Public Meeting of the California Environmental Policy Council

MULTIMEDIA EVALUATION OF BIODIESEL AND RENEWABLE DIESEL

June 23, 2015

Agenda

- Fuels Multimedia Evaluation
- Biodiesel Fuel
  - Individual Agency Presentations: ARB, State Water Board, OEHHA, DTSC
  - Summary of External Peer Review
  - Recommendations
- Renewable Diesel Fuel
  - Individual Agency Presentations: ARB, State Water Board, OEHHA, DTSC
  - Summary of External Peer Review
  - Recommendations
- Proposed Alternative Diesel Fuel Regulation
- Public Comments
- Council Consideration

Multimedia Evaluation

Health & Safety Code 43830.8

- Definition – *Identification and evaluation of **any significant adverse impact** on public health or the environment, including air, water, or soil, that may result from the production, use, or disposal of the motor vehicle fuel that may be used to meet the state board's motor vehicle fuel specifications. (Health & Safety Code §43830.8(b))*

- Requirements
  - ✓ Required before ARB establishes motor vehicle fuel specifications
  - ✓ Must address:
    - *Emissions of air pollutants*
    - *Contamination of surface water, groundwater, and soil*
    - *Disposal or use of byproducts and waste materials*
  - ✓ Summary of Evaluation – Multimedia Working Group (MMWG) Staff Report
  - ✓ External Scientific Peer Review
  - ✓ CA Environmental Policy Council (CEPC) Review
  - ✓ CEPC determination of significant impact, less adverse alternatives

California Environmental Policy Council Shall:

Determine whether proposed regulation will cause significant adverse impact on public health or environment

- No significant adverse impact and no less-adverse alternatives – No further action dictated
- Significant adverse impact or less harmful alternatives exist – Council recommends alternative measures to reduce impacts

Multimedia Working Group (MMWG)

- Oversees multimedia evaluation process
- Makes recommendations to CEPC
- Members:
  - ARB
  - DTSC
  - OEHHA
  - State Water Board
  - Other agencies consulted as needed

MMWG Responsibilities

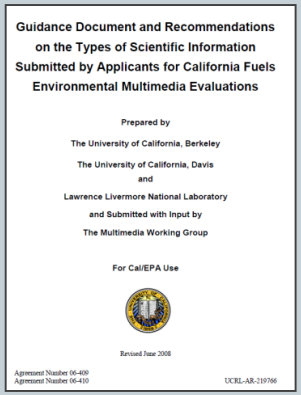
- **ARB** – Lead agency, Evaluate air quality impacts
- **State Water Board** – Assess surface water and ground water impacts
- **OEHHA** – Evaluate potential public health impacts
- **DTSC** – Evaluate potential soil and hazardous waste concerns

Evaluation Uses Rigorous Scientific Process

Tier I
Work Plan

Work Plan

- Define framework and scope
- Identify key knowledge gaps
- Feedback provided


Guidance Document and Recommendations on the Types of Scientific Information Submitted by Applicants for California Fuels Environmental Multimedia Evaluations

Prepared by

The University of California, Berkeley

The University of California, Davis

and

Lawrence Livermore National Laboratory

and Submitted with Input by

The Multimedia Working Group

For Cal/EPA Use

Revised June 2008

Agreement Number 06-409
Agreement Number 06-410

UCRL-AR-219766

Tier II
Risk Assessment Protocol

Risk Assessment Protocol

- Experimental design developed and submitted
- Protocol reviewed, feedback provided

Tier III
Multimedia Risk Assessment Final Report

Final Report Risk Assessment

- Execution of Risk Assessment
- Final report used as basis for MMWG recommendations

Multimedia Evaluation Guidance Document , June 2008

CEPC Action Needed

- MMWG prepares summary report
- Summary report and proposed ARB regulation subject to peer review
- CEPC reviews proposed regulation and summary report
- CEPC makes determination

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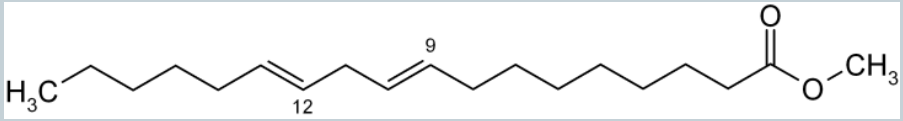
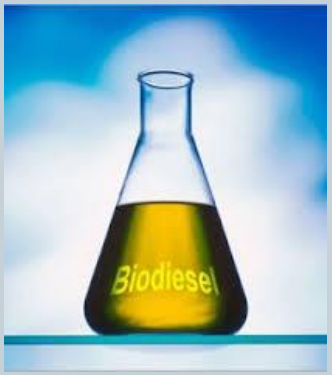
Biodiesel Fuel

- *What is Biodiesel?*
  - Fatty acid methyl ester

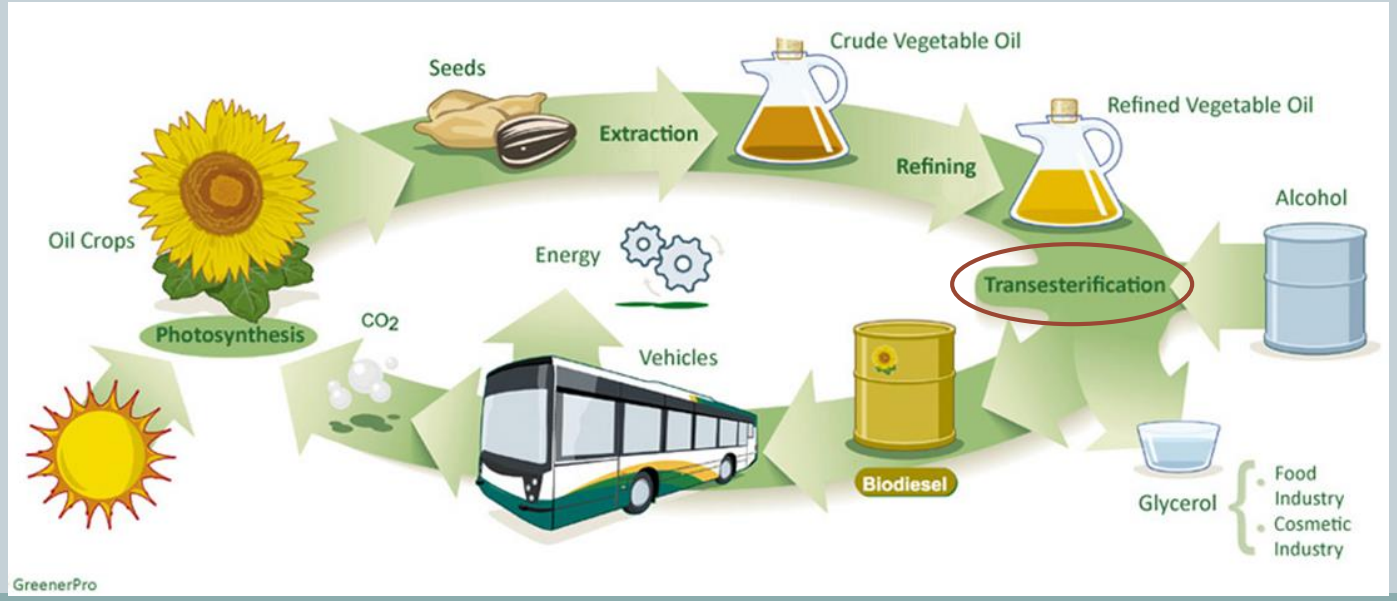




  - Derived from renewable feedstocks
    - Vegetable Oil – Soy, Palm, Corn, Canola, Safflower
    - Animal Fat – Tallow
  - Meets ASTM International Standards
    - D975 – B5
    - D7467 – B6 to B20
    - D6751 – B100

Biodiesel Fuel (*Continued*)

- *How is it Produced?*
  - Transesterifcation – Feedstock is reacted with alcohol in presence of a catalyst to produce glycerin and methyl esters (biodiesel)
  - Produced on relatively small scale



Biodiesel Fuel (*Continued*)

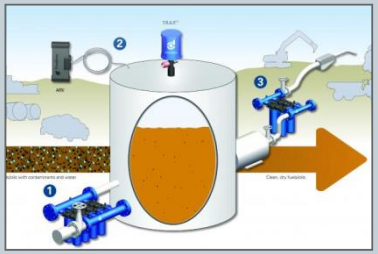
- *How is Biodiesel Transported and Distributed?*

Production Plant

Bulk Terminal

Refueling Station

- *How is Biodiesel Stored?*



Beneficial Aspects of Biodiesel

- Low carbon, renewable, alternative diesel fuel
- Reduces GHG – Supports 2030 and 2050 goals
- Reduces PM, CO, and air toxic emissions
- Key fuel supporting LCFS and Federal RFS2
- Reduces petroleum use – Supports 2030 goal
- Energy security – Feedstocks primarily sourced in U.S.

Air Quality Evaluation

Jim Aguila - ARB

Air Quality Evaluation

- Comparative analysis – Biodiesel compared to CARB diesel
- Criteria pollutants – PM, THC, CO, NO, NOx
- Air toxic emissions – Diesel PM, other Toxics
- Greenhouse gas emissions – CO_2, CH4, others

Air Quality Conclusions

- Reduces PM, THC, CO and some air toxics
- Non-statistically significant increase in 1,2-nanthroquinone, acrolein
- Reduces health risk from PM in diesel exhaust
- Biodiesel is considered low carbon fuel and supports GHG emissions reductions

Air Quality Conclusions (*Continued*)

- Studies found environmental benefits associated with biodiesel compared to CARB diesel
- Slight increased NOx emissions at certain blend levels in older vehicles & equipment
- With in-use requirements biodiesel, as specified in multimedia evaluation and proposed ADF regulation, does not pose a significant adverse impact

Water Evaluation

Laura Fisher- State Water Board

Background and Limitations

- Consistent with University of California, Davis and University of California, Berkeley, Tier I, Tier II, and Tier III Reports the State Water Board staff evaluation is specific to differential environmental impacts between biodiesel and CARB diesel

Background and Limitations (*Continued*)

- State Water Board staff conclusions and recommendations for biodiesel have limited application as they are based on:
  - Fuel additives used during testing (approved additives currently used in CARB diesel)
  - Fuels which meet ASTM fuel specifications

Biodiesel

- Aquatic toxicity screening with biodiesel blends during the Biodiesel Tier II study by UC Davis exhibited somewhat increased toxicity to subsets of screened species compared to CARB diesel
- Both B100 and B20 mixtures caused variable effects on algae cell growth, water flea survival and reproduction and abalone shell development
- However, the chemical analyses did not unambiguously reveal any causative compound for the toxicity

Biodiesel (*Continued*)

- Multimedia Evaluation identifies that unadditized biodiesel and biodiesel blends consistently show increased biodegradation as compared to CARB diesel, and additized biodiesel and biodiesel blends can result in some decreased biodegradation
- These biodegradability scenarios are influenced by additives used and biodiesel blend concentration

Biodiesel (*Continued*)

- Information provided by University of California, Davis and University of California, Berkeley and material compatibility testing has demonstrated that biodiesel and biodiesel blends are incompatible with various products commonly used in California's existing underground storage tank infrastructure

Biodiesel (*Continued*)

- Incompatibility can increases the risk of unauthorized releases, therefore material selection in underground storage tank (UST) equipment and leak detection technology is important
- Material selection resulting in proper compatibility is a statutory and regulatory requirement
- Material compatibility is reviewed and approved by local permitting agencies and implemented by UST owners/operators

Biodiesel (*Continued*)

- State Water Board recently revised UST regulations allow:
  - Biodiesel blends up to B5 may be stored in both single or double-walled USTs
  - Biodiesel blends above B5 may be stored in double-walled USTs

State Water Board Staff Conclusions and Recommendations

Given:

- Information provided by University of California, Davis and University of California, Berkeley
- Stringent design, construction and operational criteria for USTs
- Office of State Fire Marshal finding that aboveground storage tanks in compliance with APSA and SPCC that store biodiesel pose no additional risk to the environment
- UST spills/releases from USTs in California are 4 times lower than the national average, and number of new releases reported each year continues to decrease
- When spills/releases do happen they typically occur on the surface, in the subsurface soil, and/or groundwater and are detected fairly quickly

State Water Board staff concludes that there are minimal additional risks to beneficial uses of California waters posed by biodiesel than that posed by CARB diesel alone

State Water Board Staff Conclusions and Recommendations (*Continued*)

- State Water Board staff supports the Multimedia Evaluation of biodiesel which meets ASTM fuel specifications, and the finding of no significant adverse impacts on public health or environment with the recommendations provided in the Biodiesel Multimedia Evaluation Staff Report

State Water Board Staff Conclusions and Recommendations (*Continued*)

- As identified in the California Biodiesel Multimedia Evaluation Report, Tier III, the potential scope of any unanticipated impacts is difficult to determine due to the limited funding and time of the Multimedia Evaluation, therefore:
  - It is State Water Board staffs recommendation that any unanticipated risks that may have a significant impact on public health, safety or environment, as full scale production and use of biodiesel becomes common, be addressed as they occur by reconvening the Multimedia Working Group

Public Health Evaluation

Dr. Page Painter - OEHHA

Dr. John Budroe - OEHHA

OEHHA Evaluation of Potential Biodiesel Public Health Impacts

OEHHA staff evaluated the potential public health impacts from the use of biodiesel based on:

- A review of toxicity data from the UC Tier reports
- Additional relevant studies comparing toxicity of emissions from petroleum diesel and biodiesel

The evaluation focuses on the relative toxicity differences between biodiesel and petroleum diesel.

Biodiesel/CARB Diesel Exhaust Comparisons

- Substitution of biodiesel for CARB diesel appears to reduce:
  - The rate of addition of carbon dioxide to the atmosphere
  - The amount of carcinogenic PM, benzene, ethyl benzene, and PAHs released into the atmosphere
- Biodiesel use may increase NOx emissions for certain blends.

Biodiesel/CARB Diesel Exhaust Comparisons

- Biodiesel combustion may produce higher levels of some toxic constituents (e.g. 1,2-napthoquinone and acrolein)
- Biodiesel exhaust may contain a larger proportion of total particles as ultrafine particles relative to petroleum diesel exhaust

Biodiesel Exhaust and Oxidative Stress/Inflammation

- Some recent data suggest that exposure to biodiesel combustion emissions may induce enhanced inflammatory and oxidative stress responses relative to petroleum diesel when measured on a PM mass basis

Biodiesel Exhaust and Oxidative Stress/Inflammation (*Continued)*

Experimental data interpretation uncertainties :

- Unclear whether biodiesel combustion emissions would be more potent at inducing oxidative stress/inflammation than petroleum diesel combustion emissions if compared on the basis of PM emissions per mile or per horsepower hour

Biodiesel Exhaust and Oxidative Stress/Inflammation (*Continued)*

Experimental data interpretation uncertainties:

- Different studies used different test conditions. Factors that affect toxicity of diesel emissions:
  - Type of engine
  - Test cycle
  - Biodiesel source
  - Type of petroleum diesel (e.g., CARB diesel, low sulfur Euro diesel, high sulfur diesel, etc.)
- Difficult to compare different studies

Biodiesel Exhaust and Oxidative Stress/Inflammation (*Continued)*

Experimental data interpretation uncertainties:

- Several studies showed increased emissions of carbonyls (oxidative stress-inducers) with certain biodiesel fuels while a few showed decreases
- Differences in study design make comparisons of study results difficult

Biodiesel Exhaust and Oxidative Stress/Inflammation (*Continued)*

- Comparisons of oxidative stress, or other toxicity, needs to be placed in the context of decreased overall emissions

- Oxidative stress is probably just one of the mechanisms involved in the toxicity of diesel exhaust emissions, which include respiratory and cardiovascular health effects, immunotoxicity, and carcinogenicity

Biodiesel Exhaust and Oxidative Stress/Inflammation (*Continued)*

- Further research is warranted to determine if exposure to biodiesel exhaust emissions results in an increase in oxidative stress and/or inflammation compared to CARB diesel exhaust emissions
- Such research would be most useful if performed using test conditions optimized for California (e.g. engine types, test cycles, fuels)

Biodiesel Exhaust Public Health Impacts: Conclusion

OEHHA cannot determine with certainty whether replacing petroleum diesel by biodiesel or biodiesel-petroleum diesel blends for on-road motor vehicle use will reduce adverse human health impacts attributable to oxidative stress and inflammation from toxic chemicals in diesel-engine emissions.

Biodiesel Exhaust Public Health Impacts: Conclusion

However, the information currently available to OEHHA indicates:

- A reduction in cancer risk from use of biodiesel
- A reduction in PM and greenhouse gas emissions, which are associated with myriad environmental and public health impacts

Hazardous Waste and Soil Evaluation

Donn Diebert - DTSC

DTSC Role in Multimedia Fuel Evaluation

- Hazardous Waste Evaluation:
  - Production and Handling
  - Product Properties
- Soil Evaluation:
  - Environmental Fate and Transport in Soil if Spill Occurs
  - Effects on Soil Cleanup of Hazardous Waste Release

Biodiesel Hazardous Waste Evaluation (Production and Handling)

- Potential releases during the production of Biodiesel include:
  - Hexane or CO2 released to the air during seed extraction from feed stocks
  - Potential for odors associated with waste biomass

Biodiesel Hazardous Waste Evaluation (Production and Handling)

- Accidental releases during the production and handling of Biodiesel include spills or leaks of:
  - Bulk feedstock oil (non-hazardous)
  - Chemicals used during production such as methanol, hexane, acid, base
  - Approved additive packages for CARB Diesel such as antioxidants, biocides, cold flow enhancers, urea, etc.

Biodiesel Hazardous Waste Evaluation (Production and Handling)

- CARB Diesel vs. Biodiesel
  - Pure biodiesel aerobically biodegrades more readily than CARB diesel
  - Some additized biodiesel preliminarily has a higher aquatic toxicity for a small subset of tested species

Biodiesel Soil Evaluation (Fate/Transport and Soil Clean Up)

- CARB Diesel vs. Biodiesel
  - Based on the testing, no significant differences in infiltration rate into the soil
    - Some preliminary tests indicated that Biodiesel tended to move faster in the vertical than horizontal direction
  - Break down of CARB Diesel and Biodiesel have similar aerobic break down properties
  - Environment cleanup actions and remediation for soil would be similar

DTSC's Conclusions

- Hazardous waste evaluation:
  - Product Properties of CARB Diesel vs. Biodiesel **- No Significant Difference**
- Soil evaluation:
  - Environmental fate and transport in soil if spill occurs of CARB Diesel vs. Biodiesel **- No Significant Difference**
  - Effects on hazardous waste soil cleanup of CARB Diesel vs. Biodiesel **- No Significant Difference**

External Scientific Peer Review

- Initial Peer Review: Nov 2013 - Feb 2014
  - 7 reviewers; 4 areas of expertise (air, water, soil, public health)
  - Support MMWG conclusions – Based on sound scientific knowledge, methods, and practices
  - 2 reviewers provided emerging public health information on oxidative stress and inflammation
  - New B5/B10 Biodiesel Study published June 2014, Updated ADF Regulation

External Scientific Peer Review (*Continued*)

- Supplemental Peer Review: Dec 2014 - Apr 2015
  - 4 original reviewers; 2 areas of expertise (air, public health)
  - Limited to updated OEHHA public health evaluation (oxidative stress and inflammation) and ARB air quality evaluation (new B5/B10 Biodiesel Study and updated regulation)
  - Confirm support of MMWG conclusions

Recommendations

MMWG recommends that the CEPC:

- Find that the use of biodiesel fuel in California, as specified in this multimedia evaluation and the proposed regulation, does not pose a significant adverse impact on public health or the environment compared to CARB diesel fuel
- Condition the finding on the following
  - Biodiesel must meet the in-use requirements in the ADF regulation to preclude excess NOx emissions as applicable, or may qualify for an exemption

Recommendations (*Continued*)

- Any hazardous substances and hazardous waste used in production, storage, and transportation of biodiesel will be handled in compliance with applicable California laws and regulations
- Fuel formulations and additives not included within the scope of this multimedia evaluation must be reviewed by MMWG for consideration of appropriate action

Recommendations (*Continued*)

- Information regarding oxidative stress and inflammation will continue to be monitored by the MMWG. In event that information indicates potential significant risks to public due to exposure to biodiesel exhaust resulting from biodiesel use, the specific use of biodiesel will be reviewed by the MMWG for appropriate action

- In the event that any relevant available information indicate potential for significant risks to public health or the environment, the specific use of biodiesel will be reviewed by the MMWG for appropriate action

Agenda

- Fuels Multimedia Evaluation
- Biodiesel Fuel
  - Individual Agency Presentations: ARB, State Water Board, OEHHA, DTSC
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  - Recommendations
- Renewable Diesel Fuel
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Renewable Diesel Fuel

- *What is Renewable Diesel?*
  - Aliphatic hydrocarbons, subset of CARB diesel (C11-C22 vs. CARB diesel C9-C45)
  - Derived from renewable feedstocks (same as biodiesel)
    - Vegetable Oil – Soy, Palm, Corn, Canola, Safflower
    - Animal Fat – Tallow
  - Meets ARB diesel fuel specifications and ASTM D975
- *How is it Produced?*
  - Hydrotreatment of feedstocks – Common refinery process
  - Produced on a relatively large scale

Renewable Diesel Fuel (*Continued*)

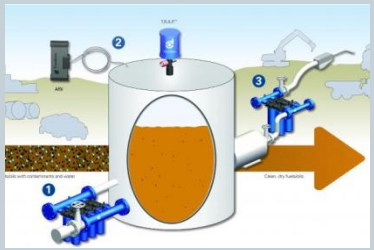
- *How is Renewable Diesel Transported and Distributed?*

Production Plant

Bulk Terminal

Refueling Station

- *How is Renewable Diesel Stored?*



Beneficial Aspects of Renewable Diesel

- Reduces PM, CO, and air toxic emissions
- Reduces NOx emissions
- Important fuel in LCFS and Federal RFS2
- Reduces petroleum use – Help achieve 2030 goal
- Energy security – Feedstocks sourced in U.S.
- Low carbon, renewable, alternative diesel fuel
- Reduces GHG – Help achieve 2030 and 2050 goals

Air Quality Evaluation

Jim Aguila - ARB

Air Quality Evaluation

- Comparative analysis - Hydrotreated vegetable oil renewable diesel compared to CARB diesel
- Criteria pollutants – PM, THC, CO, NO, NOx
- Air toxic emissions – Diesel PM, other Toxics
- Greenhouse gas emissions – CO_2

Air Quality Conclusions (*Continued*)

- Emits less PM, THC, CO, and NOx than CARB diesel
- Toxics results show reductions in most PAHs and VOCs
- Use and resulting air emissions do not pose a significant adverse impact of public health or environment

Water Evaluation

Laura Fisher - State Water Board

Background and Limitations

- Consistent with University of California, Davis and University of California, Berkeley, Tier I, Tier II, and Tier III Reports the State Water Board staff evaluation is specific to differential environmental impacts between renewable and CARB diesel

Background and Limitations (*Continued*)

- State Water Board staff conclusions and recommendations for renewable diesel have limited application as they are based on:
  - Fuel additives used during testing (approved additives currently used in CARB diesel)
  - Fuels that which meet ASTM fuel specifications

Renewable Diesel

- No significant changes in aquatic toxicity were identified by the University of California, Davis and University of California, Berkeley
- Based on data provided, impacts of fate and transport are not expected to be significantly different given similar chemical composition of renewable diesel and CARB diesel

Renewable Diesel (*Continued*)

- No significant impacts to UST material compatibility and leak detection functionality were raised within the Multimedia Evaluation

State Water Board Staff Conclusions and Recommendations

- State Water Board staff concludes that given the information provided by University of California, Davis and University of California, Berkeley there are minimal additional risks to beneficial uses of California waters posed by renewable diesel than that posed by CARB diesel alone

State Water Board Staff Conclusions and Recommendations (Continued)

- State Water Board staff supports the Multimedia Evaluation of renewable diesel which meets the ASTM fuel specifications, and the finding of no significant adverse impacts on public health or environment with recommendations provided in the Renewable Diesel Multimedia Evaluation Staff Report

State Water Board Staff Conclusions and Recommendations (Continued)

- As identified in the California Renewable Diesel Multimedia Evaluation Report, Tier III, the potential scope of any unanticipated impacts is difficult to determine due to the limited funding and time of the Multimedia Evaluation, therefore:
  - It is State Water Board staffs recommendation that any unanticipated risks that may have a significant impact on public health, safety or the environment, as full scale production and use of renewable diesel becomes common, be addressed as they occur by reconvening the Multimedia Working Group

Public Health Evaluation

Dr. Page Painter - OEHHA

Major Activities of OEHHA

- Identification of hazards from exposure to chemicals
- Dose-response assessment for toxic chemicals
- Calculation of health-based acceptable exposure levels for toxic chemicals

Major Activities of OEHHA Staff in the Multimedia Working Group

- Impact assessments of additives in reformulated fuels
- Comparative impact assessment of new fuels

Comparative assessment of a new or alternative diesel fuel requires:

- Comparing chemical concentrations in Combustion Emissions (CE) from a new diesel fuel to those from CARB diesel
- Comparing toxic impacts of CE from a new fuel to those from CARB diesel

Sources of Information Used for Comparative Fuel Impact Assessments

- Scientific studies published in peer-reviewed journals
- Reports submitted to government agencies

Renewable Diesel

- Produced by hydrotreating fatty acids from vegetable oil and is termed hydrotreated vegetable oil renewable diesel (HVORD)
- Composed of aliphatic hydrocarbons, chemicals of low toxicity

Data Sources for HVORD Assessment

- Report by Durbin et al. (2011)
- Four studies comparing CE from HVORD to CE from EN590 diesel

Comparative Evaluation of Particulate Matter (PM) and Toxic Chemicals in CE

- PM decreased in CE from HVORD
- NO_x decreased in CE from HVORD
- Benzene, ethyl benzene, toluene and xylene reduced in CE from HVORD
- Formaldehyde and acetaldehyde reduced in CE from HVORD
- Polycyclic aromatic hydrocarbon (PAH) content is reduced in CE from HVORD in most (but not all) tests

Conclusions

- Use of renewable diesel fuel produced by hydrotreating fatty acids from vegetable oil may reduce the amount of PM and aromatic organic chemicals released.

- OEHHA scientists do not find any evidence that these potential beneficial impacts are offset by adverse impacts on human health that might result from replacing some CARB ULSD use by HVORD use.

Hazardous Waste Evaluation

Donn Diebert - DTSC

Renewable Diesel Hazardous Waste Evaluation (Production and Handling)

- Potential releases during the production of Hydrotreated Renewable Diesel include:
  - n-hexane during the oil extraction process
  - Potential for odors associated with waste biomass

Renewable Diesel Hazardous Waste Evaluation (Production and Handling)

- Accidental releases during the production and handling:
  - Bulk feedstock oil (non-hazardous)
  - Chemicals used during production such as n-hexane
  - Approved additive packages for CARB Diesel such as antioxidants, biocides, cold flow enhancers, urea, etc.

Renewable Diesel Hazardous Waste Evaluation (Product Properties)

- CARB Diesel vs Renewable Diesel
  - The chemical composition and properties of Renewable Diesel are similar to CARB Diesel

Renewable Diesel Soil Evaluation (Fate/Transport and Soil Clean Up)

- CARB Diesel vs. Renewable Diesel
  - Migration of Renewable Diesel through soil is expected to be similar to CARB Diesel
  - Fate and transport of Renewable Diesel is expected to be similar to CARB Diesel
  - Break down of CARB Diesel and Renewable Diesel in the environment is expected to be similar, ultimate soil cleanup actions and remediation would be similar

DTSC's Conclusions

- Hazardous waste evaluation:
  - Product Properties of CARB Diesel vs. Renewable Diesel **- No Significant Difference**
- Soil evaluation:
  - Environmental fate and transport in soil if spill occurs of CARB Diesel vs. Renewable Diesel **- No Significant Difference**
  - Effects on hazardous waste soil cleanup of CARB Diesel vs. Renewable Diesel **- No Significant Difference**

External Scientific Peer Review

Renewable Diesel Peer Review: Nov 2013 - Feb 2014

- 7 reviewers; 4 areas of expertise (air, water, soil, public health)
- Support MMWG conclusions, based on sound scientific knowledge, methods, and practices
- No issues raised

Recommendations

MMWG recommends that the CEPC:

- Find that use of renewable diesel in California, as specified in this multimedia evaluation and proposed regulation, does not pose a significant adverse impact on public health or the environment compared to CARB diesel fuel
- Condition the finding on the following
  - Must meet definition in ADF regulation and California diesel fuel regulations under Title 13, California Code of Regulations, Section 2281-2285

Recommendations (*Continued*)

- Any hazardous substances and hazardous waste used in production, storage, and transportation of biodiesel will be handled in compliance with applicable California laws and regulations
- Fuel formulations and additives not included within scope of this multimedia evaluation must be reviewed by MMWG for consideration of appropriate action
- In the event any relevant available information indicates potential for significant risks to public health or environment, the specific use of biodiesel will be reviewed by the MMWG for appropriate action

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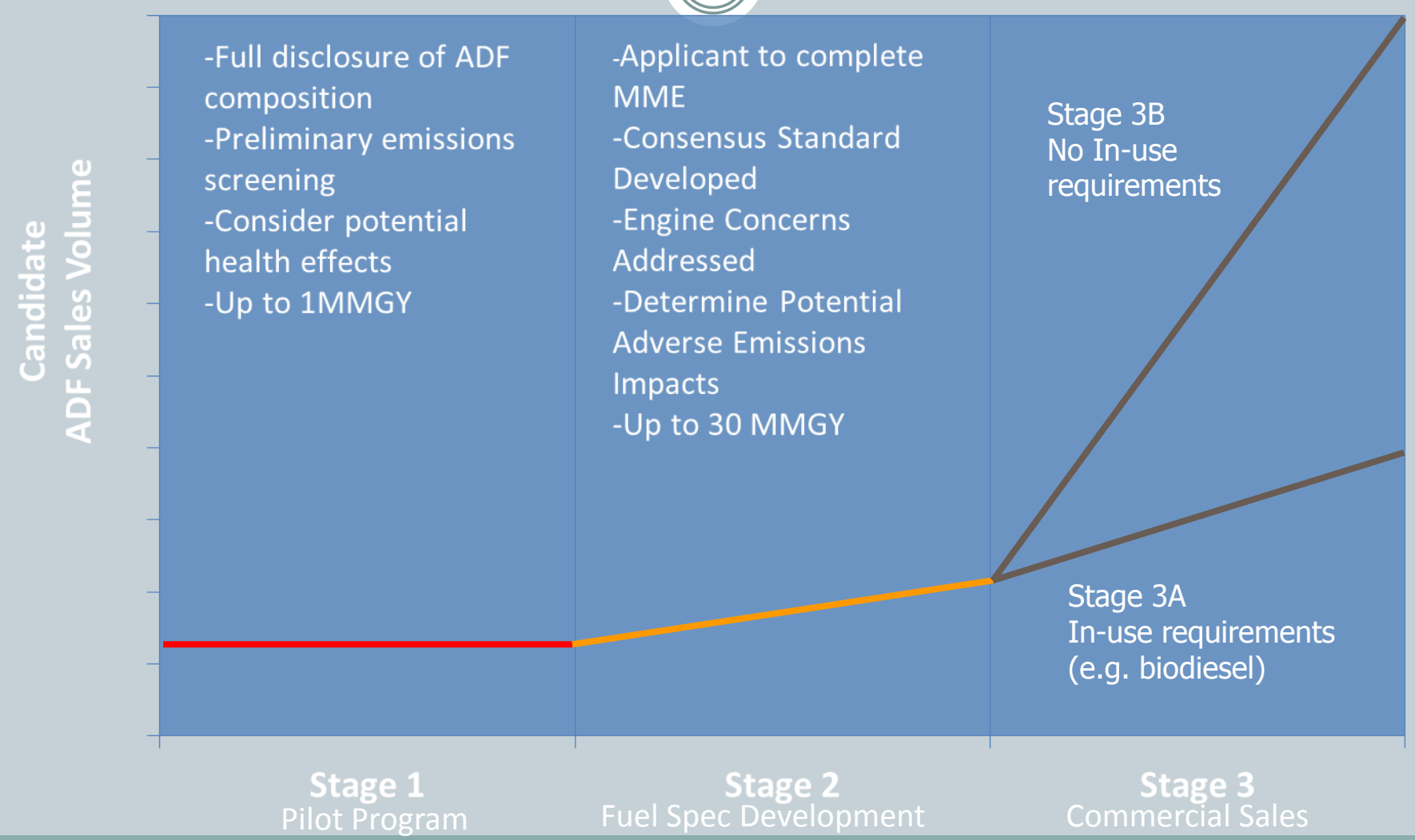
Alternative Diesel Fuel Regulation

- Subject to lengthy public process
- Support from both fuels industry and engine manufacturers
- Supports rapid deployment of low carbon diesel replacements
- Two major focuses
  - Three stage introduction of emerging ADFs into commerce
  - Establishes biodiesel as first ADF

Three-Stage Process for Emerging ADFs



Requirements for Biodiesel as First ADF

- Sets neat biodiesel fuel quality specifications
- Covers blends of biodiesel and conventional diesel (B5 to B20)
- Biodiesel blend limit: B10 or B5 depending on season and feedstock
- In-use requirements to preclude NOx increases from legacy fleet
- Exemptions for new technology diesel engines with selective catalytic reduction
- Program review by 2020

Public Comments

- Growth Energy
  - Received yesterday at noon
  - Re-submittal of comments submitted to ADF rulemaking
  - Generally pertain to environmental analysis in support of ADF rulemaking
- Western States Petroleum Association
  - Some comments outside of scope of multimedia evaluation
  - Some comments pertain to environmental analysis in support of ADF rulemaking

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Thank You