

Populations, Activity and Emissions of Diesel Nonroad Equipment in EPA Region 7

Oil and Diesel Sampling Standard Operating Procedures Appendix M

Assessment and Standards Division
Office of Transportation and Air Quality
U.S. Environmental Protection Agency

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Fuel and oil sampling procedures for Nonroad PEMS Study

Fuel sampling

- Locate diesel fuel tank on equipment, and using the electric fuel pump, draw some diesel fuel through the pump and tubing, routing the outlet hose back into tank. This will flush the fuel sampling system. Then, insert the outlet hose into the 1 L glass jar (located in bottom cabinet in front of Sensor's SEMTECH trailer). Fill the jar, leaving a small empty space near the top for liquid expansion.
- Once the jar is nearly full, put the outlet end of the fuel line into the fuel tank, remove the inlet from the fluid, and run the pump so the residual fuel in the sampling system is drained back into the equipment fuel tank.
- Secure the sample jar lid tightly. Using a permanent, indelible marker, write the sample # on one of the label cards with a metal tie band. The sample number should be the last 4 digits of establishment #-last 4 digits of equipment serial #-YYYY/MM/DD (i.e., 1456-5675-20070710 for a fuel sample taken July 10, 2007 from the piece of equipment with last 4 digits of serial # 5675 at establishment 1456). Tightly secure the tie band around the neck of the bottle.
- Using a permanent, indelible marker, mark the fuel level around the entire outside of the jar.
- Using a permanent, indelible marker, also write the sample # on a sticky label and affix to the side of the sample jar (placing the top of the sample label adjacent with the fuel level).
- Place the sample in the sample cooler in the lower cabinet at the front of the trailer, surrounded with overpack to protect it during transport.

Oil sampling

- Using the Polaris oil sampling supplies, draw an oil sample (see guidelines on next page). Pour the sample from the plastic Polaris jar into the glass oil sample jar located at the front of the Sensor's SEMTECH trailer. Draw additional sample as needed to fill the glass jar completely (with small air space near the top).
- Secure the lid tightly, and affix a tie-on label with sample # as described above.
- Make an indelible mark at the oil level around the entire perimeter of the glass jar with a marker, and affix the identifying sticky label according to the oil level as described above.
- Place the sample in the sample cooler in the lower cabinet at the front of the trailer, surrounding with overpack to protect it during transport.

Use of Polaris oil sampling equipment, taken from: <http://www.polarislabs1.com/oil-sample.htm>

Using a Vacuum Pump

The vacuum pump is used to extract samples from a dipstick or non-pressurized system. When extracting the sample, it is important to use a new piece of tubing in order to avoid sample contamination. It is also important to have an appropriate container and follow all the directions thoroughly to ensure that the oil sample is representative of all the oil in the machine.

POLARIS has developed oil analysis kits in order to make oil analysis convenient, easy and simple. These kits include pump, tubing, jars and preaddressed mailers.

Step 1- Carefully unpack the POLARIS Sample Kit, place material on a clean surface and fill out sample jar label. Measure tube to the length of reservoir tank or dipstick, add 6 inches to the measurement and place a mark on the tube.

Step 2- Insert the tube through the head of the vacuum pump and tighten lock ring. The tube should extend about 1 inch beyond the base of the vacuum pump head.

Step 3- Screw in the white sample jar to the bottom of the vacuum pump and tighten securely. Place tube into the oil, retaining tube up to the mark on the tube.

Step 4- Push and pull the vacuum pump plunger a few times to start the suction. Continue pumping until sample jar is $\frac{3}{4}$ full. Hold the pump upright in order to avoid contamination.

Step 5- Unscrew the sample jar from the vacuum pump and place the lid back on the sample jar and tighten securely. Drain remaining fluid out of tube into tank and remove tube from fill port. Unscrew locking ring on vacuum pump, remove and properly dispose used tube. Place the sample jar label on sample jar and the appropriate return-mailing label on black return mailer. Send the sample to the lab immediately.

Transport

All fuel and oil samples will remain in the PEMS deployment trailer until it is returned to Michigan. Ensure all bottles are property padded and packed tightly to avoid movement and breakage during shipping. Ensure all containers are tightly sealed to eliminate leaks and off-gassing during storage and transportation, and utilize secondary containment for any spills which might occur. Ensure all samples are received by EPA upon arrival in Michigan.