

43 Cleveland Road
Claremont
7708
Cape Town
Email address: cairncrosse@gmail.com

Ms Tyhileka Madubela
Coordinator: Portfolio Committee on Water & Environmental Affairs
Committee Section
Parliament of RSA
PO Box 15
Cape Town
8000
By email: tmadubela@parliament.gov.za

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Dear Advocate de Lange

THE POTENTIAL OR UNINTENDED CONSEQUENCES OF PUBLICATION OF THE PROPOSED AMENDMENTS TO THE LISTED ACTIVITIES PUBLISHED UNDER S 21 OF THE NATIONAL ENVIRONMENTAL MANAGEMENT: AIR QUALITY ACT 39 OF 2004

1. I address you as a retired Professor of Chemical Engineering (Cape Peninsula University of Technology) who has assisted and advised various community organisations on technical matters relating to their struggles for environmental justice. I have been doing this over a period of more than 15 years, including advising a legal NGO on technical matters. During the period 1996 – about 2003 I assisted a legal NGO and the communities they were representing in negotiations to reduce emissions from four oil refineries.

More recently I was a member of the (South African Bureau of Standards/ DEA convened) Steering Committee, the Technical Committees and various sub-committees (Working Groups), participating in the negotiations and drafting of both the current SA Ambient Air Quality Standards and the Listed Activities (LA) regulation under discussion. I was therefore intimately involved in the process of developing the LA regulation, within this process. I participated in my own capacity as an academic, but also as a representative of the Coalition for Environmental Justice and in the capacity of advising and generally working very closely with both Ms Angela Andrews of the Legal Resources Centre, and Mr Rico Euripidou of groundwork. It was an intensive process, with, at various times around 30 representatives of industries and industry associations participating, and about 5 representatives of DEAT and a few from local government. I should say that I did this on a voluntary basis, with the leave of my then employer, the Cape Peninsula University of Technology and with travelling

arrangements and my transport costs made and paid for by the Department of Environmental Affairs.

I have also conducted research into various aspects of air pollution and air pollution management. My particular interests are in air quality modelling and in the health and environmental effects of ambient air pollution.

2. What is the primary purpose of air pollution management of which the LA regulation is an important part?

Excerpts from the preamble to the Air Quality Act (NATIONAL ENVIRONMENTAL MANAGEMENT: AIR QUALITY ACT 39 OF 2004):

“WHEREAS the quality of ambient air in many areas of the Republic is not conducive to a healthy environment for the people living in those areas let alone promoting their social and economic advancement;

AND WHEREAS the burden of health impacts associated with polluted ambient air falls most heavily on the poor;

AND WHEREAS air pollution carries a high social, economic and environmental cost that is seldom borne by the polluter;”

“AND WHEREAS minimisation of pollution through vigorous control, cleaner technologies and cleaner production practices is key to ensuring that air quality is improved; And whereas additional legislation is necessary to strengthen the Government’s strategies for the protection of the environment and, more specifically, the enhancement of the quality of ambient air, in order to secure an environment that is not harmful to the health or well-being of people,”

3. What is the burden of disease (health impacts) due to ambient air pollution in South Africa? Answer is that we still don’t have good data, more than eight years after the publication of NEM:AQA.

An article published in the South African Medical Journal in 2007¹ provides some insight:

“[In 2000, o]utdoor air pollution in urban areas in South Africa was estimated to cause 3.7% of the national mortality from cardiopulmonary disease and 5.1% of mortality attributable to cancers of the trachea, bronchus and lung in adults aged 30

¹ **Estimating the burden of disease attributable to urban outdoor air pollution in South Africa in 2000.** Rosana Norman, Eugene Cairncross, Jongikhaya Witi, Debbie Bradshaw and the South African Comparative Risk Assessment Collaborating Group. August 2007, Vol. 97, No. 7 SAMJ.

years and older, and 1.1% of mortality from ARIs in children under 5 years of age. This amounts to 4 637 or 0.9% (95% uncertainty interval 0.3 - 1.5%) of all deaths”
(ARIs: Acute Respiratory Infections)

But these figures are far out of date. They refer to the situation on 2000, and they reflect the burden of disease attributable to only one of the five or six common air pollutants, and they only reflect impacts attributable to long term (annual) average exposures. But they do provide some real numbers relating to deaths and disease caused by air pollution.

The health impacts of ambient (outdoor) air pollution occur as a result of both short term episodes of high concentrations and lower level concentrations over an extended period. The importance of this observation is that if we are to minimise the health impacts of air pollution we need to manage and control both short term pollution events and long term emissions from sources.

4. The AQA provides for the development of two key aspects of air pollution management – Ambient Air Quality Standards (essentially the target quality of ‘clean air’) and Emission Standards for ‘Listed Activities’. Therefore there is a direct relationship between the emission standards regulated (for all sources) and the ambient air quality that results from these emissions. Thus we allow lax emission standards we cannot expect to achieve good air quality, or the objective of minimising health impacts.
5. The LA regulation under discussion addresses air pollutant emissions grouped into categories (processes) and sub-categories of similar processes.

The common characteristics of most if not all of these sources are:

- Stationary – that is at a fixed location. This also means that their location in relation to surrounding industries and communities is fixed.
- Pollutants are mostly discharged via chimneys (stacks)
- But in many cases ‘fugitive’ (non-stack) emissions may be significant
- When considering the impacts that these sources have, we need to consider that emissions during the start-up or shut-down of the plant, or during ‘flaring’, may be of relatively short duration but the emission rates may be several times higher than during ‘normal’ steady operation.

6. I would like to address the specific unintended consequences of the change to the change to Category 2 of the LA regulation.

In the current regulation:

11. Category 2: Petroleum Industry, the production of gaseous and liquid fuels as well as petrochemicals from crude oil, coal, gas or biomass

(1) Subcategory 2.1: Combustion installations

Description:		Combustion installations not used primarily for steam raising or electricity generation.	
Application:		All combustion installations (except test or experimental) including catalytic cracking regenerators.	
Substance or mixture of substances		Plant status	mg/Nm³ under normal conditions of 10% O₂, 273 Kelvin and 101.3 kPa.
Common name	Chemical symbol		
			Daily average kg SO₂ / ton of crude oil throughput.
Sulphur dioxide	SO ₂	New	0.4
		Existing	0.8

- (a) The following special arrangements shall apply:
- (i) The oxides of nitrogen shall be calculated as a flow-weighted average over all combustion processes.
 - (ii) No continuous flaring of hydrogen sulphide-rich gases shall be allowed.
 - (iii) Allowable SO₂ emissions from a refinery will be calculated as the sum of emissions from combustion, sulphur recovery units, flares and catalytic cracking units. For purposes of this calculation, catalytic cracking emissions will be calculated as if feed is not hydro-treated by the most appropriate method for each facility as approved by the licensing authority.

(Sulphur dioxide only, the current LA regulation, 31 March 2010)

Observations:

- a) The maximum allowable emissions of sulphur dioxide are stated in terms of an amount (in kg) per ton of throughput of crude oil, that is, per unit of production.
- b) The maximum allowable emissions refer to “the sum of emissions from combustion [‘all combustion installations’], sulphur recovery units, flares and catalytic cracking units.” In essence, all sources of sulphur dioxide emissions are included in the limit calculation.

The proposed Amendment:

Category 2: Petroleum Industry, the production of gaseous and liquid fuels as well as petrochemicals from crude oil, coal, gas or biomass

(1) Subcategory 2.1: Combustion Installations (excluding any material that is regarded as waste in terms of the Waste Act, 2008)

Description:		Combustion installations not used primarily for steam raising or electricity generation (furnaces and heaters).	
Application:		All refinery furnaces and heaters.	
Substance or mixture of substances		Plant status	mg/Nm ³ under normal conditions of 10% O ₂ , 273 Kelvin and 101.3 kPa.
Common name	Chemical symbol		
Particulate matter	N/A	New	70
		Existing	120
Oxides of nitrogen	NO _x expressed as NO ₂	New	400
		Existing	1700
Sulphur dioxide	SO ₂	New	1000
		Existing	1700

(a) The following special arrangements shall apply –

- (i) No continuous flaring of hydrogen sulphide-rich gases shall be allowed.
- (ii) Existing plant must comply with minimum emission standards for existing plant as contained in Part 3 within 5 years of the date of publication of this Notice.
- (iii) Existing plant must comply with minimum emission standards for new plant as contained in Part 3 within 10 years of the date of publication of this Notice.

(2) Subcategory 2.2: Catalytic Cracking Units

Description:		Refinery catalytic cracking units.	
Application:		All installations.	
Substance or mixture of substances		Plant status	mg/Nm ³ under normal conditions of 10% O ₂ , 273 Kelvin and 101.3 kPa.
Common name	Chemical symbol		
Particulate Matter	N/A	New	100
		Existing	120
Oxides of nitrogen	NO _x expressed as NO ₂	New	400
		Existing	550
Sulphur dioxide	SO ₂	New	1500
		Existing	3000

(a) The following special arrangements shall apply –

- (i) Existing plant must comply with minimum emission standards for existing plant as contained in Part 3 within 5 years of the date of publication of this Notice.
- (ii) Existing plant must comply with minimum emission standards for new plant as contained in Part 3 within 10 years of the date of publication of this Notice.

(3) Subcategory 2.3: Sulphur Recovery Units

Description:	Sulphur Recovery Units		
Application:	All installations		
Substance or mixture of substances		Plant status	mg/Nm³ under normal conditions of 10% O₂, 273 Kelvin and 101.3 kPa.
Common name	Chemical symbol		
Hydrogen Sulphide	H ₂ S		a
			a

- (a) The following special arrangements shall apply –
- (i) Sulphur recovery units should achieve 95% recovery efficiency and availability of 99%.
 - (ii) Existing plant must comply with minimum emission standards for existing plant as contained in Part 3 within 5 years of the date of publication of this Notice.
 - (iii) Existing plant must comply with minimum emission standards for new plant as contained in Part 3 within 10 years of the date of publication of this Notice.

What would the effect be?

- a) The proposed amendment is silent on flaring emissions. That means that there is no obligation to measure or report or account for flaring emissions, even though flaring emissions may have very significant impacts.
- b) The proposal (in the Amendment) to specify emission separate limits for sulphur dioxide emissions from ‘Combustion Units’, Sulphur Recovery Units’ and Catalytic Cracking Units’ is a feasible alternative, but would the sum of these emissions be within the limits in the current LA regulation? Since each oil refinery has different configurations (or relative sizes) of these units, the answer cannot be given without further information on the configuration of each refinery. This alternative is in any case incomplete as it does not propose corresponding emission limits for flare emissions.
- c) In the current LA regulation, ‘special arrangements’ generally refer to measurement issues specific to a sub-category. In the proposed Amendment a deferment of the compliance date is in effect proposed for sub-specific categories under ‘special arrangements’

In conclusion, the exclusion of ‘flaring emissions’ from the ambit of the emission limits constitutes a significant relaxation of the standard. The proposed emission limits for ‘Combustion Units’, Sulphur Recovery Units’ and Catalytic Cracking Units’ may constitute a further relaxation of the standards, but this can only be confirmed once further information on the configuration of each refinery is available.

Eugene Cairncross