TRAAP Lubricants Analysis Tests:

MOBILE EQUIPMENT

Spectrographic Analysis, 20 elements for wear metals, contaminants and additive elements.

Viscosity, kinematic, reported in centistokes

Water, percent volume. Samples taken from liquid-cooled components will also undergo specific tests to measure the presence of Glycol when other test indictors-(viscosity, sodium, boron, infrared scan, water) reveal possible coolant leaks.

Fuel Dilution, percent volume. (Diesel engines, gasoline engines, and certain gas turbines only.)

Fuel Soot, percent weight. (Diesel engines only.)

Total Base Number (TBN), for diesel engine oil samples. Indicates the oil's ability to neutralize sulfuric and other strong acids formed during the combustion process. The higher the TBN, the greater the oil's neutralizing capabilities. Recommended by most diesel engine manufacturers when fuel quality is suspect and when extending oil drain intervals.

Total Acid Number (TAN), for non-diesel components. Assists in the evaluation of oil serviceability by measuring the amount of titratable "acid" in the oil

Particle Count, for hydraulic fluids. Indicates the cleanliness of the fluid.

INDUSTRIAL EQUIPMENT

Spectrographic Analysis, 20 elements for wear metals, contaminants and additive elements.

Viscosity, kinematic, reported in centistokes

Water, percent volume.

Visible Debris Screen, for particles and contaminants in the fluid. If detected, debris analyzed under microscope.

Total Acid Number (TAN), for non-diesel components. Assists in the evaluation of oil serviceability by measuring the amount of titratable "acid" in the oil.

Particle Count, for hydraulic fluids, turbine oils and compressor oils. Indicates the cleanliness of the fluid.

The **Texas Refinery Corp** Difference

Texas Refinery Corp and WearCheck USA have a simple goal - to reliably, quickly, and economically provide the information needed for successful equipment preventive maintenance management. We accomplish this at Texas Refinery with over eight decades of manufacturing only the highest quality lubricants and with a WearCheck USA facility staffed by some of the most experienced and knowledgeable lubricant analysis experts and state-of-the-art instrumentation and Internet technology available.

Financial Savings

As a major expense for many businesses, equipment operation is an important area in which to achieve cost reductions. Texas Refinery provides this cost reduction through our lubricants and laboratory analysis.

Teamwork

Texas Refinery, partnered with WearCheck USA, work closely with owners and managers to make certain that program analytical needs are met in a way that benefits you.

Objectivity

With the complexity and huge expense involved in equipment operations today, there is a clear need for objective and unbiased participants in the process. Since Texas Refinery uses an independent laboratory, that follows strict and established procedures, you can be certain there is no biased interest in the results of your analysis.

Client Satisfaction

Texas Refinery has been manufacturing superior lubricants for over 80 years and WearCheck USA has been providing testing and analytical services for over 30 years. Customer satisfaction is our business.

TRC
Made in the USA since 1922

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Texas Refinery Corp's Advanced Analysis Program (TRAAP) Can Mean The Difference Between Profit and Loss

Texas Refinery's TRAAP used lubricant analysis program is designed to provide in-depth diagnosis of the status and condition of equipment through analysis of lubricants

For businesses operating fleets, manufacturing plants and other types of oil-lubricated equipment, the difference between **profit and loss** can depend on keeping operating costs as low as possible. Texas Refinery makes the difference in lowering costs by providing oils with enhanced additive chemistry, and by partnering with WearCheck USA to analyze TRC used oil and provide in-depth diagnosis of the lubricant and equipment.

The program provides a report on the mechanical status of equipment, allowing the user to control and reduce maintenance and repair costs. The analysis services, Internet management system **"WebCheck"**, and administrative services are geared to provide the user with fast and accurate information.

Our customers receive a return on their investment when they purchase Texas Refinery oils — the highest quality oils on the market to protect equipment, and concise and useful interpretations of analytical testing by WearCheck USA.

Truck, Bus and Auto Fleet Operators

Marine Companies

Construction Companies

Federal, State, and Local Government Agencies

Industrial Plants

Pulp & Paper Operations

Mining Operations

How the Program Works

1. Sampling

Taking samples of Texas Refinery lubricant from each selected component is the first step in the program.

Sampling procedures are supplied to our customers when they order oil analysis kits. Clear and concise directions, forms, and sample bottles needed to submit samples to the WearCheck laboratory are provided at no charge by Texas Refinery Corp.

2. Analysis

The second step in the program is analysis. After the samples are received by the WearCheck laboratory, they are analyzed for the presence of a number of condition indicators. The methods employed depend on the TRC product being used and may include: spectrographic analysis, viscosity, water content, fuel dilution, fuel soot, infrared analysis for oxidation and acid number, particle count, Total Base Number and others.

3. Diagnosis

While many laboratories offer lubricant analysis, none offers the diagnostic skill delivered by WearCheck, the third step in the program. In much the same way that a doctor takes blood samples and has them analyzed to obtain valuable information about a person's state of health, WearCheck analyzes lubricant samples to determine a machine's state of health.

Interpretation of the analysis can detect a number of critical situations, including:

- ***Abnormal wear problems in engines, gears, shafts, and bearings***
- ***Lubricant thinned by fuel from leaking injectors or cross-over lines***
- ***Lubricant contaminated by water/antifreeze from cracked head gaskets***
- ***Incorrect grade of lubricant in use***
- ***Air filter failure causing dirt ingression***
- ***Overextended drain intervals***
- ***Environmental contamination***
- ***Poor equipment performance because air-to-fuel ratios are not correct***

4. Reporting

The finest analysis and diagnosis are useless unless the results are presented in a logical, easy-to-use format. In other words, into language that the user understands. Texas Refinery Corp and WearCheck USA have developed a reporting method that provides concise and useful information, as the example illustrates.

5. Program Review and Management

The final stage of a lubricant analysis program is to use the information to determine the effectiveness of the program for a Return on Investment. Texas Refinery Corp allows our customers to access and manage their data through WearCheck USA's Internet Program, WebCheck™. WebCheck™ provides users the opportunity to schedule maintenance actions, manage their equipment, review lubricant analysis results, confirm corrective actions, and generate useful management reports.

TRAAP's Benefits and Features

- **Detect Abnormal Equipment Conditions before costly repairs occur**
- **Decreased maintenance time and cost**
- **Maximize Oil Drain Intervals**
- **Reduced Equipment Downtime/ Increased Production**
- **Prevent Catastrophic equipment failure**
- **Increased profits to your bottom line**
- **Quick Access to Analysis Data**
- **Networked User Base**
- **Access to Support Information and Scheduling**
- **Equipment Database Maintenance**

TRAAP Sample Report

Unit Information includes make, model, Serial Number

Recommendation Summary and any necessary corrective actions required

Contamination Dirt, water, soot, fuel, glycol, Infrared data. Identifies any abnormal contaminants present in the oil.

Lubricant Condition Oil additive in ppm, Viscosity @ 100°C Total Base Number (TBN) determines if oil is suitable for continued use

Wear Metals in parts per million (ppm). Determines if equipment is wearing abnormally.

Report Identification

TRC **TRAAP**

Texas Refinery Advanced Analysis Program

CONTAMINATION SEVERE
OIL CONDITION ABNORMAL
WEAR ABNORMAL

803 - Front Diesel Engine

Unit Make : VOLVO
Unit Model : ISX
Comp Make : CUMMINS
Comp Model : ST2

Serial No : 79017302
Cust. Ref. No. : {n/a}
Stub No. : WC-M1071548

Date Rec'd : Sep 28, 2009
Sample Date : Sep 25, 2009
Diagnostician : Mark Brinson

RECOMMENDATION

We advise that you check for the source of the coolant leak. We recommend that you drain the oil and perform a filter service on this component if not already done. We recommend an early resample to monitor this condition.

Sample Date	10/14/05	12/19/05	06/14/06	Current	UOM
Time on Unit	262804	288800	314532	339410	mls
Time on Oil	25000	25500	25732	24878	mls
Time on Fltr	25000	25500	25732	24878	mls
Oil Maint.	changed	changed	n/a	n/a	- - -
Filter Maint.	n/a	changed	n/a	n/a	- - -

CONTAMINATION

Sodium and/or potassium levels are high. Test for glycol is positive.

Sample Date	10/14/05	12/19/05	06/14/06	Current	Abn
Silicon	15	0.0	11	13	
Potassium	382	966	790	694	
Sodium	288	448	328	291	
Fuel (%)	<2.0	<2.0	<2.0	<2.0	
Glycol (%)	0.10	0.10	0.10	0.10	
Water (%)	<0.1	<0.1	<0.1	<0.1	
Soot (%)	3.3	2.6	1.2	1.2	
Sulfation	77	- -	63	0	
Nitration	60	55	50	10	

OIL CONDITION

Oil Type: 27 QTS of PRO-SPEC III 15W/40

The oil is no longer serviceable due to the presence of contaminants.

Sample Date	10/14/05	12/19/05	06/14/06	Current	Base
Boron	4.0	2.4	19	2.5	
Barium	0.0	0.5	0.0	0.0	
Calcium	4140	4777	4360	4930	
Magnesium	70	48	70	22	
Molybdenum	65	146	132	92	
Sodium	288	448	328	291	
Phosphorus	1274	1240	1079	989	
Sulfur	5420	5437	4238	4605	
Zinc	1392	1256	1104	1152	
Visc@40C	- - -	- - -	- - -	- - -	
Visc@100C	16.8	15.97	14.36	16.2	
Oxidation	60	75	70	20	
TAN	—	—	—	—	
TBN	13.9	13.1	13.6	13.4	

WEAR

The lead level is abnormal. All other component wear rates are normal.

Sample Date	10/14/05	12/19/05	06/14/06	Current	Abn
Iron	169	155	55	98	- - -
Nickel	2.0	1.1	0.9	0.9	- - -
Chromium	8.1	1.2	4.3	6.0	- - -
Titanium	0.3	0.0	0.0	0.2	- - -
Copper	2.9	2.9	7.7	3.4	- - -
Aluminum	14	8.4	6.3	7.8	- - -
Tin	0.0	2.0	0.0	0.0	- - -
Lead	11	30	6.8	63	- - -
Silver	0.0	0.0	0.0	0.0	- - -

Report ID - VENLIUM (WUSCAR) 01840682 - Pg. 1

Quick Sample Status

Unit Identification

Sample Info. Sample, received date, sample number.

Maintenance Info. Time on oil, filter, component, maintenance actions.

Abnormal Limits

New Lubricant Baseline

The Benefits of WearCheck USA's Lubricant Analysis Program

- **Control and Reduce Operating Costs**
- **Improve Equipment Reliability**
- **Limit Unscheduled Downtime**
- **Gain Support for Warranty Claims and Resale**
- **Obtain Valuable Management Information**

TRC

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