



# 33/50 Program Company Profiles: Reduction Highlights



## 33/50 PROGRAM COMPANY PROFILES: REDUCTION HIGHLIGHTS

This document summarizes information presented in 33/50 Program Company Profiles, which are a series of brief reports describing the pollution prevention and reduction activities undertaken by companies participating in EPA's 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 October, 1994, a total of approximately 1,250 companies had elected to participate in the Program, pledging to reduce emissions of the 17 target chemicals by more than 355 million pounds by 1995. Companies are encouraged to set their own reduction targets, which may vary from the Program's national 33% and 50% reduction goals. Company commitments and reduction pledges continue to be received by EPA on a daily basis. All company communications to EPA regarding the 33/50 Program are available to the public upon request.

The 1992 TRI data revealed that releases and transfers of 33/50 Program chemicals declined by 40% between 1988 and 1992, surpassing the Program's 1992 interim reduction goals by more than 100 million pounds. This accomplishment, together with evidence from analysis of facilities' projected releases and transfers of the 17 priority chemicals, reported to TRI under the Pollution Prevention Act, offers strong encouragement that the 33/50 Program's ultimate goal of a 50% reduction by 1995 will be achieved.

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 are being prepared to provide more detailed information about companies that have written to EPA describing significant emissions reduction initiatives. Fourteen Company Profiles have been prepared to date. Information presented in these profiles is drawn primarily from the company's written 33/50 Program communications and the annual TRI reports submitted by their facilities (including Pollution Prevention Act data reported to TRI in Section 8 Form R). Copies of the complete profiles of each company highlighted in this document can be obtained by contacting EPA's TSCA Hotline (see box below).

EPA does not endorse the performance, worker safety, or environmental acceptability of any of the technical options discussed in these Profiles. Mention of any product or procedure in this document and the complete Profiles is for informational purposes only, and does not constitute a recommendation of any such product or procedure, either expressly or implied, by EPA.

### 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
- ▶ TRICHLOROETHANE
- ▶ TRICHLOROETHYLENE
- ▶ XYLENES

\* Also referred to as methylene chloride

For information on the 33/50 Program, contact the TSCA Hotline at (202) 554-1404 or contact the 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.

**ACME METALS INCORPORATED**

**Acme Metals Incorporated** manufactures steel strapping tools, is an integrated producer of steel products, and operates coke and steelmaking processes at its 15 facilities located across the United States. Two of these facilities are responsible for nearly all the reported releases and transfers of 33/50 Program chemicals. The reduction efforts which have taken place at its facilities have resulted in a decrease in releases and transfers of 33/50 Program chemicals (benzene, chromium compounds, cyanide compounds, lead compounds, nickel compounds, toluene, and xylene) by 89% from 1988 to 1992. Additionally, Acme reduced releases and transfers of non-33/50 TRI chemicals by nearly 2,600,000 pounds (75%) between 1988 and 1992. Major reduction activities include:

- ▶ Replacement of its contact gas cooling system with a non-contact, wet surface air cooler in the coke byproducts recovery process. The replacement of the cooling system resulted in reductions of releases of approximately 143,000 pounds of benzene, 276,000 pounds of cyanide, 28,000 pounds of toluene, and 6,000 pounds of xylene, as well as 1,450,000 pounds of ammonia, and 10,000 pounds of naphthalene.
- ▶ Installation of emission collector headers to remove volatile chemicals, such as benzene, toluene, and xylene, from the headspaces of process units and storage tanks. This process uses steam moving under negative pressure to sweep the volatile chemicals into the byproduct recovery system. Emission collector headers were installed at the light oil storage tank, the wash oil decanter, and the wash oil circulation tank and resulted in a 14,000 pound reduction in releases of benzene, as well as smaller reductions of toluene and xylene.
- ▶ At the company's Riverdale, IL facility, spent lead dross from the steel strapping production process is now sent to an off-site recycler. Previously, the lead was landfilled. The increased recycling of lead resulted in a reduction of approximately 333,000 pounds of releases and transfers of lead.



**Aladdin Industries Incorporated** is a manufacturer of metal and plastic hardware for consumer and industrial use. Headquartered in Nashville, Tennessee, the company operates eleven facilities in Delaware, Tennessee, and Puerto Rico, one of which reports 33/50 Program chemical releases and transfers. A wide variety of products such as lunch kits, thermos bottles, hospital trays, coffee cups, lamps, and coolers are produced at its facilities. As a result of the reduction activities, Aladdin has reduced its total releases and transfers of 33/50 Program chemicals (chromium, dichloromethane, methyl isobutyl ketone, toluene, 1,1,1-trichloroethane, and trichloroethylene) by 38% from 1988 to 1992. In addition, Aladdin achieved a 99.8% reduction in releases and transfers of non-33/50 TRI chemicals from 1988 to 1992. Major reduction activities include:

- ▶ Elimination of all trichloroethylene. Trichloroethylene was required to remove petroleum oils from metal parts during metal forming processes. Synthetic lubricants are now used in place of petroleum oils and are removed from parts with an aqueous alkaline cleaner. The water from the alkaline cleaning process is treated on-site.
- ▶ Elimination of the dichloromethane use from the facility by replacing the polystyrene used in trays with polypropylene. Previously, the polystyrene trays were cut from a sheet and blemishes around the edges were removed using dichloromethane. Since the polypropylene trays are now injection molded, there are no blemishes to remove.
- ▶ Elimination of the use of toluene and methyl isobutyl ketone by replacing a thinner containing toluene and methyl isobutyl ketone with a thinner containing 25% toluene and 75% 1,1,1-trichloroethane. This thinner was later replaced with a thinner containing acetone in place of the toluene. The company is currently investigating options to eliminate the 1,1,1-trichloroethane from this formulation.

- ▶ Elimination of all releases and transfers of chromium, along with two non-33/50 TRI chemicals — phosphoric acid and sulfuric acid. Using a newly installed on-site waste treatment facility, toxic materials are removed from a water mixture containing chromium, phosphoric acid, and sulfuric acid. Fifty percent of the water is recycled, while the remainder is of sufficient quality to discharge to the sanitary sewer. The sludge is of sufficient quality to be considered nonhazardous and is disposed of in a landfill. Prior to the installation of the on-site treatment facility, all of these wastes were transferred off-site for treatment or disposal.
- ▶ Elimination of the lacquer painting process by switching to a dry powder coating, thereby eliminating the use of lead, xylenes, and ketones. Small quantities (not reportable to TRI) of lead, xylenes, and ketones were previously used in the painting process for thermos bottles.



**Aldan Rubber Company** is a manufacturer of rubber-coated fabrics that are used in a wide variety of applications, including protective clothing for fire fighting, flexible duct connectors, convertible tops, and baby products. Aldan is headquartered and located in Philadelphia, Pennsylvania. The total releases and transfers of 33/50 Program chemicals (methyl ethyl ketone and toluene) has been reduced by 85% from the company's 1988 releases and transfer levels. Major reduction activities include:

- ▶ Expansion of solvent emissions hood. An earlier project undertaken by the company involved the installation of a hood to capture solvent emissions over part of its spreader. The captured solvent was then routed to a recovery unit. Recently, the entire spreader was enclosed so that all solvent emissions are captured and recycled, rather than just those under the partial hood.
- ▶ Renovation of the solvent recovery system. As part of the renovation, the recovery unit received

a complete overhaul, including replacement of the carbon recovery media, cooling coils, and old seals and valves. The company reported the solvent recovery unit's efficiency at 98% - 99% after the renovation, an increase of approximately 20% from the previous efficiency level.

- ▶ Use of an alternative cleaner for machinery clean-up. Traditionally, toluene was used in a hand-wipe application to clean its equipment on a periodic basis. This cleaning removes excess rubber, dirt, and other contaminants from production machinery. To eliminate this use of toluene, a d-limonene cleaner is now used in a similar hand-wipe application, with reduced but satisfactory performance, and somewhat higher but still acceptable cost.
- ▶ Institution of an employee awareness program. Recognizing that a significant quantity of solvent emissions could be eliminated simply by improving the handling of process materials, an employee awareness program, mandatory for all employees who handle solvents, was implemented. During the program, environmental problems associated with the solvent emissions were explained and suggestions made for reducing emissions.
- ▶ Development of a proprietary process by which it is able to reduce solvent emissions from rubber scrap. This process is one in which the scrap is processed to remove excess solvent prior to scrap disposal. The company has found that, not only does the process reduce emissions of solvent to the air, but it also renders the rubber scrap nonhazardous. The scrap can then be disposed of in a municipal landfill.



**Anchor Fence, Inc.** is a manufacturer of high quality chain link fencing systems, gates, and specialty fencing products. The company has three facilities located in Maryland, New York, and Pennsylvania, one of which reports 33/50 Program chemical releases and transfers. The reduction activities implemented by Anchor Fence have resulted in a

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reduction of total releases and transfers of 33/50 Program chemicals (dichloromethane, lead and compounds, methyl ethyl ketone, methyl isobutyl ketone, nickel and compounds, toluene, and xylene) of 98% from 1988 to 1993. Major reduction activities include:

- ▶ Reduction of the releases of methyl ethyl ketone by 93% (113,000 pounds) through substitution of water-based formulations of primers for pipes and fittings. This action accounts for all of the observed decrease in releases of this chemical. In addition, all solvent-based paint applications are being strictly monitored to determine which can be converted to water based products in the future.
- ▶ Improvements in the operation of the company's wastewater treatment system have resulted in a 50% reduction in releases of lead, nickel, and zinc compounds between 1988 and 1992. These improvements consist primarily of adjusting the pH of the system to increase efficiency of metals removal.
- ▶ Elimination of the use of dichloromethane at the plant by shifting the PVC stripping process for off-quality products to an off-site cleaning company that uses a hot salt bath PVC removal process. This change resulted in cost savings for the company.
- ▶ Examination of solvent-based cleaning processes using toluene and methyl ethyl ketone to determine where solvent evaporation can be reduced. The company intends to install a water-cooled component cleaning tank to further reduce releases of the solvents.




**Carpenter Technology Corporation** manufactures stainless steel and other specialty metals for a variety of industries including aerospace, nuclear, and electronics. The company is headquartered in Reading, Pennsylvania and has twenty-eight facilities located throughout the United States, four of which report 33/50 Program chemical releases and transfers. Carpenter Technology has reduced its total releases

and transfers of 33/50 Program chemicals (chromium and compounds, cyanide, nickel and compounds, tetrachloroethylene, 1,1,1-trichloroethane, and trichloroethylene) by 86% from 1988 to 1992. Major reduction activities include:

- ▶ Substitution of mineral spirits (petroleum-based solvents) for trichloroethane for cleaning certain types of metal parts.
- ▶ Elimination of non-cleaning uses of 1,1,1-trichloroethane (e.g., as a lubricant).
- ▶ Improvement of vapor degreaser process control to minimize the amount of solvent needed to clean metal components, and reducing by 50% the number of vapor degreasers used.
- ▶ Improvement of process control to minimize the amount of waste acid generated and eliminate the need for sending acid bath wastes off-site for treatment.
- ▶ Improvement of sludge drying operations and recycling rolling mill sludges, resulting in a 400% increase in the amount of metal oxides that can be recycled that were previously transferred off-site for treatment.
- ▶ Addition of chemical inhibitors to acid bath solutions to reduce the amount of dissolved metals being transferred to the acid waste streams.



**Dexter Shoe Company** is a manufacturer of shoes for men, women, and children. The company is headquartered in Dexter, Maine and has forty-seven facilities in the eastern United States, four of which report 33/50 Program chemical releases and transfers. As a result of the reduction activities undertaken by the company, total releases and transfers of 33/50 Program chemicals (dichloromethane, methyl ethyl ketone, toluene, and 1,1,1-trichloroethane) were reduced by 47% from 1988 to 1992. Major reduction activities include:

- ▶ At the Skowhegan, ME facility, two solvent-based waterproofing agents have been replaced with aqueous-based products. These new products are more expensive than their solvent predecessors, but provide better coverage using less product.
  - ▶ Replacement of methyl ethyl ketone as a cleaning solvent with heptane. Because heptane still poses some risk, however, the company is continuing to investigate other alternatives.
  - ▶ Employment of a solvent recovery for cleaning solvents, such as methyl ethyl ketone and heptane. At the Skowhegan, ME facility, solvent recovery, both for reuse of individual solvents and for generalized recovery of mixed cleaning solvents have been used at the company. Some of the solvent recovery is done within the process for which the chemicals are used and, thus, can be considered source reduction.
  - ▶ At the headquarters facility in Dexter, ME, substitution of solvents and cleaners containing methyl ethyl ketone, methylene chloride, and toluene with water-based products has created reduction of releases and transfers.
  - ▶ Replacement of a filler product containing 40% acetone with a cut insert material bonded to the upper part of the shoe with a hot melt adhesive has been implemented.
  - ▶ The headquarters facility has installed a solvent recovery system for reuse of cleaning solvents.
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- Douglas & Lomason Company** is a manufacturer of automobile and truck components, primarily seat and trim parts. The company is headquartered in Farmington Hills, Michigan and operates twenty-one manufacturing facilities nationwide, of which seven reported releases and transfers of 33/50 Program chemicals. Douglas & Lomason has reduced its total releases and transfers of 33/50 Program chemicals (methyl ethyl ketone, toluene, 1,1,1-trichloroethane, xylene, and chromium/nickel) by 88% from 1988 to 1992 as a result of its reduction activities. Major reduction activities include:
- ▶ Implementation of a new mold-release agent formulation at the Havre-de-Grace, MD, facility. The manufacture of foam seat pads involves applying a wax mold-release agent to a mold to facilitate the removal of the finished molded product. The company's traditional mold-release agent, that contained 1,1,1-trichloroethane as a solvent, was replaced with a water-based formulation. This substitution completely eliminated the use of 1,1,1-trichloroethane, a reduction of 350,000 pounds.
  - ▶ Use of "high-solids" paint formulations. At the Phenix City, AL facility, manufactured metal trim parts are painted. The amount of solvent, such as toluene, xylene, and methyl ethyl ketone, used in these paints was reduced through the use of reformulated "high-solids" paint. "High-solids" paint uses a reduced percentage of solvent in formulating the paint, thereby increasing the percentage of solids.
  - ▶ Use of water-based paint. At several facilities, metal seat frames are manufactured which are painted for rust protection. At the Columbus, NE facility the use of solvents in the paint has been eliminated by using water-reducible paints, in which the solvents (in this case toluene and xylene) are replaced with ethylene glycol. This approach, contributed to reductions of 86,454 pounds of toluene and xylene releases between 1988 and 1992 at the facility.
  - ▶ Elimination of the use of paints. Solvent use has been reduced or eliminated through the implementation of two new processes that eliminate the need to paint certain parts. First, the spray-application of rust inhibitors has eliminated the need for painting, thereby reducing and in some cases eliminating the use of solvents. A second process involves the chemical application of a coating to metal parts using a process that requires no solvents. The Red Oak, IA facility used this process to eliminate releases and transfers of 61,000 pounds of toluene and xylene.

## HADCO

**HADCO Corporation** manufactures custom printed circuit boards and backplanes for use in electronic components. HADCO's reduction efforts allowed the company to reduce releases and transfers of 33/50 Program chemicals (dichloromethane, lead, methyl ethyl ketone, and 1,1,1-trichloroethane) by 95% between 1988 and 1992, reflecting a reduction of almost 2.2 million pounds. HADCO is headquartered in Salem, New Hampshire, and operates ten facilities throughout the United States, of which two report releases and transfers of 33/50 Program chemicals. Major reduction activities include:

- ▶ Implementation of new aqueous-based chemicals in the cleaning and dry film processes at its Derry, NH facility. The dry film process was modified to include carbonate-based developers instead of 1,1,1-trichloroethane, and hydroxide solutions instead of dichloromethane.
- ▶ At its Owego, NY facility, a screen cleaning use of dichloromethane was replaced with an aqueous cleaning solution.

## Johnson & Johnson

**Johnson & Johnson** is the world's largest health care company, with 185 manufacturing locations at home and abroad. The company manufactures toiletries and baby care products, medical supplies, and pharmaceutical products. As a result of the reduction activities undertaken at the six facilities which report releases and transfers of 33/50 Program chemicals, Johnson & Johnson has reduced its total releases and transfers of 33/50 Program chemicals (chloroform, dichloromethane, methyl ethyl ketone, methyl isobutyl ketone, toluene, 1,1,1-trichloroethane, and xylene) by 77% from 1988 to 1992. Major reduction activities include:

- ▶ Elimination of the use of methyl ethyl ketone, methyl isobutyl ketone, and xylene at the Consumer Products plant in North Brunswick, NJ. Vinyl extrusion and the use of a water-based emulsion have been substituted in the Band-

Aid™ Brand adhesive bandages manufacturing process where these chemicals are used, resulting in a decrease of over 380,000 pounds in releases and transfers of these three 33/50 Program solvents between 1988 and 1992.

- ▶ Equipment and procedure changes in several processes at the Noramco facility in Wilmington, DE, resulting in a combined reduction in releases and transfers of dichloromethane and toluene of over 131,000 pounds between 1988 and 1992. These changes by Noramco include: using dichloromethane and toluene as the seal fluid in liquid ring vacuum pumps, instead of water, thereby reducing wastewater transfers; implementing a leak detection and repair program to reduce fugitive emissions; and eliminating one product recovery step, further reducing dichloromethane transfers in wastewater.
- ▶ Material substitution at Ethicon plants in Somerville, NJ and San Angelo, TX, as well as the Advanced Materials facility in Gainesville, GA and the Vistakon plant in Jacksonville, FL, resulting in a decrease of over 66,500 pounds (73%) in releases and transfers of 1,1,1-trichloroethane between 1988 and 1992. A biodegradable cleaner was substituted for 1,1,1-trichloroethane.

## Olin

**Olin Corporation** is a Fortune 200 company, headquartered in Stamford, CT, with 103 facilities nationwide. Twenty-three of its facilities report 33/50 Program releases and transfers. The company manufactures a wide variety of products, including specialty chemicals, metals, and other materials, as well as products for the defense, aerospace, and sporting ammunition industries. The Olin Corporation has reduced its total releases and transfers of 33/50 Program chemicals (including dichloromethane, lead and compounds, 1,1,1-trichloroethane, xylenes, nickel and compounds, mercury, methyl ethyl ketone, and carbon tetrachloride) by 67% from 1988 to 1992 as a result of its reduction activities. Major reduction activities include:

- ▶ Installation of scrubber and process vent collection system. At the Rochester, NY facility over 60 different types of specialty chemicals are produced—relatively low volume products tailored to the specific needs of individual customers. In order to recover carbon tetrachloride from air vents, the plant installed a scrubber and additional process vent collection equipment, and now reuses the reclaimed material in several of the facility's production processes. 1992 air emissions of carbon tetrachloride were reduced to 3,437 pounds at this facility, a reduction of 70%. This facility is also investigating the substitution of carbon tetrachloride and other 33/50 Program chemicals with non-toxic raw materials.
- ▶ Identification of chemical substitution options and modification of degreaser chiller. At the Red Lion, PA facility, 1,1,1-trichloroethane is used as a multi-purpose cleaner and degreaser. A number of steps to reduce the use of this chemical were undertaken including: restricting access and requiring employees to justify their use of the material; identifying material substitution options for products not required to use the chemical (e.g., by military procurement specifications); and modifying the chiller on a solvent degreaser to enhance vapor capture. As a result of these efforts, air emissions of 1,1,1-trichloroethane were reduced to 21,700 pounds in 1992, a reduction of over 80% from 1988 levels. The facility is currently investigating two additional actions to further reduce the use of 1,1,1-trichloroethane: installing a parts washer that will use water-based cleaners instead of chlorinated solvents, or altering the overall production process to completely eliminate the cleaning process.
- ▶ Conversion to water-based soaps. At the Indianapolis, IN facility, air emissions of 37,000 pounds of 1,1,1-trichloroethane and dichloromethane were reported, that were used as degreasers. By 1990, the facility had completely eliminated its use of these two chlorinated solvents by switching to the use of water-based soaps and hot water rinsing in its metal processing and maintenance operations.
- ▶ Recycling of lead waste. The East Alton, IL Main Plant facility used to landfill large quantities of lead wastes (off-site disposal of 815,853 pounds in 1988), primarily from bullets test-fired into sand traps at the Winchester sporting ammunition plant. The facility used to screen as much lead as possible out of the sand for reuse in their own production processes, and landfill the remaining lead-contaminated sand off-site. The facility began selling unscreened material to a battery manufacturer, and more recently began selling it to a lead smelter. The sand/lead mixture is used directly as a recycled raw material in the smelting process. The landfilling of lead wastes has thus been dramatically reduced to 39,673 pounds in 1992, for an overall reduction of 95%.



**Parker Hannifin Corporation** manufactures a broad array of motion control products for industrial and aerospace applications. As a result of Parker's reduction efforts releases and transfers of 33/50 Program chemicals (14 chemicals including dichloromethane, tetrachloroethylene, 1,1,1-trichloroethane, trichloroethylene, methyl ethyl ketone, toluene, xylene, carbon tetrachloride, and methyl isobutyl ketone) decreased by more than 1,350,000 pounds between 1988 and 1992 — a 71% reduction. The company is headquartered in Cleveland, Ohio and operates 143 manufacturing plants worldwide. Fifty-two of Parker Hannifin's facilities report the use of 33/50 Program chemicals. Major reduction activities include:

- ▶ Elimination of 756,000 pounds of releases and transfers of dichloromethane, tetrachloroethylene, 1,1,1-trichloroethane, and trichloroethylene by switching to aqueous cleaning systems for degreasing operations. As a result of the agitation required in the aqueous cleaning process, the racks used to hold parts during cleaning were redesigned to accommodate agitation.
- ▶ Elimination of 453,000 pounds of releases and transfers of methyl ethyl ketone and toluene by substituting water-based solutions for solvent



solutions used to carry cements in the manufacture of rubber hoses. This substitution required the addition of a drying step because of the relatively slow evaporation rate of water.

- ▶ Elimination of 109,000 pounds of releases and transfers of carbon tetrachloride, methyl isobutyl ketone, and xylene by substituting water-based adhesives and paints for solvent-based adhesives and paints.
- ▶ Elimination of 30,000 pounds of releases and transfers of chromium and chromium compounds used in coloring processes that are part of the metal finishing operations. This reduction was achieved through waste minimization techniques such as counter-current rinsing, reduced drag-out rates, and improved quality control.



**Printed Circuit Corporation** manufactures printed circuit boards. As a result of the efforts of this company, total releases and transfers of 33/50 Program chemicals (dichloromethane and 1,1,1-trichloroethane) have been reduced by 100% from its 1988 levels. The company is headquartered and located in Woburn, Massachusetts. Major reduction activities involved a two-step substitution process:

- ▶ Implementation of the use of a water-based cleaner to strip away excess polymer from the etched circuit boards. Further, all solvent cleaning operations were switched to 1,1,1-trichloroethane, resulting in an elimination of the use of dichloromethane. As a result of the process change, the company also was able to minimize its use of methanol, a non-33/50 Program TRI chemical.
- ▶ Replacement of its use of 1,1,1-trichloroethane as a developing agent with a water-based sodium carbonate solution. As a result of the substitution efforts, the company now uses a mild detergent with water for the final cleaning

of completed circuit boards, in place of dichloromethane and 1,1,1-trichloroethane.

## Raytheon

**Raytheon Company** is a diversified organization whose major interests include manufacturing of aircraft, residential and commercial appliances, electronics, and energy/environmental services. As a result of the efforts at its facilities, Raytheon's releases and transfers of 33/50 Program chemicals (11 chemicals including, trichloroethylene, dichloromethane, tetrachloroethylene, 1,1,1-trichloroethane, lead, chromium, toluene, and xylene) decreased over 2.5 million pounds between 1988 and 1992 — a 65% reduction. The company is headquartered in Lexington, Massachusetts and has 323 facilities across the United States. Twenty-five of its facilities report 33/50 Program chemical releases and transfers. Major reduction activities include:

- ▶ Reduction or elimination of ozone depleting substances and suspect carcinogens. Dichloromethane, 1,1,1-trichloroethane, tetrachloroethylene, trichloroethylene, and CFC-113 were all targeted by the company's ozone depleting substances and suspect carcinogen phaseout goals. In 1988, these solvents were used at 18 facilities for electronics cleaning and metal degreasing, and as general solvent cleaners. Terpene-based cleaners and mildly alkaline aqueous solutions were identified as alternatives to these solvent cleaners. As a result of the development of these alternate cleaners, the use of dichloromethane, tetrachloroethylene, and CFC-113, was successfully eliminated and the use of 1,1,1-trichloroethane and trichloroethylene was significantly reduced.
- ▶ Implementation of dry media blasting system. At the Wichita, KS facility, dichloromethane was used to strip paint from aircraft. The company implemented a dry media (wheat starch) blasting system for paint stripping that completely eliminated the need for dichloromethane at this facility.

- ▶ Implementation of powder paint system. Lead, chromium, toluene, and xylene are used in painting and soldering operations. Identification and implementation of a powder paint system in some facilities has resulted in a reduction of releases and transfers of these chemicals. For applications in which powder painting is not technically feasible, the company is working with its coating suppliers to reduce the amount of solvent used in its coatings.
- ▶ Modification of coke quenching process. After the coke is removed from the coke ovens, it must be cooled rapidly. Previously, the Clairton Works used contaminated water to quench the coke. Use of contaminated water, however, resulted in releases of 33/50 Program chemicals such as benzene and toluene. The facility switched to clean quench water 100% of the time, thus eliminating the releases of benzene and toluene from the quenching operations. The contaminated water is currently treated at the facility's wastewater treatment plant where contaminants are removed to permitted levels.



**U.S. Steel Group** is a large, integrated steel manufacturer and also includes several smaller diversified businesses. The company is headquartered in Pittsburgh, Pennsylvania, and operates nine wholly-owned plants located in six states in the middle and eastern United States, six of which report releases and transfers of 33/50 Program chemicals. U.S. Steel Group's reduction activities have resulted in a reduction in releases and transfers of 33/50 Program chemicals (benzene, chromium and compounds, cyanide, lead and compounds, nickel and compounds, toluene, 1,1,1-trichloroethane, and xylene) of 87% from 1988 to 1992. Major reduction activities include:

- ▶ Installation of an inert gas blanketing system at the Gary, IN and Clairton, PA plants. Typically, nitrogen is used to confine air emissions of volatile toxic chemicals such as benzene, cyanide, toluene, and xylene in tanks or containers. By maintaining a layer of inert gas over an open tank or container, toxic chemical vapors are unable to escape from the tank.
- ▶ Implementation of dust pelletizing process. In the Steel making operations, pollution control dusts containing iron units and various metallic compounds are produced. Under normal circumstances, these dusts are landfilled. Because of the recoverable iron units in the dusts, the Edgar Thomson plant in PA, U.S. Steel Mon Valley Operations has implemented a pelletizing operation whereby pellets are recycled back into the steel making operations.