California Regional Water Quality Control Board
San Francisco Bay Region

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Linda S. Adams
Secretary for
Environmental Protection

Arnold Schwarzenegger
Governor

August 27, 2008

By Certified Mail, Return Receipt Requested

U.S. Department of Transportation
Honorable Mary E. Peters
Secretary of Transportation
1200 New Jersey Avenue, SE
Washington, D.C. 20590

Maritime Administration
Honorable Sean T. Connaughton
Maritime Administrator
West Building
Southeast Federal Center
1200 New Jersey Avenue, SE
Washington, D.C. 20590

Re: **60-Day Notice of Intent to Sue Under the Clean Water Act for Unlawful Discharge of Pollutants by Non-Retention Vessels Comprising the National Defense Reserve Fleet at Suisun Bay, Solano County, California**

Dear Secretary Peters and Administrator Connaughton:

The California Regional Water Quality Control Board, San Francisco Bay Region (hereafter "Water Board"), hereby provides notice of its intent to sue the U.S. Department of Transportation; the Honorable Mary E. Peters, in her official capacity as Secretary of Transportation; the United States Maritime Administration ("MARAD"); and the Honorable Sean T. Connaughton, in his official capacity as Maritime Administrator. These persons and entities are hereafter collectively referred to as the "Federal Violators." The Water Board provides this notice pursuant to sections 505(a)(1) and 505(b)(1) of the Federal Water Pollution Control Act (hereafter referred to as the "Clean Water Act" or "CWA"), 33 U.S.C. § 1365(a)(1) and (b)(1) and its implementing regulations, 40 C.F.R. Part 135, Subpart A.

The Water Board is an agency of the State of California, and is one of nine such regional water quality control boards which have been delegated the authority to administer and implement the Clean Water Act in California, including the authority to issue National Point Source Discharge Elimination System ("NPDES") permits and to enforce the Clean Water Act through the California Porter-Cologne Water Quality Control Act (hereafter "Porter-Cologne Act," Cal. Water Code § 13000 et seq.). (Cal. Water Code §§ 13200 et seq., 13370, 13372, 13376, 13377, 13385.) The Water Board is a "citizen" within the meaning of 33 U.S.C. § 1365(g) because its interests in ensuring compliance with the Clean Water Act and Porter Cologne Act, preventing pollution and contamination of waters of the state and of the United States, and protecting the

designated beneficial uses of waters of the state and of the United States have been adversely affected by the Federal Violators' discharges of pollutants in violation of the Clean Water Act, as described in this notice letter.

Introduction and Background

According to MARAD's draft *Programmatic Environmental Assessment for Removal of Non-Retention Vessels from National Defense Reserve Fleet Sites for Disposal*, dated June 2008 (hereafter "Draft EA"), MARAD currently maintains 57 non-retention vessels at the National Defense Reserve Fleet ("NRDF") at Suisun Bay (hereafter the "Suisun Bay Reserve Fleet" or "SBRF"). (Draft EA at p. 1-4.) "Non-retention vessels" are "NRDF vessels that have been determined by [MARAD] to be of insufficient value for commercial or military operation to warrant further preservation. The term is used synonymously with 'obsolete vessels'." (*Id.* at p. 5-5.) These vessels are stored in Suisun Bay, which constitutes waters of the state and of the United States, and is located northeast of the City of Benicia in Solano County, California. Pursuant to section 303(d) of the Clean Water Act (33 U.S.C. § 1313(d)), Suisun Bay is listed by the Water Board as "impaired," due to both point and non-point sources, by the following pollutants (among others): mercury, nickel, polychlorinated biphenyls (PCBs), dioxin and selenium. (See State Water Resources Control Board, *2006 CWA Section 303(d) List of Water Quality Limited Segments*, excerpts of which are attached hereto as "Exhibit A;" see also Draft EA at pp. 3-3, 3-5.)

Since 1994, Congress repeatedly has mandated that MARAD remove and dispose of the obsolete NRDF vessels by specified dates. (See National Maritime Heritage Act of 1994, Pub. L. No. 103-451, § 6, 108 Stat. 4769, 4777 (1994); National Defense Authorization Act for Fiscal Year 1998, Pub. L. No. 105-85, § 1026, 111 Stat. 1629, 1878 (1997); National Defense Authorization Act for Fiscal Year 2001, Pub. L. No. 106-398, § 3502, 114 Stat. 1654, 1654A-490-492 (2000).) However, the Federal Violators have failed to meet each of these statutory deadlines, and the SBRF vessels consequently remain in Suisun Bay. Moreover, the vessels are likely to remain in Suisun Bay for the foreseeable future; the Water Board is unaware of any specific time frame for removal of these ships.

The obsolete vessels in the SBRF are poorly maintained and are in a highly deteriorated condition. (Draft EA at p. 4-7.) These vessels contain many liquid and solid wastes, materials and other pollutants as defined in section 502(6) of the Clean Water Act. (33 U.S.C. § 1362(6).) A draft "Vessel Environmental Review" of the SBRF prepared in 2007 by R&M Environmental and Infrastructure Engineering, Inc. analyzed the hulls of forty of the SBRF vessels and found that they contained elevated concentrations of zinc, copper, mercury, lead, hexavalent chromium, tributyltin and other heavy metals and other pollutants. (R&M Envt'l & Infrastructure Eng., Inc., *National Defense Reserve Fleet (NRDF), Suisun Bay, CA Vessel Environmental Review*, Feb. 15, 2007, hereafter "R&M Report," at pp. 27-34, excerpts attached hereto as "Exhibit B;" see also Draft EA at pp. 3-6 – 3-8.)

The Draft EA likewise indicates that "[n]on-retention ships contain a variety of hazardous and toxic materials within their structural components." (Draft EA at p. 3-6.) For example, the EA

states, lead-based paint "is found extensively in older ships," as is paint and protective hull coatings containing chromium, cadmium, nickel, zinc, copper and manganese, and tributyltin, organotin and other toxic anti-fouling agents. (*Id.* at pp. 3-7, 3-8, 4-9.) In fact, "[h]eavy metals including mercury, lead, chromium, cadmium, zinc, copper, nickel and manganese are found *throughout* older ships." (*Id.* at p. 3-7, emphasis added.) Moreover, "[m]any of the ships currently moored at the fleet have degraded coatings." (*Ibid.*) In addition, "PCBs are likely to be found in regulated concentrations" on ship equipment and materials and "many areas on a ship." (*Ibid.*) "Asbestos [also] is found on ships in many types of materials." (*Id.* at p. 3-6.) Finally, non-retention ships commonly contain used oil such as "spent lubricating fluids . . . ; industrial oils . . . ; metal-working oil; and refrigeration oil." (*Id.* at p. 3-8.) "Diesel fuel and fuel oil may be contained in various tanks throughout a ship," and "[l]ubricating oil can be found in engine sumps and drums . . . and oil sludge can be found in fuel and cargo tanks, machinery and piping systems." (*Ibid.*)

The R&M Report found that the forty sampled vessel hulls exceeded toxicity criteria for hazardous waste with respect to zinc, lead, copper, hexavalent chromium, mercury, cadmium and barium. (Ex. B, R&M Report at pp. ES-1, ES-2, 28-30; see also Draft EA at p. 4-14.) The R&M Report also found that paint and other materials containing heavy metals and other pollutants have fallen and are continuing to fall off the ships' corroded hulls into the surrounding waters of Suisun Bay. Specifically, the forty ships evaluated have lost 18,271 kg (over 20 tons) of hexavalent chromium, copper, lead, zinc and other heavy metals from their hulls, and an estimated 57,179 kg of metals remain on the exterior surfaces of these ships.[1] (Ex. B, R&M Report at pp. ES-2, ES-3, 3, 4, 32-34.) These metals and other materials will continue to exfoliate from the ships due to age and weathering, and continue to be released into the surrounding environment of Suisun Bay. (See *id.* at p. 33.) The discharge of paint and other materials from the SBRF ships to Suisun Bay also has been documented by the National Oceanic and Atmospheric Administration (NOAA) in its recent studies of the site. (See NOAA DARRP Program, Suisun Bay Nat'l Reserve Fleet Assessment Project, Field Sampling Highlights, attached hereto as "Exhibit C.")

The Draft EA confirms that the SBRF vessels are "highly deteriorated," and that two of the SBRF vessels have known holes in their hulls "which can be a possible pathway for potentially hazardous materials to leach into the environment." (Draft EA at pp. 3-9, 4-7.) According to the EA, many of the other vessels' hulls are in "poor" or "fair" condition, and have some "potential" for holes. (*Id.* at pp. 3-9, 4-8.) A December 2006 test of the hulls of two MARAD vessels, the *Jason* and *Queens Victory*, conducted by the California Department of Toxic Substances

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[1] Because the R&M Report only evaluated forty of the 57 non-retention ships, it is highly likely that the actual amount of pollutants that already have been discharged and will continue to be discharged into Suisun Bay are higher than the amounts stated in the report. In addition, the R&M Report "only concerned itself with the paints and coating issues," and did not examine the forty ships for the potential presence of asbestos, PCBs, fuels, oils and other substances. (Ex. B, R&M Report at p. 1.) Nor did the R&M Report examine paint exfoliation below the waterline. (*Id.* at p. 5.)

Control, found "elevated levels of copper, chromium, and zinc" on the hull of one of the vessels in "concentrations high enough to be considered hazardous waste" under the California Code of Regulations. (*Id.* at p. 4-9.)

Furthermore, the Federal Violators have signaled their intention to clean the hulls and topsides of these deteriorated vessels (both above and below the waterline) in waters of San Francisco Bay prior to their eventual removal and disposal. (See Draft EA at pp. 2-4, 2-5, 2-6, 2-12, 4-9.) If not conducted in compliance with the Clean Water Act and Porter-Cologne Act, these activities will result in further discharge of paints containing heavy metals, rust, corroded pieces of metal, asbestos, PCBs, contaminated hull biofouling organisms, other organic and inorganic materials and other pollutants into the waters of the state and of the United States. (*Id.* at pp. 2-4, 2-6, 4-9 – 4-11, 4-14, 4-19.) A test of the Federal Violators' proposed method of in-water hull cleaning (scamping) in James River, Virginia demonstrated a lack of complete containment of material removed from the vessel hull. (*Id.* at pp. 2-12, 4-9, 4-14, 4-15, 4-19; see also MARAD, Supplemental Information: Sampling and Analysis – James River Pilot Project, June 2007, attached hereto as "Exhibit D.")

The Water Board previously informed MARAD that "[t]he discharge associated with the scamping process, which is currently completed in-[San Francisco] Bay, threatens to cause or contribute to exceedances of water quality standards of the Bay." (Letter from Bruce Wolfe, Executive Officer of the Water Board, to Michael Carter, Office of Environmental Activities, MARAD, re Proposed In-Bay Cleaning of Jason and Queens Victory, dated Dec. 22, 2006, at p. 1, attached hereto as "Exhibit E".) Moreover, in its comments on the James River Scamping Test Report, the Water Board stated that the sample results from the James River scamping test "indicated that dissolved copper and zinc concentrations in the vicinity of the active scamping device were significantly above background concentrations and exceeded California Toxics Rule Water Quality Criteria, which are federal standards." (Letter from Bruce Wolfe, Executive Officer of the Water Board, to Shannon Russell, MARAD, re Comments on James River Scamping Test Report and Water Code Section 13267 Technical Report Requirement – Maritime Administration – National Defense Suisun Bay Reserve Fleet, dated Sept. 14, 2007, at p. 2, attached hereto as "Exhibit F.")

The National Marine Fisheries Service likewise has indicated that, based on its analysis of the results of the R&M Report, MARAD's proposal for cleaning and removal of the SBRF vessels in San Francisco Bay "has the potential to result in adverse effects to water quality" which could result in impacts to several fish species, including species listed under the federal Endangered Species Act.[2] (Letter from Dick Butler, NMFS, to Michael Carter, MARAD, dated Aug. 27, 2007, at p. 1, attached hereto as "Exhibit G.") The San Francisco Bay Basin Plan requires these fisheries to be protected as designated beneficial uses in Suisun Bay. (See San Francisco Bay Basin (Region 2) Water Quality Control Plan (Basin Plan), Table 2-1, Suisun Basin, excerpts of

[2] The potentially affected species are: Sacramento River winter-run Chinook salmon, Central Valley spring-run salmon, Central Valley steelhead, Central California Coast steelhead, and North American southern Green Sturgeon. (*Ibid.*)

which are attached hereto as "Exhibit H.") Furthermore, NMFS stated, "movement of these vessels without proper preparatory cleaning . . . could result in the discharge of significant numbers of paint chips from the vessels," which the R&M Report documented to contain "elevated levels" of copper, lead, zinc, tributyltin and other heavy metals, and which also are likely to contain PCBs. (Ex. G, NMFS Letter at p. 2.)

Federal Violators' Violations of the Clean Water Act

The ongoing discharge of pollutants from the SBRF vessels into Suisun Bay as described above, including paint, hull fragments, rust, organic and inorganic matter containing heavy metals, PCBs, fuels, used oil, asbestos and other pollutants, as well as the threatened discharge of pollutants from any in-water cleaning of the vessels (both above and below the waterline) in San Francisco Bay, constitutes a prohibited discharge of pollutants, as defined in sections 502(6), (12) and (13) of the Clean Water Act, and is a violation of section 301(a) of the CWA. (33 U.S.C. §§ 1311(a), 1362(6), (12), (13).) Each of the 57 non-retention vessels currently in the SBRF, as well as any such vessels that MARAD had added to the SBRF prior to the date of this notice and will add to the SBRF in the future, constitutes a point source or sources within the meaning of section 502(14) of the CWA. (33 U.S.C. § 1362(14).) Suisun Bay and the greater San Francisco Bay are navigable waters (e.g. waters of the United States) within the meaning of section 502(7) of the CWA. (33 U.S.C. § 1362(7).) Because the Federal Violators do not have an NPDES permit for discharge of these pollutants, these discharges also are in violation of section 402(a) of the Clean Water Act. (33 U.S.C. § 1342(a).)

These unlawful and unpermitted discharges have caused or contributed to, and if not abated will continue or threaten to cause or contribute to, the impairment of Suisun Bay and other waters of the San Francisco Bay, in part by discharging pollutants, such as mercury, nickel and PCBs, for which Suisun Bay and other water bodies in the San Francisco Bay region are listed as water quality limited segments (water bodies) pursuant to section 303(d) of the CWA.

Furthermore, these unlawful and unpermitted discharges have caused or contributed to, and if not abated will continue or threaten to cause or contribute to, exceedances of water quality objectives (criteria to protect designated beneficial uses) for San Francisco Bay in general and Suisun Bay in particular, as specified in the San Francisco Bay Basin (Region 2) Water Quality Control Plan (Basin Plan). Applicable water quality objectives that have been and are continuing to be violated, or that are threatened to be violated, include, but are not limited to: bioaccumulation; floating material; oil and grease; population and community ecology; settleable material; suspended material; toxicity; turbidity; and objectives for the specific chemical constituents of cadmium, chromium, copper, lead, mercury, nickel, tributyltin, and zinc. (See Ex. H, Basin Plan at Chap. 3 and Tables 3-3, 3-4.)

The unlawful and unpermitted discharges also have violated and are continuing to violate or threaten to violate the Basin Plan's prohibition against discharging toxic and deleterious substances, rubbish, refuse, other solid waste, and floating oil and other floating materials to San Francisco Bay. These discharges also have harmed, and will continue to harm or threaten to harm, various designated beneficial uses of Suisun Bay and San Francisco Bay, including,

but not limited to, the following: ocean, commercial and sport fishing; estuarine habitat; fish migration; preservation of rare and endangered species; water contact recreation; non-contact water recreation; fish spawning; and wildlife habitat. (Ex. H, Basin Plan at Ch. 2 and Table 2-1, Suisun Basin.) The unlawful and unpermitted discharges have lowered and will continue to lower or threaten to lower water quality of Suisun Bay, thereby violating state and federal antidegradation requirements. Finally, the discharges have caused or contributed to and will continue or threaten to cause or contribute to conditions of contamination, pollution and nuisance in Suisun Bay and San Francisco Bay.

In addition to violating the Clean Water Act, the unlawful and unpermitted discharges also constitute violations of the state Porter-Cologne Act, because the Federal Violators are discharging and proposing to discharge pollutants into the navigable waters of the United States within the jurisdiction of the State of California without authorization, in violation of California Water Code section 13376. Pursuant to section 13385(b) of the California Water Code, these violations of section 13376 subject the Federal Violators to civil penalties of up to $25,000 for each day in which the violations have occurred or continue to occur, with an additional penalty of up to $25 times the number of gallons discharged in excess of 1,000 gallons that the Federal Violators have failed to clean up. (Cal. Water Code §§ 13385(a)(1) and (b).)

The above-referenced violations of sections 301(a) and 402(a) of the Clean Water Act and section 13376 of the Porter Cologne Act have occurred for each non-retention vessel in the SBRF on each day since August 27, 2002, and will continue to occur for each non-retention vessel in the SBRF until the violations are abated by the Federal Violators. The violations may be abated by: ceasing any and all discharges from each non-retention vessel; obtaining and complying with a valid NPDES permit for discharges from each non-retention vessel; and/or removing each non-retention vessel from waters of the United States within the jurisdiction of the State of California, in full compliance with the CWA and Porter-Cologne Act and all other applicable federal and state laws.

Notwithstanding the Water Board's previous warnings and notices (as described below), the ongoing, continuing and threatened violations of the Clean Water Act and Porter-Cologne Act continue. Therefore, upon expiration of sixty days from the date of this notice letter, unless abated prior to this date, the Water Board intends to sue the Federal Violators for these ongoing, continuing and threatened discharges of pollutants in violation of sections 301(a) and 402(a) of the Clean Water Act and section 13376 of the Porter-Cologne Act.

Violations of the Water Board's Technical Report Requirements for the SBRF

Over one year ago (on July 6, 2007), the Water Board informed MARAD that the discharges documented by the R&M Report constitute violations of the Clean Water Act which pose a significant risk to San Francisco Bay that "must be abated." (Letter from Bruce Wolfe, Executive Officer of the Water Board, to Shannon Russell, MARAD, re: Water Code Section 13267 Technical Report Requirement – National Defense Suisun Bay Reserve Fleet – Illicit Hazardous Waste Discharge, Suisun Bay, Solano County, dated July 6, 2007, at p. 2, attached

hereto as "Exhibit I.") Specifically, the R&M Report documented the following discharges: 1) discharges of heavy metals in concentrations which exceed hazardous waste thresholds; and 2) discharges of significant quantities of peeling paint into Suisun Bay. (*Ibid.*) Furthermore, the R&M Report indicated that "significant quantities of peeling paint remain on the ships and these paints are likely to discharge to Suisun Bay over time." (*Ibid.*)

In its July 6, 2007 letter, the Water Board ordered that, pursuant to California Water Code section 13267(b), MARAD submit a "Hazardous Waste Mitigation Workplan" by August 6, 2007, describing the methods and schedules that MARAD would employ to remove the peeling paint from the SBRF vessels "to ensure that no peeling paint is discharged to San Francisco Bay." (*Ibid.*) Although MARAD submitted a non-substantive one-page letter in response, it did not submit the required workplan. Consequently, the Water Board subsequently issued a Notice of Violation to MARAD. (Letter from Bruce Wolfe, Executive Officer of Water Board to Shannon Russell, MARAD, re Notice of Violation – Inadequate Report – National Defense Suisun Bay Reserve Fleet – Illicit Hazardous Waste Discharge – Suisun Bay, Solano County, dated Oct. 1, 2007, attached hereto as "Exhibit J.")

In addition, over one and a half years ago (on December 22, 2006), the Water Board informed MARAD that in-water hull cleaning of MARAD ships:

> threatens to violate the Clean Water Act by discharging material high in metals including copper, lead and zinc, such as hull coatings (paints) and potentially, corroded parts of existing hulls as debris and/or large particulates directly to San Francisco Bay. The cleaning also threatens to discharge to the Bay organic materials and organisms currently attached to the ships; those materials and organisms may have incorporated metals from the hull coating to which they attach and could constitute the discharge of pollutants.

(Ex. E at p. 1.) Furthermore, the Water Board informed MARAD that any in-water hull cleaning requires an NPDES permit pursuant to section 402 of the Clean Water Act if any discharge of pollutants may occur. (*Id.* at p. 2.)

Then, on September 14, 2007, the Water Board indicated to MARAD that, based on the results of the James River pilot test of MARAD's proposed in-water hull cleaning method, "the soluble zinc and copper concentrations detected in the vicinity of the scamping device are elevated and may preclude use of this device in California State Waters without the preparation of a specific NPDES permit, which would require significant study and regulatory review, and which may not allow the discharge without significant modification of the scamping device." (Ex. F at p. 2.) Pursuant to California Water Code section 13267(b), the Water Board also ordered MARAD to provide a "Scamping Pilot Test Workplan" that specifies "sampling and analysis methods and protective measures for a proposed scamping technology pilot test in State of California waters," at least 45 days prior to any proposed pilot test. (*Id.* at p. 1.) To date, MARAD has not provided any such workplan, notwithstanding its repeatedly stated intent to proceed with an in-water method of hull cleaning. (See Letter from Sean Connaughton, MARAD Administrator, to Bruce Wolfe, Executive Officer of Water Board, dated July 5, 2007, attached hereto as "Exhibit

K," and Letter from Elizabeth Megginson, MARAD Chief Counsel, to Bruce Wolfe, Executive Officer of Water Board, dated August 15, 2007, attached hereto as "Exhibit L;" see also Draft EA at pp. 2-4 – 2-6, 2-12, 4-9.)

The Federal Violators' knowing failure and refusal to comply with the Water Board's July 6, 2007, and September 14, 2007, Notices of Water Code 13267 Technical Report Requirements and to furnish the required technical reports, while continuing to discharge hazardous waste as defined in section 25117 of the California Health and Safety Code, violates section 13267(b) of the California Water Code. Consequently, pursuant to section 13268(c) and (d)(2) of the California Water Code, the Federal Violators are liable for civil penalties of up to $25,000 per day for each day in which the violations of section 13267(b) have occurred and continue to occur. These violations may be abated by the Federal Violators' immediate submission to the Water Board of a Hazardous Waste Mitigation Workplan containing all components specified by the Water Board in its July 6, 2007, notice and a Scamping Pilot Test Workplan containing all components specified by the Water Board in its September 14, 2007, notice.

Upon expiration of sixty days from the date of this notice letter, unless abated prior to this date, the Water Board intends to sue the Federal Violators for the above-described violations of section 13267 of the Porter Cologne Act.

Identification of Parties and Counsel

The addresses and agency contacts for the Water Board are as follows:

California Regional Water Quality Control Board
San Francisco Bay Region
c/o Bruce Wolfe, Executive Officer, and Yuri Won, Senior Staff Counsel
1515 Clay Street, Suite 1400
Oakland, California 94612
T: 510-622-2300
F: 510-622-2460

California Regional Water Quality Control Board
San Francisco Bay Region
c/o Christian Carrigan, Senior Staff Counsel
1001 I Street, Room 1630
Sacramento, CA 95814
T: (916) 322-3626
F: (916) 341-5896

The names and address of counsel representing the Water Board are as follows:

California Office of the Attorney General
c/o Christiana Tiedemann, Supervising Deputy Attorney General, and
Tara L. Mueller, Deputy Attorney General
1515 Clay Street, Suite 2000
Oakland, CA 94612
T: 510-622-2200
F: 510-622-2270

Conclusion and Relief Sought

Unless and until the foregoing violations of the Clean Water Act and Porter-Cologne Act are abated within 60 days of the date of this letter, the Water Board intends to sue the Federal Violators in United States District Court for the Eastern District of California 60 days after the date of this letter. The Water Board intends to sue the Federal Violators for injunctive relief, costs and civil penalties. Specifically, pursuant to 33 U.S.C. section 1365(a) and California Water Code section 13386, the Water Board will request a judicial order to, among other things, compel the Federal Violators to halt their unlawful and unpermitted ongoing and continuing discharges of pollutants from the SBRF vessels and to cease in-water cleaning, transportation, removal and disposal of vessels in the SBRF, and to cease accepting new vessels into the SBRF, unless and until such activities can be done in full compliance with the Clean Water Act and Porter-Cologne Act.

The Water Board also will request a judicial order, pursuant to section 13385(b) of the California Water Code, compelling the Federal Violators to pay civil penalties in an amount not to exceed $25,000 per day for each day in which the Federal Violators have violated and continue to violate section 13376 of the California Water Code, plus an additional penalty of up to $25 times the number of gallons discharged in excess of 1,000 gallons that the Federal Violators have failed to clean up. Finally, the Water Board will request a judicial order, pursuant to section 13268 of the California Water Code, compelling the Federal Violators to pay civil penalties in an amount not to exceed $25,000 per day for each day in which the Federal Violators have violated and continue to violate section 13267(b) of the California Water Code.

This notice encompasses all violations of the Clean Water Act and Porter Cologne Act by the Federal Violators arising from the factual allegations set forth herein, and evidenced by information that becomes available to the Water Board after the date of this letter. In particular, the Water Board provides notice that it intends to sue the Federal Violators for ongoing, continuing and threatened unlawful and unpermitted discharges of pollutants, including paint, hull fragments, rust, organic and inorganic materials containing heavy metals, PCBs, asbestos, fuels, used oil and other pollutants, after the date of this letter.

If you are prepared to correct the violations identified in this letter, or otherwise have any information you wish convey regarding this matter, please contact the undersigned and the

Water Board's identified counsel immediately. Thank you for your attention to this matter.

Sincerely,

Christian Carrigan
Senior Staff Counsel
California Regional Water Quality Control Board, San Francisco Bay Region

Enclosure

cc (w/ encl. via certified mail, return receipt requested):

Stephen L. Johnson, Administrator of U.S. EPA
Michael B. Mukasey, Attorney General of the United States
Wayne Nastri, Regional Administrator of U.S. EPA, Region 9
Dorothy Rice, Executive Director, State Water Resources Control Board
Tam Doduc, Chair, State Water Resources Control Board

cc (w/ encl. via regular mail):

Edmund G. Brown Jr., California Attorney General
Michael A.M. Lauffer, Chief Counsel, State Water Resources Control Board
Bruce Wolfe, Executive Officer, California Regional Water Quality Control Board, SF Bay Region
John Muller, Chair, California Regional Water Quality Control Board, SF Bay Region
Yuri Won, California Regional Water Quality Control Board, SF Bay Region
Linda Adams, Secretary, California Environmental Protection Agency
Cindy Tuck, Undersecretary, California Environmental Protection Agency
Matt Bogoshian, Deputy Secretary, California Environmental Protection Agency
Maureen Gorsen, Director, California Department of Toxic Substances Control
Paul Thayer, Executive Officer, California State Lands Commission
Christiana Tiedemann, Supervising Deputy Attorney General
Tara L. Mueller, Deputy Attorney General

Exhibit A

Excerpts From the 2006 CWA Section 303(d) List

PROPOSED 2006 CWA SECTION 303(d) LIST OF WATER QUALITY LIMITED SEGMENTS

SAN FRANCISCO BAY REGIONAL BOARD

SWRCB APPROVAL DATE: OCTOBER 25, 2006

REGION	TYPE	NAME	CALWATER WATERSHED	POLLUTANT/STRESSOR	POTENTIAL SOURCES	ESTIMATED SIZE AFFECTED		PROPOSED TMDL COMPLETION
2	R	Alameda Creek	20430051					
				Diazinon		51	Miles	2005
				This listing was made by USEPA.				
					Urban Runoff/Storm Sewers			
2	R	Alamitos Creek	20540041					
				Mercury		7.1	Miles	2006
				TMDL will be developed as part of the Santa Clara Basin Watershed Management Initiative. Additional monitoring and assessment is needed.				
					Mine Tailings			
2	L	Anderson Reservoir	20530050					
				Mercury		1013	Acres	2019
					Source Unknown			
				PCBs (Polychlorinated biphenyls)		1013	Acres	2019
					Source Unknown			
2	R	Arroyo Corte Madera Del Presidio	20320020					
				Diazinon		4	Miles	2005
				This listing was made by USEPA.				
					Urban Runoff/Storm Sewers			
2	R	Arroyo De La Laguna	20430084					
				Diazinon		7.4	Miles	2005
				This listing was made by USEPA.				
					Urban Runoff/Storm Sewers			
2	R	Arroyo Del Valle	20430023					
				Diazinon		31	Miles	2005
				This listing was made by USEPA.				
					Urban Runoff/Storm Sewers			
2	R	Arroyo Las Positas	20430080					
				Diazinon		14	Miles	2005
					Urban Runoff/Storm Sewers			

PROPOSED 2006 CWA SECTION 303(d) LIST OF WATER QUALITY LIMITED SEGMENTS

SAN FRANCISCO BAY REGIONAL BOARD

SWRCB APPROVAL DATE: OCTOBER 25, 2006

REGION	TYPE	NAME	CALWATER WATERSHED	POLLUTANT/STRESSOR	POTENTIAL SOURCES	ESTIMATED SIZE AFFECTED		PROPOSED TMDL COMPLETION
2	R	Arroyo Mocho	20430080					
				Diazinon		34	Miles	2005
					Urban Runoff/Storm Sewers			
2	L	Bon Tempe Reservoir	20113020					
				Mercury		120	Acres	2019
					Source Unknown			
2	R	Butano Creek	20240031					
				Sedimentation/Siltation		3.6	Miles	2019
				Impairment to steelhead habitat.				
					Nonpoint Source			
2	R	Calabazas Creek	20640012					
				Diazinon		4.7	Miles	2005
				This listing was made by USEPA.				
					Urban Runoff/Storm Sewers			
2	L	Calero Reservoir	20540031					
				Mercury		334	Acres	2006
				TMDL will be developed as part of the Santa Clara Basin Watershed Management Initiative. Additional monitoring and assessment is needed.				
					Surface Mining			
					Mine Tailings			
2	E	Carquinez Strait	20710020					
				Chlordane		5657	Acres	2008
				This listing was made by USEPA.				
					Nonpoint Source			
				DDT		5657	Acres	2008
					Nonpoint Source			
				Dieldrin		5657	Acres	2008
				This listing was made by USEPA.				
					Nonpoint Source			
				Dioxin Compounds (including 2,3,7,8-TCDD)		5657	Acres	2019
				The specific compounds are 2,3,7,8-TCDD, 1,2,3,7,8-PeCDD, 1,2,3,4,7,8-HxCDD, 1,2,3,6,7,8-HxCDD, 1,2,3,7,8,9-HxCDD, 1,2,3,4,6,7,8-HpCDD, and OCDD. This listing was made by USEPA.				
					Atmospheric Deposition			

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REGION	TYPE	NAME	CALWATER WATERSHED	POLLUTANT/STRESSOR	POTENTIAL SOURCES	ESTIMATED SIZE AFFECTED	PROPOSED TMDL COMPLETION
				Exotic Species		**5657 Acres**	**2019**
				Disrupt natural benthos; change pollutant availability in food chain; disrupt food availability to native species.			
					Ballast Water		
				Furan Compounds		**5657 Acres**	**2019**
				The specific compounds are 2,3,7,8-TCDF, 1,2,3,7,8-PeCDF, 2,3,4,7,8-PeCDF, 1,2,3,4,7,8-HxCDF, 1,2,3,6, 7,8,-HxCDF, 1,2,3,7,8,9-HxCDF, 2,3,4,6,7,8-HxCDF, 1,2,3,4,6,7,8-HpCDF, 1,2,3,4,7,8,9-HpCDF, and OCDF. This listing was made by USEPA.			
					Atmospheric Deposition		
				Mercury		**5657 Acres**	**2006**
				Current data indicate fish consumption and wildlife consumption impacted uses. Major source is historic: gold mining sediments and local mercury mining; most significant ongoing source is erosion and drainage from abandoned mines; moderate to low level inputs from point sources.			
					Industrial Point Sources		
					Municipal Point Sources		
					Resource Extraction		
					Atmospheric Deposition		
					Natural Sources		
					Nonpoint Source		
				PCBs (Polychlorinated biphenyls)		**5657 Acres**	**2006**
				This listing covers non dioxin-like PCBs.Interim health advisory for fish; uncertainty regarding water column concentration data.			
					Unknown Nonpoint Source		
				PCBs (Polychlorinated biphenyls) (dioxin-like)		**5657 Acres**	**2019**
				The specific dioxin like compounds are 3,4,4,5-TCB (81), 3,3,3,3-TCB (77), 3,3,4,4,5-PeCB (126), 3,3,4,4,4,4-HxCB (169), 2,3,3,4,4-PeCB (105), 2,3,4,4,5-PeCB (114), 2,3,4,4,5-PeCB (118), 2,3,4,4,5-PeCB (123), 2,3,3,4,4,5-HxCB (156), 2,3,3,4,4,5-HxCB (157), 2,3,4,4,5,5,-HxCB (167), 2,3,3,4,4,5,5-HpCB (189). This listing was made by USEPA.			
					Unknown Nonpoint Source		
				Selenium		**5657 Acres**	**2019**
				Affected use is one branch of the food chain; most sensitive indicator is hatchability in nesting diving birds, significant contributions from oil refineries (control program in place) and agriculture (carried downstream by rivers); exotic species may have made food chain more susceptible to accumulation of selenium; health consumption advisory in effect for scaup and scoter (diving ducks); low TMDL priority because Individual Control Strategy in place.			
					Industrial Point Sources		
					Agriculture		
2	**E**	**Castro Cove, Richmond (San Pablo Basin)**	**20660014**				
				Dieldrin (sediment)		**71 Acres**	**2008**
					Urban Runoff/Storm Sewers		
					Point Source		

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				Mercury (sediment)		71 Acres	2006
					Urban Runoff/Storm Sewers		
					Point Source		
				PAHs (Polycyclic Aromatic Hydrocarbons) (sediment)		71 Acres	2019
					Urban Runoff/Storm Sewers		
					Point Source		
				Selenium (sediment)		71 Acres	2019
					Urban Runoff/Storm Sewers		
					Point Source		
2	B	Central Basin, San Francisco (part of SF Bay, Central)	20440010				
				Chlordane		40 Acres	2008
				This listing was made by USEPA.			
					Nonpoint Source		
				DDT		40 Acres	2008
				This listing was made by USEPA.			
					Nonpoint Source		
				Dieldrin		40 Acres	2019
				This listing was made by USEPA.			
					Nonpoint Source		
				Dioxin Compounds (including 2,3,7,8-TCDD)		40 Acres	2019
				The specific compounds are 2,3,7,8-TCDD, 1,2,3,7,8-PeCDD, 1,2,3,4,7,8-HxCDD, 1,2,3,6,7,8-HxCDD, 1,2,3,7,8,9-HxCDD, 1,2,3,4,6,7,8-HpCDD, and OCDD. This listing was made by USEPA.			
					Atmospheric Deposition		
				Exotic Species		40 Acres	2019
				Disrupt natural benthos; change pollutant availability in food chain; disrupt food availability to native species.			
					Ballast Water		
				Furan Compounds		40 Acres	2019
				The specific compounds are 2,3,7,8-TCDF, 1,2,3,7,8-PeCDF, 2,3,4,7,8-PeCDF, 1,2,3,4,7,8-HxCDF, 1,2,3,6,7,8-HxCDF, 1,2,3,7,8,9-HxCDF, 2,3,4,6,7,8-HxCDF, 1,2,3,4,6,7,8-HpCDF, 1,2,3,4,7,8,9-HpCDF, and OCDF. This listing was made by USEPA.			
					Atmospheric Deposition		

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REGION	TYPE	NAME	CALWATER WATERSHED	POLLUTANT/STRESSOR	POTENTIAL SOURCES	ESTIMATED SIZE AFFECTED		PROPOSED TMDL COMPLETION
				Mercury		**40**	**Acres**	**2006**
				Current data indicate fish consumption and wildlife consumption impacted uses: health consumption advisory in effect for multiple fish species including striped bass and shark. Major source is historic: gold mining sediments and local mercury mining; most significant ongoing source is erosion and drainage from abandoned mines; moderate to low level inputs from point sources.			
					Industrial Point Sources			
					Minor Industrial Point Source			
					Municipal Point Sources			
					Resource Extraction			
					Atmospheric Deposition			
					Natural Sources			
					Nonpoint Source			
				Mercury (sediment)		**40**	**Acres**	**2006**
					Urban Runoff/Storm Sewers			
					Point Source			
				PAHs (Polycyclic Aromatic Hydrocarbons) (sediment)		**40**	**Acres**	**2019**
					Urban Runoff/Storm Sewers			
					Point Source			
				PCBs (Polychlorinated biphenyls)		**40**	**Acres**	**2006**
				This listing covers non dioxin-like PCBs.Interim health advisory for fish; uncertainty regarding water column concentration data.				
					Unknown Nonpoint Source			
				PCBs (Polychlorinated biphenyls) (dioxin-like)		**40**	**Acres**	**2019**
				The specific dioxin like compounds are 3,4,4,5-TCB (81), 3,3,3,3-TCB (77), 3,3,4,4,5-PeCB (126), 3,3,4,4,4,4-HxCB (169), 2,3,3,4,4-PeCB (105), 2,3,4,4,5-PeCB (114), 2,3,4,4,5-PeCB (118), 2,3,4,4,5-PeCB (123), 2,3,3,4,4,5-HxCB (156), 2,3,3,4,4,5-HxCB (157), 2,3,4,4,5,5,-HxCB (167), 2,3,3,4,4,5,5-HpCB (189). This listing was made by USEPA.				
					Unknown Nonpoint Source			
				Selenium		**40**	**Acres**	**2019**
				Affected use is one branch of the food chain; most sensitive indicator is hatchability in nesting diving birds, significant contributions from oil refineries (control program in place) and agriculture (carried downstream by rivers); exotic species may have made food chain more susceptible to accumulation of selenium; health consumption advisory in effect for scaup and scoter (diving ducks); low TMDL priority because Individual Control Strategy in place.			
					Industrial Point Sources			
					Agriculture			
					Natural Sources			
					Exotic Species			

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REGION	TYPE	NAME	CALWATER WATERSHED	POLLUTANT/STRESSOR	POTENTIAL SOURCES	ESTIMATED SIZE AFFECTED		PROPOSED TMDL COMPLETION
2	R	Corte Madera Creek	20320011					
				Diazinon		4.1	Miles	2005
				This listing was made by USEPA.				
					Urban Runoff/Storm Sewers			
2	R	Coyote Creek (Marin County)	20320020					
				Diazinon		2.6	Miles	2005
				This listing was made by USEPA.				
					Urban Runoff/Storm Sewers			
2	R	Coyote Creek (Santa Clara Co.)	20530021					
				Diazinon		55	Miles	2005
				This listing was made by USEPA.				
					Urban Runoff/Storm Sewers			
2	L	Del Valle Reservoir	20430024					
				Mercury		1022	Acres	2019
					Source Unknown			
				PCBs (Polychlorinated biphenyls)		1022	Acres	2019
					Source Unknown			
2	R	Gallinas Creek	20620013					
				Diazinon		2.1	Miles	2005
				This listing was made by USEPA.				
					Urban Runoff/Storm Sewers			
2	R	Guadalupe Creek	20540050					
				Mercury		8.1	Miles	2006
				TMDL will be developed as part of the Santa Clara Basin Watershed Management Initiative. Additional monitoring and assessment is needed.				
					Mine Tailings			
2	L	Guadalupe Reservoir	20540040					
				Mercury		63	Acres	2006
				TMDL will be developed as part of the Santa Clara Basin Watershed Management Initiative. Additional monitoring and assessment is needed.				
					Surface Mining			
					Mine Tailings			

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REGION	TYPE	NAME	CALWATER WATERSHED	POLLUTANT/STRESSOR	POTENTIAL SOURCES	ESTIMATED SIZE AFFECTED		PROPOSED TMDL COMPLETION
2	R	Guadalupe River	20540050					
				Diazinon		18	Miles	2005
				This listing was made by USEPA.				
					Urban Runoff/Storm Sewers			
				Mercury		18	Miles	2006
				TMDL will be developed as part of the Santa Clara Basin Watershed Management Initiative. Additional monitoring and assessment is needed.				
					Mine Tailings			
2	E	Islais Creek	20440010					
				Ammonia		46	Acres	2019
					Industrial Point Sources			
					Combined Sewer Overflow			
				Chlordane (sediment)		46	Acres	2008
					Industrial Point Sources			
					Combined Sewer Overflow			
				Dieldrin (sediment)		46	Acres	2008
					Industrial Point Sources			
					Combined Sewer Overflow			
				Hydrogen Sulfide		46	Acres	2019
					Industrial Point Sources			
					Combined Sewer Overflow			
				PAHs (Polycyclic Aromatic Hydrocarbons) (sediment)		46	Acres	2019
					Industrial Point Sources			
					Combined Sewer Overflow			
				Sediment Toxicity		46	Acres	2019
					Source Unknown			
2	L	Lafayette Reservoir	20732010					
				Mercury		114	Acres	2019
					Source Unknown			

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				PCBs (Polychlorinated biphenyls)		114	Acres	2019
					Source Unknown			
2	R	Lagunitas Creek	20113020					
				Nutrients		17	Miles	2019
				Tributary to Tomales Bay. TMDLs will be developed as part of evolving watershed management effort. Additional monitoring and assessment needed.				
					Agriculture			
					Urban Runoff/Storm Sewers			
				Sedimentation/Siltation		17	Miles	2009
				Tributary to Tomales Bay. TMDLs will be developed as part of evolving watershed management effort. Additional monitoring and assessment needed.				
					Agriculture			
					Urban Runoff/Storm Sewers			
2	L	Lake Chabot (Alameda Co)	20420030					
				Chlordane		312	Acres	2019
					Source Unknown			
				DDT		312	Acres	2019
					Source Unknown			
				Dieldrin		312	Acres	2019
					Source Unknown			
				Mercury		312	Acres	2019
					Source Unknown			
				PCBs (Polychlorinated biphenyls)		312	Acres	2019
					Source Unknown			
2	L	Lake Herman	20721030					
				Mercury		108	Acres	2019
				Additional monitoring and assessment needed. Problem due to historical mining.				
					Surface Mining			

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2	L	Lake Merced	20210010					
				Low Dissolved Oxygen		299	Acres	2019
				This listing was made by USEPA.				
					Source Unknown			
				pH		299	Acres	2019
				This listing was made by USEPA.				
					Source Unknown			
2	L	Lake Merritt	20420040					
				Organic Enrichment/Low Dissolved Oxygen		142	Acres	2019
				This listing was made by USEPA.				
					Source Unknown			
				Trash		142	Acres	2019
					Urban Runoff/Storm Sewers			
2	R	Laurel Creek (Solano Co)	20440040					
				Diazinon		3	Miles	2005
				This listing was made by USEPA.				
					Urban Runoff/Storm Sewers			
2	R	Ledgewood Creek	20723010					
				Diazinon		12	Miles	2005
				This listing was made by USEPA.				
					Urban Runoff/Storm Sewers			
2	R	Los Gatos Creek (R2)	20540011					
				Diazinon		19	Miles	2005
				This listing was made by USEPA.				
					Urban Runoff/Storm Sewers			
2	E	Marina Lagoon (San Mateo County)	20440040					
				Coliform Bacteria		169	Acres	2019
					Urban Runoff/Storm Sewers			
					Nonpoint Source			
2	R	Matadero Creek	20550040					
				Diazinon		7.3	Miles	2005
				This listing was made by USEPA.				
					Urban Runoff/Storm Sewers			

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2	R	Miller Creek	20620012					
				Diazinon		9	Miles	2005
				This listing was made by USEPA.				
					Urban Runoff/Storm Sewers			
2	E	Mission Creek	20440010					
				Ammonia		8.5	Acres	2019
					Industrial Point Sources			
					Combined Sewer Overflow			
				Chlordane (sediment)		8.5	Acres	2008
					Industrial Point Sources			
					Combined Sewer Overflow			
				Dieldrin (sediment)		8.5	Acres	2008
					Industrial Point Sources			
					Combined Sewer Overflow			
				Hydrogen Sulfide		8.5	Acres	2019
					Industrial Point Sources			
					Combined Sewer Overflow			
				Lead (sediment)		8.5	Acres	2019
					Industrial Point Sources			
					Combined Sewer Overflow			
				Mercury (sediment)		8.5	Acres	2019
					Industrial Point Sources			
					Combined Sewer Overflow			
				PAHs (Polycyclic Aromatic Hydrocarbons)		8.5	Acres	2019
					Industrial Point Sources			
					Combined Sewer Overflow			
				PCBs (Polychlorinated biphenyls) (sediment)		8.5	Acres	2006
					Industrial Point Sources			
					Combined Sewer Overflow			
				Silver (sediment)		8.5	Acres	2019
					Industrial Point Sources			
					Combined Sewer Overflow			

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				Zinc (sediment)		**8.5**	**Acres**	**2019**
					Industrial Point Sources			
					Combined Sewer Overflow			
2	**R**	**Mt. Diablo Creek**	**20731040**					
				Diazinon		**13**	**Miles**	**2005**
				This listing was made by USEPA.				
					Urban Runoff/Storm Sewers			
2	**R**	**Napa River**	**20650010**					
				Nutrients		**65**	**Miles**	**2008**
				TMDL will be developed as part of ongoing watershed management effort. Additional monitoring and assessment needed.				
					Agriculture			
				Pathogens		**65**	**Miles**	**2006**
				TMDL will be developed as part of ongoing watershed management effort. Additional monitoring and assessment needed.				
					Agriculture			
					Urban Runoff/Storm Sewers			
				Sedimentation/Siltation		**65**	**Miles**	**2006**
				TMDL will be developed as part of ongoing watershed management effort. Additional monitoring and assessment needed.				
					Agriculture			
					Construction/Land Development			
					Land Development			
					Urban Runoff/Storm Sewers			
2	**L**	**Nicasio Reservoir**	**20113012**					
				Mercury		**829**	**Acres**	**2019**
					Source Unknown			
2	**R**	**Novato Creek**	**20620010**					
				Diazinon		**17**	**Miles**	**2005**
				This listing was made by USEPA.				
					Urban Runoff/Storm Sewers			

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2	B	Oakland Inner Harbor (Fruitvale Site, part of SF Bay, Central)	20420040					
				Chlordane		0.93	Acres	2008
				This listing was made by USEPA.				
					Nonpoint Source			
				Chlordane (sediment)		0.93	Acres	2008
					Source Unknown			
				DDT		0.93	Acres	2008
				This listing was made by USEPA.				
					Nonpoint Source			
				Dieldrin		0.93	Acres	2008
				This listing was made by USEPA.				
					Nonpoint Source			
				Dioxin Compounds (including 2,3,7,8-TCDD)		0.93	Acres	2019
				The specific compounds are 2,3,7,8-TCDD, 1,2,3,7,8-PeCDD, 1,2,3,4,7,8-HxCDD, 1,2,3,6,7,8-HxCDD, 1,2,3,7,8,9-HxCDD, 1,2,3,4,6,7,8-HpCDD, and OCDD. This listing was made by USEPA.				
					Atmospheric Deposition			
				Exotic Species		0.93	Acres	2019
				Disrupt natural benthos; change pollutant availability in food chain; disrupt food availability to native species.				
					Ballast Water			
				Furan Compounds		0.93	Acres	2019
				The specific compounds are 2,3,7,8-TCDF, 1,2,3,7,8-PeCDF, 2,3,4,7,8-PeCDF, 1,2,3,4,7,8-HxCDF, 1,2,3,6,7,8-HxCDF, 1,2,3,7,8,9-HxCDF, 2,3,4,6,7,8-HxCDF, 1,2,3,4,6,7,8-HpCDF, 1,2,3,4,7,8,9-HpCDF, and OCDF. This listing was made by USEPA.				
					Atmospheric Deposition			
				Mercury		0.93	Acres	2006
				Current data indicate fish consumption and wildlife consumption impacted uses: health consumption advisory in effect for multiple fish species including striped bass and shark. Major source is historic: gold mining sediments and local mercury mining; most significant ongoing source is erosion and drainage from abandoned mines; moderate to low level inputs from point sources.				
					Industrial Point Sources			
					Municipal Point Sources			
					Resource Extraction			
					Atmospheric Deposition			
					Natural Sources			
					Nonpoint Source			

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				PCBs (Polychlorinated biphenyls)		**0.93 Acres**	**2006**
				This listing covers non dioxin-like PCBs.Interim health advisory for fish; uncertainty regarding water column concentration data.			
					Unknown Nonpoint Source		
				PCBs (Polychlorinated biphenyls) (dioxin-like)		**0.93 Acres**	**2019**
				The specific dioxin like compounds are 3,4,4,5-TCB (81), 3,3,3,3-TCB (77), 3,3,4,4,5-PeCB (126), 3,3,4,4,4,4-HxCB (169), 2,3,3,4,4-PeCB (105), 2,3,4,4,5-PeCB (114), 2,3,4,4,5-PeCB (118), 2,3,4,4,5-PeCB (123), 2,3,3,4,4,5-HxCB (156), 2,3,3,4,4,5-HxCB (157), 2,3,4,4,5,5,-HxCB (167), 2,3,3,4,4,5,5-HpCB (189). This listing was made by USEPA.			
					Unknown Nonpoint Source		
				PCBs (Polychlorinated biphenyls) (sediment)		**0.93 Acres**	**2006**
				This listing covers non dioxin-like PCBs. Interim health advisory for fish; uncertainty regarding water columnconcentration data.			
					Source Unknown		
				Sediment Toxicity		**0.93 Acres**	**2019**
					Source Unknown		
				Selenium		**0.93 Acres**	**2019**
				Affected use is one branch of the food chain; most sensitive indicator is hatchability in nesting diving birds, significantcontributions from oil refineries (control program in place) and agriculture (carried downstream by rivers); exotic speciesmay have made food chain more susceptible to accumulation of selenium; health consumption advisory in effect for scaupand scoter (diving ducks); low TMDL priority because Individual Control Strategy in place.			
					Industrial Point Sources		
					Agriculture		
					Natural Sources		
					Exotic Species		
2	**B**	**Oakland Inner Harbor (Pacific Dry-dock Yard 1 Site, part of SF Bay, Central)**	**20420040**				
				Chlordane		**1.8 Acres**	**2008**
				This listing was made by USEPA.			
					Nonpoint Source		
				Chlordane (sediment)		**1.8 Acres**	**2008**
					Source Unknown		
				Copper (sediment)		**1.8 Acres**	**2019**
					Source Unknown		
				DDT		**1.8 Acres**	**2008**
				This listing was made by USEPA.			
					Nonpoint Source		

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				Dieldrin		**1.8 Acres**	**2008**
				This listing was made by USEPA.			
					Nonpoint Source		
				Dieldrin (sediment)		**1.8 Acres**	**2008**
					Source Unknown		
				Dioxin Compounds (including 2,3,7,8-TCDD)		**1.8 Acres**	**2019**
				The specific compounds are 2,3,7,8-TCDD, 1,2,3,7,8-PeCDD, 1,2,3,4,7,8-HxCDD, 1,2,3,6,7,8-HxCDD, 1,2,3,7,8,9-HxCDD, 1,2,3,4,6,7,8-HpCDD, and OCDD. This listing was made by USEPA.		
					Atmospheric Deposition		
				Exotic Species		**1.8 Acres**	**2019**
				Disrupt natural benthos; change pollutant availability in food chain; disrupt food availability to native species.			
					Ballast Water		
				Furan Compounds		**1.8 Acres**	**2019**
				The specific compounds are 2,3,7,8-TCDF, 1,2,3,7,8-PeCDF, 2,3,4,7,8-PeCDF, 1,2,3,4,7,8-HxCDF, 1,2,3,6,7,8-HxCDF, 1,2,3,7,8,9-HxCDF, 2,3,4,6,7,8-HxCDF, 1,2,3,4,6,7,8-HpCDF, 1,2,3,4,7,8,9-HpCDF, and OCDF. This listing was made by USEPA.		
					Atmospheric Deposition		
				Lead (sediment)		**1.8 Acres**	**2019**
					Source Unknown		
				Mercury		**1.8 Acres**	**2006**
				Current data indicate fish consumption and wildlife consumption impacted uses: health consumption advisory in effect for multiple fish species including striped bass and shark. Major source is historic: gold mining sediments and local mercury mining; most significant ongoing source is erosion and drainage from abandoned mines; moderate to low level inputs from point sources.		
					Industrial Point Sources		
					Municipal Point Sources		
					Resource Extraction		
					Atmospheric Deposition		
					Natural Sources		
					Nonpoint Source		
				Mercury (sediment)		**1.8 Acres**	**2006**
					Source Unknown		
				PAHs (Polycyclic Aromatic Hydrocarbons) (sediment)		**1.8 Acres**	**2019**
					Source Unknown		

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SAN FRANCISCO BAY REGIONAL BOARD

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REGION	TYPE	NAME	CALWATER WATERSHED	POLLUTANT/STRESSOR	POTENTIAL SOURCES	ESTIMATED SIZE AFFECTED		PROPOSED TMDL COMPLETION
				PCBs (Polychlorinated biphenyls)		1.8	Acres	2006
				This listing covers non dioxin-like PCBs.Interim health advisory for fish; uncertainty regarding water column concentration data.				
					Unknown Nonpoint Source			
				PCBs (Polychlorinated biphenyls) (dioxin-like)		1.8	Acres	2019
				The specific dioxin like compounds are 3,4,4,5-TCB (81), 3,3,3,3-TCB (77), 3,3,4,4,5-PeCB (126), 3,3,4,4,4,4-HxCB (169), 2,3,3,4,4-PeCB (105), 2,3,4,4,5-PeCB (114), 2,3,4,4,5-PeCB (118), 2,3,4,4,5-PeCB (123), 2,3,3,4,4,5-HxCB (156), 2,3,3,4,4,5-HxCB (157), 2,3,4,4,5,5,-HxCB (167), 2,3,3,4,4,5,5-HpCB (189). This listing was made by USEPA.				
					Unknown Nonpoint Source			
				PCBs (Polychlorinated biphenyls) (sediment)		1.8	Acres	2006
					Source Unknown			
				Selenium		1.8	Acres	2019
				Affected use is one branch of the food chain; most sensitive indicator is hatchability in nesting diving birds, significant contributions from oil refineries (control program in place) and agriculture (carried downstream by rivers); exotic species may have made food chain more susceptible to accumulation of selenium; health consumption advisory in effect for scaup and scoter (diving ducks); low TMDL priority because Individual Control Strategy in place.				
					Industrial Point Sources			
					Agriculture			
					Natural Sources			
					Exotic Species			
				Zinc (sediment)		1.8	Acres	2019
					Source Unknown			
2	C	Pacific Ocean at Fitzgerald Marine Reserve	20221012					
				Coliform Bacteria		0.46	Miles	2019
					Nonpoint Source			
2	C	Pacific Ocean at Pacifica State Beach	20221011					
				Coliform Bacteria		0.87	Miles	2019
				Linda Mar and San Pedro beaches are the areas affected.				
					Urban Runoff/Storm Sewers			
					Nonpoint Source			
2	C	Pacific Ocean at Pillar Point	20221012					
				Mercury		0.62	Miles	2019
					Source Unknown			

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REGION	TYPE	NAME	CALWATER WATERSHED	POLLUTANT/STRESSOR	POTENTIAL SOURCES	ESTIMATED SIZE AFFECTED		PROPOSED TMDL COMPLETION
2	C	Pacific Ocean at Pillar Point Beach	20221012					
				Coliform Bacteria		1.1	Miles	2019
					Nonpoint Source			
2	C	Pacific Ocean at Rockaway Beach	20221011					
				Coliform Bacteria		0.29	Miles	2019
					Urban Runoff/Storm Sewers			
					Nonpoint Source			
2	C	Pacific Ocean at Venice Beach	20222011					
				Coliform Bacteria		0.38	Miles	2019
					Nonpoint Source			
2	R	Permanente Creek	20550021					
				Diazinon		13	Miles	2005
				This listing was made by USEPA.				
					Urban Runoff/Storm Sewers			
2	R	Pescadero Creek	20240013					
				Sedimentation/Siltation		26	Miles	2019
				If California Department of Fish and Game and the National Marine Fisheries Service find that for this water body fish populations are not impacted, the State Water Board supports removing this water body and pollutant from the list.				
					Nonpoint Source			
2	R	Petaluma River	20630020					
				Diazinon		22	Miles	2005
				Data source: Abelli-Amen, Petaluma Tree Planters, 1999.				
					Urban Runoff/Storm Sewers			
				Nutrients		22	Miles	2019
				TMDL will be developed as part of ongoing watershed management effort. Additional monitoring and assessment needed.				
					Agriculture			
					Construction/Land Development			
					Urban Runoff/Storm Sewers			

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REGION	TYPE	NAME	CALWATER WATERSHED	POLLUTANT/STRESSOR	POTENTIAL SOURCES	ESTIMATED SIZE AFFECTED	PROPOSED TMDL COMPLETION
				Pathogens		**22 Miles**	**2019**
				TMDL will be developed as part of ongoing watershed management effort. Additional monitoring and assessment needed.			
					Agriculture		
					Construction/Land Development		
					Urban Runoff/Storm Sewers		
				Sedimentation/Siltation		**22 Miles**	**2019**
					Agriculture		
					Construction/Land Development		
					Urban Runoff/Storm Sewers		
2	**R**	**Petaluma River (tidal portion)**	**20630040**				
				Diazinon		**1.1 Miles**	**2005**
				Data source: Abelli-Amen, Petaluma Tree Planters, 1999.			
					Urban Runoff/Storm Sewers		
				Nickel		**1.1 Miles**	**2019**
				Exceedance of California Toxic Rule dissolved criteria and National Toxic Rule total criteria; elevated water and sediment tissue levels.			
					Municipal Point Sources		
					Urban Runoff/Storm Sewers		
					Atmospheric Deposition		
				Nutrients		**1.1 Miles**	**2019**
				TMDL will be developed as part of ongoing watershed management effort. Additional monitoring and assessment needed.			
					Agriculture		
					Construction/Land Development		
					Urban Runoff/Storm Sewers		
				Pathogens		**1.1 Miles**	**2019**
				TMDL will be developed as part of ongoing watershed management effort. Additional monitoring and assessment needed.			
					Agriculture		
					Construction/Land Development		
					Urban Runoff/Storm Sewers		

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2	R	Pine Creek (Contra Costa Co)	20731011					
				Diazinon		13	Miles	2005
				This listing was made by USEPA.				
					Urban Runoff/Storm Sewers			
2	R	Pinole Creek	20660020					
				Diazinon		9.2	Miles	2005
				This listing was made by USEPA.				
					Urban Runoff/Storm Sewers			
2	R	Pomponio Creek	20240020					
				Coliform Bacteria		7.1	Miles	2019
					Nonpoint Source			
2	B	Richardson Bay	20312010					
				Chlordane		2439	Acres	2008
				This listing was made by USEPA.				
					Nonpoint Source			
				Coliform Bacteria		2439	Acres	2019
				Affected area, Waldo Point Harbor, is less than 10% of embayment; source has been positively identified as substandard sewage systems in some houseboat areas; extensive local control program in place with significant water quality improvements.				
					Urban Runoff/Storm Sewers			
					Septage Disposal			
					Boat Discharges/Vessel Wastes			
				DDT		2439	Acres	2008
				This listing was made by USEPA.				
					Nonpoint Source			
				Dieldrin		2439	Acres	2008
				This listing was made by USEPA.				
					Unknown Nonpoint Source			
				Dioxin Compounds (including 2,3,7,8-TCDD)		2439	Acres	2019
				The specific compounds are 2,3,7,8-TCDD, 1,2,3,7,8-PeCDD, 1,2,3,4,7,8-HxCDD, 1,2,3,6,7,8-HxCDD, 1,2,3,7,8,9-HxCDD, 1,2,3,4,6,7,8-HpCDD, and OCDD. This listing was made by USEPA.				
					Atmospheric Deposition			
				Exotic Species		2439	Acres	2019
				Disrupt natural benthos; change pollutant availability in food chain; disrupt food availability to native species.				
					Ballast Water			

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REGION	TYPE	NAME	CALWATER WATERSHED	POLLUTANT/STRESSOR	POTENTIAL SOURCES	ESTIMATED SIZE AFFECTED		PROPOSED TMDL COMPLETION
				Furan Compounds		**2439**	**Acres**	**2019**
				The specific compounds are 2,3,7,8-TCDF, 1,2,3,7,8-PeCDF, 2,3,4,7,8-PeCDF, 1,2,3,4,7,8-HxCDF, 1,2,3,6, 7,8,-HxCDF, 1,2,3,7,8,9-HxCDF, 2,3,4,6,7,8-HxCDF, 1,2,3,4,6,7,8-HpCDF, 1,2,3,4,7,8,9-HpCDF, and OCDF. This listing was made by USEPA.			
					Atmospheric Deposition			
				Mercury		**2439**	**Acres**	**2006**
				Current data indicate fish consumption and wildlife consumption impacted uses: health consumption advisory in effect for multiple fish species including striped bass and shark. Major source is historic: gold mining sediments and local mercury mining; most significant ongoing source is erosion and drainage from abandoned mines; moderate to low level inputs from point sources.			
					Municipal Point Sources			
					Resource Extraction			
					Atmospheric Deposition			
					Natural Sources			
					Nonpoint Source			
				PCBs (Polychlorinated biphenyls)		**2439**	**Acres**	**2006**
				This listing covers non dioxin-like PCBs. Interim health advisory for fish; uncertainty regarding water column concentration data.				
					Unknown Nonpoint Source			
				PCBs (Polychlorinated biphenyls) (dioxin-like)		**2439**	**Acres**	**2019**
				The specific dioxin like compounds are 3,4,4,5-TCB (81), 3,3,3,3-TCB (77), 3,3,4,4,5-PeCB (126), 3,3,4,4,4,4-HxCB (169), 2,3,3,4,4-PeCB (105), 2,3,4,4,5-PeCB (114), 2,3,4,4,5-PeCB (118), 2,3,4,4,5-PeCB (123), 2,3,3,4,4,5-HxCB (156), 2,3,3,4,4,5-HxCB (157), 2,3,4,4,5,5,-HxCB (167), 2,3,3,4,4,5,5-HpCB (189). This listing was made by USEPA.			
					Unknown Nonpoint Source			
2	**R**	**Rodeo Creek**	**20660022**					
				Diazinon		**8**	**Miles**	**2005**
				This listing was made by USEPA.				
					Urban Runoff/Storm Sewers			
2	**E**	**Sacramento San Joaquin Delta**	**20710010**					
				Chlordane		**41736**	**Acres**	**2008**
				This listing was made by USEPA.				
					Nonpoint Source			
				DDT		**41736**	**Acres**	**2008**
				This listing was made by USEPA.				
					Nonpoint Source			
				Dieldrin		**41736**	**Acres**	**2008**
				This listing was made by USEPA.				
					Nonpoint Source			

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REGION	TYPE	NAME	CALWATER WATERSHED	POLLUTANT/STRESSOR	POTENTIAL SOURCES	ESTIMATED SIZE AFFECTED	PROPOSED TMDL COMPLETION
				Dioxin Compounds (including 2,3,7,8-TCDD)		**41736 Acres**	**2019**
				The specific compounds are 2,3,7,8-TCDD, 1,2,3,7,8-PeCDD, 1,2,3,4,7,8-HxCDD, 1,2,3,6,7,8-HxCDD, 1,2,3,7,8,9-HxCDD, 1,2,3,4,6,7,8-HpCDD, and OCDD. This listing was made by USEPA.		
					Atmospheric Deposition		
				Exotic Species		**41736 Acres**	**2019**
				Disrupt natural benthos; change pollutant availability in food chain; disrupt food availability to native species.			
					Ballast Water		
				Furan Compounds		**41736 Acres**	**2019**
				The specific compounds are 2,3,7,8-TCDF, 1,2,3,7,8-PeCDF, 2,3,4,7,8-PeCDF, 1,2,3,4,7,8-HxCDF, 1,2,3,6, 7,8,-HxCDF, 1,2,3,7,8,9-HxCDF, 2,3,4,6,7,8-HxCDF, 1,2,3,4,6,7,8-HpCDF, 1,2,3,4,7,8,9-HpCDF, and OCDF. This listing was made by USEPA.		
					Atmospheric Deposition		
				Mercury		**41736 Acres**	**2006**
				Current data indicate fish consumption and wildlife consumption impacted uses. Major source is historic: gold mining sediments and local mercury mining; most significant ongoing source is erosion and drainage from abandoned mines; moderate to low level inputs from point sources.			
					Industrial Point Sources		
					Municipal Point Sources		
					Resource Extraction		
					Atmospheric Deposition		
					Nonpoint Source		
				Nickel		**41736 Acres**	**2019**
				This listing was made by USEPA.			
					Source Unknown		
				PCBs (Polychlorinated biphenyls)		**41736 Acres**	**2006**
				This listing covers non dioxin-like PCBs.Interim health advisory for fish; uncertainty regarding water column concentration data.			
					Unknown Nonpoint Source		
				PCBs (Polychlorinated biphenyls) (dioxin-like)		**41736 Acres**	**2019**
				The specific dioxin like compounds are 3,4,4,5-TCB (81), 3,3,3,3-TCB (77), 3,3,4,4,5-PeCB (126), 3,3,4,4,4,4-HxCB (169), 2,3,3,4,4-PeCB (105), 2,3,4,4,5-PeCB (114), 2,3,4,4,5-PeCB (118), 2,3,4,4,5-PeCB (123), 2,3,3,4,4,5-HxCB (156), 2,3,3,4,4,5-HxCB (157), 2,3,4,4,5,5,-HxCB (167), 2,3,3,4,4,5,5-HpCB (189). This listing was made by USEPA.		
					Unknown Nonpoint Source		

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				Selenium		**41736**	**Acres**	**2019**
				Affected use is one branch of the food chain; most sensitive indicator is hatchability in nesting diving birds, significant contributions from oil refineries (control program in place) and agriculture (carried downstream by rivers); exotic species may have made food chain more susceptible to accumulation of selenium; health consumption advisory in effect for scaup and scoter (diving ducks); low TMDL priority because Individual Control Strategy in place. Another source is exotic species.			
					Industrial Point Sources			
					Agriculture			
					Natural Sources			
					Exotic Species			
2	**R**	**San Antonio Creek (Marin/Sonoma Co)**	**20630031**					
				Diazinon		**18**	**Miles**	**2005**
				This listing was made by USEPA.				
					Urban Runoff/Storm Sewers			
2	**R**	**San Felipe Creek**	**20530041**					
				Diazinon		**15**	**Miles**	**2005**
				This listing was made by USEPA.				
					Urban Runoff/Storm Sewers			
2	**B**	**San Francisco Bay, Central**	**20312010**					
				Chlordane		**70992**	**Acres**	**2008**
				This listing was made by USEPA.				
					Nonpoint Source			
				DDT		**70992**	**Acres**	**2008**
				This listing was made by USEPA.				
					Nonpoint Source			
				Dieldrin		**70992**	**Acres**	**2008**
				This listing was made by USEPA.				
					Nonpoint Source			
				Dioxin Compounds (including 2,3,7,8-TCDD)		**70992**	**Acres**	**2019**
				The specific compounds are 2,3,7,8-TCDD, 1,2,3,7,8-PeCDD, 1,2,3,4,7,8-HxCDD, 1,2,3,6,7,8-HxCDD, 1,2,3,7,8,9-HxCDD, 1,2,3,4,6,7,8-HpCDD, and OCDD. This listing was made by USEPA.			
					Atmospheric Deposition			
				Exotic Species		**70992**	**Acres**	**2019**
				Disrupt natural benthos; change pollutant availability in food chain; disrupt food availability to native species.				
					Ballast Water			

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REGION	TYPE	NAME	CALWATER WATERSHED	POLLUTANT/STRESSOR	POTENTIAL SOURCES	ESTIMATED SIZE AFFECTED	PROPOSED TMDL COMPLETION
				Furan Compounds		**70992 Acres**	**2019**
				The specific compounds are 2,3,7,8-TCDF, 1,2,3,7,8-PeCDF, 2,3,4,7,8-PeCDF, 1,2,3,4,7,8-HxCDF, 1,2,3,6,7,8-HxCDF, 1,2,3,7,8,9-HxCDF, 2,3,4,6,7,8-HxCDF, 1,2,3,4,6,7,8-HpCDF, 1,2,3,4,7,8,9-HpCDF, and OCDF. This listing was made by USEPA.		
					Atmospheric Deposition		
				Mercury		**70992 Acres**	**2006**
				Current data indicate fish consumption and wildlife consumption impacted uses: health consumption advisory in effect for multiple fish species including striped bass and shark. Major source is historic: gold mining sediments and local mercury mining; most significant ongoing source is erosion and drainage from abandoned mines; moderate to low level inputs from point sources.		
					Industrial Point Sources		
					Municipal Point Sources		
					Resource Extraction		
					Atmospheric Deposition		
					Natural Sources		
					Nonpoint Source		
				PCBs (Polychlorinated biphenyls)		**70992 Acres**	**2006**
				This listing covers non dioxin-like PCBs.Interim health advisory for fish; uncertainty regarding water column concentration data.			
					Unknown Nonpoint Source		
				PCBs (Polychlorinated biphenyls) (dioxin-like)		**70992 Acres**	**2019**
				The specific dioxin like compounds are 3,4,4,5-TCB (81), 3,3,3,3-TCB (77), 3,3,4,4,5-PeCB (126), 3,3,4,4,4,4-HxCB (169), 2,3,3,4,4-PeCB (105), 2,3,4,4,5-PeCB (114), 2,3,4,4,5-PeCB (118), 2,3,4,4,5-PeCB (123), 2,3,3,4,4,5-HxCB (156), 2,3,3,4,4,5-HxCB (157), 2,3,4,4,5,5,-HxCB (167), 2,3,3,4,4,5,5-HpCB (189). This listing was made by USEPA.		
					Unknown Nonpoint Source		
				Selenium		**70992 Acres**	**2019**
				Affected use is one branch of the food chain; most sensitive indicator is hatchability in nesting diving birds, significant contributions from oil refineries (control program in place) and agriculture (carried downstream by rivers); exotic species may have made food chain more susceptible to accumulation of selenium; health consumption advisory in effect for scaup and scoter (diving ducks); low TMDL priority because Individual Control Strategy in place.		
					Industrial Point Sources		
					Agriculture		
					Natural Sources		
					Exotic Species		
2	**B**	**San Francisco Bay, Lower**	**20410010**				
				Chlordane		**92274 Acres**	**2008**
				This listing was made by USEPA.			
					Nonpoint Source		

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				DDT		**92274**	**Acres**	**2008**
				This listing was made by USEPA.				
					Nonpoint Source			
				Dieldrin		**92274**	**Acres**	**2008**
				This listing was made by USEPA.				
					Nonpoint Source			
				Dioxin Compounds (including 2,3,7,8-TCDD)		**92274**	**Acres**	**2019**
				The specific compounds are 2,3,7,8-TCDD, 1,2,3,7,8-PeCDD, 1,2,3,4,7,8-HxCDD, 1,2,3,6,7,8-HxCDD, 1,2,3,7,8,9-HxCDD, 1,2,3,4,6,7,8-HpCDD, and OCDD. This listing was made by USEPA.				
					Atmospheric Deposition			
				Exotic Species		**92274**	**Acres**	**2019**
				Disrupt natural benthos; change pollutant availability in food chain; disrupt food availability to native species.				
					Ballast Water			
				Furan Compounds		**92274**	**Acres**	**2019**
				The specific compounds are 2,3,7,8-TCDF, 1,2,3,7,8-PeCDF, 2,3,4,7,8-PeCDF, 1,2,3,4,7,8-HxCDF, 1,2,3,6, 7,8,-HxCDF, 1,2,3,7,8,9-HxCDF, 2,3,4,6,7,8-HxCDF, 1,2,3,4,6,7,8-HpCDF, 1,2,3,4,7,8,9-HpCDF, and OCDF. This listing was made by USEPA.				
					Atmospheric Deposition			
				Mercury		**92274**	**Acres**	**2006**
				Current data indicate fish consumption and wildlife consumption impacted uses: health consumption advisory in effect for multiple fish species including striped bass and shark. Major source is historic: gold mining sediments and local mercury mining; most significant ongoing source is erosion and drainage from abandoned mines; moderate to low level inputs from point sources: water quality objective exceedances. Elevated sediment levels and elevated tissue levels.				
					Industrial Point Sources			
					Municipal Point Sources			
					Resource Extraction			
					Atmospheric Deposition			
					Natural Sources			
					Nonpoint Source			
				PCBs (Polychlorinated biphenyls)		**92274**	**Acres**	**2006**
				This listing covers non dioxin-like PCBs.Interim health advisory for fish; uncertainty regarding water column concentration data.				
					Unknown Nonpoint Source			
				PCBs (Polychlorinated biphenyls) (dioxin-like)		**92274**	**Acres**	**2019**
				The specific dioxin like compounds are 3,4,4,5-TCB (81), 3,3,3,3-TCB (77), 3,3,4,4,5-PeCB (126), 3,3,4,4,4,4-HxCB (169), 2,3,3,4,4-PeCB (105), 2,3,4,4,5-PeCB (114), 2,3,4,4,5-PeCB (118), 2,3,4,4,5-PeCB (123), 2,3,3,4,4,5-HxCB (156), 2,3,3,4,4,5-HxCB (157), 2,3,4,4,5,5,-HxCB (167), 2,3,3,4,4,5,5-HpCB (189). This listing was made by USEPA.				
					Unknown Nonpoint Source			

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2	B	San Francisco Bay, South	20510000				
				Chlordane		9204 Acres	2008
				This listing was made by USEPA.			
					Nonpoint Source		
				DDT		9204 Acres	2008
				This listing was made by USEPA.			
					Nonpoint Source		
				Dieldrin		9204 Acres	2008
				This listing was made by USEPA.			
					Nonpoint Source		
				Dioxin Compounds (including 2,3,7,8-TCDD)		9204 Acres	2019
				The specific compounds are 2,3,7,8-TCDD, 1,2,3,7,8-PeCDD, 1,2,3,4,7,8-HxCDD, 1,2,3,6,7,8-HxCDD, 1,2,3,7,8,9-HxCDD, 1,2,3,4,6,7,8-HpCDD, and OCDD. This listing was made by USEPA.			
					Atmospheric Deposition		
				Exotic Species		9204 Acres	2019
				Disrupt natural benthos; change pollutant availability in food chain; disrupt food availability to native species.			
					Ballast Water		
				Furan Compounds		9204 Acres	2019
				The specific compounds are 2,3,7,8-TCDF, 1,2,3,7,8-PeCDF, 2,3,4,7,8-PeCDF, 1,2,3,4,7,8-HxCDF, 1,2,3,6,7,8-HxCDF, 1,2,3,7,8,9-HxCDF, 2,3,4,6,7,8-HxCDF, 1,2,3,4,6,7,8-HpCDF, 1,2,3,4,7,8,9-HpCDF, and OCDF. This listing was made by USEPA.			
					Atmospheric Deposition		
				Mercury		9204 Acres	2006
				Current data indicate fish consumption and wildlife consumption impacted uses: health consumption advisory in effect for multiple fish species including striped bass and shark. Major source is historic: gold mining sediments and local mercury mining; most significant ongoing source is erosion and drainage from abandoned mines; moderate to low level inputs frompoint sources: water quality objective exceedances. Elevated sediment level and elevated tissue levels.			
					Industrial Point Sources		
					Municipal Point Sources		
					Resource Extraction		
					Atmospheric Deposition		
					Natural Sources		
					Nonpoint Source		
				PCBs (Polychlorinated biphenyls)		9204 Acres	2006
				This listing covers non dioxin-like PCBs.Interim health advisory for fish; uncertainty regarding water column concentration data.			
					Unknown Nonpoint Source		

PROPOSED 2006 CWA SECTION 303(d) LIST OF WATER QUALITY LIMITED SEGMENTS

SAN FRANCISCO BAY REGIONAL BOARD

SWRCB APPROVAL DATE: OCTOBER 25, 2006

REGION	TYPE	NAME	CALWATER WATERSHED	POLLUTANT/STRESSOR	POTENTIAL SOURCES	ESTIMATED SIZE AFFECTED		PROPOSED TMDL COMPLETION
				PCBs (Polychlorinated biphenyls) (dioxin-like)		9204	Acres	2019
				The specific dioxin like compounds are 3,4,4,5-TCB (81), 3,3,3,3-TCB (77), 3,3,4,4,5-PeCB (126), 3,3,4,4,4,4-HxCB (169), 2,3,3,4,4-PeCB (105), 2,3,4,4,5-PeCB (114), 2,3,4,4,5-PeCB (118), 2,3,4,4,5-PeCB (123), 2,3,3,4,4,5-HxCB (156), 2,3,3,4,4,5-HxCB (157), 2,3,4,4,5,5,-HxCB (167), 2,3,3,4,4,5,5-HpCB (189). This listing was made by USEPA.				
					Unknown Nonpoint Source			
				Selenium		9204	Acres	2019
				A formal health advisory has been issued by OEHHA for benthic-feeding ducks in South San Francisco Bay. This health advisory clearly establishes that water contact recreation beneficial use (REC-1) is not fully supported and standards are not fully met.				
					Agriculture			
					Domestic Use of Ground Water			
2	R	San Francisquito Creek	20550040					
				Diazinon		12	Miles	2005
				This listing was made by USEPA.				
					Urban Runoff/Storm Sewers			
				Sedimentation/Siltation		12	Miles	2008
				Impairment to steelhead habitat.				
					Nonpoint Source			
2	R	San Gregorio Creek	20230014					
				Coliform Bacteria		11	Miles	2019
					Nonpoint Source			
				Sedimentation/Siltation		11	Miles	2019
				Impairment to steelhead habitat.				
					Nonpoint Source			
2	B	San Leandro Bay (part of SF Bay, Central)	20420040					
				Chlordane		588	Acres	2008
				This listing was made by USEPA.				
					Nonpoint Source			
				Dieldrin		588	Acres	2008
				This listing was made by USEPA.				
					Nonpoint Source			
				Dioxin Compounds (including 2,3,7,8-TCDD)		588	Acres	2019
					Atmospheric Deposition			

PROPOSED 2006 CWA SECTION 303(d) LIST OF WATER QUALITY LIMITED SEGMENTS

SAN FRANCISCO BAY REGIONAL BOARD

SWRCB APPROVAL DATE: OCTOBER 25, 2006

REGION	TYPE	NAME	CALWATER WATERSHED	POLLUTANT/STRESSOR	POTENTIAL SOURCES	ESTIMATED SIZE AFFECTED		PROPOSED TMDL COMPLETION
				Exotic Species		**588**	**Acres**	**2019**
				Disrupt natural benthos; change pollutant availability in food chain; disrupt food availability to native species.				
					Ballast Water			
				Furan Compounds		**588**	**Acres**	**2019**
				The specific compounds are 2,3,7,8-TCDF, 1,2,3,7,8-PeCDF, 2,3,4,7,8-PeCDF, 1,2,3,4,7,8-HxCDF, 1,2,3,6,7,8-HxCDF, 1,2,3,7,8,9-HxCDF, 2,3,4,6,7,8-HxCDF, 1,2,3,4,6,7,8-HpCDF, 1,2,3,4,7,8,9-HpCDF, and OCDF. This listing was made by USEPA.				
					Atmospheric Deposition			
				Lead (sediment)		**588**	**Acres**	**2019**
					Source Unknown			
				Mercury		**588**	**Acres**	**2006**
				Current data indicate fish consumption and wildlife consumption impacted uses: health consumption advisory in effect for multiple fish species including striped bass and shark. Major source is historic: gold mining sediments and local mercury mining; most significant ongoing source is erosion and drainage from abandoned mines; moderate to low level inputs from point sources.				
					Industrial Point Sources			
					Municipal Point Sources			
					Resource Extraction			
					Atmospheric Deposition			
					Natural Sources			
					Nonpoint Source			
				Mercury (sediment)		**588**	**Acres**	**2006**
					Source Unknown			
				PAHs (Polycyclic Aromatic Hydrocarbons) (sediment)		**588**	**Acres**	**2019**
					Source Unknown			
				Pesticides (sediment)		**588**	**Acres**	**2019**
					Source Unknown			
				Zinc (sediment)		**588**	**Acres**	**2019**
					Source Unknown			

PROPOSED 2006 CWA SECTION 303(d) LIST OF WATER QUALITY LIMITED SEGMENTS

SAN FRANCISCO BAY REGIONAL BOARD

SWRCB APPROVAL DATE: OCTOBER 25, 2006

REGION	TYPE	NAME	CALWATER WATERSHED	POLLUTANT/STRESSOR	POTENTIAL SOURCES	ESTIMATED SIZE AFFECTED		PROPOSED TMDL COMPLETION
2	R	San Leandro Creek, Lower	20420012					
				Diazinon		9.3	Miles	2005
				This listing was made by USEPA.				
					Urban Runoff/Storm Sewers			
2	R	San Lorenzo Creek	20420023					
				Diazinon		11	Miles	2005
				This listing was made by USEPA.				
					Urban Runoff/Storm Sewers			
2	R	San Mateo Creek	20440032					
				Diazinon		11	Miles	2005
				This listing was made by USEPA.				
					Urban Runoff/Storm Sewers			
2	B	San Pablo Bay	20610010					
				Chlordane		68349	Acres	2008
				This listing was made by USEPA.				
					Nonpoint Source			
				DDT		68349	Acres	2008
				This listing was made by USEPA.				
					Nonpoint Source			
				Dieldrin		68349	Acres	2008
				This listing was made by USEPA.				
					Nonpoint Source			
				Dioxin Compounds (including 2,3,7,8-TCDD)		68349	Acres	2019
				The specific compounds are 2,3,7,8-TCDD, 1,2,3,7,8-PeCDD, 1,2,3,4,7,8-HxCDD, 1,2,3,6,7,8-HxCDD, 1,2,3,7,8,9-HxCDD, 1,2,3,4,6,7,8-HpCDD, and OCDD. This listing was made by USEPA.			
					Atmospheric Deposition			
				Exotic Species		68349	Acres	2019
				Disrupt natural benthos; change pollutant availability in food chain; disrupt food availability to native species.				
					Ballast Water			
				Furan Compounds		68349	Acres	2019
				The specific compounds are 2,3,7,8-TCDF, 1,2,3,7,8-PeCDF, 2,3,4,7,8-PeCDF, 1,2,3,4,7,8-HxCDF, 1,2,3,6, 7,8,-HxCDF, 1,2,3,7,8,9-HxCDF, 2,3,4,6,7,8-HxCDF, 1,2,3,4,6,7,8-HpCDF, 1,2,3,4,7,8,9-HpCDF, and OCDF. This listing was made by USEPA.			
					Atmospheric Deposition			

PROPOSED 2006 CWA SECTION 303(d) LIST OF WATER QUALITY LIMITED SEGMENTS

SAN FRANCISCO BAY REGIONAL BOARD

SWRCB APPROVAL DATE: OCTOBER 25, 2006

REGION	TYPE	NAME	CALWATER WATERSHED	POLLUTANT/STRESSOR	POTENTIAL SOURCES	ESTIMATED SIZE AFFECTED		PROPOSED TMDL COMPLETION
				Mercury		**68349**	**Acres**	**2006**
				Current data indicate fish consumption and wildlife consumption impacted uses: health consumption advisory in effect for multiple fish species including striped bass and shark. Major source is historic: gold mining sediments and local mercury mining; most significant ongoing source is erosion and drainage from abandoned mines; moderate to low level inputs from point sources.			
					Municipal Point Sources			
					Resource Extraction			
					Atmospheric Deposition			
					Natural Sources			
					Nonpoint Source			
				Nickel		**68349**	**Acres**	**2019**
				This listing was made by USEPA.				
					Source Unknown			
				PCBs (Polychlorinated biphenyls)		**68349**	**Acres**	**2006**
				This listing covers non dioxin-like PCBs.Interim health advisory for fish; uncertainty regarding water column concentration data.				
					Unknown Nonpoint Source			
				PCBs (Polychlorinated biphenyls) (dioxin-like)		**68349**	**Acres**	**2019**
				The specific dioxin like compounds are 3,4,4,5-TCB (81), 3,3,3,3-TCB (77), 3,3,4,4,5-PeCB (126), 3,3,4,4,4,4-HxCB (169), 2,3,3,4,4-PeCB (105), 2,3,4,4,5-PeCB (114), 2,3,4,4,5-PeCB (118), 2,3,4,4,5-PeCB (123), 2,3,3,4,4,5-HxCB (156), 2,3,3,4,4,5-HxCB (157), 2,3,4,4,5,5,-HxCB (167), 2,3,3,4,4,5,5-HpCB (189). This listing was made by USEPA.				
					Unknown Nonpoint Source			
				Selenium		**68349**	**Acres**	**2019**
				Affected use is one branch of the food chain; most sensitive indicator is hatchability in nesting diving birds, significant contributions from oil refineries (control program in place) and agriculture (carried downstream by rivers); exotic species may have made food chain more susceptible to accumulation of selenium; health consumption advisory in effect for scaup and scoter (diving ducks); low TMDL priority because Individual Control Strategy in place.			
					Industrial Point Sources			
					Agriculture			
					Natural Sources			
					Exotic Species			
2	**R**	**San Pablo Creek**	**20660014**					
				Diazinon		**9.9**	**Miles**	**2005**
				This listing was made by USEPA.				
					Urban Runoff/Storm Sewers			

PROPOSED 2006 CWA SECTION 303(d) LIST OF WATER QUALITY LIMITED SEGMENTS

SAN FRANCISCO BAY REGIONAL BOARD

SWRCB APPROVAL DATE: OCTOBER 25, 2006

REGION	TYPE	NAME	CALWATER WATERSHED	POLLUTANT/STRESSOR	POTENTIAL SOURCES	ESTIMATED SIZE AFFECTED	PROPOSED TMDL COMPLETION
2	L	San Pablo Reservoir	20660012				
				Chlordane		784 Acres	2019
					Source Unknown		
				Dieldrin		784 Acres	2019
					Source Unknown		
				Heptachlor epoxide		784 Acres	2019
					Source Unknown		
				Mercury		784 Acres	2019
					Atmospheric Deposition		
				PCBs (Polychlorinated biphenyls)		784 Acres	2019
					Source Unknown		
				Toxaphene		784 Acres	2019
					Source Unknown		
2	R	San Pedro Creek	20221011				
				Coliform Bacteria		2.4 Miles	2019
					Urban Runoff/Storm Sewers		
					Nonpoint Source		
2	R	San Rafael Creek	20320012				
				Diazinon		3.6 Miles	2005
				This listing was made by USEPA.			
					Urban Runoff/Storm Sewers		
2	R	San Vicente Creek	20221012				
				Coliform Bacteria		3.8 Miles	2019
					Nonpoint Source		
2	R	Saratoga Creek	20550040				
				Diazinon		18 Miles	2005
				This listing was made by USEPA.			
					Urban Runoff/Storm Sewers		

PROPOSED 2006 CWA SECTION 303(d) LIST OF WATER QUALITY LIMITED SEGMENTS

SAN FRANCISCO BAY REGIONAL BOARD

SWRCB APPROVAL DATE: OCTOBER 25, 2006

REGION	TYPE	NAME	CALWATER WATERSHED	POLLUTANT/STRESSOR	POTENTIAL SOURCES	ESTIMATED SIZE AFFECTED		PROPOSED TMDL COMPLETION
2	L	Shadow Cliffs Reservoir	20430080					
				Mercury		90	Acres	2019
					Source Unknown			
				PCBs (Polychlorinated biphenyls)		90	Acres	2019
					Source Unknown			
2	R	Sonoma Creek	20640050					
				Nutrients		30	Miles	2008
				TMDL will be developed as part of ongoing watershed management effort. Additional monitoring and assessment needed.				
					Agriculture			
					Construction/Land Development			
					Land Development			
					Urban Runoff/Storm Sewers			
				Pathogens		30	Miles	2006
				TMDL will be developed as part of ongoing watershed management effort. Additional monitoring and assessment needed.				
					Agriculture			
					Construction/Land Development			
					Land Development			
					Urban Runoff/Storm Sewers			
				Sedimentation/Siltation		30	Miles	2008
				TMDL will be developed as part of ongoing watershed management effort. Additional monitoring and assessment needed.				
					Agriculture			
					Construction/Land Development			
					Land Development			
					Urban Runoff/Storm Sewers			
2	L	Soulajule Reservoir	20112012					
				Mercury		49	Acres	2019
					Source Unknown			
				PCBs (Polychlorinated biphenyls)		49	Acres	2019
					Source Unknown			

PROPOSED 2006 CWA SECTION 303(d) LIST OF WATER QUALITY LIMITED SEGMENTS

SAN FRANCISCO BAY REGIONAL BOARD

SWRCB APPROVAL DATE: OCTOBER 25, 2006

REGION	TYPE	NAME	CALWATER WATERSHED	POLLUTANT/STRESSOR	POTENTIAL SOURCES	ESTIMATED SIZE AFFECTED		PROPOSED TMDL COMPLETION
2	R	Stevens Creek	20550020					
				Diazinon		20	Miles	2005
				This listing was made by USEPA.				
					Urban Runoff/Storm Sewers			
				Toxicity		20	Miles	2019
					Source Unknown			
2	L	Stevens Creek Reservoir	20550031					
				Chlordane		85	Acres	2019
					Source Unknown			
				Dieldrin		85	Acres	2019
					Source Unknown			
				Mercury		85	Acres	2019
					Source Unknown			
				PCBs (Polychlorinated biphenyls)		85	Acres	2019
					Source Unknown			
2	B	Suisun Bay	20710020					
				Chlordane		25335	Acres	2008
				This listing was made by USEPA.				
					Nonpoint Source			
				DDT		25335	Acres	2008
				This listing was made by USEPA.				
					Nonpoint Source			
				Dieldrin		25335	Acres	2008
				This listing was made by USEPA.				
					Nonpoint Source			
				Dioxin Compounds (including 2,3,7,8-TCDD)		25335	Acres	2019
				The specific compounds are 2,3,7,8-TCDD, 1,2,3,7,8-PeCDD, 1,2,3,4,7,8-HxCDD, 1,2,3,6,7,8-HxCDD, 1,2,3,7,8,9-HxCDD, 1,2,3,4,6,7,8-HpCDD, and OCDD. This listing was made by USEPA.				
					Atmospheric Deposition			

PROPOSED 2006 CWA SECTION 303(d) LIST OF WATER QUALITY LIMITED SEGMENTS

SAN FRANCISCO BAY REGIONAL BOARD

SWRCB APPROVAL DATE: OCTOBER 25, 2006

REGION	TYPE	NAME	CALWATER WATERSHED	POLLUTANT/STRESSOR	POTENTIAL SOURCES	ESTIMATED SIZE AFFECTED	PROPOSED TMDL COMPLETION
				Exotic Species		**25335 Acres**	**2019**
				Disrupt natural benthos; change pollutant availability in food chain; disrupt food availability to native species.			
					Ballast Water		
				Furan Compounds		**25335 Acres**	**2019**
				The specific compounds are 2,3,7,8-TCDF, 1,2,3,7,8-PeCDF, 2,3,4,7,8-PeCDF, 1,2,3,4,7,8-HxCDF, 1,2,3,6,7,8-HxCDF, 1,2,3,7,8,9-HxCDF, 2,3,4,6,7,8-HxCDF, 1,2,3,4,6,7,8-HpCDF, 1,2,3,4,7,8,9-HpCDF, and OCDF. This listing was made by USEPA.			
					Atmospheric Deposition		
				Mercury		**25335 Acres**	**2006**
				Current data indicate fish consumption and wildlife consumption impacted uses. Major source is historic: gold mining sediments and local mercury mining; most significant ongoing source is erosion and drainage from abandoned mines; moderate to low level inputs from point sources.			
					Industrial Point Sources		
					Resource Extraction		
					Atmospheric Deposition		
					Natural Sources		
					Nonpoint Source		
				Nickel		**25335 Acres**	**2019**
				This listing was made by USEPA.			
					Source Unknown		
				PCBs (Polychlorinated biphenyls)		**25335 Acres**	**2006**
				This listing covers non-dioxin-like PCBs. Interim health advisory for fish; uncertainty regarding water column concentration data.			
					Unknown point source		
				PCBs (Polychlorinated biphenyls) (dioxin-like)		**25335 Acres**	**2019**
				The specific dioxin-like compounds are 3,4,4,5-TCB (81), 3,3,3,3-TCB (77), 3,3,4,4,5-PeCB (126), 3,3,4,4,4,4-HxCB (169), 2,3,3,4,4-PeCB (105), 2,3,4,4,5-PeCB (114), 2,3,4,4,5-PeCB (118), 2,3,4,4,5-PeCB (123), 2,3,3,4,4,5-HxCB (156), 2,3,3,4,4,5-HxCB (157), 2,3,4,4,5,5-HxCB (167), 2,3,3,4,4,5,5-HpCB (189). This listing was made by USEPA.			
					Unknown Nonpoint Source		
				Selenium		**25335 Acres**	**2019**
				Affected use is one branch of the food chain; most sensitive indicator is hatchability in nesting diving birds, significant contributions from oil refineries (control program in place) and agriculture (carried downstream by rivers); exotic species may have made food chain more susceptible to accumulation of selenium; health consumption advisory in effect for scaup and scoter (diving ducks); low TMDL priority because Individual Control Strategy in place.			
					Industrial Point Sources		
					Natural Sources		
					Exotic Species		

PROPOSED 2006 CWA SECTION 303(d) LIST OF WATER QUALITY LIMITED SEGMENTS

SAN FRANCISCO BAY REGIONAL BOARD

SWRCB APPROVAL DATE: OCTOBER 25, 2006

REGION	TYPE	NAME	CALWATER WATERSHED	POLLUTANT/STRESSOR	POTENTIAL SOURCES	ESTIMATED SIZE AFFECTED		PROPOSED TMDL COMPLETION
2	T	Suisun Marsh Wetlands	20723000					
				Metals		66339	Acres	2019
				Additional monitoring and assessment needed.				
					Agriculture			
					Urban Runoff/Storm Sewers			
					Flow Regulation/Modification			
				Nutrients		66339	Acres	2019
				Additional monitoring and assessment needed.				
					Agriculture			
					Urban Runoff/Storm Sewers			
					Flow Regulation/Modification			
				Organic Enrichment/Low Dissolved Oxygen		66339	Acres	2019
				Additional monitoring and assessment needed.				
					Agriculture			
					Urban Runoff/Storm Sewers			
					Flow Regulation/Modification			
				Salinity/TDS/Chlorides		66339	Acres	2019
				Additional monitoring and assessment needed.				
					Agriculture			
					Urban Runoff/Storm Sewers			
					Flow Regulation/Modification			
2	E	Suisun Slough	20723000					
				Diazinon		1124	Acres	2005
				This listing was made by USEPA.				
					Urban Runoff/Storm Sewers			
2	B	Tomales Bay	20114033					
				Mercury		8545	Acres	2010
				Current data indicate fish consumption and wildlife consumption impacted uses: health consumption advisory in effect for multiple fish species including striped bass and shark. Major source is historic: gold mining sediments and local mercury mining; most significant ongoing source is erosion and drainage from abandoned mines; moderate to low level inputs from point sources.			
					Mine Tailings			
				Nutrients		8545	Acres	2019
				TMDL will be developed as part of ongoing watershed management effort. Tributary streams, Lagunitas Creek and Walker Creek, must be managed first. Additional monitoring and assessment needed.				
					Agriculture			

PROPOSED 2006 CWA SECTION 303(d) LIST OF WATER QUALITY LIMITED SEGMENTS

SAN FRANCISCO BAY REGIONAL BOARD

SWRCB APPROVAL DATE: OCTOBER 25, 2006

REGION	TYPE	NAME	CALWATER WATERSHED	POLLUTANT/STRESSOR	POTENTIAL SOURCES	ESTIMATED SIZE AFFECTED		PROPOSED TMDL COMPLETION
				Sedimentation/Siltation		8545	Acres	2008
				TMDL will be developed as part of ongoing watershed management effort. Tributary streams, Lagunitas Creek and Walker Creek, must be managed first. Additional monitoring and assessment needed.				
					Agriculture			
					Upstream Impoundment			
2	R	Walker Creek	20112013					
				Mercury		16	Miles	2006
				Tributary to Tomales Bay. TMDLs will be developed as part of evolving watershed management effort. Additional monitoring and assessment needed.				
					Surface Mining			
					Mine Tailings			
				Nutrients		16	Miles	2019
				Tributary to Tomales Bay. TMDLs will be developed as part of evolving watershed management effort. Additional monitoring and assessment needed.				
					Agriculture			
				Sedimentation/Siltation		16	Miles	2009
				Tributary to Tomales Bay. TMDLs will be developed as part of evolving watershed management effort. Additional monitoring and assessment needed.				
					Agriculture			
2	R	Walnut Creek	20731040					
				Diazinon		9	Miles	2005
				This listing was made by USEPA.				
					Urban Runoff/Storm Sewers			
2	R	Wildcat Creek	20660013					
				Diazinon		12	Miles	2005
				This listing was made by USEPA.				
					Urban Runoff/Storm Sewers			

PROPOSED 2006 CWA SECTION 303(d) LIST OF WATER QUALITY LIMITED SEGMENTS

SAN FRANCISCO BAY REGIONAL BOARD

SWRCB APPROVAL DATE: OCTOBER 25, 2006

REGION	TYPE	NAME	CALWATER WATERSHED	POLLUTANT/STRESSOR	POTENTIAL SOURCES	ESTIMATED SIZE AFFECTED	PROPOSED TMDL COMPLETION

ABBREVIATIONS

REGIONAL WATER QUALITY CONTROL BOARDS

1	North Coast
2	San Francisco Bay
3	Central Coast
4	Los Angeles
5	Central Valley
6	Lahontan
7	Colorado River Basin
8	Santa Ana
9	San Diego

WATER BODY TYPE

B =	Bays and Harbors
C =	Coastal Shorelines/Beaches
E =	Estuaries
L =	Lakes/Reserviors
R =	Rivers and Streams
S =	Saline Lakes
T =	Wetlands, Tidal
W=	Wetlands, Freshwater

CALWATER WATERSHED

"Calwater Watershed" is the State Water Resources Control Board hydrological subunit area or an even smaller area delineation.

GROUP A PESTICIDES OR CHEM A

aldrin, dieldrin, chlordane, endrin, heptachlor, heptachlor epoxide, hexachlorocyclohexane (including lindane), endosulfan, and toxaphene

Exhibit B

Excerpts From the R&M Report, February 15, 2007

National Defense Reserve Fleet (NDRF), Suisun Bay, CA

VESSEL ENVIRONMENTAL REVIEW

GSA Contract GS 10F0403R
US Maritime Administration Order No. DTMA4F06021

February 15, 2007

Submitted to:

U.S. Department of Transportation
MARITIME ADMINISTRATION

201 Mission Street, Suite 1800
San Francisco, CA 94105

DRAFT

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National Defense Reserve Fleet (NDRF), Suisun Bay, CA

VESSEL ENVIRONMENTAL REVIEW

Prepared for

United States Department of Transportation
Maritime Administration (MARAD)
201 Mission Street, Suite 1800
San Francisco, CA 94105

Under
GSA Contract GS 10F0403R
US Maritime Administration Order No. DTMA4F06021

Prepared by

R&M Environmental and Infrastructure, Inc.
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February 15, 2007

EXECUTIVE SUMMARY

ES.1 PROJECT OBJECTIVES

Under a contract with the United States Maritime Administration (MARAD), R&M Environmental and Infrastructure Engineering, Inc. (R&M) sampled and analyzed paint chips from 40 vessels of the Suisun Bay Reserve Fleet (SBRF) anchored in Suisan Bay, California. In addition, R&M collected and analyzed sediment samples from locations near the vessels. This sampling program has had the following objectives:

- Document the condition of paints on vessel surfaces.
- Determine the nature and concentrations of hazardous metals in the paint chip.
- Estimate quantities of hazardous paint constituents that (a) may have been lost to the environment to date and (b) still remain and are likely to be released to the environment in the future.
- Characterize the bottom sediments from within and outside the general area where the vessels have been anchored and compare the quality of these sediments with those reported for sediments in other locations in San Francisco Bay.
- Provide a preliminary assessment of the environmental significance of the collected data.

ES.2 PAINT CHIP SAMPLING, SAMPLE ANALYSIS, AND DATA EVALUATION

ES.2.1 Paint Chip Sampling and Field Observations

Paint chip sampling and field observations were performed on August 22-24, 2006. The 40 vessels from which paint chip samples were collected had been chosen at random by MARAD from among the vessels anchored in 7 groups, designated as Rows "E" through "L," at Suisun Bay. For each vessel, three composite samples were obtained representing deck, inboard, and outboard surfaces. A total of 130 composite paint chip samples (including duplicates) were collected. Paint chip samples were obtained from exfoliated/loose paint or directly from the surface using a small scraper. The approximate surface area represented by each sample and the degree of paint exfoliation on the surfaces were estimated during sampling. These estimates were subsequently used, along with the estimates of ships' surface areas provided by MARAD,

to develop quantitative estimates of paint constituents lost from and remaining on vessel surfaces.

For the 40 vessels sampled, estimates of the percentages of surface with exfoliated/lost paint averaged 16% for inboard vertical surfaces, 17% for outboard vertical surfaces, and 58% for deck surfaces. There were differences in the type and physical characteristics of the paint, such as color, number of and thickness of overlapping layers, suggesting variation in the type and age of each coating layer.

ES.2.2 Analytical Results for Paint Chip Samples

All paint chip samples were analyzed for the 17 metals (CAM-17) that are classified as toxic substances by virtue of being environmentally persistent and bioaccumulative. Depending on the concentrations of these metals in a waste or substance, such material could be classified as hazardous waste for disposal purposes. Ten of the samples were also analyzed for hexavalent chromium, which is the more toxic form of chromium, for total tin, and for lead and arsenic bioaccessibility via physiologically-based extraction tests (PBET).

CAM-17 analytical results indicated high concentrations of many toxic substances in the paint chip samples, with values as high as 33% for copper, 23% for zinc, 6.6% for lead, and 1.2% for total chromium. Based on regulatory standards, the sampled paints would be classified as hazardous waste with respect to:

- Zinc (110 samples from all 40 vessels).
- Lead (at least 83 samples from 33 vessels).
- Copper (at least 29 samples from 27 vessels).
- Chromium (at least 33 samples from 22 vessels).
- Mercury (at least 2 samples from 2 vessels).
- Cadmium (at least 2 samples from 2 vessels).
- Barium (at least 1 sample from 1 vessel)

The number of samples exceeding hazardous waste criteria may be higher, depending on results from additional tests, which were not conducted in this project.

Hexavalent chromium concentrations ranged from 430 mg/kg to 8,500 mg/kg and accounted for 7% to 71% of the total chromium in the samples examined. Total tin, possibly originating from the use of organotin compounds as biocides in antifouling marine paint formulations, was not detected in 4 of the 10 samples and was at fairly low levels (8.6 to 100 mg/kg) in the remaining 6 samples. PBET results indicated percent bioaccessibility values ranging from less than 0.2% to 82.3% for arsenic and from 7.6% to 31.7% for lead.

ES.2.3 Estimated Quantities of Metals Lost/Remaining

The estimated quantities of CAM-17 metals in paints lost from and remaining on surfaces varied widely among the 40 vessels sampled, with the following highest quantities for chromium, copper, lead, and zinc:

Metals	Ranges of Estimated Quantities, kg/vessel		Estimated Total Quantities, all 40 Vessels, kg	
	Lost	Remaining	Lost	Remaining
Chromium	0.00-60	0.06-133	596	905
Copper	0.01-766	0.43-6,773	2,864	26,045
Lead	0.00-7,86	0.10-700	4,045	4,589
Zinc	1.36-1,679	31-2,972	10,766	25,640

The following data limitations should be considered in evaluating the significance of and any use of the above estimates:

- Not all the missing paints have necessarily been lost at the present locations of the vessels in Suisun Bay.
- Remaining (weathered) paint may be different in composition and not as easily exfoliated as that which has already been lost.
- Visually estimating surface areas represented by a paint chip sample and the fractions of the deck, inboard, and outboard surfaces from which paint has been completely exfoliated is a highly subjective process and would most likely vary with the individual observer.

- Estimates of deck, inboard, and outboard surface area may not be very accurate.
- Paint samples obtained from a few square inches may not be representative of the large surface areas to which the data is extrapolated, particularly in the light of variations noted in the apparent physical characteristics of the paint on such surfaces.
- The 40 Vessels sampled in this project had been selected at random and may not be representative of NDRF vessels at Suisun Bay.

ES.3 SEDIMENT SAMPLING, SAMPLE ANALYSIS, AND DATA EVALUATION

ES.3.1 Sediment Sampling and Field Observations

Sediment sampling, performed on September 12 and 13, 2006, consisted of collecting samples of surface sediments (maximum depth of approximately 5 cm) sediments from 24 locations. Twenty two of the locations were in and around the vessels and two locations were approximately 1,000 yards north and south of the vessels. Visual inspection of the sediment samples as they were brought to the surface indicated variation in sediment sample thickness, appearance, grain size, and support base.

ES.3.2 Analytical Results for Sediment Samples

All sediment samples were analyzed for CAM-17 metals, percent solids, and trace mercury. In addition, the porewater removed from six of the samples were tested for acid-volatile sulfide (AVS), simultaneously extracted metals (SEM), ammonia, and hexavalent chromium. Results indicated that the same metals that were found in high concentrations in the paint chip samples were also present in high concentrations in the sediment samples. The metals with average concentrations (dry-weight basis) above 5 mg/kg were zinc (78 mg/kg), nickel (77 mg/kg), chromium (73 mg/kg), vanadium (73 mg/kg) barium (58 mg/kg), copper (34 mg/kg), cobalt (18 mg/kg), lead (13 mg/kg), and arsenic (7.7 mg/kg). Samples collected approximately 1,000 yards north and 1,000 yard south of the vessels showed metal concentrations that fell within the observed ranges of concentration for the 22 other sediment samples collected in the immediate vicinity of the vessels.

The SEM/AVS molar ratio in sediment porewater is believed to provide an indication of bioavailability and toxicity of certain metals in the porewater. A ratio of one or lower suggests

unavailability of metals for biological uptake. For the six samples tested, this ratio ranged from 11 to 38, which are significantly higher than values commonly observed for contaminated sediments. No explanation can be offered for this apparent anomaly, which needs to be further investigated.

Measured ammonia nitrogen and dissolved chromium concentrations in sediment porewater ranged from 1.1 to 4 mg/L and 0.006 to 0.0195, respectively. These ammonia concentrations are generally within the range of observed concentrations in San Francisco Bay. The chromium concentrations were below the 0.05 mg/L 4-day average water quality criteria (WQC) for dissolved chromium in saltwater.

ES.3.3 Sediment Quality Assessment

The National Oceanic and Space Administration (NOAA), has developed numerical sediment quality guidelines (SQG) for interpreting and assessing sediment data. When a substance is present in the sediment at a concentration below the level established by NOAA's SQG as "Effects Range-Low (ERL)", adverse effects are not be anticipated; however, concentrations exceeding what is established as "Effects Range-Median (ERM)" can be indicative of adverse effects.

Comparison of the metal concentrations in the 24 collected sediment samples with the NOAA's ERL and ERM guidelines indicated that, except for nickel, for which all sediment samples concentrations exceeded the ERM value of 51.6 ppm, all metal concentrations were below their respective ERM values, and with only a few exceptions, are also below the ERL levels. In the few cases where ERLs were exceeded, the actual concentrations are much closer to ERLs than to ERMs.

ES.3.4 Comparison of Results with those for Sediment Samples from Other Bay Locations

The fact that sediment samples collected from the bottom of Suisun Bay at locations in and around the SBRF vessels contain the same metals that are found in the paint chip samples from vessel surfaces cannot be interpreted to implicate the paint as the only source or even a partial contributor to the observed sediment contamination. Sediment contamination may result from a

variety of sources, including industrial and municipal wastewater discharges, non-point source surface runoff, and atmospheric deposition. The possible contributions from these other sources to the observed contamination of surface sediment in and around SBRF vessels was evaluated in this project in an indirect manner by comparing the metal concentrations in the 24 collected sediment samples with the measured ambient concentration for select sites immediately upstream (Honker Bay and Grizzly Bay) and downstream (San Pablo Bay) of the SBRF in Suisun Bay. This comparison indicated that, with minor exceptions, all metal concentrations were below the range of measured ambient metals concentrations in San Francisco Bay.

ES.4 CONCLUSIONS AND RECOMMENDATIONS

Analysis of paint chip samples collected from exposed outside surfaces of 40 SBRF vessels indicate presence of high concentrations of toxic metals in the exfoliating/exfoliated paint. Although the metal concentrations in the surface sediment samples collected within the area where the SBRF vessels are anchored are generally below ERL and/or the range of measured ambient metals concentrations observed in San Francisco Bay, this does not exclude the potential for ecological risk to be present at the site. While the data suggest that the sediment metals concentrations observed at the SBRF site are consistent with the upper reaches of San Francisco Bay, as opposed to being indicative of localized site-specific inputs, the data cannot be interpreted to imply that releases of toxic metals from these vessels have not occurred in the past and/or are not currently taking place. Once released to the aquatic environment, such releases are subject to dispersion and translocation via tidal action and ecosystem processes.

Significant exfoliation of paints has occurred and will continue to occur due to weathering. Exfoliated paint is subject to environmental dispersion with potential impact on ecosystem and site maintenance personnel, visitors, and salvage crews. Corrective actions to arrest further exfoliation and loss of exfoliated paint to the environment are highly warranted and are recommended.

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ACRONYMS AND ABBREVIATIONS

AVS	Acid Volatile Sulfide
cm	Centimeter
COD	Chemical Oxygen Demand
dL	Deciliter
DOT	Department of Transportation
EPA	United States Environmental Protection Agency
ERL	Effects Range-Low
ERM	Effects Range-Medium
GSA	General Services Administration
HUD	Housing and Urban Development
IMO	International Maritime Organization
kg	Kilogram
MARAD	Maritime Administration
MEPC	Marine Environmental Protection Committee
mg	Milligram
NDRF	National Defense Reserve Fleet
NIOSH	National Institute for Occupational Safety and Health
NOAA	National Oceanic and Atmospheric Administration
NS&T	National Status and Trend (Program)
OSHA	Occupational Health and Safety Administration
PAH	Polyaromatic hydrocarbons
PBET	Physiologically-based Extraction Test
PCB	Polychlorinated biphenyls
ppm	Parts per million
PEL	Permissible exposure limit
RMP	Regional Monitoring Program
RRF	Ready Reserve Force
SBRF	Suisun Bay Reserve Fleet
SEM	Simultaneously Extracted Metals
SFEI	San Francisco Estuary Institute
SQG	Sediment Quality Goal
STLC	Soluble Threshold Limit Concentration
TBT	Tributyltin
TTLC	Total Threshold Limit Concentration
TWA	Time-weighted average
WET	Waste Extraction Test

1.0 INTRODUCTION

1.1 NATIONAL DEFENSE RESERVE FLEET (NDRF) AND SUISUN BAY RESERVE FLEET (SBRF)

The National Defense Reserve Fleet (NDRF), under the custody of U.S. Maritime Administration (MARAD), is an inactive reserve source of basic Merchant design type ships that could be activated within 20-120 days to meet the shipping requirements of the United States during national emergencies.[1] These Merchant vessels are available for use in both military and non-military emergencies. A Ready Reserve Fleet component was established as a subset of the NDRF in 1976 to provide rapid deployment of military equipment, and became known as the Ready Reserve Force (RRF) in 1984[2]. Many of the newer Merchant ships added to the NDRF are held for potential upgrade to the RRF, while older vessels, which are too costly to maintain, are being systematically scrapped.

Ships in the NDRF are located at three fleet sites – James River, VA; Beaumont, TX; and Suisan Bay, CA. Ships in the NDRF are regionally located at three fleet sites – James River, VA; Beaumont, TX; and Suisan Bay, CA. This project concerns itself with the vessels currently in the Suisun Bay Reserve Fleet (SBRF) in Suisun Bay, CA. Photographs #1 and #2 show some of the vessels currently in SBRF.

1.2 ENVIRONMENTAL CONCERNS WITH PAINT AND COATINGS ON OLD VESSELS

Vessels that are designated as obsolete and are destined for disposal are present a number of environmental challenges that must be addressed in a maintenance and disposal program. The environmental issues stem from deteriorating conditions of paints on various ship surfaces (particularly the older products that contained hazardous constituents) and presence of substances such as asbestos, polychlorinated biphenyls (PCBs), and oil and fuel within the ship structure or onboard equipment. The project that is discussed in this report has only concerned itself with the paints and coating issues.

[1] http://www.nvr.navy.mil/stat_11.htm
[2] http://www.fas.org/man/dod-101/sys/ship/ndrf.htm

Photographs #3 through #5 document the severely exfoliated condition of paints on some of the SBRF vessels. Exfoliated paint is subject to environmental dispersion with potential impact on ecosystem, site maintenance personnel, and salvage crews (when the vessel is sent for salvage). As discussed in Section 4.2 of this report, analysis of samples of paints collected from deck, hull (above the waterline) and inboard surfaces of ships indicate the presence of hazardous levels of heavy metals such as barium, chromium, copper, lead, and zinc. This finding is not surprising given the prevalence of these chemicals in the pigments used in many of the older (and some current) paint formulations.

Photo #1 – One of the several rows of vessels in the SBRF

Photo #2 – A closer look at one of the rows of SBRF

Photo #3 – Example of major paint exfoliation of an outboard surface

Photo #4 – Example of major paint exfoliation of an inboard surface

Photo #5 – Example of major paint exfoliation of a deck surface

1.4 PROJECT SCOPE AND OBJECTIVES

This project, which has been conducted for vessel in the SBRF, has had the following as its objectives:

- Documentation of the condition of paints on vessel surfaces.
- Analysis of paint samples for hazardous metal constituents.
- Development of estimates of quantities of hazardous paint constituents that (a) may have been lost to the environment to date and (b) still remain and are likely to be released to the environment in the future.
- Characterization of the bottom sediments at Suisun Bay from within and outside the general area where the vessels have been anchored.
- Evaluation of the environmental significance of the collected data.

The above objectives have been achieved via implementation of the following tasks:

- Sampling and analysis of paint chip from 40 randomly selected vessels.
- Collection and analysis of 24 surface sediment samples at Suisun Bay in the general area where the vessels are anchored.
- Comparison of the metals concentrations in the 24 collected sediment samples with the data reported by others for measured ambient concentration for select sites immediately upstream (Honker Bay and Grizzly Bay) and downstream (San Pablo Bay) of SBRF in Suisun Bay.
- Preparation of this report containing a discussion of field observations, sample analytical results, and environmental significance of results

The paint chip sampling of the vessel hulls in this project has been limited to the hull surface above the waterline. The sampling of the hull below the waterline, where the paint may still contain residual antifouling agents (see discussion in Section 2.3), is being performed by another contractor under a separate arrangement with MARAD.

1.5 REPORT ORGNIZATION

This report consists of an Executive Summary followed by Sections 1 through 5 plus 4 appendices. Section 1.0 presents the background, scope, and objective of the project. Section

2.0 reviews the regulatory and environmental background that supports discussions in subsequent sections. The protocols used for collection and analysis paint chip and sediment samples are described in Section 3.0. Analytical results for paint chip and sediment samples are presented and discussed in Sections 4.0 and 5.0, respectively. Section 4.0 also contains quantitative estimates of the paint constituents that have been lost via exfoliation for each vessel and the amounts that still remain and may be released to the environment in the future. Presentation and discussion of the sediment data in Section 5.0 also include a comparison of the analytical results for sediment samples collected in this project with data reported by others for sediment samples from select sites immediately upstream and downstream of the SBRF in Suisun Bay. Appendix A contains 40 "Vessel Datasheets", presenting vessel-by-vessel paint-chip sampling activities and results. Field documents and laboratory analytical results are presented in Appendix B (for paint chip samples) and in Appendices C and D (for sediment samples). .

2.0 REGULATORY BACKGROUND AND ENVIRONMENTAL CONSIDERATIONS

2.1 FEDERAL STATUTES AND PROGRAMS

Although the human health hazards and ecological impacts of hazardous constituents in marine paints and coatings (particularly, the older products) have been well documented, at the present time there are no specific regulations governing the management of old/exfoliating paints on obsolete vessels. The existing federal statutes relating to marine environmental quality largely deal with point source emissions and discharges from vessels, preservation and protection of coastal resources, regulation of ocean dumping, monitoring of coastal ecosystems, etc. The most relevant of these Federal laws are listed in Table 2.1.

Section 3516 of the National Defense Authorization Act for Fiscal Year 2004 requires that the MARAD and the EPA jointly develop guidance recommending environmentally best management practices to be used in the preparation of vessels for use as artificial reefs. These recommendations are contained in a May 2006 document entitled "National Guidance: Best Management Practices for Preparing Vessels Intended to Create Artificial Reefs." The document identifies the material or categories of materials of concern that may be found aboard vessels and provides a narrative clean-up performance goal and information on methods for achieving those goals in preparation of vessels prior to sinking. Materials or categories of materials identified include oil and fuel, asbestos, polychlorinated biphenyls (PCBs), paint, and solids/debris/floatables. The guidelines recommend removal of harmful exterior hull anti-fouling systems that are determined to be active and exfoliating paint (paint that is blistering, peeling, and pitting) and exfoliated paint (paint chips and flakes).

The EPA's Office of Prevention, Pesticides, and Toxic Substances develops and implements regulations pursuant to the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA). A paint that is used to control biological growth is considered a pesticide and hence is subject to regulation under FIFRA[3]. However, the regulations deal with new paint registration where screening assessment of a new chemical is performed based on product characterization data (e.g., what leaches out of paint). Even though there are currently no regulations for controlling

[3] Telephone communication with Mr. Rick Petri of the EPA Office of Prevention, Pesticides, and Toxic Substances (Tel.: 703-305-7358); September 18, 2006 (Masood Ghassemi of R&M).

the impact of old paint on water quality, the EPA Office of Water Programs is in the process of developing such regulations, primarily from the standpoint of sinking old ships to act as artificial reefs[4]. These regulations are being developed jointly with the Department of Defense (DOD), with the US Navy as the lead agency, and will apply only to military vessels. No draft regulations have yet been developed; proposed draft regulations may become available in 2007.

Table 2.1 – Some Federal Laws Relating to Marine Environmental Quality*

- Act to Prevent Pollution from Ships (33 U.S.C. §§ 1901 et seq.)
- Clean Air Act (42 U.S.C. §§ 7401 et seq.)
- Clean Vessel Act of 1992 (enacting 33 U.S.C. §1322 note)
- Coastal Barrier Resources Act of 1982 (16 U.S.C. §§ 3501 et seq.)
- Coastal Zone Management Act of 1972 (16 U.S.C. §§ 1451 et seq.)
- Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (42 U.S.C. §§ 9601 et seq.)
- Federal Water Pollution Control Act (33 U.S.C. §§ 1251 et seq.)
- Fish and Wildlife Coordination Act (16 U.S.C. §§ 661 et seq.)
- National Coastal Monitoring Act (33 U.S.C. §§ 2801 et seq.)
- National Contaminated Sediment Assessment and Management Act (33 U.S.C. § 1271)
- National Marine Sanctuaries Act (16 U.S.C. §§ 1431 et seq.)
- National Environmental Policy Act of 1969 (42 U.S.C. §§ 4321 et seq.)
- Nonindigenous Aquatic Nuisance Prevention and Control Act (16 U.S.C. §§ 4701 et seq.)
- Ocean Dumping Act (33 U.S.C. §§ 1401 et seq., inter alia)
- Oil Pollution Act of 1990 (33 U.S.C. §§ 2701 et seq.)
- Rivers and Harbors Act of 1899 (33 U.S.C. §§ 401 et seq.)
- Section 6217 of the Coastal Zone Act Reauthorization Amendments of 1990 (16 U.S.C. § 1455b)
- Shore Protection Act of 1988 (33 U.S.C. §§ 2601 et seq.)
- Title IV of the Marine Protection, Research, and Sanctuaries Act of 1972 (16 U.S.C. §§ 1447a to 1447f)
- Endangered Species Act of 1973 (16 U.S.C. §§ 1531 et seq.)
- Magnuson-Stevens Fishery Conservation and Management Act (16 U.S.C. §§ 1801 et seq.)
- Marine Mammal Protection Act (U.S.C. §§ 1361 et seq.)
- Outer Continental Shelf Lands Act (43 U.S.C. §§ 1331 et seq.)
- Hazardous Materials Transportation acts (49 U.S.C. §§ 5101 et seq., inter alia)
- Solid Waste Disposal Act (42 U.S.C. §§ 6901 et seq.)
- Toxic Substances Control Act (15 U.S.C. §§ 2601 et seq.)
- Water Resources Development Act (33 U.S.C. §§ 2280 et seq., inter alia)

* Source: 1998 Year of the Ocean: Perspectives on Marine Environmental Quality Today; http://www.yoto98.noaa.gov/yoto/meeting/mar_env_316.html

[4] Telephone communication with Mr. Brian Rappoli of the EPA Office of Water Programs (Tel.: 202-566-1548); September 18, 2006 (Masood Ghassemi of R&M).

2.2 LEAD-BASED PAINT HAZARDS

Presence of exfoliating and exfoliated paint containing lead (and other hazardous constituents) on vessels would present occupational hazards[5] to the personnel currently engaged in regular inspection and maintenance of mothball vessels and to the crews that will be engaged in demolition/salvage of the obsolete vessels[6]. In addition, dispersion of exfoliated paint and its consumption by wildlife entails potential adverse ecological impacts.

Human lead exposure occurs when dust and fumes are inhaled and when lead is ingested via lead-contaminated food, water, cigarettes, and clothing. Lead entering the respiratory and digestive systems is released to the blood and distributed throughout the body. More than 90 percent of total body burden of lead is accumulated in the bones, where it is stored for decades. Lead in bones may be released into the blood and re-expose organ systems long after the original environmental exposure. This process can also result in fetal exposure in pregnant women. The most important aspects of lead toxicity are its effects on the central nervous system, which may be irreversible; however, lead affects other organs and functions of body to various degrees. Anemia, stillbirth and miscarriages, and incidences of hypertension and cardiovascular disease have been associated with exposures to lead. Lead has also been shown to be an animal carcinogen.

With wide-spread use of lead-based paints[7] in older buildings (e.g., houses built prior to 1978) and the documented adverse health hazards associated with lead-based paints, the US Congress passed the Housing and Community Development Act (Public Law 102-5500, which included as Title X the "Residential Lead-Based Paint Hazard Reduction Act of 1992") in 1992 Title X is a comprehensive law designed to direct the Nation's response to the public health problem of lead-based paint hazards in housing. This law directed the Occupational Safety and Health Administration (OSHA) to increase the protection of workers exposed to lead hazards throughout

[5] Under OSHA general industry lead standard (29 CFR 1910.1025), the Permissible Exposure Limit (PEL) for personal exposure to airborne inorganic lead is 50 $\mu g/m^3$ as an 8-hour time-weighted average (TWA)
[6] Gary Cohn and Will Englund, "The Shipbreakers." *The Baltimore Sun* December 7, 1997
[7] Lead-Based Paint means paint or other surface coatings that contain lead equal to or exceeding 1.0 milligram per square centimeter or 0.5 percent by weight or 5,000 parts per million (ppm) by weight.

the construction industry.[8] By amending the Toxic Substances Control Act, Title X also directed the National Institute for Occupational Safety and Health (NIOSH) to conduct a comprehensive study of means to reduce hazardous occupational lead abatement exposures, to include, at a minimum, each of the following[10]:

A. Surveillance and intervention capability in the States to identify and prevent hazardous exposure to lead abatement workers.

B. Demonstration of lead abatement control methods and devices and work practices to identify and prevent hazardous lead exposures in the workplace.

C. Evaluation, in consultation with the National Institute of Environmental Health Sciences, of health effects of low and high levels of occupational lead exposures on reproductive, neurological, renal, and cardiovascular health.

D. Identification of high-risk occupational settings to which prevention activities and resources should be targeted.

E. A study assessing the potential exposures and risks from lead to janitorial and custodial workers

The U.S. Department of Housing and Urban Development (HUD)'s Office of Lead-Based Paint Abatement and Poisoning Prevention has published "Guidelines for the Evaluation and Control of Lead-based Paint Hazards in Housing.

While the sources and risk factors for lead exposure to humans are relatively well recognized, much less is known about lead exposure risks and effects to wildlife. Finkelstein, et al.[9,10] recently documented the impact of lead-based paint on seabirds on Midway Atoll, a decommissioned Navy base that has been turned into a wildlife refuge. Deteriorating lead-based paint remains on several of the island's former military buildings, with the surrounding land used as nesting ground by Laysan albatross (*Phoebastria immutabilis*). Chicks that nested near these structures often developed lead poisoning and rarely survived. One of the most noticeable symptoms of lead exposure was a condition called droopwing, in which lead affects the chicks'

[8] U.S. Department of Health and Human Services, Center for Disease Control and Prevention, "Protecting Workers Exposed to lead-Based Paint Hazard – A Report to Congress", January 1997
[9] Myra Finkelstein, et al. "Lead Poisoning of Seabirds: Environmental Risks from Leaded paint at a Decommissioned Military base." *Environ. Sci. & Technol.*, Vol. 37, No. 15, 2003; pp. 3256-3260.
[10] "Lead Paint on Former Military Bases Risks to Wildlife," *Environ. Sci. & Technol.,* Vol. 37, No. 15, August 1, 2003; pp. 277-278A.

peripheral nerves, making them unable to fly. Every one of the chicks that was sampled around the buildings that had droopwing had elevated levels of lead in their blood, averaging 4,400 micrograms per liter (µg/L), while the levels in non-droopwing chicks near the building sites averaged 850 µg/L and levels in chicks at a reference site more than 100 feet away from any buildings averaged 60 µg/L. Isotopic lead analyses confirmed that leaded paint was the source of lead poisoning in the chicks.

2.3 ANTIFOULING SYSTEMS

Much attention has been focused in recent years on organotin antifouling agents in paints used on the hull surface below the waterline. Organotin–based paints, such as the self-polishing copolymer tributyltin (TBT), kill or repel nuisance organisms that encounter ship hulls, but the paints also diffuse into adjacent waters, where other non-target plants and animals may be exposed. Signs of endocrine-disruption were noticed in non-target species such as oysters, shellfish, and snails in many studies during 1970s and 1980s[11, 12]. Because of the environmental concerns, the International Maritime Organization's Marine Environmental Protection Committee (IMO-MEPC) published mandatory regulations to ban the use of toxic antifouling paints containing organotins such as TBT. A draft resolution was submitted to IMO in 2000, urging the MEPC to ensure global prohibition on the application of organotin compounds by 2003 and complete prohibition of these biocides as antifouling agents on ships by 2008.

Assuming that antifouling coatings on obsolete vessels are more than 12 years old and essentially all the underwater hull area is covered with marine growth, a minimal amount of active biocide would be expected to still have remained on these vessels and hence antifouling agent presence and toxicity should not be an environmental concern with the obsolete vessels[13].

[11] "IMO Will Ban the use of a Popular Biocide," *Environ. Sci. & Technol.,* Vol. 33, Issue 1/P. 11, January 1, 1999.
[12] K. Kannan, et. al., "Elevated Accumulation of Tributyltin and Its Breakdown Products in Bottlenose Dolphins (*Tursiops truncates*) Found Stranded Along the U.S. Atlantic and Gulf Coasts." *Environ, Sci. Technol*. 31 (8), pp. 296-301, 1997.
[13] U.S. Environmental Protection Agency and U.S. Maritime Administration "National Guidance: Best Management Practices for Preparing Vessels Intended to Create Artificial Reefs." May 2006

2.4 HAZARDOUS WASTE CLASSIFICATION

Under the federal criteria for classifying a waste as hazardous waste (Table 2.2), the paint materials on many of the obsolete vessels that are destined for recycling or disposal may be classified as hazardous due to their high concentrations of certain heavy metals (most notably lead, chromium, copper, and zinc). Indeed, the EPA/MARAD guidelines for preparing vessels for disposal to create artificial reefs[13] call for removal of exfoliating (peeling) and exfoliated paint from the vessel surfaces.

2.5 SEDIMENT QUALITY CRITERIA

2.5.1 General Considerations

Contaminated sediments have been associated with ecological and potential human risks in freshwater and marine ecosystems throughout the world.[14] Among the contaminants are certain metals (e.g., lead, cadmium, chromium, zinc, and mercury) and hydrophobic organics (e.g., PCBs) that have a low solubility and strong tendency for adsorption on sediment particles. These contaminants have typically originated/originate in industrial and municipal wastewater discharges, atmospheric deposition, and polluted runoff water from urban and agricultural areas. Approximately 300 million cubic yards of sediments are dredged from harbors and shipping channels annually to maintain commerce, and about 3-12 million cubic yards of these dredged sediments are sufficiently contaminated to require special handling and disposal.[15]

The EPA[15], National Oceanic and Atmospheric Administration (NOAA)[16], and certain states, such as Washington[17] and New York[18], have published sediment quality guidelines for use in interpreting chemical data from analysis of sediments or as a screening tool for identifying contaminated sediments. However, there are currently no federally promulgated criteria or

[14] Rifkin, E., et al., "Chromium and Sediment Toxicity," *Environ. Sci. & Technol.,* July 15, 2004, pp.267A-271-A
[15] The U.S. Environmental Protection Agency, Office of Water. "EPA's Contaminated Sediment Management Strategy." EPA-823-R-98-001, April 1998.
[16] NOAA's Ocean Service Office of Response and Restoration: "Sediment Quality Guidelines Developed for the National Status and Trends Program," June 12, 1999.
[17] Washington Department of Ecology, "Sediment Quality Chemical Criteria". http://www.ecy.wa.gov/programs/tcp/smu/sed_chem.htm.
[18] New York State Department of Environmental Conservation, Division of Fish, Wildlife, and Marine Resources, "Technical Guidance for Screening Contaminated Sediments." 22 November 1993 (Reprinted July 1994, March 1998, and January 1999).

Table 2.2 - Regulatory Constituent Concentration Limits For Hazardous Waste Classification

Inorganic Constituent	STLC, mg/L	TTLC, Wet Weight mg/kg	Organic Constituent	STLC, mg/L	TTLC, Wet Weight, mg/kg
Antimony	15	500	Aldrin	0.14	1.4
Arsenic	5.0	500	Chlordan	0.25	2.5
Barium	100	10,000	DDT, DDE, DDD	0.1	1.0
Beryllium	0.75	75	2,4-dicholorphenoxyacetic acid	10	100
Cadmium	1.0	100	Dieldrin	0.8	8.0
Chromium (VI)	5	500	Dioxin (2,3,7,8-TCDD)	0.001	0.01
Chromium (III)	5	2,500	Endrin	0.02	0.2
Cobalt	80	8,000	Heptachlor	0.47	4.7
Copper	25	2,500	Kepone	2.1	21
Fluoride Salts	180	18,000	Lead compounds, organic	-	13
Lead	5.0	1,000	Lindane	0.4	4.0
Mercury	0.2	20	Methoxychlor	10	100
Molybdenum	350	3,500	Mirex	2.1	21
Nickel	20	2,000	Pentachlorophenol	1.7	17
Selenium	1.0	100	polychlorinated biphenyls (PCBs)	5.0	50
Silver	5	500	Toxaphenes	0.5	5
Thallium	7.0	700	Trichloroehylene	204	2,040
Vanadium	24	2,400	2,4,5-Trichlorophenoxypropionic acid	1.0	10
Zinc	250	5,000			

Notes:

The constituents listed in this table are considered "Toxic Substances" by virtue of being environmentally persistent and bioaccumulative. Any waste is a hazardous waste if it contains a substance listed in the table:

a) At a concentration in milligrams per liter (mg/L), as determined by the "Waste Extraction Test, WET", which exceeds its listed soluble threshold limit concentration (STLC).
b) At a concentration in milligrams per kilogram (mg/kg) in the waste which exceeds its listed total threshold limit concentration (TTLC)

Thus, a waste that contains a constituent at a concentration in mg/kg which is less than its listed TTLC, may or may not be a hazardous waste, depending whether or not the WET result indicates a concentration above or below the listed STLC. [Note: As a rule-of-thumb, when the concentration of a constituent exceeds 10 times its regulatory STLC, a waste extraction test (WET) must be conducted to determine whether or not a waste should be considered hazardous with respect to that constituent.]

standards for chemicals in sediments. Sediment quality guidelines are usually based on total concentrations of a contaminant, thereby ignoring the many site-specific variations in sediment physical (e.g., particle size distribution) and chemical characteristics and water quality that affect bioavailability, toxicity, and mobility of contaminants. For example, there is a 20-fold difference in copper toxicity over the pH range that commonly exists in the natural environment.[19] These site-specific considerations, which impact bioavailability and toxicity of contaminants in a sediment matrix, prevent establishment of universally applicable sediment quality standards.

Because of the above considerations, there is an ongoing scientific debate on how best to evaluate potential for contaminated sediment to cause injury to aquatic organisms[20]. One school of thought is that bioavailability is controlled primarily by the dissolved metal concentration in sediment porewater. The other school of thought uses an empirical approach that correlates trace metal sediment chemistry to biological effects data to determine toxic effects levels. This approach considers sediment ingestion as an important pathway for biotic uptake, based on studies that show although metal concentration in sediment porewater may be controlled by geochemical factors, metal exposure and subsequent toxicity is also influenced by sediment ingestion.

2.5.2 Simultaneously Extracted Metals and Acid-volatile Sulfide (SEM/AVS)

Studies have shown that while dry weight metal concentrations in sediments are not predictive of bioavailability, metal concentrations in interstitial (pore) water are correlated with observed biological effects.[21] A key partitioning phase controlling cationic metal activity and toxicity in the porewater is acid-volatile sulfide (AVS), which binds metals such as cadmium, copper, nickel, lead, and zinc (generally present as divalent species) on a mole-to-mole basis. Metal sulfide precipitates are typically very insoluble and this limits the availability of dissolved metals for biological uptake. Laboratory studies with variety of marine and freshwater benthic organisms have shown that when molar concentrations of simultaneously extracted metals

[19] Renner, R., "Rethinking Water Quality Standards for Metal Toxicity." *Environ. Sci. & Technol*. Vol. 31, , No. 10, 1997, pp. 466A-468-A

[20] Patton, G.W., and Crecelius, E.A., "Simultaneously Extracted Metals/Acid-volatile Sulfide, and Total Metals in Surface Sediment from the Hanford Reach of the Columbia River and the Lower Snake River." Report PNNL-13417, Pacific Northwest National Laboratory, U.S. Department of Energy, January 2001.

[21] Ankley, G., et al., "Technical Basis and Proposal for Deriving Sediment Quality Criteria for Metals." *Environmental Toxicology and Chemistry*, Vol. 15, No. 12, 1996, pp. 2056-2066.

(SEM) from sediment during a cold-acid extraction is less than that of AVS (i.e., the sulfide that is volatilized during the same extraction), the dissolved interstitial water metal concentration remains below those predicted to cause effects. Field studies of metal speciation in reduced, anoxic sediments, however, have indicated the presence of certain metals as both sulfide and oxide solid phases[22]. This finding suggests that it cannot be assumed that all trace metals are present in reduced sediments as sulfide phases. Of the six metals studied (cadmium, zinc, manganese, chromium, lead, and iron), only cadmium was found to be present in sediment exclusively as a sulfide phase. Zinc and manganese are only partially removed, and lead and chromium are not removed from porewater via formation of monosulfide phases, despite the reduced, anoxic conditions of the sediments.

2.5.3 NOAA's Sediment Quality Guidelines[16]

Using the considerable amounts of sediment data, generated through its National Status and Trends (NS&T) Program, NOAA has developed numerical sediment quality guidelines (SQG) for use as informal, interpretive tools for the NS&T Program. These SQGs were derived initially using a database compiled from studies performed both in saltwater and freshwater. The SQGs were updated in 1995 using a larger database compiled from many studies performed by numerous investigations in only saltwater. The updated database excluded the data from freshwater studies and/or data judged to be of marginal quality and included a considerable amount of new higher quality data. Data from each study were arranged in order of ascending concentrations. Study endpoints in which adverse effects were reported were identified. From the ascending data tables, the 10th percentile and the 50th percentile (median) of the effects database were identified for each substance. The 10th percentile values were named the "Effects Range-Low" (ERL), indicative of concentrations below which adverse effects rarely occur. The 50th percentiles were named the "Effects Range-Median" (ERM) values, representative of concentrations above which effects frequently occur.

Based on the 1995 updated database, ERL and ERM values were calculated for nine trace metals, 13 individual polyaromatic hydrocarbons (PAH), three classes of PAHs, and three

[22] O'Day, P.A., et al. "Metal Speciation and Bioavailability in Contaminated Estuary Sediments, Alameda Naval Air Station, California." *Environ. Sci. & Technol.,* Vol. 34, No. 17, 2000, pp. 3665-3673.

classes of chlorinated hydrocarbons. Sufficient amounts of reliable data were unavailable to perform similar calculations for other substances. The calculated ERLs and ERMs for the nine trace metals are presented in Table 2.3.

Table 2.3: ERL and ERM Guideline Values (ppm, dry weight) for Trace Metals[16]

Metal	ERL	ERM
Arsenic	8.2	70
Cadmium	1.2	9.6
Chromium	81	370
Copper	34	270
Lead	46.7	218
Mercury	0.15	0.71
Nickel	20.9	51.6
Silver	1.0	3.7
Zinc	150	410

3.0 SAMPLING AND ANALYSIS PROTCOLS

3.1 PAINT CHIP SAMPLING

The 40 vessels from which paint chip samples were collected had been chosen at random by MARAD from among the vessels anchored in 7 groups, designated as Rows "E" through "L," at Suisun Bay (see Table 3.1 for the list of 40 vessels and Figure 1 for the mooring plan). Samples were obtained from 2 to 6 discrete locations representing the paint on each of the following three categories of ship surfaces: outboard vertical surface (i.e., hull surface above the waterline), deck surface, and inboard vertical surface (including equipment and appurtenances on the deck, as appropriate). The discrete samples for each surface type were combined into a single composite sample for that surface. The hull surface of each vessel was sampled at locations near the top (accessed from the deck) and above the water line (accessed from a boat). The top and bottom samples were subsequently combined to obtain a composite hull surface sample. Thus, for each vessel, three composite samples were obtained representing deck, inboard, and outboard surfaces. To assess possible variations in paint characteristics for the same surface, "duplicate" samples were obtained for 4 of the vessels (i.e., 10% of the total number of vessels sampled). Including the "duplicates," a total of 130 composite paint chip samples were collected, representing the following:

- Inboard vertical surfaces: 40 vessels; 44 composite samples.
- Deck surfaces: 39 vessels: 42 composite samples (No paint on paint sample was collected from the deck of Sperry, Row E – See Vessel Datasheet in Appendix A).
- Outboard vertical surfaces: 40 vessels; 44 composite samples (Composites of discrete samples from top and bottom hull surfaces above the waterline; except for the Ambassador, the Agent, and the Aide, where the composite samples were from bottom locations near the water line only – See Vessel Datasheets in Appendix A).

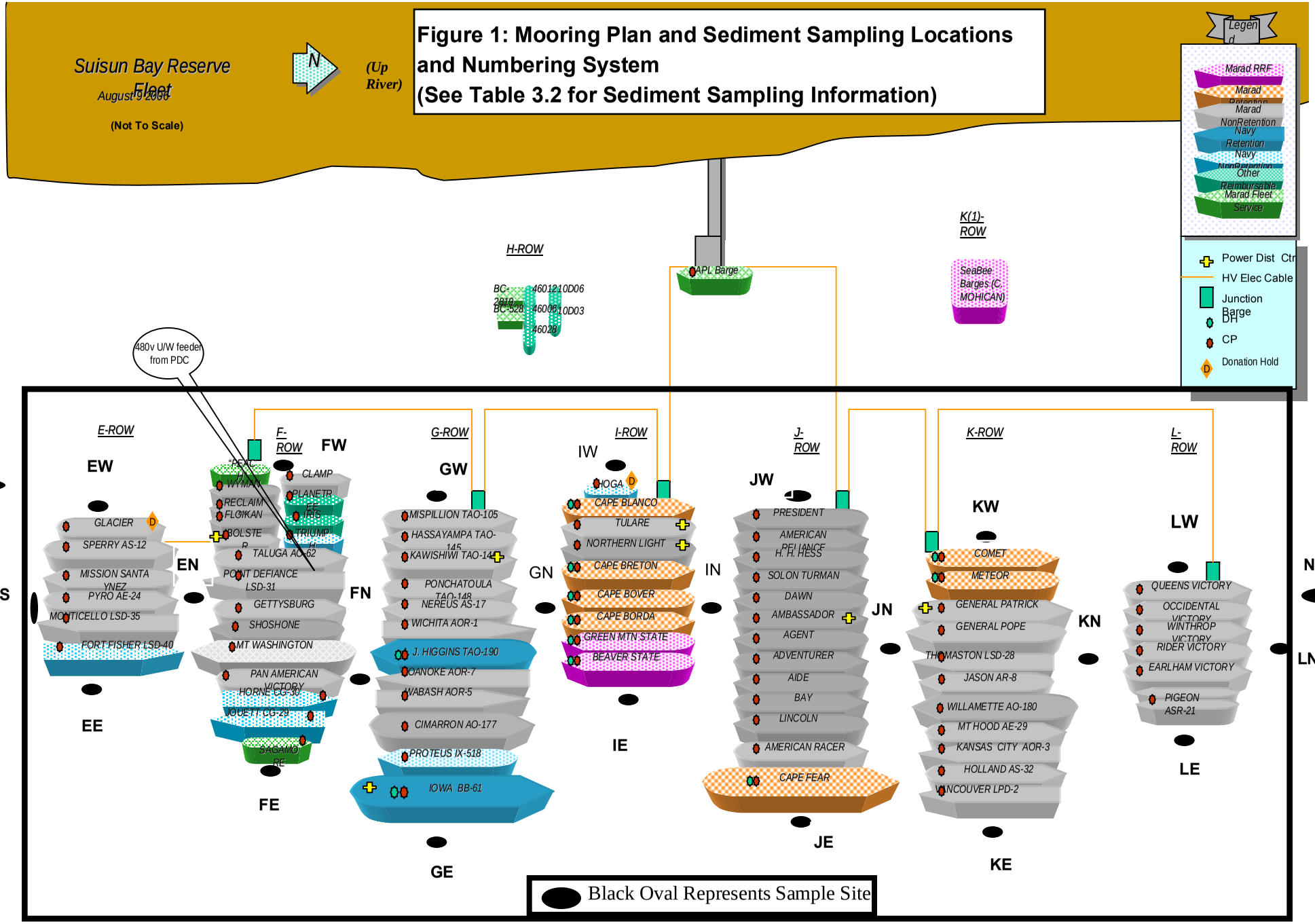
Paint chip samples were obtained from exfoliated/loose paint or directly from the surface using a small scraper (Photo #6). Samples were placed in plastic containers and labels affixed on them with pre-assigned sample identification numbers. The following information was recorded in field notes for each sample and ship surface type sampled (see sampling field notes in Appendix B):

- Date and time of sample collection
- The approximate surface area represented by each sample.
- Observation of physical sample characteristics and peculiarities (if any).
- Visual estimates of the extent of paint exfoliation on each of the three vessel surfaces sampled (i.e., inboard, outboard, and deck surfaces).

Table 3.1: The 40 Vessels from which Paint Samples were Collected

ROW*	Vessel	ROW	Vessel
E	Glacier	I	Northern Light
E	Sperry		
E	Mission Santa Ynez	J	President
		J	American Reliance
F	Clamp	J	Hess
F	Reclaimer	J	Solon Turman
F	Planetree	J	Dawn
F	Florikan	J	Ambassador
F	Iris	J	Agent
F	Bolster	J	Adventurer
F	Taluga	J	Aide
F	Point Defiance	J	Bay
F	Gettysburg	J	Lincoln
F	Shoshone	J	American Racer
F	Pan American Victory		
		K	General Patrick
G	Mispillion	K	General John Pope
G	Hassayampa	K	Vancouver
G	Nereus		
G	Wabash	L	Queens Victory
G	Sagamore	L	Winthrop Victory
		L	Rider Victory
I	Tulare	L	Earlham Victory

Paint chip sampling was performed on August 22-24, 2006, by Ms. Bonnie Kellogg of KELLCO Services (Hayward, CA), under a subcontract to R&M, the prime contractor for this project. KELLCO is a California Department of Health Services (DHS)-certified firm for lead hazard evaluation and abatement.



Boundary, General
Anchorage # 26

Field sampling notes and the sample chain-of-custody documents that accompanied the samples to the laboratory are contained in Appendix B. Photographic documentation of sampling activities is contained in the Vessel Datasheets in Appendix A.

Photo #6 – Use of a small scraper to collect paint chip samples

3.2 PAINT CHIP SAMPLE ANALYSIS

All paint chip samples were delivered, under chain-of-custody documentation, to McCampbell Analytical Laboratories (Pittsburg, CA), a State of California-certified analytical laboratory, for pre-analysis sample preparation (i.e., homogenization and weighing of the samples), sample storage, analysis for metals, and disbursement of portions of specified samples to other laboratories for specialized testing as necessary.

All paint chip samples were analyzed for CAM-17 metals[23] via EPA Method 6020. In addition, 10 of the samples were analyzed for hexavalent chromium via Total Threshold Limit Concentration (TTLC) Method and total tin via EPA Method 6020. At R&M's request, portions of 10 samples were sent by McCampbell to PRIMA Environmental (Sacramento, CA) for physiologically-based extraction tests (PBET) to determine bioaccessibility of lead and arsenic in the paint. With some modifications (see the laboratory report from PRIMA Environmental contained in Appendix B), PBET protocol followed that described in NFESC User's Guide UG-2041-ENV *Guide to Incorporating Bioavailability Adjustments into Human Health and Ecological Risk Assessments at U.S. Navy and Marine Corps Facilities, Part 2.* July 2000.

3.3 SEDIMENT SAMPLING

The approximate locations suggested by MARAD for sediment sample collection are indicated on the SBRF Mooring plan, shown as Figure 1. Twenty two of the locations were in and around the vessels and two locations were approximately 1,000 yards north and south of the vessels.

Sediment sampling was performed on September 12 and 13, 2006 by Pacific EcoRisk (Martinez, CA) under a subcontract with R&M. Pacific EcoRisk provided a 3-person sampling crew, sampling boat, and all required equipment for sample collection, equipment decontamination, sample preservation, and field condition and sample location documentation. Some photographs of sampling activities are presented as Photos #7 through #11. Table 3.2 contains data on the time of sampling, water depth and tide information at the time of sampling, and sample location coordinates. Sediment sampling field notes are presented in Appendix C.

A Van Veen grab sampler was used for sediment sample collection (Photo #10). When the sampler was brought to the surface, the water layer on the top was drained and a stainless steel spatula was used to remove the top layer of sediment to a depth of approximately 5 cm. This material was then transferred to a wide-mouth 2-liter glass jar that was labeled and placed in a

[23] CAM-17 refers to a list of heavy metals described in the California Administrative Manual or *California Code of Regulations*. It is also referred to as Title 22 metals from CCR Title XXII. The list includes Antimony (Sb), Arsenic (As), Barium (Ba), Beryllium (Be), Cadmium (Cd), Chromium (Cr), Cobalt (Co), Copper (Cu), Lead (Pb), Mercury (Hg), Molybdenum (Mo), Nickel (Ni), Selenium (Se), Silver (Ag), Thallium (Tl), Vanadium (V) and Zinc (Zn).

cooler with ice that was taken to the Pacific EcoRisk's facility in Martinez at the end of each work day for homogenization, centrifugation (to collect porewater), splitting certain samples into duplicates, and shipment to CRG Laboratories (Torrance, CA) for analysis. Samples for acid-volatile sulfide (AVS), simultaneously extracted metals (SEM), and ammonia analysis were placed in a smaller jar with the headspace purged with nitrogen gas immediately upon sample collection (Photo #11).

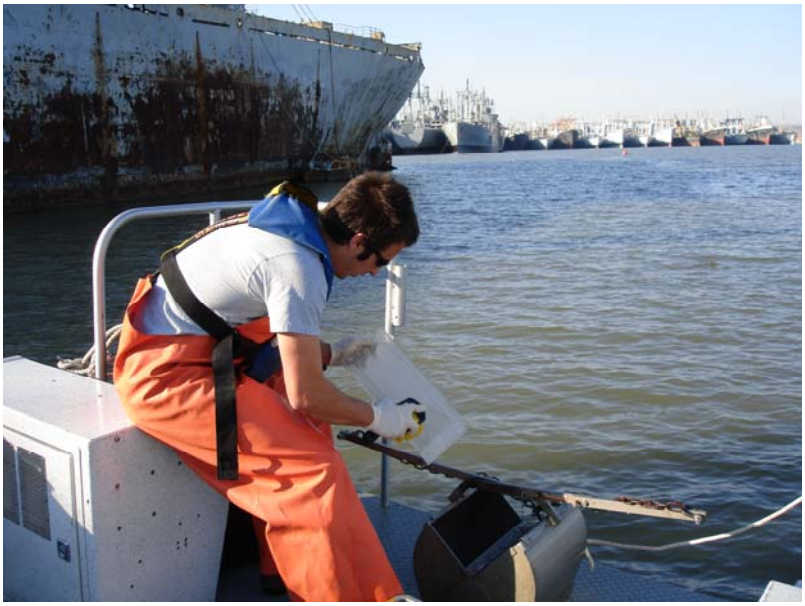


Photo #7 - Decontamination of the sampling equipment prior to and between sample collections

Photo #8 – Water brought to the surface along with the sediment being drained from the sampler

Photo #9 – Placing sediment sample into a glass container for storage and shipment to laboratory

Photo #10 – Only the top 5-cm of sediment was removed for laboratory analysis

Photo #11 - Purging the headspace in the container containing sediment sample for AVS and SEM analysis with nitrogen gas

Table 3.2: Sediment Sampling Information

Sample ID*	Date	Sample Time		Tidal Cycle	Station Depth	Sample Location Coordinates	
		Initiated	Completed			Lat.	Long.
LW	9/12/2006	8:35	8:49	Ebb +3.3 ft	31.1	38° 05.0857	122° 05.0797
LN	9/12/2006	9:15	9:22	Ebb +3.0 ft	27.1	38° 05.095	122° 05.028
LE	9/12/2006	9:38	9:44	Ebb +2.8 ft	34.2	38° 05.013	122° 05.034
KN	9/12/2006	10:05	10:12	Ebb +2.5 ft	29.5	38° 05.013	122° 05.092
JN	9/12/2006	11:15	11:26	Ebb +1.8 ft	29	38° 04.736	122° 05.291
KW	9/12/2006	12:14	12:18	Ebb +1.5 ft	25.4	38° 04.875	122° 05.282
IE	9/12/2006	12:47	12:59	Slack + 1.4 ft	34.6	38° 04.381	122° 05.559
GE	9/12/2006	13:23	13:30	Flood + 1.6 ft	34.7	38° 04.062	122° 05.897
JE	9/12/2006	13:58	14:06	Flood + 1.9 ft	29.4	38° 04.649	122° 05.395
IN	9/12/2006	14:25	14:31	Flood + 2.2 ft	24.9	38° 04.582	122° 05.529
JW	9/12/2006	14:48	14:53	Flood + 2.6 ft	25.3	38° 04.714	122° 05.627
GW	9/13/2006	7:52	8:00	Flood + 3.4 ft	31.2	38° 04.173	122° 06.118
IW	9/13/2006	8:16	8:20	Flood + 3.5 ft	33	38° 04.433	122° 05.684
GN	9/13/2006	8:38	8:45	Flood + 3.5 ft	25.4	38° 04.296	122° 05.809
KE	9/13/2006	9:13	9:21	Ebb + 3.4 ft	35.4	38° 04.729	122° 05.088
FE	9/13/2006	9:40	9:49	Ebb + 3.3 ft	35.3	38° 04.735	122° 05.094
EE	9/13/2006	10:04	10:13	Ebb + 3.1 ft	31.2	38° 04.735	122° 05.094
ES	9/13/2006	10:35	10:45	Ebb + 3.0 ft	30.4	38° 03.555	122° 06.667
S-1000	9/13/2006	11:02	11:08	Ebb + 2.6 ft	36.7	38° 03.126	122° 06.937
EW	9/13/2006	11:25	11:30	Ebb + 2.5 ft	26.9	38° 03.641	122° 06.703
EN	9/13/2006	12:11	12:17	Ebb + 2.1 ft	22.1	38° 03.748	122° 06.492
FN	9/13/2006	12:58	13:12	Ebb + 1.9 ft	26.1	38° 03.990	122° 06.131
FW	9/13/2006	12:37	12:44	Ebb + 2.0 ft	24.2	38° 03.949	122° 06.363
N1000	9/13/2006	13:30	13:45	Ebb +1.8 ft	31.4	38° 05.476	122° 04.522

* See Figure 1 for sample designation and location

3.4 SEDIMENT SAMPLE ANALYSIS

All analyses involving or related to sediment samples were performed by CRG Marine Laboratories (Torrance, CA), a state-certified analytical laboratory. Specific analyses performed, analytical method used, and the number of samples analyzed for the indicated analytes are as follows:

- Percent solids in sediment (EPA Method 160.3): 26 samples (including 2 duplicates).
- CAM-17 Metals in sediment (EPA Method 6020m): 26 samples (including 2 duplicates).
- Trace mercury in sediment (EPA Method 245.7m): 26 samples (including 2 duplicates).

- Acid-volatile Sulfide (AVS) (Plumb 1981 and TERL): 6 sediment samples (including one duplicate).Simultaneously Extracted Metals (SEM) (EPA 200.8m): 6 sediment samples (including one duplicate).Simultaneously extracted mercury (EPA 245.7m): 6 sediment samples (including one duplicate).Hexavalent chromium in water (SM 3500-Cr D): 5 porewater samples.

- Ammonia in sediment interstitial water (SM 4500-NH3 F): 5 porewater samples.

4.0 RESULTS AND DISCUSSION – PAINT CHIP SAMPLES

4.1 FIELD OBSERVATIONS

Visual examination of the condition of paint on the surfaces at the time of sampling indicated a variable degree of paint exfoliation among vessels with significant exfoliation noted on most ships, particularly the aging Victory class ships in the L-row. (For variations in the degree of exfoliation see photographs in Vessel Datasheets; e.g., Photo #798 for Glacier in Row E and Photo #770 for Clamp and Photo #780 for Bolster in Row F vs. Photo #753 for Shoshone and Photo #787 for Reclaimer, both in Row F, Photo #725 for Tulare in Row I, and Photo #823 for Rider Victory in Row L). Based on visual observations, the degree of exfoliation for the 40 vessels samples were roughly estimated as follows:

Surface	% Surface with Exfoliated/Lost Paint (range and mean)	
Inboard vertical surfaces	1 to 50 %	16 %
Outboard vertical surfaces	1 to 60 %	17 %
Deck surfaces	1 to 98 %	58 %

There was a variation in the type and physical characteristics of the paint, such as color, number of and thickness of overlapping layers (e.g., See Photos #703 for General Patrick in Row K and Photo #708 for Lincoln in Row J), suggesting variation in the type and age of each coating layer.

4.2 ANALYTICAL RESULTS

4.2.1 Paint Chip Characterization Database

Analytical results for paint chip samples are summarized in tables contained in the vessel datasheets (Appendix A). The paint chip analysis database contained in these vessel datasheets is comprised of a total of 2,263 individual concentration data points for CAM-17 metals, hexavalent chromium (including associated COD and water extract pH), total tin, and PBETs. Also included in the datasheets are estimated quantities of CAM-17 metal constituents that have been lost due to chipping and the quantities that still remain and are potentially subject to loss to environment in the future. These estimates are based on the analytical results for individual

CAM-17 metals reported by the laboratory, estimates of vessel surface areas (provided by MARAD), and visual estimates made at the time of sample collection of (a) percent of the deck, inboard, and outboard surfaces where paint had chipped , and (b) the area represented by the collected sample.

4.2.2 CAM-17 Metal Concentration Ranges

Table 4.1 shows the range of concentrations for each of the CAM-17 metals in the paint chip samples and compares these concentrations with the regulatory TTLC standards for classification of a waste as hazardous waste, as discussed in Section 2.4. The data in this table indicate that paints would be classified as hazardous waste with respect to:

- Zinc (110 samples from all 40 vessels).
- Lead (at least 83 samples from 33 vessels).
- Copper (at least 29 samples from 27 vessels).
- Chromium (at least 33 samples from 22 vessels
- Mercury (at least 2 samples from 2 vessels).
- Cadmium (at least 2 samples from 2 vessels).
- Barium (at least 1 sample from 1 vessel)

The number samples exceeding hazardous waste criteria may be higher, depending on results from "Waste Extraction Test" (WET), which was not conducted in this project in order to produce data to be compared with the STLC regulatory standards (See notes for Table 2.2).

4.2.3 Analytical Results for Hexavalent Chromium

Chromium exists primarily in trivalent [Cr(III)] and hexavalent [Cr(VI)] oxidation states, with the latter being of a significant environmental concern, because it is a strong oxidant and highly toxic. Hexavalent chromium causes lung cancer in humans. In addition to being a human carcinogen, hexavalent chromium is a skin, eye, and respiratory track irritant. Evaluations by the California Department of Health Services, the U.S. EPA, and the U.S. Agency for Toxic Substances and Disease Registry indicate that the risk of lung cancer to exposed workers is

extremely high.[24] Hexavalent chromium in the form of lead chromate (chrome yellow, chrome green, molybdenum orange), zinc chromate, barium chromate, calcium chromate, potassium dichromate, and sodium chromate, is used in pigments for paints, inks, and plastics. Hexavalent chromium enters the body via inhalation and ingestion. Chromium can be inhaled when chromium dust, mist, and fumes are in the air. Particles of chromium can be swallowed if the dust gets on hand, clothing, or beard, or in food or beverages.

Table 4.1: CAM-17 Metal Concentration Ranges in Paint Chip Samples

CAM-17 Metals	Range, mg/kg		TTLC, mg/kg	Values Exceeding TTLC	
				# of samples	# of vessels
Antimony	1.20	200	500	0	0
Arsenic	0.57	410	500	0	0
Barium	33	13,000	10,000	1	1
Beryllium	0.68	2.50	75	0	0
Cadmium	0.47	130	100	2	2
Chromium (VI)	430	8,500	500	9	7
Chromium (III)*	11	12,000	2,500	33	22
Cobalt	9.50	610	8,000	0	0
Copper	14	330,000	2,500	29	27
Lead	32	66,000	1,000	83	33
Mercury	0.05	220	20	2	2
Molybdenum	0.83	180	3,500	0	0
Nickel	6.50	2,700	2,000	1	1
Selenium	0.62	0.63	100	0	0
Silver	0.50	22	500	0	0
Thallium	ND	ND	700	0	0
Vanadium	3.40	330	2,400	0	0
Zinc	930	230,000	5,000	110	40

* Values are for total chromium

One or more paint chip samples from 8 vessels were analyzed for hexavalent chromium. The results, which are presented in Table 4.2, indicate hexavalent chromium concentrations ranging from 430 mg/kg to 8,500 mg/kg and accounting for 7% to 71% of the total chromium in the samples examined. Also included in Table 4.2 are data on pH of the de-ionized water extract and the chemical oxygen demand (COD) of the paint chip samples, which are measured as required by the protocol for hexavalent chromium analysis. The high concentrations of COD of the paint chip samples suggest the presence of significant amount of organic compounds and/or

[24] Hazard Alert, June 1992. California Department of Health Services, Hazard Evaluation System and Information Service, Richmond, CA

inorganic reducing agents in the samples, and hence higher actual concentrations of Cr(VI) than those indicated by the test.

4.2.4 Analytical Results for Total Tin

As noted in Section 2.3, tributyltin (TBT) has been used as a biocide in antifouling marine paint formulations. Ingestion is the main route of exposure to tin and tin compounds. Humans exposed for a short period of time to some organic tin compounds have experienced skin and eye irritation and neurological problems; exposures to very high amounts may be lethal.[25]

Table 4.2: Chromium Results for Paint Chip Samples

Vessel	Sample ID's	Location	Cr(VI), mg/Kg	Total Cr*, mg/Kg	% Cr(VI)	COD, mg/Kg	pH @ °C
Nereus (DUP)	0608461-002A (G6-D2)	deck	2,300	8,300	28	450,000	8.30 @ 25.6
	0608554-023A (G6-H2)	outboard	1,000	3,200	31	390,000	7.19 @ 27.3
Nereus	0608461-003A (G6-D)	deck	8,500	12,000	71	1,000,000	7.71 @ 25.7
Am. Reliance	0608461-033A (J2-D)	deck	430	5,800	7	350,000	6.44 @ 25.7
Aide	0608461-045A (J9-I)	inboard	1,100	5,600	20	130,000	6.94 @ 25.8
Clamp	0608554-011A (F2N-H)	outboard	1,700	4,000	43	230,000	6.22 @ 26.1
Point Defiance	0608554-015A (F7-H)	outboard	3,400	10,000	34	310,000	7.25 @ 27.3
Reclaimer	0608554-016A (F3S-H)	outboard	2,000	6,600	30	360,000	8.40 @ 25.9
General Patrick	0608554-018A (K2-3-H)	outboard	1,100	3,900	28	370,000	6.70 @ 26.7
Vancouver	0608554-019A (K2-11-H)	outboard	1,600	4,500	36	170,000	7.74 @ 25.9

* From analytical results in Appendix B

The paint chip samples analyzed for hexavalent chromium were also analyzed for total tin. The analytical results for tin are presented in Table 4.3. Tin was not detected in 4 of the 10 samples and was at fairly low levels (8.6 to 100 mg/kg) in the remaining 6 samples.

[25] U.S. Department of Health and Human Services, Public Health Service Agency for Toxic Substances and Disease Registry, "Tin and Tin Compounds," August 2005.

Table 4.3: Total Tin Results for Paint Chip Sampling

Vessel	Sample ID's	Location	total tin, mg/Kg
Nereus (DUP)	0608461-002A (G6-D2)	deck	8.6
	0608554-023A (G6-H2)	outboard	30
Nereus	0608461-003A (G6-D)	deck	ND
American Reliance	0608461-033A (J2-D)	deck	ND
Aide	0608461-045A (J9-I)	inboard	61
Clamp	0608554-011A (F2N-H)	outboard	ND
Point Defiance	0608554-015A (F7-H)	outboard	ND
Reclaimer	0608554-016A (F3S-H)	outboard	100
General Patrick	0608554-018A (K2-3-H)	outboard	17
Vancouver	0608554-019A (K2-11-H)	outboard	93

4.2.5 Physiologically Based Extraction Test Results for Lead and Arsenic

In assessing and managing the risks posed by contaminants such as lead and arsenic in an environment such as soil, the physicochemical properties of the medium impact the bioavailability and hence the toxicity of the chemical of concern. Due to variations in soil physicochemical properties, species physiology, and contaminant speciation, toxicity is difficult to evaluate without conducting *in vivo* dose-response studies. Such tests, however, are expensive and time consuming, making them impractical to use in assessment and management of contaminated environments.[26] One possible alternative is physiologically based extraction test (PBET), which is an *in vitro* test system for predicting the bioavailability of metals from a solid matrix. The test incorporates gastrointestinal tract parameters representative of a human, including stomach and small intestinal pH and chemistry, solid-to-solution ratio, stomach mixing, and stomach emptying rate. The correlation between the PBET results ("bioaccessability") and bioavailability based on animal studies appear to vary with the target species. For lead, for example, the results of PBET have been reported to be linearly correlated with results from a Sprague-Dawley rat model.[27] For arsenic, the results overpredict bioavailability study results in rabbits and primate models. The PBET thus is not designed to

[26] Furman, O., et al. "Risk Assessment Test for Lead Bioaccessability to Waterfowl in Mine-impacted Soils," *Jour. Environ. Qual*. Vol. 35, 450-458, 2006

[27] Ruby, M.V., "Estimation of Lead and Arsenic Bioavailability Using a Physiologically Based Extraction Test." *Environ. Sci. & Technol.* 30, 422-430, 1996.

supplant bioavailability studies model, but rather to estimate bioavailability when animal study results are unavailable.

Lead and arsenic bioaccessibility determination via PBET were performed on 6-7 paint chip samples. Results, which are presented in Table 4.4, indicate percent bioaccessibility values ranging from less than 0.2% to 82.3% for arsenic and from 7.6% to 31.7% for lead.

Table 4.4: PBET Results for Arsenic and Lead in Paint Chip Samples

Vessel	Sample ID's	Location	Arsenic Concentration, ppm		Bioaccessibility	
			Bulk Sample	Extraction Fluid	%	mg As/Kg sample
Bay	0608461-039A (J10-I)	inboard	7.1	0.0055	9.7	0.69
	0608461-039A (J10-I) DUP[1]	inboard	7.1	<0.005	<8.8	<0.63
Ambassador	0608554-033A (J6-H)	outboard	410	2.7	82.3	338
Dawn	0608461-019A (J5-D)	deck	250	<0.005	<0.2	<0.5
General Patrick	0608554-018A (K2-3-H)	outboard	86	0.071	8.3	7.1
Solon Turman	0608554-039A (J4-H)	outboard	54	<0.005	<0.93	<0.5
	0608554-039A (J4-H)[2]	outboard	54	<0.005	<0.93	<0.5
Vessel	Sample ID's	Location	Lead Concentration, ppm		Bioaccessibility	
			Bulk Sample	Extraction Fluid	%	mg Pb/Kg sample
Taluga	0608509-019A (F6-I)	inboard	66,000	50	7.6	5,000
Solon Turman	0608461-021A (J4-D)	deck	54,000	100	18.5	10,000
Queens Victory	0608554-031A (L2-H)	outboard	52,000	130	25.0	13,000
	0608554-031A (L2-H)[2]	outboard	52,000	99	19.0	9,900
	0608554-032A (L2-H2)	outboard	29,000	92	31.7	9,200
Earlham Victory	0608554-028A (L6-H)	outboard	25,000	38	15.2	3,800

[1] duplicate for quality control

[2] extraction performed at 0 °C

4.3 ESTIMATES OF CAM-17 METALS LOST/REMAINING

The estimated quantities of CAM-17 metals in paints lost from and remaining on each vessel are contained in the vessel datasheets. The estimated ranges among the 40 vessels and the total quantities for all 40 vessels are presented in Table 4.5. The data indicate highest estimates of loss quantities for zinc (1,679 kg; Taluga, Row F), lead (786 kg; Solon Turman, Row J), copper

(766 kg; Taluga, Row F), barium (113 kg; Dawn, Row J), and chromium (60 kg; Rider Victory, Row L). The corresponding estimates for highest quantities remaining are 6,773 kg of copper (Hassayampa; Row G), 2,972 kg for zinc (Hassayampa; Row G), 700 kg for lead (Queens Victory; Row L), 204 kg for Barium (Northern Light; Row I), and 133 kg for chromium (Point Defiance; Row F). For the 40 vessels as a whole, the highest quantities of metals lost and remaining are, respectively 10,766 kg and 25,640 kg for zinc, 4,045 kg and 4,589 kg for lead, 2,864 kg and 26,045 kg for copper, 751 kg and 1,357 kg for barium, and 596 kg and 905 kg for chromium.

The following data limitations should be considered in evaluating the significance of and any use of the above estimates:

- Not all the missing paints have necessarily been lost at the present locations of the vessels in Suisun Bay.
- Remaining (weathered) paint may be different in composition and not as easily exfoliated as that which has already been lost.
- Visually estimating surface areas represented by a paint chip sample and the fractions of the deck, inboard, and outboard surfaces from which paint has been completely exfoliated is a highly subjective process and would most likely vary with the individual observer.
- Estimates of deck, inboard, and outboard surface area may not be very accurate.
- Paint sample obtained from a few square inches may not be representative of the large surface area of a deck, inboard vertical surface or outboard vertical surface, particularly in the light of variations noted in the apparent physical characteristics of the paint on such surfaces.

- The 40 Vessels sampled in this project had been selected at random and may not be representative of NDRF vessels at Suisun Bay.

Table 4.5: Estimates of CAM-17 Metals Lost/Remaining

CAM-17 Metals	Estimated Quantities Ranges, kg/vessel				Estimated Total Quantities, all 40 Vessels, kg	
	Lost		Remaining		Lost	Remaining
Antimony	0.00	1.62	0.00	2.48	9.88	12.53
Arsenic	0.00	9.83	0.00	3.36	16.61	19.35
Barium	0.08	112.67	1.52	204.35	751.09	1,357.01
Beryllium	0.00	0.01	0.00	0.02	0.01	0.02
Cadmium	0.00	0.49	0.00	1.32	3.56	6.56
Chromium	0.00	59.55	0.06	133.47	596.44	904.71
Cobalt	0.02	4.99	0.15	5.57	48.71	71.20
Copper	0.01	765.78	0.43	6,773.16	2,864.41	26,045.46
Lead	0.00	786.11	0.10	699.84	4,044.87	4,588.62
Mercury	0.00	0.36	0.00	0.59	0.56	1.03
Molybdenum	0.00	2.06	0.00	3.51	10.94	19.38
Nickel	0.00	13.48	0.02	35.24	47.94	124.90
Selenium	0.00	0.00	0.00	0.01	0.00	0.01
Silver	0.00	0.03	0.00	0.22	0.13	0.54
Thallium	NA	NA	NA	NA	NA	NA
Vanadium	0.00	0.81	0.00	2.50	7.12	11.18
Zinc	1.36	1,678.76	31.00	2,971.81	10,765.83	25,640.31

5.0 RESULTS AND DISCUSSION - SEDIMENT SAMPLES

5.1 FIELD OBSERVATIONS

Visual inspection of the sediment samples as they were brought to the surface indicated variation in sediment sample thickness, appearance, and support base. While in some locations a significant amount of sediment appeared to exist on the bottom to fill the Van Veen sampler (Photo #10), in other locations (e.g., sampling location IE – See Figure 1) very little sediment could be brought to the surface, requiring repositioning of the sampling boat and re-locating the sampling location. The sediments also appeared to contain varying amounts of fines and to vary in color and texture. The sediment from sampling location JW exhibited a thin layer of brown material which was underlain by a much deeper darker-color material (Photo #12). At sampling location JW, the sampler brought up a sample containing several pieces of corroded metal, apparently having flaked off from the hull of a ship, containing barnacle growth (Photo #13).

Photo #12 - Sediment sample from sampling location JW (See Figure 1 for sample location); note the black color of the sediment that underlies the brown surface deposition

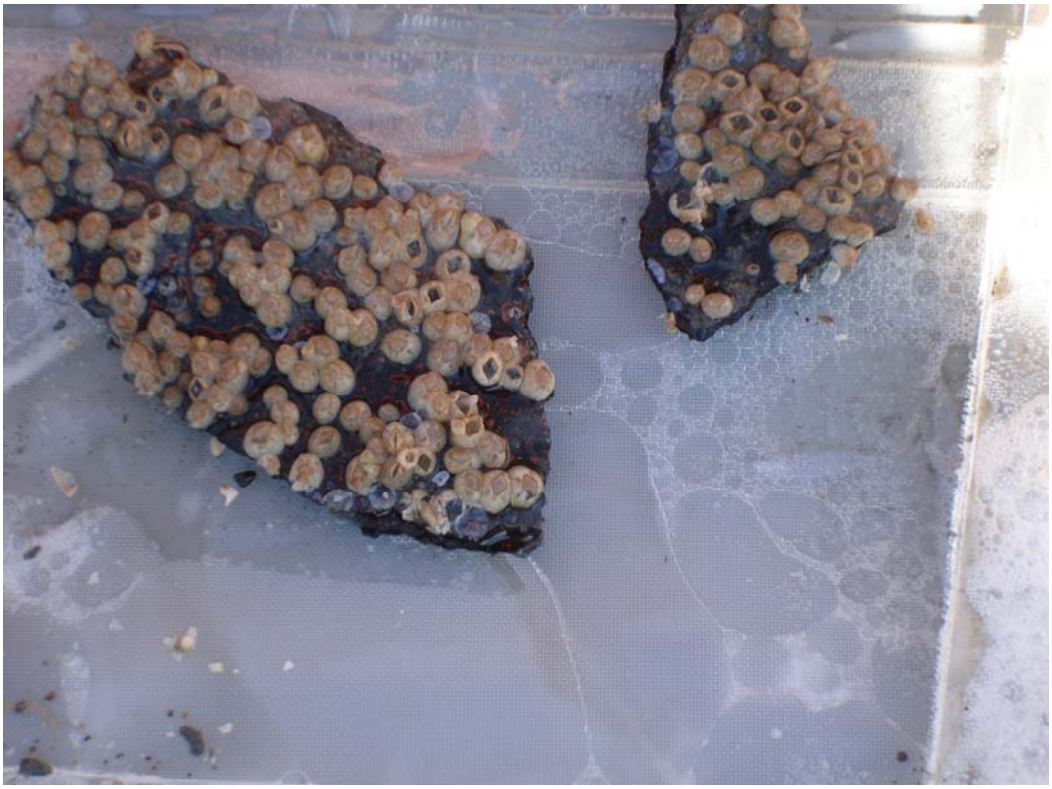


Photo #13 - Barnacle growth on the surface of two piece of metal within the sediment sample collected at JW – See Figure 1 for sample location

5.2 ANALYTICAL RESULTS

5.2.1 CAM-17 Metals Concentrations in Sediment Samples

Table 5.1 presents the results of CAM-17 metal analysis for the sediment samples collected at the 24 locations shown in Figure 1. The range and average concentrations encountered for each metal are noted in the last two columns in this table. The data indicate the following:

- Some of the same metals that were found to be present in the paint chip samples are also present in the sediment samples. In decreasing order of concentrations (in µg/g dry weight), these metals are:

Metal	Concentration (µg/g dry weight)
Zinc (Zn)	78.26
Nickel (Ni)	77.47
Chromium (Cr)	73.45
Vanadium (V)	73.24
Barium (Ba)	58.42
Copper (Cu)	34.48
Cobalt (Co)	18.02
Lead (Pb)	12.94
Arsenic (As)	7.70
Molybdenum (Mo)	0.45
Berylium (Be)	0.40
Silver (Ag)	0.35
Cadmium (Cd)	0.21
Selenium (Se)	0.18
Antimony (Sb)	0.18
Mercury (Hg)	0.16
Thalium (Ti)	0.07

- Although there is no distinctive correlation pattern between sample location and concentration of metals in the sediment samples, the data suggest that sediment samples collected in the immediate eastern vicinity of vessels in the L-Row and K-Row (sampling locations LW, LN, LE, and KE - See Figure 1) occupy the lowest metal concentration positions with respect to a number of metals, as shown in Table 5.1.

- Sediment samples collected approximately 1,000 yards north (location N-1000) and 1,000 yard south (location S-1000) show metal concentrations that fall within the observed ranges of concentration for the 22 other sediment samples collected in the immediate vicinity of the vessels.

It should be noted here that the fact that sediment samples contain some of the same metals that were found in the paint chip should not be interpreted to implicate the paints on the vessels as the primary source or even a partial contributor to the observed sediment matrix. As noted in Section 2.5.1, sediment contamination may result from a variety of historical and/or ongoing sources, including industrial and municipal wastewater discharges, non-point source runoff, and atmospheric deposition. Analysis of sediment samples collected from other locations in the Bay (See Section 5.2.5) and/or metal speciation (fingerprinting) studies, such as that used by Finklstein, et al. 11, 12 to document the impact of lead-based paint on seabirds at Midway Atoll[9,10], can assist in an investigation of the sources of metals in Suisun Bay sediments.

TABLE 5.1: CAM-17 Metal Concentrations in Sediment Samples (µg/g dry weight)
Sedeiment Sample Location Designation (See Figure 1)

Metal	LW (a)	LN	LE	KN	JN	KW	IE	GE	JE	IN	JW	GW	IW	GN	KE	FE	EE	ES	S-1000	EW	EN (b)	FN	FW	N-1000	Range	Average
Antimony (Sb)	0.0833	0.118	0.068	0.141	0.16	0.122	0.175	0.142	0.15	0.186	0.348	0.347	0.16	0.141	0.079	0.118	0.065	0.15	0.114	0.573	0.1885	0.109	0.361	0.176	0.065-0.573	0.17816
Arsenic (As)	5.0333	5.566	5.147	7.132	6.99	6.418	7.411	7.643	6.971	7.561	12.55	11.27	9.026	6.836	6.233	6.871	4.787	6.916	7.016	14.84	7.8995	5.025	12.02	7.555	4.787-14.84	7.69653
Barium (Ba)	47.64	53.4	45.01	67.42	55.8	57.43	80.64	65.26	61.12	50.85	91.13	90.77	73.39	48.29	37.39	49.25	37.51	48.91	53.63	59.86	63.475	44.89	70.72	48.17	37.39-91.13	58.4152
Berylium (Be)	0.2435	0.235	0.178	0.382	0.29	0.28	0.59	0.599	0.33	0.351	0.658	0.58	0.638	0.352	0.207	0.511	0.22	0.333	0.453	0.557	0.4405	0.291	0.596	0.33	0.178-0.658	0.40183
Cadmium (Cd)	0.0975	0.122	0.068	0.181	0.14	0.117	0.21	0.231	0.146	0.165	0.31	0.291	0.226	0.137	0.071	0.191	0.081	0.18	0.195	0.619	0.195	0.12	0.67	0.168	0.068-0.67	0.20556
Chromium (Cr)	59.613	50.88	44.94	71.12	63.9	61.02	101.4	101.3	63.94	70	103.8	93.88	106.8	69.27	48.23	87.35	47.79	57.6	75.28	85.55	73.415	57.47	95.43	72.94	44.94-106.8	73.4528
Cobalt (Co)	15.095	13.83	16.24	18.84	18	16.46	18.69	19.79	17.82	17.95	23.81	22.59	20.78	18.06	15.93	16.87	14.63	16.5	17.83	18.82	19.12	17.13	20.87	16.76	13.83-23.81	18.0156
Copper (Cu)	18.419	20.49	11.35	38.15	23.5	23.14	40.43	40.829	23.94	30.36	68.79	61.579	40.479	28.199	12.409	31.83	15.569	32.35	33.299	66.009	40.539	21.85	76.36	27.699	11.35-76.359	34.4803
Lead (Pb)	5.8963	7.076	6.144	11.85	8.85	8.1	8.66	9.016	7.887	9.187	77.52	14.909	8.541	7.965	5.035	6.817	5.278	16.13	6.821	33.659	9.193	5.352	23.26	7.375	5.035-77.519	12.9383
Mercury (Hg)	0.0865	0.094	0.043	0.171	0.12	0.111	0.075	0.088	0.106	0.141	0.288	0.261	0.073	0.128	0.04	0.067	0.07	0.148	0.128	0.74	0.173	0.117	0.343	0.137	0.04-0.74	0.15619
Molybdenum (Mo)	0.2705	0.326	0.263	0.444	0.36	0.33	0.833	0.537	0.335	0.363	0.826	0.763	0.619	0.338	0.231	0.48	0.268	0.368	0.454	0.709	0.438	0.266	0.677	0.415	0.231-0.833	0.4549
Nickel (Ni)	61.619	56.6	63.78	78.04	72.4	68.64	92.79	97.119	71.24	75.55	108.3	98.599	98.909	75.809	63.179	79.83	59.249	66.95	82.099	85.889	79.379	67.69	93.07	62.629	56.599-108.3	77.4749
Selenium (Se)	ND	0.222	0.065	0.101	0.16	ND	0.308	0.303	0.073	0.252	0.131	0.214	0.313	0.239	0.1	0.316	0.114	0.255	0.099	0.41	0.2105	0.027	0.388	0.124	ND-0.41	0.18415
Silver (Ag)	0.0645	0.046	0.029	0.15	0.23	0.092	0.637	0.687	0.241	0.33	0.595	0.741	0.771	0.255	0.026	0.505	0.032	0.227	0.405	0.531	0.4355	0.177	0.751	0.366	ND-0.771	0.34671
Thalium (Ti)	0.0498	0.05	0.043	0.083	0.06	0.059	0.11	0.104	0.061	0.063	0.102	0.1	0.099	0.058	0.038	0.075	0.04	0.058	0.073	0.119	0.073	0.054	0.106	0.056	0.038-0.119	0.07216
Vanadium (V)	54.765	49.09	46.65	73.54	66.2	60.85	97.59	91.79	65.63	66.95	100.8	97.11	99.53	65	50.63	85.66	46.95	58.82	71.41	90.09	76.36	58.85	98.7	84.85	43.88-100.8	73.244
Zinc (Zn)	53.387	51.55	54.18	86.17	69.7	63.53	87.99	93.607	67.18	78.45	133.4	12.187	93.517	75.427	55.677	76.28	52.571	78.21	77.117	134.09	90.272	65.03	161.6	67.127	12.19-161.59	78.2586

Notes:
Lowest value in the range
Highest value in the range
a) Average of two laboratory replicate analysis, which was then averaged with the results for a duplicate sediment sample
b) Average of results for duplicate samples

5.2.2 Acid-Volatile Sulfides/Simultaneously Extracted Metals

As noted in Section 2.5.2, the relative molar concentrations of acid-volatile sulfide (AVS) and simultaneously extracted metals (SEM) in sediment porewater are believed to provide an indication of bioavailability and toxicity of certain metals in the porewater. Sulfide in the porewater tends to bind with the divalent cationic forms of metals such as cadmium, copper, nickel, lead, and zinc, thereby making them unavailable and presumably less toxic to aquatic life. An SEM/AVS molar ratio of one or lower suggests that these metals would not be present in the porewater in a form that would be readily available for biological uptake.

Porewaters for sediments from six sampling locations were analyzed for AVS and SEM. The results are presented in Tables 5.2 and 5.3. The calculated SEM/AVS molar ratios for the six samples range from 11 to 38, which are significantly higher than values commonly observed for contaminated sediments[28]. No explanation can be offered for this apparent anomaly, which needs to be evaluated via repeat sampling and sample analysis. If the accuracy and representative of the SEM/AVS ratios shown in Table 5.3 are confirmed, the logical conclusion would be that the metals in the sediment at the SBRF project site are likely to be bioavailable to a much greater extent than at other sites in San Francisco Bay that contained similar metals concentrations.

5.2.3 Ammonia and Chromium (VI) in Sediment Porewater

Porewater ammonia and chromium (VI) concentrations for the six sediment samples tested are presented in Table 5.4. Measured porewater ammonia concentrations were generally within the range of observed concentrations in San Francisco Bay (See Table 5.5 and Figure 2).

While there are no readily available reported ambient concentrations for chromium (VI) in sediment in San Francisco Bay, the Regional Monitoring Program (RMP)[29] has measured and

[28] According to Mr. Jeff Cotsifas of Pacific EcoRisk (Martinez, CA), the company that performed sediment sampling for this project, they have performed other recent sediment investigations and obtained SEM/AVS ratios that are much smaller with many <1.

[29] The RMP is the largest program of the San Francisco Estuary Institute (SFEI) and monitors contamination in the Estuary. It provides water quality regulators information they need to manage the Estuary effectively. The RMP is a collaborative effort between SFEI, the Regional Water Quality Control Board, and the regulated discharger community. SFEI was founded as a non-profit organization in 1986. Known as the Aquatic Habitat Institute prior to 1994, SFEI's aim is to foster the development of the scientific understanding needed to protect and enhance the

reported on dissolved chromium concentrations in water at its various monitoring stations in the Bay (See Figure 2 for station locations). Figure 3 shows the dissolved chromium concentrations in water in parts per billion (ppb) at 26 RMP stations sampled in January, April, and July 1998. Concentrations ranged from 0.09 to 3.84 ppb. The highest concentration was sampled at Grizzly Bay (BF20) in April and the lowest at Redwood Creek (BA40) in April. Average concentrations were highest (1.31 ppb) in the Northern Estuary in January and lowest (0.14 ppb) in the Central Bay in January.

Table 5.2: Simultaneously Extracted Metals (SEM) for Selected) Sediment Samples (µmole/g dry weight

Sediment Sample Location Designation (See Figure 1)

Metal	KN	IN	GW	GN	EN (a)	FN
Antimony (Sb)	ND	ND	ND	ND	ND	ND
Arsenic (As)	0.0092	0.0063	0.0078	0.0069	0.016	0.0063
Barium (Ba)	0.1489	0.0893	0.1977	0.0821	0.135	0.1268
Berylium (Be)	ND	ND	ND	ND	ND	ND
Cadmium (Cd)	ND	ND	0.0018	ND	ND	ND
Chromium (Cr)	0.0542	0.023	0.0455	0.0274	0.036	0.0362
Cobalt (Co)	0.0942	0.0607	0.1161	0.063	0.091	0.0915
Copper (Cu)	0.0542	0.086	0.2914	0.0962	0.185	0.1075
Lead (Pb)	0.031	0.0124	0.0265	0.014	0.028	0.0137
Mercury (Hg)	ND	ND	ND	ND	ND	ND
Molybdenum (Mo)	ND	ND	ND	ND	ND	ND
Nickel (Ni)	0.1915	0.1057	0.1968	0.1102	0.147	0.1498
Selenium (Se)	ND	ND	ND	ND	ND	ND
Silver (Ag)	ND	ND	ND	ND	ND	ND
Thalium (Ti)	ND	ND	ND	ND	ND	ND
Vanadium (V)	0.2263	0.0961	0.2529	0.1055	0.179	0.1132
Zinc (Zn)	0.3803	0.2063	0.4957	0.2254	0.358	0.2933

(a) duplicate sample for quality control

San Francisco Estuary. SFEI is governed by a Board of Directors composed of Bay Area scientists, environmentalists, regulators, local governments, and industries. See http://www.sfei.org/

Table 5.3: Acid Voltile Sulfides (AVS), Simultaneously Extracted Metals (SEM), and SEM/AVS Ratios

Sediment Sample Location Designation (See Figure 1)

Analysis	KN	IN	GW	GN	EN	FN
AVS, mg/wet kg	1.09	0.26	0.34	0.29	0.34	0.32
AVS, mg/dry kg (a)	1.97	0.49	0.85	0.48	0.65	0.47
AVS, µmole/dry g	0.06	0.02	0.03	0.01	0.02	0.01
SEM, µmole/dry g (Cd, Cu, Ni, Pb, Zn)	0.66	0.41	1.01	0.45	0.72	0.56
SEM/AVS Ratio	11	27	38	30	35	38
Percent Solids (a)	55.2	52.6	39.8	60.5	51.7	68.2

(a) - Used to convert AVS values from wet weight to dry weight basis

TABLE 5.4: Ammonia and Chromium(VI) in Sediment Pore Water

Sediment Sample Location Designation (See Figure 1)

Analysis	KN	IN	GN	EN	FN
Ammonia-N (mg/L)	4	2.2	2.1	2.75	1.1
Chromium(VI) (mg/L)	0.006	0.0195	0.014	0.007	0.01

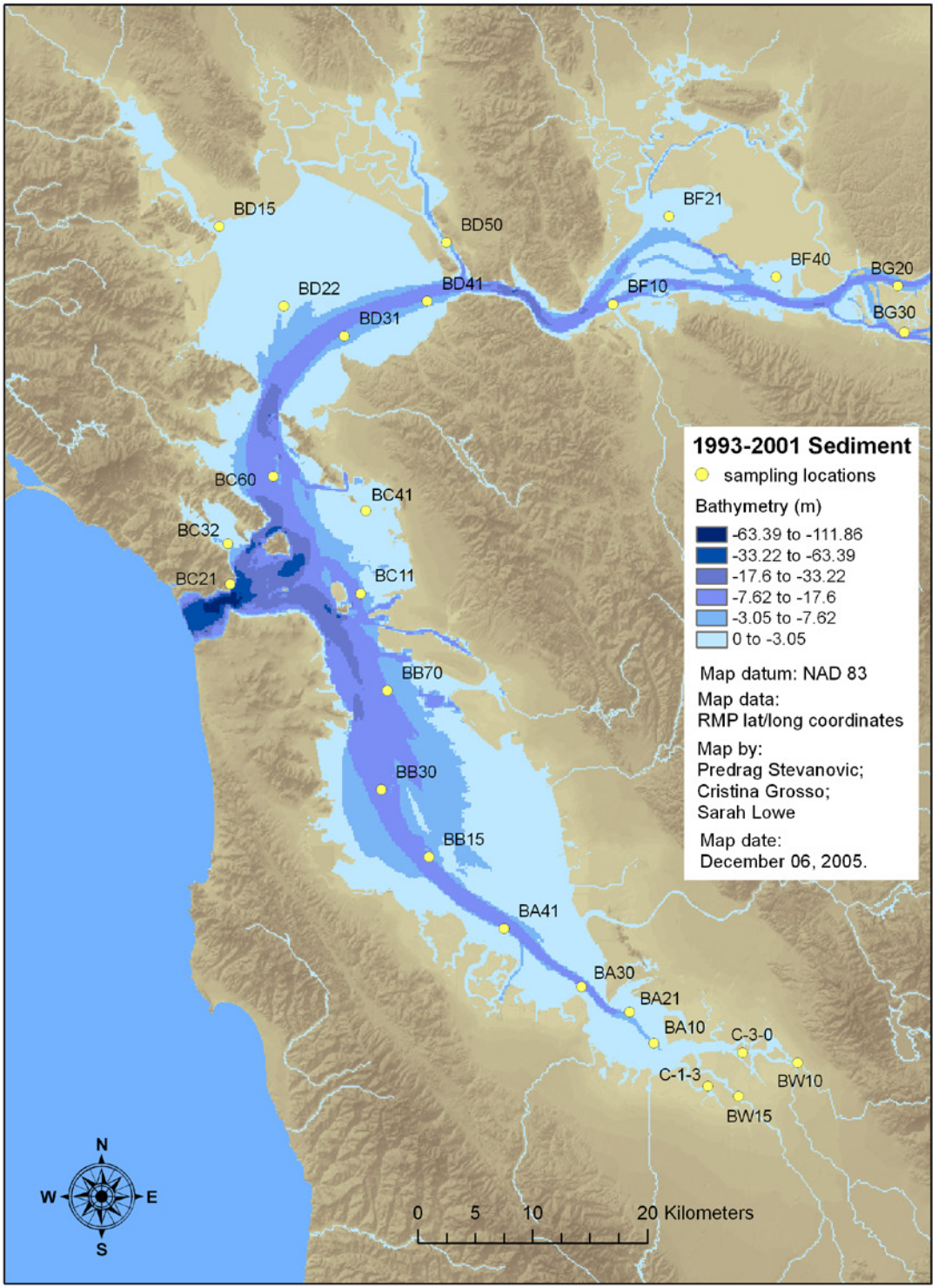
Table 5.5: Total Ammonia at Select San Francisco Bay Sites*
See Figure 2 for Station Locations
Data extracted by Pacific EcoRisk from http://www.sfei.org/

Sample Location	Mean (mg/L)	Low (mg/L)	High (mg/L)
San Pablo Bay (BD22)	0.700	0.070	1.95
Grizzly Bay (BF21)	1.29	0.010	2.31
Honker Bay (BF40)	1.39	0.130	2.67

Comparison of the sediment porewater chromium (VI) data for the 6 SBRF sediment samples (Table 5.4) with the above RMP results indicates that SBRF sediment porewater contain a higher concentrations of chromium (VI) than values reported by RMP (6 to 19 ppb vs. 0.09 to 3.84 ppb). However, in both cases the chromium values are below the 4-day average water quality standard for dissolved chromium in saltwater (i.e., 50 ppb[30].)

[30] United States Environmental Protection Agency. "National Recommended Water Quality Criteria", 2006.

Figure 2 - RMP Sites Map



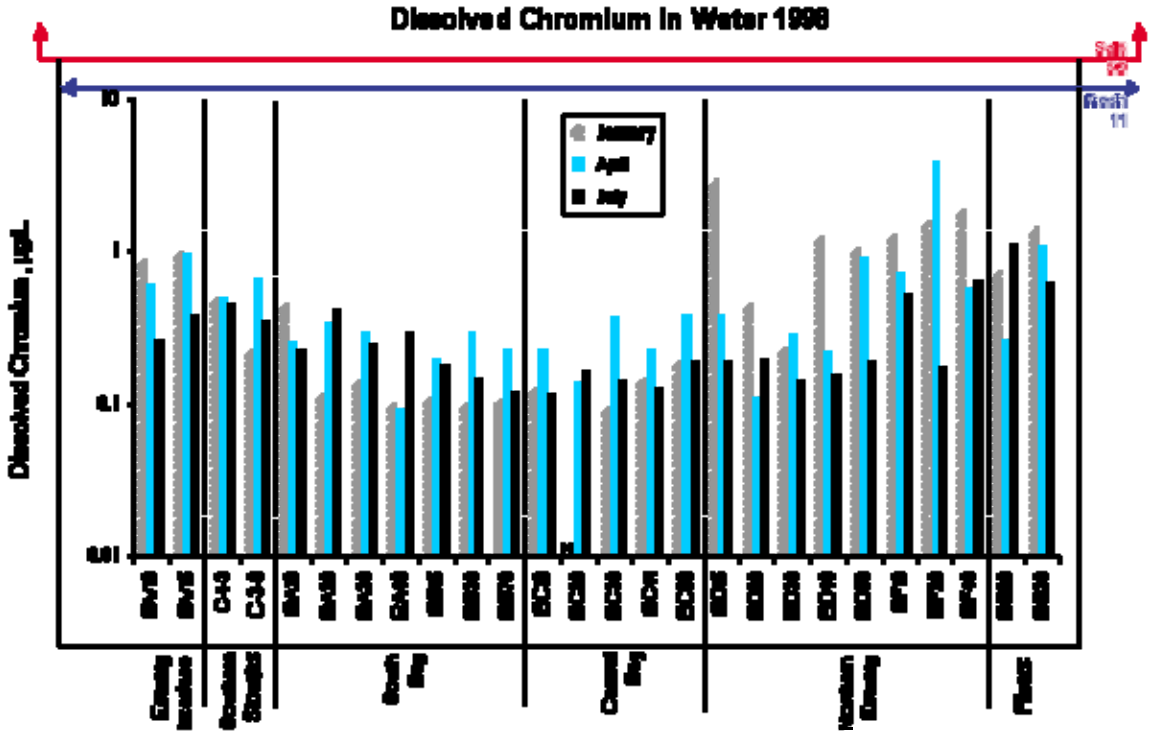


Figure 3. 1998 RMP Monitoring Results for Dissolved Chromium in San Francisco Bay
(See Figure 2 for monitoring station locations)

5.2.4 Sediment Quality Assessment Per NOAA Guidelines

As discussed in Section 2.5.3, when a substance is present in the sediment at a concentration below the level established by NOAA's Sediment Quality Guidelines as "Effects Range-Low (ERL)", adverse effects are not be anticipated; however, concentrations exceeding what is established for a substance as "Effects Range-Median (ERM) can be indicative of adverse effects.

Table 5.6 provides a comparison of the metal concentrations in the 24 collected sediment samples with the NOAA's ERL and ERM guidelines. As noted in this table, except for nickel, for which all sediment samples concentrations exceeded the ERM value of 51.6 ppm, and mercury for which one sediment sample (form location EW) exceeded the ERM value 0.71 ppm, all metal concentrations are below their respective ERM values, and with only a few exceptions, are also below the ERL levels. In the few cases where ERLs are exceeded, the actual concentrations are much closer to ERLs than to ERMs.

5.2.5 Comparison of Results with those for Samples from Other Bay Locations

Table 5.6 provides a comparison of metal concentrations in sediment samples collected in this project at locations in and around the SBRF with the RMP data for select sites immediately upstream (Honker Bay and Grizzly Bay) and downstream (San Pablo Bay) of the SBRF in Suisun Bay. This comparison reveals no drastic differences between the RMP and SBRF sampling results. Indeed, for all metals, except silver, the average concentrations in the SBRF data set are lower than the mean concentration values for the three RMP data sets. Similarly, for all metals the low values of the concentration ranges for the SBRF data are below the corresponding values for the RMP data sets. While this does not exclude the potential for ecological risk to be present at the site, these data do suggest that the sediment metals concentrations observed at the SBRF site are consistent with the upper reaches of San Francisco Bay as opposed to being indicative of localized site-specific inputs.

Table 5.5: Metal Concentrations in Sediment Samples (µg/g dry weight) which Exceed ESL and ERM Shown in Table 2.3

Sedeiment Sample Location Designation (See Figure 1)

Metal	LW (a)	LN	LE	KN	JN	KW	IE	GE	JE	IN	JW	GW	IW	GN	KE	FE	EE	ES	S-1000	EW	EN (b)	FN	FW	N-1000
Arsenic (As)	5.03325	5.566	5.147	7.132	6.99	6.418	7.411	7.643	6.971	7.561	12.55	11.27	9.026	6.836	6.233	6.871	4.787	6.916	7.016	14.84	7.8995	5.025	12.02	7.555
Cadmium (Cd)	0.0975	0.122	0.068	0.181	0.142	0.117	0.21	0.231	0.146	0.165	0.31	0.291	0.226	0.137	0.071	0.191	0.081	0.18	0.195	0.619	0.195	0.12	0.67	0.168
Chromium (Cr)	59.6125	50.88	44.94	71.12	63.85	61.02	101.4	101.3	63.94	70	103.8	93.88	106.8	69.27	48.23	87.35	47.79	57.6	75.28	85.55	73.415	57.47	95.43	72.94
Copper (Cu)	18.419	20.489	11.349	38.149	23.469	23.139	40.429	40.829	23.939	30.359	68.789	61.579	40.479	28.199	12.409	31.829	15.569	32.349	33.299	66.009	40.539	21.849	76.359	27.699
Lead (Pb)	5.89625	7.076	6.144	11.849	8.853	8.1	8.66	9.016	7.887	9.187	77.519	14.909	8.541	7.965	5.035	6.817	5.278	16.129	6.821	33.659	9.193	5.352	23.259	7.375
Mercury (Hg)	0.0865	0.094	0.043	0.171	0.12	0.111	0.075	0.088	0.106	0.141	0.288	0.261	0.073	0.128	0.04	0.067	0.07	0.148	0.128	0.74	0.173	0.117	0.343	0.137
Nickel (Ni)	61.619	56.599	63.779	78.039	72.449	68.639	92.789	97.119	71.239	75.55	108.3	98.599	98.909	75.809	63.179	79.829	59.249	66.949	82.099	85.889	79.379	67.689	93.069	62.629
Silver (Ag)	0.0645	0.046	0.029	0.15	0.227	0.092	0.637	0.687	0.241	0.33	0.595	0.741	0.771	0.255	0.026	0.505	0.032	0.227	0.405	0.531	0.4355	0.177	0.751	0.366
Zinc (Zn)	53.387	51.547	54.177	86.167	69.717	63.527	87.987	93.607	67.177	78.447	133.39	12.187	93.517	75.427	55.677	76.277	52.571	78.207	77.117	134.09	90.272	65.027	161.59	67.127

Notes:

Above ERL but below ERM

Above ERM

a) Average of two laboratory replicate analysis, which was then averaged with the results for a duplicate sediment sample

b) Average of results for duplicate samples

Table 5.6: Comparison of SBRF/Suisun Bay Sediment Data for Metals with Data RMP Data for Select Upstream (Honker Bay and Grizzly Bay) and Downstream (San Pablo Bay) Locations (Figure 2)

Metal	SBRF/Suisun Bay*		Honker Bay (BF40)**			Grizzly Bay (BF21)**			San Pablo Bay (BD22)**		
	Range	Average	Mean	Low	High	Mean	Low	High	Mean	Low	High
Arsenic (As)	4.79-14.8	7.7	12.6	8.7	19	13.4	8.42	20.6	13.9	9.89	19.4
Cadmium (Cd)	0.068-0.67	0.206	0.331	0.205	0.43	0.317	0.204	0.52	0.265	0.189	0.515
Chromium (Cr)	44.9-107	73.5	115	88.9	153	108	67.2	150	92.4	76.7	126
Copper (Cu)	11.3-76.4	34.5	61.5	39.4	75.1	58.4	39.8	68.2	49.5	41	56
Lead (Pb)	5.03-77.5	12.9	20.9	10.8	26	22.1	16.4	30.7	21.3	16	29.2
Mercury (Hg)	0.04-0.74	0.156	0.295	0.227	0.446	0.298	0.225	0.415	0.324	0.162	0.394
Nickel (Ni)	56.6-108	77.5	109	85.8	151	104	68.3	135	84.7	67.4	99.2
Selenium (Se)	ND-0.41	0.184	0.389	0.27	1.014	0.538	0.21	3.3	0.406	0.103	1.51
Silver (Ag)	ND-0.771	0.347	0.243	0.128	0.361	0.236	0.106	0.329	0.241	0.099	0.37
Zinc (Zn)	12.2-162	78.3	138	91.2	171	132	93.6	152	119	104	132

* Data from Table 5.1

** Regional Monitoring Program (RMP) data extracted by Pacific EcoRisk from the San Francisco Estuary

Exhibit C

NOAA DARRP Program
Suisun Bay National Reserve Fleet Assessment Project
Field Sampling Highlights

NOAA DARRP Program
Suisun Bay Nat'l Reserve Fleet Assessment Project
Field Sampling Highlights

Sample Plan Development

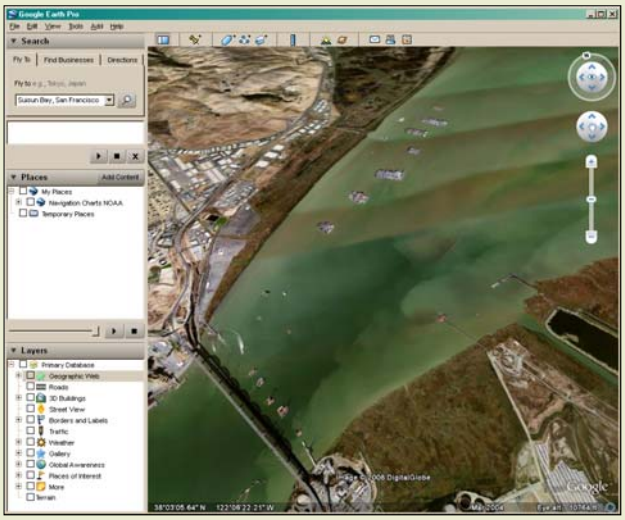
NOAA worked with numerous stakeholders this spring to develop a sampling and analysis plan. The plan calls for the collection and chemical analysis of several types of samples:

- *Transplanted bivalve (mussel) tissue*
- *Tissue from resident clams*
- *Surface sediment*
- *Subsurface sediment*

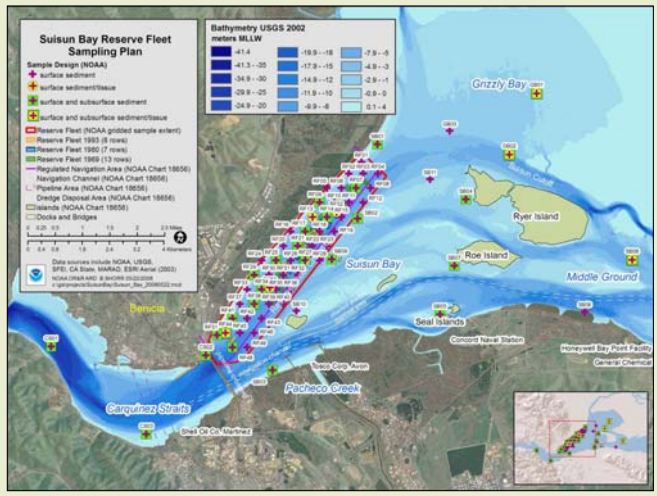
Suisun Bay National Reserve Fleet

Condition of several ships residing in Suisun Bay.

Condition of several ships residing in Suisun Bay.



Reserve Fleet at west end of Suisun Bay, viewable in Google Earth.



GIS map developed by NOAA showing planned sampling locations.

NOAA DARRP Program
Suisun Bay Nat'l Reserve Fleet Assessment Project
Field Sampling Highlights

Transplanted Mussels

Mussels originally collected from Tomales Bay are ready to be transplanted into pre-designated locations in Suisun Bay. Using transplanted mussels will ensure a sufficient amount of tissue for analysis.

Mussels being lowered beside a ship, where they will reside for 2 months. Their tissues will later be analyzed for contaminants to assess bioavailability.

Field staff preparing sampling tags and mussels for transplanting.

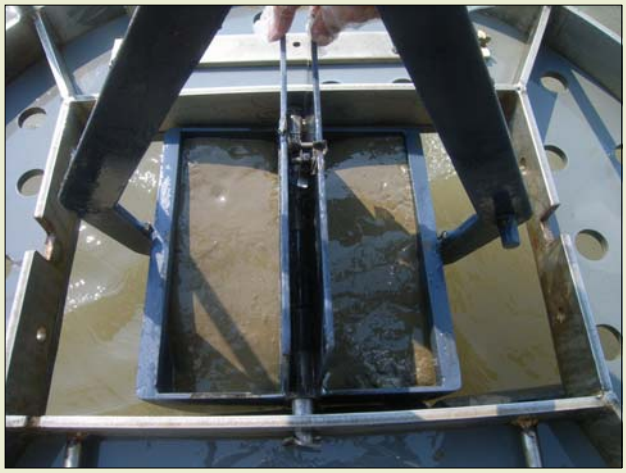
Mussels being attached to buoy and lowered into Suisun Bay.

Diver receiving mussels from field staff.

Diver transplanting mussels into Suisun Bay.

NOAA DARRP Program
Suisun Bay Nat'l Reserve Fleet Assessment Project
Field Sampling Highlights

Surface Sediment Grabs



The Van Veen sediment sampler is a heavy, metal hinged bucket that is dropped into the sediment below. The bottom of the bucket is closed and the chunk of sediment left in the bucket is brought to the surface and then transferred into sampling jars.

Retrieving Van Veen sampler.

Taking a sediment sample from Van Veen.

NOAA staff using sieve to extract paint chips or bivalves from sediment sample.

Preparing sediment samples for shipment.

Close up of sediment sample.

NOAA DARRP Program
Suisun Bay Nat'l Reserve Fleet Assessment Project
Field Sampling Highlights

Resident Clam Tissue Samples

Corbula clams living in Suisun Bay are extracted from a surface sediment sample through a sieve and will be analyzed for contaminant exposure by a lab. Since they spend their whole life at the site, these resident animals are a good indicator of contaminant exposure and uptake.

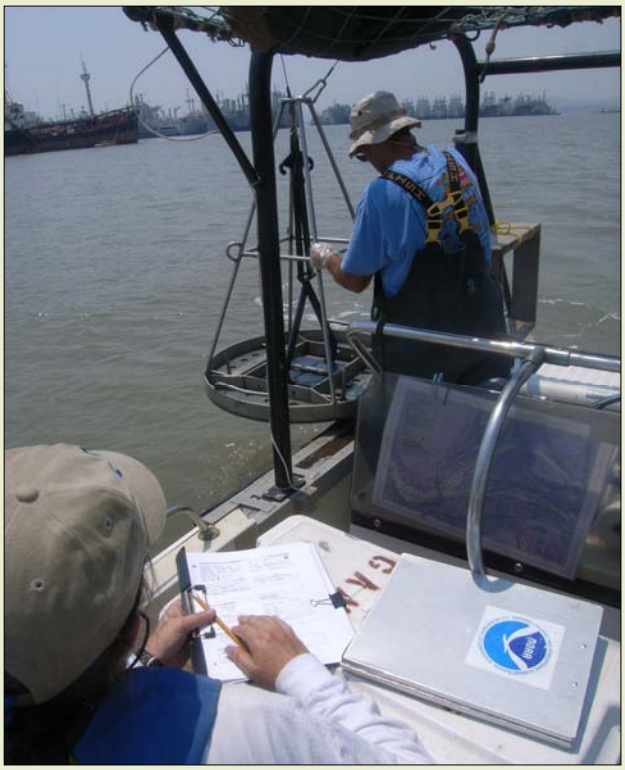
Paint Chip Sieving

In the center is a large paint chip that was washed from a surface sediment sample. They are a potential ongoing source of contaminants to animals that live and feed in the bottom sediments.

Subsurface Sediment Cores

A Vibracore sampler is used to collect deeper sediment samples below the surface. It pushes a long metal tube straight down into the sediment with a vibratory hammer. When pulled back up to the surface, the tube will contain sediment from the surface down to the depth of penetration. Samples will be collected from depths specified in the sampling plan and packed into sample jars for analysis to help us assess potential historic impacts from fleet operations back in the 1940s and 1950s.

NOAA DARRP Program
Suisun Bay Nat'l Reserve Fleet Assessment Project
Field Sampling Highlights

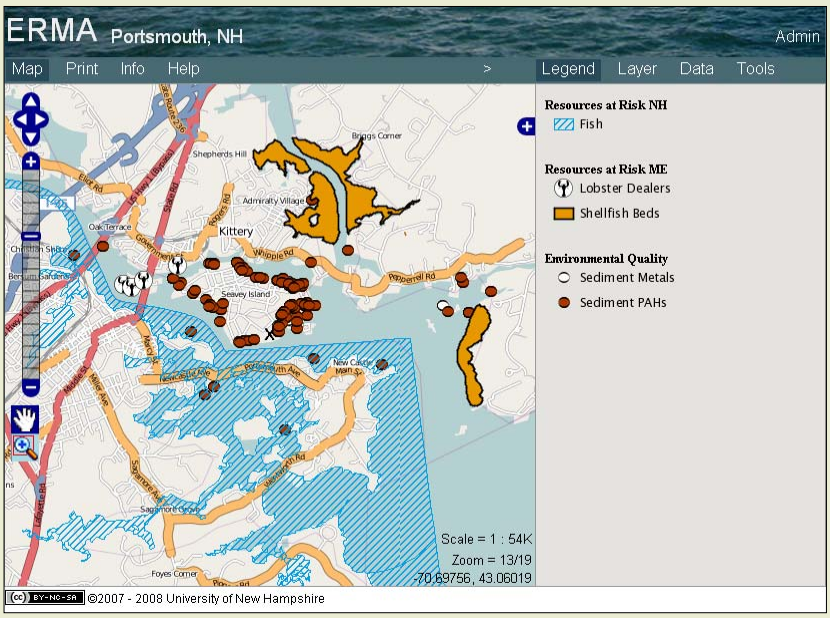


Quality Control for Field Procedures

NOAA and other partners ensure quality control for all field sampling. Activities are thoroughly documented in paper and electronic form. Cross-contamination between samples is avoided by using proper sampling techniques. The team carefully labels and ships all samples so that they can be tracked and delivered in the best condition possible to the analytical laboratories.

Data Management & Outreach

Once completed, the final study data will be available from NOAA's web site. NOAA hopes to implement a regional data management system for the San Francisco Bay area called ERMA (Environmental Response Management Application), much like the prototype just completed in Portsmouth, New Hampshire. ERMA would allow stakeholders to see the data in a mapping context, along with habitat information and data from numerous other studies.



Final Report

Once the final data is in hand, NOAA will produce a data report that summarizes the study findings and recommends additional steps, if warranted. The final report will be available in early 2009.

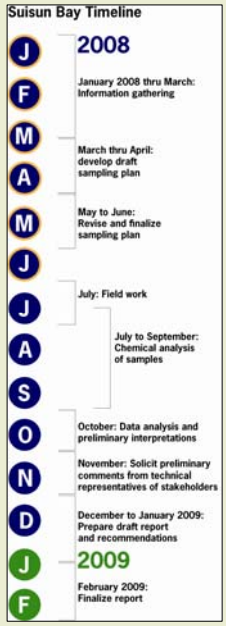


Exhibit D

James River Pilot Project
Sampling and Analysis, June 2007

Supplemental Information
Sampling and Analysis – James River Pilot Project
June 2007

Introduction

The test of a newly designed contained scamping system was conducted in the James River for the purpose of determining its effectiveness in capturing the soft biofouling on the hull of the SS LAKE. The results of analyses for dissolved metals in the discharge were compared with Virginia Water Quality Standards, which we understand are the same as those issued by the Environmental Protection Agency. It should be noted that the samples provide a snapshot of data for a given vessel. Paint coatings vary from ship to ship therefore concentrations of constituents may vary per ship.

Results

With the exception of one constituent (thallium), the discharges were below the regulated levels. Further, our analysis indicates the presence of low level background metals that may have contributed to our overall levels for some constituents. However, concentrations of dissolved metals resulting from this activity are not very different from the background concentrations. Thus, minimal material is actually being introduced into the water body.

Background Information

<u>The Scamping Machine</u>
The scamping machine is configured with three rotating brushes that form a triangle, with a propeller in the middle that holds the machine against the hull. The bulk of the material removed during scamping is discharged through the housing in the propeller wash.

The scamp was modified by enlarging the propeller discharge point to approximately one (1) foot in diameter and welding a collar to the outboard side of the of the discharge point. A series of three layered (3) nylon bags were secured to the collar, one inside the other. Figure 1 contains a photo of the bags being assembled. Figure 2 contains a photo of the diver attaching the bags to the scamping machine.

1. The innermost bag was 1 mil thick monofilament nylon. The purpose of this bag was to capture the “macro” material, which consisted of the bulk of the biofouling. This included shells, barnacles, grasses, etc. The material was collected and characterized for future disposal consideration.
2. The second bag, which encased the innermost bag, was 400 micron monofilament nylon. The purpose of this bag was to capture the “micro” material that was too fine to be captured in the internal bag. This material consisted of finely ground material; it was also collected and analyzed.
3. The outer bag was 3 mil thick monofilament nylon and was installed to provide stability to the diver operating the machine. There was no analysis of this material.

Figure 1 – Bags Being Secured Together

Figure 2 – Bags Being Secured to the Scamp Machine

Scamping and Sampling

The diver made one pass along the hull below the waterline from the middle (midship) area of the hull to the stern. (See figure 3) The bags were retrieved and samples taken of the material captured from the two bags. Figure 4 provides a photo of the macro material captured. To determine the amount and composition of the material not captured by the modified scamping machine, two methods of sample collection were employed. A boat followed the machine and a laboratory technician skimmed the turbulent zone behind the scamp with a 100 micron ("plankton") net to retrieve material that may have gotten through the two nets and into the water. A hose was also placed in the turbulent zone to collect water samples (referred to in sample identification as "water"). This procedure was completed two more times, once along the forward half of the starboard hull and along the aft half of the starboard hull.

Other samples were taken for reference and background purposes. Water was sampled upstream of the vessel to provide background data. Samples referred to as "biota" consisted of scrapings

of the hull and fouling, from approximately one foot above the water to three feet below the water. A sample of hull paint was taken from an area above the waterline.

Figure 3 – Scamp with Containment in the Water

Provided below is a better description of the samples taken. The sample ID number in the left column correlates to the Universal Laboratory sample number highlighted on the individual results pages.

Sample ID	Additional Description
0706298-001 Port Bow from Bag	"Macro" material captured in the 1 mil bag on the port side of the ship by the bow. This material was captured during the start-up test run.
0706298-002 Port Midship from Bag	"Macro" material captured in the 1 mil bag on the port middle area of the hull. This material was captured during the start-up test run.
0706298-003 Port Stern from Bag	"Macro" material captured in the 1 mil (internal) bag on the port side of the ship by the stern during the first sweep of the hull for sample gathering purposes.
0706298-004 Micro from Small Bag Port Side	"Micro" material captured in the 400µ bag on the port side of the ship by the stern during the first sweep of the hull for sample gathering purposes. This sample was comprised of the finer material that had passed through the 1 mil bag.
0706398-005 Port Stern Biota	Paint and biofouling scraped from hull above and below water line prior to hull cleaning. (port stern area) This was gathered for reference purposes.
0706298-006 Port Midship Biota	Paint and biofouling scraped from hull above and below water line prior to hull cleaning. (port midship area) This was gathered for reference purposes.
0706398-007 Stbd Stern Biota	Paint and biofouling scraped from hull above and below water line prior to hull cleaning. (stbd stern area) This was gathered for reference purposes.
0706298-008 Stbd Midship Biota	Paint and biofouling scraped from hull above and below water line prior to hull cleaning. (stbd midship area) This was gathered for reference purposes.

0706298-009 Stbd Bow Biota	Paint and biofouling scraped from hull above and below water line prior to hull cleaning. (stbd bow area) This was gathered for reference purposes.
0706298-010 Port Midship – Stern Plankton Net	Material captured in a 100µ net in the discharge turbulent zone during the cleaning. (hull cleaning from middle of port side to stern)
0706298-011 Stbd Stern - Midship from Bag	"Macro" material captured in the 1 mil bag on the stbd side of the ship during cleaning from stern to midship for sample gathering purposes.
0706298-012 Stbd Midship – Bow from Bag	"Macro" material captured in the 1 mil bag on the stbd side of the ship during cleaning from midship to bow for sample gathering purposes.
0706298-013 Stbd Stern – Midship Plankton Net	Material captured in a 100µ net in the discharge turbulent zone during the cleaning. (hull cleaning from stern of stbd side to midship)
0706298-014 Stbd Midship – Bow Plankton Net	Material captured in a 100µ net in the discharge turbulent zone during the cleaning. (hull cleaning from midship of stbd side to bow)
0706298-015 Port Midship – Stern Water Total	Water retrieved via hose/pump in the discharge turbulent zone during the cleaning. (hull cleaning from midship of port side to stern) Water to be analyzed for total metals
0706298-016 Stbd Stern – Midship Water Total	Water retrieved via hose/pump in the discharge turbulent zone during the cleaning. (hull cleaning from stern of stbd side to midship) Water to be analyzed for total metals
0706298-017 Stbd Midship – Bow Water Total	Water retrieved via hose/pump in the discharge turbulent zone during the cleaning. (hull cleaning from midship of stbd side to bow) Water to be analyzed for total metals
0706298-018 Upstream Background Water Total	Water collected in the James River upstream of the scamping operation to be analyzed for total metals
0706298-019 Port Midship – Stern Scamping Water Dissolved	Water retrieved via hose/pump in the discharge turbulent zone during the cleaning. (hull cleaning from midship of port side to stern) Water to be analyzed for total dissolved metals
0706298-020 Stbd stern – midship scamping water dissolved	Water retrieved via hose/pump in the discharge turbulent zone during the cleaning. (hull cleaning from stern of stbd side to midship) Water to be analyzed for total dissolved metals
0706298-021 Stbd midship – bow scamping water dissolved	Water retrieved via hose/pump in the discharge turbulent zone during the cleaning. (hull cleaning from midship of stbd side to bow) Water to be analyzed for total dissolved metals
0706298-022 Upstream background water dissolved	Water collected in the James River upstream of the scamping operation to be analyzed for total dissolved metals
0706298-023 Composite hull paint above water line	Paint sampled above waterline that has had no interaction with water. Collected for reference purposes.

Results Total Metals (ppm)
Background and Downstream of Discharge

metal	Background Upstream	Port Aft (water)	Stbd Fwd (water)	Stbd Aft (water)
Molybdenum		0.153	0.005	
Zinc	0.011	0.069	0.072	0.195
Antimony	0.016		0.008	0.009
Arsenic		0.011		
Barium	0.047	0.051	0.046	0.047
Beryllium				
Cadmium				
Chromium				
Cobalt			0.001	0.002
Copper	0.018	0.143	0.102	0.42
Lead		0.023		
Nickel				0.006
Selenium				
Silver				
Thallium	0.008	0.018	0.01	0.018
Vanadium	0.062		0.1	

Results
Total Dissolved Metals (ppb)*
Background and Downstream of Discharge

metal	Background Upstream	VA Water Quality Standards	Port Aft (water)	Stbd Fwd (water)	Stbd Aft (water)
Molybdenum					
Zinc	18	69,000	78	75	173
Antimony	7	4,300	4	11	6
Arsenic		n/a			
Barium	44	n/a	52	49	47
Beryllium		n/a		2	
Cadmium		n/a			
Chromium		n/a			
Cobalt		n/a		3	1
Copper		n/a	36	74	117
Lead		n/a			
Nickel		4,600			
Selenium		11,000		2	
Silver	42	n/a	7		
Thallium		6.3	1	2	9
Vanadium	31	n/a			

* Virginia standards were provided in ppb (µg/l); we converted our results from mg/l (ppm) to ppb

Figure 4 – Macro Material Captured in the 1 mil Bag

Exhibit E

Water Board Letter
Proposed In-Bay Cleaning of Jason and Queens Victory, December 22, 2006

California Regional Water Quality Control Board
San Francisco Bay Region

Linda S. Adams
Secretary for
Environmental Protection

1515 Clay Street, Suite 1400, Oakland, California 94612
(510) 622-2300 • Fax (510) 622-2460
http://www.waterboards.ca.gov/sanfranciscobay

Arnold Schwarzenegger
Governor

December 22, 2006

Mr. Michael Carter, Director
Office of Environmental Activities
U.S. Maritime Administration
400 Seventh Street, SW
Washington, D.C. 20590

Subject: Proposed In-Bay Cleaning of *Jason* and *Queens Victory*

Dear Mr. Carter:

I am writing regarding the Maritime Administration's (Marad's) upcoming proposed in-Bay cleaning of two ships, the *Jason* and *Queens Victory*, at its docks in Alameda, and more generally regarding Marad's ongoing scrapping of old ships from its Suisun Bay Reserve Fleet (mothball fleet). We are concerned that the proposed in-Bay work threatens to violate the federal Clean Water Act by discharging material high in metals including copper, lead, and zinc, such as hull coatings (paints) and, potentially, corroded parts of existing hulls as debris and/or large particulates directly to San Francisco Bay. The cleaning also threatens to discharge to the Bay organic materials and organisms currently attached to the ships; those materials and organisms may have incorporated metals from the hull coating to which they are attached and could constitute the discharge of pollutants.

The Water Board supports Marad's scrapping program. We recognize that a number of the ships at the mothball fleet are in poor condition and that they may sink or some other events may result in the discharge of pollution from the ships to the Bay. It is important, therefore, that some disposition be found for them that would prevent such an occurrence. We also recognize that the ships have accumulated, or have likely accumulated, invasive species during their residency in the Bay, and support the U.S. Coast Guard's requirement that these species be removed prior to the ships' transport to other waters (e.g., the Gulf of Mexico and Texas) for scrapping. We understand that this requirement has led Marad to clean the ships prior to their transport, using a process called "scamping." Nevertheless, Marad must still comply with all applicable laws in conducting the scamping.

The discharge associated with the scamping process, which is currently completed in-Bay, threatens to cause or contribute to exceedances of water quality standards of the Bay. We have discussed these concerns with Marad previously. It was our understanding that Marad had agreed to sample the discharge from the ship most recently cleaned in Alameda. We had

requested a sampling plan prior to this cleaning event. Marad failed to provide the requested sampling plan. The sampling that was completed by Marad is not sufficient to characterize the discharge from the first cleaning event to the Bay. The discharge was not directly sampled, with the exception of one sample of hull coating that showed high levels of metals.

On December 14, 2006, State Department of Toxic Substances Control (DTSC) staff and Water Board staff, with Marad's assistance, sampled portions of the hulls of the *Jason* and *Queens Victory* that were accessible from a boat and likely to be removed during their scamping. The samples were split. One set given to Marad's consultant. The other set was sent to DTSC's lab in Berkeley. It was Water Board staff's understanding that further in-Bay cleanings would not occur until the samples were analyzed and an appropriate path identified based on the analytical results. The day of the sampling, however, Marad staff stated that Marad expected to move the *Jason* on December 20 (now December 26), and to begin cleaning on December 27. We have subsequently learned that the *Queens Victory* is scheduled for cleaning in January. Based on this schedule, delaying the cleaning until after we receive the analytical results from our hull samples would result in a delay of 30 to 60 days, depending on the analytical results.

We have previously communicated to you, both via emails and in meetings with you, our belief that the scamping that you are planning on performing requires appropriate permitting from the Water Board to ensure that it takes place in a manner that is protective of water quality. We initially deferred such permitting until the sampling of the previously cleaned ship could be completed and analytical results were reviewed by our staff. Since that sampling was not adequate, however, we have decided to wait until sampling and review of analytical results from the *Jason* and *Queens Victory* can be completed.

At this time, Marad has the following options:

1. It may delay the cleanings of Jason and Queen Victory in order to allow time for the Water Board and DTSC to review the sampling results and make appropriate permitting decisions regarding the cleanings;

2. It may submit an NPDES discharge permit application for the proposed work, pursuant to Section 402 of the federal Clean Water Act. This would preclude discharge (i.e., cleaning) until an appropriately permit had been issued subsequent to the application's receipt; or,

3. It may complete the work in a manner such that there is no discharge to waters of the State or United States, including San Francisco Bay. For example, the work could be completed in a floating dry dock, graving dock, or by other means that precludes discharge.

The Water Board recommends that Marad pursue one of the three options outlined above.

If Marad chooses to proceed with Jason and Queens Victory as planned, then Marad could be subject to civil and criminal liability under the federal Clean Water Act and other applicable laws. In Addition, this letter is to inform you that the Water Board requires that you notify Water Board and DTSC staff, as soon as possible and at least 24 hours prior to the scamping activities, of the date, location, and company who will be conducting the scamping activities. Water Board and DTSC staff should have full access to monitor the scamping activities. We also require that you sample and report to us the quality and total quantity of the discharge to the Bay for each of the two scamping events. Representative samples shall be taken of the materials discharged to the Bay. Physical properties (e.g., soft growth, organisms, hull coating, paints, corroded parts of the hull, debris, or large particulate) of the materials shall be detailed recorded. The collected samples, if very heterogeneous in terms of physical properties, may need to be segregated before they are analyzed for arsenic, copper, chromium, lead, mercury, nickel, selenium, zinc and tributyl-tin. Total hull surface area cleaned and total quantity of materials discharged to the Bay shall be recorded and reported. Record and report total quantity of the materials discharged to the Bay. The Water Board has authority to require you to submit this technical information pursuant to Water Code Section 13267 (See the attached Water Code Section 13267 Fact Sheet). Failure to provide the required technical reports may subject Marad to administrative civil liability in an amount up to $1,000 per day of violation.

We continue to support the ship scrapping program; however, that program must be completed in a manner that is protective of water quality and in compliance with the requirements of the federal Clean Water Act.

If you have any questions, please contact Keith Lichten of my staff at (510) 622-2380, or via e-mail to klichten@waterboards.ca.gov.

Sincerely,

/original signed by/
Shin-Roei Lee
Acting for Bruce H. Wolfe
Executive Officer

Attachment: 13267 Fact Sheet

Cc: Mr. Richard Everett, U.S. Coast Guard (*via email to reverett@comdt.uscg.mil*)

Mr. Alan Ito
DTSC
P.O. Box 806
Sacramento, CA 95812-0806

Dr. Carolyn Junemann, Chief Scientist
Office of Environmental Activities
U.S. Maritime Administration
400 Seventh Street, SW
Washington, D.C. 20590

Ms. Maurya Falkner
State Lands Commission
100 Howe Ave., Suite 100 South
Sacramento, CA 95825-8202

Yvonne West
Staff Counsel
Office of Enforcement
State Water Resources Control Board
1001 "I" Street
P.O. Box 100
Sacramento, California 95812

Exhibit F

Water Board Letter
Comments on James River Scamping Test Report and
Notice of Water Code Section 13267 Technical Report Requirement,
September 14, 2007

California Regional Water Quality Control Board
San Francisco Bay Region

Linda Adams
Secretary for
Environmental Protection

1515 Clay Street, Suite 1400, Oakland, California 94612
(510) 622-2300 • Fax (510) 622-2460
http://www.waterboards.ca.gov/sanfranciscobay

Arnold Schwarzenegger
Governor

Date: SEP 14 2007
File No. 2168.05 (DCE)

U.S. Department of Transportation
Maritime Administration
Attn. Ms. Shannon Russell
1200 New Jersey Avenue, SE
Washington, D.C. 20590-0001

Subject: Comments on James River Scamping Test Report and Water Code Section 13267 Technical Report Requirement – Maritime Administration - National Defense Suisun Bay Reserve Fleet

Dear Ms. Russell:

This letter comments on the U.S. Department of Transportation – Maritime Administration (Marad) June 2007 Sampling and Analysis – James River Pilot Project report and requires that Marad prepare and submit a technical report in the form of a Scamping Pilot Test Workplan (Workplan). The Workplan shall propose sampling and analysis methods and protective measures for a proposed scamping technology pilot test in State of California waters. The workplan is due to this agency at least 45 days prior to any proposed pilot test to allow for regulatory review.

In addition, this letter incorporates comments from two State agencies: The Department of Toxic Substances Control (DTSC) and the California State Lands Commission (SLC) and one Federal Agency: The National Marine Fisheries Service (NMFS). Copies of their letters and memorandums are included as Attachment A.

The information required in the technical report will assist Water Board staff to verify that any scamping technology pilot tests completed in the State's waters do not pose a threat to water quality or the environment.

Background

In mid-June 2007 Marad conducted a scamping technology pilot test in the James River in the state of Virginia to evaluate the effectiveness of a new scamping device. The scamping device consists of three rotating brushes and a propeller in the middle that serves to hold the device against the hull. The propeller wash discharges through a series of filter bags that capture an unknown amount of the scamped material, which are subsequently

emptied into an above-water container. During the test, samples were collected from the scamped material, the background water, and from water in the vicinity of the scamping device. The samples were subsequently analyzed at an analytical laboratory for metals likely to be associated with vessel hulls. The sample results indicated that dissolved copper and zinc concentrations in the vicinity of the active scamping device were significantly above background concentrations and exceeded California Toxics Rule Water Quality Criteria, which are federal standards.

No California state agencies were consulted regarding the test design or sampling methods. Therefore, this letter serves to assist Marad in designing a scamping pilot test that may satisfy federal and California state agencies.

Comments

The attached letters from DTSC, SLC, and NMFS detail significant concerns regarding the test methods employed during the James River scamping pilot test. The majority of the comments can be addressed by preparing a thorough sampling and analysis plan for regulatory review and concurrence prior to any additional testing.

The comment letters also detail significant concern regarding the efficiency of the scamping device, as the test did not evaluate how much of the scamped material escapes the scamping device. In addition, the soluble zinc and copper concentrations detected in the vicinity of the scamping device are elevated and may preclude the use of this device in California State Waters without the preparation of a specific NPDES permit, which would require significant study and regulatory review, and which may not allow the discharge without potentially significant modification of the scamping device.

Subsequent to the completion of a pilot test, Marad will be required to prepare a feasibility study comparing the pros and cons of various technologies available to scamp the fleet. The feasibility study shall at the very least evaluate the new scamping device and scamping in a dry dock based on criteria such as: 1) overall protection of human health and the environment; 2) compliance with applicable and relevant regulations; 3) short-term and long-term effectiveness; 4) reduction of toxicity, mobility, and volume; 5) implementability; 6) costs; and 7) state and community acceptance. Based on this study, Marad will then propose the best technology to complete the scamping and Water Board staff will review that proposal with input from other agencies.

Presented below we have outlined some requirements that must be included in the required Sampling and Analysis Workplan if Marad wishes to move forward with a scamping pilot test in California state waters.

Water Code Section 13267 Technical Report Requirement

Marad shall prepare and submit a Scamping Pilot Test Workplan to the Water Board, acceptable to the Executive Officer, 45 days prior to any proposed scamping device pilot test. Presented below, we have listed some of the basic elements that shall be included in the Workplan. This list does not preclude any of the comments made in the attached letters by DTSC, SLC, and NMFS. Marad shall consider all of the comments included in this letter and its attachments when preparing the required workplan. The Scamping Pilot Test Workplan must include the following basic elements to be considered complete by this agency:

1. A Sampling and Analysis Plan (SAP) compliant with recommendations included in the July 1995 U.S. Army Corps of Engineers Technical Project Planning Guidance for HTRW Data Quality Design or the EPA Guidance for Data Quality Assessment: Practical Methods for Data Analysis, EPA QA/G-9. The attached DTSC comment letter contains more detailed comments regarding this requirement. In short, the SAP must propose a sampling methodology that will result in enough data to determine whether the scamping device implementation results in an unacceptable discharge of total or soluble metals to the State's waters;

2. A detailed description, drawing, and photographs of the scamping device including flow rates and a listing of the biota that are likely to be removed or that will remain on the vessel hull;

3. A method for determining the scamping device efficiency. The method must determine the percentage of material that is not collected by the device, including all of the sub 400 µm-sized material, which passes through the finest meshed bag. The SLC letter discusses this issue in detail and makes recommendations for better sampling methods and locations. Since the device is designed to remove only soft biota, the efficiency evaluation should include an assessment of the hard-bodied fouling organisms left on the hull;

4. A method for containing all of the scamped materials, including both solids and liquids. The James River pilot study analytical results for dissolved zinc and copper in the vicinity of the active scamping device were too elevated to be discharged directly into California state waters. Therefore, the discharge liquids must be collected during a California pilot test. In addition, the SAP shall propose methods to verify whether the elevated zinc and copper concentrations consistently exist in the discharged liquids. This requirement should address most of the concerns presented in the NMFS letter, as there will not be a discharge of soluble metals-laden water to the bay. However, the Workplan could propose a treatment

system that would remove metals to below acceptable water quality criteria prior to discharge to State waters;

5. A detailed description of the vessel hull condition(s) is required to assess whether the test results can be generalized to other vessels of similar condition(s); and,

6. A proposed waste management plan for the profiling and disposal of all waste solids and liquids at an appropriate disposal facility.

Closing

The Water Board is requiring submittal of a Scamping Pilot Test Workplan to ensure that a proposed scamping pilot test does not result in the discharge of metals to California state waters, which would pose a threat to water quality and the environment.

You should be aware that this letter represents a requirement for technical reports pursuant to California Water Code Section 13267, which allows the Board to require technical or monitoring program reports from any person who has discharged, discharges, proposes to discharge, or is suspected of discharging waste that could affect water quality (see Attachment B). Although we anticipate your cooperation in this matter, failure to respond or a late response to this requirement could potentially subject you to civil liability imposed by the Water Board. Any extension in the above deadline must be confirmed in writing by Board staff.

If you have any questions, please contact David Elias of my staff at (510) 622-2509, or via e-mail at delias@waterboards.ca.gov.

Sincerely,

for Bruce Wolfe
Executive Officer

Attachments: A - State and Federal Agency Comment letters
B - 13267 Letter Fact Sheet

cc: Please see following pages

cc: City of Benicia
Attn. Bill Whitney
City Hall
250 East "L" Street
Benicia, California 94510

Congressman George Miller
Attn. Kathy Hoffman
375 G Street, Suite 1
Vallejo, California 94592

Congresswoman Ellen Tauscher
Attn. Ricardo Blanco
2000 Cadenasso Drive, Suite A
Fairfield, California 94533

National Marine Fisheries Service
Attn. Joseph Dillon
777 Sonoma Avenue, Room 325
Santa Rosa, California 95404-4731

U.S. Department of Transportation
Maritime Administration
Attn. Mr. Michael Carter
Director of Environment
Second Floor West Building, Mail Drop No. 1
1200 New Jersey Avenue, SE,
Washington, DC 20590-0001

U.S. Department of Transportation
Maritime Administration
Attn. Kurt Michanczyk
Director of Ship Disposal Program
Second Floor West Building, Mail Drop No. 1
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Dept. of Toxic Substances Control
Attn. Alan Ito
Sr. Haz Substances Scientist
Task Force Support and Investigations Branch
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Sacramento, CA 95826

Dept. of Toxic Substances Control
Attn. Charles Gribble, P.G.
700 Heinz Avenue, Suite 100
Berkeley, California 94710

U.S. EPA Region 9
Attn. Nancy Yoshikawa
75 Hawthorne St. WTR-5
San Francisco, CA 94105

US Coast Guard, District 11
Attn. Commander Han Kim
Investigations and Inspections Branch
Coast Guard Island Building 50-8
Alameda, CA 94501

California State Lands Commission
Marine Facilities Division
Attn. Maurya B. Falkner
100 Howe Ave, Suite 100 South
Sacramento, CA 95825-8202

The Honorable Barbara Boxer
Attn. Bridget Petruczok
112 Hart Senate Office Building
Washington, DC , 20510

Russell Resources, Inc.
Attn. Peter Russell
440 Nova Albion Way, Suite 1
San Rafael, California 94903

Water Board: Bruce H. Wolfe, Shin-Roei Lee, Keith H. Lichten, David C. Elias

Attachment A

State and Federal Agency Comment letters

Linda S. Adams
Secretary for
Environmental Protection

Department of Toxic Substances Control

Maureen Gorsen, Director
700 Heinz Avenue, Suite 200
Berkeley, California 94710-2721

Arnold Schwarzenegger
Governor

To: David Elias, CEG, CHG
Engineering Geologist
Regional Water Quality Control Board, San Francisco Bay Region
1515 Clay Street, Oakland, California 94612

From: Chip Gribble, PG
Remedial Project Manager
Department of Toxic Substances Control
700 Heinz Avenue, Suite 200
Berkeley, California 94710

Date: September 4, 2007

Subject: Supplemental Information, Sampling and Analysis – James River Pilot Project, dated June 2007

INTRODUCTION

As requested, DTSC reviewed the 6-page report titled *Supplemental Information, Sampling and Analysis – James River Pilot Project, June 2007*(Data Report). This report was prepared by the U.S. Department of Transportation Maritime Administration and submitted to the San Francisco Bay Regional Water Quality Control Board on August 3, 2007 via transmittal letter from Mr. Michael Carter (Director, MARAD Office of the Environment) to Mr. Bruce Wolfe (Executive Officer, RWQCB SF Bay Region). This report was reviewed for its organization, content, and potential relevance to scamping surplus ships in San Francisco Bay.

GENERAL COMMENTS

The Data Report describes an experimental scamping activity using a common scamping device modified to collect material exhausted through the device's propeller wash. The Data Report does not reference a Sampling and Analysis Plan (SAP) typically required for environmental investigations. A SAP would typically clearly identify data quality objectives, analytical methods, experimental conditions, and criteria used to

evaluate investigation. The process of conducting environmental investigations is well documented and relevant guidance documents include; U.S Army Corps Engineers Technical Project Planning Guidance for HTRW Data Quality Design dated July 1995; EPA Guidance for Data Quality Assessment: practical Methods for Data Analysis, EPA QA/G-9. Typical environmental investigations would include experiment design, experimental hypothesis testing, statistical data evaluation, and experiment documentation. Regulations potentially applicable to the scamping process, management of waste generated by the process, and to the management of discharges from scamping, including but not limited to CERCLA, RCRA, TSCA, California Health and Safety Code Chapters 6.5 and 6.8, and CWA.

The Data Report is incomplete. Examples of apparently missing information include incomplete presentation of chemical analytical results, incomplete description of ship's hull condition, and an initial chemical characterization of the existing hull coating. The report does not clearly describe the filter/mesh sizes of the all the bags attached to the scamping device. Further, the report describes the collection of 23 samples for chemical analysis, but includes the results of only 8 samples. The report does not present or explain the results of the other 15 samples apparently submitted for chemical analysis. The report does not include any analyses/data on organic contaminants possible present (e.g. PCBs, TBT) in the hull coating. The report does not describe chemical analysis process or general analytical data quality. The report does not include sample handling practices, sample preservation, or chain of custody information typically required for environmental investigation results.

The Data Report is fundamentally flawed. The investigation does not appear to have been designed to allow for the clear determination of the environmental impacts associated with the specified scamping approach. Incomplete hull characterization impacts the validity of an assertion that adequate removal of contaminants is taking place. Failure to capture undiluted waste water from the smallest particulate pass bag precludes a determination that such waste water does not contain contaminants at concentrations of regulatory concern or that pose a risk to human health or the environment, as determined by the State. The study does not include quantification of particulate releases in the discharge water and an assessment of bay bottom sediment disturbance, which are necessary to address other environmental impacts resulting from application of this scamping methodology. Other significant flaws associated with the report include the limited and incomplete list of criteria that were used to evaluate the water quality data. The results presented in the report are compared to Virginia Water Quality Standards and the report indicates that the standards are equivalent to those issued by the USEPA. The relevant USEPA water quality standards for saltwater aquatic life protection are not equivalent to the standards listed in the Data Report. The report is also flawed due to the cursory and incomplete evaluation of the monitoring data presented. The report lacks an analysis of the applicability of, or consistency with other regulatory requirements such as RCRA.

Comparison of the report data to USEPA water quality standards for saltwater aquatic life protection does indicate that scamping activity released zinc and copper at concentrations exceeding the recommended ambient water quality criteria. Although the

report suggests scamping activity causes water quality impacts when compared to USEPA criteria, the fundamental problems with investigation design and documentation preclude ability to make a clear determination.

CONCLUSION

A meaningful and fully representative pilot study is necessary to adequately assess a specific scamping methodology for the Suisun Bay Reserve Fleet surplus ships. An appropriate study must provide data sufficient to address regulatory issues related to the CWA, RCRA, CERCLA, and Chapters 6.5 and 6.8 of the California Health and Safety Code, and be reviewed and approved by the State. This study must address principal questions of whether the specific scamping methodology would or would not generate a hazardous waste, treat a hazardous waste, and adequately contain a hazardous waste.

DTSC appreciates the opportunity to comment on the subject report. Should you have any questions regarding this review or require further details, please contact Mr. Chip Gribble by telephone at 510-540-3773 or by e-mail at cgribble@dtsc.ca.gov.

CALIFORNIA STATE LANDS COMMISSION
100 Howe Avenue, Suite 100-South
Sacramento, CA 95825-8202

PAUL D. THAYER, *Executive Officer*
(916) 574-1800 FAX (916) 574-1810
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September 4, 2007

File Ref: W9777.291

U.S. Maritime Administration
400 Seventh Street, SW
Washington D.C. 20590

Re: Comments on the sampling and analysis of James River scamping pilot project on the SS Lake (June 2007).

To Whom It May Concern:

The Marine Invasive Species Program (MISP) of the California State Lands Commission (CSLC) welcomes this opportunity to provide comments to the Maritime Administration (MARAD) regarding the sampling and analysis of the scamping pilot project conducted in the James River (VA) on the SS Lake. As MARAD considers conducting pilot scamping projects elsewhere, the MISP strongly urges that it incorporate the following comments, as well as those submitted by other California State and federal resource agencies.

Overall Comment

Conclusions cannot be drawn from this study. The lack of sufficient sample sizes, replicates, controls, quantified methods, and quantified results eliminates the possibility of understanding the efficacy of this containment system. Testing of the system should be untaken again with an approved testing protocol in place. The results should then be analyzed statistically in order to determine if the system is effective.

Introduction

1. The focus and goals of the study are not clear. Is the focus to examine the effectiveness of the scamping system at removing and capturing the "soft biofouling," as stated, or to examine how effectively the system traps paint chips, metals and other particulates that come off the vessels in conjunction with the scamping? The remainder of the paper doesn't address results pertaining to the stated purpose (to contain soft biofouling). Study should have collected and presented data on what proportion of fouling organisms was removed. If the focus is both soft biofouling containment as well as contamination containment, the sampling protocols and results should reflect this dual purpose.

2. It is not clear why the containment soft biofouling is a stated goal of this pilot. For nonindigenous species (NIS) introductions, the scamping of ships that have been resident in the scamping location for an extended period of time (e.g. decades) pose little risk for a new invasion. In this case, fouling organisms on the vessel will already be established in the local area. If, however, soft organisms must be contained because of potential toxic bioaccumulation issues, or because paint chips or ship sheathing are removed along with organisms, the goals should be clearly stated as such.

Materials and Methods

1. The sampling design was not adequate to examine the effectiveness of the scamping and the scamping containment. One vessel is not sufficient to represent the variety of vessel hulls found in the Suisan Bay fleet. Recommend a minimum of three vessels for future trials.

2. Given that the characteristics of the vessels that will be scamped will vary, the report should include specifics on the SS Lake (e.g. its age, how long has it been out of operation, when was the hull last cleaned, etc.). Such specifics may provide insight on how the scamping machine might operate on different vessels.

3. It is not clear if the bagging containment system was developed specifically for this project, who developed the instrument, or if it has been used in other studies to contain scamping material. What background research was used to design the device? What was the purpose/logic behind the design? Are there any other studies suggesting what the efficiency of this system would be?

4. Ambient flow conditions at the date and time of scamping should be documented so the approximate dispersal area of organisms, dissolved metals, and particulates can be estimated. At a minimum, current and tide stage at the time of scamping should be recorded.

5. Three half hull passes is not sufficient to characterize the effect of the scamping containment on the whole vessel. The portion of the vessel at the water line has the least curvature and "niche" areas (e.g. propeller, bow thrusters, sea chest). This system should be tested at multiple locations on the vessel hull to examine how well the scamping system works and is able to contain particulate matter.

6. The surface area covered/cleaned during the pilot should be provided so the additive effects of scamping all submerged portions of the vessel can be estimated.

7. The "Scamping Machine" section states that the "bulk" of the material removed is discharged through the housing in the prop wash. The term, "bulk" is unacceptably ambiguous. Does 95% go through the prop wash? 60%? 51%? "Bulk" could mean any of these. This vague term could mean that a large amount of the removed material may be lost during the scamping process, but this determination cannot be made.

8. The flow rate through the propeller and into the bags will influence the ability of the bags to retain organisms and paint chips > 400 um. High flow rates may force soft-bodied

organisms through the mesh even though they are > 400um and may cause paint chips to break against the mesh. Need to provide the flow rate used with this instrument.

9. Information is needed on the materials used for the machine's bristles, and the force applied to the surface of the vessel during the scamping process. The removal of hard-bodied fouling organisms typically requires a significant amount of force (e.g. prying with a knife) and it seems implausible that a single pass with this machine would remove most hard bodied organisms without removing paint chips/sheathing chips from the ship as well.

10. Soft-bodied organisms like anemones and tunicates usually make up a relatively small portion of fouling communities studied in other locations (less than 5-10% of the surface area). Need data in this study on the makeup of the fouling organisms before and after the vessel scamping process to determine what organisms, and what quantity of organisms remained on the hull following cleaning.

11. The mesh size for the smaller bag (400 µm) is very coarse and will allow many smaller particles and organisms (particularly larvae) to pass though. Additionally, many sessile invertebrates will spawn when under stress (such as with scamping), and the 400 um mesh would have little to no ability to contain many young. This mesh system will also do little to contain dissolved metals. The issue of dissolved metals is brought up in the introduction but not addressed again in terms of how the system would contain them.

12. Methods used to sample the turbulent zone behind the scamping unit need to be addressed. There is little detail with which to evaluate the specific methods:

    a. There is no suggestion that replicate samples were taken. Replicates should be taken and a more detailed description of the sampling methods should be provided.

    b. The propeller of the sampling boat could have influenced the flow of water being sampled by the 100 µm net. Ideally, the net should be pushed (with a frame) ahead of the boat to remove influence of the boat prop. This would also ensure that the net was sampling at a constant depth.

    c. The net and the hose apparently did not sample below the scamp, only behind it. It might be possible that heavier metals and pieces dropped to the bottom during the scamping process and these would not have been caught by the current sampling protocols. Suggest including protocols to sample/survey the bottom areas upstream, downstream, and directly beneath vessel.

    d. No data is provided on organisms collected in the 100 µm net. Should include

13. The study does not address the scamping unit effectiveness at removing fouling organisms. This may be a separate question from that of containment, but I recommend performing a side-by-side comparison of scamped and unscamped hull surfaces to not only determine effectiveness at removing the organisms but impact of the scamping process on the vessel hull.

14. Why were "other samples...taken for reference and background purposes,"? What were they to be compared to? What kinds of samples were taken? Please provide these details.

15. Suggest conducting a pre- and post- scamping evaluation that includes the following measurements at both times:

    a. Survey of fouling organisms on hull area where scamping will take place, and after scamping has taken place.

    b. Measurement of dissolved metal concentrations upstream, at several locations along the ship, and downstream (all of which should be replicated)

    c. Measurement of total metal concentrations in the sediments upstream, below and around the ship, and downstream (distance downstream should depend upon the strength and speed of current).

Results

1. The results provide little detail and do not allow for proper evaluation of the scamping containment unit. The "Additional Descriptions" section provides no information about what species were collected in what mass or volume. Additionally, there is no indication of the volume or mass of paint and other material collected by the containment bags or during the sampling of the turbulent flow. Without this information it is impossible to determine the effectiveness of the system.

2. The statement is made that "concentrations of dissolved metals resulting from this activity are not very different from the background concentrations. Thus, minimal material is actually being introduced into the water body." This description is unacceptably vague. What does "not very different" mean? Need to provide specific quantities and statistical tests to support this claim.

3. The results tables for total metals do not indicate if these were all of the metals found or if there were other metals that should have been tested. For the samples without data in the table, was there no testing for those elements? Why not? The volume of heavy metals should also be compared to California and Texas standards (locations of the other two reserve fleets) to determine if the metals coming off of these vessels will be in violation of water quality criteria at those locations.

4. Summary tables and/or graphs should be provided that summarize the testing results for the remaining samples (scamping water, hull paint above water line, macro material, etc.). Results should be compared to California and Texas hazardous materials standards/requirements and water quality standards/requirements.

Thank you for the opportunity to review and comment on James River scamping pilot project on the SS Lake. Please contact me at the number listed above if you have any questions.

Sincerely,

Maurya Falkner
Program Manager
Marine Invasive Species Program

Cc (via email):
David Elias, Regional Water Quality Control Board, San Francisco Bay Region
Gary Gregory, Division Chief, Marine Facilities Division, CSLC
Barbara Dugal, Division Chief, Land Management Division, CSLC
Jonathan W. Clark, Senior Staff Attorney, CSLC
Charles Gribble, Department of Toxics Substances Control
Natalie C. Manning, National Oceanic and Atmospheric Administration

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
Southwest Region
777 Sonoma Ave., Room 325
Santa Rosa, CA 95404-4731

August 27, 2007

In response refer to:
SWR/F/SWR3:JJD

Michael C. Carter, Director
Office of the Environment
U.S. Department of Transport
Maritime Administration
1200 New Jersey Avenue, SE
Washington, D.C. 20590

Dear Mr. Carter:

NOAA's National Marine Fishery Service (NMFS) would like to take this opportunity to express our concerns over your proposed action regarding the Suisun Bay Reserve Fleet anchored in Suisun Bay, California. NMFS has been in contact with the San Francisco Bay Regional Water Quality Control Board, the State Department of Toxic Substance Control, and our sister NOAA agency, the National Ocean Service Office of Response and Restoration regarding the Maritime Administration's proposal for removal and cleaning of the Suisun Bay Reserve Fleet. As we currently understand the proposal, the project has the potential to result in adverse effects to water quality and sediments in San Francisco Bay, and this could result in impacts to species listed under the Endangered Species Act (ESA), their designated critical habitats, and to the Essential Fish Habitat (EFH) of several species managed under the Magnuson-Stevens Fishery Conservation and Management Act (MSA).

Available information indicates that the following listed species (Evolutionarily Significant Units [ESU] or Distinct Population Segments [DPS]) and designated critical habitat may be affected by the Maritime Administration's proposed action:

Sacramento River winter-run Chinook salmon ESU (*Oncorhynchus tshawytscha*)
endangered (June 28, 2005, 70 FR 37160)
critical habitat (June 16, 1993, 58 FR 33212)

Central Valley spring-run Chinook salmon ESU (*Oncorhynchus tshawytscha*)
threatened (June 28, 2005, 70 FR 37160)
critical habitat (September 2, 2005, 70 FR 52488)

Central Valley steelhead DPS (*Oncorhynchus mykiss*)
threatened (January 5, 2006, 71 FR 834)
critical habitat (September 2, 2005, 70 FR 52488)

Central California Coast steelhead DPS (*Oncorhynchus mykiss*)
threatened (January 5, 2006, 71 FR 834)
North American Green Sturgeon southern DPS (*Acipenser medirostris*)
threatened (April 7, 2006, 71 FR 17757)

In additional, the project is located within an area identified as EFH for various life stages of fish species managed with the following Fishery Management Plans (FMP) under the MSA:

Pacific Groundfish FMP - various rockfishes, flatfishes, sharks, *etc.*
Coastal Pelagics FMP - northern anchovy, Pacific sardine
Pacific Coast Salmon FMP - Chinook salmon

Based upon our review of the Vessel Environmental Review report dated February 15, 2007, and the Supplemental Information for the Sampling and Analysis Report – James River Pilot Project – dated June 2007, NMFS is concerned that the movement of these vessels without proper preparatory cleaning to the proposed Alameda in-water work site could result in the discharge of significant numbers of paint chips from the vessels. As noted in the Vessel Environmental Review report, these paints contain elevated levels of heavy metals such as copper, lead, and zinc. The paints may also contain tributyl tin which was used as an antifouling biocide in marine paints for many years. The Vessel Environmental Review Report notes that tin (measured as total tin) was detected in 6 of 10 paint samples that were examined. Furthermore, polychlorinated biphenyls (PCBs) were used in paint formulations as drying oils (resins) and plasticizers or softening agents (liquids) in the past and many of the vessels are old enough that they may have been treated with this type of paint. It does not appear that the paint chips processed for the Vessel Environmental Review were examined for the presence of PCBs. These contaminants are likely to adversely affect aquatic life if they fall off during transit through San Francisco Bay.

To address these concerns, we request the Maritime Administration promptly contact NMFS to discuss this project. NMFS has technical experts available to assist the Maritime Administration develop measures which will avoid and minimize potential impacts to the aquatic environment. In addition, NMFS can assist the Maritime Administration address their obligations pursuant to section 7 of the ESA. Pursuant to Section 7(a)(2) of the ESA, all Federal agencies are required "to insure that any action authorized, funded, or carried out by such agency is not likely to jeopardize the continued existence" of any endangered or threatened species or result in the destruction of critical habitats. If an agency determines that their proposed action "may affect" an endangered or threatened species, the agency must consult with the relevant Service, the U.S. Fish and Wildlife Service and/or NMFS, depending on the species that are affected by the proposed action. Federal agencies are also required to consult with the Secretary of Commerce (via NMFS) regarding any action or proposed action authorized, funded, or undertaken by the agency that may adversely affect EFH under the MSA (16 U.S.C. 1855(b)(2)).

Please contact Joe Dillon, NOAA Fisheries Southwest Region Water Quality Coordinator at (707) 575-6093 or Joseph.J.Dillon@noaa.gov to schedule initial discussions regarding this important matter.

Sincerely,

William Hicum for

Dick Butler
Santa Rosa Area Office Supervisor
Protected Resources Division

cc: Russ Strach, NOAA Fisheries, Sacramento, California
Bob Hoffman, NOAA Fisheries, Long Beach, California
Steve Edmondson, NOAA Fisheries, Santa Rosa, California
Patrick Rutten, NOAA Fisheries, Santa Rosa, California
Gary Stern, NOAA Fisheries, Santa Rosa, California
Natalie Cosentino-Manning, NOAA Fisheries, Santa Rosa, California
Korie Schaeffer, NOAA Fisheries, Santa Rosa, California
Bruce Wolfe, San Francisco Bay Regional Water Quality Control Board, Oakland, California
Shin-Roei Lee, San Francisco Bay Regional Water Quality Control Board, Oakland, California
David Elias, San Francisco Bay Regional Water Quality Control Board, Oakland, California
Denise Klimas, NOS, Sacramento, California
Alan Ito, DTSC, Sacramento, California

Attachment B

Water Code 13267 Fact Sheet

Linda S. Adams
Agency Secretary

California Regional Water Quality Control Board

San Francisco Bay Region

Arnold Schwarzenegger
Governor

1515 Clay Street, Suite 1400, Oakland, California 94612
(510) 622-2300 • Fax (510) 622-2460
http://www.waterboards.ca.gov/sanfranciscobay

Fact Sheet – Requirements For Submitting Technical Reports Under Section 13267 of the California Water Code

What does it mean when the regional water board requires a technical report?
Section 13267[1] of the California Water Code provides that "...the regional board may require that any person who has discharged, discharges, or who is suspected of having discharged or discharging, or who proposes to discharge waste...that could affect the quality of waters...shall furnish, under penalty of perjury, technical or monitoring program reports which the regional board requires."

This requirement for a technical report seems to mean that I am guilty of something, or at least responsible for cleaning something up. What if that is not so?
The requirement for a technical report is a tool the regional water board uses to investigate water quality issues or problems. The information provided can be used by the regional water board to clarify whether a given party has responsibility.

Are there limits to what the regional water board can ask for?
Yes. The information required must relate to an actual or suspected or proposed discharge of waste (including discharges of waste where the initial discharge occurred many years ago), and the burden of compliance must bear a reasonable relationship to the need for the report and the benefits obtained. The regional water board is required to explain the reasons for its request.

What if I can provide the information, but not by the date specified?
A time extension may be given for good cause. Your request should be promptly submitted in writing, giving reasons.

Are there penalties if I don't comply?
Depending on the situation, the regional water board can impose a fine of up to $5,000 per day, and a court can impose fines of up to $25,000 per day as well as criminal penalties. A person who submits false information or fails to comply with a requirement to submit a technical report may be found guilty of a misdemeanor. For some reports, submission of false information may be a felony.

Do I have to use a consultant or attorney to comply?
There is no legal requirement for this, but as a practical matter, in most cases the specialized nature of the information required makes use of a consultant and/or attorney advisable.

What if I disagree with the 13267 requirements and the regional water board staff will not change the requirement and/or date to comply?
You may ask that the regional water board reconsider the requirement, and/or submit a petition to the State Water Resources Control Board. See California Water Code sections 13320 and 13321 for details. A request for reconsideration to the regional water board does not affect the 30-day deadline within which to file a petition to the State Water Resources Control Board

If I have more questions, whom do I ask?
Requirements for technical reports indicate the name, telephone number, and email address of the regional water board staff contact.

Revised August 2005

[1] All code sections referenced herein can be found by going to www.leginfo.ca.gov.

Exhibit G

National Marine Fisheries Service Letter, August 27, 2007

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
Southwest Region
777 Sonoma Ave., Room 325
Santa Rosa, CA 95404-4731

August 27, 2007

In response refer to:
SWR/F/SWR3:JJD

Michael C. Carter, Director
Office of the Environment
U.S. Department of Transport
Maritime Administration
1200 New Jersey Avenue, SE
Washington, D.C. 20590

Dear Mr. Carter:

NOAA's National Marine Fishery Service (NMFS) would like to take this opportunity to express our concerns over your proposed action regarding the Suisun Bay Reserve Fleet anchored in Suisun Bay, California. NMFS has been in contact with the San Francisco Bay Regional Water Quality Control Board, the State Department of Toxic Substance Control, and our sister NOAA agency, the National Ocean Service Office of Response and Restoration regarding the Maritime Administration's proposal for removal and cleaning of the Suisun Bay Reserve Fleet. As we currently understand the proposal, the project has the potential to result in adverse effects to water quality and sediments in San Francisco Bay, and this could result in impacts to species listed under the Endangered Species Act (ESA), their designated critical habitats, and to the Essential Fish Habitat (EFH) of several species managed under the Magnuson-Stevens Fishery Conservation and Management Act (MSA).

Available information indicates that the following listed species (Evolutionarily Significant Units [ESU] or Distinct Population Segments [DPS]) and designated critical habitat may be affected by the Maritime Administration's proposed action:

Sacramento River winter-run Chinook salmon ESU (*Oncorhynchus tshawytscha*)
endangered (June 28, 2005, 70 FR 37160)
critical habitat (June 16, 1993, 58 FR 33212)
Central Valley spring-run Chinook salmon ESU (*Oncorhynchus tshawytscha*)
threatened (June 28, 2005, 70 FR 37160)
critical habitat (September 2, 2005, 70 FR 52488)
Central Valley steelhead DPS (*Oncorhynchus mykiss*)
threatened (January 5, 2006, 71 FR 834)
critical habitat (September 2, 2005, 70 FR 52488)

Central California Coast steelhead DPS (*Oncorhynchus mykiss*)
threatened (January 5, 2006, 71 FR 834)
North American Green Sturgeon southern DPS (*Acipenser medirostris*)
threatened (April 7, 2006, 71 FR 17757)

In additional, the project is located within an area identified as EFH for various life stages of fish species managed with the following Fishery Management Plans (FMP) under the MSA:

Pacific Groundfish FMP - various rockfishes, flatfishes, sharks, *etc.*
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Pacific Coast Salmon FMP - Chinook salmon

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Please contact Joe Dillon, NOAA Fisheries Southwest Region Water Quality Coordinator at (707) 575-6093 or Joseph.J.Dillon@noaa.gov to schedule initial discussions regarding this important matter.

Sincerely,

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David Elias, San Francisco Bay Regional Water Quality Control Board, Oakland, California
Denise Klimas, NOS, Sacramento, California
Alan Ito, DTSC, Sacramento, California

Exhibit H

Excerpts From Water Board Basin Plan

CHAPTER 2: BENEFICIAL USES

State policy for water quality control in California is directed toward achieving the highest water quality consistent with maximum benefit to the people of the state. Aquatic ecosystems and underground aquifers provide many different benefits to the people of the state. The beneficial uses described in detail in this chapter define the resources, services, and qualities of these aquatic systems that are the ultimate goals of protecting and achieving high water quality. The Regional Board is charged with protecting all these uses from pollution and nuisance that may occur as a result of waste discharges in the region. Beneficial uses of surface waters, groundwaters, marshes, and mudflats presented here serve as a basis for establishing water quality objectives and discharge prohibitions to attain this goal.

2.1 DEFINITIONS OF BENEFICIAL USES

The following definitions (in italic) for beneficial uses are applicable throughout the entire state. A brief description of the most important water quality requirements for each beneficial use follows each definition (in alphabetical order by abbreviation).

2.1.1 AGRICULTURAL SUPPLY (AGR)

Uses of water for farming, horticulture, or ranching, including, but not limited to, irrigation, stock watering, or support of vegetation for range grazing.

The criteria discussed under municipal and domestic water supply (MUN) also effectively protect farmstead uses. To establish water quality criteria for livestock water supply, the Regional Board must consider the relationship of water to the total diet, including water freely drunk, moisture content of feed, and interactions between irrigation water quality and feed quality. The University of California Cooperative Extension has developed threshold and limiting concentrations for livestock and irrigation water. Continued irrigation often leads to one or more of four types of hazards related to water quality and the nature of soils and crops. These hazards are (1) soluble salt accumulations, (2) chemical changes in the soil, (3) toxicity to crops, and (4) potential disease transmission to humans through reclaimed water use. Irrigation water classification systems, arable soil classification systems, and public health criteria related to reuse of wastewater have been developed with consideration given to these hazards.

2.1.2 AREAS OF SPECIAL BIOLOGICAL SIGNIFICANCE (ASBS)

Areas designated by the State Water Board.

These include marine life refuges, ecological reserves, and designated areas where the preservation and enhancement of natural resources requires special protection. In these areas, alteration of natural water quality is undesirable. The areas that have been designated as ASBS in this Region are Bird Rock, Point Reyes Headland Reserve and Extension, Double Point, Duxbury Reef Reserve and Extension, Farallon Islands, and James V. Fitzgerald Marine Reserve, depicted in Figure 2-1. The 2001 California Ocean Plan (see Chapter 5) prohibits waste discharges into, and requires wastes to be discharged at a sufficient distance from, these areas to assure maintenance

of natural water quality conditions. These areas have been designated as a subset of State Water Quality Protection Areas as per the Public Resources Code.

2.1.3 COLD FRESHWATER HABITAT (COLD)

Uses of water that support cold water ecosystems, including, but not limited to, preservation or enhancement of aquatic habitats, vegetation, fish, or wildlife, including invertebrates.

Cold freshwater habitats generally support trout and may support the anadromous salmon and steelhead fisheries as well. Cold water habitats are commonly well-oxygenated. Life within these waters is relatively intolerant to environmental stresses. Often, soft waters feed cold water habitats. These waters render fish more susceptible to toxic metals, such as copper, because of their lower buffering capacity.

2.1.4 OCEAN, COMMERCIAL, AND SPORT FISHING (COMM)

Uses of water for commercial or recreational collection of fish, shellfish, or other organisms in oceans, bays, and estuaries, including, but not limited to, uses involving organisms intended for human consumption or bait purposes.

To maintain ocean fishing, the aquatic life habitats where fish reproduce and seek their food must be protected. Habitat protection is under descriptions of other beneficial uses.

2.1.5 ESTUARINE HABITAT (EST)

Uses of water that support estuarine ecosystems, including, but not limited to, preservation or enhancement of estuarine habitats, vegetation, fish, shellfish, or wildlife (e.g., estuarine mammals, waterfowl, shorebirds), and the propagation, sustenance, and migration of estuarine organisms.

Estuarine habitat provides an essential and unique habitat that serves to acclimate anadromous fishes (salmon, striped bass) migrating into fresh or marine water conditions. The protection of estuarine habitat is contingent upon (1) the maintenance of adequate Delta outflow to provide mixing and salinity control; and (2) provisions to protect wildlife habitat associated with marshlands and the Bay periphery (i.e., prevention of fill activities). Estuarine habitat is generally associated with moderate seasonal fluctuations in dissolved oxygen, pH, and temperatur and with a wide range in turbidity.

2.1.6 FRESHWATER REPLENISHMENT (FRSH)

Uses of water for natural or artificial maintenance of surface water quantity or quality.

2.1.7 GROUNDWATER RECHARGE (GWR)

Uses of water for natural or artificial recharge of groundwater for purposes of future extraction, maintenance of water quality, or halting saltwater intrusion into freshwater aquifers.

The requirements for groundwater recharge operations generally reflect the future use to be made of the water stored underground. In some cases, recharge operations may be conducted to prevent seawater intrusion. In these cases, the quality of recharged waters may not directly affect quality at the wellfield being protected. Recharge operations are often limited by excessive suspended sediment or turbidity that can clog the surface of recharge pits, basins, or wells.

Under the state Antidegradation Policy, the quality of some of the waters of the state is higher than established by adopted policies. It is the intent of this policy to maintain that existing higher quality to the maximum extent possible.

Requirements for groundwater recharge, therefore, shall impose the Best Available Technology (BAT) or Best Management Practices (BMPs) for control of the discharge as necessary to assure the highest quality consistent with maximum benefit to the people of the state. Additionally, it must be recognized that groundwater recharge occurs naturally in many areas from streams and reservoirs. This recharge may have little impact on the quality of groundwaters under normal circumstances, but it may act to transport pollutants from the recharging water body to the groundwater. Therefore, groundwater recharge must be considered when requirements are established.

2.1.8 INDUSTRIAL SERVICE SUPPLY (IND)

Uses of water for industrial activities that do not depend primarily on water quality, including, but not limited to, mining, cooling water supply, hydraulic conveyance, gravel washing, fire protection, and oil well repressurization.

Most industrial service supplies have essentially no water quality limitations except for gross constraints, such as freedom from unusual debris.

2.1.9 MARINE HABITAT (MAR)

Uses of water that support marine ecosystems, including, but not limited to, preservation or enhancement of marine habitats, vegetation such as kelp, fish, shellfish, or wildlife (e.g., marine mammals, shorebirds).

In many cases, the protection of marine habitat will be accomplished by measures that protect wildlife habitat generally, but more stringent criteria may be necessary for waterfowl marshes and other habitats, such as those for shellfish and marine fishes. Some marine habitats, such as important intertidal zones and kelp beds, may require special protection.

2.1.10 FISH MIGRATION (MIGR)

Uses of water that support habitats necessary for migration, acclimatization between fresh water and salt water, and protection of aquatic organisms that are temporary inhabitants of waters within the region.

The water quality provisions acceptable to cold water fish generally protect anadromous fish as well. However, particular attention must be paid to maintaining zones of passage. Any barrier to migration or free movement of migratory fish is harmful. Natural tidal movement in estuaries

and unimpeded river flows are necessary to sustain migratory fish and their offspring. A water quality barrier, whether thermal, physical, or chemical, can destroy the integrity of the migration route and lead to the rapid decline of dependent fisheries.

Water quality may vary through a zone of passage as a result of natural or human- induced activities. Fresh water entering estuaries may float on the surface of the denser salt water or hug one shore as a result of density differences related to water temperature, salinity, or suspended matter.

2.1.11 MUNICIPAL AND DOMESTIC SUPPLY (MUN)

Uses of water for community, military, or individual water supply systems, including, but not limited to, drinking water supply.

The principal issues involving municipal water supply quality are (1) protection of public health; (2) aesthetic acceptability of the water; and (3) the economic impacts associated with treatment- or quality-related damages.

The health aspects broadly relate to: direct disease transmission, such as the possibility of contracting typhoid fever or cholera from contaminated water; toxic effects, such as links between nitrate and methemoglobinemia (blue babies); and increased susceptibility to disease, such as links between halogenated organic compounds and cancer.

Aesthetic acceptance varies widely depending on the nature of the supply source to which people have become accustomed. However, the parameters of general concern are excessive hardness, unpleasant odor or taste, turbidity, and color. In each case, treatment can improve acceptability although its cost may not be economically justified when alternative water supply sources of suitable quality are available.

Published water quality objectives give limits for known health-related constituents and most properties affecting public acceptance. These objectives for drinking water include the U.S. Environmental Protection Agency Drinking Water Standards and the California State Department of Health Services criteria.

2.1.12 NAVIGATION (NAV)

Uses of water for shipping, travel, or other transportation by private, military, or commercial vessels.

2.1.13 INDUSTRIAL PROCESS SUPPLY (PRO)

Uses of water for industrial activities that depend primarily on water quality.

Water quality requirements differ widely for the many industrial processes in use today. So many specific industrial processes exist with differing water quality requirements that no meaningful criteria can be established generally for quality of raw water supplies. Fortunately, this is not a serious shortcoming, since current water treatment technology can create desired product waters tailored for specific uses.

2.1.14 PRESERVATION OF RARE AND ENDANGERED SPECIES (RARE)

Uses of waters that support habitats necessary for the survival and successful maintenance of plant or animal species established under state and/or federal law as rare, threatened, or endangered.

The water quality criteria to be achieved that would encourage development and protection of rare and endangered species should be the same as those for protection of fish and wildlife habitats generally. However, where rare or endangered species exist, special control requirements may be necessary to assure attainment and maintenance of particular quality criteria, which may vary slightly with the environmental needs of each particular species. Criteria for species using areas of special biological significance should likewise be derived from the general criteria for the habitat types involved, with special management diligence given where required.

2.1.15 WATER CONTACT RECREATION (REC1)

Uses of water for recreational activities involving body contact with water where ingestion of water is reasonably possible. These uses include, but are not limited to, swimming, wading, water-skiing, skin and scuba diving, surfing, whitewater activities, fishing, and uses of natural hot springs.

Water contact implies a risk of waterborne disease transmission and involves human health; accordingly, criteria required to protect this use are more stringent than those for more casual water-oriented recreation.

Excessive algal growth has reduced the value of shoreline recreation areas in some cases, particularly for swimming. Where algal growths exist in nuisance proportions, particularly bluegreen algae, all recreational water uses, including fishing, tend to suffer.

One criterion to protect the aesthetic quality of waters used for recreation from excessive algal growth is based on chlorophyll a.

2.1.16 NONCONTACT WATER RECREATION (REC2)

Uses of water for recreational activities involving proximity to water, but not normally involving contact with water where water ingestion is reasonably possible. These uses include, but are not limited to, picnicking, sunbathing, hiking, beachcombing, camping, boating, tide pool and marine life study, hunting, sightseeing, or aesthetic enjoyment in conjunction with the above activities.

Water quality considerations relevant to noncontact water recreation, such as hiking, camping, or boating, and those activities related to tide pool or other nature studies require protection of habitats and aesthetic features. In some cases, preservation of a natural wilderness condition is justified, particularly when nature study is a major dedicated use.

One criterion to protect the aesthetic quality of waters used for recreation from excessive algal growth is based on chlorophyll a.

2.1.17 SHELLFISH HARVESTING (SHELL)

Uses of water that support habitats suitable for the collection of crustaceans and filter-feeding shellfish (e.g., clams, oysters, and mussels) for human consumption, commercial, or sport purposes.

Shellfish harvesting areas require protection and management to preserve the resource and protect public health. The potential for disease transmission and direct poisoning of humans is of considerable concern in shellfish regulation. The bacteriological criteria for the open ocean, bays, and estuarine waters where shellfish cultivation and harvesting occur should conform with the standards described in the National Shellfish Sanitation Program, Manual of Operation.

Toxic metals can accumulate in shellfish. Mercury and cadmium are two metals known to have caused extremely disabling effects in humans who consumed shellfish that concentrated these elements from industrial waste discharges. Other elements, radioactive isotopes, and certain toxins produced by particular plankton species also concentrate in shellfish tissue. Documented cases of paralytic shellfish poisoning are not uncommon in California.

2.1.18 FISH SPAWNING (SPWN)

Uses of water that support high quality aquatic habitats suitable for reproduction and early development of fish.

Dissolved oxygen levels in spawning areas should ideally approach saturation levels. Free movement of water is essential to maintain well-oxygenated conditions around eggs deposited in sediments. Water temperature, size distribution and organic content of sediments, water depth, and current velocity are also important determinants of spawning area adequacy.

2.1.19 WARM FRESHWATER HABITAT (WARM)

Uses of water that support warm water ecosystems including, but not limited to, preservation or enhancement of aquatic habitats, vegetation, fish, or wildlife, including invertebrates.

The warm freshwater habitats supporting bass, bluegill, perch, and other panfish are generally lakes and reservoirs, although some minor streams will serve this purpose where stream flow is sufficient to sustain the fishery. The habitat is also important to a variety of nonfish species, such as frogs, crayfish, and insects, which provide food for fish and small mammals. This habitat is less sensitive to environmental changes, but more diverse than the cold freshwater habitat, and natural fluctuations in temperature, dissolved oxygen, pH, and turbidity are usually greater.

2.1.20 WILDLIFE HABITAT (WILD)

Uses of waters that support wildlife habitats, including, but not limited to, the preservation and enhancement of vegetation and prey species used by wildlife, such as waterfowl.

The two most important types of wildlife habitat are riparian and wetland habitats. These habitats can be threatened by development, erosion, andsedimentation, as well as by poor water quality.

The water quality requirements of wildlife pertain to the water directly ingested, the aquatic habitat itself, and the effect of water quality on the production of food materials. Waterfowl habitat is particularly sensitive to changes in water quality. Dissolved oxygen, pH, alkalinity, salinity, turbidity, settleable matter, oil, toxicants, and specific disease organisms are water quality characteristics particularly important to waterfowl habitat. Dissolved oxygen is needed in waterfowl habitats to suppress development of botulism organisms; botulism has killed millions of waterfowl. It is particularly important to maintain adequate circulation and aerobic conditions in shallow fringe areas of ponds or reservoirs where botulism has caused problems.

2.2 PRESENT AND POTENTIAL BENEFICIAL USES

2.2.1 SURFACE WATERS

Surface waters in the Region consist of non-tidal wetlands, rivers, streams, and lakes (collectively described as inland surface waters), estuarine wetlands known as baylands, estuarine waters, and coastal waters. In this Region, estuarine waters consist of the Bay system including intertidal, tidal, and subtidal habitats from the Golden Gate to the Region's boundary near Pittsburg and the lower portions of streams that are affected by tidal hydrology, such as the Napa and Petaluma rivers in the north and Coyote and San Francisquito creeks in the south.

Inland surface waters support or could support most of the beneficial uses described above. The specific beneficial uses for inland streams include municipal and domestic supply (MUN), agricultural supply (AGR), industrial process supply (PRO), groundwater recharge (GWR), water contact recreation (REC1), noncontact water recreation (REC2), wildlife habitat (WILD), cold freshwater habitat (COLD), warm freshwater habitat (WARM), fish migration (MIGR), and fish spawning (SPWN). The San Francisco Bay Estuary supports estuarine habitat (EST), industrial service supply (IND), and navigation (NAV) in addition to all of the uses supported by streams.

Coastal waters' beneficial uses include water contact recreation (REC1); noncontact water recreation (REC2); 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 California coastline within the Region is endowed with exceptional scenic beauty.

Beneficial uses of each significant water body have been identified and are organized according to the seven major hydrologic units within the Region (Figure 2-2). Table 2-1 contains the beneficial uses for water bodies that have been designated in the Region. The maps locating each water body (Figures 2-3 through 2-9) were produced using a geographical information system (GIS) at the Water Board. The maps use the hydrologic basin information compiled by the California Interagency Watershed map, with supplemental information from the Oakland Museum of California Creek and Watershed Map series, the Contra Costa County Watershed Atlas, and the San Francisco Estuary Institute EcoAtlas. More detailed representations of each location can be created using this GIS version.

The beneficial uses of any specifically identified water body generally apply to all its tributaries. In some cases a beneficial use may not be applicable to the entire body of water, such as navigation in Richardson Bay or shellfish harvesting in the Pacific Ocean. In these cases, the

Water Board's judgment regarding water quality control measures necessary to protect beneficial uses will be applied.

2.2.2 GROUNDWATER

Groundwater is defined as subsurface water that occurs beneath the water table in soils and geologic formations that are fully saturated. Where groundwater occurs in a saturated geologic unit that contains sufficient permeable thickness to yield significant quantities of water to wells and springs, it can be defined as an aquifer. A groundwater basin is defined as a hydrogeologic unit containing one large aquifer or several connected and interrelated aquifers.

Water-bearing geologic units occur within groundwater basins in the Region that do not meet the definition of an aquifer. For instance, there are shallow, low permeability zones throughout the Region that have extremely low water yields. Groundwater may also occur outside of currently identified basins. Therefore, for basin planning purposes, the term "groundwater" includes all subsurface waters, whether or not these waters meet the classic definition of an aquifer or occur within identified groundwater basins.

The California Department of Water Resources (DWR) evaluated the characteristics of groundwater basins in the Region and throughout the state and summarized the results in California's Groundwater, Bulletin 118 (2003). Of special importance to the Region are the 28 groundwater basins and seven sub-basins classified by DWR that produce, or potentially could produce, significant amounts of groundwater (Figures 2-10 and 2-10A-D). The Water Board maintains a GIS for all water bodies in the Region and has the capacity to present information on each basin at a much higher level of resolution than is depicted in Figures 2-10A-D.

Existing and potential beneficial uses applicable to groundwater in the Region include municipal and domestic water supply (MUN), industrial water supply (IND), industrial process supply (PRO), agricultural water supply (AGR), groundwater recharge (GWR), and freshwater replenishment to surface waters (FRESH). Table 2-2 lists the 28 identified groundwater basins and seven sub-basins located in the Region and their existing and potential beneficial uses.

Unless otherwise designated by the Water Board, all groundwater is considered suitable, or potentially suitable, for municipal or domestic water supply (MUN). In making any exceptions, the Water Board will consider the criteria referenced in State Water Board Resolution No. 88-63 and Water Board Resolution No. 89-39, "Sources of Drinking Water," where:

- The total dissolved solids exceed 3,000 milligrams per liter (mg/L) (5,000 microSiemens per centimeter, μS/cm, electrical conductivity), and it is not reasonably expected by the Water Board that the groundwater could supply a public water system; or
- There is contamination, either by natural processes or by human activity (unrelated to a specific pollution incident), that cannot reasonably be treated for domestic use using either Best Management Practices (BMPs) or best economically achievable treatment practices; or
- The water source does not provide sufficient water to supply a single well capable of producing an average, sustained yield of 200 gallons per day; or

- The aquifer is regulated as a geothermal energy-producing source or has been exempted administratively pursuant to 40 Code of Federal Regulations (CFR) Part 146.4 for the purpose of underground injection of fluids associated with the production of hydrocarbon or geothermal energy, provided that these fluids do not constitute a hazardous waste under 40 CFR Part 261.3.

2.2.3 WETLANDS

Federal administrative law (e.g., 40 CFR Part 122.2, revised December 22, 1993) defines wetlands as waters of the United States. National waters include waters of the State of California, defined by the Porter-Cologne Act as "any water, surface or underground, including saline waters, within the boundaries of the State" (California Water Code §13050[e]). Wetland water quality control is therefore clearly within the jurisdiction of the State Water Board and Regional Water Boards.

Wetlands are further defined in 40 CFR 122.2 as "those areas that are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs, and similar areas."

The Water Board recognizes that wetlands frequently include areas commonly referred to as saltwater marshes, freshwater marshes, open or closed brackish water marshes, mudflats, sandflats, unvegetated seasonally ponded areas, vegetated shallows, sloughs, wet meadows, playa lakes, natural ponds, vernal pools, diked baylands, seasonal wetlands, floodplains, and riparian woodlands.

Mudflats make up one of the largest and most important habitat types in the Estuary. Snails, clams, worms, and other animals convert the rich organic matter in the mud bottom to food for fish, crabs, and birds.

Mudflats generally support a variety of edible shellfish, and many species of fish rely heavily on the mudflats during at least a part of their life cycle. Additionally, San Francisco Bay mudflats are one of the most important habitats on the coast of California for millions of migrating shorebirds.

Another important characteristic of the Estuary is the fresh, brackish, and salt water marshes around the Bay's margins. These highly complex communities are recognized as vital components of the Bay system's ecology. Most marshes around the Bay have been destroyed through filling and development. The protection, preservation, and restoration of the remaining marsh communities are essential for maintaining the ecological integrity of the Estuary.

Identifying wetlands may be complicated by such factors as the seasonality of rainfall in the Region. Therefore, in identifying wetlands considered waters of the United States, the Water Board will consider such indicators as hydrology, hydrophytic plants, and/or hydric soils for the purpose of mapping and inventorying wetlands. The Water Board will, in general, rely on the federal manual for wetland delineation in the Region when issuing Clean Water Act Section 401 water quality certifications (U.S. Army Corps of Engineers (Corps) Wetlands Delineation Manual, 1987). In the rare cases where the U.S. EPA and Corps guidelines disagree on the boundaries for federal juridictional wetlands, the Water Board will rely on the wetlands delineation made by the

U.S. EPA or the California Department of Fish and Game (CDFG). For the purpose of mapping and inventorying wetlands, the Water Board will rely on the protocols and naming conventions of the National Wetlands Inventory (NWI) prepared by the U.S. Fish and Wildlife Service (USFWS).

Many individual wetlands provide multiple benefits depending on the wetland type and location. There are many potential beneficial uses of wetlands, including Wildlife Habitat (WILD); Preservation of Rare and Endangered Species (RARE); Shellfish Harvesting (SHELL); Water Contact Recreation (REC1); Noncontact Water Recreation (REC2); Ocean, Commercial, and Sport Fishing (COMM); Marine Habitat (MAR); Fish Migration (MIGR); Fish Spawning (SPAWN); and Estuarine Habitat (EST). Some of these general beneficial uses can be further described in terms of their component wetland function. For example, many wetlands that provide groundwater recharge (GWR) also provide flood control, pollution control, erosion control, and stream baseflow.

Table 2-3 shows how beneficial uses are associated with different wetland types. Table 2-3 lists and specifies beneficial uses for 34 significant wetland areas within the Region; generalized locations of these wetlands are shown in Figure 2-11. It should be noted that most of the wetlands listed in Table 2-3 are saltwater marshes, and that the list is not comprehensive.

The Water Board has participated in completing the Baylands Ecosystem Habitat Goals Report (1999) and the Baylands Ecosystem Species and Community Profiles (2000), which were written by scientists and managers in the Region in order to recommend sound wetland restoration strategies. Other efforts around the Bay to locate wetland sites include San Francisco Estuary Institute's (SFEI) EcoAtlas Baylands Maps (Baylands Maps) and Bay Area Wetlands Project Tracker (Wetlands Tracker), and the Wetland Tracker managed by the San Francisco Bay Joint Venture. Because of the large number of small and non-contiguous wetlands, it is not practical to delineate and specify beneficial uses of every wetland area. Therefore, beneficial uses may be determined site specifically, as needed. Chapter 4 of this Plan contains additional information on the process used to determine beneficial uses for specific wetland sites.

FIGURES

Figure 2-1: Areas of Special Biological Significance

Figure 2-2: Hydrologic Planning Areas

Figure 2-3: Marin Coastal Basin

Legend for Figures 2-3 through 2-9

Figure 2-4: San Mateo Coastal Basin

Figure 2-5: Central Basin

Figure 2-6: South Bay Basin

Figure 2-7: Santa Clara Basin

Figure 2-8: San Pablo Basin

Figure 2-9: Suisun Basin

Figure 2-10: Significant Groundwater Basins

Figure 2-10A: Groundwater Basins: Marin / Sonoma / Napa

Figure 2-10B: Groundwater Basins: Napa / Solano

Figure 2-10C: Groundwater Basins: San Francisco

Figure 2-10D: Groundwater Basins: East and South Bay

Figure 2-11: General Locations of Wetland Areas

TABLES

Table 2-1: Existing and Potential Beneficial Uses of Water Bodies in the San Francisco Bay Region

Table 2-2: Existing and Potential Beneficial Uses of Groundwater in Identified Basins

Table 2-3: Examples of Existing and Potential Beneficial Uses of Selected Wetlands

Table 2-4: Examples of Beneficial Uses of Wetland Areas

Table 2-1: Existing and Potential Beneficial Uses of Water Bodies in the San Francisco Bay Region

MARIN COASTAL BASIN

	← Human Consumptive Uses →						← Aquatic Life Uses →									Wildlife Use	Recreational Uses		
COUNTY Waterbody	AGR	MUN	FRSH	GWR	IND	PROC	COMM	SHEL	COLD	EST	MAR	MIGR	RARE	SPWN	WARM	WILD	REC-1	REC-2	NAV
MARIN COUNTY																			
Pacific Ocean (Marin)					E		E	E			E	E	E	E		E	E	E	E
Abbotts Lagoon											E					E	E	E	
Drakes Estero							E	E			E		E	E		E	E	E	
East Schooner Creek								E	E					E		E	P	E	
Limantour Estero							E	E			E		E	E		E	E	E	
Coast Creek								E	E					E		E	E	E	
Alamere Creek									E							E	P	E	
Crystal Lake									E					E	E	E	P	P	
Bolinas Lagoon							E	E			E	E	E	E		E	E	E	
Pine Gulch Creek		E							E			E		E	E	E		E	
Easkoot Creek																			
McKennan Gulch Creek																			
Morses Gulch Creek																			
Pike County Gulch Creek																			
Redwood Creek (Marin)	E	E	E					E	E					E	E	E	E	E	
Rodeo Lagoon									E							E	E	E	
Rodeo Creek									E		E		E	E		E	E	E	
Tomales Bay							E	E			E	E	E	E		E	E	E	
Millerton Gulch																			

MARIN COASTAL BASIN

COUNTY Waterbody	AGR	MUN	FRSH	GWR	IND	PROC	COMM	SHEL	COLD	EST	MAR	MIGR	RARE	SPWN	WARM	WILD	REC-1	REC-2	NAV
Walker Creek									E			E	E	E	E	E	P	P	
Laguna Lake																			
Frink Canyon Creek																			
Verde Canyon Creek																			
Salmon Creek																			
Soulajule Reservoir		E	E												E	E	E	E	
Lagunitas Creek	E	E							E			E	E	E	E	E	E	E	
Haggerty Gulch Creek																			
Bear Valley Creek																			
Olema Creek									E			E		E	E	E	E	E	
Nicasio Reservoir		E	E						P					E	E	E	E	E	
Nicasio Creek		E	E						E			E		E		E	E	E	
Halleck Creek																			
Devils Gulch Creek																			
Kent Lake		E							E					E	E	E	E	E	
Big Carson Creek																			
Alpine Lake		E							E					E	E	E	E	E	
Bon Tempe Lake		E							E					E	E	E	E	E	
Lake Lagunitas		E							E					E	E	E	E	E	

E: Existing beneficial use L: Limited beneficial use P: Potential beneficial use

SAN MATEO COASTAL BASIN

	Human Consumptive Uses						Aquatic Life Uses									Wildlife Use	Recreational Uses		
COUNTY Waterbody	AGR	MUN	FRSH	GWR	IND	PROC	COMM	SHEL	COLD	EST	MAR	MIGR	RARE	SPWN	WARM	WILD	REC-1	REC-2	NAV
SAN MATEO COUNTY																			
Pacific Ocean (San Mateo, San Francisco)					E		E	E			E	E	E	E		E	E	E	E
Lake Merced		P							E					E	E	E	E	E	
San Pedro Creek		E							E			E		E	E	E		E	
San Vincente Creek	E	E							E			E	E	E		E	P	P	
Denniston Creek	E	E							E			E	E	E	E	E	E	E	
Frenchmans Creek	E								E			E	E	E	E	E	E	E	
Pilarcitos Creek	E	E							E			E	E	E	E	E	P	P	
Apanolio Creek																			
Arroyo Leon Creek																			
Mills Creek																			
Pilarcitos Lake		E							E				E	E	E	E	L	E	
Purisima Creek	E								E			E	E	E		E	E	E	
Lobitas Creek	E								E			E	E	E		E	E	E	
Tunitas Creek	E								E			E	E	E	E	E	P	P	
San Gregorio Creek	E								E			E	E	E	E	E	E	E	
Alpine Creek																			
El Corte de Madera Creek									E			P	E	P	E	E	P	E	
La Honda Creek																			
Woodruff Creek																			
Clear Creek																			
Harrington Creek																			
Bogess Creek																			
Mindego Creek																			
Pomponio Creek	E								E			E		E	E	E	P	E	
Pomponio Reservoir																			
Pescadero Creek	E	E							E			E	E	E	E	E	E	E	
Butano Creek																			
Fall Creek																			
Hoffman Creek																			

COUNTY Waterbody	AGR	MUN	FRSH	GWR	IND	PROC	COMM	SHEL	COLD	EST	MAR	MIGR	RARE	SPWN	WARM	WILD	REC-1	REC-2	NAV
Honsinger Creek																			
Jones Gulch Creek																			
McCormick Creek																			
Oil Creek																			
Lambert Creek																			
Peters Creek																			
Slate Creek																			
Tarwater Creek																			
Little Boulder Creek																			
Waterman Creek																			

E: Existing beneficial use L: Limited beneficial use P: Potential beneficial use

CENTRAL BASIN

COUNTY Waterbody	AGR	MUN	FRSH	GWR	IND	PROC	COMM	SHEL	COLD	EST	MAR	MIGR	RARE	SPWN	WARM	WILD	REC-1	REC-2	NAV
	← Human Consumptive Uses →						← Aquatic Life Uses →									Wildlife Use	Recreational Uses		
SAN FRANCISCO COUNTY																			
Golden Gate Channel																			
San Francisco Bay Central					E	E	E	E		E		E	E	E		E	E	E	E
Golden Gate Park Lakes															E	E		E	
MARIN COUNTY																			
San Rafael Creek									E						E	E		E	E
Corte Madera Creek									E			P	E	P	E	E	P	E	
Ross Creek																			
Cascade Creek																			
San Anselmo Creek																			
Sleepy Hollow Creek																			
Phoenix Lake		E							E					E	E	E	E	E	
Phoenix Creek																			
Bill Williams Creek																			
Richardson Bay					E		E	E		E		E	E	E		E	E	E	E
Arroyo Corte Madera del Presidio								E	E					E		E	P	E	
Old Mill Creek									E							E		E	
Coyote Creek (Marin)									E						E	E		E	
ALAMEDA COUNTY																			
Berkeley Aquatic Park Lagoon										E		E		P		E	E	E	
Lake Temescal									E					E	E	E	E	E	

E: Existing beneficial use L: Limited beneficial use P: Potential beneficial use

SOUTH BAY BASIN

	← Human Consumptive Uses →						← Aquatic Life Uses →									Wildlife Use	Recreational Uses		
COUNTY Waterbody	AGR	MUN	FRSH	GWR	IND	PROC	COMM	SHEL	COLD	EST	MAR	MIGR	RARE	SPWN	WARM	WILD	REC-1	REC-2	NAV
SAN FRANCISCO COUNTY																			
San Francisco Bay Lower					E		E	E		E		E	E	P		E	E	E	E
SAN MATEO COUNTY																			
San Mateo Creek			E						P				E	E		E	P	P	
Lower Crystal Springs Reservoir		E							E				E	E	E	E		E	
Upper Crystal Springs Reservoir		E							E				E	E	E	E		E	
San Andreas Lake		E							E				E	E	E	E	L	E	
Foster City Lagoon																			
Bair Island Wetlands																			
ALAMEDA COUNTY																			
Lake Merritt										E				E		E	E	E	
Lower San Leandro Creek			E									P		P	P	E	P	P	
Lake Chabot (Alameda)		E							E					E	E	E	E	E	
Upper San Leandro Reservoir		E							E					E	E	E	L	P	
San Leandro Creek			E						E			P		P	P	E	P	P	
Kaiser Creek																			
Moraga Creek																			
San Lorenzo Creek		E	E	E					E			E		E	E	E	E	E	
Don Castro Reservoir									E					E	E	E	E	E	
Cull Canyon Reservoir									E					E	E	E	E	E	
Palomares Creek									E			E		E	E	E	E	E	
Crow Creek									E			E		E	E	E	E	E	
Alameda Creek Quarry Ponds				E					E						E		E	E	
Alameda Creek	E			E					E			E		E	E	E	E	E	
San Antonio Reservoir		E							E					E	E	E	L	E	

SOUTH BAY BASIN

COUNTY Waterbody	AGR	MUN	FRSH	GWR	IND	PROC	COMM	SHEL	COLD	EST	MAR	MIGR	RARE	SPWN	WARM	WILD	REC-1	REC-2	NAV
Lacosta Creek																			
Arroyo de la Laguna				E					P			E		E	P	E	E	E	
Arroyo Valle		E		E					E			P		E		E	P	P	
Shadow Cliffs Reservoir									E					E	E	E	E	E	
Del Valle Reservoir		E							E					E	E	E	E	E	
Arroyo Mocho				E					P			E		E	P	E	E	E	
Tassajara Creek				E					P			E		E	P	E	E	E	
Arroyo las Positas				E					P			E		E	P	E	E	E	
Arroyo Seco (Alameda)				E					P			E		E	P	E	E	E	
Alamo Canal				E					P			E		E	P	E	E	E	
Alamo Creek				E					P			E		E	P	E	E	E	
SANTA CLARA COUNTY																			
Calaveras Reservoir		E							E					E	E	E	L	E	
Arroyo Hondo		E	E						E					E	E	E	E	E	
Isabel Creek		E	E						E					E	E	E	E	E	
Smith Creek		E	E						E					E	E	E	E	E	
Sulphur Creek (Santa Clara)		E	E						E					E	E	E	E	E	

E: Existing beneficial use L: Limited beneficial use P: Potential beneficial use

SANTA CLARA BASIN

	← Human Consumptive Uses →						← Aquatic Life Uses →									Wildlife Use	Recreational Uses		
COUNTY Waterbody	AGR	MUN	FRSH	GWR	IND	PROC	COMM	SHEL	COLD	EST	MAR	MIGR	RARE	SPWN	WARM	WILD	REC-1	REC-2	NAV
San Francisco Bay South					E		E	E		E		E	E	P		E	E	E	E
ALAMEDA COUNTY																			
Lake Elizabeth									E					E	E	E		E	
SAN MATEO AND SANTA CLARA COUNTIES																			
San Francisquito Creek									E			E		E	E	E	P	P	
Felt Lake	E													E	E	E	E	E	
Los Trancos Creek																			
West Union Creek																			
Searsville Lake	E								E					E	E	E	E	E	
SANTA CLARA COUNTY																			
Matedero Creek									E			E		E	E	E	E	E	
Permanente Creek									E					E		E	E	E	
Stevens Creek			E						E			E		P	E	E	E	E	
Stevens Creek Reservoir		E		E					E			E		E	E	E		E	
Calabazas Creek	E			E					E						E	E	E	E	
Saratoga Creek	E		E	E					E						E	E	E	E	
Guadalupe Reservoir									E			P		P	E	E	P	E	
Los Gatos Creek		E	E	E					E			P		P	E	E		P	
Vasona Lake				E					E					E	E	E	E	E	
Lexington Reservoir		E							E					E	E	E	E	E	
Lake Elsman		E							E							E		P	
Campbell Percolation Pond				E					E					E	E	E	E	E	
Guadalupe Creek																			
Guadalupe Reservoir		E		E					E					E	E	E	E	E	
Alamitos Creek																			
Calero Reservoir		E		E										E	E	E	E	E	
Almaden Reservoir		E		E					E					E	E	E	E	E	
Herbert Creek																			

SANTA CLARA BASIN

COUNTY Waterbody	AGR	MUN	FRSH	GWR	IND	PROC	COMM	SHEL	COLD	EST	MAR	MIGR	RARE	SPWN	WARM	WILD	REC-1	REC-2	NAV
Barrett Canyon Creek																			
Coyote Creek				E					E			E	E	E	E	E	P	E	
Lower Penitencia Creek																			
Berryessa Creek																			
Upper Penitencia Creek																			
Cherry Flat Reservoir	E	E												E	E	E	L	E	
Arroyo Aguague Creek																			
Halls Valley Reservoir														E	E	E	E	E	
Silver Creek																			
Fremont Lagoon																			
Sandy Wool Lake									E					E	E	E		E	
Cotton Wood Lake									E					E	E	E	E	E	
Anderson Lake		E		E					E					E	E	E	L	E	
San Felipe Creek									P					P	E	E	P	P	
Otis Canyon Creek																			
Coyote Lake	E	E							E					E	E	E	E	E	
Soda Springs Canyon Creek																			

E: Existing beneficial use L: Limited beneficial use P: Potential beneficial use

SAN PABLO BASIN

	← Human Consumptive Uses →						← Aquatic Life Uses →									Wildlife Use	Recreational Uses		
COUNTY Waterbody	AGR	MUN	FRSH	GWR	IND	PROC	COMM	SHEL	COLD	EST	MAR	MIGR	RARE	SPWN	WARM	WILD	REC-1	REC-2	NAV
San Pablo Bay					E		E	E		E		E	E	E		E	E	E	E
SOLANO COUNTY																			
White Slough																			
Lake Chabot (Solano)	E	E							E					E	E	E	E	E	
Dalwick Lake																			
CONTRA COSTA COUNTY																			
Rodeo Creek														E	E	E	P	E	
Refugio Creek																			
Pinole Creek									E			E		E	E	E	P	P	
San Pablo Creek												E		E	E	E		E	
San Pablo Reservoir		E							E					E	E	E	E	E	
Briones Reservoir		E							E					E	E	E	L	P	
Wildcat Creek												E		E	E	E		E	
Jewel Lake									E						E	E	E	E	
Lake Anza									E						E	E	E	E	
MARIN COUNTY																			
Novato Creek		E							P			P	E	P	P	E	P	P	
Stafford Lake		E							E					E	E	E	E	E	
Pacheco Pond							E		E			P		P	E	E	P	P	
Miller Creek									E			E	E	E	E	E	E	E	
Gallinas Creek									E				E		E	E		E	
SONOMA COUNTY																			
Petaluma River									E	E		E	E	E	E	E	E	E	E
San Antonio Creek									E			P		P	E	E	P	P	
Willow Creek																			
Adobe Creek (Sonoma)																			
Sonoma Creek									E			E	E	E	E	E	E	E	
Fowler Creek																			
Schnell Creek																			
Arroyo Seco Creek (Sonoma)																			

SAN PABLO BASIN

COUNTY Waterbody	AGR	MUN	FRSH	GWR	IND	PROC	COMM	SHEL	COLD	EST	MAR	MIGR	RARE	SPWN	WARM	WILD	REC-1	REC-2	NAV
Nathanson Creek																			
Agua Caliente Creek (Sonoma)																			
Stuart Creek																			
Graham Creek																			
Yulupa Creek																			
NAPA COUNTY																			
Napa River	E	E							E			E	E	E	E	E	E	E	E
Huichica Creek																			
Carneros Creek																			
Suscol Creek																			
Tulucay Creek																			
Lake Marie	E	E							P					E	P	E	E	E	
Napa Creek																			
Browns Valley Creek																			
Redwood Creek (Napa)																			
Pickle Creek																			
Milliken Creek																			
Sarco Creek																			
Milliken Reservoir		E							E					E	E	E	L	P	
Soda Creek																			
Dry Creek (Napa)	E	E							E			E		E	E	E	E	E	
Conn Creek		E	E						E			E		E		E	E	E	
Rector Creek																			
Rector Reservoir		E							E					E	E	E	L	E	
Lake Hennessey		E							E					E	E	E	E	E	
Sage Creek		E	E						E					E	E	E	P	P	
Chiles Creek		E	E						E					E	E	E	P	P	
Bear Canyon Creek																			
Sulphur Creek (Napa)																			
York Creek									E			E		E		E	P	P	
Mill Creek (Napa)																			
Ritchey Creek																			
Bell Canyon Reservoir																			
Cyrus Creek																			

COUNTY Waterbody	AGR	MUN	FRSH	GWR	IND	PROC	COMM	SHEL	COLD	EST	MAR	MIGR	RARE	SPWN	WARM	WILD	REC-1	REC-2	NAV
Garnett Creek																			
Hopper Creek																			
Jericho Canyon Creek																			
Kimball Reservoir		E													E	E	E	E	

E: Existing beneficial use L: Limited beneficial use P: Potential beneficial use

SUISUN BASIN

	← Human Consumptive Uses →						← Aquatic Life Uses →									Wildlife Use	Recreational Uses		
COUNTY Waterbody	AGR	MUN	FRSH	GWR	IND	PROC	COMM	SHEL	COLD	EST	MAR	MIGR	RARE	SPWN	WARM	WILD	REC-1	REC-2	NAV
Carquinez Strait					E		E			E		E	E	E		E	E	E	E
Suisun Bay					E	E	E			E		E	E	E		E	E	E	E
Sacramento-San Joaquin Delta	E	E		E	E	E	E			E		E	E	E		E	E	E	E
SOLANO COUNTY																			
Lake Herman		E			E				E					E	E	E	E	E	
Green Valley Creek			E						E					E	E	E	E	E	
Lake Frey		E							E					E	E	E		E	
Lake Madigan	E	E							E					E	E	E		E	
Suisun Slough														E	E	E	E	E	E
Suisun Creek			E						E			E		E	E	E	P	P	
Suisun Reservoir																			
Wooden Valley Creek																			
Lake Curry		E												E	E	E	E	E	
Ledgewood Creek			E						E			E		E	E	E	E	E	
Laurel Creek (Solano)			E						E			E		E	E	E	E	E	
Montezuma Slough													E	E	E	E	E	E	E
CONTRA COSTA COUNTY																			
Peyton Slough																			
Pacheco Creek																			
Walnut Creek									E			E		E	E	E	P	P	
Pine Creek									E					E	E	E	E	E	
Lafayette Creek																			
Lafayette Reservoir		E							E					E	E	E	E	E	
Mt. Diablo Creek									E			E		E	E	E	E	E	
Mallard Reservoir	E	E			E	E								E	E	E	L	P	

E: Existing beneficial use L: Limited beneficial use P: Potential beneficial use

Table 2-2: Existing and Potential Beneficial Uses in Groundwater in Identified Basins

County	Groundwater Basin Name[1]	Groundwater Sub-Basin[1]	Basin Number[1]	MUN[2]	PROC[3]	IND[4]	AGR[5]	FRESH[6]
Alameda	Castro Valley	--	2-8	P	P	P	P	--
Alameda	Santa Clara Valley	Niles Cone	2-9.01	E	E	E	E	--
Alameda and Contra Costa	Santa Clara Valley	East Bay Plain	2-9.04	E	E	E	E	--
Alameda and Contra Costa	Livermore Valley	--	2-10	E	E	E	E	--
Alameda	Sunol Valley	--	2-11	E	E	E	E	--
Contra Costa	Pittsburg Plain	--	2-4	P	P	P	P	--
Contra Costa	Clayton Valley	--	2-5	E	P	P	P	--
Contra Costa	Ygnacio Valley	--	2-6	P	P	P	P	--
Contra Costa	San Ramon Valley	--	2-7	E	P	P	E	--
Contra Costa	Arroyo del Hambre Valley	--	2-31	P	P	P	P	--
Marin	Sand Point Area	--	2-27	E	P	P	P	--
Marin	Ross Valley	--	2-28	E	P	P	E	--
Marin	San Rafael Valley	--	2-29	P	P	P	P	--
Marin	Novato Valley	--	2-30	P	P	P	P	--
Napa	Napa-Sonoma Valley	Napa Valley	2-2.01	E	E	E	E	--
Napa and Solano	Napa-Sonoma Valley	Napa-Sonoma Lowlands	2-2.03	E	E	E	E	--
San Francisco and San Mateo	Visitacion Valley	--	2-32	P	E	E	P	--
San Francisco and San Mateo	Islais Valley A[7]	--	2-33A	P	E	E	P	--
San Francisco	Islais Valley B[7]	--	2-33B	P	P	P	E	--
San Francisco	South San Francisco	--	2-37	P	E	E	P	--
San Francisco and San Mateo	Westside A[7]	--	2-35A	E	P	P	E	--
San Francisco	Lobos	--	2-38	E	P	P	E	--
San Francisco	Marina	--	2-39	E	P	P	E	--
San Francisco	Downtown	--	2-40	E	P	P	E	--
San Francisco	Westside B[7]	--	2-35B	P	P	P	E	--
San Mateo	Westside C[7]	--	2-35C	E	P	P	E	--

County	Groundwater Basin Name[1]	Groundwater Sub-Basin[1]	Basin Number[1]	MUN[2]	PROC[3]	IND[4]	AGR[5]	FRESH[6]
San Mateo	Westside D[7]	--	2-35D	E	E	E	P	--
San Mateo	Santa Clara Valley	San Mateo Plain	2-9.03	E	E	E	P	--
San Mateo and Santa Clara	Santa Clara Valley[8]	Santa Clara	2-9.02	E	E	E	E	--
San Mateo	Half Moon Bay Terrace	--	2-22	E	P	P	E	--
San Mateo	San Gregorio Valley	--	2-24	E	P	P	E	--
San Mateo	Pescadero Valley	--	2-26	E	P	P	E	--
San Mateo	San Pedro Valley	--	2-36	P	P	P	P	--
Solano	Suisun-Fairfield Valley	--	2-3	E	E	E	E	--
Sonoma and Marin	Petaluma Valley	--	2-1	E	P	P	E	--
Sonoma	Napa-Sonoma Valley	Sonoma Valley	2-2.02	E	P	P	E	--
Sonoma and Marin	Wilson Grove Formation Highlands	--	1.59	E	P	P	E	--
Sonoma and Marin	Wilson Grove Formation Highlands	--	1.59	See RB1 Basin Plan[9]				
Sonoma	Kenwood Valley	--	2-19	E	P	P	E	--
Sonoma	Napa – Sonoma Volcanic Highlands	--	2-23	X	X	X	X	X
Santa Clara	Gilroy – Hollister Valley	Llagas Area	3-3.01	See RB3 Basin Plan[10]				

Notes:

1. Department of Water Resources (DWR) Bulletin 118 “California Groundwater”, 2003.
2. MUN = Municipal and domestic water supply.
3. PROC = Industrial process water supply.
4. IND = Industrial service water supply.
5. AGR = Agricultural water supply.
6. FRESH = Freshwater replenishment to surface water; designation will be determined at a later date; for the interim, a site-by-site determination will be made.
7. The existing and potential beneficial uses for groundwater basins listed in the 1995 Basin Plan (Table 2-3) were assigned to the new groundwater basins based on the geographic location of the old basins compared to the new basins. The basin names, such as Westside A,

Westside B, etc., are informal names assigned by the Water Board to preserve the beneficial use designations in the 1995 Basin Plan and do not represent sub-basins identified by the Department of Water Resources.

8. The Santa Clara Valley groundwater basin/Santa Clara groundwater sub-basin is also known as Coyote Valley.
9. This groundwater basin is also located in the North Coast Region (RB1); beneficial uses of groundwater are specified in the Basin Plan for RB1.
10. This groundwater basin is also located in the Central Coast Region (RB3); beneficial uses of groundwater are specified in the Basin Plan for RB3.

E = Existing beneficial uses; based on best available information.
P = Potential beneficial uses; based on best available information.
X = This groundwater basin was not listed in the 1995 Basin Plan; designation will be determined at a later date; for the interim, a site-by-site determination will be made.
See DWR Bulletin 118 (2003) for groundwater basin characteristics.

Table 2-3: Examples of Existing and Potential Beneficial Uses of Selected Wetlands

	TYPE OF WETLAND				
BENEFICIAL USE	**MARINE**	**ESTUARINE**	**RIVERINE**	**LACUSTRINE**	**PALUSTRINE**
AGR		○	○	○	○
COLD			○	○	○
COMM	○	○			
EST		○			
FRESH			○	○	○
GWR	○	○	○	○	○
IND		○	●	●	
MAR	○				
MIGR	○	○	○	○	
NAV	○	○	○	○	○
PROC					
REC-1	○	○	○	○	○
REC-2	○	○	○	○	○
SHELL	○	○	○		
SPWN	○	○	○	○	○
WARM			○	○	○
WILD	○	○	○	○	○
RARE	○	○	○	○	○

NOTE:
○ Existing beneficial use
● Potential beneficial use

Table 2-4 Examples of Beneficial Uses of Wetland Areas[a]

Basin/Marsh Area	*Wetland Types*		*Beneficial Uses*									
	Fresh	Brackish	EST	MAR	MIGR	COMM	RARE	REC1	REC2	SALT	SPWN	WILD
ALAMEDA COUNTY												
Arrowhead			●				●	●	●	●	●	●
Coyote Hills			●				●	●	●	●	●	●
Emeryville Crescent			●				●	●	●	●	●	●
Hayward			●					●	●	●	●	●
CONTRA COSTA COUNTY												
North Contra Costa		●	●				●	●	●	●	●	●
Point Edith		●	●				●		●		●	●
San Pablo Creek			●				●	●	●	●	●	●
Wildcat Creek			●				●	●	●		●	●
MARIN COUNTY												
Abbotts Lagoon				●				●	●	●		●
Bolinas Lagoon				●				●	●	●		●
Corte Madera			●				●	●	●	●	●	●
Drakes Estero								●	●	●	●	●
Gallinas Creek		●	●				●	●	●	●	●	●
Limantour Estero				●				●	●	●		●
Corte Madera Ecological Reserve			●					●	●	●		●
Novato Creek		●	●		●		●	●	●	●	●	
Richardson Bay			●				●	●	●	●	●	●
Rodeo Lagoon				●				●	●	●		●
San Pedro		●	●			●	●		●	●	●	●
San Rafael Creek		●	●				●	●	●	●		●
Tomales Bay				●	●			●	●	●	●	●
NAPA COUNTY												
Mare Island			●						●	●		●
Napa		●	●		●	●	●	●	●		●	
San Pablo Bay			●		●	●	●	●	●	●	●	●
SAN MATEO COUNTY												
Bair Island			●				●	●	●	●		●
Belmont Slough			●				●	●	●	●	●	●
Pescadero	●			●	●		●	●	●	●	●	●
Princeton		●						●	●	●		●
Redwood City Area			●				●	●	●			●
SANTA CLARA COUNTY												
South San Francisco Bay			●		●	●	●	●	●	●	●	●
SOLANO COUNTY												
Southhampton Bay			●				●	●	●	●	●	●
Suisun	●	●	●		●		●	●	●		●	●
White Slough			●		●		●	●	●	●	●	●
SONOMA COUNTY												
Petaluma		●	●		●	●	●	●	●		●	●

NOTE:
a. General locations of wetlands areas are depicted in Figure 2-11.

CHAPTER 3: WATER QUALITY OBJECTIVES

The overall goals of water quality regulation are to protect and maintain thriving aquatic ecosystems and the resources those systems provide to society and to accomplish these in an economically and socially sound manner. California's regulatory framework uses water quality objectives both to define appropriate levels of environmental quality and to control activities that can adversely affect aquatic systems.

3.1 WATER QUALITY OBJECTIVES

There are two types of objectives: narrative and numerical. Narrative objectives present general descriptions of water quality that must be attained through pollutant control measures and watershed management. They also serve as the basis for the development of detailed numerical objectives.

Historically, numerical objectives were developed primarily to limit the adverse effect of pollutants in the water column. Two decades of regulatory experience and extensive research in environmental science have demonstrated that beneficial uses are not fully protected unless pollutant levels in all parts of the aquatic system are also monitored and controlled. The Regional Board is actively working towards an integrated set of objectives, including numerical sediment objectives, that will ensure the protection of all current and potential beneficial uses.

Numerical objectives typically describe pollutant concentrations, physical/chemical conditions of the water itself, and the toxicity of the water to aquatic organisms. These objectives are designed to represent the maximum amount of pollutants that can remain in the water column without causing any adverse effect on organisms using the aquatic system as habitat, on people consuming those organisms or water, and on other current or potential beneficial uses (as described in Chapter 2).

The technical bases of the region's water quality objectives include extensive biological, chemical, and physical partitioning information reported in the scientific literature, national water quality criteria, studies conducted by other agencies, and information gained from local environmental and discharge monitoring (as described in Chapter 6). The Regional Board recognizes that limited information exists in some cases, making it difficult to establish definitive numerical objectives, but the Regional Board believes its conservative approach to setting objectives has been proper. In addition to the technical review, the overall feasibility of reaching objectives in terms of technological, institutional, economic, and administrative factors is considered at many different stages of objective derivation and implementation of the water quality control plan.

Together, the narrative and numerical objectives define the level of water quality that shall be maintained within the region. In instances where water quality is better than that prescribed by the objectives, the state Antidegradation Policy applies (State Board Resolution 68-16: Statement of Policy With Respect to Maintaining High Quality of Waters in California). This policy is aimed at protecting relatively uncontaminated aquatic systems where they exist and preventing further degradation. The state’s Antidegradation Policy is consistent with the federal Antidegradation Policy, as interpreted by the State Water Resources Control Board in State Board Order No. 86-17.

When uncontrollable water quality factors result in the degradation of water quality beyond the levels or limits established herein as water quality objectives, the Regional Board will conduct a case-by-case analysis of the benefits and costs of preventing further degradation. In cases where this analysis indicates that beneficial uses will be adversely impacted by allowing further degradation, then the Regional Board will not allow controllable water quality factors to cause any further degradation of water quality. Controllable water quality factors are those actions, conditions, or circumstances resulting from human activities that may influence the quality of the waters of the state and that may be reasonably controlled.

The Regional Board establishes and enforces waste discharge requirements for point and nonpoint source of pollutants at levels necessary to meet numerical and narrative water quality objectives. In setting waste discharge requirements, the Regional Board will consider, among other things, the potential impact on beneficial uses within the area of influence of the discharge, the existing quality of receiving waters, and the appropriate water quality objectives.

In general, the objectives are intended to govern the concentration of pollutant constituents in the main water mass. The same objectives cannot be applied at or immediately adjacent to submerged effluent discharge structures. Zones of initial dilution within which higher concentrations can be tolerated will be allowed for such discharges.

For a submerged buoyant discharge, characteristic of most municipal and industrial wastes that are released from submerged outfalls, the momentum of the discharge and its initial buoyancy act together to produce turbulent mixing. Initial dilution in this case is completed when the diluting wastewater ceases to rise in the water column and first begins to spread horizontally.

For shallow water submerged discharges, surface discharges, and nonbuoyant discharges, characteristic of cooling water wastes and some individual discharges, turbulent mixing results primarily from the momentum of discharge. Initial dilution, in these cases, is considered to be completed when the momentum-induced velocity of the discharge ceases to produce significant mixing of the waste, or the diluting plume reaches a fixed distance from the discharge to be specified by the Regional Board, whichever results in the lower estimate for initial dilution.

Compliance with water quality objectives may be prohibitively expensive or technically impossible in some cases. The Regional Board will consider modification of specific water quality objectives as long as the discharger can demonstrate that the alternate objective will protect existing beneficial uses, is scientifically defensible, and is consistent with the state Antidegradation Policy. This exception clause properly indicates that the Regional Board will conservatively compare benefits and costs in these cases because of the difficulty in quantifying beneficial uses.

These water quality objectives are considered necessary to protect the present and potential beneficial uses described in Chapter 2 of this Plan and to protect existing high quality waters of the state. These objectives will be achieved primarily through establishing and enforcing waste discharge requirements and by implementing this water quality control plan.

3.2 OBJECTIVES FOR OCEAN WATERS

The provisions of the State Board's "Water Quality Control Plan for Ocean Waters of California" (Ocean Plan) and "Water Quality Control Plan for Control of Temperature in the Coastal and Interstate Waters and Enclosed Bays and Estuaries of California" (Thermal Plan) and any revision to them will apply to ocean waters. These plans describe objectives and effluent limitations for ocean waters.

3.3 OBJECTIVES FOR SURFACE WATERS

The following objectives apply to all surface waters within the region, except the Pacific Ocean.

3.3.1 BACTERIA

Table 3-1 provides a summary of the bacterial water quality objectives and identifies the sources of those objectives. Table 3-2 summarizes U.S. EPA's water quality criteria for water contact recreation based on the frequency of use a particular area receives. These criteria will be used to differentiate between pollution sources or to supplement objectives for water contact recreation.

3.3.2 BIOACCUMULATION

Many pollutants can accumulate on particles, in sediment, or bioaccumulate in fish and other aquatic organisms. Controllable 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.

3.3.3 BIOSTIMULATORY SUBSTANCES

Waters shall not contain biostimulatory substances in concentrations that promote aquatic growths to the extent that such growths cause nuisance or adversely affect beneficial uses. Changes in chlorophyll a and associated phytoplankton communities follow complex dynamics that are sometimes associated with a discharge of biostimulatory substances. Irregular and extreme levels of chlorophyll a or phytoplankton blooms may indicate exceedance of this objective and require investigation.

3.3.4 COLOR

Waters shall be free of coloration that causes nuisance or adversely affects beneficial uses.

3.3.5 DISSOLVED OXYGEN

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

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 percent of the dissolved oxygen content at saturation.

Dissolved oxygen is a general index of the state of the health of receiving waters. Although minimum concentrations of 5 mg/l and 7 mg/l are frequently used as objectives to protect fish life, higher concentrations are generally desirable to protect sensitive aquatic forms. In areas unaffected by waste discharges, a level of about 85 percent of oxygen saturation exists. A three-month median objective of 80 percent of oxygen saturation allows for some degradation from this level, but still requires a consistently high oxygen content in the receiving water.

3.3.6 FLOATING MATERIAL

Waters shall not contain floating material, including solids, liquids, foams, and scum, in concentrations that cause nuisance or adversely affect beneficial uses.

3.3.7 OIL AND GREASE

Waters shall not contain oils, greases, waxes, or other materials in concentrations that result in a visible film or coating on the surface of the water or on objects in the water, that cause nuisance, or that otherwise adversely affect beneficial uses.

3.3.8 POPULATION AND COMMUNITY ECOLOGY

All waters shall be maintained free of toxic substances in concentrations that are lethal to or that produce significant alterations in population or community ecology or receiving water biota. In addition, the health and life history characteristics of aquatic organisms in waters affected by controllable water quality factors shall not differ significantly from those for the same waters in areas unaffected by controllable water quality factors.

3.3.9 pH

The pH shall not be depressed below 6.5 nor raised above 8.5. This encompasses the pH range usually found in waters within the basin. Controllable water quality factors shall not cause changes greater than 0.5 units in normal ambient pH levels.

3.3.10 RADIOACTIVITY

Radionuclides shall not be present in concentrations that result in the accumulation of radionuclides in the food web to an extent that presents a hazard to human, plant, animal, or aquatic life. Waters designated for use as domestic or municipal supply shall not contain concentrations of radionuclides in excess of the limits specified in Table 4 of Section 64443 (Radioactivity) of Title 22 of the California Code of Regulations (CCR), which is incorporated by reference into this Plan. This incorporation is prospective, including future changes to the incorporated provisions as the changes take effect (see Table 3-5).

3.3.11 SALINITY

Controllable water quality factors shall not increase the total dissolved solids or salinity of waters of the state so as to adversely affect beneficial uses, particularly fish migration and estuarine habitat.

3.3.12 SEDIMENT

The suspended sediment load and suspended sediment discharge rate of surface waters shall not be altered in such a manner as to cause nuisance or adversely affect beneficial uses.

Controllable water quality factors shall not cause a detrimental increase in the concentrations of toxic pollutants in sediments or aquatic life.

3.3.13 SETTLEABLE MATERIAL

Waters shall not contain substances in concentrations that result in the deposition of material that cause nuisance or adversely affect beneficial uses.

3.3.14 SUSPENDED MATERIAL

Waters shall not contain suspended material in concentrations that cause nuisance or adversely affect beneficial uses.

3.3.15 SULFIDE

All water shall be free from dissolved sulfide concentrations above natural background levels. Sulfide occurs in Bay muds as a result of bacterial action on organic matter in an anaerobic environment.

Concentrations of only a few hundredths of a milligram per liter can cause a noticeable odor or be toxic to aquatic life. Violation of the sulfide objective will reflect violation of dissolved oxygen objectives as sulfides cannot exist to a significant degree in an oxygenated environment.

3.3.16 TASTES AND ODORS

Waters shall not contain taste- or odor-producing substances in concentrations that impart undesirable tastes or odors to fish flesh or other edible products of aquatic origin, that cause nuisance, or that adversely affect beneficial uses.

3.3.17 TEMPERATURE

Temperature objectives for enclosed bays and estuaries are as specified in the "Water Quality Control Plan for Control of Temperature in the Coastal and Interstate Waters and Enclosed Bays of California," including any revisions to the plan.

In addition, the following temperature objectives apply to surface waters:

- The natural receiving water temperature of inland surface waters shall not be altered unless it can be demonstrated to the satisfaction of the Regional Board that such alteration in temperature does not adversely affect beneficial uses.
- The temperature of any cold or warm freshwater habitat shall not be increased by more than 5°F (2.8°C) above natural receiving water temperature

3.3.18 TOXICITY

All waters shall be maintained free of toxic substances in concentrations that are lethal to or that produce other detrimental responses in aquatic organisms. Detrimental responses include, but are not limited to, decreased growth rate and decreased reproductive success of resident or indicator species. There shall be no acute toxicity in ambient waters. Acute toxicity is defined as a median of less than 90 percent survival, or less than 70 percent survival, 10 percent of the time, of test organisms in a 96-hour static or continuous flow test.

There shall be no chronic toxicity in ambient waters. Chronic toxicity is a detrimental biological effect on growth rate, reproduction, fertilization success, larval development, population abundance, community composition, or any other relevant measure of the health of an organism, population, or community.

Attainment of this objective will be determined by analyses of indicator organisms, species diversity, population density, growth anomalies, or toxicity tests (including those described in Chapter 4), or other methods selected by the Water Board. The Water Board will also consider other relevant information and numeric criteria and guidelines for toxic substances developed by other agencies as appropriate.

The health and life history characteristics of aquatic organisms in waters affected by controllable water quality factors shall not differ significantly from those for the same waters in areas unaffected by controllable water quality factors.

3.3.19 TURBIDITY

Waters shall be free of changes in turbidity that cause nuisance or adversely affect beneficial uses. Increases from normal background light penetration or turbidity relatable to waste discharge shall not be greater than 10 percent in areas where natural turbidity is greater than 50 NTU.

3.3.20 UN-IONIZED AMMONIA

The discharge of wastes shall not cause receiving waters to contain concentrations of un-ionized ammonia in excess of the following limits (in mg/l as N):

Annual Median	0.025
Maximum, Central Bay (as depicted in Figure 2-5) and upstream	0.16
Maximum, Lower Bay (as depicted in Figures 2-6 and 2-7):	0.4

The intent of this objective is to protect against the chronic toxic effects of ammonia in the receiving waters. An ammonia objective is needed for the following reasons:

- Ammonia (specifically un-ionized ammonia) is a demonstrated toxicant. Ammonia is generally accepted as one of the principle toxicants in municipal waste discharges. Some industries also discharge significant quantities of ammonia.
- Exceptions to the effluent toxicity limitations in Chapter 4 of the Plan allow for the discharge of ammonia in toxic amounts. In most instances, ammonia will be diluted or degraded to a nontoxic state fairly rapidly. However, this does not occur in all cases, the South Bay being a notable example. The ammonia limit is recommended in order to preclude any build up of ammonia in the receiving water.
- A more stringent maximum objective is desirable for the northern reach of the Bay for the protection of the migratory corridor running through Central Bay, San Pablo Bay, and upstream reaches.

3.3.21 OBJECTIVES FOR SPECIFIC CHEMICAL CONSTITUENTS

Surface waters shall not contain concentrations of chemical constituents in amounts that adversely affect any designated beneficial use. Water quality objectives for selected toxic pollutants for surface waters are given in Tables 3-3 and 3-4.

The Regional Board intends to work towards the derivation of site-specific objectives for the Bay-Delta estuarine system. Site-specific objectives to be considered by the Regional Board shall be developed in accordance with the provisions of the federal Clean Water Act, the State Water Code, State Board water quality control plans, and this Plan. These site-specific objectives will take into consideration factors such as all available scientific information and monitoring data and the latest U.S. EPA guidance, and local environmental conditions and impacts caused by bioaccumulation. Pending the adoption of site-specific objectives, the objectives in Tables 3-3 and 3-4 apply throughout the region. Site-specific objectives for copper and nickel, adopted for South San Francisco Bay south of the Dumbarton Bridge, are listed in Table 3-3A.

South San Francisco Bay south of the Dumbarton Bridge is a unique, water-quality-limited, hydrodynamic and biological environment that merits continued special attention by the Regional Board. Controlling urban and upland runoff sources is critical to the success of maintaining water quality in this portion of the Bay. Site-specific water quality objectives have been adopted for dissolved copper and nickel in this Bay segment. Site-specific objectives may be appropriate for other pollutants of concern, but this determination will be made on a case-by-case basis, and after it has been demonstrated that all other reasonable treatment, source control and pollution prevention measures have been exhausted. The Regional Board will determine whether revised water quality objectives and/or effluent limitations are appropriate based on sound technical information and scientific studies, stakeholder input, and the need for flexibility to address priority problems in the watershed.

3.3.22 CONSTITUENTS OF CONCERN FOR MUNICIPAL AND AGRICULTURAL WATER SUPPLIES

At a minimum, surface waters designated for use as domestic or municipal supply (MUN) shall not contain concentrations of constituents in excess of the maximum (MCLs) or secondary maximum contaminant levels (SMCLs) specified in the following provisions of Title 22, which are incorporated by reference into this plan: Table 64431-A (Inorganic Chemicals) of Section 64431, and Table 64433.2-A (Fluoride) of Section 64433.2, Table 64444-A (Organic Chemicals) of Section 64444, and Table 64449-A (SMCLs-Consumer Acceptance Limits) and 64449-B (SMCLs-Ranges) of Section 64449. This incorporation-by-reference is prospective, including future changes to the incorporated provisions as the changes take effect. Table 3-5 contains water quality objectives for municipal supply, including the MCLs contained in various sections of Title 22 as of the adoption of this plan.

At a minimum, surface waters designated for use as agricultural supply (AGR) shall not contain concentrations of constituents in excess of the levels specified in Table 3-6.

3.4 OBJECTIVES FOR GROUNDWATER

Groundwater objectives consist primarily of narrative objectives combined with a limited number of numerical objectives. Additionally, the Water Board will establish basin- and/or site-specific numerical groundwater objectives as necessary. For example, the Water Board has groundwater basin-specific objectives for the Alameda Creek watershed above Niles to include the Livermore-Amador Valley as shown in Table 3-7.

The maintenance of existing high quality of groundwater (i.e., "background") is the primary groundwater objective.

In addition, at a minimum, groundwater shall not contain concentrations of bacteria, chemical constituents, radioactivity, or substances producing taste and odor in excess of the objectives described below unless naturally occurring background concentrations are greater. Under existing law, the Water Board regulates waste discharges to land that could affect water quality, including both groundwater and surface water quality. Waste discharges that reach groundwater are regulated to protect both groundwater and any surface water in continuity with groundwater. Waste discharges that affect groundwater that is in continuity with surface water cannot cause violations of any applicable surface water standards.

3.4.1 BACTERIA

In groundwater with a beneficial use of municipal and domestic supply, the median of the most probable number of coliform organisms over any seven-day period shall be less than 1.1 most probable number per 100 milliliters (MPN/100 mL) (based on multiple tube fermentation technique; equivalent test results based on other analytical techniques as specified in the National Primary Drinking Water Regulation, 40 CFR, Part 141.21 (f), revised June 10, 1992, are acceptable).

3.4.2 ORGANIC AND INORGANIC CHEMICAL CONSTITUENTS

All groundwater shall be maintained free of organic and inorganic chemical constituents in concentrations that adversely affect beneficial uses. To evaluate compliance with water quality objectives, the Water Board will consider all relevant and scientifically valid evidence, including relevant and scientifically valid numerical criteria and guidelines developed and/or published by other agencies and organizations (e.g., U.S. Environmental Protection Agency (U.S. EPA), the State Water Board, California Department of Health Services (DHS), U.S. Food and Drug Administration, National Academy of Sciences, California Environmental Protection Agency's (Cal/EPA) Office of Environmental Health Hazard Assessment (OEHHA), U.S. Agency for Toxic Substances and Disease Registry, Cal/EPA Department of Toxic Substances Control (DTSC), and other appropriate organizations.)

At a minimum, groundwater designated for use as domestic or municipal supply (MUN) shall not contain concentrations of constituents in excess of the maximum (MCLs) or secondary maximum contaminant levels (SMCLs) specified in the following provisions of Title 22, which are incorporated by reference into this plan: Tables 64431-A (Inorganic Chemicals) of Section 64431, Table 64433.2-A (Fluoride) of Section 64433.2, and Table 64444-A (Organic Chemicals) of Section 64444. This incorporation-by-reference is prospective, including future changes to the incorporated provisions as the changes take effect. (See Table 3-5.)

Groundwater with a beneficial use of agricultural supply shall not contain concentrations of chemical constituents in amounts that adversely affect such beneficial use. In determining compliance with this objective, the Water Board will consider as evidence relevant and scientifically valid water quality goals from sources such as the Food and Agricultural Organizations of the United Nations; University of California Cooperative Extension, Committee of Experts; and McKee and Wolf's "Water Quality Criteria," as well as other relevant and scientifically valid evidence. At a minimum, groundwater designated for use as agricultural supply (AGR) shall not contain concentrations of constituents in excess of the levels specified in Table 3-6.

Groundwater with a beneficial use of freshwater replenishment shall not contain concentrations of chemicals in amounts that will adversely affect the beneficial use of the receiving surface water.

Groundwater with a beneficial use of industrial service supply or industrial process supply shall not contain pollutant levels that impair current or potential industrial uses.

3.4.3 RADIOACTIVITY

At a minimum, groundwater designated for use as domestic or municipal supply (MUN) shall not contain concentrations of radionuclides in excess of the MCLs specified in Table 4 (Radioactivity) of Section 64443 of Title 22, which is incorporated by reference into this plan. This incorporation-by-reference is prospective, including future changes to the incorporated provisions as the changes take effect. (See Table 3-5.)

3.4.4 TASTE AND ODOR

Groundwater designated for use as domestic or municipal supply (MUN) shall not contain taste- or odor-producing substances in concentrations that cause a nuisance or adversely affect beneficial uses. At a minimum, groundwater designated for use as domestic or municipal supply shall not contain concentrations in excess of the SMCLs specified in Tables 64449-A (Secondary MCLs-Consumer Acceptance Limits) and 64449-B (Secondary MCLs-Ranges) of Section 64449 of Title 22, which is incorporated by reference into this plan. This incorporation-by-reference is prospective, including future changes to the incorporated provisions as the changes take effect. (See Table 3-5.)

3.5 OBJECTIVES FOR THE DELTA

The objectives contained in the State Water Board's 1995 "Water Quality Control Plan for the San Francisco Bay/Sacramento-San Joaquin Delta Estuary" and any revisions thereto shall apply to the waters of the Sacramento-San Joaquin Delta and adjacent waters as specified in that plan.

3.6 OBJECTIVES FOR ALAMEDA CREEK WATERSHED

The water quality objectives contained in Table 3-7 apply to the surface and groundwaters of the Alameda Creek watershed above Niles.

Wastewater discharges that cause the surface water limits in Table 3-7 to be exceeded may be allowed if they are part of an overall waterwastewater resource operational program developed by those agencies affected and approved by the Water Board.

TABLES

Table 3-1: Water Quality Objectives for Coliform Bacteria

Table 3-2: U.S. EPA Bacteriological Criteria for Water Contact Recreation

Table 3-3: Marine Water Quality Objectives for Toxic Pollutants for Surface Waters

Table 3-3A: Water Quality Objectives for Copper and Nickel in Lower South San Francisco Bay

Table 3-4: Freshwater Water Quality Objectives for Toxic Pollutants for Surface Waters

Table 3-5: Water Quality Objectives for Municipal Supply

Table 3-6: Water Quality Objectives for Agricultural Supply

Table 3-7: Water Quality Objectives for the Alameda Creek Watershed above Niles

Table 3-1: Water Quality Objectives for Coliform Bacteria[a]

Beneficial Use	Fecal Coliform (MPN/100ml)	Total Coliform (MPN/100ml
Water Contact Recreation	geometric mean < 200 90th percentile < 400	median < 240 no sample > 10,000
Shellfish Harvesting[b]	median < 14 90th percentile < 43	median < 70 90th percentile < 230[c]
Non-contact Water Recreation[d]	mean < 2000 90th percentile < 4000	
Municipal Supply:		
- Surface Water[e]	geometric mean < 20	geometric mean < 100
- Groundwater		< 1.1[f]

NOTES:

a. Based on a minimum of five consecutive samples equally spaced over a 30-day period.

b. Source: National Shellfish Sanitation Program.

c. Based on a five-tube decimal dilution test or 300 MPN/100 ml when a three-tube decimal dilution test is used.

d. Source: Report of the Committee on Water Quality Criteria, National Technical Advisory Committee, 1968.

e. Source: DOHS recommendation.

f. Based on multiple tube fermentation technique; equivalent test results based on other analytical techniques, as specified in the National Primary Drinking Water Regulation, 40 CFR, Part 141.21(f), revised June 10, 1992, are acceptable.

Table 3-2: U.S. EPA Bacteriological Criteria for Water Contact Recreation[1,2]
(in colonies per 100 ML)

	Fresh Water		Salt Water
	Enterococci	**E. Coli**	**Enterococci**
Steady State (all areas)	33	126	35
Maximum at:			
- designated beach	61	235	104
- moderately used area	89	298	124
- lightly used area	108	406	276
- infrequently used area	151	576	500

NOTES:

1. The criteria were published in the Federal Register, Vol. 51, No. 45 / Friday, March 7, 1986 / 8012-8016. The Criteria are based on:
(a) Cabelli, V.J. 1983. Health Effects Criteria for Marine Recreational Waters. U.S. EPA, EPA 600/1-80-031, Cincinnati, Ohio, and
(b) Dufour, A.P. 1984. Health Effects Criteria for Fresh Recreational Waters. U.S. EPA, EPA 600/1-84-004, Cincinnati Ohio.

2. The U.S. EPA criteria apply to water contact recreation only. The criteria provide for a level of production based on the frequency of usage of a given water contact recreation area. The criteria may be employed in special studies within this region to differentiate between pollution sources or to supplement the current coliform objectives for water contact recreation.

Table 3-3: Marine[a] Water Quality Objectives for Toxic Pollutants for Surface Waters (all values in ug/l)

Compound	4-day Average	1-hr Average	24-hr Average
Arsenic[b, c, d]	36	69	
Cadmium[b, c, d]	9.3	42	
Chromium VI[b, c, d, e]	50	1100	
Copper[c, d, f]			
Cyanide[g]			
Lead[b, c, d]	8.1	210	
Mercury[h]	0.025	2.1	
Nickel[b, c, d]	8.2	74	
Selenium[i]			
Silver[b, c, d]		1.9	
Tributyltin[j]			
Zinc[b, c, d]	81	90	
PAHs[k]			15

NOTES:

a. Marine waters are those in which the salinity is equal to or greater than 10 parts per thousand 95% of the time, as set forth in Chapter 4 of the Basin Plan. Unless a site-specific objective has been adopted, these objectives shall apply to all marine waters except for the South Bay south of Dumbarton Bridge, where the California Toxics Rule (CTR) applies. For waters in which the salinity is between 1 and 10 parts per thousand, the applicable objectives are the more stringent of the freshwater (Table 3-4) or marine objectives.

b. Source: 40 CFR Part 131.38 (California Toxics Rule or CTR), May 18, 2000.

c. These objectives for metals are expressed in terms of the dissolved fraction of the metal in the water column.

d. According to the CTR, these objectives are expressed as a function of the water-effect ratio (WER), which is a measure of the toxicity of a pollutant in site water divided by the same measure of the toxicity of the same pollutant in laboratory dilution water. The 1-hr. and 4-day objectives = table value X WER. The table values assume a WER equal to one.

e. This objective may be met as total chromium.

f. Water quality objectives for copper were promulgated by the CTR and may be updated by U.S. EPA without amending the Basin Plan. Note: at the time of writing, the values are 3.1 ug/l (4-day average) and 4.8 ug/l (1-hr. average). The most recent version of the CTR should be consulted before applying these values.

g. Cyanide criteria were promulgated in the National Toxics Rule (NTR). The NTR criteria specifically apply to San Francisco Bay upstream to and including Suisun Bay and Sacramento-San Joaquin Delta. Note: at the time of writing, the values are 1.0 ug/l (4-day average) and 1.0 ug/l (1-hr. average).

h. Source: U.S. EPA Ambient Water Quality Criteria for Mercury (1984).

i. Selenium criteria were promulgated for all San Francisco Bay/Delta waters in the National Toxics Rule (NTR). The NTR criteria specifically apply to San Francisco Bay upstream to and including Suisun Bay and Sacramento-San Joaquin Delta. Note: at the time of writing, the values are 5.0 ug/l (4-day average) and 20 ug/l (1-hr. average).

j. Tributyltin is a compound used as an antifouling ingredient in marine paints and toxic to aquatic life in low concentrations. U.S. EPA has published draft criteria for protection of aquatic life (Federal Register: December 27, 2002, Vol. 67, No. 249, Page 79090-79091). These criteria are cited for advisory purposes. The draft criteria may be revised.

k. The 24-hour average aquatic life protection objective for total PAHs is retained from the 1995 Basin Plan. Source: U.S. EPA 1980.

Table 3-3A: Water Quality Objectives for Copper and Nickel in Lower South San Francisco Bay

Compound	4-day Average (CCC)[1]	1-hr Average (CMC)[2]	Extent of Applicability
Copper	6.9	10.8	Marine and Estuarine Waters Contiguous to SF Bay, South of Dumbarton Bridge
Nickel	11.9	62.4[*]	Marine and Estuarine Waters Contiguous to SF Bay, South of Dumbarton Bridge

[*] Handbook of WQS, 2nd ed. 1994 in Section 3.7.6 states that the CMC = Final AcuteValue/2; 62.4 is the Final Acute Value (resident species database)/2; so the site-specific CMC is lower than the California Toxics Rule value because we are using the resident species database instead of the National Species Database.

[1] Criteria Continuous Concentration

[2] Criteria Maximum Concentration

Table 3-4: Freshwater[a] Water Quality Objectives for Toxic Pollutants for Surface Waters (all values in ug/l)

COMPOUND	4-DAY AVERAGE	1-HR AVERAGE
Arsenic[b, c, d]	150	340
Cadmium[d]	e	e
Chromium III[c, f]		
Chromium VI[b, c, d, g]	11	16
Copper[b, c, d]	9.0[h]	13[h]
Cyanide[i]		
Lead[b, c, d]	2.5[j]	65[j]
Mercury[k]	0.025	2.4
Nickel[b, c, d]	52[l]	470[l]
Selenium[m]		
Silver[b, c, d]		3.4[n]
Tributyltin[o]		
Zinc[b, c, d]	120[p]	120[p]

NOTES:

a. Freshwaters are those in which the salinity is equal to or less than 1 part per thousand 95% of the time, as set forth in Chapter 4 of the Basin Plan. Unless a site-specific objective has been adopted, these objectives shall apply to all freshwaters except for the South Bay south of Dumbarton Bridge, where the California Toxics Rule (CTR) applies. For waters in which the salinity is between 1 and 10 parts per thousand, the applicable objectives are the more stringent of the marine (Table 3-3) and freshwater objectives.

b. Source: 40 CFR Part 131.38 (California Toxics Rule or CTR), May 18, 2000.

c. These objectives for metals are expressed in terms of the dissolved fraction of the metal in the water column.

d. These objectives are expressed as a function of the water-effect ratio (WER), which is a measure of the toxicity of a pollutant in site water divided by the same measure of the toxicity of the same pollutant in laboratory dilution water. The 1-hr. and 4-day objectives = table value X WER. The table values assume a WER equal to one.

e. The objectives for cadmium and other noted metals are expressed by formulas where H = ln (hardness) as CaCO3 in mg/l: The four-day average objective for cadmium is $e^{(0.7852\ H\ -\ 3.490)}$. This is 1.1 µg/l at a hardness of 100 mg/l as $CaCO_3$. The one-hour average objective for cadmium is $e^{(1.128\ H\ -\ 3.828)}$. This is 3.9 µg/l at a hardness of 100 mg/l as $CaCO_3$.

f. Chromium III criteria were promulgated in the National Toxics Rule (NTR). The NTR criteria specifically apply to San Francisco Bay upstream to and including Suisun Bay and Sacramento-San Joaquin Delta. Note: at the time of writing, the values are 180 ug/l (4-day average) and 550

ug/l (1-hr. average). The objectives for chromium III are based on hardness. The values in this footnote assume a hardness of 100 mg/l $CaCO_3$. At other hardnesses, the objectives must be calculated using the following formulas where H = ln (hardness): The 4-day average objective for chromium III is $-0.860 \times e^{(0.8190H+1.561)}$. The 1-hour average for chromium III is $0.316 \times e^{(0.8190 H+3.688)}$.

g. This objective may be met as total chromium.

h. The objectives for copper are based on hardness. The table values assume a hardness of 100 mg/l $CaCO_3$. At other hardnesses, the objectives must be calculated using the following formulas where H = ln (hardness): The 4-day average objective for copper is $0.960 \times e^{(0.8545H-1.702)}$. The 1-hour average for copper is $0.960 \times e^{(0.9422H-1.700)}$.

i. Cyanide criteria were promulgated in the National Toxics Rule (NTR). The NTR criteria specifically apply to San Francisco Bay upstream to and including Suisun Bay and Sacramento-San Joaquin Delta. Note: at the time of writing, the values are 5.2 ug/l (4-day average) and 22 ug/l (1-hr. average).

j. The objectives for lead are based on hardness. The table values assume a hardness of 100 mg/l $CaCO_3$. At other hardnesses, the objectives must be calculated using the following formulas where H = ln (hardness): The 4-day average objective is $(1.46203 - 0.475712H) \times e^{(1.273H -4.705)}$. The 1-hour average for lead is $(1.46203 - 0.145712H) \times e^{(1.273H-1.460)}$.

k. Source: U.S. EPA Quality Criteria for Water 1986 (EPA 440/5-86-001), which established a mercury criterion of 0.012 ug/l. The Basin Plan set the objective at 0.025 based on considerations of the level of detection attainable at that time.

l. The objectives for nickel are based on hardness. The table values assume a hardness of 100 mg/l $CaCO_3$. At other hardnesses, the objectives must be calculated using the following formulas where H = ln (hardness): The 4-day average objective is $0.997 \times e^{(0.8460H + 0.0584)}$. The 1-hour average objective is $0.998 \times e^{(0.8460H + 2.255)}$.

m. Selenium criteria were promulgated for all San Francisco Bay/Delta waters in the National Toxics Rule (NTR). The NTR criteria specifically apply to San Francisco Bay upstream to and including Suisun Bay and Sacramento-San Joaquin Delta. Note: at the time of writing, the values are 5.0 ug/l (4-day average) and 20 ug/l (1-hr. average).

n. The objective for silver is based on hardness. The table value assumes a hardness of 100 mg/l $CaCO_3$. At other hardnesses, the objective must be calculated using the following formula where H = ln (hardness): The 1-hour average objective for silver is $0.85 \times e^{(1.72H - 6.52)}$. U.S. EPA has not developed a 4-day criterion.

o. Tributyltin is a compound used as an antifouling ingredient in marine paints and toxic to aquatic life in low concentrations. U.S. EPA has published draft criteria for protection of aquatic life (Federal Register: December 27, 2002, Vol. 67, No. 249, Page 79090-79091). These criteria are cited for advisory purposes. The draft criteria may be revised.

p. The objectives for zinc are based on hardness. The table values assume a hardness of 100 mg/l $CaCO_3$. At other hardnesses, the objectives must be calculated using the following formulas where H = ln (hardness): The 4-day average objective for zinc is $0.986 \times e^{(0.8473 H+0.884)}$. The 1-hour average for zinc is $0.978 \times e^{(0.8473 H+ 0.884)}$.

Table 3-5: Water Quality Objectives for Municipal Supply

Parameter	Objective (in MG/L)
Physical:	
Color (units)[a]	15.0
Odor (number)[a]	3.0
Turbidity (NTU)[a]	5.0
pH[b]	6.5 - 8.0
TDS[c]	500.0
EC (mmhos/cm)[c]	900
Corrosivity	non-corrosive
Inorganic Parameters:	
Aluminum[d]	1.0[d] / 0.2[a]
Antimony[d]	0.006
Arsenic[d]	0.05
Asbestos[d]	7 MFL[e]
Barium[d]	1.0
Beryllium[d]	0.004
Chloride[c]	250.0
Cadmium[d]	0.005
Chromium[d]	0.05
Copper[a]	1.0
Cyanide[d]	0.15
Fluoride[f]	0.6 - 1.7[g]
Iron[a]	0.3
Lead[b]	0.05
Manganese[a]	0.05
Mercury[d]	0.002
Nickel[d]	0.1
Nitrate (as NO_3)[d]	45.0
Nitrate + Nitrite (as N)[d]	10.0
Nitrite (as N)[d]	1.0
Selenium[d]	0.05
Silver[b]	0.1
Sulfate[c]	250.0
Thallium[d]	0.002
Zinc[a]	5.0
Organic Parameters:	
MBAS (Foaming agents)[a]	0.5
Oil and grease[b]	none
Phenols[b]	0.001
Trihalomethanes[b]	0.1
Chlorinated Hydrocarbons:	
Endrin[h]	0.002
Lindane[h]	0.0002
Methoxychlor[h]	0.03
Toxaphene[h]	0.003
2,3,7,8-TCDD (Dioxin)[h]	3×10^{-8}
2,4-D[h]	0.07
2,4,4-TP Silvex[h]	0.05

Parameter	Objective (in MG/L)
Synthetic Organic Chemicals:	
Alachor[h]	0.002
Atrazine[h]	0.001
Bentazon[h]	0.018
Benzo(a)pyrene[h]	0.0002
Dalapon[h]	0.2
Dinoseb[h]	0.007
Diquat[h]	0.02
Endothall[h]	0.1
Ethylene dibromide[h]	0.00005
Glyphosate[h]	0.7
Heptachlor[h]	0.00001
Heptachlor epoxide[h]	0.00001
Hexachlorecyclopentadiene[h]	0.001
Molinate[h]	0.02
Oxarnyl[h]	0.05
Pentachlorophenol[h]	0.001
Picloram[h]	0.5
Polychlorinated Biphenyls[h]	0.0005
Simazine[h]	0.004
Thiobencarb[h]	0.07 / 0.001
Volatile Organic Chemicals:	
Benzene[h]	0.001
Carbon Tetrachloride[h]	0.005
1,2-Dibromo-3-chloropropane[h]	0.0002
1,2-Dichlorobenzene[h]	0.6
1,4-Dichlorobenzene[h]	0.005
1,1-Dichloroethane[h]	0.005
1,2-Dichloroethane[h]	0.0005
cis-1,2-Dichloroethlyene[h]	0.006
trans-1,2-Dichloroethylene[h]	0.01
1,1-Dichloroethylene[h]	0.006
Dichloromethane[h]	0.005
1,2-Dichloropropane[h]	0.005
1,3-Dichloropropene[h]	0.0005
Ethylbenzene[h]	0.7
Methyl-tert-butyl ether[h]	0.13 / 0.005
Monochlorobenzene[h]	0.07
Styrene[h]	0.1
1,1,2,2-Tetrachloroethane[h]	0.001
Tetrachloroethylene[h]	0.005
1,2,4-Trichlorobenzene[h]	0.005
1,1,1-Trichloroethane	0.200
1,1,2-Trichloroethane[h]	0.005
Trichloroethylene[h]	0.005
Trichlorofluoromethane	0.15

Parameter	Objective (in MG/L)
Volatile Organic Chemicals (cont'd):	
1,1,2-Trichloro-1,2,2-trifluoromethane[h]	1.2
Toluene[h]	0.15
Vinyl Chloride[h]	0.0005
Xylenes (single or sum of isomers)[h]	1.750
Radioactivity:	
Combined Radium-226 and Radium-228[i]	5
Gross Alpha Particle Activity[i]	15i
Tritium[i]	20,000
Strontium-90[i]	8
Gross Beta Particle Activity[i]	50
Uranium[i]	20

NOTES:

a. Secondary Maximum Contaminant Levels as specified in Table 64449-A of Section 64449, Title 22 of the California Code of Regulations, as June 3, 2005.

b. Table III-2, 1986 Basin Plan

c. Secondary Maximum Contaminant Levels as specified in Table 64449-B of Section 64449, Title 22 of the California Code of Regulations, as of June 3, 2005. (Levels indicated are "recommended" levels. Table 64449-B contains a complete list of upper and short-term ranges.)

d. Maximum Contaminant Levels as specified in Table 64431-A (Inorganic Chemicals) of Section 64431, Title 22 of the California Code of Regulations, as of June 3, 2005.

e. MFL = million fibers per liter; MCL for fibers exceeding 10 um in length.

f. Flouride objectives depend on temperature.

g. A complete list of optimum and limiting concentrations is specified in Table 64433.2-A of Section 64433.2, Title 22 of the California Code of Regulations, as of June 3, 2005.

h. Maximum Contaminant Levels as specified in Table 64444-A (Organic Chemicals) of Section 64444, Title 22 of the California Code of Regulations, as of June 3, 2005.

i. Maximum Contaminant Levels as specified in Table 4 (Radioactivity) of Section 64443, Title 22 of the California Code of Regulations, as of June 3, 2005.

j. Included Radium-226 but excludes Radon and Uranium.

MG/L Milligrams per liter
pCi/L pico Curries per liter

Table 3-6: Water Quality Objectives for Agricultural Supply[a] (in mg/l)

Parameter	Threshold	Limit	Limit for Livestock Watering
Physical:			
pH	5.5-8.3	4.5-9.0	
TDS			10,000.0
EC (mmhos / cm)		0.2-3.0	
Inorganic Parameters:			
Aluminum	5.0	20.0	5.0
Arsenic	0.1	2.0	0.2
Beryllium	0.1	0.5	
Boron	0.5	2.0	5.0
Chloride	142.0	355.0	
Cadmium	0.01	0.5	0.05
Chromium	0.1	1.0	1.0
Cobalt	0.05	5.0	1.0
Copper	0.2	5.0	0.5
Flouride	1.0	15.0	2.0
Iron	5.0	20.0	
Lead	5.0	10.0	0.1
Lithium		2.5[b]	
Manganese	0.2	10.0	
Molybdenum	0.01	0.05	0.5
Nickel	0.2	2.0	
$NO_3 + NO_2$ (as N)	5.0	30[c]	100.0
Selenium		0.02	0.05
Sodium adsorption ratio (adjusted)[d]	3.0	9.0	
Vanadium	0.1	1.0	0.1
Zinc	2.0	10.0	25

NOTES:

a. For an extensive discussion of water quality for agricultural purposes, see "A Compilation of Water Quality Goals," Central Valley Regional Water Quality Control Board, May 1993.

b. For citrus irrigation, maximum 0.075 mg/l.

c. For sensitive crops. Values are actually for NO_3-N + NH_4-N.

d. Adjusted SAR = $\{ Na /[(Ca + Mg)+2]^{0.5} \}\{1 + [8.4 – pHc]\}$, where pHc is a calculated value based on total cations, Ca + Mg, and CO_3 + HCO_3, in me/l. Exact calculations of pHc can be found in "Guidelines for Interpretation of Water Quality for Agriculture" prepared by the Univ. of California Cooperative Extension.

Table 3-7: Water Quality Objectives for the Alameda Creek Watershed Above Niles

SURFACE WATER QUALITY OBJECTIVES (ALAMEDA CREEK AND 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)

GROUNDWATER QUALITY OBJECTIVES

(Concentration not to be exceeded more than 10 percent of the time during one year.)

Central Basin

TDS:	Ambient or 500 mg/l, whichever is lower
Nitrate (NO_3):	45 mg/l

Fringe Subbasins

TDS:	Ambient or 1000 mg/l, whichever is lower
Nitrate (NO_3):	45 mg/l

Upland and Highland Areas

California domestic water quality standards set forth in California Code of Regulations, Title 22 and current county standards.

Ambient water quality conditions at a proposed project area will be determined by Zone 7 of the Alameda County Flood Control and Water Conservation District at the time the project is proposed, with the cost borne by the project proponents. Ambient conditions apply to the water-bearing zone with the highest quality water.

Waters designated for use as domestic or municipal water supply shall not contain concentrations of chemicals in excess of natural concentrations or the limits specified in California Code of Regulations, Title 22, Chapter 15, particularly Tables 64431-A and 64431-B of Section 64431, Table 64444-A of Section 64444, and Table 4 of Section 64443.

Exhibit I

Water Board Letter
Illicit Hazardous Waste Discharge and
Notice of Water Code Section 13267 Technical Report Requirement,
July 6, 2007

California Regional Water Quality Control Board
San Francisco Bay Region

Linda Adams
Secretary for
Environmental Protection

1515 Clay Street, Suite 1400, Oakland, California 94612
(510) 622-2300 • Fax (510) 622-2460
http://www.waterboards.ca.gov/sanfranciscobay

Arnold Schwarzenegger
Governor

July 6, 2007
File No. 2168.05 (DCE)

U.S. Department of Transportation
Maritime Administration
Attn. Ms. Shannon Russell
1200 New Jersey Avenue, SE
Washington, D.C. 20590-0001

Subject: Water Code Section 13267 Technical Report Requirement - National Defense Suisun Bay Reserve Fleet - Illicit Hazardous Waste Discharge - Suisun Bay, Solano County

Dear Ms. Russell:

This letter requires that the U.S. Department of Transportation – Maritime Administration (Marad) prepare and submit a technical report. Marad must prepare and submit a Hazardous Waste Mitigation Workplan by August 6, 2007. This Workplan shall describe the methods and schedules to be employed to remove peeling paint from the Suisun Bay Reserve Fleet (Fleet), and to otherwise prevent paint discharge from the Fleet to State and U.S. waters.

We will shortly be forwarding, under separate cover, comments on the sediment sampling results in the February 2007 report prepared for Marad by R&M Environmental, "Vessel Environmental Review" (R&M Report). We expect these comments to include a requirement to submit a Sediment Impact Investigation Workplan to further investigate whether peeling paint from the Fleet has impacted sediments in the vicinity of the Fleet, and if so, the extent of those impacts.

The information contained in these plans will assist Water Board staff in verifying that threats to water quality presented by hazardous peeling paint are mitigated in a timely fashion and that historical impacts from peeling paint to sediments in Suisun Bay are delineated.

Requirement Rationale and Discussion

Peeling Paint: The R&M Report documents the following with regards to peeling paint: 1) peeling paint from the Fleet contains metals concentrations in excess of hazardous waste

thresholds; 2) significant quantities of peeling paint have been discharged to Suisun Bay; and, 3) significant quantities of peeling paint remain on the ships and these paints are likely to discharge to Suisun Bay over time.

Such discharges are violations of Section 402 of the federal Clean Water Act, which prohibits the discharge of waste to waters of the United States without appropriate permitting of the discharge.

San Francisco Bay is on the federal Clean Water Act Section 303(d) list of water quality limited segment for pollutants including: mercury, nickel, exotic species, and selenium. The Water Board is in the process of developing Total Maximum Daily Loads that include load and waste allocations for the discharge of these pollutants to the estuary. In general, the allocations for treated wastewater discharges from treatment plants and other industries are much lower than the estimated future discharge from the Fleet's exfoliating paint.

Since these pollutants and other metals were detected at generally high concentrations in paint chip samples collected from the Fleet, it is clear that the risk posed due to continued discharge of the pollutants to San Francisco Bay is of significant concern and must be abated. Therefore, Marad is required by the Water Board to remove peeling paint from the Fleet to prevent further discharge, as soon as possible, and as described in the Workplan required by this letter.

Water Code Section 13267 Technical Report Requirement

Marad shall prepare and submit a Hazardous Waste Mitigation Workplan to the Water Board, acceptable to the Executive Officer, by August 6, 2007.

The Hazardous Waste Mitigation Workplan must describe the paint removal methods and controls to be implemented during peeling paint removal to ensure that no peeling paint is discharged to San Francisco Bay, to the maximum extent practicable. The Workplan must also include an aggressive schedule to complete the mitigation of this on-going threat to water quality and a schedule to inspect and remove peeling annually to ensure that the paint does not present a threat to water quality in the future. Based on my staff's June 28, 2007, inspection, the majority of the peeling paint is accessible using standard ship maintenance equipment and procedures, or procedures that could be modified for the purpose of addressing on-going paint discharges.

Closing

The Water Board is requiring submittal of a Hazardous Waste Mitigation Workplan to ensure that peeling paint from the Fleet does not continue to discharge to and adversely impact sediments and surface water.

You should be aware that this letter represents a requirement for a technical report pursuant to California Water Code Section 13267, which allows the Board to require technical or monitoring program reports from any person who has discharged, discharges, proposes to discharge, or is suspected of discharging waste that could affect water quality (see Attachment A). Although we anticipate your cooperation in this matter, failure to respond or a late response to this requirement could potentially subject you to civil liability imposed by the Water Board. Any extension in the above deadline must be confirmed in writing by Board staff.

If you have any questions, please contact David Elias of my staff at (510) 622-2509, or via e-mail at delias@waterboards.ca.gov.

Sincerely,

Bruce Wolfe
Executive Officer

Attachment: 13267 Letter Fact Sheet
cc: Please see following pages

cc: City of Benicia
Attn. Bill Whitney
City Hall
250 East "L" Street
Benicia, California 94510

Congressman George Miller
Attn. Kathy Hoffman
375 G Street, Suite 1
Vallejo, California 94592

Congresswoman Ellen Tauscher
Attn. Ricardo Blanco
2000 Cadenasso Drive, Suite A
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Senator Barbara Boxer
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San Francisco, CA 94105-1858

Dept. of Toxic Substances Control
Attn. Robert Aragon, P.E.
700 Heinz Avenue, Suite 100
Berkeley, California 94710

Dept. of Toxic Substances Control
Attn. Charles Gribble, P.G.
700 Heinz Avenue, Suite 100
Berkeley, California 94710

Water Board: Bruce H. Wolfe,
Shin-Roei Lee, Keith H. Lichten,
David C. Elias

Attachment A

Water Code 13267 Fact Sheet

Linda S. Adams
Agency Secretary

California Regional Water Quality Control Board

San Francisco Bay Region

Arnold Schwarzenegger
Governor

1515 Clay Street, Suite 1400, Oakland, California 94612
(510) 622-2300 • Fax (510) 622-2460
http://www.waterboards.ca.gov/sanfranciscobay

Fact Sheet – Requirements For Submitting Technical Reports Under Section 13267 of the California Water Code

What does it mean when the regional water board requires a technical report?
Section 13267[1] of the California Water Code provides that "...the regional board may require that any person who has discharged, discharges, or who is suspected of having discharged or discharging, or who proposes to discharge waste...that could affect the quality of waters...shall furnish, under penalty of perjury, technical or monitoring program reports which the regional board requires."

This requirement for a technical report seems to mean that I am guilty of something, or at least responsible for cleaning something up. What if that is not so?
The requirement for a technical report is a tool the regional water board uses to investigate water quality issues or problems. The information provided can be used by the regional water board to clarify whether a given party has responsibility.

Are there limits to what the regional water board can ask for?
Yes. The information required must relate to an actual or suspected or proposed discharge of waste (including discharges of waste where the initial discharge occurred many years ago), and the burden of compliance must bear a reasonable relationship to the need for the report and the benefits obtained. The regional water board is required to explain the reasons for its request.

What if I can provide the information, but not by the date specified?
A time extension may be given for good cause. Your request should be promptly submitted in writing, giving reasons.

Are there penalties if I don't comply?
Depending on the situation, the regional water board can impose a fine of up to $5,000 per day, and a court can impose fines of up to $25,000 per day as well as criminal penalties. A person who submits false information or fails to comply with a requirement to submit a technical report may be found guilty of a misdemeanor. For some reports, submission of false information may be a felony.

Do I have to use a consultant or attorney to comply?
There is no legal requirement for this, but as a practical matter, in most cases the specialized nature of the information required makes use of a consultant and/or attorney advisable.

What if I disagree with the 13267 requirements and the regional water board staff will not change the requirement and/or date to comply?
You may ask that the regional water board reconsider the requirement, and/or submit a petition to the State Water Resources Control Board. See California Water Code sections 13320 and 13321 for details. A request for reconsideration to the regional water board does not affect the 30-day deadline within which to file a petition to the State Water Resources Control Board

If I have more questions, whom do I ask?
Requirements for technical reports indicate the name, telephone number, and email address of the regional water board staff contact.

Revised August 2005

[1] All code sections referenced herein can be found by going to www.leginfo.ca.gov.

Exhibit J

Water Board Notice of Violation, October 1, 2007

California Regional Water Quality Control Board
San Francisco Bay Region

Linda Adams
Secretary for
Environmental Protection

1515 Clay Street, Suite 1400, Oakland, California 94612
(510) 622-2300 • Fax (510) 622-2460
http://www.waterboards.ca.gov/sanfranciscobay

Arnold Schwarzenegger
Governor

October 1, 2007
File No. 2168.05 (DCE)

U.S. Department of Transportation
Maritime Administration
Attn. Ms. Shannon Russell
1200 New Jersey Avenue, SE
Washington, D.C. 20590-0001

Subject: Notice of Violation – Inadequate Report - National Defense Suisun Bay Reserve Fleet - Illicit Hazardous Waste Discharge - Suisun Bay, Solano County

Dear Ms. Russell:

On July 6, 2007, this agency transmitted a Technical Report Requirement order (Attachment A) to the U.S. Department of Transportation – Maritime Administration (Marad), pursuant to California Water Code Section 13267. The order required that Marad prepare and submit a Hazardous Waste Mitigation Workplan that describes the methods and schedules to be employed to remove peeling paint from the Suisun Bay Reserve Fleet and to otherwise prevent paint and other hazardous waste discharges from the Fleet to waters of the State and U.S. The workplan was due by August 6, 2007.

On August 9, 2007, we received via email a PDF of an August 7, 2007, letter from Marad's Associate Administrator Joseph Byrne in response to the Technical Report Requirement order (Attachment B). The August 7, 2007, letter briefly describes environmental studies underway for each of Marad's three fleets of non-retention vessels that will enable Marad "to enhance the management of vessels in the Suisun Bay Reserve Fleet." However, this letter does not constitute a Hazardous Waste Mitigation Workplan and does not include the information required by the July 6 order. Therefore, by not submitting an acceptable response to the Water Board's order, Marad is in violation of Water Code Section 13267.

At our August 28, 2007, conference call meeting with Marad staff, Elizabeth Megginson indicated that Marad felt its August 7, 2007, letter was responsive to the Technical Report Requirement order. Ms. Megginson also indicated that Marad's ongoing contract to complete the environmental studies described in the August 7 letter would include reviews of each ship in the Fleet, evaluations of pollutant control methods for each ship, and

development of a long-term management plan for each ship. Completion and submittal of these environmental studies in a timely fashion would largely respond to the July 6 Technical Report Requirement order as long as the studies address the requirement for a Hazardous Waste Mitigation Workplan and the other information required in the July 6 order.

Water Code Section 13268 states that any person failing or refusing to submit technical or monitoring reports can be subjected to an administratively imposed civil liability of up to $5,000 per day, and a court can impose fines of up to $25,000 per day as well as criminal penalties. At this time, Marad has yet to submit an acceptable technical report, as required by the July 6 order. This Notice of Violation is the first step in the Water Board's progressive enforcement policy. To avoid further enforcement, we encourage immediate compliance with the Technical Report Requirement order and submittal of a Hazardous Waste Mitigation Workplan, acceptable to the Water Board's Executive Officer.

If you have any questions, please contact David Elias of my staff at (510) 622-2509, or via e-mail at delias@waterboards.ca.gov.

Sincerely,

Digitally signed by
Bruce Wolfe
Date: 2007.10.01
17:46:43 -07'00'

Bruce H. Wolfe
Executive Officer

Attachments: A - July 6, 2007 Water Code Section 13267 Technical Report Requirement Letter
B - Marad Response Letter

cc: Please see following pages

cc: City of Benicia
Attn. Bill Whitney
City Hall
250 East "L" Street
Benicia, California 94510

Congressman George Miller
Attn. Kathy Hoffman
375 G Street, Suite 1
Vallejo, California 94592

Congresswoman Ellen Tauscher
Attn. Ricardo Blanco
2000 Cadenasso Drive, Suite A
Fairfield, California 94533

Senator Patricia Wiggins
Attn. Veronica Nelson
444 Georgia Street
Vallejo, California 94590

National Marine Fisheries Service
Attn. Joseph Dillon
777 Sonoma Avenue, Room 325
Santa Rosa, California 95404-4731

U.S. DOT - Maritime Administration
Attn. Mr. Michael Carter
Second Floor West Building, Mail Drop No. 1
1200 New Jersey Avenue, SE,
Washington, DC 20590-0001

U.S. DOT - Maritime Administration
Attn. Elizabeth R. Megginson
Second Floor, West Building
1200 New Jersey Ave., SE
Washington, DC 20590

U.S. DOT - Maritime Administration
Attn. Kurt Michanczyk
Second Floor West Building, Mail Drop No. 1
1200 New Jersey Avenue, SE,
Washington, DC 20590-0001

California Office of the Attorney General
Attn. Tara Mueller
1515 Clay Street, 20th Floor
Oakland, California 94612
Dept. of Toxic Substances Control
Attn. Alan Ito
8800 Cal Center Drive
Sacramento, CA 95826

Dept. of Toxic Substances Control
Attn. Charles Gribble, P.G.
700 Heinz Avenue, Suite 100
Berkeley, California 94710

U.S. EPA Region 9
Attn. Nancy Yoshikawa
75 Hawthorne St. WTR-5
San Francisco, CA 94105

US Coast Guard, District 11
Attn. Commander Han Kim
Investigations and Inspections Branch
Coast Guard Island Building 50-8
Alameda, CA 94501

California State Lands Commission
Marine Facilities Division
Attn. Maurya B. Falkner
100 Howe Ave, Suite 100 South
Sacramento, CA 95825-8202

The Honorable Barbara Boxer
Attn. Bridget Petruczok
112 Hart Senate Office Building
Washington, DC , 20510

Russell Resources, Inc.
Attn. Peter Russell
440 Nova Albion Way, Suite 1
San Rafael, California 94903

Fred Euphrat, Ph.D.
Principal Consultant
California State Legislature
Joint Committee on Fisheries and Aquaculture
50 D St., #120A
Santa Rosa, CA 95404

Water Board: Bruce H. Wolfe, Shin-Roei Lee,
Keith H. Lichten, David C. Elias

Attachment – A

July 6, 2007 Water Code Section 13267 Technical Report Requirement Letter

California Regional Water Quality Control Board
San Francisco Bay Region

Linda Adams
Secretary for
Environmental Protection

1515 Clay Street, Suite 1400, Oakland, California 94612
(510) 622-2300 • Fax (510) 622-2460
http://www.waterboards.ca.gov/sanfranciscobay

Arnold Schwarzenegger
Governor

July 6, 2007
File No. 2168.05 (DCE)

U.S. Department of Transportation
Maritime Administration
Attn. Ms. Shannon Russell
1200 New Jersey Avenue, SE
Washington, D.C. 20590-0001

Subject: Water Code Section 13267 Technical Report Requirement - National Defense Suisun Bay Reserve Fleet - Illicit Hazardous Waste Discharge - Suisun Bay, Solano County

Dear Ms. Russell:

This letter requires that the U.S. Department of Transportation – Maritime Administration (Marad) prepare and submit a technical report. Marad must prepare and submit a Hazardous Waste Mitigation Workplan by August 6, 2007. This Workplan shall describe the methods and schedules to be employed to remove peeling paint from the Suisun Bay Reserve Fleet (Fleet), and to otherwise prevent paint discharge from the Fleet to State and U.S. waters.

We will shortly be forwarding, under separate cover, comments on the sediment sampling results in the February 2007 report prepared for Marad by R&M Environmental, "Vessel Environmental Review" (R&M Report). We expect these comments to include a requirement to submit a Sediment Impact Investigation Workplan to further investigate whether peeling paint from the Fleet has impacted sediments in the vicinity of the Fleet, and if so, the extent of those impacts.

The information contained in these plans will assist Water Board staff in verifying that threats to water quality presented by hazardous peeling paint are mitigated in a timely fashion and that historical impacts from peeling paint to sediments in Suisun Bay are delineated.

Requirement Rationale and Discussion

Peeling Paint: The R&M Report documents the following with regards to peeling paint: 1) peeling paint from the Fleet contains metals concentrations in excess of hazardous waste

thresholds; 2) significant quantities of peeling paint have been discharged to Suisun Bay; and, 3) significant quantities of peeling paint remain on the ships and these paints are likely to discharge to Suisun Bay over time.

Such discharges are violations of Section 402 of the federal Clean Water Act, which prohibits the discharge of waste to waters of the United States without appropriate permitting of the discharge.

San Francisco Bay is on the federal Clean Water Act Section 303(d) list of water quality limited segment for pollutants including: mercury, nickel, exotic species, and selenium. The Water Board is in the process of developing Total Maximum Daily Loads that include load and waste allocations for the discharge of these pollutants to the estuary. In general, the allocations for treated wastewater discharges from treatment plants and other industries are much lower than the estimated future discharge from the Fleet's exfoliating paint.

Since these pollutants and other metals were detected at generally high concentrations in paint chip samples collected from the Fleet, it is clear that the risk posed due to continued discharge of the pollutants to San Francisco Bay is of significant concern and must be abated. Therefore, Marad is required by the Water Board to remove peeling paint from the Fleet to prevent further discharge, as soon as possible, and as described in the Workplan required by this letter.

Water Code Section 13267 Technical Report Requirement

Marad shall prepare and submit a Hazardous Waste Mitigation Workplan to the Water Board, acceptable to the Executive Officer, by August 6, 2007.

The Hazardous Waste Mitigation Workplan must describe the paint removal methods and controls to be implemented during peeling paint removal to ensure that no peeling paint is discharged to San Francisco Bay, to the maximum extent practicable. The Workplan must also include an aggressive schedule to complete the mitigation of this on-going threat to water quality and a schedule to inspect and remove peeling annually to ensure that the paint does not present a threat to water quality in the future. Based on my staff's June 28, 2007, inspection, the majority of the peeling paint is accessible using standard ship maintenance equipment and procedures, or procedures that could be modified for the purpose of addressing on-going paint discharges.

Closing

The Water Board is requiring submittal of a Hazardous Waste Mitigation Workplan to ensure that peeling paint from the Fleet does not continue to discharge to and adversely impact sediments and surface water.

You should be aware that this letter represents a requirement for a technical report pursuant to California Water Code Section 13267, which allows the Board to require technical or monitoring program reports from any person who has discharged, discharges, proposes to discharge, or is suspected of discharging waste that could affect water quality (see Attachment A). Although we anticipate your cooperation in this matter, failure to respond or a late response to this requirement could potentially subject you to civil liability imposed by the Water Board. Any extension in the above deadline must be confirmed in writing by Board staff.

If you have any questions, please contact David Elias of my staff at (510) 622-2509, or via e-mail at delias@waterboards.ca.gov.

Sincerely,

Bruce Wolfe
Executive Officer

Attachment: 13267 Letter Fact Sheet
cc: Please see following pages

cc: City of Benicia
Attn. Bill Whitney
City Hall
250 East "L" Street
Benicia, California 94510

Congressman George Miller
Attn. Kathy Hoffman
375 G Street, Suite 1
Vallejo, California 94592

Congresswoman Ellen Tauscher
Attn. Ricardo Blanco
2000 Cadenasso Drive, Suite A
Fairfield, California 94533

Senator Barbara Boxer
Attn. Michele Moss Weingarden
1700 Montgomery Street, Suite 240
San Francisco, California 94111

U.S. Department of Transportation
Maritime Administration
Attn. Mr. Michael Carter
Director of Environment
Second Floor West Building, Mail
Drop No. 1
1200 New Jersey Avenue, SE,
Washington, DC 20590-0001

U.S. Department of Transportation
Maritime Administration
Attn. Kurt Michanczyk
Director of Ship Disposal Program
Second Floor West Building, Mail
Drop No. 1
1200 New Jersey Avenue, SE,
Washington, DC 20590-0001

U.S. Dept. of Transportation
Maritime Administration
Attn. Bryan Vogel
201 Mission Street, 18th Floor
San Francisco, CA 94105-1858

Dept. of Toxic Substances Control
Attn. Robert Aragon, P.E.
700 Heinz Avenue, Suite 100
Berkeley, California 94710

Dept. of Toxic Substances Control
Attn. Charles Gribble, P.G.
700 Heinz Avenue, Suite 100
Berkeley, California 94710

Water Board: Bruce H. Wolfe,
Shin-Roei Lee, Keith H. Lichten,
David C. Elias

Attachment A

Water Code 13267 Fact Sheet

Linda S. Adams
Agency Secretary

California Regional Water Quality Control Board

San Francisco Bay Region

Arnold Schwarzenegger
Governor

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Fact Sheet – Requirements For Submitting Technical Reports Under Section 13267 of the California Water Code

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There is no legal requirement for this, but as a practical matter, in most cases the specialized nature of the information required makes use of a consultant and/or attorney advisable.

What if I disagree with the 13267 requirements and the regional water board staff will not change the requirement and/or date to comply?
You may ask that the regional water board reconsider the requirement, and/or submit a petition to the State Water Resources Control Board. See California Water Code sections 13320 and 13321 for details. A request for reconsideration to the regional water board does not affect the 30-day deadline within which to file a petition to the State Water Resources Control Board

If I have more questions, whom do I ask?
Requirements for technical reports indicate the name, telephone number, and email address of the regional water board staff contact.

Revised August 2005

[1] All code sections referenced herein can be found by going to www.leginfo.ca.gov.

Attachment – B

Marad Response Letter

U.S. Department
of Transportation
Maritime
Administration

1200 New Jersey Avenue, SE
Washington, DC 20590

AUG 07 2007

Mr. Bruce H. Wolfe
Executive Officer
San Francisco Bay Regional Water Quality Control Board
1515 Clay Street, Suite 1400
Oakland, CA 94612

Dear Mr. Wolfe:

Your letter of July 6, 2007, regarding technical reports has been referred to me for response.

For your information, I am pleased to advise that the Maritime Administration has initiated environmental studies and other analyses that will guide the oversight of our non-retention vessels in each of the Agency's three fleet anchorages.

The results of this programmatic undertaking should provide a long range plan that will enable the Maritime Administration to enhance the management of vessels in the Suisun Bay Reserve Fleet, as well as the James River Reserve Fleet in Virginia and the Beaumont Reserve Fleet in Texas. To that end, we are reviewing all of our current practices to find ways to improve them and are continuing the environmental reviews required by law.

This process will be completed as expeditiously as possible. Moreover, when the overall plan is ready for comment, we will invite your input prior to its adoption.

In the meantime, the Maritime Administration will continue to work with all affected government agencies in a cooperative and productive manner to find the most effective and efficient disposition of the non-retention vessels located at our National Defense Reserve Fleet sites.

Very truly yours,

Joseph A. Byrne
Associate Administrator
Environment and Compliance

Exhibit K

Letter From Marad to Water Board, July 5, 2007

U.S. Department
of Transportation
**Maritime
Administration**

Administrator

1200 New Jersey Avenue, SE
Washington, DC 20590

July 5, 2007

Mr. Bruce H. Wolfe
Executive Officer
San Francisco Bay Regional Water Quality Control Board
1515 Clay Street, Suite 1400
Oakland, CA 94612

Dear Mr. Wolfe:

It is of prime importance that obsolete vessels be removed from the Suisun Bay Reserve Fleet as soon as possible. Accordingly, this is to advise you that the Maritime Administration plans to lift its moratorium on disposing of ships from the Suisun Bay Reserve Fleet effective August 1, 2007, unless you otherwise object.

Prior to removing vessels from California waters, the Agency will clean hulls using the contained scamping procedure my staff described at the June 27, 2007 meeting in your offices. We plan to implement and confirm the efficacy of the system in Alameda and invite you to observe the system and participate in monitoring and sampling of effluent generated as well as captured. We advise the Water Quality Control Board of the timing and details of the next hull cleaning event as we move forward.

I look forward to receiving the Water Quality Control Board's agreement to the hull cleaning approach so that the Maritime Administration can remove vessels from the Suisun Bay Reserve Fleet as quickly as possible. We anticipate removing up to 15 of the 53 vessels owned by the Maritime Administration within a year, depending upon the availability of recycling facilities and funding. This will reduce the fleet by almost a third, with further reduction planned in 2008 and 2009.

Should you have questions concerning this matter, please call Michael Carter, the Director of our Office of Environment, at (202) 366-9431.

Sincerely,

Sean T. Connaughton
Maritime Administrator

Exhibit L

Letter From Marad to Water Board, August 15, 2007

U.S. Department
of Transportation
**Maritime
Administration**

1200 New Jersey Avenue, SE
Washington, DC 20590

ELIAS
AUG 20 2007

AUG 15 2007

Mr. Bruce H. Wolfe
Executive Officer
San Francisco Bay Regional Water Quality Control Board
1515 Clay Street, Suite 1400
Oakland, CA 94612

Dear Mr. Wolfe:

By letter dated August 3, 2007, we sent to you (via FedEx) data and information relating to a demonstration of scamping technology designed to collect and contain biota and other material removed from the hull of an obsolete ship at the James River Reserve Fleet (JRRF). Presumably, you and your staff have now reviewed that material, which in our view, demonstrated the effectiveness of the technology.

As the project will require substantial lead time, we intend to establish a test schedule which we will share with you. This schedule will detail the hull cleaning process for two vessels in the Suisun Bay Reserve Fleet (SBRF). Your prompt review and comments on our plan of action will be appreciated.

Once the hulls of the two vessels are cleaned, they will be towed to a facility for recycling. This, in turn, will reduce further risk to the environment associated with these vessels.

Should you have any questions about the above process and/or anticipated procedures, please address them to me. I can be reached at (202) 366-5711.

Very truly yours,

Elizabeth Megginson
Chief Counsel