



What Else Do You Need to Know

Chemicals of Concern
Upgrading Equipment
Cleaner Solutions



Cautionary Note

- Toxics Use Reduction Program cautions companies that certain alternatives to TCE also present significant hazards to human health and/or the environment
 - perchloroethylene (perc)
 - n-propyl bromide (nPB)
- *Trans*-1,2-dichloroethylene is one such alternative

trans-DCE

- Recognized as a potentially effective alternative
 - Either alone or in solvent blends
- Listed on the TURA list of toxic or hazardous substances
 - Reportable if more than 10,000 lbs are 'otherwise used' in one calendar year.
- **Not considered a preferable alternative to TCE, perc, nPB or other hazardous solvents**

trans- DCE

- **CAS 156-60-5**
- **Synonyms:**
 - trans DCE
 - trans-1,2-dichloroethene
 - 1,2-DCE

Physical Characteristics of Concern

- High vapor pressure
 - 336 mm Hg @ 25° C
- Low boiling point
 - 48.5° C
- Flammable liquid
 - Flash point 2° C
- Regulated as a VOC

Human Toxicity

- Lower human toxicity than some other halogenated solvents
- Is an immune system toxicant and a neurotoxin
- Acute exposure can cause central nervous system depression
- Chronic exposure can cause liver, circulatory, immune system and central nervous system damage

How it is Used

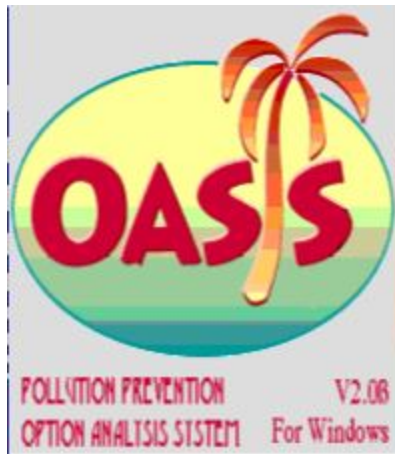
- Often used in blends with fluoroalkanes and/or hydrofluoroethers (HFE)
 - Fluosolv™ CX
 - Vertrel™ SDG
 - Opteon™ Sion
- Why?
 - Expands the range of cleaning power of HFEs
 - HFEs lower the flammability of the mixture
 - HFEs have lower human toxicity than *trans*-DCE
 - HFEs not flammable
 - But do contribute to global warming
 - Are more expensive than many solvents

Finding Safer Drop-In Substitutes

- Challenging process
- Don't have to do it alone
 - Toxics Use Reduction Institute (TURI) Lab
 - Massachusetts Office of Technical Assistance and Technology (OTA)
- Both are available to work with your company to investigate safer alternatives and processes for your specific needs

P2OASys Upgrade

- Out with the old
- In with the new



Pollution Prevention Option Analysis System

- Or should we change to:
 - Pollution Prevention Options Assessment System
- Tool allows the user to compare the technology alternatives and the current technology against each other
 - Computes a weighted average of all the scores of each category

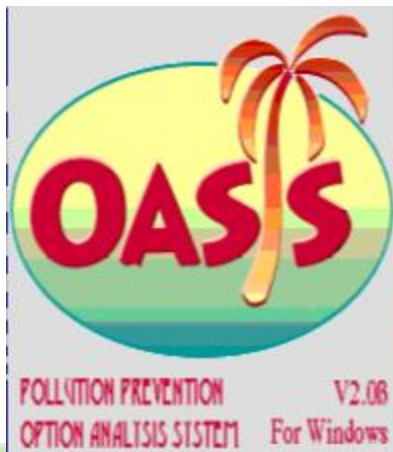
Goal of Upgrade

- To reevaluate sections, categories and data points
 - Compare to Global Harmonized System, Green Screen
 - Eliminate L, M, H input options
- To improve user interface
 - Eliminate the Excel 95 download
 - Create online user interface

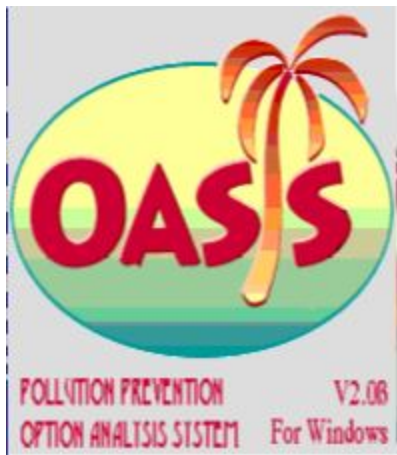
Original Tool => New Tool

Acute human effects
Chronic human effects
Physical hazards
Aquatic hazard
Persistence/bioaccumulation
Atmospheric hazard
Disposal hazard
Chemical hazard
Energy/resource use
Product hazard
Exposure potential

Acute human effects
Chronic human effects
Ecological hazards
Environmental fate & transport
Atmospheric hazard
Chemical hazard
Process Factors
Life cycle factors



Original: Mix of Values and Expert Judgment



Acute human effects	Atmospheric hazard
Inhalation LC50	greenhouse gas
PEL/TLV	ozone depletor
PEL/TLV (dusts/particles)	acid rain formation
IDLH	NESHAP
Respiratory irritation	Disposal hazard
Oral LD50	landfill
dermal irritation	EPCRA reportable quantity
skin absorption	incineration
dermal LD50	recycling
ocular irritation	Chemical hazard
Chronic human effects	vapor pressure
Reference Dose RfD	solubility in water
carcinogen	specific gravity
mutagen	flammability
reproductive effects	flash point
neurotoxicity	reactivity
developmental effects	pH
respiratory sensitivity/ disease	corrosivity
other chronic organ effects	High pressure system
Physical hazards	High temperature system
heat	mixture/reaction potential
noise generation	odor threshold
vibration	volatile organic compound
ergonomic hazard	Energy & resource use
psychosocial hazard	non renewable resource
Aquatic hazards	water use
Water Quality Criteria (HWQC)	energy use
aquatic LC50	Product hazard
fish NOAEC	upstream effects
plant EC 50	consumer hazard
observed ecological effects	disposal hazard
Persistence/bioaccumulation	Exposure potential
persistence	Exposure potential
BOD half-life	
hydrolysis half-life	
bioconcentration	
bioconcentration factor (BCF)	

New: Values, GHS Categories, Signal Words

Acute human effects	Atmospheric hazard
Inhalation LC50	greenhouse gas
Oral LD50	ozone depletor
Dermal LD50	acid rain formation
Respiratory irritation	NESHAP
Dermal irritation	Chemical hazard
Eye irritation	vapor pressure
PEL/TLV	flammability: liquid
PEL/TLV (dusts/particles)	flash point: liquid
IDLH	flammability: gas
Health	reactivity
Chronic human effects	pH
carcinogen	corrosivity
Mutagen/ Teratogen	odor threshold
reproductive/ developmental	volatile organic compound
neurotoxicity	Process Factors
respiratory sensitivity/ disease	heat
endocrine system effects	noise generation
other chronic organ effects	vibration
Ecological hazards	ergonomic hazard
Acute aquatic LC50	psychosocial hazard
Acute plant EC 50	high pressure system
Acute EC50 (algal or other aquatic plants)	high temperature system
Acute EC50 algae	water use
Chronic Aquatic NOEC (fish)	energy use
NOEC or ECx (fish, crustacea or algae) - non-rapidly degradable substances for which there are adequate chronic toxicity data	exposure potential
NOEC or ECx (fish, crustacea or algae) - rapidly degradable substances for which there are adequate chronic toxicity data	Life cycle factors
NOEC or ECx (fish, crustacea or algae) - substances not rapidly degradable and/or the experimentally determined BCF \geq 500 (or, if no BCF, log Kow \geq 4)	upstream effects
Environmental fate & transport	consumer hazard
persistence	disposal hazard (landfill, incineration)
bioconcentration	EPCRA reportable quantity
bioconcentration factor (BCF)	recycling
Rapid Degradability	renewable to non renewable resource



What's Next

- Compiling new criteria into working tool
- Piloting tool to determine successful assessment process
 - Compare to past P2OASys assessments
 - Compare with Green Screen assessments
- Complete on-line user interface
- Promote the crap out of it
- Complete world domination of Alternatives Assessment

CleanerSolutions web site

- www.cleansolutions.org
 - Testing results and report on projects

CleanerSolutions Database

Toxics Use Reduction Institute · Surface Solutions Laboratory



CleanerSolutions Home

- [About CleanerSolutions](#)
- [Database Demos](#)
- [TURI Laboratory Home](#)
- [Contact the Lab](#)

Laboratory Clients and Test

- [Find a Cleaner](#)
- [Replace a Solvent](#)
- [Safety Screening Search](#)
- [Browse Clients and Trials](#)

Vendor Supplied Information

- [Vendor Search](#)
- [Browse Vendors and Products](#)

Forms

- [Vendor Forms](#)
- [Client Forms](#)

A Simple Solution for Solvent Substitution for Surface Cleaning

More about the CleanerSolutions On-Line Tool

TURI Laboratory Client and Test Results

Search information generated from testing conducted at TURI's Laboratory. Results are linked to client testing information to help you select an alternative that will match your needs.

[Find a Cleaner](#)

Identify alternatives that have cleaned your contaminant.

[Replace a Solvent](#)

Find alternatives to your current solvent cleaner.

[Safety Screening Search](#)

Find products based on safety and environmental criteria.

[Browse Clients and Trials](#)

Look through past lab clients by industry.

Forms

[Vendor Forms](#)

Forms for submitting product information to the lab.

[Client Test Request Form](#)

Forms to arrange for testing for your company.

Vendor Supplied Information

Search vendor-supplied information for an alternative cleaner. Testing performed by TURI for listed products also are displayed.

[Search Vendor Information](#)

Search for products based on vendor recommended uses.

[Browse Vendors and Products](#)

Find vendors by name.

NEW! Material Safety Data Sheets and Technical Data Sheets for most products are now available on each Product Information page.



Search Results

Required Field
You must select one or more contaminants.

Optional Fields
Filter your search by substrate or equipment type, or leave these fields set to *Any* to include all results for a given contaminant.

Contaminant

- Fluxes
- Graphite
- Greases
- Hucker's Soil
- Inks
- Latex binder
- Lubricating/Lapping Oil
- Metal fines
- Mold Releases
- None
- Oil
- Oxides
- Paints

Substrate

- Copper
- Electronics
- Fiberglass
- Glass/Quartz
- Gold
- Liquid
- Marble
- Nickel
- Other
- Plastic
- Stainless Steel
- Steel

Equipment

- Any
- High Pressure Spray
- Immersion/Soak
- Low Pressure Spray
- Manual Wipe
- Mechanical Agitation
- Media Blasting
- Plasma
- Supercritical Extraction
- Ultrasonics
- Vapor Degreasing

Current Search Information

Search Criteria
Contaminant: Greases, Lubricating/Lapping Oils, Oil
Substrate: Nickel, Stainless Steel
Equipment: Immersion/Soak, Ultrasonics

Results
Found 2900 records
Showing records 1 - 50

Help
[Search Results Field Definitions](#)
[Contact the lab](#)

Showing records 1 - 50 of 2900 | [Field Definitions](#)

Company Name	Product Name	Safety Score	Classification	Contaminant	Substrate	Equipment	Client #	Project #	Effective
Mirachem Corporation	Mirachem 500 [compare]	42	Alkaline Aqueous	Oil	Stainless Steel	Immersion/Soak	261	1 2	N
Mirachem Corporation	Mirachem 500 [compare]	42	Alkaline Aqueous	Lubricating/Lapping Oils	Stainless Steel	Immersion/Soak	261	1 2	N
US Polychem					Stainless Steel	Immersion/Soak	261	1 1	N
					Stainless Steel	Immersion/Soak	261	1 1	Y
					Stainless Steel	Immersion/Soak	261	1 1	Y

Trial Number 5 (Client Number 272, Project Number 1)

Trial Purpose: To evaluate selected cleaners using spray cleaning.

Date Run: 10/31/06

Experiment Procedure:

Two cleaning products were diluted to 10% using hot tap water (120 F) in 1000 ml beakers. Supplied parts that were received already contaminated were cleaned in the solution for less than one minute. Two types of parts were cleaned. Following cleaning in the low pressure spray system parts were rinsed for 15 seconds in a tap water bath at 120 F and dried using dry compressed air at room temperature. Parts were analyzed visually. Cleaned parts were packaged and sent to the client. Following the cleaning at 10%, the product would be diluted to a lower concentration to reduce foaming if necessary.

Trial Results

Both parts subjected to the low pressure spray had a significant amount of buffing compound removed within the 1 minute of cleaning. The Polyspray Jet 790 XS at 10% had less foaming than the Detergent 8. During cleaning, the spray flow was directed into the 1000 ml beaker (filled within 0.5 inches of the top of the beaker with cleaning product). There was some bubbling of the solution but not enough to have any overflow of the beaker. There was no overflow even after 5 minutes of continual spray into the beaker.

Success Rating

Results suggest a scale-up feasible match for cleaning chemistry and equipment. Pilot plant study with actual parts recommended.

Conclusion

Parts did not have to be completely clean to be considered successful as the spray washing was an attempt to remove excess buffing compound prior to cleaning with ultrasonic energy. The 10% solutions of Detergent 8 and Polyspray Jet 790 XS had no foaming issues and removed about half of the buffing compound with minimal spray time and pressure.

Foaming levels are shown in the attached photographs.

When You Have Tried Everything...

- And still no luck?
 - Address process changes beyond just current cleaning method
 - Clean earlier
 - Replace manufacturing soils
 - Request supplier to clean materials prior to shipping
 - Use HSPiP to find new options
- Such projects are more challenging and take more help
 - OTA, TURI, Vendors, Clients

CONTACT INFORMATION

Company Representative: _____ Title: _____
Company Name: _____ Tel.: _____
Address (Street): _____ FAX: _____
City/Town: _____ State: _____ Zip: _____
Email: _____ Web site: _____

How did you hear about this state service? Conference/Meeting; Consultant; DEP; EPA; Internet/Website;
 Journal/Article; OTA; Student; TURI; Within Company; Town Official; Used lab before; Vendor
 Other: _____ Specific Person: _____

What is the objective of this test? _____

PROCESS DESCRIPTIONS

What is the purpose of cleaning (i.e., desired product specifications)? _____

What are the problems with present cleaning system? _____

DESCRIBE THE PART/PRODUCT TO BE CLEANED

What is this part/product used for? _____

Select material(s) of construction: Aluminum Brass Ceramic/marble Copper Electronics Glass Nickel Stainless-Steel
 Steel Plastic Alloys
 Other: _____

Specify specific types: _____

List percentages cleaned: _____ (i.e., 60% A1, 40% 304 stainless steel)

Surface type: Rough or Smooth ---- Hard or Soft

Geometry: Simple (e.g., flat) OR Complex (contains inaccessible areas)

Approx. size: Small Medium Large (dimensions in inches): _____

Weight: < 1/2lb, <1lb, < 5lb, < 10lb, < 50lb, >50lb weight: Min. _____ Max. _____

DESCRIBE THE CURRENT CLEANING PROCESS

Contaminants to remove: Oil Machining-Fluid Lubricant Grease Buffing Adhesive Resins Flux Ink Paint Wax
 Coating Dirt
 Other: _____

Are samples of contaminants available? No Yes (if available, attach MSDS)

Manufacturer	Product	Amount Used per year (month or week)

Manufacturing step immediately before cleaning: _____

Manufacturing step immediately after cleaning: _____

parts cleaned per week (or shift, etc.): _____ per batch: _____

Equipment available for use (check all that apply):

Vapor-Degreaser Mechanical-Agitation Air-Sparging Immersion/Soak/Dip Ultrasonic Manual

Spray-Washer [High or Low ___psi]

Other: _____

Specify vendor, if possible: _____

Cleaning chemicals currently being used:

Manufacturer	Product	Conc.	Vol. used in equipment	Amount Used per year (month or week)	Time	Temp

Rinse Cycle, if any: Time: _____ min. Temp: _____ deg. F Water source: DI (deionized) OR Tap

Drying Cycle, if any: Method: _____

Time: _____ min. Temp: _____ deg. F

After cleaning, parts are: Used Immediately OR Stored

If stored, how: _____ how long: _____

Method(s) employed for evaluating cleanliness: None Visual Microscopic Ultra-Violet Gravimetric Contact Angle

Gloss-color meter OSEE

Other: _____

Performance test, if any (please describe): _____

JOB DESCRIPTIONS

Job Titles in Cleaning Operation

Department	Job Title	# of Workers	Duties

CONTROL MEASURES

Do you use any control measures (hoods, splash guards, goggles, gloves, etc): _____

Comments or Areas of Concern: _____

Return any samples/parts? No Yes, to: _____