RISK BASED ODOUR MANAGEMENT

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INTRODUCTION

Sydney Water is committed to preventing odour impact on communities that neighbour its infrastructure. Sydney Water is also committed to providing cost-effective value to its customers, mainly through operational improvements. At some of Sydney Water's larger treatment plants, there have been large capital projects to address odours from the sites. This paper focuses on combining operations and capital spend to ensure odour is managed on site with a risk-based approach. This allows Sydney Water to do more in regards to odour treatment, with what they currently have and deliver greater value to its customers.

HIGHLIGHTS

- We provide odour management with a risk-based approach
- We provide odour management in an operational tool
- Overall odour management is more cost-effective

METHODOLOGY/ PROCESS

Odours are a part of sewage conveyance and treatment with many studies conducted when odour complaints occur. These typically use a form of dispersion modelling to predict odour impact and recommend capital works to cover and treat foul air.

The risk based odour management methodology involves re-evaluating odour sources which are included in dispersion models, but also identifying operating parameters which can effect odour impact. These are issues which do not necessarily make it into dispersion models due to their infrequent nature.

The methodology developed for Sydney Water includes the following items:

1. Identifying all potential sources of odour from a site
2. Establishing whether this source is included in dispersion models, and whether it should be, based on the following:
    a. Is it a constant or irregular emitter?
    b. If irregular, what abnormal operations would affect the odour emission?
    c. Is there sufficient data to quantify the odour emission (i.e. flow/area/odour/specific odour emission rate etc)?
    d. If not, can the odour emission be quantified?
    e. With all the above information, should the source be included in the dispersion model?
3. Is the source likely to be a major odour source during normal operation?

4. Is the source likely to be a major odour source during abnormal operation?
5. What is the likelihood and consequence of this source having an odour impact? – Give score based on Table 1 below.
6. Identification of short and long-term remediation.
7. With the remediation plans in effect, what is the likelihood and consequence of this source having an odour impact? – Give score based on Table 1 below.
8. Colour code all sources based on the likelihood and impact of odour before and after

Table 1: Likelihood and Impact Scoring System

		Likelihood (frequency of occurrence)			
		annual	monthly	weekly	daily
	Score	4	3	2	1
Impact on site	3	6	5	4	3
Impact off site possible	2	5	4	3	2
Impact off site probable	1	4	3	2	1

RESULTS/ OUTCOMES

Table 2 provides an example of where this risk-based odour management has been applied to one of Sydney Water's sites. This site included preliminary and primary treatment with anaerobic digestion and associated biosolids processing and biogas cogeneration. An elaborate underground ventilation and above ground odour treatment system was also used at this site.

The mitigation measures proposed include both operational and capital works. The operational improvements, such as optimising chemical dosing control in the odour treatment systems, allow Sydney Water to respond to abnormal operation that may lead to odour complaints. Mitigation measures such as ventilation optimisation includes capital expenditure at this site to completely remove one of the highest impact odour sources.

The risk register becomes a live document for Sydney Water to address odour sources based on a risk ranking, rather than solely through dispersion modelling.

CONCLUSION

The general approach of a risk-based odour management plan is that effort and expenditure are provided in areas that will provide the greatest effect. The management plan becomes a live register that allows operators to proactively manage the site from an operations perspective, and it also allows planners to ensure that odour related capital works is provided to areas where it will be the most effective. Overall, this provides Sydney Water with less odour impact on its neighbours in a manner that provides greater value for its customers.

Table 2: Example of risk-based odour management register

													Risk Level - Before Mitigation				Risk Level - Residual		
Emission	Emission type	Temporal variability	Existing or Future emission	Factors effecting emission	Abnormal operation effecting emission	Quantifiable (can it be modelled)	Emission Data Available	Currently included in model	Proposed inclusion in modelling	It is a major source during normal operation?	It is a major source during abnormal operation?	Likelihood	Consequence	Score	Potential remediation required / Notes	Likelihood	Consequence	Score
Wet chemical scrubber stack discharge	Point	YES	Existing	Dosing Control	Over / underdosing deposition of solids recirculation rate Fan rate (effects FAD)	YES	YES	YES	YES	YES	YES	2	1	2	Optimisation of dosing control and review of dosing pump sizing would be of benefit in reducing hypochlorite overdosing events. Modification of control code as indicated in start-up / shut worn events. Inclusion of inlterlocks to prevent pH related ORP depression. Change in material of probe supply-line. This should improve the H2S analyser response Emission rate would be expected to at least double (from the effected scrubber) in an overdose type event.	4	1	4
F3902 Discharge	Point	Yes	Existing	cross contamination with foul air duct	Air discharging to atmosphere from F3902 originates in VT4, and passes through a number of rooms all of which should not contain foul air. Appears to be cross contamination with foul air duct 13 and exhaust air duct 14.	YES	NO	NO	YES	YES	YES	1	1	1	Mitigation through removal of cross contamination in plennum. Repair / isolation of F3902 from foul air duct - how this is conducted is unknown at this stage.	N/A	N/A	N/A
F3906 Discharge	Point	No	Existing	cross contamination with foul air areas in underground plant	Air discharging to atmosphere from F3906 is extracted from the motor room.	YES	NO	NO	YES	NO	YES	4	1	4	Low odour "plant room" air, slightly musty. As a point source, should be included in model - however is unlikely to cause complaint due to frequency so no mitigation. Odalogging recommended to validate frequency.	4	1	4
Cogen Stack discharge	Point	YES	Existing	Cogen output	Combusion issues, high inlet sulphur, digestor operation	YES	NO	YES	YES	YES	YES	1	2	2	No sampling data available - flow and odour concentration require confirmation. No residual risk estimate provided as this will depend on the odour level from sampling.	N/A	N/A	N/A
Biogas Flares	Point	YES	Existing	Biogas production / cogen operation	Incomplete combusion	YES	NO	NO	YES	NO	YES	4	2	5	Operation requires confirmation with respect to flow and emission. Mitigation is the proper operation and maintenance of the biogas flares.	4	2	5
Centrifuge Building	Residual	YES	Existing - Removed	building pressure	Extraction rate / developed pressure Fan failure Duct balance building seals	YES	NO	N/A	N/A	N/A	N/A	N/A	N/A	N/A	REMOVED AS PART OF PARR	N/A	N/A	N/A
Biosolids Processing building	Volume	YES	New	Internal odour level, sustained negative pressure	Insufficient extract causing leakage No generated negative pressure Doors left open Insuficient sealing around building penetrations	YES	NO	NO	YES	NO	YES	4	1	4	Existing outloading building converted to processing building resulting in existing data being void. Sustained negative pressure will be required to prevent this becoming a significant odour source. No additional mitigation provided.	4	1	4