

TIER 1: INDIVIDUAL SOURCE CATEGORY CHECKLIST				Ver 1.0		
Inventory Checked: 2003		4A Enteric fermentation-CH4		CH4		
Source Category: Ministry of Agriculture and Forestry with data from Statistics New Zealand and Agresearch						
Estimates prepared by: Working spreadsheets(s)						
Tier 1 QC Activity & Procedures						
QC Activity	Procedures	Procedures adopted for 2005 NIR (2003 data)	Organisation/Person responsible for quality check	Brief description of check applied (include date/person & reference if required)	Results of check (include reference if required)	Corrective Actions Taken
Check that assumptions and criteria for the selection of activity data and emission factors are documented.	Check descriptions of activity data and emission factors and ensure that these are properly recorded and archived.	Check activity data and emission factors are described in the NIR report and any changes from previous years are adequately documented.	MIE-SP	S. Petrie 13/04/05: Checked description of activity data, emission factors and methodology in NIR	Well documented in chapter 6 and Annex 3a of the NIR	none
Check for transcription errors in data input and reference	Confirm that bibliographical data references are properly cited in the internal documentation.	1. Undertake visual checks of module names for consistency in NIR worksheets. 2. Check all references cited in the appropriate source sector chapter in the NIR report and make sure they are correctly referenced at the end of the chapter.	MIE-SP	S. Petrie 13/04/05: 1. Checked module names in worksheets for consistency. 2. Check references cited in text are correctly referenced in the reference chapter.	1. Tables labeled correctly. 2. Some references cited in text missing in reference chapter and several references no longer cited in main text	corrected reference chapter
	Cross-check a sample of input data from each source category (either measurements or parameters used in calculations) for transcription errors.	1. Cross check activity data from NIR worksheets with that in the CRF for transcription errors. 2. Check activity data figures from original source with data in the CRF.	1. MIE-SP 2. MIE-SP	S. Petrie 13/04/05: 1. visual check by comparing animal numbers for classes for 2003 used in enteric fermentation figures from NIR worksheet with that in the CRF reporter 2. calculate methane emissions using activity data	1. All livestock numbers in NIR worksheets are the same as those in the CRF reporter. 2. Final emissions of methane: Value in NIR worksheet is 1117.00Gg compared with 1123.44Gg in the CRF reporter. This was traced to a difference in the total CH4 from dairy cattle: 402.37 Gg in NIR	2. Checked this with Len-confirmed the CRF value is the correct one. He will change the value in the NIR worksheet.
Check that emissions are calculated correctly.	Reproduce a representative sample of emissions calculations.	Using the figures in the NIR worksheets, calculate representative sample of emissions manually and compare to emissions value in CRF.	MIE-SP	S. Petrie 13/04/05: Calculated dairy cattle CH4 enteric fermentation emissions using figures from worksheet 4.1	Value was 402.35Gg compared with 402.37 Gg. Test passed.	none
	Selectively mimic complex model calculations with abbreviated calculations to judge relative accuracy	Use Tier 1 approach to calculate a sub source of data (eg CH4 emissions from dairy cattle ) to judge relative accuracy.	MAF	limited time meant this check was not undertaken		
Check that parameter and emission units are correctly recorded and that appropriate conversion factors are used	Check that units are properly labelled in calculation sheets	Check the units are correctly labelled in the NIR worksheets	MIE-SP	S. Petrie 13/04/05: visual inspection of units labeled in agricultural worksheets	labeling of units in worksheets O.K	none
	Check that units are correctly carried through from beginning to end of calculations.	check appropriate units are used throughout calculations				
	Check that conversion factors are correct	Check that the correct conversion factors have been used to calculate the emissions in the NIR worksheets-particularly conversion from tonnes to Gg and from C to CH4.	MIE	S. Petrie 13/04/05: checked conversion from kg (as kg/head/yr) to Gg of CH4 for enteric fermentation and manure management occurred in NIR worksheet 4.1	conversion factors are correct and accounted for properly	none
	Check that temporal and spatial adjustment factors are used correctly.					
Check the integrity of database and/or spreadsheet files.	Confirm that the appropriate data processing steps are correctly represented in the database.	confirm data processing steps within model for enteric fermentation are appropriate	MAF	limited time meant this check was not undertaken		
	Confirm that data relationships are correctly represented in the database.	confirm data relationships within model are appropriate	MAF	limited time meant this check was not undertaken		
	Ensure that data fields are properly labelled and have the correct design specifications.	Ensure the addition or deletion of datalines are adequately explained	MIE-SP	S. Petrie 13/04/05: check worksheet tables for obvious gaps in the data series	footnotes at bottom of tables generally explain missing data (which is usually population data for 2004 which is not yet available)	
	Ensure that adequate documentation of database and model structure and operation are archived.	Ensure there is adequate documentation of the model structure and that it is archived.	MAF	S. Petrie 13/04/05: check adequate documentation of enteric fermentation model	paper written by Clark et al (2003) describing the model is archived on the MIE computer network and copies are also held at MAF	none
Check for consistency in data between source categories	Identify parameters (e.g. activity data, constants) that are common to multiple source categories and confirm that there is consistency in the values used for these parameters in the emissions calculations.	Check for consistency in animal number dataset.	MAF/MIE	consistency of animal number dataset was looked into and improved as part of recalculations in the agricultural sector		see comments under recalculations and improvements in the NIR

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<b>Inventory Checked:</b>	2003			CH4		
<b>Source Category:</b>	4A Enteric fermentation-CH4					
<b>Estimates prepared by:</b>	Ministry of Agriculture and Forestry with data from Statistics New Zealand and Agresearch					
<b>Working spreadsheet(s)</b>						
Check that the movement of inventory data among processing steps is correct.	Check that emissions data are correctly aggregated from lower reporting levels to higher reporting levels when preparing summaries.	1. Manually sum CH4 emissions from dairy cattle & non-dairy cattle sources for enteric fermentation & compare with values in cattle node in CRF reporter. 2. Compare total enteric fermentation CH4 emissions in CRF with those provided by Harry Clark and MAF	MIE-SP	S.Petrie 13/04/05: 1. sum CH4 emissions from dairy cattle and non-dairy cattle and compare with total in CRF reporter 2. Compare CRF value for total CH4 from enteric fermentation with value from model	1. The summed value of 663.3 Gg from dairy and non-dairy cattle is the same as the total for cattle	none
	Check that emissions data are correctly transcribed between different intermediate products	QA/QC procedures used that show correct transcription between intermediate worksheets and final entry of data into CRF reporter	MIE	on-going. It is anticipated during 2005 the QA/QC system will be improved and various checks of this nature will be able to be completed for the next inventory submission.		on-going. It is anticipated during 2005 the QA/QC system will be improved and various checks of this nature will be able to be completed for the next inventory submission.
Check that uncertainties in emissions and removals are estimated or calculated correctly.	Check that qualifications of individuals providing expert judgement for uncertainty estimates are appropriate.					
	Check that qualifications, assumptions and expert judgements are recorded. Check that calculated uncertainties are complete and calculated correctly	Check appropriate qualifications, assumptions and judgements for uncertainty analysis are recorded and archived. Check calculated uncertainties are completed and correct		due to time constraints this has not been documented		
	If necessary, duplicate error calculations or a small sample of the probability distributions used by Monte Carlo analyses.					
Undertake review of internal documentation.	Check that there is detailed internal documentation to support the estimates and enable duplication of the emission and uncertainty estimates.	Review internal documentation-ensure there is adequate documentation to support the estimates and uncertainty analysis.	MIE-SP	on-going. It is anticipated during 2005 the QA/QC system will be improved and various checks of this nature will be able to be completed for the next inventory submission.		on-going. It is anticipated during 2005 the QA/QC system will be improved and various checks of this nature will be able to be completed for the next inventory submission.
	Check that inventory data, supporting data, and inventory records are archived and stored to facilitate detailed review.	Check to ensure copies of reports of sector reviews and methodologies are archived.	MIE-SP	S.Petrie 13/04/05: Ensure spreadsheets and information on the enteric fermentation model are stored in an accessible and secure location	All data and methodologies associated with estimating enteric fermentation (and all agricultural emissions) are stored on the Mfe computer network which is regularly backed up.	none
	Check integrity of any data archiving arrangements of outside organisations involved in inventory preparation.	Check data archiving arrangements at MAF	MIE	on-going. It is anticipated during 2005 the QA/QC system will be improved and various checks of this nature will be able to be completed for the next inventory submission.		
Check methodological and data changes resulting in recalculations.	Check for temporal consistency in time series input data for each source category.	record result from time series consistency check in CRF reporter software	MIE-SP			
	Check for consistency in the algorithm/method used for calculations throughout the time series.	Confirm with MAF the method used for estimating CH4 from enteric fermentation is consistent throughout the time series	MIE-SP	S. Petrie 13/04/05: confirm consistent methodology	Methodology is consistent-reading model description and training on how the model runs confirms this	none
Undertake completeness checks.	Confirm that estimates are reported for all source categories and for all years from the appropriate base year to the period of the current inventory.	record result of completeness check in CRF reporter software	MIE-SP	S.Petrie 13/04/05: run completeness checks	all passed	none
	Check that known data gaps that result in incomplete source category emissions estimates are documented.	ensure any known data gaps are documented	MIE-SP	N/A	N/A	N/A
Compare estimates to previous estimates.	For each source category, current inventory estimates should be compared to previous estimates. If there are significant changes or departures from expected trends, recheck estimate and explain any difference.	Compare current inventory source category estimates with CRF tables from 2004 report	MIE-SP	S.Petrie 13/04/05: Several recalculations from this source has meant the value is different from that in the 2004 report.	A value of 1116.98Gg for enteric fermentation in 2002 for this inventory of value of 1123.08Gg in 2002 inventory-result of recalculations	none

TIER 1: INDIVIDUAL SOURCE CATEGORY CHECKLIST				Ver 1.0		
Inventory Checked:		2003				
Source Category:		1AA3b Mobile combustion from road vehicles-CO2	CO2			
Estimates prepared by:		Ministry of Economic Development				
Working spreadsheet(s)						
Tier 1 QC Activity & Procedures						
QC Activity	Procedures	Procedures adopted for 2005 NIR (2003 data)	Organisation/Person responsible for quality check	Brief description of check applied (include date/person & reference if required)	Results of check (include reference if required)	Corrective Actions Taken
Check that assumptions and criteria for the selection of activity data and emission factors are documented.	Check descriptions of activity data and emission factors and ensure that these are properly recorded and archived.	1. Check activity data and emission factors are described in the NIR report and any changes from previous years are adequately documented. 2. Ensure any recommended changes to emission factors from the energy sector have been implemented and correctly recorded in the NIR worksheets	1. MIE-SP 2. MED - Ram SriRamaratnam (7/04/05)	New EFs adopted for the 2004 submission (2002 data) has been used for the 2003 data as well since the variability of C content and calorific value of liquid fuels is less than 5%. They will require an update when there are any "significant" changes to fuel specification as anticipated.	Hale & Twomey (2003)	None.
Check for transcription errors in data input and reference	Confirm that bibliographical data references are properly cited in the internal documentation.	1. Undertake visual checks of module names for consistency in NIR worksheets. 2. Check all references cited in the appropriate source sector chapter in the NIR report and make sure they are correctly referenced at the end of the chapter.	1. MED - Ram SriRamaratnam (7/04/05) 2. MIE-SP	Visual check of module name in worksheets 1.1, 1.2 and 1.3 for all energy sector sub-categories.	No inconsistencies found with respect to the naming of modules or the references cited in the relevant source sector chapter in the NIR	None.
	Cross-check a sample of input data from each source category (either measurements or parameters used in calculations) for transcription errors.	1. Cross check activity data from NIR worksheets with that in the CRF for transcription errors. 2. Check activity data figures from original source (eg MED GHG report for energy sector) with data in the CRF.	1. MED - Stuart Black 2. MED - Ram SriRamaratnam (7/04/05)	1. visual check by comparing road transportation energy consumption figure from worksheet 1.2 (part 1) in NIR with road transportation energy consumption figure in Table 1A(a) in CRF. 2. Checked petrol activity data-comparing figures in MED's GHG Emissions report with figures in NIR worksheet 1.2 (adding up regular and premium petrol figures).	1. Value in worksheet 1.2 was 180,817 compared with same figure in the CRF. Test passed. 2. Value in Table 4.2 in MED report is 113.71 PJ (Prior to revision by SNZ in late 2004) while the aggregated petrol activity data in NIR worksheet 1.2 is 107.82 PJ (10782TJ). Test passed.	None.
Check that emissions are calculated correctly.	Reproduce a representative sample of emissions calculations.	Using the figures in the NIR worksheets, calculate emissions manually and compare to emissions figure from worksheet.	MED - Ram SriRamaratnam (7/04/05)	Calculated CO2 emissions from road transportation (petrol and diesel) using figures from worksheet 1.2	Values calculated were 5559.99 Gg CO2 compared to 5504.39 in NIR worksheet (petrol-regular); 1596.57 compared to 1580.61 Gg CO2 in NIR (petrol-premium) and 4983.69 compared with 4933.85 Gg CO2 calculated in NIR for diesel. Differences are less than 1%. Test passed.	None.
	Selectively mimic complex model calculations with abbreviated calculations to judge relative accuracy.			Take petrol activity data from Table 4.2 in MED's Energy GHG emissions document (value is 107.8 PJ) multiplied by average weighted petrol EF (66.5 kt/PJ). This figure was multiplied by 0.99 (fraction oxidised) to get Gg CO2 produced	Result is 7097 Gg CO2. Value in working spreadsheet is 7085 (regular & premium petrol aggregated together). Difference is 0.17%. Test passed.	None.
Check that parameter and emission units are correctly recorded and that appropriate conversion factors are used	Check that units are properly labelled in calculation sheets	Check the units are correctly labelled in the NIR worksheets	MED - Ram SriRamaratnam (7/04/05)	visual inspection of units labelled in worksheet 1.1 and 1.2 (including overview sheet)	Labelling fine for worksheets 1.1 and 1.2 (parts 1 & 2).	None.
	Check that units are correctly carried through from beginning to end of calculations.	Check correct units are used in calculations	MED - Ram SriRamaratnam (7/04/05)			
	Check that conversion factors are correct	Check that the correct conversion factors have been used to calculate the emissions in the NIR worksheets-particularly conversion from tonnes Gg and from C to CO2 (where appropriate).	MED - Ram SriRamaratnam (7/04/05)	Checked units, including conversion factors in petrol (regular) calculation on worksheet 1.2 in NIR. TJ * tonnes C/TJ = tonnes C. tonnes C/1000= Gg C. Gg C * 44/12 (molecular mass CO2/C) = Gg CO2.	Conversion factors are correct. Checked all energy sector data on NIR worksheets 1.1 and 1.2 (sectoral tables) are consistent with 2 decimal places for final CO2 emissions.	None.
	Check that temporal and spatial adjustment factors are used correctly.					
Check the integrity of database and spreadsheet files.	Confirm that the appropriate data processing steps are correctly represented in the database.		MED - Ram SriRamaratnam (7/04/05)	The energy GHG database at MED consists of linked spreadsheets organised primarily according to sector.		None.
	Confirm that data relationships are correctly represented in the database.					
	Ensure that data fields are properly labelled and have the correct design specifications.	1. Check labels on NIR worksheets are consistent with previous year's NIR 2. Ensure the addition or deletion of data lines are adequately explained	MIE-SP	Visual check-compared data field labels for worksheets 1.1 and 1.2 with the 2003 NIR worksheets.	Gasoline has been split into two separate data lines (for regular and premium gasoline). Av Gas is a new data line (split aviation fuel) compared to 2003 NIR worksheet 1.1 (1-3 of 5) Bitumen has been added as a new data line under liquid fossil fuels worksheet 1.1 (4-5 of 5) compared to 2003 NIR. In worksheet 1.2 gasoline has once again been split as well as fuel oil (heavy and light) and Av gas has been added as an extra data line. All of these additions were due to recommendations in the 2003 energy sector EF review adopted for the 2002 NIR repeated in the 2003 NIR.	None.

	Ensure that adequate documentation of database and model structure and operation are archived.	Ensure adequate documentation of spreadsheet structure and how the emissions are calculated	MED			
Check for consistency in data between source categories	Identify parameters (e.g. activity data, constants) that are common to multiple source categories and confirm that there is consistency in the values used for these parameters in the emissions calculations.		MED - Ram SriRamaratnam (11/04/05)	Check mobile road combustion activity data and CO2 emissions total from worksheet 1.2 and the overview worksheet.	Activity data exactly the same and CO2 emissions 12,094.67 in worksheet 1.2 compared with 12,094.67 Gg in overview worksheet. Test passed.	None.
Check that the movement of inventory data among processing steps is correct.	Check that emissions data are correctly aggregated from lower reporting levels to higher reporting levels when preparing summaries.	1. Manually sum CO2 emissions from all fuels for road transportation & compare with values in road transportation node in CRF reporter. 2. Compare total road CO2 emissions in CRF with those provided from the original source	MED - Stuart Black (14/04/05)	Check mobile road combustion CO2 emissions total from the road transportation node is consistent with internal worksheets and with the NIR.	The transportation node gives 12094.67 Gg, exactly the same as the figure in worksheet 1.2 and the estimate calculated based on the figures in the internal worksheets. Test passed.	None.
	Check that emissions data are correctly transcribed between different intermediate products	Document QA/QC procedures within MED that show correct transcription between intermediate worksheets and final entry of data into CRF reporter	MED - Stuart Black (14/04/05)	Brief description of how consistency between MED's internal worksheets and the NIR worksheets is ensured.	Emissions estimates for MED's publication <i>Energy Greenhouse Gas Emissions</i> and CO2 estimates for the CRF are calculated independently, although the activity data is calculated only once. CO2 estimates for each purpose are checked against each other. Note that the emissions estimates in the <i>Energy Greenhouse Gas Emissions</i> do not assume unoxidised carbon so the estimates in this publication are not directly comparable with the figures in the CRF.	None.
Check that uncertainties in emissions and removals are estimated or calculated correctly.	Check that qualifications of individuals providing expert judgement for uncertainty estimates are appropriate.	Confirm qualifications of those experts providing uncertainty estimates	MED	Nothing to communicate at this stage.		
	Check that qualifications, assumptions and expert judgements are recorded. Check that calculated uncertainties are complete and calculated correctly.	Check there is a documentation record of assumptions and expert judgements for uncertainty estimates.	MED			
	If necessary, duplicate error calculations or a small sample of the probability distributions used by Monte Carlo analyses.					
Undertake review of internal documentation.	Check that there is detailed internal documentation to support the estimates and enable duplication of the emission and uncertainty estimates.	Review internal documentation-ensure there is adequate documentation to support the emissions estimates & uncertainty analysis.	MED - Ram SriRamaratnam (12/04/05)	Internal documentation at MED is facilitated by the preparation of the annual <i>Energy Greenhouse Gas Emissions</i> report. The 2003 report was prepared in 2004.		None.
	Check that inventory data, supporting data, and inventory records are archived and stored to facilitate detailed review.	1. Check to ensure copies of reports of sector reviews and methodologies are archived. 2. Check inventory data is archived appropriately MED	1. MIE-SP 2. MED - Ram SriRamaratnam (12/04/05)	Make sure energy sector emission factor review by Hale and Twomey is archived in the MIE and easily accessible. Also ensure other reports written in response to that report are archived.	Reports stored on MIE computer network: m:\ClimateChange\greenhouse gas inventory\sector information\Energy. The reports are also stored at MED. * Emissions Factor Review Report * Implications for energy emissions June 2003 * Energy EF review-changes resulting from peer review of HT report	None.
	Check integrity of any data archiving arrangements of outside organisations involved in inventory preparation.	Check data archiving arrangements at MED	MIE			
Check methodological and data changes resulting in recalculations.	Check for temporal consistency in time series input data for each source category.	record results from time series consistency check in CRF reporter software	MIE		this check not completed with CRF reporter but visual checks done on time-series	none
	Check for consistency in the algorithm/method used for calculations throughout the time series.	Confirm that method used to estimate CO2 from mobile combustion is consistent for all years	MED - Stuart Black (14/04/05)	Check that the IEFs shown in the CRF reporter are consistent with the correct emission factors being used in all years.	*The IEFs for gasoline range between 65.54 and 65.8, consistent with changes in the mix between premium and regular unleaded and with the adoption of separate emission factors for premium and regular form 1996. *The IEF for diesel is 68.81 in all years. *The IEF for LPG is 59.8 in all years. *The IEF for natural gas ranges between 51.81 and 52.58, consistent with changes in the natural gas emission factor used.	None.
Undertake completeness checks.	Confirm that estimates are reported for all source categories and for all years from the appropriate base year to the period of the current inventory.	CRF reporter checks	MIE-SP	S. Petrie: check energy sector passes completeness checks	first run through found a number of gaps-mainly lack of explanations for IE and NE comments	in consultation with Stuart Black filled in these gaps and re-an checks which now passed
	Check that known data gaps that result in incomplete source category emissions estimates are documented.	ensure any known data gaps are documented	MIE-SP		no gaps in data series	None.
Compare estimates to previous estimates.	For each source category, current inventory estimates should be compared to previous estimates. If there are significant changes or departures from expected trends, recheck estimates and explain any difference.	Compare current inventory source category estimates with CRF tables from 2004 report	MIE-SP	S. Petrie compare total for road combustion in CRF report with that 2002 CRF table	Value of 11680.74 Gg CO2 for 2002 (in 2003 CRF) compared with 12,292.63 Gg for 2002 in 2002 inventory. The difference is due to misreporting of liquid fuels by oil companies in 2002 which has been fixed in the 2003 inventory and the correct emission factors (as recommended by Hale and Twomey) used	None.