Load Calculation Protocol

(June 2008)

for use by holders of NSW environment protection licences when calculating assessable pollutant loads

Department of **Environment & Climate Change** NSW

The Environment Protection Authority (EPA) is a statutory body with specific powers under environment protection legislation. In April 2007, the EPA became part of the Department of Environment and Climate Change (DECC).

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About this document

This document is the 'Load Calculation Protocol' referred to in the Protection of the Environment Operations (General) Regulation 1998 (the 'Regulation'). It sets out the methods that holders of licences issued under the *Protection of the Environment Operations Act 1997* (the 'Act') must use to calculate assessable pollutant loads.

The Protocol has two parts:

- Part A provides generic information applicable to all licence-holders who are required by the Regulation to calculate pollutant loads.
- Part B sets out additional specific requirements that relate to particular fee-based activity classifications of licensed activities listed in Schedule 1 of the Regulation. It includes a Worksheet to use for the calculations required by the Protocol.

This document is available on the Department of Environment and Climate Change's (DECC) website or in print by contacting DECC on 131 555. Copies of the Act and the Regulation are also available from the DECC website or from the NSW Government online shop at www.shop.nsw.gov.au.

In the case of any inconsistency between the Protocol and the Regulation, the latter prevails to the extent of the inconsistency. Where the Protocol and the licence require different types of monitoring, each must be conducted. Contact the local DECC regional Manager if you find significant anomalies.

The fee-based activity classifications referred to in the Protocol came into effect on 1 July 1999 and were amended on 28 April 2008 by the Protection of the Environment Operations Amendment (Scheduled Activities and Waste) Regulation 2008.

Revised Load Calculation Protocols are published in the *NSW Government Gazette* from time to time, reflecting agreed improvements or additions. The Environment Protection Authority (EPA) may agree in writing to a new or revised method of load calculation to be available for one or more licensees.

This version of the Protocol was gazetted on 27 June 2008.

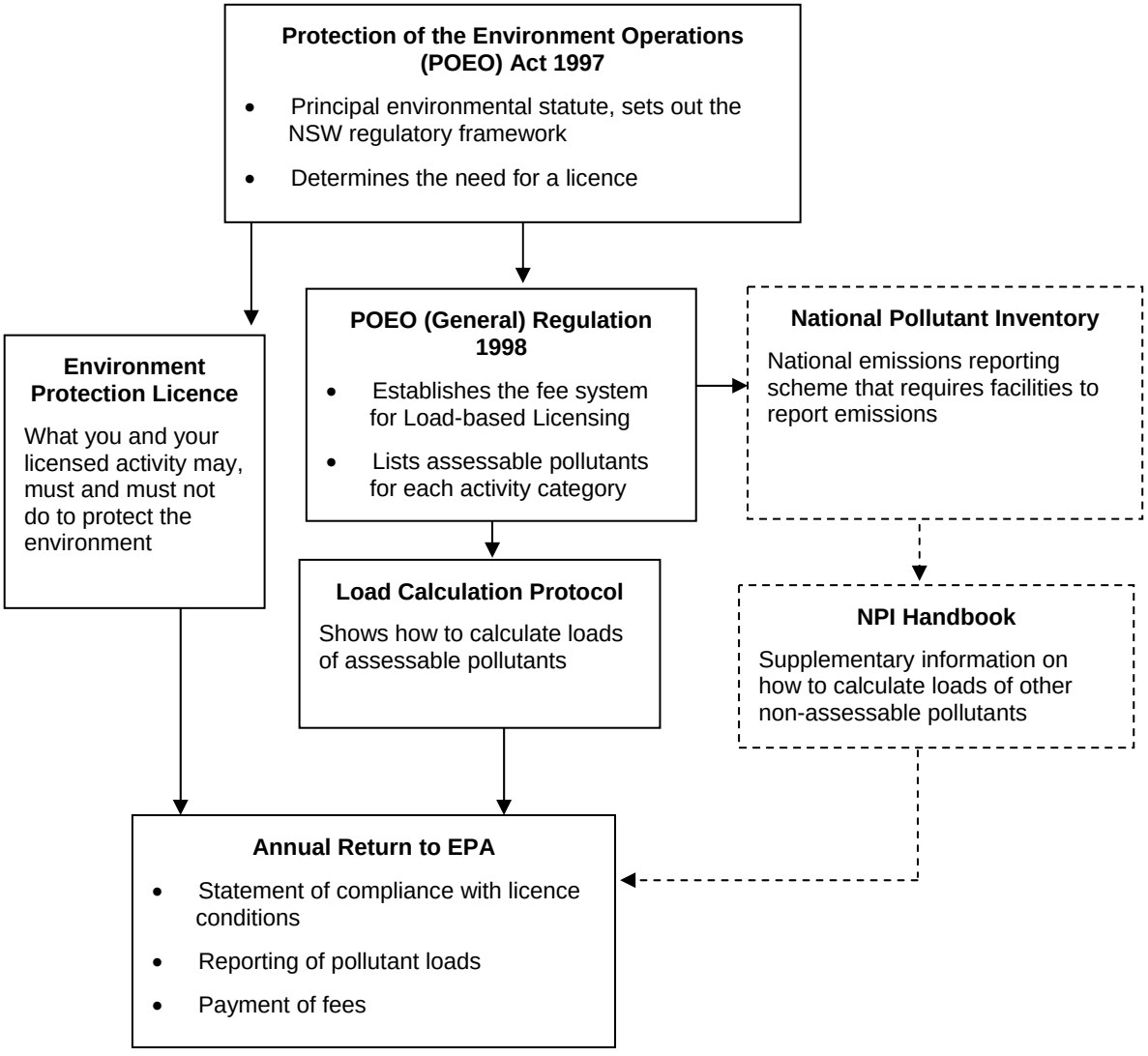
Contents

PART A

1. Generic requirements

1.1 Overview of the regulatory framework

This section explains how this Load Calculation Protocol fits into the NSW environmental regulatory framework. It also explains the relationship between Load-based Licensing (LBL) and the National Pollutant Inventory (NPI). The figure below shows the relationships between the various elements of these schemes.



1.1.1 Linkages between LBL and the NPI

LBL is NSW's pollution licensing scheme. Failure to comply with its requirements is an offence and can involve significant penalties.

The NPI is a national reporting scheme, administered in NSW by the Environment Protection Authority (EPA). Both LBL and NPI may require similar emission data for some substances. Where this is the case, it is recommended that LBL data is used for NPI purposes.

For further details on the NPI, call the Department of Environment and Climate Change (DECC) on 131 555 or go to the NPI website at www.npi.gov.au

1.2 Assessable pollutants and assessable pollutant loads

Schedule 1 of the Regulation lists those licensed activities which attract a fee. This subset of all the licensed activities also specifies assessable pollutants for these 'fee-based' activity classifications.

For example, the assessable pollutants for the fee-based activity classification of 'Cement or lime production' are:

Air pollutants	**Water pollutants**
Fine particulates Coarse particulates Nitrogen oxides (NO_x) Sulfur oxides (SO_x)	None

Part B of this Protocol lists the assessable pollutants for each fee-based activity classification. If more than one fee-based activity classification applies to a licence, the assessable pollutants include the sum of the pollutants listed for each classification. Licensees are responsible for ensuring that they follow the correct protocol for each fee-based activity classification relevant to their licence. Call DECC on 131 555 for help.

The Regulation requires calculation of pollutant loads and payment of pollutant load fees based on the assessable loads of each assessable pollutant. This Protocol prescribes the range of acceptable methods available to licensees to calculate assessable loads.

An annual return form will be provided with the licence. The assessable loads and fee calculations must be recorded on the worksheets included in the annual return.

1.2.1 Categories of pollutant loads under LBL

The **assessable load** of a pollutant is the *lowest* of the actual, weighted or agreed load. Fees are calculated using the assessable load.

The **actual load** of a pollutant is the mass (in kilograms) of the pollutant released into the environment from the potential emission sources listed in Part B of this Protocol for each fee-based activity classification. It is calculated by using the methods prescribed by this Protocol.

The actual load includes liquid wastes transferred to other parties. However the actual load does not include pollutants discharged to sewer services operated by water supply authorities; pollutants fully contained within controlled production processes on-site or at other sites; or loads transferred to other licensees whose activities have the same assessable pollutants which are then included in their own assessable loads.

Actual loads also do not include pollutants contained in solid wastes that are lawfully transferred to landfill or other waste facilities or that are subsequently recycled, reprocessed or consumed.

Actual loads also include loads received from other licensed premises, unless these loads are managed so that one of the exceptions listed above applies.

The **weighted load** of a pollutant is the actual load adjusted using one of the load-weighting methods set out in Section 5 of the Protocol. Weighted loads can result in lower fees being required in recognition of practices or circumstances that reduce environmental harm without reducing the actual pollutant loads. Examples include ceasing or reducing discharges during unfavourable conditions, and the sustainable reuse of effluent.

The **agreed load** is a load that will be achieved through future improvements as part of a Load Reduction Agreement, or an amount permitted to be reported as part of a 'bubble' licence agreement with the EPA. More information about agreed loads is provided in Section 6 of the Protocol.

1.2.2 NO_x and VOCs loads during summer

Increased pollutant fees apply for emissions of NO_x and/or volatile organic compounds (VOCs) in the Sydney Basin during summer (December–February) each year. This fee structure provides added incentive for affected licensees to reduce emissions of NO_x and/or VOCs in summer when air quality problems are worse.

Part B of the Protocol shows the acceptable load calculation methods for these pollutants. NO_x (summer) and VOCs (summer) loads must be calculated for the three-month summer period in addition to the yearly NO_x and VOCs loads which are calculated as previously. Emissions occurring over the summer period are therefore double-counted: once when calculating the load for the whole licence fee period and again when the load for the summer period is calculated.

1.2.3 Record-keeping and submission of information to the EPA

The system of load calculations may be described as 'audited self-assessment'. Licensees are required to take all the necessary steps to calculate pollutant loads. Generally, the EPA needs to see only the final load figures and the subsequent fee calculations. This information is to be reported to the EPA annually using the pro-forma annual return that is provided to each licensee.

Licensees are required to keep all records used to calculate licence fees for four years after the licence fee was paid or became payable, whichever is the later date. Licensees may be asked to produce the records for auditing at any time. It is a condition of each licence that the licensee (or the approved delegate) must personally certify each year that load calculations have been correctly completed and records have been kept as

required by this Protocol. There are significant penalties for failure to comply with this requirement.

1.3 Overview of methods for calculating actual loads

There are three methods for calculating actual pollutant loads. Some, however, may not be suitable in a particular situation. The methods are source monitoring, emission factors and mass balance calculations.

Source Monitoring (SM) – see Section 2

Loads are calculated by direct measurement or representative sampling at the facility. The details of how to undertake source monitoring are fully described in Section 2 of the Protocol.

Emission Factors (EF) – see Section 3

Emission factors are formulae that relate known emission characteristics to other variables that are easier or more economical to monitor than the pollutants themselves. For example, it may be known that a particular boiler generates *x* kg of NO_x for every hour of stable operation and *y* kg of SO_x for every tonne of coal consumed.

Two classes of emission factors are available: generic and site-specific. All licensees may use applicable generic factors that are based on industry-wide data and are conservative. Where a licensee following an EPA-approved demonstration program of monitoring can show a better level of performance than the level calculated from generic factors, the EPA may authorise the use of a site-specific emission factor. In some cases, a Predictive Emission Monitoring System (PEMS) may be used.

Mass Balance Calculations (MB) – see Section 4

A mass balance generally involves the calculation of pollutant load from a particular activity by quantifying the materials going into and out of a process.

TANKS – see Section 4

TANKS is a software package that may be used to determine emissions of benzene and VOCs from bulk storage tanks.

1.3.1 Selecting load calculation methods

For the purpose of load calculations, Part B of this Protocol divides each activity into a number of components. Each of these components has been identified as a potential source of discharge for one or more assessable pollutants.

The tables in Part B show components of activity and assessable pollutants for each applicable fee-based activity classification, and list the acceptable methods for calculating pollutant loads. Where more than one method is shown as acceptable, licensees may use any of the acceptable methods, as shown for a sample industry in Table 1.

Table 1: Acceptable load calculation methods of assessable air pollutants for a sample industry

Component or activity	**Assessable pollutants**			
(Potential source of pollutants)	*Fine particulates*	*Coarse particulates*	*Sulfur oxides*	*Nitrogen oxides*
Raw material processing	SM—PM EF—SS	SM—PM EF—SS	*	*
Stack discharge (chimney)	SM—PM EF—SS	SM—PM EF—SS	SM—CEMS EF—SS MB	SM—PM, CEMS EF—SS

SM—source monitoring (see Section 2 and Part B) (PM—periodic monitoring; CEMS—continuous emission monitoring system)

EF—emission factors (see Section 3 and Part B) (SS—site specific)

MB—mass balance (see Section 4 and Part B)

* No load calculation required: report zero in calculations.

1.3.2 LBL Technical Review Panel

The Regulation established the LBL Technical Review Panel to advise the EPA on the current or desirable contents of the Load Calculation Protocol. The Panel includes representatives of licensees, local government, environment groups, DECC and an independent adviser.

The EPA is committed to providing accurate and cost-effective methods for calculating pollutant loads. It expects that licensees will want to see additional or revised load calculation methods included in the Protocol over time. These include:

- development of site-specific emission factors
- changes to generic emission factors to reflect new data or new abatement strategies
- modification of sampling or analysis methods
- addition of new monitoring techniques
- addition of other load calculation methods (in addition to source monitoring, emission factors and mass balance).

Licensees proposing changes for consideration should first contact the LBL Technical Review Panel's liaison officer by phoning DECC on 131 555.

1.3.3 Summary example of how to calculate and report loads

1. Identify the classification(s) of activity and assessable pollutants

Consult Schedule 1 of the Regulation and identify all the fee-based classifications of activity that apply to the licensed activity. These should be the same as the fee-based classifications shown on the licence. Call the local DECC regional office (the telephone number is listed in the licence) and ask to have the licence amended if this not the case.

Note the names of the assessable pollutants for each applicable classification.

2. Select the method for calculating actual loads

Refer to Part B of the Protocol for the relevant fee-based activity classifications and select the preferred load calculation method for each pollutant in each component of activity.

3. Undertake load calculations using methods in the Protocol

Calculate the load for each component of activity listed in Part B. Where source monitoring is used, follow the directions in Section 2. If emission factors are used, follow the directions in Section 3. Requirements for mass balance calculations are set out in Section 4.

4. Calculate and record the total actual loads

Record the results of the calculations for each assessable pollutant for each component or activity in Worksheet 2 in Part B. Then add up the total actual load for each assessable pollutant on the same Worksheet.

4a Calculate any weighted loads (optional)

See Section 5 of the Protocol. Record the resulting weighted loads on the Worksheet.

4b Note any agreed load (as agreed in a Load Reduction Agreement)

See Section 6 of the Protocol. Record the applicable agreed load in the load calculation Worksheet. Agreed loads are available where the licensee has made a commitment to reduce pollutant loads by an agreed future date, or where the licence is part of a licence 'bubble'.

5. Copy the load data into the annual return

Copy the actual load data (and any weighted or agreed load data) for each assessable pollutant into the fee calculation pages of the annual return. The annual return is a separate form provided with the licence that includes certification of licence compliance.

Complete the fee calculations and the other parts of the annual return by following the instructions provided with it. The statement of compliance with the annual return must be certified (signed) by the licensee (or approved delegate) and submitted to the EPA within 60 days after the end of the licence fee period. Licence fee payments are also due at this time.

For help in completing the annual return (or for an additional copy), contact DECC (details are shown in the licence).

Note: Retain Parts A and B of the Protocol with all records of the load calculations. Send only copies of the annual return worksheets to the EPA.

2. Using source monitoring to calculate actual loads

Source monitoring involves collecting volume and concentration data. It may be continuous or periodic.

Actual loads of air and water pollutants emitted or discharged over a given time period can be determined by monitoring the volume of emissions/discharges over that time period and the pollutant concentration (pollutant mass per unit volume) in the emission/discharge:

$$\text{pollutant load} = \text{pollutant concentration} \times \text{volume}$$

Volume normally needs to be measured continuously. Pollutant concentration, however, provided that it remains generally constant, can be established via a statistically-rigorous sampling regime.

2.1 General requirements for source monitoring

For activities requiring source monitoring or where the licensee has chosen source monitoring to calculate actual pollutant loads for a component of the activity, load data must be collected in accordance with the following requirements:

1. Sampling points and monitoring procedures must be established to provide data representative of the actual loads generated at the facility.
2. Monitoring loads of assessable pollutants discharged to the environment *must* be conducted strictly in accordance with:
    - the requirements of the EPA licence
    - *Approved Methods for the Sampling and Analysis of Air Pollutants in NSW* available on the DECC website
    - *Approved Methods for the Sampling and Analysis of Water Pollutants in NSW* available on the DECC website.
3. All records used to calculate licence fees must be kept. These include:
    - a description of the intended monitoring program for LBL purposes
    - a site map showing all discharge points and monitoring locations
    - the actual monitoring undertaken and, if applicable, any reasons why it varied from the intended monitoring program
    - the sample-handling procedures used to ensure the integrity of the sample, e.g. sample date; results; units of measurement; method used, including sampling and analysis procedure, sample preservation and storage before transfer to the laboratory for analysis; name of officer collecting and handling the samples; name of laboratory; laboratory sample number; and name of the monitoring point.
4. Where there is a discrepancy between the sampling frequency required by a specific licence and those set out in this document, the more frequent sampling requirement is to be used. Contact the local DECC Regional Office for further details.

2.1.1 Practical Quantitation Limit (PQL)

The 'PQL' is the lowest level at which a substance can be routinely quantified and reported by a laboratory.

When a sample result is reported at below the PQL for the test, half the PQL value may be used for that sample for load calculation purposes. Where 50% or more of the sample results for a particular pollutant are below the PQL, zero may be reported for those samples. This applies to samples collected during the licence fee period.

The approved methods for air sampling and analysis (see Section 2.1) generally list only one analysis method for each substance to be analysed or 'analyte'. However, the approved sampling and analysis methods for water list a number of methods for each analyte.

For the purposes of LBL load fee calculations, Table 2 lists the maximum acceptable PQL for each analyte in discharges to waters, irrespective of which approved method is used. If a PQL is used with a value below that listed for the substance in Table 2, the licensee must be able to validate and document the ability of the laboratory to achieve this PQL in the specific matrix type.

Table 2: Acceptable PQLs for analytes discharged to waters

Analyte (pollutant)	PQL
Arsenic (As)	10 μg/L
BOD	2 mg/L
Cadmium (Cd)	5 μg/L
Chromium (Cr)	10 μg/L
Conductivity	5 μS/cm[a]
Copper (Cu)	10 μg/L
Fluorinated hydrocarbons	5 μg/L
Lead (Pb)	20 μg/L
Mercury (Hg)	0.5 μg/L
Oil and grease (O&G)	5 mg/L
Organophosphorus compounds (diazinon, chlorpyrifos, malathion, parathion)	0.5 μg/L
PCBs	0.2 μg/L
Pesticides (as listed in Regulation) (other than organophosphorus compounds)	0.05 μg/L
Selenium (Se)	10 μg/L
Total nitrogen (N)	0.3 mg/L
Total phenolics	0.2 mg/L
Total phosphorus (P)	0.02 mg/L
Total polycyclic aromatic hydrocarbons (PAHs)	10 μg/L
Total suspended solids (TSS)	3 mg/L
Zinc (Zn)	50 μg/L

[a] For conductivity, 5 μS/cm is equivalent to about 3 mg/L of dissolved salt.

2.1.2 Missed samples

Table 3 shows what to do when the required frequency of sampling set out in Sections 2.2 and 2.3 has not been met. Licensees must meet the greater of these requirements. In some cases, where the required number of samples is not collected, the missing data can be replaced using data obtained over the previous 12 months. Table 3 lists actions that must be taken based on the required sampling frequency and the amount of missing data. If scheduled samples are missed, they may be replaced only within the allowable period (i.e. the minimum time between sample collection must be maintained).

Table 3: Procedure for missed samples

Required sampling frequency					Procedure for missed samples [a]
< 5 per year	5–12 per year	13–25 per year	26–53 per year	> 53 per year or continuous	
Not applicable	Not applicable	Miss 1 sample	Miss 1 or 2 samples	Miss up to 2.5% of samples or, for continuous monitoring, miss up to 15% of monitoring time	Action 'A': Replace missing data with mean of data obtained over the previous 12 months.
Not applicable	Miss 1 or 2 samples	Miss 2 or 3 samples	Miss 3 or 4 samples	Miss between 2.5% and 5% of samples or, for continuous monitoring, miss 15-20% of monitoring time	Action 'B': Replace missing data with the mean of data obtained over the previous 12 months + 20%.
Miss any samples	Miss > 2 samples	Miss > 3 samples	Miss > 4 samples	Miss > 5% of samples or, for continuous monitoring, miss >20% of monitoring time	Action 'C': Report failure to collect required samples to DECC Regional Manager within 7 days of failure. Use data from the same time period for the previous year + 30%, or the mean of the data obtained over the current 12 months + 30%.

[a] The arithmetic mean should be used when using historical data.

2.1.3 Laboratory accreditation requirements

The laboratory used to analyse assessable pollutants must be certified to do the analyses by an independent accreditation body acceptable to the EPA, such as the National Association of Testing Authorities (NATA).

Exemptions from the certification requirement are available in special circumstances as specified below.

If it is impractical to use a certified laboratory because of remote location or special circumstances, a non-certified laboratory may be used for the analysis, provided some duplicate samples are sent for independent blind analysis to a certified laboratory. Duplicates of at least 5% of samples (minimum of one sample) must be analysed by the certified laboratory each year. The duplicate samples must be representative of normal operating conditions and taken in the first quarter of the licence fee period. If normal

operating conditions do not occur in the first quarter, samples should be collected as soon as normal operating conditions are attained.

Note that all laboratories used for analysis must have an effective quality assurance program. Where a 20% or greater variance is reported, licensees must investigate the reasons for the variance and take all necessary follow-up actions.

Licensees must advise the EPA in writing when they use a non-certified laboratory. The advice must include a statement of the reasons for the use of the laboratory, a list of the analytes tested, variances in results, and the name of the laboratory that did the analyses. The advice must be sent to the EPA with the Annual Return.

2.2 Additional requirements for monitoring water pollutants

2.2.1 Monitoring of discharge concentration

All samples must be collected so that they are representative of the condition being investigated and in a manner consistent with the sample collection and handling guidelines referred to in *Approved Methods for the Sampling and Analysis of Water Pollutants in NSW*.

Sampling must be undertaken at the discharge point specified in the licence, or if not specified, as close as practicable to the actual point of discharge.

Samples must be analysed for water pollutants by the methods set out in *Approved Methods for the Sampling and Analysis of Water Pollutants in NSW***.**

Minimum sampling frequencies are given in Table 4 (refer to Section 2.1 point 4 for clarification where monitoring frequency discrepancies between a licence and the Protocol exist).

Table 4: Sampling frequency for activities where licence permits discharge to waters at any time

Average dry-weather flow (kL/day) discharged	Minimum sampling frequency for assessable pollutants		
	BOD, total suspended solids, total nitrogen, total phosphorus, salt	Oil and grease	All other pollutants
< 1,200	Quarterly grab sample, min. 80 days apart	Quarterly grab sample, min. 80 days apart	Quarterly
1,200–3,600	6 representative pooled samples* per year, min. 50 days apart	6 representative grab samples per year, min. 50 days apart	
3,601–24,000	12 representative pooled samples* per year, min. 25 days apart	12 representative grab samples per year, min. 25 days apart	
> 24,000	24 representative pooled samples* per year, min. 15 days apart	24 representative grab samples per year, min. 15 days apart	

* A pooled sample is defined as at least three grab samples forming the pooled sample, with the first and last samples taken at least 7 hours apart.

For intermittent discharges which are too infrequent for the minimum sampling frequency in Table 4 to be met, contact the DECC Regional Manager who may approve, in writing, an alternative monitoring frequency.

For activities where the licence does not permit discharge to waters (except during or following wet weather), all assessable pollutants must be monitored by the collection

and analysis of one representative sample of each overflow event to a maximum of 6 samples per year.

2.2.2 Monitoring of discharge volume

Volume is calculated by multiplying recorded flow during a single period or over a specified series of periods:

Discharge volume = sum of (flow rate × time)

Flow monitoring apparatus must be located so that the whole volume that contains loads of assessable pollutants is calculated in compliance with the requirements given in Table 5.

To record different disposal methods for each effluent stream (in order to benefit from lower fees through load weighting of less than all the effluent), the volume of each effluent stream must be calculated separately.

Where flow rate measurements are missed, apply the requirements set out in Table 3.

Table 5: Minimum acceptable methods for monitoring flow rate for STPs and other licensed activities

Average dry-weather flow rate at sampling point (kL/day)	Minimum method for measuring flow rate[a]
< 1,200	Measure pump capacity *in situ* (under a range of operating conditions as applicable) and record hours run under each; or Use water input data and subtract verifiable and documented amounts lost or consumed (i.e. not included in discharges); or For gravity-operated sewage treatment systems only: estimate based on 300 litres per head of population per day.[b]
≥ 1,200	Continuous measurement device; or Use volume balance calculation for water: Determine water entering and then subtract verifiable and documented amounts lost or consumed.

[a] For STPs, outflow measurement is the preferred method for monitoring flow. Inflow data may be used. If so, net evaporation losses may be deducted from the inflow data and calculated as follows:

Estimated discharge = inflow – sum of [(evaporation – rainfall) × pond or lagoon surface area]

[b] Using 300 litres per head of population per day and the most recent census data avoids the need to make allowances for non-residential flows. Where census population does not correlate well with the population served by the STP, use population/tenement (from census) multiplied by the number of connections.

Accuracy and calibration of flow monitoring equipment

Flow-monitoring equipment (primary flow control structures and flow-sensing and recording equipment) should have a level of accuracy equivalent to 10% of the mean flow rate. Equipment must be calibrated (or, where appropriate, serviced and adjusted) according to the manufacturer's instructions or at least once a year to demonstrate the range of accuracy that has been achieved. Records of the calibration procedure and its results must be kept for four years after applicable pollution load fees are paid or payable, whichever is later.

2.2.3 Accounting for received background pollutants

In some cases, a portion of the pollutant load contained in discharges from licensed activities during the licence fee period may have originated from ambient sources rather than the 'polluting' activities of licensees. The proportion of the pollutant load derived from ambient sources may be deducted when calculating the actual load.

The ambient input pollutant loads must be:

- contained in runoff from the catchment above the premises or waters extracted from natural water bodies – e.g. rivers, harbours, oceans – and not water contaminated by activities at the licensed premises (either past or present)
- monitored using the same monitoring protocol as prescribed for calculating pollutant discharge loads (including record-keeping).

2.2.4 Deducting pollutant loads transferred to other licensed activities

Where assessable pollutant loads are transferred to other licensed activities with the consent of the recipient via pipelines, tankers or other secure enclosed methods, the amount of these loads may be deducted from the actual load calculations.

This deduction applies only if the activity or the recipient's premises is licensed under the POEO Act and:

- either the licence fee classification of the recipient's licence includes at least the same assessable water pollutants as the donor licensee, and the recipient licensee includes the loads received in doing their own actual pollutant load calculations, or
- the recipient reprocesses or consumes the pollutant loads so that they are not discharged or emitted to the environment (i.e. recycled, reprocessed or consumed as discussed in Section 1.2.1).

For information about all other transfers, see Sections 1.2.1 and 5.1.2.

2.2.5 Calculating actual pollutant loads discharged to waters

Having determined the concentration of each assessable pollutant and volume data in relation to a discharge, use the steps below to calculate the actual load of the pollutant discharged.

1. Calculate the observed load on each day a pollutant concentration sample is collected:

   $$L_d = C_d \times V_d / 1000$$

   where

   L_d = day's observed load of the pollutant (kg)

   C_d = concentration of the pollutant on the day (mg/L)

   V_d = day's total volume of discharge (kL).

2. Sum the observed daily loads (kg).

3. Divide the total from Step 2 by the total volume (kL) for those days. The result is the flow-weighted concentration (kg/kL).
4. Multiply the flow-weighted concentration from Step 3 (kg/kL) by the total volume of the licence fee period (kL).

Repeat for each assessable pollutant and record the results on a copy of load calculation Worksheet 2 provided in Part B of the Protocol.

2.2.5.1 Calculating actual pollutant loads discharged to waters where $V_d = 0$

1. If sampling is conducted on a day when $V_d = 0$, BUT there is some discharge during the 'sampling frequency period', determine a time-weighted load (L_t) instead, for that sample only as follows:

   $L_p = C_p \times V_p / 1000$

   $L_t = L_p / n$

   Where:

   L_p = *calculated load of the pollutant (kg) over minimum sampling frequency period*

   C_p = *concentration of the pollutant (mg/L) on the day when* $V_d = 0$

   V_p = *total flow (kL) over minimum sampling frequency period (as determined by Table 4)*

   L_t = *day's observed load of the pollutant (kg) when* $V_d = 0$

   n = *number of days in the minimum sampling frequency period (as determined by Table 4)*

   V_p should be calculated using methods outlined in Table 5.

2. Sum the observed daily and/or time-weighted loads.
3. Divide the total from Step 2 by the total volume (kL) for those days – use $V_t = V_p / n$ to obtain average daily volume flow during sampling period when $V_d = 0$.
4. Multiply the flow-weighted concentration from Step 3 (kg/kL) by the total volume of the licence fee period (kL).

2.2.6 Calculating salt load

Salinity is a measure of the amount of dissolved salts in industrial and natural waters. In practice, it is determined indirectly by measuring the electrical conductivity of the water as an indicator.

The electrical conductivity reading (microSiemens/cm) should then be converted to a concentration (mg/L) of dissolved salts by using the formula:

Total dissolved salts (mg/L) = 0.68 × conductivity (microSiemens/cm)

The salt load can then be determined by multiplying the total dissolved salts value by the flow (in equivalent units).

2.3 Additional requirements for monitoring air pollutants

Emission testing must be comprehensive enough to identify the assessable pollutants and determine the load of pollution emitted over all modes of plant operation.

The two monitoring methods generally applicable for calculating loads of air pollutants are continuous and periodic.

2.3.1 Continuous Emission Monitoring Systems (CEMS)

A CEMS provides a continuous record of emissions over an extended and generally uninterrupted period of time. Various approaches can be used to measure the concentration of pollutants in the gas stream. Once the pollutant concentration is known, emission rates are obtained by multiplying the concentration by the volumetric stack gas flow rate.

CEMS are suitable for monitoring emissions of nitrogen oxides (NO_x), sulfur oxides (SO_x), hydrogen sulfide (H_2S), benzene and volatile organic compounds (VOCs). The requirements for CEMS are given in *Approved Methods for the Sampling and Analysis of Air Pollutants in NSW*.

2.3.2 Periodic emission monitoring (PM)

Monitoring emission quality

The selection of sampling positions and analysis methods for air quality monitoring must be in accordance with *Approved Methods for the Sampling and Analysis of Air Pollutants in NSW*.

Sampling must be done during each licence fee period and be of sufficient duration to produce representative data that may be reliably extrapolated to provide estimates of emissions across the full range of operating conditions.

Monitoring emission volume

Volume is generally calculated by multiplying recorded flow during a single period or over a specified series of time periods:

$$\text{Emission volume} = \text{sum of (flow rate} \times \text{time)}$$

Gas-flow monitoring apparatus must be located so that the whole volume that contains loads of assessable pollutants is calculated accurately.

Reducing the costs of periodic monitoring

In some cases, the costs of sampling programs may be reduced by establishing a predictive emission monitoring system: see Section 3.2.1.

2.3.3 Calculating actual loads of air pollutants from periodic monitoring

Having determined the concentration of each assessable pollutant and using volumetric flow data, follow the steps below to calculate the actual load of the pollutant discharged.

1. For each sampling period, calculate the mass pollutant emission rate (mg/s) by multiplying the concentration of the pollutant in the sample (mg/m^3) by the volumetric flow rate (m^3/s).
2. Sum the calculated mass pollutant emission rate from Step 1, and divide the result by the number of sampling periods. The result is the flow-weighted average mass pollutant emission rate (mg/s).
3. Multiply the rate from Step 2 by the number of seconds of flow that occurred during the licence period, then divide by 1,000,000. The result is the assessable pollutant load for the licence fee period (kg).

Repeat for each assessable pollutant and record the results on a copy of load calculation Worksheet 2 provided in Part B of the Protocol.

2.4 Variations to monitoring methods for air or water pollutants

Proposals to vary the monitoring requirements set out above are considered by the LBL Technical Review Panel. Call the Panel's liaison officer at DECC on 131 555.

3. Using emission factors to calculate actual loads

An emission factor is an estimated pollutant emission rate relative to the level of industrial or other readily measurable activity. Licensees may use emission factors to calculate pollutant load where Part B of the Protocol lists this as an applicable method for a specific activity.

Two types of emission factors are generally acceptable:

- **Generic** emission factors are generally derived from broad average emission data. The emission factors provided in the Protocol are intended to be conservative (i.e. they should ensure that high emitters cannot under calculate loads through the use of emission factors). The EPA will revise generic emission factors as updated monitoring data becomes available.
- **Site-specific** emission factors, which individual licensees may develop: for example, a Predictive Emission Monitoring System (PEMS) may be used to develop a site-specific estimate for combustion sources or other stack emissions (see Section 3.2.1).

  Site-specific emission factors, other than PEMS, require EPA approval generally following assessment by the LBL Technical Review Panel (see Section 3.2). Licensees must demonstrate that the site-specific emission factor will reflect the full range of operating conditions and emissions likely to be experienced during the licence fee period.

Using emission factors (EFs) shown in the tables in Part B

1. Select emission factors for each relevant component of activity for each pollutant from the appropriate table in Part B (each activity has a separate table). Select the factors most appropriate to the control technology in place. If none of the listed control technologies applies to the component of activity, use the default emission factors listed.
2. Calculate the load for each component of the activity. Multiply the emission factor selected in Step 1 by the quantity of activity (using the relevant units of measure shown). Copy the results into Worksheet 2 in Part B.
3. Calculate the total load by adding the totals for each component. Copy the results into Worksheet 2 in Part B.

3.1 Generic emission factors

Generic emission factors can apply broadly across various listed activity classifications (such as when de-dusting equipment is used) or for a single classification only.

Where emission factors are based on abatement technology (e.g. scrubbers or baghouses), the emission controls must operate for at least 98% of the time. If the control technology is operating less than this, a combination of controlled and default factors must be used, apportioned according to the percentage of time of each operating condition.

Where emission control equipment is set up to automatically shut down emitting activities, control may be assumed to operate 100% of the time.

3.1.1 Use of generic emission factors for de-dusting

Emission factors based on manufacturers' performance guarantees may be used to calculate loads of fine and coarse particulates from de-dusting apparatus as follows.

Supplier guarantees performance for fine and total particulates

If the supplier of the equipment can provide a performance guarantee for fine and total particulate emissions as a concentration, use those emission rates to calculate the fine and total particulate load (emission rate (mg/m^3) × flow (m^3/s) × time (s)). Coarse particulates are equal to the total particulate load minus fine particulates.

Supplier guarantees performance for total particulates only

If the supplier can provide a performance guarantee only for total particulate concentration, calculate the total particulate load for the licence period and divide total particulates into fine and coarse particulates using the values in Table 6.

Table 6: Factors for the calculation of fine particulates

Equipment	% fine particulates	% coarse particulates
Bag filters	99%	1%
Electrostatic precipitators	96%	4%
Other de-dusting equipment	75%	25%

Note: Where the table in Part B of this Protocol for a specific activity stipulates an alternative percentage value based on the specific nature of the material handled, use that value.

3.2 Site-specific emission factors

In general, emission factors generated from site-specific data are superior to generic emission factors derived from averaged industry data. However, site-specific emission factors must reflect the full range of operating conditions and emissions likely to be experienced during the licence fee period.

Before being used to calculate actual loads, site-specific emission factors must be approved in writing by the EPA. Applications for approval will generally be referred by the EPA to the LBL Technical Review Panel unless they follow precedents that have already been considered by the Panel.

A licensee who wishes to develop a site-specific emission factor should contact the LBL Technical Review Panel's liaison officer by phoning DECC on 131 555. They should liaise with the Panel before committing to a monitoring program that would justify the case for the proposed site-specific emission factor.

3.2.1 Predictive Emission Monitoring Systems (PEMS)

With PEMS, licensees use a representative monitoring campaign to establish consistent relationships between pollutant discharge rates and other operational parameters that are simpler to monitor, such as quantity of steam produced, unit loading, rate of fuel consumption, stack or furnace temperature. Monitoring of these operational parameters can be used to calculate emissions at lower cost than by either continuous or periodic emission monitoring. PEMS must include a suitable program of lower-intensity validation monitoring to ensure that the calculated relationships remain accurate over time.

PEMS can be used to estimate most pollutants from fuel-burning equipment, as shown in the tables in Part B of the Protocol for each activity classification. Some licensees may be able to use source emissions data from previous monitoring campaigns to establish a PEMS. Others may have to undertake a one-off campaign during their first year of calculation of actual loads.

To use a PEMS to calculate actual loads, the following steps must be completed:

- The licensee must develop a PEMS that will reflect the full range of operating conditions and emissions likely to be experienced during the licence fee period.
- The licensee must lodge a copy of the PEMS specification (including a description of the monitoring program undertaken and copies of the data obtained) with the EPA during the licence fee period (where it will be available to any interested member of the public). The specification must be lodged with the local DEC Regional Manager.
- The lodged specification must be accompanied by a declaration signed by the licensee (or the person authorised by the EPA to sign the licensee's certificate of compliance; see Section 1.3.3 in relation to the annual return). The declaration must include a statement of the assessable pollutants, the components of activity and the maximum error ranges of the PEMS. A form is available from the local DECC Regional Office.
- Where the declared error range of the PEMS is greater than 10%, the amount equal to the part of the error range in excess of 10% (i.e. error range minus 10%) must be added to load values calculated using the PEMS.
- Refer to the following documents for specific guidance: *Example Specifications and Test Procedures for Predictive Emission Monitoring Systems*, and *Alternative Monitoring Protocol – PEMS for NO_x and CO from Industrial Furnaces*. These documents are available from the US EPA's Emission Measurement Centre website at www.epa.gov/ttnemc01/cem.html or from your DECC Regional Office.

4. Other methods that may be used to calculate actual loads

4.1 Using mass balance to calculate actual loads

Mass balance involves the quantification of material flows going into and out of a process, where the difference between inputs and outputs is assumed to be discharged to the environment. Mass balance can be used only when input and output streams can be accurately quantified. Mass balance techniques can be applied to individual components of activity or across an entire activity, but only where the applicable table in Part B authorises its use.

It is essential to recognise that the estimates derived by using mass balances are only as good as the values used in the calculations. For example, small errors in data or calculation parameters (e.g. pressure, temperature, stream concentration, flow, control efficiencies) can result in large errors in the final emission estimates. Additionally, failure to use representative samples when sampling input or output materials will also contribute to the uncertainty of the result.

To use a mass balance specification to calculate assessable loads, the following steps must be completed:

- The licensee must develop a mass balance that will reflect the full range of operating conditions and emissions likely to be experienced during the licence fee period.
- The licensee must lodge a copy of their mass balance (including a description of the estimation techniques) with the EPA during the licence fee period (where it will be available to any interested member of the public). The mass balance must be lodged with the local DECC Regional Manager.
- The lodged mass balance must be accompanied by a declaration signed by the licensee (or the person authorised by the EPA to sign the licensee's certificate of compliance; see Section 1.3.3 in relation to the annual return). The declaration must include a statement of the assessable pollutants, the components of activity and the maximum error ranges of the mass balance. A form is available from the local DECC Regional Office.
- Where the declared error range of the mass balance is greater than 10%, the amount equal to the part of the error range in excess of 10% (i.e. error range minus 10%) must be added to load values calculated using the mass balance.

4.2 Using TANKS to calculate actual loads

TANKS is a software package for Windows developed by US EPA that determines emissions from bulk storage tanks. Emissions are a function of weather conditions and tank style, size, surface coating, sealing and contents. Records of all data input into the package must be kept.

The latest version of TANKS may be downloaded from www.epa.gov/ttn/chief/software/tanks/index.html

5. Weighting pollutant loads (optional)

Through appropriate planning and management, the environmental harm of some pollutant load discharges may be reduced. These reductions can result in lower fees by allowing calculation based on weighted loads rather than actual loads. The load-weighting measures currently available are listed in this section.

5.1 Effluent reuse

The EPA encourages the sustainable reuse of effluent or liquid wastes. This section of the Protocol covers the provision for fee reductions of up to 100% for the sustainable reuse of effluent. However, the task of defining workable benchmarks of sustainability is complex.

Effluent should be applied to land only where it is environmentally safe and agronomically appropriate. In the absence of satisfactory management practices, there is a danger that inappropriate effluent reuse could simply result in a transfer of environmental impacts from waters to land. Such an outcome is unacceptable to the EPA, the community and those industries committed to sound environmental management of their operations.

The *Protection of the Environment Operations Act 1997* (s.120) makes it a serious offence for anyone to pollute or to cause or permit pollution of NSW waters. This applies equally to surface and ground waters.

5.1.1 Effluent reuse on the licensed premises

In the case of direct reuse of effluent (e.g. irrigation of crops), weighted loads are calculated by multiplying the actual loads of each pollutant by 'reuse discount factors'. There are different performance criteria for achieving discounts for each pollutant.

The reuse discount factor for each pollutant is the sum of a 'pollutant management factor' (0, 0.25 or 0.5) and a 'water management factor' (0, 0.25 or 0.5). Better performance leads to a lower factor and thus a higher fee discount, i.e. the best possible score is 0 + 0 = 0 (100% discount), and the least beneficial is 0.5 + 0.5 = 1 (nil discount). The procedure for using these factors to obtain fee reductions is shown below.

There are a number of other cases where reuse discounts apply (e.g. transferring effluent to other licensed/unlicensed premises): see Sections 2.2.4 and 5.1.2.

How to calculate weighted loads

Use Worksheet 1 to record your calculations of weighted loads. In the case of direct effluent reuse (e.g. irrigation of crops), follow Steps 1 to 6 below. For all other cases contact the local DECC Regional Manager.

If a range of discount factors applies to different portions of the effluent (e.g. different disposal or reuse methods for parts of the total load), divide the load into portions, apply the appropriate discount factors to each portion, and then sum the values to calculate the total weighted loads for each pollutant.

Worksheet 1: Calculating reuse discount factors and weighted loads

Pollutant	A Actual load	B Annual load of reused effluent	C Pollutant management factor (from Table 7)	D Water management factor (from Table 8)	E Discount factor (B + C)	F Discounted load (annual load of effluent reused × discount factor A × D)	G Weighted load = actual load – discounted load
Total nitrogen							
Total phosphorus							
BOD							
Total suspended solids							
Oil and grease							
Salt							
Metals and pesticides							

Step 1

Copy the actual load and the annual load of reused effluent calculated in accordance with Sections 2, 3 or 4 into columns A and B of Worksheet 1.

Step 2

Refer to Table 7 to determine the correct pollutant management factor for each pollutant assessable at the licensed site and enter the factor values into Column C.

Note: To receive a pollutant management factor of 0 or 0.25 for nutrients (phosphorus and nitrogen), the equivalent (or better) pollutant management factor for salt must also be met, even where it is not an assessable pollutant for the particular licensed activity. These factors are shown in Table 9.

Step 3

Use Table 8 to determine the correct water management factor for the reuse site. Enter the value into each cell of Column D. Note that one water management factor will apply to all pollutants.

Step 4

Calculate the reuse discount factor for each pollutant by adding the values entered in Columns C and D for each pollutant and enter the results for each pollutant into Column E.

Step 5

Calculate the discounted load of each pollutant by multiplying the annual load of reused effluent by the applicable discount factors (Column E) and enter the results into Column F.

Step 6

Calculate the weighted load by subtracting the discounted load from the actual load. Copy the weighted load data into Worksheet 2 in Part B.

Table 7: Pollutant management factors

	Applicable pollutant management factor		
	0 (full discount)	**0.25 (partial discount)**	**0.5 (no discount)**
Pollutant	**Management performance benchmarks**		
Total nitrogen and total phosphorus (To gain discount, salt criteria with equal or better discount must also be met)	Nitrogen and phosphorus balance maintained as outlined in Note 1 below	Nitrogen and phosphorus balance maintained as outlined in Note 2 below	Other
BOD	< 1200 kg/ha/month applied (max. 10%/day)	< 1500 kg/ha/month applied (max. 10%/day)	Other
Total suspended solids	< 15 t/ha/year applied (max. 10%/day)	Not applicable	Other
Oil and grease	No visible grease on soil surface	Not applicable	Other
Salt	See Table 9a	See Table 9b	Other
Metals and pesticides and PCBs	Based on annual monitoring data, the increase in soil levels of pollutants cannot exceed 30% of the difference between the background level and the allowable level in the soil	Based on annual monitoring data, the increase in soil levels of pollutants cannot exceed 50% of the difference between the background level and the allowable level in the soil	Other

Table 8: Water management factors

Applicable water management factor		
0 (full discount)	**0.25 (partial discount)**	**0.5 (no discount)**
Application rate controlled by irrigation scheduling or soil moisture monitoring to ensure that effluent does not percolate deeper than the root zone or intersect groundwaters, except during scheduled salt flushing as per management plan (see Note 3 regarding storage requirements).	Application ceases during and after rainfall as necessary to prevent waterlogging or runoff (see Note 3 regarding storage requirements).	Other

Table 9: Criteria for salt management (see Note 4)

(a) Pollutant management factor of 0 (full discount)

Salinity (µS/cm)	SAR[a]	Na^+ (mg/L)	Management conditions	Monitoring conditions
< 300	Any	N/A	N/A	N/A
< 735	< 3	N/A	N/A	N/A
	> 3	N/A	Apply gypsum (or equivalent in agricultural lime) every 5 years at 2 t/ha or whenever soil ESP[b] exceeds 5% within plant root zone.	Only if SAR > 6, in which case monitor Na in soil once per year.
< 1470	> 3	< 200	As above. Application to cease if EC_{se}[c] exceeds 4 dS/m in plant root zone.	Only if SAR > 6, monitor once per annum for Na and EC_{se} in soil within and immediately below plant root zone.
		> 200	Apply gypsum (or equivalent in agricultural lime) whenever soil ESP exceeds 5%. Application to cease if EC_{se} exceeds 4 dS/m in plant root zone.	Monitor once per annum for Na, and EC_{se} in soil within and immediately above plant root zone.
< 2200	< 8	< 200	As above	As above plus monitor once per year available P and N below plant root zone.
	< 10	< 200	As above	As above plus monitor any important groundwater resource within 10 m of the surface of the ground.
< 3700	> 10	> 300	As above	As above
Any	Any	Any	Effluent applied at rate of no more than 50 mm per year. EC_{se} in plant root zone not to exceed 4 dS/m.	Monitor Na and EC_{se} in soil and apply gypsum if Na levels in plant root zone exceed 5%. Monitor available P and N below plant root zone once a year.

[a] SAR – sodium adsorption ratio; [b] ESP – exchangeable sodium percentage; [c] EC_{se} – electrical conductivity of saturated extracts of soil.

(b) Pollutant management factor of 0.25 (partial discount)

Salinity (µS/cm)	SAR[a]	Na^+ (mg/L)	Management conditions	Monitoring conditions
Any	Any	Any	Effluent applied at rate of no more than 100 mm per year. Application to cease if EC_{se}[b] exceeds 4 dS/m in plant root zone.	Monitor Na and EC_{se} in soil and apply gypsum if Na levels in plant root zone exceed 5%. Monitor available P and N below plant root zone once a year.
< 7350	< 15	< 1500	Effluent applied so that nutrient budget requirements are met (see Note 1 below). Application to cease if EC_{se} exceeds 4 dS/m in plant root zone.	Monitor Na and EC_{se} in soil and apply gypsum if Na levels in plant root zone exceed 5%. Monitor available P and N below plant root zone once a year. Monitor any important groundwater resource within 10 m of surface of ground.

[a] SAR – sodium adsorption ratio; [b] EC_{se} – electrical conductivity of saturated extracts of soil.

Notes for Tables 7, 8 and 9

Note 1: Nutrient balance management

Nitrogen and phosphorus must be applied so that they are effectively used for plant growth or sustainable assimilation by the soil system. If N and P levels are rising below the plant root zone, the average amount of effluent applied per unit area must be decreased. The sustainable rate of application of nutrients (such as N and P) can sometimes limit the quantity of effluent to be used for irrigation in a given area. To obtain the fee discount, licensees must do the following:

- Develop a 15-year forward management plan that shows how proposed annual nutrient application rates compare with the annual amounts to be taken up by the biological or physical processes of the crop–soil system. This should be done before the construction of the effluent reuse scheme. Nutrient application rates must be based on the sustainable assimilation of nutrients over a rolling 15-year period.
- Review the plan every three years to ensure that future planned application rates will continue to achieve sustainable assimilation over a rolling 15-year period.
- Prepare annual nutrient balances showing nutrient application rates and the results of soil monitoring done as set out in the management plan, and how these outcomes compare with those anticipated in the management plan. Documentation of plan and annual balances must be kept for at least four years.

Note 2: as in Note 1, but with a 5 to 15-year planning timeframe.

Note 3: Discharge points and wet-weather storage

Where licences allow for direct discharge to waters, this must always occur through an authorised discharge point. Effluent discharged to waters via the authorised discharge point cannot benefit from reuse discounts. Where licences do not permit discharges to waters, adequate capacity to store effluent must be provided. Wet-weather storage must also be designed and installed to hold a volume calculated by a comprehensive water balance.

Note 4: EC_{se} (electrical conductivity of saturated extracts of soil)

For sensitive plant species, EC_{se} should be kept less than 1500 μS/cm. If EC_{se} exceeds this level, additional management practices including applying a leaching fraction will be required to ensure that plant growth is not reduced. Such changes in management practices must be supported by evaluation at the site that ensures that deliberate leaching of salts does not have an adverse impact on ground or surface water resources.

5.1.2 Transfer of effluent for reuse beyond the licensed premises

In some cases where effluent is transferred to other licensed premises, loads of assessable pollutants transferred may be deducted from actual loads. These cases are set out in Sections 1.2.1 and 2.2.4.

In all other cases, transfer or reuse of materials containing assessable pollutants beyond the licensed premises does not reduce actual loads.

However, it is possible for a weighted load to be calculated where reuse occurs off-site (which will result in a lower licence fee). The licensee can calculate a weighted load for reuse that occurs off the licensed site (or that is conducted by other parties) exactly as described above in Section 5.1.1, provided that the licensee ensures that the reuse meets the applicable performance criteria. The EPA will be satisfied that the licensee has ensured the requisite level of performance if each of the following requirements is met:

1. Effluent is released to the recipient only after:
    - all necessary state (e.g. DECC, Department of Planning, Department of Water and Energy and others) and local government approvals are obtained (e.g. local councils must obtain Ministerial approval under s.60 of the *Local Government Act 1993* before allowing sewage from their area to be discharged, treated or supplied to any person; other approvals may also be required)

- an agreed effluent management plan is in place between the recipient and the licensee that, if complied with, will result in the attainment of the relevant applicable performance criteria as set out in Section 5.1.1.

2. Pollution events associated with any aspect of the recipient's effluent reuse program are reported to the EPA. In the same way, the effluent supplier's licence requires the licensee to report pollution events on its premises to the EPA (as soon as practicable after the supplier becomes aware of an incident).
3. Effluent supply is ceased as soon as practicable after the supplier becomes aware of a misuse of effluent or failure to implement any aspect of the effluent management plan.
4. The supplier regularly reviews the recipient's use of the effluent, including at least annual site visits to identify any corrective actions required to comply with or update the management plan, and keeps a record of visits, observations and corrective actions for at least four years.
5. Where the supplier distributes more than 1000 ML of effluent annually to a reuse scheme, a third party makes an annual assessment of the scheme and the report is submitted to the EPA.

5.2 Flow-optimised discharges

Discharging pollutants to waters only during high river flows may mimic the pattern of natural diffuse pollutant loads in waters (such as nutrients or suspended solids exports from the catchment). During high flows, pollutants may be flushed from a river system and thus their impact reduced, although downstream impacts need to be considered.

All industries may be eligible for a fee reduction where they discharge the following assessable pollutants to waters only during high river flows and it can be shown that this strategy minimises the environmental impact of those discharges:

- matter causing biochemical oxygen demand
- salinity (as an indicator of dissolved salts)
- total suspended solids
- total phosphorus
- total nitrogen
- oil and grease.

This discount factor applies only to flow-optimised discharges to non-tidal waters that drain to the NSW coast and excludes waters of the Murray–Darling catchment.

Calculating the weighted load

A 50% load-weighting factor applies to the above pollutants provided that:

- the discharge occurs only during high flows in the receiving waters, where high flow is defined as a flow that exceeds the 20th percentile. Daily flow data must be available for at least five years for the reach of the river where the discharge occurs
- daily monitoring data for receiving water flows is collected or otherwise obtained to determine river flow.

Calculate the weighted load by multiplying the actual load of each of the assessable pollutants by 0.5.

5.3 Specific programs

5.3.1 Hunter River Salinity Trading Scheme

The Hunter River Salinity Trading Scheme was introduced to reduce salinity in the Hunter River. The scheme ensures that Hunter River salinity targets are not exceeded due to saline discharges from facilities with Environment Protection Licences. Participants may only discharge when the river is in 'high' or 'flood' flow and they must hold enough credits (in accordance with the scheme rules) to cover the amount of saline water they wish to discharge.

Scheme participants in the Hunter catchment may apply a weighting factor to the loads of salt discharged (as measured by conductivity) provided they have complied with all of the conditions of the licence relating to discharge during the licence fee period.

Calculate the weighted load by multiplying the actual load of salt by 0.25.

6. Load reduction agreements (optional)

Load reduction agreements (LRAs) are voluntary agreements between the EPA and licensees required to pay pollution load fees under the Protection of the Environment Operations (General) Regulation 1998. They provide immediate fee reductions for licensees willing to commit to future reductions of assessable pollutant loads, thereby freeing funds for investment in improving their environmental performance. Agreements last for a maximum of four years, giving licensees up to three full years to implement upgrades and one year to demonstrate attainment of the agreed load.

6.1 How do they work?

The licensee commits to reducing annual emissions for one or more assessable pollutants (specified in kilograms) to an agreed annual lower load, within a maximum of four years. Pollutant load fees are then calculated on the basis of the agreed loads. This means that fees are paid as if the agreed environmental improvements have already been achieved. For example, if a licensee plans to reduce annual phosphorus discharges from 1000 to 100 kilograms in four years' time, an agreed load of 100 kilograms may be reported in each year's annual return and used to calculate fees. Fee savings could be considerable.

If the licensee does not demonstrate achievement of the agreed load in the final year of the agreement (i.e. the actual or weighted load is not equal to or below the agreed load), the licensee must repay excess fee reductions to the EPA, commensurate with what has been achieved.

In return for the benefit of immediate fee reductions received under an LRA, licensees agree to ongoing lower annual load limits beyond the term of the LRA. This will ensure that environmental benefits will be ongoing. The new annual load limit would come into effect at the conclusion of the LRA.

6.1.1 Who can apply?

Current or prospective holders of an environment protection licence with assessable pollutants can apply for an LRA at any time. For further information, contact DECC on 131 555 or the local DECC Regional Office, or visit the DECC website.

PART B

7. Activity-specific requirements

This is Part B of the Load Calculation Protocol referred to in the Protection of the Environment Operations (General) Regulation 1998. Part A lists the generic requirements that apply to all fee-based activity classifications included in the LBL Scheme. Part B includes the activity, industry-specific load calculation tables and Worksheet. Licensees must refer to the tables in this part of the Protocol that apply to their licence, as described in Part A.

Table 10: Fee-based activity classifications and their assessable pollutants

Activity classification	Assessable pollutants	
	Air	Water
CEMENT OR LIME WORKS		
Cement or lime handling	Coarse particulates, fine particulates	–
Cement or lime production	Coarse particulates, fine particulates, NO_x, NO_x (summer), SO_x	–
CERAMIC WORKS		
Ceramics production	Coarse particulates, fine particulates, FI, NO_x NO_x (summer), SO_x	–
Glass production	Coarse particulates, fine particulates, NO_x, NO_x (summer), SO_x	–
CHEMICAL PRODUCTION		
Agricultural fertiliser (phosphate) production	Coarse particulates, fine particulates, FI	Total P
Ammonium nitrate production	Coarse particulates, fine particulates, NO_x, NO_x (summer)	Total N
Paints/polishes/adhesives production	Benzene, fine particulates, NO_x, NO_x (summer), VOCs, VOCs (summer)	–
Petrochemical production	Benzene, fine particulates, NO_x, NO_x (summer), VOCs, VOCs (summer)	–
Plastic resins production	Benzene, fine particulates, NO_x, NO_x (summer), VOCs, VOCs (summer)	–
Plastics reprocessing	Benzene, fine particulates, NO_x, NO_x (summer), VOCs, VOCs (summer)	–
CHEMICAL STORAGE		
Petroleum products storage	Benzene, VOCs, VOCs (summer)	–
COKE PRODUCTION		
Coke production	Benzene, benzo(a)pyrene (equiv.), coarse particulates, fine particulates, H_2S, NO_x, NO_x (summer),SO_x, VOCs, VOCs (summer)	Oil and grease (O&G), total suspended solids (TSS), total PAHs, total phenolics
ELECTRICITY GENERATION		
Generation of electrical power from coal	Benzo(a)pyrene (equiv.), coarse particulates, fine particulates, FI, NO_x, NO_x (summer), SO_x	Salt, Se, TSS
Generation of electrical power from gas	NO_x, NO_x (summer)	Salt, TSS

ENERGY RECOVERY		
Energy recovery from general waste	As, benzene, benzo(a)pyrene, fine particulates, Pb, Hg, NO_x, NO_x (summer), SO_X	–
Energy recovery from hazardous and other waste	As, benzene, benzo(a)pyrene, fine particulates, Pb, Hg, NO_x, NO_x (summer), SO_X	–
METALLURGIC ACTIVITIES		
Aluminium production (alumina)	Coarse particulates, fine particulates, Fl, NO_x, NO_x (summer), SO_x	–
Aluminium production (scrap metal)	Coarse particulates, fine particulates, Fl, NO_x, NO_x (summer), SO_x, VOCs, VOCs (summer)	–
Iron or steel production (iron ore)	Benzene, benzo(a)pyrene (equiv.), coarse particulates, fine particulates, H_2S, NO_x, NO_x (summer), SO_x, VOCs, VOCs (summer)	As, Cd, Cr, Cu, Pb, Hg, O&G, Se, TSS, Zn
Iron or steel production (scrap metal)	Coarse particulates, fine particulates, NO_x, NO_x (summer), SO_x, VOCs, VOCs (summer)	–
Non-ferrous metal production (ore concentrates) (excl. aluminium)	As, coarse particulates, fine particulates, Pb, Hg, SO_x	As, Cd, Cr, Cu, Pb, Hg, Se, TSS, Zn
Non-ferrous metal production (scrap metal) (excl. aluminium)	Coarse particulates, fine particulates, Pb, NO_x, NO_x (summer), SO_x, VOCs, VOCs (summer)	–
PAPER OR PULP PRODUCTION		
Paper or pulp production	Coarse particulates, fine particulates, NO_x, NO_x (summer)	BOD, salt, TSS, Total N, Total P, Zn
PETROLEUM AND FUEL PRODUCTION		
Crude oil/shale oil production	Benzene, benzo(a)pyrene (equiv.), fine particulates, H_2S, NO_x, NO_x (summer), SO_x, VOCs, VOCs (summer)	BOD, O&G, TSS, PAHs, Total phenolics
Natural gas/methane production	Benzene, benzo(a)pyrene (equiv.), fine particulates, H_2S, NO_x, NO_x (summer), SO_x, VOCs, VOCs (summer)	BOD, O&G, TSS, PAHs, Total phenolics
Petroleum products and fuel production	Benzene, benzo(a)pyrene (equiv.), fine particulates, H_2S, NO_x, NO_x (summer), SO_x, VOCs, VOCs (summer)	BOD, O&G, TSS, PAHs, Total phenolics
RESOURCE RECOVERY		
Recovery of waste oil	Pb, VOCs, VOCs (summer)	O&G
SEWAGE TREATMENT		
Processing by small plants (less than 10,000 ML/yr)	–	BOD, O&G, Total N, Total P, TSS
Processing by large plants (more than 10,000) ML/yr	–	BOD, Cd, Cr, Cu, Pb, Hg, O&G, Se, TSS, Total N, Pesticides and PCBs, Total P, Zn
WASTE DISPOSAL (THERMAL TREATMENT)		
Thermal treatment of general waste	As, benzene, benzo(a)pyrene, fine particulates, Pb, Mg, NO_x, NO_x (summer), SO_X	–
Thermal treatment of hazardous and other waste	As, benzene, benzo(a)pyrene, fine particulates, Pb, Mg, NO_x, NO_x (summer), SO_X	–

7.1 Cement or lime works: Handling and production

Table 11. Cement or lime works: Handling and production—Acceptable load calculation methods and emission factors, where applicable

(Production: kg per tonne of material produced. Handling: kg per tonne of material handled. Volumes are actual.)

(a) Cement and quicklime production and handling activities	*Assessable pollutants—AIR*			
Component or activity	*Coarse particulates*	*Fine particulates*	*SO_x*	*NO_x & NO_x (summer)*
1. Fuel preparation and drying				
—coal firing with dust collector	SM—PM EF—PEMS, SS or total (kg/yr emission) = 15 mg/m^3 × flow (m^3/hr) × operating time (hrs/yr) × 10^{-6} Coarse = 25% total	SM—PM EF—SS Fine = 75% total	–	–
2. Limestone or raw material crushing (kg/tonne of material through crusher)				
—default	SM—PM EF—SS, G = 0.0012	SM—PM EF—SS, G = 0.017	–	–
—fabric filter as per section 1	SM—PM EF—SS, G = 0.0003	SM—PM EF—SS, G = 0.0002	–	–
—wet or chemical suppression	SM—PM EF—SS, G = 0.0003	SM—PM EF—SS, G = 0.0005	–	–
—wet scrubber	SM—PM EF—SS, G = 0.002	SM—PM EF—SS, G = 0.004	–	–
3. Kiln				
3(a) Wet process				
—electrostatic precipitator	SM—PM EF—SS, G = 0.06	SM—PM EF—SS, G = 0.3	SM—PM EF—SS, G = 4.1	SM—PM EF—SS, G = 3.7
3(b) Preheater kiln				
—fabric filter as per section 1	SM—PM EF—SS, G = 0.02	SM—PM EF—SS, G = 0.1	SM—PM EF—SS, G = 0.27	SM—PM EF—SS, G = 2.4
—electrostatic precipitator	SM—PM EF—SS, G = 0.03	SM—PM EF—SS, G = 0.1	SM—PM EF—SS, G = 0.27	SM—PM EF—SS, G = 2.4
3(c) Pre-calciner process kiln				
—fabric filter as per section 1	SM—PM EF—SS, G = 0.02	SM—PM EF—SS, G = 0.1	SM—PM EF—SS, G = 0.54	SM—PM EF—SS, G = 2.1
—electrostatic precipitator	SM—PM EF—SS, G = 0.02	SM—PM EF—SS, G = 0.1	SM—PM EF—SS, G = 0.54	SM—PM EF—SS, G = 2.1

Table 11. Cement or lime works: Handling and production (continued)

(b) Specific lime activities	*Assessable pollutants—AIR*			
Component or activity	*Coarse particulates*	*Fine particulates*	*SO_x*	*NO_x & NO_x (summer)*
4. Clinker processing				
—fabric filter as per section 1	SM—PM EF—SS, G = 0.0005	SM—PM EF—SS, G = 0.001	–	–
—electrostatic precipitator	SM—PM EF—SS, G = 0.005	SM—PM EF—SS, G = 0.01	–	–
—gravel bed filter	SM—PM EF—SS, G = 0.015	SM—PM EF—SS, G = 0.03	–	–
5. Finished cement grinding				
—default formula for undifferentiated	SM—PM EF—SS, G = 0.5	SM—PM EF—SS, G = 0.3	–	–
—fabric filter, as per section 1	SM—PM EF—SS, G = 0.002	SM—PM EF—SS, G = 0.003	–	–
—electrostatic precipitator, as per section 1, but assuming a default factor of 60 mg/m^3 for fine and 20 mg/m^3 for coarse particulates	SM—PM EF—SS, G = 0.003	SM—PM EF—SS, G = 0.004	–	–
6. Lime kiln				
6(a) Rotary kiln				
—fabric filter	SM—PM EF—SS, G = 0.01	SM—PM EF—SS, G = 0.06	SM—PM EF—SS, G = 0.1	SM—PM EF—SS, G = 1.9
—electrostatic precipitator	SM—PM EF—SS, G = 0.50	SM—PM EF—SS, G = 4.20	SM—PM EF—SS, G = 0.5	SM—PM EF—SS, G = 1.9
6(b) Shaft kiln				
—scrubber	SM—PM EF—SS, G = 0.10	SM—PM EF—SS, G = 0.90	SM—PM EF—SS, G = 0.5	SM—PM EF—SS, G = 1.3
—fabric filter	SM—PM EF—SS, G = 0.04	SM—PM EF—SS, G = 0.034	SM—PM EF—SS, G = 0.5	SM—PM EF—SS, G = 1.3
7. Fluidised bed	SM—PM EF—PEMS, SS	SM—PM EF—PEMS, SS	SM—PM, CEMS EF—PEMS, SS	SM—PM, CEMS EF—PEMS, SS
8. Lime hydration	SM—PM EF—PEMS, SS	SM—PM EF—PEMS, SS	–	–
TOTAL actual load (kg)				

SM—source monitoring (PM—periodic monitoring; CEMS—continuous emission monitoring system); EF—emission factor (G—generic; SS—site specific; PEMS—predictive emission monitoring system)

7.2 Ceramic works: Ceramics production (excluding glass)

Table 12. Ceramic works: Ceramics production (excluding glass)—Acceptable load calculation methods and emission factors, where applicable

(kg per tonne of fired product)

AIR

Ceramics—brick production	*Assessable pollutants—AIR*				
Component or activity	*Coarse particulates*	*Fine particulates*	*Fluoride*	*SO_x*	*NO_x & NO_x (summer)*
1. Drying and firing (for both raw materials and brick drying)					
1(a) Brick dryer					
—gas	SM—PM EF—PEMS, SS, G	SM—PM EF—PEMS, SS, G	SM—PM EF—SS, G = 0.0025	SM—PM EF—PEMS, SS, G	SM—PM EF—PEMS, SS, G
—oil	SM—PM EF—PEMS, SS, G	SM—PM EF—PEMS, SS, G	SM—PM EF—SS, G = 0.0025	SM—PM EF—PEMS, SS, G	SM—PM EF—PEMS, SS, G
—coal	SM—PM EF—PEMS, SS, G	SM—PM EF—PEMS, SS, G	SM—PM EF—SS, G = 0.0025	SM—PM EF—PEMS, SS, G	SM—PM EF—PEMS, SS, G
—other	SM—PM EF—PEMS, SS	SM—PM EF—PEMS, SS	SM—PM EF—PEMS, SS	SM—PM EF—PEMS, SS	SM—PM EF—PEMS, SS
1(b) Tunnel kiln					
—gas	SM—PM EF—PEMS, SS, G	SM—PM EF—PEMS, SS, G	SM—PM EF—SS, G = 0.5	SM—PM, CEMS EF—PEMS, SS, G	SM—PM, CEMS EF—PEMS, SS, G
—oil	SM—PM EF—PEMS, SS, G	SM—PM EF—PEMS, SS, G	SM—PM EF—SS, G = 0.5	SM—PM, CEMS EF—PEMS, SS, G	SM—PM, CEMS EF—PEMS, SS, G
—coal	SM—PM EF—PEMS, SS, G	SM—PM EF—PEMS, SS, G	SM—PM EF—SS, G = 0.5	SM—PM, CEMS EF—PEMS, SS, G	SM—PM, CEMS EF—PEMS, SS, G
—other	SM—PM EF—PEMS, SS	SM—PM EF—PEMS, SS	SM—PM EF—PEMS, SS	SM—PM EF—PEMS, SS	SM—PM EF—PEMS, SS
1(c) Periodic kiln					
—gas	SM—PM EF—PEMS, SS, G	SM—PM EF—PEMS, SS, G	SM—PM EF—PEMS, SS, G	SM—PM, CEMS EF—PEMS, SS, G	SM—PM, CEMS EF—PEMS, SS, G
—oil	SM—PM EF—PEMS, SS, G	SM—PM EF—PEMS, SS, G	SM—PM EF—PEMS, SS, G	SM—PM, CEMS EF—PEMS, SS, G	SM—PM, CEMS EF—PEMS, SS, G
—coal	SM—PM EF—PEMS, SS, G	SM—PM EF—PEMS, SS, G	SM—PM EF—PEMS, SS, G	SM—PM, CEMS EF—PEMS, SS, G	SM—PM, CEMS EF—PEMS, SS, G
—other	SM—PM EF—PEMS, SS	SM—PM EF—PEMS, SS	SM—PM EF—PEMS, SS	SM—PM EF—PEMS, SS	SM—PM EF—PEMS, SS
TOTAL actual load (kg)					

SM—source monitoring (PM—periodic monitoring; CEMS—continuous emission monitoring system); EF—emission factor (G—generic; SS—site specific; PEMS—predictive emission monitoring system)

Note: Where EF—G is shown without a numerical value, no adequate data is available for Australian conditions at this time and an EF—PEMS or EF—SS may be developed by the licensee.

7.3 Ceramic works: Glass production

Table 13. Ceramic works: Glass production—Acceptable load calculation methods and emission factors where applicable

(Units are in kg per tonne of product)

AIR

(a) Production of container glass	*Assessable pollutants—AIR*			
Component or activity	*Coarse particulates*	*Fine particulates*	*SO_x*	*NO_x & NO_x (summer)*
1. Melting furnace				
—uncontrolled	–	SM—PM EF—SS, G = 0.66	SM—PM EF—SS, G = 1.7	SM—PM EF—SS, G = 3.1
—with low-energy scrubber	–	SM—PM EF—SS, G = 0.38	SM—PM EF—SS, G = 0.9	SM—PM EF—SS, G = 3.1
—with Venturi scrubber	–	SM—PM EF—SS, G = 0.095	SM—PM EF—SS, G = 0.1	SM—PM EF—SS, G = 3.1
—with baghouse	–	–	SM—PM EF—SS, G = 1.7	SM—PM EF—SS, G = 3.1
—with electrostatic precipitator	–	–	SM—PM EF—SS, G = 1.7	SM—PM EF—SS, G = 3.1
2. Other activities (e.g. mould and machinery repairs)	SM—PM EF—PEMS, SS	SM—PM EF—PEMS, SS	SM—PM, CEMS EF—PEMS, SS	SM—PM, CEMS EF—PEMS, SS
TOTAL actual load (kg)				

SM—source monitoring (PM—periodic monitoring; CEMS—continuous emission monitoring system); EF—emission factor (G—generic; SS—site specific; PEMS—predictive emission monitoring system)

AIR

(b) Production of float glass	*Assessable pollutants—AIR*			
Component or activity	*Coarse particulates*	*Fine particulates*	*SO_x*	*NO_x & NO_x (summer)*
3. Melting furnace				
—uncontrolled	–	SM—PM EF—SS, G = 0.95	SM—PM EF—SS, G = 1.5	SM—PM EF—SS, G = 4.0
—with low-energy scrubber	–	SM—PM EF—SS, G = 0.475	SM—PM EF—SS, G = 0.8	SM—PM EF—SS, G = 4.0
—with Venturi scrubber	–	–	SM—PM EF—SS, G = 0.1	SM—PM EF—SS, G = 4.0
—with baghouse	–	–	SM—PM EF—SS, G = 1.5	SM—PM EF—SS, G = 4.0
—with electrostatic precipitator	–	–	SM—PM EF—SS, G = 1.5	SM—PM EF—SS, G = 4.0
4. Other combustion	SM—PM EF—PEMS, SS	SM—PM EF—PEMS, SS	SM—PM, CEMS EF—PEMS, SS	SM—PM, CEMS EF—PEMS, SS
TOTAL actual load (kg)				

SM—source monitoring (PM—periodic monitoring; CEMS—continuous emission monitoring system); EF—emission factor (G—generic; SS—site specific; PEMS—predictive emission monitoring system)

Table 13. Ceramic works: Glass production (continued)

(c) Production of other glass (including glass fibre)	*Assessable pollutants—AIR*			
Component or activity	*Coarse particulates*	*Fine particulates*	*SO_x*	*NO_x & NO_x (summer)*
5. Melting and forming				
5(a) Wool				
—glass furnace	–	–	SM—PM EF—SS, G = 0.02	SM—PM EF—SS, G = 0.14
—electric regeneration	–	–	SM—PM EF—SS, G = 5	SM—PM EF—SS, G = 2.5
—gas regeneration	–	–	SM—PM EF—SS, G = 5	SM—PM EF—SS, G = 0.85
5(b) Textile				
—glass furnace	–	–	–	–
—electric regeneration	–	–	SM—PM EF—SS, G = 1.5	SM—PM EF—SS, G = 10
—gas regeneration	–	–	SM—PM EF—SS, G = 15	SM—PM EF—SS, G = 10
6. Other combustion	SM—PM EF—PEMS, SS, G	SM—PM EF—PEMS, SS, G	SM—PM EF—PEMS, SS, G	SM—PM EF—PEMS, SS, G
TOTAL actual load (kg)				

SM—source monitoring (PM—periodic monitoring; CEMS—continuous emission monitoring system); EF—emission factor (G—generic; SS—site specific; PEMS—predictive emission monitoring system)

Note: Where EF—G is shown without a numerical value, no adequate data is available for Australian conditions at this time and an EF—PEMS or EF—SS may be developed by the licensee.

7.4 Chemical production: Agricultural fertiliser (phosphate) production

Table 14. Chemical production: Agricultural fertiliser (phosphate) production—Acceptable load calculation methods and emission factors, where applicable

(kg per tonne produced)

AIR

Production of single superphosphate	*Assessable pollutants—AIR*		
Component or activity	*Coarse particulates*	*Fine particulates*	*Fluoride*
1.. Rock or acid reaction	SM—PM EF—PEMS, SS, G	SM—PM EF—PEMS, SS, G	SM—PM EF—PEMS, SS, G
2. Granulation (maturing)	SM—PM EF—PEMS, SS, G	SM—PM EF—PEMS, SS, G	SM—PM EF—PEMS, SS, G
TOTAL actual load (kg)			

SM—source monitoring (PM—periodic monitoring); EF—emission factor (G—generic; SS—site specific; PEMS—predictive emission monitoring system)

Note: Where EF—G is shown without a numerical value, no adequate data is available for Australian conditions at this time and an EF—PEMS or EF—SS may be developed by the licensee.

WATER

Production of single superphosphate	*Assessable pollutants—WATER*
Component or activity	*Total phosphorus*
3. Wastewater	SM—PM, CEMS EF—SS
4. Pollutants in wastewater imported from other licensed activities	SM—PM, CEMS EF—SS
TOTAL actual load (kg)	

SM—source monitoring (PM—periodic monitoring; CEMS—continuous emission monitoring system);
EF—emission factor (SS—site specific)

7.5 Chemical production: Ammonium nitrate production

Table 15. Chemical production: Ammonium nitrate production—Acceptable load calculation methods and emission factors, where applicable

(kg per tonne produced)

AIR

(a) Ammonium nitrate production	*Assessable pollutants—AIR*		
Component or activity	*Coarse particulates*	*Fine particulates*	*NO_x & NO_x (summer)*
1. Acid production	–	–	SM—PM EF—PEMS, SS, G
2. Solution formation			
2(a) Neutraliser			
—default	SM—PM EF—PEMS, SS, G	SM—PM EF—PEMS, SS, G	–
—wet scrubber	SM—PM EF—PEMS, SS, G	SM—PM EF—PEMS, SS, G	–
2(b) Evaporation or concentration			
—default	SM—PM EF—SS, G = 0.15	SM—PM EF—SS, G = 0.2	–
—wet scrubber	SM—PM EF—SS, G = 0.15	SM—PM EF—SS, G = 0.02	–
3. Solids formation and handling	SM—PM EF—PEMS, SS, G	SM—PM EF—PEMS, SS, G	–
4. Product bagging or shipping			
—default	SM—PM EF—PEMS, SS, G	SM—PM EF—PEMS, SS, G	–
—wet scrubber	SM—PM EF—PEMS, SS, G	SM—PM EF—PEMS, SS, G	–
TOTAL actual load (kg)			

SM—source monitoring (PM—periodic monitoring); EF—emission factor (G—generic; SS—site specific; PEMS—predictive emission monitoring system)

Note: Where EF—G is shown without a numerical value, no adequate data is available for Australian conditions at this time and an EF—PEMS or EF—SS may be developed by the licensee.

WATER

(c) Ammonium nitrate production	*Assessable pollutants—WATER*
Component or activity	*Total nitrogen*
5. Wastewater	SM—PM, CEMS EF—SS
6. Pollutants in wastewater imported from other licensed activities	SM—PM, CEMS EF—SS
TOTAL actual load (kg)	

SM—source monitoring (PM—periodic monitoring; CEMS—continuous emission monitoring system); EF—emission factor (SS—site specific)

7.6 Chemical production: Paint/polishes/adhesives production

Table 16. Chemical production: Paint/polishes/adhesives production—Acceptable load calculation methods and emission factors, where applicable

(kg per tonne produced)

AIR

	Assessable pollutants—AIR			
Component or activity	*Fine particulates*	*NO_x & NO_x (summer)*	*VOCs & VOCs (summer)*	*Benzene*
1. Production process	SM—PM EF—PEMS, SS, G	–	SM—PM EF—PEMS, SS, G MB	SM—PM EF—PEMS, SS, G MB
2. Combustion				
—gas	SM—PM EF—PEMS, SS	SM—PM EF—PEMS, SS	–	–
—oil	SM—PM EF—PEMS, SS	SM—PM EF—PEMS, SS	–	–
3. Transfer and storage of bulk liquids	–	–	SM—PM EF—PEMS, SS, G MB	SM—PM EF—PEMS, SS, G MB
4. Fugitive emissions from leaks and spills	–	–	SM—PM EF—PEMS, SS, G MB	SM—PM EF—PEMS, SS, G MB
5. Cleaning and maintenance	–	–	SM—PM EF—PEMS, SS, G MB	SM—PM EF—PEMS, SS, G MB
TOTAL actual load (kg)				

SM—source monitoring (PM—periodic monitoring); EF—emission factor (G—generic; SS—site specific; PEMS—predictive emission monitoring system); MB—mass balance

Note: Where EF—G is shown without a numerical value, no adequate data is available for Australian conditions at this time and an EF—PEMS or EF—SS may be developed by the licensee.

7.7 Chemical production: Petrochemical production

Table 17. Chemical production: Petrochemical production—Acceptable load calculation methods and emission factors, where applicable

(kg per tonne produced)

AIR

	Assessable pollutants—AIR			
Component or activity	*Fine particulates*	*NO_x & NO_x (summer)*	*VOCs & VOCs (summer)*	*Benzene*
1. Main production processes				
1(a) Separation	SM—PM EF—PEMS, SS, G	–	SM—PM EF—PEMS, SS, G MB	SM—PM EF—PEMS, SS, G MB
1(b) Conversion	SM—PM EF—PEMS, SS, G	–	SM—PM EF—PEMS, SS, G MB	SM—PM EF—PEMS, SS, G MB
1(c) Treatment	SM—PM EF—PEMS, SS, G	–	SM—PM EF—PEMS, SS, G MB	SM—PM EF—PEMS, SS, G MB
1(d) Auxiliary	SM—PM EF—PEMS, SS, G	–	SM—PM EF—PEMS, SS, G MB	SM—PM EF—PEMS, SS, G MB
2. Combustion	SM—PM EF—PEMS, SS, G	SM—PM, CEMS EF—PEMS, SS, G	–	–
3. Product handling	SM—PM EF—PEMS, SS, G	–	SM—PM EF—PEMS, SS, G MB	SM—PM EF—PEMS, SS, G MB
4. Storage of organic liquids	–	–	SM—PM EF—PEMS, SS, G MB	SM—PM EF—PEMS, SS, G MB
5. Fugitive emissions from leaks and spills	–	–	SM—PM EF—PEMS, SS, G MB	SM—PM EF—PEMS, SS, G MB
TOTAL actual load (kg)				

SM—source monitoring (PM—periodic monitoring; CEMS—continuous emission monitoring system); EF—emission factor (G—generic; SS—site specific; PEMS—predictive emission monitoring system); MB—mass balance

Note: Where EF—G is shown without a numerical value, no adequate data is available for Australian conditions at this time and an EF—PEMS or EF—SS may be developed by the licensee.

7.8 Chemical production: Plastic resins production

Table 18. Chemical production: plastic resins production—Acceptable load calculation methods and emission factors, where applicable

(kg per tonne produced)

AIR

	Assessable pollutants—AIR			
Component or activity	*Fine particulates*	*NO_x & NO_x (summer)*	*VOCs & VOCs (summer)*	*Benzene*
1. Production processes				
1(a) Polyvinyl chloride	SM—PM EF—PEMS, SS, G	–	SM—PM EF—PEMS, SS, G MB	SM—PM EF—PEMS, SS, G MB
1(b) Polypropylene	SM—PM EF—PEMS, SS, G	–	SM—PM EF—PEMS, SS, G MB	SM—PM EF—PEMS, SS, G MB
1(c) Expandable polystyrene	SM—PM EF—PEMS, SS, G	–	SM—PM EF—PEMS, SS, G MB	SM—PM EF—PEMS, SS, G MB
1(d) PET	SM—PM EF—PEMS, SS, G	–	SM—PM EF—PEMS, SS, G MB	SM—PM EF—PEMS, SS, G MB
1(e) Other	SM—PM EF—PEMS, SS, G	–	SM—PM EF—PEMS, SS, G MB	SM—PM EF—PEMS, SS, G MB
2. Combustion	SM—PM EF—PEMS, SS, G	SM—PM EF—PEMS, SS, G	–	–
3. Transfer of bulk liquids	–	–	SM—PM EF—PEMS, SS, G MB	SM—PM EF—PEMS, SS, G MB
4. Bulk storage of organic liquids	–	–	SM—PM EF—PEMS, SS, G MB	SM—PM EF—PEMS, SS, G MB
5. Fugitive emissions from leaks and spills	–	–	SM—PM EF—PEMS, SS, G MB	SM—PM EF—PEMS, SS, G MB
TOTAL actual load (kg)				

SM—source monitoring (PM—periodic monitoring); EF—emission factor (G—generic; SS—site specific; PEMS—predictive emission monitoring system); MB—mass balance

Note: Where EF—G is shown without a numerical value, no adequate data is available for Australian conditions at this time and an EF—PEMS or EF—SS may be developed by the licensee.

7.9 Chemical production: Plastics reprocessing

Table 19. Chemical production: plastics reprocessing—Acceptable load calculation methods and emission factors, where applicable

(kg per tonne produced)

AIR

	Assessable pollutants—AIR			
Component or activity	*Fine particulates*	*NO_x & NO_x (summer)*	*VOCs & VOCs (summer)*	*Benzene*
1. Production processes				
1(a) Polyvinyl chloride	SM—PM EF—PEMS, SS, G	–	SM—PM EF—PEMS, SS, G MB	SM—PM EF—PEMS, SS, G MB
1(b) Polypropylene	SM—PM EF—PEMS, SS, G	–	SM—PM EF—PEMS, SS, G MB	SM—PM EF—PEMS, SS, G MB
1(c) Expandable polystyrene	SM—PM EF—PEMS, SS, G	–	SM—PM EF—PEMS, SS, G MB	SM—PM EF—PEMS, SS, G MB
1(d) PET	SM—PM EF—PEMS, SS, G	–	SM—PM EF—PEMS, SS, G MB	SM—PM EF—PEMS, SS, G MB
1(e) Other	SM—PM EF—PEMS, SS, G	–	SM—PM EF—PEMS, SS, G MB	SM—PM EF—PEMS, SS, G MB
2. Combustion	SM—PM EF—PEMS, SS, G	SM—PM EF—PEMS, SS, G	–	–
3. Transfer of bulk liquids	–	–	SM—PM EF—PEMS, SS, G MB	SM—PM EF—PEMS, SS, G MB
4. Bulk storage of organic liquids	–	–	SM—PM EF—PEMS, SS, G MB	SM—PM EF—PEMS, SS, G MB
5. Fugitive emissions from leaks and spills	–	–	SM—PM EF—PEMS, SS, G MB	SM—PM EF—PEMS, SS, G MB
TOTAL actual load (kg)				

SM—source monitoring (PM—periodic monitoring); EF—emission factor (G—generic; SS—site specific; PEMS—predictive emission monitoring system); MB—mass balance

Note: Where EF—G is shown without a numerical value, no adequate data is available for Australian conditions at this time and an EF—PEMS or EF—SS may be developed by the licensee.

7.10 Chemical storage: Petroleum products storage

Table 20. Chemical storage: Petroleum products storage—Acceptable load calculation methods and emission factors, where applicable

(kg per kL throughput)

AIR

Chemical storage—petroleum products	*Assessable pollutants—AIR*	
Component or activity	*VOCs & VOCs (summer)*	*Benzene*
1. Transfer of liquids	EF—SS MB TANKS	EF—SS MB TANKS
2. Storage of liquids	EF—SS MB TANKS	EF—SS MB TANKS
3. Vapour recovery unit	SM—PM EF—PEMS, SS	–
TOTAL actual load (kg)		

SM—source monitoring (PM—periodic monitoring); EF—emission factor (SS—site specific; PEMS—predictive emission monitoring system); MB—mass balance

7.11 Coke production: Coke production

Table 21. Coke production: Coke production—Acceptable load calculation methods and emission factors, where applicable

(kg per tonne material produced)

AIR

(a) Non-recovery process	*Assessable pollutants—AIR*							
Component or activity	*Benzene*	*Benzo(a) pyrene (equiv.)*	*Coarse particulates*	*Fine particulates*	*H_2S*	*NO_x & NO_x (summer)*	*SO_x*	*VOCs & VOCs (summer)*
1. Oven charging	SM—PM EF—SS, G = 0.000001	SM—PM EF—SS, G = 0.000001	SM—PM EF—SS, G = 0.0004	SM—PM EF—SS, G = 0.0002	–	SM—PM EF—SS, G = 0.00006	SM—PM EF—SS, G = 0.0001	SM—PM EF—SS, G = 0.000001
2. Fugitive emissions	–	–	SM—PM EF—SS, G = 0.000001	SM—PM EF—SS, G = 0.000001	–	SM—PM EF—SS, G = 0.000003	SM—PM EF—SS, G = 0.000005	–
3. Oven pushing	–	–	SM—PM EF—SS, G = 0.002	SM—PM EF—SS, G = 0.0003	–	–	–	–
4. Quenching	–	–	SM—PM EF—SS, G = 0.29	SM—PM EF—SS, G = 0.03	SM—PM EF—SS, G = 0.003	–	–	–
5. Stack combustion	–	–	SM—PM EF—SS, G = 0.01	SM—PM EF—SS, G = 0.27	–	SM—PM EF—SS, G = 0.132	SM—PM EF—SS, G = 2.4	–
TOTAL actual load (kg)								

SM—source monitoring (PM—periodic monitoring); EF—emission factor (G—generic; SS—site specific)

AIR

(b) Recovery process	*Assessable pollutants—AIR*							
Component or activity	*Benzene*	*Benzo(a) pyrene (equiv.)*	*Coarse particulates*	*Fine particulates*	*H_2S*	*NO_x & NO_x (summer)*	*SO_x*	*VOCs & VOCs (summer)*
6. Gas flares – inter works	SM—PM EF—PEMS, SS, G	SM—PM EF—PEMS, SS, G	SM—PM EF—PEMS, SS, G	SM—PM EF—PEMS, SS, G	SM—PM EF—PEMS, SS, G	SM—PM EF—PEMS, SS, G	SM—PM EF—PEMS, SS, G	SM—PM EF—PEMS, SS, G
7. Coal crushing (hammer mills)	–	–	SM—PM EF—PEMS, SS, G	SM—PM EF—PEMS, SS, G	–	–	–	–
8. Coke screening	–	–	SM—PM EF—PEMS, SS, G	SM—PM EF—PEMS, SS, G	–	–	–	–
9. Oven charging and pushing (combined No. 7 battery)	SM—PM EF—PEMS, SS, G	SM—PM EF—PEMS, SS, G	SM—PM EF—PEMS, SS, G	SM—PM EF—PEMS, SS, G	SM—PM EF—PEMS, SS, G	SM—PM EF—PEMS, SS, G	SM—PM EF—PEMS, SS, G	SM—PM EF—PEMS, SS, G
10. Standpipe emissions	SM—PM EF—PEMS, SS, G	SM—PM EF—PEMS, SS, G	SM—PM EF—PEMS, SS, G	SM—PM EF—PEMS, SS, G	SM—PM EF—PEMS, SS, G	SM—PM EF—PEMS, SS, G	SM—PM EF—PEMS, SS, G	SM—PM EF—PEMS, SS, G

Table 21. Coke production: Coke production (continued)

Component or activity	*Benzene*	*Benzo(a) pyrene (equiv.)*	*Coarse particulates*	*Fine particulates*	*H_2S*	*NO_x & NO_x (summer)*	*SO_x*	*VOCs & VOCs (summer)*
11. Fugitive emissions	SM—PM EF—PEMS, SS, G	SM—PM EF—PEMS, SS, G	–	SM—PM EF—PEMS, SS, G	SM—PM EF—PEMS, SS, G	SM—PM EF—PEMS, SS, G	SM—PM EF—PEMS, SS, G	SM—PM EF—PEMS, SS, G
12. Oven pushing (No. 4, 5 and 6 batteries)	SM—PM EF—PEMS, SS, G	SM—PM EF—PEMS, SS, G	SM—PM EF—PEMS, SS, G	SM—PM EF—PEMS, SS, G	SM—PM EF—PEMS, SS, G	SM—PM EF—PEMS, SS, G	SM—PM EF—PEMS, SS, G	SM—PM EF—PEMS, SS, G
13. Quenching	SM—PM EF—PEMS, SS, G	SM—PM EF—PEMS, SS, G	SM—PM EF—PEMS, SS, G	SM—PM EF—PEMS, SS, G	SM—PM EF—PEMS, SS, G	SM—PM EF—PEMS, SS, G	SM—PM EF—PEMS, SS, G	SM—PM EF—PEMS, SS, G
14. Combustion stacks	SM—PM EF—PEMS, SS, G	SM—PM EF—PEMS, SS, G	SM—PM EF—PEMS, SS, G	SM—PM EF—PEMS, SS, G	SM—PM EF—PEMS, SS, G	SM—PM EF—PEMS, SS, G	SM—PM EF—PEMS, SS, G	SM—PM EF—PEMS, SS, G
15. Sulfate plant	–	–	SM—PM EF—PEMS, SS, G	SM—PM EF—PEMS, SS, G	–	–	–	–
16. Gas processing emissions	SM—PM EF—PEMS, SS, G	SM—PM EF—PEMS, SS, G	SM—PM EF—PEMS, SS, G	SM—PM EF—PEMS, SS, G	SM—PM EF—PEMS, SS, G	SM—PM EF—PEMS, SS, G	SM—PM EF—PEMS, SS, G	SM—PM EF—PEMS, SS, G
17. Gas processing fugitive emissions	SM—PM EF—PEMS, SS, G	SM—PM EF—PEMS, SS, G	–	–	SM—PM EF—PEMS, SS, G	–	–	SM—PM EF—PEMS, SS, G
TOTAL actual load (kg)								

SM—source monitoring (PM—periodic monitoring); EF—emission factor (G—generic; SS—site specific; PEMS—predictive emission monitoring system)

Note: Where EF—G is shown without a numerical value, no adequate data is available for Australian conditions at this time and an EF—PEMS or EF—SS may be developed by the licensee.

WATER

(c) Coke production	*Assessable pollutants—WATER*			
Component or activity	*Oil & grease*	*Total suspended solids*	*Total PAHs*	*Total phenolics*
18. Wastewater – point source	SM—PM, CEMS EF—SS	SM—PM, CEMS EF—SS	SM—PM, CEMS EF—SS	SM—PM, CEMS EF—SS
TOTAL actual load (kg)				

SM—source monitoring (PM—periodic monitoring; CEMS—continuous emission monitoring system); EF—emission factor (SS—site specific)

7.12 Electricity generation: Coal and gas

Table 22. Electricity generation: Coal and gas—Acceptable load calculation methods and emission factors, where applicable

(Except where otherwise stated—kg/GWh generated)

AIR

(a) Electricity generation	*Assessable pollutants—AIR*					
Component or activity	*Benzo(a) pyrene (eq.)*	*Coarse particulates*	*Fine particulates*	*Fluorides*	*NO_x & NO_x (summer)*	*SO_x*
1. Combustion						
—Coal	SM—PM EF—PEMS, SS, G	SM—PM EF—PEMS, SS	SM—PM EF—PEMS, SS	SM—PM EF—PEMS, SS	SM—PM,[a] CEMS,[b] EF—SS	SM—PM, CEMS,[b] EF—SS MB
—Gas	–	–	–	–	SM—PM,[a] CEMS[b] EF—SS	–
—Other	–	–	–	–	–	–
TOTAL actual load (kg)						

SM—source monitoring (PM—periodic monitoring; CEMS—continuous emission monitoring system); EF—emission factor (SS—site specific; PEMS—predictive emission monitoring system); MB—mass balance

[a] Only if generating capacity at premises is < 100 MW.

[b] Where more than one identical unit is installed at premises and CEMS is in operation on one unit, PEMS can be used to estimate emissions from second and subsequent units. CEMS or PEMS may be rotated between units.

WATER

(b) Electricity generation - coal	*Assessable pollutants—WATER*		
Component or activity	*Selenium*	*Total suspended solids*	*Salt*
2. Wastewater—point source			
2(a) Once through saltwater cooling system	SM—PM, CEMS EF—SS	SM—PM, CEMS EF—SS	SM—PM, CEMS EF—SS
2(b) Other	SM—PM, CEMS EF—SS	SM—PM, CEMS EF—SS	SM—PM, CEMS EF—SS
3. Pollutants in wastewater imported from other licensed activities	SM—PM, CEMS EF—SS	SM—PM, CEMS EF—SS	SM—PM, CEMS EF—SS
TOTAL actual load (kg)			

SM—source monitoring (PM—periodic monitoring; CEMS—continuous emission monitoring system); EF—emission factor (SS—site specific)

WATER

(c) Electricity generation - gas	*Assessable pollutants—WATER*	
Component or activity	*Total suspended solids*	*Salt*
4. Wastewater—point source	SM—PM, CEMS EF—SS	SM—PM, CEMS EF—SS
5. Pollutants in wastewater imported from other licensed activities	SM—PM, CEMS EF—SS	SM—PM, CEMS EF—SS
TOTAL actual load (kg)		

SM—source monitoring (PM—periodic monitoring; CEMS—continuous emission monitoring system); EF—emission factor (SS—site specific)

7.13 Energy recovery: General waste

Table 23. Energy recovery: General waste—Acceptable load calculation methods and emission factors, where applicable

(kg/tonne of material incinerated)

AIR

	Assessable pollutants—AIR							
Component or activity	*As*	*Benzene*	*B(a)P*	*Fine particulates*	*Pb*	*Hg*	*NO_x & NO_x (summer)*	*SO_x*
1. Combustion	SM—PM EF—PEMS, SS	SM—PM EF—PEMS, SS	SM—PM EF—PEMS, SS	SM—PM EF—PEMS, SS	SM—PM EF—PEMS, SS	SM—PM EF—PEMS, SS	SM—PM EF—PEMS, SS	SM—PM EF—PEMS, SS
TOTAL actual load (kg)								

SM—source monitoring (PM—periodic monitoring); EF—emission factor (SS—site specific; PEMS—predictive emission monitoring system)

7.14 Energy recovery: Hazardous and other waste

Table 24. Energy recovery: Hazardous and other waste—Acceptable load calculation methods and emission factors, where applicable

(kg/tonne of material incinerated)

AIR

	Assessable pollutants—AIR							
Component or activity	*As*	*Benzene*	*B(a)P*	*Fine particulates*	*Pb*	*Hg*	*NO_x & NO_x (summer)*	*SO_x*
1. Combustion	SM—PM EF—PEMS, SS	SM—PM EF—PEMS, SS	SM—PM EF—PEMS, SS	SM—PM EF—PEMS, SS	SM—PM EF—PEMS, SS	SM—PM EF—PEMS, SS	SM—PM EF—PEMS, SS	SM—PM EF—PEMS, SS
TOTAL actual load (kg)								

SM—source monitoring (PM—periodic monitoring); EF—emission factor (SS—site specific; PEMS—predictive emission monitoring system)

7.15 Metallurgic activities: Aluminium production (alumina)

Table 25. Metallurgic activities: Aluminium production (alumina)—Acceptable load calculation methods and emission factors, where applicable

(kg/tonne of product)

AIR

	Assessable pollutants—AIR				
Component or activity	*Coarse particulates*	*Fine particulates*	*Fluoride*	*NO_x & NO_x (summer)*	*SO_x*
1. Anode baking scrubber	SM—PM EF—PEMS, SS, G	SM—PM EF—PEMS, SS, G	SM—PM EF—PEMS, SS, G	SM—PM, CEMS EF—PEMS, SS, G = 60 g/GJ natural gas consumed MB	SM—PM, CEMS EF—PEMS, SS, G MB
2. Potline scrubber stacks	SM—PM EF—PEMS, SS, G	SM—PM EF—PEMS, SS, G	SM—PM EF—PEMS, SS, G	–	SM—PM, CEMS EF—PEMS, SS, G MB
3. Potline roof vent emissions	SM—PM EF—PEMS, SS, G	SM—PM EF—PEMS, SS, G	SM—PM EF—PEMS, SS, G	–	SM—PM, CEMS EF—PEMS, SS, G MB
4. Metal casting and heat treatment	–	–	–	SM—PM EF—SS, G = 60 g/GJ natural gas consumed	–
TOTAL actual load (kg)					

SM—source monitoring (PM—periodic monitoring; CEMS—continuous emission monitoring system); EF—emission factor (G—generic; SS—site specific; PEMS—predictive emission monitoring system); MB—mass balance

Note: Where EF—G is shown without a numerical value, no adequate data is available for Australian conditions at this time and an EF—PEMS or EF—SS may be developed by the licensee.

Mass balance equation:

Total SO_x = mass SO_x (petroleum coke) + mass SO_x (pitch) + mass SO_x (natural gas)

7.16 Metallurgic activities: Aluminium production (scrap metal)

Table 26. Metallurgic production: Aluminium production (scrap metal)—Acceptable load calculation methods and emission factors, where applicable

(kg/tonne of product)

AIR

	Assessable pollutants—AIR					
Component or activity	*Coarse particulates*	*Fine particulates*	*Fluoride*	*SO_x*	*NO_x & NO_x (summer)*	*VOCs & VOCs (summer)*
1. Material pre-treatment	SM—PM EF—PEMS, SS, G	SM—PM EF—PEMS, SS, G	–	–	–	SM—PM EF—PEMS, SS, G
2. Smelting and refining	SM—PM EF—PEMS, SS, G	SM—PM EF—PEMS, SS, G	SM—PM EF—PEMS, SS, G	–	–	–
3. Transport and storage of product	SM—PM EF—PEMS, SS, G	SM—PM EF—PEMS, SS, G	–	–	–	–
4. Combustion	–	SM—PM EF—PEMS, SS, G	–	SM—PM, CEMS EF—PEMS, SS, G	SM—PM, CEMS EF—PEMS, SS, G	–
5. Fugitive emissions	SM—PM EF—PEMS, SS, G	SM—PM EF—PEMS, SS, G	SM—PM EF—PEMS, SS, G	SM—PM EF—PEMS, SS, G	SM—PM EF—PEMS, SS, G	SM—PM EF—PEMS, SS, G
TOTAL actual load (kg)						

SM—source monitoring (PM—periodic monitoring; CEMS—continuous emission monitoring system); EF—emission factor (G—generic; SS—site specific; PEMS—predictive emission monitoring system)

Note: Where EF—G is shown without a numerical value, no adequate data is available for Australian conditions at this time and an EF—PEMS or EF—SS may be developed by the licensee.

7.17 Metallurgic activities: Iron or steel production (iron ore)

Table 27. Metallurgic activities: Iron or steel production (iron ore)—Acceptable load calculation methods and emission factors, where applicable

(kg/tonne produced)

AIR

	Assessable pollutants—AIR							
Component or activity	*Benzene*	*Benzo(a) pyrene (equiv.)*	*Coarse particulates*	*Fine particulates*	*H_2S*	*NO_x & NO_x (summer)*	*SO_x*	*VOCs & VOCs (summer)*
Sinter plant								
1. Sintering machine	SM—PM EF—PEMS, SS, G	SM—PM EF—PEMS, SS, G	SM—PM EF—PEMS, SS, G	SM—PM EF—PEMS, SS, G	–	SM—PM EF—PEMS, SS, G	SM—PM EF—PEMS, SS, G	SM—PM EF—PEMS, SS, G
2. Sinter cooling bed	–	–	SM—PM EF—PEMS, SS, G	SM—PM EF—PEMS, SS, G	–	–	–	–
3. Sinter process dedusting	–	–	SM—PM EF—PEMS, SS, G	SM—PM EF—PEMS, SS, G	–	–	–	–
Power								
4. Power and steam generation	SM—PM EF—PEMS, SS, G	SM—PM EF—PEMS, SS, G	SM—PM EF—PEMS, SS, G	SM—PM EF—PEMS, SS, G	SM—PM, CEMS EF—PEMS, SS, G	SM—PM, CEMS EF—PEMS, SS, G	SM—PM, CEMS EF—PEMS, SS, G	SM—PM EF—PEMS, SS, G
Blast furnace								
5. Blast furnace stoves – waste heat	SM—PM EF—PEMS, SS, G	SM—PM EF—PEMS, SS, G	SM—PM EF—PEMS, SS, G	SM—PM EF—PEMS, SS, G	SM—PM EF—PEMS, SS, G	SM—PM EF—PEMS, SS, G	SM—PM EF—PEMS, SS, G	SM—PM EF—PEMS, SS, G
6. Gas flares – blast furnace gas	–	–	SM—PM EF—PEMS, SS, G	SM—PM EF—PEMS, SS, G	–	SM—PM EF—PEMS, SS, G	SM—PM EF—PEMS, SS, G	–
7. Blast furnace dedusting process	–	–	SM—PM EF—PEMS, SS, G	SM—PM EF—PEMS, SS, G	–	–	–	–
8. Blast furnace slag processing	–	–	–	–	SM—PM, CEMS EF—PEMS, SS, G	–	–	–
9. Hot metal dumping	–	–	SM—PM EF—PEMS, SS, G	SM—PM EF—PEMS, SS, G	–	–	–	–
Steelmaking								
10. Lime kiln – material storage, handling and transfer	–	–	SM—PM EF—PEMS, SS, G	SM—PM EF—PEMS, SS, G	–	–	–	–
11. Lime kiln	SM—PM EF—PEMS, SS, G	SM—PM EF—PEMS, SS, G	SM—PM EF—PEMS, SS, G	SM—PM EF—PEMS, SS, G	SM—PM EF—PEMS, SS, G	SM—PM EF—PEMS, SS, G	SM—PM EF—PEMS, SS, G	SM—PM EF—PEMS, SS, G
12. Steelmaking	–	–	SM—PM EF—PEMS, SS, G	SM—PM EF—PEMS, SS, G	–	SM—PM EF—PEMS, SS, G	SM—PM EF—PEMS, SS, G	–

Table 27. Metallurgic activities: Iron or steel production (iron ore) (continued)

Component or activity	*Benzene*	*Benzo(a) pyrene (equiv.)*	*Coarse particulates*	*Fine particulates*	*H_2S*	*NO_x & NO_x (summer)*	*SO_x*	*VOCs & VOCs (summer)*
13. Ancillary steelmaking processes	–	–	SM—PM EF—PEMS, SS, G	SM—PM EF—PEMS, SS, G	–	–	–	–
14. Continuous casting and machine scarfing	–	–	SM—PM EF—PEMS, SS, G	SM—PM EF—PEMS, SS, G	–	SM—PM EF—PEMS, SS, G	SM—PM EF—PEMS, SS, G	–
Mills								
15. Hot rolling mills	SM—PM EF—PEMS, SS, G	SM—PM EF—PEMS, SS, G	SM—PM EF—PEMS, SS, G	SM—PM EF—PEMS, SS, G	SM—PM EF—PEMS, SS, G	SM—PM EF—PEMS, SS, G	SM—PM EF—PEMS, SS, G	SM—PM EF—PEMS, SS, G
TOTAL actual load (kg)								

SM—source monitoring (PM—periodic monitoring; CEMS—continuous emission monitoring system); EF—emission factor (G—generic; SS—site specific; PEMS—predictive emission monitoring system)

Note: Where EF—G is shown without a numerical value, no adequate data is available for Australian conditions at this time and an EF—PEMS or EF—SS may be developed by the licensee.

WATER

	Assessable pollutants—WATER									
Component or activity	*As*	*Cd*	*Cr*	*Cu*	*Pb*	*Hg*	*O&G*	*Se*	*TSS*	*Zn*
16. Wastewater – point source	SM—PM, CEMS EF—SS	SM—PM, CEMS EF—SS	SM—PM, CEMS EF—SS	SM—PM, CEMS EF—SS	SM—PM, CEMS EF—SS	SM—PM, CEMS EF—SS	SM—PM, CEMS EF—SS	SM—PM, CEMS EF—SS	SM—PM, CEMS EF—SS	SM—PM, CEMS EF—SS
17. Pollutants in wastewater imported from other licensed activities	SM—PM, CEMS EF—SS	SM—PM, CEMS EF—SS	SM—PM, CEMS EF—SS	SM—PM, CEMS EF—SS	SM—PM, CEMS EF—SS	SM—PM, CEMS EF—SS	SM—PM, CEMS EF—SS	SM—PM, CEMS EF—SS	SM—PM, CEMS EF—SS	SM—PM, CEMS EF—SS
TOTAL actual load (kg)										

SM—source monitoring (PM—periodic monitoring; CEMS—continuous emission monitoring system); EF—emission factor (SS—site specific)

7.18 Metallurgic activities: Iron or steel production (scrap metal)

Table 28. Metallurgic activities: Iron or steel production (scrap metal)—Acceptable load calculation methods and emission factors, where applicable

(kg/tonne of product)

AIR

	Assessable pollutants—AIR				
Component or activity	*Coarse particulates*	*Fine particulates*	*NO_x & NO_x (summer)*	*SO_x*	*VOCs & VOCs (summer)*
1. Pretreatment	SM—PM EF—PEMS, SS, G	SM—PM EF—PEMS, SS, G	–	–	SM—PM EF—PEMS, SS, G
2. Metal melting					
2(a) Electric arc furnace	–	SM—PM EF—PEMS, SS, G	–	–	–
2(b) Induction furnace	–	SM—PM EF—PEMS, G, SS	–	–	–
2(c) Cupola	–	SM—PM EF—PEMS, SS, G	SM—PM EF—PEMS, SS, G	SM—PM EF—PEMS, SS, G	–
3. Mould and core production	–	SM—PM EF—PEMS, SS, G	–	–	–
4. Casting and finishing	–	SM—PM EF—PEMS, SS, G	–	–	–
5. Fugitive emissions	SM—PM EF—PEMS, SS, G	SM—PM EF—PEMS, SS, G	SM—PM EF—PEMS, SS, G	SM—PM EF—PEMS, SS, G	SM—PM EF—PEMS, SS, G
6. Combustion	–	SM—PM EF—SS	SM—PM, CEMS EF—SS	SM—PM, CEMS EF—SS	–
TOTAL actual load (kg)					

SM—source monitoring (PM—periodic monitoring; CEMS—continuous emission monitoring system); EF—emission factor (G—generic; SS—site specific; PEMS—predictive emission monitoring system)

Note: Where EF—G is shown without a numerical value, no adequate data is available for Australian conditions at this time and an EF—PEMS or EF—SS may be developed by the licensee.

7.19 Metallurgic activities: Non-ferrous metal production (ore concentrates) (excl. aluminium)

Table 29. Metallurgic activities: Non-ferrous metal production (ore concentrates)—Acceptable load calculation methods and emission factors, where applicable

(kg/tonne of product)

AIR

	Assessable pollutants—AIR				
Component or activity	*Coarse particulates*	*Fine particulates*	*SO_x*	*Metals (Pb, Hg)*	*Non-metals (As)*
1. Sintering					
1(a) Sinter plant stack emissions	SM—PM EF—PEMS, SS, G	SM—PM EF—PEMS, SS, G	SM—PM, CEMS EF—SS	SM—PM EF—PEMS, SS, G	SM—PM EF—PEMS, SS, G
2. Acid plant					
2(a) Acid plant stack emissions	–	–	SM—PM, CEMS EF—SS	–	–
2(b) Acid plant venting	–	–	SM—PM, CEMS EF—SS	–	–
3. Smelting and refining					
3(a) Copper, brass, bronze	SM—PM EF—PEMS, SS, G	SM—PM EF—PEMS, SS, G	SM—PM, CEMS EF—SS	SM—PM EF—PEMS, SS, G	SM—PM EF—PEMS, SS, G
3(b) Zinc	SM—PM EF—PEMS, SS, G	SM—PM EF—PEMS, SS, G	SM—PM, CEMS EF—SS	SM—PM EF—PEMS, SS, G	SM—PM EF—PEMS, SS, G
3(c) Lead	SM—PM EF—PEMS, SS, G	SM—PM EF—PEMS, SS, G	SM—PM, CEMS EF—SS	SM—PM EF—PEMS, SS, G	SM—PM EF—PEMS, SS, G
3(d) Cadmium	SM—PM EF—PEMS, SS, G	SM—PM EF—PEMS, SS, G	–	SM—PM EF—PEMS, SS, G	SM—PM EF—PEMS, SS, G
4. Alloying and casting					
4(a) Copper, brass, bronze	SM—PM EF—PEMS, SS, G	SM—PM EF—PEMS, SS, G	SM—PM, CEMS EF—SS	SM—PM EF—PEMS, SS, G	SM—PM EF—PEMS, SS, G
4(b) Zinc	SM—PM EF—PEMS, SS, G	SM—PM EF—PEMS, SS, G	SM—PM, CEMS EF—SS	SM—PM EF—PEMS, SS, G	SM—PM EF—PEMS, SS, G
4(c) Lead	SM—PM EF—PEMS, SS, G	SM—PM EF—PEMS, SS, G	SM—PM, CEMS EF—SS	SM—PM EF—PEMS, SS, G	SM—PM EF—PEMS, SS, G
5. Fugitive emissions	SM—PM EF—PEMS, SS, G	SM—PM EF—PEMS, SS, G	SM—PM, CEMS EF—PEMS, SS, G	SM—PM EF—PEMS, SS, G	SM—PM EF—PEMS, SS, G
6. Combustion					
6(a) Natural gas-fired boilers [kg/m^3 gas]	SM—PM EF—SS, G = 0	SM—PM EF—SS, G = 0.00012	SM—PM EF—SS, G = 0.0000096	–	–
6(b) Other	SM—PM EF—PEMS, SS, G	SM—PM EF—PEMS, SS, G	SM—PM, CEMS EF—PEMS, SS, G	–	–
TOTAL actual load (kg)					

SM—source monitoring (PM—periodic monitoring; CEMS—continuous emission monitoring system); EF—emission factor (G—generic; SS—site specific; PEMS—predictive emission monitoring system)

Note: Where EF—G is shown without a numerical value, no adequate data is available for Australian conditions at this time and an EF—PEMS or EF—SS may be developed by the licensee.

Table 29. Metallurgic activities: Non-ferrous metal production (ore concentrates) (continued)

	Assessable pollutants—WATER		
Component or activity	*Total suspended solids*	*Metals (Cd, Cr, Cu, Pb, Hg, Zn)*	*Non-metals (As, Se)*
7. Wastewater—point source	SM—PM, CEMS EF—SS	SM—PM, CEMS EF—SS	SM—PM, CEMS EF—SS
TOTAL actual load (kg)			

SM—source monitoring (PM—periodic monitoring; CEMS—continuous emission monitoring); EF—emission factor (SS—site specific)

7.20 Metallurgic activities: Non-ferrous metal production (scrap metal) (excl. aluminium)

Table 30. Metallurgic activities: Non-ferrous metal production (scrap metal)—Acceptable load calculation methods and emission factors, where applicable

(kg/tonne of product)

AIR

	Assessable pollutants—AIR					
Component or activity	*Coarse particulates*	*Fine particulates*	*SO_x*	*NO_x & NO_x (summer)*	*VOCs & VOCs (summer)*	*Lead*
1. Scrap metal treatment	SM—PM EF—PEMS, SS, G	SM—PM EF—PEMS, SS, G	–	–	SM—PM EF—PEMS, SS, G	–
2. Smelting, alloying and casting						
2(a) Copper, brass, bronze	SM—PM EF—PEMS, SS, G	SM—PM EF—PEMS, SS, G	–	–	SM—PM EF—PEMS, SS, G	–
2(b) Zinc	SM—PM EF—PEMS, SS, G	SM—PM EF—PEMS, SS, G	–	–	SM—PM EF—PEMS, SS, G	–
2(c) Lead	SM—PM EF—PEMS, SS, G	SM—PM EF—PEMS, SS, G	–	–	SM—PM EF—PEMS, SS, G	SM—PM EF—PEMS, SS, G
3. Combustion	–	SM—PM EF—PEMS, SS, G	SM—PM, CEMS EF—PEMS, SS, G	SM—PM, CEMS EF—PEMS, SS, G	–	–
4. Fugitive emissions	SM—PM EF—PEMS, SS, G	SM—PM EF—PEMS, SS, G	–	SM—PM EF—PEMS, SS, G	SM—PM EF—PEMS, SS, G	–
TOTAL actual load (kg)						

SM—source monitoring (PM—periodic monitoring; CEMS—continuous emission monitoring system); EF—emission factor (G—generic; SS—site specific; PEMS—predictive emission monitoring system)

Note: Where EF—G is shown without a numerical value, no adequate data is available for Australian conditions at this time and an EF—PEMS or EF—SS may be developed by the licensee.

7.21 Paper or pulp production

Table 31. Paper or pulp production—Acceptable load calculation methods and emission factors, where applicable

(kg/tonne of product)

AIR

	Assessable pollutants—AIR		
Component or activity	*Coarse particulates*	*Fine particulates*	*NO_x & NO_x (summer)*
1. Combustion	SM—PM EF—PEMS, SS	SM—PM EF—PEMS, SS	SM—PM, CEMS EF—SS
TOTAL actual load (kg)			

SM—source monitoring (PM—periodic monitoring; CEMS—continuous emission monitoring system); EF—emission factor (SS—site specific; PEMS—predictive emission monitoring system)

WATER

	Assessable pollutants—WATER					
Component or activity	*BOD*	*Salt*	*TSS*	*Total N*	*Total P*	*Zn*
2. Wastewater – point source	SM—PM, CEMS EF—SS	SM—PM, CEMS EF—SS	SM—PM, CEMS EF—SS	SM—PM, CEMS EF—SS	SM—PM, CEMS EF—SS	SM—PM, CEMS EF—SS
3. Pollutants in wastewater imported from other licensed activities	SM—PM, CEMS EF—SS	SM—PM, CEMS EF—SS	SM—PM, CEMS EF—SS	SM—PM, CEMS EF—SS	SM—PM, CEMS EF—SS	SM—PM, CEMS EF—SS
TOTAL actual load (kg)						

SM—source monitoring (PM—periodic monitoring; CEMS—continuous emission monitoring system); EF—emission factor (SS—site specific)

Note: Where EF—G is shown without a numerical value, no adequate data is available for Australian conditions at this time and an EF—PEMS or EF—SS may be developed by the licensee.

7.22 Petroleum and fuel production: Crude oil/shale oil production

Table 32. Petroleum and fuel production: Crude oil/shale oil production—Acceptable load calculation methods and emission factors, where applicable

(kg/tonne of final product refined or manufactured, as applicable)

AIR

	Assessable pollutants—AIR						
Component or activity	*Benzene*	*Benzo(a) pyrene (equiv.)*	*Fine particulates*	*H_2S*	*NO_x & NO_x (summer)*	*SO_x*	*VOCs & VOCs (summer)*
1. Separation processes	SM—PM, CEMS EF—PEMS, SS, G	SM—PM EF—PEMS, SS, G	–	SM—PM, CEMS EF—PEMS, SS, G	–	–	SM—PM, CEMS EF—PEMS, SS, G
2. Conversion processes	SM—PM, CEMS EF—PEMS, SS, G	SM—PM EF—PEMS, SS, G	SM—PM EF—PEMS, SS, G	SM—PM, CEMS EF—PEMS, SS, G	SM—PM, CEMS EF—PEMS, SS, G	SM—PM, CEMS EF—PEMS, SS, G	SM—PM, CEMS EF—PEMS, SS, G
3. Treating process	SM—PM, CEMS EF—PEMS, SS, G	SM—PM EF—PEMS, SS, G	SM—PM EF—PEMS, SS, G	SM—PM, CEMS EF—PEMS, SS, G	SM—PM, CEMS EF—PEMS, SS, G	SM—PM, CEMS EF—PEMS, SS, G	SM—PM, CEMS EF—PEMS, SS, G
4. Auxiliary activities	–	SM—PM EF—PEMS, SS, G	SM—PM EF—PEMS, SS, G	SM—PM, CEMS EF—PEMS, SS, G	SM—PM, CEMS EF—PEMS, SS, G	SM—PM, CEMS EF—PEMS, SS, G	SM—PM, CEMS EF—PEMS, SS, G
5. Transfer of bulk liquids	SM—PM, CEMS EF—PEMS, SS, G TANKS	–	–	–	–	–	SM—PM, CEMS EF—PEMS, SS, G TANKS
6. Bulk storage of organic liquids	SM—PM, CEMS EF—PEMS, SS, G TANKS	–	–	–	–	–	SM—PM, CEMS EF—PEMS, SS, G TANKS
7. Fugitive emissions from leaks and spills	–	–	–	–	–	–	SM—PM, CEMS EF—PEMS, SS, G
8. Air emissions from wastewater treatment	–	–	–	–	–	–	SM—PM, CEMS EF—PEMS, SS, G
9. Vapour recovery units	–	–	–	–	–	–	SM—PM, CEMS EF—PEMS, SS, G
TOTAL actual load (kg)							

SM—source monitoring (PM—periodic monitoring; CEMS—continuous emission monitoring system); EF—emission factor (G—generic; SS—site specific; PEMS—predictive emission monitoring system)

Note: Where EF—G is shown without a numerical value, no adequate data is available for Australian conditions at this time and an EF—PEMS or EF—SS may be developed by the licensee.

Table 32. Petroleum and fuel production: Crude oil/shale oil production (continued)

WATER

	Assessable pollutants—WATER				
Component or activity	*BOD*	*O&G*	*TSS*	*Total PAHs*	*Total phenolics*
10. Wastewater—point source	SM—PM EF—SS	SM—PM EF—SS	SM—PM EF—SS	SM—PM EF—SS	SM—PM EF—SS
11. Pollutants in wastewaters imported from other licensed activities	SM—PM EF—SS	SM—PM EF—SS	SM—PM EF—SS	SM—PM EF—SS	SM—PM EF—SS
TOTAL actual load (kg)					

SM—source monitoring (PM—periodic monitoring); EF—emission factor (SS—site specific)

7.23 Petroleum and fuel production: Natural gas/methane production

Table 33. Petroleum and fuel production: Natural gas/methane production—Acceptable load calculation methods and emission factors, where applicable

(kg/tonne of final product refined or manufactured, as applicable)

AIR

	Assessable pollutants—AIR						
Component or activity	*Benzene*	*Benzo(a) pyrene (equiv.)*	*Fine particulates*	*H_2S*	*NO_x & NO_x (summer)*	*SO_x*	*VOCs & VOCs (summer)*
1. Separation processes	SM—PM, CEMS EF—PEMS, SS, G	SM—PM EF—PEMS, SS, G	–	SM—PM, CEMS EF—PEMS, SS, G	–	–	SM—PM, CEMS EF—PEMS, SS, G
2. Conversion processes	SM—PM, CEMS EF—PEMS, SS, G	SM—PM EF—PEMS, SS, G	SM—PM EF—PEMS, SS, G	SM—PM, CEMS EF—PEMS, SS, G	SM—PM, CEMS EF—PEMS, SS, G	SM—PM, CEMS EF—PEMS, SS, G	SM—PM, CEMS EF—PEMS, SS, G
3. Treating process	SM—PM, CEMS EF—PEMS, SS, G	SM—PM EF—PEMS, SS, G	SM—PM EF—PEMS, SS, G	SM—PM, CEMS EF—PEMS, SS, G	SM—PM, CEMS EF—PEMS, SS, G	SM—PM, CEMS EF—PEMS, SS, G	SM—PM, CEMS EF—PEMS, SS, G
4. Auxiliary activities	–	SM—PM EF—PEMS, SS, G	SM—PM EF—PEMS, SS, G	SM—PM, CEMS EF—PEMS, SS, G	SM—PM, CEMS EF—PEMS, SS, G	SM—PM, CEMS EF—PEMS, SS, G	SM—PM, CEMS EF—PEMS, SS, G
5. Transfer of bulk liquids	SM—PM, CEMS EF—PEMS, SS, G TANKS	–	–	–	–	–	SM—PM, CEMS EF—PEMS, SS, G TANKS
6. Bulk storage of organic liquids	SM—PM, CEMS EF—PEMS, SS, G TANKS	–	–	–	–	–	SM—PM, CEMS EF—PEMS, SS, G TANKS
7. Fugitive emissions from leaks and spills	–	–	–	–	–	–	SM—PM, CEMS EF—PEMS, SS, G
8. Air emissions from wastewater treatment	–	–	–	–	–	–	SM—PM, CEMS EF—PEMS, SS, G
9. Vapour recovery units	–	–	–	–	–	–	SM—PM, CEMS EF—PEMS, SS, G
TOTAL actual load (kg)							

SM—source monitoring (PM—periodic monitoring; CEMS—continuous emission monitoring system); EF—emission factor (G—generic; SS—site specific; PEMS—predictive emission monitoring system)

Note: Where EF—G is shown without a numerical value, no adequate data is available for Australian conditions at this time and an EF—PEMS or EF—SS may be developed by the licensee.

Table 33. Petroleum and fuel production: Natural gas/methane production (continued)

WATER

	Assessable pollutants—WATER				
Component or activity	*BOD*	*O&G*	*TSS*	*Total PAHs*	*Total phenolics*
10. Wastewater—point source	SM—PM EF—SS	SM—PM EF—SS	SM—PM EF—SS	SM—PM EF—SS	SM—PM EF—SS
11. Pollutants in wastewaters imported from other licensed activities	SM—PM EF—SS	SM—PM EF—SS	SM—PM EF—SS	SM—PM EF—SS	SM—PM EF—SS
TOTAL actual load (kg)					

SM—source monitoring (PM—periodic monitoring); EF—emission factor (SS—site specific)

7.24 Petroleum and fuel production: Petroleum products and fuel production

Table 34. Petroleum and fuel production: Petroleum products and fuel production—Acceptable load calculation methods and emission factors, where applicable

(kg/tonne of final product refined or manufactured, as applicable)

AIR

	Assessable pollutants—AIR						
Component or activity	*Benzene*	*Benzo(a) pyrene (equiv.)*	*Fine particulates*	*H_2S*	*NO_x & NO_x (summer)*	*SO_x*	*VOCs & VOCs (summer)*
1. Separation processes	SM—PM, CEMS EF—PEMS, SS, G	SM—PM EF—PEMS, SS, G	–	SM—PM, CEMS EF—PEMS, SS, G	–	–	SM—PM, CEMS EF—PEMS, SS, G
2. Conversion processes	SM—PM, CEMS EF—PEMS, SS, G	SM—PM EF—PEMS, SS, G	SM—PM EF—PEMS, SS, G	SM—PM, CEMS EF—PEMS, SS, G	SM—PM, CEMS EF—PEMS, SS, G	SM—PM, CEMS EF—PEMS, SS, G	SM—PM, CEMS EF—PEMS, SS, G
3. Treating process	SM—PM, CEMS EF—PEMS, SS, G	SM—PM EF—PEMS, SS, G	SM—PM EF—PEMS, SS, G	SM—PM, CEMS EF—PEMS, SS, G	SM—PM, CEMS EF—PEMS, SS, G	SM—PM, CEMS EF—PEMS, SS, G	SM—PM, CEMS EF—PEMS, SS, G
4. Auxiliary activities	–	SM—PM EF—PEMS, SS, G	SM—PM EF—PEMS, SS, G	SM—PM, CEMS EF—PEMS, SS, G	SM—PM, CEMS EF—PEMS, SS, G	SM—PM, CEMS EF—PEMS, SS, G	SM—PM, CEMS EF—PEMS, SS, G
5. Transfer of bulk liquids	SM—PM, CEMS EF—PEMS, SS, G TANKS	–	–	–	–	–	SM—PM, CEMS EF—PEMS, SS, G TANKS
6. Bulk storage of organic liquids	SM—PM, CEMS EF—PEMS, SS, G TANKS	–	–	–	–	–	SM—PM, CEMS EF—PEMS, SS, G TANKS
7. Fugitive emissions from leaks and spills	–	–	–	–	–	–	SM—PM, CEMS EF—PEMS, SS, G
8. Air emissions from wastewater treatment	–	–	–	–	–	–	SM—PM, CEMS EF—PEMS, SS, G
9. Vapour recovery units	–	–	–	–	–	–	SM—PM, CEMS EF—PEMS, SS, G
TOTAL actual load (kg)							

SM—source monitoring (PM—periodic monitoring; CEMS—continuous emission monitoring system); EF—emission factor (G—generic; SS—site specific; PEMS—predictive emission monitoring system)

Note: Where EF—G is shown without a numerical value, no adequate data is available for Australian conditions at this time and an EF—PEMS or EF—SS may be developed by the licensee.

Table 34. Petroleum and fuel production: Petroleum products and fuel production (continued)

WATER

	Assessable pollutants—WATER				
Component or activity	*BOD*	*O&G*	*TSS*	*Total PAHs*	*Total phenolics*
10. Wastewater—point source	SM—PM EF—SS	SM—PM EF—SS	SM—PM EF—SS	SM—PM EF—SS	SM—PM EF—SS
11. Pollutants in wastewaters imported from other licensed activities	SM—PM EF—SS	SM—PM EF—SS	SM—PM EF—SS	SM—PM EF—SS	SM—PM EF—SS
TOTAL actual load (kg)					

SM—source monitoring (PM—periodic monitoring); EF—emission factor (SS—site specific)

7.25 Resource recovery: Recovery of waste oil

Table 35. Resource recovery: Recovery of waste oil—Acceptable load calculation methods and emission factors, where applicable

(kg/tonne recovered)

AIR

	Assessable pollutants—AIR	
Component or activity	*Lead*	*VOCs & VOCs (summer)*
1. Pretreatment	SM—PM EF—PEMS, SS, G	SM—PM EF—PEMS, SS, G
2. Process	SM—PM EF—PEMS, SS, G	SM—PM EF—PEMS, SS, G
3. Transfer	SM—PM EF—PEMS, SS, G	SM—PM EF—PEMS, SS, G
TOTAL actual load (kg)		

SM—source monitoring (PM—periodic monitoring); EF—emission factor (G—generic; SS—site specific; PEMS—predictive emission monitoring system)

Note: Where EF—G is shown without a numerical value, no adequate data is available for Australian conditions at this time and an EF—PEMS or EF—SS may be developed by the licensee.

WATER

	Assessable pollutants—WATER
Component or activity	*Oil & grease*
4. Wastewater—point source	SM—PM, CEMS EF—SS
TOTAL actual load (kg)	

SM—source monitoring (PM—periodic monitoring; CEMS—continuous emission monitoring); EF—emission factor (SS—site specific)

7.26 Sewage treatment: Processing by small and large plants

Table 36. Sewage treatment: Processing by small and large plants—Acceptable load calculation methods and emission factors, where applicable

(a) Small plants (219 to < 10,000 ML per year)

WATER

Small sewage treatment plants	*Assessable pollutants—WATER*				
Component or activity	*BOD*	*Oil & grease*	*Total N*	*Total P*	*TSS*
1. Wastewater—point source	SM—PM, CEMS EF—SS, G	SM—PM, CEMS EF—SS, G	SM—PM, CEMS EF—SS, G	SM—PM, CEMS EF—SS, G	SM—PM, CEMS EF—SS, G
TOTAL actual load (kg)					

SM—source monitoring (PM—periodic monitoring; CEMS—continuous emission monitoring system); EF—emission factor (G—generic; SS—site specific)

Generic emission factors for small STPs in NSW

Plant type	BOD (mg/L)	Oil & grease (mg/L)	Total N (mg/L)	Total P (mg/L)	TSS (mg/L)
Activated sludge plants					
Conventional activated sludge (CAS)	15	10	40	10	20
CAS + chemical P removal + filtration	5	2	20	0.5	5
Extended aeration (EA)	15	10	20	10	20
EA with denitrification	15	10	10	10	20
EA + ponds[a]	10	10	5	8	15
EA + filtration	8	2	20	8	8
EA + chemical P removal	15	10	20	1	15
EA + chemical P removal + filtration	5	2	20	0.5	5
EA with biological nutrient (N & P) removal	15	10	10	5	20
EA with biological nutrient (N & P) removal + chemical P removal + filtration	5	2	10	0.5	20
EA + ponds + chemical P removal	10	10	5	< 1	15
EA + ponds + biological P removal	10	10	5	5	15
EA + ponds + chemical P removal + filtration	5	2	5	0.5	5
EA + ponds + filtration	5	2	5	8	5
Trickling filter plants					
Trickling filters (TF)	30	10	40	10	40
TF + ponds	20	10	40	10	30
TF + filtration	20	2	40	10	20

Table 36. Sewage treatment: Processing by small and large plants—Acceptable load calculation methods and emission factors, where applicable (continued)

Plant type (*continued)*	BOD (mg/L)	Oil & grease (mg/L)	Total N (mg/L)	Total P (mg/L)	TSS (mg/L)
Lagoon technology					
Oxidation ponds	50	10	40	10	50
Oxidation ponds + ponds	30	10	40	10	40
Aerated lagoon	40	10	40	10	40
Aerated lagoons + ponds	20	10	20	10	30
Hybrid plants					
Anaerobic + aerated lagoon + ponds	20	10	20	10	30
CAS + ponds	15	10	20	10	20
TF + extended aeration with no denitrification	15	10	40	10	20
TF + extended aeration with denitrification	15	10	15	10	20
TF + CAS + ponds	15	10	40	10	20
TF + oxidation ponds + ponds	20	10	40	10	30
TF + extended aeration + ponds	10	10	5	8	15
TF + extended aeration + ponds + chemical P removal	10	10	5	1	15

[a] 'Pond' refers to detention of effluent for more than 10 days in a form of open effluent impoundment.

(b) Large plants (> 10,000 ML per year)—include all those assessable pollutants listed for small STPs plus the following assessable pollutants

WATER

Large sewage treatment plants	*Assessable pollutants—WATER*							
Component or activity	*Cd*	*Cr*	*Cu*	*Pb*	*Hg*	*Se*	*Zn*	*Pesticides & PCBs*
1. Wastewater—point source	SM—PM, CEMS EF—SS	SM—PM, CEMS EF—SS	SM—PM, CEMS EF—SS	SM—PM, CEMS EF—SS	SM—PM, CEMS EF—SS	SM—PM, CEMS EF—SS	SM—PM, CEMS EF—SS	SM—PM, CEMS EF—SS
TOTAL actual load (kg)								

SM—source monitoring (PM—periodic monitoring; CEMS—continuous emission monitoring system); EF—emission factor (SS—site specific)

Note: Biosolids from sewage treatment plants, as defined in Schedule 1, Division 2 of the *Protection of the Environment Operations Act 1997*, are not part of the Load-based Licensing Scheme. *Environmental Guidelines: Use and Disposal of Biosolids Products* (EPA 1997) should be consulted for information on biosolids management.

7.27 Waste disposal (thermal treatment): Thermal treatment of general waste

Table 37. Waste disposal (thermal treatment): Thermal treatment of general waste—Acceptable load calculation methods and emission factors, where applicable

(kg/tonne of material incinerated)

AIR

	Assessable pollutants—AIR							
Component or activity	*As*	*Benzene*	*B(a)P*	*Fine particulates*	*Pb*	*Hg*	*NO_x & NO_x (summer)*	*SO_x*
1. Combustion	SM—PM EF—PEMS, SS	SM—PM EF—PEMS, SS	SM—PM EF—PEMS, SS	SM—PM EF—PEMS, SS	SM—PM EF—PEMS, SS	SM—PM EF—PEMS, SS	SM—PM EF—PEMS, SS	SM—PM EF—PEMS, SS
TOTAL actual load (kg)								

SM—source monitoring (PM—periodic monitoring); EF—emission factor (SS—site specific; PEMS—predictive emission monitoring system)

7.28 Waste disposal (thermal treatment): Thermal treatment of hazardous and other waste

Table 38. Waste disposal (thermal treatment): Thermal treatment of hazardous and other waste—Acceptable load calculation methods and emission factors, where applicable

(kg/tonne of material incinerated)

AIR

	Assessable pollutants—AIR							
Component or activity	*As*	*Benzene*	*B(a)P*	*Fine particulates*	*Pb*	*Hg*	*NO_x & NO_x (summer)*	*SO_x*
1. Combustion	SM—PM EF—PEMS, SS	SM—PM EF—PEMS, SS	SM—PM EF—PEMS, SS	SM—PM EF—PEMS, SS	SM—PM EF—PEMS, SS	SM—PM EF—PEMS, SS	SM—PM EF—PEMS, SS	SM—PM EF—PEMS, SS
TOTAL actual load (kg)								

SM—source monitoring (PM—periodic monitoring); EF—emission factor (SS—site specific; PEMS—predictive emission monitoring system)

Worksheet 2

1. Copy the names of the assessable pollutants and the components of the activity from the relevant table in Part B into a table like the one below. Add more rows or columns if necessary.
2. Using Sections 2, 3 and 4, and Part B of the Protocol, calculate the actual pollutant loads for each component or activity. Repeat for each assessable pollutant for your industry.
3. Sum the loads of each assessable pollutant for each component to calculate the total actual loads and enter the results in the Worksheet.
4. Calculate any weighted loads (Section 5) and enter the amounts in the Worksheet.
5. Record any agreed loads shown in a load reduction agreement from the EPA (Section 6) in the indicated cells.
6. Use the values for actual, weighted and agreed loads to complete the annual return.

EPA premises number	
Activity classification	
Licence fee period	...../...../..... to ...../...../.....

AIR

	Assessable pollutants (kg per licence fee period)						
Component or activity	**1**	**2**	**3**	**4**	**5**	**6**	**7**
1							
2							
3							
4							
5							
6							
7							
8							
Actual pollutant load (total of above)							
Weighted pollutant load							
Agreed pollutant load							

WATER

	Assessable pollutants (kg per licence fee period)						
Component or activity	**1**	**2**	**3**	**4**	**5**	**6**	**7**
1							
2							
3							
4							
5							
Actual pollutant load (total of above)							
Weighted pollutant load							
Agreed pollutant load							