90 Day Trade Waste Project

Best Practice / Food Park - Literature Review

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1 Purpose

Review the current rationale for management of trade waste (i.e. onsite pre-treatment prior to transport versus treatment by a utility at the end of pipe) and how it compares to industry 'best practice'.

1.1 Method

To be completed by conducting a desktop evaluation on the philosophy of trade waste management philosophies and practices.

1.2 Background

Like most other Australian water utilities, South Australia's wastewater networks and treatment plants were originally designed to transport and treat domestic strength waste. As industry grows, the proportion of higher strength waste discharged to the networks increases.

SA Water employs the philosophy of requiring trade waste customers to discharge via the most appropriate primary treatment (excluding high risk networks/locations, specific contaminants, etc) (SA Water Corporation - Trade Waste, 2012). This is primarily to minimise network issues (chokes, odours, safety, etc), minimise shock loads of trade waste at the WWTP (Wastewater Treatment Plant) and maximise reuse potential of materials post-WWTP.

Primary treatment is the mechanical process of removing gross solids from wastewater. Secondary and tertiary treatments remove nutrients by biological or chemical dosing, and further improve water quality for discharge or reuse. Secondary and tertiary treatments are complex and expensive, and are typically carried out by SA Water's Wastewater Treatment Plants.

2 Management of Trade Waste Literature Review

2.1 Australian Sewage Quality Management Guidelines

The Australian Sewage Quality Management Guidelines (ASQMG) (2012) were developed by Water Services Association of Australia (WSAA) members. The original version was drafted in 2008 (first labelled 'National Wastewater Source Management Guidelines') and submitted to WSAA Sewage Quality Network for review. The network consulted with representatives from the majority of urban water utilities across Australia, as well as subject matter experts.

The ASQMGs also refer to 'Guidelines for Sewerage Systems - Acceptance of Trade Waste' which was developed by Australian and New Zealand counterparts. This document describes the increasing trade waste challenges with existing wastewater networks, outlining how utilities can mitigate the risk to infrastructure and community.

Originally, wastewater networks in Australia were developed in response to community and government requirements to improve public health. As such, the networks were designed to accept, transport and treat typical domestic strength wastewater. During this time, industry had also grown and discharging to wastewater networks was viewed as the most appropriate method for disposal at the time. Utilities rapidly became aware that infrastructure was not designed for trade waste and therefore could not sustain these types of discharges indefinitely. (ANZ councils, 1994)

In an attempt to mitigate the risks involved with non-domestic discharges, the high level objectives for managing the sewer as prescribed by WSAA ASQMGs (2012) are:

1. **Safety of people**

   Safety hazards exist for personnel working the wastewater network or treatment plant, for example highly volatile substances which may by flammable or toxic.

2. **Protection of assets (pipes, plants and equipment)**

   The further from domestic strength waste the wastewater becomes, the greater the likelihood of asset damage. This may be caused by corrosive wastewaters disintegrating pipes and manholes or grease and solids causing blockages, both examples compromising public health and increasing the utility's cost of operation.

3. **Protection of treatment processes**

   WWTPs are typically designed to treat consistent strength wastewater. Significant shock loads have been known to have catastrophic effects on WWTPs, disturbing the biological process for days, placing at risk regulatory compliance and recycling potential.

4. **Facilitation of regulatory and licence compliance**

   WWTPs are required to meet certain standards to protect the environment and community; meaning the utility is required to make all reasonable and practicable measures to prevent exceedance. Additionally, some substances are not removed by the typical treatment process, meaning harmful compounds may be passed into aquatic environments if they are not removed at the source.

5. **Facilitation of recycling**

    Whether the WWTP reuses wastewater or biosolids, if the wastewater is contaminated, these resources may be rendered unusable, possibly placing the end user at risk or placing a significant cost on the utility to dispose of the resources elsewhere.

To meet these five objectives, the ASQMG recommend using the multiple barrier approach, based on risk. Multiple barriers can manage contamination more effectively than one barrier, as this reduces the reliance on one barrier constantly working at 100% effectiveness. Preventing contamination at the source is preferable to removing contaminants with additional treatment infrastructure. This is why an on-site barrier, in the form of a pre-treatment device for on-site treatment is desirable.

In particular circumstances, it may not be economically feasible to remove certain contaminants at the WWTP, therefore incentive type pricing is recommended to minimise contaminants at the source as agreed upon in the National Water Initiative (Governments, 2004).

In addition to pricing incentives, the ASQMG and the National Guidelines for Water Recycling (2006) recommend trade waste customers are also issued with contracts with quality and quantity limits, as well as on-site treatment requirements.

The National Guidelines for Water Recycling (2006) have this recommendation to minimise the presence of chemical hazards in recycled water, primarily for public health purposes. For sites where there are no direct chemical hazards to public health, on-site treatment serves the purpose of protecting the treatment process of the utility. If the utility treatment process is disturbed, this may have public health concerns as well.

Across Australia, water minimisation campaigns for both domestic and industrial customers have occurred over recent time. This has the added impact of concentrating waste in the sewer, increasing odour generation and corrosion rates, and therefore costs. With industrial sites, this highlights the 'higher than domestic sewage concentration' point source discharge, further supporting the removal of contaminants at the source (Water Services Association of Australia, June 2012). This is supported by Sydney Water's case study by managing accelerated sewer corrosion through on-site treatment.

2.2 Sydney Water Case Study - Managing Accelerated Sewer Corrosion Through Source Management

-contributed by Sydney Water (represented by Andrew Kirkwood) to the WSAA ASQMG:

In 2002 Sydney Water experienced a significant structural collapse in a critical location of the wastewater network. By analysing the network, it was found >90% of the BOD load originated from trade waste customers including food, dairy and beverage. This BOD load, coupled with typically acidic pH, deteriorated the network significantly and unexpectedly. By investigating appropriately, site discharge limits were reviewed to allow safe trade waste discharge into the network.

This is an example of inadequately managed trade waste discharge, which consequently caused substantial damage to the utility's assets. By allowing customers to discharge without completely understanding the impact on the wastewater network, the public's health was placed at risk, sewerage services were compromised and considerable costs were borne by the utility. Once Sydney Water researched the incident, it was understood what contributed to the network collapse. As a result, the 'barriers' at the customers' sites (on-site treatment) were reviewed and upgraded appropriately to mitigate the risk to the utility's assets.

2.3 Valuing Decentralised Wastewater

-sourced from 'Valuing Decentralised Wastewater' (2004)- Kevin D White

There are several benefits to treating wastewater at the source. Treating at the source allows treatment capacity to be developed as demand increases, meaning there is minimal excessive capacity installed but not used for an extended period.

By installing treatment equipment as required, this allows installations to use the best current available technology. Smaller installations, which may be modular systems, also have shorter lead times; large capacity upgrades take considerable time to complete. Contaminants of interest requiring particular treatment cost less to treat at the source than at the final destination (taking into account flow and therefore sizing of equipment).

2.4 National and Overseas Utilities Management of Trade Waste

The trade waste strategies of Australian and overseas utilities were investigated by means of an Internet search. Given the number of potential results, this search predominantly looked at a number of utilities which were thought to be similar to South Australian utility service standards to give an idea of equivalent management practices. The search reports if trade waste management is on-site or utility focused.

Table 1. Snapshot of Australian utilities management of trade waste

Utility	State	City/Region	Trade Waste Management
Sydney Water	NSW	Sydney, Illawarra, Blue Mountains	On-site
Power Water	NT	Northern Territory	On-site
SA Water	SA	South Australia	On-site
Hunter Water Corporation	NSW	Lower Hunter	On-site
Water Corporation	WA	Western Australia	On-site
Queensland Urban Utilities	QLD	Brisbane, Ipswich, etc	On-site
Unity Water	QLD	Moreton Bay, Sunshine Coast, Noosa	On-site
City West Water	VIC	Western Melbourne	On-site
South East Water	VIC	South east Melbourne	On-site
Yarra Valley Water	VIC	Eastern Melbourne	On-site
ACTEW	ACT	ACT	On-site
TasWater	TAS	Tasmania	On-site

Table 2. Snapshot of international utilities trade waste management

Company	Country	Region	Trade Waste Management
City of North Las Vegas	America	North Las Vegas	On-site
City of New York	America	New York City	On-site
United Utilities	England	Central England	On-site
Business Stream	Scotland	Scotland	On-site
Wessex Water	England	South west England	On-site
German ATV Rules and Standards	Germany	Germany	On-site

As is evident in Table 1 and Table 2, the only management of trade waste found for national and overseas utilities is on-site treatment.

It is important to note that whilst this is not an exhaustive list, there were zero examples where a utility was found to be treating industrial wastewater at the end of pipe.

Looking at the German Rules and Standards (1994) there are clear similarities with the WSAA ASQMGs. The German Rules and Standards (referred to as the Standards going forward) have discharge limits in place for similar objectives listed in Section 2.1; namely safety of people, protection of treatment process, protection of assets, protection of environmental and quality of reuse products. If a discharge is believed to contravene any these objectives, the Standards state the discharge of industrial wastewater into wastewater networks is to be made dependent upon a pre-treatment or other suitable measure.

Similar to SA Water, the Standards details a number of prohibited contaminants which must not be discharged to the wastewater network, including (but not limited to) milk, cement, potato starch, explosive mixtures, oils, fats and cleaning chemicals which may cause excessive foaming.

Importantly, the Standards state the discharge of industrial wastewater into a domestic wastewater network may be the correct choice for both economic and technical reasons. This has the joint benefit of minimising the total load of pollutants discharged to the environment (Abwassertechnische Vereinigung (ATV), 1994). However, if contaminants create operational difficulties or compromise the environment, the Standards state the wastewater should be avoided, or reduced in content by retention at source or by pre-treatment by the discharger.

2.5 Best Practice Cost Benefit Analysis

Finding a cost benefit analysis for centralised versus decentralised trade waste management proved difficult. Similar studies were found for municipal waste, from which some key points may be applied.

Ultimately, the ideal analysis would be looking at a municipal system with trade waste on-site treatment; or a sewerage system completely designed to accept industrial strength waste in every catchment. All catchments would need to be designed fairly so as not to disadvantage businesses not on industrial strength accepting catchments. To overdesign a sewerage system to this degree, capital costs would increase significantly, with ongoing maintenance of such a system significantly higher than a standard municipal system. By this design, the predominant user (being households generating domestic waste) of the sewer system would be heavily subsidising this overdesign based on the existing charging structure.

3 Consolidating Customer Types

By consolidating customer types for example in an industrial park, economies of scale may be achieved in the provision of utilities. A centralised treatment device at an industrial park for similar customer types may have advantages over individual treatment.

With reference to ASQMG, the 'best practice' for water utilities is to treat contaminants at the source with on-site treatment. Therefore, industrial discharges will be required to have a form of onsite treatment (whether for their own site or the industrial vicinity). Given food and beverage industries generally produce trade waste with similar characteristics, it may be preferable to co-locate production facilities and adopt a combined pre-treatment approach. This may have benefits including:

1. **Economy of scale**
   a. Lower overall CAPEX
   b. Lower overall OPEX
2. **Holistically, less units to maintain increasing the simplicity of operation** (including pumps, compressors, monitoring equipment, DAFs, etc)
3. **Accountability for treatment system may be more amenable to be contracted out**
4. **Depending on consolidated industry type, various wastewaters may complement each other** (e.g., one with acid discharge, one with alkaline discharge; end result may be neutral)
5. **Sludge management may be more efficient**

If an industrial park exceeds the utility's chargeable thresholds, the industrial park will still need to cover the utility treatment cost of their trade waste. To recoup costs for a centralised pretreatment device in an industrial park, each discharge would need to be monitored. This will fairly charge each industrial site their proportion of trade waste discharged to the utility.

Further work would be required to confirm the benefits and impacts of such a proposal, and this work should only occur once the location and identity of the food and beverage producers are known. An appropriate time to perform this work may be when PIRSA's Food Park project reaches feasibility stages.

4 Conclusion

As detailed in the WSAA Guidelines, the recommended 'best practice' for trade waste management in Australia is on-site, at the point of source. This is for a number of reasons, including worker safety, asset protection, treatment process protection and successful reuse of wastewater products.

Australian implementation of this 'best practice' is supported by Section 2.4, where utilities of similar service standards to South Australia were found to employ on-site treatment. Importantly, there were zero examples of similar utilities treating industrial wastewater at the end of pipe.

In conclusion, as compared to Australian and overseas utilities, as well as trade waste management guidelines, literature and case studies, SA Water currently employs industry standard practice.

5 Bibliography

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