

Eskom's response to questions to Dr Ron Sahu

General comments

Eskom power stations monitor compliance to their particulate emissions limits as set in their Atmospheric Emission Licences (AEL) on a continuous basis and provide monthly reports on station and emission performance to the licencing authorities. Included in these monthly reports are details of emissions levels on a daily basis and reasons for any exceedances of the applicable limits.

Emission exceedances are often associated with plant start- up, shut-down or upset conditions, in terms of the AEL a grace period of 48/72 hours is allowed for and is not regarded as non-compliance.

Upset conditions can generally be described as unplanned, unexpected, sudden incidents.

When the emission exceedances extend beyond the 48/72 hour grace and this exceedance is due to the station is required to report to the licencing authority (the DEA and district authority) in terms of Section 30 of the National Environmental Management Act (Act 107 of 1998).

Whilst all exceedances (plant start- up, shut-down or upset conditions) are reported in the power station monthly reports to the licensing authority, the report does not separate out the reason for daily exceedances to determine how many of them are during start up and shut down. Eskom has initiated a process to complete an analysis and respond to Dr Sahu's report. Going forward Eskom is considering revising the format of monthly report to include such an analysis and to avoid misinterpretation of the information.

Eskom stations generally comply with the conditions of their AEL and the stipulated limits specifically in the period analysed by Dr Sahu.

However, Kendal has been operating in non-compliance since the beginning of 2018.

Eskom's responses to the questions

1. How were you able to get the monthly emission monitoring reports from Eskom? Did Eskom cooperate in making the reports and data available? Are you receiving the reports on an ongoing basis now?

The emission reports used by Dr Sahu were the monthly emission monitoring reports provided by the Eskom stations to their relevant atmospheric emission licencing authorities. These reports were provided to the Centre of Environmental Rights (CER) in response to a Promotion of Access to Information Act (PAIA) request they submitted on behalf of their clients to Eskom.

There was no direct contact between Eskom and Dr Sahu in respect of the study.

Eskom has recently received a new PAIA request by CER for more recent monitoring reports and is presently evaluating that request.

2. I notice from your analysis that there were notable omissions, inconsistencies and deficiencies in Eskom's emission monitoring reports, and the data contained therein. Please can you elaborate on the most important of these, and how did you deal with these deficiencies?

Eskom's monthly emission monitoring reports are prepared to meet the requirements of the AELs issued to the stations by the relevant licencing authorities. Provision of the reports to the CER took place over several months and various efforts to confirm the completeness of the data provided were made. After the last engagement between Eskom and CER there was no indication that any information was outstanding. If Eskom was aware of any outstanding reports it would have provided these to the CER. There is a large number of reports and based on our recent review of what we did provide to CER there were only two reports outstanding (Grootvlei (Nov and Dec 2017)).

Eskom will evaluate the deficiencies picked up by Dr Sahu and address these to ensure that reported information is clear, accurate and in line with the requirements of the licencing authorities.

In terms of data issues associated with the monthly emission reports Eskom is aware of the importance of accurate and credible data and it recognises the complexity of emission reporting systems and works continually to improve the quality of reporting. To assist in this Eskom runs a number of programmes including assurance reviews and training and awareness sessions.

The assurance reviews are aimed at ensuring the correctness of data reported and capacitating power station teams. Based on the outcomes of these reviews Eskom does at times re-issue emission reports to the authorities.

The monitoring equipment on which the monthly reports are based can themselves be prone to errors. Emission equipment needs to be correlated and or calibrated regularly to ensure it accurately reflects station emissions. Whilst this is done there are cases where delays in this result in a misstatement of results, once this is addressed emissions are restated and reports are updated. Dr Sahu was not provided with any updated reports.

Gaseous emission monitoring is particularly sensitive as illustrated in the case of Lethabo where the exceedances recorded resulted from significant reliability challenges on the monitors during that period. Currently the majority of those challenges have been addressed and the station has seen a significant reduction in NO_x exceedances and only one SO_x exceedances (due to a monitor fault) in the recent past. The above issues have been communicated to the licencing authority.

Lastly as part of the annual reporting process an external data integrity audit is carried by the appointed auditors to confirm that data reported in the annual report is accurate.

3. Certain monthly reports appear to be direct copies of earlier monthly reports. Does this indicate there may be some deliberate misrepresentation of results, and what does this say about the oversight of the reporting by Eskom and the environmental compliance authorities?

Eskom confirms that there were several reports for Tutuka which were substantially similar. On investigation it would appear that during the process of manual intervention required to bring system data into the final report graphs the responsible person only transferred some of the required data. This error was unfortunately not identified during internal quality checks. The affected reports will be recreated and submitted to the licencing authority. The above error is in

no way a deliberate misrepresentation of information and even the duplicated report graphs illustrate occasional high emission levels.

4. From your broad experience as an expert in the field of environmental, mechanical and chemical engineering, is the quality of the reports and data received from Eskom considered to be up to standard and acceptable for one of the major power generation utilities in the world?

Eskom's monitoring reports are prepared to meet the applicable legislative requirements of their AEL and any additional requirements from the licensing authorities. Eskom believes they contain the key elements one would expect to see in similar reports internationally. Different legislative regimes do however have different specific requirements and as such differences can be expected.

5. From your analysis, it would appear that in each of the areas of PM, SO_x and NO_x, the number of non-compliances of particular Eskom coal-fired power stations stand out like a sore thumb. For example, the number of PM non-compliances at Matimba are 200x higher than at Kendal, while NO_x non-compliances at Matla are 150x higher than Majuba. Why are these variances so great, and what does this indicate?

It is believed that Dr Sahu's analysis may have been impacted by some of the common errors in respect of this as highlighted in the general comments above. Whilst as indicated detailed analysis of Dr Sahu's results have not been undertaken Eskom can make the following station specific comments:

- (i) Figure 2 of the Dr Sahu report does not show 200x PM non-compliances at Matimba compared to Kendal.
- (ii) Figure 4 of the report does however show 409 exceedances of SO₂ versus 2 at Kendal. Matimba and Medupi SO₂ emissions were originally based on adhoc monitoring (prior to the requirement for continuous gaseous emission monitoring). Eskom did inform the authorities that the emission limits for Medupi and Matimba may not be achievable and this proved to be correct. The SO₂ emissions are a function of the sulphur content of the coal. The Waterberg coal used at Matimba has a substantially higher sulphur level and as such there have been several recorded exceedances. Given this Eskom applied and was granted a postponement and variation to its AEL for Matimba and Medupi in September 2018 which allows the monitoring of SO₂ against a monthly not daily average as was the case when Dr Sahu's report was compiled.
- (iii) The high number of NO_x (and other gaseous) exceedances at Matla was due to an overstatement of emission levels as a result of drift on the monitoring equipment. The reported emissions reduced to below the limit the immediately following the first calibrations supporting the suspicion that the analysers drifted. The delay in calibration of this equipment was indicated in the monthly reports.

Eskom stations generally comply with the conditions of their AEL's in respect of emission levels.

Dr Sahu's report illustrates that there are periods on exceedance of the emission levels but most of these exceedances are not-legal non-compliances and are explainable with detailed review. His report also illustrates the difficulty in interpreting monitoring results without the full understanding on factors and context.

6. Has Eskom and the Department of Environmental Affairs been given opportunity to review and respond to your analysis and findings, and if so, what has been their response?

Eskom has noted Dr Sahu's report but has not formally responded.

Dr Sahu's report was recently included in the comments prepared by the CER in respect of Eskom's current Minimum Emission Standards postponement application. As such Eskom will respond to the report generally in a similar manner to what has been shared in this response.

Eskom is not aware if DEA have formally been requested for comment on the report.

7. How stringent are South Africa's minimum emission standards, particularly in relation to those of other developing countries? Would Eskom's coal-fired power stations be able to operate legally in any other countries of the world?

South Africa's MES were developed as the outcome of a process run by the National DEA which included broad consultation on the proposed standards. The standards derived are a function of the state of technology of the various emissions sources in South Africa, the practicality of compliance given that technology and the anticipated environmental impact.

In respect of SO₂ Eskom believes the RSA standard SO₂ has been established by DEA noting the high sulphur content of South African coals and the costs and impacts associated with reducing SO₂ levels. Eskom has in terms of the MES postponement application completed a Cost Benefit Analysis, the outcomes of this study reflect that the cost of retrofits to existing plant is much higher compared with the benefits to ambient air quality and health.

Some attempts have been made to compare the RSA MES to the Chinese standards. China's emissions reduction program started some +23 years ago with the first limits being published in 1996. This was progressively reduced over time. The most recent 2015 limits are basically a requirement for the eastern densely populated provinces in China while the central and western provinces are encouraged to achieve the more stringent limits. Internationally population density and the ambient air quality and health impacts do influence the emission limits.

8. From Eskom's and the DEA's responses (or lack of responses) to your analysis, and the difficulties experienced in obtaining the reports and data, do you feel Eskom and the DEA are being adequately open and transparent about the thousands of emission non-compliances by Eskom?

Eskom denies that there are thousands of emission non-compliances. Dr Sahu's report appears to have a number of errors which significantly over state the extent of the high emission levels.

Eskom has provided access to emission information through the Promotion of Access to Information Act. In addition during the recent public meetings for the MES postponement application there was a request for access to the annual emission reports and these were promptly made available to all interested and affected parties.

9. What should the Department of Environmental Affairs and the relevant emission compliance authorities be doing about the thousands of flagrant breaches of the applicable daily emission limits detailed in Eskom's own reports? How serious are these offences?

As indicated Eskom denies that there are thousands of emission non-compliances. Dr Sahu's report reflects a number of daily exceedances, many of these are permitted in terms of the conditions of the AEL and are therefore not non-compliance.

Where the authorities have identified significant recurring trends in terms of possible non-compliance they have issued Eskom with pre-compliance notices in terms of the National Environmental Management Act e.g. Kendal, Lethabo and Komati. Eskom has responded to each of these generally indicating that the high emission levels are not non-compliances to the legislation.

Kendal power station is currently operating in non-compliance, Eskom has informed the authorities and committed to an action plan to address the plant issues leading to the non-compliance.

In considering the impact of any AEL emission limit exceedances on the public it is critical to consider the local ambient air quality status. Dispersion modelling recently completed as part the Eskom MES postponement application shows that based on individual and combined power station emissions, excluding all other sources; Eskom makes a negligible contribution to PM pollution. In addition the diurnal pattern in PM concentrations based on monitored ambient data clearly indicate a morning and early evening peaks, typical of low level source contributions. However, a combination of SO₂ and NO_x emissions from all the Highveld power stations is predicted to form a significant component of the PM_{2.5} load especially over Emalahleni area, which is in non-compliance with PM standards, this is a cause for concern but will be addressed through Eskom's air quality implementation plan.

In addition, the combined SO₂ emissions from all Eskom power stations are predicted to contribute a significant amount to the pollution in and around the Emalahleni and Middelburg areas and even extending south towards Komati Power Station. However analysis indicates that the non-compliance is not only due to Eskom Power Stations but a function of a multitude of sources in the Highveld.

The dispersion modeling and ambient air quality monitoring data indicate that the elevated pollution levels in the Highveld require a holistic approach, addressing all identified and potential sources. Therefore, a single approach, only addressing Eskom power station emissions will not result in acceptable ambient air quality levels that are not harmful to human health and the environment. Eskom has initiated an offset programme which will reduce emissions from household use of coal for heating and cooking.

10. What should Eskom be doing about this sorry state of affairs, and can Eskom's response be considered adequate in any way?

Exceedances when they occur can be for various reasons including:

- Many of the exceedances seen are associated with plant start up or shut-down during which times the particulate emission equipment is not working optimally, in terms of our licence these are not formally considered exceedances.
- Blockages or damage to the filter bags in stations which use fabric filter plant technology to reduce emissions. This can be addressed through more pro-active and appropriate procurement processes. The previous procurement process was lengthy due to various procurement rules; this resulted in the late delivery of bags and higher emissions.
- Malfunctions or underperforming of the electrostatic precipitators in stations which use this technology to reduce emissions. This requires improved maintenance and adequate outage time.

- Breakdowns of the ashing system which removes the burnt ash from around the emission reduction equipment. Problems here could be conveyor breakdowns, full ash hoppers due to blockages. This requires improved maintenance, outage time and the provision of spares.
- Malfunctions of the gas conditioning plants (typically sulphur) which add additional gas to the incoming emission to improve emission reduction efficiency. This requires improved maintenance and refurbishment of some plants.
- Poor coal quality (coal which has more ash in it than was originally anticipated) which results in over use of the emission reduction equipment and the ashing systems (ash accumulates faster than planned and builds up in the plant).
- Malfunctions of the emission monitoring equipment which results in an over reporting of emission levels and the number of exceedances.
- Other equipment failures which impact on plant performance or emission equipment operations

Eskom undertakes investigations of all exceedances to identify how to address them. Mitigation actions to address the exceedances presently underway include:

- Implementation of specific emission recovery projects addressing issues such as ash plant problems, conveyor breakdowns, ash dump spacing
- Work to improve the quality of coal burnt by mixing coal stocks and in case purchasing better quality coal and blending of coal as an alternative
- Continued maintenance of all emission related equipment.
- General refurbishment and modifications of plant equipment for better performance

Implementation of work to address emission exceedances is treated as a high priority activity it is however necessary to plan the work such that the overall electricity system remains stable and that load shedding is avoided.

11. What can civil society do about this, and are any strong legal or other actions actually happening or being contemplated?

In terms of the Constitution everyone has the right to clean air, in terms of legislation, civil society can take legal action against Eskom and the authorities if there is non-compliance to AELs.