NATIONAL SUGAR MARKETING

100 Galleria Pkwy
Ste 1400
Atlanta, GA 30339
678.741.8275
natsugar.com

Pathogen Monitoring and Sugar Processing Facilities

National Sugar Marketing LLC ("NSM") and its partner facilities, as of May 1, 2017, have discontinued the environmental monitoring prerequisite program for our facilities' Hazard Analysis and Critical Control Point (HACCP) programs. In addition, NSM has also discontinued its monthly pathogen testing program for sugar products. The NSM Quality Team, in association with its partners, have evaluated all potential risks derived from pathogenic microorganisms and believes that the discontinuance of this program will not negatively affect NSM's ability to supply safe and wholesome products. Outlined below is a summary of the rationale employed for these decisions:

Physical Characteristics of Sugar Products: Sweetening foods with sugar products has been a long-standing method for extending the shelf life of foods (1). This is achieved by modifying a product's water activity and preventing microbial proliferation. For sugar to have this functional effect, granulated sugar consistently maintains a water activity of around 0.22 to 0.32 (2, 3). Food-borne pathogens require between 0.84 and 1.0 to grow (4). The incredibly low water activity of sugar products affects turgor pressure and will destroy microorganisms via plasmolysis. NSM's products with a higher water activity, liquid sugar products, also maintain pathogen-free levels. This is confirmed by published pathogen studies that document that liquid sugar products will not present a public health hazard from microbiological contamination (5).

Production Parameters: Sugar processing for beet and cane products involve elevated pH (11.0), high processing temperatures (95C), and filtration (≈0.5 μm), creating an environment hostile for pathogenic microorganism proliferation. Non-pathogenic, thermophilic, spore-forming bacteria that may be present in processing are removed via process filtration.

Empirical Evidence: NSM's partner company, Amalgamated Sugar, initiated an environmental monitoring program in 2001 and monthly pathogen testing in 2006. Testing included Escherichia coli, Salmonella enterica, Staphylococcus aureus, Pseudomonas aeruginosa (discontinued in 2012), and Listeria monocytogenes. During the extent of these programs, there have been no positive results for pathogenic microorganisms.

Food and Drug Administration: The Federal Food and Drug Administration (FDA) has long recognized sugar products as a low-risk food, recommending good manufacturing practices as a sole measure of protection (6). In recent correspondence regarding the Food Safety Modernization Act, the FDA commented in the Federal Register that they didn't expect low-risk food industries to require

NATIONAL SUGAR MARKETING

100 Galleria Pkwy
Ste 1400
Atlanta, GA 30339
678.741.8275
natsugar.com

preventive controls, including biological controls. In their view sugar is one of those low risk commodities. Their comments are as follows:

> "We expect that there will be many circumstances in which a facility appropriately determines that certain biological, chemical, or physical hazards are not hazards requiring a preventive control that must be addressed in the food safety plan. There are several types of food products for which a facility may determine that there are no hazards requiring a preventive control. Such products could include, but are not limited to: many crackers, many types of candy (hard candy, fudge, maple candy, taffy and toffee), honey, molasses, sugar… (7)"

The FDA's classification of the inherently low risk of sugar products coupled with the low risk stance taken by the International Commission on Microbiological Specifications for Foods (ICMSF) (8) further substantiate our guarantee that sugar products will be free of pathogenic microorganisms regardless of laboratory verification. NSM's remaining prerequisite programs and good manufacturing practices are rigorous and will continue to ensure safe products are supplied to our valued customers.

If some customers absolutely require pathogen monitoring, it will be considered on a case-by-case basis and implemented accordingly; however, micro analysis consideration will not be incorporated into lab analyses required for positive release programs due to the time required to plate, incubate, and count samples. This process typically takes 48 hours to complete once received at our microbiology laboratory.

NSM-associated facilities will continue to monitor products for non-pathogenic microbiological criteria for compliance with Canner's and Bottler's standards. This monitoring includes flat sour spores, thermophiles, anaerobes producing hydrogen sulfide, mesophilic bacteria, molds, and yeast. Bottler's and Canner's microbiological testing will continue to be conducted on a per-lot basis.

References:

1. Thorne, Stuart (1986). The History of Food Preservation. Totowa, NJ: Barnes & Noble Books.
2. Internal Analyses (04/04/16).
3. Food Safety. BC Centre for Disease Control. [accessed 2017 May 5]. http://www.bccdc.ca/health-info/food-your-health/food-safety.

NATIONAL SUGAR MARKETING

100 Galleria Pkwy
Ste 1400
Atlanta, GA 30339
678.741.8275
natsugar.com

4. Food and Drug Administration. Bad Bug Book, Foodborne Pathogenic Microorganisms and Natural Toxins. Second Edition. 2012.
5. Niroomand F, Sperber WH, Lewandowski VJ, Hobbs LJ. Fate of Bacterial Pathogens and Indicator Organisms in Liquid Sweeteners. Journal of Food Protection. 1998;61(3):295–299.
6. CFR - Code of Federal Regulations Title 21. accessdata.fda.gov. [accessed 2017 May 5]. https://www.accessdata.fda.gov/scripts/cdrh/cfdocs/cfcfr/CFRSearch.cfm?fr=184.1854.
7. Current Good Manufacturing Practice, Hazard Analysis, and Risk-Based Preventive Controls for Human Food; Final Rule, Fed. Reg. Vol. 80, No. 180, September 17, 2015, p. 55991.
8. Micro-organisms in foods 6: microbial ecology of food commodities. New York: Kluwer Academic, Plenum Publishers; p. 522-533, 2005.

Mike Fowers

Mike Fowers
Vice President of Quality
National Sugar Marketing LLC
Reviewed/Revised: May 6, 2019