State of California Department of Transportation

San Francisco – Oakland Bay Bridge
East Span Seismic Safety Project

SELF-ANCHORED SUSPENSION CONTRACT

SUMMARY OF WATER QUALITY SELF-MONITORING

CONSTRUCTION MONITORING PERIOD:
May 6 - 9, 2008 and July 23 - 31, 2008

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May 6 - 9, 2008 and July 23 – 31, 2008

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1.0 Summary

Under the Waste Discharge Requirements (WDRs) for the San Francisco – Oakland Bay Bridge East Span Seismic Safety Project (East Span Project), the California Department of Transportation (Caltrans) is required to conduct monitoring and reporting activities according to a Self-Monitoring Program (SMP). Sea Engineering, Inc. (SEI) conducted the required monitoring for Caltrans during the period from May 6 – 9, 2008 and July 23 – 31, 2008 during construction operations related to temporary towers for the Self-Anchored Suspension (SAS) Contract for the East Span Project. This contract erects the superstructure of the self-anchored suspension bridge, including the tower and cables.

As part of construction for the SAS portion of the project, it is necessary to build temporary towers. In May, piles were driven to support the driving frame at Temporary Tower D, which is located just north of Pier T1. In July, construction of Temporary Tower C began. Temporary Tower C is located along the eastern shoreline of Yerba Buena Island (YBI), directly east of the Torpedo Building. This included installation of a turbidity curtain, removal of riprap, and placement of gravel underlain with protective fabric. Sediment resuspension associated with these activities was monitored during May and July.

Instrument monitoring for the months of May and July was conducted at Pier T1. The depth-averaged turbidity measurements for May ranged from 3 to 21 nephelometric turbidity units (NTU) and for July ranged from 1 to 16 NTU. There were no exceedances in turbidity levels during monitoring for these two months.

There were no exceedances in pH, temperature, or dissolved oxygen levels during instrument monitoring for the months of May and July 2008.

Monitoring of these operations resulted in no exceedances in turbidity levels that required action by Caltrans. There were observed plumes from the construction site, but were not found to be in exceedance of water quality parameters.

2.0 Introduction

Caltrans is currently implementing construction activities for the East Span Project. The East Span Project is located in San Francisco Bay between the cities of San Francisco, at YBI, and Oakland. To address potential impacts on special aquatic sites, including eelgrass beds and sand flats, and open waters of the Bay over the estimated fourteen years of bridge construction and dismantling, the California Regional Water Quality Control Board, San Francisco Bay Region (RWQCB) issued WDRs for the East Span Project under Order No. R2-2002-0011.

Under Section B Number 1 and Section C Number 1 of the WDRs, Caltrans is required to prevent increases of turbidity and chemicals of concern in amounts greater than those specified by the RWQCB in the WDRs. To address the turbidity specification, Caltrans has required that

construction take place in accordance with an approved turbidity control plan. This plan outlines turbidity control measures intended to protect the eelgrass beds.

Under Section D Number 12 of the WDRs, Caltrans is required to conduct monitoring and reporting activities according to a SMP. The purpose of the SMP is to document compliance with effluent requirements and prohibitions established by the RWQCB and to facilitate self-policing by Caltrans for the prevention and abatement of pollution arising from dredging and fill activities. Sea Engineering, Inc. is conducting the required monitoring for Caltrans. This report covers monitoring of temporary tower construction operations for the SAS Contract, which extends from approximately 2,200 meters (7,220 feet) off the Oakland Mole to the new YBI anchorage piers.

Additionally, under the National Pollutant Discharge Elimination System (NPDES) Permit for General Construction Activities No. CAS000002 and the NPDES Permit for Caltrans Properties, Facilities, and Activities, No. CAS000003, waste discharge requirements for regulating the discharges of non-storm water associated with construction activity are presented.

In Figures 1 and 2, the construction areas are noted. In Figure 1, background sampling stations are marked by the letter designation BN and BS, where BN stands for Background North, and BS for Background South. The SAS Contract erects the superstructure of the self-anchored suspension bridge, including the tower and cables.

As part of construction for SAS portion of the project, it is necessary to build temporary towers. In May, temporary piles were driven to support the driving frame at Temporary Tower D, which is located just north of Pier T1. In July, construction of Temporary Tower C began. Temporary Tower C is located along the eastern shoreline of YBI, directly east of the Torpedo Building. This included installation of a turbidity curtain, removal of riprap, and placement of gravel underlain with protective fabric. Turbidity water quality monitoring was performed during days in which there were in-water construction operations.

All construction operations were monitored using the water quality monitoring protocols for dredging, fill, and non-storm water discharges to ensure no degradation of water quality occurred.

This monthly report is being submitted in accordance with the monthly reporting requirement in the SMP and monitoring protocol for non-storm water discharges. This report outlines the methods and procedures for measurement and monitoring activities including a map and photo of the site, as well as details of any exceedance of the water quality standards set forth in the WDRs. All results from May and July 2008 are included herein.

3.0 Methods and Procedures

All methods and procedures are summarized in the following section. In addition, detailed field procedures are included in Appendix A.

3.1 Sampling Methods

As specified in the SMP, Table 1 summarizes the constituents for which samples were analyzed during monitoring activities. Turbidity, pH, dissolved oxygen, and water temperature measurements were collected using a YSI 6920 Environmental Monitoring System manufactured by YSI Incorporated. The sampling techniques utilized by the individual probes on the YSI system conform to 40 CFR Section 136 specifications for water quality sampling and measurement. The YSI system was deployed for measurements in a manner consistent with the manufacturer's specifications to ensure accuracy and quality of data collected. Calibrations for the individual probes on the YSI systems followed the manufacturer's specifications (full calibration of all probes at least every 30 days) plus an additional weekly calibration of the dissolved oxygen and turbidity meters was performed to ensure data quality.

Sample Type	**Analysis Method**	**Reporting Period**
Total Suspended Solids (TSS) (mg/L)	E 160.2 correlated with Turbidity	Monthly
Turbidity (NTU)	YSI 6920	Monthly
pH	YSI 6920	Monthly
Dissolved Oxygen (mg/L)	YSI 6920	Monthly
Water temperature (^{o}C)	YSI 6920	Monthly

Table 1. Sample type, method, and reporting period.

Depth-averaging of measurements collected using the YSI system were conducted in waters greater than 1 meter (3 feet) deep due to the possible stratification present in deeper waters. A single measurement was collected at a depth of 0.3 meter (1 foot) in areas shallower than 1 meter (3 feet) and was assumed to be representative of the water column average due to greater vertical mixing of constituents in shallow waters (Fischer et al., 1979). Additionally, samples were only taken in water depths of 0.5 meter (1.5 feet) or more to reduce variability due to local wind and wave action and to help ensure the accuracy of the measurements by reducing the probability of disturbance by sampling equipment.

3.2 Turbidity Monitoring Protocol for Dredging and Fill Operations

The following outlines the specific observations and sampling completed and procedures used during dredging, fill, and placement activities.

Turbidity Sampling

Turbidity measurements were completed along a line every 152 meters (500 feet) or less parallel to the project boundary and 30 meters (100 feet) away (perpendicular) from the project boundary (Figure 3). In cases where a minimum safe distance greater than the distances above had to be maintained by the monitoring vessel, the sampling was conducted just outside the minimum safe distance in the direction of the environmentally sensitive area (ESA). Monitoring was conducted directly inside and along the ESA if the work took place on the ESA boundary. Measurements were taken every two hours while work was being completed, unless an exceedance of allowable limits was noted. If an exceedance was noted, the exceedance protocol described below was initiated.

Due to fluctuations as a result of tides, winds, waves and other natural factors, additional turbidity measurements were taken at the closest north and south background stations (locations identified with a B in Figure 1) every two hours while work was being completed in order to establish a current turbidity background.

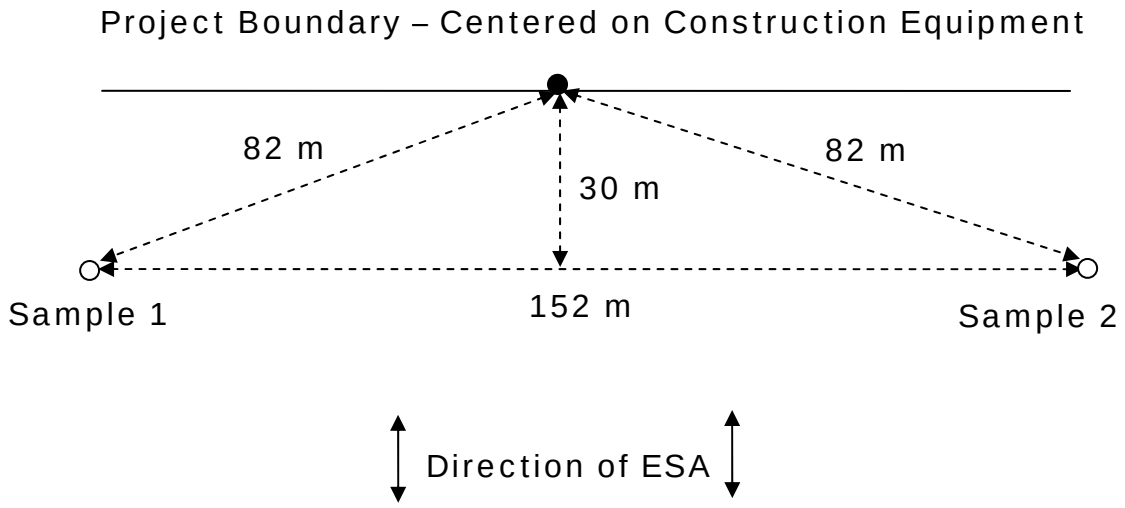


Figure 3. Schematic of sampling locations during turbidity measurements.

Sampling continued after work was halted for as long as the measured turbidity levels exceeded the following criteria:

1. If the background turbidity is less than 50 nephelometric turbidity units (NTU), then the measured turbidity levels may not exceed 50 NTU.

2. If the background turbidity is greater than 50 NTU, the measured turbidity levels may not exceed the background turbidity by more than 10 percent.

Exceedance Procedures

If the analytical results for turbidity showed that any depth-averaged sample exceeded the receiving water limit these procedures, which were developed to implement the SMP, were followed:

1. Confirm exceedance
    a. The sample location would be sampled again within 15 minutes to determine if the exceedance was a continuous event.
    b. If there was still an exceedance, background stations on both the north and south side of the bridge would be sampled to determine if the background still indicated an exceedance near the project area.
    c. If there was still an exceedance, sampling would be carried out in the direction of the ESA to determine if the waters in the vicinity of the ESA were in exceedance of adjacent background stations. This would be to verify that the area of exceedance was moving toward the ESA. If the sampling was already taking place inside the ESA step 2 would be carried out.
2. Acquire confirmation samples at the exceedance location within one hour
    a. If this sample was still in exceedance, the appropriate Caltrans agent (Appendix A) would be immediately notified.
3. Hourly confirmation sampling would continue for four hours and the process below would be implemented by Caltrans.

Caltrans would abide by the following process, as directly specified in the SMP, to address the exceedance:

1. Identify source of exceedance
2. Correct source of exceedance if it was identified as resulting from unnecessary construction activity, malfunctioning equipment, or inadequate turbidity control practices
3. Resample to determine whether exceedance has been corrected

If any receiving water limit for turbidity was exceeded and it was determined that the exceedance posed a potential threat to the ESA for any of the following:

- A continuous period of four hours or more
- Eight hours or more in any one-week period from Oct. 1 – Mar. 31
- Sixteen hours or more in any one-week period from Apr. 1 – Sept. 30

Caltrans would then suspend all construction work causing or contributing to the exceedance, until turbidity levels had fallen below exceedance levels and remained there for a minimum of four consecutive hours. Additionally, Caltrans would implement control measures necessary to prevent a recurrence of the exceedance when work was resumed and would immediately notify the RWQCB by telephone and telefax (Appendix A) of the exceedance and how it was correcting or would correct it.

If any receiving water limit for turbidity was exceeded and it was determined that the exceedance posed a potential threat to the ESA for either of the following:

- Twelve hours or more in any one-week period from Oct. 1 – Mar. 31
- Twenty-four hours or more in any one-week period from Apr. 1 – Sept. 30

Caltrans would then halt the construction activity causing the exceedance, until the cause of the violation was found and sampling demonstrated that the exceedance was corrected, or when Caltrans had provided the RWQCB with a corrective action plan, acceptable to the Executive Officer, that provided alternative methods of compliance. Caltrans would immediately notify the RWQCB by telephone and telefax of the exceedance and of how they were correcting or would correct the exceedance.

As part of the monitoring protocol developed to implement the SMP, Sea Engineering, Inc. would file a report with Caltrans on the day of exceedance that would include:

- A map showing the location of the areas of exceedance
- Duration of the exceedance
- Nature of effects (i.e., all pertinent observations and analyses)

Multiple Project Areas

When simultaneous construction activities (e.g., pile dredging and pile cleanout) occurred more than 274 meters (900 feet) apart, each construction area had distinctive turbidity measurements located no more that 30 meters (100 feet) beyond the boundary of that particular area unless a greater distance was required for safety reasons as noted under Section 3.3 - Turbidity Sampling. If simultaneous construction areas occurred more than 30 meters (100 feet) apart, but less than or equal to 274 meters (900 feet) apart, one set of turbidity measurements was used for both areas. The stations closest to the ESA were chosen for measurement.

3.3 Water Quality Monitoring Protocol for Non-Storm Water Discharges

The following outlines the specific observations and sampling completed and procedures used during non-storm water discharge operations.

Standard Observations

The following observations were recorded every day required during operations:

1. Receiving water:
    a. Floating and suspended materials of waste origin (to include oil, grease, algae, and other macroscopic particulate matter): presence or absence, source and size of affected area.
    b. Discoloration and turbidity: description of color, source and size of affected area.
    c. Odor: presence or absence, characterization, source, distance of travel and wind direction.
    d. Water fowl or aquatic wildlife: presence or absence.
    e. Hydrographic condition: time and height of corrected low and high tides; and depth of water columns and sampling depths.
    f. Weather condition: air temperature, wind direction and velocity, and precipitation.
2. Progress and location of active pile dewatering and control measures were noted on a map of the site.

Water Quality Sampling

Depth-averaged turbidity, pH, water temperature, and dissolved oxygen measurements were completed within 3 meters (10 feet) maximum from the outfall. Depth-averaging was only conducted for waters greater than 1 meter (3 feet) in depth. In cases where a minimum safe distance had to be maintained by the monitoring vessel that was greater than the distance above, sampling was conducted just outside the minimum safe distance in the direction of the ESA. Sampling was begun within 10 minutes of system start-up at each cofferdam location. Samples were then taken every 2 hours while work was being completed, and upon cessation of initial discharge.

Due to fluctuations as a result of tides, winds, waves and other natural factors, additional depth-averaged turbidity, pH, temperature, and dissolved oxygen measurements were taken at the appropriate background stations to establish a current water quality background. Two background stations (designated BN and BS) were chosen 274 meters (900 feet) outside the perimeter of the construction locations as shown in Figure 1.

Exceedance Procedures

Discharges shall not cause waters of the State to exceed the following quality limits at any time during construction activities:

1. If the background turbidity was less than 50 NTU, then the measured turbidity levels could not exceed 50 NTU.
2. If the background turbidity was greater than 50 NTU, the measured turbidity levels could not exceed the background turbidity by more than 10 percent.
3. pH: A variation of natural background by more than 0.5 pH
4. Dissolved Oxygen: 5.0 mg/L minimum
5. Dissolved Sulfide: 0.1 mg/L maximum

If any results showed that a field sample exceeded any receiving water limit, the following procedures were followed:

Confirm exceedance

a. The sample location will be sampled again within approximately 15 - 20 minutes to determine if the exceedance is a continuous event.
b. If there is still an exceedance, background stations on both the north and south side of the bridge will be sampled to determine if the background still indicates an exceedance near the project area.
c. If there is still an exceedance, sampling will be carried out closer to the ESA to determine if the waters in the vicinity of the ESA are in exceedance of adjacent background stations. This is to verify that the area of exceedance is moving toward the ESA. If the sampling is already taking place inside the ESA step 2 will be initiated.

Caltrans will then follow the procedures below to address any verified exceedance:

1. The Engineer shall be immediately notified by Sea Engineering, Inc.
2. If it is determined that the exceedance is not caused by a regional event, the discharge operation shall be terminated (the pumps shall be shut down) by the Engineer until corrective actions are in place and functioning.
3. Monitoring shall resume (i.e., inspection, observation, and sampling will occur one hour prior to the restart of discharge, within the first 10 minutes of initial discharge, every four hours during continuous discharge operations, and upon cessation of discharge).

4.0 Monitoring Results and Discussion

Operations for the construction of temporary towers were monitored daily as needed during the months of May and July to verify that no water quality degradation was occurring. Water quality monitoring was conducted in the vicinity of Pier T1 during days in which there were in-water construction operations. Water quality (turbidity) sampling was conducted to the north and south of the derrick barge, from which all construction activity was conducted, as well as sampling at the corresponding background stations to the north (BN) and south (BS).

Instrument monitoring for the months of May and July was conducted at Pier T1. The depth-averaged turbidity measurements for May ranged from 3 to 21 NTU and for July ranged from 1 to 16 NTU. There were no exceedances in turbidity levels during monitoring for these two months.

There were no exceedances in pH, temperature, or dissolved oxygen levels during instrument monitoring for the months of May and July 2008. All measured results are included in Appendix C.

TSS measurements were collected for the first three weeks of sampling in June and July, 2002, to construct a TSS versus turbidity curve. Figure 4 shows a linear fit to the TSS and turbidity data for the measured sites. The equation for the line is:

$$TSS = 1.29 + 1.49 \cdot Turbidity \qquad (1)$$

where TSS is the total suspended solids in (mg/L) and Turbidity is the turbidity measurement in NTU. This line fits the available data with a correlation coefficient (r) of 0.94 and standard error (S) of 3.9 mg/L which both denote a strong curve fit over the range of data. Under Section D Number 20 of the WDRs, turbidity meters are required to be calibrated with grab samples to reduce the error in measurements to less than 100 mg/L. The standard error of 3.9 mg/L over the measured range is much less than the required 100 mg/L limit; therefore, TSS grab samples were discontinued.

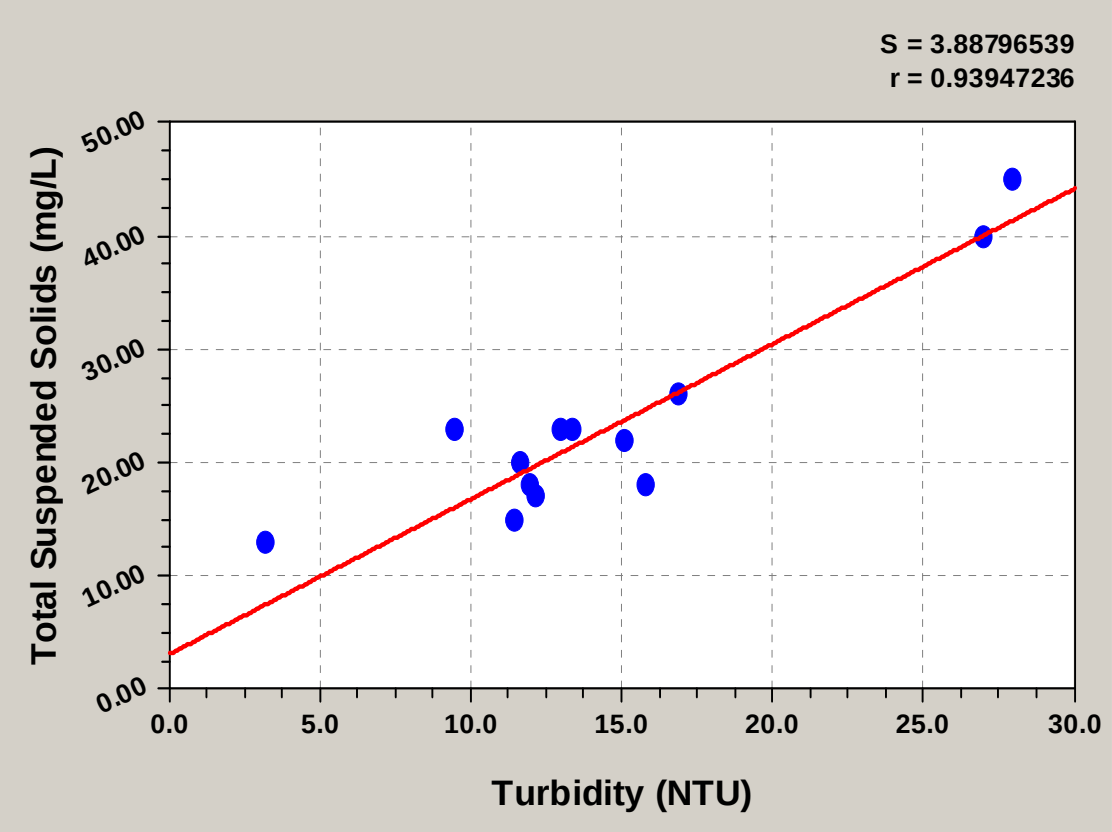


Figure 4. Total suspended solids versus turbidity including curve fit from Equation 1.

Measurements were conducted throughout each day according to the procedures outlined in the previous section. A daily report of the measurements was generated every day with comments on any exceedance. These reports are available directly from Sea Engineering, Inc. or Caltrans. A sample report is included in Appendix B.

A summary of daily turbidity data during temporary tower construction operations is located in Appendix C and a summary of water quality data during non-storm water discharge operations is located in Appendix D.

The potential for pile driving to produce turbidity has been evaluated on previous contracts. It was found that pile driving in deeper water, as at temporary Tower D, does not produce a measurable increase in turbidity. The evaluation of pile driving for this contract indicates the same. The following summarizes the monitoring results:

On 5/6 - ambient turbidity was high, so differences in construction and background turbidity are inconclusive.
On 5/7 - ambient is reduced and during the day the southern background turbidity is greater than the construction turbidity during an ebb tide (sediments traveling from background to construction)

On 5/8 - background turbidity is higher than construction. In a calmer condition, this is the most probable natural condition because the water is deeper at the pier.
On 5/9 - the trend on 5/8 is continued.

Overall, there was no indication that the pile driving increased turbidity in the area. Therefore, monitoring of the activity was discontinued.

5.0 Summary and Conclusions

Water quality monitoring for the months of May and July 2008 was conducted during pile driving for the driving frame at Temporary Tower D and various activities related to construction of Temporary Tower C. Monitoring of these operations resulted in no exceedances in turbidity levels that required action by Caltrans. Furthermore, pile driving did not produce a measurable increase in turbidity. There were observed turbidity plumes from the construction site, but were not found to be in exceedance of water quality parameters.

6.0 References

Fischer, H., List, E., Koh, R., Imberger, J., and Brooks, N. (1979). Mixing in inland and coastal waters. Academic Press, New York, NY.

Appendix A – Procedures for Observations and Sampling

Sea Engineering, Inc
Procedures for Observations and Sampling
San Francisco – Oakland Bay Bridge
East Span Seismic Safety Project

Prepared for

California Department of Transportation

The following outlines the specific observations and sampling to be completed by Sea Engineering in support of Caltrans' WDR.

Turbidity Monitoring for Dredging, Excavation, and Fill Placement Activities

24 Hour Background Sample

1. Prior to start of dredging, excavation, or fill activities, background water samples will be collected from at least 274 m (900 ft) from active areas of the site.

2. The background station closest to the current dredging, excavation, or fill work will be selected for the 24-hour background sample (shown in Figure 1 as B035 and B036). These samples shall be analyzed for turbidity (NTU), pH, Dissolved Oxygen (mg/L), and Temperature (^{0}C).

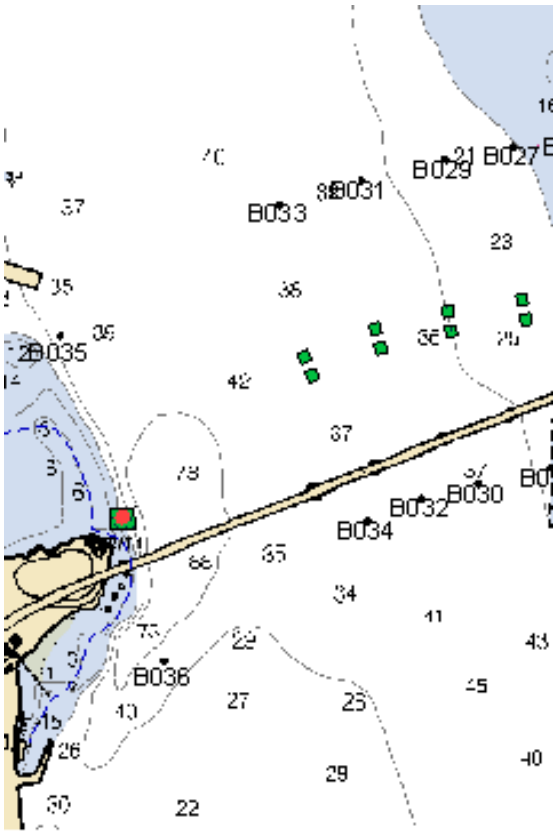


Figure 1. Locations of background stations (numbered black dots B035 and B036), and ESA boundary (dashed blue line).

3. Standard observations (defined below) will also be recorded at this site.

Standard Observations

a. Floating and suspended materials of waste origin (to include oil, grease, algae, and other macroscopic particulate matter): presence or absence, source and size of affected area.
b. Discoloration and turbidity: description of color, source and size of affected area.
c. Odor: presence or absence, characterization, source, distance of travel and wind direction.
d. Hydrographic condition: time and height of corrected low and high tides; and depth of water columns and sampling depths.
e. Weather condition: air temperature, wind direction and velocity, and precipitation.

Turbidity Sampling

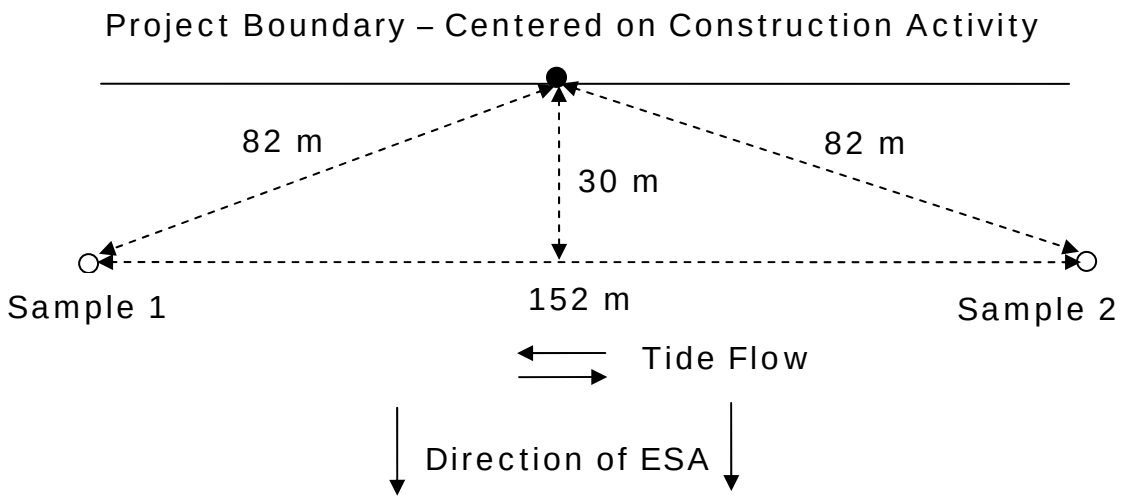
Turbidity measurements will be taken at the North and South background stations closest to the project boundary every 2 hours while work is being completed. This will establish a current turbidity background. The highest background level will be used to establish the maximum background for the project waters. Any change in standard observations will be noted.

Turbidity measurements will be completed along the project boundary as shown conceptually below to determine effects of construction on the receiving waters. The project boundary is defined as the daily limits of dredging, excavation, or fill including the perimeter of safe vessel operation near the construction equipment and other navigational obstructions. Actual monitoring locations will be determined in the field to account for tidal conditions, equipment configuration, construction methods, etc. Samples will be taken every 2 hours while work is being completed. Any change in standard observations will be noted.

Due to fluctuations as a result of tides, winds, waves and other natural factors, additional depth-averaged turbidity and pH measurements will be taken at the appropriate background stations to establish a current water quality background. Background stations have been chosen 274 m (900 ft) outside the perimeter of the cofferdam locations as shown in Figure 1. Background stations will be added as needed if required by ongoing construction.

If measured turbidity levels exceed the following criteria then Exceedance Procedures must be followed:

- If the background turbidity is less than 50 NTU, then the measured turbidity levels may not exceed 50 NTU.
- If the background turbidity is greater than 50 NTU, the measured turbidity levels may not exceed the background turbidity by more than 10%.



Exceedance Procedures

If any analytical results for turbidity show that any grab sample exceeds any receiving water limit the following procedures will be followed:

1. Confirm exceedance
    a. The sample location in exceedance will be sampled again within 15 minutes to determine if the exceedance is a continuous event.
    b. If there is still an exceedance, background stations on both the North and South side of the bridge will be sampled to determine if the background still indicates an exceedance near the project area.
    c. If there is still an exceedance, sampling will be carried out closer to the Environmentally Sensitive Area (ESA) along a direct line from the dredging to determine if the waters in the vicinity of the ESA are in exceedance of adjacent background stations. The background stations closest to this sample will additionally be sampled to verify that the area of exceedance is moving towards the ESA. If it is not in exceedance, normal 2 hour sampling will continue.
2. Acquire confirmation samples at exceedance location within 1 hour
    a. If this sample is still in exceedance, the appropriate Caltrans agent (see below) will be immediately notified.
3. Hourly confirmation sampling will continue until turbidity levels are not in exceedance. Continuous communication lines will be kept open with Caltrans and the contractor.
4. A report will be filed with Caltrans on the day of exceedance and will include:
    - A map showing the location of the areas of exceedance
    - Duration of the exceedance
    - Nature of effects (i.e., all pertinent observations and analyses)

Multiple Project Areas

If simultaneous constructions activities (e.g., multiple pile driving locations, multiple dredging locations or similar) occur more than 274 m (300 yd) apart, each construction area will have distinctive turbidity measurements located no more that 30 m (100 ft) beyond the boundary of that particular area. If simultaneous construction areas occur more that 30 m (100 ft), but less that or equal to 274 m (300 yd) apart, one set of turbidity measurements will be used for both areas. The station closest to the ESA will be chosen for measurement.

Water Quality Monitoring Protocol for Dewatering Operations

The following outlines the specific observations and sampling to be completed by Caltrans and procedures to be used.

Standard Observations

The following observations shall be recorded on every day required during operation:

1. Receiving water:
    a. Floating and suspended materials of waste origin (to include oil, grease, algae, and other macroscopic particulate matter): presence or absence, source and size of affected area.
    b. Discoloration and turbidity: description of color, source and size of affected area.
    c. Odor: presence or absence, characterization, source, distance of travel and wind direction.
    d. Water fowl or aquatic wildlife: presence or absence.
    e. Hydrographic condition: time and height of corrected low and high tides; and depth of water columns and sampling depths.
    f. Weather condition: air temperature, wind direction and velocity, and precipitation.
2. Progress and location of active cofferdam dewatering and control measures, noted on a map of the site.
3. At least one photograph will be taken of the dewatering operation on each day of operation.

Water Quality Sampling

Dewatering operations generally will be conducted in two phases. The initial phase of dewatering is to bring the water level down to a working level. The second phase is to maintain the water level. The second phase is referred to as maintenance dewatering.

Depth-averaged turbidity, dissolved oxygen, and pH measurements will be completed within 3 meters maximum from the dewatering outfall. Depth-averaging will only be conducted for waters greater than 1 meter in depth. In cases where a minimum safe distance must be maintained by the monitoring vessel that greater than the distances above, the sampling will be conducted just outside the minimum safe distance in the direction of the Environmentally Sensitive Area (ESA). Sampling will begin within 15

minutes of system start-up at each pier location. Samples will then be taken every 2 hours while work is being completed, and upon cessation of initial dewatering discharge.

Due to fluctuations as a result of tides, winds, waves and other natural factors, additional depth-averaged turbidity and pH measurements will be taken at the appropriate background stations to establish a current water quality background. Background stations will be added as needed if required by ongoing construction. Background stations have been chosen 274 m (900 ft) outside the perimeter of the cofferdam locations as shown in Figure 1.

The same monitoring procedures outlined above will also be followed for maintenance dewatering of cofferdams. For a period of fives days following initial dewatering, and once maintenance pumps are activated, monitoring of the maintenance pumps will occur twice daily to adequately characterize the maintenance discharge pumps. After this initial week of monitoring, each dewatering activity will be monitored once a week until maintenance pumping is ceased, unless less frequent monitoring is determined to be appropriate.

Exceedance Procedures

Discharges shall not cause waters of the State to exceed the following quality limits at any time during construction activities:

1. If the background turbidity is less than 50 NTU, then the measured turbidity levels may not exceed 50 NTU.
2. If the background turbidity is greater than 50 NTU, the measured turbidity levels may not exceed the background turbidity by more than 10%.
3. pH: A variation of natural background by more than 0.5 pH
4. Dissolved Oxygen: 5.0 mg/L minimum

If any results show that a field sample exceeds any receiving water limit these procedures will be followed:

5. Confirm exceedance
    a. The sample location will be sampled again within 15 minutes to determine if the exceedance is a continuous event.
    b. If there is still an exceedance, background stations on both the North and South side of the bridge will be sampled to determine if the background still indicates an exceedance near the project area.
    c. If there is still an exceedance, sampling will be carried out closer to the ESA to determine if the waters in the vicinity of the ESA are in exceedance of adjacent background stations. This is to verify that the area of exceedance is moving towards the ESA. If the sampling is already taking place inside the ESA step 2. will be carried out.

Caltrans will follow the procedures below to address a verified exceedance:

1. The Engineer shall be immediately notified by Sea Engineering, Inc..
2. The pumping operation shall be terminated (the pumps shall be shut down) by the Engineer until corrective actions are in place and functioning.
3. Monitoring shall resume (i.e. inspection, observation, and sampling will occur one hour prior to the restart of discharge, within the first 10 minutes of initial discharge, every four hours during continuous discharge operations, and upon cessation of discharge).

Sampling Methods

Turbidity, pH, and dissolved oxygen measurements will be collected using a YSI 6920 Environmental Monitoring System. The sampling techniques utilized by the individual probes on the YSI system conform to 40 CFR Section 136 specifications for water quality sampling and measurement. The YSI systems will be deployed for measurements in a manner consistent with the manufacturer's specifications to ensure accuracy and quality of data collected. Calibrations for the individual probes on the YSI system will follow the manufacturer's specifications (full calibration of all probes at least every 30 days and weekly checks to ensure data quality).

Records Maintained

Written reports, calibration, maintenance records, and other records will be maintained by Caltrans and accessible at all times. Records will be kept for a minimum of 3 years. Records will include notes and observations for each sample as follows:

1. Identity of each sample, sampling station, and observations station by number.
2. Date and time of sampling.
3. Date and time analyses are started and completed and the name of personnel conducting analyses.
4. Complete procedure used, including methods of preserving and analyzing sample and identity and volume or reagents used. A reference to a specific section of Standard Methods is satisfactory.
5. Calculation of results.
6. Results of analyses and/or observations, including a comparison of the laboratory and field results for duplicate samples, and detection limits for each analysis.
7. Records will include a map or maps of the site showing the sampling locations, work areas (e.g. cofferdams, dredging areas, etc.), photographs, and all other appropriate information.

Daily records including all data, diagrams of sampling locations, and photographs will be transmitted through electronic mail at the end of each day to Caltrans personnel.

Phone Numbers

	Cell	Office
Sea Engineering, Inc.		831-421-0871
Ken Israel	831-212-1561	831-421-0871
Caltrans		
Monica Gan	510-715-8582	
Mark Vilcheck	510-772-9038	
Robert Wong	510-867-6108	
Darryl Schram	650-222-7242	
Charles Smith		510-286-5635
ABF JV		
David Gainey	510-774-1429	

Appendix B – Sample Turbidity Report

Water Quality Self-Monitoring Program
Daily Turbidity Report
For Order No. R2-2002-0011
San Francisco – Oakland Bay Bridge East San Seismic Safety Project
Contract No. 04-0120L4

Prepared by
Sea Engineering, Inc
Santa Cruz, CA
for
California Department of Transportation
District 04
Oakland, CA

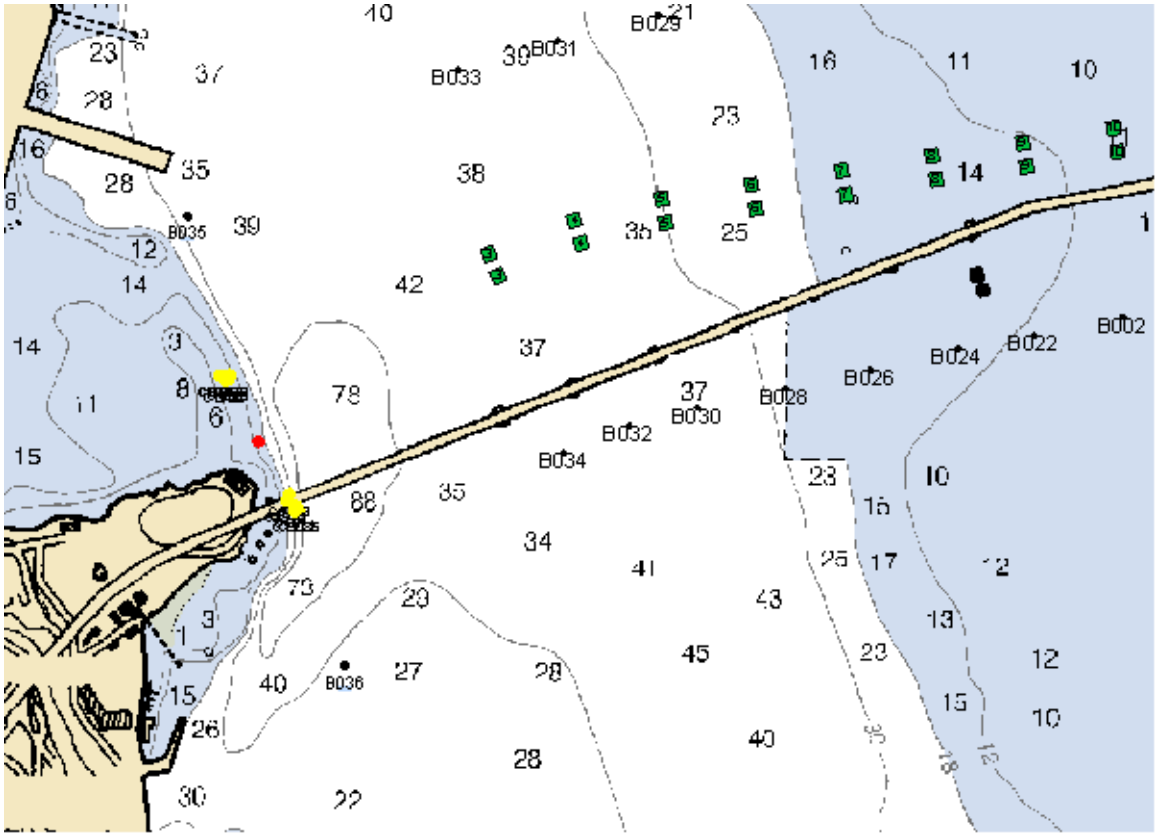
Thursday AM, July 31, 2008

Self-Monitoring Program Daily Report
Thursday AM, July 31, 2008

The 24-hour background sample was conducted at 7:00:00 AM. Conditions were mild winds over calm waters. The tide was flooding at the time of sampling. During today's operations, high tide occurred at 01:03:00 PM with a height of 1.63 meters. Low tide occurred at 5:38:00 PM with a height of 0.81 meters. The last transect was completed at 3:00:00 PM.

Water quality monitoring was conducted today for East Span Seismic Safety Project. The East Span contractor conducted construction operations during the day from shore side and derrick barge.

Depth-averaged turbidity levels did not exceed 50 NTU during the day. Depth-averaged turbidity values ranged from 2.3 to 16.3 NTU. There were no exceedances in any of the water quality parameters (turbidity, pH, temperature and dissolved oxygen) during today's monitoring operations. Monitoring (Construction North or South, or Buoy CN), and background (B035 or B036) stations are shown on the map below. Large numbers on the map denote MLLW depth in feet. A detailed summary of the measured data is included in the following pages.



The figure shows vessel background stations (BN and BS), and unmanned buoy monitoring stations (Buoy BN = background North, and Buoy CN=construction North).

San Francisco - Oakland Bay Bridge East Span

Sea Engineering

7/31/2008 Turbidly Monitoring -- Two Hour Log Sheet

Station	Time	Lat. (N)	Long. (W)	Depth (m)	Turbidity (NTU)	Sea State	Tidal State	pH	Temp	Salinity	DO
BN	6:40	37° 49.090N	122° 21.612W	10.4	9.16	Calm	Flood	7.31	19.09	39.41	7.34
CN	6:44	37° 49.021N	122° 21.0618W	1.9	8.60	Calm	Flood	7.32	18.85	39.54	7.23
CS	6:50	37° 48.799N	122° 21.497W	19.6	12.37	Calm	Flood	7.34	19.40	39.59	7.13
BS	7:16	37° 48.320N	122° 21.010W	7.9	9.13	Calm	Flood	7.37	19.03	39.855	7.65
BN	8:59	37° 49.090N	122° 21.612W	3.8	8.13	Calm	Flood	7.95	17.81	42.19	6.97
CN	9:02	37° 49.021N	122° 21.0618W	2.6	5.27	Calm	Flood	7.95	17.63	42.36	7.21
CS	9:08	37° 48.799N	122° 21.497W	20.8	6.33	Calm	Flood	7.96	17.46	41.88	6.89
BS	9:14	37° 48.320N	122° 21.010W	8.1	6.63	Calm	Flood	7.96	17.40	42.17	7.05
BN	10:36	37° 49.090N	122° 21.612W	7.5	10.99	Calm	Flood	7.97	17.31	40.98	7.03
CN	10:41	37° 49.021N	122° 21.0618W	2.4	4.90	Calm	Flood	7.97	17.44	41.29	6.30
CS	10:55	37° 48.799N	122° 21.497W	17.2	16.29	Calm	Flood	7.98	17.49	41.26	5.63
BS	10:45	37° 48.320N	122° 21.010W	8.7	10.30	Calm	Flood	7.98	17.43	40.23	5.18
BN	12:52	37° 49.090N	122° 21.612W	12.6	4.18	Calm	Ebb	7.97	19.73	42.34	6.13
CN	12:58	37° 49.021N	122° 21.0618W	2.5	2.37	Calm	Ebb	7.97	18.60	41.68	5.82
CS	13:03	37° 48.799N	122° 21.497W	19.3	2.93	Calm	Ebb	7.99	19.14	41.51	6.70
BS	13:20	37° 48.320N	122° 21.010W	10.2	6.73	Calm	Ebb	7.99	18.88	41.08	6.54
BN	14:44	37° 49.090N	122° 21.612W	7.2	2.33	Calm	Ebb	7.97	19.94	41.6	7.35
CN	14:48	37° 49.021N	122° 21.0618W	2.8	2.63	Calm	Ebb	7.98	17.73	41.6	7.39
CS	14:53	37° 48.799N	122° 21.497W	22.5	3.82	Calm	Ebb	8	19.05	41.96	7.18
BS	14:57	37° 48.320N	122° 21.010W	14.3	3.36	Calm	Ebb	8	20.62	41.67	6.99

Appendix C – Turbidity Data

San Francisco - Oakland Bay Bridge East Span

Sea Engineering

5/6/2008 Turbidly Monitoring -- Two Hour Log Sheet

Station	Time	Lat. (N)	Long. (W)	Depth (m)	Turbidity (NTU)	Sea State	Tidal State	pH	Temp
BN	8:00	37'48.967	122'21.518	10	19.68	Calm	Ebb	8.05	11.23
CN	8:10	37'48.947	122'21.524	15	21.29	Calm	Ebb	8.05	11.2
CS	8:20	37"48.923	122'21.483	19	21.13	Calm	Ebb	8.05	11.2
BS	8:30	37'48.795	122'21.401	10	17.32	Calm	Ebb	8.05	11.23
BN	10:00	37'48.967	122'21.518	8	18.67	Chop	Ebb	8.05	11.23
CN	10:05	37"48.923	122'21.483	14	19.36	Chop	Flood	8.05	11.5
CS	10:10	37'48.795	122'21.401	17	20.56	Chop	Flood	8.05	11.25
BS	10:15	37'48.967	122'21.518	9	17.63	Chop	Flood	8.05	11.28
BN	12:25	37'49.967	122'21.518	9	16.23	Calm	Flood	8.05	11.2
CN	12:30	37'48.947	122'21.524	13	17.37	Calm	Flood	8.05	11.5
CS	12:40	37'48.795	122'21.401	19	19.29	Calm	Flood	8.05	11.23
BS	12:45	37'48.791	122'21.416	11	16.43	Calm	Flood	8.05	11.2

San Francisco - Oakland Bay Bridge East Span

Sea Engineering

5/7/2008 Turbidly Monitoring -- Two Hour Log Sheet

Station	Time	Lat. (N)	Long. (W)	Depth (m)	Turbidity (NTU)	Sea State	Tidal State	pH	Temp
BN	8:00	37'48.967	122'21.518	10	9.56	Calm	Ebb	8.05	11.2
CN	8:10	37'48.947	122'21.524	15	13.80	Calm	Ebb	8.05	11.2
CS	8:20	37"48.923	122'21.483	19	11.82	Calm	Ebb	8.05	11.5
BS	8:30	37'48.795	122'21.401	10	8.94	Calm	Ebb	8.05	11.23
BN	10:00	37'48.967	122'21.518	8	10.05	Chop	Ebb	8.05	11.25
CN	10:05	37"48.923	122'21.483	14	13.33	Chop	Ebb	8.05	11.27
CS	10:10	37'48.795	122'21.401	17	12.12	Chop	Ebb	8.05	11.28
BS	10:15	37'48.967	122'21.518	9	9.30	Chop	Ebb	8.05	11.5
BN	14:20	37'48.967	122'21.518	13	9.67	Calm	Flood	8.05	11.2
CN	14:30	37'48.947	122'21.524	10	10.87	Calm	Flood	8.05	11.5
CS	14:40	37"48.923	122'21.483	17	10.52	Calm	Flood	8.05	11.25
BS	14:50	37'48.795	122'21.401	10	10.35	Calm	Flood	8.1	11.5

San Francisco - Oakland Bay Bridge East Span

Sea Engineering

5/8/2008 Turbidly Monitoring -- Two Hour Log Sheet

Station	Time	Lat. (N)	Long. (W)	Depth (m)	Turbidity (NTU)	Sea State	Tidal State	pH	Temp
BN	8:00	37'48.967	122'21.518	7	6.86	Calm	Flood	7.96	10.07
CN	8:10	37'48.947	122'21.524	13	6.05	Calm	Flood	8.12	10.88
CS	8:20	37"48.923	122'21.483	17	5.92	Calm	Flood	8.05	10.73
BS	8:30	37'48.795	122'21.401	10	5.84	Calm	Flood	8.09	10.88
BN	10:00	37'48.967	122'21.518	8	5.84	Chop	Ebb	8.06	11.5
CN	10:05	37"48.923	122'21.483	12	5.10	Chop	Ebb	7.88	11.16
CS	10:10	37'48.795	122'21.401	17	5.83	Chop	Ebb	7.87	11.15
BS	10:15	37'48.967	122'21.518	10	6.12	Chop	Ebb	7.89	11.23
BN	12:25	37'49.967	122'21.518	9	4.38	Calm	Ebb	7.9	9.65
CN	12:30	37'48.947	122'21.524	15	4.11	Calm	Ebb	7.66	11.36
CS	12:40	37'48.795	122'21.401	15	4.36	Calm	Ebb	7.66	11.2
BS	12:45	37'48.791	122'21.416	10	2.93	Calm	Ebb	7.85	11.3
BN	14:20	37'48.967	122'21.518	13	5.68	Calm	Flood	8.05	11.2
CN	14:30	37'48.947	122'21.524	10	6.88	Calm	Flood	8.09	11.44
CS	14:40	37"48.923	122'21.483	17	6.53	Calm	Flood	7.95	10.97
BS	14:50	37'48.795	122'21.401	10	6.36	Calm	Flood	7.99	10.9

San Francisco - Oakland Bay Bridge East Span

Sea Engineering

5/9/2008 Turbidly Monitoring -- Two Hour Log Sheet

Station	Time	Lat. (N)	Long. (W)	Depth (m)	Turbidity (NTU)	Sea State	Tidal State	pH	Temp
BN	8:00	37'48.967	122'21.518	9	8.53	Calm	Flood	8.31	9.51
CN	8:10	37'48.947	122'21.524	15	7.72	Calm	Flood	8.47	10.32
CS	8:20	37"48.923	122'21.483	19	7.59	Calm	Flood	8.4	10.17
BS	8:30	37'48.795	122'21.401	12	7.51	Calm	Flood	8.44	10.32
BN	10:00	37'48.967	122'21.518	10	7.51	Chop	Ebb	8.41	10.94
CN	10:05	37"48.923	122'21.483	14	6.77	Chop	Ebb	8.23	10.6
CS	10:10	37'48.795	122'21.401	19	7.50	Chop	Ebb	8.22	10.59
BS	10:15	37'48.967	122'21.518	12	7.79	Chop	Ebb	8.24	10.67
BN	12:25	37'49.967	122'21.518	11	6.05	Calm	Ebb	8.25	9.09
CN	12:30	37'48.947	122'21.524	17	5.78	Calm	Ebb	8.01	10.8
CS	12:40	37'48.795	122'21.401	17	6.03	Calm	Ebb	8.01	10.64
BS	12:45	37'48.791	122'21.416	12	4.60	Calm	Ebb	8.2	10.74
BN	14:20	37'48.967	122'21.518	15	7.35	Calm	Flood	8.4	10.64
CN	14:30	37'48.947	122'21.524	12	8.55	Calm	Flood	8.44	10.88
CS	14:40	37"48.923	122'21.483	19	8.20	Calm	Flood	8.3	10.41
BS	14:50	37'48.795	122'21.401	12	8.03	Calm	Flood	8.34	10.34

San Francisco - Oakland Bay Bridge East Span

Sea Engineering

7/23/2008 Turbidly Monitoring -- Two Hour Log Sheet

Station	Time	Lat. (N)	Long. (W)	Depth (m)	Turbidity (NTU)	Sea State	Tidal State	pH	Temp	Salinity	DO
BN	6:59	37° 49.442	122°-19.890	6.2	5.80	Calm	Ebb	7.9	17.10	38.2	9.12
CN	7:09	37° 49.311'	122° 19.925'	10.3	6.12	Calm	Ebb	7.98	17.10	38.25	7.65
CS	7:30	37° 49.238'	122° 19.941'	24.5	5.66	Calm	Ebb	7.97	16.91	38.33	8.34
BS	7:35	37° 49.188'	122° 19.916'	24.6	6.28	Calm	Ebb	7.97	17.21	38.28	7.98
BN	8:43	37° 49.442	122°-19.890	5.2	5.04	Calm	Ebb	7.97	17.44	38.4	8.54
CN	8:46	37° 49.311'	122° 19.925'	2.2	6.85	Calm	Ebb	7.96	17.37	38.45	8.72
CS	8:56	37° 49.238'	122° 19.941'	25.5	6.32	Calm	Ebb	7.96	17.69	38.22	7.87
BS	8:56	37° 49.188'	122° 19.916'	9.6	6.36	Calm	Ebb	7.95	17.89	38.47	7.98
BN	10:48	37° 49.442	122°-19.890	6.9	3.60	Calm	Flood	7.96	17.99	42.2	7.41
CN	10:51	37° 49.311'	122° 19.925'	3	3.63	Calm	Flood	7.96	17.98	41.85	7.04
CS	10:59	37° 49.238'	122° 19.941'	25	5.62	Calm	Flood	7.96	17.46	41.85	6.73
BS	11:04	37° 49.188'	122° 19.916'	8.2	5.08	Calm	Flood	7.96	18.25	41.96	6.43
BN	12:44	37° 49.442	122°-19.890	8	6.58	Calm	Flood	7.97	21.45	41.94	9.07
CN	12:46	37° 49.311'	122° 19.925'	4	4.30	Calm	Flood	7.98	19.80	42.1	8.24
CS	12:52	37° 49.238'	122° 19.941'	21.1	7.49	Calm	Flood	7.98	18.73	41.65	8.12
BS	12:59	37° 49.188'	122° 19.916'	8	6.51	Calm	Flood	7.98	18.74	41.7	8.04
BN	14:38	37° 49.442	122°-19.890	8.9	9.39	Calm	Flood	7.99	20.06	41.32	8.83
CN	14:40	37° 49.311'	122° 19.925'	3.1	9.07	Calm	Flood	7.99	21.40	41.41	8.16
CS	14:45	37° 49.238'	122° 19.941'	24.1	9.04	Calm	Flood	8	20.65	41.3	7.62
BS	14:50	37° 49.188'	122° 19.916'	9.3	7.46	Calm	Flood	8	20.52	41.23	6.65

San Francisco - Oakland Bay Bridge East Span

Sea Engineering

7/24/2008 Turbidly Monitoring -- Two Hour Log Sheet

Station	Time	Lat. (N)	Long. (W)	Depth (m)	Turbidity (NTU)	Sea State	Tidal State	pH	Temp	Salinity	DO
BN	6:52	37° 49.090N	122° 21.612W	5.4	3.76	calm	ebb	7.96	17.21	41.4	8.88
CN	7:00	37° 49.005N	122° 21.595W	30	4.20	calm	ebb	7.95	17.14	41.35	6.39
CS	7:12	37° 48.857N	122° 21.443W	9.7	4.72	calm	ebb	7.96	17.12	41.56	5.49
BS	7:28	37° 48.728N	122° 21.417W	9.6	6.66	calm	ebb	7.95	16.99	41.53	5.41
BN	8:45	37° 49.090N	122° 21.612W	4.3	5.10	calm	ebb	7.98	17.16	41.49	8.65
CN	8:51	37° 49.005N	122° 21.595W	2.2	6.40	calm	ebb	7.98	17.07	41.49	6.79
CS	8:58	37° 48.857N	122° 21.443W	25	5.10	calm	ebb	7.97	17.08	41.72	5.53
BS	9:08	37° 48.728N	122° 21.417W	8.6	4.92	calm	ebb	7.97	17.54	41.86	5.58
BN	10:50	37° 49.090N	122° 21.612W	5.6	2.88	calm	ebb	7.95	18.12	42.17	7.88
CN	10:54	37° 49.005N	122° 21.595W	3	5.13	calm	ebb	7.96	17.66	41.88	7.28
CS	11:01	37° 48.857N	122° 21.443W	25	4.75	calm	ebb	7.93	18.34	42.42	5.96
BS	11:10	37° 48.728N	122° 21.417W	8.5	4.32	calm	ebb	7.94	18.28	42.31	5.87
BN	12:50	37° 49.090N	122° 21.612W	26.1	5.75	chopy	flood	7.96	17.38	41.65	7.65
CN	13:13	37° 49.005N	122° 21.595W	2.8	4.37	chopy	flood	7.97	17.53	41.72	5.87
CS	13:19	37° 48.857N	122° 21.443W	22	5.79	chopy	flood	7.97	17.40	41.71	5.94
BS	13:27	37° 48.728N	122° 21.417W	9.2	6.00	chopy	flood	7.99	17.19	41.39	6.47
BN	14:48	37° 49.090N	122° 21.612W	8.7	8.20	chopy	flood	8.02	17.43	41.09	5.80
CN	14:58	37° 49.005N	122° 21.595W	3.1	6.20	chopy	flood	8.02	17.65	41.11	6.28
CS	15:06	37° 48.857N	122° 21.443W	24.5	7.79	chopy	flood	8	17.36	41.07	5.43
BS	15:16	37° 48.728N	122° 21.417W	9	7.17	chopy	flood	8.02	17.02	41.09	5.90

San Francisco - Oakland Bay Bridge East Span

Sea Engineering

7/25/2008 Turbidly Monitoring -- Two Hour Log Sheet

Station	Time	Lat. (N)	Long. (W)	Depth (m)	Turbidity (NTU)	Sea State	Tidal State	pH	Temp	Salinity	DO
BN	6:57	37° 49.090N	122° 21.612W	3.9	3.48	Calm	Ebb	8	16.72	41.17	7.43
CN	7:02	37° 49.005N	122° 21.595W	2.3	3.37	Calm	Ebb	8	16.71	41.17	6.58
CS	7:09	37° 48.857N	122° 21.443W	25	3.82	Calm	Ebb	7.93	17.20	41.41	5.55
BS	7:24	37° 48.728N	122° 21.417W	10.1	3.67	Calm	Ebb	7.99	17.45	41.62	6.65
BN	8:43	37° 49.090N	122° 21.612W	4	4.13	Calm	Ebb	7.96	17.29	41.56	7.43
CN	8:48	37° 49.005N	122° 21.595W	2.5	4.03	Calm	Ebb	7.95	17.32	41.59	7.49
CS	8:56	37° 48.857N	122° 21.443W	24	4.41	Calm	Ebb	7.97	17.50	41.73	7.21
BS	9:10	37° 48.725N	122° 21.417W	11.2	4.18	Calm	Ebb	7.96	17.34	41.7	7.09
BN	10:45	37° 49.090N	122° 21.612W	4.5	4.14	Calm	Slack	7.95	17.68	41.96	7.49
CN	10:50	37° 49.005N	122° 21.595W	2.6	3.87	Calm	Slack	7.95	17.75	41.99	7.16
CS	10:57	37° 48.857N	122° 21.443W	25.4	4.18	Calm	Slack	7.94	18.39	42.48	7.13
BS	11:07	37° 48.728N	122° 21.417W	8.2	3.39	Calm	Slack	7.93	18.26	42.45	6.39
BN	12:50	37° 49.090N	122° 21.612W	6.7	4.33	Chopy	Flood	7.96	17.46	41.7	7.78
CN	12:55	37° 49.005N	122° 21.595W	2.7	4.10	Chopy	Flood	7.99	17.61	41.81	7.77
CS	13:02	37° 48.857N	122° 21.443W	23.3	3.49	Chopy	Flood	7.98	18.34	42.37	7.84
BS	13:15	37° 48.728N	122° 21.417W	8.7	4.30	Chopy	Flood	7.98	18.32	42.35	7.49
BN	14:45	37° 49.090N	122° 21.612W	6.8	4.49	Chopy	Flood	7.97	17.57	41.87	7.81
CN	14:50	37° 49.005N	122° 21.595W	3.1	5.13	Chopy	Flood	8	17.70	41.94	7.62
CS	14:56	37° 48.857N	122° 21.443W	21.7	4.92	Chopy	Flood	8.03	17.64	41.48	7.66
BS	15:07	37° 48.728N	122° 21.417W	8.8	5.06	Chopy	Flood	8.03	17.45	41.31	6.93

San Francisco - Oakland Bay Bridge East Span

Sea Engineering

7/28/2008 Turbidly Monitoring -- Two Hour Log Sheet

Station	Time	Lat. (N)	Long. (W)	Depth (m)	Turbidity (NTU)	Sea State	Tidal State	pH	Temp	Salinity	DO
BN	6:53	37° 49.090N	122° 21.612W	6.5	5.79	Chopy	Flood	7.92	17.78	41.51	6.56
CN	7:01	37° 49.005N	122° 21.595W	2.7	4.70	Chopy	Flood	7.93	18.00	41.65	5.63
CS	7:07	37° 48.857N	122° 21.443W	20.1	6.42	Chopy	Flood	7.95	17.52	41.26	6.01
BS	7:22	37° 48.728N	122° 21.417W	8	5.98	Chopy	Flood	7.97	17.29	41.74	4.96
BN	8:56	37° 49.090N	122° 21.612W	10.5	7.46	Chopy	Flood	7.99	0.73	40.12	6.88
CN	8:56	37° 49.005N	122° 21.595W	3.8	5.53	Chopy	Flood	7.99	17.41	40.04	6.02
CS	9:05	37° 48.857N	122° 21.443W	25.6	6.20	Chopy	Flood	7.98	17.40	40.13	6.22
BS	9:19	37° 48.728N	122° 21.417W	9.1	6.69	Chopy	Flood	7.99	17.30	40.08	5.46
BN	10:43	37° 49.090N	122° 21.612W	11.5	4.45	Chopy	Flood	8.01	17.10	40.1	6.80
CN	10:48	37° 49.005N	122° 21.595W	2.5	4.03	Chopy	Flood	8	17.30	40.02	6.23
CS	10:55	37° 48.857N	122° 21.443W	25.1	4.90	Chopy	Flood	8	17.23	40.23	6.52
BS	11:09	37° 48.728N	122° 21.417W	12.1	4.22	Chopy	Flood	8	17.24	41.05	5.46
BN	12:45	37° 49.090N	122° 21.612W	6.7	3.64	Chopy	Ebb	7.99	17.34	41.15	6.93
CN	12:51	37° 49.005N	122° 21.595W	4.1	3.68	Chopy	Ebb	8	17.33	41.14	6.75
CS	13:00	37° 48.857N	122° 21.443W	24.9	3.41	Chopy	Ebb	7.99	17.56	41.33	6.51
BS	13:12	37° 48.728N	122° 21.417W	9.6	3.93	Chopy	Ebb	7.98	18.64	42.63	8.60
BN	14:46	37° 49.090N	122° 21.612W	9.7	4.82	Chopy	Ebb	7.98	17.68	41.63	8.36
CN	14:53	37° 49.005N	122° 21.595W	3.4	5.58	Chopy	Ebb	7.99	17.62	41.52	7.69
CS	14:59	37° 48.857N	122° 21.443W	27.6	3.72	Chopy	Ebb	7.97	17.97	42.04	7.06
BS	15:13	37° 48.728N	122° 21.417W	11.7	3.48	Chopy	Ebb	7.96	18.08	42.34	7.81

San Francisco - Oakland Bay Bridge East Span

Sea Engineering

7/29/2008 Turbidly Monitoring -- Two Hour Log Sheet

Station	Time	Lat. (N)	Long. (W)	Depth (m)	Turbidity (NTU)	Sea State	Tidal State	pH	Temp	Salinity	DO
BN	6:59	37° 49.090N	122° 21.612W	4.5	5.66	Calm	Flood	7.94	17.55	41.91	8.61
CN	7:04	37° 49.005N	122° 21.595W	1.9	5.65	Calm	Flood	7.94	18.48	42.55	6.69
CS	7:10	37° 48.857N	122° 21.443W	17.5	7.06	Calm	Flood	7.94	17.72	42.04	6.48
BS	7:23	37° 48.728N	122° 21.417W	8	6.98	Calm	Flood	7.93	17.65	42	8.52
BN	8:45	37° 49.090N	122° 21.612W	6.3	7.73	Calm	Flood	7.98	17.34	40.85	8.81
CN	8:47	37° 49.005N	122° 21.595W	3	6.77	Calm	Flood	7.96	17.37	41.4	8.56
CS	8:53	37° 48.857N	122° 21.443W	24.5	8.68	Calm	Flood	7.97	17.33	40.94	8.93
BS	9.:08	37° 48.725N	122° 21.417W	8.8	9.40	Calm	Flood	7.98	17.32	40.83	8.63
BN	10:46	37° 49.090N	122° 21.612W	5.7	5.60	Calm	Flood	7.98	17.56	41.25	8.20
CN	10:52	37° 49.005N	122° 21.595W	4.6	5.42	Calm	Food	7.98	17.06	41.18	8.41
CS	11:00	37° 48.857N	122° 21.443W	24.3	4.74	Calm	Food	7.99	17.38	41.01	8.75
BS	11:13	37° 48.728N	122° 21.417W	9.2	4.51	Calm	Food	7.98	17.15	41.12	8.45
BN	12:49	37° 49.090N	122° 21.612W	4.6	2.14	Chopy	Ebb	7.97	17.20	41.43	7.89
CN	12:54	37° 49.005N	122° 21.595W	2.7	2.83	Chopy	Ebb	7.99	17.44	41.41	7.88
CS	13:01	37° 48.857N	122° 21.443W	24.9	3.55	Chopy	Ebb	7.96	17.93	41.6	8.12
BS	13:17	37° 48.728N	122° 21.417W	10.6	3.42	Chopy	Ebb	7.97	17.94	41.56	8.34
BN	14:47	37° 49.090N	122° 21.612W	4.1	3.80	Chopy	Ebb	7.97	18.13	42.09	8.30
CN	14:47	37° 49.005N	122° 21.595W	4.1	4.20	Chopy	Ebb	7.97	18.20	42.09	8.21
CS	14:53	37° 48.857N	122° 21.443W	24.1	3.61	Chopy	Ebb	7.96	18.15	42.27	7.99
BS	15:05	37° 48.728N	122° 21.417W	9.4	3.27	Chopy	Ebb	7.96	18.42	42.97	7.76

San Francisco - Oakland Bay Bridge East Span

Sea Engineering

7/30/2008 Turbidly Monitoring -- Two Hour Log Sheet

Station	Time	Lat. (N)	Long. (W)	Depth (m)	Turbidity (NTU)	Sea State	Tidal State	pH	Temp	Salinity	DO
BN	6:49	37° 49.090N	122° 21.612W	8.5	2.39	Calm	Flood	7.96	19.07	43.03	8.89
CN	6:58	37° 49.005N	122° 21.595W	2	4.90	Calm	Flood	7.94	18.74	42.79	8.76
CS	7:03	37° 48.857N	122° 21.443W	22.9	2.18	Calm	Flood	7.97	19.20	42.79	8.98
BS	7:15	37° 48.728N	122° 21.417W	7.7	3.11	Calm	Flood	7.96	19.14	43.11	9.12
BN	8:39	37° 49.090N	122° 21.612W	5.7	2.43	Calm	Flood	7.94	17.88	42.14	9.23
CN	8:44	37° 49.021N	122° 21.618W	2.2	4.03	Calm	Flood	7.94	18.46	42.54	9.13
CS	8:54	37° 48.799N	122° 21.497W	16.7	4.95	Calm	Flood	7.94	17.86	42.17	9.31
BS	9:03	37° 48.725N	122° 21.417W	8.5	4.80	Calm	Flood	7.97	17.41	41.22	9.03
BN	10:47	37° 49.090N	122° 21.612W	4.4	2.32	Calm	Flood	7.96	17.75	41.47	8.97
CN	10:51	37° 49.021N	122° 21.618W	2.7	2.60	Calm	Flood	7.97	17.79	41.53	9.35
CS	11:00	37° 48.799N	122° 21.497W	22	4.15	Calm	Flood	7.97	17.31	41.32	9.40
BS	11:15	37° 48.728N	122° 21.417W	9	2.97	Calm	Flood	7.97	17.45	41.28	9.43
BN	12:51	37° 49.090N	122° 21.612W	8.8	1.99	Light Chop	Ebb	7.97	17.40	41.75	8.99
CN	13:00	37° 49.021N	122° 21.618W	2.6	1.30	Light Chop	Ebb	7.96	17.04	41.55	8.76
CS	13:10	37° 48.799N	122° 21.497W	22.7	1.82	Light Chop	Ebb	7.97	17.40	41.72	8.94
BS	13:23	37° 48.728N	122° 21.417W	10.7	0.97	Light Chop	Ebb	7.99	18.12	41.85	6.87
BN	14:45	37° 49.090N	122° 21.612W	7.6	1.25	Chop	Ebb	7.99	17.81	41.85	8.75
CN	14:50	37° 49.021N	122° 21.618W	3.5	1.13	Chop	Ebb	7.98	17.91	41.98	8.33
CS	14:59	37° 48.799N	122° 21.497W	16.9	1.76	Chop	Ebb	7.97	18.56	42.63	7.94
BS	15:09	37° 48.728N	122° 21.417W	13.3	2.44	Chop	Ebb	7.97	18.37	42.39	7.91

San Francisco - Oakland Bay Bridge East Span

Sea Engineering

7/31/2008 Turbidly Monitoring -- Two Hour Log Sheet

Station	Time	Lat. (N)	Long. (W)	Depth (m)	Turbidity (NTU)	Sea State	Tidal State	pH	Temp	Salinity	DO
BN	6:40	37° 49.090N	122° 21.612W	10.4	9.16	Calm	Flood	7.31	19.09	39.41	7.34
CN	6:44	37° 49.021N	122° 21.0618W	1.9	8.60	Calm	Flood	7.32	18.85	39.54	7.23
CS	6:50	37° 48.799N	122° 21.497W	19.6	12.37	Calm	Flood	7.34	19.40	39.59	7.13
BS	7:16	37° 48.320N	122° 21.010W	7.9	9.13	Calm	Flood	7.37	19.03	39.855	7.65
BN	8:59	37° 49.090N	122° 21.612W	3.8	8.13	Calm	Flood	7.95	17.81	42.19	6.97
CN	9:02	37° 49.021N	122° 21.0618W	2.6	5.27	Calm	Flood	7.95	17.63	42.36	7.21
CS	9:08	37° 48.799N	122° 21.497W	20.8	6.33	Calm	Flood	7.96	17.46	41.88	6.89
BS	9:14	37° 48.320N	122° 21.010W	8.1	6.63	Calm	Flood	7.96	17.40	42.17	7.05
BN	10:36	37° 49.090N	122° 21.612W	7.5	10.99	Calm	Flood	7.97	17.31	40.98	7.03
CN	10:41	37° 49.021N	122° 21.0618W	2.4	4.90	Calm	Flood	7.97	17.44	41.29	6.30
CS	10:55	37° 48.799N	122° 21.497W	17.2	16.29	Calm	Flood	7.98	17.49	41.26	5.63
BS	10:45	37° 48.320N	122° 21.010W	8.7	10.30	Calm	Flood	7.98	17.43	40.23	5.18
BN	12:52	37° 49.090N	122° 21.612W	12.6	4.18	Calm	Ebb	7.97	19.73	42.34	6.13
CN	12:58	37° 49.021N	122° 21.0618W	2.5	2.37	Calm	Ebb	7.97	18.60	41.68	5.82
CS	13:03	37° 48.799N	122° 21.497W	19.3	2.93	Calm	Ebb	7.99	19.14	41.51	6.70
BS	13:20	37° 48.320N	122° 21.010W	10.2	6.73	Calm	Ebb	7.99	18.88	41.08	6.54
BN	14:44	37° 49.090N	122° 21.612W	7.2	2.33	Calm	Ebb	7.97	19.94	41.6	7.35
CN	14:48	37° 49.021N	122° 21.0618W	2.8	2.63	Calm	Ebb	7.98	17.73	41.6	7.39
CS	14:53	37° 48.799N	122° 21.497W	22.5	3.82	Calm	Ebb	8	19.05	41.96	7.18
BS	14:57	37° 48.320N	122° 21.010W	14.3	3.36	Calm	Ebb	8	20.62	41.67	6.99

Appendix D – Non-Storm Water Discharge Water Quality Data

Compilation of Daily Dewatering Water Quality Readings - No Data Reported

*ND indicates non-detect values of <0.04 mg/L
*N/A indicates sample was corrupted or result is unavailable
*Checks in the Calc. column indicate that the TSS values have been caluculated using the formula TSS=1.29 + 1.49 (Turbidity)

Stat.	*Date/Time*	*Depth (m)*	*Sea State*	*Tidal State*	*Turbidity (NTU)*	*pH*	*DO (mg/L)*	*Water T (°C)*	*TSS*	*Calc.*	*Dis.Sulfide (mg/L)*
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