



## DIAGNOSIS

#### Recommendation

We advise that you check all areas where dirt can enter the system. The oil change at the time of sampling has been noted. We recommend an early resample to monitor this condition. The fluid was not specified, however, a fluid match indicates that this fluid is (GENERIC) GEAR OIL SAE 80W90. Please confirm. Please specify the component make and model with your next sample.

#### A Wear

Copper and tin ppm levels are severe. Iron and lead ppm levels are abnormal. Aluminum ppm levels are noted. Thrust washer and/or bearing/bushing wear is indicated. The low ferrous density (PQ) index indicates the wear metal levels are due to corrosion.

### Contamination

Elemental levels of silicon (Si) and aluminum (Al) indicate alumina-silicate (coarse dirt) ingress. High amount of ingressed dirt has caused abrasive wear to the component.

#### Fluid Condition

The oil is no longer serviceable as a result of the abnormal and/or severe wear.

SAMPLE INFORMATION      method      limit/base      current      history1      history2        Sample Number      Client Info      20 Mar 2024          Machine Age      hrs      Client Info      1675          Oil Age      hrs      Client Info      0          Oil Age      hrs      Client Info      0          Oil Age      hrs      Client Info      Changed          Sample Status       Imil/base      current      history1      history2        Water      WC Method      >.2      NEG          WEAR METALS      method      Imil/base      current      history1      history2        PQ      ASTM Dist@m      >500      1180           Iron      ppm      ASTM Dist@m      >10      6          Ristory1      ASTM Dist@m      >25      24           Ristory2      pp					Mar2024		
Sample Date      Client Info      20 Mar 2024          Machine Age      hrs      Client Info      1675          Oil Age      hrs      Client Info      0          Oil Changed      Client Info      0           Sample Status      Imit/base      current      history1      history2        Water      WC Method      >.2      NEG          WEAR METALS      method      limit/base      current      history1      history2        PQ      ASTM D5185(m)      >500      1180          MEAR METALS      method      limit/base      current      history1      history2        PQ      ASTM D5185(m)      >10      3           Itraium      ppm      ASTM D5185(m)      >10      3          Aluminum      pm      ASTM D5185(m)      >25      24          Copper      ppm      ASTM D5	SAMPLE INFOR	MATION	method	limit/base	current	history1	history2
Machine Age      hrs      Client Info      1675          Oil Age      hrs      Client Info      0          Oil Changed      Client Info      Changed          Sample Status      Imit base      Current      history1      history2        Water      WC Method      >.2      NEG          WEAR METALS      method      Imit/base      current      history1      history2        PQ      ASTM D8184/*      127           Iron      ppm      ASTM D5185(m)      >500      1180          Nickel      ppm      ASTM D5185(m)      >10      3          Aluminum      ppm      ASTM D5185(m)      >22           Aluminum      ppm      ASTM D5185(m)      >22           Aluminum      pm      ASTM D5185(m)      >24           Lead      ppm </td <td>Sample Number</td> <td></td> <td>Client Info</td> <td></td> <td>WC0920157</td> <td></td> <td></td>	Sample Number		Client Info		WC0920157		
Oil Age      hrs      Client Info      0          Oil Changed      Client Info      Changed          Sample Status      Client Info      SEVERE          CONTAMINATION      method      limit/base      current      history1      history2        Water      WC Method      >.2      NEG          WEAR METALS      method      limit/base      current      history1      history2        PQ      ASTM D5185(m)      >500      1180          Iron      ppm      ASTM D5185(m)      >500      1180          Nickel      ppm      ASTM D5185(m)      >10      3          Aluminum      ppm      ASTM D5185(m)      >25      24          Lead      ppm      ASTM D5185(m)      >5      0          Antimony      ppm      ASTM D5185(m)      >5      0          Antimony <td< td=""><td>Sample Date</td><td></td><td>Client Info</td><td></td><td>20 Mar 2024</td><td></td><td></td></td<>	Sample Date		Client Info		20 Mar 2024		
Oil Changed Sample Status      Client Info      Changed SEVERE          CONTAMINATION      method      limit/base      current      history1      history2        Water      WC Method      >.2      NEG          WEAR METALS      method      limit/base      current      history1      history2        PQ      ASTM D8184'      127           Iron      ppm      ASTM D5185(m)      >500      1180          Nickel      ppm      ASTM D5185(m)      >10      6          Aluminum      ppm      ASTM D5185(m)      >10      3          Lead      ppm      ASTM D5185(m)      >25      24          Antimony      ppm      ASTM D5185(m)      >10      37          Antimony      ppm      ASTM D5185(m)      >0           Vanadium      pm      ASTM D5185(m)      0 <td>Machine Age</td> <td>hrs</td> <td>Client Info</td> <td></td> <td>1675</td> <td></td> <td></td>	Machine Age	hrs	Client Info		1675		
Sample Status      Image: Setver term      setver term          CONTAMINATION      method      limit/base      current      history1      history2        Water      WC Method      >.2      NEG          WEAR METALS      method      limit/base      current      history1      history2        PQ      ASTM D8184*      127           Iron      ppm      ASTM D5155(m)      >500      1180          Nickel      ppm      ASTM D5155(m)      >10      6          Silver      ppm      ASTM D5155(m)      >25      24          Copper      ppm      ASTM D5155(m)      >25      24          Autiminum      ppm      ASTM D5155(m)      >10      37          Copper      ppm      ASTM D5155(m)      >5      0          Mainum      pm      ASTM D5155(m)      0        <	Oil Age	hrs	Client Info		0		
CONTAMINATION      method      limit/base      current      history1      history2        Water      WC Method      >.2      NEG          WEAR METALS      method      limit/base      current      history1      history2        PQ      ASTM D8184*      127           Iron      ppm      ASTM D5185(m)      >500      1180          Othornium      ppm      ASTM D5185(m)      >10      6          Nickel      ppm      ASTM D5185(m)      10      3          Silver      ppm      ASTM D5185(m)      >25      24          Auminum      ppm      ASTM D5185(m)      >100      363          Inin      ppm      ASTM D5185(m)      >100      363          Auminum      ppm      ASTM D5185(m)      00           Inin      ppm      ASTM D5185(m)      00	Oil Changed		Client Info		Changed		
Water      WC Method      >.2      NEG          WEAR METALS      method      limit/base      current      history1      history2        PQ      ASTM D8184'      127           Iron      ppm      ASTM D8185(m)      >500      1180          Chromium      ppm      ASTM D5185(m)      >10      3          Nickel      ppm      ASTM D5185(m)      >10      3          Silver      ppm      ASTM D5185(m)      >25      24          Aluminum      ppm      ASTM D5185(m)      >25      32          Copper      ppm      ASTM D5185(m)      >10      363          Antimony      ppm      ASTM D5185(m)      0           Attimony      ppm      ASTM D5185(m)      0           Attimony      ppm      ASTM D5185(m)      0	Sample Status				SEVERE		
WEAR METALS      method      limit/base      current      history1      history2        PQ      ASTM D8184'      127          Iron      ppm      ASTM D5185m      >500      1180          Chromium      ppm      ASTM D5185m      >10      3          Nickel      ppm      ASTM D5185m      >10      3          Silver      ppm      ASTM D5185m      >10      3          Aluminum      ppm      ASTM D5185m      >10      3          Aluminum      ppm      ASTM D5185m      >25      24          Aluminum      ppm      ASTM D5185m      >10      363          Astm D5185m      >10      37            Antimony      ppm      ASTM D5185m      >10           Antimony      ppm      ASTM D5185m      0 <td>CONTAMINATIC</td> <td>N</td> <td>method</td> <td>limit/base</td> <td>current</td> <td>history1</td> <td>history2</td>	CONTAMINATIC	N	method	limit/base	current	history1	history2
PQ    ASTM D8184'    127        Iron    ppm    ASTM D5185(m)    >500    ▲ 1180        Chromium    ppm    ASTM D5185(m)    >10    3        Nickel    ppm    ASTM D5185(m)    >10    3        Silver    ppm    ASTM D5185(m)    25    24        Aluminum    ppm    ASTM D5185(m)    >25    32        Lead    ppm    ASTM D5185(m)    >25    32        Copper    ppm    ASTM D5185(m)    >10    4 363        Antimony    ppm    ASTM D5185(m)    >5    0        Antimony    ppm    ASTM D5185(m)    5    0        Antimony    ppm    ASTM D5185(m)    0         Cadmium    ppm    ASTM D5185(m)    0         Barium    ppm    ASTM D5185(m)    20	Water		WC Method	>.2	NEG		
Iron      ppm      ASTM D5185(m)      >500      ▲ 1180          Chromium      ppm      ASTM D5185(m)      >10      6          Nickel      ppm      ASTM D5185(m)      >10      3          Titanium      ppm      ASTM D5185(m)      2          Silver      ppm      ASTM D5185(m)      >25      •      22          Aluminum      ppm      ASTM D5185(m)      >25      •      32          Lead      ppm      ASTM D5185(m)      >100      ▲ 363          Copper      ppm      ASTM D5185(m)      >5      0          Antimony      ppm      ASTM D5185(m)      >5      0          Cadmium      ppm      ASTM D5185(m)      0           Boron      ppm      ASTM D5185(m)      200      <1	WEAR METALS		method	limit/base	current	history1	history2
Chromium      ppm      ASTM D5185(m)      >10      6         Nickel      ppm      ASTM D5185(m)      >10      3          Titanium      ppm      ASTM D5185(m)      2          Silver      ppm      ASTM D5185(m)      0          Aluminum      ppm      ASTM D5185(m)      >25      24          Lead      ppm      ASTM D5185(m)      >25      4      32          Copper      ppm      ASTM D5185(m)      >100 <b>A</b> 363          Antimony      ppm      ASTM D5185(m)      >10 <b>A</b> 37          Antimony      ppm      ASTM D5185(m)      0          Vanadium      ppm      ASTM D5185(m)      0	PQ		ASTM D8184*		127		
Chromium      ppm      ASTM D5185(m)      >10      6          Nickel      ppm      ASTM D5185(m)      >10      3          Titanium      ppm      ASTM D5185(m)      2          Silver      ppm      ASTM D5185(m)      >25      24          Aluminum      ppm      ASTM D5185(m)      >25      32          Lead      ppm      ASTM D5185(m)      >100      A 363          Copper      ppm      ASTM D5185(m)      >100      A 37          Antimony      ppm      ASTM D5185(m)      >0           Antimony      ppm      ASTM D5185(m)      0           Vanadium      ppm      ASTM D5185(m)      0           Addium      ppm      ASTM D5185(m)      0           Addium      ppm      AS	Iron	maa	ASTM D5185(m)	>500	<b>1180</b>		
Nickel      ppm      ASTM D5185(m)      >10      3          Titanium      ppm      ASTM D5185(m)      2           Silver      ppm      ASTM D5185(m)      0           Aluminum      ppm      ASTM D5185(m)      >25      24          Lead      ppm      ASTM D5185(m)      >100      3633          Copper      ppm      ASTM D5185(m)      >10      377          Antimony      ppm      ASTM D5185(m)      >5      0          Antimony      ppm      ASTM D5185(m)      >5      0          Antimony      ppm      ASTM D5185(m)      0           Cadmium      ppm      ASTM D5185(m)      0           ADDITIVES      method      limit/base      current      history1      history2        Boron      ppm      ASTM D5185(m) <td>Chromium</td> <td></td> <td> ( )</td> <td></td> <td>6</td> <td></td> <td></td>	Chromium		( )		6		
Titanium    ppm    ASTM D5185(m)    2        Silver    ppm    ASTM D5185(m)    >25    24        Aluminum    ppm    ASTM D5185(m)    >25    24        Lead    ppm    ASTM D5185(m)    >25    4    32        Copper    ppm    ASTM D5185(m)    >100    4    363        Antimony    ppm    ASTM D5185(m)    >10    4    37        Antimony    ppm    ASTM D5185(m)    >5    0         Vanadium    ppm    ASTM D5185(m)    >5    0         Standbinum    ppm    ASTM D5185(m)    >0          Boron    ppm    ASTM D5185(m)    400    134         Molybdenum    ppm    ASTM D5185(m)    12    2         Magnesium    ppm    ASTM D5185(m) <t< td=""><td>Nickel</td><td></td><td></td><td></td><td>-</td><td></td><td></td></t<>	Nickel				-		
Silver      ppm      ASTM D5185(m)      0          Aluminum      ppm      ASTM D5185(m)      >25      24          Lead      ppm      ASTM D5185(m)      >25      24          Lead      ppm      ASTM D5185(m)      >25      4      32          Copper      ppm      ASTM D5185(m)      >100      4      363          Antimony      ppm      ASTM D5185(m)      >100      4      377          Vanadium      ppm      ASTM D5185(m)      >5      0          Vanadium      ppm      ASTM D5185(m)      0           Cadmium      ppm      ASTM D5185(m)      0      134          ADDITIVES      method      limit/base      current      history1      history2        Boron      ppm      ASTM D5185(m)      100           Molybdenum <td< td=""><td>Titanium</td><td></td><td>( )</td><td></td><td>2</td><td></td><td></td></td<>	Titanium		( )		2		
Aluminum    ppm    ASTM D5185(m)    >25    24        Lead    ppm    ASTM D5185(m)    >25    32        Copper    ppm    ASTM D5185(m)    >100    363        Tin    ppm    ASTM D5185(m)    >100    377        Antimony    ppm    ASTM D5185(m)    >5    0        Vanadium    ppm    ASTM D5185(m)    0         Beryllium    ppm    ASTM D5185(m)    0         ADDITIVES    method    limit/base    current    history1    history2      Boron    ppm    ASTM D5185(m)    200    <1	Silver		. ,		0		
Lead    ppm    ASTM D5185(m)    >25    ▲ 32        Copper    ppm    ASTM D5185(m)    >100    ▲ 363        Tin    ppm    ASTM D5185(m)    >10    ▲ 37        Antimony    ppm    ASTM D5185(m)    >5    0        Vanadium    ppm    ASTM D5185(m)    0         Beryllium    ppm    ASTM D5185(m)    0         Cadmium    ppm    ASTM D5185(m)    0         ADDITIVES    method    limit/base    current    history1    history2      Boron    ppm    ASTM D5185(m)    200    <1	Aluminum		. ,	>25	24		
Copper      ppm      ASTM D5185(m)      >100      ▲ 363          Tin      ppm      ASTM D5185(m)      >10      ▲ 37          Antimony      ppm      ASTM D5185(m)      >5      0          Vanadium      ppm      ASTM D5185(m)      0           Beryllium      ppm      ASTM D5185(m)      0           ADDITIVES      method      limit/base      current      history1      history2        Boron      ppm      ASTM D5185(m)      400      134          Molybdenum      ppm      ASTM D5185(m)      200      <1	Lead		ASTM D5185(m)	>25	<u> </u>		
Tin    ppm    ASTM D5185(m)    >10    ▲ 37        Antimony    ppm    ASTM D5185(m)    >5    0        Vanadium    ppm    ASTM D5185(m)    0        Beryllium    ppm    ASTM D5185(m)    0        Cadmium    ppm    ASTM D5185(m)    0        ADDITIVES    method    limit/base    current    history1    history2      Boron    ppm    ASTM D5185(m)    400    134        Molybdenum    ppm    ASTM D5185(m)    200    <1        Magnesium    ppm    ASTM D5185(m)    12    2        Magnesium    ppm    ASTM D5185(m)    12    45        Magnesium    ppm    ASTM D5185(m)    12    208        Magnesium    ppm    ASTM D5185(m)    125    208        Sulfur    ppm    ASTM D5185(m)	Copper				<b>3</b> 63		
Antimony    ppm    ASTM D5185(m)    >5    0        Vanadium    ppm    ASTM D5185(m)    Image: Constraint of the start of th			ASTM D5185(m)	>10	<b>4</b> 37		
Vanadium      ppm      ASTM D5185(m)      0          Beryllium      ppm      ASTM D5185(m)      0          Cadmium      ppm      ASTM D5185(m)      0          ADDITIVES      method      limit/base      current      history1      history2        Boron      ppm      ASTM D5185(m)      400      134          Barium      ppm      ASTM D5185(m)      200      <1	Antimony		ASTM D5185(m)	>5	0		
CadmiumppmASTM D5185(m)0ADDITIVESmethodlimit/basecurrenthistory1history2BoronppmASTM D5185(m)400134BariumppmASTM D5185(m)200<1	Vanadium	ppm	ASTM D5185(m)		0		
CadmiumppmASTM D5185(m)0ADDITIVESmethodlimit/basecurrenthistory1history2BoronppmASTM D5185(m)400134BariumppmASTM D5185(m)200<1	Beryllium	ppm	ASTM D5185(m)		0		
Boron      ppm      ASTM D5185(m)      400      134          Barium      ppm      ASTM D5185(m)      200      <1		ppm	ASTM D5185(m)		0		
Barium      ppm      ASTM D5185(m)      200      <1	ADDITIVES		method	limit/base	current	history1	history2
Molybdenum      ppm      ASTM D5185(m)      12      2          Manganese      ppm      ASTM D5185(m)      10           Magnesium      ppm      ASTM D5185(m)      12      45          Calcium      ppm      ASTM D5185(m)      150      72          Phosphorus      ppm      ASTM D5185(m)      1650      812          Zinc      ppm      ASTM D5185(m)      125      208          Sulfur      ppm      ASTM D5185(m)      22500      13423          Lithium      ppm      ASTM D5185(m)      22500      13423          CONTAMINANTS      method      limit/base      current      history1      history2        Silicon      ppm      ASTM D5185(m)      >75      91          Sodium      ppm      ASTM D5185(m)      >16	Boron	ppm	ASTM D5185(m)	400	134		
Manganese      ppm      ASTM D5185(m)      10          Magnesium      ppm      ASTM D5185(m)      12      45          Calcium      ppm      ASTM D5185(m)      150      72          Phosphorus      ppm      ASTM D5185(m)      1650      812          Zinc      ppm      ASTM D5185(m)      125      208          Sulfur      ppm      ASTM D5185(m)      125      208          Sulfur      ppm      ASTM D5185(m)      22500      13423          Lithium      ppm      ASTM D5185(m)      22500      1          CONTAMINANTS      method      limit/base      current      history1      history2        Silicon      ppm      ASTM D5185(m)      >75      91          Sodium      ppm      ASTM D5185(m)      >170      16	Barium	ppm	ASTM D5185(m)	200	<1		
Magnesium      ppm      ASTM D5185(m)      12      45          Calcium      ppm      ASTM D5185(m)      150      72          Phosphorus      ppm      ASTM D5185(m)      1650      812          Zinc      ppm      ASTM D5185(m)      125      208          Sulfur      ppm      ASTM D5185(m)      125      208          Lithium      ppm      ASTM D5185(m)      22500      13423          CONTAMINANTS      method      limit/base      current      history1      history2        Silicon      ppm      ASTM D5185(m)      >75      91          Sodium      ppm      ASTM D5185(m)      >10      16	Molybdenum	ppm	ASTM D5185(m)	12	2		
Calcium      ppm      ASTM D5185(m)      150      72          Phosphorus      ppm      ASTM D5185(m)      1650      812          Zinc      ppm      ASTM D5185(m)      125      208          Sulfur      ppm      ASTM D5185(m)      22500      13423          Lithium      ppm      ASTM D5185(m)      22500      13423          CONTAMINANTS      method      limit/base      current      history1      history2        Silicon      ppm      ASTM D5185(m)      >75      ▲ 91          Sodium      ppm      ASTM D5185(m)      >10      16	Manganese	ppm	ASTM D5185(m)		10		
Phosphorus      ppm      ASTM D5185(m)      1650      812          Zinc      ppm      ASTM D5185(m)      125      208          Sulfur      ppm      ASTM D5185(m)      22500      13423          Lithium      ppm      ASTM D5185(m)      22500      13423          CONTAMINANTS      method      limit/base      current      history1      history2        Silicon      ppm      ASTM D5185(m)      >75      ▲ 91          Sodium      ppm      ASTM D5185(m)      >170      16	Magnesium	ppm	ASTM D5185(m)	12	45		
Zinc      ppm      ASTM D5185(m)      125      208          Sulfur      ppm      ASTM D5185(m)      22500      13423          Lithium      ppm      ASTM D5185(m)      1          CONTAMINANTS      method      limit/base      current      history1      history2        Silicon      ppm      ASTM D5185(m)      >75      91          Sodium      ppm      ASTM D5185(m)      >170      16	Calcium	ppm	ASTM D5185(m)	150	72		
Sulfur      ppm      ASTM D5185(m)      22500      13423          Lithium      ppm      ASTM D5185(m)      Constant      1          CONTAMINANTS      method      limit/base      current      history1      history2        Silicon      ppm      ASTM D5185(m)      >75      ▲ 91          Sodium      ppm      ASTM D5185(m)      >170      16	Phosphorus	ppm	ASTM D5185(m)	1650	812		
Lithium      ppm      ASTM D5185(m)      1          CONTAMINANTS      method      limit/base      current      history1      history2        Silicon      ppm      ASTM D5185(m)      >75      91          Sodium      ppm      ASTM D5185(m)      >170      16	Zinc	ppm	ASTM D5185(m)	125	208		
CONTAMINANTS  method  limit/base  current  history1  history2    Silicon  ppm  ASTM D5185(m)  >75 <b>4</b> 91      Sodium  ppm  ASTM D5185(m)  >170  16	Sulfur	ppm	ASTM D5185(m)	22500	13423		
Silicon      ppm      ASTM D5185(m)      >75      4      91          Sodium      ppm      ASTM D5185(m)      >170      16	Lithium	ppm	ASTM D5185(m)		1		
Sodium      ppm      ASTM D5185(m)      >170      16	CONTAMINANT	S	method	limit/base	current	history1	history2
	Silicon	ppm	ASTM D5185(m)	>75	<u> </u>		
Potassium ppm ASTM D5185(m) >20 11	Sodium		ASTM D5185(m)	>170	16		
	Potassium	ppm	ASTM D5185(m)	>20	11		



# **OIL ANALYSIS REPORT**

