



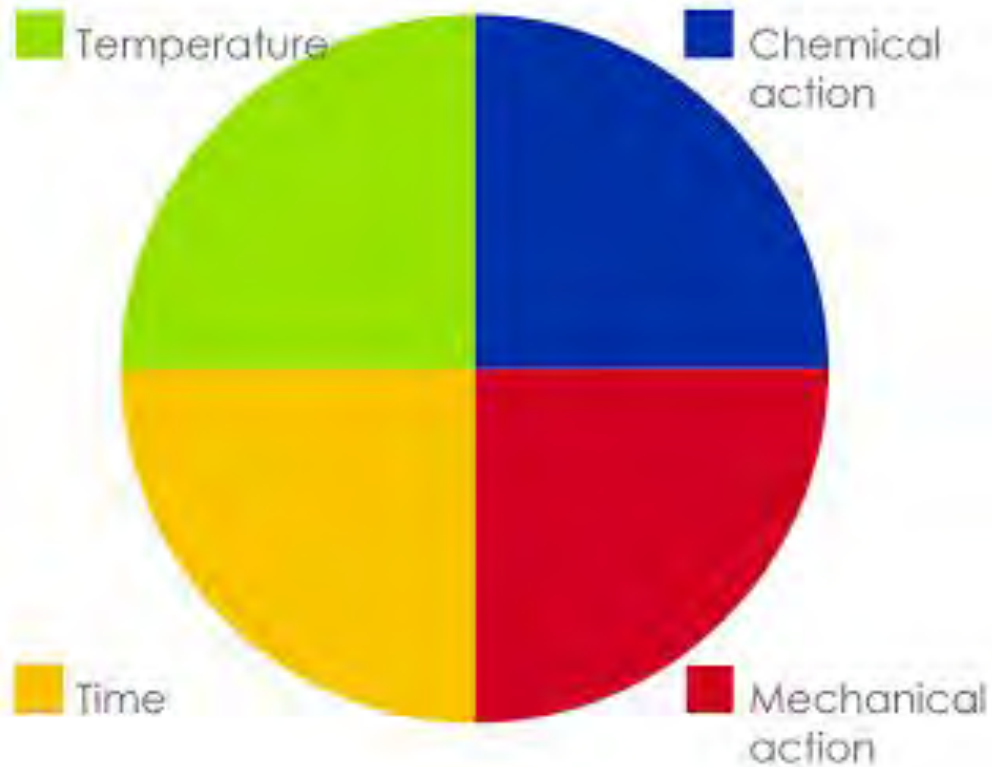
Washing Systems LLC

Washing Systems

- * Incorporated in 1989
- * Employs ~120 people
 - * United States
 - * Canada
 - * United Kingdom
- * Provide products and services to industrial laundries
- * Formulate all chemistry in-house
- * Over 30 patents in washroom chemistry technology
- * One of largest suppliers to commercial laundry industry

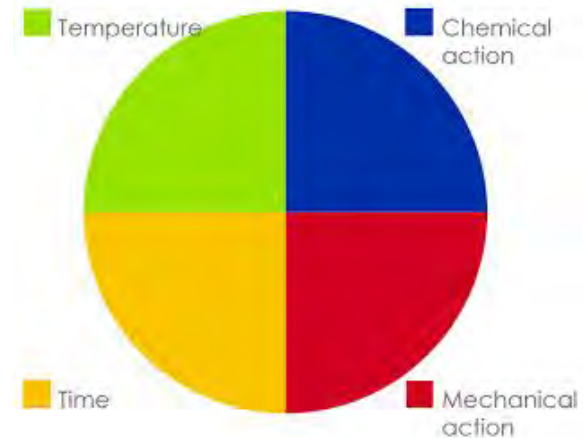


Washing Process



Chemicals (2005)

- * Chemicals used in laundry
 - * Detergents: NPE based
 - * Builders: Phosphate based or EDTA based
 - * Alkali
 - * Specialty products
 - * Brighteners
 - * Softeners
 - * Sanitizers
 - * Sours
 - * Bleach
 - * Oxidizers
 - * Specialty detergents for solvents



Company Commitment

- * Decision for green chemistry began with management in 2005
 - * “Core values and beliefs drive us to produce products that clean better and help create a healthier environment”
 - * “Our Mission is to better serve our customers by being the most innovative provider of laundry resource services to the laundry processing industry”
 - * Executive team provides guarantee to success of chemistry which enables customers to earn more profit and take better care of the environment
- * Expansion of TRSA (Textile Rental Service Association) LaundryESP (Environmental Stewardship Program)
 - * Voluntary pollution prevention and resource conservation program collaborating with EPA



Chemicals of Concern: Nonylphenol Ethoxylates

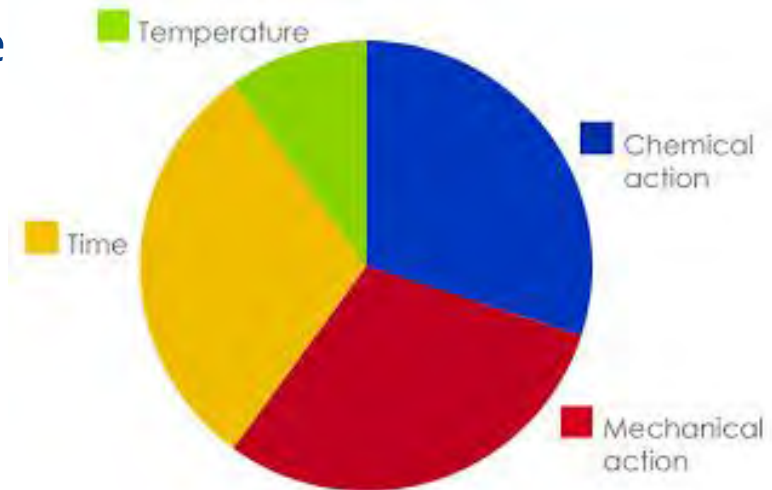
- * **Nonylphenol ethoxylates**

- * Used in detergents
- * Endocrine disruptor
- * Aquatic toxicity
- * Harmful degradation productions
- * Existing bans
 - * Canada
 - * Europe
 - * Connecticut
 - * Few local POTW (Publically Owned Treatment Works)
- * Agreement with EPA for voluntary phase-out by 2013



Success Criteria

- * Evaluated chemicals based upon “Greenness” using criteria:
 - * EPA Design for Environment (DfE) or passing Green Screen Criteria Benchmark 3
 - * Equal or better performance
 - * Same cost
 - * No hidden ancillary costs
 - * Increased washing time
 - * Increased energy use
 - * Increased water usage
 - * Same direct usage



Overview GreenScreen

- * Assessing chemical hazards on 18 Human and Environmental Health Endpoints
 - * Environmental Fate
 - * Environmental Health
 - * Human Health Group I
 - * Human Health Group II
 - * Physical Hazards
- * Endpoints range from Very High (vH) to Very Low (vL)
- * Assignment of a Benchmark using set criteria
 - * Benchmark 1 would align with SVHC under REACH

Alternative Analysis



- * “Green” trend began in consumer products
- * Relied on suppliers to provide similar green chemicals
 - * Consistent feedback and recommendations thru this partnership helped develop acceptable chemicals
- * Selected natural chemical products which provided the required surface tension at appropriate cost
- * Chose manufacturers with variety of products in order to identify acceptable components



Selection Methods for New Chemicals

CleanGredients

- * Continuously utilize and evaluate components listed for chemicals in following classes:
 - * Surfactants
 - * Solvents
 - * Fragrances
 - * Chelating agents

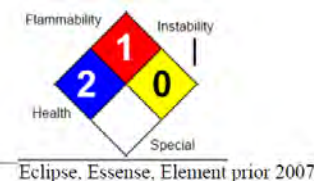


Green Screen

- * Using fundamentals to identify other potential chemical alternatives

Pure Solutions Chemical Line

- * Achieved goal in 2007 of 100% NPE free detergents
- * Obtained DfE approval in 2008
 - * 3 different detergents
 - * Eclipse, Essence, Element
- * Expanded on current line
 - * Pinnacle Liquid Detergent
- * Renewed DfE approval in 2011
 - * Detergents reformulated for improved safety



Pure Solutions Chemical Line

- * Concentrated detergents-Industry first NPE free
 - * Spectrum-DfE 2013
 - * Supreme-DfE 2013
 - * Advance-DfE 2014

Customer's Results

- * Economic benefit
- * Exceed customer expectations
 - * Reduction in water, energy usage and wash time
- * Compatible with existing chemicals/infrastructure
- * Reduction of 21.6 Million lbs from wastewater discharge
 - * 3.6 Million lbs/year
- * Utilizing formulations with renewable resources
- * Regulatory Relief



Industry Commitment

- * Developed in 2010 between TRSA and EPA
- * Voluntary phase out of NPE by 2015
 - * Liquids: December 31, 2013
 - * Dry: December 31, 2014

Greening Laundry Line

- * Continued internal green initiatives
 - * Focused on “greening” additional products
 - * Products sold in bulk
 - * Products where renewable resources could be substituted
- * External green initiatives
 - * Joined National Pollution Prevention Roundtable
 - * Entered the Safer Chemistry Challenge 2025



Safer Chemistry Challenge

- * Aligned with corporate vision
 - * Improve employee health and safety
 - * Minimize risk and liability
 - * Reduce toxins
 - * Save materials and energy
 - * Contribute to sustainability
 - * Improve image

Achievements upon Entry to SCCP

Chemical	Reduction Goal	Achievements to Date	Action Steps	Timeline
Nonylphenol ethoxylates	100%	88%	Continue converting remaining customers to new NPE-free detergents.	January-14
Butyl Cellosolve	100%	78%	Continue converting remaining customers to new detergents.	January-14
Petroleum hydrocarbon based solvents	100%	83%	Continue converting remaining customers to new solvent free detergents and builders.	January-14
Ethylenediaminetetraacetic acid (EDTA)	100%	<5%	Continue converting remaining customers to new EDTA free builders.	January-13
Phosphate	50%	<5%	Continue converting remaining customers to new phosphate free builders.	January-15

Chemicals of Concern

- * **Butyl Cellosolve (Detergents)**
 - * Health hazards: Inhalation & Absorption
 - * Moderate toxicity to aquatic organisms
 - * Voluntary elimination
- * **Petroleum hydrocarbons (Detergents)**
 - * Health hazards: Inhalation
 - * Bioaccumulation potential
 - * Voluntary elimination



Detergent Achievements

- * Nonyl-phenol ethoxylates
 - * Eliminated 3 products from product line
 - * Ahead of voluntary phase out between TRSA and EPA
- * Butyl Cellosolve within detergents
 - * Eliminated 3 products from product line
 - * Improved safety of our products
- * Petroleum Solvents
 - * Introduced a new solvent/detergent product based upon renewable resources: corn/soybean derived solvent



Builder

- * Purpose

- * Improve cleaning performance
 - * Remove impurities in water
 - * Maintain detergent's alkalinity
 - * Prevents precipitation (soap film)

- * Standard

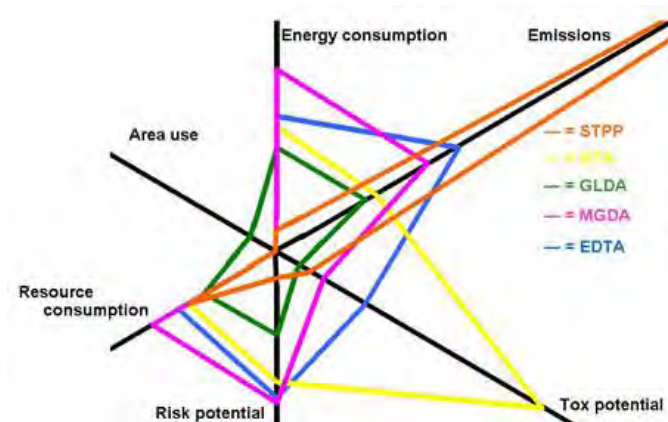
- * EDTA
- * Phosphates

Builders Chemicals of Concern

- * **Ethylendiaminetetracetic Acid (EDTA) (Builders)**
 - * Persistent organic with hazardous degradation products
 - * Existing state bans
- * **Phosphates (Builders)**
 - * Eutrophication in lakes/streams
 - * Existing state bans

Structure

- * Improved environmental footprint
 - * Chelating agent natural, sustainable, and biodegradable
 - * Sugar beet waste
 - * Contains largest proportion of renewable resources
 - * No bioaccumulation



Success Criteria

- * Resolve downstream issues customers encountered
- * Obtain DfE recognition
- * Equal or better performance
- * Same costs and direct usage
- * No hidden ancillary costs

SCCP Chemicals and Goals

Chemical	Reduction Goal
Nonylphenol ethoxylates	100%
Butyl Cellosolve	100%
Petroleum hydrocarbon based solvents	100%
Ethylenediaminetetraacetic acid (EDTA)	100%
Phosphate	50%

Builder Reductions

- * Pollutants/hazards
 - * 3.4 M lbs/yr phosphates
 - * 890,000 lbs/yr EDTA
- * Reduction in surcharge rates for Phosphates
 - * \$0.5-7.0/lb

Achievements (Continued)

- * EDTA within builder
 - * Converted 100% of customers in US and Canada to non-EDTA builders
 - * Replaced with a renewable resource: sugar beet waste
 - * Improved worker and transportation safety of product
- * Phosphate within builder
 - * Obtained greater customer acceptance
 - * One major chain committed to being non-phosphated
 - * Newer customer required in from onset of conversion
 - * Produced quality required by customers
 - * Replaced with a renewable resource: sugar beet waste
- * Obtained DfE certification for new builder: Structure -2014

Summary of Achievements

Chemical	Reduction Goal	Achievements to date Dec. 2013	Timeline
Nonylphenol ethoxylates	100%	100%	January-14
Butyl Cellosolve	100%	100%	January-14
Petroleum hydrocarbon based solvents	100%	46% for specialty products/ 100% for detergents	January-14
Ethylenediaminetetraacetic acid (EDTA)	100%	100%	January-13
Phosphate	50%	100%	January-15

Benefits to Customers

- * Improved environmental footprint
- * Same cost (ounce for ounce)
- * Same “end-use” cost
- * Same or improved wash quality
- * One for one direct replacements
- * Continued reduction in water and energy
- * Ahead of regulatory requirements

Difficulties with Identifying Alternative Chemicals

- * Obtaining valid scientific data for chemicals to complete Green Screen
 - * European Commission Joint Research Center (Institute for Health and Consumer Protection (IHCP))
 - * IUCLID Dataset
 - * OECD SIDS
 - * ECHA Registered Substance
 - * Human and Environment Risk Assessment on ingredients of household cleaning products (HERA)
 - * International Safety Scorecard
 - * Hazardous Substances Data Bank
 - * ToxNet Toxicology Data Network
 - * Agency for Toxic Substances & Disease Registry (ATSDR)

Difficulties (Continued)

- * Cost of biodegradable raw materials
- * Cleaning performance compared to nonyl-phenols
- * Solvent boosters for aiding performance
- * Physical characteristics of NPE free products
- * Compatibility with existing chemistry
- * Applicability of chemicals for industrial laundry

Continued Opportunities

- * Continued evaluation of new materials and application process
- * Continued development of other laundry chemicals
 - * Reduction or Elimination of chlorine bleaches
- * Further development of laundry processes
 - * Reduction in water and gas use
 - * Streamline product packaging
 - * Concentrated laundry detergents