

CONFIDENTIAL

Petro-Canada Heat Transfer Fluid Testing Program

Quick Reference Guide



Prepared by

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1. History and Scope of the HTF Testing Program

This testing program has been offered at no charge to existing and prospective end users of Petro-Canada Heat Transfer Fluids (HTF) since 1994. Initially, the testing was conducted at R&D until 2000 when a contract laboratory was selected. WearCheck Canada in Burlington, Ontario currently performs the testing of HTF samples.

At this time, it is offered by Suncor staff and distributors/Marketers to :

- Users of any of our fluids for monitoring purposes
- Users of competitive oils with a genuine interest to consider using our fluids

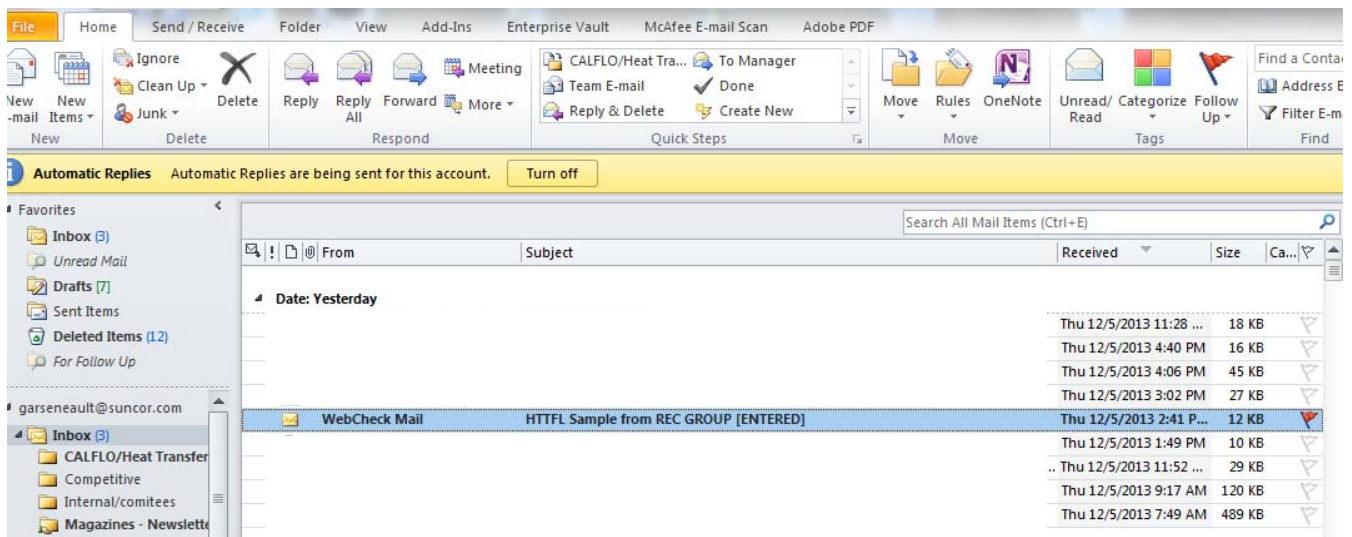
The objective in submitting HTF samples through this program may vary depending on the fluid and the customer. End users sending competitive oil samples, with prior consent from a Suncor employee, may have made a decision to convert to our products and want to determine if their system needs action before topping-off. Or maybe they have not made a final decision yet on using our product and wish to use this sample as a test of our expertise and technical support. The flexibility of this program and customized comments by HTF experts are the reasons why it has been so successful. This is something we provide that our competitors cannot. The ultimate goal is to provide value to those using our fluids, while leveraging the program to generate profitable sales of HTF and associated system maintenance products with new prospects.

Since its inception, the expert comments on the test reports were the work of one Technical Service Advisor (TSA). Due to the growth in the number of samples processed, from 100 in 2000 to approximately >450 per year today, the C&I TSAs will start providing the expert comments on samples originating from systems in their area of coverage. Even though a TSA becomes efficient at interpreting HTF results, the greatest time demand is not in interpretation but in fact finding for the context of the analysis or post-analysis follow-up.

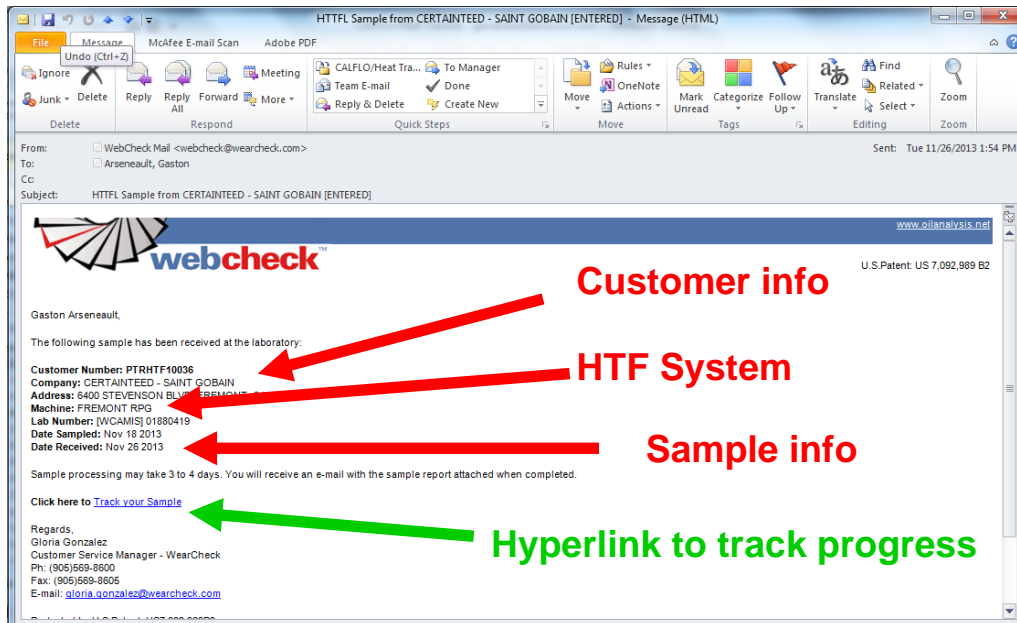
2. Samples Received at the Lab and Entered

After samples are received at WearCheck, they try to match the company and system names on the form with an existing account in the database. If no match is found, the program administrator receives an email asking to provide the Suncor sales and Suncor Technical contacts for this site as well as a distributor contact, if applicable. If a match is found, per the example below, an email is automatically generated and sent by WebCheck Mail titled :

HTTFL Sample from **CUSTOMER NAME HERE** [ENTERED]



This notification is sent to all contacts for the account, meaning the program administrator, the assigned Suncor Sales and TSA, Distributor contact (if applicable) and end user contacts. Per the example below, the note includes : the account number, the customer's address, the system sampled, sampling location and dates and a link to track the progress of the sample.



The Customer Number in the database follows the following rule :

PTRHTF1#####	USA
PTRHTF2#####	Western Canada
PTRHTF3#####	Eastern Canada
PTRHTF4#####	PCE
PTRHTF6#####	NSD (Asia, Latin America)

WearCheck's system notifies stakeholders by sending notifications in the following sequence and endings :

HTTFL..[ENTERED]	sent to all stakeholders to advise sample is ready for testing
HTTFL..[IN_REVIEW]	only sent to the TSA to go enter expert comments
HTTFL..[DIAGNOSED]	sent to all stakeholders with the report as a .pdf attachment

3. Samples Ready For Commenting by TSA After Testing

After the testing is complete, WearCheck notifies the TSA and program administrators by issuing an email titled :

HTTFL Sample from CUSTOMER NAME HERE [IN_REVIEW]

NOTE : NEVER FORWARD THE [IN_REVIEW] EMAIL BECAUSE IT WILL GIVE ANYONE COMPLETE ACCESS INTO WEARCHECK'S PATENTED DATABASE

Cc:
Subject: HTTFL Sample from CERTAINEED - SAINT GOBAIN [IN_REVIEW]

webcheck™ U.S. Patent: US 7,092,989 B2

Gaston Arseneault,
The following sample is ready for interpretation:

Customer Number: PTRHTF10112
Company: CERTAINEED - SAINT GOBAIN
Address: 2901 KAUFMAN ST, ENNIS, TX, USA
Machine: HEAT TRANSFER SYSTEM
Lab Number: [WCAMIS] 01881254
Date Sampled: Nov 19 2013
Date Received: Nov 29 2013
Sample Rating: Normal
Interpretation:

The following people will be notified when this sample is completed;

Company	Contact	Type	E-mail
Suncor Energy Inc. - Petro-Canada L	Michael Kaufman	DEFAULT	mkaufman@suncor.com
Suncor Energy Inc. - Petro-Canada L	Chris Armstrong	DEFAULT	chamstrong@suncor.com
Suncor Energy Inc. - Petro-Canada L	Gaston Arseneault	DEFAULT	garsneault@suncor.com
WEARCHECK CANADA INC.	Bill Quesnel	DEFAULT	bill@wearcheck.ca
WEARCHECK CANADA INC.	Gloria Gonzalez	DEFAULT	gloria@wearcheck.ca
PETRO-CANADA AMERICA LUBRICANTS - M	Deve Ehrhardt	SALES_REP	deve@petrocanada.com
Suncor Energy Inc. - Petro-Canada L	Frank Hayes	TECH_REP	fhayes@suncor.com
PETRO-CANADA AMERICA LUBRICANTS - M	Randy Penrice	SALES_REP	rpenrice@petrocanada.com
CERTAINEED - SAINT GOBAIN	TUNJI ADEBANYA	CUSTOMER_HTTFL_MGR	tunji.c.adebanya@saintgobain.com
CERTAINEED - SAINT GOBAIN	Joe Quaranta	CUSTOMER_HTTFL_MGR	joel.quaranta@saintgobain.com
CERTAINEED - SAINT GOBAIN	John F. Hardy	CUSTOMER_HTTFL_MGR	john.f.hardy@saintgobain.com

Click here to [Review the Sample](#)

Regards,
Gloria Gonzalez
Customer Service Manager - WearCheck
Ph: (905)569-8600
Fax: (905)569-8605

The [IN_REVIEW] email provides the TSA with the computer-generated comments as a preliminary overview of the sample condition, as well as the link into WebCheck's Diagnosis Screen.

When a sample's status is "In Review", it is recommended that the assigned TSA performs the following :

- Click on the **Review The Sample** link near the bottom of the email to access the sample results
- Verify that the sample results were merged with the previous historical data if applicable. It often happens that customers call the same system using a different name, therefore samples show up without the previous history. Notify Gloria Gonzalez (gloria.gonzalez@wearcheck.com) to rectify. Gloria will advise by responding to your email when the new results are merged with the system's previous history.
- Confirm the system's operating temperature and oil volume, fluid name, etc. Report updates or anomalies to Gloria.

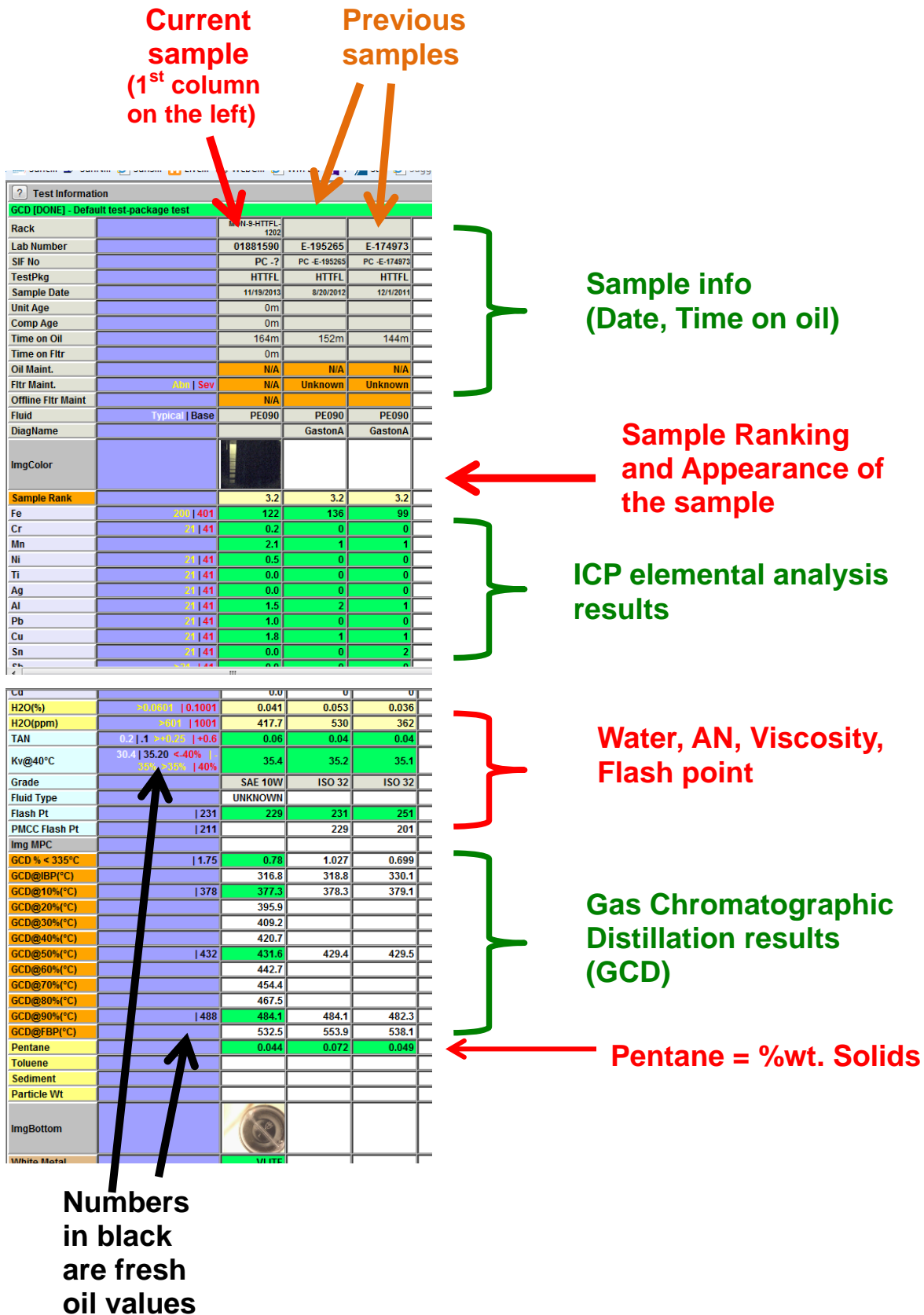
4. General Overview of the Diagnosis Screen

Picture below shows the left side of the Diagnosis Screen (Diag Screen).

The screenshot displays the left side of the Diagnosis Screen (Diag Screen) with the following components:

- Samples pending review (scroll up/down):** A list of samples including CIMSTB (CIMENT QUEBEC INC. (?) - ST-BASIL CT PORNEUF, QC) and REC MOS (REC GROUP (?) - MOSES LAKE, WA). Two samples are highlighted: 01881590 (6d HTTFL, Lubri-test 103 heat transfer fluid, 21d, W C F, Water) and 01881591 (6d HTTFL, Lubri-test 102 heat transfer fluid, 21d, W C F, Normal).
- System info (Fluid name, operating temp., heating method, volume, heater make & model, gas blanket on expansion tank, etc.):** A detailed view of the system including:
 - comp: ?
 - make/model: [0]
 - vin: [0]
 - details: Temp: 60 °C Heating Method: HOT TUBES
 - reference: Wear Limit Reference = INDHTTFL
 - fluid: 500 LTR of [PE090 | 1751] PETRO CANADA CALFLO HTF [HEAT_TRANSFER | 08/21/2013]. A yellow box highlights "Fluid Requires Review". Below this, it states "FLUID TYPICALS WERE UPDATED ON 11/26/2007, POPULATION 2 SAMPLES."
 - fluid info: [www] Mineral basestock, used for Heat Transfer Fluid.
 - Unit note: []
- Comment section WearCheck's and TSA's comments:** A section at the bottom with a red header "previous diagnosis not carried over as language has changed" and several empty text input fields for comments.

The figure below shows the right section of the Diag Screen, the results portion.



5. Step by Step Review of an HTF Sample Results

After initial review suggested at the end of Section 3 are completed, this section explains the steps to prepare comments for final release of a report.

5.1. Ask for Retest

If you would like to have one or more tests redone, send an email to Gloria Gonzalez referencing the sample lab number (starts with 018....).

5.2. Verify the color coding for each test

Look at each test result and verify the color coding. You can change the color code for each test by clicking on the cell with the parameter on the left column.

You can change the color coding for each test by clicking on the cell on the left column identifying the test

In this example, clicking on the word TAN will change the “green” coding of the 0.32 result to a different color. Keep clicking until you get the desired color.

Cd		0.0	0
H2O(%)	>0.0601 0.1001	0.002	0.004
H2O(ppm)	>601 1001	25.3	43
TAN	0.2 .1 >+0.25 +0.6	0.32	0.09
Kv@40°C	30.4 35.20 <-40% 35% >35% 35%	36.3	36.1
Grade		ISO 32	ISO 32
Fluid Type		HEAT_TRANS	
Flash Pt	231	229	223
PMCC Flash Pt	211		205
Img MPC			
GCD@ < 335°C	1.75	1.01	1.103
GCD@IBP(°C)		307.8	318
GCD@10%(°C)	378	377.6	379
GCD@20%(°C)		397.0	
GCD@30%(°C)		410.6	
GCD@40%(°C)		422.2	
GCD@50%(°C)	432	433.1	431.8
GCD@60%(°C)		444.3	
GCD@70%(°C)		455.9	
GCD@80%(°C)		469.4	
GCD@90%(°C)	488	488.2	488.4
GCD@FBP(°C)		543.6	560.9
Pentane		0.045	0.035
Toluene			

Remember that the color coding came with a comment on the bottom left that reflected the color. If you change the color it may be necessary to change the comment as well.

5.3. Verify the rating and color coding on the overall sample rating

The software calculates an overall sample rating from 0 (excellent) to 10 (bad) and assigns a color based on the code shown below. This was created to ensure one bad test result does not assign an overly negative rating to the entire sample condition.

Filtr Maint.	Abn Sev	N/A
Offline Filtr Maint		N/A
Fluid	Typical Base	NO000
ImgColor		
Sample Rank		10
Fe	200 401	302
Cr	21 41	0.2
Mn		2.5
Ni	21 41	0.2

The sample rating is as follows :

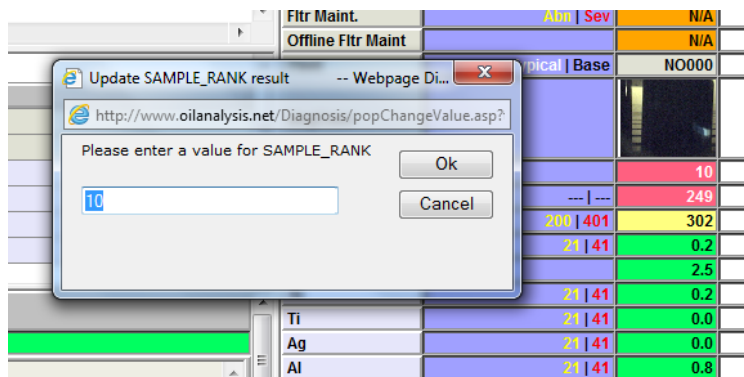
0 to 2.5 = normal = green

2.5 to 5 = abnormal = yellow

5 to 7.5 = abnormal = orange

7.5 to 10 = critical = red

The sample rating is the only number that can be changed. To change it, click once on the cell showing the sample rating value. A small new window will appear (see below), where the TSA can erase the number present and replace with a more appropriate rating.



After clicking on the sample ranking value, “10” in this example above, the window opens where we can change it to the desired number

The color coding of the whole sample will not change if you modify the sample rating. If you change the Sample Rating significantly you may have to change the color coding as well by clicking on “Sample Rank” cell (per Section 5.1).

5.4. Verify WearCheck's comments

WearCheck's software (WebCheck) and their diagnosticians formulated some comments in the boxes on the bottom left of the Diag Screen. TSAs must confirm their relevance. Any editing can be done by typing or removing text just like any text box.

The screenshot displays the WearCheck software interface. At the top, there is a table with columns: Lab Number, Lab, Pkg, Brand, Cust/Unit, Days, Rating, Problem, and Tests. Two rows are visible:

Lab Number	Lab	Pkg	Brand	Cust/Unit	Days	Rating	Problem	Tests
01876156	24d	HTTFL	Lubri-test	tank coil, hot oil heater heat transfer fluid	49d	W C F	Wear	
01876157	24d	HTTFL	Lubri-test	bore hot oil rail/terminal heat transfer fluid	49d	W C F	Normal	

Below the table, the interface shows equipment information for "SOUTAC TANK COIL, HOT OIL HEATER N/A HTTFL FLD". The details section includes:

- criticality: (--) n/a
- sector: []
- unit: ?
- comp: ?
- make/model: [0]
- vin: [0]
- details: Heating Method: FLAME-NATURAL GAS

The "current diagnosis recalled" section contains the following comments:

- PQ levels are severe. Iron ppm levels are abnormal.
- Pentane Insolubles levels are severely high.
- Barium ppm levels are severely high. Calcium ppm levels are severely high. (GCD) % < 335°C and (gcd) initial boiling point are abnormal.

WearCheck's default comments are here. TSAs must verify and edit/delete if needed

Simultaneously to transitioning to TSAs commenting on their own customer's HTF samples, we are helping WearCheck to make pointier, more accurate and meaningful standardized comments for heat transfer fluid samples. We have identified patterns and their diagnosticians will have access to standardized wording that will be applied when the sample results fit that pattern.

For example, if the sample shows a high Acid Number, high iron and water content, experience tells us the sample was most likely collected from a sampling pipe/valve that was not sufficiently flushed. In this case, WearCheck's comments will include something like :

The sample shows a high level of acids through high Acid Number, a high amount of water as well as high concentration of one or more metallic elements. If this is truly a representative sample of what is flowing through this system this is extremely concerning. However, experience shows it might come from a sampling valve that was improperly flushed. Either way, we recommend to re-sample after making sure a good 4L (1 gal.) of oil is drained out before collecting the sample. The next results will guide our experts to develop more helpful and accurate comments and action plans.

Other recurring patterns will be identified and standardized comments will be created.

5.5. Enter final comments. Action Oriented Comments.

The box shown below contains the location where TSAs enter overall comments. This is the flexibility that makes our program successful and meaningful to HTF users.

Lab Number	Lab	Pkg	Brand	Cust/Unit	Days	Rating	Problem	Tests
SOUTAC SOUND REFINING (?) - TACOMA, WA								
01876156	24d	HTTFL	Lubri-test	tank coil, hot oil heater heat transfer fluid	49d	W C F	Wear	
01876157	24d	HTTFL	Lubri-test	bore hot oil rail/terminal heat transfer fluid	49d	W C F	Normal	
BRE312CAL BRENNTAG CANADA INC (?) - CALGARY, AB								

Equipment Information for SOUTAC TANK COIL, HOT OIL HEATER N/A HTTFL FLD	
criticality	(--) n/a
sector	[]
unit	?
comp	?
make/model	[0]
vin	
details	Heating Method: FLAME-NATURAL GAS

SPCW	SPCC	SPCF
current diagnosis recalled		
PQ levels are severe. Iron ppm levels are abnormal.		
Pentane Insolubles levels are severely high.		
Barium ppm levels are severely high. Calcium ppm levels are severely high. (GCD) % < 335°C and (gcd) initial boiling point are abnormal.		

TSAs click in this box to enter comments

A TSA can re-emphasize a concerning result. Most importantly, this is our opportunity to explain how the results relate to the context of the analysis. It is also our duty to formulate helpful, realistic and fair comments containing our ultimate recommendation in terms of action plan. The comments entered will be saved in the database and be printed on this report and the future reports as well.

These comments should include :

- An action plan, in the context of the analysis
- A suggested re-sampling frequency, in the context of the analysis

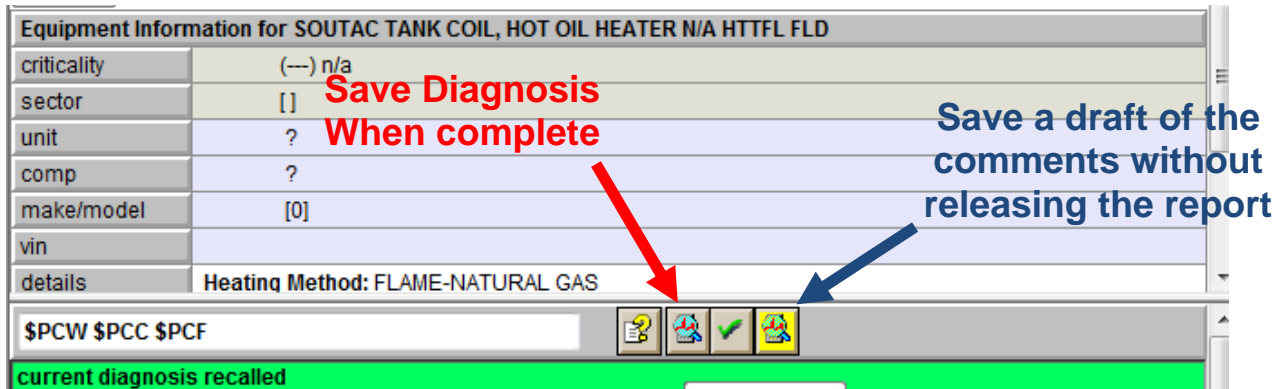
See below examples of how a good sample results may lead to different recommendations by the TSA. It's all about context. This may require the TSA to contact the end user, the Sales or Distributor Representative before formulating the final comments, to understand the objective of the analysis.

Results (overall)	Fluid	Context	Action Plan Recommendation	Sampling Frequency
Good	Petro-Canada	Routine monitoring	No action needed at this time	Consistent with past history. Yearly for most systems, more frequent for small units, newly cleaned or newly commissioned systems.
Good	Competitive	Want to change to ours but want to know if system needs cleaning, flushing, drain & refill or top-up.	Depends what they are willing to do. If they want to drain & refill then recommend it. If they wish to top-up, allow top-up.	Recommend 3 months after a change-out
Good	Competitive	Undecided to change, non-committal	Can tell them their fluid looks acceptable but use opportunity to promote our fluid that would add value to their operation	Do not suggest re-sampling in this case

The comments you enter will be saved in the database forever and be visible on the report for the next 5 future samples. This is helpful to prove an end user experiencing repeated operational problems due to oil degradation or contamination, or something more serious such as fire or an explosion, that we have tried to warn them of the seriousness of the situation.

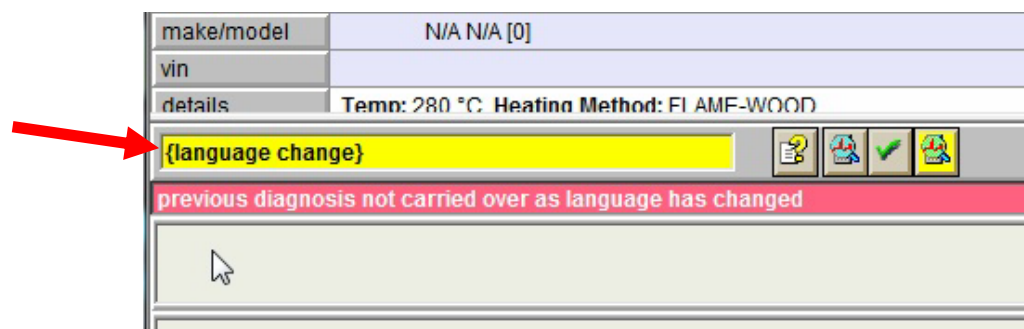
6. Saving the Diagnosis and Release the Analysis Report

One can save the diagnosis without releasing the report with the intent to get back to it when convenient. Click on the “Save diagnosis without updating sample status” button (blue arrow below). If the TSA is ready to release the report, click on the “Save diagnosis” button (red arrow below).



There is an issue with WebCheck for some French customers. The TSA can type comments in French using punctuation but must erase the **{language change}** text before clicking “Save diagnosis”

French TSAs must erase this before typing comments



Once “save diagnosis” is clicked, the report is generated and WebCheck sends an email to all stakeholders involved with the account which includes the report as a .pdf attachment. See the example below :

HTTFL Sample from **CUSTOMER NAME HERE** [DIAGNOSED]

File attached as .pdf

All comments (WearCheck's and TSA's) show up here

HTTF Sample from CERTAINTEED - SAINT GOBAIN [DIAGNOSED]

Customer Number: PFDHTF0112
 Company: CERTAINTEED - SAINT GOBAIN
 Address: 3501 KALAMAZOO ST. BOWEN, TX, USA
 Machine: HEAT TRANSFER SYSTEM
 Lab Number: HTF0112-0114
 Date Sampled: Nov 12, 2013
 Date Received: Nov 23, 2013

Interpretation: The flash point does not appear to be as high as expected. This may be due to the fact that the flash point results are slightly lower than expected. This may be due to the fact that the flash point results are slightly lower than expected. This may be due to the fact that the flash point results are slightly lower than expected.

Company	Contact	Type	Email
Suncor Energy Inc. - Para-Dewar 1	Michael Paulman	DEFAULT	mpaulman@suncor.com
Suncor Energy Inc. - Para-Dewar 1	Dina Arsenault	DEFAULT	darsenau@suncor.com
Suncor Energy Inc. - Para-Dewar 1	Steven Arsenault	DEFAULT	sarsenau@suncor.com
VERBODEN CANADA INC.	Bill Quinn	DEFAULT	bquinn@verboden.com
VERBODEN CANADA INC.	Steve Simacek	DEFAULT	ssimacek@verboden.com
PETRO-CANADA AMERICA LUBRICANTS - W	Dave Simacek	SALES_REP	dsimacek@petro.com
Suncor Energy Inc. - Para-Dewar 1	Frank Neve	TECH_SRP	fneve@suncor.com
PETRO-CANADA AMERICA LUBRICANTS - W	Randy Penick	SALES_REP	rpenick@petro.com
CERTAINTEED - SAINT GOBAIN	Tyler KOSKOVIC	CUSTOMER_HTTF_USR	tyler.koskovic@certainteed.com
CERTAINTEED - SAINT GOBAIN	Jon Swaine	CUSTOMER_HTTF_USR	jon.swaine@certainteed.com
CERTAINTEED - SAINT GOBAIN	John P. Newb	CUSTOMER_HTTF_USR	john.newb@certainteed.com

The report is attached to this email, however you may click here to [View the Report](#)

Report:
 Date: 11/23/2013
 User: Service Manager - WebCheck
 P#: 1028294200
 File: 1028294200

7. General Considerations & Tips

- It is faster to work on WebCheck while being offline, off from the Suncor network.
- WebCheck cannot generate reports on older samples they did not test.
 - Results can be viewed if you know how to log in WebCheck and search through your accounts, but the pdf report function does not work
 - Polaris deleted our HTF results from their database
 - Old Polaris reports are in REPSACCESS/Tech Services/Polaris Reports
- If you encounter an error, take a screen capture and copy-paste the error code and email Gloria Gonzalez
- Be mindful of product mixtures as it will affect results and color coding which is based on change versus recent fresh oil results
- Petro-Therm was an ISO 46 oil with a slightly different GCD curve until the 2006 reformulation when it became 35-36 cSt @ 40°C. Therefore systems filled prior to 2006 and topped up with the reformulated Petro-Therm may show viscosity and GCD results flagged as marginal when in fact they are perfectly normal.

Do not hesitate to reach out to the program administrators or to WearCheck for assistance.

Best regards,



Gaston Arseneault, *M.Sc. Chemistry*
STLE CLS, OMA I and II
ICML MLT Level I and MLA Level II
Petro-Canada America Lubricants Inc.
Sr Technical Advisor
STLE CLS
Tel (973) 673-3164
E-mail : garseneault@suncor.com