

# Toxics Reduction In The Craft Beverage Industry

Monday, September 26, 2022  
10:00 - 10:45 a.m.



*New England*  
**neefc**  
Environmental Finance Center



UNIVERSITY OF  
**SOUTHERN MAINE**

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# Agenda

**10:05 - 10:15 a.m. Finding Alternatives to Traditional Toxics in the Beverage Industry**

*Jason Marshall, Toxics Use Reduction Institute*

**10:15 - 10:25 a.m. Potential Impacts to Your Business: How does transitioning to less hazardous products affect your business?**

*Peter Cooke, NEEFC Topic Expert*

**10:25 - 10:30 a.m. Experience Trialing an Alternative**

*Jim Denz, Island Dog Brewing*

**10:30 - 10:35 a.m. New England Sustainable Craft Beverage Recognition Program**

*Peter Cooke, NEEFC Topic Expert*

**10:35 - 10:45 a.m. Time For Questions**





# Finding Alternatives for Traditional Cleaners and Sanitizers in the Beverage Industry

Jason Marshall  
TURI Lab Director  
September 26, 2022



# Brewery and Chemicals

- Clean and sanitize vats between batches
- Chemicals are used to remove the residue left behind in each step of the brewing process
- Sanitize in preparation for the next batch
- BOTH steps
  - Can lead to potential human exposure to harmful chemicals
  - Releases to the environment
- Typically, a Clean-In-Place process
- Many of the traditional cleaners and sanitizers may potentially incur more risk to the worker than necessary



# TURI Lab Evaluation of Brewery Cleaning and Sanitizing Chemicals

- Numerous criteria to be considered
  - Environmental and human health considerations
  - Performance considerations
  - Financial considerations
  - Regulatory and safety considerations

# Focus on EHS

- Specific products chosen are meant to represent categories of cleaners that contain different types of active ingredients
- Based on conversations with brewers in Massachusetts and chemical vendors

## Chemistries

- Cleaning
  - Powdered Brewers Wash (PBW)
  - Veracity Caustic Cleaner (Veracity)
  - Liquid Metal Safe (LMS)
- Sanitizing
  - StarSan

# Traditional Cleaners and Sanitizer

Product	Key Ingredients
<b>PBW</b>	Sodium Tripolyphosphate (15-40%) Sodium Metasilicate (15-40%) Sodium Percarbonate (10-30%) Poly(itaconic acid, sodium salt) (7-13%)
<b>Veracity</b>	Sodium Hydroxide (10-30%) Propylene Glycol (3-7%) Sodium Gluconate (1-5%)
<b>LMS</b>	Sodium Silicate (10-30%) Sodium Hydroxide (3-7%) Tetrasodium EDTA (1-5%)
<b>StarSan</b>	Phosphoric Acid (50%) Dodecylbenzene Sulfonic Acid (15%) Isopropyl Alcohol (10%)

# Environmental, Health and Safety

- TURI Pollution Prevention Options Analysis tool
  - P2OASys
    - [www.p2oasys.turi.org](http://www.p2oasys.turi.org)
  - Scores are meant to provide a basis for comparison between products
    - Higher the score the less desirable the products from an EHS perspective
      - Acute Human Effects
      - Chronic Human Effects
      - Ecological Hazards
      - Environmental Fate & Transport
      - Atmospheric Hazard
      - Physical Properties
      - Process Factors
      - Life Cycle Factors



# Summary of Health Effects for Baseline Products

Categories	Powder Keg	Veracity Cleaner	LMS	Star San
Acute Human Effects	VH	VH	VH	VH
Chronic Human Effects	H	VH	H	H
Ecological Hazards	M	H	L	H
Environmental Fate & Transport	M	VH	M	H
Atmospheric Hazard	L	L	L	M
Physical Properties	H	VH	VH	VH
Process Factors	M	H	H	H
Life Cycle Factors	L	H	H	H
<i>Product Score</i>	<i>M</i>	<i>H</i>	<i>M</i>	<i>H</i>



L=Low M=Medium H=High VH=Very High

# Additional Brewery Cleaning Chemical Comparison

Categories	Cell-R-Mastr	Pur-Ox	Ultra Niter	Spartan High Performance Alkaline FP
Acute Human Effects	7	10	10	vH
Chronic Human Effects	4	4	4	H
Ecological Hazards	6	6	4	H
Environmental Fate & Transport	4	5	8	H
Atmospheric Hazard	2	2	5	H
Physical Properties	8	9	10	vH
Process Factors	6	5	6	H
Life Cycle Factors	6	6	9	H
Product Score	5.4	5.9	7	H

# Alternative Cleaners

Categories	LFE Enzy matic Clean er	ECA cleane r	Surfac e Cleans e 930	Micro A07
Acute Human Effects	M	M	M	H
Chronic Human Effects	H	M	L	M
Ecological Hazards	H	L	L	L
Environmental Fate & Transport	M	M	M	M
Atmospheric Hazard	L	L	L	M
Physical Properties	H	M	M	H
Process Factors	M	H	M	M
Life Cycle Factors	M	M	L	L
<i>Product Score</i>	<i>M</i>	<i>M</i>	<i>L</i>	<i>M</i>

# Alternative Sanitizers

Categories	PAA Sanitizer (Spartan FP)	ECA Sanitizer	Lactic acid (88%)	Caprylic Acid (99%)	NaDC C Tablets	Ozone
Acute Human Effects	VH	M	VH	VH	VH	VH
Chronic Human Effects	VH	M	L	M	M	M
Ecological Hazards	M	L	L	M	VH	H
Environmental Fate & Transport	H	M	M	M	H	M
Atmospheric Hazard	L	L	L	L	L	H
Physical Properties	VH	M	H	VH	M	VH
Process Factors	VH	H	M	H	M	H
Life Cycle Factors	VH	M	L	H	H	H
<i>Product Score</i>	<i>H</i>	<i>M</i>	<i>M</i>	<i>M</i>	<i>H</i>	<i>H</i>

Key Assessment Criteria		Baseline Cleaners			Alternative Cleaners			
		Powder Keg	Veracity Caustic Cleaner	Liquid Metal Safe	LFE Enzymatic	Electrochemical Activation	Surface Cleanse 930	Micro A07
Environmental Human Health Physical Safety	P2OASys rating (L,M,H,VH)	M	H	M	M	M	L	M
	P2OASys primary concern— category with rating of VH	Acute human health effects	Acute & chronic human health effects; environmental fate and transport; physical properties	Acute human health effects & physical properties	No categories rated as VH	No categories rated as VH	No categories rated as VH	No categories rated as VH
Technical Performance	TURI Cleaning Lab Performance Results - % removal	92.22	96.87	97.77	79.77	92.67	98.15	97.20
Financial	Capital Equipment Costs	n/a	n/a	n/a	n/a	Large unit to generate varying rates of solution \$6,000-10,000  Small unit to generate varying rates of solution \$500-\$3,000	n/a	n/a
	Chemical Costs	50-55 gal drum \$850-1,050	50-55 gal drum \$575-650	50-55 gal drum \$450-550	50-55 gal drum \$2,100-\$2,735	Cost of salt, water and electricity	200 kg net wt. plastic drum \$2,190	225 kg net wt. plastic drum \$1,606

Key Assessment Criteria		Baseline Sanitizer	Alternative Sanitizers					
		Star San	Peracetic Acid	ECA	Lactic Acid	Caprylic Acid	NaDCC Tablets	Ozone
Environmental Human Health Physical Safety	P2OASys rating (L,M,H,VH)	H	H	M	M	M	H	H
	P2OASys primary concern – category with rating of VH	Acute human health effects; physical properties	Acute human health effects; chronic human health effects physical properties; process factors; life cycle	No categories rated as VH	Acute human health effects	Acute human health effects; physical properties	Acute human health effects; ecological effects	Acute human health effects; physical properties
Technical Performance	TURI Cleaning Lab Performance Results – range of ATP readings for all cleaners paired with	0-3	0-2	0-2	0-10	0-1	0-5	0-3
Financial	Capital Equipment Costs	n/a	n/a	Large unit to generate varying rates of solution \$6,000-10,000  Small unit to generate varying rates of solution \$500-\$3,000	n/a	n/a	n/a	Units producing from 1 to 100 gpm at 2ppm \$8,000-48,000
	Chemical Costs	55 gal drum \$1,883	55-gallon drum of 15% solution \$1,400	Cost of salt, water and electricity	Contact vendor for pricing	Contact vendor for pricing	Tub of 256 Tablets \$150	Cost of electricity

# What Does this all Mean

- Breweries seeking safer alternatives to existing cleaning and sanitizing chemistry
  - To determine the best alternative for their facility
    - Consider the key environmental and human health criteria initially
    - Apply the financial criteria to their individual facilities
    - Apply technical criteria

# Questions?

## The Massachusetts Toxics Use Reduction Institute

[www.turi.org](http://www.turi.org)

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# Why Care About Toxics in Your Business?

- Protect workers and customers – potential liability from exposure
- Affects Indoor Air Quality (IAQ)
- Attract sensitive and conscientious customers
- Can cost a lot to fix, but very little to prevent.  
(Report, clean up, short and long term issues from exposure)
- Lower insurance liability

# Incidents of Exposure to Hazardous Chemicals- Maine

(a state with 1.3 million people)

1993-2021 (29 years)

- 6,282 Workers' Compensation cases
- 217 cases per year
- \$23,831,484.89 in total claims payouts since 1993
- Avg cost is \$3,793.61 per claim, but almost 90% of claims have no reported cost.
- Average cost of claims with payouts are \$35,305.90

*Maine Department of Labor (2022)*



# Incidents of Exposure to Hazardous Chemicals- Maine

(a state with 1.3 million people)

- 675 claims since 1993 (10.75%) had payable benefits (23/yr)
- 286 (42.37% of payable, 4.55% of total) had payable benefits in excess of \$5,000 (9.8/ yr)

*Maine Department of Labor (2022)*



# Incidents of Exposure to Hazardous Chemicals- Maine

(a state with 1.3 million people)

Type of Cost	All Claim Cost (ACC)	Average Payable Claim (APC)	ACC Over \$5,000	APC Over \$5,000	Claim Costs over \$5,000
Benefits Paid	\$ 6,821,617.53	\$ 10,106.10	\$ 6,542,418.62	\$ 22,875.59	95.9%
Death Benefits	\$ 27,548.70	\$ 40.81	\$ 27,548.70	\$ 96.32	100.0%
Employee Legal Costs	\$ 26,056.19	\$ 38.60	\$ 24,553.13	\$ 85.85	94.2%
Employer Legal Costs	\$ 794,099.40	\$ 1,176.44	\$ 785,722.19	\$ 2,747.28	98.9%
Lump Sum Amt	\$ 5,032,706.94	\$ 7,455.86	\$ 5,029,706.94	\$ 17,586.39	99.9%
Medical Costs	\$ 9,695,424.67	\$ 14,363.59	\$ 9,368,341.36	\$ 32,756.44	96.6%
Other Payments	\$ 1,165,545.11	\$ 1,726.73	\$ 1,134,106.58	\$ 3,965.41	97.3%
Rehab Costs	\$ 268,486.35	\$ 397.76	\$ 258,198.14	\$ 902.79	96.2%
<b>Total Costs</b>	<b>\$ 23,831,484.89</b>	<b>\$ 35,305.90</b>	<b>\$ 23,170,595.66</b>	<b>\$ 81,016.07</b>	<b>97.2%</b>

Maine Department of Labor (2022)



# New England Regional Certification program



Maine Beer  
Company



# New England Regional Certification program

- Support from



# Questions?