Pollution Prevention
For
Small Slaughterhouse and Meat Packing Operations

Many communities in Wisconsin and Midwest states have small slaughterhouse, meat packing and processing facilities that discharge wastewater to the POTW. With increasing emphasis on BOD, phosphorous and chloride reductions, these facilities can have a significant impact on the ability of the POTW to maintain compliance with their wastewater permit. This fact sheet is provided as one of a series which can help small communities and the businesses located in them to reduce the impact of their wastewater on the local POTW.

Preventing the Impact of Small Slaughterhouse and Meat Packing Operations

Typically a small slaughterhouse processes 10-20 live cattle or hogs for slaughter, one or two days a week, with the meat cut and processed on-site for farmers or sold directly through a store front. Although meat cutting and meat curing activities of such facilities are also a concern for wastewater, the kill floor by far has the most direct impact. The wastewater from the kill floor area of the facility is rich in blood, flesh, fat and other animal waste. Without efficient procedures and attention to detail the wastewater from a kill floor area can quickly place the local POTW out of compliance with their permit and in extreme cases, can result in failure of the wastewater treatment process completely.

Detailed research related to the environmental effects of these facilities was accomplished many years ago. As a result of those studies the following steps are logical and reliable strategies for controlling the impact of small slaughterhouse wastewater.

1. Blood Collection
The first step is to prepare and plan well for blood collection in the kill floor area. A North Carolina study [http://www.p2pays.org/ref/01/00466.pdf](http://www.p2pays.org/ref/01/00466.pdf) indicates that the slaughtering operation is the largest single source of waste load in a meat packing plant, and blood is the major contributor.

According to the study “blood is rich in BOD, chlorides, and nitrogen. It has an ultimate BOD of 405,000 mg/l and a BOD₅ between 150,000 and 200,000 mg/l. Cattle contain up to 50 pounds of blood per animal, and typically only 35 pounds of blood are recovered in the sticking and bleeding area. The remaining 15 pounds are lost, which represents a waste load of 2.25 to 3.0 lb/1000 lb Live Weight Kill (LWK). Total loss of the blood poses a potential BOD waste load of 7.5 to 15 lb/1000 lb LWK.
The typical BOD load from blood losses in the slaughtering operation is estimated to be 3 lb/1000 lb LWK because very few meat plants practice blood control outside of the bleeding area. In beef plants, much of this loss occurs in the process steps following bleeding.” Knowing the impact of blood it is easy to see that probably the largest gains can be made by focusing on blood collection through several steps.

- Employees conducting the slaughter must be trained to skillfully process the animals with an understanding of environmental issues
- Employees should have the most ergonomically helpful tools available to help them handle the animal during slaughter
- Allowing the animal to drain longer during the stick and bleed will have a significant impact on reducing the amount of blood remaining in the animal
- Blood collection devices such as a floor trough, tanks, containers or other devices specifically designed to catch the blood and away from the facility sewer drains are critical

2. Paunch, Offal and other Waste
The contents of the animal, is another major source of waste and subsequently possible BOD loading to wastewater. According to the North Carolina study “Paunch manure, which contains partially digested feed material, has a BOD of 50,000 mg/l. At an average paunch weight of 50 pounds per head, dumping of the entire contents can contribute 2.5 lb/1000 lb LWK.

The common practices are to either screen the paunch contents, washing the solids on the screen (wet dumping), or to dump on a screen to recover the solids, allowing only the “juice” to run to the sewer (dry dumping). Wet dumping of the paunch represents a BOD loss of about 1.5 lb/1000 lb LWK because 60 to 80 per cent of the BOD in the paunch is water soluble. If dry dumping is practiced, the pollution load is much less than this.”

When none of the paunch is discharged to the sewer but is processed or hauled out of the plant for land disposal, paunch handling does not contribute to the waste load. Obviously it is extremely important to collect as much of the waste as possible to prevent the waste, juices or rinse water from entering the sewer drain.

3. In facilities with no wastewater pretreatment capability, an appropriate sized collection tank or multiple tank collection system may be needed. The animal carcass must be rinsed after skinning and gutting. It is best to have collection tanks which are sized to collect all of the first rinses of the carcass as they are still rich with blood, flesh and fat, even under the most efficient conditions.
4. It is unlikely that many small operations will have a wastewater pretreatment system unless they are required to do so by the local POTW in order to discharge to the sewer. In those cases where pretreatment of wastewater is required, Dissolved air flotation (DAF) and other conventional treatment systems designed specifically to remove solids and reduce BOD seem to be the most appropriate technologies to consider.

5. With an efficient blood and waste collection strategy that keeps the materials away from the sewer the loading to the local POTW will be greatly reduced. Ultimately the small slaughterhouse will need to comply with the local ordinance and either capture all blood and wastes or install an appropriate waste water pretreatment system.

**Technical Assistance Programs (TAP) Resources**

Using the resources listed below and the technical assistance available from state TAP’s is an inexpensive way to help businesses find the best methods to successfully reduce pollutant loadings from slaughterhouse and meat packing operations. Access to those resources is readily available in all Great Lakes states through the following web sites.

*The University of Wisconsin-Extension-Solid and Hazardous Waste Education Center* (SHWEC) is the state TAP for Wisconsin. SHWEC provides environmental information and assistance that can help you reduce or eliminate wastes, wastewater and air emissions through on-site visits and direct technical assistance. Visit [www.shwec.uwm.edu](http://www.shwec.uwm.edu) to learn more about SHWEC or to contact a specialist.

*The Great Lakes Regional Pollution Prevention Roundtable* (GLRPPR) provides contacts to other Great Lake States TAP’s and also provides access to additional national resources through the National Pollution Prevention Roundtable at [http://www.p2.org/](http://www.p2.org/). The GLRPPR is an extensive resource for publications and information through their web site at: [http://www.glrppr.org/](http://www.glrppr.org/) and provides direct access to the Publicly Owned Treatment Works and Meat Processing “Topic Hub” through the GLRPPR web site.

**Slaughterhouse Environmental Case Studies and Technical Information**

The North Carolina Division of Pollution Prevention and Environmental Assistance Waste Reduction Resource Center is perhaps the best single resource for pollution prevention studies and materials for this industry. Most of the following are from their web site and used in the recommendations of this fact sheet.
Reduction in Waste Load from a Meat Processing Plant-Beef
http://www.p2pays.org/ref/01/00466.pdf

Reduction in Wastes at a Meat Processing Plant
http://www.p2pays.org/ref/10/09347.htm

Slaughterhouse process changes to reduce biological oxygen demand (BOD)
http://www.sustainablealternatives.net/cases.cfm?caseid=1054

NCMS Environmental Road Mapping Initiative Meat Processing contains several more current and relevant documents and studies related to meat processing issues.
http://ecm.ncms.org/ERI/Meat/index.html

http://ecm.ncms.org/ERI/Meat/BMPslaughter.htm

Natural Rendering from Cornell University
http://cwmi.css.cornell.edu/naturalrendering.htm

Rendering Services

National Renderers Association Inc.
http://www.renderers.org

Sanimax
http://www.sanimax.com/products/rendering.htm

Wastewater Regulation

Always check with your local POTW for an ordinance covering specific additional limits on wastewater discharges. In Wisconsin, wastewater regulations are readily available on the internet. Many cities, towns and villages also have their wastewater ordinance on their web site. All Wisconsin statutes and administrative codes are available at these two searchable web sites:

Wisconsin Statutes http://www.legis.state.wi.us/rsb/stats.html
Wisconsin Administrative Codes http://www.legis.state.wi.us/rsb/code.htm
The following specific Wisconsin regulations apply to the slaughterhouse and meat packing industry.

NR 258 Meat Products  
http://www.legis.state.wi.us/rsb/code/nr/nr258.pdf

NR 214 Land Spreading Systems for Liquid Wastes and By-Product Solids  
http://www.legis.state.wi.us/rsb/code/nr/nr214.pdf

*Land Application of Food Processing By-Product Solids (WI-0057665-3).*  
This permit is intended to cover discharges of by-product solids to land spreading sites. By-product solids are waste materials from the animal or food processing industry including animal paunch manure (stomach contents).  
Fact Sheet and the Request for Coverage document

Even when there is no permit or local ordinance in place, all industrial facilities in Wisconsin are also required to comply with NR 211.10 which lists prohibited discharges.

The Wisconsin Department of Natural Resources portal to wastewater regulation is at  
http://www.dnr.state.wi.us/org/water/wm/ww/index.htm

A condensed list Wisconsin NR Chapters for Water/Waste Water/Storm Water is located at:  
http://www.dnr.state.wi.us/org/water/wm/ww/CtlRules.htm

Most if not all other Great Lakes States also have their wastewater regulations on the internet and can be easily accessed through the state TAP or a common internet search engine.

**Other resources of information helpful to the Slaughterhouse Industry**

US Department of Agriculture: Food Safety and Inspection Service  

Hazard Analysis and Critical Control Point (HACCP) Program  

Resources for Small and Very Small Plants  


Material Safety Data Sheets are maintained and offered freely by Vermont SIRI. http://hazard.com/msds/

The US Centers for Disease Control has fact sheets on specific Toxic Substances which may be encountered at: http://www.atsdr.cdc.gov/toxfaq.html

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