



Federal Facilities Toxic Release and Reduction Initiatives Fact Sheet

Background

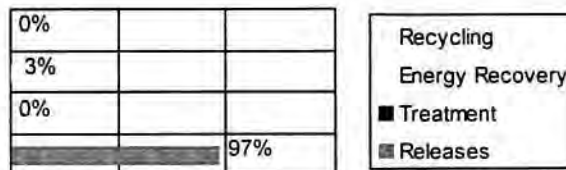
Executive Order 12856, entitled "Federal Compliance with Right-To-Know Laws and Pollution Prevention Requirements", was signed by President Clinton on August 3, 1993. The primary objectives of EO 12856 are to encourage Federal facilities to:

- Develop pollution prevention plans to reduce toxic releases by 50%;
- Collect and report data on the quantity of hazardous materials stored, used, and released at the facility;
- Ensure public access to use and release information.

Federal facilities are required to submit annual TRI reports starting in 1995 for data collected in 1994.

DICHLOROTETRAFLUOROETHANE

1995 Waste Management Distribution



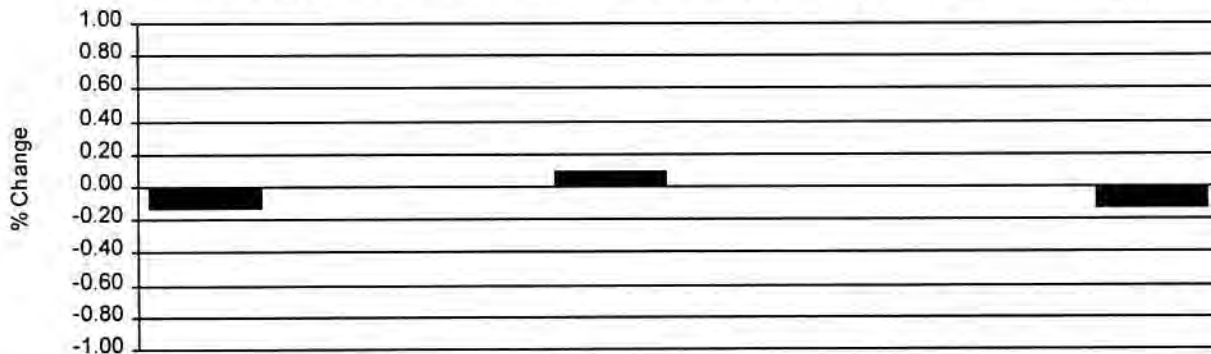
Approach

A study was undertaken to analyze Federal facility TRI data for 1994 and 1995 to: 1) determine the most commonly used and released chemicals; 2) identify currently used pollution prevention (P2) approaches and on-going pollution prevention research and development to lower or substitute the use of a chemical; and 3) identify potential RD/transition needs. As of January 1998, fifteen chemical Fact Sheets have been developed. Please refer to the back page to order Fact Sheets for other chemicals.

This Fact Sheet contains two charts and four main sections:

- The charts represent the waste management distribution and percent change of TRI reported quantities.
- Chemical Profile section.
- Identified and used P2 approaches section.
- On-going P2 research and development section.
- P2 research and development/transition needs section.

TRI Reported Quantities - Percent Change 1994 and 1995



TRI Reporting	Releases	Recycling		Energy Recovery		Treatment		Releases plus Off-site Treatment
		On-Site	Off-Site	On-Site	Off-Site	On-Site	Off-Site	
1994 (lbs)	752,459	0	0	17,999	0	0	0	752,459
1995 (lbs)	649,792	0	0	19,819	0	0	0	649,792
% Change	-14%	0%	0%	10%	0%	0%	0%	-14%

SYNONYMS	R 114	PROPELLANT 114	FLUOROCARBON-114
	F-114	CFC 114	REFRIGERANT 114

COMMON USES IN THE U.S.[#http://mail.odsnet.com/TRIFacts#](http://mail.odsnet.com/TRIFacts#)

- The Federal facilities which reported releases of CFC 114 in the TRI reports for 1994 and 1995 used the chemical as a coolant for centralized refrigeration systems (NASA Lewis Research Center), and to cool propulsion systems in Navy air-breathing engines. Two of the Navy facilities that reported TRI releases will be closing in 1997.
- CFC 114 is one of many ozone depleting substances used as refrigerants. The EPA describes Class II end uses for reciprocating, centrifugal and screw chillers as, "air conditioning systems that perform a critical mission in a high temperature industrial environment..." The Navy is one of the largest users of refrigerant CFC 114 in air-conditioning equipment, with over 959 plants installed onboard 252 surface combatant and submarines. These plants provide chilled water for various cooling applications including weapons systems and are considered mission critical plants (source: Breslin, D.A., Brunner, G.P., and Joseph C. Thill. Navy's CFC and Halon Elimination Program. <http://home.navisoft.com/navyozone/index.html>). CFC 114 is also used as a refrigerant for conducting cold sensitivity studies at dental clinics.

ACUTE HEALTH HAZARDS[#http://mail.odsnet.com/TRIFacts#](http://mail.odsnet.com/TRIFacts#)

- CFC 114 causes asphyxia at extremely high concentrations. Although CFC-114 has not been directly implicated, sniffing aerosols of other fluorinated hydrocarbons has caused sudden death owing to cardiac arrest, probably a result of sensitization of the myocardium to epinephrine. The liquid spilled on the skin may cause frostbite (source: Proctor, Nick H., Hughes, J. P., and Fischman, M.L. "Chemical Hazards of the Workplace". 2nd edition. Van Nostrand Reinhold. 1989).

CHRONIC HEALTH HAZARDS[#http://mail.odsnet.com/TRIFacts#](http://mail.odsnet.com/TRIFacts#)

- CFC 114 caused no effects as determined by clinical, biochemical and histologic examinations when rats and dogs were exposed to high levels for a 90 day test period.

COMMON P2 INITIATIVES[#http://mail.odsnet.com/TRIFacts#](http://mail.odsnet.com/TRIFacts#)

- Refrigerant: NASA Lewis Research Center has investigated the feasibility of replacing CFC-114 with one listed in 40 CFR Parts 9 and 82. One system will be replaced with another containing R-123 this fiscal year.
- Dental Clinics: HFC 134a based product called Green Endo-Ice is a substitute for CFC 114. For more information, contact Lt Col Kane, DDS Dental Investigation Armstrong Laboratory, 210-536-3502.

Additional information regarding chemical hazards and access to Material Safety Data Sheets can be reached through the Agency for Toxic Substances and Disease Registry web page: <http://atsdr1.atsdr.cdc.gov.8080/> - refer to ToxFAQs.

FEDERAL FACILITIES REPORTING**COMMON USES OF: DICHLOROTETRAFLUOROETHANE**

Federal Facilities Reporting in both 1994 and 1995	3	REFRIGERANT
Federal Facilities Reporting Only in 1994	1	
Federal Facilities Reporting Only in 1995	1	

POLLUTION PREVENTION APPROACHES CURRENTLY IN USE**REFRIGERANT**

- The Air Conditioning and Refrigeration Institute (ARI) is a trade association representing equipment and component manufacturers in the U.S. In July 1997, ARI announced the latest release of its refrigerant database. The database contains profiles of 398 refrigerants including blends. The profiles indicate common uses, identifiers, commercialization status, and phaseout dates. They also provide representative physical properties, environmental data, and safety information and classifications. The database includes 80 tabular summaries, which show compatibility test finding for alternative refrigerants and associated lubricants with elastomers and plastics, and 19 detailed toxicity summaries. The database has an extensive bibliography. For more information, contact John Nash at 703-524-8800 (source: <http://www.ari.org/pr>).

POLLUTION PREVENTION APPROACHES CURRENTLY IN USE

REFRIGERANT

- Bath Iron Works, the lead design yard for DDG-51 Flight IIA, recently awarded a contract to York International to manufacture 200-ton HFC 134a centrifugal compressor air conditioning plants for DDG-83 and follow-on ships. This will be the first installation of the Navy's newly developed ozone-friendly AC plant. The new plant replaces the CFC-114 AC plants currently used on DDG-51 class ships. The new design has an improved compressor operating range and efficiency and acoustic performance particularly at part-load conditions and offers other advantages. The new AC unit is being developed at the Carderock Division, Naval Surface Warfare Center (CDNSWC) (source: Navy CFC & Halon Clearinghouse. CFC-Halon News. Spring 1997, December 1996).
- The Navy's Shipboard Environmental Information Clearinghouse lists HCFC-124 and HFC-236a as alternatives to CFC-114. HCFC 124 retrofits may require extensive hardware modifications due to the differences between physical properties of CFC-114 and HCFC-124, especially due to the higher operating pressures of HFC-124. Manufacturers of HCFC substitutes include: SUVA-124 manufactured by DuPont, Forane 124 manufactured by Elf Atochem, and R-124 manufactured by several companies. HFC-236a substitutes include DuPont's SUCA-236fa and 3M's R-236fa. HFC-236fa retrofits may require compressor/impeller replacement due to the differences between physical properties of CFC-114 and HFC-236fa. HFC-236fa is being pursued as the retrofit alternative for the US Navy shipboard CFC-114 chillers. HFC-236fa has a GWP of 6,940 compared to carbon dioxide (CO₂=1). In August 1994, the Navy established a policy that CFC-114 air conditioning plants for Navy submarines will rely on the Navy's mission critical reserve of CFC-114 and will not undergo conversion (source: Breslin, D.A., Brunner, G.P., and Joseph C. Thill. Navy's CFC and Halon Elimination Program. <http://home.navisoft.com/navyozone/index.html>).
- EPA has approved several HCFCs as alternatives for CFC 114 for air conditioning. According to the June 3, 1997 Federal Register Notice (62 CFR 30275), the replacements are: Commercial Refrigeration: ammonia vapor compression, evaporative/desiccant cooling, Stirling Cycle, direct nitrogen expansion, pressure stepdown, CO₂, volatile methyl siloxanes, water, mineral oil; Non-commercial Refrigeration – industrial process refrigeration: (retrofit uses and new uses) HCFC 236fa; propane, propylene, butane, HC blend A, B, chlorine, evaporative/desiccant cooling; CFC-114 Industrial Process AC: (new uses) HCFC-22 only <115F; HCFC 134a only <125F; (retrofit uses and new uses) HCFC 124, R-401A, R-401B, R-401C; and CFC-114 Centrifugal Chillers: (new uses) HCFC-123, HCFC-22, HCFC-227ea, ammonia vapor compression, evaporative cooling, desiccant cooling, ammonia/water absorption, and water/lithium bromide absorption; (retrofit uses and new uses) HCFC-124, HCFC-134a, HCFC 236fa.

ON-GOING POLLUTION PREVENTION RESEARCH AND DEVELOPMENT

REFRIGERANT

Refrigerant Alternatives

UNEP's OzonAction Clearinghouse provides a clearinghouse function to help developing countries phase out their ozone depleting substances. UNEP IE's OzonAction Programme provides industry, government, and other stakeholders with information exchange services, training, and networking of ODS officers. One of these services is the OzonAction newsletter. The newsletter, OzonAction, can be found at <http://www.unepie.org/ozat/oan/oan21/oan21.html>. UNEP IE has several technology guides and other publications concerning ODS replacements including a software program with a database of substitutes. Information on the UNEP IE OzonAction Programme can be found at: <http://www.unepie.org/ozonaction.html>. Countries that signed the Montreal Protocol created a Multilateral Fund which disburses funds to support countries in eliminating ODS. At a November 1996 meeting, the representatives agreed to allocate US\$540 million to eliminate more than 30 000 tonnes of ODS from 1997 - 1999. The Montreal Protocol was renewed in early December 1997.

Refrigerant Alternatives

DOD and private industry continue to search for environmentally acceptable replacements for ozone depleting substances. The Navy's Carderock Division, Naval Surface Warfare Center is developing a HFC-134a replacement for an 800 ton centrifugal compressor AC plant for CVN-76, and a 125 ton screw compressor AC plant for smaller surface ships, and a 1.5 ton rotary vane compressor refrigeration plant for the DDG-79 and follow-on ships (CDNSWC POC: Dick Helmick, 410-293-3348, source: (source: Navy CFC & Halon Clearinghouse. CFC-Halon News. Spring 1997, December 1996).

POLLUTION PREVENTION RESEARCH AND DEVELOPMENT / TRANSITION NEEDS

REFRIGERANT

- It appears as though the use of CFC 114 can be reduced either through current techniques and commercially available products or on-going R&D. No additional R&D seems necessary to resolve the need.

Federal Facilities Which Reported for Both 1994 and 1995

Facility	1994 Release+ Off-site Treatment	1995 Release+ Off-site Treatment	Percent Change
U.S. ENRICHMENT CORP. PADUCAH, PADUCAH, KY	360,000	350,000	-3%
U.S. ENRICHMENT CORP., PIKETON, OH	370,000	290,000	-22%
U.S. DEFENSE LOGISTICS AGENCY, RICHMOND, VA	0	224	100%
NASA LEWIS RESEARCH CENTER, CLEVELAND, OH	15,960	0	-100%
NASA JOHN F. KENNEDY SPACE, KENNEDY SPACE CENTER, FL	6,499	9,568	47%

If you have additional information regarding an identified or used P2 approach, on-going P2 research and development, or any P2 research and development/transition needs, please notify Will Garvey, US EPA, 1200 Pennsylvania Avenue, NW, Ariel Rios Building, 3rd Floor, Washington, DC 20004-2403, or fax (202) 501-0069.