

We asked Gordon Wilson, from National Grid's Network Engineering team: Is the industry dealing with its transformer's corrosive sulphur problem? Or can we stop worrying about it?

Corrosive sulphur and copper sulphide related transformer problems were a hot topic for our industry for a number of years. However, judging by the feedback from corrosive sulphur related presentations I've given at Euro TechCon over the years, interest seemed to be waning, and perhaps it was of less interest in the UK anyway as we have free-breathing transformers which are meant to reduce the risk. So, is it something we can now ignore?

Well, Euro TechCon recently gave it some prominence with a presentation every day and I, for one, was interested in what others had to say.

We had a failure in 2007 where copper sulphide played a part and we have been conducting research into the best way to manage the problem ever since. We took a risk-based approach to the problem and have used sulphur removal and passivation to manage the problem.

Passivation is a commonly used mitigation option whereby an additive is introduced to the oil. This protects the copper surface from chemical attack and should prevent reaction to produce copper sulphide formation on either the copper or the paper.

Having passivated a number of our transformers we wanted to investigate how effective it really is, so we worked with Southampton University to evaluate it as a mitigating technique. A number of sophisticated surface analysis techniques have been used to show that the passivator adequately coats the surface when added at the right concentration – commonly the concentration added is 100ppm but there may be some advantage in adding twice as much, beyond that it doesn't really seem to add any more benefit.

Having looked at passivator effectiveness in the laboratory we then asked the researchers at Southampton to look at copper conductors taken from transformers removed from service at the end of their lives to confirm that the passivator was successful in getting where we wanted it to go.

The next step in this research will confirm how easy the passivator is to remove under operating conditions so that we know when, or if, we need to add more. It is not uncommon to see the passivator levels drop in service in some cases, but not in others where the conditions would be expected to be the same.



A failed winding where copper sulphide was a factor in the failure



Evidence of copper sulphide from a retired transformer

If you wish to discuss any aspect of oil management, including this issue, please contact the Commercial Engineering Services (CES) team on: +44 (0)800 783 9228 or email: ces@nationalgrid.com

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