Additional Analysis Required Under the California Environmental Quality Act, the Administrative Procedures Act, and the Health & Safety Code

On December 30, 2014, CARB circulated for public review an Initial Statement of Reasons (the "ISOR") and an Environmental Analysis ("EA") for CARB's proposed Regulation on the Commercialization of Alternative Diesel Fuels (the "ADF regulation"). Following a February 19, 2015, public hearing on the ADF regulation, the Board directed staff to consider modifications to the ADF regulation, and respond to environmental comments.

CARB released proposed modifications to the ADF regulation through its May 22, 2015, Notice of Public Availability of Modified Text and Availability of Additional Documents (the "15-Day Notice"). According to the 15-Day Notice, the proposed modifications include, among other things, changes to the baselines used for multimedia evaluations, a requirement that environmental risk be evaluated by CARB staff for the pilot program, and an exemption for producers or importers allowing sales of B6 to B20 in areas other than the South Coast or San Joaquin Air basins. The 15-Day Notice does not provide any analysis of these impacts, or evidentiary support, but instead finds they "do not change the significance determinations in the draft Environmental Analysis that was prepared for the proposed ADF and proposed LCFS regulations, and previously circulated for public comment." (*Id.* at 11.)

As a result of these, and other, defects, Growth Energy submits the following comments on the proposed modifications to the ADF regulation under the California Environmental Quality Act, the California Administrative Procedures Act, and the Health & Safety Code.

A. The Information Provided By CARB Is Insufficient to Analyze The Modifications Reflected in the 15-Day Notice

1. The Analyses Supporting the Conclusions Stated in the 15-Day Notice Have Not Been Disclosed, in Violation of CEQA

An EIR – or its functional equivalent, like the EA here – should "include detail sufficient to enable those who did not participate in its preparation to understand and to consider meaningfully the issues raised by the proposed project." (*Laurel Heights Improvement Ass'n v. Regents of Univ. of Calif.* (1988) 47 Cal.3d 376, 405.) CARB is required to make a good faith attempt to find out and disclose all that it reasonably can. (See, e.g., *Vineyard Area Citizens for Responsible Growth v. City of Rancho Cordova* (2007) 40 Cal.4th 412, 428; *Berkeley Keep Jets Over the Bay Comm. v. Bd. of Port Comm'rs* (2001) 91 Cal.App.4th 1344; *Citizens for Preserve the Ojai v. County of Ventura* (1985) 176 Cal.App.3d 421, 431.)

Further, an unsubstantiated conclusion that an impact is not significant, without supporting information or explanatory analysis, is insufficient; the reasoning supporting the determination of insignificance must be disclosed. (*City of Maywood v. Los Angeles Unified School District* (2012) 208 Cal.App.4th 362, 393; *Protect the Historic Amador Waterways v. Amador Water Agency* (2004) 116 Cal.App.4th 1099, 1111; *Citizens to Preserve the Ojai v. County of Ventura* (1985) 176 Cal.App.3d 421, 432.)

CARB violated CEQA by failing to provide this information. The Notice of Public Availability of Modified Text and Availability of Additional Documents (the "15-Day Notice") reveals that the proposed modifications to the ADF regulation (specifically, the producer/exporter exemption) would create "additional air quality impacts," (15-Day Notice at 5), including "NOx increases from biodiesel . . . ." (*Id.* at 11.) The 15-Day Notice also reveals that CARB staff "reduced the total [renewable diesel] volume expected to provide NOx emissions reductions" due to inaccurate assumptions made in the ISOR. (*Id.* at 12.) Despite these admissions, the 15-Day Notice states, "Staff has determined that the combined effects of [the proposed] changes do not change the significance determinations in the draft Environmental Analysis that was prepared for the proposed ADF and proposed LCFS regulations, and previously circulated for public comment." (*Id.* at 11.)

The 15-Day Notice, however, provides no information showing how CARB reached its conclusions regarding the NOx impacts of the proposed modifications, and in particular its bare conclusion that the modifications would not "change the significance determinations" in the draft EA. Nor is there any information showing how CARB quantified the admitted increases in NOx. There is also no information as to what diesel sources are included in CARB's emissions "inventory." As explained in an accompanying declaration prepared by an expert with relevant knowledge of the issues on which the 15-Day Notice touches, due CARB's failure to "provide [such] detailed information," "it was not possible . . . to review the data and assumptions used by CARB," nor was the expert able "to reach a conclusion about the accuracy of the analysis that was purported to have been performed or the conclusions drawn from the analysis by CARB." (Declaration of Lyons ["Decl. Lyons"] ¶ 7.) Because CARB staff has not provided information necessary to evaluate the conclusions in the 15-Day Notice, the EA should be revised and updated to provide this fundamental information, and recirculated for public review and comment.

2. The Rulemaking File Continues to Be Incomplete, Frustrating the Public's Attempts to Review CARB's Conclusions

In its comments on the ISOR and the EA for the ADF regulation, Growth Energy informed CARB that it was unable to perform a complete evaluation of the ADF regulation because important information was not included in the rulemaking file.

For example, CARB failed to include the materials required under AB 1085 in the rulemaking file, including information relating to air emissions, health impacts, and economic impacts. An example of a CARB rulemaking that contains this information is

located at http://www.arb.ca.gov/msprog/ordiesel/offroad_1085.htm. This information continues to be absent from the rulemaking file.

Because a multimedia evaluation was required as part of the instant rulemaking, the rulemaking file must also include all documents associated with the multimedia evaluation, which have not been made available to the public. Because the multimedia evaluation presumably relies upon some – albeit unspecified – information, the information forming the basis of the conclusions in the evaluation necessarily includes "data and factual information . . . on which the agency is relying." (Govt. Code, § 11347.3, subd. (b)(7).) Further, because CARB is legally required to prepare a multimedia evaluation, the information underlying the analysis in the multimedia evaluation constitutes "information, statement[s], report[s], or data that the agency is required by law to consider or prepare in connection with . . . a regulation." (*Id.*, subd. (b)(11).)

There is likewise no information in the rulemaking file sufficient to explain how CARB staff reached the conclusion that the proposed modifications "do not change the significance determinations in the draft Environmental Analysis that was prepared for the proposed ADF and proposed LCFS regulations, and previously circulated for public comment." (15-Day Notice at 11.) Plainly, such information includes at the very least "data and factual information . . . on which the agency is relying," (Govt. Code, subd. (b)(7)), or the "information, statement, report, or data that the agency is required by law to consider or prepare in connection with . . . a regulation." (*Id.*, subd. (b)(11).)

Because the rulemaking file does not contain all necessary information, CARB has violated Section 11347.3 of the Government Code.[1]

3. CARB's Interpretation of Section 11347.3, Subdivisions (b)(6), (b)(7), and (b)(11) Is Too Narrow

CARB also appears to assert that, to satisfy Section 11347.3, Subdivisions (b)(6), (b)(7), and (b)(11) of the Government Code, CARB need only include in the rulemaking file the four documents specifically mentioned in Paragraph 5 of the Peremptory Writ of Mandate issued in the matter of *POET, LLC v. California Air Resources Board, et al.*, Fresno County Superior Court, Case No. 09-CECG-04659. That is not accurate. Section 11347.4, subdivision (b)(6) requires CARB to include "[a]ll data and other factual information, any studies or reports, and written comments submitted to the agency in connection with the adoption, amendment, or repeal of the regulation." (Govt. Code § 11347.3, subd. (b)(6).) Likewise, subdivision (b)(7) requires the include of "[a]ll data and factual information . . . on which the agency is relying . . . ." (*Id.*, subd. (b)(7).) Further, Subdvision (b)(11) requires the inclusion of "[a]ny other information,

[1] Growth Energy notes that the 15-Day Notice for the Low Carbon Fuel Standard released on June 4, 2015, at page 12 references several documents to be included in the rulemaking file that was submitted to CARB by its consultants. It is implausible that similar documents somehow do not exist relating to the 15-Day Notice for the ADF regulation.

statement, report, or data that the agency is required by law to consider or prepare in connection with . . . a regulation." (*Id.*, subd. (b)(11).)

All information required under Subdivisions (b)(6), (b)(7), and (b)(11) must be included, not just the four documents specifically identified in the Peremptory Writ of Mandate.

B. The 15-Day Review Period Provides Insufficient Time for Commenting Parties to Evaluate the Modifications to the Proposed ADF Regulation; CARB Should Recirculate the EA

Fifteen calendar days provides insufficient time for the public to review CARB's modifications to the ADF regulation for several reasons.

First, the 15-Day Notice not only includes substantial modifications to the ADF regulation, but also extensive Multimedia Evaluations for both Biodiesel and Renewable Diesel. These documents total several hundreds of pages, much of which is highly technical data. This review is also being conducted concurrently with the 15-day notice for the related LCFS regulation, with its own short comment period. Fifteen days is insufficient for technical experts with relevant knowledge of the subject matter of the ADF regulation and the 15-Day Notice; certainly, a member of the public with no technical or legal background could not meaningfully be asked to provide comments on CARB's modifications within the timeframe allotted.

The prejudice caused by the short review period provided in the 15-Day Notice is exacerbated by the fact that many of the conclusions in the 15-Day Notice regarding the ***recognized*** environmental effects of the ADF regulation have been provided without supporting information or documentation, as explained above. In addition to the fact that the failure to include this analysis violates CEQA, (see *supra*, § A(1)), the failure to include this information makes it nearly impossible to even attempt to reconstruct CARB's analysis within the short amount of time provided.

C. The EA Should Be Revised to Evaluate Potential Increases in NOx Emissions, and Recirculated

CARB should recirculate the EA to provide the public sufficient opportunity to evaluate the new impacts associated with the proposed modifications, as well as significant new information showing the ADF regulation will have greater impacts than previously disclosed.

The 15-Day Notice includes a new exemption for the use of B6 to B20 fuels in older heavy-duty vehicles under Section 2293.6(a)(5)(C) of the ADF regulation. (15-Day Notice at 5.) These fuels, however, generally result in greater NOx emissions, which will increase the negative air quality impacts of the ADF regulations,, as CARB itself concedes. (See 15-Day Notice at 5 [noting the addition of an exemption for certain B6 to B20 sales "could result in additional air quality impacts . . . ."].) The exemption could also create localized increases in NOx emissions outside of the South Coast Air Basin or San

Joaquin Valley Air Basin. "Although the South Coast and San Joaquin Valley Air Basins experience the highest ozone levels in the state, there are many other areas in non-attainment of the federal and state standards where increased NOx emissions could create adverse impacts on air quality." (Decl. Lyons ¶ 8; see also *id.* ¶ 9 [showing estimated statement emissions in Table 1 of the 15-Day Notice [0.95 tons per day] is far greater than threshold of significance used by the Sacramento Metropolitan Air Quality Management District [0.0325 tons per day]].) These impacts are not analyzed in either the 15-Day Notice or the EA.

In addition, the new exemptions were not outlined or suggested in any way in the notice of proposed rulemaking and its supporting materials published in December. Because these changes were neither "nonsubstantial" nor sufficiently related to the original notice, they cannot be adopted by way of a 15-day notice. (Govt. Code § 11346.8, subd. (c); 1 Cal. Code Regs. § 40, 42; see also Decl. Lyons ¶ 6.) This completely unexpected change in the proposed ADF regulation is a substantial nonconformity with the requirements of the Administrative Procedure Act and is prejudicial, given its potential impact on the environmental impacts of the ADF regulation.

The 15-Day Notice also reveals increases in previously disclosed impacts. For example, the 15-Day Notice states that biodiesel adaptation will be lower than previously estimated, resulting in increased NOx impacts from biodiesel, and smaller statewide reductions of NOx compared to the original regulation. (See 15-Day Notice at 12.)

Further, a review of the Multimedia Evaluation discloses numerous material inconsistencies between that document and the EA, all of which call into question both the adequacy of CARB's analysis, and the integrity of CARB staff's conclusion that the ADR regulation (either as originally proposed or as modified) will not result in significant increases in NOx emissions. For example, the Multimedia Analysis does not include material information (that *was* included with the ISOR) that tended to suggest a link between the ADF and increased NOx emissions, and the ISOR and the Multimedia Evaluation use different baselines for the analysis of biodiesel [the ISOR assumes 65 million gallons of existing usage, while the Multimedia Evaluation assumes no biodiesel usage].

For example, the Multimedia Evaluation omits a finding that "NOx emission increases due to soy biodiesel are statistically significant"; the increases, expressed in tons per day, in NOx emissions due to the ADF shown in Tables 7.1 and B-1 of the ISOR; the Supplemental Statistical Analysis presented in Appendix G of the ISOR; peer review papers contradicting CARB's claims regarding the impact of biodiesel on NOx emissions from NTDEs; and documents presented during the public review process that contradict CARB's findings. (Decl. Lyons ¶¶ 15-16.)

In addition, because of these discrepancies, the findings in the EA – including the finding that the proposed ADF regulation will not result in significant impacts to the environment – are not supported by substantial, credible evidence. (See, e.g., *Preserve Wild Santee v. City of Santee* (2012) 210 Cal.App.4th 260, 283-84 [finding that

unexplained discrepancy precluded the existence of substantial evidence of adequate water supply] [citing *Vineyard Area Citizens for Responsible Growth, Inc. v. City of Rancho Cordova* (2007) 40 Cal.4th 412, 439].)

Plainly, new information has been disclosed that effects the conclusions in the EA. Among other things, the 15-Day Notice reveals a substantial increase in the severity of environmental impact (*i.e.*, NOx emissions). No mitigation has been adopted to reduce this impact to a less-than-significant level. Further, the fact that the 15-Day Notice contains no information to support CARB's conclusions demonstrates CARB's analysis is so fundamentally and basically inadequate and conclusory in nature that public comment on these issues is essentially meaningless. (See *Laurel Heights Improvement Ass'n v. Regents of Univ. of Calif.* (1993) 6 Cal.4th 1112, 1130; *cf.* CEQA Guidelines, § 15088.5(a).)

Despite this, the EA was not modified or recirculated for public review. CARB cannot comply with CEQA unless it updates the analysis in the EA, and recirculates the revised EA for a full 45-day public review, to which the staff must respond and which the Board must consider prior to any regulatory approval.

D. CARB Should Revise its Pilot Program to Ensure the Potential Environmental Effects of New Fuels Will Be Properly Evaluated

The ADF regulation contemplates that proposed alternative diesel fuels, other than biodiesel, will be introduced through a pilot program, and evaluation by CARB staff, prior to the entry of the fuel into the market.

In the 15-Day Notice, CARB has modified the pilot program to, among other things, add "significant adverse environmental impacts as a reason for disapproving a proposed pilot program." (15-Day Notice at 3.) This modification raises several concerns:

1. The Proposed Modifications Impermissibly Allow CARB to Defer Analysis and Mitigation of Environmental Effects

Except under unusual circumstances not present here, CEQA prohibits an agency from deferring analysis of environmental impacts and mitigation. "CEQA contemplates consideration of environmental consequences at the 'earliest possible stage,'" (*Rio Vista Farm Bureau v. County of Solano* (1992) 5 Cal.App.4th 351, 370 [quoting *Leonoff v. Monterey County Bd. of Supers.* (1990) 222 Cal.App.3d 1337, 1346]), and the "requirements of CEQA cannot be avoided by piecemeal review which results from chopping a large project into many little ones—each with a minimal potential impact on the environment—which cumulatively may have disastrous consequences." (*EPIC v. Dept. of Forestry & Fire Prot.* (2008) 44 Cal.4th 459, 503.)

An agency likewise may not defer mitigation, which "occurs when an EIR" or functional equivalent "puts off analysis or orders a report without either setting standards or demonstrating how the impact can be mitigated in the manner described in the"

environmental document. (*City of Long Beach, supra*, 176 Cal.App.4th at 915.) Thus, a mitigation measure that merely calls for a mitigation plan to be devised based on future studies or analysis is legally inadequate if it does not include performance standards that would mitigate the significant impact. (*Comms. for a Better Env., supra*, 184 Cal.App.4th at 95; *Endangered Habitats, supra*, 131 Cal.App.4th at 794 [rejecting mitigation requiring submission of acoustical analysis and approval of mitigation measures recommended by analysis because no mitigation criteria or potential mitigation measures were identified].)

In this case, CARB is essentially seeking to defer analysis of the environmental impacts of a candidate ADF to a later date. If the candidate ADF has such impacts, ARB staff is able to "consider the effects of offsetting factors," and adopt "conditions of use." In other words, instead of analyzing the full impacts of fuels that are alternatives to diesel fuels on the front end, CARB is allowing the Executive Officer, without performance standards, to both analyze potential impacts of candidate ADFs and consider mitigation (*i.e.*, "offsetting factors" and "conditions of use"). CARB cannot defer analysis of alternative diesels in this manner, and must instead provide the Executive Officer with reasonable performance standards to govern the review of new candidate ADFs.

2. The Proposed Modification Constitutes Impermissible Piecemealing of Environmental Review

The "requirements of CEQA cannot be avoided by piecemeal review which results from chopping a large project into many little ones—each with a minimal potential impact on the environment—which cumulatively may have disastrous consequences." (*Envt'l Prot. Info. Ctr. v. Calif. Dept. of Forestry & Fire Prot.* (2008) 44 Cal.4th 459, 503.) CEQA, therefore, "forbids 'piecemeal' review of the significant environmental impacts of a project." (*Berkeley Keep Jets Over the Bay Comm. v. Bd. of Port Comm'rs* (2011) 91 Cal.App.4th 1344, 1358.) Rather, when a lead agency undertakes the environmental review process, the lead agency must review and consider the "*whole* of the action," (CEQA Guidelines, § 15378 [emphasis added]), and consider "the effects, both individual and *collective*, of all activities involved in [the] project." (Pub. Resources Code, § 21002.1, subd. (d).) It is only through a complete and accurate "view of the project may affected outsiders and public decision-makers balance the proposal's benefit against its environmental cost, consider mitigation measures, assess the advantage of terminating the proposal . . . and weigh other alternatives in the balance." (*Berkeley Keep Jets, supra*, 91 Cal.App.4th at 1358.)

As explained above, the Executive Officer will be reviewing the environmental impacts of candidate ADFs as applications are filed, without the benefit of performance standards or other criteria for the review. In other words, the impacts of the individual candidate ADFs will be reviewed on a case-by-case basis. While the individual impacts of such candidate ADFs may not be significant standing alone, the effects of such candidate ADFs in the *aggregate* may be significant. CARB should be required to analyze candidate ADFs as a whole, and provide the Executive Officer with performance standards to ensure a significant increase in NOx emissions will not occur.

3. The Proposed Modifications Constitute an Impermissible *Post Hoc* Environmental Review that CARB May Not Delegate to the Executive Officer

CEQA prohibits the delegation of important functions, including review and consideration of an EIR or its equivalent, to a person or entity ***other than*** the body with final decision making authority over the project. (CEQA Guidelines, § 15025.) Thus, the decision-making body with final authority over project approval must also be the entity that certifies the EIR or functional equivalent. (*Sundstrom v. County of Mendocino* (1988) 202 Cal.App.3d 296, 307 [holding that board of supervisors with decision-making approval over the project "cannot delegate the responsibility" to certify the EIR "to the staff of the planning commission"]; *Kleist, supra,* 56 Cal.App.3d at 772, 779 [invalidating EIR where city council that approved the project delegated certification of the related EIR to planning board created by city ordinance]; *El Morro Community Assoc. v. Dept. Parks & Recr.* (2004) 122 Cal.App.4th 1341, 1350-51 [explaining that *Sundstrom* and *Kleist* "hold the decision maker may not delegate CEQA approval to a non-decision maker," but distinguishing those cases because "Deputy Director" who certified the EIR was also "designee to approve the project"].) The reason is clear: the environmental review document "cannot serve its informational function unless it is reviewed and considered by the governmental body which takes action having an effect upon the environment." (*Kleist, supra,* 56 Cal.App.3d at 779; see also *POET, LLC v. Calif. Air Resources Board* (2013) 217 Cal.App.4th 1214.)

Here, the Executive Officer intends to review future candidate ADFs, and determine whether those candidate ADFs will have negative environmental effects. While CARB may not be required to speculate regarding the specific characteristics of any particular fuel, as the ISOR (and the comments submitted by Growth Energy and others) itself reveals, CARB *can* evaluate the potential effects of such fuels at a general level, and adopt performance standards (*i.e.*, no increase in NOx emissions) to help govern the subsequent environmental review. By waiting until *after* the ADF regulation is approved to review even generalized effects without establishing performance standards, however, CARB is impermissibly delegating the environmental review processes to a non-decisionmaker, and allowing the environmental review to occur *after* project approval. This procedure violates CEQA.

E. CARB's Analysis of the Air Quality Impacts of the Proposed ADF Regulation Impermissibly Contemplates the Use of Different Baselines for Biodiesels and Other Alternative Diesel Fuels

Neither CARB's 15-Notice nor the "Updated ADF NOx Analysis" presented in Table 1 of the notice address one of the primary flaws in CARB's environmental analysis. Specifically, CARB has used "a baseline for determining the significance of increased NOx emissions from biodiesel use where 65 million gallons of biodiesel are already in-use to conclude" the ADF regulation will not have a significant impact on the environment. (Decl. Lyons ¶ 11; see also ISOR at 47 ["The net impacts of the proposal reduce NOx impacts from biodiesel, even assuming increased biodiesel

volumes over the subsequent years. Estimated impacts under the proposal are less than the baseline (current year) and will continue to decrease as NTDE use increases in California."].)

For fuels other than biodiesel, however, both the ISOR and the 15-Day Notice use a baseline that assumes the ADF regulation does not exist. (Decl. Lyons ¶ 11.)

CARB cannot evaluate the impacts of biodiesel and other alternative diesels on different playing fields by providing different environmental baselines. (See, e.g., *Woodward Park Homeowners Ass'n, Inc. v. City of Fresno* (2007) 150 Cal.App.4th 683, 707-10.) This is particularly true here, where a later baseline would obscure the impacts of biodiesel (a significant source of increased NOx emissions).

In short, all alternative diesels should be evaluated under the same rules, and using the same environmental baseline. Without this even playing field, the proposed modifications violate CEQA.

F. CARB Violated Section 57004 of the Health & Safety Code By Failing to Conduct a Peer Review of the ADF Regulation

Section 57004 of the Health & Safety Code provides that CARB shall not "take any action to adopt the final version of a rule unless" it undertakes a peer review to evaluate the scientific basis for the rule. (Health & Safety Code, § 57004(d).) That section requires: (1) that CARB "submit[] the scientific portions of the proposed rule, along with a statement of the scientific findings, conclusions, and assumptions on which the scientific portions of the proposed rule are based and the supporting scientific data, studies, and other appropriate materials, to the external scientific peer review entity for its evaluation," and (2) the peer reviewer "prepares a written report that contains an evaluation of the scientific basis of the proposed rule." (*Id.*)

CARB violated Section 57004 because it did not engage any expert to undertake a peer review of the ADF regulation. While CARB apparently takes the position that it retained peer reviewers for the Multimedia Evaluations on the two fuels, that is not sufficient, as those Multimedia Evaluations relate to the fuels, and not the ADF regulation. They are likewise not the type of peer review contemplated for the enactment of a regulation under Section 57004.

Further, many aspects of the ADF regulation would benefit greatly from the inclusion of comments from an independent peer reviewer. For example, one highly controversial issue associated with the ADF regulation is the fact that NOx increases still occur below B5, as explained in the analysis submitted by Robert Crawford on behalf of Growth Energy.

Another significant issue is the data indicating the ADF regulation would cause large increases in NOx emissions due to NTDEs associated with increased biodiesel usage. Despite these contested issue, there is no peer review on either point.

Because CARB did not conduct ***any*** peer review of the "scientific basis" for the ADF regulation – let alone a peer review of the more controversial scientific issues raised by the public – CARB has failed to comply with Section 57004 of the Health & Safety Code.

These failures can and should be readily corrected in short order. CARB need only postpone the currently rulemaking process by 60-90 days, which should not jeopardize its intended effective date for the proposed ADF regulation. If CARB does not engage in this process, it will constitute a prejudicial abuse of discretion.

STATE OF CALIFORNIA

BEFORE THE AIR RESOURCES BOARD

Declaration of James M. Lyons

I, James Michael Lyons, declare as follows:

1. I make this Declaration based upon my own personal knowledge and my familiarity with the matters recited herein. It is based on my experience of nearly 30 years as a regulator, consultant, and professional in the field of emissions and air pollution control. A copy of my résumé can be found in Attachment A.

2. I am a Senior Partner of Sierra Research, Inc., an environmental consulting firm located at 1801 J Street, Sacramento, California owned by Trinity Consultants, Inc. Sierra specializes in research and regulatory matters pertaining to air pollution control, and does work for both governmental and private industry clients. I have been employed at Sierra Research since 1991. I received a B.S. degree in Chemistry from the University of California, Irvine, and a M.S. Degree in Chemical Engineering from the University of California, Los Angeles. Before joining Sierra in 1991, I was employed by the State of California at the Mobile Source Division of the California Air Resources Board (CARB).

3. During my career, I have worked on many projects related to the following areas: 1) the assessment of emissions from on- and non-road mobile sources, 2) assessment of the impacts of changes in fuel composition and alternative fuels on engine emissions including emissions of green-house gases, 3) analyses of the unintended consequences of regulatory actions, and 4) the feasibility of compliance with air quality regulations.

4. I have testified as an expert under state and federal court rules in cases involving CARB regulations for gasoline, Stage II vapor recovery systems and their design, factors affecting emissions from diesel vehicles, evaporative emission control system design and function, as well as combustion chamber system design. While at Sierra I have acted as a consultant on automobile air pollution control matters for CARB and for the United States Environmental Protection Agency. I am a member of the American Chemical Society and the Society of Automotive Engineers and have co-authored nine peer-reviewed monographs concerned with automotive emissions, including greenhouse gases and their control. In addition, over the course of my career, I have conducted peer-reviews of numerous papers related to a wide variety of issues associated with pollutant emissions and air quality.

5. This Declaration summarizes the results of my review of the CARB Notice of Public Availability of Modified Text and Availability of Additional Documents for the Proposed Regulation on the Commercialization of Alternative Diesel Fuels (the ADF Regulation) dated May 22, 2015, and the California Environmental Protection Agency's Staff Report, Multi-Media Evaluation of Biodiesel, Prepared by the Multimedia Working

Group and dated May 2015, which has been added by CARB to the ADF rulemaking file. I have performed this critical review as an independent expert for Growth Energy. If called upon to do so, I would testify in accord with the facts and opinions presented here.

6. Based on my review of the changes proposed to the ADF regulation by CARB, the new exemption from mitigation requirements for B6 to B20 fuels provided through Section 2293(a)(5)(C) creates the potential for significant increases in NOx emissions from vehicles operating in areas outside the South Coast or San Joaquin Valley Air Basins. I have participated in every aspect of the development of the ADF regulation in which a member of the public was allowed by CARB to participate. The new exemption could not reasonably have been anticipated, based on the notice of proposed rulemaking and the supporting materials made available in December 2014.

7. CARB staff agrees on page 11 of the notice that the new exemption could result in increased NOx emissions. However, CARB staff claims on pages 11 to 13 of the notice that the agency has conducted "additional analysis" of NOx emissions related to a number of new issues, including the new exemption that will be added to the ADF Regulation record, and concluded that the overall impact of the ADF regulation on NOx emissions will be smaller than it originally estimated. Unfortunately, CARB has failed to provide the detailed information required for public review and comment. As a result, it was not possible for me to review the data and assumptions used by CARB staff, nor to reach a conclusion about the accuracy of the analysis that was purported to have been performed or the conclusions drawn from the analysis by CARB.

8. The notice claims, based on undisclosed "additional analysis," that increased emissions due to the new exemption will be mitigated on a statewide basis averaged over an entire year. Even assuming the "additional analysis" is correct, higher NOx emissions could occur due to the new exemption in areas outside the South Coast or San Joaquin Valley Air Basins which are not in attainment with federal and state ambient air quality standards for ozone. Although the South Coast and San Joaquin Valley Air Basins experience the highest ozone levels in the state, there are many other areas in non-attainment of the federal[1] and state[2] standards where increased NOx emissions could create adverse impacts on air quality.

9. CARB should be required to provide the necessary data to perform a careful assessment. Increased NOx emissions resulting from the new exemption could potentially be significant. This can be seen through a comparison of the criteria used to assess air quality impacts in areas of California outside the South Coast and San Joaquin Air Basins and the increases in NOx emissions estimated to result from biodiesel use. Using the Sacramento Metropolitan Air Quality Management District as an example,[3] the significance threshold for NOx emissions projects subject to CEQA is 65 pounds per day

[1] See http://www.arb.ca.gov/desig/adm/2013/fed_o3.pdf
[2] See http://www.arb.ca.gov/desig/adm/2013/state_o3.pdf
[3] See http://airquality.org/ceqa/ceqaguideupdate.shtml

or 0.0325 tons per day. Using the data in the row labeled "Emission Inventory (Diesel TPD)" in Table 1 of the CARB Notice, 0.0325 tons per day can be compared to both the 0.95 ton per day estimate for 2016 statewide increases in NOx due to the ADF regulation in Table 1 of the notice, and also the difference between that value and the 1.27 ton per day value that was CARB's original estimate. Clearly, if the new exemption results in the use of even a small amount of biodiesel in the Sacramento area without mitigation, the increase in NOx emissions could be significant. Further, similar situations where significant increases in NOx emissions occur in other ozone non-attainment areas outside of the South Coast and San Joaquin Air Basins can be expected.

10. The only way to ensure that increased NOx emissions due to the new exemption would not potentially lead to adverse air quality impacts in areas where it is allowed, and thus mitigate impacts to NOx caused by the exemption, would be to require that appropriate amounts of renewable diesel biodiesel are used in the same location and at the same time as the biodiesel provided for under the new exemption. The only way to ensure this would happen would be to require blending of renewable diesel into the biodiesel blends allowed under the new exemption. There is no such requirement in the ADF regulation.

11. Another major problem with CARB's "Updated ADF NOx Analysis" presented in Table 1 of the Notice is that CARB has failed to address a key flaw in its analysis of the adverse environmental impacts of biodiesel. This flaw relates to using a baseline for determining the significance of increased NOx emissions from biodiesel use where 65 million gallons of biodiesel are already in-use to conclude, as stated on page 47 of the Initial Statement of Reasons for the ADF regulation, that:

> *The net impacts of the proposal reduce NOx impacts from biodiesel, even assuming increased biodiesel volumes over the subsequent years. Estimated impacts under the proposal are less than the baseline (current year) and will continue to decrease as NTDE use increases in California.*

The correct baseline that is used everywhere else in the ISOR, as well as in the Multi-Media Evaluation and by the Peer Reviewers of that evaluation, is CARB diesel fuel containing **no** biodiesel. Given that the purpose of the ADF regulation is to establish specifications for fuels like biodiesel while identifying and ensuring mitigation of adverse environmental impacts, the no biodiesel baseline is clearly the correct baseline. Based on CARB's own "Updated ADF NOx Analysis," use of this baseline shows unmitigated NOx increases of about one ton per day statewide in California in 2015, 2016, and 2017, and at lower levels through 2020, despite its flaws. Further, as shown in my previous declaration, submitted to CARB prior to the ADF and LCFS public hearings in February 2015, the likely increases in NOx emissions are much larger and can be expected to continue indefinitely into the future.

When viewed in the context of the proper baseline, the data presented in Table 1 of the notice show that the proposed ADF regulation, even after CARB's update of its analysis, fails to mitigate increased NOx emissions due to biodiesel use. That CARB has erred in

establishing the baseline for analysis of biodiesel NOx impacts is support by the ADF regulation itself, as sections 2293.5(a)(3)(C), 2293.5(b)(3)(C), 2293.5(b)(5)(B), 2293.5(b)(5)(D), and 2293.5(b)(6)(B), make it clear that increased emissions from an ADF will not be included in baseline. Rather, the baseline required to be used has to reflect conditions in place before the use of the ADF.

12. Notwithstanding the above, CARB's "additional analysis" is also fatally flawed for all of the other reasons set forth in my previous declaration and its attachments dated February 17th 2015, which was filed as part of Growth Energy's comments during the original 45 day comment period on the ADF regulation.

13. Turning to the Staff Report on the Multimedia Evaluation of Biodiesel that has only recently become available for public comment and is now being included in the ADF regulation record, I have reviewed the air quality assessment that is reported to have been prepared by CARB staff, and have found it to be both inconsistent with the analysis presented in the ADF ISOR as well as fatally flawed in that it fails to consider all of the available information regarding the impact of biodiesel on NOx emissions from what CARB refers to as New Technology Diesel Engines (NTDEs). As a direct result, the Supplemental External Scientific Peer Review of the air quality impacts of biodiesel is also flawed.

14. The primary conclusion of the Multimedia Evaluation of Biodiesel with respect to air quality is:

> *Based on a relative comparison between biodiesel and CARB diesel (containing no biodiesel), ARB staff concludes that with in-use requirements biodiesel, as specified in the multimedia evaluation and proposed regulation, does not pose a significant adverse impact on public health or the environment from potential air quality impacts.*

This statement clearly highlights the fundamental inconsistency between the baseline used in the ISOR analysis of air quality impacts, where the baseline included biodiesel use, and the baseline identified in the Multimedia Evaluation Staff Report which included no biodiesel. As noted above, the appropriate baseline is the one identified in the Multimedia Evaluation Staff Report.

15. Another major inconsistency between the Multimedia Evaluation and the ISOR is the fact that CARB failed to include much of the information found in Chapters 6 and 7, and in Appendices B and G of the ISOR, all of which addresses the impact of biodiesel on emissions and air quality in the Multimedia Evaluation. Key information omitted includes:

- The finding that NOx emission increases due to soy biodiesel are statistically significant based on all data considered on page 40 of the ISOR;

- The ton per day increases in NOx emissions due to the ADF shown in Tables 7.1 and B-1 of the ISOR;

- The Supplemental Statistical Analysis presented in Appendix G of the ISOR; and

- The following peer reviewed technical papers listed as references 21 through 24 for Chapter 6 of the ISOR, which contradict CARB's claims regarding the impact of biodiesel on NOx emissions from NTDEs:

    - Gysel, Nicholas et al., *Emissions and Redox Activity of Biodiesel Blends Obtained from Different Feedstocks from a Heavy-Duty Vehicle Equipped with DPF/SCR Aftertreatment and a Heavy-Duty Vehicle without Control Aftertreatment*, SAE 2014-01-1400, Published 04/01/2014.

    - McWilliam, Lyn and Zimmermann, Anton, *Emission and Performance Implications of Biodiesel Use in an SCR-equipped Caterpillar C6.6*, SAE 2010-012157 Published, 10/25/2010.

    - Mizushima, Norifumi and Nurata, Yutaka, *Effect of Biodiesel on NOx Reduction Performance of Urea-SCR system*, SAE 2010-01-2278, Published 10/25/2010.

    - Walkowicz, Kevin et al., *On-Road and In-Laboratory Testing to Demonstrate Effects of ULSD, B20, and B99 on a Retrofit Urea-SCR Aftertreatment System*, SAE 2009-01-2733.

CARB's failure to include and fully to address the foregoing information and analysis made it impossible for any external reviewers, who were relying upon CARB for full disclosure of all relevant data and information, to perform a credible scientific review of the emissions and air quality evaluation and the conclusions reached by CARB.

16. Similarly, CARB failed to include data and information directly relevant to the issues of biodiesel impacts on emissions and air quality provided during the public comment period on the ADF regulation in the materials considered in the Multimedia Evaluation Staff Report, and therefore by the external reviewers. Data and information provided during the public comment period that contradict CARB's findings regarding biodiesel NOx impacts on NTDEs that was not made part of the Multimedia Evaluation includes:

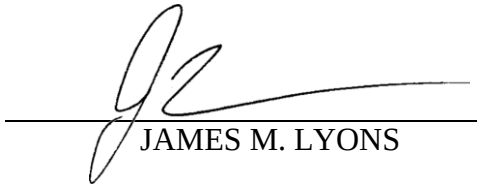
- "NOx Emission Impacts of Biodiesel Blends," Robert Crawford, Rincon Ranch Consulting, February 17, 2015; and

- Declaration of James M. Lyons, February 17, 2015, with attachments.

Again, CARB's failure to include this information also made it impossible for the Peer Reviewers, who were relying upon CARB for full disclosure of all relevant data and information, to perform a credible scientific review of the emissions and air quality evaluation and the conclusions reached by CARB.

I declare under penalty of perjury under the laws of the State of California that the foregoing is true and correct.

Executed this 8th day of June, 2015 at Sacramento, California.



JAMES M. LYONS

ATTACHMENT A

RÉSUMÉ

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A Trinity Consultants Company
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Résumé

James Michael Lyons

Education

1985, M.S., Chemical Engineering, University of California, Los Angeles

1983, B.S., Cum Laude, Chemistry, University of California, Irvine

Professional Experience

4/91 to present — Senior Engineer/Partner/Senior Partner
Sierra Research

Primary responsibilities include oversight and execution of complex analyses of the emission benefits, costs, and cost-effectiveness of mobile source air pollution control measures. Mr. Lyons has developed particular expertise with respect to the assessment of control measures involving fuel reformulation, fuel additives, and alternative fuels, as well as accelerated vehicle/engine retirement programs, the deployment of advanced emission control systems for on- and non-road gasoline- and Diesel-powered engines, on-vehicle evaporative and refueling emission control systems, and Stage I and Stage II service station vapor recovery systems. Additional duties include assessments of the activities of federal, state, and local regulatory agencies with respect to motor vehicle emissions and reports to clients regarding those activities. Mr. Lyons has extensive litigation experience related to air quality regulations, product liability, and intellectual property issues.

7/89 to 4/91 — Senior Air Pollution Specialist
California Air Resources Board

Supervised a staff of four professionals responsible for identifying and controlling emissions of toxic air contaminants from mobile sources and determining the effects of compositional changes to gasoline and diesel fuel on emissions of regulated and unregulated pollutants. Other responsibilities included development of new test procedures and emission standards for evaporative and running loss emissions of hydrocarbons from vehicles; overseeing the development of the state plan to control toxic emissions from motor vehicles; and reducing emissions of CFCs from motor vehicles.

4/89 to 7/89 Air Pollution Research Specialist
California Air Resources Board

Responsibilities included identification of motor vehicle research needs; writing requests for proposals; preparation of technical papers and reports; as well as monitoring and overseeing research programs.

9/85 to 4/89 Associate Engineer/Engineer
California Air Resources Board

Duties included analysis of vehicle emissions data for trends and determining the effectiveness of various types of emissions control systems for both regulated and toxic emissions; determining the impact of gasoline and diesel powered vehicles on ambient levels of toxic air contaminants; participation in the development of regulations for "gray market" vehicles; and preparation of technical papers and reports.

Professional Affiliations

American Chemical Society
Society of Automotive Engineers

Selected Publications (Author or Co-Author)

"Development of Vehicle Attribute Forecasts for 2013 IEPR," Sierra Research Report No. SR2014-01-01, prepared for the California Energy Commission, January 2014.

"Assessment of the Emission Benefits of U.S. EPA's Proposed Tier 3 Motor Vehicle Emission and Fuel Standards," Sierra Research Report No. SR2013-06-01, prepared for the American Petroleum Institute, June 2013.

"Development of Inventory and Speciation Inputs for Ethanol Blends," Sierra Research Report No. SR2012-05-01, prepared for the Coordinating Research Council, Inc. (CRC), May 2012.

"Review of CARB Staff Analysis of 'Illustrative' Low Carbon Fuel Standard (LCFS) Compliance Scenarios," Sierra Research Report No. SR2012-02-01, prepared for the Western States Petroleum Association, February 20, 2012.

"Review of CARB On-Road Heavy-Duty Diesel Emissions Inventory," Sierra Research Report No. SR2010-11-01, prepared for The Ad Hoc Working Group, November 2010.

"Identification and Review of State/Federal Legislative and Regulatory Changes Required for the Introduction of New Transportation Fuels," Sierra Research Report No. SR2010-08-01, prepared for the American Petroleum Institute, August 2010.

"Technical Review of EPA Renewable Fuel Standard Program (RFS2) Regulatory Impact Analysis for Non-GHG Pollutants," Sierra Research Report No. SR2010-05-01, prepared for the American Petroleum Institute, May 2010.

"Effects of Gas Composition on Emissions from Heavy-Duty Natural Gas Engines," Sierra Research Report No. SR2010-02-01, prepared for the Southern California Gas Company, February 2010.

"Effects of Gas Composition on Emissions from a Light-Duty Natural Gas Vehicle," Sierra Research Report No. SR2009-11-01, prepared for the Southern California Gas Company, November 2009.

"Technical Review of 2009 EPA Draft Regulatory Impact Analysis for Non-GHG Pollutants Due to Changes to the Renewable Fuel Standard," Sierra Research Report No. SR2009-09-01, prepared for the American Petroleum Institute, September 2009.

"Effects of Vapor Pressure, Oxygen Content, and Temperature on CO Exhaust Emissions," Sierra Research Report No. 2009-05-03, prepared for the Coordinating Research Council, May 2009.

"Technical Review of 2007 EPA Regulatory Impact Analysis Methodology for the Renewable Fuels Standard," Sierra Research Report No. 2008-09-02, prepared for the American Petroleum Institute, September 2008.

"Impacts of MMT Use in Unleaded Gasoline on Engines, Emission Control Systems, and Emissions," Sierra Research Report No. 2008-08-01, prepared for McMillan Binch Mendelsohn LLP, Canadian Vehicle Manufacturers' Association, and Association of International Automobile Manufacturers of Canada, August 2008.

"Attachment to Comments Regarding the NHTSA Proposal for Average Fuel Economy Standards Passenger Cars and Light Trucks Model Years 2011-2015, Docket No. NHTSA-2008-0089," Sierra Research Report No. SR2008-06-01, prepared for the Alliance of Automobile Manufacturers, June 2008.

"Evaluation of California Greenhouse Gas Standards and Federal Energy Independence and Security Act – Part 1: Impacts on New Vehicle Fuel Economy," SAE Paper No. 2008-01-1852, Society of Automotive Engineers, 2008.

"Basic Analysis of the Cost and Long-Term Impact of the Energy Independence and Security Act Fuel Economy Standards," Sierra Research Report No. SR 2008-04-01, April 2008.

"The Benefits of Reducing Fuel Consumption and Greenhouse Gas Emissions from Light-Duty Vehicles," SAE Paper No. 2008-01-0684, Society of Automotive Engineers, 2008.

"Assessment of the Need for Long-Term Reduction in Consumer Product Emissions in South Coast Air Basin," Sierra Research Report No. 2007-09-03, prepared for the Consumer Specialty Products Association, September 2007.

"Summary of Federal and California Subsidies for Alternative Fuels," Sierra Research Report No. SR2007-04-02, prepared for the Western States Petroleum Association, April 2007.

"Analysis of IRTA Report on Water-Based Automotive Products," Sierra Research Report No. SR2006-08-02, prepared for the Consumer Specialty Projects Association and Automotive Specialty Products Alliance, August 2006.

"Evaluation of Pennsylvania's Implementation of California's Greenhouse Gas Regulations on Criteria Pollutants and Precursor Emissions," Sierra Research Report No. SR2006-04-01, prepared for Alliance of Automobile Manufacturers, April 12, 2006.

"Evaluation of New Jersey's Adoption of California's Greenhouse Gas Regulations on Criteria Pollutants and Precursor Emissions," Sierra Research Report No. SR2005-09-03, prepared for the Alliance of Automobile Manufacturers, September 30, 2005.

"Evaluation of Vermont's Adoption of California's Greenhouse Gas Regulations on Criteria Pollutants and Precursor Emissions," Sierra Research Report No. SR2005-09-02, prepared for the Alliance of Automobile Manufacturers, September 19, 2005.

"Assessment of the Cost-Effectiveness of Compliance Strategies for Selected Eight-Hour Ozone NAAQS Nonattainment Areas," Sierra Research Report No. SR2005-08-04, prepared for the American Petroleum Institute, August 30, 2005.

"Evaluation of Connecticut's Adoption of California's Greenhouse Gas Regulations on Criteria Pollutants and Precursor Emissions," Sierra Research Report No. SR2005-08-03, prepared for the Alliance of Automobile Manufacturers, August 26, 2005.

"Evaluation of New York's Adoption of California's Greenhouse Gas Regulations On Criteria Pollutants and Precursor Emissions," Sierra Research Report No. SR2005-07-04, prepared for the Alliance of Automobile Manufacturers, July 14, 2005.

"Review of MOVES2004," Sierra Research Report No. SR2005-07-01, prepared for the Alliance of Automobile Manufacturers, July 11, 2005.

"Review of Mobile Source Air Toxics (MSAT) Emissions from On-Highway Vehicles: Literature Review, Database, Development, and Recommendations for Future Studies," Sierra Research Report No. SR2005-03-01, prepared for the American Petroleum Institute, March 4, 2005.

"The Contribution of Diesel Engines to Emissions of ROG, NOx, and PM2.5 in California: Past, Present, and Future," Sierra Research Report No. SR2005-02-01, prepared for Diesel Technology Forum, February 2005.

"Fuel Effects on Highway Mobile Source Air Toxics (MSAT) Emissions," Sierra Research Report No. SR2004-12-01, prepared for the American Petroleum Institute, December 23, 2004.

"Review of the August 2004 Proposed CARB Regulations to Control Greenhouse Gas Emissions from Motor Vehicles: Cost Effectiveness for the Vehicle Owner or Operator – Appendix C to the Comments of The Alliance of Automobile Manufacturers," Sierra Research Report No. SR2004-09-04, prepared for the Alliance of Automobile Manufacturers, September 2004.

"Emission and Economic Impacts of an Electric Forklift Mandate," Sierra Research Report No. SR2003-12-01, prepared for National Propane Gas Association, December 12, 2003.

"Reducing California's Energy Dependence," Sierra Research Report No. SR2003-11-03, prepared for Alliance of Automobile Manufacturers, November 25, 2003.

"Evaluation of Fuel Effects on Nonroad Mobile Source Air Toxics (MSAT) Emissions: Literature Review, Database Development, and Recommendations for Future Studies," Sierra Research Report No. SR2003-10-01, prepared for American Petroleum Institute, October 3, 2003.

"Review of Current and Future CO Emissions from On-Road Vehicles in Selected Western Areas," Sierra Research Report No. SR03-01-01, prepared for the Western States Petroleum Association, January 2003.

"Review of CO Compliance Status in Selected Western Areas," Sierra Research Report No. SR02-09-04, prepared for the Western States Petroleum Association, September 2002.

"Impacts Associated With the Use of MMT as an Octane Enhancing Additive in Gasoline – A Critical Review", Sierra Research Report No. SR02-07-01, prepared for Canadian Vehicle Manufacturers Association and Association of International Automobile Manufacturers of Canada, July 24, 2002.

"Critical Review of 'Safety Oversight for Mexico-Domiciled Commercial Motor Carriers, Final Programmatic Environmental Assessment', Prepared by John A Volpe Transportation Systems Center, January 2002," Sierra Research Report No. SR02-04-01, April 16, 2002.

"Critical Review of the Method Used by the South Coast Air Quality Management District to Establish the Emissions Equivalency of Heavy-Duty Diesel- and Alternatively Fueled Engines", Sierra Research Report No. SR01-12-03, prepared for Western States Petroleum Association, December 21, 2001.

"Review of U.S. EPA's Diesel Fuel Impact Model", Sierra Research Report No. SR01-10-01, prepared for American Trucking Associations, Inc., October 25, 2001.

"Operation of a Pilot Program for Voluntary Accelerated Retirement of Light-Duty Vehicles in the South Coast Air Basin," Sierra Research Report No. SR01-05-02, prepared for California Air Resources Board, May 2001.

"Comparison of Emission Characteristics of Advanced Heavy-Duty Diesel and CNG Engines," Sierra Report No. SR01-05-01, prepared for Western States Petroleum Association, May 2001.

"Analysis of Southwest Research Institute Test Data on Inboard and Sterndrive Marine Engines," Sierra Report No. SR01-01-01, prepared for National Marine Manufacturers Association, January 2001.

"Institutional Support Programs for Alternative Fuels and Alternative Fuel Vehicles in Arizona: 2000 Update," Sierra Report No. SR00-12-04, prepared for Western States Petroleum Association, December 2000.

"Real-Time Evaporative Emissions Measurement: Mid-Morning Commute and Partial Diurnal Events," SAE Paper No. 2000-01-2959, October 2000.

"Evaporative Emissions from Late-Model In-Use Vehicles," SAE Paper No. 2000-01-2958, October 2000.

"A Comparative Analysis of the Feasibility and Cost of Compliance with Potential Future Emission Standards for Heavy-Duty Vehicles Using Diesel or Natural Gas," Sierra Research Report No. SR00-02-02, prepared for Californians For a Sound Fuel Strategy, February 2000.

"Critical Review of the Report Entitled 'Economic Impacts of On Board Diagnostic Regulations (OBD II)' Prepared by Spectrum Economics," Sierra Research Report No. SR00-01-02, prepared for the Alliance of Automobile Manufacturers, January 2000.

"Potential Evaporative Emission Impacts Associated with the Introduction of Ethanol-Gasoline Blends in California," Sierra Research Report No. SR00-01-01, prepared for the American Methanol Institute, January 2000.

"Evaporative Emissions from Late-Model In-Use Vehicles," Sierra Research Report No. SR99-10-03, prepared for the Coordinating Research Council, October 1999.

"Investigation of Sulfur Sensitivity and Reversibility in Late-Model Vehicles," SAE Paper No. 1999-01-3676, August 1999.

"Future Diesel-Fueled Engine Emission Control Technologies and Their Implications for Diesel Fuel Properties," Sierra Research Report No. SR99-08-01, prepared for the American Petroleum Institute, August 1999.

"Analysis of Compliance Feasibility under Proposed Tier 2 Emission Standards for Passenger Cars and Light Trucks," Sierra Research Report No. SR99-07-02, July 1999.

"Comparison of the Properties of Jet A and Diesel Fuel," Sierra Research Report No. SR99-02-01, prepared for Pillsbury Madison and Sutro, February 1999.

"Investigation of Sulfur Sensitivity and Reversibility in Late-Model Vehicles," Sierra Research Report No. SR98-12-02, prepared for the American Petroleum Institute, December 1998.

"Analysis of New Motor Vehicle Issues in the Canadian Government's Foundation Paper on Climate Change – Transportation Sector," Sierra Research Report No. SR98-12-01, prepared for the Canadian Vehicle Manufacturers Association, December 1998.

"Investigation of the Relative Emission Sensitivities of LEV Vehicles to Gasoline Sulfur Content - Emission Control System Design and Cost Differences," Sierra Research Report No. SR98-06-01, prepared for the American Petroleum Institute, June 1998.

"Costs, Benefits, and Cost-Effectiveness of CARB's Proposed Tier 2 Regulations for Handheld Equipment Engines and a PPEMA Alternative Regulatory Proposal," Sierra Research Report No. SR98-03-03, prepared for the Portable Power Equipment Manufacturers Association, March 1998.

"Analysis of Diesel Fuel Quality Issues in Maricopa County, Arizona," Sierra Research Report No. SR97-12-03, prepared for the Western States Petroleum Association, December 1997.

"Potential Impact of Sulfur in Gasoline on Motor Vehicle Pollution Control and Monitoring Technologies," prepared for Environment Canada, July 1997.

"Analysis of Mid- and Long-Term Ozone Control Measures for Maricopa County," Sierra Research Report No. SR96-09-02, prepared for the Western States Petroleum Association, September 9, 1996.

"Technical and Policy Issues Associated with the Evaluation of Selected Mobile Source Emission Control Measures in Nevada," Sierra Research Report No. SR96-03-01, prepared for the Western States Petroleum Association, March 1996.

"Cost-Effectiveness of Stage II Vapor Recovery Systems in the Lower Fraser Valley," Sierra Research Report No. SR95-10-05, prepared for the Province of British Columbia Ministry of Environment Lands and Parks and the Greater Vancouver Regional District, October 1995.

"Cost of Stage II Vapor Recovery Systems in the Lower Fraser Valley," Sierra Research Report No. SR95-10-04, prepared for the Province of British Columbia Ministry of Environment Lands and Parks and the Greater Vancouver Regional District, October 1995.

"A Comparative Characterization of Gasoline Dispensing Facilities With and Without Vapor Recovery Systems," Sierra Research Report No. SR95-10-01, prepared for the Province of British Columbia Ministry of Environment Lands and Parks, October 1995.

"Potential Air Quality Impacts from Changes in Gasoline Composition in Arizona," Sierra Research Report No. SR95-04-01, prepared for Mobil Corporation, April 1995.

"Vehicle Scrappage: An Alternative to More Stringent New Vehicle Standards in California," Sierra Research Report No. SR95-03-02, prepared for Texaco, Inc., March 1995.

"Evaluation of CARB SIP Mobile Source Measures," Sierra Research Report No. SR94-11-02, prepared for Western States Petroleum Association, November 1994.

"Reformulated Gasoline Study," prepared by Turner, Mason & Company, DRI/McGraw-Hill, Inc., and Sierra Research, Inc., for the New York State Energy Research and Development Authority, Energy Authority Report No. 94-18, October 1994.

"Phase II Feasibility Study: Heavy-Duty Vehicle Emissions Inspection Program in the Lower Fraser Valley," Sierra Research Report No. SR94-09-02, prepared for the Greater Vancouver Regional District, September 1994.

"Cost-Effectiveness of Mobile Source Emission Controls from Accelerated Scrappage to Zero Emission Vehicles," Paper No. 94-TP53.05, presented at the 87th Annual Meeting of the Air and Waste Management Association, Cincinnati, OH, June 1994.

"Investigation of MOBILE5a Emission Factors, Assessment of I/M Program and LEV Program Emission Benefits," Sierra Research Report No. SR94-06-05, prepared for American Petroleum Institute, June 1994.

"Cost-Effectiveness of the California Low Emission Vehicle Standards," SAE Paper No. 940471, 1994.

"Meeting ZEV Emission Limits Without ZEVs," Sierra Research Report No. SR94-05-06, prepared for Western States Petroleum Association, May 1994.

"Evaluating the Benefits of Air Pollution Control - Method Development and Application to Refueling and Evaporative Emissions Control," Sierra Research Report No. SR94-03-01, prepared for the American Automobile Manufacturers Association, March 1994.

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"Searles Valley Air Quality Study (SVAQS) Final Report," Sierra Research Report No. SR94-02-01, prepared for North American Chemical Company, February 1994.

"A Comparative Study of the Effectiveness of Stage II Refueling Controls and Onboard Refueling Vapor Recovery," Sierra Research Report No. SR93-10-01, prepared for the American Automobile Manufacturers Association, October 1993.

"Evaluation of the Impact of the Proposed Pole Line Road Overcrossing on Ambient Levels of Selected Pollutants at the Calgene Facilities," Sierra Research Report No. SR93-09-01, prepared for the City of Davis, September 1993.

"Leveling the Playing Field for Hybrid Electric Vehicles: Proposed Modifications to CARB's LEV Regulations," Sierra Research Report No. SR93-06-01, prepared for the Hybrid Vehicle Coalition, June 1993.

"Size Distributions of Trace Metals in the Los Angeles Atmosphere," *Atmospheric Environment*, Vol. 27B, No. 2, pp. 237-249, 1993.

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"Development of Mechanic Qualification Requirements for a Centralized I/M Program," SAE Paper No. 911670, 1991.

"Cost-Effectiveness Analysis of CARB's Proposed Phase 2 Gasoline Regulations," Sierra Research Report No. SR91-11-01, prepared for the Western States Petroleum Association, November 1991.

"Origins and Control of Particulate Air Toxics: Beyond Gas Cleaning," in Proceedings of the Twelfth Conference on Cooperative Advances in Chemical Science and Technology, Washington, D.C., October 1990.

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"Estimation of the Impact of Motor Vehicles on Ambient Asbestos Levels in the South Coast Air Basin," Paper No. 89-34B.7, presented at the 82nd Annual Meeting of the Air and Waste Management Association, Anaheim, CA, June 1989.

"Benzene/Aromatic Measurements and Exhaust Emissions from Gasoline Vehicles," Paper No. 89-34B.4, presented at the 82nd Annual Meeting of the Air and Waste Management Association, Anaheim, CA, June 1989.

"The Impact of Diesel Vehicles on Air Pollution," presented at the 12th North American Motor Vehicle Emissions Control Conference, Louisville, KY, April 1988.

"Exhaust Benzene Emissions from Three-Way Catalyst-Equipped Light-Duty Vehicles," Paper No. 87-1.3, presented at the 80th Annual Meeting of the Air Pollution Control Association, New York, NY, June 1987.

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