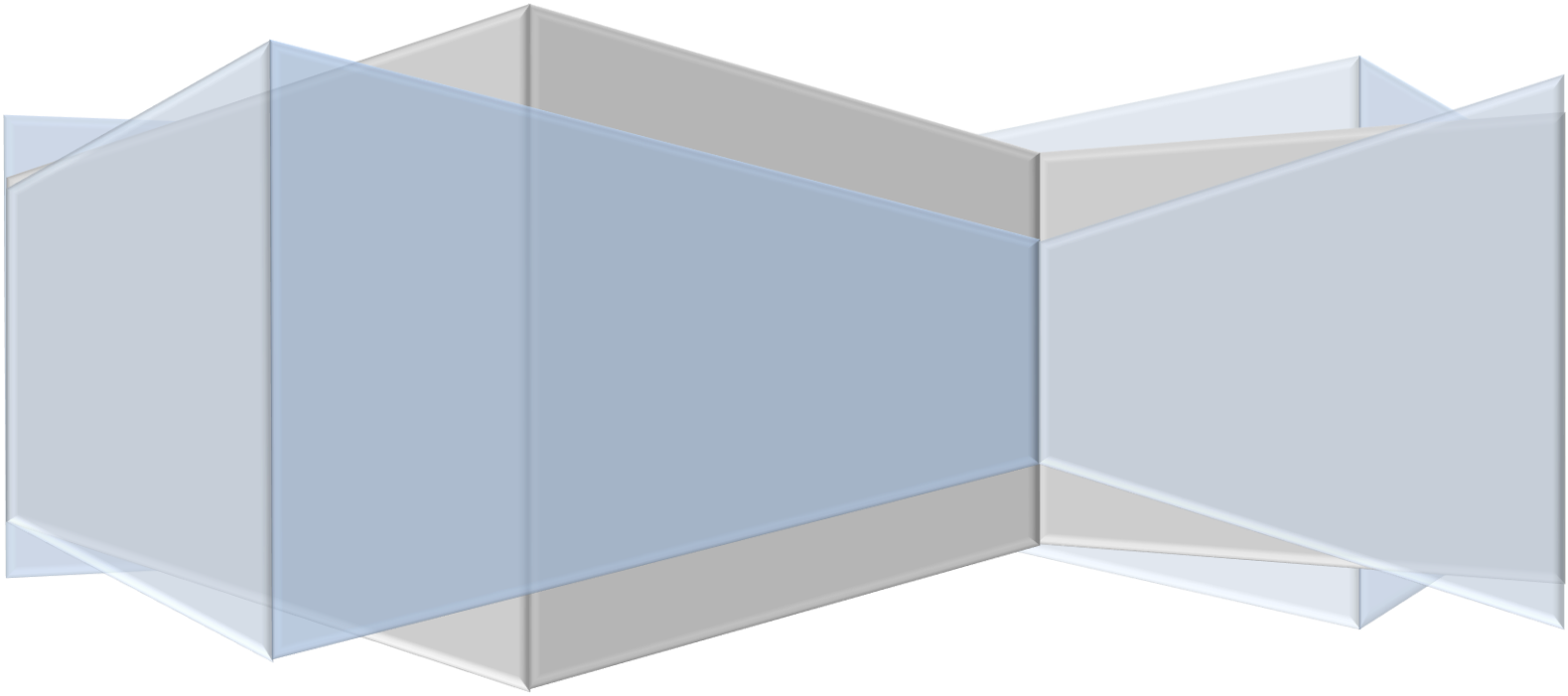
Revision A

Emissions Report – Toyota Corolla

ADDF-REP-TA-0005

Michelle Lam



EMISSIONS REPORT – TOYOTA COROLLA

ADDF-REP-TA-0005

Revision Number: A
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1 EXECUTIVE SUMMARY

The major air pollutants are caused by emissions of exhaust from motor vehicles which are principal source that emits nitrogen oxides (NOx), carbon monoxide (CO) and sulfur dioxide (SO_2) in most capital cities worldwide. These ambient air pollutants, CO, NOx and SO_2 are part of the main concern pollutants as listed in the 1998 Ambient Air Quality National Environmental Protection Measure (Ambient Air Quality NEPM) and are all in top 3 ranks in the National Pollution Inventory Risk Ranking. The pollutants are of major concern as they pose different levels of risk to human health and adversely impacts the environment.

With regards to lowering and limiting these harmful vehicle emissions, Fuel Conditioner Concentrate (FCC), FCC is a non-hydrocarbon fuel conditioner that assists in achieving clean fuel, improves performance and increasing fuel efficiency, whilst most importantly lowering emissions of air pollutants.

Key summary based on the technical analysis of the emissions from Toyota Corolla (Att. 1) with vehicle running on fuel without FCC additive (benchmark) and with addition of FCC:

CO emissions:

- Emissions of CO pollutant is ranked at No. 3 in the National Pollution Inventory Risk Ranking with a high health hazard factor (Ref. 7).
- A substantial 97% reduction of CO emissions at maximum rated power which reduces the CO concentration from 37 ppm to 1 ppm (5 minutes average time) after addition of FCC.

SO_2 emissions:

- Emissions of SO_2 pollutant is ranked at No. 3 in the National Pollution Inventory Risk Ranking (Ref. 7).
- A 4% reduction of SO_2 emissions at minimum rated power which reduces the NOx concentration from 0.00098 to 0.00094 g/min after addition of FCC.

NOx emissions:

- Emissions of NOx pollutant is ranked highest i.e. No. 1 in the National Pollution Inventory Risk Ranking with the highest environmental hazard factor (Ref. 7).
- A 4% reduction of NOx emissions at minimum rated power which reduces the NOx concentration from 0.00077 to 0.00074 g/min after addition of FCC.

2 INTRODUCTION

The major air pollutants are caused by emissions of exhaust from motor vehicles which are principal source that emits nitrogen oxides, sulfur dioxide and carbon monoxide in most capital cities worldwide. Traffic contributes more than 75% of carbon monoxide emissions and most emissions of nitrogen oxides (Ref. 7).

Statistics for Australia capital cities for year 2000–01 indicates that motor vehicles are estimated to have contributed 47% of nitrogen oxide levels in Perth and 82% in Southeast Queensland. Motor vehicles are estimated to be the source of more than 60% of carbon monoxide levels for all capital city airsheds other than Darwin (Ref. 7).

These air pollutants pose different levels of risk to human health and adversely impacts the environment. The ambient air pollutants of most concern in Australia are listed in the 1998 Ambient Air Quality National Environmental Protection Measure (Ambient Air Quality NEPM) which are carbon monoxide, nitrogen oxides, volatile organic compounds, lead, sulfur dioxide and particulate matter of less than 10 microns (PM10).

In environmental view of limiting harmful vehicle emissions, FCC is a non-hydrocarbon fuel conditioner that cleans fuel and improves performance whilst lowering emissions and increasing fuel efficiency.

2.1 BACKGROUND

FCC is a blend of blend of surfactants (detergents), oxygenates and corrosion inhibitors developed to meet the challenge of today's high performance engines. The Primary benefits of FCC are:

- Solubilises liquid water into the fuel.
- Reduces or eliminates the conditions favourable to the growth of microorganisms.
- Stabilises fuel by inhibiting the formation of gums and varnish.
- Inhibits corrosion of fuel system components.
- Promotes a uniform fuel spray pattern in combustion chambers, thus reducing carbonisation and improving combustion efficiency.
- Inhibits formation of corrosive acids in combustion chambers.

2.2 DOCUMENT SCOPE

This document scope provides technical analysis for comparison of emissions from vehicle type Toyota Corolla running on fuel before and after addition of fuel additive, herein referred to as FCC. Analysis is made on emissions of major pollutants as listed below:

- Carbon Monoxide,
- Sulfur Dioxide and
- Nitrogen Dioxide.

2.3 AIR QUALITY STANDARD

The ambient air pollutants of most concern in Australia are listed in the 1998 Ambient Air Quality National Environmental Protection Measure (Ambient Air Quality NEPM) and the National Air Quality Standard is summarised in Table 2.1 (Att. 2):

Table 2.1: Australia National Air Quality Standard

Pollutant	Averaging Period	Maximum (ambient) concentration
Carbon monoxide	8 hours	9.0 ppm
Nitrogen dioxide	1 hour	0.12 ppm
	1 year	0.03 ppm
Sulfur dioxide	1 hour	0.20 ppm
	1 day	0.08 ppm
	1 year	0.02 ppm
Photochemical oxidants (as ozone)	1 hour	0.10 ppm
	4 hours	0.08 ppm
Lead	1 year	0.50 µg/m³
Particles as PM10	1 day	50 µg/m³

2.4 POLLUTANT INVENTORY RISK RANKING

The National Environment Protection Council Technical Advisory Panel (formed to recommend substances for inclusion in the National Pollutant Inventory to assessed the risks to human health and the environment from exposure to a substance listed in the inventory) risk assessments for the major air pollutants are summarised in Table 2.1.

Table 2.1 National Pollutant Inventory Risk Ranking (Selected Air Pollutants (Ref. 7))

Pollutant	*Health hazard*	*Environmental hazard*	*Combined rank*	*National Pollution Inventory rank*[1]
Nitrogen oxides—N_2O NO NO_2	1.5	3.0	4.5	1
Carbon monoxide—CO	2.0	0.8	2.8	3
Sulfur dioxide—SO_2	1.5	1.3	2.8	3
PM_{10}	1.2	1.3	2.5	7
Lead and compounds	1.7	1.5	3.2	11
Non-methane volatile organic compounds				
Xylene	1.3	1.0	2.3	9
Benzene	2.3	1.0	3.3	14
Toluene	1.3	1.3	2.6	33

Notes The approach used to assess pollutants results in some substances receiving the same National Pollution Inventory rank. This ranking also considers human exposure to the pollutant. Excluded from the National Environment Protection Council list of approximately 400 substances were substances that had been banned or scheduled for phase-out, agriculture and veterinary chemicals, and those substances where other reporting was in place because of their ozone depleting or greenhouse effects.

Source National Pollution Inventory Technical Advisory Panel (1999); National Pollution Inventory substance profiles (Environment Australia undated).

3 ABBREVIATIONS & DEFINITIONS

3.1 ABBREVIATIONS

Abbreviations	Definition
AddFuel	AddFuel Pty. Ltd.
ADR	Australia Design Rules (Control of Vehicle Emissions)
CO	Carbon Monoxide
CO_2	Carbon Dioxide
EPA	Environmental Protection Agency
FCC	Fuel Conditioner Concentrate
H_2O	Water
NOx	Nitrogen Oxide
NO	Nitric Oxide
NO_2	Nitrogen Dioxide
PM	Particulate Matter
SO_2	Sulfur Dioxide
VOC	Volatile Organic Compound

3.2 POLLUTANT DESCRIPTION

The major pollutant assessed and its' adverse effects on human health and environment are described and summarised as below:

Pollutant		Description	Impact / Adverse Effects
CO	Carbon Monoxide	Carbon monoxide (CO) is generated from combustion process as a component of motor vehicle exhaust. This gaseous pollutant is produced when there is insufficient oxygen present in the combustion chamber which results in a partially oxidised fuel.	CO's toxicity stems from its ability to reduce the oxygen-carrying capacity of blood by preferentially bonding to haemoglobin and impacts human health.
SO_2	Sulfur Dioxide	Sulfur dioxide has a nasty, sharp smell generated from combustion process as a component of motor vehicle exhaust. It reacts easily with other substances to form harmful compounds, such as sulfuric acid, sulfurous acid and sulfate particles.	Minimum concentrations of sulfur dioxide can cause adverse health effects as it attacks the throat and lungs. Most people would feel the worst symptoms in 10 or 15 minutes after breathing it in.People with breathing problems can suffer severe illness.

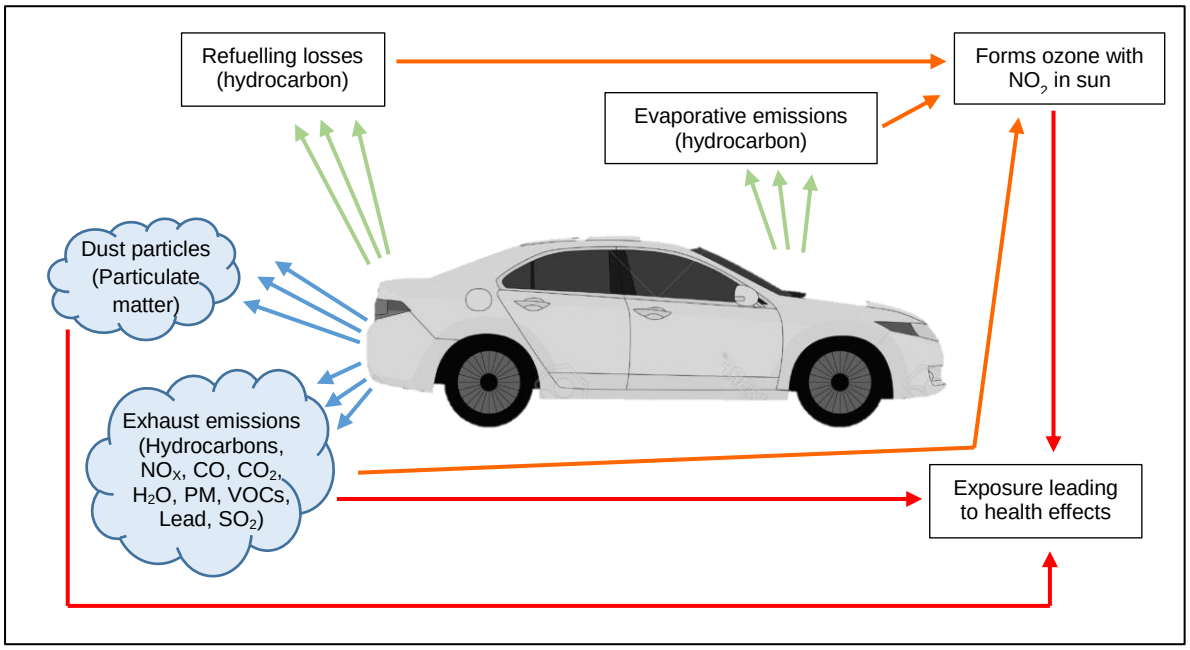
Pollutant		Description	Impact / Adverse Effects
NOx	Nitrogen Oxide	Nitrogen oxides (NOx), the term used to describe the sum of NO, nitrogen dioxide (NO_2), and other oxides of nitrogen. NOx is the sum of NO and NO_2 contents in exhaust gas (NOx = NO + NO_2).	While NO is non-toxic by itself, it contributes to ozone formation. "NO_2 can irritate the lungs and lower resistance to respiratory infection…" (Ref. 6). Under some conditions, NOx is also an important precursor to particulate matter (Ref. 2), haze and acid rain.
NO	Nitric Oxide	NO makes up the largest content / contributor in exhaust gas (Ref. 4).	
NO_2	Nitrogen Dioxide	NO_2 in proportion 5-10% of NO (Ref. 4).	

3.3 VEHICLE EMISSIONS AND HEALTH EFFECTS

Pollutants are formed during the combustion process in the vehicle's engine. There is no direct relationship between regulated pollutants produced by the engine, tailpipe emissions of these pollutants, and vehicle mass or size.

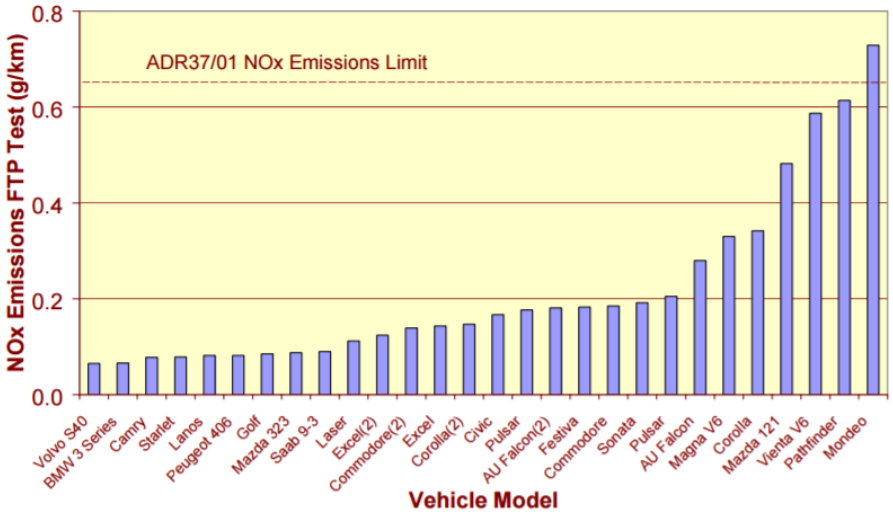
Non-combustion sources of ambient air pollution can include the evaporation of the fuel itself and vehicle movement can generate emissions of road dust and brake lining dust. The impact on human health from vehicle emissions are summarised in Figure 3.1:

Figure 3.1: Transport emissions and health effects



In Australia performance-based standards limit the amount of specific air pollutants that may be emitted by new vehicles. Each new vehicle model is required to comply with Australian Design Rules (Australian Design Rules are national standards under the Motor Vehicle Standards Act 1989) before it is supplied to the Australian market. Nitrogen Oxide emissions ADR37/01 Vehicles (Australia Design Rules compliance vehicles) are included in Figure 3.2 for emissions of CO for various vehicle make.

Figure 3.2: Nitrogen Oxide Emissions from ADR37/01 Vehicles on the ADR37/01 Test (Ref. 7)



Note Most vehicles in the Comparative Vehicle Emissions Study were designed to comply with ADR37/01.

Source Australian Government Department of Transport and Regional Services 2001

3.4 REFERENCES

The references used in this document are:

1. Vehicle Exhaust Gas Analysis (Job number 1617-153), 23-Jan-2017 and 25-Jan-2015 (Att. 1).
2. Diesel Fuel Technical Review, Chevron.
3. https://www.environment.gov.au/protection/air-quality/air-quality-standards
4. http://fluid.wme.pwr.wroc.pl/~spalanie/dydaktyka/combustion_en/NOx/NOx_formation.pdf
5. Clean Coal Engineering Technology, Miller, Bruce G., 2011
6. “Air Trends, September 2003 Report: National Air Quality and Emissions Trends Report, 2003 Special Studies Edition,” U.S. EPA, http://www.epa.gov/air/airtrends/aqtrnd03/
7. Health impacts of transport emissions in Australia: Economic costs, Australia Government, Department of Transport and Regional Services (https://bitre.gov.au/publications/2005/files/wp_063.pdf)
8. https://www.environment.gov.au/protection/publications/factsheet-sulfur-dioxide-so2

3.5 ATTACHMENTS

1. Emission Assessment, Vehicle Exhaust Gas Analysis (Job number 1617-153) (before addition of FCC and after addition of FCC) 23-Jan-2017 and 25-Jan-2017.
2. Australia Government Department of Environmental and Energy, Air Quality Standards in Australia.

4 EMISSIONS

The emissions from Toyota Corolla (Attachment 1) with specifications as below are assessed with vehicle running on fuel without FCC additive (benchmark) and with addition of FCC. The Toyota Corolla exhaust gas emission data is recorded at vehicle's minimum rated power (Run 1 - idle) and at maximum rated power (Run 2 – 3,000 RPM).

Description	Data
Unit & Engine Make	Toyota
Registration No.	1GCR 137
Model	Corolla 2016
Exhaust ID	51.46 mm

4.1 CARBON MONOXIDE (CO)

4.1.1 DESCRIPTION

Carbon monoxide (CO) is generated from combustion process as a component of motor vehicle exhaust. This gaseous pollutant is produced when there is insufficient oxygen present in the combustion chamber which results in a partially oxidised fuel. High levels of carbon monoxide can be caused by a too rich fuel mixture, incorrect idle speed, faulty air cleaner or positive crankcase ventilation (PCV) valve, incorrect fuel pressure or faulty carburettor/injection system.

4.1.2 ANALYSIS

Based on the emissions test report (Att. 1), Toyota Corolla running at minimum rated power (idle) produces CO in the exhaust at a concentration of 1 ppm and increases slightly to 2.4 ppm with addition of FCC. This is a minimal 1.4 ppm increase and considering that the vehicle is idle, this concentration of emission is insignificant in comparison to emissions from vehicle running at normal load.

With vehicle running at 3,000 RPM, the CO concentration in exhaust gas emission is 37 ppm before addition of FCC and with addition of FCC, the CO emission is significantly reduced by **97%** to less than 1 ppm.

The emissions of CO before and after addition of FCC into the fuel is summarised in Table 4.1 below:

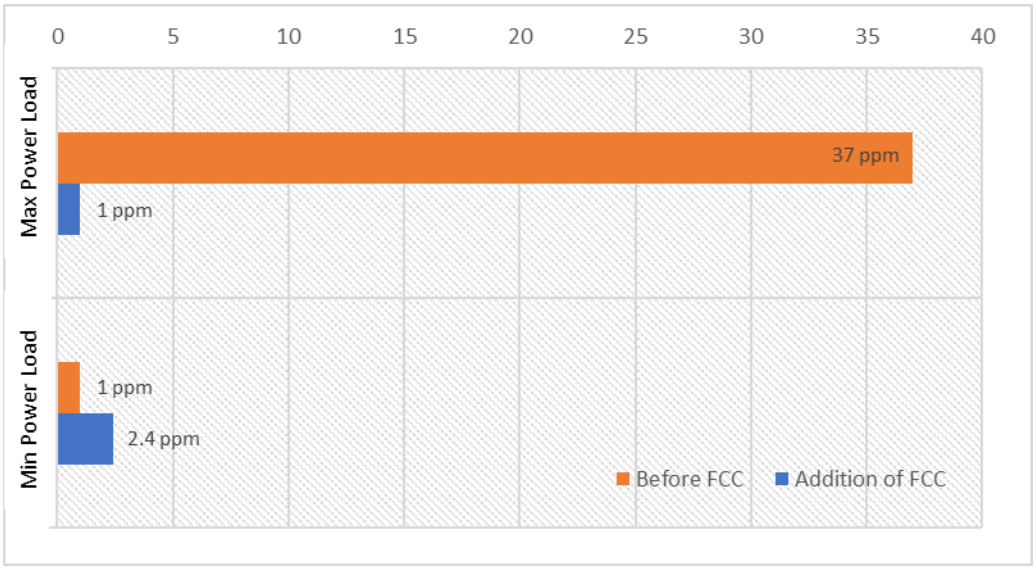
Table 4.1: Emissions of CO from Toyota Corolla's Exhaust Gas

Vehicle Operation Mode	Speed (RPM)	Before addition of FCC		After addition of FCC	
		Temp. (°C)	CO (ppm)	Temp. (°C)	CO (ppm)
Minimum Rated Power (idle)	-	116.2	1	99.8	2.4
Maximum Rated Power	3,000	180	37	228	< 1

Emissions of CO is ranked No. 3 in the National Pollution Inventory Risk Ranking with a high health hazard factor (Ref. 7).

The results are depicted in Figure 4.1 in the following page:

Figure 4.1: Emissions of CO from Toyota Corolla's Exhaust Gas Plot



4.2 SULFUR DIOXIDE

4.2.1 DEFINITION

Sulfur dioxide is generated from combustion process as a component of motor vehicle exhaust. It reacts easily with other substances to form harmful compounds, such as sulfuric acid, sulfurous acid and sulfate particles.

4.2.2 ANALYSIS

Based on the emissions test report (Att. 1), Toyota Corolla running at minimum rated power (idle) produces SO_2 in the exhaust at a concentration of 0.00098 g/min before addition of FCC. With addition of FCC, the SO_2 emissions are reduced by 4% to 0.00094 g/min.

With vehicle running at maximum rated power, the SO_2 concentration in exhaust gas emission is < 0.0019 g/min before addition of FCC and with addition of FCC, the emissions minimally increase to < 0.0020 g/min.

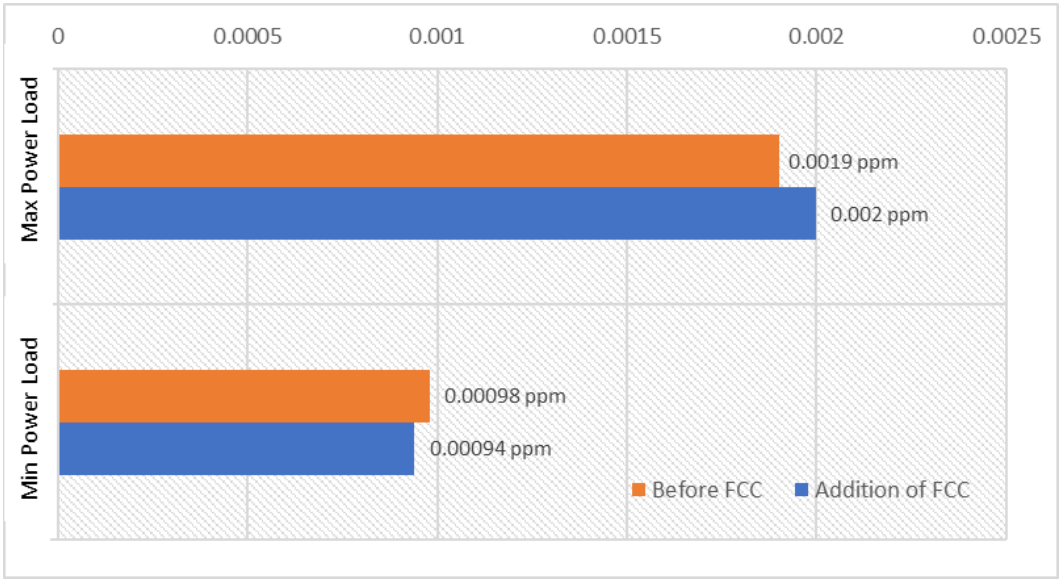
The emissions of SO_2 before and after addition of FCC into the fuel is summarised in Table 4.3 below:

Table 4.2: Emissions of SO_2 from Toyota Corolla's Exhaust Gas

Vehicle Operation Mode	Speed (RPM)	Before addition of FCC		After addition of FCC	
		Temp. (°C)	SO_2 (ppm)	Temp. (°C)	SO_2 (ppm)
Minimum Rated Power (idle)	-	116.2	0.00098	99.8	0.00094
Maximum Rated Power	3,000	180	< 0.0019	228	< 0.0020

The results are depicted in Figure 4.3 below:

Figure 4.2: Emissions of SO_2 from Toyota Corolla's Exhaust Gas Plot



4.3 NITROGEN OXIDE

4.3.1 DEFINITION

Nitrogen oxides (NOx), the term used to describe the sum of NO, nitrogen dioxide (NO_2), and other oxides of nitrogen (NOx = NO + NO_2).

These gaseous pollutants are produced under very high pressure and temperature conditions in an engine when nitrogen and oxygen in the air combines to form nitrous oxide, nitrogen dioxide and nitrogen oxide. NO makes up the largest content of NOx.

4.3.2 ANALYSIS

Based on the emissions test report (Att. 1), Toyota Corolla running at minimum rated power (idle) produces NOx in the exhaust at a concentration of 0.00077 g/min before addition of FCC. With addition of FCC, the NOx emissions are reduced by 4% to 0.00074 g/min. As NOx increases with excess oxygen, which occurs under lean fuel conditions and higher combustion temperatures, addition of FCC which appeared to have lowered the exhaust temperature from 116.2°C to 99.8°C would assisted in reduction of NOx emission.

With vehicle running at maximum rated power, the NOx concentration in exhaust gas emission is < 0.0015 g/min before addition of FCC and with addition of FCC, the emissions minimally increase to < 0.0016 g/min.

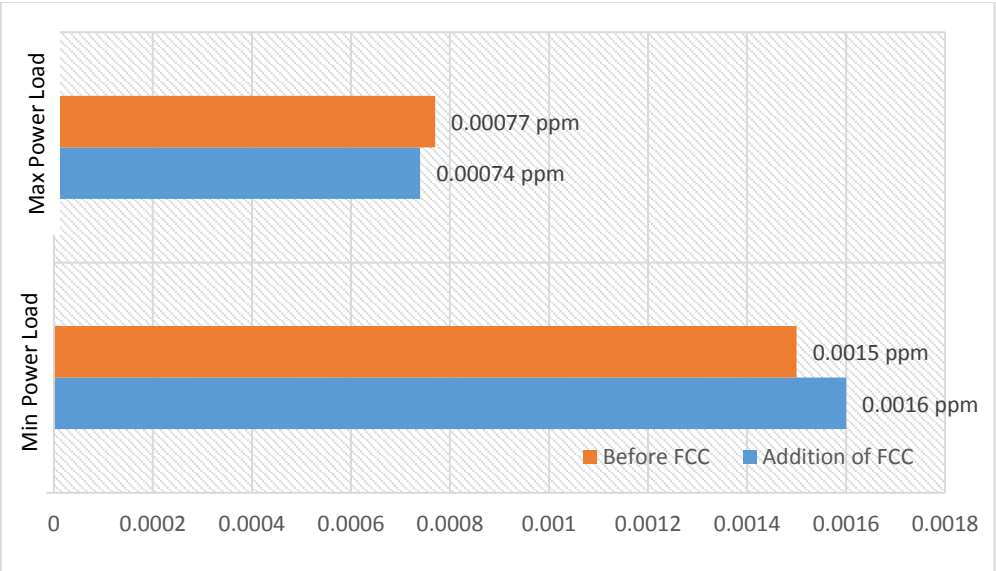
The emissions of NOx before and after addition of FCC into the fuel is summarised in Table 4.3 below:

Table 4.3: Emissions of NOx from Toyota Corolla's Exhaust Gas

Vehicle Operation Mode	Speed (RPM)	Before addition of FCC		After addition of FCC	
		Temp. (°C)	NOx (g/min)	Temp. (°C)	NOx (g/min)
Minimum Rated Power (idle)	-	116.2	0.00077	99.8	0.00074
Maximum Rated Power	3,000	180	< 0.0015	228	< 0.0016

The results are depicted in Figure 4.3 below:

Figure 4.3: Emissions of NOx from Toyota Corolla's Exhaust Gas Plot



5 SUMMARY

Pollutant		Description	Impact / Adverse Effects	Maximum (ambient) concentration	Emissions before FCC	Emissions after FCC	Remarks / Conclusion
CO	Carbon Monoxide	Carbon monoxide (CO) is generated from combustion process as a component of motor vehicle exhaust. This gaseous pollutant is produced when there is insufficient oxygen present in the combustion chamber which results in a partially oxidised fuel.	CO's toxicity stems from its ability to reduce the oxygen-carrying capacity of blood by preferentially bonding to haemoglobin and impacts human health.	9.0 ppm per 8 hours (average period) (Att. 2)	Idle: 1 ppm Max: 37 ppm	Idle: 2.4 ppm Max: 1 ppm	A substantial 97% reduction of CO emissions at maximum rated power.
SO_2	Sulfur Dioxide	Sulfur dioxide has a nasty, sharp smell generated from combustion process as a component of motor vehicle exhaust. It reacts easily with other substances to form harmful compounds, such as sulfuric acid, sulfurous acid and sulfate particles.	Sulfur dioxide irritates the nose, throat, and airways to cause coughing, wheezing, shortness of breath, or a tight feeling around the chest and most people would feel the worst symptoms in 10 or 15 minutes after breathing it in. Those most at risk of developing problems if they are exposed to sulfur dioxide are people with asthma or similar conditions.	0.20 ppm per hour (average period) (Att. 2)	Idle: 0.00098 g/min (<1 ppm per 5 mins) Max: 0.0019 g/min (<1 ppm per 5 mins)	Idle: 0.00094 g/min (<1 ppm per 5 mins) Max: 0.0020 g/min (<1 ppm per 5 mins)	A 4% reduction of SO_2 emissions at vehicle idle condition.

Pollutant		**Description**	**Impact / Adverse Effects**	**Maximum (ambient) concentration**	**Emissions before FCC**	**Emissions after FCC**	**Remarks / Conclusion**
NOx	Nitrogen Oxide	Nitrogen oxides (NOx), the term used to describe the sum of NO, nitrogen dioxide (NO_2), and other oxides of nitrogen. NOx is the sum of NO and NO_2 contents in exhaust gas ($NOx = NO + NO_2$).	While NO is non-toxic by itself, it contributes to ozone formation. “NO2 can irritate the lungs and lower resistance to respiratory infection…” (Ref. 6). Under some conditions, NOx is also an important precursor to particulate matter (Ref. 2), haze and acid rain.	0.12 ppm per hour (average period) / 0.03 per year (average period) (Att. 2)	Idle: 0.00077 g/min (<1 ppm per 5 mins) Max: 0.0015 g/min (<1.1 ppm per 5 mins)	Idle: 0.00074 g/min (<1 ppm per 5 mins) Max: 0.0016 g/min (<1.1 ppm per 5 mins)	A 4% reduction of NOx emissions at vehicle idle condition.
NO	Nitric Oxide	NO makes up the largest content in exhaust gas (Ref. 4).					
NO_2	Nitrogen Dioxide	NO_2 in proportion 5-10% of NO (Ref. 4).					

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EMISSION ASSESSMENTS

Vehicle Exhaust Gas Analysis

Pre Additive

Customer Details	Addfuel
Job Number	1617-153
Date	23/01/2017
Car Make	Toyota
Car Model	Corolla 2016
Emissions Tester	Matt Shim
Registration Number	1 GCR 137
Exhaust ID	51.46 mm

Summary Table

Parameter	Unit	Test Results		Averaging period
		Run 1 – Idle	Run 2 – 3000 RPM	
Carbon monoxide (CO)	ppm	**1**	**37**	5 minutes
	g/min	**0.00043**	**0.031**	
Sulphur dioxide (SO_2)	ppm	**<1**	**<1**	5 minutes
	g/min	**<0.00098**	**<0.0019**	
Carbon dioxide (CO_2)	%	**15.7**	**15.7**	5 minutes
Oxygen	%	**0.1**	**0.1**	5 minutes
Nitrogen Oxide (NO)	ppm	**<1**	**<1**	5 minutes
	g/min	**<0.00046**	**<0.00089**	
Nitrogen Dioxide (NO_2)	ppm	**<0.1**	**<0.1**	5 minutes
	g/min	**<0.00007**	**<0.00014**	
Oxides of nitrogen (NO_X as NO_2)	ppm	**<1.1**	**<1.1**	5 minutes
	g/min	**<0.00077**	**<0.0015**	
Average Stack	^oC	**116.2**	**180**	5 minutes
Average Stack Gas	m/s	**4.0**	**9.0**	5 minutes
Dry Standard Stack	dscm/min	**0.3425**	**0.6647**	

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EMISSION ASSESSMENTS

Vehicle Exhaust Gas Analysis

Post Additive

Customer Details	Addfuel
Job Number	1617-153
Date	25/01/17
Car Make	Toyota
Car Model	Corolla 2016
Emissions Tester	Stuart Inglis
Registration Number	1 GCR 137
Exhaust ID	51.46 mm

Summary Table

Parameter	Unit	Test Results		Averaging period
		Run 1 – Idle	Run 2 – 3000 RPM	
Carbon monoxide (CO)	ppm	**2.4**	**<1**	5 minutes
	g/min	**0.001**	**<0.00089**	
Sulphur dioxide (SO_2)	ppm	**<1**	**<1**	5 minutes
	g/min	**<0.00094**	**<0.002**	
Carbon dioxide (CO_2)	%	**15.1**	**16.1**	5 minutes
Oxygen	%	**0.4**	**<0.01**	5 minutes
Nitrogen Oxide (NO)	ppm	**<1**	**<1**	5 minutes
	g/min	**<0.00046**	**<0.00089**	
Nitrogen Dioxide (NO_2)	ppm	**<0.1**	**<0.1**	5 minutes
	g/min	**<0.00007**	**<0.00014**	
Oxides of nitrogen (NO_X as NO_2)	ppm	**<1.1**	**<1.1**	5 minutes
	g/min	**<0.00074**	**<0.0016**	
Average Stack	^oC	**99.8**	**228**	5 minutes
Average Stack Gas	m/s	**3.6**	**10.6**	5 minutes
Dry Standard Stack	dscm/min	**0.328**	**0.710**	

Australian Government
Department of the Environment and Energy

Air quality standards

On this page

Ambient air quality standards

On 26 June 1998, the National Environment Protection Council (NEPC) made Australia's first national ambient air quality standards as part of the National Environment Protection Measure for Ambient Air Quality (the 'Air NEPM').

The NEPC is a statutory body with law making powers established under the National Environment Protection Council Act 1994 (Commonwealth) and corresponding legislation in the other jurisdictions. The members of NEPC are Ministers, not necessarily environment Ministers, representing the participating jurisdictions (i.e. Commonwealth, State or Territory Governments).

The Air NEPM sets national standards for the six key air pollutants to which most Australians are exposed: carbon monoxide, ozone, sulfur dioxide, nitrogen dioxide, lead and particles. Under the Air NEPM, all Australians have the same level of air quality protection.

The standards, which are set out below, are legally binding on each level of Government, and must be met by the year 2008. The Air NEPM requires the jurisdictions to monitor air quality and this helps to identify potential air quality problems. All jurisdictions commenced formal reporting against the Air NEPM standards in 2002.

Pollutant	Averaging period	Maximum (ambient) concentration	Goal within 10 years (maximum allowable exceedences)
Carbon monoxide	8 hours	9.0 ppm	1 day a year
Nitrogen dioxide	1 hour	0.12 ppm	1 day a year
	1 year	0.03 ppm	none
Photochemical oxidants (as ozone)	1 hour	0.10 ppm	1 day a year
	4 hours	0.08 ppm	1 day a year
Sulfur dioxide	1 hour	0.20 ppm	1 day a year
	1 day	0.08 ppm	1 day a year
	1 year	0.02 ppm	none
Lead	1 year	0.50 $\mu g/m^3$	none
Particles as PM_{10}	1 day	50 $\mu g/m^3$	5 days a year

The $PM_{2.5}$ Variation to the Air NEPM sets the following advisory reporting standards and goal for particles as $PM_{2.5}$.

Pollutant	Averaging period	Maximum (ambient) concentration	Goal
Particles as PM2.5	1 day 1 year	25 $\mu g/m^3$ 8 $\mu g/m^3$	Goal is to gather sufficient data nationally to facilitate a review of the standard as part of the review of this Measure scheduled to commence in 2005.

For more information on the Air NEPM, see our factsheet on National Standards for Criteria Air Pollutants in Australia.

The full documentation of the Air NEPM and more information about the NEPC are available at www.scew.gov.au .

Emission standards

Australia does not have national air quality emissions standards. Environment protection authorities in individual States and Territories set such standards.

You may wish to contact the local State or Territory environment agency for details on the current emission controls/licence conditions imposed on facilities in their jurisdiction.

In addition, the publication 'Air Quality Regulations and Odour Management in Australia and New Zealand' provides a summary of the standards and air pollution legislation existing in Australia. This publication can be purchased from the Clean Air Society of Australia and New Zealand at their website located at www.casanz.org.au .

Air toxics

In December 2004, the National Environment Council (NEPC) made the National Environment Protection (Air Toxics) Measure (known as the 'Air Toxics NEPM') which establishes 'monitoring investigation levels' for 5 air toxics - benzene; formaldehyde; benzo(a)pyrene as a marker for Polycyclic Aromatic Hydrocarbons; toluene; and xylenes. Monitoring data gathered under the Air Toxics NEPM will inform future decisions on the management of these pollutants.

More about the Air Toxics NEPM