California Regional Water Quality Control Board

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Secretary of Environmental Protection

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ORDER NO. R2-2008-0011
NPDES PERMIT NO. CAG982001

GENERAL WASTE DISCHARGE REQUIREMENTS FOR
Discharges of Process Wastewaters from Aggregate Mining, Sand Washing, and Sand Offloading Facilities to Surface Waters

Table 1. Administrative Information

This Order was adopted by the Regional Water Board on:	February 13, 2008
This Order shall become effective on:	May 1, 2008
This Order shall expire on:	April 30, 2013

The U.S. Environmental Protection Agency (USEPA) and the Regional Water Board have classified the discharges under this General National Pollutant Discharge Elimination System (NPDES) Permit as minor discharges based on the discharges' impacts to receiving water bodies.
To obtain coverage under this general permit, Dischargers must submit a Notice of Intent (NOI) Form as described in Attachments B and C and a filing fee equivalent to the first year's annual fee. If the NOI is complete, authorization to initiate discharge will be issued by the Regional Water Board Executive Officer.
Authorized Dischargers who need to continue discharging after the expiration date of this Order shall file a completed NOI form no later than 180 days in advance of this Order's expiration date. For Dischargers that meet criteria for coverage under the General Permit and that have submitted an NOI, which is deemed complete by the Executive Officer before the stated deadline, the terms and conditions of the Order will automatically continue after its expiration date. The terms and conditions of the General Permit will remain in effect until a new Order is adopted by the Regional Water Board. Such Dischargers for which coverage is extended will become subject to the new Order upon authorization by the Executive Officer.

I, Bruce H. Wolfe, Executive Officer, do hereby certify the following is a full, true, and correct copy of an Order adopted by the California Regional Water Quality Control Board, San Francisco Bay Region, on February 13, 2008.

for Bruce H. Wolfe, Executive Officer

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I. FACILITY INFORMATION

A. This National Pollutant Discharge Elimination System (NPDES) General Permit regulates discharges from aggregate mining, sand washing, and sand offloading facilities. This General Permit covers the following discharges:

1. Effluent from wastewater treatment facilities, such as settling ponds, sand and gravel filter systems, etc.,

2. Storm water runoff from aggregate mining, sand washing, and sand dredging facilities commingled with other wastewater from the facilities,

3. Water used for sand screening and washing, and

4. Bay water discharge or return flow during hydraulic sand offloading and reclamation (where no sand-washing is practiced).

These discharges are described in detail under Findings in Section II below.

B. This General Permit does **not** cover:

1. Discharges to a sanitary sewer system,

2. Sewage generated at the facility,

3. Any discharge that is already covered under an individual NPDES permit or Waste Discharge Requirements (WDRs), or

4. Storm water discharge that is not commingled with other wastewaters from aggregate mining, sand washing, and sand offloading facilities.

C. **Relationship of General Permit and Individual Permit.** Although a discharge may be eligible for coverage under this General Permit, the Regional Water Board may determine that the discharge would be better regulated under an individual NPDES permit, under another general NPDES permit, or under Waste Discharge Requirements (WDRs) for discharges to land. If an individual or general permit is issued or if WDRs are issued for a discharge, then the applicability of this General Permit to this discharge is immediately terminated on the effective date of the individual permit or WDRs.

II. FINDINGS

A. General Description of the Facilities

1. **Aggregate mining facilities.** These facilities are generally aggregate mining and processing facilities, which produce various grades of aggregates for construction uses. Some aggregate mining facilities have a ready-mix concrete plant and/or an asphalt plant on the same property. Most facilities have oil, grease, fuel and other chemical storage as part of a maintenance shop to provide maintenance for the

equipment used in aggregate mining and aggregate transportation. Aggregate mining results in a pit in the ground. Inactive mining pits are used as water detention ponds. Groundwater seeping into the active mining pit is pumped to a series of detention ponds before discharge. The water from the last detention pond is used for aggregate washing to remove dirt and dust control at the facility. Some facilities have on-site wells to supply additional water for aggregate washing. All wash water flows to detention ponds before discharge.

2. **Marine Sand washing facilities.** Sand dredged from various locations in San Francisco Bay is transported by barges and offloaded by conveyor belt to these facilities. Wet sand is stockpiled at the facility on the ground or stored in settling ponds. The majority of reclaimed sand is screened and sold for construction uses. A small amount of sand is washed (to remove salt) for use in concrete production. Most of the facilities have oil, grease, fuel and other chemical storage as part of a maintenance shop/shed to provide maintenance for on-site equipment.

3. **Sand offloading facilities.** Sand dredged from various locations in San Francisco Bay is transported by barges and offloaded by hydraulic slurry to these facilities. Wet sand is stockpiled at the facility on the ground or stored in settling ponds. The reclaimed sand is screened and sold for construction uses.

4. **Existing facilities and new facilities**. An existing facility is a facility that is covered under Order No. R2-2002-0063 or that holds an individual NPDES permit for its discharge. A new facility is a facility that is still under construction or that has completed its construction but has not commenced discharge to State waters.

B. General Description of the Discharges

1. **Discharge from aggregate mining facilities.** The wastewater at the facilities, such as groundwater seepage diverted from active mining pits, storm water runoff from the facility yard, runoff of aggregates wash water, and runoff from dust control spray, flow into a series of detention ponds.

   Pollutants in the discharge from aggregate mining facilities consist mainly of solids that are not settled out in the detention ponds and dissolved solids, which come from groundwater. The discharge may include toxic pollutants from the groundwater (if polluted), or the storm water runoff from the facility (e.g., toxic materials not properly stored at the facility).

2. **Discharge from sand washing facilities.** Discharges from sand washing facilities normally consist of a combination of bay water that has drained from the sand piles during drying (or bay water that overflows from sand settling ponds if hydraulic dredging is used), water used for sand washing and screening, and storm water runoff from the facility yard. Potable water from a municipal source or from local wells is normally used to wash the sand. Water from municipal sources normally contains chlorine residual. This Order requires sand washing facilities that use municipal water supply as wash water to monitor chlorine residual in the discharge. Zinc phosphate is used in some water systems as a corrosion-protecting agent, and

copper is used to control algae. Copper and galvanized steel are also widely used for water supply pipes. Therefore, copper and zinc may be present in the sand wash water.

3. **Discharge from sand offloading facilities.** Discharges from sand offloading facilities normally consist of bay water that has drained from the sand piles during drying, or bay water that overflows from sand settling ponds if hydraulic dredging is used, and storm water runoff from the facility yard.

   Pollutants in the discharge from marine sand washing/sand offloading consist mainly of solids that are not settled out in the detention ponds. The discharge may include toxic pollutants from the bay water or the storm water runoff from the facility (e.g., toxic materials not properly stored at the facility).

C. Legal Authorities. This Order is issued pursuant to CWA Section 402 and implementing regulations adopted by the U.S. Environmental Protection Agency (USEPA) and CWC Chapter 5.5, Division 7. It shall serve as an NPDES permit for point source discharges from the facility to surface waters. This Order also serves as WDRs pursuant to CWC Article 4, Chapter 4 for discharges that are not subject to regulation under CWA Section 402.

States may request authority from USEPA to issue general NPDES permits pursuant to Title 40, Code of Federal Regulations (CFR), Part 122.28. On June 8, 1989, the State Water Resources Control Board (the State Water Board) submitted an application to the USEPA requesting revisions to its NPDES Program in accordance with 40 CFR 122.28, 123.62, and 403.10. The application included a request to add general permit authority to its approved NPDES Program. On September 22, 1989, the USEPA, Region 9, approved the State Water Board's request and granted authorization for the State to issue general NPDES permits.

D. Background and Rationale for Requirements. The Regional Water Board developed the requirements in this Order based on information submitted as part of Notice of Intent (NOI) submitted by dischargers, through monitoring and reporting programs, and through special studies. **Attachments A** through **F**, which contain background information and rationale for the requirements of the Order, are hereby incorporated into this Order and, thus, constitute part of the findings for this Order.

E. Notice of Intent (NOI). Any Discharger who wishes to be covered under this General Permit must submit an NOI (see **Attachments B** and **C**). Specific facility information for each discharge shall be included on the NOI Form submitted for that discharge.

Any Discharger proposing similar discharges at multiple sites may be covered under one discharge authorization letter subject to the approval of the Executive Officer on a case-by-case basis. Each outfall will be subject to individual fees.

Attachment B to this Order is the NOI form; **Attachment C** contains the instructions for filling out the NOI form.

F. **Notice of General Permit Coverage (NGPC)—Discharge Authorization.** Regional Water Board staff will review the NOI and notify the Discharger or its duly authorized representative if the NOI is complete or incomplete, and whether the proposed activity or discharge can be covered under this General Permit. After receipt of a complete NOI, the Executive Officer will issue a Notice of General Permit Coverage (NGPC). Coverage under this General Permit starts from the date of the NGPC.

G. **California Environmental Quality Act (CEQA).** This action to adopt an NPDES permit is exempt from the provisions of the California Environmental Quality Act (Public Resources Code Section 21100, et seq.) in accordance with CWC Section 13389.

H. **Technology-Based Effluent Limitations.** NPDES regulations at 40 CFR 122.44(a) require permits to include applicable technology-based limitations and standards. This Order includes technology-based effluent limitations, which are based on:

- San Francisco Bay Region Basin Plan (see II.J below), Table 4-2, effluent limits for all treatment facilities,
- Effluent Limitations Guidelines for the Mineral Mining and Processing Point Source Category, established at 40 CFR 436 Subpart C (Construction Sand and Gravel Category), and
- Best professional judgment (BPJ) pursuant to CWA Section 402(a)(1)(B) and NPDES regulations at 40 CFR 125.3.

A detailed discussion of the technology-based effluent limitations is included in the Fact Sheet (**Attachment F**).

I. **Water Quality-Based Effluent Limitations.** 40 CFR Section 122.44(d) requires that permits include effluent limitations for all pollutants that are or may be discharged at levels that have the reasonable potential to cause or contribute to an exceedance of a water quality standard, including numeric and narrative objectives within a standard. Where reasonable potential has been established for a pollutant, but there is no numeric criterion or objective for the pollutant, water quality-based effluent limitations (WQBELs) may be established: (1) using USEPA criteria guidance under CWA section 304(a), supplemented where necessary by other relevant information; (2) on an indicator parameter for the pollutant of concern; or (3) using a calculated numeric water quality criterion, such as a proposed state criterion or policy interpreting the state's narrative criterion, supplemented with other relevant information, as provided in section 122.44(d)(1)(vi). In addition to the WQBELs, this Order also includes triggers for toxic pollutants that will trigger accelerated monitoring, additional investigation, and pollutant control if trigger levels are exceeded.

J. **Water Quality Control Plan.** The Water Quality Control Plan for the San Francisco Bay Basin (Basin Plan) is the Regional Water Board's master water quality control planning document. It designates beneficial uses and water quality objectives for waters of the State, including surface waters and groundwater. It also includes programs of implementation to achieve water quality objectives. The Basin Plan was duly adopted by

the Regional Water Board and approved by the State Water Board, Office of Administrative Law and the USEPA, where required.

The Basin Plan in Chapter 2 states that the beneficial uses of any specifically identified water body generally apply to its tributaries (Tributary Rule). The potential and existing beneficial uses supported by the water bodies in this region include municipal and domestic supply (MUN), agricultural supply (AGR), industrial process supply (PRO), groundwater recharge (GWR), water contact recreation (REC1), non-contact water recreation (REC2), wildlife habitat (WILD), cold freshwater habitat (COLD), warm freshwater habitat (WARM), fish migration (MIGR), fish spawning (SPWN), estuarine habitat (EST), industrial service supply (IND), navigation (NAV), marine habitat (MAR), shellfish harvesting (SHELL), ocean, commercial and sport fishing (COMM), and preservation of rare and endangered species (RARE). In addition, the Basin Plan implements State Water Board Resolution No. 88-63, which established state policy that all waters, with certain exceptions, should be considered suitable or potentially suitable for municipal or domestic supply.

Requirements of this Order implement the Basin Plan.

K. National Toxics Rule (NTR) and California Toxics Rule (CTR). USEPA adopted the NTR on December 22, 1992, and later amended it on May 4, 1995, and November 9, 1999. About forty criteria in the NTR applied in California. On May 18, 2000, USEPA adopted the CTR. The CTR promulgated new toxics criteria for California and, in addition, incorporated the previously adopted NTR criteria that applied in the state. The CTR was amended on February 13, 2001. These rules contain water quality criteria for priority pollutants.

L. State Implementation Policy (SIP). On March 2, 2000, the State Water Board adopted the Policy for Implementation of Toxics Standards for Inland Surface Waters, Enclosed Bays, and Estuaries of California (State Implementation Policy or SIP). The SIP became effective on April 28, 2000, with respect to the priority pollutant criteria promulgated for California by the USEPA through the NTR and to the priority pollutant objectives established by the Regional Water Boards in their basin plans, with the exception of the provision on alternate test procedures for individual discharges that have been approved by the USEPA Regional Administrator. The alternate test procedures provision was effective on May 22, 2000. The SIP became effective on May 18, 2000. The State Water Board subsequently amended the SIP on February 24, 2005, and the amendments became effective on July 31, 2005. The SIP includes procedures for determining the need for and calculating WQBELs and requires dischargers to submit data sufficient to do so. Requirements of this Order implement the SIP.

M. Compliance Schedules and Interim Requirements. This Order does not include compliance schedules or interim effluent limitations.

N. Alaska Rule. On March 30, 2000, USEPA revised its regulation that specifies when new and revised state and tribal water quality standards (WQS) become effective for CWA purposes (40 C.F.R. § 131.21; 65 Fed. Reg. 24641; (April 27, 2000).) Under the revised regulation (also known as the Alaska rule), new and revised standards submitted to

USEPA after May 30, 2000 must be approved by USEPA before being used for CWA purposes. The final rule also provides that standards already in effect and submitted to USEPA by May 30, 2000, may be used for CWA purposes, whether or not approved by USEPA.

O. Stringency of Requirements for Individual Pollutants. This Order contains restrictions on individual pollutants that are no more stringent than required by the federal CWA. Individual pollutant restrictions consist of technology-based restrictions and water quality-based effluent limitations. The technology-based effluent limitations consist of restrictions on total suspended solids (TSS) and settleable matter. Restrictions on these pollutants are specified in federal regulations and are no more stringent than required by the CWA. Water quality-based effluent limitations have been scientifically derived to implement water quality objectives that protect beneficial uses. Both the beneficial uses and the water quality objectives have been approved pursuant to federal law and are the applicable federal water quality standards. To the extent that toxic pollutant water quality-based effluent limitations were derived from the CTR, the CTR is the applicable standard pursuant to 40 CFR 131.38. The scientific procedures for calculating the individual water quality-based effluent limitations are based on the CTR-SIP, which was approved by USEPA on May 18, 2000. Most beneficial uses and water quality objectives contained in the Basin Plan were approved under state law and submitted to and approved by USEPA prior to May 30, 2000. Any water quality objectives and beneficial uses submitted to USEPA prior to May 30, 2000, but not approved by USEPA before that date, are nonetheless "applicable water quality standards for purposes of the CWA" pursuant to 40 CFR 131.21(c)(1). The remaining water quality objectives and beneficial uses implemented by this Order [those for arsenic, cadmium, chromium (VI), copper (fresh water), lead, nickel, silver (1-hour), and zinc] were approved by USEPA on January 5, 2005, and are applicable water quality standards pursuant to 40 CFR 131.21(c)(2). Collectively, this Order's restrictions on individual pollutants are no more stringent than required to implement the technology-based requirements of the CWA and the applicable water quality standards for purposes of the CWA.

P. Antidegradation Policy. 40 CFR 131.12 requires that the state water quality standards include an antidegradation policy consistent with the federal policy. The State Water Board established California's antidegradation policy in State Water Board Resolution No. 68-16. Resolution No. 68-16 incorporates the federal antidegradation policy where the federal policy applies under federal law. Resolution No. 68-16 requires that existing quality of waters be maintained unless degradation is justified based on specific findings. The Regional Water Board's Basin Plan implements, and incorporates by reference, both the state and federal antidegradation policies. As discussed in detail in the Fact Sheet (**Attachment F**), the permitted discharge is consistent with the antidegradation provision of section 131.12 and State Water Board Resolution No. 68-16.

Q. Anti-Backsliding Requirements. CWA Sections 402(o)(2) and 303(d)(4) and NPDES regulations at 40 CFR 122.44(l) prohibit backsliding in NPDES permits. These anti-backsliding provisions require effluent limitations in a reissued permit to be as stringent as those in the previous permit, with some exceptions where limitations may be relaxed. As discussed in detail in the Fact Sheet (**Attachment F**), the prohibitions, limitations, and

conditions of this Order are consistent with applicable federal and State anti-backsliding requirements.

R. **Monitoring and Reporting.** 40 CFR122.48 requires that all NPDES permits specify requirements for recording and reporting monitoring results. Water Code sections 13267 and 13383 authorize the Regional Water Board to require technical and monitoring reports. The Monitoring and Reporting Program (MRP) establishes monitoring and reporting requirements to implement federal and State requirements. This MRP is provided in **Attachment E**. The MRP may be amended by the Executive Officer pursuant to USEPA regulation 40 CFR 122.62, 122.63, and 124.5.

S. **Standard and Special Provisions.** Standard Provisions, which apply to all NPDES permits in accordance with 40 CFR122.41, and additional conditions applicable to specified categories of permits in accordance with section 122.42, are provided in **Attachment D.** The Discharger must comply with all standard provisions and with those additional conditions that are applicable under section 122.42. The Regional Water Board has also included in this Order special provisions applicable to the Discharger. A rationale for the special provisions contained in this Order is provided in the Fact Sheet (**Attachment F**).

T. **Provisions and Requirements Implementing State Law.** The provisions/requirements in subsections VI.C. of this Order are included to implement state law only. These provisions/requirements are not required or authorized under the federal CWA; consequently, violations of these provisions/requirements are not subject to the enforcement remedies that are available for NPDES violations.

U. **Notification of Interested Parties.** The Regional Water Board has notified the Discharger and interested agencies and persons of its intent to prescribe WDRs for the discharge and has provided them with an opportunity to submit their written comments and recommendations. Details of notification are provided in the Fact Sheet (**Attachment F**).

V. **Consideration of Public Comment.** The Regional Water Board, in a public meeting, heard and considered all comments pertaining to the discharge. Details of the Public Hearing are provided in the Fact Sheet (**Attachment F**) of this Order.

W. **Storm Water Not Commingled with Wastewater.** Clean Water Act § 402(p) and the regulations promulgated thereunder require industrial storm water dischargers to obtain an NPDES permit for discharging storm water from the facility to state water and to implement Best Available Technology Economically Achievable (BAT) and Best Conventional Pollutant Control Technology (BCT) to control pollutants in industrial storm water discharges. The State Water Board has developed a statewide NPDES General Permit for storm water discharges associated with industrial activities (NPDES General Permit CAS000001). Storm water discharges that are not commingled with other wastewaters from aggregate mining and sand washing/offloading facilities should be regulated under the industrial storm water General Permit. Storm water discharges that commingle with process wastewaters from the aggregate mining and sand washing/offloading facilities are regulated under this General Permit.

X. **Best Management Practices (BMPs) Plan.** This Order requires a Discharger with an existing facility (or existing Discharger) to submit a Best Management Practices (BMPs) plan with the NOI, if it has not done so under the requirement of Order No. R2-2002-0063, to obtain coverage under this General Permit. However, a Discharger with a new facility (new Discharger) has the option of submitting its BMPs plan 30 days prior to its operation or commencement of discharge. This is to allow the new Discharger to develop a BMPs plan that is specific to its operation and to better identify which areas of the facility operation need improved BMPs. This Order also requires all Dischargers to update the BMPs plan annually, and implement a BMPs plan for their industrial activity. The purpose of the BMPs plan is to control and abate the discharge of pollutants from the facility to surface waters and to achieve compliance with Best Available Technology Economically Achievable (BAT) or Best Conventional Pollutant Control Technology (BCT) requirement and with applicable water quality standards.

IT IS HEREBY ORDERED, that Order No. R2-2002-0063 is rescinded upon the effective date of this Order except for enforcement purposes, and, in order to meet the provisions contained in Division 7 of the California Water Code (commencing with section 13000) and regulations adopted thereunder, and the provisions of the federal Clean Water Act and regulations and guidelines adopted thereunder, the Dischargers shall comply with the requirements in this Order.

III. DISCHARGE PROHIBITIONS

1. Discharge of effluent or treated wastewater at a location or in a manner different from that described in a Discharger's NOI, and allowed by that Discharger's NGPC, is prohibited.

2. The discharge shall not contain silt, sand, clay or other earthen materials from any activity in quantities sufficient to cause deleterious bottom deposits, turbidity, or discolorations in surface waters or to unreasonably affect or threaten to affect beneficial uses.

3. The discharge shall not contain floating debris, oil, grease, scum, or other floating materials.

4. On-site storage of oil, fuel and any other chemicals shall be within secondary containment or under a roof.

5. Bypassing retention ponds is prohibited.

IV. EFFLUENT LIMITATIONS AND DISCHARGE SPECIFICATIONS

A. Effluent Limitations for Aggregate Mining Facilities

The effluent from each discharge outfall(s) as defined in the NOI shall not exceed the following effluent limits in Table 1:

Table 1. Effluent Limitations for Aggregate Mining Facilities

Constituents	Units	Daily Maximum	Weekly Average	Monthly Average	Instantaneous Maximum	Instantaneous Minimum
1. Total Suspended Solids (TSS)	mg/L	--	45	30	--	--
2. Turbidity	NTU	40	--	--	--	--
3. Settable Matter	mL/1-hr	0.2	--	0.1	--	--
4. pH[1]	standard units	--	--	--	8.5	6.5
5. Total Dissolved Solids[2]	mg/L	500	--	--	--	--
6. Chloride[2]	mg/L	250	--	--	--	--
7. Total Chlorine residual[3]	mg/L	--	--	--	0.0	--
8. Acute Toxicity[4]	%survival	The survival of bioassay test organism(s) in 96-hour bioassays of undiluted effluent in a single-sample maximum shall be at least 70%. A bioassay test showing survival of less than 70% represents a violation of this effluent limit.				

Footnotes for Table 1:

(1) Exceedance of the pH limit will not constitute a violation of this Order if the Discharger can demonstrate that the discharge does not cause a natural background pH to be depressed below 6.5 nor raised above 8.5, or if outside this range, the receiving water has not been altered from normal ambient pH by more than 0.5 Standard Units (through upstream and downstream receiving water monitoring).

In no case shall the pH of the effluent be below 6.0 or above 9.0.

(2) The TDS and chloride limits apply to discharges into a fresh water body supporting municipal water supply or groundwater recharge. This includes Alameda Creek above Niles.

(3) The total chlorine residual limit applies only to facilities that use municipal water supply as wash water. The chlorine residual requirement is defined as below the limit of detection by standard methods of analysis, as defined in *Standard Methods for the Examination of Water and Wastewater*.

(4) Compliance with the acute toxicity limit shall be achieved in accordance with Section IV of the attached MRP (**Attachment E**).

B. Effluent Limitations for Marine Sand Washing Facilities

1. Conventional and Non-Conventional Pollutants:

The effluent from each discharge outfall(s) as defined in the NOI shall not exceed the following limits:

Table 2. Conventional and Non-Conventional Pollutant Effluent Limitations for Marine Sand Washing Facilities

Constituents	Units	Daily Maximum	Weekly Average	Monthly Average	Instantaneous Maximum	Instantaneous Minimum
1. Turbidity	NTU	50	--	--	--	--
2. Settable Matter	mL/1-hr	0.2	--	0.1	--	--
3. pH[1]	standard units	--	--	--	8.5	6.5
4. Total Chlorine residual[2]	mg/L	--	--	--	0.0	--

Footnotes for Table 2:

(1) Exceedance of the pH limit will not constitute a violation of this Order if the Discharger can demonstrate that the discharge does not cause a natural background pH to be depressed below 6.5 nor raised above 8.5, or if outside this range, the receiving water has not been altered from normal ambient pH by more than 0.5 Standard Units (through upstream and downstream receiving water monitoring).

(2) The total chlorine residual limit applies only to sand washing facilities that use municipal water supply as wash water. The chlorine residual requirement is defined as below the limit of detection by standard methods of analysis, as defined in *Standard Methods for the Examination of Water and Wastewater*.

2. Toxic Pollutants:

The effluent from each discharge outfall(s) as defined in the Notice of Intent shall not exceed the following limits:

Table 3. Final Effluent Limitations for Toxic Pollutants for Marine Sand Washing Facilities

Constituent	Unit	Final Effluent Limitations(1)(2)	
		Average monthly	Maximum daily
Copper(3)	µg/L	6.5	13

Footnotes for Table 3:

(1) a. All analyses shall be performed using current USEPA methods, or equivalent methods approved in writing by the Executive Officer.

b. Limitations apply to the average concentration of all samples collected during the averaging period (monthly = calendar month).

c. All metal limitations are total recoverable.

(2) A daily maximum or average monthly value for a given constituent shall be considered noncompliant with the effluent limitations only if it exceeds the effluent limitation and the Reporting Level for that constituent. As outlined in Section 2.4.5 of the SIP, the table below indicates the Minimum Level (ML) upon which the Reporting Level is based for compliance determination purposes. An ML is the concentration at which the entire analytical system must give a recognizable signal and acceptable calibration point. The ML is the concentration in a sample that is equivalent to the concentration of the lowest calibration standard analyzed by a specific analytical procedure, assuming that all the method specified sample weights, volumes, and processing steps have been followed.

Constituent	ML	Units
Copper	2	µg/L

(3) Alternate Effluent Limits for Copper:

a. If a copper SSO for the receiving water becomes legally effective, resulting in adjusted saltwater chronic objective of 2.5 µg/L and acute objective of 3.9 µg/L as documented in the *Copper Site-Specific Objectives in San Francisco Bay, Proposed Basin Plan Amendment and Draft Staff Report, dated June 6, 2007*, upon its effective date, the following limitations shall supersede those copper limitations listed in Table 3 (the rationale for these effluent limitations can be found in the Fact Sheet [**Attachment F**]).

Maximum daily effluent limit (MDEL) of 11 μg/L, and
average monthly effluent limit (AMEL) of 5.5 μg/L.

b. If a different copper SSO for the receiving water is adopted, the alternate WQBELs based on the SSO will be determined after the SSO effective date.

3. Whole Effluent Acute Toxicity.

Representative samples of the discharge at the discharge points as specified in individual NOIs shall meet the following limits for acute toxicity:

a. The survival of bioassay test organism(s) in 96-hour bioassays of undiluted effluent in a single-sample maximum shall be at least 70%.

b. A bioassay test showing survival of less than 70% represents a violation of this effluent limit.

Compliance with these limits shall be achieved in accordance with Section IV of the attached MRP (Attachment E).

C. Effluent Limitations for Sand Offloading Facilities

The effluent from each discharge outfall(s) as defined in the NOI shall not exceed the following limits:

Table 4. Effluent Limitations for Sand Offloading Facilities

Constituents	Daily Maximum	Instantaneous Maximum	Instantaneous Minimum
1. Settable Matter, mL/1-hr	1.0	--	--
2. pH, standard unit (1)	--	8.5	6.5

Footnote for Table 4:

(1) Exceedance of the pH limit will not constitute a violation of this Order if the Discharger can demonstrate that the discharge does not cause a natural background pH to be depressed below 6.5 nor raised above 8.5, or if outside this range, the receiving water has not been altered from normal ambient pH by more than 0.5 Standard Units.

D. Land Discharge Specifications

Not applicable.

E. Reclamation Specifications

Not applicable.

F. Storm Water Limitations

Not applicable.

V. RECEIVING WATER LIMITATIONS

A. Surface Water Limitations

1. The discharge shall not cause the following conditions to exist at any place:

   a. Floating, suspended, or deposited macroscopic particulate matter or foam in concentrations that cause nuisance or adversely affect beneficial uses;

   b. Bottom deposits or aquatic growths to the extent that such deposits or growths cause nuisance or adversely affect beneficial uses;

   c. Alterations of temperature, turbidity, or apparent color beyond present natural background levels;

   d. Visible, floating, suspended, or deposited oil or other products of petroleum origin; and

   e. Toxic or other deleterious substances to be present in concentrations or quantities that can cause deleterious effects on wildlife, waterfowl, or other aquatic biota, or that can render any of these unfit for human consumption, either at levels created in the receiving waters or as a result of biological concentration.

2. The discharge shall not cause nuisance or adversely affect the beneficial uses of the receiving water.

3. The discharge shall not cause the following limits to be exceeded in waters of the State at any one place within one foot of the water surface:

   a. Dissolved Oxygen:

      (1) For all tidal waters, the following objectives shall apply:

      In the Bay:

Downstream of Carquinez Bridge	5.0 mg/L minimum
Upstream of Carquinez Bridge	7.0 mg/L minimum

      (2) For nontidal waters, the following objectives shall apply:
      Waters designated as:

Cold water habitat	7.0 mg/L minimum
Warm water habitat	5.0 mg/L minimum

      The median dissolved oxygen concentration for any three consecutive months shall not be less than 80% of the dissolved oxygen content at saturation. When natural factors cause concentrations less than that specified above, then the

discharges shall not cause further reduction in ambient dissolved oxygen concentrations.

b. Dissolved Sulfide: Natural background levels

c. pH: The pH shall not be depressed below 6.5 nor raised above 8.5, or if outside this range, the receiving water has not been altered from normal ambient pH by more than 0.5 Standard Units.

d. Total Dissolved Solids (TDS) and Chlorides:

(1) For Alameda Creek above Niles and its tributaries:

TDS:	250 mg/L (90-day arithmetic mean) 360 mg/L (90-day 90th percentile) 500 mg/L (daily maximum)
Chlorides:	60 mg/L (90-day arithmetic mean) 100 mg/L (90-day 90th percentile) 250 mg/L (daily maximum)

(2) For other fresh water bodies supporting municipal water supply or groundwater recharge:

TDS:	500 mg/L (daily maximum)
Chlorides:	250 mg/L (daily maximum)

e. Turbidity: For a fresh water body supporting municipal supply or groundwater recharge, no increase in turbidity above present natural background levels in the Discharger's receiving water by more than the following:

Ambient Background	**Incremental Increase**
50 NTU and below	5 NTU, maximum
50-100 NTU	10 NTU, maximum
100 NTU and above	10% background, maximum

4. The discharge shall not cause a violation of any particular water quality standard for receiving waters adopted by the Regional Water Board or the State Water Board as required by the Clean Water Act and regulations adopted thereunder. If more stringent applicable water quality standards are promulgated or approved pursuant to CWA Section 303, or amendments thereto, the Regional Water Board will revise and modify this Order in accordance with such more stringent standards.

B. Groundwater Limitations

Not applicable.

VI. PROVISIONS

A. Federal Standard Provisions

The Discharger shall comply with all Standard Provisions included in **Attachment D** of this Order.

B. Monitoring and Reporting Program Requirements

1. The Discharger shall comply with the Monitoring and Reporting Program (MRP) and future revisions thereto, in **Attachment E** of this Order and as specified in the Discharger's NGPC.

2. The Discharger authorized under this permit may be required to comply with additional monitoring requirements. The Executive Officer will specify such additional monitoring requirements in the authorization letter, which will include an explanation of the need for the information. Examples of additional monitoring that could be required are listed below:

   a. Monitoring required to respond to a complaint received about a facility authorized to discharge under this permit,

   b. Dioxins and furans monitoring,

   c. Participation in the Regional Monitoring Program (RMP),

   d. Additional effluent and ambient priority pollutant monitoring.

C. Special Provisions

1. Reopener Provisions

The Regional Water Board may modify or reopen this Order prior to its expiration date in any of the following circumstances as allowed by law:

a. If present or future investigations demonstrate that the discharge(s) governed by this Order will or have a reasonable potential to cause or contribute to, or will cease to, have adverse impacts on water quality and/or beneficial uses of the receiving waters. Such investigations may or may not relate to total dissolved solids or chloride loads and their potential effect on Niles Cone groundwater basin.

b. If new or revised WQOs or TMDLs come into effect for the San Francisco Bay estuary and contiguous water bodies (whether statewide, regional, or site-

specific). In such cases, effluent limitations or triggers for toxic pollutants in this Order will be modified as necessary to reflect updated WQOs and wasteload allocations in TMDLs. Adoption of effluent limitations contained in this Order is not intended to restrict in any way future modifications based on legally adopted WQOs, TMDLs, or as otherwise permitted under Federal regulations governing NPDES permit modifications;

c. If translator or other water quality studies provide a basis for determining that a permit condition(s) should be modified;

d. If an administrative or judicial decision on a separate NPDES permit or WDR addresses requirements similar to this discharge;

e. Or as otherwise authorized by law.

The Discharger may request permit modification based on the above. The Discharger shall include in any such request an antidegradation and antibacksliding analysis.

2. Notice of Intent (NOI)

A person who seeks coverage under this General Permit shall file a complete NOI. The NOI application for each point of proposed discharge to a surface water body shall contain the information required in the NOI Form, as explained in **Attachments B and C** of this Order and as may be amended by the Executive Officer.

3. NOI Review

Upon receipt of an NOI application package for proposed discharge, the Regional Water Board staff will review the application to determine if it is complete and propose to the Executive Officer whether the Discharger is eligible to discharge waste under this General Permit. The application package shall document that the facility and associated operation, maintenance, and monitoring plans are capable of ensuring that the discharge will meet the provisions, prohibitions, effluent limitations, and receiving water limitations of this Order.

4. Notice of General Permit Coverage (NGPC) – Discharge Authorization

If the Executive Officer determines that the proposed discharge is eligible for this General Permit and its NOI is complete, the Executive Officer will authorize the proposed discharge by issuing a NGPC. The Discharger is authorized to discharge starting on the effective date of the NGPC. The NGPC will specify type(s) of wastewater and the maximum discharge flow rate allowed. Any Discharger proposing similar discharges at multiple sites may be covered under one discharge authorization letter subject to the approval of the Executive Officer on a case-by-case basis. Each outfall will be subject to individual fees.

5. Discharge Termination

In accordance with 40 CFR 122.28(b)(2)(iv), the Executive Officer may terminate or revoke coverage under this Order for any of the specified causes for an individual permit coverage set forth in 40 CFR 122.28(b)(3). After notice and opportunity for a hearing, coverage of an individual discharge under this General Permit may be terminated or modified for cause, including but not limited to, the following:

a. Violation of any term or condition of this General Permit;

b. Misrepresentation or failure to disclose all relevant facts in obtaining coverage under this General Permit; or

c. Change in any condition that requires either a temporary or permanent reduction or elimination of the authorized discharge.

6. Non-Compliance as a Violation

Upon the effective date of the Executive Officer's discharge authorization, the Discharger shall comply with all applicable conditions and limitations of this Order and its Attachments. Any permit noncompliance (violations of requirements in this Order or Monitoring Program) constitutes a violation of the Clean Water Act and the California Water Code and is grounds for enforcement action, permit or authorization termination, revocation and reissuance, modification, issuance of an individual permit, or denial of a renewal application.

7. Individual NPDES Permit May Be Required

The USEPA Administrator may request the Executive Officer to require any discharger authorized to discharge waste by a general permit to subsequently apply for and obtain an individual NPDES permit. The Executive Officer may require any discharger authorized to discharge waste by a general permit to subsequently apply for and obtain an individual NPDES permit. An interested person may petition the Executive Officer or the Regional Administrator to take action under this provision. Cases where an individual NPDES permit may be required include the following:

a. The Discharger is not in compliance with the conditions of this Order or as authorized by the Executive Officer,

b. A change has occurred in the availability of demonstrated technology or practices for the control or abatement of pollutants applicable to the point source,

c. Effluent limitation guidelines are promulgated for point sources covered by the general NPDES permit,

d. A water quality control plan containing requirements applicable to such point sources is approved, or

e. The requirements of 40 CFR 122.28(a), as explained in Finding II.C, are not met.

8. Triggers for Accelerated Monitoring and Additional Investigation

Four types of triggers for toxic pollutants are listed in Table 5 below. They are not effluent limitations and should not be construed as such. Instead, they are levels at which additional investigation is warranted to determine whether a numeric limit for a particular constituent is necessary. The Type I triggers in Table 5 are intended for use where discharges are to a fresh water body supporting municipal water supply or groundwater recharge beneficial use. Type II triggers are intended for use where discharges are to other fresh water bodies not suitable for municipal water supply or groundwater recharge. Type III triggers in Table 5 are intended for use where discharges are to a water body that is estuarine. Type IV triggers are for discharges into a marine environment. The authorization issued to each Discharger will indicate which trigger type is applicable to that specific discharge.

If any constituent in an effluent exceeds the corresponding trigger as listed in Table 5, the Discharger shall take three monthly samples (three influent, if applicable, and three effluent) for each exceeded constituent following the exceedance. If confirmed, the Discharger shall comply with Provisions IV.C.8.a and IV.C.8.b, below. If the exceedance is caused solely by the limitations of treatment capability, and the Discharger has performed accelerated monitoring in the past for the same pollutants and is in the process of evaluating alternatives or installing new treatment units to address the noncompliance, the Discharger shall be exempted from the accelerated monitoring and requirements in a. and b. below. However, the Discharger shall report the exceedance within 24 hours after awareness of the exceedance. A written notification needs to be submitted within 5 business days following the report; the Discharger shall also indicate the past and on-going efforts in the written notification.

a. Within 90 days of confirmation (through accelerated monitoring, that effluent concentrations of a pollutant exceed one or more of the above triggers), the Discharger shall submit a Feasibility Analysis to the Regional Water Board that describes if methods to control levels of pollutant(s) of concern are feasible, and if so, describes the selected methods of control to ensure that levels of pollutant(s) of concern in effluent will not be discharged at levels exceeding applicable water quality objectives.

b. If there is no feasible control method, the Discharger's Feasibility Study shall document the possibility of relocating the discharge to land, or to a sanitary sewer system.

c. Based on the results of the above evaluations, the Executive Officer may terminate the discharge and/or require application for an individual NPDES permit consistent with Provisions VI.C.5 and VI.C.7 above.

Table 5. Triggers for Accelerated Monitoring and Additional Investigation

# in CTR	PRIORITY POLLUTNTS	Type I Triggers	Type II Triggers	Type III Triggers	Type IV Triggers
		For discharges to fresh water bodies supporting MUN or GWR (ug/L) (1)	For discharges to fresh water bodies not supporting MUN or GWR (ug/L)	For discharges to estuarine water bodies (ug/L)	For discharges to marine water bodies (ug/L)
1	Antimony	6(2)	4300	4300	4300
2	Arsenic	10(2)	150	36	36
3	Beryllium	4(2)	--	--	--
4	Cadmium	1.7	1.7	3.4	9.4
5a	Chromium (III)	310	310	640	---
5b	Chromium (VI)	11	11	11	50
5	Chromium total	100(2)	--	--	--
6	Copper	14	14	4.2	4.2
7	Lead	6.0	6.0	8.5	8.5
8	Mercury	0.025	0.025	0.025	0.025
9	Nickel	79	79	13	13
10	Selenium	5	5	5	5
11	Silver	9.5	9.5	2.2	2.2
12	Thallium	1.7	1.7	6.3	6.3
13	Zinc	180	180	86	86
14	Cyanide	5.2	5.2	1	1
15	Asbestos (million fibers/L)	7	---	---	---
16	2,3,7,8-TCDD	0.000000013	0.000000014	0.000000014	0.000000014
17	Acrolein	320	780	780	780
18	Acrylonitrile	0.06	0.66	0.66	0.66
19	Benzene	1.2	71	71	71
20	Bromoform	4.3	360	360	360
21	Carbon Tetrachloride	0.3	4.4	4.4	4.4
22	Chlorobenzene	680	21,000	21,000	21,000
23	Chlordibromomethane	0.41	34	34	34
27	Dichlorobromomethane	0.56	46	46	46
29	1,2-Dichloroethane	0.38	99	99	99
30	1,1-Dichloroethylene	0.057	3.2	3.2	3.2
31	1,2-Dichloropropane	0.52	39	39	39
32	1,3-Dichloropropylene	10	1,700	1,700	1,700
33	Ethylbenzene	3,100	29,000	29,000	29,000
34	Methyl Bromide	48	4,000	4,000	4,000
36	Methylene Chloride	4.7	1,600.0	1,600	1,600
37	1,1,2,2-Tetrachloroethane	0.17	11	11	11
38	Tetrachloroethylene	0.8	8.85	8.85	8.85
39	Toluene	6,800	200,000	200,000	200,000
40	1,2-Trans-Dichloroethylene	700	140,000	140,000	140,000
42	1,1,2-Trichloroethane	0.6	42	42	42
43	Trichloroethylene	2.7	81	81	81
44	Vinyl Chloride	2.0	525	525	525
45	Chlorophenol	120	400	400	400
46	2,4-Dichlorophenol	93	790	790	790
47	2,4-Dimethylphenol	540	2,300	2,300	2,300

# in CTR	PRIORITY POLLUTNTS	Type I Triggers	Type II Triggers	Type III Triggers	Type IV Triggers
		For discharges to fresh water bodies supporting MUN or GWR (ug/L) (1)	For discharges to fresh water bodies not supporting MUN or GWR (ug/L)	For discharges to estuarine water bodies (ug/L)	For discharges to marine water bodies (ug/L)
48	2-Methyl-4,6-Dinitrophenol	13	765	765	765
49	2,4-Dinitrophenol	70	14,000	14,000	14,000
53	Pentachlorophenol	0.28	8.2	7.9	7.9
54	Phenol	21,000	4,600,000	4,600,000	4,600,000
55	2,4,6-Trichlorophenol	2.1	6.5	6.5	6.5
56	Acenaphthene	1,200	2,700	2,700	2,700
58	Anthracene	9,600	110,000	110,000	110,000
59	Benzidine	0.00012	0.00054	0.00054	0.00054
60	Benzo(a)Anthracene	0.0044	0.049	0.049	0.049
61	Benzo(a)Pyrene	0.0044	0.049	0.049	0.049
62	Benzo(b)Fluoranthene	0.0044	0.049	0.049	0.049
64	Benzo(k)Fluoranthene	0.0044	0.049	0.049	0.049
66	Bis(2-Chloroethyl)Ether	0.031	1.4	1.4	1.4
67	Bis(2-Chloroisopropyl)Ether	1,400	170,000	170,000	170,000
68	Bis(2-Ethylhexyl)Phthalate	1.8	5.9	5.9	5.9
70	Butylbenzyl Phthalate	3,000	5,200	5,200	5,200
71	2-Chloronaphthalene	1,700	4,300	4,300	4,300
73	Chrysene	0.0044	0.049	0.049	0.049
74	Dibenzo(a,h)Anthracene	0.0044	0.049	0.049	0.049
75	1,2-Dichlorobenzene	2,700	17,000	17,000	17,000
76	1,3-Dichlorobenzene	400	2,600	2,600	2,600
77	1,4-Dichlorobenzene	400	2,600	2,600	2,600
78	3,3'-Dichlorobenzidine	0.040	0.077	0.077	0.077
79	Diethyl Phthalate	23,000	120,000	120,000	120,000
80	Dimethyl Phthalate	313,000	2,900,000	2,900,000	2,900,000
81	Di-n-Butyl Phthalate	2,700	12,000	12,000	12,000
82	2,4-Dinitrotoluene	0.11	9.1	9.1	9.1
85	1,2-Diphenylhydrazine	0.04	0.54	0.54	0.54
86	Fluoranthene	300	370	370	370
87	Fluorene	1,300	14,000	14,000	14,000
88	Hexachlorobenzene	0.00075	0.00077	0.00077	0.00077
89	Hexachlorobutadiene	0.44	50	50	50
90	Hexachlorocyclopentadiene	240	17,000	17,000	17,000
91	Hexachloroethane	1.9	8.9	8.9	8.9
92	Indeno(1,2,3-cd) Pyrene	0.0044	0.049	0.049	0.049
93	Isophorone	8.4	600	600	600
95	Nitrobenzene	17	1,900	1,900	1,900
96	N-Nitrosodimethylamine	0.00069	8.1	8.1	8.1
97	N-Nitrosodi-n-Propylamine	0.005	1.4	1.4	1.4
98	N-Nitrosodiphenylamine	5	16	16	16
100	Pyrene	960	11,000	11,000	11,000
102	Aldrin	0.00013	0.00014	0.00014	0.00014
103	alpha-BHC	0.0039	0.013	0.013	0.013
104	beta-BHC	0.014	0.046	0.046	0.046

# in CTR	PRIORITY POLLUTNTS	Type I Triggers	Type II Triggers	Type III Triggers	Type IV Triggers
		For discharges to fresh water bodies supporting MUN or GWR (ug/L) (1)	For discharges to fresh water bodies not supporting MUN or GWR (ug/L)	For discharges to estuarine water bodies (ug/L)	For discharges to marine water bodies (ug/L)
105	gamma-BHC	0.019	0.063	0.063	0.063
107	Chlordane	0.00057	0.00059	0.00059	0.00059
108	4,4-DDT	0.00059	0.00059	0.00059	0.00059
109	4,4-DDE	0.00059	0.00059	0.00059	0.00059
110	4,4-DDD	0.00083	0.00084	0.00084	0.00084
111	Dieldrin	0.00014	0.00014	0.00014	0.00014
112	alpha-Endosulfan	0.056	0.056	0.0087	0.0087
113	beta-Endosulfan	0.056	0.056	0.0087	0.0087
114	Endosulfan Sulfate	110	240	240	240
115	Endrin	0.036	0.036	0.0023	0.0023
116	Endrin Aldehyde	0.76	0.81	0.81	0.81
117	Heptachlor	0.00021	0.00021	0.00021	0.00021
118	Heptchlor Epoxide	0.0001	0.00011	0.00011	0.00011
119-125	PCBs sum	0.00017	0.00017	0.00017	0.00017
126	Toxaphene	0.0002	0.0002	0.0002	0.0002
	Tributyltin	0.072	0.072	0.0074	0.0074
	Total PAHs	--	--	15	15
	Odor-Threshold (Units)	3(2)	--	--	--
	Sulfate	250,000(2)	--	--	--
	Foaming Agents	500(2)	--	--	--
	Color (color units)	15(2)	--	--	--
	EC (mmhos/cm)	900(2)	--	--	--
	Aluminum	200(2)	--	--	--
	Barium	1,000 (2)	--	--	--
	Fluoride	2,000(2)	--	--	--
	Iron	300(2)	--	--	--
	Manganese	50(2)	--	--	--
	Nitrate (as N)	10,000(2)	--	--	--
	Nitrate + Nitrite (as N)	10,000(2)	--	--	--
	Nitrite (as N)	1,000(2)	--	--	--
	Combined Radium-226 and Radium-228 (IN pCi/l)	5(2)	--	--	--
	Gross Alpha Particle (includes Radium-226 but excludes Radon and Uranium) (IN pCi/l)	15(2)	--	--	--
	Strontium-90 (IN pCi/l)	8(2)	--	--	--
	Gross Beta Particle Activity (IN pCi/l)	50(2)	--	--	--
	Beta particles and photon emitters (millirems per year)	4(2)			
	Uranium (IN pCi/l)	30(2)	--	--	--

Footnotes for Table 5:

(1) MUN – municipal water supply, GWR – groundwater recharge
(2) These are drinking water maximum contaminate levels.

9. Construction, Operation and Maintenance Specifications

a. Wastewater Facilities, Review and Evaluation, and Status Reports.

(1) The Discharger shall operate and maintain its wastewater treatment facilities in a manner to ensure that all facilities are adequately staffed, supervised, financed, operated, maintained, repaired, and upgraded as necessary, in order to provide adequate and reliable treatment and disposal of all wastewater produced.

(2) The Discharger shall regularly review and evaluate its wastewater facilities and operation practices in accordance with section a.1 above. Reviews and evaluations shall be conducted as an ongoing component of the Discharger's administration of its wastewater facilities.

(3) The Discharger shall provide the Executive Officer, upon request, a report describing the current status of its wastewater facilities and operation practices, including any recommended or planned actions and an estimated time schedule for these actions. The Discharger shall also include, in each annual self-monitoring report, a description or summary of review and evaluation procedures, and applicable wastewater facility programs or capital improvement projects.

b. Operations and Maintenance Manual (O&M), Review and Status Reports.

(1) The Discharger shall maintain an O&M Manual for the Discharger's wastewater facilities. The O&M Manual shall be maintained in usable condition and be available for reference and use by all applicable personnel.

(2) The Discharger shall regularly review, revise, or update, as necessary, the O&M Manual(s) so that the document(s) may remain useful and relevant to current equipment and operation practices. Reviews shall be conducted annually, and revisions or updates shall be completed as necessary. For any significant changes in treatment facility equipment or operation practices, applicable revisions shall be completed within 90 days of completion of such changes.

(3) The Discharger shall provide the Executive Officer, upon request, a report describing the current status of its O&M Manual, including any recommended or planned actions and an estimated time schedule for these actions. The Discharger shall also include, in each annual self-monitoring report, a description or summary of review and evaluation procedures and applicable changes to its O&M Manual.

10. Special Studies, Technical Reports and Additional Monitoring Requirements

a. Best Management Practices (BMPs) Plan

(1) **Existing Discharger.** The Discharger from an existing facility shall submit a BMPs plan together with the NOI.

(2) **New Discharger.** The Discharger from a newly proposed facility has the option of submitting its BMPs plan with the NOI or 30 days before the commencement of its operations.

(3) **BMPs plan requirements.** The BMPs plan shall address all specific means of controlling the discharge of pollutants from the facility. The content of the BMPs plan is specified in the instructions for the NOI attached to this Order. The Discharger shall implement immediately the BMPs plan upon submittal to the Regional Water Board. The Executive Officer may require additional pollutant control measures. The Discharger shall review and update the effectiveness and adequacy of the implemented BMPs plan as often as necessary.

(4) **Annual Report.** The Discharger shall submit updates to its BMPs plan annually to the Regional Water Board by July 1st of each year.

b. Facility Modification/Maintenance

The Discharger shall submit a schedule at least 30 days prior to any modification or maintenance of the facility, which the Discharger determines may result in violation of effluent limitations or alteration of the outfall location(s). The schedule shall contain a description of the maintenance including the modified outfall location(s) and its purpose; the period of maintenance, including exact dates and times; and steps taken or planned to reduce, eliminate, and prevent occurrence of non-compliance.

c. No Net Salt Loading Analysis for Discharges to Alameda Creek Above Niles

Initial Study. For Dischargers discharging into Alameda Creek above Niles, whose receiving waters are subject to the receiving water limits in Section V.A.3.d for TDS and chloride but whose receiving waters are not meeting the receiving water limits, the Discharger may perform a study to demonstrate that its operation and discharges do not result in salt build-up in the groundwater basin and request an exception to these receiving water limits. If the study conclusively shows that the Discharger's operation does not contribute salt to the groundwater basin (the conclusion must be supported by monitoring data of both the discharges and receiving water; and, ideally, it shall demonstrate that the discharges have comparable TDS and chloride levels as those in the receiving water, or contribute insignificant salt loadings compared to other tributaries or sources such that the discharges do not further deteriorate the noncompliance

situation in Alameda Creek), the Discharger will be exempt from the receiving water limits for one year from the date of initial study submittal. However, the Discharger shall continue to monitor for TDS and chloride for both the discharge and receiving water according to the schedules provided in **Attachment E** of this Order.

Annual progress report. If the Discharger wishes to continue pursuing the exception one year after its initial submittal, the Discharger shall submit an annual report that includes an analysis of its TDS and chloride data collected during the previous year (data collected at a nearby downstream station on the same stream during the same time period by other groups and agencies, such as Alameda County Water District, may also be used) to examine whether discharge quality and ambient conditions have changed. An annual report shall be submitted each year at least 30 days prior to the expiration of the previous granted exception (for example, if the previous report is submitted on May 1, the next report is due by April 2 of the next year).

The exception does not apply to the effluent limits for TDS and chloride in Table 1.

d. Total Suspended Solids (TSS) Special Study for Marine Sand Washing and Offloading Facilities

Marine sand washing and offloading Dischargers are required to perform a special study to characterize the TSS levels in their discharges using currently available methods (as of this permit reissuance, SM2540 or APHA 2540D). The study shall address the issues identified by the Hanson study (**Appendix F-2** of the Fact Sheet) that salt content in the discharge causes biased high TSS measurements. In this study, the Discharger shall develop filter rinsing protocols to remove dissolved solids to a level where Method SM2540 will yield TSS results reliable for use in permit compliance monitoring. The Discharger shall also use the new protocols to characterize TSS levels in its discharge.

Study Plan: The Discharger shall submit a study plan 90 days after permit adoption, including, but not limited to, a proposal of commercial lab(s) to be used, which the Discharger will work with to develop filter rinsing protocols, monitoring frequency (Regional Water Board staff recommends once per week analysis for TSS), and any other relevant proposals.

Annual progress reports: The Discharger shall submit annual progress reports by February 28 of each year covering the previous calendar year. The reports shall include TSS monitoring results, a discussion of issues identified related to analytical methods, and progress made in addressing the issues.

Final report: The Discharger shall submit a final report 180 days prior to the expiration of the General Permit. The final report shall include all available data and a discussion of findings and conclusions.

The study results will be considered when the Regional Water Board sets effluent limits for TSS during the next permit reissuance.

VII. COMPLIANCE DETERMINATION

Compliance with the effluent limitations contained in Section IV of this Order will be determined as specified below:

A. General.

Compliance with effluent limitations for priority pollutants shall be determined using sample reporting protocols defined in the MRP (Attachment E of this Order). For purposes of reporting and administrative enforcement by the Regional and State Water Boards, the Discharger shall be deemed out of compliance with effluent limitations if the concentration of the priority pollutant in the monitoring sample is greater than the effluent limitation and greater than or equal to the reporting level (RL).

B. Multiple Sample Data

When determining compliance with an AMEL or MDEL for priority pollutants and more than one sample result is available, the Discharger shall compute the arithmetic mean unless the data set contains one or more reported determinations of “Detected, but Not Quantified” (DNQ) or “Not Detected” (ND). In those cases, the Discharger shall compute the median in place of the arithmetic mean in accordance with the following procedure:

1. The data set shall be ranked from low to high, ranking the reported ND determinations lowest, DNQ determinations next, followed by quantified values (if any). The order of the individual ND or DNQ determinations is unimportant.

2. The median value of the data set shall be determined. If the data set has an odd number of data points, then the median is the middle value. If the data set has an even number of data points, then the median is the average of the two values around the middle unless one or both of the points are ND or DNQ, in which case the median value shall be the lower of the two data points where DNQ is lower than a value and ND is lower than DNQ.

ATTACHMENT A – DEFINITIONS

Arithmetic Mean (μ), also called the average, is the sum of measured values divided by the number of samples. For ambient water concentrations, the arithmetic mean is calculated as follows:

Arithmetic mean = $\mu = \Sigma x / n$ where: Σx is the sum of the measured ambient water concentrations, and n is the number of samples.

Average Monthly Effluent Limitation (AMEL): the highest allowable average of daily discharges over a calendar month, calculated as the sum of all daily discharges measured during a calendar month divided by the number of daily discharges measured during that month.

Average Weekly Effluent Limitation (AWEL): the highest allowable average of daily discharges over a calendar week (Sunday through Saturday), calculated as the sum of all daily discharges measured during a calendar week divided by the number of daily discharges measured during that week.

Daily Discharge: Daily Discharge is defined as either: (1) the total mass of the constituent discharged over the calendar day (12:00 am through 11:59 pm) or any 24-hour period that reasonably represents a calendar day for purposes of sampling (as specified in the permit), for a constituent with limitations expressed in units of mass or; (2) the unweighted arithmetic mean measurement of the constituent over the day for a constituent with limitations expressed in other units of measurement (e.g., concentration).

The daily discharge may be determined by the analytical results of a composite sample taken over the course of one day (a calendar day or other 24-hour period defined as a day) or by the arithmetic mean of analytical results from one or more grab samples taken over the course of the day.

For composite sampling, if 1 day is defined as a 24-hour period other than a calendar day, the analytical result for the 24-hour period will be considered as the result for the calendar day in which the 24-hour period ends.

Detected, but Not Quantified (DNQ) are those sample results less than the RL, but greater than or equal to the laboratory's MDL.

Enclosed Bays means indentations along the coast that enclose an area of oceanic water within distinct headlands or harbor works. Enclosed bays include all bays where the narrowest distance between the headlands or outermost harbor works is less than 75 percent of the greatest dimension of the enclosed portion of the bay. Enclosed bays include, but are not limited to, Humboldt Bay, Bodega Harbor, Tomales Bay, Drake's Estero, San Francisco Bay, Morro Bay, Los Angeles-Long Beach Harbor, Upper and Lower Newport Bay, Mission Bay, and San Diego Bay. Enclosed bays do not include inland surface waters or ocean waters.

Estimated Chemical Concentration is the estimated chemical concentration that results from the confirmed detection of the substance by the analytical method below the ML value.

Estuaries means waters, including coastal lagoons, located at the mouths of streams that serve as areas of mixing for fresh and ocean waters. Coastal lagoons and mouths of streams that are temporarily separated from the ocean by sandbars shall be considered estuaries. Estuarine waters shall be considered to extend from a bay or the open ocean to a point upstream where there is no significant mixing of fresh water and seawater. Estuarine waters include~~d~~, but are not limited to, the Sacramento-San Joaquin Delta, as defined in Water Code section 12220, Suisun Bay, Carquinez Strait downstream to the Carquinez Bridge, and appropriate areas of the Smith, Mad, Eel, Noyo, Russian, Klamath, San Diego, and Otay rivers. Estuaries do not include inland surface waters or ocean waters.

Inland Surface Waters are all surface waters of the State that do not include the ocean, enclosed bays, or estuaries.

Instantaneous Maximum Effluent Limitation: the highest allowable value for any single grab sample or aliquot (i.e., each grab sample or aliquot is independently compared to the instantaneous maximum limitation).

Instantaneous Minimum Effluent Limitation: the lowest allowable value for any single grab sample or aliquot (i.e., each grab sample or aliquot is independently compared to the instantaneous minimum limitation).

Maximum Daily Effluent Limitation (MDEL) means the highest allowable daily discharge of a pollutant, over a calendar day (or 24-hour period). For pollutants with limitations expressed in units of mass, the daily discharge is calculated as the total mass of the pollutant discharged over the day. For pollutants with limitations expressed in other units of measurement, the daily discharge is calculated as the arithmetic mean measurement of the pollutant over the day.

Median is the middle measurement in a set of data. The median of a set of data is found by first arranging the measurements in order of magnitude (either increasing or decreasing order). If the number of measurements (n) is odd, then the median = $X_{(n+1)/2}$. If n is even, then the median = $(X_{n/2} + X_{(n/2)+1})/2$ (i.e., the midpoint between the $n/2$ and $n/2+1$).

Method Detection Limit (MDL) is the minimum concentration of a substance that can be measured and reported with 99 percent confidence that the analyte concentration is greater than zero, as defined in title 40 of the Code of Federal Regulations, Part 136, Attachment B, revised as of July 3, 1999.

Minimum Level (ML) is the concentration at which the entire analytical system must give a recognizable signal and acceptable calibration point. The ML is the concentration in a sample that is equivalent to the concentration of the lowest calibration standard analyzed by a specific analytical procedure, assuming that all the method specified sample weights, volumes, and processing steps have been followed.

Not Detected (ND) are those sample results less than the laboratory's MDL.

Persistent pollutants are substances for which degradation or decomposition in the environment is nonexistent or very slow.

Reporting Level (RL) is the ML (and its associated analytical method) chosen by the Discharger for reporting and compliance determination from the MLs included in this Order. The MLs included in this Order correspond to approved analytical methods for reporting a sample result that are selected by the Regional Water Board either from Appendix 4 of the SIP in accordance with section 2.4.2 of the SIP or established in accordance with section 2.4.3 of the SIP. The ML is based on the proper application of method-based analytical procedures for sample preparation and the absence of any matrix interferences. Other factors may be applied to the ML depending on the specific sample preparation steps employed. For example, the treatment typically applied in cases where there are matrix-effects is to dilute the sample or sample aliquot by a factor of ten. In such cases, this additional factor must be applied to the ML in the computation of the RL.

Source of Drinking Water is any water designated as municipal or domestic supply (MUN) in a Regional Water Board Basin Plan.

Standard Deviation (σ) is a measure of variability that is calculated as follows:

$$\sigma = (\sum[(x - \mu)^2]/(n - 1))^{0.5}$$

where:

x is the observed value;

μ is the arithmetic mean of the observed values; and

n is the number of samples.

Toxicity Reduction Evaluation (TRE) is a study conducted in a step-wise process designed to identify the causative agents of effluent or ambient toxicity, isolate the sources of toxicity, evaluate the effectiveness of toxicity control options, and then confirm the reduction in toxicity. The first steps of the TRE consist of the collection of data relevant to the toxicity, including additional toxicity testing, and an evaluation of facility operations and maintenance practices, and best management practices. A Toxicity Identification Evaluation (TIE) may be required as part of the TRE, if appropriate. (A TIE is a set of procedures to identify the specific chemical(s) responsible for toxicity. These procedures are performed in three phases (characterization, identification, and confirmation) using aquatic organism toxicity tests.)

ATTACHMENT B – NOTICE OF INTENT (NOI) FORM

NOTICE OF INTENT (NOI) to comply with the terms of the region-wide General National Pollutant Discharge Elimination System (NPDES) Permit authorizing discharge from aggregate mining, sand washing, and sand offloading facilities to surface waters.

General Permit No. CAG 982001
Order No. R2-2008-0011

FOR REGIONAL WATER BOARD USE ONLY

WDID:	**Date NOI Received:**	**Date NOI Processed:**
Case Manager's Initials:	**Fee Amount Received:** **$**	**Check #:**
Category of operations: ☐ Aggregate mining ☐ Marine sand washing ☐ Sand offloading **Applicable effluent limitations (Section IV):** ☐ Aggregate mining—Table 1 ☐ Marine sand washing—Tables 2 and 3 ☐ Sand offloading—Table 4	**Receiving water type (according to Provision VI.C.8):** ☐ Fresh water supporting MUN or GWR ☐ Alameda Cr. above Niles ☐ Other fresh water bodies ☐ Other fresh water bodies ☐ Estuarine ☐ Marine	**Applicable Triggers (Provision VI.C.8):** ☐ Table 5 Type I ☐ Table 5 Type II ☐ Table 5 Type III ☐ Table 5 Type IV **Applicable receiving water limitations (Section V, for DO and TDS/chloride only, all others apply):** Dissolved oxygen ☐ 5 mg/L ☐ 7 mg/L TDS and chloride ☐ V.A.3.d.(1) ☐ V.A.3.d.(2) ☐ None Turbidity ☐ V.A.3.e ☐ None Other receiving water limits Apply to all facilities

DISCHARGER TO PROVIDE THE FOLLOWING INFORMATION

I. OWNER/OPERATOR INFORMATION (If additional owners/operators are involved, provide the information in a supplemental letter)

A. Facility/Agency Name			Owner/Operator Type (Check One) 1.☐ Public Agency 2.☐ Private 3.☐ Other, specify the type:	
Street Address				
City	State		Zip Code	Phone
B. Contact Person's Name & Title			1. ☐ Owner 2. ☐ Operator 3. ☐ Owner/Operator	

☐ Additional owner information attached

II. BILLING ADDRESS

Send to: ☐ **Owner/Operator** *(Enter information at right **only** if it is different from above)* ☐ **Other** *(Enter information at right)*	Name		
	Mailing Address		
	City	State	Zip Code

III. DISCHARGE EFFLUENT INFORMATION

1. Describe the proposed discharge(s). List any potential pollutants in the discharge. Attach additional sheets if needed.			
2. List types of discharge:			
☐ Settling pond overflow	☐ Storm water	☐ Bay water from sand pile	☐ Sand wash water, indicate the source of wash water:
☐ Others, please specify:			
3. Discharge flow rate: Average daily flow rate (gallons/day): _____ Maximum daily flow rate (gallons/day): _____			
4. Frequency of discharge: ☐ Continuous ☐ Daily ☐ Intermittent ☐ Emergency			

IV. DISCHARGE WATER QUALITY PARAMETERS

1. The following data summary (statistics) must be based on monitoring data collected during the past five years. Provide a compilation of all monitoring data and laboratory data sheets upon request from Regional Water Board staff. Provide a separate data summary table for each discharge point.

Discharge Point M-001 conventional and non-conventional pollutants:

Parameter	Value or Range of Values	Units	Test Method	Method Detection Limit	# of samples
Turbidity (0.1 NTU)		NTU			
Total Suspended Solids		mg/L			
Settleable Matter		ml/L-hr			
pH (0.1 standard units)		s.u.		Not applicable	
Dissolved Oxygen		mg/L			
Total Dissolved Solids		mg/L			
Chloride		mg/L			
Total Chlorine Residual		mg/L			
Oil and grease		mg/L			
Acute Toxicity		% survival			

Discharge point M-001 priority pollutants:

CTR No.	Priority pollutants	Value or Range of Values	Units	Test Method	Method Detection Limit	# of samples
1	Antimony		µg/L			
2	Arsenic		µg/L			
3	Beryllium		µg/L			
4	Cadmium		µg/L			
5a	Chromium (III)		µg/L			
5b	Chromium (VI)		µg/L			
6	Copper		µg/L			
7	Lead		µg/L			
8	Mercury		µg/L			
9	Nickel		µg/L			
10	Selenium		µg/L			
11	Silver		µg/L			
12	Thallium		µg/L			
13	Zinc		µg/L			
14	Cyanide		µg/L			
15	Asbestos		fibers/L			
16	2,3,7,8-TCDD (Dioxin)		µg/L			
17	Acrolein		µg/L			
18	Acrylonitrile		µg/L			
19	Benzene		µg/L			
20	Bromoform		µg/L			
21	Carbon Tetrachloride		µg/L			
22	Chlorobenzene		µg/L			
23	Chlorodibromomethane		µg/L			
24	Chloroethane		µg/L			
25	2-Chloroethylvinyl ether		µg/L			
26	Chloroform		µg/L			
27	Dichlorobromomethane		µg/L			
28	1,1-Dichloroethane		µg/L			
29	1,2-Dichloroethane		µg/L			
30	1,1-Dichloroethylene		µg/L			
31	1,2-Dichloropropane		µg/L			
32	1,3-Dichloropropylene		µg/L			
33	Ethylbenzene		µg/L			
34	Methyl Bromide		µg/L			
35	Methyl Chloride		µg/L			
36	Methylene Chloride		µg/L			
37	1,1,2,2-Tetrachloroethane		µg/L			

CTR No.	Priority pollutants	Value or Range of Values	Units	Test Method	Method Detection Limit	# of samples
38	Tetrachloroethylene		µg/L			
39	Toluene		µg/L			
40	1,2-Trans-Dichloroethylene		µg/L			
41	1,1,1-Trichloroethane		µg/L			
42	1,1,2-Trichloroethane		µg/L			
43	Trichloroethylene		µg/L			
44	Vinyl Chloride		µg/L			
45	2-Chlorophenol		µg/L			
46	2,4-Dichlorophenol		µg/L			
47	2,4-Dimethylphenol		µg/L			
48	2-Methyl- 4,6-Dinitrophenol		µg/L			
49	2,4-Dinitrophenol		µg/L			
50	2-Nitrophenol		µg/L			
51	4-Nitrophenol		µg/L			
52	3-Methyl 4-Chlorophenol		µg/L			
53	Pentachlorophenol		µg/L			
54	Phenol		µg/L			
55	2,4,6-Trichlorophenol		µg/L			
56	Acenaphthene		µg/L			
57	Acenaphthylene		µg/L			
58	Anthracene		µg/L			
59	Benzidine		µg/L			
60	Benzo(a)Anthracene		µg/L			
61	Benzo(a)Pyrene		µg/L			
62	Benzo(b)Fluoranthene		µg/L			
63	Benzo(ghi)Perylene		µg/L			
64	Benzo(k)Fluoranthene		µg/L			
65	Bis(2-Chloroethoxy)Methane		µg/L			
66	Bis(2-Chloroethyl)Ether		µg/L			
67	Bis(2-Chloroisopropyl)Ether		µg/L			
68	Bis(2-Ethylhexyl)Phthalate		µg/L			
69	4-Bromophenyl Phenyl Ether		µg/L			
70	Butylbenzyl Phthalate		µg/L			
71	2-Chloronaphthalene		µg/L			
72	4-Chlorophenyl Phenyl Ether		µg/L			
73	Chrysene		µg/L			
74	Dibenzo(a,h)Anthracene		µg/L			
75	1,2-Dichlorobenzene		µg/L			
76	1,3-Dichlorobenzene		µg/L			
77	1,4-Dichlorobenzene		µg/L			
78	3,3 Dichlorobenzidine		µg/L			
79	Diethyl Phthalate		µg/L			
80	Dimethyl Phthalate		µg/L			
81	Di-n-Butyl Phthalate		µg/L			
82	2,4-Dinitrotoluene		µg/L			
83	2,6-Dinitrotoluene		µg/L			
84	Di-n-Octyl Phthalate		µg/L			
85	1,2-Diphenylhydrazine		µg/L			
86	Fluoranthene		µg/L			
87	Fluorene		µg/L			

CTR No.	Priority pollutants	Value or Range of Values	Units	Test Method	Method Detection Limit	# of samples
88	Hexachlorobenzene		µg/L			
89	Hexachlorobutadiene		µg/L			
90	Hexachlorocyclopentadiene		µg/L			
91	Hexachloroethane		µg/L			
92	Indeno(1,2,3-cd)Pyrene		µg/L			
93	Isophorone		µg/L			
94	Naphthalene		µg/L			
95	Nitrobenzene		µg/L			
96	N-Nitrosodimethylamine		µg/L			
97	N-Nitrosodi-n-Propylamine		µg/L			
98	N-Nitrosodiphenylamine		µg/L			
99	Phenanthrene		µg/L			
100	Pyrene		µg/L			
101	1,2,4-Trichlorobenzene		µg/L			
102	Aldrin		µg/L			
103	alpha-BHC		µg/L			
104	beta-BHC		µg/L			
105	gamma-BHC		µg/L			
106	delta-BHC		µg/L			
107	Chlordane (303d listed)		µg/L			
108	4,4'-DDT (303d listed)		µg/L			
109	4,4'-DDE		µg/L			
110	4,4'-DDD		µg/L			
111	Dieldrin (303d listed)		µg/L			
112	alpha-Endosulfan		µg/L			
113	beta-Endolsulfan		µg/L			
114	Endosulfan Sulfate		µg/L			
115	Endrin		µg/L			
116	Endrin Aldehyde		µg/L			
117	Heptachlor		µg/L			
118	Heptachlor Epoxide		µg/L			
119-125	PCBs sum (303d listed)		µg/L			
126	Toxaphene		µg/L			
	Tributylin		µg/L			
	Total PAHs		µg/L			
	Odor-Threshold		odor number			
	Sulfate		mg/L			
	Foaming Agents		mg/L			
	Color		color units			
	Electric conductivity		mmhos/cm			
	Aluminum		mg/L			
	Barium		mg/L			
	Fluoride		mg/L			
	Iron		mg/L			
	Manganese		mg/L			
	Nitrate (as N)		mg/L			
	Nitrate + Nitrite (as N) $NO_3 + NO_2$ (as N)		mg/L			
	Nitrite (as N)		mg/L			
	Combined Radium-226 and Radium-228		pCi/L			
	Gross Alpha Particle		pCi/L			

CTR No.	Priority pollutants	Value or Range of Values	Units	Test Method	Method Detection Limit	# of samples
	(includes Radium-226 but excludes Radon and Uranium)					
	Tritium		pCi/L			
	Strontium-90		pCi/L			
	Gross Beta Particle Activity		pCi/L			

Discharge Point M-002 conventional and non-conventional pollutants:

Parameter	Value or Range of Values	Units	Test Method	Method Detection Limit	# of samples
Turbidity (0.1 NTU)		NTU			
Total Suspended Solids		mg/L			
Settleable Matter		ml/L-hr			
pH (0.1 standard units)		s.u.		Not applicable	
Dissolved Oxygen		mg/L			
Total Dissolved Solids		mg/L			
Chloride		mg/L			
Total Chlorine Residual		mg/L			
Oil and grease		mg/L			
Acute Toxicity		% survival			

Discharge point M-002 priority pollutants:

CTR No.	Priority pollutants	Value or Range of Values	Units	Test Method	Method Detection Limit	# of samples
1	Antimony		µg/L			
2	Arsenic		µg/L			
3	Beryllium		µg/L			
4	Cadmium		µg/L			
5a	Chromium (III)		µg/L			
5b	Chromium (VI)		µg/L			
6	Copper		µg/L			
7	Lead		µg/L			
8	Mercury		µg/L			
9	Nickel		µg/L			
10	Selenium		µg/L			
11	Silver		µg/L			
12	Thallium		µg/L			
13	Zinc		µg/L			
14	Cyanide		µg/L			
15	Asbestos		fibers/L			
16	2,3,7,8-TCDD (Dioxin)		µg/L			
17	Acrolein		µg/L			
18	Acrylonitrile		µg/L			
19	Benzene		µg/L			
20	Bromoform		µg/L			
21	Carbon Tetrachloride		µg/L			
22	Chlorobenzene		µg/L			
23	Chlorodibromomethane		µg/L			
24	Chloroethane		µg/L			
25	2-Chloroethylvinyl ether		µg/L			
26	Chloroform		µg/L			
27	Dichlorobromomethane		µg/L			

CTR No.	Priority pollutants	Value or Range of Values	Units	Test Method	Method Detection Limit	# of samples
28	1,1-Dichloroethane		µg/L			
29	1,2-Dichloroethane		µg/L			
30	1,1-Dichloroethylene		µg/L			
31	1,2-Dichloropropane		µg/L			
32	1,3-Dichloropropylene		µg/L			
33	Ethylbenzene		µg/L			
34	Methyl Bromide		µg/L			
35	Methyl Chloride		µg/L			
36	Methylene Chloride		µg/L			
37	1,1,2,2-Tetrachloroethane		µg/L			
38	Tetrachloroethylene		µg/L			
39	Toluene		µg/L			
40	1,2-Trans-Dichloroethylene		µg/L			
41	1,1,1-Trichloroethane		µg/L			
42	1,1,2-Trichloroethane		µg/L			
43	Trichloroethylene		µg/L			
44	Vinyl Chloride		µg/L			
45	2-Chlorophenol		µg/L			
46	2,4-Dichlorophenol		µg/L			
47	2,4-Dimethylphenol		µg/L			
48	2-Methyl- 4,6-Dinitrophenol		µg/L			
49	2,4-Dinitrophenol		µg/L			
50	2-Nitrophenol		µg/L			
51	4-Nitrophenol		µg/L			
52	3-Methyl 4-Chlorophenol		µg/L			
53	Pentachlorophenol		µg/L			
54	Phenol		µg/L			
55	2,4,6-Trichlorophenol		µg/L			
56	Acenaphthene		µg/L			
57	Acenaphthylene		µg/L			
58	Anthracene		µg/L			
59	Benzidine		µg/L			
60	Benzo(a)Anthracene		µg/L			
61	Benzo(a)Pyrene		µg/L			
62	Benzo(b)Fluoranthene		µg/L			
63	Benzo(ghi)Perylene		µg/L			
64	Benzo(k)Fluoranthene		µg/L			
65	Bis(2-Chloroethoxy)Methane		µg/L			
66	Bis(2-Chloroethyl)Ether		µg/L			
67	Bis(2-Chloroisopropyl)Ether		µg/L			
68	Bis(2-Ethylhexyl)Phthalate		µg/L			
69	4-Bromophenyl Phenyl Ether		µg/L			
70	Butylbenzyl Phthalate		µg/L			
71	2-Chloronaphthalene		µg/L			
72	4-Chlorophenyl Phenyl Ether		µg/L			
73	Chrysene		µg/L			
74	Dibenzo(a,h)Anthracene		µg/L			
75	1,2-Dichlorobenzene		µg/L			
76	1,3-Dichlorobenzene		µg/L			

CTR No.	Priority pollutants	Value or Range of Values	Units	Test Method	Method Detection Limit	# of samples
77	1,4-Dichlorobenzene		µg/L			
78	3,3 Dichlorobenzidine		µg/L			
79	Diethyl Phthalate		µg/L			
80	Dimethyl Phthalate		µg/L			
81	Di-n-Butyl Phthalate		µg/L			
82	2,4-Dinitrotoluene		µg/L			
83	2,6-Dinitrotoluene		µg/L			
84	Di-n-Octyl Phthalate		µg/L			
85	1,2-Diphenylhydrazine		µg/L			
86	Fluoranthene		µg/L			
87	Fluorene		µg/L			
88	Hexachlorobenzene		µg/L			
89	Hexachlorobutadiene		µg/L			
90	Hexachlorocyclopentadiene		µg/L			
91	Hexachloroethane		µg/L			
92	Indeno(1,2,3-cd)Pyrene		µg/L			
93	Isophorone		µg/L			
94	Naphthalene		µg/L			
95	Nitrobenzene		µg/L			
96	N-Nitrosodimethylamine		µg/L			
97	N-Nitrosodi-n-Propylamine		µg/L			
98	N-Nitrosodiphenylamine		µg/L			
99	Phenanthrene		µg/L			
100	Pyrene		µg/L			
101	1,2,4-Trichlorobenzene		µg/L			
102	Aldrin		µg/L			
103	alpha-BHC		µg/L			
104	beta-BHC		µg/L			
105	gamma-BHC		µg/L			
106	delta-BHC		µg/L			
107	Chlordane (303d listed)		µg/L			
108	4,4'-DDT (303d listed)		µg/L			
109	4,4'-DDE		µg/L			
110	4,4'-DDD		µg/L			
111	Dieldrin (303d listed)		µg/L			
112	alpha-Endosulfan		µg/L			
113	beta-Endolsulfan		µg/L			
114	Endosulfan Sulfate		µg/L			
115	Endrin		µg/L			
116	Endrin Aldehyde		µg/L			
117	Heptachlor		µg/L			
118	Heptachlor Epoxide		µg/L			
119-125	PCBs sum (303d listed)		µg/L			
126	Toxaphene		µg/L			
	Tributylin		µg/L			
	Total PAHs		µg/L			
	Odor-Threshold		odor number			
	Sulfate		mg/L			
	Foaming Agents		mg/L			
	Color		color units			

CTR No.	Priority pollutants	Value or Range of Values	Units	Test Method	Method Detection Limit	# of samples
	Electric conductivity		mmhos/cm			
	Aluminum		mg/L			
	Barium		mg/L			
	Fluoride		mg/L			
	Iron		mg/L			
	Manganese		mg/L			
	Nitrate (as N)		mg/L			
	Nitrate + Nitrite (as N) NO3 + NO2 (as N)		mg/L			
	Nitrite (as N)		mg/L			
	Combined Radium-226 and Radium-228		pCi/L			
	Gross Alpha Particle (includes Radium-226 but excludes Radon and Uranium)		pCi/L			
	Tritium		pCi/L			
	Strontium-90		pCi/L			
	Gross Beta Particle Activity		pCi/L			

Use additional paper for more than two discharge points.

V. RECEIVING WATER INFORMATION

Discharge Point Coordinates into the Receiving State Water:
Discharge point 1: Latitude: _____ Longitude: _____
Discharge point 2: Latitude: _____ Longitude: _____
Discharge point 3: Latitude: _____ Longitude: _____

Is there any additional receiving water or discharge point?
☐ No ☐ Yes, if yes, provide the information on a separate sheet.

VI. LOCATION MAP

Attach a topographic map or maps of the area. The map(s) should clearly show the following:

1. The legal boundaries of the facility;
2. Locations of all the treatment facilities, such as detention ponds;
3. The location and identification number of each of the facility's existing and/or proposed intake and discharge points; and
4. The receiving State water(s) and receiving storm water drainage system(s), if applicable, identified and labeled.

VII. FLOW CHART

Attach a flow chart, line drawing diagram showing the general route taken by the effluent from intake to discharge.

VIII. EFFLUENT AND RECEIVING WATER CHARACTERIZATION FOR TABLE 5 CONSTITUENTS

Check one:
☐ Existing facility. ☐ New facility.

Submit a sampling plan 90 days prior to scheduled sampling for Table 5 constituents as required by MRP (**Attachment E**). For developing the plan, see the requirements specified in the Regional Water Board August 6, 2001, Letter available at www.waterboards.ca.gov) for CTR priority pollutants and USEAP approved methods for pollutants based on MCL requirements.

IX. SITE-SPECIFIC BEST MANAGEMENT PRACTICES (BMPs) PLAN

Attach a site-specific BMPs plan on separate sheets with reference to item IX. The site-specific BMPs plan shall address all specific means of controlling the discharge of pollutants from the facility.

☐ Site-specific BMPs plan is attached with this NOI.
☐ Site-specific BMPs plan will be submitted 30 days before the commencement of the proposed discharge.

X. RECEIVING WATER AMBIENT BACKGROUND CONDITION

If the Discharger wishes to establish receiving water ambient background condition for future compliance demonstration with pH effluent limitations, the Discharger shall submit a statistical analysis and propose appropriate pH values for its receiving waters based on historical receiving water monitoring. The Regional Water Board will use this information and future receiving water monitoring data when considering Discharger's claims.

XI. AUTHORIZATION OF REPRESENTATIVE

1. This statement authorizes the named individual or any individual occupying the named position of the company/organization listed below to act as our representative to process the required NOI Form for coverage under the NPDES General Permit for discharge to State waters from the subject facility. The Owner hereby agrees to comply with and be responsible for all the conditions specified in the General Permit.

   Company/Organization Name _____

   Street Address _____

   City, State and Zip Code+4 _____

   Authorized Contact Person & Title _____

   Phone No. (___) _____ Fax No. (___) _____

   E-mail address _____

2. A separate authorization statement is attached:

   Yes _____ No _____

XII. CERTIFICATION

" I certify under penalty of law that this document and all attachments were prepared under my direct supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system or those directly responsible for gathering the information, the information submitted is, true, accurate, and complete to the best of my knowledge and belief. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment. In addition, I certify that the provisions of the permit, including the criteria for eligibility and the development and implementation of Pollution Prevention Practices, if required, will be complied with."

Signature _____ Date: _____

Printed Name & Title: _____

Facility/Agency Name: _____

Phone No.: _____ Fax No.: _____

E-mail address: _____

XIII. APPLICATION FEE AND MAILING INSTRUCTIONS

Submit this NOI with attachments and a check made out to the "San Francisco Bay Regional Water Quality Control Board" with the appropriate fee (see NOI instructions Section XII for the applicable fee). Send the complete package to the following address:

San Francisco Bay Regional Water Quality Control Board
Attn: NPDES Wastewater Division
1515 Clay Street, Suite 1400
Oakland, CA 94612

ATTACHMENT C – INSTRUCTIONS FOR COMPLETING NOTICE OF INTENT (NOI) FORM

INSTRUCTIONS FOR COMPLETE NOTICE OF INTENT (NOI) to comply with the terms of the region-wide General National Pollutant Discharge Elimination System (NPDES) Permit authorizing discharges from aggregate mining, sand washing, and sand offloading facilities to surface waters.

I. OWNER/OPERATOR INFORMATION

The owner is the organization or person who owns or leases the facility or land where the aggregate mining or sand washing, sand offloading operation is located. For a facility that is one of several owned by a corporation, indicate the corporation name and the name by which the facility is known to the employees (i.e., ABC Inc. - DEF Facility). Provide the street address or a description of the facility location (i.e., 1234 15th Drive or northwest corner of 1st Street and X Avenue). Note that each facility must obtain separate coverage under this General Permit.

II. BILLING ADDRESS

Provide this information only if the annual waste discharge fee should be billed to a different entity.

III. DISCHARGE EFFLUENT INFORMATION

List all possible discharges under item 2 of the table. Discharges that are not listed here will not be covered by this General Permit. An additional NPDES permit may be needed for any other discharge of wastewater to any State waters.

IV. DISCHARGE WATER QUALITY PARAMETERS

For existing facilities, all of the parameters must be tested by a State certified laboratory and reported in this table. Provide a copy of the laboratory data sheets and Chain of Custody documents, as applicable. For new/proposed facility, enter estimated values to this table. Where there is more than one outfall, submit a separate sheet for item IV for each outfall. Test results shall be obtained from a sample representative of the discharge.

V. RECEIVING WATER INFORMATION

If the discharge first enters a separate storm drainage system, provide the name of the receiving water body that the separate storm drainage system enters. Contact the storm drain system owner about the proposed discharge.

The discharge point is generally the discharge's point of first contact with receiving waters. Provide the coordinates of each discharge point. A U.S. Geographical Survey (USGS) or any other appropriate map may be used to interpolate the coordinates.

Attach a separate sheet for more than three discharge points. Properly label the discharge points with numbers that correspond to the discharge point label on the location map(s) and flow chart(s) submitted.

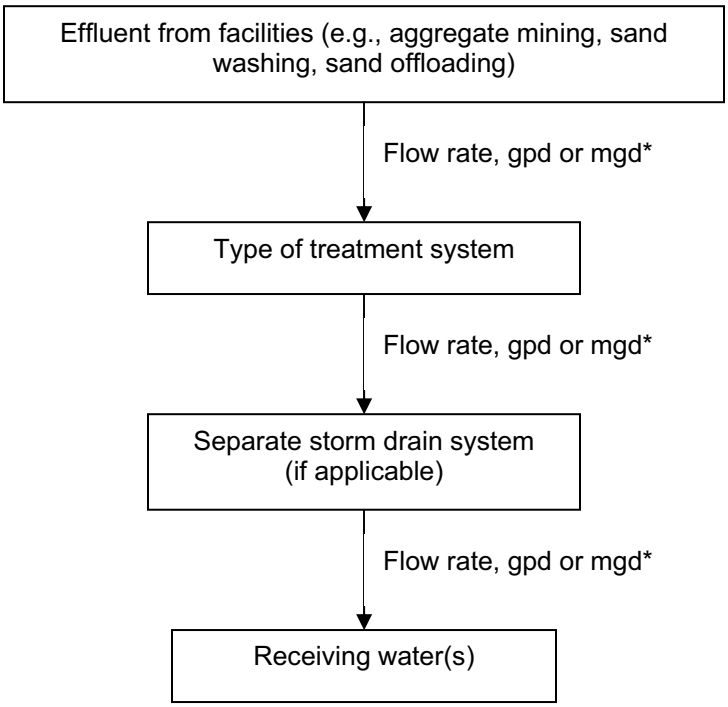
VI. LOCATION MAP

Provide the location map on 8-1/2 by 11 inches sized paper or paper folded to 8-1/2 by 11 inches. Show at least one mile beyond the property boundaries of the facility on the map.

Indicate the discharge point(s) on the location map and include all of the required information. The discharge point(s) may include where the discharge exits the facility and enters the roadway right-of-way and then flows into a separate storm drainage system and/or where the discharge directly enters the State receiving waters.

VII. FLOW CHART

An example of a line drawing is given below. The flow chart shall indicate how the discharge effluent flow from where the wastewater is generated to where it enters the receiving water, including all the treatment systems used to treat the effluent and the approximate amount of flow. The quantity of discharge may be estimated if no data are available.



* gpd – gallons per day
mgd – million gallons per day

VIII. EFFLUENT AND RECEIVING WATER CHARACTERIZATION FOR TABEL 5 CONSTITUENTS

Existing Dischargers shall submit a final report presenting the sampling results 180 days prior to expiration date of this General Permit. The Discharger, if not reporting data electronically through Regional Water Board's Electronic Reporting System (ERS), shall also submit conventional, non-conventional, and toxic pollutants data in electronic format.

All existing and new Dischargers shall submit a sampling plan 90 days prior to scheduled sampling for Table 5 constituents using Enclosure D of the Regional Water Board's August 6, 2001, Letter as a guidance for development of sampling plan for CTR priority pollutants. The sampling plan shall also include the date for submitting a report of the results.

IX. SITE-SPECIFIC BEST MANAGEMENT PRACTICES (BMPs) PLAN

An existing Discharger holding an individual NPDES permit prior to this General Permit coverage shall submit the site-specific BMPs plan with this NOI. A new Discharger has the option of submitting its BMPs plan with this NOI or 30 days before commencement of the proposed discharge. The site-specific BMPs plan shall include, at a minimum the following information:

1. **Facility Operation** - Describe the nature of the facility operation:

   (1) Type of facility, e.g., aggregate mining, sand washing, or sand offloading'
   (2) Types of products;
   (3) Types of materials and equipment used at the facility.

2. **Potential Pollutants** - Describe potential pollutants that will be generated by the facility. These pollutants may include, but may not be limited to:

   (1) Soil, sediments or silt from rock and sand washing;
   (2) Discharge associated with operation and maintenance of equipment, such as oil and grease and hydraulic fluid leakage and spills;
   (3) Any debris generated by the operation;
   (4) Storm water runoff from exposed oil, fuel or any hazardous material storage locations and containment structures;
   (5) Alkaline material from cement mix operations, etc.

3. **Pollution Control and Effluent Treatment Methods** – Describe in detail the control and treatment measures for each of the potential pollutants identified under item IX.2 above:

   (1) Prevention measures to be implemented to prevent the pollutants from entering the effluent and receiving water;
   (2) Effluent treatment methods to be implemented on-site to remove the pollutants in the effluent (indicate the treatment system locations on the location map); and

(3) Maintenance procedures and maintenance schedules to maintain the effluent treatment system.

X. AUTHORIZATION OF REPRESENTATIVE

Authorization statements are provided for the owner to complete if he wishes to authorize a representative to process this NOI for him. A standard authorization statement is provided under item XI. The owner may provide his own customized statement in a separate letter if the standard statement does not appropriately limit the authority. If a separate authorization letter is provided, this letter shall be signed by the qualified person (see item XI below for the requirement of the qualified person).

Provide the duly authorized representative's information in the applicable item(s). There shall be only one duly authorized representative at any time. The owner may change the designated duly authorized representative at any time during the processing of this NOI. The duly authorized representative will no longer be authorized effective as of the date of receipt of any new authorization statement from the owner.

XI. RECEIVING WATER AMBIENT BACKGROUND CONDITION

This submittal is optional.

When performing a statistical analysis to establish background condition for pH, the Discharger shall consider all available receiving water data collected upstream of discharges. All data can be used only when there are no increasing or decreasing trends. The Discharger may develop seasonal background condition when data show seasonality. The submittal shall include a detailed analysis, a conclusion, and a complete compilation of data used for the analysis.

XII. CERTIFICATION

The person certifying this NOI Form must meet one of the following descriptions and be employed by the owner listed in item I (refer to 40CFR 122.22 for more detailed requirements):

- For a corporation: (1) A president, secretary treasurer, or vice president of the corporation in charge of the principal business function, or any other person who performs similar policy or decision making functions for the corporation, or (2) the manager of one or more manufacturing, production, or operating facilities employing more than 250 persons or having gross annual sales or expenditures exceeding $25 million (in second-quarter 1980 dollars), if authority to sign documents has been assigned or delegated to the manager in accordance with corporate procedures.

- For a partnership or sole proprietorship: a general partner or the proprietor, respectively.

- For a municipality, State, Federal or other public agency: either a principal executive officer or ranking elected official.

XIII. APPLICATION FEE AND MAILING INSTRUCTIONS.

No application will be considered complete without the applicable fee. For discharges regulated under this General NPDES Permit, annual fees are based on California Code of Regulations (CCR) Title 23, Division 3, Chapter 9, Section 2200 (b) (9). The Regional Water Board may modify this instruction at any time to reflect a new CCR fee schedule. At this time of permit reissuance, the application fee is **$3,437** per discharge outfall.

Submit the complete NOI, with attachments, and the fee, to the Regional Water Board mailing address as indicated in the NOI.

ATTACHMENT D – FEDERAL STANDARD PROVISIONS

I. STANDARD PROVISIONS – PERMIT COMPLIANCE

A. Duty to Comply

1. The Discharger must comply with all of the conditions of this Order. Any noncompliance constitutes a violation of the Clean Water Act (CWA) and the California Water Code (CWC) and is grounds for enforcement action, for permit termination, revocation and reissuance, or denial of a permit renewal application [*40 CFR §122.41(a)*].

2. The Discharger shall comply with effluent standards or prohibitions established under Section 307(a) of the Clean Water Act for toxic pollutants and with standards for sewage sludge use or disposal established under Section 405(d) of the CWA within the time provided in the regulations that establish these standards or prohibitions, even if this Order has not been modified to incorporate the requirement [*40 CFR §122.41(a)(1)*].

B. Need to Halt or Reduce Activity Not a Defense

It shall not be a defense for a Discharger in an enforcement action that it would have been necessary to halt or reduce the permitted activity in order to maintain compliance with the conditions of this Order [*40 CFR §122.41I*].

C. Duty to Mitigate

The Discharger shall take all reasonable steps to minimize or prevent any discharge or sludge use or disposal in violation of this Order that has a reasonable likelihood of adversely affecting human health or the environment [*40 CFR §122.41(d)*].

D. Proper Operation and Maintenance

The Discharger shall at all times properly operate and maintain all facilities and systems of treatment and control (and related appurtenances) which are installed or used by the Discharger to achieve compliance with the conditions of this Order. Proper operation and maintenance also includes adequate laboratory controls and appropriate quality assurance procedures. This provision requires the operation of backup or auxiliary facilities or similar systems that are installed by a Discharger only when necessary to achieve compliance with the conditions of this Order [*40 CFR §122.41(e)*].

E. Property Rights

1. This Order does not convey any property rights of any sort or any exclusive privileges [*40 CFR §122.41(g)*].

2. The issuance of this Order does not authorize any injury to persons or property or invasion of other private rights, or any infringement of State or local law or regulations [*40 CFR §122.5l*].

F. Inspection and Entry

The Discharger shall allow the Regional Water Quality Control Board (Regional Water Board), State Water Resources Control Board (SWRCB), United States Environmental Protection Agency (USEPA), and/or their authorized representatives (including an authorized contractor acting as their representative), upon the presentation of credentials and other documents, as may be required by law, to [*40 CFR §122.41(i)*] [*CWC 13383l*]:

1. Enter upon the Discharger's premises where a regulated facility or activity is located or conducted, or where records are kept under the conditions of this Order [*40 CFR §122.41(i)(1)*];

2. Have access to and copy, at reasonable times, any records that must be kept under the conditions of this Order [*40 CFR §122.41(i)(2)*];

3. Inspect and photograph, at reasonable times, any facilities, equipment (including monitoring and control equipment), practices, or operations regulated or required under this Order [*40 CFR §122.41(i)(3)*];

4. Sample or monitor, at reasonable times, for the purposes of assuring Order compliance or as otherwise authorized by the CWA or the CWC, any substances or parameters at any location [*40 CFR §122.41(i)(4)*].

G. Bypass

1. Definitions

   a. "Bypass" means the intentional diversion of waste streams from any portion of a treatment facility [*40 CFR §122.41(m)(1)(i)*].

   b. "Severe property damage" means substantial physical damage to property, damage to the treatment facilities, which causes them to become inoperable, or substantial and permanent loss of natural resources that can reasonably be expected to occur in the absence of a bypass. Severe property damage does not mean economic loss caused by delays in production [*40 CFR §122.41(m)(1)(ii)*].

2. Bypass not exceeding limitations – The Discharger may allow any bypass to occur which does not cause exceedances of effluent limitations, but only if it is for essential maintenance to assure efficient operation. These bypasses are not subject to the provisions listed in Standard Provisions – Permit Compliance I.G.3 and I.G.5 below [*40 CFR §122.41(m)(2)*].

3. Prohibition of bypass – Bypass is prohibited, and the Regional Water Board may take enforcement action against a Discharger for bypass, unless [*40 CFR §122.41(m)(4)(i)*]:

    a. Bypass was unavoidable to prevent loss of life, personal injury, or severe property damage [*40 CFR §122.41(m)(4)(A)*];

    b. There were no feasible alternatives to the bypass, such as the use of auxiliary treatment facilities, retention of untreated wastes, or maintenance during normal periods of equipment downtime. This condition is not satisfied if adequate back-up equipment should have been installed in the exercise of reasonable engineering judgment to prevent a bypass that occurred during normal periods of equipment downtime or preventive maintenance [*40 CFR §122.41(m)(4)(B)*]; and

    c. The Discharger submitted notice to the Regional Water Board as required under Standard Provision – Permit Compliance I.G.5 below [*40 CFR §122.41(m)(4)I*].

4. The Regional Water Board may approve an anticipated bypass, after considering its adverse effects, if the Regional Water Board determines that it will meet the three conditions listed in Standard Provisions – Permit Compliance I.G.3 above [*40 CFR §122.41(m)(4)(ii)*].

5. Notice

    a. Anticipated bypass. If the Discharger knows in advance of the need for a bypass, it shall submit a notice, if possible at least 10 days before the date of the bypass [*40 CFR §122.41(m)(3)(i)*].

    b. Unanticipated bypass. The Discharger shall submit notice of an unanticipated bypass as required in Standard Provisions – Reporting V.E below [*40 CFR §122.41(m)(3)(ii)*].

H. Upset

Upset means an exceptional incident in which there is unintentional and temporary noncompliance with technology based permit effluent limitations because of factors beyond the reasonable control of the permittee. An upset does not include noncompliance to the extent caused by operational error, improperly designed treatment facilities, inadequate treatment facilities, lack of preventive maintenance, or careless or improper operation [*40 CFR §122.41(n)(1)*].

1. Effect of an upset. An upset constitutes an affirmative defense to an action brought for noncompliance with such technology based permit effluent limitations if the requirements of paragraph H.2 of this section are met. No determination made during administrative review of claims that noncompliance was caused by upset, and before an action for noncompliance, is final administrative action subject to judicial review [*40 CFR §122.41(n)(2)*].

2. Conditions necessary for a demonstration of upset. A Discharger who wishes to establish the affirmative defense of upset shall demonstrate, through properly signed, contemporaneous operating logs or other relevant evidence that [*40 CFR §122.41(n)(3)*]:

   a. An upset occurred and that the Discharger can identify the cause(s) of the upset [*40 CFR §122.41(n)(3)(i)*];

   b. The permitted facility was, at the time, being properly operated [*40 CFR §122.41(n)(3)(i)*];

   c. The Discharger submitted notice of the upset as required in Standard Provisions – Reporting V.E.2.b [*40 CFR §122.41(n)(3)(iii)*]; and

   d. The Discharger complied with any remedial measures required under Standard Provisions – Permit Compliance I.C above [*40 CFR §122.41(n)(3)(iv)*].

3. Burden of proof. In any enforcement proceeding, the Discharger seeking to establish the occurrence of an upset has the burden of proof [*40 CFR §122.41(n)(4)*].

II. STANDARD PROVISIONS – PERMIT ACTION

A. General

This Order may be modified, revoked and reissued, or terminated for cause. The filing of a request by the Discharger for modification, revocation and reissuance, or termination, or a notification of planned changes or anticipated noncompliance does not stay any Order condition [*40 CFR §122.41(f)*].

B. Duty to Reapply

If the Discharger wishes to continue an activity regulated by this Order after the expiration date of this Order, the Discharger must apply for and obtain a new permit [*40 CFR §122.41(b)*].

C. Transfers

This Order is not transferable to any person except after notice to the Regional Water Board. The Regional Water Board may require modification or revocation and reissuance of the Order to change the name of the Discharger and incorporate such other requirements as may be necessary under the CWA and the CWC [*40 CFR §122.41(l)(3)*] [*40 CFR §122.61*].

III. STANDARD PROVISIONS – MONITORING

A. Samples and measurements taken for the purpose of monitoring shall be representative of the monitored activity [*40 CFR §122.41(j)(1)*].

B. Monitoring results must be conducted according to test procedures under 40 CFR Part 136 or, in the case of sludge use or disposal, approved under 40 CFR Part 136 unless otherwise specified in 40 CFR Part 503 unless other test procedures have been specified in this Order [*40 CFR §122.41(j)(4)*] [*40 CFR §122.44(i)(1)(iv)*].

IV. STANDARD PROVISIONS – RECORDS

A. Except for records of monitoring information required by this Order related to the Discharger's sewage sludge use and disposal activities, which shall be retained for a period of at least five years (or longer as required by 40 CFR Part 503), the Discharger shall retain records of all monitoring information, including all calibration and maintenance records and all original strip chart recordings for continuous monitoring instrumentation, copies of all reports required by this Order, and records of all data used to complete the application for this Order, for a period of at least three (3) years from the date of the sample, measurement, report or application. This period may be extended by request of the Regional Water Board Executive Officer at any time [*40 CFR §122.41(j)(2)*].

B. Records of monitoring information shall include:

1. The date, exact place, and time of sampling or measurements [*40 CFR §122.41(j)(3)(i)*];
2. The individual(s) who performed the sampling or measurements [*40 CFR §122.41(j)(3)(ii)*];
3. The date(s) analyses were performed [*40 CFR §122.41(j)(3)(iii)*];
4. The individual(s) who performed the analyses [*40 CFR §122.41(j)(3)(iv)*];
5. The analytical techniques or methods used [*40 CFR §122.41(j)(3)(v)*]; and
6. The results of such analyses [*40 CFR §122.41(j)(3)(vi)*].

C. Claims of confidentiality for the following information will be denied [*40 CFR §122.7(b)*]:

1. The name and address of any permit applicant or Discharger [*40 CFR §122.7(b)(1)*]; and
2. Permit applications and attachments, permits and effluent data [*40 CFR §122.7(b)(2)*].

V. STANDARD PROVISIONS – REPORTING

A. Duty to Provide Information

The Discharger shall furnish to the Regional Water Board, SWRCB, or USEPA within a reasonable time, any information which the Regional Water Board, SWRCB, or USEPA

may request to determine whether cause exists for modifying, revoking and reissuing, or terminating this Order or to determine compliance with this Order. Upon request, the Discharger shall also furnish to the Regional Water Board, SWRCB, or USEPA copies of records required to be kept by this Order [*40 CFR §122.41(h)*] [*CWC 13267*].

B. Signatory and Certification Requirements

1. All applications, reports, or information submitted to the Regional Water Board, SWRCB, and/or USEPA shall be signed and certified in accordance with paragraph (2.) and (3.) of this provision [*40 CFR §122.41(k)*].

2. All permit applications shall be signed as follows:
   a. For a corporation: By a responsible corporate officer. For the purpose of this section, a responsible corporate officer means: (i) A president, secretary, treasurer, or vice-president of the corporation in charge of a principal business function, or any other person who performs similar policy- or decision-making functions for the corporation, or (ii) the manager of one or more manufacturing, production, or operating facilities, provided, the manager is authorized to make management decisions which govern the operation of the regulated facility including having the explicit or implicit duty of making major capital investment recommendations, and initiating and directing other comprehensive measures to assure long term environmental compliance with environmental laws and regulations; the manager can ensure that the necessary systems are established or actions taken to gather complete and accurate information for permit application requirements; and where authority to sign documents has been assigned or delegated to the manager in accordance with corporate procedures [*40 CFR §122.22(a)(1)*];

   b. For a partnership or sole proprietorship: by a general partner or the proprietor, respectively [*40 CFR §122.22(a)(2)*]; or

   c. For a municipality, State, federal, or other public agency: by either a principal executive officer or ranking elected official. For purposes of this provision, a principal executive officer of a federal agency includes: (i) the chief executive officer of the agency, or (ii) a senior executive officer having responsibility for the overall operations of a principal geographic unit of the agency (e.g., Regional Administrators of USEPA) [*40 CFR §122.22(a)(3)*].

3. All reports required by this Order and other information requested by the Regional Water Board, SWRCB, or USEPA shall be signed by a person described in paragraph (b) of this provision, or by a duly authorized representative of that person. A person is a duly authorized representative only if:

   a. The authorization is made in writing by a person described in paragraph (2.) of this provision [*40 CFR §122.22(b)(1)*];

   b. The authorization specified either an individual or a position having responsibility for the overall operation of the regulated facility or activity such as the position of

plant manager, operator of a well or a well field, superintendent, position of equivalent responsibility, or an individual or position having overall responsibility for environmental matters for the company (a duly authorized representative may thus be either a named individual or any individual occupying a named position) [*40 CFR §122.22(b)(2)*]; and

c. The written authorization is submitted to the Regional Water Board, SWRCB, or USEPA [*40 CFR §122.22(b)(3)*].

4. If an authorization under paragraph (3.) of this provision is no longer accurate because a different individual or position has responsibility for the overall operation of the facility, a new authorization satisfying the requirements of paragraph (3.) of this provision must be submitted to the Regional Water Board, SWRCB or USEPA prior to or together with any reports, information, or applications, to be signed by an authorized representative [40 CFR §122.22I].

5. Any person signing a document under paragraph (2.) or (3.) of this provision shall make the following certification:
"I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations" [*40 CFR §122.22(d)*].

C. Monitoring Reports

1. Monitoring results shall be reported at the intervals specified in the Monitoring and Reporting Program in this Order [*40 CFR §122.41(l)(4)*].

2. Monitoring results must be reported on a Discharge Monitoring Report (DMR) form or forms provided or specified by the Regional Water Board or SWRCB for reporting results of monitoring of sludge use or disposal practices [*40 CFR §122.41(l)(4)(i)*].

3. If the Discharger monitors any pollutant more frequently than required by this Order using test procedures approved under 40 CFR Part 136 or, in the case of sludge use or disposal, approved under 40 CFR Part 136 unless otherwise specified in 40 CFR Part 503, or as specified in this Order, the results of this monitoring shall be included in the calculation and reporting of the data submitted in the DMR or sludge reporting form specified by the Regional Water Board [*40 CFR §122.41(l)(4)(ii)*].

4. Calculations for all limitations, which require averaging of measurements, shall utilize an arithmetic mean unless otherwise specified in this Order [*40 CFR §122.41(l)(4)(iii)*].

D. Compliance Schedules

Reports of compliance or noncompliance with, or any progress reports on, interim and final requirements contained in any compliance schedule of this Order, shall be submitted no later than 14 days following each schedule date [*40 CFR §122.41(l)(5)*].

E. Twenty-Four Hour Reporting

1. The Discharger shall report any noncompliance that may endanger health or the environment. Any information shall be provided orally within 24 hours from the time the Discharger becomes aware of the circumstances. A written submission shall also be provided within five (5) days of the time the Discharger becomes aware of the circumstances. The written submission shall contain a description of the noncompliance and its cause; the period of noncompliance, including exact dates and times, and if the noncompliance has not been corrected, the anticipated time it is expected to continue; and steps taken or planned to reduce, eliminate, and prevent reoccurrence of the noncompliance [*40 CFR §122.41(l)(6)(i)*].

2. The following shall be included as information that must be reported within 24 hours under this paragraph [*40 CFR §122.41(l)(6)(ii)*]:

   a. Any unanticipated bypass that exceeds any effluent limitation in this Order [*40 CFR §122.41(l)(6)(ii)(A)*].

   b. Any upset that exceeds any effluent limitation in this Order [*40 CFR §122.41(l)(6)(ii)(B)*].

   c. Violation of a maximum daily discharge limitation for any of the pollutants listed in this Order to be reported within 24 hours [*40 CFR §122.41(l)(6)(ii)I*].

3. The Regional Water Board may waive the above-required written report under this provision on a case-by-case basis if an oral report has been received within 24 hours [*40 CFR §122.41(l)(6)(iii)*].

F. Planned Changes

The Discharger shall give notice to the Regional Water Board as soon as possible of any planned physical alterations or additions to the permitted facility. Notice is required under this provision only when [*40 CFR §122.41(l)(1)*]:

1. The alteration or addition to a permitted facility may meet one of the criteria for determining whether a facility is a new source in 40 CFR §122.29(b) [*40 CFR §122.41(l)(1)(i)*]; or

2. The alteration or addition could significantly change the nature or increase the quantity of pollutants discharged. This notification applies to pollutants which are subject neither to effluent limitations in this Order nor to notification requirements

under 40 CFR Part 122.42(a)(1) (see Additional Provisions—Notification Levels VII.A.1) [*40 CFR §122.41(l)(1)(ii)*].

3. The alteration or addition results in a significant change in the Discharger's sludge use or disposal practices, and such alteration, addition, or change may justify the application of permit conditions that are different from or absent in the existing permit, including notification of additional use or disposal sites not reported during the permit application process or not reported pursuant to an approved land application plan [*40 CFR §122.41(l)(1)(iii)*].

G. Anticipated Noncompliance

The Discharger shall give advance notice to the Regional Water Board or SWRCB of any planned changes in the permitted facility or activity that may result in noncompliance with General Order requirements [*40 CFR §122.41(l)(2)].*

H. Other Noncompliance

The Discharger shall report all instances of noncompliance not reported under Standard Provisions – Reporting E.3, E.4, and E.5 at the time monitoring reports are submitted. The reports shall contain the information listed in Standard Provision – Reporting V.E [*40 CFR §122.41(l)(7)*].

I. Other Information

When the Discharger becomes aware that it failed to submit any relevant facts in a permit application, or submitted incorrect information in a permit application or in any report to the Regional Water Board, SWRCB, or USEPA, the Discharger shall promptly submit such facts or information [*40 CFR §122.41(l)(8)*].

VI. STANDARD PROVISIONS – ENFORCEMENT

A. The CWA provides that any person who violates section 301, 302, 306, 307, 308, 318 or 405 of the Act, or any permit condition or limitation implementing any such sections in a permit issued under section 402, or any requirement imposed in a pretreatment program approved under sections 402(a)(3) or 402(b)(8) of the Act, is subject to a civil penalty not to exceed $25,000 per day for each violation. The CWA provides that any person who negligently violates sections 301, 302, 306, 307, 308, 318, or 405 of the Act, or any condition or limitation implementing any of such sections in a permit issued under section 402 of the Act, or any requirement imposed in a pretreatment program approved under section 402(a)(3) or 402(b)(8) of the Act, is subject to criminal penalties of $2,500 to $25,000 per day of violation, or imprisonment of not more than one (1) year, or both. In the case of a second or subsequent conviction for a negligent violation, a person shall be subject to criminal penalties of not more than $50,000 per day of violation, or by imprisonment of not more than two (2) years, or both. Any person who knowingly violates such sections, or such conditions or limitations is subject to criminal penalties of $5,000 to $50,000 per day of violation, or imprisonment for not more than three (3) years, or both. In the case of a second or subsequent conviction for a knowing violation, a person shall be

subject to criminal penalties of not more than $100,000 per day of violation, or imprisonment of not more than six (6) years, or both. Any person who knowingly violates section 301, 302, 303, 306, 307, 308, 318 or 405 of the Act, or any permit condition or limitation implementing any of such sections in a permit issued under section 402 of the Act, and who knows at that time that he thereby places another person in imminent danger of death or serious bodily injury, shall, upon conviction, be subject to a fine of not more than $250,000 or imprisonment of not more than 15 years, or both. In the case of a second or subsequent conviction for a knowing endangerment violation, a person shall be subject to a fine of not more than $500,000 or by imprisonment of not more than 30 years, or both. An organization, as defined in section 309(c)(3)(B)(iii) of the Clean Water Act, shall, upon conviction of violating the imminent danger provision, be subject to a fine of not more than $1,000,000 and can be fined up to $2,000,000 for second or subsequent convictions [*40 CFR §122.41(a)(2)*] [*CWC 13385 and 13387*].

B. Any person may be assessed an administrative penalty by the Regional Water Board for violating section 301, 302, 306, 307, 308, 318 or 405 of this Act, or any permit condition or limitation implementing any of such sections in a permit issued under section 402 of this Act. Administrative penalties for Class I violations are not to exceed $10,000 per violation, with the maximum amount of any Class I penalty assessed not to exceed $25,000. Penalties for Class II violations are not to exceed $10,000 per day for each day during which the violation continues, with the maximum amount of any Class II penalty not to exceed $125,000 [*40 CFR §122.41(a)(3)*].

C. The CWA provides that any person who falsifies, tampers with, or knowingly renders inaccurate any monitoring device or method required to be maintained under this permit shall, upon conviction, be punished by a fine of not more than $10,000, or by imprisonment for not more than 2 years, or both. If a conviction of a person is for a violation committed after a first conviction of such person under this paragraph, punishment is a fine of not more than $20,000 per day of violation, or by imprisonment of not more than 4 years, or both [*40 CFR §122.41(j)(5)*].

D. The CWA provides that any person who knowingly makes any false statement, representation, or certification in any record or other document submitted or required to be maintained under this Order, including monitoring reports or reports of compliance or noncompliance shall, upon conviction, be punished by a fine of not more than $10,000 per violation, or by imprisonment for not more than six months per violation, or by both [*40 CFR §122.41(k)(2)*].

VII. ADDITIONAL PROVISIONS – NOTIFICATION LEVELS

A. Non-Municipal Facilities

Existing manufacturing, commercial, mining, and silvicultural dischargers shall notify the Regional Water Board as soon as they know or have reason to believe [*40 CFR §122.42(a)*]:

1. That any activity has occurred or will occur that would result in the discharge, on a routine or frequent basis, of any toxic pollutant that is not limited in this Order, if that

discharge will exceed the highest of the following "notification levels" [*40 CFR §122.42(a)(1)*]:

a. 100 micrograms per liter (µg/L) [*40 CFR §122.42(a)(1)(i)*];

b. 200 µg/L for acrolein and acrylonitrile; 500 µg/L for 2,4-dinitrophenol and 2-methyl-4,6-dinitrophenol; and 1 milligram per liter (mg/L) for antimony [*40 CFR §122.42(a)(1)(ii)*];

c. Five (5) times the maximum concentration value reported for that pollutant in the Report of Waste Discharge [*40 CFR §122.42(a)(1)(iii)*]; or

d. The level established by the Regional Water Board in accordance with 40 CFR §122.44(f) [*40 CFR §122.42(a)(1)(iv)*].

2. That any activity has occurred or will occur that would result in the discharge, on a non-routine or infrequent basis, of any toxic pollutant that is not limited in this Order, if that discharge will exceed the highest of the following "notification levels" [*40 CFR §122.42(a)(2)*]:

a. 500 micrograms per liter (µg/L) [*40 CFR §122.42(a)(2)(i)*];

b. 1 milligram per liter (mg/L) for antimony [*40 CFR §122.42(a)(2)(ii)*];

c. Ten (10) times the maximum concentration value reported for that pollutant in the Report of Waste Discharge [*40 CFR §122.42(a)(2)(iii)*]; or

d. The level established by the Regional Water Board in accordance with 40 CFR §122.44(f) [*40 CFR §122.42(a)(2)(iv)*].

ATTACHMENT E – MONITORING AND REPORTING PROGRAM

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ATTACHMENT E – MONITORING AND REPORTING PROGRAM

The Code of Federal Regulations (CFR) at 40 CFR §122.48 requires that all NPDES permits specify monitoring and reporting requirements. CWC sections 13267 and 13383 also authorize the Regional Water Board to require technical and monitoring reports. This MRP establishes monitoring and reporting requirements that implement the Federal and California regulations.

I. GENERAL MONITORING PROVISIONS

A. Reporting responsibilities of waste Dischargers are specified in Sections 13225(a), 13267(b), 13268, 13383 and 13387(b) of the California Water Code and this Regional Water Board's Resolution No. 73-16.

B. The principal purposes of a monitoring program by a waste Discharger, also referred to as self-monitoring program, are: (1) to document compliance with waste discharge requirements and prohibitions established by the Regional Water Board, (2) to facilitate self-policing by the waste Discharger in the prevention and abatement of pollution arising from waste discharge, (3) to develop or assist in the development of effluent or other limitations, discharge prohibitions, national standards of performance, pretreatment and toxicity standards, and other standards, and (4) to prepare water and wastewater quality inventories.

C. Sampling is required during the entire year when discharging. All analyses shall be conducted using current USEPA methods that have been approved by the USEPA Regional Administrator pursuant to 40 CFR 136.4 and 40 CFR 136.5, or equivalent methods that are commercially and reasonably available and that provide quantification of sampling parameters and constituents sufficient to evaluate compliance with applicable effluent limits and to perform reasonable potential analysis. Equivalent methods must be more sensitive than those specified in 40 CFR 136, must be specified in the permit, and must be approved for use by the Executive Officer following consultation with the State Water Resources Control Board’s Quality Assurance Program.

D. Laboratories analyzing monitoring samples shall be certified by the Department of Health Services, in accordance with the provision of Water Code section 13176, and must include quality assurance/quality control data with their reports.

E. Written reports, strip charts, calibration and maintenance records, and other records shall be maintained by the Discharger and accessible and retained for a minimum of five years. This period of retention shall be extended during the course of any unresolved litigation regarding this discharge or when requested by the Regional Water Board or Regional Administrator of the U.S. Environmental Protection Agency, Region IX. Such records shall show the following for each sample:

1. Identity of sampling and observation stations by number.
2. Date and time of sampling and/or observations.
3. Method of sampling.
4. Full report for rainbow trout bioassay test (96-hour static bioassay renewal).
5. Date and time that analyses are started and completed, and name of personnel performing the analyses.
6. Complete procedure used, including method of preserving sample and identity and volumes of reagents used. A reference to a specific section of Standard Methods (SM) or the standard USEPA method number is satisfactory.
7. Calculations of results.
8. Results of analyses and/or observations.

F. If the Discharger wishes to invalidate any measurement, the letter of transmittal will include a formal request to invalidate the measurement, the original measurement in question, the reason for invalidating the measurement, all relevant documentation that supports the invalidation (e.g., laboratory sheet, log entry, test results, etc.), and discussion of the corrective actions taken or planned (with a time schedule for completion) to prevent recurrence of the sampling or measurement problem. The invalidation of a measurement requires the approval of Water Board staff and will be based solely on the documentation submitted at that time.

G. A tabulation reflecting bypassing and accidental waste spills shall be maintained.

H. A copy of this Order, a complete copy of the Notice of Intent filed, documentation of the authorization to discharge received from the Regional Water Board, a full copy of the O&M Manual, and any other documents relevant to the operation and maintenance of the treatment facility shall be stored at or near the treatment facility. These documents help the Dischargers' staff responsible for compliance assurance activities and shall be made available to Regional Water Board staff during inspections. The Dischargers' staff responsible for compliance assurance activities shall inspect the Facility as frequent as required by the O&M Manual.

II. MONITORING LOCATIONS

The Discharger shall establish the following monitoring locations to demonstrate compliance with the effluent limitations, discharge specifications, and other requirements in this Order.

Table E-1. Monitoring Station Locations

Discharge Point Name	Monitoring Location Name	Monitoring Location Description
Effluent	M-001 through M-"n" (E-xx[2])	At any point in the outfall between the point of discharge to the receiving water(s) and the point at which all waste tributary to that outfall is present. If the effluent first discharges into a separate storm drain system, the sampling point for compliance purpose shall be the point at which all waste tributary to the outfall and before commingling with the water in the storm drain.
Receiving Waters[1]	R-001(A,B,C,…) (CB-XX[2])	At a point in the receiving water and located upstream of the discharge point where impacts from the discharge would not be expected[3].
	R-002(A,B,C,…) (C-XX[2])	At a point in the receiving water on the edge of the mixing zone[3]; or if mixing zone cannot be determined, within 50 feet downstream of the discharge outfall.

Footnotes for Table E-1:

(1) If there is only one discharge outfall, the name R-001 or R-002 should be used. Otherwise, R-001A and R-002A for discharge point 001, R-001B and R-002B for discharge point 002, and so on are used for multiple discharge locations.

(2) The names in the parenthesis are those used in the previous General Permit.

(3) The Discharger can determine the exact receiving water sampling locations if a mixing zone can be determined based on a previous study.

III. REQUIRED EFFLUENT SAMPLING, ANALYSES AND OBSERVATIONS

Effluent monitoring is only required when discharging to the receiving waters. The schedule of effluent sampling, analysis and observation shall be that given in Tables E-2 through E-4 below.

Table E-2. Schedule of Sampling, Analysis, and Observations for Aggregate Mining Facilities

Parameter	Units[1]	Sample Type[2]	Minimum Sampling Frequency[3]
Flow Rate and volume[4]	MGD/MG	Continuous or daily	1/day
Total settable matter	mL/L/hr	Grab	1/week
Total Dissolved solids	mg/L	Grab	1/week
Chloride	mg/L	Grab	1/week
Total Suspended Solids	mg/L	C-24	1/week
Total Chlorine Residual[5]	mg/L	Grab	1/week
Turbidity	NTU	Grab	1/week
pH	s.u.	Grab	1/week
Oil and grease	mg/L	Grab	1/month
Acute Toxicity[6]	% survival	C-24	2/year
Arsenic Mercury[7]	µg/L	Grab or C-24 as specified by testing method	Quarterly for first year of operation under this Order and if not triggered twice per year thereafter

Parameter	Units[1]	Sample Type[2]	Minimum Sampling Frequency[3]
Other pollutants that may be present in the influent and/or effluent[8]	µg/L	Grab or C-24 as specified by testing method	[9]
All other Table 5 pollutants not listed above[10]	µg/L	Grab or C-24 as specified by testing method	1/5 years
Standard Observations[11]		--	1/day when operating (discharging)

Table E-3. Schedule of Sampling, Analysis, and Observations for Marine Sand Washing Facilities

Parameter	Units[1]	Sample Type[2]	Minimum Sampling Frequency[3]
Flow Rate and volume[4]	MGD/MG	Continuous or daily	1/day
Total settable matter	mL/L/hr	Grab	1/week
Turbidity	NTU	Grab	1/week
Total Chlorine Residual[5]	mg/L	Grab	1/week
pH	s.u.	Grab	1/week
Oil and grease	mg/L	Grab	1/month
Acute Toxicity[6]	% survival	C-24	2/year
Copper	µg/L	C-24	1/quarter
Mercury[7] Zinc	µg/L	Grab or C-24 as specified by testing method	Quarterly for first year of operation under this Order and if not triggered twice per year thereafter
Other pollutants that may be present in the influent and/or effluent[8]	µg/L	Grab or C-24 as specified by testing method	[9]
All other Table 5 pollutants not listed above[10]	µg/L	Grab or C-24 as specified by testing method	1/5 years
Standard Observations[11]		--	1/day when operating (discharging)

Table E-4. Schedule of Sampling, Analysis, and Observations for Sand Offloading Facilities

Parameter	Units[1]	Sample Type[2]	Minimum Sampling Frequency[3]
Flow Rate and volume[4]	MGD/MG	Continuous or daily	1/day
Total settable matter	mL/L/hr	Grab	1/week
pH	s.u.	Grab	1/week
Oil and grease	mg/L	Grab	1/month
Standard observation[11]	---	---	1/day when operating (discharging)

Footnotes for Tables E-2, E-3, and E-4:

(1) Unit Abbreviations
MGD = million gallons per day
MG = million gallons
mg/L = milligrams per liter

ml/L/hr = milliliters per liter, per hour
s.u. = standard units

(2) Sample Type
Continuous = measured continuously, and recorded and reported daily

C-24 = 24-hour composites may be made up of discrete grabs collected over the course of a day and volumetrically or mathematically flow-weighted. Samples for inorganic pollutants maybe combined prior to analysis. At least one sampling day in each week shall reflect one day of peak loading and during major unit operation shutdown or startup. If the facility discharges intermittently, then grab samples may be used instead of C-24 samples.

Grab = Grab samples of effluent shall be collected during periods of maximum peak flows (if flows vary during the day) and shall coincide with effluent composite sample days.

Samples shall be taken on random days.

(3) Minimum sampling frequency.
If two consecutive samples of a constituent monitored on a weekly (2/week) or monthly basis in a 30-day period exceed the monthly average effluent limit for any parameter, (or if the required sampling frequency is once per month and the monthly sample exceeds the monthly average limit), the sampling frequency shall be increased to daily until the additional sampling shows that the most recent 30-day moving average is in compliance with the monthly average limit.

If any maximum daily limit is exceeded, the sampling frequency shall be increased to daily until two samples collected on consecutive days show compliance with the maximum daily limit.

(4) Flow Monitoring.
Flows shall be monitored at each discharge outfall by flow meters or estimated if no flow meter is in place and the following shall be reported in self-monitoring reports:
a. Daily total flow volume (MG).
b. Discharge duration during a day, in hours.
c. Daily average flow rate (MGD), if not measured directly, calculated using a. and b. data above. If duration is not recorded, specify averaging period, i.e., 24 hours vs. estimated discharging hours.
d. Monthly total flow volume (MG).
e. Discharge days during a month.
f. Average daily maximum and average daily minimum flow rates (MGD) of discharge days (i.e., do not report zero) in a month.

Flows discharge through all authorized outfalls shall be reported, this includes all wastewater and storm water.

Some discharge points are not equipped with flow meters or only controlled by a weir; flows can be estimated in this case to the best knowledge of the operator. The Discharger may request to waive some of the flow monitoring parameters to the Executive Officer (e.g., b, c, f, above). The Executive Officer may also require the Discharger to install flow meters during the permit term.

(5) Total chlorine residual is only required for facilities using municipal water supply as wash water.

(6) Acute Toxicity monitoring (96-hour static renewal bioassay test). The test shall be performed according to Section IV below.

(7) Mercury. The Discharger shall use ultra-clean sampling methods (USEPA 1669) to the maximum extent practicable and ultra-clean analytical methods (USEPA 1631) for mercury monitoring. The Discharger may use alternative methods of analysis (such as USEPA 245) if that alternate method has a method detection limit (MDL) of 0.0002 µg/L or less.

(8) Priority pollutants are those pollutants identified as Compound Nos.1–126 by the California Toxics Rule at 40 CFR 131.38.

(9) The Regional Water Board Executive Officer may determine during the permit term that specific pollutants of concern may be present in the discharge. The Executive Officer will require the Discharger to sample for these pollutants after such determination is made. The sampling frequency may be twice per year for three years and, if not triggered, once per year thereafter.

(10) Table 5 refers to Triggers for Accelerated Monitoring and Additional Investigation.

(11) Standard observations include both receiving water and wastewater discharge:

a. Receiving Water:
   - i 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.
   - ii. Discoloration and turbidity: description of color, source, and size of affected area.
   - iii. Depth of water columns and sampling depths.

b. Weather conditions:
   - i. Air temperatures;
   - ii. Total precipitation during the previous five days and on the day of observation if there are meteorological stations on site.

c. Wastewater Effluent: Floating and suspended material of waste origin (to include oil, grease, sand, and other macroscopic particulate matter): presence or absence, source, and size of affected area.

IV. WHOLE EFFLUENT ACUTE TOXICITY TESTING REQUIREMENTS

Compliance with the whole acute toxicity requirements of this Order shall be achieved in accordance with the following:

1. Acute toxicity of effluent limits shall be evaluated by measuring survival of test organisms exposed to 96-hour static renewal bioassays.

2. Test species shall be the current species or a species approved by the Executive Officer.

3. All bioassays shall be performed according to 40 CFR 136, currently the “Methods for Measuring the Acute Toxicity of Effluents and Receiving Waters to Freshwater and Marine Organisms,” 5th Edition (EAP-821-R-02-012). Exceptions may be granted by the Executive Officer and the Environmental Laboratory Accreditation Program (ELAP).

4. If specific identifiable substances in the discharge can be demonstrated by the Discharger as being rapidly rendered harmless upon discharge to the receiving water, compliance with the acute toxicity limit may be determined after the test samples are adjusted to remove the influence of those substances. Written approval from the Executive Officer must be obtained to authorize such an adjustment.

5. Effluent used for fish bioassays must be dechlorinated prior to testing if there is chlorine residual in the effluent. Monitoring of the bioassay water shall include, on a daily basis, the following parameters: pH, dissolved oxygen, ammonia (if toxicity is

observed), temperature, hardness, and alkalinity. These results shall be reported. If the fish survival rate in the effluent is less than 70 percent or if the control fish survival rate is less than 90 percent, the bioassay test shall be restarted with new batches of fish and shall continue back to back until compliance is demonstrated.

6. The Discharger may indicate in the NOI the previous approvals by the Executive Officer and request for re-confirmation, e.g., testing species, renewal interval, etc. The Discharger may continue its current practice as long as a new method (currently the 5th edition method) allows such a variation.

V. LAND DISCHARGE MONITORING REQUIREMENTS

Not applicable.

VI. RECLAMATION MONITORING REQUIREMENTS

Not applicable.

VII. RECEIVING WATER MONITORING REQUIREMENTS – SURFACE WATER AND GROUNDWATER

A. Surface Water Monitoring at R-001(A, B, C,..) through R-"n"

The Discharger shall monitor both upstream and downstream of discharge outfall according to Table E-5 below:

Table E-5. Receiving Water Monitoring Requirements (1,5,6)

Parameter	Units(2)	Sample Type	Minimum Sampling Frequency
Dissolved Oxygen	mg/L and % saturation	Grab	1/month
Turbidity	NTU	Grab	1/month
pH	s.u.	Grab	1/week
Total Dissolved Solids(3)	mg/L	Grab	1/week
Chloride(3)	mg/L	Grab	1/week
Temperature	°C	Grab	1/month
Hardness(4)	mg/L as $CaCO_3$	Grab	1/month
Salinity(4)	ppt	Grab	1/month

Footnotes for Tables E-5

(1) a. Receiving water samples shall be collected on days coincident with effluent sampling.

b. Receiving water samples shall be collected at each station on each sampling day during the period within 1 hour following low slack water. Where sampling at lower slack water period is not practical, sampling shall be performed during higher slack water period. Samples shall be collected within the discharge plume and down current of the discharge point so as to be representative, unless otherwise stipulated.

c. Samples shall be collected within one foot below the surface of the receiving water body, unless otherwise stipulated.

(2) Unit Abbreviations
s.u. = pH standard unit
mg/L = milligrams per liter
ppt = parts per thousand

(3) Total dissolved solids is only required for discharges into fresh water bodies supporting municipal water supply or groundwater recharge.

(4) Salinity and hardness monitoring is only required for discharges into fresh and estuarine water bodies.

(5) For discharges directly into an estuarine wetland and therefore would have access difficulty for receiving water sampling, the Discharger may request to the Executive Officer in its NOI an exemption from receiving water monitoring.

(6) Receiving water monitoring is not required when there are no natural flows in the receiving water body; however, the Discharger may take samples at a nearby location at its discretion and indicated the new location in the self-monitoring report.

B. Receiving Water Priority Pollutants Sampling

The Discharger shall sample its receiving water for all pollutants listed in Table 5 of the Order (facilities with Type I triggers are required to sample for the pollutants with triggers based on MCLs). The sampling is required for at least once during the permit term. The Discharger shall submit the results 180 days prior to permit expiration with the NOI.

C. Groundwater Monitoring.

Not applicable.

VIII. LEGENDS FOR TABLES

Sampling Frequency		Legend
1/day	=	Once per day
1/week	=	Once per week
1/month	=	Once per month
1/quarter	=	Once per quarter
1/5 years	=	Once every five years

IX. OTHER MONITORING REQUIREMENTS

Not applicable.

X. REPORTING REQUIREMENTS

A. General Monitoring and Reporting Requirements

The Discharger shall comply with all Standard Provisions (**Attachment D**) related to monitoring, reporting, and recordkeeping.

B. Self Monitoring Reports (SMRs)

1. At any time during the term of this permit, the State or Regional Water Board may notify the Discharger to electronically submit self-monitoring reports. Until such notification is given, the Discharger shall submit self-monitoring reports in accordance with the requirements described below.

2. **Quarterly Reports.** The Discharger shall submit **quarterly** Self Monitoring Reports including the results of all required monitoring using USEPA-approved test methods or other test methods specified in this Order. Quarterly reports shall be due 30 days after the end of each quarter.

3. **Annual Reports.** By February 1 of each year, the Discharger shall submit an annual report to the Regional Water Board covering the previous calendar year. The report shall include both tabular and graphical summaries of the monitoring data during the previous year and a comprehensive discussion of the compliance record and the corrective actions taken or planned which may be needed to bring the discharger into full compliance with the waste discharge requirements

4. Monitoring periods and reporting for all required monitoring shall be completed according to the following schedule:

Table E-6. Monitoring Periods

Sampling Frequency	Monitoring Period Begins On…	Monitoring Period
Continuous	Effective date of permit	All
1/day	Effective date of permit	Daily
1/week	Effective date of permit	Once per week
1/month	Effective date of permit	Once per calendar month
1/quarter	Effective date of permit	January 1 through March 31 April 1 through June 30 July 1 through September 30 October 1 through December 31
2/year	Effective date of permit	Once during wet season (normally during November 1 through April 30), once during dry season (normally during May 1 through October 31)
1/year	Effective date of permit	January 1 through December 31, alternate between once during dry season (normally May 1—October 31), once during wet season (normally November 1—April 30)
1/5 years	Effective date of permit	Once during the permit term

5. The Discharger shall report with each sample result the applicable Minimum Level (ML) and the current Method Detection Limit (MDL), as determined by the procedure in 40 CFR Part 136.

   The Discharger shall report the results of analytical determinations for the presence of chemical constituents in a sample using the following reporting protocols:

a. Sample results greater than or equal to the RL shall be reported as measured by the laboratory (i.e., the measured chemical concentration in the sample).

b. Sample results less than the RL, but greater than or equal to the laboratory's MDL, shall be reported as "Detected, but Not Quantified," or DNQ. The estimated chemical concentration of the sample shall also be reported. For the purposes of data collection, the laboratory shall write the estimated chemical concentration next to DNQ as well as the words "Estimated Concentration" (may be shortened to "Est. Conc."). The laboratory may, if such information is available, include numerical estimates of the data quality for the reported result. Numerical estimates of data quality may be percent accuracy (±a percentage of the reported value), numerical ranges (low to high), or any other means considered appropriate by the laboratory.

c. Sample results less than the laboratory's MDL shall be reported as "Not Detected," or ND.

d. The Dischargers shall instruct laboratories to establish calibration standards so that the RL value (or its equivalent if there is differential treatment of samples relative to calibration standards) is the lowest calibration standard. The Discharger shall not use analytical data derived from *extrapolation* beyond the lowest point of the calibration curve.

6. The Discharger shall arrange all reported data in a tabular format. The data shall be summarized to clearly illustrate whether the facility is operating in compliance with interim and/or final effluent limitations.

7. The Discharger shall attach a cover letter to the SMR. The information contained in the cover letter shall clearly identify violations; discuss corrective actions taken or planned; and the proposed time schedule for corrective actions. Identified violations must include a description of the requirement that was violated and a description of the violation.

8. SMRs must be submitted to the Regional Water Board, signed and certified as required by the standard provisions (**Attachment D** and **G**), to the address listed below:

   Executive Officer
   California Regional Water Quality Control Board
   San Francisco Bay Region
   1515 Clay Street, Suite 1400
   Oakland, CA 94612
   ATTN: NPDES Wastewater Division

9. The Discharger has the option to submit all monitoring results in an electronic reporting format approved by the Executive Officer. The Electronic Reporting System (ERS) format includes, but is not limited to, a transmittal letter, summary of violation details and corrective actions, and transmittal receipt. If there are any

discrepancies between the ERS requirements and the "hard copy" requirements listed in the MRP, then the approved ERS requirements supercede.

C. Discharge Monitoring Reports (DMRs)

1. As described in Section XI.B.1 above, at any time during the term of this permit, the State or Regional Water Board may notify the Discharger to electronically submit SMRs that will satisfy federal requirements for submittal of Discharge Monitoring Reports (DMRs). Until such notification is given, the Discharger shall submit DMRs in accordance with the requirements described below.

2. DMRs must be signed and certified as required by the standard provisions (Attachment D). The Discharger shall submit the original DMR and one copy of the DMR to one of these addresses listed below:

STANDARD MAIL	FEDEX/UPS/ OTHER PRIVATE CARRIERS
State Water Resources Control Board Division of Water Quality c/o DMR Processing Center PO Box 100 Sacramento, CA 95812-1000	State Water Resources Control Board Division of Water Quality c/o DMR Processing Center 1001 I Street, 15th Floor Sacramento, CA 95814

All discharge monitoring results must be reported on the official USEPA pre-printed DMR forms (EPA Form 3320-1). Forms that are self-generated will not be accepted unless they follow the exact same format as EPA Form 3320-1.

D. Other Reports

Not applicable.

ATTACHMENT F – FACT SHEET

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ATTACHMENT F – FACT SHEET

As described in Section II of this Order, this Fact Sheet includes the legal requirements and technical rationale that serve as the basis for the requirements of this Order.

I. PERMIT INFORMATION

This Order reissues the NPDES General Permit in Order No. R2-2002-0063 (the previous Order or previous permit), adopted by the Regional Water Board on June 19, 2002. It regulates discharges from aggregate mining, sand washing, and sand dredging (offloading) facilities.

II. FACILITY DESCRIPTION

A. General Description of the Facilities

1. **Aggregate mining facilities.** These facilities are generally aggregate mining and processing facilities, which produce various grades of aggregates for construction uses. Some aggregate mining facilities have a ready-mix concrete plant and/or an asphalt plant on the same property. Most facilities have oil, grease, fuel and other chemical storage as part of a maintenance shop to provide maintenance for the equipment used in aggregate mining and aggregate transportation. Aggregate mining results in a pit in the ground. Inactive mining pits are used as water detention ponds. Groundwater seeping into the active mining pit is pumped to a series of detention ponds. The water from the last detention pond is used for aggregate washing to remove dirt and dust control at the facility. Some facilities have on-site wells to supply additional water for aggregate washing. All wash water flows to detention ponds before discharge.

2. **Marine Sand washing facilities.** Sand dredged from various locations in San Francisco Bay is transported by barges and offloaded by conveyor belt to these facilities. Wet sand is stockpiled at the facility on the ground or stored in settling ponds. The majority of reclaimed sand is screened and sold for construction uses. A small amount of sand is washed (to remove salt) for use in concrete production. Most of the facilities have oil, grease, fuel and other chemical storage as part of a maintenance shop/shed to provide maintenance for on-site equipment.

3. **Sand offloading facilities.** Sand dredged from various locations in San Francisco Bay is transported by barges and offloaded by hydraulic slurry to these facilities. Wet sand is stockpiled at the facility on the ground or stored in settling ponds. The reclaimed sand is screened and sold for construction uses.

4. **Existing facilities and new facilities**. An existing facility is a facility that is covered under Order No. R2-2002-0063 or that holds an individual NPDES permit for its discharge. A new facility is a facility that is still under construction or that has completed its construction but has not commenced discharge to State waters.

B. General Description of the Discharges

1. **Discharge from aggregate mining facilities.** The wastewater at the facilities, such as groundwater seepage diverted from active mining pits, storm water runoff from the facility yard, runoff of aggregates wash water, and runoff from dust control spray, flow into a series of detention ponds.

   Pollutants in the discharge from aggregate mining facilities consist mainly of solids that are not settled out in the detention ponds and dissolved solids, which come from groundwater. The discharge may include toxic pollutants from the groundwater (if polluted), or the storm water runoff from the facility (e.g., toxic materials not properly stored at the facility).

2. **Discharge from sand washing facilities.** Discharges from sand washing facilities normally consist of a combination of bay water that has drained from the sand piles during drying (or bay water that overflows from sand settling ponds if hydraulic dredging is used), water used for sand washing and screening, and storm water runoff from the facility yard. Potable water from a municipal source or from local wells is normally used to wash the sand. Water from municipal sources normally contains chlorine residual. This Order requires sand washing facilities that use municipal water supply as wash water to monitor chlorine residual in the discharge. Zinc phosphate is used in some water systems as a corrosion-protecting agent, and copper is used to control algae. Copper and galvanized steel are also widely used for water supply pipes. Therefore, copper and zinc may be present in the sand wash water.

3. **Discharge from sand offloading facilities.** Discharges from sand offloading facilities normally consist of bay water that has drained from the sand piles during drying, or bay water that overflows from sand settling ponds if hydraulic dredging is used, and storm water runoff from the facility yard.

   Pollutants in the discharge from marine sand washing/sand offloading consist mainly of solids that are not settled out in the detention ponds. The discharge may include toxic pollutants from the bay water or the storm water runoff from the facility (e.g., toxic materials not properly stored at the facility).

C. Discharge Points and Receiving Waters

The Order applies to all qualified discharges to all receiving waters of the San Francisco Bay Region, including inland surface waters and enclosed bays. The beneficial uses of these receiving waters are described in Section II, Findings, of the Order.

D. Summary of Existing Requirements

Order No. R2-2002-0063 includes the following effluent limitations:

Table F-1. Summary of Previous Permit Effluent Limits

Constituents	Daily Maximum	30-day Arithmetic Mean	7-day Arithmetic Mean	90-day Arithmetic Mean
a. Total Dissolved Solids, mg/L[(1)]	500	---	---	360
b. Chlorides, mg/L[(1)]	250	---	---	60
c. Total Suspended Solids, mg/L	---	30	45	---
d. Turbidity, NTU	40	---	---	---
e. Total Settleable Solids, mL/1-hr	0.2	0.1	---	---
f. Chlorine Residual, mg/L	0.0	---	---	---
g. pH, in pH units[(3)]	6.5-8.5 (not less than 6.5 and not greater than 8.5)			
h. Acute Toxicity	The survival of bioassay test organism(s) [(4)] in 96-hour bioassays of undiluted effluent in a single-sample maximum shall be at least 70%. A bioassay test showing survival of less than 70% represents a violation of this effluent limit.			

Note (1) Total Dissolved Solids and Chlorides limits apply only to discharges to Alameda Creek above Niles. Exceedance of the dissolved solids or chloride limits does not constitute a violation if the discharger demonstrates that the source water is also high in dissolved solids or chloride concentration and the exceedance is not caused by its facility operation.

(2) Chlorine residual limit applies only to sand washing facilities that use municipal water supply as wash water.

(3) Exceedance of pH limit does not constitute a violation if the discharger demonstrates that the source water is also high in pH and the high pH in its discharge effluent is not caused by its operations.

Dischargers expected to seek coverage under this General Permit include some that have been authorized to discharge under individual NPDES permits and/or Waste Discharge Requirements. The individual permits may have different discharge requirements. For example, one individual NPDES permit for discharges from sand offloading facilities (bay water return flow) only contains effluent limitations for settable matter and pH.

E. Planned Changes

As required in **Attachment D,** Section V.F**.** and Provision VI.C.10.b of the Order, a Discharger authorized under this Order is required to submit a notice before making any material change in the character, location, or volume of the discharge.

III. APPLICABLE PLANS, POLICIES, AND REGULATIONS

The requirements contained in this Order are based on the requirements and authorities described in this section.

A. Legal Authorities

This Order is issued pursuant to section 402 of the federal Clean Water Act (CWA) and its implementing regulations adopted by the USEPA, and chapter 5.5, division 7 of the California Water Code (commencing with section 13370). It shall serve as an NPDES permit for the point source discharges described herein to surface waters of the Region. This Order also serves as Waste Discharge Requirements (WDRs) pursuant to article 4,

chapter 4, Division 7 of the California Water Code (commencing with section 13260). Pursuant to NPDES regulations at 40 CFR 122.28, States may request authority to issue general NPDES permits. On June 8, 1989, the State Water Board applied to the USEPA requesting revisions to its NPDES Program in accordance with 40 CFR 122.28, 123.62, and 403.10, including a request to add general permit authority to its approved NPDES Program. On September 22, 1989, the USEPA, Region 9, approved the State Water Board's request, granting authorization for the State to issue general NPDES permits.

Pursuant to NPDES regulations at 40 CFR 122.28(a)(2), general permits may be used to regulate point source discharges that:

1. Involve the same or substantially similar types of operations,
2. Discharge the same types of wastes,
3. Require the same effluent limitations,
4. Require the same or similar monitoring, and
5. In the opinion of the Executive Officer, are more appropriately controlled under a general permit than under individual permits.

Regional Water Board staff interprets the "types of operations" as the "types of treatment facilities," which determines the discharge qualities. All three categories of facilities treat process wastewater by sedimentation; therefore, they all have the same type of treatment facilities. The permit requirements for treatment facility operation and best management practices are the same.

All three categories of facilities discharge a mixture of settled process wastewater (including groundwater) and storm water runoff. The major pollutant of concern in the discharges is solids resulting from aggregate or sand washing/offloading runoff. The impact to the receiving water is similar for all categories.

The permit requirements for discharge prohibitions, effluent limits for most pollutants, provisions, monitoring requirements and other permit conditions are the same or similar to each other.

The Executive Officer concludes that it is appropriate to continue regulating these three types of facilities under the same General Permit.

This Order becomes effective approximately on the date indicated provided the Regional Administrator of USEPA has no objection. If the Regional Administrator objects to its issuance, the permit shall not become effective until such objection is withdrawn. This general permit does not cover direct discharges to the Pacific Ocean.

B. California Environmental Quality Act (CEQA)

This action to adopt an NPDES permit is exempt from the provisions of the California Environmental Quality Act (Public Resources Code Section 21100, et seq.) in accordance with CWC Section 13389.

C. State and Federal Regulations, Policies, and Plans

1. **Water Quality Control Plans.** The Regional Water Board adopted a *Water Quality Control Plan for the San Francisco Basin* (Region 2) (hereinafter the Basin Plan) that designates beneficial uses, establishes water quality objectives, and contains implementation programs and policies to achieve those objectives for all waters addressed through the plan. Beneficial uses of any water body specifically identified in Chapter 2 of the Basin Plan generally apply to its tributary streams. In addition, the Basin Plan implements State Water Board Resolution No. 88-63, which establishes a policy that all waters, with certain exceptions, should be considered suitable or potentially suitable for municipal or domestic supply. Applicable beneficial uses of surface waters of the San Francisco Bay Region are listed below.

   - Agricultural Supply
   - Areas of Special Biological Significance
   - Cold Freshwater Habitat
   - Ocean, Commercial and Sport Fishing
   - Estuarine Habitat
   - Freshwater Replenishment
   - Groundwater Recharge
   - Industrial Service Supply
   - Marine Habitat
   - Fish Migration
   - Municipal and Domestic Supply
   - Navigation
   - Industrial Process Supply
   - Preservation of Rare or Endangered Species
   - Water Contact Recreation
   - Non-Contact Water Recreation
   - Shellfish Harvesting
   - Fish Spawning
   - Warm Freshwater Habitat
   - Wildlife Habitat

   This Order implements applicable provisions of the Basin Plan.

2. **National Toxics Rule (NTR) and California Toxics Rule (CTR).** USEPA adopted the NTR on December 22, 1992, amending it on May 4, 1995 and November 9, 1999, and adopted the CTR on May 18, 2000, amending it on February 13, 2001. These rules include water quality criteria for priority pollutants and are applicable to discharges from this facility

3. **State Implementation Policy.** On March 2, 2000, State Water Board adopted the Policy for Implementation of Toxics Standards for Inland Surface Waters, Enclosed Bays, and Estuaries of California (State Implementation Policy or SIP). The SIP became effective on April 28, 2000, with respect to the priority pollutant criteria

promulgated for California by the USEPA through the NTR and to the priority pollutant objectives established by the Regional Water Boards in their basin plans, with the exception of the provision on alternate test procedures for individual discharges that have been approved by USEPA Regional Administrator. The alternate test procedures provision was effective on May 22, 2000. The SIP became effective on May 18, 2000. The State Water Board amended the SIP on February 24, 2005, and the amendments became effective on May 31, 2005. The SIP includes procedures for determining the need for and calculating water quality-based effluent limitations (WQBELs) and requires dischargers to submit data sufficient to do so.

4. **Alaska Rule.** On March 30, 2000, USEPA revised its regulation that specifies when new and revised state and tribal water quality standards (WQS) become effective for CWA purposes. [40 C.F.R 131.21; 65 Fed. Reg. 24641 (April 27, 2000)] Under the revised regulation (also known as the Alaska Rule), new and revised standards submitted to USEPA after May 30, 2000, must be approved by USEPA before being used for CWA purposes. The final rule also provides that standards already in effect and submitted to USEPA by May 30, 2000 may be used for CWA purposes, whether or not approved by USEPA.

5. **Stringency of Requirements for Individual Pollutants**. This Order contains restrictions on individual pollutants that are no more stringent than required by the federal CWA. Individual pollutant restrictions consist of technology-based restrictions and water quality-based effluent limitations. The technology-based effluent limitations consist of restrictions on total suspended solids (TSS) and settleable matter. Restrictions on these pollutants are specified in federal regulations and are no more stringent than required by the CWA. Water quality-based effluent limitations have been scientifically derived to implement water quality objectives that protect beneficial uses. Both the beneficial uses and the water quality objectives have been approved pursuant to federal law and are the applicable federal water quality standards. To the extent that toxic pollutant water quality-based effluent limitations were derived from the CTR, the CTR is the applicable standard pursuant to 40 CFR 131.38. The scientific procedures for calculating the individual water quality-based effluent limitations are based on the CTR-SIP, which was approved by USEPA on May 18, 2000. Most beneficial uses and water quality objectives contained in the Basin Plan were approved under state law and submitted to and approved by USEPA prior to May 30, 2000. Any water quality objectives and beneficial uses submitted to USEPA prior to May 30, 2000, but not approved by USEPA before that date, are nonetheless “applicable water quality standards for purposes of the CWA” pursuant to 40 CFR 131.21 (c) (1). The remaining water quality objectives and beneficial uses implemented by this Order [those for arsenic, cadmium, chromium (VI), copper (fresh water), lead, nickel, silver (1-hour), and zinc] were approved by USEPA on January 5, 2005, and are applicable water quality standards pursuant to 40 CFR 131.21 (c) (2). Collectively, this Order’s restrictions on individual pollutants are no more stringent than required to implement the technology-based requirements of the CWA and the applicable water quality standards for purposes of the CWA.

6. **Antidegradation Policy.** NPDES regulations at 40 CFR 131.12 require that State water quality standards include an antidegradation policy consistent with the federal policy. The State Water Board established California's antidegradation policy in State Water Board Resolution 68-16, incorporating the requirements of the federal antidegradation policy and requiring that existing quality of waters be maintained unless degradation is justified based on specific findings. As discussed in detail in Section IV.G of this Fact Sheet the permitted discharge is consistent with the antidegradation provision of 40 CFR 131.12 and State Water Board Resolution 68-16.

7. **Anti-Backsliding Requirements.** CWA Sections 402(o)(2) and 303 (d) (4) and NPDES regulations at 40 CFR 122.44(l) prohibit backsliding in NPDES permits. These anti-backsliding provisions require effluent limitations in a reissued permit to be as stringent as those in the previous permit, with some exceptions where limitations may be relaxed. As discussed in detail elsewhere in this Fact Sheet (**Attachment F**), the prohibitions, limitations, and conditions of this Order are consistent with applicable federal and State anti-backsliding requirements.

8 **Monitoring and Reporting Requirements.** 40 CFR 122.48 requires that all NPDES permits specify requirements for recording and reporting monitoring results. CWC Sections 13267 and 13383 authorize the Regional Water Boards to require technical an.d monitoring reports. The MRP, included as **Attachment E** to this Order, establishes monitoring and reporting requirements to implement federal and State requirements. The MRP may be amended by the Executive Officer pursuant to USEPA regulation 40 CFR 122.62, 122.63, and 124.5.

D. Impaired Water Bodies on CWA 303 (d) List

On June 6, 2003, the USEPA approved a revised list of impaired water bodies prepared by the State pursuant to CWA section 303(d) - specific water bodies where it is expected that water quality standards will not be met after implementation of technology-based effluent limitations on point sources.

1. **Total Maximum Daily Loads.** The Regional Water Board plans to adopt TMDLs for pollutants on the 303 (d) list in the San Francisco Bay Region within the next ten years. Future review of the 303 (d)-list for the Bay may result in revision of this schedule, provide schedules for other pollutants, or both.

2. **Wasteload Allocations.** TMDLs will establish waste load allocations (WLAs) for point sources and load allocations (LAs) for non-point sources, and will result in achieving applicable water quality standards for the impaired waterbodies. Final effluent limitations for impairing pollutants for the Dischargers covered by this general permit will ultimately be based on WLAs derived from the TMDLs.

IV. RATIONALE FOR EFFLUENT LIMITATIONS AND DISCHARGE SPECIFICATIONS

The CWA requires point source discharges to control the amount of conventional, non-conventional, and toxic pollutants that are discharged into the waters of the United States. The control of pollutants discharged is established through effluent limitations and other

requirements in NPDES permits. There are two principal bases for effluent limitations: 40 CFR 122.44(a) requires that permits include applicable technology-based limitations and standards; and 40 CFR 122.44(d) requires that permits include water quality-based effluent limitations (WQBELs) to attain and maintain applicable numeric and narrative water quality criteria to protect the beneficial uses of the receiving water. Where numeric water quality objectives have not been established, three options exist to protect water quality: (1) 40 CFR 122.44(d) specifies that WQBELs may be established using USEPA criteria guidance under CWA section 304(a); (2) proposed State criteria or a State policy interpreting narrative criteria supplemented with other relevant information may be used; or 3) an indicator parameter may be established.

The Basin Plan prohibits discharge of any wastewater that has particular constituents of concern to beneficial uses at any point at which the wastewater does not receive a minimum initial dilution of at least 10:1. The wastewater discharges regulated by this Order may be exempted from these prohibitions because the main pollutant of concern in the effluent is silt or sediment washed off the sand and gravel. There are effluent limits in this Order to limit the discharge of these pollutants. In general there should be no water quality concerns as long as the discharges are in compliance with these effluent limits. In part, the Basin Plan states:

"This prohibition will (a) provide an added degree of protection from the continuous effects of waste discharge, (b) provide a buffer against the effects of abnormal discharges caused by temporary plant upsets or malfunctions, (c) minimize public contact with undiluted wastes, and (d) reduce the visual (aesthetic) impact of waste discharges."

As indicated in the Basin Plan, discharges of treated sewage and other discharges where the treatment processes is subject to upset contain particular characteristics of concern. The dilution requirement is to provide a contingency in the event of temporary treatment plant malfunction and to minimize public contact with undiluted treated sewage. However, the discharges here do not contain treated sewage and does not contain wastewater from a treatment process subject to upset. Therefore, the prohibition does not apply in this event.

Even if this prohibition did apply, the Basin Plan provides an exception: "Exceptions … will be considered where: An inordinate burden would be placed on the discharger relative to beneficial uses protected … ." Prohibition of the discharges from these facilities would result in closing the businesses, which would cause shortages of construction materials for housing, road, and other development needs.

Several specific factors affecting the development of limitations and requirements in this Order are discussed as follows:

A. Discharge Prohibitions

1. Prohibition 1 (discharges shall comply with the permit condition):

This prohibition is based on the Basin Plan to protect beneficial uses of the receiving water from un-permitted discharges, and the intent of sections 13260 through 13264 of the California Water Code relating to the discharge of waste to State Waters

without filing for and being issued a permit. This prohibition is unchanged from the previous permit.

2. **Prohibitions 2, 3 & 4 (no discharge of silt, sand, clay, other earthen materials, oil and grease; on-site storage of chemicals):**

   These prohibitions are based on narrative objectives for sediments, settleable matters, suspended and floating materials specified in Chapter 3 of the Basin Plan. These prohibitions are unchanged from the previous permit.

3. **Prohibition 5 (no bypassing retention ponds):**

   Retention ponds are the primary form of treatment at the facilities covered under this general permit. Bypassing any ponds would greatly reduce effluent quality. This prohibition is based on 40 CRF 122.42 (m).

B. Technology-Based Effluent Limitations

CWA Section 301(b) and NPDES regulations at 40 CFR 122.44 require permits to, at a minimum, meet applicable technology-based requirements and any more stringent effluent limitations necessary to meet applicable water quality standards.
The CWA requires the USEPA to develop effluent limitations, guidelines and standards (Effluent Limitations Guidelines - ELGs) representing application of best practicable treatment control technology (BPT), best available technology economically achievable (BAT), best conventional pollutant control technology (BCT), and best available demonstrated control technology for new sources (NSPS), for specific industrial categories. Where USEPA has not yet developed ELGs for a particular industry or a particular pollutant, Section 402(a)(1) of the CWA and USEPA regulations at 40 CFR 125.3 authorize the use of best professional judgment (BPJ) to derive technology-based effluent limitations on a case-by-case basis. When BPJ is used, the permit writer must consider specific factors outlined at 40 CFR 125.3.

C. Specific Basis for Technology- and Water Quality-Based Effluent Limitations for Conventional and Non-Conventional Pollutants

This Order includes both technology-based and water quality effluent limits for three categories of discharges: aggregate mining, marine sand washing, and sand offloading facilities. Effluent limits for total suspended solids, settleable solids, and turbidity are technology-based; effluent limits for pH, chlorine residual, total dissolved solids, chloride, and acute toxicity are water quality-based. The effluent limits are either unchanged from the previous General Order or individual permits or newly developed using site-specific data and best professional judgment. More detailed rational is discussed below:

a. Effluent limitations for Aggregate Mining Facilities (Section IV.A, Table 1):

(1) **Total suspended solids, settleable matter, chlorine residual** are based on Basin Plan Table 4-2 for effluent limitations for conventional pollutants. Based on Regional Water Board staff's best professional judgment, we believe these limits

are technically achievable, are necessary to protect the receiving water, and are generally consistent with limits from previous individual permits for similar facilities.

The chorine residual effluent limit only applies to those facilities that use municipal water supply as a source water and is based on Basin Plan Table 4-2.

(2) **pH.** The pH effluent limits are unchanged from the previous permit, and are based on Basin Plan Table 4-2 for shallow water dischargers. The exception to pH effluent limits is unchanged from the previous permit; a minor change is made, which is consistent with the Basin Plan (the discharge is not to cause the normal ambient pH to change by more than 0.5 Standard Units). The 6.5–8.5 Basin Plan objectives for surface waters are based on the pH range usually found in the surface waters in this region. However, Alameda County Water District (ACWD) data show that the pH in Alameda Creek and its tributaries in the vicinity of Dischargers' outfalls is commonly higher than 8.5. Regional Water Board staff evaluated ACWD's data from two sampling stations: AC_AADLL (Alameda Creek above Arroyo de la Laguna), which is the closest station to Hanson Mission Valley Rock Aggregate Plant and CEMEX Sunol Plant; and AM_AALP (Arroyo Mocho above Arroyo las Positas-Mocho fish ladder), which is the closet station to Vulcan Materials Company and CEMEX Eliot Aggregate Plant.

Data from Vulcan Materials Company suggest that its receiving water is high in pH, with many values above 8.5 (30 out of 44 measurements). For the ACWD's data, at Arroyo Mocho downstream of Vulcan's discharge, 38 out of 78 pH measurements are above 8.5. At Alameda Creek above Arroyo de la Laguna, 59 out of 139 pH measurements are above 8.5.

Aggregate mining operations are not likely to alter the pH in the its treated wastewater discharge (no chemicals are added), and the treated wastewater is primarily groundwater. Effluent Limitations Guidelines for the Mineral Mining and Processing Point Source Category, established at 40 CFR 436 Subpart C (Construction Sand and Gravel Category) state that pH effluent limits for this type of discharge should be within 6.0–9.0. However, we retained the more stringent effluent limits from the Basin Plan as well as the exceptions from the existing General Permit that reflect the actual ambient conditions. The Order specifies that the exceptions do not allow the pH of the discharge to be outside the range specified by the Effluent Limitations Guidelines.

(3) **Turbidity** effluent limit for aggregate mining facilities is from the previous General Permit, and was based on performance. The same limit was in some rescinded individual permits (for example, Orders 96-045 and 97-037) for the Dischargers in this area before the reissuance of the previous General Permit.

Dischargers' monitoring data show occasional exceedances of the effluent limits for TSS, settleable matter, or turbidity. This Order contains the same effluent limits for aggregate mining facilities. It is known that toxic pollutants can attach to

solids (suspended, settable, etc); therefore, improving solids removal will help remove potential toxic pollutants in the discharge as well. Although there have been occasional exceedances in the past, Regional Water Board staff believes that Dischargers are able to manage their settling ponds to achieve better removal because some facilities show no violation of solids limits. This will also help discharges to stay below the toxic pollutant trigger levels contained in Provision VI.C.8.

(4) **TDS and chloride effluent limits.** Effluent limits for TDS and chloride for discharges into any fresh water body supporting municipal supply or groundwater recharge are based on Basin Plan Table 3-5. In the Alameda Creek area, these effluent limits will limit the discharges from aggregate mining facilities to those that contain TDS and chloride that meet the water quality objectives for drinking water supply into Alameda Creek for ACWD's groundwater recharge.

The previous permit contained TDS and chloride effluent limits for discharges to Alameda Creek above Niles. These limits were partially based on Basin Plan Table 3-7 objectives. The limits are now revised to be consistent with Basin Plan Table 3-7 and are receiving water limits (in Section V) for Alameda Creek above Niles. This change is made because there is evidence showing that the discharges from aggregate mining discharges in this area, which consist primarily of groundwater, are naturally high in TDS and chlorides. The groundwater extracted by the aggregate mining operations does not contain higher TDS or chloride than those in Alameda Creek. Regional Water Board staff's analysis of both the Dischargers' and data collected by ACWD during 2003-2007 at 15 stations is summarized below (detailed analysis can be found in **Appendix F-1**).

<u>Analysis of ACWD TDS and Chloride Data</u>

For ACWD total dissolved solids data, there are 1847 total dissolved solids (TDS) data points (after excluding one outlier of 5550 mg/L). TDS at 14 of the 15 stations exceed the 90-day average objective of 250 mg/L, with long-term average values ranging from 271 to 763 mg/L; there are 14 stations with maximum TDS values above the Basin Plan daily maximum objective of 500 mg/L. The TDS average is 458 mg/L, with a range of 47–1235 mg/L from station to station. There are 623 data points (34%) above the maximum objective of 500 mg/L, 981 data points (53%) above the 90-day 90th percentile objective of 360 mg/L, and 1557 data points (84%) above the 90-day average objective of 250 mg/L.

For ACWD chloride data, there are 1866 chloride data points. Chloride at nine of the 15 stations exceeds the 90-day average objective of 60 mg/L, with long-term average values ranging from 71 to 214 mg/L; six stations have maximum chloride values that exceed the Basin Plan daily maximum objective of 250 mg/L. The chloride average is 80 mg/L, with a range of 4–475 mg/L. There are 80 data points (4%) above the maximum objective of 250 mg/L, 645 data points (34.5%) above the 90-day 90th percentile objective of 100 mg/L, and 851 data points (45.6%) above the 90-day average objective of 60 mg/L.

Therefore, the data show that Alameda Creek above Niles often does not meet the Basin Plan objectives for TDS and chloride.

Analysis of Dischargers' Data

Data from Vulcan Materials Company suggest that its discharge is similar to that of its receiving water, but neither is meeting the Basin Plan objectives for TDS and chloride.

Data from the Hanson Mission Valley Rock Aggregate Plant suggest that its discharge has higher TDS and chloride than the receiving water. Neither the effluent nor the receiving water is meeting Basin Plan objectives for TDS. Since its discharge contains only groundwater (except a small amount of storm water runoff), the groundwater must be naturally high in TDS.

Data from the CEMEX Sunol Aggregate Plant show that its discharges generally meet the Basin Plan chloride and TDS objectives. This facility only discharges groundwater.

Salt Loading

The Basin Plan TDS and chloride water quality objectives applicable upstream of Niles are intended to minimize salt build-up within the Livermore-Amador groundwater basin. Basin Plan Chapter 4 states, "The current surface water quality objectives for the Alameda Creek Watershed above Niles (Table 3-7) were adopted in 1975. They were based on historic SBA [South Bay Aqueduct] water quality primarily to prevent degradation by wastewater discharges of imported SBA water being conveyed and used for groundwater recharge during dry weather periods. Wastewater discharges were terminated in 1980." There is no evidence to show that the discharges contribute additional salt to the Livermore-Amador Valley groundwater basin. However, since most of the Dischargers could still have difficulty complying with TDS and chloride receiving water limits, consistent with the intent of the Basin Plan, this permit allows the Dischargers to perform a special study to demonstrate that there is no net salt loading to the groundwater basins from their operations. If so, it can be assumed that surface and ground water quality in the area will be protected.

b. Effluent limitations for Marine Sand Washing Facilities (Section IV.B., Table 2):

(1) **Settable matter, pH, and chlorine residual** effluent limits are based on Basin Plan criteria in Table 4-2 for effluent limitations for conventional pollutants. Based on Regional Water Board staff's best professional judgment, these limits are necessary to protect the receiving water, and are consistent with limits from previous individual permits for similar facilities.

The chorine residual effluent limit only applies to those facilities that use municipal water supply as a wash water and are based on Basin Plan Table 4-2.

Receiving waters for the marine sand processing facilities are also sometimes high in pH according to Dischargers' monitoring data. The discharge mainly contains bay water return flows, so if the pH is high in the bay, the discharge may also have high pH. As explained in (a)(1) above, exceedance of the pH limit will not constitute a violation of this Order if the Discharger can demonstrate, through receiving water monitoring, that the discharge does not cause the natural background pH to be depressed below 6.5 nor raised above 8.5, nor vary from normal ambient pH by more than 0.5 Standard Units. This variation is allowed by the Basin Plan.

(2) **Turbidity.** For this permit reissuance, Regional Water Board staff calculated a new turbidity effluent limit of 50 NTU for the marine sand washing facilities, which is higher than the existing permit limit of 40 NTU.

CWA §402(o)(2)(E) allows backsliding in the case of the turbidity limit. The Dischargers have installed the settling ponds necessary to reduce turbidity, but they cannot consistently meet the turbidity limits in the existing permit (Order No. R2-2002-0063). In most of our NPDES wastewater permits, to evaluate the ability of a discharger to comply with proposed limits, our practice has been to compare the 99th percentile of the discharger's performance data against the maximum daily limit. If the limit would be exceeded more than 1% of the time, we conclude that compliance is not immediately feasible. In this case, the Discharger would likely fail to comply with the limit 9% of the time.

The turbidity limit in the existing permit was a performance-based effluent limit, but it was based on the performance of aggregate mining facilities discharging primarily groundwater to a fresh water body that supports drinking water supply or groundwater recharge. The limit was carried over from several individual permits (e.g., Order Nos. 96-045 and 97-033) that existed before the adoption of the existing General Permit. The new effluent limit was calculated based on the data collected from the marine sand washing facilities and reflects their existing operations and actual performance. This information was not available at the time of the last permit reissuance, and CWA §402(o)(2)(B) allows backsliding in such cases when new information becomes available.

Backsliding from the previous turbidity limits is also allowed pursuant to §303(d)(4)(B). San Francisco Bay is not impaired by turbidity and the permit complies with antidegradation policies. By retaining turbidity limits based on current performance, no water quality degradation can be expected. We propose to retain turbidity limits primarily because we eliminated the TSS limits. The turbidity limit compensates for the lack of TSS information, as turbidity usually has a good correlation with TSS. We acknowledge that turbidity does not always correlate well with TSS depending on the characteristics of discharge. For example, the turbidity readings may be biased high if the effluent has color in it. However, based on the characteristics of the marine sand washing discharges

and our understanding of the issue, using turbidity as a surrogate seems to be appropriate.

Hanson argued that there should not be a turbidity effluent limit in the General Permit for marine sand washing facilities, as various turbidimeters (nephelometers) provide inconsistent results and the color in the effluent may sometimes cause falsely high turbidity readings. Regional Water Board staff believes the new limit developed using the data from Hanson's three facilities has addressed the Discharger's concerns. Their monitoring data reflect the variability of the results. The new effluent limit was developed as the 95th percentile of all monitoring data collected during 2003-2007 (one statistical outlier was excluded from the analysis, i.e., values greater than mean + 4 standard deviations); therefore, the effluent limit addresses the variability observed in the discharges.

(3) **No TSS effluent limits for marine facilities.** No TSS effluent limits are included in this Order for marine sand washing facilities.

Compliance with antibacksliding requirements

The elimination of TSS effluent limits complies with the antibacksliding requirements since the TSS cannot be reliably measured in the discharge and the Dischargers cannot comply with the effluent limits, assuming the historical monitoring data were valid. CWA §402(0)(2)(B) allows backsliding when "information is available which was not available at the time of permit issuance…and which would have justified the application of a less stringent effluent limitation at the time of permit issuance." Hanson submitted a detailed study to the Regional Water Board describing experiments it performed to determine the reliability of the standard TSS laboratory procedure (EPA method 160.2). The report is entitled Technical Report – Evaluation of the Accuracy and reliability of EPA Test Method 160.2 to Measure Total Suspended Solids (TSS) in Effluent from Marine Sand Processing Facilities, dated June 1, 2005 (see Appendix F-2 of the Fact Sheet for the report and addendums), and this study constitutes this new information.

Compliance with antidegradation requirements

Elimination of the TSS limits is also allowed pursuant to §303(d)(4)(B). San Francisco Bay is not impaired by TSS and the permit complies with antidegradation policies. By retaining turbidity limits based on current performance, no water quality degradation can be expected. Moreover, the revised draft permit contains the same total settleable matter effluent limits as the previous permit, thus preventing water quality from degradation.

Adequacy of TSS test methods

The elimination of TSS limits has good technical justification. Hanson submitted a detailed study to the Regional Water Board describing the experiments that were performed in determining the reliability of the standard TSS laboratory procedure (EPA method 160.2). The report is entitled Technical Report—Evaluation of the

Accuracy and reliability of EPA Test Method 160.2 to Measure Total Suspended Solids (TSS) in Effluent from Marine Sand Processing Facilities, dated June 1, 2005 (see **Appendix F-2** of the Fact Sheet for the report and addendums).

Hanson's study concludes that the USEPA approved method cannot produce reliable TSS results for marine sand washing discharges. Aliquots were sent to three different labs for analysis, but the labs could not generate TSS results with acceptable precision or accuracy for the same sample. The salt in the effluent may affect the TSS results if the filter is not rinsed thoroughly enough, producing biased high results (this is more likely when all the labs are using method 160.2). But with more intense rinsing, the filter used in the method cannot capture the fine particles in the marine sand washing effluent effectively, which means the TSS results would be biased low.

After detailed review and several meetings with Hanson to discuss the study, Regional Water Board staff concurred with the study results. Therefore, we conclude that it is appropriate to eliminate the TSS effluent limits for this permit reissuance. But the permit may be reopened to include appropriate TSS limits when reliable USEPA methods become available. Or, for the next permit reissuance, the Regional Water Board may re-evaluate the TSS issue and could consider TSS effluent limits, as appropriate. The revised draft permit also contains a new provision requiring the marine sand washing and sand offloading Dischargers to perform a special TSS study. The study results could be used as a basis for setting effluent limits when the salt water TSS analytical issues are adequately addressed (either through the special study or availability of an effective USEPA method).

c. Effluent limitations for Sand Offloading Facilities (Section IV.C, Table 3):

The settleable matter effluent limit is based on the current limits for these facilities specified in their current individual permits. This limit is higher than the Basin plan Table 4-2 to account for natural organic matter that may be entrained from the bay with the sand as opposed to solids introduced during more aggressive sand processing operations that occur at other facility categories covered under this Order.

These limits are appropriately protective because they currently only apply to sand offloading facilities that discharge directly into a marsh or wetland. The marsh or wetland will remove some of the settleable solids before the discharge reaches the bay. Furthermore, during an inspection of the Hanson Aggregates Marina Vista Facility, Regional Water Board staff did not observe any sediment accumulation near the discharge outfall. Therefore, it is not expected to have receiving water degradation if the discharge is to be limited at the current solids level. However, for any new discharges from a sand offloading facility directly into an open water body, e.g., bay or slough, it may be necessary to subject these new facilities to more stringent effluent limits as those in Table 2 (except for chlorine residual and acute toxicity) of the Order.

This Order requires Dischargers in this category to monitor for turbidity. For the next permit reissuance, the Regional Water Board will re-evaluate the monitoring data and treatment performance, and may impose additional and more stringent effluent limits if the Regional Water Board deems the Discharger can reasonably comply with more stringent effluent limits.

The pH effluent limits are also from Basin Plan Table 4-2 for shallow water discharges. These effluent limits are unchanged from the previous individual permit, Order No. 01-112. Exceedance of the pH limit will not constitute a violation of this Order if the Discharger can demonstrate, through receiving water monitoring, that the discharge does not cause the natural background pH to be depressed below 6.5 nor raised above 8.5, nor vary from normal ambient pH by more than 0.5 Standard Units. This variation is allowed by the Basin Plan.

d. Factors Considered Pursuant to 40 CFR 125.3(d)

Regional Water Board staff evaluated the Discharger's effluent data and found that the Discharger would have had no problem complying with the proposed technology-based limits in this Order. Regional Water Board staff concluded that immediate compliance with these limits is feasible. It is also concluded that the proposed limits represent Best Practicable Control Technology (BPT) and Best Conventional Pollutant Control Technology (BCT). In setting these limits, the factors specified in 40 CFR 125.3(d), as shown in the table below were considered.

Table F-2. Factors Considered Pursuant to 40 CFR 125.3(d)

Factors	Considerations
Cost relative to benefits	The cost of imposing these limits is reasonable given that the Discharger can comply without modifying its existing process.
Comparison of cost and pollutant reductions from publicly owned treatment works to cost and pollutant reductions from facilities subject to this permit	The facilities provide primary treatment of process wastewater (sedimentation); therefore, the cost of continuing its operation is less than publicly owned treatment works.
Age of equipment and facilities	The limits can be met with existing equipment and facilities.
Process employed	The limits can be met with the existing process.
Engineering aspects of various controls	The existing controls are practicable and capable of meeting the limits.
Process changes	No process changes are necessary to meet the limits.
Non-water quality environmental impacts	Because no process changes are necessary, no non-water quality impacts are foreseeable.

e. Whole effluent acute toxicity

This Order includes effluent limits for all aggregate mining and sand washing facilities for whole effluent acute toxicity that are unchanged from the previous Order (in Tables 1 and 2) and are based on the Basin Plan Table 4-4 for

intermittent dischargers. Historical monitoring data indicate compliance with these effluent limits.

D. Water Quality-Based Effluent Limitations (WQBELs) for Toxic Pollutants

1. Scope and Authority

a. As specified in 40 CFR 122.44 (d) (1) (i), permits are required to include WQBELs for all pollutants "which the Director determines are or may be discharged at a level which will cause, have the reasonable potential to cause, or contribute to an excursion above any State water quality standard." The process for determining "Reasonable Potential" and calculating WQBELs, when necessary, is intended to protect the designated uses of the receiving water as specified in the Basin Plan, and achieve applicable water quality objectives and criteria that are contained in other State plans and policies, the CTR, and NTR.

b. NPDES regulations and the SIP provide the basis to establish Maximum Daily Effluent Limitations (MDELs).

(1) NPDES Regulations. NPDES regulations at 40 CFR Part 122.45 (d) state: "For continuous discharges all permit effluent limitations, standards, and prohibitions, including those necessary to achieve water quality standards, shall *unless impracticable* be stated as maximum daily and average monthly discharge limitations for all discharges other than publicly owned treatment works."

(2) SIP. The SIP (page 8, Section 1.4) requires WQBELs be expressed as MDELs and average monthly effluent limitations (AMELs).

c. MDELs are used in this Order to protect against acute water quality effects. The MDELs are necessary for preventing fish kills or mortality to aquatic organisms.

2. Applicable Beneficial Uses and Water Quality Criteria and Objectives

a. The Order authorizes eligible discharges to inland surface waters, enclosed bays, and estuaries within the San Francisco Bay Region. Beneficial uses of these receiving waters, as designated by the Basin Plan, are described in Section II, Findings, of the Order.

b. The water quality criteria applicable to these receiving waters are established by the NTR, CTR, and the Basin Plan.

(1) **Basin Plan.** The Basin Plan specifies numeric WQOs for various conventional pollutants (pH, chlorine, total dissolved solids and chloride for municipal water supply and groundwater recharge in the Alameda Creek above Niles, and whole effluent acute toxicity) and 10 priority toxic pollutants, as well as narrative WQOs for toxicity and bioaccumulation in order to protect

beneficial uses. The priority pollutants for which the Basin Plan specifies numeric objectives are arsenic, cadmium, chromium (VI), copper in freshwater, lead, mercury, nickel, silver, zinc, and cyanide (see also c., below). The narrative toxicity objective states in part "[a]ll waters shall be maintained free of toxic substances in concentrations that are lethal to or that produce other detrimental responses in aquatic organisms." The bioaccumulation objective states in part "[c]ontrollable water quality factors shall not cause a detrimental increase in concentrations of toxic substances found in bottom sediments or aquatic life. Effects on aquatic organisms, wildlife, and human health will be considered." Effluent limitations and provisions contained in this Order are designed to implement these objectives based on available information.

(2) **CTR.** The CTR specifies numeric aquatic life criteria for 23 priority toxic pollutants and numeric human health criteria for 57 priority toxic pollutants. These criteria apply to inland surface waters and enclosed bays and estuaries, except in certain cases where the Basin Plan's numeric objectives in Tables 3-3 and 3-4 apply over the CTR (except in the South Bay south of the Dumbarton Bridge).

(3) **NTR.** The NTR established numeric aquatic life criteria for selenium, numeric aquatic life and human health criteria for cyanide, and numeric human health criteria for 34 toxic organic pollutants for waters of San Francisco Bay upstream to, and including, Suisun Bay and the Sacramento-San Joaquin Delta. This includes the receiving waters for these Dischargers.

c. Technical Support Document for Water Quality-Based Toxics Controls.

Where numeric objectives have not been established or updated in the Basin Plan, NPDES regulations at 40 CFR Part 122.44 (d) require that WQBELs be established based on USEPA criteria, supplemented where necessary by other relevant information, to attain and maintain narrative WQOs to fully protect designated beneficial uses.

To determine the need for and establish WQBELs, when necessary, the Regional Water Board staff has followed the requirements of applicable NPDES regulations, including 40 CFR Parts 122 and 131, as well as guidance and requirements established by the Basin Plan; USEPA's *Technical Support Document for Water Quality-Based Toxics Control* (the TSD, EPA/505/2-90-001, 1991); and the State Water Board's *Policy for Implementation of Toxics Standards for Inland Surface Waters, Enclosed Bays, and Estuaries of California* (the SIP, 2005).

d. Basin Plan and CTR Receiving Water Salinity Policy. The Basin Plan and CTR state that the salinity characteristics (i.e., freshwater versus saltwater) of the receiving water shall be considered in determining the applicable WQOs/WQC. Freshwater criteria shall apply to discharges to waters with salinities equal to or less than 1 ppt at least 95 percent of the time. Saltwater criteria shall apply to

discharges to waters with salinities equal to or greater than 10 ppt at least 95 percent of the time in a normal water year. For discharges to waters with salinities in between these two categories, or tidally influenced fresh waters that support estuarine beneficial uses, the criteria shall be the lower of the salt- or freshwater criteria (the freshwater criteria for some metals are calculated based on ambient hardness) for each substance.

Salinity. As determined by limited monitoring data and discharge locations, the receiving waters for the discharges are either fresh water or estuarine. Basically, the currently covered aggregate mining facilities all discharge to Alameda Creek above Niles Canyon, which is determined to be fresh water. All marine sand washing/offloading facilities discharge into tidally influenced creeks, wetlands, or inner harbors, all considered estuarine. Therefore, the reasonable potential analysis was performed under these two scenarios with applicable effluent and receiving water data.

e. **Receiving Water Hardness.** Some fresh water WQOs/WQC for metals are hardness dependent; i.e., as hardness increases in the receiving water, the toxicity of certain metals decreases. (1) For the estuarine Dischargers covered under this permit, only Hanson Oakland Sand Yard collected a few hardness data, which were all above 400 mg/L. Therefore, 400 mg/L was used in the calculation. (2) For discharges into Alameda Creek and its tributaries, Regional Water Board staff performed an analysis using the hardness data collected by Alameda County Water District collected during 2003 and 2007. Regional Water Board staff used the data from two receiving water stations: AC_AADLL (Alameda Creek above Arroyo de la Laguna), the closest station to the Hanson Mission Valley Rock and CEMEX Sunol aggregate plants' outfalls; AM_AALP (Arroyo Mocho above Arroyo las Positas—Mocho fish ladder), the closest station to the Vulcan's and CEMEX Eliot aggregate plants' outfalls. There are a total of 244 data points with hardness values no greater than 400 mg/L as $CaCO_3$. The adjusted geometric mean (AGM) was calculated using the procedure below. The result is 164 mg/L as $CaCO_3$ and is used in the calculation (the calculation can be found in **Appendix F-3**). The following summarizes the procedures for calculating an AGM:

i. Censor the data set to exclude hardness values above 400 mg/L.
ii. Calculate the logarithms of each hardness value.
iii. Calculate the arithmetic mean of the logarithms.
iv. Calculate the standard deviation (s) of the logarithms.
v. Calculate the standard error (SE) of the arithmetic mean:
$SE = s/\sqrt{n}$
vi. Calculate A = arithmetic mean - $t_{0.7} \times SE$
where $t_{0.7}$ is the value of Student's *t* statistics for a one-sided probability of 0.7 with *n-1* degrees of freedom, *n*-sample size. With a sample size of 244, $t_{0.7}$=0.5251.
vii. Take the antilogarithm of A, antilog A is the AGM.

3. Reasonable Potential Analysis

Assessing whether a pollutant has Reasonable Potential is the fundamental step in determining whether or not a WQBEL is required.

a. Reasonable Potential Analysis Methodology.

The RPA identifies the observed MEC in the effluent for each pollutant, based on effluent concentration data. There are three triggers in determining Reasonable Potential according to Section 1.3 of the SIP.

- The first trigger is activated if the MEC is greater than or equal to the lowest applicable WQO (MEC $\geq$ WQO), which has been adjusted, if appropriate, for pH, hardness, and translator data. If the MEC is greater than the adjusted WQO, then that pollutant has reasonable potential, and a WQBEL is required.

- The second trigger is activated if the observed maximum ambient background concentration (B) is greater than the adjusted WQO (B>WQO) and the pollutant was detected in any of the effluent samples.

- The third trigger is activated if a review of other information determines that a WQBEL is required to protect beneficial uses, even though both MEC and B are less than the WQO/WQC. A limitation may be required under certain circumstances to protect beneficial uses.

b. Effluent data.

The Regional Water Board's August 6, 2001 letter titled Requirement for Monitoring of Pollutants in Effluent and Receiving Water to Implement New Statewide Regulations and Policy (hereinafter referred to as the August 6, 2001 Letter) to all permittees, formally required the Discharger (pursuant to Section 13267 of the CWC) to initiate or continue to monitor for the priority pollutants using analytical methods that provide the best detection limits reasonably feasible.

Three facilities have collected priority pollutant data as required by the August 6, 2001 Letter: Hanson Oakland Sand Yard facility (marine sand washing category); Hanson Mission Valley Rock Aggregate Plant and Vulcan Materials Company (aggregate mining category). Since the data were collected about five years ago, two of these three facilities, Hanson Mission Valley Rock Aggregate Plant and Hanson Oakland Sand Yard, have had significant process changes. Therefore, their effluent data do not represent the current discharges from these two facilities any more.

The process changes at the Hanson Oakland Sand Yard include reconfiguration of the detention ponds and elimination of prior discharge point E-1 in January 2007. Hanson collected new effluent and receiving water data at its Oakland and San Francisco sand yards for a limited number of pollutants in December 2007;

we performed a reasonable potential analysis using the new data and included effluent limits for copper as a result. These effluent limits are to apply to all marine sand washing facilities.

Hanson Mission Valley Rock Aggregate Plant, which discharges to a tributary of Alameda Creek, has also had significant process changes since September 2006. The changes include running the groundwater detention basins in parallel instead of in series—this has increased the detention time greatly (from about 5-10 days to an average of 25 days). No conclusions can be drawn from a reasonable potential analysis due to lack of new effluent data. However, the facility reuses all its process wastewater and now only discharges groundwater; therefore, the discharge poses low or no risk to the receiving water. Data from Vulcan Materials Company, an aggregate mining facility in the Alameda Creek area, do not trigger reasonable potential for any pollutants; therefore, no effluent limits are established for the aggregates mining category.

c. Ambient Background Data.

Ambient background values are used in the reasonable potential analysis (RPA) and in the calculation of effluent limitations. For the RPA, ambient background concentrations are the observed maximum detected water column concentrations. The SIP allows background to be determined on a discharge-by-discharge or water body-by-water body basis (SIP section 1.4.3). Consistent with the SIP, Regional Water Board staff has chosen to use a water body-by-water body basis because of the uncertainties inherent in accurately characterizing ambient background in a complex estuarine system on a discharge-by-discharge basis. The SIP states that for calculating WQBELs, ambient background concentrations are either the observed maximum ambient water column concentrations or, for criteria/objectives intended to protect human health from carcinogenic effects, the arithmetic mean of observed ambient water concentrations. The receiving water data collected by the above three facilities were used in the RPA.

d. RPA Determination.

Using the method prescribed in Section 1.3 of the SIP, Regional Water Board staff compared the effluent data and ambient background data with numeric and narrative WQOs in the Basin Plan and numeric WQC from USEPA, the NTR, and the CTR. The MECs, WQOs/WQC, bases for the WQOs/WQC, background concentrations used, and Reasonable Potential conclusions from the RPAs for discharges to fresh water and estuarine are listed in the following tables for all constituents analyzed. Some of the constituents in the CTR were not determined because of the lack of an objective/criteria or effluent data. Based on the RPA methodology in the SIP, some constituents did not demonstrate Reasonable Potential. The RPA results are shown below.

Data from the Vulcan Materials Company, an aggregate mining facility in the Alameda Creek area, do not trigger reasonable potential for any pollutants;

therefore, no effluent limits are established. This result can also apply to other similar aggregate mining facilities in that area, which includes the Hanson Mission Valley Rock Aggregate Plant, and the CEMEX Sunol and CEMEX Eliot aggregate plants, which have similar processes and discharges.

Regional Water Board staff used other information and determined that copper also has a reasonable potential (trigger 3, see detailed discussion in 4(b)(1) below). Therefore, it is necessary to establish effluent limits for copper. These results also apply to other marine sand washing facilities to be covered under this Order.

Table F-3(a) Reasonable Potential Analysis Results for Hanson Oakland Sand Yard and Other Marine Sand Washing Facilities Discharging to Estuarine Water Bodies

CTR #	Priority Pollutants (µg/L)	Governing WQO/WQC	MEC or Minimum DL	Maximum Background or Minimum DL(1,2)	RPA Results(3)
1	Antimony	4300	NA	NA	No
2	Arsenic	36	**3.6**	**2.7**	No
3	Beryllium	No Criteria	NA	NA	Undetermined
4	Cadmium	3.4	NA	NA	No
5a	Chromium (III or Total)	640	NA	NA	No
5b	Chromium (VI)	11	1	10	No
6	Copper	4.2	**3**	**3.2**	**Yes**
7	Lead	8.5	1	1	No
8	Mercury	0.025	**0.006475**	**0.011**	No
9	Nickel	13	**5.55**	**2.9**	No
10	Selenium	5	**1.5**	1	No
11	Silver	2.2	1	1	No
12	Thallium	6.3	1	1	No
13	Zinc	86	**5.95**	**5.1**	No
14	Cyanide	1	10	10	No
16	2,3,7,8-TCDD	No Criteria	**NA**	NA	No

* Reasonable potential for priority pollutants 17-126 cannot be determined due to lack of data.

Table F-3(b) Reasonable Potential Analysis Results for Hanson San Francisco Sand Yard and Other Marine Sand Washing Facilities Discharging to Estuarine Water Bodies

CTR #	Priority Pollutants (µg/L)	Governing WQO/WQC	MEC or Minimum DL	Maximum Background or Minimum DL(1,2)	RPA Results(3)
1	Antimony	4300	NA	NA	No
2	Arsenic	36	**4.65**	**2.5**	No
3	Beryllium	No Criteria	NA	NA	Undetermined
4	Cadmium	3.4	NA	NA	No
5a	Chromium (III or Total)	640	NA	NA	No
5b	Chromium (VI)	11	10	10	No
6	Copper	4.2	**2.85**	**1.9**	No
7	Lead	8.5	1	**1**	No
8	Mercury	0.025	**0.00571**	**0.00535**	No

CTR #	Priority Pollutants (µg/L)	Governing WQO/WQC	MEC or Minimum DL	Maximum Background or Minimum DL(1,2)	RPA Results(3)
9	Nickel	13	**3.4**	**1.7**	No
10	Selenium	5	**1.65**	1	No
11	Silver	2.2	1	1	No
12	Thallium	6.3	1	1	No
13	Zinc	86	5	5	No
14	Cyanide	1	10	10	No
16	2,3,7,8-TCDD	No Criteria	NA	NA	No

* Reasonable potential for priority pollutants 17-126 cannot be determined due to lack of data.

Table F-3(c) Reasonable Potential Analysis Results for Vulcan Materials Company and Other Aggregate Mining Facilities Discharging to Freshwater Bodies Supporting Municipal Supply or Groundwater Recharge

CTR #	Priority Pollutants (µg/L)	Governing WQO/WQC(4)	MEC or Minimum DL	Maximum Background or Minimum DL(1,2)	RPA Results(3)(5)
1	Antimony	6	3	3	No
2	Arsenic	10	**2.35**	1	No
3	Beryllium	4	0.5	0.5	No
4	Cadmium	1.7	0.5	0.5	No
5a	Chromium (III)	310	**7.14**	**6.2**	No
5b	Chromium (VI)	11	10	10	No
5	Chromium (total)	100	NA	NA	Undetermined
6	Copper	14	**1.18**	**2.37**	No
7	Lead	6.0	0.5	0.5	No
8	Mercury	0.025	0.2	0.2	No
9	Nickel	79	**1.94**	**2.18**	No
10	Selenium	5	3	3	No
11	Silver	9.5	0.5	0.5	No
12	Thallium	1.7	0.5	0.5	No
13	Zinc	180	**4.11**	**5.19**	No
14	Cyanide	5.2	10	10	No
15	Asbestos (million fibers/L)	7	NA	NA	No
16	2,3,7,8-TCDD	1.3E-08	1.30E-06	1.30E-06	No
17	Acrolein	320	5	5	No
18	Acrylonitrile	0.059	2.5	2.5	No
19	Benzene	1.2	0.5	0.5	No
20	Bromoform	4.3	0.5	0.5	No
21	Carbon Tetrachloride	0.25	0.5	0.5	No
22	Chlorobenzene	100	0.5	0.5	No
23	Chlorodibromomethane	0.41	0.5	0.5	Undetermined
24	Chloroethane	No Criteria	0.5	0.5	Undetermined
25	2-Chloroethylvinyl Ether	No Criteria	5	5	Undetermined
26	Chloroform	No Criteria	0.5	0.5	No
27	Dichlorobromomethane	0.56	0.5	0.5	Undetermined
28	1,1-Dichloroethane	No Criteria	0.5	0.5	No
29	1,2-Dichloroethane	0.38	0.5	0.5	No
30	1,1-Dichloroethylene	0.057	0.5	0.5	No
31	1,2-Dichloropropane	0.52	0.5	0.5	No
32	1,3-Dichloropropylene	10	0.5	0.5	No

CTR #	Priority Pollutants (µg/L)	Governing WQO/WQC(4)	MEC or Minimum DL	Maximum Background or Minimum DL(1,2)	RPA Results(3)(5)
33	Ethylbenzene	3100	0.5	0.5	No
34	Methyl Bromide	48	NA	NA	Undetermined
35	Methyl Chloride	No Criteria	0.5	0.5	No
36	Methylene Chloride	4.7	0.5	0.5	No
37	1,1,2,2-Tetrachloroethane	0.17	0.5	0.5	No
38	Tetrachloroethylene	0.8	0.5	0.5	No
39	Toluene	6800	0.5	0.5	No
40	1,2-Trans-Dichloroethylene	700	0.5	0.5	Undetermined
41	1,1,1-Trichloroethane	No Criteria	0.5	0.5	No
42	1,1,2-Trichloroethane	0.6	0.5	0.5	No
43	Trichloroethylene	2.7	0.5	0.5	No
44	Vinyl Chloride	2	0.5	0.5	No
45	2-Chlorophenol	120	2	2	No
46	2,4-Dichlorophenol	93	1	1	No
47	2,4-Dimethylphenol	540	1	1	No
48	2-Methyl-4,6-Dinitrophenol	13.4	10	10	No
49	2,4-Dinitrophenol	70	5	5	Undetermined
50	2-Nitrophenol	No Criteria	10	10	Undetermined
51	4-Nitrophenol	No Criteria	10	10	Undetermined
52	3-Methyl-4-Chlorophenol	No Criteria	5	5	No
53	Pentachlorophenol	0.28	5	5	No
54	Phenol	21000	1	1	No
55	2,4,6-Trichlorophenol	2.1	2	2	No
56	Acenaphthene	1200	0.1	0.1	Undetermined
57	Acenaphthylene	No Criteria	0.1	0.1	No
58	Anthracene	9600	0.05	0.05	No
59	Benzidine	0.00012	5	5	No
60	Benzo(a)Anthracene	0.0044	0.1	0.1	No
61	Benzo(a)Pyrene	0.0044	0.1	0.1	No
62	Benzo(b)Fluoranthene	0.0044	0.1	0.1	Undetermined
63	Benzo(ghi)Perylene	No Criteria	0.1	0.1	No
64	Benzo(k)Fluoranthene	0.0044	0.05	0.05	Undetermined
65	Bis(2-Chloroethoxy)Methane	No Criteria	5	5	No
66	Bis(2-Chloroethyl)Ether	0.031	1	1	No
67	Bis(2-Chloroisopropyl)Ether	1400	2	2	No
68	Bis(2-Ethylhexyl)Phthalate	1.8	5	5	Undetermined
69	4-Bromophenyl Phenyl Ether	No Criteria	5	5	No
70	Butylbenzyl Phthalate	3000	5	5	No
71	2-Chloronaphthalene	1700	2	2	Undetermined
72	4-Chlorophenyl Phenyl Ether	No Criteria	2	2	No
73	Chrysene	0.0044	0.1	0.1	No
74	Dibenzo(a,h)Anthracene	0.0044	0.1	0.1	No
75	1,2 Dichlorobenzene	2700	0.5	0.1	No
76	1,3 Dichlorobenzene	400	0.5	0.5	No
77	1,4 Dichlorobenzene	400	0.5	0.5	No
78	3,3-Dichlorobenzidine	0.04	5	5	No
79	Diethyl Phthalate	23000	5	5	No
80	Dimethyl Phthalate	313000	5	5	No
81	Di-n-Butyl Phthalate	2700	5	5	No
82	2,4-Dinitrotoluene	0.11	2	2	Undetermined

CTR #	Priority Pollutants (µg/L)	Governing WQO/WQC[4]	MEC or Minimum DL	Maximum Background or Minimum DL[1,2]	RPA Results[3][5]
83	2,6-Dinitrotoluene	No Criteria	5	5	Undetermined
84	Di-n-Octyl Phthalate	No Criteria	5	5	No
85	1,2-Diphenylhydrazine	0.04	NA	NA	No
86	Fluoranthene	300	0.15	0.15	No
87	Fluorene	1300	0.1	0.1	No
88	Hexachlorobenzene	0.00075	2	2	No
89	Hexachlorobutadiene	0.44	2	2	No
90	Hexachlorocyclopentadiene	240	5	5	No
91	Hexachloroethane	1.9	2	2	No
92	Indeno(1,2,3-cd) Pyrene	0.0044	0.1	0.1	No
93	Isophorone	8.4	2	2	Undetermined
94	Naphthalene	No Criteria	0.15	0.15	No
95	Nitrobenzene	17	2	2	No
96	N-Nitrosodimethylamine	0.00069	5	5	No
97	N-Nitrosodi-n-Propylamine	0.005	2	2	No
98	N-Nitrosodiphenylamine	5	1	1	Undetermined
99	Phenanthrene	No Criteria	0.1	0.1	No
100	Pyrene	960	0.15	0.15	Undetermined
101	1,2,4-Trichlorobenzene	No Criteria	1	1	No
102	Aldrin	0.00013	0.005	0.005	No
103	alpha-BHC	0.0039	0.01	0.01	No
104	beta-BHC	0.014	0.005	0.005	No
105	gamma-BHC	0.019	0.02	0.02	Undetermined
106	delta-BHC	No Criteria	0.005	0.005	No
107	Chlordane	0.00057	0.1	0.1	No
108	4,4'-DDT	0.00059	0.01	0.01	No
109	4,4'-DDE	0.00059	0.05	0.05	No
110	4,4'-DDD	0.00083	0.05	0.05	No
111	Dieldrin	0.00014	0.01	0.01	No
112	alpha-Endosulfan	0.056	0.02	0.02	No
113	beta-Endosulfan	0.056	0.01	0.01	No
114	Endosulfan Sulfate	110	0.05	0.05	No
115	Endrin	0.036	0.01	0.01	Undetermined
116	Endrin Aldehyde	0.76	0.01	0.01	No
117	Heptachlor	0.00021	0.01	0.01	No
118	Heptachlor Epoxide	0.0001	0.01	0.01	No
119-125	PCBs sum	0.00017	0.5	0.5	Undetermined
126	Toxaphene	0.0002	0.05	0.05	No
	Tributylin	0.072	NA	NA	No

[1] Concentration in bold is the actual detected maximum concentration; otherwise the concentration shown is the maximum detection level.
[2] Maximum Background = Not Available, if there is no monitoring data for this constituent.
[3] RPA Results = Yes, if MEC > WQO/WQC,
= No, if MEC or all effluent concentration non-detect < WQO/WQC,
= Undetermined, if no objective promulgated, and
= Cannot be determined due to lack of data.
[4] A hardness value of 164 mg/L was used in adjusting hardness dependant criteria/objectives.

[5] Reasonable potential for pollutants in Table 5 with MCL triggers cannot be determined due to lack of data.

e. **Constituents with limited data**. In some cases, Reasonable Potential cannot be determined because effluent data are limited or ambient background concentrations are not available. The Discharger will continue to monitor for these constituents in the effluent using analytical methods that provide the best feasible detection limits. When additional data become available, further RPA will be conducted to determine whether to add numeric effluent limitations to this Order or to continue monitoring.

f. **Pollutants with no Reasonable Potential.** WQBELs are not included in this Order for constituents that do not demonstrate Reasonable Potential; however, monitoring for those pollutants is still required. If concentrations of these constituents are found to have increased significantly, the Discharger will be required to investigate the source(s) of the increase(s). Remedial measures are required if the increases pose a threat to water quality in the receiving water.

4. WQBEL Calculations.

a. WQBELs Calculation

WQBELs were developed for the toxic and priority pollutants that were determined to have reasonable potential to cause or contribute to exceedances of the WQOs or WQC.

The following table shows the WQBELs calculation for copper for marine sand washing facilities. The WQBELs were calculated based on appropriate WQOs/WQC and the appropriate procedures specified in Section 1.4 of the SIP.

Table F-4. WQBELs Calculation for Marine Sand Washing Facilities

PRIORITY POLLUTANTS	**Copper**	**Copper Alternate**
Units	**ug/L**	**ug/L**
Basis and Criteria type	CTR, SW	Copper SSO
Chronic WQO	3.1	6.0
Acute WQO	4.8	9.4
Chronic Translator	0.74	0.74
Acute Translator	0.88	0.88
WER	2.40	
Dilution Factor (D) (if applicable)	0	0
No. of samples per month	4	4
Aquatic life criteria analysis required? (Y/N)	Y	Y
HH criteria analysis required? (Y/N)	N	N
Applicable Acute WQO	13	11
Applicable Chronic WQO	10	8.1
HH criteria	--	--
Background (Max conc for Aquatic Life calc)	3.2	3.2
Background (Average conc for Human Health	3.2	3.2

calc)		
Is the pollutant Bioaccumulative(Y/N)? (e.g., Hg)	N	N
ECA acute	13	11
ECA chronic	10	8.1
ECA HH	--	--
	--	--
No. of data points <10 or at least 80% of data reported non detect? (Y/N)	Y	Y
Avg of effluent data points	--	--
Std Dev of effluent data points	--	--
CV calculated	--	--
CV (Selected) - Final	0.60	0.60
ECA acute mult99	0.32	0.32
ECA chronic mult99	0.53	0.53
LTA acute	4.17	3.53
LTA chronic	5.27	4.27
minimum of LTAs	4.17	3.53
AMEL mult95	1.55	1.55
MDEL mult99	3.11	3.11
AMEL (aq life)	6.48	5.48
MDEL(aq life)	13.00	11.00
MDEL/AMEL Multiplier	2.01	2.01
AMEL (human hlth)		
MDEL (human hlth)		
minimum of AMEL for Aq. life vs HH	6.5	5.5
minimum of MDEL for Aq. Life vs HH	13	11
Final limit - AMEL	6.5	5.5
Final limit - MDEL	13	11

b. Development of Effluent Limitations for Copper

(1) **Copper WQC.** The marine chronic and acute criteria for dissolved copper adopted in the CTR and Basin Plan are defined as 3.1 and 4.8 µg/L multiplied by a water effects ratio or WER (40 CFR 131.38 (b) and (c)(4)(i) and (iii)). The default value for the WER is 1.0 unless a WER has been developed as set forth in USEPA's WER guidance (Interim Guidance on Determination and Use of Water Effect Ratios, USEPA Office of Water, EPA-823-B-94-001, February 1994). WERs have been developed for San Francisco Bay in accordance with this USEPA guidance as documented in *North of Dumbarton Bridge Copper and Nickel Site-Specific Objective (SSO) Derivation (Clean Estuary Partnership December 2004.* The most recent document is *Copper Site-Specific Objectives in San Francisco Bay, Proposed Basin Plan*

Amendment and Draft Staff Report, dated June 6, 2007). Based on the data in these reports, a WER of 2.4 is appropriate for this discharge. In addition, the Regional Water Board developed copper site-specific translators along with the study using RMP data for San Francisco Bay (Central Bay segments). The translators are 0.74 and 0.88 for converting chronic and acute dissolved WQC into total WQC, respectively. The resulting adjusted WQC for this discharge are 10 μg/L for chronic protection and 13 μg/L for acute protection, and are used in WQBELs calculation. However, when determining reasonable potential, a WER value of 1.0 is still used, the resulting WQC as 4.2 μg/L for chronic protection and 5.5 μg/L for acute protection are used in RPA.

(2) **RPA Results.** Hanson Aggregates collected effluent and receiving water data at its Oakland Sand Yard Facility in December 2007. Both receiving water and effluent data were below the most stringent WQC. However, both concentrations were close to the most stringent objective. These facilities use tap water to wash sand, which may contain copper concentrations that are safe for human consumption but not safe for aquatic life. The Oakland facility's onsite-stored freshwater, which was used to wash the sand, has a copper concentration of 9.4 μg/L. Therefore, Regional Water Board staff determined there is reasonable potential for copper using other information (trigger 3).

(3) **Copper WQBELs.** The copper WQBELs calculated according to SIP procedures are 13 μg/L as the maximum daily effluent limit (MDEL) and 6.5 μg/L as the average monthly effluent limit (AMEL). No dilution credit was incorporated into the calculation of WQBELs.

(4) **Copper SSO and Alternate WQBELs.** The Regional Water Board has adopted the site-specific objectives for copper: 6.0 μg/L as a four-day average and 9.4 μg/L as a one-hour average, expressed as dissolved metal. Using the site-specific translators, 0.74 and 0.88 for converting chronic and acute dissolved WQC into total WQC, and WER of 2.4, the resulting WQOs are 9.3 μg/L for chronic protection and 11 μg/L for acute protection. The alternate WQBELs for copper are 11 μg/L as an MDEL and 5.5 μg/L as an AMEL.

(5) **Antibacksliding/Antidegradation.** The previous permit did not include a copper effluent limit; therefore, the new limits are more stringent than the previous ones, which is consistent with antibacksliding/antidegradation requirements.

E. Antidegradation and antibacksliding Analysis

This Order includes no TSS effluent limit and a less stringent turbidity limit for marine sand washing facilities, as discussed under Section IV.B.2.b of this Fact Sheet. The less stringent turbidity limit is allowed by the antibacksliding provisions of CWA Section 402(o)(2)(C) and (E) because the Dischargers cannot comply with the previous limit

under current technology. The receiving water bodies for the existing facilities of this category (Oakland Harbor and Islais Creek Chanel) are not impaired by solids.

This Order also complies with Antidegradation requirements. The discharge concentrations of suspended solids are unlikely to change because the Dischargers propose no substantial changes to their treatment processes. In addition, in order to comply with the triggers for toxic pollutants, Dischargers will need to better manage their treatment facilities to achieve better solids removals, thus ensuring the discharges stay below the trigger levels for toxic pollutants. Therefore, there is no expected lowering of receiving water quality.

F. Storm Water Limitations

The discharge of storm water that's not commingled with wastewater is covered under the State general storm water permit associated with industrial activities.

G. Land Discharge Specifications

N/A

H. Reclamation Specifications

N/A

V. RATIONALE FOR RECEIVING WATER LIMITATIONS

A. Surface Water

1. **Receiving Water Limitations V.A.1 through V.A.3 (conditions to be avoided**). These limitations are in the previous permit and are based on the narrative/numerical objectives contained in Chapter 2 and 3 of the Basin Plan. This Order contains revised dissolved oxygen WQOs which are consistent with the Basin Plan. The DO WQOs are revised to include a more stringent WQO (7 mg/L depending on receiving water bodies) that is consistent with the Basin Plan. The TDS and chlorides limits are based on Basin Plan, Tables 3-5 and 3-7. Turbidity receiving water limits are based on Basin Plan and BPJ.

2. **Receiving Water Limitations V.A.4 (compliance with State Law).** This requirement is in the previous permit, and requires compliance with Federal and State law.

B. Groundwater

Not applicable.

VI. RATIONALE FOR MONITORING AND REPORTING REQUIREMENTS

The principal purposes of a monitoring program by a discharger are to:

1. Document compliance with waste discharge requirements and prohibitions established by the Regional Water Board,

2. Facilitate self-policing by the discharger in the prevention and abatement of pollution arising from waste discharge,

3. Develop or assist in the development of limitations, discharge prohibitions, national standards of performance, pretreatment and toxicity standards, and other standards, and

4. Prepare water and wastewater quality inventories.

Section 122.48 of 40 CFR requires all NPDES permits to specify recording and reporting of monitoring results. Sections 13267 and 13383 of the California Water Code authorize the Regional Water Boards to require technical and monitoring reports. The Monitoring and Reporting Program, Attachment E of this Order, establishes monitoring and reporting requirements to implement federal and state requirements. The following provides the rationale for the monitoring and reporting requirements contained in the MRP for this facility.

The MRP is a standard requirement in almost all NPDES permits issued by the Regional Water Board, including this Order. It contains definitions of terms, specifies general sampling and analytical protocols, and sets out requirements for reporting of spills, violations, and routine monitoring data in accordance with NPDES regulations, the California Water Code, and the Regional Water Board's policies. The MRP also contains a sampling program specific for discharges under this Order. It defines the sampling stations and frequency, the pollutants to be monitored, and additional reporting requirements. Pollutants to be monitored include all parameters for which effluent limitations are specified. Monitoring for additional constituents, for which no effluent limitations are established, is also required to provide data for future completion of reasonable potential analysis.

A. Influent Monitoring

Routine monitoring for influent is not established in this Order. The Discharger may monitor influent on its own initiative. The Regional Water Board Executive Officer may also require the Discharger to sample influent on a case-by-case basis.

B. Effluent Monitoring

- Monitoring requirements for flow, total dissolved solids, chloride, total suspended solids, settable matter, pH, turbidity, and chlorine residual (when applicable) are retained from the previous permit, with some minor changes to the sampling frequency.

- The MRP establishes routine monitoring for toxics that have effluent limits or have been detected in the effluent with concentrations close to the WQOs. These include copper, arsenic, mercury, and zinc.

- The MRP includes a sampling requirement for other pollutants where the Regional Water Board Executive Officer determines during the permit term that they may be present in the discharge. The Executive Officer will require Dischargers to sample for these pollutants after such a determination is made. The likely sampling frequency is twice per year for three years and, if not triggered, once per year thereafter. Monitoring for all other priority pollutants once during the permit term is also included in this Order. These data will be used to perform a reasonable potential analysis for the next permit reissuance.

- The MRP requires aggregate mining and sand washing facilities to continue to monitor for acute toxicity twice per year, which is unchanged from the previous Order.

C. Receiving Water Monitoring

1. Surface Water

The MRP retains TDS, chloride and pH receiving water monitoring requirements from the previous Order, with some minor changes in sampling frequency. In addition, dissolved oxygen, turbidity monitoring is required to demonstrate compliance with receiving water limits. Temperature monitoring is required to demonstrate compliance with Basin Plan objectives. Hardness and salinity monitoring is required to collect hardness data to calculate WQOs/WQC for the next permit reissuance. Turbidity data will also be used to establish ambient background condition and may be used to set turbidity effluent limits based on water quality in the future.

2. Priority Pollutant Monitoring

This requirement is based on SIP; data will be used for RPA for future permit reissuance.

3. Groundwater

Not applicable.

D. Other Monitoring Requirements

Not applicable.

VII. RATIONALE FOR PROVISIONS

A. Standard Provisions

Standard Provisions, which, in accordance with 40 CFR 122.41 - 122.42, apply to all NPDES discharges and must be included in every NPDES permit, are provided in **Attachment D** of this Order.

B. Monitoring and Reporting Requirements

The Discharger will need to conduct monitoring of the permitted discharges in order to evaluate compliance with permit conditions. Monitoring requirements are contained in the MRP (**Attachment E**), Standard Provisions of the Permit. This provision requires compliance with these documents and is based on 40 CFR 122.63. The Standard Provisions are standard requirements in almost all NPDES permits issued by the Regional Water Board, including this Order. They contain definitions of terms, specify general sampling and analytical protocols, and set out requirements for reporting spills, violations, and routine monitoring data in accordance with NPDES regulations, the California Water Code, and Regional Water Board's policies. The MRP contains a sampling program specific for the facility. It defines the sampling stations and frequency, the pollutants to be monitored, and additional reporting requirements.

C. Special Provisions

1. **Basis for Permit Reopener provision.** Provision VI.C.1 is based on 40 CFR 123 and allows future modification of this Order and its effluent limitations as necessary in response to updated information, including but not limited to new WQOs that may be established in the future.

2. **Basis for Notice of Intent (NOI) Application.** Provision VI.C.2, NOI Application, is based on 40 CFR 122.28(b).

3. **Basis for NOI Review.** Provision VI.C.3, NOI Review, is based on 40 CFR 122.28(b).

4. **Notice of General Permit Coverage—Discharge Authorization.** Provision VI.C.4, Discharge Authorization, is based on 40 CFR 122.28(b).

5. **Basis for Discharge Termination.** Provision VI.C.5, Discharge Termination, is based on 40 CFR 122.28(b).

6. **Basis for Non-Compliance as a Violation.** Provision VI.C.6, Non-Compliance as a Violation, is based on 40 CFR 122.41(a).

7. **Basis for Individual NPDES Permit may be Required.** Provision VI.C.7, Individual NPDES Permit may be Required, is based on 40 CFR 122.28(b)(3).

8. **Basis for Provision VI.C.8 (triggers).** In general, the Dischargers authorized under this Order are expected to use Best Management Practices (BMPs) and enforced solids removal to reduce the potential negative impacts of pollutants in their discharges. Toxic pollutants may be present and detected in the effluent, which may be present in the source water (drinking water, bay water) or storm water, or introduced through activities that occur on the site. These pollutants include both organic and inorganic compounds. The purpose of this provision is to require Dischargers to implement additional actions if any pollutants exceed the triggers in

Table 5. These triggers are not effluent limitations and should not be construed as such. Instead, they are levels at which additional investigation is warranted to determine whether additional actions or a numeric limit for a particular pollutant is necessary.

Regional Water Board staff's best professional judgment is that the sources of priority pollutants from discharges covered by this Order are incidental and their loading is negligible when compared to loadings from municipal and industrial point-source discharges and storm water discharges. Furthermore, it is likely that these priority pollutants are associated with the solids discharged from these facilities. Compliance with the solids limits of this Order will ensure that the discharge does not contain priority pollutants at levels that potentially cause receiving water to exceed applicable water quality objectives or is harmful for the beneficial uses.

This provision establishes triggers for accelerated monitoring and additional pollutant control. It requires Dischargers to investigate the toxicity and ability to treat any detected compounds in excess of Table 5 triggers. If a Discharger detects any toxic compounds and cannot address the issue through BMPs and enhanced solids removal, the Regional Water Board may terminate the general permit coverage and require the discharge to be covered under an individual permit.

There are four types of triggers, based on the salinity and beneficial uses of the receiving water: fresh water bodies supporting municipal water supply or groundwater recharge; other fresh water bodies; estuarine water bodies, and salt water bodies. Some Type I triggers are also based on USEPA drinking water maximum contaminate levels (MCLs).

Regional Water Board staff will determine the receiving water types for the existing and potential discharges based on their discharge locations and available monitoring data. This will be indicated in the discharge authorization document.

9. **Basis for Construction, Operation, and Maintenance Specifications**

   a. **Wastewater Facilities, Review and Evaluation, Status Reports.** This provision is based on the Basin Plan.

   b. **Operations and Maintenance Manual, Review and Status Reports.** This provision is based on the Basin Plan and the requirements of 40 CFR §122.

10. **Basis for Special Studies and Additional Monitoring Requirements**

   a. **Best Management Practices Plan.** Provision VI.C.10.a requires all Dischargers seeking coverage under this General Permit to develop, update annually, and implement a BMPs plan for their industrial activity. The purpose of the BMPs plan is to control and abate the discharge of pollutants from the facility to surface waters and to achieve compliance with Best Available Technology Economically Achievable (BAT) or Best Conventional Pollutant Control Technology (BCT)

requirements and with applicable water quality standards. This provision is unchanged from the previous Order.

b. **Facility Modification/Maintenance.** Provision VI.C.10.b requires each Discharger to inform the Regional Water Board about modifications made to its facility that will affect effluent quality. The provision also requires the Discharger to inform the Board if the outfall is relocated or eliminated so that the Board can make any necessary modification to its permit coverage. This Provision is based on 40 CFR 122.41(l)(1).

c. **No Net Salt Loading Analysis.** This study is optional. Provision VI.C.10.c allows the Dischargers discharging into Alameda Creek above Niles to perform a study to demonstrate that their operations and discharges do not result in salt accumulation in the groundwater basin and to request an exception to these receiving water limits. This provision is based on the intent of the Basin Plan to limit salt build-up within the groundwater basin.

d. **Total Suspended Solids (TSS) Special Study.** Provision VI.C.10.d requires marine sand washing and offloading facilities to perform a special study to develop filter rinsing protocols, using method SM2540, that will yield TSS results reliable enough for CWA compliance monitoring. Regional Water Board will consider the results in setting TSS effluent limits for future permit reissuances.

VIII. PUBLIC PARTICIPATION

The San Francisco Bay Regional Water Board is considering the issuance of waste discharge requirements (WDRs) that will serve as a National Pollutant Discharge Elimination System (NPDES) General permit for aggregate mining, sand washing, and sand offloading facilities. As a step in the WDR adoption process, the Regional Water Board staff has developed tentative WDRs. The Regional Water Board encourages public participation in the WDR adoption process.

A. Notification of Interested Parties

The Regional Water Board has notified the Dischargers and interested agencies and persons of its intent to prescribe waste discharge requirements for the discharge and has provided them with an opportunity to submit their written comments and recommendations. Notification was provided through the Valley Times on January 13, 2008, and in the Recorder on January 10, 2008. Notifications for an opportunity to comment were previously provided via the same newspapers in September 2007.

B. Written Comments

The Regional Water Board staff determinations are tentative. Interested persons are invited to submit written comments concerning these tentative WDRs. Comments should be submitted either in person or by mail to the Executive Office at the Regional Water Board at the address above on the cover page of this Order, Attention Tong Yin.

To be fully responded to by staff and considered by the Regional Water Board, written comments must be received at the Regional Water Board offices by 5:00 p.m. on October 12, 2007 as required by the September 2007 public notifications.

C. Public Hearing

The Regional Water Board will hold a public hearing on the tentative WDRs during its regular Board meeting on the following date and time and at the following location:

Date: February 13, 2008
Time: 9:00 a.m.
Location: Elihu Harris State Office Building
1515 Clay Street
Oakland, CA
1st floor Auditorium
Contact: Tong Yin, Phone: (510)622-2418; email: TYin@waterboards.ca.gov

Interested persons are invited to attend. At the public hearing, the Regional Water Board will hear testimony, if any, pertinent to the discharge, WDRs, and permit. Oral testimony will be heard; however, for accuracy of the record, important testimony should be in writing.

Please be aware that dates and venues may change. Our web address is www.waterboards.ca.gov/sanfranciscobay where you can access the current agenda for changes in dates and locations.

D. Waste Discharge Requirements Petitions

Any aggrieved person may petition the State Water Resources Control Board to review the decision of the Regional Water Board regarding the final WDRs. The petition must be submitted within 30 days of the Regional Water Board's action to the following address:

State Water Resources Control Board
Office of Chief Counsel
P.O. Box 100, 1001 I Street
Sacramento, CA 95812-0100

E. Information and Copying

The Report of Waste Discharge (RWD), related documents, tentative effluent limitations and special provisions, comments received, and other information are on file and may be inspected at the address above at any time between 8:30 a.m. and 4:45 p.m., Monday through Friday. Copying of documents may be arranged through the Regional Water Board by calling (510) 622-2300.

F. Register of Interested Persons

Any person interested in being placed on the mailing list for information regarding the WDRs and NPDES permit should contact the Regional Water Board, reference this facility, and provide a name, address, and phone number.

G. Additional Information

Requests for additional information or questions regarding this order should be directed to Tong Yin at (510) 622-2418, or by e-mail at TYin@waterboards.ca.gov .

IX. APPENDICES

Appendix F-1. Data Analysis of Total Dissolved Solids, Chloride, and pH Data for Alameda Creek and Discharges into Alameda Creek and Its Tributaries
Appendix F-2. Hanson TSS Special Study and Addendum
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Fact Sheet Appendix F-1

Data Analysis for Total Dissolved Solids, Chloride, and pH
in Alameda Creek and Aggregate Mining Discharges

Fact Sheet Appendix F-1

Data Analysis for Total Dissolved Solids, Chloride, and pH in Alameda Creek and Aggregate Mining Discharges

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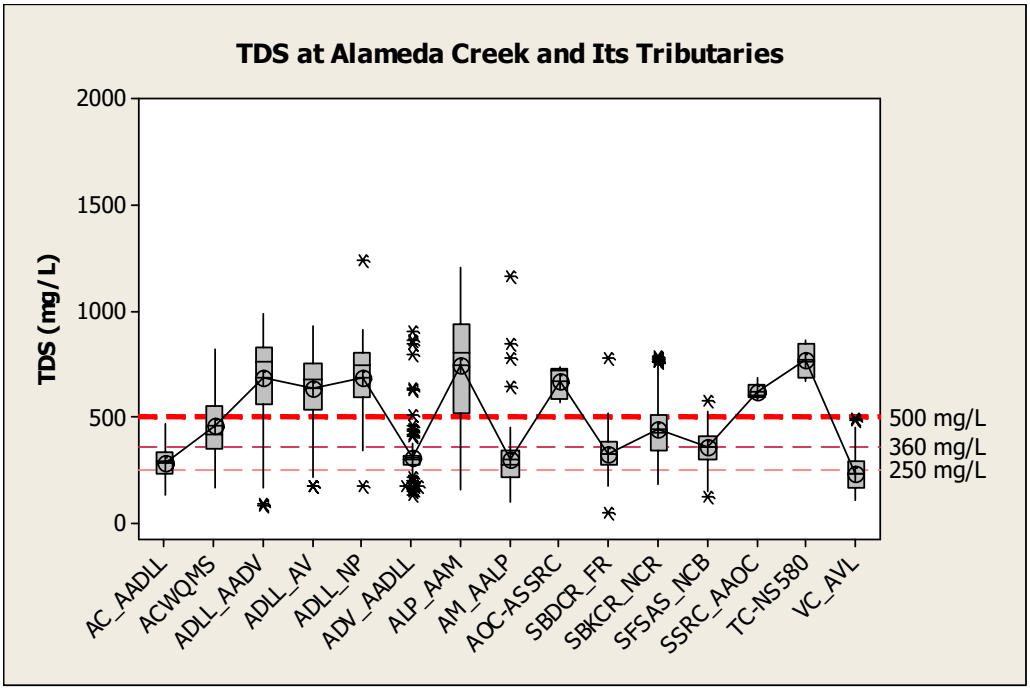
1. Alameda County Water District (ACWD)

ACWD collected data during 2003–2007 at fifteen locations in Alameda Creek and its tributaries. Analysis of the total dissolved solids (TDS), chloride, and pH (for three stations only) are listed below.

ACWD Total Dissolved Solids (TDS)

The data are plotted using boxplots grouped by sampling station as below. Reference lines are 250 mg/L, which is the Basin Plan 90-day average objective; 360 mg/L, the 90-day 90th percentile objective; and 500 mg/L, the daily maximum objective.



(How to read a boxplot: The boxplot has a box, with two wiskers extending upward and downward of the box, and stars beyond the whiskers. The bottom of the box is the first quartile (Q1, or 25% of the data values are less than or equal to this value) and the top box is the third quartile (Q3)- 75% of the data values are less than or equal to this value. The upper whisker extends to the highest data value within the upper limit (Upper limit = Q3 + 1.5 (Q3-Q1)); the lower whisker extends to the lowest value within the lower limit (Lower limit = Q1+1.5 (Q3 - Q1)). The stars are unusually large or small observations. Values beyond the whiskers are considered outliers. The line in the middle of the box is the median of the data, which half of the observations are less than or equal to it. The little circle inside the box is the mean value.)

Where the stations are described as:

Table 1. Alameda Creek Sampling Stations by ACWD

Sampling Point	Sample Point Description
AC_AADLL	Alameda Creek above Arroyo de la Laguna (505 Paloma Rd.)
ACWQMS	Alameda Creek Water Quality Monitoring Station
ADLL_AADV	Arroyo de la Laguna above Arroyo del Valle (Valley Av.)
ADLL_AV	Arroyo de la Laguna at Verona (USGS) (Verona Bridge)
ADLL_AVB	Arroyo de la Laguna at Verona (USGS, at Verona Bridge)
ADLL_NP	Arroyo de la Laguna near Pleasanton
ADV_AADLL	Arroyo del Valle above Arroyo de la Laguna (Valley Av.)
ALP_AAM	Arroyo las Positas above Arroyo Mocho (Positas fish ladder)
AM_AALP	Arroyo Mocho above Arroyo las Positas (Mocho fish ladder)
AOC_ASSRC	Alamo Creek above South San Ramon Creek
SBDCR_FR	Sinbad Creek at Foothill Rd. (Main St. Sunol)
SBKCR_NCR	Stonybrook Creek at Niles Canyon Rd. (Palomares Rd.)
SFSAS_NCB	SF Sunol Aqueduct Spillway at Niles Canyon Brightside
SSRC_AAOC	South San Ramon Creek above Alamo Creek
TC_NS580	Tassajara Creek north side 580 (Dublin Blvd.)
VC_AVL	Vallecitos Creek at Vallecitos Lane

The attached map illustrates the sampling locations in the watershed.

The following table lists the statistics of TDS at 15 locations. (Excluding an outlier of 5550 mg/L at ACWQMS)

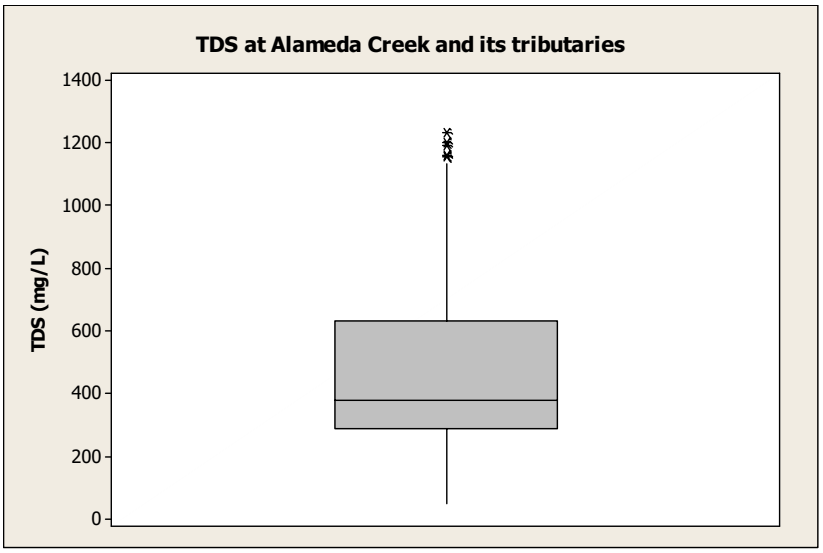
Table 2. Alameda Creek TDS Data Statistics by Station

SAMPLING_POINT	N	Mean	SE Mean	StDev	Minimum	Q1	Median	Q3	Maximum
AC_AADLL	164	280	5.66	72.54	129	230.75	290	329.75	466
ACWQMS	208	437	9.16	132.07	168	352	415.5	547.25	819
ADLL_AADV	207	685	13.2	190.4	80	558	760	826	983
ADLL_AV	156	630	13.2	164.3	169	533.8	677	750.8	924
ADLL_NP	50	686	26.8	189.4	172	595.8	741	802.8	1235
ADV_AADLL	206	307	6.7	96.19	130	276.5	295	319.25	906
ALP_AAM	207	742	17.8	256.5	153	516	798	939	1204
AM_AALP	82	297	17.2	155.4	94	211.5	271.5	343.3	1162
AOC-ASSRC	5	669	35.4	79.2	570	583	719	729.5	738
SBDCR_FR	83	327	9.86	89.87	47	272	325	380	780
SBKCR_NCR	126	437	12.9	144.3	180	338.5	422.5	506	786
SFSAS_NCB	188	353	5.48	75.1	125	300	354.5	409.75	575
SSRC_AAOC	5	616	17.5	39.1	580	588.5	602	651	681
TC-NS580	4	764	40.4	80.8	667	686.8	763	841.5	862
VC_AVL	156	232	6.55	81.85	102	165.25	233.5	289.75	490

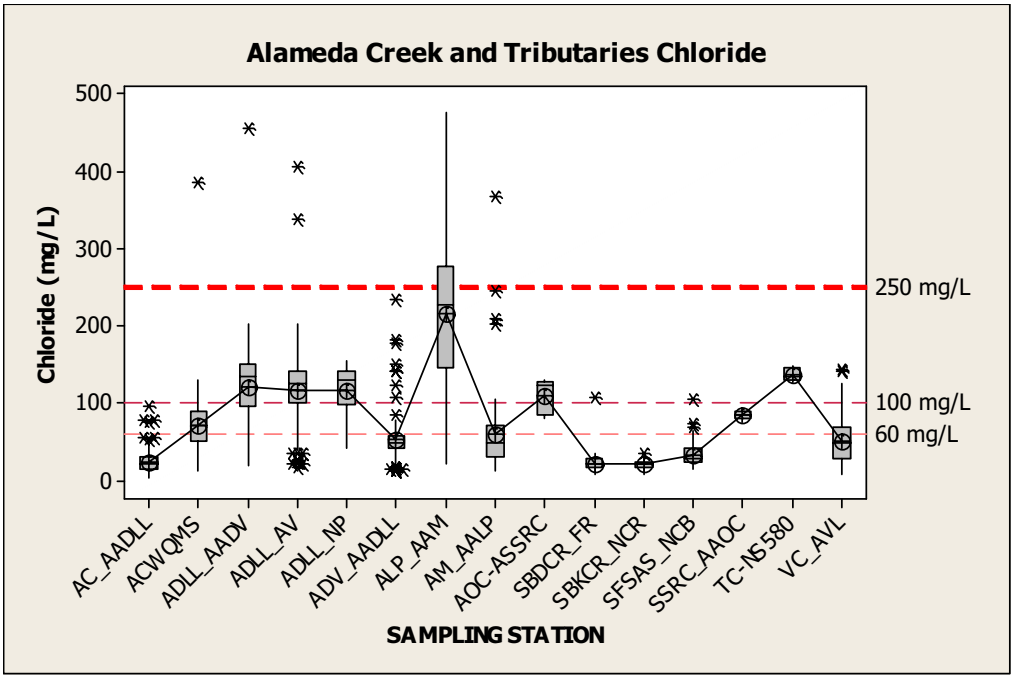
When all data are lumped together, (Excluding an outlier of 5550 mg/L at ACWQMS)

Table 3. Alameda Creek All TDS Data Statistics

Variable	N	Mean	SE Mean	StDev	Minimum	Q1	Median	Q3	Maximum
TDS	1847	458	5.4	232.23	47	289	379	630	1235



ACWD's chloride



The following table lists the statistics of chloride at 15 locations.

Table 4. Alameda Creek Chloride Data Statistics by Station

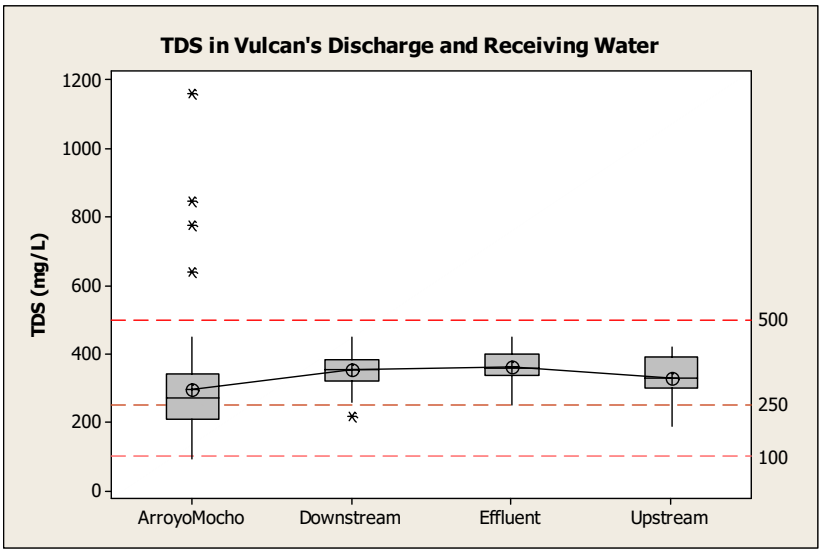
Station	N	Mean	SE Mean	StDev	Minimum	Q1	Median	Q3	Maximum
AC_AADLL	166	23	1.12	14.43	4	13.53	21	29.25	95
ACWQMS	211	71	2.44	35.42	11	51	71	88.74	385
ADLL_AADV	208	121	3.22	46.47	17.8	95.93	133	149	454
ADLL_AV	157	117	3.85	48.24	16	99.5	126	141.5	406
ADLL_NP	51	115	4.5	32.12	41	97	130	140	155
ADV_AADLL	208	52	1.78	25.72	11	41.02	48	57	234
ALP_AAM	209	215	6.19	89.54	22	145.5	226.7	277.5	475
AM_AALP	83	60	5.75	52.39	13	31	48	70	367
AOC-ASSRC	5	110	10.4	23.3	79	84.4	123.8	127.4	128
SBDCR_FR	84	22	1.26	11.55	7	16	20	27.11	107
SBKCR_NCR	127	20	0.475	5.352	8	16	20	23	33
SFSAS_NCB	189	33	0.984	13.534	14	24	28	40.69	104
SSRC_AAOC	5	84	2.61	5.83	79	79.5	83.8	89.36	93
TC-NS580	4	136	3.94	7.87	128.75	129.69	135	144.57	146
VC_AVL	159	51	2.24	28.3	8	28.75	48	68	142

2. Analysis of Vulcan Materials Company

Vulcan discharges into Arroyo Mocho, a tributary to Arroyo Del Val. It only started discharging after 2006. In addition to effluent TDS monitoring, the Discharger also collected receiving water data upstream and downstream of the discharge outfall. ACWD station at Arroyo Mocho above Arroyo las

Positas (Mocho fish ladder, AM_AALP) is the closet station near the discharge; therefore, it can be used to examine the ambient condition of Vulcan's receiving water.

Vulcan TDS



One-way ANOVA: TDS versus Station

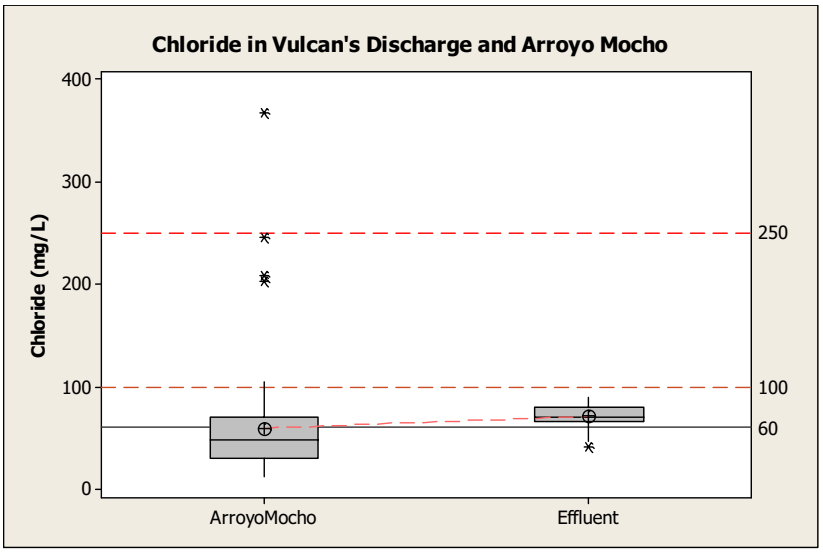
```
Source     DF       SS     MS     F      P
Station     3   174871  58290  5.04  0.002
Error     197  2278357  11565
Total     200  2453228

S = 107.5   R-Sq = 7.13%   R-Sq(adj) = 5.71%

                                   Individual 95% CIs For Mean Based on
                                   Pooled StDev
Level              N   Mean  StDev ---------+---------+---------+---------+
ArroyoMocho       82  296.5  155.4 (-------*-------)
Downstream        46  356.5   50.3                  (----------*---------)
Effluent          50  361.8   47.1                     (---------*---------)
Upstream          23  331.3   67.6      (-------------*--------------)
                                   ---------+---------+---------+---------+
                                          300       330       360       390

Pooled StDev = 107.5
```

Table 5. TDS in Vulcan's Discharge and Receiving Water

Station	N	Mean	SE Mean	StDev	Minimum	Q1	Median	Q3	Maximum
AM_AALP	82	297	17.2	155.4	94	211.5	271.5	343.3	1162
Downstream	46	357	7.42	50.34	220	320	355	385	450
Effluent	50	362	6.66	47.11	250	340	360	400	450
Upstream	23	331	14.1	67.6	190	300	330	390	420

The effluent from Vulcan has comparable TDS levels as those in its receiving water (both upstream and downstream). The discharge has higher TDS than in Arroyo Mocho downstream of discharge. But compared to other stations in Arroyo de La Laguna area, the discharge TDS level is much lower.

Vulcan Chloride



One-way ANOVA: CHLORIDE versus Station

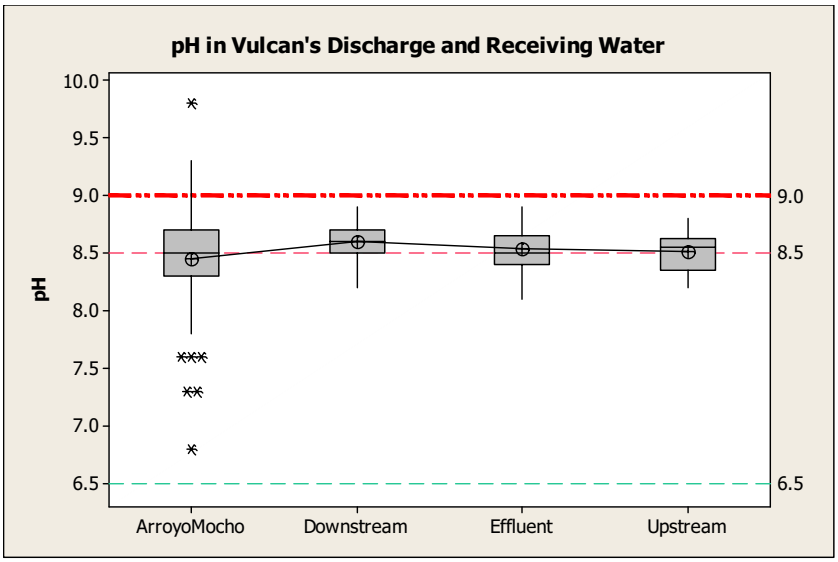
```
Source    DF      SS    MS     F      P
Station    1    4145  4145  2.37  0.126
Error    131  229386  1751
Total    132  233532

S = 41.85   R-Sq = 1.78%   R-Sq(adj) = 1.03%


                                   Individual 95% CIs For Mean Based on
                                   Pooled StDev
Level             N   Mean  StDev  ---------+---------+---------+---------+
AM_AALP          83  59.75  52.39  (--------*--------)
Effluent         50  71.28   9.35           (----------*-----------)
                                   ---------+---------+---------+---------+
                                           60        70        80        90

Pooled StDev = 41.85
```

Table 6. Chloride in Vulcan's Effluent and Receiving Water

Station	N	Mean	SE Mean	StDev	Minimum	Q1	Median	Q3	Maximum
AM_AALP	83	60	5.75	52.39	13	31	48	70	367
Effluent	50	71	1.32	9.35	42	65.75	70	80	90

The effluent from Vulcan has similar chloride levels as in Arroyo Mocho Creek near the discharge (not significantly different). The effluent does not meet the Basin Plan 90-day average objective for chloride. But it meets the objectives for 90-day 90th percentile and daily maximum objectives. The Arroyo Mocho Creek barely meets the long-term average objective (but it has data above the daily maximum objective).

Vulcan pH



One-way ANOVA: pH versus Station

```
Source     DF      SS     MS     F      P
Station     3   0.444  0.148  1.05  0.375
Error     120  16.968  0.141
Total     123  17.412

S = 0.3760   R-Sq = 2.55%   R-Sq(adj) = 0.11%


                                      Individual 95% CIs For Mean Based on
                                      Pooled StDev
Level              N    Mean   StDev  --------+---------+---------+---------+-
AM_AALP           65  8.4569  0.4796        (-----*-----)
Downstream        24  8.6083  0.1816              (---------*---------)
Effluent          25  8.5440  0.2181          (---------*---------)
Upstream          10  8.5100  0.1969  (--------------*---------------)
                                      --------+---------+---------+---------+-
                                            8.40      8.55      8.70      8.85

Pooled StDev = 0.3760
```

Table 7. pH in Vulcan's Effluent and Receiving Water

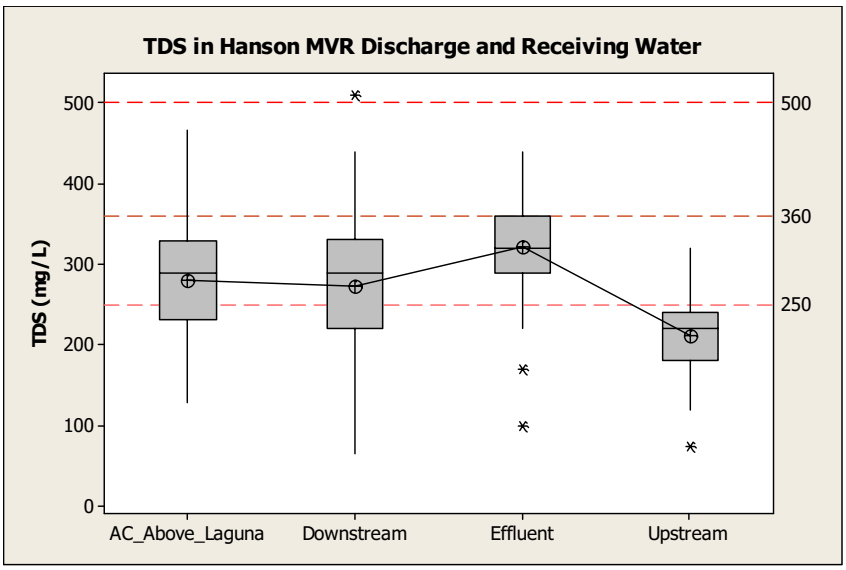
Station	N	N*	Mean	SE Mean	StDev	Minimum	Q1	Median	Q3	Maximum
AM_AALP	65	16	8.4569	0.0595	0.4796	6.8	8.3	8.5	8.7	9.8
Downstream	24	0	8.6083	0.0371	0.1816	8.2	8.5	8.6	8.7	8.9
Effluent	25	0	8.544	0.0436	0.2181	8.1	8.4	8.5	8.65	8.9
Upstream	10	0	8.51	0.0623	0.1969	8.2	8.35	8.55	8.625	8.8

pH in discharge and receiving water are not significantly different.

3. Hanson Mission Valley Rock (MVR) Aggregate Plant

The facility discharges into Alameda Creek above the confluence with Arroyo de la Laguna. ACWD station at AC_AADLL is the closest ambient station to the discharge. The Discharger also samples TDS at upstream and downstream of the discharge outfall.

Hanson MVR TDS



One-way ANOVA: TDS versus Station

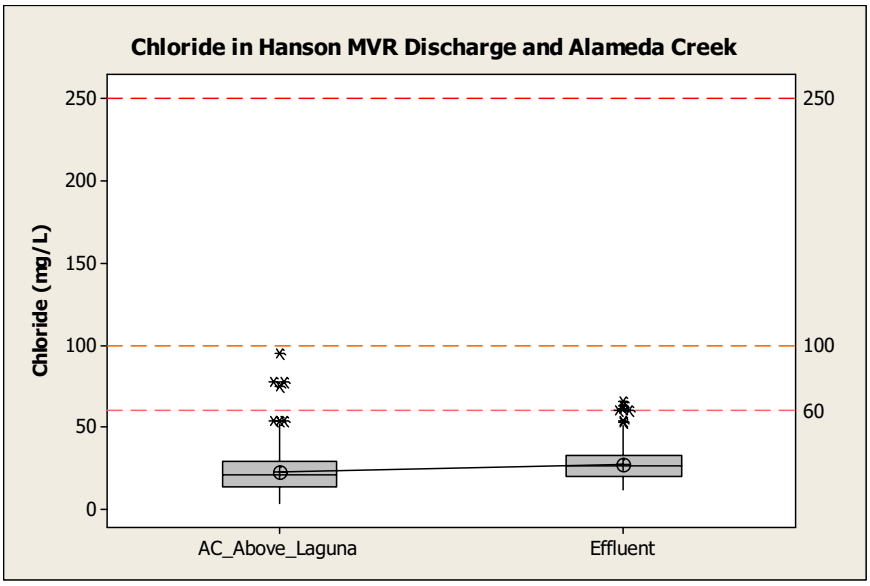
```
Source     DF       SS      MS      F      P
Station     3   855241  285080  69.46  0.000
Error     811  3328658    4104
Total     814  4183899

S = 64.07   R-Sq = 20.44%   R-Sq(adj) = 20.15%


                                Individual 95% CIs For Mean Based on
                                Pooled StDev
Level          N    Mean  StDev ---+---------+---------+---------+------
AC_AADLL     164  279.53  72.54                    (--*--)
Downstream   283  272.31  76.78                   (-*-)
Effluent     287  321.29  47.70                                 (-*-)
Upstream      81  212.41  44.45  (---*---)
                                ---+---------+---------+---------+------
                                 210       245       280       315

Pooled StDev = 64.07
```

Table 8. TDS in Hanson MVR's Effluent and Receiving Water

Station	N	Mean	SE Mean	StDev	Minimum	Q1	Median	Q3	Maximum
AC_AADLL	164	279	5.66	72.54	129	231	290	330	466
Downstream	283	272	4.56	76.78	65	220	290	330	510
Effluent	287	321	2.82	47.7	100	290	320	360	440
Upstream	81	212	4.94	44.45	75	180	220	240	320

The discharge has slightly higher TDS than in the receiving waters, but comparable. None of the stations or discharge meet the Basin Plan objectives of 90-day average or 90-day 90th percentile objectives for TDS. But all of the data, except one data point at downstream station, meet the daily maximum objective.

Hanson MVR Chloride



One-way ANOVA: Chloride versus Station

```
Source    DF     SS    MS      F      P
Station    1   1985  1985  14.57  0.000
Error    451  61439   136
Total    452  63424

S = 11.67   R-Sq = 3.13%   R-Sq(adj) = 2.92%


                             Individual 95% CIs For Mean Based on
                             Pooled StDev
Level       N   Mean  StDev  ---+---------+---------+---------+------
AC_AADLL  166  23.19  14.43  (--------*--------)
Effluent  287  27.54   9.73                          (------*-----)
                             ---+---------+---------+---------+------
                             22.0      24.0      26.0      28.0

Pooled StDev = 11.67
```

Table 9. Chloride in Hanson MVR's Effluent and Receiving Water

Station	N	Mean	SE Mean	StDev	Minimum	Q1	Median	Q3	Maximum
AC_AADLL	166	23.2	1.12	14.43	4	13.5	21	29.2	95
Effluent	287	27.5	0.574	9.732	12	20	27	33	66

The effluent has slightly higher chloride than in the Alameda Creek, but still comparable. Both of the Creek and discharge meet the Basin Plan objectives for chloride.

Hanson MVR Receiving Water pH

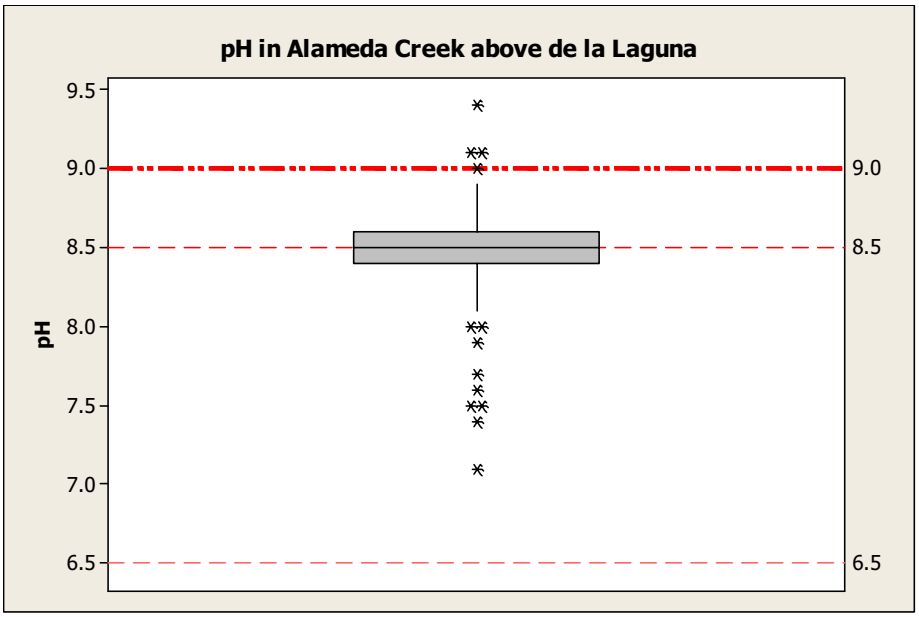


Table 10. pH in Hanson MVR's Receiving Water

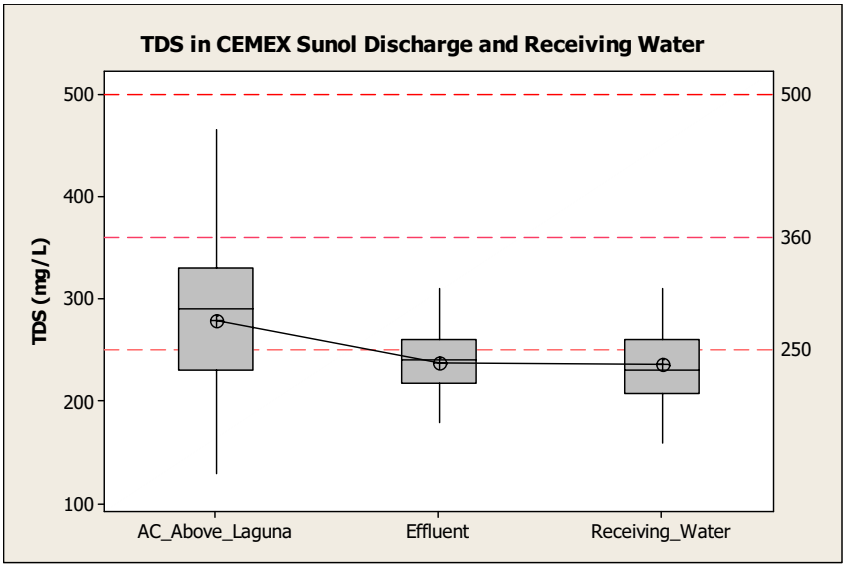
Variable	N	Mean	SE Mean	StDev	Minimum	Q1	Median	Q3	Maximum
pH	139	8.5	0.0262	0.3091	7.1	8.4	8.5	8.6	9.4

The pH median is 8.5, so 50% of the data have pH values above 8.5.

4. CEMEX Sunol Aggregate Plant

The facility discharges into San Antonio Creek or Alameda Creek (less often), right before the Alameda Creek above Arroyo de la Laguna. Therefore, the AC_AADLL data will be used as a receiving water station.

<u>CEMEX Sunol TDS</u>



One-way ANOVA: TDS versus Parameter 2

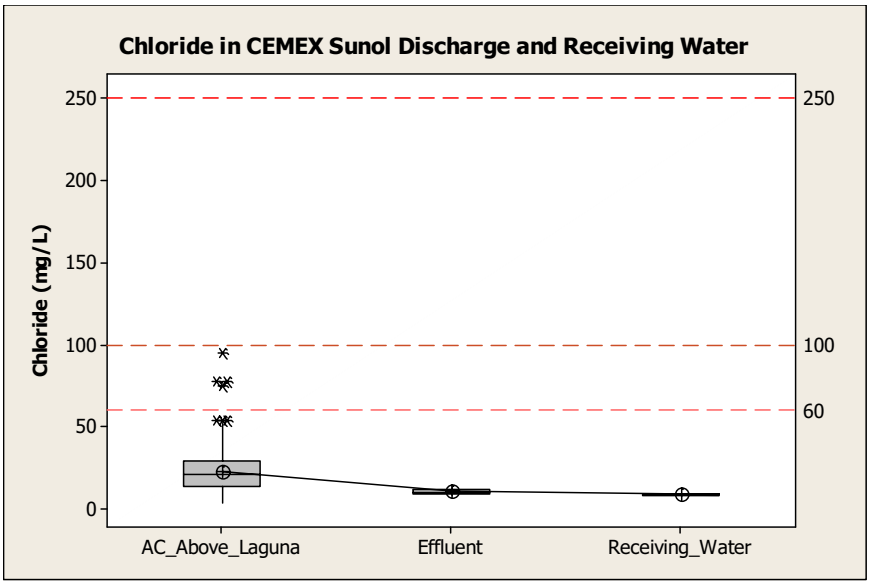
```
Source        DF       SS     MS      F      P
Parameter 2    2    99881  49940  12.84  0.000
Error        245   952909   3889
Total        247  1052790

S = 62.37   R-Sq = 9.49%   R-Sq(adj) = 8.75%


                                   Individual 95% CIs For Mean Based on
                                   Pooled StDev
Level            N    Mean  StDev  -+---------+---------+---------+--------
AC_AADLL       164  279.53  72.54                           (----*----)
Effluent TDS    42  238.10  34.02    (--------*---------)
Receiving TDS   42  236.19  34.14   (--------*---------)
                                   -+---------+---------+---------+--------
                                   220       240       260       280

Pooled StDev = 62.37
```

Table 11. TDS in CEMEX Sunol's Effluent and Receiving Water

Parameter	N	Mean	SE Mean	StDev	Minimum	Q1	Median	Q3	Maximum
AC_AADLL	164	280	5.66	72.54	129	231	290	330	466
Effluent TDS	42	238	5.25	34.02	180	218	240	260	310
Receiving TDS	42	236	5.27	34.14	160	208	230	260	310

Effluent TDS is lower than in Alameda Creek.

CEMEX Sunol Chloride



One-way ANOVA: Cl versus Parameter 1

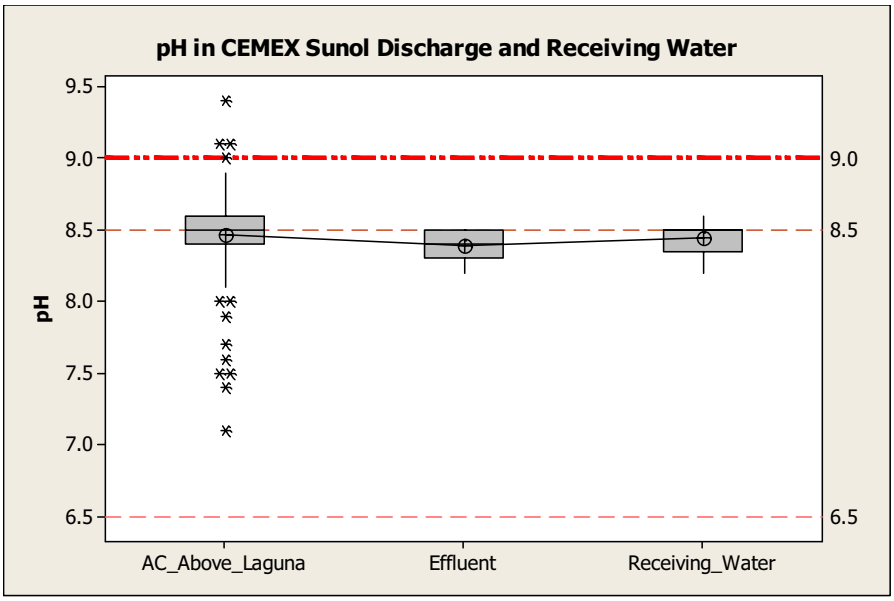
```
Source        DF     SS    MS      F      P
Parameter 1    2   6456  3228  20.26  0.000
Error        217  34577   159
Total        219  41032

S = 12.62   R-Sq = 15.73%   R-Sq(adj) = 14.96%


                                 Individual 95% CIs For Mean Based on
                                 Pooled StDev
Level           N   Mean  StDev  --+---------+---------+---------+-------
AC_AADLL      166  23.19  14.43                                 (--*--)
Effluent Cl    48  10.83   2.20              (----*-----)
Receiving Cl    6   8.98   0.32  (--------------*-------------)
                                 --+---------+---------+---------+-------
                                 0.0       7.0      14.0      21.0

Pooled StDev = 12.62
```

Table 12. Chloride in CEMEX Sunol's Effluent and Receiving Water

Parameter 1	N	Mean	SE Mean	StDev	Minimum	Q1	Median	Q3	Maximum
AC_AADLL	166	23.2	1.12	14.43	4	13.5	21	29.2	95
Effluent	48	10.8	0.317	2.197	8.5	9.3	9.9	11.8	15
Receiving Water	6	9.0	0.13	0.319	8.6	8.7	9.0	9.3	9.4

Effluent chloride is lower than in Alameda Creek.

CEMEX Sunol pH



One-way ANOVA: pH versus Parameter 3

```
Source        DF       SS      MS     F      P
Parameter 3    2   0.1256  0.0628  0.82  0.442
Error        179  13.7187  0.0766
Total        181  13.8442

S = 0.2768   R-Sq = 0.91%   R-Sq(adj) = 0.00%


                                   Individual 95% CIs For Mean Based on
                                   Pooled StDev
Level           N    Mean   StDev  ------+---------+---------+---------+---
AC_AADLL      139  8.4705  0.3091                    (-----*-----)
Effluent pH    22  8.3909  0.1065  (--------------*-------------)
Receiving pH   21  8.4429  0.1207        (--------------*--------------)
                                   ------+---------+---------+---------+---
                                       8.320     8.400     8.480     8.560

Pooled StDev = 0.2768
```

Table 13. pH in CEMEX Sunol's Effluent and Receiving Water

Parameter	N	N*	Mean	SE Mean	StDev	Minimum	Q1	Median	Q3	Maximum
AC_AADLL	139 15		8.47	0.0262	0.3091	7.1	8.4	8.5	8.6	9.4
Effluent	22	0	8.39	0.0227	0.1065	8.2	8.3	8.4	8.5	8.5
Receiving	21	0	8.44	0.0263	0.1207	8.2	8.4	8.5	8.5	8.6

Effluent pH is lower than in Alameda Creek.

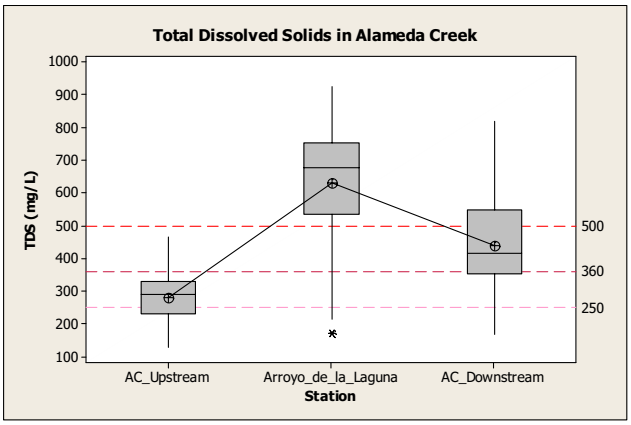
5. Possible sources of High TDS and Chloride in Alameda Creek

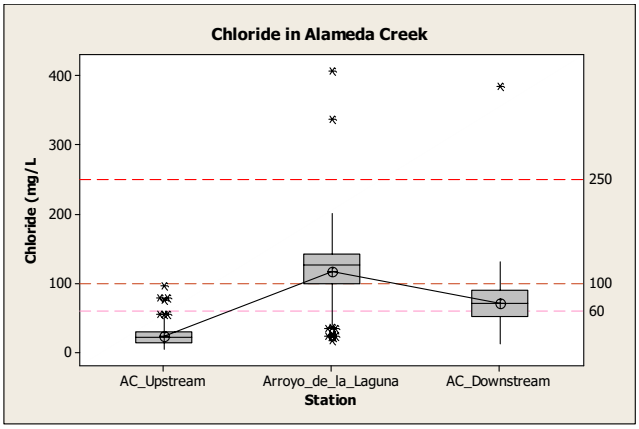
TDS and Chloride Concentration Area Difference

To examine the possible sources of high TDS and chloride in downstream Alameda Creek, which determines the quality for ACWD's water supply, we further examined the data from both the District and the aggregate mining facilities.

The major tributary of Alameda Creek (AC) is Arroyo de la Laguna. Arroyo de la Laguna contributes about half the flow in Alameda Creek and carries much higher TDS and chloride than Alameda Creek upstream of the confluence. Arroyo de la Laguna has an average TDS concentration of 630 mg/L, and an average chloride concentration of 117 mg/L. Above the confluence, Alameda Creek has a much lower average TDS concentration of 280 mg/L and an average chloride concentration of 28 mg/L. Below the confluence, both TDS and chloride in Alameda Creek increase significantly. The average TDS concentration is 437 mg/L and the average chloride concentration is 71 mg/L.

The following plots demonstrate these differences.





These plots are based on the data collected by the District at three stations: Arroyo de la Laguna at Verona (ADLL_AV), Alameda Creek above Arroyo de la Laguna (AC_AADLL or AC_Upstream in the plots), and Alameda Creek Water Quality Monitoring Station (ACWQMS, or AC_Downstream in the plots).

Table 14. Alameda Creek TDS at Three Locations

SAMPLING_POINT	N	Mean	SE Mean	StDev	Minimum	Q1	Median	Q3	Maximum
AC_AADLL	164	280	5.66	72.54	129	230.75	290	329.75	466
ACWQMS	208	437	9.16	132.07	168	352	415.5	547.25	819
ADLL_AV	156	630	13.2	164.3	169	533.8	677	750.8	924

One-way ANOVA: TDS versus Station

```
Source     DF        SS       MS       F      P
Station     2   9823294  4911647  297.97  0.000
Error     525   8653938    16484
Total     527  18477232

S = 128.4   R-Sq = 53.16%   R-Sq(adj) = 52.99%
```

```
                                Individual 95% CIs For Mean Based on
                                Pooled StDev
Level       N   Mean  StDev  ----+---------+---------+---------+-----
AC_AADLL  164  279.5   72.5  (-*-)
ACWQMS    208  437.0  132.1                 (-*)
ADLL_AV   156  629.7  164.3                                   (-*-)
                                ----+---------+---------+---------+-----
                                  300       400       500       600

Pooled StDev = 128.4
```

The analysis shows the TDS at three locations are significantly different. With Arroyo de la Laguna having the highest TDS concentrations, and Alameda Creek upstream of the confluence with Laguna having the lowest concentrations. After the two steams merge, the concentrations at downstream lie between these two.

Table 15. Alameda Creek Chloride at Three Locations

Station	N	Mean	SE Mean	StDev	Minimum	Q1	Median	Q3	Maximum
AC_AADLL	166	23	1.12	14.43	4	13.53	21	29.25	95
ACWQMS	211	71	2.44	35.42	11	51	71	88.74	385
ADLL_AV	157	117	3.85	48.24	16	99.5	126	141.5	406

One-way ANOVA: Chloride versus Station

```
Source     DF       SS      MS       F      P
Station2    2   711389  355694  285.82  0.000
Error     531   660822    1244
Total     533  1372210

S = 35.28   R-Sq = 51.84%   R-Sq(adj) = 51.66%



                                Individual 95% CIs For Mean Based on
                                Pooled StDev
Level    N    Mean  StDev  ----+---------+---------+---------+-----
AC_up  166   23.19  14.43  (-*-)
Arroyo 157  117.06  48.24                                (-*-)
AC_Do  211   70.60  35.42                 (-*)
                                ----+---------+---------+---------+-----
                                   30        60        90       120
```

The chloride at three locations are statistically significantly different than each other at 5% confidence level.

Creek Flow Statistics

USGS has the following stations in this area, which provide the flows of interest.

USGS 11176900 Arroyo de la Laguna at Verona (Arroyo de la Laguna flow before confluence with Alameda Creek)
USGS 11179000 Alameda Cr near Niles (Alameda Creek downstream flow)
USGS 11174000 San Antonio Creek near Sunol
USGS 11173575 Alameda Creek below Welch near Sunol

Table 16. Alameda Creek Flows at Three Locations

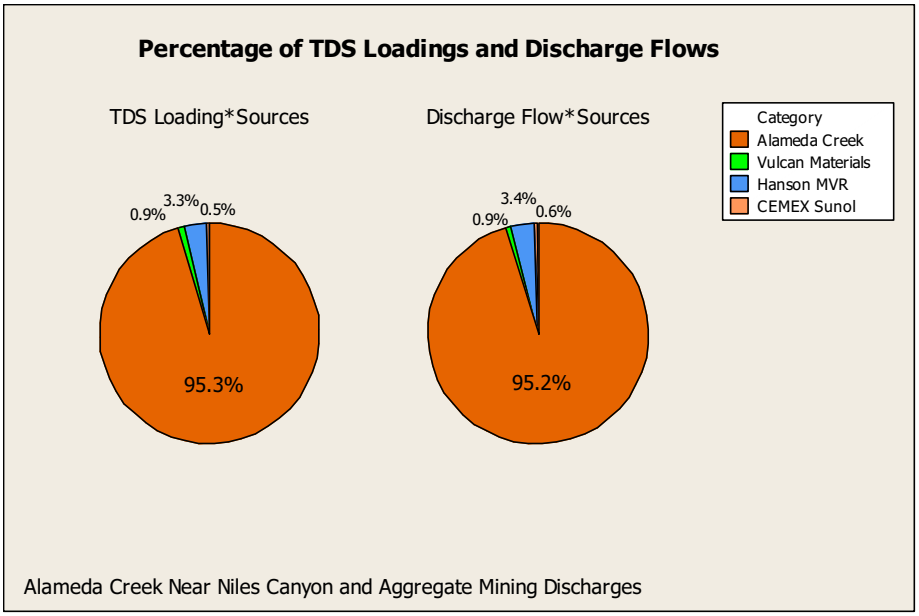
Station Name	USGS No.	2005 Flow (cfs)	2006 Flow (cfs)	2007 Flow (cfs)
Arroyo de la Laguna	11176900	95.1	98.6	33.9
Alameda Cr near Niles	11179000	185.1	224.9	60.2
San Antonio Cr	11174000	0.306	7.57	0.118
Alameda Cr upstream of San Antonio Cr	11173575	74.5	102.3	6.96
Total AC upstream	11174000 plus 11173575	74.8	109.6	7.08

Arroyo de la Laguna contributes about half the flows to the Alameda Creek after their confluence. Therefore, the water quality in Arroyo de la Laguna greatly impacts the Alameda Creek flows into the Niles Cone.

TDS Loads Estimates

We suspect that the high TDS and chloride in Arroyo de la Laguna are from natural groundwater seepage into the channels. Vulcan Materials Company and CEMEX Eliot Aggregate Plant discharge into a tributary (Arroyo Mocho) of Arroyo de la Laguna. Hanson Mission Valley Rock Aggregate Plant and CEMEX Aggregate Plant discharge into Alameda Creek or San Antonio Creek upstream of the confluence with Arroyo de la Laguna. Assuming all the discharges flow all the way downstream (no percolation, etc.), the four facilities' total discharge accounts for less than 5% of the total flows in Alameda Creek near Niles Canyon (USGS Station 11179000) during 2005 and 2007. The TDS loads from these four discharges also account for less than 5% of the total TDS loads in Alameda Creek when it passes Niles (District station ACWQMS). In other words, the loads and flows are comparable.

The following pie chart shows the percentage of flows and TDS loads from different sources: aggregate mining discharges and Alameda Creek.



The flows, TDS concentrations, and TDS loadings during each year of 2005-2007 breaks down as follows:

Table 17. Annual TDS Loading Estimate (2005-2007)

Year	Flow	Total flow volume in acre-feet	TDS in mg/L (ACWD monitoring at ACWQMS)	Mass loading ($kg \times 10^6$)	% TDS to Alameda Cr.
	Alameda Creek above Niles Canyon (USGS flow in cfs)				
2005	185	148,872	406	61.4	--
2006	225	165,111	379	64.0	--
2007	60.2	54,408	493	21.0	--
	Hanson MVR				
2005	--	4,206	337	1.75	2.85
2006	--	4,884	303	1.83	2.86
2007	--	3,302	325	1.32	6.27
	Vulcan (total volume in million gallons)				
2005	0	0	--	0	0
2006	645	1,979	339	0.802	1.25
2007	390.22	1,198	410	0.572	2.72
	CEMEX Sunol (total volume in million gallons)				
2005	95.2	292	289	0.103	0.17
2006	617.2	1,894	224	0.563	0.88
2007	5.4	17	284	0.006	0.03
	CEMEX Eliot (no discharge)				
2005	0	--	--	0	0
2006	0	--	--	0	0
2007	0	--	--	0	0

Fact Sheet Appendix F-2

Hanson TSS Special Study and Addendums

HANSON AGGREGATES' MARINE SAND PROCESSING FACILITIES

MARINE SAND PROCESSING WATER QUALITY CONTROL

TECHNICAL REPORT
EVALUATION OF THE ACCURACY AND RELIABILITY OF EPA TEST METHOD 160.2 TO MEASURE TOTAL SUSPENDED SOLIDS (TSS) IN EFFLUENT FROM MARINE SAND PROCESSING FACILITIES

PREPARED BY
Barry Keller, Ph.D., RG, CHG

JUNE 1, 2005

Barry Keller, PhD RG CHG

TECHNICAL REPORT
EVALUATION OF THE ACCURACY AND RELIABILITY OF EPA TEST METHOD 160.2 TO MEASURE TOTAL SUSPENDED SOLIDS (TSS) IN EFFLUENT FROM MARINE SAND PROCESSING FACILITIES

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I. Introduction

This Technical Report summarizes the evaluation conducted by Dr. Barry Keller, PhD RG CHG, a hydrogeophysicist, of the accuracy and reliability of EPA laboratory test method 160.2, which is described in the document EPA-600/4-79-020, attached as Exhibit A. This method is used to measure the amount of Total Suspended Solids (TSS) present in effluent discharged from Hanson Aggregates' marine sand processing facilities. This report describes the analytical procedures followed by Dr. Keller and others under Dr. Keller's supervision and summarizes the results of his evaluation.

Water quality permits issued by the California Regional Water Quality Control Board, San Francisco Bay Region (RWQCB) currently impose limits on TSS in wastewater discharges from Hanson's marine sand processing and distribution yards in Oakland and San Francisco. The approved test method for TSS in the permits is EPA Method 160.2. Applying this test method, California Certified Laboratories filter a liquid sample through a pre-weighed glass fiber filter disk, which is intended to trap the suspended particulate matter. The filter then is rinsed with distilled water, dried in an oven, and re-weighed. The difference in weight of the filter, divided by the liquid sample volume, is attributed to "non-filterable residue," or TSS, and reported in milligrams per liter (mg/L).

Historically, the testing of Hanson's effluent showed erratic results that did not correlate well with visual observations of the cloudiness of the water or with operating conditions. A variety of experiments were conducted to better understand the reasons for these erratic results and to document problems identified with the EPA Method 160.2 test. These experiments were oriented toward an evaluation of both the precision (repeatability for duplicate samples) and accuracy (relation to true value) of the test method. The tests are described in detail below, as Experiment Number 1, Experiment Number 2, and Experiment Number 3, following a brief introductory description.

In the first set of experiments (Experiment Number 1), a number of split samples from Hanson effluent were taken and submitted "blind" for analysis at different laboratories and/or by the same laboratory more than once, without identifying the samples as duplicates. This experiment was directed at examining the precision of the test results from the split samples.

In the second set of experiments (Experiment Number 2), synthetic samples were prepared using accurately weighed samples of two types of particulate material and then analyzed by the Certified Laboratories in order to evaluate the accuracy of EPA Method 160.2 in the particular circumstances involved with marine sand processing. For the first type of material, a control system was established whereby settled particulate matter ("silt") was extracted from the settling ponds at the San Francisco sand yard, and then dried and weighed. This silt material then was added back in measured volumes into a saline water solution that is representative of San Francisco Bay so that the actual TSS values were known.

For the second type of material, additional synthetic samples were prepared using a commercially available material, silica flour, which has similar particle size and density

characteristics to the settled particulate matter in Hanson's sand processing effluent. This material was ground, pre-weighed, and then mixed in saline water that is representative of the salinity of effluent from the San Francisco sand yard.

Split samples from both types of mixtures were analyzed at different laboratories (or repeated at the same laboratory) using EPA Method 160.2 and compared with the actual weights of the material mixed into the samples, in order to evaluate the accuracy of Method 160.2, as well as the precision.

In the third set of experiments (Experiment Number 3), the same samples of water mixed with both the silt from Hanson's sand yard and silica flour were analyzed with two different test methods for comparison purposes: EPA Method 160.2 and an alternative test method used by the U.S. Geological Survey, Optical Back-Scatterance (OBS). The OBS method requires extensive calibration due to its sensitivity to color of material but is very accurate in the laboratory setting where careful calibration is possible. The results of the Method 160.2 and OBS analysis, for these samples and for actual process and effluent samples, were compared to evaluate the accuracy and precision of EPA Method 160.2.

The data presented in this report include the results of effluent monitoring data that were submitted to the RWQCB in Hanson's Self-Monitoring Reports as well as duplicate analyses of the effluent samples taken for that purpose during the third and fourth quarters of 2004 and for the first quarter of 2005. The data produced from analyses of these effluent samples is attached as Exhibit B. The report also presents data from the analysis of other samples, including both internal process water and synthetic samples, that were not part of Hanson's effluent.

The results of these experiments indicate that the EPA Method 160.2 test is not sufficiently accurate or precise for measuring the fine suspended mineral particles in saline water that are characteristic of the sand yards' discharge.

II. Experiments Conducted to Evaluate Method 160.2

A. Experiment Number 1: Duplicate Sampling and Analysis

The efforts to evaluate the accuracy and reliability of TSS measurements in effluent from marine sand processing facilities involved two separate experiments using blind duplicates. Comparison of the results of the analysis of duplicate samples that are analyzed repeatedly by a single Certified Laboratory or by various Certified Laboratories allows evaluation of the precision of a test method, based on the repeatability of the results.

Prior to presenting real data, examples of accuracy and precision characteristics are shown in Figure 1. In Figure 1 a., the data from duplicate analyses are precise, and all values fall on a 45 degree line. Figures 1 b. and 1 c. show examples of data that are repeatable on the average, but with two types of imprecision, those being $\pm$ 10% of the value of the data point (1 b.) and $\pm$ 10% of a nominal "full scale" value, here set to 100 mg/L (1 c.). Either of these types of imprecision might be deemed acceptable, although

there is no standard for such acceptability, and no guidance form RWQCB. Not shown is any example of perfect precision (repeatability) but poor accuracy (i.e., wrong result). In the case of blind duplicate sampling, there is no way to determine if either result is actually correct (accurate), so there is no corresponding graphic representation of accuracy. In the other experiments described below, where the initial value (X axis – weighed synthetic sample or OBS value) is known or assumed to be correct, perfect precision with poor accuracy would look something like Figure 1 a., but with some other line or curve of agreement between the duplicate samples, rather than the 45 degree line which would represent both accuracy and precision.

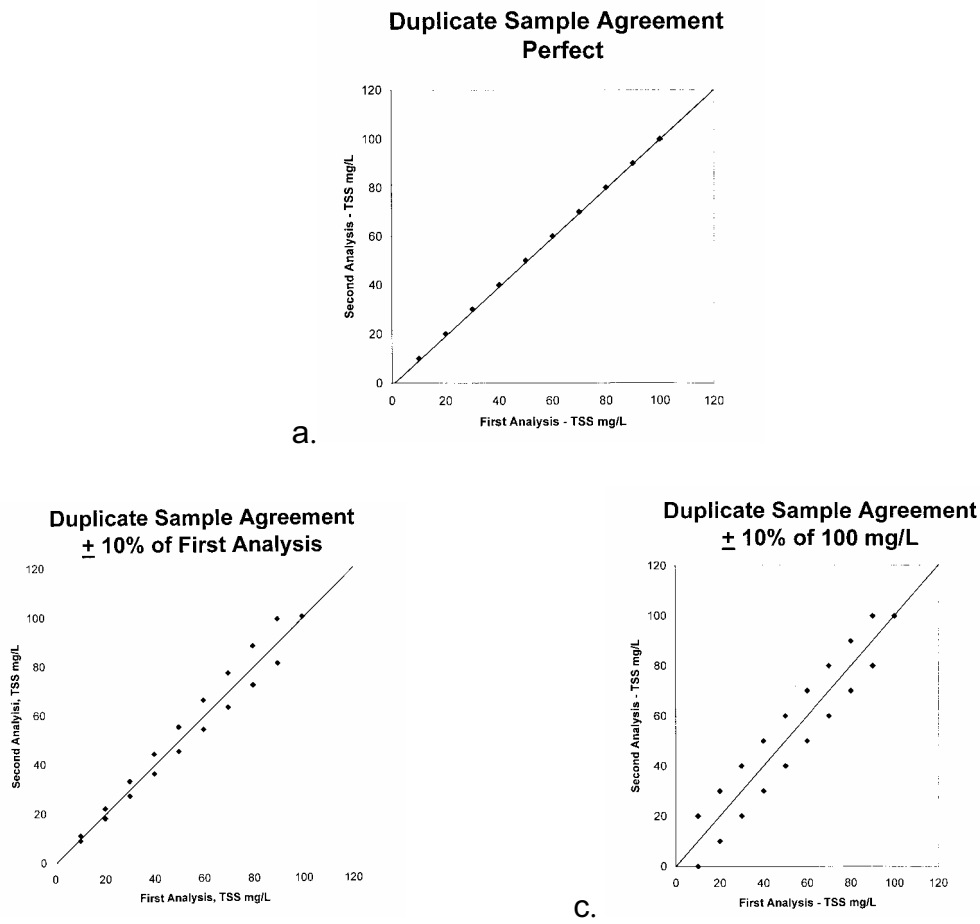


Figure 1. Examples of agreement between duplicate analyses of a TSS sample (not real data). Graph a. shows perfect agreement. Graph b. shows agreement of ± 10% of the value of the first analysis. Graph c. shows agreement of ± 10% of a nominal "full scale" value, here set to 100 mg/L. While there is no standard "acceptable agreement" and no guidance from RWQCB on this issue, either of these ranges should be considered acceptable. The "45 degree line" of perfect agreement is shown here and on subsequent graphs for comparison purposes.

In the first "blind duplicate" experiments (year 2002), samples of process water with characteristics similar to Hanson's effluent were collected from the San Francisco Yard on three separate dates, and each sample was tested by three independent laboratories – Sequoia Laboratories (Sequoia), Curtiss and Tompkins Laboratories (CT Lab), and Severn Trent Laboratories (STL). The results of the analyses by the labs differed

significantly, as shown in Table 1 and Figure 2.[1] Approximately one month later, duplicate samples of sand processing discharge water were submitted blind to all three laboratories. The precision of these results was quite poor. In extreme cases, there are differences of as much as a factor of ten between different analyses of the same sample. These experiment did not indicate which (if any) of the results was actually "correct," or the reason for the extensive variation--it simply provides a means of evaluating the precision of the test and the variability of its results. The results of these experiments are presented in Table 1 and Figure 2.

TSS Blind Duplicate Comparison - 2002

Sample	Date	Sequoia 1	Sequoia 2	STL	CT Lab	NOTE
San Francisco Yard			mg/L	mg/L	mg/L	
Pond Influent (PI)	2 Nov	31		180		
PI	7 Nov	37		60	100	
PI	8 Nov	*10*		160	160	Seq- ND<10;
Pond Effluent (PE)	12 Dec	36	46	160	41	
PE	12 Dec	98	110	160	110	
PE	13 Dec	42	45	74	39	
PE	13 Dec	180	48	250	180	

Table 1. Comparison of Results: Analysis of TSS in Blind Duplicate Samples in Year 2002. These effluent samples were collected at the San Francisco Sand Yard in 2002, and were tested at three Certified Laboratories, with testing repeated at one (Sequoia). The 8 Nov PI "Sequoia 1" result was "NON-DETECT, less than 10", so it is listed as the detection limit (*italics*).

[1] These results are presented in Table 4 of the Sampling Report contained in the Water Discharge Characterization and Permit Development Report (January 2003 Draft) also prepared by Dr Keller. Similar data were provided by Hanson to the RWQCB in a May 13, 2002 letter to Loretta Barsamian.

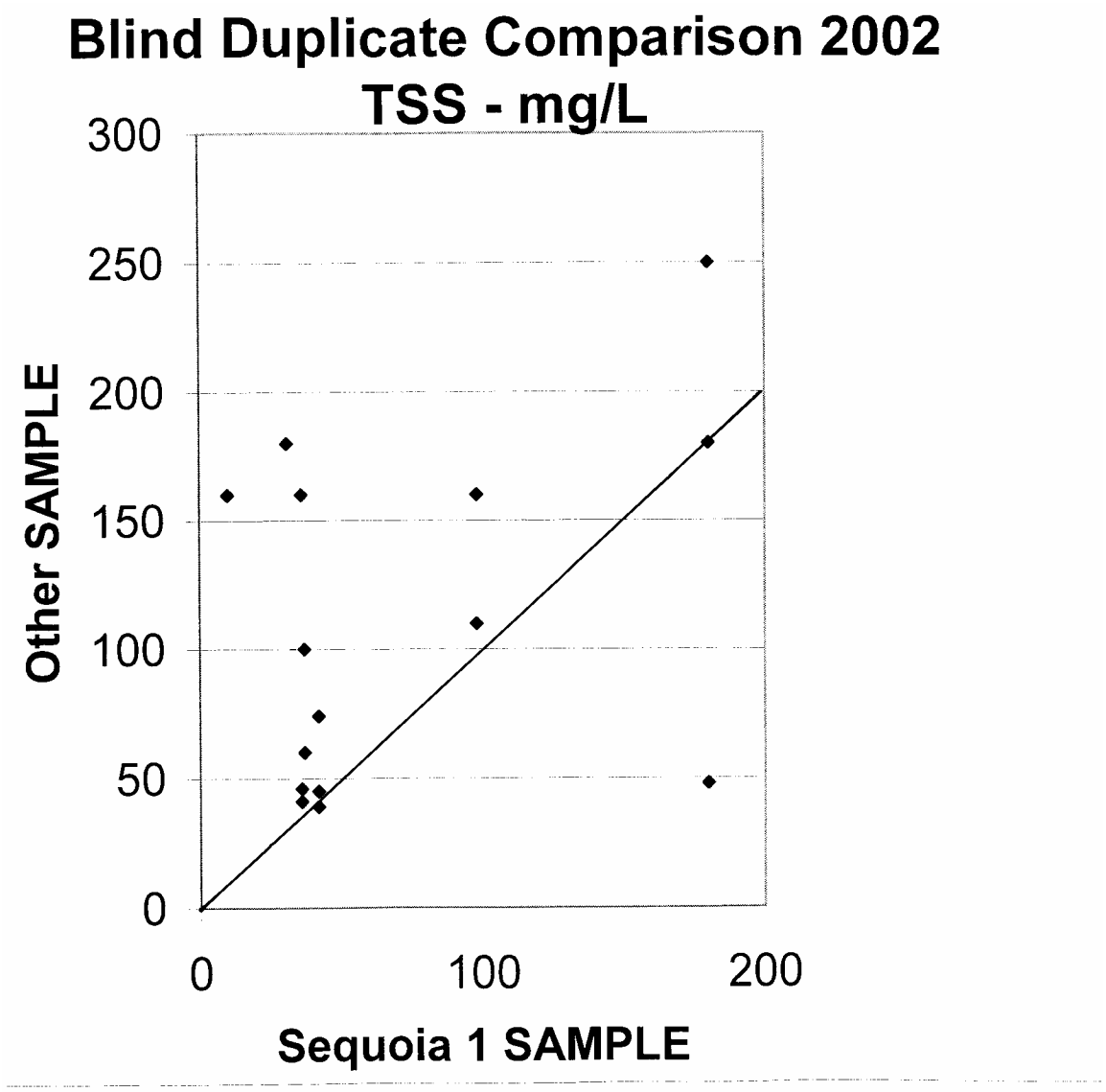


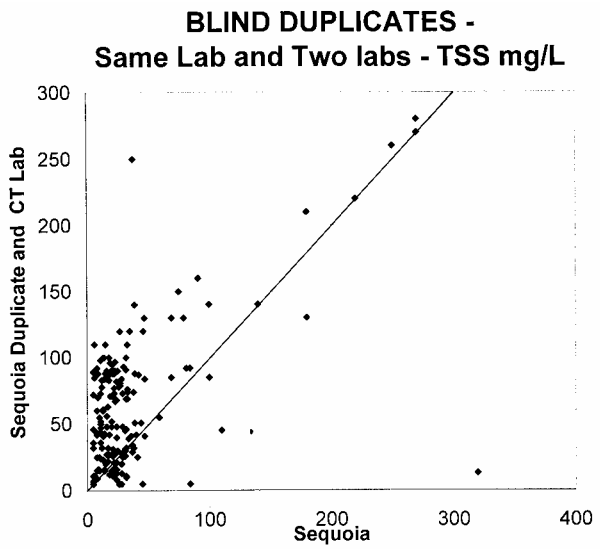
Figure 2. Comparison of Results: Blind Duplicate TSS Samples in Year 2002. These samples were collected at the San Francisco Sand Yard in 2002. The spread of values of the duplicate samples is much greater than a ± 10% acceptability criterion. See Table 1 for details.

It can be seen that there is a variation of as much as a factor of 16 (non-detect < 10 mg/L compared with 160 mg/L) between analyses of the duplicate samples and variations of a factor of 5 or more are common. If the method had good precision (repeatability), all values would fall near a 45 degree line in Figure 2, but in fact, most values are not near the line.

A much more comprehensive blind duplicate testing program has been carried out, beginning in the second half of the year 2004, with monitoring samples and internal process samples from Oakland Yard and monitoring samples from Marina Vista Yard, and continuing in year 2005, for which the results of the first quarter (2005Q1) are presented here. In the third and fourth quarter of 2004 (04Q3 and 04Q4), a total of 178

blind duplicate comparisons were made, including 6 in which both results are from a single laboratory (Sequoia) and 172 in which the results are from two laboratories (Sequoia and CT Lab). In 2005Q1, a total of 101 blind duplicate comparisons were made, including 64 in which both results are from a single laboratory (Sequoia) and 37 in which the results are from two laboratories (CT Lab).

In Figure 3, the 2004 and 2005 results are shown as separate plots, to aid visibility. As in Figure 2, in both time periods there is considerable scatter away from the 45 degree diagonal line. The year 2004 results appear to be skewed above the 45 degree line, which would indicate that the CT Lab results tended to be higher than the Sequoia results.



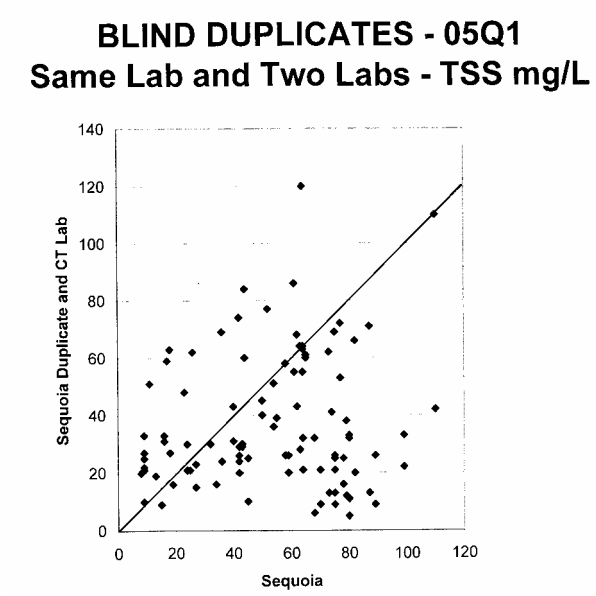


Figure 3. Blind duplicate samples from the second half of the year 2004 (upper) and first quarter 2005 (lower). In the upper plot, samples are from Oakland Yard and Marina Vista Yard, and include both discharge and internal process samples. In the lower plot, samples are Oakland effluent. The spread of

values in the lower plot is much greater than a ± 10% acceptability criterion, a pattern that is observed in all subsequent graphs.

A somewhat more complicated pattern is apparent when the data are divided into monthly time intervals. This has been done with the effluent monitoring data from the Oakland Yard, which span the entire period. In this case, Sequoia data were compared with CT Lab data, but not with Sequoia blind duplicates. As shown in Figure 4, in July and August, all CT Lab points would be above a 45 degree line, indicating that all the CT Lab results are higher than the Sequoia results. In September and October, some points would be below a 45 degree line, whereas in November and December, most points would be scattered about a 45 degree line. There is still considerable scatter in November and December, but the points are clustered around the 45 degree line. In early 2005 (January through March), there appears to be a migration of CT Lab values to below the 45 degree line. Overall, these data indicate that the test precision is poor.

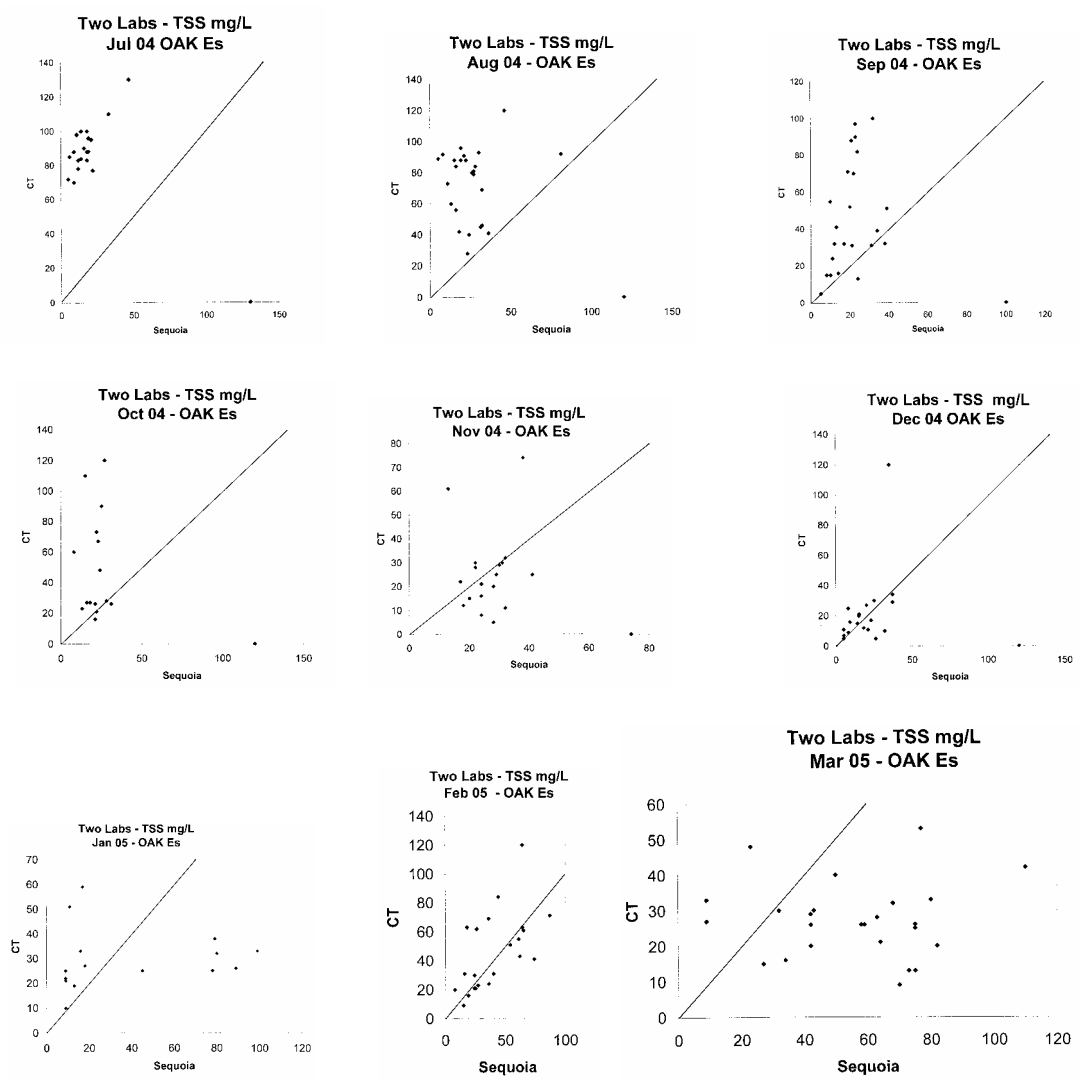


Figure 4. Monthly Blind Duplicate Plots for Oakland Yard. The data are from effluent (Es) monitoring stations. In the 2004 plots, the single point on the lower axis is not a real result, but used to control the plot

axes sizes. A clear "migration" of the CT Lab values relative to the Sequoia values can be seen during the 9 month period. No change in procedures or technicians was reported by CT Lab.

However, in addition to the overall lack of precision, a significant aspect of this time series of plots is that during the nine-month period, the data from CT Lab shifted from being consistently higher than those from Sequoia to being approximately equal, then to being lower, while the spread of values in the Sequoia data remained relatively stable during this period. According to the project manager at CT Lab, there were no changes of either procedure or analytical personnel during the 2004 period. While it would be possible to speculate on other possible causes for this observed phenomenon, for the purposes of this study it is sufficient to note that not only is the EPA Method 160.2 test unrepeatable (imprecise) within and between laboratories, but also that the pattern of imprecision between laboratories may shift with time. It clearly would be difficult to place confidence in these results.

To reiterate, these experiments involving comparison of blind duplicate sampling and analysis, do not indicate which, if any, of the results are accurate. It is simply an objective evaluation of the precision (repeatability) of the analytical results. However, the significant variation reflected in the comparison of the blind duplicate samples indicates that this test method does not have acceptable precision and cannot be regarded as producing reliable data in the context of Hanson's marine operations.

B. Experiment Number 2: Evaluating the Accuracy of TSS Test by EPA Method 160.2 by Analysis of Synthetic Samples

In this experiment, "synthetic" samples were prepared with known concentrations of suspended particulate matter and submitted to the Certified Laboratories for the purpose of evaluating the accuracy of Method 160.2 in the marine setting. Synthetic samples were prepared using two types of suspended material: 1) settled particulate matter from water samples from the final settling pond at the San Francisco sand yard; and 2) a commercially available material, silica flour, that, as mentioned above, has similar particle size and density characteristics to the settled particulate samples. The difference between this experiment and the blind duplicate sampling described above is that in this case the "correct" value of the concentration of suspended particulate matter is known in advance of the test, allowing evaluation of the accuracy of the test method. In many cases, the samples were submitted to the laboratories as blind duplicates, allowing evaluation of precision as well.

To prepare the samples with actual settled particulate matter obtained from actual Hanson process water, pre-weighed amounts of actual TSS were settled from "grab samples" taken from settling ponds at Hanson's facilities. To extract the solids from the discharge water samples, a 32-gallon barrel was filled with process generated discharge water, covered it to prevent airborne dust intrusion, and allowed to settle for two or more days before the wet silt was retrieved from the bottom, oven dried and sieved.[2] To prepare the synthetic samples from silica flour, material made of appropriately sized silica flour

[2] Results of particle size distribution (PSD) analysis of liquid and dried samples determined that this process did not produce samples with larger particles than the original discharge water.

particles was selected. The control samples made of the two types of materials were prepared by weighing portions of the dry particulate material on an analytical balance, then mixing it into 10-liter volumes of water. In some experiments, the material was added to a water mix of 1/3 filtered tap water and 2/3 filtered Bay water, mixed to simulate the salinity conditions in discharge water at the San Francisco sand yard. In other cases, the material was mixed with unfiltered East Bay Municipal Utility District (EBMUD) tap water, which has TSS less than 1 mg/L (as verified by OBS testing). Samples were split and then tested at various laboratories and/or at the same laboratory more than once.

The results of these experiments are presented in Table 2 and Figure 5. As with Experiment Number 1, it can be seen that there is a considerable variation in the results. In Figure 5, accurate test results would have all data lying on the 45 degree line, but most of the data are not near this line.

Test #	Configuration	Pre-Measured CORRECT VALUE Measured TSS mg/L	Sequoia TSS mg/L	Sequoia Repeat TSS mg/L	Curtiss & Tompkins TSS mg/L	Severn Trent TSS mg/L
LT 1	Filtered TAP water	0	ND			
LT 2	Silica Flour (SF) in Filt Tap	**50**	**11**			
LT 3	SF in Filt Tap	**100**	**5**			
LT 5	SF in Filt Tap	**40**	**14**			
LT 7	SF in Filt MIX (1/3 Tap, 2/3 Salt Water)	**50**	**37**			
LT 17	SFY92 "TSS sed" in Filt MIX	**50.54**	**71**	**44**	**51**	**57**
LT 18	SFY92 "TSS sed" in Filt MIX	**30.04**	**46**	**46**	**32**	**37**
LT 22	SFY92 "TSS sed" in Filt MIX	**100.35**	**59**	**120**	**98**	**100**
LT 26	Marina Vista Sed in 1/3 Bay: 2/3 tap filtered mix					
CAL-SF-Nov04-1	SFY92 "TSS sed" in unfiltered Tap	**30.07**	**22**		**24**	
CAL-SF-Nov04-2	SFY92 "TSS sed" in unfiltered Tap	**50.15**	**34**		**37**	
CAL-SF-Nov04-3	SFY92 "TSS sed" in unfiltered Tap	**100.35**	**55**		**61**	
CAL-20JAN05-2	SFY92 "TSS sed" in Filt MIX	**49.87**	**43**	55		
CAL-FEB05-SILICA2	SF in Filt MIX (1/3 Tap, 2/3 Salt Water)	**101.01**	**54**	32		

Table 2. Analytical Results: Synthetic Samples. SFY92 "TSS sed" is the settled particulate material from the San Francisco Sand Yard. "Filt MIX" is a mix of 1/3 filtered tap water and 2/3 filtered Bay water. All lab results were obtained using Method 160.2.

All samples with silica flour that were tested under Method 160.2 had reported values lower than the actual correct (pre-weighed) values. One possible explanation for this, other than the general considerations discussed below in Section III, is that the silica flour is translucent white and, once settled, may be difficult to see against the translucent white plastic of the sample bottle. The sample is collected in a 250 mL plastic bottle, but at the laboratory a 100 mL aliquot is poured out after shaking for the actual testing. If the original bottle is not shaken sufficiently, the aliquot may have a lower TSS concentration than the whole sample. The difficulty in seeing the silica flour, as compared to sewage wastewater or the brown sand washing discharge water could result in insufficient shaking by the laboratory technician.

In many cases, the results of testing the mixture using saline water under Method 160.2 were higher than the pre-weighed correct values. In contrast, all results of testing the mixture using tap water were lower than the pre-weighed correct values. Thus, there appears to be some degree of correlation between saline water and erroneously high EPA 160.2 results.

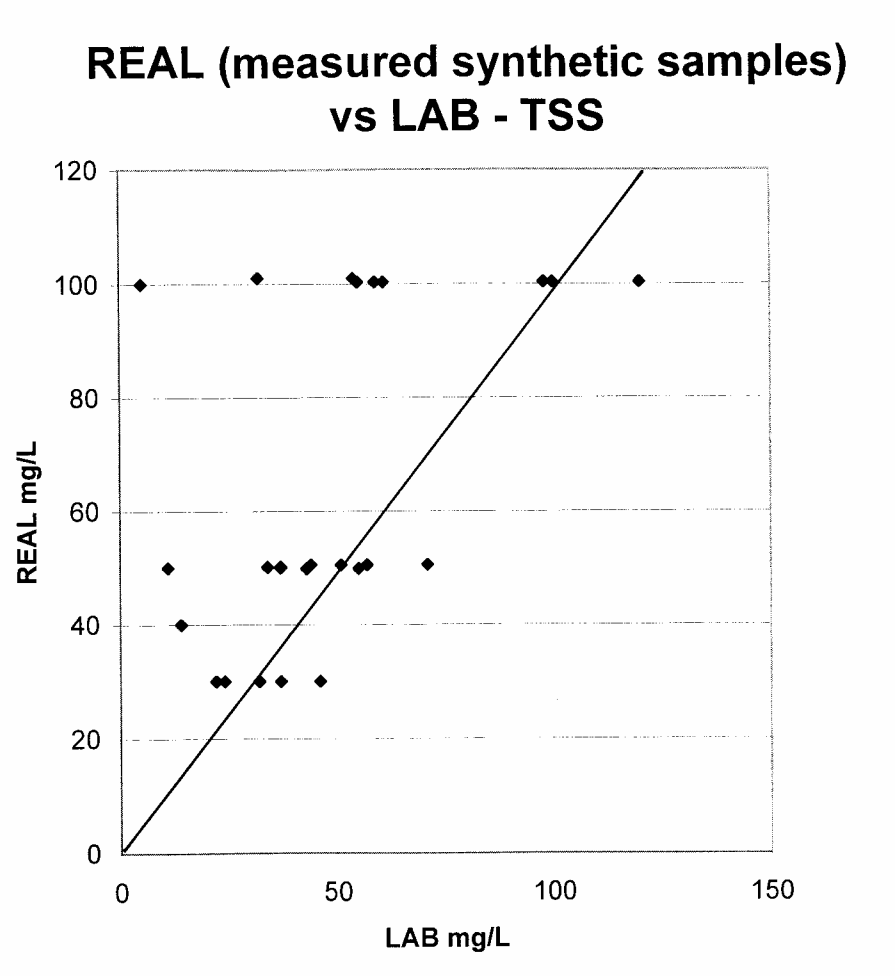


Figure 5. TSS Test Results: Synthetic Samples.

This result of these experiments, i.e., that the EPA Method 160.2 test does not produce accurate data for the sand yard discharge water, does not rely on any understanding of the test method or the characteristics of the water or of the suspended material, although some correlations are noted. It does constitute a calibration of the method with material that is representative of the sand processing effluent, with very poor results in terms of both accuracy and precision.

C. Experiment Number 3: Evaluating the Accuracy of EPA Method 160.2 by Comparing Analytical Results of Split Samples tested under Method 160.2 and Optical Back-Scatterance (OBS)

In this experiment, the Optical Back-Scatterance (OBS) instrument (D&A Instruments OBS-3) used by USGS to sample the open waters of San Francisco Bay was adapted for use here. The instrument was operated in a small test chamber to measure the TSS values in sand yard discharge water. This method quantifies the concentration of suspended solids (particulate matter) in water using indirect methods to make measurements on the water while the solids are still suspended. Such methods require careful calibration

against a reliable weighing method or against synthetic samples in order to produce reliable results (expressed in mg/L).

In this procedure, a scattering meter – the OBS test instrument – functions by emitting pulses of light that are projected into the water and then reflected off particles in the water and scattered back toward the instrument where they are counted by a detector. This experimental set-up was calibrated with the synthetic samples described above. The results are that the OBS instrument output is a very linear and repeatable function of the suspended particulate concentration for particular sample, but that the function can vary significantly between samples, either from different sand yards, or from the same sand yard on different dates (processing sand from slightly different mining locations). The synthetic sample calibration is shown in Figure 6. The variability between samples means that the system is reliable under controlled conditions where careful and frequent calibration is possible. However, for uncontrolled conditions, such as testing samples from the processing of sand that is taken from a variety of locations throughout the Bay in Hanson's daily operations, the continuous calibration that would be required for accurate results as a process control method render OBS an infeasible option.

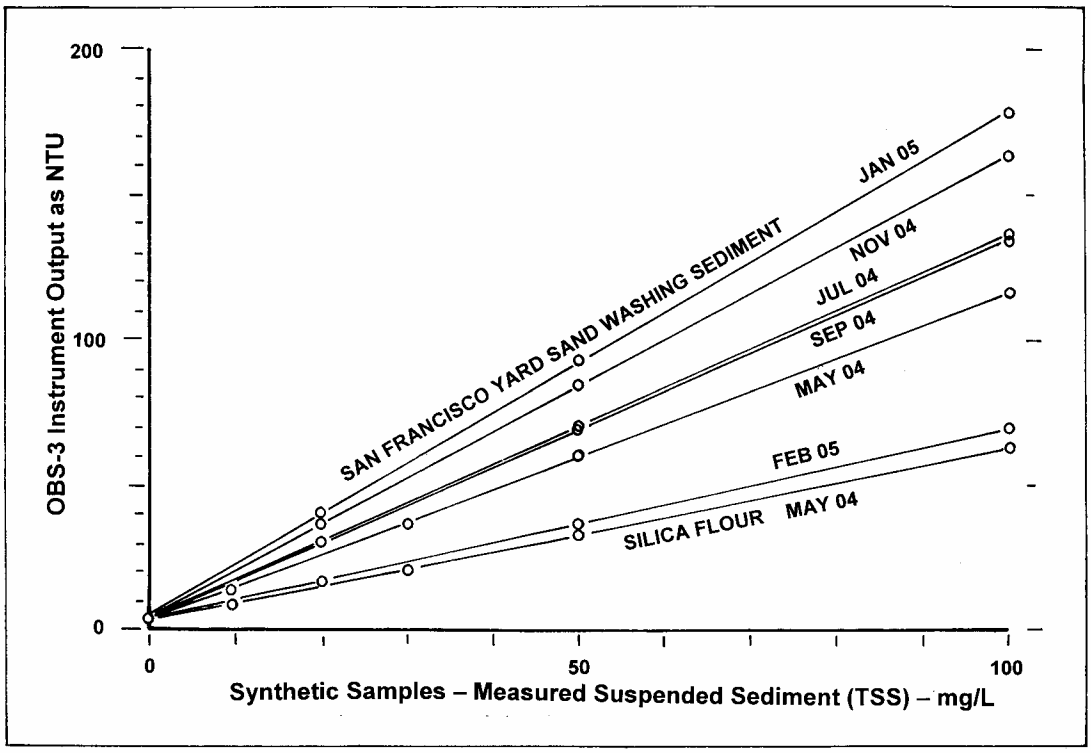


Figure 6. Relation Of OBS Instrument Output Versus Synthetic Suspended Particle Concentration for Various Samples. Most points represent repeated runs that plot in the same place, indicating very good precision. The output is very close to linear for each sample, although the curves actually bend slightly downward. The May 2004 San Francisco Yard sample was collected from the bottom of the final settling pond, while all subsequent samples were collected by settling sediment from the liquid entering the pond. The difference between the May 2004 and Feb 2005 Silica Flour samples suggests minor instrument drift,

whereas most of the difference in the San Francisco Yard samples is interpreted to be due to differences in material properties.

A large data set that allows comparison of OBS quantification of TSS with the Certified Laboratory EPA Method 160.2 filter test results was obtained in the second half of year 2004 (04Q3 and 04Q4), and in the first quarter of year 2005 (2005Q1). Many samples of discharge and internal process water at the Oakland Yard and discharge at Marina Vista Yard were tested both by OBS and EPA Method 160.2. This data set largely overlaps with the blind duplicate data presented above (Table 2, Figures 3 and 4).

Results are presented here for the Oakland yard samples, because the ongoing calibration of the instrument during this test period is applicable. The calibration samples were obtained at San Francisco Yard but they represent material taken from the same mining areas in Central San Francisco Bay as the sand that was delivered to Oakland Yard. Due to differences in sand processing operations between the two yards, it is not possible to obtain sufficiently large water samples at Oakland Yard to perform the calibration, but the San Francisco silt sample are considered to be equivalent. The OBS results are compared with Sequoia Lab EPA Method 160.2 results for 2004Q3 and 2004Q4, and for all lab results for 2005Q1.

All of the Oakland OBS / EPA Method 160.2 comparison data are shown in Figure 7. A great deal of scatter is apparent, with numerous samples analyzed under EPA Method 160.2 showing very high values, whereas the same samples analyzed under OBS show very low values.

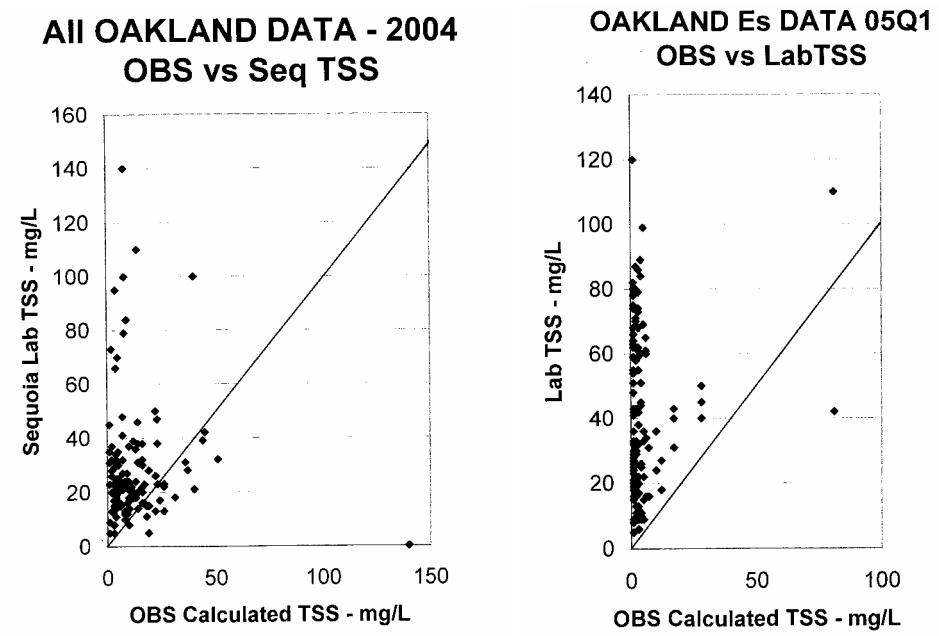


Figure 7. Comparison of Results: OBS and EPA Method 160.2. The left plot represents all data for Oakland Yard in 2004. The right plot represents effluent data obtained for Oakland Yard First Quarter 2005.

In Figure 7, for both time periods, there are numerous data points with very low OBS values, but relatively high Method 160.2 values. To visualize this situation better, the data have been winnowed to show, separately, OBS values greater than or equal to 10 mg/L and OBS values for the same sample that are less than 10 mg/L. 10 mg/L is normally the limit detection values for the EPA Method 160.2 test. Therefore, if the OBS values are credible, these should be "non-detect" by EPA Method 160.2. The Figure 7 data are shown in Figure 8, winnowed to show only OBS values greater than or equal to 10 mg/L. This figure may be compared with Figure 5, which shows similar results for synthetic samples, which also had values greater than or equal to 10 mg/L. The patterns of scatter in Figure 5 and Figure 8 are similar, again indicating the lack of accuracy of EPA Method 160.2 for this material in the range of the RWQCB permit limits.

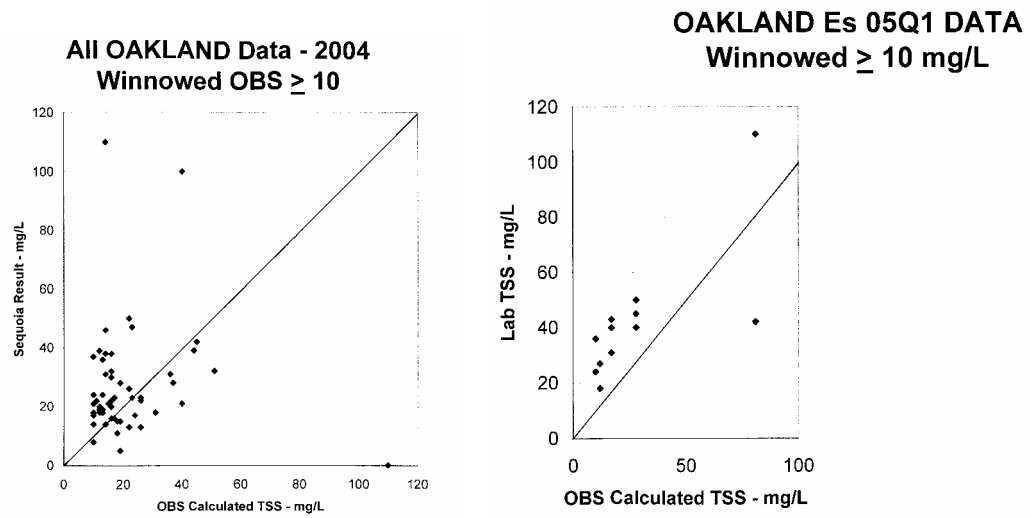
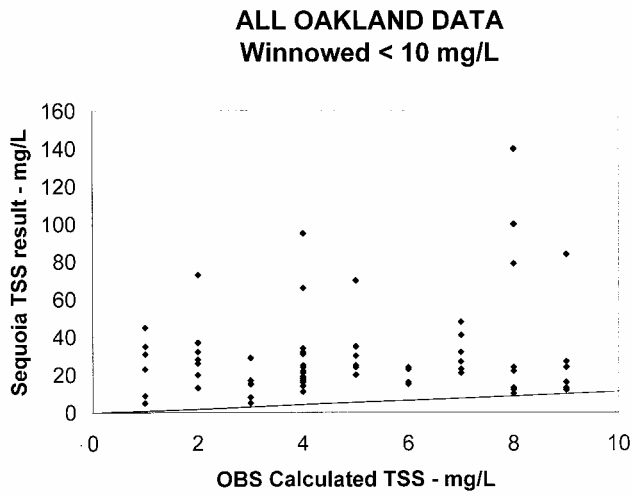


Figure 8. Comparison of Results: OBS and EPA Method 160.2 for Oakland Yard 2004 (Left Plot) and First Quarter 2005 (Right Plot) – OBS ≥ 10 mg/L.

The results winnowed for OBS values lower than 10 mg/L are shown in Figure 9. The number of significantly higher EPA Method 160.2 results (in comparison to the OBS results) is new and surprising, because previous experiments had focused on synthetic samples with concentrations above 10 mg/L (closer to the range of RWQCB Permit limits). In a number of cases, samples with OBS values less than 10 mg/L had EPA Method 160.2 results above the 45 mg/L daily limit and 30 mg/L monthly average limit. In other words, many samples whose actual values (based on OBS analysis) are well below Hanson's permit limits tested as exceeding the permit limits under Method 160.2; this result is significant in light of the fact that Hanson's compliance status is based on the Method 160.2 results.



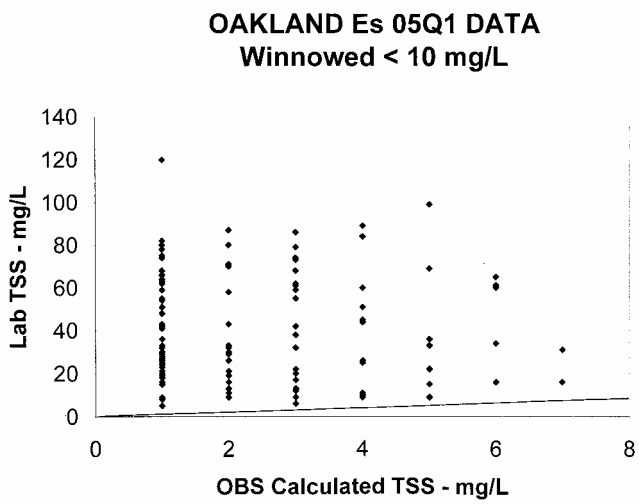


Figure 9. Comparison of Results: OBS and EPA Method 160.2 for Oakland Yard 2004 (Upper Plot) and First Quarter 2005 (Lower Plot) – OBS < 10 mg/L. At very low OBS values, there are many spurious high Method 160.2 values.

The OBS calibration data (Figure 6) indicate that the OBS quantification is extremely reliable. If these OBS data were taken at face value, it would imply that the EPA Method 160.2 results are prone to spurious high results for very low TSS concentration (clean) samples that are at or below the method detection limits. The samples represented by these data are saline, as indicated by salinity data from Sequoia Lab (typically salinity ~ 30, equivalent to 30,000 ppm total dissolved solids), so salt interference on filters that appear visually to have little or no suspended solids would seem to be a likely explanation.

III. Possible Explanations for the Results of these Experiments Demonstrating Low Accuracy and Precision of Testing Using Method 160.2

Three factors have been identified that appear to contribute to the poor accuracy and precision of the results of the EPA Method 160.2 test for this material. One relates to the filter itself; the others relate to the salinity of the water and the physical nature of the suspended particulate material, in terms of particle size and density.

The glass fiber filters that are used in the approved TSS test methods are compressed masses of disorganized glass fibers. They do not form a regular grid of uniform pores, but rather, at the microscopic level, form an irregular distribution of various size passages though the mass of fibers. Although the nominal pore size is 1-2 microns, in reality there may be larger or smaller passages through the filter, and the distribution can be different between individual filters. This aspect is described in the literature of the filter manufacturers and has been verified by electron microscope imaging (discussed further below). For particles that are much larger than this nominal pore size, such as the 20-100 micron particles in sewage treatment wastewater, the irregularity of the filter at smaller size is not a drawback. However, for the very fine, high-density silt particles in sand processing discharge water, the problem is that some portion of the particles may pass through the filter and not be weighed, resulting in an artificially low result.

In evaluating the blind duplicate sample results, one difference between the various laboratories is that they use different commercially available brands of the glass fiber filters. However, the pattern of the results, with some samples having higher reported values at a particular laboratory while others had lower values, the variation of results at a single laboratory, and the strange monthly "migration" of values when comparing Sequoia Lab and CT Lab, indicate that this is not the cause of the poor precision.

Marine sand processing discharge water has 60% to 95% of the salinity of San Francisco Bay water. Residual salt from Bay saltwater interferes with TSS test results. When the filters are oven-dried, any saline water left behind crystallizes on the filters and is weighed as sediment, which causes artificially high TSS results. This potential for error is noted in the description of Method 160.2 itself (in EPA-600/4-79-020):

> "5.2 Samples high in Filterable Residue (dissolved solids), such as saline waters, brines and some wastes, may be subject to a positive interference. Care may be taken in selecting the filtering apparatus so that washing of the filter and any dissolved solids in the filter (7.5) minimizes this potential interference."

Thus, if the filter is not sufficiently rinsed, salt may crystallize during the oven drying and be weighed as TSS. The Method goes on (Section 7.5) to suggest that 30 mL of distilled water should be used in three portions to

> "wash the graduated cylinder, filter, non-filterable residue and filter funnel wall."

However, the exact manner of applying the distilled water is not specified, so the washing technique appears to be dependent upon the techniques of individual technicians. At the Sequoia Laboratory a technician was observed spraying water from a squirt bottle directly onto the filter, whereas at a USGS laboratory that performs a similar test method (see below), the technician carefully sprayed only on the walls of the crucible (used instead of a "filter funnel"), allowing the wash water to run gently across the filter. The more vigorous spraying directly onto the filter, while removing salt water, could force fine particles through the filter. The USGS technician stated that salt crusts had been observed on the bottoms of the filters due to insufficient rinsing by a former assistant, so the potential for salt interference is a real concern. While the comparison of observed laboratory techniques is a qualitative observation, the variability of results and the lack of precision of quantitative results associated with different commercial laboratories suggests that technician variability may be a significant factor in the lack of accuracy and precision.

Regarding particle size, the Method states

> "6.1 NOTE: Because of the physical nature of the glass fiber filters, the absolute pore size cannot be controlled or measured. Terms such as 'pore size' collection efficiencies and effective retention are used to define this property in glass fiber filters."

If the particle size of the suspended particulate matter is significantly greater than the typical "pore size", the filter will effectively trap all the material. However, if the particle size is similar to, or smaller than, the typical "pore size", the potential exists for some portion of the particles to pass through the filter, particularly with vigorous washing of the filter to minimize salt interference. The filters used for EPA Method 160.2 have nominal pore sizes between 1 and 6 microns.

The particles in wastewater (sewage treatment) discharge have two typical sizes, 1 to 15 microns and 50 to 150 microns, with some larger particles. Most of these particles can be expected to be effectively be trapped by the glass fiber filters. The in-house calibration procedure of one of the Certified Laboratories (CT Lab) uses 20 micron cellulose (wood fiber) particles, which, again, would be expected to be trapped effectively.

In contrast, the particles in sand yard discharge are much finer. As shown in Figure 10, the sand yard water (this sample was not actually discharged) has a significant portion of particles smaller than 1 micron and essentially none larger than approximately 20 microns. The difficulty of trapping these particles on the irregular glass fiber filters is also shown in Figure 11, which is an electron microscope photo (at two scales) of an actual filter. It can be seen the very small particles are trapped irregularly in clumps where there are dense fibers, but large areas have no trapped particles, and small particles may have passed through.

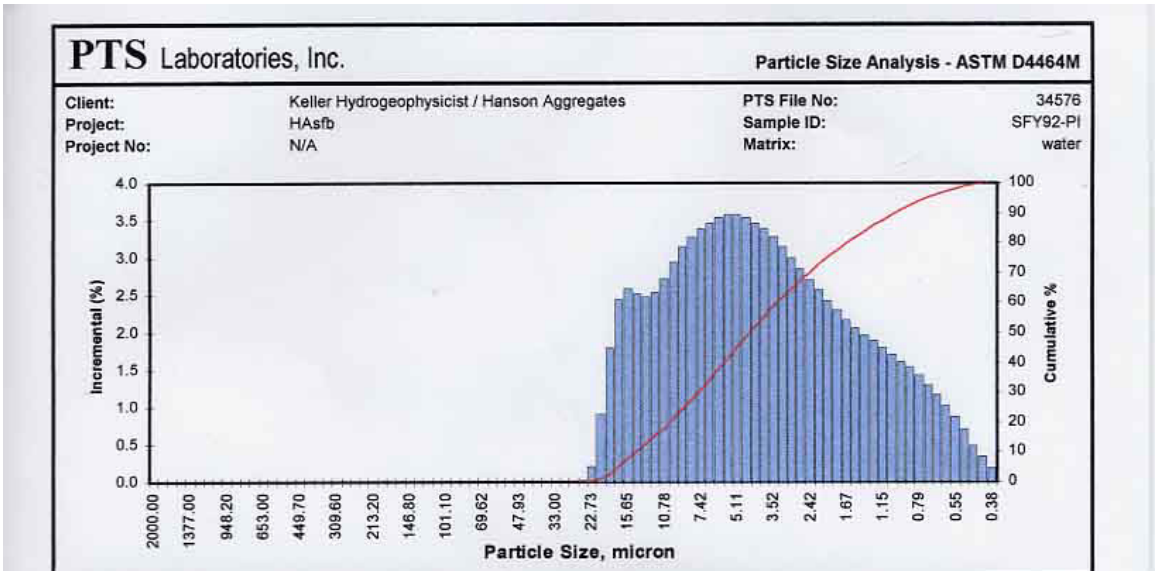


Figure 10. Particle size distribution of suspended particulate matter in sand yard process water.

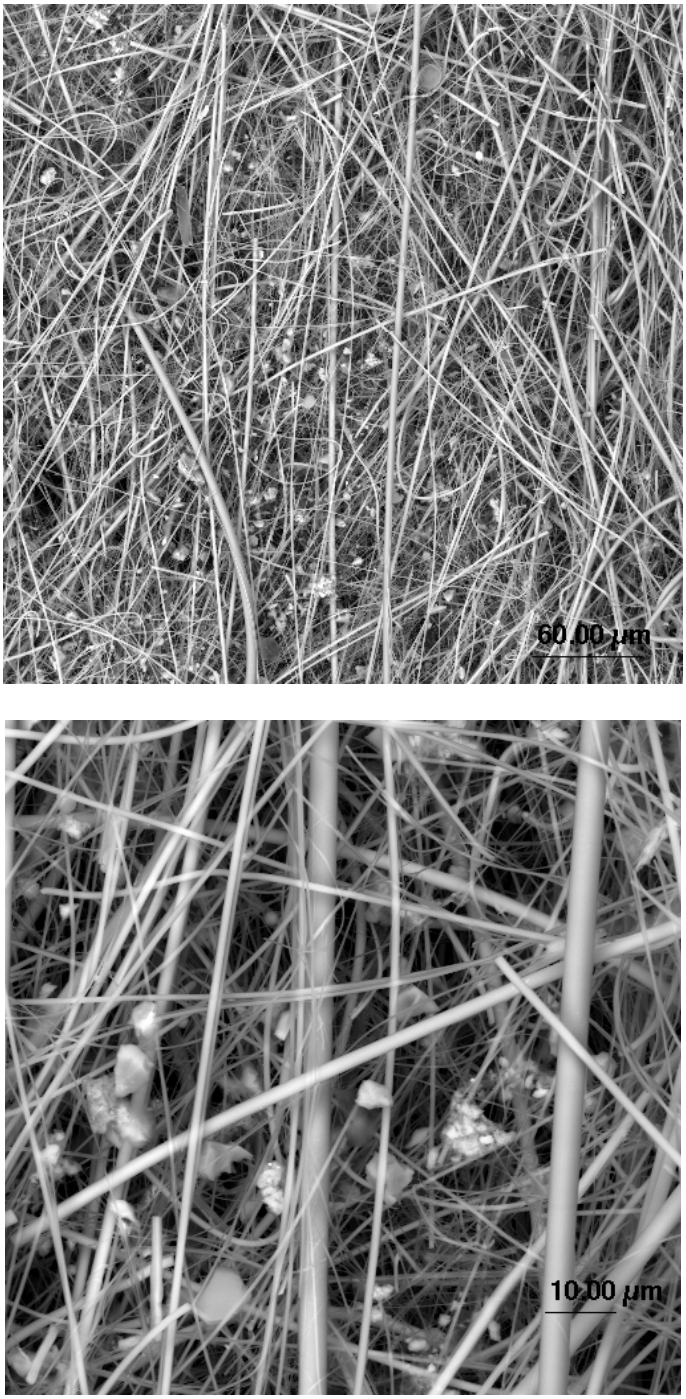


Figure 11. Scanning electron microscope photo of TSS filter used for sand yard discharge water, at two scales.

The sand yard discharge water particles are also much denser than either sewage particles or cellulose particles, both of which have density approximately 1 g/cm^3 or less. In contrast, the density of the dried, settled particulate matter used in the synthetic samples

is approximately 2 g/cm^3 or more. This high density could exacerbate the tendency of the fine particles to be washed through the filters by vigorous washing.

The action that would tend to reduce the salt interference, vigorous washing, thereby reducing erroneously high TSS results in the EPA Method 160.2 test, could also cause the fine, dense particles of sand yard discharge water to pass through the filters, causing erroneously low results. This amounts to a "trade-off" of erroneously high versus erroneously low results that may be dependent on the habits of individual technicians. Therefore, consideration of the two identified factors, water salinity and particle size / density, would indicate that the EPA Method 160.2 is prone to problems for this type of effluent.

IV. Other Weighing Methods of Suspended Solids Quantification

Other methods for determining the concentration of suspended solids (particulate matter) in water that rely on separating the solids from the water, then weighing the solids, have been identified. In addition to EPA Method 160.2, the National Pollutant Discharge Elimination System (NPDES) program's list of authorized test procedures include Standard Methods 2540 D[3] and USGS I-3765-85.[4] (see Table 1B, 40 CFR § 136.3.) Both of these methods use the same glass fiber filters as Method 160.2. While these have minor differences from Method 160.2, including the sample size that is filtered, the problems related to salinity and particle size/density would be essentially the same. Accordingly, other than possible advantages of larger sample size, there is no reason to think that these methods would provide any better accuracy and reliability than Method 160.2. With a recognized source of interference intrinsic to processing sands from the Bay, a marine environment, none of the three methods can be expected to accurately or repeatably produce valid results (although only EPA Method 160.2 was evaluated directly in this study). In other words, while the three approved TSS test methods may be valid in other TSS contexts, they are not valid under the specific conditions of Hanson's operations.

V. Conclusion

A number of experiments have been conducted to evaluate the chronically unreasonable test results reports for Total Suspended Solids (TSS), as quantified by EPA Method 160.2, for effluent water from Hanson's marine sand washing facilities on San Francisco Bay. The approaches included:

- "Blind duplicate" comparisons of effluent samples sent to the same and different California Certified Laboratories;

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[3] Three editions of Standard Methods 2540 D are approved: the 18th Edition (1991), 19th Edition (1995), and 20th Edition (1997). There are some differences among the editions. See, e.g., John Stone *Comparison of NPDES Approved Test Methods*, Express News (Winter 2004) Vol. 2, No. 1, which is available online: http://www.envexp.com/news/express_news-_newsletter.asp (visited Dec. 28, 2004). However, for the purposes of this analysis, the differences among the editions are negligible.

[4] See "Fishman, Marvin J. and Friedman, Linda C., eds., U.S. Department of the Interior, "Methods for Analysis of Inorganic Substances in Water and Fluvial Sediments," Techniques of Water-Resource Investigations of the U.S. Geological Survey, Rev. 1989.

- Comparisons, including blind duplicates of analyses of synthetic samples, which have accurately and precisely measured concentrations of real sand washing effluent silt; and

- Comparisons of California Certified Laboratory results with an alternative test method, Optical Back-Scatterance (OBS), which routinely is used by USGS in open waters of San Francisco Bay.

For each of these experiments, the Certified Laboratories applied the EPA Method 160.2 protocol just as written; therefore, each analytical result would be considered on its own as a valid application of EPA Method 160.2 for purposes of reporting compliance with Hanson's permits (for those samples that were taken as part of the monitoring and reporting program).

The results of these experiments indicate that the EPA Method 160.2 test is neither accurate nor precise for measuring suspended fine mineral sediment ("silt") as TSS in effluent from marine sand processing facilities – and certainly cannot be relied on to measure compliance with permit discharge limits.

Significant variation in blind duplicate test results, significant variation in results of synthetic control samples, and significant variation of EPA Method 160.2 results compared with OBS analysis all indicate that results obtained by EPA Method 160.2 do not have acceptable precision, and cannot be regarded as reliable data. Especially troubling is the indication that the accuracy of the test method may be worse at low levels of TSS – those with actual levels near non-detect or certainly under the permit limits.

Saline interference is a known and documented problem with this EPA Method 160.2. With a recognized source of interference intrinsic to processing sands from the San Francisco Bay, a marine environment, it is not reasonable to view these results of laboratory analyses using this method as accurate or precise. While this approved TSS test method may be valid in other contexts, it is not valid under the specific conditions of Hanson's marine operations, and it should not be used to measure compliance with Hanson's discharge permit limits.

EPA-600/4-79-020

METHODS FOR CHEMICAL ANALYSIS OF WATER AND WASTES

March 1983
Second Printing June 1982

ENVIRONMENTAL MONITORING AND SUPPORT LABORATORY
OFFICE OF RESEARCH AND DEVELOPMENT
U.S. ENVIRONMENTAL PROTECTION AGENCY
CINCINNATI, OHIO 45268

Printed on Recycled Paper

EXHIBIT A

INTRODUCTION

NOTE: Since the first printing of this edition in March 1979, various editorial errors have been brought to our attention which have been corrected in this second printing. In addition, it has been found necessary to add to this printing an updated preservation and holding times table (Table 1), as well as six new methods. They are: under pH, Electrometrics (continuous monitoring), Method 150.2; under Metals, Inductively Coupled Plasma, 200.7; under Metals/Chromium: Hexavalent, Dissolved, Method 218.5; under Metals/Sodium: AA, Furnace, Method 273.2; under Inorganic, non-metallics/Acidity: Titrimetric (acid rain), Method 305.1; and under Organics, Organic Carbon, Total: UV Promoted, Persulfate, Oxidation, Method 415.2.

These additions have been made so as to keep users of the manual current with the procedures the Agency uses in determining compliance with applicable water and effluent standards it has established.

Persons who already possess a copy of the 1979 edition of the manual and who wish to update it by including the cited additions need not request another copy. The new material is available as a separate volume, entitled, "Technical Additions to Methods for Chemical Analysis of Water and Wastes, EPA-600/4-79-020," EPA-600/4-82-055, from ORD Publications, CERI, U.S. Environmental Protection Agency, Cincinnati, OH 45268.

This third edition of "Methods for Chemical Analysis of Water and Wastes" contains the chemical analytical procedures used in U.S. Environmental Protection Agency (EPA) laboratories for the examination of ground and surface waters, domestic and industrial waste effluents, and treatment process samples. Except where noted under "Scope and Application", the methods are applicable to both water and wastewaters, and both fresh and saline water samples. The manual provides test procedures for the measurement of physical, inorganic, and selected organic constituents and parameters. Methods for pesticides, industrial organic waste materials, and sludges are given in other publications of the Agency. The methods were chosen through the combined efforts of the EPA Regional Quality Assurance Coordinators, the staff of the Physical and Chemical Methods Branch, Environmental Monitoring and Support Laboratory, and other senior chemists in both federal and state laboratories. Method selection was based on the following criteria:

(1) The method should measure the desired property or constituent with precision, accuracy, and specificity sufficient to meet the data needs of EPA, in the presence of the interfering materials encountered in water and waste samples.

(2) The procedure should utilize the equipment and skills available in modern water pollution control laboratories.

(3) The selected method is in use in many laboratories or has been sufficiently tested to establish its validity.

(4) The method should be rapid enough to permit routine use for the examination of a large number of samples.

EXHIBIT A

Instrumental methods have been selected in preference to manual procedures because of the improved speed, accuracy, and precision. In keeping with this policy, procedures for the Technicon AutoAnalyzer have been included for laboratories having this equipment available. Other continuous flow automated systems using these identical procedures are acceptable.

Intralaboratory and interlaboratory precision and accuracy statements are provided where such data are available. These interlaboratory statements are derived from interlaboratory studies conducted by the Quality Assurance Branch, Environmental Monitoring and Support Laboratory; the American Society for Testing Materials; or the Analytical Reference Service of the US Public Health Service, DHEW. These methods may be used for measuring both total and dissolved constituents of the sample. When the dissolved concentration is to be determined, the sample is filtered through a 0.45-micron membrane filter and the filtrate analyzed by the procedure specified. The sample should be filtered as soon as possible after it is collected, preferably in the field. Where field filtration is not practical, the sample should be filtered as soon as it is received in the laboratory.

Many water and waste samples are unstable. In situations where the interval between sample collection and analysis is long enough to produce changes in either the concentration or the physical state of the constituent to be measured, the preservation practices in Table I are recommended.

This manual is a basic reference for monitoring water and wastes in compliance with the requirements of the Federal Water Pollution Control Act Amendments of 1972. Although other test procedures may be used, as provided in the Federal Register issue of October 16, 1973 (38FR 28758) and in subsequent amendments, the methods described in this manual will be used by the Environmental Protection Agency in determining compliance with applicable water and effluent standards established by the Agency.

Although a sincere effort has been made to select methods that are applicable to the widest range of sample types, significant interferences may be encountered in certain isolated samples. In these situations, the analyst will be providing a valuable service to EPA by defining the nature of the interference with the method and bringing this information to the attention of the Director, Environmental Monitoring and Support Laboratory, through the appropriate Quality Assurance Coordinator.

EXHIBIT A

SAMPLE PRESERVATION

Complete and unequivocal preservation of samples, either domestic sewage, industrial wastes, or natural waters, is a practical impossibility. Regardless of the nature of the sample, complete stability for every constituent can never be achieved. At best, preservation techniques can only retard the chemical and biological changes that inevitably continue after the sample is removed from the parent source. The changes that take place in a sample are either chemical or biological. In the former case, certain changes occur in the chemical structure of the constituents that are a function of physical conditions. Metal cations may precipitate as hydroxides or form complexes with other constituents; cations or anions may change valence states under certain reducing or oxidizing conditions; other constituents may dissolve or volatilize with the passage of time. Metal cations may also adsorb onto surfaces (glass, plastic, quartz, etc.), such as, iron and lead. Biological changes taking place in a sample may change the valence of an element or a radical to a different valence. Soluble constituents may be converted to organically bound materials in cell structures, or cell lysis may result in release of cellular material into solution. The well known nitrogen and phosphorus cycles are examples of biological influence on sample composition. Therefore, as a general rule, it is best to analyze the samples as soon as possible after collection. This is especially true when the analyte concentration is expected to be in the low ug/l range.

Methods of preservation are relatively limited and are intended generally to (1) retard biological action, (2) retard hydrolysis of chemical compounds and complexes, (3) reduce volatility of constituents, and (4) reduce absorption effects. Preservation methods are generally limited to pH control, chemical addition, refrigeration, and freezing.

The recommended preservative for various constituents is given in Table 1. These choices are based on the accompanying references and on information supplied by various Quality Assurance Coordinators. As more data become available, these recommended holding times will be adjusted to reflect new information. Other information provided in the table is an estimation of the volume of sample required for the analysis, the suggested type of container, and the maximum recommended holding times for samples properly preserved.

EXHIBIT A

TABLE 1

RECOMMENDATION FOR SAMPLING AND PRESERVATION OF SAMPLES ACCORDING TO MEASUREMENT[1]

Measurement	Vol. Req. (ml)	Container[2]	Preservative[3,4]	Holding Time[5]
100 Physical Properties				
Color	50	P,G	Cool, 4°C	48 Hrs.
Conductance	100	P,G	Cool, 4°C	28 Days
Hardness	100	P,G	HNO_3 to pH < 2	6 Mos.
Odor	200	G only	Cool, 4°C	24 Hrs.
pH	25	P,G	None Req.	Analyze Immediately
Residue				
Filterable	100	P,G	Cool, 4°C	7 Days
Non-Filterable	100	P,G	Cool, 4°C	7 Days
Total	100	P,G	Cool, 4°C	7 Days
Volatile	100	P,G	Cool, 4°C	7 Days
Settleable Matter	1000	P,G	Cool, 4°C	48 Hrs.
Temperature	1000	P,G	None Req.	Analyze Immediately
Turbidity	100	P,G	Cool, 4°C	48 Hrs.
200 Metals				
Dissolved	200	P,G	Filter on site HNO_3 to pH < 2	6 Mos.
Suspended	200		Filter on site	6 Mos.[8]
Total	100	P,G	HNO_3 to pH < 2	6 Mos.

EXHIBIT A

TABLE 1 (CONT)

Measurement	Vol. Req. (ml)	Container[2]	Preservative[3,4]	Holding Time[5]
Chromium^{+6}	200	P,G	Cool, 4°C	24 Hrs.
Mercury				
Dissolved	100	P,G	Filter HNO_3 to pH < 2	28 Days
Total	100	P,G	HNO_3 to pH < 2	28 Days
300 Inorganics, Non-Metallics				
Acidity	100	P,G	Cool, 4°C	14 Days
Alkalinity	100	P,G	Cool, 4°C	14 Days
Bromide	100	P,G	None Req.	28 Days
Chloride	50	P,G	None Req.	28 Days
Chlorine	200	P,G	None Req.	Analyze Immediately
Cyanides	500	P,G	Cool, 4°C NaOH to pH >12 0.6g ascorbic acid[6]	14 Days[7]
Fluoride	300	P,G	None Req.	28 Days
Iodide	100	P,G	Cool, 4°C	24 Hrs.
Nitrogen				
Ammonia	400	P,G	Cool,4°C H_2SO_4 to pH < 2	28 Days
Kjeldahl, Total	500	P,G	Cool, 4°C H_2SO_4 to pH < 2	28 Days
Nitrate plus Nitrite	100	P,G	Cool, 4°C H_2SO_4 to pH < 2	28 Days
Nitrate[9]	100	P,G	Cool, 4°C	48 Hrs.
Nitrite	50	P,G	Cool, 4°C	48 Hrs.

EXHIBIT A

TABLE 1 (CONT)

Measurement	Vol. Req. (ml)	Container[2]	Preservative[3,4]	Holding Time[5]
Dissolved Oxygen				
Probe	300	G bottle and top	None Req.	Analyze Immediately
Winkler	300	G bottle and top	Fix on site and store in dark	8 Hours
Phosphorus				
Ortho-phosphate, Dissolved	50	P,G	Filter on site Cool, 4°C	48 Hrs.
Hydrolyzable	50	P,G	Cool, 4°C H_2SO_4 to pH<2	28 Days
Total	50	P,G	Cool, 4°C H_2SO_4 to pH<2	28 Days
Total, Dissolved	50	P,G	Filter on site Cool, 4°C H_2SO_4 to pH<2	24 Hrs.
Silica	50	P only	Cool, 4°C	28 Days
Sulfate	50	P,G	Cool, 4°C	28 Days
Sulfide	500	P,G	Cool, 4°C add 2 ml zinc acetate plus NaOH to pH >9	7 Days
Sulfite	50	P,G	None Req.	Analyze Immediately
400 Organics				
BOD	1000	P,G	Cool, 4°C	48 Hrs.
COD	50	P,G	Cool, 4°C H_2SO_4 to pH<2	28 Days
Oil & Grease	1000	G only	Cool, 4°C H_2SO_4 to pH<2	28 Days
Organic carbon	25	P,G	Cool, 4°C H_2SO_4 or HCl to pH<2	28 Days
Phenolics	500	G only	Cool, 4°C H_2SO_4 to pH <2	28 Days

EXHIBIT A

TABLE 1 (CONT)

Measurement	Vol. Req. (ml)	Container[2]	Preservative[3,4]	Holding Time[5]
MBAS	250	P,G	Cool, 4°C	48 Hrs.
NTA	50	P,G	Cool, 4°C	24 Hrs.

1. More specific instructions for preservation and sampling are found with each procedure as detailed in this manual. A general discussion on sampling water and industrial wastewater may be found in ASTM, Part 31, p. 72–82 (1976) Method D-3370.

2. Plastic (P) or Glass (G). For metals, polyethylene with a polypropylene cap (no liner) is preferred.

3. Sample preservation should be performed immediately upon sample collection. For composite samples each aliquot should be preserved at the time of collection. When use of an automated sampler makes it impossible to preserve each aliquot, then samples may be preserved by maintaining at 4°C until compositing and sample splitting is completed.

4. When any sample is to be shipped by common carrier or sent through the United States Mails, it must comply with the Department of Transportation Hazardous Materials Regulations (49 CFR Part 172). The person offering such material for transportation is responsible for ensuring such compliance. For the preservation requirements of Table 1, the Office of Hazardous Materials, Materials Transportation Bureau, Department of Transportation has determined that the Hazardous Materials Regulations do not apply to the following materials: Hydrochloric acid (HCl) in water solutions at concentrations of 0.04% by weight or less (pH about 1.96 or greater); Nitric acid (HNO_3) in water solutions at concentrations of 0.15% by weight or less (pH about 1.62 or greater); Sulfuric acid (H_2SO_4) in water solutions at concentrations of 0.35% by weight or less (pH about 1.15 or greater); Sodium hydroxide (NaOH) in water solutions at concentrations of 0.080% by weight or less (pH about 12.30 or less).

5. Samples should be analyzed as soon as possible after collection. The times listed are the maximum times that samples may be held before analysis and still considered valid. Samples may be held for longer periods only if the permittee, or monitoring laboratory, has data on file to show that the specific types of sample under study are stable for the longer time, and has received a variance from the Regional Administrator. Some samples may not be stable for the maximum time period given in the table. A permittee, or monitoring laboratory, is obligated to hold the sample for a shorter time if knowledge exists to show this is necessary to maintain sample stability.

6. Should only be used in the presence of residual chlorine.

EXHIBIT A

7. Maximum holding time is 24 hours when sulfide is present. Optionally, all samples may be tested with lead acetate paper before the pH adjustment in order to determine if sulfide is present. If sulfide is present, it can be removed by the addition of cadmium nitrate powder until a negative spot test is obtained. The sample is filtered and then NaOH is added to pH 12.

8. Samples should be filtered immediately on-site before adding preservative for dissolved metals.

9. For samples from non-chlorinated drinking water supplies conc. H_2SO_4 should be added to lower sample pH to less than 2. The sample should be analyzed before 14 days.

EXHIBIT A

RESIDUE, NON-FILTERABLE

Method 160.2 (Gravimetric, Dried at 103–105°C)

STORET NO. 00530

1. Scope and Application
   1.1 This method is applicable to drinking, surface, and saline waters, domestic and industrial wastes.
   1.2 The practical range of the determination is 4 mg/l to 20,000 mg/l.
2. Summary of Method
   2.1 A well-mixed sample is filtered through a glass fiber filter, and the residue retained on the filter is dried to constant weight at 103–105°C.
   2.2 The filtrate from this method may be used for Residue, Filterable.
3. Definitions
   3.1 Residue, non-filterable, is defined as those solids which are retained by a glass fiber filter and dried to constant weight at 103–105°C.
4. Sample Handling and Preservation
   4.1 Non-representative particulates such as leaves, sticks, fish, and lumps of fecal matter should be excluded from the sample if it is determined that their inclusion is not desired in the final result.
   4.2 Preservation of the sample is not practical; analysis should begin as soon as possible. Refrigeration or icing to 4°C, to minimize microbiological decomposition of solids, is recommended.
5. Interferences
   5.1 Filtration apparatus, filter material, pre-washing, post-washing, and drying temperature are specified because these variables have been shown to affect the results.
   5.2 Samples high in Filterable Residue (dissolved solids), such as saline waters, brines and some wastes, may be subject to a positive interference. Care must be taken in selecting the filtering apparatus so that washing of the filter and any dissolved solids in the filter (7.5) minimizes this potential interference.
6. Apparatus
   6.1 Glass fiber filter discs, without organic binder, such as Millipore AP-40, Reeves Angel 934-AH, Gelman type A/E, or equivalent.
   NOTE: Because of the physical nature of glass fiber filters, the absolute pore size cannot be controlled or measured. Terms such as "pore size", collection efficiencies and effective retention are used to define this property in glass fiber filters. Values for these parameters vary for the filters listed above.
   6.2 Filter support: filtering apparatus with reservoir and a coarse (40–60 microns) fritted disc as a filter support.

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NOTE: Many funnel designs are available in glass or porcelain. Some of the most common are Hirsch or Buchner funnels, membrane filter holders and Gooch crucibles. All are available with coarse fritted disc.

6.3 Suction flask.

6.4 Drying oven, 103–105°C.

6.5 Desiccator.

6.6 Analytical balance, capable of weighing to 0.1 mg.

7. Procedure

7.1 Preparation of glass fiber filter disc: Place the glass fiber filter on the membrane filter apparatus or insert into bottom of a suitable Gooch crucible with wrinkled surface up. While vacuum is applied, wash the disc with three successive 20 ml volumes of distilled water. Remove all traces of water by continuing to apply vacuum after water has passed through. Remove filter from membrane filter apparatus or both crucible and filter if Gooch crucible is used, and dry in an oven at 103–105°C for one hour. Remove to desiccator and store until needed. Repeat the drying cycle until a constant weight is obtained (weight loss is less than 0.5 mg). Weigh immediately before use. After weighing, handle the filter or crucible/filter with forceps or tongs only.

7.2 Selection of Sample Volume

For a 4.7 cm diameter filter, filter 100 ml of sample. If weight of captured residue is less than 1.0 mg, the sample volume must be increased to provide at least 1.0 mg of residue. If other filter diameters are used, start with a sample volume equal to 7 ml/cm^2 of filter area and collect at least a weight of residue proportional to the 1.0 mg stated above.

NOTE: If during filtration of this initial volume the filtration rate drops rapidly, or if filtration time exceeds 5 to 10 minutes, the following scheme is recommended: Use an unweighed glass fiber filter of choice affixed in the filter assembly. Add a known volume of sample to the filter funnel and record the time elapsed after selected volumes have passed through the filter. Twenty-five ml increments for timing are suggested. Continue to record the time and volume increments until fitration rate drops rapidly. Add additional sample if the filter funnel volume is inadequate to reach a reduced rate. Plot the observed time versus volume filtered. Select the proper filtration volume as that just short of the time a significant change in filtration rate occurred.

7.3 Assemble the filtering apparatus and begin suction. Wet the filter with a small volume of distilled water to seat it against the fritted support.

7.4 Shake the sample vigorously and quantitatively transfer the predetermined sample volume selected in 7.2 to the filter using a graduated cylinder. Remove all traces of water by continuing to apply vacuum after sample has passed through.

7.5 With suction on, wash the graduated cylinder, filter, non-filterable residue and filter funnel wall with three portions of distilled water allowing complete drainage between washing. Remove all traces of water by continuing to apply vacuum after water has passed through.

NOTE: Total volume of wash water used should equal approximately 2 ml per cm^2. For a 4.7 cm filter the total volume is 30 ml.

EXHIBIT A

7.6 Carefully remove the filter from the filter support. Alternatively, remove crucible and filter from crucible adapter. Dry at least one hour at 103–105°C. Cool in a desiccator and weigh. Repeat the drying cycle until a constant weight is obtained (weight loss is less than 0.5 mg).

8. Calculations

8.1 Calculate non-filterable residue as follows:

$$\text{Non-filterable residue, mg/l} = \frac{(A - B)\times 1{,}000}{C}$$

where:

A = weight of filter (or filter and crucible) + residue in mg
B = weight of filter (or filter and crucible) in mg
C = ml of sample filtered

9. Precision and Accuracy

9.1 Precision data are not available at this time.

9.2 Accuracy data on actual samples cannot be obtained.

Bibliography

1. NCASI Technical Bulletin No. 291, March 1977. National Council of the Paper Industry for Air and Stream Improvement, Inc., 260 Madison Ave., NY.

EXHIBIT A

Exhibit B
Oakland Effluent Data

Discharge Point E-001

		Curtiss & Tompkins TSS mg/l	Sequoia TSS mg/l	Sequoia Repeat* TSS mg/l	OBS Calc TSS mg/l
2004 Q3					
9-Jul-04	Fri	88	18		
12-Jul-04	Mon	95	21		
13-Jul-04	Tue	77	22		
15-Jul-04	Thur		18		
16-Jul-04	Fri		14		
19-Jul-04	Mon		18		
20-Jul-04	Tue		16		
21-Jul-04	Wed		19		
22-Jul-04	Thu	72	5		
23-Jul-04	Fri	88	9		
26-Jul-04	Mon	85	6		
27-Jul-04	Tue	83	12		8
28-Jul-04	Wed	70	9		
29-Jul-04	Thu	84	14		14
30-Jul-04	Fri				
31-Jul-04	Sat				
1-Aug-04	Sun				
2-Aug-04	Mon	92	81	140	
3-Aug-04	Tue	92	8		10
4-Aug-04	Wed	91	21		10
5-Aug-04	Thu	79	27		9
6-Aug-04	Fri	40	24		8
7-Aug-04	Sat				
8-Aug-04	Sun				
9-Aug-04	Mon	69	32		7
10-Aug-04	Tue	45	31		14
11-Aug-04	Wed				
12-Aug-04	Thu	81	37		10
13-Aug-04	Fri	88	19		13
14-Aug-04	Sat				

* Where initial results indicated a level of 40 mg/l or higher, Sequoia was directed to repeat the test, using the same sample as used in the initial analysis.

		Curtiss & Tompkins TSS mg/l	Sequoia TSS mg/l	Sequoia Repeat TSS mg/l	OBS Calc TSS mg/l
2004 Q3 (continued)					
15-Aug-04	Sun				
16-Aug-04	Mon	93	30		16
17-Aug-04	Tue	88	22		16
18-Aug-04	Wed	42	18		31
19-Aug-04	Thu	41	36		13
20-Aug-04	Fri	56	16		16
21-Aug-04	Sat				
22-Aug-04	Sun				
23-Aug-04	Mon	96	19		12
24-Aug-04	Tue		23		17
25-Aug-04	Wed	88	15		19
26-Aug-04	Thu	84	28		19
27-Aug-04	Fri				
28-Aug-04	Sat				
29-Aug-04	Sun				
30-Aug-04	Mon				
31-Aug-04	Tue				
1-Sep-04	Wed	ND	ND		19
2-Sep-04	Thu				
3-Sep-04	Fri	35	31		36
4-Sep-04	Sat				
5-Sep-04	Sun				
6-Sep-04	Mon				
7-Sep-04	Tue				
8-Sep-04	Wed	88	21		15
9-Sep-04	Thu	97	23		26
10-Sep-04	Fri	100	32		16
11-Sep-04	Sat				
12-Sep-04	Sun				
13-Sep-04	Mon	55	10		8
14-Sep-04	Tue	41	20		12
15-Sep-04	Wed	15	14		10
16-Sep-04	Thu	13	24		
17-Sep-04	Fri				
18-Sep-04	Sat				
19-Sep-04	Sun				

		Curtiss & Tompkins TSS mg/l	Sequoia TSS mg/l	Sequoia Repeat TSS mg/l	OBS Calc TSS mg/l
2004 Q3 (continued)					
20-Sep-04	Mon	90	23		23
21-Sep-04	Tue	82	24		13
22-Sep-04	Wed	34	12		9
23-Sep-04	Thu	39	38		14
24-Sep-04	Fri	39	17		10
25-Sep-04	Sat				
26-Sep-04	Sun				
27-Sep-04	Mon	92	21		15
28-Sep-04	Tue				
29-Sep-04	Wed		24		6
30-Sep-04	Thu				

		Curtiss & Tompkins TSS mg/l	Sequoia TSS mg/l	Sequoia Repeat TSS mg/l	OBS Calc TSS mg/l
2004 Q4					
1-Oct-04	Fri				
2-Oct-04	Sat				
3-Oct-04	Sun				
4-Oct-04	Mon	90	25		5
5-Oct-04	Tue	67	23		6
6-Oct-04	Wed	27	18		4
7-Oct-04	Thu	27	16		4
8-Oct-04	Fri	28	28		2
9-Oct-04	Sat				
10-Oct-04	Sun				
11-Oct-04	Mon				
12-Oct-04	Tue	26	31		4
13-Oct-04	Wed	120	27		7
14-Oct-04	Thu	73	22		8
15-Oct-04	Fri	16	21		7
16-Oct-04	Sat				
17-Oct-04	Sun				
18-Oct-04	Mon				
19-Oct-04	Tue				
20-Oct-04	Wed	190	19		4

		Curtiss & Tompkins TSS mg/l	Sequoia TSS mg/l	Sequoia Repeat TSS mg/l	OBS Calc TSS mg/l
2004 Q4 (continued)					
21-Oct-04	Thu	13	16		6
22-Oct-04	Fri	18	140	100	8
23-Oct-04	Sat				
24-Oct-04	Sun				
25-Oct-04	Mon	18	39		12
26-Oct-04	Tue	16	95	34	4
27-Oct-04	Wed				
28-Oct-04	Thu				
29-Oct-04	Fri	26	21		4
30-Oct-04	Sat				
31-Oct-04	Sun				
1-Nov-04	Mon	32	32		4
2-Nov-04	Tue				
3-Nov-04	Wed	21	24		10
4-Nov-04	Thu	12	18		10
5-Nov-04	Fri	8	24		9
6-Nov-04	Sat				
7-Nov-04	Sun				
8-Nov-04	Mon	25	41		7
9-Nov-04	Tue	15	20		5
10-Nov-04	Wed	5	28		2
11-Nov-04	Thu	16	24		4
12-Nov-04	Fri				
13-Nov-04	Sat				
14-Nov-04	Sun				
15-Nov-04	Mon	29	70	30	5
16-Nov-04	Tue				
17-Nov-04	Wed	nd	47	38	23
18-Nov-04	Thu	28	66	22	4
19-Nov-04	Fri	61	13		8
20-Nov-04	Sat				
21-Nov-04	Sun				
22-Nov-04	Mon	25	29		3
23-Nov-04	Tue	22	17		4
24-Nov-04	Wed	15	20		2
25-Nov-04	Thu				

		Curtiss & Tompkins TSS mg/l	Sequoia TSS mg/l	Sequoia Repeat TSS mg/l	OBS Calc TSS mg/l
2004 Q4 (continued)					
26-Nov-04	Fri				
27-Nov-04	Sat				
28-Nov-04	Sun				
29-Nov-04	Mon	30	22		4
30-Nov-04	Tue	30	31		1
1-Dec-04	Wed	27	20		2
2-Dec-04	Thu	ND	73	26	2
3-Dec-04	Fri	11	100	21	40
4-Dec-04	Sat				
5-Dec-04	Sun				
6-Dec-04	Mon	29	37		2
7-Dec-04	Tue	120	35		1
8-Dec-04	Wed	15	14		4
9-Dec-04	Thu	27	20		2
10-Dec-04	Fri	7	ND		1
11-Dec-04	Sat				
12-Dec-04	Sun				
13-Dec-04	Mon	30	25		4
14-Dec-04	Tue	17	23		1
15-Dec-04	Wed				
16-Dec-04	Thu	25	8		3
17-Dec-04	Fri	16	9		1
18-Dec-04	Sat				
19-Dec-04	Sun				
20-Dec-04	Mon	20	15		3
21-Dec-04	Tue				
22-Dec-04	Wed				
23-Dec-04	Thu				
24-Dec-04	Fri				
25-Dec-04	Sat				
26-Dec-04	Sun				
27-Dec-04	Mon				
28-Dec-04	Tue	20	45	5	1
29-Dec-04	Wed				
30-Dec-04	Thu				
31-Dec-04	Fri				

		Curtiss & Tompkins TSS mg/l	Sequoia TSS mg/l	Sequoia Repeat TSS mg/l	OBS Calc TSS mg/l
2005 Q1					
1-Jan-05	Sat				
2-Jan-05	Sun				
3-Jan-05	Mon				
4-Jan-05	Tue	51	11		4
5-Jan-05	Wed	59	17		3
6-Jan-05	Thu	19	13		2
7-Jan-05	Fri				
8-Jan-05	Sat				
9-Jan-05	Sun				
10-Jan-05	Mon	25	ND		1
11-Jan-05	Tue				
12-Jan-05	Wed				
13-Jan-05	Thu				
14-Jan-05	Fri	27	18		12
15-Jan-05	Sat				
16-Jan-05	Sun				
17-Jan-05	Mon	22	ND		3
18-Jan-05	Tue	25	45	10	4
19-Jan-05	Wed	26	89	9	4
20-Jan-05	Thu	32	80	11	2
21-Jan-05	Fri	38	79	12	3
22-Jan-05	Sat				
23-Jan-05	Sun				
24-Jan-05	Mon	33	99	22	5
25-Jan-05	Tue				
26-Jan-05	Wed				
27-Jan-05	Thu				
28-Jan-05	Fri	25	78	16	1
29-Jan-05	Sat				
30-Jan-05	Sun				
31-Jan-05	Mon	33	16		2
1-Feb-05	Tue	21	25		1
2-Feb-05	Wed	30	24		1
3-Feb-05	Thu	31	16		7
4-Feb-05	Fri	ND	15		5
5-Feb-05	Sat				

		Curtiss & Tompkins TSS mg/l	Sequoia TSS mg/l	Sequoia Repeat TSS mg/l	OBS Calc TSS mg/l
2005 Q1 (continued)					
6-Feb-05	Sun				
7-Feb-05	Mon	21	24		1
8-Feb-05	Tue	16	19		1
9-Feb-05	Wed	62	26		1
10-Feb-05	Thu	63	18		1
11-Feb-05	Fri				
12-Feb-05	Sat				
13-Feb-05	Sun				
14-Feb-05	Mon	71	87	13	2
15-Feb-05	Tue	41	74	41	1
16-Feb-05	Wed	43	62	68	1
17-Feb-05	Thu	63	64	32	1
18-Feb-05	Fri	51	54	36	1
19-Feb-05	Sat				
20-Feb-05	Sun				
21-Feb-05	Mon				
22-Feb-05	Tue	120	64	64	1
23-Feb-05	Wed	55	61	86	3
24-Feb-05	Thu				
25-Feb-05	Fri				
26-Feb-05	Sat				
27-Feb-05	Sun				
28-Feb-05	Mon	20	8		1
1-Mar-05	Tue	21	64	55	1
2-Mar-05	Wed	26	58	58	2
3-Mar-05	Thu	26	59	20	1
4-Mar-05	Fri				
5-Mar-05	Sat				
6-Mar-05	Sun				
7-Mar-05	Mon	30	43	29	2
8-Mar-05	Tue	40	50	45	28
9-Mar-05	Wed	29	42	24	1
10-Mar-05	Thu	26	75	21	1
11-Mar-05	Fri	33	80	5	1
12-Mar-05	Sat				
13-Mar-05	Sun				

		Tompkins TSS mg/l	Sequoia TSS mg/l	Repeat TSS mg/l	OBS Calc TSS mg/l
2005 Q1 (continued)					
14-Mar-05	Mon	32	68	6	3
15-Mar-05	Tue	33	ND		1
16-Mar-05	Wed	13	73	62	3
17-Mar-05	Thu	20	82	66	1
18-Mar-05	Fri				
19-Mar-05	Sat				
20-Mar-05	Sun				
21-Mar-05	Mon				
22-Mar-05	Tue				
23-Mar-05	Wed	48	23		1
24-Mar-05	Thu	20	42	74	3
25-Mar-05	Fri				
26-Mar-05	Sat				
27-Mar-05	Sun				
28-Mar-05	Mon				
29-Mar-05	Tue	28	63	64	1
30-Mar-05	Wed	ND	70	21	2
31-Mar-05	Thu	15	27		1

Discharge Point E-002

		Curtiss & Tompkins TSS mg/l	Sequoia TSS mg/l	Sequoia Repeat TSS mg/l	OBS Calc TSS mg/l
2004 Q2					
9-Jul-04	Fri	78	12		
12-Jul-04	Mon				
13-Jul-04	Tue				
15-Jul-04	Thur		33		
16-Jul-04	Fri		47	47	
19-Jul-04	Mon				
20-Jul-04	Tue				
21-Jul-04	Wed		19		
22-Jul-04	Thu				
23-Jul-04	Fri	98	11		
26-Jul-04	Mon				
27-Jul-04	Tue				
28-Jul-04	Wed				
29-Jul-04	Thu				
30-Jul-04	Fri		ND		
31-Jul-04	Sat				
1-Aug-04	Sun				
2-Aug-04	Mon				
3-Aug-04	Tue	89	ND		3
4-Aug-04	Wed	60	13		9
5-Aug-04	Thu	84	16		9
6-Aug-04	Fri	28	23		7
7-Aug-04	Sat				
8-Aug-04	Sun				
9-Aug-04	Mon				
10-Aug-04	Tue	46	22		14
11-Aug-04	Wed				
12-Aug-04	Thu				
13-Aug-04	Fri				
14-Aug-04	Sat				
15-Aug-04	Sun				
16-Aug-04	Mon				
17-Aug-04	Tue	120	46	110	14
18-Aug-04	Wed				
19-Aug-04	Thu				
20-Aug-04	Fri	73	11		18
21-Aug-04	Sat				
22-Aug-04	Sun				
23-Aug-04	Mon				
24-Aug-04	Tue		17		22

		Curtiss & Tompkins TSS mg/l	Sequoia TSS mg/l	Sequoia Repeat TSS mg/l	OBS Calc TSS mg/l
2004 Q2 (continued)					
25-Aug-04	Wed	80	26		22
26-Aug-04	Thu				
27-Aug-04	Fri				
28-Aug-04	Sat				
29-Aug-04	Sun				
30-Aug-04	Mon				
31-Aug-04	Tue				
1-Sep-04	Wed				
2-Sep-04	Thu	51	39		44
3-Sep-04	Fri				
4-Sep-04	Sat				
5-Sep-04	Sun				
6-Sep-04	Mon				
7-Sep-04	Tue				
8-Sep-04	Wed				
9-Sep-04	Thu				
10-Sep-04	Fri				
11-Sep-04	Sat				
12-Sep-04	Sun				
13-Sep-04	Mon	70	22		
14-Sep-04	Tue	41	13		
15-Sep-04	Wed	16	14		
16-Sep-04	Thu	24	11		
17-Sep-04	Fri				
18-Sep-04	Sat				
19-Sep-04	Sun				
20-Sep-04	Mon	71	19		
21-Sep-04	Tue	39	34		
22-Sep-04	Wed				
23-Sep-04	Thu	15	48	8	7
24-Sep-04	Fri				
25-Sep-04	Sat				
26-Sep-04	Sun				
27-Sep-04	Mon				
28-Sep-04	Tue				
29-Sep-04	Wed		79	21	8
30-Sep-04	Thu				

		Curtiss & Tompkins TSS mg/l	Sequoia TSS mg/l	Sequoia Repeat TSS mg/l	OBS Calc TSS mg/l
2004 Q4					
1-Oct-04	Fri				
2-Oct-04	Sat				
3-Oct-04	Sun				
4-Oct-04	Mon				
5-Oct-04	Tue	48	24		5
6-Oct-04	Wed	23	13		8
7-Oct-04	Thu	21	22		11
8-Oct-04	Fri				
9-Oct-04	Sat				
10-Oct-04	Sun				
11-Oct-04	Mon				
12-Oct-04	Tue				
13-Oct-04	Wed				
14-Oct-04	Thu	60	8		10
15-Oct-04	Fri				
16-Oct-04	Sat				
17-Oct-04	Sun				
18-Oct-04	Mon				
19-Oct-04	Tue				
20-Oct-04	Wed	13	13		26
21-Oct-04	Thu	31	31		14
22-Oct-04	Fri				
23-Oct-04	Sat				
24-Oct-04	Sun				
25-Oct-04	Mon	20	35		5
26-Oct-04	Tue	20	42	24	45
27-Oct-04	Wed				
28-Oct-04	Thu				
29-Oct-04	Fri	110	15		6
30-Oct-04	Sat				
31-Oct-04	Sun				
1-Nov-04	Mon				
2-Nov-04	Tue				
3-Nov-04	Wed				
4-Nov-04	Thu				
5-Nov-04	Fri				
6-Nov-04	Sat				
7-Nov-04	Sun				
8-Nov-04	Mon				
9-Nov-04	Tue				
10-Nov-04	Wed				
11-Nov-04	Thu	20	28		37

		Curtiss & Tompkins TSS mg/l	Sequoia TSS mg/l	Sequoia Repeat TSS mg/l	OBS Calc TSS mg/l
2004 Q4 (continued)					
12-Nov-04	Fri				
13-Nov-04	Sat				
14-Nov-04	Sun				
15-Nov-04	Mon				
16-Nov-04	Tue				
17-Nov-04	Wed				
18-Nov-04	Thu				
19-Nov-04	Fri				
20-Nov-04	Sat				
21-Nov-04	Sun				
22-Nov-04	Mon				
23-Nov-04	Tue				
24-Nov-04	Wed				
25-Nov-04	Thu				
26-Nov-04	Fri				
27-Nov-04	Sat				
28-Nov-04	Sun				
29-Nov-04	Mon				
30-Nov-04	Tue	11	32		30
1-Dec-04	Wed				
2-Dec-04	Thu				
3-Dec-04	Fri				
4-Dec-04	Sat				
5-Dec-04	Sun				
6-Dec-04	Mon	34	50	37	22
7-Dec-04	Tue	10	32		7
8-Dec-04	Wed	12	18		13
9-Dec-04	Thu	9	8		10
10-Dec-04	Fri	21	15		18
11-Dec-04	Sat				
12-Dec-04	Sun				
13-Dec-04	Mon				
14-Dec-04	Tue				
15-Dec-04	Wed				
16-Dec-04	Thu				
17-Dec-04	Fri				
18-Dec-04	Sat				
19-Dec-04	Sun				
20-Dec-04	Mon				
21-Dec-04	Tue				
22-Dec-04	Wed				
23-Dec-04	Thu				

		Curtiss & Tompkins TSS mg/l	Sequoia TSS mg/l	Sequoia Repeat TSS mg/l	OBS Calc TSS mg/l
2004 Q4 (continued)					
24-Dec-04	Fri				
25-Dec-04	Sat				
26-Dec-04	Sun				
27-Dec-04	Mon				
28-Dec-04	Tue	11	84	ND	9
29-Dec-04	Wed				
30-Dec-04	Thu				
31-Dec-04	Fri				

		Curtiss & Tompkins TSS mg/l	Sequoia TSS mg/l	Sequoia Repeat TSS mg/l	OBS Calc TSS mg/l
2005 Q1					
1-Jan-05	Sat				
2-Jan-05	Sun				
3-Jan-05	Mon				
4-Jan-05	Tue				
5-Jan-05	Wed				
6-Jan-05	Thu				
7-Jan-05	Fri				
8-Jan-05	Sat				
9-Jan-05	Sun				
10-Jan-05	Mon	10	ND		
11-Jan-05	Tue				
12-Jan-05	Wed				
13-Jan-05	Thu				
14-Jan-05	Fri				
15-Jan-05	Sat				
16-Jan-05	Sun				
17-Jan-05	Mon				
18-Jan-05	Tue				
19-Jan-05	Wed				
20-Jan-05	Thu				
21-Jan-05	Fri				
22-Jan-05	Sat				
23-Jan-05	Sun				
24-Jan-05	Mon				
25-Jan-05	Tue				
26-Jan-05	Wed				
27-Jan-05	Thu				
28-Jan-05	Fri				
29-Jan-05	Sat				

		Curtiss & Tompkins TSS mg/l	Sequoia TSS mg/l	Sequoia Repeat TSS mg/l	OBS Calc TSS mg/l
2005 Q1 (continued)					
30-Jan-05	Sun				
31-Jan-05	Mon	21	9		
1-Feb-05	Tue				
2-Feb-05	Wed				
3-Feb-05	Thu	23	27		
4-Feb-05	Fri				
5-Feb-05	Sat				
6-Feb-05	Sun				
7-Feb-05	Mon				
8-Feb-05	Tue				
9-Feb-05	Wed				
10-Feb-05	Thu	69	36		5
11-Feb-05	Fri				
12-Feb-05	Sat				
13-Feb-05	Sun				
14-Feb-05	Mon				
15-Feb-05	Tue	31	40	43	17
16-Feb-05	Wed	24	36		10
17-Feb-05	Thu	61	65	60	6
18-Feb-05	Fri				
19-Feb-05	Sat				
20-Feb-05	Sun				
21-Feb-05	Mon				
22-Feb-05	Tue				
23-Feb-05	Wed	84	44	60	4
24-Feb-05	Thu				
25-Feb-05	Fri				
26-Feb-05	Sat				
27-Feb-05	Sun				
28-Feb-05	Mon				
1-Mar-05	Tue				
2-Mar-05	Wed				
3-Mar-05	Thu				
4-Mar-05	Fri				
5-Mar-05	Sat				
6-Mar-05	Sun				
7-Mar-05	Mon		52	77	
8-Mar-05	Tue		55	39	
9-Mar-05	Wed	26	42	24	
10-Mar-05	Thu	25	75	ND	
11-Mar-05	Fri				

		Curtiss & Tompkins TSS mg/l	Sequoia TSS mg/l	Sequoia Repeat TSS mg/l	OBS Calc TSS mg/l
2005 Q1 (continued)					
12-Mar-05	Sat				
13-Mar-05	Sun				
14-Mar-05	Mon	30	32		
15-Mar-05	Tue	27	ND		
16-Mar-05	Wed	53	77	72	
17-Mar-05	Thu	13	75	69	
18-Mar-05	Fri				
19-Mar-05	Sat				
20-Mar-05	Sun				
21-Mar-05	Mon				
22-Mar-05	Tue				
23-Mar-05	Wed				
24-Mar-05	Thu	16	34		6
25-Mar-05	Fri				
26-Mar-05	Sat				
27-Mar-05	Sun				
28-Mar-05	Mon				
29-Mar-05	Tue	42	110	110	81
30-Mar-05	Wed				
31-Mar-05	Thu				

HANSON AGGREGATES' MARINE SAND PROCESSING FACILITIES MARINE SAND PROCESSING WATER QUALITY CONTROL

ADDENDUM 1 – "EXPERIMENT 4"

TECHNICAL REPORT
EVALUATION OF THE ACCURACY AND RELIABILITY OF EPA TEST METHOD 160.2 TO MEASURE TOTAL SUSPENDED SOLIDS (TSS) IN EFFLUENT FROM MARINE SAND PROCESSING FACILITIES

PREPARED BY
Barry Keller, Ph.D., RG, CHG

JUNE 16, 2005

ADDENDUM 1 – "EXPERIMENT 4" TECHNICAL REPORT EVALUATION OF THE ACCURACY AND RELIABILITY OF EPA TEST METHOD 160.2 TO MEASURE TOTAL SUSPENDED SOLIDS (TSS) IN EFFLUENT FROM MARINE SAND PROCESSING FACILITIES

I. Introduction

This is an addendum to the June 1, 2005 Technical Report summarizing the evaluation conducted by Dr. Barry Keller, PhD RG CHG, a hydrogeophysicist, of the accuracy and reliability of EPA laboratory test method 160.2. Method 160.2 is used to measure the amount of Total Suspended Solids (TSS) present in effluent discharged from marine sand processing facilities owned and operated by Hanson Aggregates. The Technical Report summarized the results of experiments conducted to better understand the reasons for erratic TSS results from the EPA Method 160.2 test. Since June 1, an additional experiment, Experiment Number 4, has been completed. This addendum describes Experiment Number 4.

The Technical Report (Figure 9) noted the surprising result that many EPA Method 160.2 TSS results had high values, often exceeding regulatory limits, even when samples contained very low TSS concentrations as indicated by OBS, i.e., concentrations of TSS less than 10 mg/L. Because a likely explanation of this phenomenon is that the Method 160.2 results in fact represent dissolved salt, and not suspended solid particulates, an additional experiment, "Experiment 4", was performed using prepared water samples with no suspended particulates, but significant dissolved salt content. These samples then were submitted "blind" and in duplicate to two Certified Laboratories to further evaluate the accuracy (relation to true value) of the test method. As discussed below, the Method 160.2 results were significantly high, with higher reported TSS values corresponding to higher dissolved salt content. This experiment adds support to the findings of the earlier Technical Report..

II. Sample Preparation

Experiment 4 utilized two liters of Bay water collected from the channel at the Hanson's Oakland Tidewater Yard ("Oakland Yard"), which were filtered through the same filters that are used for Method 160.2 tests (Whatman 934-AH). This same filtration method was used to produce the "ZERO TSS" water used in the OBS calibrations in Experiment Number 3 (see Figure 6) of the Technical Report. Here, the water was filtered slowly by gravity drainage, and no water was sprayed onto the filter, as may occur in the Method 160.2 procedure. For this reason, the possibility of fine particulates passing the filter is minimal, and the Optical Back-Scatterance (OBS) tests confirm that this filtered seawater has no TSS. Thus, the two liters of filtered Bay water used in Experiment Number 4 were assumed to have ZERO TSS.

To one liter of the filtered Bay water, which was extremely clear, was added 10 mL of black coffee, which resulted in a pale brown color similar to effluent samples. The color in coffee is due to dissolved material, not suspended material, and this coffee was prepared using sealed paper filter packages. Therefore, the possibility of any "TSS"

being derived from the coffee is considered nil. This liter of pale brown water was poured into four 250 mL sample bottles, two of which were labeled JUN-1 and two JUN-2. The salt content of Bay water in this area is typically approximately 30 g/L; because these samples used Bay water from this area, the salt content of these samples is assumed to be the same: 30 g/L.

To the other liter of filtered Bay water was added 35 g of table salt (Trader Joe's Kosher Flake Salt). This was stirred until no salt crystals were visible in the bottom of the beaker. The water was still extremely clear. 10 mL of black coffee was added, which produced pale brown water. This liter of pale brown water was poured into four 250 mL sample bottles, two of which were labeled JUN-3 and two labeled JUN-4. The salt content of this water was approximately 65 g/L.

One set of four bottles each, JUN-1, JUN-2, JUN-3, and JUN-4, was submitted to each of two Certified Laboratories, Sequoia Laboratories (Sequoia), and Curtiss and Tompkins Laboratories (CT Lab).

III. Results

All samples at both laboratories had reportable TSS (Table 1). At both laboratories, the water with higher dissolved salt content was reported as having higher TSS. The Sequoia results all were equal to or greater than the existing permit daily limit of 45 mg/L contained in both Hanson's individual NPDES permits for its San Francisco Pier 92 Yard ("San Francisco Yard") and Oakland Yard, as well as the General Permit for discharges from aggregate mining and sand washing facilities. The CT Lab results were greater than these limits for the ~65 g/L dissolved salt samples, and one of the ~30g/L dissolved salt samples had a reported value above the monthly average limit of 30 mg/L.

SAMPLE	DESCRIPTION	DISSOLVED SALT CONTENT in PREPARED SAMPLE	ACTUAL TSS in PREPARED SAMPLE	SEQUOIA TSS RESULTS (Method 160.2)	CT LAB TSS RESULTS (Method 160.2)
JUN-1	Filtered bay water with black coffee (no salt added)	~30 g/L	0 mg/L	45 mg/L	33 mg/L
JUN-2	Filtered bay water with black coffee (no salt added)	~30 g/L	0 mg/L	54 mg/L	27 mg/L
JUN-3	Filtered bay water with black coffee plus 35 g/l salt	~65 g/L	0 mg/L	110 mg/L	51 mg/L
JUN-4	Filtered bay water with black coffee plus 35 g/l salt	~65 g/L	0 mg/L	130 mg/L	120 mg/L

Table 1. Results of Experiment 4.

IV. Discussion and Conclusion

Synthetic samples of water with ZERO TSS but significant dissolved salt content that had been colored to look like effluent samples were reported by two Certified Laboratories to have significant TSS concentrations. In several cases, these reported concentrations were above regulatory limits. The salt content of the less concentrated samples (JUN-1 and JUN-2) was similar to that of Oakland Yard effluent water, and about half again that of San Francisco Yard effluent water. These results imply that some or all of the high TSS results that Hanson has reported over the years for the effluent monitoring samples in fact represent dissolved salt, and not suspended solid particulates.

The results of Experiment Number 4 further underscore the conclusions resulting from the Experiments summarized in the Technical Report: EPA Method 160.2 is neither accurate nor precise for measuring suspended fine mineral sediment ("silt") as TSS in effluent from marine sand processing facilities – and certainly cannot be relied on to measure compliance with permit discharge limits. Further, saline interference, which is a known and documented problem with Method 160.2 in other contexts, demonstrably precludes accurate, precise measurement of TSS in effluent from Hanson's marine sand processing facilities. Regulation of TSS using Method 160.2 is not valid under the specific conditions of Hanson's marine operations, and Method 160.2 should not be used to measure compliance with discharge permit limits.

HANSON AGGREGATES' MARINE SAND PROCESSING FACILITIES MARINE SAND PROCESSING WATER QUALITY CONTROL

ADDENDUM 2 – "MEMBRANE FILTER TEST"

TECHNICAL REPORT
EVALUATION OF THE ACCURACY AND RELIABILITY OF EPA TEST METHOD 160.2 TO MEASURE TOTAL SUSPENDED SOLIDS (TSS) IN EFFLUENT FROM MARINE SAND PROCESSING FACILITIES

PREPARED BY
Barry Keller, Ph.D., RG, CHG

MARCH 24, 2006

ADDENDUM 2 – "MEMBRANE FILTER TEST" TECHNICAL REPORT EVALUATION OF THE ACCURACY AND RELIABILITY OF EPA TEST METHOD 160.2 TO MEASURE TOTAL SUSPENDED SOLIDS (TSS) IN EFFLUENT FROM MARINE SAND PROCESSING FACILITIES

I. Introduction

This is a second addendum to the June 1, 2005 Technical Report summarizing the evaluation conducted by Dr. Barry Keller, PhD RG CHG, a hydrogeophysicist, of the accuracy and reliability of EPA laboratory test method 160.2. Method 160.2 is used to measure the amount of Total Suspended Solids (TSS) present in effluent discharged from marine sand processing facilities owned and operated by Hanson Aggregates. The Technical Report summarized the results of experiments conducted to better understand the reasons for erratic TSS results from the EPA Method 160.2 test. Subsequent to June 1, 2005, an additional experiment, Experiment Number 4, was completed, and described in Addendum 1.

This addendum, Addendum 2, describes yet another experiment requested by the RWQCB in an e-mail from Dr. Tong Yin to Mr. Bill Butler of Hanson on January 24, 2006. This experiment used plastic membrane filters instead of the glass fiber filters that are normally used in Method 160.2. The alternative methodology suggested by the RWQCB was based on a document titled Recommended Guidelines for Measuring Conventional Marine Water-Column Variables in Puget Sound, dated May 1991, prepared by Puget Sound Water Quality Authority for USEPA Region 10. On page 26 of that document is a description of the alternative Method 160.2 procedure using a membrane filter.

The membrane filter experiment used: filtered Bay water; filtered Bay water with double salt content; and filtered Bay water with three different concentrations of silica flour, a commercially available material that has very similar density and particle size properties to sand washing silt, but is white in color. These samples were then submitted "blind" and in duplicate to two Certified Laboratories to evaluate the accuracy (relation to true values) and precision (repeatability) of the test method using the membrane filters. The USEPA Region 10 document was also forwarded to the Certified Laboratories to ensure that the correct procedure was followed. As discussed below, samples of the pure filtered Bay water and Bay water with double salt samples that should have tested to have no suspended solids had many significant reported "TSS" concentrations. Further, most of the silica flour sample results were higher than the actual values.

II. Sample Preparation

The Membrane Filter Test utilized Bay water collected from the channel at the Hanson's Oakland Tidewater Yard ("Oakland Yard"), which was filtered through the glass fiber filters that are normally used for Method 160.2 tests (Whatman 934-AH). This same filtration method was used to produce the "ZERO TSS" water used in the OBS

calibrations in Experiment Number 3 (see Figure 6) of the Technical Report. Here, the water was filtered slowly by gravity drainage, and no water was sprayed onto the filter, as may occur in the Method 160.2 procedure. While the glass fiber filters have a nominal (and poorly controlled) pore size of about 2 microns, the membrane filters have a pore size of 0.45 microns. For these reasons, the possibility of fine particulates passing the filter is minimal, and previous Optical Back-Scatterance (OBS) tests confirmed that such filtered seawater has no TSS. Thus, the filtered Bay water used in the Membrane Filter Test 4 was assumed to have ZERO TSS.

The salt content of Bay water in this area is typically approximately 30 g/L; because these samples used Bay water from this area, the salt content of these samples is assumed to be the same: 30 g/L. The "filtered Bay water with double salt samples" were prepared by adding 30 g of table salt (Trader Joe's Kosher Flake Salt) to a liter of filtered Bay water. This was stirred until no salt crystals were visible in the bottom of the beaker. The salt content of this water was approximately 60 g/L.

The silica flour samples were prepared by mixing in precisely weight quantities of MIN-U-SIL 15 (silica flour produced by U.S. Silica with particle size distribution equivalent to sand washing discharge silt) to produce TSS concentrations of 30.30 mg/L, 50.74 mg/l, and 102.22 mg/L. These were mixed in 10 L batches in the OBS test chamber and the samples taken while the mixture was being actively stirred. All of the samples were split into 250 aliquots in plastic laboratory bottles and labeled as:

- MF1, 6 - Filtered Bay Water;
- MF 2, 7 – Filtered Bay Water with Double Salt;
- MF 3, 8 – Filtered Bay Water with 30.30 mg/L silica flour;
- MF 4, 9 - Filtered Bay Water with 57.54 mg/L silica flour;
- MF 5, 10 - Filtered Bay Water with 102.11 mg/L silica flour.

One set of ten bottles each was submitted to each of two Certified Laboratories, Sequoia Laboratories (Sequoia), and Curtiss and Tompkins Laboratories (CT Lab), with special requests to use membrane filters. At Sequoia, Vesapore 0.45 micron membrane filters were used. At CT, PALL Corp. GN-6 0.45 micron membrane filters were used. Laboratory results are included as Appendix A.

III. Results

Of the eight analyses of filtered Bay water without silica flour (four with double salt) seven had reported TSS concentrations. Several of these concentrations were above the TSS limits in the existing RWQCB permits. Of the twelve analyses of samples with silica flour, ten reported TSS concentrations were higher than the actual, measured TSS

values. Thus, the accuracy of the membrane filter test for saline water with silica flour that simulates sand washing silt is poor. In particular, as with the normal Method 160.2 test, samples with no real TSS, but high salt contents, are prone to false high reported TSS values.

In terms of precision, there was considerable spread, as much as 57 mg/L, between blind duplicate samples at the same laboratory, and an even higher spread between laboratories. In many cases the difference between blind duplicate sample results at a single laboratory was greater than a factor of 2. Thus, the precision of the membrane filter test for saline water with silica flour that simulates sand washing silt is also poor.

SAMPLE	DESCRIPTION	DISSOLVED SALT CONTENT	ACTUAL measured TSS	SEQUOIA TSS Results	CT LAB TSS Results
MF-1	Filtered bay water	~30 g/L	0 mg/L	11 mg/L	66 mg/L
MF-6	Duplicate Split of MF-1	~30 g/L	0 mg/L	37 mg/L	32 mg/L
MF-2	Filtered bay water plus 30 g/L salt	~60 g/L	0 mg/L	21 mg/L	ND
MF-7	Duplicate Split of MF-2	~60 g/L	0 mg/L	82 mg/L	43 mg/L
MF-3	Filtered bay water plus silica flour	~30 g/L	30.30 mg/L	50 mg/L	60 mg/L
MF-8	Duplicate Split of MF-3	~30 g/L	30.30 mg/L	39 mg/L	55 mg/L
MF-4	Filtered bay water plus silica flour	~30 g/L	57.54 mg/L	66 mg/L	93 mg/L

MF-9	Duplicate Split of MF-4	~30 g/L	57.54 mg/L	61 mg/L	150 mg/L
MF-5	Filtered bay water plus silica flour	~30 g/L	102.11 mg/L	100 mg/L	120 mg/L
MF-10	Duplicate Split of MF-5	~30 g/L	102.11 mg/L	110 mg/L	69 mg/L

Table 1. Results of the Membrane Filer Test.

IV. Discussion and Conclusion

Tests of an alternative type of filter, a 0.45 micron plastic membrane filter, in EPA Method 160.2, total suspended solids (TSS), using both filtered saline water and synthetic samples prepared with precisely weighed amounts of silica flour added to filtered saline water did not produce acceptable results, in terms of either accuracy or precision.

The results of the Membrane Filter Test further underscore the conclusions resulting from the Experiments summarized in the Technical Report: EPA Method 160.2, even using a different filter type, is neither accurate nor precise for measuring suspended fine mineral sediment ("silt", or its equivalent, silica flour) as TSS in effluent from marine sand processing facilities – and certainly cannot be relied on to measure compliance with permit discharge limits. Further, saline interference, which is a known and documented problem with Method 160.2 in other contexts, demonstrably precludes accurate, precise measurement of TSS in effluent from Hanson's marine sand processing facilities. Regulation of TSS using Method 160.2 is not valid under the specific conditions of Hanson's marine operations, and Method 160.2, even using a different filter type, should not be used to measure compliance with discharge permit limits.

Fact Sheet Appendix F-3

Alameda Creek Hardness Calculation

Appendix F-3

Hardness Calculation for Alameda Creek Discharges

No.	Station	Date	Hardness (mg/L as CaCO3)	Ln(hardness)
1	AC_AADLL	4/11/2006 11:20:00	11	2.3979
2	AM_AALP	12/12/2006 12:00:00	49	3.8955
3	AC_AADLL	6/29/2005 00:00:03	56	4.0254
4	AM_AALP	8/9/2005 00:00:00	74	4.3041
5	AM_AALP	7/27/2005 00:00:01	76	4.3307
6	AM_AALP	8/15/2005 00:00:00	82	4.4067
7	AC_AADLL	2/26/2004 00:00:00	82	4.4067
8	AM_AALP	4/28/2005 00:00:00	84	4.4308
9	AM_AALP	7/20/2005 00:00:01	87	4.4659
10	AM_AALP	8/3/2005 00:00:01	87	4.4659
11	AC_AADLL	4/22/2004 00:00:00	87	4.4659
12	AM_AALP	6/1/2005 00:00:01	88	4.4773
13	AM_AALP	8/22/2005 00:00:00	90	4.4998
14	AM_AALP	7/6/2005 00:00:01	91	4.5109
15	AM_AALP	4/22/2004 00:00:00	92	4.5218
16	AC_AADLL	1/22/2004 00:00:00	92	4.5218
17	AM_AALP	9/21/2005 00:00:01	95	4.5539
18	AM_AALP	4/8/2004 00:00:00	96	4.5643
19	AM_AALP	6/22/2005 00:00:01	96	4.5643
20	AM_AALP	6/16/2005 00:00:00	98	4.5850
21	AM_AALP	8/29/2005 00:00:00	100	4.6052
22	AM_AALP	10/19/2005 08:26:08	101	4.6151
23	AM_AALP	11/5/2005 04:08:27	103	4.6347
24	AM_AALP	4/1/2004 00:00:00	104	4.6444
25	AM_AALP	11/5/2004 00:00:00	106	4.6634
26	AC_AADLL	5/25/2006 13:09:00	106	4.6634
27	AC_AADLL	6/1/2006 11:25:00	106	4.6634
28	AM_AALP	11/24/2004 00:00:00	107	4.6728
29	AM_AALP	3/25/2004 00:00:00	108	4.6821
30	AM_AALP	10/25/2005 00:00:00	109	4.6913
31	AC_AADLL	5/18/2006 12:44:00	109	4.6913
32	AM_AALP	2/7/2006 00:00:05	110	4.7005
33	AM_AALP	9/8/2005 03:56:00	111	4.7095
34	AC_AADLL	2/16/2005 03:47:03	111	4.7095
35	AC_AADLL	6/20/2006 00:00:23	111	4.7095
36	AC_AADLL	3/15/2005 00:00:00	112	4.7185
37	AC_AADLL	4/5/2005 03:50:00	112	4.7185
38	AC_AADLL	4/25/2006 13:20:00	112	4.7185
39	AC_AADLL	3/1/2005 00:00:00	113	4.7274
40	AC_AADLL	5/3/2005 00:00:00	113	4.7274
41	AC_AADLL	4/19/2006 11:27:00	113	4.7274
42	AC_AADLL	5/4/2006 12:40:00	113	4.7274
43	AM_AALP	9/13/2005 00:00:00	114	4.7362
44	AC_AADLL	4/13/2005 03:50:38	114	4.7362
45	AC_AADLL	3/21/2006 08:25:00	114	4.7362
46	AM_AALP	12/1/2004 00:00:01	115	4.7449
47	AM_AALP	10/10/2005 00:00:00	116	4.7536
48	AC_AADLL	5/10/2006 00:00:00	116	4.7536
49	AC_AADLL	4/5/2006 10:39:00	117	4.7622
50	AC_AADLL	12/20/2005 00:00:00	118	4.7707
51	AC_AADLL	3/14/2006 12:57:00	120	4.7875
52	AM_AALP	2/26/2004 00:00:00	122	4.8040
53	AM_AALP	10/3/2005 00:00:00	123	4.8122
54	AC_AADLL	2/28/2006 00:00:05	123	4.8122
55	AC_AADLL	6/13/2006 08:42:01	124	4.8203
56	AM_AALP	11/23/2005 00:00:00	128	4.8520
57	AC_AADLL	1/13/2005 00:00:00	128	4.8520
58	AC_AADLL	4/19/2005 00:00:00	129	4.8598
59	AC_AADLL	3/7/2006 00:00:04	130	4.8675
60	AM_AALP	12/6/2005 00:00:00	131	4.8752
61	AM_AALP	12/13/2005 00:00:00	132	4.8828
62	AC_AADLL	3/22/2005 00:00:00	132	4.8828
63	AM_AALP	5/18/2005 00:00:01	133	4.8903
64	AC_AADLL	3/8/2005 00:00:00	133	4.8903
65	AC_AADLL	12/27/2005 00:00:00	134	4.8978
66	AC_AADLL	1/4/2006 00:00:00	134	4.8978
67	AM_AALP	3/30/2005 00:00:01	136	4.9127
68	AM_AALP	3/14/2006 10:05:00	139	4.9345
69	AM_AALP	11/30/2005 00:00:00	142	4.9558
70	AM_AALP	2/11/2004 00:00:02	142	4.9591
71	AC_AADLL	1/19/2006 00:00:00	143	4.9628
72	AC_AADLL	3/28/2006 07:34:00	143	4.9628
73	AC_AADLL	1/3/2003 00:00:00	143	4.9663
74	AM_AALP	4/5/2006 10:39:00	145	4.9767
75	AC_AADLL	6/27/2006 00:00:24	147	4.9904

No.	Station	Date	Hardness (mg/L as CaCO3)	Ln(hardness)
127	AC_AADLL	8/7/2003 00:00:01	188	5.2364
128	AC_AADLL	2/8/2006 00:00:00	188	5.2364
129	AC_AADLL	8/15/2007 10:47:00	188	5.2364
130	AC_AADLL	5/18/2005 00:00:01	189	5.2417
131	AC_AADLL	8/29/2005 00:00:00	189	5.2417
132	AM_AALP	2/14/2006 00:00:06	190	5.2470
133	AC_AADLL	9/14/2005 00:00:01	190	5.2470
134	AM_AALP	12/27/2005 00:00:00	191	5.2523
135	AC_AADLL	8/12/2003 00:00:00	191	5.2523
136	AC_AADLL	8/22/2005 00:00:00	192	5.2575
137	AC_AADLL	1/9/2003 00:00:01	193	5.2606
138	AC_AADLL	4/14/2004 00:00:03	193	5.2627
139	AM_AALP	1/13/2005 00:00:00	194	5.2679
140	AC_AADLL	5/8/2007 10:13:00	194	5.2703
141	AC_AADLL	1/15/2003 00:00:00	195	5.2728
142	AM_AALP	3/22/2005 00:00:00	196	5.2781
143	AC_AADLL	1/20/2005 00:00:00	197	5.2832
144	AC_AADLL	1/10/2006 00:00:05	197	5.2832
145	AM_AALP	2/21/2006 00:00:04	198	5.2883
146	AC_AADLL	7/24/2003 09:45:00	198	5.2883
147	AC_AADLL	12/21/2004 13:57:00	198	5.2883
148	AC_AADLL	2/21/2006 00:00:04	198	5.2883
149	AC_AADLL	6/15/2007 14:50:00	198	5.2904
150	AC_AADLL	7/10/2003 09:55:00	199	5.2933
151	AM_AALP	3/21/2006 11:00:00	200	5.2983
152	AC_AADLL	12/12/2006 09:30:00	201	5.3033
153	AM_AALP	5/25/2006 13:09:00	202	5.3083
154	AC_AADLL	2/18/2004 00:00:01	202	5.3083
155	AC_AADLL	9/21/2005 00:00:01	202	5.3083
156	AM_AALP	2/28/2006 00:00:05	203	5.3132
157	AC_AADLL	7/2/2003 10:00:00	203	5.3132
158	AC_AADLL	5/27/2003 00:00:00	203	5.3145
159	AC_AADLL	1/7/2004 00:00:01	204	5.3181
160	AC_AADLL	4/29/2004 00:00:00	205	5.3225
161	AC_AADLL	6/12/2003 09:45:00	205	5.3230
162	AC_AADLL	9/8/2005 03:56:00	205	5.3230
163	AC_AADLL	5/22/2003 00:00:01	206	5.3277
164	AC_AADLL	6/18/2003 11:30:00	206	5.3279
165	AC_AADLL	4/8/2004 00:00:00	206	5.3279
166	AM_AALP	5/18/2006 15:21:00	207	5.3327
167	AC_AADLL	5/6/2004 00:00:00	207	5.3327
168	AC_AADLL	6/17/2004 00:00:00	207	5.3327
169	AC_AADLL	3/13/2007 11:30:00	207	5.3348
170	AM_AALP	2/21/2007 10:15:00	208	5.3375
171	AC_AADLL	3/24/2004 00:00:01	208	5.3375
172	AC_AADLL	10/25/2005 00:00:00	208	5.3375
173	AC_AADLL	2/27/2003 00:00:01	208	5.3390
174	AM_AALP	1/2/2005 03:53:00	209	5.3423
175	AM_AALP	5/4/2006 13:20:00	209	5.3423
176	AC_AADLL	7/17/2003 10:15:00	209	5.3423
177	AC_AADLL	5/19/2004 00:00:01	209	5.3423
178	AC_AADLL	10/10/2005 00:00:00	209	5.3423
179	AC_AADLL	2/6/2003 00:00:01	210	5.3467
180	AC_AADLL	5/27/2004 00:00:00	210	5.3471
181	AC_AADLL	5/12/2004 00:00:02	211	5.3519
182	AC_AADLL	9/28/2005 00:00:01	211	5.3519
183	AC_AADLL	1/9/2007 09:05:00	212	5.3560
184	AM_AALP	4/5/2005 03:50:00	212	5.3566
185	AC_AADLL	11/3/2005 00:00:04	212	5.3566
186	AC_AADLL	11/5/2005 04:08:27	212	5.3566
187	AC_AADLL	11/23/2005 00:00:00	212	5.3566
188	AC_AADLL	7/12/2007 11:33:00	212	5.3566
189	AC_AADLL	4/10/2003 00:00:01	213	5.3629
190	AM_AALP	5/10/2006 00:00:00	214	5.3660
191	AC_AADLL	7/1/2004 00:00:00	214	5.3660
192	AC_AADLL	2/10/2005 00:00:00	215	5.3706
193	AC_AADLL	3/19/2003 00:00:00	216	5.3731
194	AC_AADLL	7/30/2003 10:15:00	216	5.3753
195	AC_AADLL	6/24/2004 00:00:00	216	5.3753
196	AC_AADLL	3/27/2003 00:00:01	217	5.3778
197	AM_AALP	6/20/2006 00:00:23	217	5.3799
198	AC_AADLL	11/30/2005 00:00:00	217	5.3799
199	AC_AADLL	3/13/2003 00:00:02	217	5.3802
200	AC_AADLL	2/11/2003 00:00:00	217	5.3818
201	AC_AADLL	1/30/2003 00:00:01	218	5.3823

Appendix F-3

Hardness Calculation for Alameda Creek Discharges

No.	Station	Date	Hardness (mg/L as CaCO3)	Ln(hardness)
76	AC_AADLL	7/27/2005 00:00:01	148	4.9972
77	AM_AALP	5/12/2005 00:00:00	150	5.0106
78	AC_AADLL	8/9/2005 00:00:00	154	5.0370
79	AC_AADLL	6/5/2006 12:15:00	156	5.0499
80	AC_AADLL	7/18/2006 00:00:23	156	5.0499
81	AC_AADLL	10/3/2005 00:00:00	157	5.0562
82	AC_AADLL	7/20/2005 00:00:01	159	5.0689
83	AM_AALP	2/4/2004 00:00:01	160	5.0752
84	AC_AADLL	7/25/2006 00:00:23	160	5.0752
85	AC_AADLL	8/17/2006 00:00:00	160	5.0752
86	AC_AADLL	8/23/2006 00:00:00	160	5.0752
87	AC_AADLL	8/1/2006 15:47:07	161	5.0814
88	AC_AADLL	10/2/2006 12:00:00	162	5.0876
89	AM_AALP	2/23/2005 00:00:01	163	5.0938
90	AC_AADLL	7/4/2006 00:00:23	164	5.0999
91	AC_AADLL	8/10/2006 00:00:00	164	5.0999
92	AC_AADLL	9/5/2006 00:00:24	164	5.0999
93	AC_AADLL	9/11/2006 09:36:00	164	5.0999
94	AC_AADLL	5/7/2003 00:00:00	164	5.1002
95	AM_AALP	7/11/2006 00:00:22	165	5.1059
96	AC_AADLL	6/1/2005 00:00:01	165	5.1059
97	AM_AALP	1/19/2006 00:00:00	166	5.1120
98	AC_AADLL	8/3/2005 00:00:01	167	5.1180
99	AC_AADLL	7/11/2006 00:00:22	167	5.1180
100	AM_AALP	3/11/2004 00:00:00	168	5.1240
101	AC_AADLL	1/5/2005 00:00:01	171	5.1417
102	AC_AADLL	8/30/2006 00:00:00	172	5.1475
103	AM_AALP	2/16/2005 03:47:03	173	5.1533
104	AC_AADLL	4/28/2005 00:00:00	173	5.1533
105	AC_AADLL	5/1/2003 00:00:01	177	5.1753
106	AC_AADLL	7/6/2005 00:00:01	177	5.1761
107	AC_AADLL	1/24/2006 12:50:00	177	5.1761
108	AC_AADLL	8/15/2005 00:00:00	178	5.1818
109	AC_AADLL	1/31/2006 00:00:05	178	5.1818
110	AC_AADLL	9/18/2006 10:59:00	178	5.1818
111	AC_AADLL	9/27/2006 08:44:00	178	5.1818
112	AC_AADLL	7/13/2005 00:00:02	180	5.1930
113	AM_AALP	4/19/2005 00:00:00	181	5.1985
114	AC_AADLL	10/10/2006 11:00:00	182	5.2040
115	AC_AADLL	11/14/2006 09:11:00	182	5.2040
116	AC_AADLL	5/25/2005 00:00:02	183	5.2095
117	AC_AADLL	6/22/2005 00:00:01	183	5.2095
118	AC_AADLL	12/18/2003 00:00:00	184	5.2149
119	AC_AADLL	6/16/2005 00:00:00	184	5.2149
120	AC_AADLL	10/19/2005 08:26:08	184	5.2149
121	AM_AALP	3/8/2005 00:00:00	185	5.2204
122	AC_AADLL	2/14/2006 00:00:06	186	5.2257
123	AC_AADLL	10/17/2006 11:45:00	186	5.2257
124	AC_AADLL	2/2/2005 00:00:01	187	5.2311
125	AC_AADLL	5/15/2003 00:00:01	187	5.2328
126	AC_AADLL	6/26/2003 10:00:00	188	5.2364

No.	Station	Date	Hardness (mg/L as CaCO3)	Ln(hardness)
202	AM_AALP	4/24/2006 11:25:00	219	5.3891
203	AC_AADLL	6/2/2004 00:00:03	219	5.3891
204	AC_AADLL	4/9/2007 12:00:00	219	5.3902
205	AC_AADLL	2/20/2003 00:00:01	220	5.3924
206	AM_AALP	7/4/2006 00:00:23	221	5.3982
207	AC_AADLL	1/23/2003 00:00:01	221	5.3999
208	AC_AADLL	6/9/2004 03:41:01	222	5.4027
209	AC_AADLL	4/3/2003 00:00:02	223	5.4080
210	AC_AADLL	4/22/2003 00:00:00	224	5.4102
211	AM_AALP	6/5/2006 13:00:00	224	5.4116
212	AM_AALP	3/4/2004 00:00:00	227	5.4250
213	AM_AALP	4/11/2006 09:30:00	227	5.4250
214	AC_AADLL	12/6/2005 00:00:00	227	5.4250
215	AC_AADLL	4/16/2003 00:00:00	228	5.4304
216	AC_AADLL	6/3/2003 11:15:00	229	5.4337
217	AC_AADLL	12/13/2005 00:00:00	229	5.4337
218	AM_AALP	2/18/2004 00:00:01	230	5.4381
219	AM_AALP	3/1/2005 00:00:00	230	5.4381
220	AM_AALP	4/20/2006 11:25:00	231	5.4424
221	AC_AADLL	3/11/2004 00:00:00	231	5.4424
222	AC_AADLL	1/15/2004 00:00:00	232	5.4467
223	AC_AADLL	3/30/2005 00:00:01	232	5.4467
224	AC_AADLL	3/6/2003 00:00:01	233	5.4505
225	AC_AADLL	2/11/2004 00:00:02	235	5.4595
226	AM_AALP	3/7/2006 00:00:04	236	5.4638
227	AM_AALP	3/28/2006 07:34:00	236	5.4638
228	AM_AALP	1/5/2006 00:00:00	240	5.4806
229	AC_AADLL	2/4/2004 00:00:01	240	5.4806
230	AC_AADLL	3/3/2004 00:00:01	240	5.4806
231	AM_AALP	3/14/2007 07:52:00	240	5.4813
232	AC_AADLL	1/29/2004 00:00:00	250	5.5215
233	AC_AADLL	12/11/2003 00:00:00	255	5.5413
234	AM_AALP	8/15/2007 12:27:00	256	5.5452
235	AM_AALP	11/16/2007 13:45:00	264	5.5759
236	AC_AADLL	3/18/2004 00:00:00	268	5.5910
237	AC_AADLL	4/1/2004 00:00:00	274	5.6131
238	AC_AADLL	12/26/2003 00:00:00	279	5.6312
239	AM_AALP	6/29/2005 00:00:03	285	5.6525
240	AC_AADLL	10/27/2004 00:00:01	294	5.6836
241	AM_AALP	6/8/2005 00:00:01	310	5.7366
242	AM_AALP	1/9/2003 00:00:01	323	5.7764
243	AC_AADLL	2/21/2007 13:30:00	324	5.7807
244	AM_AALP	6/1/2006 13:18:00	383	5.9480
			AVG	5.1123
			STDEV	0.3750
			Count	244
			STD ERR	0.0240
			t0.7	0.5251
			AGM	**164**