final report

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Review of Contaminant Emissions

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Abstract

The National Pollutant Inventory (NPI) is Australia's national database of pollutants emitted into the environment. The red meat industry is required to estimate and report annually their emissions to air, land and water of NPI substances. If a facility handles more than the designated threshold amount of an NPI substance, the operator of that facility must prepare a report to the NPI each year detailing the amount of that substance emitted. The collected and estimated information is publicly available at www.npi.gov.au.

The meat processing Emissions Estimation Technique Manual (EETM) was generated by the Queensland EPA in conjunction with a meat processing working group in 1999 and has not been revised since that time. The project revised the EETM based on industry NPI data and review of other relevant EETMs and the learning from a decade of experience reporting in the industry. The revised EETM will help companies to achieve an ongoing good standard of reporting and help to ensure that NPI data reported is consistent and reliable.

Executive Summary

The National Pollutant Inventory (NPI) is Australia's national database of pollutants emitted into the environment. The red meat industry is required to estimate and report annually their emissions to air, land and water of NPI substances. If a facility handles more than the designated threshold amount of an NPI substance, the operator of that facility must prepare a report to the NPI each year detailing the amount of that substance emitted. The collected and estimated information is publicly available at www.npi.gov.au.

The meat processing EETM was generated by the Queensland EPA in conjunction with a meat processing working group in 1999 and has not been revised since that time. The project revised the EETM based on industry NPI data and review of other relevant EETMs and the learning from a decade of experience reporting in the industry.

A number of review steps were undertaken prior to the revision of the EETM. These included a review of reported NPI data from a range of meat processing sites to identify any deficiencies in what sites are currently reporting, a review (including literature review) of industry technology and practices, a review of other food industry EETMs and a review of the current requirements of the NPI National Environment Protection Measure (NEPM). The review of reported NPI data identified some clear errors that sites were making in their reporting, which highlighted the need for some clearer guidance to be provided regarding emission reporting.

The existing EETM was found to be in need of additional information and guidance regarding requirement to report transfers of waste. Other variations to NPI requirements as a result of the 2008 NEPM variation are covered in the NPI Guide and other relevant manuals (such as in the Combustion in Boilers manual for the addition of $PM_{2.5}$ as a reportable substance arising from the burning of fuel) and are not directly relevant to the meat processing industry

The review of current industry technology and practices identified that there are many and varied initiatives that are taking place in the meat processing sector in Australia in order to improve environmental performance and many of these are more recent than 1999 (when the current manual was published). However, there was no direct evidence found of any significant process changes that would lead to *different* NPI substances being emitted by the industry (although the pollutant *amounts* emitted would be expected to be lower). Thus, it was not seen that any major changes are required to the manual as a result of industry process changes.

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1 Project Background & Objectives

The National Pollutant Inventory (NPI) is Australia's national database of pollutants emitted into the environment. The red meat industry is required to estimate and report annually their emissions to air, land and water of NPI substances. If a facility handles more than the designated threshold amount of an NPI substance, the operator of that facility must prepare a report to the NPI each year detailing the amount of that substance emitted. The collected and estimated information is publicly available at www.npi.gov.au.

The meat processing EETM was generated by the Queensland EPA in conjunction with a meat processing working group in 1999 and has not been revised since that time. The project seeks to revise the EETM based on industry NPI data and review of other relevant EETMs and the learning from a decade of experience reporting in the industry, particularly in respect of updated emission factors. The project outcome (revised EETM) will benefit the meat processing industry by providing up to date knowledge to help industry personnel in preparing company reports. The revised EETM will help companies to achieve an ongoing good standard of reporting and help to ensure that NPI data reported is consistent and reliable.

This report was prepared for Meat & Livestock Australia with matching funds provided by the Australian Government and contributions from the Australian Meat Processor Corporation.

1.1 Abbreviations

AMPC	Australian Meat Processor Corporation
BOD	Biochemical Oxygen Demand
CO2-e	carbon dioxide equivalent
COD	Chemical Oxygen Demand
EETM	Emission Estimation Technique Manual
EPA	Environment Protection Agency
G	giga
J	joule
kg	kilogram
kL	kilolitre
KPI	Key Performance Indicator
kt	kilotonne
L	litre
M	mega
m3	cubic metre
mg	milligram
MIGA	Multilateral Investment Guarantee Agency
MLA	Meat & Livestock Australia Limited
NEPM	National Environment Protection Measure
NGER	National Greenhouse and Energy Reporting
NPI	National Pollutant Inventory
PM2.5	Particulate Matter 2.5 micrometres or less in diameter
T	terra
t	tonnes
Wh	Watt hour

2 Project Methodology

The scope of work for the project included the following stages:

- Project inception meeting with Meat & Livestock Australia (MLA) and Australian Meat Processor Corporation (AMPC) to confirm project objectives (completed July 2011).
- Review past NPI data for the red meat processing industry as it appears in the NPI database for the 08-09 and 09-10 reporting years. This included a minimum of 15 facility reports and an assessment of the NPI substances typically reported, the usual range of emissions and other summary information (completed August 2011).
- Review major technological and process changes that have occurred in the red meat industry in the past ten years. This review has included information on waste management practices, as the requirements to report NPI substances in waste transfers was introduced in 2008. Experience gained in the recently completed Industry Environment Performance Review (GHD, 2011) was used to assist in this review (completed October 2011).
- Review recently updated EETM for similar food industries. This review assisted in identifying gaps in the current EETM (completed October 2011).
- Updating of the EETM document, with consideration of technology changes in the industry, similar recently updated EETMs and updates to the NPI NEPM that occurred in 2008 (completed October 2011).
- Validate the updated EETM against the previous NPI data submitted by the industry. This will assess whether the EETM provides a user-friendly tool to site personnel to enable them to accurately prepare their site's NPI report (completed February 2012).

3 Review of Past NPI Reports

As the intial stage of this project, GHD undertook a review of NPI data for the red meat processing industry as it appears in the NPI database (publically available at www.npi.gov.au) for the 08-09 and 09-10 reporting years. This review involved the examination of data from 15 facilities to determine the NPI substances typically reported, the usual range of emissions and other summary information. The report containing the detailed findings of this review is attached as Appendix 1.

4 Industry Technology & Practices

The meat industry in Australia has the potential for a large environmental impact. Developing and implementing appropriate technology solutions is critical to improving and ensuring this impact does not worsen in the future and ensure long term sustainability of the industry.

With the ever increasing pressure faced by environmental factors such as tighter emissions regulations, the uncertainty of water resources and growing demand for product, identifying practices and processes which improve environmental sustainability within the industry is paramount.

4.1 Current Initiatives

A current key investment area for the red meat industry is the application of rapid cooling technologies. These technologies allow chilling or freezing of meat within a much shorter time frame compared to more conventional refrigeration methods. These rapid cooling technologies have not been taken up commercially due to practical difficulties in implementations, such as cooling rates achieved on a laboratory scale not delivering consistent eating quality in a commercial environment. However, recent research has raised hopes that meat quality issues can be addressed and that these technologies may yet have commercial applications[1].

4.2 Current Site Practices

An Industry Environment Performance Review[2] undertaken by GHD for the year 2008-09, involved an assessment of 14 sites across Australia to assess current environmental performance. A summary of the current site practices based on the information collected in this review is provided below:

- **Recycled water** – recycled water is defined as wastewater which has been treated on site and is being returned for non-potable uses such as cattle wash, etc. Due to food safety requirements however, many sites are unable to recycle water. Water saving initiatives identified include reuse of water for yard wash-down, cattle pre-wash, truck washing and other non-potable applications; other initiatives include the reduction in hose nozzle size (to decrease water volume usage) and installation of sensors on hand wash stations and sterilizers.
- **Energy usage** – Energy usage has become an important focus area in the red meat industry, with costs likely to rise significantly with the introduction of the carbon tax. Energy saving initiatives identified included reduction in hot water temperature; flash steam recovery projects on boilers; variable speed drives installed on motors and energy audits of sites to identify specific opportunities for reduction. None of the sites assessed reported electricity generation from on-site waste methane, solar or other renewable resources.

[1] http://www.redmeatinnovation.com.au/innovation-areas/new-technologies/refrigeration/rapid-cooling--smartchill

[2] Meat & Livestock Australia; Industry Environmental Performance Review 2010; Project A.ENV.0086; March 2011

- **Greenhouse gas emissions** – The federal government introduced mandatory National Greenhouse and Energy Reporting (NGER) of greenhouse gas emissions in 2008-09 for sites that exceeded certain thresholds. The reporting thresholds for 2008-09 were:
  - 25 kt CO2-e emissions or 100 TJ energy use for individual facilities; and
  - 125 kt CO2-e emissions or 500 TJ energy use for corporate groups.

  Of the 14 participating sites, 12 exceeded the facility threshold and so reported their emissions.

  The majority of greenhouse emissions are from electrical energy consumption which accounts for 66.6% of total emissions across the 14 sites. However, electricity provided only 31.6% of the total energy consumed across the 14 sites. This is because electricity is more greenhouse gas emissions-intensive (i.e. produces more CO2-e per unit of energy) than natural gas or other fuel sources.
- **Waste** – Solid wastes reported as being recycled include:
  - *Organic* - cardboard and paper; paunch solids; and
  - *Non-organic* - boiler ash; fluorescent tubes; waste oil; batteries and plastic.

5 Review of Recently Updated EETM

GHD reviewed the NPI industry reporting materials, available on the NPI website (http://www.npi.gov.au/publications/emission-estimation-technique/index.html). There are 94 industry emission estimation technique manuals available.

There were 17 of these manuals (in addition to the meat processing manual itself) that were found to be related to the meat processing industry (e.g. wool scouring, leather tanning and finishing) or for other food processing industries. These manuals were examined for style, content and to determine the main gaps in the current meat processing manual. These manuals are shown in Table 1, along with the current issue number (note that this is simply the number of times the manual has been published and does not correspond with the NPI "version number") and date of publication of the current issue. From the table it can be seen that the majority of these manuals, like the meat processing manual, have not been updated since their original publication, and thus do not include information on more recent changes to the NPI, such as the requirement to report waste transfers.

The manuals that have been updated since their original publication was examined for updated information requirements etc, however even these manuals have not been updated since the changes to the NPI NEPM came into effect (in 2008). Only the Wine and Spirits Manufacture manual currently includes this information. The Intensive Livestock – Beef Cattle manual (last issued in 2007), was found to have some more detailed guidance for reporters that could potentially be of relevance to meat processing reporters.

Table 1 Relevant industry emissions estimation technique manuals

Manual Name	Issue #	Date
Animal and Bird Feed Manufacture	1	Dec 99
Beer and Ready-to-Drink Alcoholic Beverage Manufacture	3	March 07
Bread Manufacture	2	June 03
Coffee Roasting	1	June 99
Confectionary Manufacture	1	Dec 99
Dairy Product Manufacture	1	June 99
Fruit and Vegetable Processing	1	June 99
Intensive Livestock – Beef Cattle	4	May 07
Intensive Livestock – Pig Farming	3	June 07
Intensive Livestock – Poultry Raising	1	June 02
Leather Tanning and Finishing	1	June 99

Manual Name	Issue #	Date
Seafood Processing	1	June 99
Snack Foods Roasting and Frying	1	June 99
Soft Drink Manufacture	1	Nov 99
Vegetable Oil Processing	1	June 99
Wine and Spirits Manufacture	3	July 10
Wool Scouring	1	July 99

6 Changes to NPI NEPM

As described on the NPI website, in June 2007, the NPI National Environment Protection Measure (NEPM) was varied to “fulfil the inventory's potential as a major tool for environmental management and cleaner production”. The current NPI NEPM (as varied) was made in November 2008.

The changes under the variation include:

- reporting of transfers of NPI substances in waste to final destination;
- inclusion of new substances to the current list (PM2.5, Acrolein, Polychlorinated Biphenyls);
- lowering the threshold for mercury and compounds from 10 tonnes used to 5 kg used; and
- other matters identified in the NPI Review Report.

For financial year reporters, these changes first came into effect for the 2008-09 reporting year.

Greenhouse gas emissions reporting was initially included in the NEPM variation as an interim measure, pending the establishment of a national purpose-built greenhouse gas reporting mechanism. The National Greenhouse and Energy Reporting Act 2007 (Commonwealth) was enacted in September 2007, therefore in April 2008, greenhouse and energy reporting requirements were removed from the NEPM variation.

7 Conclusions & Recommendations

7.1 Updated Meat Processing EETM

Once the reviews described in the preceding sections of this report were completed, the following points were noted regarding the requirements for the updated Meat Processing Emission Estimation Technique Manual (EETM):

- There are many and varied initiatives that are taking place in the meat processing sector in Australia in order to improve environmental performance and many of these are more recent than 1999 (when the current manual was published). However, there was no direct evidence found of any significant process changes that would lead to **different** NPI substances being emitted by the industry (although the pollutant **amounts** emitted would be expected to be lower). Thus, it was not seen that any major changes are required to the manual as a result of industry process changes.
- The manual needs information and guidance added regarding the requirement to report transfers of waste. Other variations to NPI requirements as a result of the 2008 NEPM variation are covered in the NPI Guide and other relevant manuals (such as in the Combustion in Boilers manual for the addition of $PM_{2.5}$ as a reportable substance arising from the burning of fuel) and are not directly relevant to the meat processing industry.
- The first report in this project, in which reported NPI data from a range of meat processing sites was examined (Review of Past NPI Reports, GHD August 2011), identified some clear errors that sites were making in their reporting, which highlighted the need for some clearer guidance to be provided regarding emission reporting.

The draft updated EETM is included as Appendix 1 to this report. By prior agreement with MLA, the text of the current manual was reproduced in its entirety, and the changes that have been made are clearly noted as follows:

- Deletions are noted using ~~strikethrough~~;
- Additions are noted using highlight; and
- Comments are contained in <<>> and highlighted.

Section 5 (Transfers of NPI substances in waste) has been added and the following documents were used as resources in the preparation of this section:

- NPI Guide Version 5.2; June 2011; and
- Transfers Information Booklet Version 2.0; March 2009.

8 Appendices

8.1 Appendix 1 – Review of Past NPI Reports

8.2 Appendix 2 – Updated Meat Processing EETM