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Field Test of FPC[®] Fuel Catalyst by SF Phosphate Limited

I. Background

In March and April of 1998, SF Phosphate Limited tested FPC[®] Fuel Performance Catalyst in a fleet of 777B and 777C haul trucks. The test program included fuel consumption measurements that compared the results of stationary engine tests to fuel consumption records in gallons per hour. This study documenting the addition of FPC[®] did reduce the rate of fuel consumption by nine percent (9%). Managers implemented a FPC[®] fuel treatment program for all fuel shortly after the test was completed.

After one year of catalyst use, SF Phosphate managers decided to "check" FPC[®] performance again by conducting a "return to baseline" test, and discontinued fuel treatment in late February of 1999. As a result, the rate of fuel consumption increased approximately 11% (Table 2). This paper presents the data and the conclusions of this most recent test of FPC[®] by SF Phosphate.

II. Technical Approach and Discussion

The 1998 test compared the rate of fuel consumption in gallons per hour (gph) in the haul truck fleet only. The 1999 study was expanded to include all but the shovel gph data. The gph data for the test fleet are tabled below.

The first comparison, made for each equipment group, shows gph during the FPC[®] treated fuel period of March/April 1998 and the untreated fuel "return to baseline" gph for the same period in 1999 (Table 1). The second comparison shows total gallons consumed divided by total hours of operation for the entire test fleet (loaders, haul trucks, dozers and drills) for the same two periods (Table 2).

The data shows gph increased for each equipment group after removing FPC[®] from the fuel. Further, gph increased by over 11% (Table 2) for the entire test fleet after discontinuing FPC[®] use.

Table 1. Comparison between March/April 1998 and March/April 1999

(Gallons per Hour by Equipment Group)

Group	*1998 GPH	**1999 GPH	% Change
Loaders	17.38	19.52	+10.96
Haul Trucks	10.72	10.83	+ 1.02
Dozers	19.5	20.69	+ 5.75
Drills	12.32	13.63	+ 9.61

* Original FPC[®] treated fuel test period

** Return to baseline

Table 2. Comparison of Fleet Total Gallons and Hours for Two Test Periods

	*March/April 98	**March/April 99	% Change
Gallons	104,483.4	116,663.2	+10.44
Hours	7,347.0	7,263.0	- 1.15
GPH	14.2	16.1	+11.46

* FPC[®] treated fuel

** Return to baseline

Table 3 compares the FPC[®] treated fuel gph for Jan/Feb 1999 to the "return to baseline" gph for Mar/April of the same year. This comparison shows fuel consumption after FPC[®] removal. Fuel consumption increased from 3% to 10%, depending upon equipment group.

Table 3. Comparison of January/February to March/April Test Data

(Gallons per Hour)

Group	* Jan 99	* Feb 99	Ave.	**Mar 99	**Apr 99	Ave.	% Change
Loaders	18.33	18.32	18.33	20.02	18.94	19.52	+ 6.1
Haul Trucks	10.04	9.66	9.9	9.82	11.97	10.83	+10.3
Dozers	20.01	20.08	20.04	20.4	21.04	20.69	+ 3.1
Drills	12.72	12.27	12.49	13.66	13.6	13.63	+ 8.4

- * FPC[®] treated fuel
- ** Return to baseline

Table 4 shows that the increase in gph took place inspite of a significant decline in tons hauled per month. The SF Phosphate fleet moved an average of over 1.4 million tons of material during the FPC[®] treated fuel period of Jan/February 1999, but dropped to an average of 1.08 million tons moved during the "return to baseline" months of Mar/April 1999.

Table 4. Comparison of Tons Hauled During the Two 1999 Test Periods

*January/February 99	**March/April 99	%Chg.
1,451,618 Tons	1,085,731 Tons	- 25%

- * FPC[®] treated fuel
- ** Return to baseline

Table 5 compares gph during Jan/Feb 1998, the original baseline period, to the original FPC[®] treated fuel test period of Mar/Apr 1998. Table 5 also compares the gph during the Jan/Feb 1999 treated period to the gph during the Mar/Apr 1999 "return to baseline". The gph average for the two untreated periods (16.35 gph) is 7.77% greater than the average for the two FPC treated fuel periods (15.08 gph).

Table 5. Comparison of Untreated and Treated Fuel GPH for All Test Periods

Equipment Type	1998 **Jan/Feb	1998 *Mar/Apr	1999 *Jan/Feb	1999 **Mar/Apr
Loaders	21.09	17.38	18.33	19.52
Haul Trucks	11.62	10.72	9.90	10.83
Dozers	20.27	19.50	20.04	20.69
Drills	13.14	12.32	12.49	13.63
Average:	16.53	14.98	15.19	16.17

* FPC[®] Treated

** Untreated

III. Conclusions

The original steady-state, stationary engine tests and gph comparison done in 1998 showed the addition of FPC[®] to the fuel for the haul truck fleet reduced fuel consumption approximately 9%. This second "return to baseline" study confirms the results of the original test.

All relevant tests conducted to date show the SF Phosphate fleet is more fuel efficient when operating on FPC[®] treated fuel. Fuel efficiency improvement was observed when comparing the Jan/Feb 1998 original baseline data to the Mar/Apr 1998 original FPC[®] treated fuel data for the same fleet. This comparison reveals the test fleet was 9.4% more fuel efficient after fuel treatment (16.53 gph v. 14.98 gph).

Improved fuel efficiency (8.11%) was also demonstrated when the Jan/Feb 1998 baseline data is compared to the Jan/Feb 1999 treated data (16.53 gph v. 15.19 gph). Efficiency gain is also demonstrating again (7.36%) when comparing the Mar/Apr 1998 treated data to the Mar/Apr 1999 return to baseline data (16.17 gph v. 14.98 gph).

Finally, when all relevant gph data are compared (shown on Table 5), fuel efficiency is improved an average 7.77% with FPC fuel treatment (16.35 gph v. 15.08 gph).

The SF Phosphate data from both steady-state and in-use tests show fuel efficiency is improved 7% to 12% with FPC[®] treated fuel. The average improvement in gph of approximately 8% is nearly identical to the average obtained by many mining operations who have previously tested and are using FPC[®]. These mining operations typically employ Caterpillar powered haul trucks, usually 777s and 785s. Cat 777 and 785 trucks are equipped with 3500 series engines, like those used by SF Phosphate.

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