

Variation to Trade Waste Standards – Total Dissolved Solids

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 Total Dissolved Solids (TDS) limit in your Trade Waste Agreement? If so, you will need a TDS Variation. To help you apply for your TDS Variation 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 Variation Application process.	Question No. 5
Sampling Programme	Determine a sampling programme and submit the programme to South East Water for approval. Carry out the approved sampling program.	Question No. 8
Pre-application Letter	Submit sample results and Variation Pre-application letter to South East Water for review.	Question No. 9 and Appendix A
Application Letter	Following receipt of advice from South East Water, prepare and submit the Variation Application letter.	Question No. 9 and Appendix A
Waste Minimisation Plan	If requested, submit a Waste Minimisation Plan for the parameter TDS.	Question No. 10 and Appendix B
Ongoing Sampling	Carry out the ongoing sampling programme, as requested by South East Water	Question No. 5, Item 11 and the revised Trade Waste Agreement.

Table of Contents

1.	What is a Variation to the Standards and Why is it Needed?	4
2.	What is Total Dissolved Solids?.....	4
3.	What are the limits for Total Dissolved Solids and Why?	4
4.	What are the Requirements Which Govern Obtaining a Variation?	5
5.	What is the Process of Obtaining a Variation?	5
6.	What is the Timing Regarding Submitting a TDS Variation Application?	6
7.	What are the Costs in Obtaining a TDS Variation?	6
8.	What are the Requirements for the Sampling Programme?.....	6
9.	How Should a Company Apply for a TDS Variation?	7
10.	What are Waste Minimisation Activities and What is a Waste Management Plan?	8
11.	How Long Will the TDS Variation Last?.....	8
12.	Where Can I Obtain Further Advice?	9
Appendix A	Sample Application for TDS Load Variation.....	A.1
Appendix B	Suggestions for Minimisation of the Impact of TDS	B.1

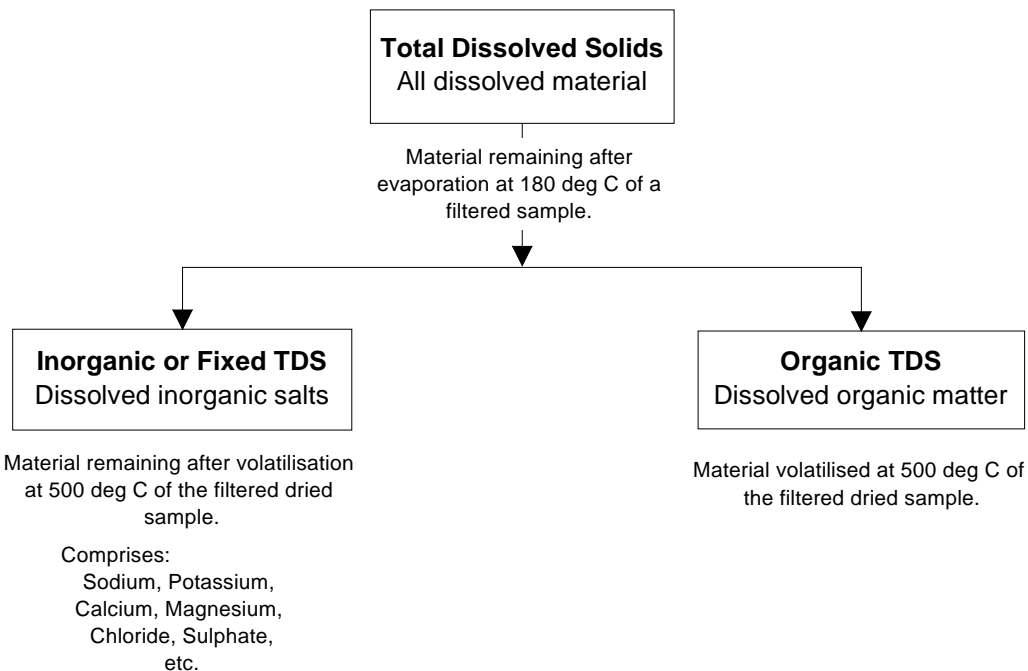
1. What is a Variation to the Standards and Why is it Needed?

South East Water's standards for acceptance of industrial sewage (termed Trade Waste) are set by its operating licence with the Victorian government. The standards are detailed in South East Water's document *Trade Waste Information Guide*.

Where a customer is having trouble meeting the standards, whilst using commonly available and accepted treatment technology to the extent that is practicable, then the customer can write to South East Water and seek a variation to the acceptable standards.

2. What is Total Dissolved Solids?

Total dissolved solids (abbreviated to TDS) refers to all dissolved material in the Trade Waste. TDS can be broken down into the following constituents.



3. What are the limits for Total Dissolved Solids and Why?

The Trade Waste standard for Total Dissolved Solids is a load based limit of 200 kg of TDS per day. Note that this is a **daily load** limit, which should be measured by determining the TDS concentration of a daily composite sample multiplied by the daily wastewater flowrate.

A limit has been set because high levels of TDS can effect the ability to reuse effluent from sewage treatment plants. This potentially contradicts the Environment Protection Authority's policy that ¹:
"Measures to conserve water resources shall be implemented where possible including...(ii) the re-use of wastewater...including treated sewage effluent...for uses such as irrigation of crops or pasture, watering of parks and gardens and recharge of wetlands."

The EPA is writing into all waste discharge licences for sewage treatment plants that treated effluent reuse be maximised, in accordance with the above policy. Approximately 90% of South East Water's sewage and Trade Waste is treated at Melbourne Water's Eastern and Western Treatment Plants, which incorporate reuse requirements in their waste discharge licences.

Dissolved salts in treated effluent, particularly sodium and chloride, interfere with plant growth and affect the soil structure. The EPA's *Guidelines for Wastewater Reuse* recommend that² it, "...is

desirable that the total dissolved solids of the wastewater are less than 1000 mg/L and preferably less than 500 mg/L..." The 1998/99 concentrations of TDS in treated sewage effluent from Eastern and Western Treatment Plants were 500 and 1,290 mg/L respectively. The conclusions are that both treatment plants cannot accept any further increases in TDS concentrations.

The Sodium Adsorption Ratio (SAR) is a measure of the effect of sodium versus other cations on the soil structure, when used for irrigation. The SAR is calculated as follows:

$$\text{SAR} = \frac{[\text{Na}^+]}{\sqrt{[\text{Ca}^{2+}] + [\text{Mg}^{2+}]}} \quad \text{Where the concentrations of all ion species are in mmol/L.}$$

The SAR increases with increasing sodium concentrations and decreasing calcium and magnesium concentrations. The optimum SAR value for wastewater for irrigation is a level of 3 or less. In 1998/99, the SAR of the effluent at Western Treatment Plant was 9.4. A study for the Western Treatment Plant concluded that the plant cannot accept much more increase in the SAR of the effluent. The 1998/99 SAR for the Eastern Treatment Plant effluent was 5.2, which Melbourne Water believes is close to the limit and would jeopardise future reuse schemes. **All requests for TDS variations therefore must also include data to enable the SAR of the contributing wastewater to be assessed.**

4. What are the Requirements Which Govern Obtaining a Variation?

South East Water can only accept sewage that falls outside the Trade Waste standards if:

- a) The sewage will not adversely affect:
 - The human health of sewer and sewage treatment plant workers;
 - the sewerage and sewage treatment plant assets;
 - the sewage treatment plant process;
 - the environment; and
- b) All other affected licensees are consulted with and approve of the discharge. This clause refers to consultation with Melbourne Water, which 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 in accord with 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 high-risk Trade Waste customers and major dischargers.

South East Water and Melbourne Water are required to adhere to the EPA's *Industrial Waste Management (Waste Minimisation) Policy 1990*. This policy requires South East Water and Melbourne Water to ensure where practicable that new Trade Waste Agreements require commonly available and appropriate waste minimisation technology.

In the case of a variation to the 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?

The variations process for TDS consists of the following steps:

Collection of Information

1. The customer must develop a sampling programme to determine the daily average TDS concentration, together with a breakdown of the Inorganic component of the TDS into its major chemical constituents
2. The customer should submit their proposed sampling programme to South East Water, for approval.
3. 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.
4. The customer must carry out the sampling programme at their cost.

Preapplication Letter/Facsimile

5. The customer will then summarise and submit to South East Water both their discharge flow data and the TDS concentration data. South East Water will then analyse the information and assist the customer to determine the TDS load to be applied for.

Application Letter

6. The customer then submits a written request to South East Water to apply for a variation, for the required TDS load.

Approval Process

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.

Post Approval

10. It is a requirement of any customer receiving a variation that they carry out waste management assessment for the parameter TDS 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 programme of measurement of TDS concentrations at a specified frequency (usually one daily composite sample every two or three months). This requirement will be written into the new Trade Waste Agreement.

6. What is the Timing Regarding Submitting a TDS Variation Application?

A customer can apply for a TDS variation at any time, however, it is a requirement that when a customer's Trade Waste Agreement comes up for review and the maximum TDS load exceeds 200 kg/day, then the customer needs to apply for a TDS variation, which would be included in the new agreement. **This variation must be approved before their existing agreement expires.** In this case it needs to be recognised that the time required for processing the application is significant.

Arranging a sampling programme and receipt of laboratory results can take up to six weeks in total. South East Water requires six weeks to review and prepare the TDS application to Melbourne Water. Melbourne Water requires up to four weeks to approve a TDS variation. **Therefore, a customer needs to commence arrangements for their variation application at least four months ahead of the expiry date of their Trade Waste Agreement.**

7. What are the Costs in Obtaining a TDS Variation?

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*.

The customer will be required to meet the costs of the sampling and analysis programme for the variation application and the costs for ongoing monitoring of the TDS in the discharge, required by the new agreement.

8. What are the Requirements for the Sampling Programme?

The customer is required to carry out a sampling programme, to determine daily average TDS concentrations, at the customer's expense.

The customer must submit details of the sampling programme, to South East Water's Trade Waste Technical Officer, for review and acceptance, prior to the programme commencing.

A minimum of six daily composite samples are required for the sampling programme. Existing TDS composite samples taken within the last twelve months can count as part of the six samples. The samples should be taken on days typical of the different **normal** production runs carried out at the

customer's site, including one run on a day of the expected worst case TDS load. Where some stormwater is directed to sewer, then samples **should not** be collected on a wet weather day.

The sampling location should be selected to be representative of the full discharge to sewer. Where there are multiple discharge points on the customer's site, then the customer will need to separately sample and analyse each of the discharge points (six daily samples for each) and then determine the total TDS load by appropriate flow weighting of each of the chemical parameters.

Ideally, samples should be flow weighted daily composites samples (ie samples made up of aliquots proportional to the flowrate over the full duration of the day). It should include any periods such as the end of the day washdown, etc, in addition to normal production waste. Many analytical laboratory/ environmental monitoring companies can provide the equipment and set up the sampling programme for you. Where flow weighted samples are impossible to take, the customer should attempt to prepare a daily composite sample by taking samples at equal intervals (for example 15 minute intervals) throughout the day.

Where the plant production process is a continuous one (ie 24 hour per day process) and there are no batch discharges (dumps) or fluctuations in quality to the wastewater treatment process, then a minimum of five equal aliquots taken throughout the full day would suffice. Where the full days wastewater is discharged from a batch tank, which is fully mixed, a composite sample of three equal grab samples of the discharge from the batch tank over the course of the discharge would suffice for a composite sample.

If any customer has any questions regarding the preparation of composite samples, they should contact South East Water's Trade Waste Technical Officer.

The customer should arrange for the samples to be analysed by a NATA registered laboratory. Each of the samples should be analysed for all of the following parameters:

- Total dissolved solids
- Inorganic total dissolved solids
- Sodium
- Potassium
- Calcium
- Magnesium
- Chloride
- Any other inorganic cations or anions that would be expected to represent more than 10% of the TDS total

The customer must take flowmeter totaliser readings at the commencement and completion of each composite sample, to determine the volume discharged over that 24 hour period. This should be from trade waste discharge meter(s), where installed, or otherwise from the incoming water meter(s) for the site. In the case of use of the water meters, the standard factor used for charging should be applied to the water consumption volume (this value can be obtained from your Trade Waste Officer).

9. How Should a Company Apply for a TDS Variation?

Preapplication Letter/Facsimile

Before formally applying for a variation, the Customer should submit the following information to South East Water - by letter, fax or email - to enable South East Water to review the situation:

1. The maximum daily flow discharged for 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.
2. The results of the daily composite samples for TDS and TDS breakdown
3. 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 customers billing records and the above information to determine the average daily flow.
4. The customer should detail all waste minimisation practices for TDS that have occurred in the last few years (for renewal of variations this should be over the duration of the existing variation). All

practices need to include estimates of expected TDS load reduction and have implementation dates attached to them.

South East Water will return the results of the review of the information to the customer so that the customer can make application for a variation to the TDS load in their agreement.

Application Letter

The application must be a formally signed letter on company letterhead.

1. The customer should confirm their current maximum daily TDS Load. The limit is the product maximum of the daily composite TDS concentrations and the maximum daily Trade Waste discharge volume.

$$\text{TDS Load [kg/day]} = \text{Max Flowrate [kL/day]} \times \text{Maximum TDS Concentration [mg/L]} / 1000$$

2. The customer should identify and quantify any changes to production or production processes that will affect future TDS loads, 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 TDS load discharged and timelines attached to their implementation.
3. The customer should detail all waste minimisation practices for TDS proposed to be practiced in the near future. All practices need to include estimates of expected TDS Load reduction and have dates attached to them, regarding their implementation.
4. Based upon all of the above factors the customer should arrive at the maximum expected TDS Load Limit expected within the horizon of the variation and agreement (usually three years). **This limit is the limit that will be used in the variation.** The limit applied for should always be rounded up from the calculated value by 2 – 5 % to the next round number.

Appendix A provides sample Pre-application and Application letters.

10. What are Waste Minimisation Activities and What is a Waste Management Plan?

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

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

Determine all the inputs contributing to the generation of waste (particularly TDS) 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 TDS) and determine their viability.

Prepare an economic evaluation for determining the cost and profitability of any waste minimisation activities.

Prepare an implementation programme 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 Information Bulletin No. 383, "*Guidelines for Preparation of Waste Management Plans*". This document is available from the South East Water Trade Waste Technical Officer, or from the EPA South Metropolitan Office on telephone (03) 9794 0597. Some possible suggestions for reducing the impact of TDS in the discharge are presented in Appendix B to this Information Guide.

11. How Long Will the TDS Variation Last?

Generally variations for TDS will be granted for a period of three years. The South East Water Trade Waste Technical Officer can vary 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 TDS is significant, the variation will be granted for a shorter period - perhaps one year.

12. Where Can I Obtain Further Advice?

Further advice regarding the variation process can be obtained from South East Water's Trade Waste Engineer, on telephone (03) 9552 3766, or Email tradewaste@sewl.com.au.

References:

1. State Environment Protection Policy (Waters of Victoria), Government Gazette, March 1998
2. Environment Protection Authority, "Guidelines for Wastewater Reuse", Environment Protection Authority, Publication 464, March 1996.

Appendix A

Sample Application for TDS Load Variation - ABC Pty Ltd

ABC Pty Ltd manufactures gizmos. The company uses most of its water in the dyeing and rinsing of the dyed gizmos.

Sample Customer's Pre-application Letter

ABC Pty Ltd
10-16 Short Street
Cheltenham

Date

Trade Waste Technical Officer
South East Water Limited
PO Box 1382
Moorabbin Vic 3189

Dear Sir/Madam

We submit this preapplication information for a Total Dissolved Solids variation for our site at 10-16 Short Street, Cheltenham.

1. We have reviewed our daily flows, by the agreed Trade Waste method, recording our water supply meter readings and using the 0.95 factor as agreed with yourselves. The maximum daily flow recorded during the period was 150 kL, however we advise that during November to December we double production (two shifts per day). We therefore would record a maximum daily flow of up to 300 kL/day.
2. Please find attached the analytical results for the Composite Sampling programme for TDS.
3. Our company typically operates and discharges Trade Waste to sewer for 5.5 days per week (ie Monday through Friday and half of Saturday). The company shuts down for three weeks from late December.
4. We reduced our water consumption and thus trade waste discharge in August 1998, by 12 %, by installation of new dyeing equipment. At this time there was no change in TDS load.

We await your advice regards a suitable TDS variation.

Yours sincerely

Tom Smith
Production Supervisor

Sample Customer's Application Letter

ABC Pty Ltd
10-16 Short Street
Cheltenham

Date

Trade Waste Technical Officer
South East Water Limited
PO Box 1382
Moorabbin Vic 3189

Dear Sir/Madam

We formally apply for a variation to acceptable standards for Total Dissolved Solids, for our Trade Waste discharge, from our property at 10-16 Short Street, Cheltenham.

1. We confirm our current maximum TDS load is 1,625 kg/day, based upon 1998 figures and the worst case of working two shifts per day.
2. We will be increasing production by a further 18% late in the year 2002.
3. We propose the following additional waste minimisation practices, to reduce TDS load.
* Recycling of salts in the dyeing process. 10 % reduction in total load. Implementation June 2002.
4. Thus our highest TDS limit will occur late in 2002 when our TDS load will be 108 % of current load. We therefore formally apply for a variation of 1800 kg/day (this figure is always rounded up to the next round value by 2 – 5 %).

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

Yours sincerely

John Smith
Production Manager

Appendix B

Suggestions for Minimisation of the Impact of TDS

- Can the amount of waste being disposed to sewer be reduced by process improvement?
- Can acid, alkali and salt dosing to the process be reduced?
- Can acid, alkali and salt solutions be reused or recycled?
- Can organic TDS be reduced by disposal of food wastes to hard rubbish or stockfeed?
- Are cleaning and disinfection chemicals being used in accordance with the manufacturer's instructions?
- Can cleaning solutions be used more efficiently or even reused?
- Can dry spilt ingredients and dry wastes be swept up and disposed to hard rubbish disposal, or disposed to recycling, instead of being hosed to sewer?
- Can waste acids be neutralised with waste alkali, instead of fresh acid/alkalis being used?
- Can lime or magnesium hydroxide be used for neutralisation of waste acid, instead of caustic soda or soda ash? It reduces the SAR and lime reduces the concentration of sulphate by precipitation. NB. these chemicals will generate some sludge.
- Can carbon dioxide be used for neutralisation of alkalis, instead of use of mineral acids?