TESTOIL
COOLANT ANALYSIS

Overall Condition Marginal

Machine Name: Previous sample 2816496

Machine ID: 6637-1-20

STANDARD COOLANT ANALYSIS

Component Information		Sample Information		Customer Information
Coolant:	MPC Thermoguard Universal ELC5	Received:	7/27/2021	Jack Boilerman
Coolant Chemistry:		Report:	7/30/2021	Great Lakes Fleet
Machine MFG:	UNKNOWN	Sample No.	999-1-710	20338 Progress Drive
Machine MOD:		Analyst / Test:	MMM / CLSTD	Strongsville, OH 44149
Machine Criticality:	Unknown	Sample Source Rating:	Unknown	

PROBLEMS

Wrong Color
Cloudy Appearance Observed
Non-Magnetic Particles Observed

COMMENTS

Coolant has changed color. Coolant should match the color of the original manufacturer/product specifications. Probable causes of color change include improper coolant mixing, glycol deterioration, outside contaminants, and/or precipitation of inhibitors out of coolant. Coolant is cloudy. Coolant should be clear and bright. Possible cause of change in clarity include improper coolant mixing, glycol deterioration, outside contaminants, and/or precipitation. Non-magnetic particulate present in coolant. Possible causes include outside contamination entering cooling system and/or coolant chemical/inhibitor drop-out. Non-magnetic precipitate in coolant can cause the plugging of cooling system passages, which can lead to restriction of flow and over heating.

CUSTOMER NOTES

Sample Date	New Fluid	7/26/2021								
Lab Number		3271963								
Hours on Engine		Unknown								
Hours on Fluid		Unknown								Normal
Condition		Marginal								Values
FLUID CONDITION										
Glycol % (R)		54.9								50.0
Freezing Point °C (R)		-44								< -30
Boiling Point °C (R)		109								> 100
pH (G)		7.8								7.0 - 11.0
OBSERVATIONS (analyst rating) IWI-520										
Color		Non-standard								
Visual Clarity		Cloudy								Clear
Visible Foam		None								None
Visible Oil		None								None
Fuel Odor		None								None
Magnetic Particles		None								None
Non-Magnetic Particles		Slight								None
CONTAMINATION										
Specific Conductance (N)		551								< 6600
Total Dissolved Solids (N)		289								< 3400
Calcium (E)		-								< 60
Magnesium (E)		-								< 20
Hardness as $CaCO_3$ (E)		-								< 300
Chloride (A)										< 75
Fluoride (A)										< 30
Sulfate (A)										< 300
DEGRADATION (mg/L) Ion Chromatography IWI-500										
Glycolate (A)										< 1500
Acetate (A)										
Oxalate (A)										< 50
Formate (A)										< 250

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Sample Date	New Fluid	7/26/2021								Normal Values
Lab Number		3271963								
Hours on Engine		Unknown								
Hours on Fluid		Unknown								
Condition		Marginal								
ADDITIVES (INORGANIC)										
Nitrate (A)										
Molybdenum (E)		8								
Nitrite (Test Kit) (J)		1600-3200								
Nitrite (A)										
Phosphate (A)										
Phosphorus (E)		20								
Boron (E)		13								
Silicon (E)		8								
Sodium (E)		542								
Potassium (E)		58								
SCA Number (U)		2.4								
ORGANIC ACID TECHNOLOGY (mg/L) HPLC IWI-510										
2-Ethylhexanoic Acid										
4-tBu-Benzoic Acid										
Adipic Acid										
Benzoic Acid										
Octanoic Acid										
p-Toluic Acid										
Sebacic Acid										
BT										
MBT										
TT										
WEAR (ppm) ICP Spectroscopy IWI-101										
Aluminum (E)		-								< 5
Copper (E)		-								< 5
Iron (E)		7								< 10
Lead (E)		-								< 5
Silver (E)		-								< 5
Tin (E)		-								< 5
Zinc (E)		-								< 10

Report Key: (-) Below detection limit, (A) mg/L - Ion Chromatography ASTM D5827 Mod, (E) ppm - ICP Spectroscopy IWI-101, (G) pH units IWI-142, (J) mg/L IWI-320, (N) uS/cm IWI-480, (R) Calculated from refractive index IWI-134, (U) Calculated from nitrite and molybdenum, (BT) Benzotriazole, (MBT) Mercaptobenzothiazole, (TT) Tolyltriazole

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REPORT REFERENCE

Fluid Condition	Glycol concentration shows whether the right mix ratio is being employed (water to glycol); when lower than expected there is likely inadequate protection for the cooling system and engine, and when higher than expected there will be a loss of heat transfer capabilities. Freeze and Boiling Points are dependent on glycol% and hint at the expected operating temperature range. The pH of conventional coolants is typically higher than that of OAT or HOAT coolants, but both are typically alkaline (pH >7). If the coolant becomes acidic (pH <7) then there is a risk of corrosion, and if the coolant is more alkaline than expected it usually indicates mixing of coolants or over-concentration.
Observations	Color, clarity, and foam provide an overview of the physical appearance of the coolant, as any change will indicate likely degradation and/or contamination. Odors are checked for signs of contamination due to adverse conditions within the cooling system. Non-magnetic particles can appear for a number of reasons including a poor source of water (used to dilute coolant concentrate) or environmental ingression; magnetic particles are signs of corrosion, cavitation or defective electrical grounds.
Contamination	Conductivity increasing indicates contamination originating from the water supply, such as hardness (calcium and magnesium) and fluoride, or combustion gases; sudden changes may be the result of overdosing inhibitor or concentrate, or mixing with another coolant. The presence of these contaminants can lead to scale and/or corrosion within the cooling system.
Degradation	Glycolate indicates the primary breakdown of the glycol portion of the coolant which is generally caused by localized overheating or an air leak (i.e., combustion blow-by) within the system. Acetate, oxalate, and formate are all signs that degradation has progressed into a more severe, secondary stage of degradation.
Additives	The presence and concentration of additives will vary from one coolant to another and should be compared to the new fluid reference; the presence of additives not seen in the reference coolant indicates that mixing with another coolant has likely occurred, and may void the OEM warranty.
Organic Acid Technology	The presence and concentration of these additives will appear in some Extended Life Coolants (ELC) and should be compared to the new fluid reference.
Wear	Wear metals are most commonly signs of corrosion (driven by low or incorrect additives) or cavitation (driven by air leaks). They may also appear due to grounding faults, localized hot spots, or poor water source.

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