

Variation to Trade Waste Standards - Ammonia

Information Guide

To obtain an overview of this information guide, please refer to the quick reference guide on the following page.

Quick Reference Guide

Are you unable to comply with the Ammonia limit in your Trade Waste Agreement? If so, you will need an Ammonia Variation or - for dischargers to Western Treatment Plant - an application for discharge in excess of 50 mg/L. To help you complete your Ammonia Variation application or application for discharge in excess of 50 mg/L, you will need to do the following:

Title	Activity	Refer to the following question number of this Guide for further information
Familiarisation	Familiarise yourself with the necessary application to be made and the application process.	Question Nos. 3 and 5
Sampling Program	Determine a sampling program jointly with South East Water. Carry out the approved sampling program.	Question No. 8
Application Letter	Following consultation with South East Water, prepare and submit the application letter.	Question No. 9 and Appendices A and B
Waste Minimisation Plan	If requested, submit a Waste Minimisation Plan for the parameter Ammonia.	Question No. 10
Ongoing Sampling	Carry out the ongoing sampling program, as requested by South East Water	Question No. 5, Item 11 and the revised Trade Waste Agreement.

INFORMATION GUIDE

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1. What is a Variation to the Standards and Why is it Needed?

South East Water's conditions for acceptance of industrial sewage (termed Trade Waste) are set by its' operating licence from the Victorian government. The **Standards for Trade Waste Discharged to the Sewerage System** (hereafter called the **Acceptance Standards**) are detailed in South East Water's **Trade Waste Information Guide** and as a schedule to Trade Waste Agreements.

Customers having trouble meeting a standard, whilst utilising commonly available and accepted treatment technology to the extent practicable, can write to South East Water and seek a variation to the Acceptance Standards.

In addition, for discharges to Western (Werribee) Treatment Plant, the ammonia limit has been raised from 50 to 200 mg/L. However the requirements that must be met for operating at these higher levels are similar to those discharges to Eastern Treatment Plant without the formal application process to Melbourne Water. Thus this guide sets out the requirements for these applications too.

2. What is Ammonia?

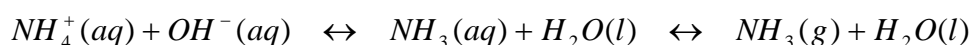
Ammonia in the aqueous phase refers to the sum of both ammonium ions (NH_4^+) and unionised ammonia (NH_3) in solution. It should be noted that ammonia is normally expressed in mg/L as nitrogen and not NH_3 .

Ammonia arises in wastewater from the breakdown of proteinaceous material, and from other aqueous wastes containing nitrogen, such as photographic waste.

3. Why are there Limits for Ammonia and What are They?

The main hazard from the discharge of ammonia to sewer is that the substance is volatile and the sewer atmosphere can contain significant concentrations of ammonia. Ammonia in the sewer atmosphere (sewer headspace) poses an inhalation hazard to sewer workers.

The equilibrium reactions for partitioning of ammonia between the aqueous phase and the gaseous phase are as follows:



It needs to be noted that the reaction is dependent upon the hydroxide or H^+ concentration in the wastewater, thus the equilibrium is dependent upon the wastewater pH. At high pHs the liberation of ammonia occurs from the wastewater into the gas phase. At low pHs solution of ammonia in the aqueous phase is increased. The equilibrium is affected by wastewater temperature, with higher temperatures liberating greater quantities of ammonia. Release of ammonia to atmosphere is also affected by the sewer geometry, particularly the presence of drop structures.

The safe limit for ammonia as nitrogen is 50 mg/L, at a pH of between 6.0 and 10.0. In order to obtain a higher limit for discharge of ammonia, it is common to reduce the upper pH limit to a lower value to retain a similar ammonia concentration in the headspace and thus limit the Occupational Health and Safety risk to sewer workers. The Trade Waste Acceptance Advisory Committee reviewed the limits for ammonia and stated that restricting the upper limit of pH to 8.0 may enable safe discharge of ammonia concentrations up to 200 mg/L. South East Water's acceptance standards require that due to the complexity of conditions in the sewer (pH, temperature, conditions of other dischargers to the sewer, sewer geometry, etc.), the OH&S risk needs to be assessed for each discharger, by desktop study and by testing of the sewer headspace for ammonia.

In addition, Melbourne Water, who are the treaters of 90 % of Melbourne's sewage, currently have limits on the quantity of ammonia that they can treat, whilst meeting their EPA Waste Discharge Licences. For discharges going to the Western Treatment Plant, ammonia-nitrogen concentrations should be limited to 200 mg/L. In the case of discharges to the Eastern Treatment Plant and in the divertible part of the sewer catchment, the limit is 50 mg/L. Despite this limit, a small number of variations have been granted for ammonia exceeding 50 mg/L in the Eastern Treatment Plant catchment

The limits in South East Water's Acceptance Standards are as follows:

4.3 Nitrogen

An occupier must not discharge trade waste with a concentration of; ...

- (b) *Ammonia, plus ammoniacal ion (expressed as N) greater than:*
- (i) *50 mg/litre, except as provided by this paragraph.*
 - (ii) *200 mg/litre, where –*
 - (A) *the trade waste discharged can only be received by Melbourne Water's Western Treatment Plant;*
 - (B) *a risk assessment has been conducted;*
 - (C) *the occupier can comply with a restricted pH range of 6.0 to 8.0;*
and
 - (D) *the occupier has demonstrated to the Authorised Person, that commonly available waste minimisation technology has been applied to the best extent practicable.*

4. What are the Requirements for Obtaining a Variation to the Acceptance Standards?

South East Water can only accept sewage that falls outside these Acceptance Standards if:

- a) The sewage will not adversely affect:
- The health of sewer and sewage treatment plant workers,
 - the sewerage and sewage treatment plant assets,
 - the sewage treatment plant process and
 - the environment.
- b) All other affected licensees are consulted with and approve of the discharge. This clause refers to consultation with Melbourne Water Corporation, who is responsible for treating the bulk of Melbourne's sewerage, at the Eastern and Western Treatment Plants.

Melbourne Water accepts sewage from South East Water under a ***Bulk Sewage Transfer, Treatment and Disposal Agreement***, between the two parties. This agreement requires that South East Water must receive Melbourne Water's consent for variations to the Acceptance Standards for significant Trade Waste customers and major dischargers.

In the case of a variation to the acceptance standards a customer needs to demonstrate that everything practicable is being done to minimise the discharge of pollutants to the sewerage system, in particular for the substance for which the variation is sought.

5. What is the Process of Obtaining a Variation to the Acceptance Standards or an Increase Above 50 mg/L?

The variations process for ammonia consists of the following steps:

1. The customer should consult with the South East Water Trade Waste Engineer before making any application. The Trade Waste Engineer will determine which type of application is required and the scope of any necessary sampling program. The sampling programme will determine the maximum ammonia concentration, together with a history of pH and temperature in the discharge and whether additional pH correction will be required. South East Water can assist, by providing the customer's historical data from the Trade Waste database.

2. The customer should determine the maximum daily flow from the property, either based upon the customers records, or from flow monitoring carried out over a period of two months.
3. The customer should carry out the agreed sampling programme. This program must be carried out at the cost of the customer.
4. The customer then submits a written request to South East Water to apply for a variation or alteration to the discharge limit, detailing the required maximum ammonia concentration.
5. South East Water will carry out a desktop study, to assess whether the OH&S risk is acceptable and provide a firm quotation for carrying out headspace testing, if required. **The customer must pay in advance for the headspace testing.**
6. South East Water will arrange for headspace testing, in cooperation with the customer. **The costs of the testing shall be borne by the customer.**
7. South East Water will then review all the available information and assess the application, to ensure that it meets the requirements. If the application requires referral to Melbourne Water it will be forwarded for their review and acceptance.
8. Whilst the application for the variation is being assessed the customer will be asked to prepare and submit a new Trade Waste Application, together with the relevant application fees.
9. Provided the Variation Application is approved, South East Water will prepare a new Trade Waste Agreement, incorporating the new variation into the agreement conditions.
10. It is a requirement of any customer receiving a variation that they carry out waste management assessment for the ammonia parameter and its components. This requirement will be written into the new agreement. Generally the customer will be given six months to carry out this task.
11. The customer will be required to carry out an ongoing program of measurement of ammonia concentrations and pH at a specified frequency. This requirement will be written into the new Trade Waste Agreement.

In the case of discharges in excess of 50 mg/L to the Western Treatment Plant, items 1, 3 to 9 and 11 are followed.

6. How Long does an Ammonia Variation Application or Increase Above 50 mg/L take to Approve?

Arranging a headspace testing program and receipt of laboratory results can take up to six weeks. South East Water requires two weeks to review an application for an increase above 50 mg/L and to prepare a variation application to Melbourne Water. Melbourne Water requires up to four weeks to approve an ammonia variation. **Therefore, a customer can expect a variation application to take up to three months to approve.**

7. What are the Costs in Obtaining an Ammonia Variation or Increase Above 50 mg/L

The customer will be required to meet the costs of the headspace sampling and analysis program and the ongoing monitoring costs for self monitoring the ammonia in the discharge, required by the new agreement. South East Water and it's consultant's costs for the headspace testing program are normally approximately \$2,500, and can be confirmed at the time of application. It must be noted that these costs apply irrespective of approval or rejection of the application.

The customer will be required to pay a new application fee for the new variation, to cover processing costs for the variation and the new Trade Waste agreement. The customer can obtain advice regarding these fees from their Trade Waste Officer, or by reference to South East Water's brochure titled **Trade Waste Charges**.

8. What are the Requirements for the Sampling Program and Headspace Testing?

The customer may be required to carry out a sampling program, to determine maximum ammonia concentrations, pH and temperature, at the customer's expense. **The customer must consult with the South East Water Trade Waste Engineer to determine the scope of the sampling program.**

Headspace testing is carried out by South East Water and an Occupational Health and Safety consultant. Headspace testing consists of the following process:

- Three separate headspace test runs are usually required, on the recommendation of the Occupational Health consultant, and are carried out on different days.
- For each run the customer must discharge typical wastewater to sewer for the duration of the headspace testing. Headspace testing usually takes two hours for each run. The wastewater must be at a flow rate, an ammonia concentration, pH and temperature similar to that being applied for in the application. As pH is a logarithmic parameter, the pH must be particularly close (within 0.3 pH units) to the limit applied for.
- For each run South East Water and its consultant will sample the sewer headspace for ammonia, at and downstream of the customer's sewer branch, in the main sewers outside the customer's property. The sewer and the customer's discharge shall also be sampled and analysed for pH, temperature and ammonia concentration.
- The Occupational Health consultant shall then prepare a report on the safety of the sewer atmosphere.

9. How Should a Customer Apply for an Ammonia Variation?

A customer's application for an ammonia variation should be a formally signed letter on company letterhead. The request for a variation should include the following information:

1. The maximum ammonia concentration being applied for.
2. The duration for which the variation is required (maximum of three years).
3. The reasons why a variation for ammonia is necessary. There need to be sound reasons for requesting the variation. This should detail the options reviewed for reduction of ammonia (commonly available technology) and why they are impractical.
4. The details of current and proposed waste minimisation practices to reduce discharge of ammonia, and the expected effects. Future waste minimisation practices need to have timelines for their implementation.
5. The typical number of working days per week for the last two years. If there are different production seasons, these should be separately detailed. South East Water will use the customer's billing records and the above information to determine the average daily flow.
6. The maximum daily flow achieved for each of the past two years, from the customer's own records. If however no historical data is available in this respect, the maximum daily volume should be determined by the customer recording flows from the existing meters, over a period of two months.
7. It is also important to determine if changes to production or production processes will affect future ammonia loads (load = discharge volume x ammonia concentration), within the horizon of the new Trade Waste Agreement (usually three years). These factors need to be detailed in the application **separately** from the current ammonia load discharged and timelines attached regarding their implementation.
8. The customer's ammonia and pH monitoring results should be attached to the application letter.
9. The customer needs to confirm that they will meet the reduced pH range of 6.0 to 8.0.

A sample application letter for an ammonia variation is attached as **Appendix A**.

10 How Should a Customer Apply for an Increase Above 50 mg/L?

A customer's application for an ammonia increase above 50 mg/L to Western Treatment Plant should be a formally signed letter on company letterhead. The request for a variation should include the following information:

- 1 The maximum ammonia concentration being applied for.
- 2 Details of waste treatment or minimisation practices adopted at the site. This should also highlight any technology that could not be implemented at the site and why this is the case.

3 Confirmation that the customer can comply with the reduced pH range of 6.0 to 8.0

A sample application letter for discharge of ammonia in excess of 50 mg/L to Western Treatment Plant is attached as **Appendix B**.

11 What are Waste Minimisation Activities and What is a Waste Management Plan?

As part of a variation application, the customer must demonstrate to South East Water that it is doing everything practicable to minimise the discharge of ammonia to sewer.

As a requirement of the initial Trade Waste Agreement incorporating an ammonia variation, the customer will be required to prepare a Waste Management Plan for the site, particularly targeting the ammonia issue. This plan should include the following:

- Determine all the inputs contributing to the generation of waste (particularly ammonia) at the site.
- Determine the outputs or generation of waste from the production and waste treatment processes.
- Identify any possible means for reducing the generation of waste (particularly ammonia) and determine their viability.
- Prepare an economic evaluation for determining the cost and profitability of any waste minimisation activities.
- Prepare an implementation program for those activities that are to be adopted.

The viability of waste minimisation activities will probably involve research and development to ensure that they do not adversely affect the production process or the quality of the finished product, however many minimisation activities have a positive payback.

Further details regarding the preparation of Waste Management Plans can be obtained from the Victorian EPA's Information Bulletin No. 383, ***Guidelines for Preparation of Waste Management Plans***. This document is available from South East Water, or from the EPA Victoria's South Metropolitan office on telephone (03) 9794 0597.

12 How Long Will the Ammonia Variation or Increase Above 50 mg/L Last?

Generally, variations for ammonia will be granted for a maximum period of three years. The South East Water Trade Waste Engineer can advise the duration of the variation based upon your circumstances. At the end of this period the variation will require renewal. In some cases where the impact of the ammonia is significant, the variation will be granted for a shorter period - perhaps one year, or the time it will take to implement appropriate treatment technology.

Ammonia limit increases to Western Treatment Plant above 50 mg/L will last for the life of the Trade Waste Agreement. Further details of agreement length can be obtained from South East Water.

13 Where Can I Obtain Further Advice?

Further advice regarding the variation process can be obtained from the South East Water, Trade Waste Engineer, on telephone (03) 9552 3662, or Email tradewaste@sewl.com.au.

Appendix A

Sample Application For Ammonia Variation - XYZ Company Pty Ltd

The XYZ company processes food products to produce seasonings. The company generates an ammonia waste stream, which it processes through an ammonia-stripping tower before discharge to sewer.

Sample Customer Pre-application Letter -

XYZ Pty Ltd
24 – 26 Smith Road
Moorabbin 3189

Manager, Trade Waste Branch
South East Water Limited
Locked bag 1
Heatherton Vic 3202

Date

Dear Sir

We wish to apply for a variation for ammonia for our Manufacturing operation at 24 –26 Smith Road, Moorabbin (Your Ref TW: 10001).

- 1 We require a variation for ammonia to 80 mg/L, for a period of three years.
- 2 An ongoing ammonia variation is required, due to the difficulties in stripping ammonia below the 80 mg/L limit over winter. We have investigated the option of installing biological treatment, however this option will not guarantee a lower ammonia concentration in winter.
- 3 The following waste minimisation practices have been or will be implemented:
 - * Installation of a filter on the drier washwater Reduction 20 kg ammonia N/day Implemented July 2000.
 - * Replacement of Cooker Grease Trap with a DAF system Reduction 95 kg ammonia N/day Implementation September 2001.
5. We typically operate our Moorabbin factory five and a half days per week – Saturday morning included is reserved for a major equipment wash down. We close the factory for four weeks from Christmas Eve.
6. We have monitored our daily wastewater flow rate for the past two months. Our maximum daily flow rate is 90 kL/day. In January 2000 we reduced our average daily flow by 35 kL/day, by installation of recycling of scrubber water. Thus last year's maximum daily flow would have been approximately 125 kL/day.
7. We are proposing to increase production by 25 % in June 2001 by installation of a new production line. Our wastewater production will increase by 25 %, however in September 2001 ammonia load will decrease by 12 %, due to waste minimisation projects detailed above. Therefore our maximum ammonia load will occur from June up to September 2001.
8. As advised by you, additional ammonia monitoring was not required. As we have pH correction, we can meet the pH 6.0 – 8.0 limit.

Should you require any further information, please contact me on telephone 9555 1234

Yours sincerely
Bob Smith
Production Manager

Appendix B

Sample Application for Ammonia Increase Above 50 mg/L to Western Treatment Plant - RST Company Pty Ltd

The RST company processes food products to produce seasonings. The company generates an ammonia waste stream, which it processes through an ammonia-stripping tower before discharge to sewer.

Sample Customer's Application Letter

RST Pty Ltd
10 Jones Street
Port Melbourne 3207

Manager, Trade Waste Branch
South East Water Limited
Locked bag 1
Heatherton Vic 3202

Date

Dear Sir

We wish to apply for an increase in ammonia discharge limit for our manufacturing operation at 25 – 31 Jones Street, Port Melbourne (Your Ref TW: 10002), as we discharge to the Melbourne Water Western Treatment Plant at Werribee.

1. We apply for an ongoing increase in ammonia limit to 200 mg/L.
2. We currently use a stripping tower for treatment of ammonia in our trade waste discharge. An ongoing ammonia variation is required, due to the difficulties in stripping ammonia to the 50 mg/L limit over winter. We have investigated the option of installing biological treatment, however this option will not guarantee a lower ammonia concentration in winter. Generation of ammonia was reduced in January 2001 by removal of particulate food matter from the wastewater, using a filter.
3. We confirm that we can meet the reduced pH range of 6.0 to 8.0, by installation of pH dosing, which we undertake to carry out following written approval of the change in limits.

We await your advice regarding Headspace Testing.

Should you require any further information, please contact me on telephone 9555 8888

Yours sincerely

John Jones
Production Manager