



What compliance actions are needed to manage and monitor polychlorinated biphenyls fluids (PCBs)?

Compiled by Tom Dalton | April 2023

Polychlorinated Biphenyls or PCBs

Polychlorinated biphenyl fluids have been around for a while. It is a manufactured insulating fluid initially used in the late 1960s and early 1970s due to its high flash point (inability to burn). However, this fluid has significant environmental impact issues as it breaks down in the environment at a prolonged rate.

It also has some adverse health issues, viz being passed along the food chain and ingested into the human body where it accumulates in the fatty tissues. From a global perspective, it has been outlawed as a persistent organic pollutant (POP). However, in South Africa, this fluid and its presence are governed by the standard SANS 290 (2020), which seeks to remove it from use in this country by 2025; or, at a minimum, to have it registered and its volumes managed by 2023, with a phase-out plan in place by 2025.

Management

Asset owners are encouraged to monitor the levels of PCBs within their transformer fleet so that they know the levels of PCB items and the volumes within their control. Levels are categorised as follows according to SANS 290 (2020).

SANS 290 (2020) levels and colour coding		
Undetectable (ND <2 ppm)	0	PCB-free item
>2-10 ppm	1	PCB-free item
11-20 ppm	2	Non-PCB contaminated item
21-50 ppm	3	Non-PCB contaminated item
50-499 ppm	4	PCB-contaminated item
>500 ppm	5	PCB-contaminated item

As an asset owner, the first action would be to have all transformer assets sampled to assess the insulating oil in the network. Label each unit with appropriate labels and place them near the sampling or drainage points. Units categorised at level 3 and above must be marked for special attention and a phase-out strategy put in place.

The second action would be to categorise the volumes of oil/fluid into each level. Once this task is completed, the organisation must (a) register with the Department of Environmental Affairs and (b) compile and maintain an inventory of PCB volumes and levels. After that, the Department of Environmental Affairs issues the organisation with a registration number and an indication of the timeframe by which specific levels need to be phased out.

Per the Government Gazette 37818 and SANS 290 (2020), those units analysed as level 3 and above will need a company strategy to phase out the fluids with an inventory of volumes and levels compiled and maintained. Note: The oil cannot be traded to any organisation other than registered oil handlers.

A transformer with a PCB level 2 and 3 can still operate without risk of failure or damage to the insulation. The issue at hand is environmental; for example, if the oil is accidentally spilt or a tank is ruptured or stored in containers that are leaking, and quantities of more than 5 litres are spilt. This will result in an environmental clean-up exercise deemed necessary (to below 0.003 mg/kg). This is a costly exercise and a financial burden on the company's resources.

Monitoring Strategy

After the initial fleet assessment, it is only necessary to analyse the fleet's PCB levels in the following conditions:

- The PCB label becomes faded and unreadable (other than if a new audit is warranted).
- Sample every 3 to 5 years – natural oil dilution by oil replenishment (topping-up).
- Oil replacement: the transformer is serviced or repaired, and new or regenerated oil is used to re-fill the unit.
- After oil treatment, meaning filtration or regeneration onsite (only replace the label if necessary or a new level has been given).

PCB will only increase due to cross-contamination or at an oil change where a declared level 0 oil is replaced with a regenerated oil resulting in the oil being mixed with oil that has a PCB level higher than level 0.

PCBs are not generated within a transformer while it is operating, nor will it be produced or destroyed. PCB levels will only change if another fluid is introduced.

New oil should be level 0, but if it is introduced to a previously contaminated unit, some residual PCB component will usually contaminate the oil, which may become a level 1 fluid. It should be noted that SANS 290 condemns the practice of dilution.

Samples can be taken in a glass vial, plastic bottle or normal 1 L sample tin.

