RWDI

CONSULTING ENGINEERS & SCIENTISTS

Future Odour Enforcement and Role of Regulation in Alberta

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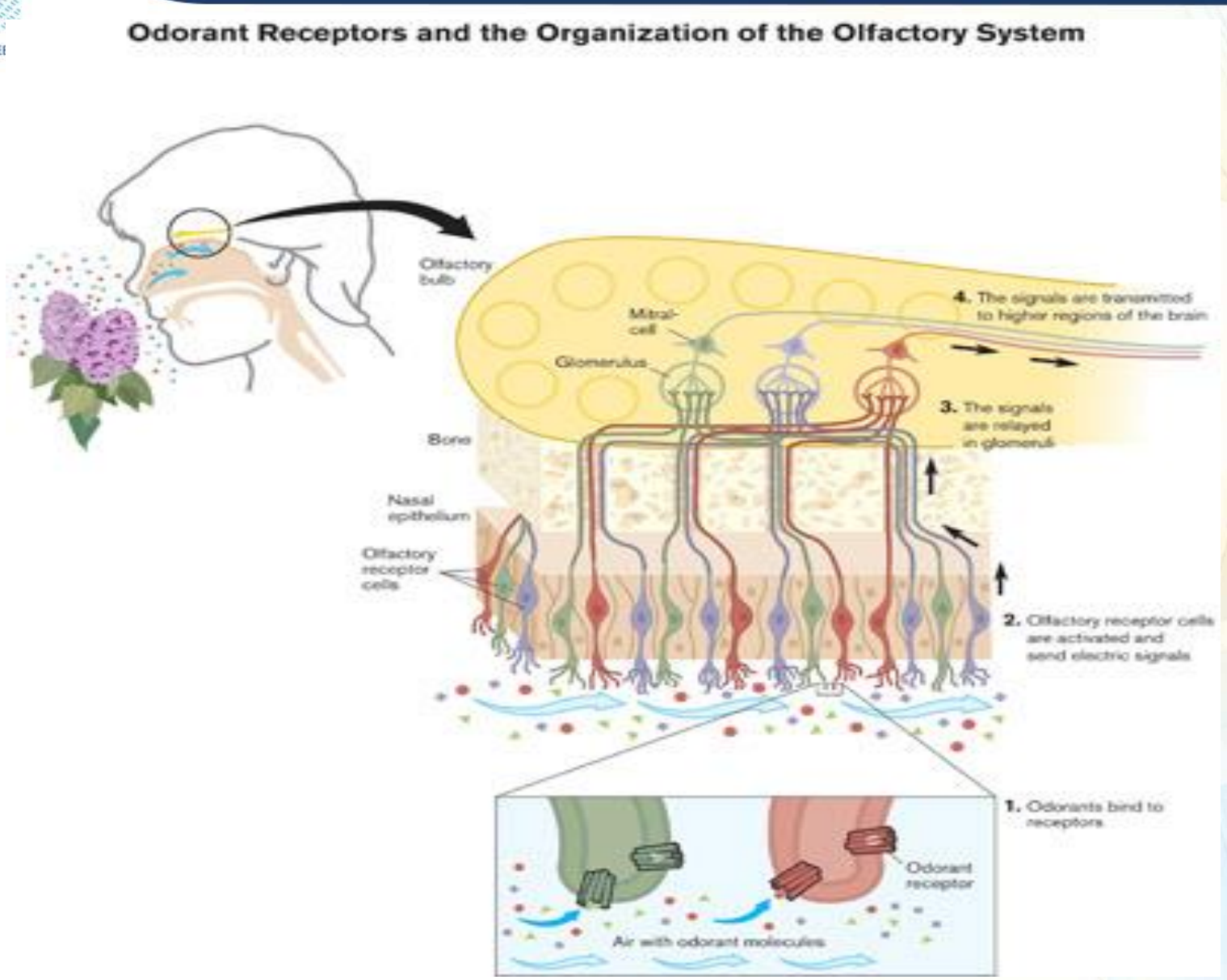
Overview of CASA/Study Objectives

- Mission: Clean Air Strategic Alliance (CASA) is a multi-stakeholder partnership with representatives selected from industry, government and non-governmental organizations to provide strategies to assess and improve air quality for Albertans, using a collaborative consensus process. http://casahome.org/
- Odour Management Team was formed in 2013 to evaluate seven areas (ongoing): managing complaints, odour assessment, health linkages, prevention/mitigation, **enforcement/role of regulation,** education/communication/awareness, and continuous improvement.
- RWDI Study Objectives: To analyze the effectiveness and completeness of existing regulations, including the roles and responsibilities of federal, provincial, and municipal governments, which address odour in Alberta.
  - Conduct a review of the effectiveness of existing regulations that address odour;
  - Identify successes, challenges, and learnings of existing regulations that address odour; and,
  - Consider ways to address existing gaps, including examples from other jurisdictions.

Quantifying odours

- Issues surrounding odour are very complex, because it is the sensation that can be caused by a single odorant or by a complex mixture of odorants, which is very subjective, and therefore, difficult to measure.
- Various measurement techniques exist, (e.g., gas chromatography or open-path Fourier transform infrared spectroscopy); however, such instruments measure only the concentrations of different chemicals or odorants. Concentrations are then compared to odour threshold values which were developed using human odour panels. The best instrument for measuring odour is still the human nose.
- Some individuals have far more sensitive noses, and therefore, will detect an odorant at much lower concentrations than others.
- One person may find an odour to be objectionable (e.g., roasting coffee or malt from a brewery) while another may not.

How we smell

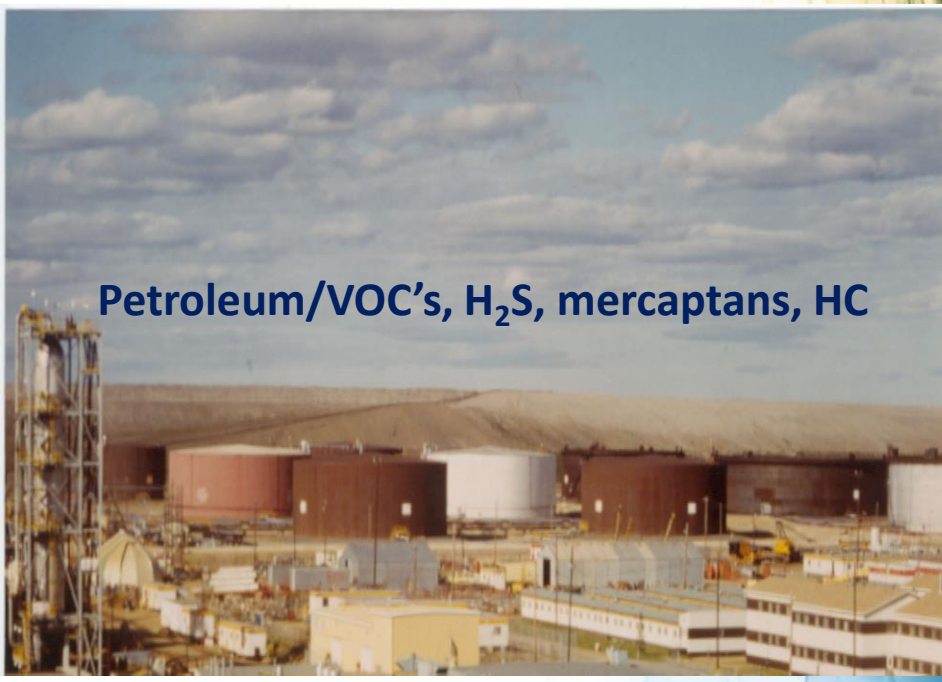


Source: http://www.nobelprize.org/nobel_prizes/medicine/laureates/2004/press.html

Examples of AB Odour Sources (Descriptor/chemical)

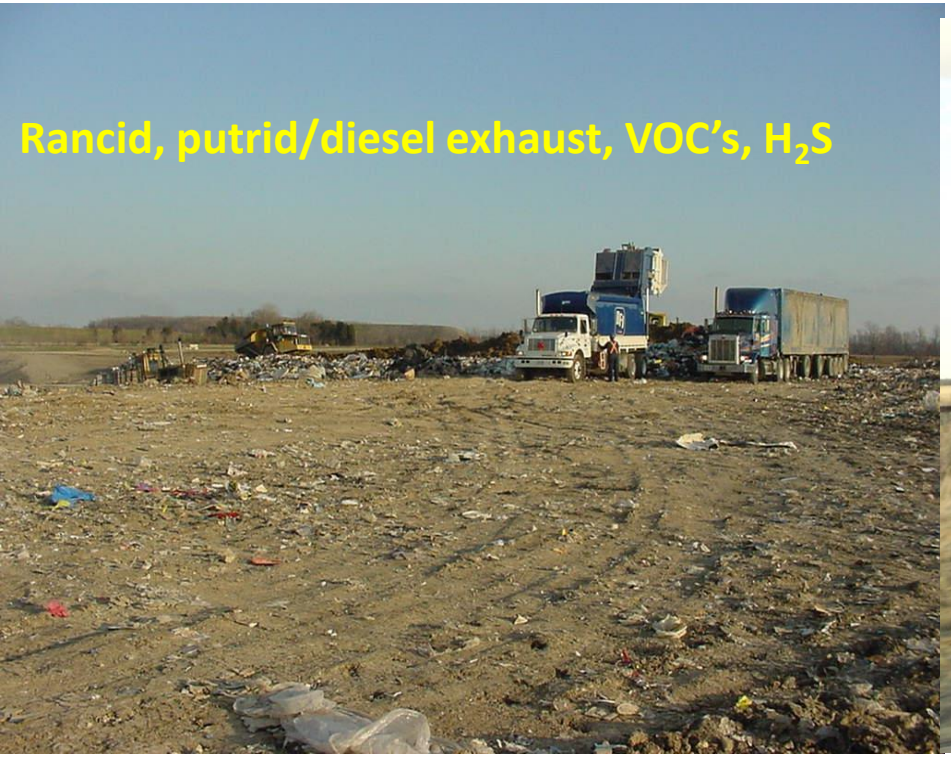
Pulp and Paper

Oil and Gas Operations



Examples of AB Odour Sources (Descriptor/chemical)

Municipal Solid Waste



Transportation

Examples of AB Odour Sources (Descriptor/chemical)

Chemical Industry

Agricultural Operations

Examples of AB Odour Sources (Descriptor/chemical)

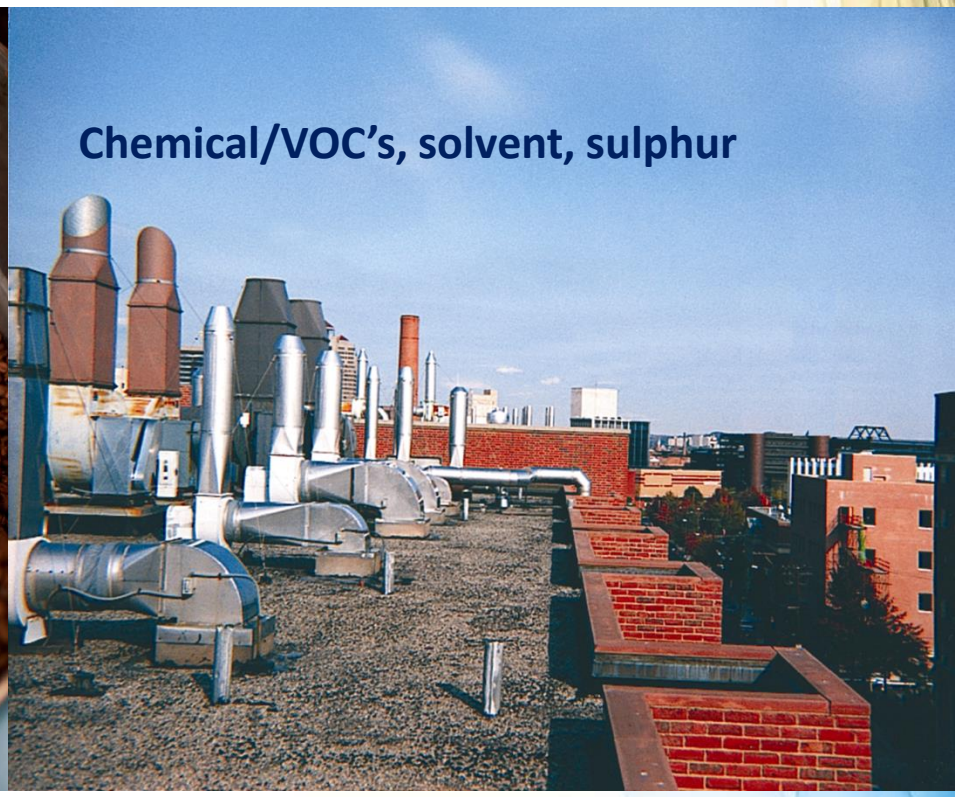
Composting

Municipal Waste Water Treatment

Examples of AB Odour Sources (Descriptor/chemical)

Food Production

Laboratories (fume hoods)



Odour Characterization – FIDOL factors

Nuisance odour characteristics are commonly referred to as FIDOL:

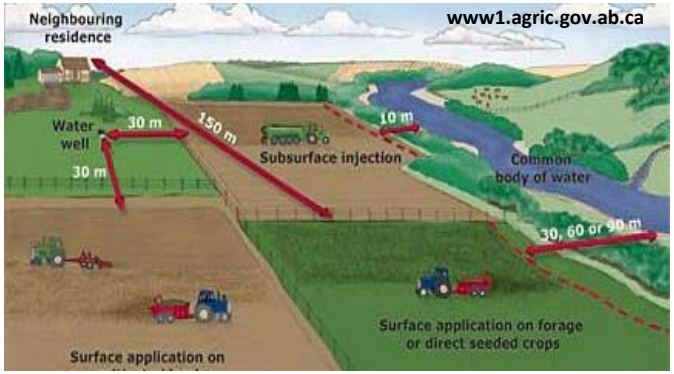
- **F**requency – number of occurrences that odour is detected.
- **I**ntensity – concentration or strength. Non-linear relationship between intensity and concentration.
- **D**uration – period of time that odour is detectable.
- **O**ffensiveness – or hedonic tone or nature. Pleasant or unpleasant. Non-offensive can be acceptable to community despite high frequency, intensity and duration (e.g., food preparation). (This factor is typically removed from FIDOL as it is hard to quantify.)
- **L**ocation – where does it occur? Residence or rural land. Park or roadway. Public space or land zoned as industrial.

Odour Management Approaches

- 1 Avoidance of Nuisance Laws
- 2 Complaint Criteria
- 3 Ambient Concentration Crite
- 4 Ambient Concentration Crite
- 5 Minimum Separation Distan
- 6 Odour Intensity Scales
- 7 Quantitative Emission Limit
- 8 Technology Criteria
- 9 Episode Duration-Frequency
- 10 Odour Index

5. Minimum Separation Distances (MDS)

- Sets a minimum separation distances or buffer zones.
- Minimum separation distances can be either fixed or variable.
- Currently used in Alberta as defined in the *Agricultural Operation Practices Act Standards and Administration*.
- MDS for a typical 600 sow farrow-to-finish operation with liquid manure range from 698 m for land zoned for agricultural purposes to 1860 m for land zoned as a rural village.



Existing Odour Framework in Canada

- Few provinces in Canada have specific odour regulations.
- Most rely upon 1-hour ambient objectives which are based on single chemical for regulation.
- Odour usually treated as *substance* or air contaminant that is *discharged* and capable of injuring the health and safety of person or life form, interferes with normal conduct of business, or causes material physical discomfort to person (i.e., *adverse effect*).

Odour Management Practices Currently in Place

	Province in Canada	Alberta
1 Avoidance of Nuisance Laws	ON, MB, NB	Agricultural Operations Practices Act (AOPA), Public Health Act
2 Complaint Criteria	BC, AB	NRCB, City of Edmonton,
3 Ambient Criteria for Chemicals	ON, QC, MB	H_2S, NH_4, CS_2
4 Ambient Criteria for Odour	SK, MB, ON	✗
5 Minimum Separation Distances	ON, AB	AOPA
6 Odour Intensity Scales	ON, AB (in house procedures)	In house procedures for AER / NRCB
7 Quantitative Emission Limit	QC	✗
8 Technology Criteria	QC, NF	Directive 60
9 Episode Duration-Frequency	✗	✗
10 Odour Index	✗	✗

Odour Management Consideration

- Almost all jurisdictions have multiple approaches when considering odour.
- Odour legislation can be considered in three different tiers such as:
  - Proactive and preventative;
  - Ongoing monitoring; or,
  - Reactive.
- Not any one approach will cover all aspects of odour management.

Odour Management Consideration

	Proactive/ Preventative	Ongoing monitoring	Reactive
1 Avoidance of Nuisance Laws			✔
2 Complaint Criteria			✔
3 Ambient Criteria for Chemicals	✔	✔	✔
4 Ambient Criteria for Odour	✔	✔	✔
5 Minimum Separation Distances	✔		
6 Odour Intensity Scales		✔	✔
7 Quantitative Emission Limit		✔	
8 Technology Criteria	✔		
9 Episode Duration-Frequency		✔	✔
10 Odour Index		✔	✔

Odour Management Consideration

- Management types can be broken down into ambient-based or emission-based systems.
- Consider new vs existing facilities.
- Size and type of facility must be thought-out.
  - Method that may be appropriate for one facility may have unreasonable or have unjustifiable financial implications for another facility.
- Quantification of odours can be difficult, and therefore, any method must address this in some manner by providing clear guidance or criteria for how an odour will be quantified.

Comparison of Strengths, Odour Management Methods

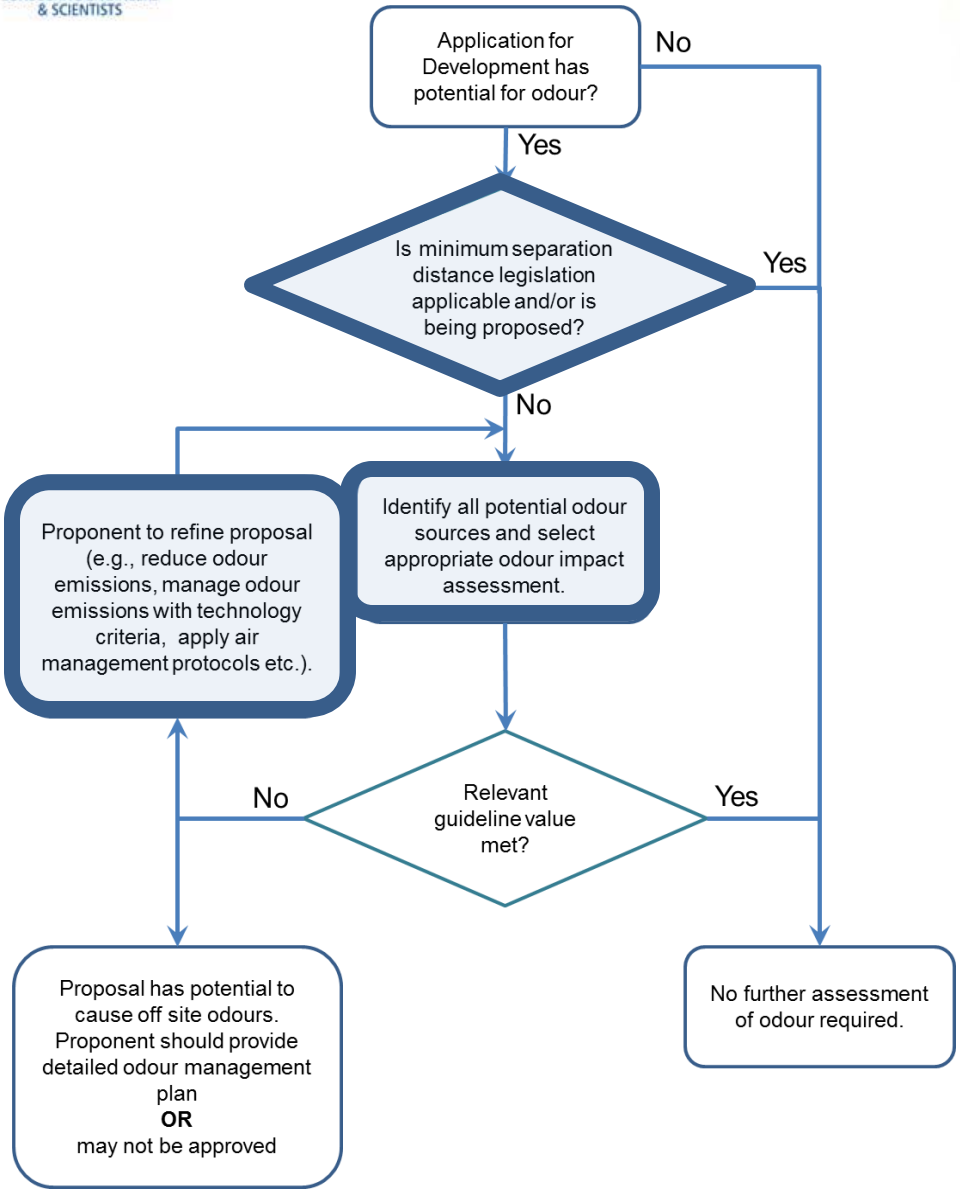
	Low Cost	Pro-active	Quantitative	Detection of Complex Odours	Focusing in Areas of Concern
1 Avoidance of Nuisance Laws	✔			✔	✔
2 Complaint Criteria	✔			✔	✔
3 Ambient Criteria for Chemicals		✔	✔		
4 Ambient Criteria for Odour		✔	✔	✔	
5 Minimum Separation Distances	✔	✔	✔		✔
6 Odour Intensity Scales	✔		✔		
7 Quantitative Emission Limit			✔	✔	
8 Technology Criteria		✔			

Note: Only methods presently in use in Canada are compared.

The Complexity of Odour Management

- Not any one approach will cover all aspects of odour management.
- Quantification of odours can be difficult, and therefore, any method must address this in some manner by providing clear guidance or criteria for how an odour will be quantified.
- Some jurisdictions use a flowchart or decision tree when determining which management approaches should be approached for both new facilities as well as ongoing odour management for existing facilities.

Example Decision Tree for New Facilities & Developments



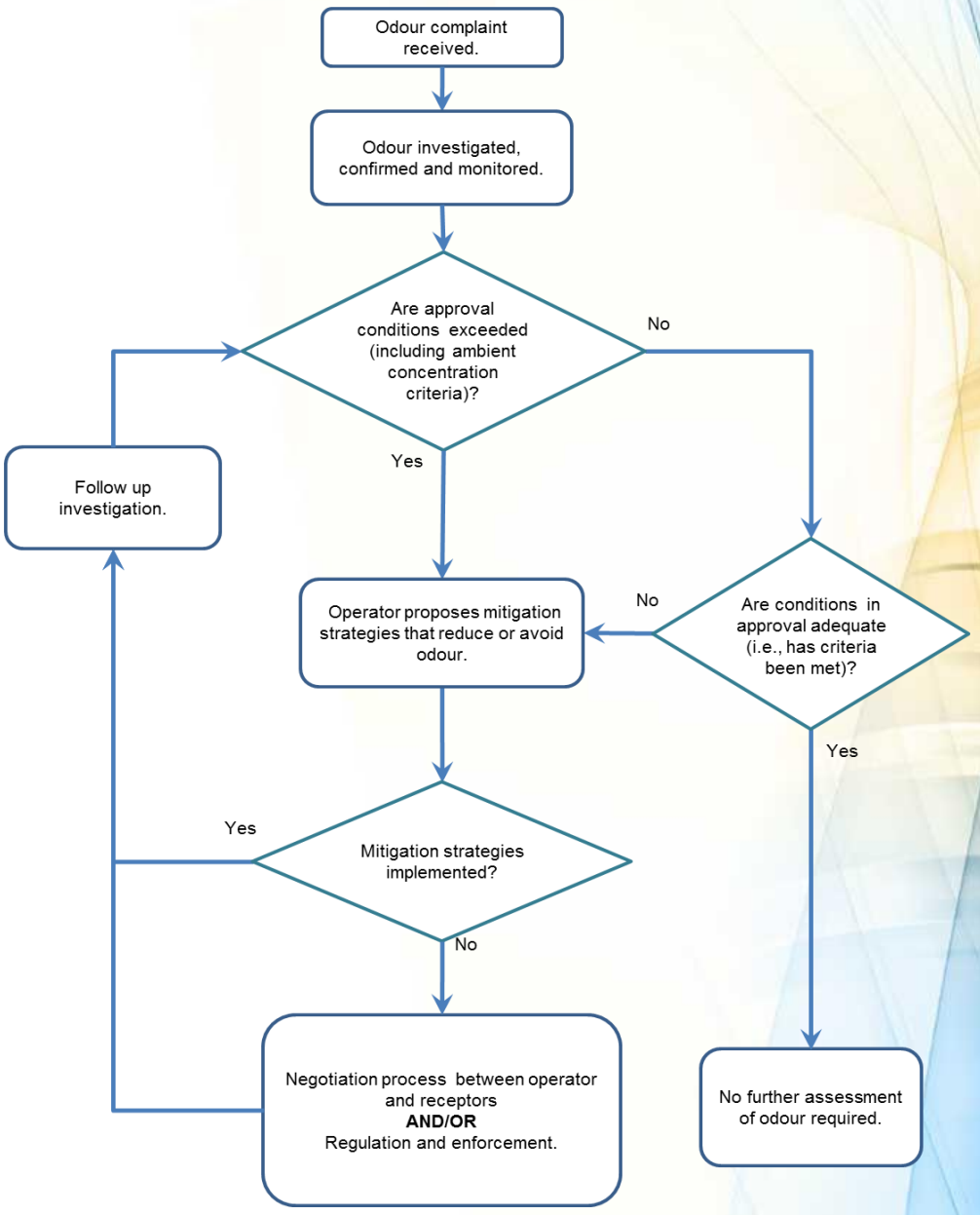
- Important for smaller businesses such as small agricultural practices or community-based businesses.
- Potential to use this approach in areas of low population density.

- Odour impact assessment would look at predicted ambient concentrations for odorants.
- Odour impact assessment would vary dependent on the sector, the size of the facility, and the potential for off-site odours.

- Although legislation would not be driven by instituting technology criteria for managing odour, the approach would be used as a technique to aid facilities.

Example Flow Chart for Existing Faculties

- A similar flow chart can be constructed for existing facilities.
- Odour complaint would initiate an odour investigation.
- Mitigation strategies would be considered if odour is found to be above the ambient criteria.



Summary

- Ten odour management approaches were studied.
- Not any one approach will cover all aspects of odour management. Each sector has different challenges when interacting with neighbours in terms of proximity, acceptance, etc.
- Therefore, three odour management approaches were recommended by RWDI for the regulation of odour in Alberta including:
  - Minimum separation distances;
  - Ambient concentration criteria for odour; and,
  - Complaint criteria.
- No matter which odour management approach is taken, clarity in regulation and legislation is essential.
- CASA Good Practices Guide and all odour management task group reports to be posted on http://casahome.org/ after presentation to CASA Board in September.

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Questions?

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