



DEPARTMENT OF ENVIRONMENTAL AFFAIRS AND TOURISM

Environmental Quality and Protection

Chief Directorate: Air Quality Management & Climate Change

**AQA IMPLEMENTATION: LISTED ACTIVITIES AND MINIMUM
EMISSION STANDARDS**

OUTPUT B.2

Review of

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REPORT AUTHORS

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EXECUTIVE SUMMARY

S.21 of the National Environmental management – Air Quality Act requires the Minister or MEC to identify these industries for regulatory control by publishing a list of activities which the Minister or MEC reasonably believe result in atmospheric emissions that have or may have a significant detrimental effect on the environment, including health, social conditions, economic conditions, ecological conditions or cultural heritage. Once identified, these activities are known as “listed activities”. S 21 also requires the setting of minimum emission standards for specified pollutants emitted by the identified industries and the manner in which the emission must be measured.

The scope of this output is to review “**Error! Reference source not found.**” regarding the criteria for selection of processes to be included as listed activities. Since publication of the transition project, significant developments have occurred in SA legislation and a review of international practices regarding emission standard setting has been carried out.

Conclusions and recommendations.

- Based on the results of the transition project and the review of international legislation in this regard, three lists of categories have been proposed in this report: Those categories or sectors which are proposed for immediate inclusion, those that are proposed for future consideration, and those that may result in atmospheric impact but could be controlled under alternative legislation administered by DEAT. It is proposed that only categories in the first list (table 8-2) be included in the initial draft regulation.
- During the drafting of the regulation, further consideration should be given to activities in each category which are presently not being practiced in South Africa and could therefore be relegated to the category for future consideration.
- Application of minimum emission standards to installations that do not have a material impact should be avoided by specifying the minimum activity levels at which the standards in each category become applicable. This could be done during the standard development process.

1. INTRODUCTION

One of the tools for controlling industrial emissions to the atmosphere is the traditional permit or license which identifies activities that may only operate if they are correctly permitted to do so by the regulatory authority, and only if the conditions set in the permit or license are met. This form of regulation was the basis for regulatory control of industrial emissions in terms of the Atmospheric Pollution Prevention Act (Act No. 45 of 1965) (hereinafter “the APPA”) and has been, repeated, with some significant modifications, in the National Environmental Management: Air Quality Act (Act No. 39 of 2004) (hereinafter “the AQA”) as described below.

2. THE IDENTIFICATION OF INDUSTRIES TO BE REGULATED

The objective of the AQA is to provide ambient air quality not detrimental to the wellbeing of South African citizens or environment. Only industries that materially impact on ambient air quality need therefore be regulated.

To this end, S.21 of the Act requires the Minister or MEC to identify these industries for regulatory control by publishing a list of activities which the Minister or MEC reasonably believe result in atmospheric emissions that have or may have a significant detrimental effect on the environment, including health, social conditions, economic conditions, ecological conditions or cultural heritage. Once identified, these activities are known as “listed activities” .S 21 also requires the setting of minimum emission standards for specified pollutants emitted by the identified industries and the manner in which the emission must be measured.

Error! Reference source not found. had as its objective, *inter alia*, to review the existing APPA list of scheduled processes and to compile an updated documented schedule of listed activities;

3. SCOPE OF STUDY

The scope of this output is to review the criteria by which the interim project selected the processes to be included as listed activities in view of developments in SA legislation and against the background of Output B1: Review of international practices in selection of and setting standards for processes to be regulated.

4. CRITERIA PROPOSED IN THE INTERIM PROJECT

The consultants for the Interim project proposed the following criteria for inclusion of industrial processes as listed activities (Hietkamp and Nkhwashu 2005):

”

The process should be active in South Africa and applies to large scale operating plants.

The activity is not listed under the proposed NEMA Chapter 4 (22): Category I identified activities that require screening

The activity is listed under the proposed NEMA Chapter 4 (23): Category II identified activities that require environmental impact assessments. However this does not mean that all activities under category II are proposed to be included in the APPA guidelines, but only those activities that “are likely to have significant detrimental effect on the environment,

including health, social conditions, economic conditions, ecological conditions or cultural heritage”

The emissions of the individual activity “are likely to have significant detrimental effect on the environment, including health, social conditions, economic conditions, ecological conditions or cultural heritage”. This implies that the combination of the toxicity of the pollutants with the released quantity may cause the quoted effects.

There must be a method to measure the emissions of the activity.

The USA Emission Measurement Centre (EMC) of the Environmental Protection Agency (EPA) has developed methods of measuring air pollutants emitted from the entire spectrum of industrial processes causing air pollution, which are widely used also in South Africa.

It is proposed that measurement methods developed by the EMC and accredited in South Africa should be followed or used as a guideline to measure specific pollutants in the stack for the activities, which are listed in the APPA schedule. The details of the measurements will be specified in the permit for the activity e.g. continuous measurement, measurements at certain intervals or measurements by an accredited third company. For activities where there are no stack emissions e.g. the disposal of general and hazardous waste emission factors according to AP-42 are proposed to be used.”

5. COMMENTS ON THE CRITERIA

- NEMA Chapter 4 (23) Category II refers *inter alia* to activities which require a permit or licence in terms of other environmental legislation. This criterion is thus self-referring and can not as such be used.
- The last criterion limits the listing of activities to point sources (i.e. those for which the EMC or a similar standardisation body has proposed measurement standards). The question of limits for those activities that meet the legal criterion of “atmospheric emissions which have or are likely to have a significant detrimental effect on the environment, including health, social conditions, economic conditions, ecological conditions or cultural heritage”(Act 39/2004, s21) but are not directly measurable i. e. fugitive emissions could be addressed by the setting of control measures which have been scientifically shown to result in a certain level of emission reduction and which would be measurable, albeit in terms of input rather than output. This question was put to the “affected industries group” during sector discussions and the view of the industries on this specific point is included in the review of the industry comments issued as a separate report.
- AP42 is a US EPA document giving emission factors for industrial activities (i.e. a link between the rate of activity and the emissions from the activity) Using AP42 to define an emission limit is therefore tantamount to using the rate of activity itself – again a circular argument.

6. ACTIVITIES PROPOSED BY PREVIOUS CONSULTANTS

Based on the above criteria, the previous consultants have proposed that all the listed activities should be grouped under specific industrial categories with the following advantages

- Enables a systematic approach for identifying and comparing air pollution releases from related activities.
- Brings SA into line with international practice (i.e. American and European methods).
- Enables an integrated pollution control approach (focussing on the expected pollutants from the specific industrial category) and provides an opportunity for cleaner production and waste minimization guidelines to be included (in line with trading partner approaches to management of technologies and industrial ecology).

On this basis, the following proposed list was included in the interim project:

Table 6-1: Proposed list under the interim project.

Ref.	Proposed Listed Activity	Description	Size	Reference to APPA Scheduled Process
1.	Combustion Installations	The generation of electricity	where electricity output is >20 Megawatts	29 and 56
2.	Petroleum industry	The bulk storage of crude petroleum and liquid petroleum products	Storage facilities with individual capacity >1 000 cubic metres each. NB: All petroleum processes will be listed because they are large scale processes and no small scale processes exist.	14 and 25
3.	Carbonisation and coal gasification	Activities involving Coke and Gas processes		34, 33, 16 and 3
4.	Metallurgical industry	Activities involving: Gold Refining; PGM Refining; Aluminium processes; Cadmium processes; Chrome processes; Copper processes; Iron and Steel processes; Lead processes; Mercury processes; Manganese processes; Metal recovery processes; Metal spray processes; Metallurgical slag processes; Roasting processes; Zinc processes; Vanadium processes; Galvanising processes; Silicon processes; Magnesium processes; Arsenic processes; Antimony processes; Beryllium processes; Nickel processes		11, 17, 23, 27, 30, 31, 32, 40, 50, 51, 52, 53, 54, 55, 57, 60, 61, 62, 63, 66 and 71
5.	Mineral processing industry	The storage and handling of ore or coal and not situated on the premises of a mine or works as defined in the Mines and Works Act, 1956.	Dumps designed to hold 100 000 tons or more	22, 65, 35, 10, 36, 28 and 59
6.	Organic chemical industry	All of the following processes: pyridine; anhydride; benzene; acetylene; aldehyde; amine; acrylonitrile; plastics production; monomer production; and vinyl chloride monomer processes	Independent of scale	19, 49, 18, 45, 48, 46, 70 and 72

Ref.	Proposed Listed Activity	Description	Size	Reference to APPA Scheduled Process
7.	Inorganic chemical industry	All of the following processes: ammonium sulphate and Ammonium chloride; carbon disulphide; caustic soda; bromine; calcium carbide; fluorine; phosphate fertilizer; chlorine; hydrochloric acid; hydrogen cyanide; sulphuric acid; sulphide; sulphocyanide; nitric acid; phosphorus; alkali; ammonia; macadam preparation; sulphite reduction; bisulphite; and selenium processes	Independent of scale	5, 12, 38, 20, 47, 24, 2, 6, 7, 44, 1, 8, 13, 4, 42, 26, 43, 58, 37, 15 and 41
8.	Explosives Industry	The manufacturing of explosives including ammunition	Independent of scale	
9.	Pharmaceuticals production			
10.	Incineration processes including hazardous waste	The use, recycling, handling, treatment, storage or final disposal of hazardous wastes (NEMA chapter 4 (23))		39
11.	The disposal of hazardous and general waste		All hazardous waste and the final disposal of general waste covering an area in excess of 100 m ² or 200 m ³ of airspace (NEMA chapter 4 (23))	
12.	Wood products industry	All of the following processes: pulp and paper; alkali waste; and wood burning and wood drying processes		68, 9 and 67
13.	Production and formulation of pesticides		Independent of scale	
14.	Animal matter processing	Processes for the rendering cooking, drying, dehydrating, digesting, evaporation or protein concentrating of any animal matter not intended for human consumption (The description needs to be extended to cover large slaughter houses and large tanning plants)		69

7. COMMENTS ON PROPOSED LIST

The following shortcomings have been identified in this proposed list:

- The category descriptions in some cases are ambiguous, as is clear from the difference between some category descriptions and the scheduled processes listed in that category:
 - a. Under the first category, it is probably the combustion of fuels (whether for electricity generation or for another reason) above a certain scale that is intended, and it should therefore be referred to as such. The definition here, as in a number of other

categories, should probably have a lower capacity limit in line with the intent if S21 of AQA, which is to control large industrial sources.

- b. Storage only, and not the actual production of refined products, is included in the description of proposed activity 2. It is obvious, from the mention of APPA Schedule 2 process 14, that the actual production is also intended. Downstream petrochemical processing should also be captured here or under the organic chemical sector.
- c. Similarly, the description of activity 5 should be expanded to include the obviously intended processes of cement production, the burning of lime and dolomite, asbestos mining and processing, glass manufacture and ceramics/refractory production. Also, brick manufacture (APPA schedule 2 no xxx) should be included here.
- d. Under activity 3, the production of char should be included. Also, it should be made clear which downstream processes of the carbonisation and gasification processes are to be included.
- e. Explosives can be included under inorganics, as the process is often downstream of nitric acid production.

8. INTEGRATING THE PROPOSED LIST WITH INTERNATIONAL PRACTICE

Review of international practice on listing (Scorgie and Kornelius 2007) has produced the list in table 8-1 for activities which are regulated in international good practice, with minimum capacities for the activities to be listed.

Table 8-1: Collation of proposed RSA categories with international categories

RSA – Proposed Listed Activity Categories	Synopsis of Internationally Prioritised Industry Sectors (based on UK PPC, US NSPS, NSW, India)
1. Combustion installations	<ul style="list-style-type: none"> • Coal, gas, biomass and liquid fuel combustion installations (>50 MW – UK; >30MW – NSW; >73MW - US) • Waste or recovered oil combustion (>3 MW - UK)
2. Petroleum industry	<ul style="list-style-type: none"> • Petrochemical production and petroleum refining (including bulk storage and handling of petroleum liquids and petroleum refinery wastewater systems) (UK – no thresholds; NSW – 2000tpa petrochemicals) • Natural gas reforming • Mineral oil refining
3. Carbonisation and coal gasification	<ul style="list-style-type: none"> • Coal gasification • Gas refining (>1000tpa gas - UK) • Activities involving pyrolysis, carbonisation, distillation, liquefaction, partial oxidation or other heat treatment of coal, lignite, oil, other carbonaceous materials or mixtures • Tar and bitumen production (>5tpd tar, bitumen or aggregate - UK)
4. Metallurgical industry	<ul style="list-style-type: none"> • Aluminium and aluminium alloys • Iron and steel production • Copper smelters (melting capacity >20 tpd - UK) • Lead smelters (melting capacity >4 tpd - UK) • Zinc smelters (melting capacity >20 tpd - UK) • Precious metals production • Refractory metal production • Nickel processes • Cadmium processes (melting capacity >4 tpd - UK) • Ferroalloy production (silicon, chromium, manganese) • Ferrous metals (hot rolling) (>20 tph crude steel - UK) • Bulk handling or storage of iron ore (except during mining)(>500 000t - UK) • Lead-acid battery manufacturing (>6.5 tpd lead – US) • Secondary Brass and Bronze Production Plants (Reverberatory and electric furnaces of >1,000 kg production capacity and blast (cupola) furnaces of >250 kg/h production capacity – US)

RSA – Proposed Listed Activity Categories	Synopsis of Internationally Prioritised Industry Sectors (based on UK PPC, US NSPS, NSW, India)
5. Mineral processing industry	<ul style="list-style-type: none"> • Cement and lime production and/or bulk handling (kilns >50tpd; 5000tpa calcium carbonate, calcium magnesium carbonate or aggregate of both - UK) • Asbestos activities • Glass and glass fibre manufacturing (>100tpa production – UK; >5tpd - US) • Ceramic production (tiles, bricks, refractory bricks, stoneware, porcelain production by firing) (kiln >75 tpd - UK)(NSW threshold is 150tpd or 30000tpa) • Coal processing/preparation plants (500tpd coal – NSW; >200tpd - US) • Metallic mineral processing plants (crushing, screening, handling) • Non-metallic mineral processing plants (crushing, screening, handling) • Phosphate rock plants (>4tph plant capacity – US) • Other mineral activities (melting capacity >20 tpd - UK)
6. Organic chemical industry	<ul style="list-style-type: none"> • Organic chemical production including: <ul style="list-style-type: none"> ○ hydrocarbons, ○ organic compounds containing oxygen, sulphur, nitrogen or phosphorus, organometallic compounds (e.g. lead alkyls) ○ plastic materials (polymers, synthetic fibres, cellulose-based fibres) ○ synthetic rubbers ○ dyes and pigments ○ surface-active agents • Polymerising or co-polymerising any unsaturated hydrocarbon or vinyl chloride (>50tpd in aggregate - UK) • Use of toluene di-isocyanate or other di-isocyanate of comparable volatility or where partly polymerised • Flame bonding of polyurethane foams or polyurethane elastomers • Recovery or purifying of acrylic acid or any ester of acrylic acid • Tyre manufacture (>50 000 tpa - UK) • Storage of chemicals in bulk
7. Inorganic chemical industry	<ul style="list-style-type: none"> • Production of inorganic chemicals such as: <ul style="list-style-type: none"> ○ Gases (e.g. NH₃, HCl, HF, H₂S, SO_x, NO_x) ○ Acids (e.g. chromic acid, hydrofluoric acid, nitric acid, sulphuric acid, oleum) ○ Bases (e.g. ammonium hydroxide, sodium hydroxide) ○ Salts (e.g. ammonium chloride, sodium carbonate) ○ Non-metals, metal oxides, metal carbonyls ○ Halogens or interhalogen compounds ○ Manufacturing Activities Involving • Manufacturing activity involving the use of hydrogen cyanide or hydrogen sulphide • Manufacturing activity involving the use or recovery of: antimony, arsenic, beryllium, gallium, indium, lead, palladium, platinum, selenium, tellurium, thallium • Recovery of any compound of cadmium or mercury • Chemical fertilizer production (20000tpa - NSW) • Bulk storage of chemicals <p>Key activities in this sector are nitric acid plants, sulphuric acid plants, agricultural fertilizer production and ammonium sulphate & ammonium nitrate production</p>
8. Explosives Industry	<ul style="list-style-type: none"> • Explosives production
9. Pharmaceuticals production	<ul style="list-style-type: none"> • Pharmaceutical production using a chemical or biological process
10. Incineration processes including hazardous waste	<ul style="list-style-type: none"> • Commercial and industrial waste incineration • Hospital/Medical/Infectious waste incineration • Municipal waste incineration
11. The disposal of hazardous and general waste	<ul style="list-style-type: none"> • Hazardous waste disposal facilities • General waste disposal facilities (>10tpd or >25000t total capacity - UK) • Disposal of Waste other than by incineration or landfill (>10tpd for hazardous waste and waste oils; >50tpd for non-hazardous waste – UK)
12. Wood products industry	<ul style="list-style-type: none"> • Paper, pulp and board manufacturing activities (>20tpd – UK; >30 000tpa - NSW) • Timber processing plants
13. Production and formulation of pesticides	<ul style="list-style-type: none"> • Pesticides, fungicides, herbicides, rodenticides, fumigants, miticides and related product production (NSW – 2000tpa products)
14. Animal matter processing	<ul style="list-style-type: none"> • Tanning plants (>12tpd finished products - UK) • Animal slaughter (>50tpd - UK) • Rendering plants - animal carcasses or waste disposing or recycling (>10tpd – UK; >5000tpa - NSW)

Collation of the two lists produces table 8-2 below as the final proposal for the South African list.

Table 8-2: Final proposal for categories to be included in the RSA listed activities.

RSA – Proposed Listed Activity Categories	Activities included
1. Combustion installations	<ul style="list-style-type: none"> • Coal, gas, biomass and liquid fuel combustion installations • Waste or recovered oil combustion
2. Petroleum industry	<ul style="list-style-type: none"> • Petrochemical production and petroleum refining (including bulk storage and handling of petroleum liquids and petroleum refinery wastewater systems) (UK – no thresholds; NSW – 2000tpa petrochemicals) • Natural gas reforming • Mineral oil refining • Refining of liquid fuels produced from coal or biomass gasification
3. Carbonisation and coal gasification	<ul style="list-style-type: none"> • Coal gasification • Refining or treatment of natural gas, producer gas or synthesis gas • Activities involving pyrolysis, carbonisation, distillation, liquefaction, partial oxidation or other heat treatment of coal, lignite, oil, other carbonaceous materials or mixtures • Processing of the by-products of carbonisation and coal gasification, including tar and bitumen production
4. Metallurgical industry	<ul style="list-style-type: none"> • Aluminium and aluminium alloys • Iron and steel production • Copper smelters • Lead smelters • Zinc smelters • Precious metals production and refining • Refractory metal production • Nickel processes • Cadmium processes • Production of silicon, magnesium, arsenic, selenium antimony, beryllium, chromium • Ferroalloy production (silicon, chromium, manganese, vanadium) • Ferrous metals (hot rolling) Lead-acid battery manufacturing • Secondary Brass and Bronze Production Plants
5. Mineral processing industry	<ul style="list-style-type: none"> • Cement and lime production and/or bulk handling • Asbestos activities • Glass and glass fibre manufacturing • Ceramic production (tiles, bricks, refractory material,, stoneware, porcelain production by firing) • Coal processing/preparation plants) • Metallic mineral processing plants (crushing, screening, handling) • Non-metallic mineral processing plants (crushing, screening, handling) • Phosphate rock plants • Storage of coal and ore not on mines
6. Organic chemical industry	<ul style="list-style-type: none"> • Organic chemical production including: <ul style="list-style-type: none"> ○ hydrocarbons, ○ organic compounds containing oxygen, sulphur, nitrogen or phosphorus, organometallic compounds (e.g. lead alkyls) ○ plastic materials (polymers, synthetic fibres, cellulose-based fibres) ○ synthetic rubbers ○ dyes and pigments ○ surface-active agents • Polymerising or co-polymerising any unsaturated hydrocarbon or vinyl chloride (>50tpd in aggregate - UK) • Use of toluene di-isocyanate or other di-isocyanate of comparable volatility or where partly polymerised • Flame bonding of polyurethane foams or polyurethane elastomers • Recovery or purifying of acrylic acid or any ester of acrylic acid • Tyre manufacture (>50 000 tpa - UK) • Storage of chemicals in bulk

RSA – Proposed Listed Activity Categories	Activities included
7. Inorganic chemical industry	<ul style="list-style-type: none"> • Production of inorganic chemicals : <ul style="list-style-type: none"> ○ Gases (e.g. NH₃, HCl, HF, H₂S, SO_x, NO_x) ○ Acids (e.g. chromic acid, hydrofluoric acid, nitric acid, sulphuric acid, oleum) ○ Bases (e.g. ammonium hydroxide, sodium hydroxide) ○ Salts (e.g. ammonium chloride, sodium carbonate) ○ Metal oxides, metal carbonyls ○ Halogens or interhalogen compounds ○ Phosphorus and phosphate salts • Manufacturing activity involving the use of hydrogen cyanide or hydrogen sulphide • Manufacturing activity involving the use or recovery of: antimony, arsenic, beryllium, gallium, indium, lead, palladium, platinum, selenium, tellurium, thallium • Recovery of any compound of cadmium or mercury • Chemical fertilizer production • Calcium carbide production • Production of inorganic pigments • Bulk storage of chemicals • Explosives production
9. Incineration processes including hazardous waste	<ul style="list-style-type: none"> • Commercial and industrial waste incineration • Hospital/Medical/Infectious waste incineration • Municipal waste incineration
10. Wood products industry	<ul style="list-style-type: none"> • Paper, pulp and board manufacturing activities
11. Animal matter processing	<ul style="list-style-type: none"> • Tanning plants • Animal slaughter • Rendering plants - animal carcasses or waste disposing or recycling

It is recommended that the categories in table 8-3 below be considered for future inclusion, but not be included in the initial list.

Table 8-3: Categories to be considered for future inclusion

Possible additional categories of listed activities	<ul style="list-style-type: none"> • Industrial and surface coating activities incl metal spraying • Textile manufacture • Printing works (large scale) • Intensive farming – rearing poultry (40 000 places - UK), pigs (2000 places – UK & NSW), cattle (1000 head –NSW), sheep (4000 head – NSW), horses (400 – NSW) • Recovery of waste including fuel production from waste • Food Industries – treating and processing animal raw materials (other than milk)(>75tpd - UK) or vegetable raw materials (>300tpd - UK) or milk (>200 tpd - UK) • Sewage Treatment Plants • Pharmaceutical and biocide production and formulation • Food industries
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The categories in table 8-4 below may result in air pollution and/or odour nuisance, but are at this stage controlled under other legislation administered by DEAT under which such pollution or nuisance could be addressed. The addition of such activities may therefore result in additional administrative burden to the operator, while inclusion would not by itself result in reduced impact.

Table 8-4: Categories controlled under other DEAT-administered legislation.

Categories presently controlled by other DEAT-administered legislation	<ul style="list-style-type: none"> • Industrial and domestic sewage treatment plants • Intensive farming – rearing poultry , cattle, sheep,, horses • Recovery of waste including fuel production from waste • Hazardous waste disposal facilities • General waste disposal facilities • Disposal of Waste other than by incineration or landfill
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9. CONCLUSIONS AND RECOMMENDATIONS

- Based on the results of the transition project and the review of international legislation in this regard, three lists of categories have been proposed in this report: Those categories or sectors which are proposed for immediate inclusion, those that are proposed for future consideration, and those that may result in atmospheric impact but could be controlled under alternative legislation administered by DEAT. It is proposed that only categories in the first list (table 8-2) be included in the initial draft regulation.
- During the drafting of the regulation, further consideration should be given to activities in each category which are presently not being practiced in South Africa and could therefore be relegated to the category for future consideration.
- Application of minimum emission standards to installations that do not have a material impact should be avoided by specifying the minimum activity levels at which the standards in each category become applicable. This could be done during the standard development process.

10. REFERENCES

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