

2020 Annual Biological Monitoring and Mitigation Compliance Report

Chevron Long Wharf Maintenance and Efficiency Project

Chevron Products Company

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Acronyms and Abbreviations

BO	Biological Opinion
B4N	Berth 4 North
B4S	Berth 4 South
°F	degrees Fahrenheit
$\mu\text{Pa}\cdot\text{sec}^2$	micropascals per second squared
CDFW	California Department of Fish and Wildlife
CEQA	California Environmental Quality Act
cSEL	cumulative sound exposure level
dB	decibels
IHA	Incidental Harassment Authorization
IS/MND	Initial Study/Mitigated Negative Declaration
ITP	Incidental Take Permit
MMMP	Marine Mammal Monitoring Plan
MMO	marine mammal observer
MMPA	Marine Mammal Protection Act
NMFS	National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Administration
Project	Chevron Long Wharf Maintenance and Efficiency Project
PTS	permanent threshold shift
RMS	root mean square
SEL	sound exposure level

1. Introduction

This 2020 Annual Monitoring and Mitigation Compliance Report is being submitted to the California Department of Fish and Wildlife in accordance with Condition #6.8 in the Project Incidental Take Permit (ITP) No. 2081-2016-056-07, and to the National Marine Fisheries Service (NMFS) in accordance with the Project Biological Opinion (BO) issued April 4, 2017 (WCR-2015-1997) and Incidental Harassment Authorization (IHA) valid from June 15, 2020 through May 31, 2021.

The Chevron Long Wharf Maintenance and Efficiency Project (Project) includes multiple construction components within and above the water to bring the Long Wharf (Berths 1 through 4) into compliance with Marine Oil Terminal Engineering and Maintenance Standards and to improve the overall operational efficiency. Monitored Project construction activities (Covered Activities) occurred between June 15 and October 30, 2020). Covered Activities during 2020 occurred at Berth 4 exclusively, except for the pre-Project baseline survey, which took place June 11, 2020 and included Berths 1 through 4 as well as the Long Wharf pier, extending from the shoreline.

In 2020, eight (8) 60-inch diameter steel piles were installed at Berth 4 using an impact driver. Prior to installing these piles, a pile probing test was conducted at nine (9) locations to determine the depth to bedrock and verify that the design and pile installation plan was adequate and did not require modification. This pile probing involved driving one (1) 20-inch diameter steel pile with vibratory hammer to a specified depth, then removing the probe pile and driving the pile at a new location for the next test.

The 2020 work plan also had scheduled the installation of nine (9) 24-inch concrete piles for the Berth 2 Fender upgrades, removal of 106 old timber piles, and installation of 52 14-inch composite piles. However, restrictions and safety precautions due to the COVID-19 pandemic slowed the planned work and these activities did not occur in 2020.

2. Project Area

The Project is located at the Chevron Products Company Richmond Refinery Long Wharf within the City of Richmond, Contra Costa County (Figure 1). The Project Area is approximately 0.75 mile south of the eastern side of the Richmond-San Rafael Bridge. Construction activities in 2020 occurred at Berth 4 exclusively.

Sediments around the Long Wharf consist of a layer of recent Bay mud, approximately 5 to 12 meters in depth, overlying 9 to 18 meters of soft to medium stiff clay (Young Bay Mud), then older stiff clays to bedrock. Depth to bedrock in the area is generally 30 meters or more. The sediments are relatively uniform in the area surrounding the Wharf at locations where piles are being driven, so the description of the sediment stratigraphy would apply to all piles driven.

3. Methods

3.1 Marine Mammal and Fish Monitoring

Marine mammal and fish monitoring efforts consisted of a pre-Project baseline survey, a worker education program, and visual monitoring during all impact and vibratory pile driving and removal activities.

3.1.1 Pre-Project Baseline Biological Survey

A pre-Project baseline biological survey was conducted by two (2) Project biologists on June 11, 2020, four (4) days prior to the start of work at Berth 4 on June 15, 2020. The baseline survey was conducted in accordance to CDFW ITP No. 2081-2016-056-07, the NMFS BO and IHA, as well as a Mitigation Measure (MM) imposed in the Initial Study/Mitigated Negative Declaration (IS/MND) that was prepared by the California State Lands Commission for the Project to comply with the California Environmental Quality Act (CEQA). The surveys consisted of a baseline marine mammal observation survey and visual observations for active bird nests. The survey area for marine mammals consisted of the waters surrounding the Long Wharf, including but not limited to the Berth 4 area. The nesting bird survey area consisted of all structures along the entire Long Wharf. Binoculars were used by both biologists during all surveys.

The baseline marine mammal survey was conducted on foot from the Long Wharf, from 9:30 A.M. until 12:00 P.M. Low tide occurred at 11:08 A.M., and high tide occurred at 4:02 A.M. and 6:38 P.M. Weather conditions were clear and partly cloudy, with temperatures increasing from 57 degrees Fahrenheit (°F) in the morning to 69°F in the afternoon. The survey area was generally free of visual obstructions; however, ships positioned at Berth 2, Berth 3, and Berth 4 obstructed some of the view along the west side of the Long Wharf. Observers walked along the entire length of the Long Wharf, as well as to the extreme north end of the mooring dolphin at Berth 4 to see around stationary ships. A distance of approximately 50 meters between each ship was not obstructed so that observers could see different angles around the width of the ships. Beyond the width of a ship (approximately 30 meters wide), the view of the water was not obstructed to the west. Views to Red Rock and Castro Ricks to the north were also not obstructed. Surrounding work activity at the neighboring berths and Long Wharf in general was minimal.

Three (3) harbor seals (*Phoca vitulina*) were observed in the water near the Long Wharf during the baseline survey. The first individual surfaced three (3) times in the same location, approximately 60 meters west of Berth 2 at 10:29 A.M. A second individual was observed resting at the surface for a few seconds before diving approximately 25 meters east of Berth 4 at 11:26 A.M. The third individual was observed once at the surface approximately 75 meters east of Berth 4 at 11:31 A.M. In addition to the harbor seals observed in the water, there were approximately 24 harbor seals hauled out at Castro Rocks, located approximately 700 meters north of the Project Area near the Richmond Bridge. No other marine mammals were observed during the survey.

After the marine mammal survey was complete, a nesting bird survey was conducted. There was a high level of bird activity on and around the Long Wharf during the survey. No nests were observed at the Long Wharf during the June 11, 2020 survey. The following confirmed nests were observed on the Long Wharf outside of the Project Area:

- Three (3) Western gulls (*Larus occidentalis*) incubating nests on the roof of the Control Room Building;
- One (1) Western gull fledgling walking on Control Room Building roof with adults;
- One (1) Western gull nest with two (2) mobile nestlings near the Control Room Building parking area (on the surface of the wharf, near the edge);
- One (1) osprey (*Pandion haliaetus*) incubating nest is located on the vehicle access pier alarm speaker post;
- One (1) osprey incubating nest on an abandoned pier north of the Richmond Bridge;
- One (1) osprey incubating nest on a platform on the shore of Point Richmond, east of Berth 4 and south of the Richmond Bridge;
- One (1) osprey nest with two (2) nestlings on a mitigation platform near the Long Wharf access gate.

3.1.2 Worker Education Program

A worker education program was given on June 8, 2020 and June 10, 2020 to all persons employed or otherwise working in the Project Area. Additional individual training was completed on July 27, 2020 and August 19, 2020. Due to COVID-19 shelter-in-place restrictions occurring at the time, the training was conducted via a virtual platform. A brochure prepared by the Designated Biologist included a description

of the biology and general behavior of the Covered Species, the distribution and habitat needs of the Covered Species, sensitivity of the Covered Species to human activities, Covered Species legal protection, recovery efforts, and penalties for violations. The brochure was transmitted to all site workers (Appendix A) via email. Once on site, all trained site workers signed a form stating they attended the program (Appendix B). The signature forms were kept on file and a copy of the permits were kept on-site in a construction monitoring notebook for the duration of construction.



Figure 1. Project Location

3.1.3 Monitoring during Pile-Driving Activities

Two (2) qualified, National Marine Fisheries Service (NMFS)-approved marine mammal observers (MMOs)/fish monitors were on-site daily during in-water work, for a total of 13 days in 2020. Table 1 provides a summary of the activities monitored in 2020.

Table 1. Summary of 2020 Monitored Covered Activities

Date	Covered Activities
6/15/2020	<ul style="list-style-type: none"> • Five pile locations at Berth 4 were probed with a 20” steel pile, using a vibratory hammer. The fifth pile probe was partially driven, secured and left in place overnight.
6/16/2020	<ul style="list-style-type: none"> • The intact pile from 6/15/20 was extracted with a vibratory hammer. Four new pile locations at Berth 4 were then probed with a 20” steel pile, using a vibratory hammer.
7/24/2020	<ul style="list-style-type: none"> • A template frame was constructed and installed prior to pile driving at Berth 4. • A bubble curtain attenuation device was installed prior to pile driving at Berth 4. The bubble curtain attenuation device was reinstalled around the new pile driving location prior to each work period from 7/24/2020 through 10/30/2020. • Pile #1, a 60-inch steel pile, was placed at the Berth 4 North Cap, using the barge crane under its own weight. No hammer strikes occurred. The pile was secured and left in place overnight.
7/25/2020	<ul style="list-style-type: none"> • Pile #1 from 7/24/20 was placed again to correct the angle and was then partially driven with an impact hammer for a total of 12 minutes. The pile was secured and left in place overnight.
7/29/2020	<ul style="list-style-type: none"> • Pile #1 was completed. It was driven with an impact hammer for a total of 45 minutes.
8/7/2020	<ul style="list-style-type: none"> • The template frame was installed prior to pile driving at Berth 4. • 60-inch steel pile #2 was placed at the Berth 4 North Cap, using the crane barge under its own weight. Then the impact hammer was used to drive the pile for a total of 39 minutes to drive the pile to completion.
8/21/2020	<ul style="list-style-type: none"> • The template frame was installed prior to pile driving at Berth 4. • 60-inch steel pile #3 was placed at the Berth 4 North Cap, using the crane barge under its own weight. Then the impact hammer was used to drive the pile for a total of 58 minutes to drive the pile to completion.
9/4/2020	<ul style="list-style-type: none"> • The template frame was installed prior to pile driving at Berth 4. • 60-inch steel pile #4 was placed at the Berth 4 North Cap, using the crane barge under its own weight. Then the impact hammer was used to drive the pile for a total of 46 minutes to drive the pile to completion.

9/18/2020	<ul style="list-style-type: none"> • The template frame was installed prior to pile driving at Berth 4. • 60-inch steel pile #5 was placed at the Berth 4 South Cap, using the crane barge under its own weight. Then the impact hammer was used to drive the pile for a total of 55 minutes to drive the pile to completion.
10/2/2020	<ul style="list-style-type: none"> • The template frame was installed prior to pile driving at Berth 4. • 60-inch steel pile #6 was placed at the Berth 4 South Cap, using the crane barge under its own weight. Then the impact hammer was used to drive the pile for a total of 31 minutes. The pile was secured and left in place overnight.
10/5/2020	<ul style="list-style-type: none"> • Pile #6 from 10/2/2020 was completed; driven with an impact hammer for a total of 11 minutes.
10/16/2020	<ul style="list-style-type: none"> • The template frame was installed prior to pile driving at Berth 4. • 60-inch steel pile #7 was placed at the Berth 4 South Cap, using the crane barge under its own weight. Then the impact hammer was used to drive the pile for a total of 43 minutes to drive the pile to completion.
10/30/2020	<ul style="list-style-type: none"> • 60-inch steel pile #8 was placed at the Berth 4 South Cap, using the crane barge under its own weight. Then the impact hammer was used to drive the pile for a total of 41 minutes to drive the pile to completion.

In accordance with the Project Marine Mammal Monitoring Plan (MMMP),¹ monitoring during each pile-driving event started at least 30 minutes prior to pile-driving (or removal) initiation and ended 30 minutes after such work was completed for the day, or when there was a pause in the work of two (2) hours or more (Monitoring Period).

The MMOs were stationed at monitoring locations that afforded the best view of the Project Area and adjacent waters and adjusted these locations during barge positioning to ensure the most unobstructed views. Monitoring locations always included one on the south side of the work area (referred to as Berth 4 South (B4S)) and one on the north side of the work area (referred to as Berth 4 North (B4N)) to view different angles and minimize any potential blind spots. A monitor was always stationed on the Berth 4 mooring dolphin catwalk to provide an unobstructed view of the Castro Rocks. Cell phones were used to communicate among the MMOs, construction team, and hydroacoustic monitoring team. MMOs used rangefinders to identify shutdown zones and estimate distances using fixed landmarks and used binoculars to continuously scan the monitoring zone for marine mammals and fish. Field data sheets summarizing environmental conditions, pile-driving activities, and observations of marine mammals were prepared daily (Appendix C).

In addition to monitoring for marine mammals, monitoring was conducted for the following three Covered Species subject to take authorization: Sacramento River winter-run chinook salmon (*Oncorhynchus tshawytscha*), Central Valley spring-run chinook salmon (*Oncorhynchus tshawytscha*), and longfin smelt (*Spirinchus thaleichthys*). No fish species covered under the CDFW ITP were observed during any of the monitoring activities in 2020. No dead or incapacitated fish were observed during any of the monitoring activities in 2020.

¹ AECOM (2018). Marine Mammal Monitoring Plan, Chevron Richmond Refinery Long Wharf Maintenance and Efficiency Project. June 2018. 55 pp.

3.1.3.1 Hydroacoustic Monitoring

In accordance with the approved Project Hydroacoustic Monitoring Plan, hydroacoustic monitoring of 60-inch steel pipe pile installation was conducted for two (2) piles, one (1) on August 21, 2020 and one (1) on September 4, 2020. During hydroacoustic monitoring events, three hydrophones were deployed to collect the data needed to calculate the attenuation rate and the distances to the various criteria. The first hydrophone position was approximately 10 meters from the piles (or as close as safely possible given site conditions), the second hydrophone position was approximately 30 meters the pile, and the third hydrophone position was over 200 meters from the pile. Hydrophones at all positions were placed at approximately mid-depth in the water column. The water depth at the pile driving location was approximately 6 meters, and a bubble curtain was in operation for the entire duration of the drives. For more information regarding the equipment and methods used, see Section 4 and Appendix D.

4. Results

4.1 Hydroacoustic Monitoring

Hydroacoustic monitoring of two (2) impact driven 60-inch steel piles while using a bubble curtain to mitigate noise impacts was conducted on August 21 and September 4, 2020, respectively. This section briefly summarizes the results of the hydroacoustic monitoring conducted in 2020. The full 2020 hydroacoustic monitoring report is provided in Appendix D.

4.1.1 Ambient Noise and Transmission Loss

Measured ambient sound pressure levels were generally between 110-130 dB RMS and at least 10 dB lower than pile driving sound pressure levels. On September 4, 2020, ambient levels were high at the 230-meter position due to rougher weather conditions in the bay. At that position, the hydrophone system was not sheltered from faster current and larger waves near the wharf. Pile driving sound levels were detectable above ambient conditions by impulse measurements and a pulse detection program at all monitoring positions.

The transmission loss calculated from the field monitoring results for impact driving of the 60-inch steel piles was 26.6 SEL on August 21 and 30.6 SEL on September 4. These values were much greater than the conservative value of 15 log used to predict the distances to the thresholds in the permit applications. This greater attenuation rate causes the distances over which thresholds may be exceeded to shrink considerably, as described in the following subsections.

4.1.2 Hydroacoustic Measurements Relative to Fish Thresholds

On July 8, 2008, the Fisheries Hydroacoustic Working Group, whose members include NMFS' Southwest and Northwest Divisions; California, Washington, and Oregon departments of transportation; the California Department of Fish and Wildlife (CDFW); and the U.S. Federal Highway Administration issued an agreement for the establishment of interim threshold criteria to determine the effects of high-intensity sound on fish. While these criteria are not formal regulatory standards, they are generally accepted as viable criteria for underwater noise effects on fish. These criteria were established after extensive review of the most recent analysis of the effect of underwater noise on fish. The agreed-upon threshold criteria for impulse-type noise to harm fish have been set at 206 dB peak, 187 dB accumulated sound exposure level (SEL) for fish over 2 grams, and 183 dB for fish less than 2 grams. Since special-status fish under 2 grams in weight were not present in the area during pile driving, only the 187 dB SEL threshold is applicable.

During the impact pile driving on August 21, 2020 underwater noise levels did not exceed the 206-dB peak threshold at 10 meters; but impact driving exceeded the 187 dB cumulative SEL (cSEL) threshold at 23 meters, based on computed transmission loss constants. During the impact pile driving on September

4, 2020 underwater noise levels did not exceed the 206-dB peak threshold at 14 meters (the closest position possible to 10 meters due to safety and engineering considerations); but impact driving exceeded the 187 dB cumulative SEL (cSEL) threshold at 55 meters, based on computed transmission loss constants.

These measured distances are less than the distances over which thresholds were anticipated to have been exceeded in the Project Biological Assessment and ITP. Fish exposed to noise levels above the cSEL threshold for an extended period could experience temporary threshold shifts in hearing, however, since the area is small, it is unlikely that individuals would remain in such close proximity to the pile long enough to experience such effects. Table 2 provides a summary of the actual and predicted distances to the underwater noise thresholds for fish.

Table 2. Measured Distances (meters) to the NMFS cSEL Thresholds for Fish over 2 grams (dB re: 1µPa-sec²)

Day	Installation Method	Pile IDs	Distance to 187 dB Cumulative SEL Actual (Predicted*)
8/21	Impact w. Bubble Curtain	60" Steel Pile #3	23 meters (158 meters)
9/4	Impact w. Bubble Curtain	60" Steel Pile #4	55 meters (158 meters)
<p>*Assumes use of a bubble curtain</p> <p>µPa-sec² = micropascals per second squared dB = decibel ID = identification NA = Cumulative SEL Thresholds are only applicable for impulsive noise (i.e.) impact pile driving. NMFS = National Marine Fisheries Service SEL = Sound exposure level</p>			

4.1.3 Hydroacoustic Measurements Relative to Marine Mammal Thresholds

In 2010, NMFS established interim thresholds regarding the exposure of marine mammals to high-intensity noise that may be considered take under the Marine Mammal Protection Act. Updated National Oceanic and Atmospheric Administration guidance on assessing the effects of underwater noise on marine mammals for agency impact analysis was adopted in 2016.² The 2016 guidance includes sound thresholds for slight injury to an animal’s hearing, or permanent threshold shift (PTS) (Level A harassment). The underwater sound pressure threshold for slight injury or PTS (Level A harassment) is a dual metric criterion for impulse noise (e.g., impact pile-driving), including both a peak pressure and cSEL threshold, which is specific to the species hearing group (high-frequency cetaceans [i.e., harbor porpoise], mid-frequency cetaceans [i.e., bottlenose dolphin], low-frequency cetaceans [i.e., gray whale], Phocids [i.e., Pacific harbor seal and Northern elephant seal], and Otariids [i.e., California sea lion and Northern fur seal]). For continuous noise (e.g., vibratory pile extraction or driving), the PTS threshold is based on cSEL for each species hearing group.

The 2010 thresholds for Level B behavioral harassment levels are still applicable: 160 dB RMS for impulse sounds and 120 dB for non-impulse or continuous sounds. Level B behavioral harassment is considered to occur when marine mammals are exposed to noise of 160 dB RMS or greater for impulse noise and 120 dB RMS for continuous noise. In some instances, ambient noise levels may be used in place of the 120 dB RMS threshold for continuous noise. For continuous noise, RMS levels are based on a time constant of 10 seconds, and those RMS levels should be averaged across the entire event. For impact pile-driving, the overall RMS levels are characterized by integrating sound energy for each

² 2016 Technical Guidance for Assessing the Effects of Anthropogenic Sound on Marine Mammal Hearing.

acoustic pulse across 90 percent of the acoustic energy in each pulse and averaging all the RMS levels for all pulses. Harassment thresholds for the various types of underwater noise are shown in Table 3.

Table 3. Underwater Noise Injury and Behavioral Disturbance Thresholds for Marine Mammals

Hearing Group and Species Considered	Underwater Continuous Noise Thresholds (e.g., Vibratory Pile-Driving)		Underwater Impulse Noise Thresholds (e.g., Impact Pile-Driving)		
	Level A cSEL Threshold	Level B RMS Threshold	Level A Peak Threshold ¹	Level A cSEL Threshold ¹	Level B RMS Threshold
Phocids (Pacific harbor seal, Northern elephant seal)	201 dB	120 dB	218 dB	185 dB	160 dB
Otariids (California sea lion, Northern fur seal)	219 dB	120 dB	232 dB	203 dB	160 dB
Low-Frequency Cetaceans (gray whale)	199 dB	120 dB	219 dB	183 dB	160 dB
Mid-Frequency Cetaceans (bottlenose dolphin)	198 dB	120 dB	230 dB	185 dB	160 dB
High-Frequency Cetaceans (harbor porpoise)	173 dB	120 dB	202 dB	155 dB	160 dB

Notes:

¹ Level A threshold for impulse noise is a dual metric criterion based on peak pressure and cSEL. Thresholds are based on the NMFS 2016 Technical Guidance for Assessing the Effects of Anthropogenic Sound on Marine Mammal Hearing.

μPa-sec² = micropascals per second squared
cSEL = cumulative sound exposure level
dB = decibels
N/A = Not applicable; no thresholds exist
NMFS = National Marine Fisheries Service
RMS = root mean square

Underwater peak and RMS are re: 1 μPa; cSEL is re: 1 μPa²-sec; Airborne RMS is re: 20 μPa.

Using the above described data collected during hydroacoustic monitoring, measured distances to underwater noise thresholds for marine mammals were calculated. Table 4 provides a summary of the measured distances over which the Level A and Level B harassment thresholds for marine mammals were exceeded during pile driving for the pile types driven in 2020. The adjusted distances are less than the predicted values used to generate the take estimates developed for the IHA request (see Table 7).

Table 4. Measured Distances (meters) to the NMFS Harassment Thresholds for Marine Mammals (dB re: 1µPa-sec²)

Month/Day	Installation Method	Pile Type	Distance to Level B Threshold	Distance to Level A cSEL Threshold (meters)*				
				Phocid Pinnipeds	Otariid Pinnipeds	Low-Frequency Cetaceans	Mid-Frequency Cetaceans	High-Frequency Cetaceans
8/21	Impact w. Bubble Curtain	60" Steel Pile #3	27 meters	25 meters	<10 meters	36 meters	<10 meters	39 meters
9/4	Impact w. Bubble Curtain	60" Steel Pile #4	76 meters	51 meters	14 meters	69 meters	14 meters	76 meters
6/21 (Year 2019)**	Vibratory Hammer	20" Steel Pile #1 20" Steel Pile #2	207 meters 170 meters	<10 meters	<10 meters	10 meters	<10 meters	<10 meters

*As calculated using the highest daily mean SEL value and the measured transmission loss.
 **No hydroacoustic monitoring of vibratory driving was conducted in 2020. Monitoring results from 2019 are provided for this pile type to demonstrate probable noise levels from the probe piles vibratory driven in 2020.
 µPa-sec² = micropascals per second squared
 cSEL = cumulative sound exposure level
 SEL = sound exposure level

4.2 Marine Mammal and Fish Monitoring

Conditions during observation periods were variable but generally favorable for marine mammal observations, with no fog present and average wind speeds generally ranging 1–15 miles per hour. There were a few occurrences of higher winds with associated choppy water conditions, as well as some days where fog and smoke from wildfires decreased the visibility. Despite unfavorable weather conditions on the Bay some days, the MMOs were reliably able to observe the waters within 450 meters of all pile driving activities.

In June, pile probing was conducted at Berth 4 on two (2) days: June 15 and June 16, 2020 (Table 1). The pile probing consisted of driving one (1) 20-inch steel pile with a vibratory hammer to record the depth of refusal. The pile was then vibrated out and reused at the next probing location. A total of five (5) locations were probed on June 15 and a total of four (4) locations were probed in the same manner on June 16.

In July, one (1) 60-inch pile was installed over the course of three (3) days: July 24, July 25, and July 29, 2020 (Table 1). The pile was probed under its own weight on July 24, but no hammer strikes occurred. The same pile was re-probed under its own weight and partially driven on July 25 and driven to completion on July 29.

August pile-driving and associated activities were conducted on a total of two (2) days: August 7 and August 21, 2020 (Table 1). Two (2) 60-inch steel piles were driven with an impact hammer at Berth 4, one (1) on August 7 and one (1) on August 21.

September pile-driving and associated activities were conducted over two (2) days: September 4 and September 18, 2020 (Table 1). Two (2) 60-inch steel piles were driven with an impact hammer at Berth 4, one (1) on September 4, and one (1) on September 18, respectively.

In October, a total of three (3) 60-inch steel piles were driven with an impact hammer at Berth 4 over four (4) days: October 2, October 5, October 16, and October 30, 2020. One (1) 60-inch steel pile was probed under its own weight and partially driven on October 2. The pile was secured and left over the weekend, then driven to completion on October 5. The remaining two (2) 60-inch steel piles were driven on October 16 and October 30, respectively.

No pile-driving was conducted at Berth 4 during the month of November.

Movement and repositioning of barges throughout Project activities would sometimes partially and temporarily obstruct small portions of the Project Area. MMOs moved along the Berth 4 dolphin walkways, staircases, and used elevated platforms to optimize views. MMOs also used cell phones to communicate blind spots and to confirm that at least one MMO could see around obstructions. Continuous communication and the ability to move on foot to different viewing angles around Berth 4 ensured that between the north and south MMO positions, observations could continue reliably.

Due to a delay in completing a 60-inch pile the previous week, an oil tanker was berthed at Berth 4, on October 5. The tanker was stationary and obstructed the view of approximately 30 meters of the western portion of the Level B zone along the west side of the Long Wharf as well as a portion of the pinniped, high-frequency and mid-frequency cetacean Level A and shutdown zones to the west. The western portions of the shutdown zones not observable were directly beneath the ship. The impact pile driving that occurred on this day was to complete the pile that was started on October 2 and resulted in eleven (11) total minutes of active impact-pile driving, and 71 minutes total of monitoring. With a ship at the berth, animals may be excluded from the shutdown zone in the area west of the wharf as an animal would need to be beneath the ship to be within the zone. Depths along the Wharf are dredged to just below the draft of the ships, leaving only about 1.8 to 5 meters between the bottom of the ship and the bay bottom. On this day, no marine mammals were sighted in any areas outside of the portion of the area with the obstructed view during the monitoring period monitoring (pre-driving, during driving, and post-driving). As shown in Table 4, the actual distances to the Level B and Level A thresholds as measured during hydroacoustic monitoring of the 60-inch piles were quite small. The measured Level A and Level B zones were 76 meters or less in radius, meaning that very little of those zones would have protruded beyond the ship, which has a width of 48 meters.

4.2.1 Listed Fish Observations and Take

No dead or incapacitated fish were observed during in-water activities and no take of fish species was recorded. No listed species of fish were observed during monitoring of in-water activities.

4.2.2 Marine Mammal Observations and Take

Marine Mammal Observations - The marine mammal Monitoring Period during construction activities was defined as 30 minutes prior to pile-driving, during pile-driving, and 30 minutes after pile-driving. Harbor seals (*Phoca vitulina*) and California sea lions (*Zalophus californianus*) were the only marine mammal species commonly observed during the Monitoring Period. Most of the seals were observed on the mainland side of the wharf, north-northeast of the Project Area, typically 40-200 meters from the Project Area. Seals were rarely seen on the open Bay side, west of the Wharf surrounding the crane and materials barges. In contrast, most of the sea lion sightings occurred on the Bay side of the wharf, west of the Project Area and typically less than 100 meters from the Project Area. Based on documented behavior and direction of travel during the Monitoring Period, sea lions generally appeared to move through the Project Area at a faster travel speed than harbor seals. Harbor seals were the only species of marine mammal observed hauled out at Castro Rocks.

Harbor porpoises (*Phocoena phocoena*) were observed swimming past the Project Area on the west side of the Wharf on June 15, 2020 and August 7, 2020. On June 15, 2020 two (2) porpoises were observed swimming south together, approximately 75 meters from the Project Area. On August 7, 2020, one (1) porpoise was observed surfacing three (3) times in the same location near Red Rock Island, over 1,000 meters from the Project Area. No other species of marine mammals were observed during Monitoring Period.

Behavioral Changes Observed in Swimming Marine Mammals - Table 5 summarizes instances when harbor seals and sea lions observed in the water surrounding the Project Area reacted to active vibratory or impact pile driving, or otherwise took interest to other Project activities around Berth 4.

Table 5. In-Water Marine Mammal Behavioral Changes During Active Pile Driving

Date	Species	MMO Position	Distance from Pile (meters)	Bearing from MMO	Behavior
6/16/2020	HASE	B4S	200	10	resting at surface; dove when vibratory hammer started
7/25/2020	HASE	B4N	100	30	swam toward pile; looked in direction of impact pile driving; dove
7/29/2020	HASE	B4S	200-400	326	swam back and forth, east to west, occasionally looking at impact pile driving while stationary at surface
8/21/2020	HASE	B4S	50-60	15	looked at Project activity and at MMO; swam toward pile; dove
8/21/2020	HASE	B4N	85	355	looked at Project activity while swimming east
10/02/2020	CASL	B4N	40	50	raised head to look at Project activity while swimming south; dove
10/16/2020	CASL	B4S	40-70	267	swam fast away from impact pile driving; porpoised (whole body surfaced and out of the water) twice
10/16/2020	HASE	B4S	50	278	dove as a sailboat approached
10/30/2020	HASE	B4S	250	40	lifted head to look at Project activity while swimming north; dove
Notes: CASL = California sea lion B4N = Berth 4 North HASE = Pacific harbor seal B4S = Berth 4 South					

Behavioral Changes Observed in Marine Mammals at Castro Rocks - Table 6 summarizes instances when harbor seals observed hauled out at Castro Rocks reacted to active impact pile driving. No behavioral changes were observed at Castro Rocks during vibratory pile-driving. All Castro Rock observations were recorded by the MMO positioned at B4N, at the northern extent of Berth 4. The haul out is located approximately 700 meters north of the Project Area.

Table 6. Castro Rocks Marine Mammal Behavioral Changes During Active Pile Driving

Date	Behavior
10/05/2020	one (1) HASE hauled out; showed no reaction to the impact-hammer soft start; moved into the water when impact-pile driving began two (2) minutes later
10/30/2020	two (2) out of seven (7) total HASE hauled out raised their heads at the start of impact pile driving after a 30-minute break in pile strikes

Estimated Take - Each individual animal observed within the predicted Level A or B zones (as reported in the IHA) during active driving was treated as a take event. Multiple sightings of an individual animal were recorded as one observation, provided the animal could be tracked or otherwise individually identified. Table 5 provides a summary of the predicted distances of Level A and Level B threshold exceedance, as

presented in the IHA. Note that Table 7 only provides the predicted distances for the Level A thresholds of species for which Level A take was authorized for 2020.

Table 7. Predicted Underwater Pile Driving Noise Levels and Distances of Threshold Exceedance

Pile Type	Source Levels at 10 meters (dB)		Distance to Threshold 160/120 dB RMS (Level B)* meters	Distance to cSEL Threshold for Harbor Seal (Level A) meters	Distance to cSEL Threshold for Harbor Porpoise (Level A) meters
	Peak	RMS/SEL			
Impact Driving					
60" steel pile	203	188 RMS/ 178 SEL	736	445	990
Vibratory Driving/Extraction					
20" steel pipe pile (4 per day)	180	163 RMS	7,360	4	10
Notes: dB = decibels cSEL = cumulative sound exposure level RMS = root mean square SEL = sound exposure level *160 dB RMS applied to impulse noise such as impact driving and 120 dB RMS applies for continuous noise such as vibratory driving.					

For all pile driving, Level A and Level B takes were recorded for animals observed only during active pile driving. A summary of take recorded by the MMOs during the Monitoring Period is provided in Table 8. There were no other indicators of marine mammal injuries observed during the Monitoring Period. A total of four (4) instances of Level B harassment for harbor seal, and four (4) instances of Level B harassment for sea lion were recorded in the observable portion of the Level B zone. A total of 34 instances of Level A harassment for harbor seal were recorded in the Level A zone.

Table 8. Observed Level A and Level B Takes

Date	Species	Total Observed During Monitoring Period	Level A Takes Observed During Active Pile Driving*	Level B Takes Observed During Active Pile Driving*	Estimated Distance Range (m)	Pile-Driving (# piles)
6/15/2020	HASE	9	0	1	80 - 300	Vibratory (5)
	HAPO	2	0	0	75	
6/16/2020	HASE	7	0	2	150 - 800	Vibratory (4)
7/24/2020	HASE	1	0	0	350	NA
7/25/2020	HASE	3	1	0	30** - 100	Impact (1)*
7/29/2020	HASE	9	2	1	60 - 750+	Impact (1)*
8/7/2020	HASE	0	0	0	NA	NA
8/21/2020	HASE	9	6	0	40 - 200+	Impact (1)
9/4/2020	HASE	3	1	0	60 - 90	Impact (1)
9/4/2020	CASL	1	0	0	40 - 60	Impact (1)
9/18/2020	HASE	2	1	0	100 - 750	Impact (1)
10/2/2020	CASL	4	0	1	35** - 100+	Impact (1)*
10/2/2020	HASE	4	2	0	40 - 100+	Impact (1)

Date	Species	Total Observed During Monitoring Period	Level A Takes Observed During Active Pile Driving*	Level B Takes Observed During Active Pile Driving*	Estimated Distance Range (m)	Pile-Driving (# piles)
10/5/2020	-	0	0	0	NA	NA
10/16/2020	CASL	3	0	3 [#]	40 - 70	Impact (1)
10/16/2020	HASE	21	14	0 [#]	30 - 400+	Impact (1)
10/30/2020	HASE	15	7	0	60 - 250	Impact (1)
TOTAL Observed Level A Takes	CASL = 0, HAPO = 0, HASE= 34					
TOTAL Observed Level B Takes	CASL = 4, HAPO = 0, HASE= 4					
<p>Notes:</p> <ul style="list-style-type: none"> * The count presented in the "Total Observed During Monitoring Period" column is inclusive of the animals observed during active pile driving. * Indicates the same pile from previous days (see Table 1 for more details). ** Animal was observed at this distance outside of the 30 minute window before/after pile driving and observed again at a greater distance during the Monitoring Period. # Some of the same individuals were counted by both MMO's and are not counted twice in the total <p>CASL = California sea lion HAPO = Harbor porpoise HASE = Harbor seal m = meters</p>						

As required by the IHA, potential takes of marine mammals that occurred outside of the reliably observable portion of the Level B zone (a radius of 450 meters) were extrapolated. This was done by taking the daily observed take (animals sighted within the observable level B or Level A zone during active pile driving) multiplied by the unobservable portion of the Level B zone. The daily observed take density was developed by summing the total number of takes observed on each day divided by the observable area of the Level B zone. For example, on June 15, 2020, the observed daily take density for harbor seals is as follows:

$$(1 \text{ harbor seal takes observed} / (\pi \times 0.4\text{km}^2)) = 1.99 \text{ harbor seal/km}^2 \text{ takes.}$$

To extrapolate daily take, the observed daily take density is then multiplied by the unobservable portion of the predicted Level B zone for that pile driving activity. This value is 87.57 square kilometers for vibratory driving of the 20-inch steel shell piles, as calculated from the distance of threshold exceedance predicted for the 2019 IHA (Table 7). The extrapolated daily take for June 15, 2020, is therefore:

$$1.99 \text{ harbor seal/km}^2 \text{ takes} \times 87.57 \text{ square kilometers} = 173.1 \text{ extrapolated takes.}$$

Note that land areas and the observable area of water are excluded from the area of the unobservable Level B zone. Table 9 provides a summary of the observed and extrapolated takes for 2019. Extrapolation is only needed for species where take was observed either during active pile driving, in this case harbor seal.

Table 9. Summary of 2020 Level A and Level B Take Events

Species	Level A - Authorized	Level A - Recorded	Level B - Authorized	Level B - Recorded	Level B - Extrapolated
Harbor porpoise (HAPO)	4	0	321	0	NA
Total HAPO Takes 2020		0 Level A		0 Level B	
California sea lion (CASL)	0	0	302	0 (Vibratory Driving) 4 (Impact driving)	0 (Vibratory Driving) 10 (Impact driving)
Total CASL Takes 2020		0 Level A		14 Level B	
Harbor seal (HASE)	513	34	5,114	3 (Vibratory Driving) 1 (Impact driving)	519 (Vibratory Driving) 83 (Impact driving)
Total HASE Takes 2020		34 Level A		606 Level B	

NA = not applicable

4.2.3 Pile-Driving Shutdowns

On two (2) occasions during the monitoring period, Project work was temporarily halted for purposes of take avoidance. On July 25, 2020 the MMOs notified Chevron at 2:19 P.M. that a harbor seal was seen within the shutdown zone, prior to the initiation of pile-driving activities. At this time, the hammer was still being positioned for work and was not yet in use. Crew members working from the barges and the barge crane paused all work as a precautionary measure. The seal was not observed again after the initial sighting. Pile driving began at 2:49 P.M., approximately 30 minutes after the seal was last observed in the shutdown zone.

On October 2, 2020 the MMOs observed a sea lion swimming north along the west side the of Long Wharf, prior to the initiation of pile-driving activities. Chevron was notified at 11:56 A.M. that the sea lion had approached the shutdown zone. At this time, the hammer was still being positioned for work and was not yet in use. Crew members were working from the barges and the barge crane was in use. Crew members continued to work with the barge crane but no pile driving occurred. The sea lion was traveling at a moderate pace, and moved through the shutdown zone quickly. Chevron was notified at 12:00 P.M. that the sea lion was over 100 meters from the Project Area. Pile driving began at 12:15 P.M., approximately 20 minutes after the sea lion was last observed in the shutdown zone and 15 minutes after it was confirmed outside of the shutdown zone.

The shutdown zones implemented at Berths 4 are shown in Figure 2 (North Cap and South Cap), and Figure 3 (greater area implemented for low frequency cetaceans).

Figure 2. Pile Driving Shutdown Zones at Berth 4 for Pinnipeds, High and Mid-frequency Cetaceans

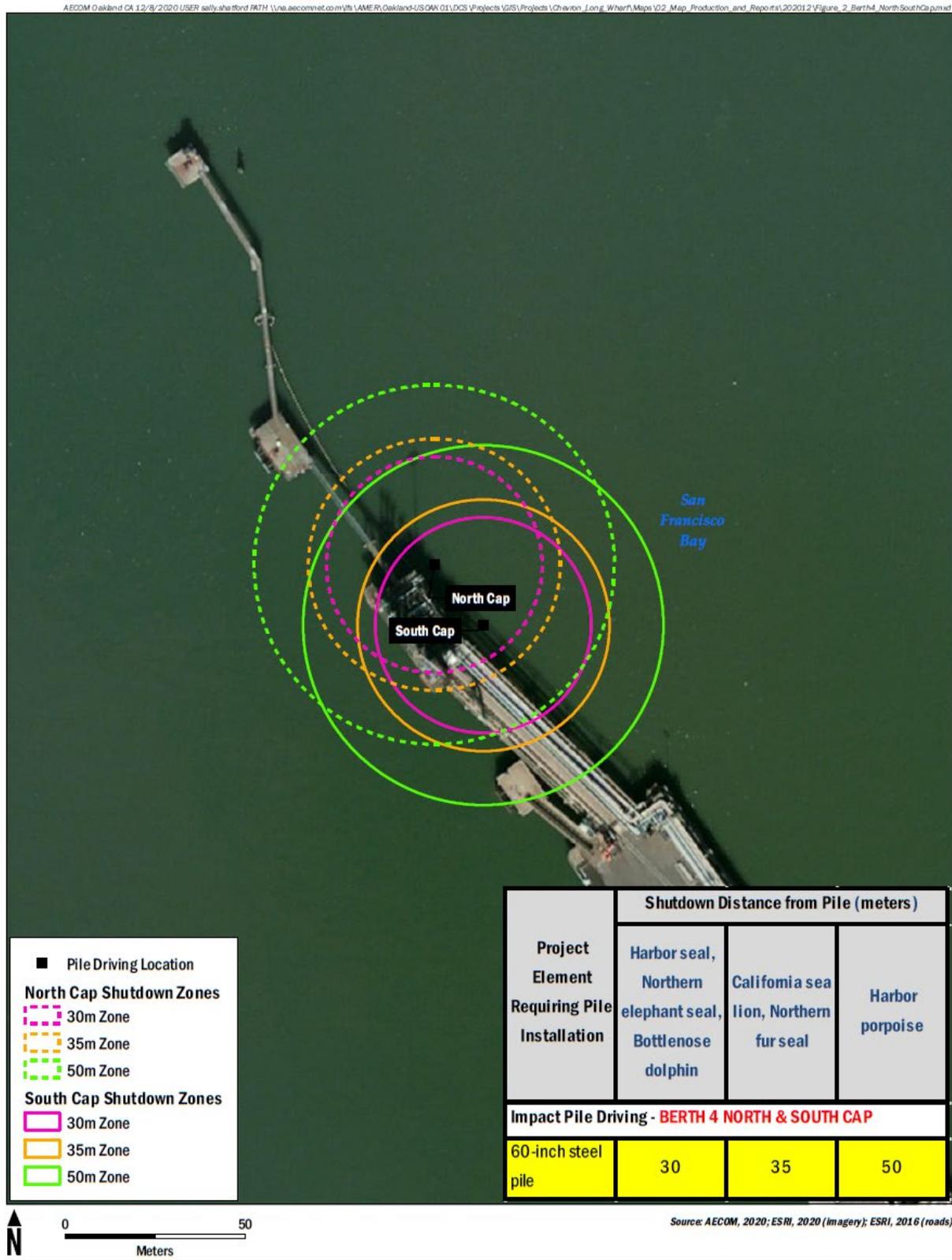
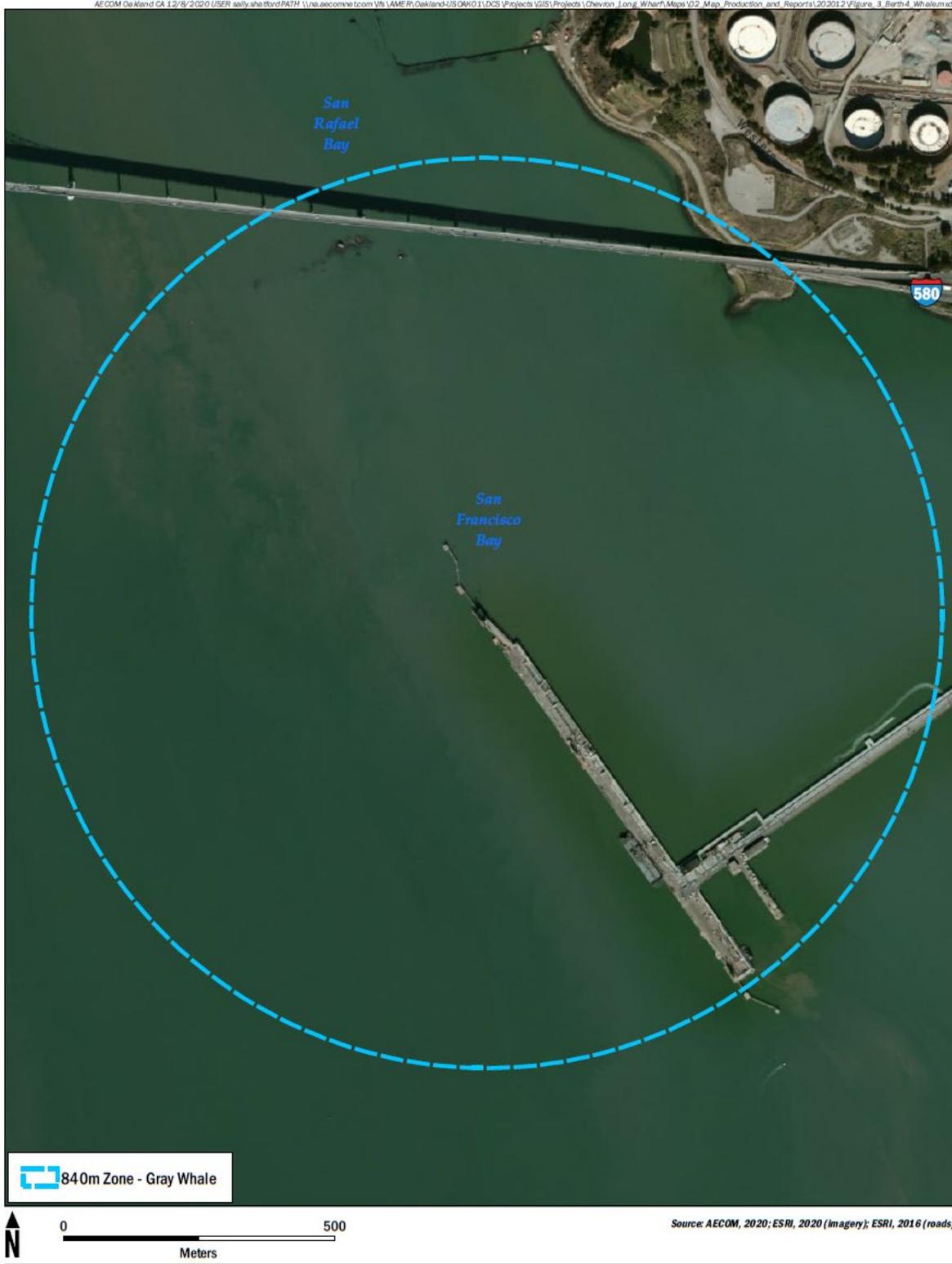


Figure 3. Pile Driving Shutdown Zones at Berth 4 for Low Frequency Cetaceans



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Chevron Long Wharf Maintenance and Efficiency Project
2020 Annual Biological Monitoring and Mitigation Compliance

FIGURE 3
*Berth 4 Gray Whale Shutdown Zone
(North & South Cap)*

5. Discussion

No incapacitated or injured fish were observed within the monitoring area during any Covered Activities, and the distances over which underwater noise levels were exceeded were consistently lower than the modeled results for fish presented in the Biological Assessment provided to NMFS and the ITP (Table 2).

Hydroacoustic monitoring found the distances to the some of the harassment thresholds for marine mammals to be significantly smaller than the modeled distances used to estimate take for the IHA. For example, the Level B zone during impact driving of the 60-inch steel piles was found to be 76 meters or less in radius, whereas the distance used in the IHA was 251 meters. This was largely due to the measured attenuation rates of 20 to 30 log being much higher than the standard, conservative value of 15 log used in the IHA calculations.

As presented in the IHA application, harbor seals are the most likely species to occur in the vicinity of the Long Wharf and were the most common species observed during pile driving in 2020.

The current avoidance and minimization measures, as required in permit conditions, have been demonstrated to effectively minimize take of marine mammals and fish. Given that the monitoring results demonstrate that underwater noise from pile driving has been far less impactful than suggested by pre-project modeling, we anticipate that potential impacts from future project activities, such as additional pile-driving, would continue to be mitigated by current avoidance and minimization measures.

Appendix A Worker Environmental Awareness Training Brochure

ENVIRONMENTAL LAWS, REGULATIONS AND PENALTIES

- ◆ **Federal Endangered Species Act (ESA)** – enacted to conserve endangered and threatened species in an effort to bring species back to viable population levels.
 - Prohibits the “take” of any listed species. “Take” is defined as “to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct.”
- ◆ **California Endangered Species Act (CESA)** – generally parallels the main provisions of the Federal Act and prohibits the “taking” of state-listed species.
- ◆ **Marine Mammal Protection Act** – protects all marine mammals.
 - Prohibits the “take” of marine mammals. “Take” is defined as “to harass, hunt, capture, or kill, or attempt to engage in any such conduct.”
- ◆ **California Fish and Game Code §3511** – prohibits take of fully protected birds. Take can only be authorized for necessary scientific research. No other take permits can be issued.

Violation of federal and/or state environmental laws may result in fines and/or jail.

PROTECTIVE MEASURES

Measures to Protect and Monitor All Species

- ◆ Time Restrictions: For all in-water pile driving activities, Chevron shall operate only during daylight hours
- ◆ Permittee shall conduct pile installation, removal, and related in-water work between June 1 and November 30
- ◆ All piles shall be removed by direct pull or by vibratory methods. Should a pile break or cannot be removed, the pile shall be cut off, at a minimum, 2 feet below the mudline.
- ◆ Permittee shall install piles with a vibratory pile driver to the maximum extent feasible. Maximum pile diameter to be installed shall be 60 inches.
- ◆ Sound pressure levels should not exceed any of the calculated distances to the peak pressure or accumulated sound exposure level.
- ◆ Permittee shall use a bubble curtain during all pile installation of 60” diameter piles using an impact hammer.

Measures to Protect Marine Mammals

- ◆ Establishment of Shutdown Zone: For all pile driving activities, will establish shutdown zones for marine mammal species.
- ◆ Shutdown zones will be monitored for 30 min prior to the start of driving. Monitor will give the all clear. Also will notify if a shutdown must occur during driving if animals approach too close.

- ◆ The shutdown zone shall be monitored throughout the time required to install a pile. Pile installation shall be halted before the animal enters the shutdown zone.
- ◆ If any marine mammal species enters the shutdown zone, all activities shall be shut down until the animal is seen leaving the zone or it has not been seen in the shutdown zone for 30 minutes for cetaceans and 15 minutes for pinnipeds.
- ◆ Use of ramp up/ soft start.
- ◆ Pile caps or cushions shall be used during all impact pile-driving activities.
- ◆ For in-water heavy machinery work other than pile driving (e.g., standard barges, tug boats, barge-mounted excavators, or clamshell equipment), if a marine mammal comes within 10 meters, operations shall cease and vessels shall reduce speed to the minimum level required to maintain steerage and safe working conditions.
- ◆ Visual marine mammal monitoring, observation, data collection, and reporting

YOUR RESPONSIBILITIES

- ◆ All workers should always keep an eye open for these species.
- ◆ If a species is observed, immediately notify your Foreman and Supervisor.

Please contact the Project Compliance Specialist, Mark Piersante, at (510) 912-8667 or Ashley Demcsak at 510-210-2598 if species are observed, with any questions, or for a complete description of all protective measures for the Project.

AECOM

Long Wharf Maintenance and Efficiency Project

WORKER ENVIRONMENTAL AWARENESS TRAINING

Protection of



Marine Mammals



Fish



SENSITIVE SPECIES

NESTING AND PROTECTED BIRDS

Most nesting birds are protected under the Migratory Bird Treaty Act except rock dove, European starling and house sparrows. If you see a nest, contact a biologist.

MARINE MAMMALS

◆ All marine mammals are protected under the Marine Mammal Protection Act.

Pacific Harbor Seal



- ◆ Most common marine mammal species in the Project area.
- ◆ Has spotted coat in a variety of shades from white or silver-gray to dark brown or black. They are true seals, having no external ear flaps. Has small flippers and move on land by flopping along on their bellies.

California Sea Lion



- ◆ Second most common marine mammal species in the Project area.

Harbor Porpoise



- ◆ Color ranges from chocolate brown in males to a lighter golden brown in females. Known for noisy barking. They are not “true” seals, having external ear flaps and large flippers that they use to “walk” on land.

- ◆ Small, relative to most dolphins. Backs are very dark gray or dark brown. They have a low triangular dorsal fin located slightly after the center of the body.

Gray Whale



- ◆ Can grow to about 50 feet long, with mottled gray body, small eyes above the corners of the mouth, and broad, paddle-shaped, pointed pectoral fins (flippers). Has a dorsal hump instead of a fin, and a series of small bumps between the hump and tail flukes.

Marine Mammal Exclusion Zones to be Enforced					
Project Element Requiring Pile Installation	Shutdown Distance from Pile (meters)				
	Gray whale	Bottlenose dolphin	Harbor porpoise	Harbor seal, Northern elephant seal	California sea lion, Northern fur seal
Impact Driving (with bubble curtain)					
24-inch square concrete	20	10	50	15	10
Impact Pile Proofing (no bubble curtain)					
36-inch steel pipe pile	60	10	80	30	10
Vibratory Driving/Extraction					
36-inch steel pipe pile	15	10	50	15	10
20-inch steel pipe pile	10	10	50	10	10
Wood and concrete pile extraction	10	10	50	15	10

FISH

Longfin Smelt



- ◆ Size: 3-inches
- ◆ Threatened under CESA

Chinook Salmon



- ◆ Size: 36-inches
- ◆ Endangered / Threatened under ESA & CESA

Green Sturgeon



- ◆ Size: 4.5-6.5 feet
- ◆ Threatened under ESA

Appendix B Training Attendance Record

**Refinery Long Wharf Maintenance & Efficiency Project
Education and Training Meeting
Attendee Sign-In Sheet**

Date: 6/10/20

The person completing and signing this Sign-in Sheet acknowledges that they have attend and successfully completed the required training session and understand all protection measures imposed by the LWMEP regulatory conditions of approval and mitigation measures required by the ITP issued by CDFW.

Name	Company	Phone	Email
Steven Sharzels	Power		
Jovanana Irena	Power Eng.	650 4559710	
Russell Casdel	Power		
Bennett Clegg	PEC		
Camilo Ortiz	P.E.C		
ALBERT APODACA	PEC		
Richard Foster	PEC	510 2073563	
Scott Williams	PEC	510 332 7692	

Appendix C Marine Mammal Monitoring Daily Field Datasheets

Date: 06/15/20

Page 1 of 8

Daily Marine Mammal Monitoring Summary Log
Richmond Refinery Long Wharf Maintenance and Efficiency Project

Monitor Name:

Laura Duffy

Weather/Visibility and Sea State - use Beaufort Scale on next page:

0805: BF = 2 east of wharf; 3 west of wharf near channel; ^{South} wind ~5kts w/ gust ≤ 10kts; ~60° F
1400 wind switch to NW gusts 15-20kts (BF stay about the same but more white caps on west side of wharf) | 50% cloud cov

Tidal Level at Start/End of Work - use Tides app or refer to Richmond Harbor at tidesandcurrents.noaa.gov):

0700

Start: flood tide, high @ 0902 / low @ 1427 / high @ 2110

end 1639: flood tide

General Human Activity in the Area:

people & vehicles on wharf; ship @ Berth 3; barge & tugs begin moving @ 0800; skiffs assoc. w/ pile work; USACE vessel making short transects in area throughout day

Monitoring Location(s) - show on diagram and take panoramic photo of field of view:

Berth 4 North (B4N) 1: (37.927100, -122.415080)
Berth 4 North (B4N) 2: (37.923222, -122.428451)

Are Castro Rocks visible (yes/no)? If yes, fill out page A-4: yes

Berth Number: 4

Pile Type - include size and material:

20" steel probe piles

Total Pile Count for the Day: 5 Equipment: Impact Vibratory

Total Minutes of Pile Driving - enter total time here¹:

60

¹ Note the start and end times for each individual pile on page 7.

Date: 06/15/20Page 2 of 8Monitor Initials: LDThe Beaufort scale

No.	Knots	Mph	Description	Effects at sea	Effects on land
0	0	0	Calm	Sea like a mirror	Smoke rises vertically
1	1-3	1-3	Light air	Ripples but no foam crests	Smoke drifts in wind
2	4-6	4-7	Light breeze	Small wavelets	Leaves rustle; wind felt on face
3	7-10	8-12	Gentle breeze	Large wavelets; Crests not breaking	Small twigs in constant motion; Light flags extended
4	11-16	13-16	Moderate wind	Numerous whitecaps Waves 1-4ft high	Dust, leaves and loose paper raised. Small branches move.
5	17-21	19-24	Fresh wind	Many whitecaps, some spray; Waves 4-8 ft high	Small trees sway
6	22-27	25-31	Strong wind	Whitecaps everywhere; Larger waves 8-13 ft high	Large branches move; Difficult to use umbrellas
7	28-33	32-38	V. strong wind	White foam from waves is blown in streaks; waves 13-20ft high	Whole trees in motion
8	34-40	39-46	Gale	Edges of wave crests break into spindrift	Twigs break off trees; Difficult to walk
9	41-47	47-54	Severe gale	High waves; sea begins to roll Spray reduce visibility; 20ft waves	Chimney pots and slates removed
10	48-55	55-63	Storm	V. high waves 20-30 ft; blowing foam gives sea white appearance	Trees uprooted Structural damage
11	56-63	64-72	Severe storm	Exceptionally high waves; 30-45 ft high	Widespread damage
12	63	73	Hurricane	Air filled with foam; visibility reduced White sea; waves over 45ft high	Widespread damage; rare

Date: 06/15/20

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Monitor Initials: LD

Daily Marine Mammal Monitoring Data Sheet - Richmond Refinery Long Wharf Maintenance and Efficiency Project

Time of Observation	Observer Initials	Work Activity ¹	Species ²	Observation Number ³	Age Class ⁴	Identifying Marks	Distance from Pile (meters) ⁵	Direction of Travel	Bearing	Behavior ⁶	
First: 0900 Last: 0900	LD	B	HASE	HASE 1	1ad	gray/tan mottled head	120m	(no travel) facing S.	due N.	Surfaced 1x for ~4 seconds	
First: 0909 Last: 0909	LD	B	HASE	HASE 2	1ad	solid gray head	200 m	(no trav.) facing W	91	Surfaced 1x	
First: 1004 Last: 1004	LD	B	HASE	HASE 3	1ad	tan/dark gray mottled	100m	W	169	slow travel towards Tiburon	
First: 1010 Last: 1010 1031	LD	B	HASE	HASE 4	1ad	dark gray	90m	N	84/20	slow travel, possible forage maintained distance	
First: 1031 Last: 1031	LD	D	HASE	HASE 5	1ad	solid tan	300m	NE	20	joined by HASE 4, slow travel	
First: 1132 Last: 1132	LD	A	HASE	HASE 6	1ad	solid red	110 m	N	253	slow travel	
First: 1439 Last: 1439	LD	A/B	HAPO	HAPO 1	2ad	/	75m	S	138	2 indiv. swimming together — possible cow/calf pair	
First: Last:											
First: Last:											
First: Last:											
First: Last:											
¹ Activity: Indicate if observation is: within the 30-minute period before pile-driving (B); during active pile-driving (D); or within the 30-minute period after pile driving (A)		² Species Abbreviations: California Sea Lion = CASL Pacific Harbor Seal = HASE Northern Elephant Seal = NOES Harbor Porpoise = HAPO		³ Examples: HASE 1, HASE 2. Use these numbers for reference on page 6 diagram.		⁴ Species Age Classes: CASL = juvenile, subadult male, adult male HASE = juvenile, adult HAPO = calf, adult		⁵ Distance: Provide an approximate distance from location of pile.		⁶ Behavior examples: Stationary at surface, swimming (slow or fast), transiting, foraging, resting, looking around. Note if mammal appears to be attentive to project activities, or displays any behavior changes related to project activities, and describe the project activity. Note any human-caused disturbances such as recreational boating or helicopters. Add a reference number if comments are provided on a separate sheet.	

Date: 06/15/20

Monitor Initials: LD

Daily Marine Mammal Monitoring Data Sheet
Richmond Refinery Long Wharf Maintenance and Efficiency Project

Castro Rocks Observations²

Time of Observation	Observer Initials	Visibility ¹	Piling Activity ²	Species ³	Number of individuals hauled-out ⁴	Behavioral Observations
0900	LD	clear 50% cloudcover	B	HASE	11	hauled out / rest
1044	LD	clear	A	HASE	11	"
1103	LD	"	D	HASE	23	"
1240	LD	"	B	HASE	26	"
1337	LD	"	A	HASE	43	"
1530	LD	"	A	HASE	32	"
1630	LD	"	A	HASE	22	"

¹Note conditions (foggy, clear, etc.)
²Indicate if observation is: within 30-minutes before pile-driving (B); during active pile-driving (D); or within 30-minutes after pile driving (A). Take at least one observation before, during, and after pile driving.
³Species Abbreviations:
 California Sea Lion = CASL
 Pacific Harbor Seal = HASE
 Northern Elephant Seal = NOES
⁴Approximate number if visibility is poor.

² One monitor must be positioned in a location to view Castro Rocks. If you are not the monitor viewing Castro Rocks, complete the date, initials, and page number and note "not applicable" on the table.

Date: 06/15/20

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Monitor Initials: LD

Daily Marine Mammal Monitoring Data Sheet
Richmond Refinery Long Wharf Maintenance and Efficiency Project

PHOTO LOG

upload photos to network, include date and monitoring position in file name

Photo Number	Photo Taken Before (B), During (D), or After (A) Pile Driving	Description
1	B	Panoramic photo from monitoring location (east) B4N1
2	B	" (west) B4N1
3	B	B4N1 view of work
4	B	USACE vessel SW of work
5	B	B4N2 view of work
6	D	pile 1
7	B	pile 2
8	B	panoramic from B4N2 (east)
9	B	panoramic from B4N2 (west)
10	B	USACE vessel SW of work
11	B	pile 3
12	A	pile 4
13	A	pile 5
14 / 15	A	panoramic from B4N2 east, west

Date: 06/15/20

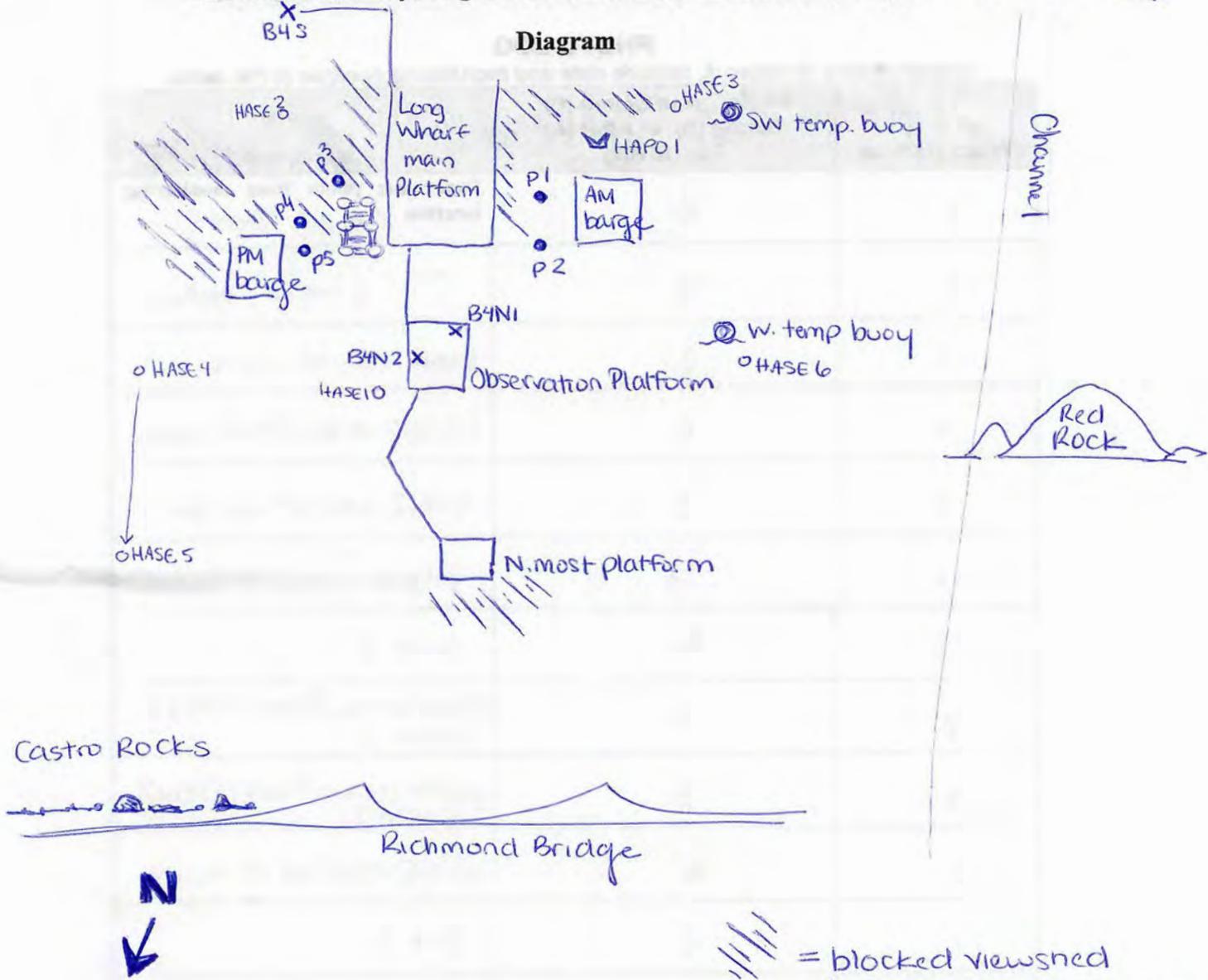
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Monitor Initials: LD

Daily Marine Mammal Monitoring Data Sheet
Richmond Refinery Long Wharf Maintenance and Efficiency Project



Diagram



- = blocked viewshed from observation platform
- P* = pile *
- HASE* = Harbor seal obs.
- ✓ HAPO* = Harbor porpoise obs.

Biological Monitor: Laura Duffy

Signature:

Date: 06/15/20

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Monitor Initials: LD

Daily Marine Mammal Monitoring Data Sheet
Richmond Refinery Long Wharf Maintenance and Efficiency Project

Pile Driving Start and Stop Times³

1. Vibratory hammer start and stop times (include breaks):

(example: Pile 1: start 1030, stop 1035; start 1041, stop 1051; start 1055; stop 1101)

1. hammer set 1013, @ location 1020, start 1020, stop 1040 = 14 min
Start 1047, stop 1047 = 1
Start 1057, stop 1105 = 8
Start 1106, stop 1109 = 3
Start 1200, stop 1204 = 4
2. hammer set 1309, soft start 1311, start 1313, stop 1326 = 13 30
- 3 start 1432, stop 1433 = 1
Start 1449, stop 1454 = 5
Start 1504, stop 1509 = 5
11
4. set 1520, start 1522, stop 1523 = 1
5. reset 1600 start 1602, stop 1607 = 5
- barge moved @ 1620

2. Impact hammer start and stop times, including any restrikes (only note breaks of 30 minutes or more):

(example: Pile 1: start 1030, stop 1130; restrike pile 1: 1355)

³ For vibratory pile driving, note each time the hammer starts and stops. For impact pile driving, note the start and end time for each pile, unless hammering ceases for ≥ 30 minutes) on that pile. Strike counts and times are included in a separate report.

Date: 6/15/20

Page 1 of 7

Daily Marine Mammal Monitoring Summary Log
Richmond Refinery Long Wharf Maintenance and Efficiency Project

Monitor Name:

Mandi McElroy

Weather/Visibility and Sea State - use Beaufort Scale on next page:

820 ~ 80% cloud cover, clear to > 200m, wind - 5 mph from W/SW, Beaufort 2
wind ↑, Beaufort 3 in mid-afternoon

Tidal Level at Start/End of Work - use Tides app or refer to Richmond Harbor at tidesandcurrents.noaa.gov:

high tide @ 0903, low @ 1426
3.8 ft 1.7 ft

General Human Activity in the Area:

tanker docked @ Berth 3, general wharf activity.

Monitoring Location(s) - show on diagram and take panoramic photo of field of view:

B4 - south ~ 55 m from south end of ^{crane} barge. South + west viewshed

Are Castro Rocks visible (yes/no)? If yes, fill out page A-4: no

Berth Number: 4

Pile Type - include size and material:

20" steel - probing only

Total Pile Count for the Day: 5 probe locations

Equipment: Impact Vibratory

Total Minutes of Pile Driving - enter total time here¹:

60 min

5th probe left in place to extract tomorrow

¹ Note the start and end times for each individual pile on page 7.

Date: 6/15/20

Monitor Initials: MM

The Beaufort scale

No.	Knots	Mph	Description	Effects at sea	Effects on land
0	0	0	Calm	Sea like a mirror	Smoke rises vertically
1	1-3	1-3	Light air	Ripples but no foam crests	Smoke drifts in wind
2	4-6	4-7	Light breeze	Small wavelets	Leaves rustle; wind felt on face
3	7-10	8-12	Gentle breeze	Large wavelets; crests not breaking	Small twigs in constant motion;
4	11-16	13-18	Moderate wind	Numerous whitecaps Waves 1-4ft high	Light flags extended Dust, leaves and loose paper raised. Small branches move.
5	17-21	19-24	Fresh wind	Many whitecaps, some spray; Waves 4-6 ft high	Small trees sway
6	22-27	25-31	Strong wind	Whitecaps everywhere; Larger waves 8-13 ft high	Large branches move; Difficult to use umbrellas
7	28-33	32-38	V. strong wind	White foam from waves is blown in streaks; waves 13-20ft high	Whole trees in motion
8	34-40	39-46	Gale	Edges of wave crests break into spindrift	Twigs break off trees; Difficult to walk
9	41-47	47-54	Severe gale	High waves; sea begins to roll Spray reduce visibility, 20ft waves	Chimney pots and slates removed
10	48-55	55-63	Storm	V. high waves 20-30 ft; blowing foam gives sea white appearance	Trees uprooted
11	56-63	64-72	Severe storm	Exceptionally high waves; 30-45 ft high	Structural damage Widespread damage
12	63	73	Hurricane	Air filled with foam, visibility reduced White sea; waves over 45ft high	Widespread damage, rare

Date: 4/15/20

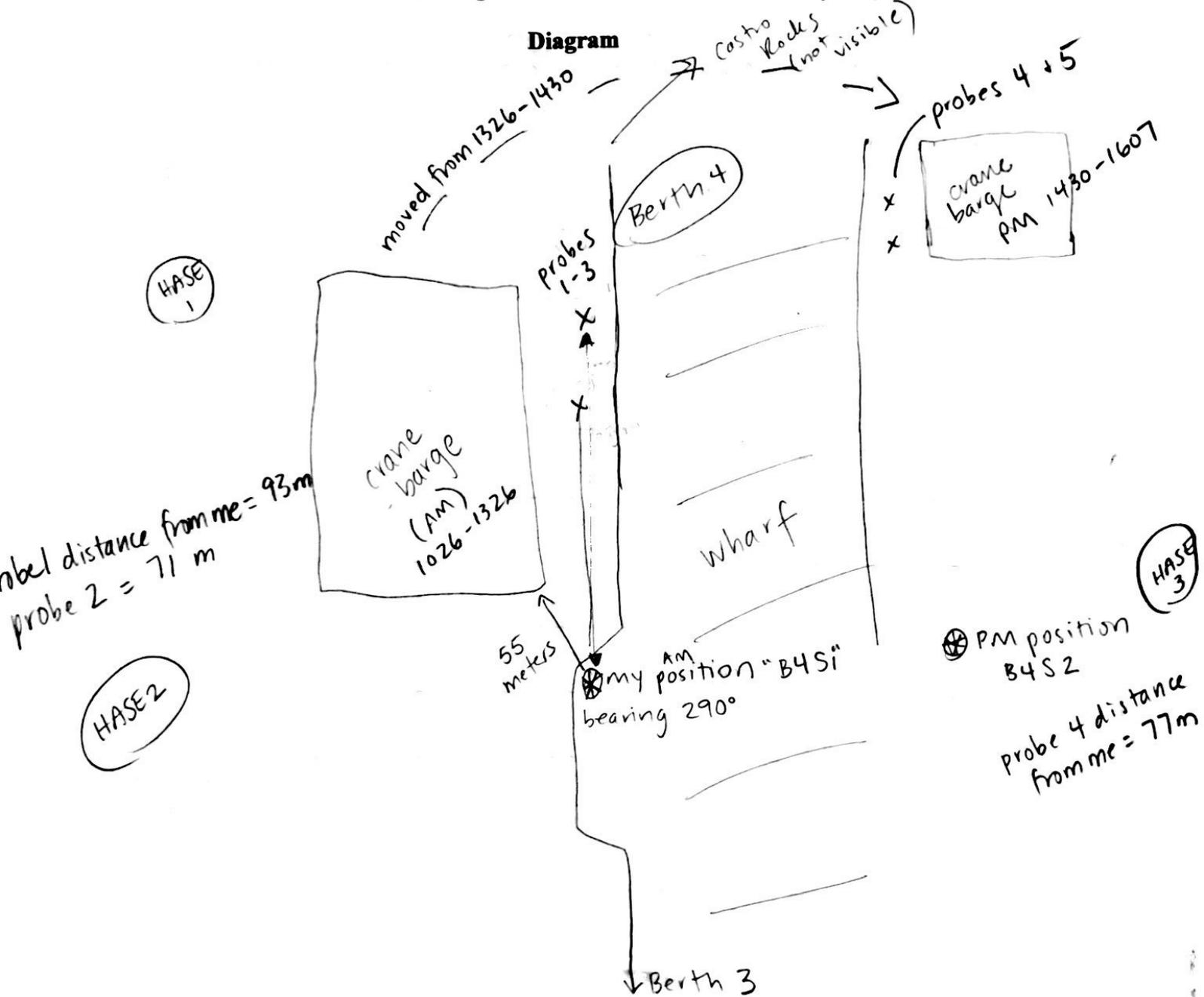
Monitor Initials: MM

B4N monitor (Laura)

Daily Marine Mammal Monitoring Data Sheet
Richmond Refinery Long Wharf Maintenance and Efficiency Project



Diagram



probe 2 = 71 m
probe 4 distance from me = 77m

PM position B4S2

probe 4 distance from me = 77m

Biological Monitor: Mandi McElroy

Signature: [Handwritten Signature]

Date: 6/15/20

Page 7 of 7

Monitor Initials: MW

Daily Marine Mammal Monitoring Data Sheet
Richmond Refinery Long Wharf Maintenance and Efficiency Project

Pile Driving Start and Stop Times³

1. Vibratory hammer start and stop times (include breaks):

(example: Pile 1: start 1030, stop 1035; start 1041, stop 1051; start 1055; stop 1101)

west side of Berth 4

Probe 1:	1026-1040	(14 min)	} 30 min
Probe 2:	1047	(< 1 min)	
	1057-1105	(8 min)	} 13 min
	1106-1109	(3 min)	
	1200-1204	(4 min)	
Probe 3:	1313-1323	(10 min)	} 13 min
	1323-1326	(3 min)	

east side of Berth 4

Probe 4:	1430-1433	(3 min)
	1448-1455	(7 min)
	1458-1508	(10 min)
probe 5:	1522	(< 1 min)
	1602-1607	(5 min)

2. Impact hammer start and stop times, including any restrikes (only note breaks of 30 minutes or more):

(example: Pile 1: start 1030, stop 1130; restrike pile 1: 1355)

N/A

³ For vibratory pile driving, note each time the hammer starts and stops. For impact pile driving, note the start and end time for each pile, unless hammering ceases for ≥ 30 minutes) on that pile. Strike counts and times are included in a separate report.

Date: 06/16/20

Page 1 of 8

Daily Marine Mammal Monitoring Summary Log
Richmond Refinery Long Wharf Maintenance and Efficiency Project

Monitor Name:

Laura Duffy

Weather/Visibility and Sea State - use Beaufort Scale on next page:

0726 : wind out of NW ~10kts; BF=2; 0% cloud cover; ~55°F
(weather stayed the same for whole work day)

Tidal Level at Start/End of Work – use Tides app or refer to Richmond Harbor at tidesandcurrents.noaa.gov:

Start:

flood tide, high @ 1012 / low @ 1512 / high @ 2141 end @ 1634 flood

General Human Activity in the Area:

people/vehicles on wharf; barge/tugs/skiff in work area; small craft, ferries, large vessel in channel

Monitoring Location(s) – show on diagram and take panoramic photo of field of view:

B4S : (37.926292, -122.413807)

Are Castro Rocks visible (yes/no)? If yes, fill out page A-4: no - blocked by barge & northmost platform of wharf

Berth Number: 4

Pile Type - include size and material:

20" steel probe piles

Total Pile Count for the Day: 45 Equipment: Impact Vibratory

Total Minutes of Pile Driving - enter total time here¹:

* - see page 7

¹ Note the start and end times for each individual pile on page 7.

Date: 06/16/20

Monitor Initials: LD

The Beaufort scale

No.	Knots	Mph	Description	Effects at sea	Effects on land
0	0	0	Calm	Sea like a mirror	Smoke rises vertically
1	1-3	1-3	Light air	Ripples but no foam crests	Smoke drifts in wind
2	4-6	4-7	Light breeze	Small wavelets	Leaves rustle; wind felt on face
3	7-10	8-12	Gentle breeze	Large wavelets; Crests not breaking	Small twigs in constant motion; Light flags extended
4	11-16	13-18	Moderate wind	Numerous whitecaps Waves 1-4ft high	Dust, leaves and loose paper raised. Small branches move.
5	17-21	19-24	Fresh wind	Many whitecaps, some spray; Waves 4-8 ft high	Small trees sway
6	22-27	25-31	Strong wind	Whitecaps everywhere; Larger waves 8-13 ft high	Large branches move; Difficult to use umbrellas
7	28-33	32-38	V. strong wind	White foam from waves is blown in streaks; waves 13-20ft high	Whole trees in motion
8	34-40	39-46	Gale	Edges of wave crests break into spindrift	Twigs break off trees; Difficult to walk
9	41-47	47-54	Severe gale	High waves; sea begins to roll Spray reduce visibility; 20ft waves	Chimney pots and slates removed
10	48-55	55-63	Storm	V. high waves 20-30 ft; blowing foam gives sea white appearance	Trees uprooted Structural damage
11	56-63	64-72	Severe storm	Exceptionally high waves; 30-45 ft high	Widespread damage
12	63	73	Hurricane	Air filled with foam; visibility reduced White sea; waves over 45ft high	Widespread damage; rare

Date: 06/16/20

Monitor Initials: LD

Daily Marine Mammal Monitoring Data Sheet - Richmond Refinery Long Wharf Maintenance and Efficiency Project

Time of Observation	Observer Initials	Work Activity ¹	Species ²	Observation Number ³	Age Class ⁴	Identifying Marks	Distance from Pile (meters) ⁵	Direction of Travel	Bearing	Behavior ⁶	
First: 0742 Last: 0742	LD	B	HASE	HASE 1	1 ad	Solid gray	500m	(not trav.) facing W	93	surfaced 1x only	
First: 0811 Last: 0838 0910	LD	A/B	HASE	HASE 2	1 ad	Solid gray	200 m	NE	331	slow travel	
First: 0906 Last: 0910	LD	A/B	HASE	HASE 3	2 ad	1 ↓ 1 solid tan	150 m	(not trav.) facing S	337	slow travel, repeat dives	
First: 1001 Last: 1001 1001	LD	D	HASE	HASE 4	1 ad	/	200m	(not trav.) facing W	10	resting @ surface; went under when hammer started	
First: 1057 Last: 1105	LD	B/D	HASE	HASE 5	1 ad	reddish/tan	200m	(not trav.) face E.	20	resting @ surface; no reaction when hammer started	
First: Last:											
First: Last:											
First: Last:											
First: Last:											
First: Last:											
First: Last:											
¹ Activity: Indicate if observation is: within the 30-minute period before pile-driving (B); during active pile-driving (D); or within the 30-minute period after pile driving (A)		² Species Abbreviations: California Sea Lion = CASL Pacific Harbor Seal = HASE Northern Elephant Seal = NOES Harbor Porpoise = HAPO		³ Examples: HASE 1, HASE 2. Use these numbers for reference on page 6 diagram.		⁴ Species Age Classes: CASL = juvenile, subadult male, adult male HASE = juvenile, adult HAPO = calf, adult		⁵ Distance: Provide an approximate distance from location of pile.		⁶ Behavior examples: Stationary at surface, swimming (slow or fast), transiting, foraging, resting, looking around. Note if mammal appears to be attentive to project activities, or displays any behavior changes related to project activities, and describe the project activity. Note any human-caused disturbances such as recreational boating or helicopters. Add a reference number if comments are provided on a separate sheet.	

Date: 06/16/20

Page 4 of 8

Monitor Initials: LD

Daily Marine Mammal Monitoring Data Sheet
Richmond Refinery Long Wharf Maintenance and Efficiency Project

Castro Rocks Observations²

Time of Observation	Observer Initials	Visibility ¹	Piling Activity ²	Species ³	Number of individuals hauled-out ⁴	Behavioral Observations
			B			NA - view blocked from B4S. Monitor @ B4N Will monitor Castro Rocks.
			D			
			A			

¹Note conditions (foggy, clear, etc.)
²Indicate if observation is: within 30-minutes before pile-driving (B); during active pile-driving (D); or within 30-minutes after pile driving (A). Take at least one observation before, during, and after pile driving.
³**Species Abbreviations:**
California Sea Lion = CASL
Pacific Harbor Seal = HASE
Northern Elephant Seal = NOES
⁴Approximate number if visibility is poor.

² One monitor must be positioned in a location to view Castro Rocks. If you are not the monitor viewing Castro Rocks, complete the date, initials, and page number and note "not applicable" on the table.

Date: 06/16/20

Page 5 of 8

Monitor Initials: LD

Daily Marine Mammal Monitoring Data Sheet
Richmond Refinery Long Wharf Maintenance and Efficiency Project

PHOTO LOG

upload photos to network, include date and monitoring position in file name

Photo Number	Photo Taken Before (B), During (D), or After (A) Pile Driving	Description
1	B	Panoramic photo from monitoring location pile 1 maintenance, B4S view
2	B	B4S panorama (east)
3	B	B4S panorama (west)
4	D	pile 1
5	D	pile 3
6	BIA	pile maintenance between hammering
7	A	pile 4
8	A	pile 5
9	B	blocked view of Castro Rocks
10	A	B4S panorama (east)
11	A	B4S panorama (west)

Date: 06/16/20

Page 6 of 8

Monitor Initials: LD

Daily Marine Mammal Monitoring Data Sheet
Richmond Refinery Long Wharf Maintenance and Efficiency Project



Biological Monitor: Laura Duffey

Signature: [Signature]

= blocked view from B4S

• p** = pile **

○ HASE ** = Harbor Seal obs.

Date: 06/16/20

Page 7 of 8

Monitor Initials: LD

Daily Marine Mammal Monitoring Data Sheet
Richmond Refinery Long Wharf Maintenance and Efficiency Project

Pile Driving Start and Stop Times³

1. Vibratory hammer start and stop times (include breaks):

(example: Pile 1: start 1030, stop 1035; start 1041, stop 1051; start 1055; stop 1101)

1. hammer set 0752, start 0754, stop 0758 = (4)

2. start 0823, stop 0837 = 14 = (25)
start 0911, stop 0922 = 11

3. start 0941, stop 1000 = 19
start 1001, stop 1019 = 18
start 1048, stop 1052 = 4 } (41)

* talking to Chevron safety manager. Plz see other monitor's notes.

4. start 1105, stop 1127 = 22
start 1130, stop 1134 = 4
start 1135, stop 1139 = 4
start 1145, stop 1155 = 10
start 1157, *
start 1335, stop 1338 = 3

5. start 1412, stop 1413 = 1
start 1414, stop *
start *, stop 1450
start 1456, stop 1522 = 20
start 1548, stop 1549 =

2. Impact hammer start and stop times, including any restrikes (only note breaks of 30 minutes or more):

(example: Pile 1: start 1030, stop 1130; restrike pile 1: 1355)

³ For vibratory pile driving, note each time the hammer starts and stops. For impact pile driving, note the start and end time for each pile, unless hammering ceases for ≥ 30 minutes) on that pile. Strike counts and times are included in a separate report.

Date: 06/16/20

Page 8 of 8

Monitor Initials: LD

Daily Marine Mammal Monitoring Data Sheet
Richmond Refinery Long Wharf Maintenance and Efficiency Project

Additional Notes

range finder reference points from B4S

- pile = 70m (1st pile)

- S. end of barge = 50m

- end of Longwharf 10m
~~SE~~
SE

- pile 2 = 95m

- pile 3 = 119m

- pile 4 = 120m

- pile 5 = 117m

* hammer malfunctioned on pile several times throughout the day = reason for so many start/stops; multiple probes

Date: 6/16/20

Page 1 of 8

Daily Marine Mammal Monitoring Summary Log
Richmond Refinery Long Wharf Maintenance and Efficiency Project

Monitor Name:

Mandi McElroy

Weather/Visibility and Sea State - use Beaufort Scale on next page:

@ 0725, Beaufort 2-3, windy ^{from NE}, 0% cloud cover, clear viz 51°F

Tidal Level at Start/End of Work - use Tides app or refer to Richmond Harbor at tidesandcurrents.noaa.gov:

low @ 0403 (2.87'), high @ 1012 (3.90'), low @ 1512 (2.04')

General Human Activity in the Area:

low level wharf activity (humans, vehicle movement); barge + skiff + tugboat @ probe locations

Monitoring Location(s) - show on diagram and take panoramic photo of field of view:

B4 North

Are Castro Rocks visible (yes/no)? If yes, fill out page A-4: yes

Berth Number: 4

Pile Type - include size and material:

20" steel - probing only

Total Pile Count for the Day: 5 probe locations Equipment: Impact Vibratory
*5th probe from 6/15 was left in place overnight; 9 total probe locations on 6/15 + 6/16
Total Minutes of Pile Driving - enter total time here¹: 191 minutes

¹ Note the start and end times for each individual pile on page 7.

Date: 6/16/20
 Monitor Initials: MM

The Beaufort scale

No.	Knots	Mph	Description	Effects at sea	Effects on land
0	0	0	Calm	Sea like a mirror	Smoke rises vertically
1	1-3	1-3	Light air	Ripples but no foam crests	Smoke drifts in wind
2	4-6	4-7	Light breeze	Small wavelets	Leaves rustle; wind felt on face
3	7-10	8-12	Gentle breeze	Large wavelets; Crests not breaking	Small twigs in constant motion;
4	11-16	13-18	Moderate wind	Numerous whitecaps Waves 1-4ft high	Light flags extended Dust, leaves and loose paper raised. Small branches move.
5	17-21	19-24	Fresh wind	Many whitecaps, some spray; Waves 4-8 ft high	Small trees sway
6	22-27	25-31	Strong wind	Whitecaps everywhere; Larger waves 8-13 ft high	Large branches move; Difficult to use umbrellas
7	28-33	32-38	V. strong wind	White foam from waves is blown in streaks; waves 13-20ft high	Whole trees in motion
8	34-40	39-46	Gale	Edges of wave crests break into spindrift	Twigs break off trees; Difficult to walk
9	41-47	47-54	Severe gale	High waves; sea begins to roll Spray reduce visibility, 20ft waves	Chimney pots and slates removed
10	48-55	55-63	Storm	V. high waves 20-30 ft; blowing foam gives sea white appearance	Trees uprooted
11	56-63	64-72	Severe storm	Exceptionally high waves; 30-45 ft high	Structural damage Widespread damage
12	63	73	Hurricane	Air filled with foam; visibility reduced White sea; waves over 45ft high	Widespread damage; rare

Date: 6/16/20

Monitor Initials: MM

Daily Marine Mammal Monitoring Data Sheet
 Richmond Refinery Long Wharf Maintenance and Efficiency Project
Castro Rocks Observations²

Time of Observation	Observer Initials	Visibility ¹	Piling Activity ²	Species ³	Number of Individuals hauled-out ⁴	Behavioral Observations
0751	MM	clear	B	HASE	3	resting. rocks mostly submerged incoming tide
1005	MM	clear	D	HASE	1	resting - high tide
1100	MM	clear	A	HASE	1	resting - no Δ during driving
1338	MM	clear	between probes	HASE	~25	resting. no Δ during driving

¹Note conditions (foggy, clear, etc.)
²Indicate if observation is: within 30-minutes before pile-driving (B); during active pile-driving (D); or within 30-minutes after pile driving (A). Take at least one observation before, during, and after pile driving.
³Species Abbreviations:
 California Sea Lion = CASL
 Pacific Harbor Seal = HASE
 Northern Elephant Seal = NOES
⁴Approximate number if visibility is poor.

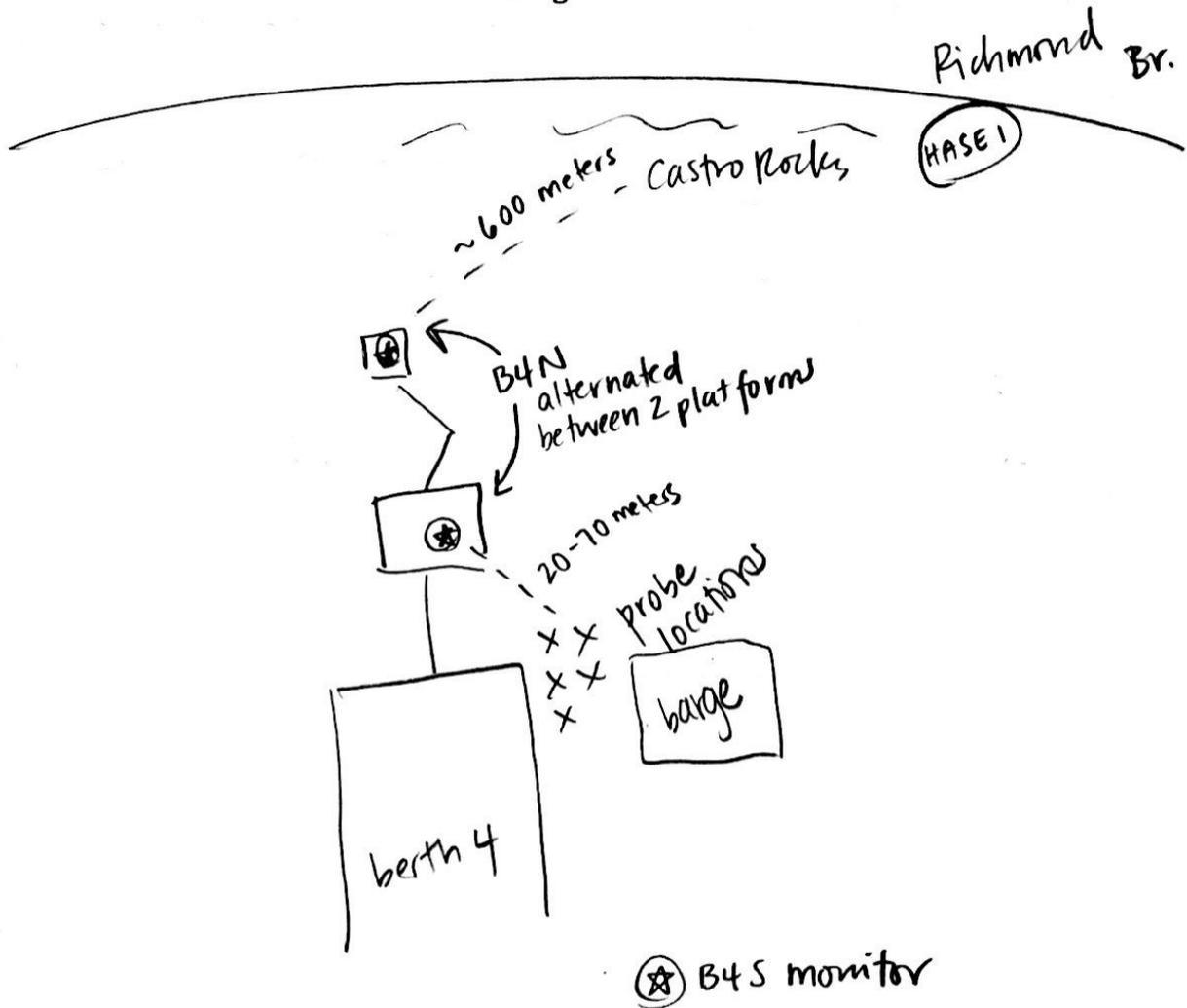
² One monitor must be positioned in a location to view Castro Rocks. If you are not the monitor viewing Castro Rocks, complete the date, initials, and page number and note "not applicable" on the table.

Date: 6/16/20

Monitor Initials: MM

Daily Marine Mammal Monitoring Data Sheet Richmond Refinery Long Wharf Maintenance and Efficiency Project

Diagram



Biological Monitor: Mandi McElroy

Signature: [Handwritten Signature]

Date: 4/16/20

Monitor Initials: MM

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Daily Marine Mammal Monitoring Data Sheet Richmond Refinery Long Wharf Maintenance and Efficiency Project

Pile Driving Start and Stop Times³

1. Vibratory hammer start and stop times (include breaks):

(example: Pile 1: start 1030, stop 1035; start 1041, stop 1051; start 1055; stop 1101)

0725 in position

* 0755 - 0757 (3 min) extracting yesterday's pile (5th probe location)

0805 moving barge to probe location 6

* 0823 - 0836 (13 min) @ location 6

* 0911 - 0921 (10 min) @ loc 6

0930 moving barge

* 0941 - 0959 (18 min) @ loc 7

* 1001 - 1019 (18 min) @ loc 7

* 1048 - 1052 (4 min) @ loc 7

1100 positioning barge + pile

* 1105 - 1127 @ loc 8 (22 min)

* 1130 - 1134 " (4 min)

* 1135 - 1139 " (4 min)

* 1144 - 1155 " (11 min)

Loc 8 continued:

* 1157 - 1223 (26 min)

break 1223 - 1334 with pile still in.

* 1334 - 1337 (3 min)

1407 placing pile @ Loc 9

* 1413 - 1414 (1 min)

* 1419 - 1423 (4 min)

* 1426 - 1449 (23 min)

* 1456 - 1522 (26 min)

* 1548 (1 min)

2. Impact hammer start and stop times, including any restrikes (only note breaks of 30 minutes or more):

(example: Pile 1: start 1030, stop 1130; restrike pile 1: 1355)

ended monitoring @ 1618

107 min.
+ 84

191

84 min

³ For vibratory pile driving, note each time the hammer starts and stops. For impact pile driving, note the start and end time for each pile, unless hammering ceases for ≥30 minutes) on that pile. Strike counts and times are included in a separate report.

Date: 6/16/20

Page 8 of 8

Monitor Initials: MM

Daily Marine Mammal Monitoring Data Sheet
Richmond Refinery Long Wharf Maintenance and Efficiency Project

Additional Notes

on site @ 0725

5th probe from yesterday was left in place overnight

0754 placed hammer on probe (yesterday's placement)

see p. 7

probe location 5 = 70 m from me, 107° bearing
6 = 55 m from me, 115°
7 = 25 m from me, 110°
8 = 20 m 105°

Date: 7/24/20

Page 1 of 8

Daily Marine Mammal Monitoring Summary Log
Richmond Refinery Long Wharf Maintenance and Efficiency Project

Monitor Name: Christina Kelleher

Weather/Visibility and Sea State - use Beaufort Scale on next page:

~~0-2~~ 1-2 Beaufort; overcast, good visibility, moderate wind

Tidal Level at Start/End of Work – use Tides app or refer to Richmond Harbor at tidesandcurrents.noaa.gov:

~~0.88 (at 12:00)~~ -0.37 ft (at 10:00); 2.76 ft at 12:12

General Human Activity in the Area:

Crew/employees walking, driving, construction equipment, boats

Monitoring Location(s) – show on diagram and take panoramic photo of field of view:

NW of berth 4 / pile, ~500 ft away (B4N)
37.9278972, -122.4151370

Are Castro Rocks visible (yes/no)? If yes, fill out page A-4: yes

Berth Number: 4

Pile Type - include size and material:

60" steel pile

Total Pile Count for the Day: 0 Equipment: Impact Vibratory

Total Minutes of Pile Driving - enter total time here¹: 0

¹ Note the start and end times for each individual pile on page 7.

Date: 7/24/20

Monitor Initials: CK

The Beaufort scale

No.	Knots	Mph	Description	Effects at sea	Effects on land
0	0	0	Calm	Sea like a mirror	Smoke rises vertically
1	1-3	1-3	Light air	Ripples but no foam crests	Smoke drifts in wind
2	4-6	4-7	Light breeze	Small wavelets	Leaves rustle; wind felt on face
3	7-10	8-12	Gentle breeze	Large wavelets; Crests not breaking	Small twigs in constant motion; Light flags extended
4	11-16	13-18	Moderate wind	Numerous whitecaps Waves 1-4ft high	Dust, leaves and loose paper raised. Small branches move.
5	17-21	19-24	Fresh wind	Many whitecaps, some spray; Waves 4-8 ft high	Small trees sway
6	22-27	25-31	Strong wind	Whitecaps everywhere; Larger waves 8-13 ft high	Large branches move; Difficult to use umbrellas
7	28-33	32-38	V. strong wind	White foam from waves is blown in streaks; waves 13-20ft high	Whole trees in motion
8	34-40	39-46	Gale	Edges of wave crests break into spindrift	Twigs break off trees; Difficult to walk
9	41-47	47-54	Severe gale	High waves; sea begins to roll Spray reduce visibility; 20ft waves	Chimney pots and slates removed
10	48-55	55-63	Storm	V. high waves 20-30 ft, blowing foam gives sea white appearance	Trees uprooted Structural damage
11	56-63	64-72	Severe storm	Exceptionally high waves; 30-45 ft high	Widespread damage
12	63	73	Hurricane	Air filled with foam; visibility reduced White sea; waves over 45ft high	Widespread damage; rare

Date: 7/24/20

Page 4 of 8

Monitor Initials: CK

Daily Marine Mammal Monitoring Data Sheet
Richmond Refinery Long Wharf Maintenance and Efficiency Project

Castro Rocks Observations²

Time of Observation	Observer Initials	Visibility ¹	Piling Activity ²	Species ³	Number of individuals hauled-out ⁴	Behavioral Observations
10:18	CK	clear - good vis.	B	HASE	56	loafed
			D			
			A			

¹Note conditions (foggy, clear, etc.)
²Indicate if observation is: within 30-minutes before pile-driving (B); during active pile-driving (D); or within 30-minutes after pile driving (A). Take at least one observation before, during, and after pile driving.
³Species Abbreviations:
California Sea Lion = CASL
Pacific Harbor Seal = HASE
Northern Elephant Seal = NOES
⁴Approximate number if visibility is poor.

² One monitor must be positioned in a location to view Castro Rocks. If you are not the monitor viewing Castro Rocks, complete the date, initials, and page number and note "not applicable" on the table.

Date: 7/24/20

Page 6 of 8

Monitor Initials: CK

CK

HASE J
HASE J

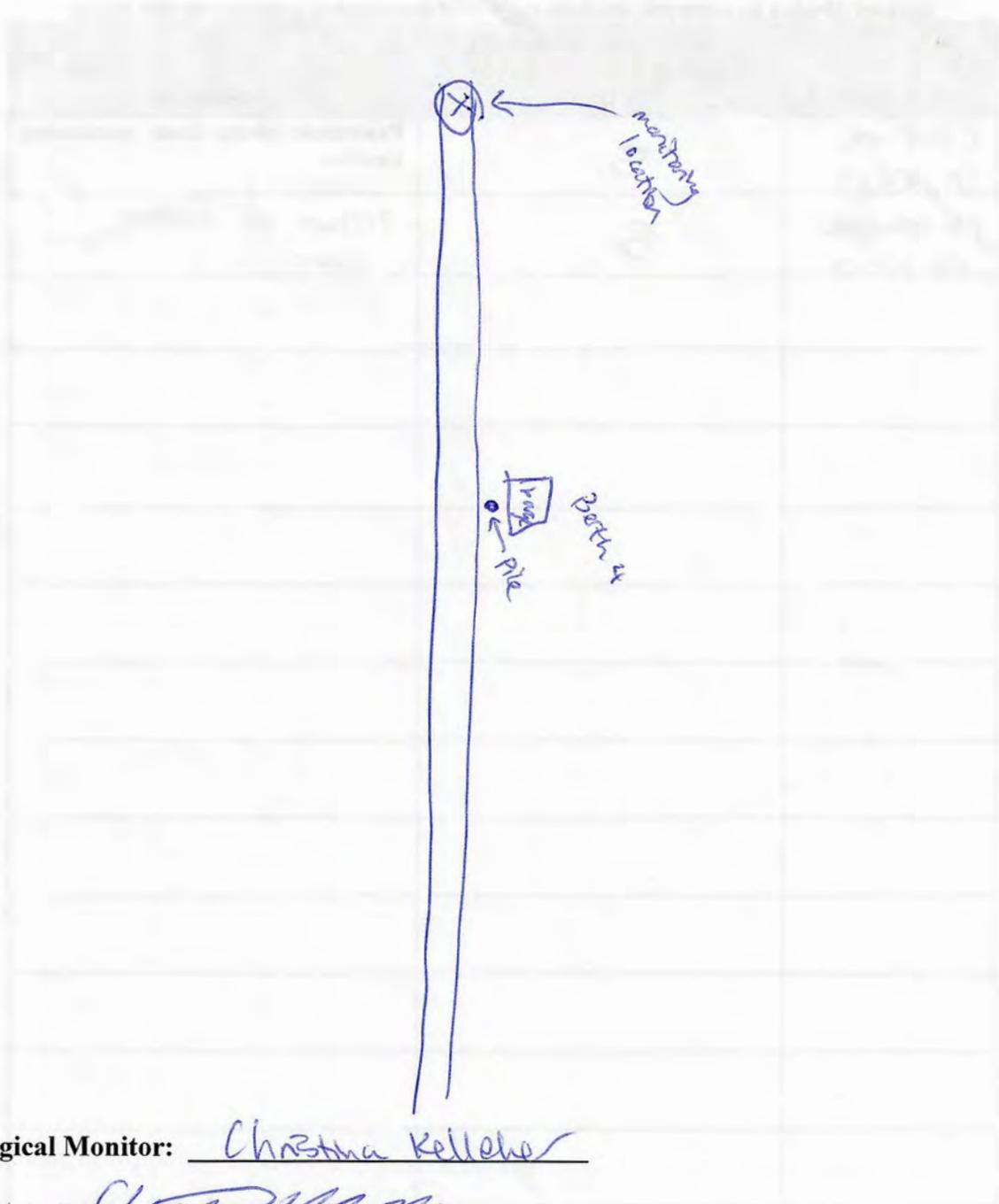


Daily Marine Mammal Monitoring Data Sheet
Richmond Refinery Long Wharf Maintenance and Efficiency Project

Diagram

3

2



5

5

Biological Monitor: Christina Kelleher

Signature: [Handwritten Signature]

Date: 7/24/20

Page 7 of 8

Monitor Initials: CK

Daily Marine Mammal Monitoring Data Sheet
Richmond Refinery Long Wharf Maintenance and Efficiency Project

Pile Driving Start and Stop Times³

1. Vibratory hammer start and stop times (include breaks):

(example: Pile 1: start 1030, stop 1035; start 1041, stop 1051; start 1055; stop 1101)

N/A

2. Impact hammer start and stop times, including any restrikes (only note breaks of 30 minutes or more):

(example: Pile 1: start 1030, stop 1130; restrike pile 1: 1355)

Marine Mammal monitoring start time: 10:00

end 12:15

No driving today

³ For vibratory pile driving, note each time the hammer starts and stops. For impact pile driving, note the start and end time for each pile, unless hammering ceases for ≥ 30 minutes) on that pile. Strike counts and times are included in a separate report.

Date: 7/24/20

Page 8 of 8

Monitor Initials: CK

Daily Marine Mammal Monitoring Data Sheet
Richmond Refinery Long Wharf Maintenance and Efficiency Project

Additional Notes

No diving today

Date: 7/24/20

Page 1 of 8

Daily Marine Mammal Monitoring Summary Log
Richmond Refinery Long Wharf Maintenance and Efficiency Project

Monitor Name:

Laura Duffy

Weather/Visibility and Sea State - use *Beaufort Scale* on next page:

65% cloud cover; low clouds/marine layer; visibility good; BF = 1 west side; east side = 2-3 closer to channel

Tidal Level at Start/End of Work – use *Tides app* or refer to *Richmond Harbor at tidesandcurrents.noaa.gov*):

low tide @ -0.58 @ 0924; high tide @ 5.71 @ 1625

General Human Activity in the Area:

tug/barges around wharf; ship left B4 @ 1000; people on wharf

Monitoring Location(s) – show on diagram and take panoramic photo of field of view:

B4.5 (Berth 4 South)

Are Castro Rocks visible (yes/no)? If yes, fill out page A-4: NO

Berth Number: 4

Pile Type - include size and material:

60" steel

Total Pile Count for the Day: 1 Equipment: Impact Vibratory
(not completed)

Total Minutes of Pile Driving - enter total time here¹:

0

¹ Note the start and end times for each individual pile on page 7.

Date: 7/24/20Page 2 of 8Monitor Initials: LDThe Beaufort scale

No.	Knots	Mph	Description	Effects at sea	Effects on land
0	0	0	Calm	Sea like a mirror	Smoke rises vertically
1	1-3	1-3	Light air	Ripples but no foam crests	Smoke drifts in wind
2	4-6	4-7	Light breeze	Small wavelets	Leaves rustle; wind felt on face
3	7-10	8-12	Gentle breeze	Large wavelets; Crests not breaking	Small twigs in constant motion; Light flags extended
4	11-16	13-18	Moderate wind	Numerous whitecaps Waves 1-4ft high	Dust, leaves and loose paper raised. Small branches move.
5	17-21	19-24	Fresh wind	Many whitecaps, some spray; Waves 4-8 ft high	Small trees sway
6	22-27	25-31	Strong wind	Whitecaps everywhere; Larger waves 8-13 ft high	Large branches move; Difficult to use umbrellas
7	28-33	32-38	V. strong wind	White foam from waves is blown in streaks; waves 13-20ft high	Whole trees in motion
8	34-40	39-46	Gale	Edges of wave crests break into spindrift	Twigs break off trees; Difficult to walk
9	41-47	47-54	Severe gale	High waves; sea begins to roll Spray reduce visibility; 20ft waves	Chimney pots and slates removed
10	48-55	55-63	Storm	V. high waves 20-30 ft; blowing foam gives sea white appearance	Trees uprooted Structural damage
11	56-63	64-72	Severe storm	Exceptionally high waves; 30-45 ft high	Widespread damage
12	63	73	Hurricane	Air filled with foam; visibility reduced White sea; waves over 45ft high	Widespread damage; rare

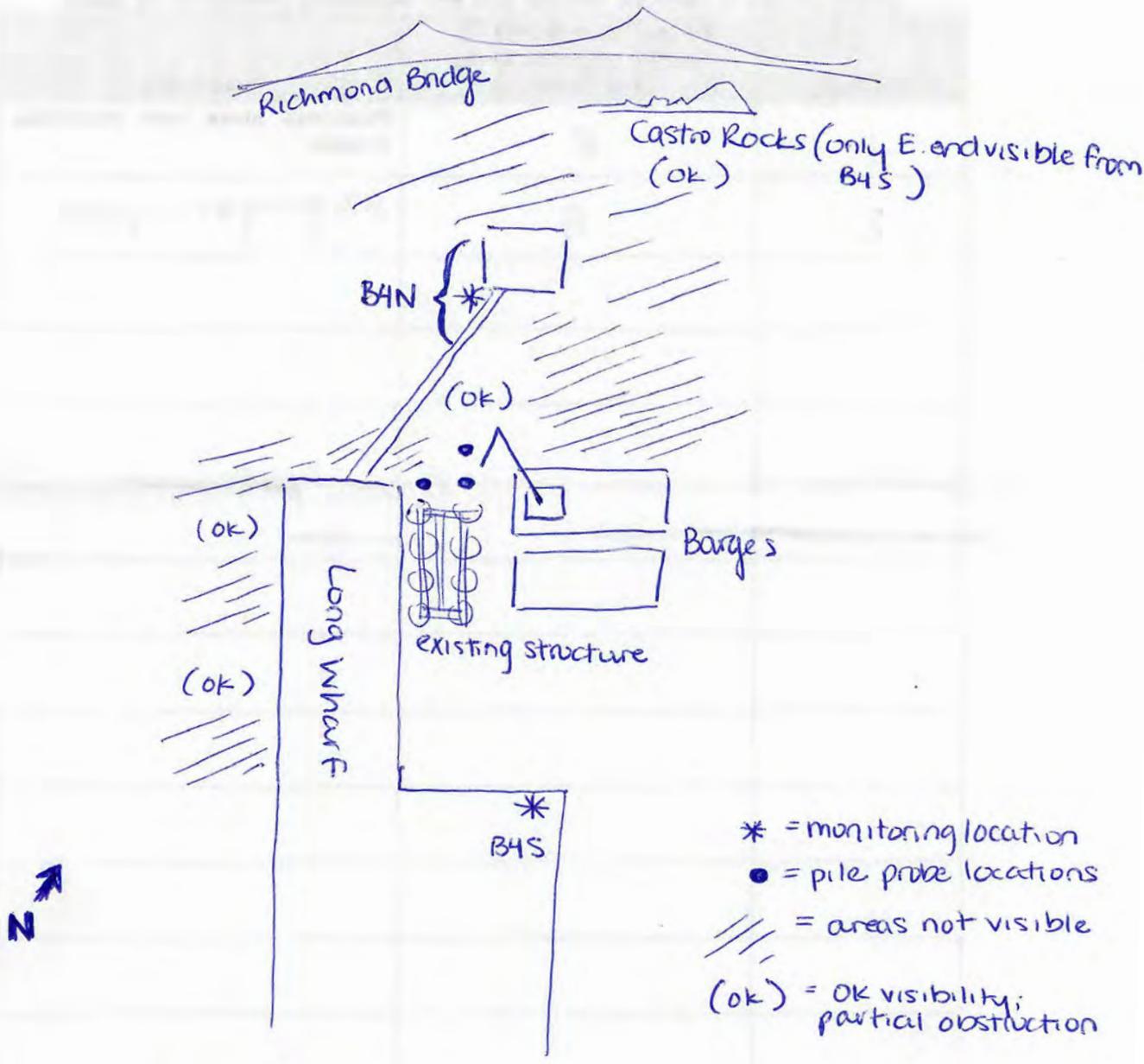
Date: 7/24/20

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Monitor Initials: LD

Daily Marine Mammal Monitoring Data Sheet
Richmond Refinery Long Wharf Maintenance and Efficiency Project

Diagram



Biological Monitor: Laura Duffy

Signature: [Signature]

Date: 7/24/20

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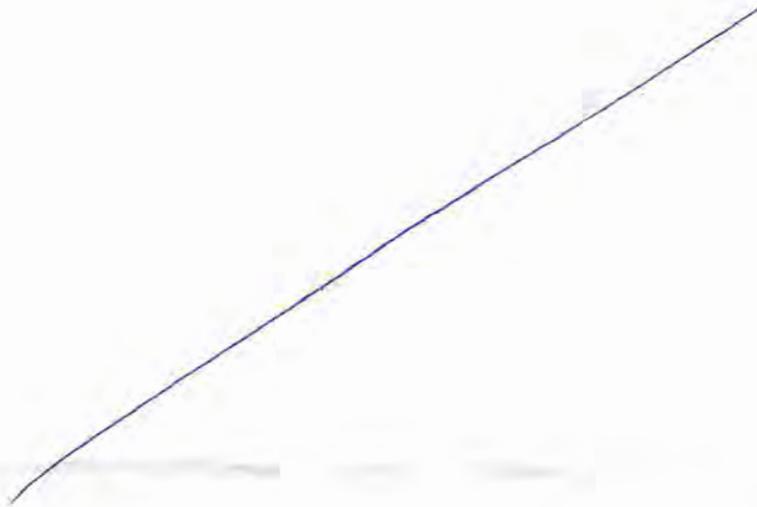
Monitor Initials: _____

Daily Marine Mammal Monitoring Data Sheet
Richmond Refinery Long Wharf Maintenance and Efficiency Project

Pile Driving Start and Stop Times³

1. Vibratory hammer start and stop times (include breaks):

(example: Pile 1: start 1030, stop 1035; start 1041, stop 1051; start 1055; stop 1101)



2. Impact hammer start and stop times, including any restrikes (only note breaks of 30 minutes or more):

(example: Pile 1: start 1030, stop 1130; restrike pile 1: 1355)

pile lifted @ 1045

set @ 1053; 1102; 1105 - different locations

~~hammer on @~~

welding @ 1124

no stakes

³ For vibratory pile driving, note each time the hammer starts and stops. For impact pile driving, note the start and end time for each pile, unless hammering ceases for ≥ 30 minutes) on that pile. Strike counts and times are included in a separate report.

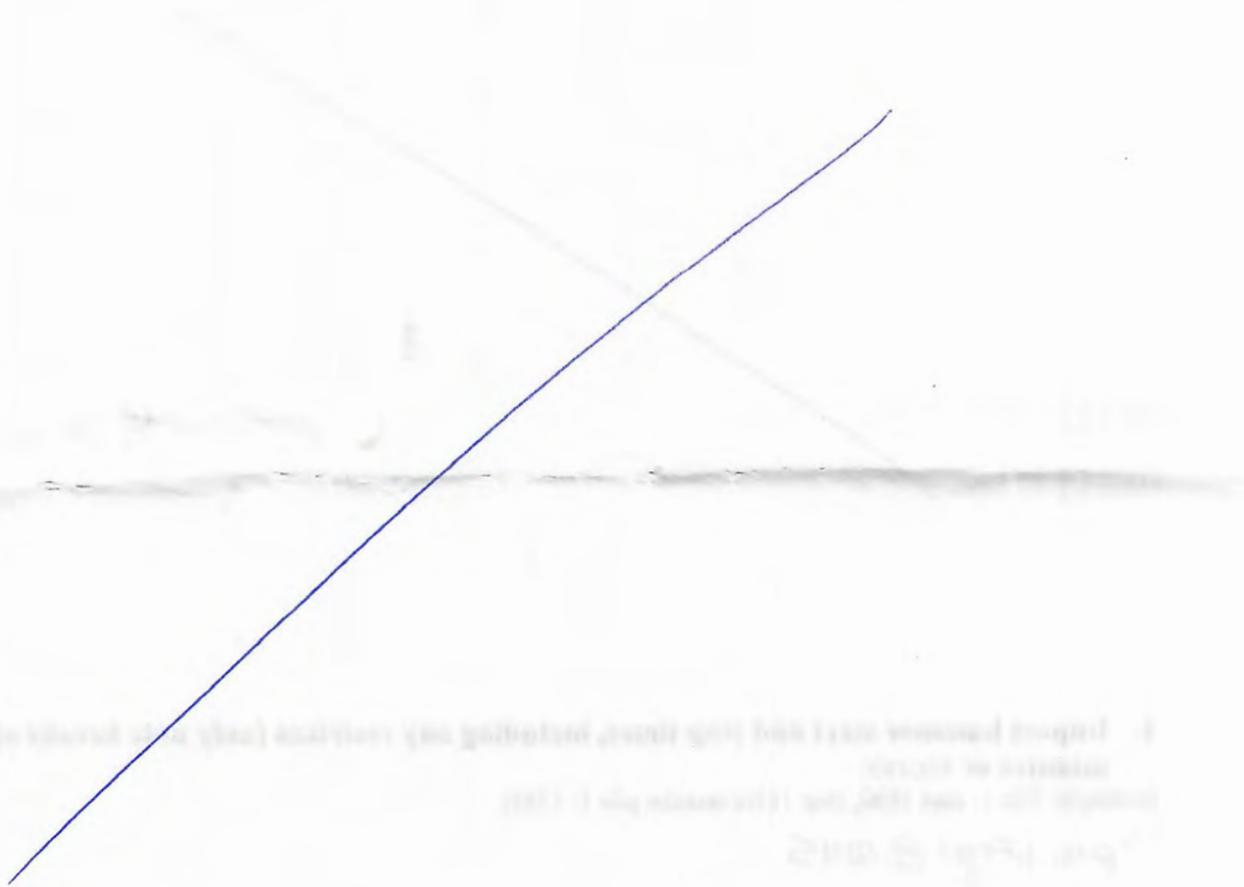
Date: 7/24/20

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Monitor Initials: LD

Daily Marine Mammal Monitoring Data Sheet
Richmond Refinery Long Wharf Maintenance and Efficiency Project

Additional Notes



NO STRAYS

Date: 7/25/20

Page 1 of 8

Daily Marine Mammal Monitoring Summary Log
Richmond Refinery Long Wharf Maintenance and Efficiency Project

Monitor Name: Christina Kelleher

Weather/Visibility and Sea State - use Beaufort Scale on next page:

clear, light wind, ~65°F, 1-2 Beaufort

Tidal Level at Start/End of Work – use Tides app or refer to Richmond Harbor at tidesandcurrents.noaa.gov:

3.96ft at 13:48, 5.76ft at 16:18

General Human Activity in the Area:

Less than weekdays, some personal vehicles & pedestrians, boats & barges docked

Monitoring Location(s) – show on diagram and take panoramic photo of field of view:

NW of berth 4/pile, ~500ft away (B4N) 37.9278972, -122.4157370

Are Castro Rocks visible (yes/no)? If yes, fill out page A-4: yes

Berth Number: 4

Pile Type - include size and material:

60" steel

Total Pile Count for the Day: 1 (incomplete) Equipment: Impact Vibratory

Total Minutes of Pile Driving - enter total time here¹: 52 minutes

¹ Note the start and end times for each individual pile on page 7.

Date: 7/25/20

Monitor Initials: CA

The Beaufort scale

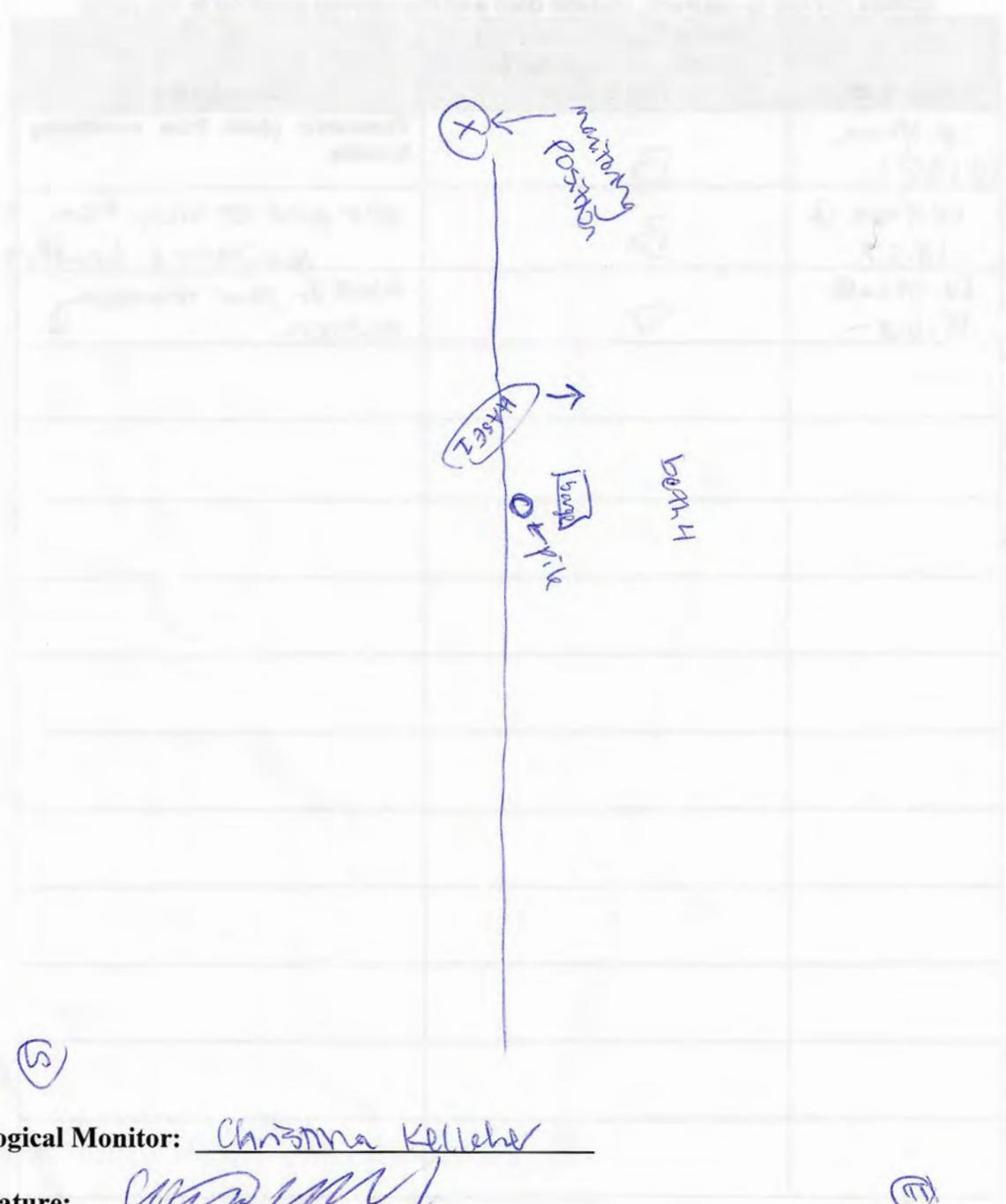
No.	Knots	Mph	Description	Effects at sea	Effects on land
0	0	0	Calm	Sea like a mirror	Smoke rises vertically
1	1-3	1-3	Light air	Ripples but no foam crests	Smoke drifts in wind
2	4-6	4-7	Light breeze	Small wavelets	Leaves rustle; wind felt on face
3	7-10	8-12	Gentle breeze	Large wavelets; Crests not breaking	Small twigs in constant motion; Light flags extended
4	11-16	13-18	Moderate wind	Numerous whitecaps Waves 1-4ft high	Dust, leaves and loose paper raised. Small branches move.
5	17-21	19-24	Fresh wind	Many whitecaps, some spray; Waves 4-8 ft high	Small trees sway
6	22-27	25-31	Strong wind	Whitecaps everywhere; Larger waves 8-13 ft high	Large branches move; Difficult to use umbrellas
7	28-33	32-38	V. strong wind	White foam from waves is blown in streaks; waves 13-20ft high	Whole trees in motion
8	34-40	39-46	Gale	Edges of wave crests break into spindrift	Twigs break off trees; Difficult to walk
9	41-47	47-54	Severe gale	High waves; sea begins to roll Spray reduce visibility; 20ft waves	Chimney pots and slates removed
10	48-55	55-63	Storm	V. high waves 20-30 ft; blowing foam gives sea white appearance	Trees uprooted Structural damage
11	56-63	64-72	Severe storm	Exceptionally high waves; 30-45 ft high	Widespread damage
12	63	73	Hurricane	Air filled with foam; visibility reduced White sea; waves over 45ft high	Widespread damage; rare

Date: 7/25/20
Monitor Initials: CK

Daily Marine Mammal Monitoring Data Sheet
Richmond Refinery Long Wharf Maintenance and Efficiency Project

(2)

Diagram



Biological Monitor: Christina Kelleher
Signature: [Handwritten Signature]

Date: 7/25/20

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Monitor Initials: CF

Daily Marine Mammal Monitoring Data Sheet
Richmond Refinery Long Wharf Maintenance and Efficiency Project

Pile Driving Start and Stop Times³

1. Vibratory hammer start and stop times (include breaks):

(example: Pile 1: start 1030, stop 1035; start 1041, stop 1051; start 1055; stop 1101)

2. Impact hammer start and stop times, including any restrikes (only note breaks of 30 minutes or more):

(example: Pile 1: start 1030, stop 1130; restrike pile 1: 1355)

monitoring start 13:50

pile 1: 14:49 (start start) - 15:41 → break to repair hammer
end for the day

³ For vibratory pile driving, note each time the hammer starts and stops. For impact pile driving, note the start and end time for each pile, unless hammering ceases for ≥ 30 minutes) on that pile. Strike counts and times are included in a separate report.

Date: 7/25/20

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Monitor Initials: CK

Daily Marine Mammal Monitoring Data Sheet
Richmond Refinery Long Wharf Maintenance and Efficiency Project

Additional Notes

Monitoring start 13:50

Date: 7/28/20

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Daily Marine Mammal Monitoring Summary Log
Richmond Refinery Long Wharf Maintenance and Efficiency Project

Monitor Name:

Laura Duffy

Weather/Visibility and Sea State - use Beaufort Scale on next page:

0% cloud cover, visibility good; no glare; BF = 0-1 east side, 3 west side; wind out of WSW 11-15 kts

Tidal Level at Start/End of Work - use Tides app or refer to Richmond Harbor at tidesandcurrents.noaa.gov:

Start 1350 H2O level @ 3.23 ft / end 1601 H2O level @ 0.61 ft [low tide 1008 high tide 1706]

General Human Activity in the Area:

people on barges, wharf; many small craft; sailing vessels in channel/central bay; tugs & tankers in channel

Monitoring Location(s) - show on diagram and take panoramic photo of field of view:

B4S (Berth 4 South)

Are Castro Rocks visible (yes/no)? If yes, fill out page A-4: no

Berth Number: 4

Pile Type - include size and material:

60" steel

Total Pile Count for the Day: 1 (incomplete) Equipment: Impact Vibratory

Total Minutes of Pile Driving - enter total time here¹:

12 min

¹ Note the start and end times for each individual pile on page 7.

Date: 7/25/20Monitor Initials: LDThe Beaufort scale

No.	Knots	Mph	Description	Effects at sea	Effects on land
0	0	0	Calm	Sea like a mirror	Smoke rises vertically
1	1-3	1-3	Light air	Ripples but no foam crests	Smoke drifts in wind
2	4-6	4-7	Light breeze	Small wavelets	Leaves rustle; wind felt on face
3	7-10	8-12	Gentle breeze	Large wavelets; Crests not breaking	Small twigs in constant motion; Light flags extended
4	11-16	13-18	Moderate wind	Numerous whitecaps Waves 1-4ft high	Dust, leaves and loose paper raised. Small branches move.
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9	41-47	47-54	Severe gale	High waves; sea begins to roll Spray reduce visibility; 20ft waves	Chimney pots and slates removed
10	48-55	55-63	Storm	V. high waves 20-30 ft; blowing foam gives sea white appearance	Trees uprooted
11	56-63	64-72	Severe storm	Exceptionally high waves; 30-45 ft high	Structural damage Widespread damage
12	63	73	Hurricane	Air filled with foam; visibility reduced White sea; waves over 45ft high	Widespread damage; rare

Date: 7/25/20

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Monitor Initials: LD

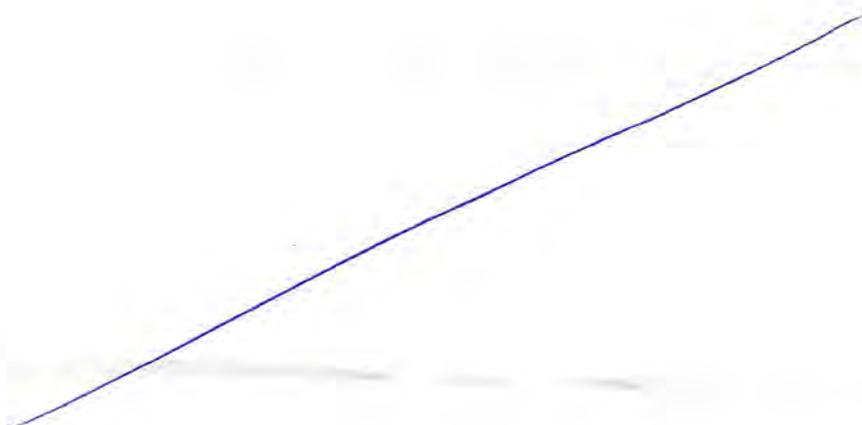
Daily Marine Mammal Monitoring Data Sheet
Richmond Refinery Long Wharf Maintenance and Efficiency Project

Pile Driving Start and Stop Times³

1. Vibratory hammer start and stop times (include breaks):

(example: Pile 1: start 1030, stop 1035; start 1041, stop 1051; start 1055; stop 1101)

see additional notes, p. 8 of 8



2. Impact hammer start and stop times, including any restrikes (only note breaks of 30 minutes or more):

(example: Pile 1: start 1030, stop 1130; restrike pile 1: 1355)

see additional notes, p. 8 of 8

³ For vibratory pile driving, note each time the hammer starts and stops. For impact pile driving, note the start and end time for each pile, unless hammering ceases for ≥ 30 minutes) on that pile. Strike counts and times are included in a separate report.

Date: 7/25/20

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Monitor Initials: LD

Daily Marine Mammal Monitoring Data Sheet
Richmond Refinery Long Wharf Maintenance and Efficiency Project

Additional Notes

- monitor start 1350
 - barge moved @ 1355 south of B4, disturbed H₂O / turbulence in area until 1408
 - barge partially blocks visibility SE of B4S monitoring station (outside exclusion zones)
 - hammer lifted @ 1408
 - ~~1419~~ B4N sees HASE in excl. zone. call R. Brooks (Chevron) 1419, stop work for 15 min 1416
 - 1449 soft start, 2 strikes >1min
 - 1455 >1min
 - 1457 >1min
 - 1500-1502 .2min
 - 1508-1510 2min
 - 1512 >1min
 - 1514 >1min
 - 1514 1min
 - 1517-1518 >1min
 - 1519
 - hammer off 1529; reset 1538
 - 1540-1541 1min
 - hammer off 1545
 - stop monitoring 1611
- } (12 min)

Date: 7/29/20

Page 1 of 8

Daily Marine Mammal Monitoring Summary Log
Richmond Refinery Long Wharf Maintenance and Efficiency Project

Monitor Name:

Christina Kelleher

Weather/Visibility and Sea State - use Beaufort Scale on next page:

Overcast, good visibility at 0-1 Beaufort Scale; sunny @ 11:00, 0-1 Beaufort
or clear

Tidal Level at Start/End of Work - use Tides app or refer to Richmond Harbor at tidesandcurrents.noaa.gov:

4.46 ft at 07:06, 2.16 ft at 12:12

General Human Activity in the Area:

Vehicles & pedestrians moving in area, small boats of crew

Monitoring Location(s) - show on diagram and take panoramic photo of field of view:

E. of pile / berth 4, 37.9261816, -122.413799, B45

Are Castro Rocks visible (yes/no)? If yes, fill out page A-4: NO

Berth Number: 4

Pile Type - include size and material:

60" steel

Total Pile Count for the Day: 1 Equipment: Impact Vibratory

Total Minutes of Pile Driving - enter total time here¹:

79 minutes

¹ Note the start and end times for each individual pile on page 7.

Date: 7/29/20

Monitor Initials: OK

The Beaufort scale

No.	Knots	Mph	Description	Effects at sea	Effects on land
0	0	0	Calm	Sea like a mirror	Smoke rises vertically
1	1-3	1-3	Light air	Ripples but no foam crests	Smoke drifts in wind
2	4-6	4-7	Light breeze	Small wavelets	Leaves rustle; wind felt on face
3	7-10	8-12	Gentle breeze	Large wavelets; Crests not breaking	Small twigs in constant motion; Light flags extended
4	11-16	13-18	Moderate wind	Numerous whitecaps Waves 1-4ft high	Dust, leaves and loose paper raised. Small branches move.
5	17-21	19-24	Fresh wind	Many whitecaps, some spray; Waves 4-8 ft high	Small trees sway
6	22-27	25-31	Strong wind	Whitecaps everywhere; Larger waves 8-13 ft high	Large branches move; Difficult to use umbrellas
7	28-33	32-38	V. strong wind	White foam from waves is blown in streaks; waves 13-20ft high	Whole trees in motion
8	34-40	39-46	Gale	Edges of wave crests break into spindrift	Twigs break off trees; Difficult to walk
9	41-47	47-54	Severe gale	High waves; sea begins to roll Spray reduce visibility; 20ft waves	Chimney pots and slates removed
10	48-55	55-63	Storm	V. high waves 20-30 ft; blowing foam gives sea white appearance	Trees uprooted Structural damage
11	56-63	64-72	Severe storm	Exceptionally high waves; 30-45 ft high	Widespread damage
12	63	73	Hurricane	Air filled with foam; visibility reduced White sea; waves over 45ft high	Widespread damage; rare

Date: 7/29/20

Monitor Initials: CK

Daily Marine Mammal Monitoring Data Sheet - Richmond Refinery Long Wharf Maintenance and Efficiency Project

Time of Observation	Observer Initials	Work Activity ¹	Species ²	Observation Number ³	Age Class ⁴	Identifying Marks	Distance from Pile (meters) ⁵	Direction of Travel	Bearing	Behavior ⁶	
First: 0731 Last: 0741	CK	B+D	HASE	HASE 1	unk	light gray face light nose	~ 750 m, moved to 500 m moves to 100 m	E	5	stationary @ surface, slowly swim East, dive	
First: 0808 0834, 0910, Last: 0932, 0954		A		HASE 1		light gray face, dark back of head				stationary @ surface, slowly swim East, dive	
First: 0759 Last: 0803	CK	B	HASE	HASE 2	unk	quickly dove could not see	~ 300 m, 100 m	S	30	stationary @ surface + dive facing S swims towards my position	
First: 0850 Last: 0934, 0953	CK	D+A	HASE	HASE 3	unk	dark gray face light nose	~ 400 m, 200 m	NE	326	swim NE, dive, swimming back & forth E to W, N of pile, occasionally looks at pile during driving	
First: 1156 Last: 12:02	CK	A	HASE	HASE 4	unk	Dark/black body, some light spotting	~ 90 m, 60 m	W	335	swimming W, dive, resurface closer to pile, looks @ barge & activity while stationary, swims away W. & dives	
First: Last:											
First: Last:											
First: Last:											
First: Last:											
First: Last:											
First: Last:											
¹ Activity: Indicate if observation is: within the 30-minute period before pile-driving (B); during active pile-driving (D); or within the 30-minute period after pile driving (A)		² Species Abbreviations: California Sea Lion = CASL Pacific Harbor Seal = HASE Northern Elephant Seal = NOES Harbor Porpoise = HAPO		³ Examples: HASE 1, HASE 2. Use these numbers for reference on page 6 diagram.		⁴ Species Age Classes: CASL = juvenile, subadult male, adult male HASE = juvenile, adult HAPO = calf, adult		⁵ Distance: Provide an approximate distance from location of pile.		⁶ Behavior examples: Stationary at surface, swimming (slow or fast), transiting, foraging, resting, looking around. Note if mammal appears to be attentive to project activities, or displays any behavior changes related to project activities, and describe the project activity. Note any human-caused disturbances such as recreational boating or helicopters. Add a reference number if comments are provided on a separate sheet.	

Daily Marine Mammal Monitoring Data Sheet
Richmond Refinery Long Wharf Maintenance and Efficiency Project
Castro Rocks Observations²

Time of Observation	Observer Initials	Visibility ¹	Piling Activity ²	Species ³	Number of individuals hauled-out ⁴	Behavioral Observations
			B			
			D			
			A			
<p><i>N/A</i> <i>See Laura Duffy's</i> <i>Monitoring Data</i></p>						
<p>¹Note conditions (foggy, clear, etc.) ²Indicate if observation is: within 30-minutes before pile-driving (B); during active pile-driving (D); or within 30-minutes after pile driving (A). Take at least one observation before, during, and after pile driving. ³Species Abbreviations: California Sea Lion = CASL Pacific Harbor Seal = HASE Northern Elephant Seal = NOES ⁴Approximate number if visibility is poor.</p>						

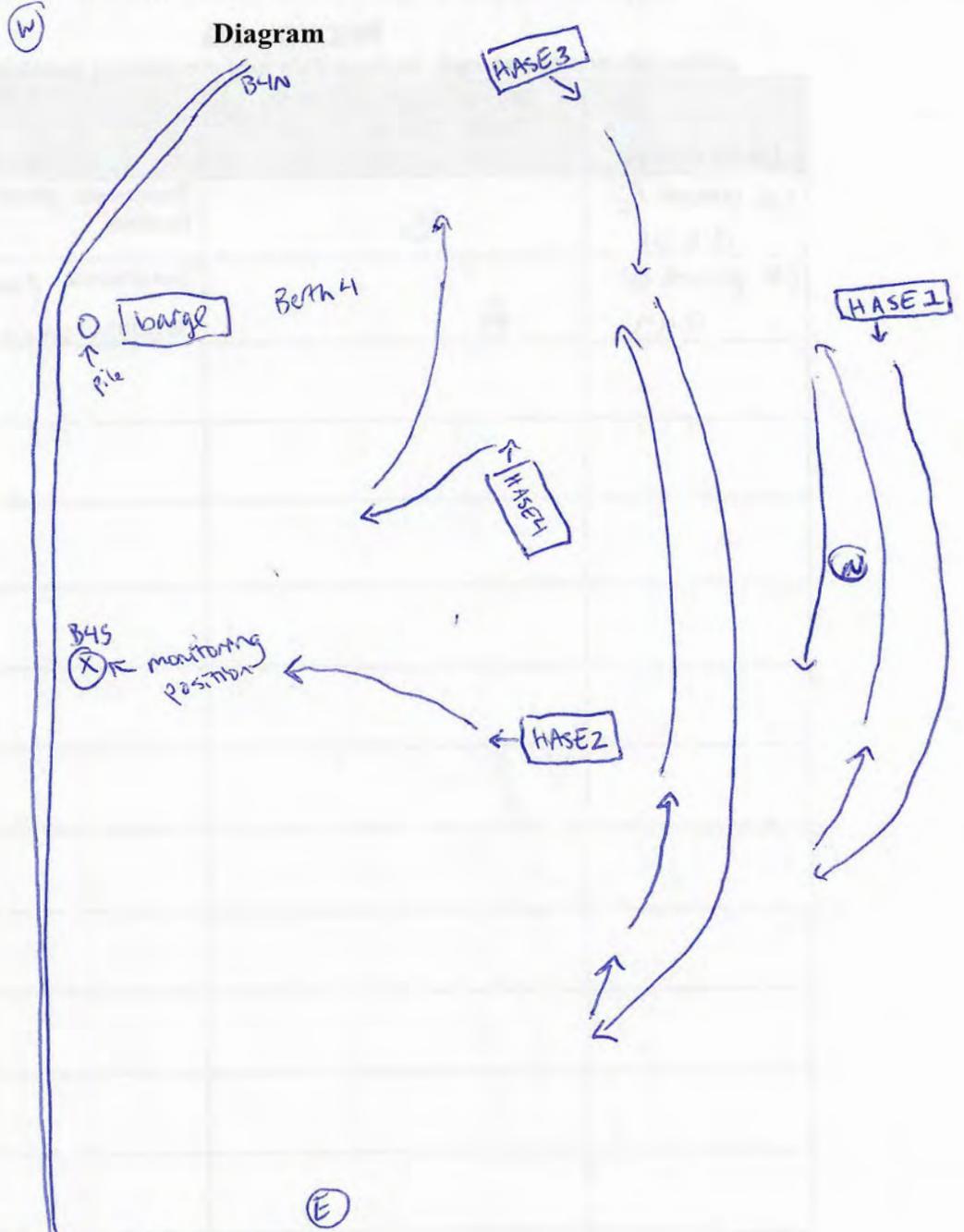
² One monitor must be positioned in a location to view Castro Rocks. If you are not the monitor viewing Castro Rocks, complete the date, initials, and page number and note "not applicable" on the table.

Date: 7/29/20

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Monitor Initials: CK

Daily Marine Mammal Monitoring Data Sheet
Richmond Refinery Long Wharf Maintenance and Efficiency Project



Biological Monitor: Christina Kelleher (E)

Signature: [Handwritten Signature]

Date: 7/29/20

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Monitor Initials: CK

Daily Marine Mammal Monitoring Data Sheet
Richmond Refinery Long Wharf Maintenance and Efficiency Project

Pile Driving Start and Stop Times³

1. Vibratory hammer start and stop times (include breaks):

(example: Pile 1: start 1030, stop 1035; start 1041, stop 1051; start 1055; stop 1101)

N/A

2. Impact hammer start and stop times, including any restrikes (only note breaks of 30 minutes or more):

(example: Pile 1: start 1030, stop 1130; restrike pile 1: 1355)

Pile 1: start 08:24 , stop ~~08:29~~ 09:29
break to remove frame around pile
start: 11:30 , stop 11:44

³ For vibratory pile driving, note each time the hammer starts and stops. For impact pile driving, note the start and end time for each pile, unless hammering ceases for ≥ 30 minutes) on that pile. Strike counts and times are included in a separate report.

Date: 7/29/20

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Monitor Initials: CK

Daily Marine Mammal Monitoring Data Sheet
Richmond Refinery Long Wharf Maintenance and Efficiency Project

Additional Notes

- Monitoring start @ 07:00 , end @ 09:59

- Monitoring start @ 11:12 , end 12:14

* Pile driving started before Marine mammal monitors completed the 30 minute pre-driving monitoring. Monitoring start @ 11:12, driving start @ 11:30

Date: 07/29/20

Page 1 of 8

Daily Marine Mammal Monitoring Summary Log
Richmond Refinery Long Wharf Maintenance and Efficiency Project

Monitor Name:

Laura Duffy

Weather/Visibility and Sea State - use Beaufort Scale on next page:

100% cloud cover; thick marine layer over SF/Angel Island/Tiburon; some glare E. side
BF = 01 east & west; wind SKt out of WSW

Tidal Level at Start/End of Work - use Tides app or refer to Richmond Harbor at tidesandcurrents.noaa.gov:

Start @ 0700 H₂O level 2.27ft / end @ 1214 H₂O level 2.17ft [high tide 0236
low tide 0915
high tide 1355]

General Human Activity in the Area:

people on barges & wharf; ship @ Berth 2; tankers / tugs in channel ⇒ B2 @ 0755

Monitoring Location(s) - show on diagram and take panoramic photo of field of view:

B4N (Berth 4 North)

Are Castro Rocks visible (yes/no)? If yes, fill out page A-4: yes

Berth Number: 4

Pile Type - include size and material:

10" steel

Total Pile Count for the Day: 1 (continued from 7/25) Equipment: Impact Vibratory

Total Minutes of Pile Driving - enter total time here¹: 45 min

¹ Note the start and end times for each individual pile on page 7.

Date: 7/29/20Page 2 of 8Monitor Initials: LDThe Beaufort scale

No.	Knots	Mph	Description	Effects at sea	Effects on land
0	0	0	Calm	Sea like a mirror	Smoke rises vertically
1	1-3	1-3	Light air	Ripples but no foam crests	Smoke drifts in wind
2	4-6	4-7	Light breeze	Small wavelets	Leaves rustle; wind felt on face
3	7-10	8-12	Gentle breeze	Large wavelets; Crests not breaking	Small twigs in constant motion; Light flags extended
4	11-16	13-18	Moderate wind	Numerous whitecaps Waves 1-4ft high	Dust, leaves and loose paper raised. Small branches move.
5	17-21	19-24	Fresh wind	Many whitecaps, some spray; Waves 4-8 ft high	Small trees sway
6	22-27	25-31	Strong wind	Whitecaps everywhere; Larger waves 8-13 ft high	Large branches move; Difficult to use umbrellas
7	28-33	32-38	V. strong wind	White foam from waves is blown in streaks; waves 13-20ft high	Whole trees in motion
8	34-40	39-46	Gale	Edges of wave crests break into spindrift	Twigs break off trees; Difficult to walk
9	41-47	47-54	Severe gale	High waves; sea begins to roll Spray reduce visibility; 20ft waves	Chimney pots and slates removed
10	48-55	55-63	Storm	V. high waves 20-30 ft; blowing foam gives sea white appearance	Trees uprooted Structural damage
11	56-63	64-72	Severe storm	Exceptionally high waves; 30-45 ft high	Widespread damage
12	63	73	Hurricane	Air filled with foam; visibility reduced White sea; waves over 45ft high	Widespread damage; rare

Date: 7/29/20

Monitor Initials: LD

Daily Marine Mammal Monitoring Data Sheet - Richmond Refinery Long Wharf Maintenance and Efficiency Project

Time of Observation	Observer Initials	Work Activity ¹	Species ²	Observation Number ³	Age Class ⁴	Identifying Marks	Distance from Pile (meters) ⁵	Direction of Travel	Bearing	Behavior ⁶	
First: 0725 Last: 0730	LD	B	HASE	HASE 1	ad	solid dark gray	80m	no SE travel	0° N 59° N	looked @ human activity then dove up again >100m east, slow trav.	
First: 0743 Last: 0743	LD	B	CASL	CASL 1	ad	/	>500m	/	200° SW	hauled out on channel marker	
First: 0804 Last: 0804	LD	B	HASE	HASE 2	ad	solid gray	90m	no travel	30° NE	looked @ work area (barge, crane) then dove. seen 1x	
First: 0826 Last: 0826	LD	D	HASE	HASE 3	ad	dark gray w/ pale snout	>100m	no travel	24° NE	resting @ surface, facing N	
First: 0930 Last: 0958	LD	A	HASE	HASE 4	ad	solid dark gray	75-100m	no travel	102° E	0931; 0935; 0938; 0945; 0949; 0953; 0958 repeat dives in same area	
First: 0931 Last: 0931	LD	A	HASE	HASE 5	ad	solid dark gray	65m	NW	22° NE	slow surface / dive. seen 1x	
First: Last:											
First: Last:											
First: Last:											
First: Last:											
First: Last:											
¹ Activity: Indicate if observation is: within the 30-minute period before pile-driving (B); during active pile-driving (D); or within the 30-minute period after pile driving (A)		² Species Abbreviations: California Sea Lion = CASL Pacific Harbor Seal = HASE Northern Elephant Seal = NOES Harbor Porpoise = HAPO		³ Examples: HASE 1, HASE 2. Use these numbers for reference on page 6 diagram.		⁴ Species Age Classes: CASL = juvenile, subadult male, adult male HASE = juvenile, adult HAPO = calf, adult		⁵ Distance: Provide an approximate distance from location of pile.		⁶ Behavior examples: Stationary at surface, swimming (slow or fast), transiting, foraging, resting, looking around. Note if mammal appears to be attentive to project activities, or displays any behavior changes related to project activities, and describe the project activity. Note any human-caused disturbances such as recreational boating or helicopters. Add a reference number if comments are provided on a separate sheet.	

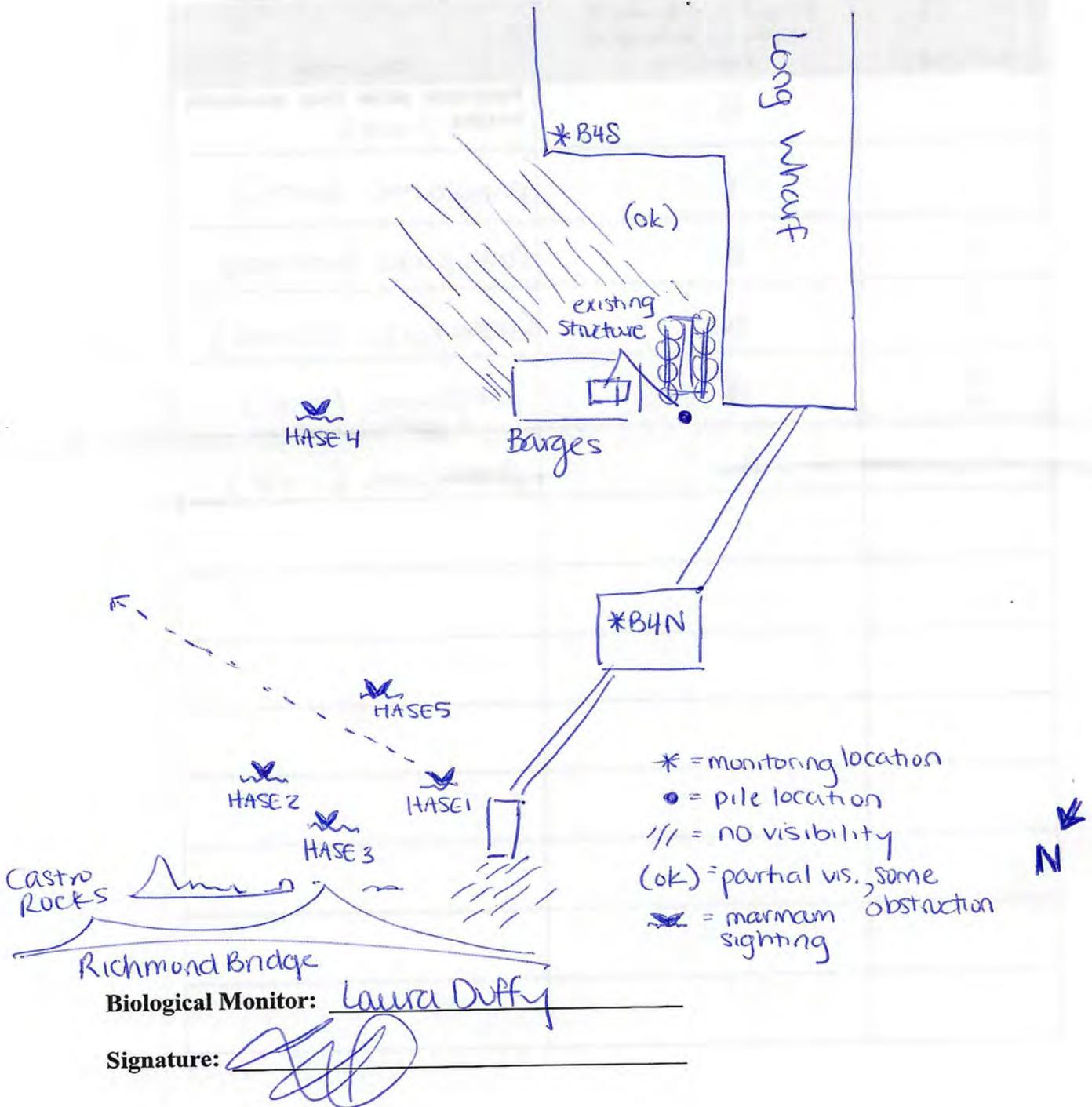
Date: 7/29/20

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Monitor Initials: LD

Daily Marine Mammal Monitoring Data Sheet
Richmond Refinery Long Wharf Maintenance and Efficiency Project

Diagram



Date: 7/29/20

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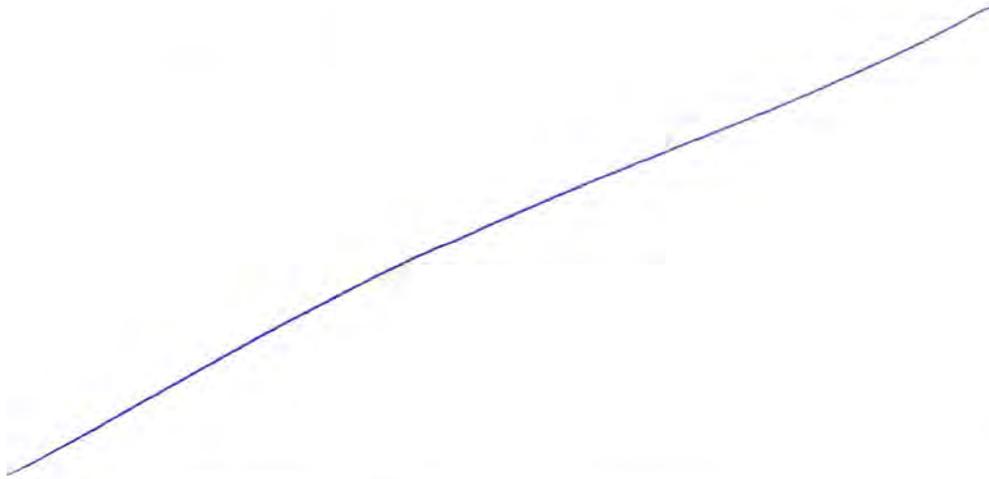
Monitor Initials: LD

Daily Marine Mammal Monitoring Data Sheet
Richmond Refinery Long Wharf Maintenance and Efficiency Project

Pile Driving Start and Stop Times³

1. Vibratory hammer start and stop times (include breaks):

(example: Pile 1: start 1030, stop 1035; start 1041, stop 1051; start 1055; stop 1101)



2. Impact hammer start and stop times, including any restrikes (only note breaks of 30 minutes or more):

(example: Pile 1: start 1030, stop 1130; restrike pile 1: 1355)

hammer up @ 0759, set by 0820	
0824 soft start (2 stakes)	> 1 min
0825 " " (1 stake)	> 1 min
0827-0834	7 min
0841-0845	4 min
0848-0856	8 min
0913-0926	13 min
0928-0929	1 min

hammer off 0941
end monitoring @ 0959

} 35min

continued on p. 8 of 8 →

~~continued p. 8 of 8~~

³ For vibratory pile driving, note each time the hammer starts and stops. For impact pile driving, note the start and end time for each pile, unless hammering ceases for ≥30 minutes) on that pile. Strike counts and times are included in a separate report.

Date: 7/29/20

Page 8 of 8

Monitor Initials: LD

Daily Marine Mammal Monitoring Data Sheet
Richmond Refinery Long Wharf Maintenance and Efficiency Project

Additional Notes

- Start monitoring @ 1112 — weather: fog lifted, 70% cloud cover
cloud cover steadily decreasing
wind 6 kt out of S
BF = 0-1 east, 1 west
no glare

1130 soft start	>1min	} 10min
1131-1139	8min	
1143-1144	1min	

- hammer off 1149

- monitoring stop @ 1214

- bubble curtain on & hammer set @ 1128
- texted R. Brooks (Chevron) @ 1128 to notify that the 30min pre-monitoring period was not over
- 1129 Chevron rep. w/ radio contact to barge & crew walked by B4N. Tried to notify pre-monitoring period was not over but was told to "hold on a minute"
- 1130 right @ soft start Chevron rep. walked back to B4N. notified that the pre-monitoring period was not yet over. Chevron did not stop the work.

Date: 08/07/20
Page 1 of 8

Daily Marine Mammal Monitoring Summary Log
Richmond Refinery Long Wharf Maintenance and Efficiency Project

Monitor Name:

Laura Duffy

Weather/Visibility and Sea State - use Beaufort Scale on next page:

90% cloud cover/marine layer; wind 9kt out of SW w/10-12 kt gusts; BF=1 east
glare on H₂O SW of pile @ 65° NE from B4S = 2/3 west

Tidal Level at Start/End of Work – use Tides app or refer to Richmond Harbor at tidesandcurrents.noaa.gov:

hi 0228
lo 0905 Start @ 0745 H₂O @ 5.3ft; end @ 1544 H₂O @ 0.52ft
hi 1559

General Human Activity in the Area:

Ships @ B2 & B3; people on wharfs/barges/tugs

Monitoring Location(s) – show on diagram and take panoramic photo of field of view:

B4S (Berth 4 South)

Are Castro Rocks visible (yes/no)? If yes, fill out page A-4: OK; obs. taken from B4N

Berth Number: 4

Pile Type - include size and material:

60" steel

Total Pile Count for the Day: 1 Equipment: Impact Vibratory

Total Minutes of Pile Driving - enter total time here¹:

39 minutes

¹ Note the start and end times for each individual pile on page 7.

Date: 08/07/20Page 2 of 8Monitor Initials: LDThe Beaufort scale

No.	Knots	Mph	Description	Effects at sea	Effects on land
0	0	0	Calm	Sea like a mirror	Smoke rises vertically
1	1-3	1-3	Light air	Ripples but no foam crests	Smoke drifts in wind
2	4-6	4-7	Light breeze	Small wavelets	Leaves rustle; wind felt on face
3	7-10	8-12	Gentle breeze	Large wavelets; Crests not breaking	Small twigs in constant motion; Light flags extended
4	11-16	13-18	Moderate wind	Numerous whitecaps Waves 1-4ft high	Dust, leaves and loose paper raised. Small branches move.
5	17-21	19-24	Fresh wind	Many whitecaps, some spray; Waves 4-8 ft high	Small trees sway
6	22-27	25-31	Strong wind	Whitecaps everywhere; Larger waves 8-13 ft high	Large branches move; Difficult to use umbrellas
7	28-33	32-38	V. strong wind	White foam from waves is blown in streaks; waves 13-20ft high	Whole trees in motion
8	34-40	39-46	Gale	Edges of wave crests break into spindrift	Twigs break off trees; Difficult to walk
9	41-47	47-54	Severe gale	High waves; sea begins to roll Spray reduce visibility; 20ft waves	Chimney pots and slates removed
10	48-55	55-63	Storm	V. high waves 20-30 ft; blowing foam gives sea white appearance	Trees uprooted Structural damage
11	56-63	64-72	Severe storm	Exceptionally high waves; 30-45 ft high	Widespread damage
12	63	73	Hurricane	Air filled with foam; visibility reduced White sea; waves over 45ft high	Widespread damage; rare

Date: 08/07/20

Monitor Initials: LD

Daily Marine Mammal Monitoring Data Sheet - Richmond Refinery Long Wharf Maintenance and Efficiency Project

Time of Observation	Observer Initials	Work Activity ¹	Species ²	Observation Number ³	Age Class ⁴	Identifying Marks	Distance from Pile (meters) ⁵	Direction of Travel	Bearing	Behavior ⁶	
First: 0812 Last: 0812	LD	B	CASL	CASL1	ad	/	>100m	N	274°W	slow travel	
First: 0833 Last: 0833	LD	B	HASE	HASE1	ad	dark w/ pale spots	30m	NE	319°NW	facing NE then dove	
First: 0855 Last: 0855	LD	B	HAPO	HAPO1	ad	/	>100m	SW	267°W	surfaced 3x @ Red Rocks then dove	
First: Last:											
First: Last:											
First: Last:											
First: Last:											
First: Last:											
First: Last:											
First: Last:											
First: Last:											
First: Last:											
First: Last:											
¹ Activity: Indicate if observation is: within the 30-minute period before pile-driving (B); during active pile-driving (D); or within the 30-minute period after pile driving (A)		² Species Abbreviations: California Sea Lion = CASL Pacific Harbor Seal = HASE Northern Elephant Seal = NOES Harbor Porpoise = HAPO		³ Examples: HASE1, HASE 2. Use these numbers for reference on page 6 diagram.		⁴ Species Age Classes: CASL = juvenile, subadult male, adult male HASE = juvenile, adult HAPO = calf, adult		⁵ Distance: Provide an approximate distance from location of pile.		⁶ Behavior examples: Stationary at surface, swimming (slow or fast), transiting, foraging, resting, looking around. Note if mammal appears to be attentive to project activities, or displays any behavior changes related to project activities, and describe the project activity. Note any human-caused disturbances such as recreational boating or helicopters. Add a reference number if comments are provided on a separate sheet.	

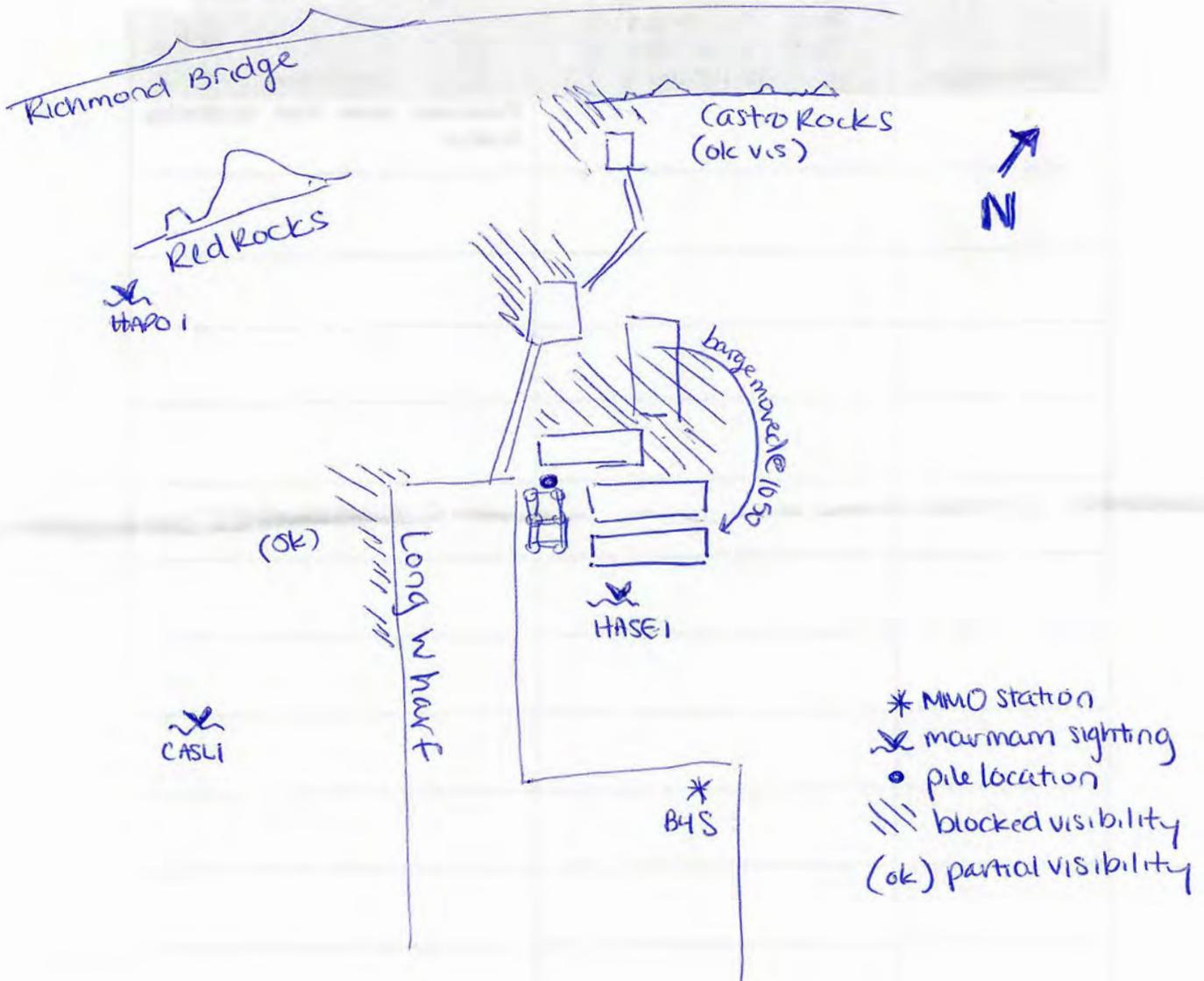
Date: 8/07/20

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Monitor Initials: LD

Daily Marine Mammal Monitoring Data Sheet
Richmond Refinery Long Wharf Maintenance and Efficiency Project

Diagram



Biological Monitor: Laura Doffy

Signature: [Signature]

Date: 8/7/20

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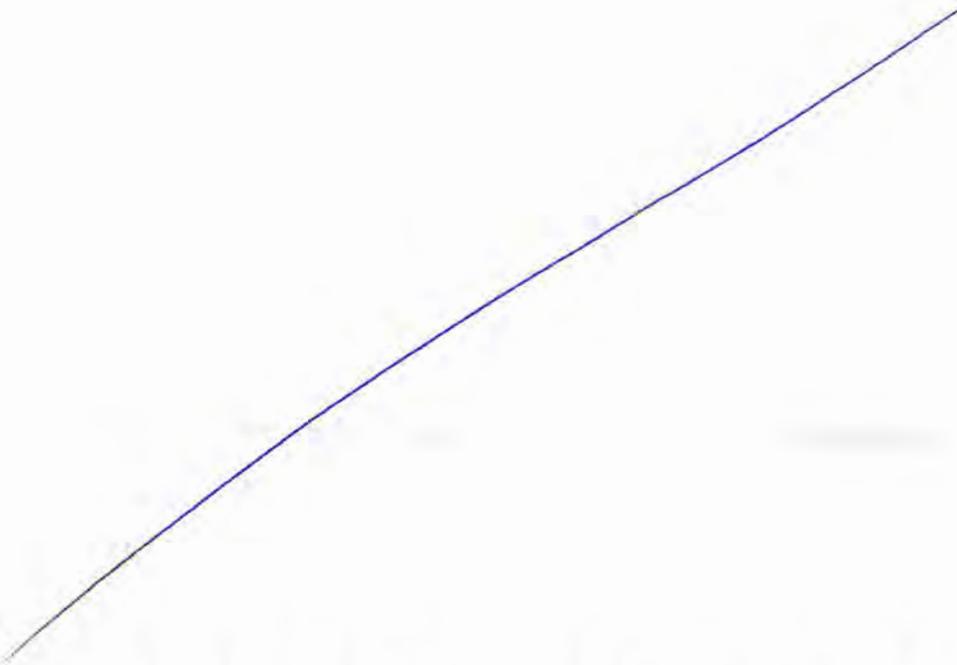
Monitor Initials: LD

Daily Marine Mammal Monitoring Data Sheet
Richmond Refinery Long Wharf Maintenance and Efficiency Project

Pile Driving Start and Stop Times³

1. Vibratory hammer start and stop times (include breaks):

(example: Pile 1: start 1030, stop 1035; start 1041, stop 1051; start 1055; stop 1101)



2. Impact hammer start and stop times, including any restrikes (only note breaks of 30 minutes or more):

(example: Pile 1: start 1030, stop 1130; restrike pile 1; 1355)

see p. 8 of 8

³ For vibratory pile driving, note each time the hammer starts and stops. For impact pile driving, note the start and end time for each pile, unless hammering ceases for ≥ 30 minutes) on that pile. Strike counts and times are included in a separate report.

Date: 8/7/20

Monitor Initials: LD

Daily Marine Mammal Monitoring Data Sheet
Richmond Refinery Long Wharf Maintenance and Efficiency Project

Additional Notes

Start monitoring 0745

- pile up 0913, set 1032
- 0942 weather shift: 5kts out of Sigusts to 8kts
20% cloud cover
BF = 0 east / 1-2 west
- 1050 barge w/ spare piles moved
- 1130 break
- hammer up 1230, set 1249

Start monitoring

Strikes

1254 (soft start 1 stake)	1min
1255 " " " "	1min
1256-1257	2min
1258	1m.
1259	1m.
1300	1m.
1301-1302	2m.
1308-1309	1m
1310	7m
1313-1330	1m
1339	5m
1349-1354	10m
1445-1455	1em
1508-1514	

+ 39min

- 3 osprey circle crane 13132
- ship leaving B2 1339
- hammer off 1405
- template up 1429
- hammer on 1441
- ship arrive B2 1510
- hammer off 1517

Stop monitoring 1544

Date: 8/7/20

Page 1 of 8

Daily Marine Mammal Monitoring Summary Log
Richmond Refinery Long Wharf Maintenance and Efficiency Project

Monitor Name:

Mandi McElroy

Weather/Visibility and Sea State - use Beaufort Scale on next page:

@ 0745 windy/foggy ~ 80% cloud cover, Beaufort 3

Tidal Level at Start/End of Work - use Tides app or refer to Richmond Harbor at tidesandcurrents.noaa.gov):

low @ 0905 (0.34'), high @ 1559 (5.39')

General Human Activity in the Area:

tankers @ Berths 2 + 3, low-level human/vehicle traffic

Monitoring Location(s) - show on diagram and take panoramic photo of field of view:

B4 North

Are Castro Rocks visible (yes/no)? If yes, fill out page A-4: yes

Berth Number:

4

Pile Type - include size and material:

60" steel

Total Pile Count for the Day:

1

Equipment:

Impact

Vibratory

Total Minutes of Pile Driving - enter total time here¹:

~ 39 min

¹ Note the start and end times for each individual pile on page 7.

Date: 8/7/20

Monitor Initials: MM

The Beaufort scale

No.	Knots	Mph	Description	Effects at sea	Effects on land
0	0	0	Calm	Sea like a mirror	Smoke rises vertically
1	1-3	1-3	Light air	Ripples but no foam crests	Smoke drifts in wind
2	4-6	4-7	Light breeze	Small wavelets	Leaves rustle; wind felt on face
3	7-10	8-12	Gentle breeze	Large wavelets; crests not breaking	Small twigs in constant motion;
4	11-16	13-18	Moderate wind	Numerous whitecaps Waves 1-4ft high	Light flags extended Dust, leaves and loose paper raised. Small branches move.
5	17-21	19-24	Fresh wind	Many whitecaps, some spray; Waves 4-8 ft high	Small trees sway
6	22-27	25-31	Strong wind	Whitecaps everywhere; Larger waves 8-13 ft high	Large branches move; Difficult to use umbrellas
7	28-33	32-38	V. strong wind	White foam from waves is blown in streaks; waves 13-20ft high	Whole trees in motion
8	34-40	39-46	Gale	Edges of wave crests break into spindrift	Twigs break off trees; Difficult to walk
9	41-47	47-54	Severe gale	High waves; sea begins to roll Spray reduce visibility, 20ft waves	Chimney pots and slates removed
10	48-55	55-63	Storm	V. high waves 20-30 ft; blowing foam gives sea white appearance	Trees uprooted
11	56-63	64-72	Severe storm	Exceptionally high waves; 30-45 ft high	Structural damage Widespread damage
12	63	73	Hurricane	Air filled with foam; visibility reduced White sea; waves over 45ft high	Widespread damage; rare

Date: 8/7/20

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Monitor Initials: MM

Daily Marine Mammal Monitoring Data Sheet
Richmond Refinery Long Wharf Maintenance and Efficiency Project

Castro Rocks Observations²

Time of Observation	Observer Initials	Visibility ¹	Piling Activity ²	Species ³	Number of individuals hauled-out ⁴	Behavioral Observations
0745-0830	MM	light fog	B	HASE	~20	resting (low tide)
1320	MM	clear	D	—	0	— incoming tide
1415	MM	clear	A	—	0	— rocks mostly submerged
		* no MMs	hauled out			
		(30 min pre/post and during)				

started @ 1254
no MMs hauled out

¹Note conditions (foggy, clear, etc.)
²Indicate if observation is: within 30-minutes before pile-driving (B); during active pile-driving (D); or within 30-minutes after pile driving (A). Take at least one observation before, during, and after pile driving.
³Species Abbreviations:
 California Sea Lion = CASL
 Pacific Harbor Seal = HASE
 Northern Elephant Seal = NOES
⁴Approximate number if visibility is poor.

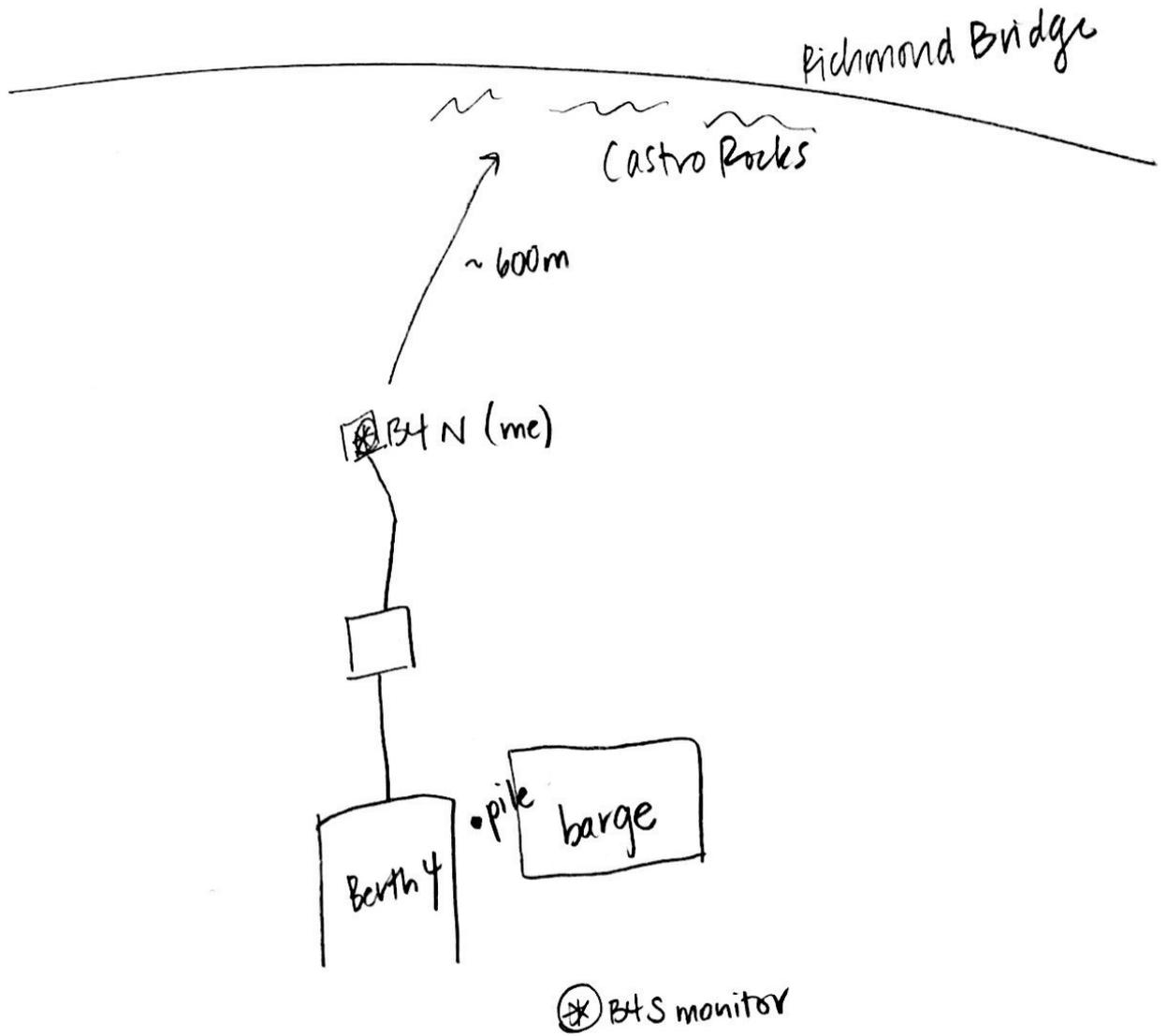
² One monitor must be positioned in a location to view Castro Rocks. If you are not the monitor viewing Castro Rocks, complete the date, initials, and page number and note "not applicable" on the table.

Date: 8/7/20

Monitor Initials: MM

Daily Marine Mammal Monitoring Data Sheet
Richmond Refinery Long Wharf Maintenance and Efficiency Project

Diagram



Biological Monitor: Mandi Gray

Signature: [Handwritten Signature]

Date: 8/7/20

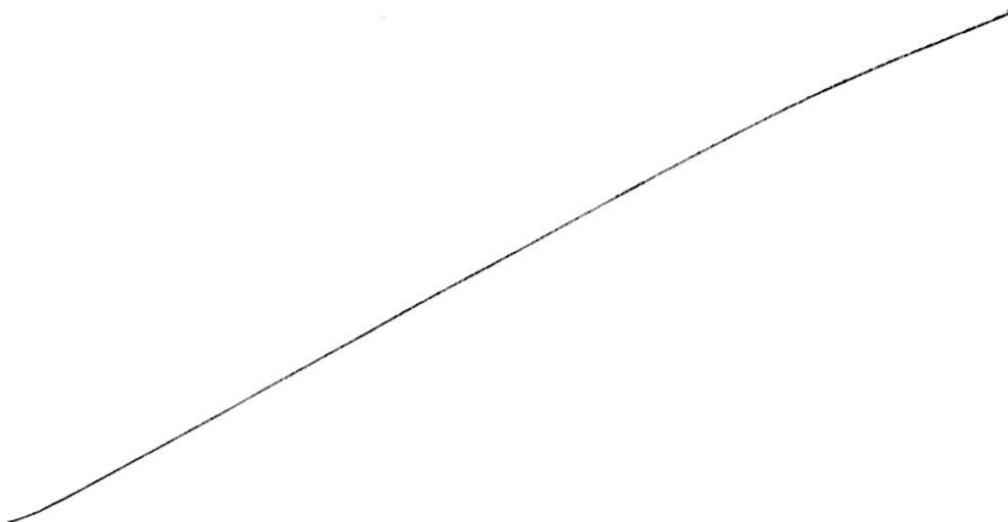
Page 7 of 8

Monitor Initials: MM

Daily Marine Mammal Monitoring Data Sheet
Richmond Refinery Long Wharf Maintenance and Efficiency Project

Pile Driving Start and Stop Times³

- 1. Vibratory hammer start and stop times (include breaks):**
(example: Pile 1: start 1030, stop 1035; start 1041, stop 1051; start 1055; stop 1101)



- 2. Impact hammer start and stop times, including any restrikes (only note breaks of 30 minutes or more):**

(example: Pile 1: start 1030, stop 1130; restrike pile 1: 1355)

30 min window start = 1224

1254 soft start

several taps 1257-1259, 1301, 1302 (< 1 min)

1308-1309, 1311 (2)

1313-1330 continuous (17 min)

1339-1341 (2)

1349-1354 (end - removing hammer + frame)

30 min post = 1424

30 min pre = 1415

1445-1455 (10 min)

1508-1514 (6 min)
- finished

end @ 1544 (30 min post)

³ For vibratory pile driving, note each time the hammer starts and stops. For impact pile driving, note the start and end time for each pile, unless hammering ceases for ≥ 30 minutes) on that pile. Strike counts and times are included in a separate report.

Date: 8/7/20 mm

Page 8 of 8

Monitor Initials: _____

Daily Marine Mammal Monitoring Data Sheet
Richmond Refinery Long Wharf Maintenance and Efficiency Project

Additional Notes

arrived @ 0745

~ 20 HASE hauled out on CR

1056 pile in place, no driving

1145-1215 crew break

1230 lifting hammer (see p. 7) - pile driving times

1530 tugboat pulling crane barge out of dock

1544 end - departed B4

Date: 8/21/20

Page 1 of 8

Daily Marine Mammal Monitoring Summary Log
Richmond Refinery Long Wharf Maintenance and Efficiency Project

Monitor Name: Christina Kelleher

Weather/Visibility and Sea State - use Beaufort Scale on next page:

Smoky conditions due to fire, sunny, 0-1 Beaufort; okay visibility, light wind
n 70°F-80°F

Tidal Level at Start/End of Work – use Tides app or refer to Richmond Harbor at tidesandcurrents.noaa.gov:

Start (10:48) = 2.67ft ; end (14:36) = 5.72ft.

General Human Activity in the Area:

Vehicles & people on the long wharf, some boats & barges in water, construction at Berth 4

Monitoring Location(s) – show on diagram and take panoramic photo of field of view:

B4S n 60m. south of Pile ; 37.9262670, -122.4138462

Are Castro Rocks visible (yes/no)? If yes, fill out page A-4: NO

Berth Number: 4

Pile Type - include size and material:

60" steel

Total Pile Count for the Day: 1 Equipment: Impact Vibratory

Total Minutes of Pile Driving - enter total time here¹: 79 minutes

¹ Note the start and end times for each individual pile on page 7.

Date: 8/21/20

Monitor Initials: CK

The Beaufort scale

No.	Knots	Mph	Description	Effects at sea	Effects on land
0	0	0	Calm	Sea like a mirror	Smoke rises vertically
1	1-3	1-3	Light air	Ripples but no foam crests	Smoke drifts in wind
2	4-6	4-7	Light breeze	Small wavelets	Leaves rustle; wind felt on face
3	7-10	8-12	Gentle breeze	Large wavelets; Crests not breaking	Small twigs in constant motion; Light flags extended
4	11-16	13-18	Moderate wind	Numerous whitecaps Waves 1-4ft high	Dust, leaves and loose paper raised. Small branches move.
5	17-21	19-24	Fresh wind	Many whitecaps, some spray; Waves 4-8 ft high	Small trees sway
6	22-27	25-31	Strong wind	Whitecaps everywhere; Larger waves 8-13 ft high	Large branches move; Difficult to use umbrellas
7	28-33	32-38	V. strong wind	White foam from waves is blown in streaks; waves 13-20ft high	Whole trees in motion
8	34-40	39-46	Gale	Edges of wave crests break into spindrift	Twigs break off trees; Difficult to walk
9	41-47	47-54	Severe gale	High waves; sea begins to roll Spray reduce visibility, 20ft waves	Chimney pots and slates removed
10	48-55	55-63	Storm	V. high waves 20-30 ft; blowing foam gives sea white appearance	Trees uprooted Structural damage
11	56-63	64-72	Severe storm	Exceptionally high waves; 30-45 ft high	Widespread damage
12	63	73	Hurricane	Air filled with foam; visibility reduced White sea; waves over 45ft high	Widespread damage; rare

Date: 8/21/20

Monitor Initials: CK

Daily Marine Mammal Monitoring Data Sheet - Richmond Refinery Long Wharf Maintenance and Efficiency Project

Time of Observation	Observer Initials	Work Activity ¹	Species ²	Observation Number ³	Age Class ⁴	Identifying Marks	Distance from Pile (meters) ⁵	Direction of Travel	Bearing	Behavior ⁶
First: 10:34 Last: 10:40, 10:55, 11:03, 11:07	CK	B&D	HASE	HASE 1	UNK	Dark gray head, light gray/ spotted chin	~75m; 60m	S	15	Stationary, looking around, diving; pops up near me, swim + look towards pile
First: 10:55 Last: 10:59, 11:03, 11:07, 11:18	CK	D	HASE	HASE 2	UNK	Dark gray head	~80m	E	330	look around, dive; HASE 1+2 swimming adjacent to each other 1103
First: 11:07 Last: 11:21, 11:51	CK	DoA	HASE	HASE 3	UNK	too far to see	~100m	S	70	Swim S, about 5m in front of HASE 1+2, all swimming S. together
First: 14:00 Last: 14:00	CK	B	HASE	HASE 4	UNK	very dark head, lighter chin + body w/ dark spots	~50-60m	W	15	look at pile/ activity + at me, swim toward pile + dive
First: Last:										
First: Last:										
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¹ Activity: Indicate if observation is: within the 30-minute period before pile-driving (B); during active pile-driving (D); or within the 30-minute period after pile driving (A)		² Species Abbreviations: California Sea Lion = CASL Pacific Harbor Seal = HASE Northern Elephant Seal = NOES Harbor Porpoise = HAPO		³ Examples: HASE 1, HASE 2. Use these numbers for reference on page 6 diagram.		⁴ Species Age Classes: CASL = juvenile, subadult male, adult male HASE = juvenile, adult HAPO = calf, adult		⁵ Distance: Provide an approximate distance from location of pile.		⁶ Behavior examples: Stationary at surface, swimming (slow or fast), transiting, foraging, resting, looking around. Note if mammal appears to be attentive to project activities, or displays any behavior changes related to project activities, and describe the project activity. Note any human-caused disturbances such as recreational boating or helicopters.

OSRR, BEKI, DCO, HEGU, WEGU, ROPE, BRPE (flyover only), PFGU, grebe sp.

Date: 8/21/20

Monitor Initials: CK

Daily Marine Mammal Monitoring Data Sheet
Richmond Refinery Long Wharf Maintenance and Efficiency Project
Castro Rocks Observations²

Time of Observation	Observer Initials	Visibility ¹	Piling Activity ²	Species ³	Number of individuals hauled-out ⁴	Behavioral Observations
			B			
			D			
			A			

N/A not visible, see Laura Duffy's monitoring sheets

¹Note conditions (foggy, clear, etc.)
²Indicate if observation is: within 30-minutes before pile-driving (B); during active pile-driving (D); or within 30-minutes after pile driving (A). Take at least one observation before, during, and after pile driving.
³**Species Abbreviations:**
California Sea Lion = CASL
Pacific Harbor Seal = HASE
Northern Elephant Seal = NOES
⁴Approximate number if visibility is poor.

² One monitor must be positioned in a location to view Castro Rocks. If you are not the monitor viewing Castro Rocks, complete the date, initials, and page number and note "not applicable" on the table.

Date: 8/21/20

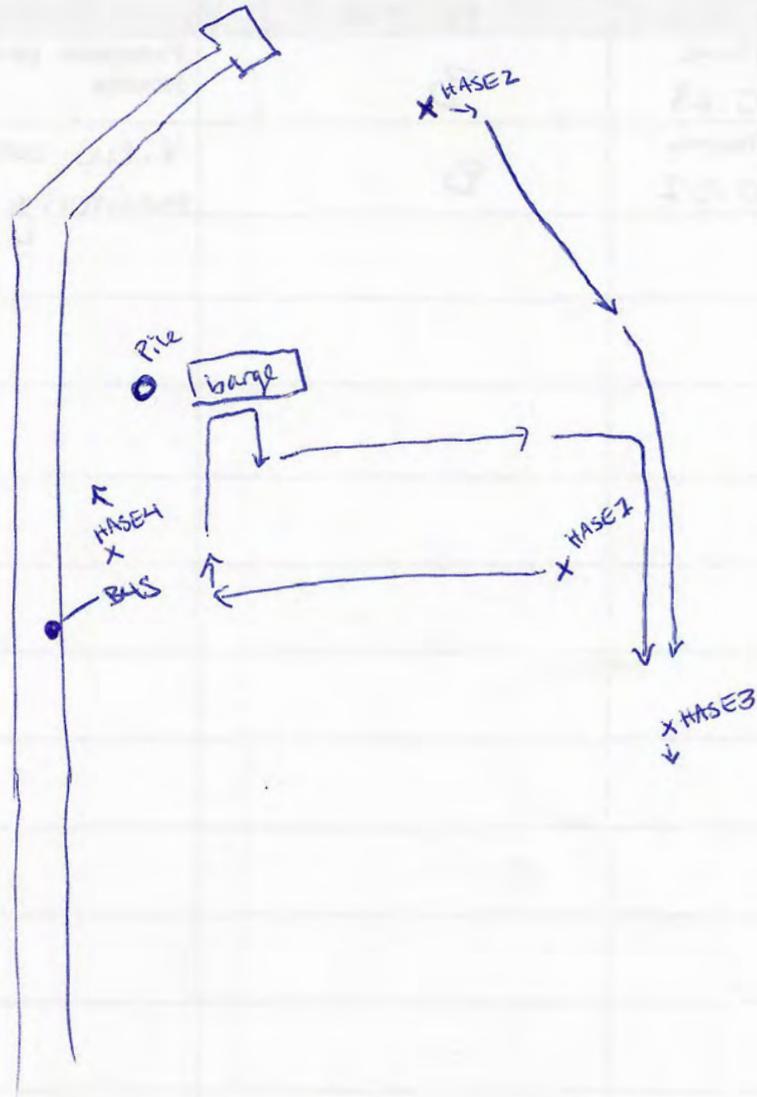
Page 6 of 8

Monitor Initials: CK

Daily Marine Mammal Monitoring Data Sheet
Richmond Refinery Long Wharf Maintenance and Efficiency Project

Diagram

(N)



Biological Monitor: Christina Kelleher

Signature: Christina Kelleher

Date: 8/21/20

Page 7 of 8

Monitor Initials: CK

Daily Marine Mammal Monitoring Data Sheet
Richmond Refinery Long Wharf Maintenance and Efficiency Project

Pile Driving Start and Stop Times³

1. Vibratory hammer start and stop times (include breaks):

(example: Pile 1: start 1030, stop 1035; start 1041, stop 1051; start 1055; stop 1101)

N/A

2. Impact hammer start and stop times, including any restrikes (only note breaks of 30 minutes or more):

(example: Pile 1: start 1030, stop 1130; restrike pile 1: 1355)

Pile 1: start 1053, stop 1144 ; start ~~14:03~~ 14:03, stop 14:31

³ For vibratory pile driving, note each time the hammer starts and stops. For impact pile driving, note the start and end time for each pile, unless hammering ceases for ≥ 30 minutes) on that pile. Strike counts and times are included in a separate report.

Date: 8/21/20

Page 8 of 8

Monitor Initials: CK

Daily Marine Mammal Monitoring Data Sheet
Richmond Refinery Long Wharf Maintenance and Efficiency Project

Additional Notes

Monitoring start time: 10:18
Monitoring end time: 12:14

Monitoring start time: 13:14
Monitoring end time: ~~15:01~~

A/M

Date: 08/21/20

Page 1 of 8

Daily Marine Mammal Monitoring Summary Log
Richmond Refinery Long Wharf Maintenance and Efficiency Project

Monitor Name:

Laura Duffy

Weather/Visibility and Sea State - use Beaufort Scale on next page:

smog/haze from wildfires, vis. ok (>100mi) BF = 1 east & west of wharf
100% cloud cover; wind ~ 6kt out of SW

Tidal Level at Start/End of Work - use Tides app or refer to Richmond Harbor at
tidesandcurrents.noaa.gov):

start @ 1018 H₂O @ 5.72ft; end @ 1501 H₂O @ 0.02ft ~~###~~
hi 1457
lo 0815

General Human Activity in the Area:

people on barges, wharf. 2 barges, 2 tugs; hydroacoustic survey boat
ship @ B3

Monitoring Location(s) - show on diagram and take panoramic photo of field of view:

B4N (Berth 4 North)

Are Castro Rocks visible (yes/no)? If yes, fill out page A-4: yes

Berth Number: 4

Pile Type - include size and material:

60" steel

Total Pile Count for the Day: 1

Equipment: Impact Vibratory

Total Minutes of Pile Driving - enter total time here¹:

58 min.

¹ Note the start and end times for each individual pile on page 7.

Date: 8/21/20

Page 2 of 8

Monitor Initials: LP

The Beaufort scale

No.	Knots	Mph	Description	Effects at sea	Effects on land
0	0	0	Calm	Sea like a mirror	Smoke rises vertically
1	1-3	1-3	Light air	Ripples but no foam crests	Smoke drifts in wind
2	4-6	4-7	Light breeze	Small wavelets	Leaves rustle; wind felt on face
3	7-10	8-12	Gentle breeze	Large wavelets; Crests not breaking	Small twigs in constant motion; Light flags extended
4	11-16	13-18	Moderate wind	Numerous whitecaps Waves 1-4ft high	Dust, leaves and loose paper raised. Small branches move.
5	17-21	19-24	Fresh wind	Many whitecaps, some spray; Waves 4-8 ft high	Small trees sway
6	22-27	25-31	Strong wind	Whitecaps everywhere; Larger waves 8-13 ft high	Large branches move; Difficult to use umbrellas
7	28-33	32-38	V. strong wind	White foam from waves is blown in streaks; waves 13-20ft high	Whole trees in motion
8	34-40	39-46	Gale	Edges of wave crests break into spindrift	Twigs break off trees; Difficult to walk
9	41-47	47-54	Severe gale	High waves; sea begins to roll Spray reduce visibility; 20ft waves	Chimney pots and slates removed
10	48-55	55-63	Storm	V. high waves 20-30 ft; blowing foam gives sea white appearance	Trees uprooted Structural damage
11	56-63	64-72	Severe storm	Exceptionally high waves; 30-45 ft high	Widespread damage
12	63	73	Hurricane	Air filled with foam; visibility reduced White sea; waves over 45ft high	Widespread damage; rare

Date: 08/21/20

Monitor Initials: LD

Daily Marine Mammal Monitoring Data Sheet - Richmond Refinery Long Wharf Maintenance and Efficiency Project

Time of Observation	Observer Initials	Work Activity ¹	Species ²	Observation Number ³	Age Class ⁴	Identifying Marks	Distance from Pile (meters) ⁵	Direction of Travel	Bearing	Behavior ⁶
First: 1038 Last:	LD	B	CASL	CASL 1	ad	/	>200m	/	210° SW	7 indiv. hauled out on channel markers
First: 1052 Last: 1052	LD	B/D	HASE	HASE 1	ad	solid gray	50m	W	357° N	1 surface/dive @ soft start 1053
First: 1056 Last: 1106	LD	D	HASE	HASE 2	ad	dark gray w/black spots	85m	E	355° N ↳ 53° NE	see notes p. 8 of 8
First: 1330 Last: 1330	LD	B	HASE	HASE 3	ad	silver w/ dark gray mottle	150m	E	1° N	slow travel, rest @ surface
First: 1430 Last: 1430	LD	D	HASE	HASE 4	2 ad.	/	>200m	NW	323° NW	slow travel in channel near Red Rocks ⁵
First: 1501 Last: 1501	LD	A	HASE	HASE 5	ad.	dark gray/ black mottle	40m	W	169° S	slow travel/dive facing W
First: Last:										
First: Last:										
First: Last:										
First: Last:										
First: Last:										
¹ Activity: Indicate if observation is: within the 30-minute period before pile-driving (B); during active pile-driving (D); or within the 30-minute period after pile driving (A)		² Species Abbreviations: California Sea Lion = CASL Pacific Harbor Seal = HASE Northern Elephant Seal = NOES Harbor Porpoise = HAPO		³ Examples: HASE 1, HASE 2. Use these numbers for reference on page 6 diagram.		⁴ Species Age Classes: CASL = juvenile, subadult male, adult male HASE = juvenile, adult HAPO = calf, adult		⁵ Distance: Provide an approximate distance from location of pile.		⁶ Behavior examples: Stationary at surface, swimming (slow or fast), transiting, foraging, resting, looking around. Note if mammal appears to be attentive to project activities, or displays any behavior changes related to project activities, and describe the project activity. Note any human-caused disturbances such as recreational boating or helicopters. Add a reference number if comments are provided on a separate sheet.

Date: 8/21/20

Monitor Initials: LD

Daily Marine Mammal Monitoring Data Sheet
Richmond Refinery Long Wharf Maintenance and Efficiency Project

Castro Rocks Observations²

Time of Observation	Observer Initials	Visibility ¹	Piling Activity ²	Species ³	Number of individuals hauled-out ⁴	Behavioral Observations
10 20	LD	Smoke/haze	B	HASE	25	hauled out, resting
13 20	LD	mostly clear some haze	B	HASE	0	(rocks almost all submerged)
			A			

¹Note conditions (foggy, clear, etc.)
²Indicate if observation is: within 30-minutes before pile-driving (B); during active pile-driving (D); or within 30-minutes after pile driving (A). Take at least one observation before, during, and after pile driving.
³**Species Abbreviations:**
 California Sea Lion = CASL
 Pacific Harbor Seal = HASE
 Northern Elephant Seal = NOES
⁴Approximate number if visibility is poor.

² One monitor must be positioned in a location to view Castro Rocks. If you are not the monitor viewing Castro Rocks, complete the date, initials, and page number and note "not applicable" on the table.

Date: 8/21/20

Page 5 of 8

Monitor Initials: LD

Daily Marine Mammal Monitoring Data Sheet
Richmond Refinery Long Wharf Maintenance and Efficiency Project

PHOTO LOG

upload photos to network, include date and monitoring position in file name

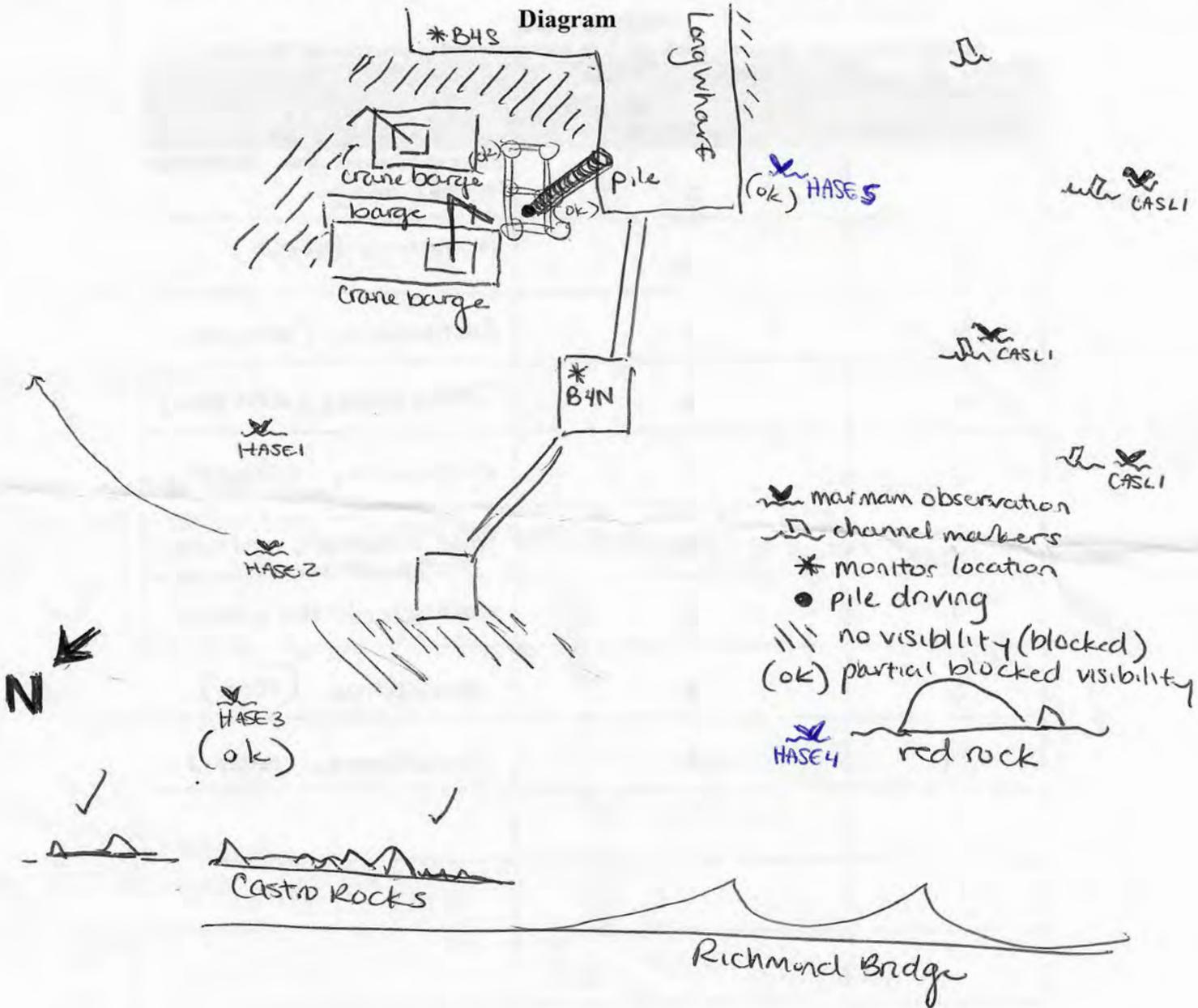
Photo Number	Photo Taken Before (B), During (D), or After (A) Pile Driving	Description
1	B	Panoramic photo from monitoring location (east)
2	B	panoramic (west)
3	B	Castro Rocks (west end)
4	B	Castro Rocks (east end)
5	D	airquality/visibility
6	D	pile location, east side of the wharf
7	D	west side of the wharf
8	A	panoramic (east)
9	A	panoramic (west)

Date: 8/21/20

Page 6 of 8

Monitor Initials: LD

Daily Marine Mammal Monitoring Data Sheet
Richmond Refinery Long Wharf Maintenance and Efficiency Project



Biological Monitor: Laura Duffy

Signature: [Handwritten Signature]

Date: 8/21/20

Page 7 of 8

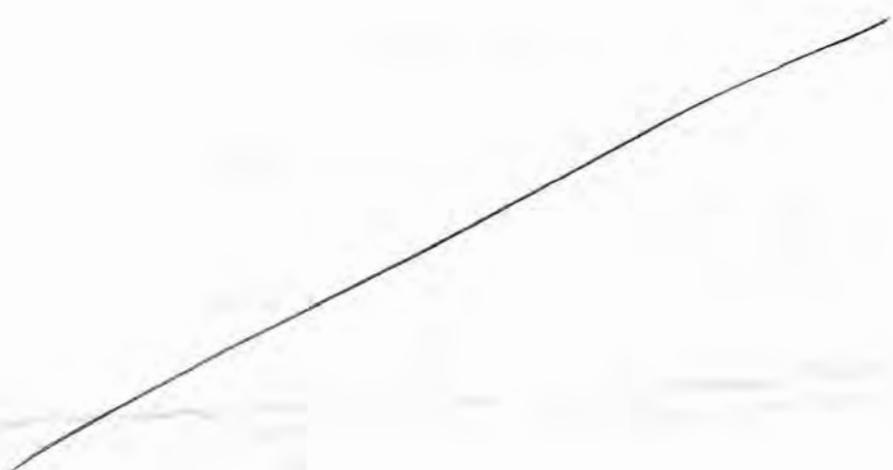
Monitor Initials: LD

Daily Marine Mammal Monitoring Data Sheet
Richmond Refinery Long Wharf Maintenance and Efficiency Project

Pile Driving Start and Stop Times³

1. Vibratory hammer start and stop times (include breaks):

(example: Pile 1: start 1030, stop 1035; start 1041, stop 1051; start 1055; stop 1101)



2. Impact hammer start and stop times, including any restrikes (only note breaks of 30 minutes or more):

(example: Pile 1: start 1030, stop 1130; restrike pile 1: 1355)

See notes p. 8 of 8

³ For vibratory pile driving, note each time the hammer starts and stops. For impact pile driving, note the start and end time for each pile, unless hammering ceases for ≥ 30 minutes) on that pile. Strike counts and times are included in a separate report.

Date: 8/21/20

Page 8 of 8

Monitor Initials: LD

Daily Marine Mammal Monitoring Data Sheet
Richmond Refinery Long Wharf Maintenance and Efficiency Project

Additional Notes

monitor start 1018
hammer positioning 1045

- HASE¹ 1052 50m 357°N fast travel/dive facing W solid gray body
soft start 1053
- HASE² 1056 85m 355°N looking @ activity/work area, travel E then dive
dark gray w/black spots

1 min

- 1059 50° NE 85m
- 1101 53° NE 90m
- 1106 53° NE 90m

Pile Stakes

1056	1 min
1100 - 1102	2 min
1103 - 1106	3 min
1110 - 1118	8 min
1119 - 1128	9 min
1137 - 1144	7 min

~ 1130 ship w/2 tugs creating alot of turbidity W. of
the wharf from channel → B2 by 1200

hammer off @ 1152

Stop monitoring 1214

Start monitoring 1314

- HASE³ 150m 1°N silver w/dark gray mottling slow travel E/rest @ surface
1330 ↕

hammer set 1401

soft start 1403

1404 - 1431 + 27 min

- 2 HASE⁴ >200m 323°NW slow travel in channel, near Red Rocks 1430

hammer off 1435

large moved 1449

Stop monitoring 1501

58 min

- HASE⁵ 1501 40m 169°S slow travel/dive facing W dark gray/black mottling

Date: 09/03/20

Page 1 of 8

Daily Marine Mammal Monitoring Summary Log
Richmond Refinery Long Wharf Maintenance and Efficiency Project

Monitor Name:

Laura Duffy

Weather/Visibility and Sea State - use Beaufort Scale on next page:

Fog/Smoke/haze; BF = 1; wind 4kts out of the west (gusts 7-9kts)
↑ lifted → increased to 3 midday; then dropped again

Tidal Level at Start/End of Work - use Tides app or refer to Richmond Harbor at tidesandcurrents.noaa.gov:

10 0755
hi 1430 start @ 1007 H₂O @ 5.00ft; end @ 1827 H₂O @ 3.73ft
10 2020

General Human Activity in the Area:

people on wharf; tug boat moving in H₂O east of B4; small craft/ferry in channel
ship @ Berth 1; skiff @ B4

Monitoring Location(s) - show on diagram and take panoramic photo of field of view:

B4N (Berth 4 North)

Are Castro Rocks visible (yes/no)? If yes, fill out page A-4: yes

Berth Number: 4

Pile Type - include size and material:

100" steel

Total Pile Count for the Day: 1 Equipment: Impact Vibratory

Total Minutes of Pile Driving - enter total time here¹: 46 min

¹ Note the start and end times for each individual pile on page 7.

Date: 09/04/20

Monitor Initials: UMD

The Beaufort scale

No.	Knots	Mph	Description	Effects at sea	Effects on land
0	0	0	Calm	Sea like a mirror	Smoke rises vertically
1	1-3	1-3	Light air	Ripples but no foam crests	Smoke drifts in wind
2	4-6	4-7	Light breeze	Small wavelets	Leaves rustle; wind felt on face
3	7-10	8-12	Gentle breeze	Large wavelets; Crests not breaking	Small twigs in constant motion; Light flags extended
4	11-16	13-18	Moderate wind	Numerous whitecaps Waves 1-4ft high	Dust, leaves and loose paper raised. Small branches move.
5	17-21	19-24	Fresh wind	Many whitecaps, some spray; Waves 4-8 ft high	Small trees sway
6	22-27	25-31	Strong wind	Whitecaps everywhere; Larger waves 8-13 ft high	Large branches move; Difficult to use umbrellas
7	28-33	32-38	V. strong wind	White foam from waves is blown in streaks; waves 13-20ft high	Whole trees in motion
8	34-40	39-46	Gale	Edges of wave crests break into spindrift	Twigs break off trees; Difficult to walk
9	41-47	47-54	Severe gale	High waves; sea begins to roll Spray reduce visibility; 20ft waves	Chimney pots and slates removed
10	48-55	55-63	Storm	V. high waves 20-30 ft; blowing foam gives sea white appearance	Trees uprooted Structural damage
11	56-63	64-72	Severe storm	Exceptionally high waves; 30-45 ft high	Widespread damage
12	63	73	Hurricane	Air filled with foam; visibility reduced White sea; waves over 45ft high	Widespread damage; rare

Monitor Initials: LMD

Daily Marine Mammal Monitoring Data Sheet - Richmond Refinery Long Wharf Maintenance and Efficiency Project

Time of Observation	Observer Initials	Work Activity ¹	Species ²	Observation Number ³	Age Class ⁴	Identifying Marks	Distance from Pile (meters) ⁵	Direction of Travel	Bearing	Behavior ⁶	
First: 1052 Last: 1052	LD	\	HASE	HASE 1	ad	dark gray w/black back	90m	NE	15°N	slow travel	
First: 1104 Last: 1104	LD	\	CASL	CASL 1	ad	silvery-brown	50m	NW	162°S	moderate travel	
First: 1108 Last: 1108	LD	\	HASE	HASE 2	ad	silver w/ gray speckling	90m	W	344°N	1x surface/dive	
First: 1430 Last: 1431	LD	D	HASE	HASE 3	ad	silver/gray	80m	N	70°N	rest @ surface facing N	
First: 1535 Last: 1536	LD	A	CASL	CASL 2	Sub m	dark brown	60-40m	SW	351° 16°N	moderate travel	
First: 1715 Last: 1715	LD	B	HASE	HASE 4	ad	gray w/ dark back	90m	N	54°NE	slow travel	
First: 1720 Last: 1720	LD	B	HASE	HASE 5	Juv.	Solid gray	60m	N	222°SW	slow travel	
First: Last:											
First: Last:											
First: Last:											
First: Last:											
¹ Activity: Indicate if observation is: within the 30-minute period before pile-driving (B); during active pile-driving (D); or within the 30-minute period after pile driving (A)		² Species Abbreviations: California Sea Lion = CASL Pacific Harbor Seal = HASE Northern Elephant Seal = NOES Harbor Porpoise = HAPO		³ Examples: HASE 1, HASE 2. Use these numbers for reference on page 6 diagram.		⁴ Species Age Classes: CASL = juvenile, subadult male, adult male HASE = juvenile, adult HAPO = calf, adult		⁵ Distance: Provide an approximate distance from location of pile.		⁶ Behavior examples: Stationary at surface, swimming (slow or fast), transiting, foraging, resting, looking around. Note if mammal appears to be attentive to project activities, or displays any behavior changes related to project activities, and describe the project activity. Note any human-caused disturbances such as recreational boating or helicopters. Add a reference number if comments are provided on a separate sheet.	

Date: 09/04/20

Monitor Initials: LMD

Daily Marine Mammal Monitoring Data Sheet
Richmond Refinery Long Wharf Maintenance and Efficiency Project

Castro Rocks Observations²

Time of Observation	Observer Initials	Visibility ¹	Piling Activity ²	Species ³	Number of individuals hauled-out ⁴	Behavioral Observations
1012	LD	fog/smoke but clear by water	B	HASE	20	hauled out / resting
1253	LD	clear	B	/	Ø	most rocks submerged
1359	LD	clear	B	/	Ø	"
1421	LD	clear	D	/	Ø	"
1542	LD	clear	A	/	Ø	"
1713	LD	clear	B	HASE	6	hauled out / resting
1745	LD	clear	D	HASE	7	" "
1824	LD	clear	A	HASE	21	" "

¹Note conditions (foggy, clear, etc.)
²Indicate if observation is: within 30-minutes before pile-driving (B); during active pile-driving (D); or within 30-minutes after pile driving (A). Take at least one observation before, during, and after pile driving.
³Species Abbreviations:
 California Sea Lion = CASL
 Pacific Harbor Seal = HASE
 Northern Elephant Seal = NOES
⁴Approximate number if visibility is poor.

² One monitor must be positioned in a location to view Castro Rocks. If you are not the monitor viewing Castro Rocks, complete the date, initials, and page number and note "not applicable" on the table.

Date: 09/04/20

Page 5 of 8

Monitor Initials: LMD

Daily Marine Mammal Monitoring Data Sheet
Richmond Refinery Long Wharf Maintenance and Efficiency Project

PHOTO LOG

upload photos to network, include date and monitoring position in file name

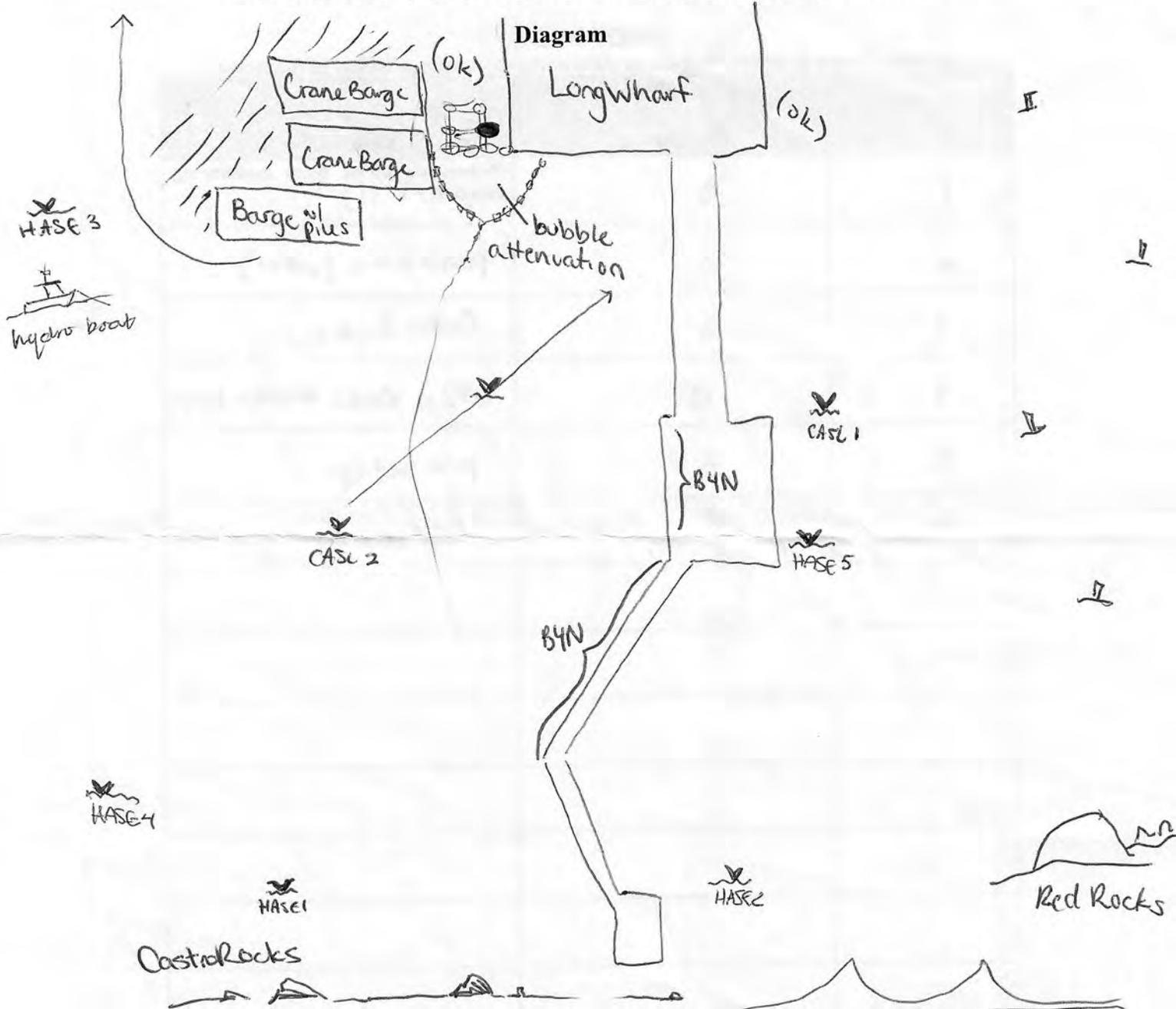
Photo Number	Photo Taken Before (B), During (D), or After (A) Pile Driving	Description
1	B	Panoramic photo from monitoring location (east)
2	B	panoramic (west)
3	B	Castro Rocks
4	B	Castro Rocks through binoculars
5	B	pile set up
6	B	hammer on

Date: 09/04/20

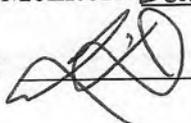
Page 10 of 8

Monitor Initials: LMD

Daily Marine Mammal Monitoring Data Sheet Richmond Refinery Long Wharf Maintenance and Efficiency Project



Biological Monitor: Laura Duffy

Signature: 

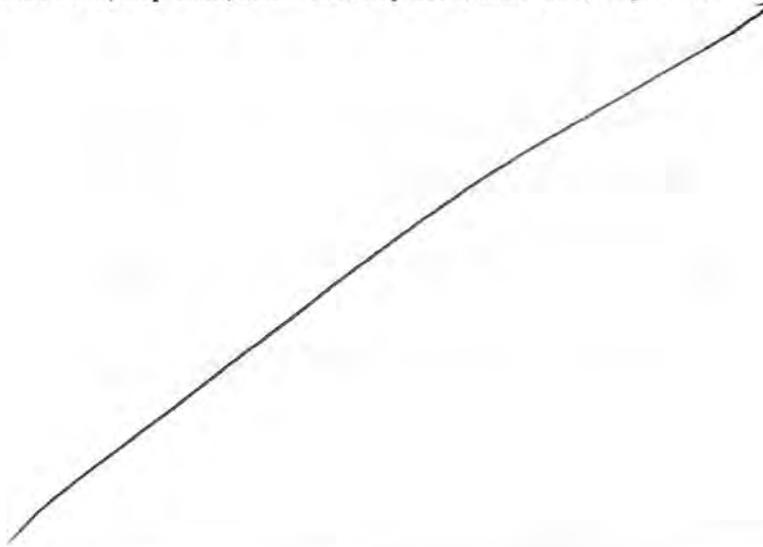
Monitor Initials: LMD

Daily Marine Mammal Monitoring Data Sheet
Richmond Refinery Long Wharf Maintenance and Efficiency Project

Pile Driving Start and Stop Times³

1. Vibratory hammer start and stop times (include breaks):

(example: Pile 1: start 1030, stop 1035; start 1041, stop 1051; start 1055; stop 1101)



2. Impact hammer start and stop times, including any restrikes (only note breaks of 30 minutes or more):

(example: Pile 1: start 1030, stop 1130; restrike pile 1: 1355)

see p. 8 of 8

³ For vibratory pile driving, note each time the hammer starts and stops. For impact pile driving, note the start and end time for each pile, unless hammering ceases for ≥ 30 minutes) on that pile. Strike counts and times are included in a separate report.

Daily Marine Mammal Monitoring Data Sheet
Richmond Refinery Long Wharf Maintenance and Efficiency Project

Additional Notes

1000 pile up

1007 in position/start monitoring

- HASE 1 15°N slow travel NE dark gray w/black back adult 90m R. of last platform 1052
CASE 1 162°S moderate travel NW 50m off SW corner obs. platform 1104
HASE 2 344°N 1x surface/dive facing W 90m silver w/gray speckling L. of last platform 1108

- fog lifted -> 50% cloud cover; wind up 8-10 kts; BF = 1 east / 3 west

- break @ 1200

- in position 1247

- pile barge moved @ 1250; welding @ pile

- 1304 hammer up on crane; on pile 1326

- 1406 soft start

- HASE 3 70°E east silver/gray rest @ surface facing north 80m off bow of crane barge
1430 1431 20m
hammer off 1524

- non-ident. CASE 2
1535 moderate trav. SW through zones
1536 60 -> 40m
351° -> 16°N
Subad. male

Pile Strikes table with columns for time ranges and durations (e.g., 1406-1407 1 min, 1408-1414 6 min, 1421-1424 3 min, 1440-1452 12 min, 1456-1502 6 min, 1504-1506 2 min, 1509+ 1 min, 1513-1514 1 min, [1544 stop monitoring])

Pile Strikes table with columns for time ranges and durations (e.g., 1540-1740 1 min, 1544-1741 1 min, 1742-1751 9 min, 1755-1757 2 min, [1827 end monitoring])

46min (circled)

- 1710 in position/start monitoring

- HASE 4 54°NE slow travel N gray w/dark back 90m 1715
HASE 5 222°SW slow travel N solid gray, small (maybe juv.?) 60m 1720

- hammer on 1725 - tell them they have 15 min for maximum monitoring window
- hammer off 1804

-> break to remove template / replace hammer

Date: 9/4/20

Page 1 of 8

Daily Marine Mammal Monitoring Summary Log
Richmond Refinery Long Wharf Maintenance and Efficiency Project

Monitor Name:

Mandi McElroy

Weather/Visibility and Sea State - use Beaufort Scale on next page:

0800 Beaufort 1-2, foggy/smoky, wind ~ 5 mph from SW, 59°F

Fog burning off, sun out @ 1100, Beaufort 2-3, wind ~ 10 mph, 64°F

Tidal Level at Start/End of Work - use Tides app or refer to Richmond Harbor at tidesandcurrents.noaa.gov):

low: 0755 high: 1430

(0.66 ft) (5.49 ft)

General Human Activity in the Area:

wharf is quiet. Tanker docked @ Berth 2

Monitoring Location(s) - show on diagram and take panoramic photo of field of view:

Berth 4 South (B4S)

Are Castro Rocks visible (yes/no)? If yes, fill out page A-4: partial (see B4N data)

Berth Number:

4

Pile Type - include size and material:

60" steel

Total Pile Count for the Day:

1

Equipment:

Impact

Vibratory

Total Minutes of Pile Driving - enter total time here¹:

~ 46 minutes

¹ Note the start and end times for each individual pile on page 7.

Date: 9/4/20

Monitor Initials: MM

The Beaufort scale

No.	Knots	Mph	Description	Effects at sea	Effects on land
0	0	0	Calm	Sea like a mirror	Smoke rises vertically
1	1-3	1-3	Light air	Ripples but no foam crests	Smoke drifts in wind
2	4-6	4-7	Light breeze	Small wavelets	Leaves rustle; wind felt on face
3	7-10	8-12	Gentle breeze	Large wavelets; Crests not breaking	Small twigs in constant motion; Light flags extended
4	11-16	13-18	Moderate wind	Numerous whitecaps Waves 1-4ft high	Dust, leaves and loose paper raised. Small branches move.
5	17-21	19-24	Fresh wind	Many whitecaps, some spray; Waves 4-8 ft high	Small trees sway
6	22-27	25-31	Strong wind	Whitecaps everywhere; Larger waves 8-13 ft high	Large branches move; Difficult to use umbrellas
7	28-33	32-38	V. strong wind	White foam from waves is blown in streaks; waves 13-20ft high	Whole trees in motion
8	34-40	39-46	Gale	Edges of wave crests break into spindrift	Twigs break off trees; Difficult to walk
9	41-47	47-54	Severe gale	High waves; sea begins to roll Spray reduce visibility, 20ft waves	Chimney pots and slates removed
10	48-55	55-63	Storm	V. high waves 20-30 ft; blowing foam gives sea white appearance	Trees uprooted
11	56-63	64-72	Severe storm	Exceptionally high waves; 30-45 ft high	Structural damage Widespread damage
12	63	73	Hurricane	Air filled with foam; visibility reduced White sea; waves over 45ft high	Widespread damage; rare

Date: 9/4/20
 Monitor Initials: MM

Daily Marine Mammal Monitoring Data Sheet
Richmond Refinery Long Wharf Maintenance and Efficiency Project
Castro Rocks Observations²

Time of Observation	Observer Initials	Visibility ¹	Piling Activity ²	Species ³	Number of individuals hauled-out ⁴	Behavioral Observations
			B			
			D			
			A			
			N/A			
		view obscured				
		see Laura (B4N)				
			data			

¹Note conditions (foggy, clear, etc.)
²Indicate if observation is: within 30-minutes before pile-driving (B); during active pile-driving (D); or within 30-minutes after pile driving (A). Take at least one observation before, during, and after pile driving.
³Species Abbreviations:
 California Sea Lion = CASL
 Pacific Harbor Seal = HASE
 Northern Elephant Seal = NOES
⁴Approximate number if visibility is poor.

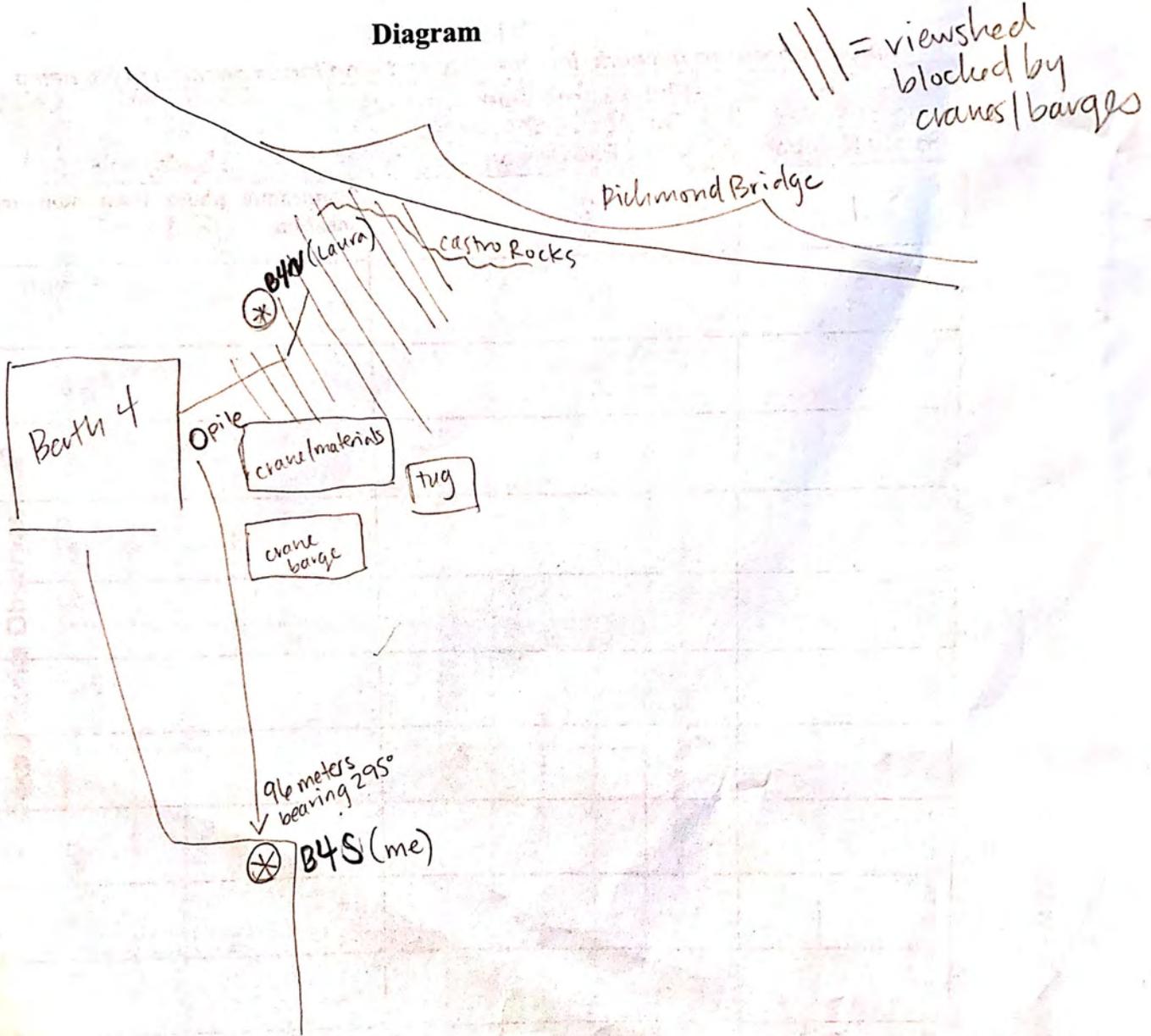
² One monitor must be positioned in a location to view Castro Rocks. If you are not the monitor viewing Castro Rocks, complete the date, initials, and page number and note "not applicable" on the table.

Date: 9/4/20

Monitor Initials: MM

Daily Marine Mammal Monitoring Data Sheet Richmond Refinery Long Wharf Maintenance and Efficiency Project

Diagram



Biological Monitor: Mandi McElroy

Signature: Mandi McElroy

Date: 9/4/20

Page 7 of 8

Monitor Initials: MM

Daily Marine Mammal Monitoring Data Sheet Richmond Refinery Long Wharf Maintenance and Efficiency Project

Pile Driving Start and Stop Times³

1. Vibratory hammer start and stop times (include breaks):

(example: Pile 1: start 1030, stop 1035; start 1041, stop 1051; start 1055; stop 1101)

2. Impact hammer start and stop times, including any restrikes (only note breaks of 30 minutes or more):

(example: Pile 1: start 1030, stop 1130; restrike pile 1: 1355)

33min

1406 soft start	< 1 min
1407 2 taps	< 1 min
1408 - 1414	6 min continuous
1421 - 1424	3 min
1440 - 1452	12 min
1456 - 1502	6 min
1504 - 1506	2 min
1509	1 min
1513 - 1514	1 min removed hammer

monitored until 1544	
break	
1703 lifting template off	1710 both monitors in position
1728 placing hammer on pile	
1740 soft start < 1 min	
1741 tap x 2 < 1 min	
1742 - 1751 9 min	
1755 - 1757 2 min	
13 min	
monitored until 1827	

B/D/A

1336-1544
and
1710-1827

³ For vibratory pile driving, note each time the hammer starts and stops. For impact pile driving, note the start and end time for each pile, unless hammering ceases for ≥30 minutes) on that pile. Strike counts and times are included in a separate report.

Date: 9/4/20

Page 8 of 8

Monitor Initials: MM

Daily Marine Mammal Monitoring Data Sheet
Richmond Refinery Long Wharf Maintenance and Efficiency Project

Additional Notes

arrived 0715
in position 1007, pile lifted / being set in position
1120 still positioning pile 12-1230 lunch/crew break
1245 tug moving materials barge, preparing to lift hammer
110 hammer in air
1325 hammer being lowered on pile
1406 soft start

- see pg A-7 -

left site @ 1845

Date: 09/18/20

Page 1 of 8

Daily Marine Mammal Monitoring Summary Log
Richmond Refinery Long Wharf Maintenance and Efficiency Project

Monitor Name:

Laura Duffy

Weather/Visibility and Sea State - use Beaufort Scale on next page:

wind from SW; 10kt; BF = 1 east / 2 west; 25% cloud cover; no glare

Tidal Level at Start/End of Work - use Tides app or refer to Richmond Harbor at tidesandcurrents.noaa.gov:

lo 0703

hi 1331 start @ 1103 h₂O @ 43.12ft; end @ 1625 h₂O @ 2.23ft

lo 1929

General Human Activity in the Area:

people on wharf / barges / tug / skiff; ships @ berths 1-3

Monitoring Location(s) - show on diagram and take panoramic photo of field of view:

B4S (Berth 4 South)

Are Castro Rocks visible (yes/no)? If yes, fill out page A-4: no

Berth Number: 4

Pile Type - include size and material:

100" steel

Total Pile Count for the Day: 1

Equipment: Impact Vibratory

Total Minutes of Pile Driving - enter total time here¹:

55 min

¹ Note the start and end times for each individual pile on page 7.

Date: 09/18/20

Monitor Initials: LD

The Beaufort scale

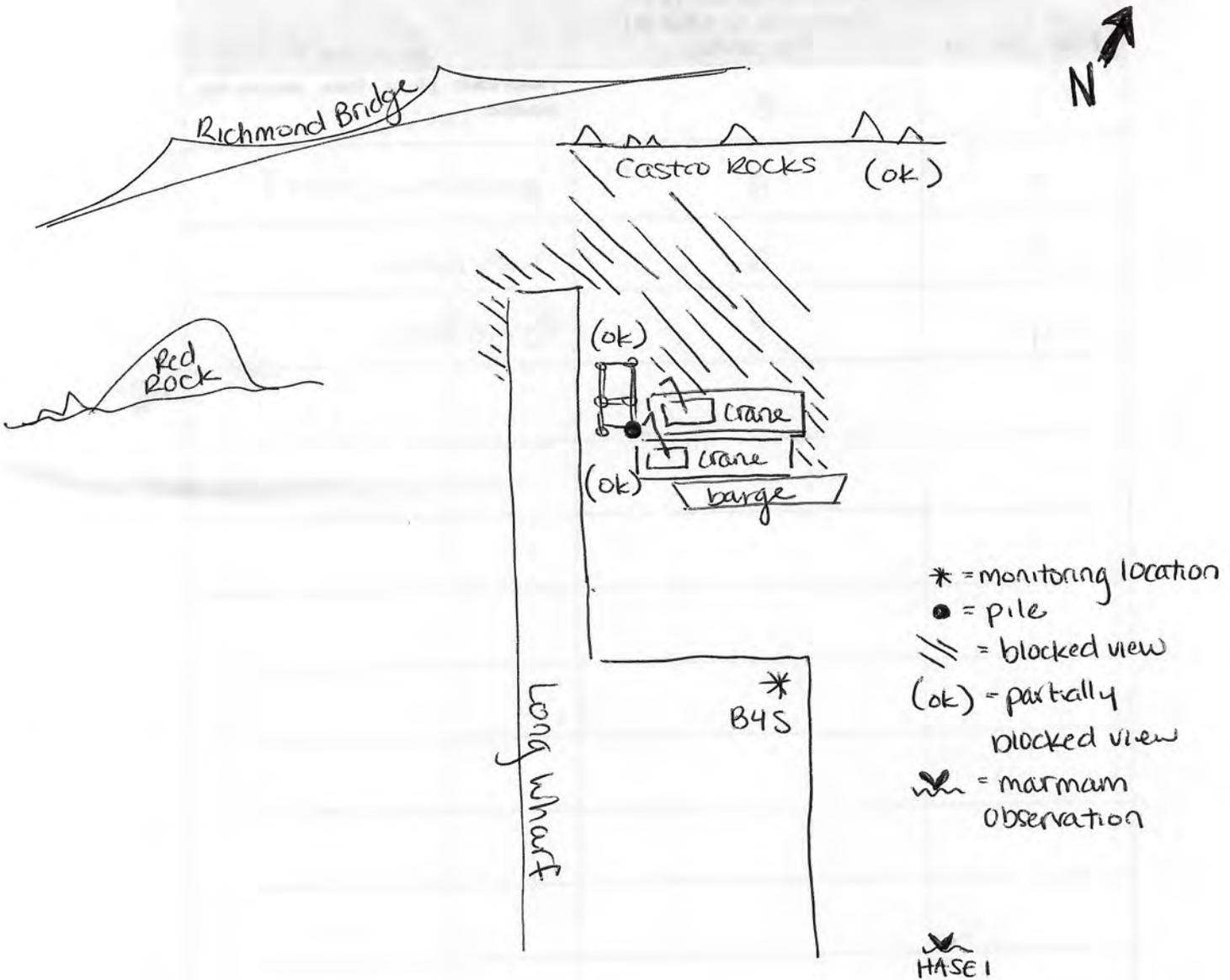
No.	Knots	Mph	Description	Effects at sea	Effects on land
0	0	0	Calm	Sea like a mirror	Smoke rises vertically
1	1-3	1-3	Light air	Ripples but no foam crests	Smoke drifts in wind
2	4-6	4-7	Light breeze	Small wavelets	Leaves rustle; wind felt on face
3	7-10	8-12	Gentle breeze	Large wavelets; Crests not breaking	Small twigs in constant motion; Light flags extended
4	11-16	13-18	Moderate wind	Numerous whitecaps Waves 1-4ft high	Dust, leaves and loose paper raised. Small branches move.
5	17-21	19-24	Fresh wind	Many whitecaps, some spray; Waves 4-8 ft high	Small trees sway
6	22-27	25-31	Strong wind	Whitecaps everywhere; Larger waves 8-13 ft high	Large branches move; Difficult to use umbrellas
7	28-33	32-38	V. strong wind	White foam from waves is blown in streaks; waves 13-20ft high	Whole trees in motion
8	34-40	39-46	Gale	Edges of wave crests break into spindrift	Twigs break off trees; Difficult to walk
9	41-47	47-54	Severe gale	High waves; sea begins to roll Spray reduce visibility; 20ft waves	Chimney pots and slates removed
10	48-55	55-63	Storm	V. high waves 20-30 ft; blowing foam gives sea white appearance	Trees uprooted
11	56-63	64-72	Severe storm	Exceptionally high waves; 30-45 ft high	Structural damage
12	63	73	Hurricane	Air filled with foam; visibility reduced white sea; waves over 45ft high	Widespread damage; rare

Date: 9/18/20

Monitor Initials: LD

Daily Marine Mammal Monitoring Data Sheet
Richmond Refinery Long Wharf Maintenance and Efficiency Project

Diagram



Biological Monitor: Laura Duffy

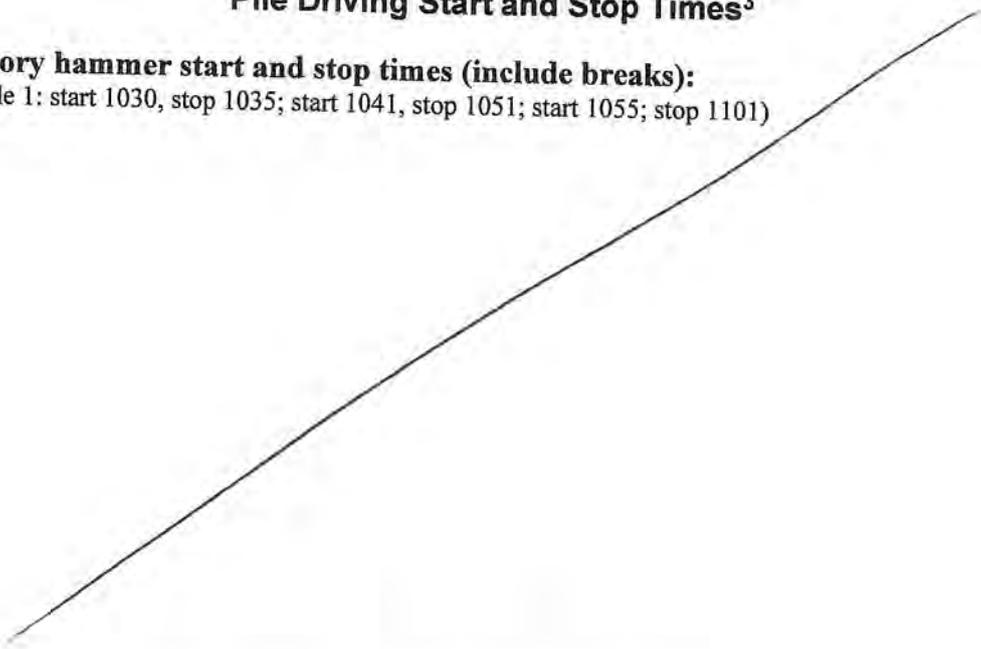
Signature: [Signature]

Daily Marine Mammal Monitoring Data Sheet
Richmond Refinery Long Wharf Maintenance and Efficiency Project

Pile Driving Start and Stop Times³

1. Vibratory hammer start and stop times (include breaks):

(example: Pile 1: start 1030, stop 1035; start 1041, stop 1051; start 1055; stop 1101)



2. Impact hammer start and stop times, including any restrikes (only note breaks of 30 minutes or more):

(example: Pile 1: start 1030, stop 1130; restrike pile 1: 1355)

1155 (soft start) 111 stakes	1 min	1221-1222	1 min
1157-1201	4	1228-	1
1204-1208	4	1230-	1
1208-1209	1	1235-	1
1210-1211	1	1237-	1
1215-	1	1238-1239	1
1218-	1	1240	1
1219-1220	1		

(continued p. 8 of 8) →

³ For vibratory pile driving, note each time the hammer starts and stops. For impact pile driving, note the start and end time for each pile, unless hammering ceases for ≥30 minutes) on that pile. Strike counts and times are included in a separate report.

Date: _____

Page ___ of ___

Monitor Initials: _____

Daily Marine Mammal Monitoring Data Sheet
Richmond Refinery Long Wharf Maintenance and Efficiency Project

Additional Notes

1248-1249 1 min
1252-1255 3
1302-1307 5
1312-1323 "

1328 hammer up; 1353 stop monitoring

1514 start — wind 15kt w/gusts to 18kt out of west
10% cloud cover; haze; marine layer @ Angel Island

1527 ship left B1

1533 hammer up / set by 1538

1541 (soft stake) 1 stake 1 min
1542 1
1543 1
1544-1555 "

end monitoring 1625

Date: 9/18/20

Page 1 of 8

Daily Marine Mammal Monitoring Summary Log
Richmond Refinery Long Wharf Maintenance and Efficiency Project

Monitor Name: Mandi McElroy

Weather/Visibility and Sea State - use Beaufort Scale on next page:
~ 50% cloud cover, Beaufort 2 in outer bay, 1 inner bay @ 1105
~ 70° F

Tidal Level at Start/End of Work – use Tides app or refer to Richmond Harbor at tidesandcurrents.noaa.gov):
low @ 0703 (0.00'), high @ 1331 (6.19'), low @ 1929 (0.55')

General Human Activity in the Area:
tanker @ Berth 2, general wharf activity

Monitoring Location(s) – show on diagram and take panoramic photo of field of view:
Berth 4 North

Are Castro Rocks visible (yes/no)? If yes, fill out page A-4: yes

Berth Number: 4

Pile Type - include size and material:
60" steel

Total Pile Count for the Day: 1 **Equipment:** Impact Vibratory

Total Minutes of Pile Driving - enter total time here¹: ~ 55 min (two separate time windows sec p. 7-8)

¹ Note the start and end times for each individual pile on page 7.

Date: 9/18/20

Monitor Initials: MM

The Beaufort scale

No.	Knots	Mph	Description	Effects at sea	Effects on land
0	0	0	Calm	Sea like a mirror	Smoke rises vertically
1	1-3	1-3	Light air	Ripples but no foam crests	Smoke drifts in wind
2	4-6	4-7	Light breeze	Small wavelets	Leaves rustle; wind felt on face
3	7-10	8-12	Gentle breeze	Large wavelets; Crests not breaking	Small twigs in constant motion; Light flags extended
4	11-16	13-18	Moderate wind	Numerous whitecaps Waves 1-4ft high	Dust, leaves and loose paper raised. Small branches move.
5	17-21	19-24	Fresh wind	Many whitecaps, some spray; Waves 4-8 ft high	Small trees sway
6	22-27	25-31	Strong wind	Whitecaps everywhere; Larger waves 8-13 ft high	Large branches move; Difficult to use umbrellas
7	28-33	32-38	V. strong wind	White foam from waves is blown in streaks; waves 13-20ft high	Whole trees in motion
8	34-40	39-46	Gale	Edges of wave crests break into spindrift	Twigs break off trees; Difficult to walk
9	41-47	47-54	Severe gale	High waves; sea begins to roll Spray reduce visibility, 20ft waves	Chimney pots and slates removed
10	48-55	55-63	Storm	V. high waves 20-30 ft; blowing foam gives sea white appearance	Trees uprooted
11	56-63	64-72	Severe storm	Exceptionally high waves; 30-45 ft high	Structural damage
12	63	73	Hurricane	Air filled with foam; visibility reduced White sea; waves over 45ft high	Widespread damage; rare

Date: 9/18/20

Monitor Initials: MM

Daily Marine Mammal Monitoring Data Sheet
Richmond Refinery Long Wharf Maintenance and Efficiency Project
Castro Rocks Observations²

Time of Observation	Observer Initials	Visibility ¹	Piling Activity ²	Species ³	Number of Individuals hauled-out ⁴	Behavioral Observations
1143	MM	clear	B	—	0	—
1158	MM	clear	D	—	0	—
1340	MM	clear	A	—	0	—
1537	MM	clear	B	HASE	3	resting
1549	MM	clear	D	HASE	4	resting
1620	MM	clear	A	HASE	3	resting

rocks are mostly submerged

round 1

round 2

¹Note conditions (foggy, clear, etc.)
²Indicate if observation is: within 30-minutes before pile-driving (B); during active pile-driving (D); or within 30-minutes after pile driving (A). Take at least one observation before, during, and after pile driving.
³Species Abbreviations:
 California Sea Lion = CASL
 Pacific Harbor Seal = HASE
 Northern Elephant Seal = NOES
⁴Approximate number if visibility is poor.

² One monitor must be positioned in a location to view Castro Rocks. If you are not the monitor viewing Castro Rocks, complete the date, initials, and page number and note "not applicable" on the table.

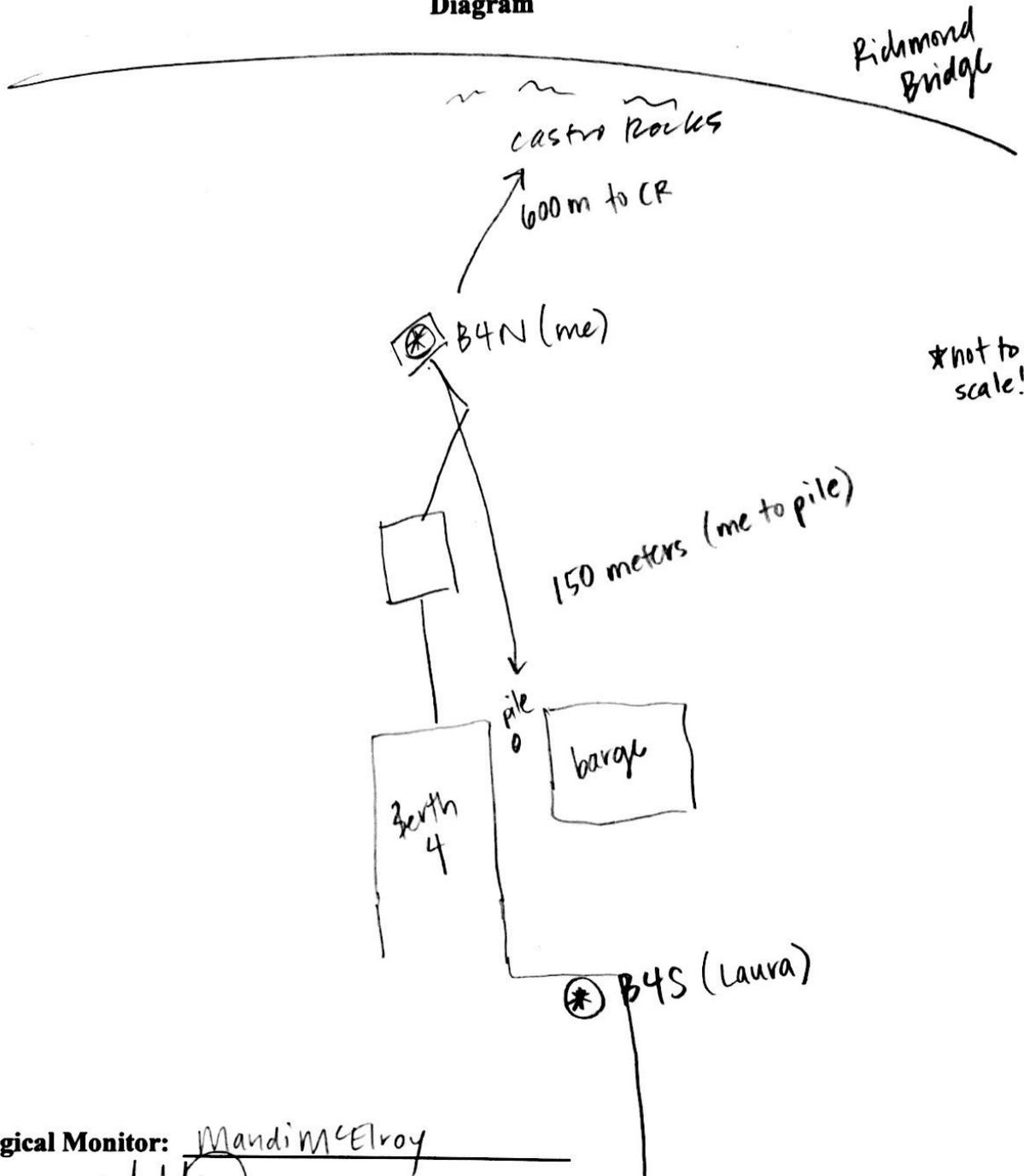
Date: 9/18/20

Page 6 of 8

Monitor Initials: MM

Daily Marine Mammal Monitoring Data Sheet
Richmond Refinery Long Wharf Maintenance and Efficiency Project

Diagram



*not to scale!

Biological Monitor: Mandi McElroy

Signature: [Handwritten Signature]

me to pile = 150 m
to CR ~ 600 m

Date: 9/18/20

Page 7 of 8

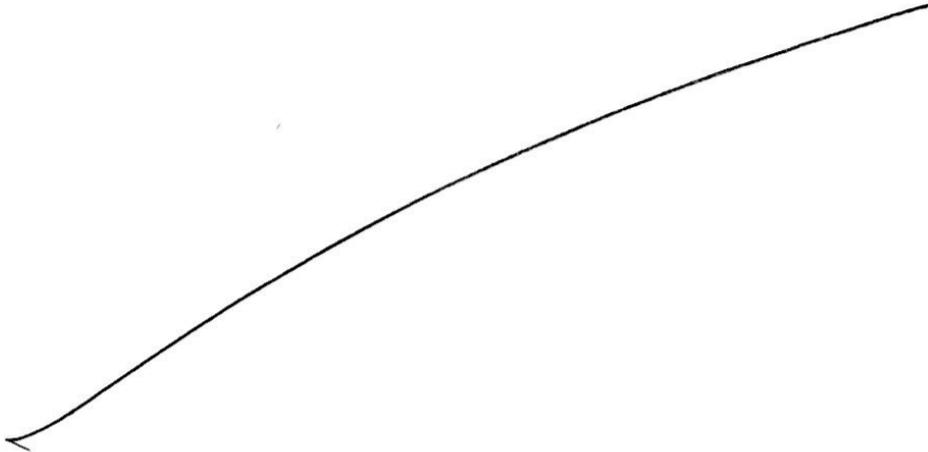
Monitor Initials: MM

Daily Marine Mammal Monitoring Data Sheet
Richmond Refinery Long Wharf Maintenance and Efficiency Project

Pile Driving Start and Stop Times³

1. Vibratory hammer start and stop times (include breaks):

(example: Pile 1: start 1030, stop 1035; start 1041, stop 1051; start 1055; stop 1101)



2. Impact hammer start and stop times, including any restrikes (only note breaks of 30 minutes or more):

(example: Pile 1: start 1030, stop 1130; restrike pile 1: 1355)

soft start @ 1155 - 1156 (< 1 min)
1157 - 1201 continuous (4 min)
1204 - 1208 (4)
1208 - 1209 (1)
1210 - 1211 (1)
1215 (< 1 min)

1218 - (1)
1219 - 1220 (1)
1221 - 1222 (1)
1228 (< 1 min)

next page

³ For vibratory pile driving, note each time the hammer starts and stops. For impact pile driving, note the start and end time for each pile, unless hammering ceases for ≥ 30 minutes on that pile. Strike counts and times are included in a separate report.

Date: 9/18/20

Monitor Initials: MM

Daily Marine Mammal Monitoring Data Sheet
Richmond Refinery Long Wharf Maintenance and Efficiency Project

Additional Notes

1105: in position @ B4N. pile is in template. tugboat repositioning barge.

1143: placing hammer

CR mostly submerged - no MMs hauled out

1st tap (SS) @ 1155 see pg. 7

cont. from p. 7

1230 }
1235 } < 1 min each
1237 }
1238 }
1240 }
1248 }

1252-1255 (3)

1302-1307 (5)

1312-1323 (11) end monitoring window @ 1353

1st monitoring window = 1125-1353

break - removing hammer / frame

no driving from 1323 - 1541

1541 soft start

1544-1555 (11 min) - completed

2nd window = 1511-1625

1625 end monitoring

Date: 10/2/20

Page 1 of 8

Daily Marine Mammal Monitoring Summary Log
Richmond Refinery Long Wharf Maintenance and Efficiency Project

Monitor Name:

Christina Kelleher

Weather/Visibility and Sea State - use Beaufort Scale on next page:

0-1 Beaufort, hazy & smoky but still good visibility

Tidal Level at Start/End of Work - use Tides app or refer to Richmond Harbor at tidesandcurrents.noaa.gov:

Start: 2.35 ft; end: 1.34 ft

General Human Activity in the Area:

Pedestrians, some cars & boats

Monitoring Location(s) - show on diagram and take panoramic photo of field of view:

B4N, n75^{meters} N. of pile, 37.9272212, -122.4150887

Are Castro Rocks visible (yes/no)? If yes, fill out page A-4: _____

Berth Number: 4

Pile Type - include size and material:

60" steel

Total Pile Count for the Day: 1

Equipment: (Impact) Vibratory

Total Minutes of Pile Driving - enter total time here!¹

(Full work window 12:15 - 12:59)

31 minutes of active driving

¹ Note the start and end times for each individual pile on page 7.

Date: 10/2/20Page 2 of 8Monitor Initials: CK*The Beaufort scale*

No.	Knots	Mph	Description	Effects at sea	Effects on land
0	0	0	Calm	Sea like a mirror	Smoke rises vertically
1	1-3	1-3	Light air	Ripples but no foam crests	Smoke drifts in wind
2	4-6	4-7	Light breeze	Small wavelets	Leaves rustle; wind felt on face
3	7-10	8-12	Gentle breeze	Large wavelets; crests not breaking	Small twigs in constant motion;
4	11-16	13-18	Moderate wind	Numerous whitecaps Waves 1-4ft high	Light flags extended
5	17-21	19-24	Fresh wind	Many whitecaps; some spray; Waves 4-8 ft high	Dust, leaves and loose paper raised. Small branches move.
6	22-27	25-31	Strong wind	Whitecaps everywhere; Larger waves 8-13 ft high	Small trees sway
7	28-33	32-38	V. strong wind	White foam from waves is blown in streaks; waves 13-20ft high	Large branches move; Difficult to use umbrellas
8	34-40	39-46	Gale	Edges of wave crests break into spindrift	Whole trees in motion
9	41-47	47-54	Severe gale	High waves; sea begins to roll Spray reduce visibility; 20ft waves	Twigs break off trees; Difficult to walk
10	48-55	55-63	Storm	V. high waves 20-30 ft; blowing foam gives sea white appearance	Chimney pots and slates removed
11	56-63	64-72	Severe storm	Exceptionally high waves; 30-45 ft high	Trees uprooted Structural damage Widespread damage
12	63	73	Hurricane	Air filled with foam, visibility reduced White sea; waves over 45ft high	Widespread damage; rare

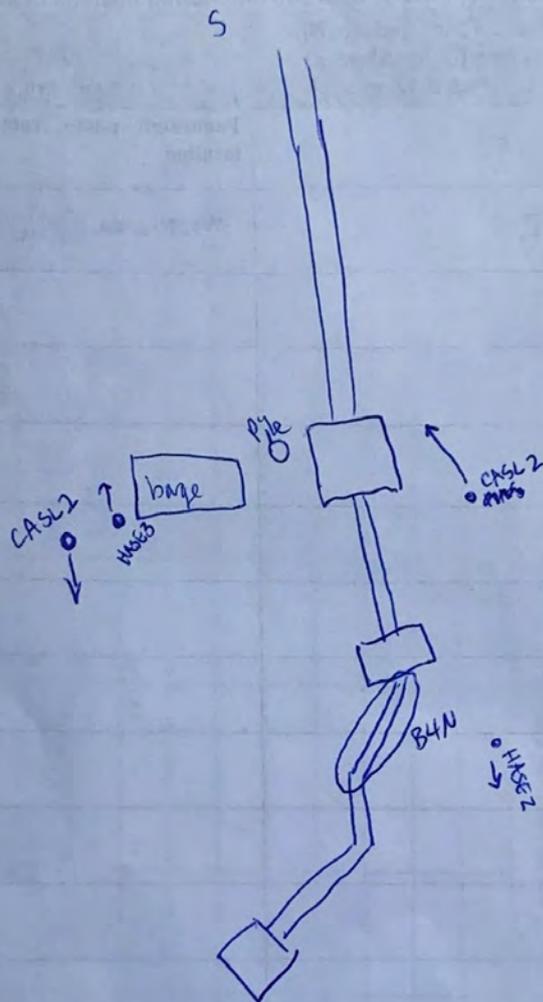
Date: 10/2/20

Page 6 of 8

Monitor Initials: CK

Daily Marine Mammal Monitoring Data Sheet
Richmond Refinery Long Wharf Maintenance and Efficiency Project

Diagram



Biological Monitor: Christina Kelleher

Signature: [Handwritten Signature]

Castro
rocks

Date: 10/2/20
Monitor Initials: CK

Daily Marine Mammal Monitoring Data Sheet
Richmond Refinery Long Wharf Maintenance and Efficiency Project

Pile Driving Start and Stop Times³

1. Vibratory hammer start and stop times (include breaks):

(example: Pile 1: start 1030, stop 1035; start 1041, stop 1051; start 1055; stop 1101)

MA

2. Impact hammer start and stop times, including any restrikes (only note breaks of 30 minutes or more):

(example: Pile 1: start 1030, stop 1130; restrike pile 1: 1355)

12:15 - 12:59 (full driving window)

12:15 - 12:16, 12:28 - 12:29, 12:33 - 12:59 (actual driving times)
 12:18 - 12:21

³ For vibratory pile driving, note each time the hammer starts and stops. For impact pile driving, note the start and end time for each pile, unless hammering ceases for ≥ 30 minutes) on that pile. Strike counts and times are included in a separate report.

Date: 10/2/20

Page 8 of 8

Monitor Initials: CK

Daily Marine Mammal Monitoring Data Sheet
Richmond Refinery Long Wharf Maintenance and Efficiency Project

Additional Notes

Monitoring start time - 11:43 am

Monitoring end time - 13:29 pm

Date: 10/02/20

Page 1 of 8

Daily Marine Mammal Monitoring Summary Log
Richmond Refinery Long Wharf Maintenance and Efficiency Project

Monitor Name:

Laura Duffy

Weather/Visibility and Sea State - use Beaufort Scale on next page:

0730:

Smoke/haze; wind = 0-2kt; BF = 0

Tidal Level at Start/End of Work - use Tides app or refer to Richmond Harbor at tidesandcurrents.noaa.gov):

lo: 0648

hi: 1309 start @ 1143 H₂O @ 2.45ft; end @ 1329 H₂O @ 1.34ft

lo: 1919

General Human Activity in the Area:

people on wharf @ barges; ships @ Berth 2 & 3; Berth 1 arrival w/ tug @ 1210
B3 leave @ 1323 w/ tug
dive boat east side B3

Monitoring Location(s) - show on diagram and take panoramic photo of field of view:

B4S (Berth 4 South)

Are Castro Rocks visible (yes/no)? If yes, fill out page A-4: no

Berth Number: B4

Pile Type - include size and material:

100" Steel

Total Pile Count for the Day: 1 → not completed Equipment: Impact Vibratory

Total Minutes of Pile Driving - enter total time here!:

31 min

¹ Note the start and end times for each individual pile on page 7.

Date: 10/02/20

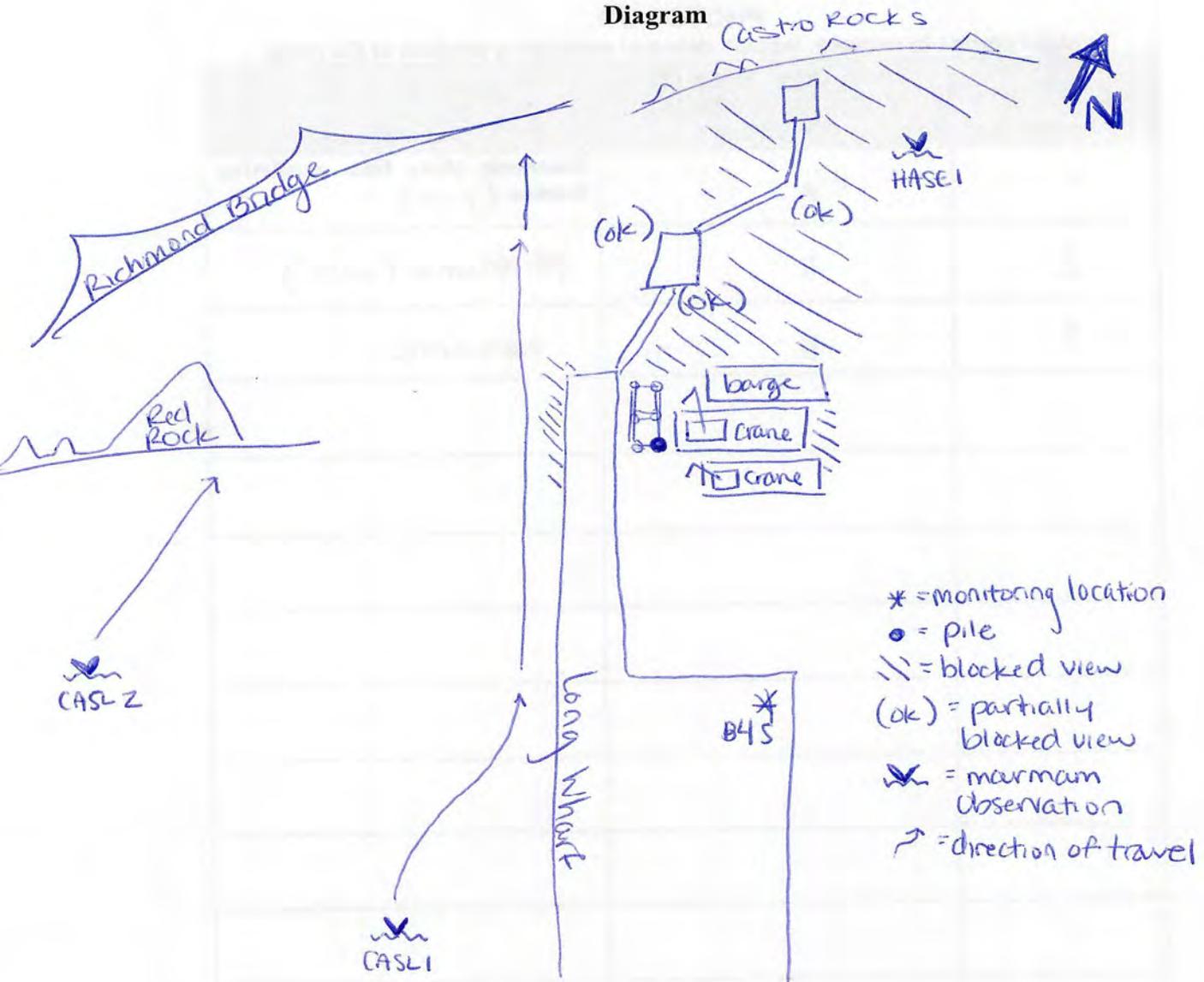
Monitor Initials: LO

The Beaufort scale

No.	Knots	Mph	Description	Effects at sea	Effects on land
0	0	0	Calm	Sea like a mirror	Smoke rises vertically
1	1-3	1-3	Light air	Ripples but no foam crests	Smoke drifts in wind
2	4-6	4-7	Light breeze	Small wavelets	Leaves rustle; wind felt on face
3	7-10	8-12	Gentle breeze	Large wavelets; Crests not breaking	Small twigs in constant motion; Light flags extended
4	11-16	13-18	Moderate wind	Numerous whitecaps Waves 1-4ft high	Dust, leaves and loose paper raised. Small branches move.
5	17-21	19-24	Fresh wind	Many whitecaps, some spray; Waves 4-8 ft high	Small trees sway
6	22-27	25-31	Strong wind	Whitecaps everywhere; Larger waves 8-13 ft high	Large branches move; Difficult to use umbrellas
7	28-33	32-38	V. strong wind	White foam from waves is blown in streaks; waves 13-20ft high	Whole trees in motion
8	34-40	39-46	Gale	Edges of wave crests break into spindrift	Twigs break off trees; Difficult to walk
9	41-47	47-54	Severe gale	High waves; sea begins to roll Spray reduce visibility, 20ft waves	Chimney pots and slates removed
10	48-55	55-63	Storm	V. high waves 20-30 ft; blowing foam gives sea white appearance	Trees uprooted
11	56-63	64-72	Severe storm	Exceptionally high waves; 30-45 ft high	Structural damage Widespread damage
12	63	73	Hurricane	Air filled with foam, visibility reduced white sea; waves over 45ft high	Widespread damage; rare

Daily Marine Mammal Monitoring Data Sheet
Richmond Refinery Long Wharf Maintenance and Efficiency Project

Diagram



Biological Monitor: Laura Ditty

Signature: [Signature]

Date: 10/02/20

Page 7 of 8

Monitor Initials: LD

Daily Marine Mammal Monitoring Data Sheet
Richmond Refinery Long Wharf Maintenance and Efficiency Project

Pile Driving Start and Stop Times³

1. Vibratory hammer start and stop times (include breaks):

(example: Pile 1: start 1030, stop 1035; start 1041, stop 1051; start 1055; stop 1101)

2. Impact hammer start and stop times, including any restrikes (only note breaks of 30 minutes or more):

(example: Pile 1: start 1030, stop 1130; restrike pile 1: 1355)

see p. 8 of 8

³ For vibratory pile driving, note each time the hammer starts and stops. For impact pile driving, note the start and end time for each pile, unless hammering ceases for ≥ 30 minutes) on that pile. Strike counts and times are included in a separate report.

Daily Marine Mammal Monitoring Data Sheet
Richmond Refinery Long Wharf Maintenance and Efficiency Project

Additional Notes

start @ 1143
hammer up 1140; set by 1145

- 1156 CASL 1 w. side LW obs. HHT moderate travel N. 131°SE → 300°NW
adult f. >100m → 40m → 100m from pile

- Chevron notified re: CASL 1 @ 1156; OK'd @ 1200
(1213 end of 30 min mammal monitoring period pre-work)

- 1205 HASE 1 gray (white spots) rest @ surface facing W 336°NW
>100m from pile

1215 soft start	1 min
1218-1221	3
1228-1229	1
1233-1249	} 26 min
1250-1259	

- 1300 CASL 2 261°W III surface slow travel NW ~80m from pile

pile stuck on template; work called for day

end monitoring 1329

Date: 10/05/20

Page 1 of 8

Daily Marine Mammal Monitoring Summary Log
Richmond Refinery Long Wharf Maintenance and Efficiency Project

Monitor Name:

Laura Duffy

Weather/Visibility and Sea State - use Beaufort Scale on next page:

wind 0-2kt; BF=0; clear (heavy marine layer W. of Angel Island)

Tidal Level at Start/End of Work - use Tides app or refer to Richmond Harbor at tidesandcurrents.noaa.gov:

lo 0814

hi 1419 start @ 1330 H₂O @ 3.0ft ; end @ 1443 H₂O @ 2.39ft

lo 2103

General Human Activity in the Area:

ships @ Berths 2, 3, & 4; people on barges, wharf, tugs; dive boat east side B. 3
↳ moved @ 1429 ↙

Monitoring Location(s) - show on diagram and take panoramic photo of field of view:

B4S (Berth 4 South)

Are Castro Rocks visible (yes/no)? If yes, fill out page A-4: no

Berth Number: 4

Pile Type - include size and material:

60" Steel

Total Pile Count for the Day: 1 (continued from 10/02/20) Equipment: Impact Vibratory

Total Minutes of Pile Driving - enter total time here¹: 11

¹ Note the start and end times for each individual pile on page 7.

The Beaufort scale

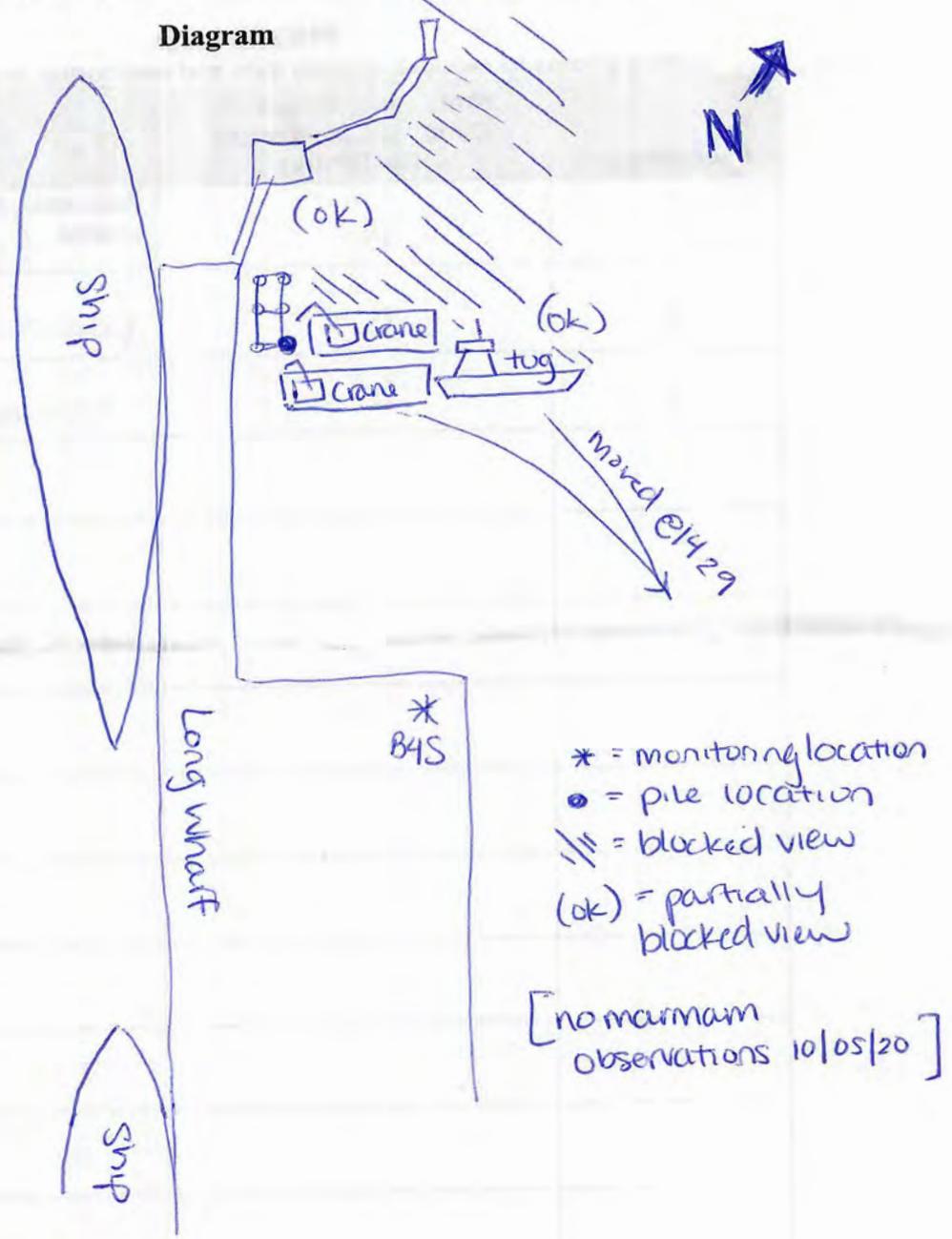
No.	Knots	Mph	Description	Effects at sea	Effects on land
0	0	0	Calm	Sea like a mirror	Smoke rises vertically
1	1-3	1-3	Light air	Ripples but no foam crests	Smoke drifts in wind
2	4-6	4-7	Light breeze	Small wavelets	Leaves rustle; wind felt on face
3	7-10	8-12	Gentle breeze	Large wavelets; Crests not breaking	Small twigs in constant motion; Light flags extended
4	11-16	13-18	Moderate wind	Numerous whitecaps Waves 1-4ft high	Dust, leaves and loose paper raised. Small branches move.
5	17-21	19-24	Fresh wind	Many whitecaps, some spray; Waves 4-8 ft high	Small trees sway
6	22-27	25-31	Strong wind	Whitecaps everywhere; Larger waves 8-13 ft high	Large branches move; Difficult to use umbrellas
7	28-33	32-38	V. strong wind	White foam from waves is blown in streaks; waves 13-20ft high	Whole trees in motion
8	34-40	39-46	Gale	Edges of wave crests break into spindrift	Twigs break off trees; Difficult to walk
9	41-47	47-54	Severe gale	High waves; sea begins to roll Spray reduce visibility; 20ft waves	Chimney pots and slates removed
10	48-55	55-63	Storm	V. high waves 20-30 ft; blowing foam gives sea white appearance	Trees uprooted Structural damage
11	56-63	64-72	Severe storm	Exceptionally high waves; 30-45 ft high	Widespread damage
12	63	73	Hurricane	Air filled with foam; visibility reduced White sea; waves over 45ft high	Widespread damage; rare

Date: 10/05/20

Monitor Initials: LD

Daily Marine Mammal Monitoring Data Sheet
Richmond Refinery Long Wharf Maintenance and Efficiency Project

Diagram



Biological Monitor: Laura Duffy

Signature: [Signature]

Date: 10/05/20

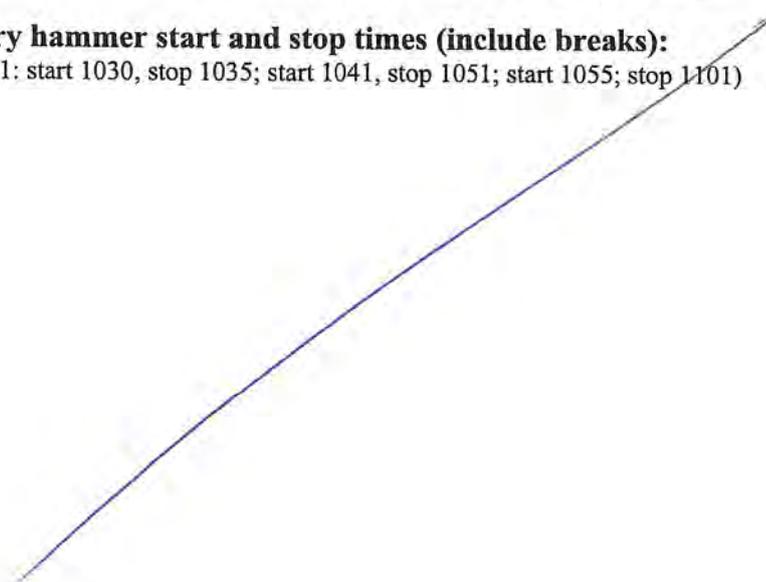
Page 7 of 8

Monitor Initials: LD

Daily Marine Mammal Monitoring Data Sheet
Richmond Refinery Long Wharf Maintenance and Efficiency Project

Pile Driving Start and Stop Times³

1. Vibratory hammer start and stop times (include breaks):
(example: Pile 1: start 1030, stop 1035; start 1041, stop 1051; start 1055; stop 1101)



2. Impact hammer start and stop times, including any restrikes (only note breaks of 30 minutes or more):

(example: Pile 1: start 1030, stop 1130; restrike pile 1: 1355)

1402 soft start }
1403 } 11 min
1404-1413 }
hammer up 1417
barge moved 1429
stop monitoring 1443

³ For vibratory pile driving, note each time the hammer starts and stops. For impact pile driving, note the start and end time for each pile, unless hammering ceases for ≥ 30 minutes) on that pile. Strike counts and times are included in a separate report.

Date: 10/05/20

Page 8 of 8

Monitor Initials: LD

Daily Marine Mammal Monitoring Data Sheet
Richmond Refinery Long Wharf Maintenance and Efficiency Project

Additional Notes

[A large blue handwritten 'X' is drawn across the 'Additional Notes' section, indicating that no data was recorded.]

Date: 10/5/20

Page 1 of 7

Daily Marine Mammal Monitoring Summary Log
Richmond Refinery Long Wharf Maintenance and Efficiency Project

Monitor Name:

Mandi McElroy

Weather/Visibility and Sea State - use Beaufort Scale on next page:

dense fog @ 1145 arrival, cleared to no clouds/sunny ~ 1300 - hazy Beaufort 1
wind 1-3 mph

Tidal Level at Start/End of Work - use Tides app or refer to Richmond Harbor at tidesandcurrents.noaa.gov:

low @ 0814 (2.27') , high @ 1419 (5.69')

General Human Activity in the Area:

busy - tanker @ B4, vehicles + personnel active on wharf

Monitoring Location(s) - show on diagram and take panoramic photo of field of view:

B4 North

Are Castro Rocks visible (yes/no)? If yes, fill out page A-4: yes

Berth Number:

4

Pile Type - include size and material:

60" steel

1 - partially ^{was} driven 10/2/20

Total Pile Count for the Day:

1

Equipment: Impact Vibratory

Total Minutes of Pile Driving - enter total time here¹:

~ 10 min

¹ Note the start and end times for each individual pile on page 7.

Date: 10/5/20Monitor Initials: MM*The Beaufort scale*

No.	Knots	Mph	Description	Effects at sea	Effects on land
0	0	0	Calm	Sea like a mirror	Smoke rises vertically
1	1-3	1-3	Light air	Ripples but no foam crests	Smoke drifts in wind
2	4-6	4-7	Light breeze	Small wavelets	Leaves rustle; wind felt on face
3	7-10	8-12	Gentle breeze	Large wavelets; Crests not breaking	Small twigs in constant motion; Light flags extended
4	11-16	13-18	Moderate wind	Numerous whitecaps Waves 1-4ft high	Dust, leaves and loose paper raised. Small branches move.
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6	22-27	25-31	Strong wind	Whitecaps everywhere; Larger waves 8-13 ft high	Large branches move; Difficult to use umbrellas
7	28-33	32-38	V. strong wind	White foam from waves is blown in streaks; waves 13-20ft high	Whole trees in motion
8	34-40	39-46	Gale	Edges of wave crests break into spindrift	Twigs break off trees; Difficult to walk
9	41-47	47-54	Severe gale	High waves; sea begins to roll Spray reduce visibility; 20ft waves	Chimney pots and slates removed
10	48-55	55-63	Storm	V. high waves 20-30 ft blowing foam gives sea white appearance	Trees uprooted
11	56-63	64-72	Severe storm	Exceptionally high waves; 30-45 ft high	Structural damage
12	63	73	Hurricane	Air filled with foam; visibility reduced White sea; waves over 45ft high	Widespread damage; rare

Date: 10/5/20

Page 4 of 7

Monitor Initials: MM

Daily Marine Mammal Monitoring Data Sheet
Richmond Refinery Long Wharf Maintenance and Efficiency Project
Castro Rocks Observations²

high tide - rocks mostly submerged

Time of Observation	Observer Initials	Visibility ¹	Piling Activity ²	Species ³	Number of Individuals Hauled-out ⁴	Behavioral Observations
1325	MM	clear	B	HASE	1	hauled out on small rock
1405	MM	clear	D	HASE	0	no reaction @ soft start, moved into water after hammering started ~ 1405
1430	MM	clear	A	—	0	—

¹Note conditions (foggy, clear, etc.)
²Indicate if observation is: within 30-minutes before pile-driving (B); during active pile-driving (D); or within 30-minutes after pile driving (A). Take at least one observation before, during, and after pile driving.
³Species Abbreviations:
 California Sea Lion = CASL
 Pacific Harbor Seal = HASE
 Northern Elephant Seal = NOES
⁴Approximate number if visibility is poor.

² One monitor must be positioned in a location to view Castro Rocks. If you are not the monitor viewing Castro Rocks, complete the date, initials, and page number and note "not applicable" on the table.

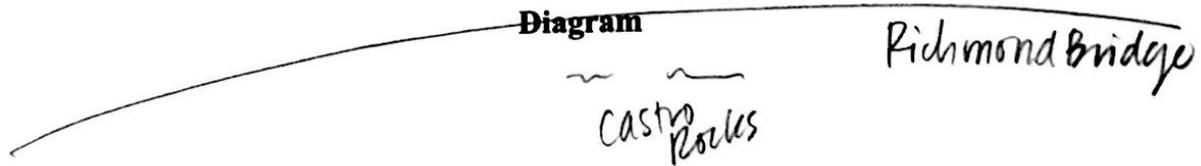
Date: 10/5/20

Page 6 of 7

Date:
Monit

Monitor Initials: MM

Daily Marine Mammal Monitoring Data Sheet
Richmond Refinery Long Wharf Maintenance and Efficiency Project



Biological Monitor: Mandi McElroy

Signature: [Handwritten Signature]

Date: 10/5/20

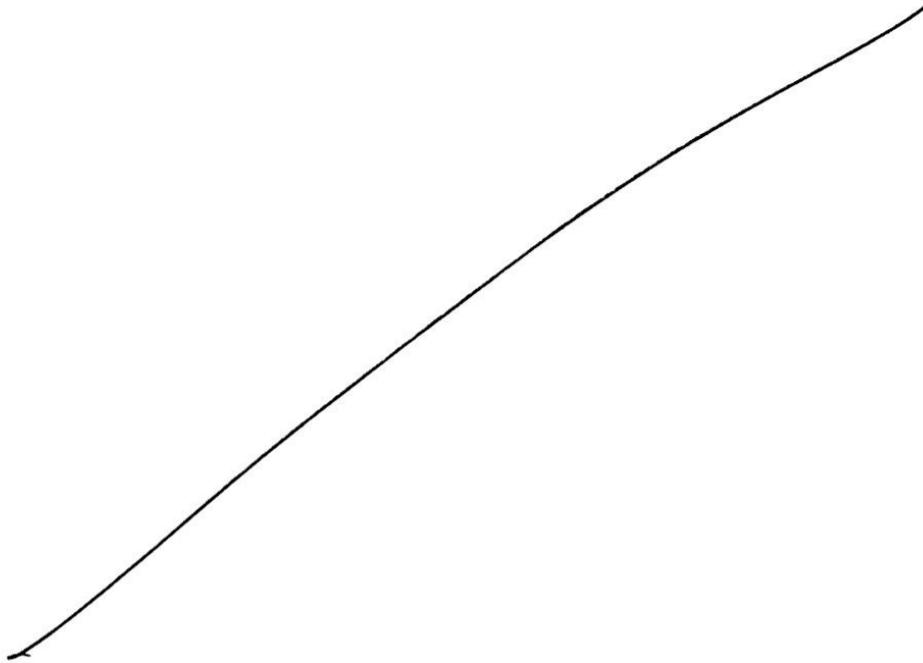
Page 7 of 7

Monitor Initials: MM

Daily Marine Mammal Monitoring Data Sheet
Richmond Refinery Long Wharf Maintenance and Efficiency Project

Pile Driving Start and Stop Times³

- 1. Vibratory hammer start and stop times (include breaks):**
(example: Pile 1: start 1030, stop 1035; start 1041, stop 1051; start 1055; stop 1101)



- 2. Impact hammer start and stop times, including any restrikes (only note breaks of 30 minutes or more):**
(example: Pile 1: start 1030, stop 1130; restrike pile 1: 1355)

1325 in position 30-min pre = 1333
1403 soft start
1404-1413 consistent hammering } ~ 10 min
end monitoring @ 1443

³ For vibratory pile driving, note each time the hammer starts and stops. For impact pile driving, note the start and end time for each pile, unless hammering ceases for ≥ 30 minutes) on that pile. Strike counts and times are included in a separate report.

Date: 10/16/20

Page 1 of 8

Daily Marine Mammal Monitoring Summary Log
Richmond Refinery Long Wharf Maintenance and Efficiency Project

Monitor Name:

Christina Kelleher

Weather/Visibility and Sea State - use Beaufort Scale on next page:

clear, sunny, hot, 0-1 Beaufort

Tidal Level at Start/End of Work - use Tides app or refer to Richmond Harbor at tidesandcurrents.noaa.gov:

start - @ 11:12 - 6.10ft; end - @ 15:30 - 2.05ft.

General Human Activity in the Area:

Minimal - some cars & people moving, no construction except at B4

Monitoring Location(s) - show on diagram and take panoramic photo of field of view:

B4N (Latitude: 37.9273098, Longitude: -122.4150683), ~75m N of pile

Are Castro Rocks visible (yes/no)? If yes, fill out page A-4: Yes

Berth Number: B4

Pile Type - include size and material:

60" steel

Total Pile Count for the Day: 1

Equipment: Impact Vibratory

Total Minutes of Pile Driving - enter total time here¹:

Minutes of driving: 43 minutes

driving work window: 11:17-12:07, 15:16-15:27

¹ Note the start and end times for each individual pile on page 7.

Date: 10/16/20

Monitor Initials: CAK

The Beaufort scale

No.	Knots	Mph	Description	Effects at sea	Effects on land
0	0	0	Calm	Sea like a mirror	Smoke rises vertically
1	1-3	1-3	Light air	Ripples but no foam crests	Smoke drifts in wind
2	4-6	4-7	Light breeze	Small wavelets	Leaves rustle; wind felt on face
3	7-10	8-12	Gentle breeze	Large wavelets; Crests not breaking	Small twigs in constant motion; Light flags extended
4	11-16	13-18	Moderate wind	Numerous whitecaps Waves 1-4ft high	Dust, leaves and loose paper raised. Small branches move.
5	17-21	19-24	Fresh wind	Many whitecaps, some spray; Waves 4-8 ft high	Small trees sway
6	22-27	25-31	Strong wind	Whitecaps everywhere; Larger waves 8-13 ft high	Large branches move; Difficult to use umbrellas
7	28-33	32-38	V. strong wind	White foam from waves is blown in streaks; waves 13-20ft high	Whole trees in motion
8	34-40	39-46	Gale	Edges of wave crests break into spindrift	Twigs break off trees; Difficult to walk
9	41-47	47-54	Severe gale	High waves; sea begins to roll Spray reduce visibility, 20ft waves	Chimney pots and slates removed
10	48-55	55-63	Storm	V. high waves 20-30 ft; blowing foam gives sea white appearance	Trees uprooted
11	56-63	64-72	Severe storm	Exceptionally high waves, 30-45 ft high	Structural damage Widespread damage
12	63	73	Hurricane	Air filled with foam; visibility reduced White sea; waves over 45ft high	Widespread damage; rare

Date: 10/16/20

Monitor Initials: CK

Daily Marine Mammal Monitoring Data Sheet - Richmond Refinery Long Wharf Maintenance and Efficiency Project

Time of Observation	Observer Initials	Work Activity ¹	Species ²	Observation Number ³	Age Class ⁴	Identifying Marks	Distance from Pile (meters) ⁵	Direction of Travel	Bearing	Behavior ⁶
First: 1007 Last: 1028, 1034	CK	BAD	HASE	HASE 1	unk	dark, narrow head, light brown w/ dark spots on side	~200m	S	330	slowly swimming S, done, some individuals that moved to Castro rocks area (see #4)
First: 1013, 1045 Last: 102, 115	CK	BAD	CASL	CASL 1	unk adult male	very dark, small	~300m, 100m	W then E	300	quietly swimming E, then W, surface + diving continuously, waves close to observer
First: 1145 Last:	CK	D	CASL	CASL 2	unk	dark, large	~200m	NE	350	swimming quickly NE, surface is rising around observer
First: 1457, Last: 1532	CK	BAD	HASE	HASE 203	unk	unk - too far	~400m	E+W	325	Same as on page 14 @ 14:57 - 2 HASE swimming adjacent to rocks @ Castro rocks
First: 1505, Last: 1515, 1520, 1522	CK	BAD	HASE	HASE 4	unk	light gray, thin body, head	~35m	N	145	slowly swimming N w/ head up, looking around, done
First: 1515, 1521 Last: 1532	CK	BAD	HASE	HASE 5-7	unk	too far to see	~400m x	moving back & forth	300	@ Castro rocks, 3 more HASE (5 total) swimming adjacent to rocks
First: 1515, 1521 Last: 1532	CK	BAD	HASE	HASE 8	unk	light gray w/ dark spots	~40m	N	125	slowly swim N, look around, dive
First: 1524, Last: 1532	CK	DATA	HASE	HASE 9-10	unk	too far to see	~400m	N	300	@ Castro rocks: 2 more HASE (7 total) swimming adjacent to rocks (note on #4)
First: 1525, Last: 1532	CK	DATA	HASE	HASE 11	unk	too far to see	~400m	moving back & forth	330	swimming N, w/ head raised, dive, swims adjacent to HASE 8 & HASE 4, heading N
First: 1538 Last:	CK	A	HASE	HASE 12	B "	light gray	~80m	E	200	quietly swimming E w/ head raised, dive
First: 1538 Last:	CK	A	HASE	HASE 13	B "	very dark gray	~60m	N	150	swimming N, dive

⁶Behavior examples: Stationary at surface, swimming (slow or fast), transiting, foraging, resting, looking around. Note if mammal appears to be attentive to project activities, or displays any behavior changes related to project activities, and describe the project activity. Note any human-caused disturbances such as recreational boating or helicopters.

Add a reference number if comments are provided on a separate sheet.

⁵Distance: Provide an approximate distance from location of pile.

⁴Species Age Classes:
CASL = juvenile, subadult male, adult male
HASE = juvenile, adult
HAPO = calf, adult

³Examples:
HASE 1,
HASE 2,
Use these numbers for reference on page 6 diagram.

²Species Abbreviations:
California Sea Lion = CASL
Pacific Harbor Seal = HASE
Northern Elephant Seal = NOES
Harbor Porpoise = HAPO

¹Activity: Indicate if observation is:
within the 30-minute period before pile-driving (B);
during active pile-driving (D);
or within the 30-minute period after pile driving (A)

Date: 10/16/20Page 4 of 8Monitor Initials: CK

Daily Marine Mammal Monitoring Data Sheet
Richmond Refinery Long Wharf Maintenance and Efficiency Project
Castro Rocks Observations²

Time of Observation	Observer Initials	Visibility ¹	Piling Activity ²	Species ³	Number of individuals hauled-out ⁴	Behavioral Observations
09:33	CK	good-clear sunny	B	HASE	0	high tide, little to no haul-out behavior
11:24	CK	"	D	"	1	high tide, swimming @ Castro Rocks but not hauled out
12:22	CK	"	A	HASE	0	high tide, little haul-out behavior
14:57	CK	"	B	HASE	2	2 hauled out on limited rocks, additional 2 swimming adjacent to rocks
15:24	CK	"	D	HASE	2	2 hauled out on same rock, 7 in water swimming adjacent
15:37	CK	"	A	HASE	8	8 hauled out - more boats as side force down, at least 5 more in water adjacent

¹Note conditions (foggy, clear, etc.)
²Indicate if observation is: within 30-minutes before pile-driving (B); during active pile-driving (D); or within 30-minutes after pile driving (A). Take at least one observation before, during, and after pile driving.
³Species Abbreviations:
 California Sea Lion = CASL
 Pacific Harbor Seal = HASE
 Northern Elephant Seal = NOES
⁴Approximate number if visibility is poor.

² One monitor must be positioned in a location to view Castro Rocks. If you are not the monitor viewing Castro Rocks, complete the date, initials, and page number and note "not applicable" on the table.

Date: 10/16/20

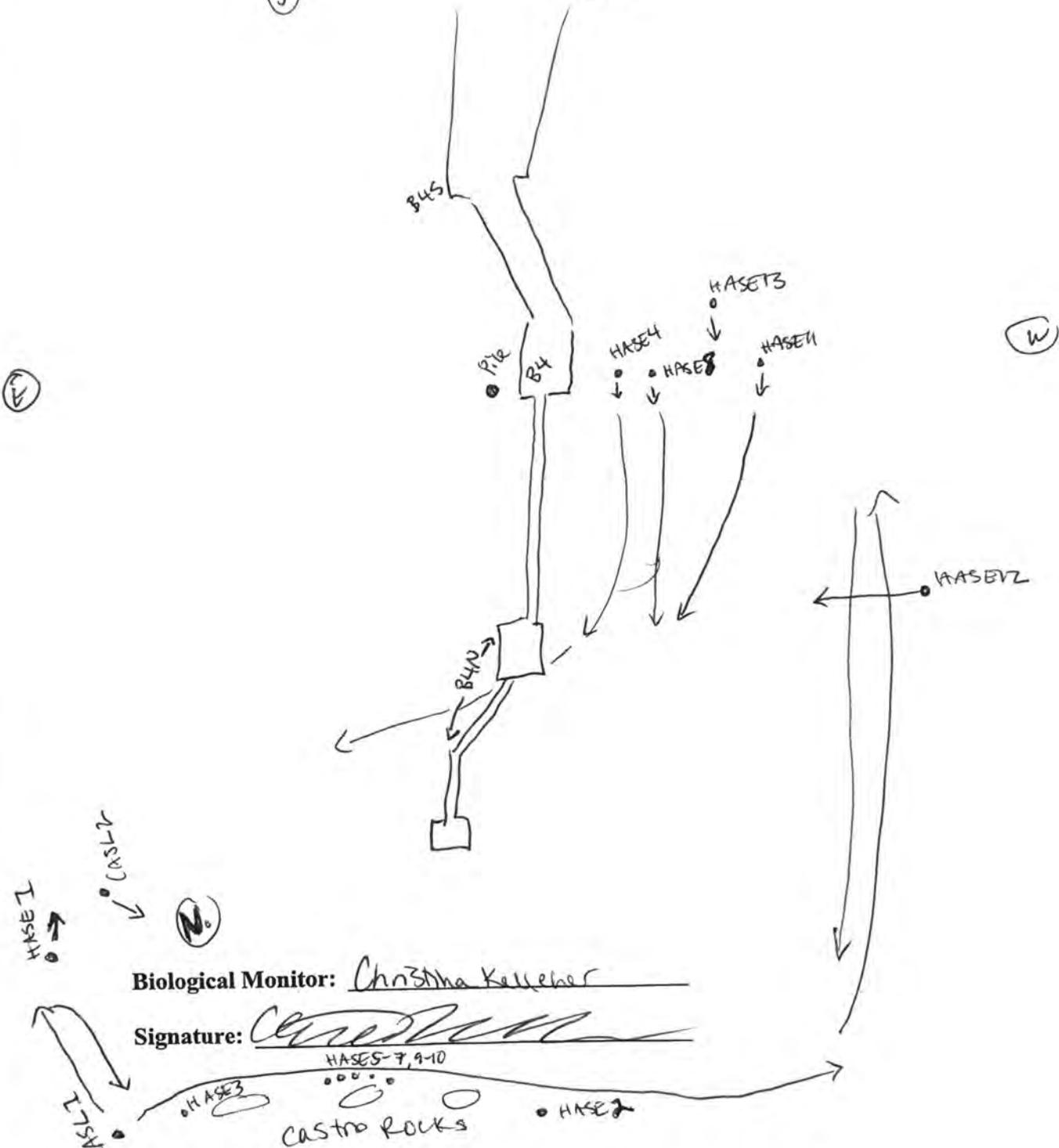
Page 6 of 8

Monitor Initials: CK

Daily Marine Mammal Monitoring Data Sheet Richmond Refinery Long Wharf Maintenance and Efficiency Project

(5)

Diagram



Biological Monitor: Christina Kelleher

Signature: [Handwritten Signature]

HASES-7, 9-10

Date: 10/16/20

Page 7 of 8

Monitor Initials: CK

Daily Marine Mammal Monitoring Data Sheet
Richmond Refinery Long Wharf Maintenance and Efficiency Project

Pile Driving Start and Stop Times³

- 1. Vibratory hammer start and stop times (include breaks):**
(example: Pile 1: start 1030, stop 1035; start 1041, stop 1051; start 1055; stop 1101)

N/A

- 2. Impact hammer start and stop times, including any restrikes (only note breaks of 30 minutes or more):**

(example: Pile 1: start 1030, stop 1130; restrike pile 1: 1355)

Soft start: 11:17, 11:19, 11:20, 11:21

driving: 11:22-11:33, 11:34-11:38, 11:39-11:45, 11:46-11:47, 11:48-11:49, 11:54-11:54, 11:56-11:57, 11:59-12:00, 12:02-12:02

12:04-12:07

Soft start: 15:16, 15:17, 15:17, 15:18

driving: 15:19-15:27

work windows: 11:17-12:07; 15:16-15:27

³ For vibratory pile driving, note each time the hammer starts and stops. For impact pile driving, note the start and end time for each pile, unless hammering ceases for ≥ 30 minutes) on that pile. Strike counts and times are included in a separate report.

Date: 10/16/20

Page 8 of 8

Monitor Initials: CK

Daily Marine Mammal Monitoring Data Sheet
Richmond Refinery Long Wharf Maintenance and Efficiency Project

Additional Notes

Monitoring start time: 09:30

Monitoring end time: 12:37

Monitoring start time: 14:54

* dining starts before the 30 minute clearance, at 15:16

Monitoring end time: 15:57

Date: 10/16/20

Page 1 of 8

Daily Marine Mammal Monitoring Summary Log
Richmond Refinery Long Wharf Maintenance and Efficiency Project

Monitor Name:

Laura Duffy

Weather/Visibility and Sea State - use Beaufort Scale on next page:

clear, 10% cloud cover; wind 0-3kt; BF=0 east, 1 west of B4

Tidal Level at Start/End of Work - use Tides app or refer to Richmond Harbor at tidesandcurrents.noaa.gov:

start @ 0930, H₂O @ ~~2.25A~~ 3.1A; end @ 1557 H₂O @ 3.9A
10 0533
hi 1208
10 1810

General Human Activity in the Area:

people on wharf, barges; ships @ B2 & B3; baycat move through west side along wharf 1205

Monitoring Location(s) - show on diagram and take panoramic photo of field of view:

B4S (Berth 4 South)

Are Castro Rocks visible (yes/no)? If yes, fill out page A-4: no

Berth Number: 4

Pile Type - include size and material:

60" steel

Total Pile Count for the Day: 1 Equipment: Impact Vibratory

Total Minutes of Pile Driving - enter total time here¹:

41 min work windows ~~X~~ 1118-1207
1517-1527

¹ Note the start and end times for each individual pile on page 7.

Date: 10/16/20

Monitor Initials: LD

The Beaufort scale

No.	Knots	Mph	Description	Effects at sea	Effects on land
0	0	0	Calm	Sea like a mirror	Smoke rises vertically
1	1-3	1-3	Light air	Ripples but no foam crests	Smoke drifts in wind
2	4-6	4-7	Light breeze	Small wavelets	Leaves rustle; wind felt on face
3	7-10	8-12	Gentle breeze	Large wavelets; Crests not breaking	Small twigs in constant motion; Light flags extended
4	11-16	13-18	Moderate wind	Numerous whitecaps Waves 1-4ft high	Dust, leaves and loose paper raised. Small branches move.
5	17-21	19-24	Fresh wind	Many whitecaps, some spray; Waves 4-8 ft high	Small trees sway
6	22-27	25-31	Strong wind	Whitecaps everywhere; Larger waves 8-13 ft high	Large branches move; Difficult to use umbrellas
7	28-33	32-38	V. strong wind	White foam from waves is blown in streaks; waves 13-20ft high	Whole trees in motion
8	34-40	39-46	Gale	Edges of wave crests break into spindrift	Twigs break off trees; Difficult to walk
9	41-47	47-54	Severe gale	High waves; sea begins to roll Spray reduce visibility; 20ft waves	Chimney pots and slates removed
10	48-55	55-63	Storm	V. high waves 20-30 ft; blowing foam gives sea white appearance	Trees uprooted
11	56-63	64-72	Severe storm	Exceptionally high waves; 30-45 ft high	Structural damage
12	63	73	Hurricane	Air filled with foam; visibility reduced White sea; waves over 45ft high	Widespread damage; rare

Monitor Initials: LD

Daily Marine Mammal Monitoring Data Sheet - Richmond Refinery Long Wharf Maintenance and Efficiency Project

Time of Observation	Observer Initials	Work Activity ¹	Species ²	Observation Number ³	Age Class ⁴	Identifying Marks	Distance from Pile (meters) ⁵	Direction of Travel	Bearing	Behavior ⁶
First: 1124 Last: 1127	LD	D	CASL	CASL2	ad (f)	Small sleek body	40 → 70	N	267 → 278	fast travel, surface 2x almost whole body out of H2O slowed once went from pile
First: 1131 Last: 1131	LD	D	CASL	CASL3	ad (f)	1rg bulbous head	50	N	306	moderate travel, very close to other CASL
First: 1223 Last: 1234	LD	A	HASE	HASE2	ad.	brown/gray mottled	>100	S	70 → 89	slow travel south
First: 1457 Last: 1457	LD	B	HASE	HASE3	ad.	light gray w/ dark spots	30-40	NA	330	rest @ surface
First: 1501 Last: 1501	LD	B	HASE	HASE4	ad.	red head brown/gray body	60	NA	10	rest @ surface
First: 1514 Last: 1555	LD	B/D	HASE	HASE5	ad.	black/gray mottled	50 → 80	NINW	353 → 351	slow travel, circling near 351°
First: 1515 Last: 1520	LD	B/D	HASE	HASE6	ad.	solid gray	90	NE	246 → 267	slow travel
First: 1526 Last: 1526	LD	D	HASE	HASE7	2ad. 1 pup?	1 much smaller than other 2	50	N	278	travelling @ surface very close together move together as sailboat approach and facing east; surface diving @ same spot
First: 1539 Last: 1551	LD	A	HASE	HASE8	ad.	gray w/ white spots	70	NA	291	slow travel } seen @ the same time but not trav. together
First: 1554 Last: 1554	LD	A	HASE	HASE9	ad.	-	70	N	46	slow travel
First: 1554 Last: 1554	LD	A	HASE	HASE10	ad.	-	80	N	65	slow travel

¹Activity: Indicate if observation is: within the 30-minute period before pile-driving (B); during active pile-driving (D); or within the 30-minute period after pile driving (A)

²Species: Abbreviations: California Sea Lion = CASL Pacific Harbor Seal = HASE Northern Elephant Seal = NOES Harbor Porpoise = HAPO

³Examples: HASE1, HASE2. Use these numbers for reference on page 6 diagram.

⁴Species Age Classes: CASL = juvenile, subadult male, adult male HASE = juvenile, adult HAPO = calf, adult

⁵Distance: Provide an approximate distance from location of pile.

⁶Behavior examples: Stationary at surface, swimming (slow or fast), transiting, foraging, resting, looking around. Note if mammal appears to be attentive to project activities, or displays any behavior changes related to project activities, and describe the project activity. Note any human-caused disturbances such as recreational boating or helicopters. Add a reference number if comments are provided on a separate sheet.

* Sightings include only those during work period and 30min before/after. please see p.8 of 8 for ALL sightings notes/observations (HASE1 = CASL 1 were observed prior to 30min period before hammer strikes).

Daily Marine Mammal Monitoring Data Sheet
Richmond Refinery Long Wharf Maintenance and Efficiency Project

PHOTO LOG

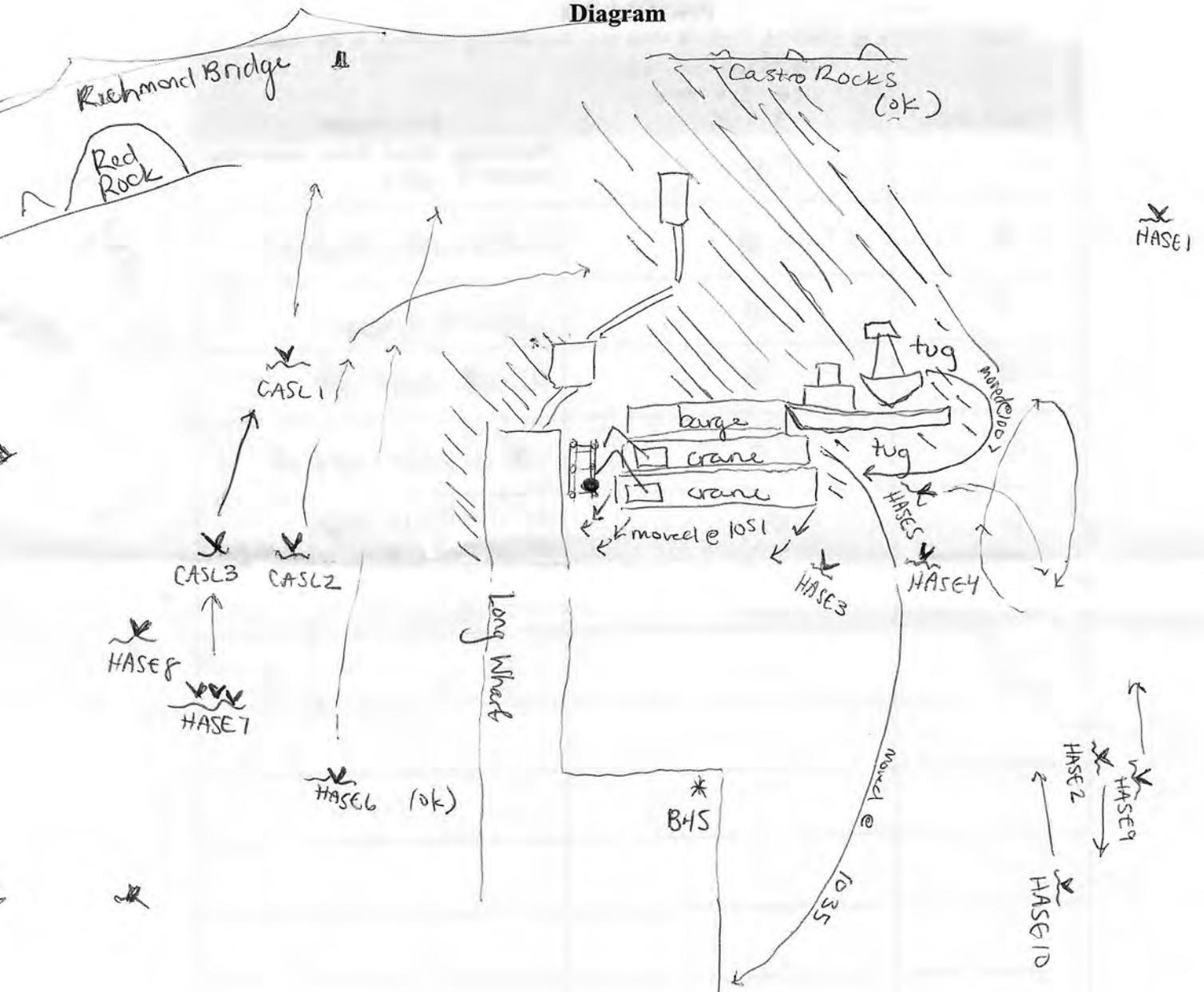
upload photos to network, include date and monitoring position in file name

Photo Number	Photo Taken Before (B), During (D), or After (A) Pile Driving	Description
1	B	Panoramic photo from monitoring location (east)
2	B	panoramic (west)
3	B	work site
4	B	HASE 3 sighting
5	A	view under wharf
6	A	area of all CASL observations, west of B4

Monitor Initials: LD

Daily Marine Mammal Monitoring Data Sheet Richmond Refinery Long Wharf Maintenance and Efficiency Project

Diagram



Biological Monitor: Laura Duffy

Signature: [Handwritten Signature]

Daily Marine Mammal Monitoring Data Sheet
Richmond Refinery Long Wharf Maintenance and Efficiency Project

Pile Driving Start and Stop Times³

1. Vibratory hammer start and stop times (include breaks):
(example: Pile 1: start 1030, stop 1035; start 1041, stop 1051; start 1055; stop 1101)



2. Impact hammer start and stop times, including any restrikes (only note breaks of 30 minutes or more):

(example: Pile 1: start 1030, stop 1130; restrike pile 1: 1355)

soft start 1118-1121 (1 blow per minute)
1122-1133
1134-1138
1139-1143
1146-1147
1148-1149
1154
1156
1159-1200
1202
1204-1207

31 minutes

soft start 1517, 1518 (1 blow each)
1519-1521

10 minutes

³ For vibratory pile driving, note each time the hammer starts and stops. For impact pile driving, note the start and end time for each pile, unless hammering ceases for ≥30 minutes) on that pile. Strike counts and times are included in a separate report.



Daily Marine Mammal Monitoring Data Sheet
Richmond Refinery Long Wharf Maintenance and Efficiency Project

Additional Notes

Start monitoring 0930 - OS ~~low~~ pile getting placed in template
1005 Stabbed w/ own weight
1007 tug moved behind barge

- HASE1 346°N solid dark body moderate travel NE 100m from pile 1011
CASL1 290°W bulbous head, dark in color moderate travel N 60m from pile 1013
CASL2 290°N " " 50m from pile 1044 (prob same as CASL1)

1103 hammer up / set by 1105
soft start 1118 (1 blow) 1119 (1 blow) 1120 (1 blow) 1121 (1 blow) (4)
1122 - 1133 (11)

- CASL 2 267° -> 278° small sleek body, likely f. same N. track as other CASL obs.
Surface 2x fast travel just beyond excl. zone (40-50m)
1124 whole body
306°NW (127 mod. travel east, crossing under walkway 60-70m from pile)
CASL 3 270°NW mod. travel north - All CASL sightings very close together! make 50m from pile
1131

- 1134-1138 (4)
1139-1143 (4)
1146-1147 (1)
1148-1149 (1)
1154 (1)
1156 (1)
1159-1200 (2)
1202 (1) (3)
1204-1207

- 1554 HASE9 46°NE 70m
1554 HASE10 65°NE 80m
slow travel N

hammer up 1215; stop monitoring 1237
1223 HASE2 brown/gray mottle slow travel S >100m from pile 70°E
89°E rest @ surface 1234 (31 min)

Start monitoring 1455

- 1457 HASE3 light gray/drk spots rest @ surface off stern/port of crane barge 30-40m from pile 338
1501 HASE4 red head brown w/ gray spotted body rest @ surface off ster 60m 16°N
1514 HASE5 black/gray mottle 50m slow swim N 353°NW 356° @ 1529 ~ 80m circling slowly 351°E
1515 HASE6 solid gray w. side B4 slow travel NE 246°, 267° 90m @ 1520 1555

10min 1517 soft start, 1518 -> stop monitoring @ 1557
1519-1527

- 1526 (3) HASE7 potentially 2 ad / 1 pup travelling close together slow travel N w/ heads turned toward work
Chevron Richmond Refinery
Long Wharf Maintenance and Efficiency Project Marine Mammal Monitoring Plan close as sailboat approached
W side 50m from pile 278° w/pelicans diving
1539 HASE8 gray/white spots 70m W side wharf lx surface facing E 291°NW, same spot 1551

Daily Marine Mammal Monitoring Summary Log
Richmond Refinery Long Wharf Maintenance and Efficiency Project

Monitor Name: Christina Kelleher

Weather/Visibility and Sea State - use Beaufort Scale on next page:

Clear & sunny, mid-60°F, 0-1 sea state

Tidal Level at Start/End of Work - use Tides app or refer to Richmond Harbor at tidesandcurrents.noaa.gov):

at 13:00 start: 5.26 ft, at [scribble] end - 14:42: 1.22 ft.

General Human Activity in the Area:

Cars & pedestrians in area, boats/ships in dock, minimal activity, dredging at N. end of B4

Monitoring Location(s) - show on diagram and take panoramic photo of field of view:

B4S, ~ 75 m South of pile, at latitude: 37.9262874, longitude: -122.4137852

Are Castro Rocks visible (yes/no)? If yes, fill out page A-4: No

Berth Number: 4

Pile Type - include size and material:

60" steel

Total Pile Count for the Day: 1 Equipment: Impact Vibratory

Total Minutes of Pile Driving - enter total time here:

40 minutes driving; Full work window (excluding breaks > 30 min) = 13:04-13:46, 14:28-14:52, 16:31-16:39

1 Note the start and end times for each individual pile on page 7.

Monitor Initials: CK

The Beaufort scale

No.	Knots	Mph	Description	Effects at sea	Effects on land
0	0	0	Calm	Sea like a mirror	Smoke rises vertically
1	1-3	1-3	Light air	Ripples but no foam crests	Smoke drifts in wind
2	4-6	4-7	Light breeze	Small wavelets	Leaves rustle; wind felt on face
3	7-10	8-12	Gentle breeze	Large wavelets; Crests not breaking	Small twigs in constant motion; Light flags extended
4	11-16	13-18	Moderate wind	Numerous whitecaps Waves 1-4ft high	Dust, leaves and loose paper raised. Small branches move.
5	17-21	19-24	Fresh wind	Many whitecaps, some spray; Waves 4-8 ft. high	Small trees sway
6	22-27	25-31	Strong wind	Whitecaps everywhere; Larger waves 8-13 ft high	Large branches move; Difficult to use umbrellas
7	28-33	32-38	V. strong wind	White foam from waves is blown in streaks; waves 13-20ft high	Whole trees in motion
8	34-40	39-46	Gale	Edges of wave crests break into spindrift	Twigs break off trees; Difficult to walk
9	41-47	47-54	Severe gale	High waves; sea begins to roll Spray reduce visibility, 20ft waves	Chimney pots and slates removed
10	48-55	55-63	Storm	V. high waves 20-30 ft; blowing foam gives sea white appearance	Trees uprooted
11	56-63	64-72	Severe storm	Exceptionally high waves; 30-45 ft high	Structural damage Widespread damage
12	63	73	Hurricane	Air filled with foam; visibility reduced white sea; waves over 45ft high	Widespread damage; rare

Monitor Initials: CK

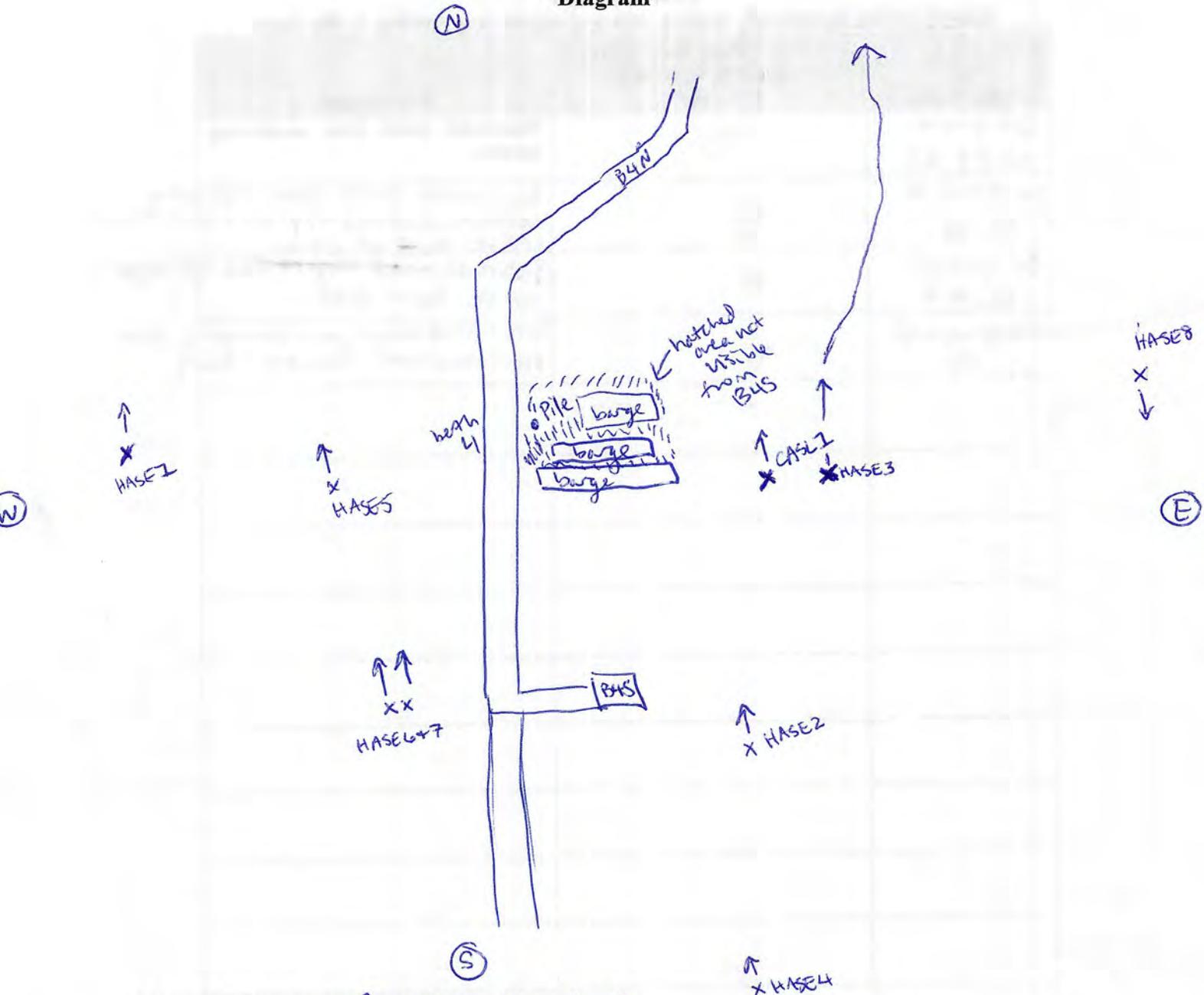
Daily Marine Mammal Monitoring Data Sheet - Richmond Refinery Long Wharf Maintenance and Efficiency Project

Time of Observation	Observer Initials	Work Activity ¹	Species ²	Observation Number ³	Age Class ⁴	Identifying Marks	Distance from Pile (meters) ⁵	Direction of Travel	Bearing	Behavior ⁶
First: 1050 Last: 1050	CK	N	CASL	CASL7	unk	very dark	~160m	N	0	swimming quickly N, diving or resurfacing
First: 1058 Last: 1344	CK	NA	HASE	HASE1	unk	red head	~100m	N	250	heading in place w/ head raised, above heading N, resurfaced hrs later in same location
First: 1302, 1407 Last: 1309, 1324	CK	B+D	HASE	HASE2	unk	dark brown w/ light patches on body	~150m	N	25	slowly swimming facing pile, above, moved 45 N, E of casing pipes
First: 13:35, 1450 Last:	CK	D	HASE	HASE3	unk	dark+light patchy face gray/brown very little stomach	~75m	N	325	floating stationary @ surface facing NW, dove
First: 1406 Last: 1406	CK	B	HASE	HASE4	unk	brown head/body light belly	~250m	N	40	swimming slowly N, lifts head to look at us
First: 1407, 1434 Last: 1445, 1472	CK	B+D	HASE	HASE5	unk	dark gray	~100m	E	190	surface+diver heading E
First: 1630 Last:	CK	B	² HASE	HASE6+7	unk	too much glare to tell	~100m	N	250	2 HASE swimming together heading N, heads above water, dove
First: 1644 Last:	CK	A	HASE	HASE8	unk	dark gray	~250m	S	335	slowly swimming w/ head raised, dove
First: Last:										
First: Last:										
First: Last:										
First: Last:										
¹ Activity: Indicate if observation is: within the 30-minute period before pile-driving (B); during active pile-driving (D); or within the 30-minute period after pile driving (A) N = none, for before the 30-minute period before pile-driving		² Species Abbreviations: California Sea Lion = CASL Pacific Harbor Seal = HASE Northern Elephant Seal = NOES Harbor Porpoise = HAPO	³ Examples: HASE 1, HASE 2. Use these numbers for reference on page 6 diagram.	⁴ Species Age Classes: CASL = juvenile, subadult male, adult male HASE = juvenile, adult HAPO = calf, adult	⁵ Distance: Provide an approximate distance from location of pile.	⁶ Behavior examples: Stationary at surface, swimming (slow or fast), transiting, foraging, resting, looking around. Note if mammal appears to be attentive to project activities, or displays any behavior changes related to project activities, and describe the project activity. Note any human-caused disturbances such as recreational boating or helicopters. Add a reference number if comments are provided on a separate sheet.				

Monitor Initials: CK

Daily Marine Mammal Monitoring Data Sheet
Richmond Refinery Long Wharf Maintenance and Efficiency Project

Diagram



Biological Monitor: Christina Kelleher

Signature: [Handwritten Signature]

||| - hatched area not visible from B4S, w/m shut-down zone

Monitor Initials: CK

Daily Marine Mammal Monitoring Data Sheet
Richmond Refinery Long Wharf Maintenance and Efficiency Project

Pile Driving Start and Stop Times³

1. Vibratory hammer start and stop times (include breaks):
(example: Pile 1: start 1030, stop 1035; start 1041, stop 1051; start 1055; stop 1101)

N/A

2. Impact hammer start and stop times, including any restrikes (only note breaks of 30 minutes or more):

(example: Pile 1: start 1030, stop 1130; restrike pile 1: 1355)

Pile 1

soft start: 13:04, 13:05, 13:05

continuous start: 13:06 = 13:09, 13:13, 13:14, 13:16, 13:18-13:19, 13:33-13:36, 13:40, 13:42-13:43,

13:44-13:46

> 30 min break

soft start: 14:28, 14:28, 14:29

continuous start: 14:30, 14:31-14:32, 14:35-14:36, 14:42-14:52

> 30 min break

soft start: 16:31, 16:31, 16:32, 16:33

continuous: 16:33-16:39

Work window: 13:04 - 13:46, 14:28 - 14:52, 16:31 - 16:39

³ For vibratory pile driving, note each time the hammer starts and stops. For impact pile driving, note the start and end time for each pile, unless hammering ceases for ≥30 minutes) on that pile. Strike counts and times are included in a separate report.

Daily Marine Mammal Monitoring Data Sheet
Richmond Refinery Long Wharf Maintenance and Efficiency Project

Additional Notes

Monitoring start time: 09:30

2 barges are in a position that blocks my (BHS) view of a portion (~40%) of the shut-down zone, shown in diagram on Page A-6, and in photos taken at 12:47 & 12:50

Monitoring end time: 15:22

Monitoring start time: 16:08

* Driving started at 16:31, before 30-minutes of pre-driving monitoring was complete

Monitoring end time: 17:09

Date: 10/30/20

Page 1 of 8

Daily Marine Mammal Monitoring Summary Log
Richmond Refinery Long Wharf Maintenance and Efficiency Project

Monitor Name:

Laura Duffy

Weather/Visibility and Sea State - use Beaufort Scale on next page:

wind 0-3kt; BF=1; clear skies/haze w/marine layer w. of Angel Island; glare @ pile; SE @ 0930

Tidal Level at Start/End of Work - use Tides app or refer to Richmond Harbor at tidesandcurrents.noaa.gov:

start @ 0930 H₂O @ 3.89 ft; end @ 1709 H₂O @ 5.08 ft

10 0540
hi 1155
10 1825

General Human Activity in the Area:

Dredging NW of B4N; ppl on wharf, barges, tug; ship @ B3; skiff w/pile work; skiff w/dredge work

Monitoring Location(s) - show on diagram and take panoramic photo of field of view:

B4N (Berth 4 North)

Are Castro Rocks visible (yes/no)? If yes, fill out page A-4: yes

Berth Number: 4

Pile Type - include size and material:

60" steel

Total Pile Count for the Day: 1

Equipment: Impact Vibratory

Total Minutes of Pile Driving - enter total time here¹:

4/min

¹ Note the start and end times for each individual pile on page 7.

Date: 10/30/20
 Monitor Initials: LD

The Beaufort scale

No.	Knots	Mph	Description	Effects at sea	Effects on land
0	0	0	Calm	Sea like a mirror	Smoke rises vertically
1	1-3	1-3	Light air	Ripples but no foam crests	Smoke drifts in wind
2	4-6	4-7	Light breeze	Small wavelets	Leaves rustle; wind felt on face
3	7-10	8-12	Gentle breeze	Large wavelets; crests not breaking	Small twigs in constant motion; Light flags extended
4	11-16	13-18	Moderate wind	Numerous whitecaps	Dust, leaves and loose paper raised. Small branches move.
5	17-21	19-24	Fresh wind	Waves 1-4ft high	Small trees sway
6	22-27	25-31	Strong wind	Many whitecaps, some spray; Waves 4-8 ft high	Large branches move; Difficult to use umbrellas
7	28-33	32-38	V. strong wind	Whitecaps everywhere; Larger waves 8-13 ft high	Whole trees in motion
8	34-40	39-46	Gale	White foam from waves is blown in streaks; waves 13-20ft high	Twigs break off trees; Difficult to walk
9	41-47	47-54	Severe gale	Edges of wave crests break into spindrift	Chimney pots and slates removed
10	48-55	55-63	Storm	High waves; sea begins to roll	Trees uprooted
11	56-63	64-72	Severe storm	Spray reduce visibility, 20ft waves	Structural damage
12	63	73	Hurricane	V. high waves 20-30 ft; blowing foam gives sea white appearance	Widespread damage
				Exceptionally high waves; 30-45 ft high	Widespread damage; rare
				Air filled with foam; visibility reduced	
				white sea; waves over 45ft high	

Monitor Initials: LD

Daily Marine Mammal Monitoring Data Sheet - Richmond Refinery Long Wharf Maintenance and Efficiency Project

Time of Observation	Observer Initials	Work Activity ¹	Species ²	Observation Number ³	Age Class ⁴	Identifying Marks	Distance from Pile (meters) ⁵	Direction of Travel	Bearing	Behavior ⁶
First: 1306 Last: 1308	LD	D	HASE	HASE4	ad	solid brown	90m	NE	70° → 160°	Slow travel
First: 1318 Last: 1318	LD	D	HASE	HASE5	ad	dark gray	> 100m	NNW	316°	slow travel
First: 1415 Last: 1422	LD	B	HASE	HASE6	ad	brown head gray spots	90m	N	85° → 350°	repeat dive @ 85° then slow travel jughandling @ 350°
First: 1419 Last: 1419	LD	B	HASE	HASE7	ad	small, silvery	> 100m	N	1°	in line w/ but further away HASE6
First: 1449 Last: 1449	LD	D	HASE(2)	HASE8	ad/pup	-	> 100m	NE	51°	1 much smaller than the other, travel close together, surface @ same time
First: 1635 Last: 1635	LD	D	HASE	HASE9	ad	solid, dark	> 100m	NE	16°	moderate travel
First: Last:										
First: Last:										
First: Last:										
First: Last:										
First: Last:										
First: Last:										
¹ Activity: Indicate if observation is: within the 30-minute period before pile-driving (B); during active pile-driving (D); or within the 30-minute period after pile driving (A)		² Species Abbreviations: California Sea Lion = CASL Pacific Harbor Seal = HASE Northern Elephant Seal = NOES Harbor Porpoise = HAPO	³ Examples: HASE1, HASE2. Use these numbers for reference on page 6 diagram.	⁴ Species Age Classes: CASL = juvenile, subadult male, adult male HASE = juvenile, adult HAPO = calf, adult	⁵ Distance: Provide an approximate distance from location of pile.	⁶ Behavior examples: Stationary at surface, swimming (slow or fast), transiting, foraging, resting, looking around. Note if mammal appears to be attentive to project activities, or displays any behavior changes related to project activities, and describe the project activity. Note any human-caused disturbances such as recreational boating or helicopters. Add a reference number if comments are provided on a separate sheet.				

Date: 10/30/20

Monitor Initials: LD

Daily Marine Mammal Monitoring Data Sheet
Richmond Refinery Long Wharf Maintenance and Efficiency Project
Castro Rocks Observations²

Time of Observation	Observer Initials	Visibility ¹	Piling Activity ²	Species ³	Number of individuals hauled-out ⁴	Behavioral Observations
0930	LD	clear	B	/	0	(most rocks submerged) hauled out ↓
1147	LD	clear	D B	HASE	1	hauled out ↓
1300	LD	clear	A B	/	0	
1340	LD	clear	D	HASE	2	hauled out
1429	LD	clear	D	HASE	7	"2 raise heads @ pile start"
1524	LD	clear	A	HASE	24	hauled out 3 swimming attempting to get a rest
1630	LD	clear	B	HASE	44	hauled out / swimming on left rocks
1705	LD	clear	A	HASE	41	hauled out

¹Note conditions (foggy, clear, etc.)
²Indicate if observation is: within 30-minutes before pile-driving (B); during active pile-driving (D); or within 30-minutes after pile driving (A). Take at least one observation before, during, and after pile driving.
³Species Abbreviations:
 California Sea Lion = CASL
 Pacific Harbor Seal = HASE
 Northern Elephant Seal = NOES
⁴Approximate number if visibility is poor.

² One monitor must be positioned in a location to view Castro Rocks. If you are not the monitor viewing Castro Rocks, complete the date, initials, and page number and note "not applicable" on the table.

Daily Marine Mammal Monitoring Data Sheet
Richmond Refinery Long Wharf Maintenance and Efficiency Project

PHOTO LOG

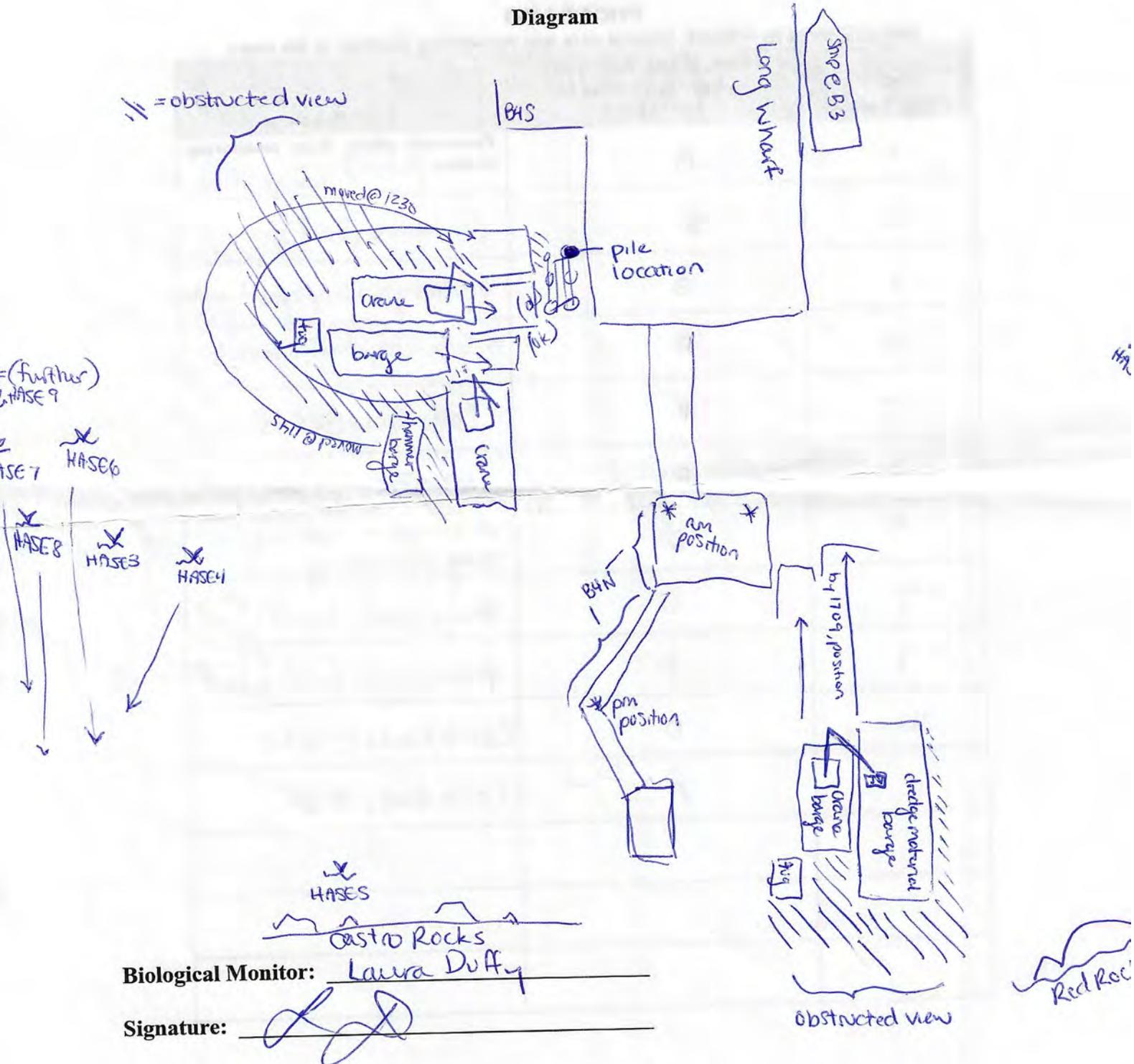
upload photos to network, include date and monitoring position in file name

Photo Number	Photo Taken Before (B), During (D), or After (A) Pile Driving	Description
1	B	Panoramic photo from monitoring location (west) am position
2	B	panoramic (east) am position
3	B	dredging activity NW of work pile
4	B	W. Side Long Wharf, looking S
5	B	Castro Rocks @ 0945
6	B	work area - pre barge moves
7	D	work area - close w/ barge positioning
8	D	panoramic (east) pm position
9	D	panoramic (west) pm position
10	D	Castro Rocks @ 1630
11	A	Castro Rocks @ 1650

Monitor Initials: LD

Daily Marine Mammal Monitoring Data Sheet
Richmond Refinery Long Wharf Maintenance and Efficiency Project

Diagram



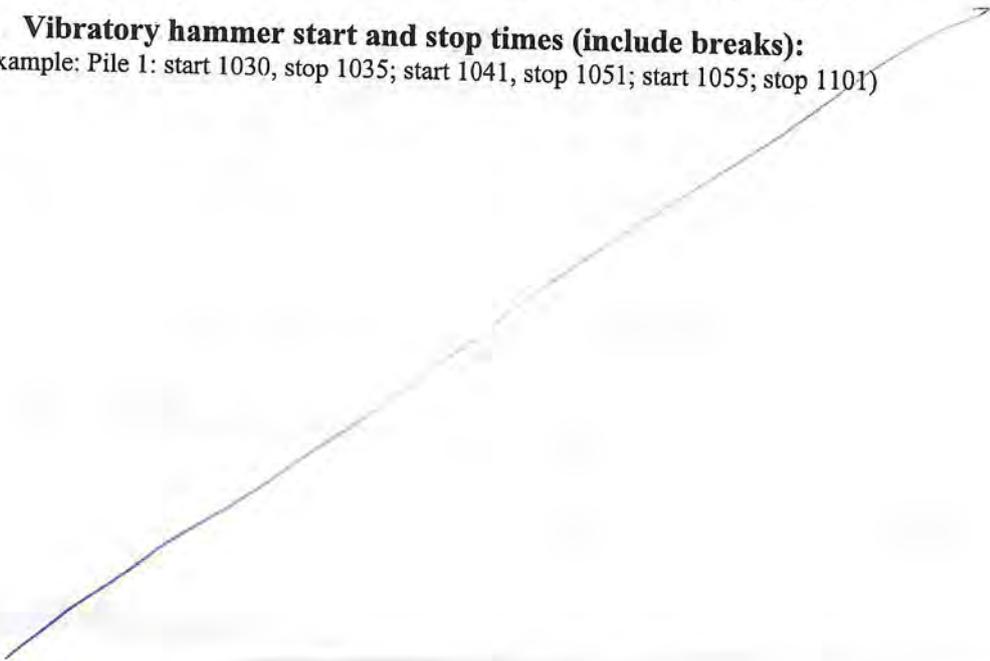
Biological Monitor: Laura Duffy

Signature: [Signature]

Daily Marine Mammal Monitoring Data Sheet
Richmond Refinery Long Wharf Maintenance and Efficiency Project

Pile Driving Start and Stop Times³

- 1. Vibratory hammer start and stop times (include breaks):**
(example: Pile 1: start 1030, stop 1035; start 1041, stop 1051; start 1055; stop 1101)



- 2. Impact hammer start and stop times, including any restrikes (only note breaks of 30 minutes or more):**
(example: Pile 1: start 1030, stop 1130; restrike pile 1: 1355)

see p. 8 of 8

³ For vibratory pile driving, note each time the hammer starts and stops. For impact pile driving, note the start and end time for each pile, unless hammering ceases for ≥ 30 minutes) on that pile. Strike counts and times are included in a separate report.

Monitor Initials: LD

Daily Marine Mammal Monitoring Data Sheet
Richmond Refinery Long Wharf Maintenance and Efficiency Project

Additional Notes

start 0930

- 1051 HASE 1 brown/gray mottle slow travel W 259° 100m, toward channel
1133 HASE 2 (to far) bob @ surface facing S 117° >100m, near B3 west side

B4N cam position moved to pm position to accommodate B4S blind spot between barges & pile / structure

1130 pile set/staked complete

- 1138 HASE 3 gray mottle slow travel/rest @ surface S 10° 90m, off N (port star) tug

1300 hammer set

1305 soft start (11 stakes)

1306 - 1309

- 1306 HASE 4 brown surface @ start of driving, slow travel NE, dip under surface again 70° 90m, off E side (port stern of barges)

1308 42°; 1311 66°

(dredging making H2O turbid ~ 100m N & NE of work area)

1313 - 1317

1318 - 1320

- 1318 HASE 5 drk gray slow travel NNW 316° >100m, close to Castro rocks

1333 - 1336

1340 -

1342 - 1343

1344 - 1346

- 1415 HASE 6 brown head -> drk gray spots near tail repeat dives 85° 70m, off stern of tug

1419 1°N slow travel N; 1422 350° toward Castro Rocks, jug handling @ slow travel

- 1419 HASE 7 small, silvery gray 1°N >100m slow travel N, in line w/ but further east w/ HASE 6

1428 - 1430

1431 -

1434 - 1436

1442 - 1451 -> end 1521

- 1449 HASE 8 (2) poss. blue cow/pup pr traveling NE together 51° NE >100m, off B4N pm position

(dredging moving S. along W side of platforms partially block)

start 1608

1631 soft start * before pre-mon period over

1632 - 1633

- 1635 HASE 9 solid, dark 110° mod travel NE >100m, mid way - closer to shore from B4N pm

1633 - 1639 -> 1709 end

Appendix D Hydroacoustic Monitoring Reports

2020 Annual Report

**Pile Driving Noise Measurements
for Chevron Long Wharf
Maintenance and Efficiency
Project**

Submitted to:

*Bill Martin
Senior Project Manager
AECOM
300 Lakeside Drive, Suite 400
Oakland, California 94612*

Prepared by:

ILLINGWORTH & RODKIN, INC.
■■■■ Acoustics • Air Quality ■■■■

*Illingworth & Rodkin
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December 2020

1. Introduction

This report presents the results of hydroacoustic monitoring conducted for the Chevron Long Wharf Maintenance and Efficiency Project (LWMEP) in Richmond, California during the 2020 calendar year. Monitoring was conducted on two (2) 60-inch steel piles installed at Berth #4.

Hydroacoustic data was collected and reported for the peak sound pressure level, root mean square (RMS) sound pressure level (SPL), sound equivalent level (SEL), and daily cumulative sound equivalent level (cSEL). The peak sound pressure level is presented in dB re 1 μ Pa as the maximum sound pressure level over the pulse duration. The RMS sound pressure level is presented in dB re 1 μ Pa and is averaged over the pulse duration for impact pile driving. The SEL sound pressure level is presented in dB re 1 μ Pa² and summarized where the SEL is greater than 150 dB to compute the cSEL. Generally, the majority of the acoustic energy of pile driving is confined to frequencies between 20 and 20,000 Hertz (Hz), and therefore sound levels were processed within this frequency range.

Each of these data are summarized as the maximum, mean, and median for each pile. If impact pile driving took place, recorded measurements were played through a Labview pulse detection program to identify the peak, RMS, pulse duration, and SEL for each pulse. These data were then used to estimate distances to exceedance thresholds for fish and marine mammals. Cumulative Distribution Function (CDF) plots of the RMS are shown for the driving of each pile as well as for background levels.

2. Monitoring Equipment and Methodology

2.1 Underwater System Equipment

Measurements were made by a live system and a stationary hydrophone recording system. For the live system, a Reson Model TC-4033 hydrophone was fed through an in-line charge amplifier into a Larson Davis Model 831 Precision Sound Level Meters (LDL 831 SLM) where measurements were observed in real-time. For the stationary hydrophone recording system, a Reson Model TC-4013 hydrophone was fed through a PCB Multi Gain Signal Conditioner (Model 480M122) and into a Roland Model R-05 Solid State Recorder. This unit was deployed via an anchor and buoy or off the construction barge. Following measurements, the recorded files from the stationary hydrophone unit's recorder were played through a calibrated LDL 831 SLM to analyze sound pressure levels.

All field notes were recorded in water-resistant field notebooks. 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.

2.2 Underwater System Acoustic Calibration

The measurement systems were calibrated prior to use in the field with a G.R.A.S. Type 42AA pistonphone and hydrophone coupler. The pistonphone, when used with the hydrophone coupler, produces a continuous 136.4 dB re 1 μ Pa tone for the TC-4033 hydrophones and 145.3 dB re 1 μ Pa tone for the TC-4013 hydrophones at 250 Hertz (Hz). The tone measured by the SLM was recorded at the beginning of the recordings. The system calibration status was checked at the beginning of each measurement day by measuring both the calibration tone and recording the tone on the solid-state digital data recorder. The pistonphones were certified at an independent facility.

2.3 Placement of Hydrophones

Measurements were made at three fixed positions on each day of monitoring in order to compute distances to fish and marine mammal thresholds. The first position was approximately 10 meters from the piles (or as close as possible given site conditions), the second measurement position was between 20 and 50 meters, and the third position was generally over 200 meters. Hydrophones at all positions were placed at approximately mid-depth in the water column. Water depth on the east side of the wharf, where hydrophones were positioned to measure piles driven at Berth #4, was also relatively constant at approximately 6 meters at all hydrophone positions.

2.4 Ambient Sound Data & Environmental Conditions

Current speeds were generally less than 1.0 meter/second but were influenced by tidal shifts. Ambient levels were measured prior to and following pile-driving events at each of the measurement locations. Cumulative Distribution Function (CDF) plots of background measurements are shown in Appendix A. Ambient sound pressure levels were generally between 110-130 dB and at least 10 dB lower than pile driving sound pressure levels. On September 4th, 2020, ambient levels were high at the 230-meter position due to rougher weather conditions in the bay (the 50% CDF was 127 dB re 1 μ Pa). This hydrophone system was not sheltered by the wharf from faster current and larger waves. Pile driving levels were detectable above ambient conditions by impulse measurements and a pulse detection program at all monitoring positions.

Sediments around the Long Wharf consist of a layer of recent Bay mud, approximately 5 to 12 meters in depth, overlying 9 to 18 meters of soft to medium stiff clay (Young Bay Mud), then older stiff clays to bedrock. Depth to bedrock in the area is generally 30 meters or more. The sediments are relatively uniform in the area surrounding the wharf at locations where piles are being driven, so the description of the sediment stratigraphy would apply to all piles driven.

2.5 Bubble Curtain System

To attenuate underwater noise levels during impact driving, a bubble curtain system was used. For the 60-inch piles the bubble curtain ring was fashioned out of a perforated flexible 2-inch inner diameter bull hose. To keep the bubble curtain surrounding the battered pile, the bubble hose was located at least 5 feet from the pile-mudline contact plane and arranged in an oblong shape. The bubble hose ring had a circumference of 50 feet and was perforated by three rows of 1/8th inch holes on 1.1 inch centers. A 1-inch diameter steel cable was attached to the entire length of the bubble hose to prevent it from floating off the bottom, with overlapping ends to ensure

a complete ring was formed. Several buoys were tied to the bubble hose so that its position could be monitored at the surface. The bubble hose was fed by one compressor providing 1,500 cubic feet per minute at a pressure of 150 pounds per square inch. This rate of airflow allowed the bubble hose to meet the Caltrans standard of 3.0 cubic meters/minute/meter.

3. Measurement Results and Analysis

Table 1 summarizes the monitoring results for the installation of 60-inch steel piles at Berth #4 on August 21st, 2020 and September 4th, 2020. The 60-inch pile measured on August 21st, 2020 was driven with 2,312 strikes over approximately 3 hours and 35 minutes and the 60-inch pile measured on September 4th, 2020, was driven with 1,652 strikes over approximately 3 hours and 51 minutes. A bubble curtain was used during the installation of both piles. Both piles were driven with a Junttan HHK16 S hydraulic impact hammer that had a maximum energy rating of approximately 174,000 ft – lbs.

On September 4th, the hydrophone positioned at 230 meters did not capture the final 336 strikes of pile driving. The measured sound levels in the near field on this monitoring date were complex, as levels measured at 14 meters were lower than those measured at 30 meters. This can occur due to the increased effectiveness of the attenuation system near the pile. However, the effect of sound transmitting through substrates, which is not attenuated by the bubble curtain, may have a greater effect at positions further away. While the drop-off rate (transmission loss constant) was computed based on all measurements, a drop-off rate computed between 30 and 230 meters was used to calculate distances to thresholds within 30 and 230 meters.

Table 2 summarizes the distances to exceedance thresholds for fish. The calculation of the cSEL for fish criteria assumes that strikes below 150 dB SEL are effective quiet. Therefore, only strikes that are greater than 150 dB SEL contribute to the cSEL calculation for fish.

Table 3 summarizes the distances to exceedance thresholds for marine mammals based on drop-off rates calculated from sound pressure levels measured at all positions, based on median RMS pulse values. Permanent Threshold Shift (PTS) isopleth distances were calculated using the NOAA Marine Mammal Calculation Guide¹. Distances to PTS thresholds for impact pile driving are reported as the largest isopleth distance of either the Peak or cSEL.

Samples of the median 1/3 octave band spectra for pile installation are included in Appendix B. The median value for each octave band was calculated over eight consecutive strikes. Cumulative Distribution Function plots of the RMS values and Time History plots of all piles are included in Appendices C and D, respectively.

¹ NMFS. 2018 Revision to: Technical Guidance for Assessing the Effects of Anthropogenic Sound on Marine Mammal Hearing Underwater Acoustic Thresholds for Onset of Permanent and Temporary Threshold Shifts (Version 2.0).

Table 1. Summary Statistics for the Installation of 60-inch Steel Piles with a Hydraulic Impact Hammer at Berth #4

Date	# of Strikes	Water Depth at Pile (m)	Msmt Distance from Pile (m)	Water Depth at Msmt (m)	Hydrophone Depth (m)	Peak (dB)			RMS – 90% pulse (dB)				SEL (dB)			cSEL
						Max	Mean	Median	Max	Mean	Median	Pulse Duration	Max	Mean	Median	
8/21	2,312	6	10	6	3	205	187	188	189	173	172	0.1277	181	165	164	204
			33	6	3	181	173	173	167	157	157	0.1984	156	150	151	182
			215	8	3	162	149	149	146	135	135	0.1636	135	128	128	162
9/4	1,652	6	14	6	3	190	180	180	174	166	166	0.1033	167	157	157	190
			30	6	3	194	186	185	180	173	173	0.0678	168	162	162	195
			230 ^a	7	3	170	158	158	155	142	142	0.1685	147	135	135	166

^aThe hydrophone at this position missed the final 336 strikes

Table 2. Distances to Fish Thresholds

Date	Distance (meters)		
	206 dB Peak	150 dB RMS	187 dB cSEL ^a
8/21	< 10	69	23
9/4	< 10	156	55

^aStrikes below 150 dB are considered effective quiet

Table 3. Distances to Marine Mammal Thresholds

Date	PTS Threshold ^a (meters)					Behavioral Harassment Threshold (meters)	Calculated Drop-Off Rates	
	LF	MF	HF	PW	OW	160 dB RMS	RMS	SEL
8/21	36	< 10	39	25	< 10	27	27.4	26.6
9/4	69	14	76	51	14	76	32.1 ^b	30.6 ^b

^aCalculated using the dual metric threshold where the largest isopleth of the peak or cSEL is reported.

^bDrop-off rate calculated between 30- and 230-meter monitoring positions due to complexity of source at nearest hydrophone

LF = Low-Frequency Cetaceans, MF = Mid-Frequency, HF = High-Frequency Cetaceans, PW = Phocid Pinnipeds in Water, and OW = Otariid Pinnipeds in water.



A

Ambient/Background
Sound Pressure Levels



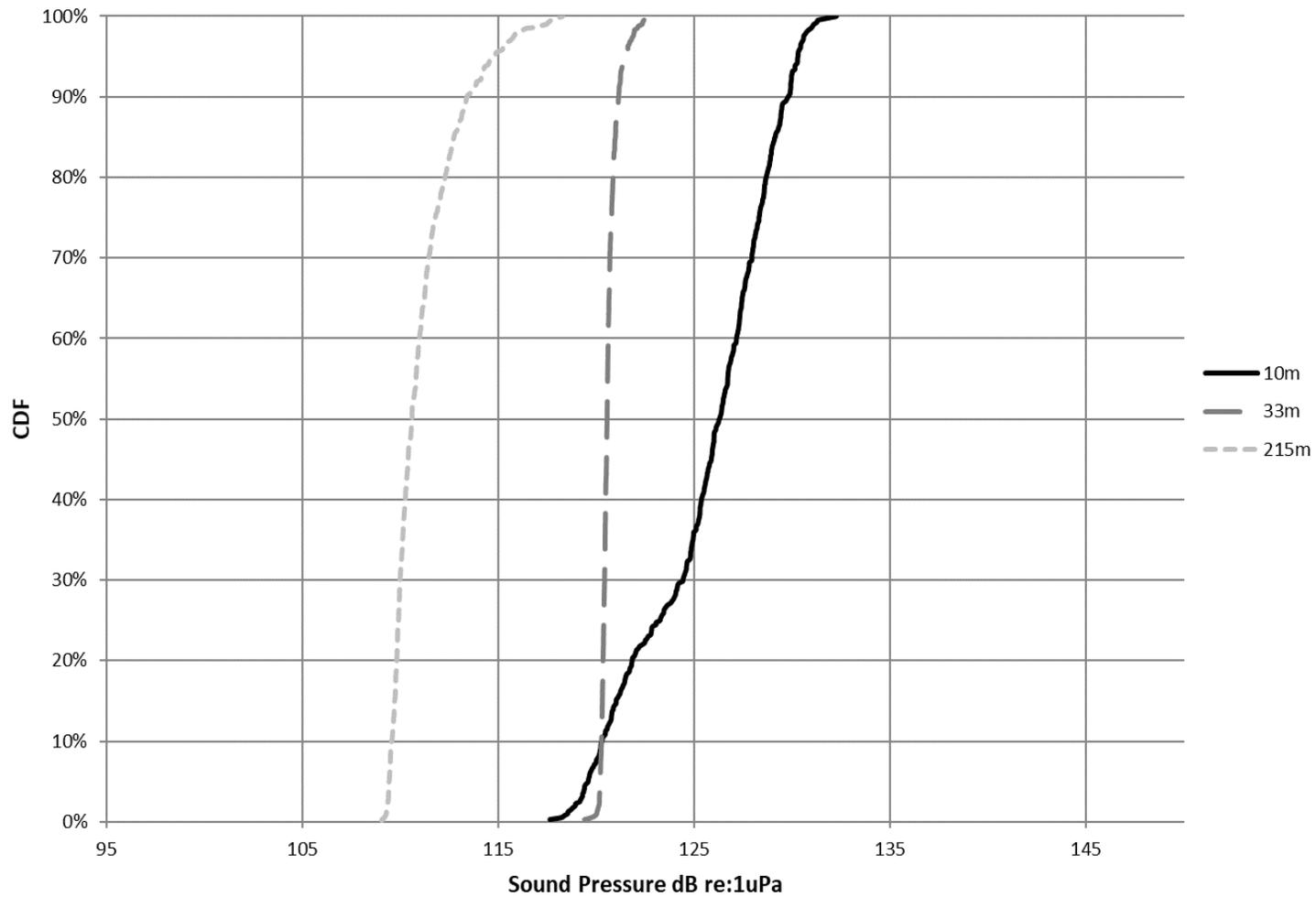


Figure A-1. CDF of Background/Ambient RMS SPL at Hydrophone Positions on August 21st, 2020

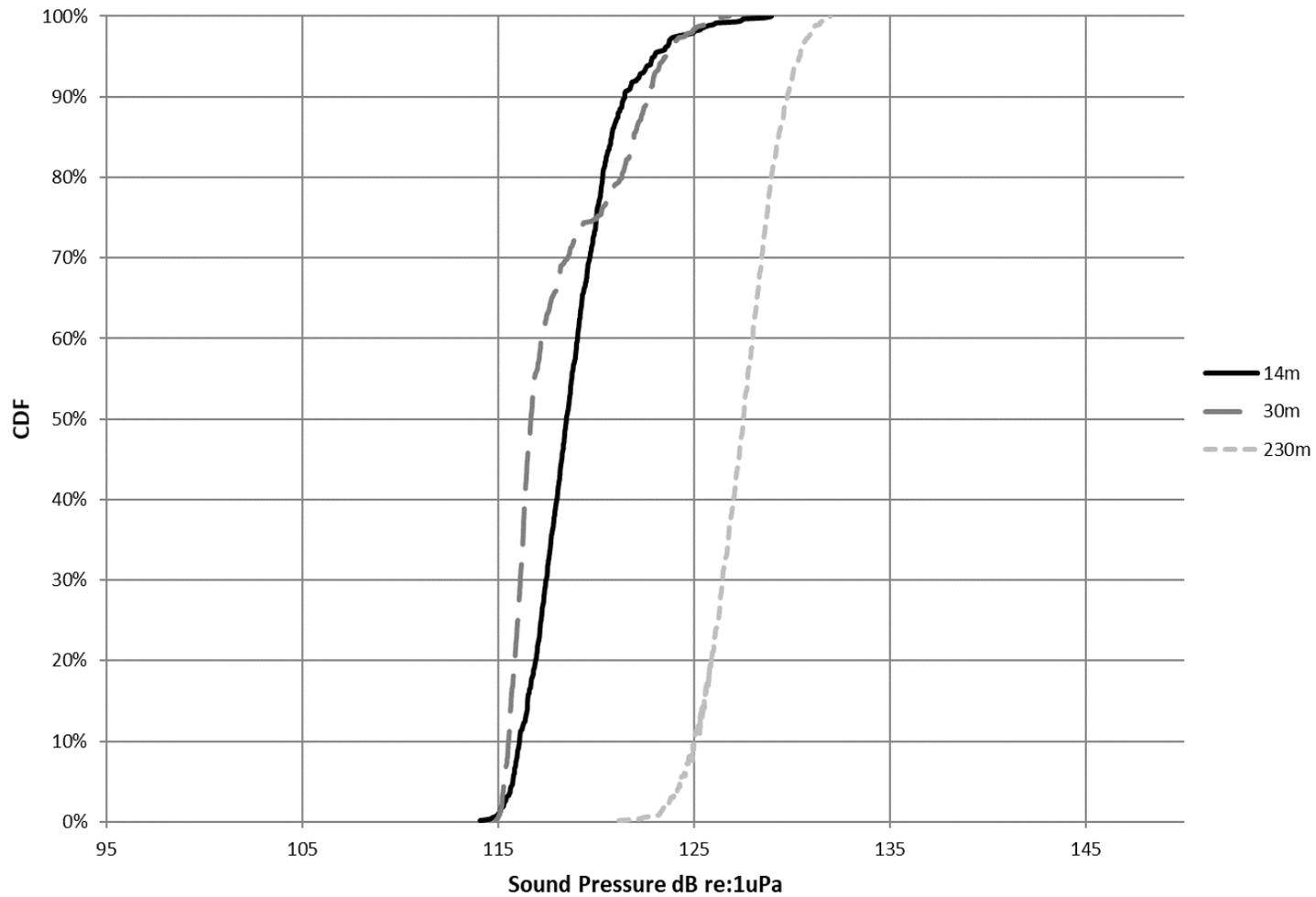


Figure A-2. CDF of Background/Ambient RMS SPL at Hydrophone Positions on September 4th, 2020



B

1/3 Octave Band
Spectrum Plots





Figure B-1. 1/3 Octave Band Plot of Median RMS Values over Eight Pile Strikes During the Installation of a 60-inch Steel Pipe Pile with a Hydraulic Impact Hammer on August 21st, 2020

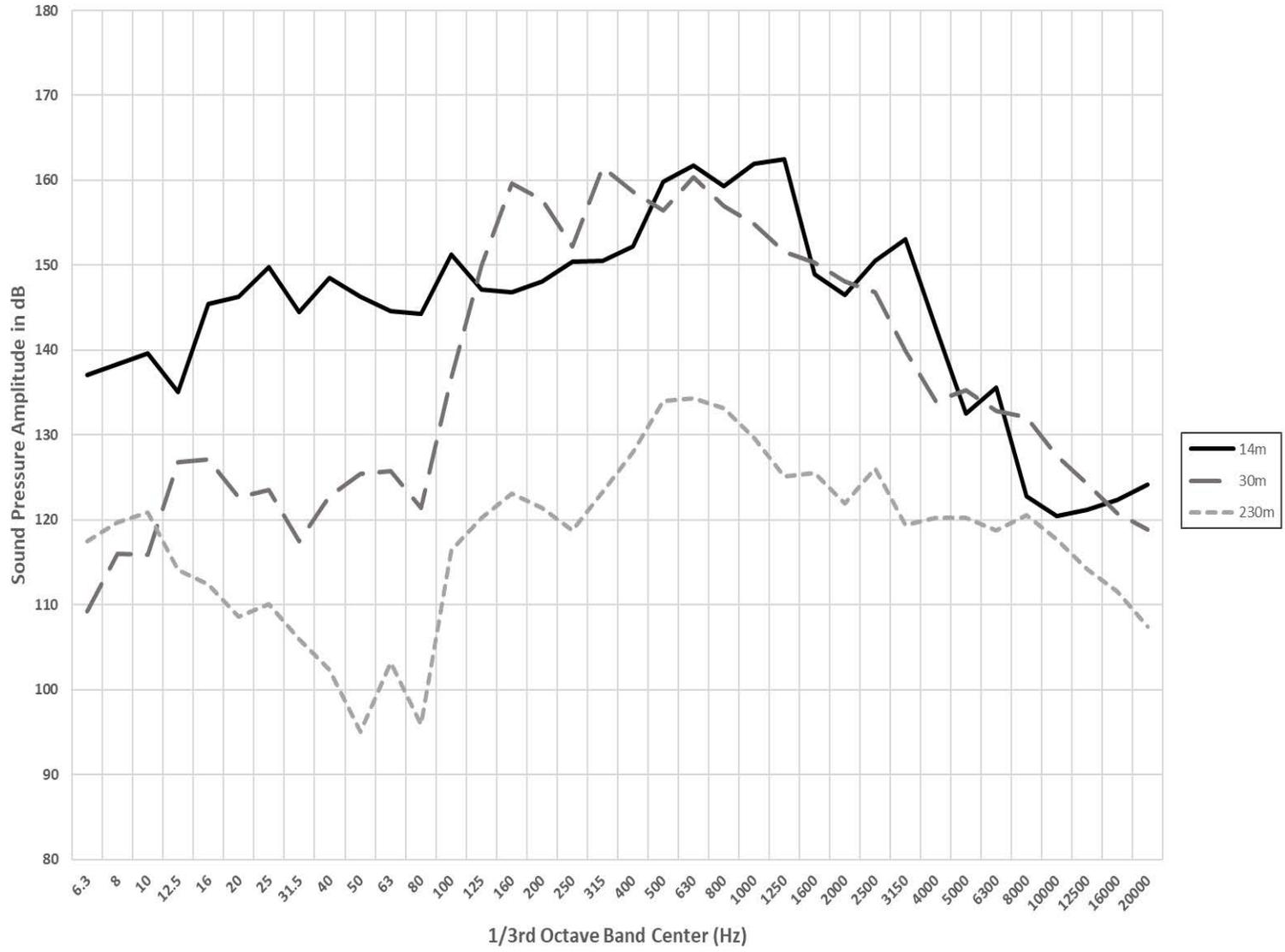


Figure B-2. 1/3 Octave Band Plot of Median RMS Values over Eight Pile Strikes During the Installation of a 60-inch Steel Pipe Pile with a Hydraulic Impact Hammer on September 4th, 2020



C

RMS Cumulative
Distribution Function Plots



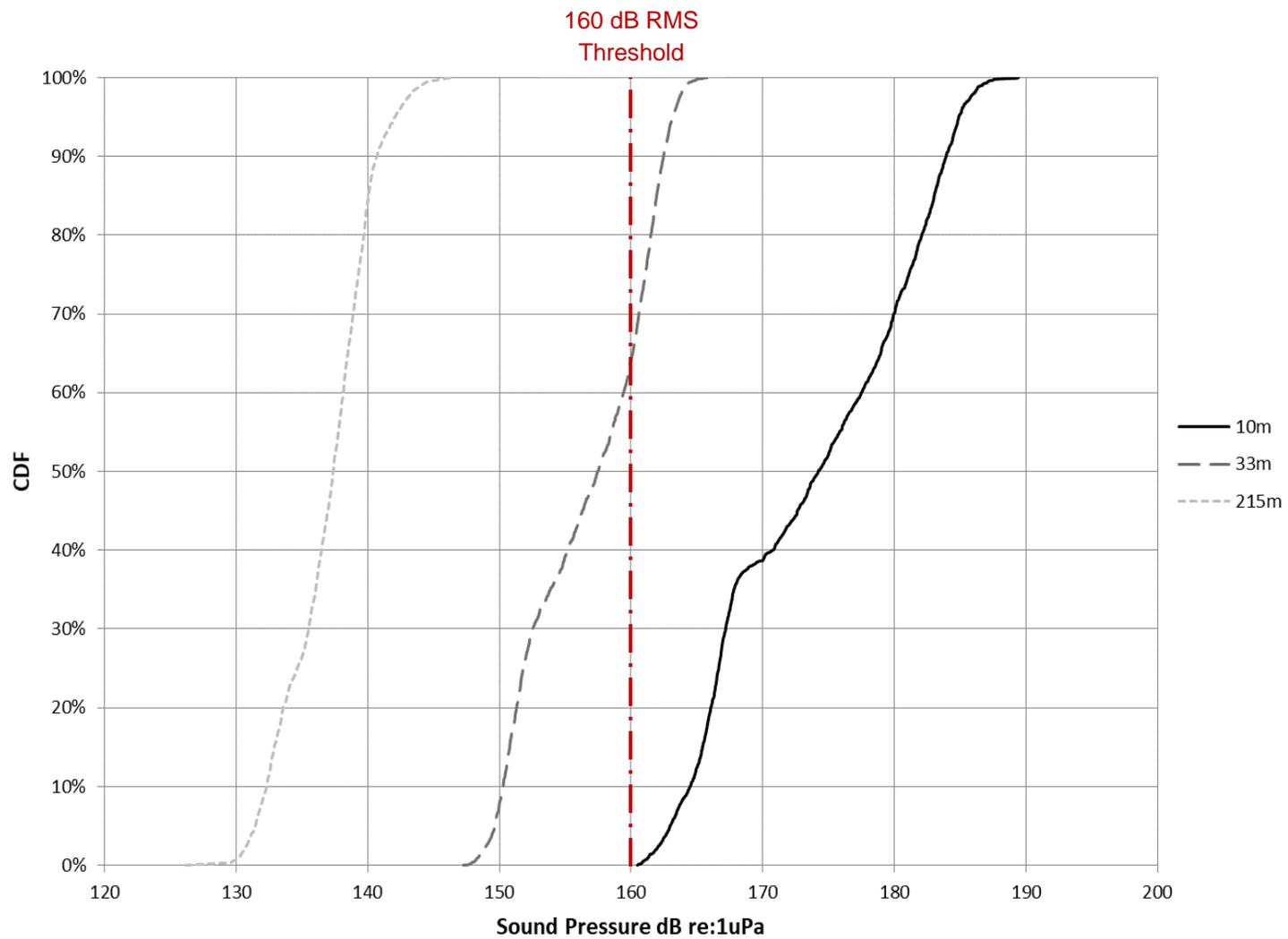


Figure C-1. CDF (RMS values) of the Installation of a 60-inch Steel Pipe Pile with a Hydraulic Impact Hammer on August 21st, 2020

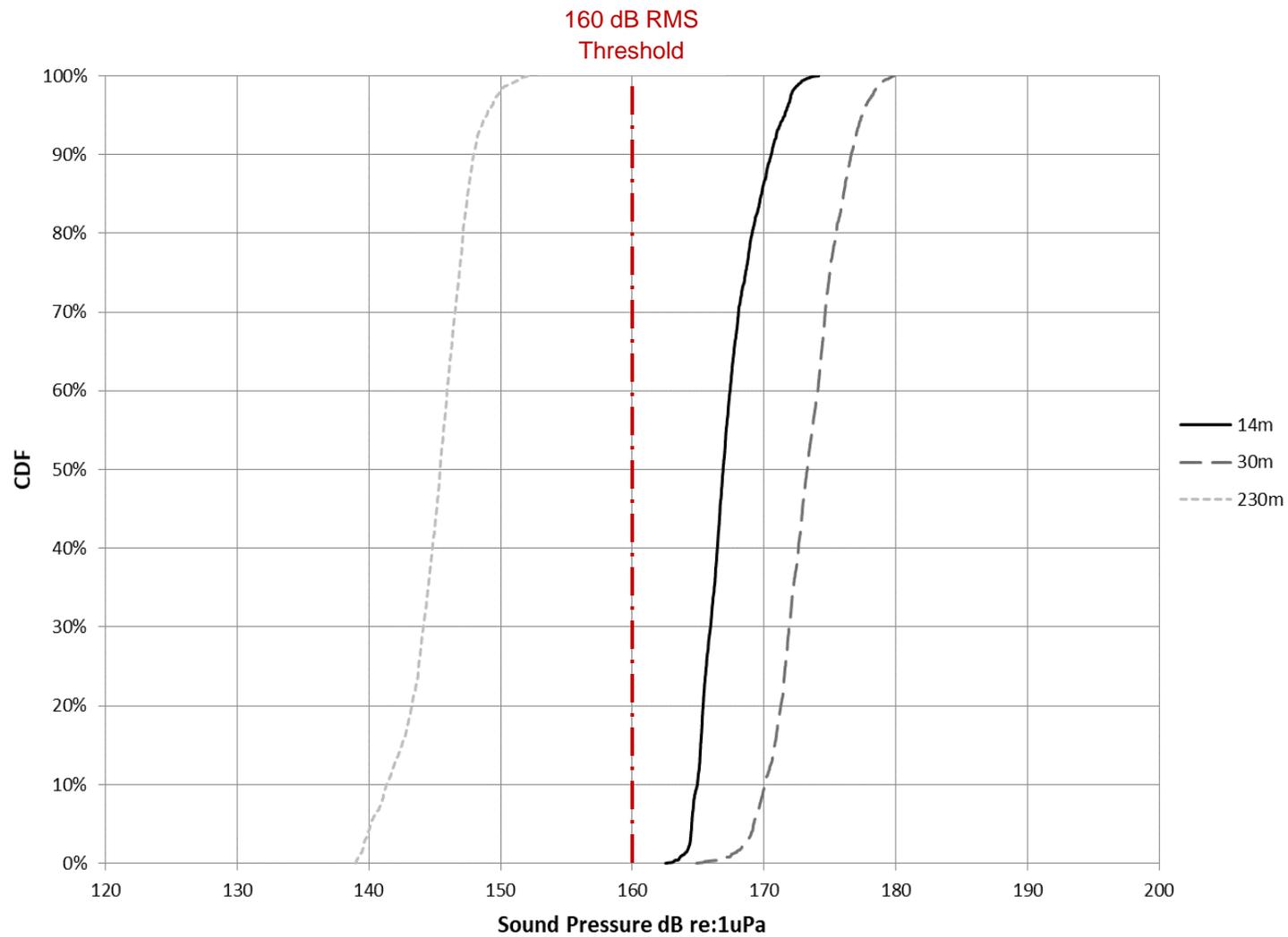


Figure C-2. CDF (RMS values) of the Installation of a 60-inch Steel Pipe Pile with a Hydraulic Impact Hammer on September 4th, 2020



D

Time History Plots



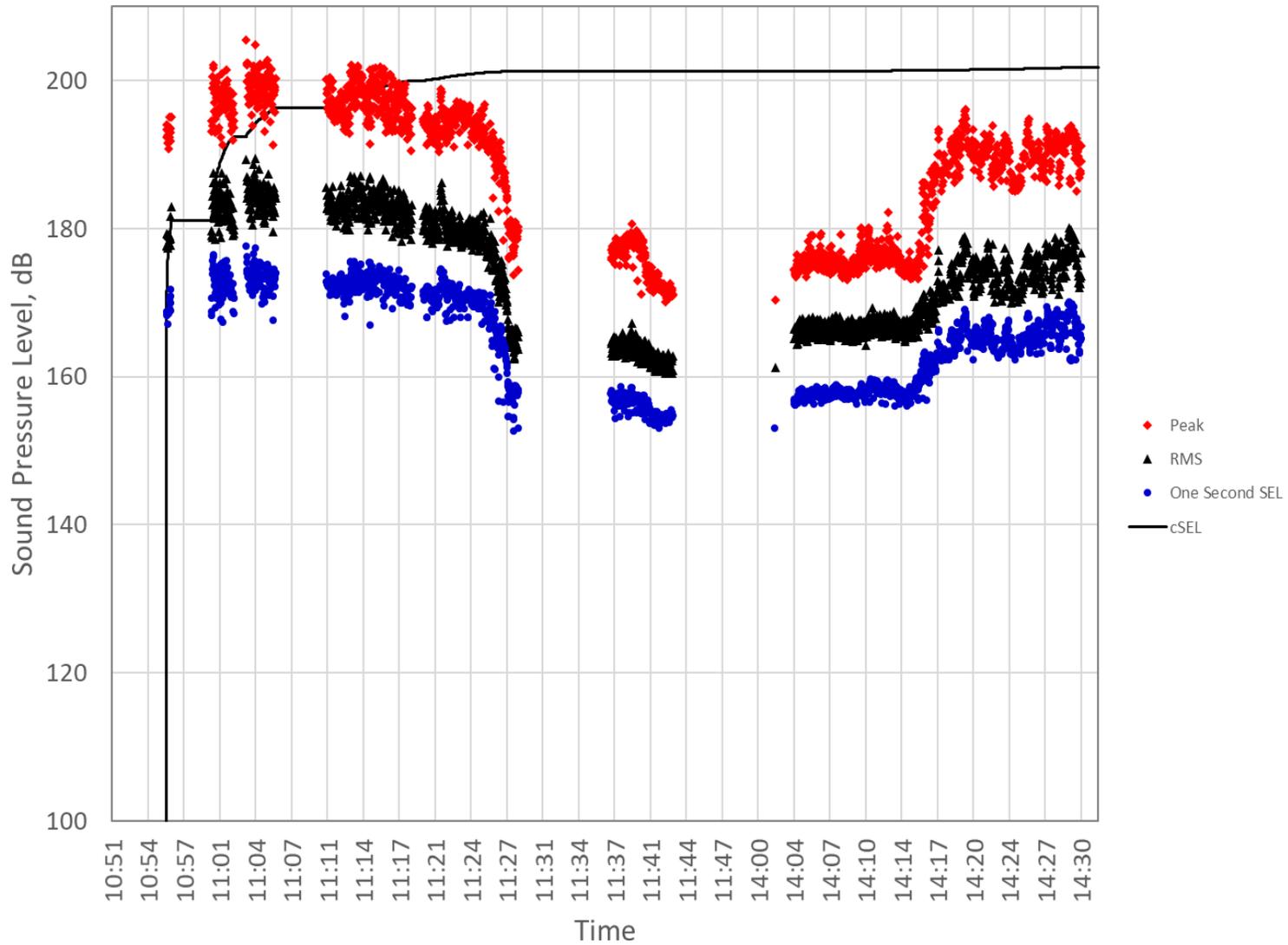


Figure D-1. Time History at 10 meters during Installation of a 60-inch Steel Pipe Pile with a Hydraulic Impact Hammer on August 21st, 2020

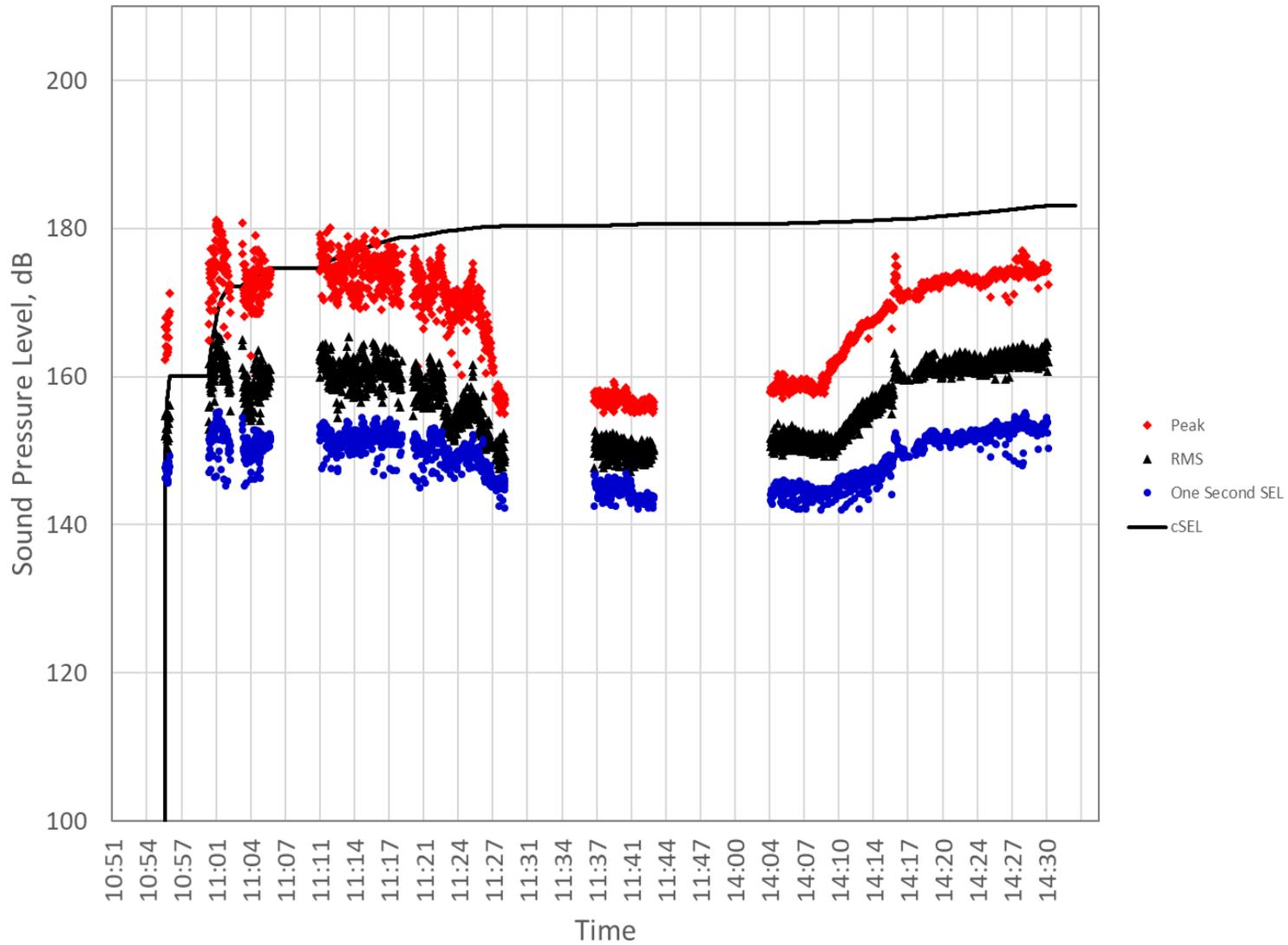


Figure D-2. Time History at 33 meters during Installation of a 60-inch Steel Pipe Pile with a Hydraulic Impact Hammer on August 21st, 2020

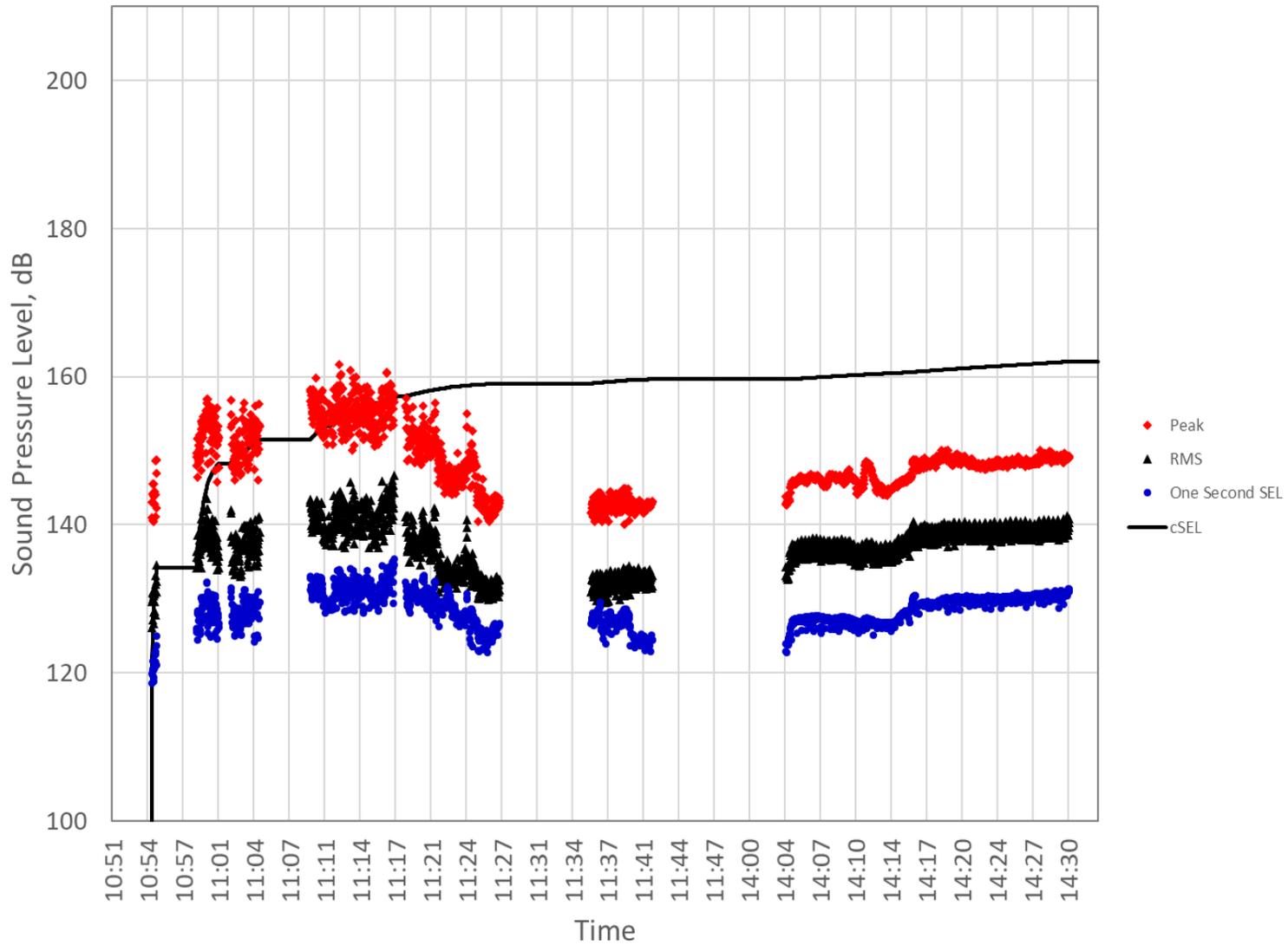


Figure D-3. Time History at 215 meters during Installation of a 60-inch Steel Pipe Pile with a Hydraulic Impact Hammer on August 21st, 2020

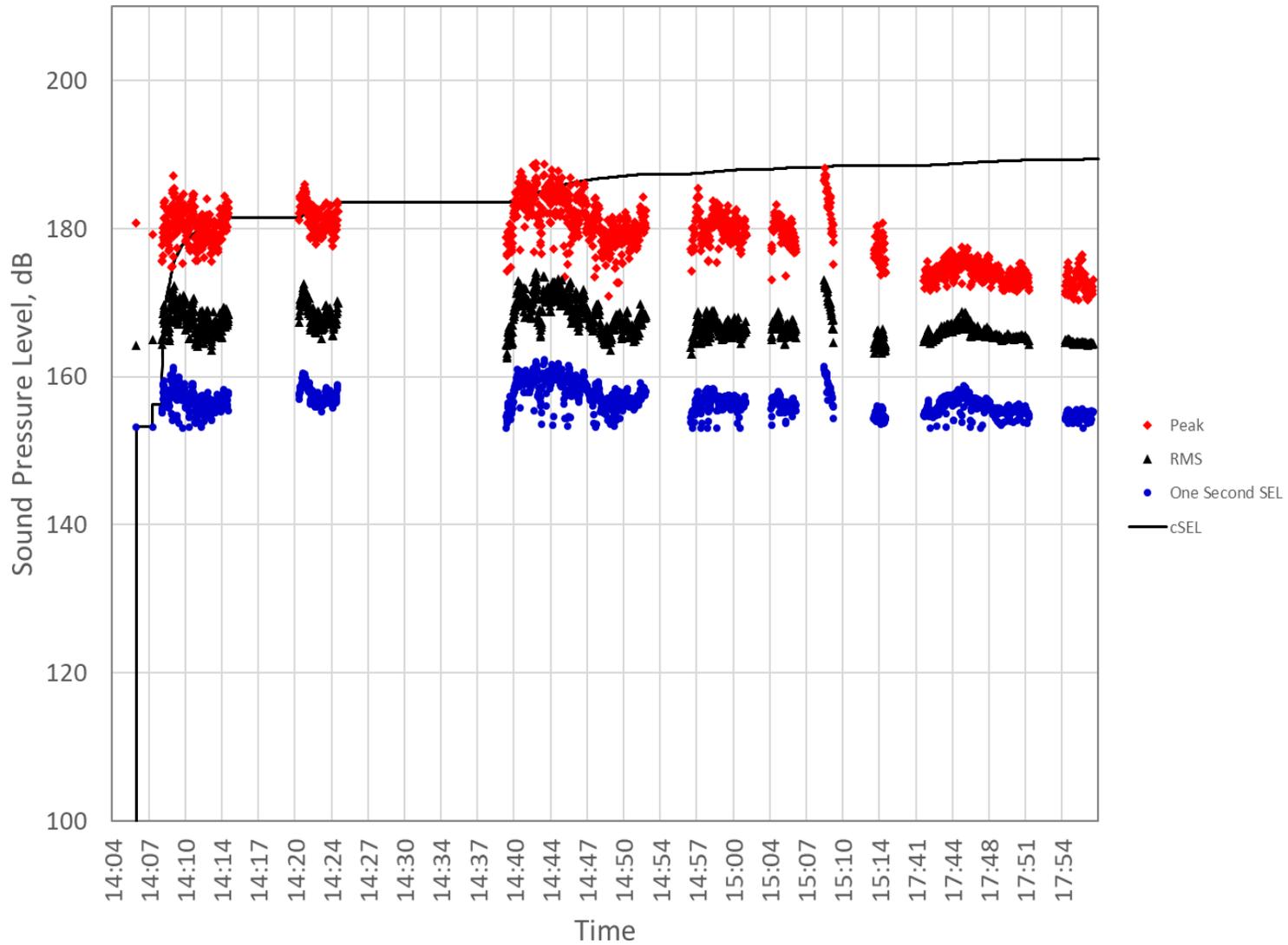


Figure D-4. Time History at 14 meters during Installation of a 60-inch Steel Pipe Pile with a Hydraulic Impact Hammer on September 4th, 2020

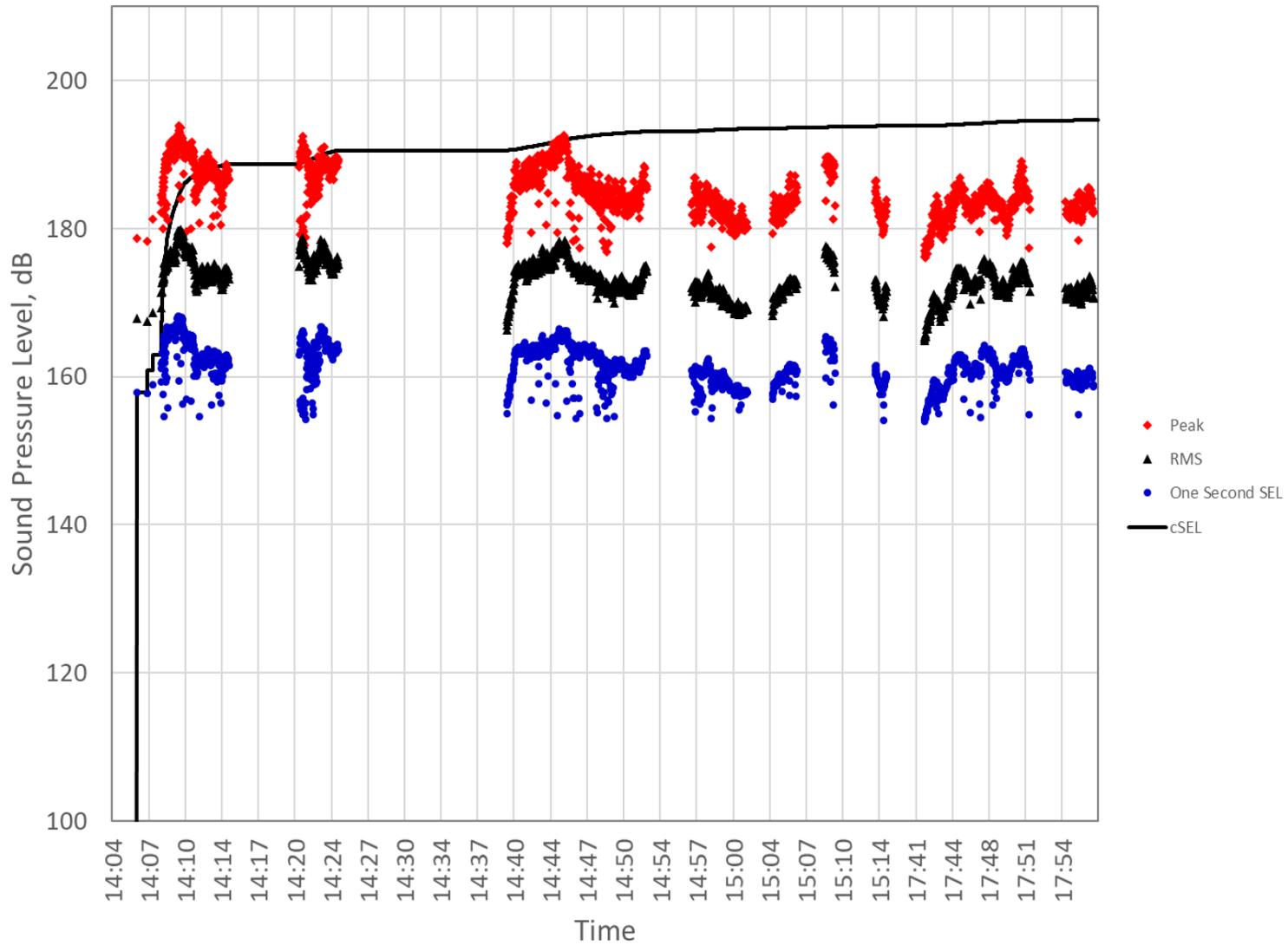


Figure D-5. Time History at 30 meters during Installation of a 60-inch Steel Pipe Pile with a Hydraulic Impact Hammer on September 4th, 2020

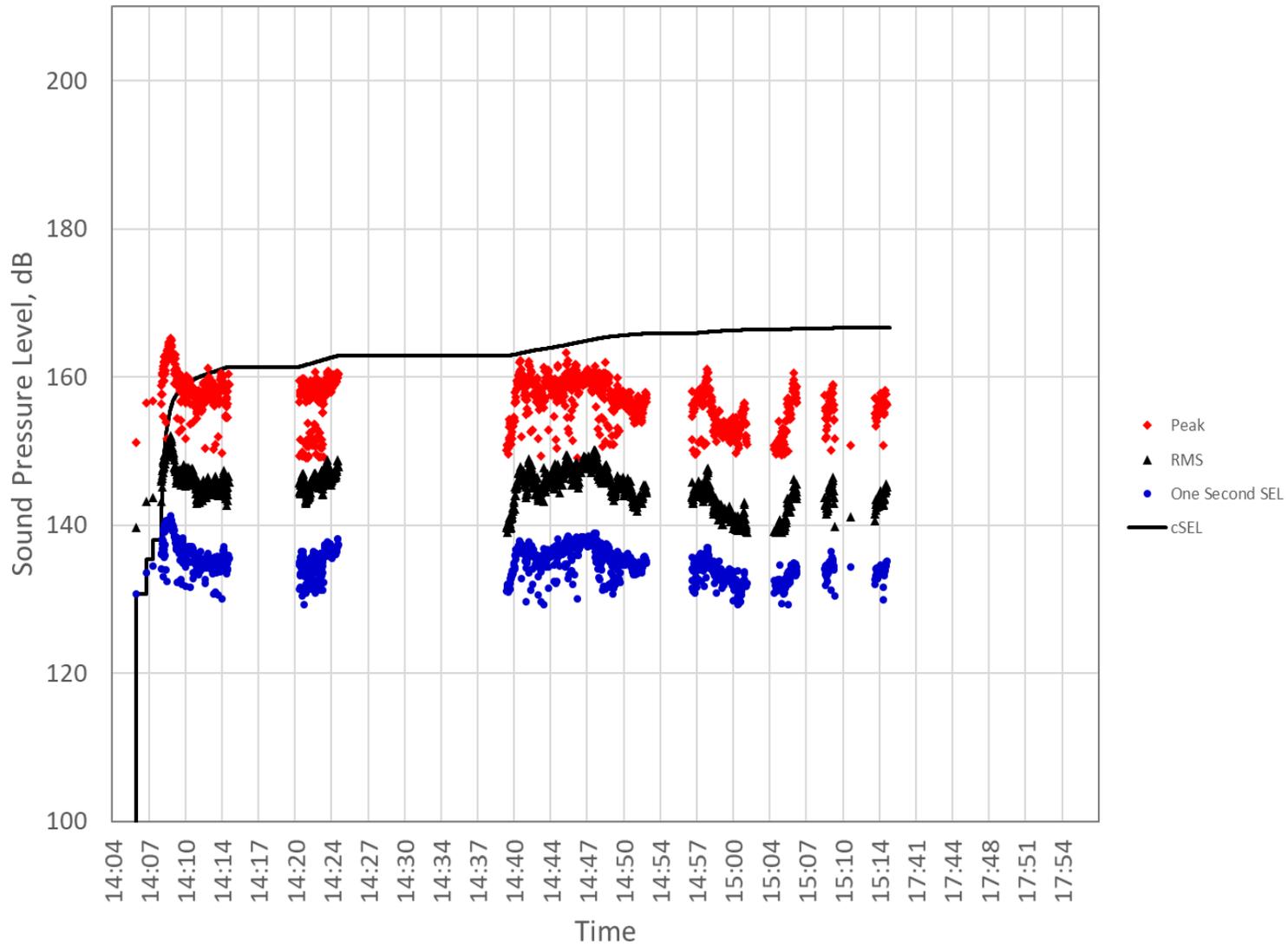


Figure D-6. Time History at 230 meters during Installation of a 60-inch Steel Pipe Pile with a Hydraulic Impact Hammer on September 4th, 2020

