

## **OIL ANALYSIS REPORT**

Sample Rating Trend



#### Machine Id **21406** Component **Diesel Engine** Fluid

MOBIL 15W40 (--- QTS)

#### DIAGNOSIS

#### Recommendation

Resample at the next service interval to monitor.

#### Wear

All component wear rates are normal.

#### Contamination

There is no indication of any contamination in the oil.

### Fluid Condition

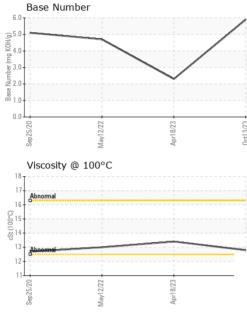
The BN result indicates that there is suitable alkalinity remaining in the oil. The condition of the oil is suitable for further service.

| SAMPLE INFORM   | IATION   | method  | limit/base  | current  | history1  | history2  |
|---|--|---|---|--|---|---|
| Sample Number   |  | Client Info   |   | IL0032490  | IL0028928   | IL0023713   |
| Sample Date   |  | Client Info   |   | 13 Oct 2023  | 18 Apr 2023   | 12 May 2022   |
| Machine Age   | mls  | Client Info   |   | 133218   | 122758  | 104277  |
| Oil Age   | mls  | Client Info   |   | 15000  | 15000   | 15000   |
| Oil Changed   |  | Client Info   |   | Changed  | Changed   | Changed   |
| Sample Status   |  |   |   | NORMAL   | ABNORMAL  | NORMAL  |
| CONTAMINATION   | ٧  | method  | limit/base  | current  | history1  | history2  |
| Fuel  |  | WC Method   | >5  | <1.0   | <1.0  | <1.0  |
| Glycol  |  | WC Method   |   | NEG  | NEG   | NEG   |
| WEAR METALS   |  | method  | limit/base  | current  | history1  | history2  |
| Iron  | ppm  | ASTM D5185m   | >100  | 43   | 81  | 79  |
| Chromium  | ppm  | ASTM D5185m   | >20   | 1  | 2   | 2   |
| Nickel  | ppm  | ASTM D5185m   | >4  | <1   | 0   | 0   |
| Titanium  | ppm  | ASTM D5185m   |   | 0  | <1  | <1  |
| Silver  | ppm  | ASTM D5185m   | >3  | <1   | 0   | 0   |
| Aluminum  | ppm  | ASTM D5185m   | >20   | 4  | 13  | 13  |
| Lead  | ppm  | ASTM D5185m   | >40   | 0  | 0   | 0   |
| Copper  | ppm  | ASTM D5185m   | >330  | 2  | 1   | 2   |
| Tin   | ppm  | ASTM D5185m   | >15   | 0  | 0   | <1  |
| Antimony  | ppm  | ASTM D5185m   |   |  |   |   |
| Vanadium  | ppm  | ASTM D5185m   |   | 0  | <1  | 0   |
| Cadmium   | ppm  | ASTM D5185m   |   | <1   | 0   | 0   |
|   |  |   |   |  |   |   |
| ADDITIVES   |  | method  | limit/base  | current  | history1  | history2  |
| ADDITIVES<br>Boron  | ppm  | method<br>ASTM D5185m   | limit/base  | current<br>0   | history1<br>7   | history2<br>30  |
|   | ppm<br>ppm   |   | limit/base  |  |   |   |
| Boron   |  | ASTM D5185m   | limit/base  | 0  | 7<br>0<br>48  | 30<br>0<br>41   |
| Boron<br>Barium<br>Molybdenum<br>Manganese  | ppm  | ASTM D5185m<br>ASTM D5185m  | limit/base  | 0<br>4   | 7<br>0<br>48<br>1   | 30<br>0<br>41<br>1  |
| Boron<br>Barium<br>Molybdenum<br>Manganese<br>Magnesium   | ppm<br>ppm<br>ppm<br>ppm   | ASTM D5185m<br>ASTM D5185m<br>ASTM D5185m<br>ASTM D5185m<br>ASTM D5185m   | limit/base  | 0<br>4<br>61<br><1<br>877  | 7<br>0<br>48<br>1<br>834  | 30<br>0<br>41<br>1<br>506   |
| Boron<br>Barium<br>Molybdenum<br>Manganese<br>Magnesium<br>Calcium  | ppm<br>ppm<br>ppm<br>ppm<br>ppm                                    | ASTM D5185m<br>ASTM D5185m<br>ASTM D5185m<br>ASTM D5185m<br>ASTM D5185m<br>ASTM D5185m  | limit/base  | 0<br>4<br>61<br><1<br>877<br>1045  | 7<br>0<br>48<br>1<br>834<br>1172  | 30<br>0<br>41<br>1<br>506<br>1725   |
| Boron<br>Barium<br>Molybdenum<br>Manganese<br>Magnesium<br>Calcium<br>Phosphorus  | ppm<br>ppm<br>ppm<br>ppm<br>ppm<br>ppm                             | ASTM D5185m<br>ASTM D5185m<br>ASTM D5185m<br>ASTM D5185m<br>ASTM D5185m<br>ASTM D5185m  | limit/base  | 0<br>4<br>61<br><1<br>877<br>1045<br>849   | 7<br>0<br>48<br>1<br>834<br>1172<br>901   | 30<br>0<br>41<br>1<br>506<br>1725<br>729  |
| Boron<br>Barium<br>Molybdenum<br>Manganese<br>Magnesium<br>Calcium<br>Phosphorus<br>Zinc  | ppm<br>ppm<br>ppm<br>ppm<br>ppm<br>ppm                             | ASTM D5185m<br>ASTM D5185m<br>ASTM D5185m<br>ASTM D5185m<br>ASTM D5185m<br>ASTM D5185m<br>ASTM D5185m   | limit/base  | 0<br>4<br>61<br><1<br>877<br>1045<br>849<br>1174   | 7<br>0<br>48<br>1<br>834<br>1172<br>901<br>1132   | 30<br>0<br>41<br>1<br>506<br>1725<br>729<br>979   |
| Boron<br>Barium<br>Molybdenum<br>Manganese<br>Magnesium<br>Calcium<br>Phosphorus<br>Zinc<br>Sulfur  | ppm<br>ppm<br>ppm<br>ppm<br>ppm<br>ppm<br>ppm<br>ppm               | ASTM D5185m<br>ASTM D5185m<br>ASTM D5185m<br>ASTM D5185m<br>ASTM D5185m<br>ASTM D5185m  |   | 0<br>4<br>61<br><1<br>877<br>1045<br>849   | 7<br>0<br>48<br>1<br>834<br>1172<br>901<br>1132<br>3120   | 30<br>0<br>41<br>1<br>506<br>1725<br>729<br>979<br>2172   |
| Boron<br>Barium<br>Molybdenum<br>Manganese<br>Magnesium<br>Calcium<br>Phosphorus<br>Zinc<br>Sulfur<br>CONTAMINANTS  | ppm<br>ppm<br>ppm<br>ppm<br>ppm<br>ppm<br>ppm<br>ppm               | ASTM D5185m<br>ASTM D5185m<br>ASTM D5185m<br>ASTM D5185m<br>ASTM D5185m<br>ASTM D5185m<br>ASTM D5185m<br>ASTM D5185m  | limit/base  | 0<br>4<br>61<br><1<br>877<br>1045<br>849<br>1174<br>3297<br>current  | 7<br>0<br>48<br>1<br>834<br>1172<br>901<br>1132<br>3120<br>history1   | 30<br>0<br>41<br>1<br>506<br>1725<br>729<br>979<br>2172<br>history2   |
| Boron<br>Barium<br>Molybdenum<br>Manganese<br>Magnesium<br>Calcium<br>Phosphorus<br>Zinc<br>Sulfur<br>CONTAMINANTS<br>Silicon   | ppm<br>ppm<br>ppm<br>ppm<br>ppm<br>ppm<br>ppm<br>ppm               | ASTM D5185m<br>ASTM D5185m<br>ASTM D5185m<br>ASTM D5185m<br>ASTM D5185m<br>ASTM D5185m<br>ASTM D5185m<br>ASTM D5185m<br>ASTM D5185m   | limit/base  | 0<br>4<br>61<br><1<br>877<br>1045<br>849<br>1174<br>3297<br>current<br>5   | 7<br>0<br>48<br>1<br>834<br>1172<br>901<br>1132<br>3120<br>history1<br>8  | 30<br>0<br>41<br>1<br>506<br>1725<br>729<br>979<br>2172<br>history2<br>8  |
| Boron<br>Barium<br>Molybdenum<br>Manganese<br>Magnesium<br>Calcium<br>Phosphorus<br>Zinc<br>Sulfur<br>CONTAMINANTS<br>Silicon<br>Sodium   | ppm<br>ppm<br>ppm<br>ppm<br>ppm<br>ppm<br>ppm<br>ppm               | ASTM D5185m<br>ASTM D5185m<br>ASTM D5185m<br>ASTM D5185m<br>ASTM D5185m<br>ASTM D5185m<br>ASTM D5185m<br>ASTM D5185m<br>ASTM D5185m<br>ASTM D5185m  | limit/base >25 >118   | 0<br>4<br>61<br><1<br>877<br>1045<br>849<br>1174<br>3297<br>current<br>5<br>0  | 7<br>0<br>48<br>1<br>834<br>1172<br>901<br>1132<br>3120<br>history1<br>8<br>3<br>3  | 30<br>0<br>41<br>1<br>506<br>1725<br>729<br>979<br>2172<br>2172<br>history2<br>8<br>2   |
| Boron<br>Barium<br>Molybdenum<br>Manganese<br>Magnesium<br>Calcium<br>Phosphorus<br>Zinc<br>Sulfur<br>CONTAMINANTS<br>Silicon   | ppm<br>ppm<br>ppm<br>ppm<br>ppm<br>ppm<br>ppm<br>ppm               | ASTM D5185m<br>ASTM D5185m<br>ASTM D5185m<br>ASTM D5185m<br>ASTM D5185m<br>ASTM D5185m<br>ASTM D5185m<br>ASTM D5185m<br>ASTM D5185m   | limit/base  | 0<br>4<br>61<br><1<br>877<br>1045<br>849<br>1174<br>3297<br>current<br>5   | 7<br>0<br>48<br>1<br>834<br>1172<br>901<br>1132<br>3120<br>history1<br>8  | 30<br>0<br>41<br>1<br>506<br>1725<br>729<br>979<br>2172<br>history2<br>8  |
| Boron<br>Barium<br>Molybdenum<br>Manganese<br>Magnesium<br>Calcium<br>Phosphorus<br>Zinc<br>Sulfur<br>CONTAMINANTS<br>Silicon<br>Sodium<br>Potassium<br>INFRA-RED                                     | ppm<br>ppm<br>ppm<br>ppm<br>ppm<br>ppm<br>ppm<br>ppm               | ASTM D5185m<br>ASTM D5185m  | limit/base<br>>25<br>>118<br>>20<br>limit/base              | 0<br>4<br>61<br><1<br>877<br>1045<br>849<br>1174<br>3297<br>current<br>5<br>0<br>9   | 7<br>0<br>48<br>1<br>834<br>1172<br>901<br>1132<br>3120<br>history1<br>8<br>3<br>17<br>history1   | 30<br>0<br>41<br>1<br>506<br>1725<br>729<br>979<br>2172<br>history2<br>8<br>2<br>2<br>17<br>history2                                    |
| Boron<br>Barium<br>Molybdenum<br>Manganese<br>Magnesium<br>Calcium<br>Phosphorus<br>Zinc<br>Sulfur<br>CONTAMINANTS<br>Silicon<br>Sodium<br>Potassium<br>INFRA-RED<br>Soot %                           | ppm                            | ASTM D5185m<br>ASTM D5185m   | limit/base<br>>25<br>>118<br>>20<br>limit/base<br>>3        | 0<br>4<br>61<br><1<br>877<br>1045<br>849<br>1174<br>3297<br><u>current</u><br>5<br>0<br>9<br><u>current</u>                        | 7<br>0<br>48<br>1<br>834<br>1172<br>901<br>1132<br>3120<br>history1<br>8<br>3<br>17<br>history1<br>0.8                                  | 30<br>0<br>41<br>1<br>506<br>1725<br>729<br>979<br>2172<br>history2<br>8<br>2<br>17<br>history2<br>0.7                                  |
| Boron<br>Barium<br>Molybdenum<br>Manganese<br>Magnesium<br>Calcium<br>Phosphorus<br>Zinc<br>Sulfur<br>CONTAMINANTS<br>Silicon<br>Sodium<br>Potassium<br>INFRA-RED<br>Soot %<br>Nitration              | ppm<br>ppm<br>ppm<br>ppm<br>ppm<br>ppm<br>ppm<br>ppm<br>ppm<br>ppm | ASTM D5185m<br>ASTM D5185m   | limit/base<br>>25<br>>118<br>>20<br>limit/base<br>>3<br>>20 | 0<br>4<br>61<br><1<br>877<br>1045<br>849<br>1174<br>3297<br>current<br>5<br>0<br>9<br>current<br>0.6<br>13.2                       | 7<br>0<br>48<br>1<br>834<br>1172<br>901<br>1132<br>3120<br>history1<br>8<br>3<br>17<br>history1<br>0.8<br>16.1                          | 30<br>0<br>41<br>1<br>506<br>1725<br>729<br>979<br>2172<br>history2<br>8<br>2<br>2<br>17<br>history2<br>0.7<br>16.9                     |
| Boron<br>Barium<br>Molybdenum<br>Manganese<br>Magnesium<br>Calcium<br>Phosphorus<br>Zinc<br>Sulfur<br>CONTAMINANTS<br>Silicon<br>Sodium<br>Potassium<br>INFRA-RED<br>Soot %                           | ppm                            | ASTM D5185m<br>ASTM D5185m   | limit/base<br>>25<br>>118<br>>20<br>limit/base<br>>3        | 0<br>4<br>61<br><1<br>877<br>1045<br>849<br>1174<br>3297<br><u>current</u><br>5<br>0<br>9<br><u>current</u>                        | 7<br>0<br>48<br>1<br>834<br>1172<br>901<br>1132<br>3120<br>history1<br>8<br>3<br>17<br>history1<br>0.8                                  | 30<br>0<br>41<br>1<br>506<br>1725<br>729<br>979<br>2172<br>history2<br>8<br>2<br>17<br>history2<br>0.7                                  |
| Boron<br>Barium<br>Molybdenum<br>Manganese<br>Magnesium<br>Calcium<br>Phosphorus<br>Zinc<br>Sulfur<br>CONTAMINANTS<br>Silicon<br>Sodium<br>Potassium<br>INFRA-RED<br>Soot %<br>Nitration              | ppm<br>ppm<br>ppm<br>ppm<br>ppm<br>ppm<br>ppm<br>ppm<br>ppm<br>ppm | ASTM D5185m<br>ASTM D5185m   | limit/base<br>>25<br>>118<br>>20<br>limit/base<br>>3<br>>20 | 0<br>4<br>61<br><1<br>877<br>1045<br>849<br>1174<br>3297<br>current<br>5<br>0<br>9<br>current<br>0.6<br>13.2                       | 7<br>0<br>48<br>1<br>834<br>1172<br>901<br>1132<br>3120<br>history1<br>8<br>3<br>17<br>history1<br>0.8<br>16.1                          | 30<br>0<br>41<br>1<br>506<br>1725<br>729<br>979<br>2172<br>history2<br>8<br>2<br>2<br>17<br>history2<br>0.7<br>16.9                     |
| Boron<br>Barium<br>Molybdenum<br>Manganese<br>Magnesium<br>Calcium<br>Phosphorus<br>Zinc<br>Sulfur<br>CONTAMINANTS<br>Silicon<br>Sodium<br>Potassium<br>INFRA-RED<br>Soot %<br>Nitration<br>Sulfation | ppm<br>ppm<br>ppm<br>ppm<br>ppm<br>ppm<br>ppm<br>ppm<br>ppm<br>ppm | ASTM D5185m<br>ASTM D5185m               | Imit/base >25 >118 >20 Imit/base >3 >20 >30                 | 0<br>4<br>61<br><1<br>877<br>1045<br>849<br>1174<br>3297<br><u>current</u><br>5<br>0<br>9<br><u>current</u><br>0.6<br>13.2<br>26.9 | 7<br>0<br>48<br>1<br>834<br>1172<br>901<br>1132<br>3120<br>history1<br>8<br>3<br>17<br>history1<br>0.8<br>16.1<br>31.9                  | 30<br>0<br>41<br>1<br>506<br>1725<br>729<br>979<br>2172<br>history2<br>8<br>2<br>17<br>history2<br>0.7<br>16.9<br>31.4                  |
| Boron<br>Barium<br>Molybdenum<br>Manganese<br>Magnesium<br>Calcium<br>Phosphorus<br>Zinc<br>Sulfur<br>CONTAMINANTS<br>Silicon<br>Sodium<br>Potassium<br>INFRA-RED<br>Soot %<br>Nitration<br>Sulfation | ppm<br>ppm<br>ppm<br>ppm<br>ppm<br>ppm<br>ppm<br>ppm<br>ppm<br>ppm | ASTM D5185m<br>ASTM D7844<br>*ASTM D7624<br>*ASTM D7415 | limit/base >25 >118 >20 limit/base >3 >20 >30 limit/base    | 0<br>4<br>61<br><1<br>877<br>1045<br>849<br>1174<br>3297<br>Current<br>5<br>0<br>9<br>Current<br>0.6<br>13.2<br>26.9<br>Current    | 7<br>0<br>48<br>1<br>834<br>1172<br>901<br>1132<br>3120<br>history1<br>8<br>3<br>3<br>17<br>history1<br>0.8<br>16.1<br>31.9<br>history1 | 30<br>0<br>41<br>1<br>506<br>1725<br>729<br>979<br>2172<br>history2<br>8<br>2<br>2<br>17<br>history2<br>0.7<br>16.9<br>31.4<br>history2 |



# **OIL ANALYSIS REPORT**

VISUAL



|                          |                          | v                        | Vhite Metal                                    | scalar   | *Visual            | NONE  | NONE          | NONE   | NONE                         |  |  |
|--------------------------|--------------------------|--------------------------|--|--|--------------------|---|---------------|--|------------------------------|--|--|
|                          |                          |                          | ellow 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                                      |  | *Visual            | NONE  | NONE          | NONE   | NONE                         |  |  |
| 22 -                     | - 23                     |                          |  | scalar   |                    | NORML   |               | NORML  | NORML                        |  |  |
| May12/22<br>Aor18/23     | 0ct13/23                 |                          | Appearance<br>Odor                             | scalar   | *Visual            |   | NORML         |  |                              |  |  |
| 2 4                      | 0                        |                          | Emulsified Water                               | scalar   | *Visual<br>*Visual | NORML   | NORML         | NORML  | NORML                        |  |  |
| 0°C                      |                          |                          | Free Water                                     | scalar<br>scalar   | *Visual            | >0.2  | NEG<br>NEG    | NEG  | NEG<br>NEG                   |  |  |
|                          |                          |                          |  |  | visuai             |   | NEG           | NLG  | NEG                          |  |  |
|                          |                          |                          | FLUID PROPERT                                  | IES  | method             | limit/base                                      | current       | history1   | history2                     |  |  |
|                          |                          | Ň                        | /isc @ 100°C                                   | cSt  | ASTM D445          |   | 12.8          | 13.4   | 13.0                         |  |  |
|                          |                          |                          | GRAPHS   |  |                    |   |               |  |                              |  |  |
|                          |                          | 0.0                      | Ferrous Alloys                                 |  |                    |   |               |  |                              |  |  |
|                          |                          | 90-<br>80-               | iron   |  | 1                  |   |               |  |                              |  |  |
| May12/22 .<br>Aor18/23 . |                          | 70                       | nickel   |  |                    |   |               |  |                              |  |  |
| Ac                       |                          | 60                       |  |  |                    |   |               |  |                              |  |  |
|                          |                          | 톱 <sup>50</sup>          | · · · · · · · · · · · · · · · · · · ·          |  |                    |   |               |  |                              |  |  |
|                          |                          |                          |  |  |                    |   |               |  |                              |  |  |
|                          |                          | 30-<br>20-               |  |  |                    |   |               |  |                              |  |  |
|                          |                          | 10-                      |  |  |                    |   |               |  |                              |  |  |
|                          |                          | 0                        |  |  |                    |   |               |  |                              |  |  |
|                          |                          |                          | Sep 25/20<br>May 12/22                         |  | Apr18/23           | 0ct13/23  |               |  |                              |  |  |
|                          |                          |                          | Sep  |  | Apr                | Oct   |               |  |                              |  |  |
|                          |                          | 1.0                      | Non-ferrous Metal                              | S  |                    |   |               |  |                              |  |  |
|                          |                          | 10                       | copper   |  |                    |   |               |  |                              |  |  |
|                          |                          | 8                        | sessesses lead                                 |  |                    |   |               |  |                              |  |  |
|                          |                          |                          |  |  |                    |   |               |  |                              |  |  |
|                          |                          | udd                      |  |  |                    |   |               |  |                              |  |  |
|                          |                          | ₫<br>4-                  |  |  |                    |   |               |  |                              |  |  |
|                          |                          |                          |  |  |                    |   |               |  |                              |  |  |
|                          |                          | 2                        |  |  |                    |   |               |  |                              |  |  |
|                          |                          | 0                        | L <u></u>                                      |  |                    |   |               |  |                              |  |  |
|                          |                          |                          | Sep 25/20<br>May 12/22                         |  | Apr1 8/23          | 0ct13/23  |               |  |                              |  |  |
|                          |                          |                          | 2  |  | Api                | 00  |               |  |                              |  |  |
|                          |                          | 18                       | Viscosity @ 100°C                              | ;  |                    |   | Base Number   |  |                              |  |  |
|                          |                          |                          |  |  |                    | 6.0   |               |  | /                            |  |  |
|                          |                          | 17                       | Abnormal                                       |  |                    | 5.0-  |               |  | /                            |  |  |
|                          |                          | 16                       |  |  |                    | 0/H0X 4.0                                       | 1             |  |                              |  |  |
|                          |                          | (0-15-<br>(100-1)<br>14- | -  |  |                    | (B/H)<br>HOX B<br>ba 3.0-<br>Bay 2.0-<br>Bage B |               |  |                              |  |  |
|                          |                          | ा<br>सुरा 14-            | •  |  |                    |   |               | $\sim$   |                              |  |  |
|                          |                          | 13                       | Abnormal                                       |  |                    | 2.0   |               |  |                              |  |  |
|                          |                          | 12                       |  |  |                    | ° 1.0-  |               |  |                              |  |  |
|                          |                          | 11-                      |  |  |                    | 0.0-  |               |  |                              |  |  |
|                          |                          |                          | Sep25/20<br>May12/22                           |  | Apr18/23           | 0ct13/23  | Sep 25/20     | Apr18/23   | 0ct13/23                     |  |  |
|                          |                          |                          | Sepi   |  | Apri               | Octi  | Sep.          | Apri   | Oct                          |  |  |
| ,                        | Laboratory               | . \                      | MaarChack USA 5                                | 01 Madia   |                    | n/ NC 07510                                     | סוופט דסווג   |  |                              |  |  |
| 4                        | Laboratory<br>Sample No. |                          |  | 601 Madison Ave., Cary, NC 27513<br>Received : 03 Nov 2023 |                    |   |               | RUSH TRUCK CENTER - CHICAGO IDEALEASE<br>4655 SOUTH CENTRAL AVENUE |                              |  |  |
| ACCREDITED               | Lab Number               |                          |  | Diagnosed : 06 Nov 2023                                    |                    |   | -000          | CHICAGO, IL  |                              |  |  |
| TESTING LABORATORY       | Unique Number            |                          | 10726043 I                                     | Diagnost   |                    | Baldridge                                       |               |  | US 60638                     |  |  |
| Certificate L2367        | Test Package             |                          | FLEET  |  |                    |   |               | Contact: MIKE LINLEY   |                              |  |  |
|                          |                          |                          | tact Customer Servi                            |  | lir                | linleym@rushtruckcenters.com                    |               |  |                              |  |  |
|                          |                          |                          | outside of the ISO 1<br>ations are based on tl |  |                    |   | CGM 106.2012) |  | 708)496-7500<br>708)496-8818 |  |  |
|                          |                          |                          |  |  |                    |   |               | (  |                              |  |  |

Contact/Location: MIKE LINLEY - IDECHIIL