

**Response to EPA's Comments on Radian's Report--
Assessment of Options for Enhanced I/M:
Emission Reductions and Costs**

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Introduction

EPA has briefly analyzed Radian's December 31, 1991 report on emission reductions and costs for alternative inspection/maintenance options. They presented their initial comments on this report at a public meeting in Houston on January 27, 1992. Radian has prepared this document in response to EPA's comments on our report.

EPA Comment: OBD is not a Viable Near-Term Strategy for Enhanced I/M.

EPA and the California Air Resources have great expectations for on-board diagnostic (OBD) systems to reduce excess emissions. Radian had proposed using a check of the OBD system to identify vehicles with excess exhaust and evaporative emissions. Although EPA believed that this was feasible, it noted that any incremental benefit from OBD could not be claimed as part of an enhanced I/M program. In addition, it will take until the year 2013 for 15 model years of OBD equipped vehicles to be on the road.

Radian had recognized that the long phase-in time for OBD systems was a problem, particularly in areas with serious or worse ozone and carbon monoxide nonattainment problems. For this reason, Radian presented the alternative loaded-mode option, which does not require vehicle phase-in.

EPA Comment: SAVER's Simpler Loaded-Mode Test is not Technically Supportable for Vehicles in the 1990s and Can Not Test for NO_x

EPA objected to the simple loaded-mode test because it felt that it could not adequately test evaporative purge systems nor could it test for excessive NO_x emissions. Concerning the ability to test the purge system, EPA noted that many Ford vehicles purge during the third acceleration of the I/M 240 test. These vehicles would

not purge during a steady-state test. Furthermore, EPA felt that the new federal and California evaporative emission standards would result in creative purge strategies being developed.

The simpler loaded-mode test proposed by Radian was based on the Sierra Research Acceleration Simulation Mode test which includes simulated steady-state and acceleration modes. The acceleration mode simulated by this test could be tailored to specific vehicles so they would undergo conditions conducive to purging. This would entail gathering information on the purge strategies for Ford vehicles (that do not purge under steady-state conditions). Then the speeds and loadings of the dynamometer could be adjusted so those conditions are encountered during the test. Alternatively, a visual inspection could be performed on those specific types of vehicles that do not purge during the simpler loaded-mode test. Note that Radian assumed that the simpler loaded-mode test would be 80 percent as effective as the I/M 240 test. The Ford vehicles in question account for much less than 20 percent of the market share.

EPA's second point concerning performing purge system tests on vehicles meeting future federal evaporative standards is contrary to engineering judgement. EPA assumes that the new standards will cause more manufacturers to use purging strategies similar to previously-mentioned Ford vehicles, which only purge during certain accelerations. However, the new evaporative emission standards will require that evaporative emissions be measured during severe ambient and driving conditions, which will likely result in manufacturers expanding the times that vehicles purge so more canister capacity is available. The new standards are unlikely to cause more vehicles to be equipped with purge strategies similar to those used on a few of the Ford vehicles mentioned by EPA. If more manufacturers do adopt alternative purge tests similar to Ford, the simpler test could be tailored to these vehicles. Also, most of these vehicles will be equipped with OBD systems which are intended to identify purge and other problems.

EPA's claim that the I/M 240 test is the only feasible option to reduce NO_x emissions is not supported by existing data or studies. EPA failed to point out that the mere existence of an I/M program will result in reduced tampering of critical NO_x emission related items, such as the catalytic converter and the EGR system. Therefore, even a basic program with an anti-tampering inspection will reduce NO_x emissions by approximately 5 percent, based on MOBILE4.1 estimates. In addition, EPA ignores a recent study performed by Sierra Research under the sponsorship of the California Bureau of Automotive Repair that showed that the Sierra Acceleration Simulation Mode test will identify most of the excess NO_x emissions. The sample in Sierra's study included late model three-way catalyst vehicles with and without EGR systems. Sierra still believes that their Acceleration Simulation Mode test will be very effective in identifying vehicles with excess NO_x emissions.

In addition to the concern over purge tests and NO_x emissions, EPA stated that the simple loaded-mode test can not simulate decelerations or transitions between accelerations, cruise, and decelerations, and therefore can not provide as much diagnostic information as a transient emission test. This point is valid. The I/M 240 test could be used by an expert diagnostician to provide additional information on what is wrong with the vehicle. However, a proper diagnosis of the vehicle, particularly late-model vehicles with computer controls, will require interrogation of the on-board computer and/or a systematic review of different sensor operations. The operator of an I/M 240 inspection facility is unlikely to provide detailed diagnostic information based strictly on the results of the emission test.

EPA Comment: Radian Significantly Overestimated the Cost of the Transient Emission Test, While Underestimating the Cost of Decentralized Testing

EPA believes that the decentralized options will require more oversight than assumed in the cost analysis. Radian has used a \$5 per vehicle cost estimate for

decentralized options. EPA pointed out that California's current certificate now costs \$7 per test. Consequently, Radian may have slightly underestimated the cost of decentralized inspection programs. EPA's point may be valid. California's current administrative and enforcement costs should be investigated further to determine exactly how much of the certificate fee is used for those purposes.

Note that EPA's proposed enhanced I/M strategy will require mechanic certification. However, none of EPA's cost estimates include the cost for mechanic certification. Many of the costs that are currently incurred in decentralized programs would be incurred in centralized programs if a strong mechanic certification program were to be enforced. In particular, there would be substantial consumer protection efforts necessary to assure that motorists are not being ripped off by the \$450 per vehicle waiver cost limit.

EPA felt that Radian had double-counted the number of lanes estimated for a transient emission test. However, EPA assumed that Radian accepted their estimate that a transient emission test plus a purge system inspection could be performed in four minutes, including moving vehicles on and off the dynamometer. As mentioned in the Radian report, it was assumed that this inspection would require a minimum of eight minutes. Therefore, Radian did not double-count the number of lanes required for the program. EPA's analysis assumes that there are no problems in identifying the location of the canister on existing vehicles, or identifying which is the proper hose to be removed to do the flow check as part of the purge system inspection.

The Texas Air Control Board (TACB) witnessed five I/M 240 inspections and noted that the average inspection time was 20-25 minutes and that none of the vehicles had hard-to-locate canisters. One of the test vehicles had a manual transmission and was difficult to test. The I/M 240 test procedure was aborted three times before a driver could successfully perform it within the allowed tolerances (three drivers attempted to perform the test). Russ Baier of TACB attempted to drive the I/M 240

cycle with an automatic transmission car and failed miserably in tracking the trace, i.e., the test cycle. He felt that proper operation of an I/M 240 test lane would require dedicated, committed, and skilled technicians, and would take much longer than 4 minutes to complete.

EPA also felt that Radian had overestimated the number of people required per lane. EPA believed that it would require 2 1/2 to 3 people for an optimized system. Radian's estimates were based on four people plus a lane supervisor. EPA admits that more people are currently required, but feels that the test can be more automated to reduce manpower requirements. However, the opportunities for automation are limited--it might be possible to automate the positioning and securing of the vehicle, but most aspects of the test will require human beings and not machines.

At the Houston presentation, EPA talked about the upcoming Louisville Request for Proposals and how it will provide real data on the cost for an I/M 240 system. This may be so, but it will be important that all cost bids be reported, not just the low bid. Furthermore, a bid price does not necessarily reflect all costs nor is there experience to show that a contractor can perform for the prices bid.

EPA Comment: Radian Significantly Underestimated the Inconvenience Cost for Low-Volume (Decentralized) Stations by Using Unsubstantiated Assumptions and Incomplete Modelling

Radian made conventional assumptions about the inconvenience cost of centralized and decentralized programs. Radian assumed that decentralized programs will have much lower inconvenience costs associated with obtaining repairs because most of the repairs will be performed at the inspection stations. Radian did not have access to survey data on centralized or decentralized inconvenience costs. EPA disagreed with Radian's analysis and cited the recent Riter report on the inconvenience associated with centralized or decentralized I/M programs. Radian recommends that an independent

consultant experienced with survey research be hired to review the Riter report and comment on its findings.

Summary

A summary of the response to EPA's comments is presented below:

- Radian agrees that OBD is not a viable near-term strategy, but it has great long-term potential.
- Radian's proposed simpler loaded-mode test should be able to test the purge function on most current vehicles. This test should be effective on future vehicles because they will purge under a wide variety of conditions, including steady-state cruise conditions. A recent study by Bureau of Automotive Repair indicates that the simpler loaded-mode test will be effective in identifying high NO_x emitters.
- Radian did not double-count the number of test lanes required for transient emission testing. Radian assumed that the purge test plus the transient emission test would require a minimum of 8 minutes versus EPA's estimate of 4 minutes.