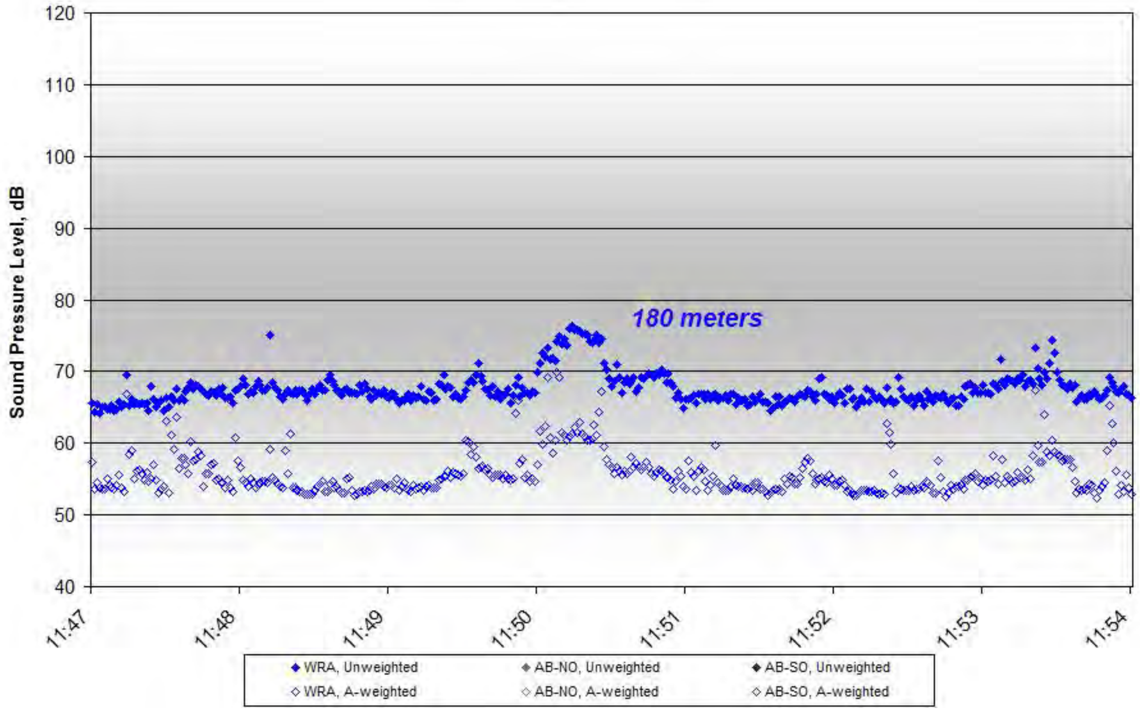

Figure C366. One-second Unweighted and A-weighted Leq Level Data at EX5, 11:49-11:52, on October 27, 2011

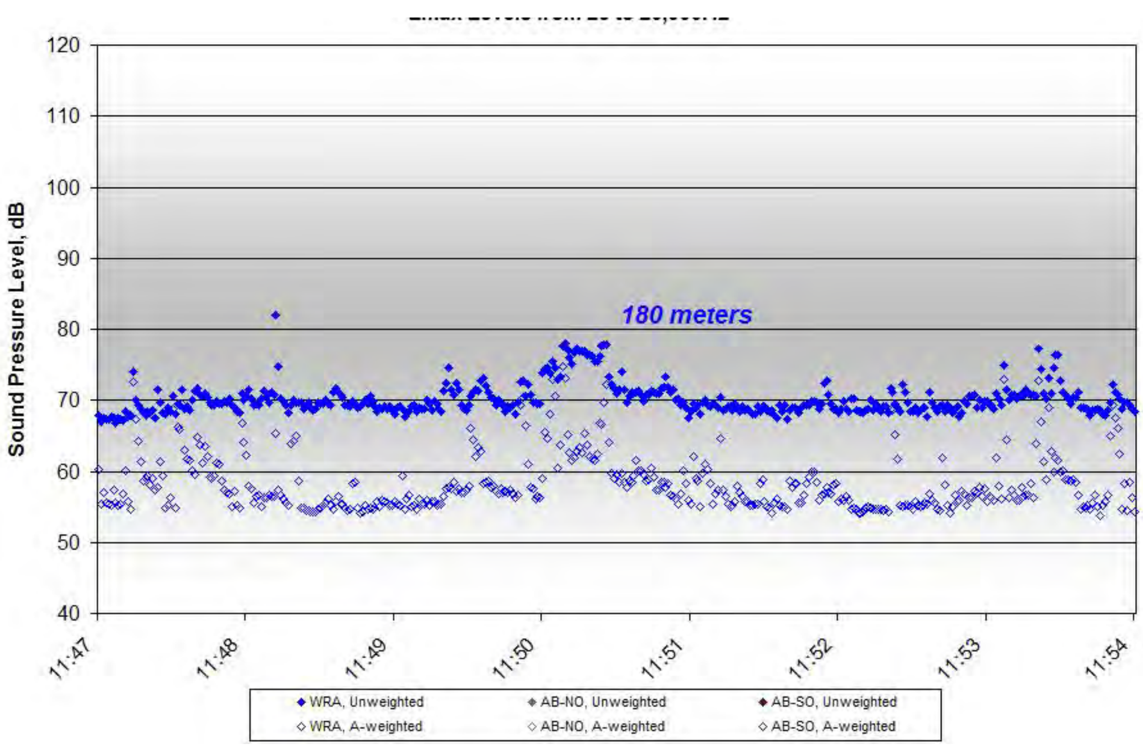

Figure C367. One-second Unweighted and A-weighted Lmax Level Data at EX5, 11:49-11:52, on October 27, 2011

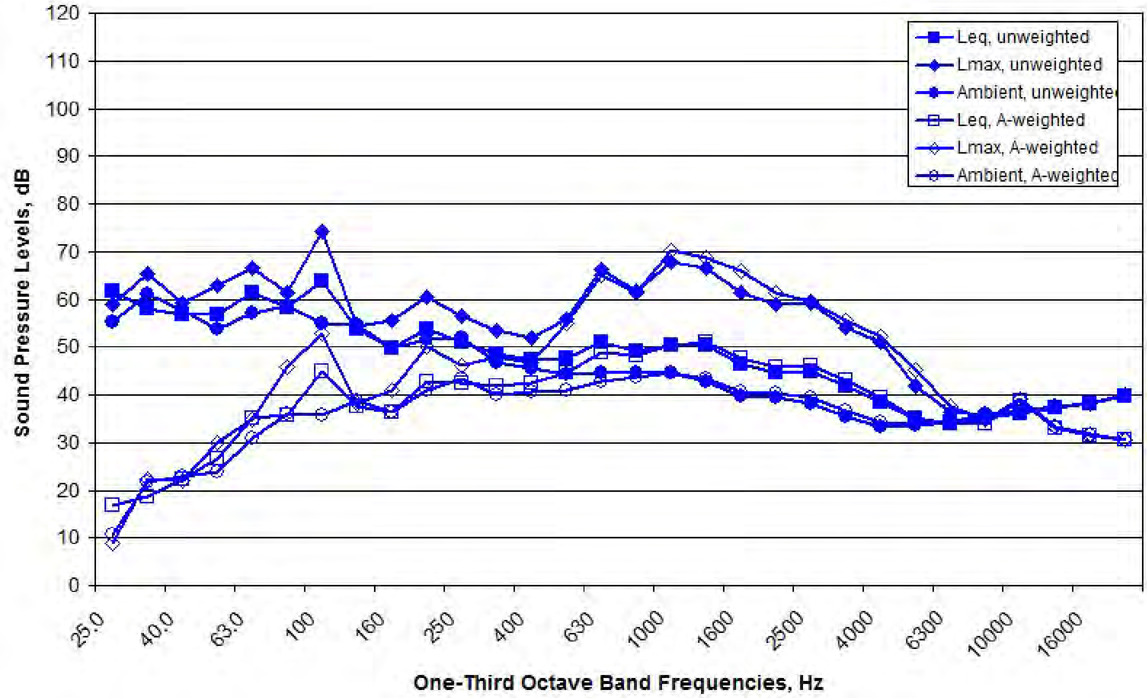

Figure C368. Average One-second Unweighted and A-weighted Spectral Data Measured at the WRA Location during EX5, 11:49-11:52, on October 27, 2011

NO DATA AVAILABLE

Figure C369. Average One-second Unweighted and A-weighted Spectral Data Measured at the AB-NO Location during EX5, 11:49-11:52, on October 27, 2011

NO DATA AVAILABLE

Figure C370. Average One- second Unweighted and A-weighted Spectral Data Measured at the AB-SO Location during EX5, 11:49-11:52, on October 27, 2011

EX6

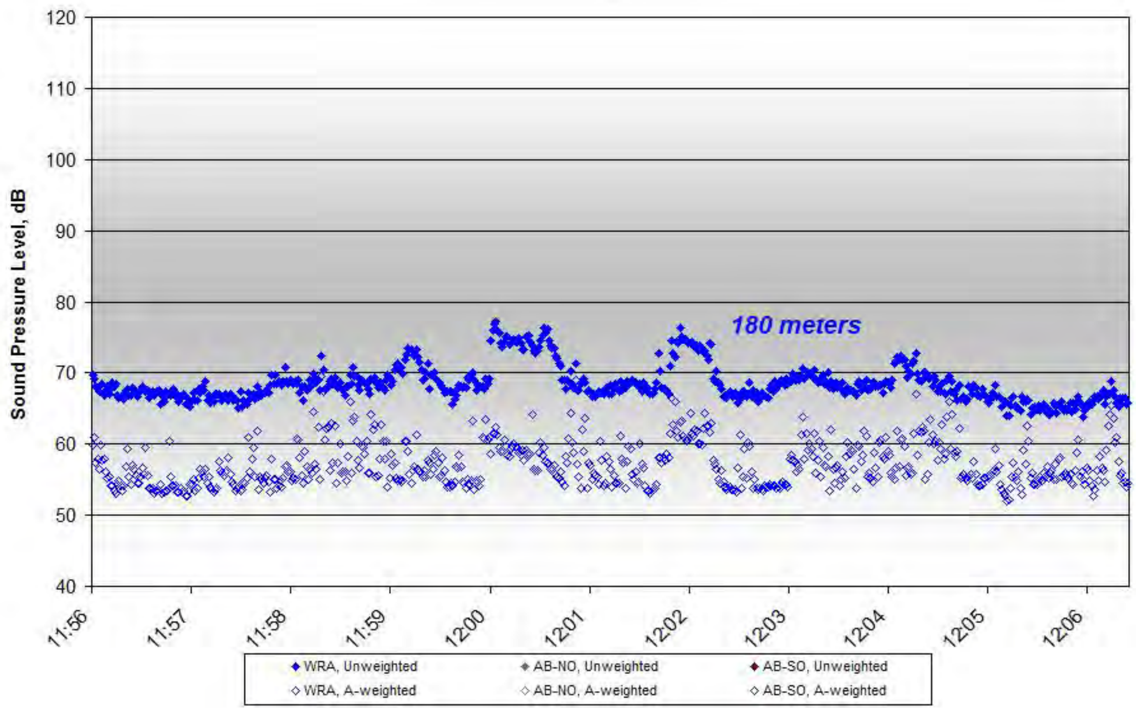

Figure C371. One-second Unweighted and A-weighted Leq Level Data at EX6, 11:58-12:02, on October 27, 2011

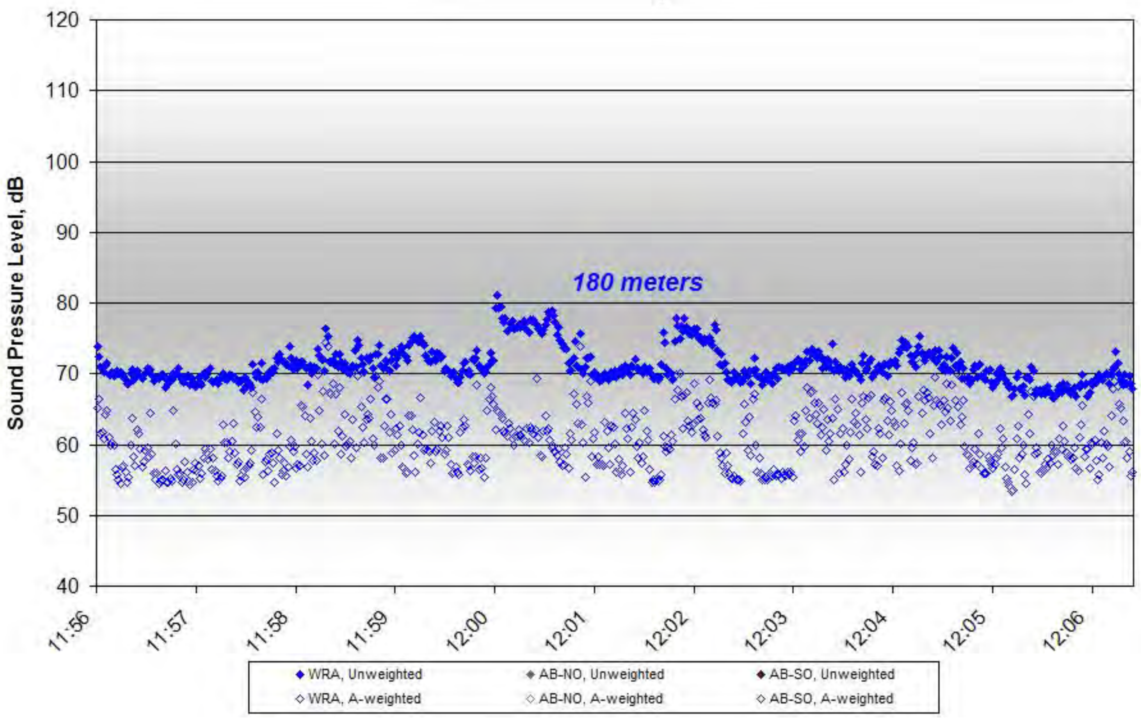

Figure C372. One-second Unweighted and A-weighted Lmax Level Data at EX6, 11:58-12:02, on October 27, 2011

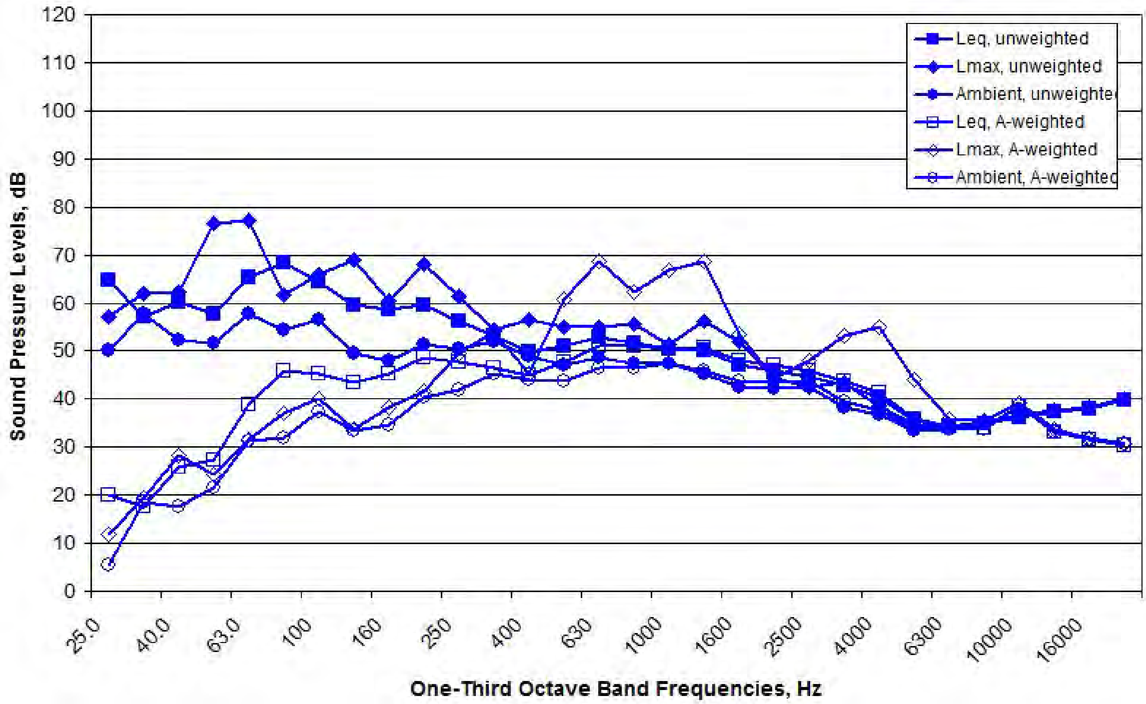

Figure C373. Average One-second Unweighted and A-weighted Spectral Data Measured at the WRA Location during EX6, 11:58-12:02, on October 27, 2011

NO DATA AVAILABLE

Figure C374. Average One-second Unweighted and A-weighted Spectral Data Measured at the AB-NO Location during EX6, 11:58-12:02, on October 27, 2011

NO DATA AVAILABLE

Figure C375. Average One- second Unweighted and A-weighted Spectral Data Measured at the AB-SO Location during EX6, 11:58-12:02, on October 27, 2011

APPENDIX D

RMDT Final Acoustic Report

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April 27, 2012

Jayme Newbigging, P.E.
Manson Construction and Engineering Company
5209 East Marginal Way South
Seattle, WA 98134

Re: Hydroacoustic Monitoring
Production Piles: PP30"x0.50" Steel Pipe Piles, APE 200-6 Vibratory Driver/Extractor
Falsework Piles: PP16", APE 200-6 Vibratory Driver/Extractor
Explosives Handling Wharf No. 1, October 4 - 27, 2011
Naval Base Kitsap, Bangor, Washington RMDT Job No. 11F35

Dear Ms. Newbigging,

This report presents underwater sound level measurements collected during construction activity at the project referenced above. Robert Miner Dynamic Testing, Inc. (RMDT) completed these measurements at your request.

The scope of the work completed by RMDT consisted of underwater sound level measurements at a distance of approximately 33 ft from the piles being installed or extracted. We understand that additional acoustic measurements at greater distances were completed by other project participants. For this project a vibratory driver/extractor was employed; impact pile driving did not occur during the subject work for Explosives Handling Wharf No. 1.

FIELD AND ANALYSIS DETAILS

Steel Pipe Piles

A total of 45 open-end steel piles were subject to installation or extraction during this project. This 45 pile total consisted of 28 new permanent piles installed, 8 temporary falsework piles installed, and 9 piles extracted. The new permanent production piles were 30" OD (Outside Diameter) open ended steel piles with wall thicknesses of 0.50" and lengths of 140 to 190 ft. Production piles supporting the new walkway are denoted by the prefix “W” and replacement wharf plies are denoted by the prefix “EHW”. Some original walkway piles were extracted, and those and other piles were driven as temporary and falsework piles. The falsework and temporary piles were typically 16" OD open-end steel piles with variable and undetermined wall thickness and may be denoted by the prefix “RX” or “EX” in the pile name.

APE 200-6 Vibratory Driver/Extractor

The 200-6 Vibratory Driver/Extractor was manufactured by American Piledriving Equipment, Inc (APE). Manufacturers specifications for the APE 200-6 indicate that the hammer can operate with a 6600 in-lb eccentric moment and a driving force of up to 542 kips. The operational frequency and power are variable and the frequency ranges from 900 to 1800 oscillations per minute (15 to 30 Hz). The APE was attached to 30" OD permanent piles by means of two caisson clamps.

Measurement Sequence

Field measurements began on October 4 and ended October 27, 2011. Production Piles were advanced using the APE 200-6 vibratory driver until a dense substrate was encountered. Penetration into this dense substrate was indicted by an increase in driving resistance. Production

Piles were advanced into this substrate to satisfy inspection criteria regarding penetration and penetration rate (ft/minute). NAVFAC established the Production Pile inspection acceptance criteria on the basis of foundation requirements and geotechnical engineering analyses. Falsework and temporary piles were monitored during both extraction and driving.

A total of 45 piles were driven or extracted on this project. Selected test and pile details, including the pile identification, dates of acoustic measurements and duration of driving are listed within the result summaries given in Appendix A. For additional information on the piles, installation machinery and the installation sequence please refer the pile layouts given in Appendix A or to the pile driving logs, field notes, and submittals prepared by other project participants.

On a very limited number of brief driving episodes RMDT did not collect usable acoustic data. On October 4 the hammer was placed on a 30" OD steel production pile, but the hammer did not operate and no acoustic data was recorded. On October 5 the hammer operated on Piles EHW 14 (BP1) and EHW 15 (BP2) for less than 13 seconds and 45 seconds, respectively; no usable acoustic data was collected by RMDT for those two piles on that occasion. On October 7 Piles RX6 and RX7 were each extracted for approximately 10 seconds and we do not have acoustic data for those events. On October 10 Pile W6 was subject to a very brief continuation of driving, and we do not have acoustic data for that period of less than 30 seconds. On October 14 during the driving of Pile EHW3 our hydrophone at mid-depth did not record usable data. Other than the exceptions noted above it is our opinion that the data we present herein covers all the periods of hammer operation for EHW1 during the period October 4 to October 27.

Measurement Equipment

Underwater sound levels were measured using hydrophones located approximately 33 ft (10 m) from the centerline of each pile. For all tests one hydrophone was approximately 3 ft (1m) above the mud-line and one hydrophone was at a depth equal to approximately one-half the water depth, or typically 30 to 40 ft. The position of the hydrophones was maintained using a line extending upward from a small steel anchor, with the hydrophones and associated signal cable raised or lowered on that anchor line. The steel anchor and anchor line were typically deployed from the existing wharf so as to make possible an unobstructed “line of sight” between the pile and each hydrophone, with minimal potential reflecting or blocking surfaces underwater within a distance of at least 40 ft of the hydrophone.

The hydrophones were Reson Type 4013 units with integral cable connected to a solid state charge converter and an integrating sound level meter. The charge converters were Model 422E12 (10.0 mV/pC) manufactured by PCB Piezontronics, Inc. The integrating sound level meters were Brüel & Kjær 2270 units having constant current line drive circuitry to power a charge converter and piezoelectric hydrophone. The Brüel & Kjær 2270 meter operated with a sampling rate of approximately 44kHz, and provided coverage for sound frequencies up to 20 kHz.

The equipment field configuration allowed direct field verification of proper function and calibration by means of a calibrated piston-phone sound source. Each measurement day the configuration and instrument settings were checked using our Gras Model 42AC piston-phone with a hydrophone adaptor. The piston-phone was field checked, in turn, using a Class 1 Sound Level Meter with a ½" microphone. This recording equipment was manned by an RMDT field engineer during all data collection.

Analyses

During field use the Brüel & Kjær 2270 units logged the values of the peak unweighted sound level, Lzpeak, and the unweighted Root Mean Square values, Lzeq, at one second intervals. These logged values are the basis for results given in this report and calculation of such results is discussed further below.

The *Peak Sound Pressure Level*, Lzpeak, is the peak "instantaneous" level obtained from the maximum excursion (either positive or negative) from the ambient pressure. Although the pressure is quantified in units such as Pascals or psi, sound level metrics, such as Lzpeak metric, are typically expressed using the non-dimensional and logarithmic decibel scale. The formula for converting a measured peak pressure to the Lzpeak metric is given below:

$$\text{Lzpeak} = 20\ \text{Log}(p/p_{ref}),$$

where p is the measured peak in Pascals (Pa) divided by a customary reference pressure, p_{ref}. For sound in water 1 µPa is the customary reference pressure. Thus, signals for which the peak pressure is 1000, 3163, or 10,000 Pa would have Peak metric values of 180 dB, 190 dB, or 200 dB, respectively. For this calculation the "peak" pressure is the peak of the absolute value of measured pressures.

The *Root Mean Square Sound Pressure Level* for a selected time period is the integral of the square of the varying pressure values within that period, divided by the length of the time period. This root mean square value is then converted to dB re: 1µPa.

During the field work for this project it was not known what time integration period equal to or greater than 1 second would be of final interest. Thus, field data was collected to obtain RMS values at 1 second intervals such that results for any larger time period could be computed from the field data. For a time interval of 1 second the unweighted RMS and Lzeq values are equal.

This report presents the RMS values for 1 second intervals, $\text{RMS}_{1\ sec}$, as logged in the field as Lzeq, and also for a 10 second interval, $\text{RMS}_{10\ sec}$, as requested by the Navy subsequent to the field work. The 10 second RMS values were computed by appropriate linear and logarithmic operations on the results for 1 second intervals. Such operations involved converting the 1 second data from dB back to pressure units (Pa squared-seconds), averaging ten sequential values, dividing by p_{ref} squared, and then taking the square root of that result, with final conversion to dB. This process provides a direct and correct calculation of $\text{RMS}_{10\ sec}$ from a series of ten sequential $\text{RMS}_{1\ sec}$ values.

PRESENTATION of MEASUREMENT RESULTS

Vibratory Driving on Production Piles

Appendix A contains a summary of the field results for each pile or test session using data reduction based on an RMS time interval of 1 second. Appendix B contains a parallel summary of results for an RMS interval of 10 seconds. In Appendix A and Appendix B the results for 30" OD Production Piles are grouped separately from the results for temporary or falsework piles.

Appendix C contains graphical "Session Logs" for each session of acoustic monitoring, with a numerical summary table for each Session Log. Separate Session Logs are given for the hydrophone located 1 m above the mud-line, and for the hydrophone at mid-depth. Separate Session Logs are also given for the 1 second and 10 second RMS integration periods.

During a typical session of acoustic monitoring there are recorded periods when the hammer is either active or inactive and the may be periods when the hammer is inactive and the recording equipment is also in standby mode. Because our recording setup was fully attended during routine operation, we often discontinued the recording by placing the instruments into standby mode if interruptions to driving were expected to be lengthy.

The Session Logs in Appendix C depict the variation of activity and associated sound pressure metrics. The multiple “soft starts” and the periods with the hammer active or inactive are apparent in these logs. Also depicted is the relatively similar pattern over time of the Lzpeak and RMS metric values, with a somewhat regular shift between the two metrics. During hammer operation on twenty-seven Production piles the Lzpeak values were typically between 13 to 19 dB higher than the RMS levels.

After reviewing the available data, particularly the Session Logs, we judged that it would be useful and necessary to separate and summarize the results for times when the hammer was either operating or idle. For most data sets at this site a 1 second RMS value of 143 dB appeared to be a suitable criterion for automated separation of the data with the hammer operating from the data with the hammer idle. In our opinion this approach and associated criterion value provided an effective estimate of the hammer operating time in each session, and also provided a basis for excluding from the averaged “Hammer Active” metrics any measurements made while the hammer was inactive.

Tables 1 and 2 summarize the results measured for twenty-seven 30" OD steel Production. The results in Tables 1 and 2 are for 1 second and 10 second RMS integration periods, respectively. Considering data for individual sessions of monitoring on Production Piles the average RMS values for a 10 second integration period were 166 and 165 dB near the bottom and at mid-column, respectively. These values were practically equivalent to the average RMS vales for a 1 second interval. The statistics for unweighted Peak sound levels, Lzpeak, differ somewhat in Tables 1 and 2 because the results in Table 1 are the averages for all 1 second values with the hammer operating, whereas the results in Table 2 are the averages of largest single value occurring within 10 second intervals.

Table 1. Summary of RMS Values, 1 Second Integration Interval, 30" OD Permanent Piles

Mean Duration	Duration StdDev	Hydrophone Location	Mean Lzpeak (dB)	LZpeak StdDev (dB)	Mean RMS (dB)	RMS StdDev (dB)
Vibratory Hammer Active (RMS $_{1\ sec}$>143 dB)						
10 min (a)	6 min	1 Meter off the Bottom	179	8	167	6
		Mid Water Column	179	8	165	6
Vibratory Hammer Inactive (RMS $_{1\ sec}$<143 dB)						
11 min (b)	NA	1 Meter off the Bottom	143	8	132	8
		Mid Water Column	140	8	128	7

Notes:
(a) The tabulated mean duration of Hammer Active generally excludes periods when the hammer was stopped or paused for any reason. Statistics for the RMS and Lzpeak metrics also generally exclude such interruptions, and are for the time periods used to sum up the duration value.
(b) The tabulated mean duration for Hammer Inactive is approximately the difference between the total recording time and the time the hammer was operating; this is shown only to give the approximate amount of time in this acoustic sample; actual non-recorded standby time may be significantly longer.

Table 2. Summary of RMS Values, 10 Second Integration Interval, 30" OD Permanent Piles

Mean Duration	Duration StdDev	Hydrophone Location	Mean Lzpeak (dB)	LZpeak StdDev (dB)	Mean RMS (dB)	RMS StdDev (dB)
Vibratory Hammer Active ($RMS_{1\ sec}$>143 dB)						
10 min	6 min	1 Meter off the Bottom	182	8	166	6
		Mid Water Column	182	8	165	6
Vibratory Hammer Inactive ($RMS_{1\ sec}$<143 dB)						
11 min	NA	1 Meter off the Bottom	147	6	132	5
		Mid Water Column	144	7	128	4

Vibratory Driving on Temporary and Falsework Piles

Tables 3 and 4 summarize the results measured on the falsework and temporary piles. The results for 1 second and 10 second RMS integration times were practically identical. For periods with the hammer active on falsework piles the mean RMS values is 162 dB. Thus, the results for the predominantly 16" OD falsework piles yielded RMS values approximately 3 to 4 dB lower than the 30" OD Production piles. However, for the falsework piles the shift between the RMS and Lzpeak values is typically between 14 to 23 dB. In our opinion the increased spread between the RMS and Lzpeak for falsework piles probably results primarily from the manner in which the smaller piles are clamped by the hammer, and the resulting increased “chatter” between the pile and the hammer’s caisson clamp.

Table 3. Summary of RMS Values, 1 Second Integration Interval, Falsework Piles

Mean Duration	Duration StdDev	Hydrophone Location	Mean Lzpeak (dB)	LZpeak StdDev (dB)	Mean RMS (dB)	RMS StdDev (dB)
Vibratory Hammer Active (RMS_1>143 dB)						
4 min	1 min	1 Meter off the Bottom	177	10	162	9
		Mid Water Column	178	10	162	8
Vibratory Hammer Inactive (RMS_1<143 dB)						
7 min	NA	1 Meter off the Bottom	142	6	129	7
		Mid Water Column	140	7	128	6

Table 4. Summary of RMS Values, 10 Second Integration Interval, Falsework Piles						
Mean Duration	Duration StdDev	Hydrophone Location	Mean Lzpeak (dB)	LZpeak StdDev (dB)	Mean RMS (dB)	RMS StdDev (dB)
Vibratory Hammer Active (RMS_1>143 dB)						
4 min	1 min	1 Meter off the Bottom	182	6	161	9
		Mid Water Column	183	9	162	8
Vibratory Hammer Inactive (RMS_1<143 dB)						
7 min	NA	1 Meter off the Bottom	147	6	129	6
		Mid Water Column	146	8	129	6

Level A Shut Down Zones

The Mitigation and Monitoring plan calls for determination of shutdown zones which incompass all areas where underwater sound levels (re: 1µPa) reach Level A Harassment criteria for marine mammals. For pinnipeds and cetaceans the Level A Harassment criteria were specified as 190 and 180 dB RMS, respectively. Within the data for this project with 30" OD production piles the mean RMS levels at the 10 m location are 167 and 165 dB at the mid depth and lower depth hydrophones, respectively. Thus, the isopleths for Level A Harassment criteria are determined to be less than 10 m from the pile.

Estimation of the approximate location of the Level A Harassment isopleths may be based on use of spreading loss analysis and extrapolation from the existing data to distances shorter than 10 m. For such analysis we use our measurements reported herein, and also the data given in a report for this project prepared by Illingworth and Rodkin, Inc (draft dated March 2012). The later report presents mean underwater sound levels (RMS, re: 1µPa) for various distances ranging from approximately 100 m to more than 1000 m. Using the mean results for each 30 Production Pile presented herein, and data from Illingworth and Rodkin for this project we have evaluated estimated distances from the pile for the 190 and 180 dB RMS isopleths. Figure 1 presents the combined field data with computed regression lines using all data for 30" OD Production Piles in EHW1. Figure 2 presents all EHW1 field data collected within the WRA, and regression lines computed for that data. Based on these regression data the computed 190 and 180 dB isopleths are not more than 3 m from the piles. This result includes extrapolation and certain assumptions regarding the character of geometric attenuation very near the pile source and may not be conservative. However, it is our opinion that these data support a conclusion that a distance of 10 m is a very conservative estimate of the location for the 190 and 180 db isopleths; mean RMS levels at 10 m were substantially lower than the Level A Harassment criteria for cetaceans and pinnipeds.

Sound Frequency Characteristics

Appendix D contains plots of the variation of sound energy with frequency using “third-octave” analysis. For these third-octave plots the energy within frequency bands equal to approximately 1/3 of an octave is computed separately for each such band, and the magnitude of energy within such bands is plotted against the frequency. Such third-octave plots provide information regarding sound pressure energy within certain ranges of frequency. For these representative plots we used data collected during driving of two different 30" OD Production Piles, driving on two different Falsework Piles, and extraction of one Falsework Pile. These third-octave plots indicate that during hammer operation the sound energy is generally distributed relatively uniformly for 1/3 octave intervals between approximately 80 or 100 Hz and 2000 Hz, and tends to reduce with distance from that approximate frequency span.

Background Sound Levels

On October 10 and 21, 2011 we collected daytime measurements of ambient levels while the pile driving equipment was not operating. The project scope did not include a detailed survey of background or ambient sound measurements; the results presented here were obtained using the equipment described above as configured for the pile driving monitoring, with a sampling rate of approximately 44 kHz. Appendix E contains "Session Logs" which graphically present the RMS and Lzpeak values over time within the two selected sets of background data. For each data set we present the RMS values for 1 second and 10 second intervals.

Based on qualitative observation of the ambient conditions, we characterize the period of background measurements on October 10 as a time of relatively stronger wind and tide with very modest levels of activity at the site. On October 21 the ambient conditions at the time of the measurements were characterized by very calm water surface and little apparent tidal current, with very modest levels of activity at the site. During collection of both data sets there was little or no activity on the pile driving barge used as a platform to deploy the hydrophones. However, because there was occasional construction site activity we judged that the best representation of the background level would be made if we removed from the averages any 1 second intervals having RMS values exceeding 143 dB. Background measurements recorded on October 21, 2012 were the quietest levels measured by RMDT on this project and may be representative of near minimum ambient sound pressure levels at this site near floating construction equipment.

Table 5 summarizes the results for these two selected background data sets. During the data set on October 10 the mean RMS value near the mud-line was 133 and 134 dB for the 1 second and 10 second RMS intervals, respectively . On October 21 the apparent background levels were approximately 9 to 10 dB lower, averaging 124 dB near the mud-line.

Table 5. Background Sound Pressure Levels

Vibratory Driving Statistics	Hydrophone Location	Mean Lzpeak (dB)	LZpeak StdDev	Mean RMS (dB)	RMS StdDev
October 10, 2011					
(1 Sec RMS < 143dB)	1 Meter off the Bottom	144	3	133	4
(10 Sec RMS < 143dB)	1 Meter off the Bottom	147	4	134	3
October 21, 2011					
(1 Sec RMS < 143dB)	1 Meter off the Bottom	137	7	124	5
(10 Sec RMS < 143dB)	1 Meter off the Bottom	143	10	124	4

Appendix E also contains plots of the variation of sound energy with frequency using "third-octave" bands. In these data sets the energy is relatively consistent in each band up to approximately 400 to 700, Hz, but tends to reduce to relatively low levels at frequencies above 2000 to 4000 Hz. This pattern of sound energy distribution differs from that given in Appendix D for measurements made during hammer operation.

Additional data on routine background levels is contained in the Session Logs that appear in Appendix C. Within the session logs the periods when the hammer is not operating are clearly apparent. Numerical data summaries for each session log are given, with separation into values falling above and below 143 dB RMS. For the values below 143 dB RMS and which may be taken to reflect an inactive hammer, the average RMS values are typically between 125 and 130 dB.

Note that these measurements with the inactive hammer were made while a variety of routine site activity was taking place nearby and are thus expected to present the background levels in the presence of moderate marine and construction activity at this site.

It was a pleasure working with Manson Construction Company and the other participants on this project. Please do not hesitate to contact us if you have any questions for us regarding this work we performed for this report.

Sincerely,

Robert F. Miner, P.E.
Principal

Andrew Banas
Staff Engineer

Robert Miner Dynamic Testing, Inc

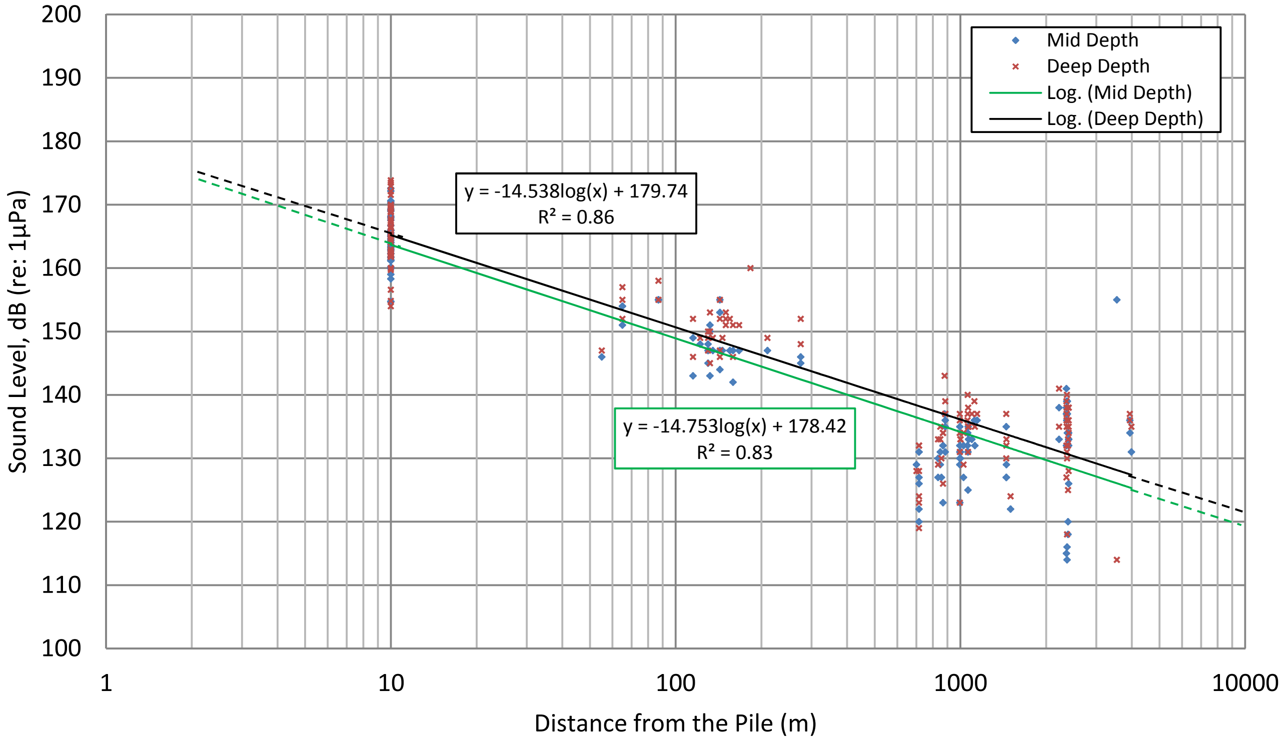


Figure 1: Acoustic Spreading Loss (RMS), 30" OD Production Piles, Vibratory Hammer (All Data)

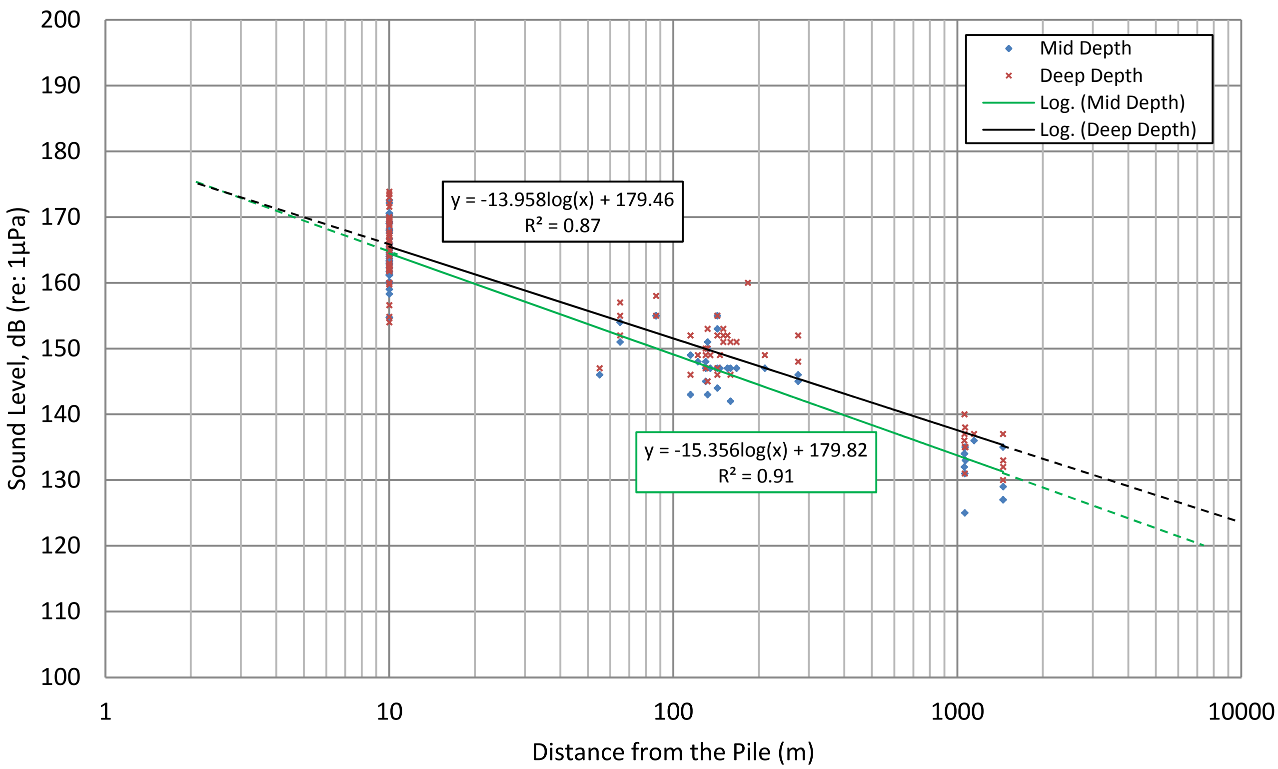


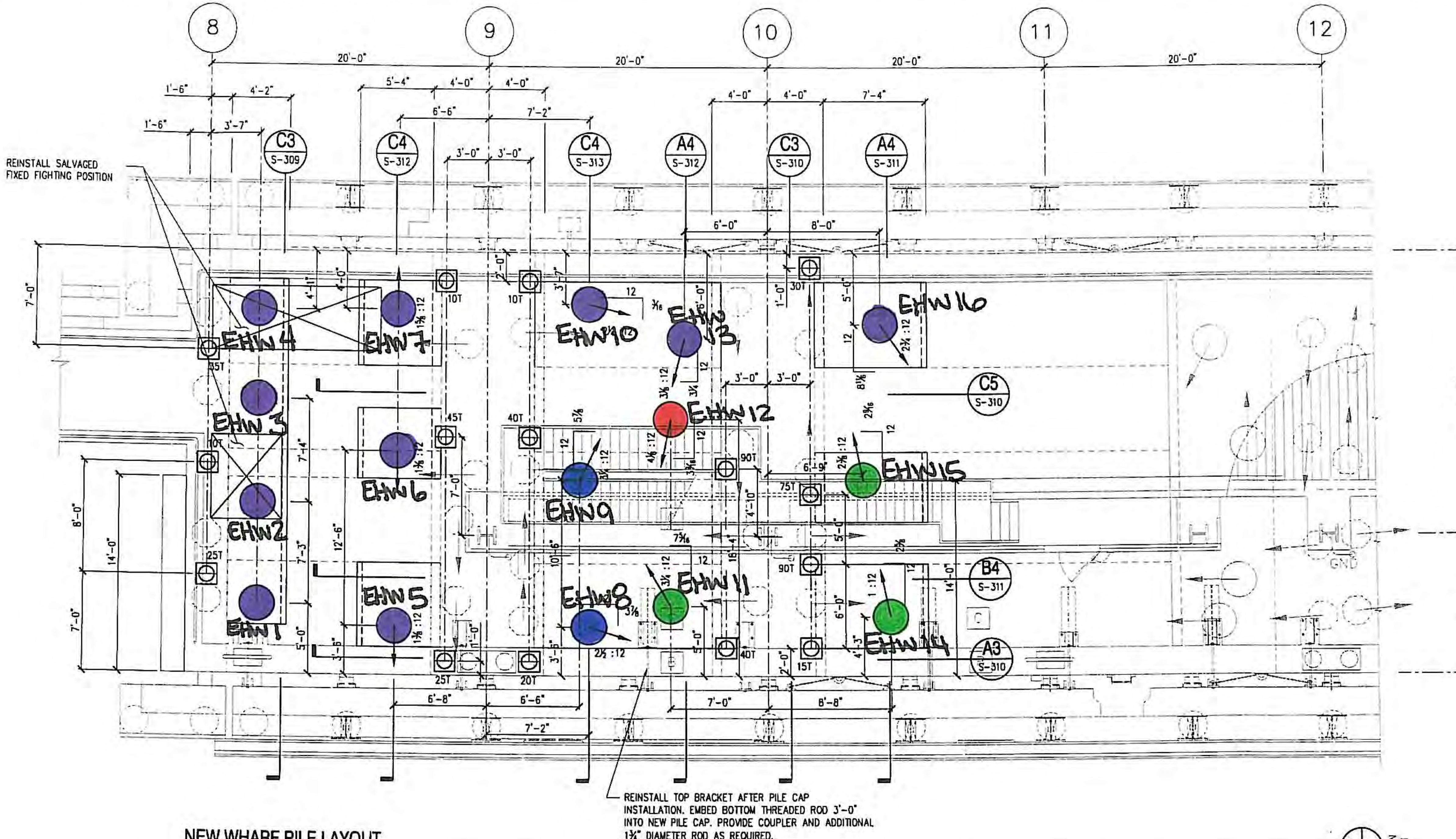
Figure 2: Acoustic Spreading Loss (RMS), 30" OD Production Piles, Vibratory Hammer (All Data Within The WRA)

Appendix A

Project Documents and

Summary of Sound Pressure Metrics
for a
One Second RMS Integration Period:

30" OD Production Piles
&
Falsework Piles



NEW WHARF PILE LAYOUT

SCALE: 1/4" = 1'-0"

LEGEND

1. INDICATES EXIST CONC PILE PER DETAIL 3 OF NAVFAC DWG # 6039863
2. INDICATES NEW 30" DIA STEEL PIPE PILE w/ MIN. 1/2" WALL THICKNESS AT TOP OF PILE ELEVATION (4" ABOVE SOFFIT, SEE A3 / S-302)
3. 4:12 INDICATES NEW STEEL PIPE PILE DIRECTION AND BATTER (4 HORIZ TO 12 VERT BATTER)
4. 20T INDICATES CYLINDER JACK PER D5 / S-302 WITH PRELOAD IN TONS

JACKING NOTES:

1. CONCRETE FOR THE STAGE 1 POUR MUST HAVE REACHED 75% OF DESIGN STRENGTH PRIOR TO LOADING JACKS.
2. PLACE JACKS ONLY IN THE POSITIONS SHOWN ON THE DRAWINGS.
3. THE CRANES MUST BE IN THEIR STOWED POSITIONS WITH CAB AT THE WHARF SIDE OF THE BUILDING.

STAGE 2 POUR NOTES:

1. THE BRIDGE CRANES MUST BE IN THEIR STOWED POSITIONS WITH CAB AT THE WHARF SIDE OF THE BUILDING. THE SOUTH CRANE MUST REMAIN STOWED FOR 3 DAYS FOLLOWING THE POUR.
2. CRANE OPERATIONS MAY NOT RESUME SOUTH OF BENT 12 UNTIL 7 DAYS AFTER THE STAGE 2 POUR.

- (purple) DRIVE 140' PILE FULL LENGTH
- (blue) DRIVE 100', SPLICE 90'
- (red) DRIVE 142' PILE FULL LENGTH
- (green) DRIVE 100', SPLICE 40'

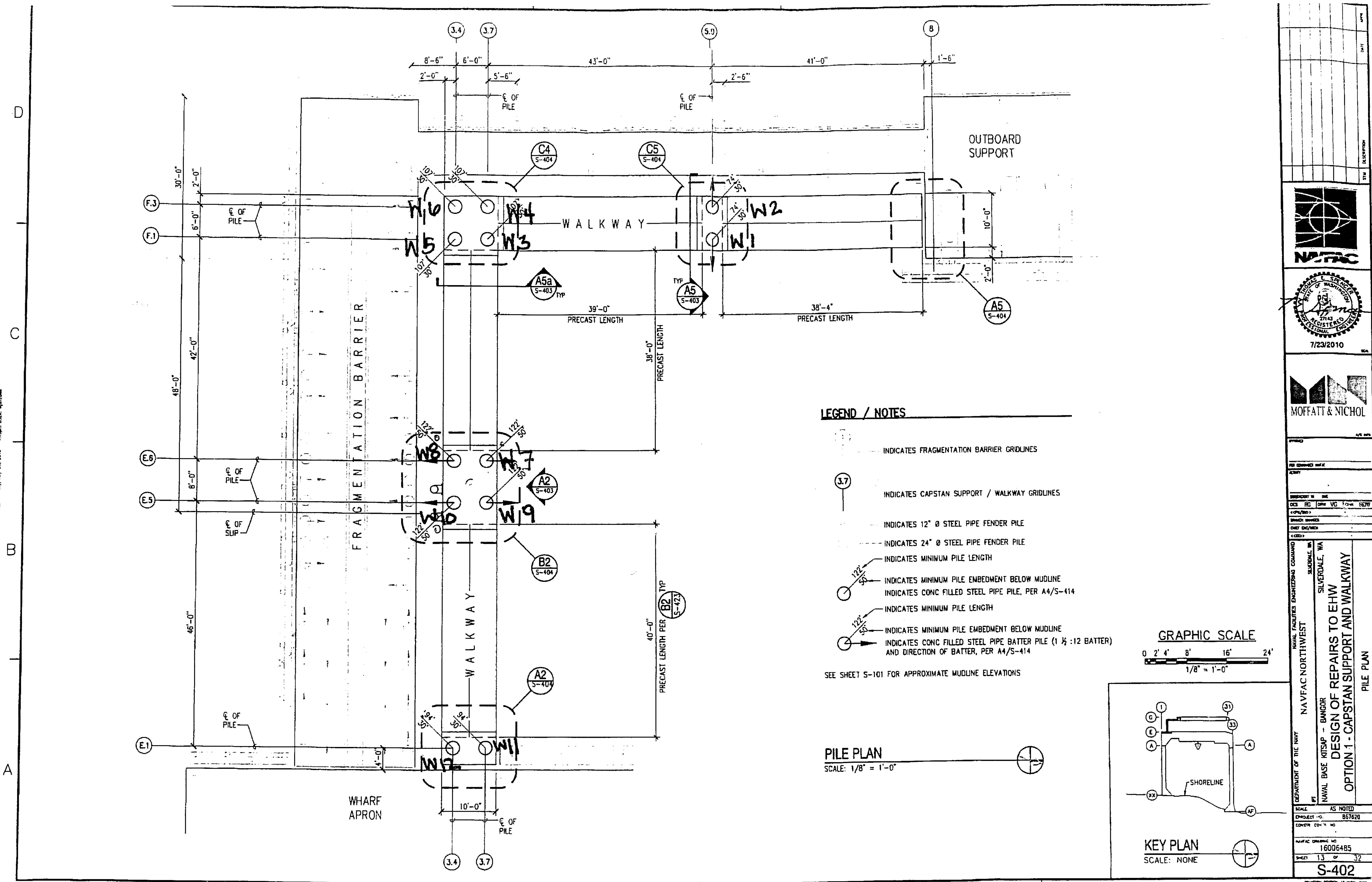
NAVFAC

7/21/2010

DEPARTMENT OF THE NAVY
NAVAL FACILITIES ENGINEERING COMMAND
NAVFAC NORTHWEST
SILVERDALE, WA.
NAVAL BASE KITSAP – BANGOR
SILVERDALE, WA.
REPAIRS TO BENTS 8, 9, & 10
EXPLOSIVE HANDLING WHARF
NEW WHARF LAYOUT AND PILE PLANS

SCALE: AS NOTED
EPROJECT NO: 867820
NAVFAC DRAWING NO. 18006198
SHEET 16 OF 27
S-301

ATTACHMENT A



ATTACHMENT B

Table A-1 Production Piles: Summary of Results, 1 Sec RMS

Pile Name	Input File	Date	Duration (RMS> 143dB) (sec)	1 Meter Off the Bottom, Hammer Active: Average of Lzpeak,dB (1 sec)	StdDev of Lzpeak,dB (1 sec)	Average of RMS, dB (1 sec)	StdDev of RMS, dB (1 Sec)	Mid Water Column, Hammer Active: Average of Lzpeak,dB (1 sec)	StdDev of Lzpeak,dB (1 sec)	Average of RMS,dB (1 Sec)	StdDev of RMS, dB (1 sec)
Vibratory Driving, Pile W6	111010 002	10/10/2011	302	172	9.6	161	8.5	176	6.4	163	5.8
Vibratory Driving, Pile W5	111010 003	10/10/2011	457	178	3.7	163	3.3	177	6.8	163	5.4
Vibratory Driving, Pile W4	111010 004	10/10/2011	459	174	8.0	162	7.0	174	8.7	160	7.0
Vibratory Driving, Pile W3	111010 005	10/10/2011	241	175	8.2	164	7.3	177	7.0	163	4.5
Vibratory Extracting/Driving, Pile W5	111010 006	10/10/2011	333	168	7.1	157	5.8	167	5.5	155	3.8
Vibratory Driving, Pile W11	111010 009	10/10/2011	480	180	7.4	167	5.8	178	8.0	164	6.3
Vibratory Driving/Extraction, Pile W12	111010 010	10/10/2011	434	171	7.6	160	6.0	170	7.3	159	5.8
Vibratory Driving, Pile W2	111011 001	10/11/2011	307	176	8.3	163	7.2	176	7.9	163	6.5
Vibratory Driving, Pile W1	111011 002	10/11/2011	237	176	8.6	162	7.4	176	6.7	163	6.0
Vibratory Driving, Pile W7	111011 003	10/11/2011	494	177	7.2	163	4.0	176	7.5	161	4.5
Vibratory Driving, Pile W9	111011 004	10/11/2011	548	179	8.0	165	4.2	179	8.2	163	5.1
Vibratory Driving, Pile W10	111011 005	10/11/2011	381	177	6.8	163	4.3	178	7.6	162	4.7
Vibratory Driving, Pile W8	111011 006	10/11/2011	377	173	4.7	162	2.6	172	5.0	160	3.5
Vibratory Driving, Pile EHW16	111011 007	10/11/2011	847	179	8.7	167	7.2	181	6.3	167	4.3
Vibratory Extraction/Driving, Pile EHW16	111011 008	10/11/2011	966	178	9.8	165	7.0	180	7.9	165	4.1
Vibratory Driving, Pile EHW12	111012 001	10/12/2011	576	175	7.1	163	5.7	176	8.1	162	5.2
Vibratory Driving, Pile EHW13	111012 002	10/12/2011	1073	178	6.0	166	4.4	177	6.9	164	4.8
Vibratory Driving, Pile EHW10	111012 003	10/12/2011	458	184	8.9	169	6.8	185	8.5	167	6.1
Resume Vibratory Driving, Pile EHW10	111013 004	10/13/2011	535	183	6.4	174	4.6	182	7.5	170	4.8
Vibratory Driving, Pile EHW7	111013 005	10/13/2011	1477	178	5.1	167	3.8	180	6.9	166	3.8
Vibratory Driving, Pile EHW5	111013 006	10/13/2011	1147	177	4.3	167	3.8	177	4.1	166	3.1
Vibratory Extraction/Driving, Pile EHW6	111014 002	10/14/2011	1668	183	6.1	169	4.4	183	5.6	168	3.4
Vibratory Extraction/Driving, Pile EHW5	111014 003	10/14/2011	166	180	4.2	171	3.6	181	2.4	171	2.0
Vibratory Driving, Pile EHW4	111014 004	10/14/2011	1003	182	6.6	169	4.3	183	6.8	168	3.9
Vibratory Driving, Pile EHW3	111014 005	10/14/2011	10	174	16.9	157	12.5	na	na	na	na
Vibratory Driving, Pile EHW1	111014 006	10/14/2011	896	180	7.0	167	4.0	180	7.2	165	4.2
Resume Vibratory Driving, Pile EHW3	111014 007	10/14/2011	761	183	6.5	170	4.2	183	7.4	168	4.4
Vibratory Driving, Pile EHW2	111015 001	10/15/2011	1025	185	6.4	170	3.9	186	6.6	169	4.4
Vibratory Driving, Pile EHW9	111015 002	10/15/2011	628	180	7.5	166	5.3	180	6.9	165	4.8
Vibratory Driving, Pile EHW8	111015 003	10/15/2011	784	175	4.3	163	3.6	175	4.3	162	3.7
Resume Vibratory Driving, Pile EHW14	111017 001	10/17/2011	579	190	6.5	172	4.2	190	6.0	171	3.9
Resume Vibratory Driving, Pile EHW15	111017 002	10/17/2011	771	182	7.1	168	4.3	178	6.3	165	4.2
Vibratory Driving, Pile EHW11	111019 002	10/19/2011	518	180	3.7	170	3.7	179	3.9	168	3.4
Vibratory Driving, Pile W8	111021 002	10/21/2011	286	176	7.3	165	5.9	177	5.3	164	3.8
Vibratory Driving, Pile W10	111021 003-A	10/21/2011	270	183	5.3	171	3.8	183	5.6	169	3.9
Vibratory Driving, Pile W1	111021 003-B	10/21/2011	242	175	8.7	162	4.8	173	8.9	160	4.9
Vibratory Driving, Pile W2	111021 003-C	10/21/2011	218	176	8.4	164	5.0	174	8.5	161	5.6
Vibratory Driving, Pile W3	111021 004	10/21/2011	179	164	5.7	155	5.8	167	2.5	155	2.2
Vibratory Driving, Pile W4	111021 005-A	10/21/2011	383	172	8.8	160	4.9	171	7.7	159	4.0
Vibratory Driving, Pile W5	111021 005-B	10/21/2011	184	173	7.5	162	5.0	173	5.4	163	4.2
Vibratory Driving, Pile W6	111021 005-C	10/21/2011	218	181	5.8	165	3.4	179	4.7	164	2.9
Vibratory Driving, Pile W7	111027 003	10/27/2011	204	189	5.6	174	5.0	189	5.3	171	4.8
Vibratory Driving, Pile W9	111027 004	10/27/2011	217	184	9.3	169	5.5	182	9.4	167	5.2
Vibratory Driving, Pile W12	111027 005	10/27/2011	340	190	5.6	174	4.6	191	3.4	173	3.0
Vibratory Driving, Pile W11	111027 006	10/27/2011	270	191	5.7	174	3.6	191	4.8	172	3.0

Table A-2 False Work Piles and Pile Extractions: Summary of Results, 1 Sec RMS

Pile Name	Input File	Date	Duration (RMS> 143dB) (sec)	1 Meter Off the Bottom, Hammer Active				Mid Water Column, Hammer Active			
				Average of Lzpeak,dB (1 sec)	StdDev of Lzpeak,dB (1 sec)	Average of RMS, dB (1 sec)	StdDev of RMS, dB (1 Sec)	Average of Lzpeak,dB (1 sec)	StdDev of Lzpeak,dB (1 sec)	Average of RMS,dB (1 Sec)	StdDev of RMS, dB (1 sec)
Vibratory Extraction, RX5	111007 002	10/7/2011	66	176	9.1	160	8.2	178	7.7	159	6.2
Vibratory Extraction, RX8	111007 003	10/7/2011	347	186	8.2	169	5.9	186	6.2	169	5.3
Vibratory Extraction, RX1	111007 004	10/7/2011	273	182	7.0	170	6.4	184	7.2	169	5.6
Vibratory Driving, FW1	111007 006	10/7/2011	366	170	8.5	157	6.5	172	9.1	157	7.1
Vibratory Driving, FW2	111007 007	10/7/2011	228	176	6.7	161	4.7	176	7.0	161	5.0
Vibratory Driving, FW3	111007 008	10/7/2011	201	184	9.9	168	7.2	186	8.4	169	6.4
Vibratory Driving, FW4	111007 009	10/7/2011	199	182	7.9	166	5.9	183	7.7	165	6.1
Vibratory Driving, FW5	111008 001	10/8/2011	199	171	8.1	153	6.8	171	8.1	156	7.0
Vibratory Driving, FW6	111008 002	10/8/2011	198	169	8.0	157	6.8	171	6.6	158	5.6
Vibratory Driving, FW7	111008 003	10/8/2011	164	170	8.4	156	6.9	171	8.4	157	6.8
Vibratory Driving, FW8	111008 004	10/8/2011	175	171	7.0	158	5.8	170	7.1	157	5.6
Vibratory Extraction, EX3, EX4, EX3, EX5 and EX6*	111027 007	10/27/2011	169	181	9.8	164	7.6	183	6.4	161	6.9

*Note: Due to the short duration of each extraction event, all work was combined into one session log. Three soft starts were recorded along with the extraction of Pile EX3, EX4, EX3, EX5 and EX6

Appendix B

Summary of Sound Pressure Metrics
for a
Ten Second RMS Integration Period:

30" OD Production Piles
&
Falsework Piles

Table B-1 Production Piles: Summary of Results, 10 Sec RMS

Pile Name	Input File	Date	Duration (RMS> 143dB) (sec)	1 Meter Off the Bottom, Hammer Active				Mid Water Column, Hammer Active			
				Average of Lzpeak,dB (10 sec)	StdDev of Lzpeak,dB (10 sec)	Average of RMS, dB (10 sec)	StdDev of RMS, dB (10 sec)	Average of Lzpeak,dB (10 sec)	StdDev of Lzpeak,dB (10 sec)	Average of RMS,dB (10 sec)	StdDev of RMS, dB (10 sec)
Vibratory Driving, Pile W6	111010 002	10/10/2011	302	175	10.1	160	9.3	179	6.0	162	5.7
Vibratory Driving, Pile W5	111010 003	10/10/2011	457	181	3.0	163	2.3	181	6.0	164	4.9
Vibratory Driving, Pile W4	111010 004	10/10/2011	459	177	8.3	162	6.7	178	9.1	160	7.0
Vibratory Driving, Pile W3	111010 005	10/10/2011	241	180	5.3	165	4.8	181	6.8	163	5.1
Vibratory Extracting/Driving, Pile W5	111010 006	10/10/2011	333	174	8.9	157	5.8	171	7.8	155	3.9
Vibratory Driving, Pile W11	111010 009	10/10/2011	480	185	6.9	167	4.7	183	6.8	163	6.3
Vibratory Driving/Extraction, Pile W12	111010 010	10/10/2011	434	175	8.9	160	6.1	173	8.6	158	6.2
Vibratory Driving, Pile W2	111011 001	10/11/2011	307	182	8.2	162	7.5	182	6.4	161	7.2
Vibratory Driving, Pile W1	111011 002	10/11/2011	237	183	5.8	162	7.1	181	5.3	162	5.5
Vibratory Driving, Pile W7	111011 003	10/11/2011	494	183	7.2	163	3.4	182	7.7	161	3.9
Vibratory Driving, Pile W9	111011 004	10/11/2011	548	183	7.9	165	4.9	183	8.0	163	4.7
Vibratory Driving, Pile W10	111011 005	10/11/2011	381	182	6.9	162	4.7	183	6.8	162	4.1
Vibratory Driving, Pile W8	111011 006	10/11/2011	377	176	5.6	162	2.9	175	5.9	160	3.0
Vibratory Driving, Pile EHW16	111011 007	10/11/2011	847	183	7.0	167	5.7	183	6.3	166	5.3
Vibratory Extraction/Driving, Pile EHW16	111011 008	10/11/2011	966	181	10.4	165	7.1	183	8.1	165	3.7
Vibratory Driving, Pile EHW12	111012 001	10/12/2011	576	178	7.2	162	6.7	180	8.6	161	5.8
Vibratory Driving, Pile EHW13	111012 002	10/12/2011	1073	180	6.8	165	4.7	180	7.5	164	5.0
Vibratory Driving, Pile EHW10	111012 003	10/12/2011	458	188	8.5	168	8.3	190	4.7	166	5.5
Resume Vibratory Driving, Pile EHW10	111013 004	10/13/2011	535	185	5.9	172	6.8	185	6.5	169	5.0
Vibratory Driving, Pile EHW7	111013 005	10/13/2011	1477	180	5.5	167	5.0	183	7.1	166	4.1
Vibratory Driving, Pile EHW5	111013 006	10/13/2011	1147	179	3.8	166	3.9	178	4.1	165	3.7
Vibratory Extraction/Driving, Pile EHW6	111014 002	10/14/2011	1668	186	5.2	169	4.1	185	5.5	168	3.9
Vibratory Extraction/Driving, Pile EHW5	111014 003	10/14/2011	166	183	3.4	170	4.5	182	2.8	171	2.2
Vibratory Driving, Pile EHW4	111014 004	10/14/2011	1003	185	5.9	169	4.4	186	6.5	168	3.4
Vibratory Driving, Pile EHW3	111014 005	10/14/2011	10	181	17.0	154	14.0	na	na	na	na
Vibratory Driving, Pile EHW1	111014 006	10/14/2011	896	183	6.6	166	4.1	183	6.7	165	4.4
Resume Vibratory Driving, Pile EHW3	111014 007	10/14/2011	761	186	6.5	170	5.2	186	7.0	168	4.7
Vibratory Driving, Pile EHW2	111015 001	10/15/2011	1025	188	5.5	170	3.9	189	5.0	169	3.9
Vibratory Driving, Pile EHW9	111015 002	10/15/2011	628	184	6.7	165	5.4	183	6.4	164	5.5
Vibratory Driving, Pile EHW8	111015 003	10/15/2011	784	177	4.0	163	4.6	177	3.9	162	4.1
Resume Vibratory Driving, Pile EHW14	111017 001	10/17/2011	579	192	3.5	172	4.8	192	3.1	170	4.9
Resume Vibratory Driving, Pile EHW15	111017 002	10/17/2011	771	185	7.2	167	4.4	180	6.8	165	4.4
Vibratory Driving, Pile EHW11	111019 002	10/19/2011	518	182	2.9	169	5.4	181	3.8	167	4.4
Vibratory Driving, Pile W8	111021 002	10/21/2011	286	179	5.6	164	6.1	179	4.7	163	5.6
Vibratory Driving, Pile W10	111021 003-A	10/21/2011	270	185	4.7	170	4.6	185	5.0	169	3.7
Vibratory Driving, Pile W1	111021 003-B	10/21/2011	242	177	9.2	162	5.3	176	9.7	160	4.8
Vibratory Driving, Pile W2	111021 003-C	10/21/2011	218	178	8.7	164	4.6	176	8.9	160	5.8
Vibratory Driving, Pile W3	111021 004	10/21/2011	179	167	5.9	155	5.6	169	3.5	155	3.4
Vibratory Driving, Pile W4	111021 003-A	10/21/2011	383	174	9.5	160	5.3	173	9.1	159	3.8
Vibratory Driving, Pile W5	111021 003-B	10/21/2011	184	176	6.7	162	3.8	175	5.0	163	3.0
Vibratory Driving, Pile W6	111021 003-C	10/21/2011	218	185	4.6	165	3.1	182	3.7	164	2.5
Vibratory Driving, Pile W7	111027 003	10/27/2011	204	192	5.0	173	5.3	191	5.0	171	3.2
Vibratory Driving, Pile W9	111027 004	10/27/2011	217	187	8.9	169	6.2	185	9.3	166	6.8
Vibratory Driving, Pile W12	111027 005	10/27/2011	340	192	3.3	173	5.6	193	1.8	173	4.4
Vibratory Driving, Pile W11	111027 006	10/27/2011	270	194	1.8	174	2.8	193	2.0	172	2.9

Table B-2 False Work Piles and Pile Extractions: Summary of Results, 10 Sec RMS				1 Meter Off the Bottom, Hammer Active				Mid Water Column, Hammer Active			
Pile Name	Input File	Date	Duration (RMS> 143dB) (sec)	Average of Lzpeak,dB (10 sec)	StdDev of Lzpeak,dB (10 sec)	Average of RMS, dB (10 sec)	StdDev of RMS, dB (10 sec)	Average of Lzpeak,dB (10 sec)	StdDev of Lzpeak,dB (10 sec)	Average of RMS,dB (10 sec)	StdDev of RMS, dB (10 sec)
Vibratory Extraction, RX5	111007 002	10/7/2011	66	183	4.1	161	5.4	183	5.3	156	6.3
Vibratory Extraction, RX8	111007 003	10/7/2011	347	189	6.7	167	7.7	189	3.5	169	4.6
Vibratory Extraction, RX1	111007 004	10/7/2011	273	184	6.4	168	7.3	189	3.4	167	6.1
Vibratory Driving, FW1	111007 006	10/7/2011	366	176	7.9	156	6.6	175	7.9	157	5.7
Vibratory Driving, FW2	111007 007	10/7/2011	228	181	7.1	161	4.5	176	7.4	155	7.2
Vibratory Driving, FW3	111007 008	10/7/2011	201	189	7.3	166	9.3	177	7.9	157	6.4
Vibratory Driving, FW4	111007 009	10/7/2011	199	188	7.2	165	6.6	176	6.8	157	6.2
Vibratory Driving, FW5	111008 001	10/8/2011	199	176	8.3	151	7.0	181	7.3	161	4.4
Vibratory Driving, FW6	111008 002	10/8/2011	198	175	9.1	157	6.6	189	4.4	165	5.3
Vibratory Driving, FW7	111008 003	10/8/2011	164	178	7.2	156	7.0	188	9.0	168	7.2
Vibratory Driving, FW8	111008 004	10/8/2011	175	178	6.8	158	4.8	179	8.8	156	7.0
Vibratory Extraction, EX3, EX4, EX3, EX5 and EX6*	111027 007	10/27/2011	169	186	7.6	161	8.0	187	4.4	160	6.5

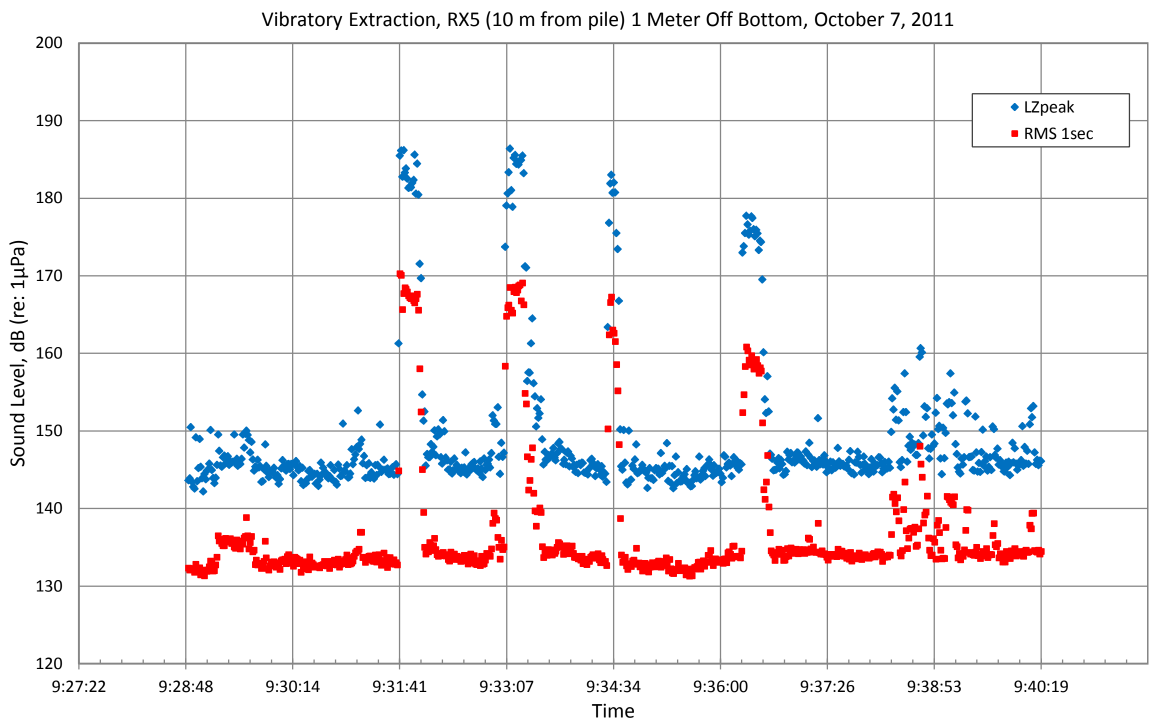
*Note: Due to the short duration of each extraction event, all work was combined into one session log. Three soft starts were recorded along with the extraction of Pile EX3, EX4, EX3, EX5 and EX6

Appendix C

Session Logs:

October 7- 27, 2011

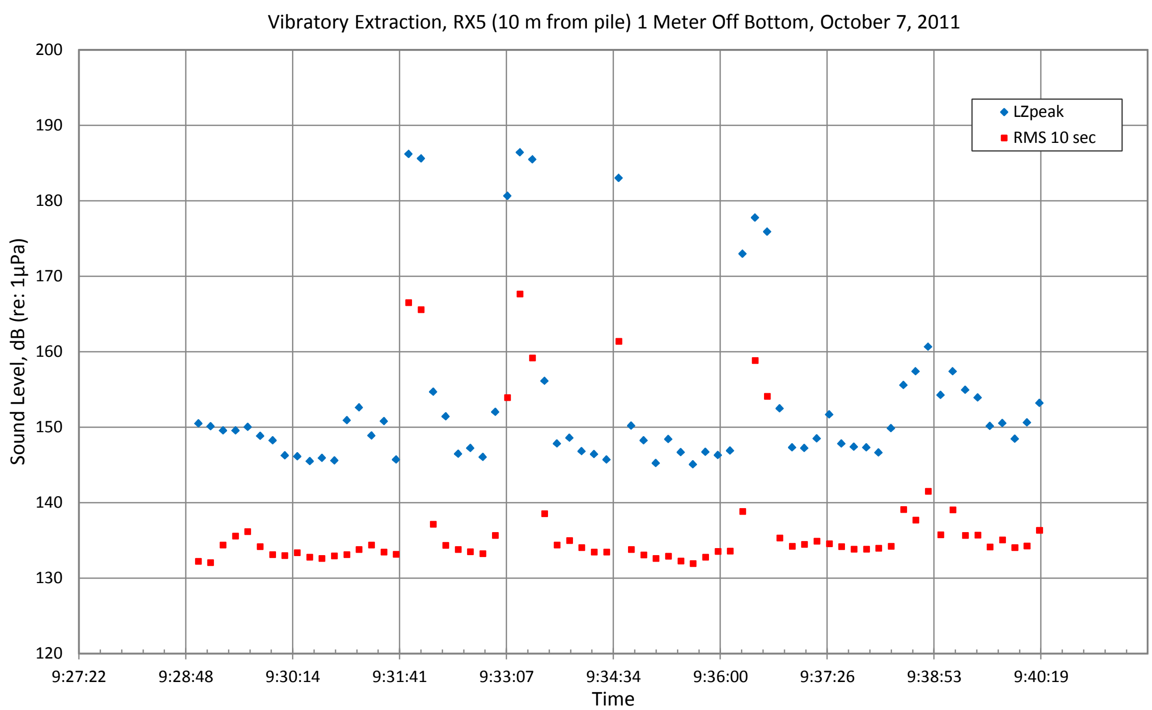
30" OD Production Piles
&
Falsework Piles



Vibratory Driving Statistics (1 Sec RMS > 143dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	176	9.1	0.05
RMS 1 sec	160	8.2	0.05

Inactive Vibratory Hammer Statistics (1 sec RMS < 143 dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	146	2.6	0.02
RMS 1 sec	134	2.0	0.01

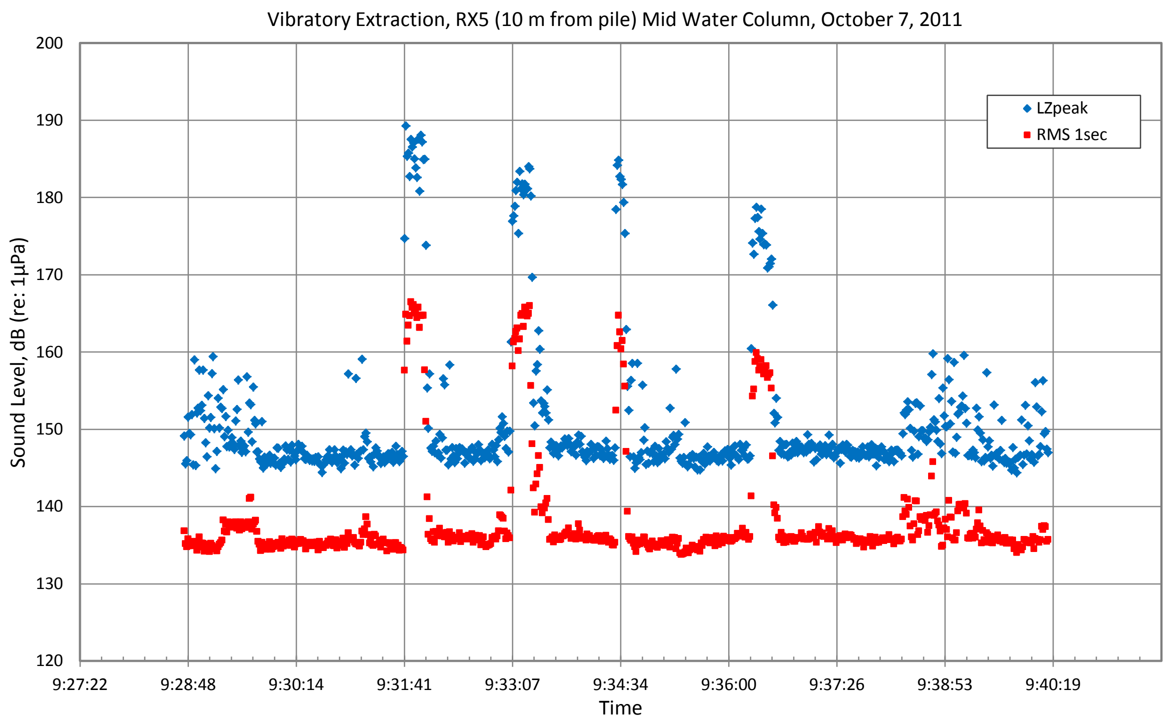
Input: 111007 002



Vibratory Driving Statistics (10 Sec RMS > 143dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	183	4.1	0.02
RMS 10sec	161	5.4	0.03

Inactive Vibratory Hammer Statistics (10 sec RMS < 143 dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	150	4.6	0.03
RMS 10sec	134	1.9	0.01

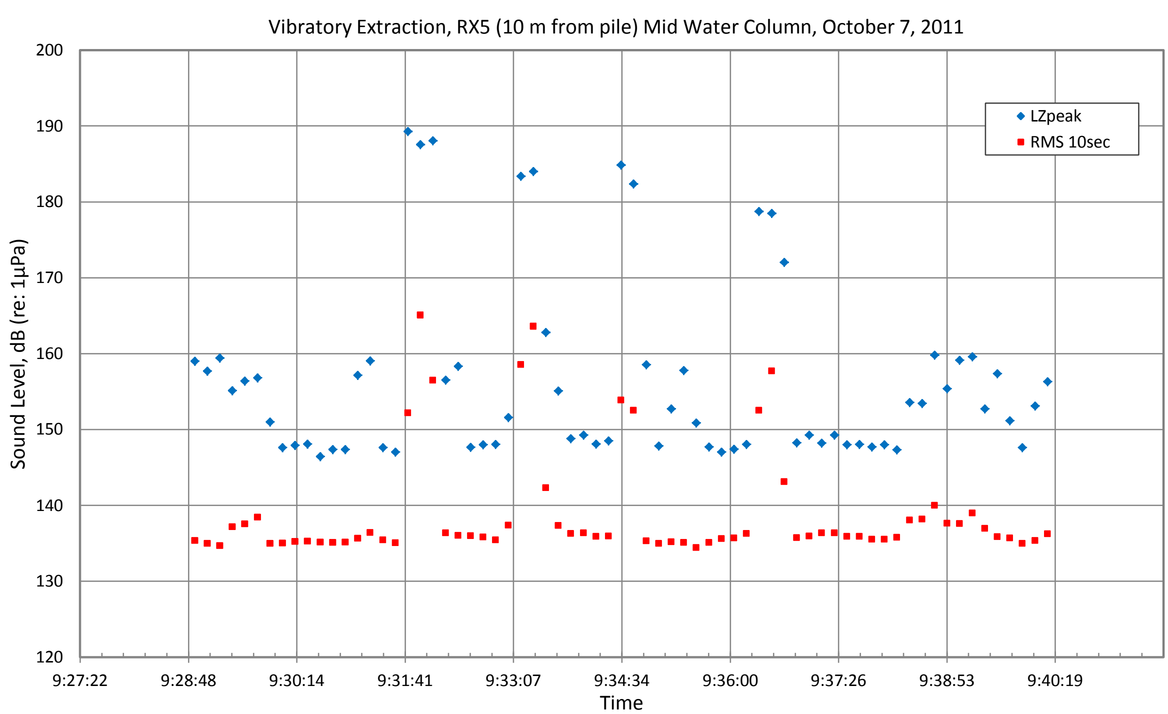
Input: 111007 002



Vibratory Driving Statistics (1 Sec RMS > 143dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	178	7.7	0.04
RMS 1sec	159	6.2	0.04

Inactive Vibratory Hammer Statistics, (1 sec RMS < 143 dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	148	3.0	0.02
RMS 1sec	136	1.4	0.01

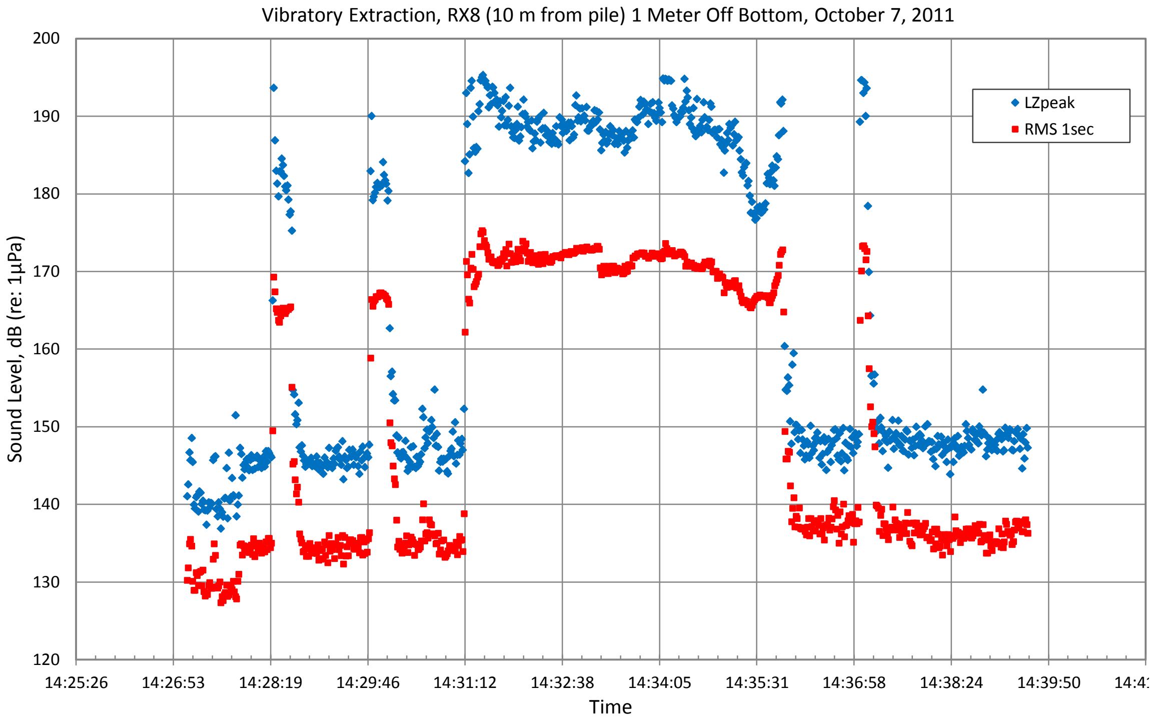
Input: 111007 002



Vibratory Driving Statistics (1 Sec RMS > 143dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	183	5.3	0.03
RMS 10sec	156	6.3	0.04

Inactive Vibratory Hammer Statistics, (1 sec RMS < 143 dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	152	4.7	0.03
RMS 10sec	136	1.4	0.01

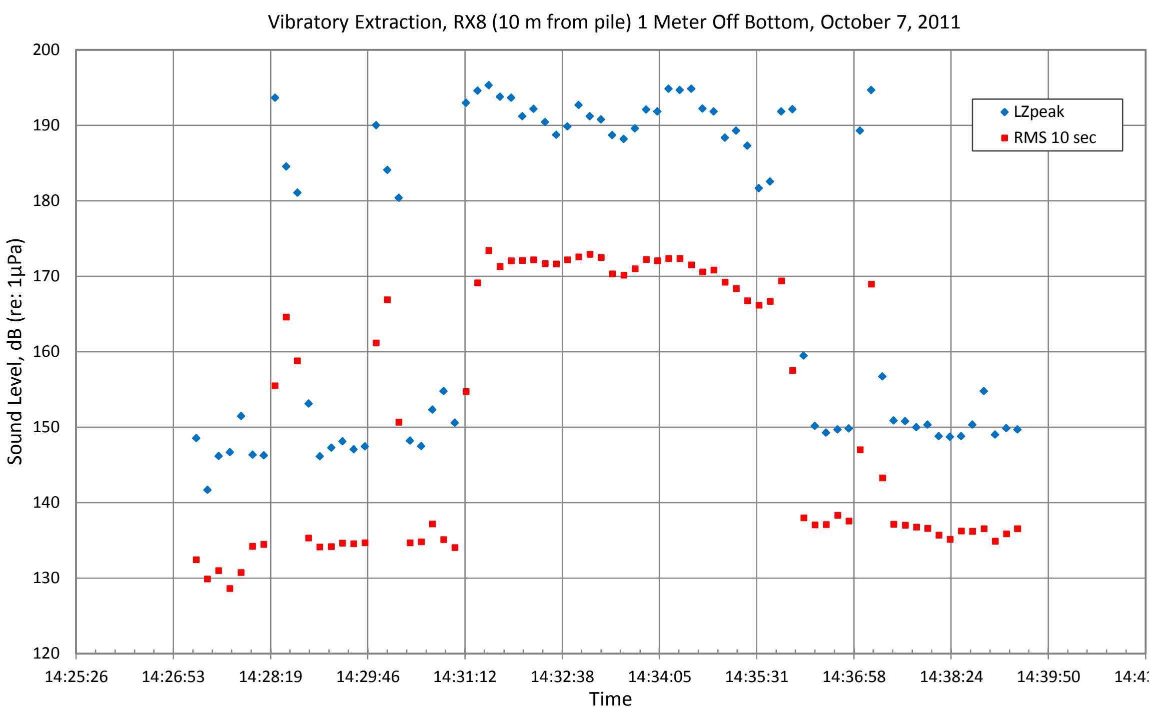
Input: 111007 002



Vibratory Driving Statistics (1 Sec RMS > 143dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	186	8.2	0.04
RMS 1 sec	169	5.9	0.03

Inactive Vibratory Hammer Statistics (1 sec RMS < 143 dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	147	2.9	0.02
RMS 1 sec	135	2.6	0.02

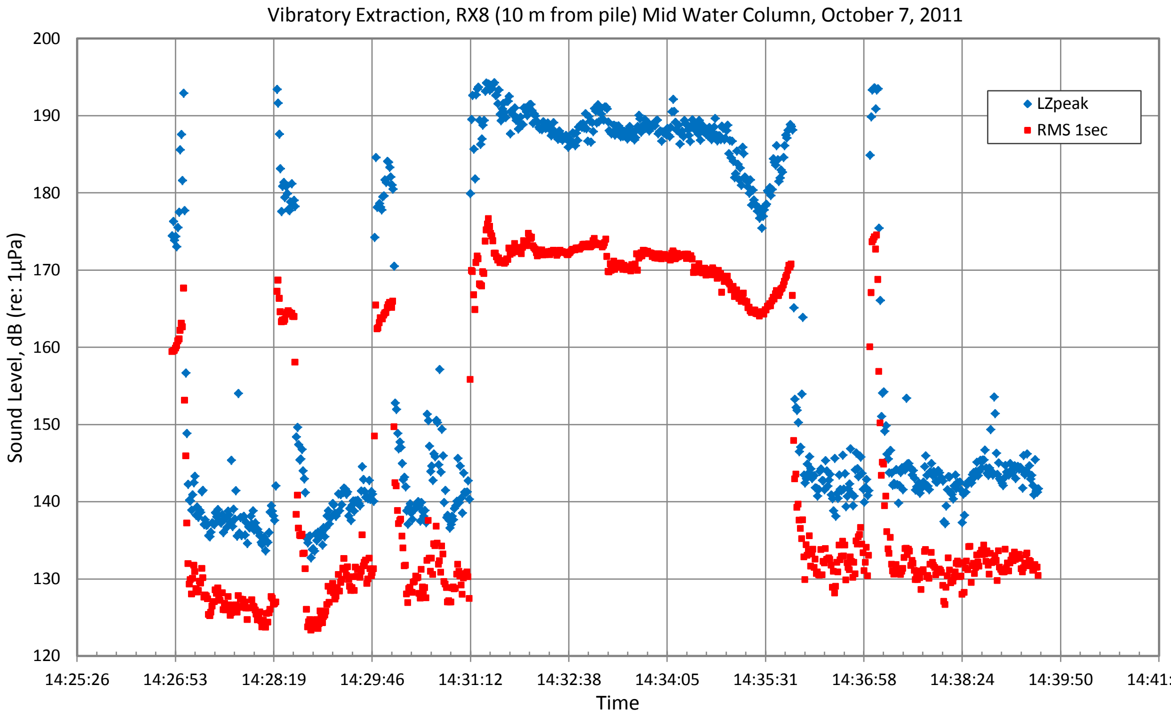
Input: 111007 003



Vibratory Driving Statistics (10 Sec RMS > 143dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	189	6.7	0.04
RMS 10sec	167	7.7	0.05

Inactive Vibratory Hammer Statistics (10 sec RMS < 143 dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	149	3.1	0.02
RMS 10sec	135	2.3	0.02

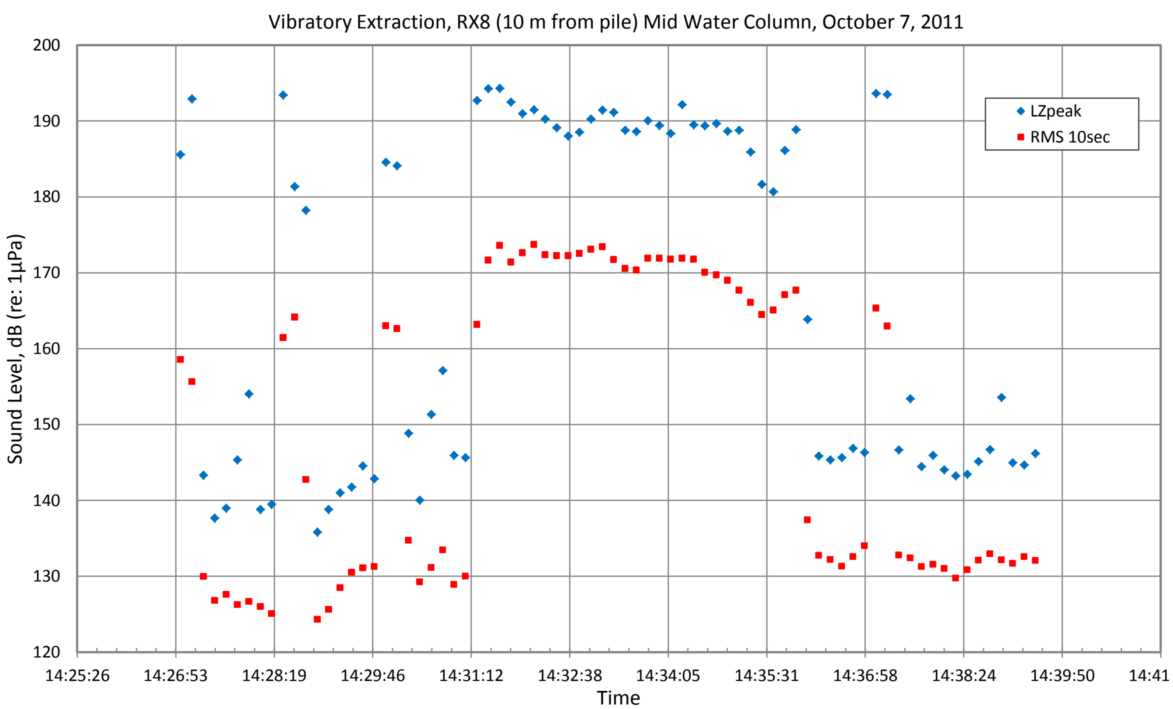
Input: 111007 003



Vibratory Driving Statistics (1 Sec RMS > 143dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	186	6.2	0.03
RMS 1sec	169	5.3	0.03

Inactive Vibratory Hammer Statistics, (1 sec RMS < 143 dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	142	4.1	0.03
RMS 1sec	131	3.4	0.03

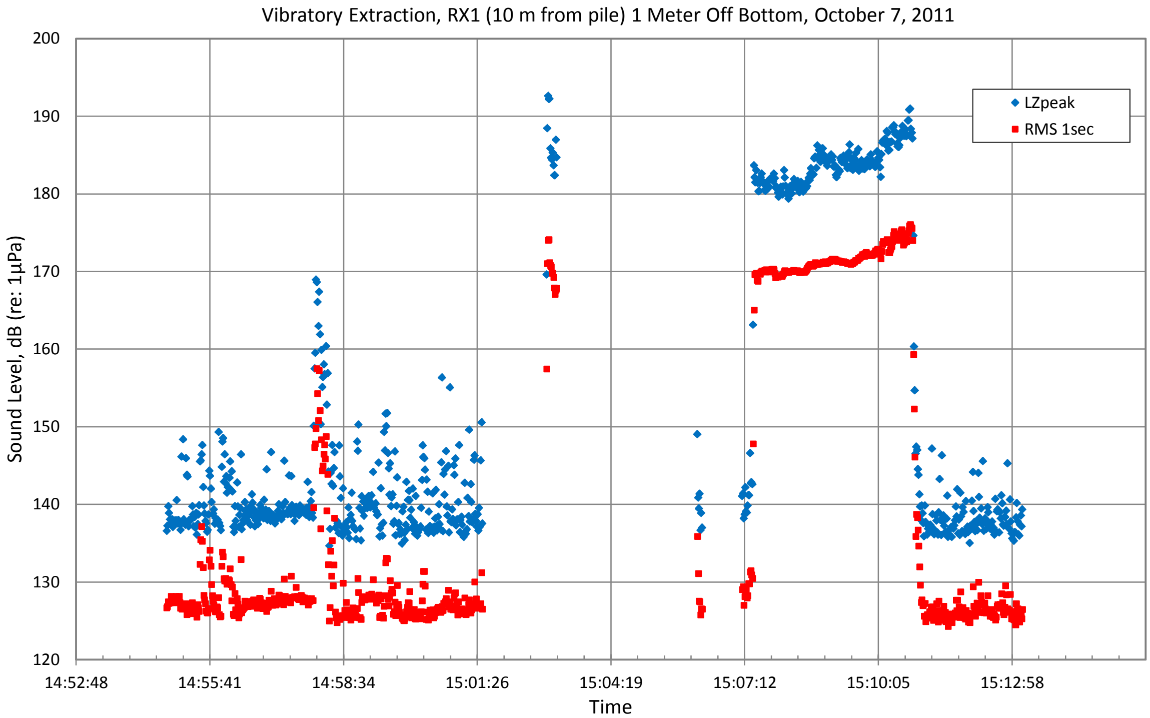
Input: 111007 003



Vibratory Driving Statistics (1 Sec RMS > 143dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	189	3.5	0.02
RMS 10sec	169	4.6	0.03

Inactive Vibratory Hammer Statistics, (1 sec RMS < 143 dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	146	7.6	0.05
RMS 10sec	131	3.5	0.03

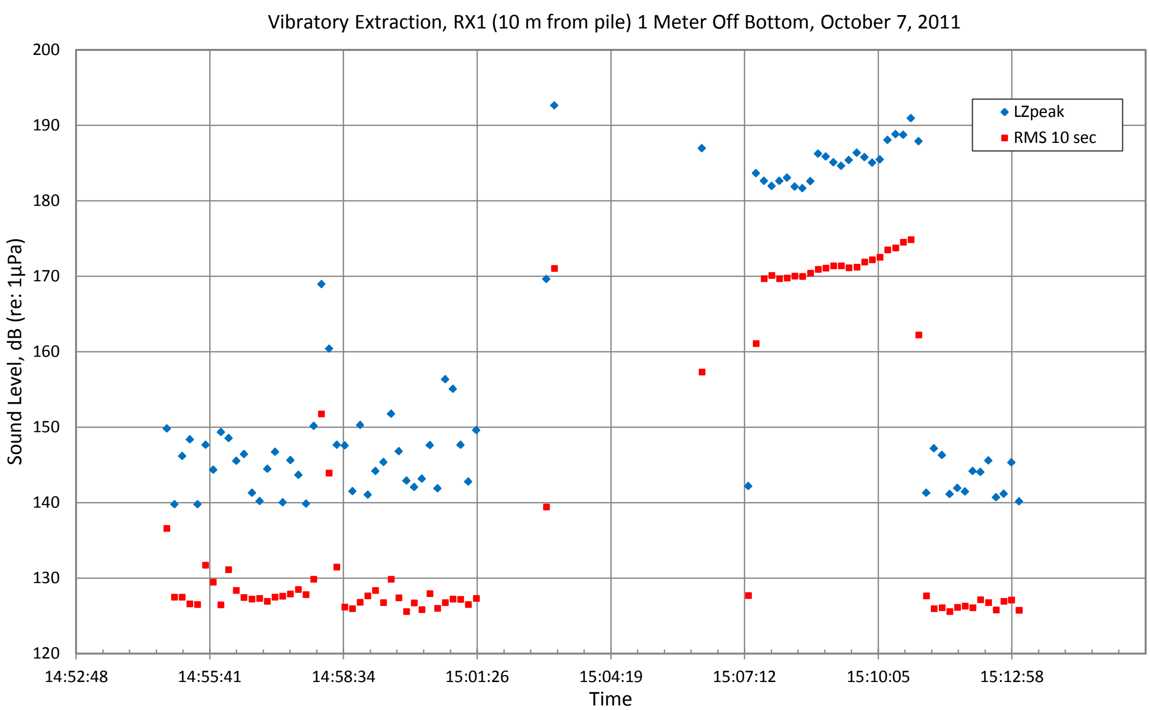
Input: 111007 003



Vibratory Driving Statistics (1 Sec RMS > 143dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	182	7.0	0.04
RMS 1 sec	170	6.4	0.04

Inactive Vibratory Hammer Statistics (1 sec RMS < 143 dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	139	9.1	0.07
RMS 1 sec	127	8.0	0.06

Input: 111007 004

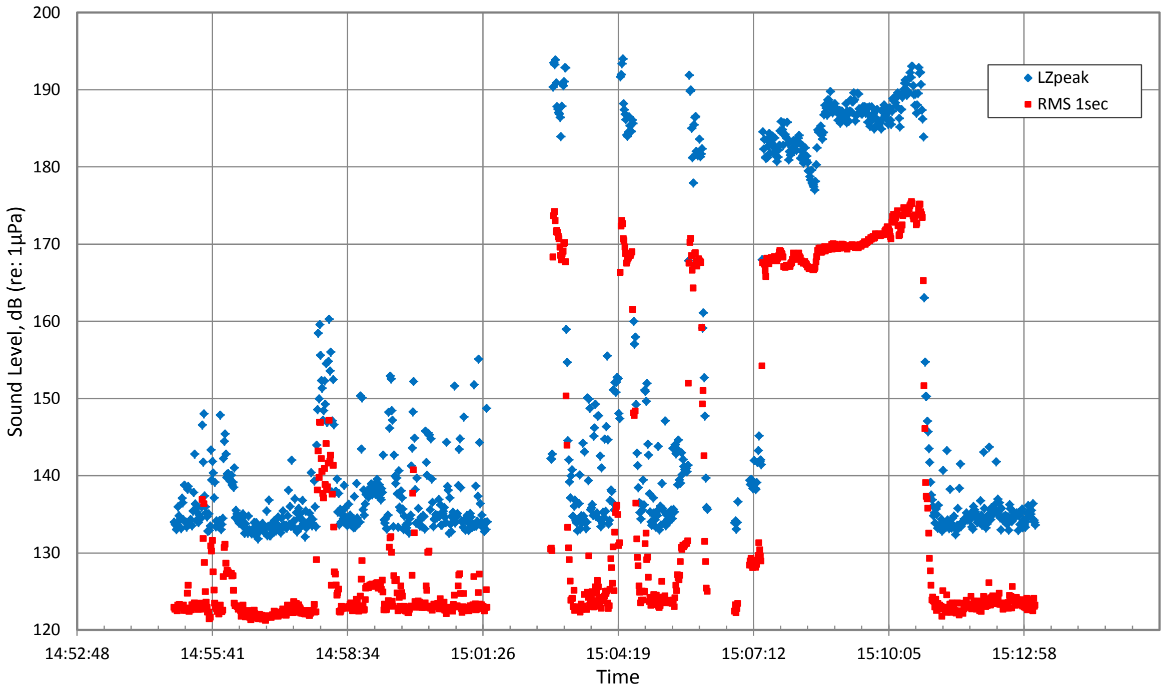


Vibratory Driving Statistics (10 Sec RMS > 143dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	184	6.4	0.04
RMS 10sec	168	7.3	0.04

Inactive Vibratory Hammer Statistics (10 sec RMS < 143 dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	145	5.1	0.04
RMS 10sec	128	2.5	0.02

Input: 111007 004

Vibratory Extraction, RX1 (10 m from pile) Mid Water Column, October 7, 2011

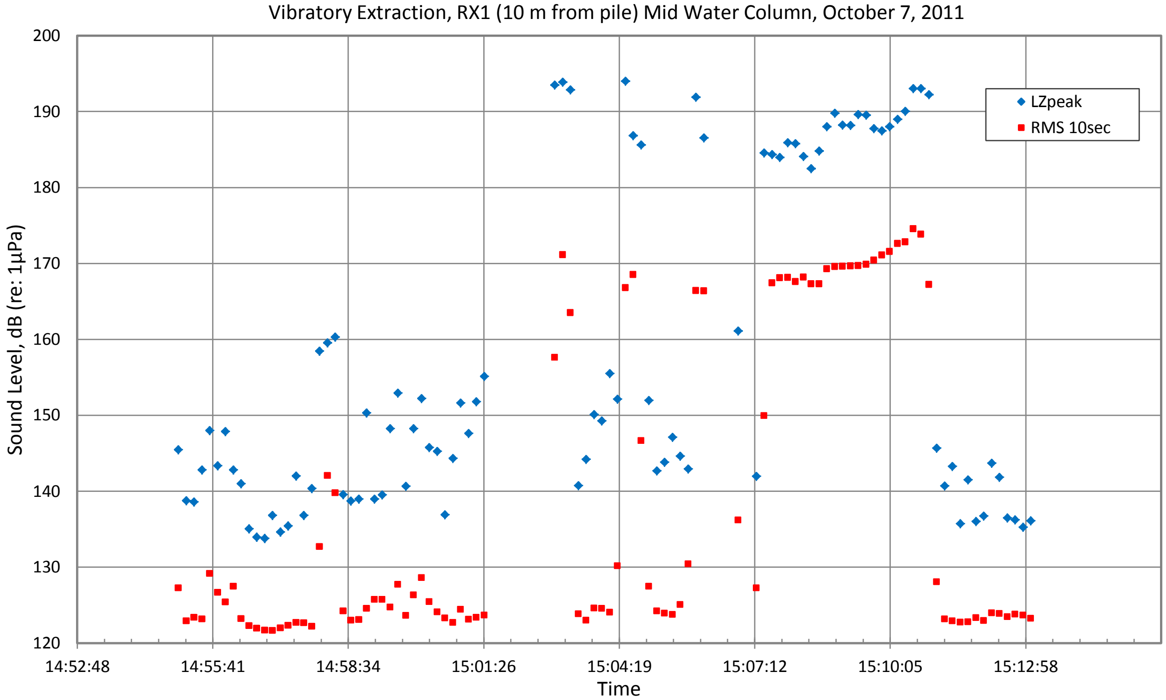


Vibratory Driving Statistics (1 Sec RMS > 143dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	184	7.2	0.04
RMS 1sec	169	5.6	0.03

Inactive Vibratory Hammer Statistics, (1 sec RMS < 143 dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	137	7.2	0.05
RMS 1sec	125	6.0	0.05

Input: 111007 004

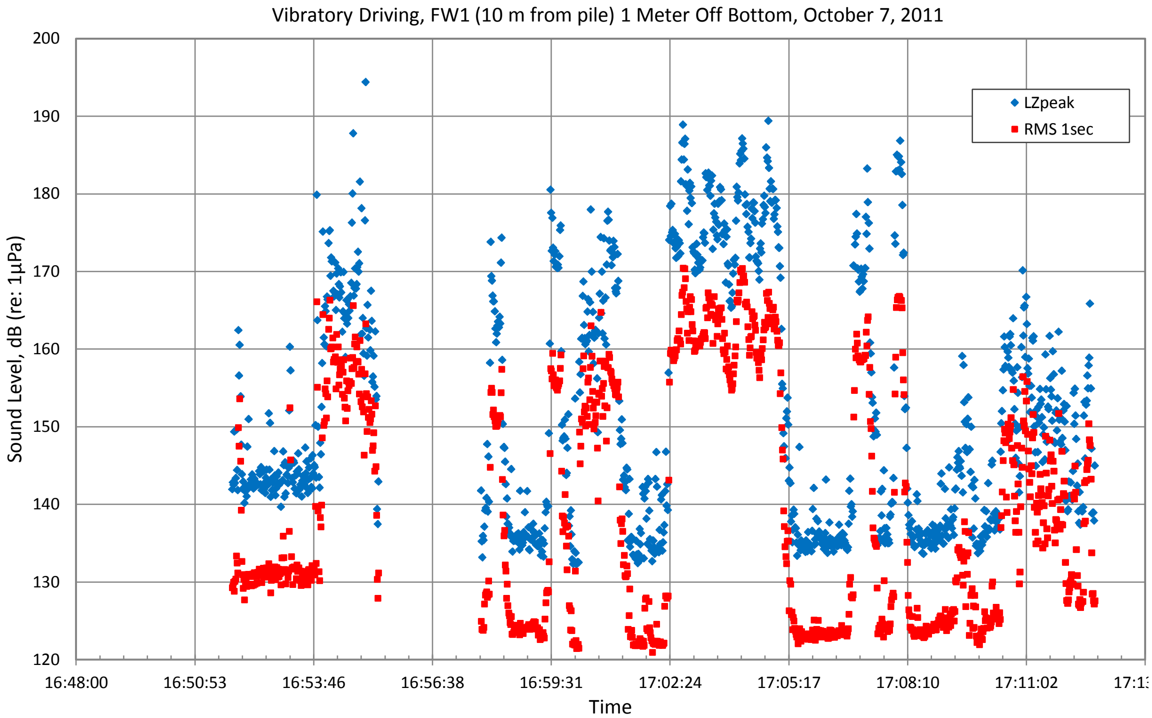
Vibratory Extraction, RX1 (10 m from pile) Mid Water Column, October 7, 2011



Vibratory Driving Statistics (1 Sec RMS > 143dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	189	3.4	0.02
RMS 10sec	167	6.1	0.04

Inactive Vibratory Hammer Statistics, (1 sec RMS < 143 dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	144	6.9	0.05
RMS 10sec	125	3.9	0.03

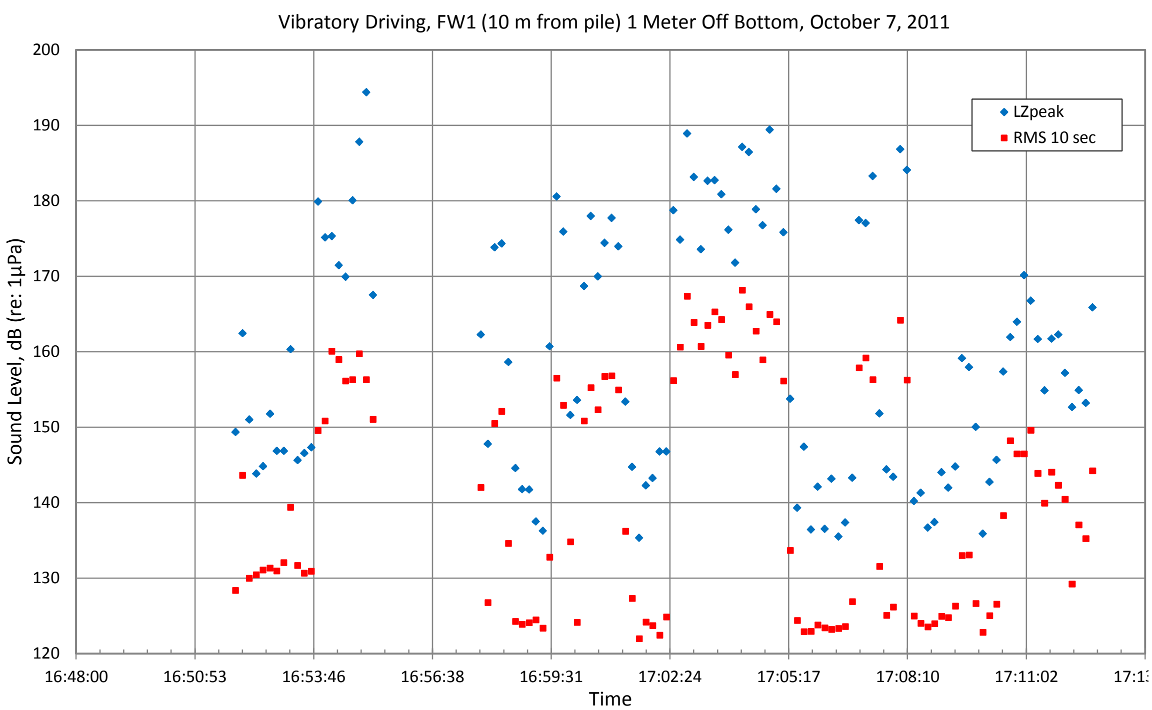
Input: 111007 004



Vibratory Driving Statistics (1 Sec RMS > 143dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	170	8.5	0.05
RMS 1 sec	157	6.5	0.04

Inactive Vibratory Hammer Statistics (1 sec RMS < 143 dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	141	8.0	0.06
RMS 1 sec	128	7.4	0.06

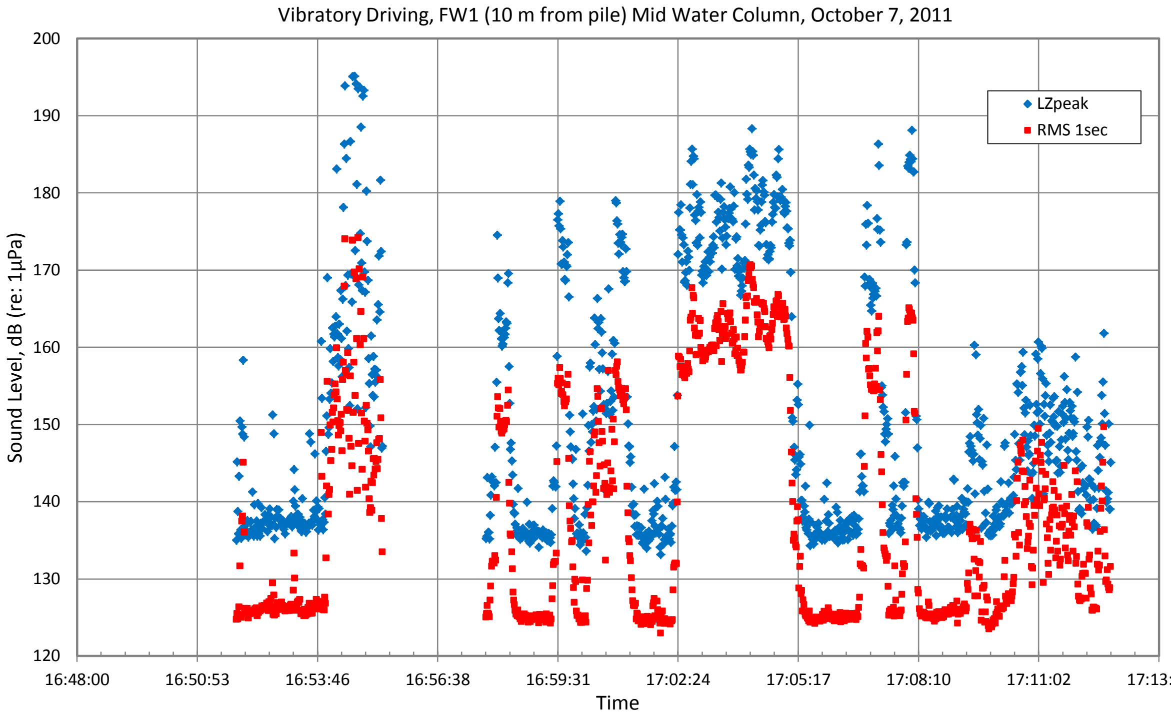
Input: 111007 006



Vibratory Driving Statistics (10 Sec RMS > 143dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	176	7.9	0.04
RMS 10sec	156	6.6	0.04

Inactive Vibratory Hammer Statistics (10 sec RMS < 143 dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	147	7.4	0.05
RMS 10sec	129	5.6	0.04

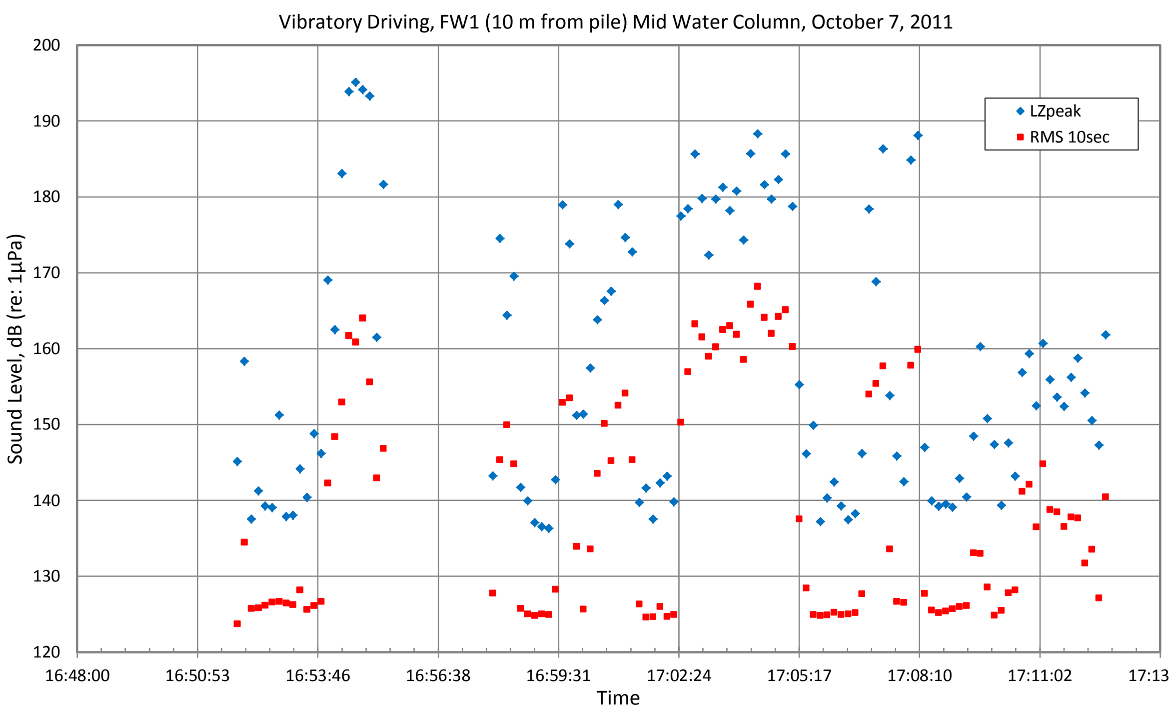
Input: 111007 006



Vibratory Driving Statistics (1 Sec RMS > 143dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	172	9.1	0.05
RMS 1sec	157	7.1	0.05

Inactive Vibratory Hammer Statistics, (1 sec RMS < 143 dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	141	7.7	0.06
RMS 1sec	129	7.0	0.05

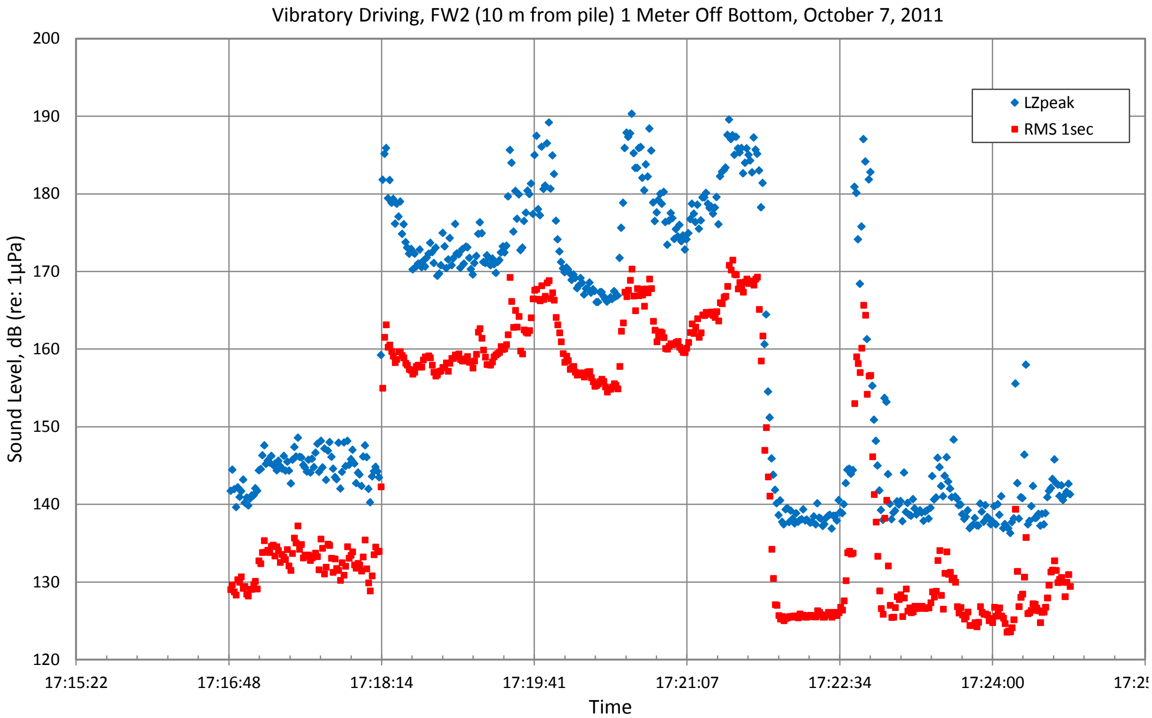
Input: 111007 006



Vibratory Driving Statistics (1 Sec RMS > 143dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	179	8.8	0.05
RMS 10sec	156	7.0	0.04

Inactive Vibratory Hammer Statistics, (1 sec RMS < 143 dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	146	7.7	0.05
RMS 10sec	129	5.4	0.04

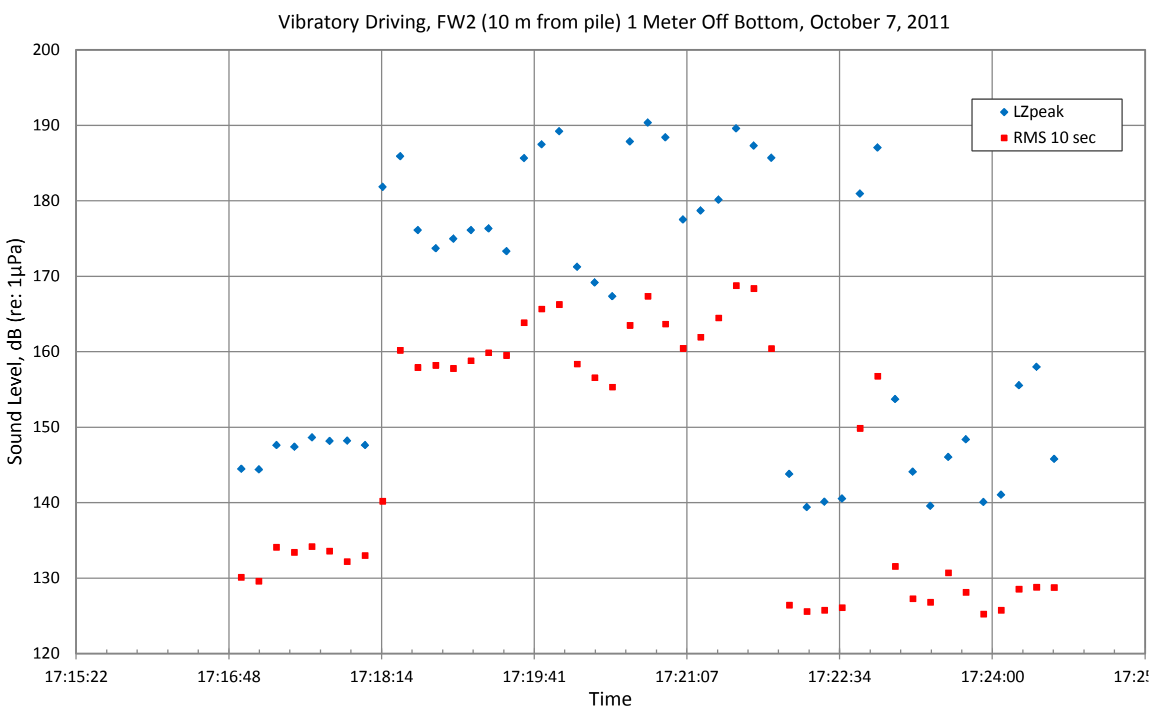
Input: 111007 006



Vibratory Driving Statistics (1 Sec RMS > 143dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	176	6.7	0.04
RMS 1 sec	161	4.7	0.03

Inactive Vibratory Hammer Statistics (1 sec RMS < 143 dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	142	3.9	0.03
RMS 1 sec	129	3.9	0.03

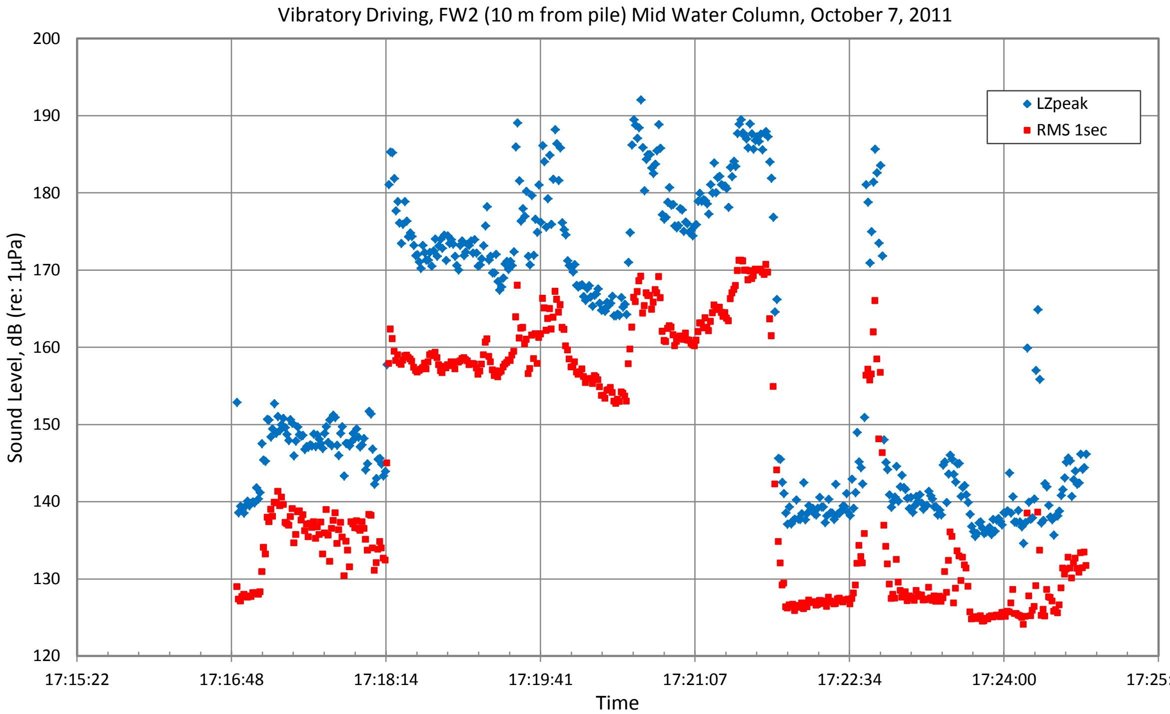
Input: 111007 007



Vibratory Driving Statistics (10 Sec RMS > 143dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	181	7.1	0.04
RMS 10sec	161	4.5	0.03

Inactive Vibratory Hammer Statistics (10 sec RMS < 143 dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	148	9.0	0.06
RMS 10sec	130	3.8	0.03

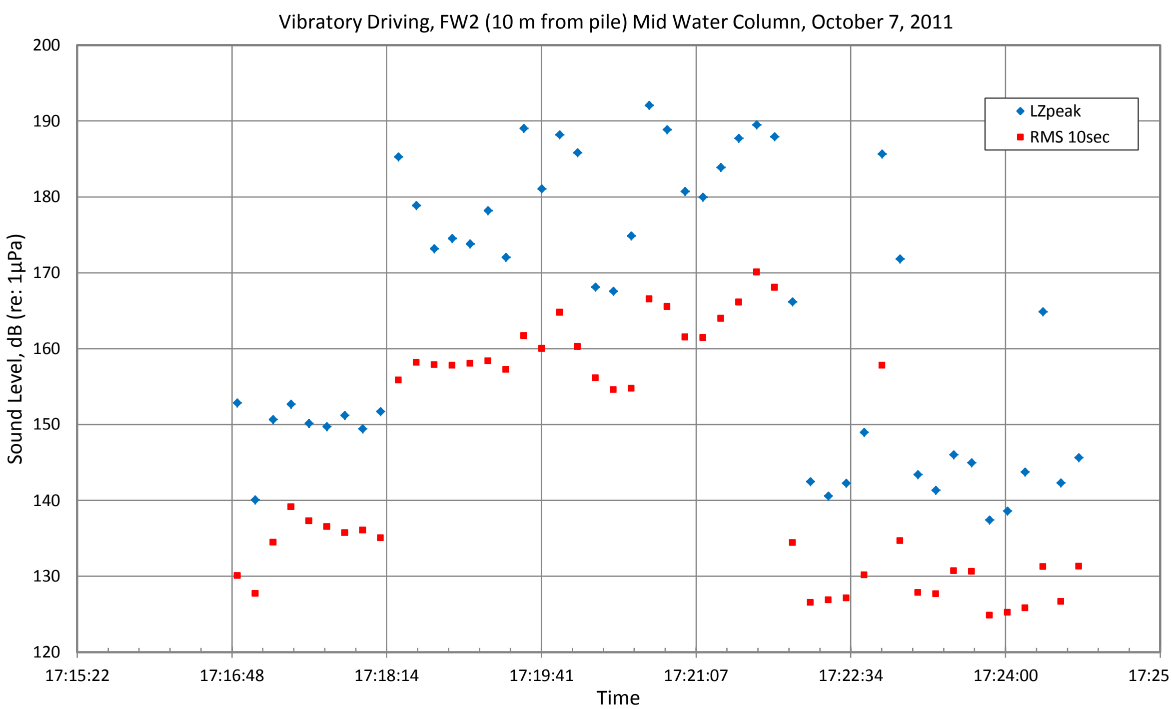
Input: 111007 007



Vibratory Driving Statistics (1 Sec RMS > 143dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	176	7.0	0.04
RMS 1sec	161	5.0	0.03

Inactive Vibratory Hammer Statistics, (1 sec RMS < 143 dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	143	5.1	0.04
RMS 1sec	131	4.6	0.04

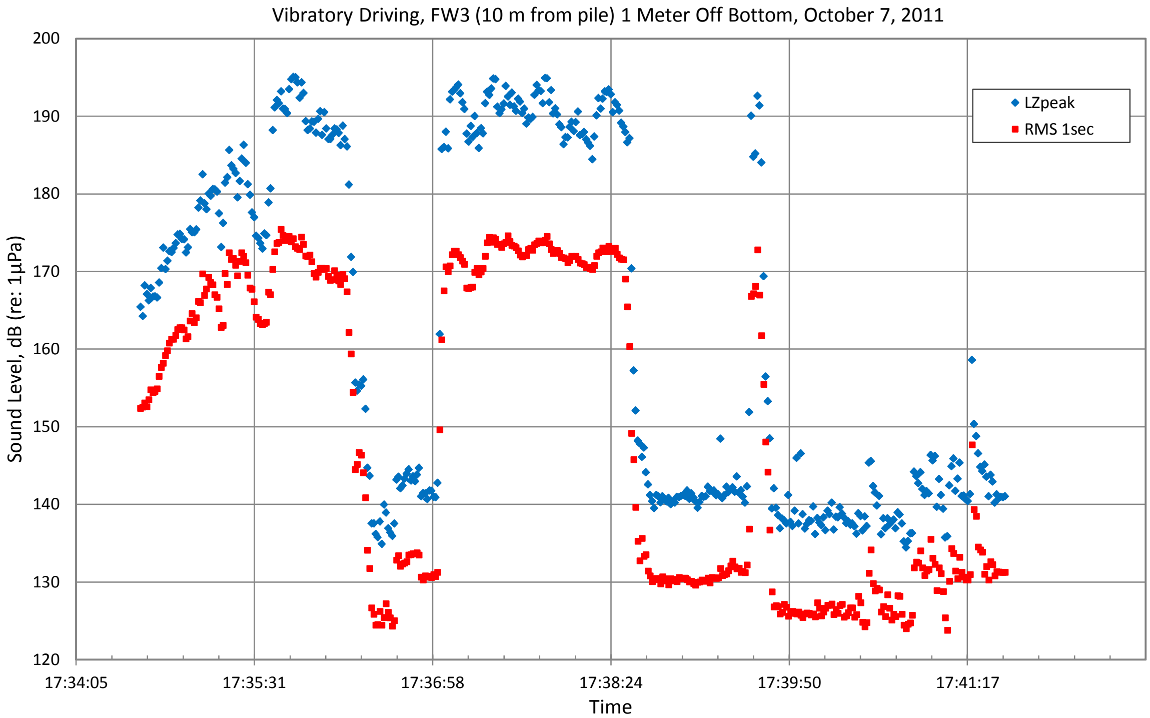
Input: 111007 007



Vibratory Driving Statistics (1 Sec RMS > 143dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	181	7.3	0.04
RMS 10sec	161	4.4	0.03

Inactive Vibratory Hammer Statistics, (1 sec RMS < 143 dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	148	8.6	0.06
RMS 10sec	131	4.3	0.03

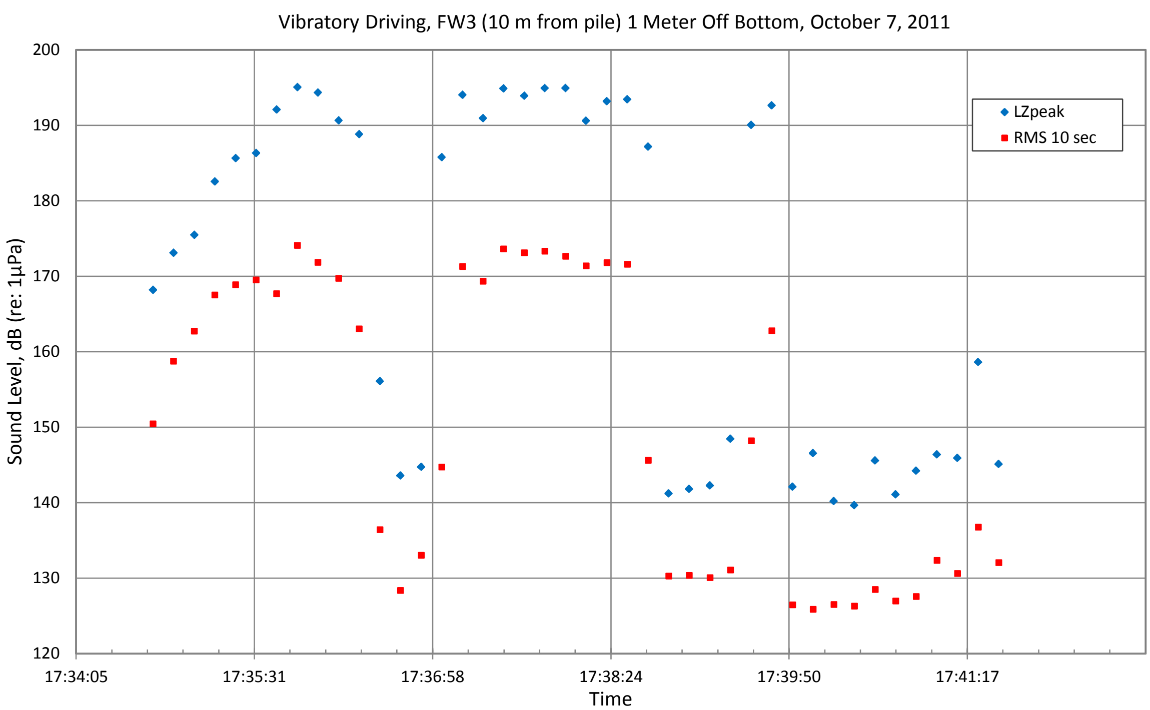
Input: 111007 007



Vibratory Driving Statistics (1 Sec RMS > 143dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	184	9.9	0.05
RMS 1 sec	168	7.2	0.04

Inactive Vibratory Hammer Statistics (1 sec RMS < 143 dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	141	3.3	0.02
RMS 1 sec	130	3.3	0.03

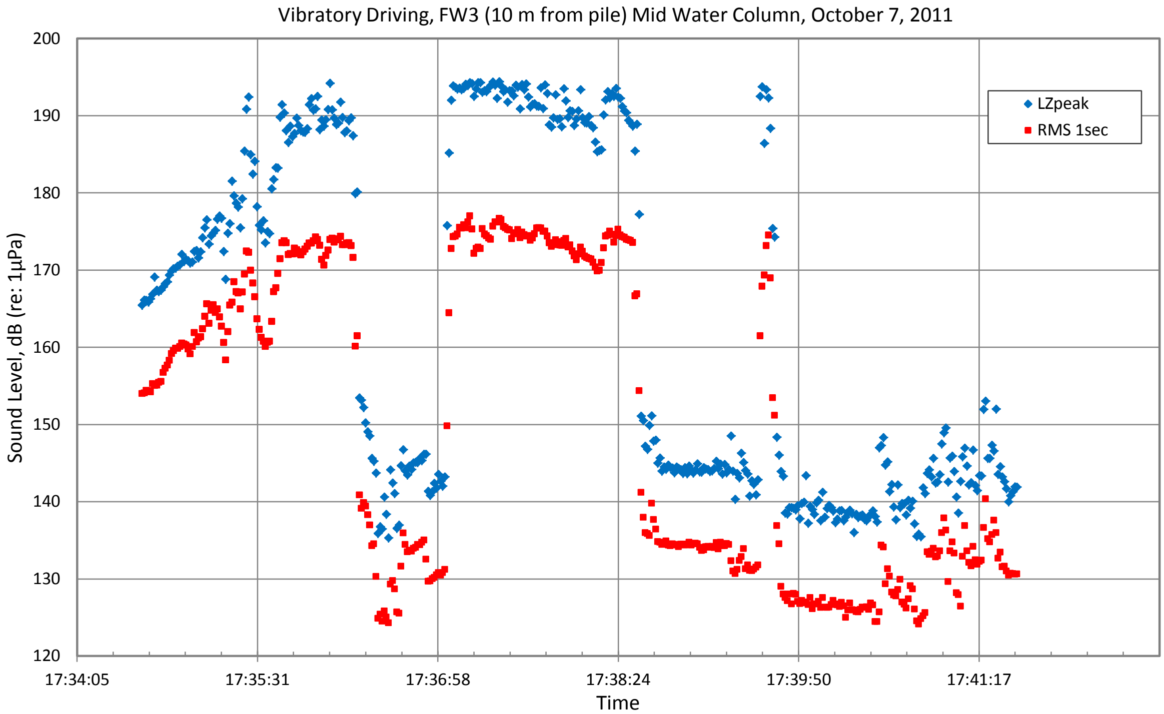
Input: 111007 008



Vibratory Driving Statistics (10 Sec RMS > 143dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	189	7.3	0.04
RMS 10sec	166	9.3	0.06

Inactive Vibratory Hammer Statistics (10 sec RMS < 143 dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	145	5.1	0.03
RMS 10sec	130	3.3	0.03

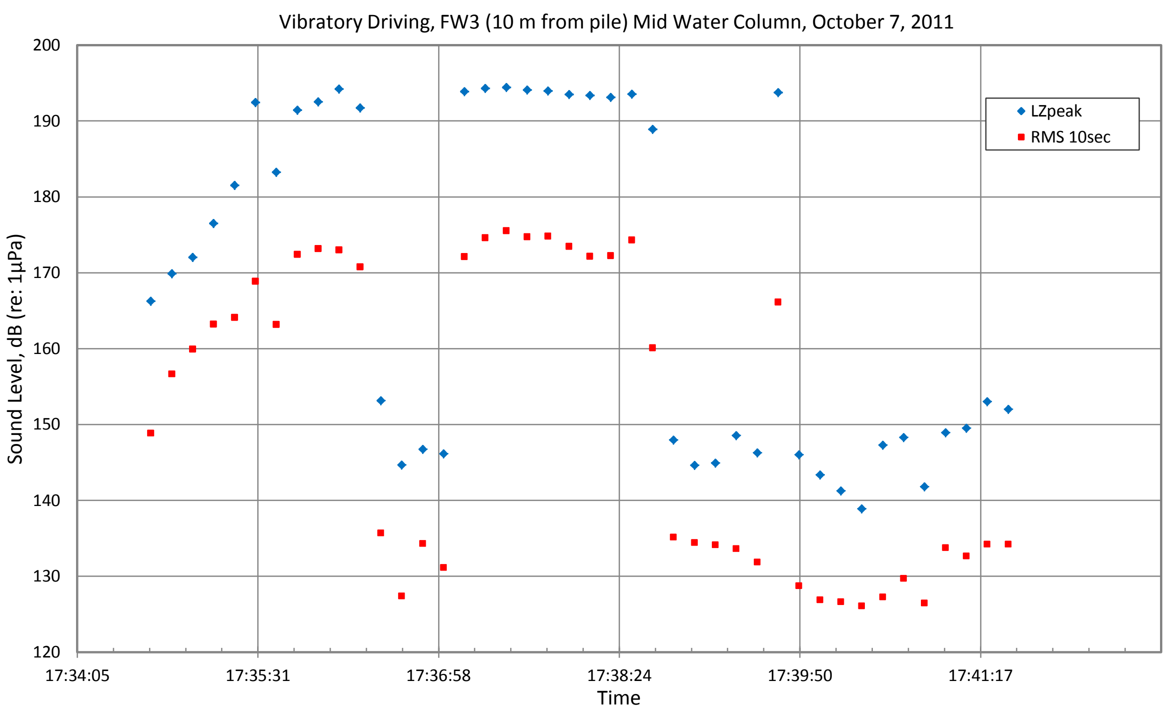
Input: 111007 008



Vibratory Driving Statistics (1 Sec RMS > 143dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	185	8.8	0.05
RMS 1sec	169	6.7	0.04

Inactive Vibratory Hammer Statistics, (1 sec RMS < 143 dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	143	3.8	0.03
RMS 1sec	131	4.0	0.03

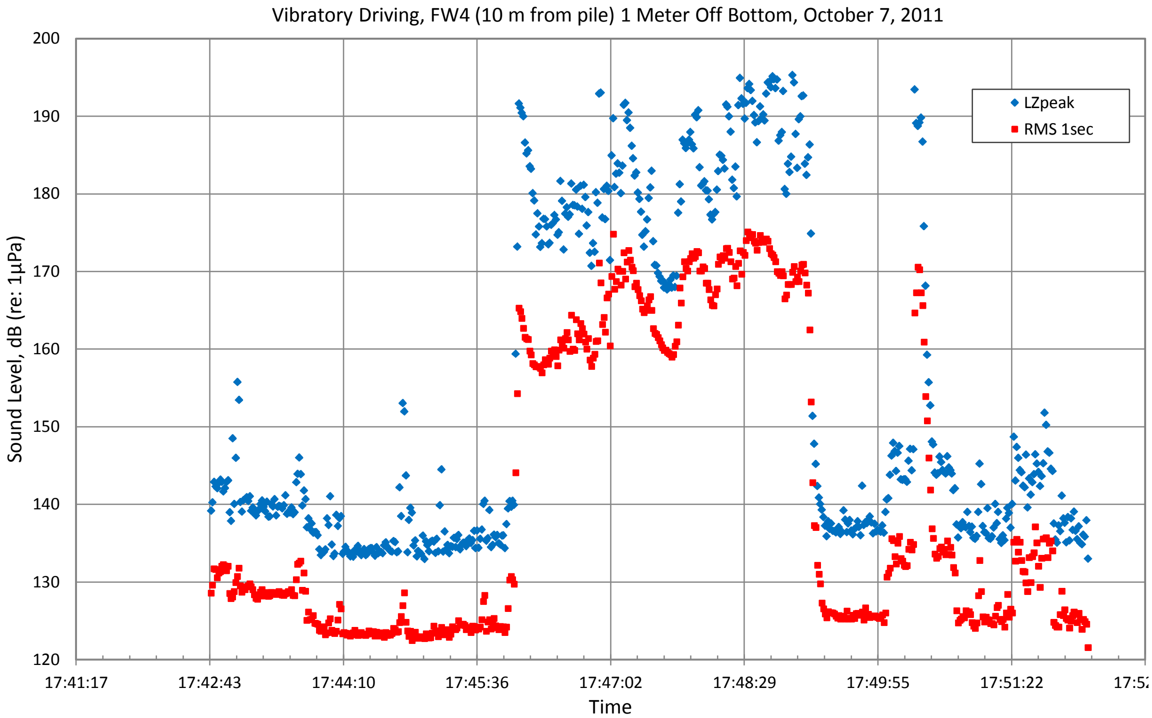
Input: 111007 008



Vibratory Driving Statistics (1 Sec RMS > 143dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	188	9.0	0.05
RMS 10sec	168	7.2	0.04

Inactive Vibratory Hammer Statistics, (1 sec RMS < 143 dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	147	3.8	0.03
RMS 10sec	131	3.4	0.03

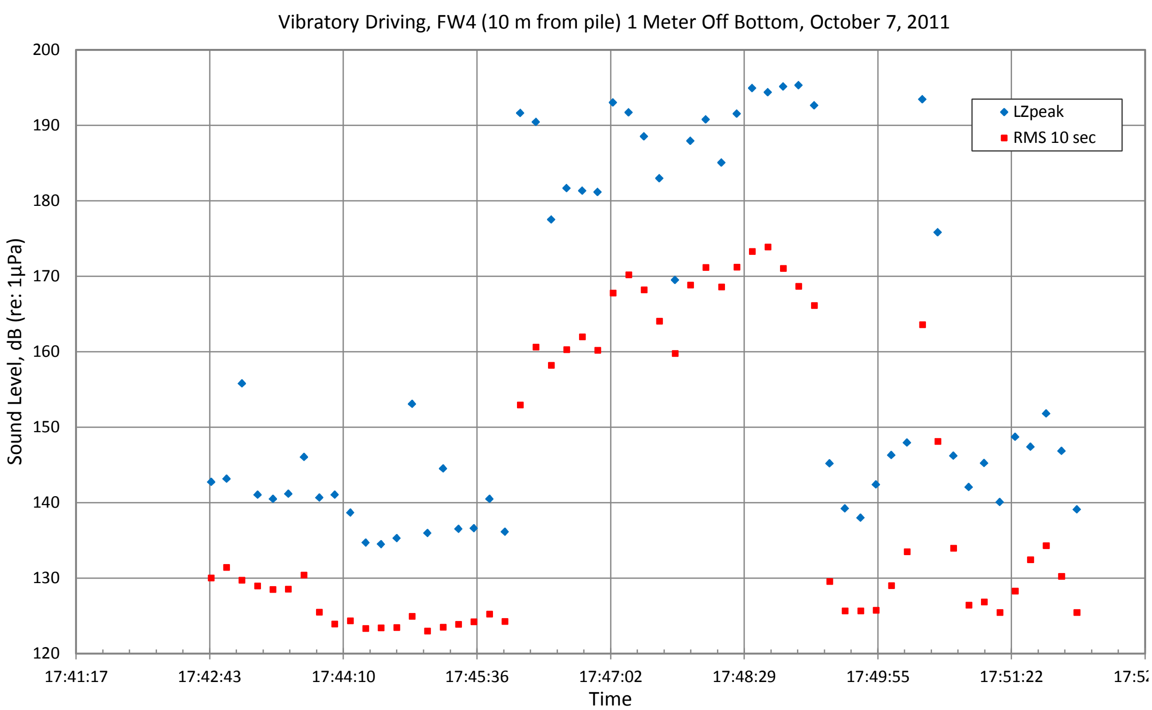
Input: 111007 008



Vibratory Driving Statistics (1 Sec RMS > 143dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	182	7.9	0.04
RMS 1 sec	166	5.9	0.04

Inactive Vibratory Hammer Statistics (1 sec RMS < 143 dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	139	4.3	0.03
RMS 1 sec	127	3.9	0.03

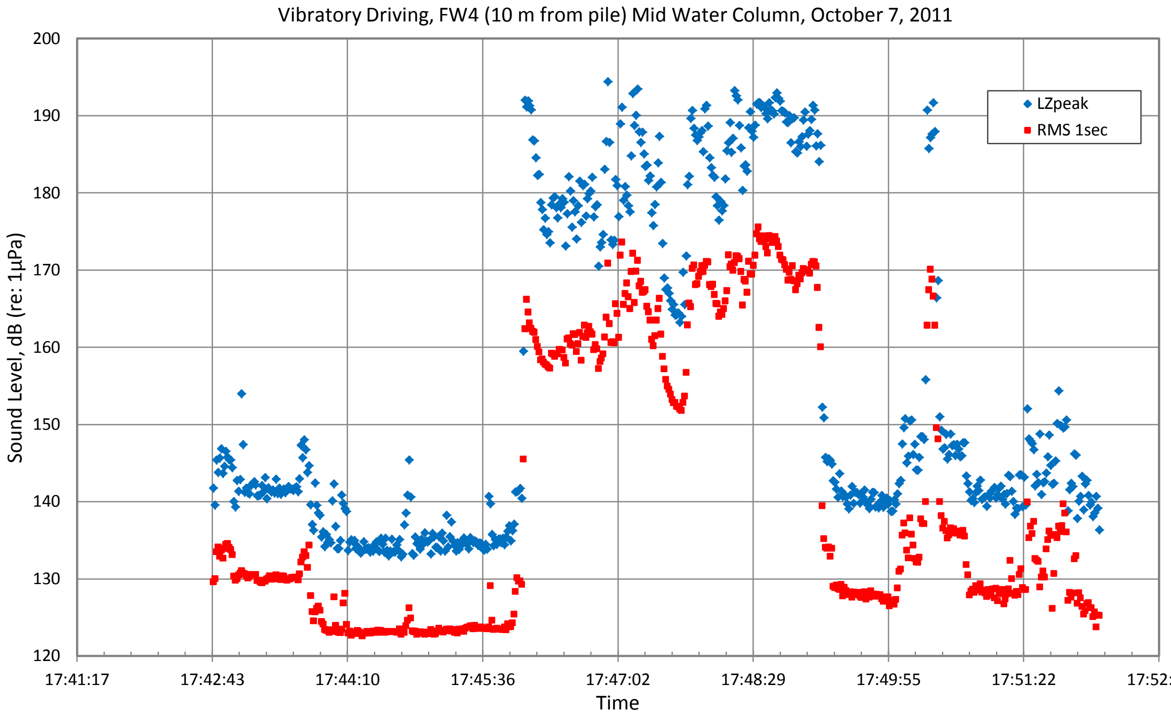
Input: 111007 009



Vibratory Driving Statistics (10 Sec RMS > 143dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	188	7.2	0.04
RMS 10sec	165	6.6	0.04

Inactive Vibratory Hammer Statistics (10 sec RMS < 143 dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	142	5.3	0.04
RMS 10sec	127	3.3	0.03

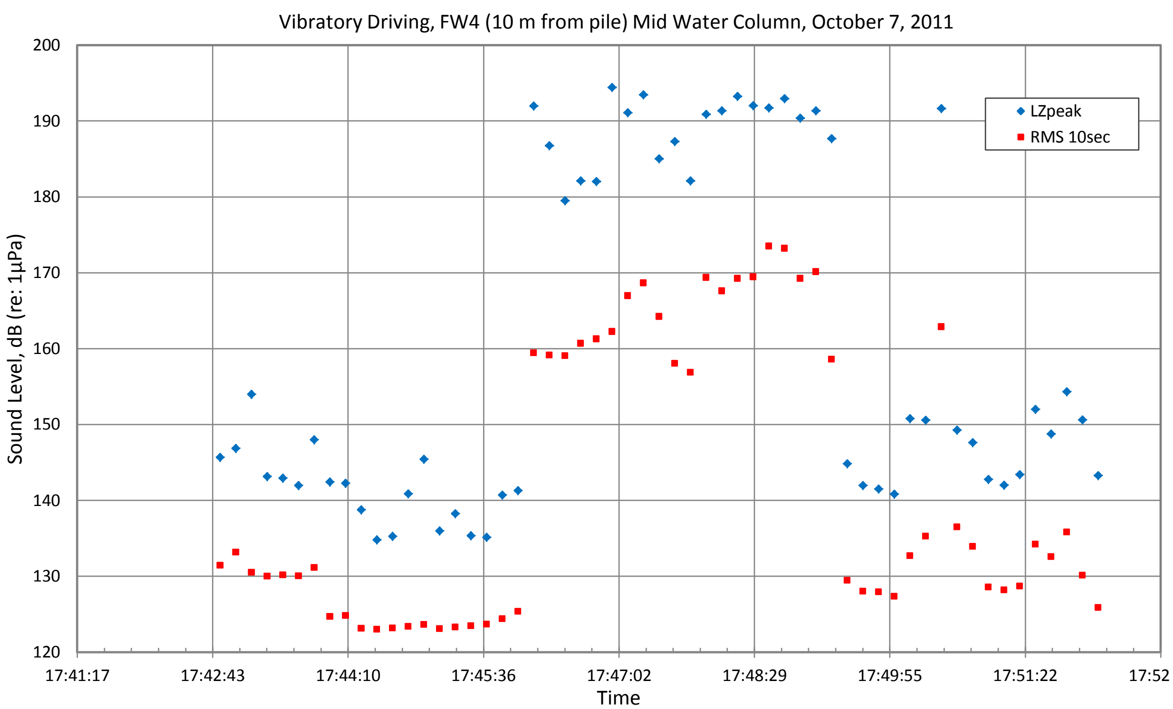
Input: 111007 009



Vibratory Driving Statistics (1 Sec RMS > 143dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	183	7.7	0.04
RMS 1sec	165	6.1	0.04

Inactive Vibratory Hammer Statistics, (1 sec RMS < 143 dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	140	4.8	0.03
RMS 1sec	128	4.5	0.04

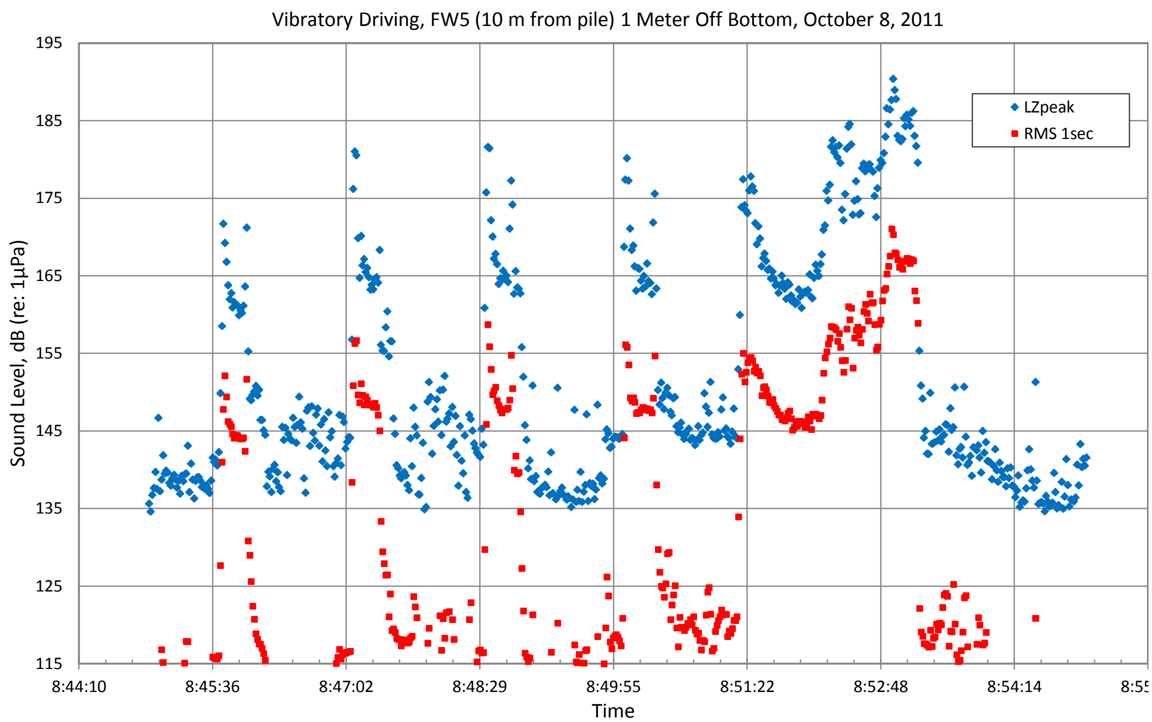
Input: 111007 009



Vibratory Driving Statistics (1 Sec RMS > 143dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	189	4.4	0.02
RMS 10sec	165	5.3	0.03

Inactive Vibratory Hammer Statistics, (1 sec RMS < 143 dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	144	5.3	0.04
RMS 10sec	128	4.2	0.03

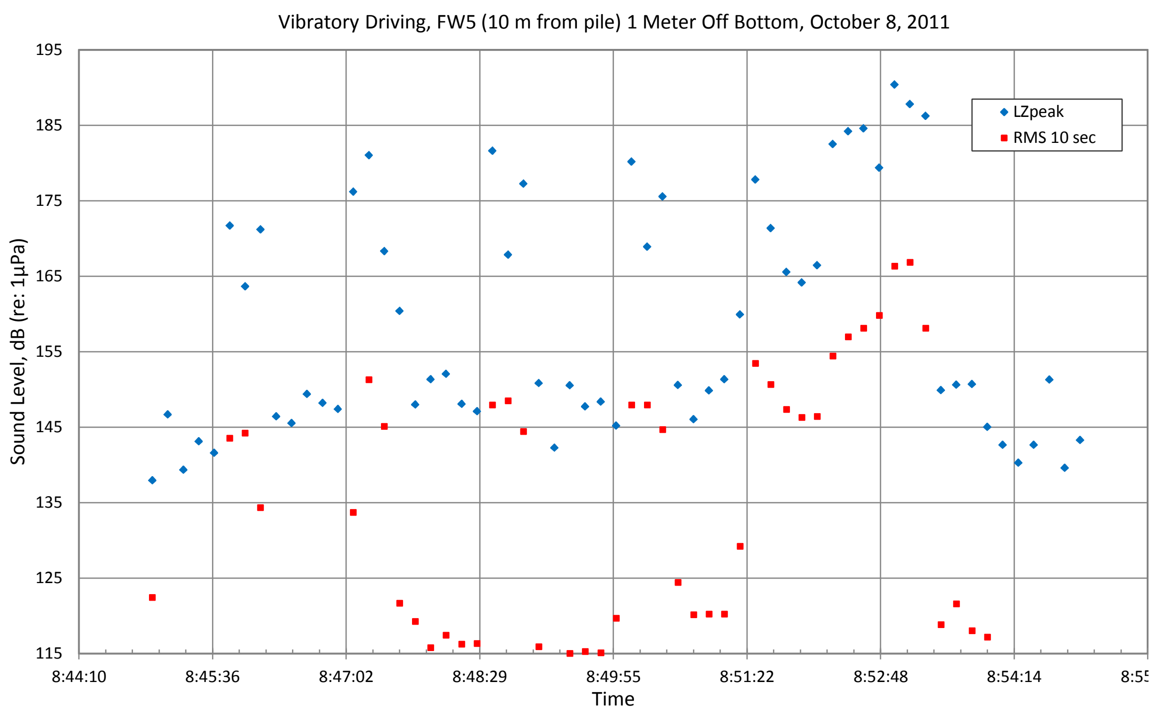
Input: 111007 009



Vibratory Driving Statistics (1 Sec RMS > 143dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	171	8.1	0.05
RMS 1 sec	153	6.8	0.04

Inactive Vibratory Hammer Statistics (1 sec RMS < 143 dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	143	5.7	0.04
RMS 1 sec	117	5.2	0.04

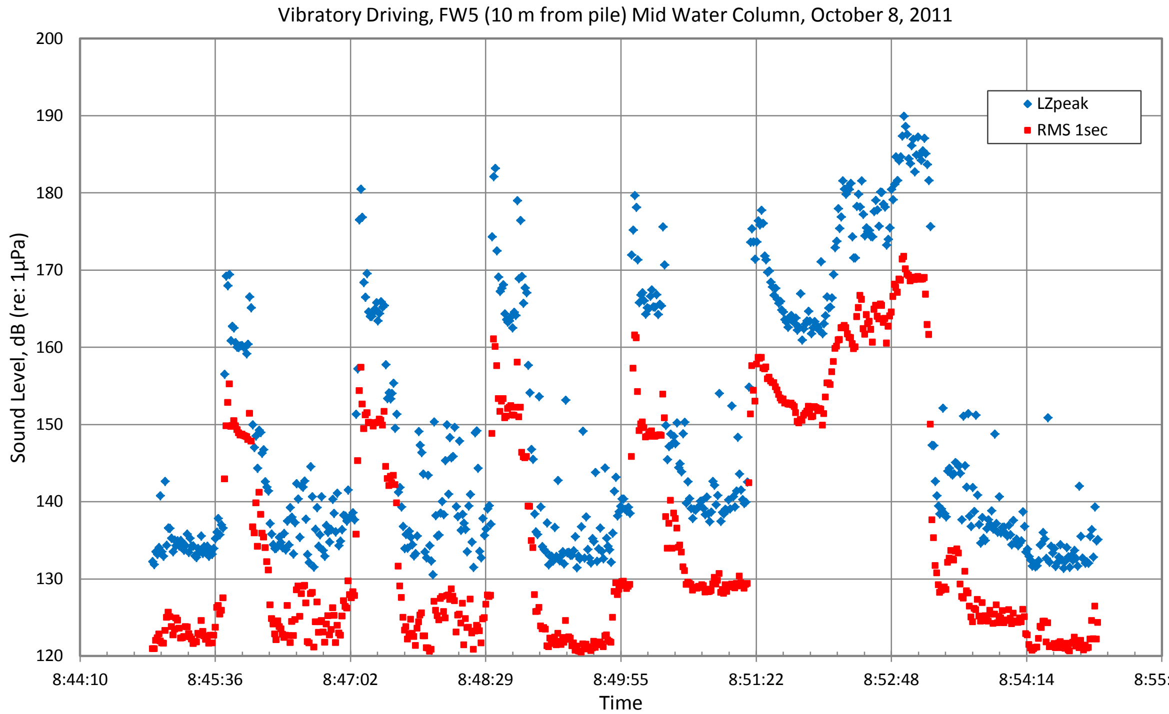
Input: 111008 001



Vibratory Driving Statistics (10 Sec RMS > 143dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	176	8.3	0.05
RMS 10sec	151	7.0	0.05

Inactive Vibratory Hammer Statistics (10 sec RMS < 143 dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	149	7.6	0.05
RMS 10sec	118	5.3	0.04

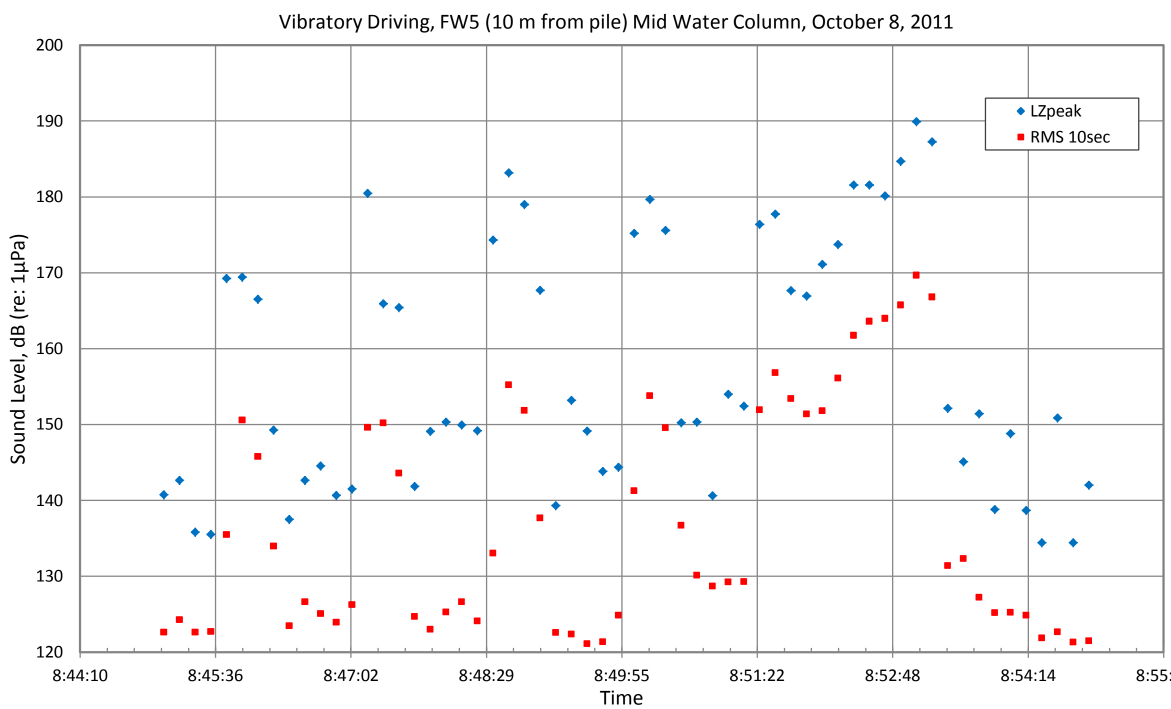
Input: 111008 001



Vibratory Driving Statistics (1 Sec RMS > 143dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	171	8.1	0.05
RMS 1sec	156	7.0	0.04

Inactive Vibratory Hammer Statistics, (1 sec RMS < 143 dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	138	5.7	0.04
RMS 1sec	126	4.7	0.04

Input: 111008 001

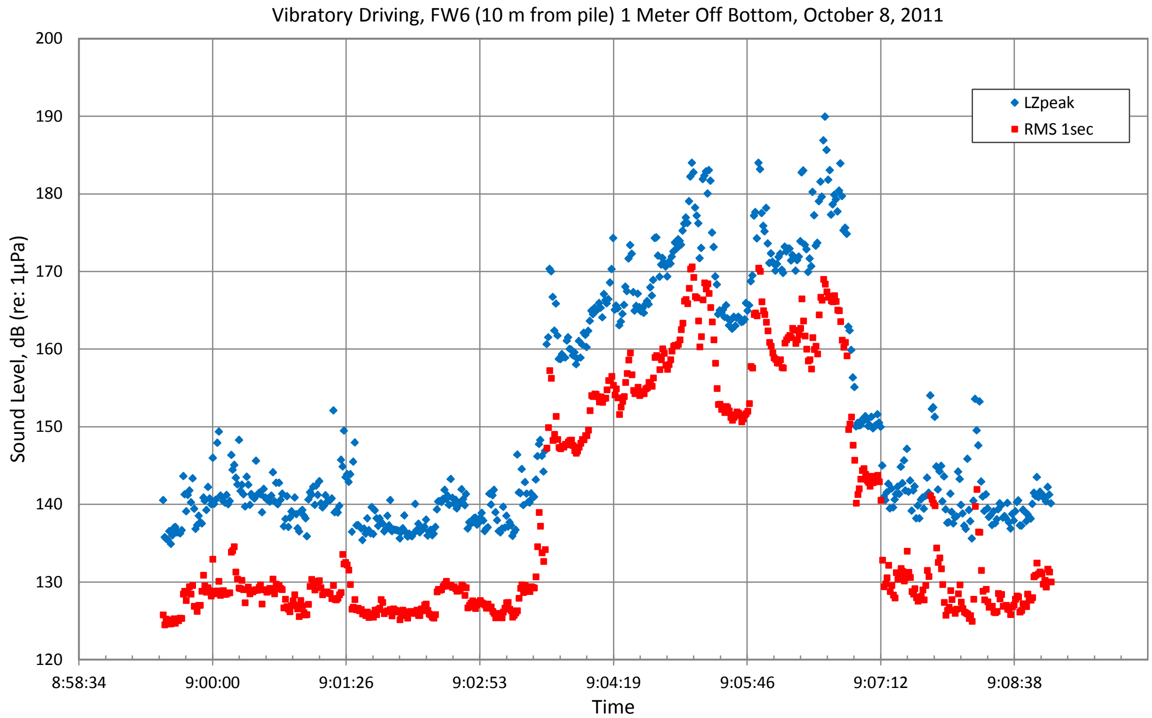


Vibratory Driving Statistics (1 Sec RMS > 143dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	176	7.4	0.04
RMS 10sec	155	7.2	0.05

Inactive Vibratory Hammer Statistics, (1 sec RMS < 143 dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	147	10.0	0.07
RMS 10sec	127	5.1	0.04

Input: 111008 001

Vibratory Driving, FW6 (10 m from pile) 1 Meter Off Bottom, October 8, 2011

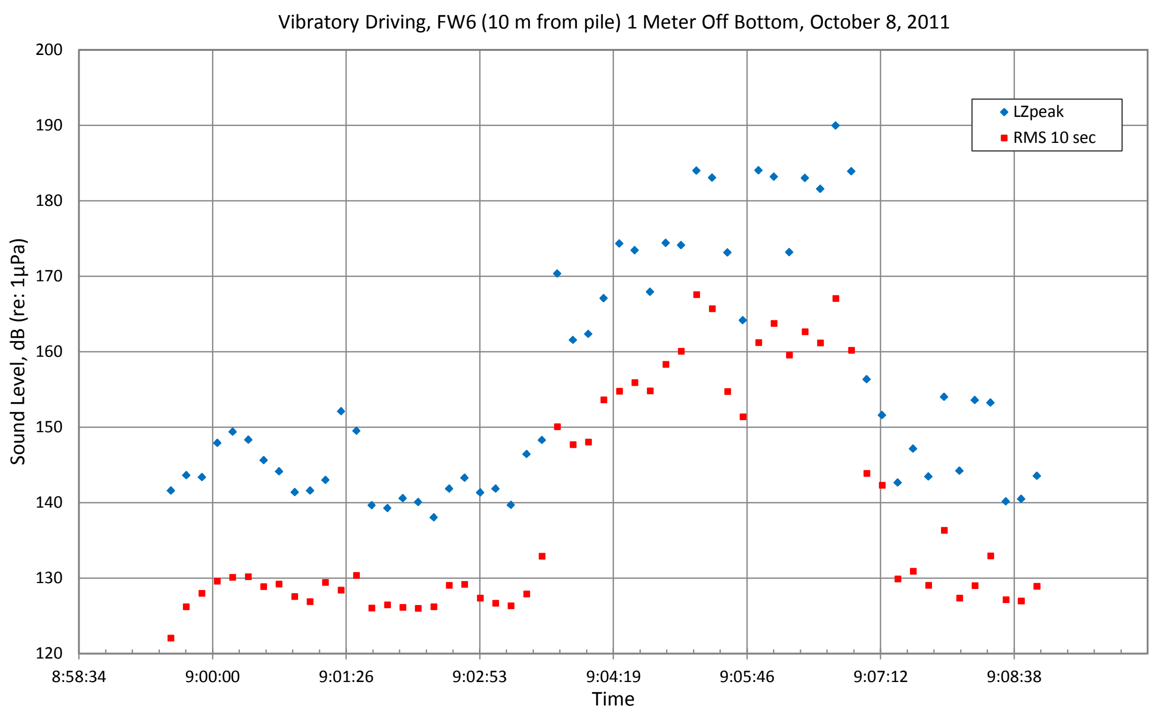


Vibratory Driving Statistics (1 Sec RMS > 143dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	169	8.0	0.05
RMS 1 sec	157	6.8	0.04

Inactive Vibratory Hammer Statistics (1 sec RMS < 143 dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	140	3.6	0.03
RMS 1 sec	129	3.4	0.03

Input: 111008 002

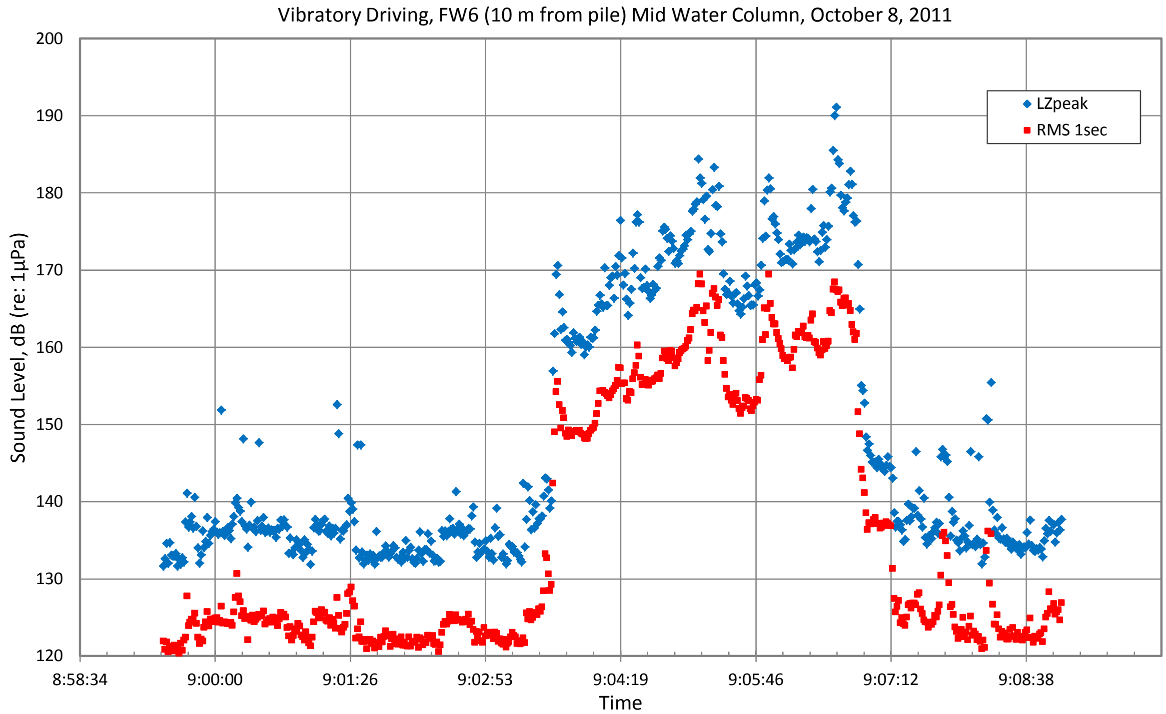
Vibratory Driving, FW6 (10 m from pile) 1 Meter Off Bottom, October 8, 2011



Vibratory Driving Statistics (10 Sec RMS > 143dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	175	9.1	0.05
RMS 10sec	157	6.6	0.04

Inactive Vibratory Hammer Statistics (10 sec RMS < 143 dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	145	4.5	0.03
RMS 10sec	129	3.4	0.03

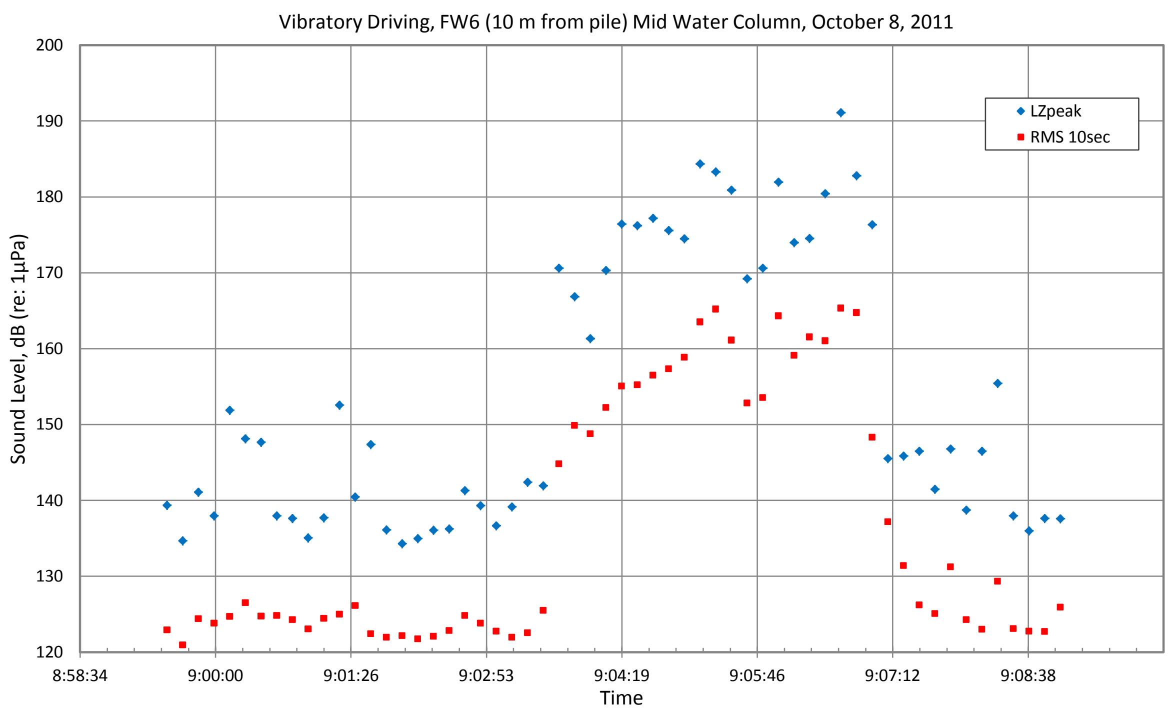
Input: 111008 002



Vibratory Driving Statistics (1 Sec RMS > 143dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	171	6.6	0.04
RMS 1sec	158	5.6	0.04

Inactive Vibratory Hammer Statistics, (1 sec RMS < 143 dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	137	4.3	0.03
RMS 1sec	125	3.9	0.03

Input: 111008 002

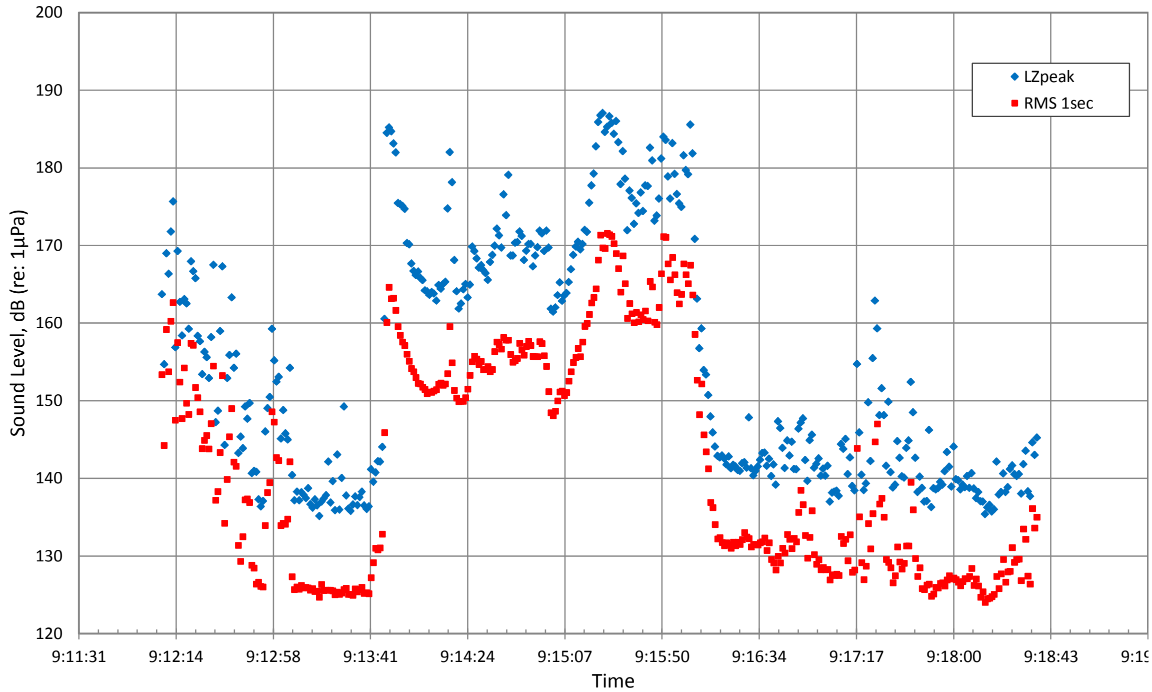


Vibratory Driving Statistics (1 Sec RMS > 143dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	176	6.8	0.04
RMS 10sec	157	6.2	0.04

Inactive Vibratory Hammer Statistics, (1 sec RMS < 143 dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	141	5.5	0.04
RMS 10sec	125	3.2	0.03

Input: 111008 002

Vibratory Driving, FW7 (10 m from pile) 1 Meter Off Bottom, October 8, 2011

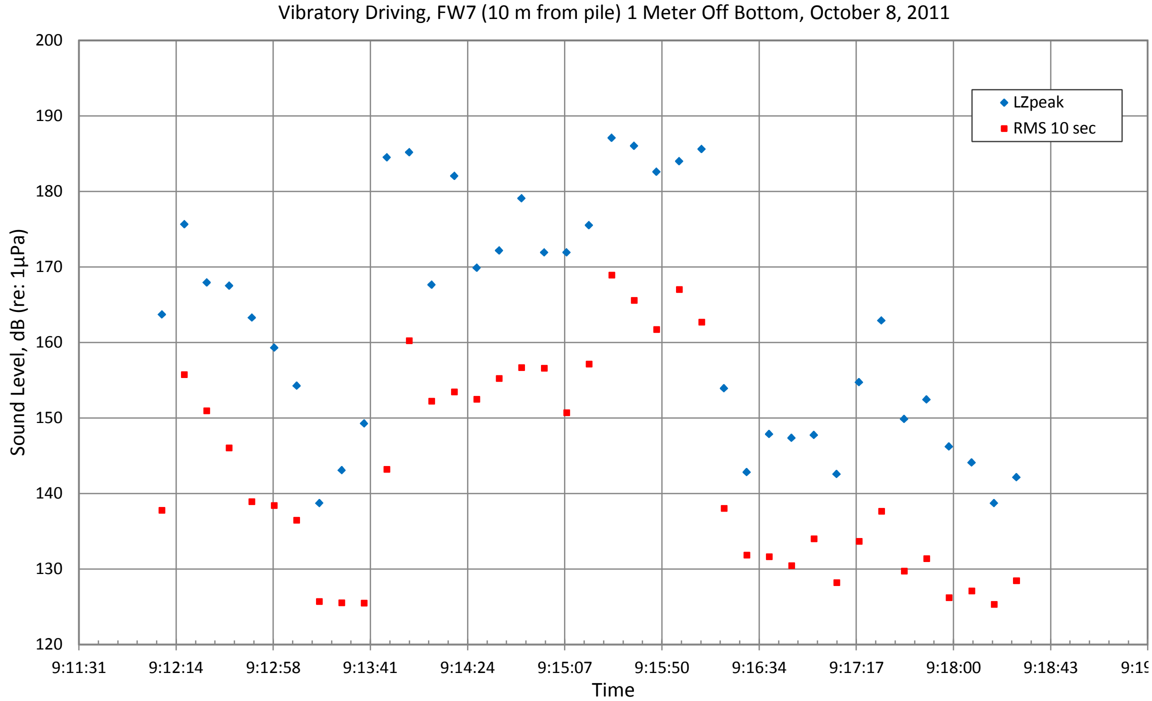


Vibratory Driving Statistics (1 Sec RMS > 143dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	170	8.4	0.05
RMS 1 sec	156	6.9	0.04

Inactive Vibratory Hammer Statistics (1 sec RMS < 143 dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	142	4.4	0.03
RMS 1 sec	130	4.2	0.03

Input: 111008 003

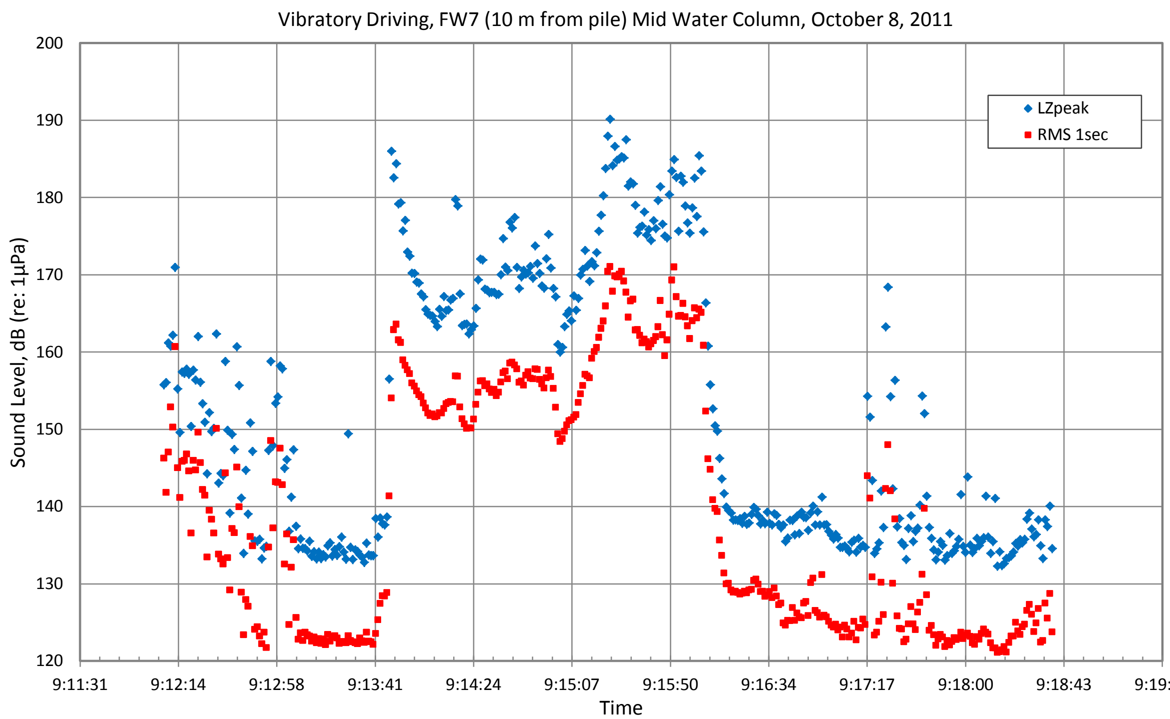
Vibratory Driving, FW7 (10 m from pile) 1 Meter Off Bottom, October 8, 2011



Vibratory Driving Statistics (10 Sec RMS > 143dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	178	7.2	0.04
RMS 10sec	156	7.0	0.04

Inactive Vibratory Hammer Statistics (10 sec RMS < 143 dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	150	7.8	0.05
RMS 10sec	132	4.9	0.04

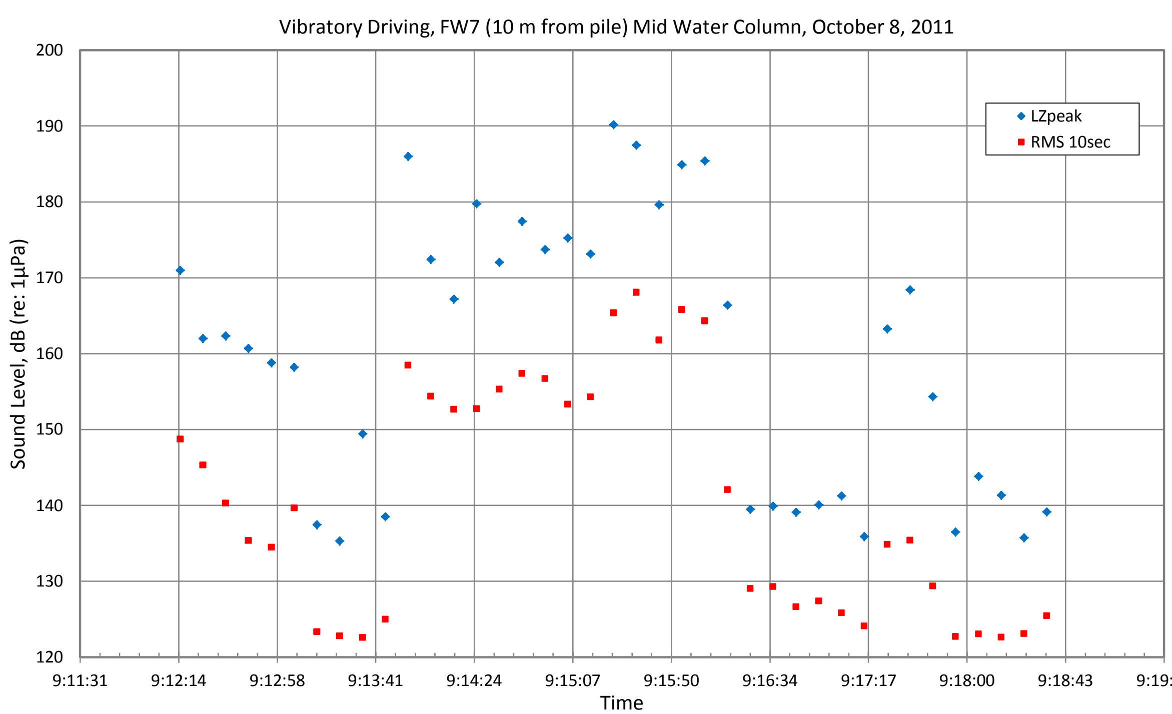
Input: 111008 003



Vibratory Driving Statistics (1 Sec RMS > 143dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	171	8.4	0.05
RMS 1sec	157	6.8	0.04

Inactive Vibratory Hammer Statistics, (1 sec RMS < 143 dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	139	5.9	0.04
RMS 1sec	127	5.4	0.04

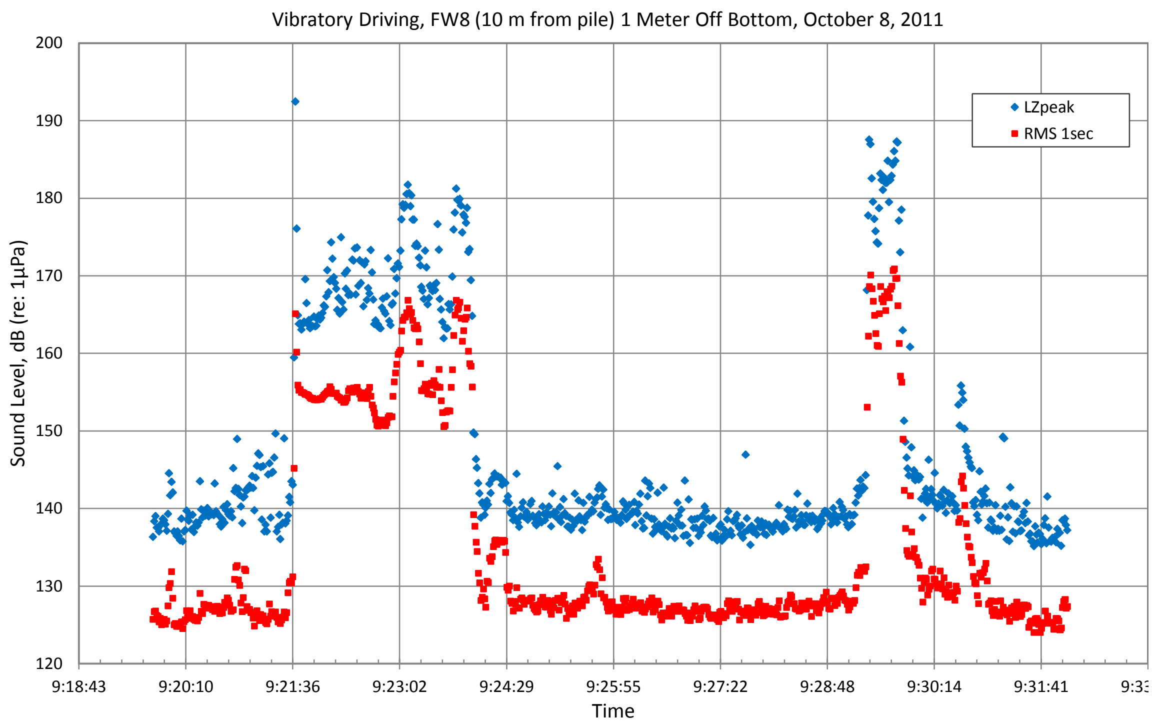
Input: 111008 003



Vibratory Driving Statistics (1 Sec RMS > 143dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	177	7.9	0.04
RMS 10sec	157	6.4	0.04

Inactive Vibratory Hammer Statistics, (1 sec RMS < 143 dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	147	11.4	0.08
RMS 10sec	129	6.4	0.05

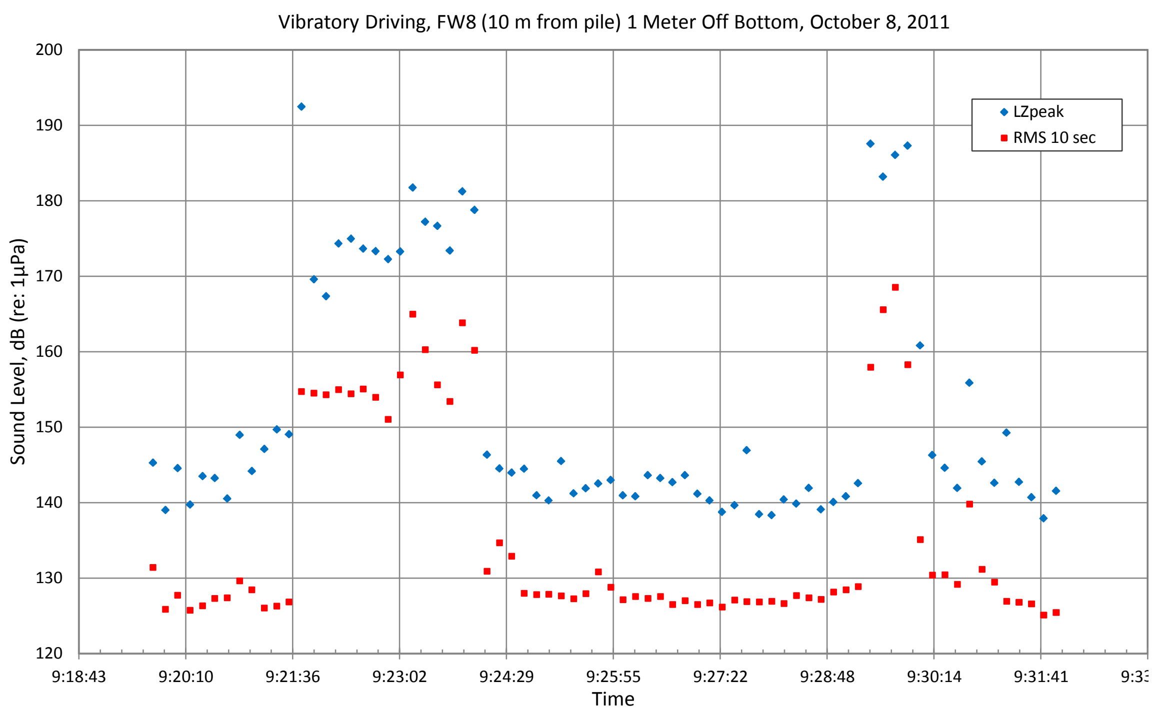
Input: 111008 003



Vibratory Driving Statistics (1 Sec RMS > 143dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	171	7.0	0.04
RMS 1 sec	158	5.8	0.04

Inactive Vibratory Hammer Statistics (1 sec RMS < 143 dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	140	3.1	0.02
RMS 1 sec	128	2.8	0.02

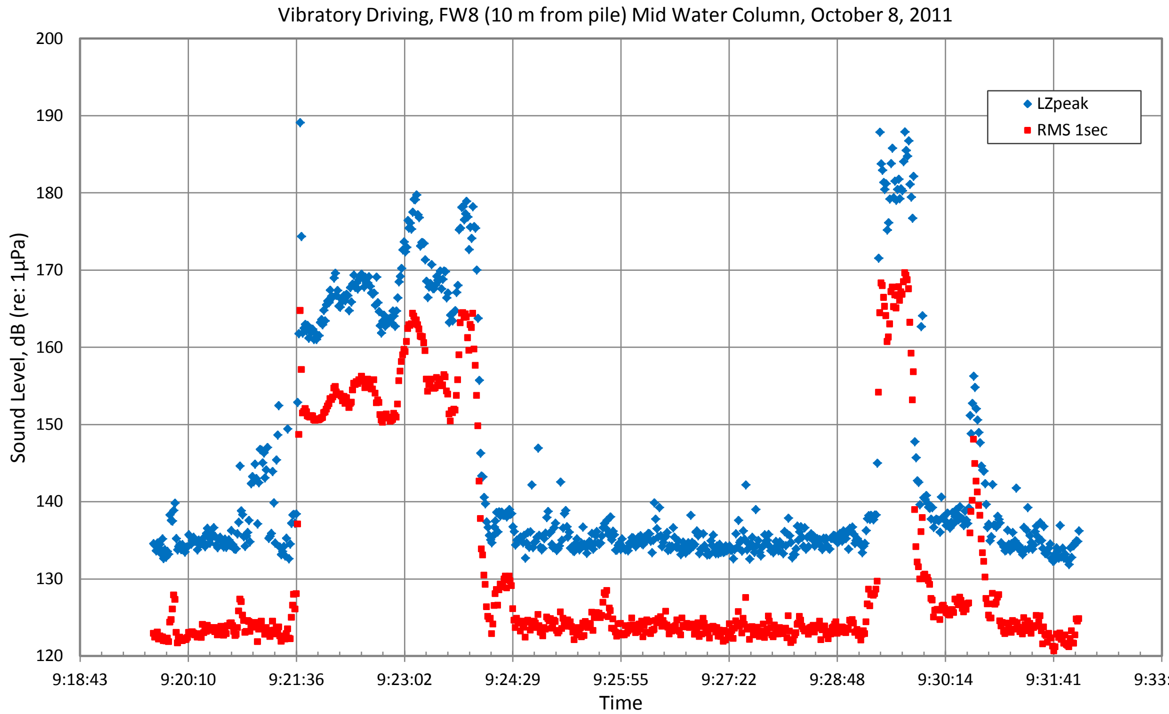
Input: 111008 004



Vibratory Driving Statistics (10 Sec RMS > 143dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	178	6.8	0.04
RMS 10sec	158	4.8	0.03

Inactive Vibratory Hammer Statistics (10 sec RMS < 143 dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	143	4.2	0.03
RMS 10sec	128	2.6	0.02

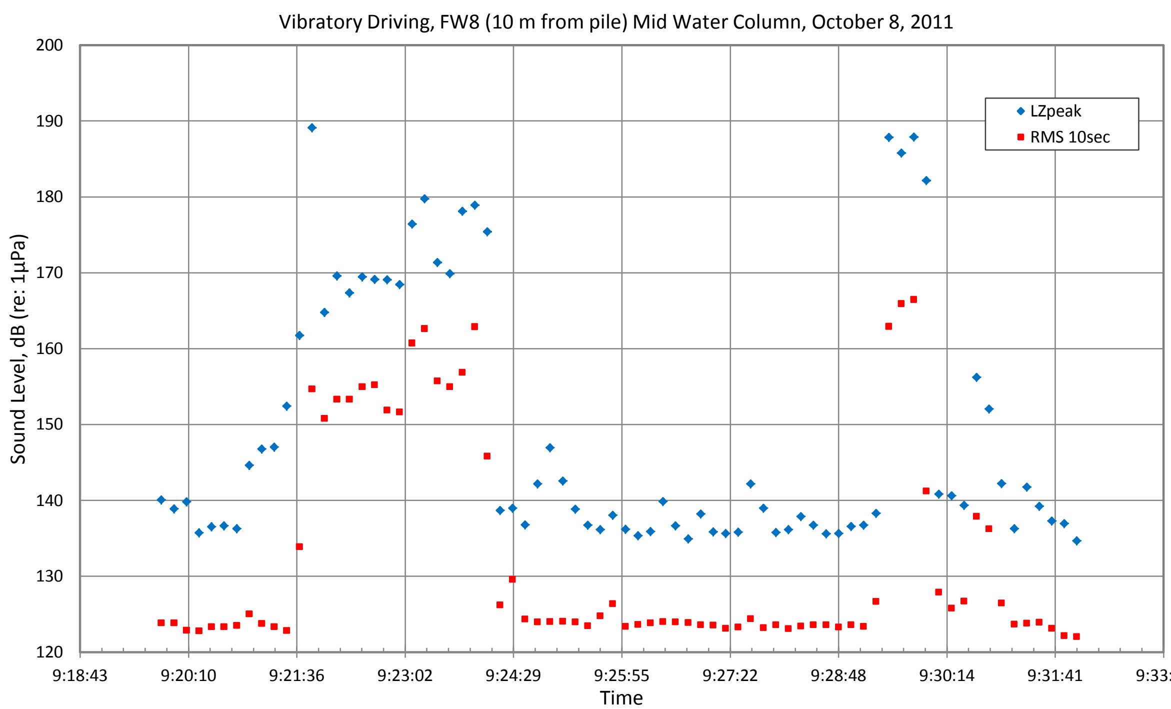
Input: 111008 004



Vibratory Driving Statistics (1 Sec RMS > 143dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	170	7.1	0.04
RMS 1sec	157	5.6	0.04

Inactive Vibratory Hammer Statistics, (1 sec RMS < 143 dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	136	3.8	0.03
RMS 1sec	125	3.1	0.02

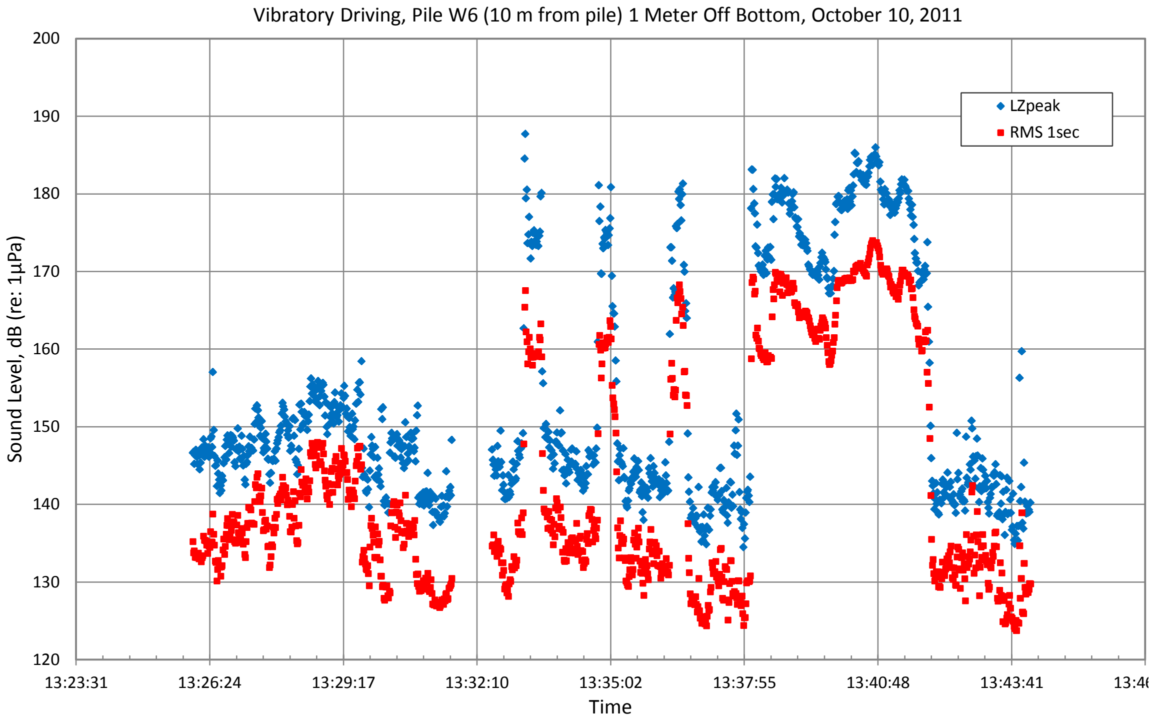
Input: 111008 004



Vibratory Driving Statistics (1 Sec RMS > 143dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	175	7.9	0.05
RMS 10sec	157	5.7	0.04

Inactive Vibratory Hammer Statistics, (1 sec RMS < 143 dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	140	7.9	0.06
RMS 10sec	125	3.8	0.03

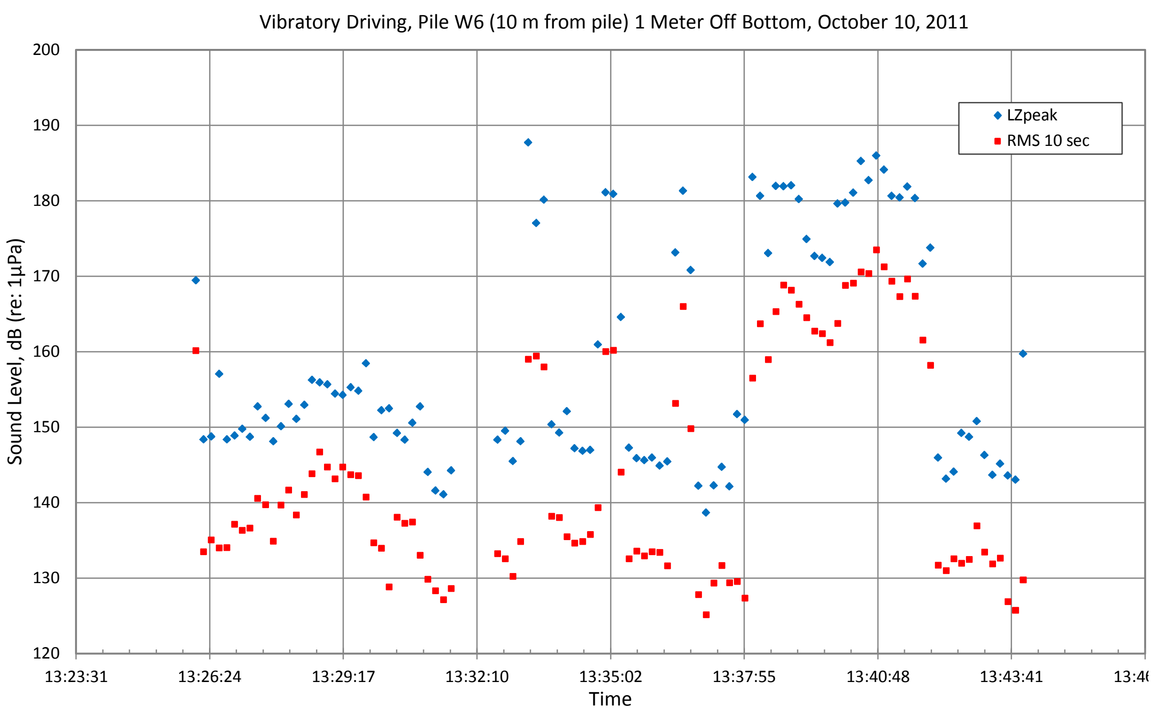
Input: 111008 004



Vibratory Driving Statistics (1 Sec RMS > 143dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	172	9.6	0.06
RMS 1 sec	161	8.5	0.05

Inactive Vibratory Hammer Statistics (1 sec RMS < 143 dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	144	6.9	0.05
RMS 1 sec	133	6.8	0.05

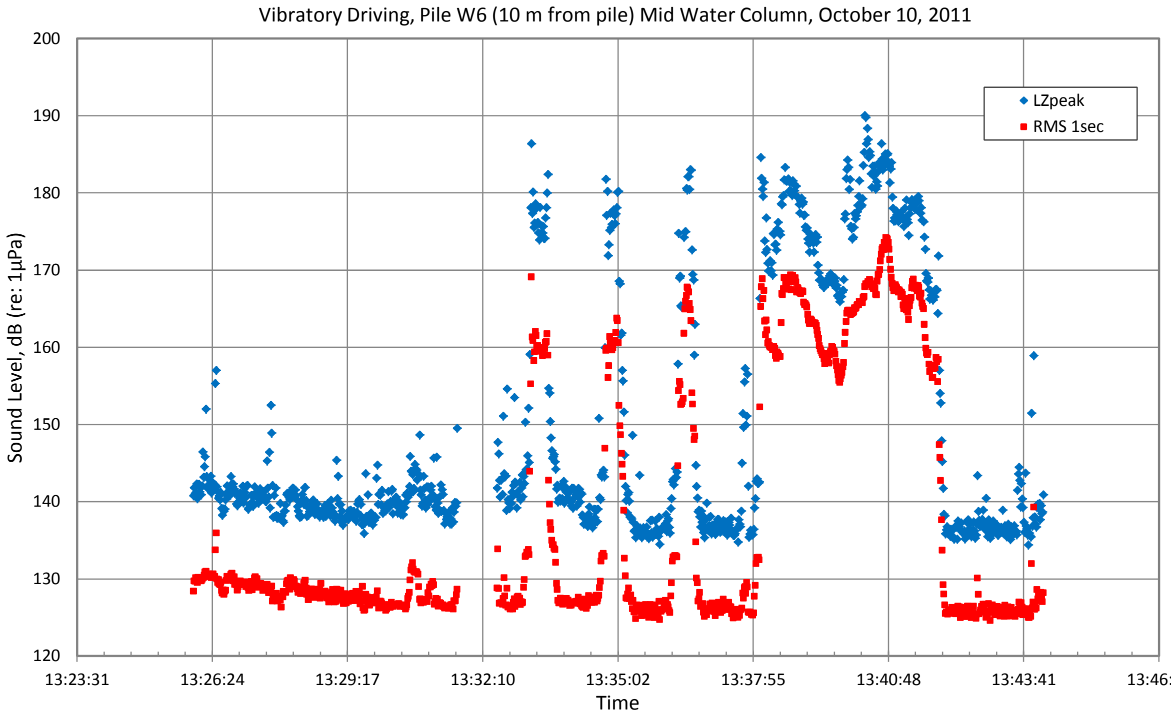
Input: 111010 002



Vibratory Driving Statistics (10 Sec RMS > 143dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	175	10.1	0.06
RMS 10sec	160	9.3	0.06

Inactive Vibratory Hammer Statistics (10 sec RMS < 143 dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	148	4.4	0.03
RMS 10sec	134	4.0	0.03

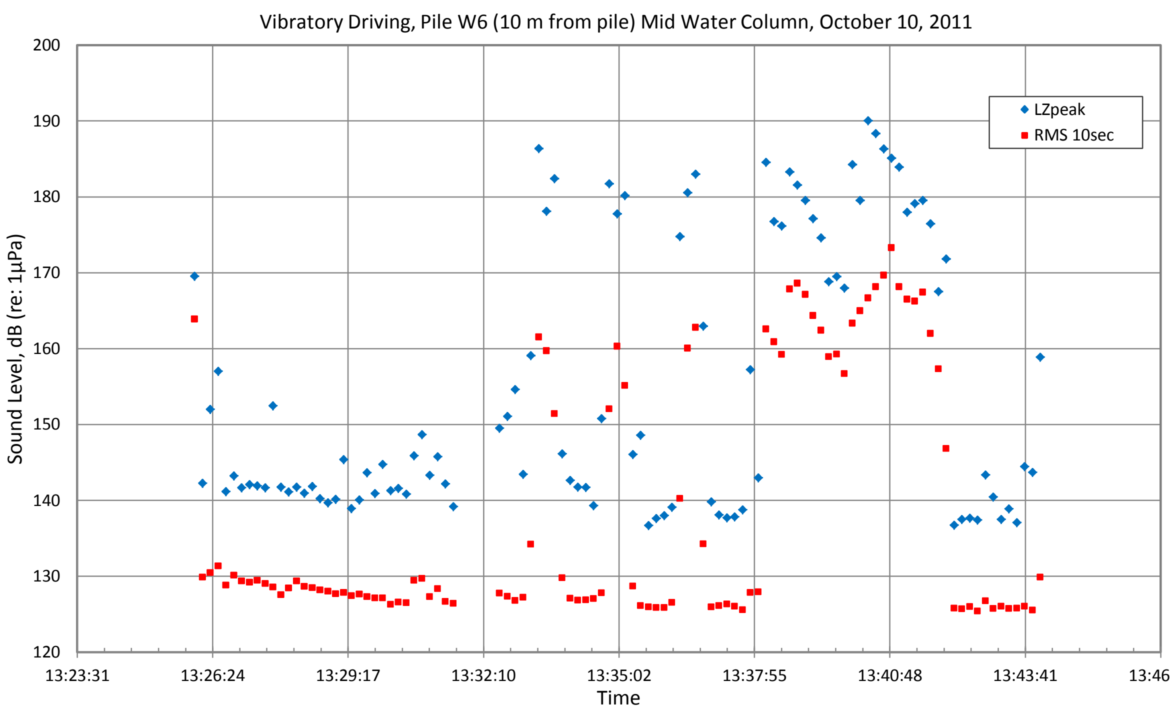
Input: 111010 002



Vibratory Driving Statistics (1 Sec RMS > 143dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	176	6.4	0.04
RMS 1sec	163	5.8	0.04

Inactive Vibratory Hammer Statistics, (1 sec RMS < 143 dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	140	6.3	0.05
RMS 1sec	128	5.2	0.04

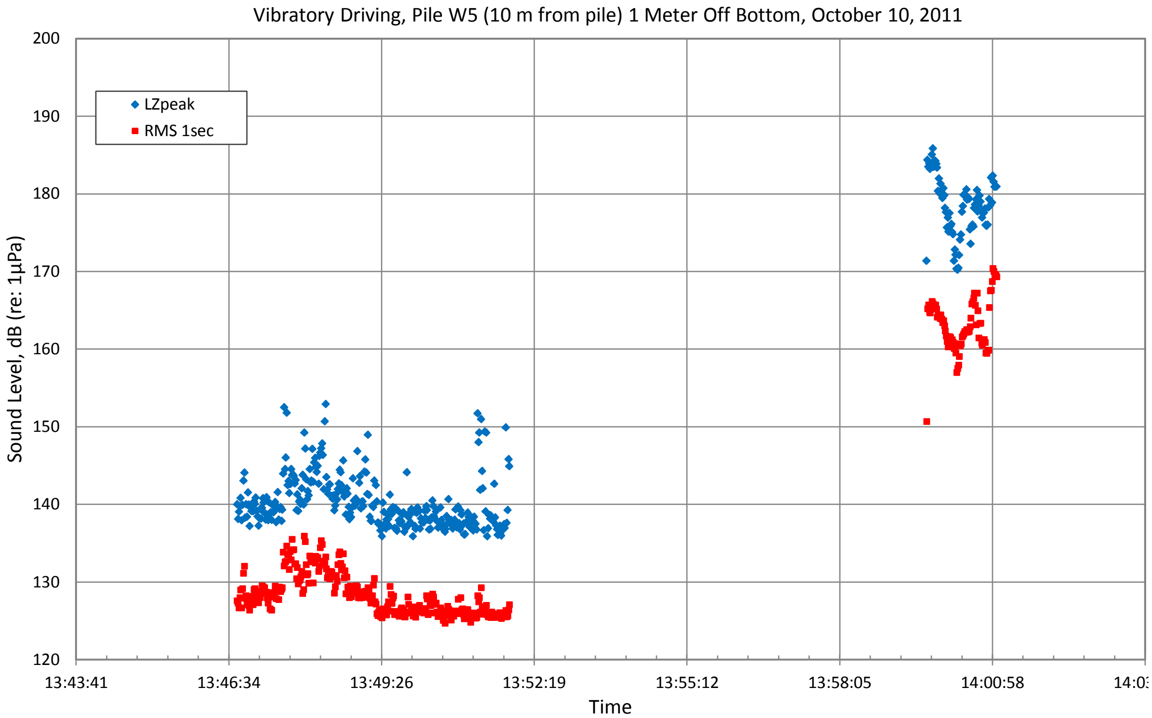
Input: 111010 002



Vibratory Driving Statistics (10 Sec RMS > 143dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	179	6.0	0.03
RMS 10sec	162	5.7	0.04

Inactive Vibratory Hammer Statistics, (10 sec RMS < 143 dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	144	7.0	0.05
RMS 10sec	128	2.4	0.02

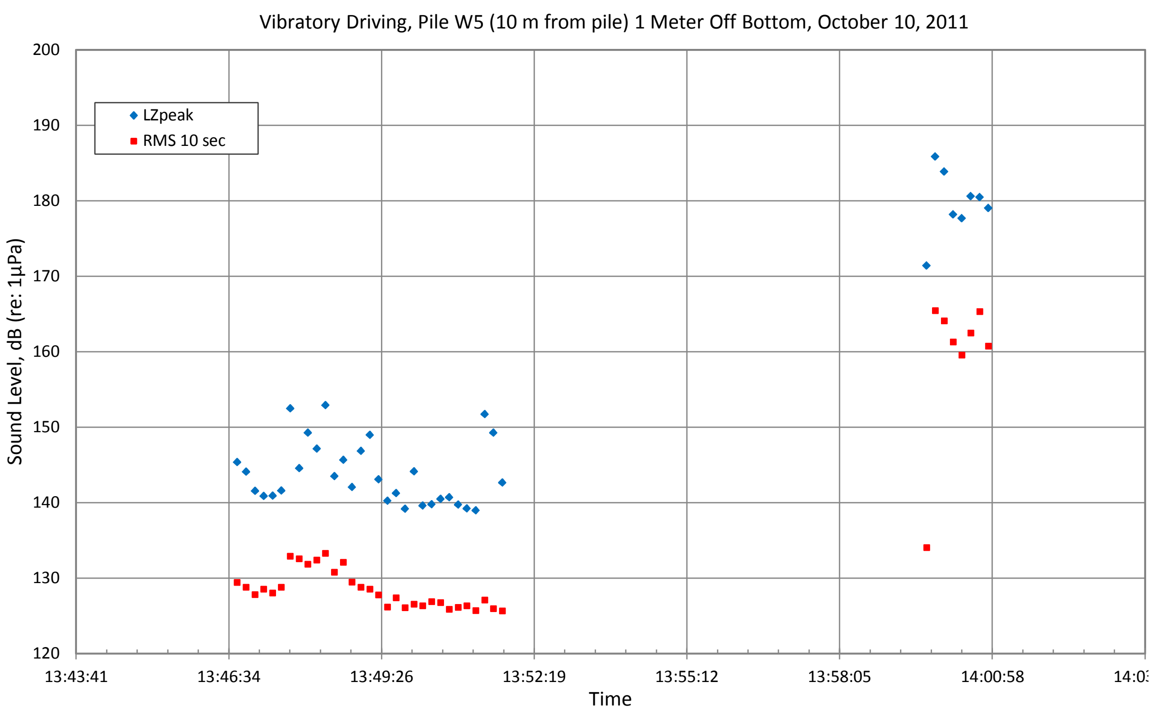
Input: 111010 002



Vibratory Driving Statistics (1 Sec RMS > 143dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	178	3.7	0.02
RMS 1 sec	163	3.3	0.02

Inactive Vibratory Hammer Statistics (1 sec RMS < 143 dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	140	8.6	0.06
RMS 1 sec	128	7.7	0.06

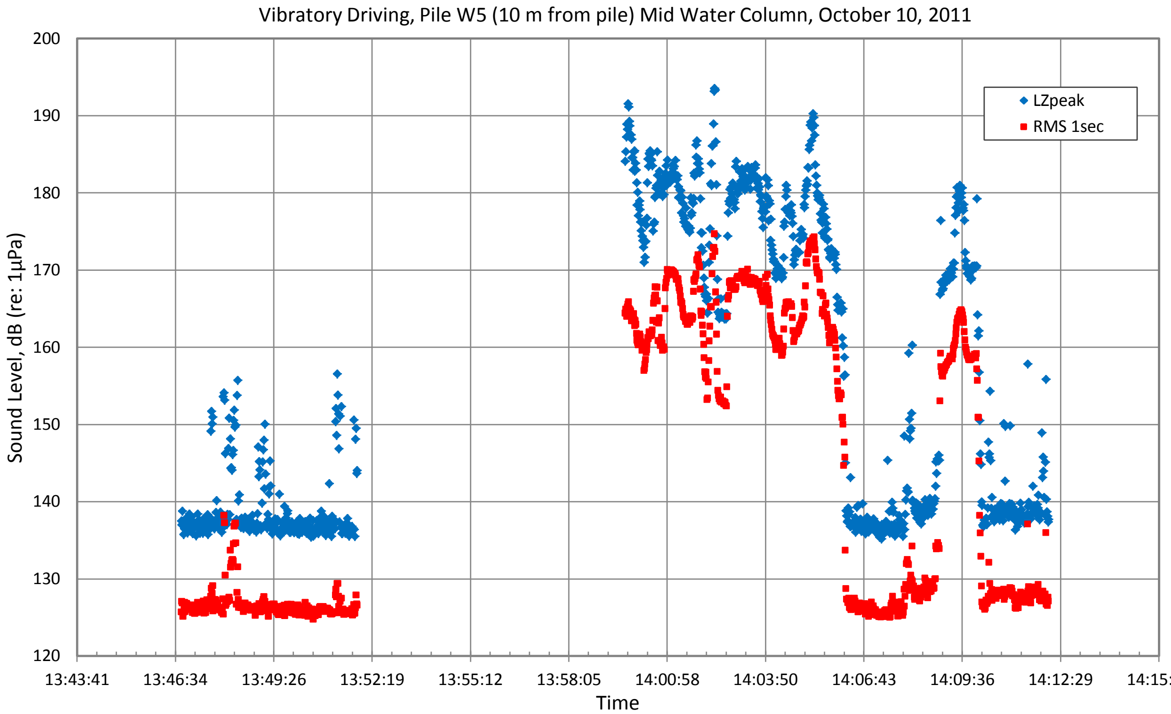
Input: 111010 003



Vibratory Driving Statistics (10 Sec RMS > 143dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	181	3.0	0.02
RMS 10sec	163	2.3	0.01

Inactive Vibratory Hammer Statistics (10 sec RMS < 143 dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	145	6.4	0.04
RMS 10sec	129	2.6	0.02

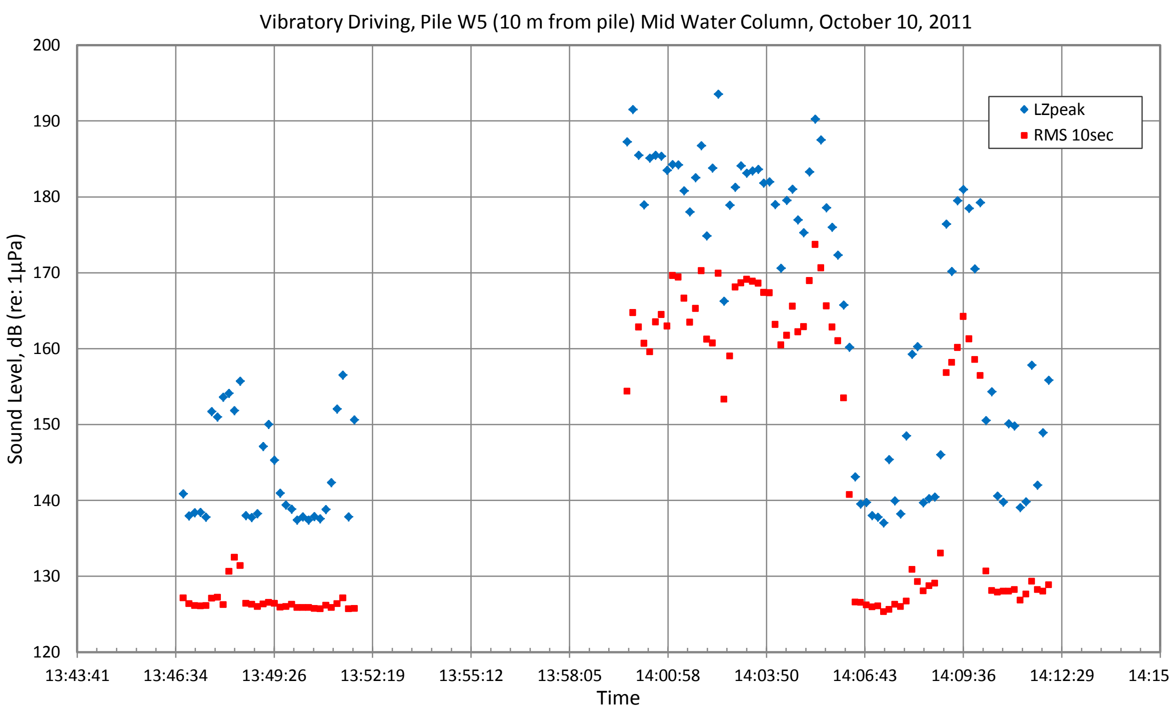
Input: 111010 003



Vibratory Driving Statistics (1 Sec RMS > 143dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	177	6.8	0.04
RMS 1sec	163	5.4	0.03

Inactive Vibratory Hammer Statistics, (1 sec RMS < 143 dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	139	7.1	0.05
RMS 1sec	127	5.6	0.04

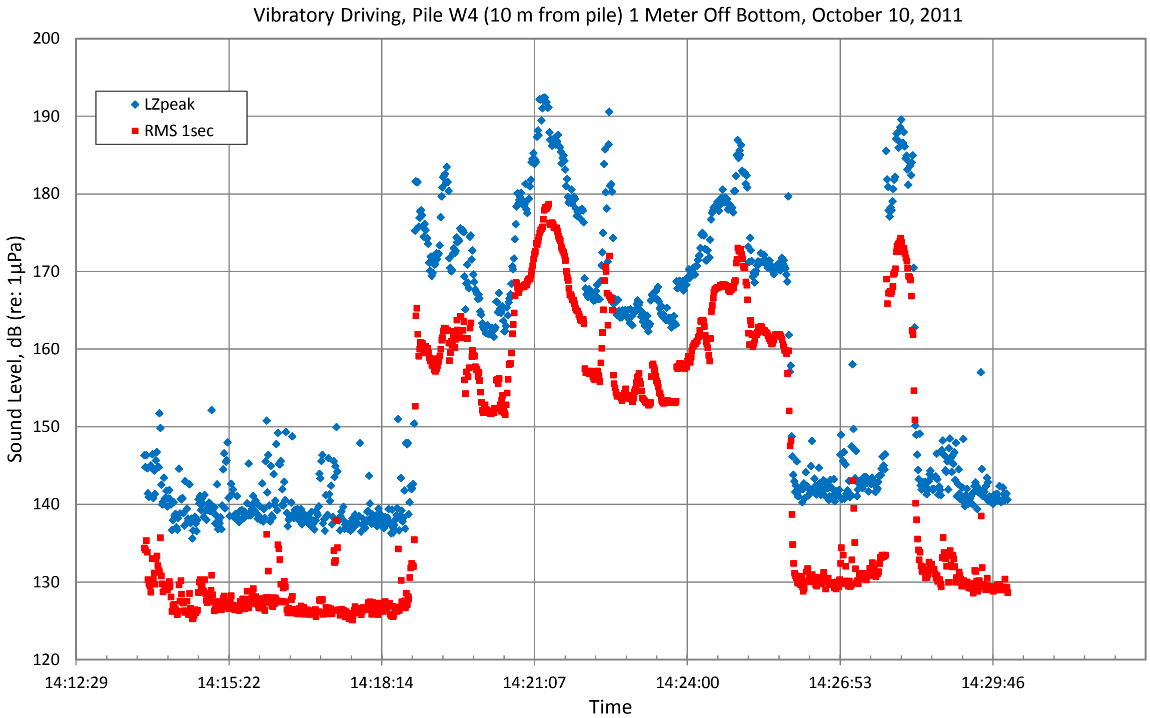
Input: 111010 003



Vibratory Driving Statistics (10 Sec RMS > 143dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	181	6.0	0.03
RMS 10sec	164	4.9	0.03

Inactive Vibratory Hammer Statistics, (10 sec RMS < 143 dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	145	7.2	0.05
RMS 10sec	127	2.5	0.02

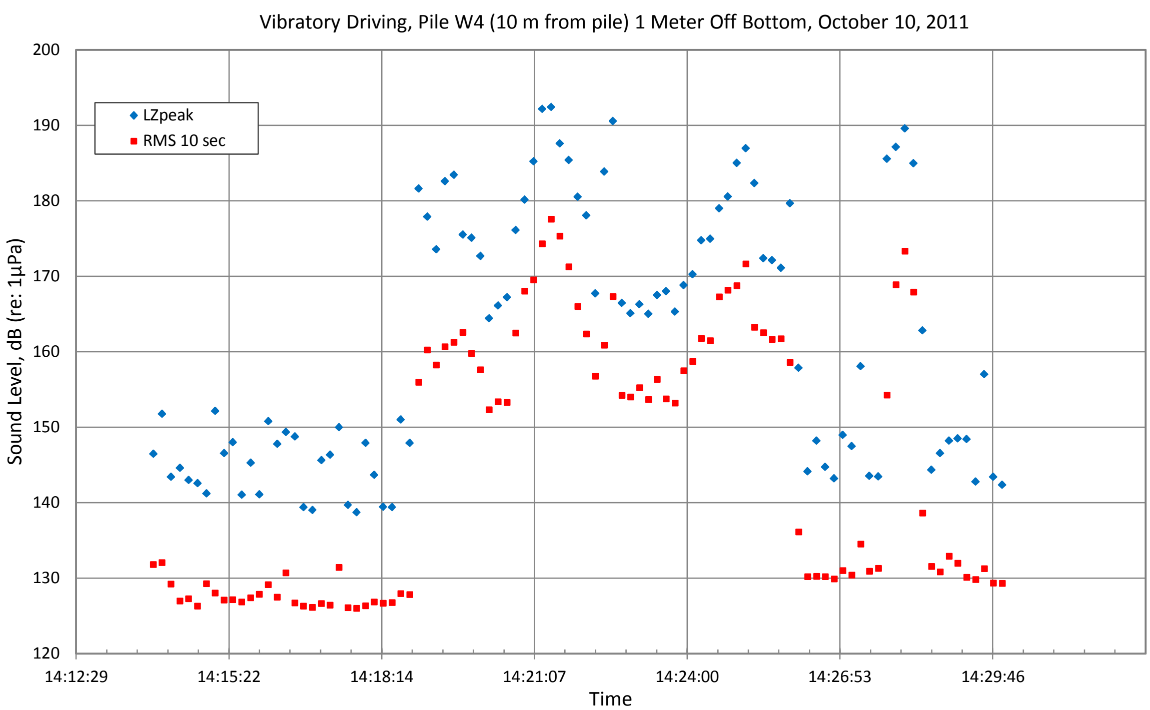
Input: 111010 003



Vibratory Driving Statistics (1 Sec RMS > 143dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	174	8.0	0.05
RMS 1 sec	162	7.0	0.04

Inactive Vibratory Hammer Statistics (1 sec RMS < 143 dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	141	3.3	0.02
RMS 1 sec	129	2.6	0.02

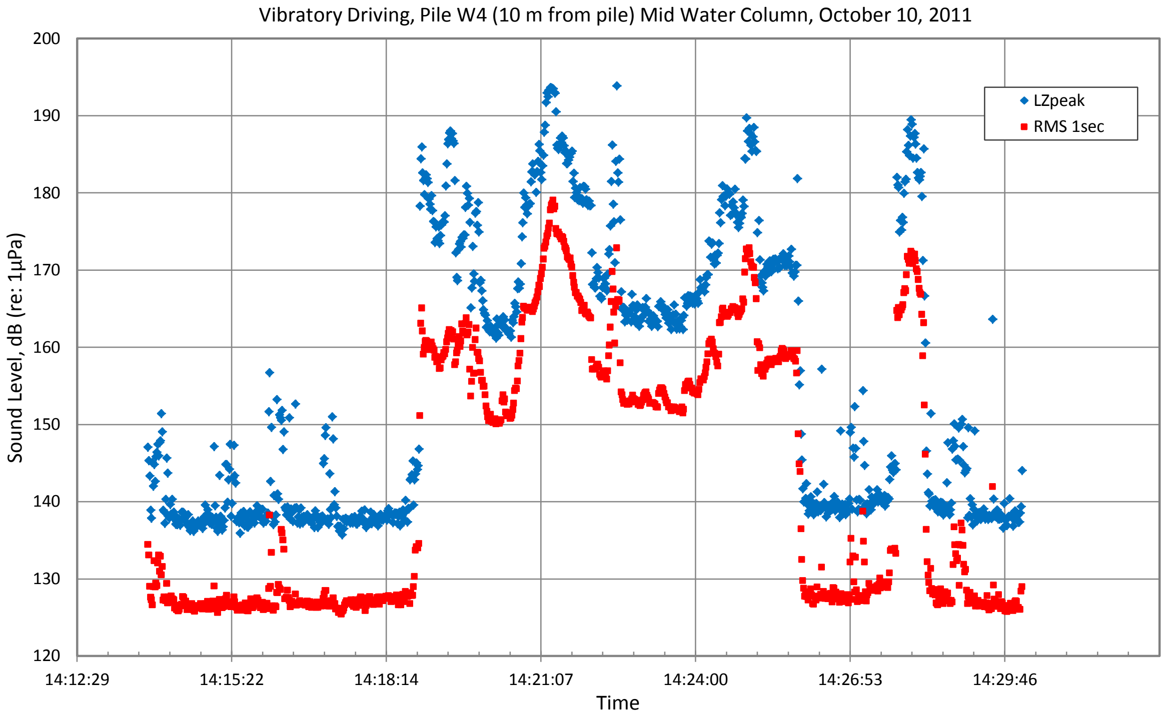
Input: 111010 004



Vibratory Driving Statistics (10 Sec RMS > 143dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	177	8.3	0.05
RMS 10sec	162	6.7	0.04

Inactive Vibratory Hammer Statistics (10 sec RMS < 143 dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	143	21.1	0.15
RMS 10sec	127	18.3	0.14

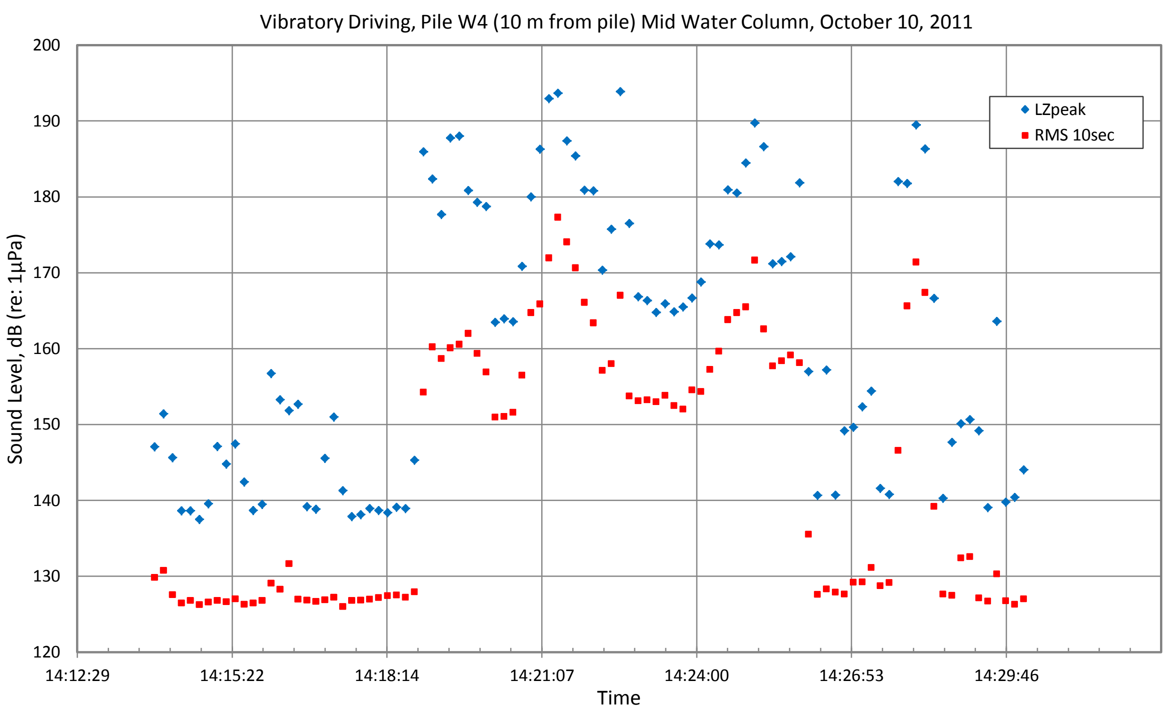
Input: 111010 004



Vibratory Driving Statistics (1 Sec RMS > 143dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	174	8.7	0.05
RMS 1sec	160	7.0	0.04

Inactive Vibratory Hammer Statistics, (1 sec RMS < 143 dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	140	3.9	0.03
RMS 1sec	128	2.3	0.02

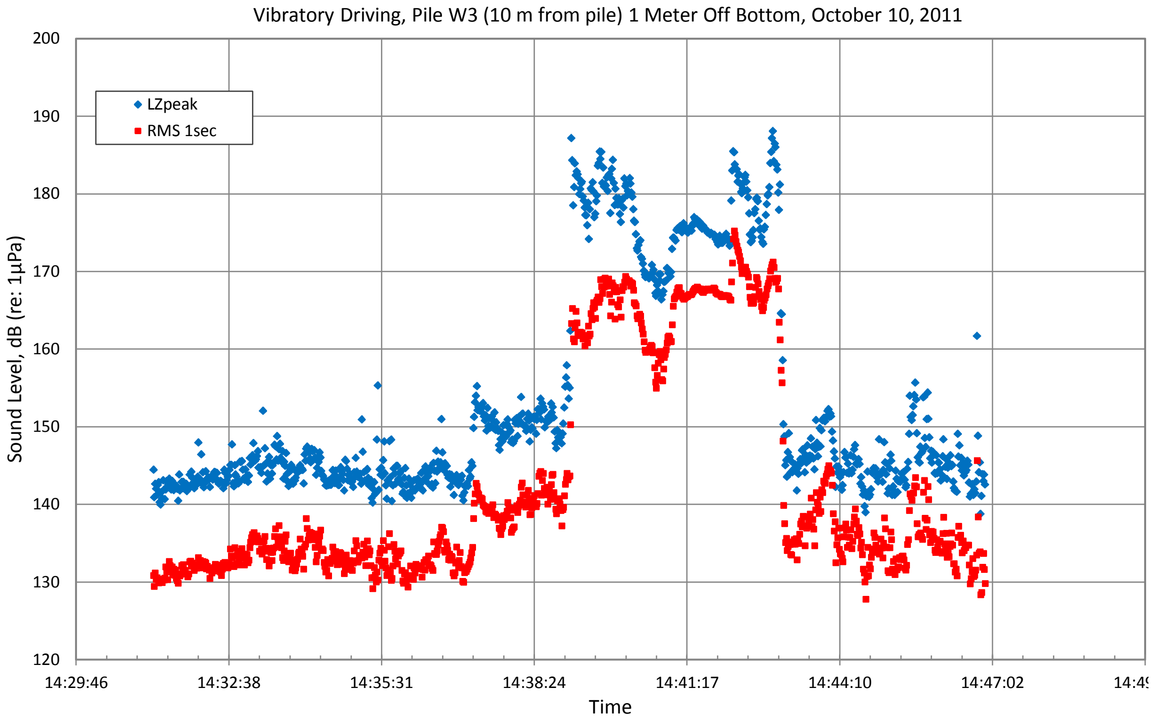
Input: 111010 004



Vibratory Driving Statistics (10 Sec RMS > 143dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	178	9.1	0.05
RMS 10sec	160	7.0	0.04

Inactive Vibratory Hammer Statistics, (10 sec RMS < 143 dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	145	7.1	0.05
RMS 10sec	128	2.5	0.02

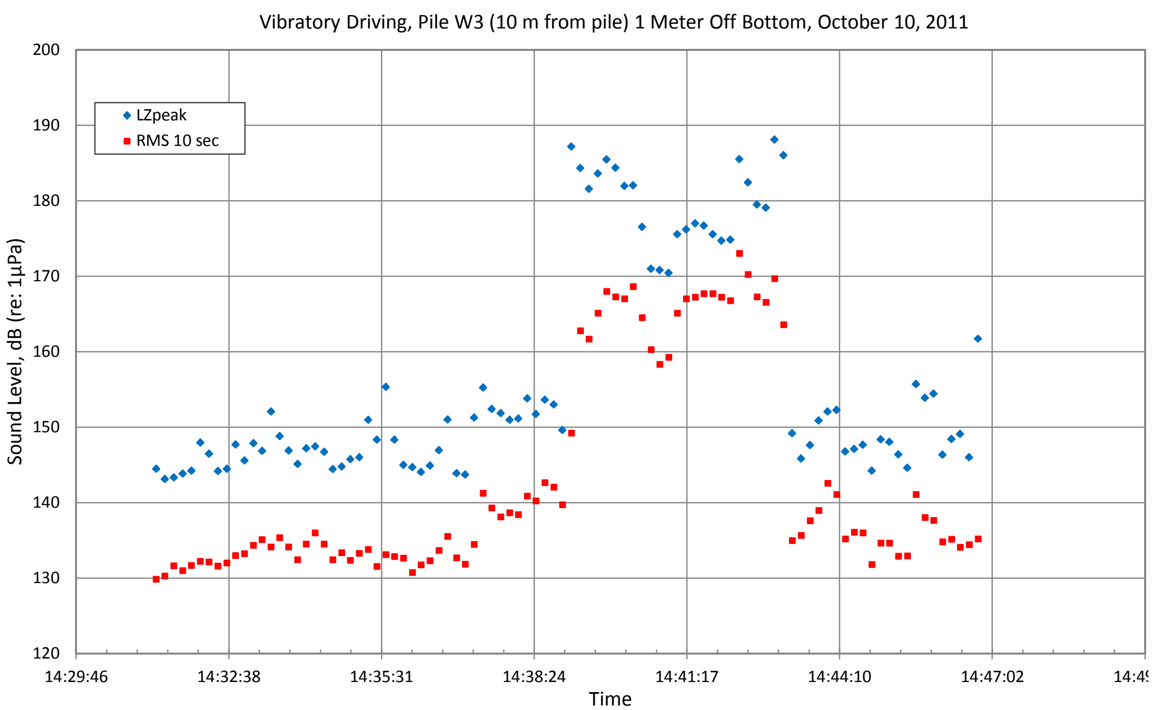
Input: 111010 004



Vibratory Driving Statistics (1 Sec RMS > 143dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	175	8.2	0.05
RMS 1 sec	164	7.3	0.04

Inactive Vibratory Hammer Statistics (1 sec RMS < 143 dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	145	3.1	0.02
RMS 1 sec	135	3.2	0.02

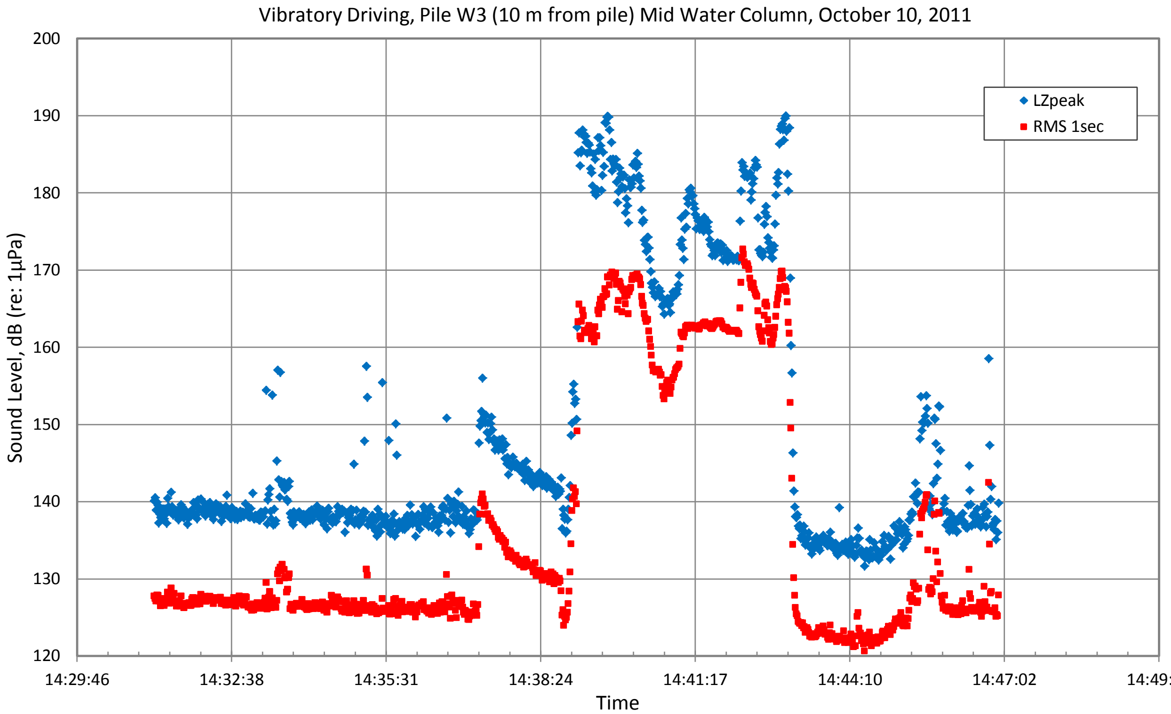
Input: 111010 005



Vibratory Driving Statistics (10 Sec RMS > 143dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	180	5.3	0.03
RMS 10sec	165	4.8	0.03

Inactive Vibratory Hammer Statistics (10 sec RMS < 143 dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	148	3.8	0.03
RMS 10sec	135	3.2	0.02

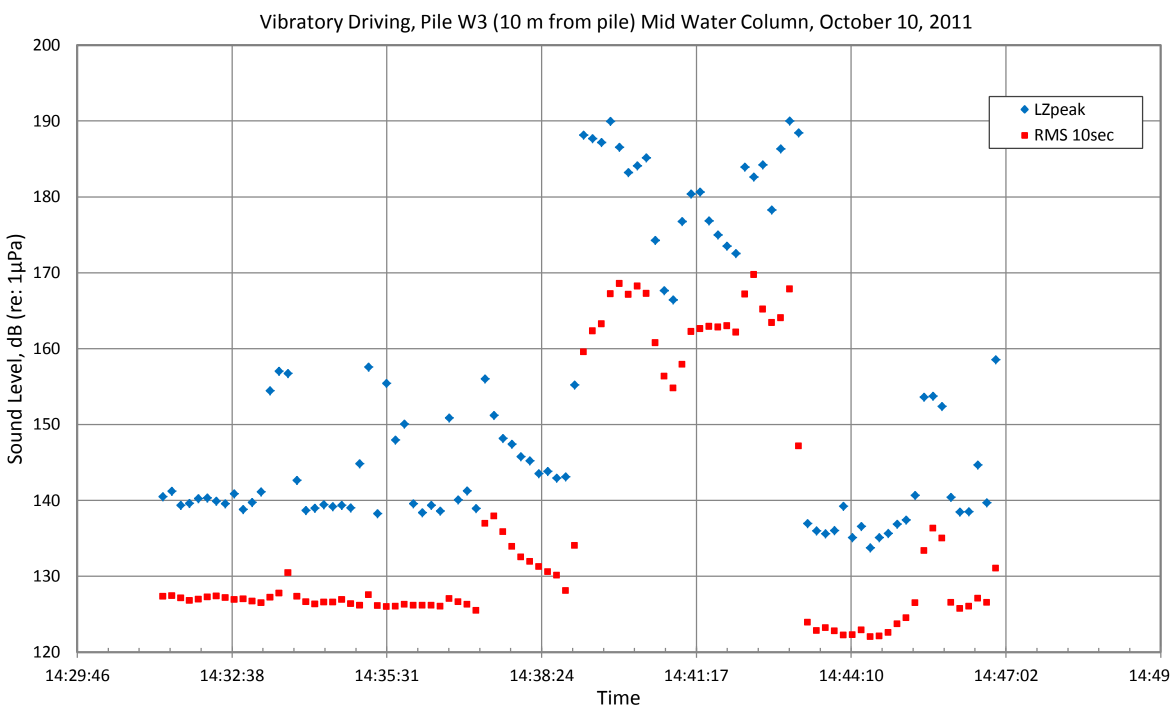
Input: 111010 005



Vibratory Driving Statistics (1 Sec RMS > 143dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	177	7.0	0.04
RMS 1sec	163	4.5	0.03

Inactive Vibratory Hammer Statistics, (1 sec RMS < 143 dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	139	4.5	0.03
RMS 1sec	127	3.9	0.03

Input: 111010 005

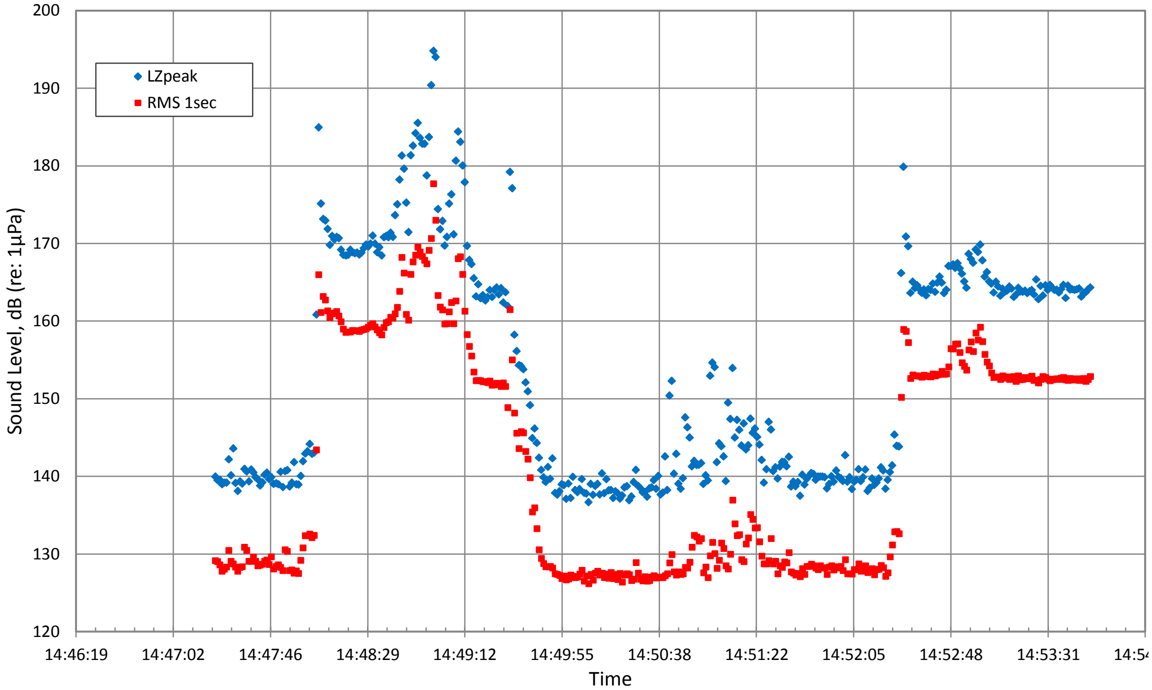


Vibratory Driving Statistics (10 Sec RMS > 143dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	181	6.8	0.04
RMS 10sec	163	5.1	0.03

Inactive Vibratory Hammer Statistics, (10 sec RMS < 143 dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	143	6.6	0.05
RMS 10sec	128	3.7	0.03

Input: 111010 005

Vibratory Extracting/Driving, Pile W5 (10 m from pile) 1 Meter Off Bottom, October 10, 2011

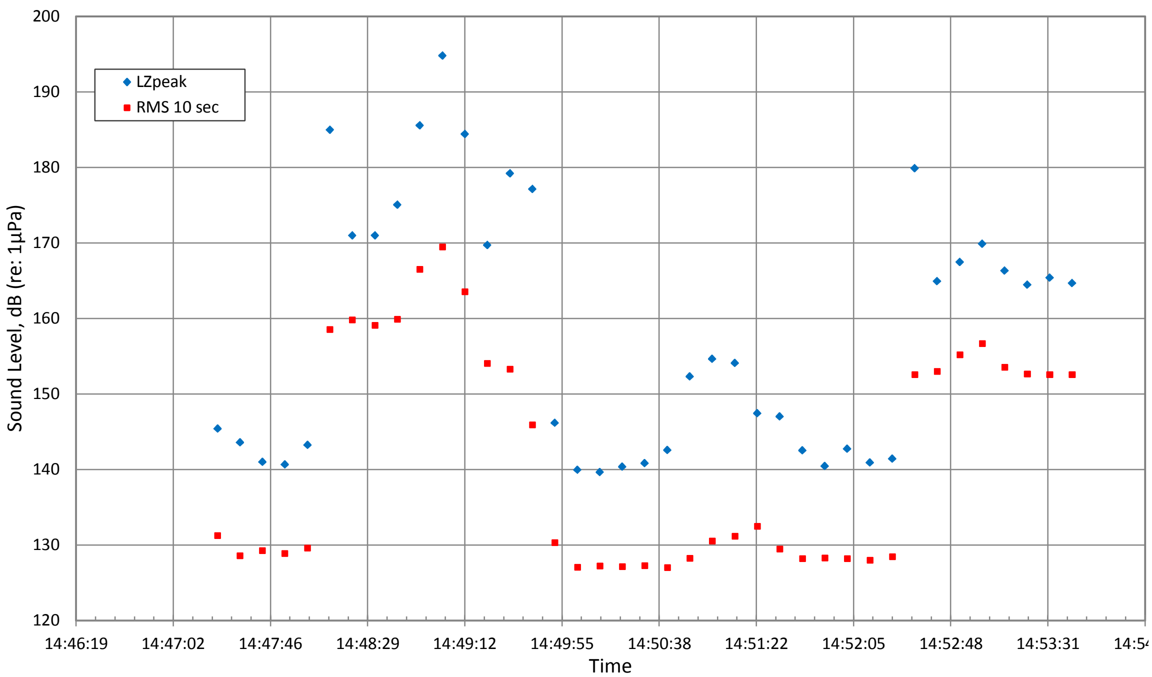


Vibratory Driving Statistics (1 Sec RMS > 143dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	168	7.1	0.04
RMS 1 sec	157	5.8	0.04

Inactive Vibratory Hammer Statistics (1 sec RMS < 143 dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	141	3.4	0.02
RMS 1 sec	129	2.3	0.02

Input: 111010 006

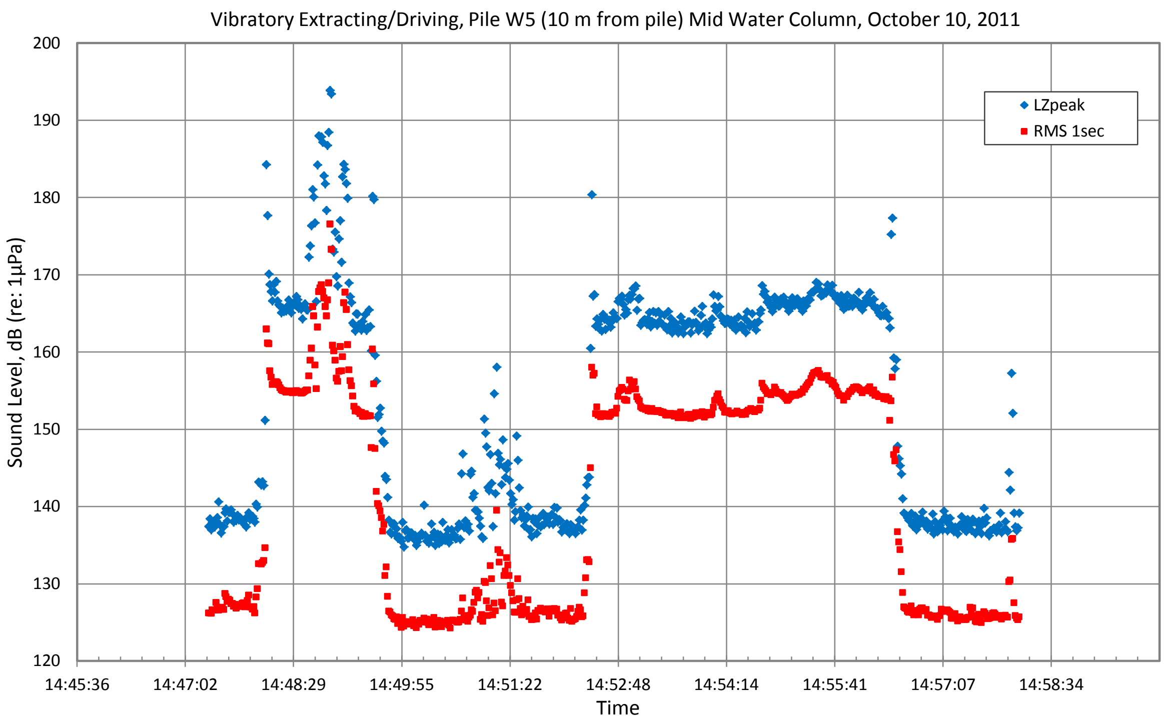
Vibratory Extracting/Driving, Pile W5 (10 m from pile) 1 Meter Off Bottom, October 10, 2011



Vibratory Driving Statistics (10 Sec RMS > 143dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	174	8.9	0.05
RMS 10sec	157	5.8	0.04

Inactive Vibratory Hammer Statistics (10 sec RMS < 143 dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	144	4.6	0.03
RMS 10sec	129	1.5	0.01

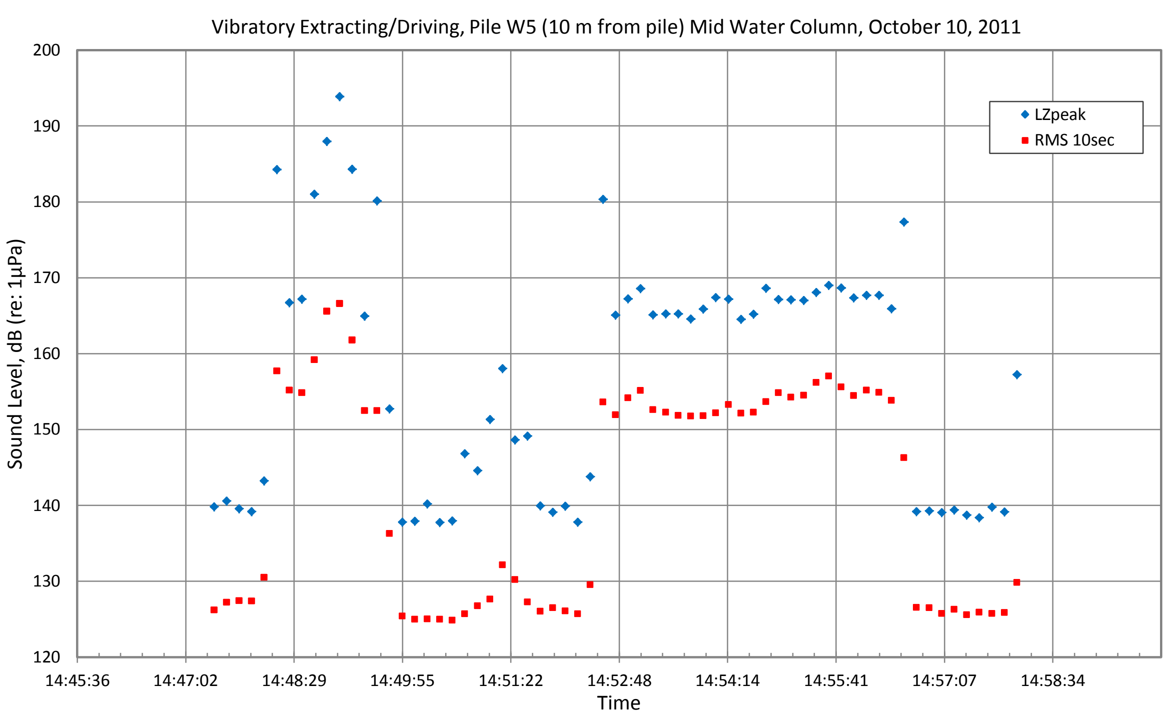
Input: 111010 006



Vibratory Driving Statistics (1 Sec RMS > 143dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	167	5.5	0.03
RMS 1sec	155	3.8	0.02

Inactive Vibratory Hammer Statistics, (1 sec RMS < 143 dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	139	3.9	0.03
RMS 1sec	127	3.0	0.02

Input: 111010 006

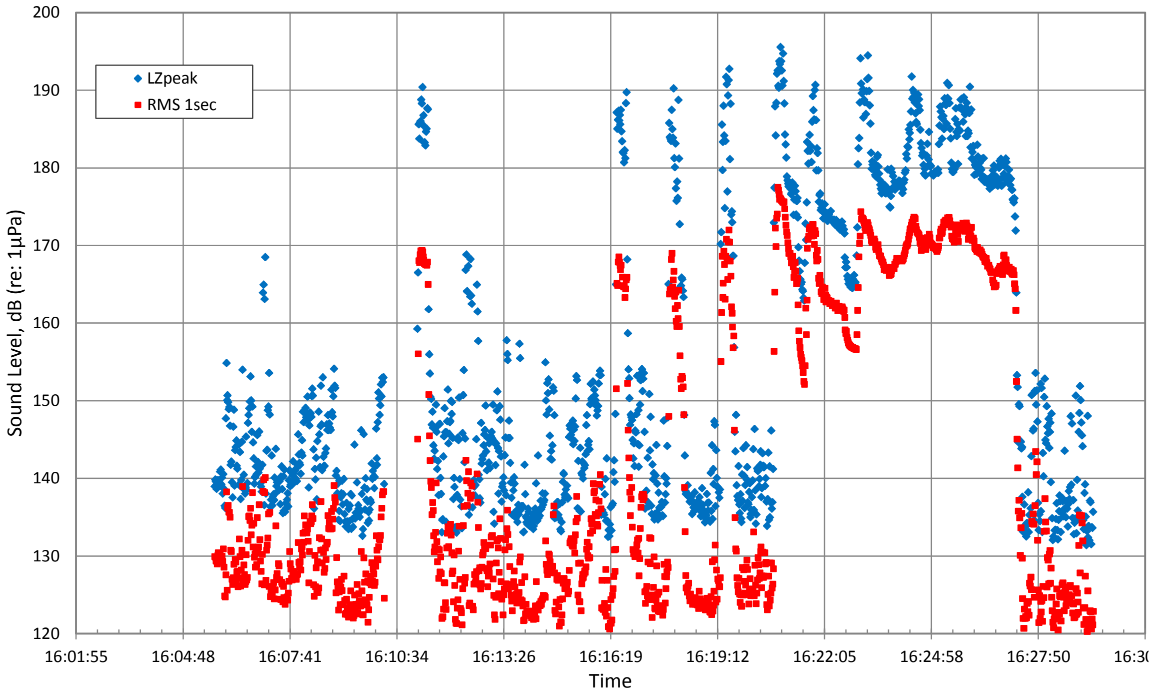


Vibratory Driving Statistics (10 Sec RMS > 143dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	171	7.8	0.05
RMS 10sec	155	3.9	0.03

Inactive Vibratory Hammer Statistics, (10 sec RMS < 143 dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	142	5.8	0.04
RMS 10sec	127	2.5	0.02

Input: 111010 006

Vibratory Driving, Pile W11 (10 m from pile) 1 Meter Off Bottom, October 10, 2011

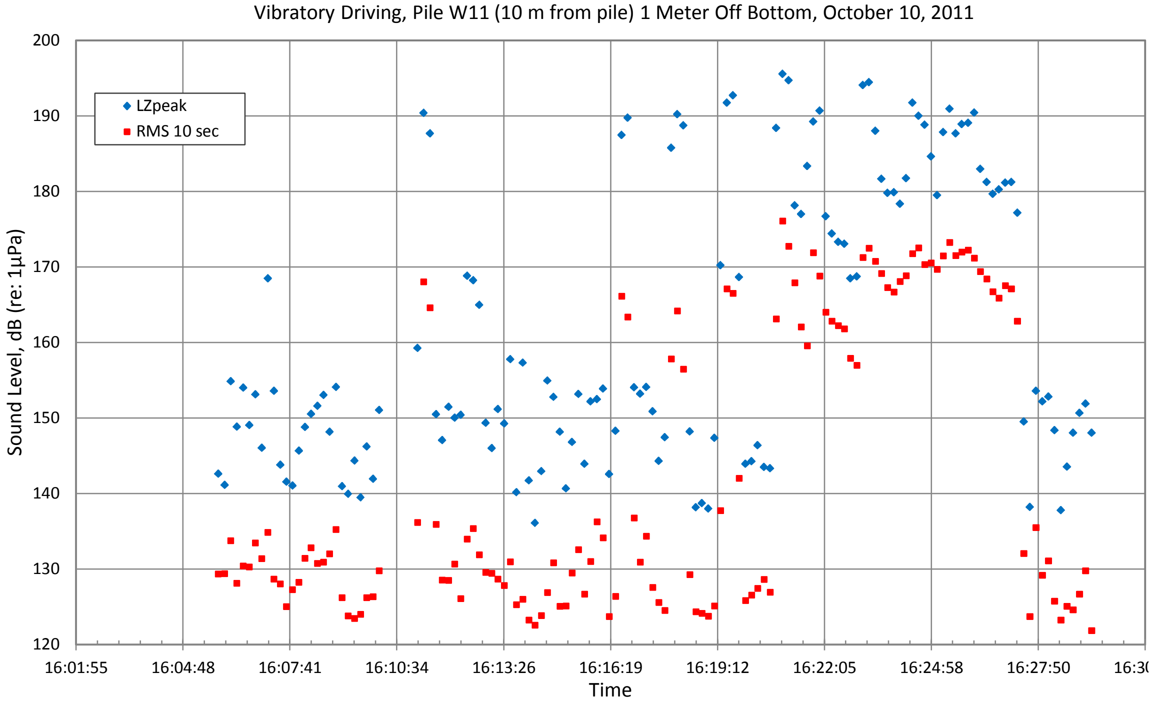


Vibratory Driving Statistics (1 Sec RMS > 143dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	180	7.4	0.04
RMS 1 sec	167	5.8	0.03

Inactive Vibratory Hammer Statistics (1 sec RMS < 143 dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	141	8.0	0.06
RMS 1 sec	128	6.4	0.05

Input: 111010 009

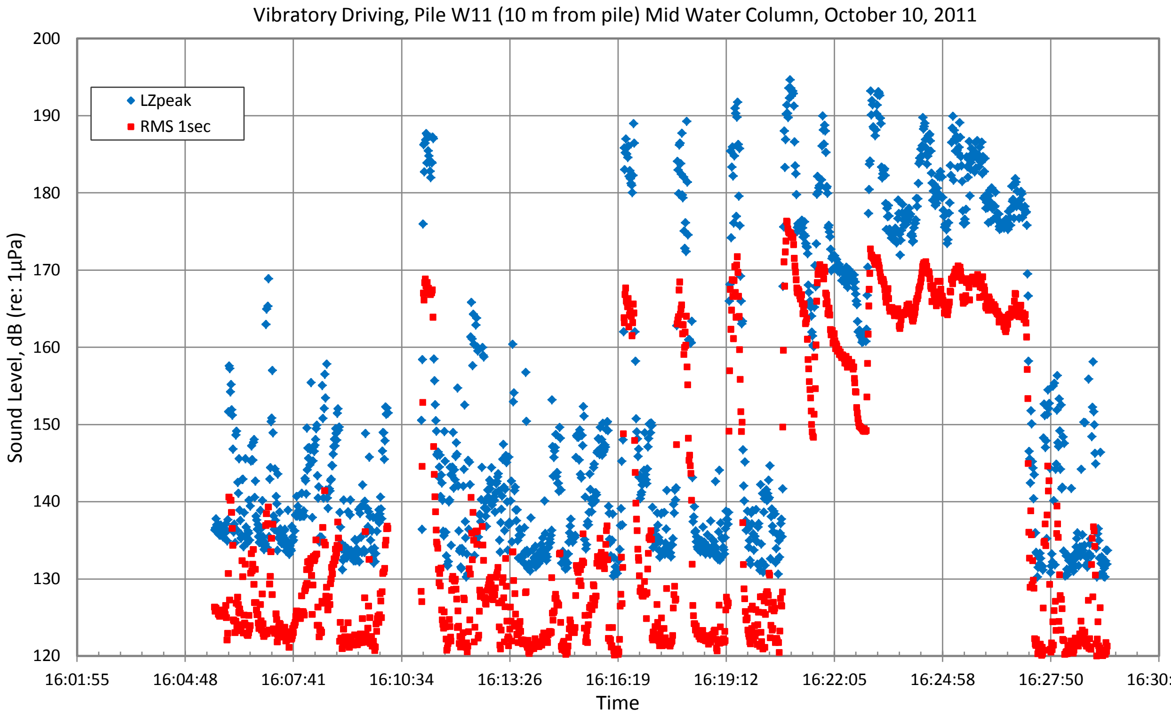
Vibratory Driving, Pile W11 (10 m from pile) 1 Meter Off Bottom, October 10, 2011



Vibratory Driving Statistics (10 Sec RMS > 143dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	185	6.9	0.04
RMS 10sec	167	4.7	0.03

Inactive Vibratory Hammer Statistics (10 sec RMS < 143 dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	149	7.4	0.05
RMS 10sec	129	4.1	0.03

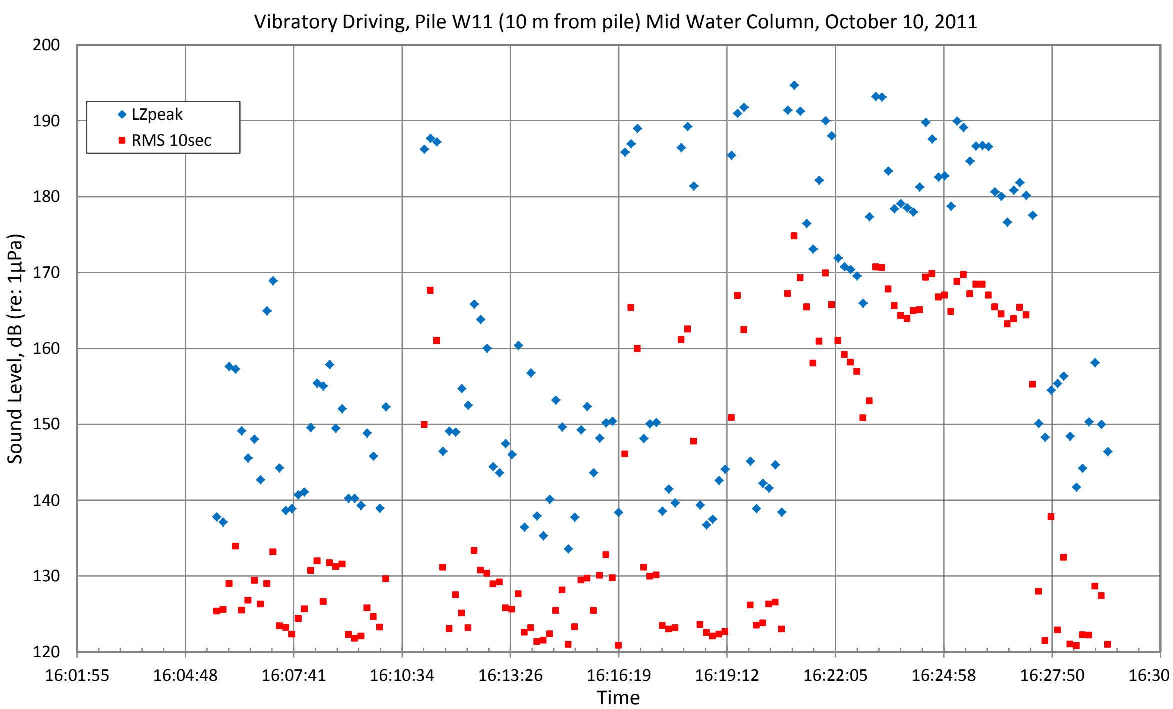
Input: 111010 009



Vibratory Driving Statistics (1 Sec RMS > 143dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	178	8.0	0.04
RMS 1sec	164	6.3	0.04

Inactive Vibratory Hammer Statistics, (1 sec RMS < 143 dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	139	8.5	0.06
RMS 1sec	126	6.4	0.05

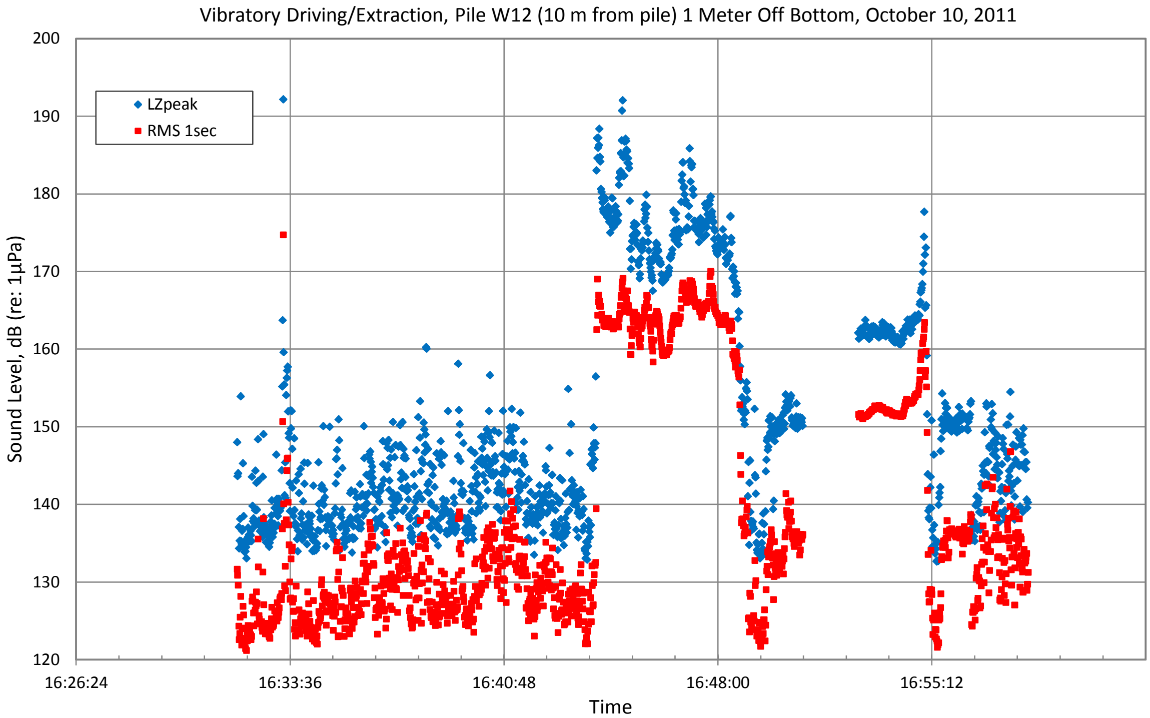
Input: 111010 009



Vibratory Driving Statistics (10 Sec RMS > 143dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	183	6.8	0.04
RMS 10sec	163	6.3	0.04

Inactive Vibratory Hammer Statistics, (10 sec RMS < 143 dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	147	7.7	0.05
RMS 10sec	126	3.9	0.03

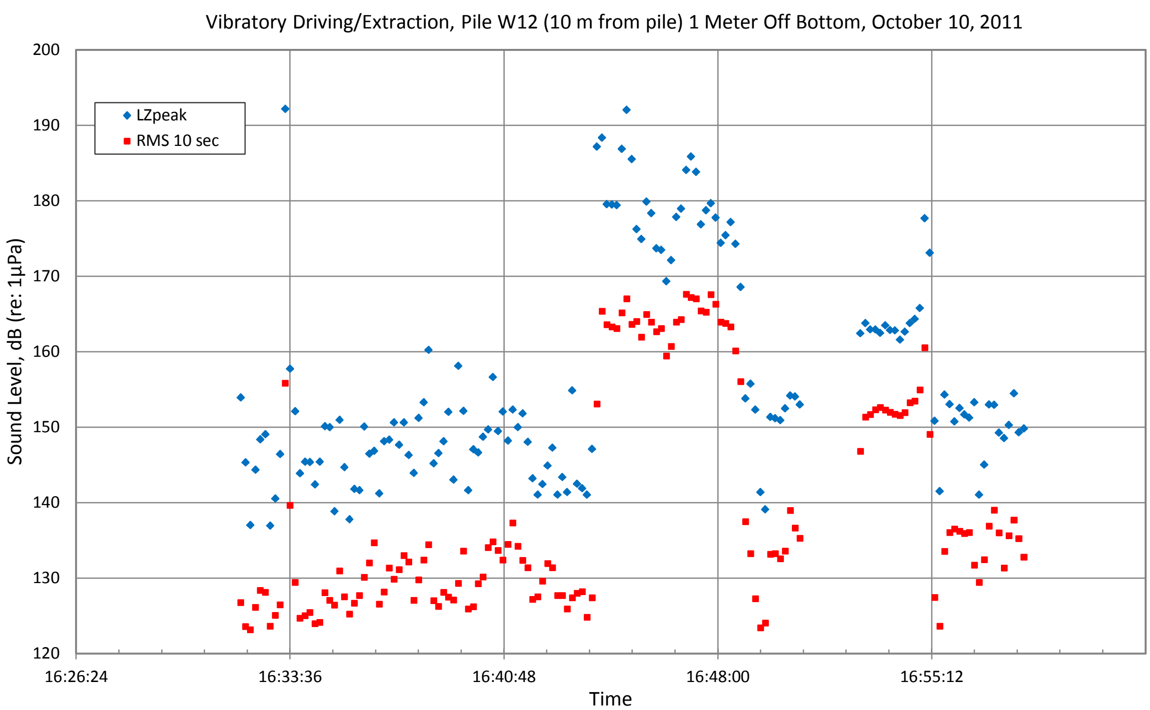
Input: 111010 009



Vibratory Driving Statistics (1 Sec RMS > 143dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	171	7.6	0.04
RMS 1 sec	160	6.0	0.04

Inactive Vibratory Hammer Statistics (1 sec RMS < 143 dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	142	5.7	0.04
RMS 1 sec	130	4.7	0.04

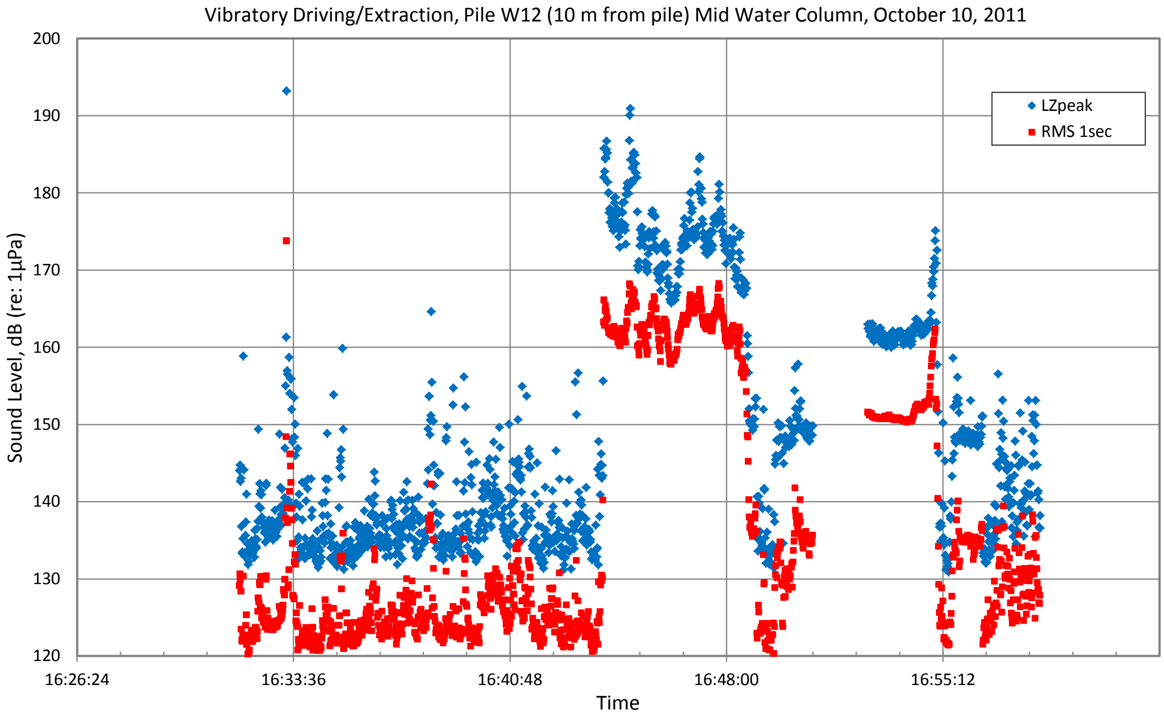
Input: 111010 010



Vibratory Driving Statistics (10 Sec RMS > 143dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	175	8.9	0.05
RMS 10sec	160	6.1	0.04

Inactive Vibratory Hammer Statistics (10 sec RMS < 143 dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	148	5.1	0.03
RMS 10sec	130	4.2	0.03

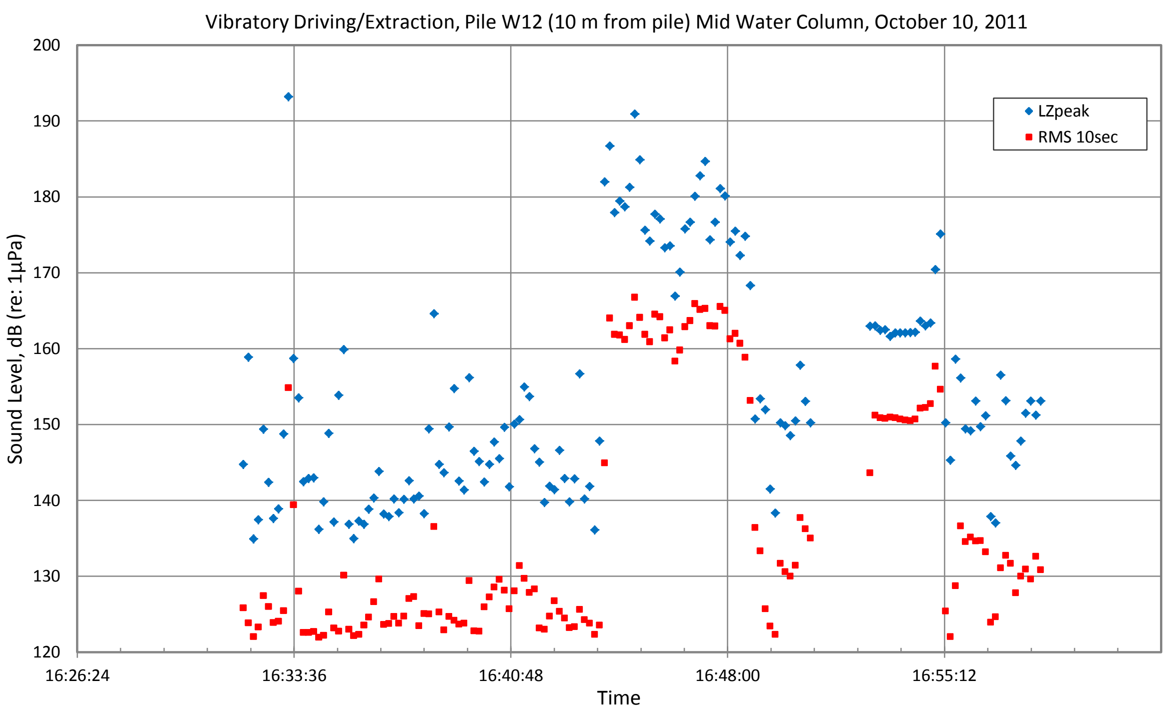
Input: 111010 010



Vibratory Driving Statistics (1 Sec RMS > 143dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	170	7.3	0.04
RMS 1sec	159	5.8	0.04

Inactive Vibratory Hammer Statistics, (1 sec RMS < 143 dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	140	6.4	0.05
RMS 1sec	127	4.8	0.04

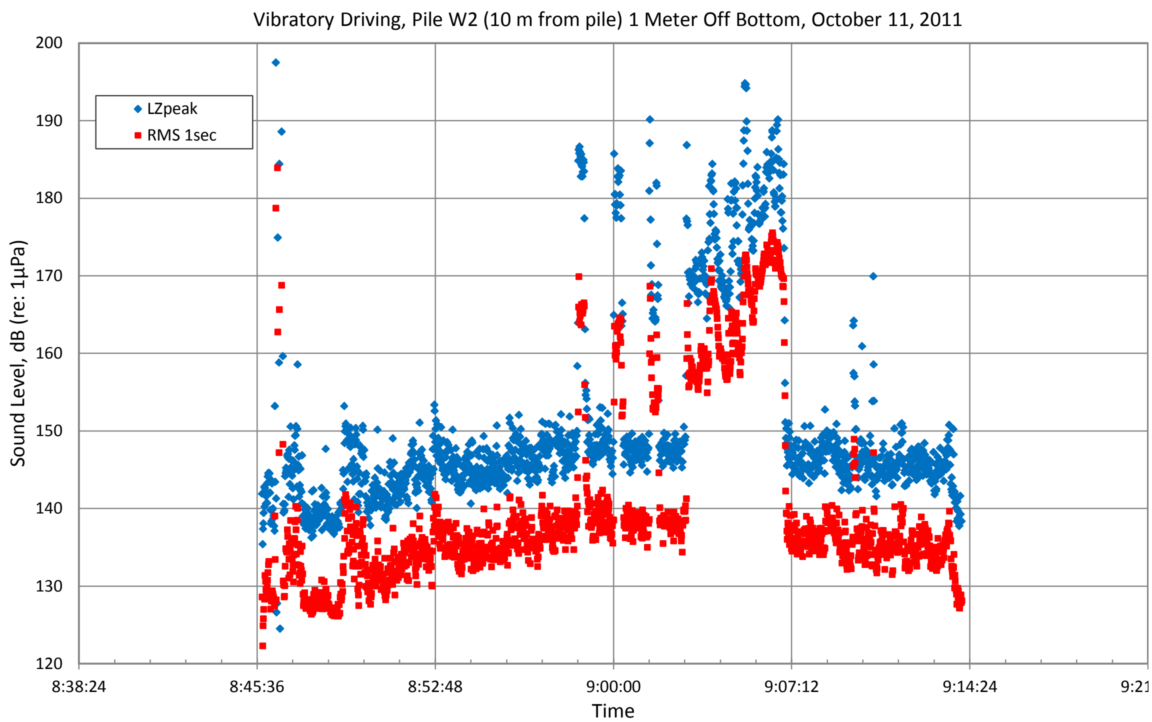
Input: 111010 010



Vibratory Driving Statistics (10 Sec RMS > 143dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	173	8.6	0.05
RMS 10sec	158	6.2	0.04

Inactive Vibratory Hammer Statistics, (10 sec RMS < 143 dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	146	6.7	0.05
RMS 10sec	127	4.4	0.03

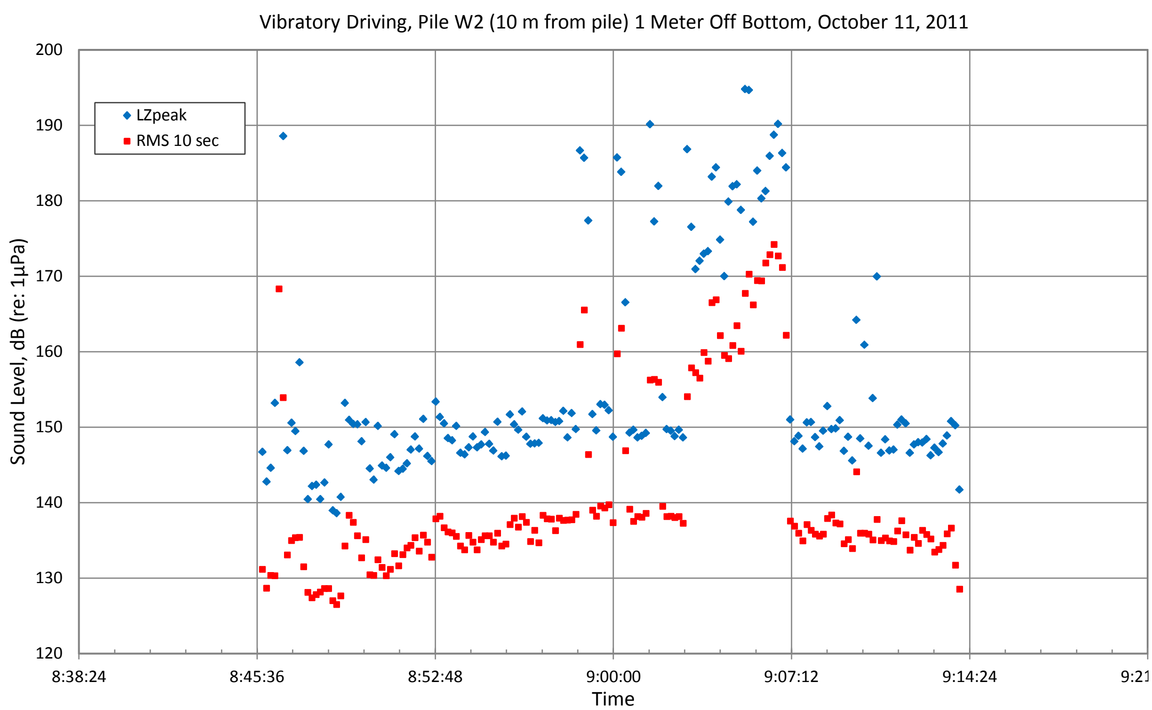
Input: 111010 010



Vibratory Driving Statistics (1 Sec RMS > 143dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	176	8.3	0.05
RMS 1 sec	163	7.2	0.04

Inactive Vibratory Hammer Statistics (1 sec RMS < 143 dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	145	4.6	0.03
RMS 1 sec	135	4.8	0.04

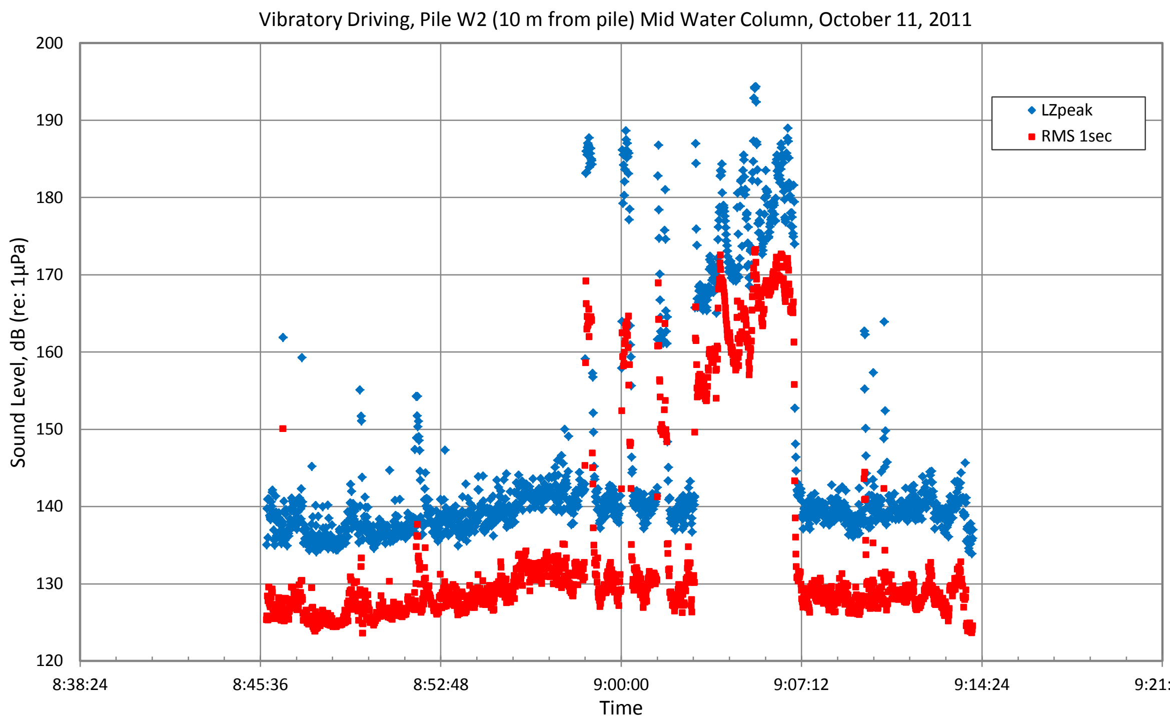
Input: 111011 001



Vibratory Driving Statistics (10 Sec RMS > 143dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	182	8.2	0.05
RMS 10sec	162	7.5	0.05

Inactive Vibratory Hammer Statistics (10 sec RMS < 143 dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	149	3.8	0.03
RMS 10sec	135	3.0	0.02

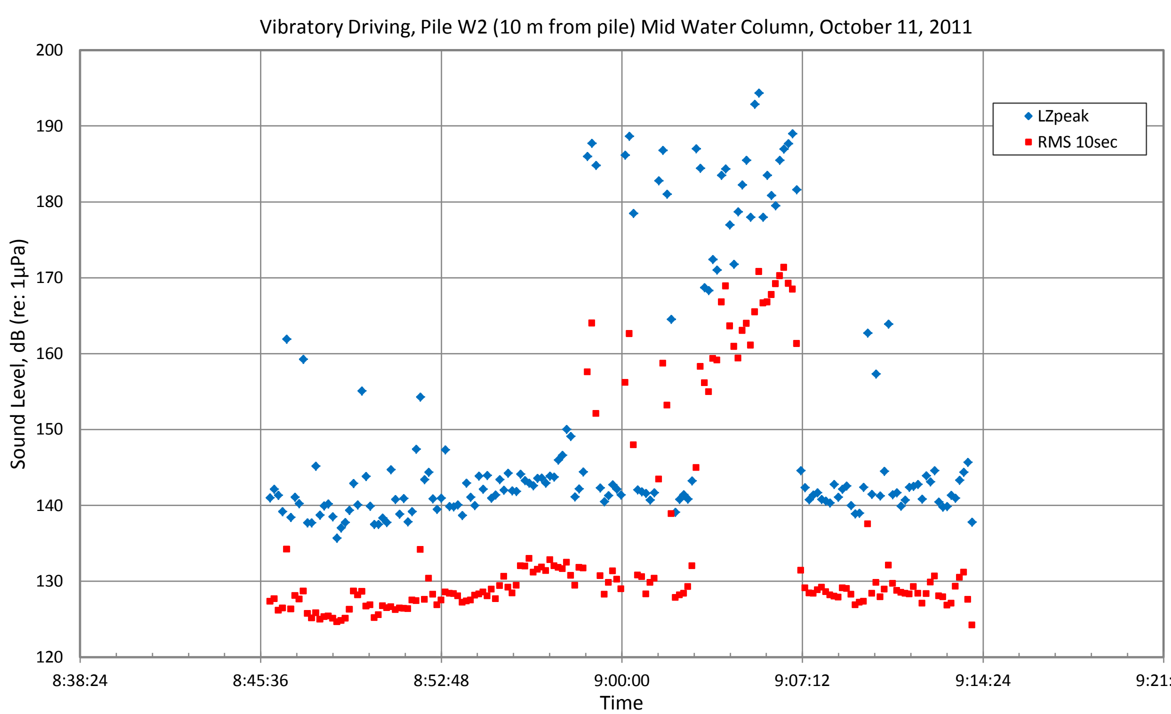
Input: 111011 001



Vibratory Driving Statistics (1 Sec RMS > 143dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	176	7.9	0.04
RMS 1sec	163	6.5	0.04

Inactive Vibratory Hammer Statistics, (1 sec RMS < 143 dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	140	3.0	0.02
RMS 1sec	129	2.5	0.02

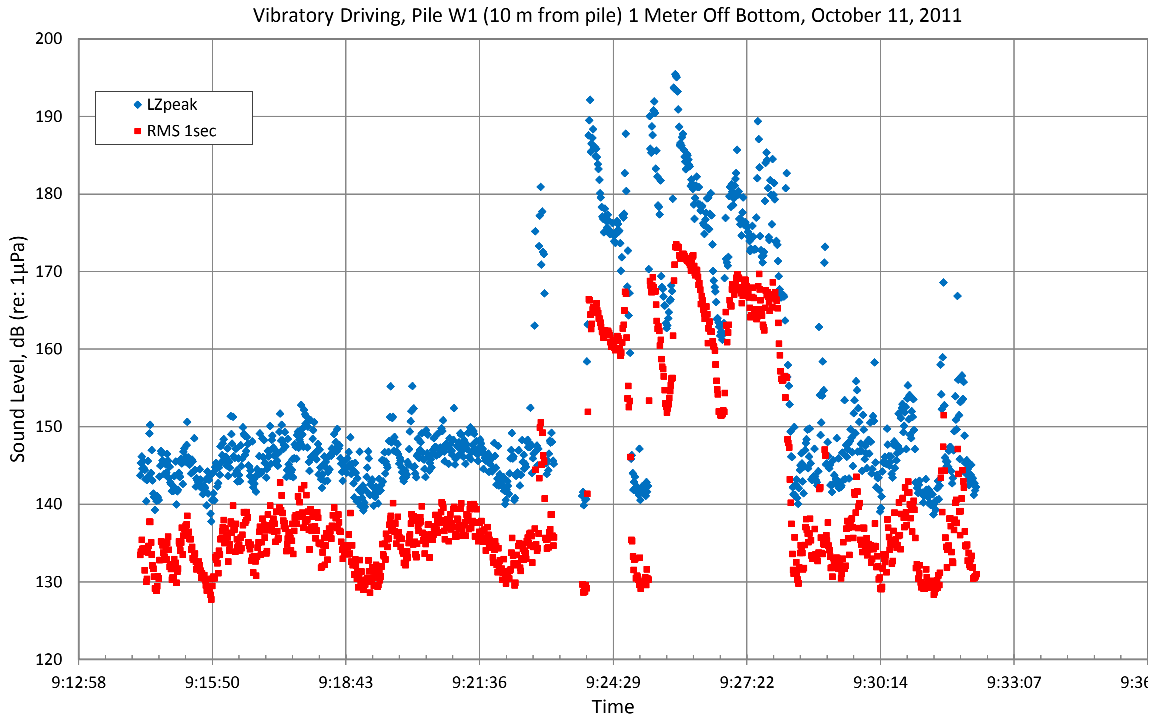
Input: 111011 001



Vibratory Driving Statistics (10 Sec RMS > 143dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	182	6.4	0.04
RMS 10sec	161	7.2	0.04

Inactive Vibratory Hammer Statistics, (10 sec RMS < 143 dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	143	5.0	0.04
RMS 10sec	129	2.4	0.02

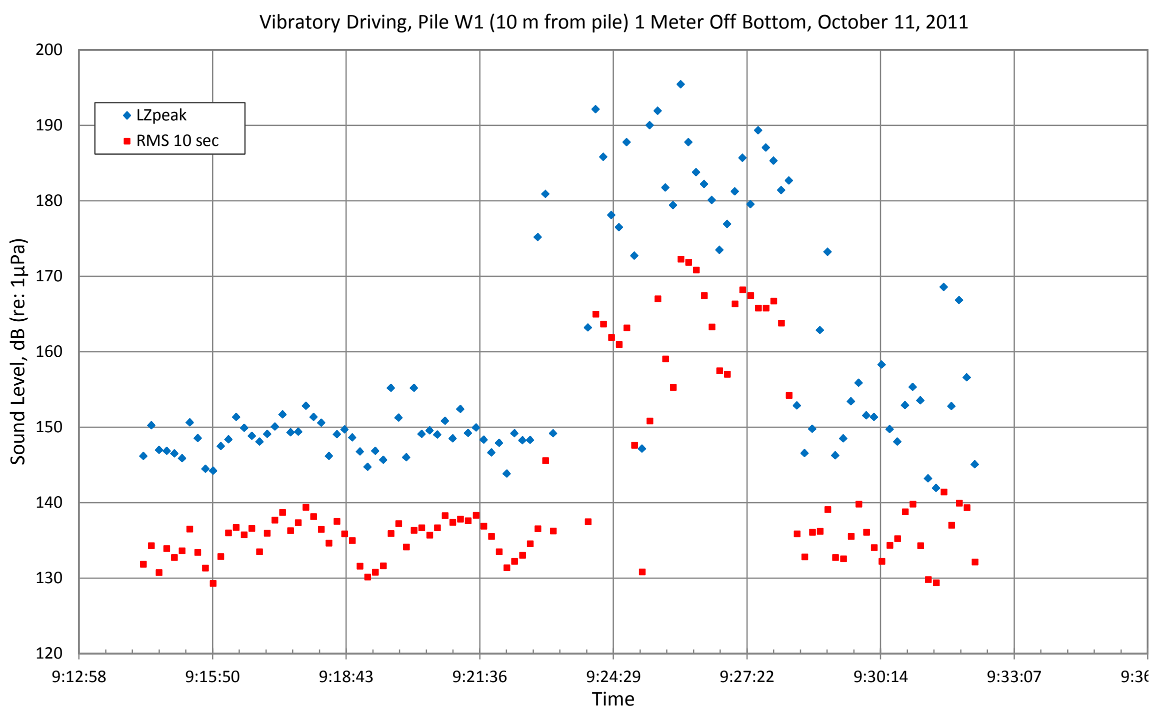
Input: 111011 001



Vibratory Driving Statistics (1 Sec RMS > 143dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	176	8.6	0.05
RMS 1 sec	162	7.4	0.05

Inactive Vibratory Hammer Statistics (1 sec RMS < 143 dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	145	6.2	0.04
RMS 1 sec	134	5.7	0.04

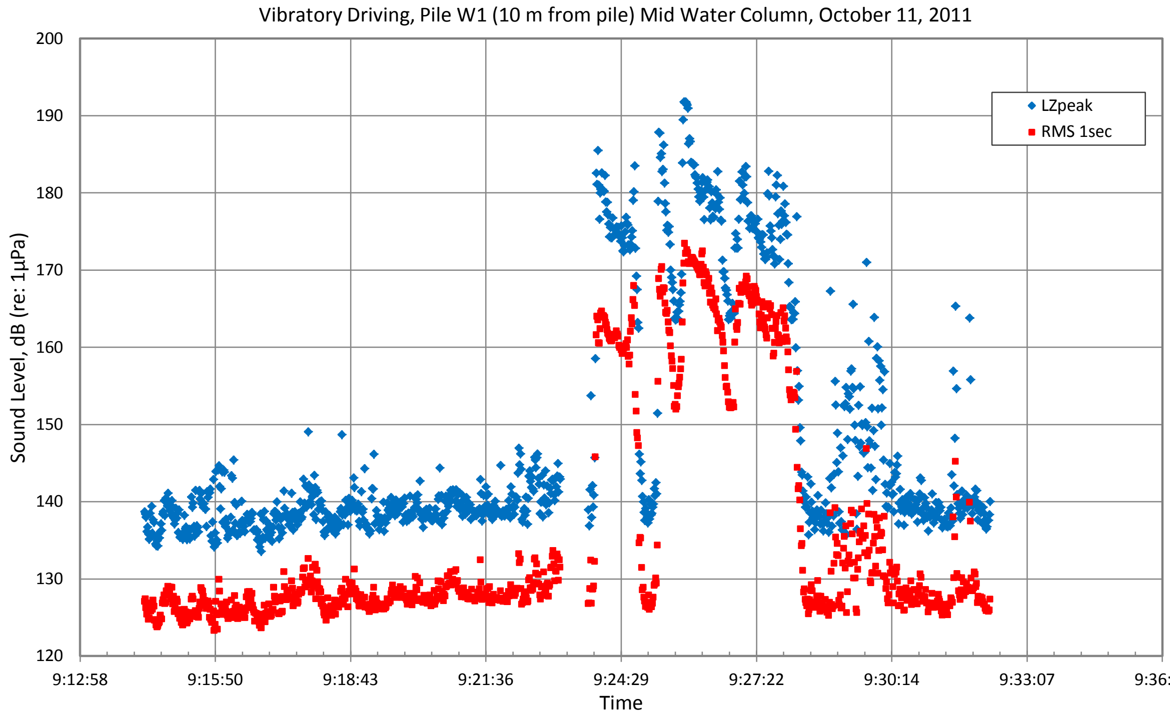
Input: 111011 002



Vibratory Driving Statistics (10 Sec RMS > 143dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	183	5.8	0.03
RMS 10sec	162	7.1	0.04

Inactive Vibratory Hammer Statistics (10 sec RMS < 143 dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	151	6.1	0.04
RMS 10sec	135	2.8	0.02

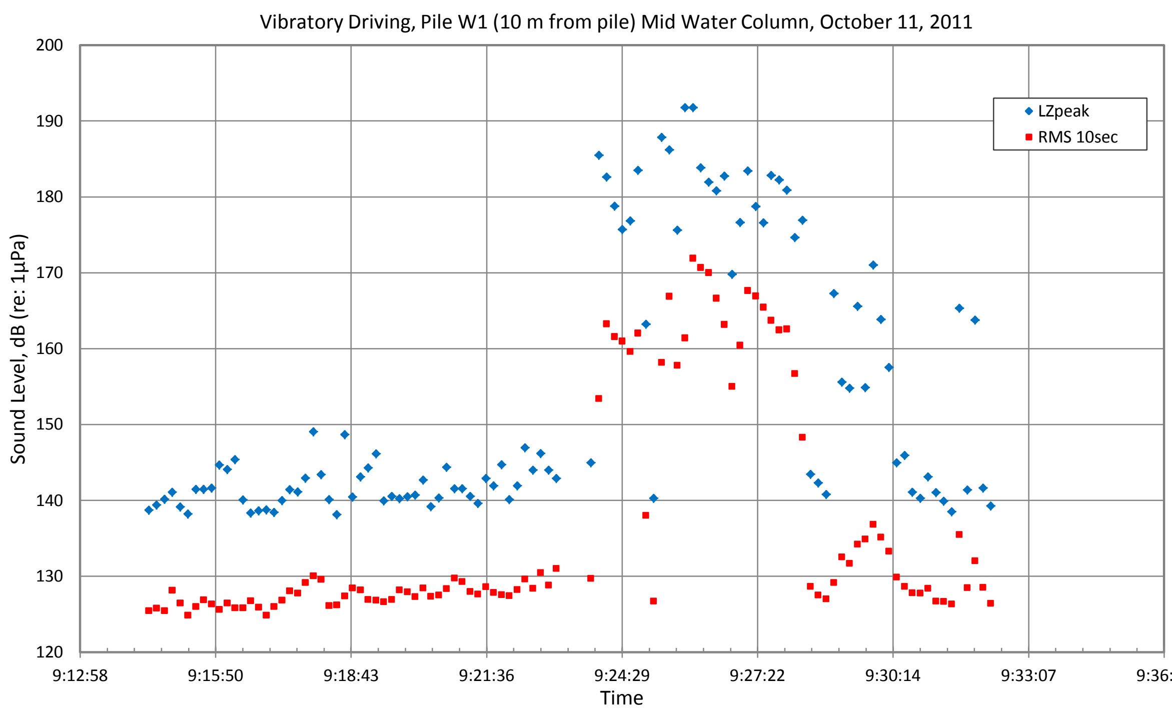
Input: 111011 002



Vibratory Driving Statistics (1 Sec RMS > 143dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	176	6.7	0.04
RMS 1sec	163	6.0	0.04

Inactive Vibratory Hammer Statistics, (1 sec RMS < 143 dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	140	6.7	0.05
RMS 1sec	128	5.3	0.04

Input: 111011 002

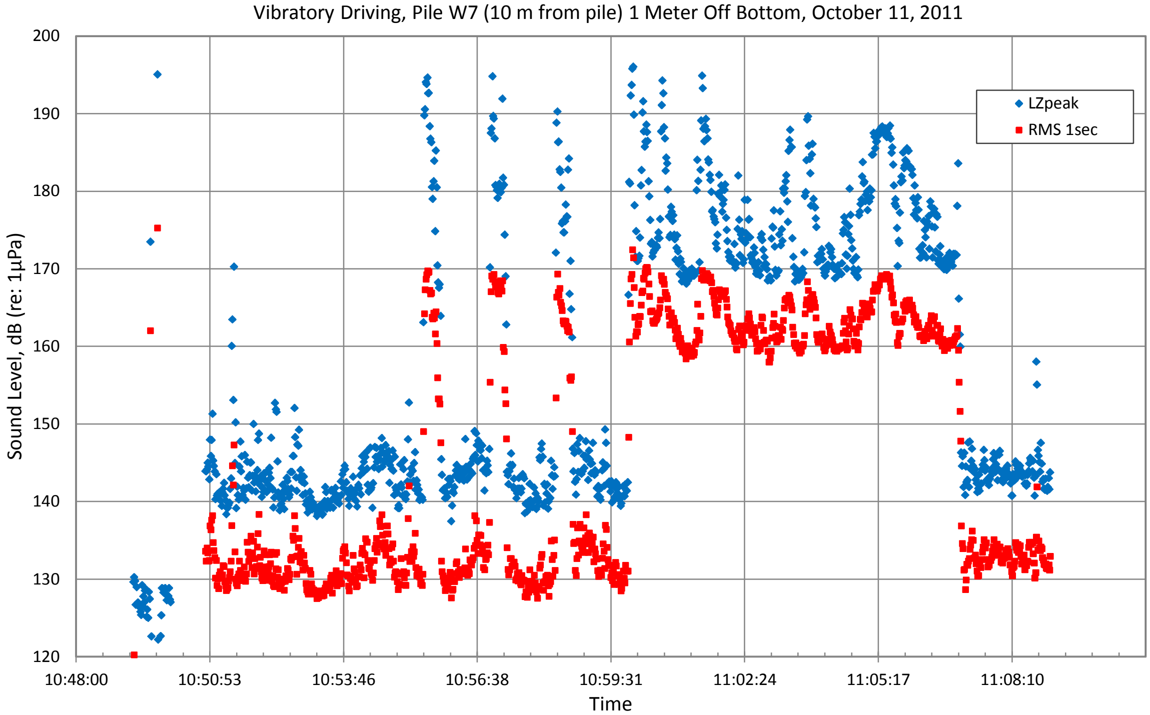


Vibratory Driving Statistics (10 Sec RMS > 143dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	181	5.3	0.03
RMS 10sec	162	5.5	0.03

Inactive Vibratory Hammer Statistics, (10 sec RMS < 143 dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	145	7.7	0.05
RMS 10sec	128	2.7	0.02

Input: 111011 002

Vibratory Driving, Pile W7 (10 m from pile) 1 Meter Off Bottom, October 11, 2011

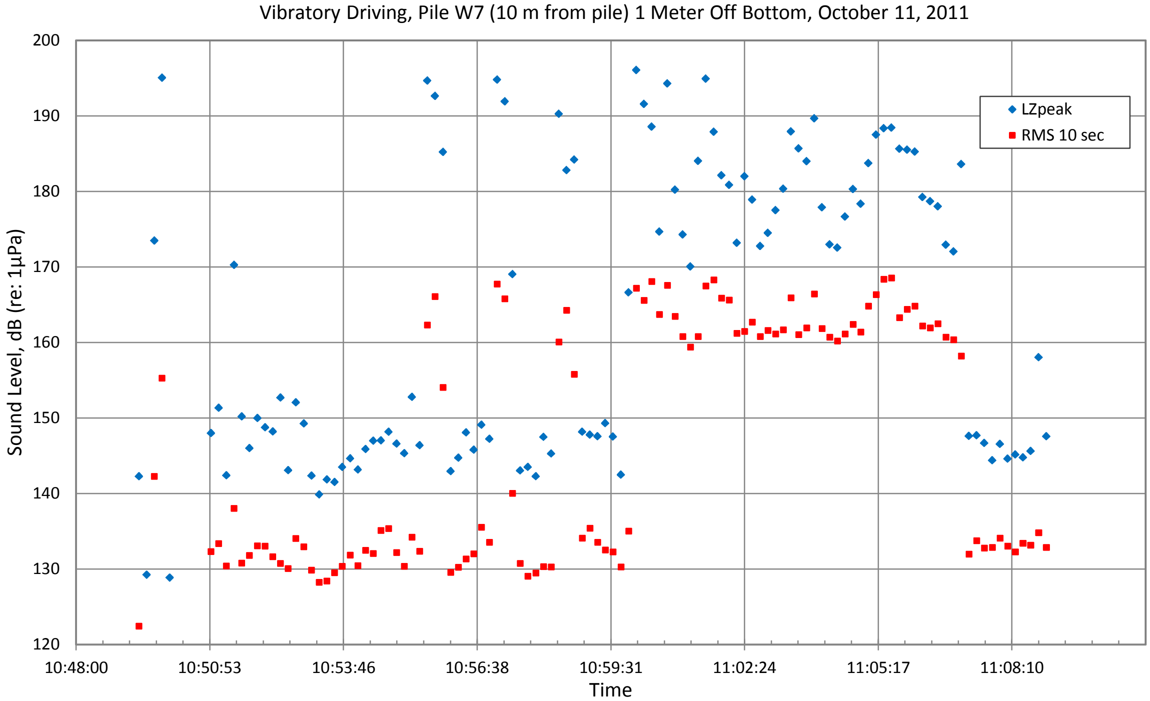


Vibratory Driving Statistics (1 Sec RMS > 143dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	177	7.2	0.04
RMS 1 sec	163	4.0	0.02

Inactive Vibratory Hammer Statistics (1 sec RMS < 143 dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	141	9.0	0.06
RMS 1 sec	130	8.7	0.07

Input: 111011 003

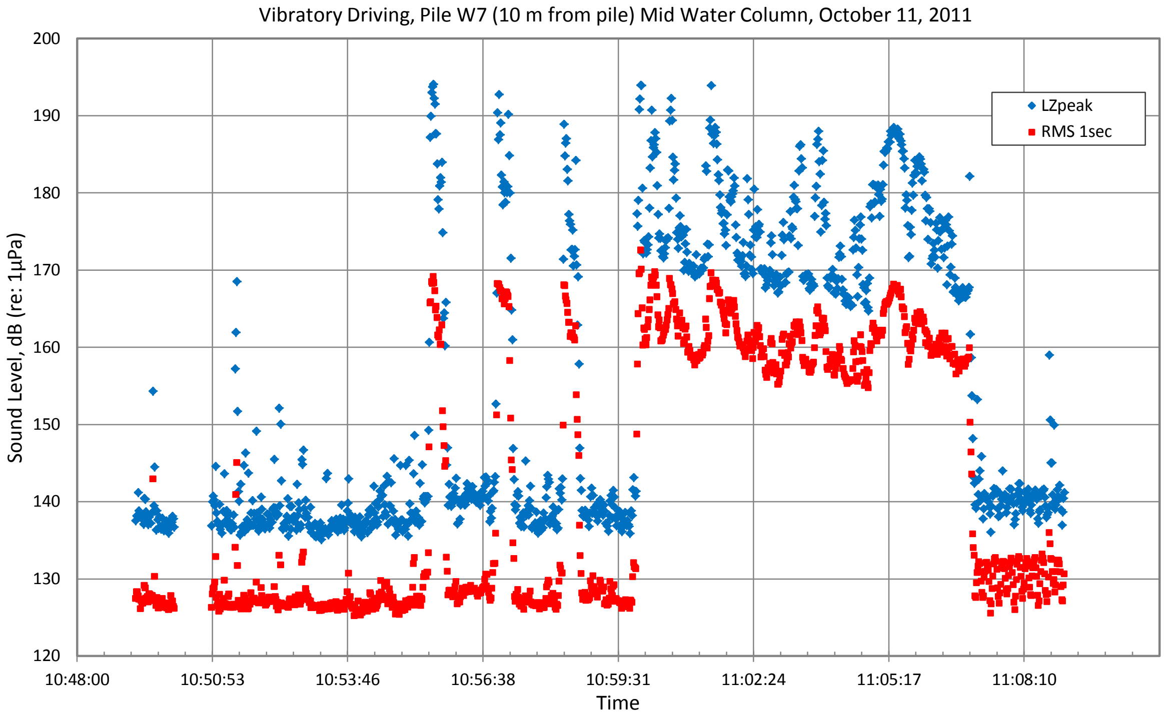
Vibratory Driving, Pile W7 (10 m from pile) 1 Meter Off Bottom, October 11, 2011



Vibratory Driving Statistics (10 Sec RMS > 143dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	183	7.2	0.04
RMS 10sec	163	3.4	0.02

Inactive Vibratory Hammer Statistics (10 sec RMS < 143 dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	147	7.4	0.05
RMS 10sec	132	3.9	0.03

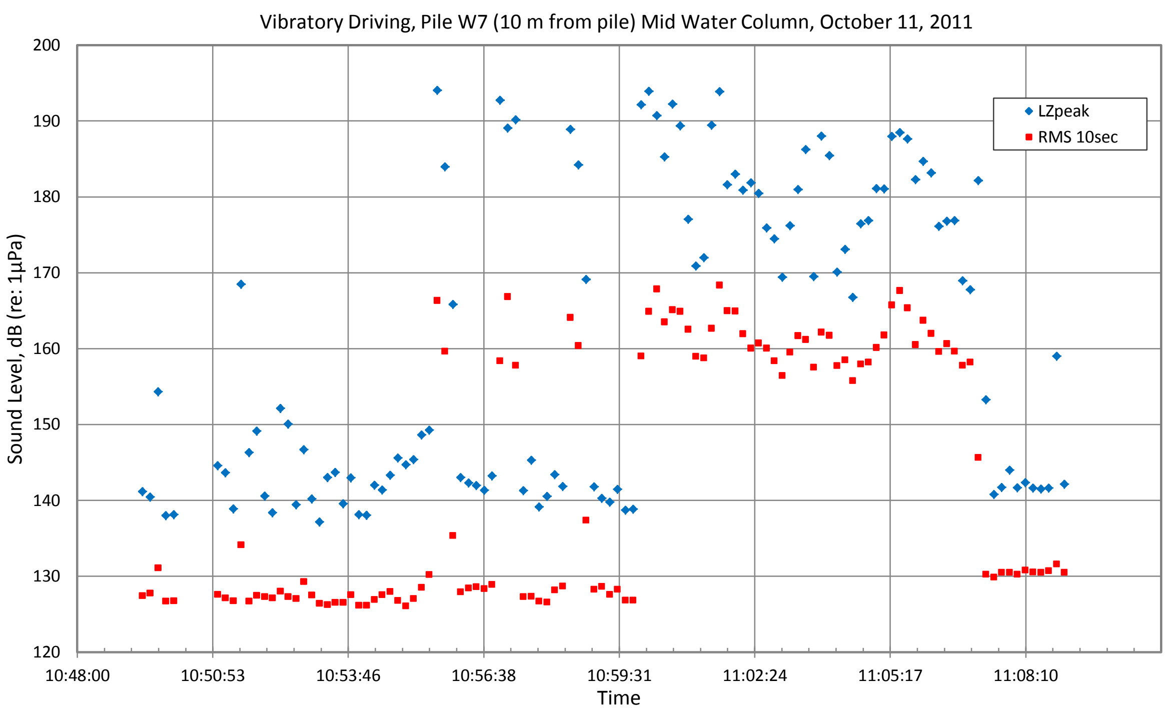
Input: 111011 003



Vibratory Driving Statistics (1 Sec RMS > 143dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	176	7.5	0.04
RMS 1sec	161	4.5	0.03

Inactive Vibratory Hammer Statistics, (1 sec RMS < 143 dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	139	6.3	0.05
RMS 1sec	128	5.5	0.04

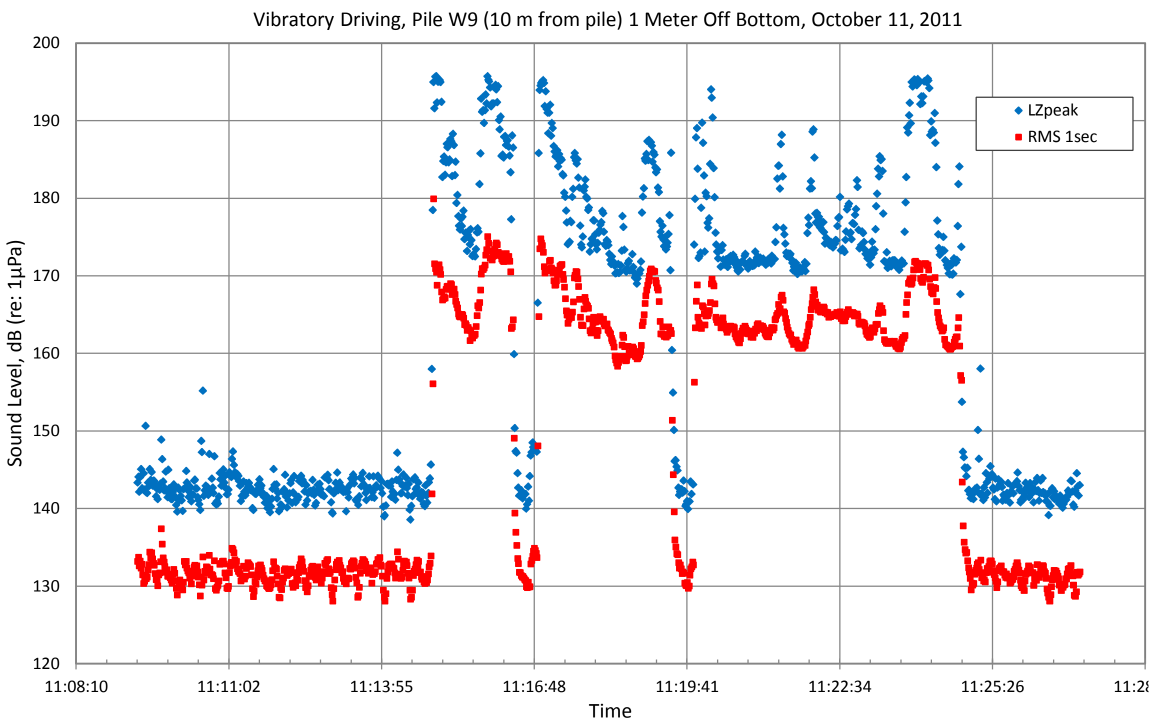
Input: 111011 003



Vibratory Driving Statistics (10 Sec RMS > 143dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	182	7.7	0.04
RMS 10sec	161	3.9	0.02

Inactive Vibratory Hammer Statistics, (10 sec RMS < 143 dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	144	6.8	0.05
RMS 10sec	128	2.2	0.02

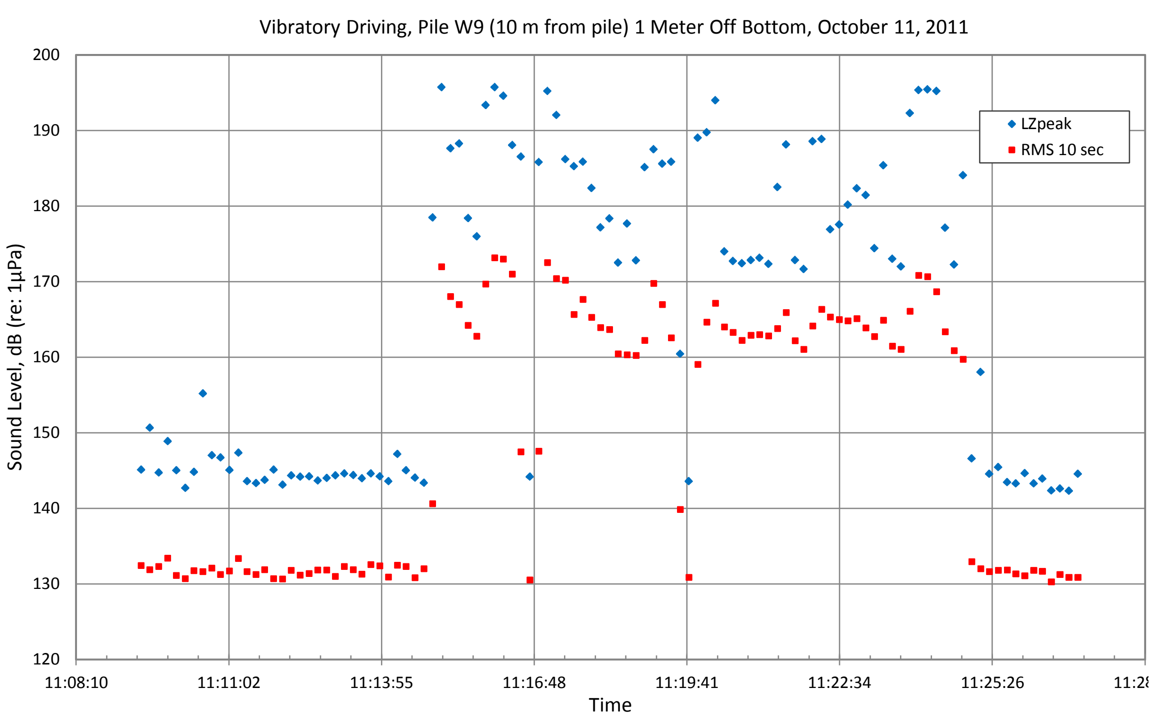
Input: 111011 003



Vibratory Driving Statistics (1 Sec RMS > 143dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	179	8.0	0.04
RMS 1 sec	165	4.2	0.03

Inactive Vibratory Hammer Statistics (1 sec RMS < 143 dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	143	2.1	0.01
RMS 1 sec	132	1.6	0.01

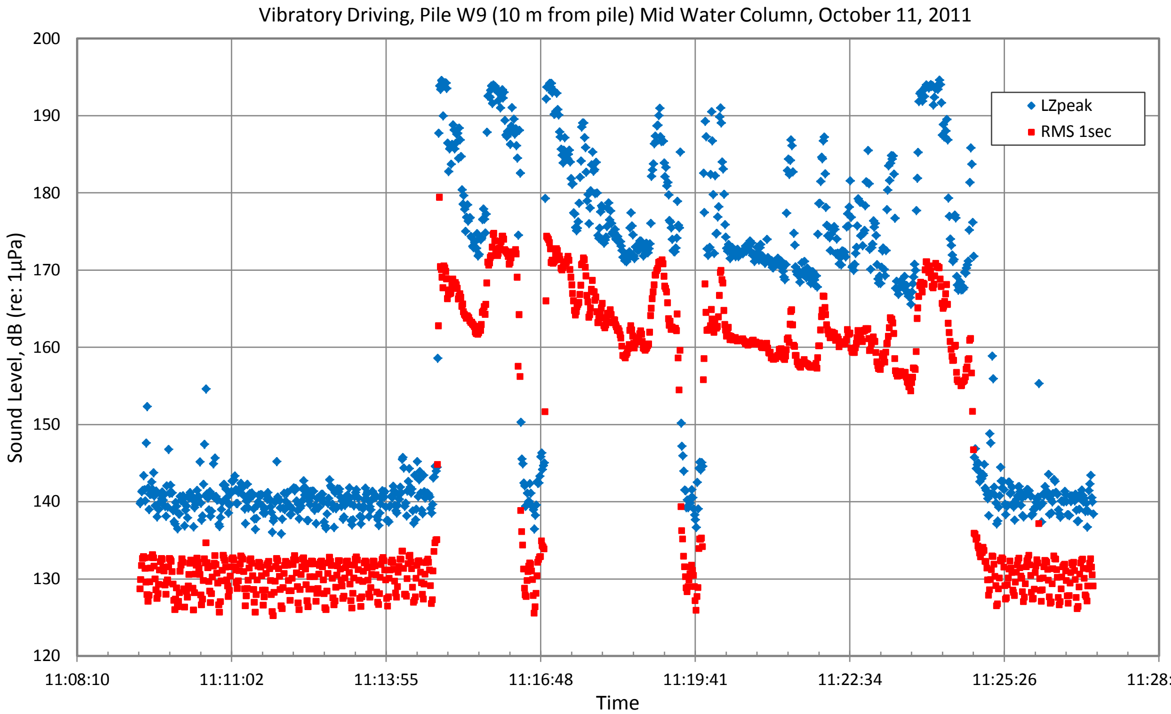
Input: 111011 004



Vibratory Driving Statistics (10 Sec RMS > 143dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	183	7.9	0.04
RMS 10sec	165	4.9	0.03

Inactive Vibratory Hammer Statistics (10 sec RMS < 143 dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	146	5.9	0.04
RMS 10sec	132	1.8	0.01

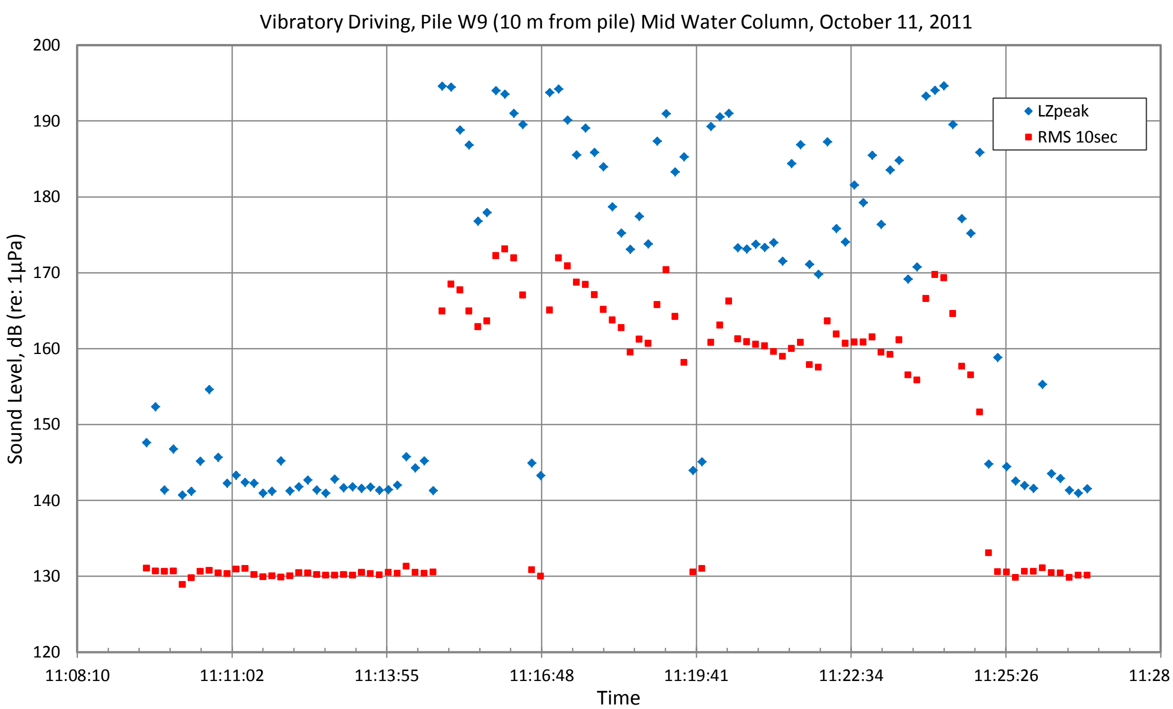
Input: 111011 004



Vibratory Driving Statistics (1 Sec RMS > 143dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	179	8.2	0.05
RMS 1sec	163	5.1	0.03

Inactive Vibratory Hammer Statistics, (1 sec RMS < 143 dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	141	2.6	0.02
RMS 1sec	130	2.3	0.02

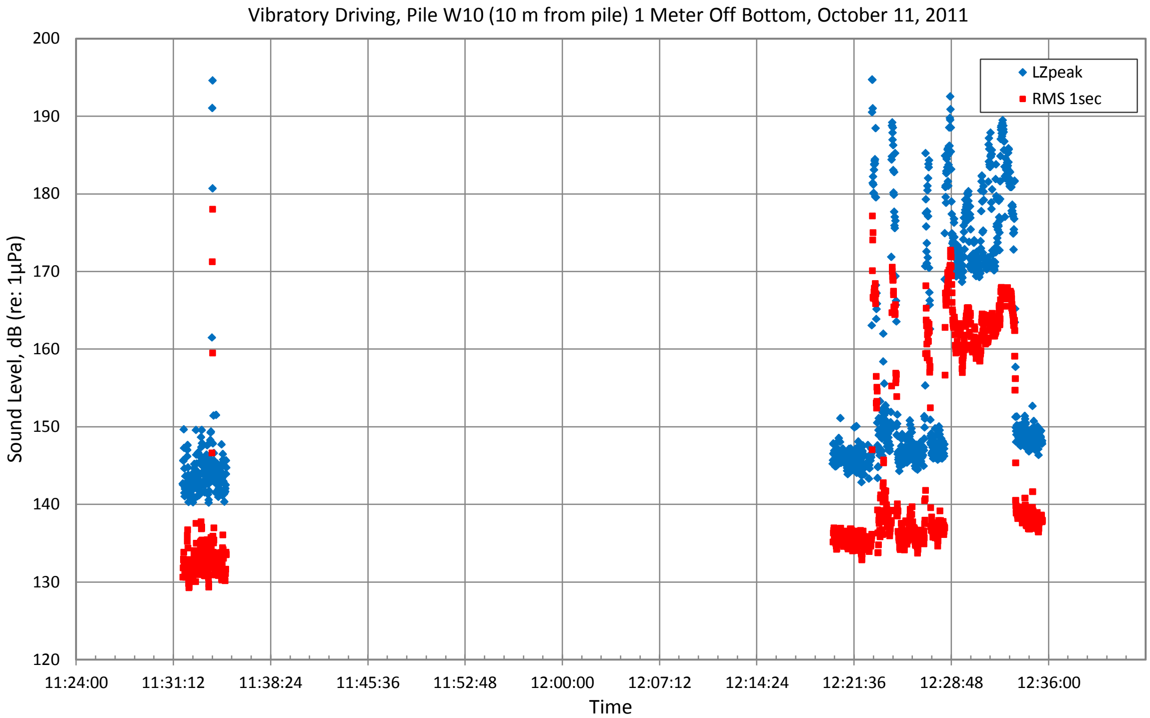
Input: 111011 004



Vibratory Driving Statistics (10 Sec RMS > 143dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	183	8.0	0.04
RMS 10sec	163	4.7	0.03

Inactive Vibratory Hammer Statistics, (10 sec RMS < 143 dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	144	3.9	0.03
RMS 10sec	130	0.6	0.00

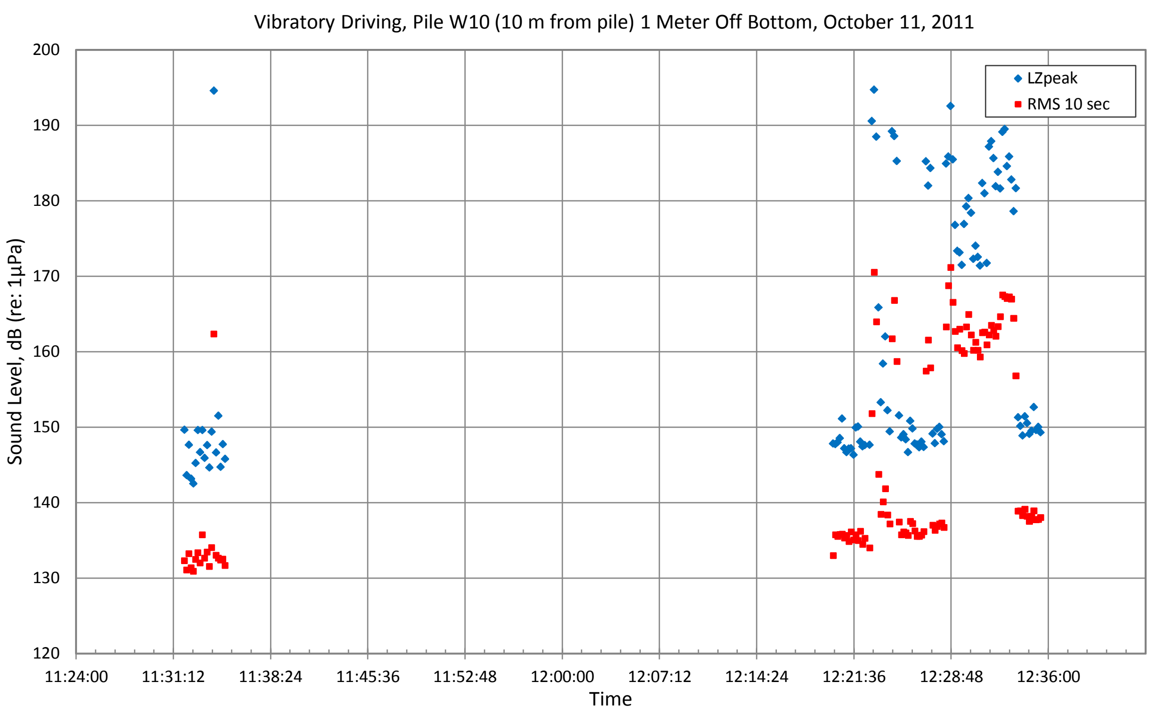
Input: 111011 004



Vibratory Driving Statistics (1 Sec RMS > 143dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	177	6.8	0.04
RMS 1 sec	163	4.3	0.03

Inactive Vibratory Hammer Statistics (1 sec RMS < 143 dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	146	8.1	0.06
RMS 1 sec	135	7.6	0.06

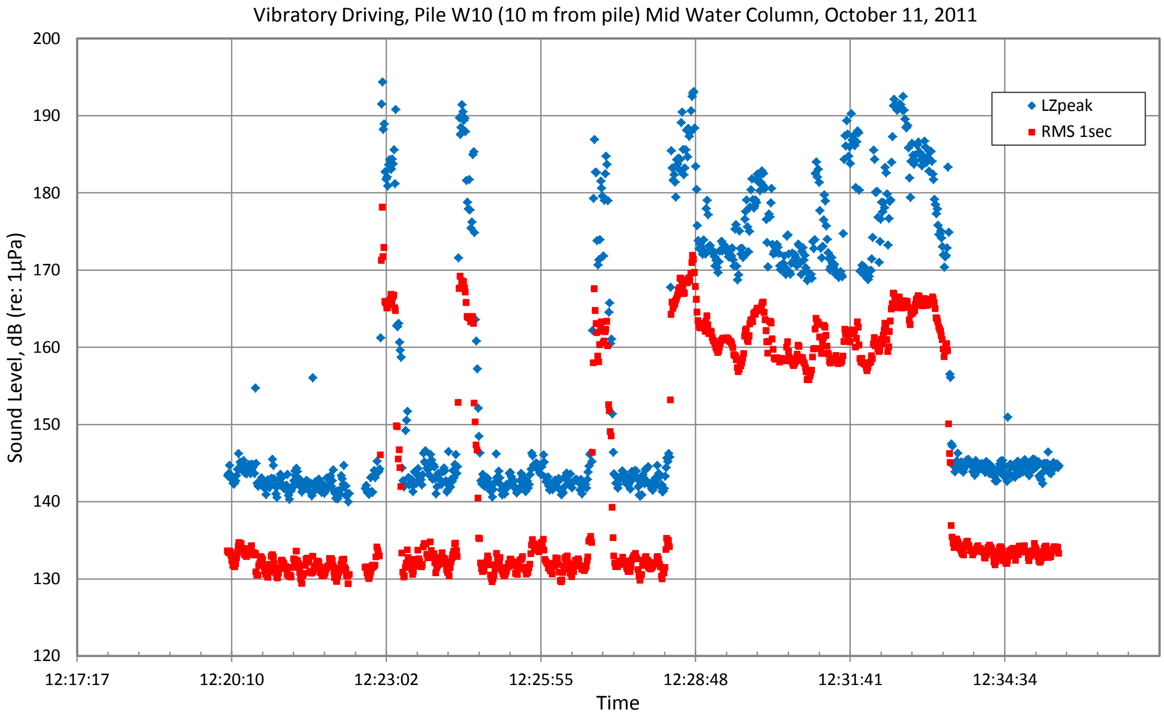
Input: 111011 005



Vibratory Driving Statistics (10 Sec RMS > 143dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	182	6.9	0.04
RMS 10sec	162	4.7	0.03

Inactive Vibratory Hammer Statistics (10 sec RMS < 143 dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	149	2.9	0.02
RMS 10sec	136	2.4	0.02

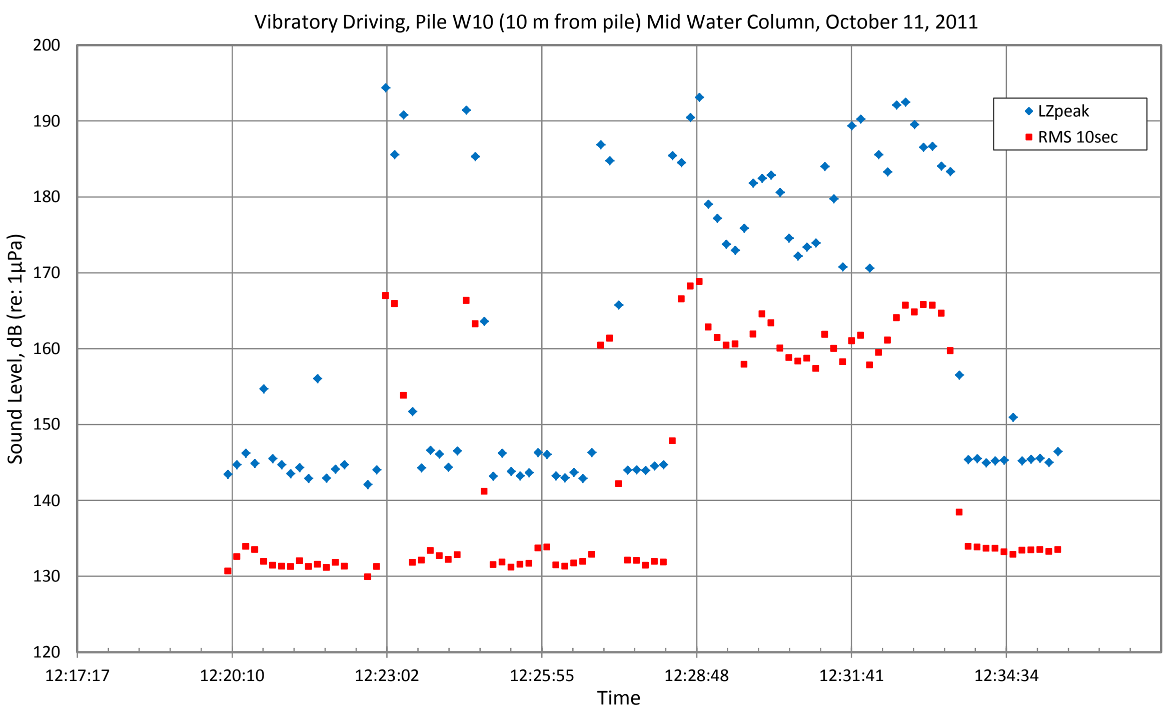
Input: 111011 005



Vibratory Driving Statistics (1 Sec RMS > 143dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	178	7.6	0.04
RMS 1sec	162	4.7	0.03

Inactive Vibratory Hammer Statistics, (1 sec RMS < 143 dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	143	6.5	0.05
RMS 1sec	132	5.9	0.04

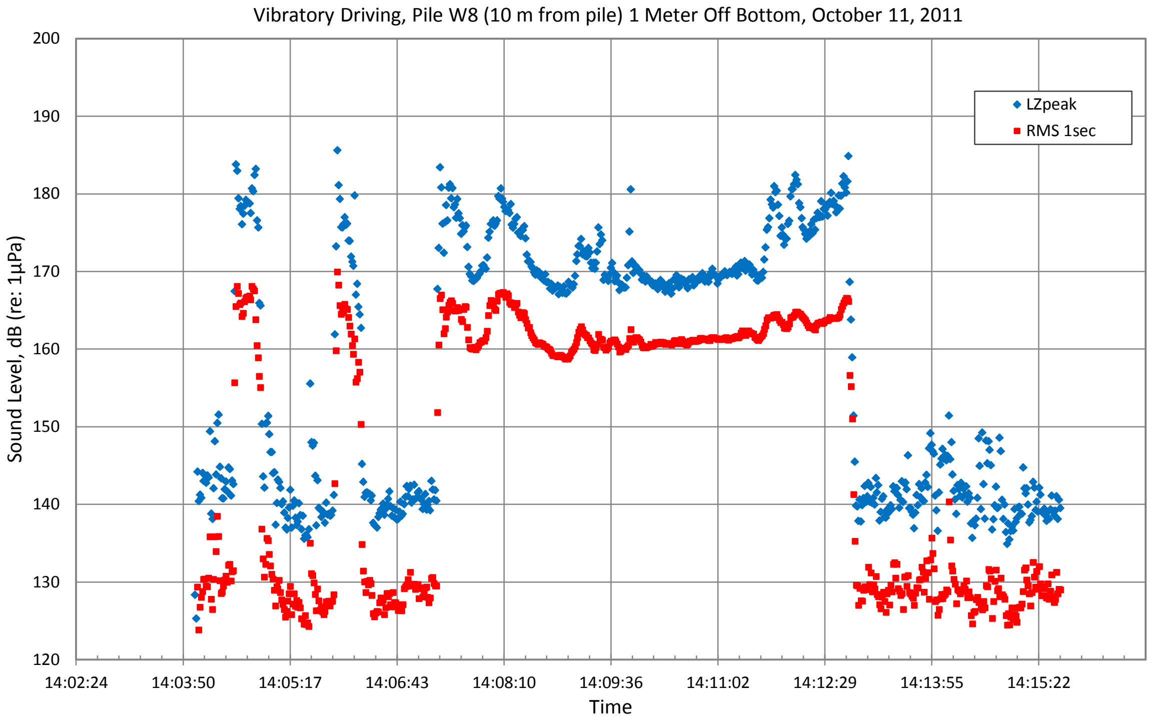
Input: 111011 005



Vibratory Driving Statistics (10 Sec RMS > 143dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	183	6.8	0.04
RMS 10sec	162	4.1	0.03

Inactive Vibratory Hammer Statistics, (10 sec RMS < 143 dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	146	4.8	0.03
RMS 10sec	133	2.2	0.02

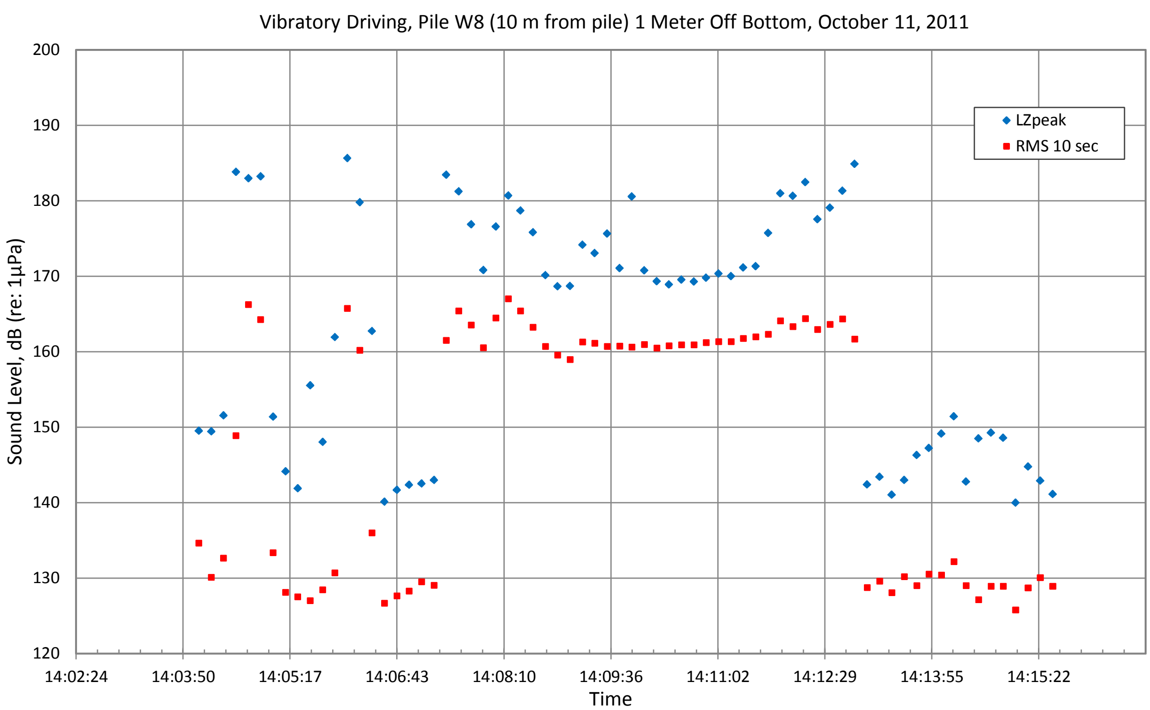
Input: 111011 005



Vibratory Driving Statistics (1 Sec RMS > 143dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	173	4.7	0.03
RMS 1 sec	162	2.6	0.02

Inactive Vibratory Hammer Statistics (1 sec RMS < 143 dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	141	3.7	0.03
RMS 1 sec	129	2.9	0.02

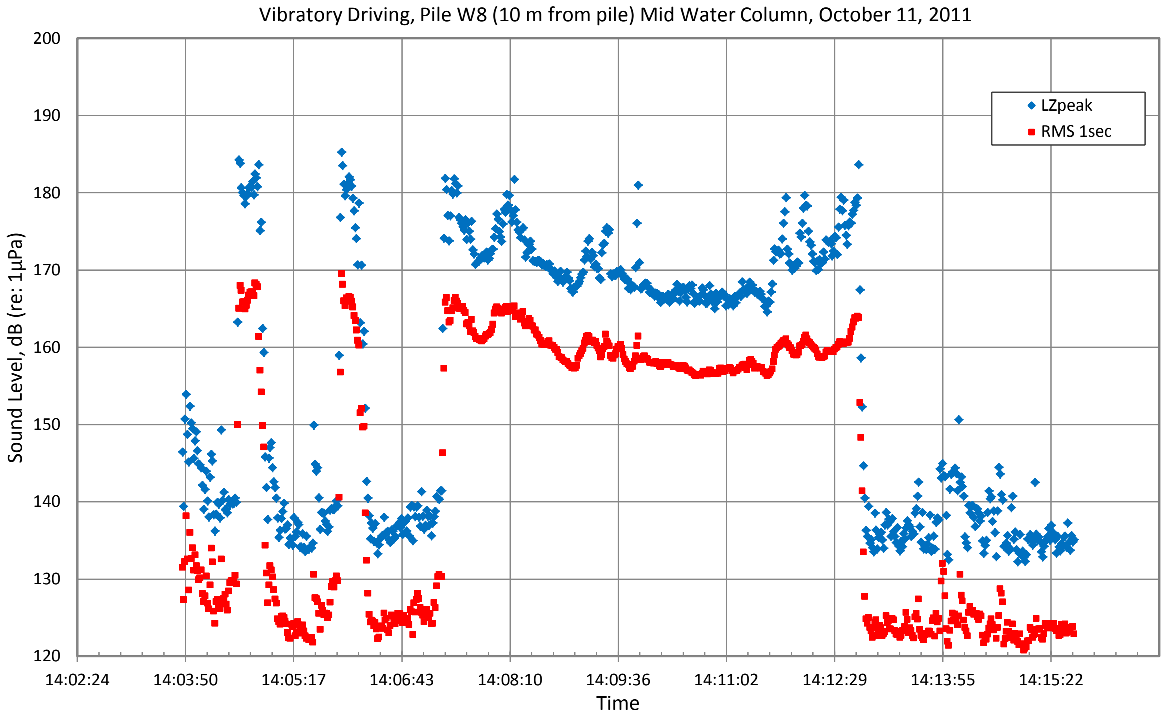
Input: 111011 006



Vibratory Driving Statistics (10 Sec RMS > 143dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	176	5.6	0.03
RMS 10sec	162	2.9	0.02

Inactive Vibratory Hammer Statistics (10 sec RMS < 143 dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	147	5.8	0.04
RMS 10sec	130	2.3	0.02

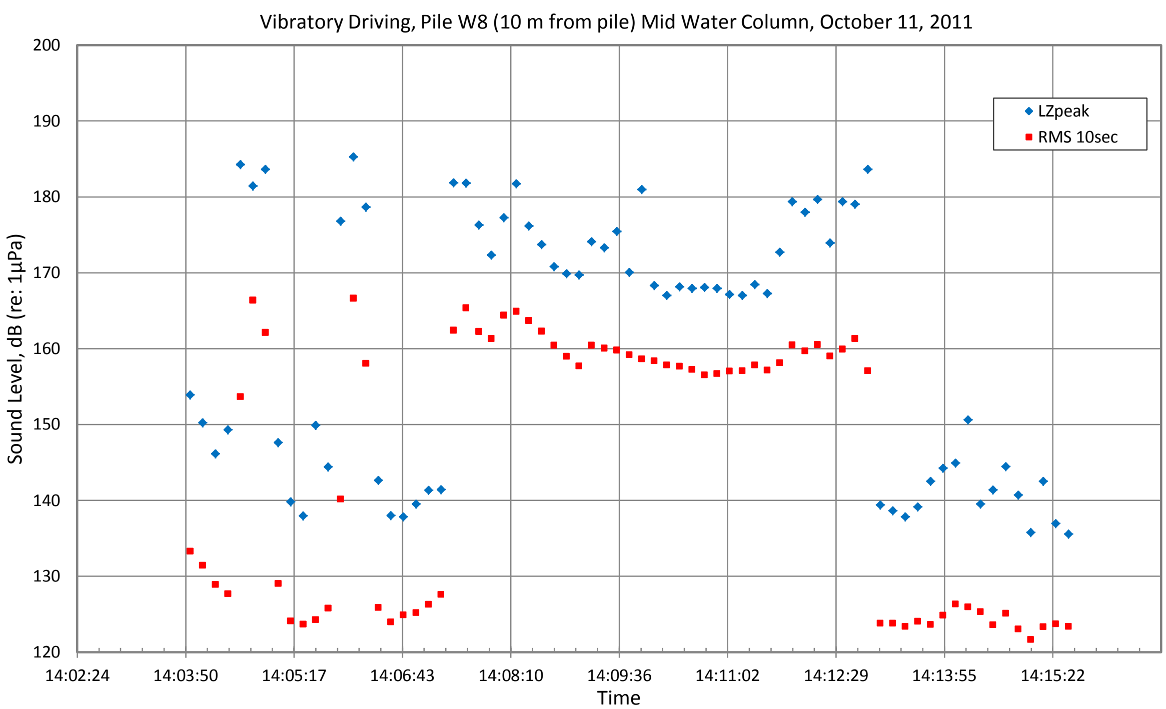
Input: 111011 006



Vibratory Driving Statistics (1 Sec RMS > 143dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	172	5.0	0.03
RMS 1sec	160	3.5	0.02

Inactive Vibratory Hammer Statistics, (1 sec RMS < 143 dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	138	4.3	0.03
RMS 1sec	125	3.3	0.03

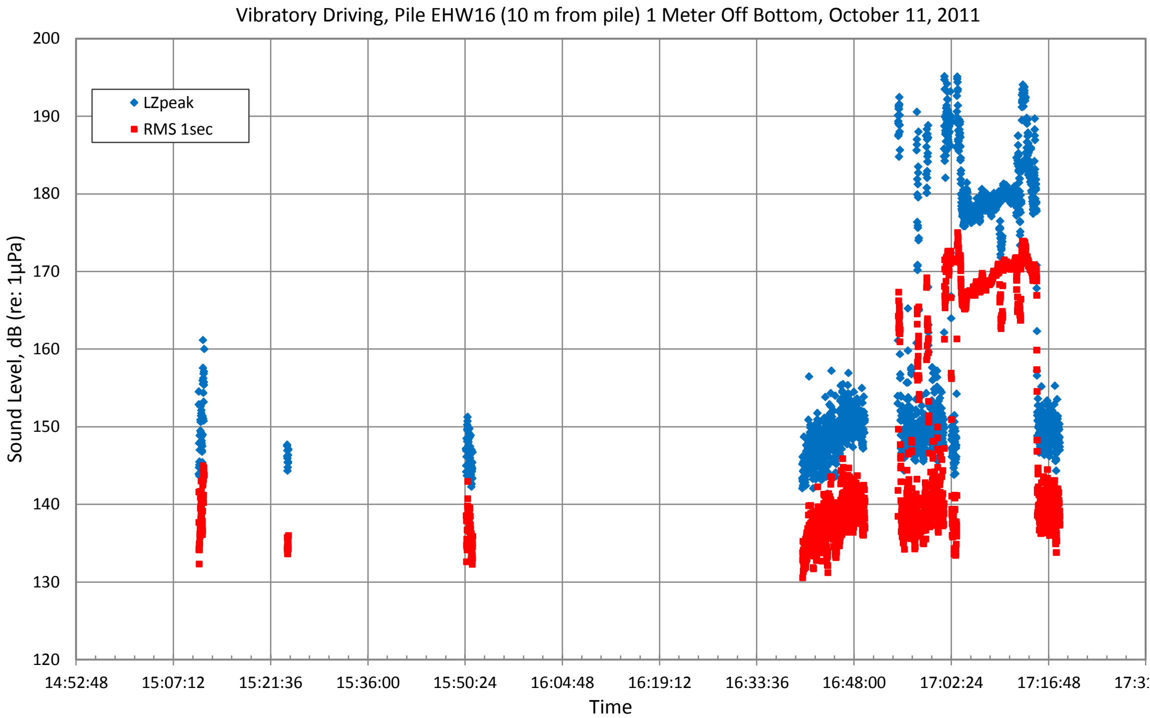
Input: 111011 006



Vibratory Driving Statistics (10 Sec RMS > 143dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	175	5.9	0.03
RMS 10sec	160	3.0	0.02

Inactive Vibratory Hammer Statistics, (10 sec RMS < 143 dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	143	7.7	0.05
RMS 10sec	126	3.6	0.03

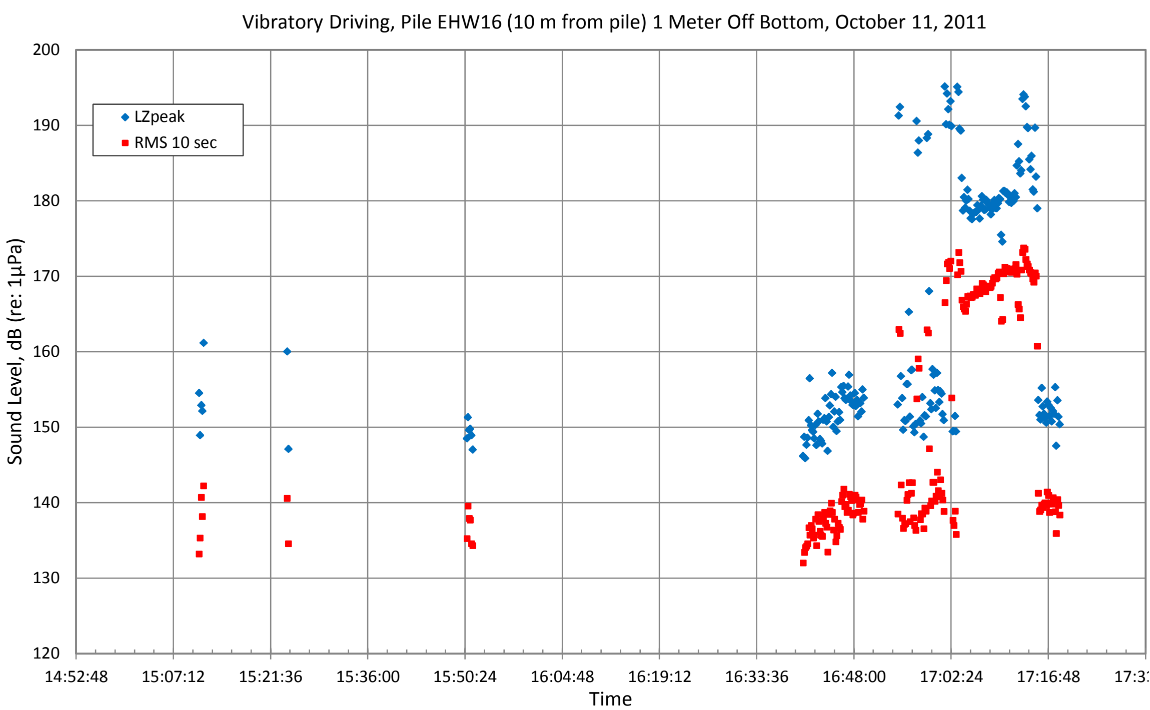
Input: 111011 006



Vibratory Driving Statistics (1 Sec RMS > 143dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	179	8.7	0.05
RMS 1 sec	167	7.2	0.04

Inactive Vibratory Hammer Statistics (1 sec RMS < 143 dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	148	8.9	0.06
RMS 1 sec	138	8.3	0.06

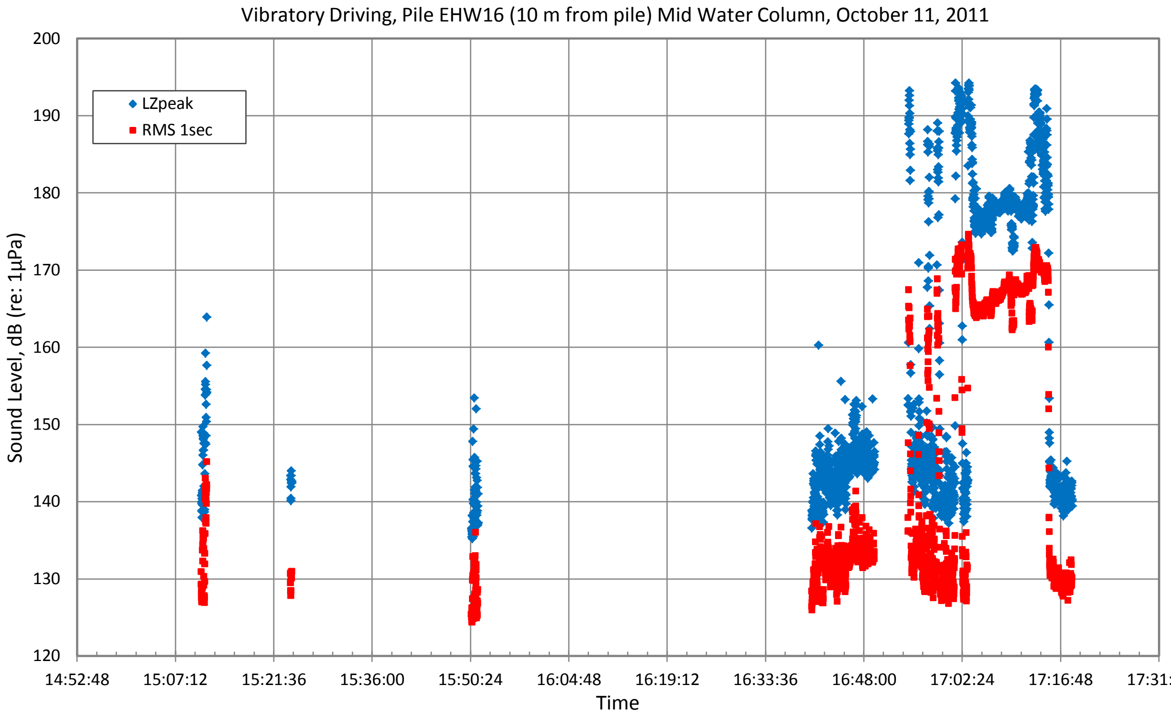
Input: 111011 007



Vibratory Driving Statistics (10 Sec RMS > 143dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	183	7.0	0.04
RMS 10sec	167	5.7	0.03

Inactive Vibratory Hammer Statistics (10 sec RMS < 143 dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	152	3.1	0.02
RMS 10sec	138	2.3	0.02

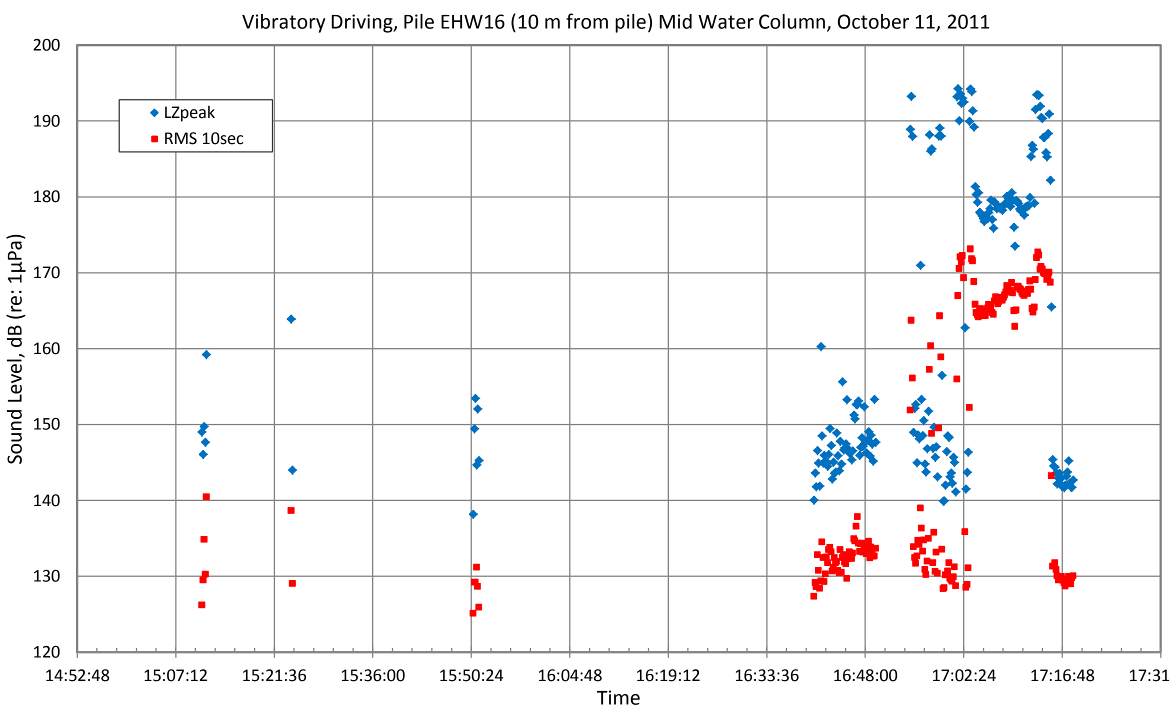
Input: 111011 007



Vibratory Driving Statistics (1 Sec RMS > 143dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	181	6.3	0.03
RMS 1sec	167	4.3	0.03

Inactive Vibratory Hammer Statistics, (1 sec RMS < 143 dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	143	8.7	0.06
RMS 1sec	131	7.9	0.06

Input: 111011 007

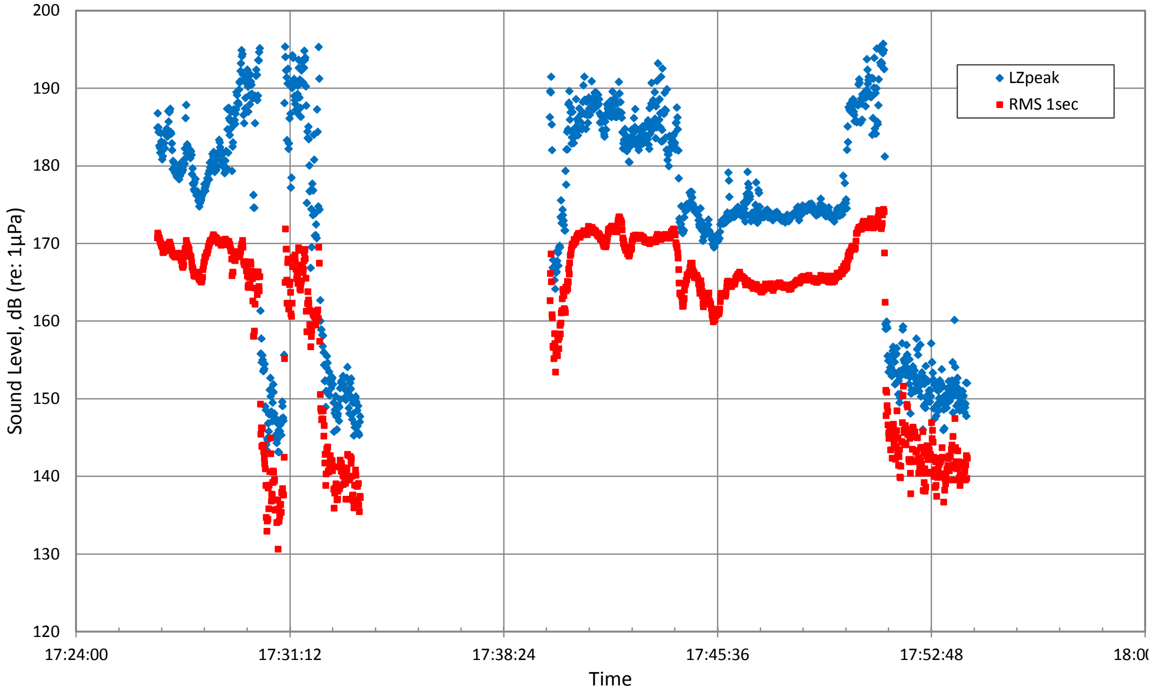


Vibratory Driving Statistics (1 Sec RMS > 143dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	183	6.3	0.03
RMS 10sec	166	5.3	0.03

Inactive Vibratory Hammer Statistics, (1 sec RMS < 143 dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	147	5.0	0.03
RMS 10sec	132	2.6	0.02

Input: 111011 007

Vibratory Extraction/Driving, Pile EHW16 (10 m from pile) 1 Meter Off Bottom, October 11, 2011

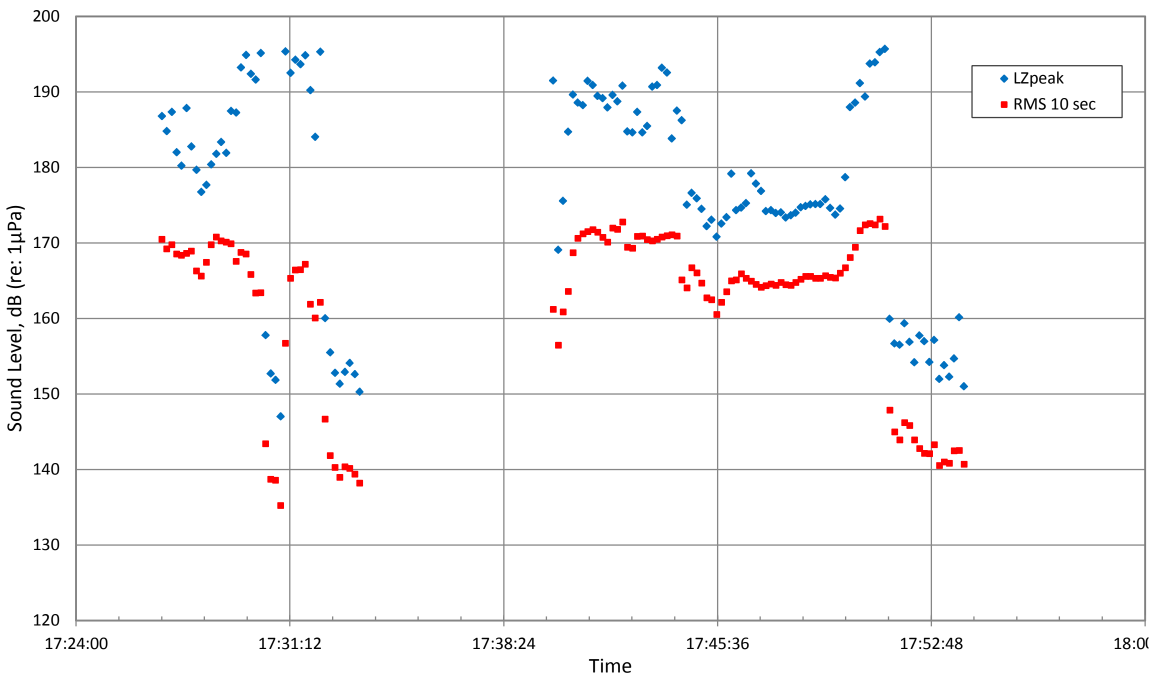


Vibratory Driving Statistics (1 Sec RMS > 143dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	178	9.8	0.06
RMS 1 sec	165	7.0	0.04

Inactive Vibratory Hammer Statistics (1 sec RMS < 143 dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	149	10.7	0.07
RMS 1 sec	139	10.0	0.07

Input: 111011 008

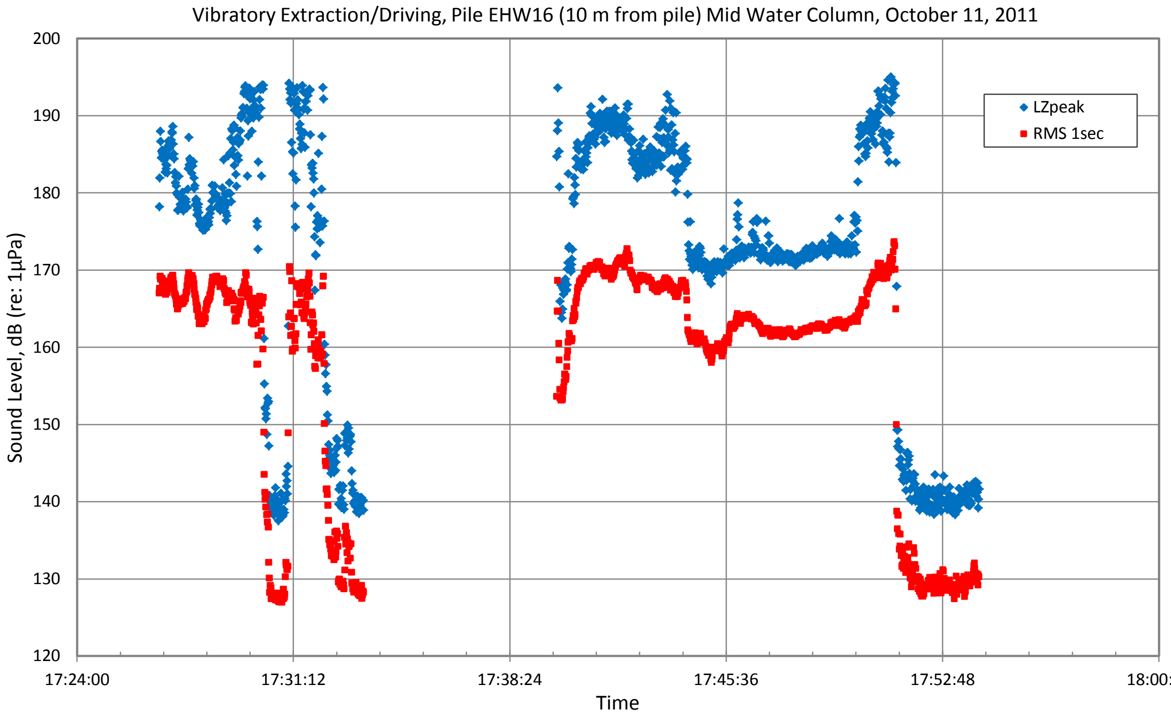
Vibratory Extraction/Driving, Pile EHW16 (10 m from pile) 1 Meter Off Bottom, October 11, 2011



Vibratory Driving Statistics (10 Sec RMS > 143dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	181	10.4	0.06
RMS 10sec	165	7.1	0.04

Inactive Vibratory Hammer Statistics (10 sec RMS < 143 dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	153	2.9	0.02
RMS 10sec	140	1.9	0.01

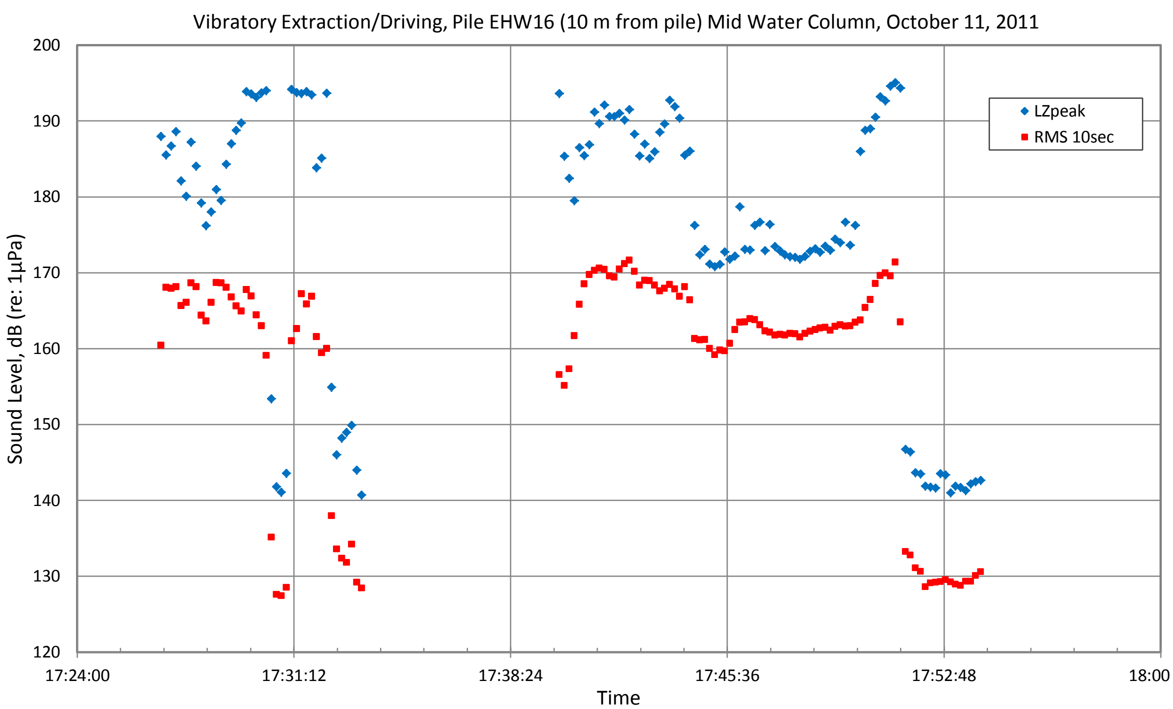
Input: 111011 008



Vibratory Driving Statistics (1 Sec RMS > 143dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	180	7.9	0.04
RMS 1sec	165	4.1	0.02

Inactive Vibratory Hammer Statistics, (1 sec RMS < 143 dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	142	9.1	0.06
RMS 1sec	130	8.3	0.06

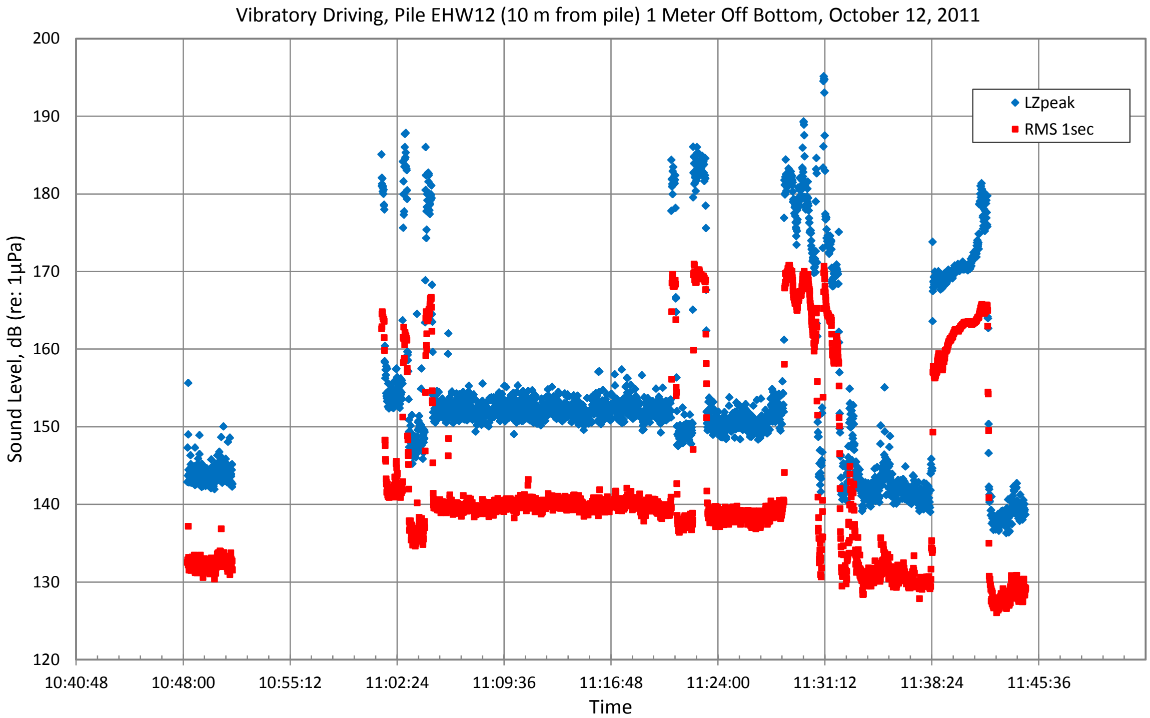
Input: 111011 008



Vibratory Driving Statistics (1 Sec RMS > 143dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	183	8.1	0.04
RMS 10sec	165	3.7	0.02

Inactive Vibratory Hammer Statistics, (1 sec RMS < 143 dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	144	3.8	0.03
RMS 10sec	131	2.5	0.02

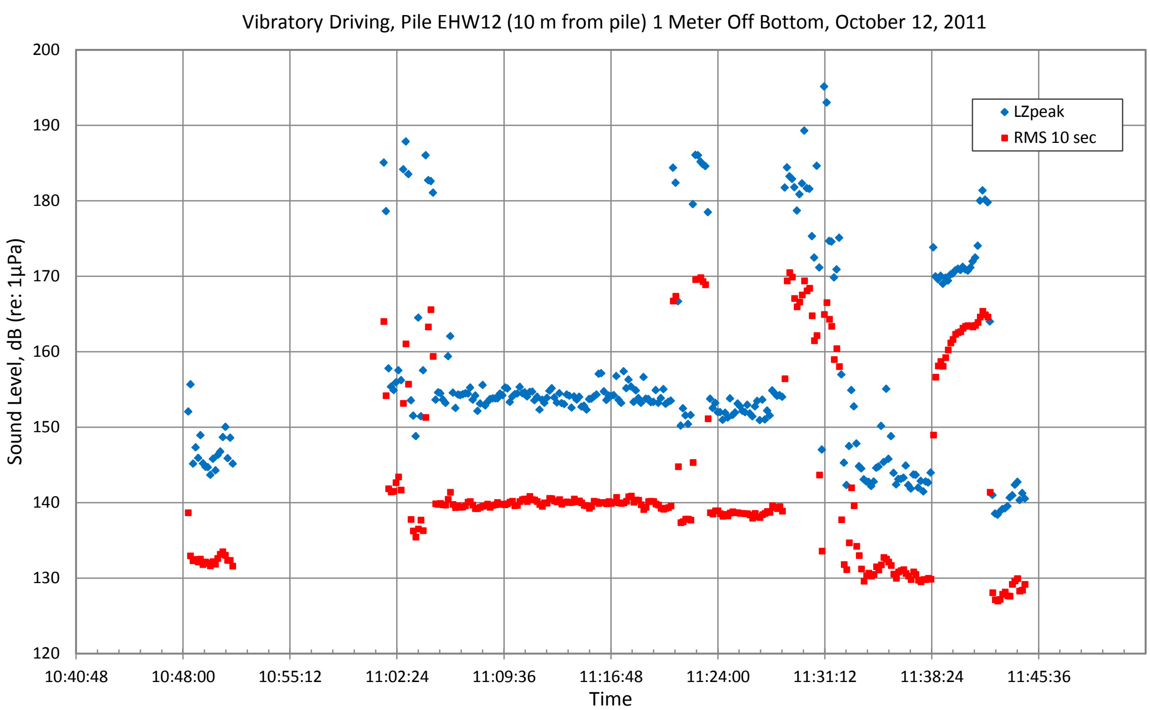
Input: 111011 008



Vibratory Driving Statistics (1 Sec RMS > 143dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	175	7.1	0.04
RMS 1 sec	163	5.7	0.03

Inactive Vibratory Hammer Statistics (1 sec RMS < 143 dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	149	5.9	0.04
RMS 1 sec	137	5.2	0.04

Input: 111012 001

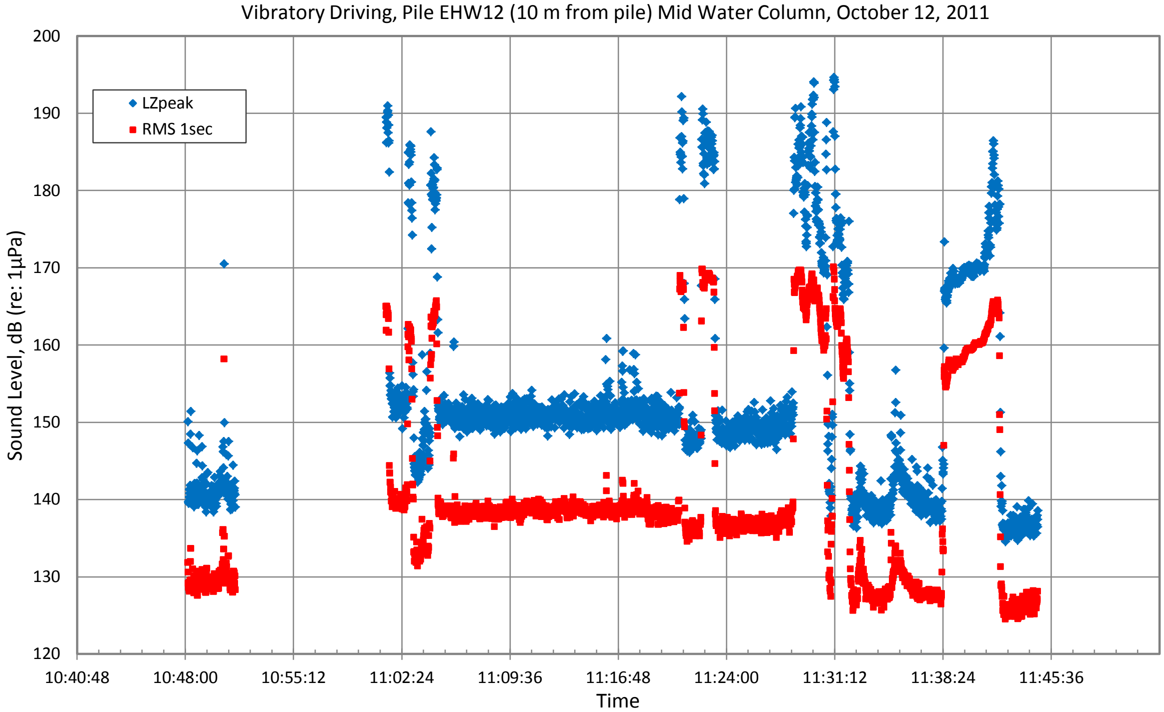


Vibratory Driving Statistics (10 Sec RMS > 143dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	178	7.2	0.04
RMS 10sec	162	6.7	0.04

Inactive Vibratory Hammer Statistics (10 sec RMS < 143 dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	151	5.2	0.03
RMS 10sec	137	4.2	0.03

Input: 111012 001

Vibratory Driving, Pile EHW12 (10 m from pile) Mid Water Column, October 12, 2011

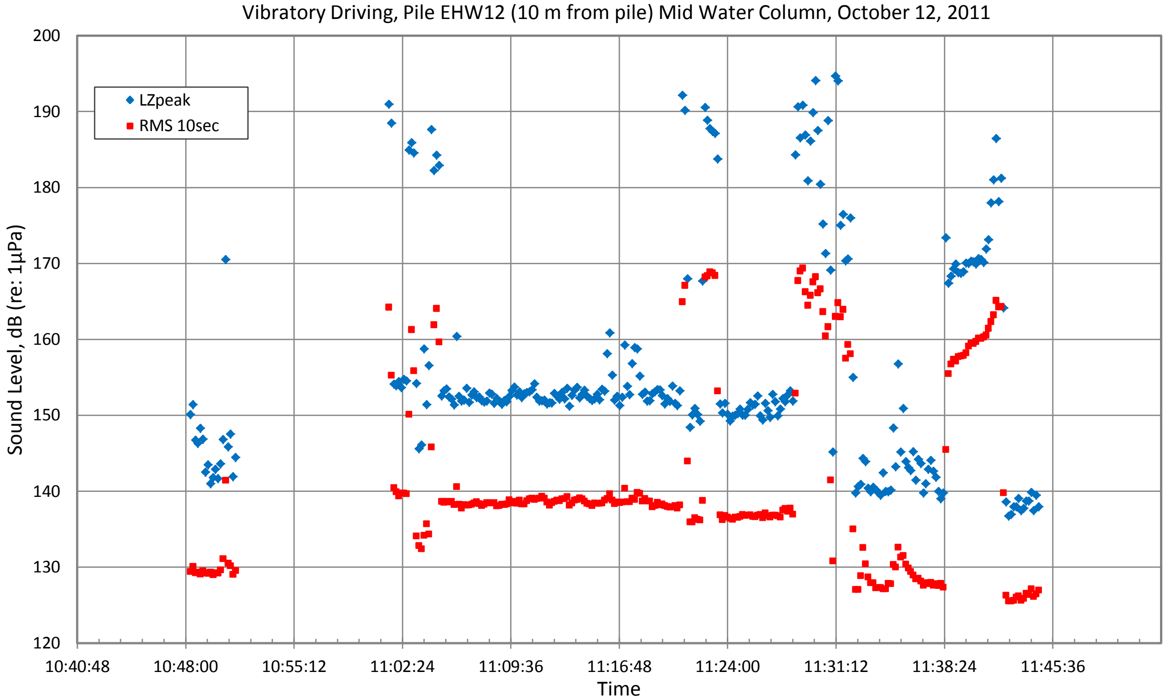


Vibratory Driving Statistics (1 Sec RMS > 143dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	176	8.1	0.05
RMS 1sec	162	5.2	0.03

Inactive Vibratory Hammer Statistics, (1 sec RMS < 143 dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	147	5.4	0.04
RMS 1sec	135	4.7	0.04

Input: 111012 001

Vibratory Driving, Pile EHW12 (10 m from pile) Mid Water Column, October 12, 2011

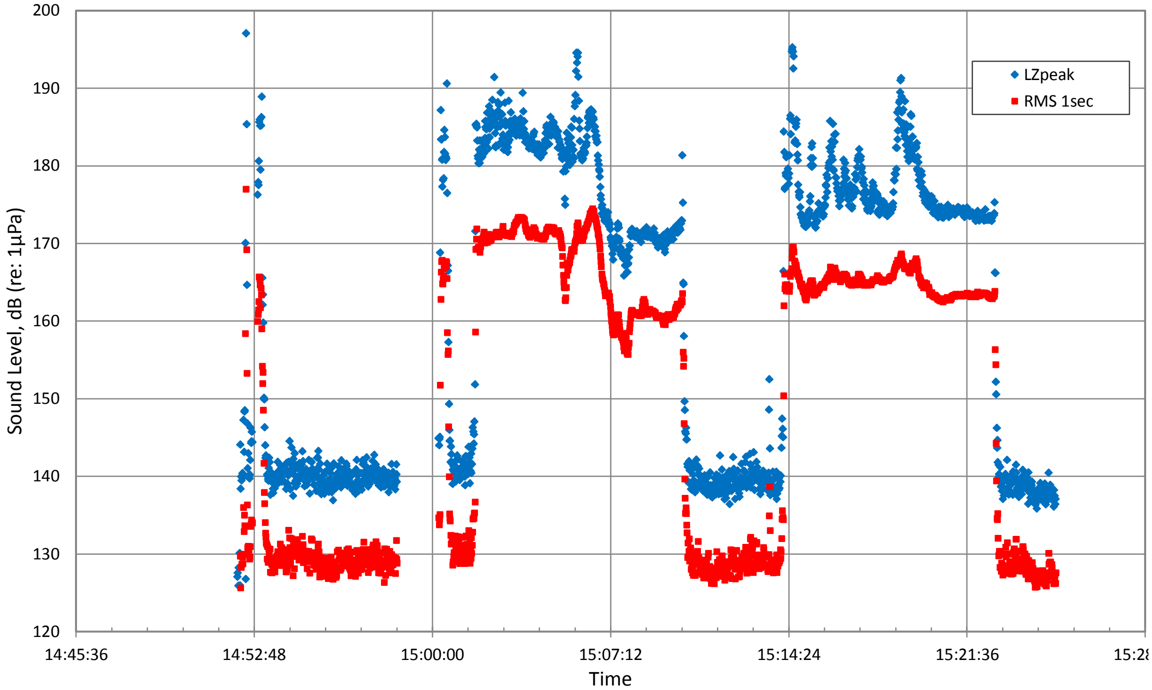


Vibratory Driving Statistics (1 Sec RMS > 143dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	180	8.6	0.05
RMS 10sec	161	5.8	0.04

Inactive Vibratory Hammer Statistics, (1 sec RMS < 143 dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	150	6.0	0.04
RMS 10sec	135	4.7	0.04

Input: 111012 001

Vibratory Driving, Pile EHW13 (10 m from pile) 1 Meter Off Bottom, October 12, 2011

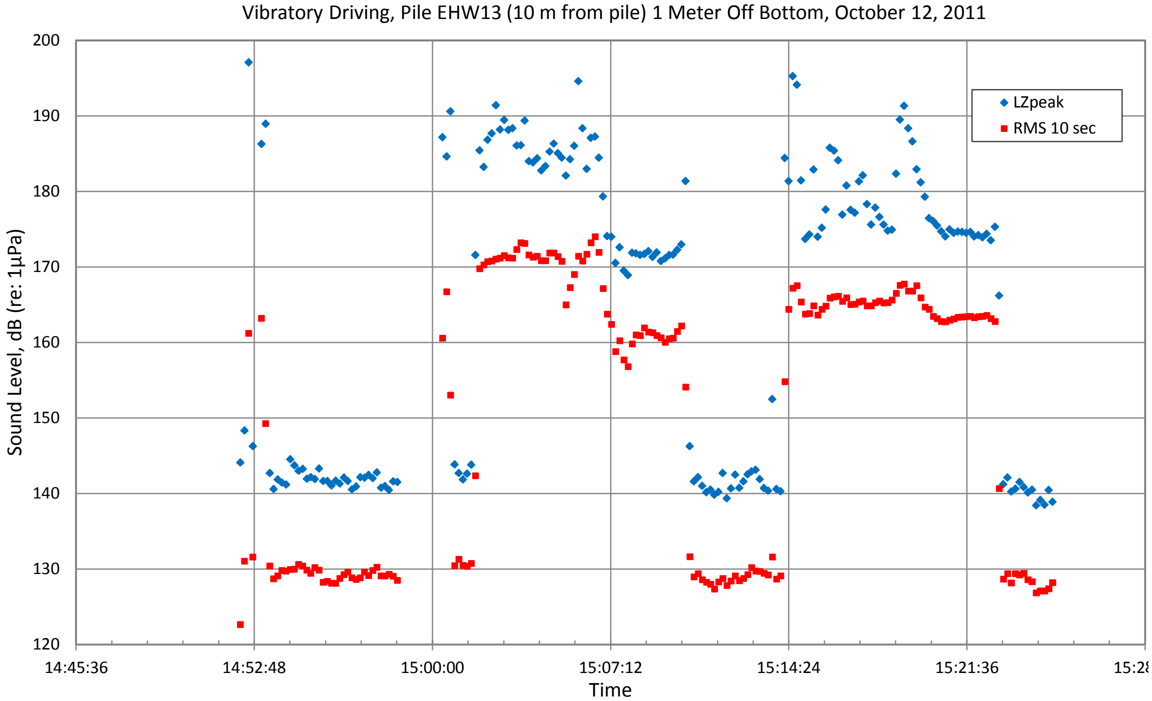


Vibratory Driving Statistics (1 Sec RMS > 143dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	178	6.0	0.03
RMS 1 sec	166	4.4	0.03

Inactive Vibratory Hammer Statistics (1 sec RMS < 143 dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	140	7.4	0.05
RMS 1 sec	129	6.8	0.05

Input: 111012 002

Vibratory Driving, Pile EHW13 (10 m from pile) 1 Meter Off Bottom, October 12, 2011

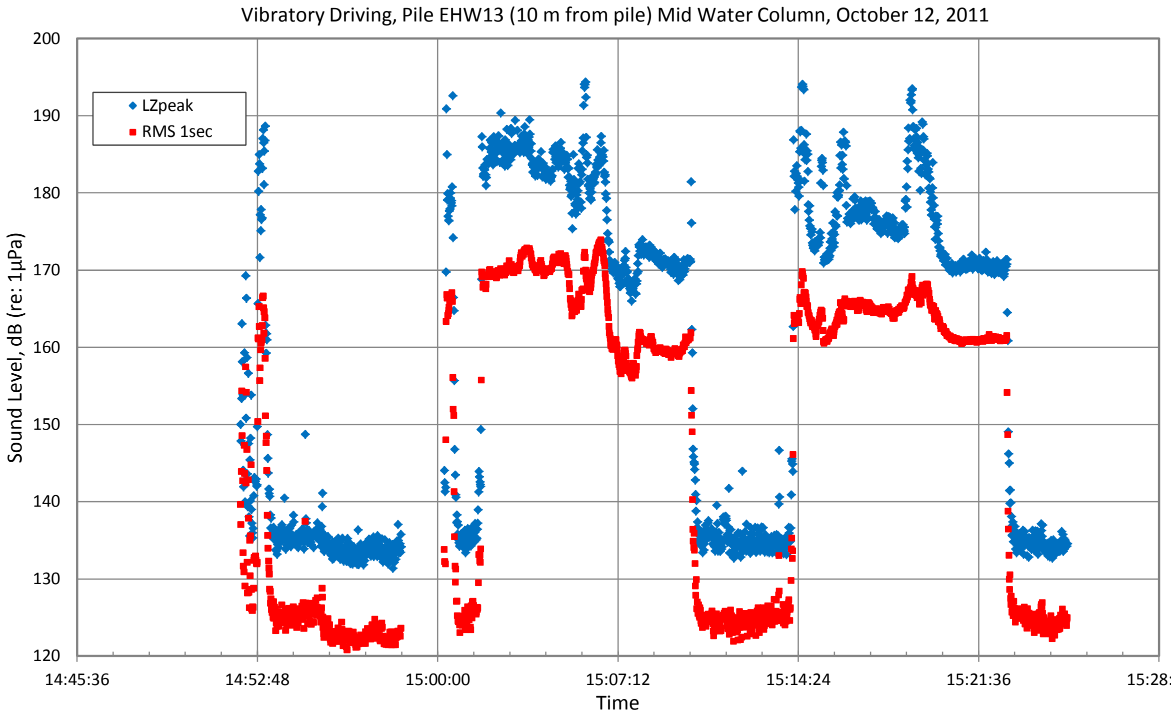


Vibratory Driving Statistics (10 Sec RMS > 143dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	180	6.8	0.04
RMS 10sec	165	4.7	0.03

Inactive Vibratory Hammer Statistics (10 sec RMS < 143 dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	143	4.8	0.03
RMS 10sec	129	2.3	0.02

Input: 111012 002

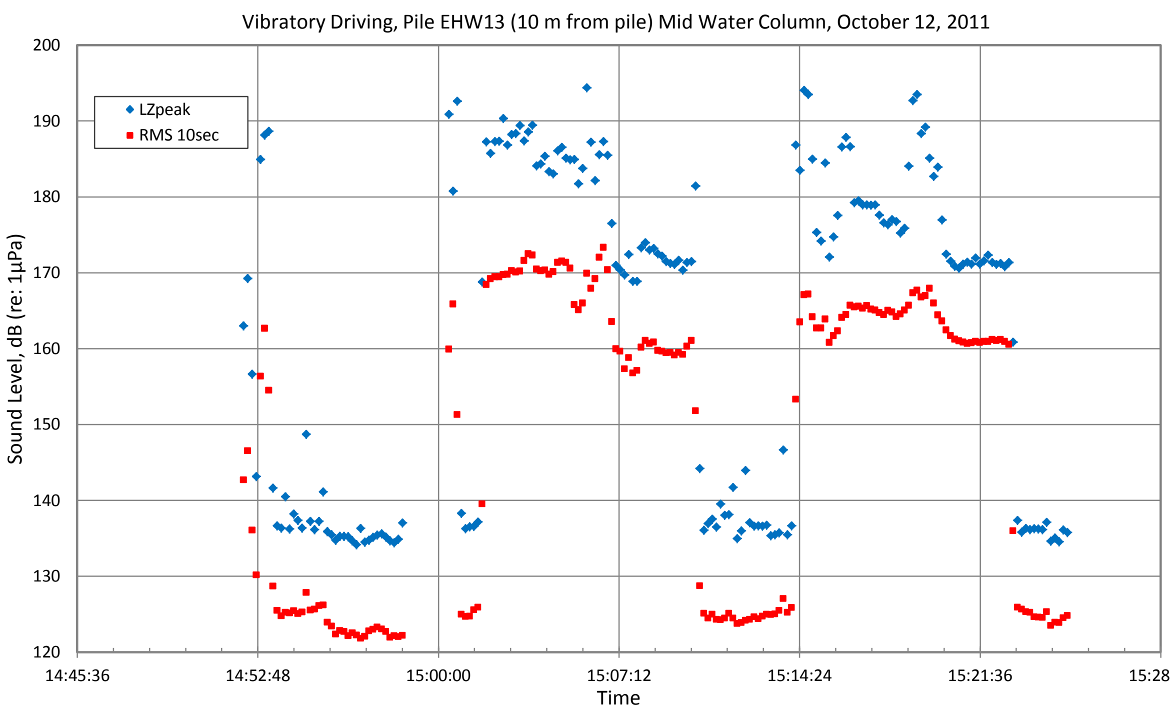
Vibratory Driving, Pile EHW13 (10 m from pile) Mid Water Column, October 12, 2011



Vibratory Driving Statistics (1 Sec RMS > 143dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	177	6.9	0.04
RMS 1sec	164	4.8	0.03

Inactive Vibratory Hammer Statistics, (1 sec RMS < 143 dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	135	5.8	0.04
RMS 1sec	125	5.4	0.04

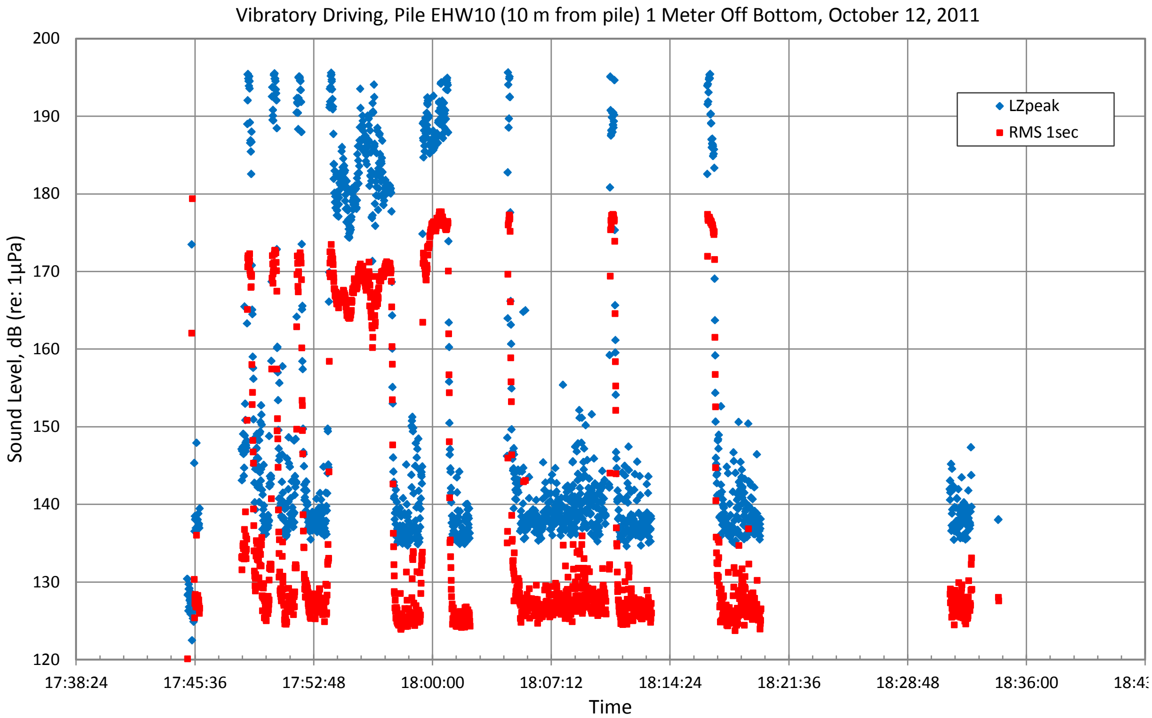
Input: 111012 002



Vibratory Driving Statistics (1 Sec RMS > 143dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	180	7.5	0.04
RMS 10sec	164	5.0	0.03

Inactive Vibratory Hammer Statistics, (1 sec RMS < 143 dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	138	6.3	0.05
RMS 10sec	125	3.5	0.03

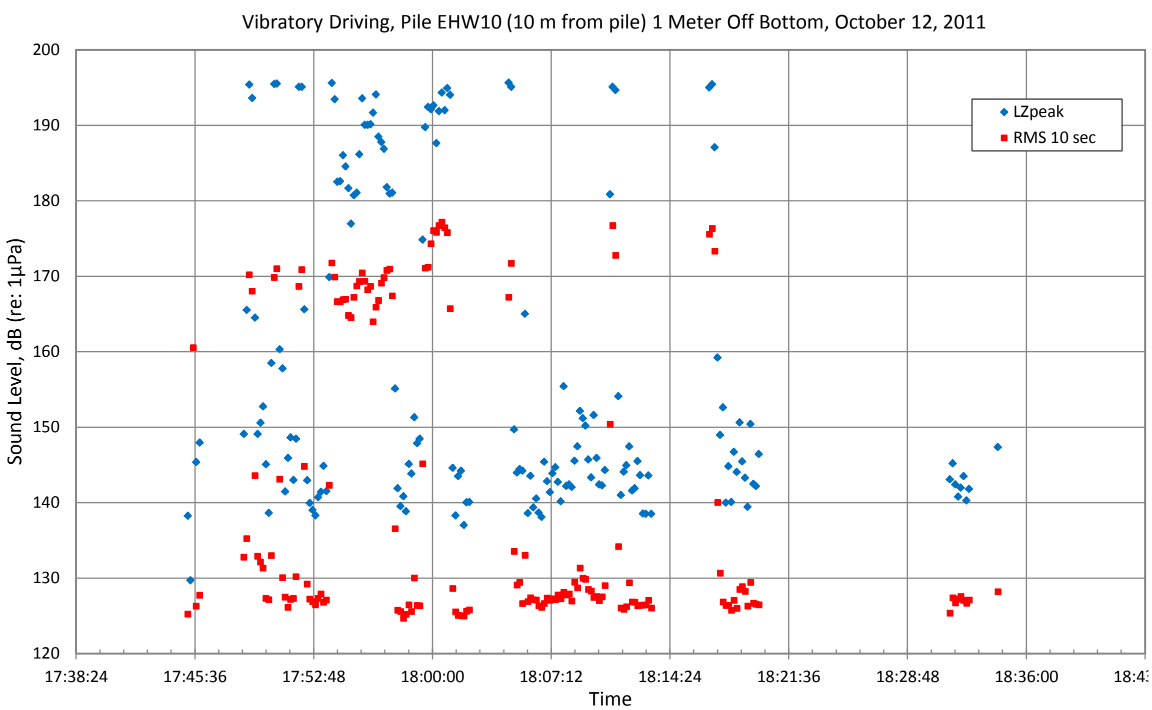
Input: 111012 002



Vibratory Driving Statistics (1 Sec RMS > 143dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	184	8.9	0.05
RMS 1 sec	169	6.8	0.04

Inactive Vibratory Hammer Statistics (1 sec RMS < 143 dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	139	11.4	0.08
RMS 1 sec	127	10.2	0.08

Input: 111012 003

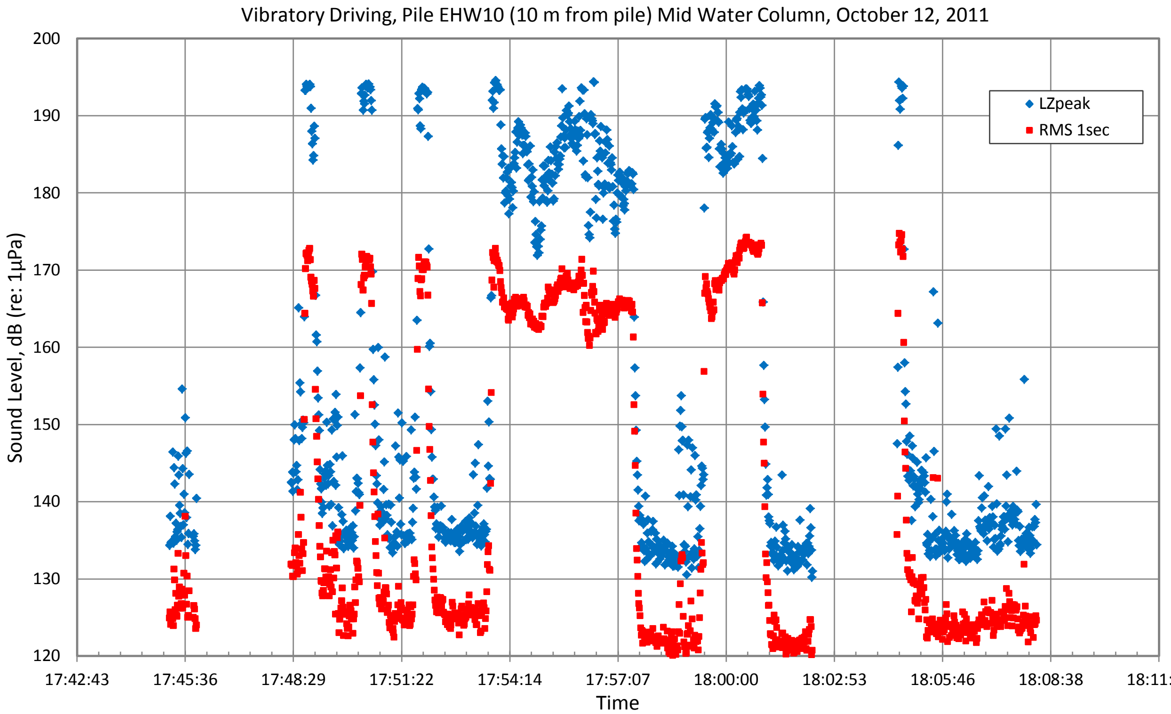


Vibratory Driving Statistics (10 Sec RMS > 143dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	188	8.5	0.05
RMS 10sec	168	8.3	0.05

Inactive Vibratory Hammer Statistics (10 sec RMS < 143 dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	145	6.0	0.04
RMS 10sec	128	3.0	0.02

Input: 111012 003

Vibratory Driving, Pile EHW10 (10 m from pile) Mid Water Column, October 12, 2011

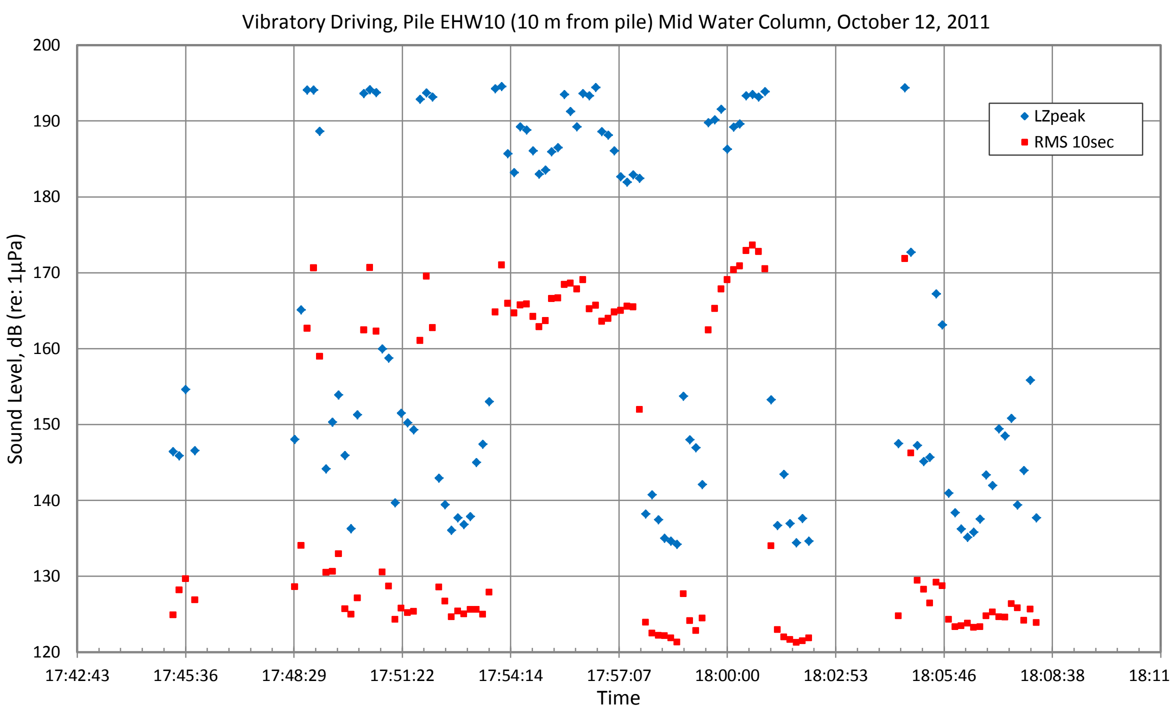


Vibratory Driving Statistics (1 Sec RMS > 143dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	185	8.5	0.05
RMS 1sec	167	6.1	0.04

Inactive Vibratory Hammer Statistics, (1 sec RMS < 143 dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	137	11.6	0.08
RMS 1sec	125	10.1	0.08

Input: 111012 003

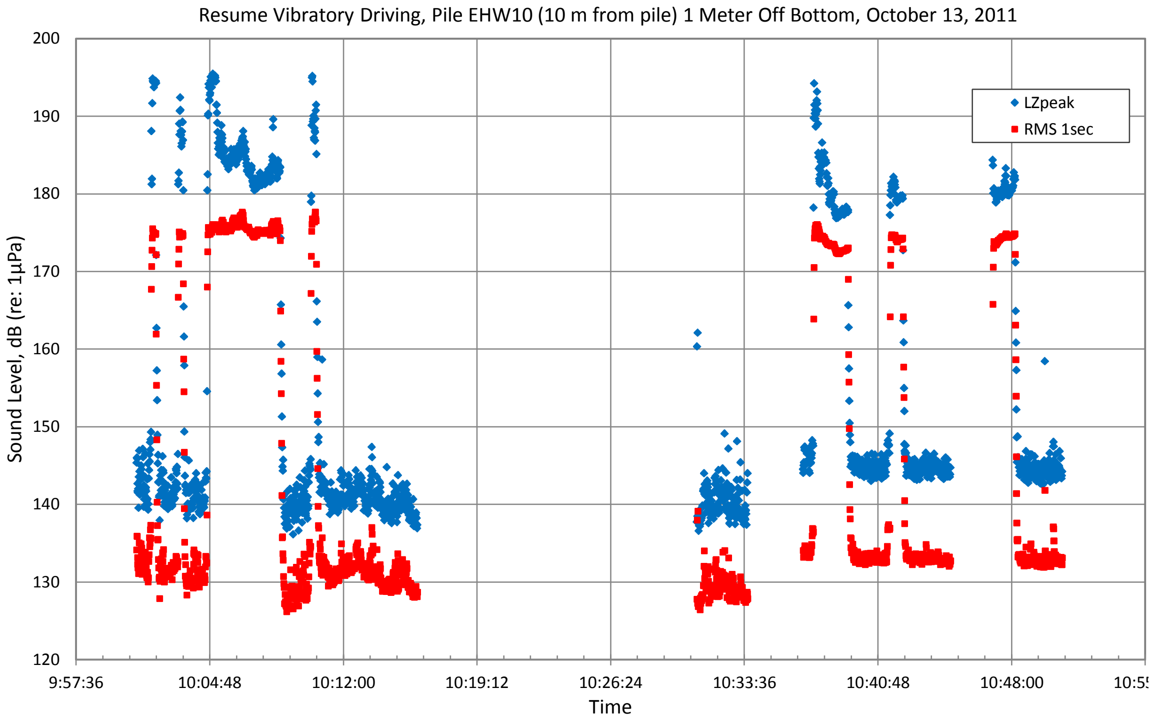
Vibratory Driving, Pile EHW10 (10 m from pile) Mid Water Column, October 12, 2011



Vibratory Driving Statistics (1 Sec RMS > 143dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	190	4.7	0.02
RMS 10sec	166	5.5	0.03

Inactive Vibratory Hammer Statistics, (1 sec RMS < 143 dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	144	7.0	0.05
RMS 10sec	125	2.5	0.02

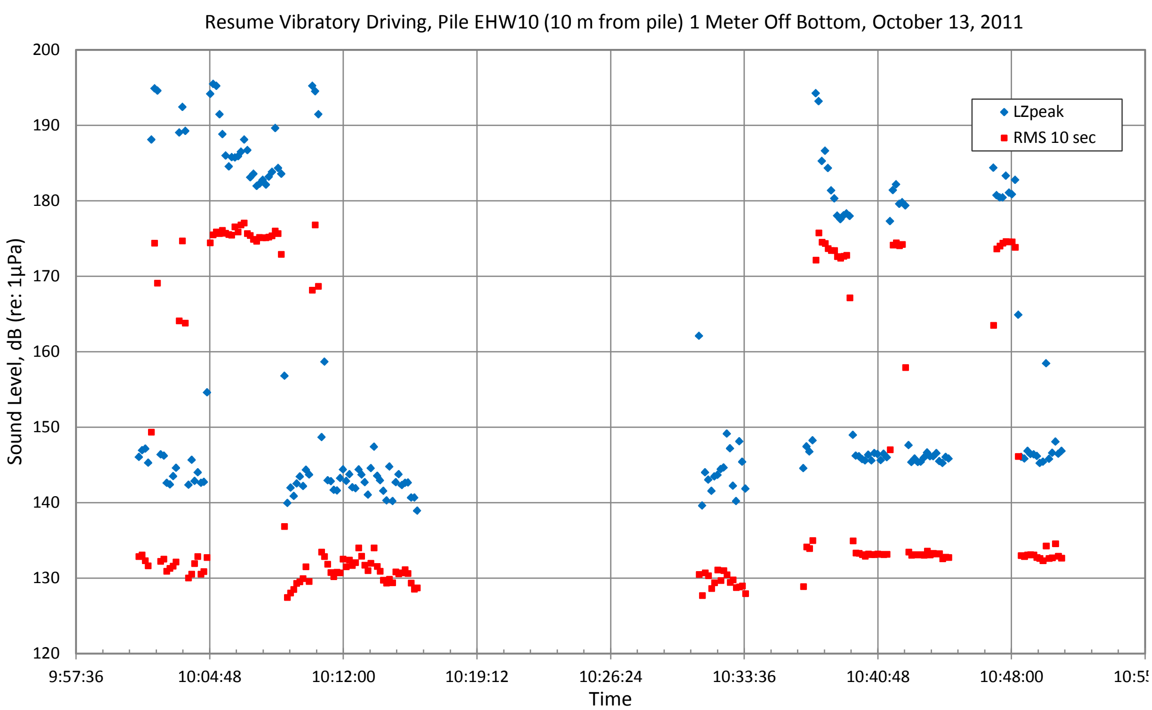
Input: 111012 003



Vibratory Driving Statistics (1 Sec RMS > 143dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	183	6.4	0.03
RMS 1 sec	174	4.6	0.03

Inactive Vibratory Hammer Statistics (1 sec RMS < 143 dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	142	7.6	0.05
RMS 1 sec	131	6.9	0.05

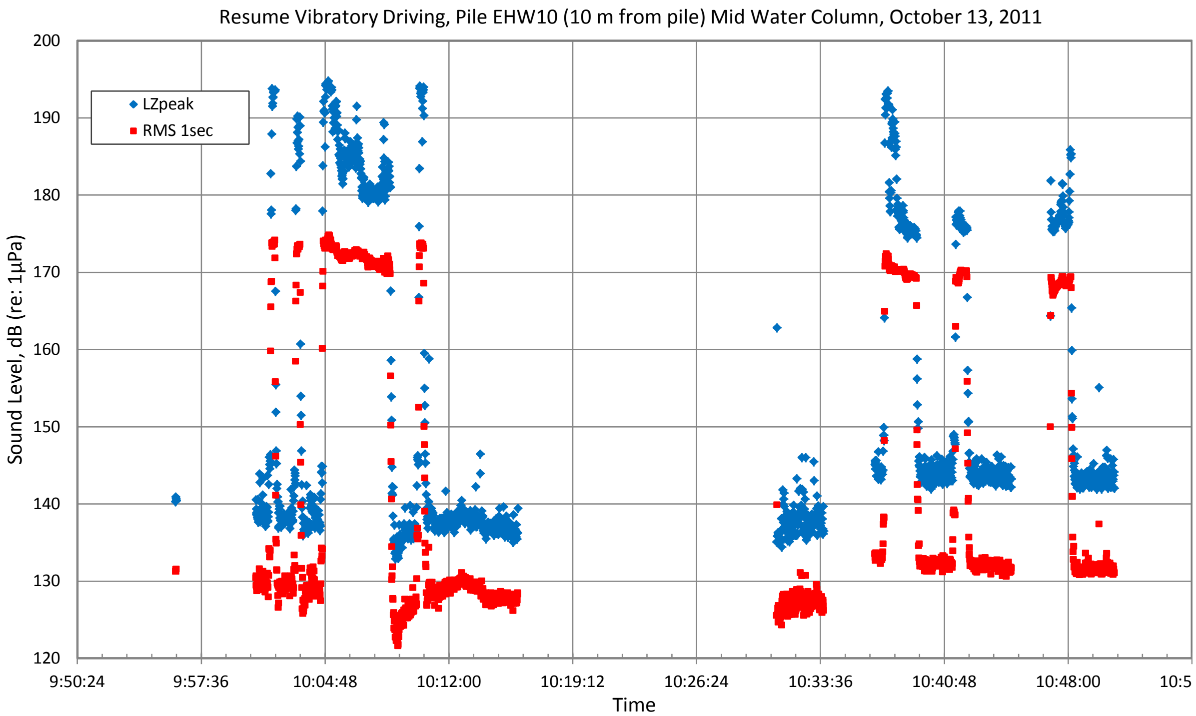
Input: 111013 004



Vibratory Driving Statistics (10 Sec RMS > 143dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	185	5.9	0.03
RMS 10sec	172	6.8	0.04

Inactive Vibratory Hammer Statistics (10 sec RMS < 143 dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	145	3.6	0.02
RMS 10sec	132	1.8	0.01

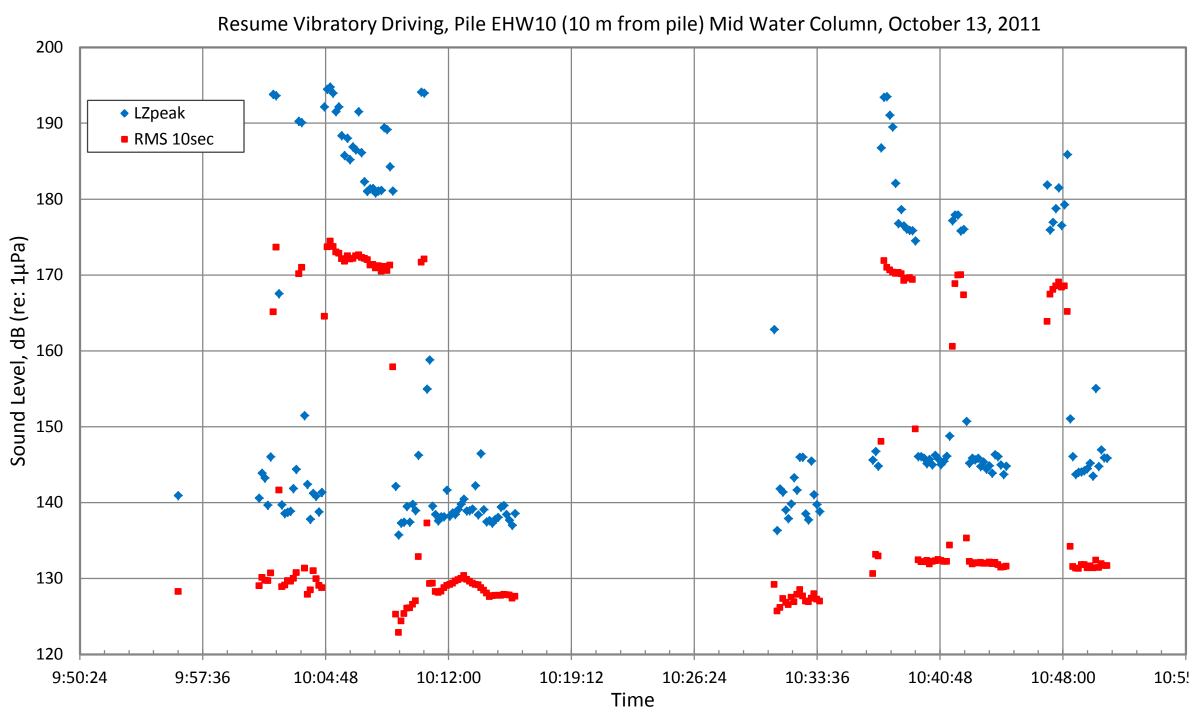
Input: 111013 004



Vibratory Driving Statistics (1 Sec RMS > 143dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	182	7.5	0.04
RMS 1sec	170	4.8	0.03

Inactive Vibratory Hammer Statistics, (1 sec RMS < 143 dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	140	8.7	0.06
RMS 1sec	129	7.8	0.06

Input: 111013 004

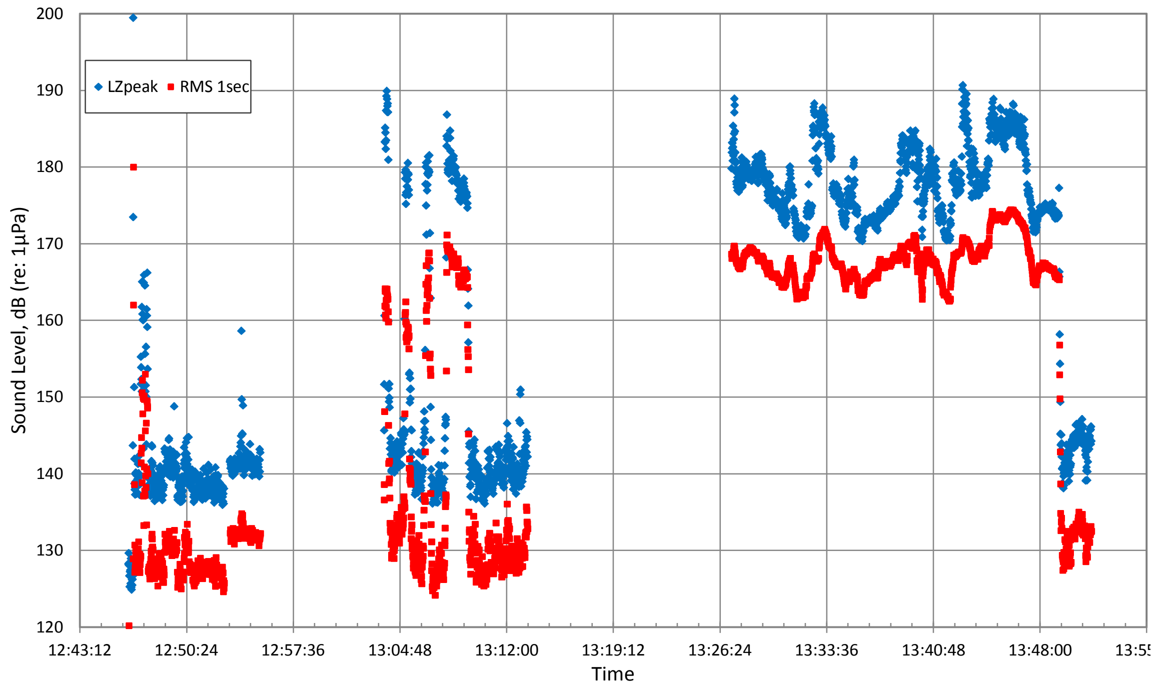


Vibratory Driving Statistics (10 Sec RMS > 143dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	185	6.5	0.04
RMS 10sec	169	5.0	0.03

Inactive Vibratory Hammer Statistics, (10 sec RMS < 143 dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	143	5.1	0.04
RMS 10sec	130	2.6	0.02

Input: 111013 004

Vibratory Driving, Pile EHW7 (10 m from pile) 1 Meter Off Bottom, October 13, 2011

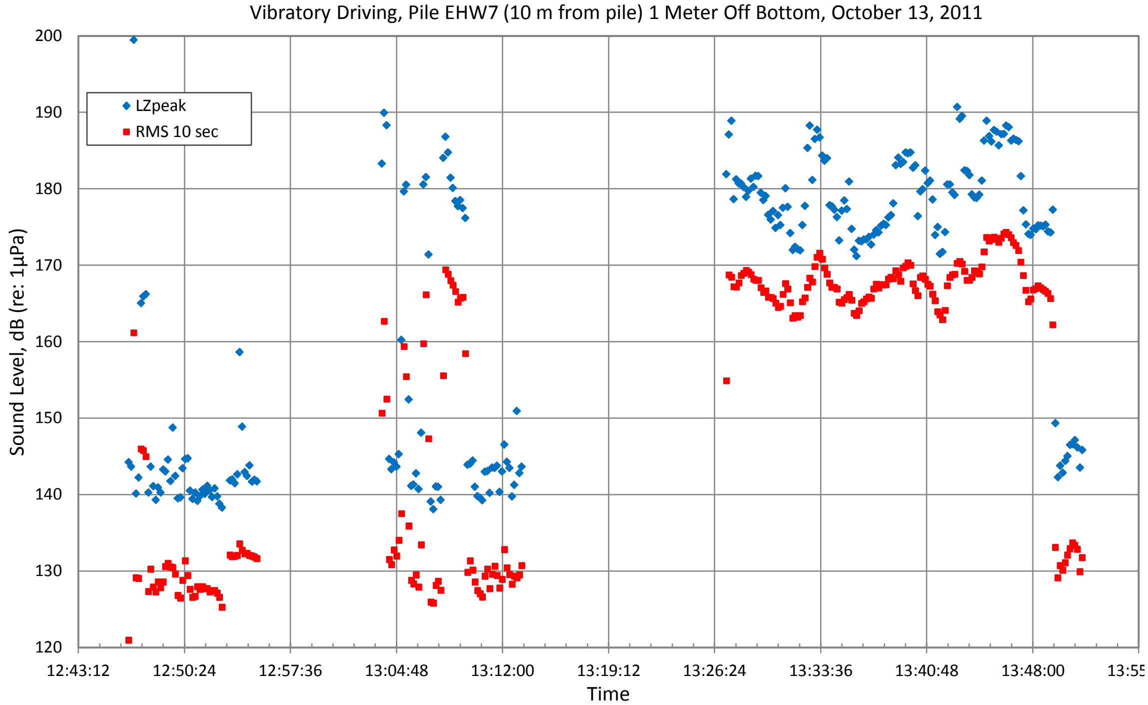


Vibratory Driving Statistics (1 Sec RMS > 143dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	178	5.1	0.03
RMS 1 sec	167	3.8	0.02

Inactive Vibratory Hammer Statistics (1 sec RMS < 143 dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	140	8.3	0.06
RMS 1 sec	129	7.7	0.06

Input: 111013 005

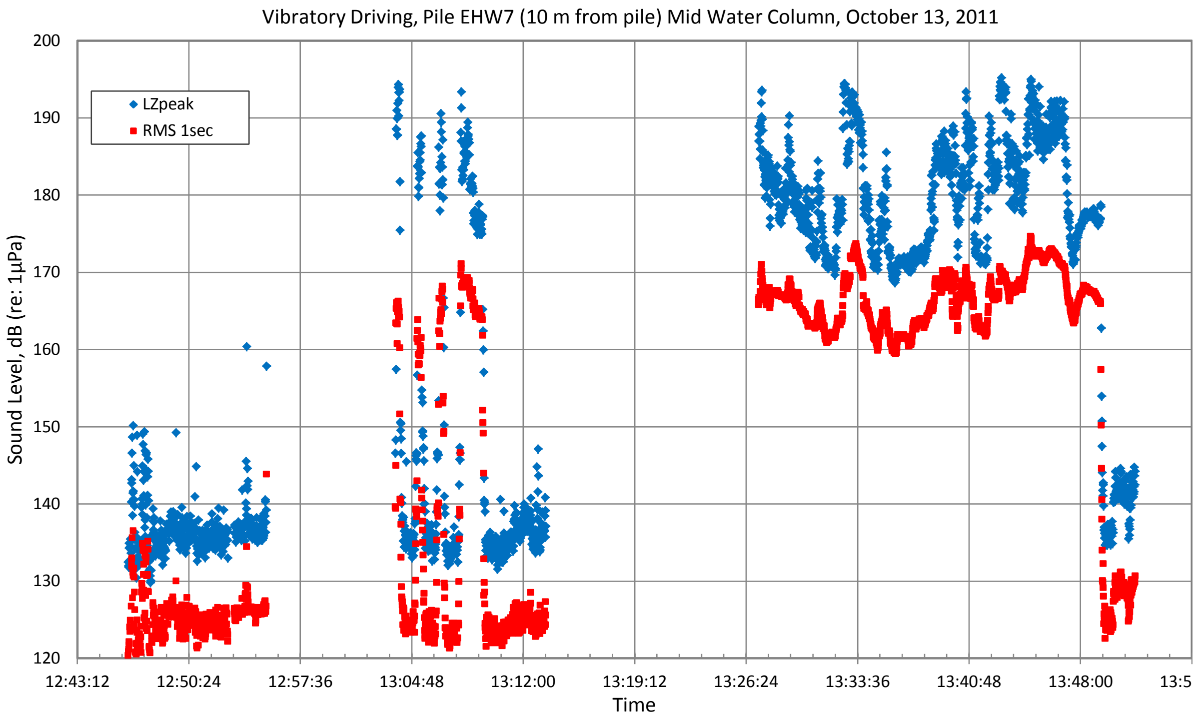
Vibratory Driving, Pile EHW7 (10 m from pile) 1 Meter Off Bottom, October 13, 2011



Vibratory Driving Statistics (10 Sec RMS > 143dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	180	5.5	0.03
RMS 10sec	167	5.0	0.03

Inactive Vibratory Hammer Statistics (10 sec RMS < 143 dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	143	3.6	0.03
RMS 10sec	130	2.7	0.02

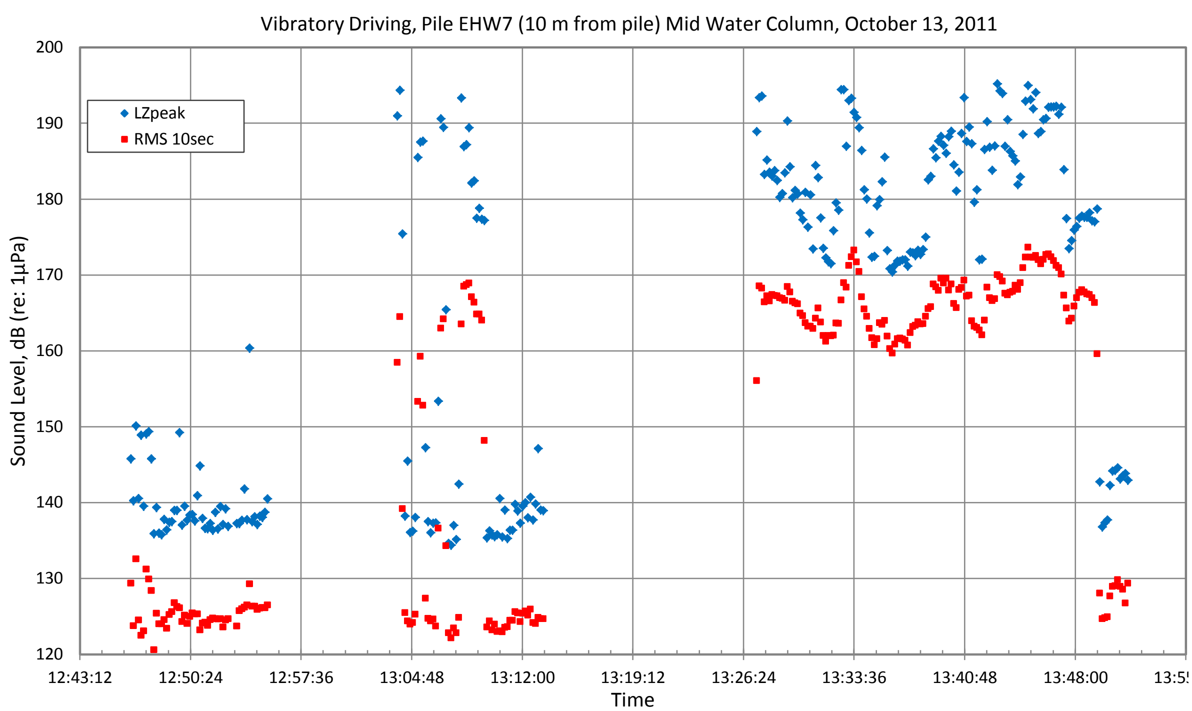
Input: 111013 005



Vibratory Driving Statistics (1 Sec RMS > 143dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	180	6.9	0.04
RMS 1sec	166	3.8	0.02

Inactive Vibratory Hammer Statistics, (1 sec RMS < 143 dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	137	8.1	0.06
RMS 1sec	125	7.4	0.06

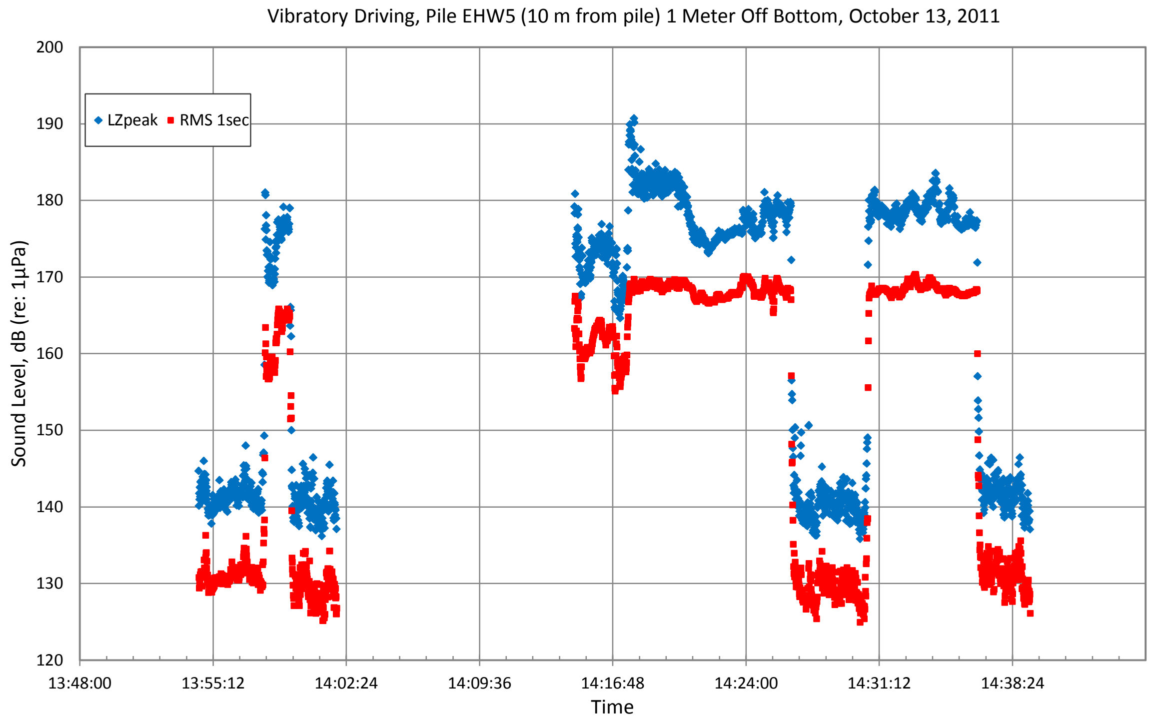
Input: 111013 005



Vibratory Driving Statistics (10 Sec RMS > 143dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	183	7.1	0.04
RMS 10sec	166	4.1	0.02

Inactive Vibratory Hammer Statistics, (10 sec RMS < 143 dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	140	6.1	0.04
RMS 10sec	126	2.8	0.02

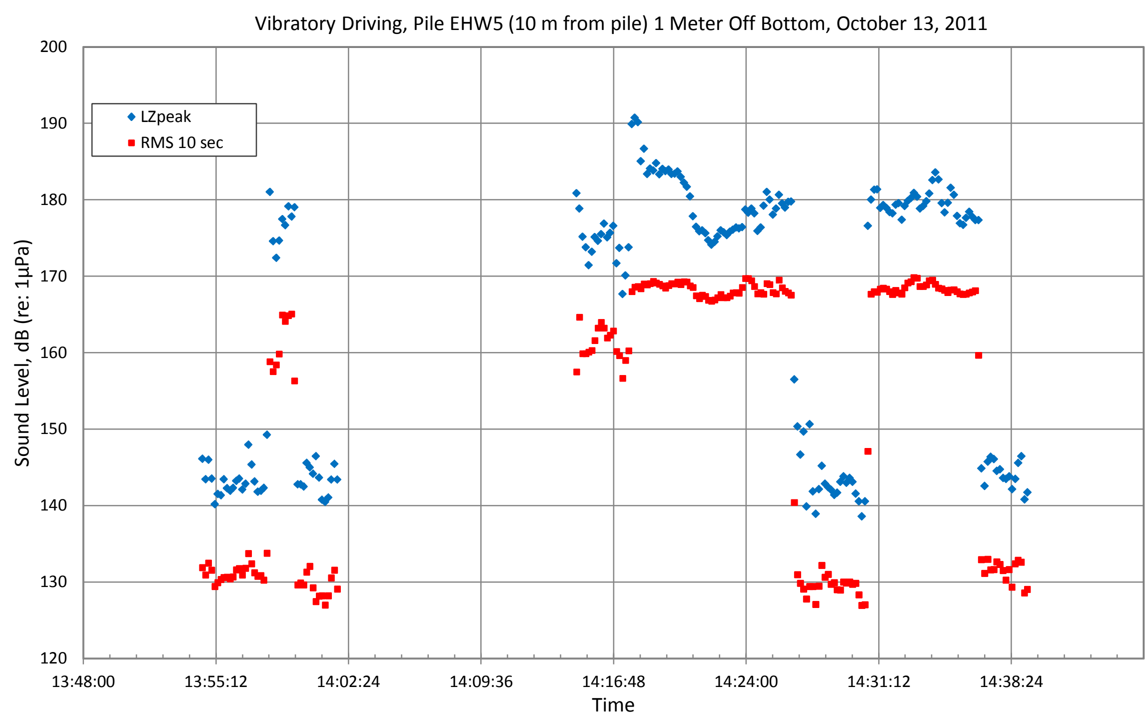
Input: 111013 005



Vibratory Driving Statistics (1 Sec RMS > 143dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	177	4.3	0.02
RMS 1 sec	167	3.8	0.02

Inactive Vibratory Hammer Statistics (1 sec RMS < 143 dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	141	5.6	0.04
RMS 1 sec	130	5.2	0.04

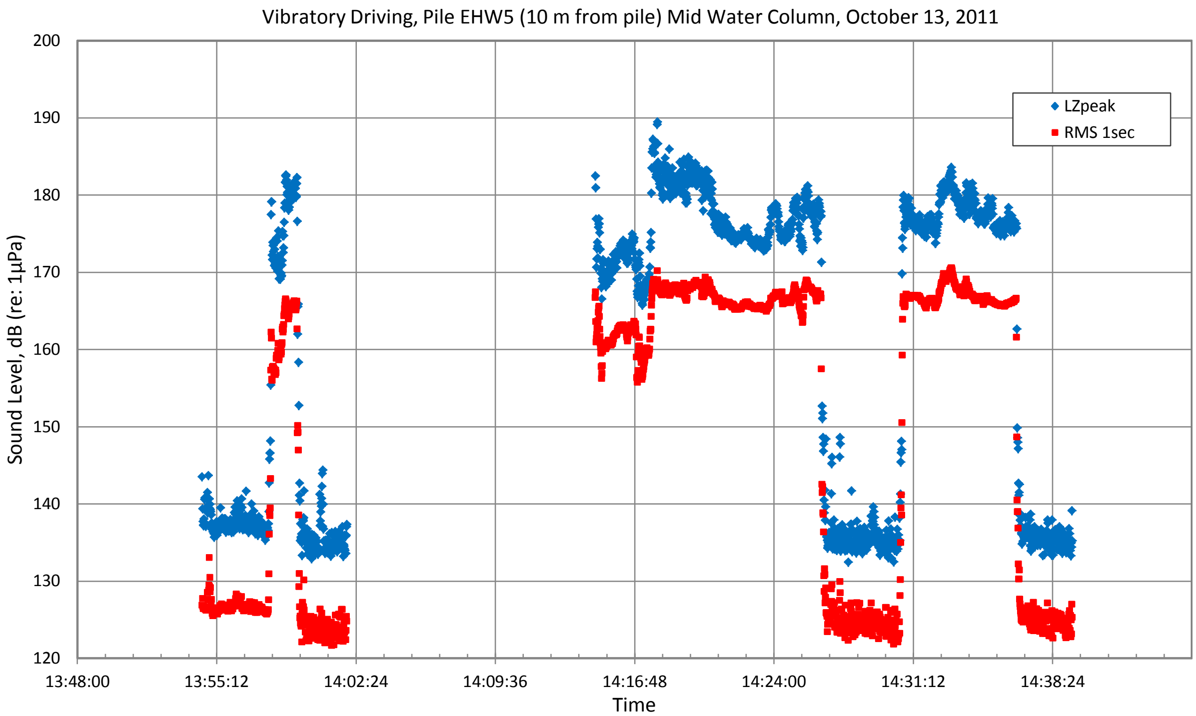
Input: 111013 006



Vibratory Driving Statistics (10 Sec RMS > 143dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	179	3.8	0.02
RMS 10sec	166	3.9	0.02

Inactive Vibratory Hammer Statistics (10 sec RMS < 143 dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	144	2.9	0.02
RMS 10sec	131	2.0	0.02

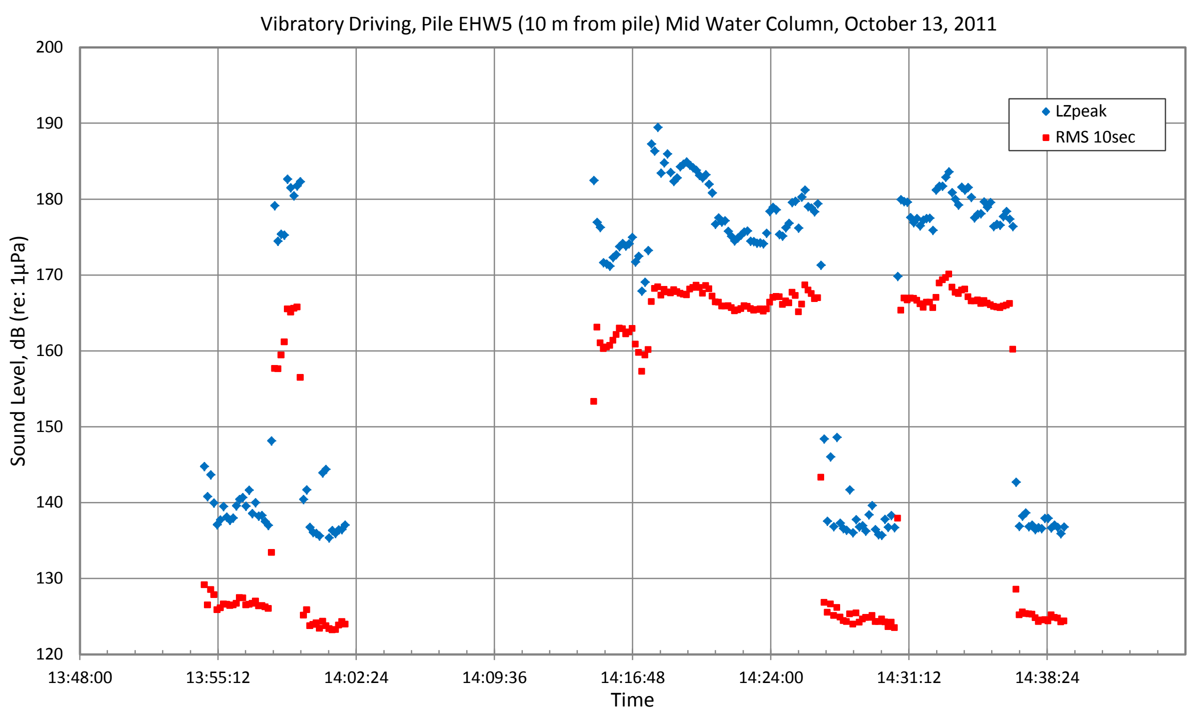
Input: 111013 006



Vibratory Driving Statistics (1 Sec RMS > 143dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	177	4.1	0.02
RMS 1sec	166	3.1	0.02

Inactive Vibratory Hammer Statistics, (1 sec RMS < 143 dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	136	5.6	0.04
RMS 1sec	125	5.2	0.04

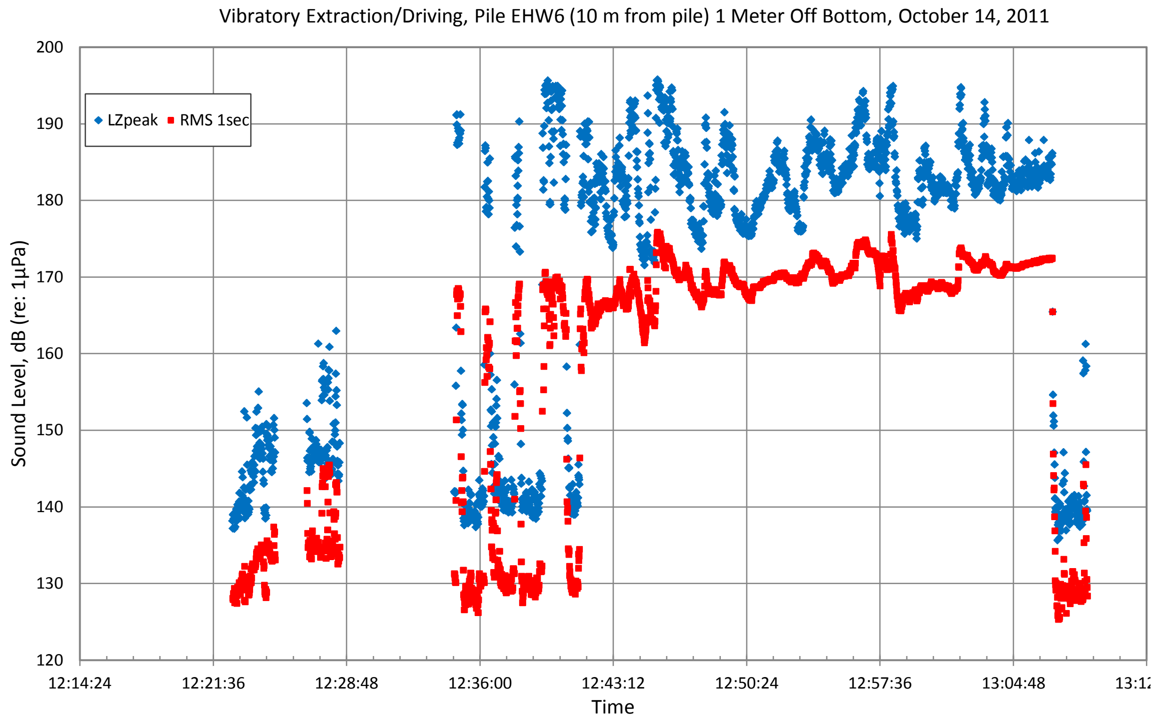
Input: 111013 006



Vibratory Driving Statistics (10 Sec RMS > 143dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	178	4.1	0.02
RMS 10sec	165	3.7	0.02

Inactive Vibratory Hammer Statistics, (10 sec RMS < 143 dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	139	4.7	0.03
RMS 10sec	126	2.2	0.02

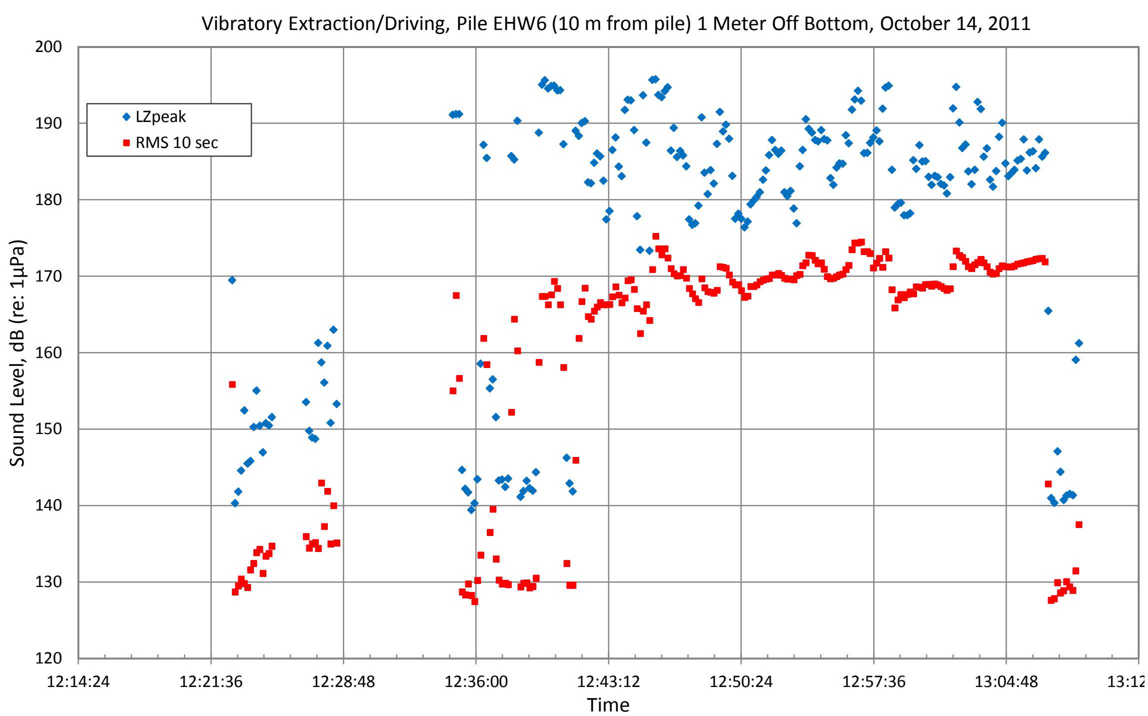
Input: 111013 006



Vibratory Driving Statistics (1 Sec RMS > 143dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	183	6.1	0.03
RMS 1 sec	169	4.4	0.03

Inactive Vibratory Hammer Statistics (1 sec RMS < 143 dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	142	9.3	0.07
RMS 1 sec	131	8.3	0.06

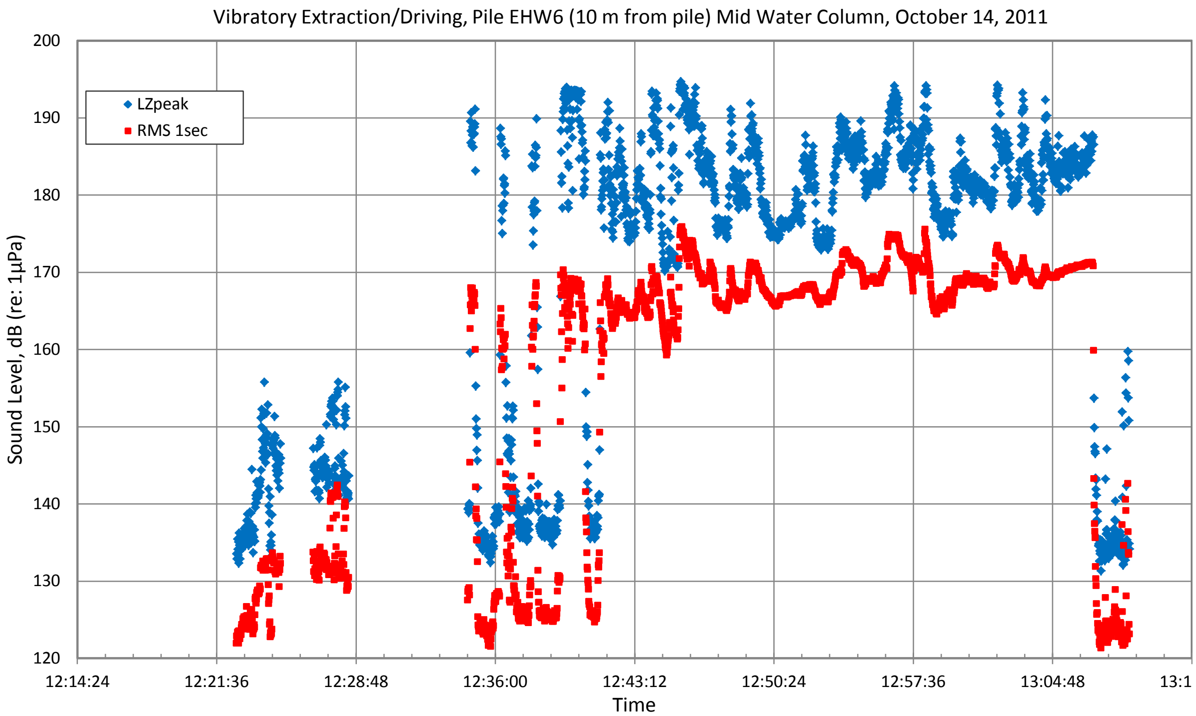
Input: 111014 002



Vibratory Driving Statistics (10 Sec RMS > 143dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	186	5.2	0.03
RMS 10sec	169	4.1	0.02

Inactive Vibratory Hammer Statistics (10 sec RMS < 143 dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	148	7.0	0.05
RMS 10sec	132	3.9	0.03

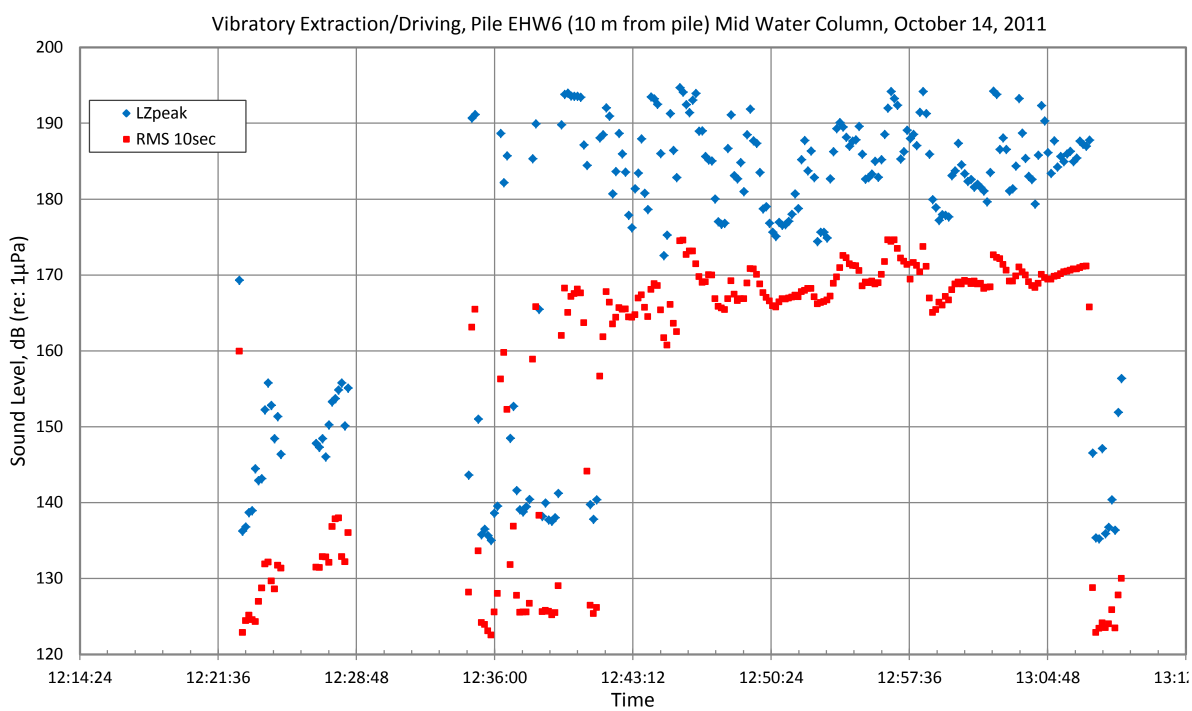
Input: 111014 002



Vibratory Driving Statistics (1 Sec RMS > 143dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	183	5.6	0.03
RMS 1sec	168	3.4	0.02

Inactive Vibratory Hammer Statistics, (1 sec RMS < 143 dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	140	9.8	0.07
RMS 1sec	128	8.6	0.07

Input: 111014 002

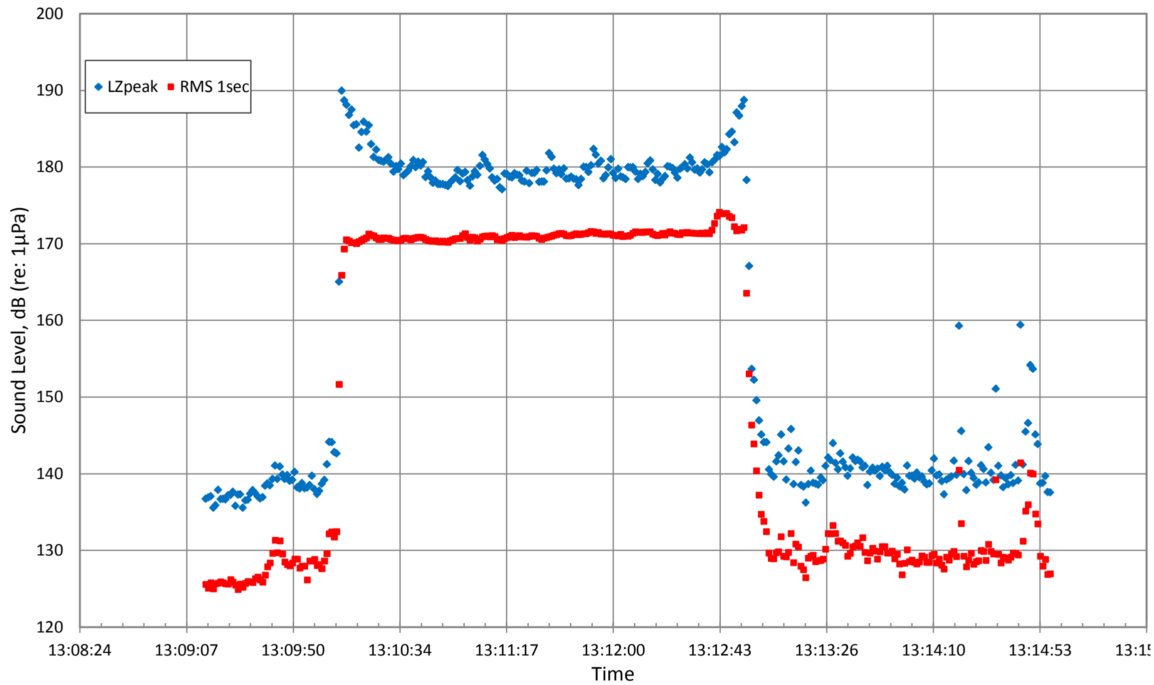


Vibratory Driving Statistics (10 Sec RMS > 143dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	185	5.5	0.03
RMS 10sec	168	3.9	0.02

Inactive Vibratory Hammer Statistics, (10 sec RMS < 143 dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	144	7.3	0.05
RMS 10sec	128	4.4	0.03

Input: 111014 002

Vibratory Extraction/Driving, Pile EHW5 (10 m from pile) 1 Meter Off Bottom, October 14, 2011

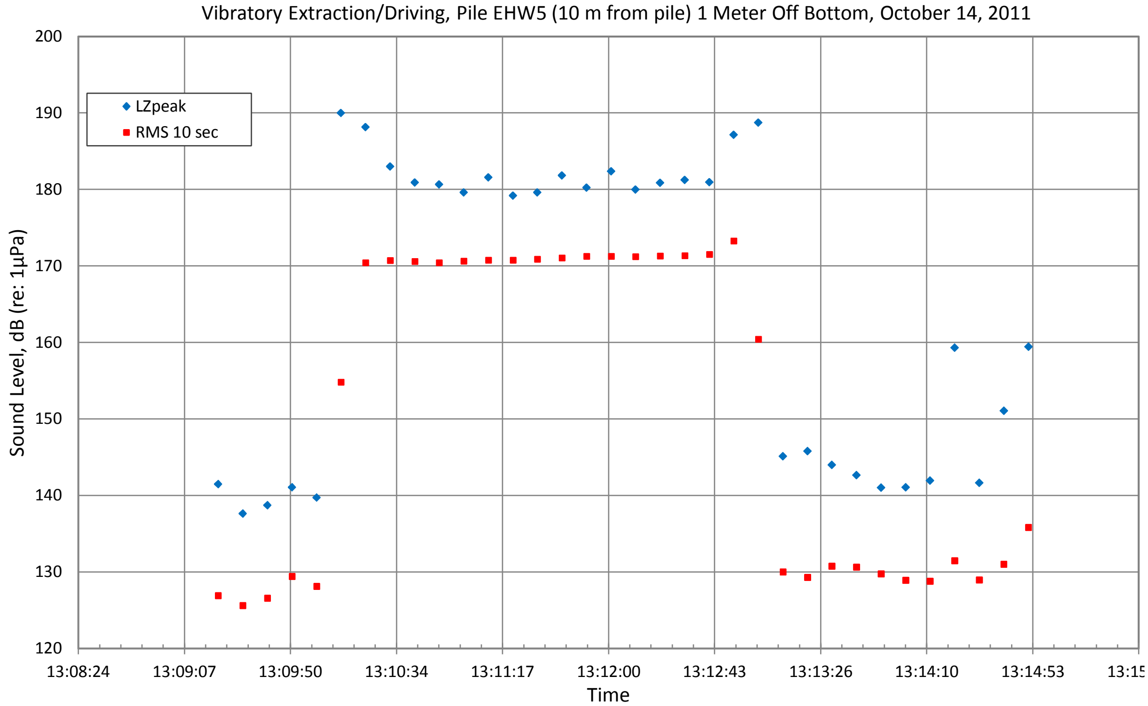


Vibratory Driving Statistics (1 Sec RMS > 143dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	180	4.2	0.02
RMS 1 sec	171	3.6	0.02

Inactive Vibratory Hammer Statistics (1 sec RMS < 143 dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	140	3.6	0.03
RMS 1 sec	130	3.0	0.02

Input: 111014 003

Vibratory Extraction/Driving, Pile EHW5 (10 m from pile) 1 Meter Off Bottom, October 14, 2011

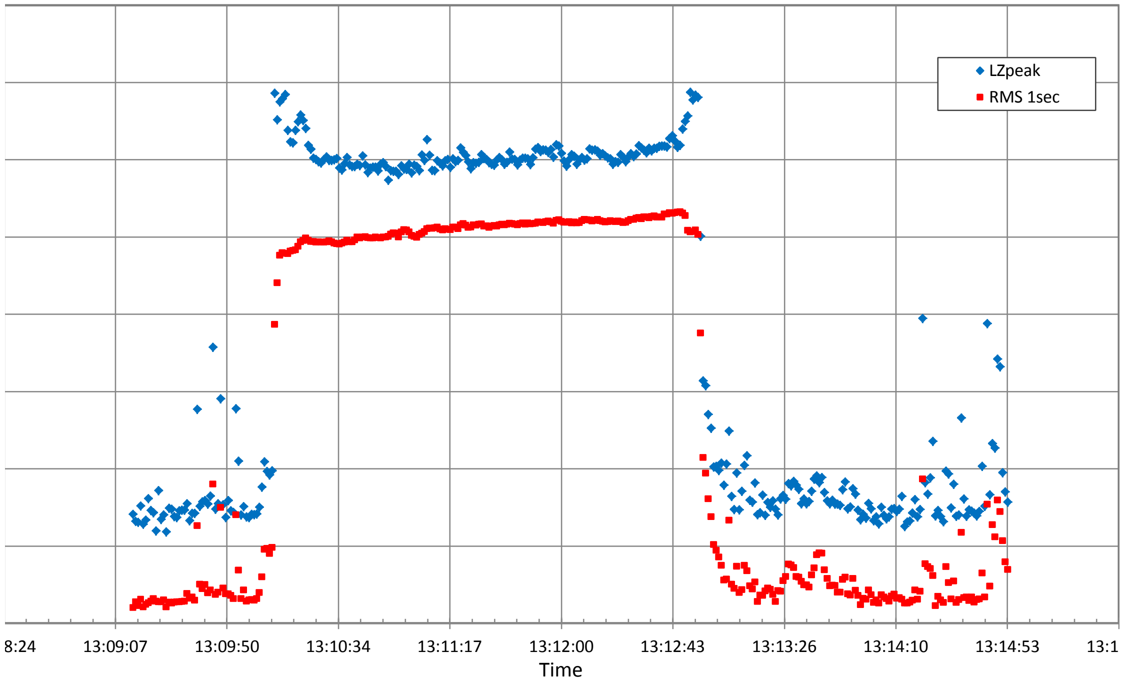


Vibratory Driving Statistics (10 Sec RMS > 143dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	183	3.4	0.02
RMS 10sec	170	4.5	0.03

Inactive Vibratory Hammer Statistics (10 sec RMS < 143 dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	144	6.6	0.05
RMS 10sec	130	2.4	0.02

Input: 111014 003

Vibratory Extraction/Driving, Pile EHW5 (10 m from pile) Mid Water Column, October 14, 2011

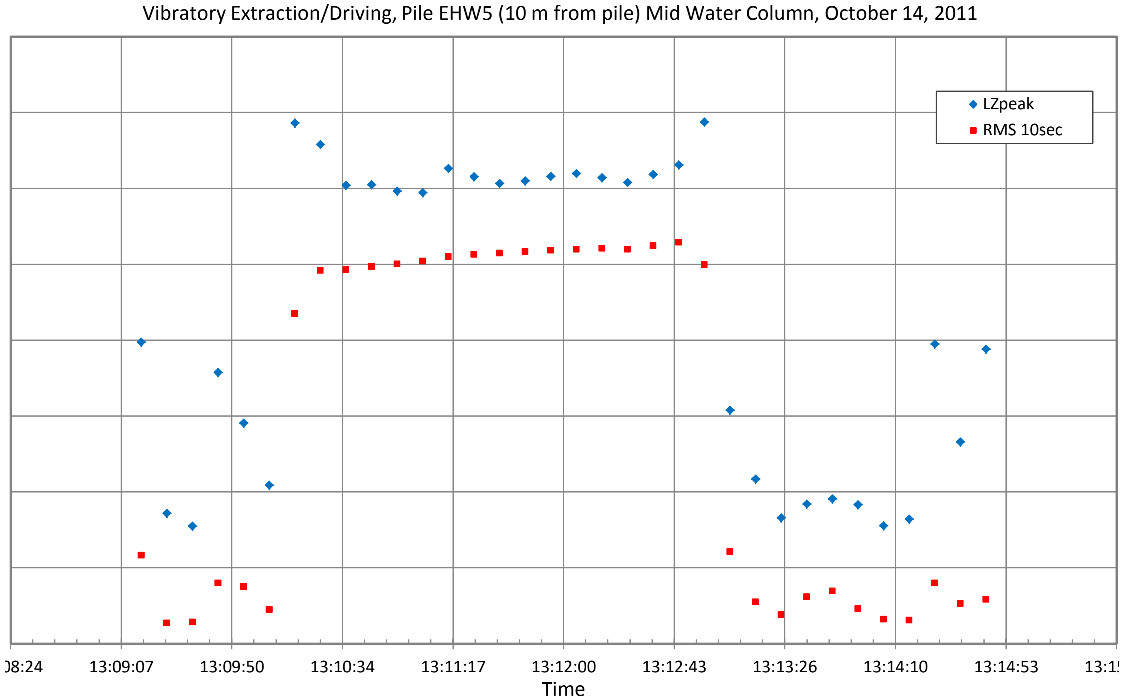


Vibratory Driving Statistics (1 Sec RMS > 143dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	181	2.4	0.01
RMS 1sec	171	2.0	0.01

Inactive Vibratory Hammer Statistics, (1 sec RMS < 143 dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	137	4.8	0.04
RMS 1sec	126	3.7	0.03

Input: 111014 003

Vibratory Extraction/Driving, Pile EHW5 (10 m from pile) Mid Water Column, October 14, 2011

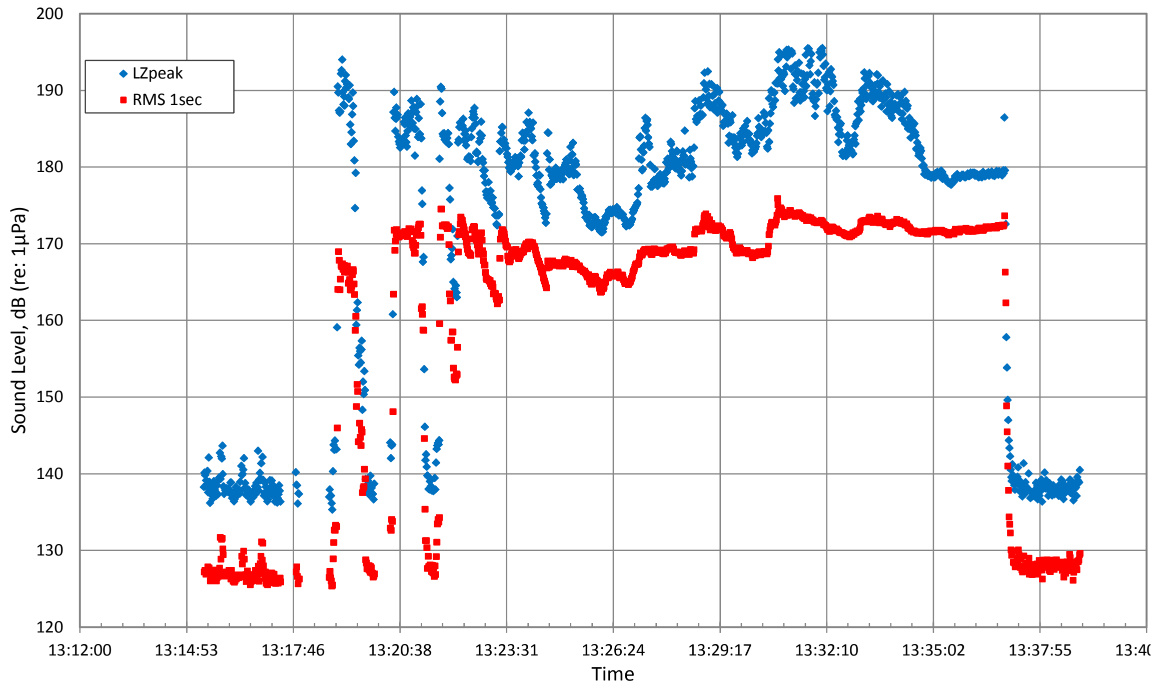


Vibratory Driving Statistics (10 Sec RMS > 143dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	182	2.8	0.02
RMS 10sec	171	2.2	0.01

Inactive Vibratory Hammer Statistics, (10 sec RMS < 143 dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	145	9.1	0.06
RMS 10sec	126	2.8	0.02

Input: 111014 003

Vibratory Driving, Pile EHW4 (10 m from pile) 1 Meter Off Bottom, October 14, 2011

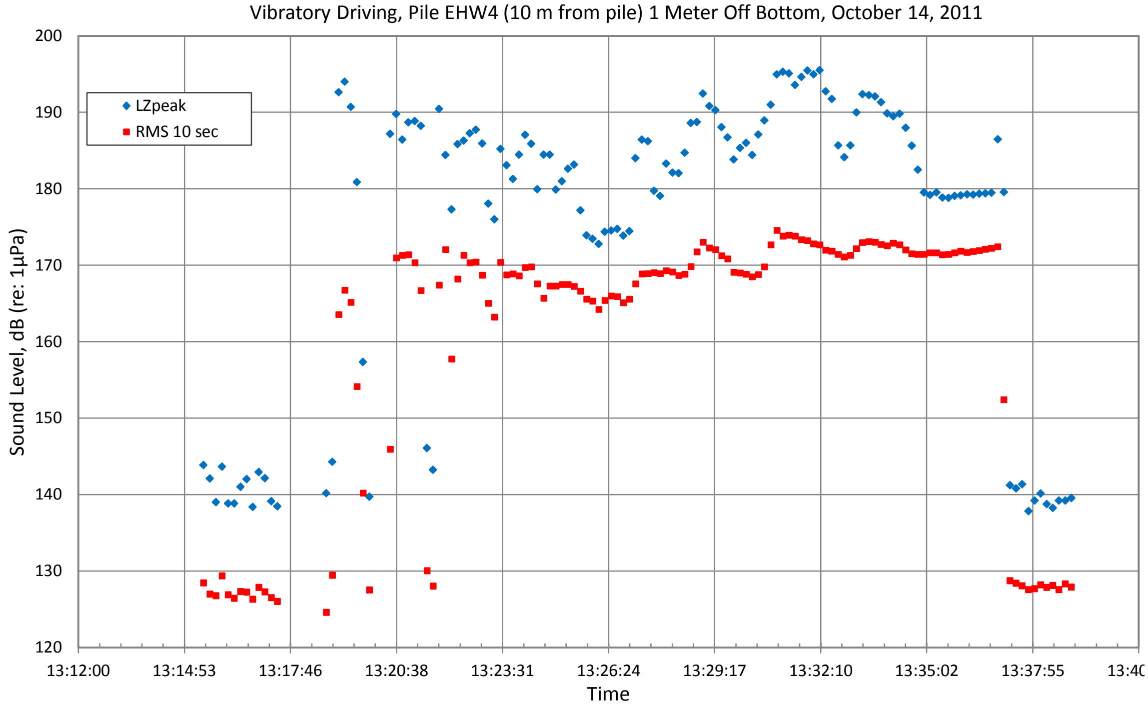


Vibratory Driving Statistics (1 Sec RMS > 143dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	182	6.6	0.04
RMS 1 sec	169	4.3	0.03

Inactive Vibratory Hammer Statistics (1 sec RMS < 143 dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	138	13.8	0.10
RMS 1 sec	127	12.7	0.10

Input: 111014 004

Vibratory Driving, Pile EHW4 (10 m from pile) 1 Meter Off Bottom, October 14, 2011

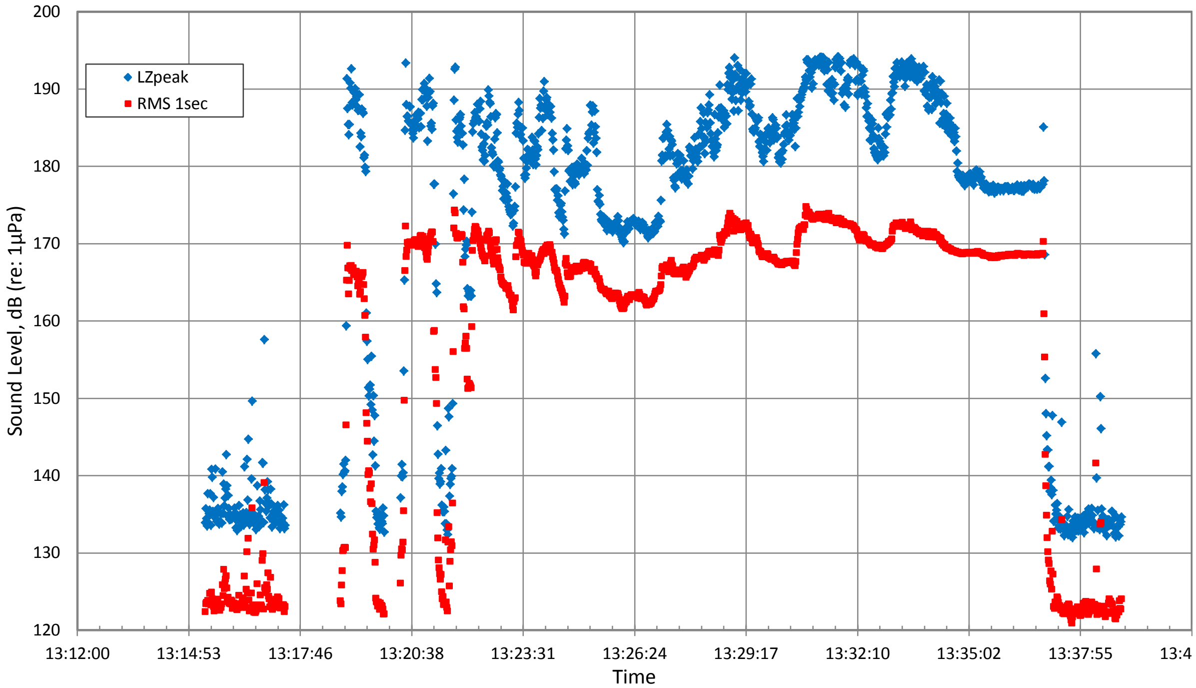


Vibratory Driving Statistics (10 Sec RMS > 143dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	185	5.9	0.03
RMS 10sec	169	4.4	0.03

Inactive Vibratory Hammer Statistics (10 sec RMS < 143 dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	141	3.7	0.03
RMS 10sec	128	2.5	0.02

Input: 111014 004

Vibratory Driving, Pile EHW4 (10 m from pile) Mid Water Column, October 14, 2011

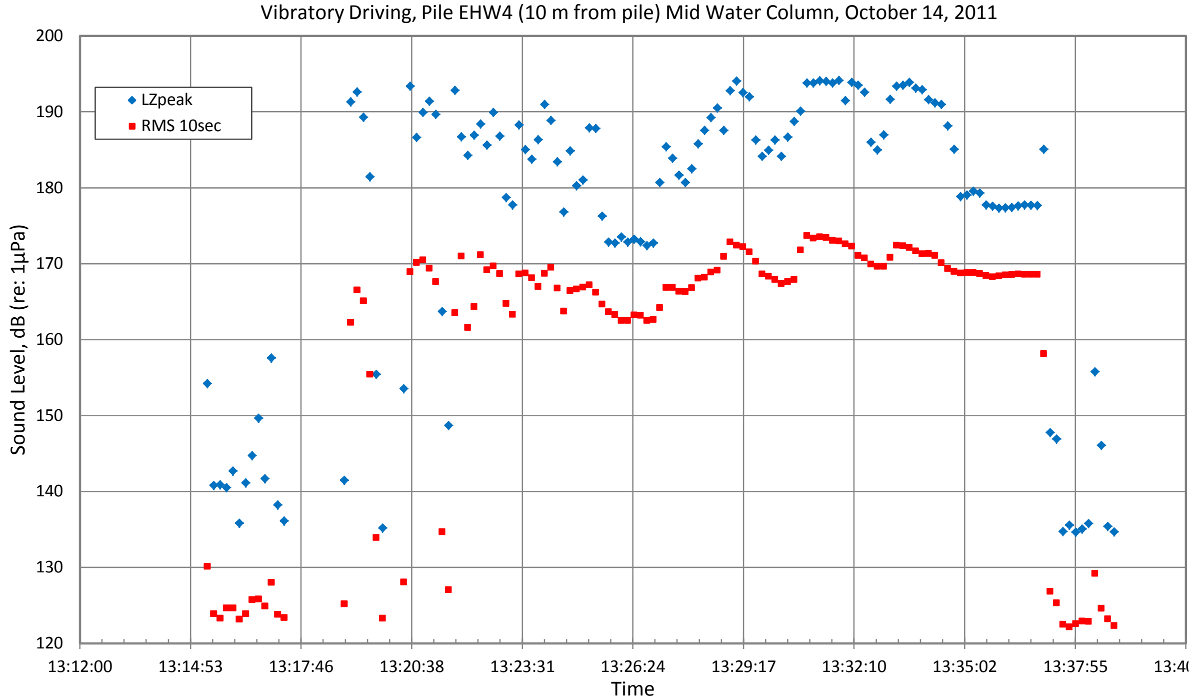


Vibratory Driving Statistics (1 Sec RMS > 143dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	183	6.8	0.04
RMS 1sec	168	3.9	0.02

Inactive Vibratory Hammer Statistics, (1 sec RMS < 143 dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	136	11.9	0.09
RMS 1sec	124	10.8	0.09

Input: 111014 004

Vibratory Driving, Pile EHW4 (10 m from pile) Mid Water Column, October 14, 2011

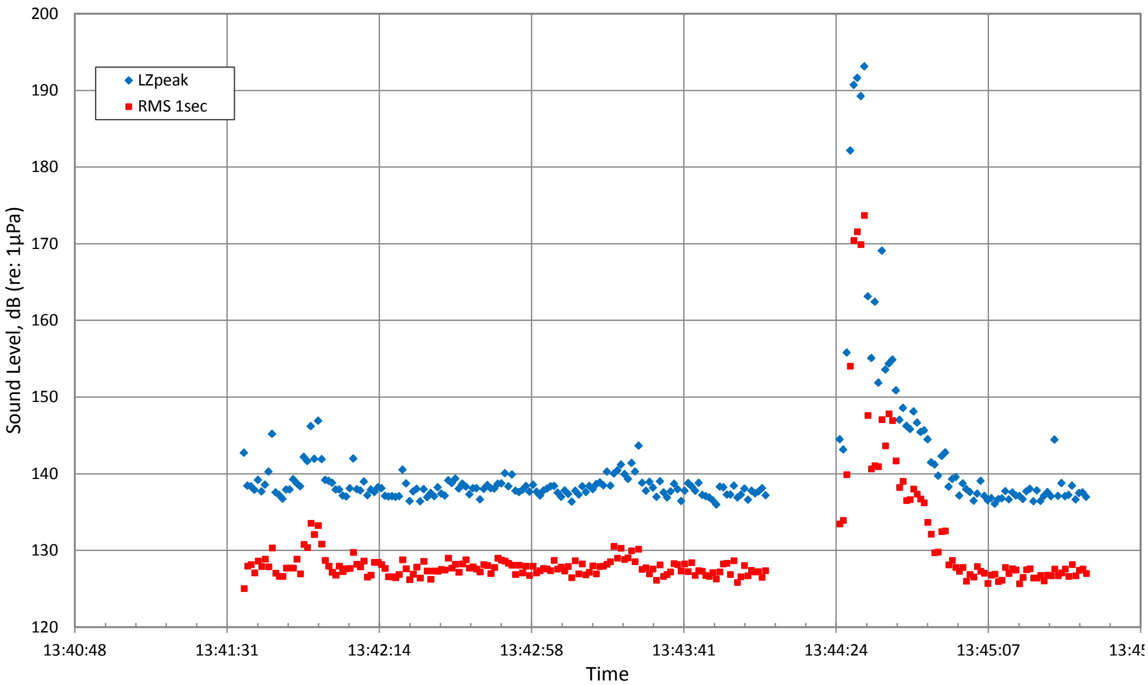


Vibratory Driving Statistics (10 Sec RMS > 143dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	186	6.5	0.03
RMS 10sec	168	3.4	0.02

Inactive Vibratory Hammer Statistics, (10 sec RMS < 143 dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	143	8.2	0.06
RMS 10sec	125	3.2	0.03

Input: 111014 004

Vibratory Driving, Pile EHW3 (10 m from pile) 1 Meter Off Bottom, October 14, 2011

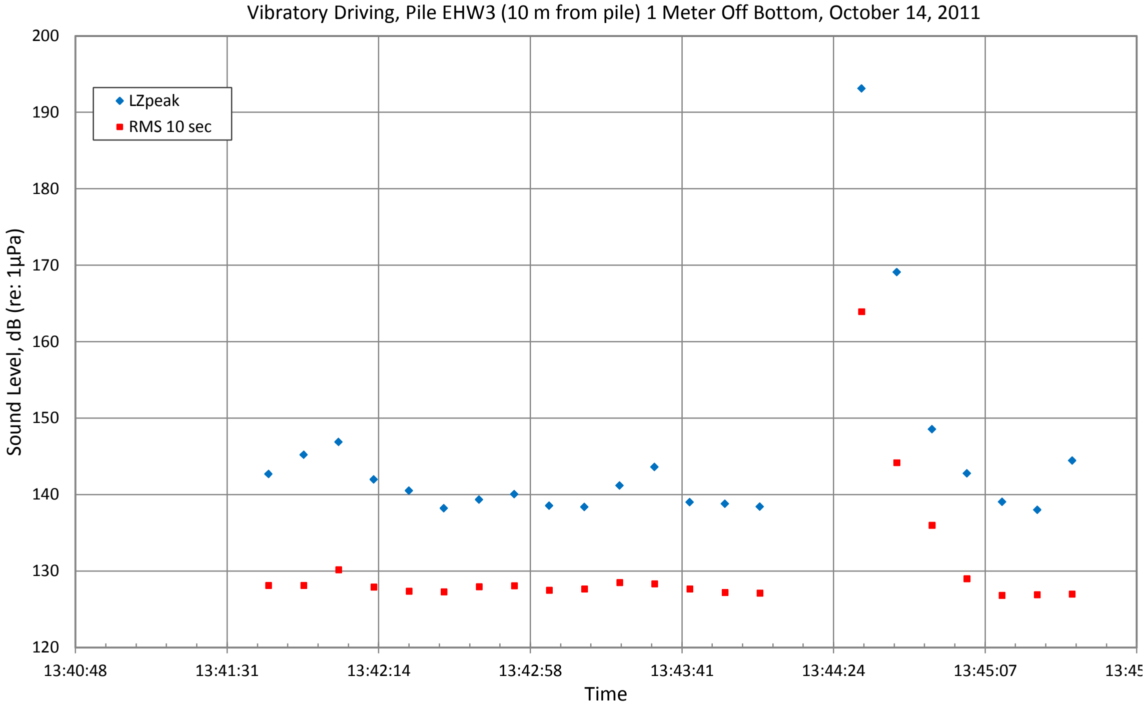


Vibratory Driving Statistics (1 Sec RMS > 143dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	174	16.9	0.10
RMS 1 sec	157	12.5	0.08

Inactive Vibratory Hammer Statistics (1 sec RMS < 143 dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	138	10.2	0.07
RMS 1 sec	128	9.4	0.07

Input: 111014 005

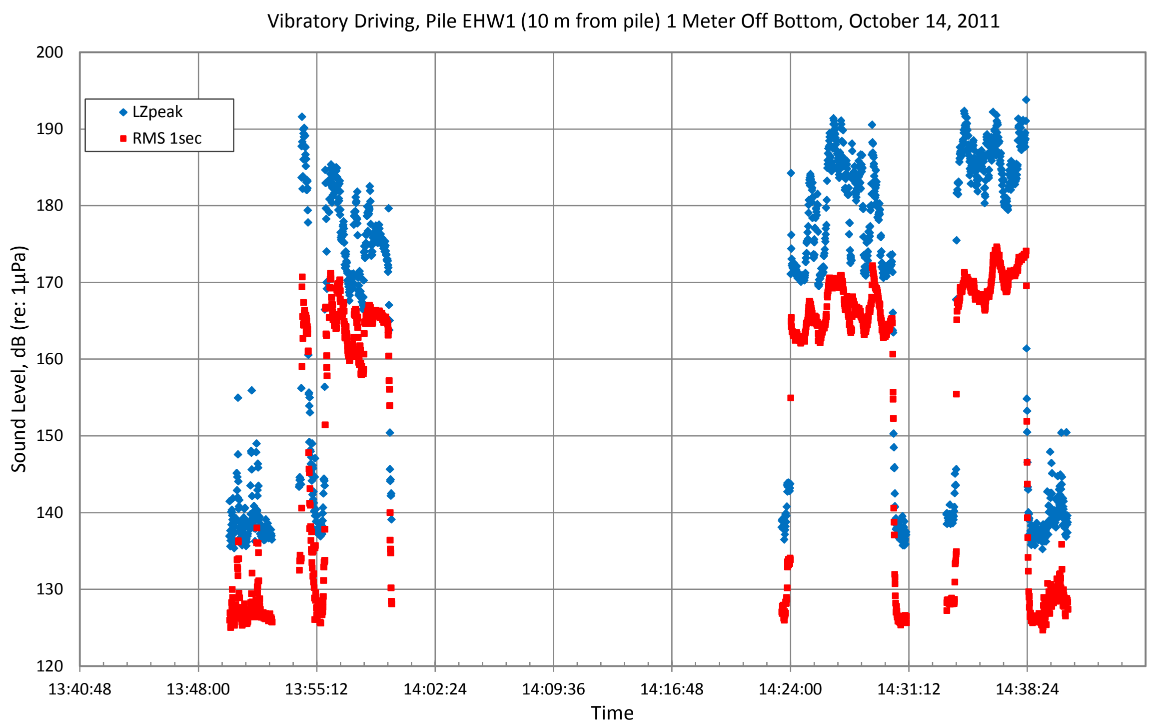
Vibratory Driving, Pile EHW3 (10 m from pile) 1 Meter Off Bottom, October 14, 2011



Vibratory Driving Statistics (10 Sec RMS > 143dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	181	17.0	0.09
RMS 10sec	154	14.0	0.09

Inactive Vibratory Hammer Statistics (10 sec RMS < 143 dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	141	3.1	0.02
RMS 10sec	128	2.0	0.02

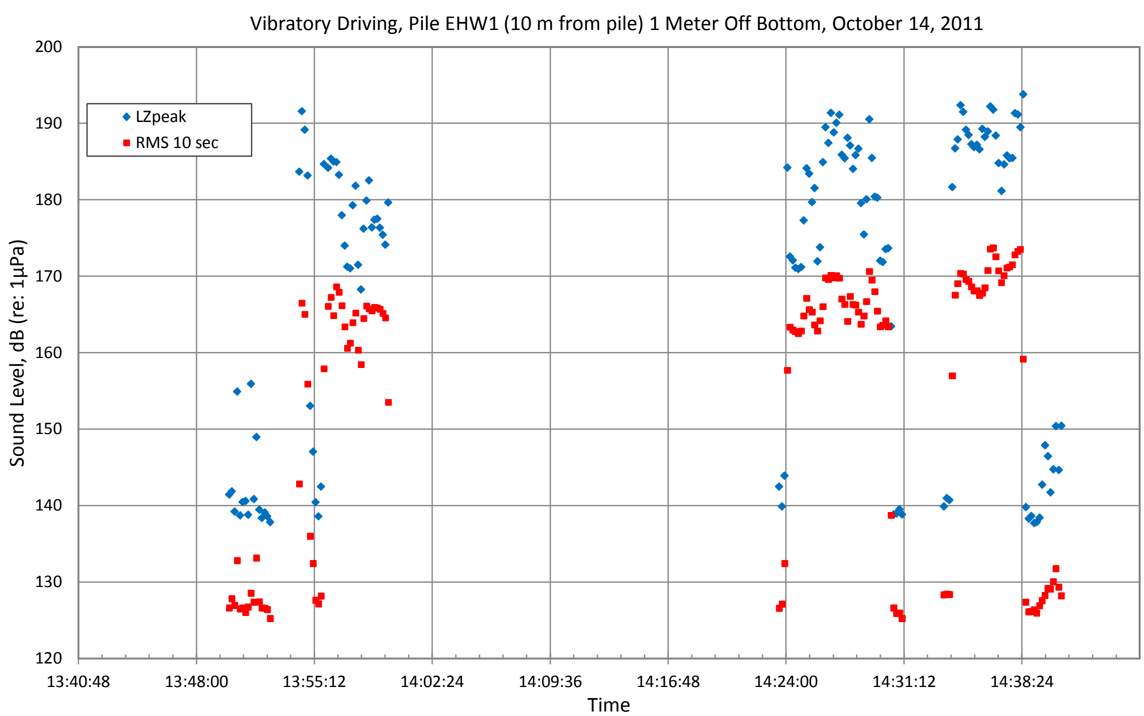
Input: 111014 005



Vibratory Driving Statistics (1 Sec RMS > 143dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	180	7.0	0.04
RMS 1 sec	167	4.0	0.02

Inactive Vibratory Hammer Statistics (1 sec RMS < 143 dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	139	13.0	0.09
RMS 1 sec	128	11.9	0.09

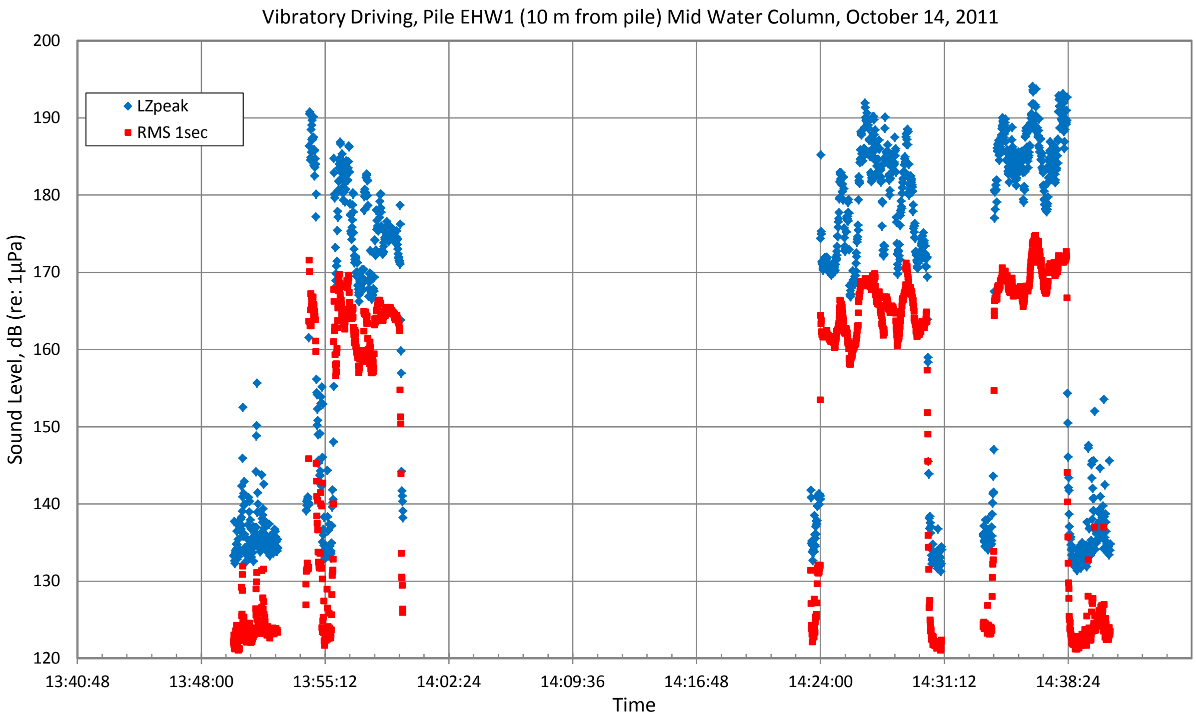
Input: 111014 006



Vibratory Driving Statistics (10 Sec RMS > 143dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	183	6.6	0.04
RMS 10sec	166	4.1	0.02

Inactive Vibratory Hammer Statistics (10 sec RMS < 143 dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	144	8.2	0.06
RMS 10sec	129	3.5	0.03

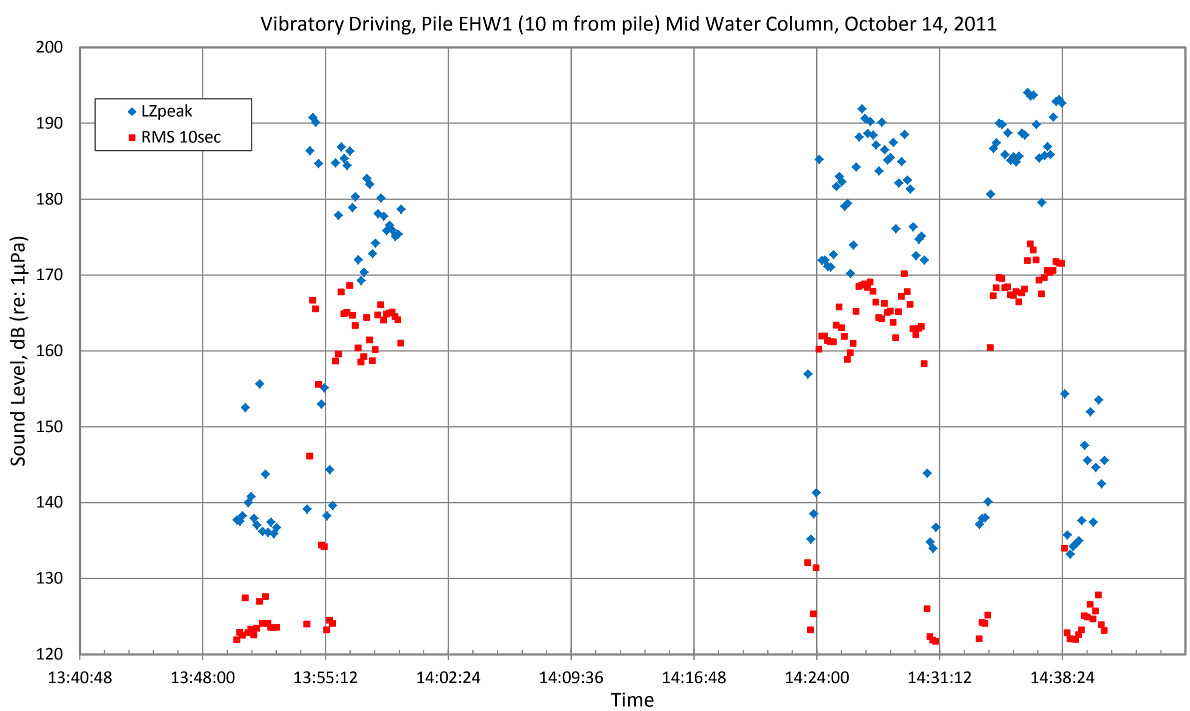
Input: 111014 006



Vibratory Driving Statistics (1 Sec RMS > 143dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	180	7.2	0.04
RMS 1sec	165	4.2	0.03

Inactive Vibratory Hammer Statistics, (1 sec RMS < 143 dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	136	11.5	0.08
RMS 1sec	124	10.4	0.08

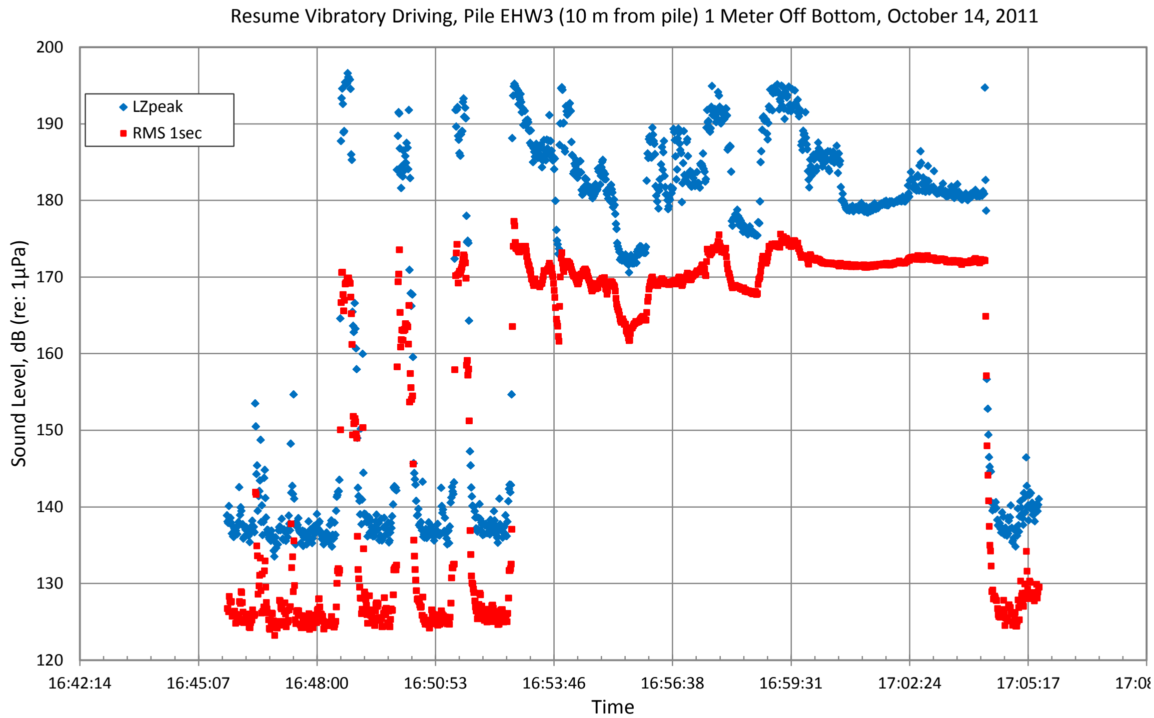
Input: 111014 006



Vibratory Driving Statistics (10 Sec RMS > 143dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	183	6.7	0.04
RMS 10sec	165	4.4	0.03

Inactive Vibratory Hammer Statistics, (10 sec RMS < 143 dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	141	6.7	0.05
RMS 10sec	125	3.3	0.03

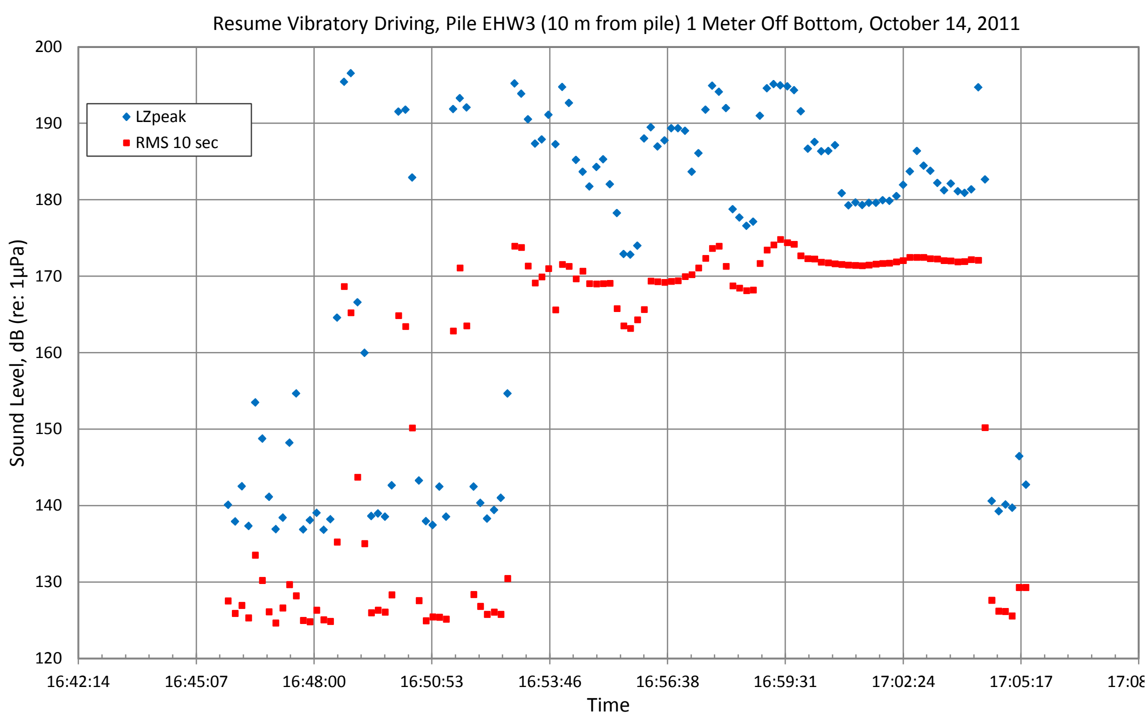
Input: 111014 006



Vibratory Driving Statistics (1 Sec RMS > 143dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	183	6.5	0.04
RMS 1 sec	170	4.2	0.02

Inactive Vibratory Hammer Statistics (1 sec RMS < 143 dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	138	3.0	0.02
RMS 1 sec	127	2.9	0.02

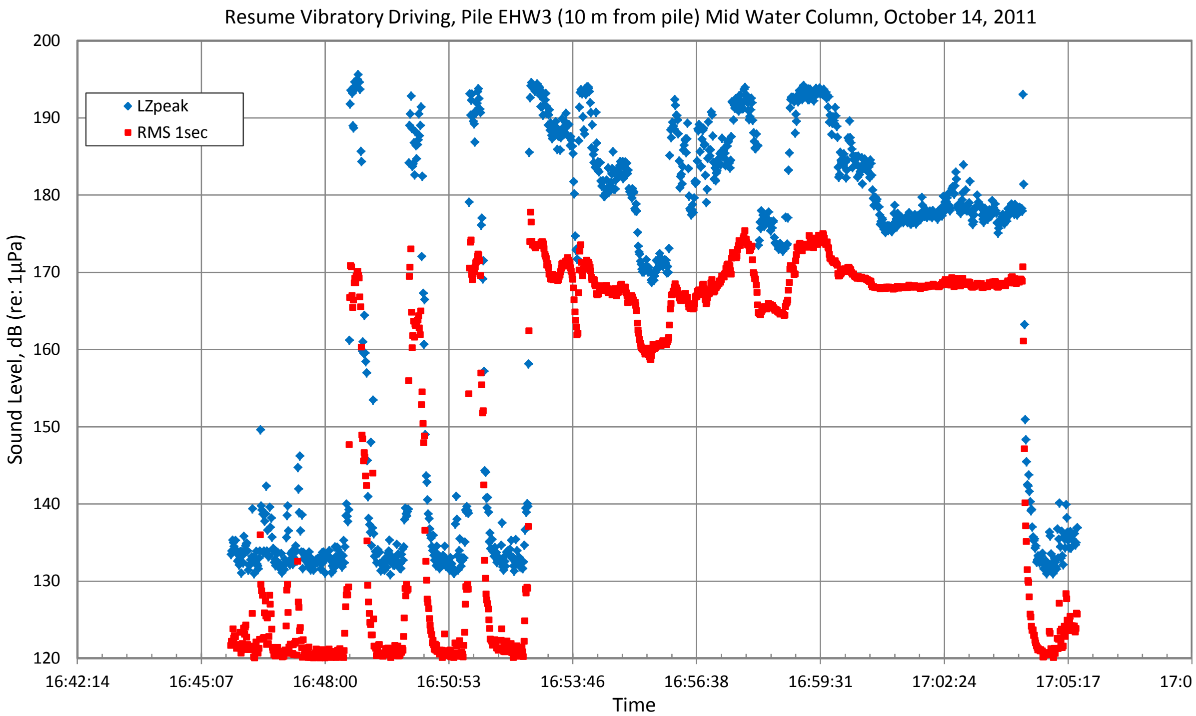
Input: 111014 007



Vibratory Driving Statistics (10 Sec RMS > 143dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	186	6.5	0.03
RMS 10sec	170	5.2	0.03

Inactive Vibratory Hammer Statistics (10 sec RMS < 143 dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	143	6.6	0.05
RMS 10sec	127	2.7	0.02

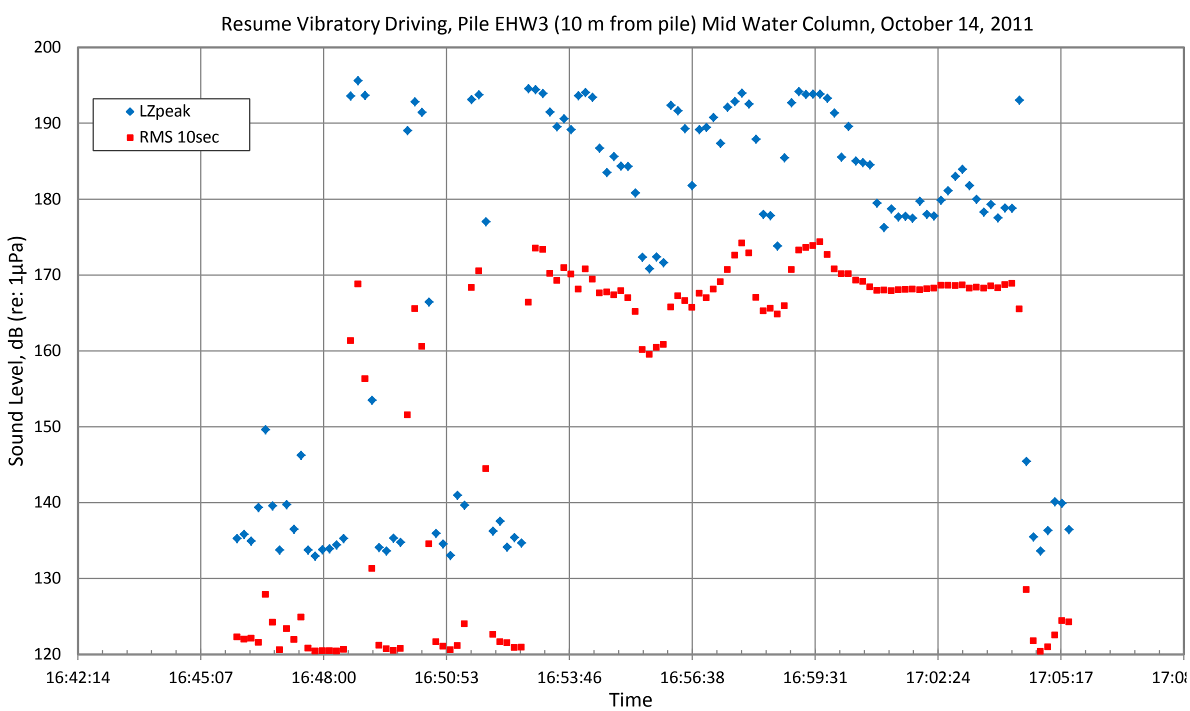
Input: 111014 007



Vibratory Driving Statistics (1 Sec RMS > 143dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	183	7.4	0.04
RMS 1sec	168	4.4	0.03

Inactive Vibratory Hammer Statistics, (1 sec RMS < 143 dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	135	3.8	0.03
RMS 1sec	123	3.6	0.03

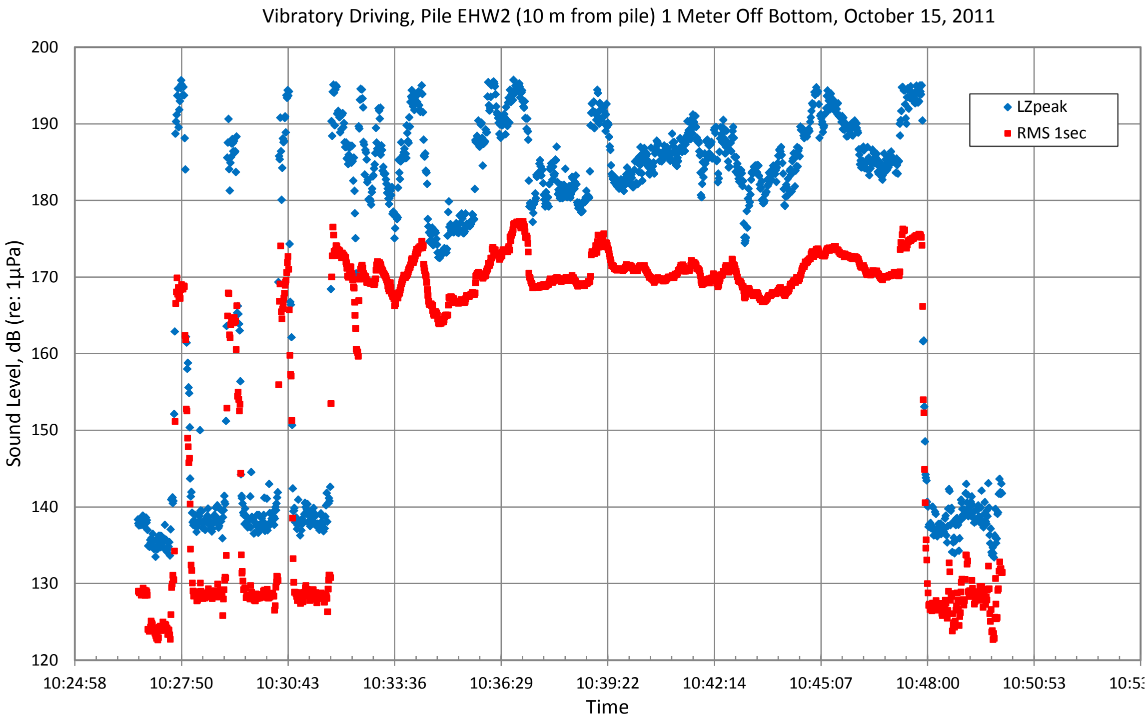
Input: 111014 007



Vibratory Driving Statistics (10 Sec RMS > 143dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	186	7.0	0.04
RMS 10sec	168	4.7	0.03

Inactive Vibratory Hammer Statistics, (10 sec RMS < 143 dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	138	6.6	0.05
RMS 10sec	123	3.1	0.03

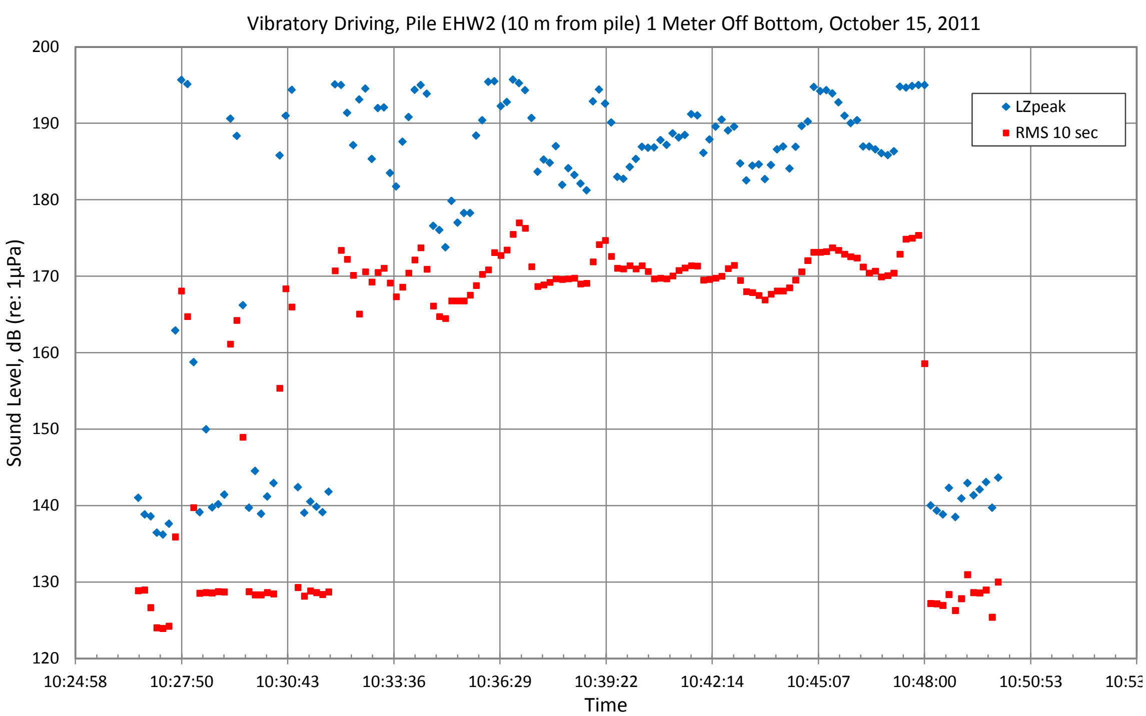
Input: 111014 007



Vibratory Driving Statistics (1 Sec RMS > 143dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	185	6.4	0.03
RMS 1 sec	170	3.9	0.02

Inactive Vibratory Hammer Statistics (1 sec RMS < 143 dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	138	2.6	0.02
RMS 1 sec	128	2.4	0.02

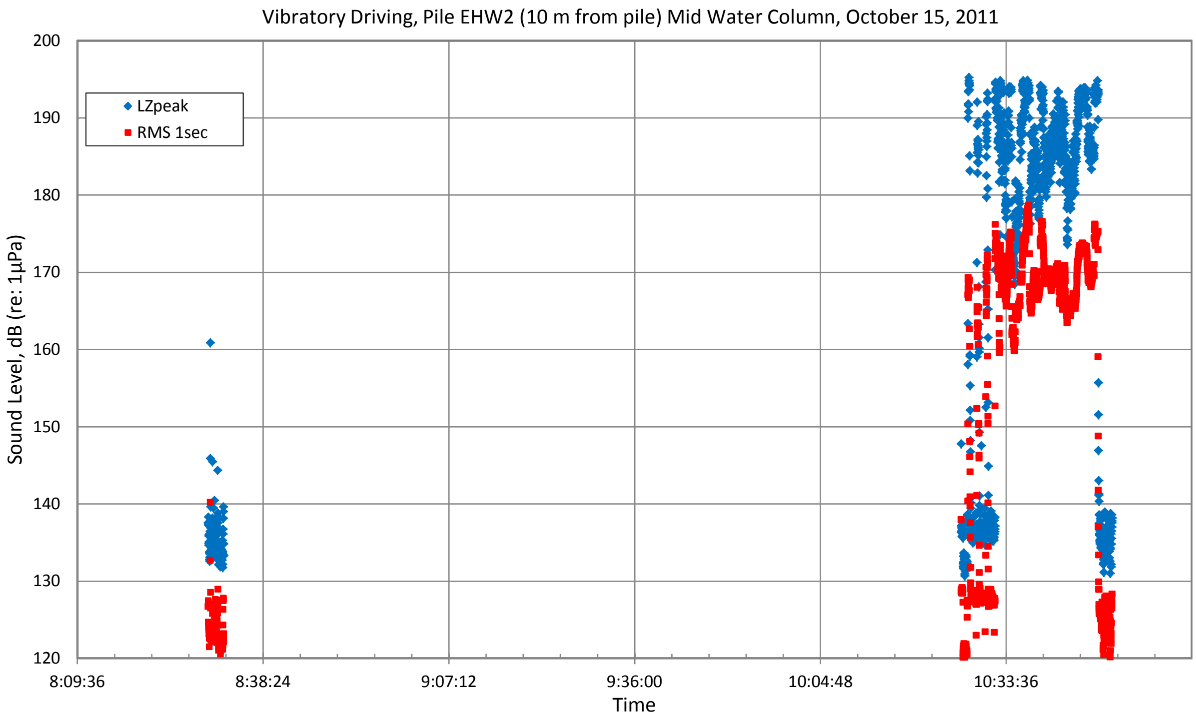
Input: 111015 001



Vibratory Driving Statistics (10 Sec RMS > 143dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	188	5.5	0.03
RMS 10sec	170	3.9	0.02

Inactive Vibratory Hammer Statistics (10 sec RMS < 143 dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	142	5.3	0.04
RMS 10sec	129	2.8	0.02

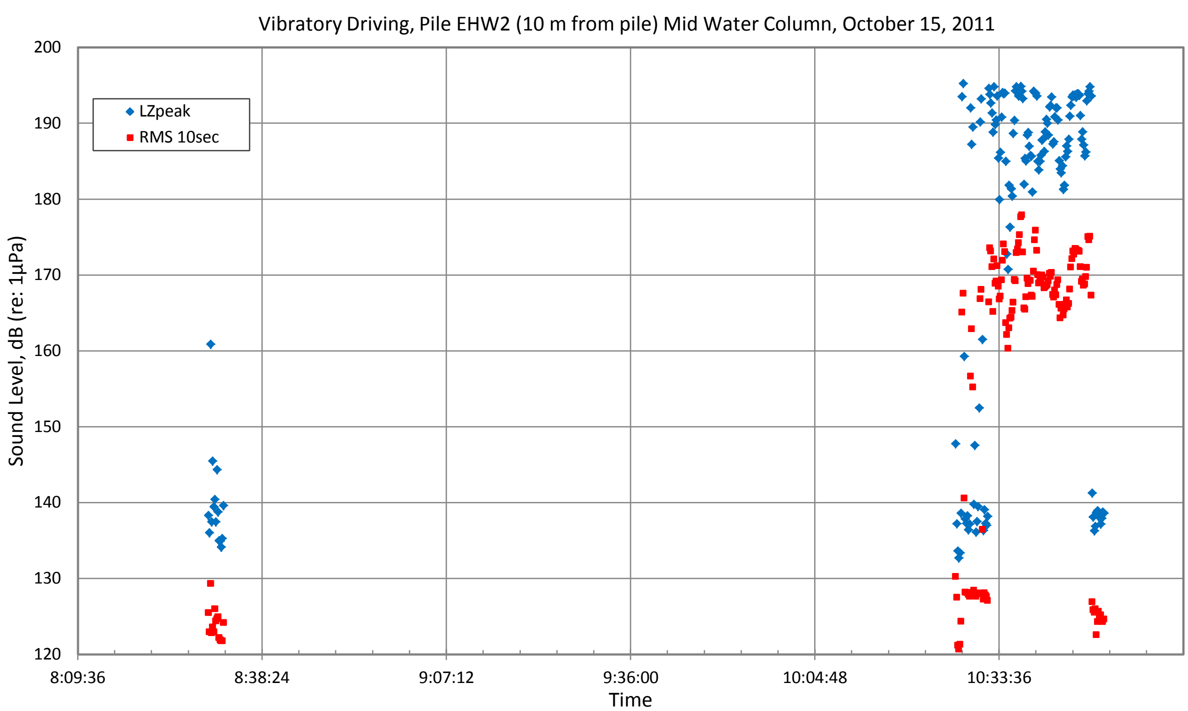
Input: 111015 001



Vibratory Driving Statistics (1 Sec RMS > 143dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	186	6.6	0.04
RMS 1sec	169	4.4	0.03

Inactive Vibratory Hammer Statistics, (1 sec RMS < 143 dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	136	6.9	0.05
RMS 1sec	126	6.4	0.05

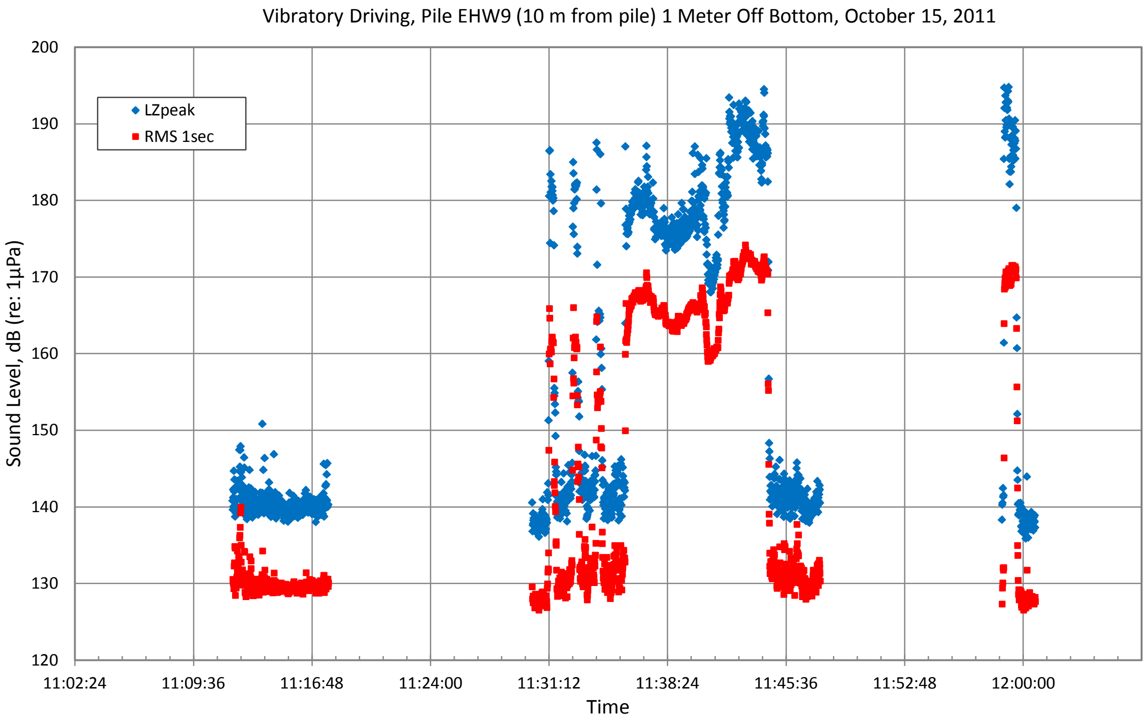
Input: 111015 001



Vibratory Driving Statistics (10 Sec RMS > 143dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	189	5.0	0.03
RMS 10sec	169	3.9	0.02

Inactive Vibratory Hammer Statistics, (10 sec RMS < 143 dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	140	6.4	0.05
RMS 10sec	126	3.5	0.03

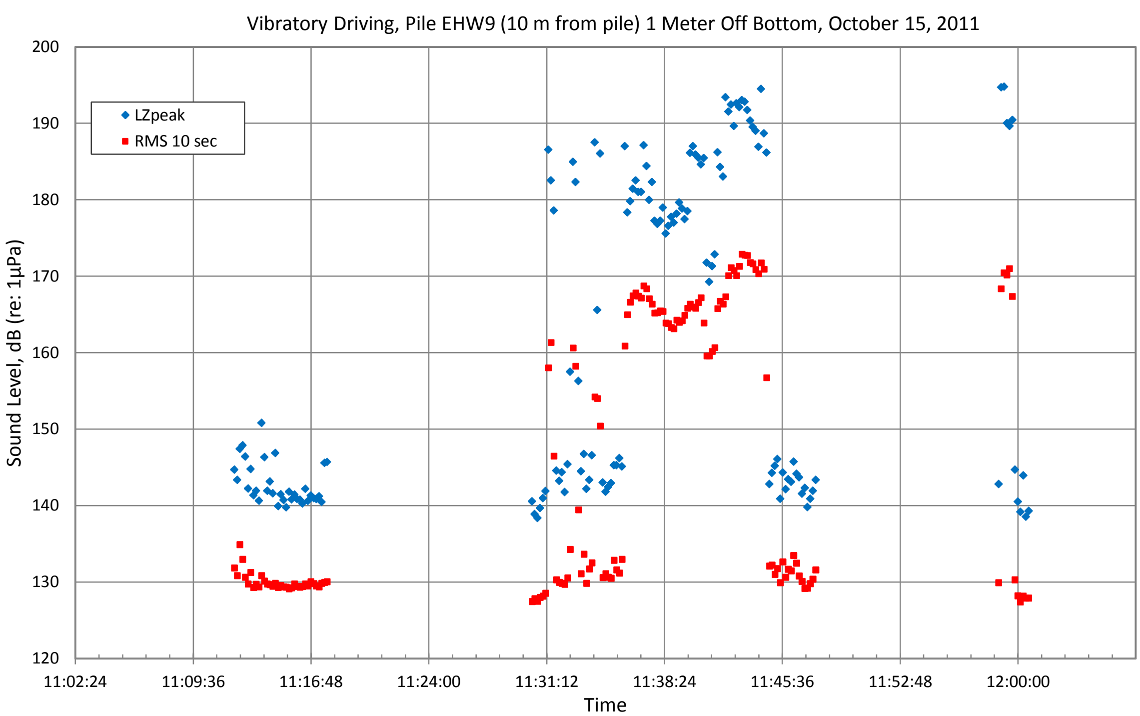
Input: 111015 001



Vibratory Driving Statistics (1 Sec RMS > 143dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	180	7.5	0.04
RMS 1 sec	166	5.3	0.03

Inactive Vibratory Hammer Statistics (1 sec RMS < 143 dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	140	7.1	0.05
RMS 1 sec	130	6.5	0.05

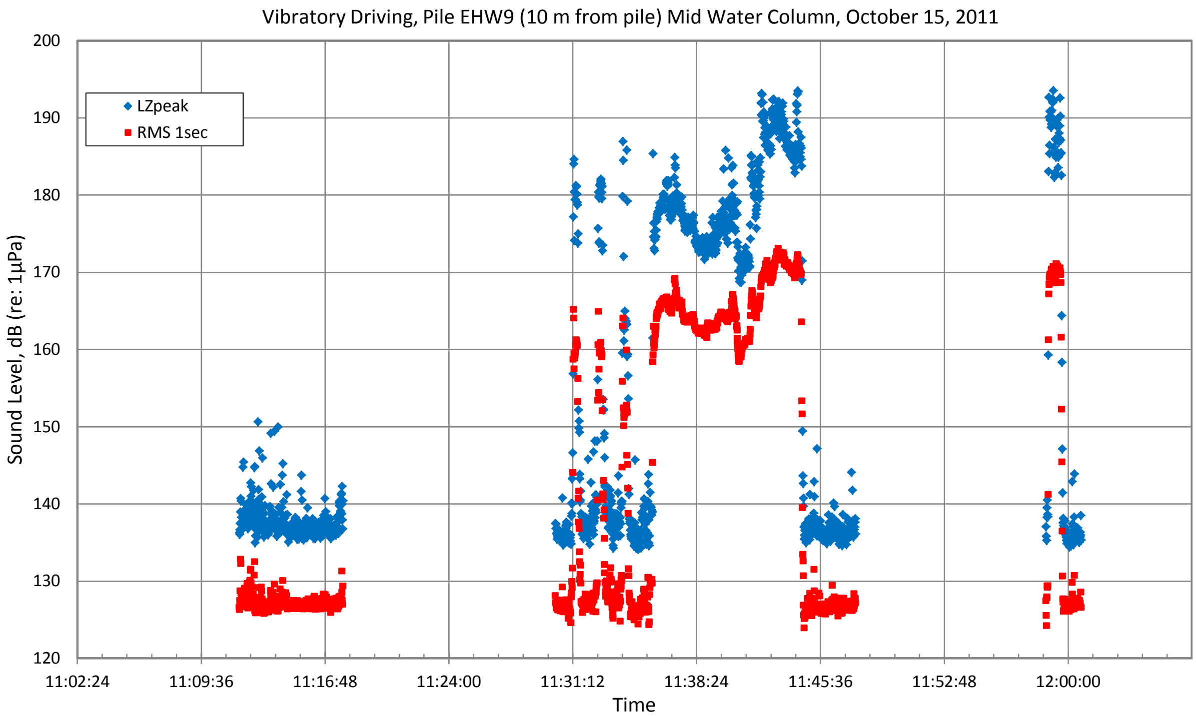
Input: 111015 002



Vibratory Driving Statistics (10 Sec RMS > 143dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	184	6.7	0.04
RMS 10sec	165	5.4	0.03

Inactive Vibratory Hammer Statistics (10 sec RMS < 143 dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	143	3.2	0.02
RMS 10sec	130	1.8	0.01

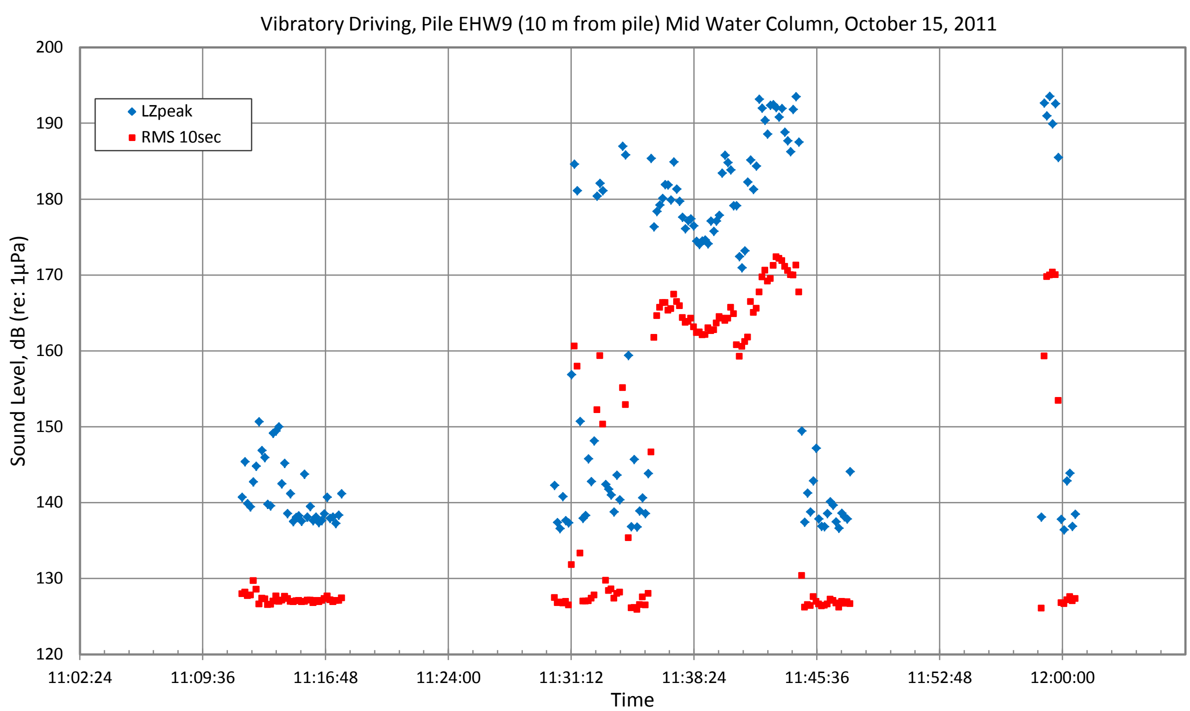
Input: 111015 002



Vibratory Driving Statistics (1 Sec RMS > 143dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	180	6.9	0.04
RMS 1sec	165	4.8	0.03

Inactive Vibratory Hammer Statistics, (1 sec RMS < 143 dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	137	7.1	0.05
RMS 1sec	127	6.3	0.05

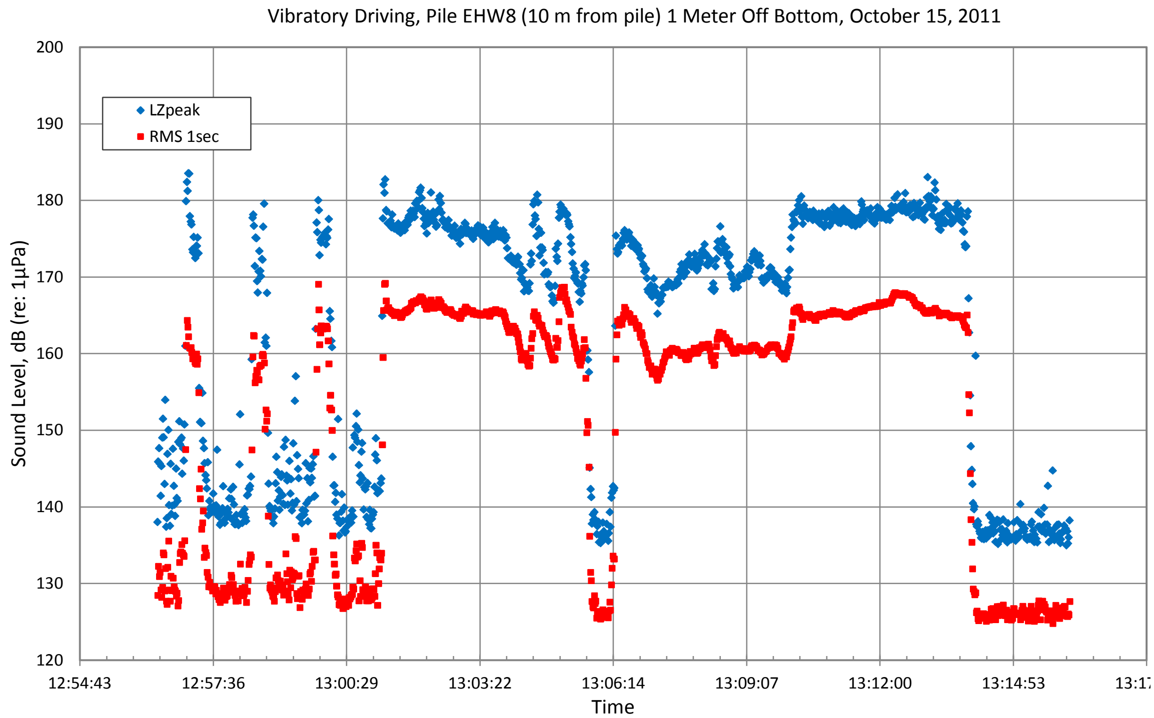
Input: 111015 002



Vibratory Driving Statistics (10 Sec RMS > 143dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	183	6.4	0.03
RMS 10sec	164	5.5	0.03

Inactive Vibratory Hammer Statistics, (10 sec RMS < 143 dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	141	4.6	0.03
RMS 10sec	127	1.4	0.01

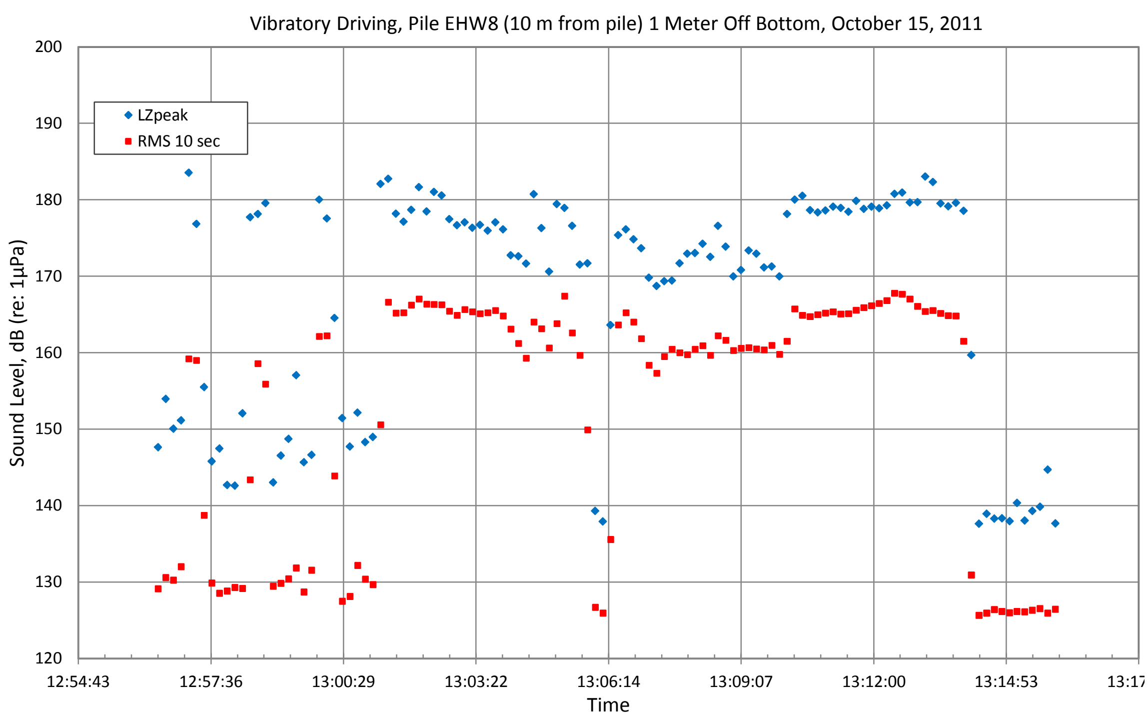
Input: 111015 002



Vibratory Driving Statistics (1 Sec RMS > 143dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	175	4.3	0.02
RMS 1 sec	163	3.6	0.02

Inactive Vibratory Hammer Statistics (1 sec RMS < 143 dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	140	4.5	0.03
RMS 1 sec	129	3.0	0.02

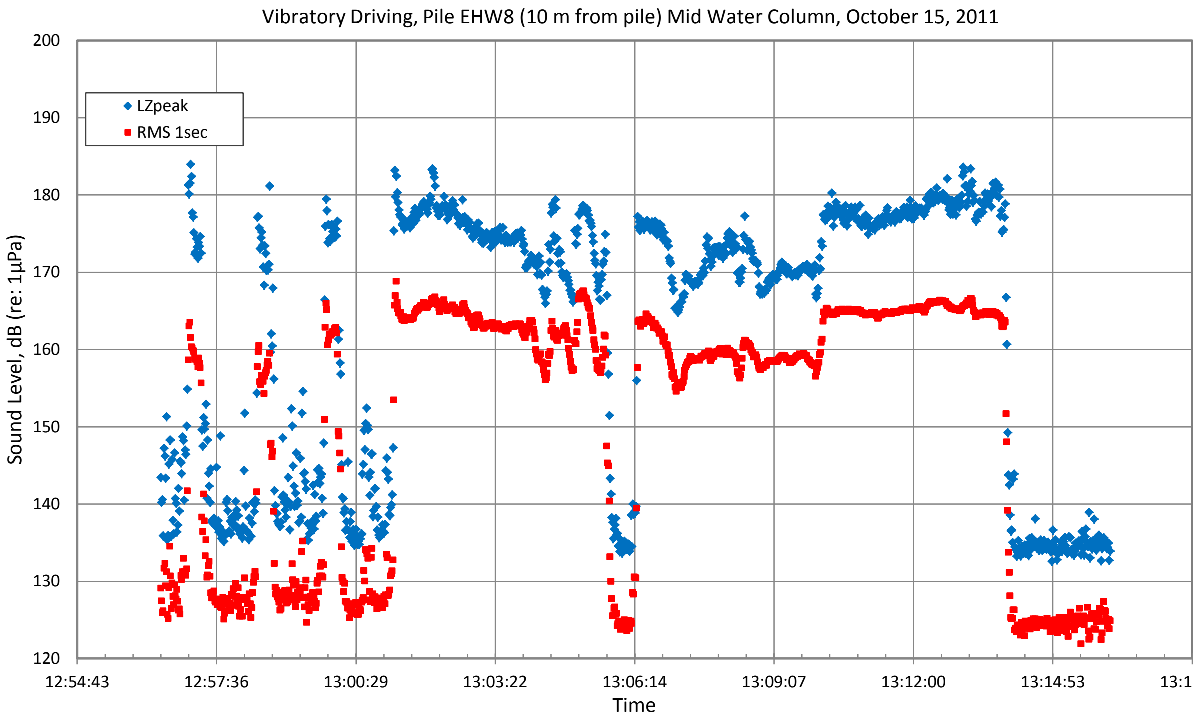
Input: 111015 003



Vibratory Driving Statistics (10 Sec RMS > 143dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	177	4.0	0.02
RMS 10sec	163	4.6	0.03

Inactive Vibratory Hammer Statistics (10 sec RMS < 143 dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	146	6.9	0.05
RMS 10sec	129	2.9	0.02

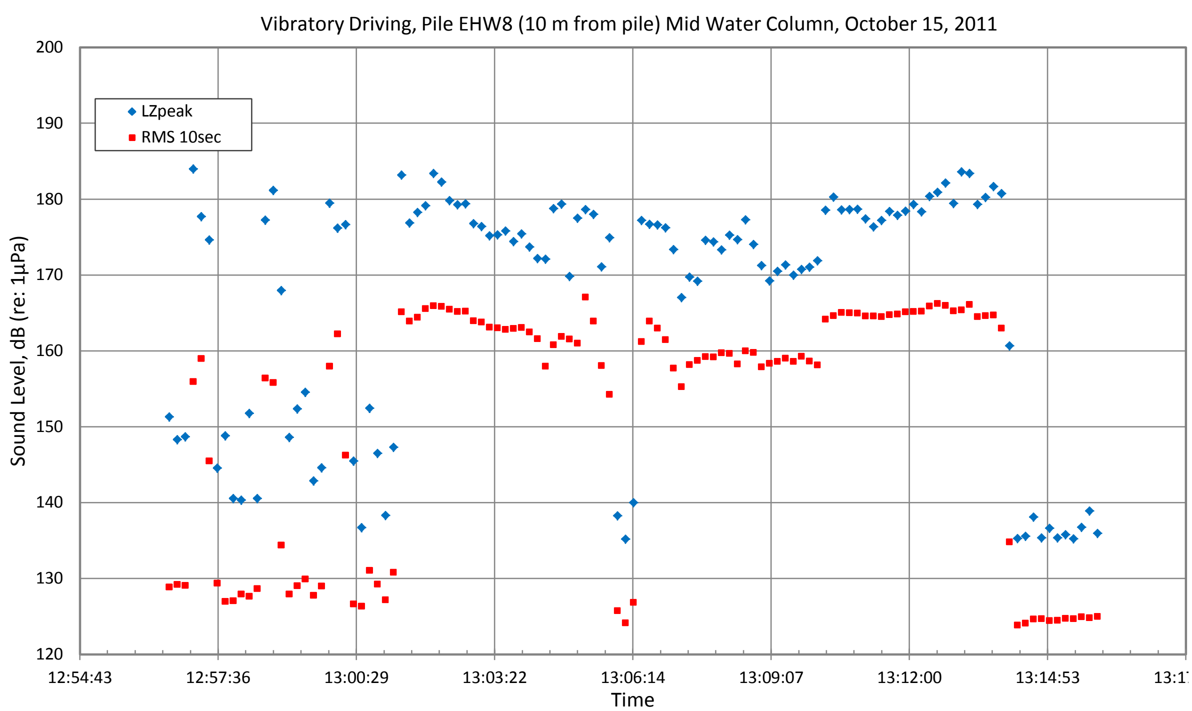
Input: 111015 003



Vibratory Driving Statistics (1 Sec RMS > 143dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	175	4.3	0.02
RMS 1sec	162	3.7	0.02

Inactive Vibratory Hammer Statistics, (1 sec RMS < 143 dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	139	5.0	0.04
RMS 1sec	127	3.3	0.03

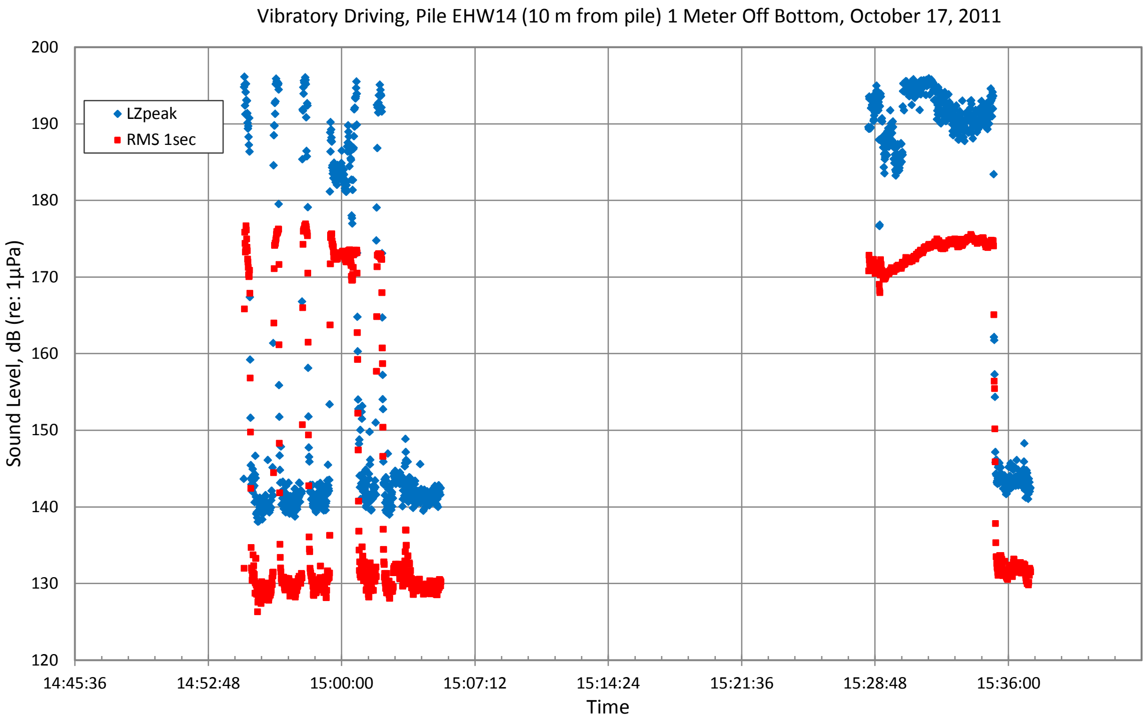
Input: 111015 003



Vibratory Driving Statistics (10 Sec RMS > 143dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	177	3.9	0.02
RMS 10sec	162	4.1	0.03

Inactive Vibratory Hammer Statistics, (10 sec RMS < 143 dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	143	8.0	0.06
RMS 10sec	127	2.7	0.02

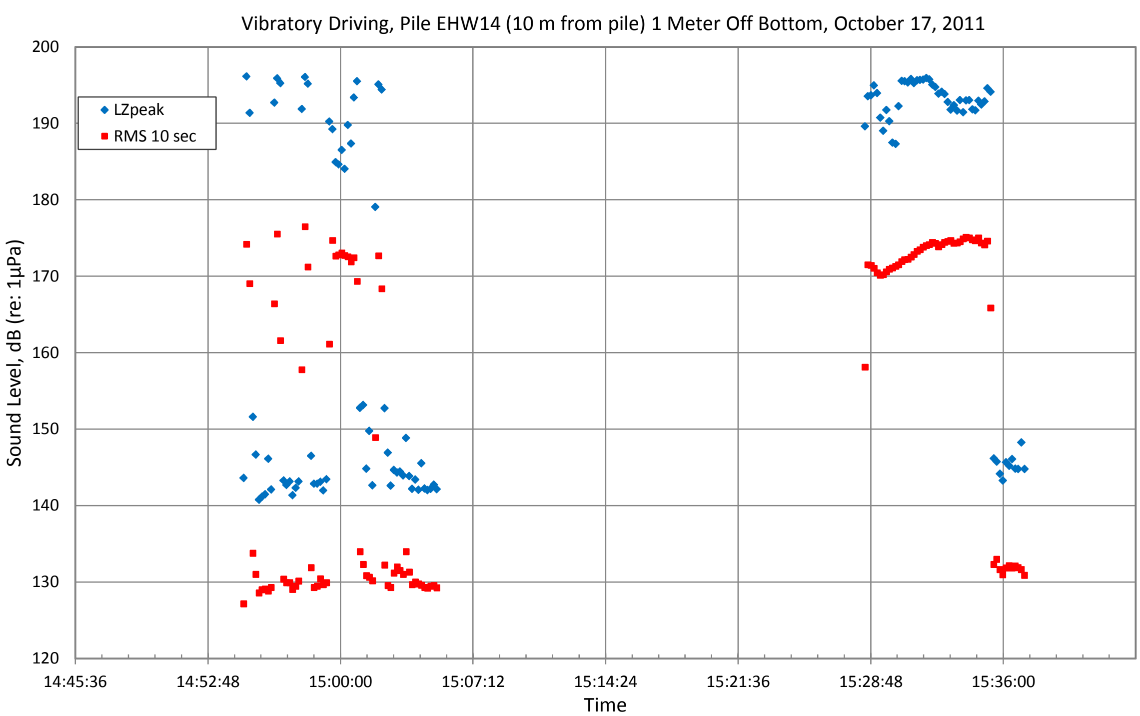
Input: 111015 003



Vibratory Driving Statistics (1 Sec RMS > 143dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	190	6.5	0.03
RMS 1 sec	172	4.2	0.02

Inactive Vibratory Hammer Statistics (1 sec RMS < 143 dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	142	6.4	0.04
RMS 1 sec	131	5.7	0.04

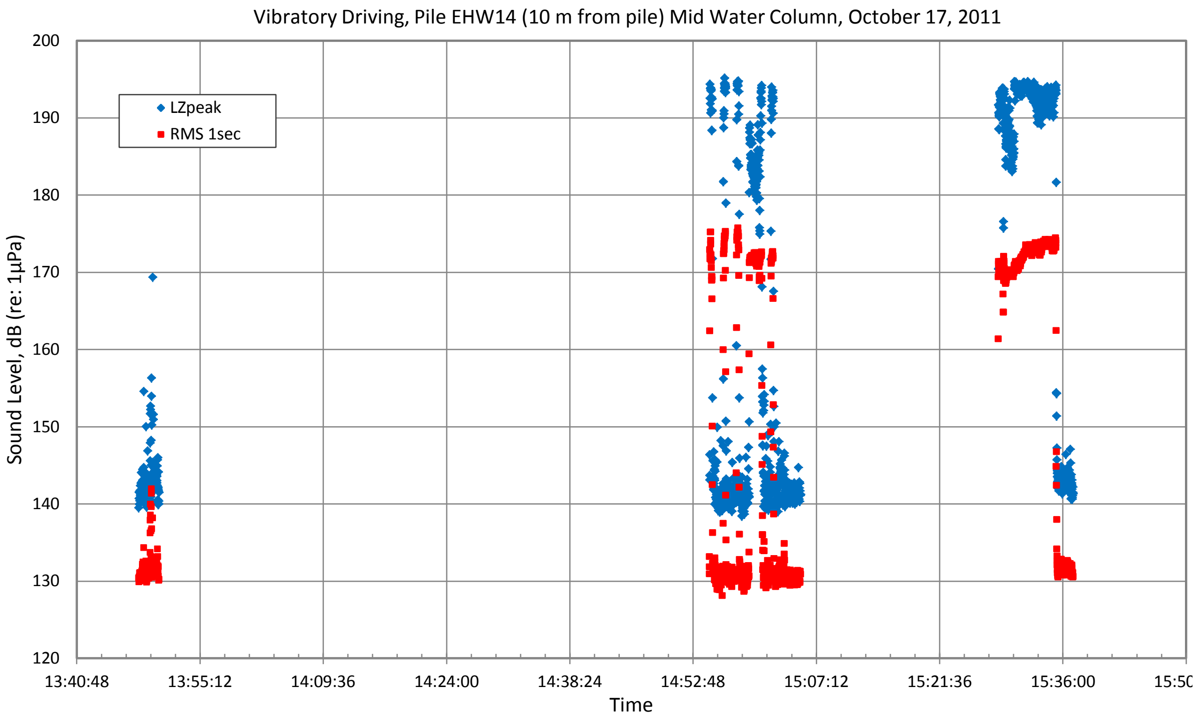
Input: 111017 001



Vibratory Driving Statistics (10 Sec RMS > 143dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	192	3.5	0.02
RMS 10sec	172	4.8	0.03

Inactive Vibratory Hammer Statistics (10 sec RMS < 143 dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	145	3.0	0.02
RMS 10sec	131	1.5	0.01

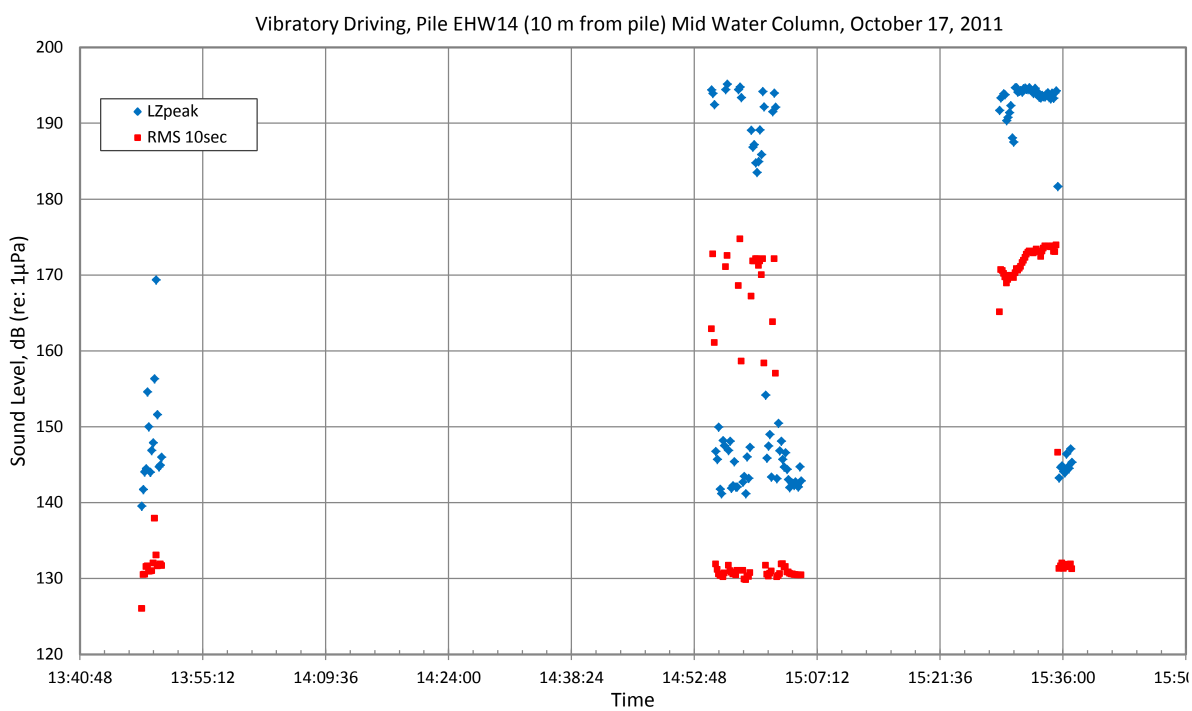
Input: 111017 001



Vibratory Driving Statistics (1 Sec RMS > 143dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	190	6.0	0.03
RMS 1sec	171	3.9	0.02

Inactive Vibratory Hammer Statistics, (1 sec RMS < 143 dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	142	8.0	0.06
RMS 1sec	131	7.1	0.05

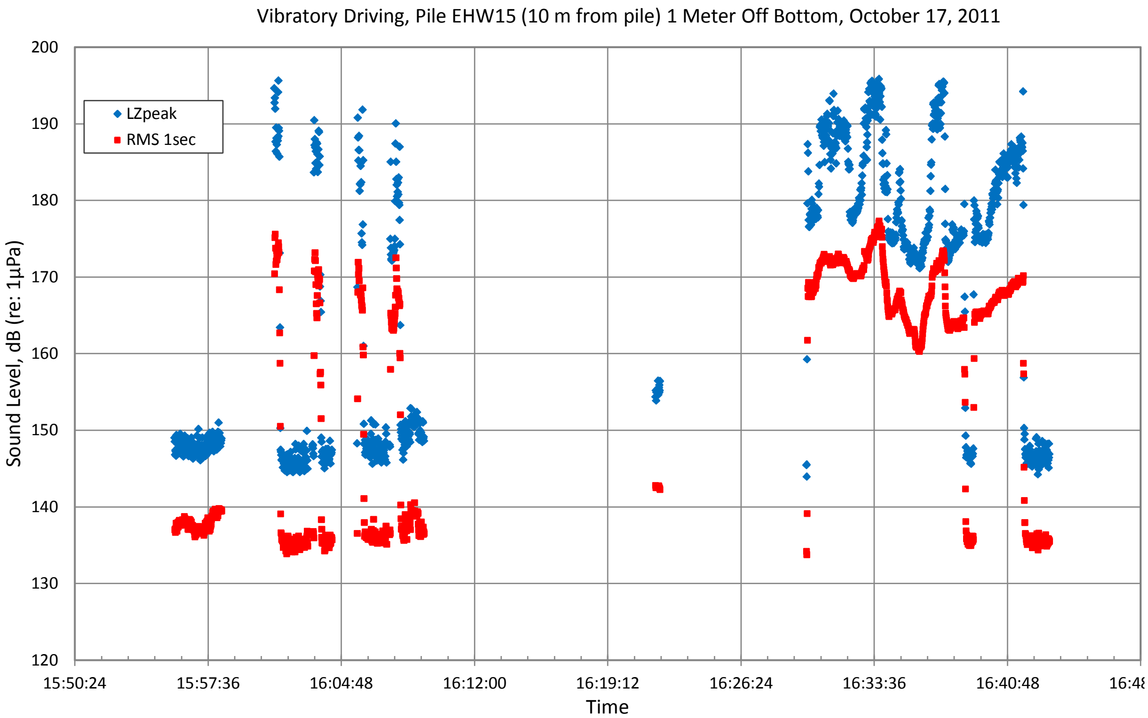
Input: 111017 001



Vibratory Driving Statistics (10 Sec RMS > 143dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	192	3.1	0.02
RMS 10sec	170	4.9	0.03

Inactive Vibratory Hammer Statistics, (10 sec RMS < 143 dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	146	4.4	0.03
RMS 10sec	131	1.2	0.01

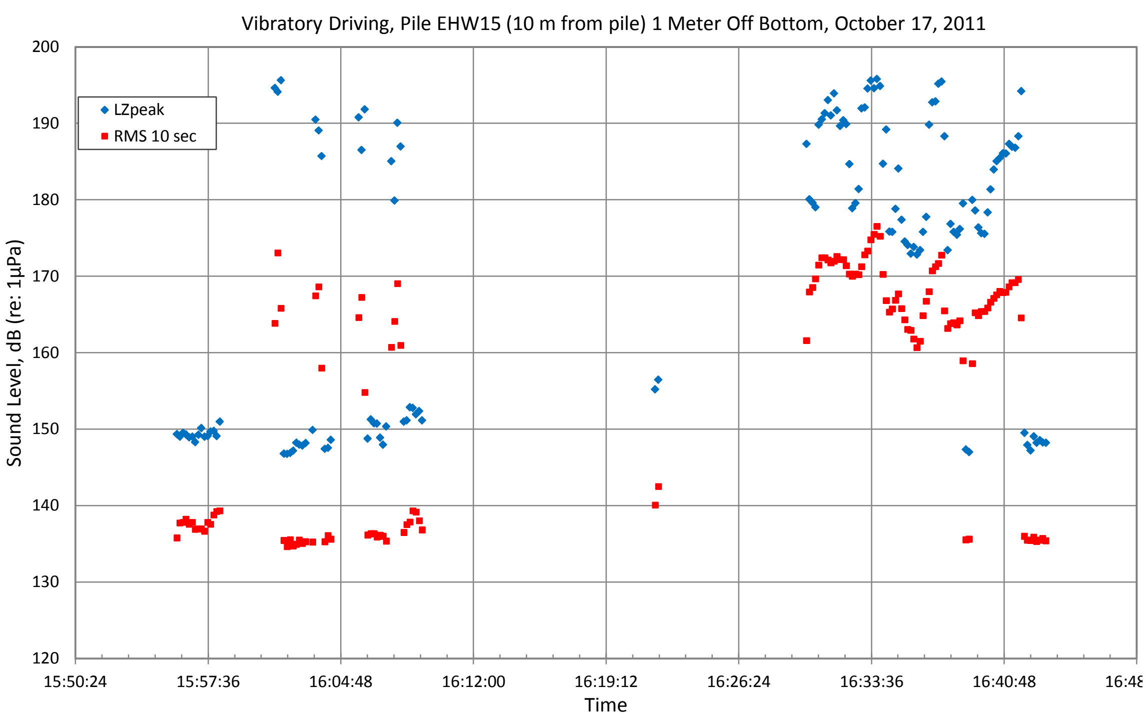
Input: 111017 001



Vibratory Driving Statistics (1 Sec RMS > 143dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	182	7.1	0.04
RMS 1 sec	168	4.3	0.03

Inactive Vibratory Hammer Statistics (1 sec RMS < 143 dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	146	15.2	0.10
RMS 1 sec	135	14.0	0.10

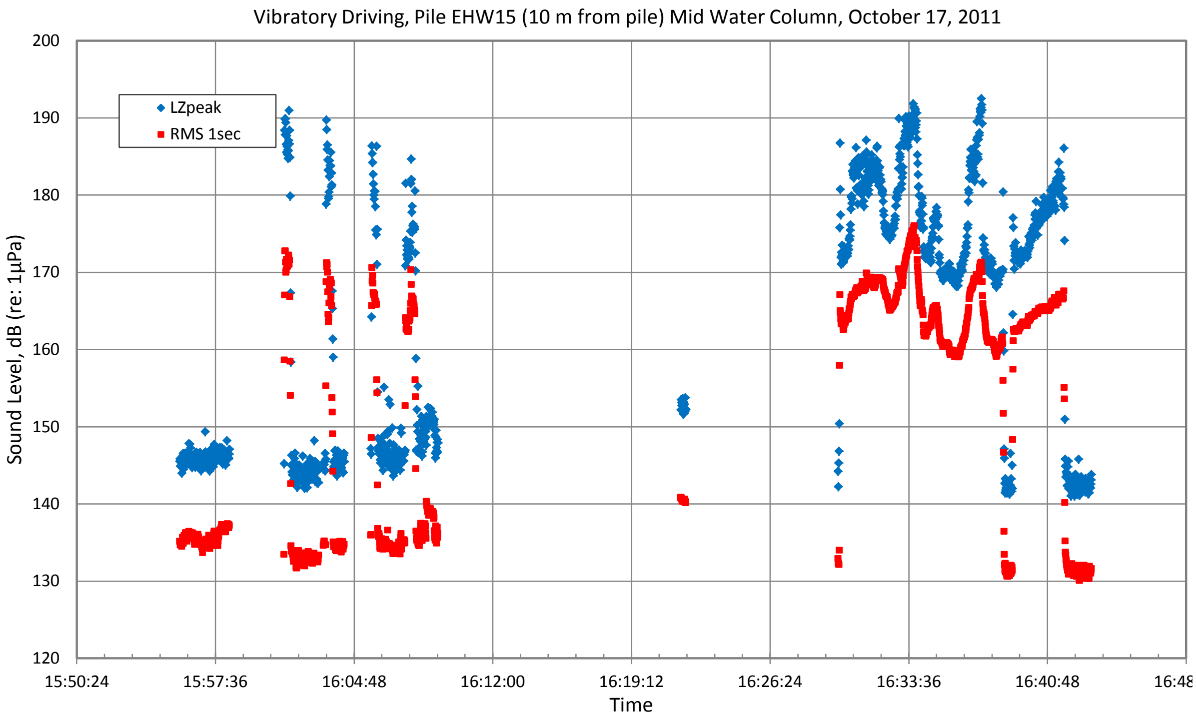
Input: 111017 002



Vibratory Driving Statistics (10 Sec RMS > 143dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	185	7.2	0.04
RMS 10sec	167	4.4	0.03

Inactive Vibratory Hammer Statistics (10 sec RMS < 143 dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	149	2.0	0.01
RMS 10sec	137	1.6	0.01

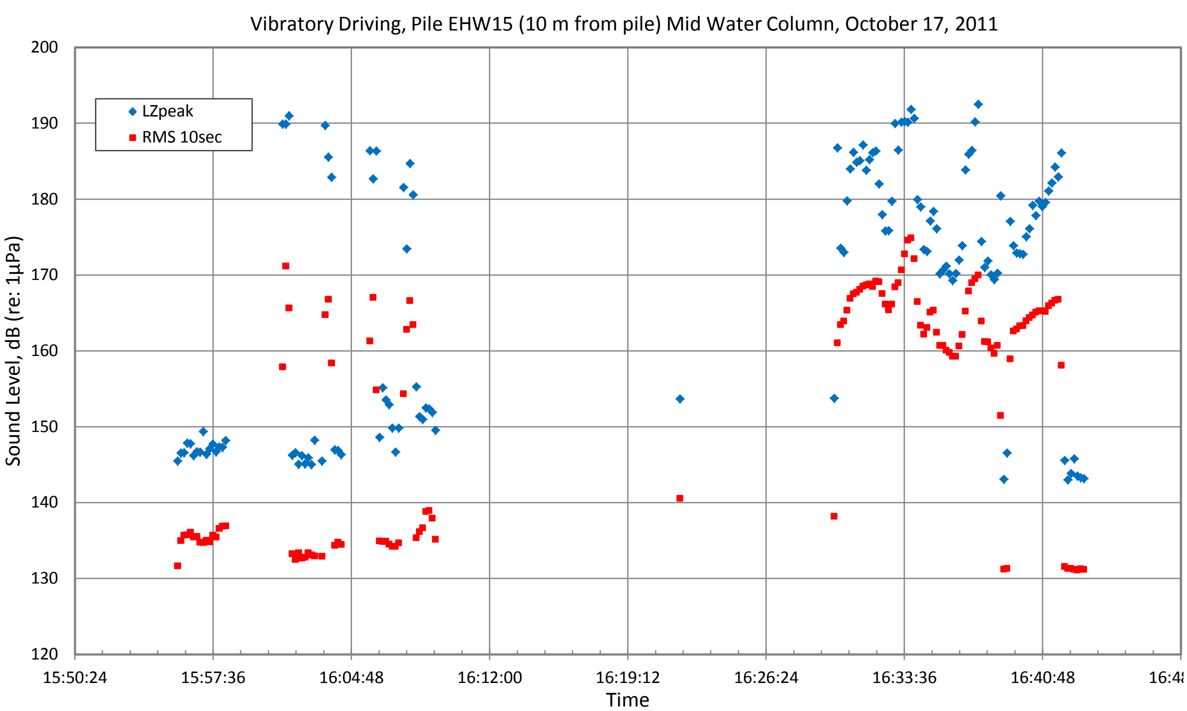
Input: 111017 002



Vibratory Driving Statistics (1 Sec RMS > 143dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	178	6.3	0.04
RMS 1sec	165	4.2	0.03

Inactive Vibratory Hammer Statistics, (1 sec RMS < 143 dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	144	15.0	0.10
RMS 1sec	133	13.8	0.10

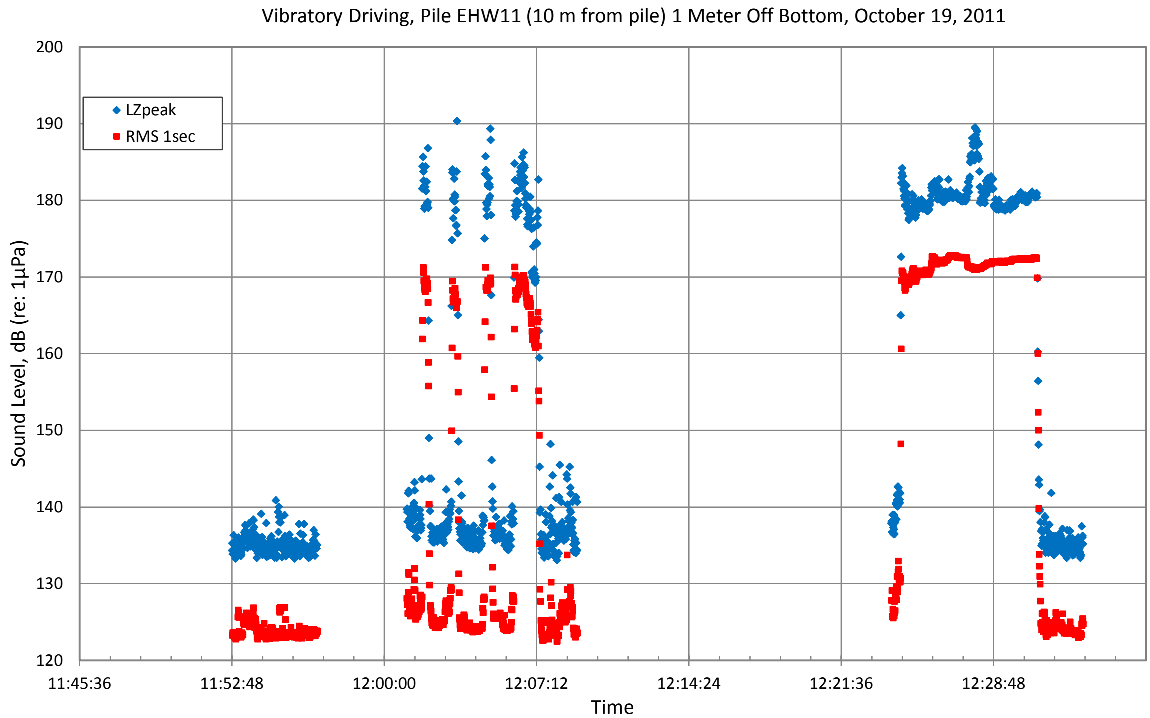
Input: 111017 002



Vibratory Driving Statistics (10 Sec RMS > 143dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	180	6.8	0.04
RMS 10sec	165	4.4	0.03

Inactive Vibratory Hammer Statistics, (10 sec RMS < 143 dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	148	3.2	0.02
RMS 10sec	134	2.2	0.02

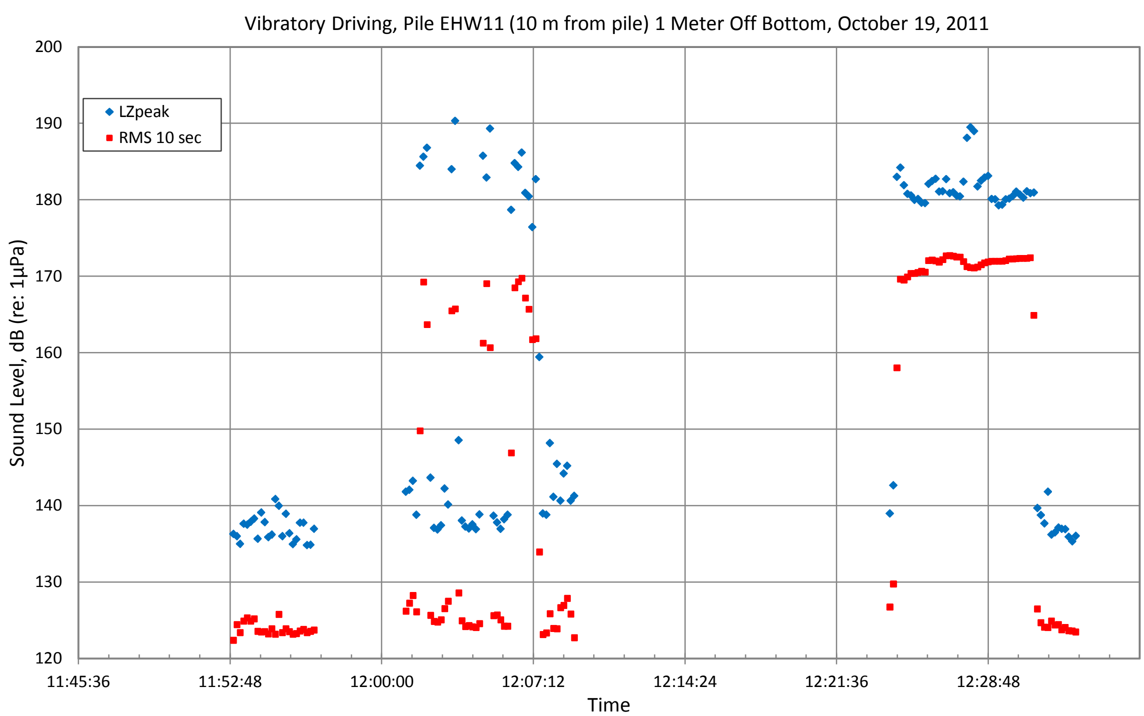
Input: 111017 002



Vibratory Driving Statistics (1 Sec RMS > 143dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	180	3.7	0.02
RMS 1 sec	170	3.7	0.02

Inactive Vibratory Hammer Statistics (1 sec RMS < 143 dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	136	7.4	0.05
RMS 1 sec	125	6.8	0.05

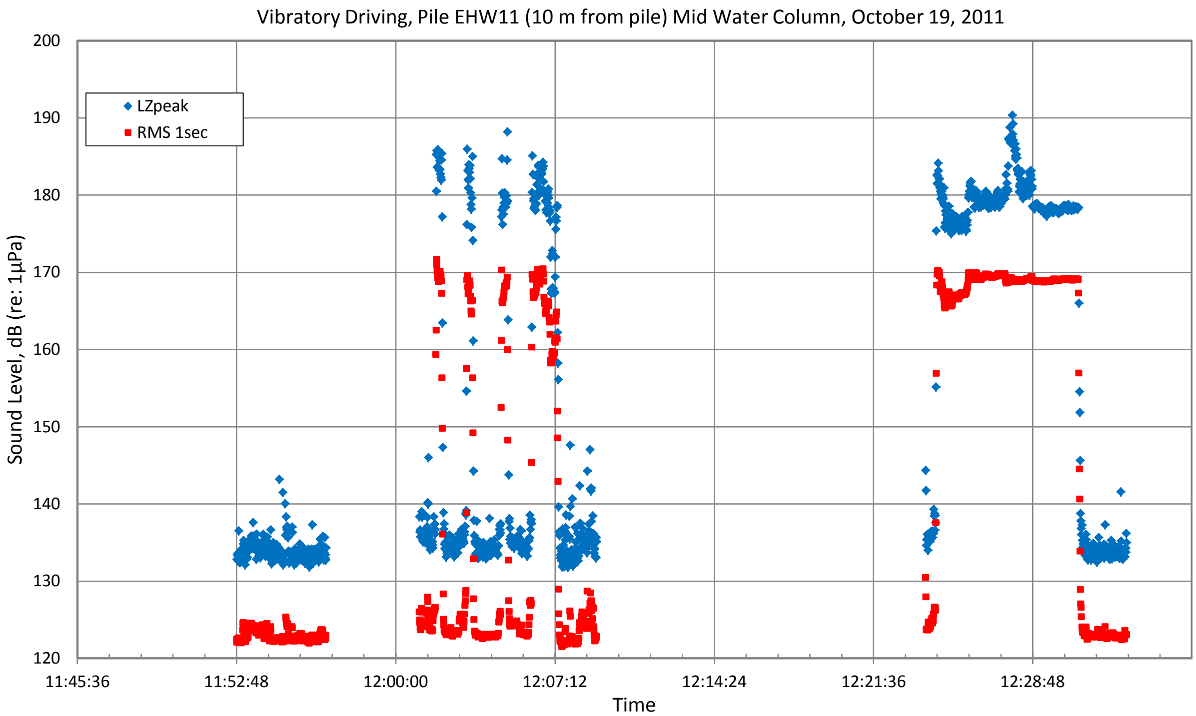
Input: 111019 002



Vibratory Driving Statistics (10 Sec RMS > 143dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	182	2.9	0.02
RMS 10sec	169	5.4	0.03

Inactive Vibratory Hammer Statistics (10 sec RMS < 143 dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	139	3.9	0.03
RMS 10sec	125	1.8	0.01

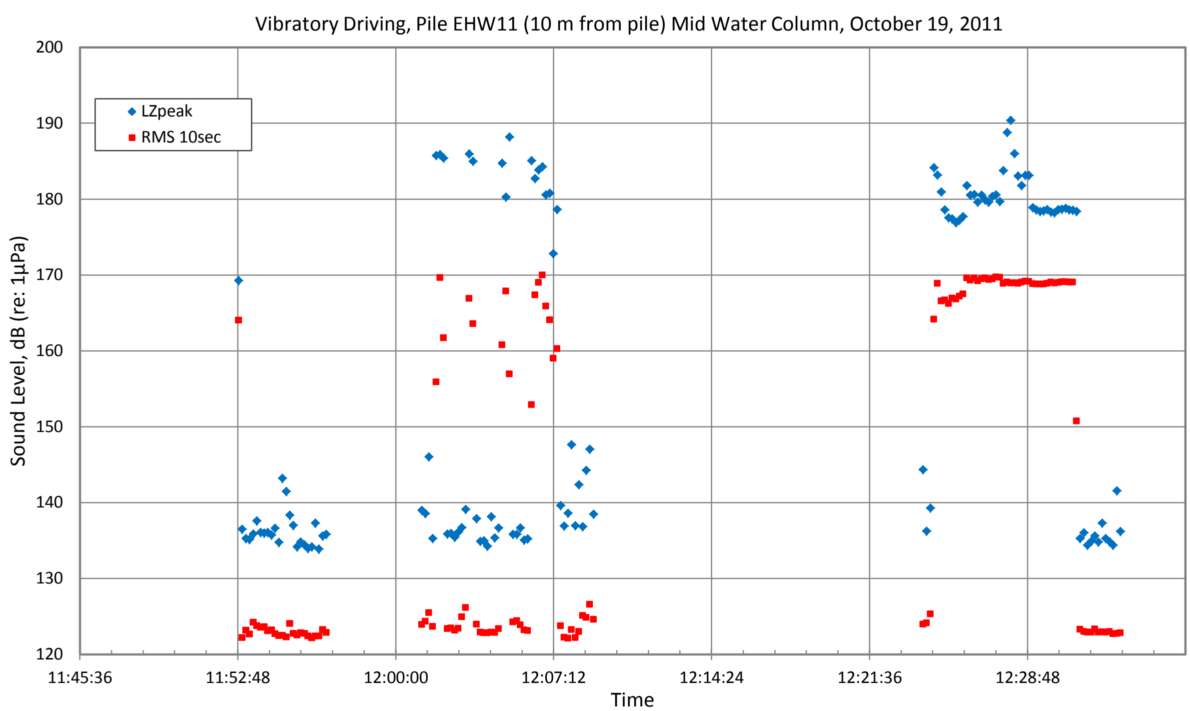
Input: 111019 002



Vibratory Driving Statistics (1 Sec RMS > 143dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	179	3.9	0.02
RMS 1sec	168	3.4	0.02

Inactive Vibratory Hammer Statistics, (1 sec RMS < 143 dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	134	7.4	0.05
RMS 1sec	123	6.6	0.05

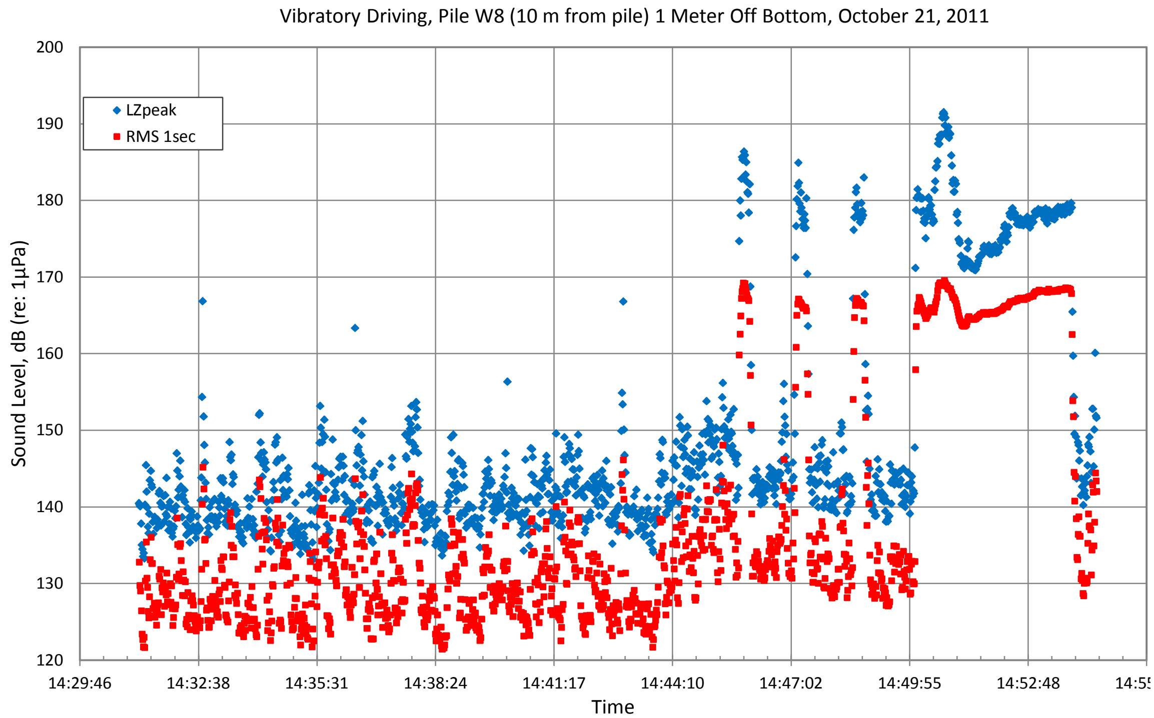
Input: 111019 002



Vibratory Driving Statistics (10 Sec RMS > 143dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	181	3.8	0.02
RMS 10sec	167	4.4	0.03

Inactive Vibratory Hammer Statistics, (10 sec RMS < 143 dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	137	3.1	0.02
RMS 10sec	123	0.9	0.01

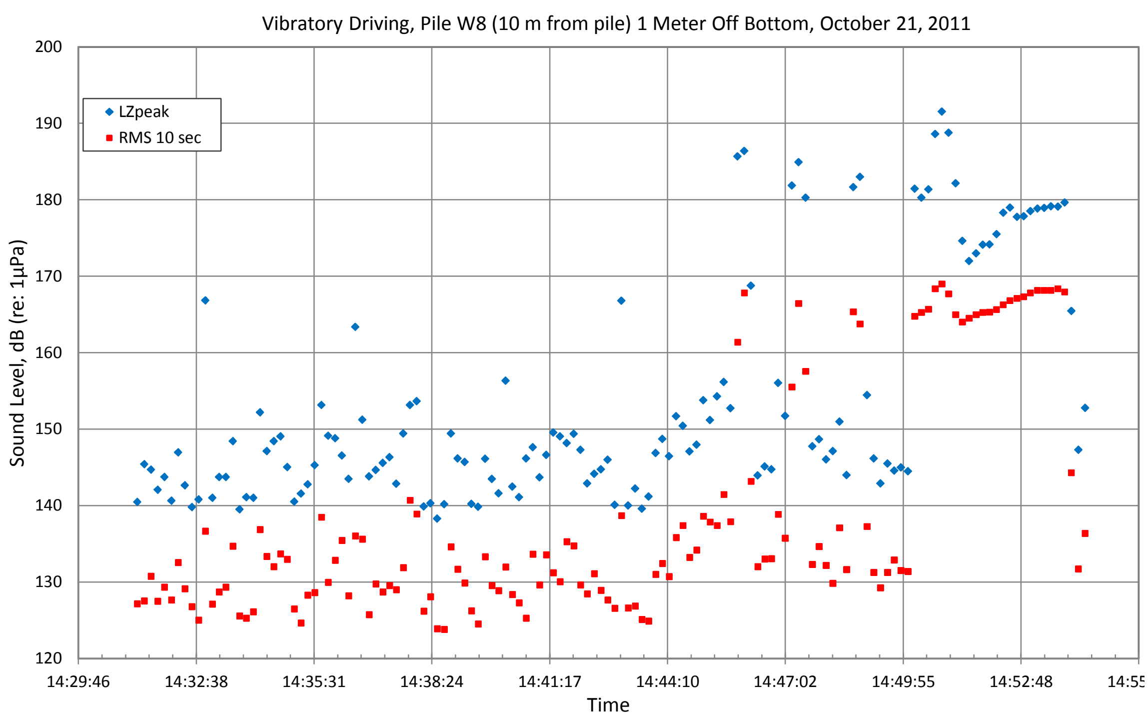
Input: 111019 002



Vibratory Driving Statistics (1 Sec RMS > 143dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	176	7.3	0.04
RMS 1 sec	165	5.9	0.04

Inactive Vibratory Hammer Statistics (1 sec RMS < 143 dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	142	4.2	0.03
RMS 1 sec	131	4.9	0.04

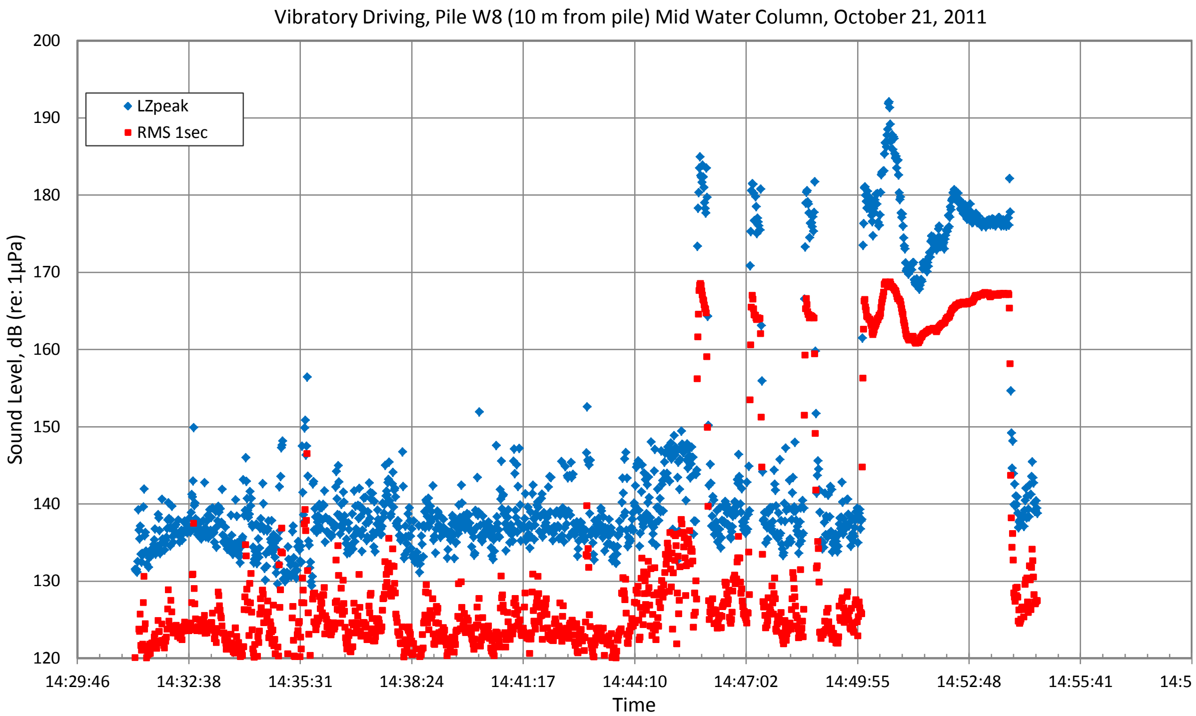
Input: 111021 002



Vibratory Driving Statistics (10 Sec RMS > 143dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	179	5.6	0.03
RMS 10sec	164	6.1	0.04

Inactive Vibratory Hammer Statistics (10 sec RMS < 143 dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	147	5.4	0.04
RMS 10sec	131	4.2	0.03

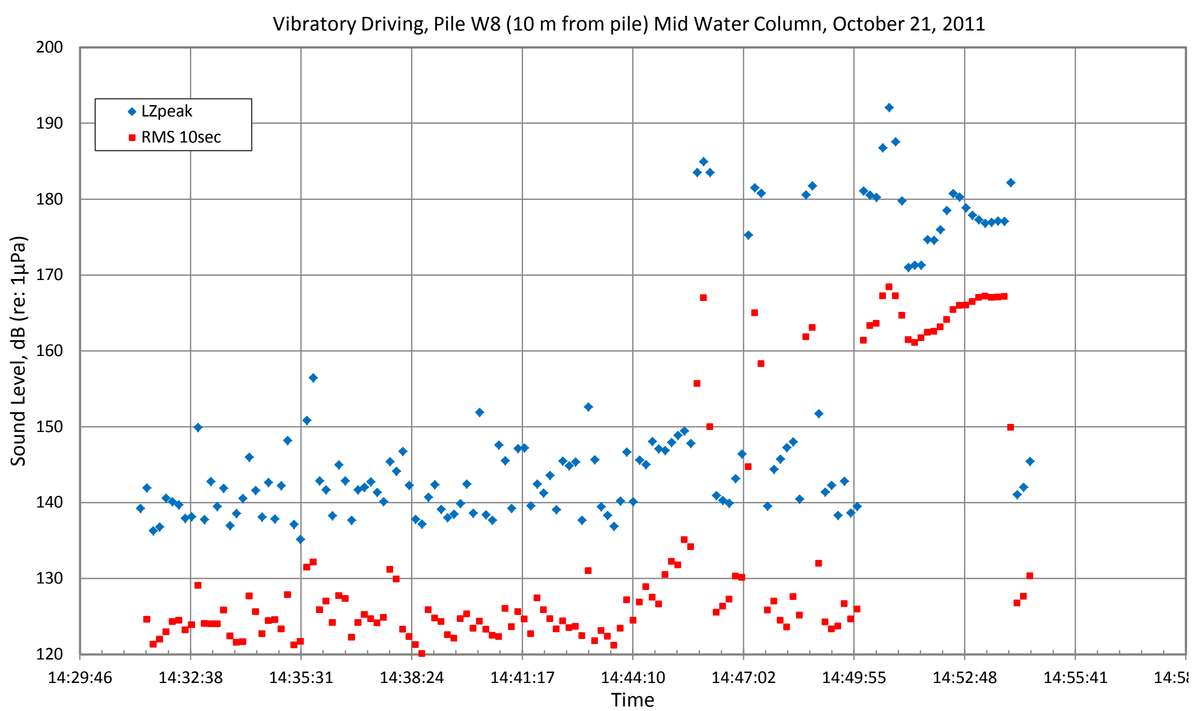
Input: 111021 002



Vibratory Driving Statistics (1 Sec RMS > 143dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	177	5.3	0.03
RMS 1sec	164	3.8	0.02

Inactive Vibratory Hammer Statistics, (1 sec RMS < 143 dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	138	3.8	0.03
RMS 1sec	125	3.7	0.03

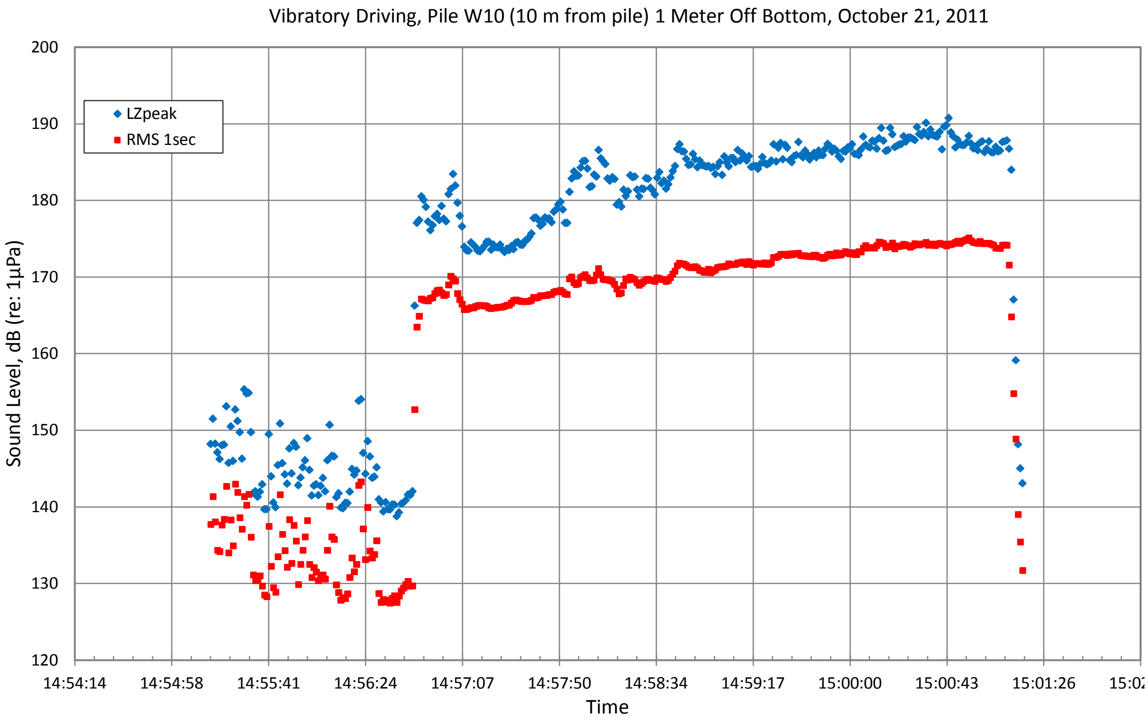
Input: 111021 002



Vibratory Driving Statistics (10 Sec RMS > 143dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	179	4.7	0.03
RMS 10sec	163	5.6	0.03

Inactive Vibratory Hammer Statistics, (10 sec RMS < 143 dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	142	4.2	0.03
RMS 10sec	125	3.1	0.02

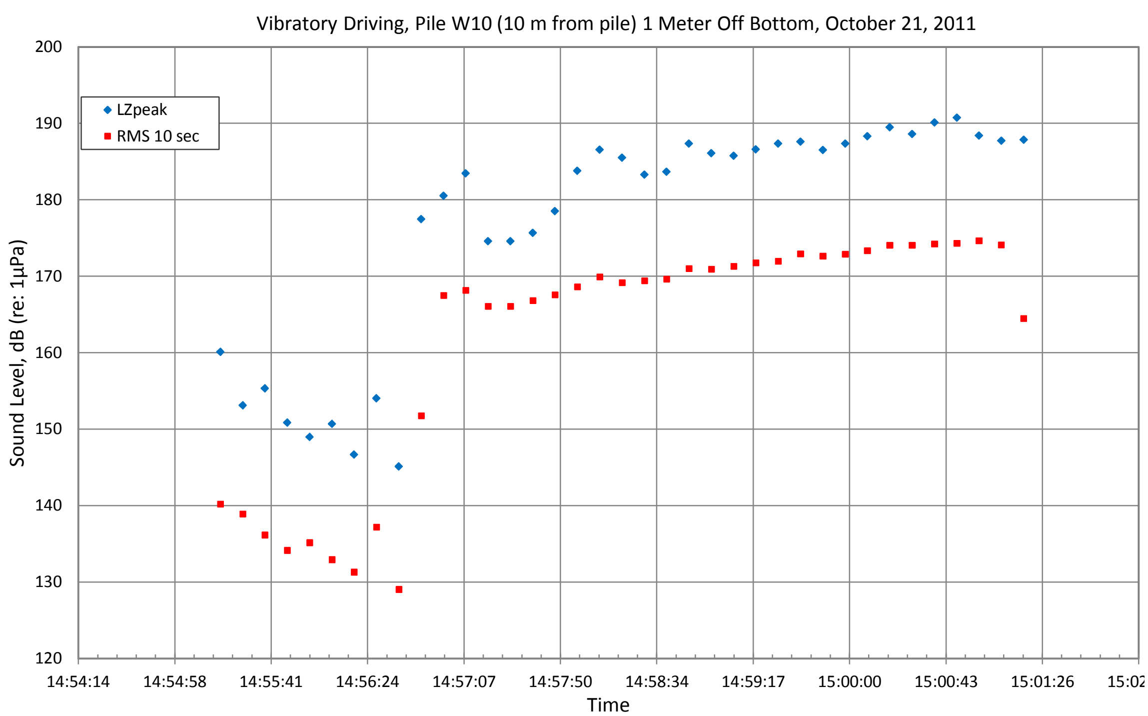
Input: 111021 002



Vibratory Driving Statistics (1 Sec RMS > 143dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	183	5.3	0.03
RMS 1 sec	171	3.8	0.02

Inactive Vibratory Hammer Statistics (1 sec RMS < 143 dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	143	15.5	0.11
RMS 1 sec	132	14.5	0.11

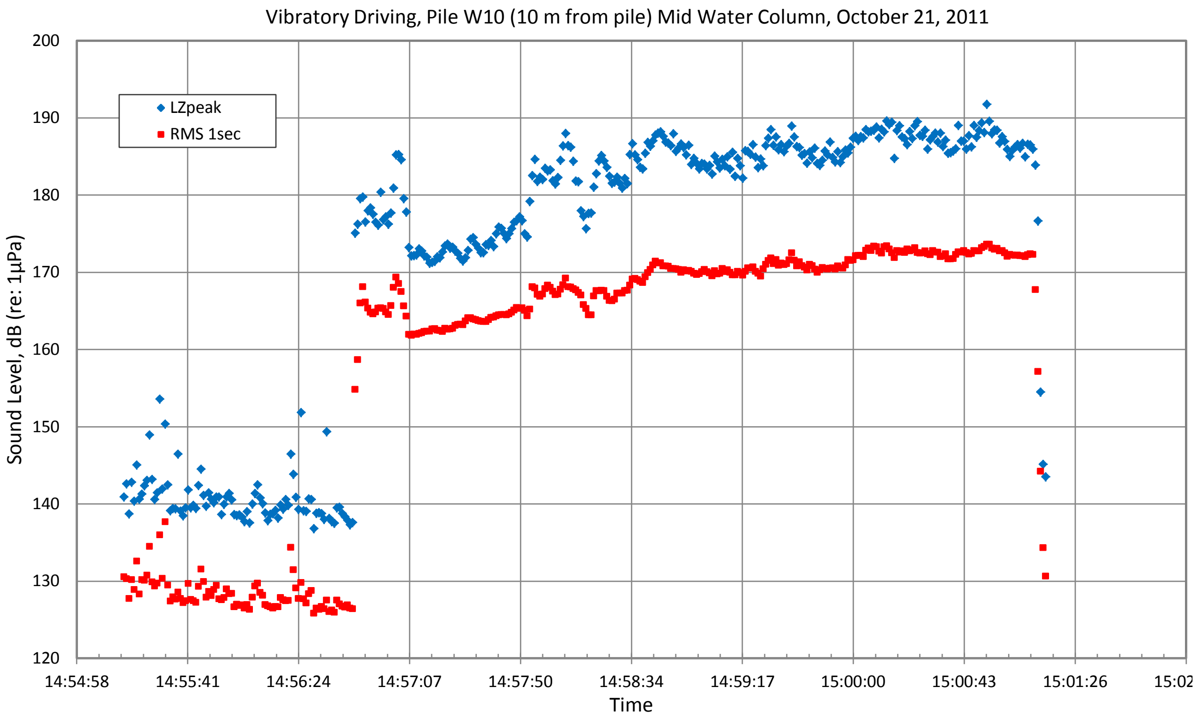
Input: 111021 005-A



Vibratory Driving Statistics (10 Sec RMS > 143dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	185	4.7	0.03
RMS 10sec	170	4.6	0.03

Inactive Vibratory Hammer Statistics (10 sec RMS < 143 dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	152	4.6	0.03
RMS 10sec	135	3.6	0.03

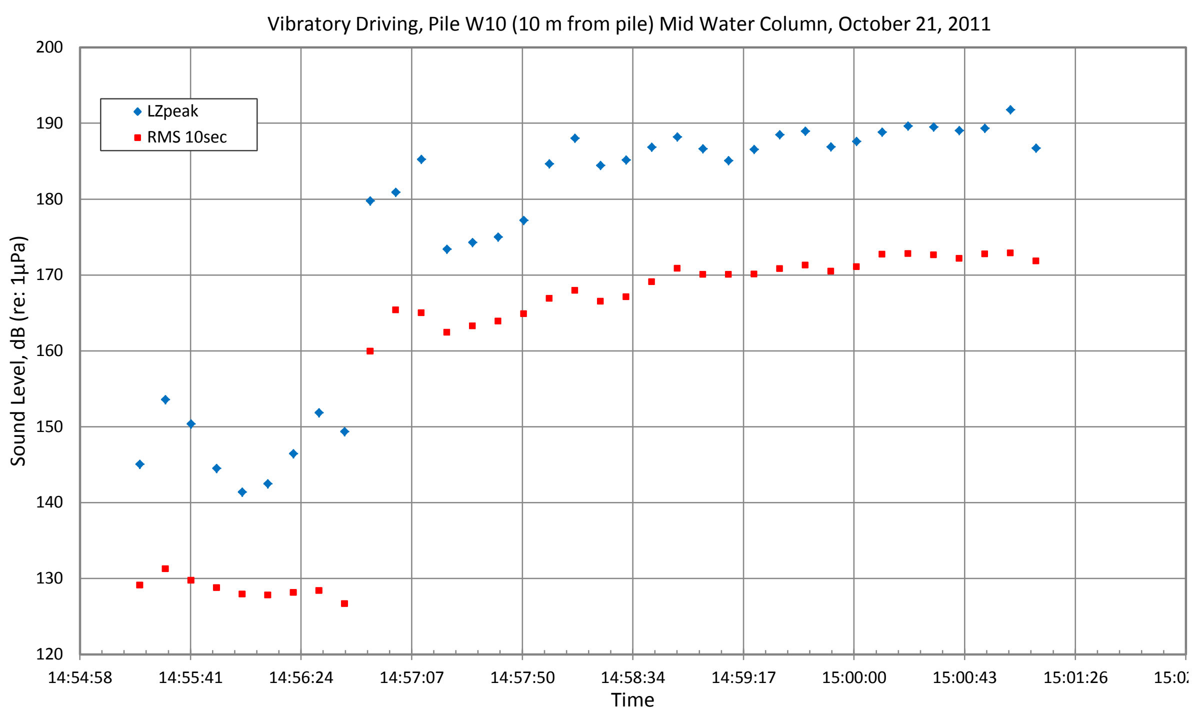
Input: 111021 005-A



Vibratory Driving Statistics (1 Sec RMS > 143dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	183	5.6	0.03
RMS 1sec	169	3.9	0.02

Inactive Vibratory Hammer Statistics, (1 sec RMS < 143 dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	139	14.9	0.11
RMS 1sec	127	13.5	0.11

Input: 111021 003-A

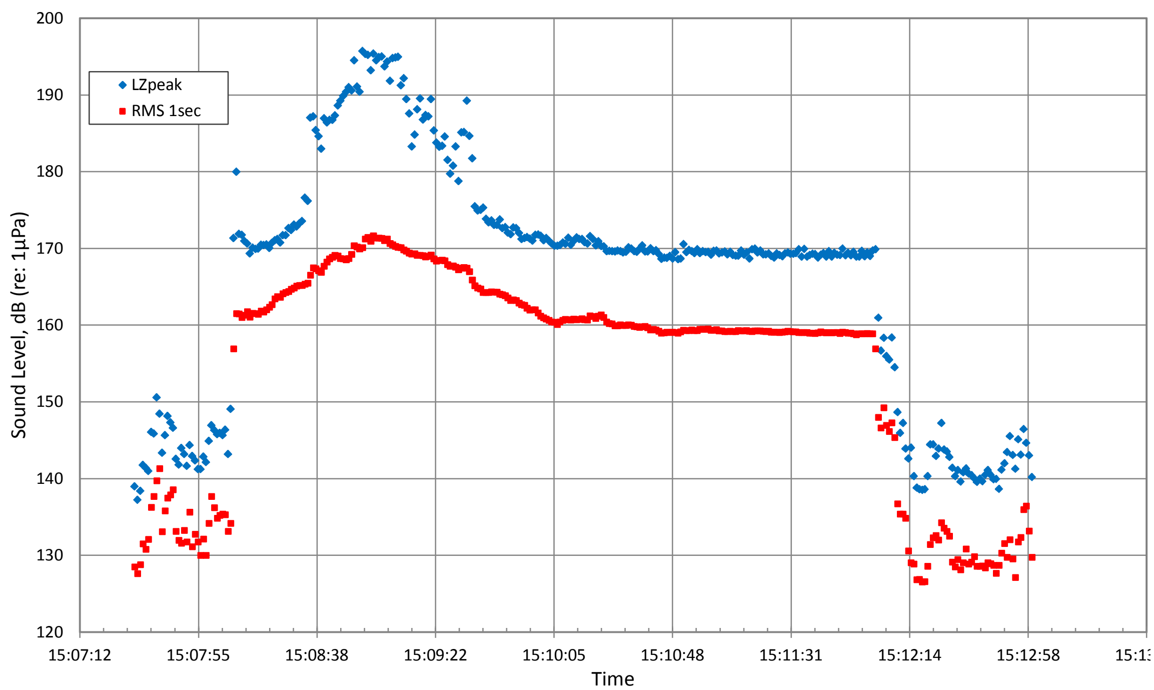


Vibratory Driving Statistics (10 Sec RMS > 143dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	185	5.0	0.03
RMS 10sec	169	3.7	0.02

Inactive Vibratory Hammer Statistics, (10 sec RMS < 143 dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	147	4.3	0.03
RMS 10sec	129	1.3	0.01

Input: 111021 003-A

Vibratory Driving, Pile W2 (10 m from pile) 1 Meter Off Bottom, October 21, 2011

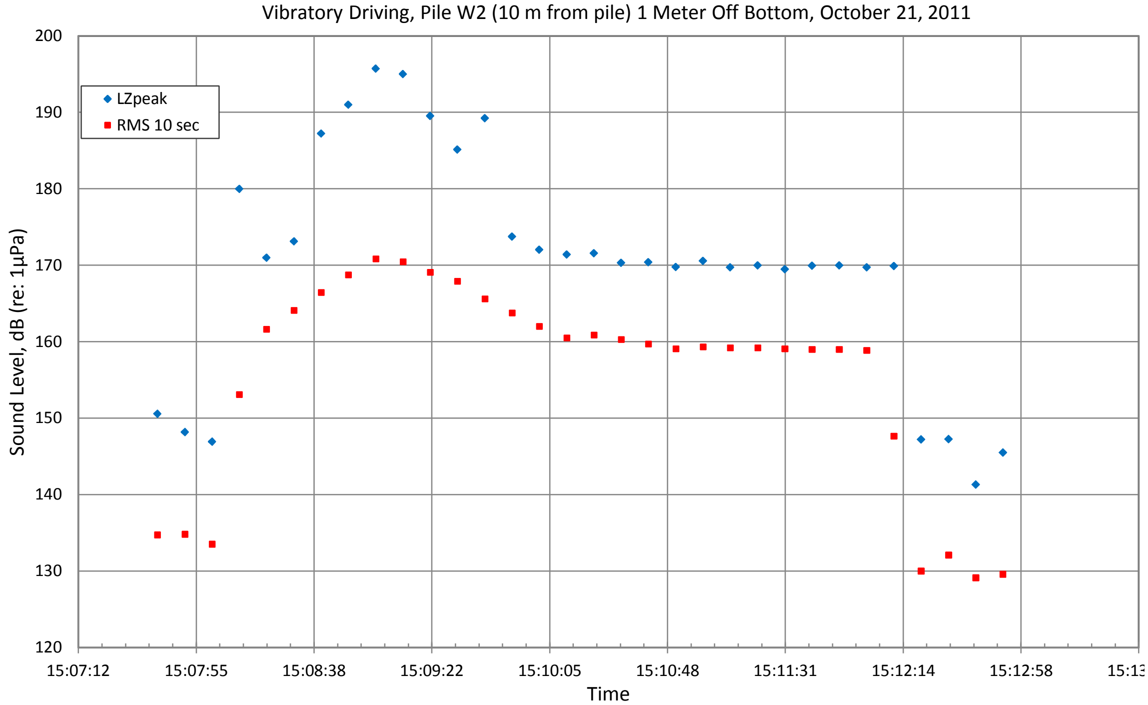


Vibratory Driving Statistics (1 Sec RMS > 143dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	175	8.7	0.05
RMS 1 sec	162	4.8	0.03

Inactive Vibratory Hammer Statistics (1 sec RMS < 143 dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	143	2.9	0.02
RMS 1 sec	132	3.4	0.03

Input: 111021 003-B

Vibratory Driving, Pile W2 (10 m from pile) 1 Meter Off Bottom, October 21, 2011

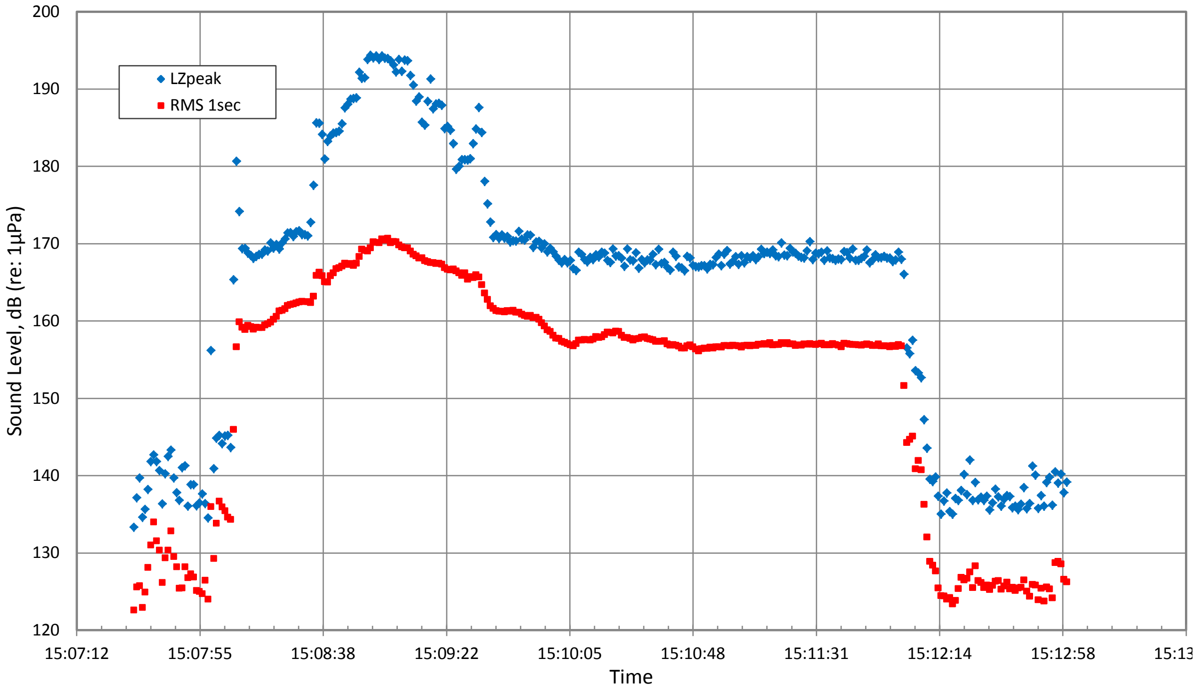


Vibratory Driving Statistics (10 Sec RMS > 143dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	177	9.2	0.05
RMS 10sec	162	5.3	0.03

Inactive Vibratory Hammer Statistics (10 sec RMS < 143 dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	147	2.8	0.02
RMS 10sec	132	2.4	0.02

Input: 111021 003-B

Vibratory Driving, Pile W2 (10 m from pile) Mid Water Column, October 21, 2011

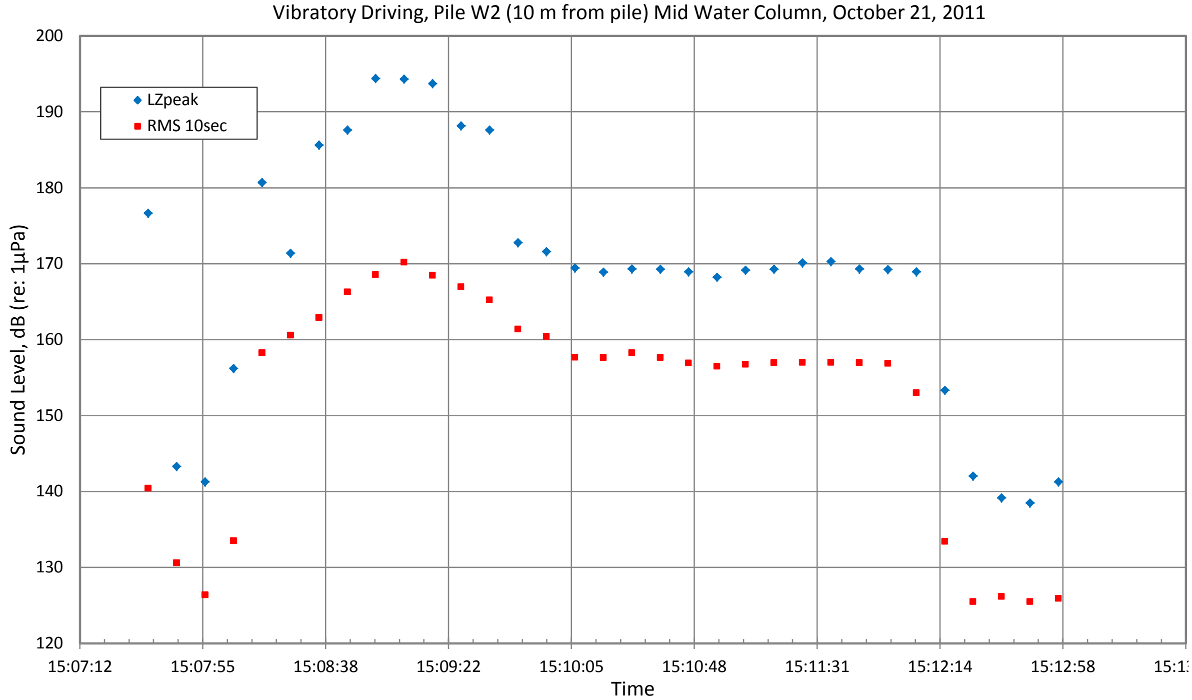


Vibratory Driving Statistics (1 Sec RMS > 143dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	173	8.9	0.05
RMS 1sec	160	4.9	0.03

Inactive Vibratory Hammer Statistics, (1 sec RMS < 143 dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	139	4.3	0.03
RMS 1sec	128	4.2	0.03

Input: 111021 003-B

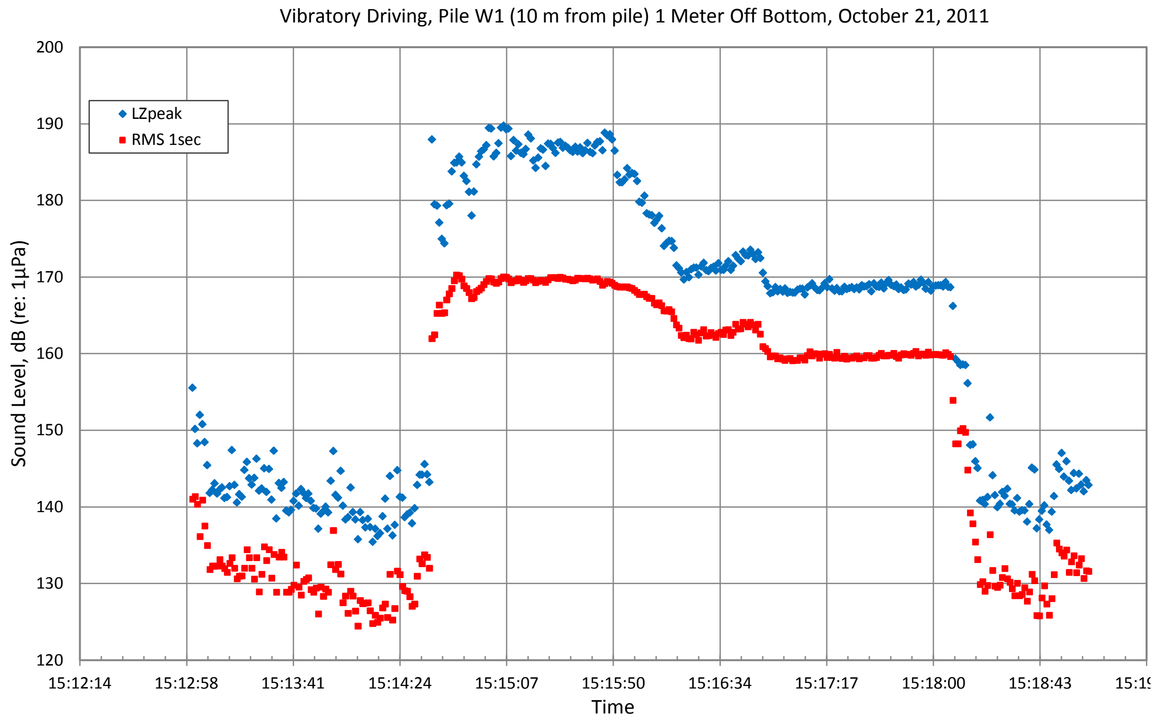
Vibratory Driving, Pile W2 (10 m from pile) Mid Water Column, October 21, 2011



Vibratory Driving Statistics (10 Sec RMS > 143dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	176	9.7	0.06
RMS 10sec	160	4.8	0.03

Inactive Vibratory Hammer Statistics, (10 sec RMS < 143 dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	148	12.4	0.08
RMS 10sec	130	5.2	0.04

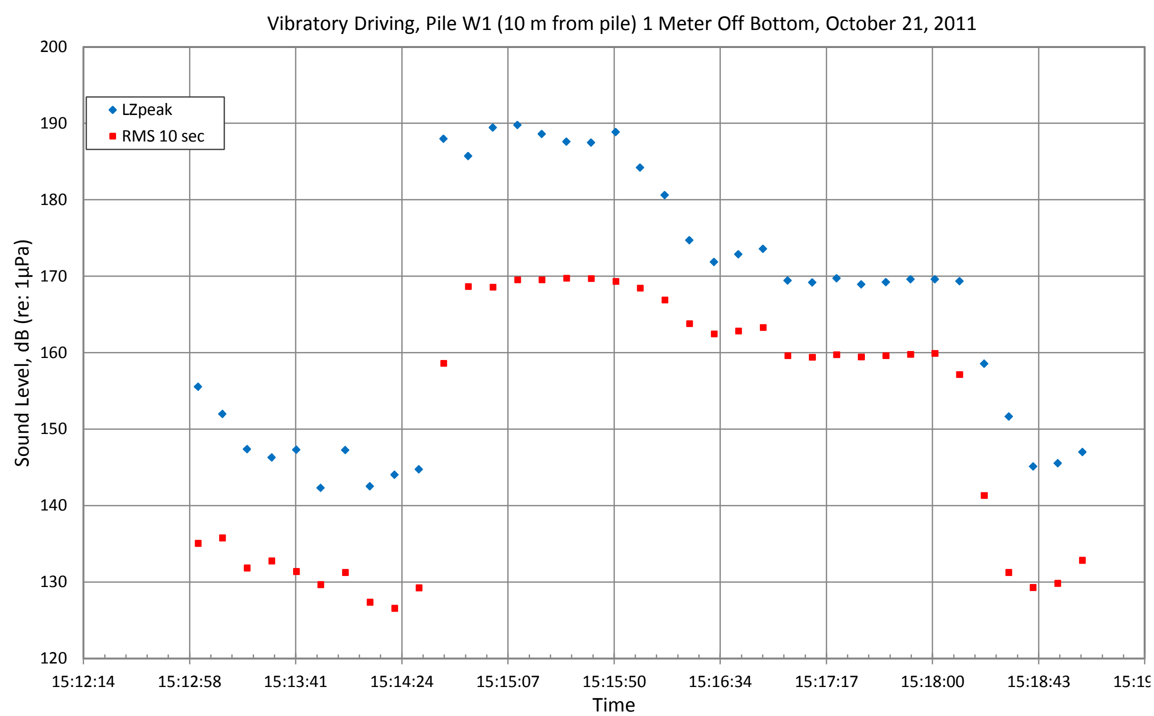
Input: 111021 003-B



Vibratory Driving Statistics (1 Sec RMS > 143dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	176	8.4	0.05
RMS 1 sec	164	5.0	0.03

Inactive Vibratory Hammer Statistics (1 sec RMS < 143 dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	142	3.4	0.02
RMS 1 sec	131	3.3	0.03

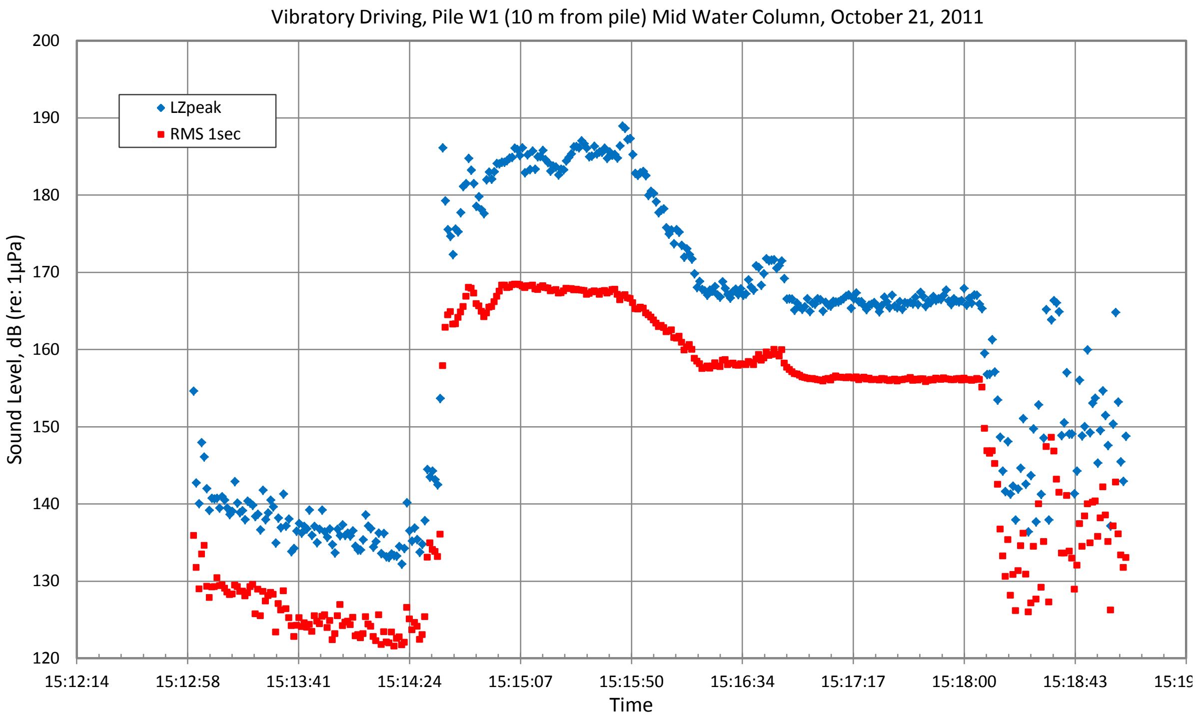
Input: 111021 003-C



Vibratory Driving Statistics (10 Sec RMS > 143dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	178	8.7	0.05
RMS 10sec	164	4.6	0.03

Inactive Vibratory Hammer Statistics (10 sec RMS < 143 dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	148	4.7	0.03
RMS 10sec	132	3.7	0.03

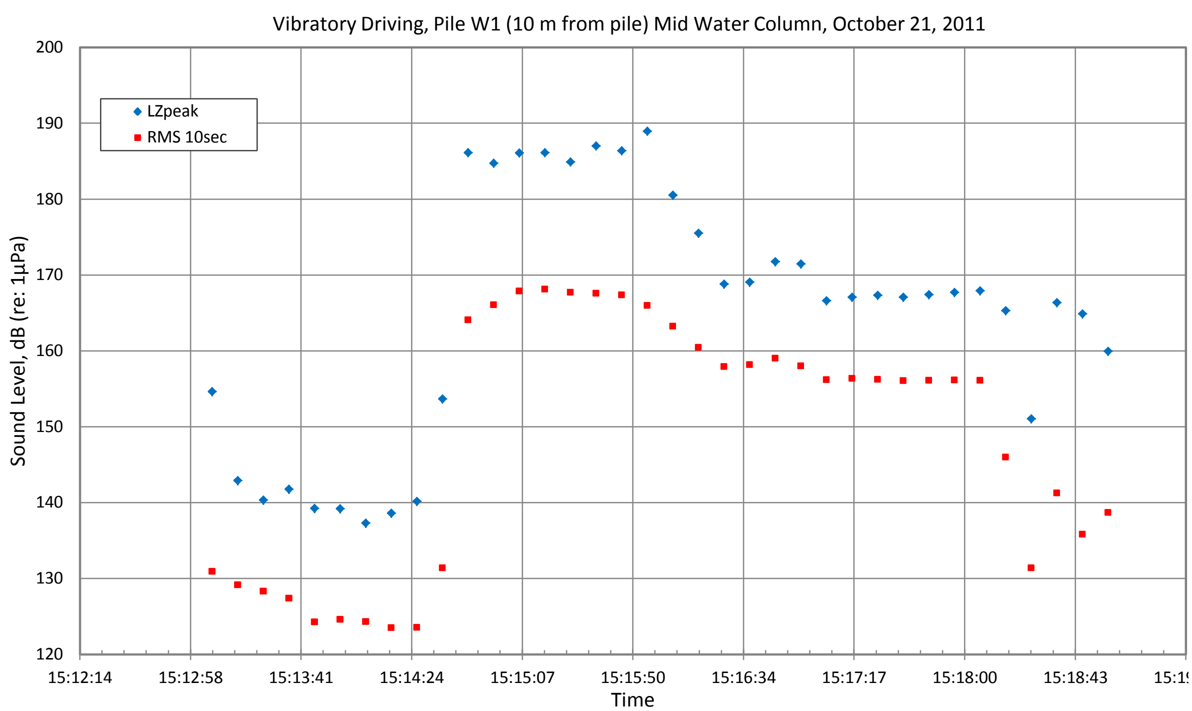
Input: 111021 003-C



Vibratory Driving Statistics (1 Sec RMS > 143dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	174	8.5	0.05
RMS 1sec	161	5.6	0.03

Inactive Vibratory Hammer Statistics, (1 sec RMS < 143 dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	141	6.8	0.05
RMS 1sec	129	5.4	0.04

Input: 111021 003-C

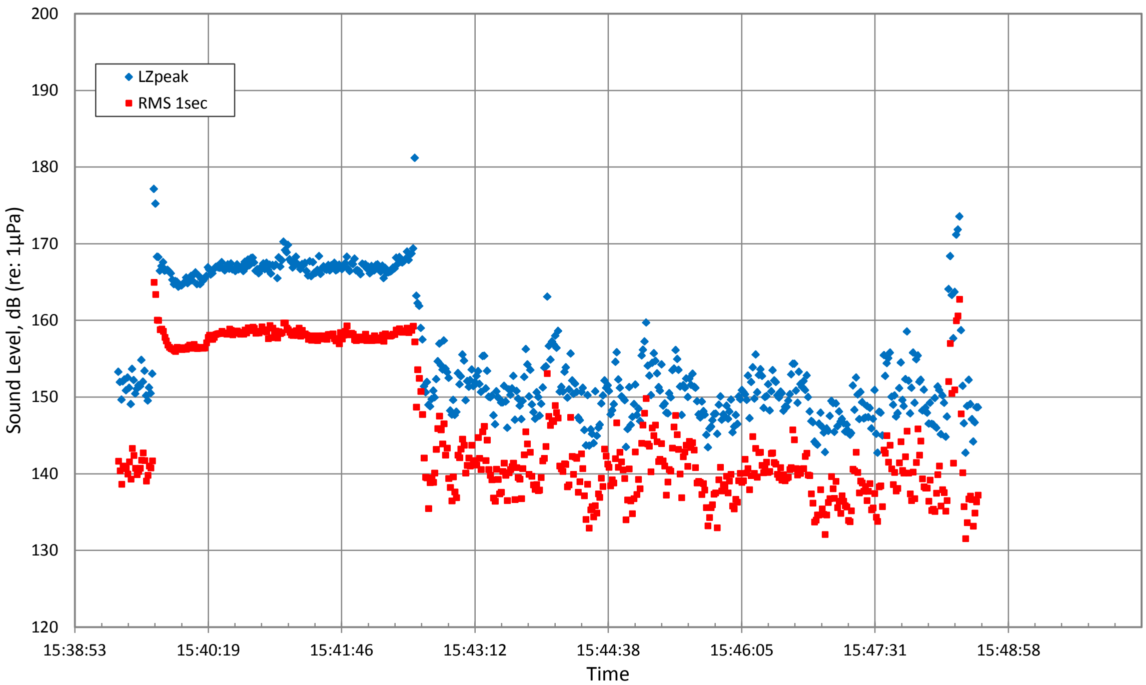


Vibratory Driving Statistics (10 Sec RMS > 143dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	176	8.9	0.05
RMS 10sec	160	5.8	0.04

Inactive Vibratory Hammer Statistics, (10 sec RMS < 143 dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	148	10.3	0.07
RMS 10sec	130	5.7	0.04

Input: 111021 003-C

Vibratory Driving, Pile W3 (10 m from pile) 1 Meter Off Bottom, October 21, 2011

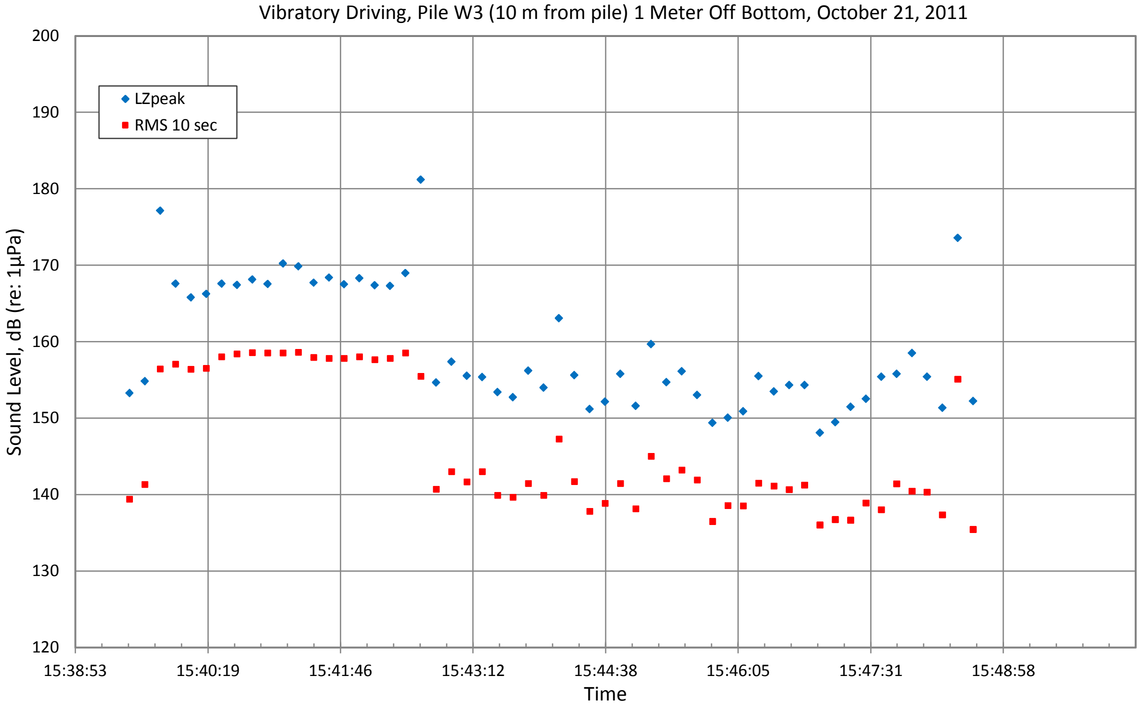


Vibratory Driving Statistics (1 Sec RMS > 143dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	164	5.7	0.03
RMS 1 sec	155	5.8	0.04

Inactive Vibratory Hammer Statistics (1 sec RMS < 143 dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	149	2.6	0.02
RMS 1 sec	139	2.5	0.02

Input: 111021 004

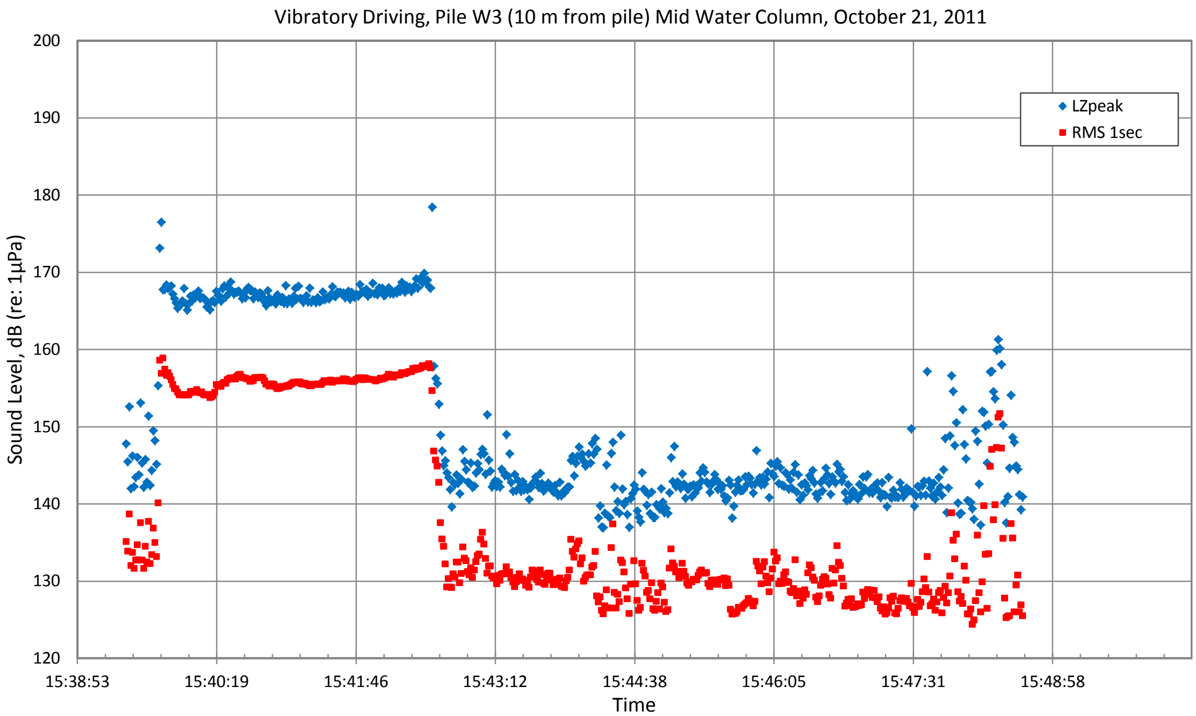
Vibratory Driving, Pile W3 (10 m from pile) 1 Meter Off Bottom, October 21, 2011



Vibratory Driving Statistics (10 Sec RMS > 143dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	167	5.9	0.04
RMS 10sec	155	5.6	0.04

Inactive Vibratory Hammer Statistics (10 sec RMS < 143 dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	153	2.4	0.02
RMS 10sec	140	2.0	0.01

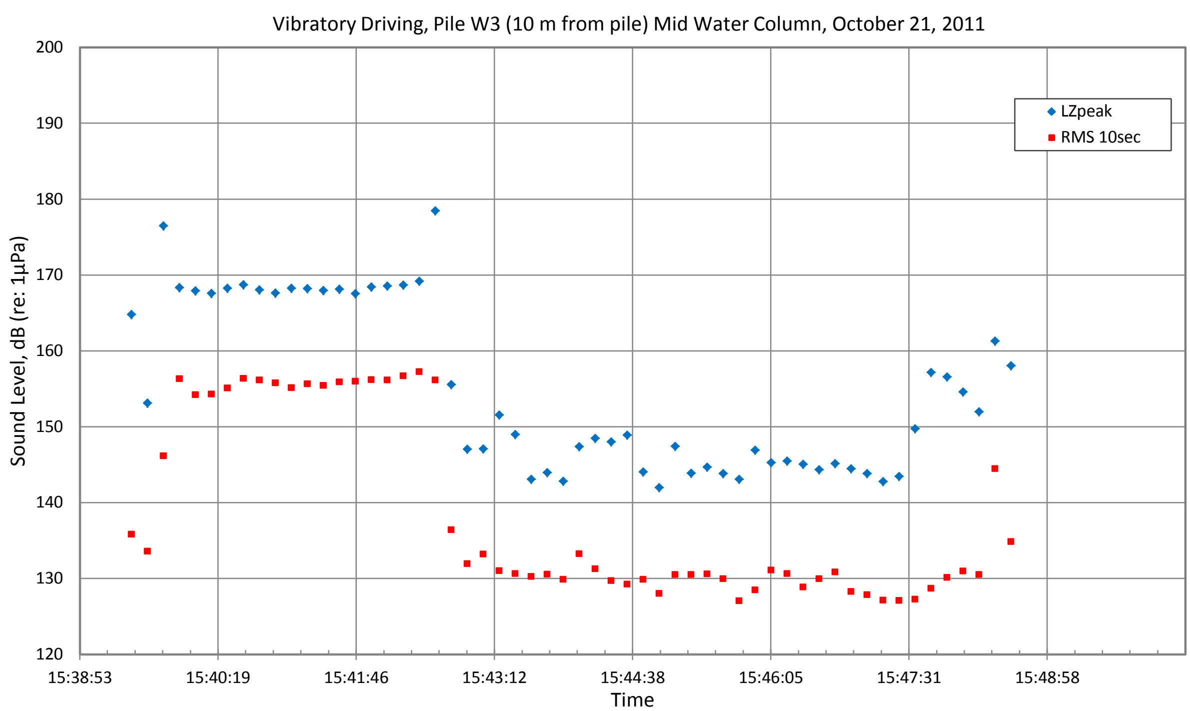
Input: 111021 004



Vibratory Driving Statistics (1 Sec RMS > 143dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	167	2.5	0.01
RMS 1sec	155	2.2	0.01

Inactive Vibratory Hammer Statistics, (1 sec RMS < 143 dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	143	3.3	0.02
RMS 1sec	130	3.0	0.02

Input: 111021 004

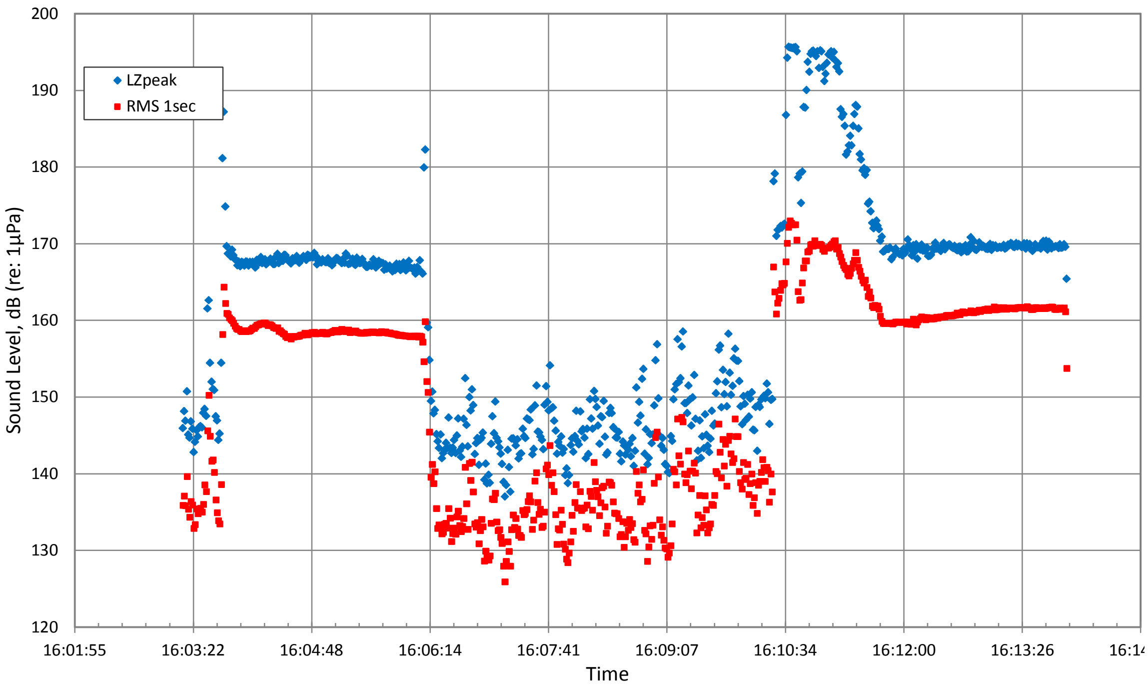


Vibratory Driving Statistics (10 Sec RMS > 143dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	169	3.5	0.02
RMS 10sec	155	3.4	0.02

Inactive Vibratory Hammer Statistics, (10 sec RMS < 143 dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	148	5.3	0.04
RMS 10sec	130	2.3	0.02

Input: 111021 004

Vibratory Driving, Pile W4 (10 m from pile) 1 Meter Off Bottom, October 21, 2011

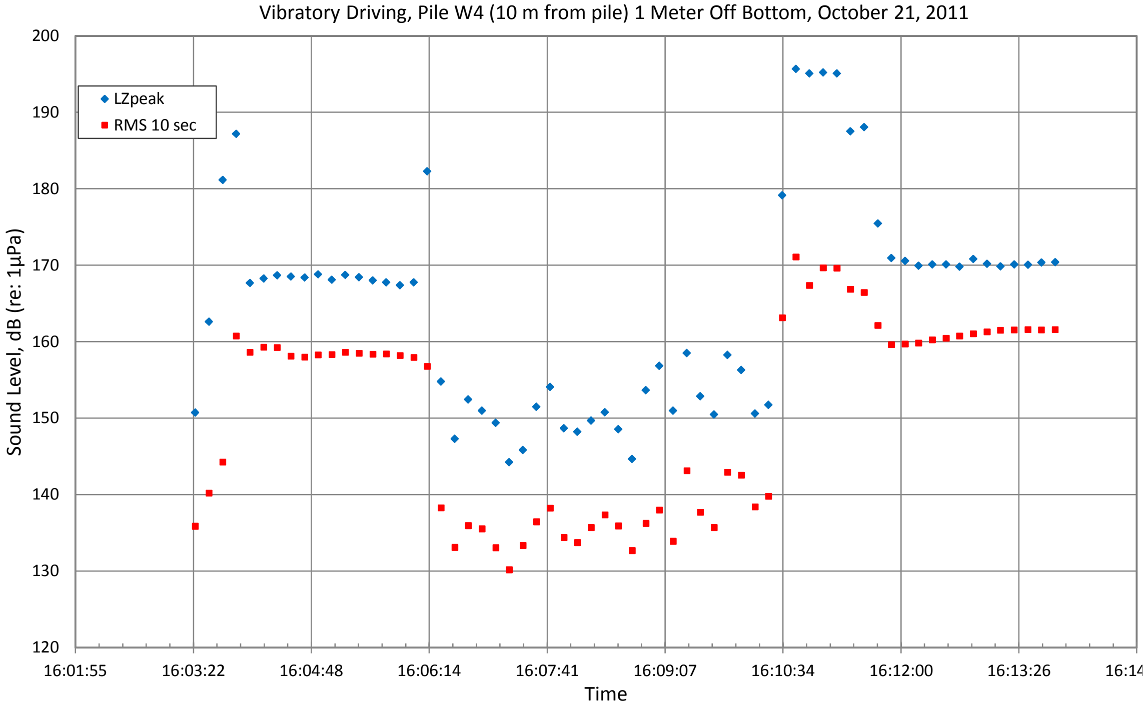


Vibratory Driving Statistics (1 Sec RMS > 143dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	172	8.8	0.05
RMS 1 sec	160	4.9	0.03

Inactive Vibratory Hammer Statistics (1 sec RMS < 143 dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	146	3.5	0.02
RMS 1 sec	136	3.6	0.03

Input: 111021 005-A

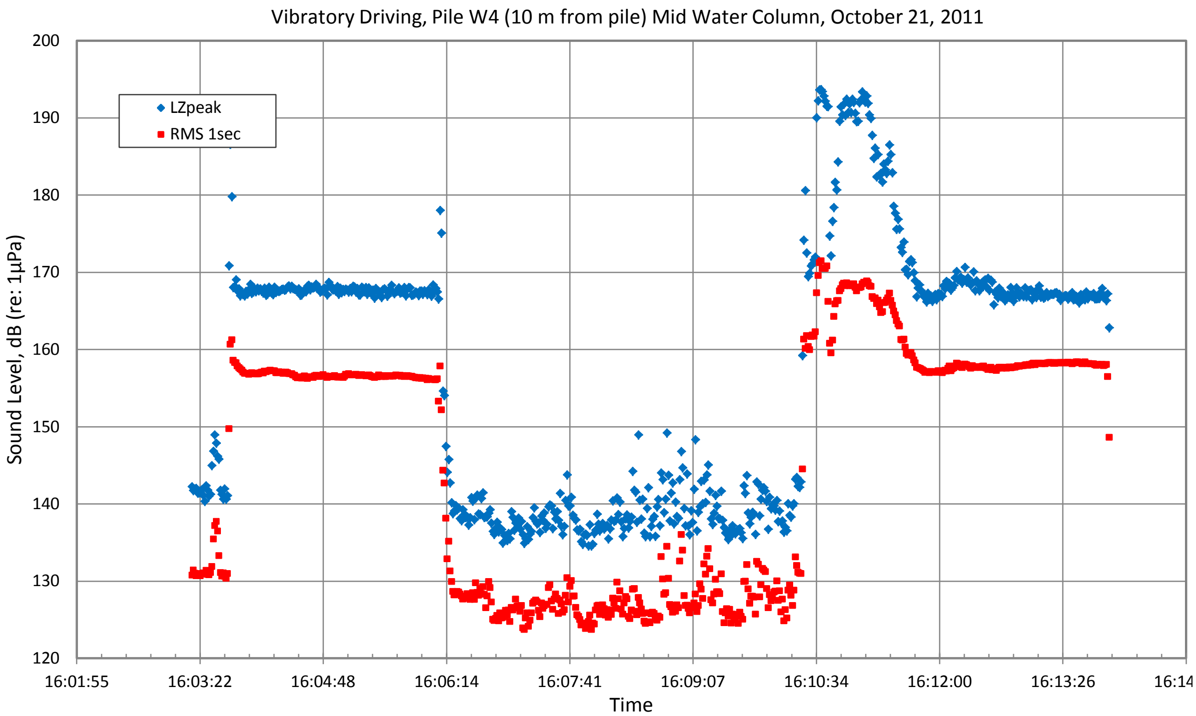
Vibratory Driving, Pile W4 (10 m from pile) 1 Meter Off Bottom, October 21, 2011



Vibratory Driving Statistics (10 Sec RMS > 143dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	174	9.5	0.05
RMS 10sec	160	5.3	0.03

Inactive Vibratory Hammer Statistics (10 sec RMS < 143 dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	151	4.2	0.03
RMS 10sec	136	3.0	0.02

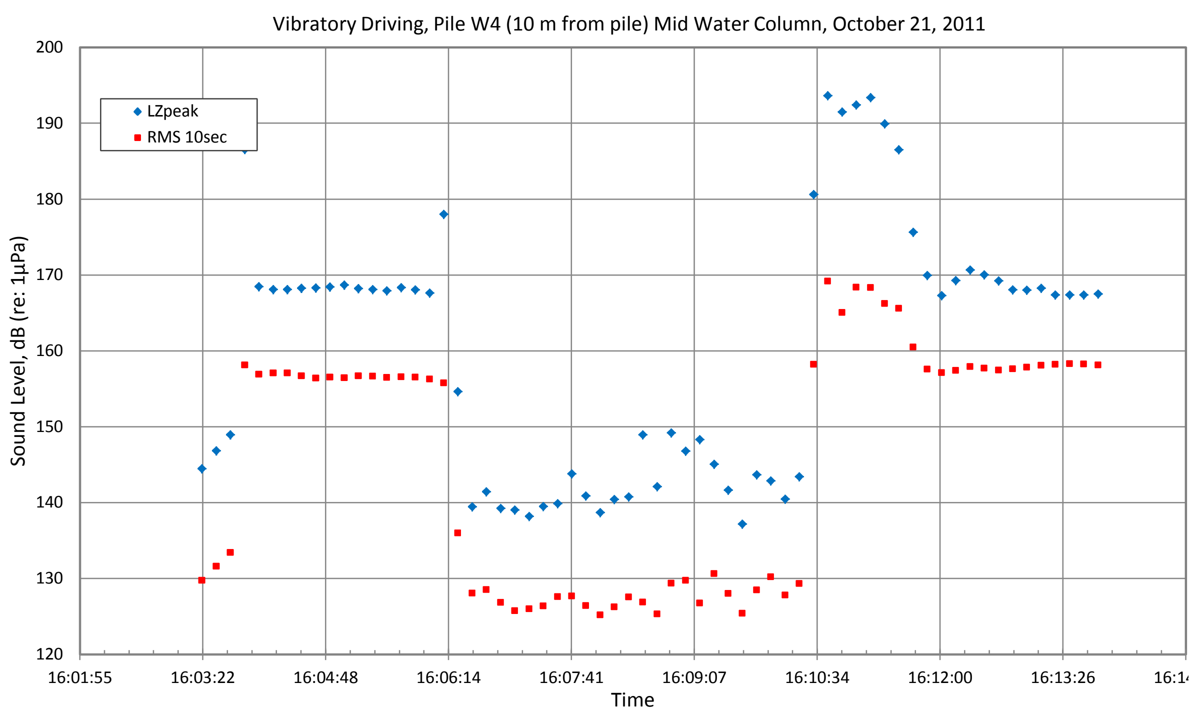
Input: 111021 005-A



Vibratory Driving Statistics (1 Sec RMS > 143dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	171	7.7	0.04
RMS 1sec	159	4.0	0.03

Inactive Vibratory Hammer Statistics, (1 sec RMS < 143 dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	139	3.0	0.02
RMS 1sec	128	2.8	0.02

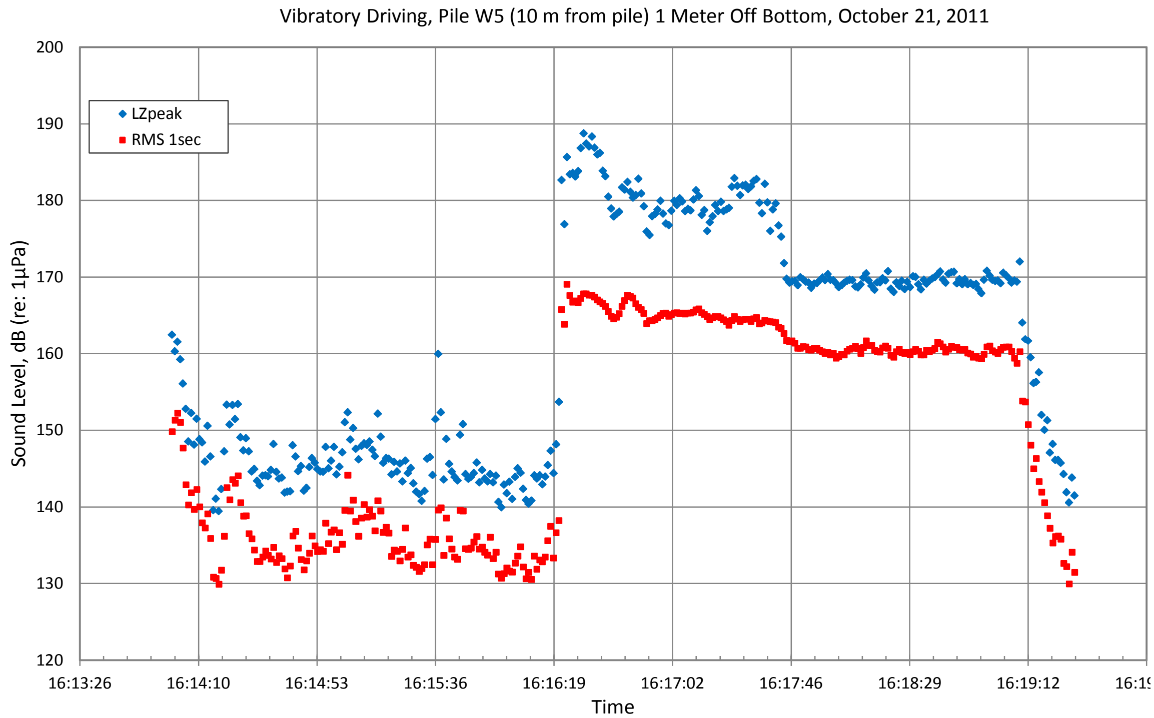
Input: 111021 005-A



Vibratory Driving Statistics (10 Sec RMS > 143dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	173	9.1	0.05
RMS 10sec	159	3.8	0.02

Inactive Vibratory Hammer Statistics, (10 sec RMS < 143 dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	143	4.2	0.03
RMS 10sec	128	2.5	0.02

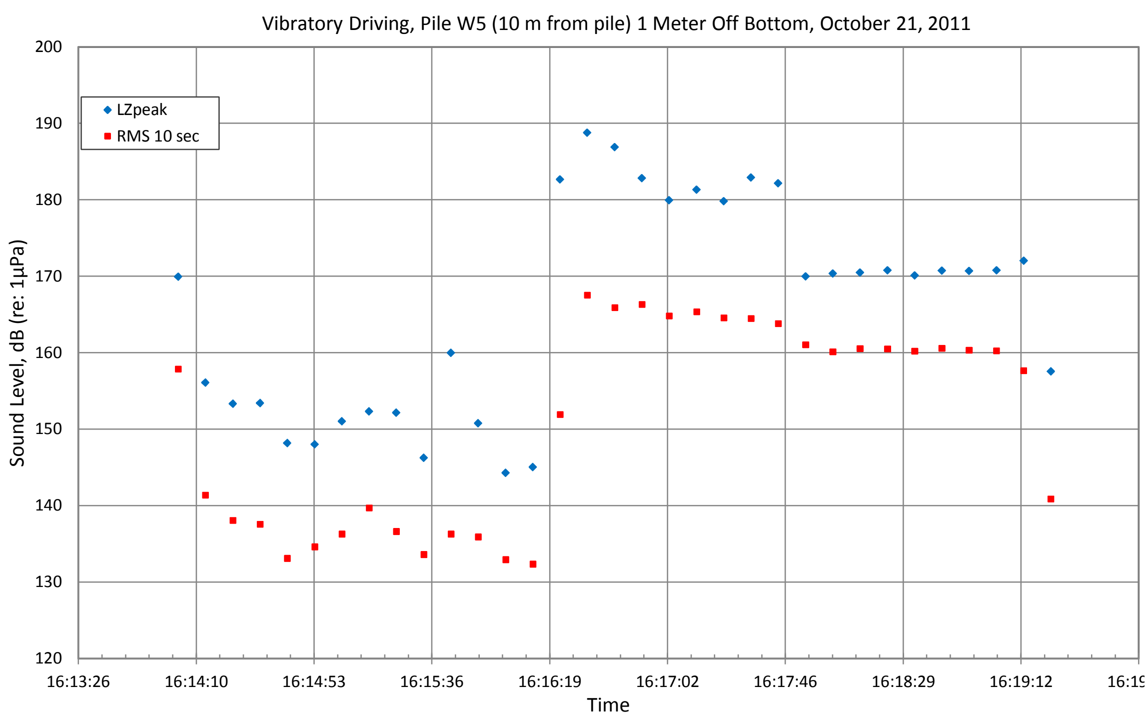
Input: 111021 005-A



Vibratory Driving Statistics (1 Sec RMS > 143dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	173	7.5	0.04
RMS 1 sec	162	5.0	0.03

Inactive Vibratory Hammer Statistics (1 sec RMS < 143 dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	146	3.3	0.02
RMS 1 sec	135	3.1	0.02

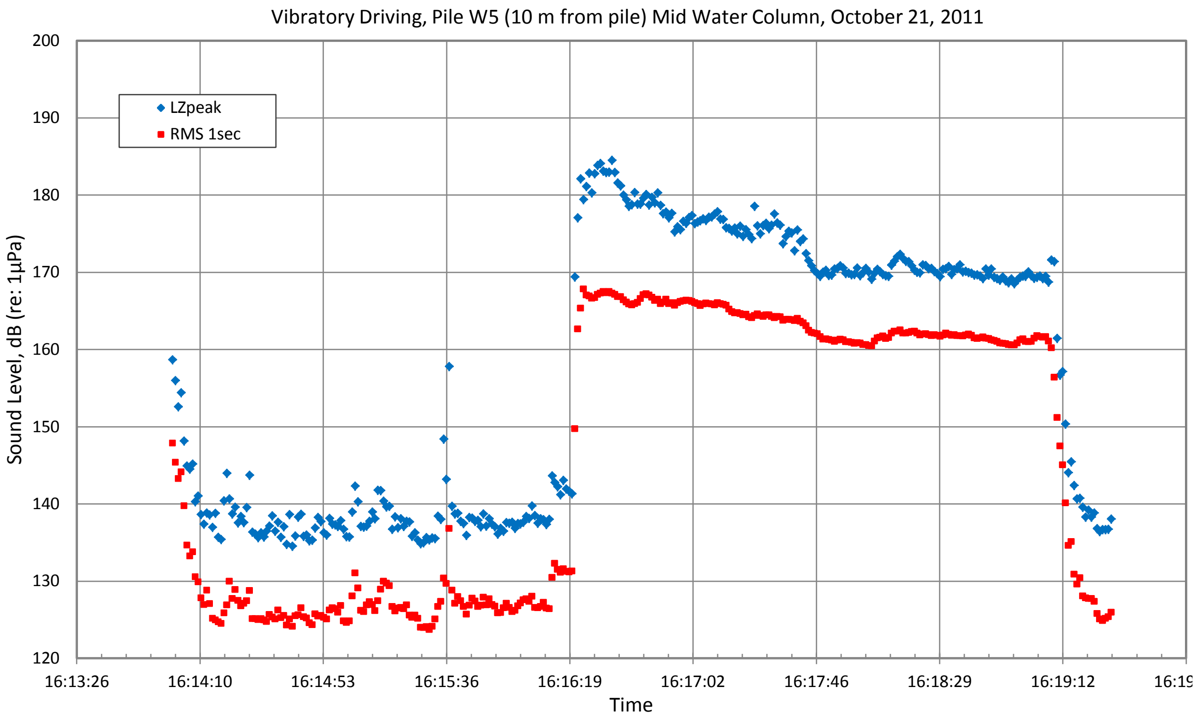
Input: 111021 005-B



Vibratory Driving Statistics (10 Sec RMS > 143dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	176	6.7	0.04
RMS 10sec	162	3.8	0.02

Inactive Vibratory Hammer Statistics (10 sec RMS < 143 dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	151	4.7	0.03
RMS 10sec	136	2.9	0.02

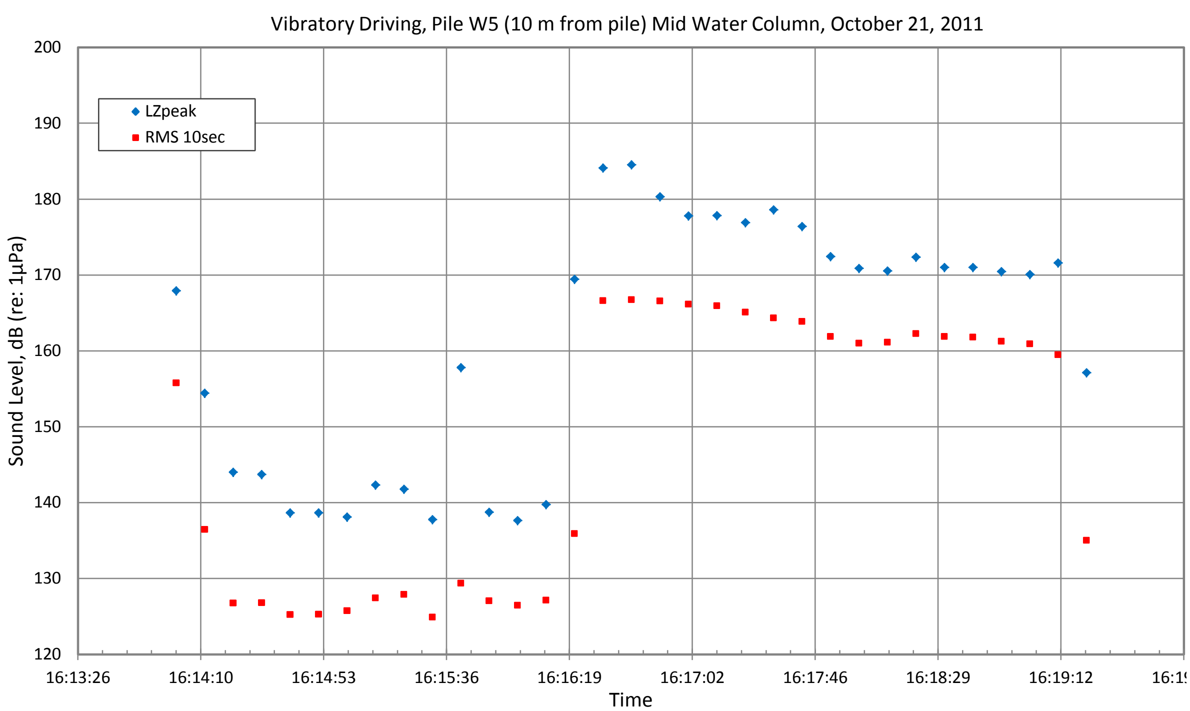
Input: 111021 005-B



Vibratory Driving Statistics (1 Sec RMS > 143dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	173	5.4	0.03
RMS 1sec	163	4.2	0.03

Inactive Vibratory Hammer Statistics, (1 sec RMS < 143 dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	139	3.2	0.02
RMS 1sec	127	2.8	0.02

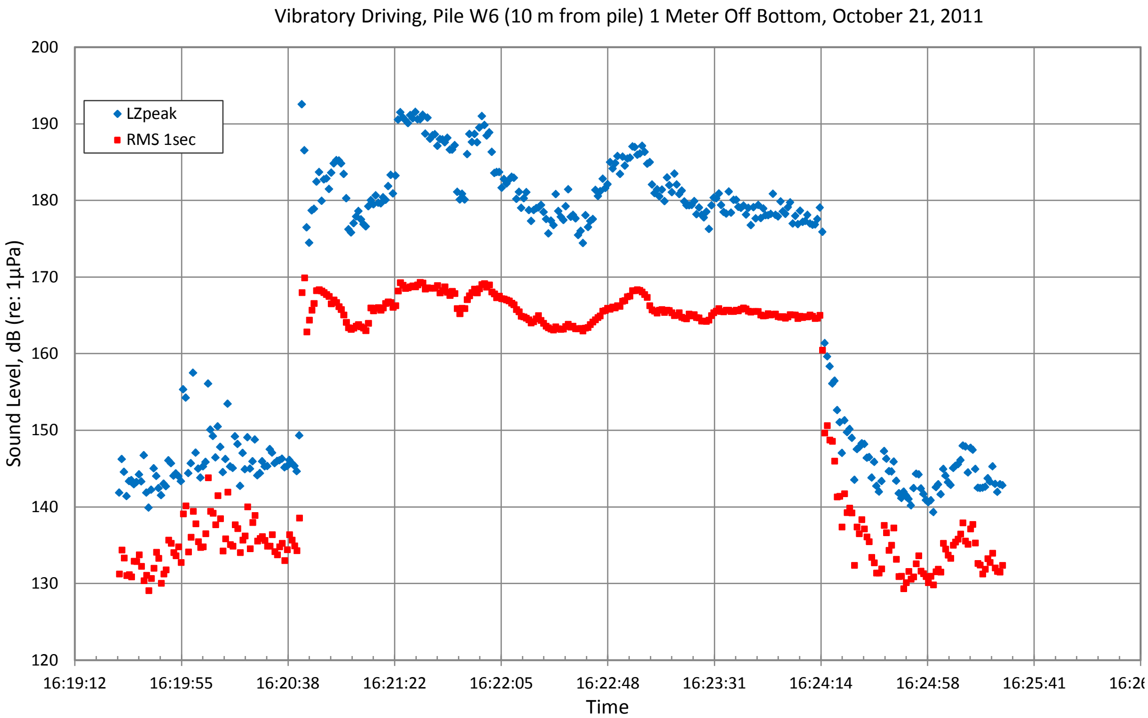
Input: 111021 005-B



Vibratory Driving Statistics (10 Sec RMS > 143dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	175	5.0	0.03
RMS 10sec	163	3.0	0.02

Inactive Vibratory Hammer Statistics, (10 sec RMS < 143 dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	145	9.7	0.07
RMS 10sec	128	3.9	0.03

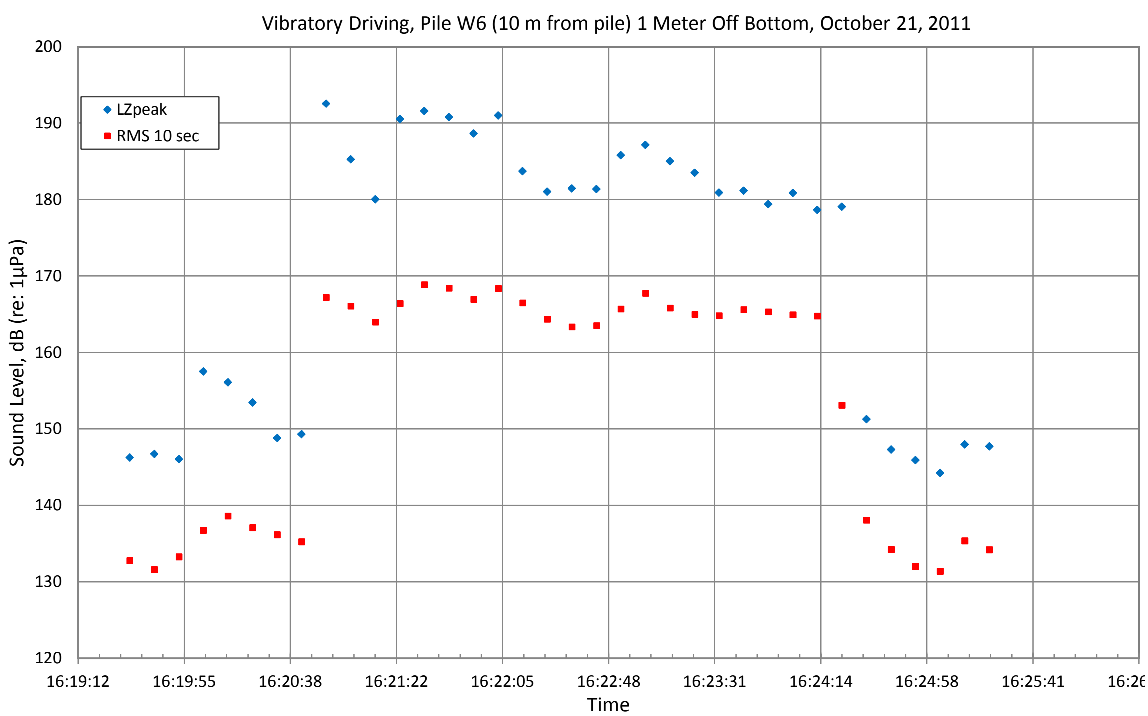
Input: 111021 005-B



Vibratory Driving Statistics (1 Sec RMS > 143dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	181	5.8	0.03
RMS 1 sec	165	3.4	0.02

Inactive Vibratory Hammer Statistics (1 sec RMS < 143 dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	145	3.1	0.02
RMS 1 sec	135	3.0	0.02

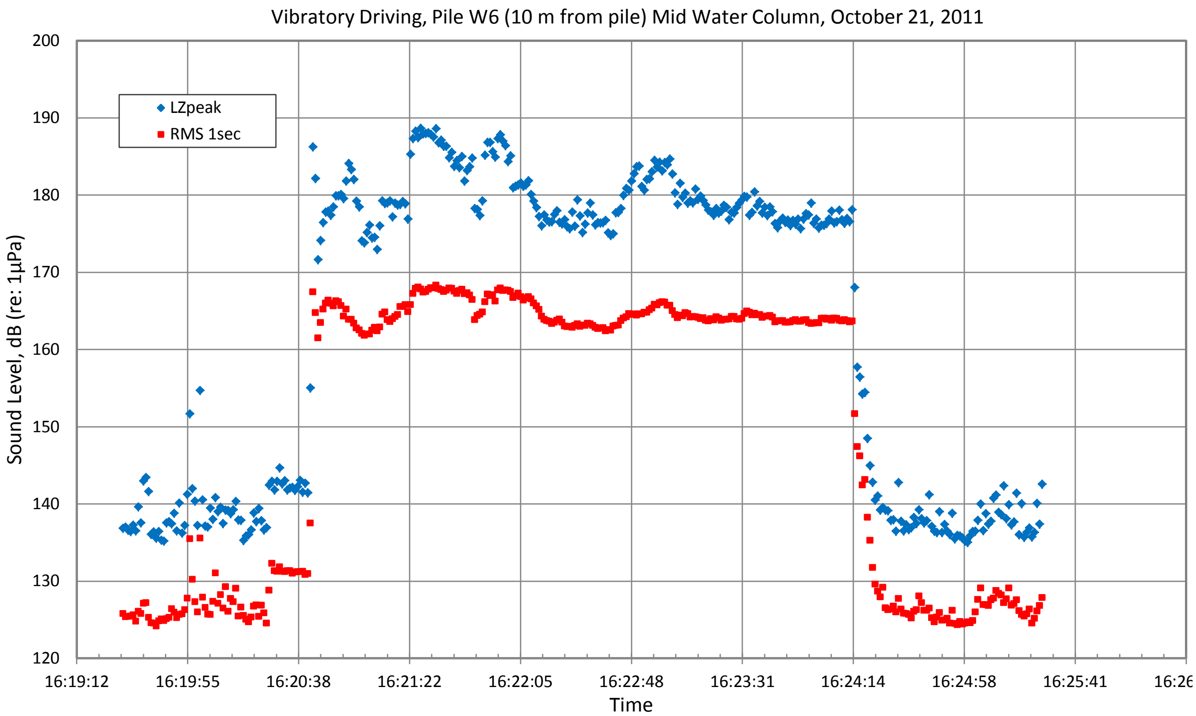
Input: 111021 005-C



Vibratory Driving Statistics (10 Sec RMS > 143dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	185	4.6	0.02
RMS 10sec	165	3.1	0.02

Inactive Vibratory Hammer Statistics (10 sec RMS < 143 dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	149	4.0	0.03
RMS 10sec	135	2.4	0.02

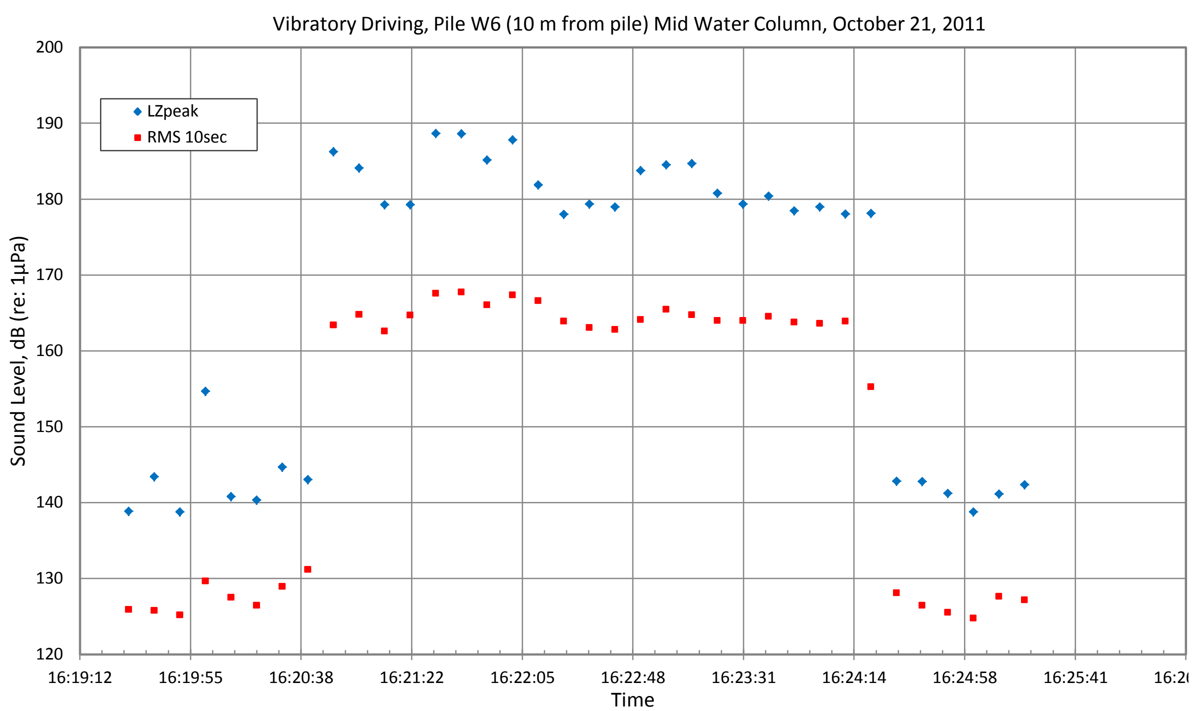
Input: 111021 005-C



Vibratory Driving Statistics (1 Sec RMS > 143dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	179	4.7	0.03
RMS 1sec	164	2.9	0.02

Inactive Vibratory Hammer Statistics, (1 sec RMS < 143 dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	139	3.5	0.03
RMS 1sec	127	3.0	0.02

Input: 111021 005-C

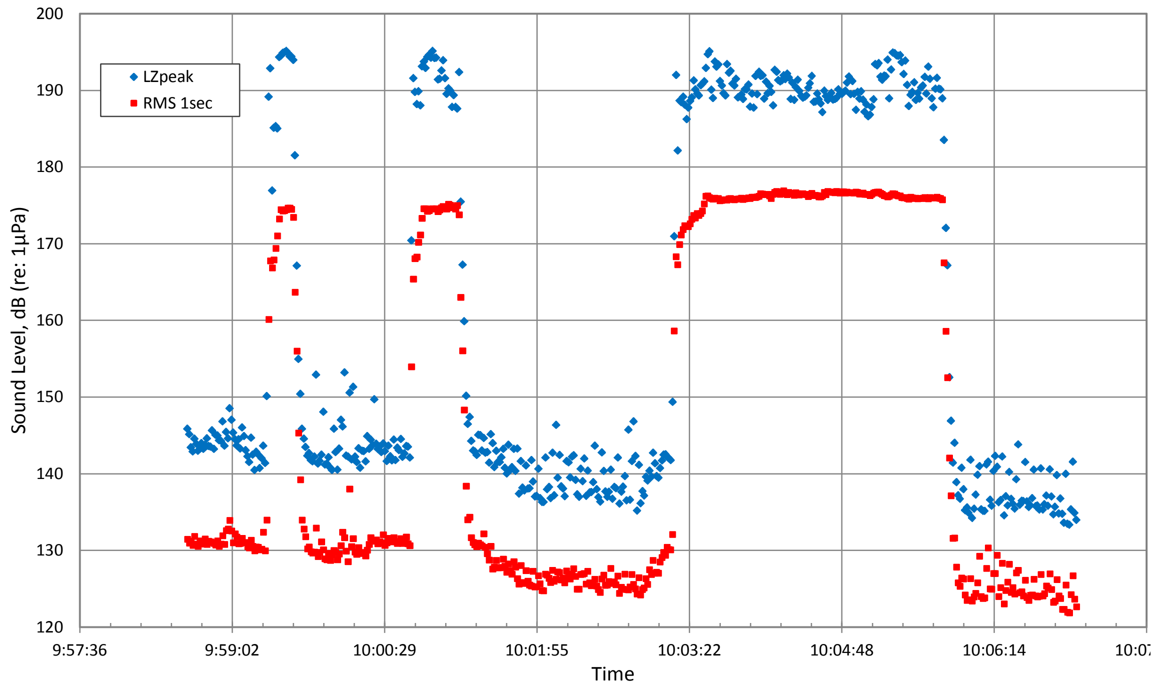


Vibratory Driving Statistics (10 Sec RMS > 143dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	182	3.7	0.02
RMS 10sec	164	2.5	0.02

Inactive Vibratory Hammer Statistics, (10 sec RMS < 143 dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	142	4.0	0.03
RMS 10sec	127	1.8	0.01

Input: 111021 005-C

Vibratory Driving, Pile W7 (10 m from pile) 1 Meter Off Bottom, October 27, 2011

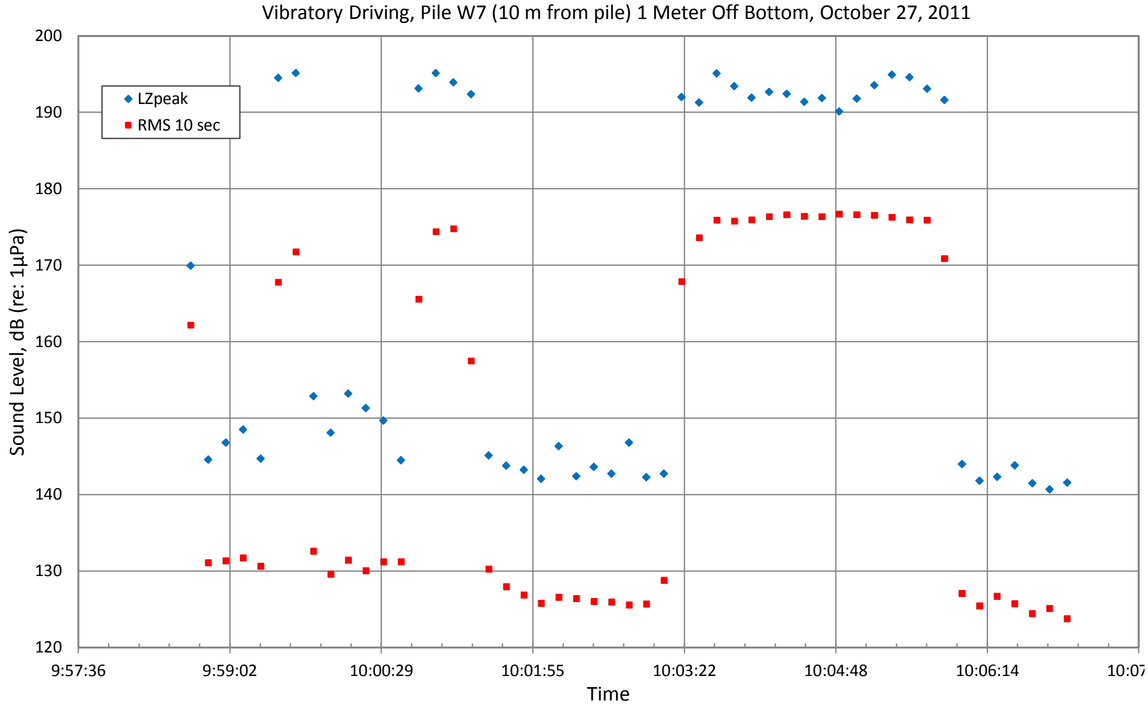


Vibratory Driving Statistics (1 Sec RMS > 143dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	189	5.6	0.03
RMS 1 sec	174	5.0	0.03

Inactive Vibratory Hammer Statistics (1 sec RMS < 143 dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	141	3.8	0.03
RMS 1 sec	128	3.2	0.02

Input: 111027 003

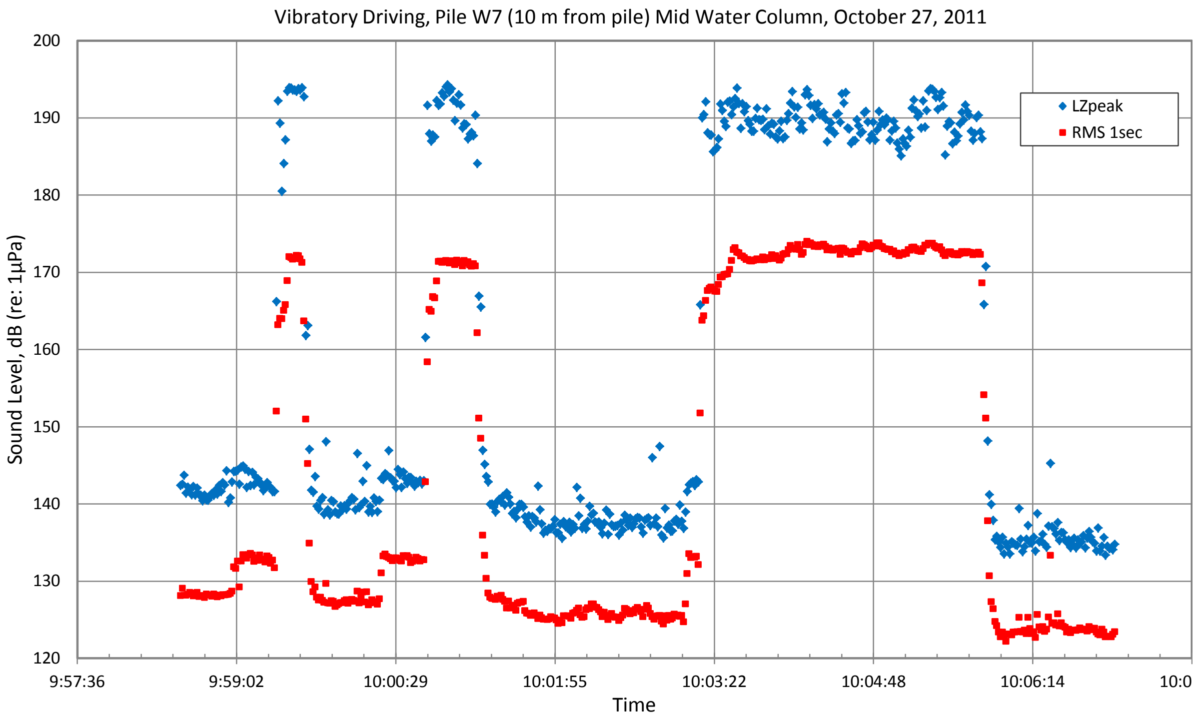
Vibratory Driving, Pile W7 (10 m from pile) 1 Meter Off Bottom, October 27, 2011



Vibratory Driving Statistics (10 Sec RMS > 143dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	192	5.0	0.03
RMS 10sec	173	5.3	0.03

Inactive Vibratory Hammer Statistics (10 sec RMS < 143 dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	145	3.5	0.02
RMS 10sec	128	2.7	0.02

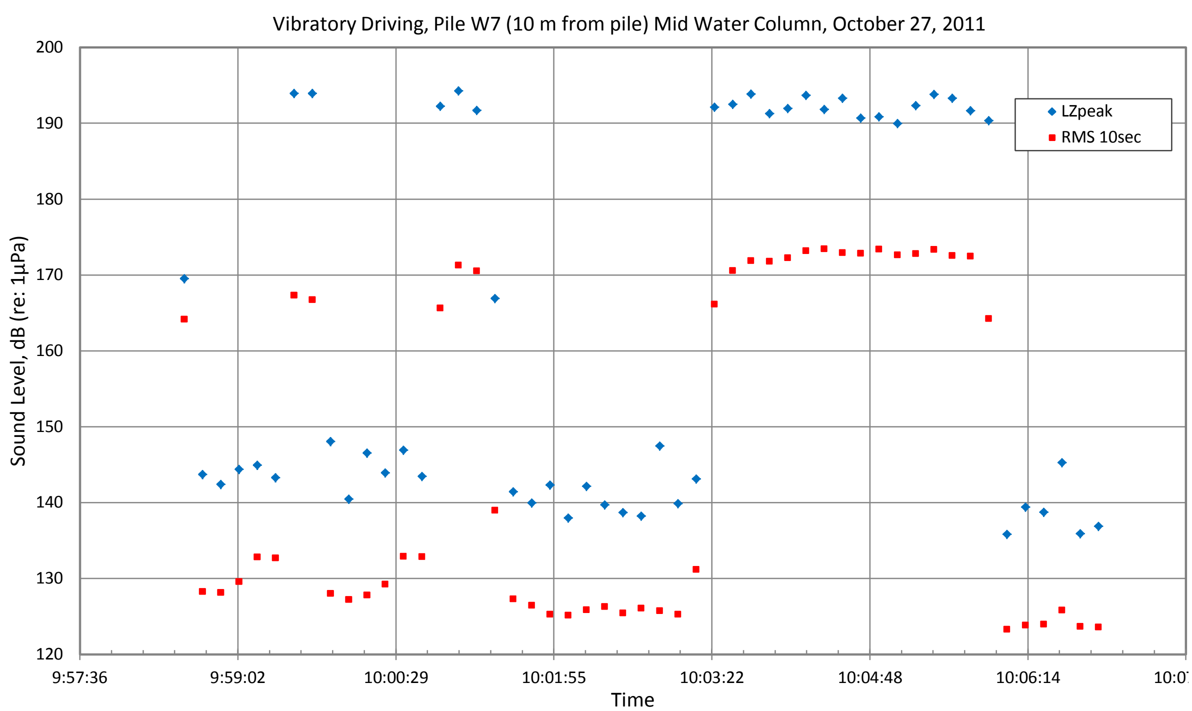
Input: 111027 003



Vibratory Driving Statistics (1 Sec RMS > 143dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	189	5.3	0.03
RMS 1sec	171	4.8	0.03

Inactive Vibratory Hammer Statistics, (1 sec RMS < 143 dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	139	3.5	0.03
RMS 1sec	127	3.4	0.03

Input: 111027 003

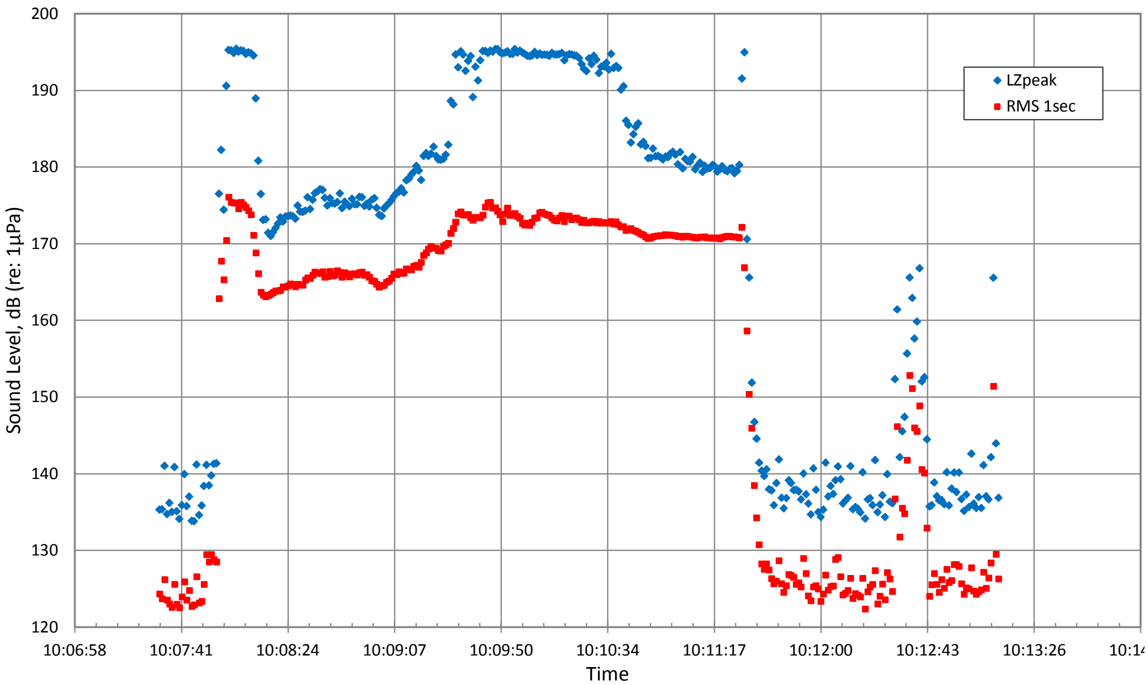


Vibratory Driving Statistics (10 Sec RMS > 143dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	191	5.0	0.03
RMS 10sec	171	3.2	0.02

Inactive Vibratory Hammer Statistics, (10 sec RMS < 143 dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	143	5.8	0.04
RMS 10sec	128	3.7	0.03

Input: 111027 003

Vibratory Driving, Pile W9 (10 m from pile) 1 Meter Off Bottom, October 27, 2011

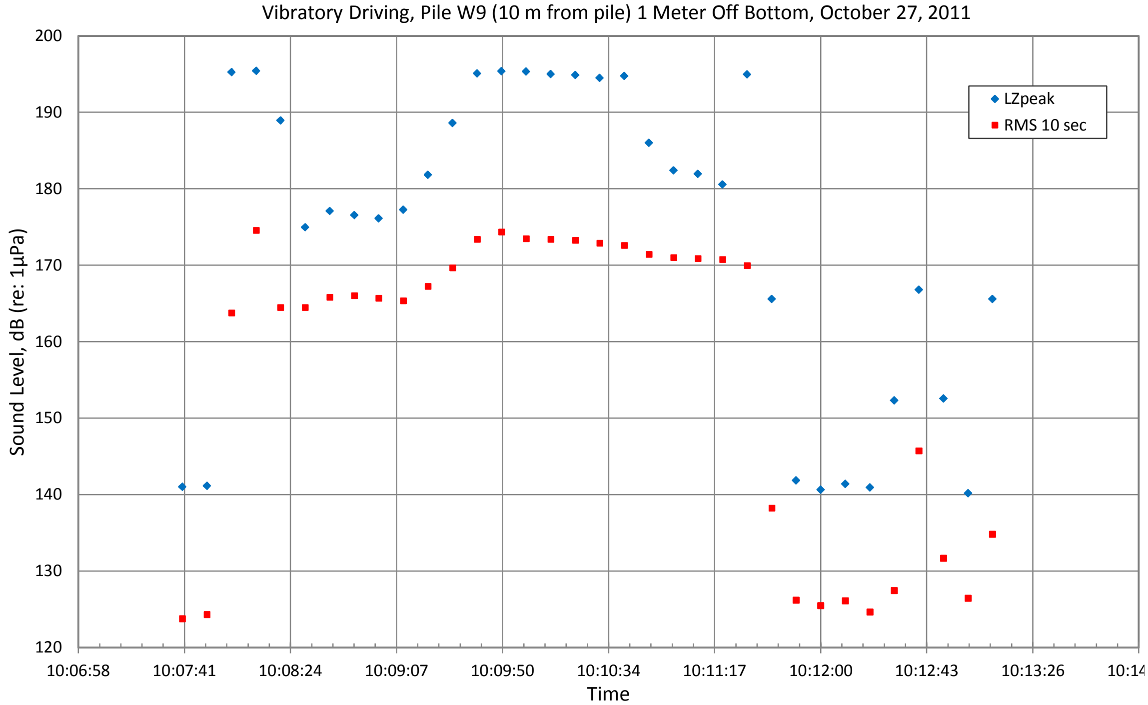


Vibratory Driving Statistics (1 Sec RMS > 143dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	184	9.3	0.05
RMS 1 sec	169	5.5	0.03

Inactive Vibratory Hammer Statistics (1 sec RMS < 143 dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	139	4.0	0.03
RMS 1 sec	127	3.7	0.03

Input: 111027 004

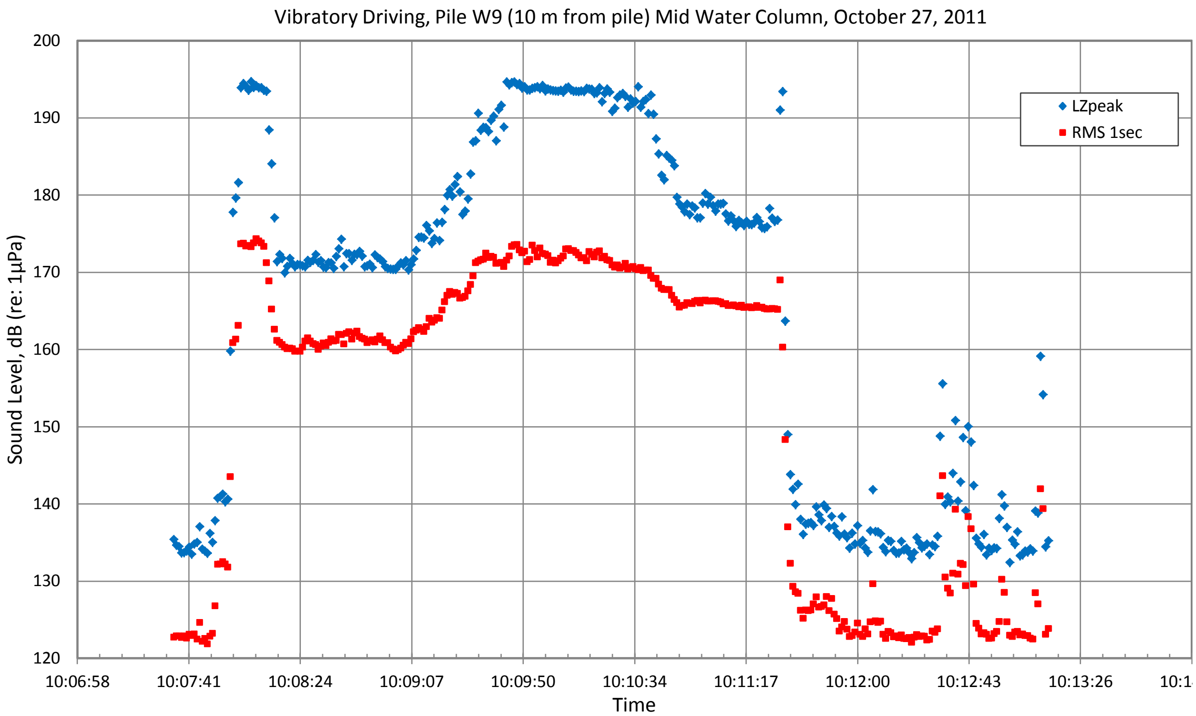
Vibratory Driving, Pile W9 (10 m from pile) 1 Meter Off Bottom, October 27, 2011



Vibratory Driving Statistics (10 Sec RMS > 143dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	187	8.9	0.05
RMS 10sec	169	6.2	0.04

Inactive Vibratory Hammer Statistics (10 sec RMS < 143 dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	148	10.0	0.07
RMS 10sec	128	4.7	0.04

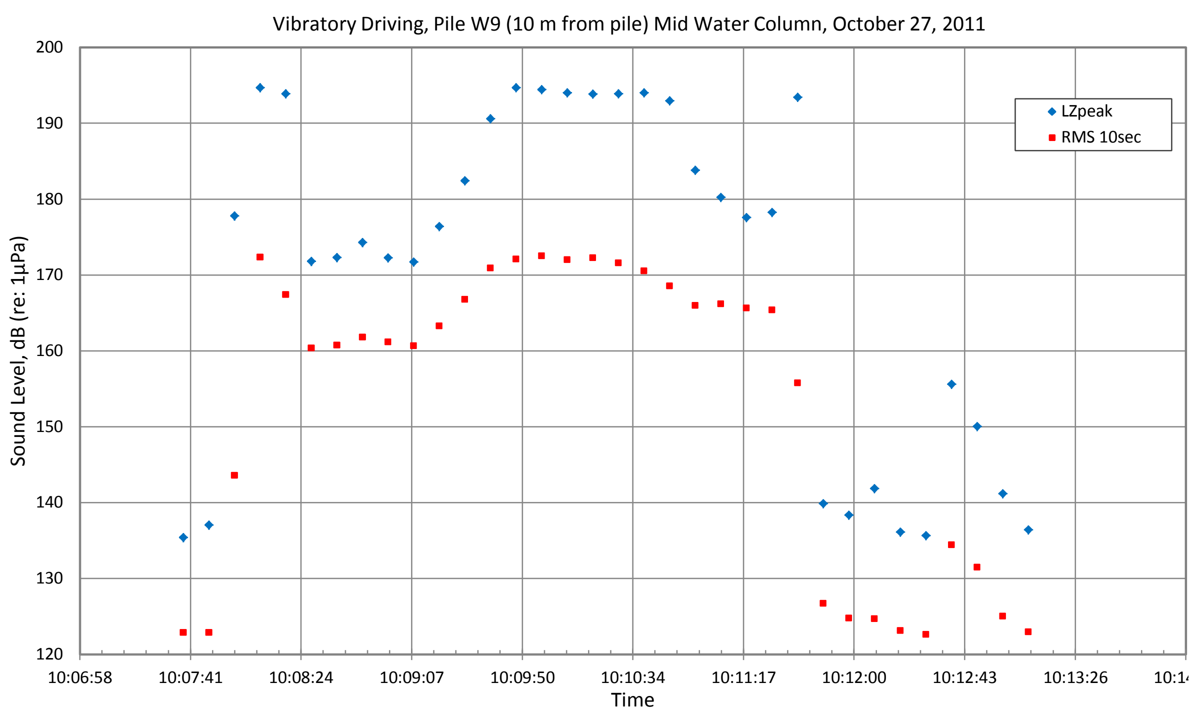
Input: 111027 004



Vibratory Driving Statistics (1 Sec RMS > 143dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	182	9.4	0.05
RMS 1sec	167	5.2	0.03

Inactive Vibratory Hammer Statistics, (1 sec RMS < 143 dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	137	4.6	0.03
RMS 1sec	126	4.4	0.03

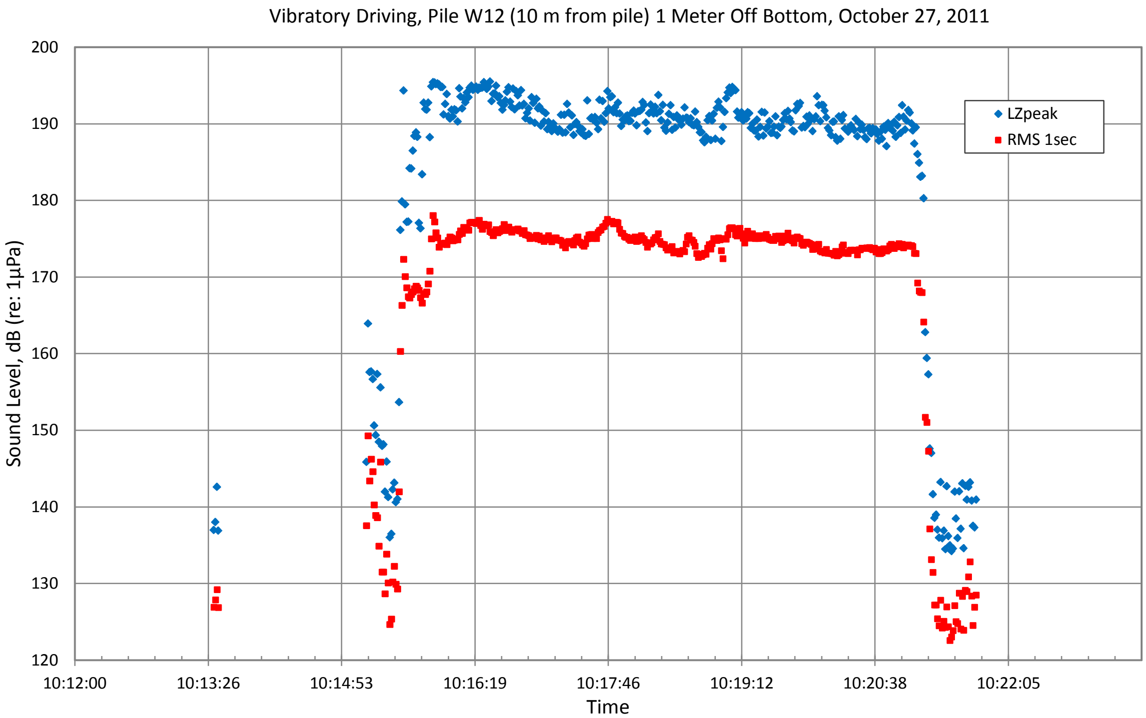
Input: 111027 004



Vibratory Driving Statistics (10 Sec RMS > 143dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	185	9.3	0.05
RMS 10sec	166	6.8	0.04

Inactive Vibratory Hammer Statistics, (10 sec RMS < 143 dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	141	6.5	0.05
RMS 10sec	126	3.9	0.03

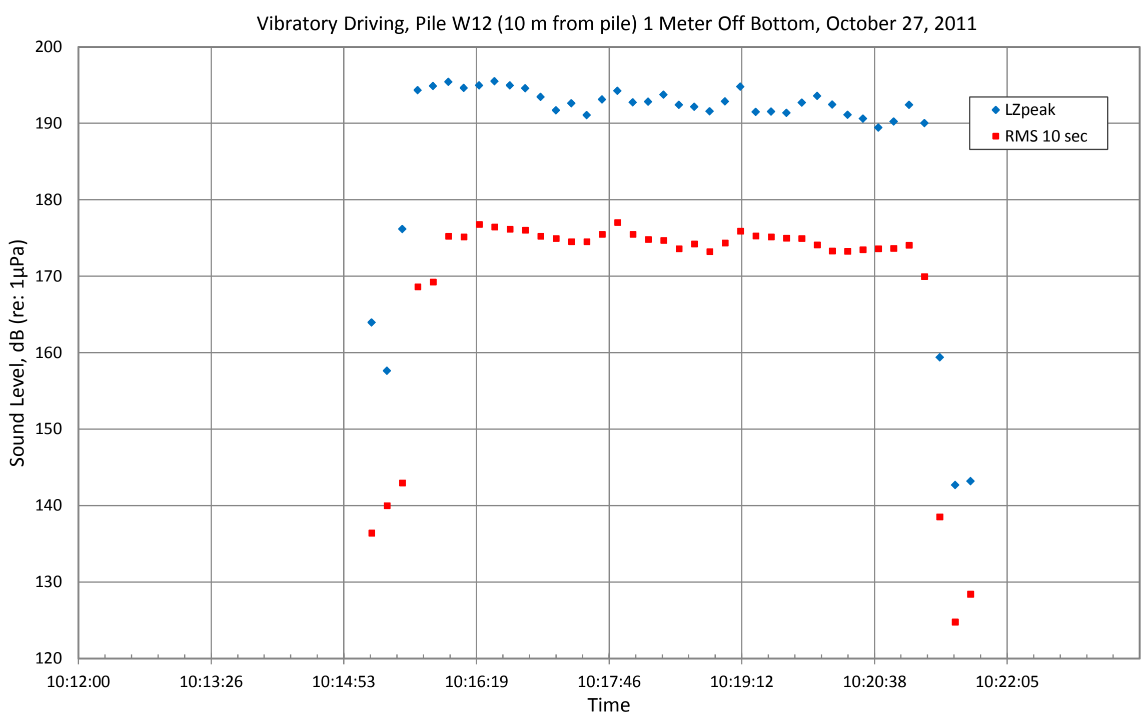
Input: 111027 004



Vibratory Driving Statistics (1 Sec RMS > 143dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	190	5.6	0.03
RMS 1 sec	174	4.6	0.03

Inactive Vibratory Hammer Statistics (1 sec RMS < 143 dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	139	20.1	0.14
RMS 1 sec	127	18.3	0.14

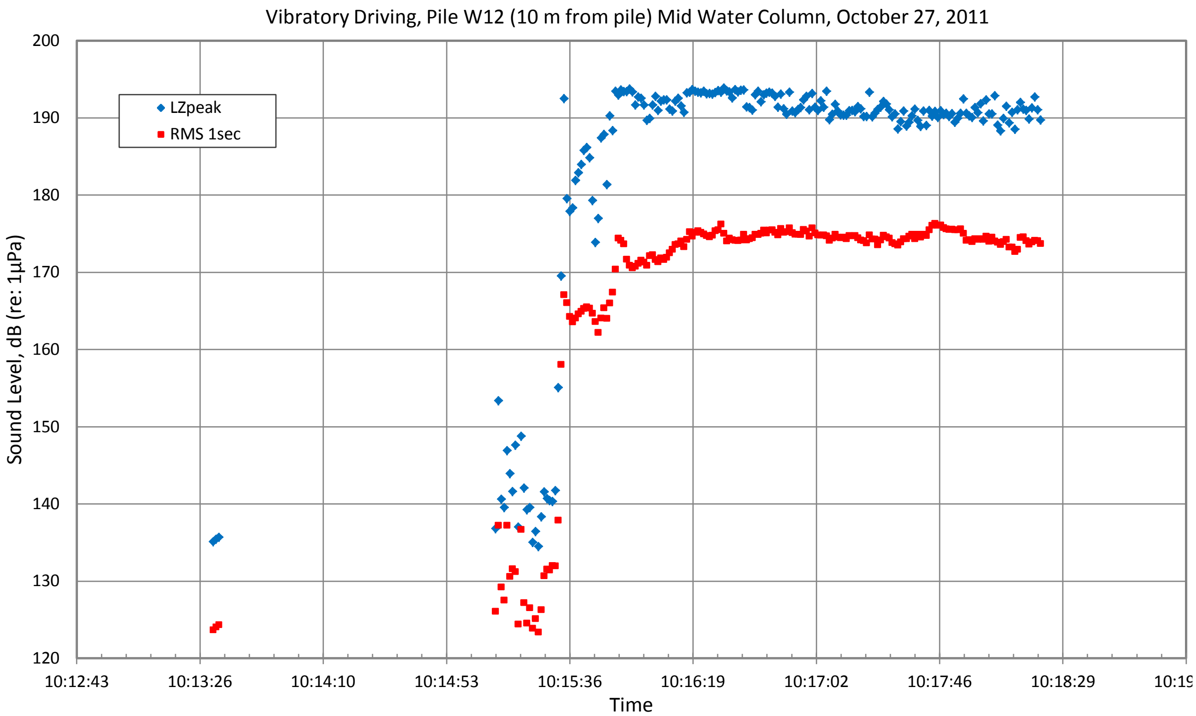
Input: 111027 005



Vibratory Driving Statistics (10 Sec RMS > 143dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	192	3.3	0.02
RMS 10sec	173	5.6	0.03

Inactive Vibratory Hammer Statistics (10 sec RMS < 143 dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	153	9.8	0.06
RMS 10sec	134	6.7	0.05

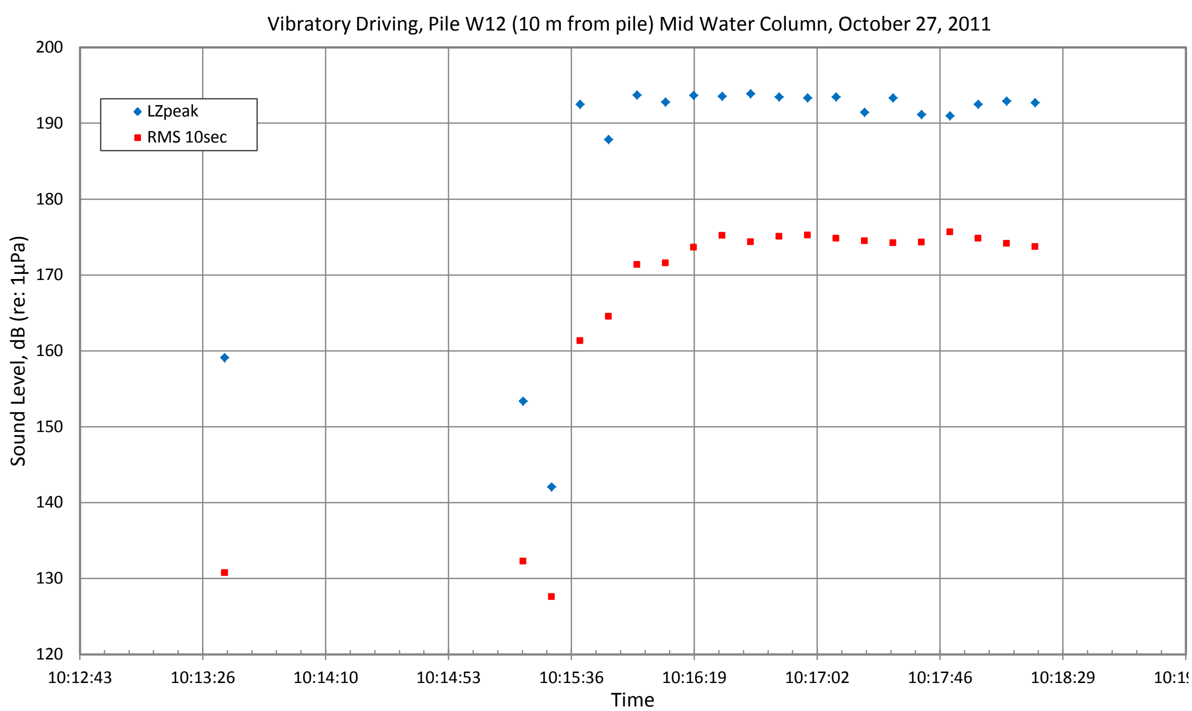
Input: 111027 005



Vibratory Driving Statistics (1 Sec RMS > 143dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	191	3.4	0.02
RMS 1sec	173	3.0	0.02

Inactive Vibratory Hammer Statistics, (1 sec RMS < 143 dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	137	19.0	0.14
RMS 1sec	125	17.4	0.14

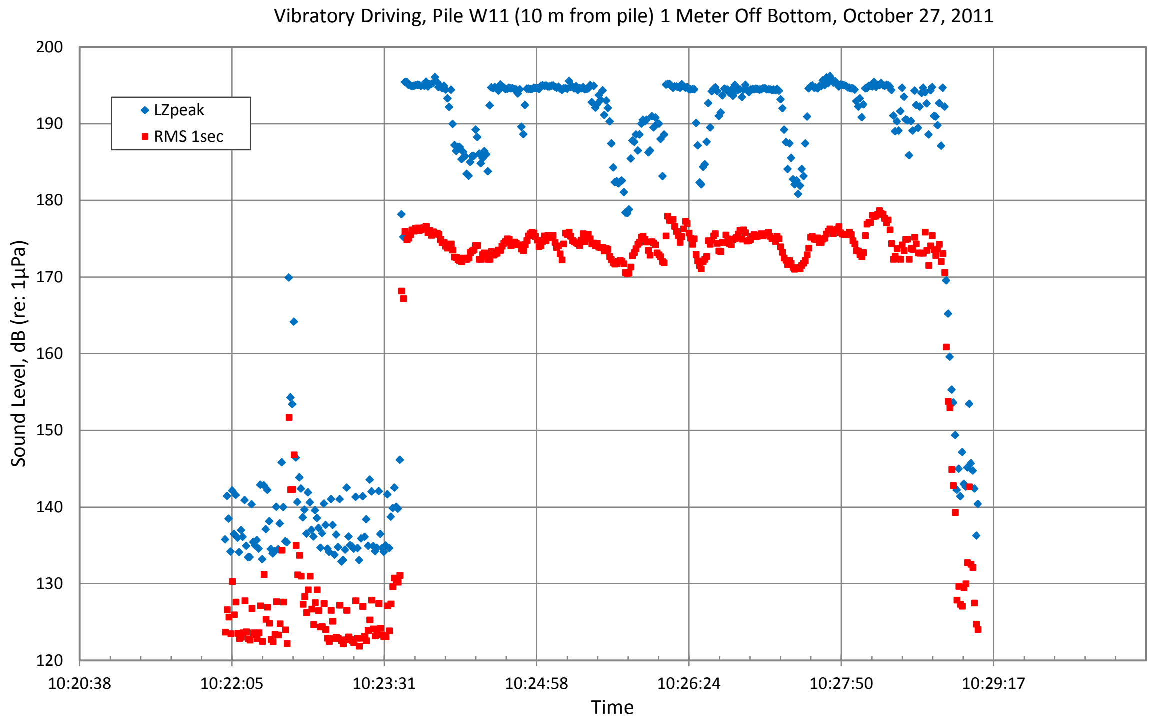
Input: 111027 005



Vibratory Driving Statistics (10 Sec RMS > 143dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	193	1.8	0.01
RMS 10sec	173	4.4	0.03

Inactive Vibratory Hammer Statistics, (10 sec RMS < 143 dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	146	9.9	0.07
RMS 10sec	128	3.6	0.03

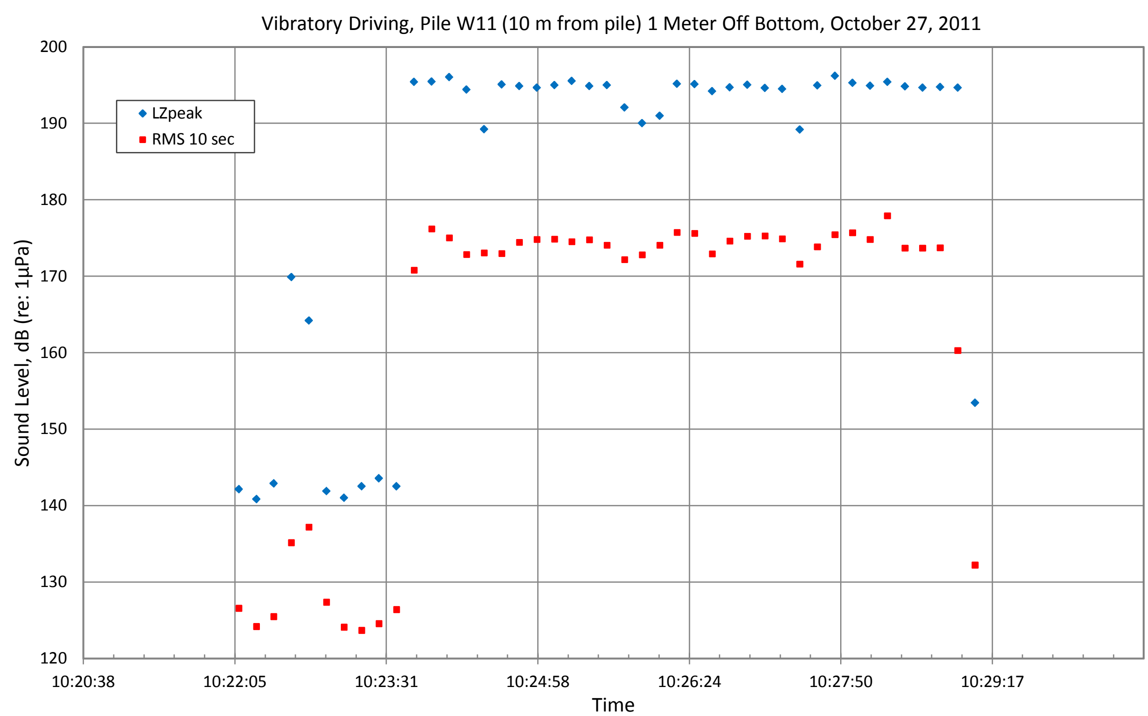
Input: 111027 005



Vibratory Driving Statistics (1 Sec RMS > 143dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	191	5.7	0.03
RMS 1 sec	174	3.6	0.02

Inactive Vibratory Hammer Statistics (1 sec RMS < 143 dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	139	4.8	0.03
RMS 1 sec	127	4.5	0.04

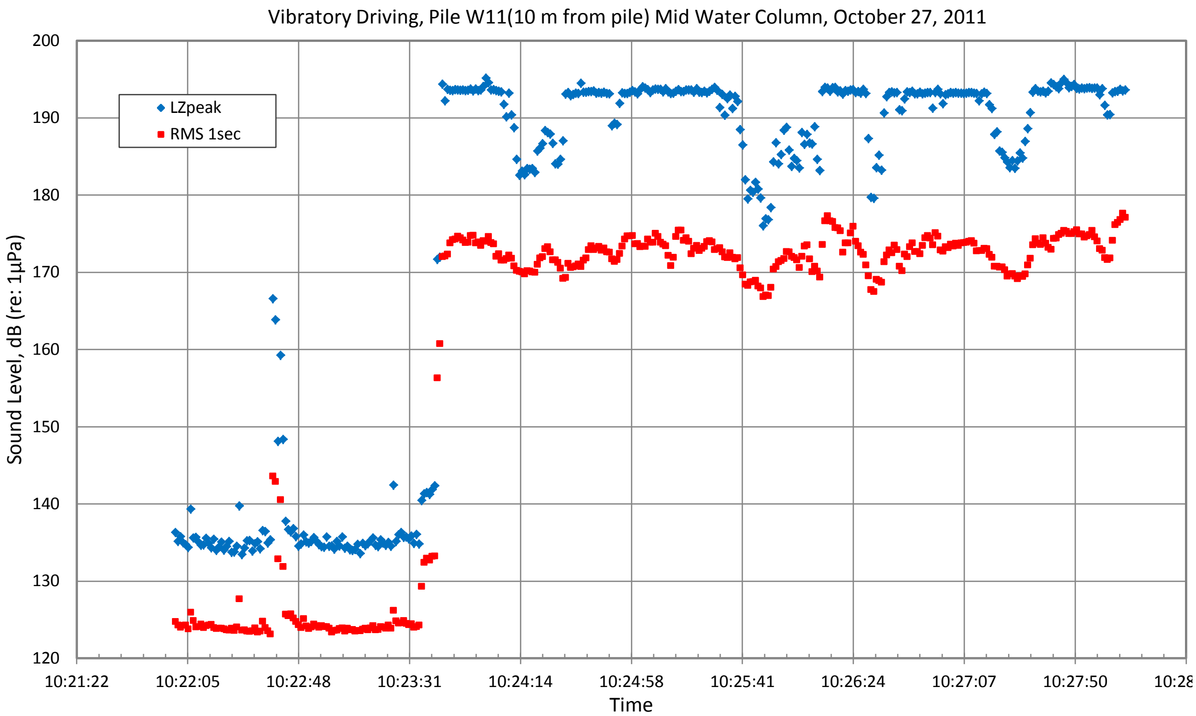
Input: 111027 006



Vibratory Driving Statistics (10 Sec RMS > 143dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	194	1.8	0.01
RMS 10sec	174	2.8	0.02

Inactive Vibratory Hammer Statistics (10 sec RMS < 143 dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	148	10.2	0.07
RMS 10sec	128	4.7	0.04

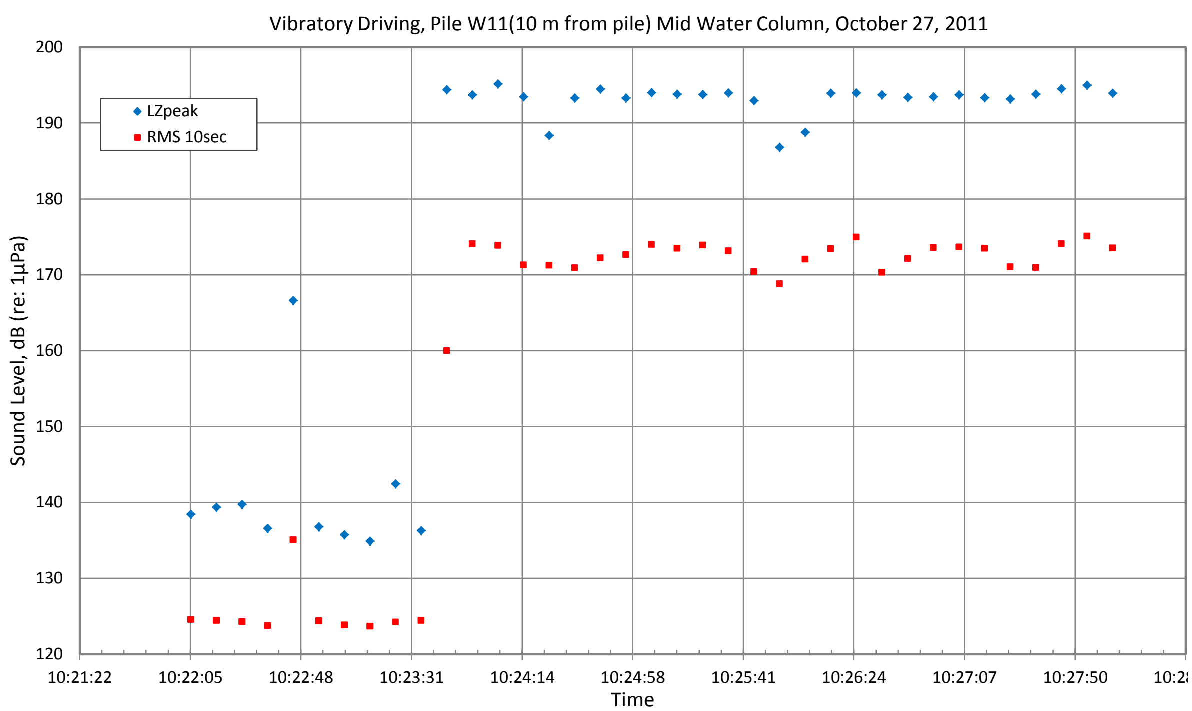
Input: 111027 006



Vibratory Driving Statistics (1 Sec RMS > 143dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	191	4.8	0.03
RMS 1sec	172	3.0	0.02

Inactive Vibratory Hammer Statistics, (1 sec RMS < 143 dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	136	4.5	0.03
RMS 1sec	125	3.3	0.03

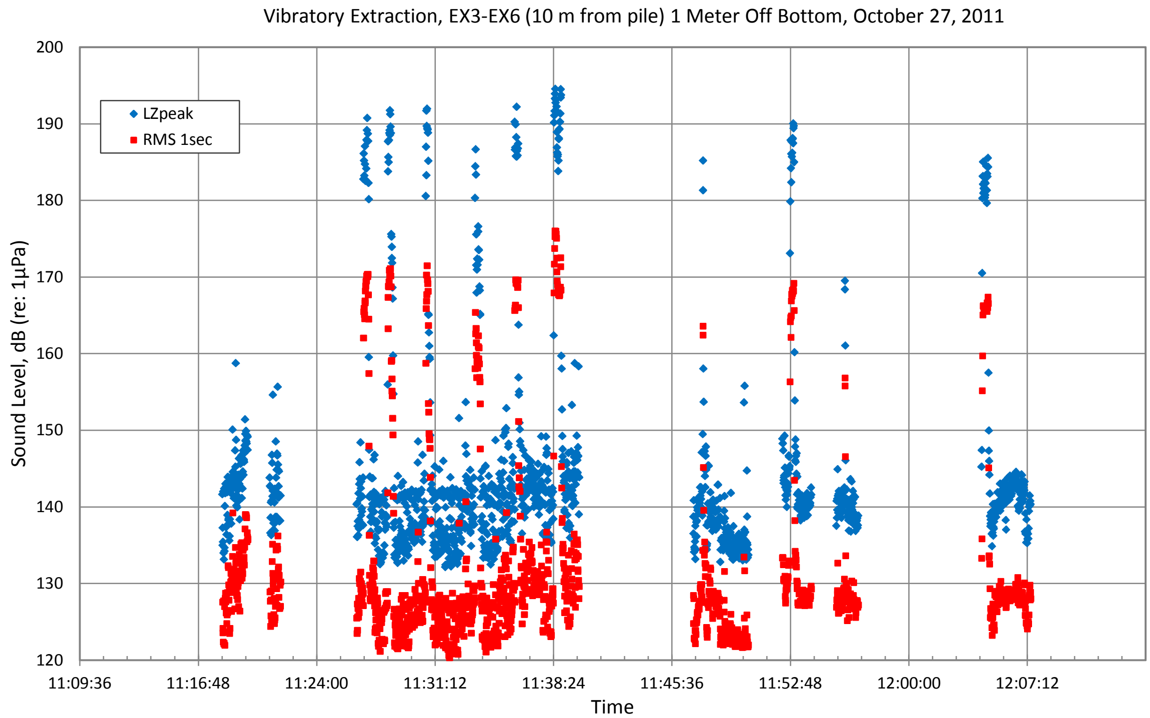
Input: 111027 006



Vibratory Driving Statistics (10 Sec RMS > 143dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	193	2.0	0.01
RMS 10sec	172	2.9	0.02

Inactive Vibratory Hammer Statistics, (10 sec RMS < 143 dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	141	9.4	0.07
RMS 10sec	125	3.5	0.03

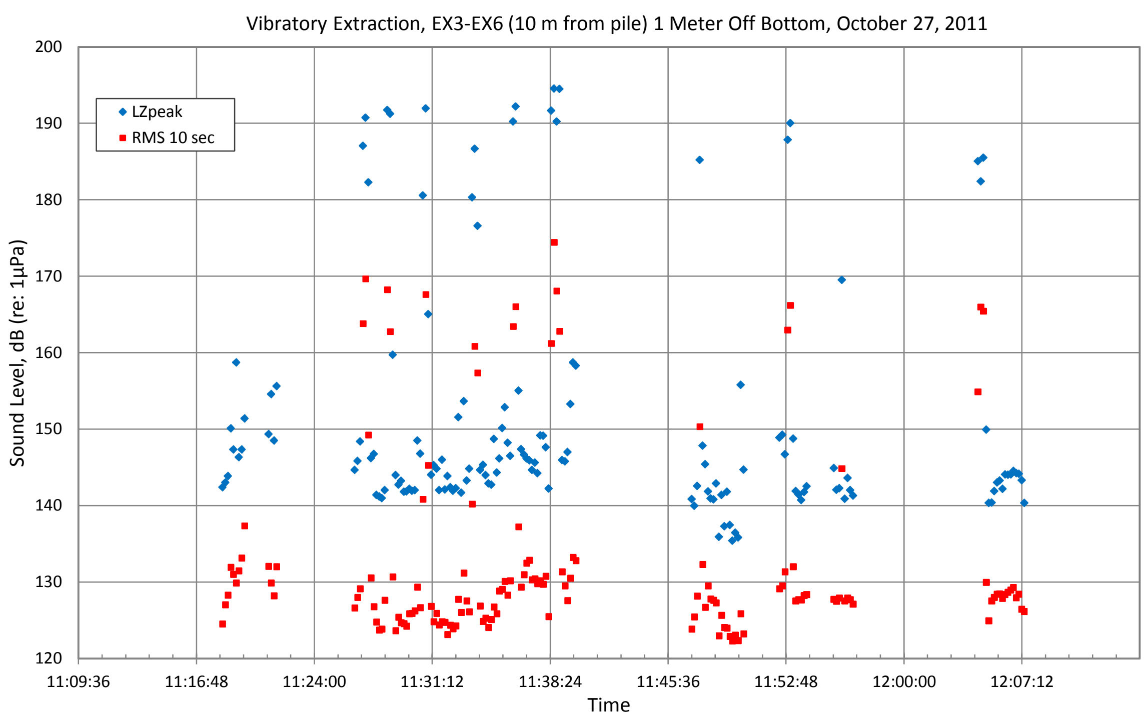
Input: 111027 006



Vibratory Driving Statistics (1 Sec RMS > 143dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	145	14.0	0.10
RMS 1 sec	164	7.6	0.05

Inactive Vibratory Hammer Statistics (1 sec RMS < 143 dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	140	10.2	0.07
RMS 1 sec	127	9.2	0.07

Input: 111027 007

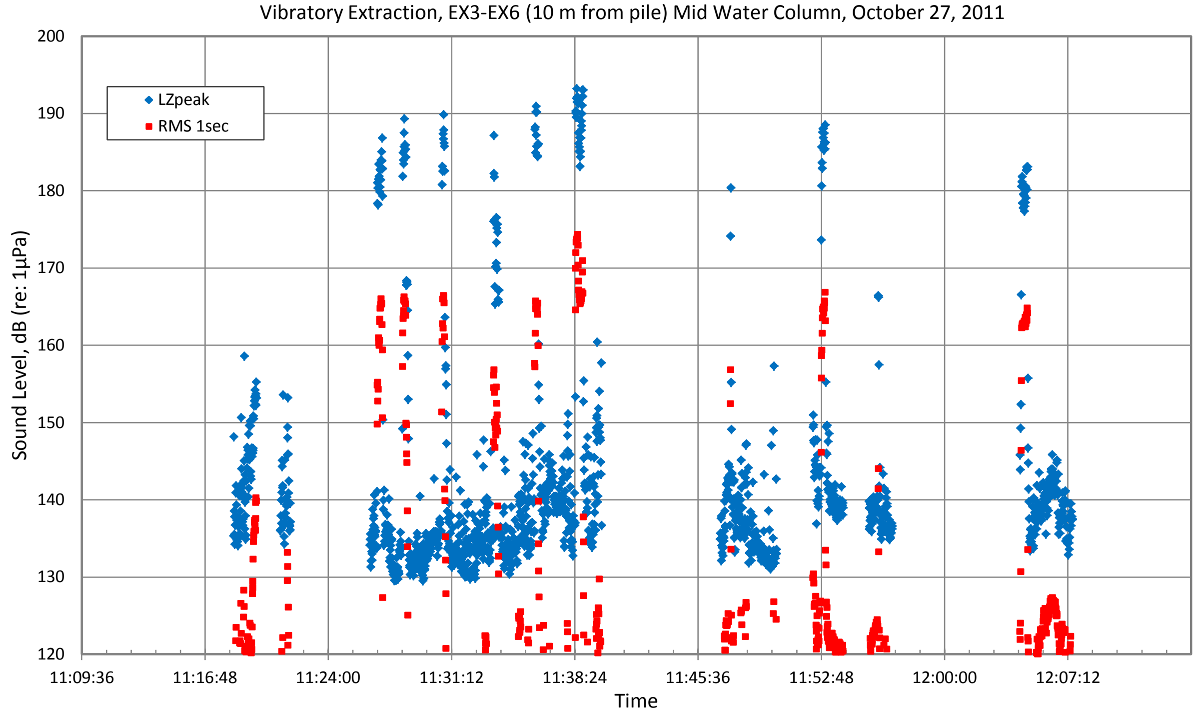


Vibratory Driving Statistics (10 Sec RMS > 143dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	186	7.6	0.04
RMS 10sec	161	8.0	0.05

Inactive Vibratory Hammer Statistics (10 sec RMS < 143 dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	146	6.4	0.04
RMS 10sec	128	3.3	0.03

Input: 111027 007

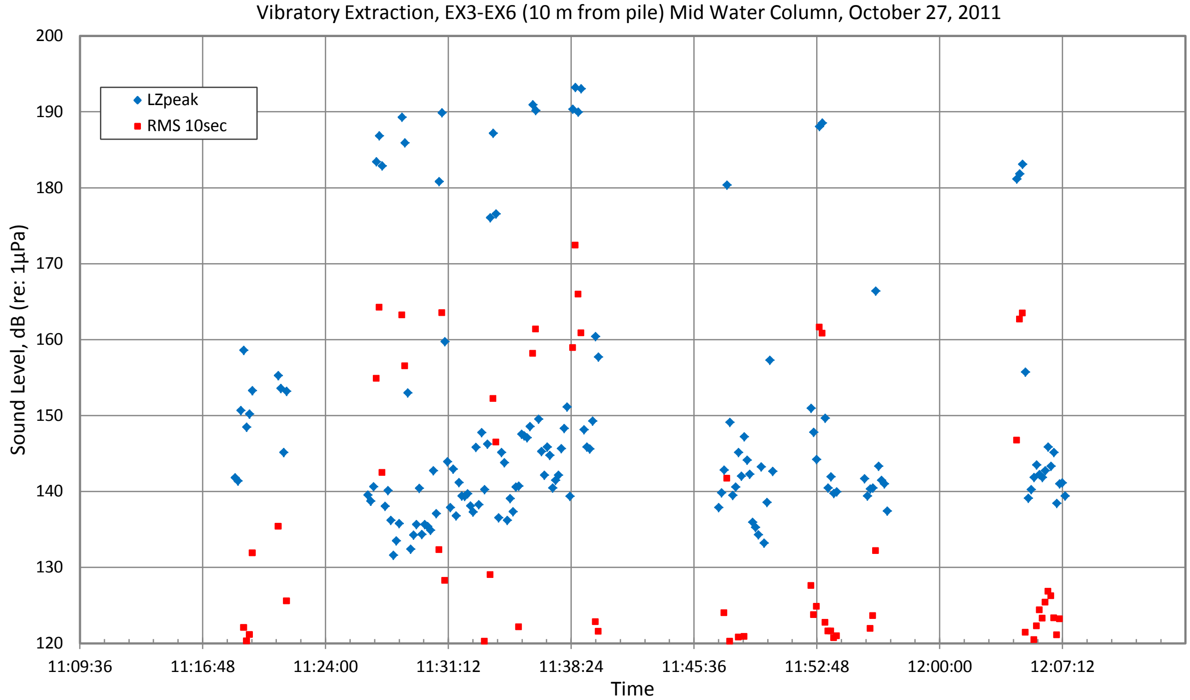
Vibratory Extraction, EX3-EX6 (10 m from pile) Mid Water Column, October 27, 2011



Vibratory Driving Statistics (1 Sec RMS > 143dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	183	6.4	0.03
RMS 1sec	161	6.9	0.04

Inactive Vibratory Hammer Statistics, (1 sec RMS < 143 dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	138	10.7	0.08
RMS 1sec	117	9.4	0.08

Input: 111027 007



Vibratory Driving Statistics (10 Sec RMS > 143dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	187	4.4	0.02
RMS 10sec	160	6.5	0.04

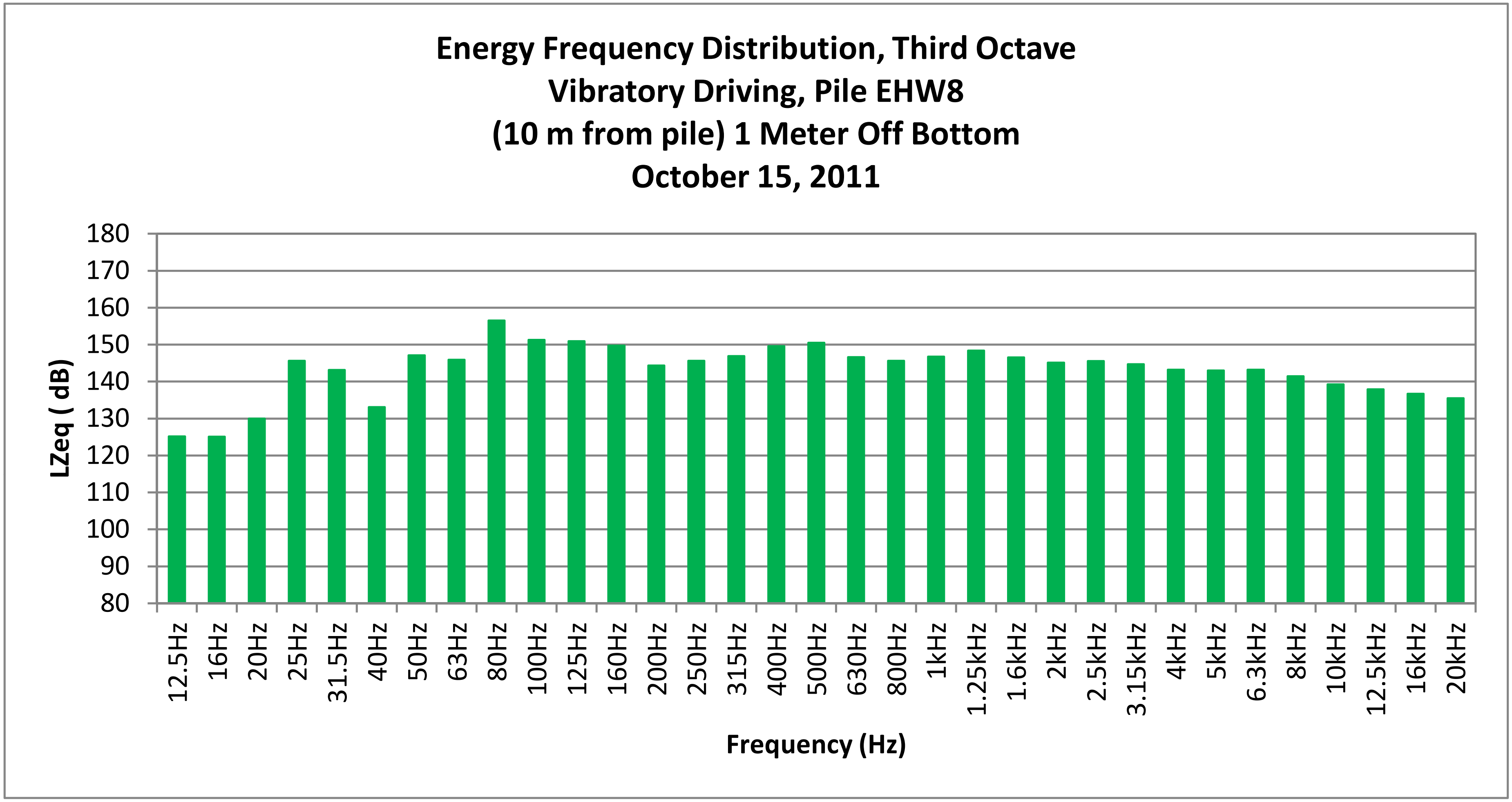
Inactive Vibratory Hammer Statistics, (10 sec RMS < 143 dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	144	8.9	0.06
RMS 10sec	118	5.8	0.05

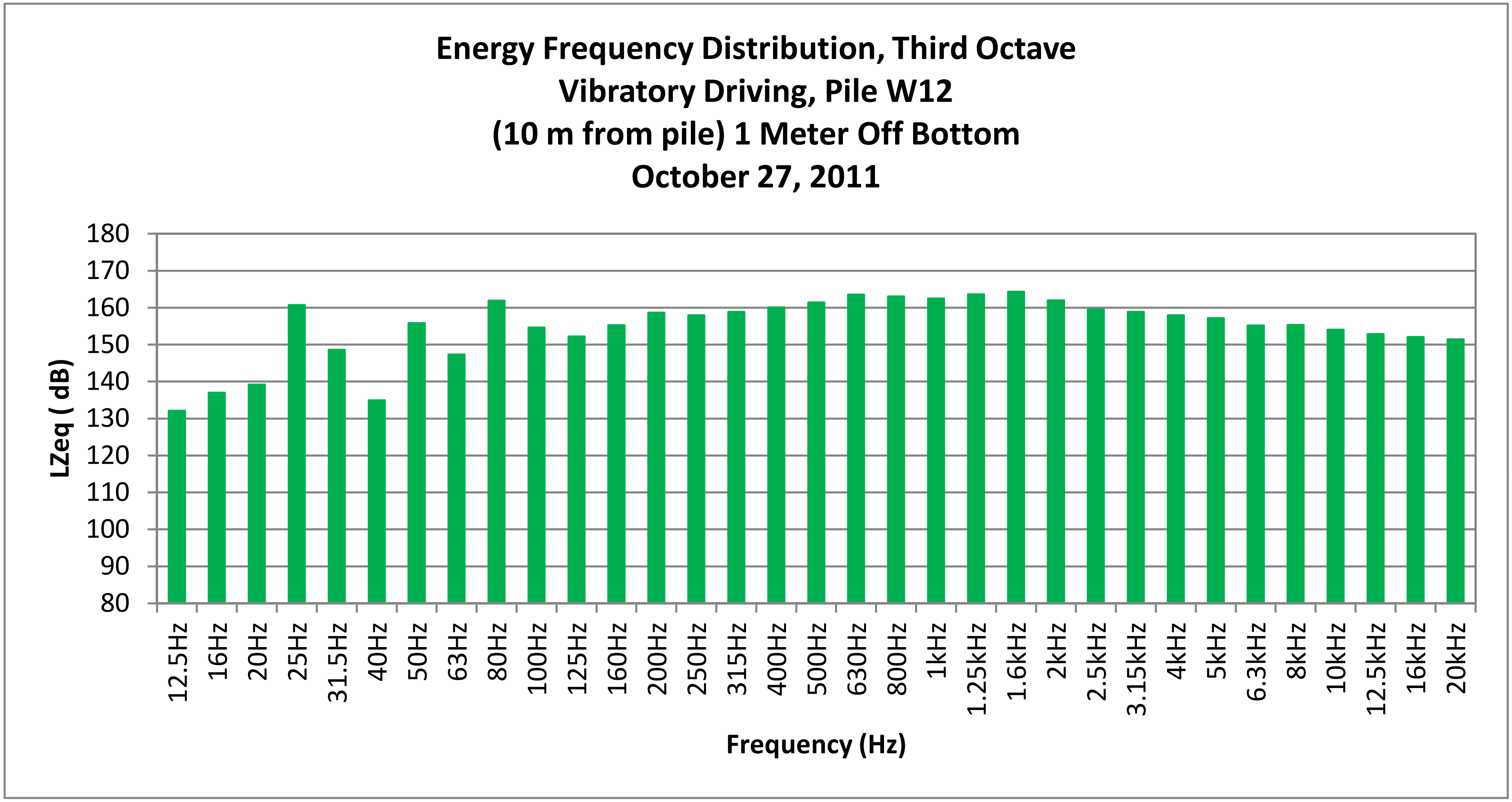
Input: 111027 007

Appendix D

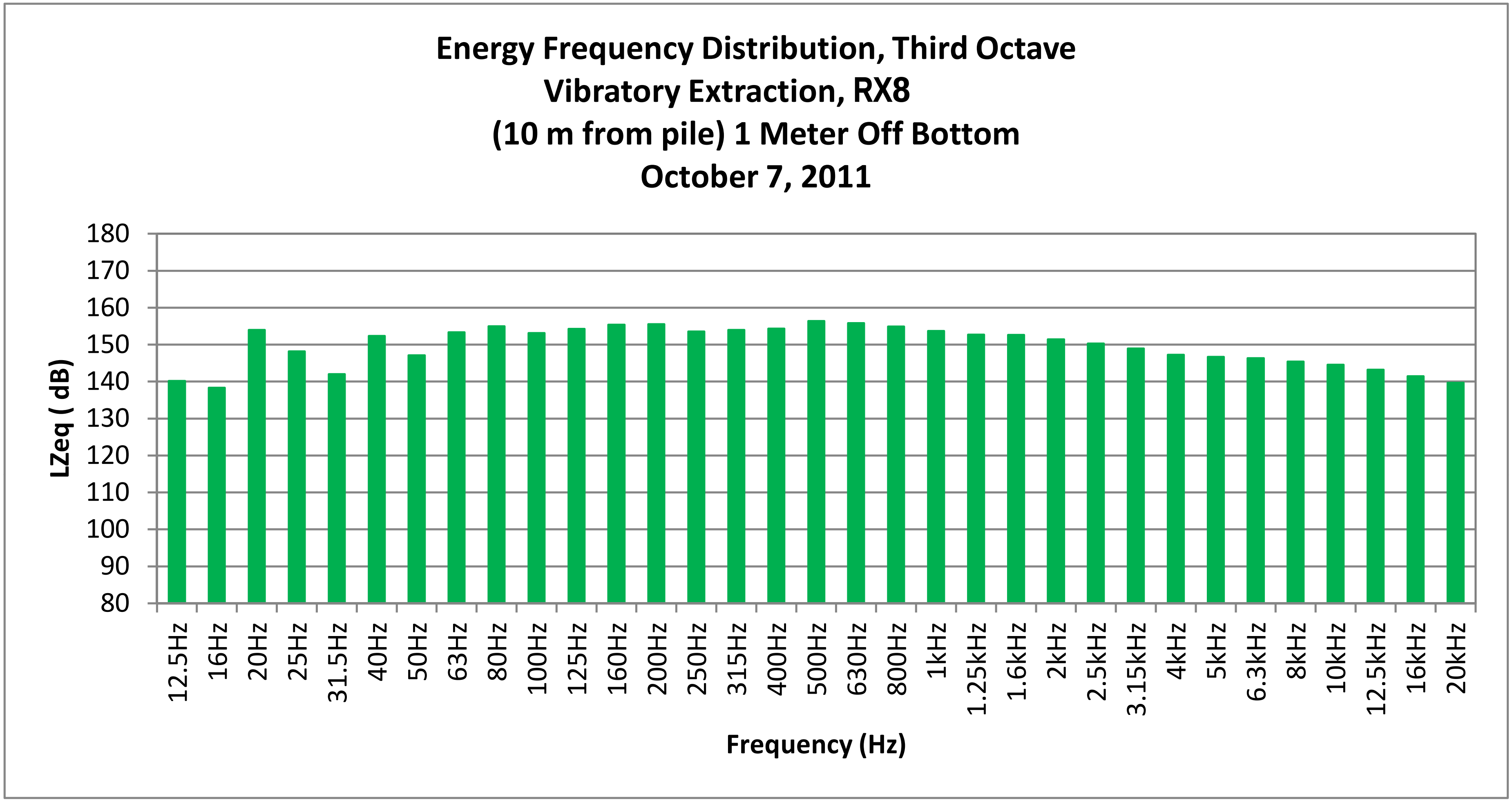
Energy Frequency Distribution:

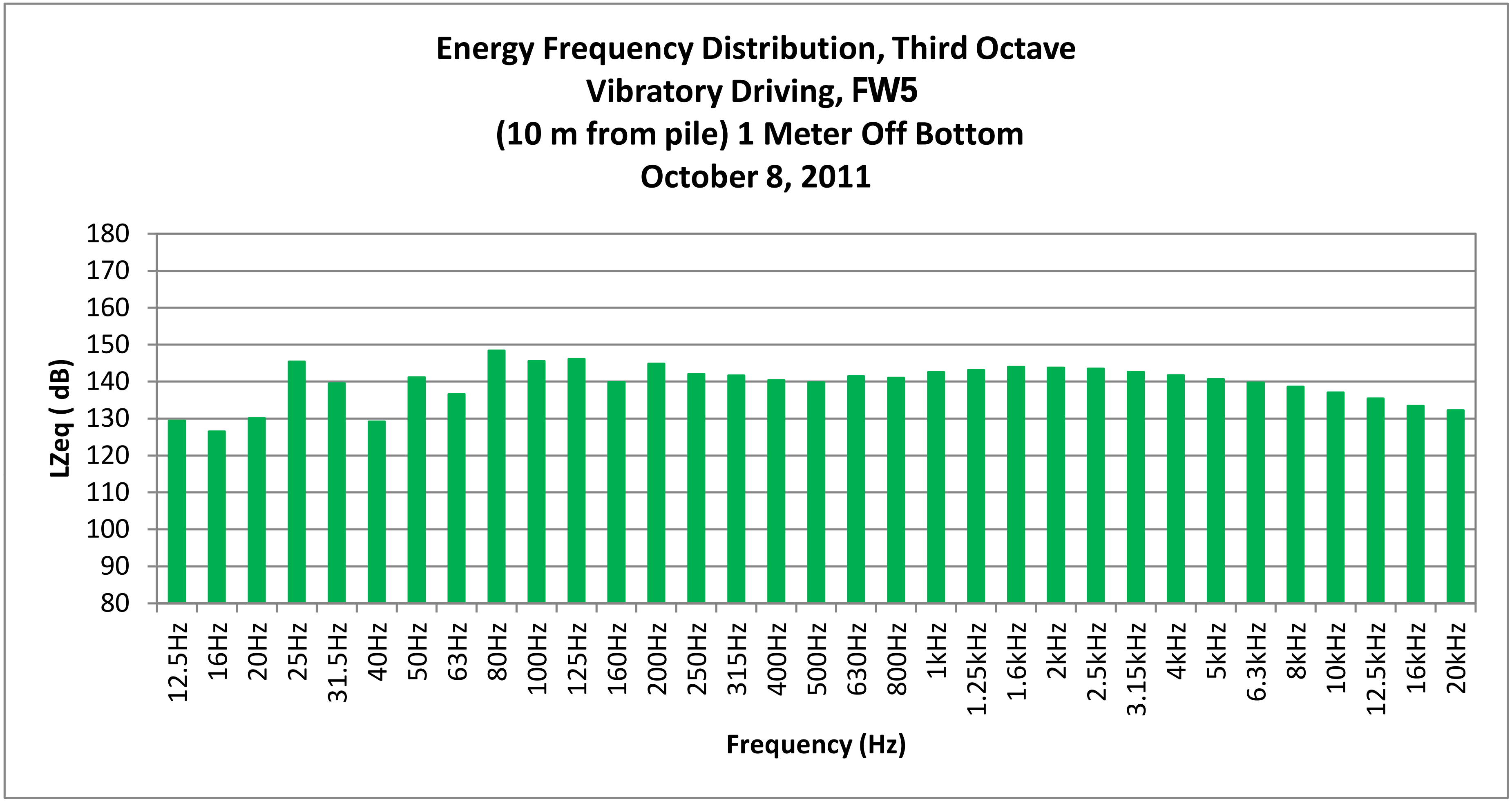
Third-Octave Plots


Energy Frequency Distribution, Third Octave
Vibratory Driving, Pile EHW8
(10 m from pile) 1 Meter Off Bottom
October 15, 2011
LZeq (dB)
180
170
160
150
140
130
120
110
100
90
80
12.5Hz
16Hz
20Hz
25Hz
31.5Hz
40Hz
50Hz
63Hz
80Hz
100Hz
125Hz
160Hz
200Hz
250Hz
315Hz
400Hz
500Hz
630Hz
800Hz
1kHz
1.25kHz
1.6kHz
2kHz
2.5kHz
3.15kHz
4kHz
5kHz
6.3kHz
8kHz
10kHz
12.5kHz
16kHz
20kHz
Frequency (Hz)

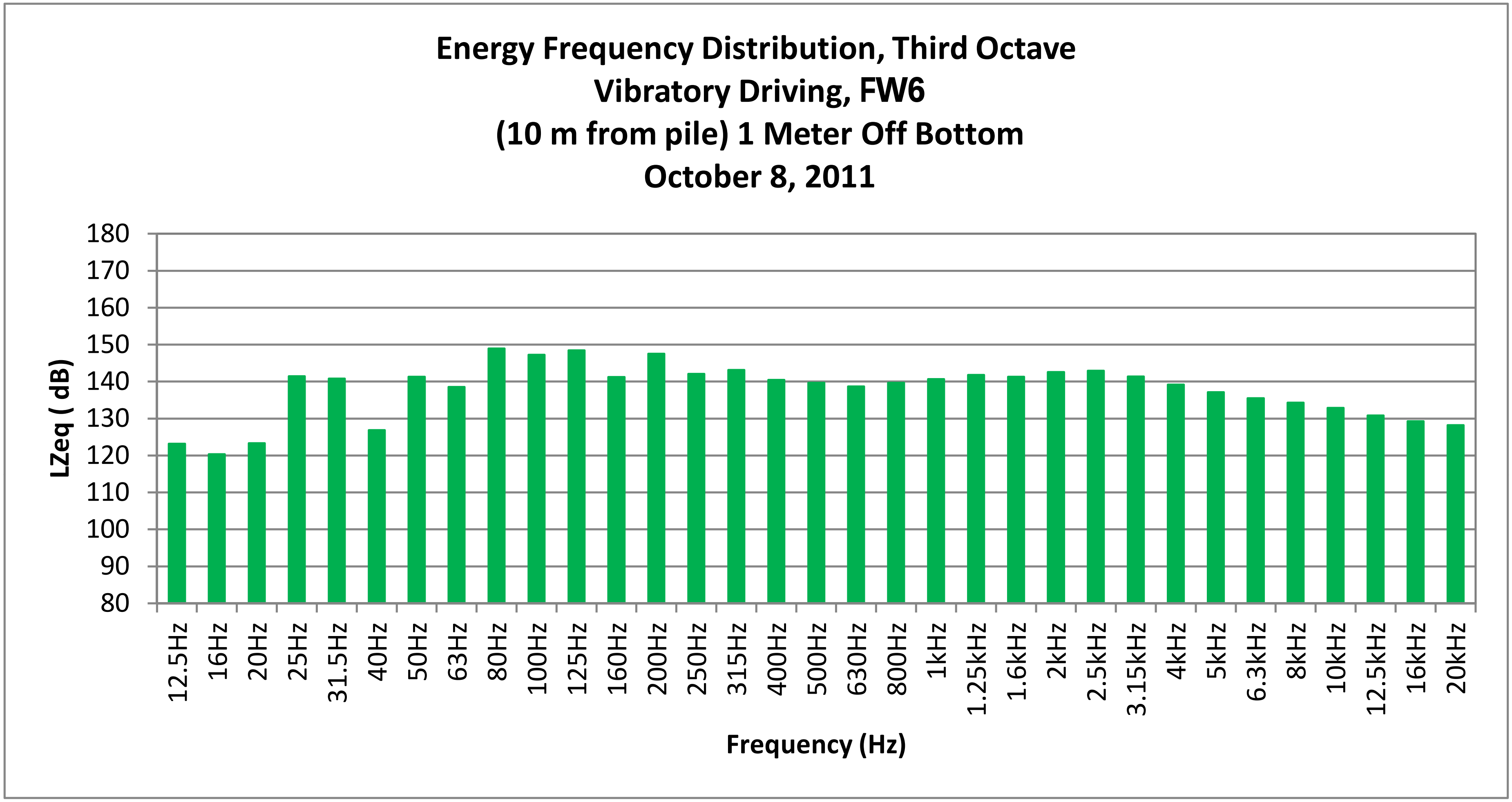


Energy Frequency Distribution, Third Octave
Vibratory Driving, Pile W12
(10 m from pile) 1 Meter Off Bottom
October 27, 2011
LZeq (dB)
180
170
160
150
140
130
120
110
100
90
80
12.5Hz
16Hz
20Hz
25Hz
31.5Hz
40Hz
50Hz
63Hz
80Hz
100Hz
125Hz
160Hz
200Hz
250Hz
315Hz
400Hz
500Hz
630Hz
800Hz
1kHz
1.25kHz
1.6kHz
2kHz
2.5kHz
3.15kHz
4kHz
5kHz
6.3kHz
8kHz
10kHz
12.5kHz
16kHz
20kHz
Frequency (Hz)


Energy Frequency Distribution, Third Octave
Vibratory Extraction, RX8
(10 m from pile) 1 Meter Off Bottom
October 7, 2011
180
170
160
150
140
130
120
110
100
90
80
LZeq (dB)
12.5Hz
16Hz
20Hz
25Hz
31.5Hz
40Hz
50Hz
63Hz
80Hz
100Hz
125Hz
160Hz
200Hz
250Hz
315Hz
400Hz
500Hz
630Hz
800Hz
1kHz
1.25kHz
1.6kHz
2kHz
2.5kHz
3.15kHz
4kHz
5kHz
6.3kHz
8kHz
10kHz
12.5kHz
16kHz
20kHz
Frequency (Hz)



Energy Frequency Distribution, Third Octave
Vibratory Driving, FW5
(10 m from pile) 1 Meter Off Bottom
October 8, 2011
180
170
160
150
140
130
120
110
100
90
80
LZeq (dB)
12.5Hz
16Hz
20Hz
25Hz
31.5Hz
40Hz
50Hz
63Hz
80Hz
100Hz
125Hz
160Hz
200Hz
250Hz
315Hz
400Hz
500Hz
630Hz
800Hz
1kHz
1.25kHz
1.6kHz
2kHz
2.5kHz
3.15kHz
4kHz
5kHz
6.3kHz
8kHz
10kHz
12.5kHz
16kHz
20kHz
Frequency (Hz)

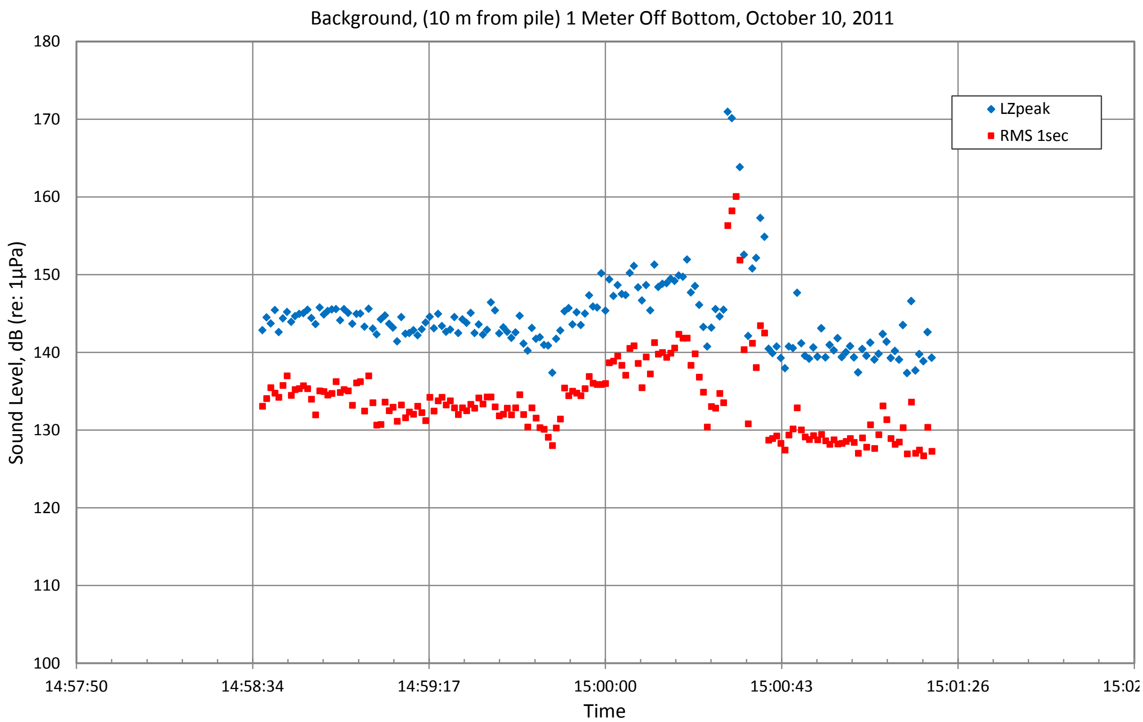


Energy Frequency Distribution, Third Octave
Vibratory Driving, FW6
(10 m from pile) 1 Meter Off Bottom
October 8, 2011
LZeq (dB)
180
170
160
150
140
130
120
110
100
90
80
12.5Hz
16Hz
20Hz
25Hz
31.5Hz
40Hz
50Hz
63Hz
80Hz
100Hz
125Hz
160Hz
200Hz
250Hz
315Hz
400Hz
500Hz
630Hz
800Hz
1kHz
1.25kHz
1.6kHz
2kHz
2.5kHz
3.15kHz
4kHz
5kHz
6.3kHz
8kHz
10kHz
12.5kHz
16kHz
20kHz
Frequency (Hz)

Appendix E

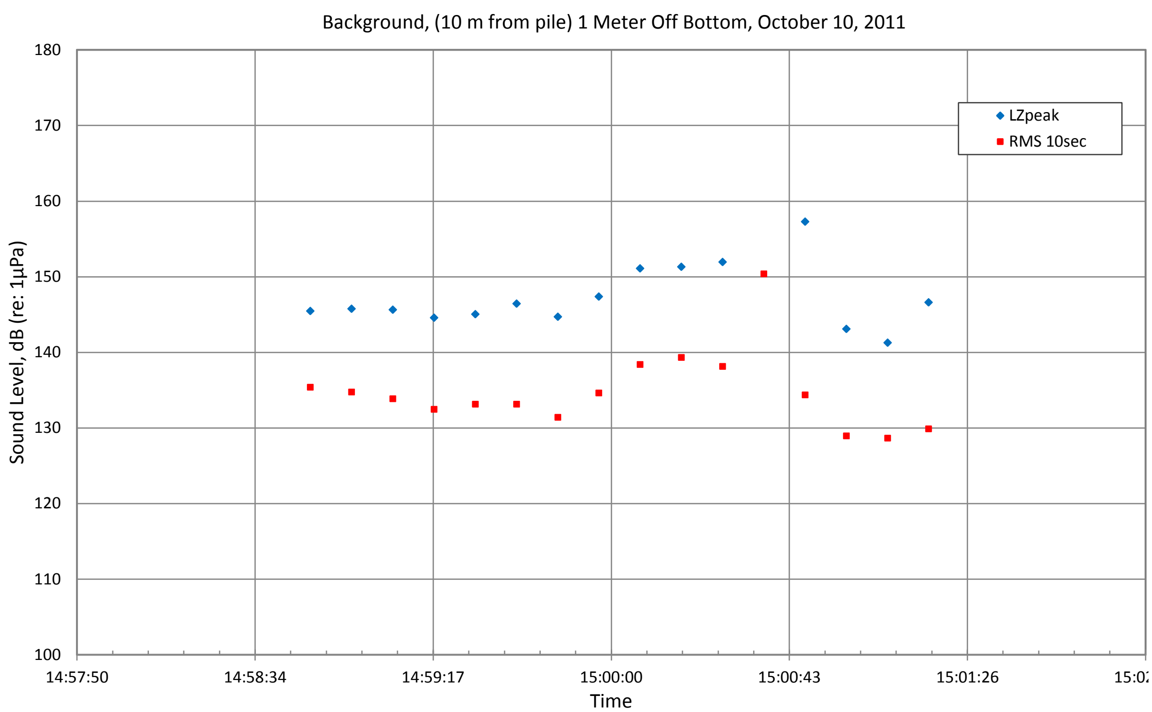
Background Sound Pressure Level Measurements:

Session Logs and Third-Octave Plots



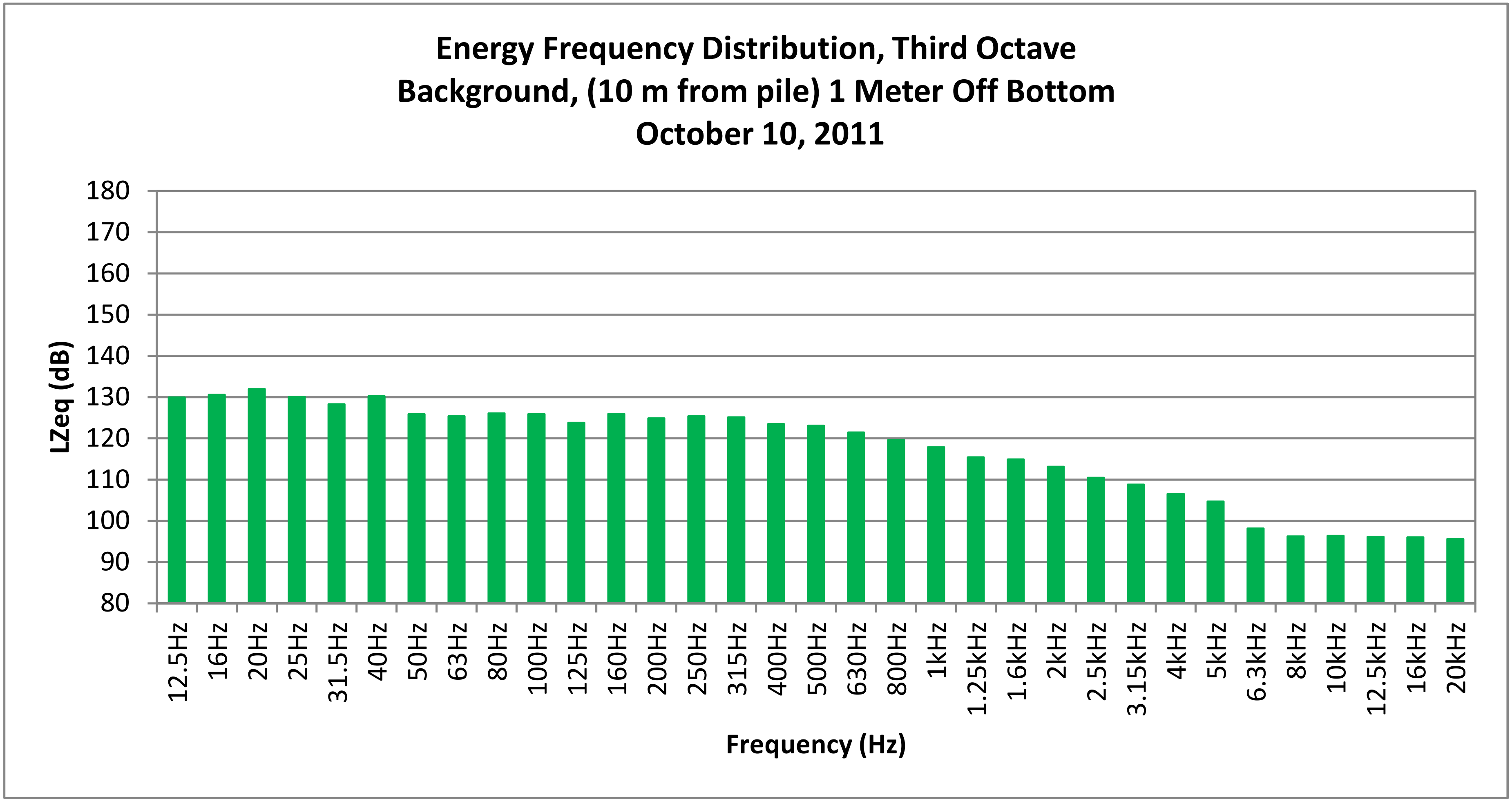
Background Statistics (1 Sec RMS > 143dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	144	3.4	0.02
RMS 1sec	133	3.8	0.03

Input: 111010 007

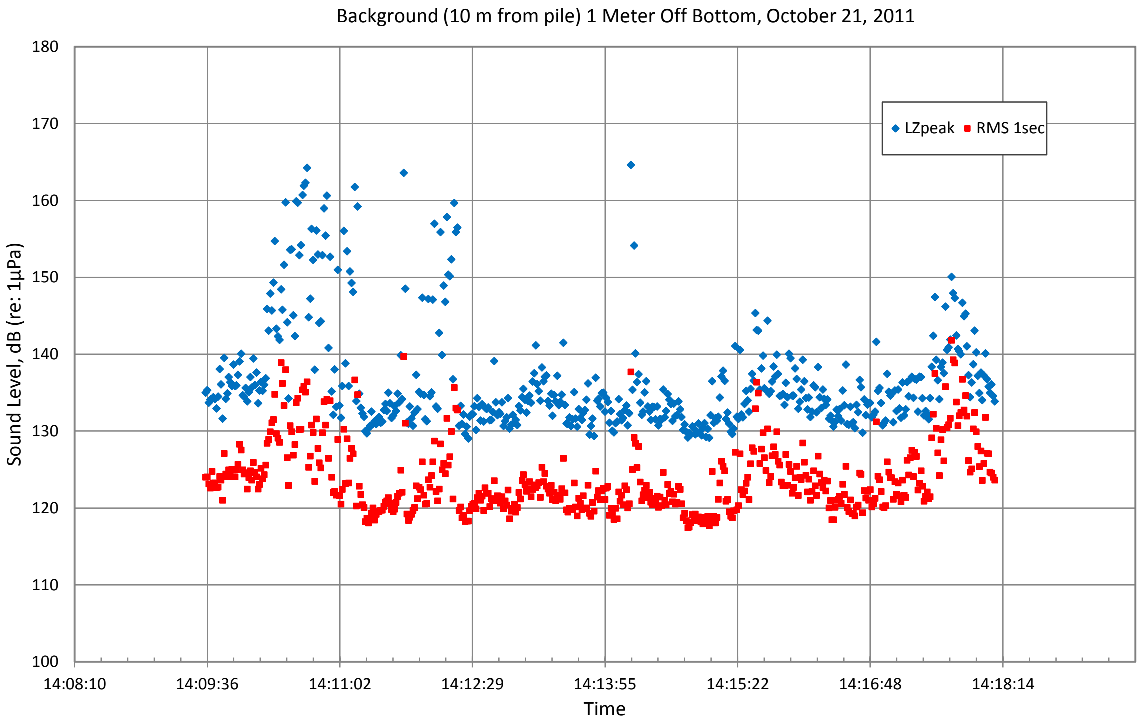


Background Statistics (10 Sec RMS > 143dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	147	4.0	0.03
RMS 10sec	134	3.2	0.02

Input: 111010 007

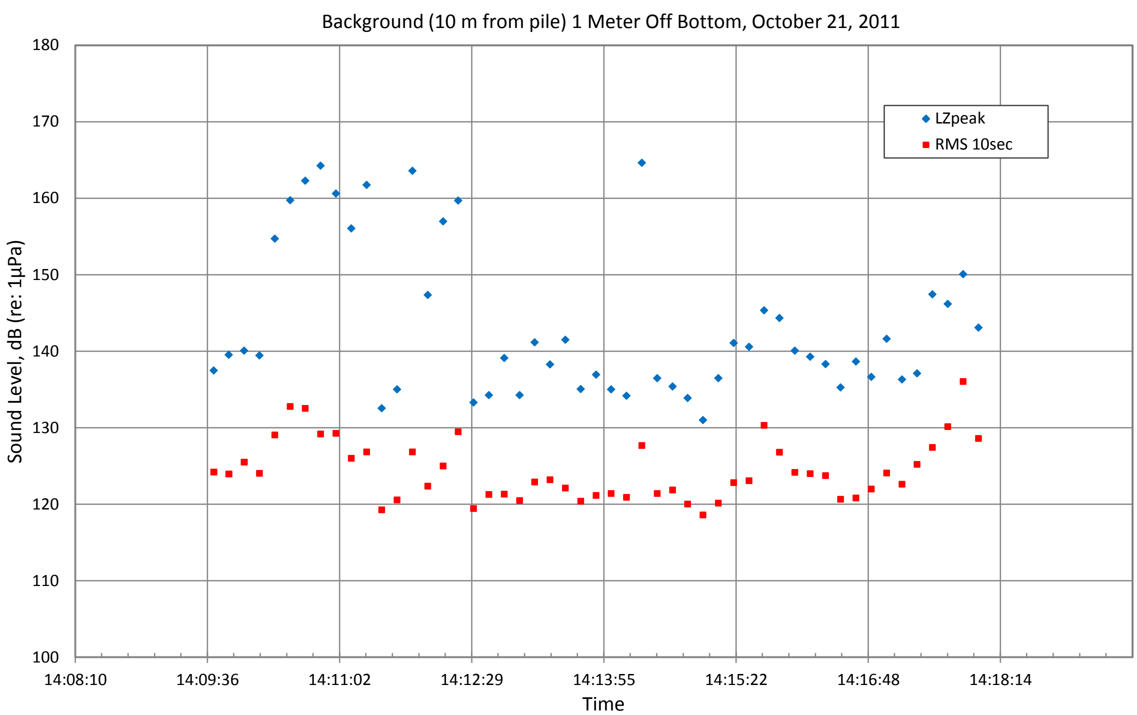


Energy Frequency Distribution, Third Octave
Background, (10 m from pile) 1 Meter Off Bottom
October 10, 2011
LZeq (dB)
180
170
160
150
140
130
120
110
100
90
80
12.5Hz
16Hz
20Hz
25Hz
31.5Hz
40Hz
50Hz
63Hz
80Hz
100Hz
125Hz
160Hz
200Hz
250Hz
315Hz
400Hz
500Hz
630Hz
800Hz
1kHz
1.25kHz
1.6kHz
2kHz
2.5kHz
3.15kHz
4kHz
5kHz
6.3kHz
8kHz
10kHz
12.5kHz
16kHz
20kHz
Frequency (Hz)



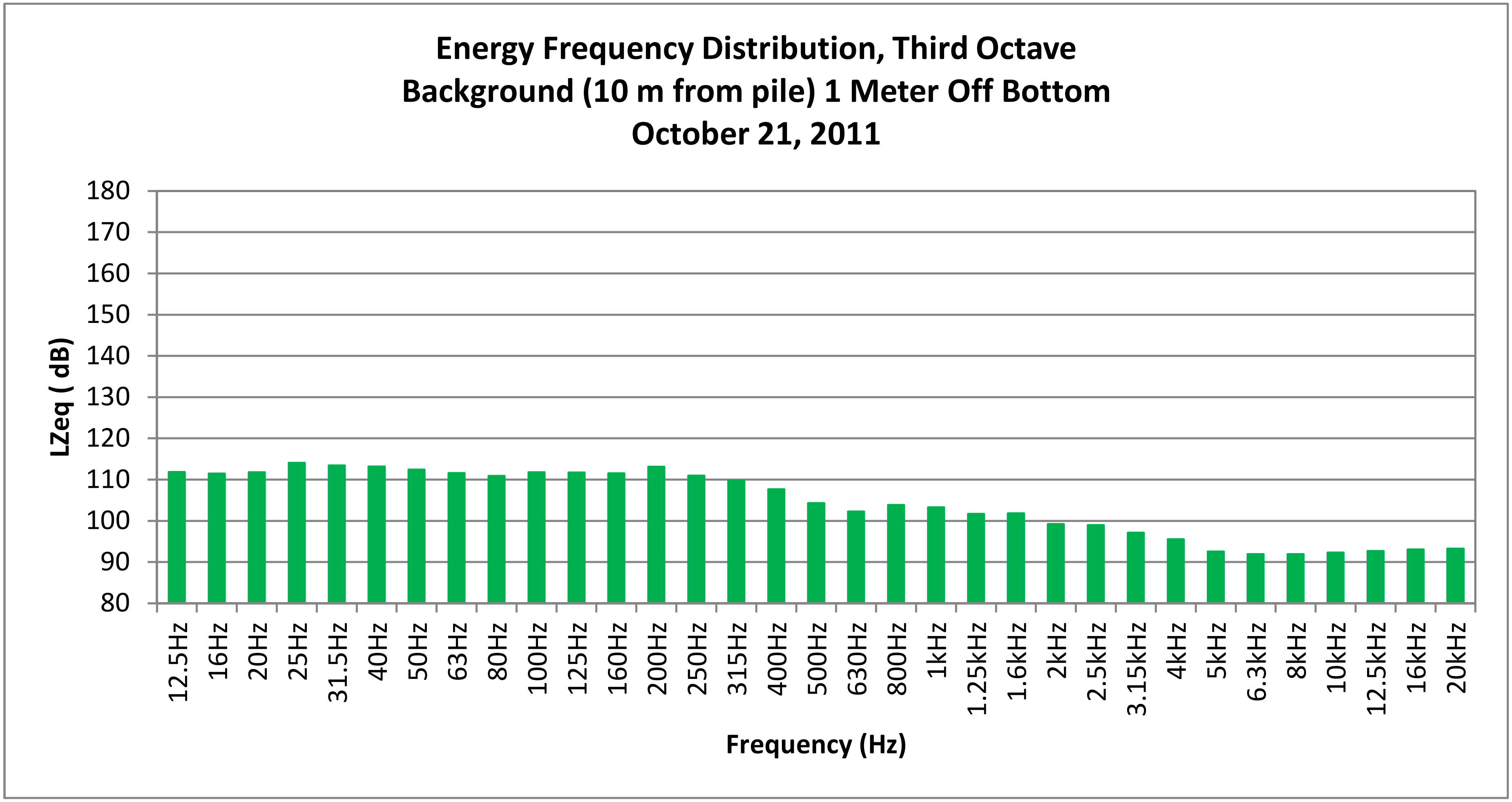
Background Statistics (1 Sec RMS > 143dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	137	7.1	0.05
RMS 1 sec	124	4.5	0.04

Input: 111021 001



Background Statistics (10 Sec RMS > 143dB)			
Quantity	Average (dB)	St. Dev.	COV
LZpeak	143	9.9	0.07
RMS 10sec	124	4.0	0.03

Input: 111021 001


Energy Frequency Distribution, Third Octave
Background (10 m from pile) 1 Meter Off Bottom
October 21, 2011
LZeq (dB)
180
170
160
150
140
130
120
110
100
90
80
12.5Hz
16Hz
20Hz
25Hz
31.5Hz
40Hz
50Hz
63Hz
80Hz
100Hz
125Hz
160Hz
200Hz
250Hz
315Hz
400Hz
500Hz
630Hz
800Hz
1kHz
1.25kHz
1.6kHz
2kHz
2.5kHz
3.15kHz
4kHz
5kHz
6.3kHz
8kHz
10kHz
12.5kHz
16kHz
20kHz
Frequency (Hz)