Lowell Center for Sustainable Production
UNIVERSITY OF MASSACHUSETTS LOWELL

Alternatives Assessment 104 Webinar:

How Agencies are Incentivizing the Adoption of Alternatives

JUNE 27, 2012

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LOWELL CENTER FOR SUSTAINABLE PRODUCTION, UMASS LOWELL

** If you would like to ask a question or comment during this webinar please type your question in the question box located in the control panel.*

Goals

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- Continuing education and dialog
- *"To advance the practice of alternatives assessment for informed substitution across federal, state, and local agencies through networking, sharing of experiences, development of common approaches, tools, datasets and frameworks, and creation of a community of practice."*

Purpose of this call

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Alternatives assessment requires both a focus on both the comparative evaluation of alternatives as well as the adoption of those alternatives. Presenters will describe how adoption of safer alternatives is being incentivized and supported through policies, recognition, supply chain dialog, research and technical assistance.

Speakers

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- Jessian Choy, City of San Francisco Office of Environment
- Chris Geiger, City of San Francisco Office of Environment
- Johnny Le, MA Toxics Use Reduction Institute
- Greg Morose, MA Toxics Use Reduction Institute
- Heidi Wilcox, MA Toxics Use Reduction Institute

Webinar Discussion Instructions

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- Due to the number of participants on the Webinar, all lines will be muted.

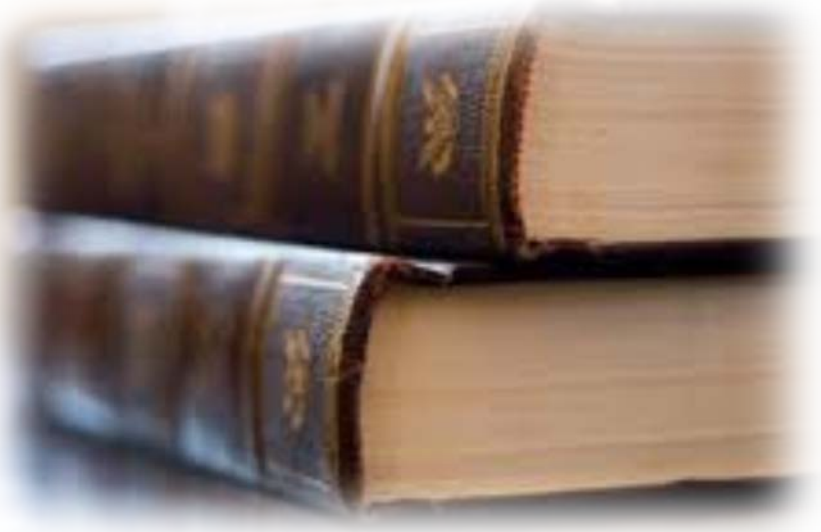
- If you wish to ask a question, please type your question in the question box located on the right side panel of your webinar control panel.

Alternatives Analysis 104:

How San Francisco is Incentivizing the Adoption of Alternatives

Ordinance Requirements

- City agencies only
- Commodity contracts only
- **Purchases restricted to “approved list”**
- Prioritization
- Reporting
- Waivers
- Training & outreach



Program Structure

City Purchaser

Green Teams

Dept. of the Environment

Cost

Performance

Impact

- Worker health
- Environmental
- Social

Integrated Pest Management

Figure 1. Citywide pesticide use, total pounds of active ingredient. Fungicides

Green teams

SF Approved List

Products that meet San Francisco's Health and Environmental Requirements

Search Products

Hit Enter to Search

Advanced Search

Join our email list

- Hear about new products, events, trainings.
- City staff: tell us green products that work so we can add them to citywide contracts.

Browse Products

- Directory
- Automotive Fluids (14)
- Automotive Supplies (7)
- Batteries (6)
- Building Materials (5)
- Cleaning Products (77)
- Electronics (7)
- Electronics Cleaners (7)
- Food (1)
- Foodware (48)
- Fuel (1)

Choosing the right product is easy when you have the City's help. In keeping with San Francisco's commitment to the Precautionary Principle, the Board of Supervisors passed legislation in 2005 requiring City staff to buy from an approved list of environmentally preferable, or "green," products. San Francisco Department of Environment created the **SF Approved List** to share the best in authoritative green purchasing information within City government and with the world at large. To create the List, we review ingredients, recycled content, energy efficiency, product reviews from City staff, and more.

This is your one-stop shop for over 1,000 green products that:

- **SF City Staff are required to buy** under City ordinances.
- **SF Green Businesses** are allowed to use.
- Can **green your home, small business or large organization**.

Share this on Twitter, Facebook, Delicious, & more. (Click "Share" in top right corner of any page).

Latest News

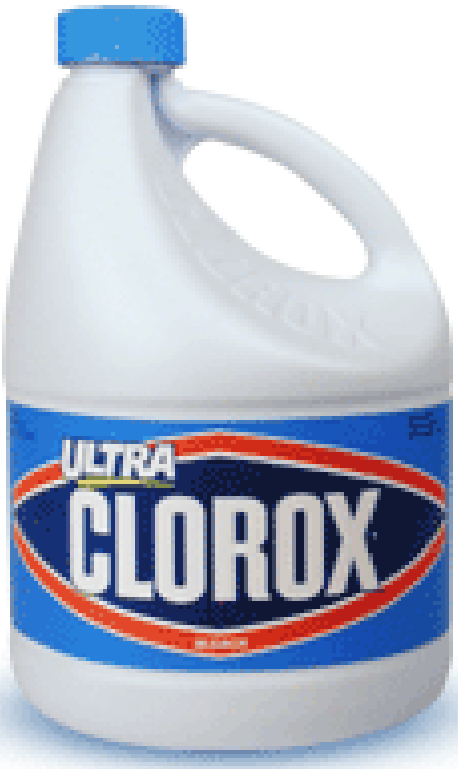
- NY Times, Fast Company on SF Approved

Latest Products

1. Sanitizers by EO
   Category: Sanitizers
   Created: Oct 13, 2010
2. Sanitizers by Clean Well
   Category: Sanitizers
   Created: Oct 13, 2010
3. Various products with...
   Category: Lubricants, Oils
   Created: Jul 16, 2010
4. Various brake cleaners...
   Category: Brake Cleaners
   Created: Jul 16, 2010
5. Various degreasers...
   Category: Degreasers
   Created: Jul 16, 2010

Show more...

Problems with disinfectants



$1.79 (60 oz)

$2.00 (10.1 oz)

Methods

- Goal: Find safest way to manage germs & maintain sanitation *(not just 'best products!')*
- Factors considered:
  - Environmental and health factors
  - Efficacy
  - Dwell time
  - Cost
  - Registration (CA)
  - Material compatibility

Active ingredients considered

- Soap & water
- Hypochlorite “bleach”
- “Quats”
- Hydrogen peroxide
- Pine oil
- Organic acids (citric/lactic/caprylic)
- Silver + citric acid
- Ortho-phenyl phenol
- Thymol
- Steam
- Electrolyzed water

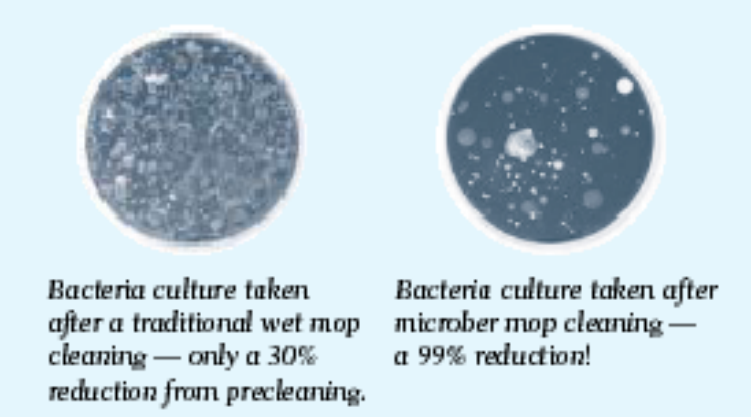
Option #1: Soap and water

AI	Efficacy			Env	Health	Dwell (m)
AHP ----------	BBB	VVV	FF	L	L	1-10
H2O2 ----------	BB	VVV	FF	L	L-H*	1-3
CAPRYLIC ACID ---	BBB	VVV	FFF	L	L	10
CITRIC ACID -------	BB	VVV	F	L	L	5-10
SILVER/CITACID --	BBB	VVV	F	M	L	2-10
LACTIC ACID ------	B	V	F	L	L	5
THYMOL ----------	BB	V V	F	L	M	10
QUATS ----------	BBB	VVV	FFF	H	M-H*	10
CHLORINE ---------	BBB	VVV	F	M	H	1-10
PINE OIL ----------	B	V	F	L	M	10
H2O2 + PAA [ ] ---	B	V	F	L	H	10
OPP ----------	BBB	VVV	FF	H	H	10

Recommendations

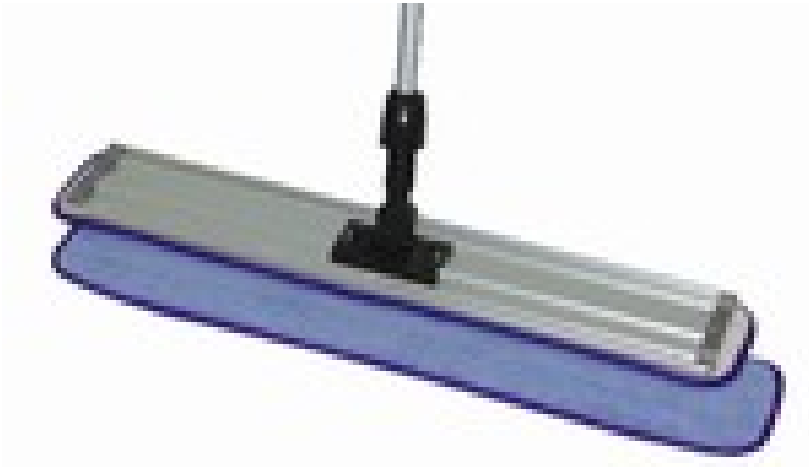
- Non food contact sanitizer
  - Alpha HP @ 1:128 dilution
- General purpose disinfectan
  - Oxivir Five 16 @ 1:16 dilution

Microfiber



Bacteria culture taken after a traditional wet mop cleaning — only a 30% reduction from precleaning.

Bacteria culture taken after microber mop cleaning — a 99% reduction!



SF Environment
Our home. Our city. Our planet.
A Department of the City and County of San Francisco

Checklist:
Practice Green Cleaning

Use Safer Practices

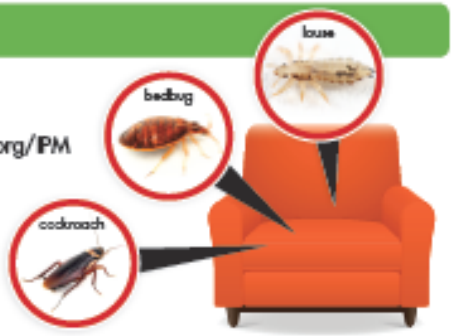
- [ ] **Use automatic dilution systems**
  Do not make stronger mixtures.
- [ ] **Use disinfectants sparingly**
  Good for surfaces that are touched frequently like doorknobs and keyboards. General cleaning removes 99% of germs.
- [ ] **Strip floors only when needed**
  Once per year or less
- [ ] **Use strong products sparingly**
  For example, use acid bowl cleaners only for deep cleaning.
- [ ] **Use microfiber mops and cloths**
  Microfiber mops clean faster, clean better, and use fewer chemicals.

Use Safer Products

- [ ] **Use concentrated products**
  Ready-to-use products are 15 times more expensive.
- [ ] **Avoid aerosol sprays**
  Trigger sprays are safer. Spray directly onto the cloth if possible. Aerosol sprays are bad for your lungs.
- [ ] **Check for safe products at SFApproved.org**
  City staff are required to use this site.

Prevent Pests

- [ ] **Report all pest problems to your supervisor immediately**
  For less toxic pest management tips: SFEnvironment.org/IPM
- [ ] **Clean & dry waste bins frequently**
- [ ] **Clean drains frequently with hot water or steam**
- [ ] **Hang mops upside-down**



Printed on 100% post-consumer recycled paper.

Specifying Products

Use third-party certifications

Use model contract language

Conduct alt. analyses

Conduct LCAs

Develop new specifications

Lessons learned

- Lists helpful
- Lists insufficient
- Cross-departmental ‘green’ teams
- Honor expertise
- Engage, cultivate ‘champions’
- Face-to-face is important…

Fun & Draconian Tips
To “Make” People Collaborate

Fun (entertaining)
Draconian (strict)

Jessian Choy

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How many of you think
telling people
why and how
to do the right thing
changes their behavior?


BANG HEAD
HERE

Invites from the Mayor and SFE:	**2007-10:**	**2011:**
Buy Green Ordinance meetings	6 depts. attended	600 new staff from 38 depts.
Buy Green Leaders	0	38 (thanks also to calls from SFE Climate Team)

More importantly,
90%
of 150 staff
would recommend our
Buy Green
Consultation

Here's a taste of
how you
might also get good results

Who to invite?

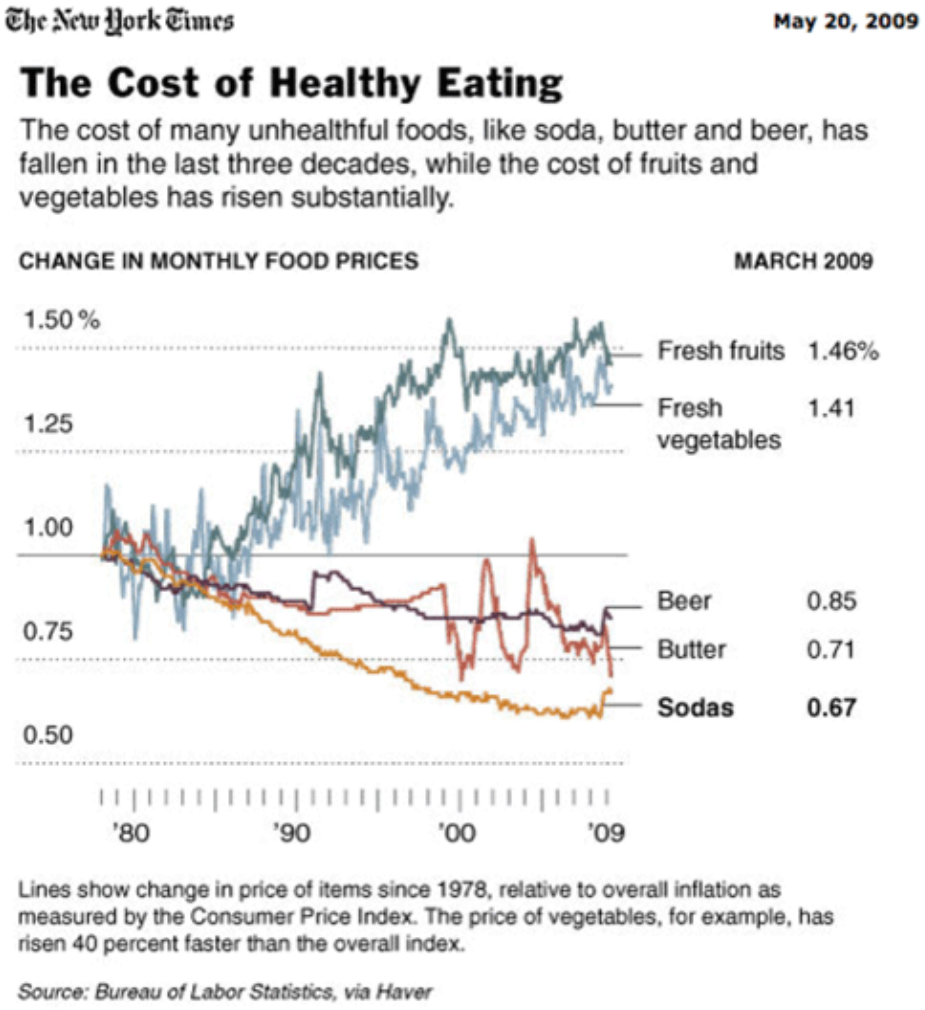
Meet with electricians from different depts. who don't work together	**Meet with staff that buy various things from the same dept.**
Less incentives to attend.	More people showed up because of their co-workers.
I was the only one promoting green.	More people excited to talk about how they want to go green.
Why listen to a random person (me) they see once/year?	Their boss or co-worker asked them to buy green *during and after.*

Best thing to do
after you introduce yourself?

Is it easier to recall:

- True stories of people that did the right thing?
- Hands-on experiences?
- Facts and charts?

People don't recall facts and charts.



The New York Times May 20, 2009

The Cost of Healthy Eating

The cost of many unhealthful foods, like soda, butter and beer, has fallen in the last three decades, while the cost of fruits and vegetables has risen substantially.

CHANGE IN MONTHLY FOOD PRICES MARCH 2009

Lines show change in price of items since 1978, relative to overall inflation as measured by the Consumer Price Index. The price of vegetables, for example, has risen 40 percent faster than the overall index.

Source: Bureau of Labor Statistics, via Haver

*Influencer: The Power to Change Anything, 2007

Are we more likely to do things for people we:

- Know?
- Don’t know?

How many of you
meet strangers
that just start telling you
what to do?

Share stories of
how I felt
when I did the right thing
(that I have in common with
my audience)

The
crazier,
weirder,
raunchier,
stinkier
the image,
the easier it is to recall.

-Joshua Foer, TED.com video

The perfect vacation

The greenest product?

I tap into our passion
for friendly competition
(keeping up with the neighbors).*

Annual Report of
Who Bought Green & Prohibited Products

	% Green by Customer	% Green by Dept.	$ Green & Prohibited by Customer
Grumpy City Staff	0%	55%	$ 415.80
Grumpy City Staff #2	0%		$ 148.80
Nonchalant staff	69%		$ 2,019.30
Happy City Worker (I hear they exist)	100% = prize		$ 16,059.00

The report allows us to:

- Ask why staff **<u>why</u> they didn't use green products** (friendly discussion ☺)

- Give green product samples/prizes (no more free samples)

  - Would you give it to staff that bought green or to the head of the org?

Auspens

$0.28/marker

Refillable

No hazardous solvent with odors

End with easy things to try now

Reviews (1)

★★★★★ Soy-Solv, multi use & effective. by **liam.curry@sfgov.org**, March 1, 2012

I was initially skeptical of this product, but it works well on fresh spray-painted graffiti and smells almost good enough to pour on salad! It also works well as a floor de-greaser when diluted with hot water.

Best place to post reminders?

Get commitment verbally
or in writing in public?

WONDER

what to do with this stuff?

Recycling Guide for SF City Departments

Toxic products are illegal to put in the trash ($25,000 fines per day per violation).

TO SCHEDULE A PICKUP, visit sfenvironment.org/sfgovrecycles or call (415) 252-3962.

- Aerosol cans
- Automotive products (antifreeze, car lights, motor oil and filters, tires, oil soaked rags*, etc.)
- Batteries–any type
- Chemicals, pesticides, cleaners
- Fluorescent bulbs and tubes, high density discharge bulbs
- Mercury thermometers and thermostats
- Paints, thinners, solvents

* Or reuse rags by laundering them through SF's citywide contract for Towel, Treated Mop & Mat Service. Call SF Purchasing Dept. for current info: (415) 554-6743.

To order battery recycling bins, visit SFEnvironment.org/SFgovrecycles

CALL the City's Virtual Warehouse at (415) 355-3772 or visit SFgov.org/surplusdisposal.

Get free stuff or donate unwanted items to other City departments

- Appliances (working or not)
- Cell phones
- Electronics and computers
- Furniture
- Metal
- Office supplies
- Wood

Toner Cartridges

- The City has a takeback agreement with the toner cartridge vendor. Please

Cell phones, Digital Cameras, iPods

Get a free recycling box at:

Who wants to print them?

SFEnvironment.org/signmaker

Recycle packaging

1. Post this above a cardboard box.

2. Get a free shipping label for these Multi-stream Wastes: terracycle.net/en-US/brigades/packaging-multi-stream-brigade.html

Take a sticky note.

What's one green idea you'll try from our meeting?

Add it to your sticky note?

Rate this talk:

Bit.ly/rate-this-talk

LinkedIn.com/in/jessian

Get more at:

Youtube.com/
jessianchoy

Twitter.com/
FunAndDraconian

Facebook.com/
FunAndDraconian

Industry Research Consortium: Alternatives Assessment for Lead in Electronics

Gregory J. Morose, Sc.D.
Toxics Use Reduction Institute
School of Health and Environment
University of Massachusetts Lowell

Overview

- Global efforts are underway in the electronics industry to imove towards using lead-free materials for the production of printed circuit boards. These efforts are driven by regulatory and market drivers such as the Restriction on Hazardous Substances (RoHS) effective July 2006.
- Numerous technical challenges remain to hinder the universal implementation of lead-free materials, mostly due to the higher melting temperatures of lead-free solders.
- For example, outstanding issues with the rework and long term reliability of electronics products manufactured with lead-free materials affects high reliability applications such as network infrastructure, aerospace, defense, information technology, and medical equipment.

Lead Toxicity & Exposure

Acute effects of lead exposure:

Brain damage, kidney damage, and gastrointestinal distress occur from acute exposure to high levels of lead in humans.

Chronic effects of lead exposure:

EPA considers lead to be a Group B2, probable human carcinogen. Chronic exposure to lead in humans can affect the blood, reproductive, and the nervous system.

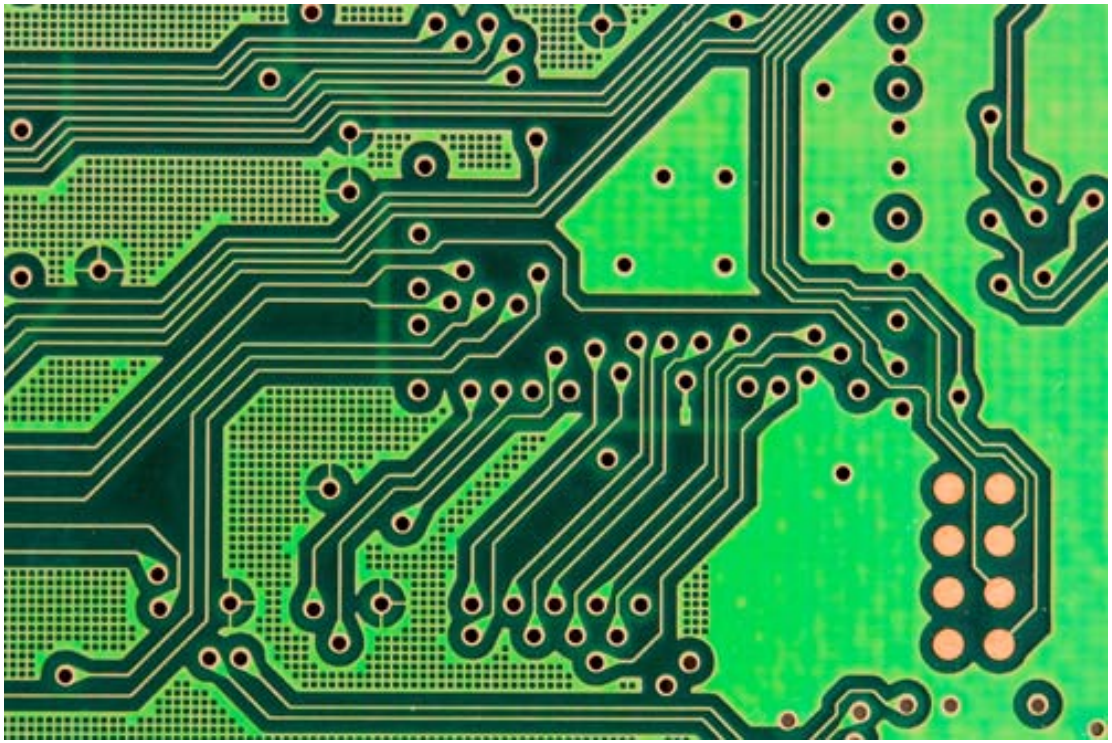
Exposure:

Occupational exposure can occur during handling of lead materials and inhalation during soldering processes. Human exposure to lead in electronics can also occur during improper disposal at product end-of-life

Lead in Electronics

Lead can be used in three major areas on printed circuit boards:

1. Conductive surface finish on circuit boards

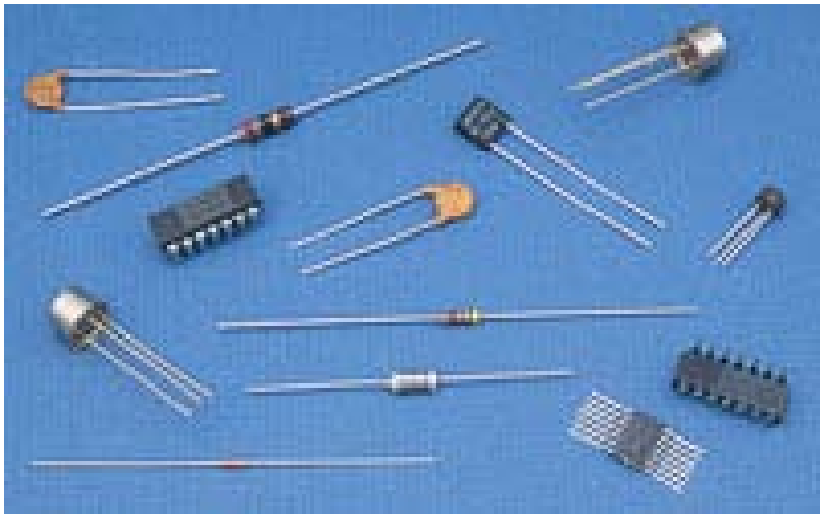


Lead in Electronics

2. Conductive surface finish for components

Surface mount components (SMT)

Through hole components (THT)

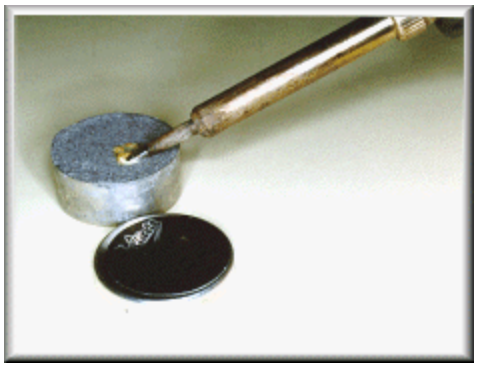


Lead in Electronics

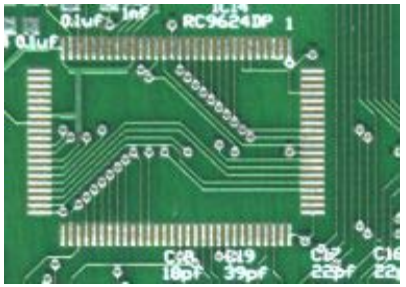
3. Solder for attaching components to circuit board

Lead-free Electronics Industry Challenges

1. Which lead-free solders?



2. Which lead-free board finishes?

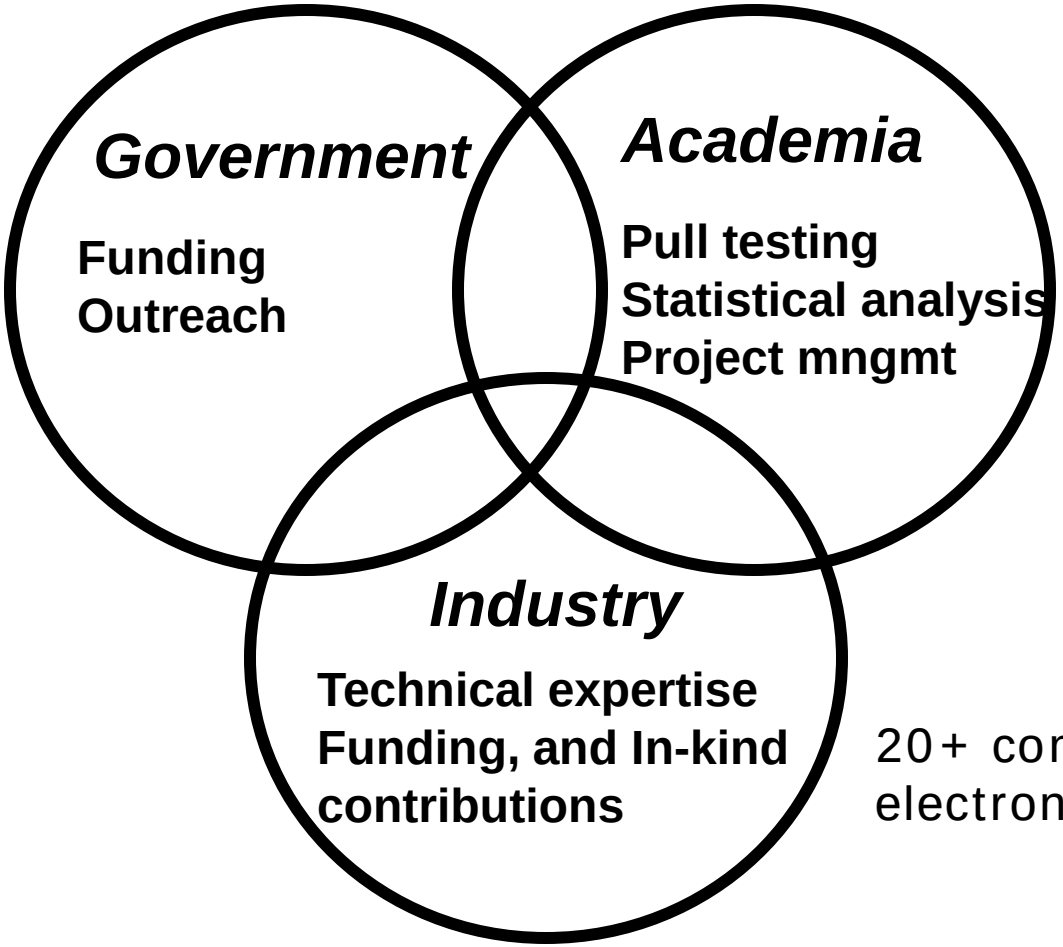


3. Which lead-free component finishes?

4. What process modifications?

Lead-free Electronics Research Consortium

$1.5 million in direct funding and in-kind contributions



20+ companies in the electronics industry

Consortium Organization

Project Manager:
Greg Morose, TURI

General Consortium Members
Representatives from industry, government, and academia

Workgroups: Assigned to address specific tasks

- Failure Modes and Effects Analysis (FMEA) creation
- Through hole component assembly
- Aperture style analysis
- Board design
- Test plan development

Four Research Phases: Conducted from 2001 – 2010 for RoHS initial implementation, and also exempt or out of scope industry applications (e.g. aerospace/defense products requiring long term reliability.)

Research: Description and Objective

Description:

Assist industry to evaluate the assembly, rework, and long-term reliability of printed circuit boards using various lead-free materials. This alternatives assessment would primarily focus on technical performance (i.e. solder joint integrity) of the various lead-free alternative materials and processes.

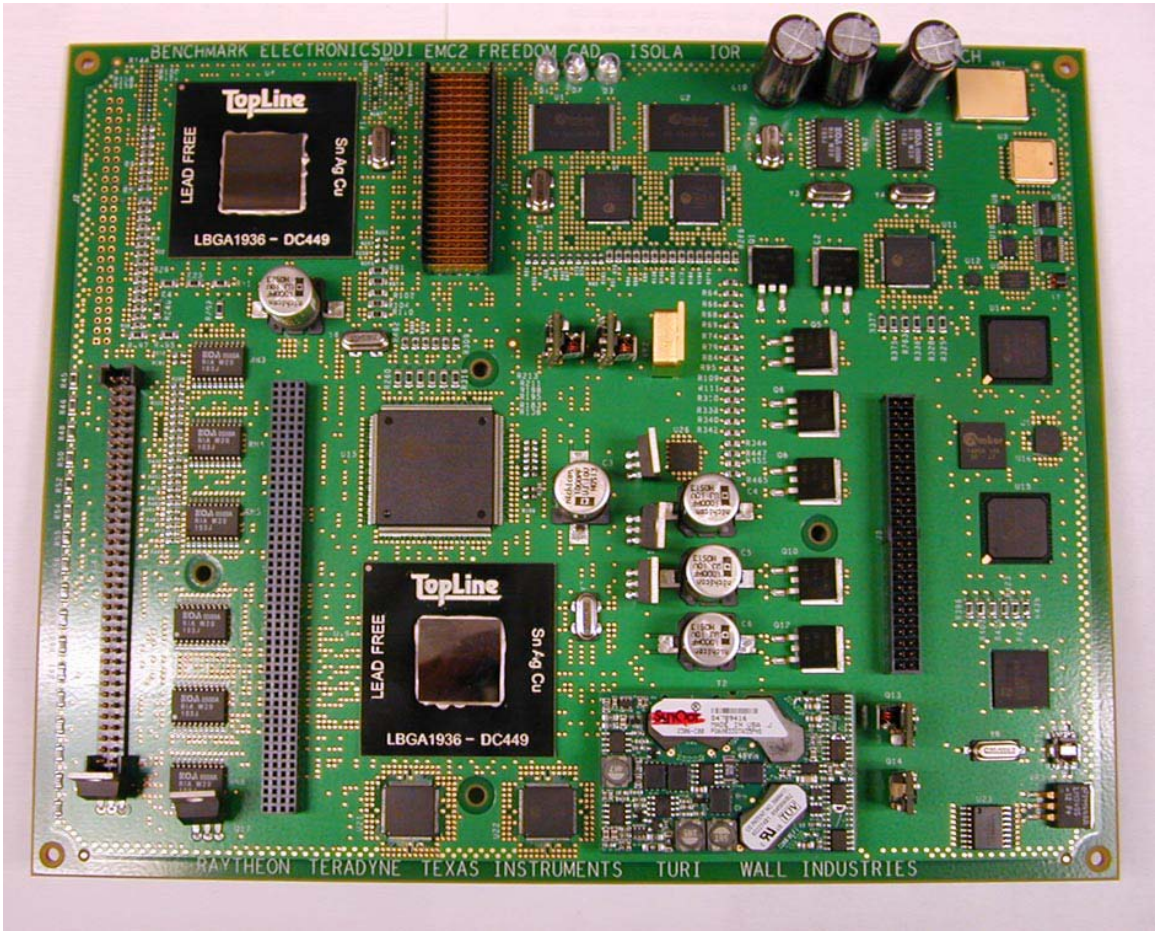
Objective:

The ultimate goal of the research is to attain and publish positive results in the needed areas of original research. The research results should help to further advance the electronics industry towards the implementation of lead-free electronics for all applications, including those demanding high reliability and long product life.

Consortium Communication

- Bimonthly consortium meetings
- Distribution of meeting materials and meeting minutes
- Workgroup documentation and presentation of results
- Surveys
- Workshops
- Develop papers for submission to electronics industry publications
- Presentation at major electronics industry conferences
- Maintain consortium website

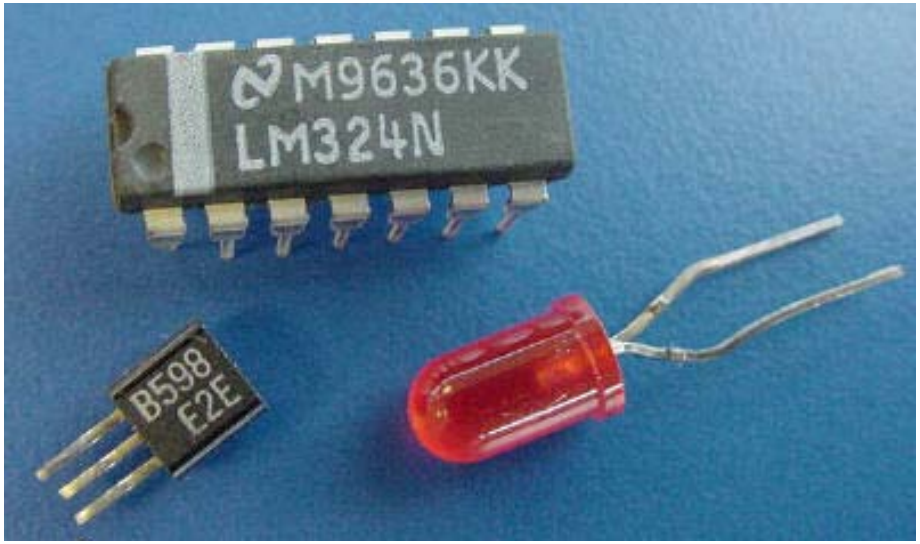
Research Test Vehicle



Phase IV Test Vehicle

- 8” wide x 10” long
- 20 layers
- 0.110 inches thick
- 907 components per test vehicle

Materials: Components, Solder, Etc.



Production/Testing Equipment

Raytheon

COBHAM

BOSE

TEXTRON

BTU

TERADYNE

WALL
Wall Industries, Inc.

SOLECTRON

Vitronics Soltec

Electronics Design

FREEDOM CAD Services — Nashua, NH

Benchmark Electronics — Hudson, NH

MACOM — Lowell, MA

International Contributions

Nanosurface finish
Germany

Halogen-free laminates
Singapore

Automated assembly
Guadalajara, Mexico

Interconnect Stress Testing
Ontario, Canada

Results: Industry Success

- Demonstrated that electronics assembly and rework with lead-free materials can be done with equal or fewer quality than tin/lead.
- Industry participants were able to have access to cutting edge research and analysis, while also sharing the costs to address a major industry challenge.
- Consortium members were able to initiate lead-free electronics programs within their companies. For example, Benchmark Electronics has now manufactured approximately 9 million lead-free printed circuit boards to date.
- Shared the results with companies outside of the consortium. The consortium has published and presented the results of its research efforts widely, including more than 40 papers, articles, and presentations for national and international professional conferences and technical journals.

Consortium Member Benefits

Industry

Ability to have input and influence on consortium efforts (e.g. material selection, supplier selection, testing strategies, etc.)

Access to cutting edge research and analysis

Ability to share the costs to address a major industry challenge

Forum provided to share ideas and receive advice from industry peers

Ability to derive competitive advantage for early preparedness

Individual: Become a knowledge leader within organization

Consortium Member Benefits

Government

Reduced the use of a toxic material (lead) which leads to a safer occupational setting and an improved environment

Improved the competitive position of local businesses by addressing industry challenges in a proactive and efficient manner

Consortium Member Benefits

Academia

Forged collaborative relationships between university and regional businesses

Provided real world learning opportunities for graduate and undergraduate students

Increased university faculty experience in applied science and engineering

Consortium Benefits: Student Learning Opportunities

Hands on laboratory experience for real world research

Presentations at industry conferences

Thank You for Participating!

Greg Morose, Sc.D.
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Toxics Use Reduction Institute

Services of the Toxics Use Reduction Institute's Laboratory

Johnny Le – Chem Engineering Student - UMass Lowell
Heidi Wilcox – Field Implementation Specialist TURI Lab

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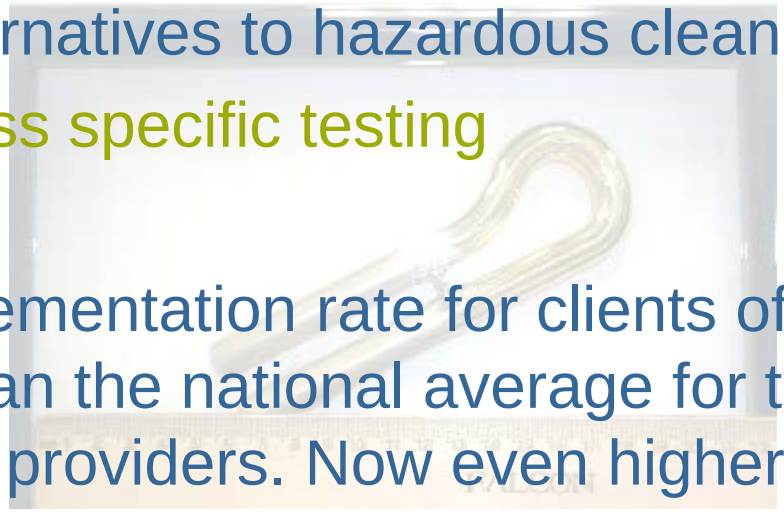
F: 978-934-3050
www.turi.org

What Have We Done

- Providing technical assistance since 1993
  - TUR Lab has helped hundreds of companies find safer alternatives to hazardous cleaning solvents
    - Process specific testing
  - The implementation rate for clients of the lab was 3x higher than the national average for technical assistant providers. Now even higher
    - Prior to 2007, 33% of the companies fully adopt the lab's recommendations
    - 2007-9, near 80% (changed our in field process)



Technical Assistance

- The goal of the lab is to assist industry in the search for safer cleaning processes
  - By developing and promoting safer alternatives to hazardous solvents
- Free Services to Massachusetts Companies
  - On-site walk through
  - Laboratory Testing
  - Piloting
    - Lab
    - On-site
  - Follow Up Assistance

Current System – Initial Contact & Info Gathering

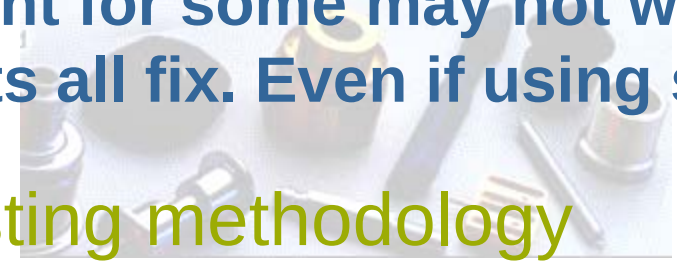
- The Lab is Contacted by company with cleaning issues of some kind
- Gather background information on process
  - SSL Test Request form asks for info on;
    - Material and size of parts to be cleaned
    - Contaminants
    - Current Solvent or other alternatives tested
    - Available Equipment
    - Operating conditions (time, temp, conc.)

Current System – Initial Onsite Visit

- On-Site visit (Heidi)
  - See manufacturing process – walk floor
  - Complete Test Request form
  - Gather samples and MSDS
    - Contaminants
    - Current Solvent
    - Dirty Parts
  - Identify possible adjustments to process

Current Process - Alternative Selection

- Process is challenging
  - Thousands of products & a lot of vendor information
  - **What is right for some may not work for others – no one size fits all fix. Even if using same chemicals**



- TURI lab testing methodology
  - Independent analysis of products – not just vendor supplied information, lab testing data into database along with vendor info
  - Objective operating conditions
  - Process specific final evaluations -customer specific

Summary of TURI Lab Process

I. Product Selection Process

Helps to 'scope' project more efficiently

- Determine substrate surface/ chemical cleaner reactivity issues
- Review lab Safety Screening Scores
  - Using TURI's CleanerSolutions Database for cleaning alternatives (www.cleanersolutions.org)

database selection process based on past performance and safety considerations

II. Temperature and Concentration Trials

Chemical field may be narrowed/changed from Phase I

- Follow chemical manufacturer's recommendations for both parameters
- Equalize time
- Minimize same-source agitation*

**chemical comparison tool; minimal use of mechanical energy; first round of scientific trials; gravimetric analysis; uses test coupons*

III. Mechanical Energy Trials

Number of chemical cleaner candidates further decreases from Phase II

- Application-specific
- Economically-sensitive
- Space-limiting
- Conduct comprehensive EHS profiles of top performing products

scientific study; may employ a variety of analytical tools for cleanliness evaluation; uses test coupons

IV. Actual Product Cleaning Trials

Geometries and sizes of parts important to cleaning efficiency

- Duplicate optimal Phase III cleaning condition
- Duplicate optimal Phase III cleanliness testing

Uses client supplied parts

V. Pilot Plant / Scale-up Feasibility Trials

Obtain input from employees that will be working on new process

- Identify areas concerns
- Arrange for lab loaning of equipment for further on-site testing
- Follow up lab work based on client feedback

Product Selection - Phase 1

- CleanerSolutions - www.cleanersolutions.org
  - TURI Lab Database of Testing
    - Includes vendor supplied information & 19 yrs of TURI lab testing data
  - Used to identify safer and effective products to have in the lab's inventory for client testing
    - Safety Screening Scores
      - VOC, ODP, GWP, HMIS/NFPA, pH
    - Matching Performance to Customer Process
      - Contaminant, substrate, equipment, current solvent

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

Find a Cleaner

Search for a cleaner that has successfully removed a contaminant similar to your own. Chances are that the alternative will also work for you. Optionally, you can add substrate and equipment criteria to help narrow your search.

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	Substrate	Equipment
Fluxes	Copper	Any
Graphite	Electronics	High Pressure Spray
Greases	Fiberglass	Immersion/Soak
Hucker's Soil	Glass/Quartz	Low Pressure Spray
Inks	Gold	Manual Wipe
Latex binder	Liquid	Mechanical Agitation
Lubricating/Lapping Oil	Marble	Media Blasting
Metal fines	Nickel	Plasma
Mold Releases	Other	Supercritical Extraction
None	Plastic	Ultrasonics
Oil	Stainless Steel	Vapor Degreasing
Oxides	Steel	
Paints		

All Fields Hold down the *shift* or *ctrl* keys to select multiple values.

☐ Return only effective results.

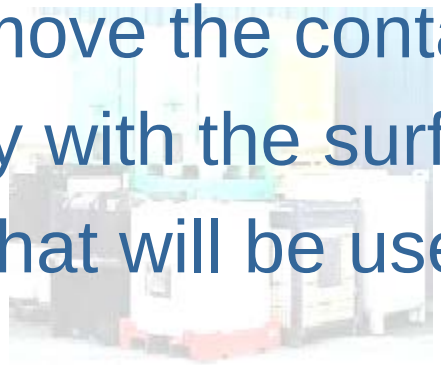
Reset Submit

Selecting an Alternative

- When choosing an alternative Don't shift the risk !!!
  - From worker to environment
  - From environment to worker
    - Ex. Replacing flammable solvent with a ozone depleting chemical
- Want to select a product that is safer for workers and the environment Not one or the other

Identifying an Alternative

- The cleaner must be assessed for;
  - Ability to remove the contaminants
  - Compatibility with the surfaces to be cleaned
  - Equipment that will be used



- Again, the alternative should be safe for the worker & the environment

Testing an Alternative - Phase 2 (Finding chemistries that Work)

- Initial laboratory evaluation of alternatives
  - Using basic operating conditions

    (specifically looking for promising chemistries)
    - Minimal concentration – generally start at 5%
    - Short times – generally 5 minutes
    - Little agitation – stir bar
  - Using coupons matching part substrate
  - Using supplied contaminants
  - Compare with current solvent (if possible)

Testing an Alternative - Phase 3 (Client specific parameters)

- Advanced lab evaluation of alternatives
  - Using client specific operating conditions
    - Moderate concentration (if necessary)
    - Times – client specific cleaning time available
    - Appropriate agitation (match current equipment)
  - Using coupons matching part substrate
  - Using supplied contaminants

Testing an Alternative - Phase 4 (Lab testing of Client Parts)

- Pre-pilot cleaning in lab setting
  - Using client specific operating conditions
  - Using client supplied parts – (parts specific geometry and blind holes are important)
  - Send/bring parts to client for assessment – (they are the experts of how clean they need their parts)

Testing an Alternative -Phase 5 (Taking lab work to the Field)

- Pilot testing at facility
  - Using best alternative cleaning products – (generally try 2 or 3 and let customer decide)
  - Using operating conditions from lab piloting – (but more specifically customers “real” cleaning &work conditions)
  - Set up piloting off-line from current system
    - Compare pilot cleaned parts with current system - for parts from the same manufacturing lot
    - **Get end user input for performance (workers)**

TURI Lab Field Work (Heidi)

- Heidi Wilcox – 13 years @ TURI
  - Grad student, contractor, full time
  - Cleaner Production Doctoral Candidate
- Snap shot of some of our work today
  - TCE work in MA & RI
- This work helped us change the way we work to increase implementation almost 3 fold

TURA Work in MA
SSL Testing (1993-2003) Snapshot

- Worked with 21 companies trying to replace TCE in cleaning applications
- A wide range of industries were represented
  - Aircraft
  - Electronics
  - General Mfr
  - Metal working
  - Optical
  - Plating
- Conducted over 100 experiments
- 11 Contaminant types
  - Abrasives
  - Buffing Compounds
  - Coatings
  - Fluxes
  - Grease
  - Inks
  - Paints
  - Cutting Fluids
  - Lubricants
  - Oils
  - Waxes

EPA Grant to Replace TCE & Chlorinated Solvents

- Two year grant - 2003-2005
  - Conducted with MA Office of Technical Assistance
  - Help small companies move away from TCE & chlorinated solvents in vapor degreasing
- Work focused on drop-in substitutes
  - Pushed due to capital investment of equipment
  - Gathered EH&S data for & tested
    - TCE and other chlorinated solvents
    - The chemical classes of the substitutes for comparisons
  - Article in Process Cleaning Magazine on Drop In Alternatives
    - 2006 Sept/Oct issue
    - http://www.processcleaning.com

EPA Funding in RI 2006-8

- Background – RI brought in EPA who brought in TURI Lab
- Workshop Fall 2006
  - Worked with 13 companies
  - On-site testing for 6
- Second Grant 2007-8
  - Worked with 8 companies
  - Another hands on workshop

Overall TCE Reduction

- All Companies from 1993-2008 (TURI)
  - 46 companies
  - Used 297,300 lbs
  - Reduced 195,200 lbs
  - 66% reduction
- RI 2006-7
  - Used 24,500 lbs
  - Estimated reduction 12,500 lbs
  - 51% reduction
- RI 2007-8
  - Used 26,000 pounds/year
  - Reduction to less then 7000 pounds/year
  - 75% of the reported TCE usage (**shows big stick of EPA helped**)

Summary

- Companies that ONLY received lab testing services ,no on site work – 30% adoption rate
- Companies the received onsite, personal technical service until project completion - 80% adoption rate
- RI project lessons of more in depth, personalized service helped us change our process for all types of companies.

Thank you

- Questions????

- Contact Information
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Discussion Questions

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- What types of incentives and programs are most effective at spurring adoption of safer alternative?
- How can small and medium sized enterprises be most effectively reached?
- How can policies be designed to support adoption and innovation in safer alternatives

Next Webinars

Lowell Center for Sustainable Production
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- Alternatives Assessment 105: Supporting Adoption of Safer Alternatives
  - July 25, 2012, 12pm Eastern/9am Pacific
- Alternatives Assessment 106: The Role of Exposure Information in Alternatives Assessment
  - September, Date/Time TBA
- Alternatives Assessment 107: Criteria for Defining Safer Alternatives
  - October, Date/Time TBA

Webinar Audio & Slides

Lowell Center for Sustainable Production
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The audio recording and slides shown during this presentation will be available at:

http://www.ic2saferalternatives.org/page/Logistics+and+Communications