APPENDIX A

Odor Wheels

Figure A.1 Wastewater odor wheel (Burlingame et al., 2004)
Figure A.2 Compost odor wheel (Suffet et al., 2009; Rosenfeld and Suffet, 2003)
Figure A.3 Urban odor wheel (Curren, 2012)
Figure A.4 Industrial odor wheel (Curren, 2012)
Figure A.5 Refinery odor wheel (Curren, 2012)
Figure A.6 Foundry odor wheel (Curren, 2012)
Figure A.7 Landfill odor wheel (Decottignies et al., 2009)
Figure A.8 Biosolids processing odor wheel (Fisher et al., 2018)
Figure A.9 Odor wheel (ATSDR, 2016)
Figure A.10 Odor wheel (Metro Vancouver, 2019)

Reference is included with each figure.

Table A.1 Common odor notes and their associated odorants and sources (i.e., the odor wheels displayed as a table)
Figure A.1 Wastewater odor wheel (Burlingame et al., 2004)

Figure A.2 Compost odor wheel (Suffet et al., 2009; Rosenfeld and Suffet, 2003)


Rosenfeld, P., Suffet, I.H., 2003. The first step to odor management is identifying the compounds that cause odors: development of an odor wheel that characterizes the smells and associated compounds. *Proceedings of the BioCycle West Coast Conference* –

Figure A.3 Urban odor wheel (Curren, 2012)

Figure A.4 Industrial odor wheel (Curren, 2012)

Figure A.5 Refinery odor wheel (Curren, 2012)

Figure A.6 Foundry odor wheel (Curren, 2012)

Figure A.7 Landfill odor wheel (Decottignies et al., 2009)

Figure A.8 Biosolids processing odor wheel (Fisher et al., 2018)

Figure A.9 Odor wheel (ATSDR, 2016)

Figure A.10 Odor wheel (Metro Vancouver, 2019)

## Table A.1 Common odor notes and their associated odorants and sources

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<th>Odor Note (Specific)</th>
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51
## Odor Source

### Odor Note (Broad)

- Vinegar
- Sour milk
- Rancid
- Vomit
- Fatty, oily
- Sour cheese
- Putrid
- Decayed
- Dead animal
- Stale beer
- Sour trash
- Rotten fruit
- Ammonia
- Cat urine
- Urine
- Ammonia, fishy
- Fishy
- Fertilizer
- Medicinal
- Alcohol
- Burnt, smoky
- Tarry
- Rubber
- Solvent, plastic
- Glue
- Gasoline
- Oil
- Paint
- Mothballs
- Shoe polish
- Chemical

### Odor Note (Specific)

- Putrid, dead animal
- Vinegar
- Sour milk
- Rancid
- Vomit
- Fatty, oily
- Sour cheese
- Putrid
- Decayed
- Dead animal
- Stale beer
- Sour trash
- Rotten fruit
- Ammonia
- Cat urine
- Urine
- Ammonia, fishy
- Fishy
- Fertilizer
- Medicinal
- Alcohol
- Burnt, smoky
- Tarry
- Rubber
- Solvent, plastic
- Glue
- Gasoline
- Oil
- Paint
- Mothballs
- Shoe polish
- Chemical

### Odorant

- acetic acid
- heptanaldehyde
- heptanal
- butyric acid
- propionic acid
- heptanaldehyde
- pyridine
- putresine
cadaverine
- trimethylamine
- dimethylamine
- trimethylamine
- methylamine
- Chlorophenol
- 1-butanol
- styrene
- methylisobutylketone
- naphthalene
- p-dichlorobenzene
- cumene

### Odor Source

- Waste Water
- Landfill
- Compost
- Urban
- Industry
- Refinery
- Foundry
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APPENDIX B

Bibliography of Guidance Documents and Standard Methods for Environmental Odor Exposure Assessment

1. United States
2. Canada
3. European Union
4. Australia
5. New Zealand
6. Japan
7. International Organizations
1. United States

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- ISO 8586:2012 Sensory analysis - General guidelines for the selection, training and monitoring of selected assessors and expert sensory assessors
- ISO 11035:1994 Sensory analysis - Identification and selection of descriptors for establishing a sensory profile by a multidimensional approach
- ISO 11056:1999 Sensory analysis - Methodology - Magnitude Estimation Method
- ISO 13301:2002 Sensory analysis - Methodology - General guidance for measuring odour, flavour and taste detection thresholds by a three-alternative forced-choice (3-AFC) procedure

**World Health Organization (WHO)**