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Review of Odour Legislation

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Odours are often the most significant contributor to air pollution complaints. Many countries have incorporated odour emissions into their environmental legislation during the past few decades and as a result continue to upgrade this legislation. There are many sources of odour emissions including industrial, municipal and agricultural sectors.

Odours have always been discharged from all types of agricultural operations but this sector is becoming increasingly important because of the growing number of concentrated animal feeding operations and, in many countries, the advancement of housing developments into rural areas. Hence, there appears to be a need for continued development of odour legislation for this sector and, because of national priorities to protect agriculture and the nature of these operations, this legislation may be quite different from other sectors.

Legislation covering most types of air pollutants, such as dust, metals, acid gases, volatile organic compounds and semi-volatile organic compounds tend to be fairly consistent in those jurisdictions which have such legislation. Odour legislation, however, tends to be much more varied and ranges from no specific mention in environmental legislation to extensive details which include odour source testing, odour dispersion modeling, ambient odour monitoring, setback distances, process operations and odour control procedures.

This paper covers the three approaches to legislate environmental odours including a qualitative approach in which odour is regarded and assessed as a nuisance, quantitative in which odour standards are provided for assessing odour data obtained form ambient air measurements or odour concentrations predicted from a combination of source odour testing and atmospheric dispersion modeling and operational requirements which may include setback distances, specific operating procedures and specific odour control equipment.

This paper summarizes the legislations in Canada, United States, Australia, New Zealand, Europe and Asia.

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Introduction

How is an odour regulated? It is difficult to answer this question in detail, due to the fact that each country, and each state or province in that country, has its own regulation. It would be very difficult to go through in detail, each state in the United States or province in Canada, or each European country; not to mention each Australian state or Asian country.

In general, there are different categories of legislation which manage odour issues and they are: Environmental Acts and Regulations, Natural Resource Acts and Regulations, Health Acts and Regulations, Odour Acts and Regulations, Nuisance Acts and Regulations, Right to Farm Acts and Regulations, Agricultural Operations Acts and Regulations, Confined Animal Feeding Operations Act and Regulations, and Ambient Air Odourous Compound Acts and Regulations.

In various jurisdictions there is mostly no clear distinction between the categories. For example, a nuisance regulation may be included under a Health Act and a Right to Farm Regulation may be included under an Environmental Act.

Definition Of Odour In The Legislation And Their Effects

How an odour is defined in the Legislation?

Odour in the legislation is defined in a number of different ways such as: type of substance, pollutant, contaminant or nuisance or as odorous substance, odorous contaminant. An odour may be defined by its effects such as a contaminant that causes an adverse effect or a character as malodorous odour or objectionable' odour.

It is important to recognize that odour is defined in these different ways since this will have a significant effect on how odour legislation is prosecuted. For example, in Ontario, Canada legislation defines only "odour" however does not differentiate between pleasant and unpleasant odour or the effects of odour, whereas other jurisdictions (e.g. Alabama) defines odour as "unpleasant odor" when can produce irritation of the upper respiratory tract, or cause symptoms or nausea.

For some of these jurisdictions, the detection of odour in the ambient air is sufficient for an offence to have occurred whereas in other jurisdictions it is necessary to demonstrate that there is an adverse effect from the odour for an offense to have occurred. Most of the acts and regulations provide a list of potential conditions which can be used to demonstrate that an adverse effect has occurred. Adverse effects include human health and welfare, animal and plant life, interference with business, loss of enjoyment of property, discomfort to persons and property damage. The type of law based on the "nuisance" or "quality of life" grounds is the most common and the oldest way to manage odour.

Exceeding an odour standard, or a standard for an odorous compound or another standard, may be sufficient to demonstrate an adverse effect in some jurisdictions. Most of the states (precisely 42) in the United States regulate the odour based on the "nuisance" factor. When odour is included under nuisance legislation, the following

terms are used to describe the symptoms of a nuisance: annoyance, damage, discomfort, disturbance or inconvenience. In some jurisdictions there are complaint criteria's for launching an investigation about the odour and their nuisance.

Many jurisdictions in North America and other countries have quantitative ambient concentration criteria for the individual chemicals which are odorous. For example, in Canada several provinces have such standards for hydrogen sulphide, ammonia, and other compounds.

Measurements Of Odours

In order to demonstrate that the offence has occurred and to support any complaints, in some jurisdictions odour testing is required.

Different types of odour testing include; odour testing at an emission source with the atmospheric dispersion modeling to predict downwind odour concentrations at the receptors, odour intensity measurements at a receptor using a scentometer or equivalent device, or just simple observations on the presence of an odour at a receptor using an authorized inspector or inspectors. The measurements or observations carried out at a receptor may include any receptor or a specific, sensitive receptor such as hospital, school, house or park.

Examples Of Legislation

Canada

Canadian federal legislation does not contain any regulations pertaining to the emissions of odours from industrial of agricultural facilities. Instead, the individual provinces and territories have a responsibility for odour emissions.

Acts (or statutes) approved by the legislature provide the legal framework for addressing odour emissions whereas the provinces or territories are responsible for the odour regulations or which are used to administer the acts.

In Ontario, under the Environmental Protection Act odour is a contaminant however it does not apply to animal wastes disposed of in accordance with both normal farming practices and the regulations made under the Nutrient Management Act, 2002. Odour is a contaminant to the degree as it may cause discomfort, loss of enjoyment of normal use of the property, or interfere with normal conduct of business. Another section of the Act prescribes maximum point of impingement concentrations for a variety of compounds. A number of these are based on on the odour potential of these compounds. Dispersion models are included in the regulation for calculating maximum point of impingement concentrations from emission rate data. Odour issues are routinely address is Certificates of Approval (Permits). Requirements for odour emission tests are often included as conditions for industrial sources, which are judged by the Ontario Ministry of the Environment to have a potential for odour impact. Emission test results are used with regulatory dispersion models to estimate maximum point of impingement odour levels. There is a guideline of 1 ou odour concentration based on the prediction of the

model, when 10 minute averaging time is used. The Ontario Municipal Act 2001 allows municipalities to control odours within their jurisdiction.

The following below table shows the summary of odour standards in Canada.

Manitoba	2 ou measured at residential receptors, 7 ou at industrial receptors
Ontario	1 ou predicted at any receptor or a sensitive receptor
Alberta, NB, NL, Northwest Territories, PEI	No standards. Odour is a prohibited contaminant.
NB, NL	for H_2S, 15 $\mu g/m^3$ (1-hr average) or 5 $\mu g/m^3$ (24-hrs)
NL	for ammonia, 100 $\mu g/m^3$ (1-hr average)
British Columbia, Nova Scotia, Saskatchewan	No standards. Odour may be a contaminant.

United States

The United States Code of Federal Regulations does not contain any regulations pertaining to the emissions of odours from industrial or agricultural facilities. Instead, the individual states generally have a responsibility for odor emissions although for some states this responsibility lies with regions, such as counties, or with municipalities.

For the states themselves, acts (or statutes) approved by the legislature provide the legal framework for addressing odour emissions whereas the state departments such as the Department of the Environment, Department of Agriculture or Department of Natural Resources are responsible for the odour regulations (or rules) which are used to administer these acts.

Essentially all the states have differences and some states apparently have no odour acts or regulations at all although odour may be addressed under nuisance legislation.

There are some examples of how odour is regulated in some of the states.

California (Bay Area)	10 or more persons complain in a 90 day period or less
Colorado	8 D/T measured at residential/commercial receptors, 16 D/T for other areas
Connecticut	8 D/T measured at any receptor
Illinois	9 D/T at residential/recreational, etc. receptors, 25 D/T for

	industrial, 17 D/T for other
Vermont	No odour detectable at any receptor
Wisconsin	66% of persons claim the odour is objectionable

D/T- Detection to Threshold

Australia
In Australia the states have the responsibility for setting air quality policies for odour. The different states have traditionally taken very individual approaches. A main development supporting the shift from traditionally qualitative odour regulations to quantitative regulations is the development of an Australian standard for odour measurement.

Below there are examples of odour standards in Japan, South Korea, Australia and New Zealand and some of the European countries.

Japan	odour standards for 22 specific odorous compounds
South Korea	odour standards for 8 specific odorous compounds, 1000 ou for industrial areas and 500 ou for other areas stack concentrations, 20 ou for industrial areas and 10 ou for other areas at facility boundaries
New South Wales	2 ou in urban areas to 7 ou in rural areas based on stack tests and modeling
Queensland	0.5 ou for tall stacks and 2.5 ou for short stacks based on stack tests and modeling
South Australia	2 ou in urban areas to 10 ou in rural areas based on stack tests and modeling
New Zealand	7 ou for poultry farms, 3 min average; 1 ou (high instability) to 10 ou (low stability) based on atmospheric stability class
Europe	
Austria	1 ou at 8% detection, 3 ou at 3% detection for general odour emissions minimum distance setbacks for various types of farm animals
Belgium	reduce the number of people mildly annoyed by odours to 12% of the population, standards based on type of facility, distance to receptors and population density
Denmark	17 ou at a sensitive receptor for a pig farm; 1 ou in an urban area
Germany	minimum distance setbacks for various types of farm animals; 350 m minimum distance from a slaughterhouse to a residence; 500 m

	minimum distance from an open compost facility to a residence
Netherlands	minimum distance setbacks for various types of farm animals reduce the number of people mildly annoyed by odours to 12% of the population, eliminate severe odour nuisances (8 ou to 10 ou) by 2010
Switzerland	minimum distance setbacks for various types of farm animals, survey of annoyance to odour levels but no numeric standards
United Kingdom	survey of complaints

Conclusions

Odour legislation as acts or regulations is present in North American, Asian, Australasian and European jurisdictions. Odour may be defined as a specific air contaminant or it may be implicated as an air contaminant based on its adverse effect or its relation to other air contaminants.

Odour offenses are based on the detection of odour in an affected area or on odour detection combined with a demonstrated adverse effect. Adverse effects include human health and welfare, animal and plant life, interference with business, loss of enjoyment of property, discomfort to persons and property damage. Air quality standards are available for odour and odorous compounds (such as ammonia and hydrogen sulphide). Agricultural operations are exempt from odour legislation and are allowed to create an odour nuisance provided they follow normal farm practices.

Not all of the above items apply to all jurisdictions and some jurisdictions may include only a few of these items in their legislation.

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