



NORTHLAND TECHNICAL
LABORATORIES

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1000 RAINBOW DRIVE
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CHRIS
NEATON BROTHERS EROSION
PO BOX 879

WATERTOWN MN 55388

STATUS IS (NORMAL) FOR SAMPLE DATED { 02/20/24 }

UNIT I.D.: B4T750-DE
COMPONENT TYPE: DIESEL ENGINE
COMP. POSITION:
COMP. MAKE/MODEL: BOBCAT T750
COMP. SERIAL #:
EQUIP. MAKE/MODEL: UNKNOWN-PLEASE ADVISE
LOCATION/SITE:
OWNER:
DISTRIBUTOR:

LUBE TYPE/GRADE: NORTHLAND SUPERLINE 15W40 EXP CK-4

CUSTOMER#: NBM7245523

RECOMMENDATIONS FOR LAB# (92002) REPORTED ON { 03/18/24 }

ANALYSIS INDICATES COMPONENT AND FLUID CONDITION ARE SATISFACTORY FOR THE TESTS THAT WERE PERFORMED.

SPECTROCHEMICAL ANALYSIS IN PARTS PER MILLION BY WEIGHT

LAB# REPORT DATE	IRON	CHROMIUM	ALUMINUM	NIQUEL	TIN	LEAD	COPPER	SILICON	SILICON	BORON	SODIUM	POTASSIUM	MAGNESIUM	PHOSPHORUS	ZINC	CALCIUM	MANGANESE	BARIUM
92002 03/18/24	22	<1	5	2	<1	<1	<1	<0.1	13	324	2	2	66	1033	1209	1580	337	<1
46754 05/09/22	19	1	4	4	<1	<1	1	<0.1	5	226	1	2	49	1049	1168	1743	242	<1
27098 07/10/20	6	<1	<1	<1	<1	<1	<1	<0.1	4	2	2	1	3	975	1085	2356	18	<1
94465 09/27/18	10	<1	2	<1	<1	1	1	<0.1	6	1	2	2	2	932	1050	2286	37	<1

SAMPLE DATA

PHYSICAL TEST RESULTS

LAB#	SAMPLE DATE DRAIN (Y/N)	HRS. OIL UNIT	VIS100C cSt	OXID ABS/CM	NITR ABS/CM	FUEL %	WATER %	GLYCOL %	SOOT ABS/CM
92002	02/20/24 Y	256 9744	14.38	29	21	<1.0	<0.1	<0.1	19
46754	04/21/22 Y	200 8407	14.43	23	16	<1.0	<0.1	<0.1	21
27098	05/15/20 Y	1151 7033	14.00	5	6	<1.0	<0.1	<0.1	12
94465	09/20/18 Y	115 5436	14.61	8	8	<1.0	<0.1	<0.1	21

NOTE: (+) BENEATH a result indicates it is HIGHER than LIMIT or TREND, (*) BENEATH a result indicates it is LOWER than LIMIT or TREND

LEGEND: (*) and (T) indicate abnormal results. Results not so noted are considered satisfactory. (<) = less than (>) = greater than. Refer to back of report for additional information.

Fatigue wear associated with catastrophic failure may not be detected by this analysis. The decision to teardown equipment should be made only after thorough evaluation of all factors including historical oil analysis data and equipment performance and operation.

Recommendations and comments are based on the expectation that all sample and unit information is accurate and representative. Missing and/or inaccurate data may affect evaluation accuracy. No warranty is expressed or implied.

Interpretation of Status:

NORMAL=

Results satisfactory- continue routine operation/maintenance

MARGINAL=

Diagnostics may be recommended- close monitoring required

ABNORMAL=

CRITICAL=

Diagnostics and corrective action required
Corrective action required- teardown may be recommended

VISCOSITY (centistokes)

fluid's resistance to flow at specific temperature. Results graded according to classifications by SAE-engine/automotive gear oils, AGMA-industrial gear oils, ISO-industrial oils. Increases indicate oxidation, overextended drain intervals and/or soot loading. Decreases indicate dilution with fuel, other lower viscosity fluid, or shearing of multi-grade oils. Make-up oil may cause increase or decrease.

FUEL DILUTION (% by volume)

unburned fuel in oil caused by system leaks, excessive idling, and/or prolonged cold engine operation.

WATER (% by volume)

abnormal due to condensation or internal/external leaks. Interferes with proper lubricant function, promotes corrosion and sludging.

GLYCOL (% by volume)

contamination from cooling system leaks, results in sludge formation and bearing corrosion.

TBN (Total Base Number)

total alkaline reserve of engine oil. Higher TBN levels reflect increased capacity to neutralize acids during combustion and/or oxidation of lubricant. Significant decreases reflect reduced control of ring/liner deposits, bearing corrosion and depletion of additive package.

TAN (Total Acid Number)

level of acidic components/by products in lubricant. Increases in TAN of used oil relate to oxidation, nitration and/or overextended drain intervals.

PARTICLE COUNT (particles per milliliter)

quantities and sizes particles in fluid without regard for composition. High counts signify poor system cleanliness/filtration efficiency. Limits specified by equipment and filter manufacturers. Results reported in micron ranges and/or ISO contamination code. Requires specially cleaned sample bottles.

INFRARED SPECTROSCOPY (absorbance units per centimeter- high indicates increased degradation or contamination)

measures specific organic degradation products and contaminants by comparing used sample with new oil reference. Establishing proper baseline with correct unused reference oil is essential.

OXIDATION

compounds originate when oxygen in air reacts with lubricant resulting in viscosity/acidity increases, corrosion, and sludge deposits. Formation accelerated by high temperatures, water contamination and/or metal catalysts.

NITRATION

compounds originate during combustion when nitrogen in air reacts with lubricant resulting in viscosity/acidity increase. Formation accelerated by overly lean air/fuel ratio and/or excessive blowby.

SPECTROCHEMICAL ANALYSIS

metallic elements identified and quantified for monitoring component wear, corrosion debris, airborne/coolant contaminants and oil additives.

Typical sources for each element are as follows:

ELEMENT	ENGINES	TRANSMISSIONS	GEAR SYSTEMS	HYDRAULICS	ALL SYSTEMS
IRON-(Fe)	liners, cylinders, valve train, rings, pistons, shafts	gears, shafts, bearings, brakes	gears, shafts, bearings, housing	pump, rod, gears, valves	dirt, oil additive, gaskets, sealants
CHROMIUM-(Cr)	rings, liners, shafts, valve train	bearings, gears, shafts	bearings, gears, shafts	cylinder rod	oil additive, coolant additive, fuel additive
ALUMINUM-(Al)	pistons, bearings, bushings, cylinder, blower, turbocharger	torque converter, bushings	bushings, oil pump, thrust washers	pump housing	coolant additive, oil additive
NICKEL-(Ni)	shafts, valve train	bearings, gears, shafts	bearings, gears, shafts	gears	piston rings, oil additive
TIN-(Sn)	bearings, bushings, pistons	bushings, thrust washers	bushings, bearings	bushings, bearings	oil additive, fuel additive, coolant additive
LEAD-(Pb)	bearings, fuel additive	bushings	bushing	bushings	oil additive
COPPER-(Cu)	bearings, bushings, thrust washers, oil cooler, oil additive	bushings, thrust washers, bearings, oil cooler, clutch discs	bushings, thrust washers	bushings, oil cooler, bearings	oil additive, fuel additive
SILVER-(Ag)	bushings, solder	oil cooler, solder	solder	solder	

Viscosity Classification Equivalents

