CASE STUDY – SAFE FOOD HANDLING & STORAGE

PREAMBLE

Responsible providers of food to the public are continually seeking to identify ways to improve their quality systems and ensure their food quality procedures are more robust, more effective and less time-consuming for staff to administer. Most people experienced with quality systems know they do not take time, they SAVE TIME! Data Acquisition Networks (DAN) has worked with a large number of quality food providers and been able to inexpensively assist them to achieve their objectives.

This report has been prepared by Data Acquisition Networks (DAN) using data from one such provider that believed they were achieving high quality standards but came to understand with the benefit of automated monitoring that improvements were required. Peter Davis is a Director of Data Acquisition Networks and has extensive food industry experience covering food manufacturing, hospitality and food service distribution and wholesaling. DAN is a data management company. In compiling this report DAN has relied upon authoritative sources that have been identified in the report as well as accepted food industry custom and practice. The report should be read against this background and input from recognised food experts should be taken rather than relying solely upon the conclusions drawn herein.

FOOD STORAGE

Food Standards Australia[1] requires businesses to prepare and sell food that is safe to eat. Food causes illness because there are high levels of food-poisoning bacteria and these poisons are called *toxins*. "A way of preventing or limiting bacteria from multiplying or producing *toxins* in food is to control the temperature of the food by either keeping it cold or very hot". Food Standards Australia requires potentially hazardous foods to be kept at 5degC or colder and prescribes that it is "safe for food to be between 5degC and 60degC for a **limited time only**". Health regulators and inspectors commonly refer to the **range between 5degC and 60degC as the DANGER ZONE** for perishable foods. Food Standards Australia defines potentially hazardous foods as foods that might contain food-poisoning bacteria and which will allow food-poisoning bacteria to multiply. Examples of potentially hazardous foods are listed as raw and cooked meat, smallgoods, dairy products, seafood, processed fruit and vegetables, cooked rice and pasta, foods containing eggs, beans and nuts and foods that contain these foods for example sandwiches and rolls. Many of these food types are also the foods that are inclusions in a balanced and nutritious diet.

[1] Food Safety: Temperature control of potentially hazardous foods. Guidance on the temperature control requirements of Standard 3.2.2 Food Safety Practices and General Requirements.

Food Standards Australia also requires that potentially hazardous frozen foods are kept frozen when they are stored, displayed or transported. Whilst no specific temperature is specified for frozen food it must be kept frozen to remain safe. Temperature abuse of frozen food can also have a detrimental impact on eating quality. It is commonly accepted that -18degC is a safe temperature at which frozen food should be stored. It is also generally agreed that infrequent but consistent temperature abuse can have a detrimental impact on the shelf-life of food and with some foods temperature abuse can also affect its nutrient value.

Food Standards Australia prescribes food that has been temperature abused for a continuous period of greater than 4-hours should be discarded. The NSW Food Authority[2] recommends perishable foods should not be left in the danger zone for longer than 2-hours!

ANALYSIS OF SAMPLE DATA

In order to undertake an appropriate analysis of the sample data a 3-month period was selected at random and used. This period covers part of the warmer end to summer as well as a period during the early onset of autumn. In practice however outside air temperature is only one influence on food storage temperature.

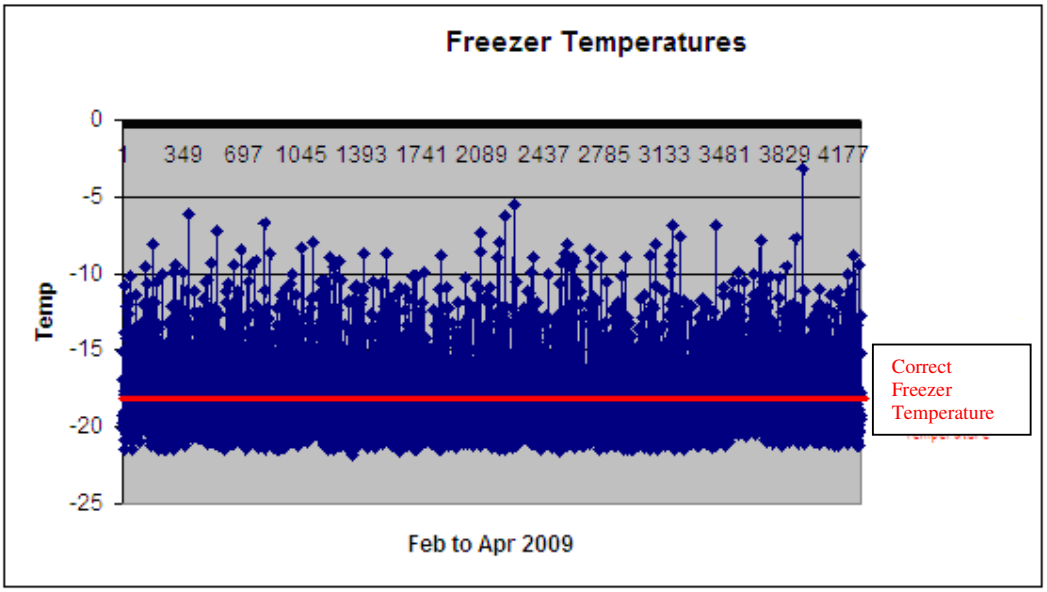
During the 3-month period under review the ***DAN Safe Food Monitoring System*** sent 4,275 data block sets to the website. Each data block set provided an average, a maximum and a minimum temperature for the fridge and the freezer for the half-hour reporting period. The ***DAN Safe Food Monitoring System*** also provides alarms when specified control points are reached. In this case the control points were set at >-16.5degC for the freezer and >+5degC for the refrigerated storage area. **During the 3-month period under review the *DAN Safe Food Monitoring System* notified 462 alarm conditions some of which were reset alarms.**

On 86 separate occasions during the 3-month period the temperature of the freezer storage area was reported by the *DAN Safe Food Monitoring System* to have been at a temperature of greater than -16.5degC for more than 45 minutes. On 7 occasions the freezer food storage area was >-10degC for more than 20 minutes. On 547 separate occasions during the 3-month period the maximum temperature recorded during a single reporting period exceeded >-10degC. There was no single day during the 3-month period when, at some stage during the day, the maximum recorded temperature in the frozen food storage room did not peak at >-

[2] http://www.foodauthority.nsw.gov.au/consumers/keeping-food-safe/#How-can-I-make-sure-my-food-is-safe

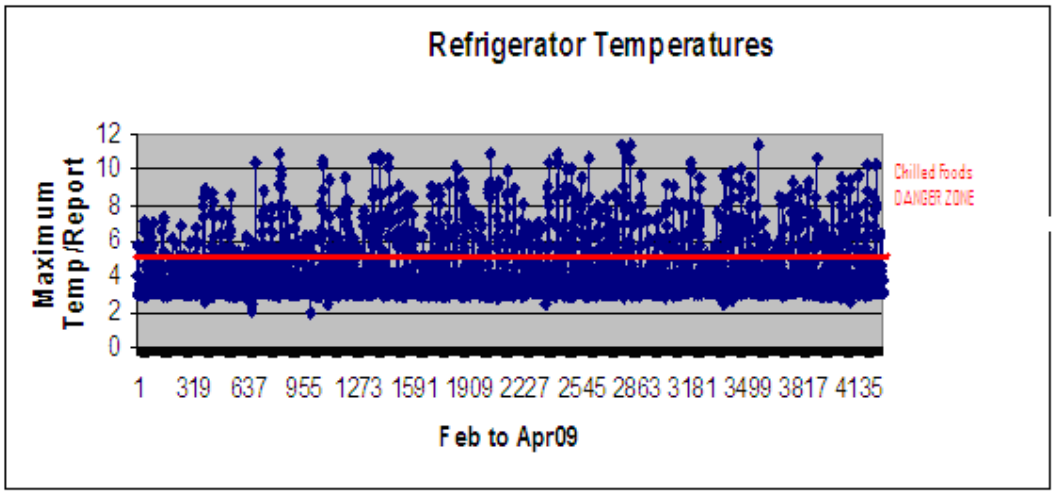
5degC and on February 1st the frozen food storage room recorded a maximum temperature reached during the day of +3.4degC. Given the incidence of temperature maximums >-5degC on many days it is probable frozen food product would have thawed only to be later re-frozen.

The graph immediately below shows the data for the period under review. The red-line labeled 'Correct Freezer Temperature' has been set at -18degC and the graph clearly shows the incidence of storage temperature higher than that level.



The refrigerated storage area during the 3-months under review was > 5degC for 10 minutes on 84 separate occasions. On 253 separate occasions the maximum temperature recorded for a reporting period was greater than +7degC with a maximum of +11.4degC recorded on February 16th which is well inside the danger zone for perishable product.

The graph below charts the MAXIMUM refrigerator temperatures for the period under review and the red-line indicates the point at which the DANGER ZONE commences for perishable and potentially hazardous foods. It should be noted these are the maximum temperatures recorded in any reporting period and that food spoilage is a function of temperature and time. Having said that, any perishable food storage area that has a high frequency of reaching Danger Zone Temperatures has a heightened risk of bacteria growth.



It is important to note that a manual temperature monitoring protocol formerly used on this sample site had not previously indicated this extent of temperature problem. Manual readings have historically been taken by a staff member at prescribed times during the day when temperature abuse was less severe. There is absolutely no suggestion these times were selected for that reason but rather, that the times when temperatures were recorded in accordance with standard procedures, were times when there was less activity and less traffic around the storage areas. As a consequence of less activity, the doors to the storage areas were less frequently open.

Based upon the sample analysis contained herein it is clear that despite genuine efforts by staff to manually monitor temperature, frozen product is likely to have thawed and then re-frozen on 10 or 11 occasions during the 3-month period under review. This estimate is based upon those days where the continuance of high temperature over a larger number of reporting intervals and the maximum temperatures recorded would normally be expected to have resulted in some product thawing.

In the case of chilled product there were 7 occasions on which product arguably stayed high enough in the DANGER ZONE for long enough for concern to be raised. Only microbiological testing and a correlation with time & temperature abuse could fully conclude the outcome.

It is reasonable to conclude however that at best the frozen and chilled product stored over the period under review is sub-optimal and heightens the risk of foodborne illness amongst the consuming public. As a secondary but never-the-less important consideration, the eating quality of food is likely to have been compromised across some food types.

Manual recording regimes with data taken say twice daily never reveal the full extent of temperature abuse. Electronic automated systems such as the ***DAN Safe Food Monitoring System*** used for collection of this sample data facilitate

the correlation of time and temperature abuse with microbial testing. On this basis informed decisions are able to be made as to shelf-life reduction, requirement for immediate usage and instruction to discard. Not only does automated electronic monitoring enable corrective action to be taken to ensure temperature is maintained but correlation of microbial contamination with time & temperature data can mean food is able to be retained when it might otherwise be discarded.

Data Acquisition Networks would like to acknowledge the support and assistance provided by owners and staff of the sample site from which this data has been drawn. For some it can be difficult and even threatening to conduct automated monitoring of food storage under their control as it subjects a process and procedures to more routine and much closer examination, more reliable and closer scrutiny whereas for others, using data objectively is seen as a way to improve performance. It was the latter quality of thinking that DAN found in this outlet and they are to be commended for their commitment to quality and food safety.