



October 20, 2006

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Subject: Comment Letter – 2006 Federal CWA Section 303(d) List

Dear Ms. Goding:

The members of the Calleguas Creek Watershed Management Plan (CCWMP) appreciate the opportunity to comment on the proposed 2006 303(d) list. We appreciate your consideration of our previous letters on the 303(d) list, but feel that a few of the issues were not addressed during the listing process. The purpose of this letter is to reiterate those comments to assist the SWRCB in considering these issues for the proposed 2006 303(d) list.

In the 2006 303(d) listing process, the State Board has appropriately taken the approach of reevaluating existing listings based on the newly established Water Quality Control Policy for Developing California's Clean Water Act Section 303(d) List (Listing Policy). We strongly support this approach and the majority of the comments in this letter are based on the examination of readily available information in the administrative record for the 303(d) lists developed in 1996, 1998, and 2002. We believe this information was available to the State Board during the development of the 2006 list and should be considered during this listing cycle for identifying faulty listings as was done for other waterbodies throughout the state. Additional data, that was not available to the State Board during the 2006 listing cycle, was provided in previous comment letters to the SWRCB on the 2006 303(d) list.

The listings developed for Region 4 in 1996, 1998, and 2002 are based on the following documents generally referred to throughout this letter as Water Quality Assessments (WQA):

- LARWQCB 1996 Water Quality Assessment and Documentation (WQA)
- LARWQCB 1998 Biennial Listing of Impaired Surface Waters Pursuant to the Clean Water Act, Section 303(d)
- LARWQCB 2002 Update: Clean Water Act Section 305(b) Report and Section 303(d) List of Impaired Waters – Los Angeles Region

General Comments

The group would like to express their support for the recommendation to delist zinc in Calleguas Creek Reach 1 (Mugu Lagoon). The water quality objectives for the pollutant are not exceeded.

Table 11 (Schedules for Completion of Total Maximum Daily Loads) of the Staff Report Volume I Revision of The Clean Water Act Section 303(d) List Of Water Quality Limited Segments (Staff Report) and the "PROPOSED 2006 CWA SECTION 303(d) LIST OF WATER QUALITY LIMITED SEGMENTS" (proposed 2006 303(d) list) indicate that a TMDL for coliform will be completed in the CCW by 2006. Stakeholders in the watershed submitted a Bacteria TMDL Work Plan in 2003. The Bacteria TMDL Work Plan, which was approved by the Regional Board and USEPA, is scheduled to be completed no later than 2008. We would appreciate a change in Table 11 and the proposed 2006 303(d) list to reflect the agreed upon schedule.

The organochlorine pesticides DDT, chlordane, dieldrin, and toxaphene are proposed for listing in fish tissue in Calleguas Creek Reach 3 (Calleguas Creek Main Stem). Additionally, chlordane, DDT, and toxaphene are proposed for listing in fish tissue in the Duck Pond Agricultural Drains/Mugu Drain/Oxnard Drain No 2, which discharges to Calleguas Creek Reach 1 (Mugu Lagoon). The CCW Organochlorine Pesticides and PCBs TMDL adopted by the Regional and State Boards in 2005 addresses these impairments and the other reaches in the CCW where the listing exists have been designated as being addressed and moved to the table entitled "PROPOSED 2006 CWA SECTION 303(d) LIST OF WATER QUALITY LIMITED SEGMENTS BEING ADDRESSED BY USEPA APPROVED TMDLS". As such, we request that this listing also be designated as being addressed and moved to the appropriate table indicating that a TMDL for this constituent was completed in 2005.

Sedimentation/Siltation is included on the proposed 2006 303(d) list for Calleguas Creek Reach 1 (Mugu Lagoon). The CCW Organochlorine Pesticides and PCBs TMDL adopted by the Regional and State Boards in 2005 addresses this impairment and the other reaches in the CCW where the listing exists have been designated as being addressed and moved to the table entitled "PROPOSED 2006 CWA SECTION 303(d) LIST OF WATER QUALITY LIMITED SEGMENTS BEING ADDRESSED BY USEPA APPROVED TMDLS". As such, we request that this listing also be designated as being addressed and moved to the appropriate table indicating that a TMDL for this constituent was completed in 2005.

Ammonia is included on the proposed 2006 303(d) list for Calleguas Creek Reach 10 (Conejo Creek). The CCW Nutrient TMDL adopted by the Regional and State Boards in 2002 addresses this impairment and the other reaches in the CCW where the listing exists have been designated as being addressed and moved to the table entitled "PROPOSED 2006 CWA SECTION 303(d) LIST OF WATER QUALITY LIMITED SEGMENTS BEING ADDRESSED BY USEPA APPROVED TMDLS". As such, we request that this listing also be designated as being addressed and moved to the appropriate table indicating that a TMDL for this constituent was completed in 2002.

The sulfate and boron TMDL completion is scheduled for 2007. We would appreciate a change in Table 11 and the proposed 2006 303(d) list to reflect the agreed upon schedule.

Specific Comments

In previous comments submitted to the SWRCB on the proposed 2006 303(d) list, supporting information was provided for the possible delisting of trash and nickel in the CCW. In the fact sheets provided by the SWRCB on the proposed 2006 303(d) list, the SWRCB provided a fact sheet discussing the reasoning for not delisting nickel, but did not provide any discussion about the trash listings. The purpose of this letter is to provide clarification on the issues identified by the SWRCB in its decision to not delist nickel and reiterate the available information that supports delisting trash. We believe that this information will allow the SWRCB staff to move forward with a recommendation to delist nickel and trash in the reaches listed in Table 1.

Table 1. Summary of Comments

Reach	Constituent	Reasoning for delisting
4	Trash	Based on the new listing policy, Reach 4 does not meet the listing criteria.
5	Trash	The listing in Reach 5 was based on data for Reach 4, and Reach 5 does not meet the listing criteria.
1	Total Nickel	The data does not support the listing.

Calleguas Creek Reaches 4 (Revolon Slough) and 5 (Beardsley Channel) – Trash

In comment letters submitted on the 2002 and 2006 proposed 303(d) lists, the CCWMP has provided information that supports the delisting of trash in Calleguas Creek Reaches 4 and 5. The fact sheets providing support for the SWRCB decisions not to delist do not include a discussion of trash in the CCW. As such, the CCWMP is reiterating our comments on the trash listing and providing a more detailed discussion of the issues. All of the evaluation is based on information presented in the administrative record for the 1996 and 1998 303(d) list, but a discussion of recent observations is included to support the conclusion.

Summary of Listings

Trash first appeared on the 303(d) list for the Calleguas Creek Watershed in 1996 for Revolon Slough (Reach 4). In 1998, Beardsley Wash (Reach 5) was added to the list, but the administrative record provides no basis for the addition of Beardsley Wash. Previous reviews of other listings indicate that Revolon Slough and Beardsley Wash were considered one reach on the 1996 list and divided into two reaches on the 1998 list with all Revolon Slough listings being applied to Beardsley Wash as well, without considering that the data were collected in Reach 4. The listings on Revolon Slough and Beardsley Wash were maintained on the 2002 list.

1996 Water Quality Assessment

The basis for the 1996 303(d) listings is provided in the “LA Regional Water Quality Control Board 1996 Water Quality Assessment and Documentation”. In addition, for “aesthetic stressors” such as trash, scum, algae, and odor, an Aesthetic Stressor Worksheet was included in the record. This worksheet summarized observations made from 1990-1995 based on information collected on field logs.

A subjective ranking was used where:

0= No information, or it was not clear that item was assessed.

1=Item assessed; value is zero or slight

2=Moderate (for trash this was interpreted to mean that trash was mentioned on the field log)

3=High (for trash this was interpreted to mean "lots of trash")

Observations receiving a 2 or a 3 were considered exceedances in the assessment. Table 2 summarizes the assessment for Revolon Slough and Beardsley Wash found in the administrative record:

Table 2. Trash Observations for Revolon Slough and Beardsley Wash

Value Given to Observation	Number of Observations Assigned the Value in Revolon Slough	Number of Observations Assigned the Value in Beardsley Wash
0	6	0
1	8	2
2	2	0
3	1	0
Unreadable	2	5
Total observations (sum of 1's, 2's and 3's)	13 ¹	2 ²
Total number of exceedances (sum of 2's and 3's)	3	0

1. The summary of the observations from Revolon Slough in the record states that the total number of observations is 13 with 3 exceedances. Two of the values are not readable in the copy available, but comparison to the summary indicates that the two unreadable values are 1's
2. The summary of the observations from Beardsley Wash in the record states that the total number of observations is 2 with 0 exceedances. Five of the individual values are not readable in the copy available, but comparison to the summary indicates that the five unreadable values are 0's.

Beardsley Wash received zero scores of 2 or 3, and therefore had zero exceedances. Based on the information in the administrative record, Beardsley Wash is fully supporting and should not be listed on the 303(d) list for trash. Revolon Slough was considered to be partially supporting and was listed on the 303(d) list.

Comparison of Data to 2004 SWRCB Listing Policy

In the 2004 SWRCB Listing Policy, a minimum number of exceedances are required to place a constituent on the 303(d) list. According to Table 3.2 in the policy (see below), for a sample size of 5 to 30, 5 exceedances are required to place the pollutant on the 303(d) list. Revolon Slough had only 3 exceedances and would therefore not meet the new listing requirements.

Based on the information in the administrative record used to place Revolon Slough and Beardsley Wash on the 303(d) list and the new listing requirements, the available information does not support the listings for trash on these reaches.

TABLE 3.2: MINIMUM NUMBER OF MEASURED EXCEEDANCES NEEDED TO PLACE A WATER SEGMENT ON THE SECTION 303(D) LIST FOR CONVENTIONAL OR OTHER POLLUTANTS.

Null Hypothesis: Actual exceedance proportion \leq 10 percent.
Alternate Hypothesis: Actual proportion $>$ 25 percent.
The minimum effect size is 15 percent.

Sample Size	List if the number of exceedances equal or is greater than
5 – 30	5*
31 – 36	6
37 – 42	7
43 – 48	8
49 – 54	9
55 – 60	10
61 – 66	11
67 – 72	12
73 – 78	13
79 – 84	14
85 – 91	15
92 – 97	16
98 – 103	17
104 – 109	18
110 – 115	19
116 – 121	20

*Application of the binomial test requires a minimum sample size of 26. The number of exceedances required using the binomial test at a sample size of 26 is extended to smaller sample sizes.

Current Information on Trash in Revolon Slough and Beardsley Wash

During 1998/99 and 2003/04, Larry Walker Associates staff members conducted year long, watershed wide monitoring for water, sediment and fish tissue that included Revolon Slough and Beardsley Wash. In conjunction with the sampling, field crews maintain field logs of observations made during the sampling events. The field crews were not specifically asked to document the presence or absence of trash, nor were they given any training on how to assess the presence or absence of trash in the waterbodies so the observations could not be used as a basis for listing or delisting the waterbody. However, the information collected does provide some indication of whether more recent observations have identified trash in the listed waterbodies.

As an example, field logs from the most recent monitoring that occurred from August 2003 to September 2004 were reviewed for mentions of trash.¹ The field log contains a field called “floating material/debris.” If this section or other notes on the log talked about trash, then the observation was considered to have indicated the presence of trash. If this field stated none or contained other notes that did not mention trash, then an observation was counted as meaning no trash was observed. For Revolon Slough, there were 32 field logs with records that indicated no trash was present and 2 with trash observations. For Beardsley Wash, 28 observations were made and none of them discussed trash. Therefore, more recent observations in these two reaches indicate that trash is not a prevalent problem.

Conclusion

Based on the criteria that the Regional Board had in place in 1996, Revolon Slough was properly listed based on being partially supporting for trash. However, based on the new listing policy and recent watershed information, Revolon Slough should be delisted from the proposed 2006 303(d) list.

The listing of trash in Reach 5 seems to be based on data collected in Reach 4 and an incorrect initial listing process. As such, the Reach 5 trash listing should be removed from the 2006 303(d) list. It should be noted that a State Board staff recommended delisting cadmium in Ballona Creek because data from a downstream reach were applied inappropriately.

CCW Reach 1 (Mugu Lagoon) – Nickel in Water Column Listing

Nickel in Calleguas Creek Reach 1 is in the Region 4 Fact Sheets Supporting “Do Not Delist” Recommendations. The “Do Not Delist” recommendation is based on an exceedance of 7 samples out of a dataset of 75. In a previous comment letter, Larry Walker Associates provided information to support that only 49 of these samples are valid for 303(d) analysis. The original data set consisted of 131 samples, 21 of these samples were excluded because the detection limit exceeded the criteria. Out of the remaining 110 samples, 35 were excluded because they were clearly located in other designated reaches (specifically Reach 2, Reach 4, and Oxnard Drainage Ditches 2 and 3). LWA argued previously that an additional 26 samples should also be excluded because they were taken to characterize discharges to Mugu Lagoon rather than to characterize the Lagoon itself. When these additional 26 samples are excluded from analysis, there are 3 exceedances out of 49 samples. According to the listing guidance, this does not support a listing of nickel in Reach 1. SWRCB Staff disagreed with the exclusion of the additional 26 samples do to uncertainty in the location of sampling. We would like to provide additional information on these 26 samples to demonstrate why they should also be excluded from the listing analysis, and therefore, why nickel should be delisted for Mugu Lagoon.

Data collected in the Lagoon comes from three sources including the Navy, the Calleguas Creek Characterization Study (CCCS, 1998-1999), and the Calleguas Creek Watershed Metals Total Maximum Daily Load Monitoring Program (CCTMDL, 2003-2004).

¹ Earlier field logs can be examined, but the previous monitoring occurred during 1998 and 1999, prior to the most recent (2002) 303(d) list.

Two steps were taken to determine which data from the above programs were appropriate for consideration in the 303(d) analysis. The first was to identify any non-detected data with detection limits exceeding the corresponding CTR criteria. The second step was to identify data collected within what could be considered the receiving waters of Reach 1 Mugu Lagoon. Samples collected near Reach 1 to characterize sources of contamination to the lagoon were not considered to characterize the receiving waters of the Lagoon. This approach is similar to other 303(d) listing analysis where only data collected within the receiving water portion of the reach is considered and land use discharge data are not. Samples collected for the purpose of characterizing sources of contamination to the lagoon could be considered for use in listing the specific drainage ditches as has been done with Oxnard Drains No. 2 and No. 3.

Sampling locations and what the corresponding data characterize are relatively well known for the Calleguas Creek Characterization Study, TMDL Monitoring Program, and the Navy after 1999. However, for data collected by the Navy between 1994 and 1999 the location of samples was not as clear, and it was not immediately clear whether sample locations were chosen to characterize the Lagoon itself, or to characterize sources of contamination to the lagoon.

The following two reports completed for the Navy provided information regarding sample collection locations and whether the locations provided information on receiving waters, or on discharge data:

- Draft Final Phase I Remedial Investigation Technical Memorandum for Naval Air Weapons Station Point Mugu, California (Tetra Tech, 1998)
- Draft Remedial Investigation for Groundwater Report Naval Base Ventura County Point Mugu Site, California (Tetra Tech, 2001)

The Phase 1 RI discusses water sampling conducted in 1994 in section 8.4 (pg 8-4 through 8-7) and section 12.4 (pg 12-6 through 12-11). The GW RI discusses water sampling conducted in 1999 in section 4.4.3 (pg 4-15 through 4-16). The Phase 1 RI and GW RI provide narrative descriptions of what each sampling location was intended to characterize in 1994 and 1999, respectively. Maps were also included in the Phase 1 RI and the GW RI displaying locations used in 1994 and 1999. However, these maps were not relied upon in the 303(d) analysis to determine sample location due to the level of accuracy of GPS coordinates and features such as storm drains. Also, Mugu Lagoon is a tidal environment that changes over time, and it is difficult to define the extent of tidal water bodies in simple maps. Because of the confusion over sample location, the two above reports were used to determine which samples would be used based on whether the sample was taken to characterize the lagoon itself (the receiving water), or sources of contamination to the lagoon (discharges to the receiving water). It is important to consider the intended purpose of sampling locations as described in the Phase 1 RI and the GW RI because it allows insight into the condition at the sampling location during the time of sample collection, which may not be the condition currently.

To provide clarification on the sample locations included in the dataset, Attachment B includes the pages of the Phase 1 RI that provide relevant information on the sample locations, including descriptions of the location and intent of samples. Additionally, Table 3 provides a summary of data from 1994 to 2004 that was excluded from the 303(d) analysis, the reason for its exclusion, and the pages of the Phase 1 RI that discuss the sample location where appropriate. A complete table of all sample data is included in Attachment A. The reason for exclusion is provided in greater detail in Attachment A.

Table 4. Dissolved Nickel Data Summary for CCW Reach 1 (Mugu Lagoon)

n	Range (ug/L)	Median ^[1] (ug/L)	Criterion (ug/L)	# of Exceedances	% Exceedance
49	<6.8*-13.78	2.65	8.3	3	6%

* < Represents a non-detect at a detection limit of 6.8 ug/L

[1] For median values calculated as the average of a non-detected and detected result, the detection limit for the non-detected result was used in the calculation.

Thank you for your consideration of these comments. If you have any questions, please feel free to contact Ashli Desai at 310-394-1036.

Yours truly,

Richard Hajas
Co-Chair Calleguas Creek Watershed Management Plan

Table 3. Summary of Data Excluded from the 303(d) analysis

No. of Samples	Reason for Exclusion
9	The Phase 1 RI indicates these samples were collected to characterize discharges to the lagoon and not the lagoon itself.
6	The Phase 1 RI (pg 12-7) identifies these sampling locations as small drainage channels indicating they were established to characterize discharges to the lagoon and not the lagoon itself.
10	The Phase 1 RI (pg 12-6) identifies these sampling locations as being either a drainage ditch, storm sewer, or sewage treatment plant outfall indicating they were established to characterize discharges to the lagoon and not the lagoon itself.
1	The Phase 1 RI (pg 9-3) identifies this sampling location as being used to characterize water that flows along a shallow swale indicating it was established to characterize discharges to the lagoon and not the lagoon itself.
10	These sampling locations are located in Reach 2 (Lower Calleguas Creek) which is considered a separate waterbody in the listing process.
12	These sampling locations are located in Reach 4 (Revolon Slough) which is considered a separate waterbody in the listing process.
4	These sampling locations are located in Duck Pond Agricultural Drain/Mugu Drain/Oxnard Drain No 2 which is considered a separate waterbody in the listing process.
9	These sampling locations are located in Rio De Santa Clara/Oxnard Drain No. 3 which is considered a separate waterbody in the listing process.
21	Detection Limit Greater than the criteria. (Listing Policy Section 6.1.5.5 Quantitation of Chemical Concentrations)

The information provided in Table 3 and Attachment B presents supplemental information that clarifies the locations of the sites excluded from LWAs previous submittals on the nickel data. Using this information, the basis for excluding the additional data and sites that result in the delisting of nickel should be clear.

As a summary, Table 4 presents the dissolved nickel data collected within the lagoon from 1994 to 2004 with the sample locations summarized in Table 3 removed. The data presented in Table 4 show three exceedances in Mugu Lagoon of the dissolved nickel criteria out of a sample size of 49. Per Table 4.1 of the listing guidance, the maximum number of measured exceedances allowed to remove a water segment from the section 303(d) list for toxicants with a sample size of 49 is four. As such, the data does not support a nickel listing in the lagoon and therefore the listing should be removed from the 2006 303(d) list.

Table 4. Dissolved Nickel Data Summary for CCW Reach 1 (Mugu Lagoon)

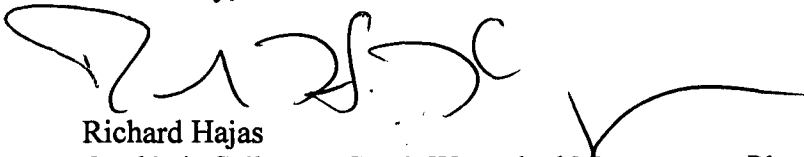
n	Range (ug/L)	Median ^[1] (ug/L)	Criterion (ug/L)	# of Exceedances	% Exceedance
49	<6.8*-13.78	2.65	8.3	3	6%

* < Represents a non-detect at a detection limit of 6.8 ug/L

[1] For median values calculated as the average of a non-detected and detected result, the detection limit for the non-detected result was used in the calculation.

Thank you for your consideration of these comments. If you have any questions, please feel free to contact Ashli Desai at 310-394-1036.

Yours truly,



Richard Hajas
Co-Chair Calleguas Creek Watershed Management Plan

Attachment A. Available Data for the Calleguas Creek Watershed Reach 1 Dissolved Nickel 303(d) Listing Analysis

Dissolved Nickel Data Used in 303(d) Listing Analysis

Reach	Monitoring Type	Project SiteID	Sample Source	Sample Date	Sign	Result (ug/L)	Exceed	Used in Analysis
1	Navy	SW11-23	Receiving Water	1/28/94	<	5.6	0	Yes
1	Navy	SW11-24	Receiving Water	2/1/94	<	6.8	0	Yes
1	Navy	SW11-22	Receiving Water	2/2/94	<	5	0	Yes
1	CCCS	CCCS: 15	Receiving Water	11/5/98	=	3.8	0	Yes
1	CCCS	CCCS: 15	Receiving Water	2/3/99	=	5.5	0	Yes
1	CCCS	CCCS: 15	Receiving Water	5/5/99	=	3.2	0	Yes
1	Navy	CC-MS-1	Receiving Water	6/10/03	=	11.4	1	Yes
1	Navy	CC-MS-1	Receiving Water	7/31/03	<	4.4	0	Yes
1	CC TMDL	1-M-A	Receiving Water	8/26/03	=	0.38	0	Yes
1	CC TMDL	1-M-B	Receiving Water	8/26/03	=	0.47	0	Yes
1	CC TMDL	1-M-C	Receiving Water	8/26/03	=	0.32	0	Yes
1	CC TMDL	1-M-D	Receiving Water	8/26/03	=	0.51	0	Yes
1	CC TMDL	1-M-A-02	Receiving Water	12/2/03	=	1.29	0	Yes
1	CC TMDL	1-M-B-02	Receiving Water	12/2/03	=	2.2	0	Yes
1	CC TMDL	1-M-D-02	Receiving Water	12/2/03	=	1.24	0	Yes
1	CC TMDL	1-M-A-03	Receiving Water	1/27/04	=	3.58	0	Yes
1	CC TMDL	1-M-B-03	Receiving Water	1/27/04	=	3.88	0	Yes
1	CC TMDL	1-M-C-03	Receiving Water	1/27/04	=	0.82	0	Yes
1	CC TMDL	D-03/1-WER-D-03	Receiving Water	1/27/04	=	1.73	0	Yes
1	Navy	CC-MS-1	Receiving Water	2/3/04	=	6.7	0	Yes
1	Navy	CC-MS-1	Receiving Water	2/26/04	=	8.6	1	Yes
1	CC TMDL	1-M-A-04	Receiving Water	3/1/04	=	5.82	0	Yes
1	CC TMDL	1-M-C-04	Receiving Water	3/1/04	=	6.34	0	Yes
1	CC TMDL	1-M-D-04	Receiving Water	3/1/04	=	3.03	0	Yes
1	CC TMDL	1-M-B-05	Receiving Water	3/25/04	=	4.29	0	Yes
1	CC TMDL	1-M-A-05	Receiving Water	3/25/04	=	4.78	0	Yes
1	CC TMDL	1-M-C-05	Receiving Water	3/25/04	=	1.09	0	Yes
1	CC TMDL	1-M-D-05	Receiving Water	3/25/04	=	1.05	0	Yes
1	CC TMDL	1-M-C-06	Receiving Water	4/28/04	=	3.97	0	Yes
1	CC TMDL	1-M-D-06	Receiving Water	4/28/04	=	1.24	0	Yes
1	CC TMDL	1-M-B-06	Receiving Water	4/28/04	=	4.45	0	Yes
1	CC TMDL	1-M-A-06	Receiving Water	4/28/04	=	4.49	0	Yes
1	CC TMDL	1-M-C-07	Receiving Water	5/27/04	=	2.65	0	Yes
1	CC TMDL	1-M-D-07	Receiving Water	5/27/04	=	1.00	0	Yes

1	CC TMDL	1-M-B-07	Receiving Water	5/27/04	=	3.13	0	Yes
1	CC TMDL	1-M-A-07	Receiving Water	5/27/04	=	13.8	1	Yes
1	CC TMDL	1-M-D-08	Receiving Water	6/30/04	=	0.74	0	Yes
1	CC TMDL	1-M-B-08	Receiving Water	6/30/04	=	1.24	0	Yes
1	CC TMDL	1-M-A-08	Receiving Water	6/30/04	=	1.88	0	Yes
1	CC TMDL	1-M-C-08	Receiving Water	6/30/04	=	1.63	0	Yes
1	CC TMDL	1-M-D	Receiving Water	7/28/04	=	0.85	0	Yes
1	CC TMDL	1-M-C	Receiving Water	7/28/04	=	1.05	0	Yes
1	CC TMDL	1-M-B	Receiving Water	7/28/04	=	2.91	0	Yes
1	CC TMDL	1-M-A	Receiving Water	7/28/04	=	4.61	0	Yes
1	CC TMDL	1-M-C	Receiving Water	8/24/04	=	3.59	0	Yes
1	CC TMDL	1-M-D	Receiving Water	8/24/04	=	0.56	0	Yes
1	CC TMDL	1-M-B	Receiving Water	8/24/04	=	2.95	0	Yes
1	CC TMDL	1-M-A	Receiving Water	8/24/04	=	5.57	0	Yes
1	CC TMDL	1-M-A	Receiving Water	10/27/04	=	3.19	0	Yes

Dissolved Nickel Data That Was Not Used in 303(d) Listing Analysis

Reach	Monitoring Type	Project SiteID	Sample Source	Sample Date	Sign	Result (ug/L)	Exceed	Used in Analysis	Reason for Exclusion
1	Navy	SW11-25	Receiving Water	1/26/94	<	11.1	0	No	Detection Limit Greater than the criteria. (Listing Policy Section 6.1.5.5 Quantitation of Chemical Concentrations)
1	Navy	SW11-26	Receiving Water	1/26/94	<	11.1	0	No	
NA	Navy	SW11-5	Drainage Ditch	1/26/94	<	11.1	0	No	
NA	Navy	SW11-7	Drainage Ditch	1/29/94	<	11.2	0	No	
NA	Navy	SW11-15	Drainage Ditch	1/29/94	<	12.1	0	No	
NA	Navy	SW5-2	Drainage Ditch	2/2/94	<	25	0	No	
NA	Navy	SW5-2	Drainage Ditch	2/2/94	<	25	0	No	
NA	Navy	SW5-2	Drainage Ditch	2/2/94	<	25	0	No	
NA	Navy	SW5-2	Drainage Ditch	2/2/94	<	25	0	No	
NA	Navy	SW5-2	Drainage Ditch	2/2/94	<	25	0	No	
NA	Navy	SW5-2	Drainage Ditch	2/3/94	<	25	0	No	
NA	Navy	SW5-2	Drainage Ditch	2/3/94	<	25	0	No	
NA	Navy	SW11-61	Tidal Creek	2/3/99	<	9.4	0	No	
NA	Navy	SW11-63	Mudflat	2/3/99	<	9.4	0	No	
NA	Navy	SW11-64	Mudflat	2/3/99	<	9.4	0	No	
NA	Navy	SW11-67	Tidal Creek	2/3/99	<	9.4	0	No	
NA	Navy	SW11-66	Tidal Marsh	2/3/99	<	9.4	0	No	
NA	Navy	SW11-68	Tidal Creek	2/3/99	<	9.4	0	No	
NA	Navy	SW11-69	Mudflat	2/3/99	<	9.4	0	No	
NA	Navy	SW11-60	Drainage Ditch	2/3/99	<	9.4	0	No	
1	Navy	CC-MS-1	Receiving Water	5/3/03	<	11.6	0	No	

Reach	Monitoring Type	Project SiteID	Sample Source	Sample Date	Sign	Result (ug/L)	Exceed	Used in Analysis	Reason for Exclusion
NA	Navy	SW5-2	Drainage Ditch	1/27/94	<	6.8	0	No	The Phase 1 RI (pg 8-7) states these samples were collected to determine if surface water is transporting contaminants off site and toward Mugu Lagoon..., SW5-2, which is in a drainage channel that discharges to Mugu Lagoon. The Phase 1 RI indicates this sample was collected to characterize discharges to the lagoon and not the lagoon itself.
NA	Navy	SW5-2	Drainage Ditch	1/27/94	<	6.8	0	No	
NA	Navy	SW5-2	Drainage Ditch	1/27/94	<	6.8	0	No	
NA	Navy	SW5-2	Drainage Ditch	1/27/94	=	8.3	0	No	
NA	Navy	SW5-2	Drainage Ditch	1/27/94	=	9.9	0	No	
NA	Navy	SW5-2	Drainage Ditch	1/28/94	<	6.8	0	No	
NA	Navy	SW5-2	Drainage Ditch	1/28/94	<	6.8	0	No	
NA	Navy	SW5-2	Drainage Ditch	1/28/94	<	6.8	0	No	
NA	Navy	SW5-2	Drainage Ditch	2/3/94	<	5	0	No	
NA	Navy	SW11-28	Drainage Ditch	2/3/94	=	7.8	0	No	The Phase 1 RI (pg 12-7**) identifies this sampling location as a small drainage channel indicating it was established to characterize discharges to the lagoon and not the lagoon itself. Fig. 12-2a suggests this site corresponding to drainage ditch No. 7.
NA	Navy	SW11-30	Drainage Ditch	2/3/94	<	5.6	0	No	The Phase 1 RI (pg 12-7) identifies this sampling location as a small drainage channel indicating it was established to characterize discharges to the lagoon and not the lagoon itself. Fig. 12-2a suggests this site corresponds to drainage ditch No. 6.
NA	Navy	SW11-1	Drainage Ditch	1/25/94	<	7.7	0	No	The Phase 1 RI (pg 12-6) identifies this sampling location as being either a drainage ditch, storm sewer, or sewage treatment plant outfall indicating it was established to characterize discharges to the lagoon and not the lagoon itself. Fig. 12-2a suggests this site corresponds to drainage ditch No. 4.
NA	Navy	SW11-3	Drainage Ditch	1/25/94	<	7.4	0	No	The Phase 1 RI (pg 12-6) identifies these sampling locations as being either a drainage ditch, storm sewer, or sewage treatment plant outfall indicating they were established to characterize discharges to the lagoon and not the lagoon itself. Fig. 12-2a suggests these sites correspond to drainage ditch No. 5.
NA	Navy	SW11-2	Drainage Ditch	1/25/94	<	6.8	0	No	
NA	Navy	SW11-4	Drainage Ditch	1/31/94	<	6.8	0	No	The Phase 1 RI (pg 12-6) identifies this sampling locations as being either a drainage ditch, storm sewer, or sewage treatment plant outfall indicating it was established to characterize discharges to the lagoon and not the lagoon itself. Fig. 12-2a shows this site may correspond to Oxnard Drain No. 3.

**SW11-XX samples were taken at the same locations as SG11-XX. See Fig. 12-2a

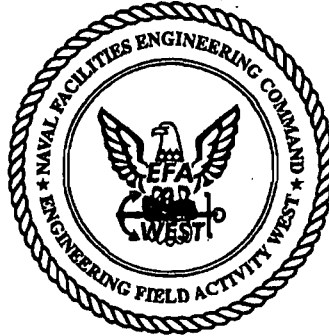
Reach	Monitoring Type	Project SiteID	Sample Source	Sample Date	Sign	Result (ug/L)	Exceed	Used in Analysis	Reason for Exclusion
NA	Navy	SW11-37	Drainage Ditch	1/29/94	<	6.8	0	No	The Phase 1 RI (pg 12-6) identifies these sampling locations as being either a drainage ditch, storm sewer, or sewage treatment plant outfall indicating they were established to characterize discharges to the lagoon and not the lagoon itself. It is not clear on Map 1 which discharges these sites corresponds to.
NA	Navy	SW11-8	Drainage Ditch	1/31/94	<	6.8	0	No	
NA	Navy	SW11-29	Drainage Ditch	1/31/94	=	7.3	0	No	
NA	Navy	SW11-27	Drainage Ditch	1/31/94	=	8.8	0	No	
NA	Navy	SW11-6	Drainage Ditch	1/31/94	=	10.9	0	No	
NA	Navy	SW11-9	Drainage Ditch	2/2/94	<	5	0	No	
NA	Navy	SW11-33	Drainage Ditch	2/4/94	<	6.7	0	No	The Phase 1 RI (pg 12-7) identifies this sampling location as being a small drainage channel indicating it was established to characterize discharges to the lagoon and not the lagoon itself. Map 1 suggests this site corresponds to a drainage ditch in the upper northwestern portion of the base.
NA	Navy	SW11-35	Drainage Ditch	2/4/94	=	5.6	0	No	The Phase 1 RI (pg 12-7) identifies these sampling locations as being in small drainage channels indicating they were established to characterize discharges to the lagoon and not the lagoon itself. Fig. 12-2a suggests these sites correspond to drainage ditches off of the Navy base, possibly Oxnard Drain No. 2.
NA	Navy	SW11-34	Drainage Ditch	1/29/94	<	5	0	No	
NA	Navy	SW11-32	Drainage Ditch	2/2/94	<	5	0	No	The Phase 1 RI (pg 12-7) identifies this sampling location as being a small drainage channel indicating it was established to characterize discharges to the lagoon and not the lagoon itself. Fig. 12-2a suggests this site corresponds to a drainage ditch off of the Navy base.
NA	Navy	SW6-1	Drainage Ditch	1/25/94	<	6.8	0	No	The Phase 1 RI (pg 9-3) identifies this sampling location as being used to characterize water that flows along a shallow swale to South Mugu Road and to a storm sewer that ultimately discharges to drainage ditch No. 6 indicating this sampling location was established to characterize discharges to the lagoon and not the lagoon itself.

Reach	Monitoring Type	Project SiteID	Sample Source	Sample Date	Sign	Result (ug/L)	Exceed	Used in Analysis	Reason for Exclusion
2	Navy	SW11-19	Receiving Water	2/3/94	<	5.6	0	No	These sampling locations are located in Reach 2 (Lower Calleguas Creek) which is considered a separate waterbody in the listing process.
2	Navy	SW11-21	Receiving Water	2/1/94	=	9.8	0	No	
2	CCCS	CCCS: 7	Receiving Water	8/5/98	=	5.6	0	No	
2	CCCS	CCCS: 7	Receiving Water	11/5/98	=	4	0	No	
2	CCCS	CCCS: 7	Receiving Water	2/3/99	=	6.5	0	No	
2	Navy	SW11-59	Receiving Water	2/3/99	=	6.9	0	No	
2	CCCS	CCCS: 7	Receiving Water	5/5/99	=	4.6	0	No	
2	Navy	CC-SS-1	Receiving Water	6/10/03	=	8.1	0	No	
2	Navy	CC-SS-1	Receiving Water	2/3/04	=	15.2	0	No	
2	Navy	CC-SS-1	Receiving Water	2/26/04	=	9	0	No	
4	Navy	SW11-18	Receiving Water	2/3/94	<	5.6	0	No	These sampling locations are located in Reach 4 (Revolon Slough) which is considered a separate waterbody in the listing process.
4	Navy	SW11-18	Receiving Water	2/3/94	<	5.6	0	No	
4	Navy	SW11-20	Receiving Water	2/1/94	<	6.8	0	No	
4	Navy	SW11-20	Receiving Water	2/1/94	<	6.8	0	No	
4	Navy	SW11-58	Receiving Water	2/3/99	=	6.7	0	No	
4	Navy	SW11-58	Receiving Water	2/3/99	=	6.7	0	No	
4	Navy	RS-SS-1	Receiving Water	6/10/03	=	9.1	0	No	
4	Navy	RS-SS-1	Receiving Water	6/10/03	=	9.1	0	No	
4	Navy	RS-SS-1	Receiving Water	2/3/04	=	9.7	0	No	
4	Navy	RS-SS-1	Receiving Water	2/3/04	=	9.7	0	No	
4	Navy	RS-SS-1	Receiving Water	2/26/04	=	7.9	0	No	
4	Navy	RS-SS-1	Receiving Water	2/26/04	=	7.9	0	No	
ODD2	Navy	SW11-16	Drainage Ditch	1/30/94	<	7.4	0	No	These sampling locations are located in Duck Pond Agricultural Drain/Mugu Drain/Oxnard Drain No 2 which is considered a separate waterbody in the listing process.
ODD2	Navy	SW11-17	Drainage Ditch	1/31/94	=	10.6	0	No	
ODD2	Navy	SW11-74	Drainage Ditch	2/3/99	=	6.6	0	No	
ODD2	Navy	SW11-75	Drainage Ditch	2/3/99	=	7.1	0	No	

Reach	Monitoring Type	Project SiteID	Sample Source	Sample Date	Sign	Result (ug/L)	Exceed	Used in Analysis	Reason for Exclusion
ODD3	Navy	SW11-11	Drainage Ditch	1/30/94	<	6.8	0	No	These sampling locations are located in Rio De Santa Clara/Oxnard Drain No. 3 which is considered a separate waterbody in the listing process.
ODD3	Navy	SW11-12	Drainage Ditch	2/2/94	<	5	0	No	
ODD3	Navy	SW11-13	Drainage Ditch	2/3/94	<	5.6	0	No	
ODD3	Navy	SW11-14	Drainage Ditch	2/3/94	<	5.6	0	No	
ODD3	Navy	SW11-36	Drainage Ditch	2/4/94	=	6.7	0	No	
ODD3	Navy	SW11-70	Drainage Ditch	2/3/99	<	5	0	No	
ODD3	Navy	SW11-71	Drainage Ditch	2/3/99	<	3.9	0	No	
ODD3	Navy	SW11-73	Drainage Ditch	2/3/99	<	3.6	0	No	
ODD3	Navy	SW11-72	Drainage Ditch	2/3/99	=	8.7	0	No	

**Comprehensive Long-Term
Environmental Action Navy
(CLEAN)**

N63126.000556
NAWS PT. MUGU
SSIC NO. 5090.3



B

**NAVAL AIR WEAPONS STATION
POINT MUGU, CALIFORNIA**

**PHASE I REMEDIAL INVESTIGATION
TECHNICAL MEMORANDUM
VOLUME I - CHAPTERS 1 - 13**

DRAFT FINAL

**Department of the Navy
Naval Facilities Engineering Command
Engineering Field Activity West
San Bruno, California 94066-2402**

location of SS5-10 where the septic tank discharged (Fugro-McClelland 1991). This change to the FSP is documented in field change request form (FCRF) Field 3 included in Appendix D.

The majority of samples from soil boring locations proposed in the FSP (B5-3 through B5-11 and B5-13 through B5-21) were collected using sediment sampling techniques (hand auger and core barrel). Proposed sample collection methods at these locations were altered because of the presence of shallow groundwater (2 to 3 inches bgs) or standing water. Samples collected at soil boring B5-12 and at monitoring wells MW5-1 to MW5-4 were the only soil samples collected using subsurface soil sampling procedures (hand auger or split spoon sampler). This change to the FSP is described in detail in FCRF Field 5 included in Appendix D.

Soil samples were collected from B5-12 and MW5-1 from the surface (0 to 18 inches bgs), approximately 3 feet bgs, and just above the water table. Soil samples from MW5-2 through MW5-4 were collected from the surface and just above the water table. Soil samples from the remainder of the locations (B5-3 to B5-11 and B5-13 through B5-21) were collected every 6 inches to a maximum depth of 2 feet bgs using sediment sampling techniques. Table 8-4 summarizes soil sampling locations and analyses.

8.4.3 Sediment Sampling

Sediment samples were collected to establish the presence and extent of off-site contaminant migration from Site 5. Sediment samples were collected to provide further definition of the vertical and horizontal extent of contamination identified in sediments during previous investigations, to establish if the drainage channel which discharges to Mugu Lagoon acts as a pathway for off-site contaminant migration, and to determine whether contaminants are present in Mugu Lagoon sediment at the outfall of the sewer effluent line.

Thirty-one sediment samples were collected from 8 locations as shown in Figure 8-3a. Samples from locations SG5-1 to SG5-5, SG5-8, and SG5-9 were collected in a drainage ditch directing surface water runoff from Site 5 to Mugu Lagoon. Sample location SG5-6 was located at the outfall of the effluent sewer line, and sediment sampling location SG5-7 was located in the tidal marsh area north of Site 5. Table 8-5 summarizes sediment sampling locations and analyses.

8.4.4 Surface Water Sampling

Surface water samples were collected to determine if surface water is transporting contaminants off site and toward Mugu Lagoon. Surface water samples were collected at one sampling location, SW5-2, which is in a drainage channel that discharges to Mugu Lagoon, as shown in Figure 8-3a. Table 8-6 summarizes the analyses for samples taken at SW5-2.

8.4.5 Monitoring Well Installation and Groundwater Sampling

Four monitoring wells (MW5-1 through MW5-4) were installed at Site 5 during the RI field investigation. Figure 8-3a shows the locations of the monitoring wells. Monitoring well MW5-1 is located directly south of the plating waste pits, MW5-2 is along South G Avenue, MW5-3 is in the vicinity of the old septic tank, and MW5-4 is southwest of Site 5. Appendix W presents lithologic borelogs and well construction diagrams. Appendix Y presents monitoring well development sheets. The following table summarizes well construction information for each monitoring well at Site 5.

Phase I RI Monitoring Well Construction Details

Site	Well No.	Date Installed	Well Depth (feet bgs)	Borehole Depth (feet bgs)	Screen Interval (feet bgs)	Elevation of TOC (feet above mean sea level)	Ground surface Elevation (feet above mean sea level)	Completion Type
5	MW5-1	1/21/94	13.0	13.5	2.5 to 12.5	4.1	4.5	Flush mount
	MW5-2	1/22/94	12.5	14.3	2.0 to 12.0	4.7	4.8	Flush mount
	MW5-3	1/23/94	12.5	13.0	2.0 to 12.0	8.5	6.3	Aboveground
	MW5-4	1/21/94	12.5	13.0	2.0 to 12.0	7.0	5.2	Aboveground

Groundwater samples were collected at the monitoring wells during four quarters of sampling over a one-year period to evaluate both groundwater quality and water levels were measured to determine flow direction at Site 5. Appendix Z presents groundwater sampling data sheets. Table 8-7 summarizes groundwater sampling locations and analyses.

In general, sampling procedures were performed in accordance with the proposed sampling procedures described in the final remedial investigation/feasibility study (RI/FS) FSP (PRC and JMM 1993b) and the ecological assessment (EA) Phase 1 FSP (PRC and others 1994). Any deviations from the general field sampling procedures are described in Chapter 4 of this technical memorandum. The sample analyses as well as deviations from the FSP associated with Site 6 are discussed below. Appendix U presents chemical analytical results (detected concentrations) and Appendix V presents results of geotechnical analyses.

9.4.1. Soil Boring Sampling

Soil boring samples were collected to determine the vertical and lateral extent of contamination in areas at Site 6 where disposal activities may have occurred. Forty surface and subsurface soil samples were collected at 11 soil boring locations (B6-3 through B6-10, MW6-1R, MW6-4, and MW6-5) during the Phase I RI field investigation. Figure 9-3 presents soil boring sample locations. Four soil borings, B6-4 through B6-7, were completed in the unpaved area; B6-8 was completed in the surface water drainage path southeast of the unpaved area; B6-10 was completed in the shallow swale outside of the fenced area. Two soil borings, B6-3 and B6-9, were completed west and east of the site, respectively, away from suspected site contamination. Eleven of the 40 soil samples were collected during the installation of monitoring wells MW6-1R, MW6-4, and MW6-5. Lithologic borelogs for all SI and Phase I RI soil borings at Site 6 are presented in Appendix X and Appendix W, respectively. Table 9-4 summarizes soil sampling locations and analyses.

Soil samples at each boring were collected from the surface (0 to 18 inches below ground surface [bgs]), 3 feet bgs, approximately 5 feet bgs, and from just above the water table.

9.4.2. Surface Water Sampling

Following storm events, surface water collects in the yard at Site 6 and flows along the shallow swale to South Mugu Road and to a storm sewer that ultimately discharges to Drainage Ditch No. 6 on the south side of South Mugu Road. The EA Phase 1 FSP (PRC and others 1994) designated two locations at Site 6 (SW6-1 and SW6-2) for the collection of surface water samples in the event rainfall was sufficient to produce standing water.

Rainfall during the evening of January 24, 1994 produced standing water at the site. Surface water sample SW6-1 was collected on January 25, 1994. The proposed sampling location of SW6-1 was moved several feet to the northwest because there was no surface water at the proposed location. Figure 9-3 shows this sample location. There was no surface water in the vicinity of proposed sampling location SW6-2; therefore, no sample was collected.

9.4.3 Monitoring Well Installation and Groundwater Sampling

Three new monitoring wells (MW6-1R, MW6-4, and MW6-5) were installed at Site 6 during the RI field investigation to supplement existing on-site monitoring wells (MW6-2 and MW6-3). Figure 9-3 shows the locations of the new and existing wells. Monitoring well MW6-1R was installed to replace existing well MW6-1, which had been destroyed. MW6-1R was installed in the inferred upgradient direction, adjacent to MW6-1 on the southern edge of Site 6. Monitoring well MW6-2 is also located south of Site 6 and is crossgradient of disposal activities. Monitoring well MW6-3 is located on the northwest corner of Site 6. Monitoring wells MW6-4 and MW6-5 were installed downgradient of the waste disposal area to define groundwater conditions directly downgradient of the unpaved area at Site 6. Appendices X and W present lithologic borelogs and well construction diagrams for the old and new wells, respectively. Appendix Y presents monitoring well development sheets. Well construction information for each monitoring well at Site 6 is summarized in the following table:

SI and RI Monitoring Well Construction Details

Site	Well No.	Date Installed	Well Depth (feet bgs)	Borehole Depth (feet bgs)	Screen Interval (feet bgs)	Elevation of TOC (feet msl)	Ground surface Elevation (feet msl)	Completion Type
6	MW6-1R	1/24/94	16.5	18.5	6.0 to 16.0	8.8	8.8	Flush mount
	MW6-2	10/25/88	14.5	15.0	4.5 to 14.5	7.4	7.0	Aboveground
	MW6-3	10/25/88	14.2	15.0	4.2 to 14.2	7.5	7.1	Aboveground
	MW6-4	1/12/94	15.0	15.5	4.5 to 14.5	8.8	8.8	Flush mount
	MW6-5	1/12/94	15.0	15.5	4.5 to 14.5	8.9	8.8	Flush mount

Groundwater samples were collected at the new and existing monitoring wells during four quarters of sampling over a one-year period to define groundwater conditions directly downgradient and

Surface water samples were collected from 12 locations in Mugu Lagoon and drainage ditches and analyzed for VOCs, SVOCs, pesticides and PCBs, and CAM metals. None of the surface water samples contained significant concentrations of the analytes.

Biological sampling was also conducted; tissue samples were collected from invertebrates and fish species from five locations in the lagoon and analyzed for SVOCs, pesticides and PCBs, and CAM metals. The tissue samples contained phenol and 4,4'-DDT, DDT metabolites, and metal. Tables 12-2 through 12-7 summarize analytical results from the SI.

12.4 REMEDIAL INVESTIGATION ACTIVITIES

The Phase I RI field investigation at Site 11 included the following activities:

- Collection of sediment samples using hand-driven or gravity driven sediment corers
- Collection of lagoon core sediment samples using a Vibracore sampler
- Collection of surface water grab samples
- Collection of hydrologic and hydrographic data
- Collection of ecological data

In general, sampling procedures were performed in accordance with the proposed sampling procedures described in the final RI/FS field sampling plan (FSP) (PRC and JMM 1993b) and the ecological assessment (EA) Phase I FSP (PRC and others 1994). Any deviations from the general field sampling procedures are described in Chapter 4 of this technical memorandum. The sample analyses as well as deviations from the FSP associated with Site 11 are discussed below. Appendix U presents chemical analytical results (detected concentrations), and Appendix V presents results of geotechnical analyses.

12.4.1 Sediment Sampling

Sediment samples were collected to determine on-base and off-base sources of contamination and each source's potential contribution to Mugu Lagoon. During the Phase I RI field investigation, 140 sediment samples were collected from 50 locations, as shown in Figure 12-2a. Additional sediment samples were collected in 1997 to support the ecological risk assessment as shown in Figure 12-2b. Samples from locations SG11-1 to SG11-10, SG11-27, SG11-29, and SG11-37 were collected at the

drainage ditch, storm sewer, and sewage treatment plant outfall. Three sediment sampling locations (SG11-15 to SG11-17) and five sediment sampling locations (SG11-11 to SG11-14, and SG11-36) were located in ODD No. 2 and No. 3, respectively. Sample locations SG11-18 to SG11-23 are located in Calleguas Creek and Revolon Slough. Sample locations SG11-28, SG11-30 to SG11-35 are located in small drainage channels throughout Site 11. Sample locations SG11-24 to SG11-26 are located in the eastern arm of the lagoon to assess the presence of contamination. Four sampling locations (SG11-39, SG11-47, SG11-51, and SG11-55) were located in the main channels of the lagoon. Sample locations SG11-46, SG11-48, SG11-53, and SG11-57 were positioned equidistant from the channel station and the bank of the lagoon. Two sampling locations (SG11-44 and SG11-45) were established in creek channels on the marsh south of the western arm of the lagoon, and three sampling locations (SG11-58, SG11-59, and SG11-60) were on the marsh east of the central basin. Table 12-8 summarizes sediment sampling locations and analyses.

Sediment samples were collected to determine if surface water runoff and groundwater from the landfill are transporting contaminants originating from the landfill to the marsh creek channel. Eight sediment samples were collected at two locations in the area of Site 1 (SG1-2 and SG1-3). Samples from location SG1-2 were collected in the tidal marsh area east of Site 1, an area that may receive contaminants from surface water runoff and groundwater discharge from the landfill. The marsh creek channel, location of sample location SG1-3, may also be an important surface water transport pathway. This sample was collected just east of the southern burn and fill area and the solid waste fill area.

Sediment samples were collected to determine if surface water runoff carries contaminants from the surface of Site 2 to Mugu Lagoon and the marsh adjacent to the site. Eight sediment samples were collected at two locations in the area of Site 2 (SG2-1 and SG2-4). Samples from location SG2-1 were collected at the head of the two marsh creeks between Sites 1 and 2. Sample location SG2-4 was located midway along the marsh creek channel on the eastern edge of Site 2.

Sediment samples originally associated with Site 4 and not removed during the Site 4 removal action were moved to Site 11 and included SG4-4, SG4-7, SG4-12, SG4-14, SG4-15, SG4-20, and SG4-21. SG4-4 is located in Drainage Ditch No. 6. SG4-7 is located upstream of Site 4. SG4-15 was located in a tributary to Drainage Ditch No. 6. SG4-12 and SG4-14 are in the salt marsh. SG4-20 and SG4-21

are located to the south of Site 4. Similarly, sediment samples originally associated with Site 5 were moved to Site 11 and included samples SG5-4 and SG5-10.

12.4.2 Lagoon Core Sampling

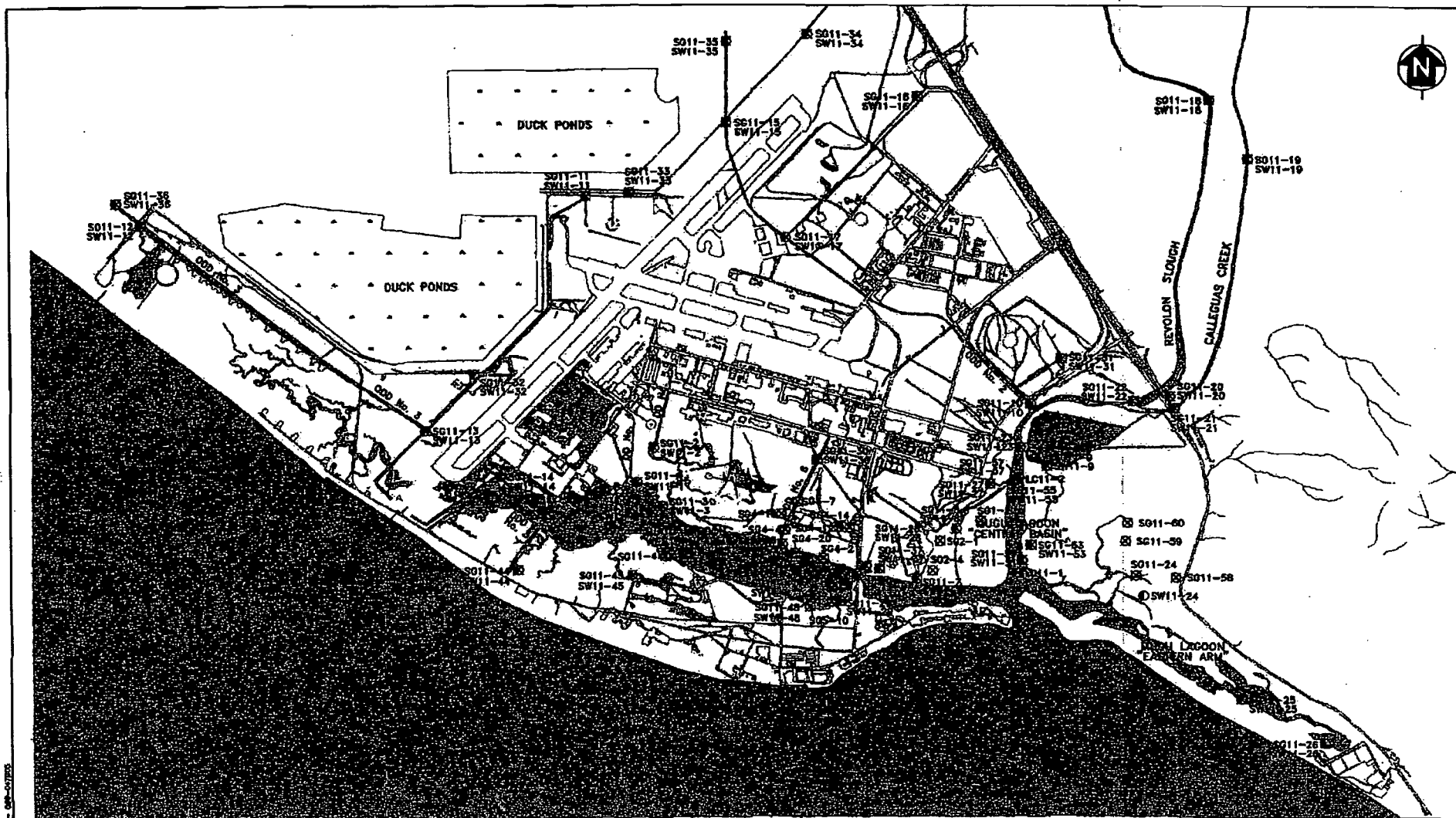
Lagoon cores were collected to provide a historical record of contamination in Mugu Lagoon and to support evaluation of dredging as a potential remedial option. Two deep cores (LC11-1 and LC11-2) were taken in the central basin of Mugu Lagoon. Sampling locations are presented in Figure 12-2a. Lagoon core LC11-1 was taken in the area dredged in 1961, in the southern part of the central basin. Lagoon core LC11-2 was taken in the area dredged in 1952, in the northern portion of the central basin. Samples were collected at the surface, 1.3 feet, 2.3 feet, 4.5 feet, and 6.8 feet at LC11-1; and at the surface, 0.9 foot, and 1.4 feet at LC11-2. These eight sediment samples were analyzed for pesticides and PCBs, inorganic chemicals, phenols, and geotechnical parameters, as presented in Table 12-8.

12.4.3 Surface Water Sampling

Surface water samples were collected to evaluate the presence of contaminants in Site 11 and to evaluate potential off-base sources that may release contaminants to ODD No. 2 and ODD No. 3. Surface water samples were collected from 46 locations throughout Site 11 as shown in Figure 12-2a. No surface water samples were collected at SW11-31 because no water was present. Also, no surface water samples were collected at sampling location SW11-49 because sample SW11-8 was collected in the same vicinity. The surface water samples were collected from a depth of 0 to 12 inches below water surface at the same locations as the sediment and benthos sampling activities. Thus, the surface water sampling locations were similar to those described above for sediment sampling. Table 12-9 summarizes surface water sampling locations and analyses.

12.4.4 Hydrological and Hydrographic Data Collection

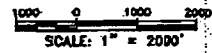
Hydrological and hydrographic data were collected, in accordance with the final draft EA work plan (PRC and others 1993) and EA Phase 1 FSP (PRC and others 1994), to characterize hydrological and estuarine processes that may influence the transport and accumulation of contaminants entering Mugu



LEGEND

- ⊠ SEDIMENT GRAB SAMPLE LOCATION
- ⊙ SURFACE WATER SAMPLE LOCATION
- ⊠ SEDIMENT GRAB / SURFACE WATER SAMPLE LOCATION

- ⊠ LAGOON CORE SAMPLE LOCATION
- ODD OXNARD DRAINAGE DITCH
- DD DRAINAGE DITCH



NAVS POINT MUGU
CALIFORNIA

FIGURE 12-2a
SITE 11 MUGU LAGOON
AND DRAINAGE DITCHES
SAMPLE LOCATIONS

DATE: 10/10/80 - 10/10/80 - 10/10/80 - 10/10/80