Western States Petroleum Association
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December 8, 2008

Anil Prabhu, ARB staff – Lifecycle Analysis WG
Chan Pham, ARB staff
Michelle Werner, ARB staff
California Air Resources Board
P.O. Box 2815
Sacramento, CA 95812
Via electronic mail

Re.: **WSPA Comments on CARB's Detailed CA-GREET Pathway for Biodiesel (Esterified Soyoil) from Midwest Soybeans**

Dear Mr. Prabhu, Ms Pham and Ms Werner,

The Western States Petroleum Association (WSPA) is submitting the attached comments regarding the above-referenced document released by CARB on October 3, 2008. WSPA is a non-profit trade organization representing twenty-eight companies that explore for, produce, refine, distribute and market petroleum, petroleum products, natural gas and other energy products in California and five other western states.

WSPA's comments include input from our consultant, ERM, and from our member companies. We have several significant concerns with the document and are hopeful that CARB will do additional work and make the necessary changes before the document is utilized as a reference.

If you have any questions or comments, we would be happy to address them with you. Please contact either me at this office, or Gina Grey at (480-595-7121).

Sincerely,

C.c: D. Simeroth CARB

Western States Petroleum Association's Comments on CARB's
Detailed California-GREET Pathway for Biodiesel (Esterified Soyoil) from Midwest Soybeans

December 8, 2008

The following comments include input from our contractor, ERM, and our member companies. The following will refer to the *Detailed California-GREET Pathway for Biodiesel (Esterified Soyoil) from Midwest Soybeans* as the "document" or "paper."

Overview: Despite the existence of disclaimers, a CARB-authored technical document citing data and results to six significant figures will be used to support important policy decisions in California and elsewhere. So it is important that these documents adequately address and deal with uncertainty.

The document says that "land use change impacts if any have **not** been included…" (emphasis ours). Obviously, land use change impacts could materially influence the effectiveness of the use of Biodiesel on GHG emissions. ARB should continue to evaluate and document land-use change and GREET default values. Additionally, the following recommendations are crucial to assure the validity of the final document:

- Perhaps most important, a sensitivity analysis surrounding key factors should be performed and specifically referenced in this document to show policy makers the range of potential scenarios and associated impacts.
- The co-product allocation method should be evaluated in a sensitivity analysis and system expansion should be considered as an alternative.
- The impacts from end-use of glycerin should be considered.
- Various assumed mileages and factors related to transportation do not seem to be supported and in some cases are inconsistent.
- Components, like electricity, that contribute more than two percent of a process or life cycle stage should be fully addressed.
- Noted table and figure inconsistencies should be addressed.

The Need for Sensitivity Analyses: This document will very likely be used to support public policy decisions that may trigger huge investments and significant environmental consequences. It is important to be able to assure policy makers, who rely on these documents that the anticipated consequences will occur within a reasonable range of anticipated costs. In this case, there are large uncertainties.

A sensitivity analysis puts any carbon footprint analysis into perspective, especially where Life-Cycle Assessment (LCA) concepts contribute to the analysis. A sensitivity analysis will help support the claim that assumptions are appropriate and that data is complete and representative for the goal of the study. Because of the importance in documenting the impact of choices, a sensitivity analysis is a requirement in the IS0 14040 and 14044 LCA standards. Although the document clearly states the choices in methodology, a sensitivity analysis is not referenced and therefore potential variations in input factors and associated impacts are not readily available for the reviewer.

For example, the document indicates that nitrous oxide (N_2O) emissions from fertilizer are a major contributor to greenhouse gas emissions at 11.1 per cent of the total pathways emissions. According to

Appendix A, Section 1.5, this pathway result is based on an assumption utilized in GREET 1.8b that 1.3 per cent of the fertilizer is ultimately converted to N_2O.

No further documentation surrounding this assumption is directly provided. A sensitivity analysis focusing on a range of potential fertilizer conversions would provide more input to the reviewer in terms of understanding the potential variations and associated impacts.

Co-Products Allocation: When considering co-products, allocation is made in the document on an energy basis. The document identifies soybean extraction as the largest greenhouse gas contributor, stating on page 27 that, "45.7% is the soybean oil extraction energy allocation to soy oil (the balance is allocated to soybean meal), 90.5% is fuel production energy allocation (the balance is co-products)."

Co-product allocation may be made through a number of different methods including energy or mass. The ISO standard uses system expansion, otherwise called the substitution method, where the impact of co-products is calculated based on avoided emissions.

ISO uses system expansion because other means of allocation are not always appropriate. For example, a mass allocation for gold-mining co-products would not be appropriate since the mass of gold is significantly different than that of the co-products. Similarly, the amount of energy in a product or co-product does not necessarily correlate to its environmental impact.

In Appendix C, the paper explains the allocation method choice, saying that, "this simplifies the analysis and eliminates certain uncertainties; however, in general, this method is less representative of the real impact of co-products than is the substitution method." ERM asserts that the choice of allocation method creates far more uncertainties than it eliminates. The legitimacy of the allocation method should be addressed through a sensitivity analysis.

WSPA suggests that a rigorous accounting of the fate of co-products and what exactly is displaced in the market may be a better approach. That approach would obviously need to deal with issues such as potential market saturation by the co-product, competition with other processes with superior economics, etc. However, that would result in a more accurate estimate of the impacts of co-products on lifecycle emissions and energy use.

Some specific allocation issues include:

- On page 37, Section 1.5, why are allocation factors not applied to soil N_20 emissions?
- Notwithstanding our above described concerns about the choice of allocation methods, on page 87 of the document the soybean oil transesterification step is being assigned an allocation factor of 42.9 percent. Shouldn't this be 90.5 percent since the soybean meal has been removed from the product system at this point? This argument was used to support 90.5 percent in the soybean oil transport step presented immediately before this step.

Glycerin: On page 85 the document discusses the production of co-product glycerin from the transesterification. The summary of the calculations presented in the pages that follow shows how the energy and emissions portion required for the biodiesel product is calculated (42.9 percent of the total for the plant). This allocation does not account for how this material is used.

Other elements of GREET take co-products to their end-use (e.g., for various fuels in a refinery). It seems inconsistent that the transportation and use of this material which was created solely as a result of biodiesel production should be ignored. This material must be consumed in some fashion and a carbon footprint results from that activity. A similar concern exists for the pathway associated with soybean meal.

Mileages and Factors Related to Transportation: The data presented on page 41, Table 2.1, indicates the distance from the field to the stack for the soybeans and stalks is 10 miles and from stack to terminal is 40 miles. ERM believes this distance is unrealistic given the Midwest geography. This figure has a linear impact such that if the distance were 100 miles or greater, a significant difference in energy intensity would result.

Footnote 1 on page 56, Table 4.2, indicates that rail distance is not doubled. This is not consistent with the practice used within the same document for truck miles where miles are doubled. Critical factors to be considered include location of the rail car when it is called into service, and what happens to it after cargo is unloaded.

Though doubling the miles would likely be overly conservative, completely ignoring this source of emissions does not seem accurate. Since the mileage has a linear effect, this impact could be significant.

Table 2.2, page 43, shows different emission rates for medium and heavy-duty trucks during the transport of soybeans vs. the return trip. It appears that this may be the result of different average speeds being assigned to full vs. empty trucks in the MOBILE6 runs used to develop these estimates.

However, the results do not appear reasonable, particularly since in some cases higher emissions are assigned to an empty truck vs. a full truck. Also, a member commenter questioned the N_2O numbers for both medium and heavy-duty trucks. CARB should check the emission factors and numbers for both medium and heavy-duty trucks.

Section 4.1, page 54, describes transporting soyoil from the Midwest to California and Washington to be processed into FAME. According to one of our members that seems unlikely.

First of all, Washington State is having a tough time supplying its own needs and most FAME is produced and shipped from the Midwest. By constructing a scenario that includes shipping oil to Washington State and then barging it to California, CARB is adding a logistics step that would not exist if the FAME were produced in the Midwest.

Methanol usage is addressed on page 61, Table 5.2. ERM's experience with other LCA calculations suggests the value for methanol production burden should be investigated – a key factor is the transportation from the manufacturing facility (likely to be on the Gulf Coast or on the Eastern Seaboard). The rail miles for this distance may be understated in the burden calculation.

This also impacts Table 5.4. Given the significance of methanol production to these calculations overall (10 percent of the biodiesel biomass), ERM suggests that the GREET factor for methanol production be reviewed for other aspects as well.

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On page 68, in Section 6.1, 80 per cent of the biodiesel is trucked 50 miles to the terminal. This presumes that 20 percent of the biodiesel is produced at the marine terminal. Why is there no mileage allocation for the other 20 percent?

Further, in Section 6.2, the paper indicates that all fuel is distributed 90 miles by truck from the marine terminal. It is questionable whether the incremental contribution of biodiesel could be added in such a narrow distribution footprint without displacing other traditional fuel (thereby incurring a footprint charge). Also, for the biodiesel produced in California, the use would all be within 90 miles of the plant; again this seems likely to have a similar displacement effect.

Electricity Contribution Greater than Two Percent: The electricity mix in the Midwest is assumed in the document to be the same as that in California (78.7 percent natural gas and 21.3 percent renewables such as wind, solar, geothermal and hydro). The paper recognizes that, in reality, Midwest electricity is largely coal produced.

However, the paper asserts, “electricity is such a small component of feedstock production that the difference is minor.” Electricity is identified as having 2.9 percent of the fuels shares. Common LCA practice is to address components that contribute more than 2 percent of a process or life cycle stage.

Tables and Figures: Table A, page 12, shows the energy consumption and greenhouse gas emissions per mmBtu of Biodiesel produced. In this table, the share of total energy is calculated by dividing the energy required in Btu to produce one million Btu of a finished (or intermediate) product. Total Tank-to-Wheel (TTW) share of total energy is identified in the table as 64.4 percent, yet the only contributing factor in the TTW breakdown is “carbon in fuel”, which is presented as 69.8 percent.

It would be useful for Table A to include the full energy and emissions estimates for each process with a separate line item for co-product credits. That way, the reader can more readily determine the impact that co-product credits have on the overall pathway results.

On page 13, the specific contributions of each of the discrete components of the fuel pathway are shown in Figure 2 and explained in a supporting paragraph. The paragraph states that, “the largest contributions are from soyoil extraction (37.3 percent) and fertilizer/pesticide/herbicide production and use (includes N_2O release) (22.4 percent).” However, Figure 2 itself shows that soyoil extraction contribution is 33.4 percent, fertilizer/pesticide/herbicide contribution is 9.1 percent, and N_2O emissions from fertilizer use contribute 11.1 percent. Which is correct?

On page 25, the footnote to Table 1.3 references loss factors. Although they are explained later in the document, a definition here would be useful.

On page 33, the values in the top section of Table 1.10 do not appear to be the sum of values in Tables 1.6 (direct emissions) and 1.9 (Upstream emissions) as indicated in the title.

On page 64 and related tables, the emissions impacts of sodium hydroxide, sodium methoxide and hydrochloric acid do not appear to be accounted for in the biodiesel production step. Even if these components are recycled, there will be some make-up required.

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On page 75, Table 7.2, have the vehicle N_2O and methane emission factors been reviewed by the CARB El Monte staff involved in vehicle testing and emissions data analysis to ensure these estimates are consistent with the most recent test results?

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