



**INVENTORY OF SAN FRANCISCO BAY AREA  
DREDGING PROJECTS**

**DREDGED MATERIAL REUSE STUDY**

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# **1. INTRODUCTION**

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## **1.1 BACKGROUND**

This study was conducted for the Port of Oakland under a grant from the California Coastal Conservancy. The study involved an inventory of dredging projects, including a characterization of dredging volume, type and quality of dredged material, and other available information relevant to ultimate reuses of the material. Results from this study will be utilized in the Regional Upland Dredged Material Rehandling Facility (DMRP) study being conducted by the Port, and in the Hamilton Army Airfield Wetlands Restoration project.

Several studies have been completed to-date under different Long Term Management Strategy (LTMS) work elements. However, the dredging environment has changed considerably since the LTMS studies were completed. Military base closures have resulted in a reduction in total dredging in the San Francisco Bay Area (Bay Area), the Port of Oakland has proposed dredging of the Oakland Harbor to 50 feet depth, and the future of the John F. Baldwin Channel Phase III deepening is uncertain. These factors, and the potential need for dredged material for marsh restoration projects in the Bay Area, led to the need for an update of previous studies.

## **1.2 PURPOSE**

The purpose of this study is to estimate the volume, type, and source (location) of dredged material generated in the Bay Area on an average annual basis, and to prepare projections over a five year planning window.

## **1.3 SCOPE OF WORK**

Specific study tasks included:

1. Estimating average annual maintenance and new work dredging volume for navigation projects in the Bay Area, based on existing information and data obtained in this study;
2. Estimating frequency of dredging projects;
3. Estimating physical properties of dredged material;
4. Estimating volume of material that is not suitable for unconfined aquatic disposal (NUAD);
5. Providing available information relevant to ultimate reuses of dredged material;
6. Present findings.

## 2. METHODOLOGY

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Our approach was to use existing documentation, prior reports and data, and update the information with data acquired in this study. A complete list of documents reviewed is presented in the references section at the end of this report.

The LTMS Draft EIR/S (1996) was reviewed, which included a profile of Bay Area dredging projects, including frequency and volume of maintenance and new work projects. It also included average annual dredging projections, based on dredging records up to the early 1990's.

Other LTMS studies reviewed included those which specifically addressed the potential for reducing maintenance dredging volumes at some of the largest navigation projects in the Bay Area (Ogden Beeman & Associates 1988, Moffatt & Nichol Engineers 1992). These studies included estimates of historic dredging volume and frequency.

Data obtained from the above studies were updated with recent information to reflect the closure of several military bases, and changes in dimensions for the large dredging projects. Data reviewed included dredging and disposal records from the San Francisco Bay Conservation and Development Commission (BCDC, 1992, 1993, 1994, 1995), Dredged Material Management Office permit files (DMMO 1996), annual reports from San Francisco District U.S. Army Corps of Engineers (USACE 1995, 1996), and construction records from USACE (updated to 1996).

Additional data for marinas, oil companies, and other privately maintained projects were obtained from the Bay Planning Coalition (1996) and phone discussions with individuals familiar with Bay Area dredging projects.

Projects were categorized as follows:

<u>Category</u>	<u>Description</u>
1. Federal Navigation	Maintained by USACE
2. U.S. Navy	Maintained by the Navy
3. Non-Federal / Private	Maintained by owner/operator other than USACE or the Navy, and with an average annual maintenance dredging of at least 15,000 cubic yards
4. Oil Companies	Maintained by private oil companies
5. Other Small Projects	Maintained by owner/operator other than USACE or Navy, and with an average annual maintenance dredging of at least 5,000 cubic yards
5a. Miscellaneous Small Projects	A subset of category 5 which consists of projects with an average annual maintenance dredging of less than 5,000 cubic yards

A total of over 75 dredging projects were identified, ranging from periodically maintained navigation channels to smaller one-time dredging episodes. A complete listing of all projects, including the sponsor and primary contact, is presented in Table 1. The location of each project, including a brief description, is presented in Table 2.

In addition to the data reviewed, a survey of current information was conducted by mailing a structured interview form to various organizations including the USACE, the Navy, all the ports, oil companies, regulatory agencies, and other individuals familiar with Bay Area dredging projects. The structured interview form was reviewed by the DMRP committee, and a sample is presented in Appendix A. A total of 32 organizations and individuals were contacted, and over 100 forms were mailed. Several follow-up phone calls were made, and meetings arranged, to discuss information not readily identified. Projects for which responses were received are marked in Table 1.

Several permit files at the San Francisco Regional Water Quality Control Board (SFRWQCB) were also reviewed to assess physical characteristics of material dredged from the relatively small private projects.

Dredging volume was categorized as either maintenance dredging (removal of sediments to restore original project dimensions) or new work volume (deepening and/or widening of projects). Many projects are not dredged on an annual basis; the frequency of dredging ranged from 1 year to several years. However, an annualized approach was selected to facilitate comparison between different time periods. The average annual volume up to 1990 is estimated as the total dredging volume in the period of record divided by the number of years in the period of record. The average annual volume between 1991 and 1996 is based on the new information gathered in this study. These updated dredging volume records were used to project dredging volumes over the next 5 years.

The following information was input in a spreadsheet / database format:

- name of project, sponsor, and point of contact;
- location and description;
- volume and frequency (episodic and average annual);
- dredging, transport and disposal method, cost, and disposal site;
- basic physical characteristics of material, volume of NUAD material, and type of contaminants identified.

TABLE 1: PROJECTS AND CONTACTS

NO	CODE	PROJECT	SPONSOR AND/OR CONTACT	BENEFICIARY AND/OR CONTACT (if different)	Response Received
	<b>F</b>	<b>Federal Navigation</b>			
1	F-1	Larkspur Ferry Channel	USACE, Mark McGovern, Cons Ops Ph: 977-8467	GGBHTD, Reuben Di Rado Ph:415-923-2322 ; Fx: 923-2348	X
2	F-2	Mare Island Strait	USACE, Mark McGovern, Cons Ops, 977-8467 AND Rod Chisolm 977-8668	Mare Island Base Reuse Auth., George Young 556-3098 AND Laurel Marcus 510-531-3101 Fx: 531-3006	X
3	F-3	Napa River	USACE, Mark McGovern, Cons Ops Ph: 977-8467	Napa County, Bob Sorsen, Flood Control Dist. Ph: 707-253-4351; Fx:	X
4	F-4	New York Slough	USACE, Mark McGovern, Cons Ops Ph: 977-8467	Port of Stockton, Patricia Huff Ph: 209-946-0246 ; Fx 209-466-7244	
5	F-5	Oakland Harbor	USACE, Mark McGovern, Cons Ops Ph: 977-8467	Port of Oakland Jon Amdur, Environmental Ph: 510-272-1582 ; Fx: 510-465-3755	X
6	F-6	Petaluma Across the Flats	USACE, Mark McGovern, Cons Ops Ph: 977-8467 ALSO : Mike Cheney 510-339-0665	N / A	X
7	F-7	Petaluma River Mile 0 to Washington St. Bridge	USACE, Mark McGovern, Cons Ops Ph: 977-8467	City of Petaluma, Tom Hargis Ph: 707-778-4304 ; Fx: 778-4437	X
8	F-8	Pinole Shoal	USACE, Mark McGovern, Cons Ops Ph: 977-8467 AND Jeff Chatfield -8710	N / A	X
9	F-9	Port of Redwood City	USACE, Mark McGovern, Cons Ops Ph: 977-8467	Port of Redwood City, Mike Gian Ph:415-306-4150 Fx: 369-7636	X
10	F-10	Richmond Harbor	USACE, Mark McGovern, Cons Ops Ph: 977-8467	Port of Richmond, Eugene Serex Ph: 510-215-4600	X
11	F-11	San Francisco Bar & Shoals	USACE, Mark McGovern, Cons Ops Ph: 977-8467	N / A	X
12	F-12	San Francisco Islais Creek & SFO Channel	USACE, Mark McGovern, Cons Ops Ph: 977-8467	Port of San Francisco, Roberta Jones Ph:415-274-0562 ;Fx: 274-0467	X
13	F-13	San Leandro Marina	USACE, Mark McGovern, Cons Ops Ph: 977-8467	City of San Leandro, Greg Mailho, PWD Ph: 510-577-3481 OR Jim Haussner, Harbormaster 357-7447	X
14	F-14	San Rafael Across the Flats	USACE, Mark McGovern, Cons Ops Ph: 977-8467	City of San Rafael, Dave Bernardi, Director, PWD Ph: 415-485-3351 ; Fx:485-3334	X
15	F-15	San Rafael Creek Mile 0 to Grand Ave. Bridge	USACE, Mark McGovern, Cons Ops Ph: 977-8467	City of San Rafael, Dave Bernardi, Director, PWD Ph: 415-485-3351 ; Fx:485-3334	X
16	F-16	Suisun Bay Channel	USACE, Mark McGovern, Cons Ops Ph: 977-8467	Port of Stockton, Patricia Huff Ph: 209-946-0246 ; Fx 209-466-7244	
17	F-17	Suisun Slough Channel	USACE, Mark McGovern, Cons Ops Ph: 977-8467	City of Suisun City, Redev. Agency, Barry Munowich Ph: 707-421-7335	X
	<b>N</b>	<b>U.S. Navy</b>			
18	N-1	Alameda NAS	U.S. Navy - WEST, John Kennedy, Ph: 244-3006 ;Fx: 244-3737 OR Sherman Seelinger 244-3016	N / A	X
19	N-2	Concord NWS	U.S. Navy - WEST, John Kennedy, Ph: 244-3006 ;Fx: 244-3737 OR Sherman Seelinger 244-3016	N / A	X
20	N-3	Hunters Point NSY	U.S. Navy - WEST, John Kennedy, Ph: 244-3006 ;Fx: 244-3737 OR Sherman Seelinger 244-3016	N / A	X
21	N-4	Mare Island NSY	U.S. Navy - WEST, John Kennedy, Ph: 244-3006 ;Fx: 244-3737 OR Sherman Seelinger 244-3016	N / A	X
22	N-5	Moffett Field NAS	U.S. Navy - WEST, John Kennedy, Ph: 244-3006 ;Fx: 244-3737 OR Sherman Seelinger 244-3016	NASA, Michael Falski, Div. Chief 415-604-0901 OR Shelley Navarro 604-0926	X
23	N-6	Oakland NSC	U.S. Navy - WEST, John Kennedy, Ph: 244-3006 ;Fx: 244-3737 OR Sherman Seelinger 244-3016	N / A	X
24	N-7	Point Molate NFD	U.S. Navy - WEST, John Kennedy, Ph: 244-3006 ;Fx: 244-3737 OR Sherman Seelinger 244-3016	N / A	X

TABLE 1: PROJECTS AND CONTACTS

NO	CODE	PROJECT	SPONSOR AND/OR CONTACT	BENEFICIARY AND/OR CONTACT (if different)	Response Received
25	N-8	Treasure Island NS	U.S. Navy - WEST, John Kennedy, Ph: 244-3006 ;Fx: 244-3737 OR Sherman Seelinger 244-3016	N / A	X
		<b>P Non-Federal / Private</b>			
26	P-1	Benecia Industries Port Terminal	Benecia Industries, Phil Plant, President, 707-745-2394 ; Fx: 746-1485 OR Joe Gadsick	N / A	X
27	P-2	Benecia Marina	City of Benecia, PWD, Ms. Chris Tomasick, 707-746-4227 ; Fx: 747-1637	N / A	X
28	P-3	Coyote Point Marina	County of San Mateo Carol Leonard, Harbor Master Ph: 415-573-2594 ; Fx: 343-5935	N / A	X
29	P-4	Larkspur Ferry Berths / Basin	GGBHTD, Reuben Di Rado Ph:923-2322 ; Fx:923-2348	N / A	X
30	P-5	Port of Oakland Berth Areas	Port of Oakland Jon Amdur, Environmental Ph: 510-272-1582 ; Fx: 510-465-3755	N / A	X
31	P-6	Port of Richmond Berth Areas	Port of Richmond Eugene Serex Ph: 510-620-6784	N / A	X
32	P-7	San Francisco Dry Dock	San Francisco Dry Dock, Ali Rajiv Ph: 861-7447	N / A	
33	P-8	Port of San Francisco Berth Areas	Port of San Francisco Roberta Jones, POSF Ph:415-274-0562 ;Fx: 274-0467	N / A	X
34	P-9	Strawberry Point (Tiburon)	Strawberry Recreation District, Robert Allen Ph: 383-6494; Fx: 383-6635	N / A	X
		<b>O Oil Companies</b>			
35	O-1	EXXON Loading Dock	EXXON, Kim Smock, Ph: 707-745-7011 OR Jason Gray 745-7880	N / A	X
36	O-2	UNOCAL Oleum Dock	UNOCAL, Ken Guziak Ph: 510-245-4458	N / A	X
37	O-3	CHEVRON Richmond Long Wharf	CHEVRON, Jason Donchin / Tom di Palma, Ph: 510-242-3549 / 5610	N / A	X
		<b>S Other Small Projects</b>			
38	S-1	ARCO Richmond Loading Docks	ARCO, Cliff Cunningham, Term. Sup. Ph: 510-236-0313 ; Fx: 232-3216	N / A	X
39	S-2	Belvedere Cove (S.F. Yacht Club)	- Form not mailed. Data from other sources -	N / A	-
40	S-3	Berkeley Marina	- Form not mailed. Data from other sources -	N / A	-
41	S-4	City of Emeryville	- Form not mailed. Data from other sources -	N / A	-
42	S-5	Clipper Yacht Harbor	- Form not mailed. Data from other sources -	N / A	-
43	S-6	Emery Cove	- Form not mailed. Data from other sources -	N / A	-
44	S-7	Greenbrae Marina	- Form not mailed. Data from other sources -	N / A	-
45	S-8	Marin Yacht Club	- Form not mailed. Data from other sources -	N / A	-
46	S-9	Martinez Marina	City of Martinez, Jim Zumwalt, City Engr, Ph: 510-372-3515 ; Fx: 372-0257	N / A	X
47	S-10	McNear Pier	- Form not mailed. Data from other sources -	N / A	-
48	S-11	Pacific Gas & Electric	- Form not mailed. Data from other sources -	N / A	-
49	S-12	Paradise Cay Yacht Harbor	- Form not mailed. Data from other sources -	N / A	-
50	S-13	Port Sonoma Marina	Brian Swedberg, Harbor Master Ph: 707-778-8055 ; Fx: 778-2084	N / A	X

TABLE 1: PROJECTS AND CONTACTS

NO	CODE	PROJECT	SPONSOR AND/OR CONTACT	BENEFICIARY AND/OR CONTACT (if different)	Response Received
51	S-14	Redwood City Yacht Harbor	- Form not mailed. Data from other sources -	N / A	-
52	S-15	San Francisco Marina	- Form not mailed. Data from other sources -	N / A	-
53	S-16	San Rafael Canal	- Form not mailed. Data from other sources -		-
54	S-17	San Rafael Rock Quarry	- Form not mailed. Data from other sources -	N / A	-
55	S-18	USCG (Horseshoe Cove & Yerba Buena Island)	- Form not mailed. Data from other sources -	N / A	-
56	S-19	Caltrans	- Form not mailed. Data from other sources -		-
57	S-20	Misc Projects	- Form not mailed. Data from other sources -		-
58	S-21	Sand Mining	- Form not mailed. Data from other sources -	N / A	-
		Private Marinas	Les Shorter, Western Dock Ph: 707-765-4646 Fx: 765-6425	N / A	X
		Private Marinas	Mike Cheney, Independent Ph: 510-339-0665 ; Fx: 339-0711	N / A	X
		ALL	SFBCDC, Steve Goldbeck / Jaime Michaels, Ph: 557-3686	N / A	X
		ALL	USACE, Mark McGovern, Ted Bruch, Cons Ops	N / A	X
		ALL	SFRWQCB, Tom Gandesbury / Toby Tyler Ph: 510-286-0841	N / A	X
		ALL	Bay Planning Coalition, Ellen Johnck, Exec. Director, Ph: 397-2293 ; Fx: 986-0694	N / A	X
		ALL	Advanced Biological Testing Kurt Kline 435-7878; Fx: 435-7882	N / A	X

TABLE 2: PROJECT DESCRIPTION AND LOCATION

NO	CODE	PROJECT	LOCATION	DESCRIPTION
	<b>F</b>	<b>Federal Navigation</b>		
1	F-1	Larkspur Ferry Channel	Central San Francisco Bay, Marin Co.	232 ft x 13 ft access channel 2-3 miles long from SF Bay to Ferry Terminal (authorized to 15 ft)
2	F-2	Mare Island Strait	Napa River, Solano County	700 ft x 30 ft channel, plus a 1000 ft x 30 ft basin. A subset of this channel (600 ft wide) is maintained at 36 ft for the Navy
3	F-3	Napa River	Napa River, Solano and Napa Co.	100 ft wide x 15 ft channel from Mare Island to Asylum Slough; 75 ft wide x 10 ft thence, to Napa City
4	F-4	New York Slough	Suisun Bay Channel, Contra Costa Co.	225 to 400 ft wide, 35 ft deep channel from mile 13 of Suisun Bay channel to San Joaquin River (about 4 miles)
5	F-5	Oakland Harbor	Oakland, Alameda Co.	Outer Harbor 42 ft deep (600 to 950 ft wide, 3 miles long) Inner Harbor 42 ft deep (being dredged, 300 to 800 ft wide, 8 miles)
6	F-6	Petaluma Across the Flats	San Pablo Bay to Railroad Bridge at mouth	200 ft wide x 8 ft channel across mud flats
7	F-7	Petaluma River (Mile 0 to Washington St. Bridge)	Petaluma River, Marin and Sonoma Co.	100 ft wide x 8 ft channel (approx 14 mile long) plus a turning basin (300-400 ft wide) and 90 ft x 4 ft channel
8	F-8	Pinole Shoal	San Pablo Bay, Contra Costa Co.	600 ft wide x 36 ft channel through Pinole Shoal (11 mile long) plus a maneuvering area near Oleum Pier
9	F-9	Port of Redwood City	Redwood City, San Mateo County	500 ft wide x 30 ft channel through San Bruno Shoal, 30 ft deep channel through Redwood Creek (about 3.5 miles)
10	F-10	Richmond Harbor	San Pablo Bay, Contra Costa Co.	600 ft wide x 45 ft approach channel and maneuvering area; 600 ft wide x 35 ft entrance channel ; 35 ft deep inner harbor channel (varying widths)
11	F-11	San Francisco Bar & Shoals	San Francisco Bar and Central Bay	2000 ft x 55 ft Bar channel plus other shoals to 35-40 ft (Alcatraz, Presidio, Black Point, Blossom Rock, Rincon Reef, Pt Knox)
12	F-12	San Francisco Islais Creek & SFO Channel	San Francisco	500 ft x 40 ft channel through Islais Creek and 35ft to 38 ft deep turning areas, plus 750ft x 10ft SFO Airport Channel and basin
13	F-13	San Leandro Marina	South San Francisco Bay, Alameda County	Approx 2.1 mile long, 200 ft wide x 6 to 7 ft ( authorized to 8 ft) Jack Maltester Channel, plus 150 ft x 6 to 7 ft interior access
14	F-14	San Rafael Across the Flats	between San Pablo and Central San Francisco Bay	100 ft wide x 8 ft channel ( approx 2 mile long)
15	F-15	San Rafael Creek Mile 0 to Grand Ave. Bridge	San Rafael Creek, Marin Co.	60 ft wide x 6 ft channel ( approx 1.5 mile long), plus 100 ft x 200 ft x 6 ft turning basin
16	F-16	Suisun Bay Channel	Carquinez Straits, Suisun Bay-Contra Costa and Solano Co.	13 mile long, 300 ft wide x 35 ft channel Bulls Head to NY Slough and 250 ft x 20 ft channel south of Seal Islands
17	F-17	Suisun Slough Channel	Suisun Slough, Solano Co.	13 mile long, 100-200 ft wide by 8 ft deep channel between Suisun City and Grizzly Bay
	<b>N</b>	<b>U.S. Navy</b>		
18	N-1	Alameda NAS	Central SF Bay, City and County of Alameda	42ft deep channel (2 mile long and 1,000 foot wide). 3 mooring basins( 50 ft deep)
19	N-2	Concord NWS	Suisun Bay, Contra Costa Co.	22 ft deep channel between Seal Islands and West Dock plus three berthing areas at piers (32 ft deep) and a 14 ft deep area at Lightening Pier
20	N-3	Hunters Point NSY	South Bay, San Francisco	Berths ( 15 ), Drydocks (3), and channels
21	N-4	Mare Island NSY	Mare Island Strait, Napa River	Docks and berthing areas with depths ranging from 30 ft to 39 ft MLLW datum
22	N-5	Moffett Field NAS	Sunnyvale, Santa Clara Co.	100 ft channel through Guadalupe Slough from SF Bay to Fuel Pier Road, 9 ft depth
23	N-6	Oakland NSC	Oakland , Alameda Co.	1/2 mile channel 400' x 41' depth, 2 basins and 3 berths (38 to 41 ft depth)
24	N-7	Point Molate NFD	Richmond, Central SF Bay	a 2000 ft x 550ft x 35 ft basin plus a 950 ft x 240 ft x 20 ft basin
25	N-8	Treasure Island NS	Treasure Island, SF Bay, SF Co.	3 mile long channel, 1000 to 1500 ft x 35 ft deep plus 3 berthing zones to 45 ft depth

TABLE 2: PROJECT DESCRIPTION AND LOCATION

NO	CODE	PROJECT	LOCATION	DESCRIPTION
	<b>P</b>	<b>Non-Federal / Private</b>		
26	P-1	Benicia Industries Port Terminal	City of Benicia, Solano County	Berth dredging Auto RO/RO terminal Bulk petroleum 38' MLLW, 2400 L.P.
27	P-2	Benicia Marina	City of Benicia, Solano County	recreational boats incl. 10 ft deep main channel, and 8 ft deep inner channel, berths, and fuel dock
28	P-3	Coyote Point Marina	Coyote Point, San Mateo	Entrance channel and berths
29	P-4	Larkspur Ferry Berths / Basin	Conte Madera, Larkspur, Marin County	Turning basin and 3 berths
30	P-5	Port of Oakland Berth Areas	Oakland Harbor, Alameda County	berths range from -34 ft to -42 ft MLLW
31	P-6	Port of Richmond Berth	Richmond Harbor, Contra	berths 6C,7,6A,6B, and terminals 1,2,4
32	P-7	San Francisco Dry Dock	San Francisco Bay	Pier 70
33	P-8	Port of San Francisco Berth Areas	San Francisco	Various areas along waterfront from Fisherman's Wharf to India Basin
34	P-9	Strawberry Point (Tiburon)	Tiburon, Marin County	6 feet project depth, private berthing for live-in boats, seal haul-out
	<b>O</b>	<b>Oil Companies</b>		
35	O-1	EXXON Loading Dock	Carquinez Strait, City of Benicia; Solano County	
36	O-2	UNOCAL Oleum Dock	Martinez, West of 680 bridge, Contra Costa Co.	T-Pier for liquid bulk carriers
37	O-3	CHEVRON Richmond Long Wharf	Rodeo, Carquinez Straits, Contra Costa Co.	berths 1 and 4 dredged to -50 ft MLLW, berths 2 and 3 dredged to -40 ft MLLW
	<b>S</b>	<b>Other Small Projects</b>		
38	S-1	ARCO Richmond Loading Docks	City of Richmond, Contra Costa County	getting ready to deepen to 38 ft
39	S-2	Belvedere Cove (S.F. Yacht Club)		
40	S-3	Berkeley Marina	City of Berkeley	
41	S-4	City of Emeryville	City of Emeryville	
42	S-5	Clipper Yacht Harbor		
43	S-6	Emery Cove		
44	S-7	Greenbrae Marina	Marin County	
45	S-8	Marin Yacht Club		
46	S-9	Martinez Marina	City of Martinez, Contra Costa County	full service 428 berth marina
47	S-10	McNear Pier	City of Martinez, Contra Costa County	
48	S-11	Pacific Gas & Electric	San Mateo County Harbor District	
49	S-12	Paradise Cay Yacht Harbor	Marin County	
50	S-13	Port Sonoma Marina	east of Petaluma River, Sonoma County	deepened channel August of 1996 to -8 ft at zero tide level
51	S-14	Redwood City Yacht Harbor	Redwood City, San Mateo County	500 ft x 30 ft channel through San Bruno Shoal, 30 ft deep channel through Redwood Creek
52	S-15	San Francisco Marina	Central SF Bay	

TABLE 2: PROJECT DESCRIPTION AND LOCATION

NO	CODE	PROJECT	LOCATION	DESCRIPTION
53	S-16	San Rafael Canal	Central SF Bay	
54	S-17	San Rafael Rock Quarry	Central SF Bay	
55	S-18	USCG (Horseshoe Cove & Yerba Buena Island)	Sausalito & eastern end of Yerba Buena Island	
56	S-19	Caltrans	Various bridges (North, Central & South Bay)	
57	S-20	Misc Projects		
58	S-21	Sand Mining	Shoals in Central & Suisun Bay	

### 3. RESULTS

#### 3.1 DREDGING VOLUME & PROJECTIONS

Results for maintenance and new work dredging volumes are presented in this section. The volumes referred to in this report are actual volumes (pre-dredge v/s post-dredge surveys) or pay volumes (actual volume less overdredge allowance), as communicated to us.

Dredging of the San Francisco Bar project, and sand mining, is excluded from the figures presented in this section, because the focus of this investigation is in-Bay dredging projects and disposal sites. A change in dredging or disposal practices is not foreseen at the S. F. Bar site over the next 5 years. The project consists of predominantly sandy material, and has a dedicated disposal site (SF-8) which provides an environmental benefit to beaches in the vicinity (Moffatt & Nichol Engineers 1996).

##### 3.1.1 Maintenance Dredging

Federal navigation and Navy projects constituted almost 90% of all dredging done in the Bay Area up to 1990. Since 1990, dredging by the Navy has declined sharply. Dredging by USACE now constitutes about 2/3rds of the total material dredged in the Bay Area.

The average annual maintenance dredging volumes for historic conditions (up to 1990), recent times (1991 to 1996), and projections up to the year 2001 for the 5 categories are presented below. Dredging volumes for individual small projects vary substantially depending on economic activity, dredging costs, and other factors. Thus, a single volume projection was made for the Other Small Projects category.

**Average Annual Maintenance Dredging Volume (cubic yards)**  
(Distribution by Sponsor)

Category	Historic (Up to 1990)	Recent Times (1991 to 1996)	Projected (1997 to 2001)
Federal Navigation <sup>1</sup>	2,516,000	1,646,000	2,130,000
U.S. Navy	1,687,000	432,000	200,000
Non-Federal / Private	289,000	376,000	370,000
Oil Companies	174,000	187,000	190,000
Other Small Projects	200,000	192,000	200,000
Total	4,866,000	2,833,000	3,090,000

<sup>1</sup> Does not include about 600,000 CY per year dredging of S.F. Bar project

Locations of the relatively large dredging projects (categories 1 to 4) are presented in Figure 1, and significant findings are summarized in this section. Data for each project, including dredging frequency, annual average volume for historic and recent conditions, volumes for which permit applications have been received in 1996 by BCDC and the projected figures are presented in Table 3.

### Summary

1. The average annual maintenance dredging volume in the Bay Area decreased from about 4.9 million cubic yards (MCY) historically, to about 2.8 MCY in recent times.
2. The average annual maintenance dredging volume, over the next 5 years, is estimated to be about 3.1 MCY. The increase of about 260,000 CY, between recent times and the projected figure, is to account for deferred maintenance dredging at the Oakland Harbor, Richmond Harbor, Napa River, San Leandro, and San Rafael projects.
3. Annual average maintenance dredging volume at Navy projects decreased from about 1.7 MCY to 430,000 CY, primarily due to the decommissioning of NAS Alameda, NSY Mare Island, and NSC Oakland. An allowance of about 200,000 CY of dredging per year, over the next 5 years, is made at these sites to account for other uses by the new owner / operator.
4. The decrease in average annual maintenance dredging for the Federal Navigation projects, from historic conditions, is estimated to be about 15%. This is primarily due to a decrease in maintenance dredging at the Mare Island, Richmond, and Pinole Shoal projects as observed in the historical records.
5. Average annual maintenance dredging for the other 3 categories (Non-Federal / Private, Oil Companies and Other Small Projects) is estimated to remain relatively unchanged, at between 650,000 CY and 750,000 CY.
6. About 2/3rds of the average annual volume results from annually dredged projects; the remaining volume is from less frequent projects.

#### **3.1.2 New Work Dredging**

The total new work dredging between 1991 and 1996 was about 5.69 MCY (see Table 3) as described below:

1. Federal Navigation	
Oakland 38 feet deepening (1992)	517,000 CY
Oakland 42 feet deepening (1995/96)	4,070,000 CY
2. U.S. Navy	
NAS Alameda (1993)	213,000 CY
NSC Oakland (1993)	737,000 CY
3. Non-Federal / Private	
Oakland Berth Areas (1992)	<u>153,000 CY</u>
TOTAL	5,690,000 CY

The total new work dredging volume over the next 5 years is estimated to be about 13 MCY as described below:

1. Richmond Harbor 38 feet deepening	1,800,000 CY
2. Oakland Harbor	
42 feet deepening (remaining)	930,000 CY
50 feet deepening (20 MCY total)	10,000,000 CY
3. Other Projects (allowance)	<u>270,000 CY</u>
TOTAL	13,000,000 CY

The estimate for new work dredging is based on the assumption that about half of the 50 feet deepening for the Oakland Harbor will occur by 2001. The future of the John F. Baldwin Phase III deepening is uncertain, and is not included because USACE is evaluating alternatives proposed by others.

### 3.2 DREDGING LOCATION

The total maintenance dredging volume was categorized by location in the Bay Area, as shown on Figure 1. Categories selected are Suisun Bay (upstream of Carquinez Bridge), North Bay (between Carquinez Bridge and Richmond Bridge), Central Bay (between Richmond Bridge and Bay Bridge) and South Bay (south of the Bay Bridge). Volumes for each category, based on historic conditions and projected over the next 5 years are summarized below.

**Average Annual Maintenance Dredging Volume (cubic yards)**  
(Distribution by Dredging Location)

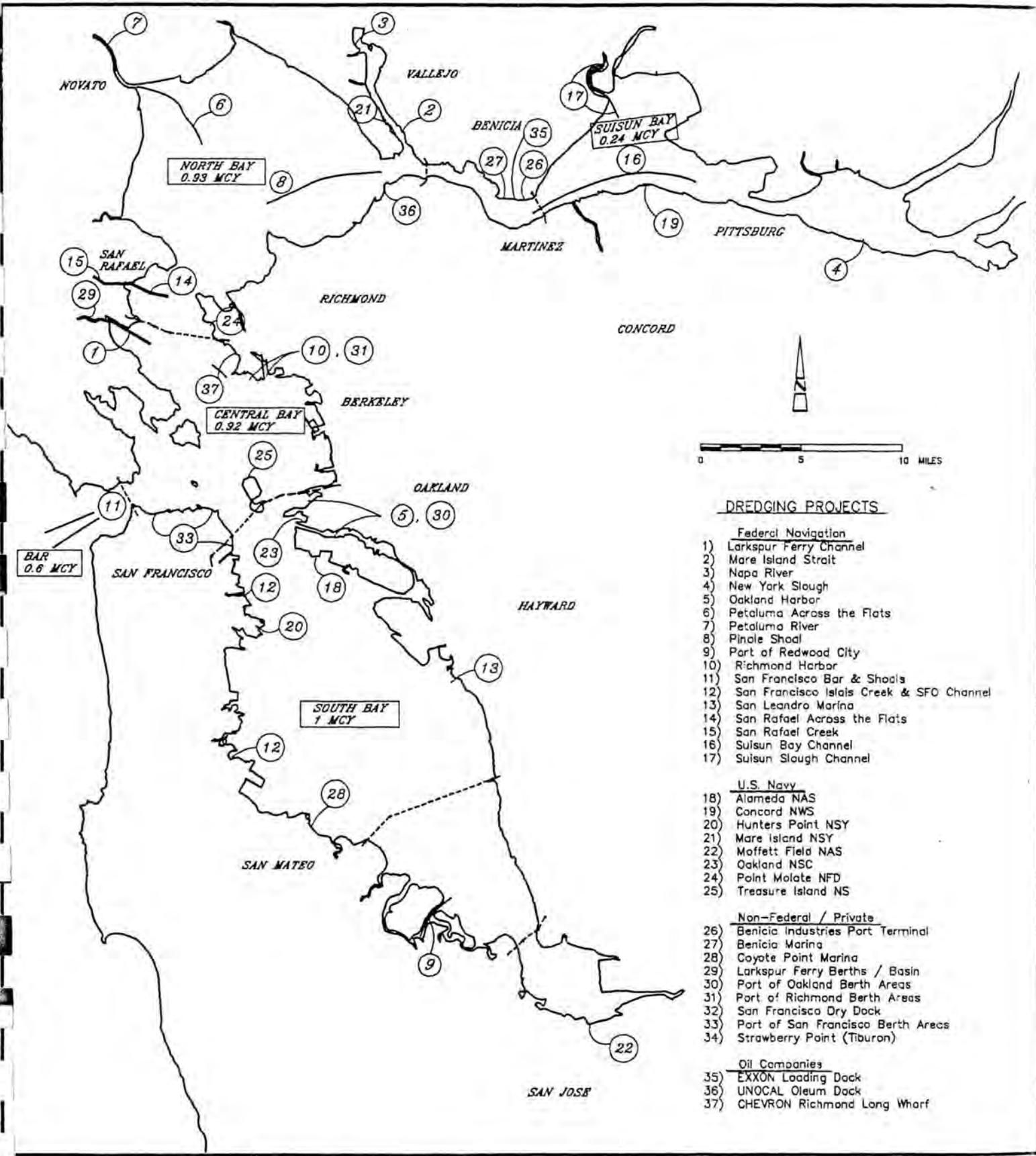
Location	Historic <sup>1</sup> (Up to 1990)	Projected <sup>1</sup> (1997 to 2001)	Change attributed to:
Suisun Bay	242,000	240,000	-
North Bay	1,635,000	930,000	Mare Island base closure & reduced dredging at Pinole Shoal & Richmond Harbor
Central Bay	1,031,000	915,000	-
South Bay <sup>2</sup>	1,958,000	1,005,000	NAS Alameda & NSC Oakland base closures
Total	4,866,000	3,090,000	

<sup>1</sup> Does not include about 600,000 CY per year dredging of S.F. Bar project

<sup>2</sup> Includes projects in the Oakland Estuary

# FIGURE 1: SAN FRANCISCO BAY AREA DREDGING PROJECTS

## DREDGED MATERIAL REUSE STUDY



### DREDGING PROJECTS

- Federal Navigation
- 1) Larkspur Ferry Channel
- 2) Mare Island Strait
- 3) Napa River
- 4) New York Slough
- 5) Oakland Harbor
- 6) Petaluma Across the Flats
- 7) Petaluma River
- 8) Pinole Shoal
- 9) Part of Redwood City
- 10) Richmond Harbor
- 11) San Francisco Bar & Shoals
- 12) San Francisco Islais Creek & SFO Channel
- 13) San Leandro Marina
- 14) San Rafael Across the Flats
- 15) San Rafael Creek
- 16) Suisun Bay Channel
- 17) Suisun Slough Channel
- U.S. Navy
- 18) Alameda NAS
- 19) Concord NWS
- 20) Hunters Point NSY
- 21) Mare Island NSY
- 22) Moffett Field NAS
- 23) Oakland NSC
- 24) Point Molate NFD
- 25) Treasure Island NS
- Non-Federal / Private
- 26) Benicia Industries Port Terminal
- 27) Benicia Marina
- 28) Coyote Point Marina
- 29) Larkspur Ferry Berths / Basin
- 30) Port of Oakland Berth Areas
- 31) Port of Richmond Berth Areas
- 32) San Francisco Dry Dock
- 33) Part of San Francisco Berth Areas
- 34) Strawberry Point (Tiburon)
- Oil Companies
- 35) EXXON Loading Dock
- 36) UNOCAL Oleum Dock
- 37) CHEVRON Richmond Long Wharf

TABLE 3: DREDGING VOLUME AND FREQUENCY

NO	CODE	PROJECT	DREDGING FREQUENCY	DREDGING VOLUME	COMMENTS / EXPECTED CHANGES	New Work Dredging ('91 - '96)	Annual Average		Permit Application (1996)	Projected Volume (Annual)
							('91 - '96)	Pre-90's		
	F	Federal Navigation							625,000	
1	F-1	Larkspur Ferry Channel	6 years	Average annual volume 75000 cy (450,000 cy per episode in the past)	Last dredged in 1995. Anticipate 200,000 cy in 1999		95,923	75,000		75,000
2	F-2	Mare Island Strait	1 year	1.5 MCY/yr up to 1984 ; 542,000 cy/yr '85 to '95	Base decommissioned. Next dredging in January'97 probably to 30 ft (currently authorized depth) or less.		433,783	542,000		400,000
3	F-3	Napa River	8-9 years	550,000 cy per episode in the past	Last dredged in 1988. (700,000 CY incl. marina, widening & OD)		0	69,000	250,000	69,000
4	F-4	New York Slough	4 years	100,000 cy per episode in the past	Last dredged in 1994		8,342	25,000		25,000
5	F-5	Oakland Harbor	1 year	Inner: 261,000 cy/yr Outer: 167,00 cy/yr (for the '80s)	42 ft deepening will probably affect sedimentation and future dredging volume	517K - '92 2.5MCY - '95 1.57MCY - '96	145,108	428,000	200,000	400,000
6	F-6	Petaluma Across the Flats	8 years	430,000 cy per episode from the 60's to 90's	Last dredged in 1994.		55,075	54,000		54,000
7	F-7	Petaluma River Mile 0 to Washington St. Bridge	4 years	240,000 cy per episode from the 50's to 80's. 170,000 +/- currently	last dredging was about 100,000 CY in 1996. Reduction attributed to erosion control measures. Next dredging in 2000		74,723	42,500		42,500
8	F-8	Pinole Shoal	2.5 years	680,000 cy per episode	may be deepened as part of John F. Baldwin Ship Channel project		97,184	272,000		200,000
9	F-9	Port of Redwood City	2-3 years	540,000 cy/episode from '55 to '89; 900,000 cy dredged in last episode	future volume may change depending on results of advantage maintenance dredging (done in part of channel to -34 ft. resulting in 300,000 - 400,000 cy additional volume) next dredge in 1999		288,368	216,000	22,600	216,000
10	F-10	Richmond Harbor	1 year	574,000 cy per episode in the 80's	38 ft deepening (1,792,500 CY) will probably affect sedimentation and future dredging		382,476	574,000		430,000
11	F-11	San Francisco Bar & Shoals	1 year	610,000 cy per episode (70's to present)	Bar site dredged every year. Shoals infrequent		553,649	610,000		600,000
12	F-12	San Francisco Islais Creek & SFO Channel	2 years	155,000 cy per episode in the past.	Islais Creek last dredged in 1977. Authorized Islais Creek project now inactive (Port dredging new channel now); SFO Channel last dredged in 1962		0	0		0
13	F-13	San Leandro Marina	4 years	240,000 cy/episode total (main and interior)	Last dredging in 1993. next dredge episode in 1997		20,195	60,000	185,650	60,000
14	F-14	San Rafael Across the Flats	4.5 years	137,000 cy per episode	Last dredged in 1986		0	30,400	173,250	30,400
15	F-15	San Rafael Creek Mile 0 to Grand Ave. Bridge	4.5 years	111,000 cy per episode in the past	Last dredged in 1991		10,678	24,700		24,700
16	F-16	Suisun Bay Channel	2 years	140,000 cy per episode in the 80's. Currently less	Last dredged in 1994		46,919	70,000	186,200	70,000

TABLE 3: DREDGING VOLUME AND FREQUENCY

NO	CODE	PROJECT	DREDGING FREQUENCY	DREDGING VOLUME	COMMENTS / EXPECTED CHANGES	New Work Dredging ('91 - '96)	Annual Average		Permit Application (1996)	Projected Volume (Annual)
							('91 - '96)	Pre-90's		
17	F-17	Suisun Slough Channel	6 years	200,000 cy per episode	Last dredged in 1991		33,000	33,300		33,000
<b>Subtotal - Federal Navigation</b>						<b>4,613,000</b>	<b>2,245,423</b>	<b>3,125,900</b>	<b>1,642,700</b>	<b>2,729,600</b>
	<b>N</b>	<b>U.S. Navy</b>								
18	N-1	Alameda NAS	1 year	900,000 cy per episode in the past	base decommissioned, anticipate no more navy dredging, or at most 200,000 cy once - maybe 2-3 years from now	213,000 - '93	186,500	900,000	100,000	50,000
19	N-2	Concord NWS	5 years	51,000 cy per episode from the 60's - 80's	may need maintenance dredging in next 1-2 years perhaps +/- 200,000 cy, as usual when needed, very infrequently needed.		0	10,200		10,000
20	N-3	Hunters Point NSY	3 years	140,000 cy per episode in the 70's and 80's	No more Navy sponsored dredging anticipated		0	46,700		10,000
21	N-4	Mare Island NSY	1 year	544,000 cy/yr up to '85 478,000 cy/yr '86 to '91 212,000 cy/yr '92 to '95	base decommissioned, anticipate no more Navy-sponsored dredging		220,138	478,000		50,000
22	N-5	Moffett Field NAS	8 years	77,000 cy per episode in the 70's -80's	Navy handles Defense Logistics Agency supplies which could lead to maintenance dredging of Guadalupe Slough. next dredge possibly in 1997 or 1998		333	9,600		10,000
23	N-6	Oakland NSC	4 years	552,000 cy per episode in the 50's - 80's	base decommissioned, no more dredging envisioned for/by Navy. Port will do dredging in the future.	737,000 - '93	0	138,000		50,000
24	N-7	Point Molate NFD	2 years	142,000 cy per episode in the past	Volume affected by base closures No further Navy sponsored dredging envisioned		25,333	71,000		10,000
25	N-8	Treasure Island NS	11-12 years	382,000 cy per episode in the past	base decommissioned no dredging envisioned		0	33,200		10,000
<b>Subtotal - U.S. Navy</b>						<b>950,000</b>	<b>432,305</b>	<b>1,686,700</b>	<b>100,000</b>	<b>200,000</b>
	<b>P</b>	<b>Non-Federal / Private</b>								
26	P-1	Benicia Industries Port Terminal	12-16 months	32-35,000 cy per episode (25,000 cy per episode in the past)	possibly-dependent on mixing and run-off. next dredge is June to Aug of '97		26,853	33,500	79,000	33,500
27	P-2	Benicia Marina	1 year	20,000 cy per episode presently	expected to dredge 40,000 cy/yr in the future. Permits requested		12,582	20,000		20,000
28	P-3	Coyote Point Marina	infrequent	119,000 cy in '94			19,792	-		15,000
29	P-4	Larkspur Ferry Berths / Basin	2 years	Berths - 4000 cy average annual			18,100	4,000	25,000	15,000

TABLE 3: DREDGING VOLUME AND FREQUENCY

NO	CODE	PROJECT	DREDGING FREQUENCY	DREDGING VOLUME	COMMENTS / EXPECTED CHANGES	New Work Dredging ('91 - '96)	Annual Average		Permit Application (1996)	Projected Volume (Annual)
							('91 - '96)	Pre-90's		
30	P-5	Port of Oakland Berth Areas	1 year	150,000 cy per episode presently		153,000 - '92	154,677	150,000	185,000 incl. exist permits	150,000
31	P-6	Port of Richmond Berth Areas	1.7 years	54,000 cy per episode presently and 29,843 cy per episode in the past	from '79 to '85 -179,056 cy for deepening purposes. 38 ft deepening (118,852 CY) will probably affect sedimentation and future dredging volume		26,924	31,800	106,000	30,000
32	P-7	San Francisco Dry Dock					34,667		98,000	35,000
33	P-8	Port of San Francisco Berth Areas	1 year	50,000 cy per episode presently			39,735	50,000	173,200	50,000
34	P-9	Strawberry Point (Tiburon)	infrequent	218,000 cy - '92/'93, 39,000 maintenance - '96			42,810	-		25,000
<b>Subtotal - Non-Federal / Private</b>						<b>153,000</b>	<b>376,140</b>	<b>289,300</b>	<b>481,200</b>	<b>373,500</b>
<b>O</b>		<b>Oil Companies</b>								
35	O-1	EXXON Loading Dock	1 year	40,000 cy per episode from '83 - '89; 23,000 cy per episode from '91 - '96	Last dredging in 1996. Permit to dredge 800,000 cy over a ten year period starting in '82		20,183	40,000	60,000	40,000
36	O-2	UNOCAL Oleum Dock	2-3 years	Up to 90,000 cy per episode in the past. 53,000 cy per episode presently	Last dredging in 1993. Next dredge episode in 1998		17,709	21,200	55,000	20,000
37	O-3	CHEVRON Richmond Long Wharf	2 years	225,000 cy per episode from '91 - '96	Last dredging in 1996. Have Corps permit for 350,000 cy/yr		149,485	113,000	260,000	130,000
<b>Subtotal - Oil Companies</b>							<b>187,378</b>	<b>174,200</b>	<b>375,000</b>	<b>190,000</b>
<b>S</b>		<b>Other Small Projects</b>								
38	S-1	ARCO Richmond Loading Docks					5,833			
39	S-2	Belvedere Cove (S.F. Yacht Club)					13,988		125,000	
40	S-3	Berkeley Marina					7,362			
41	S-4	City of Emeryville					5,642			
42	S-5	Clipper Yacht Harbor					7,568			
43	S-6	Emery Cove					7,125		50,000	
44	S-7	Greenbrae Marina					14,820			

TABLE 3: DREDGING VOLUME AND FREQUENCY

NO	CODE	PROJECT	DREDGING FREQUENCY	DREDGING VOLUME	COMMENTS / EXPECTED CHANGES	New Work Dredging ('91 - '96)	Annual Average		Permit Application (1996)	Projected Volume (Annual)
							('91 - '96)	Pre-90's		
45	S-8	Marin Yacht Club					7,783			
46	S-9	Martinez Marina	3 years	25,000+ cy per episode in the past	it may increase if funding is available.-next dredge is 1998		0	8,000		
47	S-10	McNear Pier					5,467			
48	S-11	Pacific Gas & Electric					7,867			
49	S-12	Paradise Cay Yacht Harbor					11,399		74,000	
50	S-13	Port Sonoma Marina			Last dredged in '96. Next dredging in '97		0		220,000	
51	S-14	Redwood City Yacht Harbor					11,500			
52	S-15	San Francisco Marina					12,887		125,000	
53	S-16	San Rafael Canal					22,879			
54	S-17	San Rafael Rock Quarry					5,550			
55	S-18	USCG (Horseshoe Cove & Yerba Buena Island)					7,603			
56	S-19	Caltrans			Bridge retrofits (Bay, San Mateo, Benecia, Carquinez, San Rafael)		0		385,000	
57	S-20	Misc Projects	varies	varies	Allied Signal, Aeolin Y.C., Ballena Bay, Brickyard Cove, Castrol, Contra Costa F.C.D., Newport Boating, Oakland Army Base, San Rafael Y.H., Sausalito Y.C., Schnitzer, Shell, Vallejo Ferry, Wickland, &		36,780		597,000	
<b>Subtotal - Other Small Projects</b>							192,053	200,000	1,576,000	200,000
<b>TOTAL ALL PROJECTS</b>						<b>5,716,000</b>	<b>3,433,298</b>	<b>5,476,100</b>	<b>4,174,900</b>	<b>3,693,100</b>
58	S-21	Sand Mining	varies	varies	depends on demand		346,300	-		

### 3.3 DISPOSAL LOCATION

Dredging projects were also categorized by location of the disposal site used for the dredged material. Location of the disposal sites are presented in Figure 2, and the disposal site used for each dredging project is described in Table 4. Total volumes disposed at the designated in-Bay and upland disposal sites, for historic conditions and projected over the next 5 years, are summarized below. The Deep Ocean Disposal Site (DODS) is not included because only one project (Oakland 42 feet deepening) has used the site in recent times, which would make any future projections inaccurate.

**Average Annual Maintenance Dredging Volume (cubic yards)**  
(Distribution by Disposal Location)

Disposal Site	Historic <sup>1</sup> (Up to 1990)	Projected <sup>1</sup> (1997 to 2001)	Change Attributed to:
Alcatraz (SF - 11)	3,002,000	1,882,000	NAS Alameda base closure
Carquinez (SF - 9)	687,000	553,500	Mare Island base closure
San Pablo Bay (SF - 10)	346,000	258,300	reduced dredging at Pinole Shoal
Suisun Bay	95,000	110,700	-
Upland	736,000	285,000	Mare Island base closure
Total	4,866,000	3,090,000	

<sup>1</sup> Does not include about 600,000 CY per year dredging of S.F. Bar project

Discussions with sponsors of dredging projects using upland disposal sites indicated that the primary reasons for disposing upland are:

- proximity of disposal site to dredging areas;
- availability of upland disposal area; and
- lower cost as compared to disposing at in-Bay sites, due to proximity and availability.

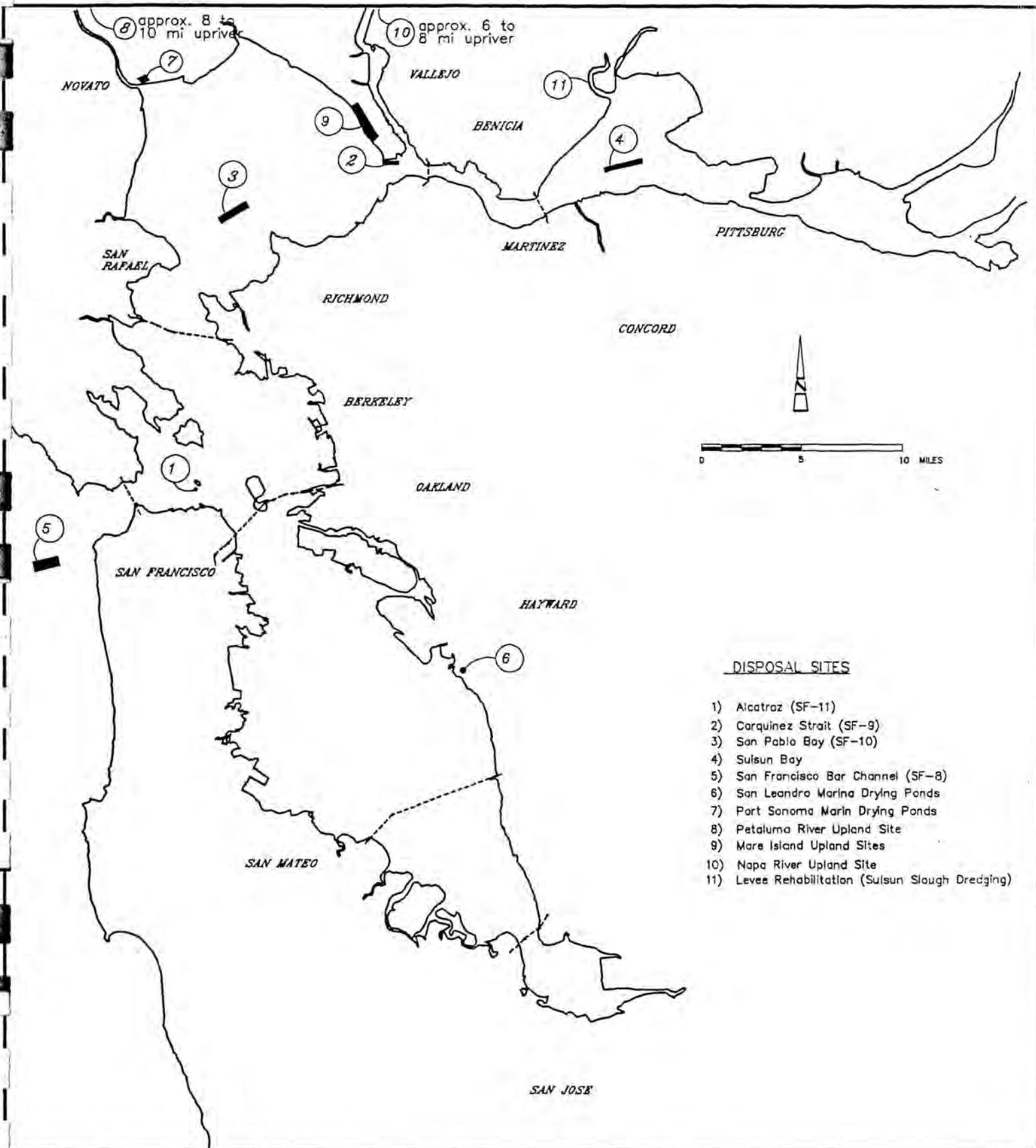
### 3.4 PHYSICAL CHARACTERISTICS OF MATERIAL

Based on the results of the survey and a review of the permit files at SFRWQCB, about 2.6 MCY (84%) of the in-Bay maintenance dredged material is fine grained. For the purpose of this investigation, fine grained material was defined as material which consists of 75% or more of silt & clay. Physical characteristics of material for each dredging project are presented in Table 5.

Projects in the Central Bay, South Bay, and around the periphery of North Bay dredge predominantly silts and clays. Projects located in creeks and rivers also dredge predominantly silts and clays. Projects dredging coarser material are located in a strong-current (tidal and river flows) environment such as the channels in Suisun Bay, Carquinez Straits and San Pablo Bay. However, during particularly wet years, a significant load of fine grained material is also dredged in these areas (for example, the projects in Benecia).

# FIGURE 2: SAN FRANCISCO BAY AREA DISPOSAL SITES

## DREDGED MATERIAL REUSE STUDY



### DISPOSAL SITES

- 1) Alcatraz (SF-11)
- 2) Carquinez Strait (SF-9)
- 3) San Pablo Bay (SF-10)
- 4) Suisun Bay
- 5) San Francisco Bar Channel (SF-8)
- 6) San Leandro Marina Drying Ponds
- 7) Port Sonoma Marin Drying Ponds
- 8) Petaluma River Upland Site
- 9) Mare Island Upland Sites
- 10) Napa River Upland Site
- 11) Levee Rehabilitation (Suisun Slough Dredging)

TABLE 4: DREDGING OPERATIONS

NO	CODE	PROJECT	OPERATIONS			APPROX. COST	DISPOSAL SITE
			Dredging	Transportation	Disposal		
<b>F Federal Navigation</b>							
1	F-1	Larkspur Ferry Channel	clamshell/bucket	barge	barge dump and clamshell/bucket	\$4-5 /cy	Alcatraz (SF-11)
2	F-2	Mare Island Strait	hydraulic	hopper	barge dump		Carquinez Straits (SF-9)
3	F-3	Napa River	hydraulic	pipeline	pipeline		upland sites
4	F-4	New York Slough	hydraulic	pipeline and hopper	barge dump and pipeline		Suisun Bay (aquatic), Carquinez Straits (SF-9) and
5	F-5	Oakland Harbor	hydraulic or clamshell/bucket	barge and hopper	barge dump or clamshell/bucket		Alcatraz (SF-11) , Upland, Deep Ocean Site (aquatic)
6	F-6	Petaluma Across the Flats	clamshell/bucket	barge	barge dump and clamshell/bucket		San Pablo Bay (SF-10), some to Port Sonoma.
7	F-7	Petaluma River Mile 0 to Washingto St. Bridge	hydraulic	pipeline	pipeline		160 acre upland site provided by City
8	F-8	Pinole Shoal	hydraulic	hopper	barge dump		San Pablo Bay (SF-10)
9	F-9	Port of Redwood City	hydraulic or clamshell/bucket	barge and hopper	barge dump or clamshell/bucket	\$3.90 / cy	Alcatraz (SF-11)
10	F-10	Richmond Harbor	hydraulic	hopper	barge dump		Alcatraz (SF-11)
11	F-11	San Francisco Bar & Shoals	hydraulic	hopper	barge dump		SF Bar site (SF-8)
12	F-12	San Francisco Islais Creek & SFO Channel	hydraulic or clamshell/bucket	barge and hopper	barge dump or clamshell/bucket		Alcatraz (SF-11)
13	F-13	San Leandro Marina	hydraulic or clamshell/bucket	pipeline or barge	barge dump or pipeline		upland (within marina property). Next dredging in 1997 - disposal at Alcatraz.
14	F-14	San Rafael Across the Flats	hydraulic or clamshell/bucket	barge and hopper	barge dump or clamshell/bucket		Alcatraz (SF-11)
15	F-15	San Rafael Creek Mile 0 to Grand Ave. Bridge	hydraulic	pipeline	pipeline	\$8.00 cy total; cost share \$1.00 /cy	historically upland. Recent- Alcatraz (SF-11)
16	F-16	Suisun Bay Channel	hydraulic	pipeline and hopper	barge dump and pipeline		Suisun Bay, Carquinez Straits(SF-9) and upland
17	F-17	Suisun Slough Channel	hydraulic or clamshell/bucket	pipeline or barge	barge dump or pipeline		upland (Pierce Island and local duck clubs)
<b>N U.S. Navy</b>							
18	N-1	Alameda NAS	hydraulic or clamshell/bucket	barge or hopper	barge dump or clamshell/bucket	\$7-10/cy	Alcatraz ( SF-11 ) for maintenance. Deep Ocean sites for deepening / future maintenance (if any)
19	N-2	Concord NWS	hydraulic or clamshell/bucket	barge or hopper	barge dump or clamshell/bucket	\$7-10/cy	Carquinez Straits in recent decades
20	N-3	Hunters Point NSY	clamshell/bucket	barge	barge dump		Alcatraz (SF-11)
21	N-4	Mare Island NSY	hydraulic	pipeline	pipeline		Upland disposal ponds on Mare Island
22	N-5	Moffett Field NAS	clamshell/bucket	barge	barge dump	\$8-10/cy	Alcatraz ( SF-11 ) or alternate upland or ocean sites
23	N-6	Oakland NSC	clamshell/bucket	barge	barge dump		various open water sites (Alcatraz, Carquinez, deep ocean )
24	N-7	Point Molate NFD	hydraulic	hopper	barge dump		Alcatraz (SF-11)
25	N-8	Treasure Island NS	hydraulic or clamshell/bucket	barge or hopper	barge dump or clamshell/bucket	\$7-10/cy	Alcatraz (SF-11) and Upland
<b>P Non-Federal / Private</b>							
26	P-1	Benicia Industries Port Terminal	clamshell/bucket	barge	barge dump	\$4.50 - \$5 /cy	Carquinez Straits (SF-9)
27	P-2	Benicia Marina	clamshell/bucket	barge	barge dump	\$6 /cy	Carquinez Straits (SF-9)
28	P-3	Coyote Point Marina	hydraulic and clamshell/bucket	barge	barge dump		Alcatraz (SF-11)
29	P-4	Larkspur Ferry Berths / Basin	clamshell/bucket	barge	barge dump	\$8 - \$9 / cy	Alcatraz (SF-11)

TABLE 4: DREDGING OPERATIONS

NO	CODE	PROJECT	OPERATIONS			APPROX. COST	DISPOSAL SITE
			Dredging	Transportation	Disposal		
30	P-5	Port of Oakland Berth Areas	clamshell/bucket	barge	99% barge dump, 5% or less clamshell	\$5 (in-bay), \$15 (ocean), \$25-80 upland	99% Alcatraz (SF-11), 1% upland (berth 10 w/ disposal at Redwood Landfill)
31	P-6	Port of Richmond Berth Areas	clamshell/bucket	barge	barge dump		Alcatraz (SF-11)
32	P-7	San Francisco Dry Dock	clamshell/bucket	barge	barge dump		Alcatraz (SF-11)
33	P-8	Port of San Francisco Berth Areas	clamshell/bucket	barge	barge dump		Alcatraz (SF-11)
34	P-9	Strawberry Point (Tiburon)	clamshell/bucket	barge	barge dump		Alcatraz (SF-11)
	<b>O</b>	<b>Oil Companies</b>					
35	O-1	EXXON Loading Dock	clamshell/bucket	barge	barge dump		SF-9 (Carquinez)
36	O-2	UNOCAL Oleum Dock	Clamshell/bucket	barge	barge dump	\$7.15 /cy	SF-9 (Carquinez)
37	O-3	CHEVRON Richmond Long Wharf	Clamshell/bucket	barge	barge dump		Alcatraz(SF-11)
	<b>S</b>	<b>Other Small Projects</b>					
38	S-1	ARCO Richmond Loading Docks					
39	S-2	Belvedere Cove (S.F. Yacht Club)	Clamshell/bucket	barge	barge dump		
40	S-3	Berkeley Marina					
41	S-4	City of Emeryville					
42	S-5	Clipper Yacht Harbor	Clamshell/bucket	barge	barge dump		
43	S-6	Emery Cove					
44	S-7	Greenbrae Marina	Clamshell/bucket	barge	barge dump		
45	S-8	Marin Yacht Club					
46	S-9	Martinez Marina	hydraulic	pipeline	pipeline	\$9.00 /cy	on site in spoils basin
47	S-10	McNear Pier					
48	S-11	Pacific Gas & Electric					
49	S-12	Paradise Cay Yacht Harbor	Clamshell/bucket	barge	barge dump		
50	S-13	Port Sonoma Marina	hydraulic	pipeline	pipeline		
51	S-14	Redwood City Yacht Harbor	hydraulic and clamshell/bucket	barge and hopper	barge dump and clamshell/bucket	\$3.89 /cy	Alcatraz (SF-11)
52	S-15	San Francisco Marina	Clamshell/bucket	barge	barge dump		
53	S-16	San Rafael Canal	Clamshell/bucket	barge	barge dump		
54	S-17	San Rafael Rock Quarry					
55	S-18	USCG (Horseshoe Cove & Yerba Buena Island)	hydraulic or clamshell/bucket	barge	barge dump or clamshell/bucket		Alcatraz(SF-11)
56	S-19	Caltrans					
57	S-20	Misc Projects					
58	S-21	Sand Mining					

### **3.5 NUAD MATERIAL**

About 475,000 CY of NUAD material, which requires to be dredged, was identified in this study (see Table 5). About 88% of this NUAD material is a result of deepening work, or from deferred maintenance dredging projects which has allowed accumulation of contaminants. About 235,000 CY is from the Richmond deepening project, which will be disposed upland as proposed in the Richmond deepening EIR/S.

The recurring volume of NUAD material, after the deepening and deferred maintenance projects are completed, was estimated as follows:

- For maintenance dredging projects, 30% of the identified NUAD volume was estimated to recur on an annual basis;
- For new work projects, 10% of the identified NUAD volume was estimated to recur on an annual basis.

Based on these assumptions, the average annual volume of NUAD material was estimated to be between 70,000 and 83,000 CY per year.

### **3.6 DREDGING EQUIPMENT**

Information regarding the equipment used for dredging, transportation and disposal operations at each project was summarized from the interview form (see Table 4). Dredging equipment identified is the hopper, hydraulic pipeline, large clamshell and small clamshell. For many projects, dredging equipment varies for each dredging episode. Transportation equipment identified is hopper, scow/barge, and pipeline. Significant findings are summarized below:

- Hopper and large clamshell dredging accounts for about 1.6 MCY (81%) of in-Bay maintenance dredging. Hopper dredging is used at many Federal navigation projects, and in open exposed areas. For sandy material, the most common equipment is the hopper dredge.
- Hydraulic pipeline dredging accounts for approximately 350,000 CY of maintenance dredging. It is mainly used at small dredging projects or when disposal is at upland sites.
- Small clamshell accounts for about 150,000 CY of maintenance dredging, primarily at the small dredging projects.

TABLE 5: CHARACTERISTICS OF DREDGED MATERIAL

NO	CODE	PROJECT	SEDIMENT TYPE	VOLUME OF UNSUITABLE	CONTAMINANT TYPE	COMMENTS
<b>F Federal Navigation</b>						
1	F-1	Larkspur Ferry Channel	> 75% silts and clays based on 1981, 1984, 1988 test results	0	N/A	
2	F-2	Mare Island Strait	silty clay (>75% silt & clay)	0	N/A	
3	F-3	Napa River	not characterized	?	?	
4	F-4	New York Slough	<25% silts and clays	0	N/A	
5	F-5	Oakland Harbor	>75% silt & clay	about 6% of maint. vol. (25,000 to 27,000 cy)	PAH, toxicity, chromium	Recurring volume would probably be less (assume 30% of NUAD identified)
6	F-6	Petaluma Across the Flats	silt (50-75% silt & clay based on judgment)	0	N/A	About 207,000 cy from last episode used at Sonoma Baylands for marsh
7	F-7	Petaluma River Mile 0 to Washington St. Bridge	unknown (> 75% silts and clays based on judgment)	0	N/A	
8	F-8	Pinole Shoal	<25% silts and clays	0	N/A	
9	F-9	Port of Redwood City	silty clay (>75% silt & clay)	less than 100,000 cy (say 75,000 cy)	unknown	One time volume. Recurring volume would probably be less (assume 30% of NUAD identified)
10	F-10	Richmond Harbor	Inner-clay, Outer-loam (>75% silt and clay)	New work - 138,430 cy	oil, grease, metals	One time volume. Recurring volume would probably be less (assume 10% of NUAD identified)
11	F-11	San Francisco Bar & Shoals	<25% silts and clays	0	N/A	
12	F-12	San Francisco Islais Creek & SFO Channel	>75% silt & clay (judgment)	not dredged (see P-8)	not dredged (see P-8)	
13	F-13	San Leandro Marina	silty clay (50-75% silt & clay)	0	N/A	
14	F-14	San Rafael Across the Flats	bay mud (>75% silt and clay)	about 4000	oil, grease, TBT	One time volume. Recurring volume would probably be less (assume 30% of NUAD identified)
15	F-15	San Rafael Creek Mile 0 to Grand Ave. Bridge	silt (>75% silt and clay)	4000	oil, grease, TBT	One time volume. Recurring volume would probably be less (assume 30% of NUAD identified)
16	F-16	Suisun Bay Channel	<25% silts and clays	0	N/A	
17	F-17	Suisun Slough Channel	unknown (> 75% silts and clays based on judgment)	0	N/A	
<b>N U.S. Navy</b>						
18	N-1	Alameda NAS	silt, clay & sand	0	N/A	
19	N-2	Concord NWS	berthing areas - silt & clay channel - sand	0	N/A	
20	N-3	Hunters Point NSY	unknown (> 75% silts and clays based on judgment)	unknown (some is probably contaminated)	unknown	Probably one time volume
21	N-4	Mare Island NSY	silty clay	0	N/A	
22	N-5	Moffett Field NAS	unknown (> 75% silts and clays based on judgment)	< 30% of maint. volume (say 45,000 cy)	unknown	Recurring volume would probably be less (assume 30% of NUAD identified)
23	N-6	Oakland NSC	unknown (> 75% silts and clays based on judgment)	0	N/A	
24	N-7	Point Molate NFD	unknown (> 75% silts and clays based on judgment)	0	N/A	
25	N-8	Treasure Island NS	unknown (> 75% silts and clays based on judgment)	0	N/A	
<b>P Non-Federal / Private</b>						
26	P-1	Benicia Industries Port Terminal	50-75% silts and clays	0	N/A	
27	P-2	Benicia Marina	>75% silt and clay based on testing	0	N/A	
28	P-3	Coyote Point Marina	>75% silt and clay based on testing	0	N/A	
29	P-4	Larkspur Ferry Berths / Basin	>75% silt and clay based on '88,'90, '93 tests	0	N/A	

TABLE 5: CHARACTERISTICS OF DREDGED MATERIAL

NO	CODE	PROJECT	SEDIMENT TYPE	VOLUME OF UNSUITABLE	CONTAMINANT TYPE	COMMENTS
30	P-5	Port of Oakland Berth Areas	>75% silts and clay based on testing	≤1% maint. volume (20,000 - 30,000 cy) plus 20,000 cy new work @ Berths 22-26	PAH's typical, TBT occasionally	New work - one time volume, (assume 10% of NUAD identified); Maintenance - recurring volume may be less (assume 30% of NUAD identified)
31	P-6	Port of Richmond Berth Areas	>75% silts and clay based on testing	New work - 95,936	oil, grease, metals	One time volume. Recurring volume would probably be less (assume 10% of NUAD identified)
32	P-7	San Francisco Dry Dock	unknown (> 75% silts and clays based on judgment)	?	?	
33	P-8	Port of San Francisco Berth Areas	>75% silts and clay based on testing	5000 cy @ Piers 33 & 35	oil, grease, PAH's	One time volume. Recurring volume would probably be less (assume 30% of NUAD identified)
34	P-9	Strawberry Point (Tiburon)	50-75% silts and clay based on judgment	0	N/A	
<b>O Oil Companies</b>						
35	O-1	EXXON Loading Dock	>75% silt and clay based on testing	0	N/A	
36	O-2	UNOCAL Oleum Dock	90% fine sand based on testing	0	N/A	
37	O-3	CHEVRON Richmond Long Wharf	silt & sandy silt	0	N/A	
<b>S Other Small Projects</b>						
38	S-1	ARCO Richmond Loading Docks		0	N/A	
39	S-2	Belvedere Cove (S.F. Yacht Club)		0	N/A	
40	S-3	Berkeley Marina		0	N/A	
41	S-4	City of Emeryville		0	N/A	
42	S-5	Clipper Yacht Harbor		0	N/A	
43	S-6	Emery Cove		0	N/A	
44	S-7	Greenbrae Marina		0	N/A	
45	S-8	Marin Yacht Club		0	N/A	
46	S-9	Martinez Marina	fine loose to soft silty mud based on testing	0	N/A	IT Corporation has used dredged material to develop marsh areas in 1994
47	S-10	McNear Pier		0	N/A	
48	S-11	Pacific Gas & Electric				
49	S-12	Paradise Cay Yacht Harbor		0	N/A	
50	S-13	Port Sonoma Marina	>75% silts and clays based on testing	0	N/A	
51	S-14	Redwood City Yacht Harbor	>75% silts and clays based on testing	0	N/A	
52	S-15	San Francisco Marina		0	N/A	
53	S-16	San Rafael Canal		0	N/A	
54	S-17	San Rafael Rock Quarry				
55	S-18	USCG (Horseshoe Cove & Yerba Buena Island)		0	N/A	
56	S-19	Caltrans	varies (coarse for Carquinez Straits, finer for varies)	30,000	?	One time volume.
57	S-20	Misc Projects	varies	Assume 3% (+6,000 cy/yr)	-	assumed 3% of 200,000 CY/yr
58	S-21	Sand Mining	predominantly sand	0	N/A	
<b>VOLUME OF UNSUITABLE MATERIAL</b>				<b>474,400 CY</b>		Recurring volume - between 70,000 and 83,000 CY/yr on average

## REFERENCES

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1. U.S. Army Corps of Engineers, San Francisco District, Annual Dredging and Disposal Report, 1995, 1996.
2. San Francisco Bay Conservation and Development Commission, Dredging and Disposal Road Maps, 1992, 1993, 1994, 1995.
3. Bay Planning Coalition, Estimation of Non-Federal Dredger Fees for Regional Monitoring Program (Draft), 1996.
4. U.S. Army Corps of Engineers, San Francisco District, Historical Dredging Files Index, updated December 1996.
5. U.S. Environmental Protection Agency, U.S. Army Corps of Engineers, San Francisco District, San Francisco Bay Conservation and Development Commission, California State Water Resources Control Board, Long Term Management Strategy (LTMS) for the Placement of Dredged Material in the San Francisco Bay Region, Draft Policy Environmental Impact Statement/Report, WRCB, April 1996.
6. Moffatt & Nichol Engineers, Reduce Dredging Requirements, prepared for U.S. Army Corps of Engineers, San Francisco District, November 1992.
7. Moffatt & Nichol Engineers, Sediment Transport Processes Study, Ocean Beach, San Francisco, California, prepared for U.S. Army Corps of Engineers, San Francisco District, November 1992.
8. Ogden Beeman & Associates, Reduce Dredging Requirements, prepared for U.S. Army Corps of Engineers, San Francisco District, October 1988.
9. San Francisco Regional Water Quality Control Board, Permit files on sediment test results for various projects.

*APPENDIX A*

Structured Interview Form

### DREDGING PROJECT DATA SHEET

1 Project: \_\_\_\_\_ 2. Code: \_\_\_\_\_

3 Sponsor: \_\_\_\_\_

4 Location: \_\_\_\_\_

5 Description: \_\_\_\_\_

6 Dredging Frequency: \_\_\_\_\_ When is next dredge episode ? \_\_\_\_\_

7 Dredging Volume:

a) Maintenance: \_\_\_\_\_ CY per episode (in the past)

b) Maintenance: \_\_\_\_\_ CY per episode (presently)

c) New Work: \_\_\_\_\_ CY ; When ? \_\_\_\_\_

new work related to:  deepening to: \_\_\_\_\_ ft

widening to: \_\_\_\_\_ ft

8 Do you anticipate the volume of dredging to change in the future (5 yr planning window) ? \_\_\_\_\_

9 Project Operation: (currently used methods)

a) Dredging:  Hydraulic  Clamshell/Bucket

b) Transportation:  Pipeline  Barge

c) Disposal:  Barge Dump  Pipeline  Clamshell/Bucket

10 Disposal Site: \_\_\_\_\_ (currently used) \_\_\_\_\_

11 Mat'l Characteristics (available data)

<u>Maintenance</u>	<u>New Work</u>
<input type="checkbox"/> >75% silts & clays	<input type="checkbox"/> >75% silts & clays
<input type="checkbox"/> 50-75% silts & clays	<input type="checkbox"/> 50-75% silts & clays
<input type="checkbox"/> 25-50% silts & clays	<input type="checkbox"/> 25-50% silts & clays
<input type="checkbox"/> <25% silts & clays	<input type="checkbox"/> <25% silts & clays

Based on ? \_\_\_\_\_ (testing, judgment, etc.)

12 Approx. Volume of Mat'l Unsuited for Aquatic Disposal : \_\_\_\_\_ % of maint. volume (of item 7 above)

Contaminant type(s) (e.g. DDT, PCB, etc.) (estimated) \_\_\_\_\_ % of new work volume (of item 7 above)

13 Are there any areas you are not dredging due to contamination reasons ?  No  Yes If so, how much ? (CY) \_\_\_\_\_

14 Additional comments: \_\_\_\_\_

15 Approximate dredging / disposal costs : your cost (\$/CY) \_\_\_\_\_ total cost (\$/CY) \_\_\_\_\_

16 Respondent: Name: \_\_\_\_\_ Tel. No. \_\_\_\_\_ Organization: \_\_\_\_\_ Fax No. \_\_\_\_\_

*APPENDIX B*

Summary of Data for Dredging Projects

*FEDERAL NAVIGATION PROJECTS*

## SUMMARY OF DATA

### DESCRIPTION AND CONTACTS

PROJECT	Larkspur Ferry Channel
---------	------------------------

LOCATION	DESCRIPTION	SPONSOR AND/OR CONTACT	BENEFICIARY AND/OR CONTACT
Central San Francisco Bay, Marin Co.	232 ft x 13 ft access channel 2-3 miles long from SF Bay to Ferry Terminal (authorized to 15 ft)	USACE, Mark McGovern, Cons Ops Ph: 977-8467	GGBHTD, Reuben Di Rado Ph: 415-923-2322 ; Fx: 923-2348

### DREDGING VOLUME / FREQUENCY

PROJECT	Larkspur Ferry Channel
---------	------------------------

HISTORIC DREDGING	DREDGING FREQUENCY	PROJECTED ANNUAL AVERAGE	COMMENTS / EXPECTED CHANGES
Average annual volume 75000 cy (450,000 cy per episode in the past)	6 years	75000	Last dredged in 1995. Anticipate 200,000 cy in 1999

### OPERATIONS

PROJECT	Larkspur Ferry Channel
---------	------------------------

DISPOSAL SITE	Dredging	Transportation	Disposal
Alcatraz (SF-11)	clamshell/bucket	barge	barge dump and clamshell/bucket

### MATERIAL CHARACTERISTICS

PROJECT	Larkspur Ferry Channel
---------	------------------------

SEDIMENT TYPE	VOLUME OF UNSUITABLE MATERIAL	COMMENTS	CONTAMINANT TYPE
> 75% silts and clays based on 1981, 1984, 1988 test results	0	(blank)	N/A

## SUMMARY OF DATA

### DESCRIPTION AND CONTACTS

PROJECT	Mare Island Strait
---------	--------------------

LOCATION	DESCRIPTION	SPONSOR AND/OR CONTACT	BENEFICIARY AND/OR CONTACT
Napa River, Solano County	700 ft x 30 ft channel, plus a 1000 ft x 30 ft basin. A subset of this channel (600 ft wide) is maintained at 36 ft for the Navy	USACE, Mark McGovern, Cons Ops, 977-8467 AND Rod Chisolm 977-8668	Mare Island Base Reuse Auth., George Young 556-3098 AND Laurel Marcus 510-531-3101 Fx: 531-3006

### DREDGING VOLUME / FREQUENCY

PROJECT	Mare Island Strait
---------	--------------------

HISTORIC DREDGING	DREDGING FREQUENCY	PROJECTED ANNUAL AVERAGE	COMMENTS / EXPECTED CHANGES
1.5 MCY/yr up to 1984 ; 542,000 cy/yr '85 to '95	1 year	400000	Base decommissioned. Next dredging in January'97 probably to 30 ft (currently authorized depth) or less.

### OPERATIONS

PROJECT	Mare Island Strait
---------	--------------------

DISPOSAL SITE	Dredging	Transportation	Disposal
Carquinez Straits (SF-9)	hydraulic	hopper	barge dump

### MATERIAL CHARACTERISTICS

PROJECT	Mare Island Strait
---------	--------------------

SEDIMENT TYPE	VOLUME OF UNSUITABLE MATERIAL	COMMENTS	CONTAMINANT TYPE
silty clay (>75% silt & clay)	0	(blank)	N/A

SUMMARY OF DATA

**DESCRIPTION AND CONTACTS**

PROJECT	Napa River
---------	------------

LOCATION	DESCRIPTION	SPONSOR AND/OR CONTACT	BENEFICIARY AND/OR CONTACT
Napa River, Solano and Napa Co.	100 ft wide x 15 ft channel from Mare Island to Asylum Slough; 75 ft wide x 10 ft thence, to Napa City	USACE, Mark McGovern, Cons Ops Ph: 977-8467	Napa County, Bob Sorsen, Flood Control Dist. Ph: 707-253-4351; Fx:

**DREDGING VOLUME / FREQUENCY**

PROJECT	Napa River
---------	------------

HISTORIC DREDGING	DREDGING FREQUENCY	PROJECTED ANNUAL AVERAGE	COMMENTS / EXPECTED CHANGES
550,000 cy per episode in the past	8-9 years	69000	Last dredged in 1988. (700,000 CY incl. marina, widening & OD)

**OPERATIONS**

PROJECT	Napa River
---------	------------

DISPOSAL SITE	Dredging	Transportation	Disposal
upland sites	hydraulic	pipeline	pipeline

**MATERIAL CHARACTERISTICS**

PROJECT	Napa River
---------	------------

SEDIMENT TYPE	VOLUME OF UNSUITABLE MATERIAL	COMMENTS	CONTAMINANT TYPE
not characterized	?	(blank)	?

SUMMARY OF DATA

**DESCRIPTION AND CONTACTS**

PROJECT	New York Slough
---------	-----------------

LOCATION	DESCRIPTION	SPONSOR AND/OR CONTACT	BENEFICIARY AND/OR CONTACT
Suisun Bay Channel, Contra Costa Co.	225 to 400 ft wide, 35 ft deep channel from mile 13 of Suisun Bay channel to San Joaquin River (about 4 miles)	USACE, Mark McGovern, Cons Ops Ph: 977-8467	Port of Stockton, Patricia Huff Ph: 209-946-0246 ; Fx 209-466-7244

**DREDGING VOLUME / FREQUENCY**

PROJECT	New York Slough
---------	-----------------

HISTORIC DREDGING	DREDGING FREQUENCY	PROJECTED ANNUAL AVERAGE	COMMENTS / EXPECTED CHANGES
100,000 cy per episode in the past	4 years	25000	Last dredged in 1994

**OPERATIONS**

PROJECT	New York Slough
---------	-----------------

DISPOSAL SITE	Dredging	Transportation	Disposal
Suisun Bay (aquatic), Carquinez Straits (SF-9) and upland	hydraulic	pipeline and hopper	barge dump and pipeline

**MATERIAL CHARACTERISTICS**

PROJECT	New York Slough
---------	-----------------

SEDIMENT TYPE	VOLUME OF UNSUITABLE MATERIAL	COMMENTS	CONTAMINANT TYPE
<25% silts and clays	0	(blank)	N/A

SUMMARY OF DATA

**DESCRIPTION AND CONTACTS**

PROJECT	Oakland Harbor
---------	----------------

LOCATION	DESCRIPTION	SPONSOR AND/OR CONTACT	BENEFICIARY AND/OR CONTACT
Oakland, Alameda Co.	Outer Harbor 42 ft deep (600 to 950 ft wide, 3 miles long) Inner Harbor 42 ft deep (being dredged, 300 to 800 ft wide, 8 miles long)	USACE, Mark McGovern, Cons Ops Ph: 977-8467	Port of Oakland Jon Amdur, Environmental Ph: 510-272-1582 ; Fx: 510-465-3755

**DREDGING VOLUME / FREQUENCY**

PROJECT	Oakland Harbor
---------	----------------

HISTORIC DREDGING	DREDGING FREQUENCY	PROJECTED ANNUAL AVERAGE	COMMENTS / EXPECTED CHANGES
Inner: 261,000 cy/yr Outer: 167,00 cy/yr (for the '80s)	1 year	400000	42 ft deepening will probably affect sedimentation and future dredging volume

**OPERATIONS**

PROJECT	Oakland Harbor
---------	----------------

DISPOSAL SITE	Dredging	Transportation	Disposal
Alcatraz (SF-11) , Upland, Deep Ocean Site (aquatic)	hydraulic or clamshell/bucket	barge and hopper	barge dump or clamshell/bucket

**MATERIAL CHARACTERISTICS**

PROJECT	Oakland Harbor
---------	----------------

SEDIMENT TYPE	VOLUME OF UNSUITABLE MATERIAL	COMMENTS	CONTAMINANT TYPE
>75% silt & clay	about 6% of maint. vol. (25,000 to 27,000 cy)	Recurring volume would probably be less (assume 30% of NUAD identified)	PAH, toxicity, chromium

## SUMMARY OF DATA

### DESCRIPTION AND CONTACTS

PROJECT	Petaluma Across the Flats
---------	---------------------------

LOCATION	DESCRIPTION	SPONSOR AND/OR CONTACT	BENEFICIARY AND/OR CONTACT
San Pablo Bay to Railroad Bridge at mouth	200 ft wide x 8 ft channel across mud flats	USACE, Mark McGovern, Cons Ops Ph: 977-8467 ALSO : Mike Cheney 510-339-0665	N / A

### DREDGING VOLUME / FREQUENCY

PROJECT	Petaluma Across the Flats
---------	---------------------------

HISTORIC DREDGING	DREDGING FREQUENCY	PROJECTED ANNUAL AVERAGE	COMMENTS / EXPECTED CHANGES
430,000 cy per episode from the 60's to 90's	8 years	54000	Last dredged in 1994.

### OPERATIONS

PROJECT	Petaluma Across the Flats
---------	---------------------------

DISPOSAL SITE	Dredging	Transportation	Disposal
San Pablo Bay (SF-10), some to Port Sonoma.	clamshell/bucket	barge	barge dump and clamshell/bucket

### MATERIAL CHARACTERISTICS

PROJECT	Petaluma Across the Flats
---------	---------------------------

SEDIMENT TYPE	VOLUME OF UNSUITABLE MATERIAL	COMMENTS	CONTAMINANT TYPE
silt (50-75% silt & clay based on judgment)	0	About 207,000 cy from last episode used at Sonoma Baylands for marsh restoration	N/A

## SUMMARY OF DATA

### DESCRIPTION AND CONTACTS

PROJECT	Petaluma River Mile 0 to Washington St. Bridge
---------	---

LOCATION	DESCRIPTION	SPONSOR AND/OR CONTACT	BENEFICIARY AND/OR CONTACT
Petaluma River, Marin and Sonoma Co.	100 ft wide x 8 ft channel (approx 14 mile long) plus a turning basin (300-400 ft wide) and 90 ft x 4 ft channel	USACE, Mark McGovern, Cons Ops Ph: 977-8467	City of Petaluma, Tom Hargis Ph: 707-778-4304 ; Fx: 778-4437

### DREDGING VOLUME / FREQUENCY

PROJECT	Petaluma River Mile 0 to Washington St. Bridge
---------	---

HISTORIC DREDGING	DREDGING FREQUENCY	PROJECTED ANNUAL AVERAGE	COMMENTS / EXPECTED CHANGES
240,000 cy per episode from the 50's to 80's. 170,000 +/- currently	4 years	42500	last dredging was about 100,000 CY in 1996. Reduction attributed to erosion control measures. Next dredging in 2000

### OPERATIONS

PROJECT	Petaluma River Mile 0 to Washington St. Bridge
---------	--

DISPOSAL SITE	Dredging	Transportation	Disposal
160 acre upland site provided by	hydraulic	pipeline	pipeline

### MATERIAL CHARACTERISTICS

PROJECT	Petaluma River Mile 0 to Washington St. Bridge
---------	--

SEDIMENT TYPE	VOLUME OF UNSUITABLE MATERIAL	COMMENTS	CONTAMINANT TYPE
unknown (> 75% silts and clays based on judgment)	0	(blank)	N/A

SUMMARY OF DATA

**DESCRIPTION AND CONTACTS**

PROJECT	Pinole Shoal
---------	--------------

LOCATION	DESCRIPTION	SPONSOR AND/OR CONTACT	BENEFICIARY AND/OR CONTACT
San Pablo Bay, Contra Costa Co.	600 ft wide x 36 ft channel through Pinole Shoal (11 mile long) plus a maneuvering area near Oleum Pier	USACE, Mark McGovern, Cons Ops Ph: 977-8467 AND Jeff Chatfield - 8710	N / A

**DREDGING VOLUME / FREQUENCY**

PROJECT	Pinole Shoal
---------	--------------

HISTORIC DREDGING	DREDGING FREQUENCY	PROJECTED ANNUAL AVERAGE	COMMENTS / EXPECTED CHANGES
680,000 cy per episode	2.5 years	200000	may be deepened as part of John F. Baldwin Ship Channel project

**OPERATIONS**

PROJECT	Pinole Shoal
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DISPOSAL SITE	Dredging	Transportation	Disposal
San Pablo Bay (SF-10)	hydraulic	hopper	barge dump

**MATERIAL CHARACTERISTICS**

PROJECT	Pinole Shoal
---------	--------------

SEDIMENT TYPE	VOLUME OF UNSUITABLE MATERIAL	COMMENTS	CONTAMINANT TYPE
<25% silts and clays	0	(blank)	N/A

SUMMARY OF DATA

**DESCRIPTION AND CONTACTS**

PROJECT	Port of Redwood City
---------	----------------------

LOCATION	DESCRIPTION	SPONSOR AND/OR CONTACT	BENEFICIARY AND/OR CONTACT
Redwood City, San Mateo County	500 ft wide x 30 ft channel through San Bruno Shoal, 30 ft deep channel through Redwood Creek (about 3.5 miles)	USACE, Mark McGovern, Cons Ops Ph: 977-8467	Port of Redwood City, Mike Giari Ph:415-306-4150 Fx: 369-7636

**DREDGING VOLUME / FREQUENCY**

PROJECT	Port of Redwood City
---------	----------------------

HISTORIC DREDGING	DREDGING FREQUENCY	PROJECTED ANNUAL AVERAGE	COMMENTS / EXPECTED CHANGES
540,000 cy/episode from '55 to '89; 900,000 cy dredged in last episode	2-3 years	216000	future volume may change depending on results of advantage maintenance dredging (done in part of channel to -34 ft. resulting in 300,000 - 400,000 cy additional volume) Next dredge in 1999

**OPERATIONS**

PROJECT	Port of Redwood City
---------	----------------------

DISPOSAL SITE	Dredging	Transportation	Disposal
Alcatraz (SF-11)	hydraulic or clamshell/bucket	barge and hopper	barge dump or clamshell/bucket

**MATERIAL CHARACTERISTICS**

PROJECT	Port of Redwood City
---------	----------------------

SEDIMENT TYPE	VOLUME OF UNSUITABLE MATERIAL	COMMENTS	CONTAMINANT TYPE
silty clay (>75% silt & clay)	less than 100,000 cy (say 75,000 cy)	One time volume. Recurring volume would probably be less (assume 30% of NUAD identified)	unknown

## SUMMARY OF DATA

### DESCRIPTION AND CONTACTS

PROJECT	Richmond Harbor
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LOCATION	DESCRIPTION	SPONSOR AND/OR CONTACT	BENEFICIARY AND/OR CONTACT
San Pablo Bay, Contra Costa Co.	600 ft wide x 45 ft approach channel and maneuvering area; 600 ft wide x 35 ft entrance channel ; 35 ft deep inner harbor channel (varying widths)	USACE, Mark McGovern, Cons Ops Ph: 977-8467	Port of Richmond, Eugene Serex Ph: 510-215-4600

### DREDGING VOLUME / FREQUENCY

PROJECT	Richmond Harbor
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HISTORIC DREDGING	DREDGING FREQUENCY	PROJECTED ANNUAL AVERAGE	COMMENTS / EXPECTED CHANGES
574,000 cy per episode in the 80's	1 year	430000	38 ft deepening (1,792,500 CY) will probably affect sedimentation and future dredging volume

### OPERATIONS

PROJECT	Richmond Harbor
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DISPOSAL SITE	Dredging	Transportation	Disposal
Alcatraz (SF-11)	hydraulic	hopper	barge dump

### MATERIAL CHARACTERISTICS

PROJECT	Richmond Harbor
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SEDIMENT TYPE	VOLUME OF UNSUITABLE MATERIAL	COMMENTS	CONTAMINANT TYPE
Inner-clay, Outer-loam (>75% silt and clay)	New work - 138,430 cy	One time volume. Recurring volume would probably be less (assume 10% of NUAD identified)	oil, grease, metals

SUMMARY OF DATA

**DESCRIPTION AND CONTACTS**

PROJECT	San Francisco Bar & Shoals
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LOCATION	DESCRIPTION	SPONSOR AND/OR CONTACT	BENEFICIARY AND/OR CONTACT
San Francisco Bar and Central Bay	2000 ft x 55 ft Bar channel plus other shoals to 35-40 ft (Alcatraz, Presidio, Black Point, Blossom Rock, Rincon Reef, Pt Knox)	USACE, Mark McGovern, Cons Ops Ph: 977-8467	N / A

**DREDGING VOLUME / FREQUENCY**

PROJECT	San Francisco Bar & Shoals
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HISTORIC DREDGING	DREDGING FREQUENCY	PROJECTED ANNUAL AVERAGE	COMMENTS / EXPECTED CHANGES
610,000 cy per episode (70's to present)	1 year	600000	Bar site dredged every year. Shoals infrequent

**OPERATIONS**

PROJECT	San Francisco Bar & Shoals
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DISPOSAL SITE	Dredging	Transportation	Disposal
SF Bar site (SF-8)	hydraulic	hopper	barge dump

**MATERIAL CHARACTERISTICS**

PROJECT	San Francisco Bar & Shoals
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SEDIMENT TYPE	VOLUME OF UNSUITABLE MATERIAL	COMMENTS	CONTAMINANT TYPE
<25% silts and clays	0	(blank)	N/A

SUMMARY OF DATA

**DESCRIPTION AND CONTACTS**

PROJECT San Francisco Islais Creek & SFO

LOCATION	DESCRIPTION	SPONSOR AND/OR CONTACT	BENEFICIARY AND/OR CONTACT
San Francisco	500 ft x 40 ft channel through Islais Creek and 35ft to 38 ft deep turning areas, plus 750ft x 10ft SFO Airport Channel and basin (2000ft x 10 ft)	USACE, Mark McGovern, Cons Ops Ph: 977-8467	Port of San Francisco, Roberta Jones Ph:415-274-0562 ;Fx: 274-0467

**DREDGING VOLUME / FREQUENCY**

PROJECT San Francisco Islais Creek & SFO

HISTORIC DREDGING	DREDGING FREQUENCY	PROJECTED ANNUAL AVERAGE	COMMENTS / EXPECTED CHANGES
155,000 cy per episode in the past.	2 years	0	Islais Creek last dredged in 1977. Authorized Islais Creek project now inactive (Port dredging new channel now); SFO Channel last dredged in 1962

**OPERATIONS**

PROJECT San Francisco Islais Creek & SFO

DISPOSAL SITE	Dredging	Transportation	Disposal
Alcatraz (SF-11)	hydraulic or clamshell/bucket	barge and hopper	barge dump or clamshell/bucket

**MATERIAL CHARACTERISTICS**

PROJECT San Francisco Islais Creek & SFO

SEDIMENT TYPE	VOLUME OF UNSUITABLE MATERIAL	COMMENTS	CONTAMINANT TYPE
>75% silt & clay (judgment)	not dredged (see P-8)	(blank)	not dredged (see P-8)

SUMMARY OF DATA

**DESCRIPTION AND CONTACTS**

PROJECT	San Leandro Marina
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LOCATION	DESCRIPTION	SPONSOR AND/OR CONTACT	BENEFICIARY AND/OR CONTACT
South San Francisco Bay, Alameda County	Approx 2.1 mile long, 200 ft wide x 6 to 7 ft ( authorized to 8 ft) Jack Maltester Channel, plus 150 ft x 6 to 7 ft interior access channels	USACE, Mark McGovern, Cons Ops Ph: 977-8467	City of San Leandro, Greg Mailho, PWD, Ph: 510-577-3481 OR Jim Haussner, Harbormaster 357-7447

**DREDGING VOLUME / FREQUENCY**

PROJECT	San Leandro Marina
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HISTORIC DREDGING	DREDGING FREQUENCY	PROJECTED ANNUAL AVERAGE	COMMENTS / EXPECTED CHANGES
240,000 cy/episode total (main and interior)	4 years	60000	Last dredging in 1993. next dredge episode in 1997

**OPERATIONS**

PROJECT	San Leandro Marina
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DISPOSAL SITE	Dredging	Transportation	Disposal
upland (within marina property). Next dredging in 1997 - disposal at	hydraulic or clamshell/bucket	pipeline or barge	barge dump or pipeline

**MATERIAL CHARACTERISTICS**

PROJECT	San Leandro Marina
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SEDIMENT TYPE	VOLUME OF UNSUITABLE MATERIAL	COMMENTS	CONTAMINANT TYPE
silty clay (50-75% silt & clay)	0	(blank)	N/A

SUMMARY OF DATA

**DESCRIPTION AND CONTACTS**

PROJECT	San Rafael Across the Flats
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LOCATION	DESCRIPTION	SPONSOR AND/OR CONTACT	BENEFICIARY AND/OR CONTACT
between San Pablo and Central San Francisco Bay	100 ft wide x 8 ft channel ( approx 2 mile long)	USACE, Mark McGovern, Cons Ops Ph: 977-8467	City of San Rafael, Dave Bernardi, Director, PWD Ph: 415-485-3351 ; Fx:485-3334

**DREDGING VOLUME / FREQUENCY**

PROJECT	San Rafael Across the Flats
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HISTORIC DREDGING	DREDGING FREQUENCY	PROJECTED ANNUAL AVERAGE	COMMENTS / EXPECTED CHANGES
137,000 cy per episode	4.5 years	30400	Last dredged in 1986

**OPERATIONS**

PROJECT	San Rafael Across the Flats
---------	-----------------------------

DISPOSAL SITE	Dredging	Transportation	Disposal
Alcatraz (SF-11)	hydraulic or clamshell/bucket	barge and hopper	barge dump or clamshell/bucket

**MATERIAL CHARACTERISTICS**

PROJECT	San Rafael Across the Flats
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SEDIMENT TYPE	VOLUME OF UNSUITABLE MATERIAL	COMMENTS	CONTAMINANT TYPE
bay mud (>75% silt and clay)	about 4000	One time volume. Recurring volume would probably be less (assume 30% of NUAD identified)	oil, grease, TBT

**SUMMARY OF DATA**

**DESCRIPTION AND CONTACTS**

PROJECT	San Rafael Creek Mile 0 to Grand Ave. Bridge
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LOCATION	DESCRIPTION	SPONSOR AND/OR CONTACT	BENEFICIARY AND/OR CONTACT
San Rafael Creek, Marin Co.	60 ft wide x 6 ft channel ( approx 1.5 mile long), plus 100 ft x 200 ft x 6 ft turning basin	USACE, Mark McGovern, Cons Ops Ph: 977-8467	City of San Rafael, Dave Bernardi, Director, PWD Ph: 415-485-3351 ; Fx:485-3334

**DREDGING VOLUME / FREQUENCY**

PROJECT	San Rafael Creek Mile 0 to Grand Ave. Bridge
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HISTORIC DREDGING	DREDGING FREQUENCY	PROJECTED ANNUAL AVERAGE	COMMENTS / EXPECTED CHANGES
111,000 cy per episode in the past	4.5 years	24700	Last dredged in 1991

**OPERATIONS**

PROJECT	San Rafael Creek Mile 0 to Grand Ave. Bridge
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DISPOSAL SITE	Dredging	Transportation	Disposal
historically upland. Recent-Alcatraz (SF-11)	hydraulic	pipeline	pipeline

**MATERIAL CHARACTERISTICS**

PROJECT	San Rafael Creek Mile 0 to Grand Ave. Bridge
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SEDIMENT TYPE	VOLUME OF UNSUITABLE MATERIAL	COMMENTS	CONTAMINANT TYPE
silt (>75% silt and clay)	4000	One time volume. Recurring volume would probably be less (assume 30% of NUAD identified)	oil, grease, TBT

SUMMARY OF DATA

**DESCRIPTION AND CONTACTS**

PROJECT	Suisun Bay Channel
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LOCATION	DESCRIPTION	SPONSOR AND/OR CONTACT	BENEFICIARY AND/OR CONTACT
Carquinez Straits, Suisun Bay-Contra Costa and Solano Co.	13 mile long, 300 ft wide x 35 ft channel Bulls Head to NY Slough and 250 ft x 20 ft channel south of Seal Islands	USACE, Mark McGovern, Cons Ops Ph: 977-8467	Port of Stockton, Patricia Huff Ph: 209-946-0246 ; Fx 209-466-7244

**DREDGING VOLUME / FREQUENCY**

PROJECT	Suisun Bay Channel
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HISTORIC DREDGING	DREDGING FREQUENCY	PROJECTED ANNUAL AVERAGE	COMMENTS / EXPECTED CHANGES
140,000 cy per episode in the 80's. Currently less	2 years	70000	Last dredged in 1994

**OPERATIONS**

PROJECT	Suisun Bay Channel
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DISPOSAL SITE	Dredging	Transportation	Disposal
Suisun Bay, Carquinez Straits(SF-9) and upland	hydraulic	pipeline and hopper	barge dump and pipeline

**MATERIAL CHARACTERISTICS**

PROJECT	Suisun Bay Channel
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SEDIMENT TYPE	VOLUME OF UNSUITABLE MATERIAL	COMMENTS	CONTAMINANT TYPE
<25% silts and clays	0	(blank)	N/A

SUMMARY OF DATA

**DESCRIPTION AND CONTACTS**

PROJECT	Suisun Slough Channel
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LOCATION	DESCRIPTION	SPONSOR AND/OR CONTACT	BENEFICIARY AND/OR CONTACT
Suisun Slough, Solano Co.	13 mile long, 100-200 ft wide by 8 ft deep channel between Suisun City and Grizzly Bay	USACE, Mark McGovern, Cons Ops Ph: 977-8467	City of Suisun City, Redev. Agency, Barry Munowich Ph: 707-421-7335

**DREDGING VOLUME / FREQUENCY**

PROJECT	Suisun Slough Channel
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HISTORIC DREDGING	DREDGING FREQUENCY	PROJECTED ANNUAL AVERAGE	COMMENTS / EXPECTED CHANGES
200,000 cy per episode	6 years	33000	Last dredged in 1991

**OPERATIONS**

PROJECT	Suisun Slough Channel
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DISPOSAL SITE	Dredging	Transportation	Disposal
upland (Pierce Island and local duck clubs)	hydraulic or clamshell/bucket	pipeline or barge	barge dump or pipeline

**MATERIAL CHARACTERISTICS**

PROJECT	Suisun Slough Channel
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SEDIMENT TYPE	VOLUME OF UNSUITABLE MATERIAL	COMMENTS	CONTAMINANT TYPE
unknown (> 75% silts and clays based on judgment)	0	(blank)	N/A

*U. S. NAVY PROJECTS*

SUMMARY OF DATA

**DESCRIPTION AND CONTACTS**

PROJECT	Alameda NAS
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LOCATION	DESCRIPTION	SPONSOR AND/OR CONTACT	BENEFICIARY AND/OR CONTACT
Central SF Bay, City and County of Alameda	42ft deep channel (2 mile long and 1,000 foot wide). 3 mooring basins( 50 ft deep)	U.S. Navy - WEST, John Kennedy, Ph: 244-3006 ;Fx: 244-3737 OR Sherman Seelinger 244-3016	N / A

**DREDGING VOLUME / FREQUENCY**

PROJECT	Alameda NAS
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HISTORIC DREDGING	DREDGING FREQUENCY	PROJECTED ANNUAL AVERAGE	COMMENTS / EXPECTED CHANGES
900,000 cy per episode in the past	1 year	50000	base decommissioned, anticipate no more navy dredging, or at most 200,000 cy once - maybe 2-3 years from now

**OPERATIONS**

PROJECT	Alameda NAS
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DISPOSAL SITE	Dredging	Transportation	Disposal
Alcatraz ( SF-11 ) for maintenance. Deep Ocean sites for deepening / future maintenance (if any)	hydraulic or clamshell/bucket	barge or hopper	barge dump or clamshell/bucket

**MATERIAL CHARACTERISTICS**

PROJECT	Alameda NAS
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SEDIMENT TYPE	VOLUME OF UNSUITABLE MATERIAL	COMMENTS	CONTAMINANT TYPE
silt, clay & sand	0	(blank)	N/A

**SUMMARY OF DATA**

**DESCRIPTION AND CONTACTS**

PROJECT	Concord NWS
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LOCATION	DESCRIPTION	SPONSOR AND/OR CONTACT	BENEFICIARY AND/OR CONTACT
Suisun Bay, Contra Costa Co.	22 ft deep channel between Seal Islands and West Dock plus three berthing areas at piers (32 ft deep) and a 14 ft deep area at Lightening Pier	U.S. Navy - WEST, John Kennedy, Ph: 244-3006 ;Fx: 244-3737 OR Sherman Seelinger 244-3016	N / A

**DREDGING VOLUME / FREQUENCY**

PROJECT	Concord NWS
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HISTORIC DREDGING	DREDGING FREQUENCY	PROJECTED ANNUAL AVERAGE	COMMENTS / EXPECTED CHANGES
51,000 cy per episode from the 60's - 80's	5 years	10000	may need maintenance dredging in next 1-2 years perhaps +/- 200,000 cy, as usual when needed, very infrequently needed.

**OPERATIONS**

PROJECT	Concord NWS
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DISPOSAL SITE	Dredging	Transportation	Disposal
Carquinez Straits in recent decades	hydraulic or clamshell/bucket	barge or hopper	barge dump or clamshell/bucket

**MATERIAL CHARACTERISTICS**

PROJECT	Concord NWS
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SEDIMENT TYPE	VOLUME OF UNSUITABLE MATERIAL	COMMENTS	CONTAMINANT TYPE
berthing areas - silt & clay channel - sand	0	(blank)	N/A

SUMMARY OF DATA

**DESCRIPTION AND CONTACTS**

PROJECT	Hunters Point NSY
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LOCATION	DESCRIPTION	SPONSOR AND/OR CONTACT	BENEFICIARY AND/OR CONTACT
South Bay, San Francisco	Berths ( 15 ), Drydocks (3), and channels	U.S. Navy - WEST, John Kennedy, Ph: 244-3006 ;Fx: 244-3737 OR Sherman Seelinger 244-3016	N / A

**DREDGING VOLUME / FREQUENCY**

PROJECT	Hunters Point NSY
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HISTORIC DREDGING	DREDGING FREQUENCY	PROJECTED ANNUAL AVERAGE	COMMENTS / EXPECTED CHANGES
140,000 cy per episode in the 70's and 80's	3 years	10000	No more Navy sponsored dredging anticipated

**OPERATIONS**

PROJECT	Hunters Point NSY
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DISPOSAL SITE	Dredging	Transportation	Disposal
Alcatraz (SF-11)	clamshell/bucket	barge	barge dump

**MATERIAL CHARACTERISTICS**

PROJECT	Hunters Point NSY
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SEDIMENT TYPE	VOLUME OF UNSUITABLE MATERIAL	COMMENTS	CONTAMINANT TYPE
unknown (> 75% silts and clays based on judgment)	unknown (some is probably contaminated)	Probably one time volume	unknown

SUMMARY OF DATA

**DESCRIPTION AND CONTACTS**

PROJECT	Moffett Field NAS
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LOCATION	DESCRIPTION	SPONSOR AND/OR CONTACT	BENEFICIARY AND/OR CONTACT
Sunnyvale, Santa Clara Co.	100 ft channel through Guadalupe Slough from SF Bay to Fuel Pier Road, 9 ft depth	U.S. Navy - WEST, John Kennedy, Ph: 244-3006 ;Fx: 244-3737 OR Sherman Seelinger 244-3016	NASA, Michael Falski, Div. Chief 415-604-0901 OR Shelley Navarro 604-0926

**DREDGING VOLUME / FREQUENCY**

PROJECT	Moffett Field NAS
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HISTORIC DREDGING	DREDGING FREQUENCY	PROJECTED ANNUAL AVERAGE	COMMENTS / EXPECTED CHANGES
77,000 cy per episode in the 70's - 80's	8 years	10000	Navy handles Defense Logistics Agency supplies which could lead to maintenance dredging of Guadalupe Slough. next dredge possibly in 1997 or 1998

**OPERATIONS**

PROJECT	Moffett Field NAS
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DISPOSAL SITE	Dredging	Transportation	Disposal
Alcatraz ( SF-11) or alternate upland or ocean sites	clamshell/bucket	barge	barge dump

**MATERIAL CHARACTERISTICS**

PROJECT	Moffett Field NAS
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SEDIMENT TYPE	VOLUME OF UNSUITABLE MATERIAL	COMMENTS	CONTAMINANT TYPE
unknown (> 75% silts and clays based on judgment)	< 30% of maint. volume (say 45,000 cy)	Recurring volume would probably be less (assume 30% of NUAD identified)	unknown

SUMMARY OF DATA

**DESCRIPTION AND CONTACTS**

PROJECT	Mare Island NSY
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LOCATION	DESCRIPTION	SPONSOR AND/OR CONTACT	BENEFICIARY AND/OR CONTACT
Mare Island Strait, Napa River	Docks and berthing areas with depths ranging from 30 ft to 39 ft MLLW datum	U.S. Navy - WEST, John Kennedy, Ph: 244-3006 ;Fx: 244-3737 OR Sherman Seelinger 244-3016	N / A

**DREDGING VOLUME / FREQUENCY**

PROJECT	Mare Island NSY
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HISTORIC DREDGING	DREDGING FREQUENCY	PROJECTED ANNUAL AVERAGE	COMMENTS / EXPECTED CHANGES
544,000 cy/yr up to '85 478,000 cy/yr '86 to '91 212,000 cy/yr '92 to '95	1 year	50000	base decommissioned, anticipate no more Navy-sponsored dredging

**OPERATIONS**

PROJECT	Mare Island NSY
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DISPOSAL SITE	Dredging	Transportation	Disposal
Upland disposal ponds on Mare	hydraulic	pipeline	pipeline

**MATERIAL CHARACTERISTICS**

PROJECT	Mare Island NSY
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SEDIMENT TYPE	VOLUME OF UNSUITABLE MATERIAL	COMMENTS	CONTAMINANT TYPE
silty clay	0	(blank)	N/A

SUMMARY OF DATA

**DESCRIPTION AND CONTACTS**

PROJECT	Oakland NSC
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LOCATION	DESCRIPTION	SPONSOR AND/OR CONTACT	BENEFICIARY AND/OR CONTACT
Oakland , Alameda Co.	1/2 mile channel 400' x 41' depth, 2 basins and 3 berths (38 to 41 ft depth)	U.S. Navy - WEST, John Kennedy, Ph: 244-3006 ;Fx: 244-3737 OR Sherman Seelinger 244-3016	N / A

**DREDGING VOLUME / FREQUENCY**

PROJECT	Oakland NSC
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HISTORIC DREDGING	DREDGING FREQUENCY	PROJECTED ANNUAL AVERAGE	COMMENTS / EXPECTED CHANGES
552,000 cy per episode in the 50's - 80's	4 years	50000	base decommissioned, no more dredging envisioned for/by Navy. Port will do dredging in the future.

**OPERATIONS**

PROJECT	Oakland NSC
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DISPOSAL SITE	Dredging	Transportation	Disposal
various open water sites (Alcatraz, Carquinez, deep ocean )	clamshell/bucket	barge	barge dump

**MATERIAL CHARACTERISTICS**

PROJECT	Oakland NSC
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SEDIMENT TYPE	VOLUME OF UNSUITABLE MATERIAL	COMMENTS	CONTAMINANT TYPE
unknown (> 75% silts and clays based on judgment)	0	(blank)	N/A

SUMMARY OF DATA

**DESCRIPTION AND CONTACTS**

PROJECT Point Molate NFD

LOCATION	DESCRIPTION	SPONSOR AND/OR CONTACT	BENEFICIARY AND/OR CONTACT
Richmond, Central SF Bay	a 2000 ft x 550ft x 35 ft basin plus a 950 ft x 240 ft x 20 ft basin	U.S. Navy - WEST, John Kennedy, Ph: 244-3006 ;Fx: 244-3737 OR Sherman Seelinger 244-3016	N / A

**DREDGING VOLUME / FREQUENCY**

PROJECT Point Molate NFD

HISTORIC DREDGING	DREDGING FREQUENCY	PROJECTED ANNUAL AVERAGE	COMMENTS / EXPECTED CHANGES
142,000 cy per episode in the past	2 years	10000	Volume affected by base closures No further Navy sponsored dredging envisioned

**OPERATIONS**

PROJECT Point Molate NFD

DISPOSAL SITE	Dredging	Transportation	Disposal
Alcatraz (SF-11)	hydraulic	hopper	barge dump

**MATERIAL CHARACTERISTICS**

PROJECT Point Molate NFD

SEDIMENT TYPE	VOLUME OF UNSUITABLE MATERIAL	COMMENTS	CONTAMINANT TYPE
unknown (> 75% silts and clays based on judgment)	0	(blank)	N/A

SUMMARY OF DATA

**DESCRIPTION AND CONTACTS**

PROJECT	Treasure Island NS
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LOCATION	DESCRIPTION	SPONSOR AND/OR CONTACT	BENEFICIARY AND/OR CONTACT
Treasure Island, SF Bay, SF Co.	3 mile long channel, 1000 to 1500 ft x 35 ft deep plus 3 berthing zones to 45 ft depth	U.S. Navy - WEST, John Kennedy, Ph: 244-3006 ;Fx: 244-3737 OR Sherman Seelinger 244-3016	N / A

**DREDGING VOLUME / FREQUENCY**

PROJECT	Treasure Island NS
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HISTORIC DREDGING	DREDGING FREQUENCY	PROJECTED ANNUAL AVERAGE	COMMENTS / EXPECTED CHANGES
382,000 cy per episode in the past	11-12 years	10000	base decommissioned no dredging envisioned

**OPERATIONS**

PROJECT	Treasure Island NS
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DISPOSAL SITE	Dredging	Transportation	Disposal
Alcatraz (SF-11) and Upland	hydraulic or clamshell/bucket	barge or hopper	barge dump or clamshell/bucket

**MATERIAL CHARACTERISTICS**

PROJECT	Treasure Island NS
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SEDIMENT TYPE	VOLUME OF UNSUITABLE MATERIAL	COMMENTS	CONTAMINANT TYPE
unknown (> 75% silts and clays based on judgment)	0	(blank)	N/A

*NON-FEDERAL / PRIVATE PROJECTS*

**SUMMARY OF DATA**

**DESCRIPTION AND CONTACTS**

PROJECT	Benicia Industries Port Terminal
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LOCATION	DESCRIPTION	SPONSOR AND/OR CONTACT	BENEFICIARY AND/OR CONTACT
City of Benicia, Solano County	Berth dredging Auto RO/RO terminal Bulk petroleum 38' MLLW; 2400 L.P.	Benicia Industries, Phil Plant, President, 707-745-2394 ; Fx: 746- 1485 OR Joe Gadsick	N / A

**DREDGING VOLUME / FREQUENCY**

PROJECT	Benicia Industries Port Terminal
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HISTORIC DREDGING	DREDGING FREQUENCY	PROJECTED ANNUAL AVERAGE	COMMENTS / EXPECTED CHANGES
32-35,000 cy per episode (25,000 cy per episode in the past)	12-16 months	33500	possibly-dependent on mixing and run-off. next dredge is June to Aug of '97

**OPERATIONS**

PROJECT	Benicia Industries Port Terminal
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DISPOSAL SITE	Dredging	Transportation	Disposal
Carquinez Straits (SF-9)	clamshell/bucket	barge	barge dump

**MATERIAL CHARACTERISTICS**

PROJECT	Benicia Industries Port Terminal
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SEDIMENT TYPE	VOLUME OF UNSUITABLE MATERIAL	COMMENTS	CONTAMINANT TYPE
50-75% silts and clays	0	(blank)	N/A

SUMMARY OF DATA

**DESCRIPTION AND CONTACTS**

PROJECT	Benicia Marina
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LOCATION	DESCRIPTION	SPONSOR AND/OR CONTACT	BENEFICIARY AND/OR CONTACT
City of Benicia, Solano County	recreational boats incl. 10 ft deep main channel, and 8 ft deep inner channel, berths, and fuel dock	City of Benicia, PWD, Ms. Chris Tomasick, 707-746-4227 ; Fx: 747-1637	N/A

**DREDGING VOLUME / FREQUENCY**

PROJECT	Benicia Marina
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HISTORIC DREDGING	DREDGING FREQUENCY	PROJECTED ANNUAL AVERAGE	COMMENTS / EXPECTED CHANGES
20,000 cy per episode presently	1 year	20000	expected to dredge 40,000 cy/yr in the future. Permits requested

**OPERATIONS**

PROJECT	Benicia Marina
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DISPOSAL SITE	Dredging	Transportation	Disposal
Carquinez Straits (SF-9)	clamshell/bucket	barge	barge dump

**MATERIAL CHARACTERISTICS**

PROJECT	Benicia Marina
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SEDIMENT TYPE	VOLUME OF UNSUITABLE MATERIAL	COMMENTS	CONTAMINANT TYPE
>75% silt and clay based on testing	0	(blank)	N/A

SUMMARY OF DATA

**DESCRIPTION AND CONTACTS**

PROJECT Coyote Point Marina

LOCATION	DESCRIPTION	SPONSOR AND/OR CONTACT	BENEFICIARY AND/OR CONTACT
Coyote Point, San Mateo County	Entrance channel and berths	County of San Mateo Carol Leonard, Harbor Master Ph: 415-573-2594 ; Fx: 343-5935	N / A

**DREDGING VOLUME / FREQUENCY**

PROJECT Coyote Point Marina

HISTORIC DREDGING	DREDGING FREQUENCY	PROJECTED ANNUAL AVERAGE	COMMENTS / EXPECTED CHANGES
119,000 cy in '94	infrequent	15000	(blank)

**OPERATIONS**

PROJECT Coyote Point Marina

DISPOSAL SITE	Dredging	Transportation	Disposal
Alcatraz (SF-11)	hydraulic and clamshell/bucket	barge	barge dump

**MATERIAL CHARACTERISTICS**

PROJECT Coyote Point Marina

SEDIMENT TYPE	VOLUME OF UNSUITABLE MATERIAL	COMMENTS	CONTAMINANT TYPE
>75% silt and clay based on testing	0	(blank)	N/A

**SUMMARY OF DATA**

**DESCRIPTION AND CONTACTS**

PROJECT	Larkspur Ferry Berths / Basin
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LOCATION	DESCRIPTION	SPONSOR AND/OR CONTACT	BENEFICIARY AND/OR CONTACT
Conte Madera, Larkspur, Marin County	Turning basin and 3 berths	GGBHTD, Reuben Di Rado Ph:923-2322 ; Fx:923-2348	N / A

**DREDGING VOLUME / FREQUENCY**

PROJECT	Larkspur Ferry Berths / Basin
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HISTORIC DREDGING	DREDGING FREQUENCY	PROJECTED ANNUAL AVERAGE	COMMENTS / EXPECTED CHANGES
Berths - 4000 cy average annual	2 years	15000	(blank)

**OPERATIONS**

PROJECT	Larkspur Ferry Berths / Basin
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DISPOSAL SITE	Dredging	Transportation	Disposal
Alcatraz (SF-11)	clamshell/bucket	barge	barge dump

**MATERIAL CHARACTERISTICS**

PROJECT	Larkspur Ferry Berths / Basin
---------	-------------------------------

SEDIMENT TYPE	VOLUME OF UNSUITABLE MATERIAL	COMMENTS	CONTAMINANT TYPE
>75% silt and clay based on '88,'90, '93 tests	0	(blank)	N/A

**SUMMARY OF DATA**

**DESCRIPTION AND CONTACTS**

PROJECT	Port of Oakland Berth Areas
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LOCATION	DESCRIPTION	SPONSOR AND/OR CONTACT	BENEFICIARY AND/OR CONTACT
Oakland Harbor, Alameda County	berths range from -34 ft to -42 ft MLLW	Port of Oakland Jon Amdur, Environmental Ph: 510-272-1582 ; Fx: 510-465-3755	N / A

**DREDGING VOLUME / FREQUENCY**

PROJECT	Port of Oakland Berth Areas
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HISTORIC DREDGING	DREDGING FREQUENCY	PROJECTED ANNUAL AVERAGE	COMMENTS / EXPECTED CHANGES
150,000 cy per episode presently	1 year	150000	(blank)

**OPERATIONS**

PROJECT	Port of Oakland Berth Areas
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DISPOSAL SITE	Dredging	Transportation	Disposal
99% Alcatraz (SF-11), 1% upland (berth 10 w/ disposal at Redwood Landfill)	clamshell/bucket	barge	99% barge dump, 5% or less clamshell

**MATERIAL CHARACTERISTICS**

PROJECT	Port of Oakland Berth Areas
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SEDIMENT TYPE	VOLUME OF UNSUITABLE MATERIAL	COMMENTS	CONTAMINANT TYPE
>75% silts and clay based on testing	<=1% maint. volume (20,000 - 30,000 cy) plus 20,000 cy new work @ Berths 22-26	New work - one time volume; Maintenance - recurring volume may be less (assume 30% for maint., 10% for new)	PAH's typical, TBT occasionally

## SUMMARY OF DATA

### DESCRIPTION AND CONTACTS

PROJECT	Port of Oakland Berth Areas
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LOCATION	DESCRIPTION	SPONSOR AND/OR CONTACT	BENEFICIARY AND/OR CONTACT
Oakland Harbor, Alameda County	berths range from -34 ft to -42 ft MLLW	Port of Oakland Jon Amdur, Environmental Ph: 510-272-1582 ; Fx: 510-465-3755	N / A

### DREDGING VOLUME / FREQUENCY

PROJECT	Port of Oakland Berth Areas
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HISTORIC DREDGING	DREDGING FREQUENCY	PROJECTED ANNUAL AVERAGE	COMMENTS / EXPECTED CHANGES
150,000 cy per episode presently	1 year	150000	(blank)

### OPERATIONS

PROJECT	Port of Oakland Berth Areas
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DISPOSAL SITE	Dredging	Transportation	Disposal
99% Alcatraz (SF-11), 1% upland (berth 10 w/ disposal at Redwood Landfill)	clamshell/bucket	barge	99% barge dump, 5% or less clamshell

### MATERIAL CHARACTERISTICS

PROJECT	Port of Oakland Berth Areas
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SEDIMENT TYPE	VOLUME OF UNSUITABLE MATERIAL	COMMENTS	CONTAMINANT TYPE
>75% silts and clay based on testing	<=1% maint. volume (20,000 - 30,000 cy) plus 20,000 cy new work @ Berths 22-26	New work - one time volume, (assume 10% of NUAD identified); Maintenance - recurring volume may be less (assume 30% of NUAD identified)	PAH's typical, TBT occasionally

SUMMARY OF DATA

**DESCRIPTION AND CONTACTS**

PROJECT	Port of Richmond Berth Areas
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LOCATION	DESCRIPTION	SPONSOR AND/OR CONTACT	BENEFICIARY AND/OR CONTACT
Richmond Harbor, Contra Costa	berths 6C,7,6A,6B, and terminals 1,2,4	Port of Richmond Eugene Serex Ph: 510-620-6784	N / A

**DREDGING VOLUME / FREQUENCY**

PROJECT	Port of Richmond Berth Areas
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HISTORIC DREDGING	DREDGING FREQUENCY	PROJECTED ANNUAL AVERAGE	COMMENTS / EXPECTED CHANGES
54,000 cy per episode presently and 29,843 cy per episode in the past	1.7 years	30000	from '79 to '85 -179,056 cy for deepening purposes. 38 ft deepening (118,852 CY) will probably affect sedimentation and future dredging volume

**OPERATIONS**

PROJECT	Port of Richmond Berth Areas
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DISPOSAL SITE	Dredging	Transportation	Disposal
Alcatraz (SF-11)	clamshell/bucket	barge	barge dump

**MATERIAL CHARACTERISTICS**

PROJECT	Port of Richmond Berth Areas
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SEDIMENT TYPE	VOLUME OF UNSUITABLE MATERIAL	COMMENTS	CONTAMINANT TYPE
>75% silts and clay based on testing	New work - 95,936	One time volume. Recurring volume would probably be less (assume 10% of NUAD identified)	oil, grease, metals

SUMMARY OF DATA

**DESCRIPTION AND CONTACTS**

PROJECT	San Francisco Dry Dock
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LOCATION	DESCRIPTION	SPONSOR AND/OR CONTACT	BENEFICIARY AND/OR CONTACT
San Francisco Bay	Pier 70	San Francisco Dry Dock, Ali Rajiv Ph: 861-7447	N / A

**DREDGING VOLUME / FREQUENCY**

PROJECT	San Francisco Dry Dock
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HISTORIC DREDGING	DREDGING FREQUENCY	PROJECTED ANNUAL AVERAGE	COMMENTS / EXPECTED CHANGES
(blank)	(blank)	35000	(blank)

**OPERATIONS**

PROJECT	San Francisco Dry Dock
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DISPOSAL SITE	Dredging	Transportation	Disposal
Alcatraz (SF-11)	clamshell/bucket	barge	barge dump

**MATERIAL CHARACTERISTICS**

PROJECT	San Francisco Dry Dock
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SEDIMENT TYPE	VOLUME OF UNSUITABLE MATERIAL	COMMENTS	CONTAMINANT TYPE
unknown (> 75% silts and clays based on judgment)	?	(blank)	?

SUMMARY OF DATA

**DESCRIPTION AND CONTACTS**

PROJECT	Port of San Francisco Berth Areas
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LOCATION	DESCRIPTION	SPONSOR AND/OR CONTACT	BENEFICIARY AND/OR CONTACT
San Francisco	Various areas along waterfront from Fisherman's Wharf to India Basin	Port of San Francisco Roberta Jones, POSF Ph:415-274-0562 ;Fx: 274-0467	N / A

**DREDGING VOLUME / FREQUENCY**

PROJECT	Port of San Francisco Berth Areas
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HISTORIC DREDGING	DREDGING FREQUENCY	PROJECTED ANNUAL AVERAGE	COMMENTS / EXPECTED CHANGES
50,000 cy per episode presently	1 year	50000	(blank)

**OPERATIONS**

PROJECT	Port of San Francisco Berth Areas
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DISPOSAL SITE	Dredging	Transportation	Disposal
Alcatraz (SF-11)	clamshell/bucket	barge	barge dump

**MATERIAL CHARACTERISTICS**

PROJECT	Port of San Francisco Berth Areas
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SEDIMENT TYPE	VOLUME OF UNSUITABLE MATERIAL	COMMENTS	CONTAMINANT TYPE
>75% silts and clay based on testing	5000 cy @ Piers 33 & 35	One time volume. Recurring volume would probably be less (assume 30% of NUAD identified)	oil, grease, PAH's

SUMMARY OF DATA

**DESCRIPTION AND CONTACTS**

PROJECT	Strawberry Point (Tiburon)
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LOCATION	DESCRIPTION	SPONSOR AND/OR CONTACT	BENEFICIARY AND/OR CONTACT
Tiburon, Marin County	6 feet project depth, private berthing for live-in boats, seal haul-out	Strawberry Recreation District, Robert Allen Ph: 383-6494; Fx: 383-6635	N / A

**DREDGING VOLUME / FREQUENCY**

PROJECT	Strawberry Point (Tiburon)
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HISTORIC DREDGING	DREDGING FREQUENCY	PROJECTED ANNUAL AVERAGE	COMMENTS / EXPECTED CHANGES
218,000 cy - '92/'93, 39,000 maintenance - '96	infrequent	25000	(blank)

**OPERATIONS**

PROJECT	Strawberry Point (Tiburon)
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DISPOSAL SITE	Dredging	Transportation	Disposal
Alcatraz (SF-11)	clamshell/bucket	barge	barge dump

**MATERIAL CHARACTERISTICS**

PROJECT	Strawberry Point (Tiburon)
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SEDIMENT TYPE	VOLUME OF UNSUITABLE MATERIAL	COMMENTS	CONTAMINANT TYPE
50-75% silts and clay based on judgment	0	(blank)	N/A

***OIL COMPANIES PROJECTS***

SUMMARY OF DATA

**DESCRIPTION AND CONTACTS**

PROJECT	EXXON Loading Dock
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LOCATION	DESCRIPTION	SPONSOR AND/OR CONTACT	BENEFICIARY AND/OR CONTACT
Carquinez Strait, City of Benicia; Solano County	(blank)	EXXON, Kim Smock, Ph: 707-745-7011 OR Jason Gray 745-7880	N / A

**DREDGING VOLUME / FREQUENCY**

PROJECT	EXXON Loading Dock
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HISTORIC DREDGING	DREDGING FREQUENCY	PROJECTED ANNUAL AVERAGE	COMMENTS / EXPECTED CHANGES
40,000 cy per episode from '83 - '89; 23,000 cy per episode from '91- '96	1 year	40000	Last dredging in 1996. Permit to dredge 800,000 cy over a ten year period starting in '82

**OPERATIONS**

PROJECT	EXXON Loading Dock
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DISPOSAL SITE	Dredging	Transportation	Disposal
SF-9 ( Carquinez)	clamshell/bucket	barge	barge dump

**MATERIAL CHARACTERISTICS**

PROJECT	EXXON Loading Dock
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SEDIMENT TYPE	VOLUME OF UNSUITABLE MATERIAL	COMMENTS	CONTAMINANT TYPE
>75% silt and clay based on testing	0	(blank)	N/A

SUMMARY OF DATA

**DESCRIPTION AND CONTACTS**

PROJECT	UNOCAL Oleum Dock
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LOCATION	DESCRIPTION	SPONSOR AND/OR CONTACT	BENEFICIARY AND/OR CONTACT
Martinez, West of 680 bridge, Contra Costa Co.	T-Pier for liquid bulk carriers	UNOCAL, Ken Guziak Ph: 510-245-4458	N / A

**DREDGING VOLUME / FREQUENCY**

PROJECT	UNOCAL Oleum Dock
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HISTORIC DREDGING	DREDGING FREQUENCY	PROJECTED ANNUAL AVERAGE	COMMENTS / EXPECTED CHANGES
Up to 90,000 cy per episode in the past. 53,000 cy per episode	2-3 years	20000	Last dredging in 1993. Next dredge episode in 1998

**OPERATIONS**

PROJECT	UNOCAL Oleum Dock
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DISPOSAL SITE	Dredging	Transportation	Disposal
SF-9 (Carquinez)	clamshell/bucket	barge	barge dump

**MATERIAL CHARACTERISTICS**

PROJECT	UNOCAL Oleum Dock
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SEDIMENT TYPE	VOLUME OF UNSUITABLE MATERIAL	COMMENTS	CONTAMINANT TYPE
90% fine sand based on testing	0	(blank)	N/A

SUMMARY OF DATA

**DESCRIPTION AND CONTACTS**

PROJECT: CHEVRON Richmond Long Wharf

LOCATION	DESCRIPTION	SPONSOR AND/OR CONTACT	BENEFICIARY AND/OR CONTACT
Rodeo, Carquinez Straits, Contra Costa Co.	berths 1 and 4 dredged to -50 ft MLLW, berths 2 and 3 dredged to -40 ft MLLW	CHEVRON, Jason Donchin / Tom di Palma, Ph: 510-242-3549 / 5610	N / A

**DREDGING VOLUME / FREQUENCY**

PROJECT: CHEVRON Richmond Long Wharf

HISTORIC DREDGING	DREDGING FREQUENCY	PROJECTED ANNUAL AVERAGE	COMMENTS / EXPECTED CHANGES
225,000 cy per episode from '91 - '96	2 years	130000	Last dredging in 1996. Have Corps permit for 350,000 cy/yr

**OPERATIONS**

PROJECT: CHEVRON Richmond Long Wharf

DISPOSAL SITE	Dredging	Transportation	Disposal
Alcatraz(SF-11)	clamshell/bucket	barge	barge dump

**MATERIAL CHARACTERISTICS**

PROJECT: CHEVRON Richmond Long Wharf

SEDIMENT TYPE	VOLUME OF UNSUITABLE MATERIAL	COMMENTS	CONTAMINANT TYPE
silt & sandy silt	0	(blank)	N/A