

REPORT NO. 818

APPENDIX B

Sample Supply, Preparation and Homogeneity Testing

Sample Supply

B1.1

Sample Preparation and Homogeneity Testing

B1.2 - B1.4

B1.1

Sample Supply

July 2012 to June 2013

Petrol Samples (for RON and MON):

Supply Period	Participant/Supplier
July '12 to December '12	Caltex Refineries (NSW) Kurnell
January '13 to June '13	Caltex Refineries (QLD) Lytton

AVGAS Samples:

Supply Period	Participant/Supplier
July '12 to May '13	BP Refinery (WA) Kwinana

B1.2

Sample Preparation and Homogeneity Testing

Procedure for Preparation - CFR Correlation Samples

The following procedure is recommended for the preparation of PTA CFR correlation samples:

- 1) Obtain sufficient quantity of sample from bulk storage in a suitable size drum, leaving not more than 15-20% ullage, close the drum tightly and store in a cool place or at least under shelter overnight.
- 2) Prepare required number of one-litre cans (see table below) plus a few spares with proper size plastic inserts and screw-caps.

Prepare glass tubing, bent at right-angles, fitted with slotted rubber bung (to fit the drum opening), and a stop-cock for siphoning purposes. The extension of tubing below the stop-cock should be long enough to reach the bottom of a one-litre can. A drum fitted with a suitable drain-cock and tubing to reach the bottom of a one-litre can may also be used. Rubber tubing which comes into contact with the gasoline must not be used.

- 3) Set up the drum in an elevated position, fit the siphon so that the tubing immersed in gasoline is only a few centimetres above the bottom of the drum. By the aid of an aspirator and plastic tubing attached to the siphon outlet (below the stop-cock), suck the gasoline into the siphon system and close the stop-cock. Disconnect aspirator assembly.

Before filling the one-litre cans, run some sample into a waste container. Fill the cans (including enough for homogeneity testing – see table below), ensuring that the outlet tube is always inserted into the can and kept only slightly above the bottom of the can to minimise vapour losses. Maintain approximately 10% ullage in cans thus filled.

If the drain-cock assembly is used instead of siphon, flushing into the waste can must also be carried out before filling of cans.

- 4) Fill cans without delay, ensuring that plastic inserts are placed and screwed hand-tight as soon as each can is filled. Number each can in order of filling.
- 5) Verify that all screw-caps are tight, and invert all cans for approximately thirty minutes.
- 6) Verify the absence of leaks by close inspection. Reject any can that is suspect.
- 7) Apply a dab of "unifix" or other suitable cement (silicon or wax sealant) to join the screw-cap to the body of can. This will ensure that no tampering with sample will occur.

B1.3

Please note:

Exposure of the sample to sunlight or fluorescent lamp UV emissions can induce chemical reactions that can affect octane number ratings.

Exposure to wavelengths less than 550 nm for a short time can significantly affect octane number ratings.

8) Pre-distribution Testing for Homogeneity:

Prior to distributing the samples, test a number of them according to the table below for density according to ASTM D4052 or ASTM D1298.

No. of Samples Prepared	No. of pre-distribution samples to be tested
< 20	3
21 – 30	4
31 – 40	5
41 – 60	6

One sample should be drawn near the start of the preparation, one near the end and the remainder approximately evenly spread throughout the range. Where possible, density testing should be done by more than one analyst, each testing 2 – 3 samples.

9) Calculate a “low” z-score by taking the difference between the lowest density result and the mean density and dividing this by the test method standard deviation. Test method standard deviation is given by $R / 2.772$, where R = test method reproducibility.

Similarly calculate a “high” z-score by taking the difference between the highest density result and the mean density and dividing this by the method standard deviation.

A z-score of ≤ 2.0 indicates satisfactory homogeneity.

Report results of pre-distribution density checks to PTA for inclusion in the monthly results summary.

Note: Stability testing is not performed as spark-ignition fuel is considered stable for a minimum period of six months providing it has been stored in an opaque sealed air-tight container.

10) Dispatch samples in accordance with Transport of Dangerous Goods regulations and airline IATA safety regulations. **Note that door to door costs are paid by the supplying laboratory – including customs fees for New Zealand samples.**

11) Each month email the PTA CFR Program Coordinator to advise that the samples have been dispatched.

B1.4

Shandy Samples - Motor Gasoline only

- 1) Obtain components from the bulk storage, permit to attain the same temperature by keeping in a cool place or under shelter.
- 2) Measure each component with minimum delay into a suitable size drum, close tightly and agitate well. Store overnight in cool place or under shelter.
- 3) Before the preparation for one-litre can fillings, agitate the drum again to ensure the homogeneity.
- 4) Fill and dispatch cans following steps 3 to 10 for gasoline samples above.

Labelling

It is required that the label contain the name and address of the recipient, together with:

**PTA
CFR Scheme - Motor Gasoline or Aviation Gasoline
Research or Motor Method (as applicable)
Month of Test (Year)**

Homogeneity Testing Results

Homogeneity testing was conducted prior to sample distribution, by measuring the density of selected samples according to ASTM D4052 or ASTM D1298. Low and high z-scores are calculated as : $z = (A - \text{median}) \div B$, where A is the lowest or highest density result, and B is the test method standard deviation. This is given by $R \div 2.772$, where R = test method reproducibility. A $|z\text{-score}| \leq 2.0$ indicates satisfactory homogeneity. All homogeneity results had a z-score of <2.0 and were therefore considered satisfactory.

-----**END OF REPORT**-----