

TECHNICAL MEMORANDUM

**TRANSPORTATION CONFORMITY IMPLICATIONS OF EMISSION REDUCTION
SHORTFALLS FROM CALIFORNIA'S SMOG CHECK II PROGRAM**

UC Davis-Caltrans Air Quality Project
<http://AQP.engr.ucdavis.edu>

Task Order No. 12
UC Davis Contract No. 43A0014

January 6, 2000

Douglas Eisinger, Program Manager
U.C. Davis / Caltrans Air Quality Project

Tom Kear
U.C. Davis / Caltrans Air Quality Project

Dr. Deb Niemeier, Principal Investigator
Dept. of Civil and Env. Engineering
University of California
One Shields Ave.
Davis, CA 95616

Prepared for

The California Department of Transportation

Mike Brady, Air Quality Program Coordinator
Environmental Program, MS-27
1120 N Street
Sacramento, CA 94274
(916) 653-3738

Prepared in response to

A Caltrans request to help the transportation planning community assess and respond to an anticipated shortfall in Smog Check II emission reduction program benefits.

Transportation Conformity Implications Of Emission Reduction Shortfalls From California's Smog Check II program

Abstract:

California must submit to the U.S. EPA on February 8, 2000 a report detailing the effectiveness of the state's inspection and maintenance (IM) program, "Smog Check." Metropolitan areas with especially bad air quality problems have an "enhanced IM" program, while the remaining metropolitan areas have "basic IM." California's air quality state implementation plans (SIPs) rely in particular on the projected emission reduction benefits assumed for enhanced IM. Metropolitan Planning Organizations (MPOs) conducting conformity analyses assume that the IM program in their area is achieving the emission reduction benefits included in the area's SIP. Due to a variety of IM program implementation changes and problems, California's February 8, 2000 IM report to EPA will likely reveal that actual IM program emission reduction benefits are falling short of the assumed benefits included in the SIPs. The shortfall is likely focused on the enhanced I/M program. This shortfall will make conformity findings more difficult, and is likely to most negatively impact the Southern California Association of Governments (SCAG) and the Sacramento Area Council of Governments (SACOG). Due to the timing of regional transportation plan updates, this issue may cause conformity problems beginning July 2000 with the scheduled approval of SCAG's 2000 RTIP.

Overview:

California's 1994 Ozone SIP, approved by U.S. EPA on February 7, 1997, contains a requirement that California implement an enhanced IM program. The carbon monoxide SIP for the South Coast Air Quality Management District also relies on enhanced IM. California's enhanced IM program appears to have been less effective than what was assumed in the state's SIPs. California has a February 8, 2000 deadline to submit to the U.S. EPA a progress report on the state's IM program. The report needs to document how well California's IM program is performing, in comparison to the emissions reduction benefits projected for the program several years ago. It is widely expected that the report will find that the IM program has not yet performed as promised. At the same time, the state Air Resources Board (ARB) is likely to identify emission reduction benefits from other mobile source control programs that will partially offset the emission reductions shortfall created by the IM program's inadequacies.

The issue is important to MPOs and Caltrans since regional transportation plans (RTPs) and transportation improvement programs (TIPs) rely on committed mobile source programs to demonstrate conformity. Any shortfall in IM program benefits could potentially harm an MPO's ability to demonstrate conformity.

This memorandum summarizes:

- Which areas of California are affected by a potential shortfall in enhanced IM program benefits.
- The timeline for when an IM program shortfall affects conformity determinations.
- Conformity implications of an I/M program shortfall.
- Potential alternative program benefits to offset a shortfall.

Affected Areas:

Six MPO's are potentially affected: San Joaquin, Stanislaus, Fresno, Kern, SACOG, and SCAG. Of these, it is anticipated that SCAG and SACOG are the only regions with a critical reliance upon the emission reduction benefits from enhanced I/M. In both the SCAG and SACOG planning areas, practically any shortfall in program benefits that is not replaced by benefits from other measures may result in a loss of conformity. The SCAG region faces a significantly larger problem than does SACOG, and many of the potential sources of replacement emission reductions are not available to SCAG because the replacement credits have already been used in the South Coast to meet other air quality planning requirements.

For the San Joaquin Valley (SJV) to avoid problems (San Joaquin, Fresno, and Kern County MPOs), emission reductions equivalent to perhaps 30 to 50 percent of the enhanced I/M program benefits must be available. The SJV MPOs will likely be able to overcome an emissions benefit loss on the order of 30 to 50 percent.

A Region by region list of emission budgets and projected emissions (with and without enhanced I/M) is shown in attachment 2. [Note, although San Diego and the San Francisco Bay Areas are among the state's large metropolitan regions, neither relies on enhanced IM for their air quality SIPs.]

"SCAG (South Coast Air Basin)" includes all of Caltrans District 12, most of LA County in District 7, and the non-desert urban areas of District 8. "SACOG" area is the Sacramento Metro nonattainment area for ozone, including Sacramento and Yolo Counties, Placer and El Dorado Counties except the Tahoe Basin, and the southern portions of Yuba and Sutter Counties.

Timeline: When IM Program Shortfalls Affect Conformity

SCAG: July 2000 Conformity Milestone

Depending upon the severity of the IM program shortfall, conformity problems are likely to occur by July of 2000, when SCAG is scheduled to adopt their transportation improvement program (TIP) update.

Statewide: September 2000 Conformity Milestone

By September of 2000, all regions need to update their TIPs for the upcoming STIP cycle. It is anticipated that FHWA may not make conformity findings for any TIP that relies on enhanced I/M benefits. (SCAG will be the first to hit this problem, with anticipated SCAG board adoption of their TIP update in July.)

SACOG: Potential Lawsuit Could Trigger Earlier Conformity Problems

In July of 1999, SACOG's 1999-2022 RTP (known as the Metropolitan Transportation Plan) was adopted by the SACOG Board and approved by the Federal Highway Administration (FHWA) for conformity purposes. Subsequent to FHWA's approval action, an environmental organization in Sacramento (ECOS) issued a "notice of intent" (NOI) to sue SACOG and other government agencies (including Caltrans) over the approval of the Sacramento area RTP. The NOI cites the use of enhanced IM program benefits as the reason for the suit. Given the pending

lawsuit, FHWA is now considering whether to reverse its July 1999 conformity finding. Given that FHWA would most likely apply the same criteria to all of the MPOs that they eventually apply to SACOG, events statewide may be based on the actions taken in the SACOG region.

Conformity Implications of an I/M Program Shortfall:

Existing conformity determinations should not be affected by an IM program shortfall, with the possible exception of SACOG, if FHWA decides to reverse its conformity approval.

Future conformity determinations in the affected areas will be more difficult following February 8, 2000. After February 8, 2000 (when the state submits its IM program review to EPA), conformity analyses in the affected areas will need to assume enhanced IM program benefits consistent with the state's February 2000 program review. The conformity emission budgets in the affected areas will not change unless the SIP is amended and those changes are approved by EPA. Therefore, while the emission reduction goals will be held constant, projected emission reductions will decrease, to the extent that the IM program is falling short of its targets. This will be a particularly difficult problem for SCAG and SACOG. The attached table (Attachment 2) documents how each affected area's emissions budget relates to the IM program, and which areas are likely to experience problems meeting their emissions budgets in the future, if the IM program has a significant program shortfall. As documented in Attachment 2, SACOG and SCAG (South Coast portion) may not meet NOx (and ROG in SCAG) budgets without virtually all of the enhanced IM benefit for at least some analysis years. A more detailed analysis including allowance for partial IM credit and other emission reduction measures to compensate for shortfalls is needed and would be accomplished by SACOG and SCAG once more information from ARB is available.

SCAG's current conformity determinations are valid until at least September 30, 2000 (the expiration date of the TIP for funding purposes), and could possibly extend to June 9, 2001 (the conformity expiration for the RTP). If the RTP or TIP is amended in the meantime, however, FHWA may insist on a new conformity analysis incorporating IM credit revisions; inability to demonstrate conformity at that time would result in inability to approve the amendment, but should not harm the underlying program.

SACOG's RTP conformity determination (assuming no adverse effects due to the lawsuit) is valid for 3 years, or until 2002. Their TIP will expire in the Fall of 2000 for funding purposes, and a new conformity determination will be required at that time.

Potential solutions to this problem include:

1. Revise the SIPs in the affected areas, to provide alternative mobile source controls that make up the IM program emissions shortfalls.
2. Revise the SIPs to modify the mobile source emissions budgets.
3. Demonstrate that alternative mobile source controls are already in place (or will be in place) that will produce the same or greater emission reduction benefits as the enhanced IM program, on a schedule that keeps the region within its emissions budgets.

Under the transportation conformity rule, 93.104(e), any EPA approval of a SIP revision triggers an 18 month time period at the end of which conformity must be redetermined for all affected RTPs and TIPs. It is likely that California will initiate SIP revisions to avoid overall ozone SIP failures, and to help regions meet conformity timetables. EPA SIP review and approval actions would presumably be done on an accelerated basis, if possible. However, even on an accelerated schedule a SIP revision would likely take at least a year to accomplish. Conformity work done during the time SIP revisions are being prepared and are under consideration by EPA would continue to be subject to question based on the expected contents of the February 8, 2000 ARB report.

Potential Alternative Program Benefits to Offset a Shortfall

Potential emission reductions that CARB was considering in November of 1999 to help offset shortfalls in the enhanced I/M program are shown in Attachment 3. In summary, the reductions are:

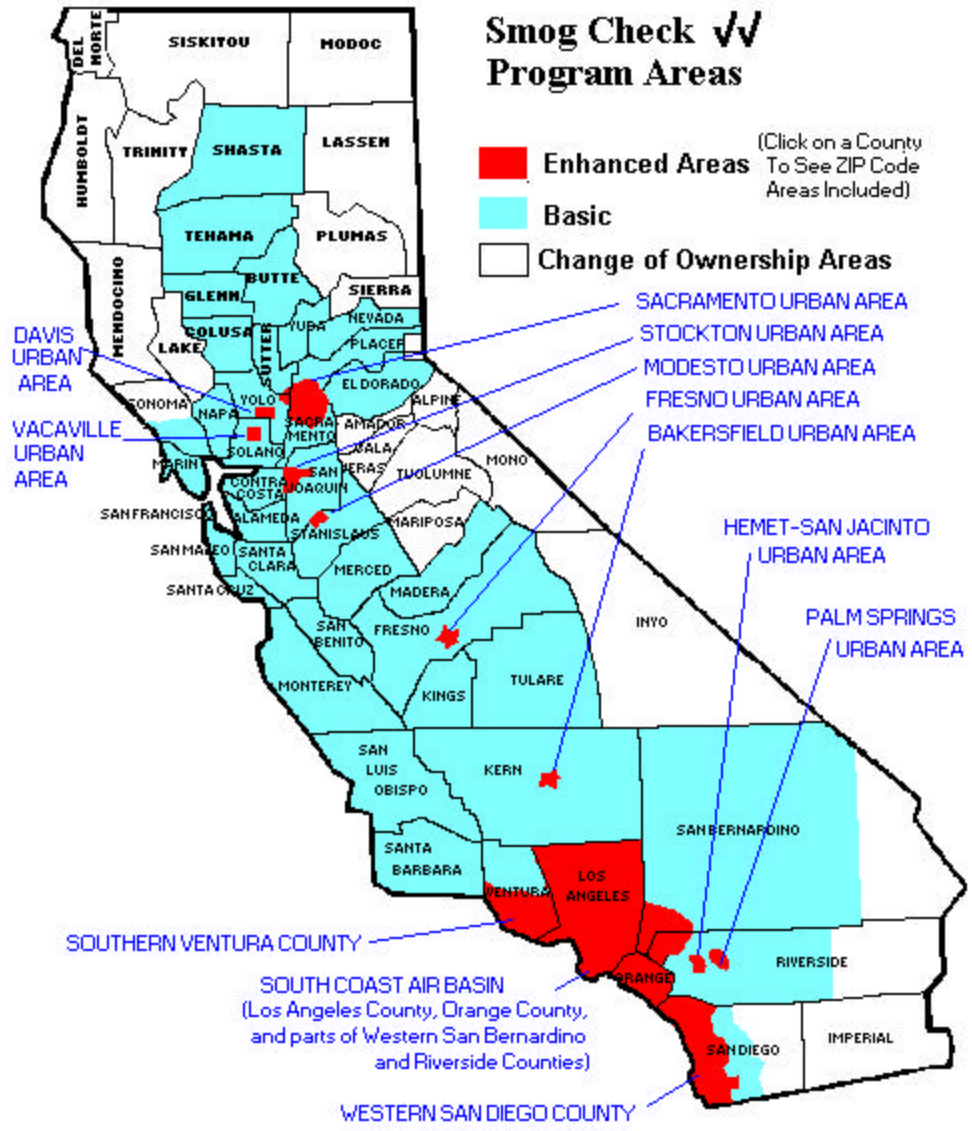
- Potential 5% reduction in year 1999 NO_x from gasoline-powered vehicles (5% of the gas-powered emissions, not the entire on-road inventory) (from combustion chamber deposit controls).
- Potential 4% reduction in year 1999 on-road VOC emissions (from recalculated reformulated gasoline benefits).
- Potential 1% reduction in year 2005 on-road ROG emissions (from better than expected certification emissions from new heavy duty diesel engines).

ARB will likely identify other program benefits that may be available to offset an IM program shortfall.

Acknowledgement

The authors received significant assistance from Mike Brady of the Caltrans Environmental Program. Mr. Brady contributed numerous helpful comments and edits.

**ATTACHMENT 1:
California Enhanced I/M Areas**



Source: Bureau of Automotive Repair.

**ATTACHMENT 2:
Region by Region Impacts**

Estimated Impact of California Enhanced I/M Program On Transportation Conformity

(Plan and RTP Emissions for MPOs in California Enhanced I/M Areas)

(EMFAC7f emissions, 1994 SIP Budgets, Enhanced I/M benefits estimated using data from the I/M review committee)

*** Projection Of Enhanced I/M Benefits Are Estimates Only. Actual Benefits Will Be Different ***

(Shaded Cells Show Conformity Problems When IM Benefits are Absent)

MPO/County (Ozone Attainment Year)		Tons / Day										
		2001	2002	2003	2005	2007	2008	2010	2015	2018	2020	2022
"Plan" = RTP/TIP												
San Joaquin (1999)	ROG Budget	14.16						14.16			14.16	
	ROG Plan	11.89						6.78			8.4	
	ROG w/o I/M	12.81						7.30			9.05	
	NOx Budget	30.01						30.01			30.01	
	NOx Plan	28.67						22.82			28.8	
	NOx w/o I/M	30.00						23.88			30.13	
Stanislaus (1999)	ROG Budget	10.29						10.29			10.29	
	ROG Plan	7.66						4.93			4.77	
	ROG w/o I/M	8.26						5.31			5.14	
	NOx Budget	19.43						19.43			19.43	
	NOx Plan	17.51						15.83			10.38	
	NOx w/o I/M	18.35						16.59			10.88	
Fresno (1999)	ROG Budget	19.18						19.18	19.18		19.18	
	ROG Plan	17.18						12.59	9.08		11.73	
	ROG w/o I/M	18.51						13.57	9.79		12.64	
	NOx Budget	34						34	34		34	
	NOx Plan	33.7						28.13	26		33.18	
	NOx w/o I/M	35.24						29.41	27.19		34.69	
Kern (1999)	ROG Budget			15.88				15.88			15.88	15.88
	ROG Plan			11.46				7.29			9.49	10.18
	ROG w/o I/M			12.54				7.97			10.38	11.14
	NOx Budget			26.21				26.21			26.21	26.21
	NOx Plan			21.85				17.65			23.45	25.6
	NOx w/o I/M			22.75				18.38			24.42	26.66
SACOG (2005)	ROG Budget		39.67		31.32				31.32			31.32
	ROG Plan		32.27		24.99				16.84			16.6
	ROG w/o I/M		37.39		29.14				19.64			19.36
	NOx Budget		70.25		61.35				61.35			61.35
	NOx Plan		69.37		59.68				52.21			55.53
	NOx w/o I/M		75.79		65.91				57.66			61.33

MPO/County (Ozone Attainment Year)		Tons / Day										
		2001	2002	2003	2005	2007	2008	2010	2015	2018	2020	2022
"Plan" = RTP/TIP												
SANDAG	ROG Budget	Note: The San Diego ozone SIP is not dependent upon enhanced IM benefits. (source: SANDAG staff).										
	ROG Plan											
	ROG w/o I/M											
	NOx Budget											
	NOx Plan											
	NOx w/o I/M											
SCAG (SCAB) (2010)	ROG Budget		214.2 1		157.8		111.4 9	49.21			49.21	
	ROG Plan		197.7 4		140.1 9		82.63	48.49			32.93	
	ROG w/o I/M		234.9 3		169.0 7		105.0 1	74.48			50.89	
	NOx Budget		437.0 2		364.1 8		313.4 4	253.5 7			253.5 7	
	NOx Plan		385.8 1		332.9 6		280.1 2	244.8 9			251.8 8	
	NOx w/o I/M		417.2 3		363.1 4		311.2 1	274.9 9			282.7 4	
SCAG (Ventura) (2005)	ROG Budget		12.47		9.82			9.82			9.82	
	ROG Plan		10.37		8.47			5.27			4.48	
	ROG w/o I/M		11.87		9.68			6.02			5.12	
	NOx Budget		24.36		21.33			21.33			21.33	
	NOx Plan		22.43		19.65			15.74			16.83	
	NOx w/o I/M		24.27		21.40			17.14			18.33	
SCAG (MDAB & SSAB) (2007)	ROG Budget		31.07		26.45	23.31		23.31			23.31	
	ROG Plan		23.22		19.96	17.52		14.46			13.32	
	ROG w/o I/M		25.29		22.07	19.37		15.99			14.73	
	NOx Budget		65.79		57.06	54.82		54.82			54.82	
	NOx Plan		47.81		41.75	40.26		36.99			44.83	
	NOx w/o I/M		49.70		43.65	42.10		38.68			46.87	

Notes:

- 1) Based on EMFAC7f v1.1 for consistency with the 1994 Ca. Ozone SIP. All Budget and Plan #'s are drawn from each areas SIP and RTP/TIP.
- 2) Enhanced I/M control factors are calculated as the ratio of enhanced I/M benefit (as claimed in the SIP) to the SIP's on-road emissions without the enhanced the I/M benefit.
- 3) I/M credit is calculated as the enhanced I/M control factor applied to the MPO's plan/RTP emission estimates.
- 4) I/M benefits projected beyond the legislated attainment dates are based on the attainment year's Enhanced I/M control factors
- 5) For the SCAB in 2010 and 2020, The black box was added back into the emissions budget for purpose of calculated the enhanced I/M control factor, and added to the plan/RTP emissions for estimating the I/M benefit.
- 6) SCAB 2020 EMFAC7f black box credit estimated as the 2010 black box SIP credit rolled back using the 1998 AQMP EMFAC7g black box credit for 2010 and 2020.

ATTACHMENT 3:
Potential Emission Reduction Credits to Offset IM Program Shortfalls

Program	Description	Implementation Date	Emission Benefits
Combustion chamber deposits (CCDs)	Requires deposit control additives in gasoline (provides a regulation to keep benefits already being achieved by existing RFG program)	<ul style="list-style-type: none"> 9/24/98, ARB updates regs to cap allowable combustion chamber deposits Ongoing since implementation of California RFG (phase II began in 1996) 	<p>NO_x: At least a 5% reduction in NO_x from gasoline-powered vehicles.</p> <p>Example: Sacramento on-road 1999 NO_x inventory is 51.24 tpd. Estimated benefit is 2.6 tpd (or greater)</p>
Reformulated gasoline	Oil refiners are using the “predictive model” to comply with the RFG mandate. ARB has recalculated benefits.	<ul style="list-style-type: none"> Ongoing since implementation of California RFG (phase II began in 1996) 	<p>VOC: 4% reduction in on-road VOC emissions in the year 1999. 31 tpd reduction statewide (year 2000)</p> <p>Example: Sacramento (with 8% of state’s VMT), equals 2 tpd in 1999</p>
Heavy duty diesel engine particulate emission standards	Engine makers have built engines that emit below the NMHC 0.4 g/bhp-hr standard. ARB documents that actual engine emissions are 0.25 g/bhp-hr.	<ul style="list-style-type: none"> For 1994 and later model years. 	<p>NMHC (or ROG): About a 1% reduction in year 2005 ROG emissions for on-road ROG</p> <p>Example: Sacramento has 0.2 to 0.3 tpd fewer ROG emissions in 1999, and 0.3 tpd fewer in 2005</p>

Summary:

1. Potential 5% reduction in year 1999 NO_x from gasoline-powered vehicles (5% of the gas-powered emissions, not the entire on-road inventory) (combustion chamber deposit controls).
2. Potential 4% reduction in year 1999 on-road VOC emissions (recalculated reformulated gasoline benefits).
3. Potential 1% reduction in year 2005 on-road ROG emissions (better than expected certification emissions from new heavy duty diesel engines).

Source: ARB staff paper dated 7/8/99: “Emission Reduction Benefits for Selected ARB Programs”