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September 20, 2009

RE: California Air Resources Board (CARB) “MODIFIED REGULATORY LANGUAGE FOR PUBLIC COMMENT, REGULATION TO REDUCE GREENHOUSE GAS EMISSIONS FROM HEAVY-DUTY VEHICLES”,

EPA Interim Test Method for Verifying Fuel-Saving Components for SmartWay: Modifications to SAE J1321, EPA-420-F-09-046, August 2009

Honorable Mary Nichols  
California Air Resources Board  
1001 I Street  
Sacramento, CA 95814

Honorable Mary Nichols,

A review of the EPA Interim Test Method is summarized in the attachment. A few of the concerns with the EPA Interim Test Method are;

- *does not measure in-service performance* of a vehicle or vehicle component,
- *can not provide valid fuel consumption data*, and
- *has a precision error of at least 6%*.

For these reasons listed above and based upon additional information provided below and in the attached document the CARB should immediately modify the existing technology verification process and procedures.

CARB’s strict reliance on the voluntary EPA SmartWay program to identify viable aerodynamic technologies has and will continue to adversely affect the programs success. To address the need for reliable, practical and cost effective solutions CARB should adopt a policy that allows organizations, manufacturers, and users to request a waiver of the EPA verification requirement. The waiver process would allow the use of more reliable and higher quality data obtained with industry accepted test standards established by the Society of Automotive Engineers (SAE), Technology and Maintenance Council (TMC) of the American Trucking Association.

If there are any questions or requests for additional information please feel free to contact me by email at [Richard.wood@solusinc.com](mailto:Richard.wood@solusinc.com) or by phone at 757-486-3570.

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## ATTACHMENT

The information provided in this document is in response to a request by CARB for comments to the EPA “Interim Test Method for Verifying Fuel-Savings Components for SmartWay: Modifications to SAE J1321”

**NOTE: The following information describes the input and edits provided in the body of this document**

- **AREAS OF CONCERN ARE HIGHLIGHTED IN YELLOW**
- **RECOMMENDED CHANGES ARE NOTED WITH RED TEXT, RED UNDERLINES AND RED STRIKE THRU.**
- **SUPPORTING BACKGROUND COMMENTS ARE OFFERED AS BLUE TEXT CONTAINED WITHIN ( ).**

Recommended corrections and changes to the subject document are provided below:

### Interim Test Method for Verifying Fuel-Saving Components for SmartWay: Modifications to SAE J1321

This is an EPA document describing how the Joint TMC/SAE Fuel Consumption Test Procedure – Type II (SAE J1321 Surface Vehicle Recommended Practice (October, 1986) can be adapted as an interim test method to quantify the fuel consumption impact of fuel-saving equipment for the purpose of determining eligibility for inclusion in SmartWay.

#### **Description of Interim Test Method**

The Joint TMC/SAE Fuel Consumption Test Procedure – Type II (SAE J1321 Surface Vehicle Recommended Practice (October, 1986) is modified by adding the following provisions:

1. ~~Test must be conducted on a test track, not a roadway.~~ (According to the SAE and TMC the precision of the subject test method is not reduced by testing on a roadway. This provision only serves to increase test costs that will result in an increase in the cost of products and thereby limiting the number of options available to the industry. If CARB continues to rely solely upon the subject test method then CARB should allow for test results from all sources.)
2. ~~Test track length > 1.5 miles (5 miles recommended).~~ (see 1 above)
3. ~~Track Test route~~ must be circular, figure eight, or oval in shape. (see 1 above)
4. ~~Track Test route~~ surface must be completely dry and well-maintained; surface typical of highway surfaces (asphalt or cement). (see 1 above)
5. ~~Grade change on test track not greater than 2 degrees.~~ (see 1 above, Item 5 is not required, grade effects are accounted for within the precision of the existing test method.)
6. ~~Altitude of test facility not greater than 4,000 feet above sea level.~~ (see 1 above, Item 6 is not required, altitude effects are accounted for within the precision of the existing test method)
7. ~~No precipitation on the test track for duration of test.~~ (see 1 above, a dry track is covered in item 4 above)
8. ~~Temperatures range for duration of test should be less than 30°F at the test track must be 68–86 F for duration of test.~~ (a specific temperature range is not required, these effects are accounted for within the precision of the existing test method)
9. ~~Wind speed at the test track~~ cannot exceed ~~42~~ 5 mph for duration of test. (Wind speed will result in

large errors in test method precision, especially for aerodynamic devices and technology. The J1321 test method is designed to provide results for the no wind condition or zero yaw. Allowing 12mph wind speed will result in low precision and unreliable results with a precision error that can be estimated to be 50% the wind speed or for the EPA allowance of 12mph would result in 6% precision error. It is also important to specify the location and frequency of the wind measurements. )

10. Wind gusts at the test track cannot exceed 15.5 mph for duration of test. (Wind speed can result in large errors in test method precision, especially for aerodynamic devices and technology. The J1321 test method is designed to provide results for the no wind condition or zero yaw. Allowing 15mph wind speed will result in low precision and unreliable results with a precision error that can be estimated to be 50% the wind speed or 7% precision error.)

11. Top speed of test drive cycle not to exceed 65 mph.

12. Test trailer configuration must be a typical dry box semi-trailer, 53' long, 12. 102" wide, and 13' 6" high.

13. Trailers must be the same model, configured the same and similar age, mileage and condition. (need to have the same undercarriage structure and components, same rear bogie, wheels, tires, underride bar, etc...)

14. Each trailer must have the same test payload. The combined weight of the trailer and payload must be approximately 46,000 pounds, +/- 500 pounds.

15. Test payload must be loaded over axle to be consistent with federal bridge laws. Payload must be secured so it does not shift during the test.

16. Tires must be inflated to manufacturer-recommended maximum cold inflation pressure prior to start of test.

17. Tires must be as similar as possible in size and condition, and have accumulated at least 500 miles wear-in prior to start of test. (need to specify tread depth range)

18. The tractor-trailer aerodynamic gap must as similar as possible on both pairs of trucks, as measured from the aft most point on the back of the tractor or tractor side or roof mounted aerodynamic fairing (which ever is furthest aft) to the forward most point on the front of the trailer or trailer front mounted aerodynamic fairing or flow control device (which ever is furthest forward). (The change in fuel use with changes in tractor to trailer aerodynamic gap distance are due to changes in aerodynamic resistance. It is therefore important that the aerodynamic gap be the figure of merit and not the vehicle gap. Where the aerodynamic gap is that noted by the revised text above and the vehicle gap is that noted by the original text above.)

19. If testing a candidate tractor against a current SmartWay tractor model for the purpose of demonstrating SmartWay eligibility, the two tractors must have substantially similar drive train and power train configuration, including gear ratio, engine horsepower and size, transmission type, lubricant type, rear axle ratio, accumulated mileage, emissions aftertreatment system, etc.

20. If testing trailer modifications or trailer aerodynamic equipment, test tractors must be the same model, configured the same, similar age, mileage, condition and be equipped with features typical of line haul combination trucks – e.g., high roof fairing, side cab extender fairings, and aerodynamic profile. (the use of the same tractor and trailer combinations is critical to the test of aerodynamic technology. It is also critical that the change in aerodynamic resistance does not result in a change in engine performance characteristics that would bias the results.)

21. EPA must review and approve the test plan and the vehicle configurations prior to testing.

22. EPA reserves the right to review all test data and to reject any test it determines was not conducted in accordance with these provisions and / or SAE J1321, or otherwise not credible according to good engineering judgment.

### **General requirement:**

All provisions of SAE J1321 must be followed, in addition to the above EPA provisions. Trucks must be prepped and maintained according to SAE J1321, and results must be within SAE test minimum acceptable ratios to be a valid test. All measurement devices must be NIST-traceable. The fuel must meet all applicable ASTM standards for motor fuel for the intended application.

(Based upon these "General Requirements" the EPA has not verified any aerodynamic devices.

According to the SAE Surface Vehicle Recommended Practice, J1321, there have not been any valid tests performed and thus there are not any verified EPA technologies and therefore there are no CARB verified technologies. J1321 states: ***"A single test is inconclusive regardless of the results. A single test should be taken as an indicator. Test results must be repeatable to have validity."*** J1321 also states: ***"If a number of tests do not show consistent results, then one must conclude that the changes caused by the component or vehicle system are less than can be measured by the test procedure."*** The EPA has violated its own Interim Test Method by failing to require that J1321 tests be repeated, as instructed by the SAE J1321 standard, in order to develop a valid test result with quantifiable fuel use measurements.)