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**CALLEGUAS CREEK WATERSHED  
MANAGEMENT PLAN**

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**Calleguas Creek Watershed  
OC Pesticides and PCBs TMDL**

**Agricultural Source Identification  
Work Plan**

*submitted to:*

LOS ANGELES REGIONAL WATER QUALITY CONTROL BOARD

*prepared by:*

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## Introduction

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The *Total Maximum Daily Load for Organochlorine Pesticides, Polychlorinated Biphenyls, and Siltation in Calleguas Creek, Its Tributaries, and Mugu Lagoon (TMDL)* was adopted by the Los Angeles Regional Water Quality Control Board (RWQCB) on July 7, 2005 and became effective on March 24, 2006. The TMDL was developed to address impairments to Calleguas Creek and its tributaries caused by organochlorine (OC) pesticides and Polychlorinated Biphenyls (PCBs) in water, sediment, and fish tissue. OC pesticides and PCBs are often called historic or legacy pollutants, since concentrations of these chemicals persist in the environment despite enactment of regulations to restrict and/or prohibit their use. The TMDL was adopted to address the continued impairment of waterbodies due to the persistence of OC pesticides in the environment, despite the fact that many of these pesticides have not been used in more than 20 years.

The OCs TMDL Basin Plan Amendment (BPA) contained requirements to develop source identification work plans. The following Work Plan was developed to address Implementation Plan Task #6 as required in the BPA:

Submit a workplan for approval by the Executive Officer to identify agricultural sources of organochlorine pesticides and polychlorinated biphenyls and implement a collection and disposal program for organochlorine pesticides and polychlorinated biphenyls.

The specific constituents addressed in this Source ID Work Plan are the constituents for which allocations are included in the TMDL as shown below:

- Chlordane – alpha, gamma
- Dieldrin
- DDT: 4,4'-DDD, 4,4'-DDE, 4,4'-DDT
- Toxaphene

This Work Plan will focus on OC pesticides, as PCBs are not typically found in agricultural areas. Should review of PCB spill databases under the Urban Source Identification Work Plan identify sites in agricultural areas, this information will be considered as part of this study.

The goal of the Work Plan is to conduct a source identification that will supplement the TMDL and agricultural monitoring program to provide the level of detail necessary to implement control measures within the CCW. The source analysis for the TMDL contained a significant amount of information on sources to the watershed. This Work Plan will build upon the TMDL source analysis and gather the information necessary to identify specific sources within agricultural areas that may be subject to control. As such, the Work Plan provides a process for identifying agricultural sources in the CCW, prioritizing those sources, and implementing a collection and disposal program.

## Source Identification Steps

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The sources of the above listed constituents can be determined through the following activities:

- Identify and research current and historic uses
- Review and update information regarding current regulations
- Identify on-land spill sites
- Research the effect of environmental transport
- Evaluate other potential sources

**Identify and research current and historic uses.** The TMDL Source Analysis contains a large amount of background information on the sources of OC pesticides and PCBs in the CCW. The information provided in the Source Analysis section will be reviewed, updated as necessary, and information gaps identified. Information gaps will be filled by:

- Reviewing literature and internet resources
- Contacting local experts and other agencies or communities who have worked with OC pesticide sources (Table 3)
- Examining local records, databases, and pesticide sales data

Additionally, the use of OC pesticides in Ventura County for agriculture will be compared to other areas in California and the United States. Studies on source identification and control will be reviewed to determine if any information is useful for identifying sources or control strategies for agriculture in the CCW.

OC pesticides may still be in use outside the U.S. For example, as of 1995, the use of DDT was neither banned nor restricted in such countries as Honduras, Suriname, Uruguay, Mauritania, Chad, Pakistan, Malaysia, and New Zealand. Toxaphene is used in such places as Mexico, Suriname, Chile, Argentina, Norway, Spain, Mauritania, Ivory Coast, Chad, Sudan, Bangladesh, and Malaysia (Voldner and Li, 1995). Potential conveyance through atmospheric deposition or other pathways to the watershed may be evaluated if information obtained through the source identification study indicates the sources are more significant than assumed in the TMDL source analysis.

**Review and update information regarding current regulations:** As of 1997-98, the use of chlordane, DDT, dieldrin, and toxaphene has been prohibited in the U.S. Current regulations regarding use of these chemicals in California, the U.S., and throughout the world will be reviewed. Regulations governing recordkeeping and management of hazardous materials and hazardous wastes can be reviewed to identify possible information sources regarding these compounds and provide information on possible control strategies.

**Identify on-land spill sites:** Online databases of spill sites, RWQCB records, local government files, DTSC records, and historical land use maps may provide information on locations of sites containing elevated levels of OCs. Table 2 contains a list of databases that can be researched to identify possible spill sites for OC pesticides. California Department of Pesticide Regulation (DPR) databases were used to develop information for the TMDL Source Analysis, and can be updated if necessary.

**Other potential sources:** Storage of OC pesticides in agricultural areas may be a source, but it will be difficult to quantify the magnitude of this source. Research will be conducted to determine if other areas have implemented collection programs and the results of any identified programs that target agriculture will be reviewed and summarized.

**Monitoring approaches for source identification:** The agricultural conditional waiver program includes monitoring to identify possible sources of OC pesticides, and a monitoring plan has been approved by the RWQCB to conduct that monitoring. The information collected under that program combined with the information gathered above will be used to identify any additional monitoring needs. Any additional monitoring required will be coordinated with the existing TMDL monitoring and agricultural conditional waiver monitoring requirements to the extent possible.

A summary memo describing the sources identified above will be developed for review by stakeholders in the CCW.

## Source Evaluation and Control Measure Identification

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Sources will be prioritized based on potential to be present in the watershed, proximity to water bodies and potential to be released, and estimated quantity of OCs associated with the source. In addition, jurisdiction over the source and ability to work with the source should be considered. Once the sources have been prioritized, the information will be considered by the Ventura County Agricultural Irrigated Lands Group to assist in identifying control measures for OC pesticides. Control measures for OC pesticides focus on preventing sediment transport from agricultural lands where these chemicals were applied in the past. The transport of OC pesticides attached to sediment may occur through any soil erosion mechanism, including water, wind, or gravity. However, the greatest loads are likely to occur through water erosion in the forms of irrigation or stormwater runoff. Control measures identified through the implementation of this Work Plan may include: the elimination or capture of irrigation runoff, cover crops, mulching, grassed waterways, conservation tillage, or vegetative barriers. Specific control measures will depend on the results of the source prioritization and tailored to the implementation location. The table below includes a list of BMPs to address OC pesticides taken from the Ventura County Agricultural Irrigated Lands Group 2007 Water Quality Management Plan. The management practice list was originally compiled using information from the following sources:

- Recommendations by UCCE Farm Advisors
- NRCS Field Office Technical Guide
- Farm Water Quality Plan, ANR Publication 9002
- Positive Points System for California Avocados, 2007
- Positive Points System for California Citrus, 2006
- Self-assessment tool for evaluation of sustainable citrus management practices, 2006
- Checklist for Assessing and Mitigating Runoff in Greenhouses and Nurseries, 2004.

**Table 1. Management Practices for OC Pesticides**

<b><i>Sediment and Erosion Management</i></b>
Consult with local agencies (NRCS, RCD, UCCE, or county planning) to develop a soil conservation plan.
Know your soil series and its erosion hazard rating.
Consider erosion hazard rating and prevailing winds when choosing row orientation.
Long runs of production area are broken up by access roads or buffer strips.
Riparian areas of other areas of natural vegetation were retained or expanded during site development.
Avoid bare fields using cover crops, leaving plant debris, or planting subsequent crops.
Minimize compaction by using drive rows, reducing tractor passes, reducing cultivation, and avoiding driving on or tilling wet ground.
Apply mulch, compost, or green waste to improve soil characteristics, especially for sandy or clayey soils.
Windbreaks or shelterbelts are used in areas prone to wind erosion.
In sloped production areas, management practices to minimize erosion such as contour farming, contoured buffer strips, or terracing are used.
Berms, culverts, or flow channels are in place to divert water away from roads.
Road erosion is minimized by grading, using gravel or mulch on roads, or constructing water bars or drainways.
Erosion management practices such as terracing, water diversions, and critical area plantings are used for non-production areas that are sloped or hilly.
Ditch banks are protected from erosion with vegetation, rock protection, or geotextiles.
Non-cropped areas with bare soil are protected from erosion with vegetation, mulch, gravel, or by diverting water.
Irrigation runoff is captured or kept on the property.
Stormwater runoff is captured or kept on the property.
Sediment traps are used at the end of the field to retain sediments in runoff.
Devices are in place to treat runoff before it leaves the property, such as grassed waterways, vegetated filter strips, and tailwater recycling systems.
<b><i>Irrigation Management</i></b>
At least annually test the irrigation system for distribution uniformity by monitoring water delivery or pressure differences within a block.
Utilize the services of the Irrigation Mobile Lab.
Implement appropriate improvements based on your own irrigation system test or the recommendations of the Irrigation Mobile Lab.
When drip irrigation is used, the distribution uniformity is 90% or better.
Irrigation main and lateral lines are regularly inspected for breaks, leaks, or clogs.
Filters are inspected and cleaned regularly.
Lines are flushed or cleaned chemically to prevent clogging
Pressure regulators are used.
Sprinkler heads and drip emitters of the same gallonage are used within each block and replaced with the same heads or emitters when necessary.
Water is diverted from non-crop areas by adjusting sprinkler head arcs or using sprinkler guards.

The grower knows the infiltration rate of the soil, the available water holding capacity of the soil, and the crop rooting depth.
Soil moisture is measured with equipment such as gypsum block soil moisture sensors (such as Watermarks), tensiometers, soil probe, or neutron probe.
Evapotranspiration (ET) values are used to determine irrigation requirements. Values are obtained from CIMIS, onsite atmometers, or other appropriate devices.
If irrigation must be based on a set schedule due to water availability, the timing or amount of irrigation is varied according to the weather.
Flow meters are used to measure actual water use.
Irrigation is halted if significant runoff occurs.
Harvested or unplanted areas are not irrigated.
Well head is protected from surface contamination (located high in the landscape so that surface water drains away from well head; located away from potential contaminants; the space between the casing and sides of hole is grouted; casing regularly inspected for leaks; vermin-proof well cap with screened vent).
Irrigation duties are performed only by personnel who understand and practice appropriate irrigation scheduling, application, and crop management practices related to runoff management.
<b><i>Property Management</i></b>
Landowner, grower, or other personnel regularly attend UC Cooperative Extension, Commodity Board, or other industry meetings.
Landowner, grower, or other responsible personnel subscribe to and read farming, trade, and industry journals containing articles about water quality, fertilizer, pest and erosion management.
Employees receive training on the following: wearing protective clothing, understanding fertilizer/pesticide signage, MSDS and label information, personal hygiene and sanitation, trash disposal and recycling, use storage and disposal of fertilizers and pesticides, pest and disease scouting, spill cleanup, and irrigation.
Training is provided in the employees' native language.

As part of the source control program, a collection and disposal program for stored agricultural OC pesticides will be implemented. To the extent possible, this program will be coordinated with existing urban collection programs and the program being developed under the Urban Source Identification Work Plan. However, if the source identification identifies any other agricultural collection programs that demonstrate different approaches are needed to address agricultural sources or the urban programs cannot accept agricultural pesticides, a separate collection program may need to be developed.

## Schedule

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The Work Plan consists of four steps: source identification, source prioritization, control measure identification, and collection and disposal. The following table summarizes the schedule for completing these steps and implementing the collection and disposal program.

**Table 2. Schedule**

<b>Action</b>	<b>Estimated Completion</b>
Source Identification	
<ul style="list-style-type: none"><li>Identify and research current and historic uses.</li></ul>	June 2009
<ul style="list-style-type: none"><li>Review and update information regarding current regulations.</li></ul>	July 2009
<ul style="list-style-type: none"><li>Identify on-land spill sites.</li></ul>	July 2009
<ul style="list-style-type: none"><li>Other potential sources.</li></ul>	September 2009
<ul style="list-style-type: none"><li>Monitoring approaches for source identification.</li></ul>	December 2009
Source Prioritization	March 2010
Control Measure Identification	November 2010
Collection and Disposal Program	November, 2010

**Table 3. Online databases for on-land spill/ contaminated site identification**

Database	Web Address	Responsible Agency	Criteria for Inclusion in Database	Description
Accidental Release Information Program (ARIP)	<a href="http://yosemite.epa.gov/oswer/ceppoeweb.nsf/content/ds-epds.htm#arip">http://yosemite.epa.gov/oswer/ceppoeweb.nsf/content/ds-epds.htm#arip</a>	EPA	Significant release of a hazardous substance	The ARIP database collects information on accidental releases of hazardous chemicals at fixed facilities. Facilities submit information on their facility, the circumstances and causes of a particular spill, and the accidental release prevention practices and technologies in place prior to, and added or changed as a result of, the event. The current version was updated in July 2000. This database contains incidents from 1986 to 1999. This database contains information on facilities throughout the country. It can be downloaded to an Excel file and sorted.
National Priorities List (Superfund) Database	<a href="http://www.epa.gov/superfund/sites/query/basic.htm">http://www.epa.gov/superfund/sites/query/basic.htm</a>	EPA	Hazardous waste site	This database can be searched by pollutant and county making the information very accessible. These profiles are very comprehensive and provide plentiful information on site histories.
Envirofacts Multisystem Database	<a href="http://www.epa.gov/enviro/html/multisystem_query_java.html">http://www.epa.gov/enviro/html/multisystem_query_java.html</a>	EPA	Varies depending on each database	The Envirofacts Query Form allows 13 of EPA's environmental databases to be searched for facility information, including toxic chemical releases, water discharge permit compliance, hazardous waste handling processes, Superfund status, and air emission estimates. This database can be searched by pollutant as well as county. NPDES permits are included in this database, so not all results indicate a contamination problem.
Spills, Leaks Investigation & Cleanups (SLIC) Database	<a href="http://www.swrcb.ca.gov/rwqcb4/Lustis/SLIC.xls">http://www.swrcb.ca.gov/rwqcb4/Lustis/SLIC.xls</a>	SWRCB	Unauthorized discharge polluting or threatening to pollute a waterbody	This database includes facilities throughout California. It can be sorted by city or county. A keyword search can locate sites of concern.
Leaking Underground Storage Tank Information System (LUSTIS)	<a href="http://www.swrcb.ca.gov/rwqcb4/Lustis/Lustis.xls">http://www.swrcb.ca.gov/rwqcb4/Lustis/Lustis.xls</a>	SWRCB	Leak from underground storage tank	This database includes facilities in Region 4. It is sorted by city but a keyword search can locate sites of concern.

**Table 3. Online databases for on-land spill/ contaminated site identification**

Database	Web Address	Responsible Agency	Criteria for Inclusion in Database	Description
DTSC's CalSites	<a href="http://www.dtsc.ca.gov/database/calsites/calf001.cfm">http://www.dtsc.ca.gov/database/calsites/calf001.cfm</a>	DTSC	Site has confirmed hazardous contamination	This database can be searched by county but not by pollutant. Once contaminated sites within a county of interest are retrieved, profiles on individual facilities must be read to ascertain if PCBs or OCs are a concern. These profiles are, for the most part, very comprehensive and provide plentiful information on site histories.
DTSC's Cortese List	<a href="http://www.dtsc.ca.gov/database/Calsites/Cortese_List.cfm">http://www.dtsc.ca.gov/database/Calsites/Cortese_List.cfm</a>	DTSC	Site has potential or confirmed hazardous contamination	The Hazardous Waste and Substances Sites (Cortese) List is a planning document used by the State, local agencies and developers to comply with the California Environmental Quality Act requirements in providing information about the location of hazardous materials release sites. DTSC is responsible for a portion of the information contained in the Cortese List. Other State and local government agencies are required to provide additional hazardous material release information for the Cortese List. This website provides DTSC's portion of the Cortese List, which consists of the Calsites database and sites that are Certified with Operation and Maintenance. Similar to CalSites, this database can be searched by county but not by pollutant. Once contaminated sites within a county of interest are retrieved, profiles on individual facilities must be read to ascertain if PCBs or OCs are a concern. These profiles are, for the most part, very comprehensive and provide plentiful information on site histories.
DTSC's Voluntary Cleanup Fund	<a href="http://www.dtsc.ca.gov/database/calsites/calf001.cfm">http://www.dtsc.ca.gov/database/calsites/calf001.cfm</a>	DTSC	Voluntary investigation and/or cleanup where contamination is a low threat to public health or the environment	This database can be searched by county but not by pollutant. Once contaminated sites within a county of interest are retrieved, profiles on individual facilities must be read to ascertain if PCBs or OCs are a concern. These profiles are, for the most part, very comprehensive and provide plentiful information on site histories.
Site Mitigation and Brownfields Reuse Program (Calsites) Deed	<a href="http://www.dtsc.ca.gov/database/calsites/deed_list_contaminant.cfm">http://www.dtsc.ca.gov/database/calsites/deed_list_contaminant.cfm</a>	DTSC	Site has use limits placed by DTSC due to possible or necessary cleanup	This database can be searched by pollutant or county.

**Table 3. Online databases for on-land spill/ contaminated site identification**

Database	Web Address	Responsible Agency	Criteria for Inclusion in Database	Description
Restrictions				
Hazardous Waste Management Program (HWMP) Deed Restrictions	<a href="http://www.dtsc.ca.gov/database/LUC/county_list.cfm">http://www.dtsc.ca.gov/database/LUC/county_list.cfm</a>	DTSC	Site has use limits placed by DTSC due to possible or necessary cleanup	This database reports results in two parts: deed notices and land use restrictions. The database can be searched by county but not pollutant. There are only 32 sites in this entire database.
National Response Center Data	<a href="http://www.nrc.uscg.mil/foia.html">http://www.nrc.uscg.mil/foia.html</a>	US Coast Guard	All chemical and oil spill data reported to the National Response Center are available on this site.	This database can be searched by pollutant and county, city or state. Other more specific information can also be queried. Spill reports include date, location and a description of the spill incident.

**Table 4. List of OC pesticide source experts**

<b>Name</b>	<b>Affiliation</b>
Susan Johnson	Ventura County Agricultural Commissioner's Office
Linda Lichtenberger	California Department of Pesticide Regulation
Sam McIntyre	Pesticide Advisor, Somis Ag Management, Inc.

## References

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Los Angeles Regional Water Quality Control Board (LARWQCB). 2005. Basin Plan Amendment for the Total Maximum Daily Load for Organochlorine Pesticides, Polychlorinated Biphenyls, and Siltation in Calleguas Creek, Its Tributaries, and Mugu Lagoon.

Voldner, Eva C., and Yi-Fan Li, 1995. "Global Usage of Selected Persistent Organochlorines," *The Science of the Total Environment*, 160/161:201-210, 1995.