FOOD SAFETY SUPPORT

Alberta Agriculture and Rural Development has a team of food safety specialists available to assist you to assess and improve your food safety programs.

www.agriculture.alberta.ca/aha

Contact 780-427-4054
or toll free 310-0000.

Improving food safety programs is a good business decision as doing so can enhance food safety, quality and consumer confidence; reduce waste and recalls; and open doors to additional markets.

Alberta

- **Chemical analyses** - Routine chemical analyses test for the most common chemical parameters found in water, such as iron, sodium, sulfates, nitrates and nitrites. In some cases, you may need to request testing for additional parameters when a regional health concern is identified (such as arsenic or fluoride). A routine chemical analysis is required once a year. When samples for chemical analysis are being submitted it is recommended that the water be collected at the end of the spring off or immediately following an extended period of wet weather.
- **Non-routine testing** - Non-routine testing is necessary when unusual situations occur. Bad water results, unexplained illnesses, obvious contamination situations such as pesticide or hydrocarbon spills or flooding are examples. Occurrences on neighboring properties may also provide reason for non-routine testing.

Sampling

How you collect a water sample is as important as the analysis itself. When collecting water samples for testing, processors should choose sites that represent the various water outlets within the facility. The use of proper sampling bottles and procedures are imperative and can be obtained through your health unit or other approved laboratories performing the analyses.

Interpreting results

After an analysis is performed, the facility should receive a copy of the results. Water sample results received should be kept on file as part of the written records for at least one year from the date of sampling. Local health units are the responsible authorities for identifying whether water is suitable for use in a food processing facility.

The water testing results must conform to the *Canadian Drinking Water Quality Guidelines*. These guidelines outline the acceptable microbiological, chemical, radiological limits and other physical characteristics of water, such as taste and odour. The most significant risks to people's health from water come from microscopic organisms such as disease causing bacteria, protozoa and viruses. The guidelines that relate to these microorganisms are stringent because the associated health effects can be severe. Chemical and radiological substances may also be found in some drinking water supplies but these are generally only a concern if they are present above guideline levels and a person is exposed to them over a period of time. Aesthetic quality guidelines address parameters that may affect acceptance of drinking water, such as odour and taste.

Food Safety Sentinel is now available on-line by visiting the Alberta HACCP Advantage (AHA) website at www.agriculture.alberta.ca/aha and clicking on the link to the Food Safety Sentinel newsletter.

Alberta

Alberta Agriculture
and Rural Development
Food Safety Division

O.S. Longman Building
6909 116 Street
Edmonton, AB T6H 4P2
T. 780-427-4054
F. 780-427-1437

aha@gov.ab.ca
www.agriculture.alberta.ca/aha

References:

- *Canadian Drinking Water Guidelines*, Health Canada, http://www.hc-sc.gc.ca/ewh-semt/water-eau/drink-potab/guide/index-eng.php
- *Water Supply for Food and Beverages Operations*, Cooperative Extension Services, Kansas State University, http://www.oznet.ksu.edu/library/h20ql2/MF1122.PDF
- *Residual Free Chlorine Analysis*, Safe Drinking Water Foundation, http://www.safewater.org/PDFS/owd/OWD_Res_Free_Chlor_Analysis_E.pdf
- *Drinking Water Treatment Devices*, Alberta Health and Wellness, http://www.calgaryhealthregion.ca/publichealth/envhealth/program_areas/drinking_water/documents/AH&W_Choosing_a_Water_Treatment_Device.pdf
- *Water Wells that Last Generations*, Alberta Agriculture and Rural Development, http://www1.agric.gov.ab.ca/$department/deptdocs.nsf/all/wwg404.
- *National Meat and Poultry Code*, Part 7, Second Edition (Amended November 2003), Canadian Food Inspection Agency, http://www.cfis.agr.ca/english/regcode/nmprc/amnd2003/nmpcode2003_e.pdf

This newsletter is made possible with funding from Agriculture and Agri-Food Canada,
through the Canadian Food Safety and Quality Program's Food Safety Initiative, under the Agricultural Policy Framework.

FOOD SAFETY SENTINEL

April 2009

IN THIS ISSUE

WATER SUPPLY IN MEAT PROCESSING PLANTS

WATER SUPPLY REQUIREMENTS AND USES

Any food processing operation needs to carefully consider the supply of water for its process. Overlooking or mismanaging it, in terms of quantity and quality, could bring the operator serious problems.

A plant operator should know with certainty that the water supply meets the following requirements:

- Reliable - sufficient supply is assured regardless of drought or other adverse weather
- Consistent quality - constantly meets applicable water quality standards.

The *Canadian Drinking Water Quality Guidelines* established by the Federal-Provincial-Territorial Committee on Drinking Water and published by Health Canada are used to determine when the parameters exceed established maximum acceptable concentrations. The *Canadian Drinking Water Quality Guidelines* can be found online at: http://www.hc-sc.gc.ca/ewh-semt/water-eau/drink-potab/guide/index-eng.php

In meat processing plants, water is mainly used for two purposes:

General Purpose Water- this water is used in washing carcasses, sanitation activities and employee handwashing. It is used in the largest amounts and it should be potable, clear, colourless and free of contaminants that affect taste or odour.

Process Water - is added to the product itself at any point during any processing steps, e.g. cooking, cooling of cooked product and sausage formulation. It must be potable and of sufficient quality not to degrade product quality. This includes being free of dissolved minerals that make water excessively hard or affect the taste. Hard water contains minerals that could affect the texture of the products. For example iron, manganese or sulfate in high amounts can have an undesirable affect on the taste of the finished product.

Water Sources

There are two possible water sources for the food processing industry: **public** (municipal) supply and **private well**. For any processor, the water supply choice depends on location of the facility, the availability and quality of source options and the cost of any necessary water treatment.

A public water supply should require little, if any, treatment prior to many uses. Public supplies are treated and tested on a regular basis to assure that they meet established safe water standards.

Many facilities use private wells as a source of water supply. Unlike municipal water systems, private water supplies are not always subjected to routine testing for microbiological and chemical contamination or to appropriate disinfection procedures.

Canada

The Agricultural Policy Framework (APF)
A FEDERAL - PROVINCIAL - TERRITORIAL INITIATIVE

Alberta

WELL MAINTENANCE

Wells can become contaminated with harmful bacteria such as fecal coliforms or *E. coli*. If these types of contaminations occur, shock chlorination is one of the most effective methods to eliminate the bacteria.

It is a relatively inexpensive and straight-forward procedure, also used to control iron and sulfate-reducing bacteria in water wells. Although not a cause of health problems in humans, iron and sulfate-reducing bacteria growth will coat the inside of the well casing, water piping and pumping equipment, creating problems such as restricted water flow in distribution lines, plugging of water treatment equipment and a rotten egg odour.

To be effective, shock chlorination should be done on a regular basis, at least once a year as part of a routine well maintenance program. Shock chlorination will disinfect the following parts of the well:

- The entire well depth
- The formation around the bottom of the well
- The pressure system
- Some water treatment equipment
- The distribution system

To accomplish this, a large volume of chlorinated water is siphoned down the well to displace all the water in the well and some of the water in the formation surrounding the well. To be effective, you must use enough chlorine and water mixture to reach and disinfect the entire cased section of the well and surrounding water-bearing formation. Complete information on Shock Chlorination can be found in Module 6 of "*Water Wells that Last Generations*" published by Alberta Agriculture and Rural Development at: http://www1.agric.gov.ab.ca/$department/deptdocs.nsf/all/wwg404

There are generally three types of private wells used:

- **Dug** – These wells are made by digging a hole in the ground, and then casing the hole with a strong material to prevent collapse. Dug wells are not generally very deep, ranging from 10 to 30 feet. This short depth means these types of wells are most at risk for contamination.
- **Driven** – These types of wells are usually deeper than dug wells, ranging from 30 to 50 feet in depth. This is still reasonably shallow and therefore a driven well has quite a high risk of contamination.
- **Drilled** – Drilled wells are the deepest form of well and range from 100 to 400 feet in depth. They intersect bedrock cracks containing ground water and this creates a water supply.

Water Treatment Systems

Private wells can become contaminated if they have been poorly constructed or improperly sited or if they have been infiltrated by contaminated surface water. In fact, the aquifer (the water-bearing underground layer of porous rock or sand) itself can even be the source of contamination. Depending on the source of the water, conditions of use, and extent of microbiological contamination, disinfection may be needed.

Although products and materials for the treatment of drinking water are not currently regulated at the national level, Health Canada recognizes the need for these items to be safe and effective. Health Canada does not recommend specific brands of water treatment devices, but it suggests that consumers look for a label indicating that the device has been certified as meeting the appropriate National Science Foundation International (NSFI) or American National Standards Institute (ANSI) standards.

Water treatment devices can be divided into two groups, according to function:

1. **Disinfection systems** – kill or inactivate biological contaminants present in the water supply.

Chlorination is the most common disinfectant method used in Canada, easy to use and relatively inexpensive to operate. Chlorine kills most disease-causing organisms and requires short to moderate contact times. Chlorine treatment alone, however, may not provide adequate protection against parasites such as *Giardia lamblia*. If parasites are present or suspected, it is recommended that the water be first passed through a filter to remove these parasites and then chemically treated with chlorine to kill bacteria and viruses.

Residual Chlorine

In order to ensure that the water is treated through the whole distribution system an excess of chlorine is usually added. The chlorine will decrease in concentration with distance from the source until it reaches the point where the chlorine level can become ineffective. Therefore, it is important to make sure that there is enough chlorine remaining to disinfect even at the far ends of the distribution system.

There are two ways in which residual chlorine is measured:

- *Free Chlorine* residual is the chlorine that has not reacted with any organic or inorganic matter; it remains in the water after the chlorine demand has been satisfied.
- *Total Chlorine* is the chlorine that remains in the water that is both free and reacted.

To determine if the treatment is effective the Federal-Provincial-Territorial Committee on Drinking Water recommends a minimum of 0.1mg/L (ppm) free chlorine and 0.5 mg (ppm) total chlorine.

Ultraviolet (UV) systems are also effective against bacteria, viruses and parasites and produce no taste or odour. In addition, only a few seconds' exposure to UV light is required if the water is clear. They do not, however, ensure the safety of the water beyond the point of application, so that flushing the system is recommended after periods of non-use.

Distillation systems – besides removing bacteria, they are also used to reduce the levels of all chemicals in drinking water. They are effective for the removal of heavy metals and are often combined with filtration for the removal of certain "volatile" chemicals.

Ozonation systems produce small quantities of ozone that is effective in killing pathogens over a short period of time. This system produces no taste or odour in the water. The process is dependent, however, on thorough mixing of ozone with the water.

2. **Other Treatments** are designed to improve the aesthetic conditions of the water supply but they can also be very effective at removing specific contaminants in water:

Reverse Osmosis (RO) can remove nearly all contaminants, including lead, nitrate and sodium, pesticides and heavy metals. RO removes contaminants from water using a semi- permeable membrane that permits only water, and not dissolved ions such as sodium, to pass through its pores. Although not designed for microbial removal, RO units can prevent the passage of viruses through the membrane.

Filtration is used to remove small particles in the water. In many cases, particles may be soluble in water and must undergo chemical reactions (chlorination) to draw the particles out of the solution so that the filters can remove them. Filters can also be effective in removing chemicals and bacteria.

Water Quality Testing

Public Water Supply

The drinking water supply can be broken down into three parts: the source of water, the water treatment system and the distribution system, which carries the treated water to facilities. Municipalities have regular water testing programs and can provide a plant with results of the tests performed after the water goes through the treatment system. Any chemical analysis performed by the municipality can also serve as the potability record for the facility, provided the document is kept on file and is updated on an annual basis. This document may also contain a bacterial analysis and can be used as a reference to show the acceptance of the water entering the facility. However, a facility should also test the potability of the water following distribution by sampling the water for microbial analysis at different points of use throughout the plant.

Well Water

Aquifer contamination, problems with a well's structure or lack of routine maintenance could each lead to a change in water quality. Changes in water quality are not detected by changes in taste, smell or appearance. For this reason it is important to sample and analyze water on a routine basis. Alberta Agriculture and Rural Development regulations require water to be sampled and tested for:

- Bacterial analysis - Bacterial analysis determines the total coliform and fecal coliform (*Escherichia Coli*)bacteria in the water. Coliform bacteria are usually present in soil and surface water. Fecal coliforms are present in animal and human waste. Both are indicator organisms for the potential presence of pathogenic (disease causing) bacteria. Bacterial analysis can be done through your local health unit and it's required to be done at least on a monthly basis.

WATER STORAGE

Water storage facilities are generally used to add to the supply when a regular or main source alone cannot meet peak demands. Water storage facilities must be constructed from materials that won't reduce water quality. Materials should be listed in the *Reference Listing of Accepted Construction Materials, Packaging Materials and Non-Food Chemical Products* published by the Canadian Food Inspection Agency or facilities must have, on file, a 'Letter of No Objection' for the material used from Health Canada.

Metal and plastic are the most common materials used for water storage. Plastic can be a problem as it generally is permeable or lets through many gases. Therefore, water storage tanks made from plastic should be kept away from chemicals that may pose a contamination risk to the stored water.

When buying new water storage tanks and equipment, processors should ensure that they are thoroughly cleaned and sanitized before use. Regular cleaning procedures for water tanks should be included in the facility's sanitation program.