United States Environmental Protection Agency

Office of Enforcement and Compliance Assurance Washington, DC 20460

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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.

FREON 113

1995 Waste Management Distribution

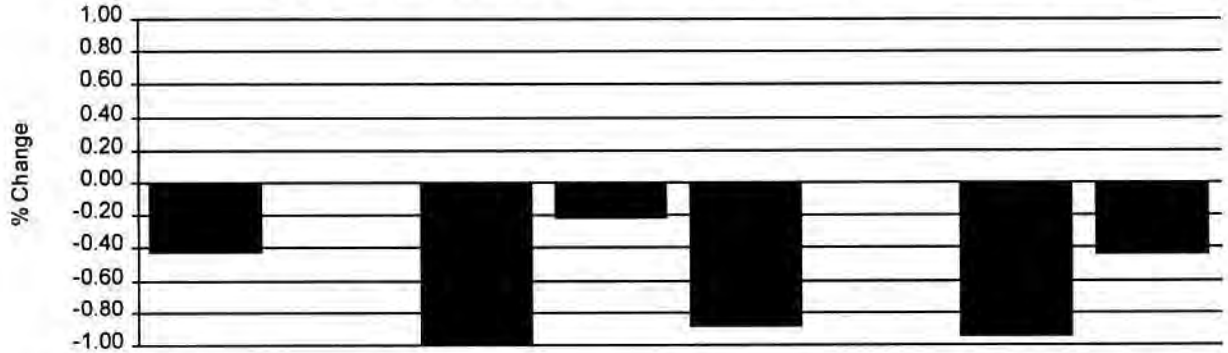
Approach

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)	542,871	0	88	362,583	51,784	0	20,537	563,408
1995 (lbs)	309,835	0	0	281,082	5,820	0	971	310,806
% Change	-43%	0%	-100%	-22%	-89%	0%	-95%	-45%

CHEMICAL PROFILE: FREON 113

CAS #: 76-13-1

SYNONYMS CFC 113 TRICHLOROTRIFLOROETH FREON 113

COMMON USES IN THE U.S.

#http://mail.odsnet.com/TRIFacts/235.html#

- CFC 113 has been used in precision cleaning operations for many years in industries such as semiconductor manufacturing, and fabricated metals. Other industrial applications are dry cleaning, aerosol applications (e.g., conformal coatings, contact cleaners), bearer media for coating and impregnation, vapor soldering, component drying (e.g., for semiconductors and printed circuit boards), riveting and machining, hydraulic system testing, leak testing, laboratory processes, mold release agents, solid rocket motors, and oxygen cleaning systems (Solvents, Coatings and Adhesives Technical Options Committee. 1994 Report of the Solvents, Coatings and Adhesives Technical Options Committee for the 1995 Assessment of the UNEP Montreal Protocol on Substances the Deplete the Ozone Layer. 1994).

ACUTE HEALTH HAZARDS

#http://mail.odsnet.com/TRIFacts/235.html#

- Exposure can irritate the eyes, nose, and throat. Breathing high concentrations of Freon 113 can cause the hear to beat irregularly or stop. Exposure can cause drowsiness and difficulty in concentration.

CHRONIC HEALTH HAZARDS

#http://mail.odsnet.com/TRIFacts/235.html#

- Repeated exposure can cause skin irritation and rash. Freon 113 has not been tested for its ability to cause cancer or reproductive failure.

COMMON P2 INITIATIVES

#http://mail.odsnet.com/TRIFacts/235.html#

- Recycling. Recycle new cleaners to extend life.
- Process efficiency improvements. Use alternative equipment in association with new cleaners.
- Solvent substitutes. Substitute alternative cleaners.

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: FREON 113
Federal Facililties Reporting in both 1994 and 1995	8	PRECISION CLEANING
Federal Facililties Reporting Only in 1994	8	
Federal Facililties Reporting Only in 1995	2	

POLLUTION PREVENTION APPROACHES CURRENTLY IN USE

PRECISION CLEANING

- The U.S. Air Force B-2 Program approved the use of an aqueous cleaning system for interim cleaning of hydraulic and oxygen tubes and the final cleaning of hydraulic tubes as a replacement for Freon 113. The system consists of a Proceco Spray cabinet and three approved aqueous cleaners (Brulin 1990 GD, Rebound 7, and Turco Sprayeze LT). POC: Capt Jason Herman. DSN: 785-9502. Reference: "Weapon System P2 Monitor". January 1997 edition.
- Information on alternatives for CFC-113 and methyl chloroform is available from many sources including a vendor list published by the EPA's Significant New Alternatives Policy Program, Stratospheric Protection Division. The document is available from EPA's Stratospheric Ozone Information Hotline (800) 296-1996. One of the best sites for up-to-the minute information on CFC 113 replacements is the Navy CFC & Halon Clearinghouse which has a web site (http://home.navisoft.com/navyozone) and a quarterly newsletter, CFC-Halon News. Another seminal publication is EPA's "Conservation and Recycling Practices for CFC 113 and Methyl Chloroform" EPA/400/1-91/017. June 1991. The publication discusses conservation practices and strategies specific to batch cleaning, in-line cleaning, and cold cleaning and a section on case studies of industrial practices. An excellent trade journal for information on precision cleaning is, "Precision Cleaning" published by Witter Publishing Corporation. Other valuable sources of information for Freon 113 include the Joint Service Pollution Prevention Data Sheets in the Navy P2 Equipment Book available on the World Wide Web (URL: http://enviro.nfesc.navy.mil/p2library/), and the Defense Logistics Agency Environmental Products catalogue which is available from the Defense General Supply Center, Richmond, VA, and through the World Wide Web (URL: http://es.inel.gov or the Navy site listed above).

POLLUTION PREVENTION APPROACHES CURRENTLY IN USE

PRECISION CLEANING

- Examples of implemented pollution prevention related projects to ODS elimination in general include the following: Advanced Cruise Missile DSO -- US Air Force -- eliminated ODS from all operations
  AGM-130 Systems Program Office -- US Air Force -- eliminated ODS in manufacture of rocket motors
  Titan IV Program Office -- US Air Force -- reduced use of ODS in manufacture of Titan IV launch vehicle
  B-52 Program Office -- US Air Force -- reduced use of ODS on the B-52 airframe by 5400 lbs.
  Direct Reporting Program Manager. Advanced Amphibious Assault Vehicle US Marine Corps. Developed a program for the "ODS-free" Advanced Amphibious Assault Vehicle. This vehicle is one of the first weapon systems acquisitions throughout the DOD that expressly prohibits Class I and Class II ODCs from its design. Peacekeeper Missile -- US Air Force and Draper Laboratory -- eliminated ODS in the manufacture and operation of the Peacekeeper Missile. (source: "Navy Takes Home the Gold at EPA Stratospheric Ozone Protection Awards Dinner: Best of the Best Awards". http://www.navy.seic.com/epaward.htm).
- The Center for Technical Excellence for ODC Solvents, Corpus Christi Army Depot tested and implemented alternative chemicals, processes, and technologies to replace ozone-depleting solvents such as Freon 113 in production, remanufacturing, and repair activities.
- In September, 1996, the Navy's Specification Review Board approved two new specifications, MIL-STD-1330D (Standard Practice for Precision Cleaning and Testing of Shipboard Oxygen, Helium, Helium-Oxygen, Nitrogen, and Hydrogen Systems) and MIL-DTL-24800 (Cleaning Compound, Aqueous Oxygen Systems Components). The new aqueous cleaning process (known as Navy Oxygen Cleaner) detailed in MIL-STD-1330D will eliminate 95% of the CFC 113 oxygen systems cleaning use. The remaining 5% will be replaced by HCFC-141b and or HFE 7100. The Air Force switched from CFC-113 in handwipe applications to Navy Oxygen Cleaner to clean liquid oxygen, gaseous oxygen, and liquid nitrogen components found in aircraft. Further information on the Navy Oxygen Cleaner is available in the September 1995 edition of the Weapon System P2 Monitor.
- A contractor at a Federal facility, Day and Zimmerman, Inc. reported using CFC 113 to clean explosives off the nest of the firing device. The facility is investigating the use of an alternative and is also considering using brush application. The George C. Marshall Space Flight Center uses CFC 113 for cleanliness verification testing for liquid oxygen and other cryogenic systems components, in equipment parts washers, and in general cleaning products. The Center installed a solvent recovery and recycling system in CY 1996 and has switched to alernate organic solvents. Lawrence Livermore National Laboratory reduced its use of CFC 113 as a coolant by implementing a hazardous materials pharmacy and by recycling. The facility is also substituting R134a for R12 when possible. NASA Johnson Space center is developing an aqueous verification method for spacecraft propulsion components. The US Marine Corps is trying to find less hazardous solvent replacements for CFC 113 as a solvent cleaner.

ON-GOING POLLUTION PREVENTION RESEARCH AND DEVELOPMENT

HEAVY-DUTY SOLVENT

Supercritical Carbon Dioxide Optical Sub-system Cleaning:

ARDEC; POC: Mr. Curtis Anderson, 201-724-4287.

Supercritical Carbon Dioxide for Solvent Replacement:

LANL conducted a project to develop improved techniques for cleaning with supercritical carbon dioxide. LANL has a Supercritical Fluids Experimental User facility available for exploratory evaluation and long-term R&D. Los Alamos National Laboratory; POC: Dale Spall, Ken Laintz.

Plasma Dry Cleaning:

LANL conducted a technology demonstration of plasma dry cleaning on sample components and is developing industrial process techniques. Process uses an oxygen, radio-frequency plasma to remove hydrocarbon surface contamination, such as cutting fluids, oils, and greases from components. Resultant by-products are carbon dioxide and water vapor. Reactive ions generated in a plasma bombard the substrate, releasing contaminants. Los Alamos National Laboratory; POC: Harold Davis.

P2 Technology Maturation:

Ultraviolet Light/Ozone Cleaning. Wright Lab, McDonnell Douglas, SAIC; POC: Harvey Lilenfeld (314) 233-2550.

Environmentally Acceptable Cleaning Processes:

U.S. Army, TARDEC; POC: Unknown

Deploy Lactate Esters as Non-toxic, Non-polluting Solvent:

Explore the use of inexpensive lactate esters, such as ethyl lactate, for paint equipment cleaning, and honeycomb structure cleaning prior to bonding. Test recovery process. Conduct economic analysis. NCMS/ORNL; POC: Mr. Jim Frank, 708-252-7693

Continuous Aqueous Cleaning to Eliminate ODC:

RIA; POC: Unknown

ON-GOING POLLUTION PREVENTION RESEARCH AND DEVELOPMENT

HEAVY-DUTY SOLVENT

Aqueous-based Degreasing Technology:

The Army's Soldier Systems Command (SSCOM) will develop nonpolluting, nontoxic water-based degreasers for cleaning metal/ glass/plastic surfaces using biopolymer emulsifying materials. Develop microbially produced natural surfactants (emulsans) through fermentation processes and optimize chemical structure of the new materials for specific oil/grease removal needs. Solve production issues for fermentation and purification of new bioemulsifiers. Relate detergency to chemical structure. Tailor chemical structure of bioemulsifiers for specific degreasing applications. Extramural: modify bioemulsifiers by fermentation feeding strategies. Chemically characterize new emulsifiers. Modify other similar biopolymers with fermentation technique. Optimize bioremediation methods for emulsified oil/grease solutions. NRDEC and AMC-IOC; POC: Dr. Fred Allen 508-233-4266

APMS&E for Aircraft Components:

Field demonstration of laser based facility for component cleaning, coating removal and surface preparation. Wright Lab; POC: Robert Hall, WL/MLPJ, DSN 785-2334.

APEDOM for a Supercritical Fluid Cleaner for Avionics and Mechanical Components:

Alternative Process Design and Operation Manual for a supercritical fluid cleaner with an internal chamber sized to accommodate both avionics and mechanical components. Air Force Research Laboratory; POC: Phil Mykytiuk, WL/MLSE, DSN 785-3953, (513) 255-3953.

PRECISION CLEANING

SEMATECH R&D

The leading trade associations for the semiconductor and electronics industries (i.e., SEMATECH, Semiconductor Industry Association) are supporting R&D projects for finding acceptable substitutes for CFC cleaners.

Electronics Manufacturing Productivity Facility R&D Projects

The Electronics Manufacturing Productivity Facility (EMPF) has a web site (http://www.empf.org) with a technical database of on-going and recently completed R&D projects. The database contains eighteen projects related to testing and evaluating alternatives for CFC usage for electronics manufacturing.

Navy Strategic Systems Programs Fire Control and Guidance Branch.

The US Navy Strategic Systems Programs Office is responsible for the design, development, production, and maintenance of the Trident weapon system. Navy initiated a program to eliminate the use of CFC-113 and methyl chloroform. Draper Laboratory, the design agent for the guidance system, is working with Navy contractors to eliminate CFC-113 from the Trident program.

POLLUTION PREVENTION RESEARCH AND DEVELOPMENT / TRANSITION NEEDS

PRECISION CLEANING

- On-going R&D and existing commercial off the shelf technology solutions are adequately addressing the pollution prevention needs for this use.

Federal Facilities Which Reported for Both 1994 and 1995

Facility	1994 Release+ Off-site Treatment	1995 Release+ Off-site Treatment	Percent Change
U.S. AIR FORCE VANDENBERG AFB, VANDENBERG A F B, CA	0	8,510	100%
NASA AMES RESEARCH CENTER, MOFFETT FIELD, CA	1,300	305	-77%
NASA JOHN F. KENNEDY SPACE, KENNEDY SPACE CENTER, FL	214,797	190,291	-11%
NASA JOHNSON SPACE CENTER, LAS CRUCES, NM	0	8,600	100%
NASA LYNDON B. JOHNSON, HOUSTON, TX	16,000	17,000	6%
U.S. AIR FORCE, TINKER AFB, OK	15,021	0	-100%
U.S. AIR FORCE CAPE CANAVERAL, CAPE CANAVERAL, FL	0	26,000	100%
NASA, HUNTSVILLE, AL	41,000	18,000	-56%
U.S. AIR FORCE PLANT 44 AZ, TUCSON, AZ	70,400	0	-100%
U.S. NAVY PUGET SOUND, BREMERTON, WA	12,820	0	-100%
U.S. ARMY LONE STAR ARMY, TEXARKANA, TX	10,000	0	-100%
U.S. DOE LAWRENCE LIVERMORE, LIVERMORE, CA	2,630	3,800	44%
U.S. MARINE CORPS, CHERRY POINT, NC	28,000	27,000	-4%
U.S. MARINE CORPS CAMP LEJEUNE, CAMP LEJEUNE, NC	7,395	0	-100%
U.S. NAVY, JACKSONVILLE, FL	12,000	11,300	-6%
U.S. NAVY, PORTSMOUTH, VA	16,600	0	-100%

Federal Facilities Which Reported for Both 1994 and 1995

Facility	1994 Release+ Off-site Treatment	1995 Release+ Off-site Treatment	Percent Change
U.S. NAVY NAVAL AIR STATION, ALAMEDA, CA	34,500	0	-100%
U.S. AIR FORCE NEWARK AFB, HEATH, OH	80,945	0	-100%

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.