

Alternative Cleaner Trial

Island Dog Brewery in South Portland, Maine

BACKGROUND

The New England Environmental Finance Center (New England EFC), based at the University of Maine's Southern campus at the University of Southern Maine (USM), partnered with Island Dog Brewery located in South Portland, Maine, to trial an alternative cleaner highlighted in the [Assessment of Alternatives to Cleaners and Sanitizers for the Brewing Industry](#) by the Toxics Use Reduction Institute (TURI). Island Dog Brewery expressed interest in an alternative vat cleaner to limit exposure to harmful chemicals and to reduce operational environmental impact. The cleaner chosen for the trial was Surface-Cleanse/930® Neutral Cleaner, produced by International Products Corporation. Surface-Cleanse/930® Neutral Cleaner had the highest efficacy rating of the five alternative cleaners that TURI assessed and was compatible with Island Dog's current clean in place (CIP) set-up. Surface-Cleanse/930® Neutral Cleaner is a liquid cleaner with a neutral pH.

Baseline before testing: The brewery has been using a CIP process using Spartan High-Performance Alkaline FP. Approximately 10 gallons of water were used for pre-rinse heated to a temperature of 140-160° F. The cleaner was used at a concentration of 1.56% (30 ounces cleaner to 15 gallons of water for a 180-gallon vat) at a temperature of 140-160° F. The CIP process lasted for 20 minutes. The wash water was then diluted with the recovered pre-rinse water to help neutralize pH before being discharged. The CIP process was followed by a post-rinse of ~10 gallons of water at room temperature. After the cleaning process, the vat is sanitized.

Left: Island Dog Brewery owner Jim Denz adds Surface-Cleanse/930® Neutral Cleaner to Island Dog's CIP system.

Right: Surface-Cleanse/930® Neutral Cleaner



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HIGHLIGHTS

PARTNERS

The Toxics Use Reduction Institute (TURI) at UMass Lowell, Island Dog Brewing

LOCATION

Island Dog Brewing in South Portland, Maine

SCALE/SIZE

5 Barrel Brewhouse

KEYWORDS

Wastewater, Water efficiency, Energy efficiency, Toxics, Pollution Prevention, Sustainable Operations, Beverage Industry

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APPROACH

Island Dog and New England EFC trialed Surface-Cleanse/930® Neutral Cleaner in one of the brewery vats using a process of pre-rinse, CIP, and post-rinse at two different cleaner dilutions (trial 1 and trial 2). The cleaner was diluted using 15 gallons of water. Pre-rinse and cleaner dilution water was heated to 110 ° F. The CIP process lasted 30 minutes. The post-CIP cleaner was not diluted or treated prior to discharge considering its neutral pH. The recovered pre-rinse water was instead used for the post-rinse.

Trial 1: Trial 1 took place in a vat that had previously brewed a fruit beer. The cleaner dilution was approximately 1.75% or 1 liter of cleaner to 15 gallons of water.

Trial 2: Trial 2 took place in a vat that had previously brewed an India Pale Ale. The cleaner concentration was approximately 2.29% or 1.3 liters of cleaner to 15 gallons of water.

Table 1: Chemical composition of traditional and alternative cleaners.

Composition of Cleaning Product	
Chemical Name	Weight (%)
<i>Spartan High-Performance Alkaline FP</i>	
Sodium Hydroxide	15-40
Potassium Hydroxide	0.1-1
Sodium Polyacrylate	0.1-1
<i>Surface-Cleanse/930® Neutral Cleaner</i>	
Undecanol, ethoxylated	10-25
EO PO Isodecyl Alcohol	10-25
2-methylisothiazol-3(2H)-one	0-0.1

P2OASys Category	Spartan High-Performance Alkaline FP	Surface-Cleanse/930® Neutral Cleaner
Acute Human Effects	VH	M
Chronic Human Effects	H	L
Ecological Hazards	H	L
Environmental Fate & Transport	H	M
Atmospheric Hazard	H	L
Physical Properties	VH	M
Process Factors	H	M
Life Cycle Factors	H	L
<i>Product Rating</i>	<i>H</i>	<i>L</i>

KEY:



Low



Medium



High



Very High

Table 2: Data/table from TURI compiled from the TURI P2OASys tool indicating hazard concern ratings. The P2OASys tool generates a score for the various traditional and alternative cleaners and sanitizers based on a set of databases and the professional judgment of the TURI lab staff.

ENVIRONMENTAL AND HEALTH IMPACTS

Physical Properties/Composition: Island Dog Brewery's traditional cleaner, Spartan High-Performance Alkaline FP, is caustic. The active ingredient with the highest concentration by weight (not including water) is sodium hydroxide (15-40%) more commonly known as caustic soda or lye (Table 1). Spartan High-Performance Alkaline FP's caustic and corrosive properties lead to a TURI rating of very high for physical properties (Table 2).

Surface-Cleanse/930® Neutral Cleaner's primary active ingredient by weight is ethoxylated undecanol, a nonionic surfactant (Table 1) which is physically gentle on most surfaces.

Human Health Effects: As seen in Table 2, TURI's assessment of Spartan High-Performance Alkaline FP rated very high on acute human health effects and high on chronic human health effects considering the potential for respiratory irritation, oral irritation, irreversible skin burns, eye damage, respiratory sensitivity, and/or asthma symptoms. Surface-Cleanse/930® Neutral Cleaner received ratings of medium and low on acute human health effects and chronic human health effects respectively (Table 2).



Left: Island Dog CIP set up.
Right: Before and after of the inside of the vat for trial 2.

Environmental Impacts: Spartan High-Performance Alkaline FP is rated high in ecological hazards, environmental fate & transport, and atmospheric hazard (Table 2). The environmental fate & transport rating can be attributed to the cleaner's bioaccumulation potential. The atmospheric hazard rating is based on the National Emission Standards for Hazardous Air Pollutants. Surface-Cleanse/930® Neutral Cleaner received ratings of low and medium on ecological hazards and environmental fate & transport respectively (Table 2).

KEY FINDINGS

Cleaning results: Trial 1 eliminated most visible debris although an estimated 10% remained. Island Dog was pleased, and owner Jim Denz expressed confidence that the vat could be used at this level of cleanliness following sanitation. Trial 1 did produce a substantial amount of foam requiring extra post-rinse. Trial 2 eliminated all visible debris and did not produce substantial foam so extra rinsing was not required. Varying results may be attributed to the different brews (soil) and dilutions. Owner Jim Denz expressed enthusiasm for Surface-Cleanse/930® Neutral Cleaner as a

viable alternative to the more caustic cleaner Island Dog has been using.

Water Use: While the alternative cleaner uses the same volume of dilution water for CIP, it does not require further dilution prior to discharge due to the neutral pH. Instead of using the recovered pre-rinse (used for warming the tank proper to cleaning) for pre-discharge dilution and new water for the post-rinse, the recovered pre-rinse can be used for the post-rinse. This saves approximately 10 gallons of water per cleaning as long as there is no excessive foaming which may require a higher volume of post-rinse water than what was recovered from the pre-rinse.

Wastewater: Considering that Surface-Cleanse/930® Neutral Cleaner is a neutral pH product there is no risk of impacting the wastewater system. Traditional cleaners have high pHs requiring pretreatment. If proper pretreatment is not done, traditional cleaner discharge poses a risk to the wastewater system.

Energy Efficiency: TURI recommends that Surface-Cleanse/930® Neutral Cleaner should be used at 110 ° F versus the 140-160 ° F for the caustic Island Dog Brewery previously used. Island Dog's use of Surface Cleanse/930 reduces 2.6 kWh of electricity (.09 therms of natural gas) which is less than \$1 per cleaning.

Cost: Surface-Cleanse/930® Neutral Cleaner at the time of trial cost \$269.10/5 gallons. Island Dog Brewery's traditional cleaner at the time of trial cost \$91.86/5 gallons and is used at a lower dilution. Cleaning with Surface-Cleanse/930® Neutral Cleaner would cost Island Dog Brewery \$15.44 per cleaning whereas cleaning with their traditional cleaner costs only \$3.60 per cleaning. Savings in energy efficiency and water use will create financial savings over time considering the ~100 cleanings a year Island Dog Brewery must do. While the cost is greater, reducing the legal liability of a person's exposure to hazardous materials can be a financial benefit. In Maine there are over 400 reported incidents of exposure to hazardous materials by businesses each year where the average cost to the business is over \$2000.

Key takeaways: Island Dog Brewery considers Surface-Cleanse/930® Neutral Cleaner a desirable cost-reasonable alternative. Island Dog Brewery is considering implementing Surface-Cleanse/930® Neutral Cleaner as their regular cleaner and using their traditional cleaner on occasion with consideration to the cost differences. Island Dog Brewery owner Jim Denz's initial impression was that the environmental and human health impacts make the cost investment worthwhile.

Surface-Cleanse/930® Neutral Cleaner is produced by the International Products Corporation. Learn more about the product and view the Safety Data Sheet at <https://www.ip-col.com/cleaners/surface-cleanse-930>, or contact International Products Corporation [through this form](#) or by calling 609-386-8770.