American Reusable Textile Association

Greening of Reusable Surgical Textiles

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Gurtler Industries, Inc., Vice President, Research & Development

- 35+ years in industry with Ecolab & Gurtler
- Technical Service
- Product development
- Marketing

American Reusable Textile Association, President

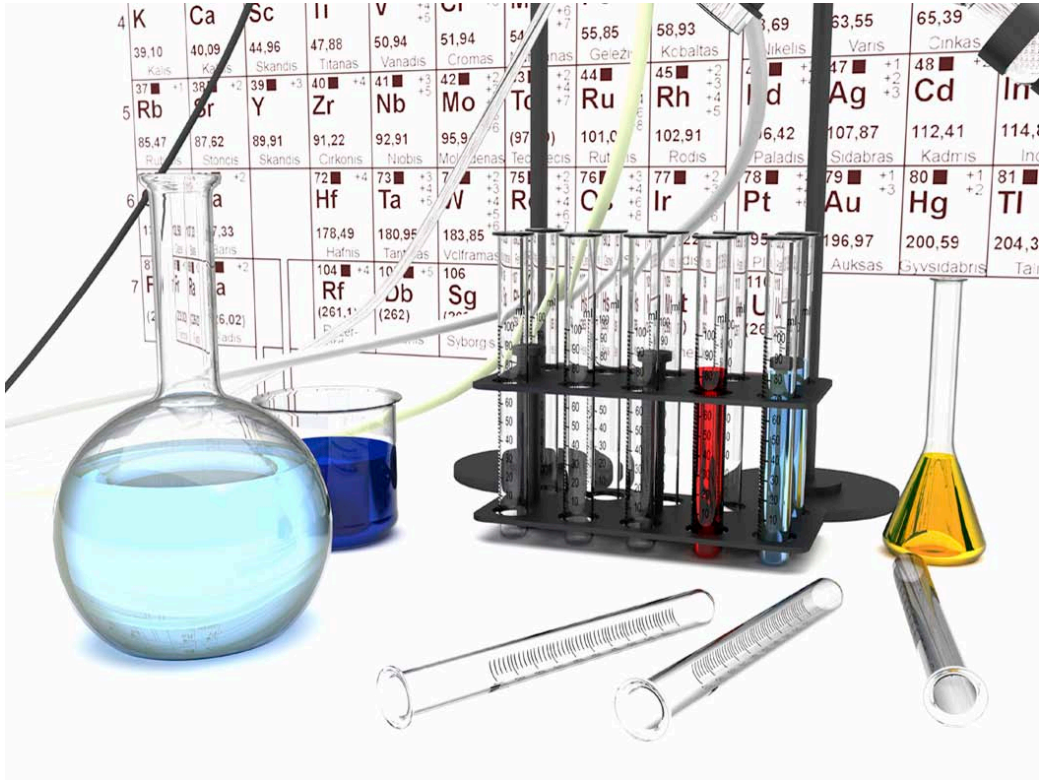
- Mission: To create a greater appreciation for and acceptance of reusable textiles.

Healthcare Laundry Accreditation Council, Chair, Advisory Committee

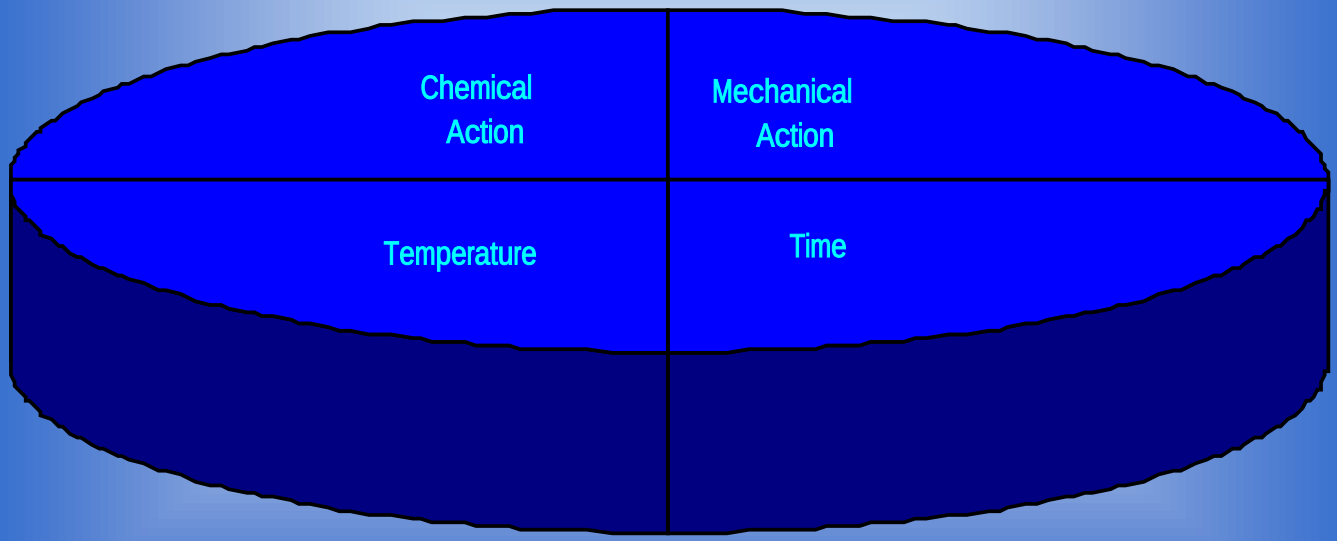
- Founding member of Board, 2005

Laundry Chemistry

Chemistry affects all aspects of the laundering process…



Standard Laundry Process



Chemical Environmental Issues

- Surfactants – Biodegradability
- Phosphates – Eutrophication
- Solvents – Biodegradable/Renewable
- Bleaches – Chlorinated organics in wastewater
- Water and Energy Usage – How chemicals can affect

Surfactants

APE Surfactants

- Alkyl Phenol Ethoxylates or Nonyl Phenol Ethoxylates (NPEs)
- Slowly biodegradable
- Some products of biodegradation have been suspected of harming aquatic life.

Surfactants

APE Surfactants

- Europe has eliminated APEs.
- Canada is phasing out APEs by 90% by 2010.
- US EPA has set up a voluntary program:
  - SDSI: Safer Detergent Stewardship Initiative

Surfactants

APE Surfactants

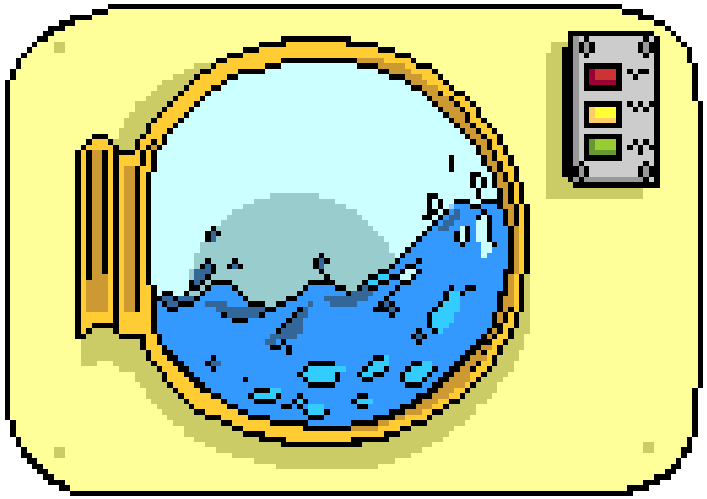
- USA: State and Community initiatives to ban APEs are gaining political acceptance.

- USA: Sierra Club and UNITE Here (textile/laundry workers union) are promoting environmental pressure to change.

Surfactants

APE Surfactants

- Most consumer laundry detergent manufacturers have already eliminated APEs.
- Most Industrial Laundry Chemical manufacturers have non-APE detergent formulations available.



Surfactants

APE Surfactants

- Impact of Replacing APEs:
  - Most replacements are 10-20% more costly.
  - APEs work very well on oily soils – so additional detergent or additives may be required to achieve equivalent quality in the laundry with non-APEs.

Biodegradable Surfactants

SDSI - Safer Detergent Stewardship Initiative

- Elimination of detergents that are not completely biodegradable.
- Detergent formulators have alternative formulas available now.
- Industry conversion has begun, and will progress over the next few years.

Phosphates

Phosphates cause premature eutrophication of lakes…

Phosphates

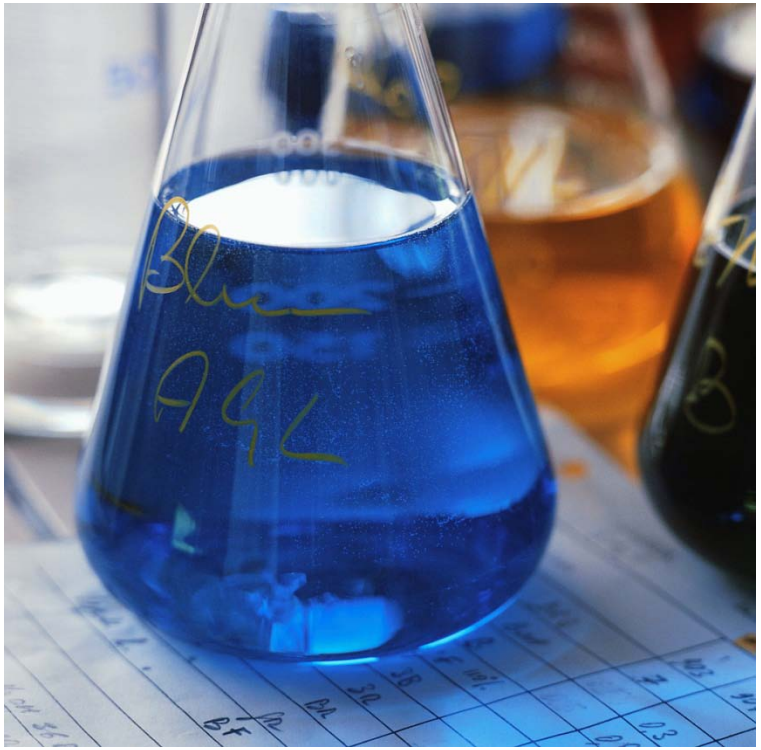
- Phosphates in laundry products:
  - Sequester water hardness ions, preventing them form interfering with detergent action
  - Suspend soils
  - Enhance detergent efficacy
- Since the early 1970s “P” has been regulated
  - States developed limits and bans
  - No national standard

Phosphates

- Laundry chemical manufacturers have limited phosphate and non-phosphate formulations
  - Organic polymers have good performance
  - EPA: Avoid NTA and EDTA
- New Research is continuing, as “green” issues intensify
  - Renewable and biodegradable alternatives are available

Solvents

Hydrocarbon solvents do not biodegrade, plus can pollute air…



Solvents

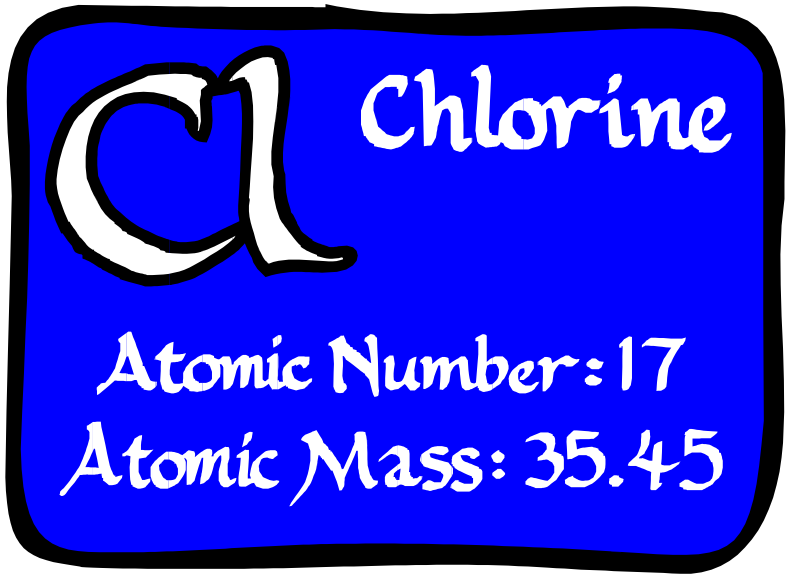
- Traditional solvent/detergents include:
  - Odorless mineral spirits – aliphatic hydrocarbons
  - Cyclical hydrocarbons – more aggressive, more odiferous
  - D-Limonene – extracted from oranges
  - “Butyl Cellosolve” solvent
- All have negative environmental or health issues.

Solvents

- Safer solvents currently available
  - DPM: More environmentally friendly, according to EPA
- New research on “renewable” solvents
  - Derived from plant sources, not petroleum
  - Soy and corn-based
  - Biodegradability is a plus

Chlorine Bleach

- Chlorine reacts with organics in wastewater –
  - Creates organo-carbons/chloroform
  - Cancer-causing agents



Chlorine Substitutes

- Oxygen Bleaches –

  Hydrogen peroxide

  - Not as effective as a sanitizer or stain remover
  - Requires hot (>170°F) water for greatest effectiveness
  - Does not react with Chlorhexidene gluconate (Hibiclens)

Chlorine Substitutes

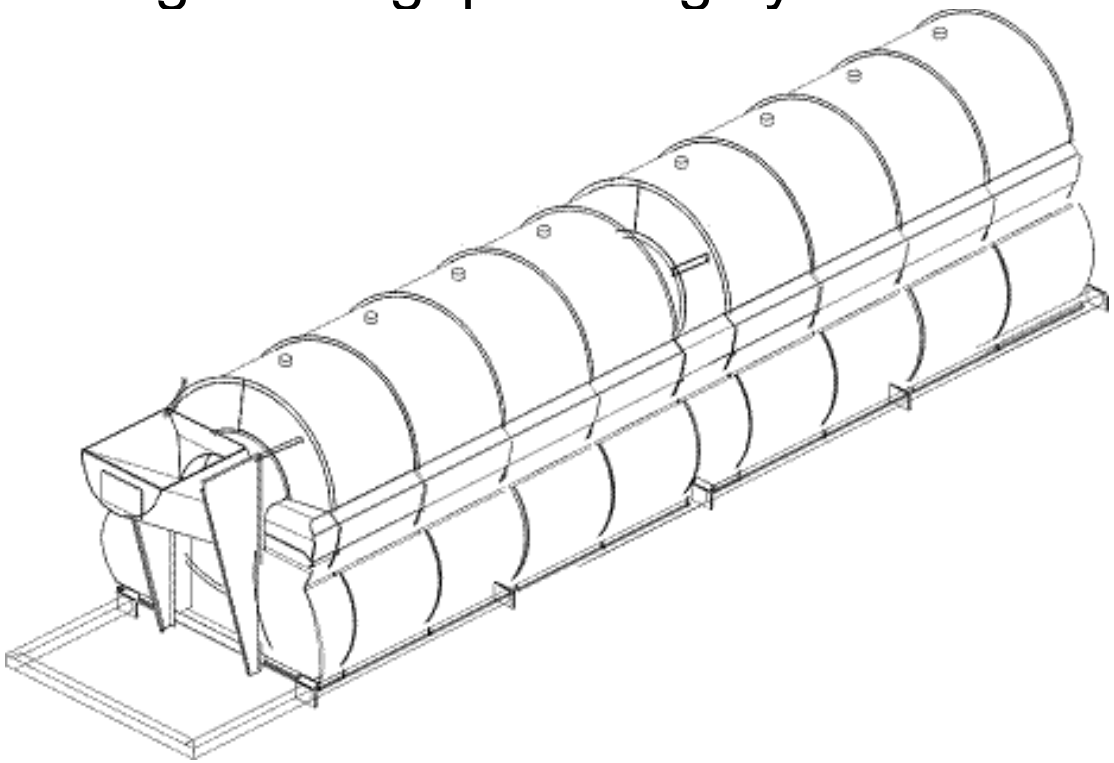
- “Activated” Oxygen Bleaches –

  Peracetic Acid

  - Effective at lower temperatures (120-140°F)
  - More effective sanitizer than peroxide
  - Very high cost impact

Laundering – Water and Energy Use

- Modern washing technology – tunnel washers:
  - Built-in water and energy reuse systems
  - High throughput – Highly automated

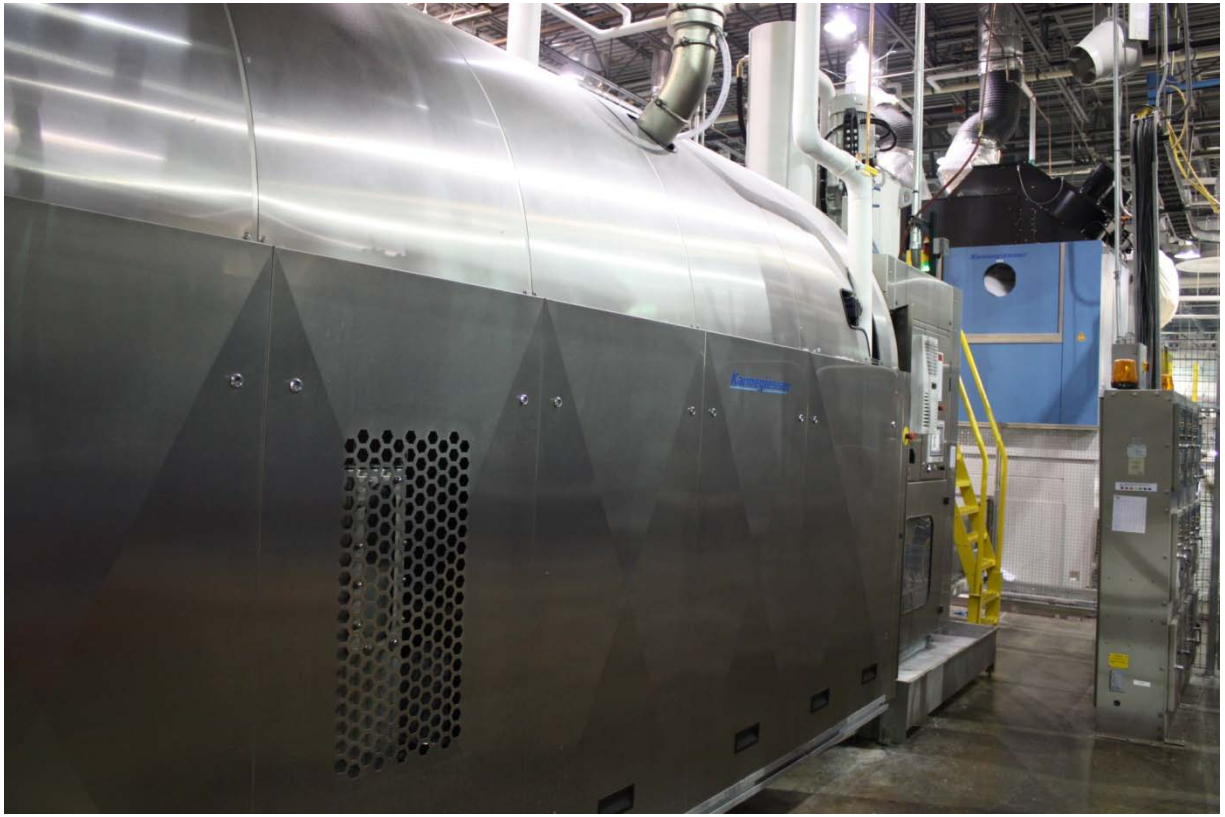


Tunnel Washing

- Milnor Continuous Batch Washer

Tunnel Washing

- Kannegiesser Batch Tunnel Washer



Tunnel Washing

- Automated Handling – Transfer to Dryers

Tunnel Washing

- Water use –
  - 0.5-0.7 gallons of water per pound of processed textile
  - vs. 3.0+ gallons of water with traditional washing methods
- Energy usage
  - Under 2500 BTUs per pound

Water and Energy Considerations

- Water and energy conservation and reuse requires special considerations for chemical usage.
- Reuse of water can cause chemical imbalances.
- Soils loads will be higher, calling for more effective rinsing.
- Water reuse can cause a build-up of TDS (Total Dissolved Solids).

Water and Energy Considerations

- Water Reuse – Chemical Considerations
  - Neutral and low alkaline detergents
  - Improved soil suspension agents and additives
  - Higher levels of water conditioners
- Reuse of water allows for reuse of chemicals.
  - Rebalance chemical usage

Low Temperature Washing

- Published reports by TRSA (Textile Rental Service Association) and AAMI indicate that a well designed wash formula will provide "hygienically clean" textiles, even at lower wash temperatures.

- CDC: “Studies have shown that a satisfactory reduction of microbial contamination can be achieved at water temperatures lower than 160°F if *laundry chemicals suitable for low-temperature washing are used at proper concentrations*.”

  http://www.cdc.gov/ncidod/dhqp/bp_laundry.html

Low Temperature Washing

- Veteran's Administration sponsored a research study that investigated the effect of low temperature and chemical oxidation on the "hygienically clean" aspects of the laundering process used in their laundry facilities.

- This study is entitled "Killing of Fabric- Associated Bacteria in Hospital Laundry by Low Temperature Washing" (Blaser, et al., **Journal of Infectious Diseases**, Vol. 149, No. 1, Jan. 1984, 48-57).

- The article concluded that there was sufficient reduction of pathogenic bacteria, even in low temperature washing (22ºC, 72ºF).

- It also noted that even with the elimination of chlorine bleach, adequate reduction in pathogens was observed when compared to traditional high temperature (71ºC, 160ºF) washing processes.

Laundry ESP

Industry initiative - partner with EPA

- Over a ten year period:
  - Increased production by 41%
  - Reduced water use by 28%
    - Saving 26 billion gallons of water
  - Reduced energy use by 14%
    - Saving 16 trillion BTU
  - Reduced carbon footprint
    - 15% reduction of CO_2 emissions
  - Reduced pollutants discharged to waste stream by 43%

Laundry ESP

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Laundering Standards

- Healthcare Laundry Accreditation Council
  - Established Standard for healthcare laundries
  - Inspects and Accredits
  - Developing Inspection Process for Surgical Textiles

Healthcare Laundry Accreditation Council

- The only organization formed for inspecting and accrediting laundries that process healthcare textiles.
- Completely voluntary laundry industry program.
- Accreditation valid for 3 years.

HLAC Timeline

- 1998: AAMI, ARTA and TRSA paths cross
- 1999-2004: TRSA Healthcare Committee
- 2005: Independent HLAC Board established
- 2006: First laundry accredited by HLAC
- 2009: Renewals begin—100% commitment
- 2010: HLAC to launch updated Standards including OR pack room module

Who is HLAC?

- 12-Member volunteer Board
  - 4 TRSA members
  - 4 Association members
  - 2 members from government or hospitals
  - 2 members from Co-ops or OPLS
- 5 Inspectors
  - With a combined 100+ years of laundry operational and management experience
- Executive Director
  - Day-to-day operations
  - Customer service
- Advisory Committee
  - Open participation
  - Knowledge capital of 30+ professionals

HLAC

- New Standard in final draft review.
- Surgical pack room currently not included.
  - Coming in 2010
- Accredit laundries in U.S. only.
  - Canada “pilot” test completed

HLAC

Accreditation Issues –

- Documentation: training; procedures; policies; contracted services; quality standards; wash formulas; and more.
- Facility: signage, air flow; clean linen storage; and more.
- Employees: training; safety; cleaning and sanitation; and more.

The Standards

- Part I: Basic Considerations
- Part II: Textile Processing Cycle

Coming:

- **Part III: Surgical Pack Assembly Room**

The Standards

- **Part I: Basic Considerations**
  - Textile control procedures
  - Facility
  - Contingency planning
  - Personnel and hiring
  - Occupational safety and hygiene
  - Training
  - Quality control and process monitoring
  - Customer service

The Standards

- **Part II: The Textile Processing Cycle**
  - Handling, collection and transporting of soiled healthcare textiles
  - Sorting (including sharps)
  - Washing, extracting and drying
  - Finishing
  - Packaging and storage
  - Delivery of cleaned healthcare textiles

The Standards

- **Part III: Surgical Pack Assembly Room**
  - Textiles that are prepared for sterilization
  - Basic backbone derived from AAMI ST65:2008
  - Incorporates same components as Parts I & II plus unique factors applicable to a pack room
  - Part III stops at the sterilization step

Accredited Laundry Growth = Availability to Healthcare Clients

- Today, over 2/3 of U.S. population resides in a region served by an accredited laundry
- 100th laundry accredited in May, 2010
- More laundries continue to prepare.

Environmental Impact

- Reusable vs. Single-Use
  - Life Cycle Analysis
  - Laundering
  - End-of-life disposition

Life Cycle Comparison* A

Reusable -Polyester/FC		Disposable - Pulp/PET/FC	
• Energy	8.0	• Energy	30.4
• Water	11.0	• Water	43.0
• Global Warming	0.4	• Global Warming	0.8
• Acidification	1.7	• Acidification	13.6
• Eutrophication	0.2	• Eutrophication	0.8

*Life Cycle Assessment of Surgical Gowns, Anders Schmidt, Ph.D, dk-TEKNIK Energy & Environment, April, 2000

Life Cycle Comparison* A

Reusable – Polyester/Laminate

- Energy 13.2
- Water 17.3
- Global Warming 0.8
- Acidification 5.0
- Eutrophication 0.5

Disposable – Pulp/PE/PES/Laminate

- Energy 31.8
- Water 22.8
- Global Warming 0.8
- Acidification 13.4
- Eutrophication 0.8

* Life Cycle Assessment of Surgical Gowns, Anders Schmidt, Ph.D, dk-TEKNIK Energy & Environment, April, 2000

Life Cycle Assessment B

- Comparing laundered surgical gowns with polypropylene-based disposable gowns
  - Compared one sterile pack, containing one gown and one surgical towel.
  - LCA technique, according to ISO 14044 Standard
  - RMIT University, Melbourne, Australia, November, 2008

Life Cycle Assessment B

Conclusion:

- “Overall reusable gowns were found to generate lesser environmental impacts in the global warming, photochemical oxidation, eutrophication, carcinogens, land use, water use, solid waste, (and) fossil fuels.”

Life Cycle Assessment B

Impact Category	Reusable*	Disposable*
Global Warming	5.1	10
Photochem. Oxidation	1.6	4.6
Eutrophication	4.6	5.5
Carcinogens	7.6	13
Land Use	1.7	24
Water Use	1.1	1.4
Solid Waste	4.3	34
Fossil Fuels	6.4	19
Minerals	1.1	1.0

Note: Units defined in report

Life Cycle Assessment C

- University of Minnesota – Fairview Hospital System
  - 5 Hospitals, including the Univ. of Minnesota Hospital
- Study performed by the UMN Technical Assistance Program (MnTAP)

MnTAP Study: System-wide Cost and Waste Data

	Total Annual Waste (lbs)	Waste per Adjusted Patient Day (lbs)	Total Annual Cost	Cost Per Adjusted Patient Day
Disposable Gowns	310,000	0.59	$1,660,000	$3.17
Reusable Gowns	56,000	0.11	$1,300,000	$2.51
Difference	**254,000 lbs**	**0.48 lbs**	**$360,000**	**$0.66**

Summary of MnTAP LCA Results

Preliminary data:

- CO_2 Emissions Per Gown Use
  - Disposable: 3.0 Kg
  - Reusable: 0.3 Kg

- Total Carcinogenic Compounds Per Gown Use
  - Disposable: 7.9×10^{-3} Kg
  - Reusable: 3.6×10^{-4} Kg

MnTAP LCA Report

- Full LCA Report to be completed this summer
- First report of study findings at the ARTA Green Summit, Quebec City, July 22, 2010

American Reusable Textile Association

2010 Green Summit

Leading the Industry into the New Era of Sustainability

July 22-23

Chateau Frontenac

Quebec City, Quebec, Canada

We Invite You to Join Us!

For more information on the agenda and registration, go to

www.arta1.com

Questions?

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Reusable Textiles – The Responsible Choice