SOURCE REDUCTION REPORT
and
TWO-YEAR WORK PLAN
2008-2010

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

March, 2009

This work plan was prepared by the staff of the Department of Toxic Substances Control's Office of Pollution Prevention and Green Technology. This work plan fulfills the requirements set forth in Health & Safety Code Section 25244.22.

The work plan was prepared under the direction of:

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Source Reduction Advisory Committee

Authority: A "California Source Reduction Advisory Committee" was created by Senate Bill 1916 (1998), effective January 1, 1999, to provide advice to the Department of Toxic Substances Control (DTSC, the Department) in performing certain responsibilities. The Committee's membership, role, and duration are specified in Health and Safety Code, division 20, chapter 6.5, article 11.9, section 25244.15.1.

Purpose: The Advisory Committee's responsibilities include but are not limited to:

(a) Reviewing and providing guidance in the preparation of DTSC's two-year work plan;

(b) Evaluating the performance and progress of the Department's source reduction (pollution prevention) program; and

(c) Making recommendations to the Department concerning program activities, funding priorities, and legislative changes.

Source Reduction Advisory Committee Members

Public Members

Robin Bedell-Waite,
Chairperson
Contra Costa County

Kasey Christie, Vice-Chair
GKN Aerospace

David Arrieta
Western States Petroleum Association

Dave Campbell
Paper and Allied Industrial, Chemical & Energy Workers Int'l Union

Larry Moore
Larry's AutoWorks

Kelly Moran
Sierra Club

Gretchen Lee Salter
Breast Cancer Fund

John Ulrich
Chemical Industry Council of California

Open
Statewide Environmental Advocacy Organization

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Lynn Baker
California Air Resources Board

Nita Davidson
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California Integrated Waste Management Board

Liz Kanter
State Water Resources Control Board

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SOURCE REDUCTION REPORT and TWO-YEAR WORKPLAN, 2008-2010

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PART 1 - Introduction

1.1 DTSC'S EXPANDING ROLE IN SOURCE REDUCTION, REDUCTION OF THE USE OF TOXIC SUBSTANCES, AND REDUCTION OF EXPOSURES TO TOXIC SUBSTANCES

A. Long-standing authority to undertake source reduction activities

1. Hazardous Waste Source Reduction and Management Review Act of 1989

The Department's Pollution Prevention Program began with the passage of the Hazardous Waste Reduction, Recycling, and Treatment Research and Demonstration Act of 1985.[1] This statute required that DTSC establish a technical and research assistance program to assist generators in identifying and applying methods of source reduction and other hazardous waste management approaches. In 1989, California enacted the Hazardous Waste Source Reduction and Management Review Act (hereafter, "Source Reduction Act" or "Act").[2] This statute provided the first regulatory mandate for industries that generate larger waste quantities to systematically examine opportunities for reducing the generation of hazardous waste at the source.

Source reduction is defined in the statute as action that causes "a net reduction in the generation of hazardous waste," or "a lessening of the properties which cause it to be classified as a hazardous waste."[3] Source reduction includes: (1) input changes in materials or feedstocks; (2) production process changes, such as reusing materials within a given process; (3) product reformulation/substitution, including changes in specifications of end products; and (4) operational improvements to improve site management, such as inventory control and training.[4] Source reduction by definition excludes actions taken after a hazardous waste is generated, such as concentration to reduce hazardous waste volume, dilution to reduce hazardous characteristics, or displacement of hazardous waste from one environmental medium to another.[5] Source reduction as defined also explicitly excludes "treatment."[6]

The Hazardous Waste Source Reduction and Management Review Act of 1989 requires hazardous waste generators that meet a quantitative threshold of annual hazardous waste generation to review alternative processes, operations and procedures with the potential

[1] Added by Stats. 1985, Ch. 1030, Sec. 2.
[2] This statute is often referred to by its 1989 Senate bill number, "SB 14."
[3] Health & Saf. Code section 25244.14(e)(1).
[4] Health & Saf. Code section 25244.14(e)(3).
[5] Health & Saf. Code section 25244.14(e)(2).
[6] Health & Saf. Code section 25244.14(e)

to reduce the generation of hazardous waste, and to prepare a plan and timetable for implementing and documenting all "technically feasible and economically practicable" source reduction measures. The Act instructed DTSC to, by regulation, develop a "program for hazardous waste source reduction," to include, at minimum, a format to be used by generators for completing the review and plan,[7] a procedure for exemptions from the Act where "no source reduction opportunities appear to exist for the generator," and appropriate protection for trade secrets. The Act also required DTSC to establish a computerized data and information system to categorize generators and track source reduction information. The Act requires that every four years generators must prepare a "hazardous waste management performance report" that documents source reduction measures and any improved waste management practices implemented in the preceding four years.

2. Expansion of source reduction authority in 1998

In Senate Bill 1916 of 1998, the California legislature expressed its intention to "expand the State's hazardous waste activities . . . to promote implementation of source reduction measures using education, outreach, and other effective voluntary techniques."[8] Key features of this expansion included:

> (1) the requirement that DTSC establish a "technical assistance and outreach program to promote implementation of model source reduction measures in priority industry categories," focusing on at least two priority categories of industries with source-reduction potential every two years, including one category consisting primarily of small businesses;[9]
>
> (2) the requirement that DTSC provide source reduction training and resources to the local-level Certified Unified Program Agencies (CUPAs), regional and local governments, and business assistance corporations and centers;
>
> (3) the formation of an external Source Reduction Advisory Committee to provide advice on and critical review of DTSC's proposed two-year work plan, review DTSC's source reduction progress, and make recommendations regarding program activities, funding priorities, and legislative changes;
>
> (4) the establishment of two quantitative benchmarks for the source reduction program:
>
> - the instruction that for source reduction projects involving "primarily large or technologically complex businesses," DTSC communicate with representatives of 80% of the state's companies in the category (a measure of DTSC effort or "output");

[7] Health & Saf. Code section 25244.16(a)
[8] Health & Saf. Code section 25244.13(c)
[9] Health & Saf. Code section 25244.17.1(a)

- a requirement that DTSC determine "the extent to which the statewide goal of 5 percent per year reduction of the generation of hazardous wastes . . . has been attained" (a measure of environmental outcome); and
- a requirement that DTSC provide, each fiscal year, training and information resources to at least 90 percent of the Certified Unified Program Agencies; and

(5) the instruction that DTSC evaluate why the 5% reduction-per-year source reduction had or had not been attained, make "recommendations designed to assure . . . attainment," and include "recommendations for legislation."

B. DTSC's expansion of authority through the Green Chemistry Initiative

In April of 2007, Linda Adams, Secretary for Environmental Protection, directed DTSC to lead a chemical policy reform effort termed the "Green Chemistry Initiative." As the Secretary explained:

> *In the absence of a unifying approach, interest groups and policy makers have been attempting to take these issues on one by one. Product by product, chemical by chemical, and now even city by city approaches can often have unintended, even regrettable consequences, even with the best of intentions. I believe we need to develop a coordinated, comprehensive strategy . . . .* [10]

Substantial DTSC resources, including numerous pollution prevention staff members, have been devoted to organizing symposia, holding public workshops, convening a Scientific Advisory Panel, and supporting an extensive internet blog to obtain broad-based input and recommendations for chemicals policy reform and advancing green chemistry in California. In January 2008, DTSC presented an initial report on "Options" for the Green Chemistry Initiative to Secretary Adams. DTSC Director Maureen Gorsen provided recommendations to Secretary Adams on green chemistry options for California.

Implementation of the Green Chemistry Initiative process significantly stretched DTSC's pollution prevention staff resources. In the long term, however, this investment of DTSC's resources will move California towards a better and more comprehensive approach to source reduction and toxics reduction through a combination of legislation, regulations, economic incentives, and/or new programs aimed at creating incentives for developing less-toxic production processes and products.

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10 http://www.dtsc.ca.gov/PollutionPrevention/GreenChemistryInitiative/upload/CalEPA_Green_Chemistry_Initiative_Memo.pdf

C. DTSC's new authority to address toxic substances in specific products in commerce

In recent years, DTSC's authority to prevent pollution through source reduction has been supplemented by expanding legislative authority and responsibility for toxic chemicals in consumer products rather than exclusively in waste. Some statutes require DTSC to enforce requirements that toxic materials in specified products do not exceed regulatory limits, while others require DTSC to ensure that products containing toxic substances are properly managed at the end of their useful life. Examples of the former include the Toxics in Packaging Prevention Act, [11] statutes limiting the sale of lead-containing jewelry,[12] restrictions on heavy metals in certain electronics,[13] and the Lighting Efficiency and Toxics Reduction Act.[14] Examples of the latter are California's Treated Wood Waste law; [15] and the Perchlorate Contamination Prevention Act of 2003.[16]

Over time, DTSC expects to obtain greater legislative authority over toxic substances in consumer products in a more comprehensive fashion pursuant to the Green Chemistry Initiative and consistent with the CIWMB's Strategic Directive #5 (producer liability).[17]

The California Green Chemistry Initiative report contained, released in December 2008, included six recommendations:

- Expand pollution prevention programs
- Develop green chemistry workforce education and training
- Create an online product ingredient network
- Create an online toxic clearinghouse
- Accelerate the quest for safer products
- Move toward a "cradle-to-cradle" economy

Two of the recommendations were enacted when Governor Schwarzenegger signed two historic bills on September 29, 2008. Assembly Bill 1879 (Feuer, Chapter 599, 2008 Statutes) authorizes DTSC to identify and prioritize chemicals of concern, evaluate alternatives and specify regulatory responses. The bill also establishes a Green Ribbon Science Panel to provide implementation advice and expands the Environmental Policy Council to oversee critical program activities. The second bill, Senate Bill 509 (Simitian, Chapter 560, 2008 Statutes) requires an online Toxics Information Clearinghouse be established to provide public access to information on the toxicity of chemicals. Implementation of the these bills will be a DTSC priority for 2008 through 2010 and will require a significant commitment of DTSC staff resources, some of which will come from the Office of Pollution Prevention and Green Technology.

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[11] Health & Saf. Code, section 25214.16 (a)
[12] Health & Saf. Code, section 25214.1 et. seq.
[13] Electronic Waste Recycling Act of 2003; Health & Saf. Code, section 25214.10
[14] AB 1109; Health & Saf. Code section 25210.9
[15] AB 1353 of 2004; Health & Saf. Code 25150.7 and 25150.8
[16] AB 826
[17] http://www.ciwmb.ca.gov/BoardInfo/StrategicPlan/2007/SD05.htm

1.2 ELEVATING THE IMPORTANCE OF POLLUTION PREVENTION

A. DTSC's Vision and Mission

Historically, DTSC has primarily regulated hazardous waste at the point of generation and during treatment, transportation and disposal ("cradle to grave"). DTSC now seeks to advance a "cradle to cradle" perspective, in which the initial design of processes and products incorporates strategies that minimize the use and generation of toxic substances. Such design would reduce the potential for releases of toxic substances, thereby reducing human exposures to those substances. And, due to the "detoxification" of materials in commerce, "green design" would facilitate reuse and recycling of those materials. Better design would also reduce the potential for generating waste, including hazardous waste, during the manufacture, use, and disposal of products and processes.

In August of 2007, DTSC adopted new Mission and Vision Statements to capture this broader view of addressing the hazards and risks posed by toxic substances:

> *Mission: The Mission of the Department of Toxic Substances Control is to provide the highest level of safety, and to protect public health and the environment from toxic harm.*
>
> *Vision: We will be global leaders in environmental excellence, using sound science, promoting green technology and seeking continuous improvement, for a healthy, sustainable and prosperous California.*

The new statements are intended to acknowledge that threats to health and the environment stem not just from mismanagement of hazardous materials and waste but from the design of products and processes themselves.

B. Expansion of the Office of Pollution Prevention and Green Technology

Consistent with DTSC's increased emphasis on detoxifying industrial processes and consumer products on the front end, DTSC recently reorganized so as to:

> (1) move most outreach and regulatory functions related to toxic substances in consumer products into the Office of Pollution Prevention and Green Technology (P2 Office);
>
> (2) address plastics pollution by expanding the pollution prevention staff through the budget change process and through an interagency agreement with the Department of Conservation; and

(3) create a new Deputy Director of Pollution Prevention and Green Technology position to elevate the status of this work internally and externally.

Pollution Prevention is one of three "core" program areas at DTSC along with Site Mitigation & Brownfields (clean-up) and Enforcement and Emergency Response.

C. New DTSC toxic substances reduction activities

The Office of Pollution Prevention is involved in several new initiatives addressing high-profile or emerging issues with respect to toxic substances in consumer products and industrial processes. Two examples of these new projects, described below, are related to 1.) nanomaterials, and 2.) plastics recycling and bioplastics.

1. Nanomaterials

Nanomaterials are now ubiquitous, appearing in countless industrial applications and consumer products. Materials and devices designed at the nano-scale are being used or considered for use in applications as diverse as cancer treatment, sun block, and scratch-resistant automotive coatings. However, the potential environmental and health effects of nanotechnology in various applications are currently poorly understood. In order to gain a greater understanding of these potential effects, DSTC is gathering information on nanotube manufacturing, distribution, and use, and is monitoring the efforts of other regulatory agencies with respect to this technology. DTSC is establishing a partnership with this industrial sector to develop an "industrial ecology" approach to manufacturing, including product stewardship, to protect public health and the environment. DTSC will continue to investigate the merits of voluntary initiatives and traditional governmental regulatory approaches.

2. Plastics recycling/bioplastics

DTSC has entered into a four-year agreement with the Department of Conservation to identify innovative methods to reduce plastic beverage container life-cycle impacts, boost recycling rates, and reduce the toxicity and hazards of plastic waste. DTSC will employ environmental life cycle analysis methods to quantify the multi-media environmental impacts associated with alternative plastic formulations, processes, and technologies by tracing resource use and pollution discharges from plastics product production through disposal. The project will also help develop and assess bioplastics and alternative additives for their market potential. In order to address issues related to the end-of-life issues of bioplastics, DTSC staff is also collaborating with CIWMB to examine biodegradation, composting, and other issues that relate to both organizations.

DTSC is examining ways to coordinate and integrate the pollution prevention activities and projects required by statute into the implementation of these and other new initiatives (e.g., the implementation of green chemistry options). For example, DTSC proposes to

examine the conventional plastics manufacturing industry's source reduction opportunities in this pollution prevention work plan cycle which will complement the above-described plastics recycling and bioplastics research conducted by pollution prevention staff. Together, these projects will give DTSC a much better understanding of both the existing plastics industry's opportunities for source reduction and emerging, environmentally-preferable plastics technologies that may one day supplant conventional plastics.

1.3 DTSC's EFFORTS TO PRIORITIZE PROJECTS AND MEASURE ENVIRONMENTAL RESULTS OF DEPARTMENTAL ACTIVITY

A. Departmental strategic planning & Pollution Prevention Office planning

DTSC is currently revising its 2002 strategic plan to reflect its broader vision of work related to reducing the use of toxic substances. The Pollution Prevention Office is undertaking its own planning exercise to identify ways to expand pollution prevention efforts in the near term in California through a variety of tools, including both voluntary and regulatory approaches.

B. Performance measurement

All of DTSC's programs have adopted specific performance measures to track project success, focusing on measuring real-world environmental and public health impacts of individual projects rather than only measuring staff time, funds expended, or number of reports produced. The Pollution Prevention Office's measures include metrics related to source reduction effectiveness, reduction of hazardous chemical use in consumer products, and advancement of environmental justice goals, among many others. In 2009, DTSC will work to gather data for a baseline against which we can measure future program performance.

C. Data analysis

As DTSC embarks on performance management initiatives, sources of validated and readily-available data are critical for characterizing the quality and quantity of our efforts vis-à-vis output/outcomes measures, and environmental indicators. DTSC has a variety of databases, many of which were created independently, using different formats and sources of information and with technology tools that do not facilitate information-sharing. DTSC has a tremendous amount of mission-relevant data, but its current data model is not coordinated across program areas and does not help us do our work as

effectively as it could. DTSC has accordingly created a new Office of Data Evaluation and Environmental Indicators (Office). The intent of this new office is to find a better way to collect, validate, analyze and disseminate data.

One responsibility of the new Office will be the collection and analysis of data collected via the Source Reduction Act. This change will facilitate a more complete analysis of the information and better comparisons with other internal data sources, such as Hazardous Waste Tracking System manifest information and biennial generator reports.

D. Proposed improvements to the work plan process

Historically, DTSC's two-year source reduction work plan has had two major components: a lengthy discussion of waste generation patterns and trends, and a description of planned project work. In an effort to improve the work planning process, DTSC has greatly reduced the data portion of this document (Chapter 3) as compared to previous two-year work plan, and proposes to provide a more robust data analysis in 2009.

The legislative intent of requiring the data section was to help inform decisions and target potential waste streams, chemicals and/or industrial sectors for DTSC initiatives. However, by presenting the information at the same time as the actual work plan, the data section does not serve its intended purpose. Therefore, DTSC proposes to submit a separate data report in the intervening years between the two-year source reduction work plans. The creation of DTSC's new Office of Data Evaluation and Environmental Indicators will facilitate this and should provide higher-quality review, improve the data analysis, and allow for more timely presentation of information to the Pollution Prevention Advisory Committee. Accordingly, a more comprehensive data analysis will be provided in 2009.

PART 2 - Pollution Prevention Projects

2.1 SOURCE REDUCTION PROJECTS FOR 2008-10

This section of the work plan presents the sector-based projects, required by the Source Reduction Act (SB 1916) of 1998, that DTSC currently has underway or is planning for the upcoming two-year period. It also includes several assessment reports prepared pursuant to the Hazardous Waste Source Reduction and Management Review Act. It is not a comprehensive look at everything DTSC is doing in the area of pollution prevention. Many other efforts are in progress and are likely to continue in the upcoming years. This section provides a quick overview of the work and planned activities in nine different industrial sectors.

A. *Marine Vessel Service and Repair (MVSR)*

Background and Scope

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DTSC will establish a technical assistance and outreach project to implement pollution prevention (P2) best management practices (BMP) at marine vessel service and repair facilities in California. The project's goal is to increase implementation of P2 strategies at boatyards and marinas, thereby eliminating or reducing hazardous waste generation, wastewater discharges, and volatile organic chemicals or particulate air emissions. The program is designed to enable concerned government and business entities to educate boatyards and marinas in effective P2 strategies. The training program consolidates information from existing training programs, the internet, industry associations, and high-performers in the boatyard and marina industry, and is designed for use by boatyard and marina managers and technicians. DTSC staff will seek advice and input from representatives from the boatyard and marina industry and government agencies to ensure that the program will reach the target audience and address important environmental health and safety issues. Working with government agencies that have programs that target the boatyard and marina industry and tapping existing programs for information and resources will enable DTSC to develop a comprehensive training and outreach program that complements but does not duplicate the efforts of others.

Current Status

DTSC started work on this project in 2005. Staff conducted site visits at nine boat yards and thirteen marinas to collect background information and identify pollution prevention opportunities and BMPs . Four fact sheets were drafted and one completed. A list of potential partners was developed and preliminary contacts were made. Although work was delayed due to competing priorities and staff vacancies, additional staff have been assigned to complete the project. A revised list of planned activities is presented below.

Schedule/Planned Activities

Work on the MVSR project resumed in the spring of 2009. The major tasks for 2008-11 are similar to those proposed in the previous two-year pollution prevention work plan:

Task 1 – Needs assessment and review of available resources

To assess industry needs for P2 training, staff will conduct a preliminary study of available training material. In-house, on-line, and published training materials will be reviewed and assessed. In addition, surveys of boatyards and marinas will be conducted to assist in understanding boatyard and marina operations.

Task 2 – Establish program partnerships and advisory team

Developing appropriate relationships with partners, including the boating industry, relevant regulatory agencies, and local pollution prevention organizations is essential for program success. This includes identifying an advisory team and program partners to assist in developing training materials, facilitating outreach with the boating community, and providing training. These groups will be comprised of industry and government entities such as:

- Boating industry organizations
- California Clean Boating Network
- Clean Marinas California Program
- The Department of Boating and Waterways
- Certified Unified Program Agencies CUPA's)
- California Consortium of Pollution Prevention Committees
- DTSC's Source Reduction Advisory Committee members
- Interested parties such as the state of Arizona
- Interagency Coordinating Committee (IACC)
- State Water Resources Control Board Marinas and Recreational Boating Workgroup
- Department of Pesticide Regulation Copper Antifouling Paint Sub-Workgroup

Task 3 – Develop BMPs and P2 strategies

BMPs and P2 strategies will be developed that provide the most benefit to the industry in terms of pollution prevention, worker health and safety, and cost savings. First, existing information will be collected on existing P2 strategies, BMPs, and innovative technologies that pertain to boatyards and marinas. Information will be summarized and presented to stakeholders and partners to gain their input. Advisory team input will help staff:

- determine which P2 and BMP topics and innovative technologies have the greatest potential to positively benefit the environment and the overall industry;
- ensure that BMPs address industry problems and concerns in boatyards and marinas;
- ensure that the curriculum balances simple BMPs and P2 solutions (i.e., low cost / no cost alternatives) with P2 strategies that potentially cost more but offer greater benefit; and
- gain a thorough understanding of the industry and the technicians to identify the best way to reach them to effect behavioral change through training.

The information gained from the research and advisory team input will be used to select and organize training topics and develop training curricula. Training topics will 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 a description of the benefits of each alternative and new technology, including economic data and payback periods.

The draft training curricula will be presented to the advisory team for input on content, quality, and training delivery (i.e., in person, video, web-based, or a combination these techniques). Team input will be incorporated into the final training curriculum.

Task 4 – Training curriculum and resources

Training resources developed may include in-person training, technology demonstrations, hands-on training, videos, or combinations of the above. When appropriate, DTSC will rely on existing training programs, videos, materials and on-line resources.

This task also involves developing and publishing training and informational materials that support the overall program, and making these materials available on DTSC's web site. These materials include fact sheets, case studies, and

informational pamphlets in packets called “tool kits.” The 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, BMPs, cost, training requirements, payback periods, and industry’s general response. Advisory team members will help identify facilities to feature in case studies.

A P2 compliance checklist will be developed to help facilities identify P2 measures that promote regulatory compliance. Initially, the checklist will assist small businesses and/or establish minimum thresholds for “green business” certification programs. Should DTSC and its partners decide to evolve the boatyards and marinas P2 program into a “model shop” program similar to the Vehicle Service and Repair Model Shop program, the P2 checklist could be used to evaluate model shop status.

To promote the boatyard and marina P2 program, information and supporting materials will be posted on DTSC’s web site. The MVSR webpage will serve as a centralized point for DTSC to interact with interested parties, schedule training venues, and provide easy access to the P2 checklist, fact sheets, tool kits, and case studies.

If feasible, DTSC will develop an on-line directory of P2 products, supplies and services as part of the boatyards and marinas P2 program support infrastructure. The directory would be similar to the directory developed for DTSC’s VSR P2 program, and would direct boatyards and marinas to the products and services covered in the training.

To ensure that the training program meets objectives and expectations, DTSC will test the program at select facilities and seek input from the advisory team before the training program is finalized.

Task 5 – Program outreach

At the corporate partner level, DTSC will work with regional business managers to promote the program to their facilities 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 play an important role in disseminating information and facilitating training to boatyards and marinas that are not affiliated with any corporate partner. Green business programs, CUPAs, air quality management districts, DTSC inspectors, and publicly owned treatment works staff can inform boatyards and marinas 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 CalCUPA Forum and Regional Environmental

Business Resource and Assistance Centers (REBRAC) can organize training workshops and promote the program through newsletters, web sites, and other outreach efforts. DTSC will support the local partners as needed.

Training workshops will be provided, depending on available resources. 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 DTSC's resources. Second priority will be given to individual facilities. Local agency inspectors and business assistance providers will be encouraged to attend these training workshops.

Task 6 – Program evaluation and measurements

DTSC will develop a measurement strategy for the boatyards and marinas program that compares baseline performance to post-implementation performance. Success will be measured on several levels:

- Number of facilities receiving the training,
- Number of facilities that implemented P2 measures as a result of MVSR training and outreach efforts,
- Number of facilities seeking to independently pursue implementation, and
- Reduction in pounds of hazardous waste generated due to P2 implementation.

DTSC will develop procedures and survey forms that can be used to track progress and measure program success. A data base will be developed to track measurement data and the progress of participant facilities. Measurement strategies developed and implemented for similar existing programs will be evaluated for good ideas.

Number of facilities receiving training. Each facility that receives the training will be entered into a data base, creating a file for that facility.

Baseline. Each facility that chooses to implement P2 strategies will be asked to complete a baseline survey to document their average workload and paint use, hazardous waste generation, solvent use, average VOC content in coatings, and existing P2 measures. DTSC 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 workers and DTSC staff. The baseline data collected from this survey will be entered into the data base.

Post implementation survey. Each facility that has completed the training and implemented BMPs and P2 measures will complete a follow-up survey that asks for the same information as the baseline survey. DTSC will log this information into the database and compare it with each facility's baseline data. The follow-up survey will also seek input on

customer satisfaction, technicians' 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 DTSC to determine if the project goals (i.e., number of facilities participating, hazardous waste and emission reductions, number of programs using the training developed) have been met. At least one year after making the program available DTSC will compile a progress report that summarizes the survey results. The report will highlight program successes, detail areas for improvement, share promising P2 opportunities through case studies, and describe industry's reaction to the program.

Task 7 – Project ongoing maintenance set-up

By the end of June 2011, DTSC will transfer boatyards and marinas program responsibility to willing partners. During calendar year 2011, DTSC staff will work with partners engaged in boatyards and marinas work and technician training to identify interest in taking on one or more aspects of long-term boatyards and marinas program maintenance. State and local agency partners, business assistance centers, and green business programs 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.

B. *Auto Body and Paint*

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Background and Scope

There are approximately 8,000 auto body and paint shops in California.[18] Many of these shops do bodywork and refinishing, producing repairs that are near factory-finish quality. Types of work include frame repair, body filling and sanding, panel replacement, surface preparation, and primer and coating application. Coating application ranges from painting one car panel to complete paint jobs.

The most common hazardous waste generated at these shops is spent solvents mixed with paint waste. Used oil, antifreeze, lead-acid batteries, sanding dust, and solvent recycler still bottoms are also generated in smaller quantities. Spent paint booth filters are

[18] Source: infoUSA.com

sometimes managed as hazardous waste; however, many shops have determined that their booth filters are non-hazardous and are disposing of these as non-hazardous waste. Some dusts generated from sanding operations are hazardous waste because they have been found to contain metals above California regulatory thresholds. Many shop owners and inspectors are unaware that their sanding dusts may be hazardous waste.

Air emissions from paint application and paint-gun cleaning present the greatest concerns. California's air districts have rules specifying the type of spray equipment that can be used and the amount of volatile organic compounds (VOCs) allowable in automotive refinishing coatings. A number of air districts, such as South Coast Air Quality Management District and San Joaquin Air Pollution Control District, have greatly restricted the VOC content in the base coat. This has required shops to use waterborne basecoats in place of the high-VOC solvent base coats. Air districts also have rules for paint-gun cleaning, and some air districts require the use of enclosed gun washers and/or specify the amount of VOCs allowable in gun-cleaning solvents.

Wastewater and storm water discharges also present environmental concerns. Heavy metals from sanding operations, spilled or drained vehicle fluids, paints and solvents, and soaps from car washing all have the potential to contaminate surface waters and ground water.

Current Status

The Auto Body and Paint (AB&P) P2 project commenced in July 2004 and will sunset in mid 2010. Training materials identifying best management practices and pollution prevention strategies were developed, including fact sheets and guidance in both English and Spanish, and high-quality training videos in DVD format. All of the training materials and related resources are available on DTSC's AB&P project website. The primary focus for the remainder of the project is to work with partners and key project stakeholders to provide or promote these training materials and resources to auto body & paint shop operators throughout California. Also planned are Spanish-language versions of the training videos, and the completion of a study to demonstrate the effectiveness of waterborne coatings, low toxicity thinners/cleaners, and sanding alternatives.

The fact sheets cover the following topics:

- reducing paint waste,
- managing sanding waste,
- gun cleaning,
- solvent recycling,
- wastewater management, and
- waterborne coatings.

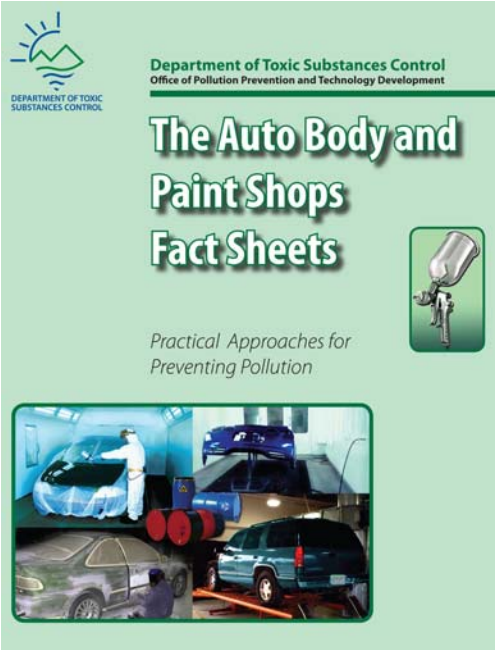
The project team also developed guidance on worker health and safety and hazardous waste management. As this is a voluntary program, staff also developed a P2 and Compliance Assistance Checklist to help shop managers and operators evaluate

opportunities to reduce waste and improve compliance at their facilities. Two thousand copies of the training materials "toolkit" were published for distribution to auto body shops, shop organizations, local regulatory agencies and green business programs. A Spanish-language version of the toolkit was developed to better serve the training needs of the industry.

In addition to the toolkit, training videos were developed covering the following topics:

- reducing paint waste,
- sanding waste,
- gun cleaning,
- solvent recycling, and
- wastewater management.

The videos were filmed at auto body shops throughout California, and showed shop employees and managers using the recommended P2 strategies and best management practices. In the video, shop operators share their experience on how the BMPs benefit their operations by preventing pollution, reducing operational cost, providing a safer working environment, and maintaining regulatory compliance.



Several training presentations were developed for use by DTSC, local agencies, training centers, or other project partners to deliver the program. Presentations provide a great opportunity for an interactive review of program materials.

All of the training resources (fact sheets, videos and presentations) are published on the DTSC Auto Body Pollution Prevention website. Additional published resources include links to California air quality districts, the Air Resources Board, DTSC's hazardous waste management information, online training courses, storm water guidance, Green Business Programs and the United States Environmental Protection Agency (U.S. EPA) partnership programs.

DTSC also funded a project with The Institute for Research and Technical Assistance (IRTA) to identify, test and demonstrate low-VOC, low toxicity alternatives for the auto body industry. IRTA is a nonprofit organization established in 1989 to assist companies and whole industries in adopting low-VOC, low toxicity alternatives.

A number of auto body facilities in the South Coast Air Basin participated in the study which included the following four components:

1. Test and demonstrate waterborne coatings. Shops had an incentive to participate in the project because it will facilitate compliance with new South Coast Air Quality Management District regulations that become effective in 2009.
2. Test and demonstrate alternative low-toxicity cleaning solvents, including those applicable to the new water-borne coatings.
3. Test and demonstrate alternative paint thinning agents. IRTA tested the thinners with the current high-VOC coatings and with the waterborne coatings.
4. Test and demonstrate alternative methods for dust control with each participating facility.

Planned Activities for 2008-10

Additional training material will be developed, including a Spanish-language version of the videos, and updating the AB&P website to incorporate updated vendor contact information.

The alternatives research project with IRTA is completed and is posted at http://www.dtsc.ca.gov/PollutionPrevention/GreenChemistryInitiative/upload/Alts-Assm.pdf.

Presentations and workshops will continue to be scheduled through mid-2010. Project staff will continue to work with stakeholders and partners to reach shops throughout the state. Additional avenues will be pursued to increase program awareness, including working with paint and equipment suppliers, technical schools, and participating in industry-related events.

The collection of measurement information will continue. This includes the number of trainings provided, the number of toolkits distributed, the number of “display” events, and the number of participants at trainings. In addition, case studies and success stories will be developed to evaluate the program’s effectiveness. As this program enters its final year, and as strategic partners incorporate the DTSC’s training resources into their programs. DTSC staff will seek their assistance in conducting surveys and developing a data base as an additional performance tool for measuring ongoing program accomplishments.

C. *Chemical Industry Challenge*

Background and Scope

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The chemical industry challenge project is a partnership with the Chemical Industry Council of California (CICC) to promote pollution prevention within California's chemical industry by offering recognition to individual facilities for their environmental achievements. A workgroup composed of representatives from DTSC, CICC, DTSC's Source Reduction Advisory Committee, and chemical industry facilities developed criteria for recognition, along with a scoring system. The criteria include a mandatory "good compliance" requirement. Other criteria fall into the categories of pollutant reductions, sustainable design, pollution prevention technology or process demonstration, and transferable pollution prevention technology or process. Applications are judged by a review team consisting of DTSC staff, two Advisory Committee members, and the general manager of CICC.

Current Status

The DTSC/CICC partnership held one recognition event in 2007 during which three facilities were recognized (see project summary for more details). A second recognition event occurred in October of 2008.

DTSC and CICC awarded recognition plaques for achievements in pollution prevention to three chemical industry facilities:

- **Ampac Fine Chemicals, Ranch Cordova**. Ampac, a pharmaceuticals manufacturer, was able to recycle its raffinate dryer solvent back into the process by convincing a customer to have the federal Food and Drug Administration revalidate a purification process. Ampac staff calculated that they were able, in 2007, to reduce ethanol consumption by 93%, heptane use by 76%, and the hazardous waste stream from this process by 91%.

- **Dow Chemical, Pittsburg.** This Dow facility reduced chemical leaks and spills by 79% at an agricultural chemical unit over a six-month period, by implementing a "Loss of Primary Containment (LOPC) Reduction Roadmap" methodology. This comprehensive 15-step process targets LOPC events, such as leaks, breaks, and spills. The roadmap combines elements of leadership, analysis, organization, training, technology, maintenance, and progress monitoring to achieve its goals.

- **Searles Valley Minerals, Trona.** As part of an energy management program begun early in 2007, Searles Valley Minerals implemented a combustion tuning program where all-gas-fired equipment was tested and tuned on a regular basis. This eliminated hydrocarbon emissions (which were 91% methane, a greenhouse gas) and reduced nitrogen oxide emissions to negligible levels. The adjustments also led to a 20-25% reduction in fuel use, translating to an annual cost savings of approximately $176,800.

Schedule/Planned Activities for 2008-10

This project was originally scheduled to either transition to the Chemical Industry Council or end in September/October of 2008. However, during the Green Chemistry Initiative stakeholder input process, DTSC has received a number of suggestions related to awards and recognition as a way of promoting green chemistry. DTSC now plans to continue the current program.

D. *Vehicle Service and Repair (VSR)*

Background and Scope

The Vehicle Service and Repair (VSR) project provides free training and technical assistance to repair facilities throughout California to help reduce the use of hazardous materials and the amount of hazardous waste generated by the auto, truck and construction repair industry. This voluntary program provides opportunities to reduce operational costs through environmentally-friendly best management practices. The program emphasizes practical pollution prevention measures that are good for business, the public, and the environment. DTSC has shifted the VSR Program from a "Model Shop" recognition program to a program where the companies adopt VSR requirements and are supported by DTSC (as a "sponsor"). The extended VSR Program recognizes a company or business (fleet, auto repair shop, etc.) that adopts and incorporates the program's best management practices into that business' formal pollution prevention program. The company or business will receive formal recognition that its pollution program "meets the state of California's standards for VSR P2 practices."

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Current Status

To track the efforts and accomplishments of new and re-certified P2 Model Shop recipients, applicants are required to complete the "Summarize Your Environmental Benefits" form, available on the project website.[19]

Annual re-certification began in the spring of 2007 for VSR P2 Model Shops wanting re-certification. The shops must submit an annual Environmental Benefits form and still meet the minimum 100-point requirement for VSR Model Shop status to be re-certified.

The amount of waste generated per year for applicable waste streams will be compared with baseline numbers to determine changes in waste generation.

Schedule/Planned Activities for 2008-2010

The VSR project was initially scheduled to end in June 2006. The VSR industry remains engaged so DTSC continues to work on the project including efforts to quantify the results of the VSR program.

During the current calendar year, DTSC was approached by two major fleet operations, Granite Construction and Waste Management, Inc., interested in implementing a model shop program for its fleets. The estimated number of fleets we can sponsor over the next two-year cycle with the current level of staffing is two to three fleets, which could represent over 100 individual shops.

The California Bureau of Automotive Repair has expressed interest in incorporating the model shop program requirements into its Green Shop Inspection Program. The Bureau inspects all of California's licensed repair shops (approximately 33,000), including smog shops, automotive repair shops, auto body shops, and combination shops. DTSC is coordinating with the Bureau on this effort.

DTSC will also continue to support local Green Business Program efforts, of which the vehicle service and repair industry is a major target audience.

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[19] www.dtsc.ca.gov/PollutionPrevention/VSR/VSR_P2Model.cfm

2.2 FOCUSED INDUSTRY POLLUTION PREVENTION TEAM PROJECTS

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These projects involve three industry sectors: utilities, metal finishing, and printed circuit board manufacturing. (The utility/power-generating sector is actually a combination of two Standard Industrial Classification codes: 4911-Electric Services and 4939-Combination Utilities.)

The primary goal of the Focused Industry Pollution Prevention Team (FIP2T) is to achieve significant reductions in hazardous waste generation through source reduction. A secondary goal is to promote, identify and where possible quantify improvements in other environmental media, such as air, water, solid waste, and energy. For each sector, the project has identified the 20 to 40 largest-quantity waste generators in the sector. DTSC staff will work with these companies using the facilities' hazardous waste source reduction plans, reports and summary progress reports as a starting point for identifying and discussing pollution prevention opportunities.

The two initial phases for these projects have been completed:

PHASE I: START-UP (April 2007 – June 2007)
Recruited staff, conducted detailed analyses of available data, identified critical generators and waste streams, identified potential partners, conducted initial review of available P2 technologies and source reduction opportunities.

PHASE II: PRE-SB 14 OUTREACH (May 2007 – Sept 2007)
Developed specific message(s) for targeted sectors, developed outreach strategies and conducted outreach during the critical June -August period (e.g., hazardous waste source reduction plans were due in September 2007).

The following outlines work planned for the three sectors. As more information and understanding of the sectors becomes available, more specific tasks may be identified and pursued.

PHASE III: IMPLEMENTATION (Sept 2007 – Sept 2008)
Part 1 - Request copies of hazardous waste source reduction plans and hazardous waste management performance reports from key businesses, review the plans, compile data from the summary progress reports, refine project goals and targets, continue evaluation of P2 opportunities, and collect case study information to be shared with the industry

Part 2 - Coordinate with DTSC's enforcement and compliance programs for inspections of larger generators, and determine appropriate course of action depending upon compliance assessment results

Part 3 - conduct on-site assessments and provide technical assistance and support, sponsor and conduct demonstration projects, and develop case studies.

PHASE IV: WRAP-UP (Oct 2008 – Mar 2009)
Measure and assess results achieved. One year after the source reduction documents are due, the project team(s) will commence measuring what has been implemented and achieved. A final report will be prepared, including lessons learned, recommendations, and final results.

A. Utilities

Background and Scope

There are approximately 46 energy services facilities, in addition to about 16 independent energy service retailers. These companies produce, sell, buy and/or distribute electrical power throughout the state of California. They are also the source of routinely-generated hazardous waste. There are different types of energy sources that fuel the power plants: natural gas, landfill gas, biomass, and geothermal fluids. This project will look at twenty to thirty of these operations.

The most common hazardous waste stream generated across the electrical utilities industry is oily water or waste/mixed oil. Waste oil is generated in abundance due to normal maintenance procedures. Facility equipment such as transformers and power generation turbines contain oil that needs periodic changing. Waste oil is also generated in small quantities due to equipment leaks and/or spills. Most facilities contain these leaks and/or spills of oil via an oil-water separator. Oily water comes from maintenance cleaning or storm water that falls onto the facility. The oily water is sent to the oil-water separator, where the oil is skimmed off for recycling and the water discharged under an National Pollution Discharge Elimination System permit. Facilities are finding it difficult to identify ways to reduce the oily water waste stream, as it is mostly produced due to maintenance activities. Some facilities are working to reduce the number of times they have to perform their maintenance duties in order to continue their effective operations.[20]

Another common waste stream is "inorganic solid waste." This is the largest-quantity waste stream generated by the geothermal plants. This waste category is also used to capture wastes comprised of debris (blast grit and duct sweep) produced during routine equipment maintenance and cleaning of the cooling towers and boilers. Paint chips, spent

[20] Note that that if the waste oil does not contain hazardous amounts of metals or polychlorinated byphenols, the oil is recycled.

blast material and aerosol cans also fall under this waste stream. At the biomass facility, waste ash is generated from a cleaning process. This waste contains lead and therefore is classified as hazardous.

The power-generating sector can be broken down into different waste-producing categories. Newer power-generating facilities with state-of-the-art operations have only minor opportunities for pollution prevention. In contrast, there are a number of old power plants that only operate during peak demand periods. These seem to have limited opportunities for pollution prevention because of the economics of limited use. Most of the wastes from these old plants are associated with maintenance activities. There are several geothermal operations in Imperial County that contribute the bulk of the total waste in this sector. These facilities are in the process of upgrading piping, equipment and operations; however, the changes will result in only a small percentage reduction in hazardous waste generation. The brines that result from the geothermal extraction process continue to present problems because of the heavy metals inherent in the waste stream. Finally, there is a scattering of other smaller operations: biomass, landfill gas, and non-power plant corporation yards with general maintenance waste.

Status

This project is currently underway. Contacts have been made with strategic partners to help in understanding the industry, promoting pollution prevention and addressing multi-media environmental problems. Source reduction plans prepared under the Source Reduction Act are being reviewed, waste generation data is being reviewed and compiled, site visits are being conducted, and work is ongoing to identify potentially-viable source reduction alternatives that could be promoted across the industry. Progress is also being made on refining the lists of major generators and identifying key waste streams.

Planned Activities for 2008-10

The project will be conducted in four phases as summarized above.

Potential for Further DTSC P2 Program Efforts

Preliminary findings suggest that this effort may not continue beyond this assessment phase. The diversity of operations and operational issues makes a sector-wide P2 assistance approach difficult. A break-through pollution prevention technology or approach has not been found, so there is little to demonstrate or actively promote (although the Sacramento Municipal Utility District is undertaking many notable efforts to reduce its environmental footprint). It is recommended that after the initial plan reviews are completed and site visits conducted, a determination be made as to which, if any, of the identified pollution prevention measures should be more actively promoted or

showcased. Otherwise, this project will simply result in an industry assessment similar to what has been produced under past Source Reduction Act efforts.

B. Metal Finishing

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Background and Scope

There are more than 160 metal finishing facilities subject to Source Reduction Act requirements in California. "Metal finishing" is a broad industrial classification covering a variety of chemical, electrochemical and physical processes used in coating and finishing a variety of metal parts and products. There may be many other metal finishing operations in California that are "captive shops" [21] reporting under a different industrial waste category. (For example, United Airlines may have a plating shop at its maintenance facility, but it reports under the SIC code 4512, Transportation by Air.) Metal finishing processes include plating (chrome, zinc, nickel, cadmium, copper, gold and/or silver), anodizing, cleaning/etching, degreasing, electroforming, electropolishing, polishing, phosphatizing and buffing. Parts/products include automotive, aerospace, appliance, heavy equipment, plumbing, electronics and jewelry.

Principal hazardous waste streams include metal-laden alkaline rinse waters, parts-cleaning solvents (e.g., methyl ethel ketone), metal-laden plating baths, cyanide solutions and acid solutions, and some solids (such as metal sludge and buffing dust). Of these, the wastes of greatest environmental and health concern are cyanide, cadmium, hexavalent chromium and hydrofluoric acid.

Initial review of the 2006 source reduction data suggests that the overall per-facility quantities of hazardous waste shipped off-site have declined. Source reduction measures thus far noted in the source reduction plans include:

- reducing acid use by recycling of acid and use of new "acid extender" products,
- reformulating plating baths,
- optimizing bath filters, and
- re-plumbing to maximize water recycling.

Status

The Focused Industry Pollution Prevention Team (FIP2T) Metal Finishing Team is currently working with twenty two large metal finishers, and has thus far conducted site visits at seven facilities. Analysis of source reduction plans submitted by these 22 metal

[21] Defined as "those electroplating and metal finishing facilities that own, in a calendar year, more than 50 percent (based on area) of material undergoing metal finishing. Source: Sacramento State Office of Water Programs glossary (www.owp.csus.edu/training/glossary/indexList.php?subdir=c)

finishers is in progress. FIP2T is coordinating with the Model Shop Program and other DTSC initiatives, and with other stakeholders, including metal finishing trade associations, the Air Resource Board, the State Water Resources Control Board, and relevant CUPAs.

Planned Activities for 2008-10

Site visits to more facilities are slated for summer and fall of 2008. DTSC has recognized the need to expand the number of facilities studied to a total of 40 to50 of the state's largest metals finishers, including "captive" shops. Through studying these facilities' source reduction plans and site visits, the FIP2 project seeks to:

- identify source reduction achievements and/or areas where source reduction is needed and attainable;
- promote simple in-plant P2 practices; e.g., drag-out reduction and counter-current rinsing;
- promote, where feasible, the replacement of problem chemicals such as hexavalent chrome and cyanide with "green" alternatives; and
- promote, where feasible, alternative "green" technologies.

C. Printed Circuit Boards

Background and Scope

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There are approximately 80 printed circuit board (PCB) manufacturers in California subject to the Source Reduction Act. Although the products and waste streams produced by printed circuit board manufacturing facilities are diverse, many of the production processes conducted by these companies are similar in that they are primarily engaged in manufacturing bare rigid or flexible printed circuit boards without mounted electronic components.

Key production processes that result in hazardous waste generation are: cleaning/surface preparation, catalyst application/electroless plating, pattern printing/masking, electroplating, and etching. On the basis of net weight of waste generation, the spent alkaline and acidic etchants from the ammoniated or cupric etching line/processes are of the highest priority. The specific chemicals contained in these waste streams that present the highest risk to the environment, as identified through a series of risk assessment methodologies, include lead and lead compounds, copper and copper compounds, hydrochloric acid, ammonia, sulfuric acid, methyl ethyl ketone, nitric acid, methanol, dimethyl formamide, chlorine, formaldehyde, and nickel and nickel compounds.

PCB manufacturing source reduction opportunities were identified in the following areas in the source reduction plans:

- minimization of industrial wastewater and treatment residuals;
- minimization of spent etchant and associated hazardous waste;
- process modification and waste stream segregation;
- minimization of chemicals drag-out recovery; improved materials handling, storage and recordkeeping;
- process optimization; improved maintenance techniques;
- hazardous materials substitution; and
- other on-site and off-site materials recycling and reuse.

Status

The source reduction plans and measures for the priority waste stream, spent etchant, include:

- process modification, end-of-pipe treatment, or a combination of in-line treatment and separate treatment of segregated waste streams, e.g., adding a cupric chloride etching process to reduce the level of aqueous ammonia etchant usage;
- installing a gravimetric feed-&-bleed controller onto etcher and increasing the copper concentration control target without compromising quality;
- utilization of network etchant recovery systems to increase on-site etchant recovery;
- utilization of thinner dry film copper materials;
- installing a one step conveyorized developer-etch-strip line; and
- neutralization of the alkaline and acidic waste streams.

It is important to recognize that decision-making about the implementation of source reduction measures for the PCB industry also involves consideration of other issues, such as product characteristics, economics, downstream and upstream materials choices and chemistries.

The project has enlisted the assistance of the UC Davis Chemical Engineering Department. DTSC is working with them to help identify and evaluate possible alternatives for reducing spent etchant waste.

Planned Activities 2008-10

DTSC will continue to work with UC Davis on the identification and analysis of alternatives. Staff will again make contact with the industry association to gain its support for promoting source reduction of the etchant waste stream. The project will also explore

options for improving the management of wastewaters, possibly focusing on the benefits of water conservation as a driving force for source reduction changes. DTSC staff is currently conducting site visits to become familiar with the source reduction options proposed in the plans. Staff will also complete a report summarizing findings and encouraging implementation of innovative source reduction technologies.

Potential for Further DTSC P2 Program Efforts

Preliminary findings suggest that there are consistent needs for technical assistance across the entire sector. If technologies for regenerating etchant prove viable, then a follow-up focused P2 technical assistance effort to promote these technologies would be desirable and a logical next step. After the work began organizational changes were made. The Metal Finishing and Printed Circuit Board projects were made into two subgroups that are part of The Metal Finishing project.

2.3 Green Business Metrics Project

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Background and Scope

In 1995, the Association of Bay Area Governments (ABAG), in coordination with the U.S. EPA, Cal/EPA and local governments across the San Francisco Bay area, created a incentive program to recognize businesses that went beyond compliance with environmental regulations (waste water, storm water, air and hazardous materials/waste regulations) and voluntarily instituted robust multi-media measures to conserve energy, water and other materials, reduce waste and prevent pollution. This incentive/recognition program is known as the Green Business Program. Due to the continued and demonstrated success of such programs, local jurisdictions across California continue to launch new Green Business Programs to engage their business communities in progressive environmental practices.

Status/Results

In 2005, green business programs throughout the state formed the California Green Business Program Network (Network) to provide a forum to share program information, encourage consistency among green business programs throughout the state, and promote new and existing green business programs. Green business programs work in partnership with each other to create standards for green business recognition. Network members include: Alameda, Contra Costa, Santa Clara, City of Santa Monica, San Francisco, Monterey Bay Area (Monterey/Santa Cruz Counties), San Diego, Napa, Marin, and

Sonoma. At this time, Santa Barbara, Los Angeles, San Mateo and Solano Counties are in the process of forming green business programs.

Planned Activities 2008-10

As California green business programs grow, there has remained a very real and unmet need to develop robust tools for managing data, tracking business information and measuring green business program effectiveness. The top two goals of the Green Business Metrics Project are:

1. to develop the tools critical to continued operation and growth of green business programs, and
2. to create a practical and credible tool for generating measurable results to report to such partners and funders as DTSC, U.S. EPA, the Western Regional Pollution Prevention Network, the National Pollution Prevention Roundtable and others.

The San Francisco Green Business Program coordinator, in collaboration with the Monterey Bay Area Green Business Program coordinators (Santa Cruz County and Ecology Action, a 501c3 non-profit organization), will work cooperatively with a DTSC-funded contractor to develop and implement a regional, web-based database that will quantify accomplishments. When completed, the database will produce reports on measurable outcomes such as kilowatts per hour of energy saved, gallons of water saved, pounds of waste diverted from landfills, pounds of toxic materials/waste reduced and greenhouse gas emissions reduced. DTSC hopes to have the contract in place by the end of June 2008 and work begun on finalizing the metrics and developing the database immediately thereafter. The goal is to have the framework for the database developed by the end of 2008, with training and deployment occurring in early 2009 and initial data loading completed by June of 2009. The final phase of the project will focus on uploading the database to the Pollution Prevention Resource Exchange (P2RX) web site[22] so that it can be used by programs throughout California.

2.4 Hazardous Waste Source Reduction and Management Review Act Industry Assessments

The assessments described in this section are required under California's hazardous waste source reduction law. DTSC is required to select industry sectors for review of source reduction progress. The pharmaceutical and fabricated metals industry sectors were selected for review during this period. Note that the statute directs DTSC to consider the

[22] The Pollution Prevention Resource Exchange is a national network of regional information centers: **NEWMOA** (Northeast), **WRRC** (Southeast), **GLRPPR** (Great Lakes), **Zero Waste Network** (Southwest), **P2RIC** (Plains), **Peaks to Prairies** (Mountain), **WSPPN** (Pacific Southwest), **PPRC** (Northwest).

outcomes of these reviews, when determining industry sectors for voluntary source reduction projects.

A. Pharmaceutical Industry Assessment

Background and Scope

DTSC recently assessed California's pharmaceutical manufacturing industry under the authority of the Source Reduction Act. The assessment included Standard Industrial Classification codes 2833-36, which include medicinals and botanicals, pharmaceutical preparations, in-vitro and in-vivo diagnostic substances, and the manufacture of serums, vaccines, blood plasma and similar substances. The assessment did not include medical waste, nor did it include issues such as the excretion of pharmaceuticals into the environment, or the disposal of unused pharmaceuticals. The pharmaceutical industry is heavily regulated by the U.S. Food and Drug Administration (FDA). The drug research and development process typically takes 15 years from initial toxicology testing to clinical trials for safety, through final review and approval by FDA. Consequently, the pharmaceutical industry may find it difficult to change operations or formulations for the purpose of reducing hazardous waste generation.

The assessment looked at source reduction accomplishments between 1999 and 2002, and projected source reduction activities from 2002 to 2006. Twenty eight facility profiles from 26 companies were analyzed. The total hazardous waste manifested from these companies increased by 20 million pounds from 1998 (19 million pounds) to 2002 (39 million pounds). The reported waste avoided during this same period was 3.1 million pounds. The increase in waste generation is due to new facilities and increased production at existing facilities. There were 12 more facilities reporting under SB 14 in 2002 as compared to 1998.

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Status/Results

The assessment report was completed in 2007 and is posted on DTSC's web site. Copies were distributed to the regulated community and the public. While the industry is making some progress on hazardous waste source reduction, the majority of its hazardous waste continues to be managed through off-site disposal, treatment, or recycling.

The assessment report highlights many individual company efforts to reduce waste at the source. Commonly-generated waste streams include various solvents generated from both process reactions and equipment washing, acidic and alkaline solutions and wastewater with organic residues associated with cleaning operations, and residues associated with

FDA-required testing in on-site laboratories. While some individual waste streams may be reduced significantly, across-the-board reduction projections were in the 10-15% range (not accounting for variations in production).

Planned Activities 2008-10

Staff has proposed to hold a pharmaceutical industry forum. At the forum pharmaceutical facility staff would share P2 strategies focusing on both proven and innovative technologies with the potential to reduce the largest-quantity hazardous waste streams. The forum would also include a discussion of any barriers that are hindering implementation of source reduction measures.

Potential for Further DTSC P2 Program Efforts

This sector could be a candidate for additional DTSC P2 voluntary efforts; however, it would be a challenge because of the unique nature of the sector's variable manufacturing processes, the federal regulatory controls that govern this sector, and the sector's tendency towards secrecy with respect to processes and proprietary ingredients. The combination of these factors would make any kind of sector-wide project more difficult. One possible option would be to encourage source reduction through an award or recognition program. AMPAC Fine Chemicals, a pharmaceutical manufacturer, was awarded recognition for its P2 accomplishments in the DTSC's Chemical Challenge Project.

B. Fabricated Metals Industry Assessment

Background and Scope

The fabricated metals industry is made up of facilities that generally perform two functions: forming metal shapes and metal finishing operations, including surface preparation. SIC code 34 is composed of facilities that fabricate metal products and those that perform plating, polishing and other surface coating operations. This industry assessment included facilities in SIC codes 3411 (metal cans), 3412 (metal barrels, drums and pails), 3451 (screw machine bolts), 3452 (bolts, nuts, rivets and washers) and 3499 (fabricated metal products, not elsewhere classified). The assessment looked at source reduction accomplishments within this sector that occurred between 1999 and 2002 and projected source reduction activities from 2002 to 2006.

Surface preparation is performed by many of the reporting facilities in this assessment. Surface preparation includes anodizing, passivation, plating, and other related processes. Surface cleaning prior to applying the finish is critical for the adhesion and performance of the finish coating. If the surface is not properly cleaned, the final finish may not adhere.

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Metal fabricating processes usually employ the use of cutting and cooling oils, as well as degreasers and cleaning solvents. The oils are used when forming and cutting metal to cool the work piece and in tooling. Some facilities evaluated in this assessment use plasma cutting for accurate high-speed metal cutting which does not require the use of combustible gases. In recent years, the industry has been switching from traditional chlorinated and halogenated solvents to aqueous-based cleaning. Metal finishing may include anodizing (converting the metal surface to an insoluble oxide coating), chemical conversion coating (including chromating, phosphating and passivation), electroplating and painting, along with other metal finishing techniques.

Forty-eight companies were reviewed as a part of this assessment. Specific profile information was included for thirty of the facilities.

Status/Results

Based upon a detailed analysis of seventeen facilities, aqueous waste generation decreased approximately 500,000 pounds or about 17 percent from 1998 to 2002. Non-aqueous manifested waste decreased by more than 4.8 million pounds during the same time period, equivalent to a 35 percent decrease. However, this reduction is overshadowed by an increase of almost 12 million pounds (approximately 133 percent) during the period from 2002 to 2005.

The 48 facilities included in this assessment produced 31 different major waste streams during 2002. Based on these 31 major waste streams, nearly 441 million pounds (46 percent) of the hazardous waste was reduced from the period of 1998 to 2002.

The seven largest-quantity reported waste streams, in descending order, were:

- plating process rinse,
- alkaline solution with metals,
- waste fluid,
- chrome bearing wastewater,
- absorbent sludge,
- aqueous solution with organic residue, and
- waste oil and wastewater oil.

The total reduction (440,000,000 pounds) of the top seven waste streams is 99.9 percent of the total of all 31 waste streams generated by all reporting facilities.

Seven of the 31 generated waste streams increased from 1998 to 2002:

- floor sweep absorbents and rags,
- inside can spray waste,
- paint solvents,
- oil with alkaline cleaner,
- paint sludge,
- potassium permanganate/sodium hydroxide, and
- waste coating/ink sludge.

Four of the thirty-one generated waste streams were newly-generated in 2002:

- paint-related waste,
- alkaline solution,
- cyanide plating waste, and
- waste nitric acid.

Planned Activities 2008-10

The final assessment report is scheduled for release and distribution in June of 2009. The only activity planned for the immediate future is the distribution of the report.

Potential for Further DTSC P2 Program Efforts

The fabricated metals industry would make a good candidate for additional focused P2 efforts. Such a project could build on and use information generated from other metal finishing pollution prevention efforts. The fabricated metal sector is a good candidate for technology transfer because of the similarities of operations across the sector. An additional reason this sector may be a good candidate for additional effort is because of the South Coast Air Quality Management District efforts to address VOC issues in the industry, which could provide opportunities for a joint effort between the agencies.