



Federal Facilities Toxic Release and Reduction Initiatives Fact Sheet

METHANOL

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.

1995 Waste Management Distribution



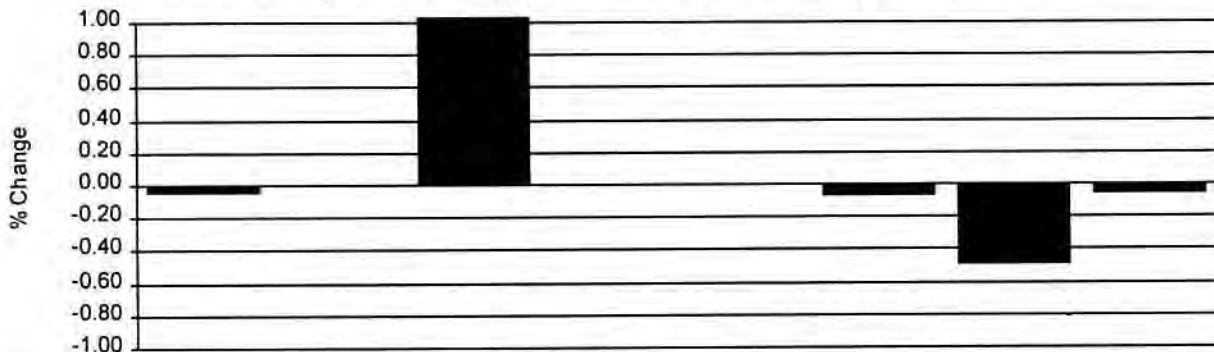
Approach

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)	402,954	0	1,597	400	0	124,409	4,626	407,580
1995 (lbs)	381,454	0	4,200	400	0	114,830	2,369	383,823
% Change	-5%	0%	163%	0%	0%	-8%	-49%	-6%

SYNONYMS

WOOD ALCOHOL

WOOD SPIRIT

CARBINOL

COMMON USES IN THE U.S.

www.epa.gov/ttn/uatw#http://www.epa.gov/ttn/uatw#

- Red River Army Depot used denatured alcohol (5% methanol) in maintaining the Chapparel Missile in 1994. Over 90% of Red River's consumption of methanol is attributed to missile maintenance. The missile is no longer maintained at Red River so the facility expects the use of methanol to drop below the reporting threshold in the future (source: Red River Army Depot Pollution Prevention Plan, 1995). Pine Bluff Arsenal reported using methanol in 1994 but none in 1995 which may indicate that it was used for a one-time special production run. Sunflower Ammunition Plant's methanol usage dropped by 89% from 1994 to 1995. The facility is on the inactive list so the use in 1994 may also have been the result of a one-time batch operation.
- The second largest reported user of methanol is DOE's Oak Ridge Y-12 plant (10% of the 1994 total TRI release). The plant's primary mission is manufacturing and reworking nuclear weapon components, and dismantling weapon components returned from the national stockpile. Examples of some of the operations include: precision fabrication services, laboratory operations, and weapons disassembly. Methanol may be used as a cleaner in precision fabrication and laboratory operations.
- Federal facilities reported using methanol for a variety of applications including: natural gas processing, in water treatment, as a microbial feed, electrical parts cleaning, as an emulsion breaker, and lab testing. The largest single consumer of methanol is the DOE Naval Petroleum facility in Tupman, CA (78% of the 1994 total TRI releases). Naval Petroleum Reserve Number 1 is a major oil and gas producing field with a daily output of 74,000 barrels of oil and 330 million cubic feet of gas (1991). Methanol is used in the production of natural gas as a solvent in the continuous acid gas removal process. Acid gas constituents such as hydrogen sulfide are removed from natural gas to prevent corrosion. Methanol is one of several physical solvents used to absorb carbon dioxide and hydrogen sulfide. Physical solvents are typically regenerated on-site by flashing.
- Methanol is also used as an antifreeze for automotive radiators, an ingredient of gasoline (as an antifreezing agent and octane booster), a gasoline substitute, and as fuel for picnic stoves. Methanol is also an ingredient in paint and varnish removers as well as denatured alcohol.
- Methanol is primarily used in the US in the production of methyl-t-butyl ether, a gasoline additive. Methanol is also used in the production of chemicals such as formaldehyde, acetic acid, chloromethanes, and methyl methacrylate. Other applications are: as an industrial solvent for inks, resins, adhesives, and dyes, and in the manufacture of pharmaceuticals.

ACUTE HEALTH HAZARDS

www.epa.gov/ttn/uatw#http://www.epa.gov/ttn/uatw#

- Contact of skin with methanol can produce mild dermatitis.
- Acute exposure of humans to methanol by inhalation or ingestion may result in visual disturbances, such as blurred or dimness of vision, leading to blindness. Methanol can be acutely toxic if ingested. Neurological damage, specifically permanent motor dysfunction, may also result. Coma or death due to respiratory failure may occur in individuals exposed to high doses of methanol.

CHRONIC HEALTH HAZARDS

www.epa.gov/ttn/uatw#http://www.epa.gov/ttn/uatw#

- No information is available on the carcinogenic effects of methanol in humans or animals. EPA has not classified methanol with respect to carcinogenicity.
- Chronic inhalation or oral exposure to methanol may result in conjunctivitis, headache, giddiness, insomnia, gastric disturbances, visual disturbances, and blindness in humans.

COMMON P2 INITIATIVES

www.epa.gov/ttn/uatw#http://www.epa.gov/ttn/uatw#

- Process efficiency improvements. In addition to alternative cleaners, a wide range of new precision cleaning technologies are on the market.
- Cleaning
Material substitution. Depending on the nature of the part being cleaned and the contaminant being removed, substitutes for methanol (denatured alcohol) as a cleaner may be available.
- Natural gas production
Material substitution. There are alternatives to the use of methanol in continuous acid gas removal processes.

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: METHANOL

Federal Facilities Reporting in both 1994 and 1995	11	HAND-WIPE SOLVENT	NATURAL GAS PRODUCTION
Federal Facilities Reporting Only in 1994	3	POWER PRODUCTION	PRECISION CLEANING
Federal Facilities Reporting Only in 1995	0		

POLLUTION PREVENTION APPROACHES CURRENTLY IN USE

HAND-WIPE SOLVENT

- No implemented P2 projects were identified.

NATURAL GAS PRODUCTION

- Alternatives to the use of methanol in continuous acid gas removal processes include chemical absorbants (e.g., aqueous solutions of organic amines such as monoethanolamine, diethanolamine, iron sponge batch process, and adsorption systems using molecular sieves for feed gases having low acid gas concentrations. Amine and batch processes account for over 90% of the wellhead applications (source: Kirk-Othmer. Encyclopedia of Chemical Technology, 4th edition. John Wiley & Sons, 1995.)

PRECISION CLEANING

- Examples of precision cleaning alternatives for methanol are contained in the following list:
 - Ultrasonic Cleaning
 - Plasma Cleaning
 - Carbon Dioxide Snow
 - Supercritical Fluid
 - Dry Steam
 - Semi-Aqueous Cleaners
 - Media Blast Systems
 - Thermal Cleaning
 - Ultraviolet/Ozone Systems
 - Laser Cleaning Systems

ON-GOING POLLUTION PREVENTION RESEARCH AND DEVELOPMENT

HAND-WIPE SOLVENT

Solvent Substitution for Fuel Tank Cleaning:

Using isopropyl alcohol (IPA) as a temporary substitute for the cleaning compound (NSN 6850-00-611-7993) that contains MEK for spot cleaning fuel tanks. The B-52 program office is working with Morton Aerospace to test a substitute sealant (MC-250) that could be removed with a substitute cleaner that does not contain HAPS. USAF, B-52 Program Office; POC: Unknown.

Surface/Solvent Diagnostics for Metal Cleaning Operations:

Army Research Laboratory; POC: Unknown

Substitute Wipe Solvent:

Testing DS-108 as a substitute wipe solvent. DS-108 Solvent was developed and patented by General Dynamics, Fort Worth Division (now Lockheed-Martin Tactical Aircraft Systems) for use in the F-16 program. DS-108 has been qualified to meet a variety of OEM and military specifications and received toxicity clearance from the Surgeon General, Department of the Army. USAF, OC-ALC; POC: Unknown.

Substitute Hand-Wipe Solvents:

Tested 30 commercially available hand-wipe cleaners. Of the 30 cleaners, only four passed all screening tests: SD 1291 (Brulin Corporation); CitraSafe (Inland Technology); Super 140 (LPS Industries); and De-Solv-It E&E (Orange-Sol, Inc.). USAF, Warner Robins ALC (WR-ALC/TI); POC: Unknown.

Substitute Hand-Wipe Solvents:

Evaluated 24 cleaners. Testing three potential substitutes for MEK: ISO-BLAST, MD-516F, and Androx 5564. USAF, F-15 Program Office, Wright Patterson AFB; POC: Unknown.

Substitute for Hand-Wipe Solvents:

Conducted extensive testing on commercially available, environmentally-friendly hand-wipe solvents for use on the B-2 program at the Air Force Plant 42 Palmdale site. Selected two solvents for implementation in manufacturing operations, Dynamold DS-108 and DS-108CA. Northrop Grumman; POC: Unknown.

Solvent Substitution/Low VOC Cleaners:

Navy-Patuxant; POC: Unknown

ON-GOING POLLUTION PREVENTION RESEARCH AND DEVELOPMENT

HAND-WIPE SOLVENT

Non-toxic Small/Medium Caliber Automatic Weapons Cleaning Process:

ARDEC; POC: Unknown

Alternatives for General Aircraft Maintenance:

CCAD; POC: Unknown

NATURAL GAS PRODUCTION

Lawrence Livermore National Lab

Lawrence Livermore National Lab is researching the development of new catalysts that partially oxidize methane to methanol. The future of natural gas processing depends on the development of catalyzed routes directly converting methane to higher valued products (olefins and alcohols). This basic research project will help recover remote natural gas resources (source: DOE's R&D web page database <http://www.doe.gov/md/data>).

POWER PRODUCTION

Development of new catalysts

Lawrence Livermore National Lab is researching the development of new catalysts that partially oxidize methane to methanol. The future of natural gas processing depends on the development of catalyzed routes directly converting methane to higher valued products (olefins and alcohols). This basic research project will help recover remote natural gas resources (source: DOE's R&D web page database <http://www.doe.gov/md/data>).

PRECISION CLEANING

No research projects were identified.

POLLUTION PREVENTION RESEARCH AND DEVELOPMENT / TRANSITION NEEDS

HAND-WIPE SOLVENT

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

NATURAL GAS PRODUCTION

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

POWER PRODUCTION

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

PRECISION CLEANING

- 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. NAVY ROOSEVELT ROADS, CEIBA, PR	5,100	4,900	-4%
U.S. ENRICHMENT CORP., PIKETON, OH	1,600	1,600	0%
U.S. DOE OAK RIDGE Y-12 PLANT, OAK RIDGE, TN	39,000	35,000	-10%
U.S. DOE OAK RIDGE K-25 SITE, OAK RIDGE, TN	7	14	100%
U.S. DOE NAVAL PETROLEUM, TUPMAN, CA	313,016	321,807	3%
U.S. DOE NAVAL PETROLEUM, CASPER, WY	67	0	-100%
U.S. DOE FERNALD ENVIRONMENTAL, FERNALD, OH	1,700	3,400	100%
U.S. DOE, UPTON, NY	1,860	1,860	0%
U.S. DOE, OAK RIDGE, TN	367	261	-29%
U.S. ARMY SUNFLOWER AMMUNITION, DE SOTO, KS	10,745	1,130	-89%
U.S. ARMY RED RIVER ARMY DEPOT, TEXARKANA, TX	12,000	0	-100%
U.S. ARMY PINE BLUFF ARSENAL, PINE BLUFF, AR	18,192	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. ARMY GARRISON, FORT GEORGE G MEADE, MD	0	0	0%
U.S. ARMY FORT HOOD, FORT HOOD, TX	926	12,000	1196%
U.S. ARMY FORT CAMPBELL, FORT CAMPBELL, KY	3,000	1,851	-38%

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.