



APPLIED ENVIRONMENTAL SCIENCES, INC.
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January 20, 1998

Mr. Paul Maliszewski
FPC Great Lakes
1001 West Glen Oaks Lane
Mequon, Wisconsin 53092

RE: Vulcan Materials Vehicle Measurements Summary - Final Report

Hydrocarbon Mass Emission Rate Reduction Estimates

Dear Mr. Maliszewski:


The attached table is being provided to you as an addendum to our January 12, 1998 Vehicle Measurement Summary report. This table compares hydrocarbon mass emission rate reductions found at the Payne & Dolan Franklin quarry tests, to those estimated from the treated test vehicle measurements taken on the Racine quarry vehicles. Baseline test results for similar Payne & Dolan vehicles were paired with the three Racine Vulcan Materials treated vehicles, in the calculation of hydrocarbon mass emissions reductions.

The Racine vehicles exhibited low hydrocarbon mass emissions consistent with FPC-1 treated vehicles tests for other clients. Estimated mass hydrocarbon emission decreases as a result of fuel treatment with the FPC-1 catalyst ranged from 57.1 to 285.7 pounds per year decrease, based on a 3,000 hour per year vehicle usage. For a fleet of 100 vehicles this would equate to an annual hydrocarbon reduction of as much as 14.3 tons per year (based on the maximum estimated mass hydrocarbon emissions reductions for the vehicles tested).

This level of hydrocarbon reduction could be banked, traded or sold in ozone nonattainment areas including the southeast Wisconsin area where the Racine and Franklin Quarry operations are located. In addition, vehicles from several Vulcan Materials operations located in the southeast Wisconsin ozone non-attainment counties could be aggregated for the purposes of accumulating hydrocarbon emissions reductions for banking, trading or sale. While an exact market value has not been set for these credits, a typical price would be \$2,000 -\$4,000 per ton. Please contact me if you have any questions regarding this information.

Very truly yours,

Applied Environmental Sciences, Inc.



John S. Flickinger

Principal Scientist

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**Vulcan Materials/Payne & Dolan
Comparison of Hydrocarbon (HC) Mass Emissions**

**Franklin Quarry (Payne & Dolan) and Racine Quarry (Vulcan
Materials)**

| Vehicle # | Type | Baseline HC (g/sec) | Treated HC (g/sec) | Decrease* (g/s) | Decrease** (lbs/yr) |
|-----------|-----------------------------|---------------------------|--------------------------|--------------------|------------------------|
| 13168 | End Loader (Michigan) | 0.0063 | 0.0031 | .0064 | 152.4 |
| 13118 | End Loader (CAT) | 0.0158 | 0.0070 | .0088 | 209.5 |
| 11305 | Haul Dump Truck | 0.0171 | 0.0074 | .0097 | 231.0 |
| 11604 | Haul Dump Truck | 0.0152 | 0.0094 | .0059 | 140.5 |
| 26583*** | End Loader (Michigan) | 0.0063 | 0.0051 | .0012 | 57.1 |
| 25866*** | Haul Dump Truck | 0.0162 | 0.0042 | .0120 | 285.7 |
| 26639*** | Haul Dump | 0.0162 | 0.0048 | .0114 | 271.4 |

Truck

- * This is the average per vehicle decrease in g/sec between the baseline and treated test periods. For vehicles 13168 and 26583, the Michigan end loaders, the measured HC mass decrease was multiplied by 2 because this vehicle has two exhaust stacks.

- * * This is the annual per vehicle decrease, assuming an annual run time of 3,000 hrs/yr.

- * * The Payne and Dolan test baseline HC mass emission rate was used to determine a HC mass emission decrease for each of the Vulcan Materials vehicles. Baseline HC mass emission rates for similar vehicles were used. For the haul dump trucks, the average of the two Payne & Dolan baseline test results was used as the Vulcan Materials baseline.