ZIEGLER CAT
901 West 94th Street
Minneapolis MN 55420-4236

ZIEGLER RENTAL — THE Rental STORE

MINNESOTA	952-888-4121	800-352-2812
IOWA	515-957-3800	800-342-7002
MISSOURI	515-957-3800	800-342-7002
WISCONSIN	515-957-3800	800-342-7002

Sold To: M B E INCORPORATED
530 RIVER ST S
DELANO MN 55328

Invoice Number: SW000175662
Date: 11/08/13
Account No.: 5320900

Ship To:

W7648

Invoice Information

WO Number:	FM32968	Make:	CATERPILLAR
WO Date:	9/17/13	Model:	D6RDSLGP
		Serial:	09PN01039
Store:	MINNEAPOLIS	PIN:	
Payment Terms:	CHARGE	Id No:	
P/O Number:	D6R	Cust Unit:	L120
Ship Via:			
Invoice Type:	1H1H1H	Meter:	4188.0

ENTERED 11-19

Invoice Summary

Parts:	7,116.99
Labor:	11,916.00
Misc:	1,017.85
Taxes:	1,428.63
Invoice Total:	21,479.47

Amount Due: $21,479.47

DUE BY 10TH OF THE NEXT MONTH
A service charge of 1 1/2 % per month will be assessed on all past due accounts.

To ensure proper credit, please detach this portion, at the perforation, and return with remittance.

M B E INCORPORATED
530 RIVER ST S
DELANO MN 55328

Account Number: 5320900
Invoice Number: SW000175662
Invoice Date: 11/08/13

Please remit to:
ZIEGLER INC.
SDS 12-0436
PO BOX 86
MINNEAPOLIS,MN 55486-0436

Amount Due: $21,479.47

Amount Enclosed:

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Invoice Number: SW000175662 **Date:** 11/08/13 **Account No.:** 5320900

Quantity	Item	N/R	Description	Unit Price	Extended

CLEAN MACHINE
CLEAN AREA TO BE REPAIRED
REPAIR PROCESS COMMENTS:
REMOVED BELLYPANS AND PANELS. CLEANED MACHINE FOR ENGINE REPAIR.

F/R LBR 500.00 *

SEGMENT 01 TOTAL 500.00 T

REPAIR RADIATOR TANK
REPAIR RADIATOR NECK -- CRACKED
REPAIR PROCESS COMMENTS:
REMOVED THE OLD RADIATOR NECK. CLEANED THE AREA WHERE THE NEW ONE WILL BE INSTALLED. INSTALLED THE NEW RADIATOR NECK. SWAPPED THE STEP TUBE FROM THE OLD NECK. CHECKED FOR LEAKS. DID NOT FIND ANY LEAKS.

1	8N-8846		NECK FILLER	S5	11.30	11.30

TOTAL PARTS SEG. 10 11.30 *

TOTAL LABOR SEG. 10 58.00 *

SEGMENT 10 TOTAL 69.30 T

REPAIR RADIATOR
CUSTOMER COMPLAINT:
RADIATOR WAS LEAKING BADLY.
PUNCTURE IN ONE OF THE RADIATOR CORES.
REPAIR PROCESS COMMENTS:
RAN MACHINE INTO THE SHOP AND REMOVED THE GRILL AND RIGHT SIDE ENGINE PANELS. STARTED MACHINE TO PINPOINT WHERE THE LEAK WAS COMING FROM. FOUND ONE CORE LEAKING BADLY. DRAINED COOLANT DOWN & REMOVED THE ONE LEAKING CORE. REPLACED IT ALONG WITH THE BOTTOM TANK SEAL AND TOP CONNECTING HOSES. PUMPED COOLANT BACK INTO THE SYSTEM AND TOPPED OFF WITH AN ADDITIONAL 4 GALLONS OF ELC. STEAMED OFF RADIATOR AREA AND RAN MACHINE TO CHECK FOR ANY ADDITIONAL LEAKS. NONE WERE FOUND. INSTALLED GRILL AND PANELS.
**THE RADIATOR CORE THAT WAS REPLACED WAS THE THIRD ONE FROM THE RIGHT SIDE OF THE MACHINE AS VIEWED FROM SEATED IN THE CAB.

4	1P-4278		CLAMP	S5	1.30	5.20
1	6I-2431		SEAL	S5	41.78	41.78
2	106-4572		HOSE	S5	4.69	9.38
1	175-0505		CORE AS-RADI	S5	489.14	489.14
9	238-8648		COOLANT-ELC	S5	12.75	114.75

TOTAL PARTS SEG. 11 660.25 *

TOTAL LABOR SEG. 11 696.00 *

SEGMENT 11 TOTAL 1356.25 T

FLUSH RADIATOR
FLUSH RADIATOR GROUP -- HAS OIL IN COOLANT SYSTEM
REPAIR PROCESS COMMENTS:
RAN WATER AND STEAM CLEANER SOAP IN THE COOLING

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Quantity	Item	N/R	Description	Unit Price	Extended

SYSTEM. STALLED MACHINE OUT AND RAN FOR AN ADEQUATE TIME IN ORDER TO THE HAVE THE THERMOSTAT OPEN AND FOR THE SOAP TO GET EVERYWHERE. DRAINED. RAN STRAIGHT WATER IN SYSTEM. RAN MACHINE AGAIN. DRAINED. FOUND THE WATER TO STILL BE TOO FULL OF OIL. FILLED WITH CAT BRAND FLUSH AND WATER. RAN MACHINE UNTIL HOT AGAIN. DRAINED. FLUSHED THE COOLING SYSTEM WITH CLEAN HOT WATER UNTIL NO SOAP WAS COMING OUT OF THE DRAIN ON THE RADIATOR AND THE DRAIN ON THE TRANSMISSION OIL COOLER. FINISHED DRAINING, CLOSED DRAINS, FILLED MACHINE WITH COOLANT. RAN MACHINE TO MIX COOLANT. CHECKED THE FREEZING TEMPERATURE AT -32 DEGREE FAHRENHEIT.

4	4C-4610	CLEANER	S5	13.57	54.28

TOTAL PARTS SEG. 12 54.28 *

TOTAL LABOR SEG. 12 464.00 *

SEGMENT 12 TOTAL 518.28 T

TROUBLESHOOT ENGINE
CUSTOMER COMPLAINT:
CHASKA, IN CITY LIMITS, MN
TROUBLESHOOT ENGINE LOTS OF OIL IN COOLING SYSTEM
CAUSE OF FAILURE:
HEAD GASKET
RESULTANT DAMAGE:
PRESSURE RADIATOR
REPAIR PROCESS COMMENTS:
ARRIVED AT MACHINE I TOOK RADIATOR CAP OFF AND FOUND OIL RESIDUE IN COOLING SYSTEM. ST CLOUD PUT A OIL COOLER ON THE MACHINE A FEW MONTHS AGO SO I FIGURED THAT IT WAS RESIDUAL OIL SO I SUCKED THE TOP OF THE TANK. I THEN RAN THE MACHINE TO LOOSEN UP MORE OIL IN THE COOLING SYSTEM. WHEN I WAS DOING THAT I NOTICED THAT THERE WAS COOLANT COMING OUT OF THE OVER FLOW HOSE. I THEN RAN MACHINE UP TO OPERATING TEMP. I THEN RELEASED THE PRESSURE FROM THE COOLING SYSTEM AND PUT MY COOLANT PRESSURE TESTER ON IT. WITH THE ENG AT IDLE I COULD WATCH THE PRESSURE GAUGE BUILD TO 15 PSI IN UNDER A MIN. I THE BLED THE SYSTEM AGAIN AND TRIED IT AGAIN. IT DID THE SAME THING. THE TEST WAS INDICATING THAT THERE WAS A BAD HEAD GASKET AND BUILDING COMPRESSION INTO THE RADIATOR. I THEN SENT THE MACHINE TO THE SHOP TO FLUSH THE RADIATOR AND REPLACE THE HEAD GASKET.
CUSTOMER COMPLAINT:
WATERTOWN.MN
REPAIR PROCESS COMMENTS:
CHECKED COOLANT LEVEL. FOUND COOLANT IS LOW. ADDED 5 GAL OF COOLANT. CHECKED ENGINE COMPARTMENT FOR COOLANT LEAKS. REMOVED RIGHT SIDE PANEL. PRESSURE TESTED COOLANT SYSTEM. FOUND RADIATOR HAS A BROKEN CORE ON THE LOWER RIGHT HAND SIDE AT THE BOTTOM OF THE CORE. REINSTALLED SIDE PANEL. TAGGED MACHINE , ONLY RUN TO LOAD ON A TRAILER FOR TRANSPORT AND CHECK COOLANT.

TOTAL LABOR SEG. 20 480.00 *

SEGMENT 20 TOTAL 480.00 T

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Invoice Number: SW000175662 **Date:** 11/08/13 **Account No.:** 5320900

Quantity	Item	N/R	Description	Unit Price	Extended

REMOVE & INSTALL CYLINDER HEAD ASSEMBLY
REMOVE AND INSTALL CYLINDER HEAD
REPAIR PROCESS COMMENTS:
REMOVED BELLY PANS. REMOVED THE HOOD. REMOVED ALL THE ENGINE SIDE PANELS AND ACCESS DOORS FROM THE MACHINE. REMOVED THE PRE CLEANER. REMOVED THE AIR CLEANER .DRAINED COOLANT. REMOVED THE COOLANT ELBOW AND THERMOSTAT HOUSING FROM THE ENGINE. REMOVED THE FLOOR MAT AND THE FLOOR PLATES FROM THE CAB. REMOVED THE MUFFLER SUPPORT AND FAN. REMOVED THE TRANSMISSION FILL TUBE AND DIPSTICK. REMOVED THE EXHAUST MANIFOLD, TURBO, INTAKE HOSES, AND EXHAUST STACK. REMOVED THE VALVE COVER. REMOVED THE FUEL INJECTION LINES AND FUEL NOZZLES. REMOVED THE ROCKERS. REMOVED THE PUSH TUBES. REMOVED THE LIFTERS. REMOVED THE HEAD BOLTS. REMOVED THE CYLINDER HEAD FROM THE MACHINE. SENT THE CYLINDER HEAD TO SPEC SHOP FOR CLEANING AND INSPECTING. SPEC SHOP FOUND THE HEAD TO BE CRACKED. A REMAN HEAD WAS ORDERED. FOUND COUNTER BORES NEEDED TO BE CUT AFTER CHECKING LINER PROTRUSION. AFTER LINER PACKS AND BEARINGS WERE ROLLED IN. INSTALLED HEAD SPACER PLATE. INSTALLED HEAD GASKET. INSTALLED LIFTERS. INSTALLED CYLINDER HEAD. TORQUED HEAD BOLTS TO 115 FT LBS THEN TO 185 FT LBS IN SEQUENCE. INSTALLED PUSH TUBES. INSTALLED ROCKER ARMS. SET VALVE LASH TO .015 IN ON INTAKE AND .025 IN ON EXHAUST. TORQUED JAM NUTS. INSTALLED VALVE COVER. CHECKED ALL 6 FUEL NOZZLES. FOUND THAT 2 OF THEM WERE STILL FUNCTIONAL. FOUND ONE WITH A DROPPED TIP. ALSO FOUND THE REMAINING 3 WERE NOT IN GOOD CONDITION. INSTALLED 4 RE MAN NOZZLES. INSTALLED FUEL INJECTION LINES. FOUND THE OLD EXHAUST MANIFOLD TO BE CRACKED. INSTALLED A CAT CLASSIC MANIFOLD. INSTALLED THE TURBO AND ALL THE AIR INTAKE LINES. INSTALLED THE TRANSMISSION DIPSTICK TUBE AND FILL TUBE. INSTALLED THE MUFFLER SUPPORT AND FAN. INSTALLED A NEW THERMOSTAT. INSTALLED THE THERMOSTAT HOUSING AND COOLANT LINES. INSTALLED THE AIR CLEANER. FILLED MACHINE WITH WATER AND A NEW OIL FILTER. PRELUBED THE ENGINE WITH OIL THROUGH THE OIL SAMPLE PORT. AFTER RUNNING MACHINE, REMOVED THE OIL FILTER AND CUT OPEN. FOUND SOME DEBRIS IN THE OIL FILTER. INSTALLED A NEW OIL FILTER, AND TOPPED OFF THE ENGINE OIL. AFTER RUNNING THE ENGINE AGAIN, REMOVED THE ENGINE OIL FILTER AND CUT OPEN. FOUND THE FILTER TO BE CLEAN. INSTALLED A NEW OIL FILTER, AND TOPPED OFF THE ENGINE OIL. INSTALLED ALL THE ENGINE SIDE PANELS, BELLY PANS, AND THE HOOD BACK ONTO THE MACHINE. SWAPPED OUT THE BATTERIES FOR BETTER USED BATTERIES. CLEANED MACHINE WHERE REPAIRS WERE MADE.

1	392-3548	KIT GASKET	S5	355.90	355.90
		TOTAL PARTS	SEG. 22		355.90 *
		TOTAL LABOR	SEG. 22		1392.00 *
		SEGMENT 22 TOTAL			1747.90 T

REPLACE WITH CAT REMAN CYLINDER HEAD ASSEMBLY

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Quantity	Item	N/R	Description	Unit Price	Extended
REPAIR PROCESS COMMENTS: WASHED HEAD, MAGNAFLUXED HEAD AND FOUND IT TO BE CRACKED FROM INTAKE SEAT GOING TO AND DOWN INJECTOR HOLES ON CYLINDERS NO#1, 2 & 5. REPLACED HEAD WITH ONE REMAN PN#0R-2549. RETURNED CORE, WASHED HEAD AND SWITCHED OVER FITTINGS. TAPED OFF PORTS AND BROUGHT OUT TO MAIN SHOP. TAK.					
1	0R-2549		HEAD CYL REM	S5	1437.06	1437.06
1			CORE CHARGE	S5	1285.78	1285.78
1-			CORE CREDIT	S5	1285.78	1285.78-
			TOTAL PARTS	SEG. 24		1437.06 *
			TOTAL LABOR	SEG. 24		115.00 *
			SEGMENT 24 TOTAL			1552.06 T
MACHINE/GRIND/MILL LINER SEAT/INSERT REPAIR PROCESS COMMENTS: CLEANED AND INSPECTED CYLINDER BLOCK. MACHINED ALL SIX COUNTER BORES FOR 0.030" INSERTS, PN# 9L-5855. DE-BURRED CYLINDER BLOCK AND TAGGED ENGINE, STATING THE ENGINE MUST BE FINAL CLEANED BEFORE ASSEMBLY. JDN.					
6	9L-5855		SHIM	S5	7.59	45.54
			TOTAL PARTS	SEG. 25		45.54 *
			TOTAL LABOR	SEG. 25		819.00 *
			SEGMENT 25 TOTAL			864.54 T
REPAIR ENGINE REPAIR ENGINE ---INSTALL LINER PACKS --ROLL IN BEARINGS --INSPECT OIL PUMP--TEST NOZZLES REPAIR PROCESS COMMENTS: AFTER THE CYLINDER HEAD WAS REMOVED. CHECKED THE LINER PROJECTION OF THE ENGINE. FOUND THAT NUMBER 5 LINER WAS LOW, AND THE ENGINE REQUIRED COUNTER BORES TO BE CUT. REMOVED ALL 6 LINER PACKS. CLEANED ALL SOOT, OIL, AND COOLANT FROM THE CRANKCASE. CLEANED THE BLOCK DECK. HAD SPEC SHOP CUT THE COUNTER BORES INTO THE BLOCK. RE-CLEANED THE DECK AND THE CRANKCASE. MEASURED NEW CLASSIC MAIN BEARINGS FOR CONSISTENCY. ALL WERE WITHIN .0005 INCH OF EACH OTHER AND WITHIN .001 INCH OF THE MAIN BEARINGS REMOVED. ROLLED IN NEW MAIN BEARINGS. TORQUED THE BOLTS TO 30 FT LBS PLUS 90 DEGREES TURN. MEASURED THE NEW CAT ROD BEARINGS FOR CONSISTENCY. FOUND THAT ALL ROD BEARINGS WERE WITHIN .0005 INCH OF EACH OTHER AND .001 OF THE OLD BEARINGS. MEASURED ALL THE LINER FLANGES. FOUND THEM TO BE WITHIN SPEC. INSTALLED RE MAN LINER PACKS ALONG WITH NEW CAT ROD BEARINGS. TORQUED THE NUTS TO 30 FT LBS PLUS 90 DEGREES TURN. CLEANED ANY OIL AND DEBRIS OFF THE DECK. INSPECTED OIL PUMP IT WAS OK TO BE REUSED. INSTALLED OIL PUMP AND INSTALLED OIL PAN.					
2	0L-0364		LOCK	S5	.24	.48
1	0R-4124		NOZZLE AS	S5	80.79	80.79
1			CORE CHARGE	S5	79.22	79.22
1-			CORE CREDIT	S5	79.22	79.22-
2	0R-4124		NOZZLE AS	S5	80.79	161.58

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Invoice Number: SW000175662 **Date:** 11/08/13 **Account No.:** 5320900

Quantity	Item	N/R	Description		Unit Price	Extended
2			CORE CHARGE	S5	79.22	158.44
2-			CORE CREDIT	S5	79.22	158.44-
1	0R-4124		NOZZLE AS	S5	80.79	80.79
1			CORE CHARGE	S5	79.22	79.22
1-			CORE CREDIT	S5	79.22	79.22-
6	0R-4488		CYL KIT	S5	477.88	2867.28
6			CORE CHARGE	S5	231.29	1387.74
6-			CORE CREDIT	S5	231.29	1387.74-
2	0S-1571		CAP SCREW	S5	.55	1.10
1	0S-1590		CAP SCREW	S5	.61	.61
2	1P-4278		CLAMP	S5	1.30	2.60
3	1R-1807		LUBE FILTER	S5	15.41	46.23
6	1T-0416		BOLT	S5	2.27	13.62
1	2M-5407		GASKET	S5	.90	.90
12	2N-2766		LOCK NUT	S5	4.94	59.28
1	2P-8746		GASKET	S5	1.03	1.03
11	2S-6160		WASHER	S5	1.49	16.39
1	3J-7354		SEAL O RING	S5	.72	.72
2	3K-0360		SEAL	S5	.96	1.92
1	3R-1317		HOSE	S5	10.35	10.35
1	4M-6480		GASKET	S5	.84	.84
67	5P-1465		CM-HOSE STK	S5	.12	8.04
1	6B-7469		SPACER	S5	6.59	6.59
1	6N-0009		RING	S5	6.05	6.05
1	6N-1558		RING-SEAL	S5	5.03	5.03
9	6V-1426		STUD	S5	9.62	86.58
2	6V-1427		STUD	S5	10.27	20.54
1	7F-7590		GASKET	S5	1.24	1.24
6	7W-4486		WASHER	S5	1.03	6.18
1	8H-9788		GASKET	S5	.78	.78
1	8M-0904		GASKET	S5	.80	.80
2	8M-5248		SEAL O RIN	S5	3.56	7.12
1	8M-5253		SEAL O RIN	S5	2.28	2.28
1	8N-6854		GASKET	S5	2.58	2.58
1	8S-8874		LOCK-NUT	S5	3.11	3.11
1	9L-1658		STUD	S5	9.51	9.51
6	9L-9098		SEAL	S5	4.12	24.72
1	9M-4849		SEAL O RING	S5	4.14	4.14
3	9S-8752		NUT	S5	.20	.60
6	9X-2836		SCREW	S5	1.10	6.60
1	9X-6458		WASHER HARD	S5	.50	.50
2	100-3652		THRUST-PLATE	S5	33.45	66.90
1	111-8010		REGULATOR	S5	52.41	52.41
3	114-2687		SEAL-O-RING	S5	3.88	11.64
1	127-1966		HOSE	S5	55.70	55.70
1	131-6645		HOSE	S5	9.52	9.52
1	134-0641		WASHER	S5	1.21	1.21
1	169-4199		GASKET-OIL	S5	31.71	31.71
1	169-4200		GASKET	S5	28.68	28.68
1	188-6126		GASKET	S5	1.06	1.06
1	210-9479		HOSE	S5	22.16	22.16
7	238-8647		CAT ELC	S5	25.87	181.09
1	238-8649		COOLANT-ELC	S5	61.10	61.10
1	261-0899		MANIFOLD-CLA	S5	231.80	231.80
6	271-2489		SEAL-WASHER	S5	1.33	7.98
6	328-5572		BEARING-ROD	S5	24.37	146.22
12	371-8946		CM HOSE BULK	S5	1.16	13.92
7	376-9085		BRG-MAIN-CLA	N5	10.81	75.67
			TOTAL PARTS	SEG. 26		4548.27 *
15.00			TOTAL LABOR	SEG. 26		6902.00 *
2.00			CAT DE OIL ULS			203.25
			CAT HYD OIL 10W			37.10
			TOTAL MISC CHGS	SEG. 26		240.35 *

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SEGMENT 26 TOTAL 11690.62 T

RESEAL TRANS LINES/HOSES
REPAIR PROCESS COMMENTS:
FOUND A HOSE THAT WAS LEAKING FROM THE PRIORITY VALVE. REMOVED ONE END OF THE HOSE AND FOUND THE O-RING MISSING. INSTALLED THE O-RING AND INSTALLED THE LINE. NO MORE LEAKS.

1	8M-4986		SEAL O RING	S5	4.39	4.39

TOTAL PARTS SEG. 30 4.39 *

SEGMENT 30 TOTAL 4.39 T

PERFORM TECHNICAL ANALYSIS 1
PERORM TA INSPECTIO

F/R L/M 349.00 *

SEGMENT 98 TOTAL 349.00 T

TRAVEL TO/FROM MACHINE

105.00	TOTAL LABOR	SEG. 99	240.00 *
	TRAVEL MILEAGE		178.50
	TOTAL MISC CHGS	SEG. 99	178.50 *

SEGMENT 99 TOTAL 418.50 T

SERVICE SUPPLIES AND ENVIRONMENTAL CHARGES 500.00 T

TAX EXEMPTION LICENSE 9732569

MN SALES TAX-6.875% 1378.50 T

TRANSIT TAX 0.25% 50.13 T

DUE BY 10TH OF THE NEXT MONTH

INVOICE TOTAL 21,479.47

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530 RIVER ST S
DELANO MN 55328

Invoice Number: SW140133903
Date: 8/28/13
Account No.: 5320900

Ship To:

:U 1411

Invoice Information

WO Number: FM31751
WO Date: 7/16/13

Store: MPLS FIELD SERVICE
Payment Terms: CHARGE
P/O Number: D6R 9PN01039
Ship Via:
Invoice Type: 1H1H1H

Make: CATERPILLAR
Model: D6RDSLGP
Serial: 09PN01039
PIN:
Id No:
Cust Unit: L120

Meter: 4125.0

Invoice Summary

Parts:	201.48
Labor:	1,020.00
Misc:	287.30
Taxes:	109.76
Invoice Total:	1,618.54

ENTERED

Amount Due: $1,618.54

DUE BY 10TH OF THE NEXT MONTH

A service charge of 1 1/2 % per month will be assessed on all past due accounts.

To ensure proper credit, please detach this portion, at the perforation, and return with remittance.

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SDS 12-0436
PO BOX 86
MINNEAPOLIS,MN 55486-0436

Amount Due: $1,618.54

Amount Enclosed:

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Invoice Number: SW140133903 **Date:** 8/28/13 **Account No.:** 5320900

Quantity	Item	N/R	Description	Unit Price	Extended

TROUBLESHOOT TURBOCHARGER
CUSTOMER COMPLAINT:
CHASKA, IN CITY LIMITS, MN
REPAIR PROCESS COMMENTS:
ARRIVED AT MACHINE REMOVED THE TURBO INLET TUBE AND FOUND THAT THE IMPELLER WAS RUBBING THE HOUSING. I THEN REMOVED THE OIL LINES FOR THE TURBO I THEN REMOVED THE EXHAUST. I THEN UNBOLTED THE TURBO AND REMOVED IT. I THEN INSTALLED THE NEW TURBO WITH NEW GASKETS. I THEN INSTALLED THE EXHAUST AND THE INLET TUBE. I THEN INSTALLED THE OIL LINES WITH NEW GASKETS. RAN MACHINE. CHECKED TURBO PRESSURE AND IT WAS GOOD

1	1T-0416		BOLT	S	2.27	2.27
2	3B-4628		COTTER	S	.14	.28
1	4N-9216		HOSE	S	11.45	11.45
2	5P-0597		CLAMP	S	4.49	8.98
1	7W-4486		WASHER	S	1.03	1.03
1	8N-5132		CLAMP	S	13.86	13.86

TOTAL PARTS SEG. 01 37.87 *

TOTAL LABOR SEG. 01 240.00 *

SEGMENT 01 TOTAL 277.87 T

TROUBLESHOOT FUEL SYSTEM
REPAIR PROCESS COMMENTS:
ARRIVED AT MACHINE FOUND MACHINE TO BE RUNNING RUFF AND SPITTING FUEL OUT OF THE EXHAUST. I THEN DID A CYL CUT OUT TEST AND FOUND THE #4 INJECTOR BAD. I THEN REMOVED THE INJECTOR AND FOUND THE NOZZLE MISSING OUT OF THE INJECTOR. I THEN RAN BACK T THE SHOP FOR PARTS. WHEN I RETURNED TO THE MACHINE. I INSTALLED THE INJECTOR AND THE MACHINE RAN GOOD. CUSTOMER DID NOT WANT TO REMOVE CYL HEAD TO RETRIEVE THE NOZZLE. ALSO THE INJECTOR CORE WAS BAD.

1	0R-4124		NOZZLE AS	S	80.79	80.79
1			CORE CHARGE	S	79.22	79.22
1-			NO CREDIT	S	.00	.00
2	1L-3047		WASHER	S	1.80	3.60

TOTAL PARTS SEG. 02 163.61 *

TOTAL LABOR SEG. 02 540.00 *

SEGMENT 02 TOTAL 703.61 T

TRAVEL TO/FROM MACHINE

TOTAL LABOR SEG. 99 240.00 *

130.00 TRAVEL MILEAGE 221.00

TOTAL MISC CHGS SEG. 99 221.00 *

SEGMENT 99 TOTAL 461.00 T

SERVICE SUPPLIES AND ENVIRONMENTAL CHARGES 66.30 T

ZIEGLER CAT
901 West 94th Street
Minneapolis MN 55420-4236

ZIEGLER RENTAL — THE Rental STORE

MINNESOTA	952-888-4121	800-352-2812
IOWA	515-957-3800	800-342-7002
MISSOURI	515-957-3800	800-342-7002
WISCONSIN	515-957-3800	800-342-7002

Invoice Number: SW140133903 **Date:** 8/28/13 **Account No.:** 5320900

Quantity	Item	N/R	Description	Unit Price	Extended

TAX EXEMPTION LICENSE 9732569

MN SALES TAX-6.875%	103.73 T
HENNEPIN TAX 0.15%	2.26 T
TRANSIT TAX 0.25%	3.77 T

DUE BY 10TH OF THE NEXT MONTH

INVOICE TOTAL 1,618.54

ZIEGLER CAT

901 West 94th Street
Minneapolis MN 55420-4236

ZIEGLER RENTAL — THE CAT Rental STORE

MINNESOTA	952-888-4121	800-352-2812
IOWA	515-957-3800	800-342-7002
MISSOURI	515-957-3800	800-342-7002
WISCONSIN	515-957-3800	800-342-7002

Sold To: M B E INCORPORATED
530 RIVER ST S
DELANO MN 55328

Invoice Number: SW080113797
Date: 7/18/13
Account No.: 5320900

Ship To:

W7136

Invoice Information

WO Number: WJ98374
WO Date: 7/09/13

Store: ST. CLOUD
Payment Terms: CHARGE
P/O Number: D6RDSLGP
Ship Via:
Invoice Type: 1H1H1H

Make: CATERPILLAR
Model: D6RDSLGP
Serial: 09PN01039
PIN:
Id No:
Cust Unit: L120 D6R 1039
Meter: 4114.0

Invoice Summary

Parts:	869.64
Labor:	1,631.01
Misc:	254.62
Taxes:	189.42
Invoice Total:	2,944.69

Amount Due: $2,944.69

DUE BY 10TH OF THE NEXT MONTH
A service charge of 1 1/2 % per month will be assessed on all past due accounts.

To ensure proper credit, please detach this portion, at the perforation, and return with remittance.

M B E INCORPORATED
530 RIVER ST S
DELANO MN 55328

Account Number: 5320900
Invoice Number: SW080113797
Invoice Date: 7/18/13

Please remit to:
ZIEGLER INC.
SDS 12-0436
PO BOX 86
MINNEAPOLIS,MN 55486-0436

Amount Due: $2,944.69

Amount Enclosed:

ZIEGLER CAT
901 West 94th Street
Minneapolis MN 55420-4236

ZIEGLER RENTAL — THE CAT Rental STORE

MINNESOTA	952-888-4121	800-352-2812
IOWA	515-957-3800	800-342-7002
MISSOURI	515-957-3800	800-342-7002
WISCONSIN	515-957-3800	800-342-7002

Invoice Number: SW080113797 **Date:** 7/18/13 **Account No.:** 5320900

Quantity	Item	N/R	Description	Unit Price	Extended

REPLACE WITH EXCHANGE ENGINE OIL COOLER
CUSTOMER COMPLAINT:
THERE IS ENGINE OIL IN THE RADIATOR.
CAUSE OF FAILURE:
THE OIL COOLER WAS LEAKING OIL INTO THE COOLING SYSTEM.
REPAIR PROCESS COMMENTS:
CAME OUT TO THE MACHINE AND IT HAD BLOWN A COOLANT HOSE AND THEIR MECHANIC WAS FIXING IT. THE MACHINE WAS HOT AND THE OIL SAMPLE CAME BACK POSITIVE WITH COOLANT IN THE OIL ALSO. DRAINED THE REST OF THE COOLANT THAT DIDN'T SPILL. THEN REMOVED THE OIL FILTER, BASE AND TUBES. THEN REMOVED THE ELBOW IN FRONT OF THE COOLER. REMOVED THE COOLER AND FOUND THAT THERE WAS LOTS OF OIL IN THE COOLING SYSTEM. PRESSURE CHECKED THE OIL COOLER AND FOUND THAT IT LEAKED DOWN .2 PSI IN THREE MINUTES ACCORDING SPEC IT WOULD HAVE TO LEAK DOWN .3 PSI. PUT THE OIL COOLER IN A PAIL OF WATER AND HAD SOME AIR LEAK OUT THEN IT STOPPED DUE TO THE COOL WATER. DECIDED TO REPLACE THE OIL COOLER. CLEANED ALL THE MATING SURFACES. INSTALLED REMAN OIL COOLER AND TORQUED IT TO 35 FT LBS. THEN INSTALLED THE OIL FILTER BASE AND TORQUED IT TO 18 FT LBS. THEN INSTALLED THE OIL SUPPLY AND PRESSURE TUBE TO FILTER BASE. EVERYTHING WAS RESEALED. DISASSEMBLED THE FILTER BASE AND RESEALED IT WHILE IT WAS OFF. FILLED THE SYSTEM WITH COOLING SYSTEM CLEANER AND RAN THE MACHINE FOR A HALF AN HOUR AND THEN DRAINED THE COOLING SYSTEM. FILLED THE SYSTEM WITH SOAP AND WATER TWICE MORE AND RAN IT FOR A HALF AN HOUR STALLING THE MACHINE OUT GETTING IT HOT. COOLING SYSTEM WILL BE FILLED ON ANOTHER SEGMENT.

1	0R-3499	CORE A OIL	S5	523.42	523.42
1		CORE CHARGE	S5	203.46	203.46
1-		CORE CREDIT	S5	203.46	203.46-
1	148-0293	GASKET KIT	N5	36.70	36.70

TOTAL PARTS SEG. 01 560.12 *

TOTAL LABOR SEG. 01 1105.50 *

SEGMENT 01 TOTAL 1665.62 T

DRAIN & REFILL ENGINE COOLANT WITH LONGLIFE
CUSTOMER COMPLAINT:
FLUSH AND FILL COOLANT.
CAUSE OF FAILURE:
OIL IN COOLING SYSTEM.
REPAIR PROCESS COMMENTS:
AFTER CLEANING ON THE OTHER SEGMENT. FILLED SYSTEM WITH WATER AND RAN IT FOR A SHORT TIME. DRAINED THE SYSTEM AND THEN FILLED THE SYSTEM WITH 4 GALS OF CONCENTRATE AND ANOTHER 15 GALLONS OF ELC. RAN THE MACHINE FOR AWHILE AND CHECKED THE COOLANT PROTECTION AND HAD -35 DEGREE F. FOUND NO LEAKS IN THE SYSTEM.

2	4C-4610	CLEANER	S5
4	238-8647	CAT ELC	S5
1	238-8648	COOLANT-ELC	S5
3	238-8649	COOLANT-ELC	S5

ZIEGLER CAT
901 West 94th Street
Minneapolis MN 55420-4236

ZIEGLER RENTAL — THE CAT Rental STORE

MINNESOTA	952-888-4121	800-352-2812
IOWA	515-957-3800	800-342-7002
MISSOURI	515-957-3800	800-342-7002
WISCONSIN	515-957-3800	800-342-7002

Invoice Number: SW080113797 **Date:** 7/18/13 **Account No.:** 5320900

Quantity	Item	N/R	Description	Unit Price	Extended
			F/R ALL		731.03 *
			SEGMENT 02 TOTAL		731.03 T
			TRAVEL TO/FROM MACHINE JOBSITE AT HWY 25 AND 40TH ST NEAR BUFFALO, MN.		
			TOTAL LABOR SEG. 99		120.00 *
78.00			TRAVEL MILEAGE		132.60
			TOTAL MISC CHGS SEG. 99		132.60 *
			SEGMENT 99 TOTAL		252.60 T
			SERVICE SUPPLIES AND ENVIRONMENTAL CHARGES		106.02 T
			TAX EXEMPTION LICENSE 9732569		
			MN SALES TAX-6.875%		189.42 T
			DUE BY 10TH OF THE NEXT MONTH		
			INVOICE TOTAL		2,944.69

ZIEGLER CAT

901 West 94th Street
Minneapolis MN 55420-4236

ZIEGLER RENTAL — CAT Rental Store

MINNESOTA	952-888-4121	800-352-2812
IOWA	515-957-3800	800-342-7002
MISSOURI	515-957-3800	800-342-7002
WISCONSIN	515-957-3800	800-342-7002

Sold To: M B E INCORPORATED
530 RIVER ST S
DELANO MN 55328

Invoice Number: WJ98315
Date: 7/11/13
Account No.: 5320900

Ship To:

WJ7138

Invoice Information

WO Number: WJ98315
WO Date: 7/03/13

Store: ST. CLOUD
Payment Terms: CHARGE
P/O Number: D6R
Ship Via:
Invoice Type: 1H1H1H

Make: CATERPILLAR
Model: D6RDSLGP
Serial: 09PN01039
PIN:
Id No:
Cust Unit: L120 DLR
Meter: 4110.0 1039

Invoice Summary

Parts:	242.72
Labor:	636.93
Misc:	1,105.50
Taxes:	136.48
Invoice Total:	2,121.63

Amount Due: $2,121.63

A service charge of 1 1/2 % per month will be assessed on all past due accounts.

To ensure proper credit, please detach this portion, at the perforation, and return with remittance.

M B E INCORPORATED
530 RIVER ST S
DELANO MN 55328

Account Number: 5320900
Invoice Number: WJ98315
Invoice Date: 7/11/13

PROFORMA INVOICE

Please remit to:
ZIEGLER INC.
SDS 12-0436
PO BOX 86
MINNEAPOLIS,MN 55486-0436

Amount Due: $2,121.63

Amount Enclosed:

ZIEGLER CAT

901 West 94th Street
Minneapolis MN 55420-4236

ZIEGLER RENTAL — THE Rental STORE

MINNESOTA	952-888-4121	800-352-2812
IOWA	515-957-3800	800-342-7002
MISSOURI	515-957-3800	800-342-7002
WISCONSIN	515-957-3800	800-342-7002

Invoice Number: WJ98315 **Date:** 7/11/13 **Account No.:** 5320900 **Page:** 2

Quantity	Item	N/R	Description	Unit Price	Extended

* * * PROFORMA INVOICE * * *

PERFORM MAINTENANCE ON LEVEL-1,2&3 PM (1000 HR)
CUSTOMER SITE
MONTROSE MN
***** PREVENTIVE MAINTENANCE SERVICE *****
*
YOUR MACHINE MAINTENANCE WAS COMPLETED USING OUR CUSTOMIZED INSPECTION CHECK LIST. THIS SERVICE INCLUDES THE LABOR, PARTS, FLUIDS, OIL SAMPLES AND TRAVEL COST WITHIN A 50 MILE RADIUS.

1	1R-0735	ELEMENT AS	S
1	1R-0739	FILTER AS	S
1	1R-0750	FILTER AS	S
1	1R-1712	FILTER A	S
1	2K-4472	O RING	S
1	3S-7781	GASKET	S
1	4T-6788	OIL FILTER	S
1	6D-9157	SEAL	S
1	6I-2501	ELEMENT AS	S
1	6V-5188	SEAL	S
1	6V-9633	GASKET	S
1	8H-2778	GASKET	S
1	9G-9981	BREATHER	S
1	132-8876	TRANS FILTR	S

F/R ALL 1943.75 *

SEGMENT 01 TOTAL 1943.75 T

SERVICE SUPPLIES AND ENVIRONMENTAL CHARGES 41.40 T

TAX EXEMPTION LICENSE 9732569

MN SALES TAX-6.875% 136.48 T

INVOICE TOTAL 2,121.63

ZIEGLER CAT

PREVENTIVE MAINTENANCE SYSTEM
CALL CHECKLIST
WORK ORDER/SEG: WJ98315 01

CUSTOMER	: 5320900	M B E INCORPORATED
EQUIP NUMBER	: L120	
MAKE	: AA	CATERPILLAR
MODEL	: D6RDSLGP	
SERIAL NUMBER	: 09PN01039	
PLAN	: D6R 55	D6R 9PN1-UP LCPM *
JOB/COMPONENT	: 742 7503	PERFORM MAINTENANCE ON LEVEL-1,2&3 PM (1000 H
AGREEMENT	: 0300G00883	MBE INC. D6R 9PN01039
TECHNICIAN	: 0055	ABBOTT - 0055
CALL NUMBER	: 10	
SCHEDULE DATE	: 10/31/12	
EQUIP LOCATION	: MONTROSE MN	

CHECKLIST INFORMATION

OK STEP ---------- DESCRIPTION ----------

DA 10

DATE PERFORMED: 7-8-13

SMU: 4110

EMPLOYEE NAME: Duane Abbott

EQUIPMENT LOCATION: Buffalo 5-oil SOS 1-Ecc SOS

REPAIRS NEEDED: _____

****
PRE-START
****

DA 30 If hydraulic oil needs to be changed,
add a separate segment and use
job code 744 and component code 5095.
Change hydraulic oil.
Hydraulic refill (12.5 GALS HYDO)

COMMENTS: _____

CUSTOMER : 5320900 M B E INCORPORATED
EQUIP NUMBER : L120
MAKE : AA CATERPILLAR
MODEL : D6RDSLGP
SERIAL NUMBER : 09PN01039

CHECKLIST INFORMATION

OK	STEP	DESCRIPTION
DSA	40	NOTE! All refill capacities are approximate amounts! COMMENTS: _____
DSA	50	Check engine oil and coolant levels. (Note fluids added) If coolant is low, find problem! No maintenance with ELC coolant! Radiator capacity is 18.5 GALS. COMMENTS: _____

****
WARM-UP
****

DSA	70	Start engine and check for unusual noises or smoke. Let engine warm up before taking oil sample and draining oil. Check gauges, controls and operation of machine. COMMENTS: _____
DSA	80	CHECK FLUID LEVELS (Note fluids added) - Transmission - Hydraulic - Brake fluid - Final drives - Pivot shaft - Recoil spring - Winch (If equipped) COMMENTS: _____

****
LC-1
****

DSA	100	Take SOS sample from engine oil. Fill out label (1 SOS SAMPLE) COMMENTS: _____
DSA	110	Change engine oil and filters. Cut filter open and inspect for foreign material. Oil filter number (1-1R0739) Engine oil refill (7.4 GALS DEO) COMMENTS: Changed eng oil & filter. cut filter open. no debris refilled 6.95 gallons of 10w 30
DSA	120	Dispose of drain oil and complete service reports. COMMENTS: _____

****
LC-2
****

PREVENTIVE MAINTENANCE SYSTEM
CALL CHECKLIST
WORK ORDER/SEG: WJ98315 01

GLER INC.
OLIS, MN

M B E INCORPORATED

MER : 5320900
NUMBER : L120
AA
L : D6RDSLGP
AL NUMBER : 09PN01039

CATERPILLAR

CKLIST INFORMATION

STEP ---------- DESCRIPTION ----------

A 140 Take SOS sample and fill out labels for:
- Transmission
- Hydraulic
- Final drives (4-SOS SAMPLE)

COMMENTS: _____

~~DSA~~ 150 Check condition of fan pulleys, belts and fan drive bearings. Check for excessive radial and axial movement by prying on hub.

COMMENTS: _____

~~DSA~~ 160 Install a new secondary fuel filter.
Fuel filter number (1-1R0750)
Install a new fuel water separator.
Water separator number (1-1R1712)

COMMENTS: _____

~~DSA~~ 170 Change transmission oil filter element.
Cut filter open and inspect for foreign material.
Transmission filter number (1-3434465)
Filter seal numbers (1-2K4472 1-6D9157)

COMMENTS: Changed trans filter, cut open, no debris

~~DSA~~ 180 Change Hydraulic system filter element.
Cut filter open and inspect for foreign material.
Hydraulic filter number (1-1R0735)
Filter gasket number (1-6V9633)

COMMENTS: Changed Hyd filter, cut open, no debris

~~DSA~~ 190 Change hydraulic Case Drain filter.
Cut filter open and inspect for foreign material.
Case drain filter number (1-4T6788)

COMMENTS: Changed filter, cut open, no debris

~~DSA~~ 200 Replace primary air filter element.
Primary filter number (1-6I2501)

COMMENTS: _____

****
PM-3
****

~~DSA~~ 220 Take SOS coolant sample from radiator.
Fill out label (1 SOS SAMPLE)

COMMENTS: _____

~~DSA~~ 230 SAFETY ITEMS
Check machine for: (Note repairs)
- Safety lock link
- Back up alarm
- Seat belts
- Brake condition and operation
- Parking brake condition and operation

COMMENTS: _____

CUSTOMER : 5320900 M B E INCORPORATED
EQUIP NUMBER : L120
MAKE : AA CATERPILLAR
MODEL : D6RDSLGP
SERIAL NUMBER : 09PN01039

CHECKLIST INFORMATION

OK	STEP	DESCRIPTION
DSA	240	Check air filter indicator and check pre-cleaner. Blow out cab filters. COMMENTS: _____
DSA	250	Drain water and sediment from fuel tank. Note, if water is found, then service primary filter and replace fuel filter. COMMENTS: _____
DSA	260	Drain brake air tank. (Note condition) COMMENTS: _____
DSA	270	WALK AROUND INSPECTION (Note repairs) Check machine for: Oil leaks, damage and etc. Check condition of: GET, Tires, Loader linkage, Electrical, system and batteries. COMMENTS: _____
DSA	280	CHECK: - Fan/alternator belts - Water pump weep hole - Coolant hoses - Radiator COMMENTS: _____
DSA	290	Lubricate with MPGM. Note if operator is greasing machine. Grease number (1-1833424) COMMENTS: _____
DSA	300	Clean engine crankcase breather element and check breather tube. COMMENTS: _____
DSA	310	Replace transmission breathers. Breather number (1-1856684) COMMENTS: _____
DSA	320	Clean transmission and torque converter screen. Transmission screen seal (1-6V5188) Torque converter screen gskt (1-3S7781) COMMENTS: _____
DSA	330	Change transmission oil. Transmission refill (38.5 GALS TDTO) COMMENTS: Changed trans oil, refilled 36 gallons of 30w
DSA	340	Change oil in both final drives. Final drive refill (7.2 GALS TDTO) COMMENTS: Changed oil in finals, 6.75 gallons of 30w all together

CUSTOMER : 5320900 M B E INCORPORATED
EQUIP NUMBER : L120
MAKE : AA CATERPILLAR
MODEL : D6RDSLGP
SERIAL NUMBER : 09PN01039

CHECKLIST INFORMATION

OK	STEP	DESCRIPTION
OA	350	Disassemble and clean fuel tank cap and filler neck screen. COMMENTS: _____
OA	360	Visually inspect rollover protective structure (ROPS) for damage and/or loose or missing hardware. COMMENTS: _____
OA	370	~~[illegible]~~ COMMENTS: _____
OA	380	Inspect all cooling system hoses. Report all hard, cracked or damaged hoses. COMMENTS: _____
OA	390	Replace secondary air filter element. Secondary filter number (1-6I2502) COMMENTS: _____
OA	400	Replace cab air filters. Cab filter numbers (1-6T0988 1-6T5068) COMMENTS: _____
___	410	At an additional cost! Engine tune-up ? Cooling system service ? 2000 hours is when we should recommend these items, but at an additional cost! COMMENTS: _____

** END OF REPORT **

ZIEGLER CAT

ZIEGLER S-O-S ANALYSIS LAB
901 WEST 94TH STREET
MINNEAPOLIS,MN 55420-4299
(952) 888-4121 (800) 352-2812

S·O·S℠ Services

Sample For:

SHOP SAMPLE
KEN COWLES
2225 255TH ST
SAINT CLOUD MN 56301-8742

Serial #: 09PN01039
Compartment: Diesel Engine
Unit #: L120
Model #: D6RDSLGP
WO #: WJ98315

ACTION

Sample #: 130702728
Date Received: 7/10/13
Oil Brand: Caterpillar
Oil Blend: Diesel Engine O
Oil Weight 10W30

M B E INCORPORATED

CURRENT SAMPLE INFORMATION						WEAR METALS ANALYSIS									INFRARED ANALYSIS			PHYSICAL TESTS				
Date Taken	Changed		Quarts Oil Added	Meter	Meter on Oil	K Potassium PPM	CU Copper PPM	NA Sodium PPM	FE Iron PPM	CR Chromium PPM	AL Aluminum PPM	SI Silicon PPM	PB Lead PPM	SN Tin PPM	Soot	Sulfation	Oxidation	PQ-Ferrous Debris	Viscosity	Anti-Freeze	Fuel Dilution	Water
	Oil	Filter																				
7/08/13	Y	Y		4110	252	5	4	104	53	1	2	5	5	0	71	13	8	22	14.5	P	N	N

Interpretation
The analysis of the oil sample taken from your Diesel Engine indicates that Iron and Soot are slightly high. This oil sample tests positive for antifreeze contamination.

Recommendation
Check for coolant getting into the oil. Antifreeze in the oil requires attention to prevent a possible failure. Also suggest cutting oil filter open, pulling out pleats and checking for metal pieces.

TRENDING SAMPLE INFORMATION						WEAR METALS ANALYSIS									INFRARED ANALYSIS			PHYSICAL TESTS				
Date Taken	Changed		Quarts Oil Added	Meter	Meter on Oil	K Potassium PPM	CU Copper PPM	NA Sodium PPM	FE Iron PPM	CR Chromium PPM	AL Aluminum PPM	SI Silicon PPM	PB Lead PPM	SN Tin PPM	Soot	Sulfation	Oxidation	PQ-Ferrous Debris	Viscosity	Anti-Freeze	Fuel Dilution	Water
	Oil	Filter																				
7/08/13	Y	Y		4110	252	5	4	104	53	1	2	5	5	0	71	13	8	22	14.5	P	N	N
8/27/12	Y	Y		3858	281	0	3	12	54	1	1	4	5	0	140	21	10	11	14.6	N	N	N
6/13/12	Y	Y		3577	242	0	3	14	41	1	2	4	2	1	78	15	9	9	14.3	N	N	N
3/21/12	Y	Y		3335	304	1	9	19	40	1	3	5	3	1	130	28	23	13	14.7	N	N	N
10/19/11	Y	Y		3031	280	1	23	35	39	1	2	6	2	2	139	27	20	9	15.1	N	N	N
6/20/11	Y	Y		2751		0	1	12	11	1	1	7	1	0	3	17	14	6	11.0	N	P	N
4/21/10	Y	Y		2508	246	4	24	135	95	3	6	23	9	2	42	20	16	28	11.1	P	N	N

CURRENT SAMPLE IS INCLUDED IN TRENDING

THIS ANALYSIS IS INTENDED AS AN AID IN PRE

SEE REVERSE SIDE FOR TEST EXPLANATIONS

To realize the full benefits of the diagnostic capabilities of the oil analysis program, the user should do the following:

1. Provide complete and accurate information on the sample label.
2. Adhere to proper sampling procedures.
3. Be on a regular and continuous sampling program.
4. Cut oil filters open and inspect (particles in the oil large enough to be seen by the naked eye are too large for analysis and may indicate imminent failure).

Metals are shown in parts per million (PPM) and are evaluated according to hours or miles the oil has been in use, amount of oil added, recent component repairs, type of operation and other conditions that might affect the concentration.

Caterpillar Inc. has established "normal" wear rates for their products. Interpretation of oil samples from other brands of machines is based on other manufacturer recommendations or general guidelines established for similar components. Elevated readings indicate excessive wear and shortened component life, but may not indicate an imminent failure.

TEST EXPLANATION

	Possible sources of high readings in Caterpillar product.
WEAR METALS	
COPPER:	Air compressor bushings; oil cooler tubes; thrust washers; wrist pin bushings; oil pump bushings; anti-seize compounds after a repair; additives in the new oil; condensation (water). In transmissions, discs and thrust plates.
IRON:	Cylinder walls; oil pump; crankshafts, gear teeth.
CHROMIUM:	Piston rings, valve stems, new engine break-in, ball and roller bearings.
ALUMINUM:	Main and rod bearings; pistons; rocker shaft in some engines. Transmission pump bushings, torque converter impeller or turbine.
SILICON:	Dirt; anti-foam additives in new oil. (Dirt is an abrasive and normally elevates all readings to indicate excessive wear and shortened component life).
LEAD:	Overlay on main and rod bearings; fuel contaminated with gasoline (tetraethyl lead).
SODIUM:	Produced when engine coolant contacts a hot surface and the water evaporates leaving a residue; oil additive.
POTASSIUM:	Element used to detect coolant.
TIN:	Piston plate coating; overlay on main and rod bearings.
PHYSICAL TEST	
PQ	Measurement of ferrous debris.
VISCOSITY:	A bath viscometer is used to measure viscosity at 100 C., and readings are reported in centistokes. Viscosity results are used to detect possible fuel dilution; oil thickening from high soot and /or oxidation or use of the wrong oil, and in some cases, oil transfer. Viscosity should trend within 2 centistokes.
ANTIFREEZE:	Water pump seal; oil coolers; liner seals; head gaskets. Test for more than .1% by volume ethylene glycol antifreeze in engine oil. Ethylene glycol causes serious sludge and varnish formation.
FUEL DILUTION:	Failed nozzles; fuel transfer pump seals; under valve cover fuel lines. Test for more than .4% diesel fuel in engine oil. (Invalid test results can be produced by volatile liquids if used to clean sample gun or container).
WATER:	Coolant leaks; condensation (due to low operation temp.); contaminated new oil. Test for more than .1% by volume. Can rust components, promote oil oxidation and forms acid with combustion products.
PARTICLE COUNT	A method of reporting the number and size (in microns) of particles in a volume of fluid. Cannot be performed if water is present or if oil is too dark in color.
INFRARED ANALYSIS	Will be run on oil samples when additional information is necessary for interpretation.
SOOT:	Indication of lugging; over fueling; air inlet restriction; filter plugging. Reported in terms of absorbance X 100 (The maximum normally allowed is 60).
OXIDATION:	Oxidation occurs in all compartments. It is accelerated by heat and contaminants such as water. Oxidized oil allows a buildup of sludge and varnish. Reported in terms of absorbance X 100 (The maximum normally allowed is 34 for engine and 17 for non-engine).
SULFATION:	Sulfur products caused by combustion of diesel fuel which contains sulphur. Sulphur products cause corrosion and may lead to piston ring sticking. Reported in terms of absorbance X 100 (The maximum normally allowed is 34).
NITRATION:	Nitrogen products resulting from the combustion process occur in all engines but only reach problem levels in natural gas engines. Nitrogen compounds cause the oil to thicken, lose it lubricating capabilities, and leads to filter plugging, heavy deposits and lacquering. Reported in terms of absorbance X 100 (The maximum normally allowed is 16).

NOTE: Prior to performing any major repairs based solely on SOS test results, consult your Caterpillar SOS Supervisor.

ZIEGLER CAT

ZIEGLER S-O-S ANALYSIS LAB
901 WEST 94TH STREET
MINNEAPOLIS,MN 55420-4299
(952) 888-4121 (800) 352-2812

S·O·S℠ Services

Sample For:
SHOP SAMPLE
KEN COWLES
2225 255TH ST
SAINT CLOUD MN 56301-8742

Serial #:	09PN01039
Compartment:	Powershift Transmission
Unit #:	L120
Model #:	D6RDSLGP
WO #:	WJ98315

Sample #:	130702731
Date Received:	7/10/13
Oil Brand:	Caterpillar
Oil Blend:	Trans/Drive Tra
Oil Weight	30

M B E INCORPORATED

CURRENT SAMPLE INFORMATION						WEAR METALS ANALYSIS							INFRARED ANALYSIS		PARTICLE COUNT				PHYSICAL TESTS			
Date Taken	Changed		Quarts Oil Added	Meter	Meter on Oil	CU Copper PPM	FE Iron PPM	CR Chromium PPM	AL Aluminum PPM	SI Silicon PPM	PB Lead PPM	NA Sodium PPM	Soot	Oxidation	ISO Code	µm 5	µm 10	µm 15	PQ-Ferrous Debris	Viscosity	Anti-Freeze	Water
	Oil	Fltr																				
7/08/13	Y	Y		4110	1079	1	13	0	2	9	0	3	0	9	18/13	1963	123	45	6	13.5	N	N

Interpretation
Results of latest sample indicate elements tested didn't exceed normal specifications for this compartment. No excessive wear is indicated at this time.

Recommendation
Continue to monitor compartment by sampling at recommended intervals.

TRENDING SAMPLE INFORMATION						WEAR METALS ANALYSIS							INFRARED ANALYSIS		PARTICLE COUNT				PHYSICAL TESTS			
Date Taken	Changed		Quarts Oil Added	Meter	Meter on Oil	CU Copper PPM	FE Iron PPM	CR Chromium PPM	AL Aluminum PPM	SI Silicon PPM	PB Lead PPM	NA Sodium PPM	Soot	Oxidation	ISO Code	µm 5	µm 10	µm 15	PQ-Ferrous Debris	Viscosity	Anti-Freeze	Water
	Oil	Fltr																				
7/08/13	Y	Y		4110	1079	1	13	0	2	9	0	3	0	9	18/13	1963	123	45	6	13.5	N	N
6/13/12	N	Y		3577	546	1	12	0	2	8	0	2	0	9	19/14	3161	261	107	9	13.0	N	N
10/19/11	Y	Y		3031	992	3	17	1	3	17	0	3	0	11	17/14	847	234	106	8	12.1	N	N
4/21/10	N	Y		2508	469	2	14	0	2	12	0	3	0	11	17/14	1027	321	144	12	12.2	N	N
9/16/08	Y	Y		2039	1044	5	12	0	2	12	0	3	0	11	18/14	1361	367	141	7	13.1	N	N
3/19/08	N	Y		1576	581	4	11	0	3	14	0	3	0	11	21/19	19674	6748	2798	3	13.3	N	N
8/08/07	Y	Y		995		11	18	1	3	18	0	3	0	11	19/16	3182	983	437	0	12.6	N	N

CURRENT SAMPLE IS INCLUDED IN TRENDING

SEE REVERSE SIDE FOR TEST EXPLANATIONS

ZIEGLER CAT

ZIEGLER S-O-S ANALYSIS LAB
901 WEST 94TH STREET
MINNEAPOLIS, MN 55420-4299
(952) 888-4121 (800) 352-2812

S·O·S℠ Services

Sample For:
SHOP SAMPLE
KEN COWLES
2225 255TH ST
SAINT CLOUD MN 56301-8742

Serial #:	09PN01039
Compartment:	Radiator
Unit #:	L120
Model #:	D6RDSLGP
WO #:	WJ98315
	M B E INCORPORATED

ACTION

Sample #:	130790210
Date Received:	7/10/13
Date Taken	7/08/13
Service Meter:	4110
Hours on Sample:	4110

Glycol Concentration (%) Ethylene Glycol Assumed Unless Specified Otherwise	55%	(30 - 65%)	**Coolant Properties**			Supplemental Coolant Additive (ppm)	545 See Back Charts
Freeze Point (°F)	-47		Conductivity (µmhos/cm)	2804	(<7500)	Color	RED ELC
Boil Point (°F) 0.0 psi	230		pH	8.3	(7.0 - 11.0)	Visual Contamination	EXTCLOUDY/CONTA

Interpretation
Sample has some oil contamination.

Recommendation
The presence of oil in the sample is an indication of a leak between the coolant system and one of the oil systems (engine, hydraulic, etc) or could be from combustion in cooling system. Is there a possibility that the presence of oil in this sample may have come from the way the sample was taken (oil in the sample gun, reusing sample tubing, or an oily sample bottle)?

TRENDING SAMPLE INFORMATION / COOLANT ANALYSIS

Date Taken	Changed Cool	Changed Filter	Meter Reading	Hours On Cool	GLYC	FP	BP	CONDUCT	pH	SCA	Color	Visual Contamination
7/08/13	Y		4110	4110	55	-47	230	2804	8.3	545	RED ELC	EXTCLOUDY/CONTA
8/08/07	U		995	0	48	-30	226	3220	7.4	815	RED	CLEAR
1/09/06	N		699	0	44	-20	223	3710	7.5	1085	ORANGE	CLEAR
1/11/06	N		9175	0	50	-34	227	3110	9.7	1355	RED	CLEAR

CURRENT SAMPLE IS INCLUDED IN TRENDING

SEE REVERSE SIDE FOR TEST EXPLANATIONS