Oil Sampling

Do it correctly or don't bother.

First a safety note.

Taking oil samples can possibly place you in a hazardous situation therefore if you cannot take the sample safely don't do it until you can work out a safe way to do the task.

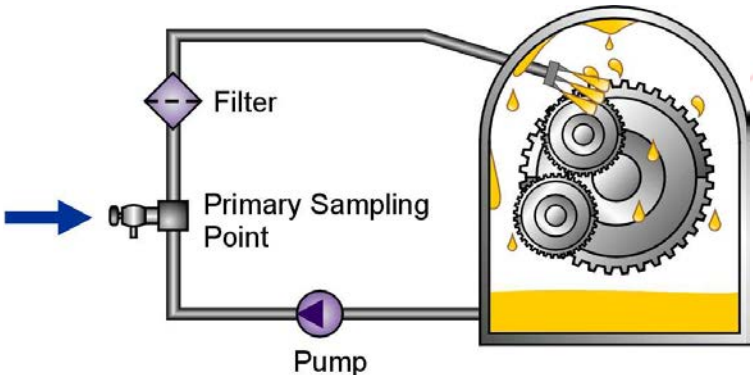
Number ONE ensure your own Safety and Health.

- Always observe the area and company safety rules.
- Let your colleagues know where you are going.
- If there is a control room advise them that you are in the area and what you are doing and where.
- Always think before you act and plan how you will do the task.
- Take particular care with high-pressure piping, thermal systems and any sampling close to electrical equipment or when sampling from a drain line.

Do not take a sample from stopped equipment

If at all possible, you should not take a sample from stopped equipment as the contaminants will have settled out of the oil and you will be sending off a bias sample that does not truly represent the lubricant in the machine.

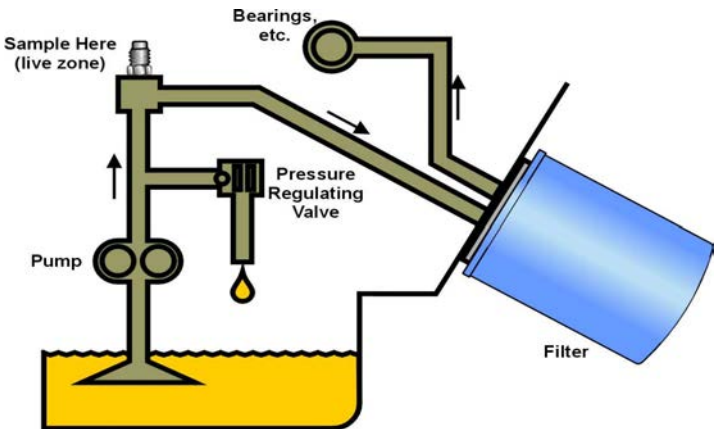
If you have no option but to take an oil sample from a stopped machine you MUST try and take it within an hour of the machine stopping if you want a representative sample and trendable oil analysis data.
The rate of particle settling is defined by Stoke's Law. Assuming the contamination are spherical-shaped particles, a 50-micron silica particle can settle 100mm in 12 minutes, while a 50-micron steel particle can settle 100mm in 2.1 minutes.



Wet Sump Circulating Systems

The best location to sample in a pumped circulating oil system is via a sample cock located between the pump and filter

Oil laboratories -PNG
Aircorps Road, (PO Box 1298), Lae 411, Papua New Guinea
+675 472 0711
enquiries@oilabspng.com



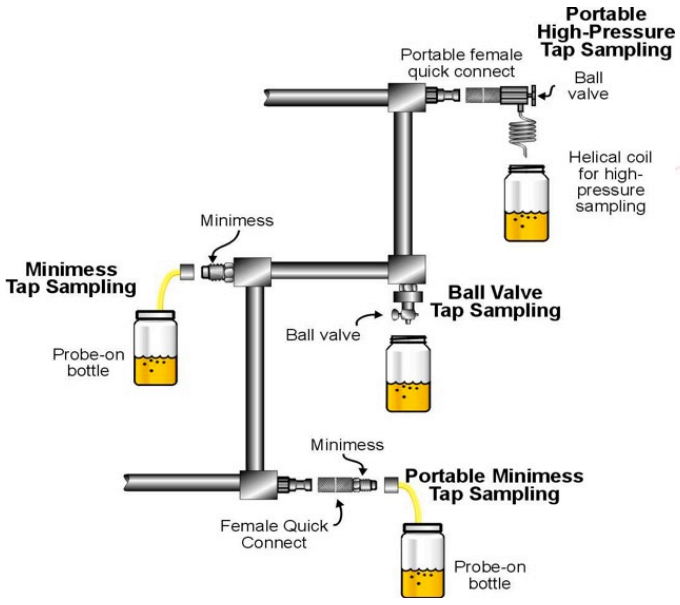
The best location to Sample Crankcase Oil

Sampling from a cock on the line on taking oil from the pump to the filter is the best way to sample a sump. The next best However, this will in many cases not be practical therefore a sample will have to be taken from the oil stream as the sump is drained. Never take the first oil from the sump as it will contain any water and concentrated sludge. If you elect to sample from the falling stream of oil be very careful as the oil may be hot enough to burn you. If you have cleaned the drain pan and the only oil in the pan is from the engine you want sample you can take a sample from pan providing you take the top layer of oil.

Sampling from Pressurised Oil Lines

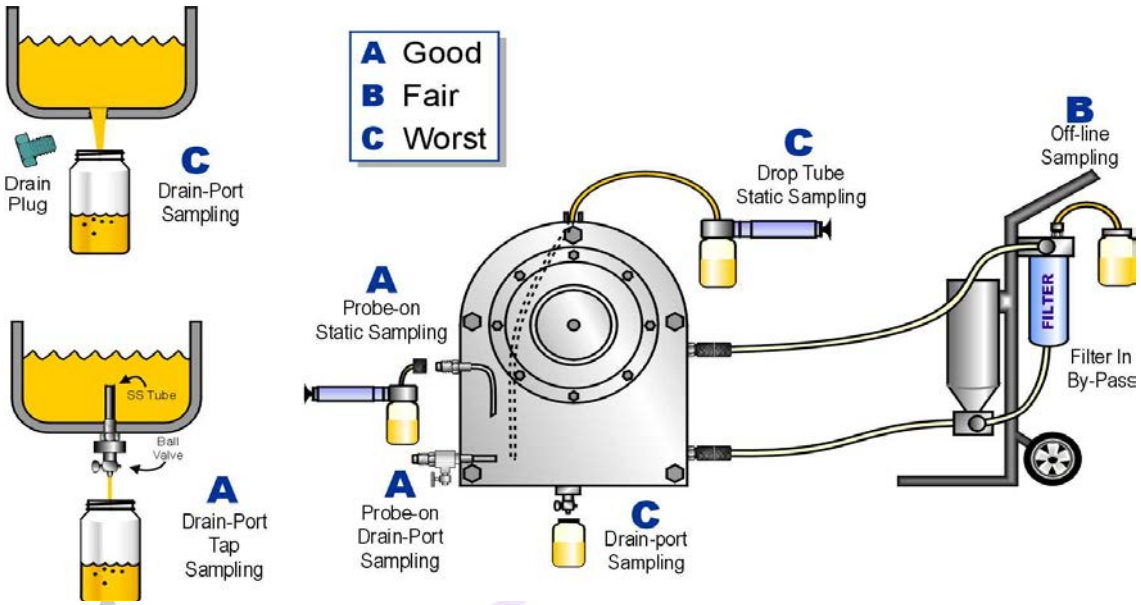
Pressurised lines provide you with many options to take good quality samples. But there are a few cautions,

- Be very careful taking hot oil samples because the plastic bottle can lose rigidity and collapse.
- When setting up the sample point be careful of low flow areas or dead lines.
- If the line contains high pressure fluid always use a high-pressure sampling system.



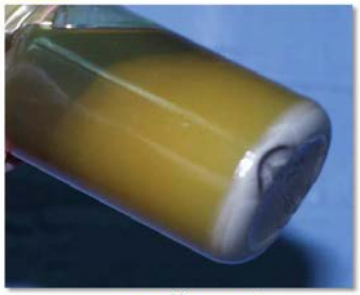
Options for Sampling from Pressurised Oil Lines

Oil laboratories -PNG
Aircorps Road, (PO Box 1298), Lae 411, Papua New Guinea
+675 472 0711
enquiries@oilabspng.com



Sampling Splash/Bath Lubricated Machines

Taking sample from oil drain points



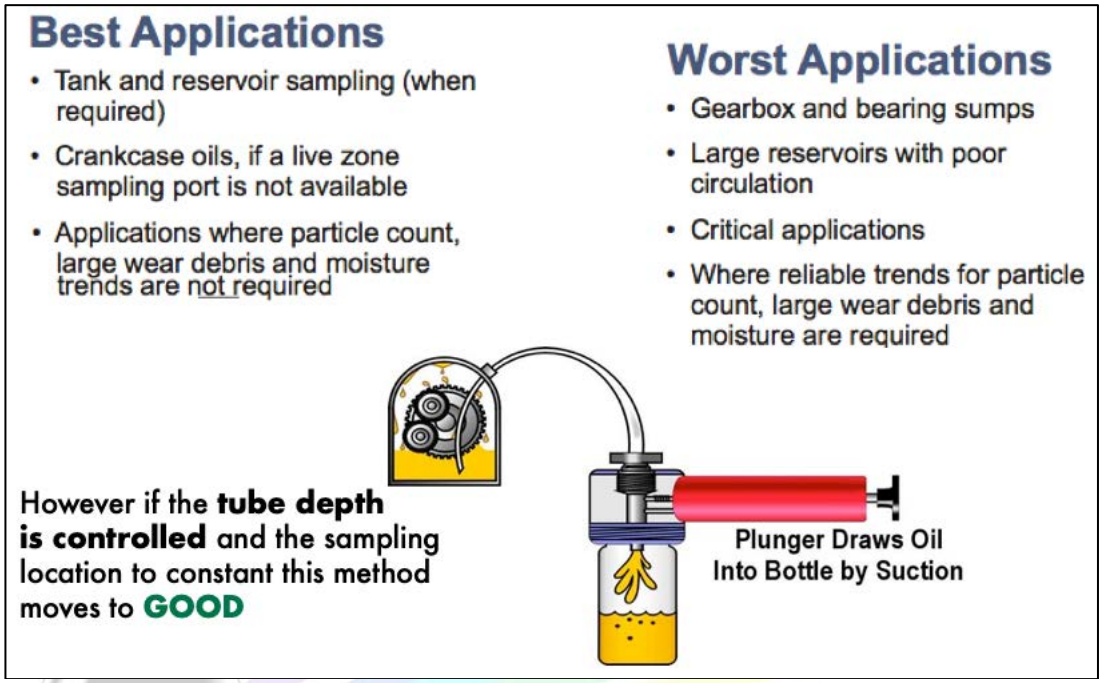
sediment

sludge

Taking a sample from a systems oil drain point unless taken with care and correctly will almost certainly be biased. The only way to get a sample from a drain point and ensure the sample will be reasonably representative is to have the system running and drain at least a litre of oil to waste before sampling. Cautions ensure you do not run the system out of oil, top up with new oil after sampling. If water is still present in the oil stream after a one litre drain keep on draining, being cognisant of the oil remaining in the system, until the stream is free of water then take the sample.

Oil laboratories -PNG
Aircorps Road, (PO Box 1298), Lae 411, Papua New Guinea
+675 472 0711
enquiries@oilabspng.com

Drop-Tube Vacuum Pump Sampling



Tips to Effective Drop-Tube Vacuum Pump Sampling

Keep vacuum pump horizontal during sampling

- Use "clean Oil" sampling procedure (keep all items bagged before use).
- Do not re-use sample tubes. They are one use only.
- For any drop tube samples using the dipstick tube follow this procedure
  - Remove the dipstick and place flat on a clean dry location.
  - Place the end of the sample tube 15 to 20mm from the sump end of the dipstick, now lay the sample tube along the dipstick.
  - At the point where the dipstick stops at the top of the dipstick tube, mark the sampling tube with a dark coloured permanent marker.
  - Cut the sample tube free of the roll about 250 to 300mm further along the tube.
  - The short end of the sample tube can now be inserted and locked into the vacuum sample pump.
  - Screw a bottle in place then feed the sample tube down the dipstick tube until the mark is reached.
  - Now using slow and even strokes, draw the sample.

Oil laboratories -PNG
Aircorps Road, (PO Box 1298), Lae 411, Papua New Guinea
+675 472 0711
enquiries@oilabspng.com

- When the sample bottle is at the 80% full point loosen tube back nut to break the vacuum and stop the oil flow.
- After you have removed the bottle from pump invert the pump to drain the oil from the tube.
- Ensure the lid is screwed tightly onto the bottle and it correctly identified.

Ensure the quality of the sample

- A key factor is to practice taking a sample before the real thing!
- Be consistent when taking a sample.
- Always take the sample at the same point, in the same way and after the machine has been running for at least an hour.
- The best sample will always come from a running machine.
- Do not sample immediately after a large volume of lubricant has been added. In this case defer taking a sample for a day.
- Always be sure to draw sufficient of the sample to fill the bottle to between 80 and 90% full

Getting ready

Insert a clean sampling tube and bottle

Insert tube into sample access point

Suction out a sample

Oil laboratories -PNG
Aircorps Road, (PO Box 1298), Lae 411, Papua New Guinea
+675 472 0711
enquiries@oilabspng.com

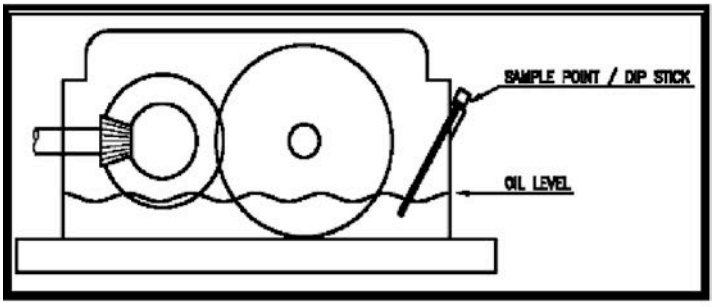
Return or replace access plug or dipstick

Ensure the oil sample is firmly capped and Identified. Now the sample must be returned to office to complete the ID form and dispatch the sample to Oil Laboratories – PNG for analysis.

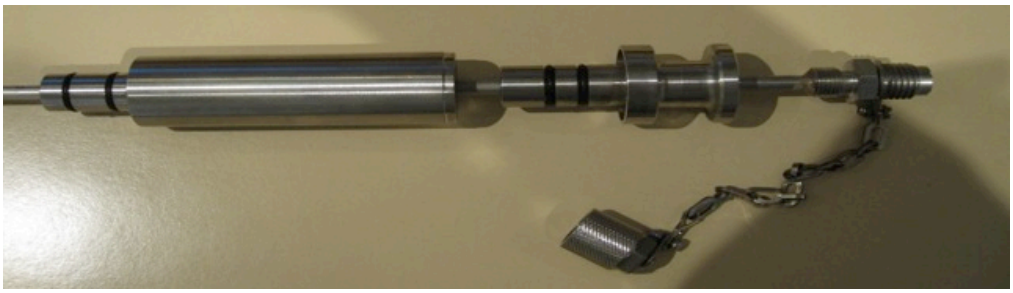
Sampling Hints

Often when sampling from a reservoir or gear box in a dusty location the dipstick hole is the sample point, the dipstick will be buried under dust.

This dust MUST be completely cleaned away before the dipstick is removed for sampling. But that raises a point; is this always done before the oil level is checked??? A way of solving the problem is to use and extended dipstick system as illustrated in this example.



Oil laboratories -PNG
Aircorps Road, (PO Box 1298), Lae 411, Papua New Guinea
+675 472 0711
enquiries@oilabspng.com



The extended dipstick replaces the current dipstick. The base length can be between 50 and 150mm to ensure the draw point is well above the dust rill angle. The dipstick is a hollow SS tube that on installation is cut to the correct length. A screwed plug is fitted to the top of the dip stick. To take an oil sample the dipstick is left in place, the plug unscrewed and the sample tube is inserted into the tube to the correct depth then the sample is withdrawn using the vacuum pump. The use of this procedure reduces the chances of oil contamination but most importantly removes the possibility of the sample tube being caught in the meshing gears. This is a very unpleasant event.

Sample Identification

In order for our laboratory to provide you with correct analysis and diagnostics the samples you send us must be correctly identified. Oil Laboratories – PNG use a **unique Sample number and bar code** for each sample. This allows us to track the sample through the lab and assign analysis results to the correct sample.

To ensure we can trend results, it is vital that you always use the same unique machine identification for each sample from that machine, i.e. HT240 engine. This will allow us to file the current analysis result in date sequence with previous analysis results from that machine and compartment. This allows us to build an analysis history for that machine and compartment that can be trended, this may allow us to identify pending problems.

This is an example of a sample ID label; this must be **fully** completed for each sample you submit for analysis.

A00010567

Customer Dispatch Receipt
Unit ID.....
Oil type.....
Date sampled.....

Oil Laboratories - PNG
+675 472 0711
oillabspng.com

A00010567

Company Name .....
Contact Name ..... Phone .....
Contact email .....

Oil Name .....
Date of sampling .....

Equipment ID ..... Machine hrs/Km ..... Oil hours.....
Machine make..... Model.....
Compartment .....Capacity L..... Top Up L.....

Comments .....
.....

Send this data sheet with sample please placed in a zip lock bag along with samples

Lab Only Data entered

A00010567

Oil Laboratories – PNG
Company .....
Contact details.....
Oil Type .....

Stick this label to sample bottle

Company name – The name of the company submitting the samples
Contact Name - **This MUST be included in case we need to contact you**
Phone Number- **This MUST be included in case we need to contact you**

OIL LABORATORIES - PNG
A Dunlop PNG Company

E-mail Address-	**This MUST be included to allow us to send you the analysis results**
Oil Name–	**The full name is required** including the manufacturer, product name and viscosity grade, i.e. **Total Rubia Optima 1100 15w-40**
Date of sampling-	The date when the sample was actually taken
Equipment ID –	This is often the Fleet Number or Registration Number but must be the same for every sample from that unit.
Equipment Hrs/kms-	This Info assists with problem diagnosis
Oil Hours-	This Info assists with problem diagnosis
Equipment Make-	This Info assists with problem diagnosis
Equipment Model-	This Info assists with problem diagnosis
Compartment-	This is vital data as often each compartment uses a different oil
Oil Capacity Litres-	This Info assists with problem diagnosis
Top-Up Litres-	This Info assists with problem diagnosis
Comments-	Optional but allows you to include any information that you consider we need to know about the machine and its condition.

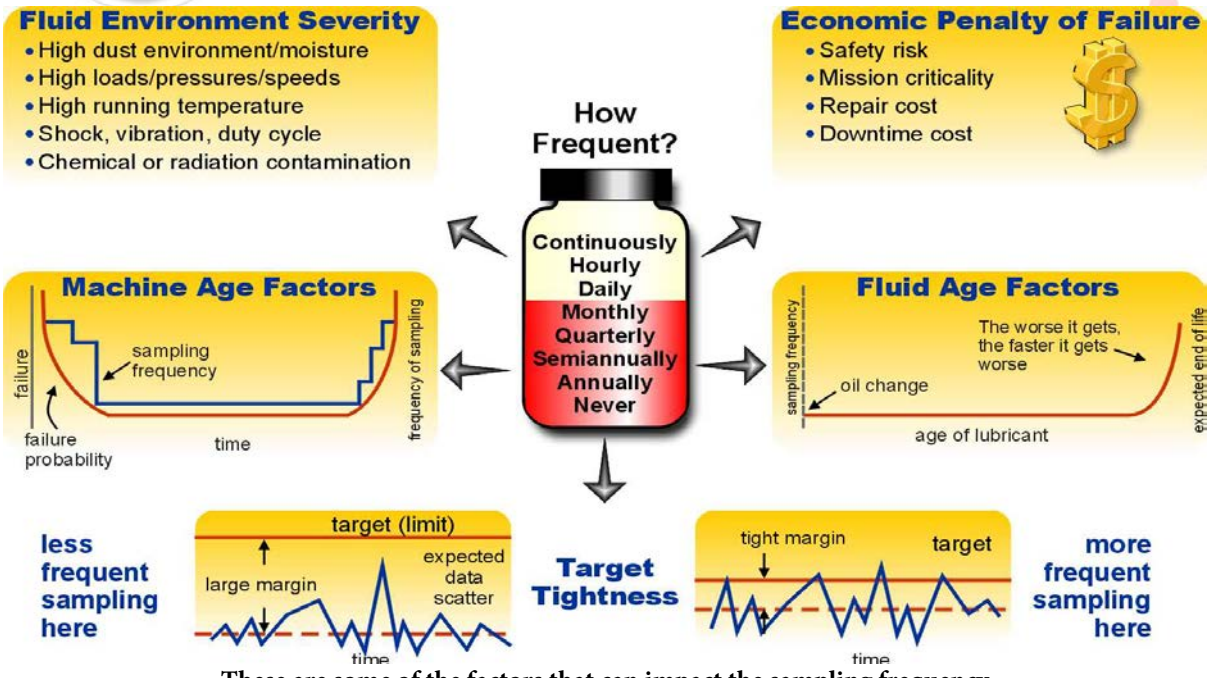
And most importantly dispatch the sample to the lab ASAP

Sampling Frequency

How often should samples be taken? This is a question we are asked frequently. There are two types of oil samples: **Investigative**, those where you are following up on a problem, a machine running hot, possible oil mix up, or an unusual noise or vibration coming from a machine and **Scheduled CM samples.**

When **Investigative** are sent to the lab you must alert us as that you think you have problem and what it may be. This will allow us to focus our tests and diagnosis plus prioritise the sample.

The frequency you take on **scheduled samples** is dependant on a number of factors. The following few pages will provide you with some guidelines. We are available to apply our experience in guiding you to select the most appropriate frequency for your equipment.

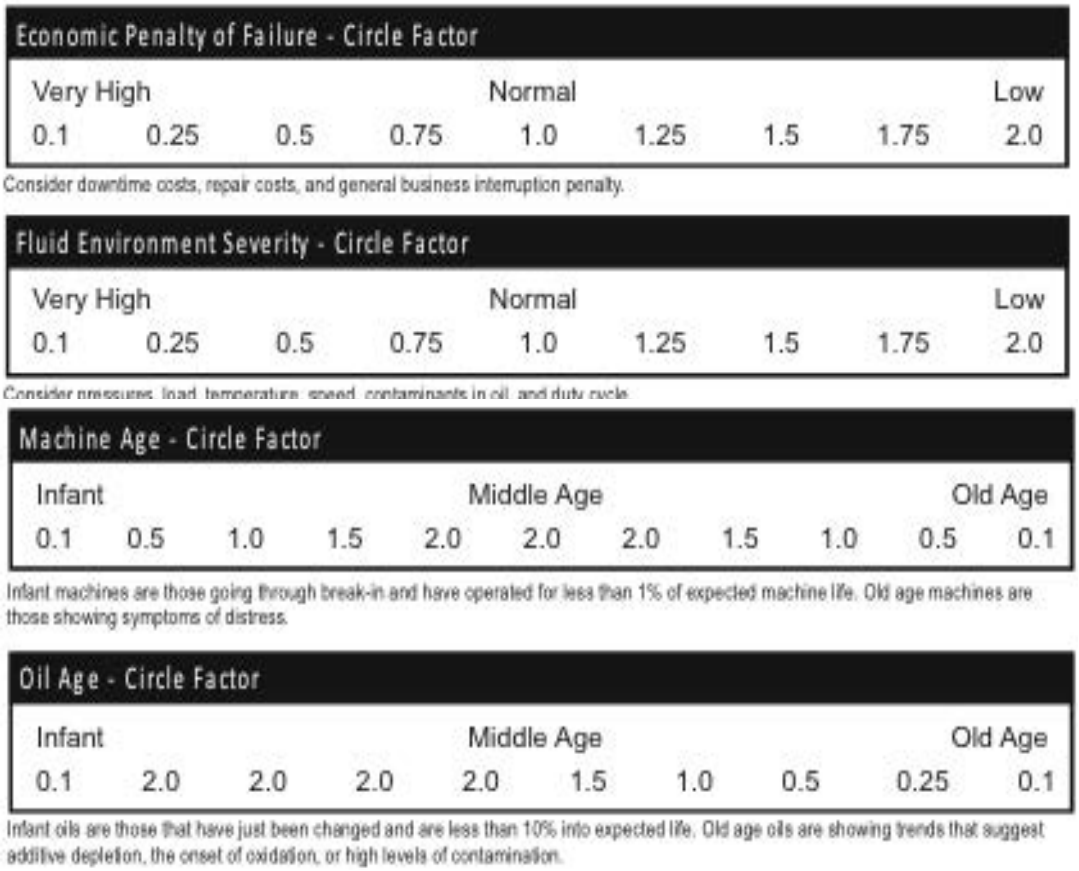


These are some of the factors that can impact the sampling frequency

Oil laboratories -PNG
Aircorps Road, (PO Box 1298), Lae 411, Papua New Guinea
+675 472 0711
enquiries@oilabspng.com

Machine or System Type	Oil Sampling Frequency
Diesel engines – mobile	250 hours (20,000km)
Diesel engines – stationary	500 hours
Diesel engines – mobile (extended oil drain)	500 hours (40,000Km)
Transmissions	1000 hours (80,000km)
Differentials and Final Drives	1000 hours (80,000km)
Hydraulics – mobile equipment	1000 hours (80,000km)
Radiators – Engine Coolants	500 hours (40,000km)
Gas Turbines	500 hours
Steam Turbines	500 hours
Air & Gas Compressors	500 hours (if on a mine drill 250hrs)
Chillers (Refrigeration)	500 hours
Gear Boxes – high speed	500 hours
Gear Boxes – low speed	1000 hours
Bearings – journal and rolling element	500 hours

The table above can be used as a guide to frequency of sampling in various applications. The table following allows you to adjust the baseline sampling frequency based on a range of factors critical to your operation.



Oil laboratories -PNG
Aircorps Road, (PO Box 1298), Lae 411, Papua New Guinea
+675 472 0711
enquiries@oilabspng.com