

Customer Testimonial



Low Tox[®] Hydraulic Oil (6602) & Duolec[®] Vari-Purpose Gear Lubricant (1606)

New York City Water Tunnel Tunnel Boring Machine

- *Provided trouble free performance*

Customer Profile

New York City is developing its infrastructure. Many of the cities water and rail tunnels are close to a hundred years old and are operating at their maximum capacity. This report is on a water tunnel that was recently completed. These projects can range from half a billion to a couple of billion dollars. It is a joint venture of three tunnel constructors; the lead constructor is located in Secaucus, New Jersey.

Application

Tunnel Boring Machine (TBM)

The water tunnel was bored with a 12 foot diameter machine. The rail tunnels are bored with a 22 foot diameter machine. Numerous wheel cutting heads are mounted on the rotating face of the machine. The loose rock is removed via a conveyor mounted in the center of the front of the machine. In some cases, the rock is removed by rail cars. There are four large motor reducers that drive the rotating cutter face plate. They drive a large ring gear near the diameter of the machine. The face plate is supported by a large bearing. The machine maintains pressure on the rock face by hydraulic pressure. There are two hydraulic tanks on the machine. One holds 600 gallons and the other holds 300 gallons.

Challenge

The hydraulic system has the greatest potential for an oil spill. The City requires biodegradable oil in the hydraulic reservoirs. They prefer a vegetable oil, but the constructors have found that they perform poorly in the TBM. The other critical application is the gear drive

components. A days downtime can cost \$400,000. The four gear drive units, ring gear and the support bearing are constantly under shock loads. Often foam and water in the gear oil would slow the job down. A failure of a gear drive could occur.

LE Solution

Dave O'Connor, LE lubrication consultant, recommended Low Tox[®] Hydraulic Oil (6602) and Duolec[®] Vari-Purpose Gear Lubricant (1606).

Low Tox 6602 is a low toxicity hydraulic oil designed with advanced product technology that gives performance equivalent to premium hydraulic fluids, yet affords low ecotoxicity to address environmental concerns.

Duolec 1606 is a high performance industrial/automotive gear oil acceptable for use in any industrial gear or bearing application that requires a high thermal stability, extreme pressure lubricant.

Results

Using Low Tox 6602, the hydraulic system operated the complete job with no unexpected outages or failures. It provided trouble free performance from start to finish.

Duolec 1606 ISO 320 protected the gear reducers, the ring gear and the support bearing. On the previous job, the four reducers experienced severe foaming problems with a commercial gear oil. Duolec 1606 is nonfoaming in service. It also allows any water that enters the system to immediately drop to the bottom of the reservoir.



LEAP (LE Analysis Program) samples were monitored on a regular basis to assure machine and oil condition. Oil changes were based on condition rather than on time. All components provided trouble free service with no failures. The ring gear was in such good condition that it was used on the next job.

Other Products Used

Conveyors

The water tunnel used an extensive conveyor system to remove the excavated rock. Almagard® Vari-Purpose Lubricant (3752) sealed out water and contaminants while extended grease intervals. Bearing life was greatly extended thus, reducing downtime. They also removed rock by rail car.

Dewatering Pumps

Water migration into the bearing housing was a constant challenge often causing pump failure. Multilec® Industrial Oil (6804) and Low Tox® Turbine Oil (6414) resist water wash out and with a very high film strength tolerate water better than other oils.

Locomotive Diesel Engines

Emissions in the tunnel are critical. With the Ultra Low Sulfur Diesel Fuel, the performance of diesel engines are often poor. Assurance of a clean engine that delivers complete fuel combustion is difficult to achieve. BTU+ Total Treat (2410) Diesel Fuel Improver delivers complete combustion and fewer emissions.

Thank you to Dave O'Connor, LE lubrication consultant (pictured), for providing the information used in this report.



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Based on actual user experience. Individual results may vary. Not intended to supersede manufacturer specifications.