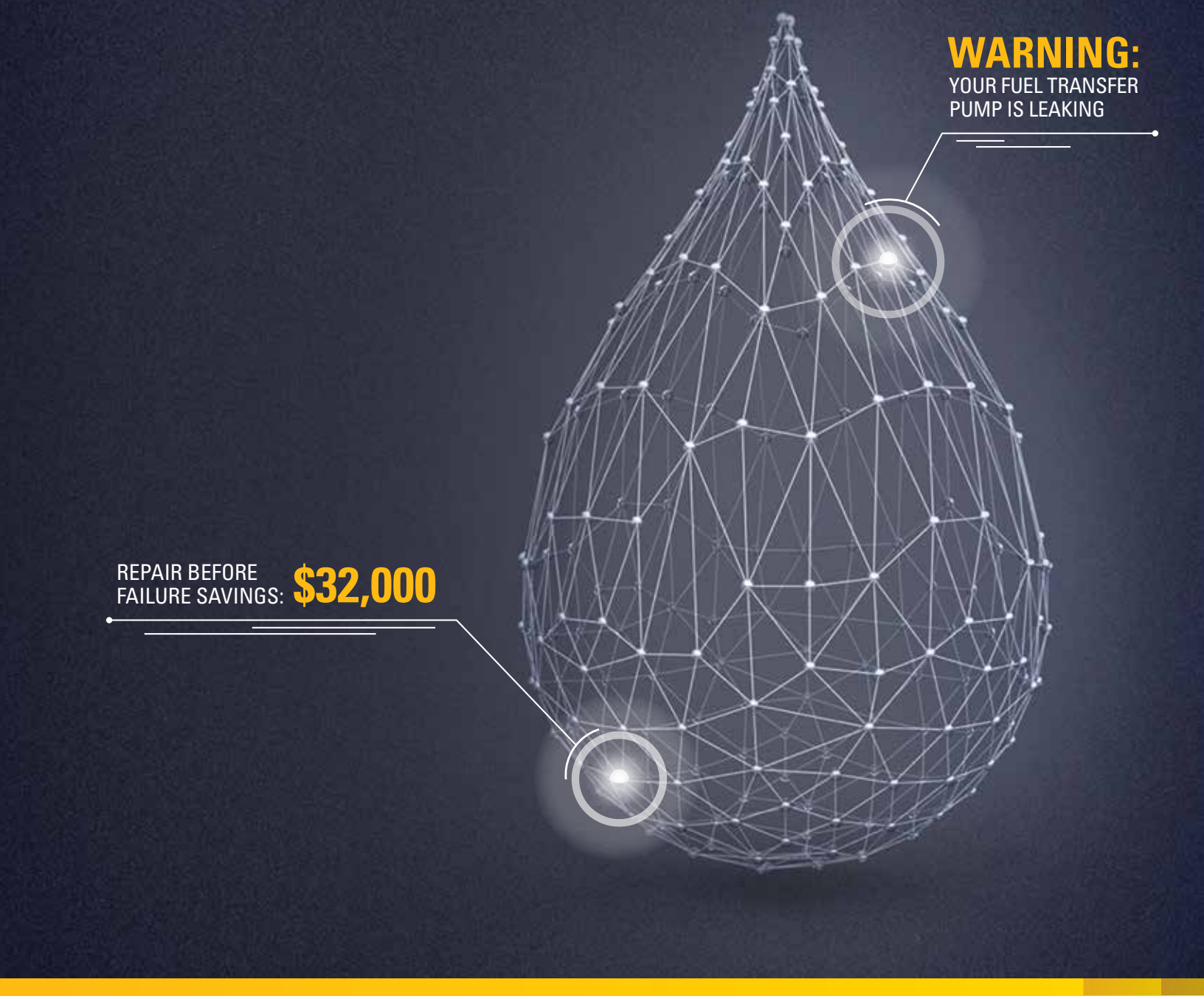
CAT® S·O·S℠ SERVICES

LISTEN TO THE LIFEBLOOD OF YOUR MACHINE



FULL MENU OF
FLUID ANALYSIS CAPABILITIES

CAT®

CAT® S·O·S℠ SERVICES

FULL MENU OF FLUID ANALYSIS CAPABILITIES

The Cat® S·O·S℠ Services Team includes highly trained scientists, engineers and product support experts with decades of equipment know-how. We're focused on one goal: Looking out for the health of your machines and the bottom line of your operation, every day.

Whether you're new to sampling or a seasoned pro...

Whether you're using Cat fluids or another brand...

Whether you'd like to order your own sampling kit or let your Cat dealer handle it all for you...

Here's an in-depth look at the full testing options available to you—only from S·O·S Services. Let's explore the right mix for your unique needs.



UNDERSTANDING YOUR **OIL**



A visual inspection can only reveal so much about the operating health of your equipment. But ongoing oil analysis helps you spot small problems long before they become costly repairs. That means you get more productive hours and fewer downtime headaches.

Only S·O·S Services gives you detailed information about your equipment's oil condition, internal wear and contamination levels. Plus, get wear metal trending data specific to your machine, which quickly spots deviations and monitors gradual changes in concentration levels.

» AVAILABLE SERVICES

STANDARD TESTING

Our technicians perform comprehensive analysis on lubricated systems (engines, transmissions, hydraulics, final drives, differentials, gearboxes, compressors).

We can spot:

- Early signs of damaging wear metals
- Condition of your oil
- Overall particle analysis
- Contaminants that hurt performance (water, fuel, glycol, dirt, etc.)

ADDITIONAL TESTING

- **Total Acid Number (TAN)** measures the buildup of acidic byproducts in your oil, which can lead to corrosion and premature wear of internal metallic components.
- **Total Base Number (TBN)** measures your oil's reserve alkalinity and its ability to neutralize acidic components and prevent corrosion.
- **Water (Karl Fischer Titration)** measures the moisture in your oil. Water doesn't act as a good lubricant, and even relatively small amounts can interfere with the oil's ability to form a protective film between moving parts.

THE CASE FOR **COOLANT**



Some equipment users may be overlooking their cooling system maintenance or even recycling coolant to reduce disposal costs. But today's engine operating temperatures are higher than they used to be, and smaller radiators and cooling system capacities are being designed into modern diesel engines. These and other factors are placing ever-higher demands on your coolant and cooling systems.

Problems that originate in your cooling system often spread into major issues throughout your engine, transmission or hydraulic system. In fact, about 50% of all engine downtime can be attributed to cooling system problems. That's why it's so critical to care about your coolant as much as your oil.

» AVAILABLE SERVICES

LEVEL 1

Every time you change your oil (or around every 500 hours), get a coolant test. This easy check can determine whether your coolant has the right chemical balance for maximum system protection and cooling efficiency. It's also helpful for documenting routine maintenance.

Tests and interpretation include:

- Glycol level
- pH
- Conductivity
- Nitrite
- Magnetic solids
- Odor
- Color
- Appearance
- Precipitate
- Foam
- Freeze point / Boil Point
- Elemental Analysis

LEVEL 2

About once a year, it's important to proactively check for issues like cavitation, corrosion or electrolysis that can go undetected until it's too late. Also, if you suspect a cooling system problem or want extra peace of mind that your coolant is working as it should, Level 2 is recommended. (Level 1 analysis may indicate the need for Level 2.)

Includes all tests performed in Level 1, *plus:*

- Evaluating coolant chemistry
- Elemental analysis
- Contaminants
- Water quality
- Anion analysis of coolant additives & their breakdown products



"Hidden machine issues happen more than you think. My colleagues and I study about 7 million samples each year, and roughly 15% reveal issues our customers need to know about right away. I'm passionate about finding potential problems early, so you never have to worry."

— **DANA FRANKLIN**
Chemist, Corporate Accounts
Caterpillar S•O•S Services

DON'T FORGET **DIESEL FUEL**

Fuel quality can be a key indicator of the overall health of your system. And poor-quality fuel can affect how your equipment performs—including abnormal wear of components, valves, valve guides, piston rings, etc. This has bottom-line impacts on your maintenance and operating costs.

Beyond performance, equipment owners are increasingly realizing the value of regular fuel analysis when it comes to meeting emissions requirements. Are you putting quality fuel in your tank?

S•O•S Services and your Cat dealer can help check your fuel quality, inside the tank and out. We offer several options to pinpoint problems before they become serious.



» AVAILABLE SERVICES

BASIC FUEL CHECK

Periodically testing your fuel is an easy way to spot common issues like water contamination, which can lead to filter-plugging microbe growth. Prolong the life of your parts and get good insight into issues like hard starting, wear and power loss as well as Fuel Specification.

Tests and interpretation include:

- Biodiesel content
- Sulfur content
- Elemental analysis
- Particle count
- Karl Fischer
- Visual inspection
- Microbial growth (bacteria & fungi)

FUEL MONITORING

Go beyond the Basic to keep your productivity on track, while ensuring your machines meet emissions requirements by minimizing diesel particulates. This service is even better for insight into filter plugging, hard starting, accelerated wear and low power, as well as Fuel Specification. It also can reveal sources of white smoke and deposits.

Includes all tests performed in Basic, *plus:*

- Color
- Cetane index
- Density
- Viscosity
- Distillation curve

FUEL STORAGE

Large operations often store fuel on site for convenience. But when fuel is subjected to heat, moisture and other conditions, its quality can degrade. This service is just as handy as Fuel Monitoring for hard starting and white smoke—and it's the best for detecting causes of rapid filter plugging, deposits, accelerated wear and low power, as well as Fuel Specification.

Includes all tests performed in Basic and Fuel Monitoring, *plus:*

- Clear & bright
- Oxidation stability
- Flash point

COLD TEST

If you're using or storing fuel in a cold-weather environment, that can further impact its quality. It's crucial to recognize issues such as particulate clouding early. (This service also provides robust insights about all issues discussed in other testing options.)

Includes all tests performed in Basic and Fuel Monitoring, *plus:*

- Pour point
- Cloud point
- Cold filter plugging point (CFPP)





"From a cost-savings standpoint, if we have dirt entry and metal wear in the oil, we can do a repair or reseal for $7,000. A failure can cost $25,000. That's a continuous savings for us."

— **JOHN MEESE**
Senior Director of Heavy Equipment, Waste Management, & AEMP 2016-17 Chairman

TESTS & REFERENCE

You want accurate results you can trust, every time. That's why we developed a proprietary process that combines high international standards with the equipment expertise you can only get from Caterpillar. S•O•S Services worldwide testing standards are built by Caterpillar scientists and backed by product engineers to ensure consistent quality.

FUEL

TEST	TEST METHOD
Percent biodiesel	EN14078
Sulfur content	ASTM D5453
Distillation curve	ASTM D7345
Particle count	ISO 4406
Density	ASTM D4052
Viscosity	ASTM D445
Oxidation stability	EN 14112
Color	ASTM D6045
Water, Karl Fischer Titration	ASTM D6304
Cetane index	ASTM D4737
Pour point & cloud point	ASTM D7346 & ASTM D7689
CFPP	ASTM D6371
Flash point	ASTM D93 or D6450

COOLANT

TEST	TEST METHOD
Percent glycol	Caterpillar Inc.
pH	ASTM D1287
Conductivity	Caterpillar Inc.
Freeze point / boil point	ASTM S3321
Nitrite by discrete analysis	Caterpillar Inc.
Magnetic solids, odor, color, appearance, precipitate, foam	Record of physical properties
Organic additives by HPLC	Caterpillar Inc.
Anion analysis by IC	ASTM D5827
Elemental analysis	ASTM D6130

OIL

TEST	TEST METHOD
Elemental analysis	ASTM D5185
Oil condition analysis	ASTM E2412
Viscosity	ASTM D445
Percent of fuel content	ASTM D7593
Percent of glycol content	ASTM D7922
Particle count	ISO11171:1999 reported per ISO 4406
TAN	ASTM D664
TBN	ASTM 2896
Water, Karl Fischer Titration	ASTM D1744 or D7546

CONNECT WITH THE EXPERTS

Learn what a smart program includes, request a sample kit or discover how your dealer can handle equipment management for you at **www.cat.com**

LET'S DO THE WORK.™

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