SETTING NATIONAL FUEL QUALITY STANDARDS

A NATIONAL STANDARD FOR BIODIESEL

A Submission by

THE AUSTRALIAN INSTITUTE OF PETROLEUM

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EXECUTIVE SUMMARY

- AIP and its member companies support the development of national fuel standards, including a standard for biodiesel.

- Biodiesel has the potential to form a significant part of the Australian liquid fuels framework. However it must be introduced in a way that does not undermine the increasingly stringent quality requirements for diesel fuel, or the application of national fuel standards.

- It is likely that the production of biodiesel will include large and small producers, with the latter servicing local markets. This reinforces the need for quality control and a properly enforced biodiesel standard.

- Biodiesel has some significant differences to conventional diesel, and is unlikely to meet conventional diesel standards, particularly in regard to density, viscosity and cloudpoint.

- To ensure fit-for-purpose fuels for vehicles not adapted to use B100 biodiesel, AIP strongly recommends the following strategy for biodiesel standards:

    1. The establishment of a B100 standard;
    2. A clear regulation that any blends including biodiesel must meet the conventional diesel standard;
    3. Labelling of pumps dispensing biodiesel. This should also differentiate between B100 and biodiesel blends;
    4 A cap on biodiesel blend rates, set at a level advised by vehicle manufacturers. This should be set at a level at which biodiesel blends can be used without modifying engines, and at which the energy loss is manageable

- The B100 standard should be aligned with the proposed European prEN14214 biodiesel standard, for reasons of consistency and completeness. Cloudpoint and CFPP standards will however need to be adapted to Australian conditions.

- Test methods should be those recommended for the prEN14214 standard, except where there is overlap with established Australian diesel standards and test methods. In these parameters, the latter should be used.

- The blend cap rate should be set in line with the advice from diesel vehicle manufacturers.

- A low blend cap – for example, 5 per cent – would assist biodiesel blends to meet diesel fuel standard, and also minimise the effect of the lower energy content of diesel.

- Other issues to be addressed:
  i. Lubricant Degradation. The use of B100 or high percentage biodiesel blends can cause severe engine lubricant degradation. Diesel engine manufacturers recommend more frequent oil change intervals if biodiesel is used;
  ii. Vehicle operators need to be informed of the lower energy content of biodiesel blends. This should be done through labelling at the dispenser;
  iii. Hygroscopic nature of biodiesel. Sites dispensing biodiesel should adopt due care and procedures to ensure that water does not contaminate the biodiesel;
  iv. Storage stability of biodiesel. Biodiesel producers should advise sites storing of biodiesel of recommended storage intervals;
  v. Blending. It is important that all biodiesel blends are fully blended with the conventional diesel. Splash blending alone is not recommended for blending biodiesel with conventional diesel.

- It is essential, as with conventional diesel, that biodiesel complies with the relevant standards, and that there is a clear audit trail to enable the identification of the source of any off-specification fuel.

- All regulatory testing of biodiesel should be done in NATA certified laboratories

- To assist monitoring and compliance, AIP recommends the mandating of a fuel marker regime for biodiesel, similar to that in place for low excise fuels.

SECTION 1: INTRODUCTION

The Australian Institute of Petroleum (AIP) was established in 1976 as a non-profit making industry association. AIP's mission is to promote and assist in the development of a sustainable, internationally competitive petroleum products industry, operating efficiently, economically and safely, and in harmony with the environment and community standards.

This submission is in response to Discussion Paper No 6, *A National Standard for Biodiesel* (the Discussion Paper), issued by Environment Australia in April 2003.

AIP and its member companies support the development of national fuel standards, including a standard for biodiesel. AIP is pleased to make this submission on behalf of the following member companies:

BP Australia Pty Ltd
Caltex Australia Ltd
Mobil Oil Australia Pty Ltd
The Shell Company of Australia Ltd

Section 2 of this submission provides an overview of AIP's position on biodiesel and biodiesel standards, including comments on the likely development of the biodiesel industry. Section 3 covers the AIP's views on the 100 per cent Biodiesel (B100) standard, and on a cap on the blend rate. Biodiesel quality issues not covered by the standard are discussed in Section 4, including compliance matters.

SECTION 2: AN OVERVIEW OF THE AIP POSITION ON BIODIESEL AND THE BIODIESEL STANDARD

2.1 General

AIP companies are not producers of biodiesel, and at this point it is not envisaged that this situation will change

AIP and member companies recognise the Commonwealth Government's Biofuels Target of 350 MLs by 2010. Biodiesel has the potential to play an important role in the achievement of this target. Biodiesel is technically feasible, and has the potential to form a significant part of the overall Australian liquid fuels framework.

It is however essential that biodiesel enters the market in a manner that does not undermine the increasingly stringent quality requirements for diesel fuel, or the application of the national diesel fuel standards.

There are some operational issues for biodiesel that will need to be managed. However, the key challenge for biodiesel will be economic. AIP has no direct information on production costs of biodiesel. However, for biodiesel to establish itself in the market, it will need to be competitive with diesel.

On the basis of information in the public domain, biodiesel seems likely to need long-term support to achieve this. AIP does not have a specific opinion on the nature or extent of this support. However the following points seem relevant:

- The anomalies in the excise treatment of biodiesel as a B100 or as a blend with conventional diesel will need to be removed;
- Excise-free status may not be sufficient in some markets, given the substantial excise rebates already available to certain market segments.

2.2 Production and Distribution Issues relevant to Fuel Standards

Biodiesel is less hygroscopic than ethanol, and in general presents less difficulties in blending than ethanol. It is reasonable to assume that blending could be carried out effectively at regional fuel depots, rather than major fuel terminals.

The Discussion Paper states that, as biodiesel is denser than diesel, splash blending is acceptable as long as the biodiesel is added on top of the conventional diesel. This presumably is on the assumption that the biodiesel will sink through the conventional diesel, and so mix. AIP urges

caution in this regard. It would indeed preferable to add the biodiesel on top of the conventional diesel. However, this does not in itself guarantee an even blend, and it is possible that there will be a tendency for the biodiesel to settle in a layer at the bottom. This would cause vehicle operability problems. AIP recommends that any blending operation includes facilities, such as agitators, to ensure an even blend.

Overall, a very likely scenario is that the production of biodiesel will include large and small producers, with the latter dispersed and servicing local markets. This raises issues in quality control, and underlines the need for a biodiesel quality standard, supported by an effective monitoring and compliance program.

Any biodiesel producer or blender will have some sort of involvement with fuel excise and fuel standards. Therefore all such plants should be licensed, and a standards monitoring regime in place.

2.3 Overview on Biodiesel Standards

A key guiding principle for all fuel standards should be to ensure that any diesel, conventional or biodiesel, should be fit-for-purpose in the vehicle in which it is used.

Biodiesel has certain significant differences to conventional diesel:

- Heavier viscosity, with potential impact on spray patterns (increasing emissions), and pump plungers (possible distortion);
- Higher density (blending problems, increasing emissions);
- Higher flashpoint;
- Lower energy value (approximately 10 per cent);
- Hygroscopic (though less than ethanol);
- Impact on elastomers at high blend rates;
- Higher cloudpoint (greater propensity to gel in cold conditions)
- Lower oxidation stability;
- Degradation of lubricants is a threat.

Biodiesel is unlikely to meet the conventional diesel fuel standards, particularly in relation to density, viscosity, and cloudpoint, for the above reasons. Therefore vehicles designed to operate on conventional diesel would operate sub-optimally if fuelled on B100, or high percentage biodiesel blends.

AIP consequently urges the following strategy on biodiesel standards:

1. The establishment of a B100 standard;

2. A clear regulation that any blends including biodiesel must meet the conventional diesel standard, supported by an effective monitoring and compliance program;
3. Labelling of pumps dispensing biodiesel. This should also differentiate between B100 and biodiesel blends;
4. A cap on biodiesel blend rates, set at a level advised by diesel engine manufacturers. This should be set at a level at which biodiesel blends can be used without modifying engines, and at which the energy loss is manageable.

This approach would not preclude the dispensing of B100, for use in vehicles adapted to use B100. It would however ensure that biodiesel blends sold to vehicles not specially adapted for biodiesel will be fit-for-purpose.

SECTION 3: THE B100 STANDARD, AND THE BLEND CAP

3.1 The B100 Standard

The establishment of a B100 standard is essential both for ensuring a fit-for-purpose fuel for vehicle adapted for B100, and for blenders to meet conventional diesel standards.

AIP believes that the standard and test methods should be aligned with the proposed EU standard prEN14214 for the following reasons:

- Consistency with overall strategy of harmonising with European fuel standards
- The EU tests are more complete. The US ASTM standard does not include standards in some key areas: sulfur, CFPP, density, ester content.

The cloudpoint/CFPP standards should be adapted for Australian conditions.

The EU standards include a cetane number standard. There is no alternative to this, as a cetane index is not applicable to biodiesel. However, the following should be noted:

- Testing for cetane number requires a cetane engine.
- There is no cetane engine in Australia
- A cetane engine costs approximately $0.5 million, and requires substantial experience to operate properly and consistently.

3.2 Test Methods

In principle, the test methods adopted should be as consistent as possible with those recommended for the proposed prEN14214 standard.

However, it is advisable also to be consistent with the test methods also established for conventional diesel under the Australian *Fuel Standards (Automotive Diesel) Determinations.*

AIP suggests that the test methods established for prEN14214 be specified for the B100 standard, except where there is a test method already established for a parameter specified under the Australian *Fuel Standards (Automotive Diesel) Determinations.* In these instances, the latter should be used unless there is a clear inconsistency with the standard. This would suggest the exceptions to the prEN14214 test methods in the table overleaf:

Parameter	Suggested test method
Sulfur	ASTM D5453
Carbon Residue	ASTM D4530
Viscosity	ASTM D445
Acidity	ASTM D974
Oxidation Stability	ASTM D2274 (as adapted for biodiesel)
Cloud point	ASTM D2500
Density	ASTM D1298
Water & Sediment	ASTM D2709
Copper Corrosion	ASTM D130

3.3 The Blend Cap Rate

AIP believes that diesel engine manufacturers are best placed to advise on blend cap rates, and will defer to their opinion.

However, one point should be noted. Biodiesel blends must meet conventional diesel standards. The addition of biodiesel to diesel will stretch some diesel parameters in any blend – for example density, viscosity, cloudpoint. This in turn infers the need for testing facilities to test the blend, which would be expensive. Smaller producers/blenders may find it difficult to carry out the testing, and so guarantee that biodiesel blends meet the fuel standards. This problem would substantially lessened by the introduction of a relatively low cap on the blending rate – for example 5 per cent.

SECTION 4: FUEL STANDARDS ISSUES NOT COVERED BY FUEL STANDARDS

4.1 Fuel Standard Issues Not Covered by Fuel Standards

a) Engine Lubricant Degradation

The mixture of biodiesel with engine lubricants can cause of polymerisation of lubricants, and consequent loss of effectiveness. The greatest risk is posed by B100 and high percentage biodiesel blends. This problem is recognised by most diesel engine manufacturers – eg Detroit Diesel, Cummins, Caterpillar. All these companies recommend handling of the problem by a reduction in the oil drain interval. Cummins is the most specific, stating that 'the oil change interval can be affected by the use of biodiesel fuels and some applications may require shortening intervals to half of the diesel equivalent'.

b) Energy Value

Biodiesel has approximately 10% less than energy value than diesel. Given the long distances and high fuel consumption of most diesel vehicles, compared to petrol vehicles, this loss of energy value could become significant if blend rates exceed 5%. This issue is best seen as a commercial issue, with labelling required to ensure that the purchaser is sufficiently informed.

c) Hygroscopic Nature

Biodiesel is somewhat hygroscopic. Sites blending and dispensing biodiesel will need to adopt due care and procedures in management of waste water on the sites, and particularly around the tanks holding biodiesel.

d) Storage

Some concerns have been raised over the long-term stability of biodiesel. This issue could be managed through guidelines on usage, so that biodiesel is not kept in store for extended periods of time. This period is likely to be consistent with that advised for diesel.

4.2 Compliance Issues

The possible large number of small producers of biodiesel will make compliance management difficult. Moreover, once biodiesel is blended, it can be difficult to readily determine whether biodiesel is present, if the blend rate is low.

This underlines the need for an effective monitoring and compliance program to be established. This should include testing as required by NATA certified laboratories.

It is necessary under fuel standards regulations that there is a clear audit trail for the source of product. This allows the identification of the source of the problem, in the event of a batch of fuel being found to be off-specification. In the case of biodiesel blends, it would be important to clarify whether biodiesel is present.

AIP suggests that a fuel marker regime be instituted for biodiesel. Markers are commercially available that can identify both the presence of biodiesel, and the blend rate.

The use of markers would have a number of advantages:

- It would be easier for Monitoring & Compliance (MCE) personnel to determine whether biodiesel was present
- If it was a requirement for licensed biodiesel operators to add the marker, it would help identify that the biodiesel is sourced from a licensed premise, that is one required to meet the B100 standard.
- MCE staff could focus more attention on instances of non-marked biodiesel, if this was ultimately identified as being present in an off-specification blend.