

Potential for Reuse of Low Contamination Abattoir Effluent (PIP.O10)

Establishing a mutually beneficial water reuse arrangement with a neighbouring process

Project Aims

- Characterise the volume and contaminant level of potential reuse (“white” water) streams
- Determine the appropriate technology to enable the reuse of this water in a nearby industry and/or within the abattoir itself
- Develop a best practice water reuse model for the meat industry.

Story

In this time of heightened concern about water use efficiency, Northern Co-Operative Meat Company Ltd has taken significant steps towards water reuse. The installation of separate drainage systems has permitted the segregation of “white” streams from slaughter floor wastewater and established a viable reuse opportunity at a neighbouring tannery.

Description of project

When the Veal Floor at Northern Co-Operative Meat Company Ltd was rebuilt in 1999 not only was water efficiency incorporated into the design, but separate drainage systems were installed to permit segregation of “white” streams (steriliser and handwash water) from other slaughter floor wastewater streams. To take advantage of the opportunity to quantify and evaluate the various wastewater streams, they installed monitoring equipment to relay details of cold water, steriliser water and handwash water usage on the Veal Floor to a central SCADA system.

Large volumes of reasonably high quality water were found to be available from the viscera table boot-wash wastewater stream, the viscera table 2nd cold wash and the combined steriliser wastes from the hide-on area. They were, consequently, collected along with some other medium-to-high quality wastes such as handwash wastes and viscera table hot water wash wastes.

Substantial reuse of ‘white’ wastewaters reclaimed from slaughter floors could be reused in the stockyards and for cattle washing. However, it was determined that tanning operations, located adjacent to the abattoir, offered reuse opportunities of the same order of magnitude as stockyards with the advantage that the water did not need to be treated to potable level.

The CSIRO confirmed that the use of the reclaimed water from this project (in the tannery presoak, dehairing and delimiting stages) presented insignificant risk to the quality of the tanned hides. However, temperature and microbiological contamination were identified as important issues with some of the stages in the tanning process. One important constraint was that the tanning process at the nearby tannery requires water of about 26 to 28oC whereas the identified slaughter floor wastewaters vary from ambient temperature to over 80 oC.

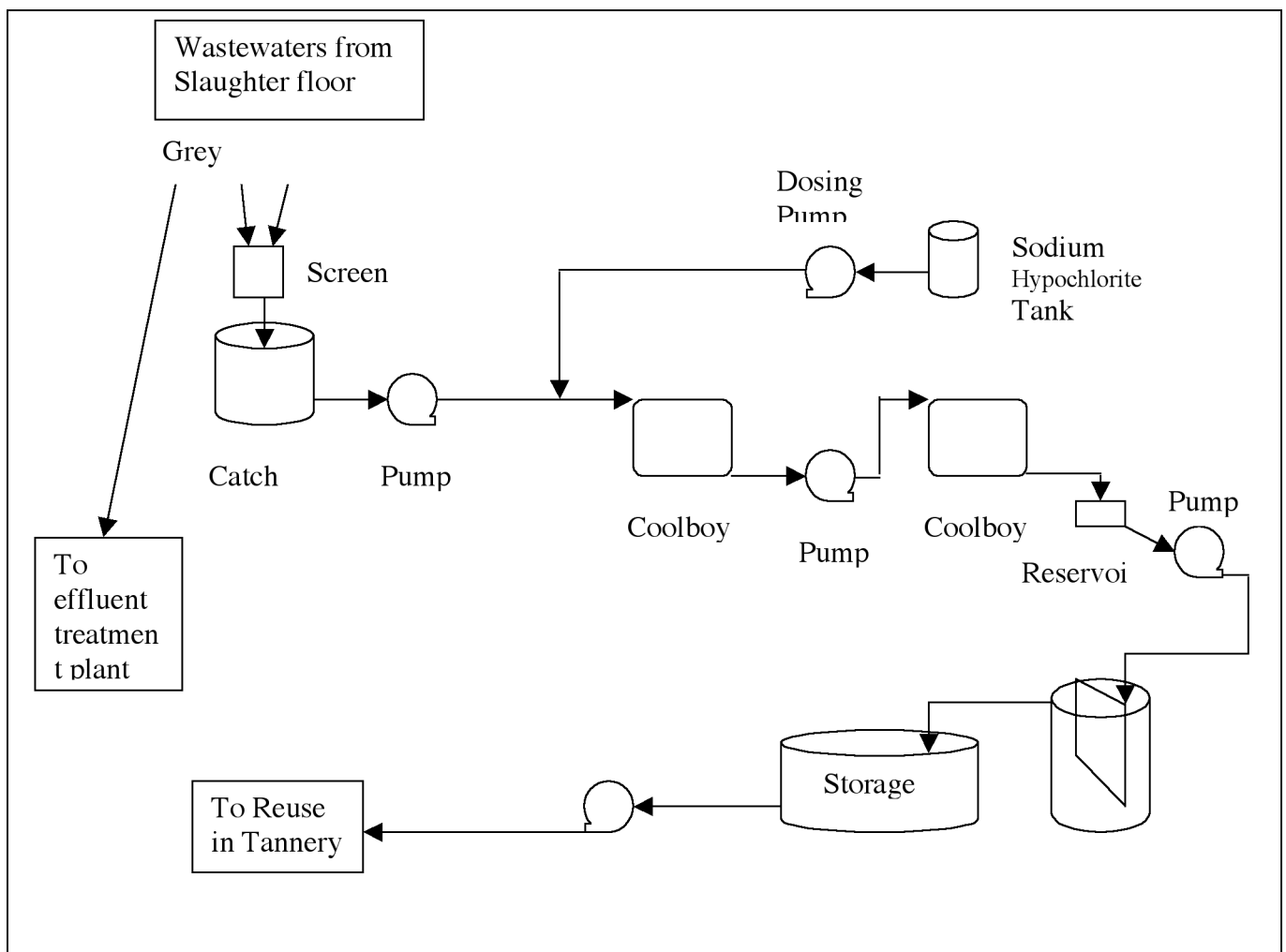
A model was developed to predict the volume, temperature and contamination of any combination of individual wastewater sources. From this model the combination of the following wastes was found to be suitable for reuse in the tannery subject to cooling.

Major Outcomes

- 100kL per day reduction of water usage at the tannery
- Continued expansion of water reuse from the abattoir to the tannery
- Reduced hydraulic & temperature load on the abattoir effluent treatment plant

Effluent Source	Temperature (oC)	Volume(m3)	Quality Rating
Hide on Knife Sterilisers	82 +	20	High
Vis Table 2nd cold wash	20 - 25	21	Med / High
Vis Table Boot Wash - cold	20 - 25	19	Med / High
Vis Table Boot Wash - hot	72	15	Med / High
Vis Table last cold wash	34	10	Medium
Hide on Handwashes	30	10	Medium
Vis Table hot wash	48	8	Medium

When applied to these combined wastes the model predicted the collection of about 104 kL of water at 46°C. Cooling was planned using existing evaporative coolers configured as shown in the diagram below.



The collection, basic filtering and chlorination system were established, with the reclaimed water transferred to the tannery for presoaks and final washouts of the tanning drums. Once established, the average collection temperature was found to be 53°C with the cooling system capable of delivering a high quality water to the tannery at 14-16°C.



The water reuse plant with coolboys at the left rear



The "white" wastewater catch tank

Evaluation

Key points to note from this project are:

- 100kL per day of white water previously sent to the effluent system has been reused
- Removal of 100kL of water at approximately 50°C has allowed the effluent plant to operate at a lower temperature
- Reduced water volume and reduced temperature has created the potential for a smaller, more efficient, effluent treatment facility
- Establishment of a useful wastewater prediction model

The white water recovery prediction model appears to have been successful and can be used at other abattoirs. The reuse of reclaimed "white wastewater" has continued at the tannery since the project was completed and successfully continues to displace fresh town water in the tanning process. There have been no problems with product quality in relation to the use of reclaimed water.

Since the project was completed there have been significant improvements in the amount of water reclaimed and the amount of reclaimed water reused at the tannery. White wastewater sources identified in the PIP, but not collected at the time, are now being collected and there are plans to continue expanding the collection of "white" wastewaters. The reuse at the tannery has been expanded from the first 2 steps of tanning to the first 4 steps. Improvements also are being made to the disinfection of the water to allow chlorination of the stored water when no reclaimed water is being added.

There is no financial transaction between the abattoir and the tannery as it is part of the same corporate ownership. However, with the cumulative savings in town water and the reduced cost of handling the reduced volumes of wastewater, the savings to NCMC are estimated at \$12,000 pa. The cost of capital required to make these savings is an order of magnitude higher than the savings. The project would not necessarily be justified on monetary payback alone. However, there are other advantages of the project including reduced sensitivity to drought, reduced sensitivity to future cost increases in town water, and fostering a responsible corporate ethic with regards to minimising resource wastage.

Summary

Northern Co-Operative Meat Company Ltd has taken the opportunity given by the previous redevelopment of their beef slaughterfloor to identify and establish the successful recovery and reuse of specific “white” wastewater streams. While many abattoirs do not have the infrastructure to easily recover separate wastewater streams, the model prepared by NCMC could allow them to predict a final stream from a number of different source streams. The model would allow other abattoirs to establish the cost/benefit of modifying plant to enable the capture of specific streams.

NCMC have used their relationship with the tannery to their mutual benefit. For NCMC it is the removal from site of a significant volume of wastewater without passing through their effluent treatment plant. For the tannery it is the ability to obtain water to meet their needs without taking potable water from other sources.

This opportunity for reuse would be available to any abattoir with any type of complimentary processing facility nearby and should be considered as a significant environmental improvement.

Contacts

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