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EPA's 33/50 Program Company Profile

CHRYSLER CORPORATION

Partnership in Prevention

Government-Industry-Community

Printed on Recycled Paper

This Company Profile is part of a series of reports being developed by EPA to highlight the accomplishments of companies participating in the 33/50 Program. The 33/50 Program is an EPA voluntary pollution reduction initiative that promotes reductions in direct environmental releases and offsite transfers of 17 high-priority toxic chemicals. The program derives its name from its overall goals — an interim goal of a 33% reduction by 1992 and an ultimate goal of a 50% reduction by 1995. The program uses 1988 Toxics Release Inventory (TRI) reporting as a baseline. In February, 1991, EPA began contacting the parent companies of TRI facilities that reported using 33/50 Program chemicals since 1988 to request their participation in the 33/50 Program. As of November, 1995, nearly 1,300 companies had elected to participate in the Program, pledging to reduce emissions of the 17 target chemicals by more than 380 million pounds by 1995. Companies set their own reduction targets, which may vary from the Program's national 33% and 50% reduction goals.

17 PRIORITY CHEMICALS TARGETED BY THE 33/50 PROGRAM

BENZENE
CADMIUM & COMPOUNDS
CARBON TETRACHLORIDE
CHLOROFORM
CHROMIUM & COMPOUNDS
CYANIDES
DICHLOROMETHANE*
LEAD & COMPOUNDS
MERCURY & COMPOUNDS
METHYL ETHYL KETONE
METHYL ISOBUTYL KETONE
NICKEL & COMPOUNDS
TETRACHLOROETHYLENE
TOLUENE
1,1,1-TRICHLOROETHANE
TRICHLOROETHYLENE
XYLENES

* Also referred to as methylene chloride

Industry exceeded the 33/50 Program's interim 33% reduction goal by more than 100 million pounds in 1992. National emissions of Program chemicals were reduced by an additional 100 million pounds in 1993, bringing total reductions since 1988 to more than 685 million pounds (46%). Facilities' TRI projections suggest that the Program's ultimate 50% reduction goal will be observed to have been achieved or exceeded in the 1994 TRI data, a full year ahead of schedule. The 1,300 companies enrolled in the 33/50 Program have accounted for most of the Program's pollution reductions. Representing just 15% of eligible companies and owning only a third of the facilities reporting Program chemicals to TRI, participants are responsible for 78% of the reductions since 1988 and 98% of the 100 million pounds reduced in 1993.

EPA is committed to recognizing companies for their participation in the 33/50 Program and for the emissions reductions they achieve. The Program issues periodic Progress Reports, in which participating companies are listed and highlighted. In addition, Company Profiles, such as this one, are being prepared to provide more detailed information about how companies have achieved their emissions reductions. Information presented in these profiles is drawn from a number of sources, including the company's written communications to the 33/50 Program, extensive interviews with company representatives, the annual TRI reports submitted by the company's facilities (including Pollution Prevention Act data reported to TRI in Section 8 of Form R), and, in many cases, site visits to one or more of the company's facilities. Mention of trade names, products, or services in this document does not convey, and should not be interpreted to convey, official EPA approval, endorsement, or recommendation.

Copies of other 33/50 Program Company Profiles, as well as Reductions Highlights documents summarizing all of these Profiles, may be obtained by contacting the Program as specified in the box below. In addition, all written company communications to EPA regarding the 33/50 Program are available to the public upon request.

For information on the 33/50 Program, contact the TSCA Hotline at (202) 554-1404 or contact 33/50 Program staff directly by phone at (202) 260-6907 or by mail at Mail Code 7408, Office of Pollution Prevention and Toxics, U.S. EPA, 401 M Street, SW, Washington, D.C. 20460.

CHRYSLER CORPORATION

SUMMARY

Chrysler Corporation reduced releases and transfers of 33/50 Program chemicals by 74 percent from 13.5 million pounds in 1988 to under 4 million pounds in 1993. This achievement far exceeds the Company's initial 33/50 Program goal of a 60 percent reduction in releases and transfers by 1995. Accordingly, Chrysler committed to additional reductions totaling 80 percent by 1995. Chrysler accomplished the majority of these reductions in the vehicle coating and painting area of operations at its assembly plants nationwide. This case study describes three activities in the vehicle coating and painting operation that resulted in significant reductions of releases and transfers of 33/50 Program chemicals and other volatile organic compounds (VOCs) — basecoat/clearcoat materials reformulation, process control, and equipment changes.

COMPANY BACKGROUND

Chrysler produces passenger cars, minivans, sport-utility vehicles, and light-duty trucks for sale to customers worldwide. It produces about 2.8 million vehicles a year. The Company is headquartered in Highland Park, Michigan and operates about 50 facilities in North America, and additional manufacturing operations in at least 10 other countries. Chrysler employs about 112,000 individuals worldwide. In 1994, the Company reported worldwide consolidated revenues of $52.2 billion.

ENVIRONMENTAL STRATEGY

Chrysler Corporation has committed itself to becoming the world's premier automotive company by the year 2000. With respect to environmental issues, this dedication reaches further than compliance with the law to encompass the integration of sound environmental practices into all business decisions. To reinforce that commitment, Chrysler has adopted five Environmental Principles shown in Exhibit 1 to guide its employees worldwide. Part of the Company's strategy for achieving this goal is a proactive approach for dealing with environmental issues facing the automotive industry.

Exhibit 1

Chrysler's Environmental Principles

Chrysler Corporation's Environmental Principles

It is a policy of Chrysler Corporation:

- To be committed to the integration of sound environmental practices, materials and technology into the development, design and manufacture of its products and its manufacturing and assembly processes. The objective is to:
  - → Conserve resources, prevent pollution and recycle materials where practical at every stage of manufacture and the product life style.
  - → Promote the efficient use of energy in its operations and products.
  - → Operate with a goal of continuously improving the impact of its operations and products on the environment.
- To strongly support product and operational actions to preserve and protect the environment, Chrysler will:
  - → Advise and educate its dealers and the public regarding the use of its products in a safe, energy efficient and environmentally-responsible manner.
  - → Enlist the support of all employees and suppliers in minimizing the potential hazards and impacts of its operations.
- To pursue vigorous development of environmentally superior technology and management methods throughout the industry and the public sector.
- To continue to cooperate and work with government to develop technically and financially sound, environmentally responsible laws and regulations.
- To assess its environmental performance and periodically provide information of interest to its Board of Directors, shareholders, employees, authorities and, where appropriate, the public.

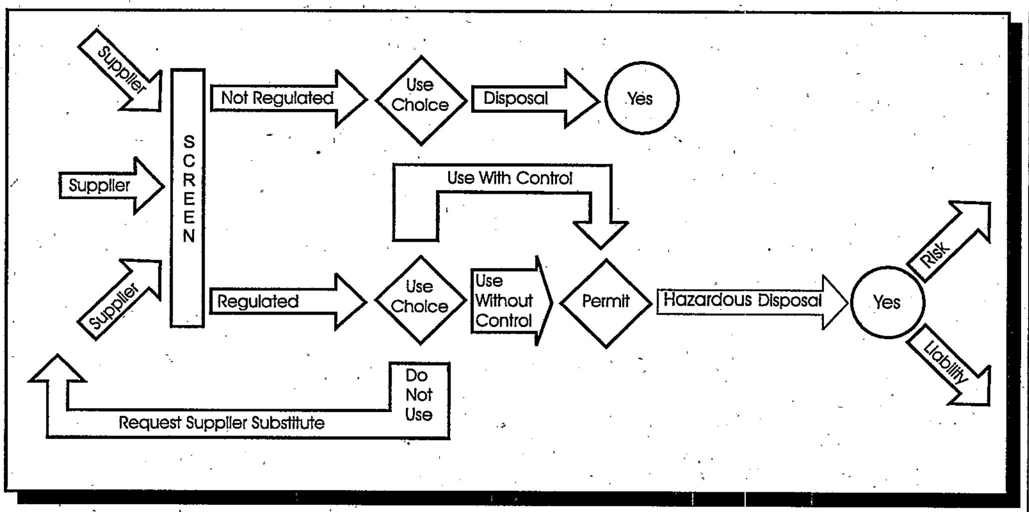
Chrysler believes that pollution prevention principles lie at the heart of making cost-effective decisions to avoid long-term liabilities and increase operational flexibility. Therefore, the Company has adopted the Life Cycle Management (LCM) approach as a basis for its Environmental and Pollution Prevention strategy.

One of the Company's environmental policy objectives is to conserve resources, prevent pollution, and recycle materials where practical at every stage of manufacture and product life. Chrysler believes that pollution prevention principles lie at the heart of making cost-effective decisions to avoid long-term liabilities and increase operational flexibility. Therefore, the Company has adopted the Life Cycle Management (LCM) approach as a basis for its Environmental and Pollution Prevention strategy. In LCM, tracking of materials starts in the product development cycle and ends when waste is recycled, treated, or disposed. Exhibit 2 shows Chrysler's LCM decision making process.

Chrysler's long term goal is to completely incorporate pollution prevention along with integrated product development into its corporate culture. Reformulating existing materials to remove toxics and regulated substances is one of Chrysler's basic strategies to reduce risk to employees and protect the environment. To effect this change, Chrysler is involving the United Auto Workers Union in its environmental protection efforts as well as educating management and salaried employees. In order to demonstrate its commitment to the environment, the Company has set an internal goal of eliminating all reportable TRI chemicals releases and transfers by the year 2000.

Exhibit 2

Chrysler's LCM Decision Making Process



In addition to the 33/50 Program, the Company participates in the Automotive Industry Pollution Prevention Project, a voluntary initiative between the Government and the Big Three automakers, designed to reduce the releases of 65 persistent toxic substances that adversely affect water quality in the Great Lakes.

Although Chrysler manufactures the key components of its vehicles, suppliers provide about 70 percent of the parts.

Chrysler's efforts in the environmental area have won the Company various awards, among them the U.S. EPA Stratospheric Ozone Protection Award for the Company's efforts to eliminate CFCs from automobiles, the Presidents Environment and Conservation Challenge Award for the "Jefferson North Project," and the U.S. EPA Administrators Award for environmental improvement through pollution prevention for the "Design of the Jefferson North Assembly Plant." The last two awards recognized Chrysler's efforts to implement innovative solutions and environmental improvements through pollution prevention at its Jefferson North Assembly plant. Many of these environmental improvements have been incorporated in other Chrysler plants worldwide.

Overview Of 33/50 And TRI Chemical Releases And Transfers

Vehicle manufacturing is a complex process involving people, machinery, parts, and chemicals. Although Chrysler manufactures the key components of its vehicles, suppliers provide about 70 percent of the parts. The Company does the final assembly of the cars at its assembly plants prior to introducing them to the market. The largest manufacturing operation associated with TRI chemical use is the vehicle coating and painting process.

Chrysler's facilities in the United States reported the use of twelve 33/50 Program chemicals during the years 1988-1993. The primary uses of each of these chemicals are as follows:

Benzene is a constituent of gasoline.

Chromium is used in the rinse solution of the phosphate pretreatment process and in the primer surface coating solutions.

In 1988, Chrysler reported a total of 20.7 million pounds of releases and transfers of TRI chemicals. Of this total, 13.5 million pounds were 33/50 Program chemicals.

Dichloromethane is used primarily as a solvent to strip paint build up inside the paint process lines and as an aid in the injection molding process of manufacturing operations.

Lead is used in electrodeposition primer coatings solutions and in solder compounds, including metal gas tank manufacturing operations.

Methyl ethyl ketone (MEK) is used as a solvent in paints and primer surface coatings and is a constituent in purge solvents used to clean equipment between paint color changes.

Methyl isobutyl ketone (MIBK) is used as a solvent in paints and electrodeposition primer coating and is a constituent in purge solvents used to clean equipment between paint color changes.

Nickel is used in phosphate pretreatment solutions and metal gas tank manufacturing operations.

Toluene is used as a solvent in paints and is a constituent in purge solvents used to clean equipment between color changes.

Tetrachloroethylene, 1,1,1-trichloroethane (TCA), ***and trichloroethylene*** (TCE) are used as equipment cleaners and degreasers.

Xylene is used primarily as a solvent in paints, as a constituent in purge solvents used to clean equipment between color changes, and as a solvent to strip paint build-up inside the paint process lines. It is also used as a car body and equipment cleaner.

Exhibit 3

Releases and Transfers of TRI Chemicals (1000 pounds)

Chrysler's Releases and Transfers of TRI Chemicals

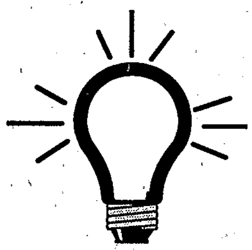
33/50 Chemicals (1,000 lbs)	1988	1993
Benzene	28	2
Chromium & Compounds	45	23
Dichloromethane	140	1
Lead & Compounds	28	12
Methyl Ethyl Ketone	1,434	210
Methyl Isobutyl Ketone	1,358	693
Nickel & Compounds	3	30
Tetrachloroethylene	1	NR
Toluene	1,689	194
1,1,1-Trichloroethane	831	290
Trichloroethylene	1	NR
Xylene	7,908	2,040
33/50 Subtotal*	13,467	3,494
Other TRI Chemicals	7,248	3,711
Total*	20,715	7,204

NR = Not reported, use below reporting threshold
** Columns may not sum to total due to rounding*

In 1988, Chrysler reported a total of 20.7 million pounds of releases and transfers of TRI chemicals. Of this total, 13.5 million pounds were 33/50 chemicals. The data used in this report were obtained from TRI data released to the public by EPA in March of 1995. Exhibit 3 presents the Company's summary data for 1988 and 1993. Additional detail is provided in Appendices A through D.

Chrysler's waste containing metals, namely chromium, lead, and nickel, are primarily transferred off-site for treatment or disposal. The remainder of the 33/50 Program chemicals are released primarily as air emissions.

33/50 Program Goals and Reduction Projects



Chrysler Corporation joined the 33/50 Program in 1991 with a commitment to achieve a 60 percent reduction in releases and transfers of 33/50 Program chemicals by 1995, using 1988 TRI data as a baseline. This translates to a pledged reduction of over 8 million pounds. In 1993, the Company realized that it had achieved it's initial commitment to the Program several years ahead of schedule. Based on the Company's success to this point and continued aggressive reduction strategies planned for the future, Chrysler increased its 33/50 Program goal to an 80 percent reduction in releases and transfers of 33/50 Program chemicals by 1995, for a total pledged reduction of nearly 11 million pounds.

A proactive environmental and pollution prevention approach is part of Chrysler's overall long term business strategy. The Company developed this strategy in response to various challenges that faced the automotive industry in the 1980s. At the time, Clean Air Act regulations required automobile manufacturers to reduce their emissions of VOCs, while foreign competition and customer demands required the industry to reduce cost and improve quality in order to remain competitive.

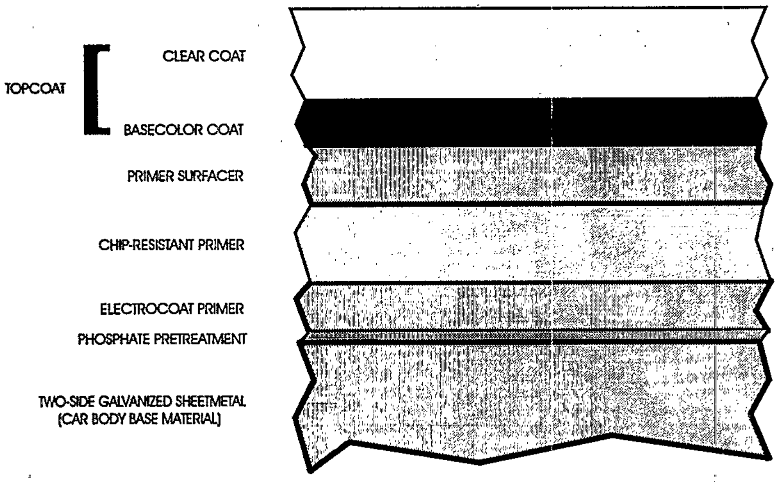
A proactive environmental and pollution prevention approach is part of Chrysler's overall long term business strategy. The Company developed this strategy in response to various challenges that faced the automotive industry in the 1980s.

Internal Company studies indicated that the paint shops within the assembly plants accounted for approximately 80 percent of the Company's emissions of concern. The painting and coating process was also one of the most costly components of the automobile manufacturing process. In addition, end-of-the-pipe controls had reached a point of increasing costs and decreasing effectiveness. In other words, the controls provided no added value to the product or process. As such, the Company placed an increased focus on activities in the paint shop area that would minimize material use, reduce emissions and waste, minimize environmental compliance issues and health and safety concerns, which reduce the cost of the coating manufacturing operations.

The purpose of automobile painting is to provide a protective and attractive finish to the final product. The most common coating system found in a typical automotive paint shop consists of five key steps, shown schematically in Exhibit 4 and discussed below. Solvents, usually volatile organic compounds (VOCs), are used as carriers to apply the coating solids to the vehicle. These solvents dissolve and disperse the pigments and resins that provide the color, appearance, and protective and mechanical properties of the coating finish.

Exhibit 4

Five Key Steps in the Coating Process



1) **Phosphate Pretreatment.** This initial step consists of spray and or immersion treatment stages to clean, chemically treat (conversion), and rinse the vehicle body. Between three and thirteen stages can be used to apply a layer of phosphate/manganese crystals on the metallic substrate surface. Rinse operations using trivalent chromium solutions seal the crystals onto the substrate. The purpose of the phosphate pre-treatment coating is to provide additional corrosion protection to the vehicle, improve the adhesion characteristics of paint, and smooth out the thermal expansion differences between the base metal and the paint that might otherwise lead to finish cracking.

Internal Company studies indicated that the paint shops within the assembly plants accounted for approximately 80 percent of the Company's emissions of concern.

2) **Electrodeposition Primer (Electrocoat Primer)**. The primary purpose of this step is to apply a coating to the vehicle surface that provides corrosion protection and improves adhesion properties and appearance of the overall finish. It is especially useful in highly recessed areas of the car, where coating is very difficult to accomplish using other application methods. In this step an overhead conveyor with cradle-shaped carriers transports the vehicle body through the electrocoat process. The vehicle body is negatively charged (cathode) and is immersed into a tank containing the waterborne pigment and resin coating solution. Anodes located in the tank positively charge the coating material causing the deposition of particles on the car body. As the film thickness increases, its electrical insulating properties assist in controlling the coating thickness. After the process is complete, the car is rinsed to remove a thin layer of non-deposited material prior to curing. Rinsing is accomplished in a full-immersion rinse tank and then in several spray rinse stages to remove the material. The final rinse uses deionized water. In each stage of the rinse cycle, the rinse water is processed through an ultrafiltration system that recovers virtually all of the rinsed material for reuse.

3) **Chip-Resistant Primer**. The purpose of this step is to apply a urethane-based, impact-absorbent material on the car's critical surfaces to resist chipping, primarily from road gravel impingement. Historically, chip-resistant materials have been high viscosity, solvent-borne coatings sprayed with conventional air atomization equipment. They also can be applied electrostatically or with airless or semi-airless spray to increase the coating transfer efficiency and reduce material usage.

4) **Primer surface.** This step of the process provides a coating film on all exterior vehicle surfaces that lends "forgiveness" to the overall coating system. It adds chip protection, fills surface imperfections, and strengthens intercoat adhesion. The application of primer surface coatings uses similar equipment and processes as the application of chip-resistant coatings. Some manufacturers, including Chrysler, have successfully eliminated the primer surface process through the use of thicker electrodeposition primer coatings (step 2).

5) **Topcoat.** This final coating consists of a base color coat and clear coat film. The most common system uses the high solids, solvent-borne basecoat/clearcoat technology. Basecoat materials provide the color aspect of the topcoat appearance. Color is determined by selection of pigments and metallic or mica-metallic flake additives. Resins provide the general mechanical properties, durability, and chemical resistance.

Solvents, usually volatile organic compounds (VOCs), are used as carriers to apply the coating solids to the vehicle. These solvents dissolve and disperse the pigments and resins that provide the color, appearance, and protective and mechanical properties of the coating finish.

After the exterior body surface is cleaned with a solvent wipe, the interior surfaces (e.g. engine compartment, luggage compartment) are painted with an initial spray of the basecoat paints using manual sprayers or robots. Then the first exterior spray zone builds most of the color film with either a set of nine or ten high voltage, high speed rotary atomizer spray guns, called turbobells, or a set of three reciprocating spray machines. Since metallic colors will lose their brilliance and "go dark" when sprayed electrostatically, robots or reciprocators apply a "dress coat" to bring the color match to an approved styling color. With each color change, paint lines and applicators must be purged of any excess paint. A typical basecoat spray booth zone consists of 18 or more spray guns that must be purged. The mixture of purge solvent and waste paint can be collected for recovery of purge solvent. The clearcoat film thickness determines the "distinctness of image" of the basecolor, including the gloss level, reflectiveness and final finish. High speed rotary atomizers apply the appropriate coating thickness of solvent-borne clearcoat materials which contain no pigments. Some interior surfaces, such as door jambs, are clearcoated with manual dress up spray. Clearcoat equipment requires only preventive purging.

Topcoat spray booths are designed with downdraft airflow and the paint particles from any overspray are collected in high efficiency water wash curtains. At most facilities, sludge is dried to a fine powder which is then recycled into fillers for sealers, asphaltic coatings, and concrete. Paint overspray remaining on the booth interior and equipment must be cleaned using solvents. Thermal incinerators reduce both solvent emissions and odor.

The electrocoat, chip-resistant primer, primer surface, and topcoat all must be cured in an oven. Paint curing is a function of time and temperature and varies by coating type. With high temperatures and low volume air changes, the VOC concentration of bake-oven emissions is high enough to justify economical control. Incineration is the primary method used to control these emissions.

Each assembly plant had one person responsible for program implementation who worked closely with each plant paint supplier, equipment vendors, and Chrysler's Paint & Energy Management Group to implement the program in such a way that it would meet the plant's production and financial commitments.

The remainder of this section discusses Chrysler's source reduction activities including material reformulation, process control, and equipment changes associated with the coating process. Chrysler worked very closely with paint suppliers and equipment manufacturers on these projects. The Company implemented the source reduction projects at the assembly plant level. Each assembly plant had one person responsible for program implementation who worked closely with each plant paint supplier, equipment vendors, and Chrysler's Paint & Energy Management Group to implement the program in such a way that it would meet the plant's production and financial commitments. A look at the Sterling Heights Assembly Plant (SHAP), which was one of the first Chrysler plants to implement these source reduction projects, provides examples of the overall impact of these activities on 33/50 Program chemical releases and transfers between 1988 and 1993. Appendix C provides a more detailed description of releases and transfers of TRI chemicals at this facility.

Project #1: Basecoat/Clearcoat Material Reformulation

1

Reformulating the basecoat/clearcoat composition was a two-phase project. In the first stage of the program, reducing the amount of existing solvents in the basecoat applications was the primary goal. A typical coating at the time of the investigation contained 45 percent solids and 55 percent solvents by volume. Xylene, toluene, methanol, methyl isobutyl ketone, and methyl ethyl ketone are some of the solvents typically used in coatings. Chrysler's Paint & Energy Management Group worked very closely with paint suppliers to develop the high solids/low solvent coating compositions. Each supplier had the responsibility of reformulating and testing its paint composition to meet Chrysler's requirements for quality and VOC emissions. Development work in this area lasted about two years and resulted in coating compositions of about 50 percent solids and 50 percent solvents by volume.

In the second phase of this project, Chrysler requested that its suppliers continue working on reformulation projects to further reduce the amounts of TRI chemicals, primarily VOCs and Hazardous Air Pollutants (HAP), in their coatings while still meeting the Company's quality and regulatory emissions requirements. Based on Chrysler's estimates, the suppliers reformulated their paints, reducing the amount of TRI chemicals by approximately 65 percent in the basecoat and 20 percent in the clearcoat paint compositions from 1988 compositions. Implementation of this phase of the project took place late in 1991 at SHAP. Exhibit 5 shows a generic description of the reformulation modifications of solvent-borne basecoat developed by PPG Industries. This description is an overview of the reformulation evolution processes and does not represent any specific basecoat at any particular Chrysler plant. Waterborne basecoat (step 4 in Exhibit 5) technology is the next advancement of the reformulation process. Chrysler began implementing this technology in 1993 and expects to complete implementation at all facilities by the end of the decade. Currently seven facilities worldwide have been converted.

In the first stage of the program, reducing the amount of existing solvents in the basecoat applications was the primary goal. A typical coating at the time of the investigation contained 45 percent solids and 55 percent solvents by volume.

In addition to the product reformulations, Chrysler instituted better incoming material quality operating practices at its plants. The Company included incoming quality material inspections to measure solids level, conductivity, and resistivity of paint against material specifications that varied from color to color and supplier to supplier.

Chrysler estimates that the first phase of this project reduced 33/50 Program chemical annual releases and transfers by 170,000 pounds between 1988 and 1993 at SHAP. The second phase of this project reduced 33/50 Program releases and transfers by an estimated 100,000 pounds per year between 1991 and 1992 at SHAP. There was no appreciable cost penalty or cost savings to the Company associated with this project.

Exhibit 5

Reformulations of Solvent-Borne Basecoat

SOLVENT EVOLUTION PPG SOLVENT-BORNE BASECOATS AS SUPPLIED TO CHRYSLER

Solvent	Solvent % Evolution				
	Baseline	Step 1	Step 2	Step 3	Step 4
DIBK (diisobutyl ketone)	5	15	22	23	—
Xylene	50	20	10	2	—
Isopar E	6	6	6	6	—
Heptane	12	12	12	12	—
Naptha	10	10	10	10	—
Toluene	1	1	1	1	—
n-butyl acetate	8	29	33	35	—
Isopropanol	2	2	2	2	—
Methyl isobutyl ketone	1	1	—	—	—
Methanol	4	4	—	—	—
Methyl ethyl ketone	1	—	—	—	—
Ethanol	—	—	4	4	—
DPM glycol ether	—	—	—	5	5
Water	—	—	—	—	75
PGMDE (propylene glycol glycol mono butyl ether)	—	—	—	—	18
Mineral spirits	—	—	—	—	2
% HAPs	57	26	11	3	—

Notes:
Solvent percentages are expressed as percent of total solvent.
Data presented is for generic basecoat and does not represent any specific PPG coating at any Chrysler plant.
Baseline is from 1987 calendar year. Steps 1, 2 and 3 occurred between 1988 and 1995 for solvent-borne basecoats.
Step 4 represents levels attained with waterborne basecoats.

Project #2: Process Control of Basecoat Application

Internal company studies of assembly plant operations identified significant opportunities to reduce paint use and cost. Methyl ethyl ketone, methyl isobutyl ketone, toluene, and xylene are some of the 33/50 Program chemicals typically used as solvents in the coating solutions. Pigments and metallic or mica-metallic flake additives provide the color in the basecoat. Waste in this application was primarily associated with inefficient spray processes and basecoat manufacturing operations. Consequently, Chrysler launched a program designed to reduce the amount of basecoat paint and solvents used per vehicle produced in the paint shop of the assembly plant. Efforts were concentrated on two areas within the assembly plant paint shop: spray process parameters and manufacturing operations.

To minimize color changes, Chrysler instituted the concept of block painting in which blocks or groups of vehicles are coated with the same color.

In the past, the paint shop had set process parameters empirically and parameter tolerances were broad in order to achieve the desired engineering specifications for coating thickness. Therefore, coating thickness was not consistent from job to job and operator to operator, even though it met the required specifications. Fixed parameters were set for each type of basecoat application and equipment used. The Company studied the optimum relationship of atomizing air, fluid delivery rate, and distance between the spray gun and the target for each application. By optimizing these three parameters, as well as enhancing and improving personnel training programs associated with the paint

2

processes and operations, Chrysler was able to better control the paint thickness and reduce the amount of overspray associated with the spray process application. This improved control resulted in reduced paint usage per car and reduced solvent usage and emissions associated with overspray clean up operations.

In manufacturing operations, the paint lines must be purged with solvents between each color change in order to avoid quality problems resulting from mixing paints of different colors. Minimizing the number of color changes reduces the amount of paint and purge solvent used. To minimize color changes, Chrysler instituted the concept of block painting in which blocks or groups of vehicles are coated with the same color. The Company streamlined its plant production schedules so that it could maximize the number of vehicles painted the same color at the same time in the paint shop area. SHAP is now running an average of about 10 vehicles per block, and Chrysler estimates that block painting has reduced purge solvent use by about 50 percent.

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The Company also found that the paint shop painted certain areas and parts of the car for which the paint does not provide any engineering or aesthetic consumer function. Chrysler personnel reviewed these painting practices and eliminated areas that did not need painting such as the inner door surfaces, under the hood, and certain areas of the fenders, thus further reducing paint usage and cost.

Chrysler estimates that this project reduced 33/50 Program chemical releases and transfers by approximately 500,000 pounds annually between 1988 and 1993 at SHAP alone, saving an estimated $3.0 million per year per plant based primarily on material and labor cost associated with the painting operations. This project did not require any capital investment from the Company.

3

Project #3: Equipment Changes

The third project identified by Chrysler was a capital equipment project associated with the paint applicators. There are numerous spray methods that can be used to apply paints and coatings. Spray gun designs atomize the paint into a fine spray that is directed to the vehicle. In air spray processes, the paint is stored in a pressure tank and fed to the gun using compressed air. Application efficiencies can be as low as 20 percent with air spray processes. Electrostatic spray gun systems inject the atomized paint from conventional spray guns into an electrostatic field where the spray is negatively charged and deposited on the grounded vehicle. Optimized electrostatic spray processes can achieve efficiencies of up to 75 percent. These basic spray gun designs are integrated in automatic machines used in automobile paint applications. Chrysler uses two types of such equipment, reciprocators and bells. Reciprocators are older equipment that have transfer efficiencies of about 40-50 percent depending on the application. Reciprocators typically use low-voltage electrostatic or manual spray guns. The more expensive and state-of-the-art bells utilize a high-voltage, high-speed rotary atomizer gun called a turbobell that can achieve transfer efficiencies of over 90 percent depending on the application.

In this project, Chrysler worked closely with equipment vendors and paint suppliers to implement the more efficient technologies available to the automotive industry. Chrysler found that, by emphasizing electrostatic spray applications and by investing in turbobell-type equipment, substantial emissions reductions, and material cost savings could be achieved. For example, in painting the interior vehicle surfaces, the Company emphasized conversion to manual or robotic low voltage electrostatic applicators from conventional air atomized guns. In addition using the high transfer efficiency bells in basecoat applications instead of reciprocators has cut the amount of paint usage by half in some application processes.

Chrysler estimates that this project reduced 33/50 Program chemicals releases and transfers by approximately 300,000 pounds annually between 1988 and 1993 at SHAP. There was an initial capital investment of about $1 million for the purchase and installation of electrostatic spray guns, with an estimated payback period of one year. The initial capital investment for the bell equipment was approximately $4 million, with a payback period of about 6 months. The cost savings for the project were associated with material cost, labor cost, and productivity improvements.

33/50 Progress

Chrysler Corporation has reduced annual releases and transfers of 33/50 Program chemicals by nearly 10 million pounds or 74 percent between 1988 and 1993. In addition, the Company has achieved significant reductions in releases and transfers of non-33/50 TRI chemicals. The Company has reduced non-33/50 TRI chemical releases and transfers by 3.5 million pounds or 49 percent, from 7,248,208 pounds in 1988 to 3.7 million pounds in 1993. These reductions are illustrated in Exhibit 6. Releases and transfers for 1993 are illustrated by chemical and by release media in Exhibits 7 and 8, respectively. In addition, Exhibits 9 and 10 illustrate the Company's 33/50 Chemical reductions from 1988-1993, by chemical and release media respectively. The Company achieved its initial goal of a 60 percent reduction in releases and transfers of 33/50 Program chemicals several years ahead of schedule and was very close to achieving its revised goal of 80 percent at the end of 1993.

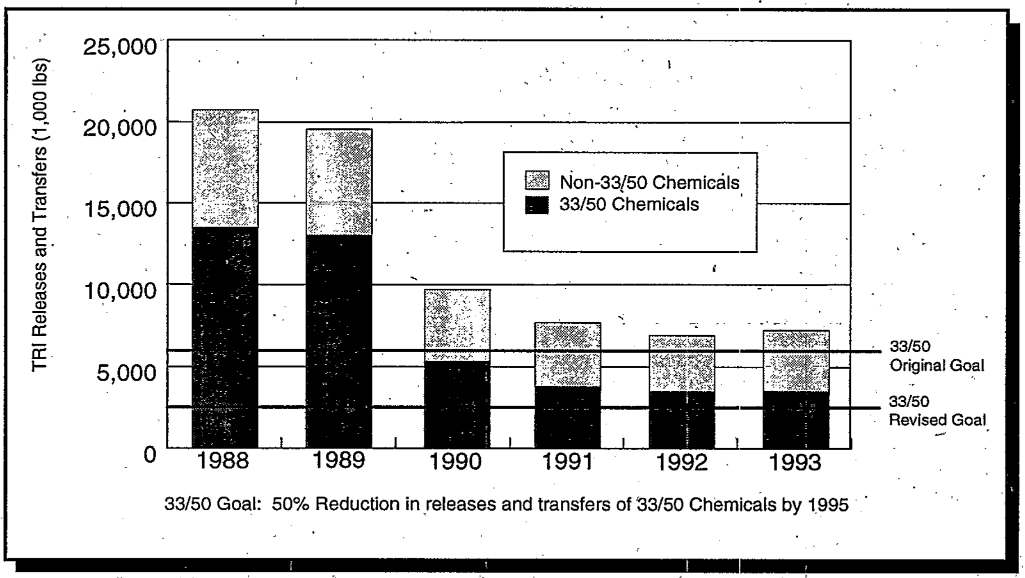
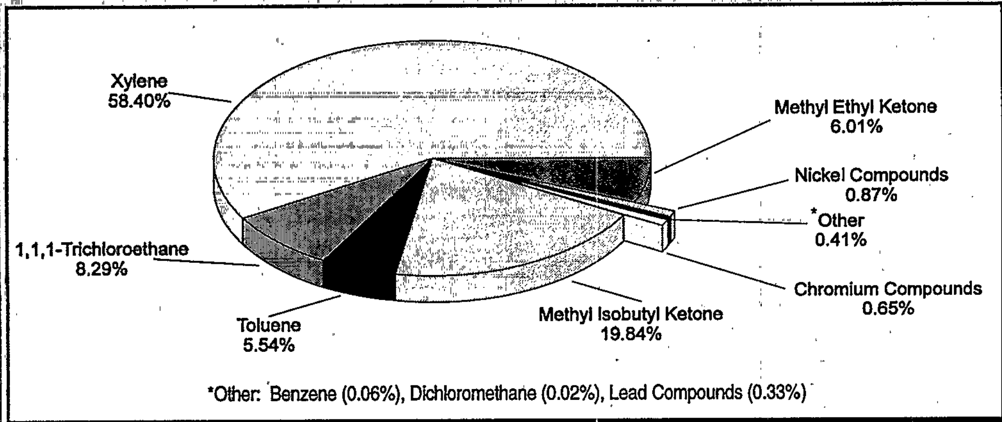


Exhibit 6

Chrysler's Progress Towards Meeting 33/50 Goals

Exhibit 7

Percentage Breakdown of 33/50 Program Chemical Releases and Transfers for 1993 (by Chemical)



Major contributors to Chrysler's reductions in releases and transfers of 33/50 Program chemicals include the following:

Methyl ethyl ketone	-	1,224,042 pounds (85 percent reduction)
Methyl isobutyl ketone	-	665,302 pounds (49 percent reduction)
Toluene	-	1,495,751 pounds (89 percent reduction)
1,1,1-Trichloroethane	-	541,297 pounds (65 percent reduction)
Xylenes	-	5,867,886 pounds (74 percent reduction)

Implementation of the activities discussed in this case study reduced basecoat paint use at SHAP from 1.16 gallons per vehicle in 1988 to 0.58 gallons per vehicle in 1993.

To measure its progress, Chrysler tracks "paint use per vehicle produced" at its assembly plants. Implementation of the activities discussed in this case study reduced basecoat paint use at SHAP from 1.16 gallons per vehicle in 1988 to 0.58 gallons per vehicle in 1993. This is equivalent to a 50 percent reduction in basecoat paint use on a production-normalized basis.

Chrysler estimates that the activities discussed in this case study have reduced company-wide releases and transfers of 33/50 Program chemicals by approximately 6,500,000 pounds between 1988 and 1993. Additional activities that resulted in unquantified reductions of 33/50 Program chemical releases and transfers include:

- reducing lead concentration by reformulating the electrodeposition primer coating solutions;
- eliminating lead and chromium from topcoat paints and other paint applications;
- substituting less hazardous trivalent chromium solutions for hexavalent chromium solutions in the rinse step of the phosphate pretreatment process;
- substituting a chromium- and lead-free corrosion-resistant coating solution used in radiator manufacturing operations;
- eliminating the use of a toluene-based adhesive by switching to a mechanical fastener; and
- substituting water-based solutions for chlorinated solvents in degreasing and cleaning operations.

During the same time frame, the Company has divested and consolidated some of its facilities in order to accommodate the market changes that faced the automotive industry. Consequently, Chrysler measures its 33/50 Program progress on a production-

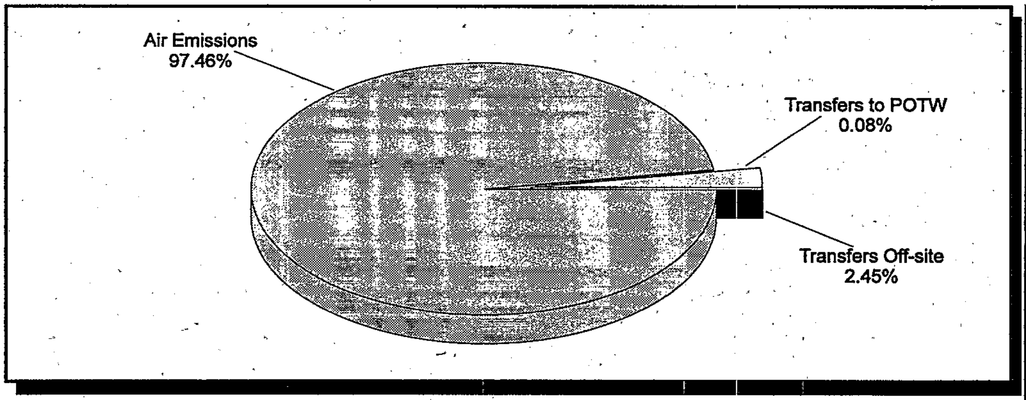


Exhibit 8

Percentage Breakdown of 33/50 Program Chemical Releases and Transfers for 1993 (by Media)

normalized basis. Based on normalized production, the Company has reduced releases and transfers of 33/50 Program chemicals by 5.7 pounds per vehicle produced, from approximately 8.0 pounds in 1988 to 2.3 pounds in 1993, a 71 percent reduction.

The 33/50 Program fits well with the overall Company strategy to address environmental issues in the most cost-effective and innovative way that suits its needs.

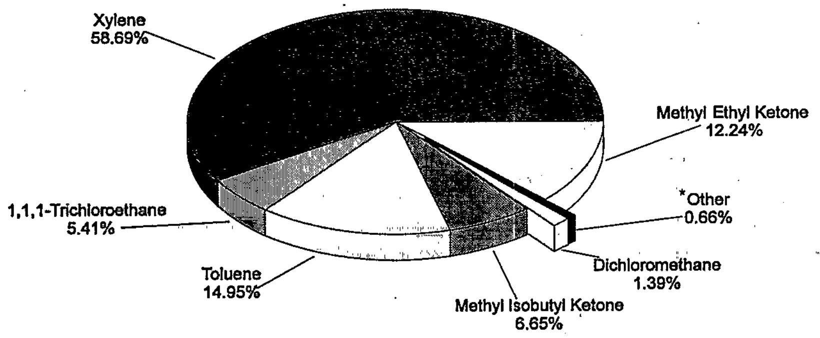
Chrysler's participation in the 33/50 Program has been positive. The 33/50 Program fits well with the overall Company strategy to address environmental issues in the most cost-effective and innovative way that suits its needs. The Company's pollution prevention activities have resulted not only in reductions of releases and transfers of toxic chemicals, but also in significant cost savings to the Company. One facility of particular note, Chrysler's St. Louis assembly plant, went through a New Source Review Process as defined in the Clear Air Act and met Lowest Achievable Emission Rate levels for an ozone non-attainment area as a result of source reduction measures and implementation of waterborne technology. The Company estimates that the St. Louis plant saved approximately $20 million in capital costs and over $1.0 million in annual operating costs associated with end-of-pipe spray booth controls.

Future Efforts

Chrysler indicated that its environmental efforts to date have picked most of the "low hanging fruit" in the pollution prevention area and that further improvements will require more innovative efforts. The Company believes that the "Design for the Environment" approach incorporated into the LCM approach will provide the framework for further source reduction opportunities while maintaining its competitive position in the business world. The Company has implemented LCM in a program designed to eliminate at least 26 toxic substances from over 100,000 materials currently entering into its plants. Chrysler determined that there are approximately 1,700 federal, state, and local regulated substances in geographic regions where its main manufacturing operations are located. Of these 1,700, approximately 760 regulated substances are used at Chrysler plants. The Company has identified 103 of these 760 chemicals that account for 80 percent of the Company's emissions. Of these 103, the Company identified 26 that were restricted for production, and stipulated that substitutes should not include any of the 77 remaining chemicals on the list. Using non-regulated substances also allows the Company greater operational flexibility and reduces regulatory burden and time associated with requirements to obtain operating permits that may interfere with Company plans to introduce a product to the market. Chrysler indicated that the greatest impact of this program will be observed after 1998, since production part numbers for the 1997

Exhibit 9

Contribution of Reductions of each Chemical to Total Reductions



*Other: TCE (0.01%), Tetrachloroethylene (0.01%), Benzene (0.26%), Lead Compounds (0.16%), Chromium Compounds (0.22%)
Note: There was a 27,000 lbs. increase in the releases and transfers of Nickel Compounds

The Company expects to continue implementing water-borne basecoat systems at its assembly plants nationwide — a substitution that will further reduce releases and transfers of 33/50 and other TRI chemicals.

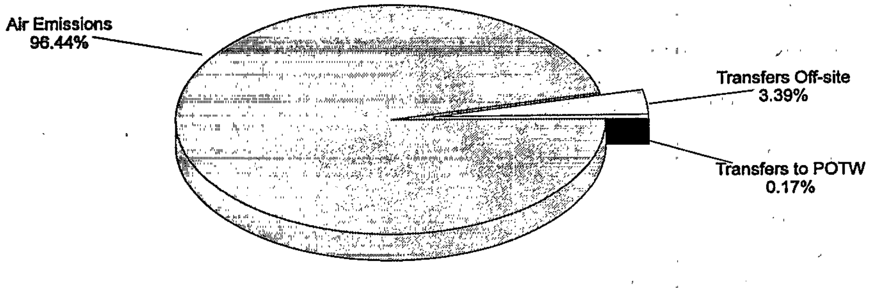
model year have already been released. Since the Company's business relies heavily on suppliers, working with suppliers is integral for the Company to achieve its goals.

In addition, Chrysler is continuing its efforts to implement advancements in the coatings and paint technology areas. The Company expects to continue implementing water-borne basecoat systems at its assembly plants nationwide — a substitution that will further reduce releases and transfers of 33/50 and other TRI chemicals. In 1993, the United States Council for Automotive Research (USCAR) and the Big Three automakers formed the Low Emissions Paint Consortium (LEPC). One of the goals of the LEPC is to develop coating technologies that will reduce compact vehicle VOC coating emissions from the best current industry performance of 3.1 pounds per vehicle with end-of-pipe controls to 1.5 pounds per vehicle without any end-of-pipe controls.

Chrysler believes that its source reduction programs and the life cycle management approach incorporated into its environmental strategy will allow the Company to achieve its environmental goals, and it fully expects to meet its revised goal of an 80 percent reduction in releases and transfers of 33/50 Program chemicals by the end of 1995.

Exhibit 10

Contribution of Reductions from each Release Media to Total Reductions



Note: There was a 100% reduction (480 lbs.) in Surface Water Discharges.

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Appendix A
Chrysler Corporation
Releases and Transfers of TRI Chemicals, 1988-1993

Chemical	Year	Total Air Emissions (pounds)	Surface Water Discharges (pounds)	Releases to Land (pounds)	Transfers to POTW (pounds)	Transfers Off-site for Treatment/ Disposal/Other (pounds)	Total Releases and Transfers (pounds) (1)	Percent Change 1988-1992 Total Releases and Transfers
Benzene	1988	25,410	0	0	1,250	1,645	28,305	
	1989	11,964	0	0	1,030	1,698	14,692	
	1990	2,083	0	0	2	61	2,146	
	1991	1,431	0	0	8	121	1,560	
	1992	2,045	0	0	4	216	2,265	
	1993	1,982	0	0	0	0	1,982	-93%
Chromium	1988	263	0	0	774	42,908	43,945	
	1989	263	0	0	271	6,953	7,487	
	1990	12	0	0	31	5,543	5,586	
	1991	8	0	0	5	5,510	5,523	
	1992	917	0	0	21	17,219	18,157	
	1993	392	0	0	0	22,214	22,606	-49%
Chromium compounds	1988	500	0	0	250	250	1,000	
	1989	0	0	0	34	6	40	
	1990	110	0	0	169	26,325	26,604	
	1991	0	0	0	50	450	500	
	1992	0	0	0	0	1,949	1,949	
	1993	0	0	0	0	150	150	-85%
Dichloromethane	1988	135,050	50	0	750	4,300	140,150	
	1989	235,200	0	0	552	16,801	252,553	
	1990	48,850	0	0	0	292	49,142	
	1991	46,040	0	0	0	0	46,040	
	1992	17,200	0	0	0	0	17,200	
	1993	540	0	0	0	0	540	-100%

Appendix A
Chrysler Corporation
Releases and Transfers of TRI Chemicals, 1988-1993

Chemical	Year	Total Air Emissions (pounds)	Surface Water Discharges (pounds)	Releases to Land (pounds)	Transfers to POTW (pounds)	Transfers Off-site for Treatment/ Disposal/Other (pounds)	Total Releases and Transfers (pounds) (1)	Percent Change 1988-1992 Total Releases and Transfers
Lead	1988	5,233	180	0	696	11,574	17,683	
	1989	5,020	0	0	619	275,440	281,079	
	1990	561	0	0	122	2,480	3,163	
	1991	5,466	0	0	128	6,053	11,647	
	1992	1,203	0	0	285	12,537	14,025	
	1993	585	0	0	216	9,436	10,237	-42%
Lead compounds	1988	562	0	0	250	9,300	10,112	
	1989	750	0	0	530	28,557	29,837	
	1990	98	0	0	348	36,657	37,103	
	1991	7	0	0	324	34,022	34,353	
	1992	66	0	0	35	13,689	13,790	
	1993	0	0	0	0	1,408	1,408	-86%
Methyl ethyl ketone	1988	1,419,131	250	0	2,850	11,729	1,433,960	
	1989	1,395,770	0	0	1,750	28,933	1,426,453	
	1990	643,336	0	0	0	838	644,174	
	1991	288,659	0	0	0	2,098	290,757	
	1992	230,947	0	0	0	391	231,338	
	1993	203,556	0	0	0	6,362	209,918	-85%
Methyl isobutyl ketone	1988	1,341,592	0	0	4,316	12,513	1,358,421	
	1989	2,210,900	0	0	1,250	8,673	2,220,823	
	1990	490,278	0	0	0	157	490,435	
	1991	511,988	0	0	0	3,315	515,303	
	1992	760,320	0	0	0	47	760,367	
	1993	692,100	0	0	0	1,019	693,119	-49%
Nickel	1988	10	0	0	254	489	753	
	1989	500	0	0	263	1,866	2,629	
	1990	21	0	0	10	1,375	1,406	
	1991	11	0	0	3	1,341	1,355	
	1992	10	0	0	3	1,370	1,383	
	1993	12	0	0	3	1,793	1,808	140%

Appendix A
Chrysler Corporation
Releases and Transfers of TRI Chemicals, 1988-1993

Chemical	Year	Total Air Emissions (pounds)	Surface Water Discharges (pounds)	Releases to Land (pounds)	Transfers to POTW (pounds)	Transfers Off-site for Treatment/ Disposal/Other (pounds)	Total Releases and Transfers (pounds) (1)	Percent Change 1988-1992 Total Releases and Transfers
Nickel compounds	1988	0	0	0	250	1,900	2,150	
	1989	250	0	0	950	460	1,660	
	1990	16	0	0	1,208	23,600	24,824	
	1991	5	0	0	823	12,150	12,978	
	1992	4	0	0	1,264	12,358	13,626	
	1993	0	0	0	2,592	25,950	28,542	1228%
Tetrachloroethylene	1988	1,000	0	0	0	250	1,250	
Toluene	1988	1,453,692	0	0	2,283	233,344	1,689,319	
	1989	995,620	0	0	912	53,305	1,049,837	
	1990	287,880	0	0	21	902	288,803	
	1991	194,159	0	0	63	1,975	196,197	
	1992	189,867	0	0	34	1,359	191,260	
	1993	188,355	0	0	0	5,213	193,568	-89%
1,1,1-Trichloroethane	1988	793,497	0	0	750	36,685	830,932	
	1989	747,963	0	0	507	12,250	760,720	
	1990	471,900	0	0	0	0	471,900	
	1991	330,000	0	0	0	2,525	332,525	
	1992	330,200	0	0	0	935	331,135	
	1993	289,400	0	0	0	235	289,635	-65%
Trichloroethylene	1988	1,000	0	0	0	250	1,250	
Xylene (mixed isomers)	1988	7,845,700	0	0	5,161	57,129	7,907,990	
	1989	6,912,550	0	0	1,898	37,094	6,951,542	
	1990	3,252,600	0	0	17	6,772	3,259,389	
	1991	2,305,140	0	312	260	24,411	2,330,123	
	1992	1,861,753	0	0	0	15,177	1,876,930	
	1993	2,028,122	0	0	0	11,982	2,040,104	-74%

Appendix A
Chrysler Corporation
Releases and Transfers of TRI Chemicals, 1988-1993

Chemical	Year	Total Air Emissions (pounds)	Surface Water Discharges (pounds)	Releases to Land (pounds)	Transfers to POTW (pounds)	Transfers Off-site for Treatment/ Disposal/Other (pounds)	Total Releases and Transfers (pounds) (1)	Percent Change 1988-1992 Total Releases and Transfers
33/50 Program Chemicals	**1988**	**13,022,640**	**480**	**0**	**19,834**	**424,266**	**13,467,220**	
	1989	**12,516,750**	**0**	**0**	**10,566**	**472,036**	**12,999,352**	
	1990	**5,197,745**	**0**	**0**	**1,928**	**105,002**	**5,304,675**	
	1991	**3,682,914**	**0**	**312**	**1,664**	**93,971**	**3,778,861**	
	1992	**3,394,532**	**0**	**0**	**1,646**	**77,247**	**3,473,425**	
	1993	**3,405,044**	**0**	**0**	**2,811**	**85,762**	**3,493,617**	-74%
Non-33/50 Program Chemicals	1988	5,943,820	8,310	0	489,457	806,621	7,248,208	
	1989	4,926,903	50	0	835,386	744,074	6,506,413	
	1990	2,374,288	10	0	1,585,878	421,508	4,381,684	
	1991	2,404,853	8	48	930,657	548,593	3,884,159	
	1992	2,271,996	4	0	636,546	503,086	3,411,632	
	1993	2,458,844	0	0	662,534	589,451	3,710,829	-49%
All TRI Chemicals	1988	18,966,460	8,790	0	509,291	1,230,887	20,715,428	
	1989	17,443,653	50	0	845,952	1,216,110	19,505,765	
	1990	7,572,033	10	0	1,587,806	526,510	9,686,359	
	1991	6,087,767	8	360	932,321	642,564	7,663,020	
	1992	5,666,528	4	0	638,192	580,333	6,885,057	
	1993	5,863,888	0	0	665,345	675,213	7,204,446	-67%
Percent Change, 1988-1992								
33/50 Program Chemicals		74%	100%	—	86%	80%	74%	
Non-33/50 Program chemicals		59%	100%	—	-35%	27%	49%	
All TRI Chemicals		69%	100%	—	-31%	45%	65%	

(1) Total Releases and Transfers for 1991 and 1992 do not include on- or off-site recycling or energy recovery.

Appendix B
Chrysler Corporation, Selected Facilities
Releases and Transfers of TRI Chemicals, 1988-1993

Chemical	Year	Total Air Emissions (pounds)	Surface Water Discharges (pounds)	Underground Injection (pounds)	Releases to Land (pounds)	Transfers to POTW (pounds)	Transfers Off-site for Treatment/ Disposal/Other (pounds)	Total Releases and Transfers (pounds) (1)
CHRYSLER CORP. - STERLING HEIGHTS, MI								
Benzene	1988	3,550	0	0	0	250	750	4,550
	1989	2,390	0	0	0	250	0	2,640
	1990	64	0	0	0	0	0	64
	1991	56	0	0	0	0	0	56
	1992	114	0	0	0	0	0	114
	1993	417	0	0	0	0	0	417
Dichloromethane	1988	4,950	0	0	0	250	0	5,200
	1989	97,000	0	0	0	250	600	97,850
	1990	2,010	0	0	0	0	0	2,010
	1991	3,900	0	0	0	0	0	3,900
Lead compounds	1990	0	0	0	0	75	2,260	2,335
Methyl ethyl ketone	1988	332,000	0	0	0	250	1,000	333,250
	1989	185,300	0	0	0	250	600	186,150
	1990	97,000	0	0	0	0	360	97,360
	1991	31,400	0	0	0	0	950	32,350
Methyl isobutyl ketone	1988	102,300	0	0	0	250	1,000	103,550
	1989	585,200	0	0	0	250	80	585,530
	1990	77,800	0	0	0	0	0	77,800
	1991	82,000	0	0	0	0	6	82,006
	1992	105,000	0	0	0	0	4	105,004
	1993	145,000	0	0	0	0	2	145,002

Appendix B
Chrysler Corporation, Selected Facilities
Releases and Transfers of TRI Chemicals, 1988-1993

Chemical	Year	Total Air Emissions (pounds)	Surface Water Discharges (pounds)	Underground Injection (pounds)	Releases to Land (pounds)	Transfers to POTW (pounds)	Transfers Off-site for Treatment/ Disposal/Other (pounds)	Total Releases and Transfers (pounds) (1)
Nickel	1988	0	0	0	0	250	0	250
Nickel compounds	1990	0	0	0	0	150	3,100	3,250
	1992	0	0	0	0	140	1,600	1,740
	1993	0	0	0	0	340	1,700	2,040
Tetrachloroethylene	1988	1,000	0	0	0	0	250	1,250
Toluene	1988	334,000	0	0	0	250	138,250	472,500
	1989	123,000	0	0	0	60	1,100	124,160
	1991	10,500	0	0	0	0	261	10,761
	1993	12,000	0	0	0	0	161	12,161
1,1,1-Trichloroethane	1988	1,000	0	0	0	250	0	1,250
Trichloroethylene	1988	1,000	0	0	0	0	250	1,250
Xylene (mixed isomers)	1988	910,000	0	0	0	250	5,950	916,200
	1989	1,560,000	0	0	0	250	2,900	1,563,150
	1990	508,000	0	0	0	0	3,400	511,400
	1991	278,000	0	0	0	0	2,500	280,500
	1992	166,000	0	0	0	0	20	166,020
	1993	234,000	0	0	0	0	6	234,006

Appendix B
Chrysler Corporation, Selected Facilities
Releases and Transfers of TRI Chemicals, 1988-1993

Chemical	Year	Total Air Emissions (pounds)	Surface Water Discharges (pounds)	Underground Injection (pounds)	Releases to Land (pounds)	Transfers to POTW (pounds)	Transfers Off-site for Treatment/ Disposal/Other (pounds)	Total Releases and Transfers (pounds) (1)
33/50 Program Chemicals	**1988**	**1,689,800**	**0**	**0**	**0**	**2,000**	**147,450**	**1,839,250**
	1989	**2,552,890**	**0**	**0**	**0**	**1,310**	**5,280**	**2,559,480**
	1990	**684,874**	**0**	**0**	**0**	**225**	**9,120**	**694,219**
	1991	**405,856**	**0**	**0**	**0**	**0**	**3,717**	**409,573**
	1992	**271,114**	**0**	**0**	**0**	**140**	**1,624**	**272,878**
	1993	**391,417**	**0**	**0**	**0**	**340**	**1,869**	**393,626**
Non 33/50 Program Chemicals	1988	114,050	0	0	0	1,250	3,250	118,550
	1989	130,364	0	0	0	1,290	650	132,304
	1990	29,432	0	0	0	33,004	25,522	87,958
	1991	32,042	0	0	0	33,520	23,183	88,745
	1992	47,903	0	0	0	9,053	18,093	75,049
	1993	47,170	0	0	0	36,950	15,793	99,913
All TRI Chemicals	1988	1,803,850	0	0	0	3,250	150,700	1,957,800
	1989	2,683,254	0	0	0	2,600	5,930	2,691,784
	1990	714,306	0	0	0	33,229	34,642	782,177
	1991	437,898	0	0	0	33,520	26,900	498,318
	1992	319,017	0	0	0	9,193	19,717	347,927
	1993	438,587	0	0	0	37,290	17,662	493,539

(1) 1991, 1992, and 1993 Total Releases and Transfers do not include off-site recycling or recovery.

Appendix C
Chrysler Corporation
Pollution Prevention Act Reporting, 1991-1993 Data and 1994-1995 Projections

Chemical	Year	Recycled On-Site (pounds)	Recycled Off-Site (pounds)	Energy Recovery On-Site (pounds)	Energy Recovery Off-Site (pounds)	Treated On-Site (pounds)	Treated Off-Site (pounds)	Quantity Released (pounds)	Percent Change 1991-1995 Quantity Released	Total Production Related Wastes (pounds)	Percent Change 1991-1995 Production Related Wastes
Benzene	1991	0	0	0	98	400	2	1,423		1,923	
	1992	0	0	0	102	370	164	2,101		2,737	
	1993	0	0	0	61	420	0	1,982		2,463	
	1994	0	0	0	61	420	0	3,252		3,733	
	1995	0	0	0	61	420	0	3,252	129%	3,733	94%
Chromium	1991	0	125,600	0	0	0	4,300	1,219		131,119	
	1992	0	0	0	0	0	0	0		0	
	1993	16,000	163,800	0	0	0	5,728	16,498		202,026	
	1994	16,000	163,800	0	0	0	5,728	16,498		202,026	
	1995	16,000	163,800	0	0	0	5,728	16,498	1253%	202,026	54%
Chromium compounds	1991	0	0	0	0	0	500	0		500	
	1992	0	1,200	0	0	0	1,200	49		2,449	
	1993	0	390	0	0	0	650	0		1,040	
	1994	0	390	0	0	0	150	0		540	
	1995	0	390	0	0	0	150	0		540	8%
Dichloromethane	1991	0	30,300	0	12,000	0	0	46,200		88,500	
	1992	0	78,300	0	23,004	0	0	21,100		122,404	
	1993	0	32,300	0	53,001	0	0	18,440		103,741	
	1994	0	71,000	0	53,004	0	0	16,540		140,544	
	1995	0	0	0	53,000	0	0	540	-99%	53,540	-40%
Lead	1991	0	185,350	0	0	0	2,180	34,544		222,074	
	1992	0	229,053	0	0	0	2,758	11,036		242,847	
	1993	0	115,478	0	0	0	3,054	7,136		125,668	
	1994	0	115,478	0	0	0	3,054	7,136		125,668	
	1995	0	115,478	0	0	0	3,054	7,136	-79%	125,668	-43%

Appendix C
Chrysler Corporation
Pollution Prevention Act Reporting, 1991-1993 Data and 1994-1995 Projections

Chemical	Year	Recycled On-Site (pounds)	Recycled Off-Site (pounds)	Energy Recovery On-Site (pounds)	Energy Recovery Off-Site (pounds)	Treated On-Site (pounds)	Treated Off-Site (pounds)	Quantity Released (pounds)	Percent Change 1991-1995 Quantity Released	Total Production Related Wastes (pounds)	Percent Change 1991-1995 Production Related Wastes
Lead compounds	1991	2,600	10,507	0	0	0	5,354	31,120		49,581	
	1992	5,200	6,517	0	0	0	6,830	26,850		45,397	
	1993	5,200	3,617	0	0	0	4,730	26,580		40,127	
	1994	5,200	3,617	0	0	0	3,400	1,580		13,797	
	1995	0	3,600	0	0	0	1,400	0	-100%	5,000	-90%
Methyl ethyl ketone	1991	980	11,450	0	18,015	303,370	2,012	293,219		629,046	
	1992	30,000	15,365	0	43,489	262,300	1,161	260,547		612,862	
	1993	15,000	7,024	0	12,295	267,723	7,320	224,457		533,819	
	1994	15,000	9,324	0	25,295	270,423	9,780	311,457		641,279	
	1995	15,000	9,324	0	25,295	270,423	9,780	311,430	6%	641,252	2%
Methyl isobutyl ketone	1991	1,300	375,600	0	1,033,910	154,871	1,998	516,380		2,084,059	
	1992	8,100	938,000	0	325,290	97,710	23	734,200		2,103,323	
	1993	0	1,068,002	0	185,378	26,080	1,003	706,200		1,986,663	
	1994	0	1,121,002	0	343,378	41,980	1,003	894,020		2,401,383	
	1995	0	1,121,002	0	343,378	41,980	1,003	894,000	73%	2,401,363	15%
Nickel	1991	21,000	28,140	0	0	0	475	884		50,499	
	1992	0	0	0	0	0	0	0		0	
	1993	0	60,620	0	0	0	565	1,237		62,422	
	1994	0	60,620	0	0	0	565	1,237		62,422	
	1995	0	60,620	0	0	0	565	1,237	40%	62,422	24%
Nickel compounds	1991	0	0	0	0	0	3,489	10,853		14,342	
	1992	0	110	0	0	0	6,674	6,900		13,684	
	1993	0	0	0	0	0	24,281	4,820		29,101	
	1994	0	0	0	0	0	24,336	5,600		29,936	
	1995	0	0	0	0	0	24,252	4,400	-59%	28,652	100%

Appendix C
Chrysler Corporation
Pollution Prevention Act Reporting, 1991-1993 Data and 1994-1995 Projections

Chemical	Year	Recycled On-Site (pounds)	Recycled Off-Site (pounds)	Energy Recovery On-Site (pounds)	Energy Recovery Off-Site (pounds)	Treated On-Site (pounds)	Treated Off-Site (pounds)	Quantity Released (pounds)	Percent Change 1991-1995 Quantity Released	Total Production Related Wastes (pounds)	Percent Change 1991-1995 Production Related Wastes
Toluene	1991	8,600	3,457	0	16,080	33,420	1,832	194,959		258,348	
	1992	21,500	2,935	0	22,019	38,200	1,046	197,967		283,667	
	1993	220	4,790	0	12,117	35,780	4,999	180,785		238,691	
	1994	220	7,470	0	20,917	37,600	5,201	204,485		275,893	
	1995	220	7,470	0	20,917	37,600	5,201	203,555	4%	274,963	6%
1,1,1-Trichloroethane	1991	847,500	28,200	0	88,480	0	8	329,900		1,294,088	
	1992	422,100	33,300	0	31,380	0	330	328,200		815,310	
	1993	414,000	33,400	0	11,800	0	235	307,000		766,435	
	1994	414,000	33,400	0	11,800	0	235	265,500		724,935	
	1995	414,000	0	0	9,300	0	35	225,000	-32%	648,335	-50%
Xylene (mixed isomers)	1991	3,800	1,215,699	0	458,569	176,700	5,751	1,525,610		3,386,129	
	1992	8,100	1,776,160	0	804,733	181,400	2,067	1,897,751		4,670,211	
	1993	0	1,419,880	0	416,900	195,400	11,873	2,039,681		4,083,734	
	1994	0	1,522,880	0	725,900	204,200	11,873	2,285,681		4,750,534	
	1995	0	1,522,880	0	725,900	204,200	11,873	2,285,620	50%	4,750,473	40%
33/50 Program Chemicals	**1991**	**885,780**	**2,014,303**	**0**	**1,627,152**	**668,761**	**27,901**	**2,986,311**		**8,210,208**	
	1992	**495,000**	**3,080,940**	**0**	**1,250,017**	**579,980**	**22,253**	**3,486,701**		**8,914,891**	
	1993	**450,420**	**2,909,301**	**0**	**691,552**	**525,403**	**64,438**	**3,534,816**		**8,175,930**	
	1994	**450,420**	**3,108,981**	**0**	**1,180,355**	**554,623**	**65,325**	**4,012,986**		**9,372,690**	
	1995	**445,220**	**3,004,564**	**0**	**1,177,851**	**554,623**	**63,041**	**3,952,668**	32%	**9,197,967**	12%
Non 33/50 Program Chemicals	1991	2,636,260	1,115,433	10	299,678	3,315,749	1,032,580	2,917,920		11,317,630	
	1992	1,549,940	145,343	0	359,311	2,650,996	869,845	2,490,012		8,065,447	
	1993	1,439,240	3,174,714	0	298,601	3,205,814	947,463	2,968,586		12,034,418	
	1994	1,439,240	3,194,063	0	365,081	3,251,044	1,152,424	3,098,251		12,500,103	
	1995	1,438,900	3,179,493	0	314,771	3,201,298	1,079,517	3,015,623	3%	12,229,602	8%

Appendix C
Chrysler Corporation
Pollution Prevention Act Reporting, 1991-1993 Data and 1994-1995 Projections

Chemical	Year	Recycled On-Site (pounds)	Recycled Off-Site (pounds)	Energy Recovery On-Site (pounds)	Energy Recovery Off-Site (pounds)	Treated On-Site (pounds)	Treated Off-Site (pounds)	Quantity Released (pounds)	Percent Change 1991-1995 Quantity Released	Total Production Related Wastes (pounds)	Percent Change 1991-1995 Production Related Wastes
All TRI Chemicals	1991	3,522,040	3,129,736	10	1,926,830	3,984,510	1,060,481	5,904,231		19,527,838	
	1992	2,044,940	3,226,283	0	1,609,328	3,230,976	892,098	5,976,713		16,980,338	
	1993	1,889,660	6,084,015	0	990,153	3,731,217	1,011,901	6,503,402		20,210,348	
	1994	1,889,660	6,303,044	0	1,545,436	3,805,667	1,217,749	7,111,237		21,872,793	
	1995	1,884,120	6,184,057	0	1,492,622	3,755,921	1,142,558	6,968,291	18%	21,427,569	10%
Percent Changes, 1991-1994											
33/50 Program Chemicals		50%	-49%	--	28%	17%	-126%	-32%		-12%	
Non 33/50 Program Chemicals		45%	-185%	--	-5%	3%	-5%	-3%		-8%	
All TRI Chemicals		47%	-98%	--	23%	6%	-8%	-18%		-10%	

Appendix D
Chrysler Corporation, Selected Facilities
Pollution Prevention Act Reporting, 1991-1993 Data and 1994-1995 Projections

Chemical	Year	Recycled Off-Site (pounds)	Energy Recovery Off-Site (pounds)	Treated On-Site (pounds)	Treated Off-Site (pounds)	Quantity Released (pounds)	Percent Change 1991-1995 Quantity Released	Total Production Related Wastes (pounds)	Percent Change 1991-1995 Production Related Wastes
CHRYSLER CORP. - STERLING HEIGHTS, MI									
Benzene	1991	0	0	0	0	56		56	
	1992	0	0	0	0	110		110	
	1993	0	0	0	0	420		420	
	1994	0	0	0	0	420		420	
	1995	0	0	0	0	420	650%	420	650%
Dichloromethane	1991	7,300	0	0	0	3,900		11,200	
	1992	7,300	0	0	0	3,900		11,200	
	1993	7,300	0	0	0	3,900		11,200	
Methyl ethyl ketone	1991	2,600	2,900	3,700	940	31,000		41,140	
	1992	2,600	2,900	3,700	940	31,000		41,140	
	1993	2,600	2,900	3,700	940	31,000		41,140	
Methyl isobutyl ketone	1991	130,000	8,600	15,000	6	82,000		235,606	
	1992	190,000	1,800	15,000	4	110,000		316,804	
	1993	210,000	34,000	2,400	2	150,000		396,402	
	1994	210,000	34,000	2,400	2	150,000		396,402	
	1995	210,000	34,000	2,400	2	150,000	83%	396,402	68%
Nickel compounds	1991	0	0	0	0	0		0	
	1992	0	0	0	1,700	0		1,700	
	1993	0	0	0	2,000	0		2,000	
	1994	0	0	0	2,000	0		2,000	
	1995	0	0	0	2,000	0	0%	2,000	0%
Toluene	1991	3,400	780	750	260	11,000		16,190	
	1992	0	0	0	0	0		0	
	1993	0	0	0	0	0		0	
	1994	0	0	0	0	0		0	
	1995	0	0	0	0	0	-100%	0	-100%

Appendix D
Chrysler Corporation, Selected Facilities
Pollution Prevention Act Reporting, 1991-1993 Data and 1994-1995 Projections

Chemical	Year	Recycled Off-Site (pounds)	Energy Recovery Off-Site (pounds)	Treated On-Site (pounds)	Treated Off-Site (pounds)	Quantity Released (pounds)	Percent Change 1991-1995 Quantity Released	Total Production Related Wastes (pounds)	Percent Change 1991-1995 Production Related Wastes
Xylene (mixed isomers)	1991	140,000	31,000	30,000	2,500	270,000		473,500	
	1992	320,000	2,700	7,700	20	170,000		500,420	
	1993	240,000	38,000	7,900	6	240,000		525,906	
	1994	240,000	38,000	7,900	6	240,000		525,906	
	1995	240,000	38,000	7,900	6	240,000	-11%	525,906	11%
33/50 Program Chemicals	**1991**	**283,300**	**43,280**	**49,450**	**3,706**	**397,956**		**777,692**	
	1992	**519,900**	**7,400**	**26,400**	**2,664**	**315,010**		**871,374**	
	1993	**459,900**	**74,900**	**14,000**	**2,948**	**425,320**		**977,068**	
	1994	**450,000**	**72,000**	**10,300**	**2,008**	**390,420**		**924,728**	
	1995	**450,000**	**72,000**	**10,300**	**2,008**	**390,420**	**-2%**	**924,728**	**19%**
Non 33/50 Program Chemicals	1991	3,325	1,940	30,500	45,340	32,342		113,447	
	1992	677	989	146,200	27,130	47,599		222,595	
	1993	351	104	298,900	52,295	47,278		398,928	
	1994	351	104	298,900	52,295	47,278		398,928	
	1995	351	104	298,900	52,295	47,278	46%	398,928	252%
All TRI Chemicals	1991	286,625	45,220	79,950	49,046	430,298		891,139	
	1992	520,577	8,389	172,600	29,794	362,609		1,093,969	
	1993	460,251	75,004	312,900	55,243	472,598		1,375,996	
	1994	450,351	72,104	309,200	54,303	437,698		1,323,656	
	1995	450,351	72,104	309,200	54,303	437,698	2%	1,323,656	49%