


Office of the City Manager

INFORMATION CALENDAR

April 12, 2005

To: Honorable Mayor and
Members of the City Council

From:  Phil Kamlarz, City Manager

Subject: Update on Use of Biodiesel

INTRODUCTION

This memorandum provides an update on the City of Berkeley's use of biodiesel fuel (B100), especially in light of community concerns that the Public Works Department is discontinuing use of B100 (100% biodiesel).

CURRENT SITUATION AND ITS EFFECTS

City of Berkeley is not abandoning the biodiesel program. However, because of engine problems with numerous vehicles that used B100, staff temporarily scaled back from B100 to using B20 (a fuel mixture of 20% biodiesel and 80% Ultra Low Sulfur Diesel [ULSD]), while investigating and trouble-shooting to determine the problem source. The first problem is that the filters get clogged on the trucks--then staff has to replace the lift pump, which is like a fuel pump on the diesel trucks (which brings the fuel up to the engine) because these get gummed-up. The second problem is that the ejectors on the engine (which sprays the fuel down into the engine) are problematic because the seals require continual replacement. Each problem occurs at least every week--and necessitate that staff stock this equipment to keep the trucks running. Since vehicles began being fueled with B20, all the problems vanished.

Staff is currently collecting engine oil samples for lab analysis, including fuel samples from underground storage tanks. Staff is working with the engine oil supplier and holding ongoing meetings and conversations with CytoCulture (Public Works' environmental biotechnology consultant with technical and scientific information on biodiesel). It appears that somewhere staff may have received one or two bad loads of fuel (that were possibly not correctly or thoroughly processed at the refinery). The CytoCulture contact is working with the fuel vendor to develop a pre-delivery certification and quality assurance program to try to prevent future deliveries of fuel that does not meet required specifications.

BACKGROUND

City of Berkeley pioneered the use of B100 as a clean burning, non-toxic and renewable alternative to petroleum diesel fuel for two years. From January 2003 to January 2005, Public Works' fleet (including 9 school buses, paramedics vehicles, long haul 18-wheel refuse trucks, garbage trucks, curbside recycling trucks, maintenance vehicles, street sweepers and lawn mowers) operated successfully on pure B100. The B100 project evolved from a successful pilot project in which all 192 vehicles were operated on a B20 biodiesel blend for 17 months (2001-

2002). The fleet switched over to B100 after a unanimous City Council vote in December 2002 in support of the change.

Generally, the City fleet ran satisfactorily using the B100. However, cost increases and technical issues forced the City to reevaluate its biodiesel program. The fleet was switched back to B20 temporarily to allow formulation of a new biodiesel strategy to address emissions compliance, cost issues and technical problems associated with running the entire fleet on B100. A proposal was made by CytoCulture to ramp the fleet back up to run on a B50 blend that would still meet the environmental objectives of using biodiesel while optimizing the compliance requirements set by the California Air Resource Board (CARB).

The following are a list of justifications for switching Berkeley's fleet from B100 biodiesel to a B50 biodiesel blend with ULSD:

- **Fuel Costs:** B100 biodiesel costs the City over \$1.00 per gallon more than diesel fuel. The B50 blend (a mixture of 50% biodiesel with 50% ULSD) costs about \$.50 per gallon more per gallon than regular diesel fuel. Since the City is currently using over 160,000 gallons of fuel per year, this would amount to a fuel savings of approximately \$74,000.
- **Maintenance Costs:** In addition to fuel cost savings, there should be an accompanying decrease in the maintenance costs associated with the switch from B100 to B50 such as the replacement of fuel hoses, cleaning of fuel storage tanks and dispensers, and the servicing of fuel injector and fuel injector pumps.
- **Compliance:** CARB is phasing in new emission control regulations that call for a level one minimum reduction in particulate material (PM) of at least 25% in public fleet heavy duty diesel vehicles. Whereas B100 would achieve a 55-60% reduction in PM, it also increases nitrogen oxide (NOx) emissions upwards of 7-10%. CARB regulations stipulate that there should be no increased NOx emissions associated with emission control strategies, so technically, the B100 would put the fleet out of compliance. By selecting the B50 blend with ultra low sulfur, the City would achieve a compromise of achieving over 25% reduction in PM without increasing NOx levels more than a few percent. The B50 blend would also decrease air toxics by more than 30%, reduce hydrocarbon emissions and carbon monoxide emissions by 25% and drop sulfur levels in the blended fuel to less than 8 ppm. Further, the City would use half the normal amount of petroleum per year it would have used prior to the biodiesel program.

The following are potential problems that should be considered:

- There are reports from Germany that high blends of biodiesel and diesel fuel can be more sensitive to fuel quality problems. Apparently, bad biodiesel mixed 50:50 with regular diesel can cause more aggressive deterioration of elastomer components than the biodiesel alone. CytoCulture is investigating the claims and will report back soon. Biodiesel fuel quality has to become the highest priority at any blend (B20 to B100), so CytoCulture must make it clear

to their distributor that it is incumbent on them to monitor and warranty the quality of any biodiesel they deliver to the City. In the past they have relied on good faith and documentation received with each rail car or truckload of biodiesel purchased. Golden Gate Petroleum, the City's supplier of B100 and B20, and CytoCulture are in discussions to determine how to implement a reasonable quality-control system at their Martinez storage facility.

- **Environmental/Social Impacts:** It will be a major setback to retreat from B100. Pure biodiesel that is a non-toxic, renewable, clean burning vegetable based fuel made in America from soybeans and other new vegetable oil crops that could be grown in our own state (e.g., drought tolerant high oil yield mustard). Diluting the fuel in half with petroleum is difficult to accept, especially after the City Council received an Environmental Achievement Award last June by the U.S. E.P.A., along with letters of congratulations from U.S. Senators and members of Congress.

Public Works would like to have the flexibility to determine the most effective way to balance environmental, technical, and financial concerns and provide City Council with regular updates on current fuel use. Public Works' newest vehicles use Compressed Natural Gas, which may be an even cleaner fuel.

POSSIBLE FUTURE ACTION

The B50 blend with ULSD may be the most realistic long-term compromise for California (given the limitations and cost of biodiesel). No other fleet in America is running on a mid-range blend like B50. More than 99 percent of all biodiesel fleets in the U.S. are running on the "standard" B20 blend (achieves only a 15-17% drop in PM, unacceptable by CARB) or on "low blends" like B2 or B5 (e.g., the entire fleet of state diesel vehicles in Minnesota is mandated now to run on 2% biodiesel).

Berkeley has the opportunity again to lead the country and pioneer a new "California biodiesel Blend" consisting of 50% biodiesel (ideally, made from local recycled yellow grease feed stocks) and ULSD. The new blend will favor recycled cooking oils or brown grease that produces a biodiesel with better emission properties, particularly for NOx. The blend will include additives to improve cetane levels and further decrease NOx emissions as well as to retard the growth of bacteria and mold in the fuel. Since the petroleum fuel is the ULSD, the sulfur oxides emissions will be very low and the fuel will become compatible with most after-treatment technologies designed to further reduce PM, unburned hydrocarbons and, in some cases, even reduce NOx emissions.

FISCAL IMPACTS OF POSSIBLE FUTURE ACTION

While the cost of fuel fluctuates daily, in fact the cost of diesel currently costs more than the cost of unleaded gasoline, initial savings listed in the balancing measures have changed. Currently the cost of B100 is around \$3.00 a gallon, ULSD costs \$2.00 a gallon, and a new B50 blend advocated by the consultant that used 50% biodiesel and 50% ULSD at a cost of around \$2.50 a gallon.

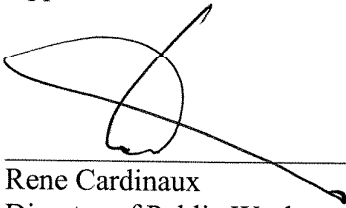
The City currently uses 160,000 gallons of B100 each year. A switch to ULSD will result in a savings of \$160,000. However, this may not allow the City to achieve the CARB emission control regulations to reduce particulate matter.

A compromise switch to the B50 blend will increase fuel costs more than if ULSD is used, and reduce savings to around \$74,000. However, this option will cause less pollutants (within acceptable CARB levels) to be released into the air than with the ULSD.

CONTACT PERSON

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Approved:



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