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CENTRAL ELECTRICITY BOARD
MAURITIUS
FUEL EFFICIENCY REPORT
UNITS NO 5 & 6, ST LOUIS
POWER STATION

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EXECUTIVE SUMMARY

Following a series of efficiency tests conducted on Unit No. 6 at Saint Louis power station during 1997, Central Electricity Board management agreed to installation of permanent catalyst injection systems for Units No. 5 and 6 during 1998. The installation was calibrated and commissioned during February, 1999 at which time a further series of baseline tests were conducted on both engines at loads of 6, 7.5 and 8.5 MW.

Both of these engines had recently returned to service following major overhaul and were in peak operating condition.

A series of treated fuel tests were conducted during May, 1999 and the results detailed in this report.

The average increase in fuel efficiency measured was **2.2%** after applying density corrections. The density of baseline and treated fuel is almost identical and the calorific values can be assumed to be the same for both series of tests.

TEST PROCEDURE

The Specific Fuel Consumption (SFC) test procedure employed in this study measures the absolute mass of fuel consumed to produce the energy generated by the engine and alternator over time at a constant load. From this data the engine's efficiency can be calculated.

The evaluation of FPC-2 involves a series of back to back untreated (baseline) and treated fuel tests conducted approximately three months apart.

MEASUREMENT OF FUEL CONSUMED

A pair of calibrated MacNaught M-40 flow transducers were used to measure fuel supplied to the engine and also fuel returning from the engine from which the net volume of fuel consumed over a given time span, at ten minute intervals, can be assessed.

The flow transducers are fitted with thermocouple probes which enable measurement of fuel temperature at each transducer. From the fuel temperature the density at that temperature is calculated. A sample of fuel oil was taken for laboratory analysis and the density determined at 15°C and 20°C. Copies of the Laboratory Reports are included in the *Appendix*.

Volumetric fuel flows are corrected for density and temperature and reported in mass (kg) of fuel.

MEASUREMENT OF WORK DONE

A Microvip MKII energy analyser was used to measure the alternator's electrical output parameters namely:-

KWatt	kVArh
Ampere	kWh
Volt	Hours
Hz	LmA
PD Med	MVAr

TEST PROCEDURE

Once the meters were installed into the fuel lines and the Microvip energy analyser connected to the control panel, a pair of stop watches were synchronised and data extracted at ten minute intervals and recorded as shown in the data sheets in the *Appendix* to this Report.

Recordings of fuel readings were in the main made by St Louis power station staff. The Microvip readings were recorded on a hard copy paper printout which is also included in the *Appendix* to the report.

FUEL QUALITY

We have calculated the net calorific value of the baseline and treated fuel oils as follows:

Baseline	Density 0.950 @ 15°C	Calorific Value 9910 Cal/g
Treated	Density 0.949 @ 15°C	Calorific Value 9910 Cal/g

The calorific values of the baseline and treated fuels are identical.

TEST RESULTS

A summary of the mean results achieved in this test program are shown in Table I below:-

Mean Results Unit No. 5								
Nominal Load (kw)	**6000**		**7500**		**8500**		**Overall Average**	
	Load	**kg/kWh**	**Load**	**kg/kWh**	**Load**	**kg/kWh**	**Load**	**Kg/kWh**
Untreated	5778	0.2178	7506	0.2147	8397	0.2163	7227	0.2163
Treated	5969	0.2121	7704	0.2113	8649	0.2095	7441	0.2109
% CHANGE	**+ 3.3%**	**- 2.6%**	**+ 2.6%**	**- 1.6%**	**+3.0%**	**- 3.1%**	**+2.9%**	**- 2.5%**

Mean Results Unit No. 6								
Nominal Load (kw)	**6000**		**7500**		**8500**		**Overall Average**	
	Load	**kg/kWh**	**Load**	**kg/kWh**	**Load**	**kg/kWh**	**Load**	**Kg/kWh**
Untreated	5928	0.2168	7540	0.2141	8604	0.2132	7357	0.2147
Treated	5940	0.2124	7605	0.2103	8694	0.2090	7413	0.2105
% CHANGE	**+ 0.2%**	**- 2.0%**	**+ 0.9%**	**- 1.8%**	**+ 1.05%**	**- 2.0%**	**+ 0.8%**	**- 1.96%**

Computer printouts for each set of untreated and treated fuel tests conducted at the three nominal load settings 6, 7.5 and 8.5 MW follow in the *Appendix*.

The following charts Nos 1 and 2 provide a graphical representation of the results for Unit Nos. 5 and 6.

Chart 1

CEB St Louis Power Station
Genset # 5
6, 7.5, 8.5 MW

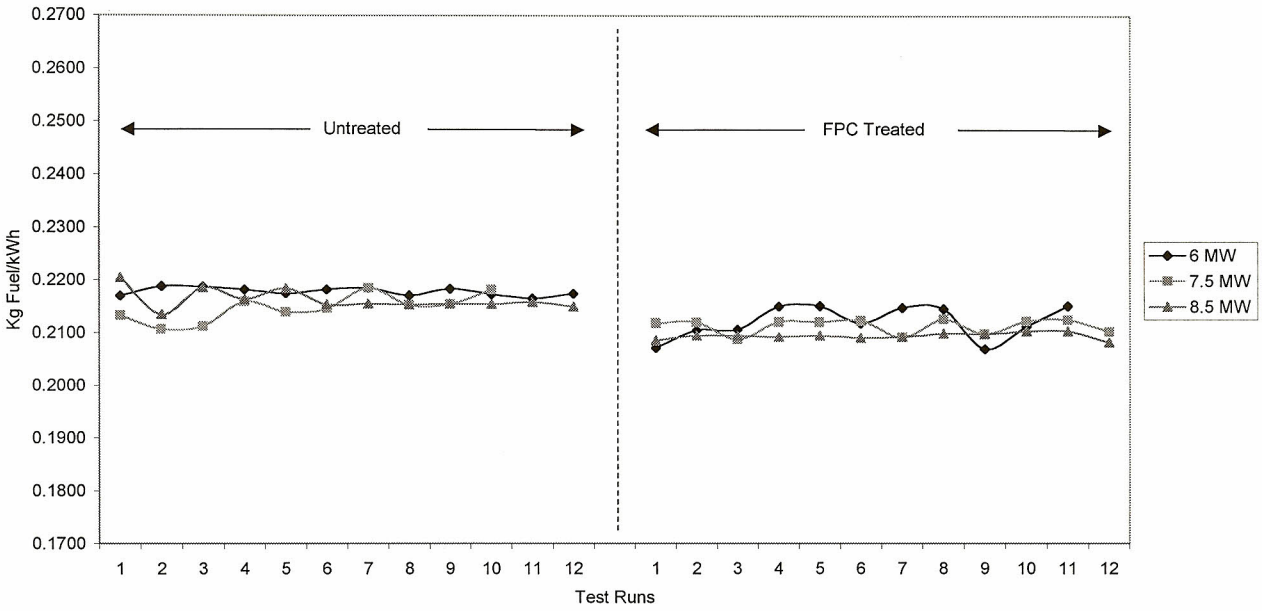


Chart 2

CEB St Louis Power Station
Genset # 6
6, 7.5, 8.5 MW

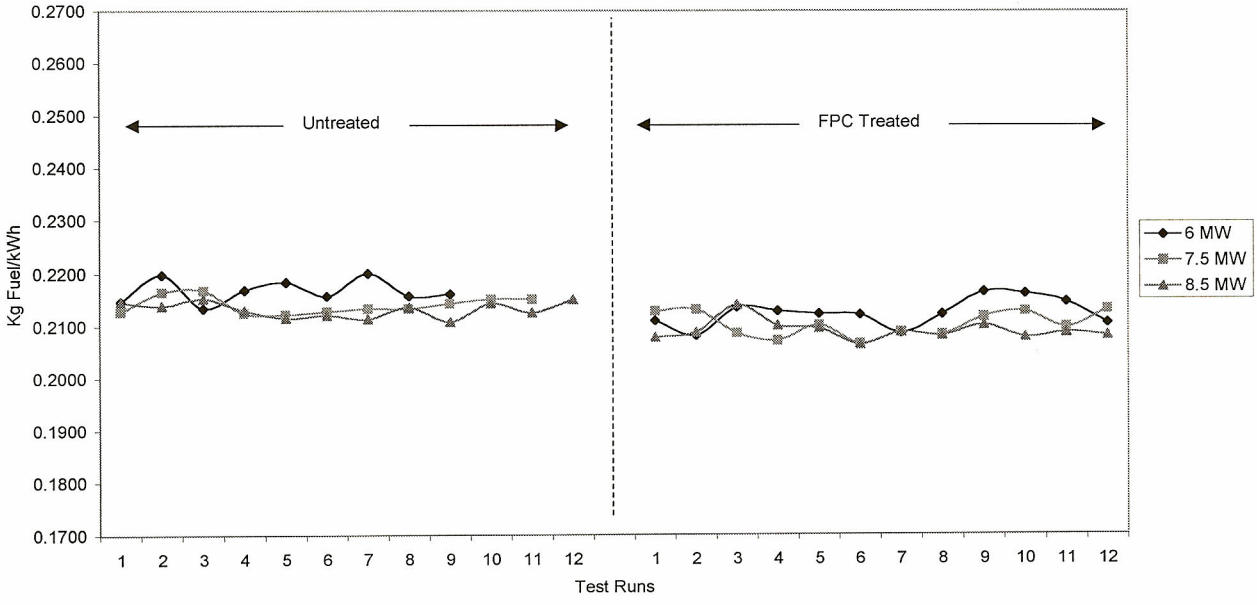
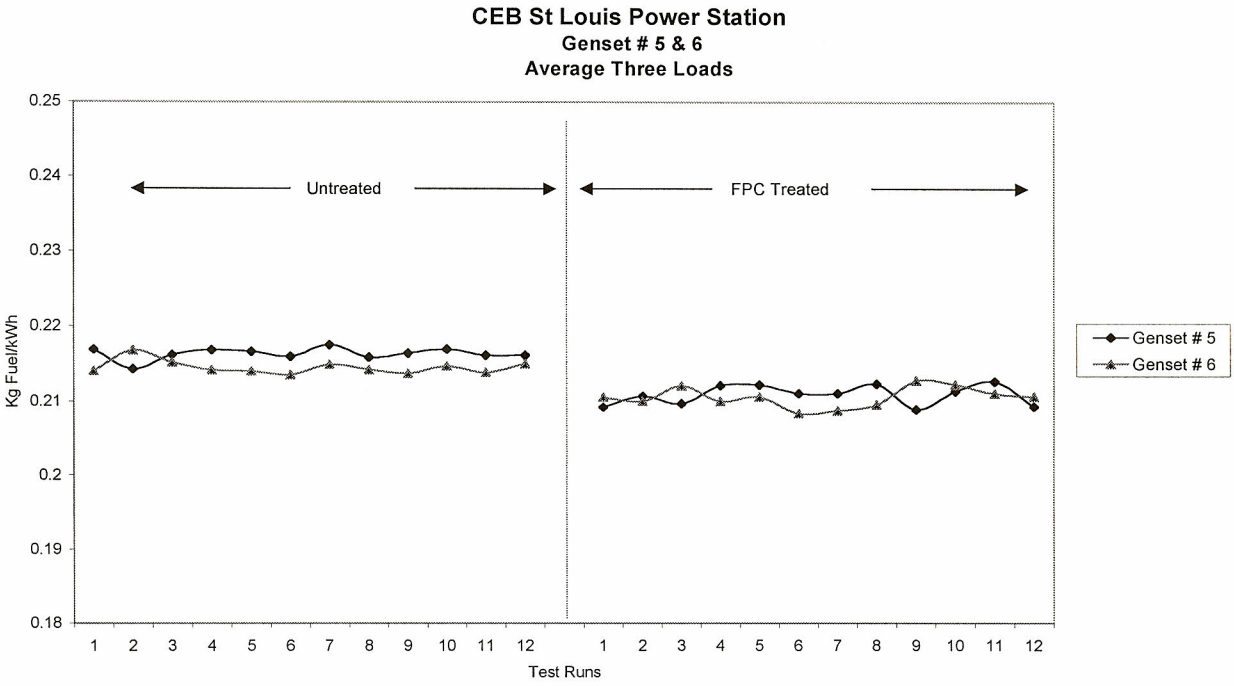


Chart No. 3 represents graphically the means of the three loads for both Units 5 and 6.

Chart 3



Graphs of the results for each Unit tested covering each of the three load settings are set out in the Appendix together with the computer printouts.

Photographs of the test equipment and FPC-2 metering system installed at St. Louis Power Station during the test program follow on the next page.

CONCLUSION

The second controlled engineering standard Specific Fuel Consumption (SFC) efficiency study on both Unit Nos. 5 and 6 at St. Louis Power Station provide strong evidence of reduced fuel consumption.

The results achieved in this second series of tests are lower than those conducted on Unit No. 6 during 1997. The earlier tests were conducted on an engine at the latter stage of operation in the overhaul cycle.

This current test series has been performed after relatively low hours from completion of major overhauls.