To: Rick Shedd

From: Bob Sulnick

Re: Evergreen Oil Re-refined Oil Recommendations

Evergreen Oil, Inc. (Evergreen) operates the only fully licensed part "B" re-refinery in the Western United States dedicated to the production of virgin-like quality lube base oils, from used lube oil. Evergreen's re-refinery is located in Newark, California.

Evergreen's base oils have passed the laboratory and engine test requirements ensuring they meet all American Petroleum Institute (API) standards for the same cold-start pumpability, rust erosion, engine wear, and high performance standards as virgin oil; as well as warranty requirements for new automobiles. Evergreen's base lubes are used in California government fleet vehicles as well as the California cities of Los Angeles, Thousand Oaks, Santa Monica, San Francisco, Chula Vista and Sacramento all use re-refined oil in their fleets.

Evergreen hereby recommends the following to the Committee.

The Report acknowledge that re-refined oil is the equivalent of virgin oil. The American Petroleum Institute (API), U.S. Environmental Protection Agency (USEPA), and the U.S. Department of Energy (DOE) all acknowledge that re-refined oil is the equivalent of motor oil produced from virgin crude oil.

The Report acknowledge that re-refined oil does not void major automobile manufacturer warranties. Auto manufacturers may not legally endorse a particular brand of motor oil. However, many, including: Ford, GM, Mercedes-Benz, Chrysler, Cummins and Detroit-Diesel have gone on record to state that using re-refined oil does not affect warranty coverage including.

Ford. "Ford recommends using engine oil meeting Ford Specification…Both virgin and re-refined engine oils are capable of meeting these requirements…"

GM. "General Motors recommends for use in its vehicles engine oils which meet the performance requirements specified in the latest **International Lubricant Standardization and Approval Committee (ILSAC) Minimum Performance Standard**…and which are certified by the **American Petroleum Institute** for use in gasoline engines…Engine oils meeting these requirements can be made with either virgin or re-refined base oils."

Chrysler Corporation. "The engine oil used in Chrysler vehicles must meet the Owners' Manual recommendation to satisfy warranty requirements. This recommendation is to use an oil **displaying the American Petroleum Institute Certification Mark**…This specification does not differentiate between products made

from virgin base oils or re-refined base oils. Oils made from re-refined base oils can meet these requirements…"

Mercedes-Benz. "We approved the use of re-refined engine oils for use in our engines decades ago.

Cummins. "Re-refined lubricating oils can be used in Cummins engines if they have an API quality designation signifying they have been tested…"

Detroit Diesel. "Detroit Diesel favors the recycling of waste oil and permits the use of re-refined oils in all engine product lines, provided the re-refined oil meets the **SAE Viscosity, API and Military specifications."**

Defense Supply Center Richmond. All branches of the United States department of Defense Armed forces have been approved to use re-refined motor oil in vehicles and military equipment. Military Specifications for motor oil clearly indicate that re-refined motor oil is considered equivalent in quality and performance to virgin oil, provided that the minimum performance requirements are met.

The DSCR offers a closed-loop re-refined motor oil program servicing all military installations in the continental United States (CONUS).

The DSCD says the following about re-refined oil: "Re-refined motor oil satisfies all manufacturers' engine warranties and meets the American Petroleum Institute (API) and energy conserving performance classifications. The society of Automotive Engineers (SAE) has approved the use of re-refined oil and the U.S. Army Tank-Automotive and Armaments Command (TACOM) has also qualified these engine oils under MIL-PRF-2104, for use in combat and tactical vehicles."

The Report acknowledge there is an industry approved definition of re-refined oil. API, the Western States Petroleum Association (WSPA), Evergreen, and Safety/Kleen have all agreed on the following definition of re-refined oil**:** *"Re-refined oil" means a lubricant base stock or oil base that has been derived from used oil and meets all the following criteria:*

(a)Processed using a series of mechanical or chemical methods, or both, including, but not limited to, vacuum distillation, ***followed by solvent refining or hydrotreating.***

(b) Capable for meeting the Physical and Compositional Properties, in addition to the Contaminants and Toxicological Properties, as defined under the American Society for Testing and Materials (ASTM) D6074-99 standard.

(c) Processed into a material that has a quality level suitable for use in a finished lubricant.

This definition ensures that fleets using re-refined oil will be using a product equivalent to oil produced from virgin crude.

The Committee's Report acknowledge the amount of used oil resource available. The nation produces 1.3 billion gallons of used oil annually, over 100 million gallons

produced by California. According to the U.S. Environmental Protection Agency (EPA), by re-refining its used oil the nation would save between 1.3 and 2.5 million gallons of oil per day.

The Report acknowledge there is statutory authority for using re-refined oil. There are a variety of legislative dictates which support recommending re-reined oil for use in California fleets:

The Legislative Counsel Digest explaining AB 236 unequivocally states that the revision of existing purchasing methodologies by the Department of General Services (DGS) shall be based upon: **"**environmental and energy benefits**".**

AB 236 SECTION 1. Section 25722.5 (a) (1) refers to *"[m]inimum air pollution emission[s]; (2) (A) requires [evaluat[ing] and scor[ing] emissions…in addition to capital costs to enable the Department of General Services to choose the…lowest life-cycle cost…"*[1]

AB 236 Section 2. Section 25722.6 (a) (1): "*The vehicle rankings shall include both of the following criteria:*

(1) the reduction in greenhouse gas emissions, air pollutant emissions…on a full fuel-cycle basis…"

(2) the life-cycle costs of the vehicle and fuel, including maintenance (emphasis added)."

Public Contract Code (PCC) section 12203 requires State agencies to ensure that at least 50 percent of the dollars spent on lubricating oils (LO) be spent on LO's with a base oil content consisting of at least 70 percent re-refined oil.

PCC section 12205 requires all State agencies to obtain from all suppliers written certification of the post-consumer recycled content of each product offered or sold to the State.

PCC sections 10405-10409 require State and local agencies to purchase lubricating oil…from the seller whose oil product contains the greater percentage of recycled oil.

AB 32. The California Air Resources Board (CARB) is considering how to integrate re-refined oil into its AB 32 mandated rule making precisely because re-refining saves energy and reduces GHG emissions in the transportation sector

The DGS Best Practices Manual explicitly identifies the "environmental and energy benefits of re-refined oil. It states: "[t]he ***highest and best use*** of used motor oil is to re-refine it into new motor oil…If more re-refined motor oil were purchased by fleet managers, less used oil would be available to be burned for fuel – resulting in fewer air emissions and a higher and better use for used motor oil". The Manual goes on to state: "*Compared to crude oil refining to produce virgin lubricating oil, producing lubricating oil from used motor oil requires less energy, and conserves valuable crude oil, a non-renewable resource*

The Report acknowledge there are multiple studies verifying the environmental benefits of re-refined oil. According to the *U.S. Environmental Protection Agency* (EPA), by re-refining its used oil the nation would save between 1.3 and 2.5 million gallons of oil per day. The same study concludes one gallon of re-refined used motor oil will yield the same 2.5 quarts of lubricating oil obtained from refining 42 gallons (one barrel) of virgin crude oil.

The *American Petroleum Institute* has concluded that it takes 50-85 percent less energy to produce a lubricant through re-refining used oil than to produce that same volume by refining virgin crude.

Recent *European studies* concluded that the average CO2 equivalent burned of re-refined oil produces 42% less greenhouse gas emissions than the equivalent burden of virgin base oil (Groupement Europeen de I'Industrial Regeration 2007). A similar study by the

Commonwealth of *Massachusetts* concluded that by purchasing 72,000 gallons of re-refined motor oil, a year, the state reduced greenhouse gas emissions by 270 tons (Executive Office for Administration and Finance 2007).

The U.S. Department of Energy (DOE) in its "Used Oil Re-refining Study to Address Energy Policy" (Chapter 7, 2006) cites energy conservation as justification for recommending re-refining used oil compared to refining virgin crude. In so doing, it states: "re-refining [is] the best solution from both energy resource preservation and environmental conservation perspectives." The study concludes by saying that compared to crude oil refining to produce virgin lubricating oil, producing lubricating oil from used motor oil requires one-third the energy of refining crude oil, while conserving valuable crude oil, a non-renewable resource.

Boughton and Horvath (2004) and GEIR (2005) cite increased air quality as justification for recommending re-refining over direct burning of used oil (RFO).

The *California Integrated Waste Management Board* (CIWMB) has concluded that "closed-loop" recycling is "highest and best use" of a resource.

Lawrence Livermore National Laboratory (LLNL), at the request of the CIWMB, recently studied the benefits of re-refined oil and identified re-refining as the "highest and

best use" of the resource. In so doing, the report focuses on the energy and greenhouse gas savings along with the "closed-loop" nature of re-refining.

According to *Cal EPA*, re-refining oils can lead to additional environmental benefits because the toxic heavy metals (e.g., zinc, lead, cadmium, and chromium) are extracted from the used oil. These metal compounds are solidified and stabilized into asphalt flux, thereby posing minimal environmental risk.

The California DTSC in assessing re-refined oil from a LCA perspective not only found reduced environmental impact from diversion of used oil as fuel, and recycling energy-intensive material back into commerce; but from fostering the development of additional treatment capacity.

The Report acknowledge that synthetic oils are not necessarily environmentally superior to re-refined oil.

The amount of energy required to manufacture synthetic lubricant oil is estimated to be about *three times* that of mineral-based oil[2] (*whereas re-refining used oil takes one-third the energy of manufacturing from virgin crude*).

Synthetic oils are composed primarily of crude oil base stock; there are, therefore, no "life cycle" advantages to using synthetic oils. Most synthetic motor oils are fabricated by polymerizing short chain hydrocarbon molecules (alpha-olefins) into longer chain hydrocarbon polymers called polyalpha-olefins (PAOs).

The initial costs of synthetic oils are between two and four times more expensive than petroleum based oils.
As lubricant oils lubricate engines they accumulate PAHs. Higher concentrations of PAHs have been found in used synthetic oil leading to greater engine particulate emissions.

Because synthetic lubricants degrade more rapidly in soil and aquatic systems (they show higher biodegradability than mineral oils because of their higher degree of hydrocarbon chain linearity), they cause more environmental damage than conventional lubricant oils.

The Report acknowledge there would be environmental gains by California fleets re-refining their used oil and using re-refined oil. Re-refined oil is an alternative to oil with energy and GHG benefits. Re-refined oil is cheaper than synthetic oil and is less energy intensive.