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Pollution Prevention Report and Two-Year Workplan

2004-2006

California Environmental Protection Agency
Department of Toxic Substances Control
Office of Pollution Prevention
and Technology Development

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Pollution Prevention Report and Two-Year Workplan Executive Summary

Californians are concerned about the quality of their environment, and are vitally interested in ensuring that the generation and release of toxic and other hazardous substances is minimized. In response to this concern, the Legislature in 1998 augmented the state's hazardous waste source reduction program, located within the California Environmental Protection Agency's (Cal/EPA) Department of Toxic Substances Control (DTSC).[1] The Legislature also provided for DTSC to convene a Pollution Prevention Advisory Committee (Advisory Committee) to help DTSC determine how to target pollution prevention (P2) resources. The Advisory Committee consists of ten public members representing diverse interests, and seven *ex officio* members from relevant Cal/EPA boards, departments, and offices. Through a collaborative fact-finding and decision-making process, DTSC developed this two-year workplan and evaluated source reduction progress in the state.

DTSC Pollution Prevention Advisory Committee

Public Members:

- Ann Heil, Chair, Los Angeles County Sanitation Districts
- Robin Bedell-Waite, Vice Chair, Contra Costa County Hazardous Materials
- Greg Beach, San Bernardino County Fire Department, CalCUPA Forum
- Kelly Moran, Sierra Club
- Barbara Brenner, Breast Cancer Action
- Stewart Crook, Agilent Technologies Inc.
- Larry Moore, Larry's AutoWorks
- Dave Campbell, Paper, Allied Industrial, Chemical and Energy Workers International Union

Cal/EPA *ex officio* representatives:

- Lynn Baker, Air Resources Board
- Jeff Barnickol, State Water Resources Control Board
- Jeff Wong, Department of Toxic Substances Control
- Linda Mazur, Office of Environmental Health Hazard Assessment
- Nita Davidson, Department of Pesticide Regulation
- Judy Friedman, California Integrated Waste Management Board
- Vacant, Office of the Secretary

Source reduction (also known as "pollution prevention," or P2) is defined in California statute as:

- any action that causes a net reduction in the generation of hazardous waste; or
- any action taken before the hazardous waste is generated that results in a lessening of the properties which cause it to be classified as a hazardous waste.

This report contains the two-year workplan required by SB 1916, as well as hazardous waste and environmental release data. Part I introduces the document.

[1] See Health & Safety Code section 25244.12 et. seq.; SB 1916 of 1998

The Two-Year Workplan
Part II contains DTSC's P2 workplan for fiscal years[2] 04/05 and 05/06, with emphasis on the SB 1916-related projects, voluntary P2 programs, industry forums, integration of P2 into regulatory programs, and regulatory initiatives.

Vehicle Service and Repair Pollution Prevention Project
In Fall of 2003, DTSC decided to continue work on its successful Vehicle Service and Repair (VSR) project for this planning period, continuing its emphasis on public and private fleets. DTSC believes that significant additional environmental benefits will be gained from targeting training and outreach efforts toward fleet management programs at school districts, public utilities, commercial freight companies and government agencies. Working with large fleets provides DTSC with the opportunity to promote and encourage a variety of beneficial measures and the application of oil life extension measures, which have the potential to significantly reduce statewide generation of waste oil, the state's largest wastestream. There is a significant marketing and exit strategy component to the VSR project with the intent to demonstrate the project's benefits to both private and public partners. This will serve to enhance cultural change in the industry from both internal and external incentives, allow DTSC to disengage from the day to day operations except for periodic audit of emerging technologies and practices, and support its partners sustaining the VSR effort.

Auto Body and Paint Pollution Prevention Project
Building on the relationships established while working with the vehicle service and repair industry, DTSC decided to embark on a similar voluntary program with the auto body and paint industry. This industry was targeted primarily because of the large amounts of volatile organic solvents used in the shops and released to the environment. P2 practices, alternative materials, and technologies available in the marketplace can help this industry make a significant beneficial environmental impact by reducing its use and multimedia release of these solvents.

This three-year program will include a training and outreach component that encourages auto body and paint shops to adopt P2 measures and best management practices. Throughout training development, DTSC will work with an advisory team comprised of representatives from the Auto Body and Paint (AB&P) industry and government agencies to ensure that the curriculum and delivery is designed to reach the target audience, while addressing important environmental health and safety issues.

The program will also include a practical product and technology evaluation component involving a dynamic process between product and equipment manufacturers, spray technicians, industrial hygienists and toxicologists working together to promote alternative coatings and solvents, new application systems, and new equipment cleaning technologies that are both safe and high performance, and are accepted in the marketplace.

[2] California state government's fiscal years begin July 1st and end the following June 30th.

To ensure continued success of the auto body and paint program after the three-year period, DTSC will develop a state-wide support infrastructure consisting of corporate partners, local agencies and local partners to continue the program.

Voluntary Pollution Prevention Project:
Mercury (Hg) Elimination Leadership Program (HELP)
DTSC undertook a voluntary P2 program with the goal of virtually eliminating the presence of mercury in California hospitals by the end of 2005. The challenge was issued to California hospitals by correspondence on October 2, 2002. A mercury reduction toolkit was developed that contains information about mercury-containing devices found in healthcare settings, a list of licensed mercury recyclers or other take-back programs, information on the universal waste rules affecting the handling of mercury, and access to a spreadsheet to assist in accounting for specific mercury sources within individual facilities.

Over 105 hospitals and 8 Publicly Owned Treatment Works (POTW) have joined the HELP program. DTSC has partnered with the California Department of Health Services (DHS) to certify when a hospital has actually become mercury-free. Other partners on this project are the California Healthcare Association (CHA), the United States Environmental Protection Agency (U.S. EPA) Region IX, and Hospitals for a Healthy Environment (H2E). Certificates of appreciation were presented to 25 hospitals that successfully eliminated mercury sources for which there were replacements, and that have a plan for properly dealing with other sources upon removal or when alternatives become available. A total of 364,204 grams, or 803 pounds, of mercury were removed from these 25 hospitals.

During this two year period, DTSC will focus initially on outreach to the hospital system administrators. With commitment from the hospital system administration for their member hospitals to work on mercury elimination, hospitals are able to get the funding needed to replace their instruments, approval to replace the previous laboratory procedures, and devote the time necessary to complete the transition. POTWs will be contacted again through their respective organizations to encourage them to partner with their local hospitals and DTSC. County hospitals will be targeted through the California Association of Public Hospitals and Health Systems (CAPH) and also encouraged to participate in HELP. DTSC will work with CHA to schedule training with their members' hospital engineers. Outreach and training will continue with DHS through their local county enforcement agencies, along with outreach to those hospitals that do not belong to a hospital system. Activities of the previous year will continue, although hospitals will be reminded that DTSC will no longer present awards to hospitals after December 2005.

Other DTSC P2 Program Elements
DTSC's P2 program contains numerous other elements, including:

- Marketing and developing partnerships with private industry, conducting market research, and evaluating opportunities for future program direction, development, and expansion.
- Holding industry P2 forums.
- Implementing the Hazardous Waste Source Reduction and Management Review Act ("SB 14") through 1998 and 2002 SPR follow-up, review of SB-14 documents, and preparation of industry assessments.
- Integrating P2 into regulatory programs through inspections, enforcement, permitting, training, focused compliance
  (i.e., jewelry mart), and Certified Unified Program Agency (CUPA) integration.
- Supporting local P2 programs including local P2 committees, Green Business Programs, P2 week, and others.
- California/Mexico P2 support.

These programs and expected outputs are described in Section 4 of Part II.

DTSC is also working on P2 technology projects, including:

- Non-chemical cooling water treatment methods;
- Life-cycle assessments of auto shredder residue and used oil management;
- Demonstration of high efficiency oil filters on state fleets; and
- Pollution prevention measures for jewelry manufacturing.

Hazardous Waste Trends, Source Reduction Progress, Current Status of Waste
Parts III and IV of this report provide an overview of hazardous waste data, and an evaluation of hazardous waste source reduction progress. DTSC looked at hazardous waste manifest, Toxics Release Inventory and Biennial Report System data. The bulk of the analysis relied on manifest data, because DTSC's charge is the regulation of California hazardous wastes. Highlights from the data review include:

- Waste oil is the single-largest waste stream generated in California, and waste oil and oil contaminated waste together constitute over one third of all manifested waste in California. Waste oil from the transportation sector (about 200,000 tons per year) could be reduced to half the current volume by widespread use of high efficiency oil filtration systems and implementation of oil life extension programs.
- Organic waste, excluding waste oil, constitutes a significant quantity of total hazardous waste manifested in California (274,157 tons in 2000), and may be an appropriate target for hazardous waste source reduction efforts.
- Generation of inorganic hazardous waste has been on an upward trend since 1996. The waste stream classified as "other inorganic solid waste" now constitutes 17% of the recurrent (i.e., routine) hazardous waste manifested.

- Total manifested hazardous waste is trending upward after several years of decline in the early nineties; however, increases in quantities of site cleanup waste are primarily responsible for this steady upward trend.
- Recurrent hazardous waste generation has remained about the same over the last few years, increasing less than one percent from 1993 to 2001.
- Recurrent hazardous waste generation normalized per Gross Domestic Product shows a 1.9 percent per year reduction from 1993 to 2001; 0.63 percent reduction when normalized per Durables; and 0.28 percent reduction when normalized per Manufacturing.
- A significant portion of the hazardous waste manifested in the state is directly or indirectly related to the production, maintenance, operation, and disposal of the automobile.

Part I:
Introduction

Californians are concerned about the quality of their environment, and are vitally interested in ensuring that the generation and release of toxic and other hazardous substances are minimized. Pollution Prevention (P2) has emerged as a superior strategy to reduce the creation of pollution and the subsequent negative impacts of those pollutants. In 1998, the Legislature, in response to continuing concerns about pollution, augmented the state's hazardous waste P2[3] program, which is located within California Environmental Protection Agency's (Cal/EPA) Department of Toxic Substances Control (DTSC).

This is the third workplan developed by DTSC under this legislation (SB 1916 of 1998). This workplan details the targets and activities for fiscal years 2004 through 2006. In addition to information about planned P2 activities, this report contains information such as hazardous waste generation and environmental release data.

DTSC has decided to continue its work with the vehicle service and repair industry for this plan period while adding an additional project focusing on auto body repair and refinishing. These two industry types were selected for P2 focus as a result of DTSC's evaluation of hazardous waste generation, as well as other considerations, during the latest planning cycle of SB 1916. Those considerations included the potential for reaching a great number of facilities and influencing waste and other operational practices of these industries. The significant resources, benefits, and partnerships developed in prior years provide the tools and incentives to promote genuine environmental and economic improvements.

Each of these projects will address important P2 priorities, and promote implementation of source reduction measures as mandated by SB-1916. The Vehicle Service and Repair project (VSR) is a voluntary program that addresses an industry primarily made up of small businesses, but also focuses on large businesses and fleets and will incorporate a new SB-14 call-in component. The auto body repair and refinishing project will be breaking new ground with both small and large business, and will complement the aggressive air quality requirements that have been established in many of the State's most sensitive air basins.

DTSC recognizes that, for our P2 efforts to bring meaningful changes in the industries we are working with, staff should make direct contact with industry contacts and their representative associations. We will accomplish this, budget and travel permitting, through conference attendance, speaking engagements and other outreach opportunities.

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[3] In this report, DTSC's program will be referred to as the "pollution prevention" (P2) program. Note that in DTSC's statute, it is called the hazardous waste "source reduction" program. Because "pollution prevention" is defined as "source reduction" in federal law and in common usage, and because "pollution prevention" has developed as the term of art in this field, "pollution prevention" will be used.

Background

Pollution prevention (also known as "source reduction") is defined in California statute as:

- any action that causes a net reduction in the generation of hazardous waste; or
- any action taken before the hazardous waste is generated that results in a lessening of the properties which cause it to be classified as a hazardous waste.

As an overall environmental approach, P2 stresses the importance of maximizing resource use, creating little waste, and using the least-hazardous materials as possible. While traditional regulatory programs focus on restricting releases or properly managing wastes after they are produced, P2 focuses on the strategies that eliminate or reduce the creation of such wastes and pollutants. The collateral benefits to California business are clearly evident as well. Reductions in operating costs and environmental fees, worker safety improvements, elimination of long-term liability, improved environmental compliance and an enhanced image of environmental responsibility all contribute to a more sustainable business climate.

Pollution Prevention Strategies

- changing a production process in order to reduce or eliminate waste
- changing the nature of a product so that the use of toxic input materials is avoided
- improving purchasing practices
- inventory control and housekeeping to preclude the generation of off-specification and outdated chemicals

Pollution Prevention Benefits

- reduced costs to businesses
- reduced need for regulatory oversight
- reduced need for waste management and landfill capacity
- reduced worker exposure to hazardous waste and toxic materials
- reduced community and consumer exposure to toxic chemicals
- long term environmental benefits

DTSC's Pollution Prevention Program

DTSC has operated its P2 program since 1985. Efforts to promote hazardous waste source reduction include:

- implementing the Hazardous Waste Source Reduction and Management Review Act (commonly known as "SB 14"). This program requires that hazardous waste generators identify processes that generate hazardous waste, consider alternatives that would reduce or eliminate waste generation, select appropriate source reduction strategies for implementation, and establish a timeline to implement these strategies. Facilities subject to SB 14 also must report their source reduction and hazardous waste management progress over time;
- providing support and resources to local government P2 programs;
- conducting research into P2 alternatives;
- developing printed P2 material for use by hazardous waste generators,
- training both industry and regulatory agency staff on P2;
- integrating P2 into regulatory programs at the state and local levels;
- supporting the Pollution Prevention Advisory Committee, which consists of ten public members and the executive officers of DTSC, the Air Resources Board, the State

Water Resources Control Board, the Integrated Waste Management Board, the Office of Health Hazard Assessment , and the Office of the Secretary (Cal/EPA) as *ex officio* members;

- preparing a P2 workplan that includes a summary analysis of hazardous waste generation and management patterns by Standard Industrial Classification (SIC Code, waste stream and type of management method, and an outline of proposed P2 activities for the next two years; and
- developing and implementing a voluntary P2 program.

The enactment of SB 1916 and the establishment of DTSC's Pollution Prevention Advisory Committee represented a continuing effort in California to protect public health and the environment through pollution prevention. This document provides details on upcoming activities and expected accomplishments.

Finally, preparation of this workplan comes at a time of some uncertainty, which could affect its implementation. For example, we have assumed that resources available to the program will not decline as California deals with its current budget problems. As DTSC is largely fee funded and receives minimal general fund support, we do not anticipate major revisions. It is also important to recognize that the election of Governor Schwarzenegger and subsequent changes in the administration mean that we must be flexible to changing priorities within Cal/EPA. While we believe that P2 will continue to play an important role as Cal/EPA reshapes its mission, there are other important projects that we may be asked to undertake in lieu of those described in this workplan.

Part II:
DTSC Two-Year Pollution Prevention Workplan
(2004-2006)

Overview

This document represents the workplan for the Department of Toxic Substances Control's (DTSC) pollution prevention (P2) program for fiscal years 2004/2006. The mission and objectives for the program are presented immediately below. This is followed by sections containing summaries of the major focus areas and activities that will be pursued this year.

Mission

The mission of DTSC's P2 program is to promote pollution prevention by providing state leadership, guidance, and assistance to industry, local government, communities and other environmental agencies.

Although DTSC's statutory directive is clearly based in California's hazardous waste control law, DTSC's P2 program considers its mission as broader than just reducing amounts of hazardous waste generated. Such an approach would focus exclusively on businesses that generate very large quantities of hazardous waste. In order to protect public health, the environment, and workers, and to prevent media transfer of pollutants, DTSC's P2 program includes activities related to small quantity generators, specific chemicals, and interagency cooperation. Full implementation of pollution prevention represents a significant cultural change and philosophical shift in the historic way of doing business, both in the private sector and in government, and requires an approach that is broad and sustained.

Pollution Prevention Program Objectives

- Establish effective networks for communicating, promoting and distributing pollution prevention information
- Promote and provide support to local pollution prevention programs
- Achieve measurable reductions in the generation of hazardous waste and/or the hazardous properties of waste produced in California through source reduction
- Ensure that inspectors and permit staff at both the state and local levels promote pollution prevention during routine regulatory activities
- Expand current hazardous waste pollution prevention efforts to include other environmental regulatory agencies, so as to achieve better overall environmental results and minimize the unwanted shift of pollutants between environmental media
- Achieve recognition as a resource for P2 information

Note that the laws and regulations establishing the P2 program within DTSC do not grant the authority to mandate or enforce prevention. Even the Hazardous Waste Source Reduction and Management Review Act of 1989 (commonly known as "SB 14"),

which requires that large generators of hazardous waste plan to reduce hazardous waste generation, contains clear limitations on DTSC's enforcement authorities. DTSC does not have the authority to control the decisions made by businesses as to whether or not to implement specific P2 strategies. The ultimate decision to implement source reduction resides instead with individual generators, which each face a unique set of environmental, economic and technical constraints. DTSC believes that through leadership, guidance, assistance, and the integration of pollution prevention into other aspects of its regulatory program, California will ultimately achieve significant reductions in the quantity and/or toxicity of hazardous waste generated.

Section 1: Vehicle Service and Repair Workplan
Fiscal Years (2004-2006)

Background

The Vehicle Service and Repair (VSR) P2 Project has been operating since July 2000. Through the project, more than 1500 people have been trained and about 60% have implemented at least one of the P2 options presented. Because of the success and continuing demand of the program, the Office of Pollution Prevention and Technology Development (OPPTD) will extend the program through fiscal years 2004 and 2005.

The project outreach that has been accomplished through 2003 has generated more interest than can be completed by the previous ending date, June 30, 2004. DTSC plans to complete work with interested facilities to become model shops in 2004-2006. Staff expects the model shops will become P2 leaders and help sustain P2 in the industry after the end of this project. The following activities have generated increased interest in the project:

- The promotion of the project through the state Driving Green Task Force and the University of California Office of the President helped to create state fleets' interest in the model shop program. DTSC staff is currently responding with training and site P2 audits of the state agency facilities and University of California fleets;

- Fleets with more than one shop, such as Pacific Gas & Electric, Sacramento Municipal Utilities District, Department of Defense, and United States Postal Service have expressed interest in the model shop program;

- Promotion of the model shop program by private companies, California State Automobile Association, NAPA, Ford, and Honda has created enough interest to carry staff work beyond June 2004; and

- School districts were introduced to the VSR P2 materials through the California Integrated Waste Management Board's (CIWMB) school district diversion program, which includes grants to fourteen school districts. About 900 school districts statewide operate their own buses, and others contract with private transportation providers. DTSC expects to work with school district fleets that have shown interest in the model P2 shop program. Grantees and other school districts may receive P2 information through CIWMB outreach, on-line, and school district conferences after the project end date.

This document describes the actions that will be undertaken by DTSC staff to:

- Continue to assist shops working toward model shop status as a follow up from the 2003/04 model shop outreach;

- Continue P2 outreach to fleets, including state and local government, Department of Defense, school districts, and private fleets; and

- Continue to promote the adoption of the VSR P2 practices or a "Model Shop Program" to private and public entities that can implement their own programs as part of the exit strategy.

Waste Generation and Management

The services provided by VSR shops and fleet maintenance facilities include general vehicle repair and maintenance, smog testing, radiator, brake, and transmission services. Typical hazardous wastes generated by the vehicle maintenance and repair industry are used oil, oil and fuel filters, waste antifreeze, lead acid batteries, waste solvents, oil/water separator liquid and sludge, and contaminated absorbent and shop rags. VSR facilities can release solvents, oils, battery acid, and metals to the environment through the air, ground, sewer, and storm water drain. Activities that may cause environmental releases include improper management of an oil/water separator, spills and storm water runoff, and the use of petroleum-based cleaning solvents. Poor shop practices and lack of training on hazardous materials handling and management may be the underlying cause of some of these releases. There is a significant potential for harmful releases in this industry and there are a large number of facilities in California. There are opportunities to affect positive changes by a large number of operators by the implementation of P2 methods.

Project History

DTSC staff established training and technical assistance outreach to local governments and small to medium businesses through the VSR project that began in July 2000. Staff worked with local government programs such as Certified Unified Program Agencies (CUPA), city environmental agencies, sewer and storm water agencies, regional air quality agencies, and business assistance groups to reach VSR facilities and fulfill the commitments made in the workplans for 2000- 2004. In 2000-2002 DTSC staff provided training and assistance directly to shops, local government staff and fleet managers.

Materials Distributed 2000-2003

Toolkits	8600
Hydrophobic Mops	4400
Auto/Fleet Videos	1700

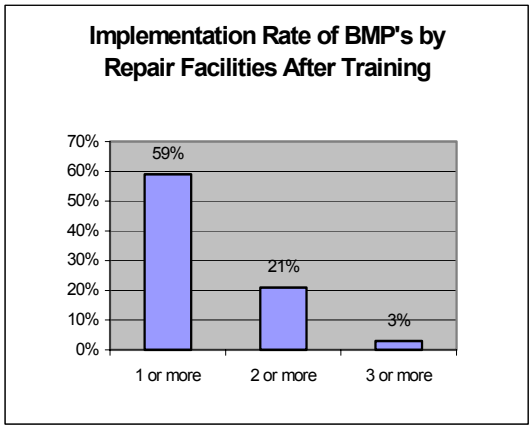
In 2002 –2003, the VSR program shifted focus to working with companies that have many affiliated shops, such as Ford, NAPA Auto Parts and California State Automobile Association (CSAA), to adopt the program and provide training to their affiliates with support provided by DTSC and local government staff. For fleet maintenance facilities, work focused on outreach and education to state government fleets, school district and local government fleets, and private fleets. In 2002-2003, staff promoted and distributed the Model Shop Program to affiliated shops and fleets. Twenty-five shops, including state and local agencies and commercial

Number of DTSC Model P2 Shop Recipients

Statewide Total	25
State facilities	16
UC & Sch. Dist.	2
Dealers/Sm. Bus.	5
Municipal Fleets	2

shops were certified as model shops as of March 1, 2004. CSAA and NAPA have recently promoted the Model Shop Program to their affiliated shops which has generated a lot of interest in the program from small business shops. Staff anticipates an increased work load through the end of FY 2004/05 to respond to the demand from affiliated shops.

Based on post-training surveys through 2003, the rate of implementing one P2 method is 59%, two or more about 21% and 3 or more methods implemented, 3%, as shown. Implementation of the 4-step clean up method using the hydrophobic mop is the most readily adopted P2 practice. If all mops distributed are in use, about 880 tons of hazardous waste and over 10.5 million gallons of contaminated wash water are avoided, as shown on the chart to the right.



Several regional air districts have adopted rules banning the use of volatile organic compound (VOC) solvents in parts cleaning. About 80% of shops in California are now affected by the low VOC rules. If all shops are in compliance and are using aqueous based parts cleaning, the amount of solvent waste avoided is about 4.5 million gallons per year. However, many shops are not in compliance with these rules. Other shops begin without proper equipment and cleaning solutions to meet their needs and become dissatisfied with the aqueous cleaning requirement. The result in many cases is that shops have some aqueous equipment installed in their shop, but return to using aerosol and/or liquid petroleum solvents. Through P2 outreach, DTSC staff helps to achieve compliance and resolve the low VOC cleaning issues by recommending practical solutions. The results are increased compliance with parts cleaning air quality rules and increased environmental and health benefits. The potential VOC air emissions reduction (estimated) from one hundred percent compliance is about 2600 tons per year, as shown in Table 1 below.

Table 1: Estimated P2 Implementation Results

	Method Implemented	
	Dry Floor Clean Up	Aqueous Parts Cleaning
Number of Shops Implementing	4400	24,800
Waste Reduction	880 tons/year	4,464,000 gallons/year
Wash Water Reduction	10,560,000 gallons/year	
VOC Emissions Reduction		2629 tons/year

Project Goal

The goal of the VSR Program is to reduce environmental and human health impacts of vehicle service, maintenance and repair operations within California by changing the behaviors and practices of the industry to those that promote:

1. Increased awareness of P2 techniques;
2. Increased compliance with existing environmental laws and regulations; and
3. A commitment to protect public health and the environment.

One of the major focuses for this workplan will be to continue to develop partnerships with large private organizations so that they maintain VSR P2 programs beyond the project life. DTSC staff will help to create a culture of P2 in the VSR industry that will sustain P2 programs within fleets and other large industries with many types of vehicles.

Strategy

During fiscal years 2004-2006, DTSC will employ 5 main strategies:

1. Use the Model Shop Program as an outreach tool for fleets and shops,
2. Conduct a Source Reduction Plan call-in and review to identify P2 alternatives that fleets are implementing,
3. Exit strategy-continue to promote program adoption by large corporations with affiliated shops, industry groups, compliance school and green business programs,
4. Promote distribution of the P2 curricula to community colleges and other technician training programs, and
5. Continue measurement to determine project effectiveness, including cost savings to industry.

The activities for each strategy are described in the following sections.

Strategy 1 Outreach - Model Shop Program

In 2003-2004, the Model Shop Program was promoted through industry groups and the state fleet Driving Green Task Force. Enough interest was generated to continue working with these shops through the 2004-2006 work phase.
The Model Shop Program is designed to assist vehicle repair facilities to identify P2 opportunities at their facility, provide P2 and basic compliance training to shop employees, and give formal recognition for successful implementation of industry accepted P2 Best Management Practices.

The Model Shop Program requires that shops reduce hazardous waste generation, improve environmental compliance and enhance worker health and safety compared to traditional practices. When certified as model shops, they are recognized for their success in addressing all of these issues. Shops that have already implemented P2 methods realize that the Model Shop Program is important to claim recognition for their efforts. Many other shops are introduced to the concept by their industry peers and

work toward upgrading their processes to qualify as model shops. VSR facilities interested in becoming a model P2 shop may find a description of the Model P2 Shop Program on DTSC P2 web pages at: http://www.dtsc.ca.gov/PollutionPrevention/VSR/VSR_P2Model.html.

DTSC staff have distributed information to promote the program to shops and fleets, see Addendum 1, Model Shop Flyer.

In order to become a Model Shop VSR facilities must complete the following steps:

1. Provide DTSC approved P2 training for shop employees. A self-paced training work book and video set has been developed and is available, or OPPTD staff may conduct on-site or classroom training for large group settings;
2. Conduct a P2 assessment of the shop. The purpose of the assessment is to review all shop processes to find opportunities to implement P2 practices in the short and long term time frames;
3. Resolve environmental compliance violations or notices. DTSC staff review current inspection reports and notify the local environmental agency; and
4. Complete the "Model Shop" checklist with a minimum score of 100 points. DTSC or a local partner agency will verify the checklist. See Addendum 2, Model Shop Checklist.

The CSAA and NAPA Auto Care are actively promoting the model shop program to their affiliated shops. Currently, DTSC staff follows up with individual shop requests, but CSAA and NAPA will completely adopt the program and take responsibility for the training and certification at their affiliate shops. DTSC will continue working with dealerships and fleets to promote adoption of the Model Shop Program in 2004-2006.

Local Government Support

Effective outreach to VSR shops depends on the participation of DTSC's local government partners. Employees from ninety different local government regulatory agencies, including water quality, hazardous waste, air quality and waste water agencies have attended past VSR training. Most of the local agencies that have received the DTSC P2 training have used this project to incorporate P2 into their local programs. DTSC regional P2 staff have provided support to and built relationships with local regulatory agencies to achieve this result. For 2004-2006, DTSC staff will continue to support local agencies that conduct P2 outreach through inspections, site visits, industry conferences and meetings. In 2002, the City and County of San Francisco began their own shop program, "San Francisco Clean and Green" with assistance from DTSC staff for training and providing P2 materials during the start-up phase. Their program has since graduated to a Green Business Program.

Local Government Green Business Program

Historically there has been one recognized Green Business Program (GBP) administrated by the Association of Bay Area Governments (ABAG). In 2002 and 2003, DTSC staff supported San Diego, Monterey and Santa Cruz Counties in beginning

GBPs. In 2003, the Sacramento County Business Environmental Resource Center (BERC) received an U.S. Environmental Protection Agency (U.S. EPA) P2 grant and will begin implementing a GBP in January 2004. As with most of the ABAG counties, all of these programs began their GBP with the automotive repair industry. DTSC staff will continue to support the new and established GBPs in 2004-2006.

Workshop sponsored by Santa Clara County GBP

State Agency Fleets

Currently, DTSC staff is working with state agency fleets to institutionalize P2 practices within their operations. Staff is working with the State and Consumer Services Agency (SCSA) Driving Green Task Force to promote the program. DTSC staff will continue outreach to state fleets with the goal of all state fleet facilities becoming model shops. There are ten state agencies, including the University of California System (UC), that own and service their vehicles. So far three agencies, Department of General Services, Department of Water Resources and Department of Transportation have been involved in the Model Shop Program with most of their shops becoming certified model shops. In the UC system, two shops are certified and

The Driving Green Task Force's members are managers from state agencies that own vehicle and equipment fleets. Their purpose is to implement sustainable practices in operating state fleets. The Driving Green Task Force addresses various practices, including environmentally preferable purchasing of cars, trucks, and equipment; lower emission fuels; extending oil life; and clean shop practices.

several other facilities are in various stages of becoming model shops.
There are opportunities to work with more state fleets in 2004-2006. Staff from at least thirty of the Department of Corrections prisons with auto repair education programs have attended VSR training workshops and have expressed interest in the Model Shop Program. The California Military Department (National Guard) has also shown interest and DTSC staff plans to continue working with both of these agencies in 2004-2006. Staff expect that outreach to state agency fleets will result in the reduction of pollutant generation, improvements in worker health and safety, cost savings-including disposal fee reductions, and environmental protection. State agency fleets are expected to become P2 leaders and models for local agency and private fleets as well as small business repair shops.

Oil Life Extension Project: The DTSC Technology Development Branch received a grant from the CIWMB to complete a demonstration study of high efficiency oil filters in state fleet vehicles. The study began in June 2003 and continues through June 2005. The project will provide filters for selected state vehicles, buses, and equipment, and periodic oil sample analysis at no cost to participating state agencies. The Technology Development Branch coordinated with the Driving Green Task Force and the VSR team in planning the high efficiency oil filter study. As well as benefiting the participating agencies, the high efficiency oil filter study will provide case studies and data to support P2 outreach. State agencies and interested parties may find information about the project at the DTSC web page:
http://www.dtsc.ca.gov/ScienceTechnology/OPPTD_FLY_High-Efficiency-Oil-Filters.html

Local Government Agency Fleets
City, county and special districts maintain more than 650 vehicle and equipment fleets in California. In order to maximize the number of local agency fleets that DTSC reaches, staff will continue to work with industry associations such as the California County Fleet Managers Association (CCFMA), the Public Fleet Supervisors' Association, and the Municipal Equipment Maintenance Association (MEMA) throughout 2004-2006. Staff plans to continue to attend regional association chapter meetings and conferences, provide publications, and write articles for newsletters. DTSC expects that through these associations, state and local agency model shops will influence other fleet managers to adopt P2 practices and will result in the reduction of pollutant generation, improvements in worker health and safety, cost savings-including disposal fee reductions, and environmental enhancement.

School Districts Fleets
Staff will provide training and assistance in coordination with the California Integrated Waste Management Board's (CIWMB) Environmental Ambassador Pilot Program (EAPP) and the Unified Education Strategy (UES), two grant projects for local school districts. Through these projects, participating school districts integrate instructional strategies with resource conservation projects, such as source reduction and recycling on school campuses. The programs are designed to include environment-based education and environmental science and technology. CIWMB and DTSC staff have introduced the VSR P2 materials to school administrators and school bus fleet managers of participating schools. DTSC has conducted fleet facility site assessments

and is providing materials and training to school district fleet staff and promoting the Model Shop Program. Staff plan to continue outreach to school district fleets during 2004-2006 and expects that it will result in the reduction of pollutant generation, improvements in worker health and safety, and cost savings including disposal fee reductions, and environmental protection.

Private Fleets

Staff will continue to work with private fleet companies that have shown interest in the VSR project. The project consists of an initial assessment of current practices at the fleet maintenance facilities and providing training and technical assistance to allow the companies to meet the model shop criteria. Fleets that have expressed interest and have attended training are Federal Express, Pacific Gas & Electric (PG&E), Sacramento Municipal Utilities District (SMUD), East Bay Municipal Utility District (EBMUD) and Southern California Edison. Outreach to private fleets will also include contact with industry organizations such as the National Association of Fleet Administrators (NAFA) and attendance at regional chapter meetings, conferences, trade shows, and educational seminars. Staff expects that outreach to private fleets will result in the reduction of pollutant generation, improvements in worker health and safety, and cost savings including disposal fee reductions, and environmental protection.

Department of Defense (DOD) Fleets

Staff plans to work with DOD fleets to implement P2 and recruit facilities to achieve model shop status. Those that have expressed interest include United States Marine Corps, Camp Pendleton. Staff work in this area will support the goals of the California Pollution Prevention Partnership (CAP3) agreement that was signed by DOD and the California Environmental Protection Agency (Cal/EPA) in 2003. Although DOD facilities have implemented a variety of P2 methods, there are opportunities for their fleets to practice additional P2 alternatives. Some DOD fleets have implemented P2 in vehicle washing operations, however, P2 options such as dry floor clean up, oil life extension, and aqueous parts cleaning among others could be implemented to further the goals of CAP3. DTSC staff expects that outreach to DOD fleets will result in the reduction of pollutant generation, improvements in worker health and safety, and cost savings including disposal fee reductions, and environmental protection. CAP3 newsletter is located on the website:
http://enviro.nfesc.navy.mil/ps/newsletters/p2partnership/CAP2news1.pdf

Strategy 2 Fleet Maintenance SB 14 Source Reduction Plan Call-In

DTSC will conduct a source reduction plan review of the transportation and fleet maintenance industry to assess compliance and to identify source reduction measures that fleets are implementing. The results from the plan review will be used as baseline data and shared with the automotive repair and fleet industry. Ten fleet maintenance generators submitted their required Summary Progress Report (SPR) for reporting year 2002, however it is likely that DTSC will request plans from additional generators. Staff found more than one hundred fleet generators that are potential non-compliers with

SB-14 based on waste stream analysis of generators in the DTSC Hazardous Waste Tracking System (HWTS). Two qualifying waste streams identified were oil/water separator waste and solvent waste.

To conduct the source reduction plan review, staff will complete the following tasks:

- analyze the non-complier data to target generators for source reduction plan call-in;
- develop mail-out to request source reduction plans and reports;
- review and analyze submitted documents;
- provide technical assistance as needed;
- analyze results; and
- prepare results summary.

Strategy 3 Exit Strategy- Program Adoption

The "exit" goal of the project is to have developed significant cultural change in the industry to foster routine P2 practices and provide the training and tools for private and public implementation of voluntary model shop programs.

Throughout the project, marketing of the VSR program has been integrated with education in order to demonstrate the program's benefits to as wide an audience as possible. To maximize the outreach capability, marketing for the project has included:

1. Using marketing to identify and capitalize on opportunities to expand the delivery of the VSR program by the voluntary partners;
2. Creating incentives for partners to become a surrogate and carry on DTSC's work at the end of the project; and
3. Introducing and promoting the program's benefits to fleet managers and industry multipliers such as industry organizations and corporate clients.

For 2004-2006, marketing provides the foundation for and is integral to the exit strategy. DTSC does not plan to certify additional model shops after June 2006. Through the marketing of the model shop and VSR program, the life of the project will be extended beyond DTSC's end date. It is expected that marketing the VSR and model P2 shop program to industry and government partners will give the project a sustainable component by:

1. Demonstrating the incentives to partners interested in implementing their own program. The marketing strategy delivers answers to "what's in it for me?" to multipliers, small businesses, and fleets; and
2. Providing a comprehensive package for local governments, business assistance providers, and corporate and industry partners so they may continue a VSR program after the DTSC project closes in 2006 with minimal effort. For example:

    a. Model Shop resources have been distributed to NAPA, AAA and business assistance providers such as San Diego County, Sacramento Business

Environmental Resource Center, Santa Cruz County and the City and County of San Francisco. The business assistance and P2 groups have since begun Green Business programs with automotive repair industry, using DTSC staff training and materials. Santa Cruz County initiated their GBP in April 2004 with 7 shop certifications. Other local agencies, such as the cities of Los Angeles and Long Beach, Santa Clara County and many others continue outreach with DTSC and their own materials;

b. DTSC staff members are working with the California Compliance School staff who will create a VSR P2 training course as part of their program. The course is planned to be available to anyone interested and promoted to CUPA to be used as possible Supplemental Environmental Projects for penalty credit; and
c. Staff will continue working with the Automotive Industry Action Group (AIAG) to encourage them to adopt the P2 curricula as part of their on-line Environmental Management System (EMS) training. When completed, the project would involve all the major automobile dealerships on a voluntary basis.

Maintenance of Local Programs

DTSC will continue to provide materials that address the needs of the project partners. DTSC staff will continue to research and "check-in" with industry groups and assistance providers to receive feedback and identify more current technologies and timely industry issues. Subject to resource availability, staff will continue to modify DTSC outreach materials as necessary to reflect technology, regulatory and economic changes. This support will allow the local partners to successfully establish and sustain their own VSR programs into the future.

Model Shop Certificate Presentation to Model Shop Certificate Presentation

Strategy 4 Curricula Distribution

The curricula development, including the on-line course, was completed in July 2002 and students have enrolled in the Shasta College on-line course since then. The course description is provided in Addendum 3. The link to course information is: http://online.shastacollege.edu:8900/public/AUTO30_RR/index.html. In 2004-2006 DTSC and Shasta Community College staff will continue to promote curricula use in more trade schools, community colleges, high schools and Regional Occupational Programs (ROP) that offer automotive technician training and certification programs. A long term goal is the eventual adoption of a P2 curriculum as part of the Automotive Service Excellence (ASE) national certification process.

Strategy 5 Measurement of Project Effectiveness

To judge the effectiveness of education and outreach for 2004 – 2006 the following types of measures will be used as indicators of success:

1. Reduction in generation of waste wash water at vehicle repair shops;
2. Reduction in the use and generation of solvents and solvent wastes;
3. Air emission reductions at vehicle service and repair facilities;
4. Cost savings data;
5. Number of shops/fleets reached with the training and materials;
6. Number of shops that achieve model shop status;
7. Number of partners (industry and local governments) that independently implement the VSR program; and
8. Facilities that achieve compliance by implementing P2 options

Addendum 1 - Model Shop Flyer

State of California Model Shop Program

Being "Green" offers auto repair businesses substantial marketing potential because of the public's increasing demand for environmentally friendly auto repair shops.

Recognition. A green P2 **model shop logo** signifying recognition by the State will be awarded to each individual model shop that has received training and implemented P2 alternatives. The **logo** is approved to be included in marketing and promotional programs.

Technical training for repair facilities. The training includes a self-guided video of six training modules supported by a video training workbook. Training segments are between 7 and 15 minutes long, and may be completed one at a time at weekly safety meetings, for example. The training demonstrates P2 methods that reduce operating costs for auto repair shops. A shop whose staff is trained in P2 methods will improve worker health and safety and improve compliance with environmental regulations.

Training assistance and on site technical support. A toll free telephone number will be available to talk directly with technical staff regarding training and implementation questions. Local agency personnel will be available to answer questions regarding on site implementation.

The primary benefits of the State of California's Model Shop Program are savings from reduced operating costs, environmental benefits from improved compliance, and improved employee health and safety and morale.
Contact: California Department of Toxic Substances Control, Office of Pollution Prevention and Technology Development 1-800-700-5854

http://www.dtsc.ca.gov/PollutionPrevention/VSR.html

Addendum 2 – Model Shop Checklist

DTSC Model Shop P2 Checklist.

(Note: Certain point items (*) may be mandated as part of either state or local requirements.)

15	Conduct a P2 Assessment using the P2 Opportunities Assessment Guidelines.
15	Use of aqueous brake washer or bird bath equipment for brake cleaning.
6	Use refillable and pressurized spray cans (e.g. brake cleaner, lubricants, engine
20*	All solvent parts cleaners have been removed and replaced with aqueous based parts cleaning system that: • Circulates and filters aqueous solution • does not contain any volatile organic compounds • is not contaminated by chlorinated cleaners, and • spent solution & filters are properly disposed of.
10	Uses one or more aqueous parts washers, some solvent tanks still in use. (Partial
5	Use an industrial launderer for shop towels (shop rag contract).
2	Segregate, drain, crush, and recycle used oil filters.
5	Use of a battery exchange service to eliminate use and storage of battery acid and
5	Store spent batteries in secondary containment, covered if outdoors.
2	Use pump & spigot on new product to control spills.
2	Use spouts & funnels on waste drums to control spills.
5	Use a fully enclosed waste transfer system for waste liquids
2	Use & maintain drip pans in outside areas to control fluid leakage.
10*	Store hazardous materials and wastes in covered area with secondary containment away from storm & sanitary sewer drains.
2	Have emergency spill kits available (e.g. mats, plugs, etc.)
2	Stencil all storm drains "No Dumping ... Flows to waterway"
2	Post warning signs (min. 5"x 8") above sink areas "Do Not Discharge Hazardous Wastes or Chemicals Down Any Work Sink or Drain".
10	No open drains, or seal existing drains in service bays.
20*	Implement Dry-Shop Spill Cleanup Method *Eliminate routine use of absorbents. *Use hydrophobic mops for "4-Step cleanup method for hazardous spills.
15	Seal shop floor with an impermeable coating, such as epoxy.
20	Install closed loop vehicle washing system.
10	Prohibit vehicle washing or send vehicles to commercial washing facility, with a closed loop water recycling system.
5	Inventory control: Replace hazardous materials with non-hazardous materials.
10	Use reusable oil filters for fleet vehicles.
10	Install by-pass filters and use oil analysis to extend oil change intervals on fleet vehicles.
5	Use re-refined oil.
10	Additional P2 alternatives implemented at facility.

Add up Circled P2 Points

(NOTE: **100** points out of a possible **225** points are required to become a Model

Addendum 3 - Shasta College On-line Course Flyer

Shasta College

ONLINE COURSE!

Pollution Prevention Training for Automotive Facilities (AUTO 30)

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*An **online college course** focusing on the proper management of hazardous wastes generated by automotive repair facilities. Learn about the concepts of pollution prevention, the waste streams inherent to automotive repair facilities, and how to perform environmental audits.*

- *This class is conducted completely online.*
- *Course cost is $33.00 (Campus fees may apply)*
- *Students must have access to and working knowledge of the Internet and Windows*
- *Class begins January 27, 2003*

Course Objectives:

- Define pollution prevention
- Outline **"best practices" of businesses**
- Develop source reduction methods
- Recognize **environmental impacts** from the automotive industry
- Define "Right-to-Know"
- Read and interpret hazardous material and waste labeling
- Interpret and use a Material Safety Data Sheet
- Develop a **plan for a safe shop environment**
- Define worker hazards
- Identify solid, liquid, and gaseous waste streams
- Locate and **interpret local, state, and federal regulations** that relate to hazardous materials and waste
- Develop a plan for an environmental audit
- Define the **process for an environmental audit**
- Work with a business to schedule and perform an environmental audit

For more information visit
http://online.shastacollege.edu:8900/public/AUTO30_RR/index.html
or telephone Raleigh Ross, Automotive Technologies Instructor, at 530-225-4903.

Section 2: Auto Body and Paint Industry Project Workplan

This section describes the actions that will be undertaken by DTSC to:

- Develop and test training curriculum for P2 at auto body and paint (AB&P) shops;
- Identify and promote alternative products that are both safe for workers and the environment.
- Develop training and supporting materials, online product and services directory, and an AB&P P2 website, then test the program with partners;
- Engage corporations, state and local government agencies, and local programs to help promote and support the AB&P P2 training program;
- Develop strategies to measure outcomes and program success; and
- Implement and support the training and outreach program and, ultimately, transfer program responsibility to local and corporate sponsors by June 30, 2007.

Background

There are approximately 1,300 AB&P shops in California. Through day-to-day activities, these shops impact the environment through releases of toxic air contaminants and sewer and storm water discharges. They also generate hazardous waste in the form of spent solvents, paint waste, and stripping waste. While regional air quality regulations drive a shop's selection of coating system formulations, equipment cleaning practices, and other paint shop activities, many shops need help with overall compliance, health and safety issues, and hazardous waste source reduction. This AB&P workplan, which was modeled after the successful pollution prevention program for the vehicle service and repair industry, delineates how OPPTD will build relationships and approach industry clients in a business model atmosphere to ultimately take the industry beyond compliance through voluntary adoption of processes, equipment and materials that both minimize hazardous waste and reduce the use and release of toxic air contaminants.

Project Description

The AB&P P2 project will:

- develop and implement a comprehensive training and outreach program that focuses on P2 strategies for AB&P shops; and
- include a product component that identifies alternative and replacement products to ensure that they are safe for workers and the environment.

The training program, which will consolidate information from existing training programs, the internet, industry associations, and leaders in the AB&P industry who have implemented P2 practices, will be designed for AB&P shop managers and technicians. OPPTD will seek advice and input from representatives from the AB&P industry and government agencies during program development to ensure that the program is designed to reach the target audience while addressing important environment, health

and safety issues. Working with government agencies that have programs in-place that target the AB&P industry and tapping existing programs for information and resources will enable OPPTD to develop a comprehensive training and outreach program that complements but does not duplicate the efforts of others.

In addition to on-site P2 training, the program may include videos, an AB&P P2 website, and an online products and services directory. Completion of these latter items, which would complement and support the overall training, will be dependent on continued adequate resources. To ensure continued program success after June 30, 2007, OPPTD will develop a state-wide support infrastructure consisting of corporate partners, local agencies, local partners who will initially help with program implementation and ultimately carry on successful program initiatives.

The product identification component of the AB&P program will involve industrial hygienists and toxicologists evaluating alternative coatings and solvents to ensure that they safe for workers and the environment, and are accepted in the marketplace.

Industry Description

AB&P industry is classified under Standard Industrial Classification (SIC) Code 7532 – Top and body repair and paint shops. According to 2001 data from DTSC's hazardous waste manifest system, there are 1,283 active AB&P shops in California.[4] The California Air Resources Board air permit database contains 1,363 facilities using SIC Code 7532.

Demographics

Of the approximate 1,300 AB&P shops in California, most of them can be described as small, well-established, family-owned businesses. They get most of their work through referrals. The number-one factor affecting shop owners' overall buying decisions (primarily with respect to coatings) is quality, not cost.[5] While toxic air emissions released during the coating application process are the primary environmental concern associated with AB&P shops, these shops also generate other emissions, hazardous wastes, wastewater, and storm water discharges from other shop operations. **Pollution prevention in the AB&P industry must focus on reducing or eliminating multimedia environmental effects associated with shop practices and the use of hazardous chemicals.**

Of the roughly 1,300 AB&P shops in California, it is estimated based on 2001 hazardous waste manifest data that 30 shops generate most of the hazardous waste, with the remaining shops each generating under 5 tons per facility. Solvents, used primarily for cleaning paint equipment, comprise the majority of the hazardous waste manifested by this industry. OPPTD was unable to utilize its SB 14 database to assess current hazardous waste source reduction efforts by this industry in California because

4 The term "active" is used to describe AB&P shops using SIC Code 7352 that manifested hazardous waste during calendar year 2001. Note that not all facilities report their SIC codes on their manifests.
5 Demographic information taken from nationwide statistics posted on the Southwest Pollution Prevention Website (http://p2.utep.edu)

we have no record of AB&P shops (using SIC Code 7532) submitting SB 14 reports in 1999 or 2003. Most AB&P shops do not generate enough hazardous waste to trigger the SB 14 reporting threshold of 13.2 tons per year.

It is estimated that, based on conservative assumptions, the AB&P industry releases 4,700 tons of VOCs to the atmosphere each year through coating operations alone. While all air districts are required to regulate the amount of VOCs in automotive coatings, the South Coast Air Quality Management District (SCAQMD) is leading the way by setting the most stringent standards for VOC content in coatings. Additionally, by July 2005, SCAQMD will require that the solvents used for cleaning coating application equipment not exceed 0.21 grams of VOCs per liter, which is significantly lower than its current standard of 4.6 grams per liter. It is anticipated that industry-wide source reduction will be achieved if these future VOC standards are used as a target for the AB&P industry statewide. Using P2 strategies to comply with stringent SCAQMD standards will help shops within the SCAQMD jurisdiction maintain profitability and a good compliance record. Shops outside the SCAQMD jurisdiction will realize similar benefits while going beyond compliance.

Targeted Practices
Our research indicates that there are numerous management practices and P2 opportunities that apply to the following AB&P shop practices:

• Paint stripping (wet sanding/solvents)	• Paint equipment cleaning
• Surface preparation and cleaning	• Shop and floor cleanup
• Paint mixing	• Dust control
• Paint and coating application	• Paint booth management

New equipment and technologies, and alternative materials also present P2 solutions:

- New coating formulations (i.e., water-based, low VOC).
- New paint application equipment and processes that reduce the amount of material sprayed, thereby reducing material use, costs and VOC emissions.
- Automatic paint gun cleaning equipment that reduces solvent usage and VOC emissions.
- On-site solvent filtration, distillation, reuse and recycling.
- Alternative low-VOC solvents.

Project Design Assistance
OPPTD will form an advisory team of industry stakeholders and involve them in the early stages of the design and development the AB&P P2 program. The advisory team will help identify practices and technologies that will achieve the greatest overall benefit to the industry and the environment, and will evaluate these practices and technologies from a business perspective. These practices and technologies will be distinguished from those that are already widely accepted, and those that show little potential for industry acceptance or pollution prevention. OPPTD will also seek to identify issues surrounding the safety of replacement products such as alternative coatings and

solvents, and share identified safety concerns with formulators, encouraging them to resolve these issues.

Project Goal

The overall goal of this project is to increase implementation of P2 strategies at AB&P shops thereby reducing hazardous waste generation and VOC air emissions. This will be achieved by designing a program that will enable various government and business entities to continue educating AB&P shops in effective P2 strategies. In order to achieve this goal, the following targets have been established:

- Ten percent of the AB&P shops in California will implement P2 strategies from the training to a predetermined threshold.
- At least ten local partners will commit to disseminating program information, receiving inspector training, providing ongoing technical support to shops implementing the training, and assessing program implementation.
- The shops that implement the P2 strategies will reduce their manifested hazardous waste by 30%.
- The shops that implement the P2 strategies will voluntarily reduce their VOC emissions to below standards in place in the air basin governed by the SCAQMD.

Cal/EPA's Environmental Protection Indicators for California (EPIC) program has identified environmental indicators that can be used to help assess trends in environmental conditions. This project will address and strive for reduction in the following EPIC indicators: Total emission of toxic air contaminants; and volume of hazardous waste exported (i.e., shipped off site). For more information on EPIC, go to http://www.oehha.ca.gov/multimedia/epic/aboutepic.html.

Strategy

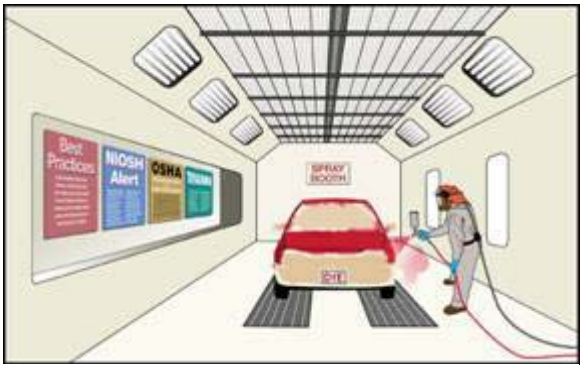
In order to initiate the training and outreach program in mid FY 04/05, OPPTD will complete the following tasks by December 1, 2004:

Task 1: Identify viable P2 strategies and alternatives, and develop training curriculum
Task 2: Develop and implement health and safety review of alternative products
Task 3: Develop training program, training delivery strategy, and support infrastructure
Task 4: Gain commitments from the AB&P industry and local agencies who will help implement the program
Task 5: Market, promote and implement program (starting on or before December 1, 2004)

Task 1 Identify P2 Strategies and Develop Training Curriculum

Objective: The primary objective of Task 1 is to develop training curricula that, once implemented at AB&P shops, will provide the most overall benefit to the industry in terms of pollution prevention, worker health and safety, and cost savings.

Description: Task 1 will initially involve collecting existing information on the various P2 strategies, best management practices (BMPs), and new and innovative technologies that pertain to AB&P shops. In addition to researching the internet and contacting trade associations, OPPTD will seek input from spray technician training programs, AB&P shops with successful P2 programs, Air Quality Management Districts (AQMDs), publicly owned treatment works (POTWs), and Green Business Programs.



The CCAR-Greenlink® Virtual Shop is a good resource for P2 and BMP

OPPTD will form an AB&P advisory team of stakeholders that will be involved in key aspects of curriculum and training program development. The advisory team will consist of representatives from independent AB&P shops, AB&P corporations, car dealerships, paint manufacturers, industry associations, technician training schools, local enforcement agencies (CUPAs, AQMDs, and POTWs), Air Resources Board, Green Business Programs, and other local business assistance centers.

Information will be summarized and organized into training subcategories, then shared with stakeholders and partners to gain their input. Advisory team input will be used to:

1) determine which P2 and BMP topics and innovative technologies have the greatest potential to positively affect the environment and the overall industry;
2) ensure that the AB&P program addresses industry problems and concerns, both in the shop and from a regulatory perspective;
3) ensure that the curriculum balances simple BMPs and P2 solutions (i.e., low hanging fruit) with P2 strategies that potentially cost more but offer greater benefit; and
4) gain a thorough understanding of the industry and the technicians to identify the best way to reach them and affect behavioral change through training.

Next, we will use the information gained from the research and advisory team input described above to select and organize training topics and develop training curricula. Training curriculum for each topic will likely include a discussion of current practices, problems associated with current practices (i.e., environmental, health and safety, cost), BMPs and P2 alternatives, emerging technologies, and benefits of each alternative and new technology, including and economic data and payback periods.

The draft training curricula will then be presented to the advisory team to get their input on content and quality, as well as gain their insight on how to best deliver the training (i.e., in person, PowerPoint™, video, web-based, or combination of the above). Team input will be incorporated into the final training curriculum.

Responsibility: OPPTD staff will be responsible for completing Task 1 and assembling the AB&P advisory team. Staff will visit at least four AB&P shops and attend at least one spray technician training while developing the training curriculum.

Potential Partners: Potential partners for Task 1 include stakeholders from industry and government who will help ensure the quality and integrity of the training curriculum. Stakeholders and advisory team members will be sought from the following potential project partners:

- Corporate AB&P partners:
  - NAPA-affiliated collision repair centers
  - California State Automobile Association (CSAA) and affiliated AB&P shops
  - MAACO Auto Painting and Bodyworks
  - Miracle Auto Painting & Body Repair
- Car dealerships engaged in AB&P work:
  - Toyota
  - Ford
  - Honda
  - Volvo
  - General Motors
- Automobile paint manufacturers
  - PPG
  - Sherwin Williams
  - Dupont
- Industry Associations
  - California Auto Body Association
  - National Paints & Coatings Association, California Paint Council
- Nonprofit resource centers and training providers for the AB&P industry:
  - Coordinating Committee for Automotive Repair (CCAR), including their web-based CCAR-Green Link Virtual Shop
  - I-CAR
  - Coatings Care, affiliated with the National Paints & Coatings Association
  - Paints and Coatings Resource Center (PARC)
  - The Coatings Guide™
  - Peaks to Prairies P2 Information Center
  - Iowa Waste Reduction Center
- State and local government agencies
  - California Air Resources Board
  - CUPAs and the Cal CUPA Forum
  - Air Quality Management Districts (AQMDs)
  - San Francisco Department of Public Health

- Publicly-owned Treatment Works (POTWs)
- Green Business Programs
- Regional Environmental Business Resource Assistance Centers (REBRACs)

Task 2 Health and Safety Review of Alternative Products

Objective: To ensure that P2 products, such as alternative coatings and solvents, are non-toxic, and environmentally friendly.

Description: Task 2 will involve a dynamic process where OPPTD will coordinate with product manufacturers, suppliers, technician training schools, AB&P trade associations, industrial hygienists and toxicologists working together to ensure that alternative products are environmentally safe and acceptable to the marketplace. These products include alternative paints and coatings (i.e., water-based and low VOC) and alternative solvents.

DTSC's industrial hygienists and toxicologists will evaluate alternative coatings, solvents and processes for health and safety concerns and environmental concerns associated with using and discarding these alternative products. These specialists will assist in assessing worker health and safety during normal use of these alternate products. They will also evaluate alternative products for short- or long-term implications regarding their use, worker health and safety, the environment, or exposure to surrounding populations. Any concerns raised about these alternative products will be shared with the manufacturer and the involved schools and shops, who will together be encouraged to work toward a resolution.

Marketing and product promotion: When safe and effective alternative products and processes become available in the marketplace, OPPTD will work with the advisory team to ensure that these products and processes also make good business sense before promoting them. OPPTD will also ensure that industry associations, AB&P resource centers, and training providers are informed of these products, and their quality, performance and safety. OPPTD will share major milestones in product development and the availability of new high quality, environmentally friendly products with the advisory team and other stakeholders enabling them to disseminate this information to AB&P corporations and shops, via their websites, publications, and other outreach efforts.

Responsibility: Each partner in this collaborative effort will have a unique role:

- OPPTD will ensure that information on the toxicity evaluation regarding alternative products is shared with stakeholders and the advisory team.
- Paint and product manufacturer partners that develop alternative products will share them with DTSC and the spray technician schools.
- Spray technician schools will test the products for ease of use and performance.
- Industrial hygienists and toxicologists will evaluate products for environmental and health and safety concerns associated with product use.

- Project partners will evaluate alternative products, processes and technologies to determine if they make good business sense.
- Project partners will disseminate information on safe and effective alternative products to AB&P corporations and shops via their websites, publications, and other outreach efforts.

Inherent in developing these relationships is the opportunity to capitalize on existing collaborations within this industry.

Potential Partners: Potential partners for Task 2 include the automobile paint manufacturers, the nonprofit resource centers and training providers for the AB&P industry, and industry associations listed under Task 1. Toyota's Technician Training School has expressed interest in participating with this endeavor.

Task 3 Develop Training Program, Training Delivery Strategy, and Support Infrastructure

Objective: The objective of Task 3 is to develop a comprehensive training program and support infrastructure that is accessible to and understandable by all interested AB&P shops and local agencies.

Description: Task 3 will first involve developing the training curriculum into a training program that may include in-person training, technology demonstrations, hands-on training, videos, props, or combination of the above. When possible and appropriate, DTSC will rely on existing training programs, videos, materials and online resources. How the training is delivered will depend upon availability of existing materials and funding, which is uncertain at this time. For example, in lieu of developing a comprehensive self-paced training video similar to the one developed for the VSR program, OPPTD may only have enough contract funds to develop a limited number of short subject-specific videos that can be used during in-person training sessions.

Task 3 will also involve developing and publishing training and informational materials that support the overall training program and making these materials available online. These materials include fact sheets, case studies, and informational pamphlets called "tool kits." Fact sheets and tool kits will contain the same information covered in the training curriculum, but in greater detail. Case studies will include facility-specific P2 success stories with detailed information on the P2 measures implemented, cost, training

LaserTouch™ spray targeting system

requirements, payback periods, and industry's general response. Advisory team members will help identify shops to feature in case studies.

This task will also involve developing a P2 checklist. The goal of the P2 checklist will be to establish a minimum level of implementation. The checklist could be used as a tool to evaluate AB&P shops that have implemented P2 measures covered in the training. Initially, such a checklist will be available to Green Business Programs for their use in evaluating the P2 component of a shop's Green Business application. For example, shops that score at or above a minimum threshold will satisfy the P2 requirements for becoming certified as a Green Business. Should OPPTD and its partners decide to evolve the AB&P P2 program into a model shop program similar to the VSR Model Shop program, the P2 checklist could be used to evaluate model shop status.

To ensure that AB&P P2 program information and supporting materials are easily accessible to program partners and shops, Task 3 will involve developing an AB&P P2 website. This website will serve as a centralized point for OPPTD to interact with partners and shops interested in the program, schedule training venues, and provide easy access to the P2 checklist, fact sheets, tool kits, and case studies.

If funding becomes available, OPPTD will develop an online directory of P2 products, supplies and services as part of the AB&P P2 program support infrastructure. Such a directory would be similar to the directory developed for OPPTD's VSR P2 program http://www.dtsc.ca.gov/PollutionPrevention/VSR/ and would direct AB&P shops to the products and services covered in the training. If it is not feasible to develop an online directory, supplier information and website links will be provided through DTSC's AB&P website.

Training program testing: To ensure that the training program meets objectives and expectations, OPPTD will test the training program at select shops and seek input from the advisory team and other interested partners on all of the elements of the training program described above before they are finalized.

Responsibility: OPPTD staff will be responsible for incorporating the training curriculum into a training program. In addition to drawing information from the internet and existing training programs, staff will collaborate with outstanding performers in the AB&P industry, trainers, suppliers of P2 products and services, and interested members of the advisory team to help develop the presentation and delivery of the training. If funding is available for filming and editing, OPPTD will seek to involve these entities in the creation of a comprehensive video. OPPTD staff will prepare the fact sheets, tool kits and case studies, relying on information available from the internet and representatives from AB&P industry. Depending on the ability of staff and/or funding, graphic design of fact sheets and tool kits will be completed in-house or contracted to a graphic design firm. OPPTD will also seek funding opportunities through project partners for the development and production of a training video and collateral materials. OPPTD staff will collaborate with local agencies and Green Business Programs to develop the P2 checklist. OPPTD staff will work with DTSC's Office of Environmental Information

Management (OEIM) to develop an online directory, and will collaborate with industry partners to develop the AB&P website.

Potential partners: Potential partners for Task 3 include those who will participate in or contribute to the development of the training program, including the same potential partners listed in Task 1.

Task 4 Gain Commitments from the AB&P Industry and Local Agencies to Help Implement the Program

Objective: The objective of Task 4 is to build relationships and develop partnerships with corporations and local agencies, and involve them in the development, outreach, promotion and implementation of the AB&P program.

Description: OPPTD will continually cultivate relationships with the AB&P advisory team members and partners (listed under Task 1) who choose to get involved in the development of the training program. Because training program development will be a collaborative effort involving these partners, OPPTD anticipates all partners will be optimistic about the program and its future potential. In addition to participating in the development of the AB&P program, committed partners will play an active role in promoting participation in the program among the industry, implementing the program (Task 5), and monitoring program success.

In order to assemble well rounded team of project partners, OPPTD will strive to gain commitments from the following:

1. At least three corporations (i.e., auto dealerships, AB&P corporations) committed to disseminating the program to their affiliated or franchise shops, and providing ongoing technical and program support.
2. At least one paint manufacturer committed to developing safer alternative coating systems, or promoting existing safe alternative coating systems, and disseminating program information to their clients.
3. At least one spray technician training program committed to incorporating P2 curriculum into its standard training and disseminating AB&P program information.
4. At least ten local partners from Green Business Programs, REBRACs, AQMDs, CUPAs, and POTWs committed to disseminating program information to AB&P shops within their jurisdictions, receiving inspector training, providing ongoing technical support to shops implementing the training, and assessing program implementation through shop inspections and completion of the P2 checklist.

Since OPPTD will rely on its partners and regional DTSC inspectors to help promote the program, we will make every effort to give the training to our partners and inspectors before or during the early stages of program implementation. Training corporate partners will enable them to speak informatively about the program while they are trying to encourage AB&P shops to adopt it. Trained inspectors will provide a valuable service

to shops seeking advice or wishing to be evaluated based on the P2 checklist developed under Task 3.

Responsibility: OPPTD is responsible for communicating with potential partners, involving them in the program development process, securing their commitments to participate in program outreach and implementation, and providing training.

Potential partners: Potential partners who will take an active role in outreach and program implementation may include the AB&P advisory team as well as other corporate AB&P partners, car dealerships, and state and local partners listed under Task 1.

Task 5 Market, Promote and Implement the AB&P P2 Program

Objective: The objective of Task 5 is to capitalize on the demand for the program by encouraging AB&P shops, suppliers and equipment manufactures to participate in this P2 program, and providing technical and regulatory assistance to shops during P2 implementation. Task 5 will require a collaborative effort between OPPTD, DTSC regional inspectors, and the project partners identified in Task 4.

Description: The key to Task 5 is to understand the business motivators and values of (i.e., demand for) the program, to develop a marketing strategy that capitalizes on this demand, and then create widespread awareness of the AB&P P2 program when the program is ready for release. OPPTD will organize press events, issue press releases, and make public service announcements. Using the media, we will commend our partners for adopting and being a part of this promising AB&P P2 program, while at the same time make the public aware of the program and its value.

At the corporate partner level, OPPTD will work with regional business managers to promote the program to their AB&P shops and affiliates. Regional managers will be responsible for organizing training workshops, and will have the opportunity to promote their own P2 products and services.

Local partners will serve an important role in disseminating information and facilitating training to AB&P shops that are not affiliated with the corporate partners. Green Business Programs, CUPAs, AQMDs, DTSC inspectors, and POTWs can inform AB&P shops within their jurisdiction about the program during inspections. They can also organize training workshops for their regulated community, and promote the program in local newsletters and in routine correspondence. Similarly, the California CUPA forum and REBRACs can organize training workshops and promote the program through news letters, their web sites, and other outreach efforts. OPPTD will support the local partners as needed.

OPPTD will respond in some way to all requests for training. First priority will be given to requests for training workshops organized by our local and corporate partners, because these venues will likely reach more people, thus better leveraging OPPTD's

limited resources. Second priority will be given to individual shops. Local inspectors and business assistance providers who have not yet received the training will be encouraged to attend these technician training workshops.

Responsibility: OPPTD will be responsible for providing outreach and technical materials to corporate and local partners, and to anyone who is interested. We will provide AB&P P2 training to local and corporate partners, to technicians at workshops arranged by our partners, and to individual shops requesting the training. As indicated above, corporate, industry and local partners will play a major role in outreach, making AB&P shops aware of the program, and setting up the training workshops. This will also leverage OPPTD's resources.

The ultimate transfer of program responsibility to our public and private sector partners will be accomplished by:

- determining the environmental values of the program's components (i.e., improved compliance, improved worker health and safety, and the psychological benefits that come from improving the environment), and relating these values to the business values and motivators (i.e., market positioning, increased sales, reduced operating expenses) of the partners who express an interest in carrying the program beyond its first two years;
- tracking the program's accomplishments relative to these values in cooperation with these partners; and
- designing and building program models that have the highest probability of being adopted by our partners by capitalizing on these values and proven results.

Potential partners: Potential partners include those listed under Task 1. In addition, industry associations such as the California Auto Body Association and the National Paints & Coatings Council will be asked to promote the AB&P P2 program through their web sites.

Evaluation – Measures of Success

OPPTD will develop a measurement strategy for the AB&P program that compares baseline performance to post-implementation performance. Success will be measured on several levels:

- Number of shops receiving the training;
- Number of shops obtaining above the threshold established on the P2 checklist;
- Number of partners seeking to independently pursue implementation;
- Reduction in pounds of hazardous waste generated due to P2 implementation;
- Reduction in paint usage per unit of measure;
- Reduction in solvent usage for cleanup; and
- Number of shops meeting SCAQMD levels or better for VOCs in various coatings and solvents.

Activities
OPPTD will develop procedures and forms that can be used to track progress and measure program success. A database will be developed to log the shops participating in the program, and will be used to track their progress and keep track of measurement information as it becomes available. Measurement strategies developed and implemented under similar existing programs will be evaluated for good ideas.

Number of shops receiving training. Each shop that receives the training will be logged into a database, creating a file for that shop.

Baseline. Each shop that chooses to implement P2 strategies will be asked to complete a baseline survey to document their average work load and paint usage, hazardous waste generation, solvent usage, average VOC content in coatings, and existing P2 measures. OPPTD will review case studies and work with industry and agency partners to determine the most efficient way to collect baseline information so as to not overburden shop workers and OPPTD staff. OPPTD will use VOC calculators (http://www.paintcenter.org/calc_main.cfm) to determine baseline shop emissions from the application of coatings. The baseline information collected from this survey will be logged into the database.

P2 Checklist. Once a shop has received the training and has implemented P2 measures, it will have the option to be inspected by a third party to see if it can achieve above the threshold on the P2 checklist developed under Task 2. Green Business Programs have expressed interest in using a P2 checklist to evaluate AB&P shops that want Green Business Certification. Corporate-affiliated AB&P shops (i.e., dealerships, AAA, NAPA, MAACO, and Miracle) may be interested in using the P2 checklist to establishing a minimum level of implementation for their shops adopting the program. Checklist scores will be logged into the database.

Post implementation survey. Each shop that has completed the training and implemented best management practices (BMPs) and P2 measures will complete a follow-up survey that asks for the same information as the baseline survey. OPPTD will log this information into the database and compare it with each shop's baseline data. The follow-up survey will also seek input on customer satisfaction, technician's adaptation to change, and ease of application of BMPs and P2 strategies.

Have we achieved our project goals?
The information obtained from the baseline and follow-up surveys will enable OPPTD to determine if the project goals (i.e., number of shops participating, hazardous waste and emission reductions) have been met. At lease one year after making the program available, but no later than June 30, 2007, OPPTD will compile a progress report that highlights the program successes, details areas for improvement, shares promising P2 opportunities through case studies, and gives industry's reaction to the program. The progress report will be distributed broadly to give credit to all who participated and to promote similar voluntary programs within DTSC and other agencies in California and beyond.

Contribution to Environmental Protection Indicators
Two of Cal/EPA's EPIC indicators are relevant to the AB&P industry:

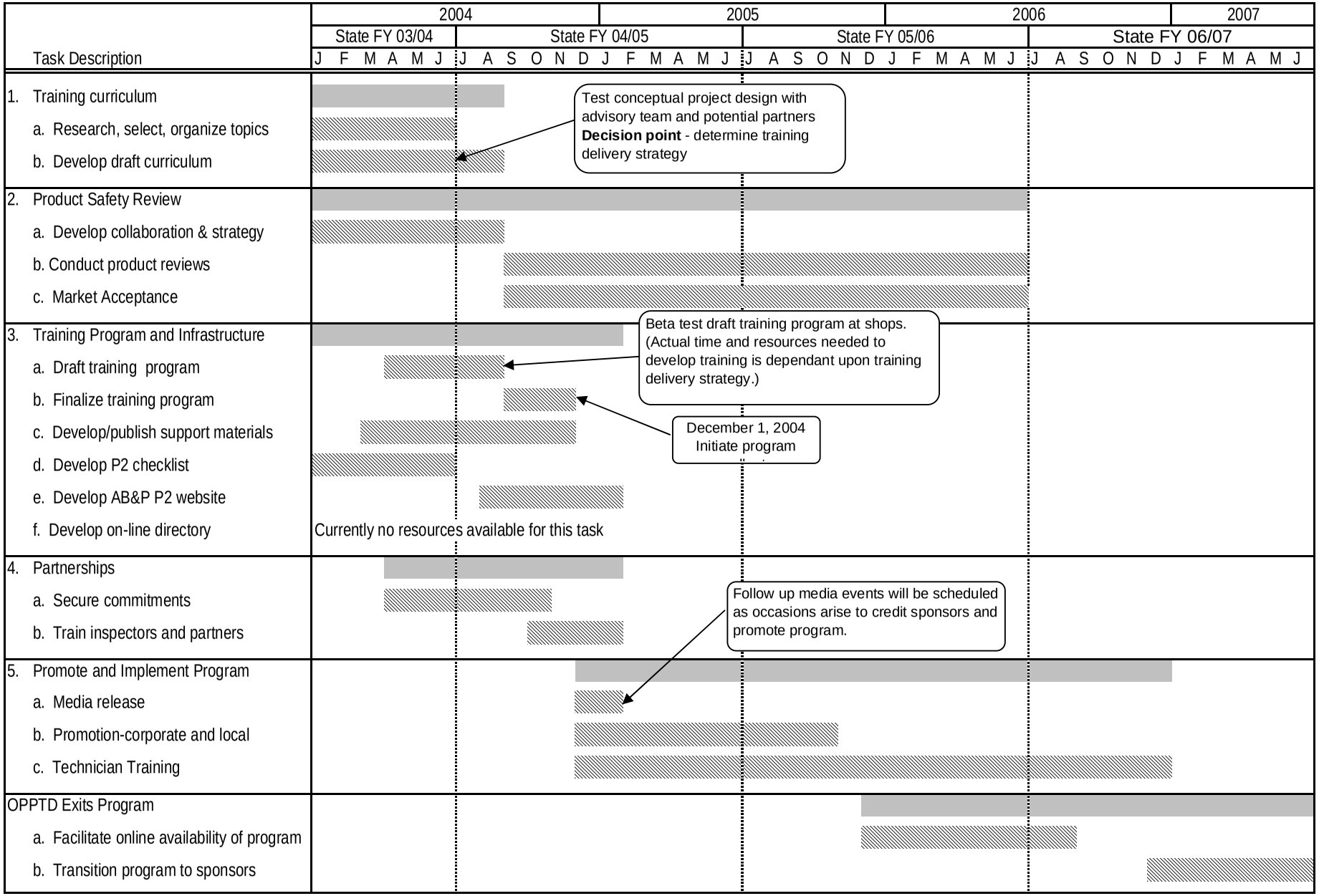
- Total emission of toxic air contaminants
- Volume of hazardous waste exported (i.e., shipped off site)

By achieving the project goals listed earlier in this workplan, this voluntary program will help the AB&P industry make a positive contribution toward reducing emissions of toxic air contaminants, such as the VOCs released during automotive coating operations. Achieving the project goals will also have the net result of decreasing hazardous waste exports through source reduction and recycling.

Project Schedule

AB&P project tasks will be initiated and completed according to the schedule and timeline provided on Table 2.

Table 2: Schedule and Timeline for Auto Body Paint Pollution Prevention Program



Exit Strategy

The development of an exit strategy is essential and dynamic. AB&P program elements and strategies may change as the program progresses to capitalize on the program's economic and environmental values. Such positive changes will increase the likelihood of the project being transferred to willing partners.

By June 30, 2007, OPPTD will transfer AB&P program responsibility to willing partners. Successful transition will rely on two very important components:

1. web availability of training and support materials, and
2. partners who will take responsibility for critical program elements.

Once the training program, support materials, checklist, and measurement worksheets have been developed and finalized, they will be posted on DTSC's AB&P P2 website. Web posting will serve several purposes:

- Provide willing partners easy access to needed materials;
- Provide information on or links to new technologies, products, and BMPs relevant to the AB&P industry;
- Inform interested AB&P shops and partners about the program and how to participate; and
- Provide a mechanism for tracking and reporting program success beyond July 2007.

During calendar year 2006, staff will be talking to partners engaged in AB&P work and technician training to seek interest in taking on one or more aspect of long-term AB&P program maintenance. Corporate partners and automobile dealerships will be asked to assume program responsibility for their affiliated or franchise shops and dealerships. State and local agency partners, business assistance centers, and GBPs will be asked to assume program responsibility for their specific geographic areas. Responsibilities will include continuing outreach to businesses, information dissemination, and providing technical assistance. Community colleges and training centers will be asked to continue the technician training component of the program. Starting in January 2007, OPPTD will discontinue training courses and transition these aspects of AB&P program responsibility to the willing partners.

After June 2007, OPPTD will commit limited staff resources to:

- Maintain and update the AB&P P2 website with new information and links to technologies, products, and BMP's;
- Collect measurement information, including baseline and post implementation data, and report on program success (via the AB&P P2 website), including what our partners are doing, number of shops participating, waste and emission reduction accomplishments, case studies and success stories;
- Create a listserve to update partners and shops about AB&P P2 website updates; and
- Provide on-call technical or administrative assistance to partners, as needed.

Section 3: Mercury (Hg) Elimination Leadership Program (HELP) A Voluntary Pollution Prevention Program for Hospitals

Background

Problem Description

Senate Bill 1916 required that DTSC "develop a low-cost voluntary program to further reduce generation of hazardous waste by large businesses in California . . . designed to promote cooperative relationships between California business and the department, while creating a significant environmental benefit from reduced hazardous waste generation." DTSC determined, during discussions with the Pollution Prevention Advisory Committee (Advisory Committee), that the Mercury (Hg) Elimination Leadership Program (HELP) mercury challenge for hospitals would be most appropriate for implementation. This challenge is for California hospitals to reach virtual mercury elimination by the end of year 2005.

Industry Description – Demographics and Targeted Practices

In 1998, DTSC published the "Pollution Prevention Guide for Hospitals." This was the result of reviewing Source Reduction Evaluation Plans and Reports from 29 hospitals that produced more than 12,000 kilograms (13.2 tons) of hazardous waste or more than 12 kilograms (26 pounds) of extremely hazardous waste in 1990 [Hazardous Waste Source Reduction and Management Review Act of 1989 (SB 14)]. This document discusses pollution prevention for hazardous wastes generated by hospitals, including mercury, which is considered to be an extremely hazardous waste. It also includes waste minimization option evaluation tables and case studies. Due to the de-listing of silver waste, hospitals are no longer large generators and do not fall under SB 14 requirements.

On June 24, 1998, the American Hospital Association and U.S. EPA, in consultation with Health Care Without Harm, a group representing 80 nongovernmental organizations, reached a landmark agreement to work in voluntary partnership to virtually eliminate mercury waste generated by hospitals by December 2005. The American Hospital Association is a national organization that represents and services nearly 5,000 hospitals, healthcare networks, and their patients and communities.

In 1999, the California Department of Health Services (DHS), which regulates medical waste, received a Pollution Prevention Incentives for States grant from U.S. EPA to develop pollution prevention programs at 6 San Francisco Bay Area hospitals with the intent of transferring the lessons learned to other healthcare facilities. DTSC augmented these efforts with SB 1916 funds by contracting with DHS to conduct mercury audits at these hospitals and develop a "Guide to Mercury Assessment and Elimination in Healthcare Facilities." This guide provides tools for hospitals to conduct their own mercury audits and demonstrates that viable mercury-free substitutions can be made. An Excel spreadsheet allows the hospitals to automatically calculate the amount of mercury being removed.

This set of esophageal dilators (bougies) weighs about 12 pounds. The weight is necessary to insert the device into the patient's stenosed (constricted) food tube. These mercury-weighted bougies have been replaced with tungsten gel filled models. (© CA DHS HP3)

The documented costs of mercury spills can outweigh the equipment replacement costs. UCLA spent $39,883 for mercury disposal and $28,059 in personnel costs for spills on campus from 1997 through 1999. Removing mercury from incineration and sanitary sewers are the major goals of eliminating mercury from hospital waste streams.

Staff using a mercury vacuum to clean up mercury from an office carpet. (Photo courtesy of UCLA, Office of Environment, Health & Safety)

Micro vacuum being used to pick up spilled mercury. (Photo courtesy of UCLA, Office of Environment, Health & Safety)

Project Goal

The project goal continues to be the virtual elimination of mercury in California hospitals. The Environmental Leadership Council's (American Hospitals Association/U.S. EPA Council) approved definition for virtual elimination (as it applies to mercury under the American Hospitals Association/U.S. EPA memorandum of understanding) is "the elimination of the disposal or improper discharge of mercury from a facility and the replacement of existing products which contain mercury with those that are mercury-free or as mercury-free as possible."

Specific Goal Related to Measure of Success

Our goal is that California will be the lead in the nation in having the most hospitals committed to the goal of virtual mercury elimination by 2005.

Strategies and Identification of Potential Partners

In the spring of 2002, DTSC met with DHS because of previous mercury elimination work with them, to develop a partnership for this project. Other partners on this project

are the California Healthcare Association (CHA), U.S. EPA Region IX, and Hospitals for a Healthy Environment (H2E). As a hospital signs up to be a partner with HELP, they are also given the option to have DTSC sign them up as a member of H2E. A hospital reaching virtual mercury elimination not only receives recognition from California's DTSC, but will also qualify for the national H2E "Making Medicine Mercury-free". A hospital's publicly owned treatment works (POTW) is also given the option to partner in the project with their hospital.

DTSC is using the definition for a "general acute care hospital" under Health and Safety Code Section 1250(a) to define the hospitals targeted for this project. However, any healthcare facility reaching the goals of the program will receive a certificate of appreciation. The challenge to become a mercury-free facility by December 2005 was issued to California hospitals by correspondence on October 4, 2002. The letter was sent to both the hospitals' administrators and hazardous waste or health and safety officers. Copies of the letters were also sent to the hospital's local enforcement agency and POTW.

Evaluation – Measure of Success

Activities
Over the past year, 105 hospitals and 8 POTWs have signed up as partners in HELP. Twenty-one of the hospitals are independent; the remainder belong to a hospital system. Twelve training sessions in mercury elimination were provided to over 520 attendees interested in hospital pollution prevention. Those in attendance statewide included hospitals, POTWs, CUPAs, and local medical waste management enforcement staff.

Contribution to Environmental Indicator
Certificates of appreciation for virtual mercury elimination were presented to 25 hospitals with a total of 364,204 grams or 803 pounds of mercury being removed from these facilities. If we achieve virtual mercury elimination from the current 105 hospitals who have partnered with our project, we project the removal of approximately 2,029,188 grams or 2.2 tons of mercury statewide. We hope there will be an increase in enrollment to HELP by hospitals once the new webpage is advertised and hospitals are able to apply online. DTSC will continue to work to develop commitments from hospitals to sign up for the HELP program, provide assistance in mercury elimination, and collect data to measure project success.

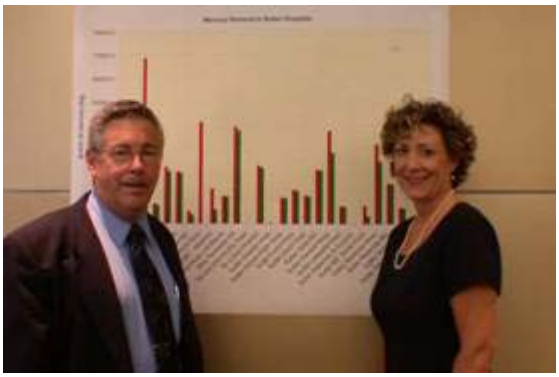
Bedside mercury sphygmomanometer commonly found in hospitals. (© CA DHS HP3)

The bedside mercury sphygmomanometer has been replaced with an aneroid unit. (© CA DHS HP3)

Every hospital refrigerator must have a thermometer. This mercury thermometer could easily be replaced with an alcohol/spirit thermometer. (© CA DHS HP3)

HELP Award Recipients

Alta Bates Summit Med Ctr – Ashby Campus
Alta Bates Summit Med Ctr – Herrick Campus
Alta Bates Summit Med Ctr – Summit Campus
Marin General Hospital
Memorial Hospital Los Banos
Sutter Maternity & Surgery Center
City of Hope National Medical Center
Eden Medical Center
Memorial Medical Center Modesto
Mills Peninsula Health Services
Novato Community Hospital
Sutter Auburn Faith Hospital
Sutter Coast Hospital
Sutter Davis Hospital
Sutter Delta Medical Center
Sutter General Hospital
Sutter Lakeside Hospital
Sutter Memorial Hospital Sacramento
Sutter Roseville Medical Center
Sutter Solano Medical Center
Stanford Hospitals and Clinics
Kaiser Permanente Fontana Medical Center
Kaiser Permanente Fresno Medical Center
Kaiser Permanente Roseville Medical Center
Kaiser Permanente Santa Rosa Medical Center



Progress of mercury removal at Sutter Health System. Jack McGurk, Chief of Environmental Management at DHS and Tracy Robles of Sutter Health. (© CA DHS HP3)

Right: September 5, 2003 DTSC Director Ed Lowry and Jack McGurk, Chief of Environmental Management of DHS, present Sutter Health HELP Awards. (© CA DHS HP3)

A CD has been developed that contains all of the tools needed for a hospital to work on eliminating mercury from their facility. Examples of the tools on the CD include a listing of mercury-containing devices in a healthcare setting, a spreadsheet to account for specific mercury sources within individual facilities, a list of licensed mercury recyclers and take-back programs, and the new Universal Waste Rule regulations for the handling of mercury products. Forms for signing up for the program are included on the CD. Other related current healthcare pollution prevention tools are included on the CD to provide additional resources for hospitals on the cutting edge of implementing pollution prevention.

Milestone Timelines

January 2004 - December 2004

Toolkits will be mailed to all of the hospitals that sign up as partners with HELP. A link from http://www.dtsc.ca.gov/HazardousWaste/Mercury/HELP/ allows hospitals and POTWs to enroll online. It contains all of the materials in the toolkit along with other useful links.

DTSC will focus first on outreach to the hospital system administrators. There are 47 hospital systems in California. Of the 105 hospitals currently in HELP, 22 hospital systems are represented. With commitment from the hospital system administration for their member hospitals to work on mercury elimination, hospitals are able to get the funding needed to replace their instruments, approval to replace the previous laboratory procedures, and devote the time necessary to complete the transition. This has been demonstrated by the commitment by both Sutter Health System and Kaiser Permanente Health System. Sutter Health System and Kaiser Permanente Health System have committed to reach the goal of virtual mercury elimination by Spring of 2004. Catholic Healthcare West Health System will work with its members to sign up for the HELP program and set up regional training. The University of California (UC) Office of the President would like the UC hospitals to join HELP. UC San Francisco is mercury-free and will act as a model hospital for the other UC hospitals. UCSF will be working with us to recruit the UC hospitals and set up training.

The California Water Environment Association (CWEA), a large association for waste water industry professionals, has recently endorsed the HELP Program. Letters have been developed to be sent to the largest POTWs. These letters are invitations for the POTWs to send out letters to their hospitals to work with them on mercury elimination. We plan to also contact POTWs through their respective organizations that may express an interest, such as the American Metropolitan Sewerage Agencies Nationwide (AMSA), and the Bay Area Pollution Prevention Group (BAPPG) to encourage them to partner with their local hospitals and DTSC.

The California Association of Public Hospitals and Health System (CAPH) has agreed to put an article in their newsletter on HELP. All 36 of the county hospitals belong to CAPH. We will be on their agenda for their Fall 2004 meeting. They are also researching whether it may be appropriate to attend their earlier regional meetings.

DTSC will work with CHA to schedule training with their members' hospital engineers. All of the California acute care hospitals belong to CHA. CHA has committed to continue presenting articles in their newsletters and coordinating training with the member hospitals. CHA will be placing another article in their newsletter announcing our website and again encouraging members to sign up for the HELP program. We plan to attend the CHA engineers quarterly meeting to be held in Northern and Southern California. CHA also has quarterly hospitals system administrator meetings that would be an excellent opportunity to meet with system administrators.

Outreach and training continues with DHS through their local county enforcement agencies, along with outreach directly to those hospitals that do not belong to a hospital system.

January 2005 - December 2005

All of the activities of the previous year will continue. However, hospitals will be reminded that DTSC will no longer present awards to hospitals after December 2005.

Exit Strategy – Project Termination or Transition

The goal of the voluntary partnership of the American Hospital Association, U.S. EPA, and Health Care Without Harm is virtual elimination of mercury waste generated by hospitals by 2005. In conjunction with this, DTSC will end the Mercury Elimination Leadership Award presentations by December 31, 2005. A transition plan will be explored to consider the continuation of the awards through one of the HELP partners. DTSC will also explore a method of condensing and disseminating the information on mercury elimination into a format appropriate for sharing with physicians' offices and medical groups.

Section 4: Other DTSC Pollution Prevention Activities

Marketing

Pollution prevention is not new. What is new is OPPTD's marketing approach to pollution prevention. Since P2 is voluntary, the acceptance, implementation and adoption of pollution prevention are driven by market forces. Therefore, OPPTD is now relying on marketing and building business relationships to design and implement its P2 programs. OPPTD has realized it needs to think like "them", to understand how and why pollution prevention makes good business sense to our private sector clients.

Marketing is essential to pollution prevention. Pollution prevention is conceptually different from pollution control. Pollution control is typically enforcement-driven and relies on capturing pollutants after they are created and hopefully before their release into the environment. Pollution prevention, on the other hand, or as some people say, at the other end of the pipe, focuses on eliminating or reducing environmental waste before it is generated. Although pollution prevention is voluntary, it can make very good business sense if approached as a business decision. Pollution prevention is solution-based. It provides problem solving opportunities driven by a variety of business motivators including: economics, public relations, image, market positioning and compliance. Through marketing, pollution prevention can capitalize on these business motivators and problem solving opportunities that make good business sense and offer our clients programs that eliminate or minimize pollution before it starts, increase efficiency, reduce operating expenses, decrease employee exposure to harmful chemicals, and reduce long term liability.

To create a successful P2 program, it is important for OPPTD to develop partnerships with the private sector. What appears on the surface to be a simple dynamic between government and business is actually very complex. OPPTD has learned through its marketing efforts that, to expect a business to devote its scarce resources to a voluntary environmental program, it needs to think like a businessperson.

Successful marketing also includes a marketing research component. Marketing research for OPPTD assists with evaluating opportunities for future program direction, development, and expansion. Marketing research in this context would evaluate the short and long term potential outcomes and probable environmental benefit of potential future program considerations. Marketing research, as practiced in the private sector is integral to the initial decision making process to develop a new product or service idea by assessing the probability of success. The same concept is also beneficial in the strategic decision making process in the government sector, whether it is for present or future program direction, by determining the various factors of success and evaluating the variables associated with each factor relative to the expected outcomes of the proposed program idea.

Industry Forums

During the prior planning year, DTSC cosponsored two successful industry forums: one with the petroleum refining industry, and one with the semiconductor industry.

The idea for a petroleum forum was developed following DTSC's decision to discontinue the ambitions stakeholder-based refinery project for security reasons following the events of September 11, 2001. The Advisory Committee encouraged DTSC to work with the industry to develop a new voluntary refinery project unrelated to SB 1916. This new project involved assembling at team of individuals from OPPTD, Western States Petroleum Association (WSPA), and interested representatives from California's refineries. After months of planning, the team organized a one-day technical forum that brought together environmental staff and managers from all of California's petroleum refiners, as well as industry representatives from Washington State and Texas. Attendees learned P2 strategies for granular activated carbon applications and spent abrasives, and learned about new universal waste mandates and fluorescent lamp crusher technology development. Response to the technical forum was very favorable with most of the attendees indicating that they envision applying what they learned at their facilities. Forum technical proceedings are at www.dtsc.ca.gov.

The team is currently planning a similar technical forum to take place in spring or fall 2004. The 2004 technical forum may include multimedia discussion on soils management; policies and procedures for a P2 program; a review of the results from the 2003 forum (i.e., which technologies were applied, what worked, what didn't); and a source reduction technology selected from industry SB 14 source reduction documents. The 2004 forum will focus on opportunities and obstacles to source reduction and improved waste management practices, and will include speakers from industry, DTSC, and other Cal/EPA boards, departments and offices.

In November 2003, OPPTD and the Semiconductor Environment, Safety and Health Association (SESHA) sponsored a one-day P2 mini-conference. This well-attended event attracted environmental staff and managers from most of California's major semiconductor companies. Topics included chemical management strategies, facility decommissioning activities, copper waste treatment, implemented source reduction measures documented in facilities' SB 14 documents, and regulatory updates. Presentation materials are available at SESHA's website http://seshaonline.org and at www.dtsc.ca.gov.

Implementation of the Hazardous Waste Source Reduction and Management Review Act (SB 14, 1989)

The Hazardous Waste Source Reduction and Management Review Act (SB 14) requires that larger quantity generators evaluate source reduction opportunities and report on accomplishments every four years. The most recent SB 14 documents, including the Source Reduction Plan, the Hazardous Waste Management Performance Report and the Summary Progress Report (SPR), were due September 1, 2003.

The four-year planning horizon within SB 14 causes DTSC's work in this area to be cyclic in nature. During the first two years after the plans are due, DTSC gathers data and assesses industries' source reduction efforts. During the year before plans are due, DTSC focuses on outreach to alert the regulated community that plans are again due the following year. Every year, DTSC makes presentations related to SB 14, answers generator questions and/or provides training.

Summary Progress Report Follow-up

Prior to 1999, facilities subject to SB 14 were not required to submit any source reduction documents to DTSC unless DTSC specifically requested them. In 1998, a statutory change instituted the "SPR," with a requirement for all businesses subject to SB 14 to submit their SPR to DTSC. For the first time, generators were required to prepare and submit documents indicating compliance with SB 14. This has enabled DTSC to more accurately determine the number of facilities that are covered by the program, identify facilities that have not complied with SB 14, and identify facilities that are no longer required to report.

For the previous SB 14 reporting period of 1998, DTSC used information compiled from the submission of SPRs to identify facilities that were not in compliance with SB 14 reporting requirements. DTSC mailed non-compliant generators notices informing them of their SB 14 status and their reporting requirements. The initial letter was sent to approximately 5,200 facilities. A follow-up letter was sent to 3,000 that did not respond to the first letter.

As part of the effort, staff has responded to hundreds of phone calls, received and logged SPRs and prepared correspondence continuing through 2002. Of the 1,100 facilities that remain, the 300 non-compliant businesses generating the largest quantities of waste were identified for possible future enforcement actions, which may include the assessment of penalties.

As a result of staff working with the 300 non-compliant facilities, all but two facilities either complied with SB 14 by submitting a SPR or were determined to be exempt from SB 14. The two remaining facilities were assessed penalties in late 2002 for failure to comply with SB 14 and were required to prepare and submit complete SB 14 documents in order to return to compliance.

As a result of staff efforts the following our records show:

- approximately 2,000 facilities submitted SB 14 documents/Summary Progress Reports;
- approximately 2,000 facilities self-certified as exempt from SB 14 requirements due to closure, exempted waste streams, small quantity generators, etc.

As facilities submit their SB 14 documents, DTSC staff conducted completeness reviews. Facilities were contacted regarding these reviews and the SB 14 program. With the first SB 14 enforcement project completed, three goals have been achieved:

- increased awareness of source reduction and the SB 14 program,
- increased SB 14 compliance, and
- refinement of the SB 14 database.

DTSC is continuing this enforcement process through the current SB 14 reporting cycle, which began in September 2003 with industry's preparation of SB 14 source reduction documents including the submittal of the next SPR. More than 1,200 generators submitted their 2002 SPR by the September 1, 2003 deadline. Staff is currently evaluating databases to help determine which additional facilities may be required to prepare SB 14 documents. DTSC will be mailing non-compliant generators notices informing them of their SB 14 status and their reporting requirements as was done during the previous reporting cycle. This will require staff working through 2004 to identify and work with non-compliant generators to assist them return to compliance. Also see the next page for a more detailed discussion of the SPR enforcement initiative.

Source Reduction Plan Reviews

A major task under SB 14 is the source reduction plan review process. This involves determining which industries to target for study, developing lists of generators within the target industry sectors, and formally requesting submittal of their plans and reports. The purpose of the review is twofold: to assure compliance and to identify viable source reduction alternatives that can be shared throughout the industry. During fiscal year 002/03, DTSC called in SB 14 documents from the chemical industry. Formal requests for these documents began in the late fall/early winter of 2002 with the review process continuing for the remainder of the fiscal year and the last half of fiscal year 2002/2003. Staff is currently preparing fact sheets, reports, and other documents to share findings for the chemical industry sector that has been targeted. In addition, staff has been reviewing SB 14 documents that were submitted voluntarily from generators. From the last half 2001 to late 2003, staff has received SB 14 source reduction documents from nearly 200 generators. Approximately 125 were reviewed by staff. Generators continue to voluntarily submit SB 14 documents and staff will continue to conduct reviews during the current SB 14 cycle.

New SB 14 Reporting Cycle

Commencing in fiscal year 02/03, the program conducted activities associated with the development of the next set of plans, which were due to DTSC by September 1, 2003.

During the Fall of 2002, the SB 14 Guidance Manual was updated and reprinted. Between Fall 2002 and September 2003, staff conducted extensive outreach to the regulated community. This included sending a notice to every SB 14 generator reminding them of the requirements as well as workshops for affected generators, consultants and local agencies. SB 14 workshops and presentations were given statewide, informing the regulated community of SB 14 requirements and reminding them of the compliance date for source reduction plans, hazardous waste management reports, and SPRs. During the last part of 2002 and through the first 8 months of 2003, staff gave over 25 SB 14/P2 presentations to nearly 800 attendees including generators, consultants and local agencies (CUPAs).

Industry assessments are also being prepared based on SB 14 reporting documents. Staff has recently completed a 1998 assessment of the petroleum refining industry based on the last set of SB 14 documents which will be published late 2003. To compliment this report, an updated assessment based on the 2002 set of petroleum refining SB 14 documents will be prepared during early 2004. Industry source reduction documents have already been obtained by staff to conduct this study. This second petroleum refining industry report will be published mid-2004.

Currently a 1998 and 2002 assessment of the source reduction efforts of the semiconductor industry are also currently under way. SB 14 documents from selected semiconductor facilities are being reviewed, and the target completion date for the assessment report is mid-2004. Furthermore, as mentioned previously on Section 1 (Large Business Project Workplan), DTSC coordinated with the Semiconductor Environment, Safety and Health Association and jointly held a well-attended semiconductor P2 conference on November 5, 2003 in Sunnyvale, California.

2002 SB 14 Summary Progress Report (SPR) Enforcement Initiative

The 2002 SPR was due to be prepared and submitted to DTSC by September 1, 2003. During the last SB 14 cycle (1998), approximately 700 SPRs were received by the September 1 due date. As a result of enforcement activities, a total of approximately 2,000 SPRs were finally received for the 1998 SB 14 cycle. For the current 2002 cycle, nearly 1,200 SPRs have been voluntarily submitted. This represents greater than a 70 percent increase from the previous voluntary SPR submittals. In order to maximize SPR compliance, DTSC is in the process of its latest enforcement initiative by preparing mailing lists to potential non-compliant SB 14 generators.

This year DTSC planned to initiate its SPR enforcement initiative in January 2004 for the following reasons:

- Lost student assistant due to budget cuts. The student would normally perform much of the work on the mailing list database.

- Support and technical staff completed data entry of paper SPRs into DTSC's new SPR electronic database on January 5, 2004. This enabled DTSC to effectively track SPR status prior to conducting extensive enforcement activities.

- Due to budget constraints no money was available for any type of mailing, no matter how small or inexpensive. Tentative funding for printing and mailing are just now (January 2004) available.

With improved budget and data management conditions it is anticipated that future enforcement initiatives will be planned to enable the first enforcement mailing to occur during the first week following the September 1 document receipt deadline. We anticipate a continued trend of fewer generators in our enforcement universe. This will mean a shorter and more direct return to compliance effort.

What to do with 2002 SB 14 Summary Progress Report Data?
The 2002 SB 14 SPR database contains general facility information such as location and type of business. Hazardous waste source reduction data is the central focus of the SPR and is presented in both a retrospective and forward looking manner. The most basic source reduction data collected is total source reduction achieved and source reduction projected by the individual reporting facilities. Source reduction achieved gives the quantity of hazardous waste that a specific facility has reduced due to their implementation of some type of change in their manufacturing process during the previous four year period. Source reduction projected gives the quantity of hazardous waste that a specific facility estimates that they will optimally reduce due to the implementation of some type of planned change in their manufacturing process over the next four years. These two data fields can be displayed to present statewide or local trends or they may be industry, facility or waste stream specific.

Other data available from the SPR are total waste generated during the specific SB 14 reporting years since the SPR has been available (1998 and 2002). Again, these may be very general statewide numbers or facility specific.

Once the 2002 SPRs are received and entered into the database, DTSC will be generating a 2002 SPR summary report. The summary report will offer the following information:

- Total statewide facilities reporting
- Total statewide quantity of hazardous waste generated
- Total statewide quantity of aqueous hazardous waste generated
- Total statewide quantity of non-aqueous waste generated
- Total statewide quantity of source reduction achieved and projected

DTSC anticipates pursuit of non-complying generators during Spring 2004. Following the submissions from this noncompliance effort, DTSC will compile a “summary report” by Fall 2004.

Table 3: SB 14 Implementation Workplan Summary

Activities	Outputs	Comments
1. Outreach & Education -Organize and conduct training -Make presentations -Respond to inquiries	As requested or when DTSC determines need --increased compliance with SB 14 --increased quality of SB 14 efforts	Major efforts started with revisions to the Guidance Manual in the fall of 2002. Extensive outreach Jan-Sept . 2003.
2. SB 14 Document Request and Review	--analyze data for targeting --technical review and analysis of approximately 100 source reduction plans --remote and onsite technical assistance, as needed --enforcement follow-up when necessary --results analysis --report preparation and distribution	New Source Reduction Plans and Reports were due Sept 2003.
3. CUPA Assistance -Technical assistance -Training	--cooperation of CUPA hazardous waste inspectors to promote P2 and SB 14 compliance --increased CUPA inspector capacity to review/enforce SB 14 plan requirements; --respond to CUPA requests for information, referrals	
4. Summary Progress Reports (SPR) -Summary Progress Report follow-up -Analyze and compile data	--increased compliance with SB 14 --publish results of SPR data analysis	

Other Activities

DTSC performs a number of activities that do not easily fit into any one of the above categories. In general, these activities tend to be cooperative projects involving commitment of staff time to support projects for which DTSC's P2 program is not the lead, but a supporting player. These include:

- coordinating with U.S. EPA Region IX's Pollution Prevention Team (quarterly meetings, review and comment on projects and deliverables, serving as speakers at U.S. EPA sponsored workshops, etc);

- participating as one of the principals of the Western Regional Pollution Prevention Network (a consortium of P2 programs within Region IX);
- conducting P2 projects and activities along the California/Mexico Border (conferences, training, technical assistance; and
- participating in national P2 workgroups (e.g., National Pollution Prevention Roundtable, the Forum on State and Tribal Toxics Actions, the Association of State and Territorial Solid Waste Management Officials, etc.).

Border P2 Training

DTSC has conducted seven training session along the California/Mexico Border related to pollution prevention, parts cleaning, and vehicle service and repair.

The Pollution Prevention Branch provides assistance to DTSC's Technology Development Branch on projects involving P2 technologies, including participating in final review panels. Resources are also expended on reviewing proposed state and federal laws and regulations, preparing federal grant applications (P2 Incentives to States, Resource Conservation and Recycling Act, etc.).

Because DTSC is not the lead organization on most of these projects, the level of resources that go into these projects tends to be limited by time and staff availability. Some of these projects may be quite deserving of more significant resource commitments if more staff time were available.

Table 4: Other DTSC P2 Activities Workplan Summary

Activities	Outputs	Comments
1. **Coordination with EPA Region IX** -Quarterly meetings -Provide speakers at EPA events	--ongoing coordination/communication with U.S. EPA P2 program	DTSC P2 staff work closely with U.S. EPA P2 staff to coordinate activities.
2. **Western Regional Pollution Prevention Network** -Participate in Steering Committee meetings -Assist in preparing reports for the federal grant -Assisting in preparing grant applications	--consistent and ongoing availability of P2 information, training and conference opportunities for CA local P2 programs.	This is an integral part of DTSC's support to California's local government P2 programs.
3. **Mexico Border** -Assist DTSC border coordinator -Attend state and regional committee meetings -Identify targets -Organize and conduct training -Respond to inquiries -Arrange for translations -Provide information for grant reports	--increased knowledge of P2 within border facilities --support to overall DTSC border efforts	This includes participation in multi-agency, multi-state or multi-national meetings.

Activities	Outputs	Comments
4. **National Programs** -Participate in NPPR conference (2) -Participate in periodic ASTWMO meetings (2-3 per year) -Participate in FOSTTA meetings (3 per year) --For each of the above, review and comment on U.S. EPA proposals	--consistent effort to include P2 as a primary element of environmental management system pilots. --increased DTSC knowledge of national efforts --continuing awareness of trends in environmental management and pollution prevention --ongoing training opportunities --DTSC input into national P2 initiatives	
5. **Technology Certification** -Participate on certification review teams -Provide technical reviews and comments	--ongoing coordination between P2 and technology development --exploit opportunities to promote P2 technologies	
6. **Laws and Regulations** -Review proposed laws and regulations from P2 perspective and provide comments	--exploit opportunities to provide P2 incentives through regulatory processes	Also see regulatory integration
7. **Grant Applications** -Prepare grant applications for DTSC P2 funding -Prepare letters of support for others seeking grant funding	--exploit opportunities to fund special DTSC or local-level projects through federal funding	
8. **Dept of Commerce Loan Review**	--increased availability of funding for facility P2 efforts note: due to recent budget and organizational changes this program will not be operational for the near future	--ensure loans are appropriate (P2, not treatment)

Local Government Support

California's regulatory structure places much of the day-to-day work with businesses, especially hazardous waste generators, at the local government level. For this reason, DTSC has consistently placed a high value on building and supporting local government P2 programs. DTSC's efforts in this area focus primarily on information transfer and assistance, especially through work with seven regional P2 committees that have been established to facilitate communications between local programs. Local programs participating on these regional committees include sewering agencies, local fire departments, air districts, environmental health programs, household hazardous waste collection programs, storm water run-off programs and regional water quality control boards. The regional committees typically meet on a bi-monthly basis. DTSC staff attend the meetings to share information between committees, as well as present information from DTSC and Cal/EPA.

Supporting Local Pollution Prevention Programs

During 2002-2003, DTSC:

- participated in over 50 local government P2 committee meetings designed to foster and support local government P2 efforts.
- co-sponsored National Pollution Prevention Week, in which over 120 local agencies conducted P2 events in their communities. DTSC printed and distributed the very popular P2 Week posters and t-shirts for the event.
- provided ongoing support for the Bay Area, San Diego, and the Monterey Bay Area Business Program. Also introduced the Green Business concepts to Sacramento County Business Environmental Resource Center.
- participated and co-sponsored the Western Regional Pollution Prevention Network, including co-sponsoring the annual P2 conference, which was attended by over 225 people in 2002 and 2003. Served as speakers and trainers as well as session moderators.

DTSC also assists in sponsoring and coordinating the annual local government P2 conference. For the last two years, this has been combined with a U.S. EPA Region IX-supported Western Regional Pollution Prevention Network conference. In 2001, this event also partnered with the California Water Environment Association.

Pollution Prevention Week (September 16-22, 2002 and September 17-23, 2003) is expected to continue and grow. DTSC will participate by developing and distributing posters, information packets, press releases, and other support materials to local P2 programs.

Table 5: Local Government Support Workplan Summary

Activities	Outputs	Comments
1. **Support Local Committees** -Attend regular meetings of 7 regional local govt. P2 committees -Technical support (publish/distribute minutes, etc.) -Establish new regional committees when appropriate (e.g., Monterey Bay area and Shasta County-Redding area)	-- support of dozens of California local agencies in each of the committees that provide P2 assistance and information to businesses --ongoing training for several hundred local P2 staff -- increased multi-media coordination by working with local and regional P2 programs across all environmental media	The newest committee to be started, the San Diego Area P2 Committee, is now established and is working toward multi-national activities.
2. **Pollution Prevention Week** -Prepare & distribute materials to local and State programs. -Work with East Bay Municipal Utility District on poster; print & distribute -Track & catalog events/results	--publish and distribute 7,500 posters used by local govt. staff in hundreds of public locations statewide --facilitate and participate in statewide activities during Sept.16-22, 2002, to promote P2 (over 100 events statewide)	
3. **Annual P2 Conference** -Work w/ committees on agenda training and session topics -Coordinate with WRP2 Network on event logistics -Assist in securing speakers -Moderate sessions -Attend conference -Distribute results	--training/conference/coordination opportunity for 200 local, state and federal P2 staff across California	
4. **Bay Area Green Business Support** -Attend periodic meetings -Provide technical support on targeted industries -Review industry-specific criteria	--strengthened local government efforts to promote P2 to small businesses and to communities by recognizing "green" businesses. --improved coordination with local government --shared information	

At the DTSC regional level, DTSC has been funded through its Resource Conservation and Recovery Act (RCRA)[6] grant to support the Bay Area Green Business Program. This is an ongoing demonstration project managed by the Association of Bay Area Governments to show how market forces can encourage more P2 implementation. Local governments in the San Francisco Bay area have developed industry-specific standards that include both compliance and P2 elements. "Green businesses" that meet the standards are given recognition by the local government and promoted to the

[6] RCRA, the "Resource Conservation and Recovery Act," is the federal law governing the classification and management of hazardous waste. States authorized to implement this federal program receive funding through grants, in this case, the "RCRA grant."

public as a preferable place to conduct business. DTSC provides technical support to the program and assists with technical detail and coordination between various state and local regulatory agencies

Integrating Pollution Prevention into Regulatory Programs

Compliance requirements can serve as an important motivator for businesses to implement P2. To be successful, pollution prevention must be viewed as a legitimate tool to be used by the regulatory programs to achieve their mission of protecting public health and the environment. DTSC continues to work toward the integration of P2 into regulatory activities, including inspections, enforcement, permitting, regulation development and the activities of the local-level hazardous waste regulatory agencies (which are overseen by DTSC's Hazardous Waste Management Program).

Recent organizational changes at DTSC have resulted in increased opportunities for P2 integration. In May of 2003, Director Edwin F. Lowry appointed Kim Wilhelm, then Chief of the Office of Pollution Prevention and Technology Development and long-time chief of DTSC's P2 program, as Division Chief of the Statewide Compliance Division (SCD), with a directive to further the integration of P2 into that Division's programs. At the same time, a reorganization within the Hazardous Waste Management Program placed DTSC's Certified Unified Program Agency (CUPA) oversight group within SCD, providing an opportunity to unify efforts to integrate P2 at the state and local levels.

As part of HWMP's recent reorganization, the southern California P2 regional seniors were assigned to the Permitting Division (PD), providing increased opportunities to work with PD management to ensure that permitting processes appropriately include P2. Final organizational changes occurred when a P2 regional senior was placed in the Sacramento regional office, and a P2 staff person in the Berkeley office was directed to expand his duties to include P2 integration into regulatory programs. These organizational changes, completed in the summer of 2003, have put in place the resources to provide at least a basic level of assistance to regulatory staff in each of the field offices (with the exception of the Clovis and San Diego satellite offices), and within both SCD and PD.

The long-term goal for integrating P2 into DTSC's regulatory programs is to assure that every interaction, whether permitting, inspections, enforcement, fee structures, regulations reform, technical assistance, etc., that DTSC has with the regulated community sends a consistent message about the value of P2 as the preferred approach for protecting public health and the environment.

P2 in Inspections and Enforcement

P2 staff, working with staff from the Statewide Compliance Division, is in the process of developing recommendations to SCD management to help define DTSC's efforts in integrating P2 into inspections, enforcement, and compliance assistance activities. Concurrently, regional P2 staff is increasing efforts to accompany inspectors on selected inspections in order to:

- Provide information about P2 practices to facility operators.
- Help inspectors evaluate facility compliance with requirements to address waste minimization in their:
  - Annual Report, [CCR §66264.75(h-j) requirement for generators to provide, in its annual report, the following information:
    - A description of the efforts undertaken during the year to reduce the volume and toxicity of waste generated,
    - A description of the changes in volume and toxicity of waste actually achieved during the year in comparison to previous years, and
    - A certification signed by the generator or authorized representative;
  - Annual certification requirement for onsite facilities to certify that it has a "program in place to reduce the volume and toxicity of all hazardous wastes which are generated by the facility operations to the degree, determined by the permittee, to be economically practicable" (HSC §25202.9);
  - Biennial Report, [Title 22, CCR, §66262.41(b)(6)-(8)];
  - Waste minimization certification requirements in a facility's operating record [CCR §66264.73(b)(9)]; and
  - Hazardous Waste Source Reduction and Management Review Act source reduction documents (SB 14).
- Revise DTSC inspection checklists to integrate source reduction planning, certification, and reporting requirements.
- Provide information about P2 technical assistance providers.
- Provide information from DTSC's hazardous waste Tracking System (HWTS) to help facility operators identify waste generation trends over time.
- Explain the benefits of P2 to facility operators.
- Observe facility operations for development of a P2 Supplemental Environmental Project (SEP), should enforcement ensue.
- Assist in the development and oversight of SEPs.

Further refinement of roles and responsibilities in this area will continue to be developed, particularly in the area of tracking P2 activities and measuring results.

P2 in Permitting

The recent assignment of southern California regional P2 seniors to DTSC's Permitting Division offers new opportunities to ensure that the permitting process sends appropriate messages with regard to P2. Efforts will focus on ensuring that the regulatory requirements described above (waste minimization certification, "program in place" requirements, and source reduction planning under SB 14 are appropriately addressed in the permitting process. To facilitate these activities, the Permit Writer's Manual will be revised to integrate source reduction and waste minimization planning, certification and reporting requirements. Model facility permits that include P2 will be developed for onsite and offsite treatment, storage, and disposal facilities (TSDFs).

Local Government P2 Integration Efforts
DTSC continues its tradition of strong support for local-level P2 program support. In the area of P2 integration, these efforts focus on supporting CUPA inspection and enforcement activities, and helping to link facilities needing help with P2 assistance providers.

Continued efforts to support P2 activities within the CUPA regulatory activities include:
- Working with Cal/EPA and DTSC CUPA oversight staff to promote the implementation of P2 SEPs within CUPA inspection, enforcement and compliance assistance activities;
- Providing training and support for CUPAs in their P2 compliance assurance activities (e.g., SB 14, “program in place” requirements, etc.);
- Working with local P2 assistance providers to ensure that facilities have a place to go when they need P2 information as they address compliance issues.

Jewelry Marts and P2
P2 staff continues to work with staff from the Hazardous Waste Management Program to address compliance problems with jewelry marts in Los Angeles. A study was recently conducted to survey a representative number of manufacturers in the Los Angeles Jewelry Mart to characterize the hazardous waste streams produced and identify the current management practices for those wastes.
Study results will be used to identify currently unregulated waste management practices to aid in developing policy and regulations regarding hazardous waste generation and management in the jewelry manufacturing industry. These results will also be used to develop educational materials to assist jewelry manufacturers statewide in complying with current statutes and regulations for hazardous waste management. P2 has been an important element of DTSC's work in this area. Educational materials for this industry will continue to include P2 information.

Regulatory Initiatives
By collecting data on the presence of polybrominated diphenyl ethers (PBDEs) in humans, DTSC’s Hazardous Materials Laboratory provided data to support the recent statutory ban of the use of polybrominated diphenyl ethers (PBDEs) as flame retardants in California.

Training
The development and implementation of training is one of the most important duties of DTSC's P2 regulatory integration staff. The P2 training program includes:

- Delivering workshops for hazardous waste inspectors on how to evaluate source reduction documents prepared pursuant to the Hazardous Waste Source Reduction and Management Review Act (aka SB 14);
- Developing and delivering training on P2 integration for permitting, inspection, and enforcement activities;
- Delivering training to support DTSC's vehicle service and repair P2 program;
- Developing and delivering P2 training on Green Business cross-media Inspection;

- Developing and delivering training on PCB ballast lighting retrofits in schools; and
- Developing and delivering P2 training for metal finishers at the ENTECH West Conference.

Guidance and Procedures Development

P2 regional staff continues to develop guidance and procedures for pollution prevention, as practiced by regulatory staff. In addition to the guidance currently under development in the area of inspections and enforcement, planned activities include:

- A fact sheet for facilities on the source reduction planning, reporting, and certification requirements;
- A revised DTSC inspection checklist,
- Guidance on the applicability of waste minimization requirements to different types of permits, and
- Guidance for permit writers on their role in implementing P2.

Part III:
Trends in Manifest, Toxics Release Inventory, and Biennial Report System Data in California: 1996 to 2002

Introduction

An understanding of California's hazardous waste trends and the current status of waste generation is essential to designing an effective P2 program. To further this understanding, DTSC staff reviewed available environmental data as well as some relevant econometric data. DTSC intends to continue to improve and refine its data analysis capabilities over the next two years with the expectation that these will prove increasingly valuable in planning future program priorities and directions.

Three databases were used for this analysis: the hazardous waste manifest tracking system (HWTS), the Toxics Release Inventory (TRI) data set, and Biennial Generator System (BRS) data. These three data sets report on different aspects of hazardous wastes and materials. HWTS data reflect off-site hazardous waste management and are based on information contained in shipping documents known as California Uniform Hazardous Waste Manifests (manifests). TRI captures information from users of specific hazardous chemicals and includes estimates of releases of those chemicals. The federal Biennial Generator System includes hazardous waste data collected from generators[7] every two years, as the name suggests. In this reporting system, generators report quantities of Resource Conservation and Recovery Act (RCRA) hazardous waste generated – that is, waste that is hazardous under the federal regulatory system. A large percentage of waste manifested in California, perhaps over 50%, is non RCRA waste. Non RCRA wastes are designated hazardous because of California's more stringent hazardous waste classification scheme.

The purpose of this analysis is twofold: to examine hazardous waste trends over time (1993-2001[8]); and to evaluate pollution prevention progress in California. One important point needs to be made before looking at this information: none of the data sets allows an assessment of total hazardous waste generated. The most significant reason is that none of the data sets captures quantities of hazardous wastewater that are treated onsite and sent to a publicly owned treatment works. (TRI does include chemicals managed on site; however, TRI quantities are estimates of chemical amounts and cannot be translated into hazardous waste quantities.) Because of this, it is not possible to determine the total amount of hazardous waste generated in California. While we cannot state that manifested waste trends correlate exactly with total waste generated, those trends must serve as surrogates for total waste generation because total waste quantities remain unknown.

[7] The term "generator" will be used throughout this analysis to describe businesses or public sector entities that produce hazardous waste.
[8] Manifest data are available through 2000; TRI data through 1999.

A Few Words About the Three Data Sets

To understand the analyses that follow, it is important to note the character, differences, and utility of the three data sets used here.

Manifest Data

A manifest, a form of shipping document, must be completed by generators when shipping hazardous waste off site for management or disposal. The data within the manifest system come from information entered on manifests by these generators. Manifests contain information on the generator, transporter, and treatment facility, as well as information related to the type of waste (identified by California Waste Code) the quantity of waste, and how it was managed (treated, recycled, or disposed)[9].

The manifest system is designed as a "cradle to grave" system to ensure that wastes arrive at the destination the generator intended, and is designed to track the movement and ultimate disposition of hazardous waste. DTSC enters data from all manifest copies received into an automated data system known as the Hazardous Waste Tracking System (HWTS) database. Approximately half a million manifests are processed annually.

Manifest Data Limitations

Interpreting manifest data depends on understanding and accounting for the limitations of this data set. Limitations pertinent to this analysis are listed below.

- This system tracks shipments. Increases in waste amounts do not necessarily equate to increased actual exposures or risk.
- The system tracks waste amounts, not concentration or chemical quantities. Large amounts of low-level contamination may give appearance of high hazard.
- There is potential for double-counting due to general system errors as well as when wastes are collected via milkrun[10] manifest to a transfer station, then shipped again from the transfer station to the treatment or disposal facility.
- The use of milkrun and modified manifests obscures the total number of hazardous waste generators (the total number of generators manifesting hazardous waste, discussed later in this chapter, will be undercounted due to this factor).[11]
- Aqueous hazardous wastes that are treated on a generator's site and subsequently disposed to a POTW (publicly owned treatment works) via an industrial sewer are excluded from these data. However, solid hazardous wastes, such as filter cake or sludge, generated as a result of on-site treatment are included in the data.
- Unit conversion factors may not adequately account for the variance in density of the range of wastes shipped.
- There is variability in the use of California Waste Codes when completing the

[9] A list of California Waste Code titles in contained in Appendix 1 (page 121).

[10] "Milkrun" manifests are used by hazardous waste haulers to transport smaller amounts of wastes from numerous small quantity generators.

[11] As of 1/01/02, milkrun and modified manifests were combined into a new manifest called a "consolidated manifest." The number of waste streams allowable for shipment under this consolidated manifest is larger than that previously allowed under milkrun and modified manifests. This may result in future analyses of manifest data showing fewer generators of record, with larger volumes per generator.

manifest. This includes the inability to clearly discern site clean-up wastes from routinely-generated wastes (discussed in more detail later in this chapter).

- Changes in the definition of hazardous waste and/or the waste code system can affect trends analyses.
- Changes in compliance with manifest requirements can affect trends analysis.
- Improvements in DTSC's manifest tracking capabilities can affect trends analysis.
- Errors in filling out the manifest, or keying in the data can cause significant misreporting of quantities by the system.

Hazardous Waste to Treatment, Storage & Disposal Facilities, Including Transfer Stations: Potential to Double-Count Waste Amounts

Because the manifest system is designed to track shipments of hazardous waste, some waste quantities may be double-counted if wastes are sent to intermediate facilities prior to ultimate disposition. In this analysis, quantities that were identifiable as double-counted waste were subtracted from the total. Despite this, there remains some potential in this analysis to double-count some waste. This means that quantities of manifested waste may be overstated.

Data Entry Procedures

In the previous version of this report (September 2000), DTSC staff looked at data entry procedures to see whether they could have affected the analyses. Data entry procedures changed significantly between 1995 and 1996, which coincides with a decrease in recurrent waste generation. A review of the change in procedures indicated that the new procedures should not have caused the change in quantities shown in the analysis beginning in 1996. For data entered prior to 1996, similar verification procedures were not in place and, therefore, are likely to be less accurate. The new procedures ensured that from 1996 forward, the data are 99.95% accurate. Accuracy, in this context, refers to how accurate data entry personnel are in transferring the information from the actual manifest to the data system. The limitations inherent in the manifest system discussed earlier in this chapter still apply.

Excluded Hazardous Waste

Numerous hazardous wastes, both RCRA and nonRCRA, were excluded from designation as hazardous waste between 1993 and 1998. Some of these exclusions were established in order to conform with exclusions that occurred at the federal level.

Appendix 2 contains a list of wastes that were excluded during the 1990's.[12] The rationales for excluding specific wastes vary. A waste may be excluded because new scientific research indicates that a substance is not as dangerous as previously thought. Another rationale would be to remove regulatory barriers to recycling hazardous wastes within a manufacturing process. Some wastes may be excluded because another agency is adequately regulating the waste. Because these excluded wastes do not correlate with the manifest codes, it is very difficult to evaluate the effect of these

[12] This list was developed for the last P2 workplan and was not updated for this report; therefore, it may not be complete.

exclusions on trends in waste manifested. Such an analysis was deemed outside the scope of this report.

Toxics Release Inventory

The federally-mandated Toxics Release Inventory (TRI) tracks information about chemical releases, and contains information much broader than just hazardous waste. Facilities reporting under TRI are primarily manufacturers, although a 1998 addition now requires reporting by waste management facilities and utilities.

TRI requires reporting only for specific chemicals, identified in the data by the Chemical Abstract Service (CAS) number or chemical category. Releases to all environmental media are reported, including on-site releases to air, water, and land, and off-site transfers to disposal, treatment, energy recovery and recycling. (Appendix 3 contains detailed information on the various reporting categories within TRI.) This analysis will focus on "total chemicals generated" as a surrogate for hazardous waste generation.

Facilities with more than 10 employees that meet the following reporting thresholds are required to report under TRI:

1) greater than 25,000 lbs of the listed chemical manufactured or processed on site; or
2) greater than 10,000 lbs of the listed chemical otherwise used at the facility.

When reading this chapter, it is important to remember the difference in units; manifest (and Biennial Report System) quantities are in tons, TRI in pounds.

TRI Data Limitations

TRI is not a comprehensive reporting system; many major industries as well as other important sources of chemical releases are not covered by TRI. Moreover, many toxic chemicals are not included in TRI. TRI only tracks chemical releases or transfers. There is no simple way to compare waste generation information between the HWTS database and TRI because one includes water and soil, and the other is by chemical type.

The reported chemical releases are based on estimates, rather than actual measurements, and are reported as pounds of pure chemical, not mixtures, as is the case in the manifest and the Biennial Generator System (BRS; discussed below) data.

TRI data may not be available on smaller businesses due to reporting threshold levels being too high to capture the smaller generators. Finally, some chemicals released may not be reported due to not meeting threshold levels.

For these reasons, the data presented here differs from that presented in DTSC's 2000 report, due to the significantly different manner in which the data were handled. The data presented here parallels the data presented in DTSC's 2002 report, and the methodologies applied were consistent with those used to prepare the 2002 analysis.

Biennial Report System Data
Hazardous waste generators are required under federal law to report, every two years, the total amount of hazardous waste generated during specific reporting years.

Biennial Report System Data Limitations
The federal Biennial Report System (BRS) data set includes only RCRA waste; nonRCRA waste is not included. Many waste types are excluded from this data set, most significantly, wastewater that is treated on site. Only large-quantity generators are required to report BRS data. Finally, note that due to data quality concerns, this analysis will only focus on the BRS data for 1997 and 2001.

Trends, 1996-2002

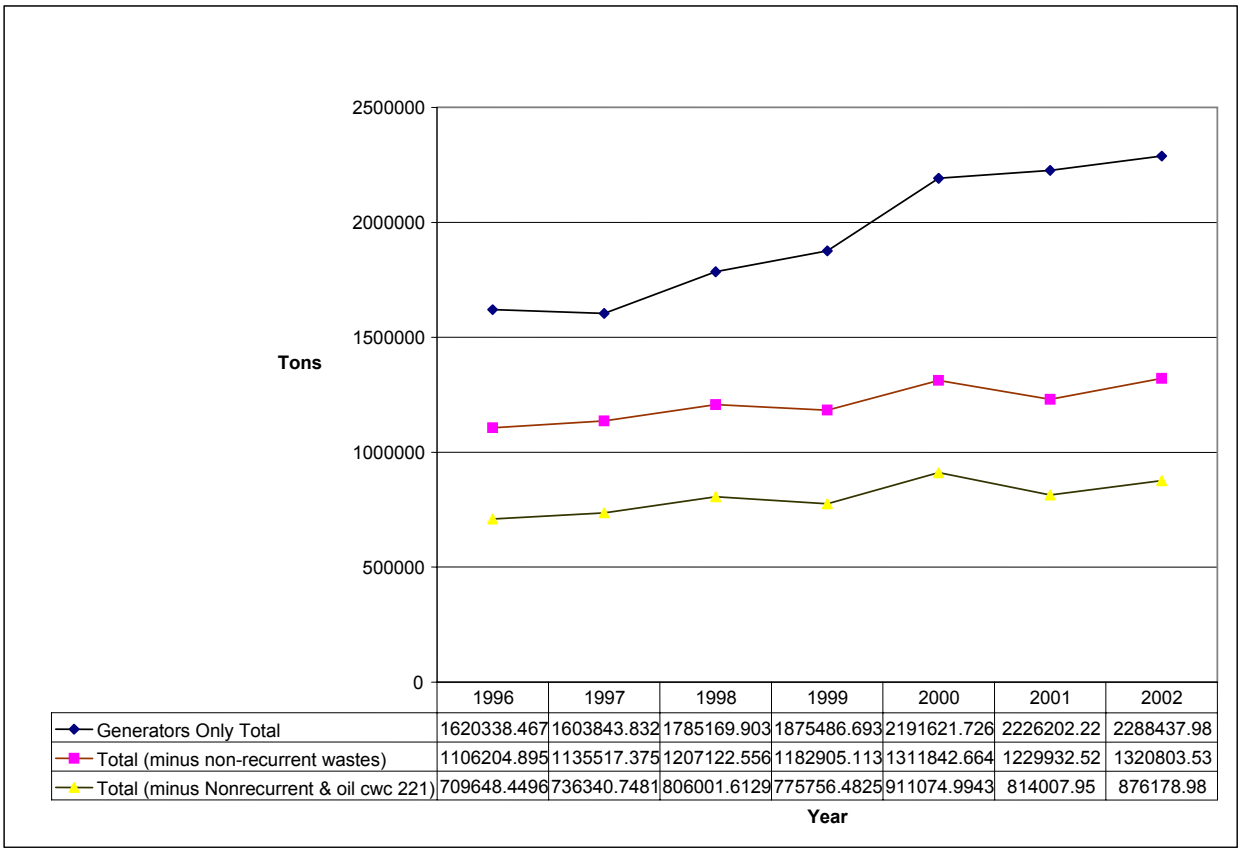
Trends were evaluated using data from three data sources: DTSC's HWTS database, U.S. EPA's TRI, and the federal Biennial Generator System.

HWTS Data
Data from DTSC's HWTS database were used to evaluate trends in hazardous waste manifested from generators. This database captures both RCRA and nonRCRA hazardous waste from all generators. The evaluation initially looks at trends in total annual manifested hazardous waste, then systematically subtracts nonrecurrent waste and potentially double-counted wastes to maintain a focus on routinely-generated wastes.

Trends in Total Hazardous Waste Manifested
The top line in Figure 1 shows the total amount, in tons, of hazardous waste manifested in California from 1996 through 2002.[13] The upward trends that apparently began by 1997 have continued. The total amount of hazardous waste manifested in 2002 was approximately 40%[14] greater than that in 1996.

[13] To the extent the data allow, these quantities were adjusted to eliminate double counting of manifested wasted handled at an off-site treatment, storage, or disposal facility where it might be shipped for some subsequent handling and/or disposal.
[14] Percentages have been rounded to the nearest whole number.

Figure 1: Manifested Hazardous Waste 1996-2002



	1996	1997	1998	1999	2000	2001	2002
Generators Only Total	1620338.467	1603843.832	1785169.903	1875486.693	2191621.726	2226202.22	2288437.98
Total (minus non-recurrent wastes)	1106204.895	1135517.375	1207122.556	1182905.113	1311842.664	1229932.52	1320803.53
Total (minus Nonrecurrent & oil cwc 221)	709648.4496	736340.7481	806001.6129	775756.4825	911074.9943	814007.95	876178.98

Recurrent Waste Trends

"Nonrecurrent" waste quantities were subtracted from the total to derive the middle trend line in Figure 1. Nonrecurrent wastes are those that are not routinely generated; they are hazardous wastes that come from operations such as contaminated site cleanups, removing PCB-contaminated equipment, and removing asbestos. "Household hazardous waste" was included in this category, in order to focus on commercial and industrial hazardous waste generation. Recurrent waste, then, is the total quantity of manifested waste minus non-recurrent waste.[15]

Recurrent manifested waste increased approximately 19% from 1996 to 2002 from 1,106,2054 tons in 1996 to 1,320,804 tons in 2002 (this after a 17% drop from 1,307,000 tons between 1993 and 1996). As seen in Figure 1, total recurrent waste manifested has exhibited an upward trend from 1996 to 2002. Figure 1 also shows manifested recurrent waste minus waste oil and mixed oil (bottom line), to more accurately indicate waste generated from the industrial and commercial sectors. The

[15]Wastes included in the non-recurrent category include California Waste Codes (CWC):

151 asbestos-containing waste,
261 polychlorinated biphenyls and material containing PCBs,
611 contaminated soil from site clean-up, and
612 household hazardous waste

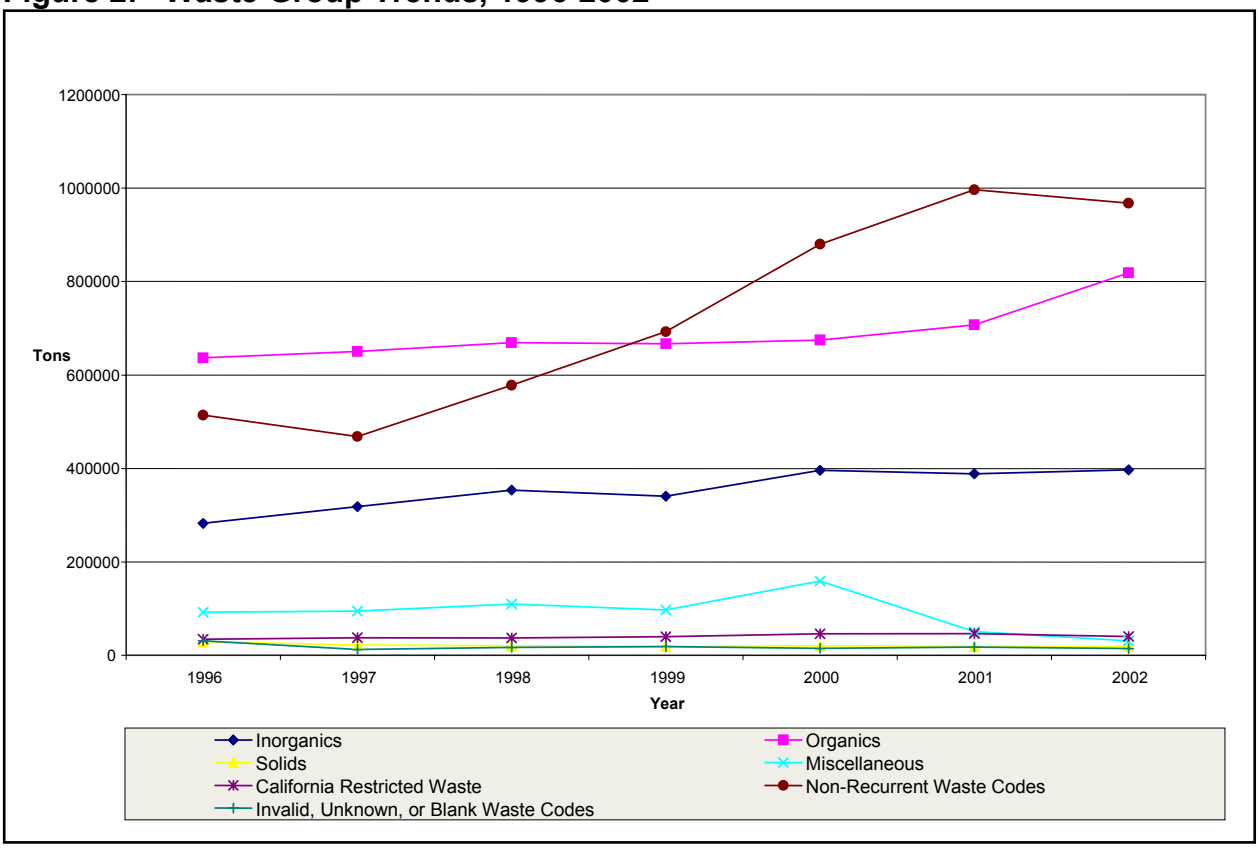
2002 quantity of 876,178 tons is about 23% more than the 709,648 tons reported in 1996.

To more closely evaluate the trends in manifested waste, the waste types were grouped, by California Waste Code, into seven categories: inorganics, organics, solids, miscellaneous, California Restricted Waste,[16] nonrecurrent waste, and "invalid, unknown, or blank." Figure 2 illustrates the trends for these waste groups.

From 1996 to 2000, the "organics" group exhibited a mild increasing trend that became increasing steeper into 2002. When looking at this result, remember that this waste group includes waste oil/mixed oil, the largest single hazardous waste stream generated. Waste oil/mixed oil has historically constituted almost 60% of the total organics waste group.

"Solids" remained relatively stable while "miscellaneous" rose in 2000 and dropped significantly thereafter. California Restricted Waste showed an increasing trend between 1996 and 2000, remaining relatively stable thereafter. The "invalid, unknown or blank" category remains stable, possibly indicating a consistent level in users' understanding of how to complete manifests, resulting in consistency in the manifest data.

Figure 2: Waste Group Trends, 1996-2002



[16] "Restricted" wastes cannot be landfilled unless they are treated to certain specifications.

The inorganics waste group demonstrated an overall upward trend from 1996 through 2001,(see Figure 2 and Table 6). One waste type, “other inorganic solid waste” (California Waste Code 181) accounted for most of the increase. California Waste Code 181 is also notable in that it is one of only two waste streams that have increased steadily and significantly over time. (The other is California Waste Code 792, “liquids with pH <= 2 with metals which constitutes only 2% of the total recurrent waste.)

Table 6: CWC 181 Waste Trends

	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
Tons CWC 181	112,265	113,355	199,724	125,534	150,043	170,904	183,944	228,160	230,831	249,849
% CWC 181 of recurrent waste	9%	8%	15%	11%	13%	14%	16%	17%	19%	19%

Finally, note that California Waste Code 181 is an increasing and significant percentage of total recurrent waste (Table 7 below). Table 7 lists the top twenty five generators of CWC 181 waste, by quantity, exclusive of permitted treatment, storage or disposal facilities. Unfortunately, it has come to our attention that the system reliability issues, combined with very significant errors in completion of manifests for 181 waste may account for the apparent increase in 181 waste. Further review and analysis, along with improvements in system reliability and manifest usage, will be necessary in order to adequately evaluate 181 waste trends.

Table 7: Top 25 Generators of CWC 181

US EPA ID No.	Facility Name	Waste Code	Tons
CAP000010060	USEPA WESTLEY TIRE FIRE	181	28508.55
CAD983663600	SALTON SEA POWER L P AND BRINE L P	181	15410.24
CAD983613233	LA DEPARTMENT WATER & POWER	181	12760.19
CAD983648403	LEATHERS POWER PLANT	181	11028.7
NYD030485288	REVERE SMELTING & REFINING CORP	181	9598.18
CAD009164021	SHELL OIL PRODUCTS/US MARTINEZ REFINERY	181	8940.36
CAC002553213	PORT OF SAN DIEGO	181	7350
CAN000905908		181	5546.69
CAD983648445	ELMORE POWER PLANT	181	3711.09
CAT000618942	UNOCAL SANTA MARIA VALLEY	181	3580.12
CAT080011968	CHEVRON USA INC-CYMRIC AREA PRODUCT	181	3456.67
CAD983648429	VULCAN POWER PLANT	181	2870.19
CAD009108705	TOSCO REFINING COMPANY	181	2767.25
CAR000128207	K B Home Fort Ord Hayes Housing Redev	181	2737.55
CAD008336901	CHEVRON 1001651-EL SEGUNDO REFINERY	181	2737.16
CAT080011943	CHEVRON USA INC KERN RIVER AREA PROD	181	2692.44
CAD008237679	TOSCO REFINING CO	181	2620.32
CAD981448764	AVIBANK MFG INC	181	2564.11
CAD990845513	GKN AEROSPACE CHEM-TRONICS INC	181	2563.22
CAT080011521	GEYSERS POWER COMPANY,LLC	181	2417.09
CAP000111575	Roman Catholic Archbishop S F	181	2413.07
CAD983648437	DEL RANCH POWER PLANT	181	2185.46
CAP000120360	Folsom / First L L C	181	2078.29
ORD010746402	JOHNSON CONTROLS BATTERY GROUP INC	181	1748.4
CAL000180136	PACIFIC ULTRAPOWER-CHINESE STATION	181	1742.78

Nonrecurrent waste trends will be discussed in more detail later in this chapter.

Number of Generators

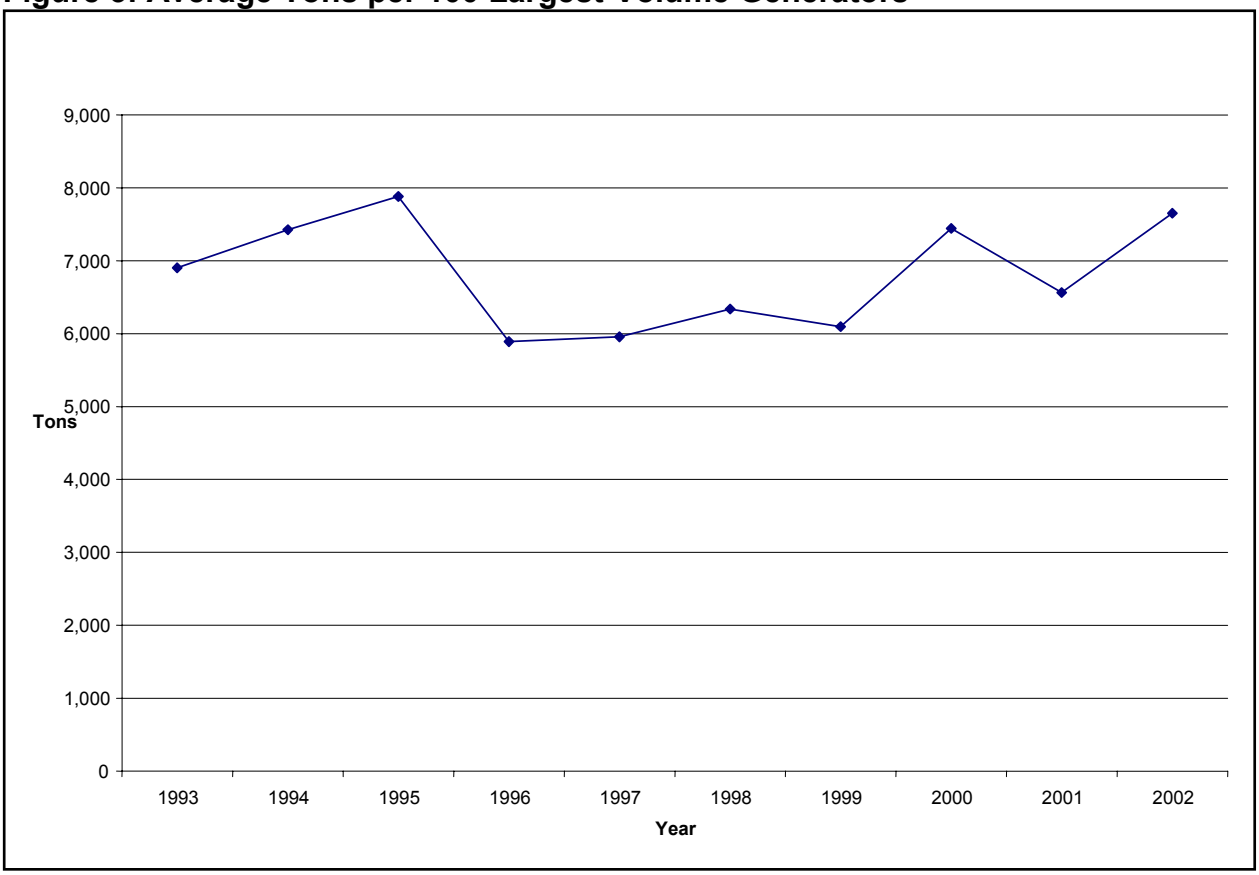
The number of hazardous waste generators manifesting waste has not increased since 1998, and in fact, has declined significantly over the past several years (about 9%). Remember that, because of milkrun and modified manifesting options, these numbers are understated. In addition, more waste types are now eligible for milkrun manifesting, further reducing the system's ability to accurately identify all hazardous waste generators.

Table 8: Changes in the Number of Generators, 1993 to 2000

Year	Number of Generators
1993	42,500
1998	63,000
2000	63,000
2001	56,852
2002	57,266

Trends for Generators Manifesting Large Quantities of Recurring Waste
The “top one hundred” entities consistently manifest about half of the total recurring waste. Figure 3 shows the average quantity, per generator, of hazardous waste manifested by these 100 generators. (Note that the “top 100" generators from any one year are not necessarily the same facilities that were the “top 100" in any other year. A determination of which facilities reappear from year to year was not made for this report.

Figure 3: Average Tons per 100 Largest-Volume Generators

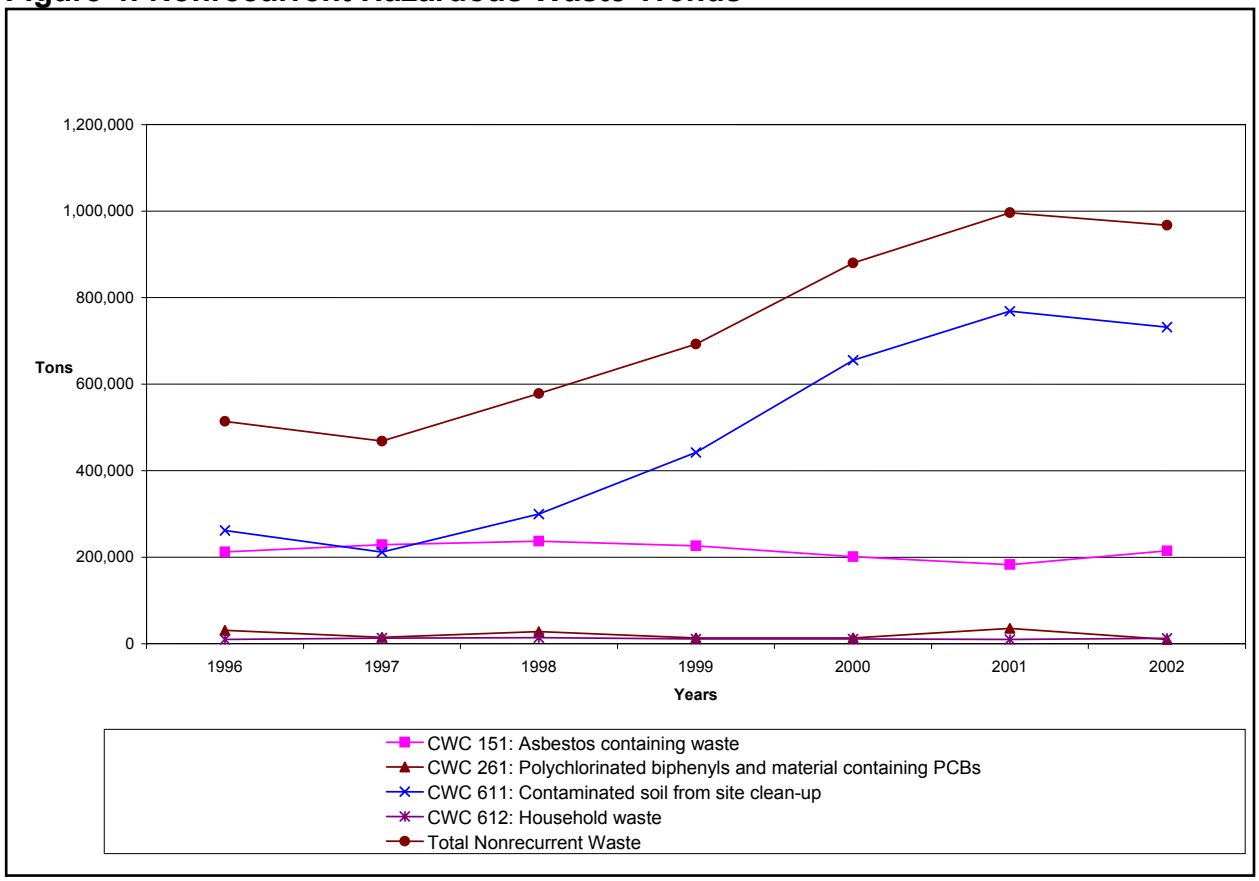


Trends for Generators Manifesting Small Quantities of Hazardous Waste
Trends for recurrent waste from entities that manifest smaller amounts of hazardous waste are more difficult to ascertain given the limitations of the data. This is primarily because we cannot determine with precision the total number of entities generating waste (largely due to milkrun and modified manifesting procedures

Waste Oil and Mixed Oil
“Waste oil and mixed oil” (California Waste Code 221) is consistently a significant portion of California’s total amount of manifested recurrent waste. The percentage of waste/mixed oil manifested relative to the recurrent total typically ranges from 29% to 36% (1993 to 1996). “Waste oil and mixed oil” is California’s largest waste stream.

Nonrecurrent Waste and Contaminated Soil
Nonrecurrent waste is a significant portion of total hazardous waste manifested. These wastes increased by nearly 100% from 1996 to 2001, dropping slightly in 2002. Moreover, as a percentage of California's total manifested waste, nonrecurrent wastes have steadily increased. Figure 4 below indicates that contaminated soil from site cleanup (California Waste Code 611) accounts for this increase in nonrecurrent wastes. The upward trend in site clean-up waste is a positive trend, because it reflects efforts to remediate contaminated properties for re-use, and prevents possible groundwater contamination.

Figure 4: Nonrecurrent Hazardous Waste Trends



These data may undercount the quantity of hazardous waste generated from site clean-up activities. While there is a California Waste Code for “contaminated soil,” other wastes generated during clean-up activities may be manifested under other waste codes, making it difficult to assess the total quantity of wastes generated due to clean-up activities. For example, some portion of California Waste Code 181, “other inorganic solid waste,” may consist of site remediation waste that is not contaminated soil.

Several factors contribute to the increase in contaminated soil and clean-up waste:

- DTSC’s Site Mitigation Program oversees many hazardous waste site clean-ups, including Brownfield remediation, voluntary clean-ups, and school site remediations. In addition, approximately 2,000 cleanups of clandestine labs occur per year,

contributing to the total quantity of hazardous waste generated in California (although there may be little contaminated soil generated in these clean-ups).

- AB 2784 (Strom-Martin, Chapter 326, Statutes of 1998) specifies that no waste that contains total lead in excess of 350 parts per million may be disposed to land other than a Class I hazardous waste disposal facility. This includes waste that is not a hazardous waste but that contains lead with a total concentration exceeding 350 parts per million. This bill significantly restricted options for managing lead-contaminated soil, and has probably resulted in increased disposal of such soil as hazardous waste.

This discussion is significant because it illustrates the concept of "beneficial" hazardous waste generation. For example, when a facility replaces its light ballasts with energy-efficient ones, there is a short-term increase in hazardous waste generation; the environmental benefits of the activity are realized over a longer time frame. In addition, the environmental benefits of these activities are much broader than those related specifically to hazardous waste generation. For example, the environmental benefits of a widespread conversion to energy-efficient lighting systems will result in air quality improvements, reduced need for energy generation, and reduced costs for consumers. The benefits of increased site clean-up activity are also widespread. Rehabilitation of urban properties can reduce exposures of residents to contaminated properties. Such redevelopment has additional benefits, in that it can reduce the need to consume previously-undeveloped land at the edges of urban areas, reduce car and truck traffic, can reduce the need to extend city services such as sewers, and so on.

Table 9: Number of TRI Filers in California

Year	Number of Facilities Reporting	Number of Chemicals Reported
1987	1,915	5,251
1988	2,117	6,119
1989	2,156	6,443
1990	2,161	6,267
1991	2,042	5,939
1992	1,952	5,497
1993	1,852	5,084
1994	1,683	4,509
1995	1,553	4,177
1996	1,375	3,739
1997	1,393	3,844
1998	1,377	4,393
1999	1,406	3,818
2000	1,466	4,118
2001	1,612	4,420

Source: U.S.EPA TRI Explorer web site: http://www.epa.gov/triexplorer/facilitytransfer.htm

Analysis of Toxic Release Inventory Data

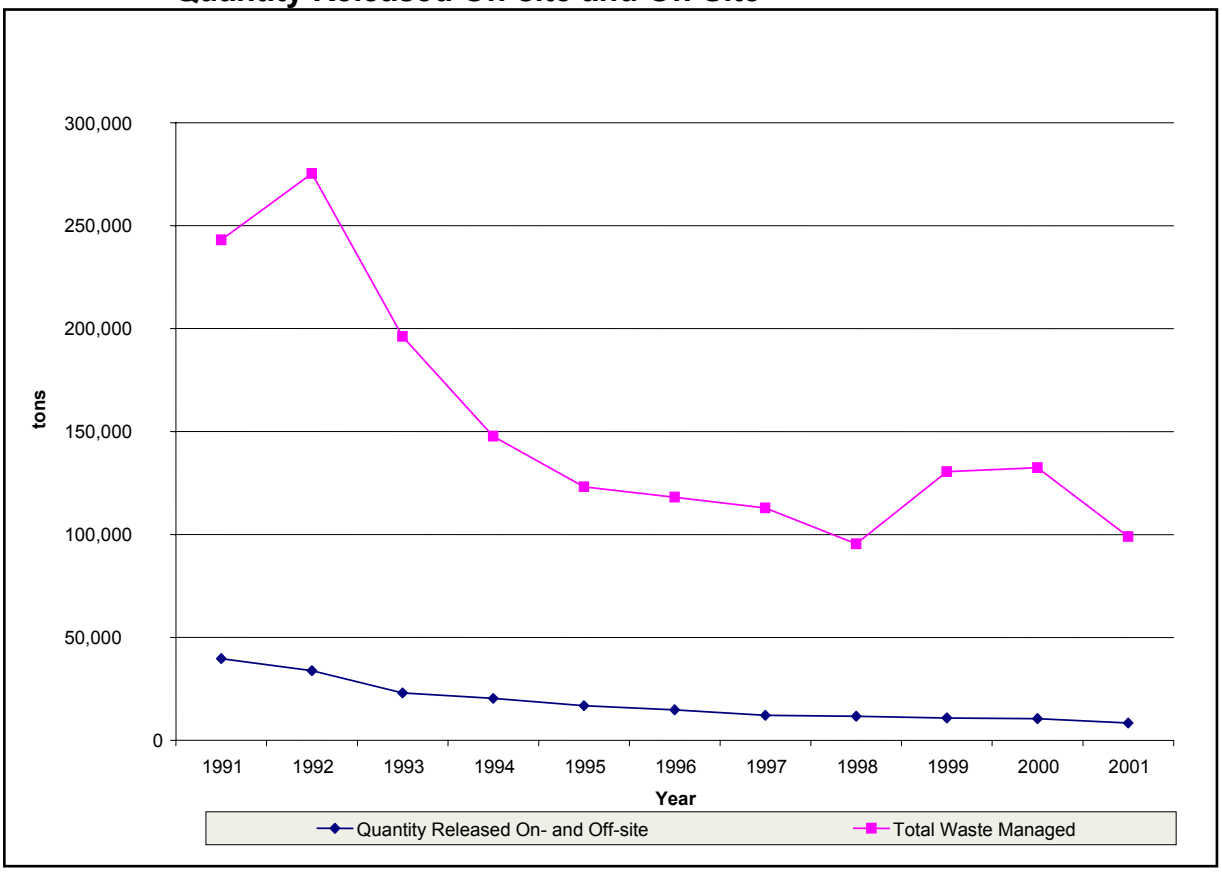
Trends in TRI data were evaluated with respect to the number of facilities filing TRI reports, the number of chemicals reported, total chemicals generated, and total releases reported. Remember that reported TRI quantities are estimates of pure chemical. Chemicals managed (e.g., wastewater treatment) on site are included in this report but again cannot be correlated to quantities of hazardous waste generated. The number of TRI filers in California decreased from 1987 to 2002, and appears to been on the increase in the last three years, as has the number of chemicals reported, as seen in Table 9 at left.

Total Releases

Total TRI releases to all environmental media have decreased over time, although there was a rise and subsequent fall again between 1998 and 2001. A closer look at the data associated

with the 1999 increase revealed that two petroleum refining facilities were responsible for 83,759,678 pounds of this quantity, which is 55% of the total. Most of that quantity, 82,130,028 pounds (roughly 41,000 tons), was in the "treated on site" management category. In Figure 5, the top line represents "total chemicals generated," which is the sum of chemicals recycled on site, recycled off site, energy recovery on site, energy recovery off site, treated on site, treated off site, and quantities released on and off site. This figure also shows "quantity released on and off site," which is the total amount (in tons) of the toxic chemical released due to production-related events by facilities to all environmental media both on and off site during the calendar year.[17] This figure illustrates the difference between total chemicals generated and those that are released.

Figure 5: TRI "Total Chemicals Generated", 1991 - 2001 and "Quantity Released On-site and Off Site



The bottom line in Figure 5[18] shows that on- and off-site release totals have decreased by approximately 64% from 1991 to 2002. Note however that the downward trend ended in 1997 and has been essentially flat since then.

[17] Source: U.S. EPA, TRI Explorer, http://222.epa.gov/triexplorer/reports.htm.
[18] In the 2000 version of this report, we noted a significant upward tick from 1997 to 1998, with 1998 releases increasing 53% from 1997. The addition of waste management facilities to this data set was responsible for the increase. This report's Figure 5, derived from the U.S. EPA's "TRI Explorer" website, is specific to "1991 Core Chemicals" and "Original Industries" and so does not include those off-site waste management facilities.

Table 10: Comparison of 1997 and 1999 BRS Statistics

	1997	1999
Quantity of RCRA Waste Reported	672,946 tons	427,302 tons
California rank re: quantity RCRA waste generated	12	16
Percent of nation's total	1.7%	1.1%
California rank re: # of generators	2	2
Number of generators	1,782	1,850
Percent of U.S. generators	8.8%	9.2%
California RCRA waste imports	270,167 tons	161,748
California RCRA waste exports	207,119 tons	168,722
Source: U.S. EPA's Office of Solid Waste website at http://www.epa.gov/epaoswer/hazwaste/data/index.htm#brs		

Biennial Report System Data

As mentioned earlier in this chapter, historic Biennial Report System data are considered unreliable; therefore, we will only attempt to compare the 1997, 1999 and 2001 data. According to U.S. EPA's latest evaluation of these data, which only includes reported RCRA nonaqueous waste, California ranks sixteenth in the nation with regard to total waste manifested (807,297tons of RCRA waste). Although California has 13.4% of the nation's total RCRA waste generators, it manifested 2.0% of the nation's total RCRA waste, up significantly from 1.1% in 1999.[19]

Table 11: Comparison of 1999 and 2001 BRS Statistics

	1999	2001
Quantity of RCRA Waste Reported	437,302 Tons	807,297 Tons
California Rank: Quantity RCRA Waste Generated	16	16
Percent of U.S. Total	1.1 %	2.0 %
California Rank: # of Generators	2	1
Number of Generators	1,850	2,544
Percent of U.S. Total	9.2 %	13.4 %
California RCRA Waste Imports	161,748 Tons	24,680 Tons
California RCRA Waste Exports	168,722 Tons	442,670 Tons
Source: The National Biennial RCRA Hazardous Waste Report, http://www.epa.gov/epaoswer/hazwaste/data/brs01/national.pdf. See this document for additional detail.		

The 2001 results provide evidence that waste generation and management patterns in California may be changing. The 2001 RCRA waste quantity (807,297 tons) is nearly double that reported in 1997 (437,302 tons). Furthermore the quantity of RCRA waste reported exported has more than doubled (from 168,722 tons to 442,670 tons). Finally,

[19] EPA Executive Summary, The National Biennial RCRA Hazardous Waste Report (Based on 1999 Data), June 2001, EPA530-S-01-001 PB2001-106318

RCRA waste imports reported were down dramatically (from 168,722 to 24,680 tons) from 1999 to 2001. While these results imply changes in California's hazardous waste generation and management practices, further investigation will be necessary to determine their significance. It is also interesting to note that while California's count of generators is down (Table 8), the BRS reports an increase in number of generators by more than 32% (Table 11). Also, remember that some wastes are excluded from the BRS data, most notably, hazardous wastewater that is treated on site. These rankings therefore are inaccurate in that they only provide a picture of RCRA hazardous wastes that are not excluded from the BRS reporting requirements. Because the quantities of wastes that are excluded including and especially wastewater are so large, attempting to interpret Biennial Report System data with respect to how California compares to other states is very difficult.

Hazardous Waste Source Reduction Progress in California

DTSC is required by statute to "evaluate hazardous waste source reduction in this state, using the data . . . analysis" contained in this report. In this section, two approaches are used to get a sense of California's progress in reducing hazardous waste generation. The first approach looks simply at hazardous waste generation as represented by quantities of waste that are manifested. The second uses California's Gross Domestic Product (GDP) figures from 1993 to 2001[20] to adjust the quantities manifested per changes in California's economic activity.

Difficulties in Measuring Pollution Prevention

Measuring pollution prevention accurately is difficult, and is best and most accurately done in a disaggregated sense; that is, the more specific and focused the analysis, the more accurate. It also is inherently difficult to measure something that does not exist, such as waste or pollution that is never generated, the goal of P2 programs. Some of the problems associated with measuring pollution prevention are discussed below.

Normalization

Normalizing data allows an adjustment of amounts of waste or pollution per some factor, such as production levels. Without normalization, factors such as increases in population, increased (or decreased) production rates, changes in the number of generators, and other similar changes in production patterns may skew the data, rendering interpretation difficult. Making matters more difficult is the lack of a standard normalization factor across industries. What might make sense for one industry type (for example, amount of waste per gallon of paint produced) would be meaningless to another (a job-shop metal plater). The problems inherent in normalizing waste generation make it very difficult to determine causes of changes in waste generation over time.

Variable Concentrations Of Chemical Constituents In Waste

Source reduction isn't just reducing quantities of generated waste. It also includes reducing a waste's toxicity, even if the quantity remains the same. Such reductions

[20] GDP data for 2002 were not available.

cannot be measured via the manifest system as long as the waste remains hazardous, because the manifest system does not include information about concentrations of a chemical, and therefore cannot be used to assess changes in toxicity over time. Only reductions in wastes that are so reduced in toxicity (and other hazardous waste criteria) that they no longer are classified as hazardous waste can appear as source reduction through manifest data analysis.

Multiple Chemical Constituents In Waste
Another confounding factor is the issue of multiple chemicals in waste streams. Many wastes contain mixtures of chemicals. A company's source reduction efforts may reduce or even eliminate one toxic chemical from a waste but, because other waste constituents remain, those source reduction accomplishments remain invisible in the data.

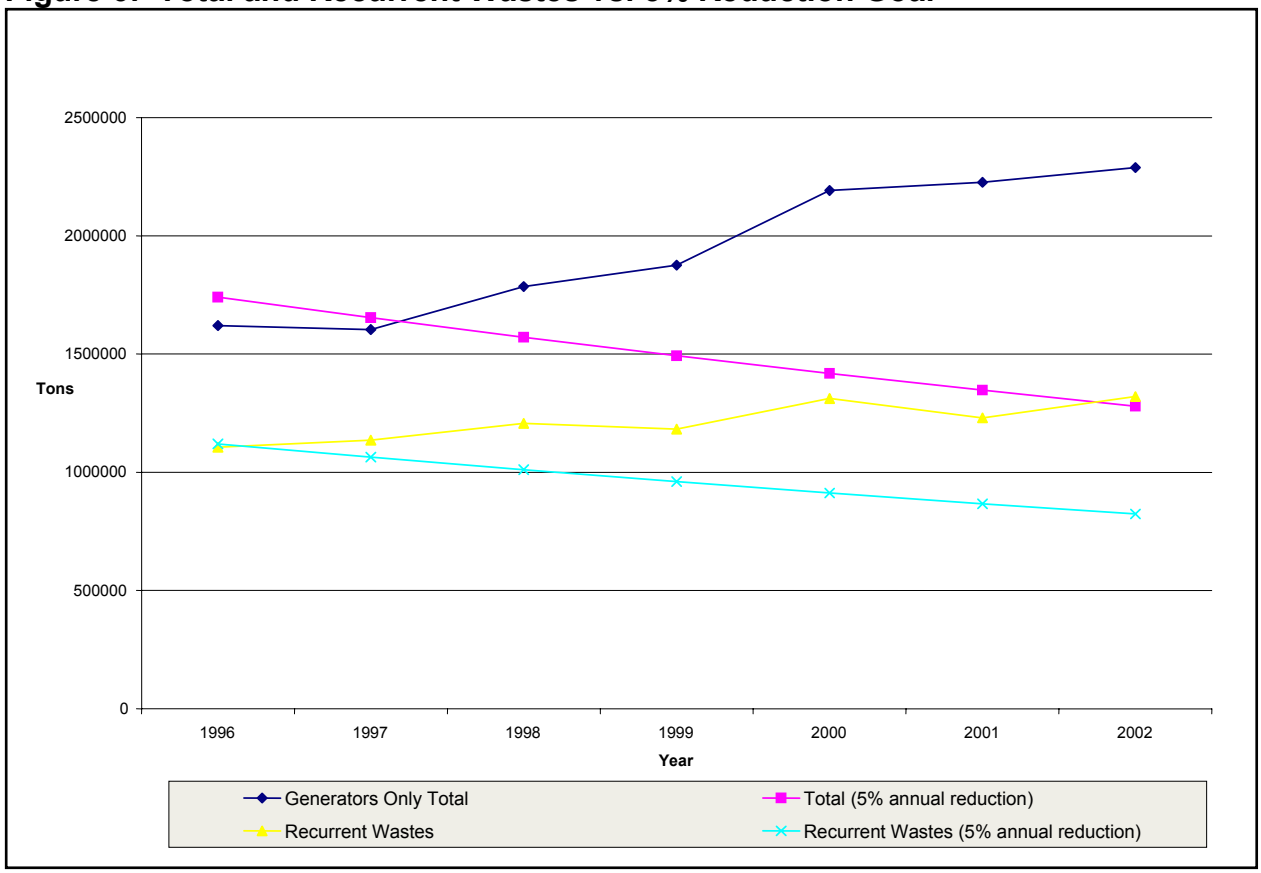
Changes In The Regulatory Structure
Changes in the definition of what is a hazardous waste will affect trends data. The data may indicate that California is succeeding in pollution prevention when what really happened is that wastes were declassified (see Appendix 2 for a list of wastes excluded from hazardous waste designation between 1993 and 1998). The opposite can occur as well. In 2001, DTSC reiterated that cathode ray tubes (CRT) in computer monitors and television displays are hazardous waste that must be managed as such. This will significantly affect future analyses of California's waste generation, because it is estimated that 315 million computers containing a total of 1.2 billion pounds of lead will become obsolete between 1997 and 2004.

Incomplete Data
Finally, as mentioned previously, we do not know the total quantity of hazardous waste generated in California. Therefore, we must use waste manifested as a surrogate in evaluating generation trends.

Source Reduction Progress
Despite these difficulties, and with them in mind, we can get an overall picture of hazardous waste generation over time, and some indication of source reduction progress. Health & Safety Code section 25244.15(e) established a goal for California to reduce its hazardous waste generation 5% per year from 1993 to 2000. While this goal is no longer in effect, we will continue to look at this goal to get a sense of progress in California.

Hazardous Waste Generation as Represented by Manifested Waste Quantities
Figure 6 compares the total manifested waste from 1996 to 2003 to the 5% per year goal stated in law. Figure 6 also shows the comparison to the 5% goal using only recurrent wastes (rather than the total). California appeared to be meeting the goal for overall hazardous waste generation in 1996 and 1997 and for recurrent waste in 1996. However, increases in total waste from 1997 onward, and in recurrent waste from 1996 onward resulted in the divergence of generated waste and the reduction goal.

Figure 6: Total and Recurrent Wastes vs. 5% Reduction Goal



Waste Generation Normalized by Gross State Product

One interpretation is that the increase in waste generation is consistent with the increase in economic activity in California in the late 1990s. To get a sense of California's waste generation trends in relation to economic activity, we normalized our hazardous waste generation data with State Domestic Product data.

Tables 12a,12b, and 12c contain the most current data available regarding waste generated and Gross State Product, Durable Goods subset (a subset of manufactured goods), and the Manufacturing subset. Also included are the values representing the goal of a 5% per annum reduction starting with 1993 as the base year.

Table 12a: California Gross State Product, 1993-2001

Year	Current Dollars (millions)	Recurrent Manifested Waste (tons)	5% per year SR goal (tons)	Tons waste/ million dollars	5% per year SR goal (tons/million dollars)
1993	847,579	898,829	898,829	1.06	1.06
1994	879,041	911,249	853,888	1.04	1.01
1995	925,931	1,307,194	811,193	1.41	0.96
1996	973,395	1,106,205	770,634	1.14	0.91
1997	1,045,254	1,135,517	732,102	1.09	0.86
1998	1,125,331	1,207,123	695,497	1.07	0.82
1999	1,213,355	1,182,905	660,722	0.97	0.78
2000	1,330,025	1,311,843	627,686	0.99	0.74
2001	1,359,265	1,229,933	596,302	0.90	0.70

Source: U.S. Department of Commerce, Bureau of Economic Analysis, http://www.bea.doc.gov/bea/regional/gsp/. See this document for additional detail.

Table 12b: California Durable Goods Gross State Product, 1993 - 2001

Year	Current Dollars (millions)	Recurrent Manifested Waste (tons)	5% per year SR goal (tons)	Tons waste/ million dollars	5% per year SR goal (tons/million dollars)
1993	72,288	898,829	898,829	12.43	12.430
1994	74,344	911,249	853,888	12.26	11.809
1995	81,476	1,307,194	811,193	16.04	11.218
1996	86,785	1,106,205	770,634	12.75	10.657
1997	96,500	1,135,517	732,102	11.77	10.124
1998	100,950	1,207,123	695,497	11.96	9.618
1999	112,495	1,182,905	660,722	10.52	9.137
2000	124,548	1,311,843	627,686	10.53	8.680
2001	104,114	1,229,933	596,302	11.81	8.246

Source: U.S. Department of Commerce, Bureau of Economic Analysis, http://www.bea.doc.gov/bea/regional/gsp/. See this document for additional detail.

Table 12c: California Manufacturing California Gross State Product, 1993 - 2001

Year	Current Dollars (millions)	Recurrent Manifested Waste (tons)	5% per year SR goal (tons)	Tons waste/ million dollars	5% per year SR goal (tons/million dollars)
1993	117,080	898,829	898,829	7.68	7.68
1994	119,740	911,249	853,888	7.61	7.30
1995	127,195	1,307,194	811,193	0.28	6.93
1996	134,669	1,106,205	770,634	8.21	6.58
1997	147,304	1,135,517	732,102	7.71	6.26
1998	155,626	1,207,123	695,497	7.76	5.94
1999	170,929	1,182,905	660,722	6.92	5.65
2000	187,017	1,311,843	627,686	7.01	5.36
2001	163,841	1,229,933	596,302	7.51	5.10

Source: U.S. Department of Commerce, Bureau of Economic Analysis, http://www.bea.doc.gov/bea/regional/gsp/. See this document for additional detail.

Figure 7a illustrates the upward trends of both Gross State Product in current dollars and recurrent waste generated in tons. Also included for reference are the values representing a 5% per annum decrease in recurrent waste with 1993 as the base year.

Figure 7a: Gross State Product

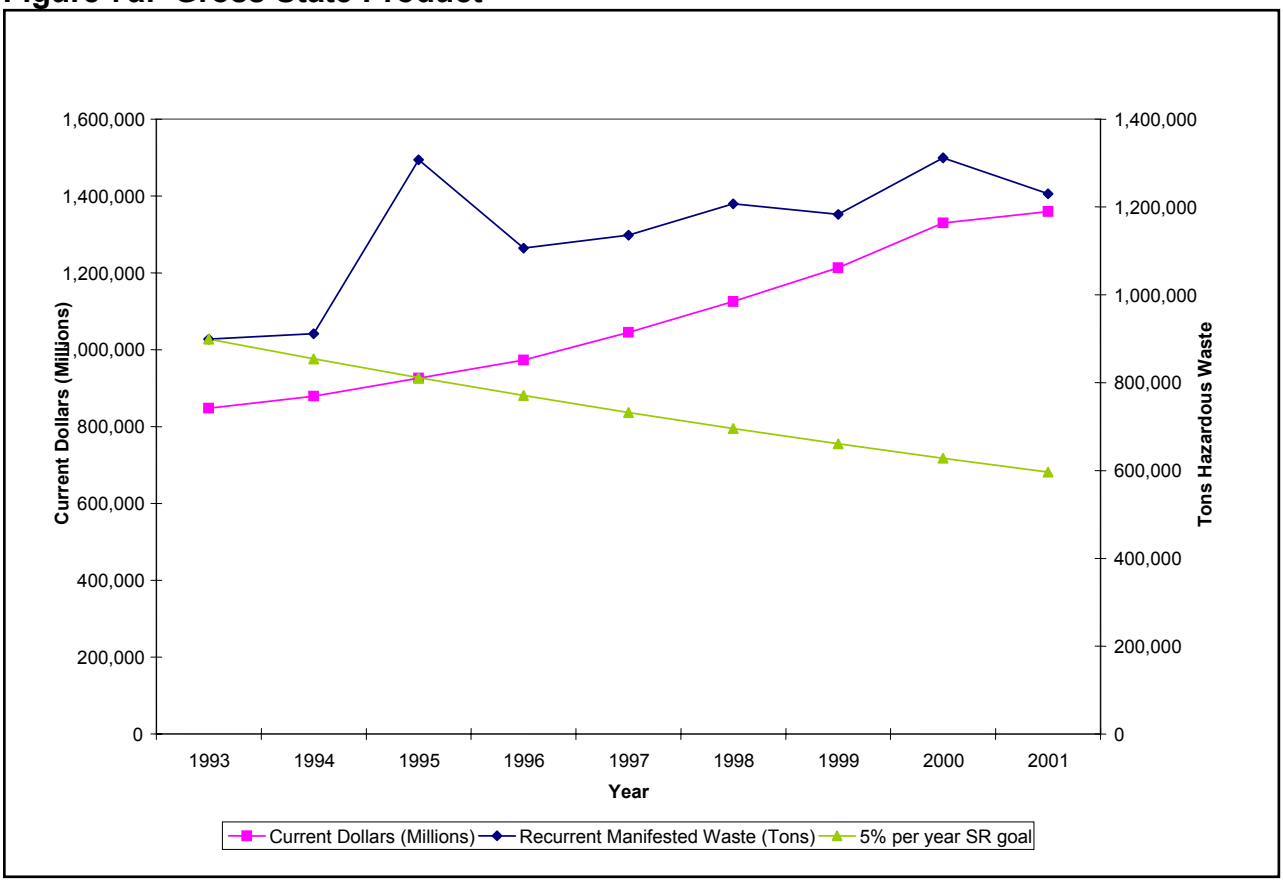
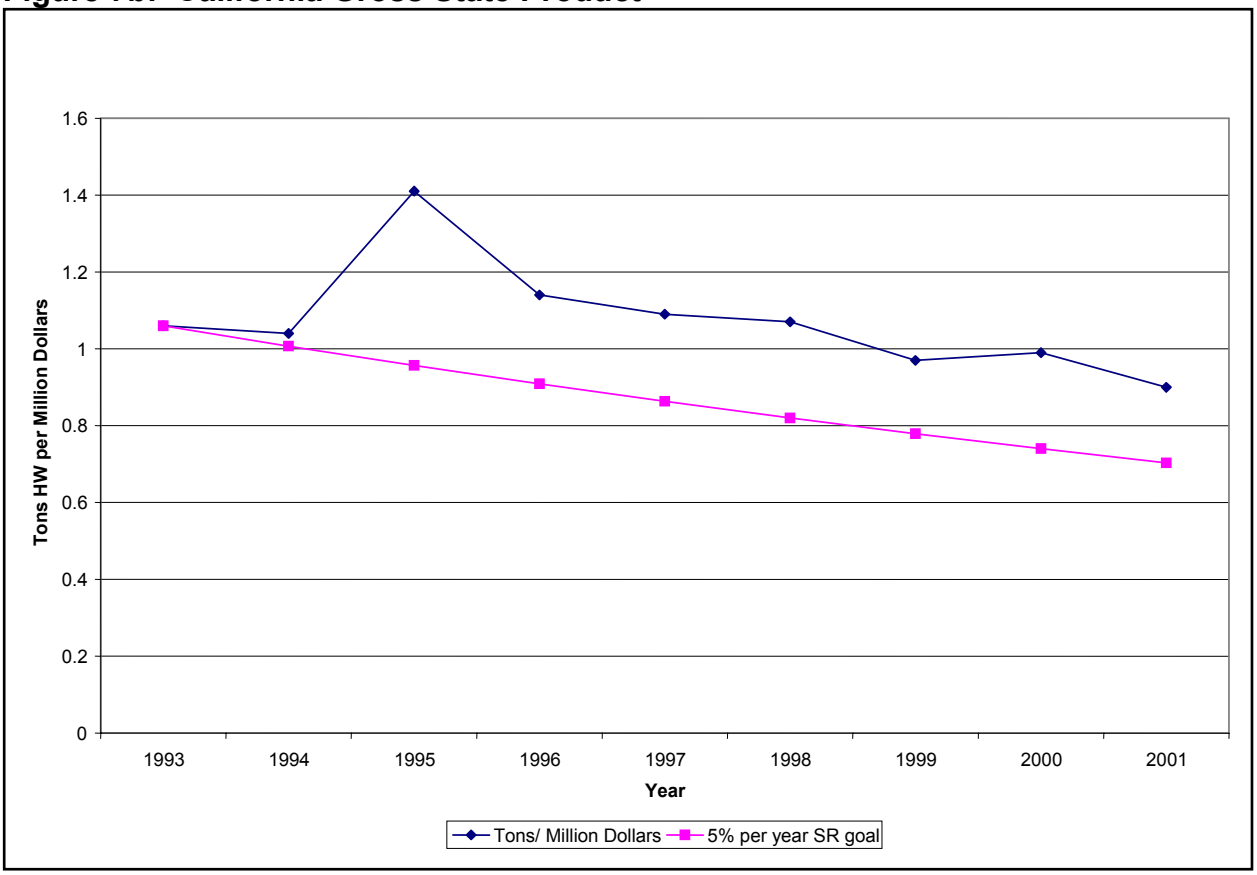


Figure 7b show an apparent “improvement” in recurrent waste generation normalized to Gross State Product in current dollars. Also included for reference are the values representing a 5% per annum decrease in tons of recurrent waste per million dollars of Gross State Product with 1993 as the base year.

Figure 7b: California Gross State Product



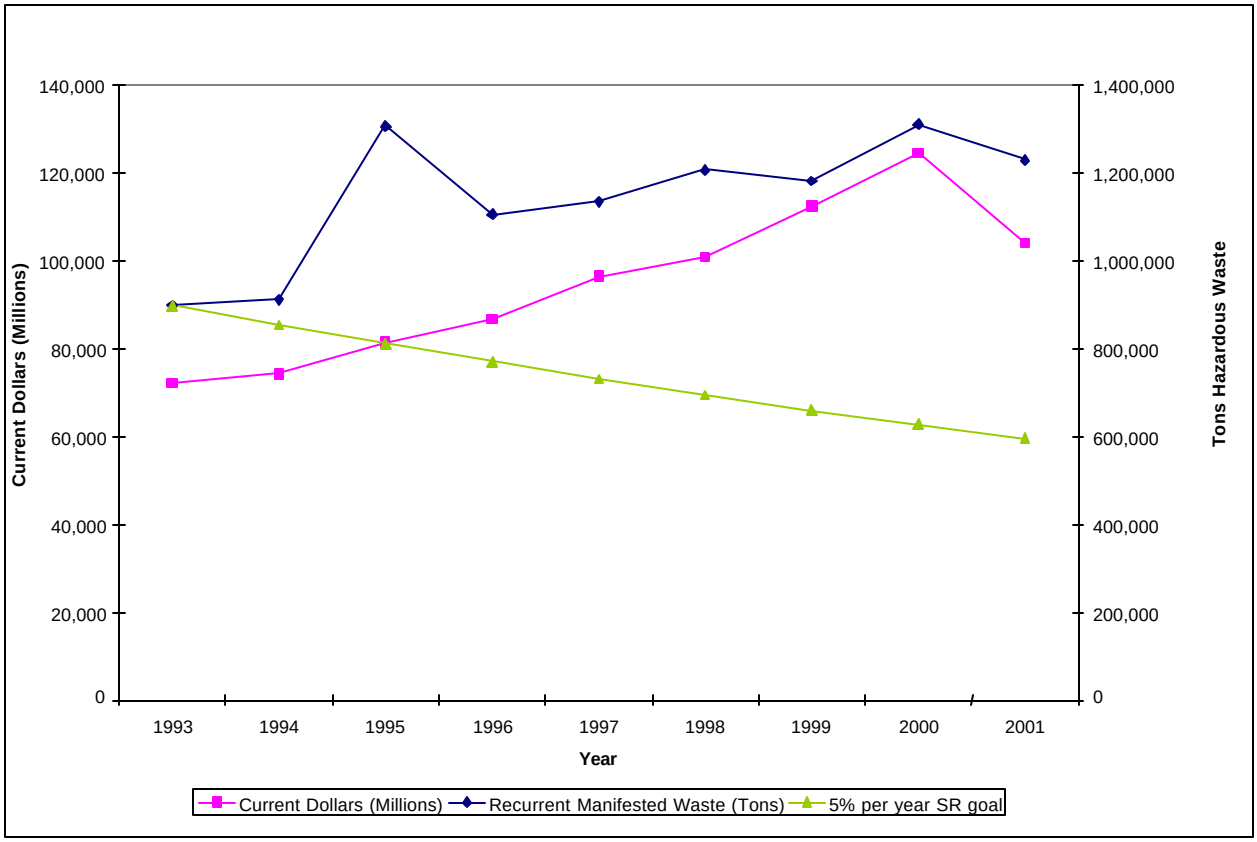
However, we were concerned that the Gross State Product might prove too general an indicator, and could in fact be misleading if the contribution of activities unrelated (or too indirectly related) to waste generation swamped the waste generating contributors to the metric. To reduce the likelihood of such effects, and to establish a more satisfying cause and effect relationship between waste generation and our chosen econometric indicators, we have selected some additional subsets of Gross State Product for correlation to our waste data.

Gross State Product is a broad-based, highly-aggregated econometric indicator that reflects an extreme diversity of market activities, many of which have no meaningful cause and effect relationship to hazardous waste generation. In an effort to look at waste generation in the context of a more closely correlated (and practically meaningful) econometric indicator, we looked at normalizing waste generation against durable goods, and manufacturing. Both of these are subsets of the Gross State Product, and constitute a logical starting point for a more focused analysis.

We expected that hazardous waste generation would be more closely correlated with durables than the state domestic product as a whole, and this appears to be the case. Likewise, we expected, and found, an even higher degree of correlation between waste generation and manufacturing.

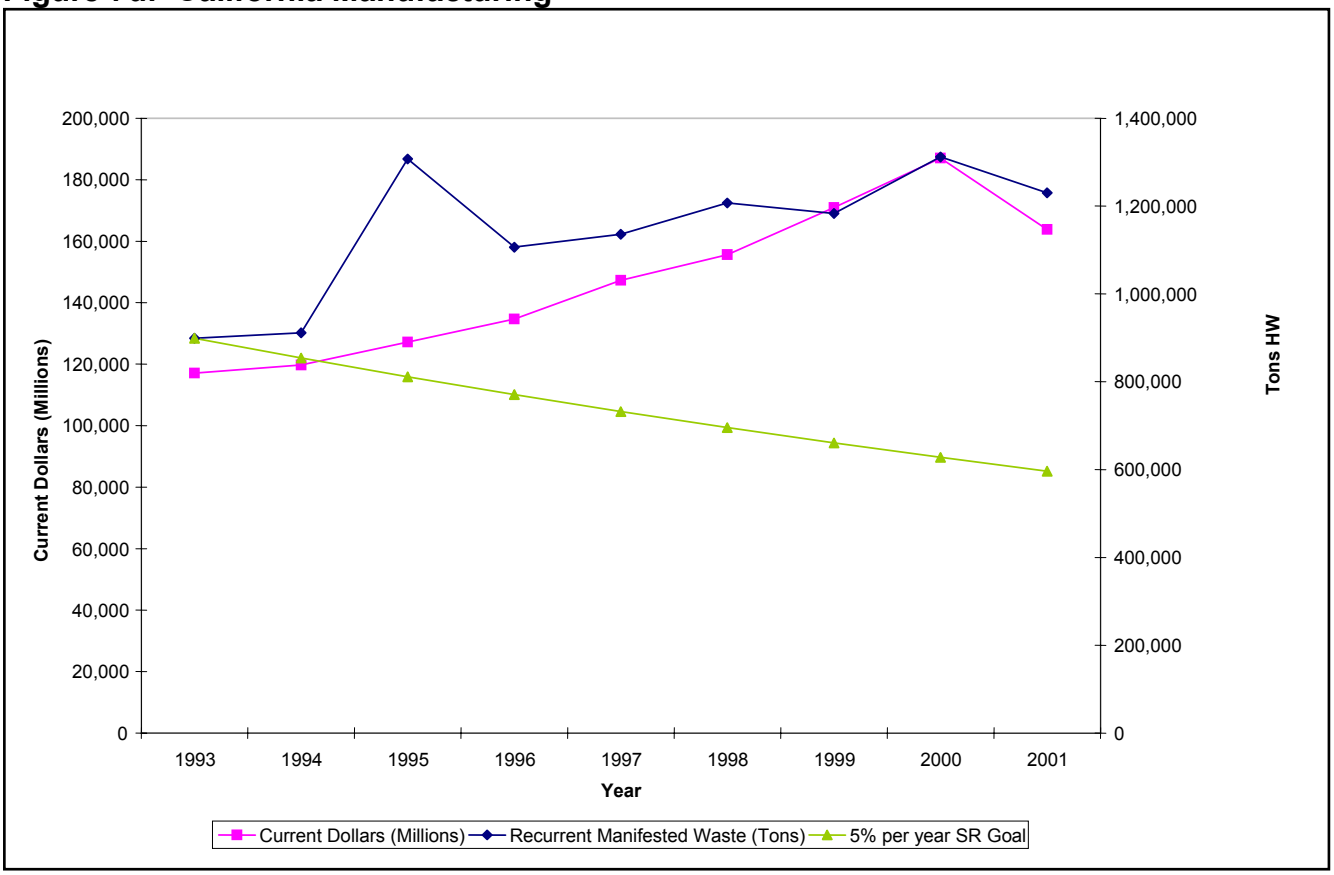
Figure 7c illustrates the close correlation between recurrent waste generation and the Durables subset of Gross State Product (especially if we discount the 1995 waste datapoint as an "outlier"). Also included for reference are the values representing a 5% per annum decrease in tons of recurrent waste with 1993 as the base year.

Figure 7c: California Durable Goods



Likewise, Figure 11d shows that the correlation between manufacturing activity and recurrent waste generation is even closer. Also included for reference are the values representing a 5% per annum decrease in tons of recurrent waste with 1993 as the base year

Figure 7d: California Manufacturing



However, when we look at the quotient of our columns of raw data to get units of waste per unit of economic activity for the more specific subsets of Gross State Product that are more closely correlated, the results are not so clearly indicative of "improvement" as when using the more highly-aggregated Gross State Product.

Figure 7e shows tons of recurrent waste per million dollars of durable goods. Also included for reference are the values representing a 5% per annum decrease in tons of recurrent waste per million dollars of the durable goods subset of Gross State Product with 1993 as the base year.

Figure 7e: California Durable Goods

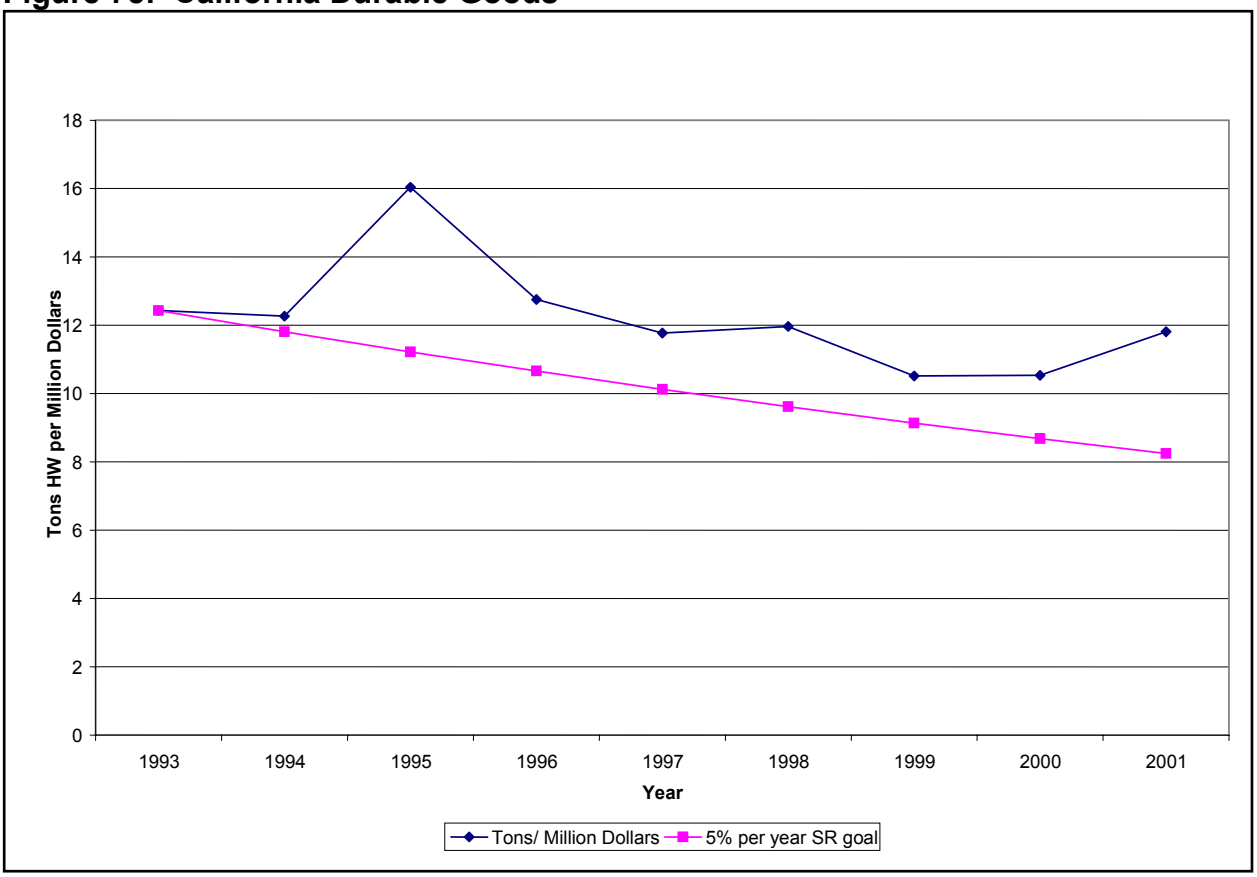
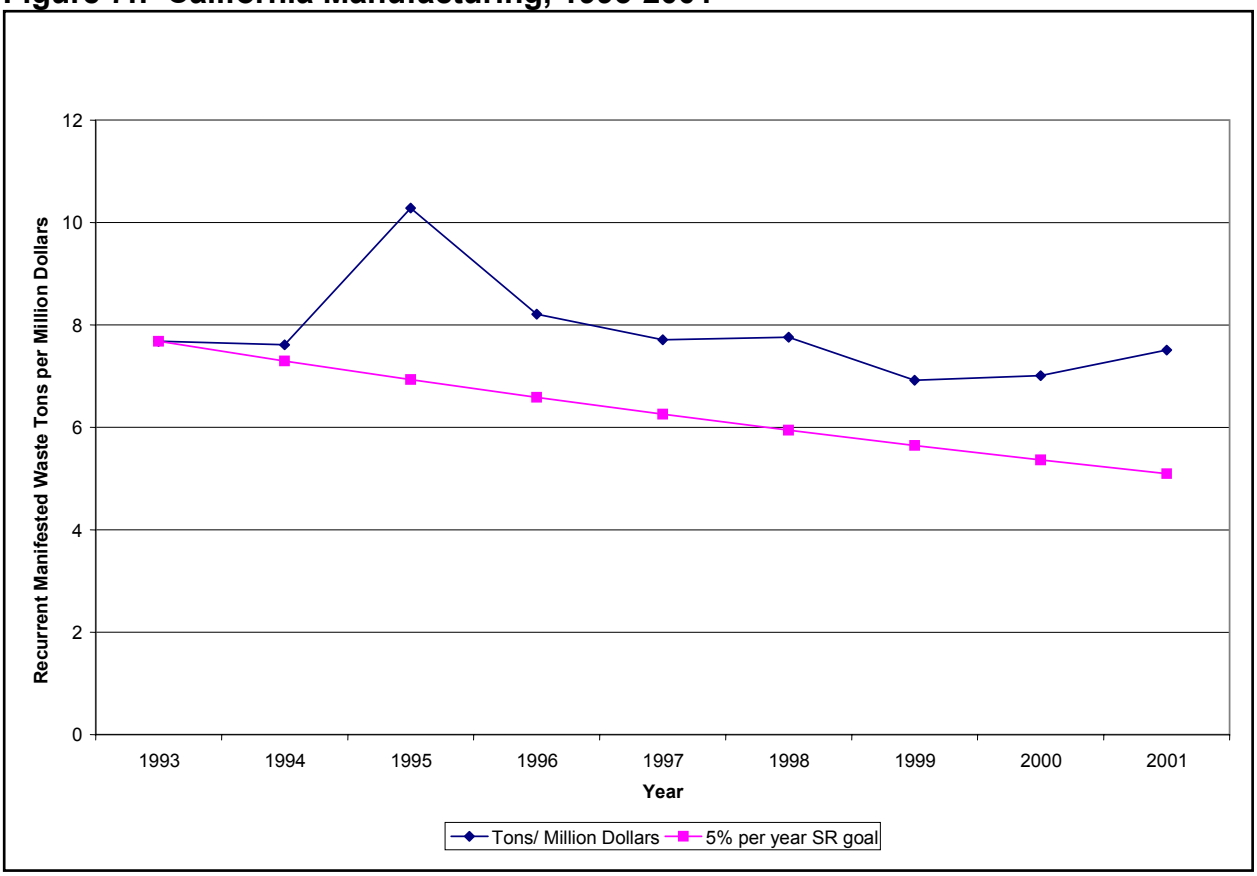


Figure 7f shows tons of recurrent waste per million dollars of Manufacturing. Also included for reference are the values representing a 5% per annum decrease in tons of recurrent waste per million dollars of the Durable Goods subset of Gross State Product with 1993 as base year.

Figure 7f: California Manufacturing, 1993-2001



These normalized metrics give us a somewhat different picture. Although waste per $M of Gross State Product appeared to be decreasing steadily through 2001 (dropping 15% over 8yrs), the results were far less convincing when normalized against the more highly correlated indicators. Tons of waste per $M of durables decreased by only 5% over the same eight years. Tons of waste per $M of manufacturing, the most closely correlated indicator of the three, decreased only 2.2%. For perspective, a 5% annual rate of decrease for the same 8 year period would have yielded about a 34% decrease in waste generation. Furthermore, a possible trend reversal starting in 1999 is evident when the data are normalized against the more specific indicators. While the overall trend of waste generated versus econometric indicators does arguably demonstrate a slight downward trend, variations by industry type, size, etc., will require further investigation before any compelling case can be made for “improvement”.

This may be partially explained by the lags inherent in the econometric indicators, as opposed to the relative real-time nature of the hazardous waste numbers. For example, the waste produced in manufacturing a good will appear in the year’s numbers for waste generated regardless of whether the good was ever sold/delivered, while the specific econometric indicator may not fully account for the same item in terms of dollars (value-added). Furthermore, the total Gross State Product continued climbing, despite the overall downturn in the economy, and the detrimental effects on the durable goods and

manufacturing sector. Further analysis may be useful in determining the relationship between hazardous waste generation and management, the activities that drive our economy, and the value of econometric approaches for assessing program priorities and policy implications.

Conclusion

Reaching absolute conclusions about California's progress in reducing hazardous waste generation is difficult, given the limitations of available data and the complexities associated with measuring progress.[21] However, some things can be seen in this chapter. Two hazardous waste groups stand out as possible candidates for pollution prevention effort. First, the "organics" group is about twice as large as the next-largest waste group, and may be an appropriate target for hazardous waste source reduction efforts. However, remember that this waste group contains California Waste Code 221, waste oil, the single-largest waste stream in California. Still, the organics waste group minus California Waste Code 221 constitutes a significant quantity of total waste manifested – 274,157 tons in 2000. Second, the "inorganics" waste group is on an upward trend. Driving that upward trend is CWC 181 "other inorganic solid waste," which is steadily increasing and in 2002 constituted 19% of recurrent hazardous waste manifested.

It appears that total hazardous waste generation, as represented by manifested waste quantities, is trending up after several years of apparent decline in the early nineties. Recurrent hazardous waste generation is essentially flat for the last few years; the upward trend in all waste was driven mainly by increases in quantities of cleanup waste manifested as hazardous waste. In fact, recurrent waste generation increased less than 1% from 1993 to 2001. Finally, recurrent waste generation normalized per Gross Domestic Product shows a 1.9% per year reduction from 1993 through 2001, while normalization against durables and manufacturing yield 0.63% and 0.28% per year reductions, respectively.

Total hazardous waste generation continues to increase in California. Much of the recent increase is associated with site clean-up activities; most other hazardous waste types are relatively flat. This indicates a positive trend in California; that is, more waste sites being reclaimed for re-use, and fewer sources of unregulated contaminants in the environment.

[21] Because of DTSC's role as regulator of hazardous wastes and substances, only manifest data were used in the conclusion to evaluate progress.

Part IV:
Current Status of Hazardous Waste Generation

In Part III, we looked at the trends in hazardous waste generation and Toxics Release Inventory (TRI) releases over time. This chapter looks more closely at the situation as it currently exists. Four questions emerged:

- What waste streams are generated?
- What industries generate the waste?
- How are wastes managed?
- Which facilities generate the most waste?

This chapter will focus on these four questions. 2000 data will be used to investigate these questions, as it is the last complete year for which these data are available (1999 for Biennial Report System and TRI data).[22]

What Waste Streams Were Generated?

All hazardous wastes, both RCRA and nonRCRA, are manifested in California according to California Waste Codes (CWC). As discussed in the previous chapter, these codes range from somewhat specific to very general. The range of materials that are actually manifested in any given California Waste Code may vary widely from facility to facility, or within a single facility over time. Table 13 gives some examples to illustrate the kinds of wastes that are classified within some of the commonly used California Waste Codes.

[22] Throughout this chapter, the discussions of manifest data refer to the subset with nonrecurrent wastes removed; in other words, the discussion is about recurrent wastes unless otherwise specified.

Table 13: Examples of Wastes Transported Under California Waste Codes

CWC	Waste Code Descriptor	Example Waste Streams
123	Unspecified alkaline solution	ammonium copper chloride, ammonium hydroxide sodium hydroxide copper tetreamine dichloride
135	Unspecified aqueous solution	non-RCRA hazardous waste liquid, (non-DOT regulated) hazardous waste liquid NOS ("not otherwise specified"), (cadmium, silver) (chromium, zinc) non RCRA Hazardous waste liquid NOS, (water, oil)
162	Other spent catalyst	non-RCRA hazardous waste, solid (spent catalyst) (spent nickel moly catalyst) self-heating solid, inorganic, NOS (spent catalyst w/arsenic)
181	Other inorganic solid waste	environmentally hazardous waste substance solid NOS (nickel, cadmium) hazardous waste solid, NOS, (mercury) (fluorescent light tubes) (steel and garnet blast)
214	Unspecified solvent mixture	waste flammable liquid, NOS (lead, petroleum distillates) (toluene, xylene) (methanol, toluene) waste paint-related material
223	Unspecified oil-containing waste	non-RCRA hazardous waste liquid (oil and water) (mop and deburring water) waste flammable liquid, NOS (gasoline, jet fuel, crude oil)
252	Other still bottom waste	MEK, chromium non-RCRA hazardous waste liquid, still bottoms non-RCRA hazardous waste, liquid paint solids with toluene, xylene
343	Unspecified organic liquid mixture	hazardous waste liquid NOS (ethylene glycol) waste styrene monomer, inhibited waste flammable liquid, corrosive NOS, (alpha picoline) hazardous waste liquid NOS (benzene, tetrachlorethylene)
352	Other organic solids	non-RCRA hazardous waste, solid (rags w/soil and oil) (oily debris)
491	Unspecified sludge waste	hazardous waste solid NOS, (cadmium, chromium) wastewater screenings, filtercake and phosphate sludge, non-hazardous waste solid non-RCRA hazardous waste, solid (filter cake, baghouse debris)

For the top twenty waste streams (by quantity), Table 14 shows the relative contribution of each California Waste Code to the total recurrent wastes manifested in 2002.

Table 14: Percent of Recurrent Waste Manifested, by Waste Code, 2002

CWC	Waste Type (California Waste Code) Description	Tons	% of Recurrent Waste
221	Waste oil and mixed oil	444,625	34%
181	Other inorganic solid waste	249,850	19%
352	Other organic solids	119,372	9%
223	Unspecified oil-containing waste	117,037	9%
134	Aqueous solution with total organic residues less than 10 percent	45,186	3%
214	Unspecified solvent mixture	31,207	2%
222	Oil/water separation sludge	29,541	2%
135	Unspecified aqueous solution	26,939	2%
343	Unspecified organic liquid mixture	24,096	2%
132	Aqueous solution with metals (< restricted levels and see 121)	20,489	2%
792	Liquids with pH <= 2 with metals	17,614	1%
171	Metal sludge (see 121)	15,321	1%
331	Off-specification, aged or surplus organics	13,670	1%
133	Aqueous solution with total organic residues 10 percent or more	13,164	1%
741	Liquids with halogenated organic compounds >= 1,000 Mg./L	13,140	1%
212	Oxygenated solvents (acetone, butanol, ethyl acetate, etc.)	12,346	1%
491	Unspecified sludge waste	10,084	1%
122	Alkaline solution without metals pH >= 12.5	7,097	1%
241	Tank bottom waste	6,888	1%
571	Fly ash, bottom ash and retort ash	6,597	1%
	Total for Top 20	1,224,262	94%
	Recurring Wastes	1,307,514	100%

Waste oil (California Waste Code 221, waste oil & mixed oil) dominates recurrent wastes, contributing 34% of the total amount of recurrent waste in California. It is important to note for 2002 that less than 40% of the manifested used oil was treated by re-refining or distillation, despite being considered “recycled”. The balance of used oil was blended with other materials and consumed as fuel oil. The significant environmental impacts from used oil-derived fuels and the need to support the addition of treatment capacity is outlined in a recent life-cycle assessment report (Environmental Science and Technology, v38 n2). The next largest waste stream is California Waste Code 181 (Other Inorganic Solid Waste), at 19% of the total. These percentages were 33% and 14%, respectively, in 1998.

Which industries generated the waste?

Understanding which industry types generate more or less waste is important for Pollution Prevention (P2) program planning. P2 programs can leverage resources by targeting industry types that both generate large quantities of waste (large potential for reduction) and that utilize similar processes across the industry (providing a focal point for research and assistance).

The data available for this analysis were evaluated by Standard Industrial Classification (SIC) codes, to determine which industries generate waste. SIC codes provide information about businesses' primary industrial sectors. It is important to note that SIC Codes are self-assigned by companies. They are not assigned by any government agency.

Manifest Data by Industry Type
Historically, SIC Codes were not routinely collected and entered into the manifest system. As in the previous reports, a large percentage of the generators shipping hazardous waste in calendar year 2002 have not reported an SIC Code. This resulted in only about half of the manifest records in The HWTS database being associated with an SIC Code, rendering the information in Table 15 incomplete and potentially inaccurate.

There have been a number of changes in managing generator information in 2000 and 2001that are expected to make the calendar year 2001 and later manifest data more useful with respect to SIC Codes:

- businesses requesting permanent California EPA ID Numbers have been required to provide SIC Code information as a condition of obtaining an ID number;
- the 2001 generator verification notice sent to hazardous waste generators requested SIC Code information be provided. Currently (late 2001), 64% of the generators that have verified their business information have reported SIC Code information;
- Senate Bill 271 (Chapter 319, Statutes of 2001) was enacted in 2001. Part of the bill language gives DTSC greater enforcement power to compel businesses to report their SIC Code as part of the annual verification process;
- Senate Bill 271 created the consolidated manifesting process mentioned in the previous section, which replaces the current milkrun variance regulations and modified manifesting procedures formerly in statute. Approximately 20,000 currently exempt generators (generally generators using consolidated manifests that formerly used milkrun manifests) will be required to obtain ID numbers to ship hazardous waste after January 1, 2002. They will be also be required to provide SIC Code information; and
- the 2002 verification cycle will compel, rather than request, generators to provide this information. This will increase the percentage of businesses with SIC Code information, resulting in further improvements in our ability to identify industry types generating hazardous waste.

Because only about half of the year 2002 records contain SIC information, it follows that the highest percentage of waste manifested, by quantity, has a blank SIC Code (49%). The next largest percentage of wastes (9%) is generated by SIC Code 48421, Used Household and Office Goods Moving (likely used oil). Table 15 below shows the contribution of each SIC Code to the total, to the extent that SIC codes are available in this data set.

Table 15: Percent of Each SIC Code for Manifested Total (Recurrent Wastes) 2002

SIC	SIC Code Description	Tons	%
	Blank	407,912	31%
48421	Used Household and Office Goods Moving	121,864	9%
32411	Petroleum Refineries	86,674	7%
324191	Petroleum Lubricating Oil and Grease Manufacturing	62,255	5%
32731	Cement Manufacturing	52,707	4%
22112	Electric Power Transmission, Control, and Distribution	49,643	4%
4841	General Freight Trucking	26,929	2%
325412	Pharmaceutical Preparation Manufacturing	23,575	2%
92811	National Security	22,928	2%
332813	Electroplating, Plating, Polishing, Anodizing, and Coloring	16,626	1%
22121	Natural Gas Distribution	15,395	1%
334412	Bare Printed Circuit Board Manufacturing	14,298	1%
334413	Semiconductor and Related Device Manufacturing	13,113	1%
221122	Electric Power Distribution	11,974	1%
213111	Drilling Oil and Gas Wells	11,539	1%
42272	Petroleum and Petroleum Products Wholesalers (except Bulk Stations and Terminals)	10,628	1%
5622	Waste Treatment and Disposal	10,237	1%
488991	Packing and Crating	8,870	1%
4871	Scenic and Sightseeing Transportation, Land	7,903	1%
325211	Plastics Material and Resin Manufacturing	7,545	1%
	Total for Top 20	982,615	75%
	Grand Total	**1,307,514**	**100%**

California's Toxics Release Inventory Releases by SIC Code

Table 16 below shows the SIC codes responsible for TRI total waste managed, quantities treated off-site, quantities released on- and off-site, and quantities recycled off-site. The table is ordered by total waste managed, and reported in pounds. Notice that the petroleum sector accounts for 25% of the total chemicals generated. However, it ranks second (16%) in the "quantity released on- and off-site" category, with the "off-site facilities" ranking first in that category (39%).

Table 16: California's Largest TRI Filers by Industry Type, Sorted by Total Chemicals Generated, 2001 TRI

Industry (SIC Codes)	Total Chemicals Generated	%	Treated Off-site	%	Quantity Released On and Off Site	%	Recycled Off-site	%
29 Petroleum	95,432,042	25%	4,833,549	18%	9,994,450	16%	4,171,489	6%
4953/7389 RCRA/Solvent Recovery	50,681,677	13%	1,978,625	7%	25,299,658	39%	1,528,843	2%
33 Primary Metals	43,069,007	11%	399,744	1%	1,834,170	3%	17,538,509	23%
28 Chemicals	40,693,351	11%	4,214,287	15%	2,824,891	4%	3,712,847	5%
36 Electrical Equip.	38,595,071	10%	1,890,619	7%	1,907,053	3%	19,546,550	26%
34 Fabricated Metals	27,026,501	7%	2,106,214	8%	3,514,409	5%	8,150,181	11%
Multiple Codes 20-39	23,975,989	6%	1,090,843	4%	2,173,289	3%	14,585,948	20%
20 Food	18,462,726	5%	5,205,341	19%	4,565,747	7%	10,386	0%
37 Transportation Equip.	9,128,261	2%	2,033,114	7%	1,805,929	3%	1,286,599	2%
30 Plastics	6,016,206	2%	887,877	3%	2,128,390	3%	222,443	0%
26 Paper	5,946,416	2%	43,000	0%	1,551,451	2%	156,235	0%
5171 Petroleum Bulk Terminals	5,235,461	1%	605,221	2%	314,657	0%	59,783	0%
No Reported Codes	4,137,722	1%	42,784	0%	1,252,772	2%	473,218	1%
39 Miscellaneous	2,738,796	1%	1,389,907	5%	275,644	0%	204,704	0%
10 Metal Mining	2,055,661	1%	0	0%	1,478,478	2%	6,723	0%
22 Textiles	1,963,117	1%	422,011	2%	61,971	0%	375,314	1%
32 Stone/Clay/Glass	1,794,108	0%	2,544	0%	1,349,120	2%	176,382	0%
35 Machinery	1,698,116	0%	100,881	0%	54,332	0%	1,327,312	2%
38 Measure/Photo.	1,278,039	0%	176,964	1%	86,124	0%	559,641	1%
49 Electric Utilities	1,196,681	0%	304	0%	637,537	1%	558,840	1%
25 Furniture	805,475	0%	36	0%	157,912	0%	33,680	0%
24 Lumber	784,280	0%	1,605	0%	728,318	1%	883	0%
5169 Chemical Wholesalers	484,242	0%	14,949	0%	53,896	0%	22,829	0%
27 Printing	185,869	0%	19,958	0%	55,751	0%	50,757	0%
31 Leather	144,695	0%	0	0%	79,695	0%	0	0%
Total (pounds)	**383,529,510**	**100%**	**27,460,378**	**100%**	**64,185,642**	**100%**	**74,760,095**	**100%**

Biennial Generator Report Data

The total quantity of waste generated in California in 2001, as reported to this data set, was 807,297 tons. The top 10 generators of RCRA waste in 2001 are shown in Table 17a. The total quantity of waste generated in California in 1999, as reported to this data set, was 427,302 tons. The top 10 generators of RCRA waste are shown in Table 17b.

There has obviously been significant turnover in the top ten generators as identified in the Biennial Report dataset. Only three generators remain on the 2001 list from the 1999 version. The top ten generators of 2001 reported nearly as much waste (390,597

tons) as all reporting generators combined in 1999 (427,302) Surprisingly, the top ten generators in 2001 represented only 48% of the total waste reported while 1999's top ten accounted for 51% of that year's reported total.

Table 17a: Top Ten California RCRA Waste Generators as Reported to the U.S. EPA's Biennial Report System, 2001

Facility Name	City	Tons	% of Total
Brite Plating Co. Inc.	Los Angeles	265,205	33%
Valero Refining Company	Benicia	29,928	4%
Martinez Refining Company	Martinez	16,763	2%
Golden West Refining Company	Santa Fe Springs	14,971	2%
Pentagon Technologies	Hayward	13,903	2%
Kinsbursky Brothers, Inc.	Anaheim	11,387	1%
Quemetco, Inc.	City of Industry	11,339	1%
Pacific Resource Recovery Services	Los Angeles	9,273	1%
Pioneer Circuits, Inc.	Santa Ana	9,146	1%
Exide Technologies	Los Angeles	8,682	1%
Total for Top 10		**390,597**	**48%**
Total		**807,297**	**100%**

Source: The National Biennial RCRA Hazardous Waste Report, http://www.epa.gov/epaoswer/hazwaste/data/brs01/state.pdf. See this document for additional detail.

Table 17b: Top Ten RCRA Waste Generators as Reported to the U.S. EPA's Biennial Report System, 1999

Facility Name	City	Tons	% of Total
Phibro-Tech, Inc.	Santa Fe Springs	71,999	17%
D/K Environmental	Vernon	26,228	6%
Los Angeles County/USC Med Center	Los Angeles	20,544	5%
Quemetco Inc.	City of Industry	19,343	5%
Safety-Kleen (San Jose), Inc.	San Jose	18,132	4%
Romic Environmental Technologies Corp.	East Palo Alto	16,086	4%
Martinez Refining Company	Martinez	13,865	3%
Kinsbursky Brothers	Anaheim	12,332	3%
GNB Technologies Inc.	Vernon	9,936	2%
Tamco	Rancho Cucamonga	9,836	2%
Total for Top 10		**218,301**	**51%**
Total		**427,302***	**100%**

Source: "The National Biennial RCRA Hazardous Waste, http://www.epa.gov/epaoswer/hazwaste/data/brs99/. See that report for additional

*Except for wastes disposed via deepwell/underground injection, U.S. EPA has excluded wastewater from the 1997 and 1999 National Biennial Reports. This quantity therefore does not include aqueous hazardous wastes treated on-site prior to discharge to a publicly owned treatment works; nor does it include such aqueous wastes sent off-site for treatment and disposal.

How were the wastes managed?
When shipping hazardous wastes under a manifest, generators must include a designation of the type of waste management method that will be used at the final destination. An understanding of existing waste management strategies is essential for understanding hazardous waste issues. In 2002, recycling was the most prevalent method for managing hazardous waste in California, accounting for 46% of the manifested waste total. Table 18 shows each management method's relative percentage of the total.

Table 18: Hazardous Waste Management Methods in California, 2002 Manifest (Recurrent Wastes)

Method	Mgmt Code	Tons of Waste	% Managed
Recycler	R01	604,473	46%
Disposal, landfill	D80	337,475	26%
Transfer station	H01	163,260	12%
		84,105	6%
Treatment, tank	T01	61,193	5%
Disposal, other	D99	34,877	3%
Treatment, incineration	T03	18,063	1%
Invalid disposal code	***	3,957	0%
Disposal, surface impoundment	D83	88	0%
Disposal, injection well	D79	13	0%
Disposal, Land application	D81	10	0%
Treatment, surface impoundment	T02	0	0%
Total		**1,307,514**	**100%**

Transfer stations accounted for 12% of the total wastes managed in 2002. The majority of the wastes being received by transfer stations is waste oil (California Waste Code 221), which usually is designated as recycled (which includes blending and burning as fuel for energy recovery).

Hazardous Wastes Shipped Out Of State
Out of state waste shipments are tracked under the manifest system of the state receiving the waste. Not all states, however, maintain their own manifest tracking system. Hazardous wastes sent from California to one of these states (without a tracking system) are tracked under California's manifest system. The blank "method" in Table 18 may be wastes shipped out of state. DTSC would not necessarily receive the copy of the manifest, which shows management methods from out-of-state treatment, storage or disposal facilities.

Hazardous Waste Management - Disposal
Table 19 shows the top five industry types disposing hazardous wastes to landfill[23]. After the 32% of the waste is not associated with an SIC Code, the cement manufacturing industry is now the largest generator of hazardous waste, at 15%, and the petroleum refining industry remains one of the largest generators of recurrent hazardous waste, at 14% of the total. The quantity generated by petroleum refineries in 2002 (47,823 tons) is larger than the quantities generated in 1999 (39,179 tons), and the percentage of the total is also slightly more (In 2000 this sector's contribution amounted to 13% of the state's total; in 2002 it was 14%).

Table 19: Top 25 Industry Types Disposing to Landfill, 2002 Manifest

SIC	Standard Industrial Classification Description	Tons	%
	Blank	108,797	32%
32731	Cement Manufacturing	52,173	15%
32411	Petroleum Refineries	47,823	14%
22112	Electric Power Transmission, Control, and Distribution	27,649	8%
22121	Natural Gas Distribution	12,699	4%
332995	Other Ordnance and Accessories Manufacturing	6,348	2%
92811	National Security	4,481	1%
211111	Crude Petroleum and Natural Gas Extraction	4,468	1%
221122	Electric Power Distribution	4,079	1%
332813	Electroplating, Plating, Polishing, Anodizing, and Coloring	3,677	1%
332722	Bolt, Nut, Screw, Rivet, and Washer Manufacturing	3,197	1%
334613	Magnetic and Optical Recording Media Manufacturing	2,731	1%
3364	Aerospace Product and Parts Manufacturing	2,603	1%
333295	Semiconductor Machinery Manufacturing	2,109	1%
334411	Electron Tube Manufacturing	2,063	1%
48839	Other Support Activities for Water Transportation	1,869	1%
32552	Adhesive Manufacturing	1,753	1%
333912	Air and Gas Compressor Manufacturing	1,629	0%
92119	Other General Government Support	1,610	0%
325211	Plastics Material and Resin Manufacturing	1,598	0%
56121	Facilities Support Services	1,588	0%
334412	Bare Printed Circuit Board Manufacturing	1,558	0%
325188	All Other Basic Inorganic Chemical Manufacturing	1,498	0%
61131	Colleges, Universities, and Professional Schools	1,388	0%
48611	Pipeline Transportation of Crude Oil	1,141	0%
	Total for Top 25	**300,528**	**89%**
	Total	**337,475**	**100%**

[23] The tables in this chapter show only what appear to be the significant industries or facilities; therefore, the number of industries or facilities shown may vary from table to table.

In 2002, the largest recurrent waste stream manifested for disposal was California Waste Code 181 (other inorganic solid waste), accounting to 49% of the total recurrent waste going to disposal. In 2000 this waste stream constituted 54% of the total recurrent waste. Table 20 below lists the top waste codes, representing 98% of the total material going to landfills. All other waste streams were less than 1,000 tons.

Table 20: Top 15 Waste Codes to Landfill, 2002 Manifest

CWC	California Waste Code	Tons	%
181	Other inorganic solid waste	165,658	49%
352	Other organic solids	77,635	23%
223	Unspecified oil-containing waste	58,923	17%
571	Fly ash, bottom ash and retort ash	5,989	2%
491	Unspecified sludge waste	4,431	1%
441	Sulfur sludge	3,303	1%
421	Lime sludge	2,189	1%
171	Metal sludge (see 121)	2,173	1%
591	Baghouse waste	2,047	1%
162	Other spent catalyst	2,013	1%
241	Tank bottom waste	1,761	1%
512	Other empty containers 30 gallons or more	1,570	0%
272	Polymeric resin waste	1,501	0%
513	Empty containers less than 30 gallons	1,258	0%
161	Fluid Catalytic Cracker waste	1,106	0%
	Total for Top 15	**331,556**	**98%**
	Total	**337,475**	**100%**

Table 21: Top 15 Facilities to Landfill, 2002 Manifest

Facility Name	County	Tons	%
HANSON PERMANENTE CEMENT	Santa Clara	52,163	15%
USEPA WESTLEY TIRE FIRE	Stanislaus	28,242	8%
LA DEPARTMENT WATER & POWER	Los Angeles	12,667	4%
TESORO REFINING & MARKETING CO.	Contra Costa	12,448	4%
Atlantic Richfield Co Vernalis	San Joaquin	10,973	3%
SHELL OIL PRODUCTS/US MARTINEZ REFINERY	Contra Costa	10,831	3%
SALTON SEA POWER L P AND BRINE L P	Imperial	9,281	3%
LEATHERS POWER PLANT	Imperial	8,933	3%
PORT OF SAN DIEGO	San Diego	7,250	2%
NI IND NORRIS DIV	Los Angeles	6,330	2%
EXXON MOBIL OIL CORP	Los Angeles	5,490	2%
WHEELABRATOR MARTELL INC	Amador	4,980	1%
TOSCO REFINING COMPANY	Contra Costa	4,278	1%
VINCE TANK LINES	San Bernardino	4,008	1%
UNOCAL SANTA MARIA VALLEY	Santa Barbara	3,595	1%
Total for Top 15		**181,469**	**54%**
Total		**337,475**	**100%**

*a biomass facility

Table 21 presents a listing of the largest quantity generators sending material to land disposal. The top fifteen includes six refineries and three power plants. The largest generator, Hansen Permanente, is a cement manufacturer. The “Westley Tire Fire” entry represents non-recurrent clean-up waste.

Hazardous Waste Management: Incineration

Environmental and public health advocates are particularly concerned about hazardous waste incineration, largely because of the byproducts that can be released during combustion processes. If not properly controlled, these byproducts can include dioxins and other highly toxic materials.

Tables 22, 23 and 24 below shows the industries, waste types, and facilities involved in hazardous waste incineration. Table 23 below shows TRI “off-site transfers for further management” by industry type.

Table 22: Top 16 Industry Types to Incineration, 2002 Manifest

NASIC	NA SIC Description	Tons	%
32411	Petroleum Refineries	4,579	25%
336411	Aircraft Manufacturing	2,450	14%
		1,729	10%
325412	Pharmaceutical Preparation Manufacturing	1,638	9%
325199	All Other Basic Organic Chemical Manufacturing	1,113	6%
54171	Research and Development in the Physical, Engineering, and Life Sciences	866	5%
3364	Aerospace Product and Parts Manufacturing	807	4%
61131	Colleges, Universities, and Professional Schools	460	3%
32532	Pesticide and Other Agricultural Chemical Manufacturing	405	2%
92811	National Security	298	2%
22112	Electric Power Transmission, Control, and Distribution	219	1%
334413	Semiconductor and Related Device Manufacturing	201	1%
32562	Toilet Preparation Manufacturing	183	1%
325211	Plastics Material and Resin Manufacturing	158	1%
2211	Electric Power Generation, Transmission and Distribution	152	1%
334112	Computer Storage Device Manufacturing	150	1%
	Total for Top 16	**15,410**	**85%**
	Total	**18,063**	**100%**

Table 23: Top 14 California Waste Codes to Incineration, 2002 Manifest

CWC	California Waste Code Description	Tons	%
352	Other organic solids	6,095	34%
214	Unspecified solvent mixture	1,974	11%
222	Oil/water separation sludge	1,529	8%
181	Other inorganic solid waste	1,315	7%
341	Organic liquids (nonsolvents) with halogens	768	4%
241	Tank bottom waste	732	4%
343	Unspecified organic liquid mixture	557	3%
162	Other spent catalyst	544	3%
491	Unspecified sludge waste	505	3%
551	Laboratory waste chemicals	473	3%
731	Liquids with polychloronated biphenyls >= 50 Mg./L	433	2%
221	Waste oil and mixed oil	417	2%
331	Off-specification, aged or surplus organics	316	2%
741	Liquids with halogenated organic compounds >= 1,000 Mg./L	297	2%
	Total for Top 14	**15,956**	**88%**
	Total	**18,063**	**100%**

Table 24: Top 20 Facilities to Incineration, 2002 Manifest

Facility Name	County	Tons	%
NORTHROP GRUMMAN CORP (WC)	Los Angeles	1,609	9%
AEROJET FINE CHEMICALS, LLC	Sacramento	1,257	7%
CHEVRON PRODUCTS CO	Contra Costa	1,099	6%
CHEVRON 1001651-EL SEGUNDO REFINERY	Los Angeles	1,056	6%
HONEYWELL, INTERNATIONAL INC	Los Angeles	786	4%
BP WEST COAST PRODUCTS LLC	Los Angeles	777	4%
UNITED TECHNOLOGIES PW SPACE PROPULSION	Santa Clara	511	3%
LOCKHEED MARTIN AERONAUTICS COMPANY	Los Angeles	475	3%
VALERO REFINING COMPANY-CALIF	Solano	448	2%
THE DOW CHEMICAL COMPANY	Contra Costa	404	2%
TESORO REFINING & MARKETING CO.	Contra Costa	311	2%
NORTHROP GRUMMAN CORP	Los Angeles	309	2%
VOUGHT AIRCRAFT INDUSTRIES INC	Los Angeles	297	2%
BIO RAD LABORATORIES	Contra Costa	279	2%
STRINGFELLOW PRETREATMENT PLANT	Riverside	266	1%
US NAVY PUBLIC WORKS CENTER	San Diego	227	1%
CENCO REFINING COMPANY	Los Angeles	211	1%
ALZA CORPORATION	Solano	196	1%
LOCKHEED MARTIN SPACE SYSTEMS	Santa Clara	185	1%
LSI LOGIC CORP	Unknown	179	1%
Total for Top 20		**10,884**	**60%**
Total		**18,063**	**100%**

Table 25: 2001 TRI Transfers Off-site for Further Waste Management (in pounds) for All Chemicals By Industry, California, 2001

Industry	Transfers to Recycling	Transfers to Energy Recovery	Transfers to Treatment	Transfers to POTWs	Other Off-site Transfers	Total Transfers Off-site for Further Waste Management
20 Food	10,625	0	237	4,923,966	0	4,934,828
22 Textiles	374,657	135,889	27,719	11,937	0	550,202
24 Lumber	890	1,711	1,457	280	0	4,339
25 Furniture	33,403	27,452	36	0	28,766	89,657
26 Paper	156,235	11,180	250	43,365	15	211,045
27 Printing	16,004	3,920	0	19,958	0	39,882
28 Chemicals	3,312,499	14,214,440	1,449,377	2,609,667	17,767	21,603,750
29 Petroleum	4,121,671	80,474	1,290,985	3,875,856	0	9,368,987
30 Plastics	214,209	185,123	38,209	929,774	0	1,367,315
31 Leather	0	0	0	0	0	.
32 Stone/Clay/Glass	150,131	750	1,521	1,397	687	154,486
33 Primary Metals	17,293,817	32,210	53,576	539,127	0	17,918,729
34 Fabricated Metals	8,156,509	514,446	391,705	3,162,097	1,109	12,225,866
35 Machinery	1,326,430	102,335	1,380	99,500	0	1,529,645
36 Electrical Equip.	19,732,311	1,149,293	581,821	2,452,172	5	23,915,602
37 Transportation Equip.	1,261,729	109,753	326,525	1,691,864	0	3,389,871
38 Measure/Photo.	557,819	183,953	153,178	19,218	0	914,168
39 Miscellaneous	192,769	572,881	319	635,939	76,200	1,478,108
Multiple Codes 20-39	13,183,662	282,390	244,000	1,083,252	227	14,793,531
No Reported Codes	474,965	478,000	9,385	12,583	0	974,933
Original industry subtotal:	**70,570,336**	**18,086,200**	**4,571,680**	**22,111,952**	**124,776**	**115,464,945**
10 Metal Mining	38,723	0	0	0	0	38,723
49 Electric Utilities	590,615	0	0	748	0	591,363
5169 Chemical Wholesalers	22,548	312,086	7,147	12,598	0	354,379
5171 Petroleum Bulk Terminals	59,905	2,852	22,180	3,563	0	88,500
4953/7389 RCRA/Solvent Recovery	1,489,357	6,766,977	319,734	2,028,632	0	10,604,700
New industry subtotal:	**2,201,148**	**7,081,915**	**349,061**	**2,045,541**	**0**	**11,677,665**
Total	**72,771,483**	**25,168,116**	**4,920,741**	**24,157,493**	**124,776**	**127,142,610**

Which facilities generated the most waste?
Table 26 below shows the 17 largest-quantity hazardous waste generators as identified in the manifest data system for 2002. Note that several of the companies are also "off-site facilities." Such facilities are those that accept waste generated elsewhere for treatment and disposal. Generally, such facilities were excluded from these analyses to avoid double-counting the waste. For this table, however, wastes manifested under these facilities' EPA identification number for permitted activities were excluded. The quantities listed here were manifested under a different EPA ID number and may reflect activities associated with milkrun transporter activities.

Table 26: 17 Largest Quantity Generators, 2002 Manifest

Facility Name	County	Tons	Percent
HANSON PERMANENTE CEMENT	Kings	52,135	4%
ASBURY ENVIRONMENTAL SERVICES	Los Angeles	43,776	3%
ASBURY ENVIRONMENTAL SERVICES	San Bernardino	43,129	3%
EVERGREEN ENVIRONMENTAL SERVICES	Alameda	37,542	3%
USEPA WESTLEY TIRE FIRE	Kings	28,509	2%
CLEARWATER ENV MGMT DBA ALVISO INDEPENDENT OIL	Los Angeles	18,996	1%
GOLDEN WEST REFINING CO	Los Angeles	16,315	1%
CLEARWATER ENVIRONMENTAL MGMT	Santa Clara	13,805	1%
SAFETY-KLEEN SYSTEMS INC	Los Angeles	13,768	1%
LA DEPARTMENT WATER & POWER	Kings	12,897	1%
ASBURY ENVIRONMENTAL SERVICES	Yolo	12,686	1%
	Unknown	11,327	1%
EVERGREEN ENVIRONMENTAL SERVICES	Yolo	11,141	1%
SHELL OIL PRODUCTS/US MARTINEZ REFINERY	Kern	11,044	1%
Atlantic Richfield Co Vernalis	Kings	11,002	1%
SALTON SEA POWER L P AND BRINE L P	Kern	10,683	1%
REVERE SMELTING & REFINING CORP	Los Angeles	9,598	1%
Total for Top 17		**358,354**	**27%**
Total		**1,307,514**	**100%**

Discussion and Conclusions

The picture of waste generation described in this chapter does not account for a variety of important considerations. BGR and manifest data do not contain information about what chemicals are found loose in the environment. None of these data sets, TRI, manifest or BGR, allow for an accounting of the varying toxicity of wastes. The risks posed by the generation of hazardous wastes cannot be evaluated conceptually. To assess risk, one must know specifically what chemicals and in what concentrations population groups were exposed to, the associated time-frame, and possible routes of exposures. TRI data can give an indication of potential risk due to its focus on pounds

of pure chemical. Manifest and Biennial Generator Report data are of little use for this purpose.

A review of this chapter indicates that about two-thirds of the hazardous waste manifested in California consists of oil and oil-contaminated waste; organic and inorganic solids; and auto-shredder waste. Furthermore, the data indicate that a significant portion of the hazardous waste manifested in the state is directly or indirectly related to the production, maintenance, operation and disposal of the automobile. Waste oil and oil-contaminated waste constitute over a third of all manifested waste. DTSC Life Cycle Analysis (LCA) staff estimated that used oil from the transportation sector (about 200,000 tons per year) could be source reduced to half the current volume by the widespread use of high-efficiency oil filtration systems that give longer intervals between oil changes (e.g., over 10,000 miles rather than the average 4800 miles for passenger cars). These filters are commercially available for large vehicles are publicly available for light duty vehicles. Efforts to educate the public and advocate that vehicle manufacturers install these filters are needed to address this growing and resource-intensive waste stream.

Remember, however, that environmental problems cannot be directly correlated to hazardous waste amounts. In fact, the wastes reported to the manifest and BGR data sets are those that are properly managed and controlled; presumably, these quantities represent materials that do not cause harm, or cause less harm, because they are not released uncontrolled into the environment. However, regardless of the risk or environmental problems, proper hazardous waste management continues to pose a formidable challenge.

Appendix 1:

California Waste Codes

California Nonrestricted Wastes

Inorganics

121. Alkaline solution (pH> or = 12.5) with metals (antimony, arsenic, barium, beryllium, cadmium, chromium, cobalt, copper, lead, mercury, molybdenum, nickel, selenium, silver, thallium, vanadium, or zinc)
122. Alkaline solution without metals (pH > or = 12.5)
123. Unspecified alkaline solution
131. Aqueous solution (2 < pH < 12.5) containing reactive anions (azide, bromate, chlorate, cyanide, fluoride, hypochlorite, nitrite, perchlorate, and sulfide anions)
132. Aqueous solution with metals (< restricted levels and see 121)
133. Aqueous solution with total organic residues 10 percent or more
134. Aqueous solution with total organic residues less than 10 percent
135. Unspecified aqueous solution
141. Off-specification, aged, or surplus inorganics
151. Asbestos-containing waste
161. FCC waste
162. Other spent catalyst
171. Metal sludge (see 121)
172. Metal dust (see 121) and machining waste
181. Other inorganic solid waste

Organics

211. Halogenated solvents (chloroform, methyl chloride, perchloroethylene, etc.)
212. Oxygenated solvents (acetone, butanol, ethyl acetate, etc.)
213. Hydrocarbon solvents (benzene, hexane, Stoddard, etc.)
214. Unspecified solvent mixture
221. Waste oil and mixed oil
222. Oil/water separation sludge
223. Unspecified oil-containing waste
231. Pesticide rinse water
232. Pesticides and other waste associated with pesticide production
241. Tank bottom waste
251. Still bottoms with halogenated organics
252. Other still bottom waste
261. Polychlorinated biphenyls and material containing PCBs
271. Organic monomer waste (includes unreacted resins)
272. Polymeric resin waste

281. Adhesives
291. Latex waste
311. Pharmaceutical waste
321. Sewage sludge
322. Biological waste other than sewage sludge
331. Off-specification, aged, or surplus organics
341. Organic liquids (nonsolvents with halogens)
342. Organic liquids with metals (see 121)
343. Unspecified organic liquid mixture
351. Organic solids with halogens
352. Other organic solids

Solids

411. Alum and gypsum sludge
421. Lime sludge
431. Phosphate sludge
441. Sulfur sludge
451. Degreasing sludge
461. Paint sludge
471. Paper sludge/pulp
481. Tetraethyl lead sludge
491. Unspecified sludge waste

Miscellaneous

511. Empty pesticide containers 30 gallons or more
512. Other empty containers 30 gallons or more
513. Empty containers less than 30 gallons
521. Drilling mud
531. Chemical toilet waste
541. Photochemicals/photoprocessing waste
551. Laboratory waste chemicals
561. Detergent and soap
571. Fly ash, bottom ash, and retort ash
581. Gas scrubber waste
591. Baghouse waste
611. Contaminated soil from site clean-ups
612. Household wastes
613. Auto-shredder waste

California Restricted Wastes

“Restricted” wastes cannot be landfilled unless they are treated to certain specifications.

711. Liquids with cyanides > or = 1000 Mg/L
721. Liquids with arsenic > or = 500 Mg/L
722. Liquids with cadmium > or = 100 Mg/L
723. Liquids with chromium (VI) > or = 500 Mg/L
724. Liquids with lead > or = 500 Mg/L
725. Liquids with mercury > or = 20 Mg/L
726. Liquids with nickel > or = 134 Mg/L
727. Liquids with selenium > or = 100 Mg/L
728. Liquids with thallium > or = 130 Mg/L
731. Liquids with polychlorinated biphenyls > or = 50 Mg/L
741. Liquids with halogenated organic compounds > or = 1000 Mg/L
751. Solids or sludges with halogenated organic compounds > or = 1000 mg/Kg
791. Liquids with pH < or = 2
792. Liquids with pH < or = 2 with metals
801. Waste potentially containing dioxins

Appendix 2:

Wastes Excluded from Hazardous Waste Designation Between 1993 and 1998

RCRA Waste Streams

debris 261.3, 40 CFR
recovered oil from petroleum refining, exploration and production 261.4(a)(12)
excluded scrap metal 261.4 (a)(13)
shredded circuit boards (14)
condensates from kraft mill steam strippers (15)
secondary materials from the primary mineral processing industry (16)
used oil refining distillation bottoms 261.4(b)(14)
residues of waste in empty containers 261.7(a)(1)
universal wastes (batteries, pesticides, mercury thermostats, HH and conditionally exempt small qty generator waste) 261.9
residues derived from the burning or processing of hazardous waste in an industrial furnace 266.112
military munitions 266.202

NonRCRA Waste Streams

intermediate manufacturing process streams 25124(c)(1)
acetic acid 25145(b)(2)(B)(i)
aluminum chloride (ii)
ammonium bromide (iii)
ammonium sulfate
anisole
boric acid
calcium fluoride
calcium formate
calcium propionate
cesium chloride
magnesium chloride
potassium chloride
sodium bicarbonate
sodium borate decahydrate
sodium carbonate
sodium chloride
sodium iodide
sodium tetraborate
oils commonly used as food flavorings (xix)
wastes exceeding a TTLC 25141.5(b)(3)(A) and (B)

wastes from the extraction, beneficiation, and processing of ores and minerals 25143.1(b)(1)
treated wood waste 25143.1.5
cementitious material 25143.8(a)
debris contaminated with petroleum 25143.12
wastes containing silver 25143.13
dry cell batteries 25216
human surgery specimens or tissue 117635 Health and Safety Code
pharmaceuticals 11747 Health and Safety Code
pulping liquors 66261.4(a)(4)
secondary materials (a)(5)
infectious wastes (b)(1)
used oil re-refining distillation bottoms (b)(3)
used chlorofluorocarbon refrigerants (b)(4)

Appendix 3:

TRI Reporting Categories

Air Releases
Total releases to air include all TRI chemicals emitted by a plant from both its stack(s) as well "fugitive" sources (such as leaking valves).

Stack Air Releases
Releases to air occur through confined air streams such as stacks, vents, ducts or pipes. These are also called point source releases.

Fugitive Air Releases
This category includes releases to air that do not occur through a confined air stream, including equipment leaks, evaporative losses from surface impoundments and spills, and releases from building ventilation systems. These releases are also called releases from non-point sources.

Water Releases
Releases to water include discharges to streams, rivers, lakes, oceans and other bodies of water (but not ground water). This includes releases from both point sources, such as industrial discharge pipes, and non-point sources, such as stormwater runoff, but not releases to sewers or other off-site wastewater treatment facilities.

Land Releases
Land releases include all the chemicals disposed on land within the boundaries of the reporting facility, and can include any of the following types of on-site disposal:

RCRA Subtitle C Landfills
This category includes wastes buried on-site in landfills regulated by RCRA Subtitle C.

Other On-Site Landfills
This category includes wastes buried on-site in landfills that are not regulated by RCRA.

Land Treatment/Application Farming
This category includes wastes that are applied or incorporated into soil.

Surface Impoundments
Surface impoundments are uncovered holding ponds used to volatilize (evaporate wastes into the surrounding atmosphere) or settle waste materials.

Other Land Disposal
This category includes other forms of land disposal, including accidental spills or leaks.

Underground Injection
Underground injection releases fluids into a subsurface well for the purpose of waste disposal. Wastes containing TRI chemicals are injected into either Class I wells or Class V wells.

Other Injection Wells include Class II, III, and IV wells.
Class I Injection Wells are industrial, municipal, and manufacturing wells injecting liquid wastes into deep, confined, and isolated formations below potable water supplies.

Class II oil- and gas-related wells re-injection of produced fluids for disposal, enhanced recovery of oil, or hydrocarbon storage.

Class III wells are associated with the solution mining of minerals.

Class IV wells include the injection of hazardous or radioactive fluids directly or indirectly into underground sources of drinking water (USDW), only if the injection is part of an authorized CERCLA/RCRA clean-up operation.

Class V wells are generally used to inject non-hazardous wastes into or above an underground source of drinking water. Class V wells include all types of injection wells that do not fall under I-IV. They are generally shallow drainage wells, such as floor drains connected to dry wells or drain fields.

Offsite Transfers
TRI also tracks off-site transfers to various types of facilities such as Publicly Owned Treatment Works (municipal sewage treatment plants), treatment and disposal facilities, as well as recycling and energy recovery facilities.

Publicly Owned Treatment Works (POTW)
A POTW is a wastewater treatment facility that is owned by a state or municipality. Wastewaters from facilities reporting under TRI are transferred through pipes or sewers to a POTW. Some chemicals, such as metals, may be removed, but are not destroyed and may be disposed of in landfills or discharged to receiving waters; transfers of metals and metal compounds to POTWs are categorized as off-site releases.

Treatment and Disposal
Toxic chemicals in wastes that are transferred off-site may be treated through a variety of methods, including biological treatment, neutralization, incineration, and physical separation. These methods typically result in varying degrees of destruction of the toxic chemicals. Toxic chemicals in wastes that are transferred

off-site for disposal generally are released to land at an off-site facility or are injected underground.

Recycling and Energy Recovery

Toxic chemicals in wastes sent off-site for the purposes of recycling are generally recovered by a variety of recycling methods, including solvent recovery and metals recovery. Toxic chemicals in wastes sent off-site for purposes of energy recovery are combusted off-site in industrial furnaces (including kilns) or boilers that generate heat or energy for use at that location. Both of these management methods (recycling and energy recovery) are considered to be recycling within the TRI data system. Incineration is not considered to be energy recovery and is therefore not included within the recycling category.