REGION 3
STAFF
REPORT

STATE OF CALIFORNIA
REGIONAL WATER QUALITY CONTROL BOARD
CENTRAL COAST REGION

STAFF REPORT FOR REGULAR MEETING OF OCTOBER 26, 2001

Prepared on July 26, 2001

ITEM:

SUBJECT: Changes to 303(d) List of Impaired Water Bodies

SUMMARY:

To achieve the water quality goals of the Clean Water Act, the United States Environmental Protection Agency's (USEPA's) first objective is to ensure that technology-based controls on point sources are established and maintained. Where such controls are insufficient to attain and maintain water quality standards, water quality-based controls are required.

The State is required to identify a list of impaired water bodies requiring water quality based controls, or Total Maximum Daily Loads (TMDLS), under Section 303(d) of the Federal Clean Water Act (CWA). The TMDL will evaluate waters upstream of the 303(d) listed water as well as the 303(d) listed water. The Regional Water Quality Control Board, Central Coast Region (RWQCB) will consider public comments and provide recommended Section 303(d) List changes to the State Water Resources Control Board (SWRCB). Changes are being proposed for the 1998 303(d) List. The SWRCB will review recommendations from all the Regional Boards. The SWRCB will hold a public hearing and consider public comments; finalize the 303(d) List; and transmit the List to the USEPA.

The RWQCB solicited information from the public to consider for the 303(d) List. (This letter is shown in Attachment One.) The public was given until May 15, 2001 to provide information. The Regional Board only considered information provided by May 15, 2001 in this recommendation. The Regional Board is only accepting comments about proposed changes to the 303(d) List identified in Attachment Two.

The 303(d) List update includes additions to water bodies and pollutants; removal of water bodies and pollutants, if standards are attained; and changes to the description of water bodies currently listed (for example, refinement of identified impaired reaches, changes in priority, etc).

DISCUSSION:

Background

Since the 1990s, emphasis has been placed on the 303(d) List. Under the authority of Section 303(d) of the Clean Water Act, USEPA expects States to develop a Total Maximum Daily Loads (TMDLs) for waters on the List where technology based effluent limits or other legally required pollution control mechanisms are not sufficient or stringent enough to implement the water quality standards applicable to such waters. Updates of the list must be performed according to Section 303(d) of the Clean Water Act. Updates include adding or removing waters, and indicating Regional Board priorities and schedules for developing TMDLS. A TMDL is a plan to attain water quality standards. This plan allocates pollution control responsibilities among pollution sources in a watershed, and it is the basis for taking actions needed to restore a waterbody.

The USEPA (40CFR 130.7[a][5]) directs States to "assemble and evaluate all existing and readily available water quality-related data and information" to develop the Section 303(d) List and priorities for TMDLs. Ideally, this process should involve review of information such as monitoring data, scientific literature, or resource management agency files that document water quality conditions and trends.

Approach to Listing Waters

The general factors used by the Regional Board staff recommended changes to the 303(d) List for surface waters within the Central Coast Region are shown below. These factors are the same as the 1998 listing factors. Staff obtained these factors from the 1998 Clean Water Act Section 303(d) Listing Guidelines for California (August 11, 1997) (hereafter referred to as "Listing Guidelines"). The Listing Guidelines were developed by an ad hoc workgroup of staff from the Regional Water Quality Control Boards, the State Water Resource Control Board, and the USEPA.

Listing Factors

1. Effluent limitations or other pollution control requirements [e.g., Best Management Practices (BMPs)] are not stringent enough to assure protection of beneficial uses and attainment of SWRCB and RWQCB objectives, including those implementing SWRCB Resolution Number 68-16 "Statement of Policy with Respect to Maintaining High Quality of Waters in California."

2. Fishing, drinking water, or swimming advisory currently in effect. This does not apply to advisories related to discharge in violation of existing WDRs or NPDES permit.

3. Beneficial uses are impaired or are expected to be impaired within the listing cycle (i.e. in next two years). Impairment is based upon evaluation of chemical, physical, or biological integrity. Impairment will be determined by "qualitative assessment", physical/chemical monitoring, bioassay tests, and/or other biological monitoring. Applicable Federal criteria and RWQCB Water Quality Control Plans determine the basis for impairment status.

4. The water body is on the previous 303(d) List and either: (a monitored assessment" continues to demonstrate a violation of objective(s) or (b) "monitored assessment" has not been performed.

5. Data indicate tissue concentrations in consumable body parts of fish or shellfish exceed applicable tissue criteria or guidelines. Such criteria or guidelines may include SWRCB Maximum Tissue Residue Level values, FDA Action Levels, NAS Guidelines, and U.S. EPA tissue criteria for the protection of wildlife as they become available.

6. The water quality is of such concern that the RWQCB determines the water body needs to be afforded a level of protection offered by a 303(d) listing.

Evaluation Approach

Staff is utilizing a "weight of evidence" approach to develop new listings for the Regional Board's recommendation. Staff is interpreting "weight of evidence" to mean more water quality data exists to indicate impairment than water quality data that does not indicate impairment. Staff considers the "weight of evidence" to occur where 50% or greater of all samples for a given water body exceed applicable *Water Quality Control Plan, Central Coast Region (*Basin Plan) standards, State Water Resources Control Board Ocean Plan standards, or Assembly Bill (AB) 411 beach posting guidelines.

Staff only considered data that had been collected and analyzed with appropriate certified quality assurance/quality control procedures. The type of information that was readily available to the Central Coast Regional Board to develop the 303(d) list was primarily conventional water quality data. This type of data is for constituents such as total dissolved solids, sodium, chloride, nitrate, dissolved oxygen, and bacteria. The data set for each constituent for each water body was individually reviewed to determine whether 50% or greater of the samples had values greater than the applicable water quality criteria or guideline for that constituent. If so, the waterbody/pollutant combination is proposed as a new listing. Statistical methods were not utilized as a listing approach (i.e. mean values, median values were not calculated).

There are no specific minimum data requirements or a specific frequency of exceedences for making a finding that water quality objectives are not attained. (This is particularly the case when statistical approaches are not used, such as basing attainment upon mean or median values for a given site.) In general, more data is needed to interpret environmental results that are specific to time and geography. Less data would be needed to make a determination based on environmental results that serve as integrators over space and time. For example, more water column chemistry data would generally be needed to determine impairment than fish tissue chemistry data. All the data received and evaluated by the Regional Board staff for this update was water column data.

The rigor of evidence used to recommend that a water be listed is a judgment decision of the Regional Boards and their staff. It must be kept in mind that a decision to list does not require the same certainty that is applied when determining violations of permit conditions. Constructing the list is not a regulatory action. This is an informational and administrative exercise that prioritizes our work and highlights problem locations. As such, the judgment of staff is sufficient basis for listing. What is necessary is a reasonable rationale to support the listing or delisting, and documentation of the information relied on to reach that conclusion. The regulatory actions associated with listing come as a response to the list. TMDLs, standards actions, or other means of resolving the non-attainment condition are the regulatory instruments.

Development of a TMDL "Problem Statement" (and subsequent TMDL components) is the more appropriate mechanism to evaluate data more rigorously and determine a stronger, clearer, and scientific basis for impairment. If the problem can be clearly defined, staff proceeds with TMDL development. If the problem remains unclear or there does not appear to be adequate data to proceed with TMDL development, additional monitoring can be scheduled at this point or any point during TMDL development to fill data gaps or improve information. If after collecting adequate data the problem cannot be determined, the waterbody can be delisted.

Delisting Factors

According to the Listing Guidelines, water bodies may be delisted for specific pollutants or stressors if any one of these factors is met:

1. Objectives are revised (for example, Site Specific Objectives), and the exceedence is thereby eliminated.

2. A beneficial use is de-designated after U.S. EPA approval of a Use Attainability Analysis, and the non-support issue is thereby eliminated.

3. Faulty data led to the initial listing. Faulty data include, but are not limited to typographical errors, improper quality assurance/quality control (QA/QC) procedures, or Toxic Substances Monitoring/State Mussel Watch Elevated Data Levels which are not confirmed by risk assessment for human consumption.

4. It has been documented that the objectives are being met and beneficial uses are not impaired based upon "Monitored Assessment" criteria.

5. A TMDL has been approved by the U.S. EPA.

6. There are control measures in place which will result in protection of beneficial uses. Control measures include permits, cleanup and abatement orders, and watershed management plans which are enforceable and include a time schedule.

Proposed TMDL Priorities

A priority ranking is required for listed waters to guide TMDL planning pursuant to 40 CFR 130.7. TMDLs will be ranked into high, medium, and low priority categories based on:

- water body significance (such as importance and extent of beneficial uses, threatened and endangered species concerns and size of water body),
- degree of impairment or threat (such as number of pollutants/stressors of concern, and number of beneficial uses impaired or threatened),
- conformity with related activities in the watershed (such as existence of watershed assessment, planning, pollution control and remediation, or restoration efforts in the area),
- potential for beneficial use protection or recovery,
- degree of public concern, and
- available information.

It should be noted that the criteria can be applied in different ways to different water bodies and pollutants. For example, a water body may be severely impaired, but if there is little likelihood of beneficial use recovery than a lower priority might be given. Staff also considered (1) the overall need for an adequate pace of TMDL development for all listed waters and (2) if other water bodies and pollutants have become a higher priority.

Staff also assigned a higher priority according to Regional Board priority watersheds (Salinas, Morro Bay, San Lorenzo, Pajaro, Santa Maria, and Santa Ynez).

Schedules for TMDL development after the first two years should be regarded as <u>very tentative.</u> Completion will depend significantly upon the availability of funding, availability of staff, on watershed stakeholder group priorities, and RWQCB Basin Plan amendment priority. They will also depend upon further evaluation of the need for and feasibility of TMDLs. If additional water bodies are listed in 2002 or subsequent 303(d) review cycles these schedules will also need to be revised.

Public Solicitation

Regional Board staff solicited public information and comments regarding 303(d) List additions on March 7, 2001(Attachment One). The public was notified that information must be received by May 15, 2001. The public solicitation letter was also placed on the Central Coast Region's web page.

Information and data considered that resulted in new listings of impaired waterbodies is discussed below and in Attachment Three. Information and data considered that did not result in new listings is discussed in Attachment Four. Regional Board staff only considered data with proper quality assurance/quality control. Only conditions with 50% or greater of all samples for a given water body exceeding applicable Basin Plan, Ocean Plan, or AB 411 criteria were proposed as new listings.

The Santa Barbara County Public Health Department submitted water quality data as a result of the March 7, 2001 public information solicitation. The County's data indicates impairment of three additional Santa Barbara County beaches. The County utilizes QA/QC procedures to assure reliable sample results. The samples are analyzed at the Santa Barbara County Public Health Laboratory.

Other information/data was also received, but it did not result in new 303(d) listings. This information is described in Attachment Four.

Regional Board Information Reviewed

Many potential data sources exist and/or were submitted in response to the public solicitation. Potential data sources include State Mussel Watch/Toxic Substances Monitoring; beach-monitoring data; monitoring data for regulated/unregulated discharges; and data from other local, state and federal agencies. Listing information can be obtained from reports containing trend analysis/water quality assessment information. Where available, these sources were utilized. For example, the California Department of Pesticide Regulation provided water quality data. (No new water quality impairment conditions were identified.) Some data sources did not have additional information beyond that which was available in 1998 (such as State Mussel Watch or Toxic Substances Monitoring data).

The Central Coast Region has developed an ambient water quality monitoring program called the Central Coast Ambient Monitoring Program (CCAMP). The CCAMP surface water monitoring strategy is to focus on watersheds and coastal confluences. CCAMP watershed characterization calls for dividing the Central Coast Region into five watershed rotation areas and conducting synoptic, tributary based sampling each year in one of the areas. Over a five-year period, all the hydrologic units in the Region are monitored and evaluated. Permanent watershed sites are monitored monthly for conventional water quality parameters, and once during the year for sediment chemistry, bioaccumulation, and benthic invertebrate assemblages. In addition to the synoptic site selection approach, additional monitoring sites are established in each rotation area to provide focused attention on watershed and water bodies known to have water quality impairments.

CCAMP utilizes quality assurance/quality control (QA/QC) procedures to develop reliable water quality sampling results. Requirements for field and laboratory duplicates and blanks, adherence to field sampling protocols, chain of custody, chain of data processing, and similar quality assurance procedures are set forth for data collected by CCAMP and its contractors. Only the State Department of Health Services certified labs perform data analyses.

Federal law requires States to consider 305(b) reports when developing 303(d) list. 303(d) regulations requires the state to consider "[w] aters identified by the State in its most recent section 305(b) report as 'partially meeting' or 'not meeting' designated uses or as 'threatened';" [40 C.F.R.sec. 130.7 (b)(5)(i)]. In the case of the Central Coast Regional Board, the 305(b) report relies upon CCAMP data. CCAMP data is also the same data source used for the 303(d) list. Reviewing this data resulted in several new listings (see next section and Attachments Two and Three).

In addition to CCAMP, staff used monitoring data generated by the Morro Bay National Estuary Program. This ten year sampling program monitors several stations within the Morro Bay watershed. Sampling and analysis is performed according to the Quality Assurance Project Plan (RWQCB, 1996). This data resulted in one new listing.

Another data source staff used for the proposed 303(d) List is South County Regional Wastewater Authority (SCRWA) monitoring data generated by Waste Discharge Requirements. In particular, staff utilized data for Llagas Creek upstream of this facility to support listing. This upstream Llagas Creek water quality data was compared to site-specific water quality objectives contained in Table 3-7 of the Basin Plan. Regional Board Waste Discharge Requirements stipulate QA/QC procedures within the Standard Provisions and Reporting Requirements for Waste Discharge Requirements. This data resulted in four new listings.

Staff is proposing to add several water quality impairments to the 1998-303(d) List.

Proposed Changes To 303(D) List

Proposed Listings

The recommended changes to the 1998-303(d) list are shown in Attachment Two. Additions are shown in a highlighted format and deletions are shown in a ~~strikethrough~~ format.

More information about proposed new listings is shown in Attachment Three. Included is staff's rationale for adding a specific condition.

Proposed 303(d) Delistings

Staff is proposing to remove water quality conditions from the 1998-303(d) List. Waters proposed for delisting are summarized below and shown in a ~~strikethrough~~ format in Attachment Two. Attachment Five contains detailed rationale for proposed listing.

<u>Chorro Creek Metals</u>

Staff is proposing to delist Chorro Creek for metals after evaluating data and finding conditions support delisting factor three because sample data showing exceedences was collected from outside of the waterway. Available information also supports delisting factor four based on aquatic habitat data submitted after the listing by the California National Guard. Chorro Creek will remain on the list for Siltation which also supports delisting factor six because sediment reductions required under the Siltation TMDL are expected to also reduce metals loads in Chorro Creek.

<u>Los Osos Creek Priority Organics</u>

Staff is proposing to delist Los Osos Creek for Priority Organics. Water column and sediment data was collected as part of a monitored assessment and no exceedences of standards existed. Therefore delisting factor four is supported. Los Osos Creek will remain on the list for Siltation which also supports delisting factor six because sediment reductions required under the Siltation TMDL are expected to also reduce pesticides loads in Los Osos Creek.

<u>San Lorenzo River Estuary—Siltation</u>

Staff is proposing to delist the San Lorenzo River Lagoon. The original listing appears to have been based on generic data that was not truly indicative of the conditions in the San Lorenzo River Lagoon. This conclusion supports delisting factor three, use of faulty data. The City of Santa Cruz's 1989 study of the lower San Lorenzo River (Philip Williams & Associates, et al, 1989), which includes the Lagoon Management Plan, has established that problems within the lagoon are associated with the breaching of the sand bar that becomes established between the lagoon and Monterey Bay, and are not due to the delivery of sediment from upstream sources.

Other Changes Proposed

Attachment Two indicates a priority and schedule for each new listing and changes to priority and schedule for some existing listings.

The following general comments provide background and justification for proposed schedules shown on Attachment Two. While initial assessments started for several listings between 1996 and 1998, TMDL development did not. From 1996 to 2000, TMDL-related efforts focused on updating the 1998 303(d) list and assessing resource needs and priorities for TMDL development, watershed management, and establishment of CCAMP. In July 1999, Region 3 secured dedicated resources (for five staff people) for TMDL development. These resources were augmented in July 2000 (with three additional staff people). Much of the TMDL effort during 1999 focused on recruiting, hiring, and training new staff, establishing the TMDL program and integrating the program into the Watershed Branch. Actual TMDL development work throughout Region 3, as defined by the 1998 303(d) List, began in July 2000 and significantly increased in January 2001. Hence several start dates have been proposed to be modified on the 303(d) list to better reflect this overall schedule. Proposed schedules for the new listings have been determined in conjunction with this overall schedule as well. Additionallly, USEPA requires that TMDLs be scheduled for completion within 13 years of the year a waterbody is listed (2015 for waters added to the list as part of this 2002 303(d) List Update). Specific reasons for each change are indicated in footnotes on Attachment Two.

Listing Clarifications

San Luis Obispo Creek Priority Organics

Staff is proposing to delist San Luis Obispo Creek for Priority Organics and refining/clarifying the listing to PCB. Exceedences of hexachlorocyclohexane (HCH), chlordane, and polychlorinated biphenyl (PCB) served as the basis of the original listing for priority organics. Staff revisited data that was the basis of the initial listing, and have recently preformed a monitored assessment. Reconsideration of the original data supports delisting for HCH based on delisting criteria three. Results of the monitored assessment supports delisting for chlordane based on delisting criteria four. San Luis Obispo Creek will remain listed for PCB because the monitored assessment conducted does not support delisting for this constituent. Attachment five contains detailed report for this proposed clarification.

COMMENTS:

Pending

ATTACHMENTS:

1. March 7, 2001 Public Solicitation Letter
2. Recommended Central Coast Region 2001 303 (d) List
3. Listing Rationale
4. Information Received that did not result in 303(d) List Additions
5. Delisting and Clarification Rationale

RECOMMENDATION:

Approve staff recommendation for changes to the 1998-303(d) List.

ATTACHMENT THREE. LISTING RATIONALE FOR 2OO1 303(D) LIST

Watershed	Water Body	Pollutant	Rationale	Total Samples	Monitoring Dates	Data Source(s)
Estero Bay	Los Osos Creek	Dissolved Oxygen	Basin Plan Objective violated 64% of samples at station "WAR"	359	12/14/93-4/19/99	Morro Bay National Monitoring Program
Estrella	Cholame	Fecal Coliform	Basin Plan Objective violated 80% of samples	10	2/02/99-2/08/00	Central Coast Ambient Monitoring Program (CCAMP)
Pajaro	Llagas Creek	Fecal Coliform	Basin Plan Objective violated 63% of samples for stations "FRA", "LLA", and "VIS"	41	12/18/97-6/12/98	CCAMP
Pajaro	Llagas Creek	Chloride	Basin Plan Site-Specific Objective violated 100% of samples	78	6/23/92-6/13/00	South County Regional Wastewater Authority (SCRWA) Wastewater Discharge Requirement Monitoring Program (all samples are upstream of SCRWA)
Pajaro	Llagas Creek	Dissolved Oxygen	Basin Plan Objective violated 66% of samples	128	9/12/88-6/13/00	SCRWA Wastewater Discharge Requirement Monitoring Program and CCAMP predawn sampling

LISTING RATIONALE FOR 2OO1 303(D) LIST

Watershed	Water Body	Pollutant	Rationale	Total Samples	Monitoring Dates	Data Source(s)
Pajaro	Llagas Creek	Sodium	Basin Plan Site-Specific Objective violated 77% of samples	78	6/23/92-6/13/00	SCRWA Wastewater Discharge Requirement Monitoring Program (all samples are upstream of SCRWA)
Pajaro	Llagas Creek	Total Dissolved Solids	Basin Plan Site-Specific Objective violated 100% of samples	90	9/12/88-6/13/00	SCRWA Wastewater Discharge Requirement Monitoring Program (all samples are upstream of SCRWA)
Pajaro	Pajaro River	Fecal Coliform	Basin Plan Objective violated 90% of samples at Station "FRA"	11	12/18/97-1/07/99	CCAMP
Pajaro	Tesquita Slough	Fecal Coliform	Basin Plan Objective violated 63% of samples	16	12/18/97-12/16/98	CCAMP
Salinas	Alisal Creek	Fecal Coliform	Basin Plan Objective violated 83% of samples	6	7/28/99-2/10/00	CCAMP
Salinas	Atascadero Creek	Dissolved Oxygen	Basin Plan Objective violated 67% of samples from CCAMP data	20	4/7/99-5/15/00	CCAMP

LISTING RATIONALE FOR 2OO1 303(D) LIST

Watershed	Water Body	Pollutant	Rationale	Total Samples	Monitoring Dates	Data Source(s)
Salinas	Gabilan	Fecal Coliform	Basin Plan Objective violated 100% of samples	6	2/1/99-2/10/00	CCAMP
Salinas	Quail Creek	Fecal Coliform	Basin Plan Objective violated 63% of samples	6	2/01/99-11/30/00	CCAMP
Salinas	Salinas Reclamation Canal	Fecal Coliform	Basin Plan Objective violated 89% of samples	37	2/01/99-2/10/00	CCAMP
Salinas	Salinas River (Upper)	Chloride	Basin Plan Site-Specific Objective violated 100% of samples	42	2/2/99-4/26/00	CCAMP
Salinas	Salinas River (Upper)	Sodium	Basin Plan Site-Specific Objective violated 100 % of samples	32	5/13/90-2/8/00	CCAMP
Salinas	San Lorenzo Creek	Fecal Coliform	Basin Plan Objective violated 60% of samples; Station "LOK" violated Basin Plan Objective 100% of samples	15	2/02/99-2/10/00	CCAMP

LISTING RATIONALE FOR 2OO1 303(D) LIST

Watershed	Water Body	Pollutant	Rationale	Total Samples	Monitoring Dates	Data Source(s)
Salinas	Tembladero Slough	Fecal Coliform	Basin Plan Objective violated 63% of samples	8	4/26/99-2/07/00	CCAMP
Santa Maria	Alamo Creek	Fecal Coliform	Basin Plan Objective violated 57% of samples	14	2/01/00-1/31/01	CCAMP
Santa Maria	Blosser Channel	Fecal Coliform	Basin Plan Objective violated 50% of samples	10	5/03/00-2/28/01	CCAMP
Santa Maria	Bradley Canyon Creek	Fecal Coliform	Basin Plan Objective violated 60% of samples	25	1/12/00-1/29/01	CCAMP
Santa Maria	Main Street Drain	Nutrients	Basin Plan Nitrate Drinking Water Objective violated 60 % of samples at Main Street Drain	10	1/12/00-1/29/01	CCAMP
Santa Maria	Nipomo Creek	Fecal Coliform	Basin Plan Objective violated 72% of samples	25	1/11/00-1/31/01	CCAMP
Santa Maria	Orcutt Solomon Creek	Fecal Coliform	Basin Plan Objective violated 62% of samples	50	1/12/00-2/28/01	CCAMP

LISTING RATIONALE FOR 2OO1 303(D) LIST

Watershed	Water Body	Pollutant	Rationale	Total Samples	Monitoring Dates	Data Source(s)
Santa Maria	Oso Flaco Lake	Nutrients	Basin Plan Nitrate Drinking water objective violated 100 % of samples	55	1/12/00-1/31/01	CCAMP
Santa Maria	Santa Maria River	Fecal Coliform	Basin Plan Objective violated 52% of samples	33	1/12/00-2/28/01	CCAMP
Santa Maria	Santa Maria River	Nutrients	Basin Plan Nitrate Drinking water objective violated 100 % of samples at Stations SMA and SMI	23	1/12/01-2/28/01	CCAMP
South Coast	Pacific Ocean @ Arroyo Quemado Beach	Total Coliform	Ocean Plan Shellfish objective violated 85% of time	250	3/24/97-4/25/01	Santa Barbara County Public Health Department
South Coast	Pacific Ocean @ Arroyo Quemado Beach	Fecal Coliform	Ocean Plan Water Contact objective violated 57% of time	250	3/24/97-4/25/01	Santa Barbara County Public Health Department
South Coast	Pacific Ocean @ Mission Creek (East Beach)	Total Coliform	Ocean Plan Shellfish objective violated 69% of samples	262	9/10/96-4/23/01	Santa Barbara County Public Health Department

LISTING RATIONALE FOR 2OO1 303(D) LIST

Watershed	Water Body	Pollutant	Rationale	Total Samples	Monitoring Dates	Data Source(s)
South Coast	Pacific Ocean @ Mission Creek (East Beach)	Fecal Coliform	Assembly Bill 411 Beach posting recommendation violated 61% of time;	262	9/10/96-4/23/01	Santa Barbara County Public Health Department
South Coast	Pacific Ocean @ Jalama Beach	Total Coliform	Ocean Plan Shellfish objective violated 53% of samples	222	3/10/97-4/23/01	Santa Barbara County Public Health Department
South Coast	Pacific Ocean @ Jalama Beach	Fecal Coliform	Assembly Bill 411 Beach posting recommendation violated 50% of time	222	3/10/97-4/23/01	Santa Barbara County Public Health Department

Attachment Two

2001 CENTRAL COAST REGIONAL BOARD 303 (D) AND TMDL PRIORITY LIST

TYPE	WATER BODY NAME	HYDRO UNIT	CAUSES	SOURCE	PRIORITY	SIZE AFFECTED	UNIT	START DATE	END DATE
B	Monterey Bay South	309.500	Pesticides	Agriculture	Low	10	Miles	2005[a]	2011
			Metals	Surface Mining	Low	10	Miles	2005[a]	2011
B	Monterey Harbor	309.500	Unknown Toxicity	Source Unknown	Low	74	Acres	2005[a]	2011
			Metals	Railroad Slag Pile	Medium	74	Acres	1998	2003
B	Morro Bay	310.220	Metals	Surface Mining Nonpoint Source Boat Discharges/Vessel Wastes	High	100	Acres	1996	2000
			Sedimentation/Siltation	Agriculture Irrigated Crop Production Construction/Land Development Resource Extraction Channelization Channel Erosion	High	100	Acres	1996	1999
			Pathogens	Upland Grazing Urban Runoff/Storm Sewers Septage Disposal Natural Sources Nonpoint Source	High	50	Acres	1996	2000
B	Moss Landing Harbor	306.000	Pesticides	Agriculture Irrigated Crop Production Specialty Crop Production	Low	160	Acres	2005	2009
			Sedimentation/Siltation	Agriculture Irrigated Crop Production Agriculture-storm runoff Hydromodification Dredging (Hydromod.) Channel Erosion Erosion/Siltation Nonpoint Source	Low	160	Acres	2005	2009
			Pathogens	Agriculture Nonpoint Source Boat Discharges/Vessel Wastes	Low	40	Acres	2005	2009

2001 CENTRAL COAST REGIONAL BOARD 303 (D) AND TMDL PRIORITY LIST

TYPE	WATER BODY NAME	HYDRO UNIT	CAUSES	SOURCE	PRIORITY	SIZE AFFECTED	UNIT	START DATE	END DATE
E	Carpinteria Marsh (El Estero Marsh)	315.340	Priority Organics	Urban Runoff/Storm Sewers	Low	80	Acres	2006	2011
			Nutrients	Agriculture	Low	80	Acres	2006	2011
			Sedimentation/Siltation	Agriculture Construction/Land Development Storm sewers	Low	80	Acres	2006	2011
			Org. enrichment/Low D.O.	Agriculture	Low	80	Acres	2006	2011
E	Elkhorn Slough	306.000	Pesticides	Agriculture Irrigated Crop Production Agriculture-storm runoff Agricultural Return Flows Contaminated Sediments Erosion/Siltation Nonpoint Source	Low	500	Acres	2005	2009
			Sedimentation/Siltation	Agriculture Irrigated Crop Production Agriculture-storm runoff Channel Erosion Nonpoint Source	Low	50	Acres	2005	2009
			Pathogens	Natural Sources Nonpoint Source	Low	500	Acres	2005	2009
E	Goleta Slough	315.310	Priority Organics	Nonpoint Source	Low	200	Acres	2006	2011
			Metals	Industrial Point Sources	Low	200	Acres	2006	2011
			Sedimentation/Siltation	Construction/Land Development	Low	200	Acres	2006	2011
			Pathogens	Urban Runoff/Storm Sewers	High[3]	200	Acres	2006	2011
E	Moro Cojo Slough	309.100	Pesticides	Agriculture Irrigated Crop Production Agriculture-storm runoff Agricultural Return Flows Nonpoint Source	Low	345	Acres	2001[b]	2011
			Sedimentation/Siltation	Agriculture Irrigated Crop Production Agriculture-storm runoff Construction/Land Development	Low	345	Acres	2000[c]	2011

2001 CENTRAL COAST REGIONAL BOARD 303 (D) AND TMDL PRIORITY LIST

TYPE	WATER BODY NAME	HYDRO UNIT	CAUSES	SOURCE	PRIORITY	SIZE AFFECTED	UNIT	START DATE	END DATE
E	*Old Salinas River Estuary*	*309.110*	*Pesticides*	*Agriculture* *Irrigated Crop Production* *Agriculture-storm runoff* *Agriculture-irrigation tailwater* *Agricultural Return Flows* *Nonpoint Source*	*Medium*	*50*	*Acres*	*2001*[b]	*2003*
			Nutrients	*Agriculture* *Irrigated Crop Production* *Agriculture-irrigation tailwater* *Nonpoint Source*	*Medium*	*50*	*Acres*	*2001*[b]	*2003*
E	*Salinas River Lagoon (North)*	*309.100*	*Pesticides*	*Agriculture*	*Medium*	*75*	*Acres*	*2001*[b]	*2003*
			Nutrients	*Nonpoint Source*	*Medium*	*75*	*Acres*	*2001*[b]	*2003*
			Sedimentation/Siltation	*Nonpoint Source*	*Medium*	*75*	*Acres*	*2000*[c]	*2001*
E	*Salinas River Refuge Lagoon (South)*	*309.100*	*Pesticides*	*Agriculture*	*Medium*	*163*	*Acres*	*2001*[b]	*2003*
			Nutrients	*Agriculture*	*Medium*	*163*	*Acres*	*2001*[b]	*2001*
			Salinity/TDS/Chlorides	*Agriculture*	*Medium*	*163*	*Acres*	*2001*[b]	*2003*
E	*San Lorenzo River Estuary*	*304.120*	~~*Sedimentation/Siltation*~~	~~*Hydromodification*~~	~~*High*~~	~~*20*~~	~~*Acres*~~	~~*1998*~~	~~*2000*~~
			Pathogens	*Urban Runoff/Storm Sewers* *Natural Sources*	*Medium*	*20*	*Acres*	*1999*	*2001*
E	*Soquel Lagoon*	*304.130*	*Nutrients*	*Septage Disposal* *Nonpoint Source*	*Low*	*2*	*Acres*	*2003*	*2007*
			Sedimentation/Siltation	*Construction/Land Development*	*Medium*	*2*	*Acres*	*2001*	*2005*
			Pathogens	*Urban Runoff/Storm Sewers* *Natural Sources* *Nonpoint Source*	*High*[3]	*2*	*Acres*	*2003*	*2007*
E	*Tesquita Slough*	*305.300*	*Fecal Coliform*	*Agriculture* *Nonpoint Source* *Natural Sources*	*Medium*[2]	*5*	*Miles*	*2004*[h]	*2015*
L	*Hernandez Reservoir*	*305.500*	*Mercury*	*Subsurface Mining*	*Medium*	*619*	*Acres*	*2001*[d]	*2003*

2001 CENTRAL COAST REGIONAL BOARD 303 (D) AND TMDL PRIORITY LIST

TYPE	WATER BODY NAME	HYDRO UNIT	CAUSES	SOURCE	PRIORITY	SIZE AFFECTED	UNIT	START DATE	END DATE
L	*Nacimiento Reservoir*	*309.820*	*Metals*	*Subsurface Mining* *Natural Sources*	*High*	*5370*	*Acres*	*1997*	*2000*
L	***Oso Flaco Lake***	***312.100***	***Nitrate***	***Agriculture*** ***Nonpoint Source***	***Medium***[1]	***8***	***Acres***	***2006***[d]	***2015***
L	*Schwan Lake*	*304.120*	*Nutrients*	*Nonpoint Source*	*Low*	*32*	*Acres*	*2006*	*2011*
			Pathogens	*Urban Runoff/Storm Sewers* *Natural Sources*	*High*[3]	*32*	*Acres*	*2006*	*2011*
R	***Alamo Creek***	***312.300***	***Fecal Coliform***	***Natural Sources*** ***Agriculture*** ***Range Land***	***Medium***[2]	***5***	***Miles***	***2006***[i]	***2015***
R	***Alisal Creek***	***309.200***	***Fecal Coliform***	***Urban Runoff*** ***Natural Sources*** ***Nonpoint Source*** ***Agriculture***	***Medium***[2]	***15***	***Miles***	***2003***	***2015***
R	*Aptos Creek*	*304.130*	*Sedimentation/Siltation*	*Disturbed Sites (Land Develop.)* *Channel Erosion*	*Medium*	*4*	*Miles*	*2001*	*2001*
			Pathogens	*Urban Runoff/Storm Sewers*	*Low*	*4*	*Miles*	*2005*	*2011*
~~*R*~~	~~*Arroyo Burro Creek*~~ *(Moved to coastal water section)*	~~*315.320*~~	~~*Pathogens*~~	~~*Urban Runoff/Storm Sewers*~~ ~~*Nonpoint Source*~~	~~*Medium*~~	~~*6*~~	~~*Miles*~~	~~*2006*~~	~~*2011*~~
R	***Atascadero Creek***	***309.810***	***Dissolved Oxygen***	***Agriculture*** ***Urban Runoff*** ***Unknown Source***	***Medium***[1]	***5***	***Miles***	***2004***[h]	***2015***
R	*Blanco Drain*	*309.100*	*Pesticides*	*Agriculture* *Irrigated Crop Production* *Agriculture-storm runoff* *Agriculture-irrigation tailwater* *Agricultural Return Flows* *Nonpoint Source*	*Medium*	*8*	*Miles*	*2001*[b]	*2005*
R	***Blosser Creek***	***312.100***	***Fecal Coliform***	***Agriculture*** ***Pasture Lands*** ***Urban Runoff*** ***Storm water*** ***Natural Sources***	***Medium***[1]	***5***	***Miles***	***2006***[i]	***2015***

2001 CENTRAL COAST REGIONAL BOARD 303 (D) AND TMDL PRIORITY LIST

TYPE	WATER BODY NAME	HYDRO UNIT	CAUSES	SOURCE	PRIORITY	SIZE AFFECTED	UNIT	START DATE	END DATE
R	**Bradley Canyon Creek**	**312.100**	**Fecal Coliform**	**Agriculture Urban Runoff Pasture Lands Natural Sources**	**Medium[1]**	**5**	**Miles**	**2006[1]**	**2015**
R	Carbonera Creek	304.120	Nutrients	Nonpoint Source	High	10	Miles	1993	2000
			Sedimentation/Siltation	Construction/Land Development Nonpoint Source	High	10	Miles	1998	2000
			Pathogens	Urban Runoff/Storm Sewers Nonpoint Source	Medium	10	Miles	1999	2001
R	Carpinteria Creek	315.340	Pathogens	Agriculture Land Disposal Septage Disposal	High[3]	6	Miles	2006	2011
R	**Cholame Creek**	**317.000**	**Fecal Coliform**	**Pasture Lands Nonpoint Source Natural Sources Agriculture**	**Medium[2]**	**8**	**Miles**	**2004[h]**	**2015**
R	Chorro Creek	310.220	~~Metals~~	~~Resource Extraction~~ ~~Mine Tailings~~	~~High~~	~~11~~	~~Miles~~	~~1996~~	~~2000~~
			Nutrients	Municipal Point Sources Agriculture Irrigated Crop Production Agriculture-storm runoff	High	11	Miles	1996	2000
			Sedimentation/Siltation	Agriculture Irrigated Crop Production Range Land Upland Grazing Agriculture-storm runoff Construction/Land Development Road Construction Resource Extraction Hydromodification Channelization Streambank Modification/Destabilization Channel Erosion Erosion/Siltation Natural Sources Golf course activities Nonpoint Source	High	11	Miles	1996	1999

2001 CENTRAL COAST REGIONAL BOARD 303 (D) AND TMDL PRIORITY LIST

TYPE	WATER BODY NAME	HYDRO UNIT	CAUSES	SOURCE	PRIORITY	SIZE AFFECTED	UNIT	START DATE	END DATE
R	Clear Creek	304.120	Mercury	Resource Extraction	Medium	2	Miles	2001[d]	2003
R	Espinosa Slough	309.100	Pesticides	Agriculture Urban Runoff/Storm Sewers	Medium	320	Acres	2001[b]	2003
			Priority Organics	Nonpoint Source	Medium	320	Acres	2001[b]	2003
			Nutrients	Agriculture Storm sewers	Medium	320	Acres	2001[b]	2003
R	Gabilan Creek	309.700	Fecal Coliform	Urban Runoff Nonpoint Source Natural Sources	Medium[2]	4	Miles	2004[h]	2015
R	Las Tablas Creek	309.810	Metals	Surface Mining	High	13	Miles	1997	2000
R	Las Tablas Creek, North Fork	309.810	Metals	Surface Mining	High	5	Miles	1997	2000
R	Las Tablas Creek, South Fork	309.810	Metals	Surface Mining	High	4	Miles	1997	2000

2001 CENTRAL COAST REGIONAL BOARD 303 (D) AND TMDL PRIORITY LIST

TYPE	WATER BODY NAME	HYDRO UNIT	CAUSES	SOURCE	PRIORITY	SIZE AFFECTED	UNIT	START DATE	END DATE
R	*Llagas Creek*	*305.300*	*Nutrients*	*Municipal Point Sources* *Agriculture* *Irrigated Crop Production* *Pasture Land* *Agriculture-storm runoff* *Agriculture-irrigation tailwater* *Agricultural Return Flows* *Urban Runoff/Storm Sewers* *Habitat Modification* *Nonpoint Source* *Point Source*	*High*	*22*	*Miles*	*2000*[e]	*2005*[f]
			Sedimentation/Siltation	*Agriculture* *Hydromodification* *Habitat Modification*	*Medium*	*22*	*Miles*	*2000*[e]	*2005*[f]
			Fecal Coliform	***Pasture Land*** ***Nonpoint Source*** ***Natural Sources***	***Medium***[2]	***4***	***Miles***	***2004***[h]	***2015***
			Chloride	***Nonpoint Source*** ***Unknown Source***	***Medium***[2]	***1***	***Miles***	***2004***[h]	***2015***
			Dissolved Oxygen	***Nonpoint Source*** ***Unknown Source*** ***Point Source***	***Medium***[2]	***1***	***Miles***	***2004***[h]	***2015***
			Sodium	***Nonpoint Source*** ***Unknown Source***	***Medium***[2]	***1***	***Miles***	***2004***[h]	***2015***
			Total Dissolved Solids	***Nonpoint Source*** ***Unknown Source***	***Medium***[2]	***1***	***Miles***	***2004***[h]	***2015***
R	*Lompico Creek*	*304.120*	*Nutrients*	*Septage Disposal*	*High*	*5*	*Miles*	*1993*	*2000*
			Sedimentation/Siltation	*Construction/Land Development* *Natural Sources*	*High*	*5*	*Miles*	*1998*	*2000*
			Pathogens	*Septage Disposal* *Natural Sources* *Nonpoint Source*	*Medium*	*5*	*Miles*	*1999*	*2001*

2001 CENTRAL COAST REGIONAL BOARD 303 (D) AND TMDL PRIORITY LIST

TYPE	WATER BODY NAME	HYDRO UNIT	CAUSES	SOURCE	PRIORITY	SIZE AFFECTED	UNIT	START DATE	END DATE
R	Los Osos Creek	310.220	~~Priority Organics~~	~~Urban Runoff/Storm Sewers~~	~~High~~	~~10~~	~~Miles~~	~~2001~~[d]	~~2003~~
			Nutrients	Agriculture Irrigated Crop Production Agriculture-storm runoff Agricultural Return Flows	High	10	Miles	1996	2000
			Sedimentation/Siltation	Agriculture Irrigated Crop Production Range Land Upland Grazing Agriculture-storm runoff Hydromodification Channelization Dredging (Hydromod.) Habitat Modification Removal of Riparian Vegetation Streambank Modification/Destabilization Channel Erosion Erosion/Siltation Natural Sources Nonpoint Source	High	10	Miles	1996	1999
			Dissolved Oxygen	Agriculture Urban Runoff Pasture Lands Unknown Sources	High[4]	1	Miles	2003[j]	2015
R	Main Street Canal	312.100	Nitrate	Agriculture Nonpoint Source Urban Runoff	Medium[1]	6	Miles	2006[j]	2015
R	Mission Creek	315.320	Unknown Toxicity	Urban Runoff/Storm Sewers	Low	9	Miles	2006	2011
			Pathogens	Urban Runoff/Storm Sewers Septage Disposal	High[3]	9	Miles	2006	2011
R	Nipomo Creek	312.100	Fecal Coliform	Urban Runoff Agriculture Natural Sources	Medium[1]	5	Miles	2006[j]	2015
R	Orcutt Solomon Creek	312.100	Fecal Coliform	Pasture Lands Nonpoint Source Agriculture Natual Sources	Medium[1]	5	Miles	2006[j]	2015

2001 CENTRAL COAST REGIONAL BOARD 303 (D) AND TMDL PRIORITY LIST

TYPE	WATER BODY NAME	HYDRO UNIT	CAUSES	SOURCE	PRIORITY	SIZE AFFECTED	UNIT	START DATE	END DATE
R	Pajaro River	305.100	Nutrients	Agriculture Irrigated Crop Production Agriculture-storm runoff Agriculture-subsurface drainage Agriculture-irrigation tailwater Agricultural Return Flows Urban Runoff/Storm Sewers Wastewater - land disposal Channelization Removal of Riparian Vegetation Nonpoint Source	High	49	Miles	2000[e]	2005[f]
			Sedimentation/Siltation	Agriculture Irrigated Crop Production Range Land Agriculture-storm runoff Resource Extraction Surface Mining Hydromodification Channelization Habitat Modification Removal of Riparian Vegetation Streambank Modification/Destabilization Channel Erosion Natural Sources	Medium	49	Miles	2000[e]	2005[f]
			Fecal Coliform	Pasture Lands Nonpoint Source Natural Sources	Medium[2]	5	Miles	2004[h]	2015
R	Quail Creek	309.200	Fecal Coliform	Pasture Lands Natural Sources Agriculture	Medium[2]	4	Miles	2004[h]	2015
R	Rider Gulch Creek	305.100	Sedimentation/Siltation	Agriculture Silviculture Construction/Land Development	Medium	2	Miles	2000[e]	2005[f]

2001 CENTRAL COAST REGIONAL BOARD 303 (D) AND TMDL PRIORITY LIST

TYPE	WATER BODY NAME	HYDRO UNIT	CAUSES	SOURCE	PRIORITY	SIZE AFFECTED	UNIT	START DATE	END DATE
R	Salinas Reclamation Canal	309.200	Pesticides	Minor Industrial Point Source Agriculture Irrigated Crop Production Agriculture-storm runoff Agriculture-irrigation tailwater Agricultural Return Flows Nonpoint Source	Medium	20	Miles	2001[b]	2005
			Priority Organics	Minor Industrial Point Source Agriculture Irrigated Crop Production Agriculture-storm runoff Agriculture-irrigation tailwater Agricultural Return Flows Urban Runoff/Storm Sewers Source Unknown Nonpoint Source	Medium	20	Miles	2001[b]	2005
			Fecal Coliform	Urban Runoff Pasture Lands Natural Sources Agriculture	Medium[2]	5	Miles	2004[h]	2015
R	Salinas River	309.100	Pesticides	Agriculture Irrigated Crop Production Agriculture-storm runoff Agriculture-irrigation tailwater Agricultural Return Flows Nonpoint Source	Medium	50	Miles	2001[b]	2003
			Nutrients	Agriculture	Medium	50	Miles	2001[b]	2007
			Sedimentation/Siltation	Agriculture Irrigated Crop Production Range Land Agriculture-storm runoff Road Construction Land Development Channel Erosion Nonpoint Source	Medium	90	Miles	2000[f]	2003
			Salinity/TDS/Chlorides	Agriculture	Medium	50	Miles	2001[b]	2005

2001 CENTRAL COAST REGIONAL BOARD 303 (D) AND TMDL PRIORITY LIST

TYPE	WATER BODY NAME	HYDRO UNIT	CAUSES	SOURCE	PRIORITY	SIZE AFFECTED	UNIT	START DATE	END DATE
R	Salinas River (Upper)	309.810	Chloride	Agriculture Urban Runoff Pasture Lands	Medium	25	Miles	2001[b]	2015
			Sodium	Agriculture Urban Runoff Pasture Lands	Medium	15	Miles	2001[b]	2015
R	San Antonio Creek (Santa Barbara Co)	315.310	Sedimentation/Siltation	Agriculture Nonpoint Source	Low	6	Miles	2006	2011
R	San Benito River	305.500	Sedimentation/Siltation	Agriculture Resource Extraction Nonpoint Source	Medium	86	Miles	2000[e]	2005[f]
R	San Lorenzo Creek	309.700	Fecal Coliform	Agriculture Urban Runoff Pasture Lands Natural Sources	Medium[2]	3	Miles	2004[h]	2015
R	San Lorenzo River	304.120	Nutrients	Septage Disposal Nonpoint Source	High	25	Miles	1993	2000
			Sedimentation/Siltation	Silviculture Construction/Land Development Land Development Urban Runoff/Storm Sewers	High	25	Miles	1998	2000
			Pathogens	Urban Runoff/Storm Sewers Septage Disposal	High	60	Miles	1999	2001
R	San Luis Obispo Creek (Below W. Marsh Street)	310.240	~~Priority Organics~~	~~Industrial Point Sources~~	~~Medium~~	~~9~~	~~Miles~~	~~2001[d]~~	~~2003~~
			PCB	Unknown Sources	Medium	9	Miles	2001[d]	2003
			Nutrients	Municipal Point Sources Agriculture Irrigated Crop Production Agriculture-storm runoff	High	9	Miles	1999[g]	2000
			Pathogens	Urban Runoff/Storm Sewers	High	9	Miles	1999[g]	2000

2001 CENTRAL COAST REGIONAL BOARD 303 (D) AND TMDL PRIORITY LIST

TYPE	WATER BODY NAME	HYDRO UNIT	CAUSES	SOURCE	PRIORITY	SIZE AFFECTED	UNIT	START DATE	END DATE
R	***Santa Maria River***	***312.100***	***Fecal Coliform***	***Pasture Lands Urban Runoff Agriculture Natural Sources***	***Medium[1]***	***5***	***Miles***	***2006[l]***	***2015***
			Nitrate	***Urban Runoff Agriculture Pasture Lands***	***Medium[1]***	***3***	***Miles***	***2006[l]***	***2015***
R	*Santa Ynez River*	*314.000*	*Nutrients*	*Nonpoint Source*	*Low*	*70*	*Miles*	*2003*	*2007*
			Sedimentation/Siltation	*Agriculture Urban Runoff/Storm Sewers Resource Extraction*	*Low*	*70*	*Miles*	*2003*	*2007*
			Salinity/TDS/Chlorides	*Agriculture*	*Low*	*70*	*Miles*	*2003*	*2007*
R	*Shingle Mill Creek*	*304.120*	*Nutrients*	*Septage Disposal*	*High*	*2*	*Miles*	*1998*	*2001*
			Sedimentation/Siltation	*Construction/Land Development Nonpoint Source*	*High*	*2*	*Miles*	*1998*	*2001*
R	*Tembladero Slough*	*309.100*	*Pesticides*	*Agriculture Irrigated Crop Production Agriculture-storm runoff Agricultural Return Flows Nonpoint Source*	*Medium*	*150*	*Acres*	*2001[b]*	*2003*
			Nutrients	*Agriculture Irrigated Crop Production Agriculture-storm runoff Agricultural Return Flows Nonpoint Source*	*Medium*	*150*	*Acres*	*2001[b]*	*2003*
			Fecal Coliform	***Pasture Lands Urban Runoff Natural Sources Agriculture***	***Medium[2]***	***10***	***Miles***	***2004[h]***	***2015***
R	*Valencia Creek*	*304.130*	*Sedimentation/Siltation*	*Agriculture Construction/Land Development*	*Medium*	*7*	*Miles*	*2001*	*2005*
			Pathogens	*Agriculture Septage Disposal*	*Low*	*7*	*Miles*	*2006*	*2011*

2001 CENTRAL COAST REGIONAL BOARD 303 (D) AND TMDL PRIORITY LIST

TYPE	WATER BODY NAME	HYDRO UNIT	CAUSES	SOURCE	PRIORITY	SIZE AFFECTED	UNIT	START DATE	END DATE
R	Waddell Creek, East Branch	304.110	Nutrients	Municipal Point Sources	Medium	3	Miles	2001	2005
R	Watsonville Slough	305.100	Pesticides	Agriculture Irrigated Crop Production Agriculture-storm runoff Agriculture-irrigation tailwater Nonpoint Source	Medium	300	Acres	2001[d]	2003
			Metals	Agriculture Urban Runoff/Storm Sewers	Medium	300	Acres	2001[d]	2003
			Sedimentation/Siltation	Agriculture Irrigated Crop Production Agriculture-storm runoff Nonpoint Source	Medium	300	Acres	2000[e]	2005[f]
			Pathogens	Urban Runoff/Storm Sewers Source Unknown Nonpoint Source	Medium	300	Acres	2001[d]	2003
			Oil and grease	Urban Runoff/Storm Sewers Nonpoint Source	Medium	300	Acres	2001[d]	2003
C	Pacific Ocean at Arroyo Burro Beach	315.320	Pathogens	Urban Runoff/Storm Sewers Nonpoint Source	High[3]	6	Miles	2006	2011
C	Pacific Ocean at Arroyo Quemado Beach	315.100	Fecal Coliform	Pasture Lands Nonpoint Source Agriculture Natural Sources	High[3]	2	Miles	2006[l]	2015
			Total Coliform	Pature Lands Nonpoint Source Natural Sources Agriculture	High[3]	2	Miles	2006[l]	2015

2001 CENTRAL COAST REGIONAL BOARD 303 (D) AND TMDL PRIORITY LIST

TYPE	WATER BODY NAME	HYDRO UNIT	CAUSES	SOURCE	PRIORITY	SIZE AFFECTED	UNIT	START DATE	END DATE
C	Pacific Ocean at Jalama Beach	315.100	Fecal Coliform	Pasture Lands Nonpoint Source Natural Sources Agriculture	High[3]	1	Miles	2006[1]	2015
			Total Coliform	Pasture Lands Agriculture Nonpoint Source Natural Sources	High[3]	1	Miles	2006[1]	2015
C	Pacific Ocean at Mission Creek	315.310	Fecal Coliform	Urban Runoff Agriculture Nonpoint Source Natural Sources Unknown Sources	High[3]	5	Miles	2006[1]	2015
			Total Coliform	Urban Runoff Nonpoint Source Sources Unknown Agriculture	High[3]	5	Miles	2006[1]	2015
C	Pacific Ocean at Point Rincon	315.340	Pathogens	Urban Runoff/Storm Sewers Nonpoint Source	High[3]	3	Miles	2006	2011

Attachment Two

START AND END DATE FOOTNOTES

[a] No staff or budget in 1998, scheduled to start 2005

[b] No staff in 1998, part of the Salinas River TMDL Planning Unit; work initiated on Pesticides, Priority Organics, Nutrients, and Salinity in 2001.

[c] No staff in 1998, part of the Salinas River TMDL Planning Unit, work initiated on Siltation in 2000.

[d] No staff in 1998, work initiated in 2001.

[e] No staff in 1998; part of the Pajaro River Planning Unit; work initiated in 2000.

[f] Pajaro River Nutrients and Sedimentation/Siltation TMDL schedules are adjusted to coincide with the Sedimentation/Siltation TMDL contract efforts. Schedule leverages state funds to partner with existing efforts and research by others (UCSC), outreach by the Farm Bureau, and flood control efforts.

[g] Preliminary assessments completed prior to 1999 but TMDL development started in 1999.

[h] Scheduled to follow-up on initial Pajaro/Salinas work; current resources committed until 2004.

[i] Current resources committed until 2004; in order to integrate the TMDL with the existing schedules work can't be initiated until 2006.

[j] May be completed by 2003 as part of the Morro Bay Nutrient TMDL, otherwise current resources committed until 2004.

PRIORITY FOOTNOTES

1.

CCAMP data is avaliable. Additionally, there are limited watershed efforts (such as planning, monitoring and assessment) in place to facilitate TMDL development.

Furthermore, the Santa Maria River watershed was not one of the top priority watersheds determined by the Regional Board per the Watershed Management Initiative.

2. Pajaro River Watershed waterbodies for nutrients, coliform and dissolved oxygen are a medium priority because we only have CCAMP data accessible and levels indicate

Salinas River Watershed waterbodies for nutrients, coliform and dissolved oxygen are also medium priority, even though it was one of the original top priority watersheds per the Watershed Management Initiative, because only CCAMP data is available. A significant data collection, modelling or other water quality research effort is still necessary to develop TMDLs for these constituents for a watershed as extensive as Salinas River.

3. Santa Barbara/South Coast Watersheds were made higher priority due to increased attention on beach closures. Data collection efforts completed (county, CCAMP) reveal multiple exceedences of standards. Many of these beaches are the focus of the Clean Beaches Initiative.

4. This was made high to coincide with Morro Bay Nutrients TMDL.

Re 3
2/28/02

Footnotes for Attachment Two

The explanation for each numeric superscript is as follows:

High Priority

1) Those waterbodies previously listed as high priority on the 1998 303(d) List AND with TMDL development in progress. (Except San Lorenzo River Estuary which is revised to low priority to coordinate with new studies which have just been initiated.)
2) Those waterbodies previously assigned medium or low prioirity, but have been revised to high due to: new information such as data or public concern, initiation of related watershed activities by others that will aid in TMDL development, increased efficiency by merging TMDL development efforts of separately listed waterbodies.
3) Those waterbodies newly listed on the proposed 2002 303(d) List, scheduled to commence in 2006 when resources become available.

Medium Priority

4) Those waterbodies previously listed as medium priority on the 1998 303(d) List, scheduled to commence in 2006 when resources become available. (Except Aptos and Valencia Creeks for sedimentation because these TMDLs have already been initiated.)
5) Those waterbodies newly listed on the proposed 2002 303(d) List, scheduled to commence in 2006 when resources become available.

Low Priority

6) Those waterbodies previously listed as low priority on the 1998 303(d) List, scheduled to commence in 2011 when resources become available.
7) Those waterbodies newly listed on the proposed 2002 303(d) List, scheduled to commence in 2011 when resources become available.

S:\WB\Watershed Assessment Unit\2001 303(d) List\Follow-Up 303d Info and Hearing\Feb 1 303d Staff Report and Attachments\Footnotes for Attachment 2 of 303d Staff Report.doc

ATTACHMENT THREE. LISTING RATIONALE FOR 2OO1 303(D) LIST

Watershed	Water Body	Pollutant	Rationale	Total Samples	Monitoring Dates	Data Source(s)
Estero Bay	Los Osos Creek	Dissolved Oxygen	Basin Plan Objective violated 64% of samples at station "WAR"	359	12/14/93-4/19/99	Morro Bay National Monitoring Program
Estrella	Cholame	Fecal Coliform	Basin Plan Objective violated 80% of samples	10	2/02/99-2/08/00	Central Coast Ambient Monitoring Program (CCAMP)
Pajaro	Llagas Creek	Fecal Coliform	Basin Plan Objective violated 63% of samples for stations "FRA", "LLA", and "VIS"	41	12/18/97-6/12/98	CCAMP
Pajaro	Llagas Creek	Chloride	Basin Plan Site-Specific Objective violated 100% of samples	78	6/23/92-6/13/00	South County Regional Wastewater Authority (SCRWA) Wastewater Discharge Requirement Monitoring Program (all samples are upstream of SCRWA)
Pajaro	Llagas Creek	Dissolved Oxygen	Basin Plan Objective violated 66% of samples	128	9/12/88-6/13/00	SCRWA Wastewater Discharge Requirement Monitoring Program and CCAMP predawn sampling

LISTING RATIONALE FOR 2OO1 303(D) LIST

Watershed	Water Body	Pollutant	Rationale	Total Samples	Monitoring Dates	Data Source(s)
Pajaro	Llagas Creek	Sodium	Basin Plan Site-Specific Objective violated 77% of samples	78	6/23/92-6/13/00	SCRWA Wastewater Discharge Requirement Monitoring Program (all samples are upstream of SCRWA)
Pajaro	Llagas Creek	Total Dissolved Solids	Basin Plan Site-Specific Objective violated 100% of samples	90	9/12/88-6/13/00	SCRWA Wastewater Discharge Requirement Monitoring Program (all samples are upstream of SCRWA)
Pajaro	Pajaro River	Fecal Coliform	Basin Plan Objective violated 90% of samples at Station "FRA"	11	12/18/97-1/07/99	CCAMP
Pajaro	Tesquita Slough	Fecal Coliform	Basin Plan Objective violated 63% of samples	16	12/18/97-12/16/98	CCAMP
Salinas	Alisal Creek	Fecal Coliform	Basin Plan Objective violated 83% of samples	6	7/28/99-2/10/00	CCAMP
Salinas	Atascadero Creek	Dissolved Oxygen	Basin Plan Objective violated 67% of samples from CCAMP data	20	4/7/99-5/15/00	CCAMP

LISTING RATIONALE FOR 2OO1 303(D) LIST

Watershed	Water Body	Pollutant	Rationale	Total Samples	Monitoring Dates	Data Source(s)
Salinas	Gabilan	Fecal Coliform	Basin Plan Objective violated 100% of samples	6	2/1/99-2/10/00	CCAMP
Salinas	Quail Creek	Fecal Coliform	Basin Plan Objective violated 63% of samples	6	2/01/99-11/30/00	CCAMP
Salinas	Salinas Reclamation Canal	Fecal Coliform	Basin Plan Objective violated 89% of samples	37	2/01/99-2/10/00	CCAMP
Salinas	Salinas River (Upper)	Chloride	Basin Plan Site-Specific Objective violated 100% of samples	42	2/2/99-4/26/00	CCAMP
Salinas	Salinas River (Upper)	Sodium	Basin Plan Site-Specific Objective violated 100 % of samples	32	5/13/90-2/8/00	CCAMP
Salinas	San Lorenzo Creek	Fecal Coliform	Basin Plan Objective violated 60% of samples; Station "LOK" violated Basin Plan Objective 100% of samples	15	2/02/99-2/10/00	CCAMP

LISTING RATIONALE FOR 2OO1 303(D) LIST

Watershed	Water Body	Pollutant	Rationale	Total Samples	Monitoring Dates	Data Source(s)
Salinas	Tembladero Slough	Fecal Coliform	Basin Plan Objective violated 63% of samples	8	4/26/99-2/07/00	CCAMP
Santa Maria	Alamo Creek	Fecal Coliform	Basin Plan Objective violated 57% of samples	14	2/01/00-1/31/01	CCAMP
Santa Maria	Blosser Channel	Fecal Coliform	Basin Plan Objective violated 50% of samples	10	5/03/00-2/28/01	CCAMP
Santa Maria	Bradley Canyon Creek	Fecal Coliform	Basin Plan Objective violated 60% of samples	25	1/12/00-1/29/01	CCAMP
Santa Maria	Main Street Drain	Nutrients	Basin Plan Nitrate Drinking Water Objective violated 60 % of samples at Main Street Drain	10	1/12/00-1/29/01	CCAMP
Santa Maria	Nipomo Creek	Fecal Coliform	Basin Plan Objective violated 72% of samples	25	1/11/00-1/31/01	CCAMP
Santa Maria	Orcutt Solomon Creek	Fecal Coliform	Basin Plan Objective violated 62% of samples	50	1/12/00-2/28/01	CCAMP

LISTING RATIONALE FOR 2OO1 303(D) LIST

Watershed	Water Body	Pollutant	Rationale	Total Samples	Monitoring Dates	Data Source(s)
Santa Maria	Oso Flaco Lake	Nutrients	Basin Plan Nitrate Drinking water objective violated 100 % of samples	55	1/12/00-1/31/01	CCAMP
Santa Maria	Santa Maria River	Fecal Coliform	Basin Plan Objective violated 52% of samples	33	1/12/00-2/28/01	CCAMP
Santa Maria	Santa Maria River	Nutrients	Basin Plan Nitrate Drinking water objective violated 100 % of samples at Stations SMA and SMI	23	1/12/01-2/28/01	CCAMP
South Coast	Pacific Ocean @ Arroyo Quemado Beach	Total Coliform	Ocean Plan Shellfish objective violated 85% of time	250	3/24/97-4/25/01	Santa Barbara County Public Health Department
South Coast	Pacific Ocean @ Arroyo Quemado Beach	Fecal Coliform	Ocean Plan Water Contact objective violated 57% of time	250	3/24/97-4/25/01	Santa Barbara County Public Health Department
South Coast	Pacific Ocean @ Mission Creek (East Beach)	Total Coliform	Ocean Plan Shellfish objective violated 69% of samples	262	9/10/96-4/23/01	Santa Barbara County Public Health Department

LISTING RATIONALE FOR 2OO1 303(D) LIST

Watershed	Water Body	Pollutant	Rationale	Total Samples	Monitoring Dates	Data Source(s)
South Coast	Pacific Ocean @ Mission Creek (East Beach)	Fecal Coliform	Assembly Bill 411 Beach posting recommendation violated 61% of time;	262	9/10/96-4/23/01	Santa Barbara County Public Health Department
South Coast	Pacific Ocean @ Jalama Beach	Total Coliform	Ocean Plan Shellfish objective violated 53% of samples	222	3/10/97-4/23/01	Santa Barbara County Public Health Department
South Coast	Pacific Ocean @ Jalama Beach	Fecal Coliform	Assembly Bill 411 Beach posting recommendation violated 50% of time	222	3/10/97-4/23/01	Santa Barbara County Public Health Department

Attachment Four.
Information Received that did not lead to 303(d) List Additions

California Department of Pesticide Regulation (DPR)

DPR provided pesticide information. The information applies to water bodies already on the 303(d) list. Therefore, no new listings are proposed.

City of Santa Cruz

The City of Santa Cruz provided turbidity data for Majors Creek. The City stated this watershed is experiencing increasingly frequent periods of high turbidity associated with the heavy sedimentation attributed to natural background erosion sources, the large network of unmaintained seasonal roads, log jam related stream bank erosion, feral pig activity and other factors. In addition to the drinking water quality and production challenges posed by these conditions, the channel itself (especially the East Branch) is choked with sediment, thereby limiting habitat functions.

The City submitted turbidity data to support their request.

Staff does not have sufficient evidence to support listing Majors Creek. The City should submit clarifying information to support violation of the Basin Plan turbidity objective. The Basin Plan turbidity objective states in part:

> "Waters shall be free of changes in turbidity that cause nuisance or adversely affect beneficial uses."

The City should document how, when, and why turbidity causes nuisance or adversely affects beneficial uses.

Monterey Bay Aquarium Data

The Monterey Bay Aquarium sent extensive water quality information regarding ocean waters in the vicinity of the aquarium. The data was for dissolved oxygen, temperature, total coliform, fecal coliform, enterococcus, total ammonia, nitrite, nitrate, phosphate, and pH. Staff reviewed the data. No listings are proposed because the weight of evidence does not support listing.

Santa Barbara Channel Keeper

The Santa Barbara Channel Keeper submitted citizen-based sampling data. Data was submitted for total coliform, E. Coli, Enterococcus, nitrate, phosphate, sulfate, turbidity, dissolved oxygen, water temperature, conductivity and pH.

Approximately ten areas were samples. However, there were only a few samples for each area. Staff did not receive quality assurance procedures.

Data indicates high bacteria concentrations, but there are not enough samples to indicate impairment. Furthermore, we do not have quality assurance procedures. Staff supplemented the data we received from the channel keeper by looking at data we received from the Santa Barbara County Public Health Department. (The Health Department unitizes quality assurance procedures and has many more sampling events.)

(Staff is proposing to list three Santa Barbara County beaches based upon Santa Barbara County Public Health Department sampling.)

Santa Barbara County Creek Watchers

This organization provided data for approximately 250 sampling events. However, no quality assurance data was submitted.

Most sites sampled by this organization are also being sampled by CCAMP during 2001-2002. Since the CCAMP program utilizes quality assurance procedures, the Regional Board should consider this a more reliable information source. If Santa Barbara County Creek Watchers submits an adequate quality assurance program, staff will consider this organization's data for subsequent 303(d) listings.

Santa Barbara County Public Health Department

The Health Department has sampled approximately twenty beaches on a regular basis since 1996. Several beaches have over 200 samples each. The County utilizes quality assurance procedures to assure reliable data. For these reasons, this is useful data for the Regional Board to consider for listing purposes.

Staff analyzed County Data for violations of Assembly Bill (AB) 411 objectives and State Water Resources Control Board Ocean Plan (Ocean Plan) objectives. The Ocean Plan contains water quality standards for Total and Fecal Coliform. Where shellfish harvesting may occur, total coliform objectives apply.

Staff utilized the weight of evidence approach to determine impairment. For each beach, staff determined the number of violations of AB 411 or Ocean Plan objectives. Staff is proposing to list a water body is the number of violations is 50 percent or greater. Three Santa Barbara County beaches meet this level of evidence Arroyo Quemado, East Beach at Mission Creek, and Jalama beach.

San Lorenzo Valley Water District

The Water District submitted a report titled *Comparisons of Juvenile Steelhead Densities, Population Estimates and Habitat Conditions for the San Lorenzo River, Santa Cruz County, California, 1995-99; with and Index of Adult Returns,* June 2000. This report discusses juvenile and coho salmon and steelhead trout populations within the San Lorenzo River. This report will be used by staff developing TMDLs for the San Lorenzo River watershed. This watershed is already on the 303(d) list for pathogens and siltation.

Spatial Analysis of Metals and Relationship to Infauna in Monterey Bay Sediments (A Master's Thesis prepared by Anuraag Gill, December 1998)

This thesis evaluates the spatial distribution of metals in Monterey Bay sediment and the relationship to benthic infauna in the vicinity of municipal wastewater discharges. The report indicates high levels of nickel and chromium may be related to natural geologic sources. Arsenic exceeded the Threshold Effects Level (TEL) at one site. (TEL values estimate toxic biological effects and were utilized by the State Water Resources Control Board Bay Protection and Toxic Cleanup Program. The TEL is derived by taking the geometric mean of the 50th percentile of the "no effects" data and the 15th percentile of the "effects" data.) However this is not sufficient weight of evidence (per Bay Protection and Toxic Cleanup protocol) to list this site for arsenic. If other evidence was available, such as benthic assemblages' relationship to arsenic concentrations, listing could be considered.

United States Geologic Survey (USGS)

The USGS submitted water quality data for the Santa Ynez watershed, San Antonio watershed, Santa Maria watershed, Salinas watershed, and San Benito watershed. The USGS data does not indicate any additional impairment conditions.

Upper Salinas Las Tablas Resource Conservation District (RCD)

The RCD submitted data for the Upper Salinas River and tributaries. The data includes general water quality descriptions including temperature, nutrients, turbidity, and dissolved oxygen. Most stations only have one or two sampling events. The station with the highest number of samples had four sampling events. This is not enough data to determine water quality conditions. In addition, no quality assurance information was provided. If the RCD submits an adequate samples and a quality assurance program, staff will consider this organization's data for subsequent 303(d) listings.

Attachment Five
Delisting and Clarification Rationale
Detailed Reports for:

Chorro Creek Metals
Los Osos Priority Organics
San Lorenzo River Estuary Siltation
San Luis Obispo Creek Priority Organics

Staff Report Attachment No. 5
July 27, 2001
303(d) List of Impaired Water Bodies

Proposal to Delist Chorro Creek for Metals from California's 303(d) List of Impaired Waters

Draft July 24, 2001

1. Introduction

Total Maximum Daily Loads (TMDLs) are required for waters listed as impaired pursuant to Section 303(d) of the Clean Water Act. The 303(d) list identifies water quality limited water bodies. A water quality limited segment is any known segment that does not meet applicable water quality objectives and/or is not expected to meet applicable water quality objectives, even after the application of technology-based effluent limitations or other Regional Board requirements. Chorro Creek was placed on California's 1998 303(d) list for metals and siltation. This document reviews the 303(d) listing of Chorro Creek for metals and proposes Chorro Creek for metals be removed from the 303(d) list of impaired waters. A separate document of a TMDL for siltation in Chorro Creek, Los Osos Creek, and the Morro Bay Estuary is in the public and administrative review process.

a. Physical Setting

The Chorro Creek watershed (the Watershed) is located in San Luis Obispo County, approximately 225 miles south of San Francisco Bay. The Watershed covers approximately 27,520 acres or 42 square miles, and, together with the Los Osos Creek watershed (approximately 20,480 acres or 32 square miles) makes up the larger Morro Bay watershed (approximately 48,000 acres or 75 square miles). The Watershed runs generally east-west, and is bounded to the north by the Santa Lucia Mountains, part of the Coast Range, and to the south by the Morros, a series of exposed volcanic plugs. Chorro Creek originates in uplands of the Santa Lucia Mountains, approximately 2,700 feet above mean sea level and ten miles distant from its mouth on Morro Bay. Chorro Creek and its tributaries have steep gradients and deeply dissect the uplands. Morro Bay is a semi-enclosed estuary and Chorro Creek empties into a salt marsh wetland in the eastern portion of Morro Bay. Morro Bay in turn empties westward into the larger Estero Bay and the Pacific Ocean.

The upper reaches of Chorro creek, draining approximately 7 square miles above Chorro Reservoir, can be considered an important sub-area of the overall basin due to the concentration of past mining activities in these upper reaches. This document will focus primarily on these upper reaches due to concerns about the relationship between inactive metals mines and water quality objectives for metals.

The climate in the Watershed is mediterranean, with cool, wet winters and warm, dry summers. There is typically little or no precipitation during the period May – November. Based on a 30 year period from 1961 to 1990 the average annual rainfall in the nearby city of San Luis Obispo is 23.5 inches (Chamber of Commerce, San Luis Obispo).

b. Beneficial uses

The *Water Quality Control Plan, Central Coast Basin – Region 3* (the Basin Plan) identifies various beneficial uses for Chorro Creek (Regional Water Quality Control Board [RWQCB], 1994), as depicted in Table 1, below:

Table 1: Beneficial Uses for the Chorro Creek Watershed

Designated Beneficial Uses of the Chorro Creek Waterbody upstream of Chorro Reservoir
Municipal and Domestic Water Supply
Agricultural Supply
Ground Water Recharge
Water Contact Recreation
Non Contact Water Recreation
Cold Freshwater Habitat
Warm Freshwater Habitat
Preservation of Biological Habitats of Special Significance
Rare, Threatened or Endangered Species
Freshwater Replenishment
Commercial and Sport Fishing
Spawning, Reproduction , and/or Early Development

c. Land uses

Various land uses occur within the Watershed including:

- a water supply reservoir;
- cultivated agriculture, including portions of the California Polytechnic State University;
- uncultivated rangeland;
- various urban, commercial and residential uses associated with the City of Morro Bay and San Luis Obispo County;
- developed parkland (El Chorro Regional Park and Morro Bay State Park);
- the Cuesta Community College campus ;
- a military reservation (Camp San Luis Obispo);

- a correctional facility (California Men's Colony) with a point-source wastewater discharge;
- National Forest lands; and
- inactive metals mines.

Land uses in the upper Chorro Creek area above Chorro Reservoir are comprised of only the inactive metals mines, National Forest lands, Camp San Luis Obispo, and uncultivated rangeland.

d. Habitat and fisheries

Faunal Survey

The California Army National Guard, Camp San Luis conducted an aquatic faunal survey in the upper reaches of Chorro Creek (two sample sites in the western fork and three sample sites in the middle fork above Chorro reservoir) from November 1992 through May 1994. The National Guard reports good diversity of fauna in the western fork (35 species of insects, red-legged frogs, and various other biota) and a more diverse assemblage in the middle fork (rainbow trout [presumed land-locked steelhead], 32 species of aquatic insects, coastal range newts, northwestern fence lizards, alderflies [Sialidae] and caddisflies [Rhyacophilidae] among other biota; Froland, 2000).

e. Geology and mining

The watershed occurs within the California Coast Ranges geologic province. The watershed's southern boundary is the Morros, a series of exposed dacite volcanic plugs. The Santa Lucia Mountains form the watershed's northern boundary, and include Franciscan Formation sedimentary rocks, and various igneous and metamorphic rock, including serpentine, peridotite, and dunite (Eckel, et. al., 1941). Lenses and pods of chromite ore occur in the dunite and, to a lesser extent, the peridotite (RWQCB, 1999). Chromite ore may also contain iron, magnesium, nickel, chromium, aluminum and oxygen, and is typically fine-grained, with grain diameters less than 1 millimeter (RWQCB, 1999). Chromite and other ores found in the watershed typically occur as metal oxides and do not tend to produce acids on contact with water.

The watershed contains a number of inactive mines, dating from the latter nineteenth century through the early 1970's. Some mines experienced alternating phases of activity and inactivity, and some were partially converted from closed-shaft mines to open-pit mines. Little or no mine reclamation has occurred in the watershed, and mine sites may contain open pits, open shaft entrances, mining machinery, ore piles, and spoils piles. Metals-rich sediment is ubiquitous in the watershed, originating from the erosion of natural lithology and from commercial mining operations.

f. Available Data

Data available for this TMDL includes water and sediment sampling conducted as part of two studies in area performed by the Regional Board: Surface Water Degradation by Inactive Metal Mines in Northwest San Luis Obispo County, California (RWQCB, 1993), and Inactive Metal Mines in Four San Luis Obispo County Watersheds, Surface Water Quality Impacts and Remedial Options (RWQCB, 1999). Additional data on aquatic habitat is available from a faunal survey conducted by the California Army National Guard (Froland, 2000). Regional Board staff conclude that the most pertinent water quality data are found in Inactive Metal Mines in Four San Luis Obispo County Watersheds, Surface Water Quality Impacts and Remedial Options (RWQCB, 1999a). Regional Board staff note that none of the available data were from efforts designed specifically to collect data for the purpose of developing a TMDL or evaluating Chorro Creek related to Clean Water Act 303(d) listing criteria. The studies include limited analytical laboratory water quality data and were designed to characterize inactive mines not streamwater chemistry. A detailed discussion of the available data considered for this proposed delisting is included in Appendix A.

2. Problem Statement

The most current data available for Chorro Creek indicate that numeric water quality objectives for dissolved metals concentrations per the California Toxics Rule are being met. These data also indicate that numeric water quality objectives for total metals as expressed in the Basin Plan are being met in the waters of Chorro Creek. (Previous evaluations did note that some samples collected within mines exceeded objectives and thus displayed a potential future impact to the creek. However, no reliable samples collected from within the creek indicated exceedence of water quality objectives, see Appendix A.) The faunal survey conducted by the National Guard suggests narrative water quality objectives for aquatic habitat are being met in the waterways above Chorro reservoir. Because available data indicate both numeric and narrative objectives (of the Basin Plan and the California Toxics Rule) are being achieved in Chorro Creek, Chorro Creek is identified as having no metals-specific water quality impairment.

a. Water Quality Objectives

The Basin Plan contains both narrative and numeric water quality objectives for specific metals and beneficial uses. Water Quality Objectives in the Basin Plan are expressed as concentrations of total water column metals. In addition to the Basin Plan (for priority pollutants), the California Toxics Rule (Federal Register, 2000) provides water quality objectives pertinent to dissolved metals concentrations. Regional Board work files indicate Chorro Creek was placed on California's 303(d) list due to exceedences of Basin Plan metals objectives identified using a spreadsheet database. Clarification of sampling locations indicates that Basin Plan and California Toxics Rule water quality objectives for metals are being met within Chorro Creek.

3. Proposed Delisting

a. Delisting factors

Regional Board staff considered delisting factors identified in the 1998 Clean Water Act Section 303(d) Listing Guidelines for California (Ad Hoc Workgroup, 1997) for adding or removing waterways from the 303(d) list. These guidelines were developed by a workgroup of regional board, state board, and US EPA Region 9 staff and indicate that water bodies may be delisted for specific pollutants or stressors if any one of six factors is met. These guidelines were considered by the Central Coast Regional Board, State Water Resources Control Board, and US EPA Region 9 during the public and administrative review and approval of the State's 303(d) List of Impaired Waters in 1998.

The six Delisting Factors were:

1. Objectives are revised, and the exceedence is thereby eliminated.
2. A beneficial use is de-designated after US EPA approval of a Use Attainability Analysis, and the non-support issue is thereby eliminated.
3. Faulty data led to the initial listing. Faulty data include, but are not limited to typographical errors, improper quality assurance/quality control (QA/QC) procedures, or Toxic Substances Monitoring/State Mussel Watch EDLs which are not confirmed by risk assessment for human consumption.
4. It has been documented that the objectives are being met and beneficial uses are not impaired based on "Monitored Assessment" criteria.
5. A TMDL has been approved by the US EPA.
6. There are control measures in place which will result in protection of beneficial uses. Control measures include permits, cleanup and abatement orders, and watershed management plans which are enforceable and include a time schedule.

Considering these Delisting Factors, Regional Board staff propose removing Chorro Creek from the 303(d) list for metals. This proposal is based on available data which indicate that delisting factors 3, 4, and 6 above have been met. Each of these factors are discussed below in relation to the available data regarding Chorro Creek.

b. Delisting Rationale

Factor 3.

Chorro Creek was initially placed on the 303(d) list based upon data collected during studies of inactive metals mines in the region. Although the data themselves are not faulty, the interpretation of the data was incorrectly performed. Staff entered the field sampling data from reports into a spreadsheet database for convenient access. In preliminary screening of database files in preparation for the 1998 303(d) list process, two sample locations were observed to routinely exceed numeric metals water quality objectives and Chorro Creek was therefore recommended for listing for metals. However, subsequent detailed examination of the data - which were collected to evaluate inactive mine sites – reveals that the two sample locations in question were not in the waterway (Chorro Creek). One was collected in the interior pit pool of an inactive mine and the other was from a seepage face on the side of a tailings slope. Therefore, Regional Board staff believe this listing was faulty interpretation of field data which does not indicate metals impairment in the creek and is inconsistent with other sample results from the creek indicating no exceedence of water quality objectives.

Factor 4.
Subsequent to the 1998 placement of Chorro Creek on California's 303(d) list for metals impairment, Regional Board staff received a copy of the National Guard's 1992 - 1994 Faunal Survey for Camp San Luis Obispo (Froland, 2000). Data presented in this report indicate a broad variety of insects and aquatic species in the forks of the upper reaches of Chorro Creek above Chorro Reservoir. This new data suggests that aquatic habitat narrative objectives of the Basin Plan are being achieved. Although no new water quality data were available to confirm this, it is important to consider the value of the faunal data in the overall evaluation of conditions in Chorro Creek.

As an extra margin of safety, the relationship of habitat indicators to satisfactory water quality will also be confirmed with ongoing numeric data collection:

- in the ongoing Central Coast Ambient Monitoring Program (CCAMP),
- as part of a separate TMDL for metals in Morro Bay (currently being developed), and,
- in the monitoring and implementation phases of the siltation TMDL for Morro Bay and Chorro Creek (RWQCB, 2001).

The availability of aquatic habitat data not previously considered satisfies factor 4 of the delisting factors.

Factor 6.
A recently developed TMDL for Siltation for Chorro Creek, Los Osos Creek, and Morro Bay Estuary establishes a load reduction in sediment throughout the Morro Bay watershed (including Chorro Creek and its upper reaches above Chorro Reservoir) of approximately 50% (RWQCB, 2001). The Siltation TMDL implementation plan specifically requires remediation of inactive mines as progress toward achievement of the sediment reduction goals. In addition, the entire Camp San Luis Obispo, including its mines, has entered into a cost recovery agreement for Regional Board Staff oversight of actions to achieve the required reclamation of the mines (RWQCB, 1999b). The Siltation TMDL will be presented to the Regional Board for adoption in February 2002. The National Guard (Camp San Luis Obispo) has already begun work on one remedial effort ("Grand Canyon" project). The National Guard has indicated intent to budget sediment reduction remediation for the mines on National Guard property over the next several years.

As these sediment reduction projects progress, they are expected to reduce sediment influx into the Creek, which is expected to result in reduced metals loading into the waterway (based on the metals being adsorbed to sediment and only reaching Chorro Creek when sediment is transported into the waterway). The establishment of the siltation TMDL, with these actions to reduce sedimentation (and metals), is an enforceable action with a specific timetable for implementation which satisfies Factor 6 of the delisting factors.

Because Chorro Creek's listing for metals impairment satisfies factors 3, 4, and 6 of the delisting factors presented in the 1998 Clean Water Act Section 303(d) Listing Guidelines for California (Ad Hoc Workgroup, 1997), staff recommends that Chorro Creek for Metals be removed from California's list of impaired waters.

4. Public Participation Process

This proposal to delist Chorro Creek for metals will be presented to the Central Coast Regional Board for approval in a public meeting. Board meeting agendas are publicly noticed in advance and include opportunity for public comment on all action items before the Board. Prior to presentation to the Regional Board, a preliminary draft of the proposal will be sent out to the Interested Parties List developed for the Chorro Creek, Los Osos Creek, and Morro Bay Estuary Siltation TMDL. The mailout will include a schedule indicating when the formal draft proposal for public comment is anticipated and that the proposed delisting is scheduled as part of the 303(d) list update scheduled for presentation to the Regional Board at its October 2001 meeting. In addition to the mailout of the draft proposal to delist, a public information meeting was scheduled with the National Estuary Program to present these findings and enhance stakeholder input to the process.

If the Regional Board approves the proposal, it will be submitted to the State Board staff for inclusion in the state's public process of updating California's 303(d) list in 2001. These overlapping regional and state efforts will afford ample opportunity for public input on the Regional Board staff proposal to remove Chorro Creek from California's 303(d) listing of metals-impaired waters.

5. References Cited

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Appendix A

Review of Available Data
1. Numeric Data

Two evaluations, published in 1993 and 1999 respectively, were conducted by staff at the Regional Board and reported impacts from abandoned mines in the Chorro Creek watershed. These reports were: Surface Water Degradation by Inactive Metal Mines in Northwest San Luis Obispo County, California, by Central Coast Regional Water Quality Control Board (RWQCB, 1993) and Inactive Metal Mines in Four San Luis Obispo County Watersheds: Surface Water Quality Impacts and Remedial Options, by Central Coast Regional Water Quality Control Board (RWQCB, 1999). Although the data were not collected for the purpose of developing a TMDL, they are the available analytical sample data available for evaluating Chorro Creek. Metals evaluated in the two reports are listed below:

> 1993: Antimony, Cadmium, Chromium(III), Chromium(VI), Copper, Iron, Lead, Mercury, Nickel, and Zinc
> 1999: Aluminum, Arsenic, Barium, Beryllium, Boron, Cobalt, Magnesium, Manganese, Molybdenum, Selenium, Silver, Thallium, and Vanadium and the 1993 constituents.

The first report (RWQCB, 1993) described 26 samples collected throughout the watershed below mined areas. Each sample was analyzed for dissolved metals in water, total metals in water, sediment quality and general chemistry (including hardness). The data indicated two exceedences of Basin Plan objectives for total water column chromium. One exceedence of California Toxics Rule objectives was found for the dissolved amounts of copper. However the total amount of copper in that same sample was reported as non-detect which indicates either a reversal of sample identifications or a lab or sampling error. It is presumed in this evaluation that the sample identifiers were reversed, thus meaning the dissolved amounts were non-detect and the total metals amount was 0.4 mg/l. Interpreting the copper detection as a total metals content means the data do not indicate a violation of California Toxics Rule objectives.

The follow-up report (RWQCB, 1999) reported on twelve additional samples collected for a follow-up study and analyzed both total metals in the water column and dissolved metals. The 1999 data include a result where aluminum exceeded the water column objectives at a relatively distant downstream site near San Luisito Creek. The downstream sample had a reported total aluminum at 1.4 mg/l (versus a Basin Plan objective for municipal supply of 1.0 mg/l) and did not detect any dissolved aluminum. A mine pit water sample collected at the same time had 1.3 mg/l total aluminum and two samples along the creek in between these points had relatively consistent total aluminum concentrations of 0.1 and 0.3 mg/l, suggesting the downstream sample may have been an anomaly caused by sampling or analysis error. Because there was only one sample exceeding the mine pit sample, the intervening samples were at lower concentrations, and the next sample just downstream was also a much lower concentration (0.1 mg/l), the 1.4 mg/l aluminum result is being considered an anomaly and is not considered an indication of exceedence of water quality objectives. Also, because the sample with total aluminum content of 1.3 mg/l was collected from a mine drainage channel and not in the waterway itself, it is not considered an exceedence of water quality objectives.

Data from the same follow-up report (RWQCB, 1999) also indicated that a copper Basin Plan objective exceedence reported in the first report (RWQCB, 1993) was no longer occurring. This further supports the interpretation that the copper data was incorrectly reported in the first report.

2. Aquatic Toxicity Data

As part of the data presented in "Inactive Metal Mines in Four San Luis Obispo County Watersheds: Surface Water Quality Impacts and Remedial Options" (RWQCB, 1999), toxicity testing was conducted using elutriate from sediment samples collected in the west and east fork of Chorro Creek (RWQCB, 1999, pg. C-1 and Appendix D, Table 6). Toxicity testing of elutriate determines the survival rate of the test organism(s), but does not identify the specific cause of lower survival rates. Testing was done by collecting a sediment sample and centrifuging the sediment with a test water, then taking the test water from the centrifuge and culturing aquatic species in a tank with this water for 72 hours. The test reported (SWRCB, 1999) used ceriodaphnia dubia. Although widely used to evaluate aquatic toxicity, scientific literature indicates ceriodaphnia dubia is highly susceptible to nickel toxicity (as compared to fathead minnows, see Kszos, Stewart, and Taylor, 1992). It is noted that recent research suggests elutriate may overestimate toxicity and other more appropriate methods of evaluating sediment are being developed (for example, see Weston, 2001 and, Field et al., 1999). Because only one species (ceriodaphnia dubia) was used and results did not clearly indicate a source of toxicity, staff find that this one test alone is not adequate enough to indicate an exceedence of narrative aquatic habitat objectives.

Proposal to Delist Los Osos Creek for Priority Organics

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July 23, 2001

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Table of Contents

Proposal to Delist Los Osos Creek for Priority Organics

1. Introduction

Total Maximum Daily Loads (TMDLs) are required for water bodies listed as "impaired" pursuant to Section 303(d) of the Clean Water Act. An impaired water body is any known segment that does not meet applicable water quality objectives and/or is not expected to meet applicable water quality objectives, even after the application of technology-based effluent limitations or other Regional Board requirements. Los Osos Creek was placed on California's 1998 303(d) list for Priority Organics. This document reviews the 303(d) listing of Los Osos Creek and recommends that Los Osos Creek be removed from this listing.

a. Background

Los Osos Creek is on the 303(d) list for Priority Organics. This creek drains into the Morro Bay Estuary (see Figure 1), which is a designated National Estuary by the United States Environmental Protection Agency. Regional Board working files indicate that the creek was listed for Priority Organics based on erosion problems the Los Osos Landfill was having in 1991 (Nanson, 2000), however no actual sampling data was collected.

The County of San Luis Obispo owns the Los Osos Landfill and has been monitoring the surface water and groundwater upstream, across from and downstream of the landfill since 1988. Data from the three surface monitoring stations indicate no organic compounds have been detected at levels above any regulatory values since 1997. It should be noted that there were certain organics found above regulatory values before 1997 (dichloromethane, PCE, TCE, and vinyl chloride) (Nanson, 2000); however, these constituents have not reappeared since 1997 (raw data in Appendix 1).

The area surrounding Los Osos Creek is mainly farmland and grazing land. Based on the 1999 California Pesticide Use Report Data, this is an area where a relatively small amount of pesticide or herbicide is applied in comparison to the other hydrologic units of the region. The main chemical, which comprises 87% percent of the application, is sulfur (California Department of Pesticide Regulation, 1999). Nearly all other chemicals applied near Los Osos Creek constitute a fraction of a percent each when compared with the sulfur application.

California State Mussel Watch program conducts tissue analysis on shellfish along the coast of California, including Morro Bay. No tissue analyses have been conducted since 1980 in Morro Bay for the presence of organics in mussels (California State Mussel Watch, 1988). This data is too old to be considered relevant to this current listing.

Toxic Substances Monitoring Program (TSM) took two fish samples (California Killifish and Rainbow Trout) from Los Osos Creek in August of 1992 and analyzed them for 45 different pesticides and PCBs. The only organics found in the fish tissue were the DDT derivatives DDE and DDD (Toxic Substances Monitoring Program, 1995). No DDT was detected. The California Killifish was the only sample of the two that had tissue levels considered harmful to the organism; levels exceeded 9.1 ppb, the standard in the California Ocean Plan (State Water Resources Control Board, 2000), for total DDT level (i.e. DDE plus DDD). Again, like the State Mussel Watch, this data is almost 10 years old and is not necessarily representative of the current situation.

Natural events have occurred that may have significantly changed conditions represented by historical data. For example, during the 1994-95 rainy season, El Niño rains fell and the Creek flowed at record highs. These flows most likely flushed a large part of Los Osos Creek sediment out into the ocean. This rain presumably flushed much of the organics that may have been attached to the sediment, out to sea as well.

Given the above background information, the only reasons to suspect Priority Organics in Los Osos Creek are present and problematic are based on older data regarding the landfill and tissue analyses data that suggest DDE and DDD may have been a problem in 1992. Therefore, Regional Board Staff decided to conduct a monitored assessment to determine if Priority Organics are present in Los Osos Creek and adversely affecting the beneficial uses.

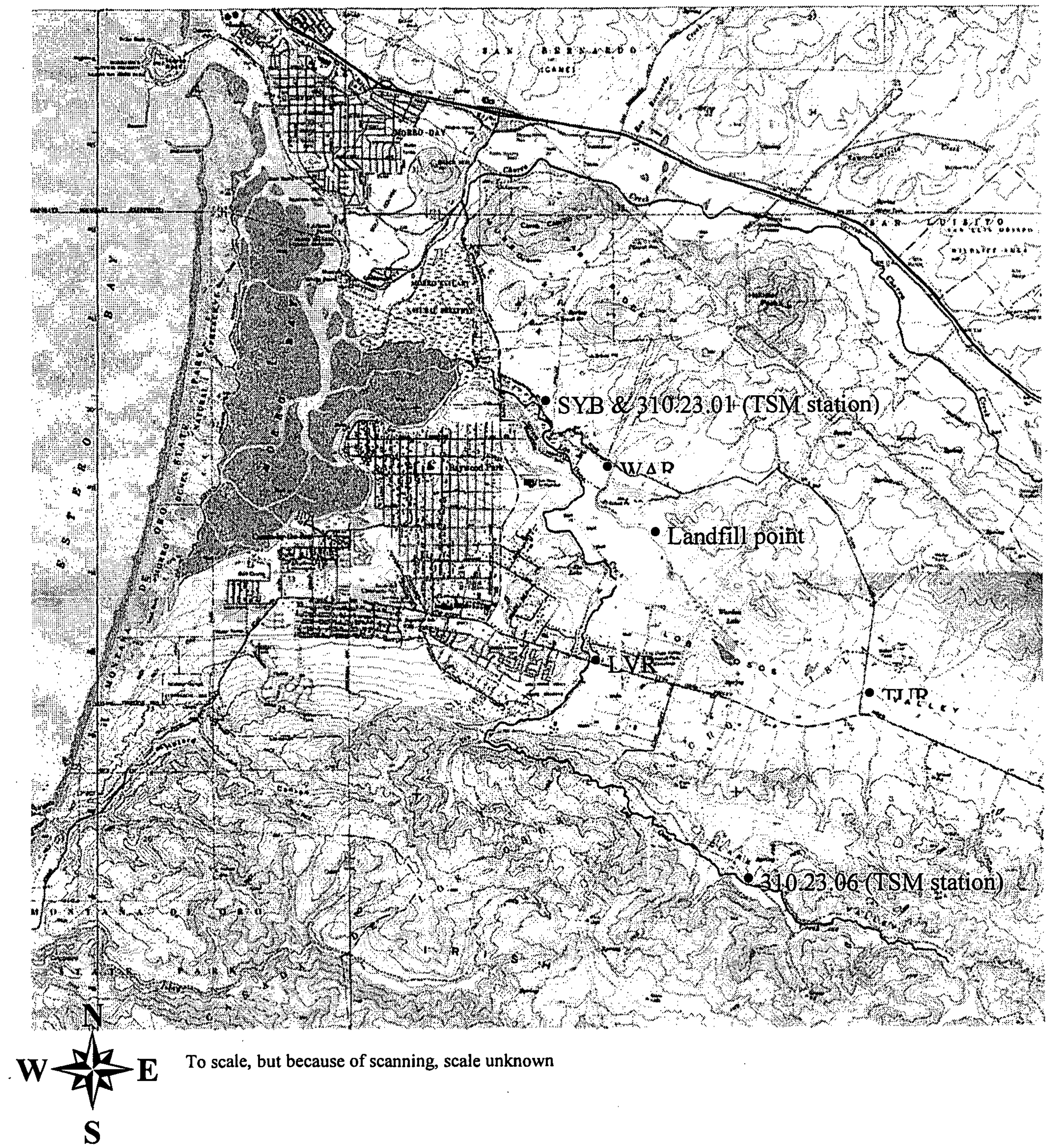

Figure 1: Los Osos Creek (lower creek in blue outline) and sampling locations.

b. Monitored Assessment

Two sampling events were conducted. These took place on March 8, 2001 and June 5, 2001. Five samples sites were selected in Los Osos Creek and its tributaries (see Figure 1). Water and sediment samples were taken in all five spots (with the exception of no sediment taken at SYB March 8, because of the vegetated bank and high water level, and neither sediment nor water was taken at LVR June 5 because the creek was dry). Both water and sediment samples were analyzed with EPA methods 8080, 8270, and 8260. The sample collection on March 8 was after a period of very heavy rain and the June 5 collection was after a period of fairly dry weather. Sampling was performed in this manner to account for seasonality. Monitored assessments met the suggested criterion of having a minimum of Level II information according to Clean Water Act, Section 303(d) "Listing Guidelines for California."(1997).

c. Results of the Monitored Assessments

(see Appendix 2 for raw data from these assessments)

1. March 8, 2001-monitored assessment

No organics were found in the water column during this sampling event as all samples came up non-detect. There were, however, detectable readings for certain organics in the sediment. There are no regulatory limits that exist for sediment; but there are screening values that NOAA recommends (NOAA Screening Quick Reference Tables, 1999). The Bay Protection and Toxic Cleanup Program consider any sampling station values higher than ERMs (effects range median) or PELs (probable effects level) to have elevated chemical content (California State Water Resources Control Board, 1998). Therefore, sediment values were compared to ERM and PEL values when applicable. There were no ERMs in NOAA's screening values for any of the constituents found. Bis(2-ethylhexyl)phthalate, DDT, DDD, DDE, endrin and ethyl benzene were found in the sediment below established PEL levels. Bis(2-ethylhexyl)phthalate, DDT, DDD, DDE, and ethyl benzene were found at site-WAR, endrin, DDT, DDD, and DDE were found at site WAR-dup and bis(2-ethylhexyl)phthalate was found at site-TUR. The constituents and their respective NOAA values are broken down by specific chemical later in the document.

2. June 5, 2001-monitored assessment

No organics were found in the water column during this sampling event as all samples came up non-detect. Only one constituent was found in one of the sediment samples. Site-SYB had a detection of methylene chloride in the sediment which was below the agricultural target NOAA has set forth.

d. Sediment – comparing lab given values to NOAA values

Sediment samples were reported to the Regional Board in an "as received basis." That is, the samples were analyzed as they were presented to the lab, and were not dried. NOAA values are reported on a "dry weight basis." Comparing these two sediment values are not equal so a correction factor must be applied. Typical sediment collected creek side normally has a moisture content ranging from 8-20%. Therefore, all concentrations reported to the Board were converted to dry weight by multiplying the concentrations by 8 and 20% moisture to give us a range of expected values. No values of organics in the sediment were above levels considered harmful by NOAA. Please see Appendix 3 for a description of NOAA values.

2. Problem Statement

The most current data available for Los Osos Creek indicate that numeric water quality objectives for Priority Organic concentrations per the California Toxics Rule and the Basin Plan are being met. Narrative sediment quality standards relating to organics are being met as well according to the Basin Plan. Numeric sediment quality guidance taken from NOAA values implies that no sediment samples exceed an upper threshold which indicates "probable toxic effects." No recent tissue data is available, however, based on the values seen in the sediment and in the water, impairment of tissue is not expected. Because available data indicate both numeric and narrative objectives (of the Basin Plan and the California Toxics Rule) are being achieved in Los Osos Creek, the Creek is identified as having no Priority Organic-specific water quality impairment.

a. Basin Plan Objectives

According to the Basin Plan, there should not be any constituents present in water bodies at levels which compromise any impacts to beneficial uses. Beneficial uses for Los Osos Creek include: municipal and domestic supply, agricultural supply, ground water recharge, water contact recreation, non-contact water recreation, wildlife habitat, cold fresh water habitat, warm fresh water habitat, migration of aquatic organisms, spawning reproduction and early development, rare, threatened or endangered species, freshwater replenishment, commercial and sport fishing (Regional Water Quality Control Board, 1994).

In the Basin Plan's general objectives, it states that, "no individual pesticide or combination of pesticides shall reach concentrations that adversely affect beneficial uses. There shall be no increase in pesticide concentrations found in bottom sediments or aquatic life" (Regional Water Quality Control Board, 1994). Based on sediment data, organics are not present in concentrations that adversely effect beneficial uses when compared with NOAA screening values. Without chemistry background data, it is not possible to say if the concentrations are increasing or decreasing. However, given the biodegradation properties of DDT, it appears as though the DDT is in the process of biodegrading. Based on the tissue data taken in 1992, DDE and DDD were found in one of the two fish samples (California Killifish) at levels above what is considered acceptable according to the California Ocean Plan (State Water Resources Control Board, 2000). Ocean Plan objectives are mentioned in this freshwater creek situation because there are no freshwater tissue regulations that exist. Therefore, ocean water regulations will be used instead. Ocean Plan objectives state that DDT levels in tissue shall not exceed 9.1 parts per billion (ppb). Although there was no DDT found in the fish tissue, DDD and DDE were found (see Table 1). These breakdown products are summed and collectively considered DDT. While the DDT value in Killifish exceeds the regulations, this data was taken in 1992. This data is too old to be considered representative of the current situation. If there were simultaneous sediment samples taken at the time of the fish tissue samples in 1992, we would expect the values of DDT in the sediment to have been higher than the current concentration of DDT in the sediment. Unfortunately, these samples were not taken. No recent tissue sampling has been done since 1992, but based on the sediment values obtained in the two monitored assessments this year; concentration of DDT in the tissue of fish in 2001 is not expected.

Table 1: DDD and DDE levels found in California Killifish and Rainbow Trout tissue in 1992 on Los Osos Creek.

	Level found (ppb)			Ocean Plan Regulations (ppb)
Site/type of fish	DDD	DDE	DDT - total	DDT - total
310.23.01/ CA Killifish	16	92	108	9.1
310.23.06/Rainbow Trout	None detected	7.2	7.2	9.1

For organic chemicals, the Basin Plan states that "all inland surface waters...shall not contain concentrations of organic chemicals in excess of the limiting concentrations set forth in California Code of Regulations, Title 22, Chapter 15, Article 5.5, Section 64444.5." Since all water column samples came up non-detect, this section is satisfied.

b. Priority Organics – California Toxics Rule, Federal Register, 40 CFR Part 131

Priority Organics, as listed in the Federal Register, give numeric concentrations of constituents that should not be exceeded in water (Federal Register, 2000). Because there were no detections of these constituents in water, there were no violations of these regulations.

c. Organic Constituents Found in the Sediment

1. Bis(2-ethylhexyl)phthalate

Bis(2-ethylhexyl)phthalate is a colorless oily liquid that is extensively used in a wide variety of industrial, domestic and medical products and is ubiquitous in the environment (Risk Assessment Information System, 2001). Research has shown bis(2-ethylhexyl)phthalate binds onto dissolved organic macromolecules and that in most soil-water systems, these macromolecules are not mobile. These macromolecules tend to be extensively adsorbed onto soil surfaces due to a large part to van der Waals forces (Dragun, 1988). Therefore, bis(2-ethylhexyl)phthalate is not expected to enter the water column.

There are no known sources of this chemical that could be rectified on Los Osos Creek. The presence of this chemical may be due to its presence in the environment and the atmosphere. In terms of affecting aquatic life, experiments have shown that fish do not extensively bioaccumulate this chemical, however, it may cause symptoms in the liver and kidney's of laboratory rats (Risk Assessment Information System, 2001). Data regarding toxicity in humans was not available. Concentrations of bis(2-ethylhexyl)phthalate were below NOAA guidance values. Table 2 contains actual data regarding bis(2-ethylhexyl)phthalate and comparisons to NOAA values.

Table 2: Levels of **bis(2-ethylhexyl)phthalate** found in the sediment compared with NOAA values per the March 5, 2001 sampling. All concentrations are in **mg/kg**.

	Concentration on an "as received basis"	Concentration, corrected to account for a "dry weight basis"		NOAA value based on a "dry weight basis"
Site		Assuming 8% moisture	Assuming 20% moisture	UET
WAR	0.069	0.07452	0.0828	0.750
WAR-dup	0.16	0.1728	0.192	0.750
TUR	0.069	0.07452	0.0828	0.750

2. DDT and metabolites

DDT is an organochlorine that was used as an insecticide and has been banned for use in the United States since 1972 (Extension Toxicology Network Pesticide Information, 2001). DDT, like bis(2-ethylhexyl)phthalate, binds onto dissolved organic macromolecules and is generally not mobile. DDT tends to be extensively adsorbed onto soil surfaces due to a large part to van der Waals forces. DDT is nearly a planar configuration and the larger the planar surface area is, the greater the extent of adsorption (Dragun, 1988).

DDE is a metabolite of DDT (see Figure 2). Because the DDT values found in the sediment are lower than DDE values, we can infer that DDT is in the process of biodegrading. The biodegradation process of DDT can take decades.

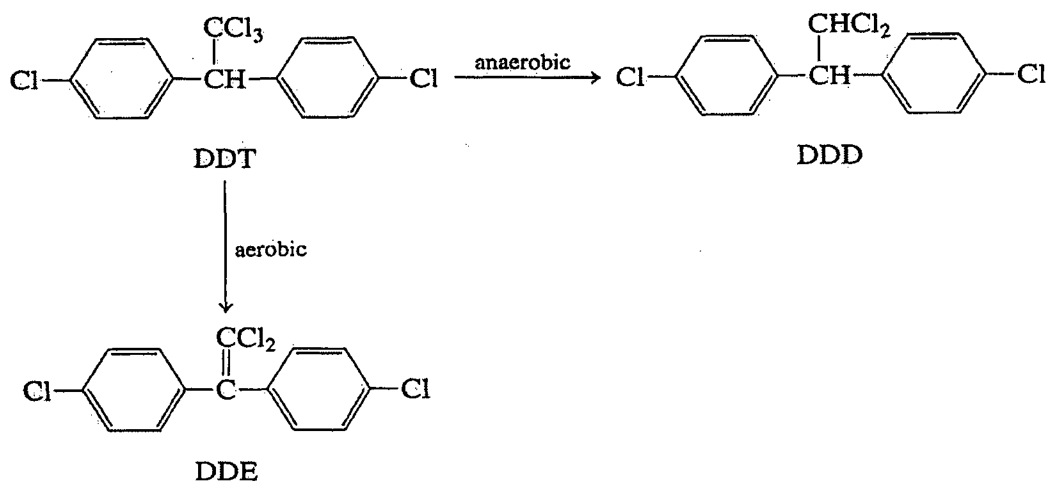

Figure 2: Biodegradation pathways of DDT (Watts, 1998).

Because this chemical was banned back in the 1970's, there is no reason to suspect any new DDT would be entering the environment. There are residual amounts of DDT that remain in the soil (see Tables 3-5) at levels that are not expected to be harmful to any of the beneficial uses of the creek, according to NOAA guidance values.

In terms of the DDD and DDE found in the tissue of the California Killifish, we do not expect to see these types of levels at this point in time. If, for the sake of argument, levels were higher than expected, preventative action would entail controlling erosion on the creek banks, which is already being proposed through the Siltation TMDL for Chorro Creek, Los Osos Creek and the Morro Bay Estuary (Regional Water Quality Control Board, 2001). Therefore, any and all best management practices that may be put into effect in a worse case scenario are already in progress.

Table 3: Levels of **DDD** found in the sediment compared with NOAA values per the March 5, 2001 sampling. All concentrations are in **mg/kg**.

	Concentration on an "as received basis"	Concentration corrected to account for a "dry weight basis"		NOAA values based on a "dry weight basis"	
Site		Assuming 8% moisture	Assuming 20% moisture	PEL	UET
WAR	0.00063	0.00068	0.00076	0.00851	0.060
WAR-dup	0.00046	0.00050	0.00055	0.00851	0.060

Table 4: Levels of **DDE** found in the sediment compared with NOAA values per the March 5, 2001 sampling. All concentrations are in **mg/kg**.

	Concentration on an "as received basis"	Concentration corrected to account for a "dry weight basis"		NOAA values based on a "dry weight basis"	
Site		Assuming 8% moisture	Assuming 20% moisture	PEL	UET
WAR	0.0044	0.00475	0.00528	0.00675	0.050
WAR-dup	0.0041	0.00443	0.00492	0.00675	0.050

Table 5: Levels of **DDT** found in the sediment compared with NOAA values per the March 5, 2001 sampling. All concentrations are in **mg/kg**.

	Concentration on an "as received basis"	Concentration corrected to account for a "dry weight basis"		NOAA values based on a "dry weight basis"	
Site		Assuming 8% moisture	Assuming 20% moisture	PEL	UET
WAR	0.0036	0.00389	0.00432	no value	0.050
WAR-dup	0.0031	0.00335	0.00372	no value	0.050

3. Endrin

Endrin is a solid, white, nearly odorless substance that was mainly used on field crops and also used to control rodents and birds. Endrin has not been produced or sold for general use in the U. S. since 1986. This substance does not dissolve well in water and tends to cling to the bottom sediments of water bodies (Environmental Media Services, 2001). As with DDT, there is no reason to suspect that any more endrin will be entering the environment. No endrin was found in fish tissue samples taken by Toxic Substances Monitoring Program (Toxic Substances Monitoring Program, 1995). No values endrin concentrations exceeded NOAA guidance values. Please see Table 6 for the actual data regarding endrin.

Table 6: Levels of **endrin** found in the sediment compared with NOAA values per the March 5, 2001 sampling. All concentrations are in **mg/kg**.

	Concentration on an "as received basis"	Concentration corrected to account for a "dry weight basis"		NOAA values based on a "dry weight basis"	
Site		Assuming 8% moisture	Assuming 20% moisture	PEL	UET
WAR-dup	0.0006	0.00065	0.00072	0.0624	0.5

4. Ethyl benzene

Ethyl benzene is a colorless organic liquid with a sweet, gasoline-like odor. It is found in most common household products such as pesticides, carpet glues, varnishes, paints, and in gasoline (College Term Papers, 2001). There are many ways this constituent could have entered the creek at some point in time but it does not appear that there exists a continuous source of ethyl benzene that could be controlled. There was no concentration of ethyl benzene that exceeded NOAA guidance values. Please see Table 7 for actual data regarding ethyl benzene.

Table 7: Levels of **ethyl benzene** found in the sediment compared with NOAA values per the March 5, 2001 sampling. All concentrations are in **mg/kg**.

	Concentration on an "as received basis"	Concentration, corrected to account for a "dry weight basis"		NOAA value based on a "dry weight basis"
Site		Assuming 8% moisture	Assuming 20% moisture	AET for marine sediment*
WAR	0.0027	0.00292	0.00324	0.004

*No values given for freshwater sediment.

5. Methylene Chloride

Methylene chloride is a colorless liquid with a sweetish odor. It is predominantly used as a solvent in paint strippers and removers; as a process solvent in the manufacture of drugs and pharmaceutical and film coatings; as a metal cleaning and finishing solvent in electronics manufacturing; as a propellant in aerosols for products such as paints, automotive products and insect sprays; and as a post-harvest fumigants for grains and strawberries and as a degreening agent for citrus fruit (Lakes Environmental Software, 2001). Because there are so many different uses of this constituent, its origin cannot be conclusively determined. While there are strawberry farms in the vicinity of Los Osos Creek, according to the 1999 California Pesticide Database, this chemical was not applied (California Department of Pesticide Regulation, 1999). The detection of methylene chloride was well below levels considered harmful by NOAA values. Please see Table 7 for actual data.

Table 7: Levels of **methylene chloride** found in the sediment compared with NOAA values per the June 5, 2001 sampling. All concentrations are in **mg/kg**.

	Concentration on an "as received basis"	Concentration, corrected to account for a "dry weight basis"		NOAA value based on a "dry weight basis"
Site		Assuming 8% moisture	Assuming 20% moisture	Agricultural target
SYB	0.030	0.03240	0.03600	0.100

3. Rationale To Delist

Regional Board staff considered delisting factors identified in the 1998 Clean Water Act Section 303(d) Listing Guidelines for California (Ad Hoc Workgroup, 1997) for adding or removing waterways from the 303(d) list. These guidelines were developed by a workgroup of regional board, state board, and US EPA Region 9 staff and indicate that water bodies may be delisted for specific pollutants or stressors if any one of six factors is met. These guidelines were considered by the Central Coast Regional Board, State Water Resources Control Board, and US EPA Region 9 during the public and administrative review and approval of the State's 303(d) List of Impaired Waters in 1998. Two out of the six of these specific delisting factors may be applied to this situation.

The six Delisting Factors were:

1. Objectives are revised, and the exceedance is thereby eliminated.
2. A beneficial use is de-designated after US EPA approval of a Use Attainability Analysis, and the non-support issue is thereby eliminated.
3. Faulty data led to the initial listing. Faulty data include, but are not limited to typographical errors, improper quality assurance/quality control (QA/QC) procedures, or Toxic Substances Monitoring/State Mussel Watch EDLs which are not confirmed by risk assessment for human consumption.
4. It has been documented that the objectives are being met and beneficial uses are not impaired based on "Monitored Assessment" criteria.
5. A TMDL has been approved by the US EPA.
6. There are control measures in place which will result in protection of beneficial uses. Control measures include permits, cleanup and abatement orders, and watershed management plans which are enforceable and include a time schedule.

The fourth delisting factor states that a water body may be delisted for a specific pollutant if "it has been documented that the objectives are being met and beneficial uses are not impaired based upon 'Monitored Assessment' Criteria." Based on the Monitored Assessments that took place on March 8 and June 5 of 2001, objectives are being met and beneficial uses are not impaired. In both dry and wet weather, Priority Organics were not found in the water column and the Priority Organics found in the sediment were at levels that would not be expected to be harmful to any of the beneficial uses of the creek, according to NOAA guidance values. Although DDE and DDE were found in the tissue of fish in 1992, these chemicals are breakdown products of DDT and should be decreasing in concentration with time. Nine years later, we expect fish tissue levels to be negligible. If it were determined there was still a problem with levels of DDT in the tissue of fish; the course of action would be to control erosion, which is already proposed by the Siltation TMDL for Chorro Creek, Los Osos Creek and the Morro Bay Estuary.

The sixth delisting factor states that a water body may be delisted for a specific pollutant if "there are control measures in place which will result in protection of beneficial uses. Control measures include permits, clean up and abatement orders, and watershed management plans, which are enforceable and include a time schedule." There are two such "control measures" in place on Los Osos Creek and its tributaries.

The first of these has to do with the Los Osos Landfill. The landfill was issued several clean up and abatement orders (CAO) beginning in 1989. According to Chapter 15 regulations, the discharger must continue a Corrective Action Program for as long as is necessary to bring the affected waters into compliance with water quality standards (California Code of Regulation, 1984). To this date, the County of San Luis Obispo continues to monitor upstream, across from and downstream of the landfill. The CAO has not yet been rescinded because the County has been finding organics in the groundwater monitoring wells. However, as stated earlier, there has been no detection of any organics in the surface water since 1997.

The second of the two control measures is the Siltation TMDL for Chorro Creek, Los Osos Creek and the Morro Bay Estuary. Because erosion of farmlands is the only expected source of legacy pollutants into the creek, controlling of the sediment should stop these pollutants from entering, if there are any left. This TMDL assures that excess sediment will not enter the creek. There are several ways that this will be implemented. One of the ways is that the growers in the area must attend a short course on how to best manage their lands to control erosion (along with other issues). These growers have been monitoring their lands voluntarily and reporting results to the Farm Bureau. Joy Fitzhugh of the Farm Bureau visits the farmers in the field to check up on the progress they are making. The growers send reports of this progress to the Regional Water Quality Control Board. Additionally, the National Monitoring Program does monitoring to determine the effectiveness of the new Best Management Practices these growers are putting into action.

In addition to reasons four and six listed above, Los Osos Creek will be in the Central Coast Ambient Monitoring Program's (CCAMP) rotation in the calendar year 2002 (Worcester, 2001). There will be a point selected on the Creek and monthly monitoring will take place. A wide variety of tests will be conducted, among them an organic toxicity or tissue test, if it is deemed necessary. CCAMP's monitoring is important because this Creek will continue to be monitored.

Regional Board Staff recommend delisting Los Osos Creek for Priority Organics. Based on NOAA screening values and existing control measures we do not expect the impairment of any of the beneficial uses of Los Osos Creek.

4. Public Participation

This proposal to delist Los Osos Creek for organics will be presented to the Central Coast Regional Board for approval in a public meeting. Board meeting agendas are publicly noticed in advance and include opportunity for public comment on all action items before the Board. Prior to presentation to the Regional Board, a preliminary draft of the proposal will be sent out to the Interested Parties List developed for the Morro Bay and Chorro Creek Siltation TMDL. The mailout will include a schedule indicating when the formal draft proposal for public comment is anticipated and that the proposed delisting is scheduled as part of the 303(d) list update scheduled for presentation to the Regional Board at its October 2001 meeting. In addition to the mailout of the draft proposal to delist, a meeting will be scheduled with the National Estuary Program implementation committees to present these findings and enhance stakeholder input to the process.

If the Regional Board approves the proposal, it will be submitted to the State Board staff for inclusion in the state's public process of updating California's 303(d) list in 2001. These overlapping regional and state efforts will afford ample opportunity for public input on the Regional Board staff proposal to remove Los Osos Creek from California's 303(d) listing of organics-impaired waters.

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Appendix 1 – Raw Data, County Landfill

Los Osos Creek, Priority Organics.
Turri Road Landfill testing done by the County.

Station and dates	All values are in µg/L benzene	chloroethane	chloroform	1,4-dichlorobenzene	1,1-dichloroethane	1,2-trans-dichloroethylene	ethylbenzene	(dichloromethane) methylene chloride	(PCE) tetrachloroethylene	(TCE) trichloroethylene	toluene	1,1,1-trichloroethane	vinyl chloride
S-1													
10/1/88	0.4		<0.1						<0.1		5		
1/1/89	<0.1		<0.1						<0.1		<0.1		
7/1/89	<0.1		<0.1						<0.1		<0.1		
10/1/89	<0.1		<0.1						<0.1		<0.1		
1/1/90	<0.1		<0.1						<0.1		1.6		
7/1/92	<0.1		<0.1						<0.1		1.9		
10/1/92	<0.1		<0.1						17.9		<0.1		
10/1/93	<0.1		<0.1						<0.1		1.3		
7/1/94	<0.1		<0.1						0.7		<0.1		
1/1/95	<0.1		<0.1						2.8		<0.1		
7/1/95	<0.1		0.1						<0.1		<0.1		
7/1/96	<0.1		<0.1						<0.1		<0.1		
10/1/97	<0.1		<0.1						<0.1		0.1		
9-1-99 grab	<0.1	<0.3	<0.1	<0.1	<0.2	<0.2	<0.1	<0.2	<0.1	<0.1	0.2	<0.2	<0.2
10-19-99 grab	<0.1	<0.3	<0.1	<0.1	<0.2	<0.2	<0.1	<0.2	<0.1	<0.1	0.2	<0.2	<0.2
S-2													
5/1/88	<0.1			<0.1	<0.2		<0.1	9	<0.1	<0.1	<0.1	<0.2	<0.2
7/1/88	<0.1			<0.1	0.6		<0.1	<0.2	1.7	<0.1	5.8	<0.2	2
10/1/88	0.5			<0.1	1.1		0.7	<0.2	<0.1	0.9	5.2	<0.2	1.8
1/1/89	<0.1			<0.1	<0.2		<0.1	<0.2	<0.1	<0.1	<0.1	<0.2	<0.2
4/1/89	<0.1			<0.1	0.7	<0.2	<0.1	<0.2	<0.1	0.6	2.2	<0.2	1.6
7/1/89	<0.1			<0.1	<0.2	<0.2	<0.1	<0.2	0.7	0.5	0.7	<0.2	<0.2
10/1/89	<0.1			<0.1	0.5	<0.2	<0.1	<0.2	1.1	1.4	<0.1	<0.2	3
1/1/90	<0.1			<0.1	0.6	<0.2	<0.1	<0.2	0.6	1	1.2	<0.2	<0.2
4/1/90	<0.1			<0.1	0.87	<0.2	<0.1	<0.2	<0.1	1.67	0.76	<0.2	2.69
7/1/90	<0.1			<0.1	<0.2	<0.2	<0.1	<0.2	<0.1	0.89	<0.1	<0.2	0.65
10/1/90	<0.1			<0.1	<0.2	<0.2	<0.1	<0.2	3.36	<0.1	<0.1	<0.2	<0.2
1/1/91	<0.1			1	1	<0.2	<0.1	<0.2	1.6	1.9	2.9	<0.2	2.8
10/1/91	<0.1			<0.1	<0.2	<0.2	<0.1	<0.2	1	<0.1	<0.1	<0.2	<0.2
10/1/92	<0.1			<0.1	<0.2	<0.2	<0.1	<0.2	<0.1	<0.1	<0.1	3.4	<0.2
7/1/93	<0.1			<0.1	<0.2	<0.2	<0.1	<0.2	<0.1	<0.1	<0.1	<0.2	<0.2
10/19/99 - grab	<0.1	<0.3	<0.1	<0.1	<0.2	<0.2	<0.1	<0.2	<0.1	<0.1	<0.1	<0.2	<0.2
S-3													
7/1/88		<0.3	<0.1						<0.1		2.1		
1/1/89		<0.3	<0.1						<0.1		<0.1		
7/1/90		<0.3	<0.1			<0.2			<0.1		<0.1		
10/1/90		<0.3	<0.1			<0.2			1.11		<0.1		
10/1/91		<0.3	<0.1			<0.2			0.9		0.9		
4/1/92		<0.3	<0.1			<0.2			<0.1		0.5		
7/1/92		<0.3	<0.1			<0.2			<0.1		<0.1		
10/1/96		<0.3	0.1			<0.2			<0.1		0.1		
7/1/97		<0.3	<0.1			<0.2			0.1		<0.1		
4/1/99		0.3	<0.1			<0.2			<0.1		<0.1		
10-19-99 grab	<0.1	<0.3	<0.1	<0.1	<0.2	<0.2	<0.1	<0.2	<0.1	<0.1	<0.1	<0.2	<0.2

Appendix 2 – Monitored Assessments, Raw Data

Los Osos Creek, Priority Organics, March 8, 2001

Priority Organics in the **sediment**

Reported in mg/kg on an as received basis.

Unable to get a sediment sample from SYB because of the high water level and vegetated bank.

		Sampling Locations				
Number corresponding with Federal Register	Constituent	WAR	WAR dup	LVR	TUR	Landfill point
19	Benzene	nd	nd	nd	nd	nd
20	Bromoform	nd	nd	nd	nd	nd
21	Carbon Tetrachloride	nd	nd	nd	nd	nd
22	Chlorobenzene	nd	nd	nd	nd	nd
23	Chlorodibromomethane	nd	nd	nd	nd	nd
24	Chloroethane	nd	nd	nd	nd	nd
26	Chloroform	nd	nd	nd	nd	nd
27	Dichlorobromomethane	nd	nd	nd	nd	nd
28	1,1-Dichloroethane	nd	nd	nd	nd	nd
29	1,2-Dichloroethane	nd	nd	nd	nd	nd
30	1,1-Dichloroethylene	nd	nd	nd	nd	nd
31	1,2-Dichloropropane	nd	nd	nd	nd	nd
32	1,3-Dichloropropylene	nd	nd	nd	nd	nd
33	Ethylbenzene	**0.0027**	nd	nd	nd	nd
34	Methyl Bromide	nd	nd	nd	nd	nd
35	Methyl Chloride	nd	nd	nd	nd	nd
36	Methylene Chloride	nd	nd	nd	nd	nd
37	1,1,2,2 - Tetrachloroethane	nd	nd	nd	nd	nd
38	Tetrachloroethylene (PCE)	nd	nd	nd	nd	nd
39	Toluene	nd	nd	nd	nd	nd
40	1,2-Trans-Dichoroethylene	nd	nd	nd	nd	nd
41	1,1,1-Trichloroethane (1,1,1 TCA)	nd	nd	nd	nd	nd
42	1,1,2-Trichloroethane (1,1,2 TCA)	nd	nd	nd	nd	nd
43	Trichloroethylene (TCE)	nd	nd	nd	nd	nd
44	Vinyl Chloride	nd	nd	nd	nd	nd
45	2 - Chlorophenol	nd	nd	nd	nd	nd
46	2,4 – Dichlorophenol	nd	nd	nd	nd	nd
47	2,4 – Dimethylphenol	nd	nd	nd	nd	nd
48	2-Methyl-4,6-Dinitrophenol	nd	nd	nd	nd	nd
49	2,4 – Dinitrophenol	nd	nd	nd	nd	nd
50	2-Nitrophenol	nd	nd	nd	nd	nd
51	4-Nitrophenol	nd	nd	nd	nd	nd
52	3-Methyl-4-Chlorophenol	nd	nd	nd	nd	nd
53	Pentachlorophenol	nd	nd	nd	nd	nd
54	Phenol	nd	nd	nd	nd	nd
56	Acenaphthene	nd	nd	nd	nd	nd
57	Acenaphthylene	nd	nd	nd	nd	nd
58	Anthracene	nd	nd	nd	nd	nd
59	Benzidine	nd	nd	nd	nd	nd
60	Benzo(a)Anthracene	nd	nd	nd	nd	nd

Revised 5/16/01

		Sampling Locations				
Number corresponding with Federal Register	Constituent	WAR	WAR dup	LVR	TUR	Landfill point
61	Benzo(a)Pyrene	nd	nd	nd	nd	nd
62	Benzo(b)Fluoranthene	nd	nd	nd	nd	nd
63	Benzo(ghi)Perylene	nd	nd	nd	nd	nd
64	Benzo(k)fluoranthene	nd	nd	nd	nd	nd
65	Bis(2-Chloroethoxy)Methane	nd	nd	nd	nd	nd
66	Bis(2-Chloroethyl)Ether	nd	nd	nd	nd	nd
68	Bis(2-Ethylhexyl)Phthalate	**0.069**	**0.16**	nd	**0.069**	nd
69	4-Bromophenyl Phenyl Ether	nd	nd	nd	nd	nd
70	ButylbenzylPhthalate	nd	nd	nd	nd	nd
71	2-Chloronaphthalene	nd	nd	nd	nd	nd
72	4-Chlorophenyl Phenyl Ether	nd	nd	nd	nd	nd
73	Chrysene	nd	nd	nd	nd	nd
74	Dibenzo(a,h)Anthracene	nd	nd	nd	nd	nd
75	1,2 - Dichlorobenzene	nd	nd	nd	nd	nd
76	1,3 – Dichlorobenzene	nd	nd	nd	nd	nd
77	1,4 – Dichlorobenzene	nd	nd	nd	nd	nd
78	3,3'-Dichlorobenzidine	nd	nd	nd	nd	nd
79	Diethyl Phthalate	nd	nd	nd	nd	nd
80	Dimethyl Phthalate	nd	nd	nd	nd	nd
81	Di-n-Butyl Phthalate	nd	nd	nd	nd	nd
82	2,4 – Dinitrotoluene	nd	nd	nd	nd	nd
83	2,6-Dinitrotoluene;	nd	nd	nd	nd	nd
84	Di-n-Octyl Phthalate	nd	nd	nd	nd	nd
85	1,2 – Diphenylhydrazine	nd	nd	nd	nd	nd
86	Fluoranthene	nd	nd	nd	nd	nd
87	Fluorene	nd	nd	nd	nd	nd
88	Hexachlorobenzene	nd	nd	nd	nd	nd
89	Hexachlorobutadiene	nd	nd	nd	nd	nd
90	Hexachlorocyclopentadiene	nd	nd	nd	nd	nd
91	Hexachloroethane	nd	nd	nd	nd	nd
92	Ideno 1,2,3 (c,d) pyrene	nd	nd	nd	nd	nd
93	Isophorone	nd	nd	nd	nd	nd
94	Napthalene	nd	nd	nd	nd	nd
95	Nitrobenzene	nd	nd	nd	nd	nd
96	N-Nirosodimethylamine	nd	nd	nd	nd	nd
97	N-Nitrosodi-n-Propylamaine	nd	nd	nd	nd	nd
98	N-Nitrosodiphenylamine	nd	nd	nd	nd	nd
99	Phenanthrene	nd	nd	nd	nd	nd
100	Pyrene	nd	nd	nd	nd	nd
101	1,2,4 – Trichlorobenzene	nd	nd	nd	nd	nd
102	Aldrin	nd	nd	nd	nd	nd
103	alpha-BHC	nd	nd	nd	nd	nd
104	beta-BHC	nd	nd	nd	nd	nd
105	gamma-BHC	nd	nd	nd	nd	nd
106	delta-BHC (Lindane)	nd	nd	nd	nd	nd
107	Chlordane	nd	nd	nd	nd	nd

		Sampling Locations				
Number corresponding with Federal Register	Constituent	WAR	WAR dup	LVR	TUR	Landfill point
108	4,4'-DDT	**0.0036**	**0.0031**	nd	nd	nd
109	4,4'-DDE	**0.0044**	**0.0041**	nd	nd	nd
110	4,4'-DDD	**0.00063**	**0.00046**	nd	nd	nd
111	Dieldrin	nd	nd	nd	nd	nd
112	Alpha-Endosulfan	nd	nd	nd	nd	nd
113	Beta-Endosulfan	nd	nd	nd	nd	nd
114	Endosulfan Sulfate	nd	nd	nd	nd	nd
115	Endrin	nd	**0.0006**	nd	nd	nd
116	Endrin Aldehyde	nd	nd	nd	nd	nd
117	Heptachlor	nd	nd	nd	nd	nd
118	Heptachlor Epoxide	nd	nd	nd	nd	nd
119-125	Polychlorinated Biphenyls (PCBs)	nd	nd	nd	nd	nd
126	Toxaphene	nd	nd	nd	nd	nd

Los Osos Creek, Priority Organics, March 8, 2001
Priority Organics in the water
Reported in **ug/L**

Number corresponding with Federal Register	Constituent	Sampling Locations					
		SYB	WAR	WAR dup	LVR	TUR	Landfill point
19	Benzene	nd	nd	nd	nd	nd	nd
20	Bromoform	nd	nd	nd	nd	nd	nd
21	Carbon Tetrachloride	nd	nd	nd	nd	nd	nd
22	Chlorobenzene	nd	nd	nd	nd	nd	nd
23	Chlorodibromomethane	nd	nd	nd	nd	nd	nd
24	Chloroethane	nd	nd	nd	nd	nd	nd
26	Chloroform	nd	nd	nd	nd	nd	nd
27	Dichlorobromomethane	nd	nd	nd	nd	nd	nd
28	1,1-Dichloroethane	nd	nd	nd	nd	nd	nd
29	1,2-Dichloroethane	nd	nd	nd	nd	nd	nd
30	1,1-Dichloroethylene	nd	nd	nd	nd	nd	nd
31	1,2-Dichloropropane	nd	nd	nd	nd	nd	nd
32	1,3-Dichloropropylene	nd	nd	nd	nd	nd	nd
33	Ethylbenzene	nd	nd	nd	nd	nd	nd
34	Methyl Bromide	nd	nd	nd	nd	nd	nd
35	Methyl Chloride	nd	nd	nd	nd	nd	nd
36	Methylene Chloride	nd	nd	nd	nd	nd	nd
37	1,1,2,2 - Tetrachloroethane	nd	nd	nd	nd	nd	nd
38	Tetrachloroethylene (PCE)	nd	nd	nd	nd	nd	nd
39	Toluene	nd	nd	nd	nd	nd	nd
40	1,2-Trans-Dichoroethylene	nd	nd	nd	nd	nd	nd
41	1,1,1-Trichloroethane (1,1,1 TCA)	nd	nd	nd	nd	nd	nd
42	1,1,2-Trichloroethane (1,1,2 TCA)	nd	nd	nd	nd	nd	nd
43	Trichloroethylene (TCE)	nd	nd	nd	nd	nd	nd
44	Vinyl Chloride	nd	nd	nd	nd	nd	nd
45	2 - Chlorophenol	nd	nd	nd	nd	nd	nd
46	2,4 – Dichlorophenol	nd	nd	nd	nd	nd	nd
47	2,4 – Dimethylphenol	nd	nd	nd	nd	nd	nd
48	2-Methyl-4,6-Dinitrophenol	nd	nd	nd	nd	nd	nd
49	2,4 – Dinitrophenol	nd	nd	nd	nd	nd	nd
50	2-Nitrophenol	nd	nd	nd	nd	nd	nd
51	4-Nitrophenol	nd	nd	nd	nd	nd	nd
52	3-Methyl-4-Chlorophenol	nd	nd	nd	nd	nd	nd
53	Pentachlorophenol	nd	nd	nd	nd	nd	nd
54	Phenol	nd	nd	nd	nd	nd	nd
56	Acenaphthene	nd	nd	nd	nd	nd	nd
57	Acenaphthylene	nd	nd	nd	nd	nd	nd
58	Anthracene	nd	nd	nd	nd	nd	nd
59	Benzidine	nd	nd	nd	nd	nd	nd
60	Benzo(a)Anthracene	nd	nd	nd	nd	nd	nd

Revised 5/16/01

		Sampling Locations					
Number corresponding with Federal Register	Constituent	SYB	WAR	WAR dup	LVR	TUR	Landfill point
61	Benzo(a)Pyrene	nd	nd	nd	nd	nd	nd
62	Benzo(b)Fluoranthene	nd	nd	nd	nd	nd	nd
63	Benzo(ghi)Perylene	nd	nd	nd	nd	nd	nd
64	Benzo(k)fluoranthene	nd	nd	nd	nd	nd	nd
65	Bis(2-Chloroethoxy)Methane	nd	nd	nd	nd	nd	nd
66	Bis(2-Chloroethyl)Ether	nd	nd	nd	nd	nd	nd
68	Bis(2-Ethylhexyl)Phthalate	nd	nd	nd	nd	nd	nd
69	4-Bromophenyl Phenyl Ether	nd	nd	nd	nd	nd	nd
70	ButylbenzylPhthalate	nd	nd	nd	nd	nd	nd
71	2-Chloronaphthalene	nd	nd	nd	nd	nd	nd
72	4-Chlorophenyl Phenyl Ether	nd	nd	nd	nd	nd	nd
73	Chrysene	nd	nd	nd	nd	nd	nd
74	Dibenzo(a,h)Anthracene	nd	nd	nd	nd	nd	nd
75	1,2 - Dichlorobenzene	nd	nd	nd	nd	nd	nd
76	1,3 – Dichlorobenzene	nd	nd	nd	nd	nd	nd
77	1,4 – Dichlorobenzene	nd	nd	nd	nd	nd	nd
78	3,3'-Dichlorobenzidine	nd	nd	nd	nd	nd	nd
79	Diethyl Phthalate	nd	nd	nd	nd	nd	nd
80	Dimethyl Phthalate	nd	nd	nd	nd	nd	nd
81	Di-n-Butyl Phthalate	nd	nd	nd	nd	nd	nd
82	2,4 – Dinitrotoluene	nd	nd	nd	nd	nd	nd
83	2,6-Dinitrotoluene;	nd	nd	nd	nd	nd	nd
84	Di-n-Octyl Phthalate	nd	nd	nd	nd	nd	nd
85	1,2 – Diphenylhydrazine	nd	nd	nd	nd	nd	nd
86	Fluoranthene	nd	nd	nd	nd	nd	nd
87	Fluorene	nd	nd	nd	nd	nd	nd
88	Hexachlorobenzene	nd	nd	nd	nd	nd	nd
89	Hexachlorobutadiene	nd	nd	nd	nd	nd	nd
90	Hexachlorocyclopentadiene	nd	nd	nd	nd	nd	nd
91	Hexachloroethane	nd	nd	nd	nd	nd	nd
92	Ideno 1,2,3 (c,d) pyrene	nd	nd	nd	nd	nd	nd
93	Isophorone	nd	nd	nd	nd	nd	nd
94	Napthalene	nd	nd	nd	nd	nd	nd
95	Nitrobenzene	nd	nd	nd	nd	nd	nd
96	N-Nirosodimethylamine	nd	nd	nd	nd	nd	nd
97	N-Nitrosodi-n-Propylamaine	nd	nd	nd	nd	nd	nd
98	N-Nitrosodiphenylamine	nd	nd	nd	nd	nd	nd
99	Phenanthrene	nd	nd	nd	nd	nd	nd
100	Pyrene	nd	nd	nd	nd	nd	nd
101	1,2,4 – Trichlorobenzene	nd	nd	nd	nd	nd	nd
102	Aldrin	nd	nd	nd	nd	nd	nd
103	alpha-BHC	nd	nd	nd	nd	nd	nd
104	beta-BHC	nd	nd	nd	nd	nd	nd
105	gamma-BHC	nd	nd	nd	nd	nd	nd
106	delta-BHC (Lindane)	nd	nd	nd	nd	nd	nd
107	Chlordane	nd	nd	nd	nd	nd	nd

		Sampling Locations					
Number corresponding with Federal Register	Constituent	SYB	WAR	WAR dup	LVR	TUR	Landfill point
108	4,4'-DDT	nd	nd	nd	nd	nd	nd
109	4,4'-DDE	nd	nd	nd	nd	nd	nd
110	4,4'-DDD	nd	nd	nd	nd	nd	nd
111	Dieldrin	nd	nd	nd	nd	nd	nd
112	Alpha-Endosulfan	nd	nd	nd	nd	nd	nd
113	Beta-Endosulfan	nd	nd	nd	nd	nd	nd
114	Endosulfan Sulfate	nd	nd	nd	nd	nd	nd
115	Endrin	nd	nd	nd	nd	nd	nd
116	Endrin Aldehyde	nd	nd	nd	nd	nd	nd
117	Heptachlor	nd	nd	nd	nd	nd	nd
118	Heptachlor Epoxide	nd	nd	nd	nd	nd	nd
119-125	Polychlorinated Biphenyls (PCBs)	nd	nd	nd	nd	nd	nd
126	Toxaphene	nd	nd	nd	nd	nd	nd

Los Osos Creek, Priority Organics, June 5, 2001
Priority Organics in the **sediment**
Reported in **mg/kg** on an as received basis.
Unable to get a sediment sample from SYB because of the high water level and vegetated bank.

		Sampling Locations			
Number corresponding with Federal Register	Constituent	WAR	SYB	TUR	Landfill point
19	Benzene	nd	nd	nd	nd
20	Bromoform	nd	nd	nd	nd
21	Carbon Tetrachloride	nd	nd	nd	nd
22	Chlorobenzene	nd	nd	nd	nd
23	Chlorodibromomethane	nd	nd	nd	nd
24	Chloroethane	nd	nd	nd	nd
26	Chloroform	nd	nd	nd	nd
27	Dichlorobromomethane	nd	nd	nd	nd
28	1,1-Dichloroethane	nd	nd	nd	nd
29	1,2-Dichloroethane	nd	nd	nd	nd
30	1,1-Dichloroethylene	nd	nd	nd	nd
31	1,2-Dichloropropane	nd	nd	nd	nd
32	1,3-Dichloropropylene	nd	nd	nd	nd
33	Ethylbenzene	nd	nd	nd	nd
34	Methyl Bromide	nd	nd	nd	nd
35	Methyl Chloride	nd	**0.03**	nd	nd
36	Methylene Chloride	nd	nd	nd	nd
37	1,1,2,2 - Tetrachloroethane	nd	nd	nd	nd
38	Tetrachloroethylene (PCE)	nd	nd	nd	nd
39	Toluene	nd	nd	nd	nd
40	1,2-Trans-Dichoroethylene	nd	nd	nd	nd
41	1,1,1-Trichloroethane (1,1,1 TCA)	nd	nd	nd	nd
42	1,1,2-Trichloroethane (1,1,2 TCA)	nd	nd	nd	nd
43	Trichloroethylene (TCE)	nd	nd	nd	nd
44	Vinyl Chloride	nd	nd	nd	nd
45	2 - Chlorophenol	nd	nd	nd	nd
46	2,4 – Dichlorophenol	nd	nd	nd	nd
47	2,4 – Dimethylphenol	nd	nd	nd	nd
48	2-Methyl-4,6-Dinitrophenol	nd	nd	nd	nd
49	2,4 – Dinitrophenol	nd	nd	nd	nd
50	2-Nitrophenol	nd	nd	nd	nd
51	4-Nitrophenol	nd	nd	nd	nd
52	3-Methyl-4-Chlorophenol	nd	nd	nd	nd
53	Pentachlorophenol	nd	nd	nd	nd
54	Phenol	nd	nd	nd	nd
56	Acenaphthene	nd	nd	nd	nd
57	Acenaphthylene	nd	nd	nd	nd
58	Anthracene	nd	nd	nd	nd
59	Benzidine	nd	nd	nd	nd
60	Benzo(a)Anthracene	nd	nd	nd	nd

		Sampling Locations			
Number corresponding with Federal Register	Constituent	WAR	SYB	TUR	Landfill point
61	Benzo(a)Pyrene	nd	nd	nd	nd
62	Benzo(b)Fluoranthene	nd	nd	nd	nd
63	Benzo(ghi)Perylene	nd	nd	nd	nd
64	Benzo(k)fluoranthene	nd	nd	nd	nd
65	Bis(2-Chloroethoxy)Methane	nd	nd	nd	nd
66	Bis(2-Chloroethyl)Ether	nd	nd	nd	nd
68	Bis(2-Ethylhexyl)Phthalate	nd	nd	nd	nd
69	4-Bromophenyl Phenyl Ether	nd	nd	nd	nd
70	ButylbenzylPhthalate	nd	nd	nd	nd
71	2-Chloronaphthalene	nd	nd	nd	nd
72	4-Chlorophenyl Phenyl Ether	nd	nd	nd	nd
73	Chrysene	nd	nd	nd	nd
74	Dibenzo(a,h)Anthracene	nd	nd	nd	nd
75	1,2 - Dichlorobenzene	nd	nd	nd	nd
76	1,3 – Dichlorobenzene	nd	nd	nd	nd
77	1,4 – Dichlorobenzene	nd	nd	nd	nd
78	3,3'-Dichlorobenzidine	nd	nd	nd	nd
79	Diethyl Phthalate	nd	nd	nd	nd
80	Dimethyl Phthalate	nd	nd	nd	nd
81	Di-n-Butyl Phthalate	nd	nd	nd	nd
82	2,4 – Dinitrotoluene	nd	nd	nd	nd
83	2,6-Dinitrotoluene;	nd	nd	nd	nd
84	Di-n-Octyl Phthalate	nd	nd	nd	nd
85	1,2 – Diphenylhydrazine	nd	nd	nd	nd
86	Fluoranthene	nd	nd	nd	nd
87	Fluorene	nd	nd	nd	nd
88	Hexachlorobenzene	nd	nd	nd	nd
89	Hexachlorobutadiene	nd	nd	nd	nd
90	Hexachlorocyclopentadiene	nd	nd	nd	nd
91	Hexachloroethane	nd	nd	nd	nd
92	Ideno 1,2,3 (c,d) pyrene	nd	nd	nd	nd
93	Isophorone	nd	nd	nd	nd
94	Napthalene	nd	nd	nd	nd
95	Nitrobenzene	nd	nd	nd	nd
96	N-Nirosodimethylamine	nd	nd	nd	nd
97	N-Nitrosodi-n-Propylamaine	nd	nd	nd	nd
98	N-Nitrosodiphenylamine	nd	nd	nd	nd
99	Phenanthrene	nd	nd	nd	nd
100	Pyrene	nd	nd	nd	nd
101	1,2,4 – Trichlorobenzene	nd	nd	nd	nd
102	Aldrin	nd	nd	nd	nd
103	alpha-BHC	nd	nd	nd	nd
104	beta-BHC	nd	nd	nd	nd
105	gamma-BHC	nd	nd	nd	nd
106	delta-BHC (Lindane)	nd	nd	nd	nd
107	Chlordane	nd	nd	nd	nd

		Sampling Locations			
Number corresponding with Federal Register	Constituent	WAR	SYB	TUR	Landfill point
108	4,4'-DDT	nd	nd	nd	nd
109	4,4'-DDE	nd	nd	nd	nd
110	4,4'-DDD	nd	nd	nd	nd
111	Dieldrin	nd	nd	nd	nd
112	Alpha-Endosulfan	nd	nd	nd	nd
113	Beta-Endosulfan	nd	nd	nd	nd
114	Endosulfan Sulfate	nd	nd	nd	nd
115	Endrin	nd	nd	nd	nd
116	Endrin Aldehyde	nd	nd	nd	nd
117	Heptachlor	nd	nd	nd	nd
118	Heptachlor Epoxide	nd	nd	nd	nd
119-125	Polychlorinated Biphenyls (PCBs)	nd	nd	nd	nd
126	Toxaphene	nd	nd	nd	nd

Los Osos Creek, Priority Organics, June 5, 2001
Priority Organics in the water
Reported in **ug/L**

		Sampling Locations			
Number corresponding with Federal Register	Constituent	SYB	WAR	TUR	Landfill point
19	Benzene	nd	nd	nd	nd
20	Bromoform	nd	nd	nd	nd
21	Carbon Tetrachloride	nd	nd	nd	nd
22	Chlorobenzene	nd	nd	nd	nd
23	Chlorodibromomethane	nd	nd	nd	nd
24	Chloroethane	nd	nd	nd	nd
26	Chloroform	nd	nd	nd	nd
27	Dichlorobromomethane	nd	nd	nd	nd
28	1,1-Dichloroethane	nd	nd	nd	nd
29	1,2-Dichloroethane	nd	nd	nd	nd
30	1,1-Dichloroethylene	nd	nd	nd	nd
31	1,2-Dichloropropane	nd	nd	nd	nd
32	1,3-Dichloropropylene	nd	nd	nd	nd
33	Ethylbenzene	nd	nd	nd	nd
34	Methyl Bromide	nd	nd	nd	nd
35	Methyl Chloride	nd	nd	nd	nd
36	Methylene Chloride	nd	nd	nd	nd
37	1,1,2,2 - Tetrachloroethane	nd	nd	nd	nd
38	Tetrachloroethylene (PCE)	nd	nd	nd	nd
39	Toluene	nd	nd	nd	nd
40	1,2-Trans-Dichoroethylene	nd	nd	nd	nd
41	1,1,1-Trichloroethane (1,1,1 TCA)	nd	nd	nd	nd
42	1,1,2-Trichloroethane (1,1,2 TCA)	nd	nd	nd	nd
43	Trichloroethylene (TCE)	nd	nd	nd	nd
44	Vinyl Chloride	nd	nd	nd	nd
45	2 - Chlorophenol	nd	nd	nd	nd
46	2,4 – Dichlorophenol	nd	nd	nd	nd
47	2,4 – Dimethylphenol	nd	nd	nd	nd
48	2-Methyl-4,6-Dinitrophenol	nd	nd	nd	nd
49	2,4 – Dinitrophenol	nd	nd	nd	nd
50	2-Nitrophenol	nd	nd	nd	nd
51	4-Nitrophenol	nd	nd	nd	nd
52	3-Methyl-4-Chlorophenol	nd	nd	nd	nd
53	Pentachlorophenol	nd	nd	nd	nd
54	Phenol	nd	nd	nd	nd
56	Acenaphthene	nd	nd	nd	nd
57	Acenaphthylene	nd	nd	nd	nd
58	Anthracene	nd	nd	nd	nd
59	Benzidine	nd	nd	nd	nd
60	Benzo(a)Anthracene	nd	nd	nd	nd

		Sampling Locations			
Number corresponding with Federal Register	Constituent	SYB	WAR	TUR	Landfill point
61	Benzo(a)Pyrene	nd	nd	nd	nd
62	Benzo(b)Fluoranthene	nd	nd	nd	nd
63	Benzo(ghi)Perylene	nd	nd	nd	nd
64	Benzo(k)fluoranthene	nd	nd	nd	nd
65	Bis(2-Chloroethoxy)Methane	nd	nd	nd	nd
66	Bis(2-Chloroethyl)Ether	nd	nd	nd	nd
68	Bis(2-Ethylhexyl)Phthalate	nd	nd	nd	nd
69	4-Bromophenyl Phenyl Ether	nd	nd	nd	nd
70	ButylbenzylPhthalate	nd	nd	nd	nd
71	2-Chloronaphthalene	nd	nd	nd	nd
72	4-Chlorophenyl Phenyl Ether	nd	nd	nd	nd
73	Chrysene	nd	nd	nd	nd
74	Dibenzo(a,h)Anthracene	nd	nd	nd	nd
75	1,2 - Dichlorobenzene	nd	nd	nd	nd
76	1,3 – Dichlorobenzene	nd	nd	nd	nd
77	1,4 – Dichlorobenzene	nd	nd	nd	nd
78	3,3'-Dichlorobenzidine	nd	nd	nd	nd
79	Diethyl Phthalate	nd	nd	nd	nd
80	Dimethyl Phthalate	nd	nd	nd	nd
81	Di-n-Butyl Phthalate	nd	nd	nd	nd
82	2,4 – Dinitrotoluene	nd	nd	nd	nd
83	2,6-Dinitrotoluene;	nd	nd	nd	nd
84	Di-n-Octyl Phthalate	nd	nd	nd	nd
85	1,2 – Diphenylhydrazine	nd	nd	nd	nd
86	Fluoranthene	nd	nd	nd	nd
87	Fluorene	nd	nd	nd	nd
88	Hexachlorobenzene	nd	nd	nd	nd
89	Hexachlorobutadiene	nd	nd	nd	nd
90	Hexachlorocyclopentadiene	nd	nd	nd	nd
91	Hexachloroethane	nd	nd	nd	nd
92	Ideno 1,2,3 (c,d) pyrene	nd	nd	nd	nd
93	Isophorone	nd	nd	nd	nd
94	Napthalene	nd	nd	nd	nd
95	Nitrobenzene	nd	nd	nd	nd
96	N-Nirosodimethylamine	nd	nd	nd	nd
97	N-Nitrosodi-n-Propylamaine	nd	nd	nd	nd
98	N-Nitrosodiphenylamine	nd	nd	nd	nd
99	Phenanthrene	nd	nd	nd	nd
100	Pyrene	nd	nd	nd	nd
101	1,2,4 – Trichlorobenzene	nd	nd	nd	nd
102	Aldrin	nd	nd	nd	nd
103	alpha-BHC	nd	nd	nd	nd
104	beta-BHC	nd	nd	nd	nd
105	gamma-BHC	nd	nd	nd	nd
106	delta-BHC (Lindane)	nd	nd	nd	nd
107	Chlordane	nd	nd	nd	nd

			Sampling Locations		
Number corresponding with Federal Register	Constituent	SYB	WAR	TUR	Landfill point
108	4,4'-DDT	nd	nd	nd	nd
109	4,4'-DDE	nd	nd	nd	nd
110	4,4'-DDD	nd	nd	nd	nd
111	Dieldrin	nd	nd	nd	nd
112	Alpha-Endosulfan	nd	nd	nd	nd
113	Beta-Endosulfan	nd	nd	nd	nd
114	Endosulfan Sulfate	nd	nd	nd	nd
115	Endrin	nd	nd	nd	nd
116	Endrin Aldehyde	nd	nd	nd	nd
117	Heptachlor	nd	nd	nd	nd
118	Heptachlor Epoxide	nd	nd	nd	nd
119-125	Polychlorinated Biphenyls (PCBs)	nd	nd	nd	nd
126	Toxaphene	nd	nd	nd	nd

Appendix 3- Description of NOAA values

Explanation of NOAA Screening Values

PEL = The level above which adverse effects are frequently expected.
ERM = The median concentration of the toxic effects data set and the median of no effect data set.
AET = Represents concentration above which biological impacts would always be expected by the specific biological indicator due to exposure to the particular contaminant alone (toxic effects may also be observed below these levels).

Proposal to Delist

San Lorenzo River Lagoon

for Siltation

California Regional Water Quality Control Board
Central Coast Region

July 25, 2001

Table of Contents

Background

The San Lorenzo River Estuary and the San Lorenzo River have been listed for non-attainment of established water quality standards pertaining to sediment under Section 303(d) of the Clean Water Act. Three creeks within the San Lorenzo River Watershed have also been listed. These are Shingle Mill Creek, Lompico Creek and Carbonera Creek. Section 303(d) requires the State to establish the Total Maximum Daily Load (TMDL) for sediment at a level necessary to achieve/attain the water quality standard for sediment. Seasonal variations and a margin of safety that takes into account any lack of knowledge concerning the relationship between effluent limitations and water quality must be incorporated into the TMDL.

The following watershed characterization is from a State Water Resources Control Board draft staff report (SWRCB, 1982, pgs. 12-13):

"The San Lorenzo River drains an area of 138 square miles in northern Santa Cruz County. The river flows southward to empty into Monterey Bay at the City of Santa Cruz (Figure 1). Much of the watershed is rugged and forested as is typical of the Coast Range south of San Francisco.

"Elevations range from sea level to above 3,000 feet within the San Lorenzo River Watershed. The river drops from an elevation 2,900 feet to sea level in 22 miles, dropping the first 2,000 feet in only 3 miles. Most of the tributaries enter the river from the east where the drainage area is underlain with sedimentary rocks. Major tributaries from the east include Branciforte, Carbonera, Zayante, Newell and Bear Creeks. Boulder and Fall Creeks are the two major streams that drain the western portion of the watershed that is underlain by granitic rock.

"The climate of the watershed is affected by its proximity to the Pacific Ocean. Winters are cool and wet with an average annual rainfall of about 47 inches, ranging from about 30 inches in the City of Santa Cruz to 60 inches at the community of Boulder Creek. Summers are warm and dry although cooled at times by morning fog at the lower elevations. Eighty-two percent of the rainfall occurs in the period December through April.

"Highway 17 from Santa Cruz to San Jose follows the western border of the watershed. Highway 9 from Santa Cruz to Santa Clara generally follows the San Lorenzo River northward. Communities important to the watershed include Scotts Valley, Felton and Boulder Creek.

"Human use of the watershed followed a pattern similar to other areas of the Coast Range within 100 miles of San Francisco Bay. In the early 1800's, the coastal grasslands supported cattle that were a source of hides and tallow. During the 1860 to 1900 period, logging was a major activity. In 1864, 28 sawmills were operating in the Big Basin- San Lorenzo Valley (SCCPD, 1979, secondary reference). Although redwood and fir were the principal species sought as lumber, many areas were clear-cut so that other species of trees were cut and later burned in the process.

"Although some forest and brush areas were converted to agricultural land in the late 1800's and early 1900's, agriculture has not remained an important use in the watershed. Limestone supported an important industry for a time and there were a number of sand and gravel quarries.

"In the mid-1800's, the beach at Santa Cruz and the redwood forests became an important attraction for people from the San Francisco Bay area. Many second-home developments began in the period between 1900 and 1925. This use increased and many of the small communities were well established prior to 1940. In the 1950's the San Lorenzo River was considered a "well-developed resort and recreational area (Smith, 1958, secondary reference)." Much of the watershed, though, consisted of summer homes. In 1960, the vacancy rate for the watershed was 56 percent, while the population at the time was 10,946 (Ricker, 1976, secondary reference). In the 1960's many of the summer homes were converted to year- round residences. A number of major subdivisions were authorized and many residences were built for year-round occupancy. By 1976, many summer homes were converted to permanent residences, and the vacancy rate decreased to 21 percent, while the population rose to 30,538 (Ricker, 1976, secondary reference). Between 1960 and 1976, the number of housing units in the watershed increased from 8,982 to 14,131, a 57.3 percent increase (SCCPD, 1979, secondary reference). Most of the new development during this period was along the flat valley bottom along the streams and it was estimated that 14 percent of the homes in the watershed were within 100 feet of the San Lorenzo River or one of its tributaries (SCCPD, 1979, secondary reference)."

The following is from a Central Coast Regional Board Report (Jagger, 1993, pg.12-13):

"Coats (1982, secondary reference) asserted that land-use activities, including road and homesite construction, significantly increased the sediment yields in Zayante Creek and San Lorenzo River. Observations of Zayante and Lockhart Creeks by Coats (1982, secondary reference) showed that although the head and middle waters of these creeks had the same steep slopes and bedrock composition, the sediment yield was higher in the mid-basin regions, possibly because "land use has been more intense in mid-basin areas (Coats, 1982, secondary reference). Estimates on the extent of induced erosion ranged from two to four times the amount of natural erosion (SCCPD, 1979, secondary reference). The same source noted that 90 percent of landslides observed in the winter of 1978 were triggered by human disturbances. SWRCB (1982, secondary reference) stated that over 25 percent of the induced sedimentation of the San Lorenzo River was attributed to recent construction, with another 35 percent of the sedimentation blamed on erosion from unimproved paved roads. Coats (1982, secondary reference) stated that 80 percent of the induced erosion was from road construction. The County Resources Inventory Map (SCS, 1990, secondary reference) stated that impairment of Bean, Bear, Boulder, Kings, Lompico, Newell, and Zayante Creeks resulted directly from construction or development."

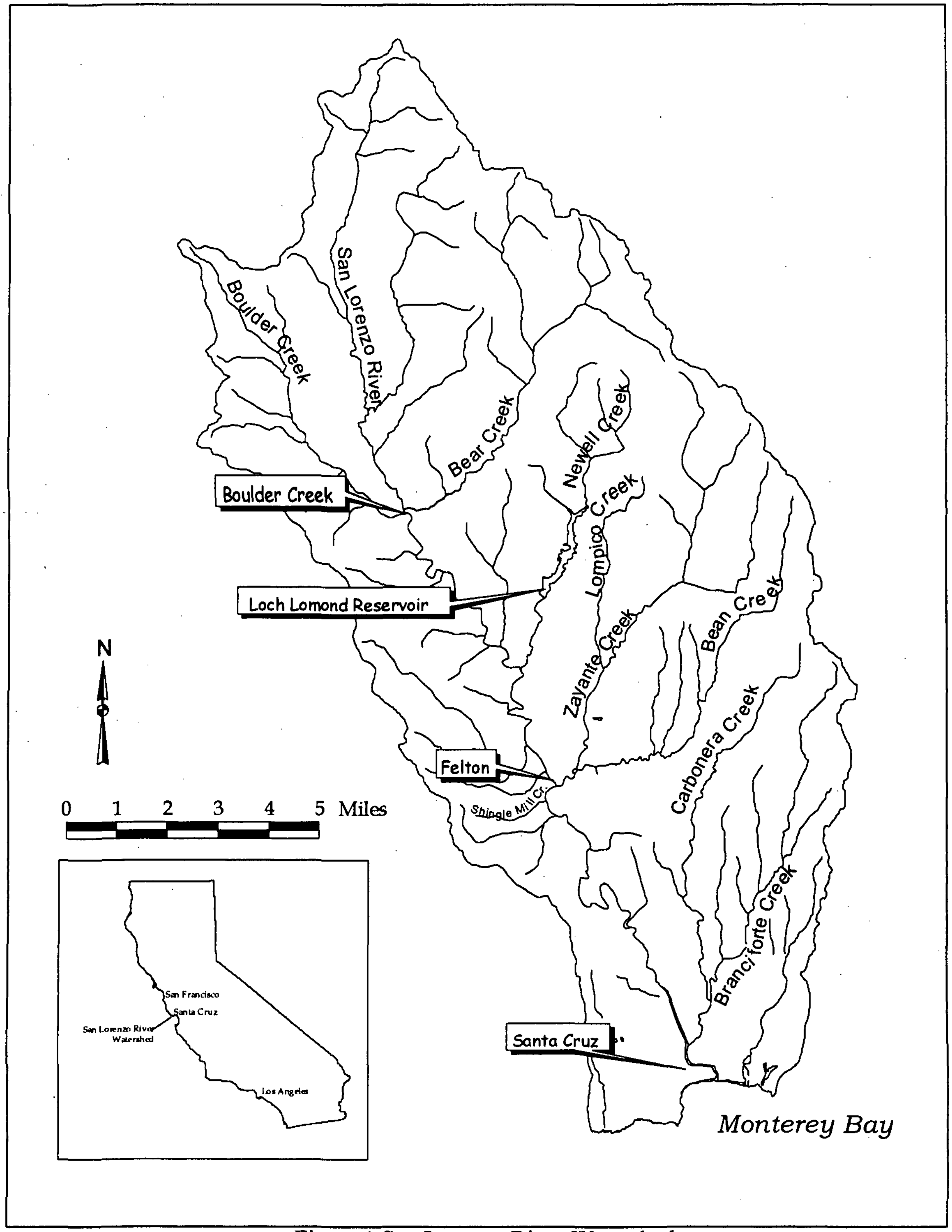

Figure 1 San Lorenzo River Watershed

Construction activity is not as prevalent today, in 2001, as it was in the 1970's and 1980's. County data indicates that construction activity peaked in the watershed in the 1970's and 1980's and has since decreased (Reference Figure 2 below). Therefore, construction has not been identified as a separate sediment source category. It is included in the Other Urban and Rural Lands sediment source category. Current construction trends are towards single home development on large parcels. The access roads associated with this type of development are proving to be problematic and are addressed within the appropriate Roads Sediment Category.

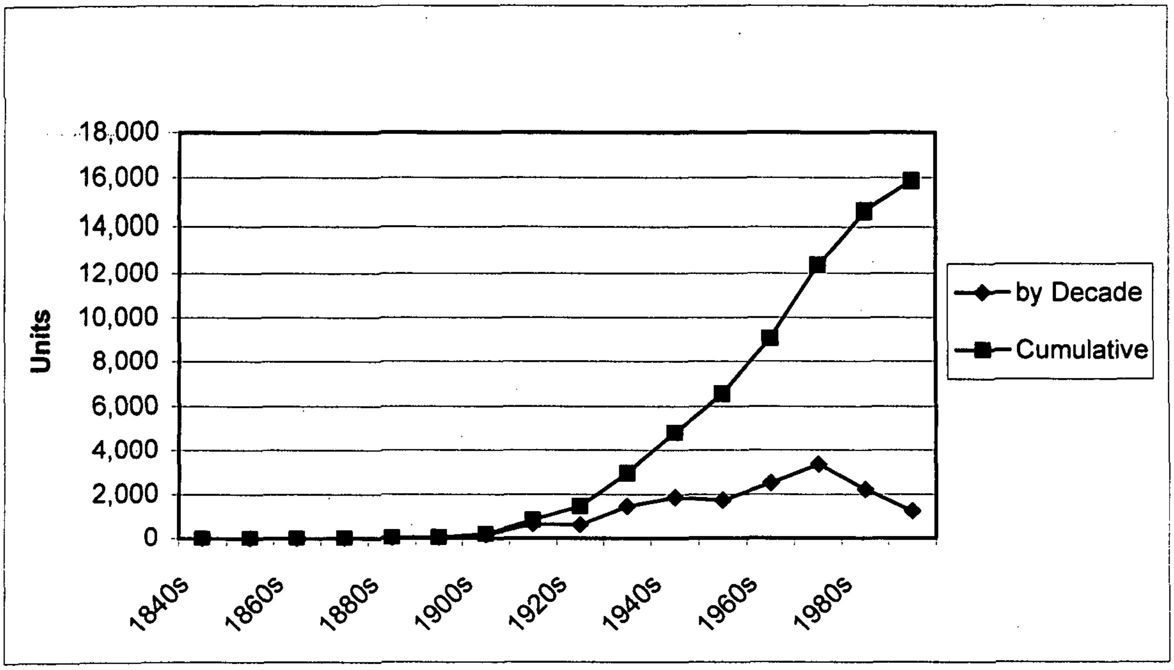

Figure 2 Construction Activity in San Lorenzo River Watershed

The dominant cause of disturbance remains the extensive road network (Hecht, 1998, pg. 37-38). Unpaved and poorly maintained roads that are used for year-round access continue to be the most persistent sources of bed sedimentation. Increasing use and disturbance of the roadway surfaces as well as inadequate roadway drainage appear to be the primary immediate sources. Numerous small-scale failures of cut and fill slopes and culvert blowouts also introduce much debris along roads. Sidecasting of storm debris during road maintenance contributes to stream sedimentation. Road drainage practices accelerate flow to and within headwater creeks induce considerable road-related erosion downstream from the right-of-way. The connection between road construction/maintenance and culvert blowouts and eroding banks downstream is often not perceived or appreciated.

Improved maintenance of existing roads is likely to prove one of the most effective means of reducing sedimentation and persistent turbidity in the San Lorenzo River Watershed. In this context, roads include those maintained by the County, State, road associations, and private owners (including those used for timber harvest and fire control).

Problem Statement

The waterbodies that have been listed for sediment in the San Lorenzo River Watershed are: the Main Stem of the San Lorenzo River, Carbonera Creek, Lompico Creek, Shingle Mill Creek and The San Lorenzo River Lagoon. The specific water quality objectives that apply wholly, or in part, to sediment are contained within the Central Coast Region's Water Quality Control Plan (Basin Plan) (Carpenter, 1994, pg. III-3) and are listed below:

Settleable solids: Waters shall not contain settleable material in concentrations that result in deposition of material that causes nuisance or adversely affects beneficial uses.

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

Turbidity: Waters shall be free of changes in turbidity that cause nuisance or adversely affect beneficial uses.

Increase in turbidity attributable to controllable water quality factors shall not exceed the following limits:

1. Where natural turbidity is between 0 and 50 Jackson Turbidity Units (JTU), increases shall not exceed 20 percent.

2. Where natural turbidity is between 50 and 100 JTU, increases shall not exceed 10 JTU.

3. Where natural turbidity is greater than 100 JTU, increases shall not exceed 10 percent.

Allowable zones of dilution within which higher concentrations will be tolerated will be defined for each discharge in discharge permits.

Beneficial Uses

Designated beneficial uses for the San Lorenzo Watershed are listed in Table 1. Those beneficial uses that may be impacted by excessive sediment and/or turbidity include:

1. Cold Fresh Water Habitat (COLD) - Uses of water that support cold water ecosystems including, but not limited to, preservation or enhancement of aquatic habitats, vegetation, fish or wildlife, including invertebrates.

2. Migration of Aquatic Organisms (MIGR) - Uses of water that support habitats necessary for migration or other temporary activities by aquatic organisms, such as anadromous fish.

3. Spawning, Reproduction, and/or Early Development (SPWN) - Uses of water that support high quality aquatic habitats suitable for reproduction and early development of fish.

4. Rare, Threatened, or Endangered Species (RARE) - Uses of water that support habitats necessary, at least in part, for the survival and successful maintenance of plant or animal species established under state or federal law as rare, threatened, or endangered.

5. Municipal and Domestic Supply (MUN) - Uses of water for community, military, or individual water supply systems including, but not limited to, drinking water supply. According to State Board Resolution No. 88-63, "Sources of Drinking Water Policy" all surface waters are considered suitable, or potentially suitable, for municipal or domestic water supply except where:

   a. TDS exceeds 3000 mg/l (5000 uS/cm electrical conductivity);
   b. Contamination exists, that cannot reasonably be treated for domestic use;
   c. The source is not sufficient to supply an average sustained yield of 200 gallons per day;
   d. The water is in collection or treatment systems of municipal or industrial wastewaters, process waters, mining wastewaters, or storm water runoff; and
   e. The water is in systems for conveying or holding agricultural drainage waters.

Table 1
Designated Beneficial Uses for Listed Waterbodies within the San Lorenzo Watershed

Waterbody Names	MUN	AGR	IND	GWR	REC1	REC2	WILD	COLD	MIGR	SPWN	BIOL	RARE	EST	FRESH	COMM	SHELL
San Lorenzo River Estuary					X	X	X	X	X	X	X	X	X		X	X
San Lorenzo River	X	X	X	X	X	X	X	X	X	X	X	X		X	X	
Carbonera Creek	X	X	X	X	X	X	X	X	X	X					X	
Lompico Creek	X	X		X	X	X	X	X	X	X					X	
Shingle Mill Creek	X			X	X	X	X	X	X	X					X	

Impacts to Beneficial Uses

Fisheries (COLD, MIGR, SPWN, RARE)

Anadromous fisheries are impacted by sediment within the San Lorenzo River Watershed. The San Lorenzo River and its three listed waterbodies, Carbonera Creek, Lompico Creek and Shingle Mill Creek have been identified as impaired by sediment due to impacts to beneficial uses associated with anadromous fisheries.

Dramatic decreases in coho salmon (from 5,000 in 1960 to <100 in 1980) and steelhead (from 20,000 in 1964 to 750 in 1980) populations within the San Lorenzo River and its tributaries have been attributed to the loss of suitable habitat for spawning, rearing and oversummering due to excessive sedimentation from the extensive road system, urban and suburban development and natural and man-induced landslides within the watershed. Current populations of steelhead remain at early 1980 levels, while no coho salmon were found during 1994-1997 monitoring efforts (Alley, 1998, pg. 10-11).

Decreases in fish populations have often been attributed to the loss of stream habitat resulting from excessive sedimentation (SCCPD, 1979, pg. 71). "The San Lorenzo River once held the distinction of having the largest steelhead fishery south of San Francisco (SCCPD, 1979, secondary reference). The Department of Public Health (1950-1951, secondary reference) said 'The San Lorenzo River System is vitally important to the fisheries of the State of California,' with 100 miles of streams supporting fishery habitats. However, the watershed has experienced severe drops in both silver *(coho)* salmon and steelhead trout counts. In 1964, the number of steelhead in the San Lorenzo River was estimated at 20,000 (SCCPD, 1979, secondary reference). In 1980, that figure dropped to 750 (SWRCB, 1982, secondary reference). The salmon counts are equally discouraging. In 1960, the total salmon run was 5,000, but dropped to less than 100 by 1980 (SWRCB, 1982, secondary reference). Local groups have been stocking the river since the 1950's with 10,000 to 50,000 juvenile steelhead and silver salmon. Silver salmon stocking was discontinued in 1983 (U.S. Army Corps of Engineers, 1989, secondary reference)" (Jagger, 1993, pg 1-2).

On August 18, 1997, the National Marine Fisheries Service published a final rule listing the Central California Coast and South/Central California Coast steelhead Evolutionary Significant Units (ESUs) as threatened species under the Endangered Species Act. Numeric targets have been selected that are protective of steelhead and coho salmon habitat that are critical for spawning, rearing and overwintering.

"In 1962, Hee described all of the tributaries in the watershed as having either rocky or gravelly bottoms, which are ideal for the spawning of steelhead and salmon, with only the San Lorenzo River itself having sandy conditions (Hee, 1962, secondary reference). Sedimentation has destroyed more than 50 percent of ideal streambed habitat for steelhead and salmon in the years up to 1979 (SCCPD, 1979, secondary reference)" (Jagger, 1993, pg. 14).

"The severe drop in fish counts indicates that the habitat in the San Lorenzo Watershed is no longer compatible with the needs of the native fish species. While other factors may also contribute to the drop in steelhead trout and silver salmon, several sources have discovered a direct correlation between siltation and survival rates of steelhead and coho salmon fry (Shapovalov and Taft, 1954, secondary reference; SCCPD, 1979, secondary reference). Hee (1962, secondary reference) and the Santa Cruz County Planning Department (1979, secondary reference) have produced adequate descriptions of the watershed over the last thirty years to verify the fact that siltation is occurring" (Jagger, 1993, pg. 16).

Sedimentation problems have been associated with increased human activities in the watershed. "Prior to 1968, available literature refers to the pristine quality of the river and its attractiveness to tourists. Since 1968, various reports have documented the general decline in the quality of the water within the San Lorenzo River and a concurrent decline in salmon and steelhead populations. Early studies indicate that the amount of sedimentation was a concern only in terms of quarry sluicing (Smith, 1958, secondary reference), and the turbidity of the water was measured only as it related to sewage outfall (Hee, 1962, secondary reference). Smith (1958, secondary reference) reported that sufficient scouring of streams in the watershed occurred during winter storms to offset the inflow of sediment from storm runoff. Leonard (1968, secondary reference) was the first to document a concern for the increased erosion caused by man's activities in the watershed. Sediment deposition has caused an increase in the amount of silt-covered bottom in the San Lorenzo River from 8 percent in 1966 to 65 percent in 1972 (SCCPD, 1979 analysis of Department of Fish and Game data, secondary reference). SCCPD (1979, secondary reference) analysis of USGS and county data revealed that, compared to expected natural rates, watershed streams have had very high rates of sediment transport. A 1990 study found that most tributaries of the watershed have been impacted by sediment from either development or unknown sources (SCS, 1990, secondary reference)" (Jagger, 1993, pg. 10).

The most recent study concerning sediment conditions in the San Lorenzo River was completed in July 1998 in support of the update of the 1979 San Lorenzo River Watershed Plan. The study findings are summarized below (Hecht, 1998, pg. 2):

"Stream conditions have not substantially improved since the 1979 Watershed Plan, despite the original plan's generally well-founded recommendations. The strongest comparative data are available for the Zayante and Bean Creek subwatersheds. In this portion of the watershed, the bed material is now composed of slightly finer bed material, with fewer clean spawning gravels or cobbles and boulders for summer rearing of young fish. The mineralogic composition of the bed sediment indicate that proportionately less bed sediment is originating from the upper portions of these watersheds, and more form the lower sandy portions. The upper areas are more typical of most areas of the watershed; this pattern suggests that existing measures may be helping slightly or at least inhibiting further sedimentation, although this should be regarded as an inference rather than a finding due to complicating factors. The lower portions of the two watersheds include large areas of urbanizing and eroding sandy soils, pointing to the need to address the unique challenges posed by these soils."

San Lorenzo River Lagoon

"The San Lorenzo River Lagoon comprises the reach from Monterey Bay at the Santa Cruz Boardwalk amusement park to the north of Water Street. Predominantly freshwater conditions occur upstream of Water Street while brackish water dominates the environment downstream of the pedestrian bridge. This estuarine zonation is reflected by the distribution of vegetation species on the channel bed and the lower levee and embankment slopes. In 1988, tule and cattail thrived in the brackish water conditions downstream of the pedestrian bridge, while freshwater species such as willow and alder were excluded and absent. Upstream of the brackish water zone, above Water Street, willow and alder grow on the channel bed.

"During winter months, the river mouth is opened by winter floods and the lower river is subject to tidal exchange to a high tide elevation of up to about 4.0 feet above mean sea level (msl). In the summer months, the combined effect of declining river flows and a build up of sand on the beach by summer wave conditions closes the river mouth with a sand bar. With the river mouth blocked, the lagoon fills up to elevations of 5.0 to 6.0, and occasionally up to 8.0 feet above mean sea level with freshwater supplied by inflows on the San Lorenzo River and Branciforte Creek. Because high lagoon levels have created flooding problems for the surrounding urban areas, the lagoon has often been artificially drained by breaching the sand bar with a bulldozer, or by had if the sand bar is narrow.

"... The lagoon is most productive when it is either entirely freshwater, as in the summer after the mouth has closed and freshwater inflows have displaced residual salt water, or when the water column is a well-mixed combination of salt and fresh water, typically in the winter months when the river mouth is open to tidal circulation. The lagoon habitat is not productive if it is static and stratified with a denser layer of salt water underlying a less-dense layer of fresh water. Stratification occurs either in the early summer months shortly after closure of the river mouth prior to conversion to freshwater, or when the lagoon has been artificially opened by breaching. When the lagoon is stratified and static, the bottom salt water layer acts as a solar collector which traps heat, raising water temperatures above levels where steelhead and their food (mostly aquatic species dependent on the environment of the lagoon bottom) can survive. In a prolonged stratified condition, steelhead are forced to the cool surface water where little food exists and where they become highly visible and easy prey for birds. Stratified conditions can also result in poor dissolved oxygen levels in bottom waters which degrade or destroy habitat for steelhead and their food.

"Breaching the sand bar to drain the lagoon in the summer months prolongs the stratified condition and damages the important steelhead habitat by introducing salt water and releasing freshwater. Breaching in the late summer months can be particularly severe because freshwater inflows to the lagoon decline, offering little chance to convert the lagoon to freshwater.

"During the summers of 1987 and 1988, a preliminary investigation of habitat changes was conducted. During this period, sand bar breaching was limited, and at times, the lagoon was allowed to fill up to 6.5 feet above msl. Without breaching, the summer lagoon converted to purely freshwater and provided good quality habitat. It extended upstream of Water Street with higher quality aquatic habitats from Water Street to the Ocean: adult steelhead were found in pools along San Lorenzo Park, juvenile steelhead found improved habitat throughout, and more vegetation along the lagoon fringes brought greater food productivity drawing greater numbers of waterfowl. When breaching was conducted several time in the summer of 1988, the water quality conditions declined and the fish population in the lagoon declined dramatically" (Philip Williams & Associates, et al, 1989).

The only written statement that was found that implicated sediment as the source of the temperature, dissolved oxygen and salinity problems in the lagoon were from an internal memo of the Department of Fish and Game (DFG) that assessed the coho salmon habitat in

San Mateo and Santa Cruz Counties. "Degradation of water quality in the lagoon from silt loading which creates shallow depths, and problems with DO, temperature and salinity" (Anderson and Nelson, 1996, pg. 15).

Although the Lagoon Management Plan and the DFG memo identify changes in temperature, dissolved oxygen and salinity as the physical properties affecting the fish habitat, they arrive at different conclusions on the causes of those changes. The Lagoon Management Plan builds a plausible case for the observed problems within the lagoon and decisions made within this TMDL are based on the management plan and not DFGs observations, which are generic in nature (Jennifer Nelson, 2001, personal communication).

The proposal to delist the San Lorenxo River (SLR) Lagoon is based on the fact that the original listing appears to have been based on generic data that was not truly indicative of the conditions in the SLR Lagoon. The City of Santa Cruz's 1989 study of the lower San Lorenzo River (Philip Williams & Associates, et al, 1989), which includes the Lagoon Management Plan, has established that problems within the lagoon are associated with the breaching of the sand bar that becomes established between the lagoon and Monterey Bay, and are not due to the delivery of sediment from upstream sources.

Based on the analysis provided in the Lagoon Management Plan, the lagoon is not significantly impacted by sediment delivered from upstream sources. Therefore, it is proposed remove the San Lorenzo Lagoon from the list of impaired waterbodies (303(d) list).

<u>Municipal Water Supply (MUN)</u>

The municipal water supply of the San Lorenzo Valley is dependent on the water quality of the San Lorenzo River and has been adversely affected by sediment. County residents rely on either the surface or ground waters of the San Lorenzo Watershed for their water needs. There are numerous surface water diversions within the San Lorenzo River Watershed that are used municipal water supply

During high flows, surface water diversions for municipal water supplies within the San Lorenzo River and its tributaries have experienced periods where they must be shut down due to excessive turbidity and sedimentation that overwhelm the filtering capacity of the intake facilities. This causes suppliers to rely on other sources at a time when available surface water is at its greatest quantity.

Currently, the impacts to municipal water supply are not clearly defined in terms of frequency and duration. There are no comprehensive records relating water supply operations to turbidity levels in the river and its tributaries. City of Santa Cruz personnel indicate that there may be a sliding scale on when intakes have be closed and can be opened depending on river and meteorological conditions. For example, if turbidity is at 10 NTUs and there is a threat of rain the City may decide to shut down the intake in anticipation of increasing turbidity in the river if it does rain. If a storm has passed, the City may elect to open the intake when turbidity is at 25 NTUs in anticipation of decreasing turbidity as flow decreases after the storm.

There is an impression that turbidity impacts are getting "worse". A complete review of the City's operations log for the water intake may shed some light on the trends in turbidity levels and how they affect the City's operations. Other issues that may affect the operations of the water supply system for the City is an aging plant with increasing demands for water and stiffer requirements for turbidity on the delivery side of the system. The stiffer turbidity requirements on the delivery side are associated with pathogens and disinfection requirements for drinking water.

Also, turbidity is not strictly a sediment problem, especially in a watershed that has logging activities in it. Organic matter may be a significant component in turbidity levels.

The implementation of the recommendations of this TMDL for sediment reduction will also improve turbidity, in the long run. There are no quick fixes and it is felt that decreases in sediment delivery to streams will occur over many years, so operational considerations will have to assume that turbidity will not be improved in the short-term.

It is recommended that turbidity be monitored and its sources be identified as part of the Implementation and Monitoring Plan. As the issue comes into focus, numeric targets and allocations will be put in place, if warranted.

Conclusions

The San Lorenzo River and its tributaries, Carbonera Creek, Lompico Creek and Shingle Mill Creek exceed narrative water quality objectives for settleable materials because beneficial uses associated with anadromous fisheries have been adversely impacted by sediment.

The main impacts from sediment are to anadromous fish habitat: spawning gravels, pools and riffles. Fine sediments in spawning gravels can affect the survival of eggs by limiting flow through the gravels, thereby reducing oxygen supply to the eggs and interfering with the removal of metabolic wastes. Fine sediment in spawning gravels can also affect survival of fry by inhibiting their emergence from the redd. Pools that are used for oversummering habitat may become filled with fine sediment, reducing their volume, which in turn affects their overall usefulness. Riffles act as a source of food for fish by providing habitat for benthic invertebrates (water insects that live on the river/stream bottom) on which the fish feed. Sediment can reduce or eliminate habitat for benthic invertebrates by partially or completely covering riffles.

The San Lorenzo River Lagoon is not impacted by sediment. Increased temperatures, decreased dissolved oxygen levels and increased salinity have been associated with the breaching of the sand bar at the mouth of the river during summer, which was a management technique used to alleviate flooding to areas adjacent to the lagoon. The sand bar forms during the summer due to wave action on the ocean side and decreased flows within the river. Because no direct impact to the lagoon from sediment could be identified, it is

Turbidity has been identified as a potential problem within the watershed. Specifically, municipal water supplies have had to temporarily close certain intakes due to periodic high turbidities. Most of the information surrounding the turbidity problems is anecdotal, with little specific data to establish the extent and magnitude of the impacts. Although it is recognized that turbidity does have an impact on the operation of some municipal water supplies, it is unclear what the operational parameters are that cause the closure of the intakes and the source of the turbidity has not been established. The City of Santa Cruz Public Works Department has installed a turbidimeter at the Tait Street intake in order to better define the turbidity problem. Turbidity monitoring throughout the watershed will be part of the implementation and monitoring phase of the TMDL in order to better define the impacts as well as the sources of the turbidity.

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San Luis Obispo Creek

Priority Organics Listing-

Problem Statement and Clarification of Listing

July 25, 2001

Table of Contents

1. Introduction

A Total Maximum Daily Load (TMDL) is required for waters listed as impaired pursuant to Section 303(d) of the Clean Water Act. The 303(d) list identifies water bodies or segments that do not meet water quality objectives, or are not expected to meet water quality objectives after technology-based effluent limitations are applied.

San Luis Obispo Creek was placed on the 303(d) list in 1998 for 'Priority Organics.' This document is a Problem Statement and clarification of the listing, resulting in a listing of 'Polychlorinated Biphenyl (PCB).'

Data from 1990 and 1991 indicated elevated levels of hexachlorocyclohexane (HCH), chlordane, and PCB, which prompted the listing of priority organics. Staff have since revisited this data, and have determined that portions of it cannot be used as listing criteria. Furthermore, staff have since conducted monitoring in San Luis Obispo Creek and have determined water quality objectives are being met for HCH and chlordane.

Physical Setting

The San Luis Obispo Creek Watershed (Watershed) is located on the Central Coast of California, approximately 240 miles south of San Francisco and 200 miles north of Los Angeles. The Watershed encompasses 84.2 square miles (53,905 acres) and includes the intersection of three valleys. These valleys are Los Osos, Chorro, and Edna Valleys, and portions of the mountains that define them. The mountain ranges defining the Watershed are the Santa Lucia Mountains (eastern boundary of the Watershed), the Irish Hills (western boundary of the Watershed), and the Morros (separating Los Osos Valley and Chorro Valley). San Luis Obispo Creek (Creek) and its tributaries arise in the uplands of these mountains (up to 2,200-ft. elevation) and traverse portions of their respective valleys before emptying at San Luis Obispo Bay at Avila into the Pacific Ocean. The drainage pattern of the creeks in the Watershed is dendritic, with the Creek being the main watercourse for the Watershed. The main stem of the Creek is approximately 18 miles in length. The eleven major tributaries are:

- Brizziolari Creek
- Davenport Creek
- East Branch San Luis Obispo Creek
- Froom Creek
- Old Garden Creek
- Prefumo Creek
- Reservoir Canyon Creek
- San Miguelito Creek
- Squire Canyon Creek
- Stenner Creek
- Sycamore Creek

The Creek and its tributaries flow through various land uses, including: chaparral, oak woodlands, grassland and low-intensity rangeland, intensive animal feeding areas, irrigated cropland, vineyards and orchards, rural residential areas, and urban (residential and commercial) uses. Urban land uses are concentrated within the city limits of San Luis Obispo and on the campus of California Polytechnic State University, San Luis Obispo. Agricultural and rural land uses occur in the areas surrounding the City and on the Cal Poly campus. Irrigated agriculture tends to be concentrated in the flatter bottomlands. The steeper slopes tend to be either relatively undisturbed chaparral and woodland, or used as non-irrigated, low-intensity rangeland. Figure-1 below illustrates the location and pattern of San Luis Obispo Creek Watershed.

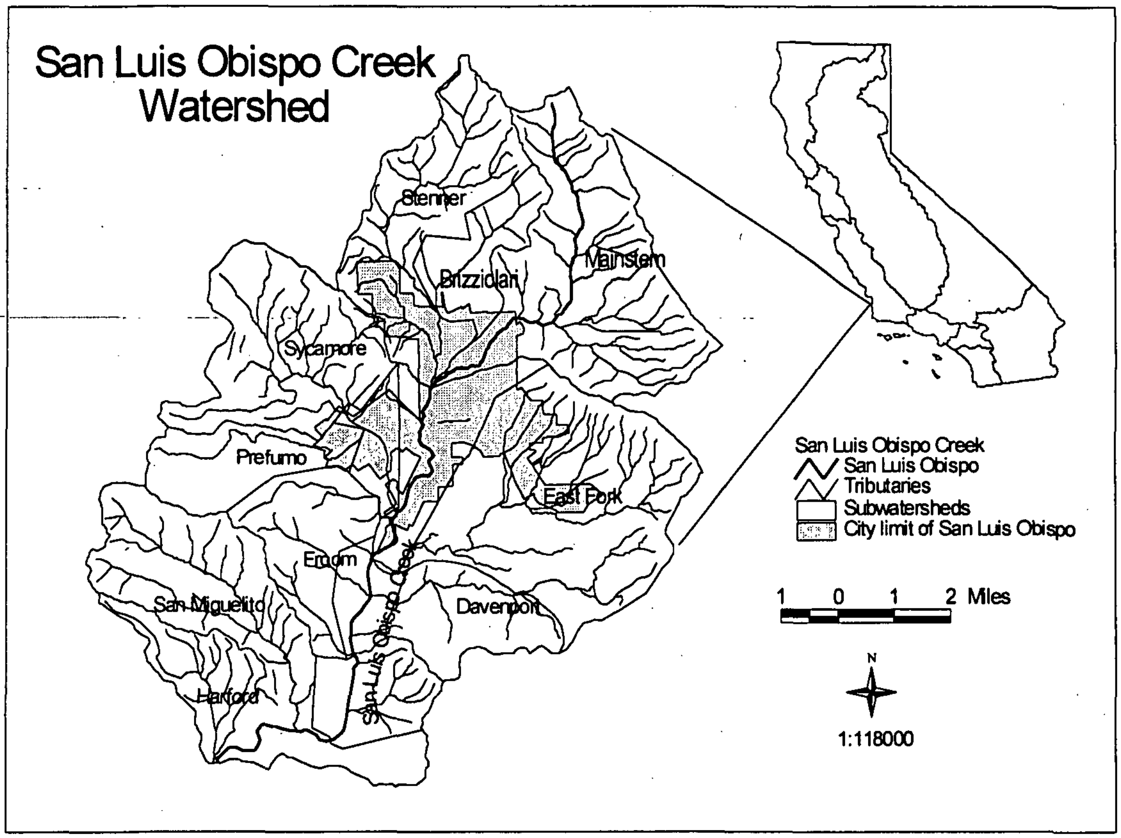

Figure-1. San Luis Obispo Creek Watershed

Beneficial Uses

The *Water Quality Control Plan Central Coast Basin – Region 3* (Basin Plan) adopted by the Regional Board and the State Water Resources Control Board (SWRCB) identifies the following beneficial uses for the waters of San Luis Obispo Creek and its tributaries:

- Municipal and Domestic Water Supply (MUN)
- Agricultural Supply (AGR)
- Ground Water Recharge (GWR)
- Water Contact Recreation (REC-1)

- Non-Contact Water Recreation (REC-2)
- Wildlife Habitat (WILD)
- Cold Freshwater Habitat (COLD)
- Warm Freshwater Habitat (WARM)
- Migration of Aquatic Organisms (MIGR)
- Spawning, Reproduction, and/or Early Developments (SPWN)
- Rare, Threatened, or Endangered Species (RARE)
- Freshwater Replenishment (FRSH)
- Commercial and Sport Fishing (COMM)

Of the identified beneficial uses, Central Coast Regional Water Quality Control Board staff (staff) have determined that Municipal and Domestic Water Supply (MUN), and Cold Freshwater Habitat (COLD) are the most sensitive to the effects of the organic constituents addressed in this document.

2. Problem Statement

a) Constituents of Concern

San Luis Obispo Creek was listed for priority organics because two tissue samples collected in 1990-1991 carried elevated levels of chlordane, HCH, and PCB. The following is a short discussion of each of these constituents. The discussion is provided to help build an understanding as to why chlordane and HCH no longer pose a risk to water quality in the Creek.

Chlordane was widely used in the United States from 1947 to 1988. The primary use of chlordane was for termite control, but was also used to protect crops from other soil-living pests. The toxicity of chlordane needs further research. However, EPA reports human short-term health effects to the central nervous system, and long-term effects of cancers to various parts of the body.[1] Chlordane bioaccumulates in aquatic organisms, and is considered highly toxic to them, as well as birds. Chlordane tends to adsorb to soil particles; its environmental fate is unclear, but through time can slowly leach into groundwater. EPA banned the use of chlordane on crops in 1978, and all commercial and domestic use in 1988.

PCB's began being used in the 1930's as a synthetic insulator in transformers. The product allowed the electrical engineer to place the transformer anywhere he/she wished because PCB's are fire-resistant. The uses of PCB's soon expanded to other industries where fire-retardant insulation was necessary. The manufacture of PCB's ceased in the late 1970's, but a large number of electrical units containing PCB's remained in operation, many of which were not labeled as containing the compound. Consequently, release of PCB's into the environment continued after the ban on manufacture. US EPA estimates that releases to the environment totaled 74,000 pounds between 1987 and 1993,

[1] http://www.epa.gov/safewater/dwh/c-soc/chlordan.html

with the bulk of the release occurring in 1990 in California.[2] Current releases are due mainly to cycling between soil and air. The health effects of PCB's include skin ailments, reproductive disorders, and liver disease. Furthermore, they are known to be carcinogenic to animals, and suspected to be to humans. PCB solubility in water diminishes through time, but is stored in the fatty tissues of animals and humans, and can bioaccumulate in food webs. Biodegradability is slow, they adsorb to soil particles, and persist in the environment.

HCH began being used as an insecticide on fruits and vegetables in the 1940's. There are several isomers of HCH (alpha, beta, delta, gamma), but only gamma-HCH is an effective insecticide. Consequently, products largely containing the gamma-HCH isomer were manufactured, marketed as Lindane, and became a primary source to the environment. HCH is still used by humans today (as Lindane) as a topical treatment to control lice, fleas, and scabies. HCH has not been manufactured in the U.S. since 1983, but is still imported. Exposure to HCH can cause blood disorders, dizziness, headaches, and seizures. Laboratory rodents exposed to prolonged high levels of HCH developed cancers, and HCH is therefore suspected of being a carcinogen to humans. HCH isomers can be present in vapor, attached to soil, or attached to dust particles. It is biodegraded by algae, fungi, and bacteria, and is broken down in water quickly; lindane breaks down in about a month.[3] HCH bioaccumulates in the fatty tissues of fish.

Listing Rationale

Staff collected samples from the Creek in 1991and 1990 through the State Mussel Watch and Toxic Substance Monitoring programs, respectively. Two of the tissue samples collected had elevated levels of chlordane, HCH, and PCB. Elevated levels of these constituents provided a basis for the listing of the Creek as impaired due to priority organics. However, priority organics, as outlined by US EPA, includes a suite of over 200 organic constituents, only three of which (i.e., chlordane, HCH, and PCB) were found in elevated concentrations in the Creek.

Tissue from a freshwater clam collected on February 26, 1991 contained PCB and chlordane at levels exceeding the Maximum Tissue Residue Level (MTRL) for those constituents. Tissue from a goldfish collected on July 25, 1990 contained PCB and HCH levels exceeding the 85^{th} percentile of Elevated Data Levels (EDL) established for that data period. A short description of these criteria is necessary for context.

MTRLs are concentrations developed by State Water Resources Control Board staff to protect against consumption of fish and shellfish that contain substances potentially harmful to humans. The MTRL concentrations were calculated using existing water quality objectives and are "used as alert levels or guidelines indicating water bodies with potential human health concerns and are an assessment tool and not compliance or enforcement criteria."[5] The units for MTRLs are expressed as mass of pollutant per mass of tissue, e.g. μg/kg.

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[2] http://www.epa.gov/safewater/dwh/c-soc/pcbs.html
[3] http://www.atsdr.cdc.gov/tfacts43.html

EDLs are a comparative tool developed by SWRCB staff to rank concentrations for a particular substance (pollutant) in a particular sample between other samples for the same substance. The EDL is obtained by producing a cumulative distribution of all the concentrations from various samples of a particular substance for a determined period of time. A sample having a particular concentration ranking in the 85th percentile implies that 85 percent of the samples analyzed for that substance showed equal or lower concentrations. The measure is used for internal comparative analysis only, "they (EDLs) do not assess adverse impacts, nor do they necessarily represent concentrations that may be damaging to the mussels, clams, or to a human consuming these species."[4]

Table-1 lists the data point with constituents that exceeded the MTRL. Table-2 lists the data point with constituents that exceeded the EDL-85 level.

Table-1. Data exceeding MTRL.

Constituent	Date Sampled	Organism	Concentration (μg/L)	1987-1993 MTRL (μg/L)[a]	1995-1997 MTRL (μg/L)[b]
Total Chlordane	02/26/91	freshwater clam	17.5	1.2	8.3
Total PCB	02/26/91	freshwater clam	14.1	2.2	5.3

a. Numeric criteria for 1991 data point.[3]
b. Recent numeric criteria based on CTR values.[4]

Table-2. Data exceeding EDL-85

Constituent	Date Sampled	Organism	Concentration (μg/L)	EDL-85th Percentile[a]	EDL-95th Percentile[b]
Total HCH	07/25/90	goldfish	106.8	60.0	682.7
Total PCB	07/25/90	goldfish	9638.1	8521.3	40500.0

a. See Footnote 4 below.
b. See Footnote 4 below.

Note that Table-1 lists two exceedences of MTRL limits. The first is for chlordane, the second is for PCB. Table-2 lists two exceedences for the EDL-85th percentile. The first is for HCH, and the second is for PCB. Neither of the exceedences approached the EDL-95th percentile.

The listing rational for San Luis Obispo Creek for priority organics was based solely on these two data points and their exceedence of MTRL and EDL values.

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[4] State Water Resources Control Board-California Environmental Protection Agency. State Mussel Watch Program 1987-1993 Data Report. March 1995.

[5] State Water Resources Control Board-California Environmental Protection Agency. State Mussel Watch Program 1995-1997 Data Report. September 2000.

Current Data

Staff conducted an assessment in April 2001 for the organics contained in EPA method 508 analysis, which includes chlordane, HCH, and PCB, as well as seventeen other organic constituents. Water column samples were collected from nine sites as illustrated in Figure-2 below. The 1990 and 1991 sampling points from the State Mussel Watch and Toxic Substance Monitoring Programs are also listed.

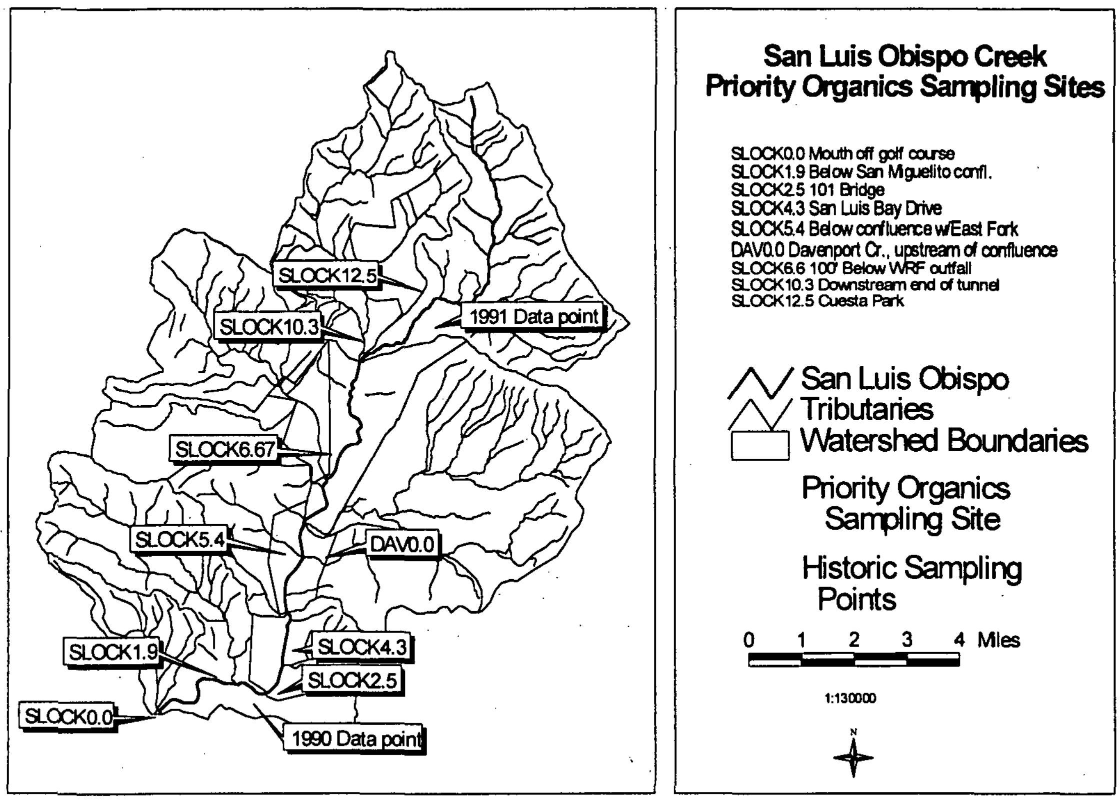

Figure-2. Map showing priority organics sampling sites during April 2001 assessment.

The Central Coast Ambient Monitoring Program (CCAMP) conducted sampling in the Creek in September 1999. CCAMP collected fish tissue for analysis of several constituents, including chlordane, HCH, and PCB. Tissue from twenty fish were collected from the site listed as SLOCK0.0 in Figure-2, combined into one sample, and analyzed for various constituents.

Table-3 below lists the results from the April 2001 sampling. Table-4 below lists the detection limit for the data in Table-3, as well as numeric objectives that apply.

Table 3. Data from April 2001 monitoring.

SITE	DATE	Matrix	ALPHA-BHC[a] µg/L	BETA-BHC µg/L	DELTA-BHC µg/L	GAMMA-BHC µg/L	CHLORDANE µg/L	TOTAL-PCB µg/L
DAV0.0	04/27/01	aqueous	ND[b]	ND	ND	ND	ND	ND
SLOCK0.0	04/06/01	aqueous	ND	ND	ND	ND	ND	ND
SLOCK0.0	04/20/01	aqueous	ND	ND	ND	ND	ND	ND
SLOCK1.9	04/06/01	aqueous	ND	ND	ND	ND	ND	ND
SLOCK1.9	04/20/01	aqueous	ND	ND	ND	ND	ND	ND
SLOCK2.5	04/06/01	aqueous	ND	ND	ND	ND	ND	ND
SLOCK2.5	04/20/01	aqueous	ND	ND	ND	ND	ND	ND
SLOCK4.3	04/06/01	aqueous	ND	ND	ND	ND	ND	ND
SLOCK4.3	04/20/01	aqueous	ND	ND	ND	ND	ND	ND
SLOCK5.4	04/06/01	aqueous	ND	ND	ND	ND	ND	ND
SLOCK5.4	04/20/01	aqueous	ND	ND	ND	ND	ND	ND
SLOCK6.67	04/06/01	aqueous	ND	ND	ND	ND	ND	ND
SLOCK6.67	04/20/01	aqueous	ND	ND	ND	ND	ND	ND
SLOCK10.3	04/06/01	aqueous	ND	ND	ND	ND	ND	ND
SLOCK10.3	04/20/01	aqueous	ND	ND	ND	ND	ND	ND
SLOCK12.5	04/06/01	aqueous	ND	ND	ND	ND	ND	ND
SLOCK12.5	04/20/01	aqueous	ND	ND	ND	ND	ND	ND

a. BHC is equivalent to HCH
b. ND implies not detected; this detection limit is quantified in the Table-4 below.

Table 4. Detection limits and numeric objectives for water by constituent.

CONSTITUENT	BC LAB DETECTION LIMIT (µg/L)	BASIN PLAN OBJECTIVE (µg/L)	CTR-FRSHWTR AQUATIC[b] (µg/L)	CTR MUN[c] (µg/L)
ALPHA-BHC	0.0025	none	none	0.0039
BETA-BHC	0.0025	none	none	0.014
DELTA-BHC	0.0025	none	none	NONE
GAMMA-BHC	0.0025	4.0[a]	0.95	0.019
CHLORDANE	0.05	0.1	2.4	0.00057
TOTAL PCB	0.1	0.3	none	0.00017

a. Basic plan objective for Lindane, which active ingredient is gamma-BHC.
b. California Toxics Rule (CTR) maximum concentration to protect freshwater aquatic organisms.
c. CTR concentration for 10^{-6} human risk of carcinogens for consumption of water or aquatic organisms.

The matrix of the data collected by CCAMP staff was fish tissue. Therefore the results of this data are gauged not by water quality objectives (as outlined in Table-4), but by tissue objectives listed as MTRLs. Table-5 below lists the results of the CCAMP sampling, as well as the numeric objectives that apply.

Table-5. 1999 CCAMP tissue data from San Luis Obispo Creek.

CONSTITUENT	MATRIX	CONCENTRATOIN (µg/Kg)	1995-1997 MTRL[a] (µg/L)
ALPHA-HCH	tissue	<1.0[b]	1.7
BETA-HCH	tissue	<2.0	6.0
DELTA-HCH	tissue	<2.0	none
GAMMA-HCH	tissue	<1.0	8.2
CHLORDANE	tissue	2.0	8.3
TOTAL PCB	tissue	56.0	5.3

a. MTRLs are derived from California Toxic Rule water quality objectives.
b. An "<" indicates levels are at or below non-detection concentration.

HCH Results

Water quality objectives, as well as tissue residue objectives, for HCH are being met. Notice from Table-3 that the concentration of all species of HCH (listed as BHC) is non-detectable. The detection limit of the laboratory is lower than all the water quality objectives outlined in Table-4. Furthermore, the CCAMP tissue data (Table-5) show non-detect values that are lower than the MTRL objectives. Therefore, the water quality objectives outlined in the Basin Plan and CTR, as well as the objectives of the MTRL are met.

Chlordane Results

Chlordane concentrations in water samples are non-detectable, and fall below the MTRL objective. Table-3 and Table-4 illustrate that levels of chlordane are lower than the water quality objectives outlined in the Basin Plan, as well as the CTR objective for freshwater aquatic. However, the detection limit for chlordane is greater than the CTR MUN numeric objective. The actual concentration of chlordane in each sample could be lower than the CTR objective, including zero, but simply cannot be quantified below the laboratory detection limit. This uncertainty of the actual chlordane concentration is addressed in section "d" below. However, CCAMP data (Table-5) indicate levels of chlordane below the MTRL objective, and the MTRL objective is derived from CTR water quality objectives. Therefore, it can safely be stated that both water quality and tissue residue level objectives for chlordane are met.

PCB Results

The levels of PCB found in water samples collected in April 2001 are non-detectable, and like chlordane, the detection limit is less than the Basin Plan objective, but greater than the CTR objective. However, unlike chlordane, PCB concentrations in fish tissue collected by CCAMP (Table-5) are greater than the MTRL objective that is based on CTR. Therefore, the Basin Plan objective for PCB is met, but the CTR objective is not.

Discussion of Non-Detection Limits

The problem arises in that the laboratory reports non-detect for all constituents for all data points for the water quality samples collected in April 2001. However, the detection limit for chlordane and PCB is higher than the CTR objective for MUN. Therefore, the actual concentration of chlordane and PCB may or may not be lower than the CTR objective.

The CTR objectives for chlordane and PCB are based on laboratory experiments using rodents fed varying amounts of the pollutants. The amount of pollutant triggering a cancer is noted, then this amount is extrapolated to humans using an average adult human weight (70 kg) and average amount of water consumed each day (2 liters). The resulting numeric target (concentration of pollutant in water) is based on a 10^{-6} risk of a human contracting a cancer from the pollutant. In other words, the risk of an adult weighing 70 kg contracting a cancer, after drinking two liters of creek water each day contaminated at the specified numeric objective, is 1/1,000,000.

Note that the resulting numeric objective established does not address whether or not the concentration can be measured. On the contrary, a detection limit in the magnitude of parts per trillion would be necessary to meet the objective. Consider the following:

1. At this time, no conventional environmental laboratory is able to detect these pollutants at a level of parts per trillion.[6]
2. The laboratory detection limits listed in Table-4 are more sensitive than the standards outlined by the SWRCB that were established to implement the CTR.[7] SWRCB mandates a laboratory have a maximum detect limit of 0.1 mg/L for chlordane, and 0.5 mg/L for PCB. The laboratory used by staff to analyze data collected in April 2001 has detection levels of 0.05 μg/L for chlordane and 0.1 μg/L for PCB. These detect levels are well within the state approved standards designed to comply with CTR.

3. Listing Clarification

Staff proposes to clarify the listing for San Luis Obispo Creek from its present listing of priority organics, to Polychlorinated biphenyl (PCB). This clarification, in effect, de-lists for HCH and chlordane and re-establishes the listing for PCB. This clarification is warranted for the following reasons.

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6 Buttran, Steward. BC Laboratory of Bakersfield (Organics Supervisor). July 2001. Personal Communication.

7 State Water Resources Control Board, California Environmental Protection Agency. Policy for Implementation of Toxics Standards for Inland Surface Waters, Enclosed Bays, and Estuaries of California. 2000.

b) HCH

Exceedence of an EDL for hexachlorocyclohexane was used as a basis for listing. However, since the listing, a determination has been made that EDLs cannot be used as listing rationale. Consider the following.

Staff considered de-listing factors identified in the 1998 Clean Water Act Section 303(d) Listing Guidelines for California, for adding or removing waterways from the 303(d) list (Ad Hoc Workgroup, 1997). These guidelines were developed by a workgroup of regional board, state board, and US EPA Region 9 staff and indicate that water bodies may be de-listed for specific pollutants or stressors if any one of six factors is met. These guidelines were considered by the Central Coast Regional Board, State Water Resources Control Board, and US EPA Region 9 during the public and administrative review and approval of the State's 303(d) List of Impaired Waters in 1998. The six de-listing factors are:

a. Objectives are revised, and the exceedence is thereby eliminated.
b. A beneficial use is de-designated after US EPA approval of a Use Attainability Analysis, and the non-support issue is thereby eliminated.
c. Faulty data led to the initial listing. Faulty data include, but are not limited to typographical errors, improper quality assurance/quality control (QA/QC) procedures, or Toxic Substances Monitoring/State Mussel Watch EDLs that are not confirmed by risk assessment for human consumption.
d. It has been documented that the objectives are being met and beneficial uses are not impaired based on "Monitored Assessment" criteria.
e. A TMDL has been approved by the US EPA.
f. There are control measures in place which will result in protection of beneficial uses. Control measures include permits, cleanup and abatement orders, and watershed management plans that are enforceable and include a time schedule.

Note that the data prompting the listing for HCH was from Toxic Substances Monitoring for which an EDL was exceeded. Factor-c above specifically eliminates the using EDLs that are not confirmed by risk assessment. In addition, recall that "they (EDLs) do not assess adverse impacts, nor do they necessarily represent concentrations that may be damaging to the mussels, clams, or to a human consuming these species."[4] Therefore, the 1990 data point showing an exceedence of EDL-85 for HCH is considered faulty data, and should not be used as a rationale for listing.

The HCH concentration was reported as non-detect for all data points, and meets Basin Plan, CTR, and MTRL objectives. Therefore, objectives are met, beneficial uses are not impaired by HCH.

Chlordane

Results from data obtained in April 2001 show that levels of chlordane are at or below laboratory non-detection limits. The non-detect limits of the state-approved laboratory used to analyze the recent data are more sensitive (lower) than the standards set forth by the SWRCB.

Chlordane meets the MTRL objective, which is derived from the CTR-MUN objective. This, in effect, substantiates that neither tissue nor water quality objectives for chlordane are exceeded. Beneficial uses are therefore protected, and factor-d above has been satisfied.

PCB

Results from CCAMP monitoring indicate that the numeric objective of the MTRL for PCB in fish tissue is exceeded. However, results from water quality monitoring in April 2001 indicate PCB levels are non-detectable at detect levels approved by the state to meet CTR objectives. This inconsistency is indicative of how PCB behaves in the environment insofar its solubility in water diminishes over time, while it bioaccumulates in animals. For this reason, a clarification of the listing to PCB is necessary as well as warranted.