

October 20, 2011

TO: John Callahan
Rick Huey

FROM: Jim Laughlin
(206) 440-4643

SUBJECT: Edmonds Ferry Terminal – Vibratory Pile Monitoring Technical Memorandum.

Underwater Noise Levels

This memo summarizes the vibratory pile driving results measured at the Edmonds Ferry Terminal in an effort to collect site specific data on underwater noise levels. The memo presents data collected during vibratory pile driving at the Edmonds Ferry Terminal facility during the month of September 2011.

Two 30-inch diameter and two 36-inch diameter steel piles were monitored on two separate days as they were driven with a J&M 66 vibratory hammer with a maximum centrifugal force of 240 tons. This report applies no frequency filter (*e.g.*, A-weighting or C-weighting) to the underwater acoustic measurements:

- Underwater sound levels quoted in this report are given in decibels relative to the standard underwater acoustic reference pressure of 1 microPa.
- Airborne noise levels were measured as un-weighted sound level. Airborne noise levels in this report use the acoustic reference pressure of 20 microPa.

The continuous sounds that frequently occur for extended periods associated with the use of a vibratory hammer may produce harassment-level take of Endangered Species Act (ESA) and Marine Mammal Protection Act (MMPA) listed marine mammals. This harassment occurs when the sound exceeds the current 120 dB RMS NMFS threshold. Therefore, this memo adopts the 120 dB RMS threshold for the present analysis.

Measurement Locations

September 12, 2011

Near field measurements were taken approximately 10 meters from the pile in 21 feet of water on September 12, 2011.

September 14, 2011

Near field measurements were taken at 11 meters from the piles being driven in 19 feet of water on September 14, 2011.

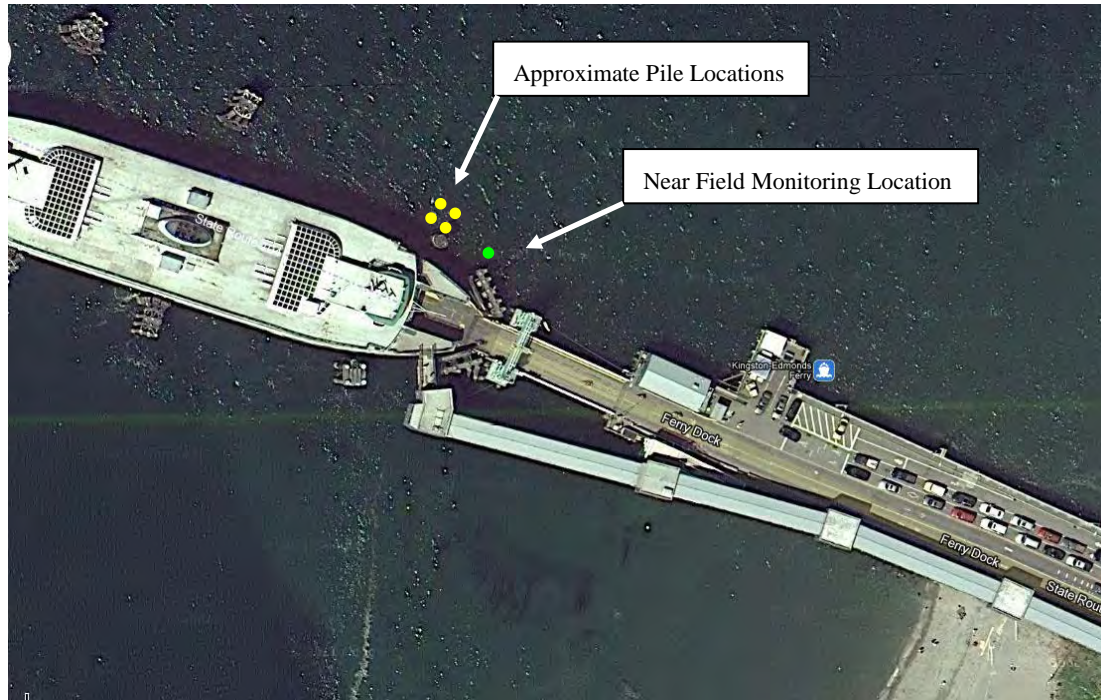


Figure 1: Location of near field monitoring location and piles at the Edmonds Ferry Terminal.

No noise mitigation was utilized as part of these vibratory measurements. Broadband (20 Hz to 10 kHz) Root Mean Square (RMS) noise levels are reported in terms of the 30-second average continuous sound level computed from the Fourier transform of the pressure waveforms in 30-second time intervals.

Near Field Measurements

- Average RMS values ranged from 162 to 166 dB RMS at the near field location with an overall average RMS value of 164 dB RMS. Distances from hydrophone to pile ranged between 10 and 11 meters.
- Table 1 summarizes the results of the near field measurement locations for each pile monitored.

Table 1: Summary Table of Underwater Monitoring Results at the Near Field Location.

Pile #	Pile Diameter (inches)	Date	Hydrophone Depth	Distance To Pile (meters)	Absolute Peak (dB)	Average RMS Value (dB)
1	30	9/12/11	21 feet (midwater)	10	194	165
2	30	9/12/11	21 feet (midwater)	10	195	166

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Pile #	Pile Diameter (inches)	Date	Hydrophone Depth	Distance To Pile (meters)	Absolute Peak (dB)	Average RMS Value (dB)
3	36	9/14/11	19 feet (midwater)	11	191	163
4	36	9/14/11	19 feet (midwater)	11	186	162
Overall Average:					192	164

The results of Table 1 show average RMS values around 164 dB RMS in the near field for most piles. Average RMS values are appropriate for continuous sounds generated during vibratory driving.

Conclusions

Near field underwater measurements were taken at the Edmonds Ferry terminal during vibratory pile driving. RMS values measured at the near field location ranged between 162 and 166 dB RMS with an overall average RMS value of 164 dB. These values are lower than previous vibratory measurements collected in Puget Sound.

If you have any questions please call me at (206) 440-4643.

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Attachments
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