



## Lubricants

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### INTRODUCTION

King County is proud to have purchased re-refined motor oil since 1992. This helps the environment by reducing the impacts of refining and also conserves a non-renewable resource.

Engine lubricating oil does not "wear out." Producers can re-refine oil to remove contaminants introduced during its use and replace the "additive packages" that confer its specific properties, such as viscosity. Current technologies allow used oil to be re-refined into a high-quality base-stock and several oil companies now market products that have been certified by the American Petroleum Institute (API). API Certification is the basis for warranty requirements of motor vehicle manufacturers and is used in specifications of motor oil buyers.

In addition to using re-refined motor oils, King County began using vegetable-based hydraulic oils, in 2001.

### USAGE HISTORY AND EXPERIENCE

Motor oil made with re-refined base-stock has been used in county vehicles operated by the Renton Maintenance Facility, Motorpool and Solid Waste Operations since 1992. Metro Transit became one of the first major metropolitan transit authorities in the nation to adopt the use of re-refined motor oil for its entire fleet of over 1,200 buses in 1999. In 2008, the county purchased 106,000 gallons of re-refined oil, primarily 15w40 and 10w30, at a cost of approximately \$545,000.

The Renton Maintenance Facility of the Fleet Administration Division (Fleet) has purchased vegetable-based hydraulic oils for use in their equipment since 2001. Bio-based lubricants were tested by Fleet and found to perform as well or better than petroleum oils. They are readily biodegradable, low in toxicity, and are safer for workers. The agency also requires manufacturers to fill new equipment with vegetable-based hydraulic fluid. In the past year, they required four pieces of equipment, a compact tractor, grader, vibratory soil compactor and vibratory roller to be filled and labeled with "Use only Biodegradable Hydraulic Oil in This Unit." In the past year, they purchased 1,900 gallons at a cost of approximately \$24,000.

## BID AND CONTRACT SPECIFICATIONS

### King County Contracts

#### RE-REFINED MOTOR OIL

This section contains excerpts (shaded area) from the provisions of the 2007 Invitation-To-Bid for motor oil:

#### Report Requirements

Re-refined and virgin oil lubrication products may be purchased under the resulting contract. The supplier shall report the total dollars and unit volume of re-refined and virgin oil and lubrication products supplied each County department during each calendar quarter. This report may be provided in a format that is specified by the County, preferably computer generated. This report shall be provided in duplicate. One copy will be mailed to the Buyer of record of this contract and one copy will be mailed to the Environmental Purchasing Coordinator. This report shall be submitted during the month following the end of the completed quarter.

#### Specifications

##### A. 15 W 40 Motor Oil

Multigrade motor oil meeting the performance and warranty requirements of virtually all diesel and gasoline manufactures, including Caterpillar and Cummins.

##### 1. Re-refined Motor Oil

API Service Classification: CI-4, CH-4, CF-4, CF, SL.  
Allison C-4; Caterpillar ECF-1; Caterpillar TO-2, Cummins CES 20078.

##### 2. Virgin Motor Oil

API Service Classification: CI-4 Plus, CI-4, CH-4, CG-4, CF-4, SL, SJ.  
Allison C-4, Caterpillar ECF-1, Cummins CES 20078, Cummins 20077, Cummins 20076

##### B. 10 W 30 Motor Oil

Multigrade motor oil meeting the performance and warranty requirements of a broad range of passenger and light truck gasoline engines, including late model Fords, Chryslers and General Motors.

API Service Classification CI-4, Ch-4, CG-4, CF-4, CF, SL  
Caterpillar ECF-1, Caterpillar TO-2, Cummins CES 20076, 20071  
U.S. Government CID A-A-52039B

##### C. SAE 40W Motor Oil

Monograde motor oil meeting the performance and warranty requirements of diesel engine manufactures, including Detroit Diesel Corp.

API Service Classification: CF, CL, SJ  
U.S. Government CID A-A-52306A

##### D. Hydraulic Oil AW ISO 32

Premium Antiwear Hydraulic Oil

Designed for piston, gear, or vane pumps used in high pressure, high speed industrial and mobile hydraulic systems.

Typical Inspection Test:  
Pour point: oC (oF) -27 (-17)  
Viscosity : cSt @40oC.....32

##### E. Hydraulic Oil AW ISO 46

Premium Antiwear Hydraulic Oil

Designed for piston, gear, or vane pumps used in high pressure, high speed industrial and mobile hydraulic systems.

Typical Inspection Test:  
Pour point: oC (oF) -30 (-22)  
Viscosity : cSt @40oC...( 46)

#### F. Multipurpose Automotive Gear Lubricant, API GL-5

SAE Grade 85W/140

Thermally stable and thermally durable multipurpose extreme pressure automotive gear lubricant.

API Service GL-5, MT-1  
Mack GO-J  
SAE J 2360  
MIL –PRF-2105E  
Rockwell (Timken Axle) O-76-A (SAE 85W-140)  
And O-76-D (SAE 80W-90)  
Axles with limited-slip differentials  
Hypoid gear sets  
Manual transmissions (where an API GL-5 gear Lubricant is recommended.)

#### G. Multipurpose Automotive Gear Lubricant, API GL-5

SAE GRADE 80W/90

Thermally stable and thermally durable multipurpose extreme pressure automotive gear lubricant.

- API Service GL-5, MT-1
- Ford M2C197-A (SAE 80W-90)
- Mack GO-J:
- SAE J 2360
- MIL-PRF-2105E
- Rockwell (Timken Axle) O-76-A (SAE 85W-140) And O-76-D (SAE 80W-90)
- Axles with limited-slip differentials
- Hypoid gear sets
- Manual transmissions (where an API GL-5 gear lubricant is recommended)

#### H. Multipurpose Lithium Complex Grease

A multipurpose extreme pressure grease designed for use in a Wide range of automotive and industrial applications. Multipurpose Lithium Complex EP Grease NLGI Grade #2

- NLGI Automotive Service Classification
- GC-LB (ASTM D4950)
- 50 lb Timken OK Load rating

#### I. Premium Multipurpose Lithium Complex Grease

A multipurpose extreme pressure grease designed for use in a wide range of automotive and industrial applications.

Premium Lithium Complex EP Grease NLGI Grade #2

- NLGI Automotive Service Classification
- GC-LB (ASTM D4950)
- 80 lb Timken OK Load rating



**Equipment Requirements:**

- 1. John Deere
- 2. New Holland
- 3. Case Corp. (Case I.H.)
- 4. AGCO Massey-Ferguson
- 5. Fiat
- 6. Kubota
- 7. Transmissions/Wetbrakes MIL-L-2105C
- 8. Caterpillar TO-2

**Gear Performance:**

- 1. GL-4 Requirements

**Hydraulic Applications:**

- 1. Vickers
- 2. Rexroth
- 3. Denison
- 4. Sauer-Sundstrand
- 5. Commercial Intertech
- 6. White

**Friction:**

- 1. Ford, Brake Noise and Capacity, Ford 6610
- 2. John Deere, Power Shift Transmission, JDQ94

**Antiwear:**

- 1. Ford 3000
- 2. Final Drive - High Torque
- 3. John Deere JDQ95
- 4. Spiral Bevel - High Torque
- 5. FZG
- 6. Low Speed High Torque

**Thermal/Oxidation Stability:**

- 1. John Deere JDQ16
- 2. Allison C4

**Seal Compatibility:**

- 1. Ford M2C134D
  - a. ATRR 100 Nitrile
- 2. John Deere JDQ9
  - a. BUNAN
- 3. Allison
  - a. Polyacrylate
  - b. Silicone

c. Viton		
<b>Corrosion and Water Sensitivity:</b>		
1. Rust Protection, hours	ASTM D1748	>100
2. Copper Corrosion	ASTM D130	1a
3. Water Sensitivity Solids, %Additive Loss 0.0 (0.5% Volume H2O)		
<b>Biodegradability and Ecotoxicity:</b>		
1. CEC L33A93	80-90%	
2. WGK Rating*	1	
*Rating:	0=least harmful	
	3=most harmful	

**FOR MORE INFORMATION**

[Green California – Motor Oil](#)  
[API Standards for Motor Oil](#)

**VENDOR INFORMATION**

Current King County suppliers:

Re-refined Motor Oil -

[Nelson Petroleum](#) (425)353-9701 or (800)562-9882 Everett, WA  
[76 Lubricants](#) (manufacturer)

- [Copy of Purchase Order #B19416B and pricing](#)

Bio-based Lubricants -

[SeaPort Petroleum](#) - biobased lubricants (206) 971-7999 Seattle, WA  
[Renewable Lubricants](#) (manufacturer)

- [Copy of Purchase Order #B19801B and pricing](#)