



Consulting Political Scientist

717 K Street, Suite 534
Sacramento, California 95814
916-447-4956 Voice
916-447-8689 Fax

Summary of the Smog Check Technology Forum and Roundtable Discussion

Convened by the

South Coast Air Quality Management District
March 21, 2007

Prepared for the
South Coast Air Quality Management District
21865 Copley Drive
Diamond Bar, CA 91765

Contract Number: 07262

May 10, 2007

Prepared by: Judith Lamare Ph.D.

Table of Contents
Page

<i>Executive Summary</i>	3
<i>AQMD Perspective, Dean Saito, Manager Mobile Source Strategies, South Coast AQMD</i>	7
<i>California Air Resources Board Perspective, James Goldstene, Smog Check Program Manager, Air Resources Board</i>	8
<i>Bureau of Automotive Repair Perspective, Sherry Mehl, Chief, Bureau of Automotive Repair</i>	9
<i>EMFAC Model Assumptions about the Smog Check Program, Mark Carlock, Senior Partner, Saint Malo Solutions</i>	10
<i>Remote Sensing Technical Feasibility, Peter McClintock, Ph.D., Principal, Applied Analysis</i>	11
<i>On-Board Diagnostics and Future Applications, Michael McCarthy, Manager, Advanced Engineering Section, Mobile Source Control Division, Air Resources Board</i>	13
<i>Current Research on PM Measurement in the Smog Check Program, John Collins, Ph.D., QA/QC Coordinator, CE-CERT, University of California, Riverside</i>	15
<i>Roundtable Discussion Summary</i>	16
<i>Concluding Remarks and Questions</i>	28

Executive Summary

The South Coast AQMD convened the technical forum on smog check to look for significant new reductions from in use light duty vehicles, beyond the proposal by California Air Resources Board (CARB) for the 2007 State Implementation Plan (SIP). The South Coast AQMD is particularly concerned about the health impacts of exposure to particulate matter because this pollutant so disproportionately affects the region's population.

California's smog check program has evolved over more than two decades. It is currently credited with achieving emission reductions of 137 tons of NOx and ROG in the South Coast. It tests vehicles that are seven model years and older every other year in most parts of the state, and exempts vehicles made before 1976. On Board Diagnostic (OBD) systems have been included in 1996 and newer model years. About 36 percent of the fleet is directed to test-only facilities for testing. About 15 percent, or 1.5 million, of the tested vehicles fail (based on 2005 numbers from BAR). Failed vehicles may be eligible for consumer assistance if repaired at a Gold Shield certified repair shop. Random roadside inspection of vehicles has shown that about 40 percent of the failed and repaired vehicles are not in compliance with emission standards when randomly tested on the road at some point after passing smog check. Determining the causes of the refail rate is under investigation by the State. The State is also retiring about 16,000 failed vehicles per year in conjunction with the Smog Check program. The number is expected to increase next year.

The South Coast has 16 million residents affected by the worst air quality in the nation, and 11 million light and medium duty vehicles contribute to this problem. **Dean Saito**, Manager of Mobile Source Strategies outlined the need for further reductions from the on-road fleet, and stated that the AQMD has identified vehicle inspection and maintenance of emission control equipment as the single largest measure in its SIP strategy. AQMD has identified three measures not included in CARB's SIP strategy to be included: 1) light duty remote sensing identification of on-road high emitters; 2) remote sensing identification of medium duty on-road high emitters; and 3) voluntary implementation of remote On Board Diagnostic (OBD) compliance monitoring. The South Coast AQMD is implementing a pilot program to identify the highest emitting three percent of vehicles on the road, and to offer owners incentives to repair or retire.

The California Air Resources Board, represented by **James Goldstene**, Smog Check Program manager, noted that statewide passenger vehicles are responsible for 33 percent of the ROG and 22 percent of the NOx emissions in 2006. He reviewed the 2007 SIP proposal for smog check and light duty vehicle scrappage measures. These are: low pressure evaporative testing; more stringent cut points; annual inspections for older vehicles; annual inspections for high annual mileage vehicles; visible smoke test; inspection of light and medium duty diesels; inspection of motorcycles. Some of these measures are now underway and others will require legislative action. Voluntary vehicle retirement will play a bigger role in the future. These measures are expected to reduce 14 tons of NOx and 14 tons of ROG in the South Coast air basin by 2014.

Sherry Mehl, Chief of the Bureau of Automotive Repair (BAR), outlined the complex procedures required to implement new smog check measures. The time required to implement new measures presents a barrier to rapid adaptation of the program. She described BAR's proposal to streamline the testing equipment required, to provide more flexibility through a

modular approach, and to reduce smog station costs for maintenance of testing equipment. Mehl also stressed the importance of partnerships and vehicle owner education in the future of smog check.

Mark Carlock, St. Malo Solutions, an environmental consultant, described the relationship between the EMFAC model, the model for estimating the air quality benefits of the smog check program, and the various research programs conducted by CARB and BAR to determine program impacts. Of particular importance are the ARB's Surveillance Program and the BAR's Random Roadside Inspection. The EMFAC estimates of emission reductions from Smog Check are consistent with these on-road data sources. However, the sampling and size of the samples used in the estimates are not robust.

Dr. Peter McClintock, Applied Analysis, examined the feasibility and benefits of on-road identification of high emitters. An on road remote sensing program could identify the highest emitting three percent of the vehicles in use and would also have unmeasured benefits due to the incentive for better compliance with smog check requirements. He noted blind spots in the ASM testing regime and the current refail rate for failing and repaired vehicles as key reasons for implementing remote sensing for high emitters.

Michael McCarthy, ARB's OBD Manager, described the status of California's current program for on board diagnostics (OBD) of emission control systems. He noted that there are technical improvements that could be made in the OBD program, including tighter inspection criteria. Tightening criteria for OBD readiness would eliminate some missed emissions. He also noted that by offering OBD only testing regimes as some other states do for OBD equipped vehicles, the state's smog check program could absorb greater testing attention to the older and high mileage vehicles. He described options for implementing remote monitoring of OBD systems and recommended that a licensing system be considered to enable voluntary participation in OBD only inspection. The license would enable any qualified system to be offered to the public.

John Collins, UC Riverside CE-CERT, presented results from recent research on the measurement of particulate mass emissions from light duty vehicles. The vehicles selected for the test were primarily smoking vehicles. While the detection of vehicles with gross levels of particulate emissions is confirmed, the quantification of the results presents challenges because of the variability in measurements.

Roundtable Discussion. Dr. Judith Lamare, Acting Chair of the California Inspection and Maintenance Review Committee (IMRC), led the Roundtable Discussion. Dr. Jeffrey Williams, also an IMRC member and an economist with the University of California at Davis, joined the panel of experts. The Roundtable discussed the following topics: Future of Smog Check; What can be done with On Board Diagnostic Systems; How to Accelerate Vehicle Retirement; Technical Issues in Implementing Annual Smog Check for Older and High Mileage Vehicles; Issues in Implementing RSD to identify high emitters; Modeling Benefits of In Use Light Duty Vehicle Emission Reduction Programs; and Incentives in the Smog Check Program

Next Steps. The AQMD encourages a broader discussion of ideas generated in this forum. In particular, the California Inspection and Maintenance Review Committee will continue dialogue on these issues.

There was an area of unresolved disagreement regarding how much credit smog check takes in EMFAC for reducing failed vehicle emissions. This is related to the bigger issue of whether it is cost effective to repair or retire the worst polluting vehicles. There is also uncertainty about the efficiency of using remote sensing technology to identify candidates for repair and retirement. A number of issues were raised that should continue to receive attention in a statewide forum of affected parties such as the Vehicle Repair and Retirement Task Force suggested by the Clean Air Dialogue and embraced by the Cal-EPA and Department of Consumer Affairs last year.

The following questions were identified in the forum that deserve more attention:

1. What would be required to enable continuous remote monitoring of OBD systems on a voluntary basis?
2. Can OBD-only testing reduce the average cost and inconvenience of smog check to the consumer?
3. What is required to tighten readiness criteria for OBD testing? What other OBD requirements should be implemented in the short run to follow up on successes in other states?
4. How can the motorist be motivated to act on an “engine light on” signal? Is a fine for driving with check engine light on feasible and cost effective for reducing emissions?
5. Is it important to report odometer readings? If so, what’s the best way to get this done for vehicles not going through smog check?
6. There is a need to monitor closely the results of the South Coast pilot to identify high emitting vehicles on-road and offering incentives for their repair or retirement. What is the cost-effectiveness of this program compared with the SIP scrappage program as envisioned by ARB and BAR? Do these two programs complement or compete with each other?
8. Is there a cost-effective way to ensure that replacement vehicles in a scrappage program are replaced with 1998 or newer vehicles?
9. Can on-road RSD discourage tampering and illegal parts replacement, encourage registration and proper inspection and repair? Is there a way to measure these claimed benefits?
10. What are the causes for false passes and rapid retests in the Smog Check program?
11. What is the role of voluntary event based high emitter identification and repair programs like that implemented by Valley Clean Air Now?

12. How can we reward repair stations that do proper diagnostics and encourage thorough repairs?
13. The Smog Check Summit: what needs to be done to plan and execute a summit on the future of smog check?
12. What does the Two Speed Idle (TSI) test add to ASM smog check?
13. What air quality benefits are there for testing 4W/AW drive vehicles on dynamometer? What are the costs?
14. What research is needed on owners of high polluting vehicles to improve voluntary participation in vehicle retirement programs? Are ownership period requirements an unnecessary detriment to retirement?
15. Can we get a higher rate of retirement for 1980s vehicles, for example by linking registration fees to pollution levels so that owners are more motivated to retire the older models?
16. Should owners of passing vehicles tested by sanctioned shops be required to do a free retest at a referee station within 60 days to verify that vehicles are operating in compliance? Should such vehicles be issued a retest requirement within one year if the free retest requirement is not honored by the vehicle owner.

AQMD Perspective, Dean Saito, Manager Mobile Source Strategies, South Coast AQMD

Dean Saito, Manager of Mobile Source Strategies, outlined the need for further reductions from the on-road fleet, and stated that the AQMD has identified vehicle inspection and maintenance of emission control equipment as the single largest measure in its SIP strategy. It is the one control measure that gets the greatest reductions. The South Coast AQMD convened the technical forum on smog check to look for significant new reductions from in use light duty vehicles, beyond the proposal by California Air Resources Board (CARB) for the 2007 State Implementation Plan (SIP).

The South Coast AQMD is particularly concerned about the health impacts of exposure to particulate matter because this pollutant disproportionately affects the region's population. The 2015 deadline for PM 2.5 attainment is not met by the ARB SIP proposal. The South Coast has 16 million residents affected by the worst air quality in the nation, and 11 million light and medium duty vehicles contribute to this problem. Over half of the nation's exposure to PM 2.5 is experienced in the South Coast and 82 percent of California's problem with PM 2.5 is found here. The population's exposure to cancer risk from air toxics is also very significant. The AQMD is also concerned about the leveling off of progress in reducing ozone in the air basin.

On and off-road mobile sources are the key drivers of both ozone and PM 2.5. They also contribute 89 percent to the air toxic contribution to cancer risk in the South Coast. Both ozone and PM require significant new NOx reductions from both heavy and light duty vehicles. The SCAQMD has linked the Ozone and PM SIPs and created a combined strategy. However, the primary responsibility for these emissions belongs to CARB and US EPA. The SCAQMD has less than 25 percent of the responsibility for emissions reductions in the SIPs.

SCAQMD has identified 70 tons of NOX emissions as the shortfall in meeting the PM 2.5 standard on time.

AQMD has identified three measures not included in CARB's SIP strategy that it proposes be included: 1) light duty remote sensing identification of on-road high emitters, 2) remote sensing identification of medium duty on-road high emitters, and 3) voluntary implementation of remote On Board Diagnostic (OBD) compliance monitoring.

A voluntary OBD III program would involve vehicle owners equipping their vehicles with transponders. The reductions achieved would be due to off cycle repairs from the identified failures. The remote sensing identification and offer of incentives to repair or scrap high emitting vehicles measure is based on the current pilot program.

California Air Resources Board Perspective, James Goldstene, Smog Check Program Manager, Air Resources Board

James Goldstene, Smog Check Program manager, for the California Air Resources Board noted that statewide passenger vehicles [cars, light trucks, SUVs, minivans and motorcycles] are responsible for 33 percent of the ROG and 22 percent of the NO_x emissions in 2006. ARB uses four methods to reduce these passenger vehicle emissions: new vehicle standards, fuel standards for cleaner fuel, smog check, and on-board diagnostics. Looking at to 2014, substantial added reductions will occur due to the California program. Today's smog check program is credited with reducing 137 tons of combined ROG and NO_x per day in the South Coast Air Basin.

Goldstene reviewed the 2007 SIP proposal for smog check and light duty vehicle scrappage measures to achieve additional reductions. ARB expects these measures to be implemented by 2010. These are:

- Low pressure evaporative testing, now proposed for regulation by BAR;
- More stringent cut points for tailpipe failure, now under joint investigation by ARB and BAR for implementation;
- Annual inspections for older vehicles, now proposed by legislation (AB 616) sponsored by the Sacramento Air District;
- Annual inspections for high annual mileage vehicles;
- Visible smoke test, to reduce particulate emissions from 1976 to 1995 vehicles, now in the regulatory process as required by legislation (SB 1870) passed in the 2006 legislative session;
- Inspection of light and medium duty diesels, an action proposed by the California Air Resources Board in 2006; and
- Inspection of motorcycles. CARB 2008 standards require motorcycles to have catalytic converters. CARB also wants motorcycles to be inspected for tampering.

Voluntary vehicle retirement also will play a bigger role in the future in the South Coast. The retirement of 50,000 vehicles in the South Coast is anticipated. At present the Bureau of Automotive Repair retires about 16,000 vehicles statewide as part of the Smog Check program. The BAR is now developing more options for vehicle retirement in compliance with SB 1870 of the 2006 legislative session. The goal is to increase scrappage by 2,000 vehicles per year on a statewide basis. The resulting impacts in the South Coast are projected to be 2.8 tons per day of ROG reduced and 2.4 tons per day of NO_x reduced.

These smog check and scrappage measures can be implemented by 2010 and are expected to result in 14 tons of NO_x and 14 tons of ROG reductions in the South Coast air basin by 2014.

Bureau of Automotive Repair Perspective, Sherry Mehl, Chief,
Bureau of Automotive Repair

Sherry Mehl, Chief of the Bureau of Automotive Repair (BAR), outlined the complex procedures required to implement new smog check measures. The time required to implement new measures presents a barrier to rapid adaptation of the program. She described BAR's proposal to streamline smog check testing equipment, to provide more flexibility through a modular approach, and to reduce smog station costs for maintenance of testing equipment. Mehl also stressed the importance of partnerships and vehicle owner education in the future of smog check.

Once legislation is passed, BAR must develop regulations to implement it. If it requires test equipment or changes in software, BAR must conduct research, coordinate with equipment manufacturers, set specifications, and educate the industry. This time consuming regimen also opens the door to more factors affecting the process.

Of major concern to BAR is the use of test analyzers that are 10 years old. To change the software in these analyzers requires cooperation of the manufacturers. The last update took 18 months to be installed. BAR is now on a fast track to develop a new analyzer. The concept uses an off-the-shelf computer with BAR software that interfaces with testing components. The new analyzer will expedite and lower costs of future updates.

Test procedures, technician training, referee services, enforcement programs, data capture, and evaluation all must be updated with any change in the program. BAR recently completed a lengthy process in implementing a new data system. It cannot add new data capture to the system until the system has been completed as contracted. Software changes have to be coordinated with the VID contractor.

For enforcement, procedures have to be put into place to expand the enforcement program to encompass new smog check program elements. Consumer assistance program changes will also be triggered by new smog check requirements. Budgeting and staffing requirements change as new elements are added to the smog check program. Performance measures for Gold Shield Stations may need to be revised.

There are timing issues with implementation. For example, DMV cannot begin to implement changes in notices until the regulations are adopted.

BAR looks to partners to help with implementation challenges. Partners need to understand what it takes to implement as they consider new improvements to smog check.

EMFAC Model Assumptions about the Smog Check Program, Mark Carlock, Senior Partner, Saint Malo Solutions

Mark Carlock, environmental consultant, described the relationship between the EMFAC model, the model for estimating the air quality benefits of the smog check program, and the various research programs conducted by CARB and BAR to determine program impacts. Of particular importance are the ARB's Surveillance Program and the BAR's Random Roadside Inspection. The EMFAC estimates of emission reductions from Smog Check are consistent with these on-road data sources. However, the sampling and size of the samples used in the estimates are not robust.

While South Coast is seeking more emissions from smog check in the future, this goal may be inconsistent with the evolution of the motor vehicle fleet. Newer cars are cleaner and are driven more miles, and they are growing as a group. Older vehicles are used less and also experience attrition over time.

Potential benefits of smog check are included in Air Resources Board modeling of vehicle emissions. The core model is the Emission Factor (EMFAC) model, which is data driven and revisions are publicly documented. The calculation of vehicle emissions using EMFAC is based on vehicle emissions data from vehicle testing, population of vehicles and vehicle activity data. Mileage data is acquired by BAR in the smog check process, speed and vehicle miles traveled are calculated from transportation planning agency information. There are also corrections for example for temperature and altitude. I&M is a correction factor in the EMFAC model to account for the emissions reductions achieved by the repairs in smog check program to reduce deterioration of emission control systems. The EMFAC model allows vehicle emissions to be estimated using various "what if scenarios" about the smog check program.

Vehicle emissions data is based on the ARB Surveillance Program, which has a 6000-vehicle database, accumulated since 1976. Vehicles are brought in for intensive testing and repair. The surveillance program mimics the smog check program; in addition, it looks also at what maximum emission reductions could be achieved with no cost limit. The Surveillance Program has allowed ARB to categorize vehicles by emissions performance compared to standard. Normal vehicles are emitting at or below the standard. Vehicles are categorized by how much above the standard they are emitting. As vehicles age, the proportions in the higher emitting categories expand.

Emissions of vehicles are lowest when brand new and deteriorate as the vehicle ages. Smog Check is designed to identify deterioration and correct for it. The model uses a calculation of what emissions would be without inspection and maintenance, and estimates what smog check is able to achieve.

Remote Sensing Technical Feasibility, Peter McClintock, Ph.D.,
Principal, Applied Analysis

Dr. Peter McClintock, Applied Analysis, examined the feasibility and benefits of on-road identification of high emitters. An on road remote sensing program could identify the highest emitting three percent of the vehicles in use and would also have unmeasured benefits due to the incentive for better compliance with smog check requirements. He noted blind spots in the ASM testing regime and the current refail rate for failing and repaired vehicles as key reasons for implementing remote sensing for high emitters.

McClintock looked at the studies showing 10 percent of the vehicles have three quarters of the excess emissions. Pinpointing which vehicles have high emissions is very important to ensure that those vehicles get good repair. Also important is the refail rate after smog check. Sierra Research reports that about 40 percent of the failed vehicles that are repaired then refail again at roadside inspection soon afterwards. In addition 20 percent of the passed vehicles fail at roadside soon after. McClintock noted that the reasons for refail could be: coaxing vehicles to pass, improper inspections, and short-lived or incomplete repairs. Coaxing vehicles to pass would include warming the vehicle, tuning it to pass ASM mode, use of additives and/or tampering or replacement of parts.

He reviewed how remote sensing works and its use in the U.S. Colorado, Missouri, Texas and Virginia are operating remote sensing programs. Remote sensing could be used effectively in California to measure vehicles on the road. There is no interference with the vehicle owner and it is relatively inexpensive. It is a short test, under real world conditions, and high emitters can have variable emissions. Any short test is a compromise over an FTP test.

California has studied RSD for 18 years. Numerous studies have confirmed that high emitters identified in RSD testing also have high rates of failing roadside ASM tests. McClintock noted that ASM is not a perfect test, and he compared ASM to FTP testing. Some high emitters of HC can pass ASM. Testing demonstrates that clean vehicles have consistent emissions while marginal emitters can have variable test results. The correspondence between ASM tests and RSD measurements is good but the results are not identical. Even where a high emitter identified by RSD passes ASM, it should be diagnosed for emission reduction potential.

RSD sites are generally on-ramps. The vehicles are warmed up and the power range is good after the meter is passed, with vehicles often merging into one lane. The South Coast has targeted 120 sites and recently received approval to use freeway on-ramps during peak periods. The South Coast is particularly suitable for the program since the traffic count volume is similar to that found in the Texas program.

The costs per vehicle to identify high emitters is \$1-\$2 per unique vehicle. The cost to recruit participants depends on the success rate for recruitment, which is yet to be determined for the South Coast. The South Coast program targets the 3 percent dirtiest vehicles. The estimate for the South Coast is \$320 per recruited vehicle, assuming a 20 percent recruitment rate. Lower recruitment rates yield higher program costs and lower cost-effectiveness. A mandatory program would cost less per RSD emitter, and McClintock estimated that cost at \$155. He compared that to \$337 per smog check average high emitter.

McClintock questioned some of the assumptions used by the California Air Resources Board in estimating the benefits of the South Coast's "3 percent high emitter" identification program, arguing that the benefits are greater at a lower cost than the smog check program. He suggested the use of "incremental" benefits beyond smog check since roadside testing reveals a 40 percent refail rate for smog check repaired vehicles. He also stated that vehicles found on road have higher VMT than others of the same model year and should be credited with more than average emissions reductions when fixed or retired. He also believes high emitters have higher mass emissions than credited by the equations published in the Carl Moyer guidelines.

McClintock reviewed cost-effectiveness estimates for high emitter identification from the South Coast pilot program and the Valley CAN voluntary program, at \$8k to \$12k a ton. He then listed a number of corollary and unmeasured benefits that RSD has in influencing vehicle owners. These include: deterring tampering and parts replacement; deterring improper inspections, deterring non-compliance, encouraging prompt maintenance, encouraging complete repairs and encouraging correct registration. The RSD program also provides data about on road vehicle emission performance. He stated that hidden benefits such as these could exceed the measured benefits of the program.

McClintock concluded his presentation with information about heavy-duty vehicle RSD applications and new technological developments in RSD for light duty monitoring. The latter includes battery operated, unattended, small footprint monitoring with wireless capability, and ability to separately monitor vehicles in two lane operations.

On-Board Diagnostics and Future Applications, Michael McCarthy, Manager, Advanced Engineering Section, Mobile Source Control Division, Air Resources Board

Michael McCarthy, ARB's OBD manager, described the status of California's current program for on board diagnostics of emission control systems. He noted that there are technical improvements that could be made in the OBD program, including tighter inspection criteria. Tightening criteria for OBD readiness would eliminate some missed emissions. He also noted that by offering OBD only testing regimes as some other states do for OBD equipped vehicles, the state's smog check program could absorb greater testing attention to the older and high mileage vehicles. He described options for implementing remote monitoring of OBD systems and recommended that a licensing system be considered to enable voluntary participation in OBD only inspection. The license would enable any qualified system to be offered to the public.

OBD is not a tailpipe sensor. It is software in the engine computer with diagnostics to evaluate data coming from sensors in the car to determine if the emissions control system is working right. If not, a dashboard light is illuminated and diagnostic information is stored in the engine computer. OBD is designed to detect malfunctions early to avoid emission control breakdown.

OBD began nationwide in 1996. There are over 140 million cars in the nation with OBD. In California over 50 percent of the vehicles are OBD equipped. During smog check, the inspector plugs into the vehicle computer and the test analyzer downloads data. There are over 500,000 OBD inspections every month.

OBD is limited by the 97 analyzer (as described in Chief Mehl's presentation). We are not inspecting vehicles as thoroughly as we could. Other states are making better use of OBD. Most have OBD only testing and gather more information from cars. Some are using tighter readiness inspection criteria and gathering more information from OBD systems for analysis. California is missing emission reductions by allowing vehicles to be retested before they have cleared all their OBD inspection readiness codes. Some cars get through a loophole. California also could require more information in the engine computer to assist fraud detection. You could identify vehicles that should have been recalled and were not, and could identify whether a vehicle has been properly repaired. We are not at the forefront of using OBD technologies.

California could reduce inspection time and make inspections more convenient to motorists through the use of OBD only test concepts being implemented in other states. Oregon for example has a more convenient way to do a reinspection after repair. Oregon is trying kiosk OBD testing. Another concept is remote OBD monitoring for continuous testing. Examples include roadside monitoring. The vehicle owner is notified to report when the OBD system signals a failure. BAR currently is conducting a pilot on taxicabs. When the dashboard light is illuminated, the vehicle goes into service for diagnosis and repair. The benefits include shorter time between fault and repair, less cost for inspection, and less time when vehicle is out of service.

McCarthy suggested that a voluntary OBD only testing program could be offered using the licensing system. This would enable private vendors with BAR licenses to offer motorists the

service of continuous testing. These motorists would not be required to report for smog check unless the OBD system indicates the vehicle is out of compliance.

McCarthy noted that post 1996 light and medium duty diesels and post 2010 gas and diesel heavy duty vehicles are now being equipped with OBD systems. These may make the most sense for remote OBD testing. Regulators really only want to know when they are dirty, and it also makes sense for fleet owners to use remote testing to reduce down time. OBD only inspection could allow us to get at vehicles now not being inspected.

Current Research on PM Measurement in the Smog Check Program,
John Collins, Ph.D., QA/QC Coordinator, CE-CERT, University of
California, Riverside

Dr. John Collins, UC Riverside CE-CERT, presented results from recent research on the detection of high pm emitters. The study of measurement of particulate mass emissions from light duty vehicles was sponsored by ARB and the co-investigators were CE-CERT, ARB, ESP, and DRI. The vehicles selected for the test were primarily smoking vehicles. While the detection of vehicles with gross levels of particulate emissions is not difficult, the quantification of the results presents challenges because of the variability in measurements.

The study recruited 8 vehicles with high in use PM emissions. The vehicles recruited have different kinds of smoke. The PM emissions were measured using standard CVS tunnel and filter methods. The emissions were then tested using new potential screening methods. Vehicles were repaired and then finally the vehicles are to be retested (but as yet have not been). Two invisible smokers were also included.

The standard CVS testing included Teflon filters, and coarse carbon filter. It was supplemented with DustTrak, a continuous optical measure, and CPC — condensation part counter— in the standard CVS tunnel. DustTrak is more convenient than filter sampling and correlates well with the filter, easily separating the high and low emitters. The mini CVS with DustTrak was used at smog check station. Also they used remote sensing devices including UV Transmissimeter, IR Transmissometer and UV Lidar.

The measurement of mass over the standard unified cycle was shown compared with a 10 mg per mile level could be met easily by any normal vehicle. The emissions ranged over three orders of magnitude. The DustTrak compares well with the filter method and identifies high emitting vehicles. The DustTrak needs to be calibrated to the kind of pm you are seeking to measure however. The study also looked at the number of particles emitted over the unified cycle as well with similar results. The dynamic range is not as wide as it is with mass. Nevertheless the testing method distinguishes the normal from high emitting vehicles.

For the vehicles in the study, smog checks were performed. Several were marginal failures; several were gross polluters. Heavy smokers are likely, but not always, failures. To supplement smog check with collected mass, a mini CVS was created. It is a tube that collects a total flow of 150 cfm with unfiltered ambient air. When there is a measurement using CVS, which uses ambient air for dilution, the concentration in the diluted stream is proportional to the mass emission. If you just measure tailpipe you can't determine that. The system was able to tell high emitters from low emitters. It was done during smog check.

An instrumental method would be useful to assist in identification of the pm high emitters. Tests at smog check are variable. The results vary by time spent idling. Testing should require that the duration of warm-up be standardized.

Roundtable Discussion Summary

Dr. Judith Lamare, Acting Chair of the California Inspection and Maintenance Review Committee (IMRC), led the Roundtable Discussion. Dr. Jeffrey Williams, also an IMRC member and an economist with the University of California at Davis, joined the panel of experts. The Roundtable discussed the following topics:

Future of Smog Check;
What can be done with On Board Diagnostic Systems;
How to Accelerate Vehicle Retirement;
Technical Issues in Implementing Annual Smog Check for Older and High Mileage Vehicles;
Issues in Implementing RSD to Identify High Emitters;
Modeling Benefits of In-Use Light Duty Vehicle Emission Reduction Programs
Incentives in the Smog Check Program; and
Other Issues.

Dean Saito introduced Dr. Lamare, the moderator for the afternoon session. Dr. Lamare introduced Dr. Jeffrey Williams, University of California Davis economist and member of the IMRC. She noted also that the California Inspection and Maintenance Review Committee would review the forum on March 24. She introduced the IMRC staff, Rocky Carlisle, and IMRC members Nickey, Hisserich, and DeCota. To begin the discussion, moderator Lamare asked panel members whether they had any clarification questions about any of the presentations.

Clarifications

Q. In OBD, is there a record of how long the check engine light has been on when the technician examines it?

McCarthy: Since the 2005 model year, the OBD record shows distance since illuminated. It has been detected in Europe longer.

Q. Is ARB planning follow-up to the taxi pilot for continuous monitoring (OBD III).

McCarthy: BAR was instrumental in that program and it continues. It is not limited to taxi-cabs and anyone can sign up. The issues now are how to target further pilot applications. The technology is there and various technology companies have approached us. How to best integrate a remote system is the issue.

Q. Is there a difference in fail rates for HEP and not-directed vehicles of the same model year?

Carlock: there was no difference in fail rate. HEP means old vehicles fail more than newer vehicles. If the test is stringent enough, there won't be any difference. HEP attempts to distinguish high emitters within a model year but there is no evidence that it does.

Discussion:

The Future of Smog Check. There are new SIP measures, new things beyond SIP, but what are your visions about what smog check will look like in the future?

Chief Mehl: There is a lot to envision and a lot of opportunity. We've been having open discussion about the issues and the direction and what things need to be in place. The ideas are great but the implementation is where we need to get. Example: We are expanding from 42 cut points to 9000.

We can help each other. It's better if we share the vision. I'd like to focus on a summit. Are there simple ways to do things where there are results we can live with? We can reach a goal if we set it.

James Goldstene: Make smog check and clean running cars more understandable to the motorists, and technicians, so that they understand that there is a payoff. We need a forum like Sherry is suggesting to minimize inconvenience and maximize use of technology to improve the overall quality of what we are trying to do.

Dean Saito: Change the mindset of the public about smog check. At clean car events that offer free smog check to the public we hear stories from vehicle owners about what mechanics tell them to do to pass smog check. It is more than a once every two year event. The Western Riverside smog event used remote sensing to characterize emissions. It could change their mindset about their emissions with immediate feedback. The referee program also gets feedback like this.

Jeffrey Williams. Looking at the very distant future, can we make it clearer how much air pollution is costing people? I can envision cars with a meter on the dash that shows the health care cost of the tailpipe emissions. The owner can then get repairs to reduce emissions (rather than hit a cut point). We're not using all the information we could (from OBD II for example) to fix the pollution costs of the vehicle. How many miles has the car has driven with check engine light? There should be a fine for driving with the check engine light on.

Potential of OBD? Mike McCarthy opened up the issue. What is the potential impact of OBD on smog check program in the next 10-15 years?

Mark Carlock: Jeffrey Williams' ideas are not too far off. In OBD we have the ability to have 140,000 cut points. You could have a cut point without any new analyzers for the 50 percent of vehicles with OBD. Listen to what the monitors on the cars have to say. Reward me for keeping a clean car. If my car is doing ok, leave me alone. We are not leading the charge, and other states have done the work. We can do continuous remote testing. To give smog check its due, it is the most effective program out there but the least efficient.

Mike McCarthy: people are making decisions to make green choices, hybrid vehicles, for example. There needs to be a better connection between the light and the decision to make the choice not to wait on it. On OBD, there is a host of things we could do. We could do a simple

thing like license companies to do continuous monitoring. The state would have to develop specs. The companies could couple the service with other services to sell their product.

James Goldstene: I agree with what Mike has said. There is a future for systems like this.

Sherry Mehl: BAR is working on public relations campaign to make the link between childhood asthma and getting your car repaired. We are working with stations on low performance. One of the things we are working on is to get them to lay out the diagnostics to the customer. One of the fears is that the consumer will go to a less thorough, cheaper competitor. Stations we have worked with are having better performance and having better dollar performance also, because they are giving consumers options.

Lamare: In the 2004 Consumer Survey done by IMRC, most failed vehicle owners said they were not given options.

Goldstene: there is a fine line between over sell and proper sell. Stations are concerned about that.

Sherry Mehl: it has to be obvious oversell. A better catalytic converter is not oversell. It is also something that we look at over time, as unnecessary repairs. We want stations to know that they will not cross that line if they offer a full diagnosis on smog check.

Dean Saito: The South Coast AQMD SIP draft does call for 2012 requirement for transponders installment as an additional measure. OBD III takes off from the taxi pilot. It is the installation of a transponder that sends a signal to the state when light goes off. The consumer would have 45 days to make the repairs. The repairs would get done instead of waiting for smog check. Early, off cycle repairs would provide emission reductions.

Peter McClintock. The older vehicles are where a lot of emissions are left. Annual and evaporative testing will make a difference. We still need on road monitoring and link that to ongoing maintenance. Maybe next iteration of OBD should put the light on the outside of the car.

Lamare: who is really affected by smog check? That's 15 percent that fail. The high emitters may be 5-10 percent of that. What kind of research do we need to put together incentives, programs to address that group?

McClintock. There's a lot we don't know about what is happening to this group in the fleet. A study that tracks them over time, without owners being aware would be nice.

Williams: combine remote sensing with the Wisconsin program to squirt high emitters with salt water. Isn't that how the other states get rid of their older vehicles? Actually, I've looked at who owns the older cars. A lot are third cars in a household. The way to get rid of them is to make it expensive to keep them around. The registration fee on an 84 model year should not be less than a 2004 since it is polluting so much more. More would be retired if there was a price calculation for registration that is equivalent to the real cost of the car to the public.

Lamare: smog check of the future: you're looking for higher rate of retirement of older vehicles?

Williams: looks like it would be really good to get rid of a lot of 1984 cars. Twenty years from now today's model year vehicles might look good, or not. Smog check is about what to do with the ten- twenty year old cars.

Mark Carloff: other countries do have a reverse registration. Japan is very aggressive about turnover; there is a moratorium against rebuilding. Japanese engines come over here and keep our cars alive. You do have to think about what people are affected. For most of them it is a necessity.

Sherry Mehl: people who own these are least likely to pay for full diagnosis and repair. We're looking at ways to increase the CAP program so that people who need to use it have the ability to do so in a streamlined fashion and get immediate use of the program. Increasing that fund, increasing the repair cost limit, and requiring the OBII catalytic converter. There's a huge education factor for those who need an older car for work. We're doing surveys right now for our outreach program.

Lamare: An idea has been floated for a vehicle maintenance organization to make cheaper cleaner transportation available to consumers, similar to health maintenance with a fee. It would be like an insurance program or a lease program for the low-income motorist. The motorist pays a fee and the car is either repaired or replaced to keep the motorist in a clean, working vehicles. This is intended to take out the factor that they have to keep the car going that they have. Is there any utility for this kind of program in smog check?

Dean: We've discussed PZEV warranty requirement for other cars. Is it possible for ARB to increase warranty requirements as a way to make sure cars are maintained.

Lamare: this happens when a new car is offered in the California market.

McCarthy: the California LEVII program defines tailpipe standards and the manufacturer has an average to meet. He can certify his cars to PZEV standard (optional bumper to bumper emission warranty). He gets extra credit for the warranty. In 2012, 30 percent of the passenger cars may be certified to that standard.

Lamare: the problem is highly differentiated. There are warranty vehicles, OBD vehicles and we are looking at the legacy fleet that has utility in the market but the vehicles have to be frequently fixed. The State offers a consumer assistance program to support the consumer. Another concept would be a sign-up program at a fixed price to guarantee driver clean transportation. Is there any role for this concept? Is there no traction for this idea among regulators or is it impractical at the legislative level?

Goldstene: with vehicle retirement, we assume that the low participation rate is partly due to the fact that some people can't afford a replacement vehicle. There might be opportunities for private finance companies, or maybe a private public partnership to have a cost-effective and

profitable program to reach borrowers who normally wouldn't be reachable. It is a financial and economic problem: is there a segment of motorists who could benefit?

Williams: principle is good but this clientele is unlikely to have health insurance. It is more important to get that first.

Lamare: in 2004 we talked about cranking up the scrappage program and developing partnerships with dealers to provide replacement vehicles. That part fell to the wayside. What happened? Is it dead?

Dean Saito: AB 923 was passed in 2004 and it incorporates light duty incentive programs. We have a high emitter identification program to offer low-income eligible owners additional funds to replace their vehicles. There is a funding mechanism if you can show it meets the cost-effectiveness threshold required by Moyer. We have higher incentives for LEV or cleaner. So the elements are all there.

Mehl: we have AB 1870 to allow higher incentive funds to retire or repair vehicles. If we can target specific cars we want, and use the funds to provide higher incentives for low-income folks, then we are getting closer.

Lamare: Ah, there is incremental movement in identifying and retiring more high polluting vehicles.

Goldstene: the manufacturer's finance companies are those who would have to be approached.

Mehl: if people aren't buying health insurance, they won't buy this kind of car insurance. These folks may not even have checking accounts. It takes special outreach. We are gearing up to focus on this.

Annual Smog Check Issues. We have talked about new SIP measures. What issues have come up? Starting with annual smog check. What are the issues coming up with implementing annual smog check and smog check for high annual mileage vehicles?

Mehl: there is legislation to make registration biennial, which would prohibit us from doing annual smog.

Goldstene: Is there an environmental justice issue that you are treating low-income owners differently? We know that 15 year old and older vehicles fail at twice the rate. We don't know who owns these vehicles.

Williams: Even if they are tested every year, what does it mean? We know so little about what causes people to fix or retire a vehicle.

Lamare: your research shows people more likely to scrap near smog check. If more frequent checks, doesn't this accelerates the rate?

Williams: I'm hesitant to generalize from that study. At some point the car's just not worth the repair cost. Getting people to accept this is part of the education process.

Mehl: we're looking at why we are denying applications, and what bars people from moving forward when they want to move toward retirement. A lot of them are not in the date range that is now allowed. We are preparing regulations to move the permitted time period to 180 days of smog check. We can pick up a third more cars.

McClintock: a high emitter identification program combined with more scrappage funds would start to make a dent in the population.

Annual Smog Check for High Mileage Vehicles. Who has figured out how to identify high mileage vehicles?

Goldstene: there are odometer readings in the smog check data base (VID) if technicians record it properly. OBD will record this at some time.

Lamare: six years of vehicle operation not subject to smog check. It has to be eight years old to do as you suggested. Why isn't the state requiring VMT reports if VMT is important to climate change and smog?

Goldstene: VMT – vehicle miles traveled – and the increase of it, and how our metropolitan areas are laid out, are causing us to drive more and more and alternative transportation often is not practical for people.

Lamare: what does it take to get VMT reported in OBD systems?

McCarthy: most remote OBD devices have the ability to manually enter the odometer and then will calculate mileage from speed and distance. If you use remote systems, in theory, you can do it. If we can inspect newer models a lot cheaper, then we can expand the vehicles in regular inspection, such as high mileage late model year vehicles. We know we are missing dirty cars but it didn't make financial sense to include them in the program due to the high cost and low payoff.

Lamare: they are more likely to fail with increasing mileage, no?

Goldstene: the SIP concept is that any vehicle with more than 25,000 miles in a year has a higher risk of failing.

Lamare: why not rely on OBD for 96 or newer vehicle? High annual mileage requirement is in the proposed SIP. What does it get you above the annual and the OBD requirements we already have?

McClintock: you could make a rule for commercial vehicles only to apply smog check to high mileage vehicles.

Goldstene: in our analysis for South Coast, the potential impacts of annual inspection of older vehicles are 10.3 tons and for high mileage annual inspection is another 2.1 tons.

Saito: The benefit of annual inspection is off cycle repairs?

Goldstene: it accelerates the benefit.

McCarthy: it does not include the increased rate of scrappage.

Lamare: there are some really high mileage commuters out there also.

McCarthy: why are we not requiring OBD III transponders on all new cars now? The answer is: what technology do you sign up for that will be around for 20 years? It is a struggle to mandate a specific transponder technology. Better to license qualifying technologies. Maybe require all cars to have two connectors so that a device can be installed. There may be ways to promote easier installation of these devices.

Saito: we recommend a voluntary opt-in program and then a state regulation with new vehicles equipped with this kind of technology. It would be a shame not to take advantage of the technology and what it offers. If consumer opts in, they don't have to worry about smog check and pay for cert. You can get a transponder for \$20.

Remote Sensing Technology. What is the role of Remote Sensing in identifying high emitter vehicles? There has been a debate in California about how, when, whether to use RSD. How is the role evolving? What are the challenges?

McClintock. One of the challenges is how the cost-effectiveness is judged. It needs to be debated and better understood. It is at least as cost-effective as smog check.

Saito: the cost-effectiveness is highly predicated on how many SIP credits you can claim for your voluntary program. What we heard today about assumptions in EMFAC about benefits of the smog check program needs to be examined because it drastically affects the cost-effectiveness calculation of other programs because the EMFAC model claims such a significant reduction from the existing smog check program.

Carlock: correct. The assumption in EMFAC is that if emissions are high enough for RSD to detect, it will be detected by smog check. The benefits are limited to off cycle reductions rather than the assumption that smog check wouldn't have caught it.

McClintock: that's the crux. High emitters are variable. ASM sometimes passes and sometimes fails. On road emitters are more important.

Carlock: you can level those concerns about ASM, but you also can find the same variability on RSD. Your only hope is to see it cheaply a number of times.

Saito: we're only going to bring in the top 3 percent. We won't be near the borderline.

Goldstene: how many do you have to see to get the top 3 percent?

Saito: we will collect 1 million unique records. We can bring in 3-4 thousand vehicles.

McCarthy: how many times do you have to see it?

Saito: one

McClintock: two readings at once. Most vehicles are very clean most of the time.

Goldstene: why not just use the VID to find the very same cars that the RSD technology can find, but with far less effort.

McClintock: isn't that the HEP? Working with model year it is still one in three of a group and you'd have to pull in three cars to get one.

Williams: the HEP doesn't include the history of the vehicle.

Lamare: a lot of them are third cars, not driven a lot. Older vehicles are generally driven fewer miles. But some are driven a lot with disproportionate impacts on air quality. Only an on road test targets these. What you want to get at is the cars in use. The HEP doesn't tell you that.

Williams: the SIP issue. We know what is being claimed is not what we are getting. We do want cleaner air. How will people respond to the District's offer? It is not just that the vehicle can be identified. What will the owners do? That's the key of the program. Maybe the state should be sending letters to HEP vehicles promoting retirement.

Saito: the success of our program is dictated by the voluntary response.

Modeling Benefits. The refail rate rises rapidly quite soon after smog check. The modeling credit to smog check doesn't include that information? Is credit for smog check inflated for SIP?

Carlock: No. There is an assumption that there is not longevity in repairs. The surveillance program reflects the same information found in the roadside.

Goldstene: Roadside data validates the model.

Carlock: EMFAC assumes that you start to deteriorate at day 1.

Saito: how do changes in cut points get reflected in model?

Carlock: It changes the rate of identification. Pushing down on cut points pushes up on failures but there are limitations to what you can do there. There is legal limit to false fails. There is also the problem of trying to fix vehicles that aren't broken.

Lamare: we expect more validity in failures and more opportunities to fix vehicles with finer cut points.

Goldstene: we anticipate more durable repairs to ensure pass. Once a car passes, motorist is not obliged to get more thorough, more durable repair. Finer cut points are intended to lead to more durable repairs.

McClintock: how will EMFAC handle that?

Carlock: better repairs lead to higher emission reductions, but the assumption is that deterioration begins right away.

McClintock: it is more than just how long the repairs last. Some aren't done.

Carlock: new failures occur also. The model is blind to specific vehicles. It uses a composite.

Dean: is the Sierra Research evaluation evaluating durability of repair relative to EMFAC?

Goldstene: we're waiting for an outline from Sierra for Step 2. The first report showed lack of a "sawtooth", with 40 percent refail at roadside. One part of it will be focus groups with consumers. Consumer willingness to pay for repair, mechanical issues and fraud, will all be included in the study.

Lamare: it has come up in so many forums, where environmental and business community asks about how smog check and scrappage are credited in EMFAC and SIP. Is there something we should be doing to make this more transparent to the public? Is there a public process we can use? We've heard today that I/M is a correction factor to EMFAC. We don't have a model of Smog Check that we can talk about publicly?

Carlock: there is a model in EMFAC, the CALIMFAC model that makes assumptions about I&M. There is a lot of data available from the program that is not incorporated in that model. That is the process to examine. However for the last few random roadsides that have been done, the model has been very close to what is happening at the roadside.

Collins: In the past, the model is a black box. It is not documented, the source code is not available.

Carlock: you can get it.

McClintock: EMFAC sort of reflects what you see, what you measure. We don't know how many of the emissions in the inventory are reducible. How much more can we reduce it?

Carlock: it is not a completely analytical question. There are political questions that are reflected in the assumptions of the model. The assumption is that the measure is going to be effective even if there is not evidence to suggest how effective it might be. A specific concern should be directed at questioning specific parameters in the model. For example, the assumption in the

model is that vehicles yet to be produced will meet their standards. Re smog check, it assumes vehicles will be failed and fixed. The model does agree with the roadside data.

McClintock: doesn't make sense to assume cars fixed will stay fixed until the next smog.

Carlock: it doesn't say that.

McClintock: some of these fail successive smogs. If you intervene, you've changed that.

McCarthy: the model does reflect that. It is a composite.

Incentives. What about identifying repeated with failures and putting them in a separate category? What is the state's experience with trying to target vehicles with known history?

Goldstene: what percentage of those who have failed multiple tests would fail if called in? It hasn't been tried.

McCarthy: There was a contractor that presented at one of the past Colorado Clean Air Conferences on efforts to try to refine HEP to predict probability of future failure based on past smog check inspection history.

Williams: My VW Golf study showed previous test predicted failure but two tests before didn't.

Lamare: I took home the message from that study that multiple failures lead to retirement. They are out of the fleet by the time you are looking for them.

Saito: In our pilot, we will only ask for participation from consumers with at least one failed test to ensure that there is an incentive to participate in the program; that they would know the value of \$500/repair or \$2000 incentive for retirement.

Lamare: just thinking about this population (high emitters with multiple failures likely to be captured on RSD) what kind of research could be done on this group of vehicle owners to help the District and state to provide more attractive incentives?

Williams: decisions are made by the car-household. Other cars in same household are influencing the decision. [This suggests targeting multiple car households.]

Carlock: look at our unregistered vehicle study where we went to all 58 counties. We did not find a clear correlation with indicators of economic status. Another study was the 1000 car scrappage study. We asked people what they bought; the study describes the average replacement.

Williams: Stanford has reported CAFÉ standard compliance has affected the used vehicle market values. Current retirement rates are affected by CAFÉ standards set 15 years ago. It is a complex system because they are alive so long. [Suggests looking at vehicle market rates in setting incentives.]

Incentives. We've started a dialogue at IMRC about performance incentives. What would incentivize station owners, vehicle owners and others to perform better? What incentives would matter? To whom should they be offered? What difference would it make?

McCarthy: prior study shows people upgrade to a car 8 years newer. We'd like to see them upgrade to 1998 model year because LEV I program was then in place and every car is better. The OBD systems are better and enhanced evaporative emission control requirements were required. Anything we can do to get to that level plans better for the future. There are more powerful inspection and repair tools on these vehicles.

Saito: we're offering an additional \$1000 (if income eligible) if they replace with LEV I or better.

Goldstene: it is a marketplace issue involving motorists and technicians. Incentives and disincentives for all players can be discussed, to reward or penalize. Can you require smog repairs to be warrantied for certain period of time? There are so many variables beyond the station though.

Carlock: why not hold the manufacturers' responsible? Make them responsible for quality throughout the life of the product? We've set up a system where I as a new car buyer may never bear the burden of a flaw in my vehicle. It gets passed down and then we talk about social justice. If I had to pay for smog check for the life of the vehicle, I would be more conscientious.

Williams: BAR enforcement system is based on the test. How much slippage is tolerable? We can't have a perfect system. The car owner is never punished for clean piping. Why don't we require that a vehicle have a repeat inspection if inspected at a shop that had its license taken.

Lamare: we heard shocking things about culture of cheating in smog check in the SIP hearing.

Carlock: doesn't that require you to define what cheating is. If you define it, doesn't it describe how it can be done?

Williams: It is fair to say that if shop lost license permanently, there was cheating.

Carlock: my previous car smoked when started. I knew that I would warm up the car before check. Is that cheating? It's a slippery slope.

Williams: I am saying that if we don't believe your grade, you have to take the test over again. We have info on customers in the data we should use.

Goldstene: BAR is doing focus groups to further explore fair test compliance.

McCarthy: maybe a strategy exists that a motorist can have a free referee test within 60 days, or face a retest within next year, if a shop is sanctioned.

Other Issues. Final comments?

Dean Saito: all the four-wheel drive/ all wheel drive vehicles get two speed idle. With more and more SUVs out there, there should be some program for NOx testing by four-wheel drive dynamometers.

Williams: Aren't these OBD II?

McCarthy: 96 or newer, but 95 and older, there is a small population that can be dealt with by referee.

Saito: a lot of folks don't realize they are getting a lesser test for emissions. It can be addressed.

Goldstene: OBD can pretty much address these. Except for '95 and older which is a small number.

Carlock: there's more than that: anything over 10,000 GVWR, and anything with a wide wheel base.

Saito: there are still a lot of tailpipe failures that don't trigger OBD.

McCarthy: we started a study and looked at 37 1996-98 vehicles that were high emitters and failed tailpipe test as gross polluters, and we used Gold Shield stations for repair. A couple of hundred of these are in smog check every month. There were a fair chunk of them trying to get through the readiness loophole. There were almost half that couldn't be repaired or failed again. They were intermittent or quirky. We couldn't get an emissions benefit. Most of the emissions benefit was from Chrysler Dodge failures for the catalyst that was an enforcement issue that ended up with recalls and extended warranty. Or there were cases where an aftermarket pre OBD catalyst had been installed.

Public Comment

IMRC Members

Roger Nickey: IMRC and Test Only Facility Owner. All 93 and newer two wheel drive Mercedes are not testable on the dyno. The HEP tries to forecast where losses will be. I would say 90 or older are all likely to fail. When you get to OBD, it is component replacement for repairs. For the older vehicles, there is a lot more to finesse.

Dennis DeCota: IMRC industry representative, and I've been involved in smog check for some time. There have to be proactive incentives in the program. We can quantify emission reductions at the station level. We should publicize those who are proficient in reducing emissions. It is important that people take pride in what they do. Another important issue is that we have a double standard. There is ambiguity in what we can do legally in smog check. Shop owners believe they are subject to enforcement actions if they oversell a job. To ensure that smog check repair has longevity, technicians need a protocol for diagnostics. We could do a better job of public relations. We can create the same attitude toward smog check as we have done in recycling. It has to be done at the shop level. The shop is the level at which the public is sold on the program. Incentivize the people to sell the value of the program. That would result in more emissions reductions. RSD is a player in the future. On Star today offers you diagnosis. People

are more conscious of pollution issues and there are larger players who can help out by buying the emission reductions that are now beyond the ability of consumer to pay for. Also we need to find other alternatives for transportation for those with cars that aren't worth fixing. Fix it or park it. The polluters have to be responsible for fixing it. [Question regarding industry not able to repair past the cut point? Response: the history, the mindset of the industry, the regulatory culture, play a role. Estimates have to be accurate by law. A number of factors play into the preference to sell a cheap catalyst.]

Dr. John Hisserich, IMRC member. I have questions about the Port emissions and Port RSD inspections. I could envision a program for remote sensing but what if most of the trucks that would fail would be so bad that the cost of repairs would be overwhelming? The trucks using the ports have high mileage so perhaps they would just be replaced?

Dean Saito: with the bond measure passing, there is a billion dollars to address emissions in goods movement, including ports. There is discussion of replacing that port truck fleet. It's a fleet of owner operators. Targeting the dirtiest trucks can be done with RSD.

McCarthy: there is a different economic scale with trucks than with light duty vehicles.

Carl Nord, Environmental Systems Products. A point to make to the repair industry is that ESP looks at RSD as an augmentation to the program. ESP is the largest provider of analyzers in California and we want to see the smog check program to continue. RSD has a place to help identify the polluting vehicle and can do things that a high emitter profile cannot do.

Diane Forte, Environment Now. People are holding onto their cars longer (cites DOE study). Also Dr. Lawson at the last forum talked about the problem of a wall of emissions that is always out there as vehicles age. Should there be a mechanism so that multiple failures requires a referee review of repairs, and availability of funding assistance?

McCarthy: yes we expect cars to age and emissions to get worse. Smog Check is a good way to identify the cars that need to be fixed. There's a massive infrastructure to deal with it. What are we doing to not have the same discussion 20 years from now? OBD is being put in there to improve detection and diagnosis. Maybe we need to look at different ways to motivate people to respond to the light.

Saito: it is not just old vehicles that are high emitters.

Williams: there are a lot of cars that have chronic problems. Aren't they something special?
Saito: we tested the smoking vehicle database, where vehicles have multiple failures. At the referee station, most of those caught could not be fixed with \$500.

Forte: In Pacoima a community group sought to do outreach to get people to use the BAR retirement program. In a significant number of cases they were not within the two-year ownership requirement. It was very discouraging that they could not participate.

Saito: We have made that comment to ARB that it is overkill for RSD identified cars to require 24 months ownership in the district. ARB has only agreed to consider it if that was a significant barrier.

Forte: greenhouse gases are on the agenda, and targeting high mileage vehicles. We should think about odometer readings in general. Maybe those who are not required to do smog check should come in for VMT reporting. You can't reduce what you don't measure. An alternative would be self-certified report at vehicle registration. It would also help document what VMT is in the South Coast. You could audit the information.

James O'Neill, owner of Gold Shield station in Chino. He thanked the panel. He noted that the reflash/reprogram of the computer will be a more frequent repair in the future. Repeat failures do happen. It is a social issue that some owners have the attitude of keeping the car as long as possible. These owners also do not do routine maintenance. I'd like to see a limit to repetitive CAP repair unless referee directed. Fix it or retire it. These customers will not pay for additional repairs.

Steve Gould, IMRC staff: the average cost for a test in California is \$56. The average centralized program cost about \$15. The average decentralized program is \$30. We have requirement contemplated for annual test. How can OBD reduce the cost of the test?

Dean: it can be reduced and our pilot program will develop data to show that. A voluntary OBD III program will collect data to reduce cost.

McCarthy: OBD can only help reduce costs with newer cars. Most states use OBD only and time required is under 5 minutes for most vehicles. The older and problematic cars are the ones we want to subject to even more tests. That is, unless you want to artificially subsidize the cost of testing old cars by requiring OBD cars to do conventional smog check.

Lamare: is there a legal requirement for tailpipe test?

McCarthy: yes.

Mark: there is an exception for a remote tests.

McCarthy: BAR can do pilots; it would be clean to get legislative change for widespread change.

McClintock: You could rebate out of registration fees to pay cost of ASM tests to level it out as the older population is declining.

Saito: But that would be an incentive to keep the vehicle going.

Joe Calhoun: We've known most of what I have heard today for a long time. Changes should be focused on getting rid of the gross emitter and most of those are older vehicles. Also I encourage you not to mandate a specific type of equipment, but simply mandate performance.

Gene Moroll, Shop Owner in Glendale. You have created a competition with the test only that has wrecked the program. You should go one way or the other. If you eliminate Test Only aborts and pretests, it would help. Or give it all to test only for initial testing and let us fix them.

Charlie Peters, representing a coalition of motorists. It has been a long boring day in my opinion, hearing the same sort of things we've heard for decades and not addressing the important issues in my opinion. I heard about driving around with check engine light for years and getting smog checks but not getting fixed. This gentleman has had tampered cars in the CAP program. We've never found out if what is broken on a car got fixed. That's not quite true. There's a gentleman here with a diamond in his ear that has the data. A lot of these cars just need a four-dollar filter. Audit the shops; ask them what they want to do. Change their behavior or they don't do business in California. The public deserves a better program than they are getting. But we only pay attention to the technology. The most effective technology is between the technicians' ears. People can do a much better job given the appropriate support. A little pilot study could prove it. Everybody here is paid by the government to make decisions for the public and the public is getting the shaft.

Lee Shook. Foundation for California Community Colleges, smog check program. We do the referee program and the pilot project for South Coast. We did a repair about a week ago and though it did pass the ASM test, it failed the TSI at idle. One difficulty with a program of this type is what happens when the car subsequently breaks down. The last person to repair the car gets the blame although something totally different is wrong with the car. Regarding the CAP program, there is a waiver procedure that is available only once.

Dean Saito. We are looking to see if it makes sense to do both TSI and ASM.

Concluding Remarks

Next Steps. The AQMD encourages a broader discussion of ideas generated in this forum. In particular, the California Inspection and Maintenance Review Committee will continue dialogue on these issues.

There was an area of unresolved disagreement regarding how much credit smog check takes in EMFAC for reducing failed vehicle emissions. This is related to the bigger issue of whether it is cost effective to repair or retire the worst polluting vehicles. There is also uncertainty about the efficiency of using remote sensing technology to identify candidates for repair and retirement. A number of issues were raised that should continue to receive attention in a statewide forum of affected parties such as the Vehicle Repair and Retirement Task Force suggested by the Clean Air Dialogue and embraced by the Cal-EPA and Department of Consumer Affairs last year.

The following questions were identified in the forum that deserve more attention:

1. What would be required to enable continuous remote monitoring of OBD systems on a voluntary basis?

2. Can OBD-only testing reduce the average cost and inconvenience of smog check to the consumer?
3. What is required to tighten readiness criteria for OBD testing? What other OBD requirements should be implemented in the short run to follow up on successes in other states?
4. How can the motorist be motivated to act on an “engine light on” signal? Is a fine for driving with check engine light on feasible and cost effective for reducing emissions?
5. Is it important to report odometer readings? If so, what’s the best way to get this done for vehicles not going through smog check?
6. There is a need to monitor closely the results of the South Coast pilot to identify high emitting vehicles on-road and offering incentives for their repair or retirement. What is the cost-effectiveness of this program compared with the SIP scrappage program as envisioned by ARB and BAR? Do these two programs complement or compete with each other?
8. Is there a cost-effective way to ensure that replacement vehicles in a scrappage program are replaced with 1998 or newer vehicles?
9. Can on-road RSD discourage tampering and illegal parts replacement, encourage registration and proper inspection and repair? Is there a way to measure these claimed benefits?
10. What are the causes for false passes and rapid retests in the Smog Check program?
11. What is the role of voluntary event based high emitter identification and repair programs like that implemented by Valley Clean Air Now?
12. How can we reward repair stations that do proper diagnostics and encourage thorough repairs?
13. The Smog Check Summit: what needs to be done to plan and execute a summit on the future of smog check?
12. What does the Two Speed Idle (TSI) test add to ASM smog check?
13. What air quality benefits are there for testing 4W/AW drive vehicles on dynamometer? What are the costs?
14. What research is needed on owners of high polluting vehicles to improve voluntary participation in vehicle retirement programs? Are ownership period requirements an unnecessary detriment to retirement?
15. Can we get a higher rate of retirement for 1980s vehicles, for example by linking registration fees to pollution levels so that owners are more motivated to retire the older models?

16. Should owners of passing vehicles tested by sanctioned shops be required to do a free retest at a referee station within 60 days to verify that vehicles are operating in compliance? Should such vehicles be issued a retest requirement within one year if the free retest requirement is not honored by the vehicle owner.