



From: Raymond Smith, Facilities and Quality Director

Re: Pathogen Testing of Granulated Sugar

United Sugars Corporation is committed to manufacturing safe and wholesome products. Since refined sugar is a very low risk product for pathogenic organisms, United Sugars Corporation has discontinued the quarterly pathogen-testing program for granulated sugar at the end of 2003. The reasons for discontinuing the end-product testing for pathogens are as follows:

1. There have been no positive results obtained from pathogen testing of the products produced by United Sugars Corporation's eleven facilities since testing began in 1993.
2. Microbes pathogenic to humans are comfortable growing at normal body temperature of 98.6 °F. Pathogenic microbes are not capable of surviving sugar-processing temperatures of 212°F.
3. The water activity (A_w) of sugar (granulated sugar $A_w = 0.622$) does not allow for the growth of pathogenic microbes, which have higher A_w growth requirements in the range of 0.83-0.97 as given in the table below.

Organism	Lowest A_w that organism can grow
<i>Clostridium botulinum</i>	0.93
<i>Staphylococcus aureus</i>	0.83
<i>Bacillus cereus</i>	0.95
<i>Salmonella</i>	0.93
<i>Listeria monocytogenes</i>	0.90
<i>Yersinia</i>	0.96
<i>Vibrio</i>	0.94
<i>Clostridium perfringens</i>	0.95
<i>Escherichia coli</i>	0.97

4. Each facility within United Sugars Corporation has a very stringent GMP (Good Manufacturing Practices) program as well as a HACCP (Hazard Analysis Critical Control Points) program that ensure the cleanliness of the facilities and that the products produced are not adulterated.

United Sugars Corporation will test for pathogens under necessary circumstances. These include, but are not limited to the following:

- GMP's have been violated and the possibility of product contamination is evident.
- The product has been stored in an unsanitary manner (placed in an area with standing water, leaking roof, infestation, etc.) due to unforeseen circumstances.