

## **OIL ANALYSIS REPORT**

### Area Nashville [Nashville] Hydraulic - Steering

Hydraulic System

AW HYDRAULIC OIL ISO 32 (110 GAL)

#### DIAGNOSIS

#### Recommendation

No corrective action is recommended at this time. Resample at the next service interval to monitor. ( Customer Sample Comment: Dparnell )

#### Wear

All component wear rates are normal.

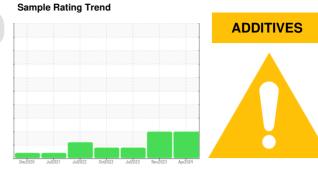
#### Contamination

There is a high amount of silt (particulates < 6 microns in size) present in the oil.

#### Fluid Condition

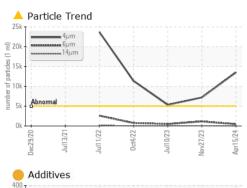
Additive levels indicate the addition of a different brand, or type of oil. The AN level is acceptable for this fluid. The condition of the oil is suitable for further service.

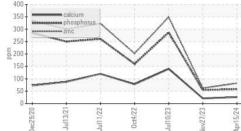
Sample Date         Client Info         15 Apr 2024         27 Nov 2023         10 Jul 2023           Machine Age         hrs         Client Info         0         117         0           Oil Age         hrs         Client Info         2724         117         11304           Oil Changed         Client Info         2724         117         11304           Sample Status         Image         AENORMAL         ATTENTION         ATTENTION           WEAR METALS         method         Imit/base         current         history1         history2           Iron         ppm         ASTM 05185m         >20         2         <1         0         0           Nickel         ppm         ASTM 05185m         >20         2         0         0         0           Auminum         ppm         ASTM 05185m         >20         2         0         0         0           Auminum         ppm         ASTM 05185m         >20         <1         0         0         0           Auminum         ppm         ASTM 05185m         >20         <1         0         0         0           Auminum         ppm         ASTM 05185m         >20         <1			Dec2020	Jul2021 Jul2022	Oct2022 Jul2023 Nov2023	Apr2024	
Sample Date         Client Info         15 Apr 2024         27 Nov 2023         10 Jul 2023           Machine Age         hrs         Client Info         0         117         0           Oil Age         hrs         Client Info         2724         117         11304           Oil Changed         Client Info         270         9         0         14           Chromium         ppm         ASTM 05155m         20         2         <1         0         0           Nickel         ppm         ASTM 05155m         20         2         0         0         0           Lead         ppm         ASTM 05155m         20         2         0         0         0           Vanadium         ppm         ASTM 05155m         20         1         0         0         0           Vanadium         ppm         ASTM 05155m         2         1         0         2           Vanadium	SAMPLE INFORM	IATION	method	limit/base	current	history1	history2
Machine Age     hrs     Client Info     0     117     0       Oil Age     hrs     Client Info     2724     117     1304       Sample Status     Client Info     ABNORMAL     ATTENTION     ATTENTION       WEAR METALS     method     limit/base     current     history1     history1       Iron     ppm     ASTM DS185n     >20     9     0     14       Chromium     ppm     ASTM DS185n     >20     2     <1	Sample Number		Client Info		WC0874897	WC0805241	WC0769194
Oil Age         hrs         Client Info         2724         117         11304           Oil Changed         Client Info         Filtered         Not Changd         Filtered           Sample Status         method         limit/base         current         history1         ATTENTION           WEAR METALS         method         limit/base         current         history2         ATTENTION           Iron         ppm         ASTM D5185m         >20         9         0         14           Chromium         ppm         ASTM D5185m         >20         2         -1         -1           Nickel         ppm         ASTM D5185m         >20         2         0         0           Auminum         ppm         ASTM D5185m         >20         2         0         0           Gopper         ppm         ASTM D5185m         >20         5         2         7         1           Tin         ppm         ASTM D5185m         >20         <1	Sample Date		Client Info		15 Apr 2024	27 Nov 2023	10 Jul 2023
Oli Changed         Client Info         Filtered         Not Changed         Filtered           Sample Status         Image         Image         Current         ATTENTION         ATTENTION           WEAR METALS         method         limit/base         current         history1         history2           Iron         ppm         ASTM D5185m         >20         9         0         14           Chromium         ppm         ASTM D5185m         >20         2         <1	Machine Age	hrs	Client Info		0	117	0
Sample Status         method         Imit/base         current         history1         ATTENTION           WEAR METALS         method         limit/base         current         history1         history2           Iron         ppm         ASTM D5185n         >20         9         0         14           Chromium         ppm         ASTM D5185n         >20         2         <1	Oil Age	hrs	Client Info		2724	117	11304
WEAR METALS         method         limit/base         current         history1         history2           Iron         ppm         ASTM D5185n         >20         9         0         14           Chromium         ppm         ASTM D5185n         >20         2         <1	Oil Changed		Client Info		Filtered	Not Changd	Filtered
Iron         ppm         ASTM D5185m         >20         9         0         14           Chromium         ppm         ASTM D5185m         >20         2         <1	Sample Status				ABNORMAL	ATTENTION	ATTENTION
Image         ASTM DS185m         >20         2         <1         <1           Nickel         ppm         ASTM DS185m         >20         <1	WEAR METALS		method	limit/base	current	history1	history2
Nickel         ppm         ASTM D5185m         >20         <1         0         0           Titanium         ppm         ASTM D5185m         0         0         0           Silver         ppm         ASTM D5185m         >20         2         0         0           Aluminum         ppm         ASTM D5185m         >20         2         0         0           Copper         ppm         ASTM D5185m         >20         5         2         7           Tin         ppm         ASTM D5185m         >20         <1	Iron	ppm	ASTM D5185m	>20	9	0	14
Titanium         ppm         ASTM D5185m               Silver         ppm         ASTM D5185m         S20         2         0         0           Aluminum         ppm         ASTM D5185m         >20         2         0         0           Lead         ppm         ASTM D5185m         >20         5         2         7           Tin         ppm         ASTM D5185m         >20         <1	Chromium	ppm	ASTM D5185m	>20	2	<1	<1
Silver         ppm         ASTM D5185m         0         0         0         0           Aluminum         ppm         ASTM D5185m         >20         2         0         0           Lead         ppm         ASTM D5185m         >20         5         2         7           Copper         ppm         ASTM D5185m         >20         <1	Nickel	ppm	ASTM D5185m	>20	<1	0	0
Aluminum         ppm         ASTM D5185m         >20         2         0         0           Lead         ppm         ASTM D5185m         >20         <1	Titanium	ppm	ASTM D5185m		<1	0	0
Lead         ppm         ASTM D5185m         >20         <1         0         0           Copper         ppm         ASTM D5185m         >20         5         2         7           Tin         ppm         ASTM D5185m         >20         <1	Silver	ppm	ASTM D5185m		0	0	0
Copper         ppm         ASTM D5185m         >20         5         2         7           Tin         ppm         ASTM D5185m         >20         <1	Aluminum	ppm	ASTM D5185m	>20	2	0	0
Copper         ppm         ASTM D5185m         >20         5         2         7           Tin         ppm         ASTM D5185m         >20         <1	Lead		ASTM D5185m	>20	<1	0	0
Tin       ppm       ASTM D5185m       >20       <1       0       0         Vanadium       ppm       ASTM D5185m       <1       0       0         ADDITIVES       method       limit/base       current       history1       history2         Boron       ppm       ASTM D5185m       5       <1       0       4         Barium       ppm       ASTM D5185m       5       <1       0       4         Barium       ppm       ASTM D5185m       5       <1       0       2         Magnese       ppm       ASTM D5185m       5       <1       0       2         Magnesium       ppm       ASTM D5185m       200       26       21       140         Phosphorus       ppm       ASTM D5185m       200       58       55       287         Zinc       ppm       ASTM D5185m       200       62       349       349         Sulfur       ppm       ASTM D5185m       250       1       10       <1         Sodium       ppm       ASTM D5185m       >15       1       0       <1         Sodium       ppm       ASTM D5185m       >20       1       0       <1 </td <td>Copper</td> <td></td> <td>ASTM D5185m</td> <td>&gt;20</td> <th>5</th> <td>2</td> <td>7</td>	Copper		ASTM D5185m	>20	5	2	7
Vanadium         ppm         ASTM D5185m							0
Cadmium         ppm         ASTM D5185m         <1         0         0           ADDITIVES         method         limit/base         current         history1         history2           Boron         ppm         ASTM D5185m         5         <1         0         4           Barium         ppm         ASTM D5185m         5         <1         0         4           Manganese         ppm         ASTM D5185m         5         <1         0         2           Manganese         ppm         ASTM D5185m         20         <1         <1         <1           Maganesium         ppm         ASTM D5185m         200         26         21         140           Phosphorus         ppm         ASTM D5185m         200         58         55         287           Zinc         ppm         ASTM D5185m         370         82         62         349           Sulfur         ppm         ASTM D5185m         2500         174         175         1279           CONTAMINANTS         method         limit/base         current         history1         history2           Silicon         ppm         ASTM D5185m         20         1         0 <td>Vanadium</td> <td></td> <td></td> <td></td> <th></th> <td>0</td> <td>0</td>	Vanadium					0	0
Boron         ppm         ASTM D5185m         5         <1         0         4           Barium         ppm         ASTM D5185m         5         0         0         0           Molybdenum         ppm         ASTM D5185m         5         <1							
Barium         ppm         ASTM D5185m         5         0         0         0           Molybdenum         ppm         ASTM D5185m         5         <1	ADDITIVES		method	limit/base	current	history1	history2
Molybdenum         ppm         ASTM D5185m         5         <1         0         2           Manganese         ppm         ASTM D5185m         20         0         <1	Boron	ppm	ASTM D5185m	5	<1	0	4
Marganese         ppm         ASTM D5185m         0         <1         <1           Magnesium         ppm         ASTM D5185m         25         2         <1	Barium	ppm	ASTM D5185m	5	0	0	0
Magnesium         ppm         ASTM D5185m         25         2         <1         5           Calcium         ppm         ASTM D5185m         200         26         21         140           Phosphorus         ppm         ASTM D5185m         300         58         55         287           Zinc         ppm         ASTM D5185m         370         82         62         349           Sulfur         ppm         ASTM D5185m         2500         174         175         1279           CONTAMINANTS         method         limit/base         current         history1         history2           Silicon         ppm         ASTM D5185m         >15         1         10         <1	Molybdenum	ppm	ASTM D5185m	5	<1	0	2
Calcium       ppm       ASTM D5185m       200       26       21       140         Phosphorus       ppm       ASTM D5185m       300       58       55       287         Zinc       ppm       ASTM D5185m       370       82       62       349         Sulfur       ppm       ASTM D5185m       2500       174       175       1279         CONTAMINANTS       method       limit/base       current       history1       history2         Silicon       ppm       ASTM D5185m       >15       1       10       <1	Manganese	ppm	ASTM D5185m		0	<1	<1
Phosphorus         ppm         ASTM D5185m         300         58         55         287           Zinc         ppm         ASTM D5185m         370         82         62         349           Sulfur         ppm         ASTM D5185m         2500         174         175         1279           CONTAMINANTS         method         limit/base         current         history1         history2           Silicon         ppm         ASTM D5185m         >15         1         10         <1	Magnesium	ppm	ASTM D5185m	25	2	<1	5
Zinc         ppm         ASTM D5185m         370         82         62         349           Sulfur         ppm         ASTM D5185m         2500         174         175         1279           CONTAMINANTS         method         limit/base         current         history1         history2           Silicon         ppm         ASTM D5185m         >15         1         10         <1	Calcium	ppm	ASTM D5185m	200	26	21	140
Sulfur         ppm         ASTM D5185m         2500         174         175         1279           CONTAMINANTS         method         limit/base         current         history1         history2           Silicon         ppm         ASTM D5185m         >15         1         10         <1           Sodium         ppm         ASTM D5185m         >15         1         10         <1           Potassium         ppm         ASTM D5185m         >20         1         0         0           Water         %         ASTM D6304         >0.05         0.003         0.001         0.003           ppm         ASTM D6304         >500         36         14         38.6           FLUID CLEANLINESS         method         limit/base         current         history1         history2           Particles >4µm         ASTM D7647         >5000         13521         7201         5325           Particles >6µm         ASTM D7647         >1300         462         1171         490           Particles >1µm         ASTM D7647         >40         2         19         12           Particles >21µm         ASTM D7647         >40         2         19         12     <	Phosphorus	ppm	ASTM D5185m	300	<b>5</b> 8	55	287
Sulfur         ppm         ASTM D5185m         2500         174         175         1279           CONTAMINANTS         method         limit/base         current         history1         history2           Silicon         ppm         ASTM D5185m         >15         1         10         <1           Sodium         ppm         ASTM D5185m         >15         1         10         <1           Potassium         ppm         ASTM D5185m         >20         1         0         0           Water         %         ASTM D6304         >0.05         0.003         0.001         0.003           ppm Water         ppm         ASTM D6304         >500         36         14         38.6           FLUID CLEANLINESS         method         limit/base         current         history1         history2           Particles >4µm         ASTM D7647         >5000         13521         7201         5325           Particles >6µm         ASTM D7647         >1300         462         1171         490           Particles >1µm         ASTM D7647         >10         0         1         1           Particles >38µm         ASTM D7647         30         0         0	Zinc	ppm	ASTM D5185m	370	82	62	349
Silicon         ppm         ASTM D5185m         >15         1         10         <1           Sodium         ppm         ASTM D5185m         >20         1         0         0           Potassium         ppm         ASTM D5185m         >20         1         0         0           Water         %         ASTM D6304         >0.05         0.003         0.001         0.003           ppm Water         ppm         ASTM D6304         >500         36         14         38.6           FLUID CLEANLINESS         method         limit/base         current         history1         history2           Particles >4µm         ASTM D7647         >5000         13521         7201         5325           Particles >6µm         ASTM D7647         >1300         462         1171         490           Particles >14µm         ASTM D7647         >160         8         65         30           Particles >21µm         ASTM D7647         >40         2         19         12           Particles >38µm         ASTM D7647         >3         0         0         0           Oil Cleanliness         ISO 4406 (c)         >19/17/14         21/16/10         20/17/13         20/16	Sulfur		ASTM D5185m	2500	<b>174</b>	175	1279
Sodium         ppm         ASTM D5185m         0         1         <1           Potassium         ppm         ASTM D5185m<>20         1         0         0           Water         %         ASTM D6304         >0.05         0.003         0.001         0.003           ppm Water         ppm         ASTM D6304         >500         36         14         38.6           FLUID CLEANLINESS         method         limit/base         current         history1         history2           Particles >4µm         ASTM D7647         >5000         ▲ 13521         7201         5325           Particles >6µm         ASTM D7647         >100         462         1171         490           Particles >14µm         ASTM D7647         >160         8         65         30           Particles >21µm         ASTM D7647         >10         0         1         1           Particles >38µm         ASTM D7647         >3         0         0         0           Oil Cleanliness         ISO 4406 (c)         >19/17/14         21/16/10         20/17/13         20/16/12           FLUID DEGRADATION         method         limit/base         current         history1         history2	CONTAMINANTS		method	limit/base	current	history1	history2
Potassium         ppm         ASTM D5185m         >20         1         0         0           Water         %         ASTM D6304         >0.05         0.003         0.001         0.003           ppm         ASTM D6304         >500         36         14         38.6           FLUID CLEANLINESS         method         limit/base         current         history1         history2           Particles >4µm         ASTM D7647         >5000         ▲ 13521         7201         5325           Particles >6µm         ASTM D7647         >1300         462         1171         490           Particles >14µm         ASTM D7647         >160         8         65         30           Particles >21µm         ASTM D7647         >40         2         19         12           Particles >38µm         ASTM D7647         >3         0         0         0           Oil Cleanliness         ISO 4406 (c)         >19/17/14         21/16/10         20/17/13         20/16/12           FLUID DEGRADATION         method         limit/base         current         history1         history2	Silicon	ppm	ASTM D5185m	>15	1	10	<1
Water       %       ASTM D6304       >0.05       0.003       0.001       0.003         ppm Water       ppm       ASTM D6304       >500       36       14       38.6         FLUID CLEANLINESS       method       limit/base       current       history1       history2         Particles >4µm       ASTM D7647       >5000       13521       7201       5325         Particles >6µm       ASTM D7647       >1300       462       1171       490         Particles >14µm       ASTM D7647       >160       8       65       30         Particles >21µm       ASTM D7647       >40       2       19       12         Particles >38µm       ASTM D7647       >10       0       1       1         Particles >71µm       ASTM D7647       >3       0       0       0         Oil Cleanliness       ISO 4406 (c)       >19/17/14       21/16/10       20/17/13       20/16/12         FLUID DEGRADATION       method       limit/base       current       history1       history2	Sodium	ppm	ASTM D5185m		0	1	<1
ppm Water         ppm         ASTM D6304         >500         36         14         38.6           FLUID CLEANLINESS         method         limit/base         current         history1         history2           Particles >4µm         ASTM D7647         >5000         13521         7201         5325           Particles >6µm         ASTM D7647         >1300         462         1171         490           Particles >14µm         ASTM D7647         >160         8         65         30           Particles >14µm         ASTM D7647         >100         2         19         12           Particles >21µm         ASTM D7647         >10         0         1         1           Particles >38µm         ASTM D7647         >3         0         0         0           Oil Cleanliness         ISO 4406 (c)         >19/17/14         21/16/10         20/17/13         20/16/12           FLUID DEGRADATION         method         limit/base         current         history1         history2	Potassium	ppm	ASTM D5185m	>20	1	0	0
FLUID CLEANLINESS       method       limit/base       current       history1       history2         Particles >4µm       ASTM D7647       >5000       ▲ 13521       7201       5325         Particles >6µm       ASTM D7647       >1300       462       1171       490         Particles >6µm       ASTM D7647       >160       8       65       30         Particles >14µm       ASTM D7647       >160       8       65       30         Particles >21µm       ASTM D7647       >40       2       19       12         Particles >38µm       ASTM D7647       >10       0       1       1         Particles >71µm       ASTM D7647       >3       0       0       0         Oil Cleanliness       ISO 4406 (c)       >19/17/14       21/16/10       20/17/13       20/16/12         FLUID DEGRADATION       method       limit/base       current       history1       history2	Water	%	ASTM D6304	>0.05	0.003	0.001	0.003
Particles >4μm       ASTM D7647       >5000       ▲ 13521       7201       5325         Particles >6μm       ASTM D7647       >1300       462       1171       490         Particles >14μm       ASTM D7647       >160       8       65       30         Particles >21μm       ASTM D7647       >40       2       19       12         Particles >21μm       ASTM D7647       >10       0       1       1         Particles >38μm       ASTM D7647       >3       0       0       0         Particles >71μm       ASTM D7647       >3       0       0       0         Oil Cleanliness       ISO 4406 (c)       >19/17/14       21/16/10       20/17/13       20/16/12         FLUID DEGRADATION       method       limit/base       current       history1       history2	ppm Water	ppm	ASTM D6304	>500	36	14	38.6
Particles >6µm         ASTM D7647         >1300         462         1171         490           Particles >14µm         ASTM D7647         >160         8         65         30           Particles >21µm         ASTM D7647         >40         2         19         12           Particles >38µm         ASTM D7647         >10         0         1         1           Particles >38µm         ASTM D7647         >3         0         0         0           Oil Cleanliness         ISO 4406 (c)         >19/17/14         21/16/10         20/17/13         20/16/12           FLUID DEGRADATION         method         limit/base         current         history1         history2	FLUID CLEANLIN	ESS	method	limit/base	current	history1	history2
Particles >14μm         ASTM D7647         >160         8         65         30           Particles >21μm         ASTM D7647         >40         2         19         12           Particles >38μm         ASTM D7647         >10         0         1         1           Particles >38μm         ASTM D7647         >30         0         0         0           Particles >71μm         ASTM D7647         >3         0         0         0           Oil Cleanliness         ISO 4406 (c)         >19/17/14         21/16/10         20/17/13         20/16/12           FLUID DEGRADATION         method         limit/base         current         history1         history2	Particles >4µm		ASTM D7647	>5000	<u> </u>	7201	5325
Particles >21μm         ASTM D7647         >40         2         19         12           Particles >38μm         ASTM D7647         >10         0         1         1           Particles >38μm         ASTM D7647         >30         0         0         0           Particles >71μm         ASTM D7647         >3         0         0         0           Oil Cleanliness         ISO 4406 (c)         >19/17/14         21/16/10         20/17/13         20/16/12           FLUID DEGRADATION         method         limit/base         current         history1         history2	Particles >6µm		ASTM D7647	>1300	462	1171	490
Particles >38μm         ASTM D7647         >10         0         1         1           Particles >71μm         ASTM D7647         >3         0         0         0           Oil Cleanliness         ISO 4406 (c)         >19/17/14         21/16/10         20/17/13         20/16/12           FLUID DEGRADATION         method         limit/base         current         history1         history2	Particles >14µm		ASTM D7647	>160	8	65	30
Particles >71μm         ASTM D7647         >3         0         0         0           Oil Cleanliness         ISO 4406 (c)         >19/17/14         ▲ 21/16/10         20/17/13         20/16/12           FLUID DEGRADATION         method         limit/base         current         history1         history2	Particles >21µm		ASTM D7647	>40	2	19	12
Oil Cleanliness         ISO 4406 (c)         >19/17/14 <b>21/16/10</b> 20/17/13         20/16/12           FLUID DEGRADATION         method         limit/base         current         history1         history2	Particles >38µm		ASTM D7647	>10	0	1	1
Oil Cleanliness         ISO 4406 (c)         >19/17/14 <b>21/16/10</b> 20/17/13         20/16/12           FLUID DEGRADATION         method         limit/base         current         history1         history2			ASTM D7647	>3	0	0	0
					<b>21/16/10</b>	20/17/13	20/16/12
Acid Number (AN) mg KOH/g ASTM D8045 0.57 0.082 0.108 0.25	FLUID DEGRADA	TION	method	limit/base	current	history1	history2
	Acid Number (AN)	mg KOH/g	ASTM D8045	0.57	0.082	0.108	0.25

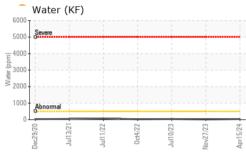


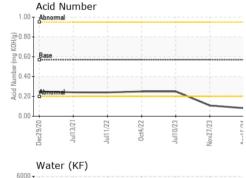


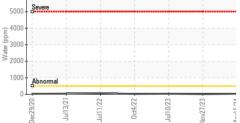
# **OIL ANALYSIS REPORT**



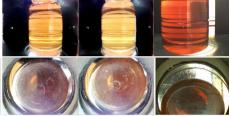




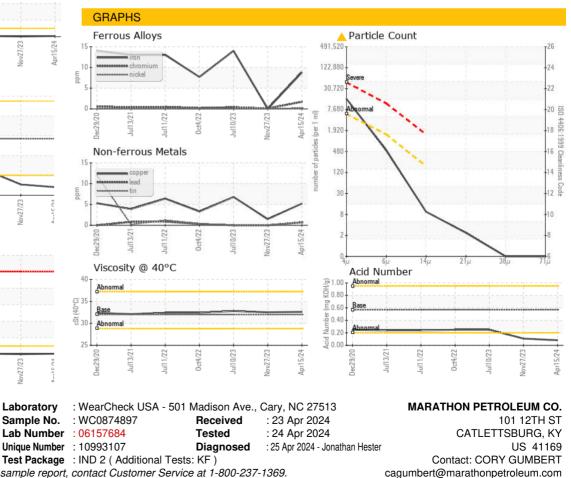




VISUAL		method	limit/base	current	history1	history2
White Metal	scalar	*Visual	NONE	NONE	NONE	LIGHT
Yellow Metal	scalar	*Visual	NONE	NONE	NONE	NONE
Precipitate	scalar	*Visual	NONE	NONE	NONE	NONE
Silt	scalar	*Visual	NONE	NONE	NONE	NONE
Debris	scalar	*Visual	NONE	NONE	NONE	NONE
Sand/Dirt	scalar	*Visual	NONE	NONE	NONE	NONE
Appearance	scalar	*Visual	NORML	NORML	NORML	NORML
Odor	scalar	*Visual	NORML	NORML	NORML	NORML
Emulsified Water	scalar	*Visual	>0.05	NEG	NEG	NEG
Free Water	scalar	*Visual		NEG	NEG	NEG
FLUID PROPERT	IES	method	limit/base	current	history1	history2
Visc @ 40°C	cSt	ASTM D445	32	32.6	32.5	32.8
SAMPLE IMAGES		method	limit/base	current	history1	history2
Color					•	



Bottom



To discuss this sample report, contact Customer Service at 1-800-237-1369.

\* - Denotes test methods that are outside of the ISO 17025 scope of accreditation.

Statements of conformity to specifications are based on the simple acceptance decision rule (JCGM 106:2012)

Report Id: MARCAT [WUSCAR] 06157684 (Generated: 04/25/2024 15:27:13) Rev: 1

Certificate 12367

Submitted By: M/V NASHVILLE

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