Acquisition, Review, and Correlation of Odor Literature for the Air & Waste Management Association EE-6 Odour Committee

Submitted to the Department of Civil and Environmental Engineering in Fullfilment of Course 93-409

University of Windsor

by:

Group 1:

Jon David Kehoe
James Harcus

Group 2:

Michael Smith
M. Jason Warren

Faculty Advisor: Dr. Alex Gnyp

Date Submitted: August 9, 1996

ABSTRACT

A comprehensive acquisition, review, and correlation of odor literature was undertaken for the Air and Waste Management Association's EE-6 Odor Committee. This literature was acquired from various sources and represents a substantial collection of materials pertaining to odor investigations from a domestic and international forums of experts in the field.

After review, this literature was organized into categories that best represent the different fields of odor investigations that are listed as:

- Perception of Odors
- Sources of Odors
- Impact of Odors
- Sampling and Analysis of Odors
- Control of Odors
- Regulation of Odors

The human perception of odors consists of more than just "smell", it represents a complex series of psychological and physiological responses to the quality of the odourant detected.

While the sources of odors may be common chemicals, their characterization in a positive or negative manner is entirely subjective. However, by relating odorous compounds to their more common likenesses, they may be tracked to their origins.

As the most commonly recognized form of air pollution, unfamiliar and/or objectionable odors can draw attention to previous or acknowledged problems. Therefore, when determining the impact of odors on individuals and the community as a

whole, it is important to differentiate between minor annoyance and more serious implications to the well being of the public at large.

When sampling for odors, it is important to remember that the actual odourant is only a very small fraction of the air collected and must be carefully treated to ensure the quality of the sample is not compromised before analysis. Hence the sampling technique and vessel of containment must preserve the odorous compound in its originally encountered state. The means of analysis must be adequate to identify the characteristics of the odorous compounds. Choosing a means of analysis will depend on whether the data required is qualitative (odor thresholds, objective preferences) or quantitative (concentration, composition).

Although society would prefer zero tolerance of objectionable industrial odors, this is not possible with the best available control technology. With this in mind, a reasonable degree of treatment must be applied to reduce the frequency and annoyance of such events while not creating an unduly punitive financial burden on the source.

The lack of a specific unified scale for quantifying all odors makes it impossible for the adoption of legislation by Regulatory Agencies to enforce. Instead, odors are regulated in terms of other characteristics (particulate, vapor, fumes, gases, etc.) and by monitoring the number of legitimate complaints attributed to the producer. Due to the subjective nature of regulating odor emissions, the investigation of foreign policies in similar instances would be invaluable in solving odor problems.

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1.0 INTRODUCTION

1.1 BACKGROUND

1.1.1 DEFINITION OF AN ODOUR.

An odour can be defined as the sensation of smell perceived as a result of an olfactory stimulus which can be comprised of an individual odourant or a mixture of substances.

1.1.2 EFFECTS OF ODOURS ON HUMANS.

The effect of odours on humans is primarily one of nuisance however, the effects can be more problematic. Odours can trigger nausea, headaches, loss of appetite, disturb sleep patterns and if persistent can cause emotional disturbance, mental depression, irritability, interfere with proper working conditions and may cause a depreciation in property values.

1.1.3 DETERMINATION OF ODOURS.

The human olfactory system can serve as an aid in the detection of potentially hazardous compounds. However, the sensitivity of each individual's olfactory system is widely varied. Some individuals possess a heightened sensitivity to odours (hyperosmic) while others are physically unable to detect odourous compounds (anosmics). This wide variance in an individual's ability to detect odours, as well as the variability and complex nature of odours themselves, makes the determination of odours very difficult to standardize and measure quantitatively.

1.2 PURPOSE OF STUDY

1.2.1 AIR AND WASTE MANAGEMENT ASSOCIATION (AWMA).

Organizations like the Air and Waste Management Association (AWMA) have devoted much time and effort to define the causes, effects and controls of various types of odours. As part of the AWMA's continued research into odours, the idea of an odour reference manual was conceived by the EE-6 Odor Committee.

1.2.2 DRAFT REFERENCE MANUAL.

The goal of this project was to produce a draft reference manual which would contain relevant odour related literature from sources around the globe. (including Canada, United States, Germany, Japan, Russia, France, Netherlands). Many documents were provided by various members of the AWMA to Dr. Alex Gnyp. Approximately 3000 papers and reports have been classified during this study.

1.2.3 CREATION OF A DRAFT ODOUR REFERENCE MANUAL.

This draft odour reference manual provides a concise, organized and useful reference document which can be used as a tool by new or well established participants in odour related research, industrial, consulting and regulatory projects.

1.2.4 SUBDIVISIONS OF DRAFT ODOUR REFERENCE MANUAL.

After considerable thought and analysis of initial source materials, it was decided to divide the draft odour reference manual into six sections. The following divisions were created:

- Perception
- Sources
- Impact on Society
- Sampling and Analysis
- Control Methods
- Regulations

2.0 ODOUR PERCEPTION

2.1 BACKGROUND

2.1.1 PROBLEMS ASSOCIATED WITH PERCEPTION BY HUMANS.

The perception of odours by humans is not completely understood because of the complex series of chemical and neurological interactions that take place in the human olfactory system. The response to an odour may provoke an emotional response as well as draw on an individual's past experience which may be associated with that particular odour. The nature of the odour itself may also cloud an individual's natural detection ability. The chemical composition, predominant weather conditions and the originating source of an odour may all act in some fashion to muddle an individual's perception of the odour.

2.2 ANATOMY AND PHYSIOLOGY

2.2.1 HUMAN OLFACTORY SYSTEM.

Any study on the perception of odours by humans must begin with an examination of the anatomy and physiology of the human olfactory system. (See **Figure 1- Human Olfactory Structure**).

"The receptors for smell (olfaction) are specialized to respond to volatile chemicals that have dissolved in the mucous coating of the nasal cavity. The olfactory receptors are contained in a region of the nasal mucosa called the olfactory epithelium

that is located in the upper portion of the nasal cavity on either side of the nasal septum."
[1] Tiny hairs or cilia, are the receptive portion of the olfactory receptor cell. It is believed that these cilia provide several different receptor sites for odourous molecules to interact with the cell. This interaction causes the cell to depolarize and generate a general potential that causes a nerve impulse to be conveyed to the brain by way of the olfactory nerve. This nerve impulse triggers a response from two areas of the brain; the thalamus and the limbic systems. The thalamus initiates conscious perception and fine discrimination of an odour through the cortex. The exact basis for this discrimination is largely unknown. The limbic system coordinates certain behavioral and emotional responses to particular odours. These responses to the odourous stimuli vary significantly from person to person.

As a result of the complex nature of the anatomy and physiology involved, odour perception is very subjective and difficult to standardize and measure quantitatively.

[1] Mason, Elliott et al. Human Anatomy and Physiology. 4th ed. West Publishing Co., St. Paul, Minn., 1992.

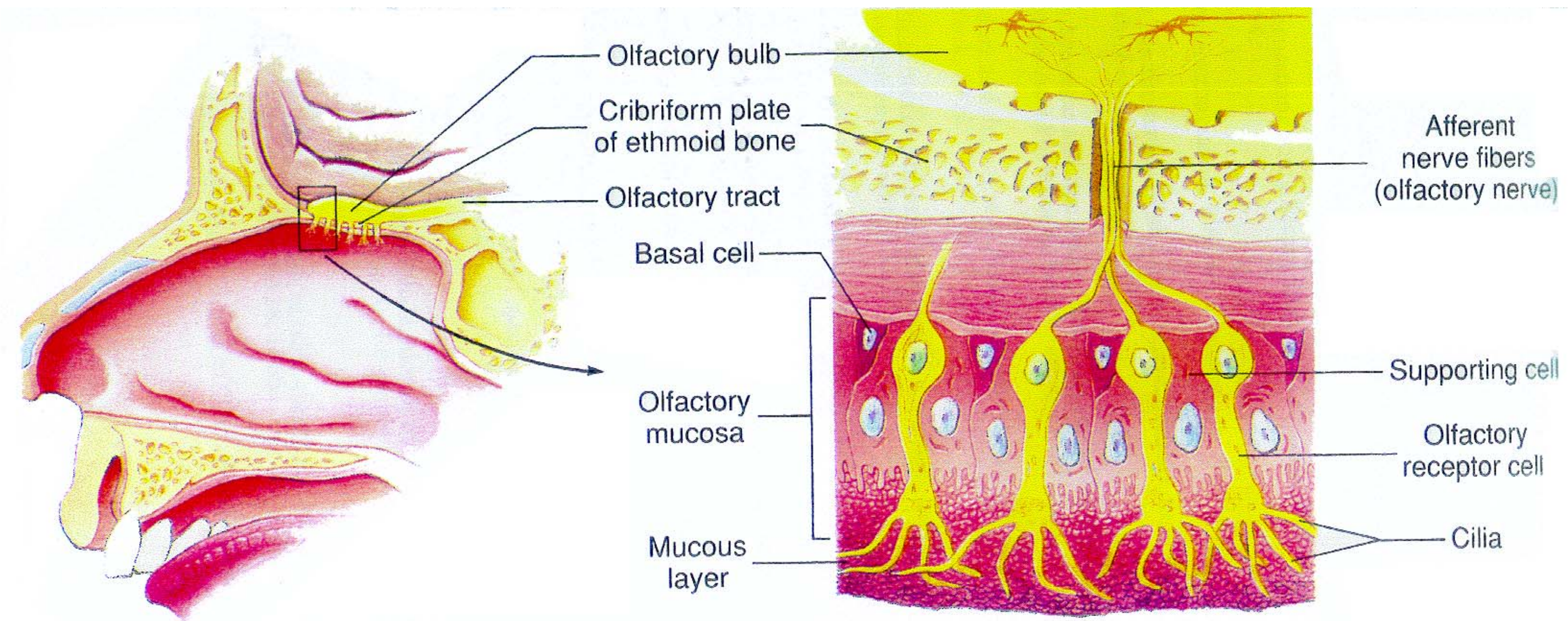

Figure 1. Location and Structure of the Olfactory Receptors

2.3 REFERENCES

Adams, D.F., F.A. Young & R.A. Luhr. Evaluation of a Odor Perception Threshold Test Facility. Tappi, 51, no. 3. Code A, 1968.

Adrian, E.D.. Basis of Sensation: Some Recent Studies of Olfaction. British Medical Journal, 1. 1954.

Adrian, E.D.. Olfactory Discrimination. L'Annee Psychlogique, 50. 1951.

Adrian, E.D.. Sensory Discrimination With Some Recent Evidence from the Olfactory Organ. British Medical Bulletin, 6. 1950.

Adrian, E.D.. Sensory Messages and Sensation. The Response of the Olfactory Organ to Different Smells. Acta Physiologica Scandinavica, 29. 1953.

Airkem Company. Odors and the Sense of Smell: A Bibliography, 320 B.C.- 1947. Airkem. New York, 1952.

Alarie, Y.. Irritating Properties of Airborne Materials to the Upper Respiratory Tract. Archives of Environmental Health, 13. 1966.

Allison, V.C. & S.H. Katz. An Investigation of Stenches and Odors for Industrial Purposes. J. Ind. Eng. Chem., 11. Code B5, 1919.

Amerine, M.A., R.M. Pangborn, and E.B. Roessler. Principles of Sensory Evaluation of Food. Academic Press. New York, 1965.

Amoore, J.E., Perfumery Essent. Oil Record 43:321 (1952); Chem. Abstr. 47:2427 (1953).

Amoore J.E., Ollman B.G., Practical test kits for quantitatively evaluating the sense of smell, Rhinology 21: 49-54, 1983.

Amoore J.E., Steinle S., A graphical history of specific anosmis. In Genetics of Chemical Sensing and Communication Ed. by C.J. Wysocki and M.R. Dare. Marcel Dekker, Inc. (in press).

Amoore J.E., The perception of hydrogen sulfide odor in relation to setting an ambient standard, Final Report to California Air Resources Board, ARB Contract A4-046-33, 46 pp., 1985.

Amoore J.E., Venstrom D., Sensory analysis of odor qualities in terms of the stereochemical therory, J. Food Sce. 31:118-128, 1966.

Amoore, J. E., Current Status of the Steric Theory of Odor, Annals New York Academy of Sciences, 116, 457, 1964.

Amoore, J. E., The Stereochemical Theory of Olfaction. I. Identification of the Seven Primary Odors, Proc. Sci. Sect. Toilet Goods Assoc., Suppl. to No. 37, 1, 1962.

Amoore, J.E. Current Status of the Steric Theory of Odor. Ann. N.Y. Acad. Sci., 116, 1964.

Amoore, J.E. Evidence for the Chemical Olfactory Code in Man. Ann. N.Y. Acad. Sci. 237, 1974.

Amoore, J.E. Olfactory Genetics and Anosmia. In: L.M. Beidler (ed.), Handbook of Sensory Physiology IV Part I: Olfaction. Springer-Verlag. New York, 1971.

Amoore, J.E. Specific Anosmia and the Concept of Primary Odors. Chem. Senses and Flavor 2, 1977.

Amoore, J.E. Specific Anosmia: A Clue to the Olfactory Code. Nature 214, 1967.

Amoore, J.E. The Stereochemical Specifities of Human Olfactory Receptors. Perfum. Essent. Oil Rec. 43, 1952.

Amoore, J.E., and D. Venstrom. Correlations Between Stereochemical Assessments and Organoleptic Analysis of Odorous Compounds. In: Olfaction and Taste II. Pergamon Press. Oxford, 1967.

Amoore, J.E., and D. Venstrom. Sensory Analysis of Odor Qualities in Terms of the Stereochemical Theory. Journal of Food Science, 31. 1966.

Amoore, J.E., D. Venstrom, and A.R. Davies. Measurement of Specific Anosmia. Perception and Motor Skills, 26. 1968.

Amoore, J.E., G. Palmieri, and E. Wanke. Molecular Shape and Odor: Pattern Analysis by PAPA. Nature, 216. London, 1967.

Amoore, J.E., J.W. Johnston Jr., and M. Rubin. Perception: Mechanisms and Models. W.H. Freeman and Co.. San Francisco, 1972.

Amoore, J.E., J.W. Johnston Jr., and M. Rubin. The Stereochemical Theory of Odors. Scientific America, 210. 1964.

Amoore, J.E.. A Biochemists' Approach to Olfaction. Western Regional Research Center, Agricultural Research Service, U.S. Department of Agriculture. Berkeley, California, 1973.

Amoore, J.E.. A Plan to Identify Most of the Primary Odors. In Olfaction and Taste, Proceedings of the Third International Symposium on Olfaction and Taste. The Rockefeller University Press. New York, 1969.

Amoore, J.E.. Current Status of the Steric Theory of Odor. Annals of the New York Academy of Sciences, 116. 1964.

Amoore, J.E.. Evidence for the Chemical Olfactory Code in Man. Western Regional Research Center, Agricultural Research Service, U.S. Department of Agriculture. Berkeley, California. 1973.

Amoore, J.E.. Odor Blindness as a Problem in Odorization. American Gas Association, Operating Section, Annual. 1968.

Amoore, J.E.. Olfactory Genetics and Anosmia. In: Handbook of Sensory Physiology, Vol. IV. Springer-Verlag. New York, 1971.

Amoore, J.E.. Specific Anosmia and the Concept of Primary Odors. Chemical Senses and Flavor, 2. 1977.

Amoore, J.E.. Specific Anosmia: A Clue to the Olfactory Code. Nature. 1967.

Amoore, J.E.. The Stereochemical Theory of Olfaction. 1. Identification of the Seven Primary Odors. Proceedings of the Scientific Section, Toilet Goods Association, Supplement to No. 37. 1962.

Amoore, J.E.. The Stereochemical Theory of Olfaction. 2. Elucidation of the Stereochemical Properties of the Olfactory Receptor Sites. Proceedings of the Scientific Section, Toilet Goods Association, Supplement to No. 37. 1962.

Anonymous. Explaining Odor Perception. Chemical Engineering News, 38. 1976.

Anonymous. The Psychological and Aesthetic Aspects of Odor. In: National Academy of Sciences, National Research Council, Comittee on Medical and Biological Effects of Environmental Pollutants: Hydrogen Sulphide. University Park Press. Baltimore, 1979.

Aoki, K., and S.F. Takagi. Intracellular Recording of the Olfactory Cell Activity. Proceedings of the Japan Academy, 44. 1968.

Ash, K.O. Chemical Sensing: An Approach to Biological Molecular Mechanisms Using Difference Spectroscopy. Science 162, 1968.

Baird, J.C.A.. A Cognitive Theory of Psychophysics. II. Fechner's Law and Steven's Law. Scandinavian Journal of Psychology, 11. 1970.

Baker, R.A.. Response Parameters Including Synergism - Antagonism in Aqueous Odor Emission. Annals of the New York Academy of Sciences, 116. 1964.

Baker, R.A.. Threshold Odors of Organic Chemicals. Journal of the American Water Works Association, Vol. 55. 1963.

Barinaga, M.. How the Nose Knows: Olfactory Receptor Cloned. Science, 252. 1991.

Barnett, A.. Sightless Snake Sniffs its Way to Dinner. New Science, 135. 1992.

Barth, C.. Why Does It Smell So Bad?. American Society of Agricultural Engineers, Paper No. 70-416. St. Joseph, Michigan, 1970.

Bartoshuk, L.M. & W.S. Cain. Chemoreception. B.B. Wolman (Ed.), In International Encyclopedia of Neurology, Psychiatry, Psychoanalysis, and Psychology. New York: Van Nostrand Reinhold, 1977.

Baylin, F. Temporal Patterns and Selectivity in the Unitary Responses of Olfactory Receptors in the Tiger Salamander to Odor Stimulation. J. Gen. Physiol. 74, 1979.

Baylin, F. & D.G. Moulton. Adaptation and Cross-adaptation to Odor Stimulation of Olfactory Receptors in the Tiger Salamander. J. Gen. Physiol. 74, 1979.

Beck, L.H., and W.R. Miles. Some Theoretical and Experimental Relationships Between Infrared Absorption and Olfaction. Science, 106. 1947.

Beets, M. G. J., Molecular Structure and Organoleptic Quality, SCI Monograph N., 1, Society of Chemical Industry, London, 1957.

Beets, M.G.J. Structure-activity Relationships in Human Chemoreception. London: Applied Science Publishers, 1978.

Beets, M.G.J., and E.T. Theimer. Odour Similarity Between Structurally Unrelated Odorants. In: Taste and Smell in Vertebrates. Churchill. London, 1970.

Beets, M.G.J.. Odor and Stimulant Structure. In: Handbook of Perception. Vol VIA, Tasting and Smelling. Academic Press. New York, 1978.

Beets, M.G.J.. Olfactory Response and Molecular Structure. In: Chemical Senses, Part 1, Olfaction. Handbook of Sensory Physiology, Vol. 4. Springer. Berlin, 1974.

Beets, M.G.J.. Olfactory Response and Molecular Structure. In: Handbook of Sensory Physiology, Vol. IV. Springer-Verlag. New York, 1971.

Beets, M.G.J.. Structure-Response Relationships in Chemoreception. In: Structure-Activity Relationships. Pergamon Press. Oxford, 1973.

Beidler, L.M.. Chemical Excitation of Taste and Odor Receptors. Advances in Chemistry Series, 56. 1966.

Beidler, L.M.. Chemical Senses, Part 1, Olfaction. Handbook of Sensory Physiology, Vol. 4. Springer. Berlin, 1971.

Belkov, A.N.. Action of small Concentrations of Carbon Tetrachloride on the Human Body. Chem. Abstr., 74 (1971) 2340n. Code B5, 1969.

Benforado, D. M., Rotella, W. J., and Horton, D. L., Development of an Odor Panes for Evaluation of Odor Control Equipment, J. Air Pollution Control Association, 19, (2), 101-105, 1969.

Berglund, B. Quantitative and Qualitative Analysis of Industrial Odors with Human Observers. From Annals of the New York Academy of Sciences. Volume 237, 1974.

Berglund, B., V. Berglund, and T. Lindvall. Olfactory Self- and Cross-Adaption: Effects of Time of Adaption and Perceived Odor Intensity. Sensory Processes, 2. 1978.

Berglund, B., V. Berglund, and T. Lindvall. On Perceptual Interaction of Noise and Odor. Reports from the Department of Psychology, University of Stockholm. 1975.

Berglund, B., V. Berglund, G. Ekman, and T. Engen. Individual Psychophysical Functions for 28 Odorants. Perception and Psychophysics, 9. 1971.

Berglund, B.. Quality, Intensity, and Time in Olfaction Perception. Proceedings of the 6th International Symposium on Olfaction and Taste. Information Retrieval. Washington, 1977.

Bergman, P., and S.K. Escalona. Unusual Sensitivities in Very Young Children. Psychoanalytic Study of the Child, 3-4. 1949.

Berthelot, M. Observations sur les Procédés Propres a Déterminer les Limites de la Sensibilité Olfactive. Ann. Chim. Phys. 22. [French]. Code E1, 1901.

Berzins, A. Determination of the Threshold of Olfactory Perception of Ethylenimine. Aktual. Chem. Abstr., 72 (1970) 35503e. Code B5, 1967.

Bezpalkova, L.E. The Threshold of Reflex Effects of Methylacrylate Vapours Upon Human Organism. (in Czech.) Cesk. Hyg., 12. Code B2, 1967.

Bienfang, R.. The Subtle Sense. University of Oklahoma Press. Norman, Oklahoma, 1946.

Birnbaumer, L., S.L. Pohl & A.J. Kauman. Receptors and Acceptors: A Necessary Distinction in Hormone Binding Studies. In: Advances in Cyclic Nucleotide Research. Vol. IV, P. Greengard & G.A. Robinson, (eds.), Raven Press, New York, 1974.

Blank, D.L.. Mechanism Underlying the Analysis of Odorant Quality at the Level of the Olfactory Mucosa. II. Receptor Selective Sensitivity. Annals of the New York Academy of Sciences, 237. 1974.

Bocca, E. & M.N. Battiston. Odour Perception and Environment Conditions. Acta Oto-Laryngol., 57. Code B, 1964.

Boelens, H. Molecular Structure and Olfactive Properties. In: Structure-activity Relationships in Chemoreception. London: IRL Press Ltd., 1976.

Boelens, H.. Molecular Structure in Olfactive Properties. In: Structure Activity Relationships in Chemoreception. Information Retrieval Limited. London, 1976.

Brill, A.A.. The Sense of Smell in the Neuroses and Psychoses. Psychoanalytic Quarterly, 1. 1932.

Bronshtein, A.A., and A.V. Minor. Significance of the Cilia and Their Motility in the Functioning of Olfactory Receptors. Doklady Biological Science, 213. 1973.

Brown K.S., McClean C.M., and Robinette R.R., The distribution of the sensitivity to chemical odors in man, Human Biology 40:456, 1986.

Brown, K.S., C.M. MacLean, and R.R. Robinette. Senseitivity to Chemical Odors. Human Biology, 40. 1968.

Brown, K.S., C.M. MacLean, and R.R. Robinette. The Distribution of the Sensitivity to Chemical Odors in Man. Human Biology, 40. 1968.

Bruvold, W.H. "Laboratory Panel Estimation of Consumer Assessments of Taste and Flavor". J. of Appl. Psych., 54, 1970.

Cagen, R.H. & W.N. Zeiger. Biochemical Studies of Olfaction: Binding Specificity of Radioactively Lableled Stimuli to an Isolated Olfactory Preparation from Rainbow Trout (Salmo gairdneri). Proc. Nat. Acad. Sci. USA 75, 1978.

Cain, W.S. Differential Sensitivity for Smell: "Noise at the Nose." Science, 195, 1977.

Cain, W.S. Odor Identification by Males and Females. Prediction Versus Performance. Chem. Sens., 7, 1982.

Cain, W.S. Odor Intensity: Differences in the Exponent of the Psychophysical Function. Percept. Psychophys., 6 (6A). Code A, 1969.

Cain, W.S. and F. Johnson Jr.. Lability of Odor Pleasentness: Influence of Mere Exposure. Perception, 7. 1978.

Cain, W.S., and C.L. Murphy. Interactions Between Chemoreceptive Modalities of Odour Irritation. Nature, 284. 1980.

Cain, W.S., and H.R. Moskowitz. Psychophysical Scaling of Odor. In Human Responses to Environmental Odors. Academic Press. New York, 1974.

Cain, W.S., and L.E. Marks. Stimulus and Perception: Readings in Sensory Psychology. Little, Brown. Boston, 1971.

Cain, W.S., and M. Drexler. Scope and Evaluation of Odor Counteraction. Annals of the New York Academy of Sciences, 237. 1974.

Cain, W.S.. Differential Sensitivity for Smell: "Noise" at the Nose. Science, 195. 1977.

Cain, W.S.. History in Research on Smell. In: Handbook of Perception. Vol. VIA, Tasting and Smelling. Academic Press. New York, 1978.

Cain, W.S.. Interactions Among Odors, Environmental Factors and Ventilation. In: Indoor Climate. Danish Building Research Institute. Copenhagen, 1979.

Cain, W.S.. Lability of Odor Pleasentness. In: Preference Behavior and Chemoreception. Information Retrieval Limited. London, 1979.

Cain, W.S.. Odor Intensity After Self-Adaption and Cross-Adaption. Perception and Psychophysics, 7. 1970.

Cain, W.S.. Odor Intensity: Mixtures and Masking. Chemical Senses and Flavour, 1. 1975.

Cain, W.S.. Odor Magnitude: Coarse Versus Fine Grained. Perception and Psychophysics, 22. 1977.

Cain, W.S.. Olfaction and the Common Chemical Sense: Some Psychophysical Contrasts. Sensory Processes, 1. 1976.

Cain, W.S.. Perception of Odor Intensity and the Time-Course of Olfactory Adaption. Trans. Amer. Soc. Heat. Refrig. Air-Cond. Eng., 80. 1974.

Cain, W.S.. Perception of Odor Intensity and the Time-Course of Olfactory Adaption. Scandinavian Journal Experimental Psychology. 1967.

Cain, W.S.. Perception of Odor Intensity and the Time-Course of Olfactory Adaption. ASHRAE Transactions, 80. 1974.

Cain, W.S.. To Know With the Nose: Keys to Odor Identification. Science, 203. 1979.

Carterette, E.C. and M.P. Friedman. Handbook of Perception. Vol. II. Psychophysical Judgement and Measurement. Academic Press, Inc.. New York, 1974.

Carterette, E.C., and M.P. Friedman. Handbook of Perception. Vol. VIA, Tasting and Smelling. Academic Press. New York, 1978.

Chalke, H.D., J.R. Dewhurst, and C. Ward. Loss of Sense of Smell in Old People. Public Health, 72. London, 1958.

Cheesman, G.H.. Odour and Chemical Constitution - A New Approach. Proceedings of the Royal Australian Chemical Institute, 27. 1960.

Chemical Senses Update. Nutrition Today, 28. 1993.

Cherry, R.J., G. Dodd, and D. Chapman. Small Molecule Lipid-Membrane Interactions and the Puncturing Theory of Olfaction. Biochim. Biophys. Acta., 211. 1970.

Clarenburg, L.A. Penalization of the Environment due to Stench. A Study of the Perception of Odorous Air Pollution by the Population. Atmos. Environ. 7, 1973.

Clark, E.C., and H.W. Dodge. Effect of Anosmia on the Appreciation of Flavor. Neurology, 5. 1955.

Clark, E.C., and H.W. Dodge. Extraolfactory Components of Odor. American Medical Association Journal, 159. 1955.

Coghlan, A.. An Electronic Nose for Brewing Better Beers. New Science, 137. 1993.

Cohen, H.. Clinical and Diagnostic Significance of the Sense of Smell. American Physician, 28. 1923.

Cometto- Muniz, J.E. & W.S. Cain. Perception of Nasal Pungency in Smokers and Nonsmokers. Physiol. Behav., 29, 1982.

Corbit, T.E. & T. Engen. Facilitation of Olfactory Detection. Percept. Psychophys., 10. Code B, 1971.

Criswell, D.W. “Chemically Active Odorants as Olfactory Probes”. Dissertation, North Texas State University, 1982.

Crossland, H.R., M. Goodman, and A. Hockett. Anosmia and its Effects Upon Taste Perception. Journal of Experimental Psychology, 10. 1930.

Daly, C.D., and R. Senior White. Psychic Reactions to Olfactory Stimuli. British Journal of Medical Psychology, 10. 1930.

Daval, G., J. Leveteau, P. MacLeod, A. Holley, A. Duchamp & M.F. Revial. Studies on Local EOG and Single Receptor Responses to Multiple Odour Stimulation in the Frog. In: Olfaction and Taste IV, D. Schneider (ed.), Wessenshaftliche Verlagsgesellshaft, Stuttgart, Germany, 1972.

Davies, J.T., A Model System for the Olfactory Membrane Nature 174:693, 1954.

Davies, J.T.. A Theory of the Quality of Odors. Journal of Theoretical Biology, 8. 1965.

Davies, J.T.. Olfactory Theories. In: Chemical Senses, Part 1, Olfaction. Handbook of Sensory Physiology, Vol. 4. Springer. Berlin, 1971.

Davis, P.. An A-Z Aromatherapy. Barnes & Noble.

Davis, R.G. Olfactory Psychophysical Paramaters in Man, Rat, Dog and Pigeon. J. Comp. Physiol. Psychol., 85. Code B, 1973.

Dawson, T.M., and Others. Beta-Adrenergic Receptor Kinase-2 and Beta-Arrestin-2 as Mediators of Odorant-Induced Desensitization. Science, 259. 1993.

de Belle, J.S., and M. Heisenberg. Associative Odor Learning in Drosophila Abolished by Chemical Ablation of Mushroom Bodies. Science, 263. 1994.

De Vries, H., and M. Stuiver. The Absolute Sensitivity of the Human Sense of Smell. In: Sensory Communication. Wiley. New York, 1961.

de Wijk, R.A., and W.S. Cain. Odor Identification by Name and by Edibility: Life Span Development and Safety. Human Factors, 36. 1994.

Delaleu, J.C. & A. Holley. Modification of Transduction Mechanisms in the Frog's Olfactory Mucosa using a Thiol Reagent as Olfactory Stimulus. Chem. Senses and Flavour 5, 1980.

Derenzo, David R., Gnyp, Alex, (eds.), Recent Developments and Current Practices in Odor Regulations, Controls and Technology, Papers from an International Specialty Conference. Air and Waste Management Association, ISSN 1040-8177; No. 18, Pittsburgh, Pennsylvania, 1989.

Deveza, R., and Others. Odor sensing for Robot Guidance. International Journal of Robotic Research, 13. 1994.

Dodd, G.H. Structure and Function of Chemoreceptor Membranes. In: Transduction Mechanisms in Chemoreception, T.M. Poynder (ed.), Information Retrieval Ltd., London, 1974.

Doron, T.. The Present Situation and Problems of Odor Pollution in Japan. Koryo, No. 104. Japan, 1973.

Doty, R.L., P. Shaman, S.L. Applebaum, R. Giberson, L. Siksorski, and L. Rosenberg. Smell Identification Ability: Changes With Age. Science Magazine, 226. 1984.

Doty, R.L., W.E. Brugger, P.C. Jurs, M.A. Orndorff, P.J. Snyder, and L.D. Lowry. Intranasal Stimulation from Odorous Volatiles. Physiology and Behavior, 20. 1978.

Doty, R.L.. A Review of Olfactory Dysfunctions in Man. American Journal of Otolaryngology, 1. 1979.

Doving, K.B., and A.L. Lange. Comparative Studies of Sensory Relatedness of Odours. Scandinavian Journal of Psychology, 8. 1967.

Doving, K.B.. An Electrophysiological Study of Odour Similarities of Homologous Substances. Journal of Physiology, 186. 1966.

Doving, K.B.. Analysis of Odour Similarities from Electrophysical Data. Acta Physiologica Scandinavica, 68. 1966.

Dravnieks A., Musurat T., Lamm R.A., Hedonics of Odors and Odor Descriptors, JAPCA 34:752-755, 1984.

Dravnieks A., Odor Character Profiling, JAPCA 33:775, 1983.

Dravnieks, A. Odor Perception and Odorous Air Pollution. The Journal of the Technical Association of the Pulp and Paper Industry, 55, no. 5, 1972.

Dravnieks, A. Physiochemical Basis of Olfaction. In: Kuehner, R. (Ed.) Annals of the New York Academy of Sciences, July 30, 1964, Vol. 16, Art. 2, 1964.

Dravnieks, A. & P. Laffort. Physio-chemical Basis of Quantitative and Qualitative Odor Discrimination in Humans. In: D. Schneider (Ed.), Olfaction and Taste IV, 142-148, Proc. Fourth Internat. Symp., August 1971, Wissenschaftliche Verlagsgesellschaft MBH, Stuttgart. Code B3, 1972.

Dravnieks, A., and H.J. O'Neill. Annoyance Potentials of Air Pollution Odors. American Industrial Hygiene Association, Journal, 40. 1979.

Dravnieks, A., Buidling-Block Model for the Characterization of Odorant Molecules and Their Odors, Presented at New York Academy of Sciences Conference on Odors, October 1, 1973.

Dravnieks, A., Correlations of Odor Intensities and Vapor Pressure with Structural Properties of Odorants, Presented at 172nd American Chemical Society National Meeting, San Francisco, September, 1976.

Dravnieks, A., F.C. Bock, and F.H. Jarke. Sensory Structure of Odor Mixtures. In: Odor Quality and Chemical Structure. American Chemical Society, 148. Washington, D.C., 1981.

Dravnieks, A., Flavor Chemistry, pp. 29-52, Advances in Chemistry Series, No. 56, American Chemical Society, Washington, D. C., 1966.

Dravnieks, A., Odor Perception and Odorous Air Pollution, TAPPI, 55, (5), 737-742, 1972.

Dravnieks, A., T. Musurat, and R.A. Lamm. Hedonics of Odors and Odor Descriptors. Journal of the Air Pollution Control Association, 34. 1984.

Dravnieks, A., Threshold of Smell and Measurement, Industrial Odor Technology Assessment, Edited by Paul N. Cheremisinoff and R.A. Young, Ann Arbor Science Publishers, Inc., Chapter 2, 27-44, 1974.

Dravnieks, A.. A Building Block Model for the Characterization of Odorant Molecules and Their Odors. The New York Academy of Sciences Conference on Odors: Evaluation, Utilization, and Control. 1973. Annals of the New York Academy of Sciences, 237. 1974.

Dravnieks, A.. Contribution of Molecular Properties of Odorants to the Hedonic Value of Their Odors. Presented at the 7th Symposium of the Sense of Smell. Cannes, France, 1972.

Dravnieks, A.. Odor Character Profiling. Journal of the Air Pollution Control Association, 33. 1983.

Dravnieks, A.. Odor Perception and Odorous Air Pollution. TAPPI, 55. 1972.

Dravnieks, A.. Properties of Receptors Through Molecular Parameters of Odorivectors. In: Olfaction and Taste II. Pergamon. Oxford, 1967.

Duffee, R. A., Wahl, John P., Marrone, W., and Nader, J. S., Defining and Measuring Objectionable Odors, International Pollution Engineering Congress, Philadelphia, October 1973.

Durrans, T.H., Residual-Affinity Theory of Odors, Perfumery Essent. Oil Record 11:391, 1920.

Dyson, G. M., Perfum. Essen. Oil Rec., 28, 13, 1937.

Dyson, G. M., Scientific Basis of Odour, Chem. Ind. 57:647, 1938.

Dyson, G.M. Raman Effect and the Concept of Odour. The Perfumery and Essential Oil Record 28, 1937.

Dyson, G.M.. The Scientific Basis of Odour. Chemistry and Industry, 57. 1938.

Eisler, H., and C. Ottander. On the Problem of Hysterisis in Psychophysics. Journal of Experimental Psychology, 65. 1963.

Eisler, H., and H. Montgomery. On Theoretical and Category Scales and Their Relation. Perception and Psychophysics, 16. 1974.

Eisler, H.. How Prothetic is the Continuum of Smell?. Scandinavian Journal of Psychology, 4. 1963.

Eisler, H.. Magnitude Scales, Category Scales, and Fechnerian Integration. Psychological Review, 70. 1963.

Eisler, H.. On Psychophysics in General and the General Psychophysical Differential Equation in Particular. Scandinavian Journal of Psychology, 6. 1965.

Eisler, H.. On the Problem of Category Scales in Psychophysics. Scandinavian Journal of Psychology, 3. 1962.

Ekman, G., B. Berglund, U. Berglund, and T. Lindvall. Perceived Intensity of Odor as a Function of Time of Adaption. Scandinavian Journal of Psychology, 8. 1967.

Elsberg, C.A., and I. Levy, The Sense of Smell, I. A New and Simple Method of Quantitative Olfactometry, Bull. Neurol. Inst. 4:5, 1935.

Engen, T., and B.M. Ross. Long-Term Memory of Odors With and Without Verbal Descriptors. Journal of Experimental Psychology, 100. 1973.

Engen, T., and D.H. McBurney. Magnitude and Category Scales of the Pleasantness of Odors. Journal of Experimental Psychology, 68. 1964.

Engen, T., and L.P. Lipsitt. Decrement and Recovery of Responses to Olfactory Stimuli in the Human Neonate. Journal of Comparative and Physiological Psychology, 59. 1965.

Engen, T., and P.A. Furth. Effects of Cigarette Smoking on Odor Detection. Unpublished Manuscript, Brown University. 1975.

Engen, T., J.E. Kuisma, and P.D. Eimas. Short Term Memory of Odors. Journal of Experimental Psychology, 99. 1973.

Engen, T., L.P. Lipsitt, and H. Kaye. Olfactory Responses and Adaption in the Human Neonate. Journal of Comparative and Physiological Psychology, 56. 1963.

Engen, T., R.A. Kilduff, and N.J. Rummo. The Influence of Alcohol on Odor Detection. Chemical Senses and Flavour, 1. 1975.

Engen, T.. Man's Ability to Perceive Odors. In: Advances in Chemoreception. Vol. 1: Communication by Chemical Signals. Appleton. New York, 1970.

Engen, T.. The Effect of Expectation on Judgements of Odor. Research Report ICLR-RR-70-11, Injury Control Research Laboratory, US Department of Health, Education and Welfare. 1972.

Engen, T.. The Perception of Odors. Academic Press Series in Cognition and Perception. New York, 1982.

Engen, T.. Why the Aroma Lingers on. Psychology Today, 13, 138. 1980

Erickson, R.P., and S.S. Schiffman. The Chemical Senses: A Systematic Approach. In: Handbook of Psychobiology. Academic Press. New York, 1975.

Escher, S.D., and E. Oliveros. A Quantitative Study of Factors That Influence the Substantivity of Fragrance Chemicals on Laundered and Dried Fabrics. Journal of the American Oil Chemistry Society, 71. 1994.

Evaluation of the Use of Humans in Measuring the Effectiveness of Odor Control Technology at the Source, NCASI Technical Bulletin 56, National Council of the Paper Industry.

Evans, C.D., H.A. Moser, and List. Odor and Flavor Responses to Additives in Edible Oils. Journal of the American Oil Chemists Society, 48. 1971.

Eykman, H.J. "Klinische Olfactometrie." Thesis, Utrecht. [German]. Code D6, 1927.

Fawcett, H.H.. Hazardous and Toxic Materials: Safe Handling and Disposal. John Wiley and Sons. New York, 1984.

Fazzalari, F.A., Ed. Compilation of Odor and Taste Threshold Values Data. Sponsored by ASTM Committee E-18 on Sensory Evaluation of Materials and Products. ASTM Data Series DS48A. Philadelphia: American Society for Testing and Materials, 1978.

Fesenko, E.E., V.I. Novoselov & K. Krapivinskaya. Molecular Mechanisms of Olfactory Reception IV. Some Biochemical Characteristics of the Camphor Receptor from Rat Olfactory Epithelium. Biochem. Biophys. Acta 587.

Finger, T.E., and W.L. Silver. Neurobiology of Taste and Smell. John Wiley & Sons. Toronto, 1987.

Fomin, A.P. Biological Effect of Epichlorohydrine and Its Hygienic Significance as an Atmospheric Pollutant. Hyg. Sanit. USSR, 31. [English translation of Russian article]. Code B2, 1966.

Foster, D., L.A. Smith, and E.H. Scofield, a New Dirhinic Olfactory Stimulator, Am. J. Psychol. 60:272, 1947.

Frazier, J.L. & J.R. Heitz. Inhibition of Olfaction in the Moth Heliothis Virescens by the Sulfhydryl Reagent Fluorescein Mercurec Acetate. Chem. Senses and Flavour 1, 1975.

Frederiksen, J.R.. Two Models for Psychophysical Judgement: Scale Invariance with Changes in Stimulus Range. Perception & Psychophysics, 17(2). 1975.

Free, E.E.. Shall We Train Our Noses? Forum, 75. 1926.

Friedman, L. & J.G. Miller. Odor Incongruity and Chirality. Science 172, 1971.

Frisch, D. Notes on the Fine Stucture of the Olfactory Epithelium. In: Olfaction and Taste III, G. Ohloff (ed.), Rockeffeller University Press, New York, 1969.

Furchgott, E., and M.P. Friedman. The Effect of Hunger and Taste on Odor RLs. Journal of Comparative and Physiological Psychology, 53. 1960.

Geldard, F.A.. The Human Senses. John Wiley and Sons. New York, New York, 1972.

Gennings, J.N., D.B. Gower & L.H. Bannister. Studies on the Receptors to 5-alpha-16-en-3-alphanol in Slow Nasal Mucosa. Biochem. Biophys. Acta. 496, 1977.

Genot, R.. But, Doctor, What an Odor. Scalpel, 114. Brussels, 1961.

Gesteland, R.C., J.Y. Lettvin, W.H. Pitts & A. Rojas. Odor Specificities of the Frog's Olfactory Receptors. In: Olfaction and Taste I, Y. Zotterman (ed.), Pergamon Press, London, 1963.

Gesteland, R.C.. The Neural Code: Integrative Neural Mechanisms. In: Handbook of Perception. Vol. VIA, Tasting and Smelling. Academic Press. New York, !978.

Getchell, M.L., and R.C. Gesteland. The Chemistry of Olfaction Reception: Stimulus Specific Protection From Sulfhydryl Regent Inhibition. Proceedings of National Academy of Sciences, 69. 1972.

Getchell, T.V. Analysis of Intracellular Recordings from Salamander Olfactory Epthelium. Brain Resiarch 123, 1977.

Getchell, T.V. Analysis of Unitary Spikes Recorded Extracellularly From Frog Olfactory Cells and Axons. J. Physiol. 234, 1973.

Getchell, T.V. Electrogenic Sources of Slow Voltage Transients Recorded from Frog Olfactory Epithelium. J. Neurophysiol. 26, 1974.

Getchell, T.V. & M.L. Getchell. Signal Detecting Mechanisms in the Olfactory Epithelium: Molecular Discrimination. Ann. N.Y. Acad. Sci. 237, 1975.

Gibbons, B.. The Intimate Sense of Smell. Official Journal of the National Geographic Society, Vol. 170, 3. Washington, D.C., 1986.

Gofmekler, V.A. Experimental Observation of the Reflex Effect of Acetaldehyde Upon Human Organism. Cesk. Hyg., 12. [English summary of Czech. article]. Code B2, 1967.

Goldberg, S.J., J. Turpin, & S. Price. Anisole Binding Protein from Olfactory Epithelium: Evidence for a Role in Transduction. Chem. Senses and Flavour 4, 1979.

Gordon, K.. The Recollection of Pleasant and Unpleasant Odors. Journal of Experimental Psychology, 8. 1925.

Graziadei, P.P.C. Topological Relations Between Olfactory Neurons. Z. Zellforsch. 118, 1971.

Graziadei, P.P.C.. Cell Dynamics in the Olfactory Mucosa. Tissue and Cell, 5. 1973.

Green, D.M. and J.A. Swets. Signal Detection Theory and Phsychophysics. John Wiley and Sons. New York, 1966.

Greenberg, M.J.. The Dependence of Odor Intensity on the Hydrophobic Properties of Molecules. In: Odor Quality and Chemical Structure. American Chemical Society, 148. Washington, D.C., 1981.

Grijns, G. Messungen der Riechscharfe bei European und Javanen. Arch. Anat. Physiol., Physiol. Abt., 30. Code E2, 1906.

Grijns, G. Y-a-t-il une Relation Entre le Pouvoir Absorbant a l'égard de la Chaleur Rayonnante et le Pouvoir Odorant des Substances. Arch. Neerl. Physiol., 3. [French]. Code E2, 1919.

Guadagni, D.G., R.G. Buttery, and J. Harris. Odour Intensities of Hop Oil Components. Journal of the Science of Food and Agriculture, Vol. 17. 1966.

Guadagni, D.G., R.G. Buttery, and S. Okano. Odour Thresholds of Some Organic Compounds Associated With Food Flavors. Journal of the Science of Food and Agriculture, Vol. 14. 1963.

Guadagni, D.G.. Additive Effect of Sub-Threshold Concentrations of Some Organic Compounds Associated Food Aromas. Nature, Vol. 200. 1963.

Guadnagni, D.B., R.G. Buttery, S. Okana, and H.K. Burn. Additive Effect of Sub-Threshold Concentrations of Some Organic Compounds Associated With Food Aromas. Nature, 200. 1963.

Guillot, M.. Anosmies Partielles et Odours Fondamentales. Canadian Royal Academy of Science Service, 226. 1948.

Gundlach, R.H. & G. Kenway. A Method for the Determination of Olfactory Thresholds in Humans. J. Exp. Psychol., 24. Code A, 1939.

Gusel'nikov, V.L., A.M. Korolev & O.Y. Frolov. Interaction of Odorants and the Olfactory Hairs of Frogs in Vitro. Doklady Biochem. 216, 1974.

Hall, R.H., and W. Krawciw. Sensory Pollution and the Petroleum Industry. Petroleum Industry Environmental Conservation Association. 1975.

Hangartner, M.. Belastigung durch Geruchsimmissionen. Sozial Praventivemd., 25. 1980.

Hannson, B.S., and Others. Functional Specialization of Olfactory Glomeruli in a Moth. Science, 256. 1992.

Hargrave, W.J., and C.R. Burdick. The Physiology of Taste and Odour Problems in Drinking Water. Environmental Science and Engineering. 1996.

Haring, H.G.. Vapor Pressures and Raoult's Law Deviations in Relation to Odor Enhancement and Suppression. In: Human Responces to Environmental Odors. Academic Press. New York, 1974.

Harper, R. E.C. Bate-Smith, E.C. Land, and N.M. Griffitys. A Glossary of Odor Stimuli and Their Qualities. Perfume Essential Oil Rec., 59. 1968.

Harper, R., E.C. Bate Smith, and D.G. Land. Odour Description and Odour Classification. American Elsevier. New York, 1968.

Haycraft, J.B.. The Objective Cause of Sensation. Part III. The Sense of Smell. Brain, 11. 1889.

Hazzard, F.W.. A Descriptive Account of Odors. Journal of Experimental Psychology, 13. 1930.

Hellman, T. H. and Small, F. H., Characterization of Odors From the Petrochemical Industry Using Sensory Methods, Presented at 74th National Meeting of AIchE, New Orleans, 1973.

Hellman, T. M., and Small, F. H., Characterization of the Odor Properties of 101 Petrochemicals Using Sensory Methods, Chemical Engineering Progress, 69 (9), 75-77, 1973.

Hellman, T.M., and F.H. Small. Characterization of Petrochemical Odors. Chemical Engineering Process. 1973.

Henion, K.E.. Direct Psychophysical Scaling of the Olfactory Pleasantness of Diluted n-Amyl Acetate. Perception & Psychophysics, 10. 1971.

Henion, K.E.. Psychophysical Scales of the Olfactory Pleasantness of Homologous Alcohols. Perception & Psychophysics, 9. 1971.

Henkin, R.I., and G.F. Powell. Appetite and Anosmia. Lancet, 1. 1971.

Hopkins, H.. The Smell That Tells. FDA Consumer, DHEW Publications No.(FDA) 75-2022. 1975.

Hopton, F. J., and Laughlin, R. G. W., Brewhouse Odors Characterization and Control, Prepared for Labatt Breweries of Canada Limited, London, Ontario, Report No. P. 1444/1, Ontaroi Research Foundation, Sheridan Park, Ontario, not dated.

Hopton, F.J.. How the Nose Knows a Rose. Ontario Research Foundation. Sheridan Park Research Community. Mississauga, 1985.

Horesh, A.J., Allergy to Food Odors. Its Relation to the Management of Infantile Eczema, J. Allergy 14:331, 1943.

Hornung, D.E, and M.M. Mozell. Factors Influencing the Differential Sorption of Odorant Molecules Across the Olfactory Mucosa. Journal of General Physiology, 69. 1977.

Hubert, H.B., R.R. Fabsitz, M. Feinleib, and K.S. Brown. Olfactory Sensitivity in Humans: Genetic Versus Environmental Control. Science, 208. 1980.

Ishiguro, T.. A Study on the Evaluation of Mixed Odors. Journal of the Japan Air Cleaning Association, 11. 1975.

Itskovics, A. A., The Stimulability of the Olfactory Analyser in the Hygienic Evaluation of Atmospheric Air Pollution, U.S.S.R., Literature on Air Pollution and Related Occupational Diseases, 3, 106, 1960.

Janse, M., Ontwikkeling van een vragenljst voor schriftelijke enquetes naar stankinder (in Niederlandisch), Department of Psychology, University of Utrecht, The Nethelands, 1987.

Johnston, J.W. Jr.. The Essential Nature of Putrid Odors. In: Theories of Odors and Odor Measurement. Robert College Research Center. Istanbul, 1968.

Johnston, J.W., D.G. Moulton, and A. Turk. Advances in Chemoreception. Vol. 1: Communication by Chemical Signals. Appleton. New York, 1970.

Jones, F.N., and M.H. Jones. Modern Theories of Olfaction: A Critical Review. Journal of Psychology, 36. 1953.

Jones, F.N.. Olfactory Absolute Thresholds and their Implications for the Nature of the Receptor Process. Journal of Psychology, 40. 1955.

Jones, F.N.. Scales of Subjective Intensity for Odors of Diverse Chemical Nature. American Journal of Psychology, 71. 1958.

Jones, F.N.. Subjective Scales of Intensity for the Three Odors. American Journal of Psychology, 71. 1958.

Jounela-Ericksson, P.. Olfaction and Taste VI. Paris, 1977. Information Retrievel Ltd. London, 1977.

Jurs, P.C., C.L. Ham, and W.E. Brugger. Computer -Assisted Studies of Chemical Structure and Olfactory Quality Using Pattern Recognition Techniques. In: Odor Quality and Chemical Structure. American Chemical Society, 148. Washington, D.C., 1981.

Kaba, H., and Others. Induction of an Olfactory Memory by the Activation of a Metobotropic Glutamate Receptor. Science, 265. 1994.

Kandel, Schwartz, Jessell. Principles of Neural Science, Third Edition. New York: Elsevier Science Publishing Co., Inc, 1991.

Karlin, A. Molecular Interaction of the Acetycholine Receptor. Proc. Nat. Acad. Sci. USA 72, 1973.

Kastka, J. Psychologische Indikatoren der Verkehrslarmbelastigung. In: Schick, A.(Hsg.) Akustik zwischen Physik und Psychologie.-Stuttgart:Klett, 1981, 68-86.

Kastka, J.. Empirische Untersuchungen zur Frage der Zulassigen Belastigung durch Geruche. 3rd International and Environmental Neurology Congress, 25. Prag, 1979.

Kastka, J.. Ergebnisse einer Langsschnittuntersuchung zum Geruchsbelastigungsprobleme. 6. Arbeitstagung der Deutschen Gesellschaft fur Hygiene und Mikrobiologie e.V., 27. Mainz, 1976.

Kastka, J.. Geruchsbelastigung im Raum Dortmund. In: Minister fur Arbeit, Gesundheit und Soziales des Landes Nordrhein-Westfalen. Luftreinhalteplan Ruhrgebiet. Dortmund, 1979.

Kastka, J.. Untersuchungen zur Belastigungswirtkung der Umweltbedingungen Verkehrslarm und Industriegeruche. In: Umweltpsychologie. Perspektiven-Probleme-Praxis. Klett. Stuttgart, 1976.

Kastka, J.. Zur Katastermassigen Erfassung von Geruchsbelastigung in Industriellen Grossraumen. 37. Tagung der Deutschen Gesellschaft fur Hygiene und Mikrobiologie e.V., 1. Berlin, 1979.

Kauer, J.S. & D.G. Moulton. Responses of Olfactory Bulb Neurons to Odour Stimulation of Small Areas in the Tiger Salamander. J. Physiol. (London) 243, 1974.

Kendrick, K.M., and Others. Changes in the Sensory Processing of Olfactory Signals Induced by Birth in Sheep. Science, 256. 1992.

Kenneth, J.H.. Osmics: The Science of Smell. Oliver and Boyd. Edinburgh, 1922.

Kerka, W.F. & C.M. Humphreys. Temperature and Humidity Effect on Odor Perception. Heat./Piping/Air Cond., 28. Code B, 1956.

Kerka, W.F., and Humphreys, C.M., Temperature and Humidity Effect on Odor Perception, ASHRAE Research Report No. 1587, ASHRAE Transactions, 62, 531, 1956.

Khachaturyan, M.Kh. & B.K. Baikov. On the Possibility of Detecting the Effect of Reflexes of Low Butanol Concentrations by Inculcation of Conditioned Inhibition. Hyg. Sanit. USSR, 34. [English translation of Russian article]. Code B, 1969.

Khachaturyan, M.Kh., M.I. Gusev & O.E. Gorlova. The Effect of Weak Olfactory Stimuli on the Latent Period of Motor Reaction to Light in Man. Hyg. Sanit. USSR, 33. [English translation of Russian article]. Code B, 1968.

Kimbrell, G.McH., and E. Furchgott. The Effect of Aging on Olfactory Threshold. Journal of Gerontology, 18. 1963.

Kimura, K. Olfactory Nerve Response of the Frog. Kumamoto Med. J. 14, 1961.

King, B.M. and J. Solms. Air-Water Partitioning of Flavour Compounds in Systems Containing Purines, in: "Olfaction and Taste VII". Irl Press Ltd.. London, 1980.

Klopping, H. L., Olfactory Theories and the Odors of Small Molecules, J. Agr. Good Chem., 19, 999, 1971.

Klopping, H.L. Olfactory Theories and the Odors of Small Molecules. Journal of Agriculture and Food Chemistry, 19. 1971.

Klopping, H.L.. Olfactory Theories and the Odors of Small Molecules. J. Agr. Food Chem., 1971.

Kniebes, D.V., J.A. Chisholm & R.C. Stubbs. Olfactory Response Factors for Natural Gas Odorants. Presented at the American Gas Association, Houston, TX, 1968. Code B, 1969.

Kobayashi, A.. Sotolon. Identification, Formation, and Effect on Flavour. Flavour Chemistry. 1989.

Koch, R.B. Biochemical Studies of Olfactory Tissue. Responses of ATPase to Octanal and Ascorbic Acid. Chem. Biol. Interact. 4, 1971.

Koch, R.B. & D. Dessaiah. Preliminary Studies on Rat Olfactory Tissue: Effects of Odorant on Na-K ATPase Activity. Life Sci. 15, 1974.

Koch, R.B. & H. Rossi. Effect of Antibody to Anisole Binding Protein on Odorant Perturbation of Na-K Sensitive ATPase Activity. Chem. Senses and Flavour 6, 1981.

Koelega, H.S., and E.P. Koster. Some Experiments in Sex Differences in Odor Perception. Annals of the New York Academy of Sciences, 237. 1974.

Koelega, H.S.. Olfaction and Sensory Asymmetry. Chemical Senses and Flavor, 4. 1979.

Koelega, Harry S. Annals of the New York Academy of Sciences. Vol. 237. Code E2, 1974.

Koster, E.P. "Adaptation and Cross-adaptation in Olfaction." Thesis, Utrecht. Code E2, 1971.

Koster, E.P. Human Psychophysics in Olfaction. In: Methods of Olfactory Research, (ed D.G. Moulton et al), London: Academic Press, 1975.

Koster, E.P.. Intensity in Mixtures of Odorous Compounds. In: Olfaction and Taste, III. Rockefeller University Press. New York, 1969.

Kubie, J.L. & D.G. Moulton. Regional Patterning of Responses to Odors in the Salamander Olfactory Mucosa. Society fro Neuroscience Abstracts 5, (Abstract #414), 1979.

Kuehner, R.L., Humidity Effects on the Odor Problem, ASHRAE Research Report No. 1569, ASHRAE Transactions 62, 249, 1956.

Kurahashi, T., and Others. Suppression of Odorant Responses by Odorants in Olfactory Receptor Cells. Science, 265. 1994.

Laffort, P. & A. Dravnieks. An Approach to a Physico-chemical Model of Olfactory Stimulation in Vertebrates by Single Compounds. J. Theor. Biol., 38. Code B, 1973.

Laffort, P.. Mise en Evidence de Relations Lineaires entre l'Activite Odorante des Molecules et Certaines de Leurs Caracteristiques Physicochimiques. Comptes Rendus. Academie des Sciences 256. 1963.

Laing, D.G. A Comparitive Study of the Olfactory Sensitivity of Humans and Rats. Chem. Senses Flavor, 1. Code A, 1975.

Laing, D.G., Characterization of human behaviour during odour perception, in Perception, 1982, volume 11, pp. 221-230.

Laing, D.G., H. Panhuber & R.I. Baxter. Olfactory Properties of Amines and n-butanol. Chem. Senses Flavor, 3. Code A, 1978.

Laing, D.G.. A Comparative Study of Olfactory Sensitivity of Humans and Rats. Chemical Senses and Flavor, 1. 1975.

Lauffer, P.G.. Odor. In: The Encyclopedia of Chemistry, 3rd Edition. Van Nostrand Reinhold Company. New York, 1973.

Laughlin, H.F.. Influence of Temperature in Threshold Odor Evaluation. Taste Odor Control Journal, 28. 1962.

Laurent, G., and H. Davidowitz. Encoding of Olfactory Information with Oscillating Neural Assemblies. Science, 265. 1994.

Lawless, H.T., and T. Engen. Associations to Odors: Interference, Memories, and Verbal Labelling. Journal of Experimental Psychology, 3. 1977.

Lawless, H.T., and W.S. Cain. Recognition Memory for Odors. Chemical Senses and Flavor, 1. 1975.

Leigh, A.D.. Defects of Smell After Head Injury. Lancet, 1. 1943.

Leitereg, T., D.G. Guadagni, J. Harris, T.R. Mon & R. Teranishi. Evidence for the Difference Between the Odours of the Optical Isomers (+) and (-) Carvone. Nature 230, 1971.

LeMagnen, J.. Olfaction and Nutrition. In: Handbook of Sensory Physiology, Vol IV. Springer-Verlag. New York, 1971.

Lester, D. & W.R. Adams. The Inhalational Toxicity of Oxygen Difluoride. Am. Ind. Hyg. Assoc. J., 26. Code C1, 1973.

Lindvall, T., On Sensory Evaluation of Odorous Air Pollutant Intensities, Dept. of Environment Hygiene, Karolinska Institute, Stockholm, Sweden, 1970.

Lindvall, T., Swedish Experiences on Sensory Evaluation of the Odorous Air Pollution Intensities, Proceedings of 2nd International Clean Air Congress, Academic Press, New York, 1971.

Lindvall. T.. Perception of Composite Odorous Air Pollutants. Proceedings of the 6th International Symposium on Olfaction and Taste. Information Retrieval. Washington, 1977.

Lindzey, G., and E. Aronson. Handbook of Social Psychology, Vol. II. Addison-Wesley. Massachusetts, 1968.

Lipsitt, L.P., T. Engen, and H. Kaye. Developmental Changes in the Olfactory Threshold of the Neonate. Child Development, 34. 1963.

Lipsitt, L.P., T. Engen, S.J. Bloom, and V. Jennings. Olfactory Development in Children to Five Years of Age. Unpublished Report. Brown University. 1975.

Lundstrom, I. & C. Nylander. A Possible Model for Receptors in Excitable Membranes. J. Theor. Biol., 1981.

Macfarlane, A.. Olfaction in the Development of Social Preferences in the Human Neonate. Ciba Foundation Symposium, 33. 1975.

Macleod, P.. Quality Coding Through Neural Response Patterns. In: Transduction Mechanisms in Chemoreception. Information Retreival. London, 1974.

Macleod, P.. Structure and Function of Higher Olfactory Centers. In: Handbook of Sensory Physiology. IV: Chemical Senses, Part 1, Olfaction. Springer-Verlag. Heidelberg, 1971.

Mair, R.G., C. Capra, W.J. McEntree, and T. Engen. Odor Discrimination and Memory in Korsakoff's Psychosis. Journal of Experimental Psychology: Human Perception and Performance, 6. 1980.

Mair, R.G., J.A. Boufford, T. Engen, and T.H. Morton. Olfactory Sensitivity During the Menstrual Cycle. Sensory Processes, 2. 1978.

Margolis, F.L. and T.V. Getchell. Molecular Neurobiology of the Olfactory System. Molecular, Membranous, and Cytological Studies. Plenum Press. New York, 1988.

Maria, G.. On The Problems of the Odour Parameters of Air Pollution. Idojaras, 73. Budapest, Hungaria, 1969.

Marks, L.E.. Sensory Process: The New Psychophysics. Academic Press, Inc.. New York, 1074.

McCartney, W. Olfaction and Odours. Springer-Verlag. New York, 1968.

McCord, C. P. and Witherridge, W. M., Odors: Physiology and Control, McGraw-Hill Book Company, New York, 1949.

McCord, C.P. and W.M. Witheridge. Odors: Physiology and Control. McGraw-Hill Book Company. New York, 1949.

McGee, W.A., F.L. Oglesby, R.L. Raleigh & D.W. Fassett. The Determination of a Sensory Response to Alkyl 2-Cyanoacrylate Vapor in Air. Am. Ind. Hyg. Assoc. J., 29. Code C4, 1968.

McGill, J.R. & B.R. Kowalski. Intrinsic Dimensionality of Smell. Anal. Chem., 1977.

McKenzie, D.. Aromatics and the Soul: A Study of Smells. Hoeber. New York, 1923.

Menevse, A., G. Dodd & T.M. Poynder. Evidence for the Specific Involvement of Cyclic AMP in the Olfactory Transduction Mechanism. Biochem. Biophys. Res. Commun. 77, 1977.

Menevse, A., G.H. Dodd, T.M. Poynder & D. Squirrel. A Chemical Modification Approach to the Olfactory Code. Biochem. Soc. Trans. 5, 1977.

Menevse,A., G. Dodd, and T.M. Poydner. A Chemical Modification Approach to the Olfactory Code, Studies With a Thiol-Specific Reagent. Biochemistry Journal, 176. 1978.

Mitchell, M.A., K.S. Konigsbacher, and W.M. Edman. The Importance of Odor as a Nonfunctional Component or Odor-A Tool of Marketing. Annals of the New York Academy of Sciences, 116. 1964.

Moncrieff, R. W., The Chemical Senses, 2nd Ed., p. 395, Leonard Hill Limited, London, 1951.

Moncrieff, R., The Chemical Senses, 3rd ed., Leonard Hill, London, 1967.

Moncrieff, R.W.. Odor Preferences. Leonard Hill. London, 1966.

Montcrieff, R.W.. Olfactory Adaption and Odor Likeness. Journal of Physiology, 133. London, 1956.

Montgomery, H..Magnitude Scales, Category Scales, and the General Psychophysical Differential Equation. Perception & Psychophysics, 21. 1977.

Morimura, S. Untersuchung uber den Geruchssinn. Tohoku J. Exp. Med., 22. [German]. Code E1, 1934.

Morresi, A. C., Cheremisinoff, P. N., and Young, R. A., Human Response and Effects of Odors, Industrial Odor Technology Assessment, Edited by P. N. Cheremisinoff and R. A. Young, Ann Arbor Science Publishers, Inc., Chapter 1, 1-25, 1974.

Morresi, A.C., P.N. Cheremisinoff, and R.A. Young. Human Response and Effects of Odors. In: Industrial Odor Technology Assessment. Ann Arbor Science Publications Inc.. Ann Arbor, 1975.

Morrison, G.R. “Flavour Thresholds for Added Substances”. J. Inst. Brew. 88, 1982.

Moschandreas, D.J., and D.R. Jones. Fatigue of Olfactory Senses to Odorants Used in Natural Gas Odorization Practices. IIT Research Institute. Chicago, Illinois. Presented at the 79th Annual Meeting of the Air Pollution Control Association. Minneapolis, Minnesota, 1986.

Moschandreas, D.J., and S.M. Relwani. Perception of Environmental Tobacco Smoke Odors: an Olfactory and Visual Response. Atmospheric Environment B, 26B. 1992.

Moschandreas, D.J., D. Jones, J. Martinus, and E. Ragus. Odor Recognition and Fatigue. IITRI Annual Report No. C08601, GRI Accenssion No. GRI 81 0088. 1982.

Moskowitz H.R., Dravnieks A., Cain W.S., Turk A., Standardized procedure for expressing odor intensity, Chem. Senses Flovour 1: 235-237, 1974.

Moskowitz, H.R. & A. Dravneiks. Odor Intensity and Pleasantness of Butanol. J. Exp. Psychol., 103. Code B, 1974.

Moskowitz, H.R., A. Dravnieks, and L.A. Klarman. Odor Intensity and Pleasantness for a Diverse Set of Odorants. Perception and Psychophysics, 19. 1976.

Moskowitz, H.R., and C.L. Gerbers. Dimensional Salience of Odors. Annals of the New York Academy of Sciences, 237. 1974.

Moskowitz, H.R., B. Scharf, and J.C. Stevens. Sensation and Measurement. D. Reidel Publishing Company. Dordrecht, 1974.

Moskowitz, H.R.. Perception and Psychophysics. 1970.

Moulton, D.G. Olfactory Performance and Receptor Processes in the Dog. In: Y. Katsuki, M. Sato, S.F. Takagi & Y. Oomura (Eds.). Food Intake and Chemical Senses. Japan Scientific Societies Press. Code D6, 1977.

Moulton, D.G. Spatial Patterning of Response to Odors in the Peripheral Olfactory System. Physiol. Rev. 47, 1976.

Moulton, D.G. & D.A. Marshall. Odor Detection in Dog and Man. In: Abstracts of the First Congress of the European Chemoreception Research Organization, Paris. Code D4, 1974.

Moulton, D.G., & L.M. Beidler. Structure and Function of the Peripheral Olfactory System. Physiol. Rev. 47, 1967.

Moulton, D.G., and L.M. Beidler. Structure and Function in the Peripheral Olfactory System. Physiological Review, 47. 1967.

Moulton, D.G.. Differential Sensitivity to Odors. In Sensory Receptors. Cold Spring Harbour Symposium 30. 1965.

Moulton, D.G.. Spatial Patterning of Responses to Odors in the Peripheral Olfactory System. Physiological Reviews, 56. 1976.

Moulton, D.G.. The Olfactory Pigment. In: Handbook of Sensory Physiology. Springer-Verlag. Berlin, 1970.

Mower, G.D., R.G. Mair, and T. Engen. Influence of Internal Factors on the Perceived Intensity and Pleasantness of Gustatory and Olfactory Stimuli. In: The Chemical Senses and Nutrition. Academic Press. New York, 1977.

Mozell, M.M. Evidence for a Chromatographic Model of Olfaction. J.Gen. Physiol. 56, 1970.

Mozell, M.M. Evidence for Sorption as a Mechanism of the Olfactory Analysis of Vapors. Nature 203, 1964.

Mozell, M.M. & M. Jagodwicz. Chromatographic Separation by the Nose: Retention Times Measured Across in vivo Olfactory Mucosa. Science 181, 1973.

Mueller, C. G., Sensory Psychology, Prentice-Hall, Englewood Cliff, New Jersey, 1965.

Mullins, L. J., Olfaction, Annals New York Academy of Sciences, 62, 247, 1955.

Mustaparta, H. Spatial Distribution of Receptor Responses to Stimulation with Different Odours. Acta Physiol. Scand. 82, 1971.

Naves, Y.R.. The Relationship Between the Stereochemistry and Odorous Properties of Organic Substances. In: Molecular Structure and Organoleptic Quality. S.C.I. Monograph No.1. 1957.

Nishida, K., M. Yamakawa, and T. Honda. Experimental Investigations on the Combined Effects of Components Mixed in Odorous Gas. Mem. Fac. Eng. Kyoto Univ., 41. 1979.

Oakley, B. & R. Schafer. Experimental Neurobiology: A Laboratory Manual, University of Michigan Press, Ann Arbor, 1978.

Odors. ASHRAE Handbook of Fundamentals. New York, N.Y. 1974.

Ohloff, G. Steriochemistry-activity Relationships in Human Odor Sensation. In: Olfaction and Taste VII. London: IRL Press Ltd., 1980.

Ohloff, G.. Stereochemistry-Activity Relationships in Human Odor Sensations in Human Odor Sensations: The Trixial Rule in " Olfaction and Taste VII". IRL Press Ltd.. London, 1980.

Olfaction and Taste V, Proceedings of the Fifth International Symposium, edited by Derek A. Denton and John P. Coghlan, Academic Press, New York, 1975.

On the Scent of a Better Day at Work. New Science, 129. 1991.

Ottoson, D. Analysis of the Electrical Activity of the Olfactory Epithelium. Acta Physiol. Scand. 35 (suppl. 122), 1956.

Ottoson, D.. Analysis of the Electrical Activity of the Olfactory Epithelium. Acta Physiologica Scandinavica, 35 (Supplement 122). 1956.

Ottoson, D.. Studies on the Relationship Between Olfactory Stimulating Effectiveness and Physiochemical Properties of Odorous Compounds. Acta Physiologica Scandinavica, 43. 1958.

Ottoson, D.. Sustained Potentials Evoked by Olfactory Stimulation. Acta Physiologica Scandinavica, 5 (Supplement 122). 1954.

Pager, J.. Nutritional States, Food Odors, and Olfactory Function. In: The Chemical Senses and Nutrition. Academic Press. New York, 1977.

Pangborn, R. M., Berg, H. W., Roessler, E. B. and Webb, A. D., Influence of Methodology on Olfactory Response, perceptual and Motor Skills, 18, 91-103, 1964.

Parker, G.H. & E.M. Stabler. On Certain Distinctions Between Taste and Smell. Am J. Physiol., 32. Code B, 1913.

Passy, J. Revenue Generale sur les Sensations Olfactives. Annee Psychol., 2. [French]. Code D5, 1893.

Passy, J. Sur la Perception des Odeurs. C.R. Soc. Biol., 44. [French]. Code D5, 1892.

Passy, J. Sur Quelgues Minimums Perceptibles d-Odeurs. C.R. Hebd. Seances Acad. Sci., 114. [French]. Code D5, 1892.

Patrick, G.T.W.. On the Confusion of Tastes and Odors. Psychological Review, 6. 1899.

Patte F., Etcheto M., Laffort P., Selected and standardized values of suprathreshold odor intensities for 110 substances, Chem. Senses Flavour 1: 283-305, 1975.

Patte, F. "Le Codage Moléculaire de la Stimulation Olfactive-Clarifications et Mises ou Point." Thesis, Lyon. Code E2, 1978.

Pelosi, P., & A.M. Pisanelli. Binding of 2-isobutyl-3-methoxypyrazine to Cow Olfactory Mucosa. Chem. Senses and Flavour 6, 1981.

Pelosi, P., N.E. Baldaccini & A.M. Pisanelli. Binding of 2-isobutyl-3-methoxypyrazine to Olfactory Mucosa From Different Animals. In: Olfaction and Taste VII, H. van der Starre (ed.), IRL Press, London, 1980.

Persaud, K., P. Wood & G. Dodd. An Approach to Affinity Labelling of Rat Olfaction Receptors. In: Olfaction and Taste VII, H. van der Starre (ed.), IRL Press, Washington, (abstract), 1980.

Peryan, D.R. and F.J. Pilgrim. Hedonic Scales of Measuring Food Preferences. Food Technology, 11. 1957.

Peto, E.. Contribution to the Development of Smell Feeling. British Journal of Medical Psychology, 15. 1936.

Pfaffman, C.. Olfaction and Taste. Proceedings of the Third International Symposium on Olfaction & Taste. The Rockefeller University Press. New York, 1969.

Pflugers Arch. - European Journal of Physiology, 273. 1978.

Plattig, K.-H., and G. Kobal. Distribution of Olfactory Evoked Brain Potentials on the Human Skull

Plattig, K.H., and G. Kobal. Zeitreihenanalysen des EEG bei Objektiver Beurteilung von Geruchsempfindungen des Menschen. In: Geruchsprobleme bei Tierhaltung und Tierkorperbeseitigung. VDI-Verlag. Dusseldorf, 1975.

Poziomek, E.J., G.L. Boshart, E.V. Crabtree, R. Dahn, J.M Green, D.J. Hoy, R.A. Mackay, G.T. Pryor, H. Stone & M. Tanabe. Research in the Olfactory Detection of Chemical Agents. Microchem. J., 16. Code C1, 1971.

Price, S. Anisole Binding Protein from Dog Olfactory Epithelium. Chem. Senses and Flavour 5, 1978.

Price, S., & J.A. Desimone. Models of Taste Receptor Cell Stimulation. Chem. Senses and Flavour 2, 1977.

Prusakov, V.M., K.K. Dushutin, N.N Ladygina & E.A. Verzhbitskaya. A Combined Action of the Products of the Interaction of Dimethylamine and Nitrogen Dioxide on the Olfactory Analyzer of Man (in Russ.). Gig. Sanit., 41. Code B2, 1976.

Pryor, G.T., G. Steinmetz, and H. Stone. Changes in Absolute Detection Threshold and in Subjective Intensity of Suprathreshold Stimuli During Olfactory Adaption and Recovery. Perception and Psychophysics, 8. 1970.

Punter, P.H. Onderzoek naar de Reukgevoeligheid en Mogelijke Mengeffecten van de 6 Belangrijkste Componenten van Vartkensmest. Psychological Laboratory, University of Utrecht. Unpublished report. Cited in Gemert and Nettenbreijer 1977. Code D1, 1975.

Puttnam, C.. Can Police Dogs Really Sniff Out Crimes?. New Science, 131. 1991.

Pyysalo, T., M. Suihko, and E. Honkanen. Odour Thresholds of the Major Volatiles Identified in Cloudberry and Arctic Bramble. Lebensmittel-Wisseschaften und-Technologie, 10. 1977.

Raven, P.H., and G.B. Johnson. Biology, 3rd Edition. Mosby-Year Book, Inc.. Toronto, 1992.

Rebattu, J., and H. Lafon. Les Troubles de l'Olfaction. Le Journal de Medicine de Lyon, 51. 1970.

Reed. How Does the Nose Know? Cell, Vol. 60, 1990.

Rhein, L.D. & R.H. Cagan. Biochemical Studies of Olfaction: Isolation, Characterization and Odorant Binding Activity of Cilia. Proc. Natl. Acad. Sci. USA 77, 1980.

Riddiford, L.M. Antennal Proteins of Saturiid Moths - Their Possible Role in Olfaction. J. Insect Physiol. 16, 1980.

Rocén, E. Contribution to the Localisation of "Sweet Smell" Scand. Arch. Physiol., 40. Code E2, 1920.

Rosen, A.A., J.B. Peters, and F.M. Middleton. Odor Thresholds of Mixed Organic Chemicals. Journal of the Water Pollution Control Federation, 34. 1962.

Rosenberg, B., T.N. Misra, and R. Switzer. Mechanism of Olfactory Transduction. Nature, 217. 1968.

Rossi, H., & R.B. Koch. Odorant Responses of Na-K ATPase Activity by Preparations from Paired Turbinals of Rat Olfactory Tissue. Chem. Senses and Flavour 6, 1981.

Rubert, S.L., M.H. Hollender, and E.G. Mehrhof. Olfactory Hillucinations. Archives of General Psychiatry, 5. 1961.

Rummo, N.J., and T. Engen. The Effect of Carbon Monoxide and Alcohol on Odor Detection. Injury Control Research Laboratory. Providence, Rhode Island, 1973. Unpublished Manuscript. Brown University. 1974.

Ruth, J.H.. Odor Thresholds and Irritation Levels of Several Chemical Substances: A Review. American Industrial Hygiene Association, 47. 1986.

Salo, P., L. Nykanen, and W. Suomalainen. Odor Thresholds and Relative Intensities of Volatile Aroma Components in an Artificial Beverage Imitating Whisky. Journal of Food Science, 37. 1972.

Salo, P..Aroma Research. Centre for Agricultural Publishing and Documentation. Wageningen, 1975.

Samuels, S.W. "Assessment of Perception of Air Pollution". In: W.R.D. Sewell & I. Burton (eds.), Perceptions and Attitudes in Resources Management, Information Canada, Ottawa, 1971.

Sarnat, H.B.. Olfactory Reflexes in the Newborn. Presented at the First International Congress of Child Neurology. Toronto, 1975.

Schafer, R. & K.R. Brower. Psychophysical Recognition of Functional Groups on Odorant Molecules. In: Olfaction and Taste V, D.A. Denton & J.P. Coghaln, (eds.), Academic Press, New York, 1975.

Schemper, T., S. Voss, and W.S. Cain. Odor Identification in Young and Elderly Persons: Sensory and Cognitive Limitations. Journal of Gerontology, 1. 1980.

Schiffman, S. S., Contributions to the Psychochemical Dimension of Odor: A Psychophysical Approach, Annals New York Acad, Sci., 164, 1974.

Schiffman, S.S., D.E. Robinson, and R.P. Erickson. Multidimensional Scaling ogf Odorants: Examination of Psychological and Physiochemical Dimensions. Chemical Senses and Flavor, 2. 1977.

Schiffman, S.S., J. Moss , and R.P. Erickson. Threshold of Food Odors in the Elderly. Experimental Aging Research, 2. 1976.

Schiffman, S.S., M. Orlandi, and R.P. Erickson. Changes in Taste and Smell With Age: Biological Aspects. In: Sensory Systems and Communication in the Elderly. Raven Press. New York, 1979.

Schiffman, S.S.. Contributions to the Physicochemical Dimensions of Odor: A Psychophysical Approach. Annals of the New York Academy of Science, 237. New York, 1974.

Schleppnik, A.A.. Structure Recognition as a Peripheral Process in Odor Quality Coding. In: Odor Quality and Chemical Structure. American Chemical Society, 148. Washington, D.C., 1981.

Schneider, R.A. Newer Insights into the Role and Modifications of Olfaction in Man Through Clinical Studies. Annals of the New York Academy of Sciences, 237. 1974.

Schneider, R.A., and S. Wolf. Relation of Olfactory Acuity to Nasal Membrane Function. Journal of Applied Physiology, 15. 1960.

Scniffman, S. S., Physiochemical Correlates of Olfactory Quality, Science, 185, 112, 1974.

Self, P.A., Horowitz, F.D., and L.Y. Paden. Olfaction in New Born Infants. Developmental Psychology, 4. 1972.

Semb, G.. The Detectibility of the Odor of Butanol. Perception and Psychophysics, 4. 1968.

Sgibnev, A.K. The Action of Low Formaldehyde Fumes Concentrations on the Human Organism. Gig. Tr. Prof. Zabol., 12. [English summary of Russian article]. Code B2, 1968.

Shepard, G.M., T.V. Getchell, and K.S. Kauer. Analysis and Function in the Olfactory Pathway. In: The Nervous System. The Basic Neurosciences. Raven Press. New York, 1975.

Shepard, G.M.. Central Processing of Olfactory Signals. In: Chemical Signals in Vertabrates. Plenum Press. New York, 1976.

Shepherd, G.M.. Neurobiology, 3rd Edition. Oxford University Press. Toronto, 1994.

Shibuya, T. & D. Tucker. Single Unit Responses of Olfactory Receptors in Vultures. In: Olfaction and Taste II, T. Hayashi (ed.), Pergamon Press, New York, 1967.

Shibuya, T., N. Ai, and S.F. Takagi. Response Types of Single Cells in the Olfactory Bulb. Proceedings of Japan Academy, 38. 1962.

Smith, D.B., T. A. Goff, and J.J. Principato. Human Odorant Evoked Responses: Effects of Trigeminal or Olfactory Deficit. Electroencephalography & Clinical Neurophysiology, 30. 1971.

Smyth, H.F. & J. Seaton. Acute Response of Guinea Pigs and Rats to Inhalation of the Vapors of Tetraethyl Orthosilicate (Ethyl Silicate). J. Ind. Hyg. Toxicol., 22. Code C4, 1940.

Spence, W., and J.P. Guilford. The Affective Value of Combinations of Odors. American Journal of Psychology, 45. 1933.

Steinbrecht, R.A. Comparative Morphology of Olfactory Receptors. In: Olfaction and Taste III, G. Ohloff (ed.), Rockefeller University Press, New York, 1969.

Steinbrecht, R.A.. Comparative Morphology of Olfactory Receptors. In: Olfaction and Taste III. Rockefeller University Press. New York, 1969.

Steinheider, B., G. Winneke, and H.-W. Schlipkoter. Somatic and Psychological Effects of Malodours. A Case Study from a Mushroom Fertilizer Production Plant. Staub-Reinhaltung der Luft 53. 1993.

Stevens S.S., The psychophysics of sensory function, Amer. Sci. 48:226-253, 1960.

Stevens, S.S.. On the Psychophysical Law. Psychological Review, 64. 1957.

Stoddart, D.M.. The Ecology of Vertebrate Olfaction. Chapman and Hall. New York, 1980.

Stoll, M.. Important Effects on Odor Produced by Slight Chemical Differences. France Parfums, 8. 1965.

Stone, H. Some Factors Affecting Olfactory Sensitivity and Odor Intensity. Thesis, University of California. Code E2, 1963.

Stone, H. & G. Pryor. Some Properties of the Olfactory System of Man. Percept. Psychophys., 2. Code B, 1967.

Stone, H. & J.J. Bosley. Olfactory Discrimination and Weber's Law. Percept. Mot. Skills, 20. Code B, 1965.

Stone, H., G.T. Pryor & G. Steinmetz. A Comparison of Olfactory Adaptation Among Seven Odorants and Their Relationship with Several Physiochemical Properties. Percept. Psychophys., 12. Code B, 1972.

Stone, H., G.T. Pryor & J. Colwell. Olfactory Detection Thresholds in Man Under Conditions of Rest and Exercise. Percept. Psychophys., 2. Code B, 1967.

Stone, H., Ough, C. S., and Pangborn, R. M., Determination of Odor Dirrerence Thresholds, J. Food Science, 27, 197-202, 1962.

Stuckey, S.. Smell of Success for a Panda's Love Life (Could Sensors Tell When a Panda is Ready for Fertilization). Engineer, 278. 1994.

Stuiver, M.. Biophysics of the Sense of Smell. Doctoral Dissertation, University of Grooningen. 1958.

Stuiver, M.. De l'Effet Important de Differences Chimiques Minimes sur la Perception de l'Odeur. France et ses Parfums 8. 1965.

Sullivan, D. C., Adams, D. F., and Young, F. A., Design of an Odor Perception and Objectionability Threshold Test Facility, Atmospheric Environment, 2 (2), 121-133, 1968.

Sullivan, R.J., Air Pollution Aspects of Odorous Compounds, Litton Systems, Inc. Environmental Systems Division 7300 Pearl Street, Bethesda, Maryland 20014, Prepared for the National Air Pollution Control Administration Consumer Protection & Environmental Health Service Department of Health, Education, and Welfare (Contract No. PH-22-68-25), September 1969.

Swets, J. A., Is There a Sensory Threshold?, Science, 134, 168-177, 1961.

Swets, J. A., Tanner, W. B., and Birdsall, T.G., Decision Processes in Perception, Stimulus and Perception, Readings in Sensory Psychology, Edited by W.S. Cain and L.E. Marks, Little, Brown, Boston, 1971.

Swets, J.A., W.B. Tanner, and T.G. Birdsall. Decision Processes in Perception. In: Stimulus and Perception: Readings in Sensory Psychology. Boston, 1971.

Takagi, S. EOG Problems. In: Olfaction and Taste III, G. Ohloff (ed.), Rockefeller University Press, New York, 1969.

Takagi, S.F., and K. Omura. Responses of the Olfactory Receptor Cells to Odours. Proceedings of the Japan Academy, 39. 1963.

Takagi, S.F., and M. Okano. Electrogenesis and Secretion in the Olfactory Epithelium. Proceedings of the International union of Physiological Sciences, IX. 1971.

Takagi, S.F., and T. Yajima. Electrical Activity and Histological Change of the Degenerating Olfactory Epithelium. Journal of General Physiology, 48. 1965.

Takagi, S.F., K. Aoki, M. Iino, and T. Yajima. The Electropositive Potential in the Normal and Degenerating Olfactory Epithelium. In: Olfaction and Taste III. Rockefeller University Press. New York, 1969.

Takagi, S.F.. Biophysics of Smell. In: Handbook of Perception. Vol. VIA, Tasting and Smelling. Academic Press. New York, 1978.

Takeuchi, A., and N. Takeuchi. On the Permeability of End-Plate Membrane During the Action of Transmitter. Journal of Physiology, 154. London, 1960.

Tanabe, T., M. Iino, Y. Oshima, and S.F. Takagi. An Olfactory Area in the Prefrontal Lobe. Brain Research, 80. 1974.

Tank, D.W., and Others. Odors, Oscillations, and Waves: Does it All Compute?. Science, 265. 1994.

Tanyolac, N.N.. Theories of Odor and Odor Measurement. Unwin. London, 1968.

Teranishi, R.. Odor and Molecular Structure. In: Gustation and Olfaction. Academic Press. London, 1971.

Treisman, M.. Sensory Scaling and the Psychophysical Law. Quarterly Journal of Experimental of Psychology, 16. 1964.

Treon, J.F. & F.R. Dutra. Physiological Response of Experimental Animals to the Vapor of 2-nitropropane. AMA Arch. Ind. Hyg. Med., 5. Code C1, 1952.

Tucker, D. and S. Shibuya. A Physiologic and Pharmacologic Study of Olfactory Receptors. Cold Spring Harbour Symposium of Quantitative Biology, 30. 1965.

Tucker, D.. Olfactory Cilia are not Required for Receptor Function. Federaction Proc., 26. 1967.

Tucker, D.. Olfactory, Vomero-Nasal, and Trigeminal Receptor Responses to Odorants. In: Olfaction and Taste. Pergamon Press. Oxford, 1963,

Turk, A., et al., (Eds.). "Human Responses to Environmental Odors". Academic Press, New York, N.Y., 1974.

VDI-Kommission Reinhalting der luft, Geruche, Stand der Erkenntnisse zur Ermittlung von Belastung und Belastigung, Workshop 28. November 1989, Dusseldorf.

Venstrom, D., and J.E. Amoore. Olfactory Threshold in Relation to Age, Sex or Smoking. Journal of Food Science, 33. 1968.

Vernet-Maury, E. Olfaction and Taste VII. (ed H. van der Starre), IRL Press Ltd, 1980.

Vines, G.. Ewe-Turn for Maternal Behaviour. New Science, 134. 1992.

Vines, G.. How Yuccus Neutralise Nasty Niff. New Science, 131(12). 1991.

Viswanathan, S.. Evaluation of Intensities, Hedonics and Complaint Potentials of Aliphatic Alcohols and Acetates Using n-Butanol as Standard. M.A.Sc. Thesis, University of Windsor. Windsor, Ontarion, 1979.

von Sydow, E.. Comparison Between Psychophysical and Electrophysiological Data for Some Odor Substances. In: Theories of Odor and Odor Measurement. Unwin. London, 1968.

Wang, H.-W., and Others. Induction of Olfactory Receptor sensitivity in Mice. Science, 260. 1993.

Warren, C.B.. Development of Fragrances with Functional Prorerties by Quantitative Measurement of Sensory and Physical Parameters. In: Odor Quality and Chemical Structure. American Chemical Society, 148. Washington, D.C., 1981.

Wells, F.L.. Reaction-Time to Affects Accompanying Smell Stimuli. American Journal of Psychology, 41. 1929.

Wenzel, B.M.. Differential Sensitivity in Olfaction. Journal of Experimental Psychology, 39. 1949.

Whisman, M.L., J.W. Goetzinger, F.O. Cotton, and D.W. Brinkman. Odorant Evaluation: A Study of Ethanethiol and Tetrahydrothiophene as Warning Agents in Propane. Environmental Science Technology, 12. 1978.

Wilby, F.V., Variation in Recognition Odor Threshold of a Panel, J. Air Pollution Control Association, 19, (2), 96-100, 1969.

Winkler K., Zur Diskussion Gestellt: Imissionsgrenzwerte zur Verhinderrung von Geruchsbelastigungen, Wasser Luft Betrieb 19, 411, 1975.

Winneke , G. and J. Kastka. Odour Pollution and Odour Annoyance Reaction in Industrial Areas of the Rhine-Ruhr-Region. Proceedings of the 6th International Symposium on Olfaction and Taste. Information Retrieval. London, 1977.

Wohlers, M.C.. Odor Intensity and Odor Travel From Industrial Sources. International Journal of Air and Water Pollution, 7. 1963.

Wohlwill, J.F., Human adaptation to levels of environmental stimulation, Human Ecology, 2, pp 127-147, 1974.

Wright, R. H., Odor and Molecular Vibration. I Quantum and Thermodynamic Consideration, J. of Applied Chem., 4, 611, 1954.

Wright, R.H., and A. Robson. Basis of Odor Specifity: Homologues of Benzaldehyde and Nitrobenzene. Nature, 222. London, 1969.

Wright, R.H., C. Reid, and H.G.V. Evans. Odor and Molecular Vibration (3). A New Theory of Olfaction Stimulation. Chemistry and Industry, 37. 1956.

Wright, R.H.. Molecular Vibration and the Green Odor. Journal of Applied Chememical Biotechnology. 1971.

Wright, R.H.. Odor and Chemical Constitution. Nature, 173. 1954.

Wright, R.H.. Odor and Molecular Vibration. Nature. 1966.

Wright, R.H.. Odor and Molecular Vibration.I. Quantum and Thermodynamic Considerations. Journal of Applied Chemistry, 4. London, 1954.

Wright, R.H.. Odor and Molecular Vibration: Redundancy in the Olfactory Code. In: Odor Quality and Chemical Structure. American Chemical Society, 148. Washington, D.C., 1981.

Wright, R.H.. The Science of Smell. George Allen and Unwin. London, 1964.

Wright, R.H.. Why Is An Odour?. Nature, 209. 1966.

Yoshida, M.. Descriptive and Emotional Profiles of Odours and Their Preferences. In: Preference Behaviour and Chemoreception. Informational Retrievel Limited. London, 1979.

Yoshida, M.. Studies in Psychometric Classification of Odors (4). Japanese Psychological Research, 6. 1964.

Zotterman, Y.. Olfaction and Taste. Pergamon Press. New York, 1963.

3.0 SOURCES

3.1 BACKGROUND

3.1.1 LOCATION OF AN ODOUROUS EMISSION SOURCE.

All odours emanate from at least one location which may or may not be easily identified. Some odourous emissions are visible to the naked eye (such as the plume from a stack) while other emissions are invisible (such as the result of fugitive emissions from an open door or window).

In general, most odours are more sporadic than continuous. As with odour perception, this can cause considerable changes in the location, duration and intensity of any odour. The predominant weather conditions at the time of perception can also greatly influence the identification of an odourous emission source. These factors all play a vital role in the determination of an odourous emission source.

3.2 COMMON SOURCES

3.2.1 COMMON ODOUR EMISSIONS FROM AN INDUSTRIAL SOURCE.

Some common odourous emissions from typical industrial sources are listed in **Table 1.**

Table 1 - Industrial Source and Associated Odourous Chemicals

INDUSTRY	CHEMICAL GROUPS
Petroleum Refining	- mercaptans, phenolic compounds, acids, organic sulphides, aldehydes
Transportation - products of incomplete combustion	- hydrocarbons, nitrogen compounds
Pulp and Paper	- mercaptans, alcohols, terpenes, camphors, starch decomposition products
Pharmaceutical	- amines, reduced sulphur compounds
Textiles	- urea, starch decomposition products
Agrochemical - fertilizers, pesticides, agriculture	- amines, mercaptans, reduced sulphur compounds, acidic gases, chlorine compounds, phenols, alcohols, aldehydes, ketones, esters
Chemical - paint manufacturing, resin kettles, varnish cookers, rubber compounding, chemical milling and manufacture	- acids, alcohols, aldehydes, ketones, phenols, mercaptans, amines, chlorinated organic solvents, esters
Metallurgical - coke and core ovens, cupolas, metal castings	- aldehydes, aromatic and aliphatic hydrocarbons, acids

3.3 REFERENCES

Air Pollution Survey of Odorous Compounds, A Literature Review, U.S. Dept. of Health, Education and Welfare. NAPCA Publication No. APTD 66-42, 1969.

Akhmedov, B.K. Methapos as an Air Pollutant. Hyg. Sanit. USSR, 33. [English translation of Russian article]. Code B2, 1968.

Allen, R.J., R.A. Wadden, and E.D. Ross. Characterization of Potential Indoor Sources of Ozone. American Industrial Hygiene Association Journal, 39. 1978.

Appell, L.. Physical Foundations in Perfumery VIII. The Minimum Perceptible. Am. Perfum. Cosmet., 84. Code B, 1969.

Atmospheric Emissions from Oil Refineries, U.S. Public Health Serv. Publ. 763, 1963.

Aylward, F., G. Coleman, and D.R. Haisman. Catty Odours in Food: The Reaction between Mesityl Oxide and Sulfur Compounds in Foodstuffs. Chemy. Ind.. 1967.

Bedborough, D.R. Recent Changes in Sources of Odour Nuisance and Odour Abatement Techniques. Royal Society of Chemistry Annual Congress Symposium, Lancaster, 1983.

Behringer, R.. Odours from Slaughterhouses. Staub-Reinaltung der Luft, Band 45. 1985.

Belles, F. (Ed.) Fluorine Handbook. National Aerospace and Space Administration. Lewis Research Center, Cleveland (cited by: P.M. Ricca, Exposure Criteria for Fluorine Rocket Propellants, Arch. Environ. Health, 12 (1966). Code C1, 1965.

Berck, B. Sorption of Phosphine by Cereal Products, J. Agric. Food Chem., 16. Code C2, 1968.

Black, A.W., and C.L. Hemeon. Inentification of Industrial Odor Problems. Presented at the American Institute of Chemical Engineers 79th National Meeting. Houston, Texas,1975.

Blanchard, J. Relazioni tra l'odore di un Gas ed il Suo Tenore in Mercaptani, Gas (Rome), 26. [Italian]. Code E2, 1976.

Boholt K., Determination of Odour Emission From Area Sources. Miljo & Teknologi 2, 1988 (in Danish).

Boon, A.G., and A.R. Lister. Formation of Sulphide in Rising Main Sewers and its Prevention by Injection of Oxygen. Progresses in Water Technology, 7. 1975.

Bouwer, E.J. and P.L. McCarty, Ethylene Dibromide Transformation under Mehanogenic Conditions, Applied and Environmental Microbiology, Aug. 1985, pp. 527-528.

Brockett, O.D.. Some Causes of Biological Instability and Their Effect on Algal population Levels in Waste Treatment Lagoons. Water pollution research: Eighth International conference: Progress in Water Technology, 9. 1978.

Brugger, W.E. & P.C. Jurs. Extraction of Important Molecular Features of Musk Compounds Using Pattern Recognition Techniques. J. Agric. Food Chem., 1977.

Brunekreef, B. & H. Harssema. Viscose Odors in Ambient Air. Water, Air, Soil Pollut., 13. Code B, 1980.

Burlingame, G.A., and Others. Cucumber Flavor in Philadelphia's Drinking Water. American Water Works Association Journal, 84. 1992.

Buttermore, R.E.. Eutrophication of an Impounded Estuarine Lagoon. Marine Pollution Bulletin, 8. 1977.

Buttery, R.C., R.M. Seifert, D.G. Guadagni & L.C. Ling. Characterization of Some Volatile Constituents of Bell Peppers. J. Agric. Food Chem., 17. Code B, 1969.

Buttery, R.G., and J.A. Garibaldi. Odorous Compounds from Potatoe Processing Waste Effluent Irrigation Fields: Volatile Acids. Journal of Agriculture and Food Chemistry, 28. 1980.

Cadle, S.H., and P.A. Mulawa. Sulfide Emissions from Catalyst-Equipped Cars. Society of Automotive Engineers. Technical Paper Series, 780200. 1978.

Cain, W.S.. The Odoriferous Environment and the Application of Olfactory Research. In: Handbook of Perception, Volume Via Tasting and Smell. Academic Press. New York, 1978.

Cernansky, N.P., C.W. Savery, I.H. Suffet, anf R.S. Cohen. Physical and Chemical Phenomena Responsible for Odor Formation in Diesel Engines, Interim Progress Report, Jun 1977 - Dec 1977. National Technical Information Service. Springfield, Virginia, 1978.

Cheremisinoff, P. N., Young, R. A., Industrial Odor Technology Assessment, Ann Arbor Science, Mich., 1975.

Chlorine Dioxide and Tastes and Odors. Public Works, 123. 1992.

Daget, N.. Profile Sensory Evaluation of Chocolate. In Erster Internationaler Kongress Uber Kakao und Schokoladeforschung. Munich, 1974.

Datz, S. H., and Talbert, E. J., U. S. Bureau of Mines, Technical Paper 480, 1-37, 1930.

Davis, P.A. Carbon Tetrachloride as an Industrial Hazard. J. Am. Med. Assoc., 103. Code C1, 1934.

Dawson, D.S., and M.A. Gokare. Gaseous Emissions from Wastewater Facilities. Water and Environmental Research, 66. 1994.

Day, D.L., E.L. Hansen, and S. Anderson. Gases and Odors in Confinement Swine Buildings. Trans. American Society of Agricultural Engineers, 8. 1965.

de La Riva, C., Ratzki, E., Medrow, W., Atmospheric Environment, in Vorbereitung

Deadman, K.A. & J.A. Prigg. The Odour and Odorization of Gas. Research Communication GC59. The Gas Council, London. Code E2, 1959.

Dendall, D. A., and P.L. Lewis, Odor Intensity and Characterization of Jet Exhaust and Chemical Analytical Measurements, NASA, CR-121159, Arthur D. Little Inc., Mass,, 1973.

Denmead, C.F., Air Pollution by Hydrogen Sulphide from a Shallow Polluted Tidal Inlet, Auckland, New Zealand, Clean Air Conference, First Technical Session. Proc. Clean Air Conf. Uiv. New South Wales 1 :20, 1962.

Derenzo, David R., Gnyp, Alex, (eds.), Recent Developments and Current Practices in Odor Regulations, Controls and Technology, Papers from an International Specialty Conference. Air and Waste Management Association, ISSN 1040-8177; No. 18, Pittsburgh, Pennsylvania, 1989.

DeWulf, T.A., A.W. Haga, L.J. Lund, and G.A. Whiting. Odors in the Community: A Case Study. Ford Motor Company. Dearborn, Michigan. Presentated at the 80th Annual Meeting of the Air Pollution Control association. New York, New York, 1987.

Diesel Exhaust Composition and Odor: Progress Report for Year 1965, Scott Reseach Laboratories, Inc., Oct. 1966.

Dietrich, A.M., and Others. Tastes and Odors Associated With Chlorine Dioxide. American Water Works Association Journal, 84. 1992.

Dlkin, H.F., Petroleum Refinery Emissions, in Air Pollution, vol. III, 2nd ed., A.C. Stern, Ed., New York: Academic Press, 1968.

Dobrinskii, A.A. Establishing Hygienic Norms for Some Intermediates in Caprolactam Production in the Air. Hyg. Sanit. USSR, 29. [English translation of Russian article]. Code B2, 1964.

Dravnieks, A., and J. Whitfield, Gas Chromatographic Study of Air Quality in Schools, ASHRAE Semiannual Meeting, Jan. 24-28, 1971.

Dravnieks, A., and Prokop, W. H, Source Emission Odor Measurement by a Dynamic Forced-Choice Triangle Olfactometer, J. Air Pollution Control Association, 25, (1), 28-35, 1975.

Dravnieks, A., Whitfield, J., and Shah, J., Determination of Odor Components in Tobacco Smoke, ASHRAE Semiannual Meeting, February 1974.

Dravnieks, A.. A Building-block Model for the Characterization of Odorant Molecules and their Odors. Ann. N.Y. Acad. Sci., 237. Code A, 1974.

Dubrovskaya, F.I. & M. Kh. Khachaturyan. Sanitary Evaluation of Valeric Acid as an Atmospheric Pollutant. In: M.Y. Nuttonson (Ed.), American Institute of Crop Ecology (AICE) survey of U.S.S.R. Air Pollution Literature. Volume XIX. [English translation of Russian article]. Code B2, 1973.

Dunlap, M.K., J.K. Kodama, J.S. Wellington, H.H. Anderson & C.H. Hine. The Toxicity of Allyl Alcohol. AMA Arch. Ind. Health, 18. Code C4, 1958.

Durr, P.. The Composition of Apple Juice Aroma and its Correlation to Sensory Data, in: Criteria of Food Acceptance. Forster-Verlag Ag. Zurich, 1981.

Eglite, M.E. A Contribution to the Hygienic Assessment of Atmospheric Ozone. Hyg. Sanit. USSR, 33. [English translation of Russian article]. Code B2, 1968.

Ehresmann, K.. Cause of "Catty" Odours in Lacquer Application Cabin. Staub-Reinhaltung der Luft 50, 1990.

Elfimova, E.V. Biological Activity of Low Atmospheric Concentrations of Isopropylbenzene and Benzene. Chem. Abstr., 66 (1967) 93947q. Code B5, 1966.

Elhin, H.F., and R.A. Constable. Source/Control of Air Emmisions. Hydrocarbon Processing, 51. 1972.

Elliott, M.A., and R.F. Davis, Composition of Diesel Exhoust Gas, Presented at Society of automotive Engineers National Diesel Engine Meeting, St. Louis, Mo., Nov. 1949.

England, A., D.G. Laing & H. Panhuber. Odorous Pollutants. CSIRO Division of Food Research, Report of Research 1977-1978. Code E2, 1978.

Environmental Hearing, Avon Township, Michigan vs. Southern Oakland County Incinerator Authority, October 19, 1983.

EPA. Locating and Estimating Air Emissions from Sources of Polycyclic Organic Matter (POM), 1987.

Eriksson, A. P. Lindner & O. Martensson. Molecular Properties and the Smell of Bitter Almonds. In: Proceedings from 1978 International Symposium on Structure Conformation and Evolution of Biological Molecules. Oxford: Pergamon Press, 1981.

Evaluation of the Use of Humans in Measuring the Effectiveness of Odor Control

Fanelle, C.. Drink Sensibly. ASTM Standards News, 19. 1991.

Fassett, D.W. Esters. In: F.A. Patty (Ed.), Industrial Hygiene and Toxicology. Volume II. Toxicology, Interscience, New York/London. Code D4, 1962.

Fieldner, A.C., S.H. Katz & S.P. Kinney. Gas Masks for Gases Met in Fighting Fires. U.S. Bureau of Mines. Technical Paper no. 248. Code C1, 1921.

First, Melvin W. "Public-Health Aspects: Management of Environmental Odors", from Odors from Stationary and Mobile Sources, National Research Council, Washington, D.C., 1979. Appendix A, 1979.

Flynn, N.w., M. Guttman, J. Hahn, and J.R. Payne, Trace Chemical Characterization of Pollutants Occurring in the Production of Landfill Gas from the Shoreline Regional Park Sanitary Landfill, Mountain View, CA.

Freudenberg, K. & M. Reichert. Sulphate Pulp Mill Odors. Tappi, 38. Code C4, 1955.

Gorlova, O.E. Hygienic Evaluation of Isopropyl Alcohol as an Air Pollutant. Hyg. Sanit. USSR, 35. [English translation of Russian article]. Code B2, 1970.

Grigorieva, K.V. Studies on Pollution of Atmospheric Air with Maleic Anhydride. Hyg. Sanit. USSR, 29. [English translation of Russian article]. Code B2, 1964.

Habib, Y.H.. Odor Emission Sources in the Chemical and Petroleum Industry. In: Industrial Odor Technology Assessment. Ann Arbor Science Publications Inc.. Ann Arbor, 1975.

Harper, R.. Some Chemicals Representing Particular Odour Qualities. Chemical Senses and Flavor, 1. 1975.

Hartman, W.J.Jr., and D.A. Long. Municipal Wastewater Odor Still a Problem. Part 2. Water & Sewage Works, 123. 1976.

Hartman, W.J.Jr., and D.A. Long. Municipal Wastewater Odor still a Problem: Pt. 1. Water and Sewage Works, 122. 1975.

Hartung, J.. Dust in Livestock Buildings as a Carrier of Odours. In: Nielson, V.C., J.H. Voorburg, and P.L. Hermite. Odour Prevention and Control of Organic Sludge and Livestock Farming. New York, 1986.

Hartung, L.D., E.G. Hammond & J.R. Miner. Identification of Carbonyl Compounds in a Swine-Building Atmosphere. Livest. Waste Manage. Pollut. Abatement, Proc. Int. Symp.. Code B5, 1971.

Hellman, T.M. & F.H. Small. Characterization of the Odor Properties of 101 Petrochemicals Using Sensory Methods. J. Air. Pollut. Contr. Assoc., 24. Code A, 1974.

Hellman, T.M. & F.H. Small. The Characterization of Odor from the Petrochemical Industry Using Sensory Methods. AICHE Publications Dept., MS No. 4988. [Unpublished], 1973.

Hellman, T.M. & F.H. Small. The Characterization of Pertochemical Odors. Chem. Eng. Progr., 69. Code A, 1973.

Hicks, R.. Odour as an Air Pollutant. Proceedings of the 1975 Clean Air Conference: Vol. 2. Ann Arbor Science Publishers Inc.. Ann Arbor, 1975.

Hogstrom, U. A Statistical Approach to the Air Pollution Problem of Chimney Emission. Atmos. Environ. 2, 1968.

Holmes, J.A., E.C. Franklin & R.A. Gould. Report of Selby Smelter Commission. Department of the Interior, Bureau of Mines, Bulletin 98. Washington, D.C.: U.S. Dept. of Commerce. Code A, 1915.

Hopton, F.J. and R.G.W. Laughlin. Brewhouse Characterization and Control. Prepared for Labatt Breweries of Canada Limited. London ,Ontario.

Hori, M., Y. Kobayashi & Y. Ota. Vinyl Chloride Monomer Odor Concentration. Plast. Ind. News, 18. Code B, 1972.

Jensen, S.E., and Others. Actinomycetes as a Factor in Odour Problems Affecting Drinking Water from the North Saskatchewan River. Water Research, 28. 1994.

Kastka, J. Untersuchungen zur Belastigungswirkung der Umweltbedingungen Verkehrslarm und Industriegeruche, In: Kaminski, G. (Hsg.) Umweltpsychologie. Perspektiven-Probleme-Praxis.-Stuttgart: Klett, 1976, 187-223.

Katz, S.H., and E.J. Talbert. Intensities of Odors and Irritating Effects of Warning Agents for Inflammable and Poisonous Gases. Technical Paper 480, Bureau of Mines, US Department of Commerce, 1930.

Keddie, A.W.C. The Quantification of the Emissions and Dispersion of Odours from Sewage Treatment Works. Institute of Water Pollution Control Conference, Harrogate, 1981.

Keddie, A.W.C. & H.R. Gibbens. Odour Emissions and Dispersions with Examples from the Chemical Industry. Society of Chemical Industry International Symposiumon "The Chemical Industry and the Environment in the 1980s", London, 1982.

Klarenbeek, J.V.. Odour Emissions of Dutch Agriculture. ASAE- Publication 13. Michigan, 1985.

Koe, L.C.C., and N.C. Tan. Odour Generation Potential of Wastewaters. Water Research, 24. 1990.

Krasovitskaya, M.L. & L.K. Malyarova. Low Unsaturated Ethylene Hydrocarbon Concentrations in the Air Surrounding Operating Crude Oil Complexes (Combines). In: B.S. Levine (Ed.), U.S.S.R. Literature on Air Pollution and Related Occupational Diseases, Volume 16. Code B2, 1968.

Krasovitskaya, M.L. & L.K. Malyarova. Small Concentrations of Hydrocarbons in the Air of Naphthachemical Plants. Chem. Abstr., 65 (1966) 14324d. Code D4, 1966.

Kraub, P., Kraub,T., Mayer, J., T. Wallenhorst, Tubingen. Examination of Odor Formation and Odor Reduction in Composting Plants. Staub-Reinhaltung der Luft 52. 1992.

Kulle, T.J., and G.P. Cooper. Effects of Formaldehyde and Ozone on the Trigeminal Nasal Sensory System. Archives of Environmental Health, 30. 1975.

Lang, R., T. Herrera, D. Chang, G. Tchobanoglous, and R. Spicher, Trace Organic Constituents in Landfill Gas, Report prepared for the California Waste Management Board, November 1987.

Lang, R., Tchobanoglous, G., Modeling Emissions of Trace Gases from Landfills, paper presented at the 82nd Annual Meeting & Exhibition of the Air and Waste Management Association, 89-53.2, Anageim, California, June 25-30, 1989.

Lin, S.D.. Sources of Tastes and Odors in Water: Pt. 2. Water and Sewage Works, 123. 1976.

Lindvall, T., Sensory Measurement of Ambient Traffic Odors, J. Air Pollution Control Association, 23, 697-700, 1973.

Linnaeus, K.. Odores Medicamentorum, in: Amoenitates Academicae. Lars Salvius. Stockholm, 1756.

Manchen, K.. Monitoring Air Pollutants from Municipal Wastewater Plants. Pollution Engineering, 11. 1979.

Matthews, P.J.. Noxious Atmospheres in the Water Cycle. Institution in Water Engineers and Scientists. Journal, 30. 1976.

McJilton, C.E., and Others. Bacteria and Indoor Odor Problems - Three Case Studies. American Industrial Hygiene Association Journal, 51. 1990.

Medrow W.: Immissionsermittlungen mit Hilfe von Begehungen. In:VDI-Berichte 561, 329-342, 1988.

Miner, J.R., and T.E. Hazen. Ammonia and Amines: Components of Swine-Building Odor. Trans. American Society of Agricultural Engineers, 12. 1969.

Miner, J.R.. Odors from Confined Livestock Production. A State-of-the-Art. Office of Research and Development, US EPA. Washington, D.C., 1974.

Mueller, C.G.. Sensory Psychology. Prentice-Hall. Engelwood Cliff, New Jersey, 1965.

National Academy of Sciences. Odors from Stationary and Mobile Sources, 1979.

New York Plant is a Stinker. ENR, 227. 1991.

Noren, O.. Noxious Gases and Odours. Applied Science Publishers. 1977.

Oakley, H.R.. Development Septicity in Sewerage Systems. Effluent and Water Treatment Journal, 19. 1979.

Odors Emitted from Raw and Digested Sewage Sludge. St. Louis Metropolitan Sewer District . US EPA. Washington, D.C., 1973.

Odors from Stationary and Mobile Sources, Board on Toxicology and Environmental Hazards, Assembly of Life Sciences, National Research Councel, Natioal Academy of Sciences, Washington, D.C., 1979.

Odors from Stationary and Mobile Sources. National Academy of Sciences, Washington, DC, 1979.

Odors from Stationary and Mobile Sources. Board on toxicology and Environmental Hazards, Assembly of Life Sciences, National Research Council, National Academy of Sciences. Washington, D.C., 1979.

Ohloff, G.. Odorous Properties of Enantiomeric Compounds. In: Olfaction and Taste, the Proceedings of the Fourth International Symposium. Wissenschaftliche Verlagsgesellschaft. Stuttgart, 1972.

Ohma, S. La Classification des Odeurs Aromatiques en Sousclasses. Arch. Neerl Physiol., 6. [French]. Code E1, 1922.

Oldenburg, J.. Odour and Ammonia Emissions from Livestock Farming. Staub-Rienhaltung der Luft 50. 1990.

Olmstead, E.V. Dibromoethane. In: Encyclopedia of Occupational Health and Safety I. International Labour Office, Geneva. Code C1, 1972.

Passy, J. Forme Periodique du Pouvoir Odorant Dans la Serie Grasse. C.R. Hebd. Seances Acad. Sci., 116. [French]. Code D5, 1893.

Passy, J. L'odeur dans la Serie Grasse. C.R. Soc. Biol., 45. [French]. Code D5, 1893.

Passy, J. Les Properties Odorantes des Alcools de la Serie Grasse. C.R. Hebd. Seances Acad. Sci., 114. [French]. Code D5, 1892.

Passy, J. Pouvoir Odorant du Chloroforme, du Bromoforme et de L'iodoforme. C.R. Hebd. Seances Acad. Sci., 116. [French]. Code D5, 1893.

Patte, F. M. Etcheto, and P. Laffort. Selected and Standardized Values of Suprathreshold Odor Intensities for for 110 Substances. Chemical Senses and Flavor, 1. 1975.

Patterson, R.L.S., and D.N. Rhodes. Catty Odours in Food: Their Production in Meat Stores from Mesityl Oxide and Paint Solvents. Chemy. Ind.. 1967.

Patterson, R.L.S.. Catty Odours in Food: Confirmation of the Identity of 4-Mercapto-4-Methylpentan-2-one by GC/MS. Chemy. Ind.. 1969.

Peacock, V.E., M.L. Deinzer, L.A. McGill, and R.E. Wrolstad. Hop Aroma in American Beer. Journal of Agriculture and Food Chemistry, 28. 1980.

Pearce, T.J.P, J.M. Peacock, F. Aylward, and D.R. Haismann. "Catty" Odours in Food. Reactions Between Hydrogen Sulfide and Unsaturated Ketones. Chim. Ind. 37. 1967.

Phillips, D.M.P.. Threonine and the Odour of Protein Hydrolysates. Nature, 173. 1954.

Polak, E., G. Fetison, A. Fombon, and A. Skalli. Structure-Odor Relationships for "Catty"-Smelling-Mercapto in Humans. Journal of Agriculture and Food Chemistry, 36. 1988.

Polgar, L.G., R.A. Duffee & L.J. Updyke. Odor Characteristics of Mixtures of Sulfur Compounds Emitted from the Viscose Process. 68th Ann. Meet. Air Pollut. Control Assoc., June 15-20, Boston, Paper 75-55.2. Code A, 1975.

Polgar, L.G., R.A. Duffee & L.J. Updyke. Odor Characteristics of Mixtures of Sulfur Compounds Emitted From the Viscose Process. Preprint 75-55.2. Presented at the 68th Annual Meeting, Air Pollution Control Association, Boston, 1975.

Polhemus, J.. Rubber, Plastics and Glass Industries Odors. In: Industrial Odor Technology Assessment. Ann Arbor Science Publications Inc.. Ann Arbor, 1975.

Poostchi, E.B.M., Development of a Strategy for Quantifying the Impact of Odorous Emissions from Stationary Sources on the Surrounding Communities, Ph.D. Dissertation, University of Windsor, Windsor, Ont., 1985.

Post, N.. The Odor Phase of Waste Disposal. Water and Sewage Works, R377-379. 1960.

Preti, G., and Others. Letting the Nose Lead the Way, Malodorous Components in Drinking Water. Analytical Chemistry, 65. 1993.

Pulles, M.P.J. and Cavalini, P.M. Odour concentrations and odour annoyance: A study around sugar refineries. In: Brasser, L.J. and Mulder, W.C. (eds.). Man and his Ecosystem. Proc. of the 8th World Clean Air Congress 1989 in the Hague, 1989. Amsterdam: Elsevier, 1989, 117-122.

Research on Chemical Odors, Part I-Odor Thresholds for 53 Commercial Chemicals, A. D. Little, Inc., Manufacturing Chemists Association, Washington, D.C., October 1968.

Rowe, V.K. & M.A. Wolf. Ketones. In: F.A. Patty (Ed.), Industrial Hygiene and Toxicology Volume. Toxicology, Interscience, New York/London. Code D6, 1962.

Sawatani, T.. Problem of Obnoxious Odors in Industrial Pollutions. Association of Safety Engineering. Yokohama, Japan, 1970.

Schinneller, D.J.. Flavor and Aroma Thresholds of Selected Aldehydes and Interactions with 5'-Nucleotides Associated with Orange Juice. M.S. Thesis, University of Florida. Gainsville,1972.

Schroeder. W.H.. Air Pollution Aspects of Odorous Substances. A Literature Survey.Canada. Air Pollution Control Directorate. Environmental Protection Service Report Series. Economic and Technical Review Report EPS-3-AP-75-1. 1975.

Selway, M.D., R.J. Allen, and R.A. Wadden. Ozone Production from Photocopying Machines. American Industrial Hygiene Association Journal, 41. 1980.

Shusterman, D.J., A.L. Casey & R.R. Neutra. The Health Significance of Odorous Air Emissions From Stationary Sources: Investigation of Odor and Symptom Complaints Near a Hazardous Waste Site. For Presentation at the 82nd Annual Meeting & Exhibition, Air and Waste Management Association, Anaheim, California, 1989.

Silvery, J.K.G.. Taste and Odors - Effects of Organisms. Journal of the American Water Works Association, Vol. 58. 1963.

Sittig, M.. Odorous Compounds. Environmental Sources and Emissions Handbook. Environmental Technology Handbook 2. Park Ridge, New jersey, 1975.

Stephens, E.R. Identification of Odors from Cattle Feed Lots. Calif. Agric., 25, no. 1. Code B5, 1971.

Stern, A.C.. Air Pollution, 3rd Edition. Vol I: Air Pollutants, Their Transformations and Transport. Academic Press, Inc.. New York, 1976.

Stinson, S.. Analysis Yields Clues to Coffee, Wine Flavors. Cemical Engineering News, 71. 1993.

Stone, R.. Sewage Treatment System Odors and Air Pollutants. Journal of Sanitary Engineering Division, ASCE, SA4. 1970.

Sudbury, A.. Mapping Odor Sources from Complaint Statistics: More Than One Source (PONG2). Journal of the Air and Waste Management Association, 44. 1994.

Sullivan, R.J., Air Pollution Aspects of Odorous Compounds, Litton Systems, Inc. Environmental Systems Division 7300 Pearl Street, Bethesda, Maryland 20014, Prepared for the National Air Pollution Control Administration Consumer Protection & Environmental Health Service Department of Health, Education, and Welfare (Contract No. PH-22-68-25), September 1969.

Sullivan, R.J.. Preliminary Air Pollution Survey of Odorous Compounds. National Air Pollution Control Administration Publication No. APTD 66-42, US Department of Health, Education, and Welfare. 1969.

Summer, W.. Odor Pollution of Air-Causes and Control. Leonard Hill. London, 1971.

Summer, W.. Predicting Olfactory Quality From Far Infrared Spectra. Presented New York Academy of Sciences Conference on Odors: Evaluation, Utilization, and Control. 1973.

Taylor, G.J.. Air Pollution Associated with the use of Geothermal Energy. Air Pollution Control association 71st Annual Meeting and Exhibition: Abstracts of Papers. Pittsburgh, Pennsylvania, 1978.

Technology at the Source, NCASI Technical Bulletin 56, National Council of the Paper Industry.

Tomlinson, E.J., and A.M. Bruce. Problems of Septicity in Biological Treatment. Effluent and Water Treatment Journal, 19. 1979.

Toxicity Data Sheet: Allyl Chloride. Shell Chemical Corporation. Industrial Hygiene Bulletin, SC. Code C1, 1958.

Toxicity Data Sheet: Epichlorohydrin. Shell Chemical Corporation. Industrial Hygiene Bulletin, SC. Code C1, 1959.

Toxicity Data Sheet: Ethyl Amyl Ketone. Shell Chemical Corporation. Industrial Hygiene Bulletin, SC. Code C1, 1958.

Toxicity Data Sheet: Mesityl Oxide. Shell Chemical Corporation. Industrial Hygiene Bulletin, SC. Code C1, 1957.

VDI 3782, Blatt 4, Vorentwurf: Ausbreitung und Immissionen von Geruchstoffen, November 1989.

VDI 3940, Entwurf: Bestimmung der Geruchstoffimmission durch Begehungen, August 1989.

VDI-Kommission Reinhalting der luft, Geruche, Stand der Erkenntnisse zur Ermittlung von Belastung und Belastigung, Workshop 28. November 1989, Dusseldorf.

Verma, S.A., A.K. Tyagi, and R.C. Dalela. Physico-Chemical and Biological Characteristics of Kadaradad in Uttar Pradesh. Indian Journal of Environmental Health, 20. 1978.

Verscheuren, K., Ed. Handbook of Environmental Data on Organic Chemicals. New York: Van Nostrand Reinhold Co., 1977.

Vierle, O., and R. Worle. Ergebnisse und Bewerungen von Messungen Organischer Luftverunreinigungen. In: Organische Verunreinigungen in der Umwelt. Erich Schmidt Verlag. Berlin, 1978.

Vogt, W.G., Wolatile Organic Compounds in Gases form Landfill Simulators, Proc. of the 8th International Landfill Gas Symposium, GRCDAm Apr. 1985.

Wanner, H.U.. Air Pollution from Treatment Plants. Progress in Water Technology, 11. 1979.

Winneke, G. and J. Kasta, Comparison of odour-annoyance data from different industrial sources: problems and indications. In: T.S. Koelega (ed.), Environmental annoyance: characterization, measurement and control, Elsevier Science Publishers, Amsterdam, pp. 129-139, 1987.

Winneke, G. und J. Kastka. Comparison of odour annoyance data from different industrial sources: Problems and implications In: Koelega, H.S. (ed.). Environmental annoyance: Characterization, Measurement, and Control.- Amsterdam, New York, Oxford:Elsevier, 1987, 129140.

Winneke, G. und Kastka, J., Odour Pollution and odour annoyance reactions in industrial areas of the Rhine-Ruhr region In: Le Magnen, J. and Mc Leod, P. (eds.). Proceedings of the 6th Int. Symp. on Olfaction and Taste.- London, Washington: Information Retrieval, 1977, 471-479.

Wohler's, H.C..Odor Intensity and Odor Travel From Industrial Sources. International Journal of Air and Water Pollution, 7. 1963.

Wright, R.H.. Odor and Molecular Vibration: A Possible Membrane Interaction Mechanism. Chemical Senses and Flavor, 2. 1976.

Wright, R.H.. Odor and Molecular Vibration: Optical Isomers. Chemical Senses and Flavor, 3. 1978.

Wrightson, K.E.. Flavor and Odor Thresholds and Interactions of selected Orange Juice Components. M.S. Thesis, University of Florida. Gainsville, 1972.

Yasuhara, A., and K. Fuwa. Odor and Volatile Compounds in Liquid Swine Manure. II. Steam-Distillable Substances. Bulletin of the chemical Society of Japan, 50. 1977.

Yasuhara, A.. Relation Between Odor and Odorous Components inSolid Swine Manure. Chemosphere, 9. 1980.

Young, P.J. and A. Parker, The Identification and Possible Environmental Impact of Trace Gases and Vapours inLandfill Gas, Waste Management and Research, 1983, pp. 213-226.

Young, P.J., and L.A. Heasman, An Assessment of the Odor and Toxicity of the Trace Components of Landfill Gas, Proc. of the 8th International Landfill Gas Symposium, GRCDA, Apr. 1985.

Zwaardemaker, H.. Odoriferous Materials. In: International Critical Tables of Numerical Data, Physics, Chemistry, and Technology. McGraw-Hill & National Research Council. New York, 1926.

4.0 IMPACT ON SOCIETY

4.1 BACKGROUND

4.1.1 COMMUNITY RESPONSE TO ODOURS.

Generally, the effect of odours on a population is primarily one of nuisance. Despite the immediate identification of an odour by individuals in a community, odour problems are still the most difficult to measure objectively. The complex and variable nature of odours is very difficult to overcome making a systematic approach to odour recognition extremely arduous.

4.1.2 ROLE OF HUMANS IN ODOUR RECOGNITION.

Some odourous compounds can exist and exhibit their effects at concentrations in the parts per billion (ppb) range. The human olfactory system, in some instances, is able to detect these compounds even at this low concentration. There are analytical methods for determining the presence of these particular odour causing agents, however, there does not exist any analytical means to determine an individual's annoyance with a particular odour. Humans remain the primary instrument in determining the existence of an odour problem.

4.1.3 FACTORS AFFECTING ODOUR JUDGMENT.

An individual's judgment of the existence of an odourous agent is affected by the following variables:

- natural sensitivity
- sex
- prejudices against the source
- health problems
- medications
- age
- eating, drinking smoking habits
- personal experience
- pregnancy
- education

The existence and verification of an odour is a complex and multi-stage process which requires investigating numerous individual responses and evaluating those responses in order to arrive at any conclusion.

4.2 REFERENCES

Adams, R.G., and N. Crabtree. Anosmia in Alkaline Battery Workers. British Journal of Industrial Medicine, 18. 1961.

Air Quality Data from the National Air sampling Networks and Contributing State and Local Networks 1964-1965, U.S. Public Health Service, Cincinnati, Ohio, 1966.

Altena, K., W. Biesiot, N.E. van Brederode , I. van Kamp, T.R. Knottnerus, J.V. Lako, M.P.J. Pulles, R.E. Steward, Environmental Noise and Health, Description of data, Models and Methods used, and the results of the epidemiological surveys. Report No. GA-DR-03-01, Miniistry of Housing, Physical Planning and the Environment, The Hague, The Netherlands, 1988.

Amdur, M.O., W.W. Melvin & P. Drinker. Effects of Inhalation of Sulfur Dioxide by Man. Lancet., 265. Code B5, 1953.

Ames, R.G., and J.W. Stratton. Acute Health Effects from Community Exposure to N-Propyl Mercatan from an Ethoprop-treated Potatoe Field in Siskiyou County . Archives of Environmental Health, 46. California, 1991.

Amoore, J. & E. Hautla. Odor as an Aid to Chemical Safety: Odor Thresholds Compared with Threshold Limit Values and Volatilities for 214 Industrial Chemicals in Air and Water Dilution. J. Appl. Toxicol. 3, 1983.

Andreescheva, N.G.. The Effects of Certain Aromatic Carbohydrates in the Air. Hyg. Sanit. USSR, 33. [English translation of Russian article]. Code B2, 1968.

Baker, R.A.. Odor Effects of Acqueous Mixtures of Organic Chemicals. Journal of Water Pollution Control Federation, Vol. 35. 1963.

Baker, R.A.. Problems of Tastes and Odors. Journal of the Water Pollution Control Federation, 33. 1961.

Basarin, V., and P.E. Cook. A Survey of Public Attitudes to Industrial Odors. Clean Air, 16. Australia, 1982.

Beaton, J.L., A.J. Ranzieri, E.C. shirly, and J.B. Skag. A Method for Analyzing and Reporting Highway Impact on Air Quality. Federal Highway Administration. Washington, D.C., 1973.

Belkov, A.N. Action of Small Concentrations of Carbon Tetrachloride of the Human Body. Chem. Abstr., 74 (1971) 2340n. Code B5, 1969.

Black, A. W., and Hemeon, C. L., Identification of Industrial Odor Problems, Presented at the American Institute of Chemical Engineers 79th National Meeting, Houston, Texas, 16-20 March 1975.

Bremser, L.W.. Good Neighbor Policy Works. Water and Wastes Engineering, 15(11). 1978.

Brown, E.A., and N.J. Colombo, The Asthmogenic Effect of Odors, Smells and Fumes, Ann. Allergy 12:14, 1954.

Brown, E.A., Persistent Cough and Bronchospasm Due to Exposure to Fumes ofRange Oil, Ann. Allergy 7:756, 1949.

Bruvold, W.H., S.M. Rappaport, T.C. Wu, B.E. Bulmer, C.E. DeGrange & J.M. Kooler. Determination of Nuisance Odor in a Community. WPCF Journal, Vol. 55, No. 3, 1983.

Bushtueva, K.A. New Studies of the Effect of Sulfur Dioxide and of Sulfuric Acid Aerosol on Reflex Activity of Man. In: V.A. Ryazanov (Ed.), Limits of Allowable Concentrations of Atmospheric Pollutants, Book 5. Code B5, 1962.

Carl, C.E., and B.L. Christensen, Appraisal of Air Pollution in South Dakota, South Dakota State Dept. of Health Div. of Sanitary Engineering and U.S. Public Health Serv., Aug. 1962.

Carpenter, C.P. The Chronec Toxicity of Tetrachloroethylene. J. Ind. Hyg. Toxicol., 19. Code C4, 1937.

Carpenter, C.P., H.F. Smyth Jr. & C.B. Shaffer. The Acute Toxicity of Ethylene Imine to Small Animals. J. Ind. Hyg. Toxicol., 30. Code C4, 1948.

Cava, A.J., and S.L. Lieblich. Inter and Intra-State Odors on Staten Island. New York State Department of Environmental Conservation. Long Island City, New York. Presented at the 80th Annual Meeting of the Air Pollution Control Association. New York, New York, 1987.

Cavalini, P.M., L.G. Koeter-Kemmerling, and M.P.J. Pulles. Coping with Odour Annoyance and Odour Concentrations: Three Field Studies. Journal of Environmental Psychology, 11. 1991.

Cederlof, R., L. Friberg, E. Jonsson, L. Kaij, and T. Linvall. Studies of Annoyance Connected With Offensive Smell From a Sulphate Cellulose Factory. Nord. Hyg. Tidskv, 45. 1964.

Cheremisinoff P.N., Young R.A., Industrial Odor Technology Assessment, Science Publishers, Ann Arbor. 1975, pp. 52-53.

Community Reaction to Airport Noise, Tracor, Inc., Vol. 1: Contractor Report No. 1761, NASA Contract NASW-1549, 97 pp, July 1971, Vol.2: NASA No. CR-111-316, 245 pp, September 1970, National Aeronautics and Space Administration, Washington, D.C..

Copley International Corporation, A Study of the Social and Economic Impact of Odors, Phase III, Development and Evaluation of a Model Odor Control Ordinance, Report to the U.S. Environmental Protection Agency, EPA Publication No. 650/5-73-001, Contract No. 68-02-0095, Washington, D.C., February 1973.

Copley International Corporation, National Survey of the Odor Problem, Publication Nos. PB-194 376 (test) and PB-194 377 (appendix), U.S. Dept. of Commerce, National Technical Information Service, Springfield, VA, 1970.

Dalla Valle, J.M., and H.C. Dudley. Evaluation of Odor Nuisance in the Manufacture of Kraft Paper. Public Health Report, 54. 1939.

Deane, M., and G. Sanders. Annoyance and Health Reactions to Odor from Refineries and other Industries in Carson, California. Environmental Res., 15. 1978.

Deane, M., and G. Sanders. Health effects of Exposure to Community Odors from Pulp Mills, Eureka, 1971. Environmental Res., 14. 1977.

Deane, M., G. Sanders & E. Jonsson. Trends and Community Annoyance Reactions to Odors from Pulp Mills. Eureka, CA 1969-1971. Environ. Res. 14, 1977.

Deane, M., G. Sanders, and E. Jonsson. Trends and Community Annoyance Reactions to Odors from Pulps Mills Eureka, California 1969-1971. Environmental Res., 14. 1977.

Debry, A., and F. Bloneau. The Impact of Sanitation Plants on the Environment. 3-Secondary Pollutants from Purification Plants. What's The Situation? What Can One Do?. Techniques et Sciences Municipales et Revue L'Eau, No. 10:488-504. 1979.

Deese, D.E. & R.E. Joyner. Vinyl Acetate: A Study of Chronic Human Exposure. J. Am. Ind. Hyg. Assoc., 30. Code C4, 1969.

Degobert, P. Diesel Exhaust Odours, Their Importance-Evaluation Methods. Institut Francais du Petrole, Ref. IFP, No. 26864 A. 1979.

Degobert, P. Hedonic and Intensity Ranking of Different Malodors by Category Estimation and Pain Comparison. In: Prefernce Behaviour and Chemoreception. Information Retrievel Limited. London, 1979.

Degobert, P. Sensory Behaviou of a Nose Panel Towards Bad Odours: Application to Diesel Exhaust Odours. In: Olfaction and Taste, VI. Information Retrievel Limited. London, 1977.

Derenzo, David R., Gnyp, Alex, (eds.), Recent Developments and Current Practices in Odor Regulations, Controls and Technology, Papers from an International Specialty Conference. Air and Waste Management Association, ISSN 1040-8177; No. 18, Pittsburgh, Pennsylvania, 1989.

Dirken, J.M., Arbeid en Stress (in Niederlandisch), Wolters Noordhof, Groningen, The Netherlands.

Donham, K.J., M. Rubino, T.D. Thedell, and J. Kammermeyer. Potential Health Hazards to Agricultural Workers in Swine Confinement Buildings. Journal of Occupational Medicine, 19. 1977.

Dravnieks, A. and H.J. O'Neill. Annoyance Potentials of Air Pollution Odors. American Idustrial Hygiene Association Journal, 40. 1979.

Dubrovskaya, F.I., M.S. Katsenelenbaum, Ya.K. Yushko, G.V. Bulychev & V.A. Koroleva. Atmospheric Air Pollution with Discharges from Synthetic Fatty Acids and Alcohols Producing Industries and Their Effect on the Health of the Population. Gig. Sanit., 26. [English summary of Russian article]. Code B2, 1961.

Dudley, H.C. & J.W. Miller. Toxicology of Selenium VI. Effects of Subacute Exposure to Hydrogen Selenide. J. Ind. Hyg. Toxicol., 23. Code C1, 1941.

Duffee, R.A. & N.E. Bowne. Odor Survey in the Vicinity of an Automobile Assembly Plant. TRC Project Report 61233, 1973.

Duffee, R.A., J.E. Hooper. Odor thresholds for chemicals with established occupational health standards. Prepared for the American Industrial Hygiene Association, 1988.

Endo, R.T. Kohgo & T. Oyaki. 10, Research on Nuisance in Hokkaido (part 2). Chemical Analysis of Odors. In: Proceedings of the 8th Annual Meeting of the Japan Society of Air Pollution, Symposium (1): Hazard Nuisance Pollution Problems Due to Odors (English Translation for APTIC by SCITRAN). Code E2, 1967.

Feinberg, S.M., and R.L. Aries, Asthma from Food Odors, J. Am. Med. Assoc. 98:2280, 1932.

Flesh, R.D. and A. Turk. Social and Economic Effects of Odors. Industrial Odor Technology Assessment, Ann Arbor Science Publishers, Inc.. 1974.

Flesh, R.D. and Tuk, A., Social and Economic Effects of Odors, Industrial Odor Technology Assessment, Edited by Paul N. Cheremisinoff and R. A. Young, Ann Arbor Science Publishers, Inc., Chapter 4, 57-74, 1974.

Gautam, S.S., A.V. Venkatanarayanan, and B. Parthasarathy. Occupational Environment of Paper Mill Workers in South India. Ann. Occupational Hygiene, 22. 1979.

Gilbert, T.. Ausbreitung von Geruchen in Bodennahe. In: Geruchsprobleme bei Tierhaltung und Tierkorperbeseitigung. VDI-Verlag. Dusseldorf, 1975.

Gnyp, A., St. Pierre, C., Poostchi, E., Assessing the Impact of Odorous Emissions from Municipal Waste Landfill Sites on the Surrounding Community, Presented at the 78th Annual Meeting of the Air Pollution Control Association, Detroit, Mich., 1985.

Gobel, W.. Geruchsausbreitung. In: Geruchsprobleme bei Tierhaltung und Tierkorperbeseitigung. VDI-Verlag. Dusseldorf, 1975.

Goldsmith, J. Health and Annoyance Impact of Odor Pollution, California Department of Health Services, Epidemiological Studies Laboratory, 1973.

Gudiksen, P.H., M.C. Axelrod, D.L. Ermack, K.C. Lamson, and R. Lange. A Methodology for Assessing the potential Impact on Air quality Resulting from Geothermal Resource Development in the Imperial Valley. National Technical Information Service. Springfield, Virginia, 1977.

Gusev, I.S. Reflective Effects of Microconcentrations of Benzene, Toluene, Xylene and Their Comparative Assessment. Hyg. Sanit. USSR, 30. [Russian]. Code B2, 1965.

Hand I.F., Weekly Mean Values of Daily Total Solar and Sky Radiation, Technical Paper No. 11, U.S. Weather Bureau, Washington, D.C., 1949.

Hangartner, M.. Assessment of Odor Annoyance in the Community. Federal Institute of Technology. Zurich, Switzerland. Presented at the 80th Annual Meeting of the Air Pollution Control Association. New York, New York, 1987.

Hangartner, M.. Assessment of Odor Annoyance. Staub-Reinhaltung der Luft 48. Zurich, 1988.

Hare, C.T., and K.J. Springer. Public Response to Diesel Engine Exhaust Odors. EPA Air Pollution Control Office, South West Research Institute. San Antonio, Texas, 1971.

Haug, R.T., An Essay on the Elements of Odor Management, In: Biocycle Journal of Waste Recycling, Vol. 31., No. 10, pp. 60-67, October, 1990.

Haulet, R., and P. Zettwoog. Relations Between Odorous Pollution Levels from an Industrial Site and sensory discomfort Perceived by the Population. In: Atmospheric Pollution. Proceedings of the 12th International Colloquium. Paris, France, 1976.

Heyroth, F.F. Halogens. In: F.A. Patty (Ed.), Industrial Hygiene and Toxicology, Volume II. Toxicology, Interscience, New York/London. Code C1, 1963.

Hine, C.H., A. Pasi & B.G. Stephens. Fatalities Following Exposure to 2-nitropropane. J. Occup. Med., 20. Code C1, 1978.

Hine, C.H., H. Ungar, H.H. Anderson, J.K. Kodama, J.K. Critchlow & N.W. Jacobson. Toxicological Studies on p-Tertiary-Butyltoluene. AMA Arch. Ind. Hyg. Occup. Med., 9. Code C4, 1960.

Hine, C.H., J.K. Kodama, R.J. Guzman & G.S. Loquvam. The Toxicity of Allylamines. Arch. Environ. Health, 1. Code C4, 1960.

Hine, C.H., R.J. Guzman, M.K. Dunlap, R. Lima & G.S. Loquvam. Studies on the Toxicity of Glycidaldehyde. Arch. Environ. Health, 2. Code C4, 1961.

Hollingsworth, R.L., V.K. Rowe, F. Oyen, H.R. Hoyle & H.C. Spencer. Toxicity of Paradichlorobenzene. AMA Arch. Ind. Health, 14. Code C3, 1956.

Hollingsworth, R.L., V.K. Rowe, F. Oyen, T.R. Torkelson & E.M. Adams. Toxicity of o-dichlorobenzene. AMA Arch. Ind. Health, 17. Code C3, 1958.

Horstman, S.W., R.F. Wromble, and A.N. Heller. Identification of Community Odor Problems by use of an Observer Corps. Journal of the air Pollution Control Association, 21. 1971.

Hunt, P., and K. Hauck. Raising a Stink Over Composting Odors. American City Cty, 105. 1990.

Irish, D.D. Halogenated Hydrocarbons: I. Aliphatic. In: F.A. Patty (Ed.), Industrial Hygiene and Toxicology, Volume II. Toxicology, Interscience, New York/London. Code C1, 1962.

Itskovich, A.A. & V.A. Vinogradova. Norms for Phenol in the Atmosphere. Chem. Abstr., 61 (1964) 6256b. Code B5, 1962.

Ivanov, S.V. Materials on Toxicology and Hygienic Rating of Ethylbenzol Content in the Atmosphere of Industrial Premises. Gig. Tr. Prof. Zabol., 8. [English summary of Russian article]. Code B2, 1964.

Jaakkola, J.J.. The Effects of Malodourous Sulfur Compounds from Pulp Mills on Respiratory and other Symptoms. The South Karelia Air Pollution Study. 1990.

Jacobson, K.H., E.B. Hackley & L. Feinsilver. The Toxicity of Inhaled Ethylene Oxide and Propylene Oxide Vapors. AMA Arch. Ind. Health, 13. Code A, 1956.

Jacobson, K.H., E.B. Rinehart, H.J. Wheelright, M.A. Ross, J.L. Papin, R.C. Daly, E.A. Greene & W.A. Groff. The Toxicology of an Aniline-furfuryl Alcohol-hydrazine Vapor Mixture. Am. Ind. Hyg. Assoc. J., 19. Code A, 1956.

Jacobson, K.H., J.H. Clem, H.J. Wheelright, W.E. Rinehart & N. Mayes. The Acute Toxicity of the Vapors of Some Methylated Hydrazine Derivatives. AMA Arch. Ind. Health, 12. Code A, 1955.

Jeltes, R. Measurements of Organic Substances in the Atmosphere in The Netherlands in Relation to Their Pollible Detrimental Effect. In: G. Hambraeus and I. Jung (Eds.). Verunreinigung der Luft. IVA-Rapport 78, Stockholm. Code E2, 1975.

Jones, F.N. A Comparison of the Methods of Olfactory Stimulation; Blasting vs. Sniffing. Am. J. Psychol., 68. Code B, 1955.

Jones, F.N. An Olfactometer Permitting Stimulus Specification in Molar Terms. Am. J. Psychol., 67. Code B, 1954.

Jones, F.N. Olfactory Absolute Thresholds and Their Implications for the Nature of the Receptor Process. J. Psychol., 40. Code B, 1955.

Jones, F.N. The Reliability of Olfactory Thresholds Obtained by Sniffing. Am. J. Psychol., 68. Code B1, 1955.

Jonsson, E. M. Deane & G. Sanders. Community Reactions to Odors from Pulp Mills: A Pilot Study in Eureka, California. Environ. Res. 14, 1975.

Jung, J. "Untersuchung Uber Geruchsschwellen." Thesis, Wurzburg. Code E2, 1936.

Kappus, H.. Die Toxikologie des Schefelwasserstoffs. Staub, Luft 39, 6. Reinhalt, 1979.

Kastka, J., and G. Winneke. Classification and Evaluation of Annoyance Reactions to Environmental Odors. 6th International Symposium on Olfaction and Taste vom 15. Paris, 1977.

Kastka, J.. Assessment and Evaluation of Odours and Their Annoying Effect. VDI-Bereichte 416. 1982.

Kastka, J.. Inhalt ung Umfang der Geruschbelastigungggsreaktion. Institut fur Wasser-, Boden- und Lufthygiene vom 20. Vortrag, Berlin, 1976.

Kastka, J.. Results of Field Research on Odor annoyance Problems. "colloquium on the Problems of Annoyance Reaction from Odor and Noise Pollution", National Swedish Environment Protection Board, 17. Stockholm, 1978.

Kastka, J.. Zur Inhaltlichen Bedeutung von Geruchsbelasttigung und ihrer Bewertung. In: Organische Verunreinigungen in der Umwelt. Erich Schidt Verlag. Berlin, 1978.

Kazakova, M.N. (Unreferenced citation in: N.G. Andreescheva, The Effects of Certain Aromatic Carbohydrates in the Air. Hyg. Sanit. USSR, 33, No. 4.) Code D6, 1968.

Keddie, A.W.C. Prediction of Odour Nuisance.

Kendall, D.A.. Human Responses to Odorants. Proceedings of the Air Pollution Control Association 68th Annual Meeting and Exhibition. Boston, 1975.

Kerka, W.F., and Humphreys, C.M., Temperature and Humidity Effect on Odor Perception, ASHRAE Research Report No. 1587, ASHRAE Transactions, 62, 531, 1956.

Kimmerle, G. & A. Eben. Zur Toxicitat von Methylisocyant und Dessen Quantitativer Bestimmung in der Luft. Arch. Toxicol., 20. In German, reviewed at TRC. Code C4, 1964.

Kincaid, J.F., E.L. Stanley, C.H. Beckworth & F.W. Sunderman. Nickel Poisoning. Am. J. Clin. Pathol., 26. Code C1, 1956.

Kinkead, E.R., U.C. Pozzani, D.L. Geary & C.P. Carpenter. The Mammalian Toxicity of Ethylidenenorbornene (5-Ethylidenebicyclo (2,2,1) Hept-2-ene). Toxicol. Appl. Pharmacol., 20. Code A, 1971.

Kinkead, E.R., U.C. Pozzani, D.L. Geary & C.P. Carpenter. The Mammalian Toxicity of Dicyclopentadiene. Toxicol. Appl. Pharmacol., 20. Code B, 1971.

Kock M., Pfeiffer K.P., Pichler-Semmelrock F., Mose J.R. :Erhebung der Haufigkeit der Geruchsbelastung in einer Region mit Hilfe der Rastermehode. Forum Stadte-Hygined, 40, 43-48, 1989.

Koelega, H.S.. Environmental Annoyance: Characterization, Measurement, and Control. Elsevier Science Publishers. Amsterdam, New York, Oxford, 1987.

Kohler M.A., Nordensen T.J., And Fox W.E., Evaporation from Pans and Lakes, Research Paper No. 38, Hydrolic Services Division, U.S. Weather Bureau, Washington, D.C. (May 1955).

Korneev, Yu.E. Effect of the Combined Presence of Low Concentrations of Phenol and Acetophenone in the Urban Atmosphere. Hyg. Sanit. USSR, 30. [English translation of Russian article]. Code B2, 1965.

Kosiborod, N.R. Hygienic Significance of Low Diethylamin Concentrations in the Atmosphere. Hyg Sanit. USSR, 33. [English translation of Russian article]. Code B2, 1968.

Krackow, E.H. Toxicity and Health Hazards of Boron Hydrides. AMA Arch. Ind. Hyg. Occup. Med., 8. Code B5, 1953.

Krichevskaya, I.M. Biological Effect of Caprolactam and its Sanitary-Hygienic Assessment as an Atmospheric Pollutant. Hyg. Sanit. USSR, 33. [English translation of Russian article]. Code B2, 1965.

Krivanek, Dr. N.D. Central Research & Development Dept. Haskell Laboratory for Toxicology and Industrial Medicine. Letter to P.R. Jann in Response to n-Butanol Exposure Issue, 1988.

Kuehner, R.L., Humidity Effects on the Odor Problem, ASHRAE Research Report No. 1569, ASHRAE Transactions 62, 249, 1956.

Kulakov, A.E. The Effect of Low Concentrations of Hexamethylene Diamine on the Human Body. Hyg. Sanit., USSR, 29. [English translation of Russian article]. Code B2, 1964.

Lazarus, R.S., The stress and coping paradigm. In:e. Eisdorfer, D. Cohen, A. Kleinman and P. Maxim (Eds.) Conceptual models for psychopathology, pp. 173-209. Spectrum, New York, 1981.

Levin, L. & K.L. Gabriel. The Vapor Toxicity of Trimethyl Phosphite. Am. Ind. Hyg. Assoc. J., 34. Code C1, 1973.

Lilliard, D.A. Aqueous Odor Thresholds. Environmental Protection Agency, U.S.A., 660/4-75-002. Code E2.

Lindvall, T., and E.P. Radford. Measurement of Annoyance Due to Exposure to Environmental Factors. From the 4th Karolinska Institute Symposium on Environmental Health. 1973.

Lindvall, T., and L.T. Svensson. Equal Unpleasantness Matching of Malodorous Substances in the Community. Journal of Applied Psychology, 59. 1974.

Lindvall, T.. Nuisance Effects of Air Pollutants. Nordisk Hygienisk Tidskrift, 50. 1969.

Melekhina, V.P. The Problem of Combined Action of Three Mineral Acids. In: B.S. Levine (Ed.), USSR Literature on Air Pollution and Related Occupational Diseases, Vol. 16. Code B2, 1968.

Miedema H.M.E., Ham J.M., de Jong R.G., Don J.A.: Odour annoyance in the living environment. In: VDI-Berichte 561, 241-254, 1988.

Miedema, H.M.E., J.M. Ham, R.G. de Jong, and J.A. Don. Odour Annoyance in the Living Environment. VDI-Verlag. Dusseldorf, 1986.

Morresi, A. C., Cheremisinoff, P. N., and Young, R. A., Human Response and Effects of Odors, Industrial Odor Technology Assessment, Edited by P. N. Cheremisinoff and R. A. Young, Ann Arbor Science Publishers, Inc., Chapter 1, 1-25, 1974.

Moskowitz, H.R.. Odors in the Environment. Hedonics Perfumery and Odor Abatement. In: Handbook of Perception, Volume 10. Academic Press. New York, 1978.

Murray, D.R., S.S. Cha, and N.E. Bowne. Use of a fluctuationg plume puff model for prediction of the impact of odourous emissions. Preprint 78-68.6. Presented at the 71st Annual Meeting. Air Pollution control Association, Houston, Texas, June 1978.

Nagy, G.Z.. The Odor Impact Model. Journal of the Air and Waste Management Association,41. 1991.

Nawakowski, A.C. Environmental Health and Safety, The Upjohn Company, Kalamazoo, Michigan, Unpublished data (1980). In: Workplace Environmental Exposure Level Guide: Piperidine. Am. Ind. Hyg. Assoc. J., 43. Code C1, 1982.

Nicell, J.A., Preliminary Assessment of the Odour Impact Model as A Regulatory Strategy, M.A.Sc. Thesis, University of Windsor, Windsor, Ont., 1986.

Nishida K., M. Yama Kawa and T. Honda, Experimental Investigations on the Combined Actions of Components Mixed in Odorous Gas, Mem. Fac. Eng., Kyoto Univ., 41, part 4, 552-565, 1979.

Nystrom, A.E. Health Hazards in the Chloroprene Rubber Industry and Their Prevention. Acta Med. Scand., Suppl., 219. Code C1, 1948.

Odor Thresholds for Chemicals with Established Occupational Health Standards, Am. Ind. Hygiene Assoc., Akron, OH, 1989.

Odors, ASHRAE Handbook of Fundamentals, Chapter 12, 1977.

Oglesby, F.L., J.H. Sterner & B. Anderson. Quinone Vapors and Their Harmful Effects II. Plant Exposures Associated with Eye Injuries. J. Ind. Hyg. Toxicol., 29. Code C3, 1947.

Parker J.L., Legal Issues Resulting from Odor emissions, John L. Parker & Associates Ltd., Chicago, Illinois, presented at the 77th Annual Meeting of the Air Pollution Control Association, San Francisco, California, June 24-29, 1984.

Parker, J.L.. Legal Issues Resulting From Odor Emissions. Presented at the 77th Annual Meeting of the Air Pollution Control Association. San Francisco, California, 1984.

Patty, F.A. Alkaline Materials. In: F.A. Patty (Ed.), Industrial Hygiene and Toxicology Volume II. Toxicology, Interscience, New York/London. Code C1, 1962.

Patty, F.A. Arsenic, Phosphorus, Selenium, Sulfur and Tellurium. In: F.A. Patty (Ed.), Industrial Hygiene and Toxicology Volume II. Toxicology, Interscience, New York/London. Code C1, 1962.

Patty, F.A. Inorganic Compounds of Oxygen, Nitrogen and Carbon. In: F.A. Patty (Ed.), Industrial Hygiene and Toxicology Volume II. Toxicology, Interscience, New York/London. Code C1, 1962.

Patty, F.A. & W.P. Yant. Odor Intensity and Symptoms Produced by Commercial Propane, Butane, Pentane, Hexane and Heptane Vapor. U.S. Bureau of Mines, R.I. 2979. Code C4, 1929.

Peronti, J.W.. Assessment of Odor Problems Caused by Implementation of Low Solvent Technology at a Delaware Automotive Assembly Plant. Presented at the 78th Annual Meeting of the Air Pollution Control Association. Detroit, Michigan, 1985.

Pogosyan, U.G. The Effect on Man of the Combined Action of Small Concentrations of Acetone and Phenol in the Atmosphere. Hyg. Sanit. USSR, 30. [English translation of Russian article]. Code B2, 1965.

Poostchi, E.B.M.. Development of a Strategy for Quantifying the Impact of Odourous Emissions from Stationary Sources on the Surrounding Community. Ph.D. Dissertation, University of Windsor. Windsor, Ontario, 1985.

Poostchi, E.B.M.. Development of Procedures for Assessment and Documentation of Odorous Impacts on a Community. M.A.Sc. Thesis, University of Windsor. Windsor, Ontario, 1981.

Pozzani, U.C., E.R. Kinkead & J.M. King. The Mammalian Toxicity of Methacrylonitrile. Am. Ind. Hyg. Assoc. J., 29. Code C4, 1964.

Procedure for Determination of Odor Impact Models by the Binary Port Odor Panel Method. Air Resources branch, Ontario Ministry of the Environment, Report AMP #143. Toronto, Ontario, 1988.

Pulles, M.P.J. and P.M. Cavalini, Odour concentrations and odour annoyance: a study around sugar refineries. In: L.J. Brasser and W.C. Mulder (Eds) Man and his Ecosystem. Proc. VIII World Clean Air Congress, The Hague 1989, Elsevier Science Publishers B.V. Amsterdam, pp 117-122.

Pulles, M.P.J., W. Biesiot, and R. Stewart, Adverse effects of environmental noise on health. In: B. Berglund, U. Berglund, J. Karlsson and T. Lindvall (eds.), Proceedings of the 5th internatioal Congress on Noise as a Public Health Problem, Stockholm, Sweden, August 21-25, 1988, Swedish Council for Building Research, Stockholm, Sweden, in press.

Recknagel, R.O. & E.A. Glende. Carbon tetrachloride hapatotoxicity: an example of lethal clearage. CRC Crit. Rev. Toxicol. 2, 1973.

Ridker, R.G.. Economic Costs of Air Pollution. Frederick A. Praeger Publishers. New York, 1967.

Ripp, G.Kh. Hygienic Basis for the Determination of the Allowable Concentration Limit of Divinyl in Atmospheric Air. In: USSR Literature on Air Pollution and Related Occupational Diseases, Volume 17. Code B2, 1968.

Rosen, A.A., R.T. Skeel, and M.M. Ettinger. Relationship of River Water Odor to Specific Organic Contaminants. Journal of the Water Pollution Control Federation, 35. 1963.

Rotton, J., Indirect measures of annoyance: what price air pollution. In: T.S. Koelega (ed.), Environmental annoyance: characterization, measurement and control, Elsevier Science Publishers, Amsterdam, pp. 153-164, 1987.

Rupp, H. & D. Henschler. Effects of Low Chlorine and Bromine Concentrations on Man. Int. Arch. Gewerbepathol. Gewerbehyg., 23. (National Translations Center.) Code C4, 1967.

Ruth, J.H., Odor Thresholds and Irritation Levels of Several Chemical Substancces: A Review, American Industrial Hygiene Association Journal, Vol. 47, March 1986.

Satin, K., M. Deane, A. Leonard, R. Neutra, N. Gravitz, M. Harnly & R. Green. The McColl Site Health Survey, California Department of Health Services, Epidemiological Studies Section, Berkeley, CA, 1983.

Satin, K., S. Huie & L. Croen. Operating Industries, Inc. Health Effects Study, California Department of Health Services, Epidemiological Studies and Surviellance Section, Berkeley, CA, 1986.

Schmidt, M., and E. Auermann. Empfehlungen fur die Mindestabstande Zwischen Anlagen der Tierischen Grossproduktion und dem Siedlungsgebiet. In: Geruchsprobleme bei Tierhaltung und Tierkorperbeseitigung. VDI-Verlag. Dusseldorf, 1975.

Schroeder, W.H.. Air Pollution Aspects of Odorous Substances - A Literature Survey. Environment Canada Report EPS 3-AP-75-1. 1975.

Schwarz, N., F. Strack, H.J. Hippler, and G. Bishop. The Impact of Administration Mode on Response Effects in Survey Measurements. Applied Cognitive Psychology. 1991.

Selye, H.. A Syndrome Produced by Diverse Nocuous Agents. Nature, 138. 1936.

Shim, C. & M. Williams. Effect of Odors in Asthma. Am. J. Med. 80, 1986.

Shusterman, D., J. Balmes & J. Cone. Behavioral Sensitization to Irritants/Odorants After Acute Overexposures. J. Occup. Med, 1988.

Slavgorodskiy, L.P. Biological Effects and Hygienic Evaluation of Air by Phthalic Anhydride. In: USSR Literature on Air Pollution and Related Occupational Diseases. Volume 17. Code B2, 1968.

Smith W.S., Schueneman J.J., Zeidberg L.D., Public Reaction to Air Pollution in Nashville, Tennessee, JAPCA 14:418, 1964.

Smith, K.A., J.M. Bremmer and M.A. Tatabai, 1973, Sorption of Gaseous Atmospheric Pollutants by Soils, Soil Sci, pgs. 313-319, April 1973.

Smith, W.S., J.J. Schueeman, and L.D. Zeidberg. Public Reaction to Air Pollution in Nashville, Tennessee. Journal of the Air Pollution Control Association, 14. 1964.

Springer, K.. Combustion Odors - A Case Study. In: Human Responses to Environmental Odors. Academic Press. New York, London, 1974.

Springer, K.J., and C.T. Hare. A Field Survey to Determine Public Opinion of Diesel Engine Exhaust Odor. EPA Air Pollution Control Office, South West Research Institute. San Antonio, Texas, 1970.

Springer, K.J.. Combustion Odors-A Case Study. In: Human Responses to Environment Odors. Academic Press. New York, 1974.

Stalker, W.W. Defining the Odor Problem in a Community. Am. Ind. Hyg. Assoc. J., 24. Code A, 1963.

Steinheider, B., and G. Winneke. Industrial Odours as Environmental Stressors: Exposure-Annoyance Associations and Their Modification by Coping, Age, and Perceived Health.

Stern, A.C.. Air Pollution, 3rd Edition, Vol II: The Effects of Air Pollution. Academic Press. New York, 1976.

Stewart, R.D., E.D. Baretta, H.C. Dodd & T.R. Torkelson. Experimental Human Exposure to Vapor of Propylene Glycol Monomethyl Ether. Arch. Environ. Health, 20. Code C4, 1970.

Stewart, R.D., J.E. Peterson, P.E. Newton, C.L. Hake, M.J. Hosko, A.J. Lebrun & G.M. Lawton. Experimental Human Exposure to Propylene Glycol Dinitrate. Toxicol. Appl. Pharmacol., 30. Code A, 1974.

Sullivan, R.J., Air Pollution Aspects of Odorous Compounds, Litton Systems, Inc. Environmental Systems Division 7300 Pearl Street, Bethesda, Maryland 20014, Prepared for the National Air Pollution Control Administration Consumer Protection & Environmental Health Service Department of Health, Education, and Welfare (Contract No. PH-22-68-25), September 1969.

Sullivan, R.J.. Air Pollution Aspects of Odorous Compounds. US Department of Commerce. 1969.

Suro, R., Grass roots groups show power battling pollution close to home, The New York Times, New York, Sunday July 2 1989.

Sutton, W.L. Aliphatic and Alicyclic Amines. In: F.A. Patty (Ed.), Industrial Hygiene and Toxicology Volume II. Toxicology, Interscience. New York/London. Code C1, 1962.

Sutton, W.L. Heterocyclic and Miscellaneous Nitrogen Compounds. In: F.A. Patty (Ed.), Industrial Hygiene and Toxicology, Interscience. New York/London. Code C1, 1962.

Tepikina, L.A. Biological Effects of Mesidine as an Atmospheric Pollutant. Hyg. Sanit. USSR., 33. [English translation of Russian article]. Code B2, 1968.

The Air Pollution Situation in Terre Haute, Indiana, with Special Reference to the Hydrogen Sulfide Incident of May-June 1964, U.S. Public Health Service, 1964.

The Report of the Third Karolinska Symposium on Environmental Health. 1970.

Treon, J.F., F.P. Cleveland & J. Cappel. The Toxicity ot Hexachlorocyclopentadiene. AMA Arch. Ind. Health, 11. Code C2, 1955.

Turk, A., H. Karamitsos, K. Mahmood, J. Mozaffari, and R. Loewi. Wastes Generated From the Removal of Sulfide Odors. Department of Chemistry, The City College of the City University of New York. New York.

U.S. Environmental Protection Agency. "A Study of the Social and Economic Impact of Odors". La Jolla, California, Copley International Corporation; Phase III, 1973.

Ubaidullaev, R. Effect of Low Concentration of Methanol Vapours on Man and Animals. Hyg. Sanit., USSR, 31. [English translation of Russian article]. Code B2, 1966.

Ubaidullaev, R.U., & U.A. Madzhidov. Investigation Data on Reflex and Resorptive Action of Small Concentrations and Doses of Kilwal (in Russ.). Gig. Sanit., no.3. Code B2, 1978.

VDI-Kommission Reinhalting der luft, Geruche, Stand der Erkenntnisse zur Ermittlung von Belastung und Belastigung, Workshop 28. November 1989, Dusseldorf.

Verschueren, K.. Handbook of Environmental Data on Organic Chemicals. Van Nostrand Reinhold Company. Toronto, 1977.

Viswanathan, S., Evaluation of Intensities, Hedonics and Complaint Potentials of Aliphatic Alchohols and Acetates Using n-Butanol as Standard, M.A.Sc. Thesis, University of Windsor, Windsor, Ont., 1979.

Weeks, M.H. Monoethanolamine. In: Transactions of the Symposium on Health Hazards of Military Chemicals. Chemical Warfare Laboratories Special Publication. Code D6, 1958.

White, C.. The Effect of Odours on Health, in: Odours. National Society for Clean Air Seminar. Birmingham, 1976.

Winkler, K.. Immissionsgrenzwerte zur Verhinderung von Geruchsbelastigungen. Luft Betr., 19. Wasser, 1975.

Winneke G., Kastka J., Odor pollution and odor annoyance reactions in industrial areas of the Rhine-Ruhr region. In Olfaction and Taste VI, pp. 471-479. Ed. By J. Le Magnen and P. MacLeod. Information Retrieval, London, 1977.

Winneke, G. and J. Kasta, Comparison of odour-annoyance data from different industrial sources: problems and indications. In: T.S. Koelega (ed.), Environmental annoyance: characterization, measurement and control, Elsevier Science Publishers, Amsterdam, pp. 129-139, 1987.

Winneke, G. und Kastka, J. Bewertungssystem fur Geruche auf der Basis von Belastigungsdaten. In: Ges. Z. Ford. D. Lufthygiene- und Silikoseforschung (Hsg.). Umwelthygiene. Luftverunreinigung - Wirkung auf den Menschen, WirKungskaaster. Dusseldorf: Albers, 1984, 103-114.

Winneke, G. und Kastka, J., Odour Pollution and odour annoyance reactions in industrial areas of the Rhine-Ruhr region In: Le Magnen, J. and Mc Leod, P. (eds.). Proceedings of the 6th Int. Symp. on Olfaction and Taste.- London, Washington: Information Retrieval, 1977, 471-479.

Winneke, G., and J. Kastka. Geruchsbelastigung durch Luftverunreinigungen. Prax. Pneumol., 29. 1975.

Winneke, G., and J. Kastka. Wirkung von Gerchsstoffen auf den Menschen. In: Geruchsprobleme bei Tierhaltung und Tierkorperbeseitigung. VDI-Verlag. Dusseldorf, 1975.

Wohlwill, J.F., Human adaptation to levels of environmental stimulation, Human Ecology, 2, pp 127-147, 1974.

Wolf, M.A., V.K. Rowe, D.D. McCollister, R.I. Hollingsworth & F. Oyen. Toxicological Studies of Certain Alkylated Benzenes and Benzene. AMA Arch. Ind. Health, 14. Code E2, 1956.

Woolrich, P.F. Toxicology, Industrial Hygiene and Medical Control of TDI, MDI and PMPPI. Am. Ind. Hyg. Assoc. J., 43. Code C1, 1982.

Work Papers for the Conference on the Dose-Response Relationship Affecting Human Reaction to Odorous Substances. Arther D. Little. Cambridge, Massachusetts, 1971.

Zapp, J.A. Hazards of Isocyanates in Polyurethane Foam Plastic Production. Arch. Ind. Health, 15. Code C1, 1957.

Zibireva, I.A. Relative Toxicity of Microconcentrations of Two Chlorisocyanates (para- and meta-isomers). Hyg. Sanit., USSR, 32. [English translation of Russian article]. Code B2, 1967.

5.0 SAMPLING AND ANALYSIS

5.1 SAMPLING TECHNIQUES

5.1.1 IDEAL SAMPLING METHOD.

There are several procedures that can be used to collect odour samples for analysis. An ideal procedure would involve having a panel of test subjects directly at the source of the emission, where the odour sample could be continuously withdrawn without the need for storage. However, this direct odour measurement technique is impractical because a mobile laboratory equipped for sensory testing is required.

5.2 STATIC TECHNIQUES

5.2.1 SYRINGE DILUTION METHOD.

In the past, a simple sample collection procedure depended on the syringe dilution method. This approach involved the use of a large syringe to collect a sample and dilute it for presentation to odour panelists. However, due to the large surface-to-sample volume ratio, this method was susceptible to odour adsorption effects.

5.2.2 LUNG TECHNIQUE.

The lung technique involves evacuating the air between a Tedlar sample bag and the lung wall which causes the bag to fill with the sample.

5.2.3 PERISTALTIC PUMP METHOD.

In the peristaltic pump method, the odourous sample is transferred from a source through disposable odourless plastic tubing into a plastic sample bag. The peristaltic pump method operates on the same principle as the lung technique but differs in that there is no contact between the interior of the pump and the odourous sample. In both the lung and peristaltic pump methods, the material that will contact the sample must be conditioned with the odourous gas prior to collection.

5.2.4 GENERAL SELECTION METHOD CRITERIA.

The general criteria for selection of a sampling container are size considerations, ease in handling, ruggedness, inertness, temperature sensitivity and permeation. Based on these criteria, the collection devices most generally used today are a Tedlar bag for the lung technique or the peristaltic pump method.

5.3 DYNAMIC TECHNIQUES

5.3.1 DYNAMIC DILUTION METHOD.

The dynamic dilution method involves the flow of sample into a mixing chamber at a well defined constant rate where it mixes with the odour free dilution air or nitrogen (also flowing at a measured constant rate) and continuously fills a Tedlar sample bag at the desired dilution. The benefit of this method is minimization or even elimination of condensation and adsorption effects.

5.4 ANALYSIS

5.4.1 SIX-LEVEL DYNAMIC DILUTION FORCED CHOICE TRIANGLE OLFACTOMETER.

The current method for analyzing odour samples depends on the Six-Level Dynamic Dilution Forced Choice Triangle Olfactometer. (See **Figure 2**). The olfactometer supplies six dilution levels, each equipped with a set of 3 glass sniffing ports. Two of the ports emit deodorized air while the other discharges the odour sample diluted with odour free air. Eight to ten odour panelists are told that at one of the three ports they may detect an odour and their task is to identify the port that provides the odourous dilution. Even if a panelist is unsure, a decision must be made and recorded (forced choice). The panelists proceed from the most diluted sample towards the higher concentrations of the sample. This approach is necessary to avoid a temporary loss of sensitivity if a stronger odour is sampled first. A signal box with six triple sets of lights provides the panelist inside the odour-free room with a means of communicating responses to the panel coordinator. The panel coordinator records the results on a special form and calculates the data following a statistical procedure which results in an averaged panel value termed ED_{50}, or now referred to as the D/T or dilution to threshold value. This value represents the dilution at which 50% of the panel would detect the presence of the odour in the diluted sample.

5.4.2 CALCULATING D/T (ASTM E679 METHOD).

The simplest method for determining the D/T value is the ASTM E679 method. This procedure involves estimation of the individual maximum likelihood threshold for each panelist and a calculation of the panel's geometric mean. Considering that a panelist makes three correct responses from the fourth dilution level onwards, a statistical assumption is made that the panelist would be capable of making a correct judgment at a dilution level somewhere between the third and fourth level. The most likely dilution threshold would then be the geometric mean of the dilution factors for the third and fourth levels. The D/T or ED_{50} value of the panel is calculated by evaluating the geometric mean of the individual odour thresholds.

5.5 REFERENCES

'Nose' Sniffs the Sweet Smell of Success (Electronic Nose). Process Engineering, 75. 1994.

Acree, T.E., R.M. Butts, R.R. Nelson, and C.Y. Lee. Sniffer to Determine the Odor of Gas Chromatic Effluents. Analytical Chemistry, 48. 1976.

Adams D.F., Young F.A., Luhr R.A., Evaluation of an odor perception threshold test facility, Tappi 51 (3): 62A-67A, 1968.

Adams, D.F., et al., Improved Sulfer Reacting Microcoulometric Cell for Gas Chromatography, Anal. Chem. 38(8): 1094, 1966.

Adams, D.F., R.K. Koppe, and W.N. Tuttle, Analysis of Kraft-Mill, Sulfur-Containing Gases with GLC Ionization Detectors, J. Air Pollution Control. Assoc. 15(1):31, 1965.

AFNOR, Normalisation Francaise NF X 43-104, Air Quality, Odourous Atmospheres, Sampling Methods, December 1986.

AFNOR, Norme Francaise NF X. Determination of the Dilution Factor at the Perception Threshold. 1986.

Air Pollution Control Association (APCA) TT-4 Committe Dynamic Olfactometer Round Robin Interlaboratory Test Results, 1977, 1980.

Air Pollution Survey of Odorous Compounds. A Literature Review, U.S. Department of Health, Education, and Welfare. NAPCA Publication No. APTD 66-42. 1969.

Aitken, M.D., and M.F. Okun. Quantification of Wastewater Odors by the Affected Public. Water and Environmental Research, 64. 1992.

Altena, K., W. Biesiot, N.E. van Brederode , I. van Kamp, T.R. Knottnerus, J.V. Lako, M.P.J. Pulles, R.E. Steward, Environmental Noise and Health, Description of data, Models and Methods used, and the results of the epidemiological surveys. Report No. GA-DR-03-01, Miniistry of Housing, Physical Planning and the Environment, The Hague, The Netherlands.

American Society for Testing and Materials, E122 Standard Practice for Choice of Sample Sixe to Estimate the Average Quality of Lot in Process. ASTM, 1916 Race St., Philadelphia, PA 19103, reapproved 1979.

American Society for Testing and Materials, E679 Standard Method for Determination of Odor and Taste Thresholds by a Forced-Choice Ascending Mithod of Limits ASTM, 1916 Race St., Philadelphia, PA 19103, 1979.

American Society for Testing and Materials. ASTM D 1391-57, Standard Method for Measurement of Odor in Atmospheres (Dilution Method). Philadelphia: ASTM, 1976.

American Society for Testing and Materials. Atlas of Odor Character Profiles by Andrew Dravnieks (Data Series DS 61). Philadelphia, PA: American Society for Testing and Materials, 1985.

American Society for Testing and Materials. Basic Principles of Sensory Evalutation, STP 433, 1968.

Amoore J.F., Hautala E., Odor as an aid to chemical safety: odor thresholds compared with Threshold Limit Values and volatilities for 214 industrial chemicals in air and water dilution, J. Applied Toxicology, 3 (6): 272-290, 1983.

Amoore J.E., O'Neill R.S., Proposal for a unifying scale to express olfactory thresholds and odor levels: the "decismel scale", Proc. Air Poll. Control Assoc. Ann. Tg. Paper No. 78.5, 21 pp. , 1988.

Amoore, J.E. Molecular Basis of Odor. C.C. Thomas, Springfield, Illinois, 1970.

Amoore, J.E. & R.G. Buttery. Partition Coefficients and Comparitive Olfactometry. Chem. Senses Flavor, 3. Code B, 1978.

Amoore, J.E., and D. Venstrom. Correlations Between Stereochemical Assessments and Organoleptic Analysis of Odorous Compounds. In "Olfaction and Taste II", Pergamon Press. Oxford, 1967.

Amoore, J.E., D. Venstrom, and A.R. Davis. Measurement of Specific Anosmia. Perceptual and Motor Skills, 26. 1968.

Amoore, J.E., The Stereochemical Theory of Olfaction, Proc. Sci. Sect. Toilet Goods Assoc., Special Suppl. to Vol. 37 (I) , 1962.

Amoore, J.E.. A Matching-Standards Method for Evaluating Odor Annoyance . In: Recent Determinations and Current Practices in Odor Regulations, Controls, and Technology. A&WMA Transactions Series, No. 18. Pittsburgh, Pennsylvania, 1991.

Amoore, J.E.. The Stereochemical Specifications of Olfactory Receptors. Perfume Essential Oil Rec., 43. 1952.

Anagnostou, T.J., T.S. O'Rourke & B. Devlin. Devlin Olfactometer Data Interpretations Using Population Odor Response Concepts. AWMA 86th Ann. Meeting & Exhibition, Denver, 1993.

Andersson, G., C. Brosset, and P. Grennfelt. The Stability of Odorous Compound in the Atmosphere. In: Human Responses to Environmental Odors. Academic Press. New York, 1974.

Anon, DIN 5485 - Wortzusammensetzungen mit den Wortern Konstante, Koeffizient, Zahl, Faktor, Grad, MaB, Pegel, DIN, 1977.

Anon. Odor Panel Smells Trouble. Modern Manufacturing, Vol. 1, No. 7, 1968.

Anon., Brochure Veehouderig en Hinderwet., Ministerie van Landbouw en Visserig, Staatsuitgeverig, 's Gravenhage, 1976.

Anon., Indicatief Meergarenplan Lucht 1985-1989, Staatsuitgeverig, 's Gravengage, 1984.

Anon., Ringonderzoek van Olfaktometers in Nederland, Publication series on Air nuber 80, Ministry VROM, 's Gravenhage, 1989, ISBN 90 346 2036 0.

Anon., Standaadisatie Olfaktometers, Publication series on Air number 49, Ministry VROM, 's Gravenhage, September 1985, ISBN 90 346 0657 0.

Anon.. Reports of Studies on the Measurement of the Offensive Odors (from 1972-1980) (in Japan). Japan Environment Agency, Tokyo. Code D3, 1980.

Anonymous. L'Identificazione e la Determinazione Degli Odori di Raffineria. Riv. Combust., 30. 1976.

Anonymous. Measuring Diesel Exhaust Odor. Automotive Engineering, 84(8). 1976.

Anonymous. Seminaire de Printemps sur les Odeurs. CITEPA Etudes Documentaires, 55. Birmingham, 1976.

Anonymous. The Identification and Measurement of Refinery Oils. Stichting CONCAWE, Report , 8.

Anzion, C. et al.: Standardization of Olfactometers in the Netherlands. Man and his Ecosystem. Proceedings of the 8th World Clean Air Congress 1989. the Hague, The Netherlands, 11-15 September 1989, Volume 1. Elsvier Science Publishers B. V. Amsterdam - Printed in the Netherlands.

Applebury, T.E., and M.J. Schaer, Analysis of Kraft Pulp Mill Gases by Process Gas Chromatography, Dept. of Chem. Eng., Montana State Univ., Bozeman, Mont., 1968.

Applebury, T.E., and M.J. Schaer. Analysis of Kraft Pulp Mill Gases by Process Gas Chromatography. Journal of The Air Pollution Control Association. 1970.

Arito, H., & S.F. Takagi. Selective Blocking of Odor and Water Responses by Parachloromercuribenzoate and Uranyl Ions. Proc. Japan Acad., 56(Ser. B), 1980.

Armit, H.W.. The Toxicology of Nickel Carbonyl, J. Hyg, 7. Code E2, 1907.

Arshney, S.C., Development of Procedures for Determining Industrial Odour Thresholds, M.A.Sc. Thesis, University of Windsor, Windsor, Ont., 1979.

Arsovic, H.M., and H. Burchard. schlechter Luft auf der Spur. U.-Techn. Umweltmagazin, 6. 1977.

Arsovic, H.M.. Identifizierung und Messung von Geruchen. In: Intstitut fur Gewerbliche Wasserwirtschaft und Luftreinhaltung e.V.. Geruchsprobleme durch gewerbliche Abwasser im Betrieb, in der Kanalisation und in Abwasserbehandlungsanlagen. IWL-Forum, 1978.

Association Française de Normalisation, NF X 43-101 Air Quality: Method of Measuring the Odor Intensity of Gaseous Effluents. Determination of the Dilution Factor to Perception Threshold. AFNOR, Tour Europe-Cedex 7, 92080 Paris La Défense, 1986.

ASTDR (Agency for Toxic Substances and Disease Registry). Toxicological Profile for Cyanide, 1988.

ASTM D 3466-76, 1983, Standard Test Method for Ignition of Granular Activated Carbon.

ASTM D 3838-80, Standard Test Method for pH of Activated Carbon.

ASTM subcommittee E-18.04, Standard practice for defining and calculating individual and group sensory thresholds from forced choice data sets of intermediate size, December 1990.

ASTM, Standard for the Measurement of Odor in Atmospheres (Dilution Method) - Designation D1391-78, 1984 Annual Book of ASTM Standards American Society for Testing and Materials, Philadelphia, PA, 1984.

ASTM. Standard Method for Defining and Calculating Sensory Thresholds from Intermediate Size. AWMW E 18.04.25 Sensory Thresholds from Forced-Choice Data, 6th Draft, 1990.

ASTM. Standard Practice for Determination of Odor and Taste Thresholds by a Forced-Choice Ascending Concentration Series Method of Limits, E 679-79. Annual Book of Standards, American Society for Testing and Materials, Philadelphia, PA.

Babin, I.N., I.I. Strizhevskii & E.I. Kordysh. Use of the Odorimeter VNIIT for Comparative Tests of the Intensity of the Odor of Carbide and Electrolysis Acetylene. Chem. Abstr., 66 (1967) 31815m. Code B5, 1965.

Backman, E.L.. Experimentella Undersokningar Ofver Luktsinnets Fysiologi. Upsala Laekarefoeren. Foerh., 22. Code E1, 1917.

Backman, E.L.. The Olfactologie of the Methylbenzol Series. Onderzoekingen Gedaan in Het Physiologisch Laboratorium der Utrechise Hogeschool, S5, 18. Code E2, 1918.

Badings, H.T., H. Maarse, R.J.C. Kleipool, A.C. Tas, R. Neeter, and A.C. Noever de Brauw. Proc. Symposium of Aroma Research. Zeist, Pudoc. Wageningen, 1975.

Bahnmuller, H. Olfactometry of Dibutyl amine, Methyl acrylate, Isoamyl alcohol and a Spray Thinner for Car Varnish - Results on a VDI interlaboratory test. Staub-Reinhaltung der Luft 44, 1984.

Bahnmuller, H., Olfaktometrie von Dibutylamin, Acryls {"auremethyleste, Isoamylalkohol und eines Spritzverdunners fur Autolacke- Ergebnisse eines VDI-Ringvergleichs, Staub-Reinhalt, luft 44, nr 7/8, July/August 1984.

Bahnmuller, H.: Olfaktometrie von Dibutylamin, Acrylsauremethylester, Isoamylalkohol und eines Spritzverdunners fur Autolacke-Ergebnisse eines VDI-Ringvergleiches. Staub-Reingalt. Luft 44 Nr. 9, S. 325-331, 1988.

Baikov, B.K., Basic Experimental Data for the Determination of Maximal Permissible Concentrations of Carbon Disulfide and hydrogen Sulfide Simultaneously Present in the Air; Translated by B.S. Levine, U.S.S.R. Literature on Air Pollution and Related Occupational Diseases 12:47, 1963.

Baikov, B.K., M.K. Khachaturyan, E.V. Bordodina, N.G. Feldman & A.M. Tambovtseva. Data for Hygienic Standardization of Amyl Alcohol in the Atmosphere. Gig. Sanit., 38. [Engilish summary of Russian article]. Code B2, 1973.

Baikov, B.K.. Experimental Data for Substantiating the Maximum Permissible Concentration of Carbon Disulfide in Combination with Hydrogen Disulfide in the Atmospheric Air. Gig. Sanit., 28. [English summary of Russian article]. Code B2, 1963.

Bakalyar, H.A., and R.R. Reed. Identification of a Specialized Adenlyl Cyclase That May Mediate Odorant Detection. Science, 250. 1990.

Baker, R.A.. Critical Evaluation of Olfactory Measurement. Journal of The Water Pollution Control Federation, 34. 1962.

Baker, R.A.. Electrophoretic and Taste and Odor Measurements in Plant Control. Journal of the American Water Works Association, Vol. 57. 1965.

Baker, R.A.. Limitation of Present Objective Techniques in Sensory Characterization. In: Correlation of Subjective-Objective in the Study of Odors and Taste. Philadelphia, Pennsylvania, 1967.

Baker, R.A.. Odor Testing Laboratory. Journal of the Water Pollution Control federation, 35. 1963.

Baker, R.A.. Trace Organic Analyses by Aqueous Gas-Liqid Chromatography. International Journal of Air and Water Pollution, Vol. 10. 1966.

Baldus, C.. "Undersuchung Uber Geruchsswellen." Thesis, Wurzburg. Code E2, 1936.

Barbalic, N.. Mutual Dependencies Between the Characteristic Parameters of the Lognormal Mathematical Model of Air Pollutant Concentration. Atmospheric Environment, 15. 1981.

Barnes, R.D., L.M. Law, and A.J. MacLeod. Comparison of Some Porous Polymers as Adsorbents for Collection of Odor Samples and the Application of the Technique to an Environmental Malodor.Analyst, 106(1261). London,England, 1981.

Bartl, P., A. Schaaf, and A. Zeman. Geruchsmessungen in Kommunalen Klaranlagen-Einfuhrung in die Problematik und Methodik. GWF Wasser-Abwasser, 120. 1979.

Basic Principles of Sensory Evaluation. ASTM Publications, STP 433. 1968.

Basmadshijewa, K., M. Argirowa & E. Dawidkswa. Hygienische Begrundung des MIK-Wertes von Methylendichlorid in der Atmospharischen Luft. Wiss. Z. Humboldt-Univ. Berlin, Math, Naturwiss. Reihe, 19. [English summary of German article]. Code E2, 1970.

Beck, L.H., and W.R. Miles. Some Theoretical and Experimental Relationships Between Infrared Absorption and Olfaction. Science, 106. 1947.

Bedborough, D.R. & P.E. Trott. The Sensory Measurement of Odours by Dynamic Dilution. Warren Spring Laboratory, Stevenage, Report No.: LR 299 (AP). Code E2, 1979.

Benforado, D.M., W.J. Rotella, and D.L. Horton. Development of an Odor Panel for Evaluation of Odor Control Equipment. Journal of the Air Pollution Control Association. 1969.

Berglund, B., and T. Lindvall. Olfactory Evaluatiuon of Indoor Air Quality. Danish Building Research Institute. Copenhagen, 1979.

Berglund, B., V. Berglund, and T. Lindvall. A Psychological Detection Method in Environmental Research. Environmental Research, 7. 1972.

Berglund, B., V. Berglund, and T. Lindvall. Measurement of Rapid Changes of Odor Concentrations by a Signal-Detection Approach. Journal of the Air Pollution Control Association, 24. 1974.

Berglund, B., V. Berglund, T. Lindvall, and L.T. Svennson. A Quantitative Principle of Perceived Intensity Summation in Odor Mixtures. Journal of Experimental Psychology, 100. 1973.

Bernert, J.. Messtechnische Erfassung von Geruchsstoffen in den Abgasen von Intensivtierhaltungen. In: 5. Symposium uber Branchenspezifische Emissionen, Intensivtierhaltungen. Vortrage. Munchen, 1977.

Bewtra, V.K., Gynp, A.W. Mathur, G.P., Price, S.J.W., St. Pierre, C.C., Smith, D.S., Wood, G.W., Application of Sensory-Analytical Techniques to Odor Analysis: A Distillery Case Study, for Technology Development and Appraisals Section Air Resources Branch Ministry of the Environment Province of Ontario, Toronto, Ontario, December 1977.

Beyer W.H., CRC Handbook of Tables for Probability and Statistics, 2nd ed. CRC Press, Inc., Boca Raton, FL, 1985, p. 282.

Beynon, J. H., Mass Spectrometry and Its Application to Organic Chemistry, Elsevier, Amsterdam, 1960.

Biemann, K., Mass Spectrometry,Applications to Organic Chemistry, McGraw-Hill, New York, 1966.

Bienfang, R.. Dimensional Characterization of Odors. Chronica Botanica, 6. 1941.

Bley, W., J. Goldbach, J. Nasser, and D. Ropers. Typische Geruchsbelastigende Substanzen im Umkreis von Mineralolbetrieben-Einfuhrung in die Problematik-DGMK-Projekt 25. Deutsche Gesellschaft fur Mineraldwissenschaft und Kohlechemie e.V., 32. Hamburg, 1979.

Bliss, P., K. Jiang, and T. Schulz. The Development of a Sampling System for the Determination of Odor Emission Rates from Areal Sources: II. Mathematical Model. Journal of the Air and Waste Management Association, 45. 1995.

Boelens, H. Relationship Between the Chemical Structure of Compounds and their Olfactive Properties. Cosm. Perf. , 1974.

Boelens, H., H.G. Haring & H.J. Takken. The Influence of Molecular Structure on Olfactive Quality (A Quantitative Approach). Chemistry and Industry, 1983.

Boelens, H., H.G. Harring, D. de Rijke & P.H. Punter. Molecular Structure and Olfactive Properties. In: Proceedings of the 3rd Annual Meeting of the American Chemical Society, Sarasota, FL, 1981.

Boholt, K. Determination of Odour Emission From Area Sources. Miljo & Teknologi, (in Danish), 1988.

Boholt, K., Bestemmelse af lugtemissionen fra abne arealkilder, in Miljo & Teknologi, 2/1988.

Boholt, K., Losses of gases in PVTF (Tedlar) and PET (Nalophan NA) bags, dk-Teknik, 1994.

Boholt, K., Results of investigation of gas losses in PET and Tedlar bags, DK-Teknik, Denmark

Boholt, K., the influence of velocity of air and flow rate on odour control concentration measured by olfactometer, dk-TEKNIK, February 1992.

Bollyky, L.J., A. Brodgesell, M. Chiba, L. Dubois, R.J. Gordon, R.A. Herrick, J.S. Jacobson, R.C.C. Lao, and B.G. Liptak. Air Pollution Control Instrumentation and Air Quality Detectors. In:Environmental Engineering Handbook, Vol. 2. Deerfield, Illinois, 1974.

Borisova, M.K. Experimental Data for Determination of the Maximum Allowable Concentration of Dichloroethane in the Atmosphere. Gig. Sanit., 22. [English summary of Russian article]. Code B2, 1957.

Bowers J.F., Bjorklund J.R., and Cheny C.S., Industrial Source Complex (ISC) Dispersion Model User's Guide, EPA-450/4-79-030, Volume I, Dec. 1979.

Bowers J.F., Bjorklund J.R., and Cheny C.S., Industrial Source Complex (ISC) Dispersion Model User's Guide, EPA-450/4-79-031, Volume II, Dec. 1979.

Bozza, G. & P. Colombo. Eliminazione Degli Odoro di una Fabrica di Cellulosa al Solfato. Chem. Ind. (Milan), 31. [Italian]. Code E2, 1949.

Brower, K.R. & R. Schafer. The Recognition of Chemical Types of Odor. The Effect of Steric Hindrance at the Functional Group. J. Chem. Educ., 1975.

Brunekreef, B., and H. Harssema. Viscose Odors in Ambient Air. Water, Air, and Soil Pollution, 13. 1980.

Buchberg, H., M.H. Jones, H.G. Lindh & K.W. Wilson. Air Pollution Studies with Simulated Atmospheres. California University, Los Angeles. Code E2, 1961.

Byrd, J.F., and A.H. Phelps, Jr. Odor and Its Measurement. "Air Pollution", Vol.II, 2nd Ed.. A.C. Stern, editor, Academic Press. New York, 1968.

C.E.P., Fluid Flow through Packed Columns, Chem. Eng. Progr., 48 (2) : 89(1952).

Cain, W.S., and M. Drexler. Scope and Evaluation of Odor Concentration. Annals of the New York Academy Of Sciences, 237. 1974.

Cain, W.S.. Olfaction and the Common Chemical Sense: Similarities, Differences, and Interactions. In: Odor Quality and Chemical Structure. American Chemical Society, 148. Washington, D.C., 1981.

Cain, W.S.. The Case Against Threshold Measurement of Environmental Odors. Journal of the Air Pollution Control Association, 30. 1980.

Calvert S. and Englund H.M., Odor Sampling and Analysis, in Handbook of Air Pollution Technoloty, John Wiley & Sons, Inc., P. 847, 1984.

Carey, F.F., and J.T. Oden, Finite Elements: Fluid Mechanics, Vol. VI, Prentice-Hall, Englewood Cliffs, Inc., N.J., 1986.

Carey, G., and J.T. Oden, Finite Elements: Comutational Aspects, Vol. III, Prentice Hall, Inc., Englewood Cliffs, N.J., 1984.

Carsch, G.. An Olfactory Aptitude Test for the Selection of a Perfume Panel. Proceedings of the Second Open Symposium of the American Society of Perfumers. 630 Fifth Avenue, New York, 1956.

Caulott, E., Significance Tests, Routledge and Kegan Paul Ltd., Boston, Mass., 1973.

Cederhof, R., Edfors, M. L., Friberg, L., and Lindvall, T., Determination of Odor Thresholds for Flue Gases From a Swedish Sulfate Cellulose Plant, TAPPI, 48 (7), 405-411, July 1965.

Cederhof, R., Edfors, M. L., Friberg, L., and Lindvall, T., On the Determination of Odor Thresholds in Air Pollution Control - An Experimental Field Study on Flue Gases From Sulfate Cellulose Plants, J. Air Pollution Control Association, 16(2), 92-94, 1966.

Cederhof, R., M.L. Edfors, L. Friberg, and T. Lindvall. Determination of Odor Thresholds for Flue Gases from a Swedish Sulfate Cellulose Plant. TAPPI, 48. 1965.

Cederhof, R., M.L. Edfors, L. Friberg, and T. Lindvall. On the Determination of Odor Thresholds in Air Pollution Control- An Experimental Field Study on Flue Gases from Sulfate Cellulose Plants. Journal of the Air Pollution Control Association, 16. 1966.

CEN/TC264/WG5/N19, Eurovent 4/3, Air quality - Staionary source emissions. Determination of the dust concentration in gas carrying ducts. Manual method with performance criteria, 2nd edition, June 1993.

Cha, S.S.. Odor Thresholds for Chemicals with Established Occupational Health Standards. In: Recent Determinations and Current Practices in Odor Regulations, Controls, and Technology. A&WMA Transactions Series, No. 18. Pittsburgh, Pennsylvania, 1991.

Chanin, G., et al. "A Simplified Technique for Atmospheric H_2S Studies". Sew. and Ind. Waste, 26, 1954.

Cheesman, G.H. & H.M. Kirkby. An Air Dilution Olfactometer Suitable for Group Threshold Measurements. Q.J. Exp. Psychol., 11. Code A, 1959.

Cheremisinoff P.N., Young R.A., Pollution Engineering Handbook, Ann Arbor Science, Michigan. 1976, pp. 275-279.

Cheremisinoff, P. N., Young, R. A., Industrial Odor Technology Assessment, pp. 16-17, Ann Arbor Science Bublishers, Mich. 1975.

Chuiton, G.. Mesure en Continu des Odeurs Ammonia-Cales par une Cellule Electrochimique. Pollution Atmosphere, 17. 1975.

Clausen, D.F., C.E. Felt, L.F. Borchardt & A.A. Reinsch. Quantitative Odor Measurement. Mod. Package., 29. Code B, 1955.

Coghlin, A.. Electronic Nose detects the Nasty Niffs. New Science, 141. 1994.

Cometto-Muniz, J.E., and W.S. Cain. Sensory Reactions of Nasal Pungency and Odor to Volatile Organic Compounds: The Alkylbenzenes. American Industrial Hygiene Association Journal, 55. 1994.

Compairison of Containers for Collection of Odorous Air Samples. Walter C. McCrone Associates, Inc., prepared for the Illinois Environmental Protection Agency. 1975.

Cooper, H.B.H.Jr.. and A.T. Rossano. Sorce Testing for Air Pollution Control. McGraw-Hill. New York, 1974.

Cooper, H.B.H.Jr.. Can You Measure Odor?. Hydrocarbon Processing. 1973.

Corbit, T.E., and T. Engen. Facilitation of Olfactory Detectors. Perception and Psychophysics, 10. 1971.

Cormack, D., Darling, T. A., and Lynch, B. W. J., Comparison of Techniques for Organoleptic Odor-Intensity Assessment, Chemistry and Industry, 857-861, November 2, 1974.

Cowden, D.J., Croxton, F.E., Applied General Statistics, Sir Isaac Pitman and Sons Ltd., N.J., 1955.

Cowley, J.J., A.L. Johnson, and B.W.L. Brooksbank. The Effect of Two Odorous Compounds in an Assessment-of-People Test. Psychoneuroendocrinology, 2. 1977.

Crocker, E.C., and L.F. Henderson. Analysis and Classification of Odors. American Perfumer and Essential Oil Review, 22. 1927.

Csanady, G.T.. Turbulent Diffusion in the Environment. Dordrecht. Reidel, 1973.

Cussler, E.L., Diffusion: Mass Transfer in Fluid Systems, Cambridge University Press, New York, 1984.

David, H.A.,and M.C. Trivedi. Pair, Triangular and Duo-Trio Tests. Technical Report No. 55, Department of Statistics. Virginia Polytechnic Institute. Blacksburg, 1962.

Davies, J.T., and F.H. Taylor. The Role of Adsorption and Molecular Morphology in Olfaction: The Calculation of Olfactory Thresholds. Biology Bulletin, 117. 1959.

Davis, A.G.. The Microencapsulation of Odorants as a Method of Stimulus Control in Studies of Odor Quality Perception. Chemical Senses and Flavor, 4. 1979.

Davis, R.G.. Olfactory Perceptual Space Models Compared by Quantitative Methods. Chemical Senses and Flavor, 4. 1979.

Dayton, L.. On the Scent of Food Films' Nasty Niffs. new Science, 140. 1993.

Degobert, P.H.. Diesel Exhaust Odor Measurements. Automotive Propulsion: Proceedings of the Fourth International Symposium on Automotive Propulsion Systems, Vols. I and II. In: North Atlantic Treaty Organization. Committee on the Challenges of Modern Society. Publication 61. 1978.

DeGrange, C.E. "Collection of Atmospheric Hydrogen Sulfide with Filters Impregnated with $CdSO_4$". M.S. Thesis, University of California, Berkeley, 1982.

Dekker, C.M., A. Groenendijk, C.J. Sliggers, and G.K. Verboom. Quality Criteria for Models to Calculate Air Pollution. LUCHT 90. 1991.

Department of Environmental Protection, Division of Environmental Quality vs Township of Piscataway, Department of Public Works. Final Decision, OAL DKT. NO. EEQ 2661-88, Agency Dkt. NO. 88-63.

Derenzo, David R., Gnyp, Alex, (eds.), Recent Developments and Current Practices in Odor Regulations, Controls and Technology, Papers from an International Specialty Conference. Air and Waste Management Association, ISSN 1040-8177; No. 18, Pittsburgh, Pennsylvania, 1989.

Determination of Odour in Ambient Air by Field Inspection. VDI 3940: Bestimmung der Geruchsstoffimmission durch Begehungen. Beuth-Verlag. Berlin, 1993.

Deutsch, S.. Acid Potassium Iodide Method for Determining Atmospheric Oxidants. Journal of the Air Pollution Control Association, 18. 1968.

Dimmick, F.L.. The Investigation of the Olfactory Qualities. Psychological Review, 34. 1927.

Dolan, W.P.. Gas Chromatographic Analysis of Organic Emissions. In: Industrial Odor Technology Assessment. Ann arbor Science Publications Inc.. Ann Arbor, 1975.

Dolan, W.P.. Odor Panels. In: Industrial Odor Technology Assessment. Ann Arbor Science Publications Inc.. Ann Arbor, 1975.

Dollnick, H.W.O.: Olfaktometrie von Schwefelwasserstoff, n-Butanol, Isoamylalkohol, Propionsaure und Dibutylamin-Ergebnisse eines VDI-Ringvergleiches. Staub-Reinhalt. Luft 48 Nr.9, S.325-331, 1988.

Dollnik, H.W.O, et. al., Olfactometry with hydrogen sulfied, n-butanol, isoamyl alcohol, propionic acid and diputyl amine. Staub-Reinhalting der Luft 48 No.9, pp. 325-331, 1988 (in German).

Donner, W., John, T., and W. S. Galloway, Use of A Mass Spectrometer as a Gas Chromatograph Detector, Anal. Chem., 29, 1378, 1957.

Dorling, T.A.. Measurement of Odour Intensity in Farming Situations. Agricultural Environment, 3. 1977.

Dorsey, J. S., Hunt, R. H., and M. J. O'Neal, Rapid-Sconning Mass Spectrometry - Continuous Analysis of Fractions from Capillary Gas Chromatograph, Anal. Chem., 35, 511, 1963.

Doty, R.L., P. Shaman and M. Dann, Development of the university of Pennsylvania smell identification test: a standardized microencapsulated test of olfactory function, Physiology and Behaviour, 32, pp. 489-502.

Døving, K.B., and B. Schieldrop. An Apparatus Based on Turbulent Mixing for Delivery of Odorous Stimuli. Chemical Senses and Flavor, 1. 1975.

Dowell, K.E.. An Approach to Community Odor Surveys. In: Recent Determinations and Current Practices in Odor Regulations, Controls, and Technology. A&WMA Transactions Series, No. 18. Pittsburgh, Pennsylvania, 1991.

Dranieks, A. and W.H. Prokop. Source Emission Odor Measurement by a Dynamic Forced-Choice Triangle Olfactometer. Journal of the Air Pollution Control Association, 25. 1975.

Dranieks, A., W.H. Prokop and W.R. Boehme. Measurement of Ambient Odors Using Forced-Choice Triangle Olfactometer. Journal of the Air Pollution Control Association, 28. 1974.

Dranieks, A.. Development of Odor Measurement Methods in U.S.A.. Staub, Luft 39, 4. Reinhalt, 1979.

Dravneiks A., Jarke F, Odor threshold measurement by dynamic olfactometry:significant operational variables, J. Air Pollut. Control ASS. 30, pp. 1284-1289, 1980.

Dravnieks A. and Prokop W., Source Emission Odor Measurement by a Dynamic Forced-Choice Triangle Olfactometer, Journal of APCA, Vol. 25, p. 28, 1975.

Dravnieks A., Benforado D.M., Cain W.S., Duffee R.A., and Flesh R.D., Measurement methods. In Odors from Stationary and Mobile Sources. National Academy of Sciences, Washington, D.C. 1979.

Dravnieks A., Meilgaard M., Shcmidtsdorff W., Odor thresholds by forced-choice dynamic triangle olfactometry:reproducibility and methods of calculation, J. Air Pollut. Controll Ass. 36, pp. 900-905, 1986.

Dravnieks A., Odor Character Profiling, JAPCA, Vol. 33, No. 8, P. 775, Aug. 1983.

Dravnieks A., Schmidtsdorff W., and Meilgaard M., Odor thresholds by forced-choice dynamic triangle olfactometer: Reproducibility and Methods of Calculation, Journal of Air Pollution Control Association. 36:900, 1986.

Dravnieks, A. Development of a Dynamic Forced-choice Triangle Olfactometer and of a Sample Storage System for the Odor Unit Content Determination of Rendering Plan Exhausts. IITRI Project C 8217-2, Final Report. IITRI Research Institute, Chicago. Code A, 1973.

Dravnieks, A. & A. O'Donnell. Principles and Some Techniques of High-resolution Headspace Analysis. J. Agric. Food Chem., 19. Code B5, 1971.

Dravnieks, A. & B.K. Krotoszynski. Collection and Processing of Airborne Chemical Information, II. J. Gas Chromatogr., 6. Code B5, 1968.

Dravnieks, A. & W.H. Prokop. Source Emission Odor Measurement by a Dynamic Forced-Choice Triangle Olfactometer. Air Pollution Control Assoc. Paper, 1973.

Dravnieks, A. et al, High Speed Collection of Organic Vapors from the Atmosphere, Environmental Science and Tech., 5, 1220, 1971.

Dravnieks, A., and J. Whitfield. Gas Chromatographic Study of Air Quality in Schools. ASHRAE, Report No. 2177. 1971.

Dravnieks, A., and Prokop, W. H, Source Emission Odor Measurement by a Dynamic Forced-Choice Triangle Olfactometer, J. Air Pollution Control Association, 25, (1), 28-35, 1975.

Dravnieks, A., et.al., Odor thresholds by forced choice dynamic triangle olfactometry: reproduceability and methods for calculation, JAPCA, vol. 36, pp. 900-905, 1986.

Dravnieks, A., F.C. Bock, J.J. Powers, M. Tibbets, and M. Ford. Comparison of Odours Directly and Through Profiling. Chemical Senses, 3. 1978.

Dravnieks, A., Jarke, F., Odor Threshold Measurement by Dynamic Olfactometry: Significant Operational Variables, Journal of the Air Pollution Controal Association, Vol. 30, No. 12, December 1980.

Dravnieks, A., Measuring Industrial Odors, Chemical Engineering, Deskbook Issue, 91-95, Ocotber 21, 1974.

Dravnieks, A., Method of Detecting Odors and Apparatus Therefor, U. S. Patent 3, 902, 851 6 pages, September 2, 1975.

Dravnieks, A., New Methods and Devices for the Measurement of Odors, Delivered at International Pollution Engineering Congress, Cleveland, Ohio, December5, 1972.

Dravnieks, A., Odor Thresholds by Forced Choice Dynamic Triangle Olfactometry: Reproducibility and Methods of Calculation, Journal of the Air Pollution Control Association, Vol. 36, No. 8, August 1986.

Dravnieks, A., Threshold of Smell and Measurement, Industrial Odor Technology Assessment, Edited by Paul N. Cheremisinoff and R.A. Young, Ann Arbor Science Publishers, Inc., Chapter 2, 27-44, 1974.

Dravnieks, A., W. Schmidtsdorff, and M. Mellgaard. Odor Thresholds by Forced-Choice Dynamice Triangular Olfactometry: Reproducibility and Methods of Calculation. Journal of the Air Pollution Control Association, 36. 1986.

Dravnieks, A., W.H. Prokop, W.R. Boehme. "Measurement of Ambient Odors Using Dynamic Forced-Choice Triangle Olfactometer". JAPCA 25, 1975.

Dravnieks, A.. Odor Threshold Measurement by Dynamic Olfactometry: Significant Operational Variables. Journal of the Air Pollution Control Association. December 1980, Vol. 30, No. 12, 1980.

Dravnieks, A.. Approaches to Objective Olfactometry. In: Theories of Odors and Odor Measurement. Robert College Research Center. Istanbul, 1968.

Dravnieks, A.. Approaches to Standardization in Techniques of Odor Measurements. Air Pollution Control Association Specialty Conference Proceedings. State-of-the-Art of Odor Control Technology II. Pittsburgh, Pennsylvania, 1977.

Dravnieks, A.. Developments Towards Standardization of Measurements of Odors and Odorous Air Pollution. From: 4. Joint Conference on Sensing of Environmental Pollutants. New Orleans, Louisiana, 1977.

Dravnieks, A.. Industrial Odor Measurement. Presented at The 4th Joint Chemical Engineering Conference, American Institute of Chemical Engineers and Canadian Society for Chemical Engineering. Vancouver, B.C., 1973. Odor Sciences Center, IIT Research Institute. Chicago, Illinois, 1974.

Dravnieks, A.. Method of Detecting Odors and Apparatus Therefor. U.S. Patent 3, 902, 851. 1975.

Dravnieks, A.. Odour Quality: Semantically Generated Multidimensional Profiles are Stable. Science, 218. 1982.

Dravnieks, A.. Threshold of Smell and Measurement. In: Industrial Odor Technology Assessment, Ann Arbor Science Publishers, Inc. Ann Arbor, Michigan, 1975.

Duan-Fen-Djuy. Data for Determining the Maximum Permissible Concentration of Hydrogen Sulfide in the Atmospheric Air. Gig. Sanit., 24. [English summary of Russian article]. Code B2, 1957.

Dubrovskaya, F.I.. Hygienic Evaluation of Pollution of Atmospheric Air of a Large City with Sulfur Dioxide Gas. In: V.A. Ryazanov (Ed.). Limits of Allowable Concentrations of Atmospheric Pollutants. Book 3. Washington, D.C.: Dept. of Commerce. Code B2, 1957.

Duffee, R. A., Wahl, John P., Marrone, W., and Nader, J. S., Defining and Measuring Objectionable Odors, International Pollution Engineering Congress, Philadelphia, October 1973.

Duffee, R.A., Kenson, R.E., Cha, S., and Nader, J. S., Evaluation of Odor Measurement Techniques, Volume IV Phenolic Resin Process Emissions, Prepared for Environmental Protection Agency, EPA Contract 68-02-0662, November 1974.

Duffee R.A., Wahl J.P., Marrone W., and Nader J.S., Defining and measuring objectionable odors, In pollution Engineering Techniques - An Overview Introduction the Problem. Ann Arbor Science Publishers, 1974.

Duffee, A., M.A. O'Brien & N. Ostojic. Odor Modeling - Why and How. Recent Developments and Current Practices in Odor Regulations, Controls and Technology. Edited by: D.R. Derenzo & A. Gnyp.

Duffee, R. A., Appraisal of Odor Measurement Techniques, J. Air Pollution Control Association, 18(7), 472-474, 1968.

Duffee, R.A., and S.S. Cha. Consideration of physical Factors in Dynamic Olfactometry. Journal of the air pollution Control association, 30. 1980.

Duffee, R.A., Appraisal of Odor-Measurement Techniques, J. Air Pollution Control Assoc. 18(7):472, 1968.

Duffee, R.A., Cha, S.S., Consideration of Physical Factors in Dynamic Olfactometry, Journal of the Air Pollution Control Association, Vol. 30, No. 12, December 1980.

Duffee, R.A., J.P. Wahl, W. Marrone, and J.S. Nader. Defining and Measuring Objectionable Odors. International Pollution Engineering Congress. Philadelphia, 1973.

Duffee, R.A., R.E. Kenson, S. Cha, and J.S. Nader. Evaluation of Odor Measurement Techniques, Volume IV Phenolic Resin Process Emissions. Prepared for Environtal Protection Agency, EPA Contract 68-02-0662. 1974.

Duffee, R.A., Schutz, H.G., and Ray, H.W., "Development of an Odor-Measuement Technique for domestic Gas Incinerators", American Gas Association, 1961.

Duffee, R.A., Wahl, J.P., Defining and Measuring Objectionable Odors, International Pollution Engineering Congress, Philadelphia, 1973.

Duffee, R.A.. Appraisal of Odor Measurement Techniques. Journal of the Air Pollution Control Association, 18. 1968.

Duffee, R.A.. Odor Modelling - Why and How. In: Recent Determinations and Current Practices in Odor Regulations, Controls, and Technology. A&WMA Transactions Series, No. 18. Pittsburgh, Pennsylvania, 1991.

Dunson, J.B., A.A. Ekpechi, P.R. Jann, and B.W. Wolstenholme. Dynamic Diluter for Field Odor Evaluations. Air & Waste Management Association, Presented at the 84th Annual Meeting & Exhibition. Vancouver, British Columbia, 1991.

Durchfuhrung der Technischen Anleitung zur Reinhaltung der Luft. Gem RdErl. des Ministers fur Arbeit, Gesundheit und Soziales, und des Ministers fur Wirtschaft, Mittelstand und Verkehr vom 14.10.1986.

Durrett, L.R.. Determination of Petroleum Wax Odor by Gas Chromatography. Analytical Chemistry, Vol. 38. 1966.

Eagleson P.S., Dynamic Hydrology, pp. 221-223, McGraw-Hill, 1970.

Egolf, L.M., and P.C. Jurs. Quantitative Structure-Retention and Structure-Odor Intensity Relationships for a Diverse groups of Odor-Active Compounds. Analytical Chemistry, 65. 1993.

Eichhorn, J., R. Schrodin, and W.G. Zdukowski. Three-Dimensional Numerical Simulations of the Urban Climate. Contributions of Atmospheric Physics 61. 1988.

Eller, P.. NIOSH Manual of Analytical Methods, Third Edition. US Department of Health and Human Services, Public Health Services, Center for Disease Control, National Institute for Occupational Safety and Health, Division of Physical Sciences and Engineering. Cincinnati, Ohio, 1984.

Elliot, P.B.. Signal Detection and Recognition by Human Obsrevers. Wiley. New York, 1964.

Ellis-Hall, B. "The Application of the Quantal Response Method to a Small Flavor Panel". Proc. I. Int. Congr. Food Technol. 3, 1967.

Elsberg, C. A., I. Levy, and E.D. Brewer, Anew Method for Testing the Sense of Smell, Science 83:211, 1936.

Elsberg, C.A., and I. Levy. The Sense of Smell. I. A New and Simple Method of Quantitative Olfactometry. Bulletin of the Neurological Institute of New York, 4. 1935.

Engen, T., and C. Pfaffmann. Absolute Judgements of Odor Intensity. Journal of Experimental Psychology, 58. 1959.

Engen, T., and C. Pfaffmann. Absolute Judgements of Odor Quality. Journal of Experimental Psychology, 59. 1960.

Erley, D.S.. Infrared Analysis of Air Contaminants Trapped in Silica Gel. american Industrial Hygienists Association Journal, 23. 1962.

Evaluation of Four Odor Measurement Systems, Report to the Illinois Environmental Protection Agency, TRC, The Research Corporation of New England, December 1975.

Evaluation of Pilot Plant Performance: Pilot Plant Installed on the Off-Gas of Charbroiler at Hardee's Food System, Inc.. Report No. AD-S-15-20199.1. Upper Marlboro, Maryland, 1974.

Evaluation of the Use of Humans in Measuring the Effectiveness of Odor Control Technology at the Source. National Council of the Paper Industry for Air and Stream Improvement, Technical Bulletin, 56. New York, 1971.

Eyferth, K., and K. Krueger. The Construction of a Programmable Olfactometer. Behavioral Research Methodology and Instrumentation, 2. 1970.

Fair, G.M., and Wells, W.F., The Air Dilution Method of Odor Determination in Water Analysis, J. American Water Works Association, 26, (11), 1670-1677, 1934.

Fazzalary, S. A., Compilation of Odor and Taste Threshold Data, ASTM, Philadelphia, Pennsylvania, February 1978.

Feenstra, J.F., Brouwer, J., Analysis of environmental complaint telephone lines in the Netherlands (preliminary study), in Dutch, Instituut voor Milieuvraagstukken, 8410, Amsterdam, 1984.

Feldman, Yu.G. The Experimental Determination of the Maximum Permissible One-time Concentration of Diketene in the Atmosphere. Hyg. Sanit. USSR, 32. [English translation of Russian article]. Code B2, 1967.

Feldman, Yu.G. & T.I. Bonashevskaya. On the Effect of Low Concentrations of Formaldehyde. Hyg. Sanit. USSR, 36. [English translation of Russian article]. Code B2, 1971.

Feldstein, M., S. Balestrieri, and D. A. Levaggi, Studies on the Gas Chromatographic Determination of Mercaptans, J. Air Pollution Control Assoc. 15(5):215, 1965.

Filatova, V.I. Data for Substantiating the Maximum Permissible Concentration of Methylmethacrylate in the Atmospheric Air. Gig. Sanit., 27. [English translation of Russian article]. Code B2, 1962.

Findley, A.E. Further Studies of Henning's System of Olfactory Qualities. American Journal of Psychology, 35. 1924.

First, M.W.. Air Sampling and Analysis for Contaminants in Workplaces. In: Air Sampling Instruments for Evaluation of Atmospheric Contaminants, Sixth Edition. American Conference of Governmental Industrial Hygienists. Cincinnati, Ohio, 1983.

Flemming, D.C. & R.E. Johnstone. Recognition Thresholds for Diethyl Ether and Halothane. Anesthesiology, 46. Code A, 1977.

Fluck, E. The Odor Threshold of Phosphine. J. Air Pollut. Control Assoc., 26. Code A, 1976.

Flury, F. Uber Kampfgasvergiftungen IX. Lokal Reizende Arsenverbindungen. Z. Gesamte Exp. Med., 13. [German]. Code C4, 1921.

Foster, D.. Limitations of Subjective Measurement of Odors. In: Correlation of Subjective-Objective Methods in the Study of Odors and Taste. American Society for Testing and Materials. Philadelphia, Pennsylvania, 1967.

Fox, E.A. and V.E. Gex. Procedure for Measuring Odor Concentration in Air and Gases. Journal of the Air Pollution Control Association, 7. 1957.

Franson, M.A.. Standard Methods for the Examination of Water and Wastewater. American Public Health Association. Washington, D.C., 1985.

Frantikova, D. Determination of the Olfactory Threshold to Industrial Poisons (in Czech.). Act. Nerv. Super., 4. Code E2, 1962.

Franz, J.J., T.S. Govindam, and B.V. Grezorovich. A Laboratory Technique for Estimating Off-Plant Odor Intensity From Surface Coating Processes. Presented at the 67th Annual Meeting of the Air Pollution Control Association. Denver, Colorado, 1974.

Frechen, F.-B., Geruchsemissionen aus Klaranlagen, Gewasserschutz-Wasser-Abwasser, Aachen, Band 108, Ges.Z. Forderung der Siedlungswasserwirtchaft an der RWTH Aachen.

Frechen, F.B.. Odor Emissions of Large Wastewater Treatment Plants: Source Strength Measurement, Atmospheric Dispersion Calculation, Emission Prognosis, Countermeasures - Case Studies. Water Science and Technology, 25. 1992.

Freund, J., Miller, J., Probability and Statistics for Engineers, Second Ed., Prentice-Hall Inc., N.J., 1977.

Friberg, L., E. Jonsson, and R. Cederloff. Studies of Hygienic Nuisances of Waste Gases From Sulfur Pulp Mill, Part 2: Odor Threshold Determinations. Nordisk Hygienisk Tidskrift, 41. 1960.

Friedrich, H.E., and D.M. Benforado. Utilization of the Odor Panel Technique for Evaluating Odorous Industrial Emissions. Presented at the 66th Meeting of the Air Pollution Control Association. Chicago, 1973.

Frijters, J.E.R. "Expanded Tables for Conversion of a Proportion of Correct Responses (P) to the Measure of Sensory Difference (d') for the Triangular Method and the 3-alternative Forced Choice Procedure". J. Food. Sci. 47, 1981.

Frijters, J.E.R., and S.C.C. Beumer. Psychophysical Methodology in Odour Pollution Research: The Measurement of Poultry House Odour Detectibilty and Intensity. Chemical Senses and Flavor, 4. 1979.

Fuller, G.H., R. Steltenkamp, and G.A. Tisserand. The Gas Chromatograph with Human Sensor: Perfumer Model. Annals of the New York Academy of Sciences, 116. 1964.

Fyn-Djui, D., Basic Data for the Determination of Limit of Allowable Concentration of Hydrogen Sulfide in Atmospheric Air, U.S.S.R. Literature on Air Pollution and Related Occupational Diseases 5:66, 1961.

Gallo, P.. Applicability of a Limiting Type Orifice In-Stack Dilution Probe to Odour Sampling. Master's Thesis, University of Windsor. Windsor, Ontario, 1993.

Gatchalian, M.M., Sensory Evaluation Methods with Statistical Analysis, University of the Philippines, Quezon City, Philippines, 1981.

Gavaudan, P., H. Poussel, G. Brebion & M.P. Schutzenberger. L'etude des Conditions Thermodynamiques de l'excitation Olfactive et les Theories de l'olfaction. C.R. Hebd. Seances Acad. Sci., 226. [French]. Code E2, 1948.

Gehle, F.-W.. Olfaktometrische Bewertung der Geruchsintensitat. In: Neue Problemlosungen fur Lufreinigungstechnik und Gasreinigung. Ceagfilter und Entstaubungstechnik GmbH. Dortmund, 1978.

Geier, F. "Beitrag sur Bestimmung von Geruchsschwellen." Thesis, Wurzburg. [German]. Code E2, 1936.

Gemeinsamer RunderlaB des Ministers fur Umwelt, Raumordnung und Landwirtschaft V 1- 8001.725.1-(V Nr. 08/86) und des Ministers fur Wirtschaft, Mittelstand und Technologie-133-81-3.7-19/86- vom 14.10.1986 (MB1. NW Nr. 88 Seite 1658)-Durch-fuhrung der TALuft.

Gesteland, R.C. Initial Events of the Electroolfactogram. Ann. N.Y. Acad. Sci. 116, 1964.

Geueke, KJ, Essers, KH, Stability of odour concentrations in 50 l bags of Nalophan NA, Landesumweltant Nordrhein Westphalen.

Gex, V.E. and J.P. Snyder. New Device: Wider Concept Helps to Measure Odors Quantitatively. Chemical Engineering, 59. 1952.

Gex, V.E., and Synder, J.P., New Device, Wider Concept Helps to Measure Odors Quantatively, Chemical Engineering, 59 (12), 200-201, 372, 374, 1952.

Gibson, N., Panel threshold values for n-butanol, Communication of Warren Spring Laboratory, June 23, 1993.

Giebel, J.. Vergleich von Wahrgenommenen und Simulierten Geruchen. Schriftenr. Landesanst. Immissionsschutz Land. NW., 50. 1980.

Gifford, F.. Statistical Properties of a Fluctuating Plume Dispersion Model. Advanced Geophysics. 1959.

Gilbert, R., L. Lavoie. Le Nouvel Olfactometre Portable Tecnodor. Compte-rendu d'Euroreur. 1994.

Gilland, J.C.Jr., and A.P. Bright. Determination of Dimethyl and Diethyl Sulfate in Air by Gas Chromatography. American Industrial Hygiene Association, 41.1980.

Gnyp, A. W., Mathur, G. P., Price, S. J. W., St. Pierre, C. C., Smith, D. S., Varshney, S. C., Development of Procedures for Determining Industrial Odor Thresholds, for Technology Development and Appraisals Section Air Resources Branch Ministry of the Environment Province of Ontario, Toronto, Ontario, August 1979.

Gofmekler, V.A. Data to Substantiate the Maximum Permissible Concentration of Acetates in the Atmosphere. Gig. Sanit., 25. [English summary of Russian article]. Code B2, 1960.

Gohlke, R. S., Time-in-Flight Mass Spectrometry and Gas-Liquid Partition Chromatography, Anal. Chem., 31, 535, 1959.

Goldbeck, R.A., J.H. Kaeding, and W.E. Reroglia,Odor Coding for Malfunction Detection and Diagnosis, Philco Corp., Palo Alto, Calif., Aug. 1966.

Goldenberg, D.M. Geruchswahrnehmung und Schwellen von Duftgemischen Beim Menschen. Hais-, Nasen- und Ohrenheilkunde, Zwanglose Schriftenreihe, Heft 19. Barth, Leipzig. Code E2, 1967.

Grab, W.. Symposium Aromastoffe in Fruchten und Fruchtsaften, Internationale Fruchtstaft-Union. Bern. 1978.

Green, D.M. & J.A. Swets. Signal Detection Theory and Psychophysics. New York: Wiley and Sons, 1966.

Greenberg, M.J. Dependence of Odor Intensity on the Hydrophobic Properties of Molecules. A Quantitative Structure Odor Intensity Relationship. J. Agric. Food Chem. 27, 1979.

Gregson, R.A.M., and M.J. Mitchell. Odor Quality Similarity Scaling and Odor - Word Profile Matching. Chemical Senses and Flavor, 1. 1975.

Grennfelt, P. and T. Lindvall. Sensory and Physical-Chemical Studies of Pulp Mill Odors. Proceedings of the Third International Clean Air Congress. VDI-Verlag. Dusseldorf, 1973.

Gruber, C. W., Jutze, G. A., and Huey, N. A., Odor Determination Techniques for Air Pollution Control, J. Air Pollution control Association, 10, 327-330, 1960.

Gruber, C.W., G.A. Jutze, and N.A. Huey. Odor Determination Techniques for Air Pollution Control. Journal of the Air Pollution Control Association, 10. 1960.

Guadagni, D.G.. Requirements for Coordination of Instrumental and Sensory Techniques. In: Correlation of Subjective-Objective Methods in the Study of Odors and Taste. Philadelphia, Pennsylvania, 1967.

Guth, H., and W. Grosch. Quantitation of Potent Odorants of Virgin Olive Oil by Stable-Isotope Dilution Assays. Journal of the American Oil chemistry Society, 70. 1993.

Hall, H.J.. Evaluation of Measurements Methods and Instrumentation for Odorous Compounds in Stationary Sources. II. Field Testing. US NTIS. PB Rep., No. 240775. Linden, New Jersey, 1973.

Hamanabe, Y., S. Harima, T. Miura, T. Domon & T. Namiki. The Sensitive Measurement of Bad Odor in Using of an Odorless Chamber. J. Jpn. Soc. Air Pollut., 4(1):115. In Japanese, English Abstract. Code E1, 1969.

Hamauzu, Y.. Odor Perception Measurement by the Use of Odorless Room. Sangyo Kogai (Industrial Public Nuisance), 5. 1969.

Hangartnar, M.. Olfactometric Measurements. Umweltschutz/Gesundheirsphysiol., ETHZ. 1987.

Hangartner M., Hartung J., Paduch M., Pain B. F., Voorburg J. H., Improved Recommendations on Olfactometric Measurements. Environmental Technology Letters, Vol 10, pp 231-236, 1989.

Hangartner M., Odour measurement and assessement of odour annoyance in Switzerland. In: Volatile emissions from livestock farming and sewage operations. V.C. Nielsen, J.H. Voorburg and P. L'Hermite (eds.) Elsevier Applied Science Publishers, London and New York, 1988.

Hangartner, M. Geruchsprobleme bei der Abfallbeseitigung. Gesund. Ing.,. Code E2, 1981.

Hangartner, M. Odour Measurement and Assessment of Odour Annoyance in Switzerland. In: Volatile Emissions From Livestock Farming and Sewage Operations, V.C. Nielson, J.H. Voorburg & P.L. Hermite (eds.), Elsevier Applied Science Publishers, London/New York, 1988.

Hangartner, M., and H.U. Wanner. Geruchsanalysen bei Abwasserreinigungsanlagen. Wasser, Energie, Luft 70. 1978. Schwarzbach, E.. Sammeln Reprasentativer Geruchsstoffe mit Waschflaschen und Photochemische Gruppenanalyse. In: Geruchsprobleme bei Tierhaltung und Tierkorperbeseitigung. VDI-Verlag. Dusseldorf, 1975.

Hangartner, M., and J. Wuest. The Frequency of Odour Events as a Measure of Odour Nuisance. Staub-Reinhaltung der Luft 54. 1994.

Hangartner, M., e.a., Improved recommendations on olfactometric measurements, COST 681 working group 'Odour Measurement', in Env. Techn. Letters, Vol. 10, pp 231-236, 1989.

Hangartner, M., Gross, A., und Klett, R., Geruchsminderung bei einer Schlammtrocknungsanlage - Erfolgskontrolle durch Olfaktometrie und Befragung. VDI-Berichte Nr. 561, 1986.

Hangartner, M., J. Hartung, and J.H. Voorburg. Recommendations on Olfactometric Measurements. Environmental Technology Letters, 6. 1985.

Hangartner, M., J. Hartung, M. Paduch, B.F. Pain & J.H. Voorburg. Improved Recommendations on Olfactometric Measurements. Environmental Technology Letters, Vol. 10, 1989.

Hangartner, M., R. Both, F.-B. Frechen, W. Medrow, M. Paduch, K.-H. Plattig, P.H. Punter, and G. Winneke. Characterization of Odour Annoyance. Part 3: National Regulations: Approaches to Solve the Problem and Lack of Knowledge. Staub-Reinhaltung der Luft 55. 1995.

Hangartner, M.. Geruchsanalysen bei Abwassereinigungsanlagen. Eidgenossische Technische Hochschule. Zurich, 1977.

Hangartner, M.. Standardisation on Olfactometry with Respect to Odor Pollution Control. Institute of Hygiene and Applied Ergonomics. Zurich, Switzerland. Presented at the 80th Annual Meeting of the Air Pollution Control Association. New York, New York, 1987.

Harden, A.K., and R.A. Hood. Odor Measuring Techniques. Environmental Technology Letters, 5(4). West Sussex, UK, 1984.

Hardenberg, H., and H. Daudel. Untersuchungen zur Geruchsintensitatsbestimmung Mittels Geschmacktests an Abgasdurchperltem Wasser. Motortech. Z., 40. 1979.

Harkort, W., Olfaktometrie als Beurteilungsgrundlage fur Geruche, ATV-Seminar Emissions-und Immissionsprobleme bei Abwasseraniagen, 8. bis 9. 10.1987, TA Esslingen, 1987.

Harkort, W.. Beurteilung von Geruchswahrnehmungen bei Klaranlagen. GWF Wasser-Abwasser, 120. 1979.

Harkot, W.-D.. Ermittlungen bei Geruchsbelastigungen. Tech. Ueberwach., 18. 1977.

Harreveld, A. van, Clarkson, C., techniques and Methodology in Odour Measurement, paper presented at the First Irish Conference on the Atmospheric Environment, Cork, 92 02 02.

Harreveld, A. van, Heeres, P., Quality control and optimisation of dynamic olfactometry using n-Butanol as a standard reference odorant, Draft to be published in Staub-Reinhaltung der Luft, February 1995.

Harreveld, A.P. van, Calibration and quality assurance for olfactometry as required by the Dutch olfactometry standard, draft, October 1991.

Harssema, H. Including an inventory of mrthods of odour measurements in varios European countries by subgroup of the COST 681 working group on olfactometric measurements, Wageningen University, Dept. of Air Pollution, October, 1991.

Harssema, H., Heeres, P., A long duration ring test of olfactometers, Presented at symposium Biotechniques for Air Pollution Abatement and odour control policies, Maastricht, Oktober 1991.

Harssema, H., Heeres, P., A long duration ring test of olfactometers 1992 Elsevier Science Publishers BV.

Harssema, H., Heeres, P., Progress of standardisation of olfactometers in the Netherlands, Staub-Reinhalt. luft, 50, pp. 185-187, 1990.

Hartung, J., and H.G. Hilliger. A Method for Sampling Air in Animal Houses to analyze trace gases Including Odorants With the Gas Chromatograph. Agricultural Environment, 3. 1977.

Hartung, J.. Erganzung und Anassung eines Probenahmeverfahrens zur Erfassung von Fremdgasen aus Stalluft mit der Gaschromatographie. Diss. Dez.. Hannover, 1977.

Hasegawa, T., and T. Ishiguro. Studies on Sampling Methods of Odor Materials in Atmosphere. 1. Notes on Materials Produced in Tedlar Bags by the Photochemical Reaction. Akushu no Kenkyu, 5(24). 1976.

Heberhold, C.. Halbleiter-Odorimtrie. In: Geruchsprobleme bei Tierhaltung und Tierkorperbeseitigung. VDI-Verlag. Dusseldorf, 1975.

Heeres, P., and H. Harssema. An Interlaboratory Comparison of Odour Measurements of n-Butanol. in Vorbereitung zur Veroffentlichung in Staub-Reinhalt. Luft.

Heeres, P., H. Harssema, and C.J. Smitshoek. The Influence of the Dilution Air on the Threshold Value of H_2S. Staub-Reinhaltung der Luft, Band 46. Wageningen, Netherlands, 1986.

Heinz, D.E., R.M. Panghorn, and W.G. Jennings. Pear Aroma: Relation of Instrumental and Sensory Techniques. Journal of Food Science, Vol. 29. 1964.

Hellman T.M., Small F.H., Characterization of the odor properites of 101 petrochemicals using sensory methods, JAPCA 24: 979-982, 1974.

Hellman, T. H. and Small, F. H., Characterization of Odors From the Petrochemical Industry Using Sensory Methods, Presented at 74th National Meeting of AIchE, New Orleans, 1973.

Hellman, T.M., Measurement of Odors, Industrial Odor Technology Assessment, Edited by Paul N. Cheremisinoff and R.A. Young, Chapter 3, 45-56, 1974.

Hellman, T.M.. Measurement of Odors. In: Industrial Odor Technology Assessment. Ann Arbor Science Publications Inc.. Ann Arbor, 1975.

Helvig, J.R., G.A. Marotz, D.D. Lane, US E.P.A., and the University of Kansas. Refinement of a Sample and Analytical Approach to Characterization of Organic Compound Releases Using a Whole-Air Technique. Presented at the 81st Annual Meeting of the Air Pollution Control Association. Dallas, Texas, 1988.

Hemeon, W.C.L., and A.W. Black. Measurement of Fugitive Odor Sources. Air Pollution Control Association Specialty Conference Proceedings. State-of-the-Art of Odor Control technology II. Pittsburgh, Pennsylvania, 1977.

Hemeon, W.C.L., Technique and Apparatus for Quantitative Measurement of Odor Emission, J. Air Pollution Control Association, 18, 166-170, 1968.

Hemeon, W.C.L.. Technique and Apparatus for Quantitative Measurement of Odor Emission. Journal of the Air Pollution Control Association, 18. 1968.

Hendriks, A.P.J. Zelfadaptatie en Kruisadaptatie met enige Primaire en Niet-Primarie Geurstoffen. Psychology Laboratory, University of Utrecht, Unpublished Report. Code D1, 1979.

Henning, H. Der Geruch (Zweite Ausgabe). Barth. Leipzig. In German, reviewed at TRC. Code C1, 1924.

Henning, H. Psychologische Studien am Geruchssinn. In: E. Abderhalden (Ed.), Handbuch der Biologischen Arbeitsmethoden VI, A. Urban und Schwarzenberg, Berlin/Wien. In German, reviewed at TRC. Code C1, 1927.

Henschler, D., A. Stier, H. Beck & W. Neumann. Olfactory Threshold of Some Important Irritant Gases and Manifestation in Man by Low Concentrations. (National Translation Center). Arch. Gewerbepathol. Gewerbehyg., 17. [In German, English translation from National Translation Center]. Code C3, 1960.

Henschler, D., W. Assmann & K.O. Meyer. Zur Toxikologie der Toluylendiisocyanate. Arch. Toxicol., 19. In German, reviewed at TRC. Code C3, 1962.

Henseler, G.. Sensorische Geruchsbestimmung an Klarschlammproben. Wasser, Energie, Luft 71, 5. 1979.

Hermanides, J. "Over de Constanten der in de Olfactometri Gebruikelijke Negen Standaardgeuren." Thesis, Utrecht. Code E2, 1909.

Hersey C., Project Desctription and Scope of Work for an Analysis of Air Quality Problems at Sanitary Landfills, SEMCOG, Jan. 1988.

Hesse, W. Bestimmung von Geruchsschwellen in Absoluten Werten. Z. Hals-, Nasen-, Ohrenheilk., 16. In German, reviewed at TRC. Code B5, 1928.

Hilliger, H.G., and J. Hartung. Geruchsbewertung im Stall durch Verknupfung von Sensorischen und Analytischen Methoden. In: Organische Verunreinigungen in der Umwelt. Erich Schmidt Verlag, 6. Berlin, 1978.

Hilliger, H.G.. Sensorische Geruchsbwertung - Probleme und eigene Erfahrungen. In: Geruchsprobleme bei Tierhaltung und Tierkorperbeseitigung. VDI-Verlag. Dusseldorf, 1975.

Hinton, D.O.. Community Air Sampling. In: Air Sampling Instruments for Evaluation of Atmospheric Contaminants, Sixth Edition. American Conference of Governmental Industrial Hygienists. Cincinnati, Ohio, 1983.

Hoffman, F.B. & A. Kohlrausch. Bestimmung von Geruchsschwellen. Biochem, Z., 156. [German]. Code E1, 1925.

Hofmann, G.. Biochemisches Mittel im Flussigmist zur Geruchsunterdruckung. KTBL-Schriften-Vertrieb im Landwirtschaftsverlag GmbH. Hiltrup, 1975.

Hofmann, H., and D. Smidt. Olfactometrie - Verfahren und Beurteilungsmasstabe bei Praktischen Tests. In: geruchsprobleme bei Tierhaltung und tierkorperbeseitigung. VDI-Verlag. Dusseldorf, 1975.

Hogstrom, U. A Method for Predicting Odour Frequencies from a Point Source. Atmos. Environ. 6, 1972.

Hogstrom, U. An Experimental Study on Atmospheric Diffusion. Tellus 16, 1964.

Hogstrom, U.. Transport and Dispersal of Odors. In: Human responses to Environmental Odors. Academic Press. New York, 1974.

Homans, W.J., H. Kohler, E. Paul, and D. Bardtke. Bestimmung von Geruchsschwellwerten mit dem Olfaktometer TO4 in Kombination mit dem Flammenionisationsdetektor. Staub, Luft 38, 6. Reinhalt, 1978.

Hopton, F.J.. Odors-Its Nature and Measurement. Ontario Research Foundation presented PCAO Educational Seminar. Toronto, 1974.

Horstman, S.W., R.F. Wromble, and A.N. Heller, Identification of Community Odor Problems by Use of and Observer Corps, J.Air Pollution Control Assoc. 15(6):261, 1965.

Huijer, H. "De Olfactologie van Aniline en Homolegen." Thesis Utrecht. Code E2, 1924.

Hulbert, R., and D. Feben. Studies on Accuracy of Threshold Odor Value. Journal of the American Water Works Association, 33. 1941.

Ifeadi, C.G. "Quantitative Measurement and Sensory Evaluation of Dairy Waste Odor." Thesis. Columbus (Ohio State Univ.). Code B, 1972.

Ifeadi, C.N., E.P. Taiganides, and R.K. White. Quantitative Measurement and Sensory Evaluation of Dairy Waste Odor. 3. International Symposium Managing Livestock Wastes, American Society of Agricultural Engineering, Proceedings, 275. Urbana, Illinois, 1975.

IIT Research Institute, Instructions for Dynamic Triangle Olfactometer 1977 Model, Chicago, Illinois. 1977.

Instructions for Dynamic Triangle Olfactometer, 1977 Model. U.S. Patent 3, 902, 851. Developed at IIT Research Institute. Chicago, Illinois, 1977.

ISO Sensory analysis - Methodology - Initiation and training of assessors in the detection and recognition of odours, ISO 5496, First edition 1992.

ISO, International Standard Sensory analysis - Vocabulary; Norme Internationale, Analyse sensorielle - Vocabulaire, ISO 5492, First edition; Premiere edition 1992.

ISO, ISO 10780 (draft), Test method for measuring velocity and volume rate of flow of gas streams in ducts, June 1993.

ISO6879, Air Quality - Performance characteristics and related concepts for air quality measuring methods, First edition, 1983-09-01.

ISO9096, Stationary source emissions - determination of concentration and mass flow rate of particulate material in gas carrying ducts - manual gravimetric method, first edition, 1992-06-15.

Itskovics, A.A.. The Stimulability of the Olfactory Analyser in the Hygienic Evaluation of Atmospheric Air Pollution. Literature on Air Pollution and Related Occupational Diseases, 3. U.S.S.R., 1960.

Jager, J., H. Kohler, and E. Schwarzbach. Grundlagen der biologischen Abluftreinigung. Teil III: Analytik von Geruchsemissionen. Staub, Luft 39, 9. Reinhalt, 1979.

Jager, J.. Geruchsentwicklung von Deponien-Messmethoden und Bewertungskriterien. In: Aktuelle Probleme der Deponietechnik. TU, 6. Berlin, 1978.

Janicek, G., V. Pliska & J. Kubatova. Olfactometric Estimation of the Threshold Perception of Odorous Substances by a Flow Olfactometer (in Czech.). Cesk Hyg., 5. Code E1, 1960.

Janowski, T., J. Gawlik, and S. Zimnal. Gaschromatographische Untersuchungen der Stalluft. In: Geruchsprobleme bei Tierhaltung und Tierkorperbeseitigung. VDI-Verlag. Dusseldorf, 1975.

Janse, M.. Development of a Questionnaire for Written Surveys to Investigate Odour Annoyance. Oliemans Punter & Partners/ University of Ultrecht. 1987.

Jenkins, R.L., J.P. Gute, S.W. Krasner, and R.B. Baird. The Analysis and Fate of Odorous Sulfur Compounds in Wastewaters. Water researcg, 14(5)., 1965.

Jiang, K., P.J. Bliss, and T.J. Schulz. The Development of a Sampling System for Determining Odor Emission Rate from Areal Sources: I. Aerodynamic Performance. Journal of the Air and Waste Management Association, 45. 1995.

Johnson, R.A.. A System for Field Measurements of Environmental Odor Intensities and Odorant Concentrations Based on the ASTM Odor-Referencing Method. Air Pollution Control Association 71st Annual Meeting and Exhibition. Pittsburgh, Pennsylvania, 1978.

Jones, F. N., A Comparison of the Methods of Olfacotry Simulation: Blasting vs Sniffing, American Journal of Psychology, 68, 486-488, 1955.

Jones, F.N.. A Comparison of the Methods of Olfactory Simulation: Blasting vs. Sniffing. American Journal of Psychology, 68. 1955.

Jones, F.N.. A Forced-Choice Method of Limits. American Journal of Psychology, 69. 1956.

Jones, F.N.. A Test of Validity of the Elsberg Method of Olfactometry. American Journal of Psychology, 46. 1953.

Juergens, C., Darstellung von Geruchimmissionsprognosen unter Berucksichtigung geltender Rechtsvorschriften inNordrhein-Wistfalen, VDI-Bericht 561, Geruchstoffe, 1986.

Jurs, P.C., C.L. Ham & W.E. Brugger. Computer-Assisted Studies of Chemical Structure and Olfactory Quality Using Pattern Recognition Techniques. In: Odor Quality and Chemical Structure. ACS Symposium Series, Washington: American Chemical Society, 1981.

Kaiser, E.R.. Odor and its Measurement. In: Air Pollution, Vol.1. Academic Press. New York, 1963.

Kane, L.E., C.S. Barrow, and Y. Alarie. A Short Term Test to Predict Acceptable Levels of Exposure to Airborne Sensory Irritants. American Industrial Hygiene Association Journal, 40. 1979.

Karesek, F. W., GC/MS/Computers, Anal. Chem., 44, No. 4, 32A, 1972.

Kastka, J., H.-O. Keldenich, and G. Winneke. Olfaktometrische Techniken zur Bewerttung Geruchsintensiver Immissionen. In: Gesellschaft zur Forderung der Lufthygiene und Silikoseforschung e.V. Lufthygiene und Silikoseforschung. Jahresbericht, 1976.

Kastka, J., Noack, R. and Mau, U. Langs-und Querschnittsuntersuchungen zur Geruchsbelastigung bei Katastererhebungen in Nordrhein-Westfalen, In: VDI-Kommission Reingaltung der Luft (Hsg.) Geruchsstoffe. Quellen, Ausbreitung, Wirkungen, Olfaktometrie, technische und admisistrative MaBnahmen.- Dusseldorf:VDI-Verlag, 1986, 255-270.

Katka, J., H.-O. Keldenich, and G. Winneke. Zur Bestimmung Olfaktometrischer Eigenschaften der Aubenluft mittels einer Mobilen Laboreinheit. 20. Tagung Experimetell Arbeitender Psychogen vom 19. Marburg, Vortrag, 1978.

Katz, S.H. & E.J. Talbert. Intensities of Odors and Irritating Effects of Warning Agents for Inflammable and Poisonous Gases. U.S. Bureau of Mines, Technical Report no. 480. Washington D.C.: U.S. Dept. of Commerce. Code A, 1930.

Kay, R.E., J. T. Eichner & D.E. Gelvin. Quantitative Studies on the Olfactory Potentials of Lucilia Sericata. Am. J. Physiol., 213. Code C1, 1967.

Kendall, D.A., and A.J. Neilson. Odor Profile Studies of Effluent Waste Waters from Seven Refineries. A.D. Little Inc., Presented at 29th Midyear Meeting of American Petroleum Institute. St. Louis, Missouri, 1964.

Kendall, D.A., G. Leonardus & E.R. Rubin. Parameters Affecting the Determination of Odor Thresholds. Report C-68988. Arthur D. Little, Inc., Cambridge (U.S.A.). Code E2, 1968.

Kendall, D.A., P.L. Levins and G. Leonardos. Diesel Exhaust Odor Analysis by Sensory Techniques. Paper 740215 Automotive Engineering Congress. 1974.

Kenson, R. E., Cha, S. S., Duffee, R. A., Wade, W. A., Patzlaff, G. S., and Nader, J. S., Evaluation of Odor Measurement Methods I: Laboratory Tests, II: Industrial Process Tests, Presentation at the 70th Annual Meeting of the Air Pollution Control Association, Toronto, Ontario, June 1977.

Kier, L.B., T. Di Paolo & L.H. Hall. Structure-Activity Studies on Odor Molecules Using the Molecular Connectivity. J. Theor. Biol., 67, 1977.

King, B.M., and J. Solms. Procceedings of the 7th Symposium on Olfaction and Taste. Information Retrieval Ltd.. London,1980.

Kitagawa, T.. Rapid Method of Quantitative Gas Analysis by means of Detector Tubes. Journal of the Chemical Society of Japan, 6. 1952.

Kitagawa, T.. The Rapid Measurement of Toxic Gases and Vapors. 13th Congress of Occupational Health. New York, 1960.

Kittel, G. Die Moderne Olfaktometrie und Odorimetrie. Z. Laryngol., Rhinol, Otol. Ihre Grenzgeb., 12. [German]. Code E1, 1968.

Kittel, G. & P.G.J. Wendelstein. Zur Differenzierung der Olfaktiven Wahrnehmungs-ung Erkennungsschwelle. Arch. Klin. Exp. Ohren-, Nasen-Kehkopfheilkd, (Berlin), 199. Code E2, 1971.

Knuth, H.W., H.H. Oelert, and J. Zajontz. Zur Gaschromatographischen Bewertung der Geruchsintensitat von Dieselabgasen. Staub, Luft 37, 3. Reinhalt, 1977.

Kock M., Pfeiffer K.P., Pichler-semmelrock F., Mose J.R.: Statistische Untersuchungen uber Zusammenhange zwischen Geruchsbelastung und Wohlbefinden mittils Fragebogens in der Umgebung einer Zellstoffabrik. Forum Stadte-Hygiene, 40, 49-53, 1989.

Koe C.B. and Brady D. K., Quantification of Sewage Odors, Research Report No. CE 40, Dept. of Civil Eng., University of Queensland, St. Lucia, Australia, 1983.

Kohler, H., and W.J. Homans. Kombinattion von Olfaktometer und Flammenionisationsdtektor zur Bestimmung von Geruchsschwellwerten - Einstaz der Messmethodik in der Praxis. Staub, Luft 40. Reinhalt, 1980.

Kohnosuke, N., M. Yamakawa, and T. Honda. Experimental Investigations on the Combined Actions of Components Mixed in Odoorous Gas. Memories of the Faculty of Engineering, 41. 1979.

Kommission reinhalung der Luft im VDI und DIN, Evaluation of odour threshold measurements, Dusseldorf, 22nd November, 1991.

Kost, W.-J., S. Reis, W. Medrow. Examination of Odour Dispersion. Wind Tunnel Simulation and Model Calculation. Staub-Reinhaltung der Luft 51. 1991.

Koster E.P. et al., Direct scaling of odor annoyance by population panels, VDI Berichte 561 - Odorants, 1985.

Koster, E.P. Human Psychophysics in Olfaction. In: Methods of Olfactory Research, (ed D.G. Moulton et al), London: Academic Press, 1975.

Koster, E.P.. Direct Scaling of Odour Annoyance by Population Panels. In: VDI-Berichte 561. Dusseldorf, 1986.

Kotera, S., H. Nishihara, and T. Inoue. Preliminary Test for 3-Point Comparison Odor Rating. Fukuoku-Shi Eisei Shikenshoho,7.. Japan, 1982.

Kovatsis, A., and M. Tsougas. Determination of Hydrogen Sulfide in the Environment by Indirect Atomic Absrption Spectroscopy. Bulletin of Environmental Contamination toxicology, 15. 1976.

Krause, K.-H., and T. Lung. Immission Prognosis of Odour Loads for Plant Licensing. Staub-Reinhaltung der Luft 53. 1993.

Krotosynski, B.K. & A. Dravnieks. Odor-relevant Measurement of Odorous Pollutants in Air. Presented at 61st Annual Meeting of Air Pollution Control Association, St. Paul, Minn., 1968.

Kuehner, R.L.. Humidity Effects on the Odor Problem. ASHRAE Research Report No. 1569, ASHRAE Transactions, 62. 1956.

Kulka, W. & E. Homma. Beitrage zur Kenntnis der Laboratoriumsluft und Deren Schadlichen Beimingungen. Z. Anal. Chem., 50. [German]. Code E1, 1910.

Kummler R.H., Cho B., Roginski G., Sinha R., and Greenber A., A Comparative Validation of RAM and Modified SAI Models for Short Term SO^2 Concentrations in Detroit, JAPCA, Vol. 29, No. 7, P. 720, 1979.

Kuroda, D.. Analysis of Odorous Gases Generated from Fish-Solubles and Fish Meals. Kagaku To Kogyo, 43(7). Osaka, Japan, 1969.

Kurtschatowa, G. & E. Dawidkowa. Hygienische Begrundung des Kurzzeit-MIK-Wertes von 4,6,-Dinitro-o-Kresol in der Atmospharischen Luft Wiss. Z. Humbolt-Univ. Berlin, Math.-Naturwiss. Reihe, 19. Code D6, 1970.

Kushida, M., M. Kubo, Y. Seto, H. Fujioka, S. Nakano, M. Tsuji, and T. Mizawa. Studies on Malodorous Substanses. V. Sulfur Compounds. Kagawa-ken Kogai Kenkyu Senta Shoho, 8. Japan, 1983.

Laffort, P. Interactions Quantitatives dans un Melange d'odeurs: Niveau Liminaire. Olfactologia, 1. [French]. Code D6, 1968.

Laffort, P. Les Facteurs de L'activité Quantitative des Molécules Odorantes. These A.O. 1131, Faculté des Sciences D'Orsay, 1966.

Laffort, P. Some New Data on the Physico-chemical Determinants of the Relative Effectiveness of Odorants. In: N.N. Tanyolac (Ed.), Theories of Odor and Odor Measurement, Robert College Bebek, Istanbul, 1968.

Laffort, P., F. Patte & M. Etcheto. Olfactory Coding on the Basis of Physico-Chemical Properties. Conference of Odors: Evaluation, Utilization and Control. N.Y., 1973.

Laffort, P.. Communication Olfactive et Facettes de L'Odorite, dans Odeurs et Desodorisation. Tec & Doc Lavoisier. Paris, 1991.

Lane, D., and R. Carter. Whole-Air Sampling as a Method for Volatile Organic Compound Determination. Department of Civil Engineering, University of Kansas. Unpublished Report. 1985.

Lang, R., Modeling the Movement of Trace Gases in Municipal Solid Waste Landfills, submitted in partial fulfillment of Ph.D. in Civil Engineering, University of California at Davis, March 1989.

Langenau, E.E.. <u>Correlation of Objective-Subjective Methods as Applied to the Perfumery and Cosmetic Industries</u>. In: Correlation of Subjective-Objective Methods in the Study of Odors and Taste. Philadelphia, Pennsylvania, 1967.

Larsen, R.J.. <u>A New Mathematical Model of Pollutant Concentration Averaging Time and Frequency</u>. Journal of the Air Pollution Control Association, 19. 1969.

Laska, M., and R. Hudson. <u>A Comparison of Detection Thresholds of Odour Mixtures and Their Components</u>. Chemical Senses, 16. 1991.

Laughlin, H.F.. <u>Palatable Level With the Threshold Odor Test</u>. Taste Odor Control Journal, 20. 1954.

Lavoie,L., C. Lelievre and R. Gilbert. <u>Towards a New Key Approach for Odor Nuisance Regulations and Control: Description of a Performant Method of Odor Measurements Based on the Innovative Olfactometer TECNODOR</u>. Tecnovir International Incorporated. Quebec.

Le Magnen, J. "<u>Les Mécanismes de l'odorat</u>". Atomes n^{o} 254, 1968.

Le Magnen, J.. <u>Analyse d'Oeurs Complexes et Homologues par Fatigue</u>. Comptes Rendus Hebdomadaires de l'Academie des Sciences Paris, 226. 1948.

Lebowitz, M.F.. <u>Sampling of Afterburners for Effective Combustion</u>. In: Air Pollution Control Association Specialty Conference Proceedings. State-of-the-Art of Odor Control Technology II. Pittsburgh, Pennsylvania, 1977.

Leonardos G., D. Kendall & N. Barnard. <u>Odor Threshold Determinations of 53 Odorant Chemicals</u>. J. Air Pollut. Contr. Assoc., 19. Code B, 1969.

Leonardos, B., Dendall, D., and Bernard, N., <u>Odor Threshold Determination of 53 Odorant Chemicals</u>, J. Air Pollution Control Association, 19(2), 91-95, 1969.

Leonardos, G., F. Sullivan, S.P. Levine, R.T. Stordeur, T.M. Harvey, and D. Schuetzle. <u>A Comparison of Polymer Adsorbent and bag Sampling Techniques for Paint Bake Oven Odorous Emissions</u>. Journal of the Air Pollution Control Association, 30. 1980.

Leonardos, G., <u>Selection of Panelists</u>, Journal of the Air Pollution Control Association, Vol. 30, No. 12, December 1980.

Leonardos, G., <u>The Profile Approach to Odor Measurement</u>, Proceedings, Mid-Atlantic States Section, Air Pollution Control Association, Semi-Annual Technical Conference on Odors: Their Detection,, Measurement and Control, New Brunswick, New Jersey, 18-35, May 13, 1970.

Leonardos, G.. The Profile Approach to Odor Measurement. Proceedings: Mid-Atlantic States Section, Air Pollution Control Association Semi-Annual Technical Conference on Odors: Their Detection. Measurement, and Control. Rutgers University, New Brunswick, New Jersey, 1970.

Leroux, J., and M. Mahmud. Flexibility of X-Ray Emission Spectrography as Adapted to Microanalysis of Air Pollutants. Journal of the Air Pollution Control Association, 20. 1970.

Levin, I.W.. Laser Raman Spectroscopy. In: Human Responses to Environmental Odors. Academic Press. New York, 1974.

Linch, A.L.. Evaluation of Ambient Air Quality by Personal Monitoring. CRC Press. Cleveland, Ohio, 1973.

Lindvall, T., Sensory Measurement of Ambient Traffic Odors, J. Air Pollution Control Association, 23, 697-700, 1973.

Lindvall, T.. Measurement of Odorous Air Pollutants. Nordisk Higienisk Tidskrift, 47. Sweden, 1966.

Lindvall, T.. On Sensory Evaluation of Odorous Air Pollutant Intensities. Department of Environment Hygiene, Karolinska Institute. Stockholm, Sweden, 1970.

Lindvall, T.. On Sensory Evaluation of Odorous Air Pollution Intensities. Measurements of Odor Intensity in the Laboratory and in the Field with Special Reference to Effluents of Sulfate Pulp Factories. Nordisk Hygienisk Tidskrift, 2. 1970.

Lindvall, T.. Sensory Measurement of Ambient Traffic Odors. Journal of the Air Pollution Control Association, 23. 1973.

Lindvall, T.. Swedish Experiences on Sensory Evaluation of the Odorous Air Pollution Intensities. Academic Press. New York, 1971.

Linvall, T.. On Sensory Evaluation of Odourous Air Pollutant Intensities. Nordisk Hygiensk Tidskrift Supplementum 2. Stockholm, 1970.

Logtenberg, M.Th. Onderzoek Naar de Nauwkeurigheid van Geurconcentratiemetingen met de TNO Snuifkar. Division for Physical and Chemical Technology TNO, Apeldoorn, Unpublished Report. Cited in Gemert 1982. Code D1, 1978.

Lutchko, J.R., N.J. Wagner, and R.K. Sinha. Measurement of Odor Emission and Their Control by Activated Carbon. Paper No. 128, Presented at Pittsburgh Conference on Analytical Chemistry and Applied Spectroscopy. Cleveland, Ohio, 1977.

M. Paduch, R. Both, F.-B. Frechen, M. Hangartner, K.-H. Plattig, P.H. Punter, G. Winneke. Characterization of Odour Annoyance. Part 1: Description of Underlying Odour Parameters. Staub-Reinhaltung der Luft 55. 1995.

Mackay, D.A.M., D.A. Lang, and M. Berdick. Objective Measurement of Odor: Ionization Detection of Food Volatiles. Analytical Chemistry, Vol. 33. 1961.

MacLeod, P., J.M. Fauconnier, Ph. Guillet & M.F. Thal. Development of an Olfactometer According to the French Odour Measurement Standard AFNOR. VDI Berichte, 1992.

Makeicheva, N.A. Data for Hygienic Standardization of a Mixture of Furfurol, Formaldehyde, Phenol and Acetone in the Atmosphere (in Russ.). Gig. Sanit., no. 9. [English summary of Russian article]. Code E1, 1978.

Makhinya, A.P. Hygienic Assessment of Atmospheric Air Polluted by Sulfur Dioxide Phenol. Hyg. Sanit., USSR, 31. [English translation of Russian article]. Code B2, 1966.

Malyarova, L.K. Biological Action and Hygienic Significance of Trichloroethylene as an Atmospheric Pollutant. Chem. Abstr., 72 (1970) 24265c. Code B5, 1967.

Malz, F., J. Gorlas, L. Brell, H. Ingensiep, G. Drzisga, and B. Stephan. Die Kontinuierliche Messung von Kohlenwasserstoff- und Schwefelwasserstoff-Emissionen aus Einleitungen und Vorflutern. Von Wasser, 51. 1978.

Mannabeck, H.. Tragbare Olfaktometer. In: Geruchsprobleme bei Tierhaltung und Tierkorperbeseitigung. VDI-Verlag. Dusseldorf, 1975.

Mannebeck, H.. Zur Problematik der Olfaktometrie und ihre Anwendung zur Bestimmung von Geruchsemissionen. In: 5. Symposium uber Branchenspezifische Emission, Intensivtierhaltungen. Schriftenreihe Luftreinhaltung, 1978.

Manual for Interviews. Survey Research Center. Ann Arbor, Michigan, 1969.

Manual on Sensory Testing Materials, ASTM Special Publ, 434, American Society for Testing and Materials, Philadelphia, PA, 1968.

Manual on Sensory Testing Methods. ASTM Publications, STP 434. 1968.

Manual, Dynamic Dilution Forced-Choice Triangle Olfactometer. Model 101, IIT Research Institute, Chicago, IL, 1979.

Manufacturer of Plastic Bags, Pollution Measurement Corporation, Chicago, Illinois.

Marotz, G., D. Lane, and R. Carter. Field Evaluation of a Heavy Gas Detection and Dispersion Approach Using a Whole-Air Technique. Department of Civil Engineering, University of Kansas. Unpublished Report. 1986.

Marshall, W.F., and D.E. Seizinger. Diesel Odor Measurement: Comparison of Two Methods. Department of Energy, Bartlesville Energy Technology Center. Bartlesville, Oklahoma, 1978.

Martindale, C. and Hines, D., Dimensions of Olfactory Quality, Letter to the Editor, 188, 74, Science, 1975.

Mateson, J.F.. Olfactory: Its Techniques and Apparatus. Journal of the Air Pollution Control Association, 5. 1955.

May, J. Odor Thresholds of Solvents for Assessment of Solvent odors in the Air. Staub, 26. [English translation of Russian article]. Code A, 1966.

McAffee, M., M. O-Brien, G. Mayer, and R. Caballero. An Evaluation of the Sensitivity and Precision of Odor Panel Analysis. Air and Waste Management Association 87th Annual Meeting. Pittsburgh. 1994.

McCawley, E.L. The Comparative Toxicity of 2-chloro-2-butene, 1,2,3-trichlorobutane and 1,2-dichloroethane. Univ. Calif. Publ. Pharmacol., 2. Code E2, 1942.

McDonald, M.K.. An Experimental Study of Henning's System of Olfactory Qualities. American Journal of Psychology, 33. 1922.

McGrath, T.R., and D.B. Steele. Characterization of Phenolic Odors in a Residential Neighborhood. Commonwealth of Massachusetts. Tewksbury, Massachusetts. Presented at the 80th Annual Meeting of the Air pollution Control Association. New York, New York, 1987.

Medrow, V.W., and C. Juergens. The Simulation of Odour Dispersion. Staub-Reinhult, Luft 44. Essen, 1984.

Medrow, W., Harkort, W., Juergens, C., Erfahrungen bei der Ermittlung von Geruchsemissionen verursacht durch Flaechenquellen, Staub-Reinhaltung der Luft, 53 (1993) 413-418, 1993.

Medrow, W., Juergens, C., Die Simulation der Geruchausbreitung, Staub-Reingaltung der Luft, 44, 1984, Heft 11, S. 475-479.

Medrow, W., W. Harkort, and C. Juergens. Emperical Knowledge Gained with the Control of Odour Immisions Caused by Area Sources. Staub-Reinhaltung der Luft 53. 1993.

Meilgaard, M.C.. ASTM Task Group E-18.04.25 on Sensory Thresholds. In: Recent Determinations and Current Practices in Odor Regulations, Controls, and Technology. A&WMA Transactions Series, No. 18. Pittsburgh, Pensylvania, 1991.

Meiselman, H.L., and R.S. Rivlin. Clinical Measurement of Taste and Smell. Collier Macmillan Canada, Inc.. Toronto, 1986.

Methods of Air Sampling and Analysis. American Public Health Association. Washington, 1972.

Metz, N.. Erfahrungen mit dem Geruchsmessgerat. In: Organische Verunreinigungen in der Umwelt. Erich Schmidt Verlag. Berlin, 1978.

Mieure, J.P., and M.W. Dietrich. Determination of Trace Organics in Air and Water. Journal of Chromatographic Science, 11. 1973.

Mihelcic, J.R., and Others. Estimation of VOC Emissions from Wastewater Facilities by Volatization and Stripping. Journal of the Air and Waste Management Association, 43. 1993.

Mills, J.L., R.T. Walsh, K.D. Luedtke, and L.K. Smith. Quantitative Odor Measurement. Journal of the Air Pollution Control Association, 13. 1963.

Mitsumoto, T. Olfaktometrische Untersuchungen. Z. Sinnesphysiol., 57. Code E1, 1926.

Miyamoto, I., Y. Inada, M. Ishizaka, and S. Okumura. Examination and Measurement of an Offensive Odor Caused by Sulfur Compounds Associated with Kraft Pulping.Kogai To Taisaku, 9(7). Japan, 1973.

Models for the calculation of the dispersion of air pollution, including recommendations for the values of parameters in the long-term model, Staatsuitgeverij/SCMO-TNO, The Hague/Delft, The Netherlands, 1976; and Parameters in the long-term model of air pollution dispersion-new recommendations, SCMO-TNO, Delft, The Netherlands, 1984.

Mohnen, V., Durham, J., QA/QC for air quality monitoring in the United States, VDI Berichte nr 838, Aktuelle Aufgaben der MeBtechnik, 1990, pp. 69-75.

Molton, P.M., and D. Cash. Novel Combination Method Assesses Sewage Odors. Water and Wastes Engineering, 15(2). 1978.

Monell Center Pushes Frontiers of Taste and Smell Research. Food Engineering, 62. 1990.

Morrison, G.R. "Measurement of Flavour Thresholds". J. Inst. Brew. 88, 1982.

Morrison, G.R., Flavor Thresholds for Added Dubstances, J. Inst. Brewing 88:167, 1982; Measurement of Flavor Thresholds, J. Inst. Brewing 88:170, 1982.

Moskowitz, H.R. Psychophysical Scaling and Optimization of Odor Mixtures. In: Odor Quality and Chemical Structure, ACS Symposium Series, Washington: American Chemical Society, 1981.

Moskowitz, H.R., A. Dravnieks, W.S. Cain, and A. Turk. Standarized Procedure for Expressing Odor Intensity. Chemical Senses and Flavor, 1. 1974.

Moskowitz, H.R., and C.D. Barbe. Profiling of Odor Components and Their Mixtures. Sensory Processes, 1. 1977.

Moskowitz, H.R.. Psychophysical Scaling and Optimization of Odor Mixtures. In: Odor Quality and Chemical Structure. American Chemical Society, 148. Washington, D.C., 1981.

Moulton, D.G., Turk, A., and Johnston, J.W., Methods in Olfactory Research, Academic Press, New York, 1975.

Moulton, D.G.. Spatial Patterning of Response to Odors in the Peripheral Olfactory System. Physiological Reviews, 56. 1976.

Moulton, D.G.. Structure-Activity Relations in Olfaction: From Single Cell to Behavior-The Comparative Approach. In: Odor Quality and Chemical Structure. American Chemical Society, 148. Washington, D.C., 1981.

Moy, L. & S. Tarifa. Utilisation de Capteurs Pour L'évaluation des Odeurs. Analusis Magazine, Vol. 19, no. 9, 1991.

Mozell, M.M.. Evidence for a Chromatographic Model of Olfaction. Journal of General Physiology, 56. 1970.

Mozell, M.M.. The Spatiotemporal Analysis of Odorants at the Level of Olfactory Receptor Sheet. Journal of General Physiology, 56. 1966.

Muhlen, Th. Zur. Messungen von Styrol-Emissionen und Immissionen Mit Hilf derr Gaschormatographie. Zentraibl. Arbeismed. Arbeitsschetz, 18. In German, reviewed at TRC. Code B, 1968.

Mukhitov, B.M. & A.A Azimbekov. Hygienic Evaluation of Methyl Ethyl Ketone as an Atmospheric Pollutant. Chem. Abstr. 81, (1974) 10876v. Code B5, 1971.

Mulik, J.D., R.K. Stevens, and R.E. Baumgardner. Analytical System for Measuring Malodorous Compounds from Kraft Mills. Environmental Sciences Research Lab.

Atmospheric Chemistry and Physics Division. Research triangle Park, North Carolina, 1978.

Murray, D.R., S.S. Cha & N.E. Browne. Use of a Fluctuating Plume Puff Model for Prediction of the Impact of Odorous Emissions. Preprint 78-68.6. Presented at the 71st Annual Meeting, Air Pollution Control Association, Houston, TX., 1978.

Musada, J., J. Fukuyama, and H. Ito. Sensor Utilization for Odor Measuring - Utilization by Dilution Method. Proceedings of the 6th Annual Meeting of the Odor Research and Engineering Association of Japan. Tokyo, Japan, 1993.

Mustaparta, H.. Spatial Distribution of Receptor Responses to Stimulation With Different Odours. Acta Physiologica Scandinavica, 82. 1971.

Mutz, G.. Literaturwerte von Geruchsschwellenkonzentrationen reiner Stoffe-Masszahlen zur Beurteilung von Geruchsbelastigungen? Staub, Luft 40, 2. Reinhalt, 1980.

Nachbar, R.B. & T.H. Morton. A Gas Chromatograph (GLPC) Model for the Sense of Smell. Variation of Olfactory Sensitivity with Conditions of Stimulation, 1989.

Nader, J. S., An Odor Evaluation Apparatus for Field and Laboratory Use, American Industrial Hygiene Association Journal, 19, (1), 1-7, 1958.

Nagata, Y., and N. Takeuchi. Results of Determinations of Odor Threshold Values by the Triangle Odor Bag Method. Nippon Kankyo Eisei Senta Shoho, 17. Japan, 1990.

Nakano, S., M. Kubo, M. Kushida, H. Fujioka, Y. Seto, M. Tsuji, and T. Mizawa. Studies on Malodorous Substances. IV. Effect of Panel on Olfactory Sensory Test. Kagawa-Ken Kogai Kenkyu Senta Shoho. Japan, 1983.

Nathan, S.. On the Scent of Something Big (Electronic Nose). Chemical Industry, 15. 1994.

Naus, A. Olphatoric Properties of Industrial Matters. Prague: Charles University. Code C1, 1947.

Naves, Y.R. Etudes sur les Matieres Vegetales Volatiles XLVI. Sur le Déboulement de la d,l-a-ionone. Helv. Chim. Acta, 30. [French]. Code D6, 1947.

Naves, Y.R. & M. Delepine. Sur les iso-p-irones Actives et Racemique et Leurs Derives. C.R. Hebd. Seances Acad. Sci., 237. [French]. Code D6, 1953.

NCASI, Evaluation of the use of humans in measuring the effectiveness of odor control technology at the source, Atmospheric Quality Improvement, Technical Bulletin No. 56.

National Councel of the Paper Industry for Air and Stream Improvement, New York, 1971.

Neuhaus, W. Wahrnemungsschwelle und Erkennungsschwelle Beim Riechen des Hundes in Vergleich zu den Riechwahrnehmungen des Menschen. Z. Vgl. Physiol., 39. In German, reviewed at TRC. Code B, 1957.

Nevers, A.D. & W.H. Oister. Problems in the Critical Comparison of Odor Intensities. Proc. Oper. Sect. Am. Gas. Assoc., 65. Code B4, 1965.

Newman, A.R.. Electronic Noses. Analytical Chemistry, 63. 1991.

Nicell, J.A.. A Mathematical Analysis of Odor Threshold Determinations. In: Recent Determinations and Current Practices in Odor Regulations, Controls, and Technology. A&WMA Transactions Series, No. 18. Pittsburgh, Pennsylvania, 1991.

Nishida, K., M. Yamakawa & T. Honda. Experimental Investigations on the Combined Actions of Components Mixed in Odourous Gas. Mem. Fac. Eng., Kyoto Univ., 41, part 4. Code A, 1979.

Nishida, K., T. Honda & K. Bota. "New Apparatus on the Measurement of Odor Intensity." 68th Ann. Meet. Air Pollut. Control Assoc., June 15-20, Boston, Paper 75-55.3, 1975.

NNI, Dutch Preliminary Standard NVN 2820. Sensory Odour Measurements using an Olfactometer. The Measurement of Odour Thresholds. 1990.

Norme AFNOR NF X43-101. Qualité de l'air. Méthode de mesurage de l'odeur d'un effluent gaxeux. Détermination du facteur de dilution au seuil de perception. 1986

Norme AFNOR PR X 43-104. Qualité de l'air. Atmosphères odorantes. Méthodes de prélèvement. Encours de publication

Nose Now Also Has a 'Brain'. Process Engineering, 75. 1994.

O'Brien, M. Guidelines for Odor Sampling and Measurement by Dynamic Dilution Olfactometry (Draft). Submitted for Review to: AWMA EE-6 Subcommittee on the Standardization of Odor Measurement, 1993.

O'Brien, M.A. Odor Panel Selection, Training and Utilization Procedures - A Key Component in Odor Control Research. Recent Developments and Current Practices in Odor Regulations, Controls and Technology. Edited by: D.R. Derenzo & A. Gnyp.

O'Brien, M.A.. Guidelines For Odor Measurement by Dynamic Dilution Olfactometry. Submitted for Review to: Air and Waste Management Association's EE-6 Subcommittee on the Standardization of Odor Measurement. 1992.

O'Brien, M.A.. Odor Panel Selection, Training and Utilization Procedures - A Key Component In Odor Control Research. In: Recent Determinations and Current Practices in Odor Regulations, Controls, and Technology. A&WMA Transactions Series, No. 18. Pittsburgh, Pennsylvania, 1991.

Oberthur, R., Ein logarithmischer MaBstab mit dB-Einheiten zur Darstellung des Geruchsstoffpegels, Staub-Reinhalt, luft 50, pp. 175-183, 1990.

Oberthur, R.C.. Alternative Reflections on the Assessment of Odour Emissions and Immissions. Staub-Reinhaltung der Luft 53. 1993.

Ozturk, S. "A Study of Selected Environmental Influences on the Organoleptic Properties of Drinking Water." Thesis, Drexel University. (From: Dissertation Abstracts International B, 37). Code A, 1976.

Padgett, C.H.. A Mobile Laboratory for Continuous Ambient Measurments of Reduced Sulfur Gas. In: Recent Determinations and Current Practices in Odor Regulations, Controls, and Technology. A&WMA Transactions Series, No. 18. Pittsburgh, Pennsylvania, 1991.

Paduch, M.. Assessment of Odours in Ambient Air- Which is the Correct Method. Staub-Reinhaltung der Luft 49. Dusseldorf, 1989.

Paduch, M.. Determination and Assessment of Odour in Ambient Air (Guidelines on Odours in Ambient Air) - A Meteorogical Review. Staub-Reinhaltung der Luft 55. 1995.

Pangborn, R.M., H.W. Berg, E.B. Roessler, and A.D. Webb. Influence of Methodology on Olfactory Response. Perceptual and Motor Skills, 18. 1964.

Patte, F., and P. Laffort. An Alternative Model of Olfactory Quantitative Interaction in Binary Mixtures. Chemical Senses and Flavor, 4. 1979.

Pauli, R., Houben, M., Lepperhoff, G., Ein hochpraezises Olfaktometer zur Bestimmung des Abgasgeruchs van Dieselmotoren, 1992 Elsevier Science Publishers BV.

Pavia D.L., Lampan G.M., and Kriz G.S., Introduction to Organic Laboratory Techniques, 2nd ed., Saunders College Publ, Philadelphia. 182 p. 402.

Perrin M.L., Thal M.F., Jezequel M., Standardixation of olfactometry in France, Proceedings of the 81st Annual Meeting of APCA: 88-78.2. (1988).

Perrin, M.L.. Measurement of Odor Annoyance by Population Panels Living in an Industrial Area. In: Recent Determinations and Current Practices in Odor Regulations, Controls, and Technology. A&WMA Transactions Series, No. 18. Pittsburgh, Pennsylvania, 1991.

Perrin, M.L.. Olfactometrie Dans L'Industrie. Rapport LO/3.1. 1991.

Pfeiffer, K.P., Kock, M., Pichler-Semmelrock, F. und Mose, J. Relationen zwischem Geruchshaufigkeit und Geruchsbelastigung- Ein dreistufiges Modell. (Dieses Symposium).

Phelps, A.H.. Odors. In: Air Pollution. Vol. III: Measuring, Monitoring, and Surveillance of Air Pollution. Environmental Science. An Interdisciplinary Monograph Series. Academic Press. New York, 1976.

Photochemical Oxidents; Measurement of Ozone in the Atmosphere; Requirements for Preparation, Adoption, and Submittal of Implementation Plans. US E.P.A., Federal Register 35:22392. 1978.

Piggott, J.R. & R. Harper. Ratio Scales and Category Scales of Odour Intensity. Chem. Senses Flavor, 1. Code B, 1975.

Pliel, J., and W. McClenny. Reduced-Temperature Preconcentration and Gas Chromatographic Analysis of Ambient Upper-Phase Organic Compounds: System Automation. US E.P.A., Environmental Monitoring Systems Laboratory. North Carolina, 1984.

Pliska, V. Olfaktometrische Studien IV. Fehleranalyse Olfaktometrischer Messungen. Sb. Vys. Sk. Chem.-Technol. Praze. Potraviny, 6. Code D6, 1962.

Pliska, V. & G. Janicek. Die Veranderungen der Wahrneh-mungsschwellen-Konzentration der Fiechstoffe in Einiger Homologischen Serien. Arch. Int. Pharmacodyn, 156. In German, reviewed at TRC. Code B, 1965.

Pliska, V. & G. Janicek. Olfaktometrische Studien I. Die Definition der Wahrnehmungsschwelle-Konzentration Mittels Volumengraden Sb. Vys. Sk. Chem.-Technol. Praze, Oddil Fak. Potravin. Technol., 4. In German, reviewed at TRC. Code E2, 1960.

Plotnikova, M.M. Data on Hygienic Evaluation of Acrolein as a Pollution of the Atmosphere (in Russ.). Gig. Sanit., 22. Code B2, 1957.

Polak, E. Is Odour Similarity Quantifiable? Chemistry and Industry, 1983.

Polta R.C. and M.N. Ho, Variability of Stack Gas Odor Evaluation Technical Memorandum No. 3, QC88-143. Metropolitan Waste Control Commission, St. Paul, MN, 1988.

Polta, R.. Odor Experienc/Research at Metropolitan Waste Control Commission. In: Recent Determinations and Current Practices in Odor Regulations, Controls, and Technology. A&WMA Transactions Series, No. 18. Pittsburgh, Pennsylvania, 1991.

Poostchi, E., A.W. Gnyp., and C.C. St. Pierre. Comparison of Models Used for the Determination of Odor Thresholds. Atmospheric Environment, 20(12). Windsor, 1986.

Popov, I. N., Cherkasov, Y. F., and Trakhtman, O. L., Determination of Sulfur Dioxide Odor Threshold Concentration, U.S.S.R. Literature on Air Pollution and Related Occupational Deseases, 3, 102, 1960.

Popov, I.N., E.F. Cherkasov, & O.L. Trakhtman. Determination of Sulfur Dioxide Odor Threshold Concentration (in Russ.). Gig. Sanit., 17. Code E1, 1952.

Popov, V.A. Hygienic Evaluation of Tetrahydrofuran as an Atmospheric Pollutant. Hyg. Sanit. USSR, 35. [English translation of Russian article]. Code B5, 1970.

Poustchi, R.. Verification of a Perceived Odor Problem in a Community. In: Recent Developments and Current Practices in Odor Regulations, Controls, and Technology. A&WMA Transactions Series, No. 18. Pittsburgh, Pennsylvania, 1991.

Powers, J.J.. Correlation of Sensory Evaluation Data With Objective Test Data, in: " Sensory Evaluation Methods for the Practicing Food Technologist". Johnston, M.R., Institute of Food Technologists. Chicago, Illinois, 1979.

Prince, R.G.H., and J.H. Ince. The Measurement of Intensity of Odor. Journal of Applied Chemistry, 8. 1958.

Prinz, B.: Wirkungskataster, in F.J. Dreyhaupt (Hrsg.): Handbuch zur Aufstellung von Luftreinhalteplanen. Verlag TUV Rheinland GmbH, Koln 1979.

Procedure for the Determination of Odour Impact Models by the Binary Port Odour Panel Method, Ontario Ministry of the Environment, Toronto, 1988.

Prokop, W., Franz, J., Odour Measurement by Dynamic Olfactometry, Journal of the Air Pollution Control Association, Vol. 30, No. 12, December 1980.

Prokop, W.H.. Measurement of Odor Emissions from Municipal Sewage Sources. In: Recent Determinations and Current Practices in Odor Regulations, Controls, and Technology. A&WMA Transactions Series, No. 18. Pittsburgh, Pennsylvania, 1991.

Proposed Standard Test Method for the Determination of the Accelerated Hydrogen Sulfide Breakthrough Capacity of Granular Activated Carbon. Calgon Corporation. Pittsburgh, Pennsylvania, 1986.

Punter, P.H. Measurement of Human Olfactory Thresholds for Several Groups of Structurally Related Compounds. Chem. Sens., 7. Code A, 1983.

Punter, P.H., B. Ph. M. Menco, and H. Boelens. The Efficacy of n-Aliphatic Alcohols and n-Aliphatic Fatty Acids on Various Membrane Systems with Special Reference to Olfaction and Taste. In: Odor Quality and Chemical Structure. American Chemical Society, 148. Washington, D.C., 1981.

Punter, P.H., J. Blaauwbroek, and A.J. Oliemans. Odour Experience Research Benegora. Oliemans Punter & Partners. 1989.

Punter, P.H., J. Blaauwbroek, M. Janse, and A. Oliemans. Quantifying Odour Annoyance: The WKJ Survey. Lucht en Omgeving maart. 1989.

Quebedeaux, W.A., M.F. Terraso, N.W. TylerJr., A.T. Hugh, and J. Harris. Methods for the Capture and identification of Organic Odors. In: Industrial Odor Technology Assessment. Ann Arbor Science Publications Inc.. Ann Arbor, 1975.

Quellmalz, E.. Dunnschtchtchromatografie und Massenspektrometrie. In: Geruchsprobleme bei Tierhaltung und Tierkorperbeseitigung. VDI-Verlag, Dusseldorf, 1975.

Randebrock, E.M. Molecular Theory of Odor with the V-helix as Potential Perceptor. In: G. Ohloff, A.F. Thomas (Eds.). Gustation and Olfaction, Academic Press, London/New York. Code B5, 1971.

Ratzki, E., Harkort, W., Medrow, W., Geruchsbalastigung durch Tierintensivhaltung - Forschungs - vorhaben Schweineintensivhaltung, im Auftrag der Landesanstalt fur Immissionsschutz des Landes Nordrhein-Westfalen, 1989.

Reddell, D.L., and J.M. Sweeten. Evaluation of Odor Intensities at Livestock Feeding Operations in Texas. In: Wanaging Livestock Wastes. Proceedings 3rd International Symposium on Livestock wastes. American Society of Agricultural Engineers. St. Joseph, Michigan, 1975.

Reid, N. M., et al., Investigation of Odor Control in Render-Industry, EPA Report No. EPA-R2-72-088, Washington, D.C., 1972.

Rix, M.R.E. Standard Test Method For Evaluation The Odour Potential of Automotive Coatings. APCA Conference, Detroit Michigan, 1989.

Rix, M.R.E.. Standard Test Method for Evaluating the Odor potential of Automotive Coatings. In: Recent Determinations and Current Practices in Odor Regulations, Controls, and Technology. A&WMA Transactions Series, No. 18. Pittsburgh, Pennsylvania, 1991.

Robb, G.P., Turney, B.L., Statistical Methods for Behavioral Science, Intext Educational Publishers, N.Y., 1973.

Robbins, M.C. Determination of Napthalene in Air. AMA Arch. Ind. Hyg. Med., 4. Code C3, 1951.

Rohlfing, H., W. Germann, and H. Westerhoff. Comparison of 2 Different Methods for the Determination of Hedonic Tone. In: Vorbereitung fur, "Chemical Senses".

Rolfe, K.A.. Odour Assessment. Clean Air, 14. 1980.

Ronneau, C.. Study of a Case of Odorous Pollution. Pollut. Atmos., 94.Louvain-la-Neuve, Belgium, 1992.

Roos, C., Standardisation of olfactometers, Publication series 'Air', Ministry of Public Housing and the Environment, No. 49, The Hague, 1985.

Rox, E.A., and Gex, V. E., Procedure for Measuring Odor Concentration in Air and Gases, J. Air Pollution Control Association, 7 (5), 60-61, 1957.

Ruby, M.G., W.H. Prokop, and D.A. Kalman. Measurement of Odor Emissions from a Sewage Treatment Plant. Presented at the 80th Annual Meeting of the Air Pollution Control Association. New York, New York, 1987.

Rumsey, D.W. & R.P. Cesta. Odor Threshold Levels for UDMH and NO_2. Am. Ind. Hyg. Assoc. J., 31. Code C3, 1970.

Russell, G.F. & J. Hills. Odor Differences Between Enantiomeric Isomers. Science 172, 1971.

Ruth, J.H. Odor Threshold and Irritation Levels of Several Chemical Substances: A Review. Am. Ind. Hyg. Ass. J., 47:A, 1986.

Ryazanov, V.A., K.A. Bushtueva, Yu.V. Novikov. Methods for the Experimental Determination of Limits of Allowable Concentrations of Atmospheric Air Pollutants. In: V.A. Ryazanov (Ed.), Limits of Allowable Concentrations of Atmospheric Pollutants. Book 3, 1957.

Ryhage, R., Use of a Mass Spectrometer as A Detector and Analyser for Effluents Emerging from HighTemperature Gas Liquid Chromatography Column, Anal. Chem., 36 759, 1964.

Sakuma, K., T. Miura, T. Domon, K. Kanazawa, S. Harima & T. Namiki. "17. Sensory Measurement of Odors Using an Odorless Chamber." In: Proceedings of the 8th Annual Meeting of the Japan Society of Air Pollution, 1967: Symposium (1): Hazard Nuisance

Pollution Problems Due to Odors (English Translation for APTIC by SCITRAN). Code E2, 1967.

Sales, M. Odeur et Odorisation des gaz . 7e Congres International de L'industrie du Gaz, Rome. Code E2, 1958.

Sanders, G. & R. Dechant. Hydrogen Sulphide Odor Threshold Study. Air and Industrial Hygiene Laboratory, California, Department of Public Health, unpublished report, 1961 (cited by H.F. Droege. "A Study of the Variation of Odor Threshold Concentrations Reported in the Literature." Proceedings 60th Annual Meeting Air Pollution Control Association, Cleveland, 1967), 1961.

Sanders, G.R., R.A. Umbraco, S. Twiss & P.K. Mueller. The Measurement of Malodor in a Community by Dynamic Olfactometry. Air and Industrial Hygiene Laboratory, Laboratory Services State of California Department of Public Health, Berkeley. Report no. 86, 1970.

Sano, I., H. Ohta, I. Tsuboi, and A. Sano. An Attempt to Relate the Gross Intensity of a Compound Odor to the Total Concentration of Ingredients (IX). Considerations of Background Odor and the Length of Sampling Time. Aichi Kogyo Digaku Kenkyu Hokoku, b, 19. Japan,, 1984.

SAS User's Guide, Statistics, Version 5 Edition. Cary, NC 27511-8000, 1985, pp. 565-606.

Scentometer: An Instrument for Field Odor Measurement. Barnebey-Cheney Company Manual T-539. Columbus, Ohio, 1970.

Schaeffer, J., TNO/CIVO report 6608, concerning stability of odour samples in bags, Extract from TNO/CIVO report 6608, and appendix of TNO experiences in appendix of letter dated April 26, 1993.

Scherberger, R.F., G.P. Happ, F.A. Miller & D.W. Fassett. A Dynamic Apparatus for Preparing Air-Vapor Mixtures of Known Concentrations. Am. Ind. Hyg. Ass. Quart. 19. Code B, 1958.

Schiffman, S.S. Future Design of Flavour Molecules By Computer. Chemistry and Industry, 1983.

Schiffman, S.S., M.L. Reynolds & F.W. Young. Introduction to Multidimensional Scaling. New York: Academic Press, 1981.

Schiffman, S.S.. Characterization of Odor Quality Utilizing Multidimensional Scaling Techniques. In: Odor Quality and Chemical Structure. American Chemical Society, 148. Washington, D.C., 1981.

Schley, O.H. "Untersuchung uber Geruchsschwellen." Thesis, Wurzburg. Code E2, 1934.

Schneider, R.A., C.E. Schmidt & J.P. Costiloe. Relation of Odor Flow Rate and Duration to Stimulus Intensity Needed for Perception. J. Appl. Physiol., 21. Code B, 1966.

Schneider, R.A., J.P. Costiloe, A. Vega, and S. Wolf. Olfactory Threshold Technique with Nitrodilution of n-Butane and Gas Chromatography. Journal of Applied Physiology, 18. 1963.

Schoedder, F. Messen von Geruchsstoffkonzentrationen Erfassen von Geruch. Grundl. Landtechnik, 27. [German]. Code E1, 1977.

Schreier, P.. Gaschromatographisch-Massenspektrometrische Untersuchungen von Geruchsstoffen aus der Tierhaltung. In: Geruchsprobleme bei Tierhaltung und Tierkorperbeseitigung. VDI-Verlag. Dusseldorf, 1975.

Schubert, P.. Mess- und Auswerteverfahren zur Beurteilung von Klaranlagen-Emissionen. Luft betrieb, 5. Wasser, 1980.

Schuetzle, D., Prater, T. J., and Ruddell, S. R., Sampling and Analysis of Emissions form Stationary Sources I. Odors and Total Hydrocarbons, J. Air Pollution Control Association 25(9), 925-932, 1975.

Schwartz, R. Uber die Riechscharfe der Honigbiene. Z. Vgl. Physiol., 37. In German, reviewed at TRC. Code C2, 1955.

Seffelaar, A.M., C.J.A. van der Zalm, D.D.L. Daamen, G.B. Dijksterhuis, and P.H. Punter. A Comparison of Odour Annoyance Survey Results. Staub-Reinhaltung der Luft 52. Leiden, 1992.

Seffelaar, A.M.. Comparing Analysis of the WKJ-Odour Annoyance Survey Using Princals. University of Leiden. Leiden, 1990.

Semb, G.B.. The Detectibility of the of Butanol. Perception and Psychophysics, 4. 1968.

Sfiras, J. & A. Demeiliers. Application of Gas Chromatography to Olfactometric Research. Recherches. No. 16. Code D6, 1967.

Shalamberidze, O.P. Reflex Action of a Mixture of Sulfur Dioxide and Nitrogen Dioxides. Hyg. Sanit., USSR, 32. [English translation of Russian article]. Code B2, 1967.

Shellenberger, R.D.. Procedures for Determining Threshold Odor Concentrations in Aqueous Solutions. Taste Odor Control Journal, 24. 1958.

Shepard, R.N.. The Analysis of Proximities: Multidimensional Scaling With an Unknown Distance Function. Psychometrika, 27. 1962.

Sherrard, G.C. The Practical Application of Two Qualitative Tests for HCN in Ship Fumigation. Public Health Rep., 43. Code C2, 1928.

Silverstein, R. M., Bassler, G. C., Spectrometric Identification of Organic Compounds, John Wiley and Sons, New York, 1963.

Singh, P., T. Ramasivan & K. Krishnamurthy. A Simple Phosphine Detector. Bull. Grain Technol., 5. Code C2, 1967.

Sinkuvene, D.S. Hygienic Evaluation of Acrolein as an Air Pollutant. Hyg. Sanit. USSR, 35. [English translation of Russian article]. Code B2, 1970.

Sjostrom, L.B.. Correlation of Objective-Subjective Methods as Applied in the Food Field. In: Correlation of Subjective-Objective Methods in the Study of Odors and Taste. American Society for Testing and Materials. Philadelphia, Pennsylvania, 1967.

Smith, H.O., & A.D. Hochstettler. Determination of Odor Thresholds in Aor Using C14-Labeled Compounds to Monitor Concentrations. Environ. Sci. Technol., 3. Code B, 1969.

Smolczyk, E. & H. Cobler. Chemischer Nachweis von Atemgiften und Subjektive. Empfindlichkeit. Gasmaske, 2. Code E2, 1930.

Snedecor, G.W. and Cochran, W.G., Statistical Methods, 6th ed., Iowa State Unversity Press, Ames, IA 50010, 1967, Chapter 17.

Sober, R.F., and D. Paul. Less-Subjective Odor Assessment. Chemical Engineering, 99. 1992.

Source Testing Code. Air Management Branch, Ministry of The Environment. Ontario, 1973.

Spaulding, C.H.. Accuracy and Application of Threshold Odor Test. Journal of the American Water Works Association, 34. 1942.

Stahl, W.H.. Compilation of Odor and Taste Threshold Values Data. ASTM. Philadelphia, Pennsylvania, 1973.

Standard Method for Measurement of Odors in Atmospheres (Dilution Method), ASTM D1391-57 (Reapproved 1967), 1972 Annual Book of ASTM Standards Part 23, American Society for Testing and Materials, Philadelphia, PA.

Standard Method of Test for Concentration of Odorous Vapors (Absrption Method). ASTM Designation: D-1354-60. 1969.

Standard Practice for Determination of Odor and Taste Thresholds by a Forced-Choice Ascending Concentration Series Method of Limits. ASTM E 679, American Society for Testing and Materials, Philadelphia, PA, 1979.

Stein, M., P. Ottenberg, and N. Roulet. A Study of the Development of Olfactory Preferences. American Medical Association Archives of Neurological Psychiatry, 80. 1958.

Steinmetz, G., G.T. Pryor & H. Stone. Effect of Blank Samples on Absolute Odor Threshold Determinations. Percept. Psychophys., 6. Code B, 1969.

Steinmetz, G., G.T. Pryor, and H. Stone. Olfactory Adaption and Recovery in Man as Measured by Two Psychophysical Techniques. Perception and Psychophysics, 8. 1970.

Stern, A.C.. Air Pollution. Vol. III: Measuring, Monitoring, and Surveillance of Air Pollution. Environmental Science. An Interdisciplinary Monograph Series. Academic Press. New York, 1976.

Stinson, S.. Electronic Nose Moves Closer to Reality. Chemical Engineering News, 69. 1991.

Stone H., Bosley J.J., Olfactory discrimination and Weber's Law, Percept. Motor Skills 20: 657-665. 1965.

Stone, H. Determination of Odor Difference Limens for Three Compounds. J. Exp. Psychol., 66. Code B, 1963.

Stone, H., C.S. Ough, and R.M. Pangborn. Determination of Odor Difference Thresholds. Journal of Food Science, 27. 1962.

Stone, H.. Techniques for Odor Measurement; Olfactory vs. Sniffers. Journal of Food Science, 28. 1963.

Stordeur, R.T., C.M. Stordeur, S.P. Levine, and J.H. Hoggat. A New Micro-Processor Controlled Dynamic Olfactometer. Journal of the Air Pollution Control Association, 31. 1981.

Stuper, A.J., W.E. Brugger & P.C. Jurs. Computer Assisted Studies of Chemical Structure and Biological Function. New York: Wiley and Sons, 1979.

Suchier, A. Reagenspapier zum Nachweis Kleiner Mengen Phosgen. Z. Anal. Chem., 79. In German, reviewed at TRC. Code C2, 1929.

Sudman S., Bradburn N.M., Asking Questions - A Practical Guide to Questionnarire Design, Jossey-Bass Publishers, San Francisco, California, 1983.

Suffet, I.H., and S. Segall. Detecting Taste and Odor in Drinking Water. Journal of the American Water Works Association, 63. 1971.

Sullivan, D.C., D.F. Adams, and F.A. Young. Design of an Odor Perception and Objectionability Threshold Test Facility. Atmospheric Environment, 2. 1968.

Sullivan, F., and G. Leonardos. Determination of Odor Sources for Control. Annals of the New York Academy of Sciences, 237. 1974.

Sullivan, R.J., Air Pollution Aspects of Odorous Compounds, Litton Systems, Inc. Environmental Systems Division 7300 Pearl Street, Bethesda, Maryland 20014, Prepared for the National Air Pollution Control Administration Consumer Protection & Environmental Health Service Department of Health, Education, and Welfare (Contract No. PH-22-68-25), September 1969.

Summer W., Panels and Evaluation, in Odour Pollution of Air-Causes and Control, Leonard Hill, London, P.86, 1971.

Sweeten, J.M., A.R. McFarland, J.E. Sorel, R.O. Gaunt, and D.L. Redell. A Butanol Olfactometer for Field Measurement of Ambient Odours. Journal of the Air Pollution Control Association, 34. 1984.

Sweeten, J.M., D.L. Reddell, L. Schake, and B. Garner. Odor Intensities at Cattle Feedlots. Trans. ASAE, 20. 1977.

Swets, J.A.. Is There a Sensory Threshold?. Science, 134. 1961.

Tabakova, S. Experimental Data for Hygienic Standards for Dipterex in Air. Hyg. Sanit. USSR, 34. [English translation of Russian article]. Code B2, 1969.

Takhirov, M.T. Experimental Study of the Combined Action of Six Atmospheric Pollutants on the Human Organism (in Russ.). Gig. Sanit., 39. Code E1, 1974.

Takhirov, M.T. Hygienic Standards for Acetic Acid and Acetic Anhydride in Air. Hyg. Sanit. USSR., 34. [English summary of Russian article]. Code B2, 1969.

Tamman, G. & W. Oelsen. Zur Bestimmung der Dampfdrucke von Riechstoffen. Z. Anorg. Allg. Chem., 172. [In German; reviewed at TRC.] Code B, 1928.

Taylor J.K., Quality Assurance of Chemical Measurement, Liwis Publishers, Inc., Chelsen, Michigan, pp. 27-28, 1987.

TC264/WG2 Draft European CEN Standard Dynamic olfactometry to determine the odour threshold, Draft Version 92.01, May 1992, Revised in June 1993.

Technical Report to the Illinois Environmental Protection Agency on the Evaluation of Four Odor Measurement Systems. The Research Corporation of New England. 1975.

Technische Anleitung zur Reinhaltung der Luft-TA Luft vom 27, Februar 1986 (GMG1. S. 95).

Teghtsoonian, R., M. Teghtsoonian, B. Berglund, and V. Berglund. Invariance of Odor Strength With Sniff Vigor: An Olfactory Analogue to Size Constancy. Journal of Experimental Psychology: Human Perception and Performance, 4. 1978.

Tempelaar, H.C.G. "Over den Invloed van Licht op Reukstoffen." Thesis, Utrecht. Code E2, 1913.

Teranishi, R. High Reolution Gas Chromatography in Aroma Research. Am. Perfum. Cosmet., 82 (1967). Code D2, 1966.

Teranishi, R., R.G. Buttery & D.G. Guadagni. Odor Quality and Chemical Structure in Fruit and Vegetable Flavors. Ann. N.Y. Acad. Sci., 237. Code B3, 1974.

Teranishi, R.. High Resolution Gas Chromatography in Aroma Research. Society of Flavor Chemists, Inc.. (in Press).

Thal M.F., Zettwoog P., Dix ans d'expérience de mesures olfactives dans l'industrie et dans l'environnement, Vlème Congrès mondial pour la qualité de l'air, Paris, 1983.

Thal, M.F. & P. Zettwoog. Techniques de Mesure de la Pollution Atmoshperique due aux Odeurs. B.I.S.T. Commissariat a L'Energie Atomique, 1974.

Thal, M.F., P. Zettwoog, and P. Guillet. Mesure des Odeurs. Nuisances Environmentale, 67. 1978.

The Threshold Odor Test. Taste Odor Control Journal, 29. 1963.

Theimer, E.T., T. Yoshida & E.M. Klaiber. Olfaction and Molecular Shape. J. Agric. Food Chem. 25, 1977.

Thiele V. Experimentelle Untersuchungen zur Ermittlung Eines Geruchsschwellenwertes fur Schwefelwasserstoff, Staub, 39, 159-160, 1982.

Thiele V., Verification and Standardization of olfactometric measurements. Staub-Reinhaltung der Luft 45 No. 5, pp. 200-203, 1985 (in German).

Thiele, V. Experimentelle Untersuchungen zur Ermittlung Eines Geruchsschwellenwertes fur Schwefelwasserstoff, Staub, 39. In German, reviewed at TRC. Code A, 1979.

Thiele, V. Olfactometric Measurements of Hydrogen Sulfide - Results of a VDI-ringtest. Staub-Reinhaltung der Luft 42, 1982.

Thiele, V. Olfaktometrie von H_2S-Ergebnisse des VDI-Ringver-gleiches, Staub, 42. Code E1, 1982.

Thiele, V., Bahnmuller, H., VDI Ringvergleiche zur Geruchsschwellenbestimmung. Prufung und Standardisierung von Olfaktometermessungen, Staub-Reinhalt, luft 45, nr 5, pp. 200-203, 1985.

Thiele, V., Olfaktometrie an einer Emissionsquelle- Ergebnisse des VDI-Ringvergleichs, Staub-Reinhalt, luft 44, nr 7/8, pp. 342-350, 1984.

Thiele, V.. Experimentelle Untersuchungen zur Ermittung eines Geruchsschwellenwertes fur Schwefelwasserstoff. Staub, Luft 39, 5. Reinhalt, 1979.

Thiele, V.. LIS-Olfaktometer- Eine Apparatur zur Bewertung von Geruchen im Labor - Schriftenr. Immissionsschutz Land NW, 49. Landesanst, 1979.

Thiele, V.. Measurements of Odors. Brennst.-Waerme-Kraft, 39(1-2). Germany, 1987.

Thiele, V.. Olfaktometrie von H_2S - Ergebnisse eines VDI Ringvergleiches. Staub-Reinhaltung der Luft 42. 1982.

Thiele, V.: Olfaktometrie von Schwefelwasserstoff- Ergebnisse des VDI_Ringvergleiches. Staub-Reinhalt. Luft 42 Nr. 1, S. 11-15, 1982.

Thiele, V.V., J. Kastka, G. Winneke, and B. Prinz. Problems of Odour Measurement-Comparison of Investigations by MIU and LIS. Staub-Reinhalt Luft 41. Dusseldorf and Essen, 1981.

Thomas, H.A.Jr.. Calculation of Threshold Odor. Journal of the American Water Works Association, 35. 1943.

Thomas, M.D., J.O. Ivie, J.N. Abersold & R.H. Hendricks. Automatic Apparatus for Determination of Small Concentrations of Sulfur Dioxide in Air. Ind. Eng. Chem., Anal. Ed., 15. Code C2, 1943.

Tkach, N.Z. Combined Effect of Acetone and Acetophenone in the Atmosphere. Hyg. Sanit. USSR, 30. [English translation of Russian article]. Code B2, 1965.

Tkachev, P.G. Methods for Determining Threshold of Olfactory Sensation for Chemical Substances Having an Odor (in Russ.). Gig. Sanit., no. 3. Code E1, 1978.

Torkelson, T.R., M.A. Wolf, F. Oyen & V.K. Rowe. Vapor Toxicity of Allyl Chloride as Determined in Laboratory Animals. Am. Ind. Hyg. Assoc. J., 20. Code C4, 1959.

Torkelson, T.R., S.E. Sadek, & V.K. Rowe. The Toxicity of Boron Trifluoride when Inhaled by Laboratory Animals. Am. Ind. Hyg. Assoc. J., 22. Code C2, 1961.

TRC Environmental Corporation. Reference Guide to Odor Thresholds for Hazardous Air Pollutants Listed in the Clean Air Act Amendments of 1990. Prepared for: U.S. EPA., 1991.

Tressl, R., M. Holzer, and M. Apetz. Proc. int. Symposium on Aroma Research. Zeist. Pudoc. Wageningen, 1975.

Tripp, R.. Automatic Cryogenic Sampling and Gas Chromatographic Analysis of Volatile Organic Compounds. US E.P.A., Region 7, Standard Operating Procedure. 1984.

Tritthart, P.. Ein Beitrag zum Geruch der Abgase von Dieselmotoren. Motortech. Z., 41. 1980.

Tsang, P., Device for Collection and Assay of Ambient Gases, U.S.E.P.A. Publication 650/2-74-006, Washington, D.C., 1973.

Tsuji, M., T. Okuno, T. Yamazaki, and Y. Shintani. Measurements of Bad Smelling Substances. Geographical Features and Concentration Distributions. Hyogo-ken Kogai Kenkyusho Kenkyu Hokoku, 7. Japan, 1975.

Tsuruizumi, A., K. Oya, I. Sano, I. Tsuboi, and A. Sano. An Attempt to Relate the Gross Intensity of a Compound Odor to the Total Concentration of Ingredients (XII). Intensity of the Odor from the Vessel for the Sampling and Storaging an Odor-Holding Air. Aichi Kogyo Daigaku Kenkyu Hokoku, B, 21. Toyota, Japan, 1986.

Tuorila H., e.a., The influence of tests and panelists on odour detection thresholds, Lebensm, Wiss. u. Technol., 15, pp. 97-101, 1982.

Turk, A. Expressions of Gaseous Concentration and Dilution Ratios. Atmos. Environ., 7. Code B, 1973.

Turk, A. and S. Mehlman. Correlations Between Instrumental and Sensory Characterization of Atmospheric Odors. In: Correlation of Subjective-Objective Methods in the Study of Odors and Taste. Philadelphia, Pennsylvania, 1967.

Turk, A., E. Switala & S. Thomas. Suprathreshold Odor Measurements by Dynamic Olfactometry: Principles and Practice. JAPCA, 30, 1980.

Turk, A., L.R. Reckner & G.D. Robinson. The Mechanism of Odor Transport. Paper 69-123. Presented at the 62nd Annual Meeting, Air Pollution Control Association, New York, 1969.

Turk, A.. Selection and Training of Judges for Sensory Evaluation of the Intensity and Character of Diesel Exhaust Odors. U.S. Public Health Service, Publication No. 999-AP-32. 1967.

Turner D.B. and Novak J.H., User's Guide for RAM-Data Preparation and Listings,EPA-600/8-78-016b, Volume II, Nov, 1978.

Turner D.B., Workbook of Atmosgheric Dispersion Estimates, Public Health Service Publication, No. 999-AP26, 1969.

Vaca, C.E., J. Wilhelm & M. Harms-Ringdahl. Interaction of lipid peroxidation products with DNA. A review. Mutation Res. 195, 1988.

Valentin, F.H.H., North, A.A., Draft Revises Concise Guide, Warren Spring Laboratory, UK

Valentin, F.H.H., North, A.A., Odour Control- a concise guide, warren Spring Laboratory, UK, 1980.

Valentin, G. Lehrbuch der Physiologie des Menschen 2.2. Friedrich Bieweg und Sohn. Braunschweig. Code D5, 1848.

Valentin, G. Lehrbuch der Physiologie des Menschen 2.3. Friedrich Bieweg und Sohn. Braunschweig. Code D5, 1850.

Van Anrooji, A. "Desodorisatie Langs Photochemischen Weg." Thesis. Utrecht. Code E2, 1931.

Van Belois, H.J., and C.J.M. Anzion. Measurement of Emissions Over Surface Areas Using The Hood Method. In: Studies in Environmental Science 51 " Biotechniques for Air Pollution Abatement and Odour Control Policies". Elsevier. Amsterdam, London, New York, Tokyo, 1992.

Van Gemert, L.J. Compilation of Odor Threshold Values in Air. Supplement IV. Zeist, The Netherlands: Central Institute for Nutrition and Food Research TNO (CIVO-TNO), 1973.

Van Gemert, L.J. & A.H. Nettengrejer. Compilation of Odor Threshold Values in Air and Water. Zeist and Voorburg, The Netherlands: Central Institute for Nutrition and Food Research TNO (CIVO-TNO)/National Institute for Water Supply (RID), 1977.

van Harreveld, A.Ph., and P. Heeres. Quality Control and Optimization of Dynamic Olfactometry Using n-Butanol as a Standard Reference Odorant. Staub-Reinhaltung der Luft 55. 1995.

Varsheny, S.C.. Development of Procedures for Determing Industrial Odor Thresholds. M.A.Sc. Thesis, University of Windsor. Windsor, Ontario, 1979.

Varshney, S.C., E. Pootschi, A.W. Gnyp, and C.C. St. Pierre. A Rapid Procedure for Selecting Attenuators for IITRI Dynamic Dilution Olfactometers. Environmental Progress. 1986.

VDI 3787, Blatt 3, Vorentwurf: Meteorologische Statistik fur GauB'sche Ausbreitungsmodelle, Oktober 1988.

VDI 3881 Bl. 1: Olfactometry: Odour Threshold Determination; Fundamentals. Beuth-Verlag. Berlin, 1986.

VDI 3881 Bl. 2: Olfactometry: Odour Threshold Determination; Sampling. Beuth-Verlag. Berlin, 1987.

VDI 3881 Bl. 3: Olfactometry: Odour Threshold Determination; Olfactometers With Gas Jet Dilution. Beuth-Verlag. Berlin, 1986.

VDI 3881. Olfactometry- Odour Threshold Determination- Fundamentals. 1986.

VDI 3882 Bl. 1.: Olfactometry-Determination of Odour Intensity. Beuth-Verlag. Berlin, 1992.

VDI 3882 Bl. 2.: Olfactometry- Determination of Hedonic Odour Tone. Beuth-Verlag. Berlin, 1994.

VDI 3883 Bl. 2: Effects and Assessment of Odours-Determination of Annoyance Parameters by Questioning-Repeated Brief Questioning of Neighbour Panellists. Beuth-Verlag. Berlin, 1993.

VDI 3940: Determination of Odour in Ambient Air by Field Inspection. Beuth-Verlag. Berlin, 1993.

VDI, VDI 3881 Part 1, Richtlinien, Olfactometry, Odour Threshold Determination, Fundamentals, May 1986.

VDI, VDI 3881 part 2, Richtlinien, olfactometry, odour threshold determination, January 1987.

VDI, VDI 3881 Part 3, Richtlinien, Olfactometry, Odour Threshold Determination, Olfactometers with Gas Jet Dilution, November, 1986.

VDI-Berichte 561: Geruchsstoffe: Quellen, Ausbreitung, Wirkungen, Olfaktometrie, Technische und administrative MaBnahmen. VDI-Verlag, Dusseldorf, 1988.

VDI-Guideline 3782/4. Environmental Meteorology-Dispersion of Odorants in the Atmosphere. Draft Edition 1991.

VDI-Guideline 3940. Determination of Odour in Ambient Air by Field Inspections. Draft Edition. 1991.

VDI-Kommission Reinhalting der luft, Geruche, Stand der Erkenntnisse zur Ermittlung von Belastung und Belastigung, Workshop 28. November 1989, Dusseldorf.

Venstrom D., Amoore J.E., Olfactory threshold in relationto age sex or smoking, J. Food Sci. 33: 264-265, 1968.

Verein Deutscher Ingenieure, VDI 3881 Olfactometry: Odor Threshold Determination. Fundamentals. VDI, Beuth-Verlag GmbH, Burggrafenstr. 6, D-1000 Berlin 30, 1986.

Verschueren, K., Handbook of Environmental Data on Organic Chemicals, Van Nostrand Reinhold Co., New York, N.Y., 1977.

Vershueren K., Handbook of Evnironmental Data on Organic Chemicals, 2nd ed. Van Nostrand-Reinhold, New York. 1983, pp. 57-58.

Verwaltungsvorschriften zum Bundes-Immissionsschutzgesetz. Gem. RdErl, des Ministers fur Arbeit, gesundheit und Soziales, des Ministers fur Ernahrung, Landwirtschaft und Forsten, und des Ministers fur Wirtschaft, Mittelstand und Verkehr vom 15.07.1976. Ministerialblatt fur das Land NW vom 01.09. 1976.

Verwaltungsvorschriften zum Genehmigungsverfahren nach 6, 15 Bundes-Immissionsschutzgesetz (BImSchG) fur Mineralolraffinerien und petrochemische Anlagen zur Kohlenwasserstoffherstellung. RdErl. des Ministers fur Arbeit, Gesundheit und Soziales vom 14, April 1975 (MB1. NW S. 966, SMB1. NW 7130)

Vetter, H., and H.H. Kowalewsky. H_2S-Emission aus Tierhaltungsbetrieben. Staub, Luft 39, 5. Reinhalt, 1979.

Viswanathon, S., G.P. Mathur, A.W. Gnyp, and C.C. St. Pierre. Application of Probability Models to Odor Threshold Determinations. Atmospheric Environment, 17. 1983.

Vogel, T.M., C.S. Criddle, and P.L. McCarty, Transformations of Halogenated Aliphatic Compounds, Environmental Science and Technology, Vol. 21, No. 8, 1987, pp. 722-736.

Volk, W., Applied Statistics for Engineers, McGraw-Hill Book Company, Inc., New York, Chapter 7, 1958.

Wade, W.A. III, K.C. Tower & S. Cha. Technical Report to the Illinois EPA on the Evaluation of Four Odor Measurement Systems. TRC Project No. 32390. Wethersfield, CT.: The Research Corporation of New England, 1974.

Wahl J.P., Duffee R.A., Marrone W.A., Evaluation of Odor Measurement Techniques, Summary Report to the U.S. EPA, EPA Contract 68-02-0662, Program Element 1A1010, 1974, Report No. 1.

Wahl, J.P., R.A. Duffee, and W.A. Marrone. Evaluation of Odor Measurement Techniques. Prepared for U.S. Environmental Protection Agency (EPA-650/2-74-008-a). !974.

Walter C. McCrone Associates, Inc., Comparison of Containers for Collection of Odorous Air Samples, Prepared fpr the Illinois Environmental Protection Agency, November 1975.

Wang, J. & K. Skipka. Dispersion Modeling of Odorous Emissions. For Presentation at the 86th Annual Meeting & Exhibition of the AWMA, Denver, CO, 1993.

Warner, P.O.. Analysis of Air Pollutants. Kap. 7. Environmental Science and Technolgy. John Wiley & Sons. New york, 1976.

Warner, P.O.. Odor Detection and Determination. In: Analysis of Air Pollutants, Kap. 7. Evironmental Science and Technology. John Wiley & Sons. New York, 1976.

Warren, C.B., W.E. Brugger & G.S. Zander. MAECIS: A Computer Program for the Handling and Analysis of Flavour and Fragrance Molecules. Chemistry and Industry, 1983.

Watson, J. T. and K. Biemann, High-Resolution Mass Spectra of Compounds Emerging form a Gas Chromatograph, Anal. Chem., 36, 1135, 1964.

Weisheit, W., and D. Pinkal. Quantitative Bestimmung von Aminen in Abluft. Gesunheits-Ingenieur, 96. 1975.

Weitbrecht, U. Beurteilung der Trichloroathylen-Gefahrdung im Betrieb. Zentralbe. Arbeitsmed. Arbeitsschutz., 7. In German, reviewed at TRC. Code C1, 1957.

Wenzel, B.M.. Techniques in Olfactometry: A Critical Review of the Last One Hundred Years. Psychological Bulletin, 45. 1948.

Weurman, C.. Recent Developments in Food Odour Research Methods. Recent Advances in Food Science, 3. 1963.

Weurman, C.. Sampling in Airborne Odorant Analysis. In: Human Responses to Environmental Odors. Academic Press. New York, 1974.

Weurman, C.. Vergleich Zweier Methoden fur die Messung von Geruchen. In: Geruchsprobleme bei Tierhaltung und Tierkorperbeseitigung, VDI-Verlag. Dusseldorf, 1975.

Whisman M.L., Goetzinger J.W., Cotton F.O., Brinkman D.W., Thompson C.J., A New Look at Odorization Levels for Propane Gas. Bartlesville Energy ResearchCenter, Bartlesville, OK, 1977.

Whisman, M.L., J.W. Goetzinger, F.O. Cotton & D.W. Brinkman. Odorant Evaluation: A Study of Ethanethiol and Tetrahydrothiophene as Warning Agents in Propane. Environ. Sci. Technol., 12. Code A, 1978.

Wick, E.L.. Chemical and Sensory Aspects of the Identification of Odor Constituents in Food. Food Technology, Vol. 19. 1965.

Wijnen, H.L.J.M., Guideline for Olfactometric measurements in the Netherlands: Comparison with Western European Cuidelines, In: Odour Trevention and control of organic sludge and livestock farming, ed. Nielsen, V.C., Voorburg, J.H., L'Hermite, P., Elseviers Applied Sceence Pubglishers, London, 1986.

Wilby, F.V. The Odor Comparator an Improved Instrument for Quatntitative Odor Measurement. Proc. Oper. Sect. Am. Gas Assoc., 64. Code B, 1964.

Wilby, F.V.. Variation in Recognition Odour Threshold of a Panel. Journal of the Air Pollution Control Association, 19. 1969.

Willhite, M.T.. Use of Odor Thresholds for Predicting Off-Property Odor Impacts. In: Recent Determinations and Current Practices in Odor Regulations, Controls, and Technology. A&WMA Transactions Series, No. 18. Pittsburgh, Pennsylvania, 1991.

Williams, F.D., J.F. Emele & M.C. Alford. The Application of the Dynamic Triangle Olfactometer to the Evaluation of Oral Odor. Chem. Senses Flavour, 2. Code A, 1977.

Wilska, S. Ozone. Its Physiological Effects and Analytical Determination in Laboratory Air. Acta Chem. Scand., 5. Code C2, 1951.

Wilson, G.. Odors, Their Detection and Measurement. EUTEK, Process Development and Engineering. Sacramento, California, 1975.

Wilson, G.E., and T.W. Schroepfer. Sewage Sludge Management Program. Volume 4A: Odor Studies, 1978. Assessment and Control of Large Emission Area Odor Risk. Sacramento Area Cunsultants, california, 1979.

Wilson, G.E., and T.W. Schroepfer. Sewage Sludge Management Program. Volume 4B: Odor Studies, 1978. Preliminary Reassessment of Odor Risk. sacramento area Consultants, California, 1979.

Wilson, G.E., T.W. Schroepfer, and J. Huang. Sewage Sludge Management Program. Volume 3A: Odor Studies, 1975-1977. Diurnal Odor Evaluations at the Solid Storage Basins. Sacramento Area Consultants, Californea, 1979.

Winkler, K. Zur Diskussion Gestellt: Immissionsgrenzwerte zur Verhinderung von Geruchsbelastigungen. Wasser, Luft und Betr., 19. In German, reviewed at TRC. Code C1, 1975.

Winneke, G. and M. Paduch. Measurement and Evaluation of Odours in Air Quality Control. Society for Clean Air in the Netherlands. The Netherlands, 1989.

Winneke, G., and J. Kastka. Comparison of Odour Annoyance Data from Different Industrial Sources. Problems and Implications. In: Environmental Annoyance Characterization, Measurement and Control. Elsevier Science Publications. Amsterdam, New York, Oxford, 1986.

Winneke, G., e.a., Vergleichende olfaktometrische Untersuchungen zu Formaldehyd und Schwefelwasserstof, in Staub-Reinhaltung der Luft 48,pp. 319-324, 1988.

Winneke, G., J. Kotalik, H.-O. Keldenich, and J. Kastka. Zur Wahrehmung von Schwefelwasserstoff unter Labor- und Feldbedingungen. Staub, Luft 39, 5. reinhalt, 1979.

Winneke, G., R. Both, F.-B. Frechen, M. Hangartner, W. Medrow, M. Paduch, K.-H. Plattig, and P.H. Punter. Characterization of Odour Annoyance. Part2: Interdependence of Specific Odour Parameters Affecting the The Annoyance Level.

Winquist, F., and Others. Performance of an Electronic Nose for Quality Estimation of Ground Meat. Measurement Science Technology, 4. 1993.

Wittes, J., and A. Turk. The Selection of Judges for Odor Discrimination Panels. In: Correlation of Subjective-Objective Methods in the Study of Odors and Taste. ASTM STP 440, American Society for Testing and Materials. Philadelphia, Pennsylvania, 1967.

Wolfermann, H.F.. Stationare und mobile Olfaktometer. In: Geruchsprobleme bei Tierhaltung und Tierkorperbeseitigung. VDI-Verlag. Dusseldorf, 1975.

Wollin, A.E.. An Assessment of the Applicability of a Venturi Dynamic Dilution Probe to the Collection of Odourous Samples From Stationary Sources. Master's Thesis, University of Windsor. Windsor, Ontario, 1987.

Woodrow, H.F., and B. Karpman. A New Olfactometric Technique and Some Results. Journal of Experimental Psychology, 3. 1917.

Woodworth, H.F., and H. Schlosberg. Multidimensional Scaling of Odors. In: Theories of Odors and Odor Measurement. Robert College Research Center. Istanbul, 1968.

Woskow, M., Multidimensional Scaling of Odors, Doctoral Dissertation, University of California, Los Angeles, 1964.

Woskow, M.H. Multidimensional Scaling of Odors. Ph.D. Thesis, University of California, Los Angeles. No. 64-6198. University Microfilms, Inc., Ann Arbor, Mich, 1974.

Woskow, M.H.. Multidimensional Scaling of Odors. Theories of Odors and Odor Measurements. Robert College, Istanbul, 1968.

Wright, R. H. and K. Michels, Evaluation of Far Infrared Relations to Odors by a Standards Similarity Methods, Annals New York Acad. of Sci., 116, 535, 1964.

Wright, R.H. Odour and Chemical Constitution. Nature 173, 1954.

Wright, R.H. Odour and Molecular Variation Vibration: A Possible Membrane Interaction Mechanism. Chem. Senses and Flavor 2, 1976.

Wright, R.H. Olfactory Coding. Nature 216, 1967.

Wright, R.H. Steriochemical and Vibrational Theories of Odour. Nature 239, 1972.

Wright, R.H. & K.M. Michels. Evaluation of Far Infarred Relations to Odor by a Standards Similarity Method. Ann. N.Y. Acad. Sci. 116, 1964.

Wright, R.H., & R.E. Burgess. Molecular Coding of Olfactory Specificity. Can. J. Zool. 53, 1975.

Wright, R.H., and K.M. Michaels. Evaluation of Far Infrared Relations to Odors by a Standards Similarity Method. Annals of the New York Academy of Science, 116. New York, 1964.

Wright, R.H.. Predicting Olfactory Quality From Far Infrared Spectra. New York Academy of Sciences Conference on Odors: Evaluation, Utilization, and Control. 1973.

Wright, R.H.. Understanding Olfaction. Soap Perfumery and Cosmetics, XLVI. 1973.

Yamazaki, I., and M. Moriyama. Sensor Technology. Asakur Shobo. Tokyo, Japan, 1984.

Yokoyama, K., and F. Ebisawa. Detection and Evaluation of Human Reactions Using a Chemical Sensor Based on Adsorbate Detection. Analytical Chemistry, 65. 1993.

Yoshida, M. Studies in Psychometric Classification of Odors (6). Jap. Psychol. Res. 14, 1972.

Yoshida, M.. In Search of the Scheme of Olfaction. In: Food Intake and the Chemical Senses. University of Tokyo Press. Tokyo, 1977.

Yoshida, M.. Studies of Psychometric Classification of Odors (4). Japanese Psychological Research, 6. 1964.

Yoshida, M.. Studies of Psychometric Classification of Odors (5). Japanese Psychological Research, 6. 1964.

Yoshiyuki, K., T. Kurakawa, K. Nishida, T. Higuchi, T. Higuchi, and J. Endo. Research and Development of Odor Measurement Using a Semiconductor Gas Sensor. Journal of the Air and Waste Management Association, 46. 1996.

Young, F.A. & D.F. Adams. "Comparison of Olfactory Thresholds Obtained on Trained and Untrained Subjects." Proc. 74th Annu. Conv. Am. Psychol. Assoc. Code A, 1966.

Zalm, C.J.A. van der. Analysis of the Compararibilty of German and Dutch-Belgian Odour Annoyance Survey Results. University of Leiden. Leiden, 1990.

Zoldak, J.J., B.E. Dumdei, and D.V. Kenny. Ambient Air Monitoring in Worcester, Massachusetts. MDS Advanced Analytics, Incorporated. Two Dundee Park, Andover, Massachusetts. Commonwealth of Massachusetts Department of Environmental Quality engineering. 1986.

Zwaardemaker, H.. On Measurement of the Sense of Smell in Clinical Examination. Lancet, 1. 1889.

6.0 CONTROL

6.1 BACKGROUND

Controlling offensive odours requires more consideration than simply installing a prescribed control method. Instead, a systematic approach should be undertaken to develop an odour control program.

6.2 ODOUR CONTROL PROGRAM.

6.2.1 PHASE 1 OF AN ODOUR CONTROL PROGRAM.

Phase 1 of an odour control program uses conceptual engineering to identify the problem and outline possible solutions. The preliminary visit is a walk through inspection of the process to determine areas of immediate concern and possibly experience the odour first hand. Before any action can be undertaken against the odour, it must be identified. Source testing accomplishes this task as well as provides the concentrations and emission rates which help to define the magnitude of the problem. "Add-on" control devices are expensive. A review of operations may offer cheaper alternatives such as the substitution of less odourous chemicals for presently used materials, process modifications, or even process elimination. Even if these measures cannot solve the problem completely, they may still reduce the required size of the control device to be installed.

Engineering design involves gathering all relevant information required to select the eventual control technique. Every control method has its advantages and disadvantages which must be considered along with the required control capacity, reliability and the potential for other pollution problems or health and safety concerns. The initial costs of a control device would include construction, installation, and extra features such as fans, pumps, and foundations. Most control techniques are fairly maintenance intensive and depending on the operation they can require a variety of fuel sources, utilities, chemicals and catalysts. The final concept report should include the recommended control techniques and all relevant information that will be required to make the decision to employ a particular odour control program.

6.2.2 PHASE 2 OF AN ODOUR CONTROL PROGRAM.

Phase 2 of an odour control program involves taking the actual engineering design from the blueprint to full scale operation. The final concept report from Phase 1 is used to prepare plans and specifications necessary to construct the apparatus. Simultaneously, approval from the appropriate control agencies is sought to actually implement the measures. Upon finalizing the plans and receiving control agency approval, the process of reviewing bids will eventually lead to the selection of a contractor capable of doing the job. Finally, construction inspections should be undertaken during and after assembly to guarantee specifications were met by the builder. Control agencies usually require a trial period with frequent source testing to demonstrate the effectiveness of the in-place control device. Full time operation of the control plant can begin once approval agencies are satisfied that the measures undertaken will prevent any further instances involving offensive odours.

6.3 ODOUR CONTROL TECHNIQUES

6.3.1 PROCESS MODIFICATION.

Process modification involves altering the manufacturing process to reduce the production of odourous compounds. Some simple examples include changing the type and size of seals and gaskets. Other modifications can be as extreme as substituting alternative materials in the manufacturing process. This method can be very effective in reducing potential odour complaints by diminishing the emission of odourous compounds at the source.

6.3.2 INCINERATION.

Incineration is one of the most commonly used odour control technologies today. This process is very effective when high efficiencies are required and the odourous compounds are combustible hydrocarbons. Incineration involves the oxidation of the hydrocarbons to carbon dioxide and water vapour.

6.3.3 ADSORPTION.

Adsorption is an effective technology when the concentration of the odourous compound is high and can possibly be recycled for reuse by the source. The process efficiency decrease with time as the adsorbent binds more and more of the adsorbed compounds. This typically requires the control technology to incorporate some means of regenerating the adsorbent without interruption of the ongoing process.

6.3.4 BIOFILTRATION.

Bioifiltration can be successfully employed as an odour control technology for exhaust streams which contain volatile organic compounds. The process involves the use of a bed of biologically activated material through which the exhaust stream is fed. The microorganisms living within the bed metabolize the pollutants through aerobic degradation to produce carbon dioxide, water and microbial biomass.

6.3.5 ODOUR MASKING.

Odour masking involves the addition of a single or two or more compounds to an odourous pollutant to produce a cancellation of the odourous impact. This process is limited by geography. The farther from the source the complaint is, the less likely odour masking will be an effective solution.

6.3.6 IMPROVED DISPERSION.

The principle behind this process is based on the principle that 'the solution to pollution is dilution'. However, this technology is not considered as an environmentally ethical solution in today's society.

6.4 REFERENCES

A Comprehensive Study on Bad Odor Control. Ministry of International Trade and Industry, Bureau of Research Coordination. Japan, 1972.

Absorption of Odorous Sulfur Compounds in Chlorine and Caustic Solutions, National Council for Stream Improvement, New York City, Atmospheric Pollution Technical Bulletin No. 23, March 1965.

Aho, W.A., G.F. Griffin, and A.K. Bakir. Pollution Abatement of Poultry Manure by Maxi-Mixing Method. In: Managing Livestock Wastes. Proceedings 3rd International Symposium on Livestock Wastes. American Society of Agricultural Engineering, 6. 1975.

Air Pollution Engineering Manual. Air Pollution Control Division of Los Angeles County, US Public Health Service Publication No. 999-AP-40. 1967.

Air Pollution Manual Part II, Control Equipment. American Hygiene Association. Detroit, Michigan, 1968.

Akamatsu, K.. Ozone Oxidation of Dimethyl Sulfide and Deodorizing of KP Blow-Gas. Journal of the Japanese of the Association of the Pulp and Paper Industry, 22. 1968.

Aldi, R.G., A.W. Gnyp, G.P. Mathur, S.J.W. Price, C.C. St. Pierre, D.S. Smith, and G.W. Wood. Odor Control Studies: I Odor Control Technology, II Catalytic Oxidation of Odorous Compound. Technology Development and Appraisals Section, Air Resources Branch, Ministry of the Environment. Toronto, Ontario, 1976.

Allen, E.R., Y. Yang, H.U. Hartenstein, Final Project Report to Provide Technical Assistance in the Design and Installation of an Odor Control Biofilter System at the Kanapaha Wastewater Treatment Plant, University of Florida Department of Environmental Engineering Sciences, Gainesville, Florida, March 1989.

Allen, H.S.. New Plant Solves Seasonal Problem. Water and Wastes Engineering, 12. 1975.

Allenspach, M.. Thermische Verbrennung. In: Technik der Abgasreinigung. Tagung Lufthygiene 1976. Brugg-Windisch, 1976.

Altybaev, M., and V.V. Streltsov, Removal of Sulfur Compound form Gaseous Fuels, Coke Chem. (USSR) 8, 1966.

An EPA ‘Best’ Cleans Water in Cincinnati. Civil Engineering (Journal of the American Society of Civil Engineers), 63. 1993.

Anderson, L.W.. Odor Control in Rendering by Wet scrubbing - A Case History. National Renderers Association Odor Control Manual. 1971.

Ando, S.. Odor Control of Wastewater Treatment Plants. Journal of the Water Pollution Control Federation, 52. 1980.

Anon., Geurnormering, Publication series on Air Number 11, Ministry VROM, 's Gravenhage, 1983, ISBN 90 346 0169 2.

Anonymous. Abluft ohne Geruch Verfahren zur Desodorierung der Abluft aus der Cold-Box-Kernherstellung. U-Tech. Unweltmagazin, 39. 1978.

Anonymous. Better Results With Powdered Activated Carbon. Water and Pollution Control, 117. 1979.

Anonymous. Energy Recovery Feature of Thermal Oxidizer Creates Efficient Pollution Control. Chemical Processing. Chicago, 41. 1978.

Anonymous. Ermittlung von Emissionen und Immissionen an Anlagen, indenen Kartoffeln, Fleisch Oder Fisch Gebraten wird. Niedersachsisches Socialministerium, 126. Hannover, 1977.

Anonymous. Foul Odors Foiled by FRP Scrubbers and Carbon Banks. Chemical Processing. Chicago, 39. 1976.

Anonymous. GAC Curbs Sewage Odors. Water and Sewage Works, 125. 1978.

Anonymous. Gas Scrubbers Solve Odor Problem at Fish Meal Plant. Air Engineering. 1966.

Anonymous. Gegen Gase und Geruche. Emissionsminerung durch Ad- und Absorption. U.-Techn. Umweltmagazin. 1976.

Anonymous. Geruchfreie Luft an Tankstellen. Stadtereinigung, 13. Unweltschutz, 1976.

Anonymous. Geruchsemissionen aus KlaranLagen. In: Institut fur Gewrbliche Wasserwirtschaft und Luftreinhaltung e.V. IWL-Forum. 1978.

Anonymous. Hydrogen Peroxide Cubs Sulphur Odor. Compressed Air, 84. 1979.

Anonymous. Hydrogen Peroxide Eliminates Odor in Wastewater Treatment Plant. Water and Sewage Works, 125. 1978.

Anonymous. Lime-Not Just a Better Smell. Water and Waste Treatment Journal, 22. 1979.

Anonymous. Modular Activated-Carbon System Controls Odors. Chemical Engineering, 84. 1977.

Anonymous. Mother Nature's Secret Combats Refuse Storage Odors. Solid Wastes Management Refuse Removal Journal, 20. 1977.

Anonymous. Odor Abatement Incineration System Recovers 26-Million Btu/hr Heat at Armak Chemical Plant. Chemical Processing. Chicago, 40. 1977.

Anonymous. Odour Control in Municipal Wastewaters-An Independent View. Effluent and Water Treatment Journal. 1979.

Anonymous. Odours. Report of the Working Party on the Suppression of Odours from Offensive and Selected Other Trades Part 2. Best Present Practice in Odour Prevention and Abatement. Warren Spring Laboratory. Hertfordshire, 1975.

Anonymous. Plastic Balls Suppress Odors at Large European Plant. Chemical Processing, 39. Chicago, 1976.

Anonymous. Resort Area and Sewage Treatment Plant on One Location - Odor Control With Ozone. The Welsbach Family. 1966.

Anonymous. Thermal Oxidizer System Safely Nauseous Odors. Chemical Processing. Chicago, 39. 1976.

Aquino, J.T.. Your Neighbor's Nose: The Goal of Odor Control. Waste Age, 24. 1993.

Arnold, D.L.B.. Chemical Oxidation of Odours by Ozone. Chemical Industry, 22. London, 1974.

Arsovic, H.. Neutralization of Annoying Odors. Presented at the Colloquium Geruchsbelastigende Stoffe. Dusseldorf, Germany, 1971.

Arsovic, H.M., and H. Burchard. Chemische und Verfahrenstechnische Probleme der Geruchsbekampfung an Abwasser-Aufbereitungsanlagen. Staub. Luft 38, 11. Reinhalt, 1978.

Arsovic, H.M., and H. Burchard. Removal of Gaseous and Liquid Emissions from Flaying Stations (ARSOX-METHOD). Gesundheitstech, 4. 1973.

Artis, D.. Legal Controls Over Odour Nuisance. Presented at a meeting of the Water and Environment Group of the SCI. London, 1984.

Artis, D.. Statutory Nuisance Procedure for the Control of Odour Emissions. J.P.. 1981.

Artis, D.. The Legal Control of Offensive Trades. J.P..1983.

Asendorf, E.. Zur Desodorierung von Gullebehandlung in Bauerlichen Fleinbetrieben. Forum Stadtehyg., 29. 1978.

Atlas, R.M. and R. Bartha, (1981), Microbial Ecology: Fundamentals and Applications, Addison Wesley Publ. Company, Reading, MA, 1981, USA.

Ayers, K.C., and J.L. Parr. Odor Control Features of a New Kraft Mill. In; Air Pollution Control Association 68th Annual Meeting and Exhibition, 6. Boston, 1975.

Ayres, D.C., and C.M. Scott. Oxidative Control of Organosulfur Pollutants. Environmental Science Technology, 13. 1979.

Azuma, K., K. Doi, A. Ikeda, S. Suzuki, S. Ymauchi, and H. Takahara. Exhaust Gas Deodorization with Chemical Scrubbing and Ozonation. Proceedings of the 4th International Clean Air Congress. The Japanese Union of Air Pollution Prevention Associations, 4. Tokyo, 1977.

Azuma, K., K. Doi, M. Morikawa, and M. Kose. Deodorization with Ozone. Mitsubishi Denki Giho, 48. Tokyo, 1974.

Azuma, K.. Deodorization by the Ozone Method. Kankyo Sozo, 4. 1974.

Azuma, T.. Deodorization by Ozone. Kankyo Gitutsu, 2. 1973.

Azuma, T.. Odor Elimination by Ozone. Kankyo Sozo, 4. 1974.

Baader, W.. Zielsetzung, Zusammenhange und Verfahrenstechnik der Fest- und Flussigmistbehandlung. Ein Uberblick. Scheineprod, 27. Geflugelwirt, 1975.

Baba, Y.. Deodorizing Equipment and Deodorants. Kogai (Haka Shobo), 5. 1970.

Backman, E.L., Note sur la puissance des odeours et leur solubilite dans l'eau et dans l'huile, J. Physiol. Path. Gen. 17:1 (1917).

Baker J.M., Peters C.S., Perry R., and Knight C.P.V., Odor Control in Solid Waste Management, Effluent and Water Treatment Journal, April 1983.

Balling, R.C.Jr., and C.E. Reynolds. The Diurnal Flux in the Dispersion of Sewage Plant Odors. Water, Air, and Soil Pollution, 14. 1980.

Baratt, M.. Ozone Stifles Sewage Odors in Residential Areas. The American City Magazine. 1975.

Bardtke, D.. biologische Gesichtspunkte zur Vermeidung von Geruchsemissionen bei der Behandlung, Lagerung und Ausbrinung von Flussigmist. Grundl. Landtechnik, 28. 1970.

Barker, R.. Improving the Efficiency of Ozone in Odour Treatment by Activation with U.V. Light. Electricity Council Research Center. Capenhurst, England, 1975.

Barnebey, H.L., Activated Charcoal for Air Purification, Trans. Am. Soc. Heating Air-Conditioning Eng. 64:481, 1958.

Bauch, H., and H. Burchard. Studies to Inprove Strongly Smelling or Toxic Effluents by Ozone. Wasser, Luft Betrieb, 14. 1970.

Baum, H.E.. Plastic Balls Suppress Sewage Plants Smells. Water and Pollution Control, 113. 1975.

Beck, H., and H.-J. Strauss. Uber Neue Erkenntnisse und Erfahrungen bei der Adsorptiven Gasreinigung nach dem Adsox-Verfahren. In: Abgas, Abwasser, Abfall und Recycling und Aktuelle Probleme der Luftreinhaltung und ihre losungswege. Verl. Chemie GmbH. Weinheim, 1976.

Benforado, D. M., Rotella, W. J., and Horton, D. L., Development of an Odor Panel for Evaluation of Odor Control Equipment, J. Air Pollution Control Association, 19, (2), 101-105, 1969.

Benforado, D.M., and G. Cooper, The Application of Direct-Flame Incineration as an Odor Control Process in Kraft Pulp Mills. Presented at the 22nd Engineering Conf., Process Systems and Controls, Water and Air Pollution, Technical Association of the Pulp and Paper Industry, Atlanta, Ga., Sept. 19-22, 1967.

Benforado, D.M., and J. Waitkus. Fume Control in Wire Enameling by Direct-Flame Incineration. Journal of the Air Pollution Control Association, 18. 1968.

Benjes, H.H.Jr., and W.F. Owen. Really Improve Operation and Maintenance. Water and Wastes Engineering, 16. 1979.

Bergdoll, J.F.. The use of Dried Bacteria Cultures and Enzymes to Control Odor and Liquefy Organic Waste Found in Hog, Dairy and Poultry Producing Units as well as Lagoons. In: Managing Livestock Wastes. Proceedings 3rd International Symposium on Livestock Wastes. American Society of Agricultural Engineers. St. Joseph, Michigan, 1975.

Bernert, J.. Praktikable Methode zur Oxidation Verminerung von Geruchsstoff-Emissionen. Das Kalksteinturmverfahren. Luft Betr, 21. Wasser, 1977.

Bethea, R.M. Engineering Analysis and Odor Control. In: Industrial Odor technology assessment. Ann Arbor science Publications Inc.. Ann Arbor, 1975.

Bethea, R.M.. Solutions for Feedlot Odor Control Problems. Journal of the Air Pollution Control Association, 22. 1972.

Betz, E.C., and H.J. Feist. Catalytic Afterburning of Industrial Gases. Technik, 20. Berlin, 1965.

Bhatia, M.V., and P.N. Cheremisinoff. Combustion Methods for Odor Control. In: Industrial Odor Technology Assessment. Ann Arbor Science Publications Inc.. Ann Arbor, 1975.

Bhatia, M.V.. Packed Tower and Absorption Design. In: Air Pollution Control and Design Handbook, Pt. 2. Pollution Engineering and Technology 2. Basel: Marcel Dekker, 28. New York, 1977.

Bhatia, S.P., L.P. Marentette, T.L.C. de Souza, H. Barclay, A. Wong, and S. Prahacs. Remove TRS from Stack Gases with Activated Carbon. Pulp Paper Magazine Canada, 78. 1975.

Bhatia, S.P., M.K. Azarniouch, T.L.C. de Souza, R. Rowbottom, and S. Prahacs. Improved Scrubbing Technique for the Abatement of Odor and Particulate Emissions from Kraft Mills. Co-operative Pollution Abatement Research Report 252-2, Domtar Limited Research Center. 1974

Bhatia, S.P., T.L.C. de Souza, M.K. Azarniouch, and S. Prahacs. Air Pollution Control in Kraft Pulp Mills. American Industrial Hygiene Association Journal, 39. 1978.

Bhatla, M.N.. Control of Odors at an Activated Sludge Plant. Journal of the Water Pollution Control Federation, 47. 1975.

Billings, C.H.. H_2S Removal With Chelated Iron. Public Works, 124. 1993.

Bioxide Cuts Sewage Hydrogen Sulfide Levels. Pollution Engineering, 23. 1991.

Biscan, D.A., and J.L. Rizzo. Sewage Odour Control Asing Alkali Impregnated Activated Carbon. 1989.

Biscan, D.A.. Sewage Odor Control Using Alkali Impregnated Carbon. In: Recent Developments and Current Practices in Odor Regulations, Controls and Technology. A&WMA Transactions Series, 18. Pittsburgh, Pennsylvania, 1991.

Blanck, C.A.. End Odor and Taste Complaints with Granular Activated Carbon. American City and County, 92. 1977.

Blendl, H.M.. Haltungstechnische Anforderungen an Intensivtierhaltungen zur Verminderung oder Vermeidung von Emissionen. In: %. Symposium uber branchenspezifische Emissionen, Intensivtierhaltungen. Munchen, 1977.

Blendl, H.M.. Moglichkeiten der Emissionsminderung bei der Tierhaltung. In: Geruchsprobleme bei Tierhaltung und Tierkorperbeseitigung. VDI-Verlag. Dusseldorf, 1975.

Blosser, R.O., and H.B.H. Cooper, Jr., Secondary Scrubbbing of Kraft Recovery Stack Gas, Presented at 61st Annual Meeting of the Air Pollution Control Association, St. Paul, Minn. Paper No. 68-129, June 23-27, 1968.

Blosser, R.O.. Odor Control Technology in the Kraft Pulping Industry. In: Air Pollution Control Association. State-of-the-Art of Odor Control Technology II. APCA Specialty Conference Proceedings, 3. Pittsburgh, Pennsylvania, 1977.

Blosser, R.O.. Trends in Odor Control Technology: How They Affect Kraft Pulp Mills. Pulp and Paper, 53. 1979.

Bohn, G.L., C.K. Prososki, J.G. Eckhardt, Hydrocarbon adsorption by soils as the stationary phase of gas-solid chromatography, J. Evniron. Qual. 9:563, 1980.

Bohn, H.L., R.K. Bohn, Soil beds weed out air pollutants, Chem. Engr. 95(6):73, April 25, 1988.

Bohn, H.L.. Compost Scrubbers of Malodorous Air Streams. Compost Science, 17. 1976.

Bohn, H.L.. Soil and Compost Filters of Malodorant Gases. Journal of the Air Pollution Control Association, 25. 1975.

Bohnke, B. and D. Eitner, 1983, Vergleichende Utersuchung verschiedener Komposte in einen mobilen Biofilter (Investigation and Comparison of Different Kinds of Compost in a Mobile Biofilter), Gutachten i.A. der AG Kompostabstaz NW, Aachen, West Germany, 1983.

Boll, C.H.. Activated Carbon Solvent Recovery. In: Industrial Odor Technology Assessment. Ann Arbor Science Publishers Inc.. Ann Arbor, 1975.

Bollyky, L.J.. Odor Control - Oxidation by Substances Other Than Air. In: Environmental Engineer's Handbook. Chilton Book Co.. Radnor, Pennsylvania, 1974.

Bollyky, L.J.. Ozone Systems for Odor Control. Proceedings of the First International Symposium on Ozone for Water and Wastewater Treatment. International Ozone Institute. Syracuse, New York, 1975.

Boscak, V., N. Ostojic, and D. Gruenwald. Odor Problems? Don't Just Hold Your Nose. Water and Wastes Engineering, 12. 1975.

Bosworth, C.M. and A.J. Barduhn. Recent Advances in Odor Control by Air Washing. Annals of New York Academy of Sciences, 116. 1964.

Bousfield, S., P.N. Hobson, and R. Summers. A Note on Aerobic Digestion of Cattle and Poultry Wastes. Agricultural Wastes, 1. 1979.

Bowker, R.P.G., J.M. Smith, and N.A. Webster. Odor and Corrosion Control in Sanitary Sewerage Systems and Treatment Plants. US E.P.A. 625/1-85/018. Cincinnati, Ohio, 1985.

Brady, J.D.. Dry Effluent- Wet Scrubbing System for Waste Incinerators. Anderson 2000 Inc.. Peachtree City, Georgia. Presented at the 81st Annual Meeting of the Air Pollution Control Association. Dallas, Texas, 1988.

Breitfelder, E., K. Pohl, and E. Schubert. Untersuchungen uber die Katalytische Oxydation von Trimethylamin zur Geruchsbeseitigung. Wiss. Z. Tech. Uni. Dres., 26. 1977.

Bremmer H., Verhagen H., Vissscher K., Inventarisatie HKW in Nederland; Afvalstoffen en Emissies; Verwerkings- en bestrijdingstechnieken, Werkdocument RIVM nr 738608002, Mrt 1988.

Brewer, G.L.. Fume Incineration. Chemical Engineering. 1968.

Brinsko, G.A.. Add Oxygen for Odor-Free Sludge Dewatering. American City, 90. 1975.

Brooman, D.L., and E. Edgerley Jr.. Concentration and Recovery of Atmospheric Odor Pollutants Using Activated Carbon. Journal of the Air Pollution Control Association, 16. 1966.

Brooman, D.L., and E. Edgerley, Jr., Concentration and Recovery of Atmospheric Odor Pollutants Using Activated Carbon, J. Air Pollution Control Assoc. 16:25, 1966.

Brown, C.K. and J.C. Taylor. Cupola Odor Control Tests. Ontario Research Foundation Report 71-01. Sheridan Park, Ontario, 1971.

Brunner W., Staub D., Leisinger T., Bacterial degradation of Dichloromethane, Appl.&Env. Microbiology, vol 40. 1980.

Bryson, J.D, C.A. Davis, and F.J. Zuicarelli. Sewage Odor Control Works in Beloit, Wisconsin. Water and Sewage Works, 125. 1978.

Bump, R.L.. Precipitator design for Low-Odor Boilers Offers Special Problems. Pulp and Paper, 60. 1976.

Burstein, D.. Sewage Plant Odor Control. American City and County, 4. 1979.

Butryn, G.L., and K.C. Ayers. Mead Experience in Steam Stripping Kraft Mill Condensates. Technical Association of the Pulp and Paper Industry. 1975.

Byers, H.W.. Odor Control at Clavey Road Plant. Pollution Engineering, 10. 1978.

Byrd, J.F., et al., Solving a Major Odor Problem in a Chemical Process, J. Air Pollution Control Assoc. 14(2): 509, 1964.

Cain, W.S., and T. Engen. Scope and Evaluation of Odor Counteraction and Masking. Annals of the New York Academy of Sciences, 237. 1974.

Cain, W.S., L.G. Berglund, R.A. Duffee, and A. Turk. Ventilation and Odor control: Prospects For Energy Efficiency. Final Report Phase I. TRC Environmental Consultants. Weathersfield, Connecticut, 1979.

Callahan, W.F., and A.B. Pincince. Physical-Chemical Treatment System at Fitchburg, Massachusetts. TAPPI Environmental Conference. Atlanta, Georgia, 1977.

Callan, B.T.. Malodour Measurement and Control. Chem Ind, 21. 1993.

Carlson, D.A. and C.P. Leiser, 1966, Soil Beds for the Control of Sewage Odors, J. Water Pollution Control Federation, Vol. 38, No. 5, pgs. 829-840, May 1966.

Carver, T.O., et al., An Approach to a Solution of an Interstate Air Pollution Problem, Presented at the Annual Meeting of the Air Pollution Control Association, Houston, Tex., June 1964.

Casalini, C., G. Mascellani, and V. Michelini. Abbatimento di Odori Molesti Provenienti dalla Fermentazione di Antibiotici. Inquinamento, Acqua, Aria, Suolo, 18. 1976.

Cederhof, R., Edfors, M. L., Friberg, L., and Lindvall, T., On the Determination of Odor Thresholds in Air Pollution Control - An Experimental Field Study on Flue Gases From Sulfate Cellulose Plants, J. Air Pollution Control Association, 16(2), 92-94, 1966.

Cederlof, R., M.L. Edfors, L. Friberg & T. Lindvall. On the Determination of Odor Thresholds in Air Pollution Control. An Experimental Field Study on Flue Gases from Sulfate Cellulose Plants. J. Air Pollut. Contr. Assoc., 16. Code A, 1966.

Cha, S.S.. Odor Control from Paint and Coating Operations Through Process Simulation and Dispersion Modeling. In: Air Pollution Control Association Specialty Conference Proceedings. State-of-the-Art of Odor Control Technology II. Pittsburgh, Pennsylvania, 1977.

Cha, S.S.. Solving Community Odor Problems: A General Approach. Environmental Risk Limited. Bloomfield, Connecticut. Presented at the 80th Annual Meeting of the Air Pollution Control Association. New York, New York, 1987.

Chass, R.L., The Status of Engineering Knowledge for the Control of Air Pollution, Proc. of Natl. Conf. on Air Pollution, Washington, D.C. (Dec. 10-12, 1962); U.S. Public Health Serv. Publ. 1022, 1963.

Cheremisinoff, P., Young, R.A., Industrial Odor Technology Assessment, Ann Arbor Science Publishers Inc., Ann Arbor, Mich., 1975.

Cheremisinoff, P.N., and R.A. Young. Air Pollution Control and Design Handbook Pt. 2. Pollution Engineering and Technology 2. Basel: Marcel Dekker. New York, 1977.

Cheremisinoff, P.N., and R.A. Young. Industrial Odor Control Case Histories. In: Industrial Odor Technology Assessment. Ann Arbor Science Publications Inc.. Ann Arbor. 1975.

Cheremisinoff, P.N., and R.A. Young. Industrial Odor Technology Assessment. Ann Arbor Science Publications Inc.. Ann Arbor, Michigan, 1977.

Cheremisinoff, P.N., R.M. Bethea, T.M. Hellman, and O.B. Lauren. Techniques for Industrial Odor Control. Pollution Engineering, 7. 1975.

Cheremisinoff, P.N.. Atmospherc Transport, Dispersion and Stack Design Considerations. In: Industrial Odor Technology Assessment. Ann Arbor Science Publications Inc.. Ann Arbor, 1975.

Cheremisinoff, P.N.. Plant Site Selection Factors. In: Industrial Odor Technology Assessment. Ann Arbor Science Publications Inc.. Ann Arbor, 1975.

Cheremisinoff, Paul A. and Richard A. Young. Pollution Engineering Practice Handbook. Ann Arbor, Michigan: Ann Arbor Science Publishers, Inc., 1981.

Chu, J.T.. Odor Control Experiences in Wastewater Treatment Plants. National Conference on Environmental Engineering Research, Development and Design: Second Annual: Extended Abstracts. 1975.

Clapham, T.M., T.J. Junker, and G.S. Tobias. Activated Carbon- Odorant Removal from Air Quantified. Presented at the American Society of Heating and Refrigeration and Air Conditioning Engineers. Kansas City, Missouri, 1970.

Cleary, G.. Some Considerations in the Evaluation and Control of Odors. Proceedings of the 2nd International Clean Air Congress, Academic Press. New York, 1971.

Clement, J.L., and J.S. Elliott, Kraft Recovery Boiler Design for Odor Control, Presented at the 4th Paper Industry Air & Stream Improvement Conference, Halifax, Nova Scotia, Sept. 17, 1968.

Coffey, F.B.. San Antonio Balances Solutions to Plant and Sewer Odors. In: Recent Developments and Current Practices in Odor Regulations, Controls and Technology. A&WMA Transactions Series, 18. Pittsburgh, Pennsylvania, 1991.

Cole, C.A., H.D. Bartlett, D.H. Buckner, and D.E. Younkin. Odor Control of Liquid Dairy and Swine Manure using Chemical and Biological Treatments. In: Managing Livestock Wastes. Proceedings 3rd International Symposium on Livestock Wastes. American Society of Agricultural Engineers, 12. St. Joseph, Michigan, 1975.

Cole, C.A., P.E. Paul, and H.P. Brewer. Odor Control with Hydrogen Peroxide. Journal of the Water Pollution Control Federation, 48. 1976.

Coles, B. Effects of modifying structure on electrophilic reactions with biological nucleophiles. Drug Mtab. Rev. 15, 1984.

Complaint Data Files, Air Pollution Control Division, Wayne County Department of Health, 1311 East Jefferson, Detroit, Michigan 48207, 1984-1985.

Compost Odor Control. Public Works, 123. 1992.

Control and Disposal of Cotton-Ginning Wastes, A Symposium at Dallas, Texas, May 3-4, 1966, U.S. Public Health Service, Cincinnati, Ohio, 1967.

Control of Odorous Vapours (Adsorption Method). Annual Book of ASTM Standards. American Society for Testing and Materials. Philadelphia, Pennsylvania, 1976.

Control Techniques for Particulate Air Pollutants, National Air Pollution Control Administration Publication AP-51, Jan. 1969.

Control Technology: Gases and Odors. Air Pollution Control Association. Pittsburgh, Pennsylvania, 1973.

Cooney C.L., in Biotechnology, Rehm H.J., Reed G. eds., vol 1, Ch 2, VCH Verlaggesellschaft, Weinheim, 1981.

Cooper, D.E.. The Prevention of Odours During the Anaerobic Digestion of Meat Waste. Proceedings of the 1975 Clean Air Conference: Vol. 2. Ann Arbor Science Publishers. Ann Arbor, 1975.

Cooper, H.B.H.. Cost Effectiveness of Recovery Furnace Odor Control in the Pulp and Paper Industry. Presented at the 78th Meeting of the American Institute of Chemical Engineers. Salt Lake City, 1974.

Cosentine, M.V., Control of Atmospheric Odors form Fermentation Processes, Air Pollution Control Assoc. News 4, Dec. 1956.

Coticelli, N.. Odor Analysis Provides Better Monitoring. Pipeline Gas Journal, 219. 1992.

Courau, P.J.. The Elimination of Odors. Cah. Med. Inter Profess., No. 41. 1971.

Cox, J.P.. Odor Control and Olfaction. Pollution Sciences Publications Co.. Lynden, Washington, 1975.

Cromwell, W.E.. Ozone in Air Pollution Abatement. Industrial Engineering Chemistry, 51. 1959.

Cross, F.L., and G.E. Benson. Monitoring Odors and Selection of Control Equipment. Presented at the 12th Annual Purdue Air Quality Conference. Roy F. Weston Inc.. West Chester, Pennsylvania, 1973.

Cross, F.L.. Air Pollution Odor Control Primer. Technomic Publishing Co., Inc.. Westport, Connecticut, 1973.

Cross, F.L.. How to Treat Air Contaminants - Odors. Presented at the American Institute of Plant Engineers, National pollution Control Conference. Cincinnati, Ohio, 1972.

Crouse, L.F., and D.E. Waid. Efficient Design of Afterburners for Incineration of Many Industrial Fumes. Air Engineering, 9. 1967.

Daley, A.C.. The Colfax Packing Company Malodor Control System. Air Pollution Control Association 71st Annual Meeting and Exhibition Abstracts of Papers. Pittsburgh, Pennsylvania, 1978.

Danielson, J.A. (Ed.), Air Pollution Engineering Manual, Air Pollution Control District County of Las Angeles. U.S. Public Health Service, Bureau of Disease Prevention, Environmental Control, Natioal Center for Air Pollution Control, Cincinnati, Ohio, 1967.

Davis, J.A., Stone, Neil & Bender, and Manfred. Tall Stacks as a Possible Solution to Odour Related Complaints. 1985.

Davis, J.C.. Pulpers Apply Odor Control. Chemical Engineering, 1971.

Dawson, D.S.. Biological Treatment of Gaseous Emissions. Water & Environmental Research, 65. 1993.

Demers, C.E., J.F. Feimer, T. Hamilton, and R. Murray. Preliminary Investigations of Odour Control at a Typical Industrial Source. Department of Chemical Engineering, University of Windsor. Windsor, Ontario, 1974.

Dencker, D.D.. Meat Industry Air Pollution Control. Presented at the 12th Annual Purdue Air Quality Conference. 1973.

Deodorization and Removal of Odorous Gas. Okayama Prefecture, Industrial Experiment Station, No. 110. Japan, 1971.

Deodorization of Animal Excrement. FMC Corp., French Patent 2187-729. 1974.

Department of Environmental Protection, Division of Environmental Quality vs Township of Piscataway, Department of Public Works. Final Decision,)AL DKT. NO. EEQ 2661-88, Agency Kkt. NO. 88-63.

Derenzo, David R., Gnyp, Alex, (eds.), Recent Developments and Current Practices in Odor Regulations, Controls and Technology, Papers from an International Specialty Conference. Air and Waste Management Association, ISSN 1040-8177; No. 18, Pittsburgh, Pennsylvania, 1989.

Detering, K., H. Kohler, and E. Paul. Verminderung der Abluft beim Cold-Box-Verfahren durch Abaugung aus Kernkasten mit Druckausgleich. Giesserei, 65. 1978.

Dickerson, R.C., and B.N. Murphy. Scope of Set Scrubbers for Odor Control. Annals of the New York Academy of Sciences, 237. 1974.

Dickerson, R.C., and B.N. Murthy. Scope of Wet Scrubbers for Odor Control. Environmental Protection Agency, National Environmental Research Center, Research Triangle Park. North Carolina.

Dickson, C.. Composting by Cooperation. Public Works, 122. 1991.

Digiacomo, J.D.. New Approaches to the Design of Afterburners for Varnish Cookers. Journal of the Air Pollution Control Association, 23. 1973.

Disinfection, Taste and Odor Control. Public Works, 125. 1994.

Disinfection; Odor Prevention and Control. Public Works, 125. 1994.

Doi, K., K. Azuma, and K. Nishiyama. Deodorization of Sulfur Compounds by Ozone Taiki Osen Kenkyu, 8. 1973.

Doig, I.A.. Activated Carbon in Air Pollution and Odour Control. Clean Air, 14. 1980.

Don, J.A.. Odour Abatement Through Biofiltration. Proceedings of International Symposium ‘Characterization and Control of Odorous Pollutants in Process Industries’. Louvain-la-Neuve, Belgium, 1984.

Don, J.A.. Odour Measurement and Control. Presented to the Filtration Society at a meeting on Odour Control in Industry. London, 1986.

Don, J.A.. The Rapid Development of Biofiltration for the Purification of Various Waste Gas Streams. VDI-colloquium ‘Odorants’. Baden-Baden, 1985.

Douglas, I.B.. Some Chemical Aspects of Kraft Odor Control. Journal of the Air Pollution Control Association, 18. 1968.

Dragt, A.J., and J. van Ham. Biotechniques fo Air Pollution Abatement and Odour Control Policies. Studies on Environmental Science, 51. Amsterdam, 1992.

Dragt, A.J., and S.P.P. Ottengraf, (1985), Biofiltration A New Technology in Air Pollution Control Experiences in the Netherlands, File 4-4508-23-10, Eindhoven University of Technology, May 1985, The Netherlands.

Dravnieks, A., Schmidtsdorff, W. and Meilgaard, M.C., J. Air Pollution Control Assoc. 36:900, 1986.

Drew J., Russell J., and Bajak H. W., ed., Sulfate Turpentine Recovery, Pulp Chemicals Association, New York, 1971.

Duffee, R., P.R. Jann, R.D. Flesh, and W.S. Cain. Odor/Ventilation Relationships in Public Buildings. Presented at the Seventy-Third Annual Meeting of the Air Pollution Control Association. Montreal, Quebec, 1980.

Duffee, R.A., D.R. Murray. Ambient odor modeling to determine control requirements. Technical Paper 83-37.6. Presented at Annual Meeting of the Air Pollution Control Association, 1983.

Dumon, R.. The Fight Against Odors, A Harmful Effect of a Sophisticated World. Cim. Ind., Genie Chim., 105. 1972.

Dutch Pre-Standard on Olfactometry. The Dutch Normalisation Institute, Translated by the Housing, Physical Planning and Environment Directorate General for Environmental Protection Air Directorate. 1990.

Eckert, J.S.. Use of Packed Beds for Separation of Entrained Particles and Fumes from an Air Stream. Journal of the Air Pollution Control Association, 16. 1966.

Economic Consideration in Air Pollution Control. National Air Pollution Control Administration Publication No. AP-51. Reprinted from “Control Techniques for Particulate Air Pollutants”.

Eddington, K., and P. Carnell. Compact Catalytic Reactor Controls Vent Odors From Oil Field. Oil and Gas Journal, 89. 1991.

Edwards, F.R.. Controlling Fumes and Odors. Reprint from Plant Engineering, 1971.

Edwards, F.R.. Oxidation Processes for Controlling Fumes and Odours. Plant Engineering. 1971.

Effective Odor Control Contributes to Downtown Revitalization. Public Works, 125. 1994.

Eitner, D. and H.G. Gethke, 1987, Design, Construction and Operation of Bio-Filters for Odour Control in Sewage Treatment Plants, Paper Presented at the 80th Annual Meeting of the Air Pollution Control Association in New York, NY, June 1987.

Eitner, D., (1984) Untersuchungen uber Einsatz und Leistungsfahigkeit von Kompostfilteranlagen zur biologischen Abluftreinigung im Bereich von Klaranlagen unter besonderer Berucksichtigung der Standzeit (Investigations of the Use and Ability of Compost Filters for the Biological Waste Gas Purification with Special Emphasis on the operation Time Aspects), GWA, Band 71, RWTH Aachem Sept. 1984, West Germany.

Elkin, H.F. and R.A. Constable. Source/Control of Air Emissions. Hydrocarbon Processing, 51. 1972.

Elliot, T.C.. Odor Control: Its Time is Coming. Power, 115. 1971.

Ellis, J., and W. Korth. Removal of Geosmin and Methylisoborneol from Drinking Water by Adsorption and Ultra Stable Zeolite-Y. Water Res, 27. 1993.

Engel, J.H., R. Kanczuzewski, and J.K. Samuels. Odor Control Programs. Presented at the 75th National Meeting of the American Institute of Chemical Engineers. Detroit, Michigan, 1973.

Engelhardt, A. “The Transformation of Hydrogen Sulfide to Sulfur by Means of Activated Carbon, - a New Process of Sulfur Recovery and Gas Purification,” Brennstoff Chem. 2, 1921.

EPA, 1985, Odor and Corrosion Control in Sanitary Sewerage Systems and Treatment Plants, Design Manual, EPA/625/1-85-018, October 1985.

Ermenc, E.D., and J.A. Jutze. Odor Control bu Adsorption. In: Air Pollution Control Association Specialty Conference Proceedings, State-of-the-Art of Odor Control Technology II. Pittsburgh, Pennsylvania, 1977.

Eunpu, F.F.. Aeration System Controls Reservoir Eutrofication. Water and Pollution Control, 115. 1977.

Evaluation of the Use of Humans in Measuring the Effectiveness of Odor Control Technology at the Source, NCASI Technical Bulletin 56, National Council of the Paper Industry.

Evaluation of Wastewater Generation, Collection, and Treatment - SCM Clidco Organics, Environmental Science and Engineering, Inc., Gainesville, Florida, 1988.

Faith, W.L., Odor Control in Cattle Feed Yards, J. Air Pollution Control Assoc. 14(11):459, 1964.

Fattinger, V., F.T. Schmitz, and J. Schneider. Geruchsvernichtung durch Abscheiden von Aerosolen und Absorption von Stinkstoffen. In: Technik der Abgasrinigung. Tagung Lufthygiene 1976.

Faulkner, W.D., W.G. Schuliger and J.E. Urbanic. Odor Control Methods Using Granular Activated Carbon. Presented at 74th National Meeting of American Institute of Chemical Engineers. New Orleans, 1973.

Fehr, R.L., and R.J. Smith. Management of a Flushing-Gutter Manure-Removal System to Improve Atmospheric Quality in Housing for Laying Eggs. In: Managing Livestock Wastes. Proceedings 3rd International Symposium on Livestock Wastes. American Society of Agricultural Engineering, 11. St. Joseph, Michigan, 1975.

Feldstein, M., D.A. Levaggi, and R. Thuillier. Odor Regulation by Emission Limitation. Air Pollution Control Association. 1973.

Fenlon, D.R., and P.J. Mills. Stabilisation of Pig Slurry with Lime. Agricultural Wastes, 2. 1980.

Ficek, K.J.. Potassium Permanganate for Odor Control. In: Industrial Odor Technology Assessment. Ann Arbor Science publishers Inc.. Ann Arbor, 1975.

Field, W. and Others. Reducing H_2S Curbs Odor and Corrosion. Pollution Engineering, 25. 1993.

Finkbeiner, F.. Abluft- und Abfallgasverbrennung in den Kraftwerken der BASF. Erdoel Kohle, Petrochemical, 32. Erdgas, 1979.

First, M.W. and J.J. Lynch. Air Pollution Control of High Speed Printing Presses. Presented at 67th Annual Meeting of the Air Pollution Control Association. Denver, 1974.

First, M.W., W. Schilling, J.H. Govan, and A.H. Quinby. Control of Odors and Aerosols from Spent Grain Dryers. Harvard School of Public Health. Boston, 1973.

First, M.W., W. Schilling, J.H. Govan, and A.H. Quinley. Control of Odors and Aerosols From Spent Grain Dryers. Journal of the Air Pollution Control Association, 24. 1974.

First, M.W.. Effectiveness of Odor Counteractants for the Treatment of Stack Gases. Journal of the Air Pollution Control Association, 9. 1958.

Fisher, P.W., H. Wang, Dames & Moore, C. Wilber, and Greeley and Hansen. Odor Control and Abatement for a Sludge Composting Facility. Presented at the 79th Annual Meeting of the Air Pollution Control Association. Minneapolis, Minnesota, 1986.

Flesh, R.D.. Social and Economic Criteria for Control Effectiveness. Annals of the New York Academy of Sciences, 237. 1974.

Fogiel, M.. Pollution Control Technology. Research and Education Technolgy. New York, New York, 1973.

Forbes, J.H.Jr.. Wastewater Collection. Water Environ Res, 65. 1993.

Forbes, R.H.Jr., and Others. Combined Strategies for Odor Control. BioCycle, 35.1994.

Francis, G.Z., and R.E. Lipinski. Control of Air Pollution from Restaurat Charbroilers. Maryland State Department of Health and Mental Hygiene, 27. 1977.

Francis, G.Z., and R.E. Lipinski. Control of Air Pollution from Restaurant Charboilers. Journal of the Air Pollution Control Association, 27. 1977.

Franzky, U.. Prevention of Pollutant Odors Caused by Organic Compounds. Staub, Reinhaltung Luft, 28(3). Germany, 1968.

Franzky, U.. The Use of Oxidation Processes for Reduction of Odorous Emissions. VDI, No. 149. Berlin, 1970.

Frechen, F.-B., and J.T. Kettern. Reduction of Odorous Emissions from a Hazardous Waste Landfill Site Using Biofiltration and Other Techniques. Institute for Sanitary Engineering. Aachen, F.R. Germany. Presented at the 80th Annual Meeting of the Air Pollution Control Association. New York, New York, 1987.

Frega, V.. Industrial Odor Control. In: Air Pollution Control and Design Handbook Pt. 2. Pollution Engineering and Technology 2. Basel: Marcel Dekker. New York, 1977.

Frost, H.J.. H_2S-Emmissionen auf dem Gebiet der chemischen Industrie und Moglichkeiten der Emissionsminderung. Staub, Luft 59, 4. Reinhalt, 1979.

Fume Incineration Effective for Odor Pollution Control, Ind. Heating 33(7):1266, 1966.

Fume Oxidation Units used to Concentrate Sludge. Water/Eng Management, 138. 1991.

Gang, S.N., Coke Gas Purification from Hydrogen Sulfide in High Speed Rotary Absorbers, U.S.S.R. Literature on Air Pollution and Related Occupational Diseases 4, Aug. 1960.

Gary, L.. Controlling Sewer Insects and Sewer Odors. Public Works. 1950.

Gasiorowski, K.. H_2S bei Mineralolraffinerien und Erdgasaufbereitungsanlagen - Emissionen und Immissionen. Staub, Luft 39, 6. Reinhalt, 1979.

Gay, D.. Passing the Taste Test (Treatment of Water Supply). American City Cty, 108. 1993.

Geipel, H.. Reinigung geruchsbelastigender Abluft durch Chemische Oxidation. In: Abgas, Abwasser, Abfall und Recycling und aktuelle Probleme der Luftreinhaltung und ihre Losungswege. Verl. Chemie GmbH, 1. Weinheim, 1976.

Gelber, P.. One-Two Punch Controls processing Odors. Food Processing - Marketing. 1967.

Gemert,L.J., A.H. van Nettebreyer. Compilation of Odour Threshold Values in Air and Water. RID-CIVO/TNO. 1977 plus supplements 1985.

Germerdonk, R.. Adsorption von Geruchsund anderen Problematischen Stoffen. In: Technische Sorptionsverfahren zur Reinhaltung der Luft. Tagung nurnberg 1975. VDI-Verlag. Dusseldorf, 1976.

Germerdonk, R.. Adsorption von Geruchsund anderen Problematischen Stoffen. Staub, Luft 36, 7. Reinhalt, 1976.

Gillot, Y., and A. Marchand. Contribution to the Study of the Deodorization of Piggery Wastes. Techniques et Sciences Muncipales et Revue L'Eau, 78. 1978.

Gilpin, A.. Control of Air Pollution. Butterworth and Company Limited. London, 1963.

Giugliano, M., and G. Urbini. Odor Control in Sewage Treatment Plants. Ingegneria Ambientale Inquinamento E Depurazione, 7. 1978.

Godfrey, R.W.. Combined System Solves Odor and Disinfection Problems. Water/Eng Management, 139. 1992.

Goldstein, N.. Odor Control Progress at Composting Sites. BioCycle, 35. 1994.

Goldstein, N.. Odor Control Progress for Sludge Composting. BioCycle, 34. 1993.

Gomella, C., and J.P. Belle. Extraction de Micropollutants par le Charbon Actif. Techniques et Sciences Municipales et Revue L'Eau, 70. 1975.

Gottschling, R.D., and C. Nebel. Industrial Odor Control by oxidation with Ozone. Proceedings of the First International Symposium on Ozone Water and Wastewater Treatment. International Ozone Institute. Syracuse, New York, 1975.

Grant, W.D., and P.E. Long, (1981), Environmental Microbiology, Halsted Press, NY, 1981, USA.

Green, M.. Stop Odors in the Vapor Phase. Water/Eng Management, 138. 1991.

Green, W. and T. Elliott. Control of Rendering Plant Odors in Philadelphia. Presented at 64th Annual Meeting of the Air Pollution Control Association. Atlantic City, New Jersey, 1971.

Griffin, G.E.. Good-Neighbor Plant. The American City Magazine. 1965.

Grillot, R., and A. Ladam. Several Methods Used in France to Prevent Odours. Pollut. Atmos., 11. Paris, 1969.

Grunder, L.J., West Coast Kiesel Odor Control - A Progress Report, Presented at the Meeting of Canadian Transit Association, March 1960.

Guide for Air Pollution Episode Avoidance. US EPA. Research Triangle Park, North Carolina, 1971.

Guide for Control of Air Pollution in Medium-Sized Urban Areas. US EPA. Research Triangle Park, North Carolina, 1971.

Guide for Control of Air Pollution in Small Urban Areas. US EPA. Research Triangle Park, North Carolina, 1971.

Gumerman, R.C., and D.A. Carlson. Chemical Aspects of Odor Removal in Soil Systems. In: Animal Waste Management. Cornell University Conference on Agricultural Waste Management. 1969.

Gust, M., F. Sporenberg, and E. Schippert. Grundlagen der Biologischen Abluftreinigung. Teil IV: Abgasreinigung durch Mikroorganismen mit Hilfe von Biowaschern. Stau, Luft 39, 9. Reinhalt, 1979.

Gust, M., H. Grochowski, and S. Schirz. Grundlagen der Biologischen Abluftreinigung. Teil V. Abgasreinigung durch Mikroorganismen mit Hilfe von Biofiltern. Staub, Luft 39, 11. Reinhalt, 1979.

H_2O_2 Solves Florida Odor Problems. American City Cty, 108. 1993.

H_2S Loading Challenges Odor Control System. Pollution Engineering, 25. 1993.

H_2S Loading Challenges Odor Control System. Water/Eng Management, 140. 1993.

H_2S Oxidation Process Solves Odor Problems. Water/Eng Management, 139.

Habelt, J.. Geruchsminderung durch Oxidationsgraben. KTBL-Schriften-Vertrieb im Landwirtschaftsverlag GmbH, 202. Hiltrup, 1978.

Hackl, A.. Die Emission Gasformiger Schadstoffe in der Zellstoff- und Papierindustrie. Umweltschutz, 14. 1977.

Hall, H.J.. The Technology of Gas Cleaning: State of the Art. Trans. N.Y. Academy of Sciences.

Hangartner M., Standardization on Olfactometry with respect to Odor Pollution Control. Paper 87-75A.1. 80th Annual Meeting of APCA, New York, June, 1987.

Hanna, G.F., R.L. Kueller, J.P. Karnes, and R. Garbowicz. A Chemical Method for Odor Control. Annals of the New York Academy of Sciences, 116. 1964.

Hardison, L.C., and L.R. Steenberg. Criteria for Chemical Odor Control Systems. Presented Before the New York Academy of Sciences Conference on Odors: Evaluation, Utilization and Control. 1973.Annals of the New York Academy of Sciences, 237. 1974.

Haring, H.G., A. Turk, and R.W. Okey. Cost-Effectiveness Relationships in Odor Control. Annals of the New York Academy of Sciences, 237. 1974.

Harris N., Hansford G., A study of substrate removal in a microbial film reactor, Water Research , vol 10, 1976.

Harris, J.C., 1978, Ozonation, prisented in Unit Operations for Treatment of Hazardous Industrial Wastes, D.J. DeRenzo, editor, Noyles Data Corporation, Park Ridge, New Jersey.

Harris, L.D.. Energy and Efficiency Characteristics of the Ejector Venturi Scrubber. Journal of the Air Pollution Control Association, 15. 1965.

Harris, W.B.. Atmospheric Pollution. In: Dangerous Properties of Industrial Materials. Reinhold Publishing Corporation. New York, 1958.

Harris, W.B.. Ventilation Control. In: Dangerous Properties of Industrial Materials. Reinhold Publishing Corporation. New York, 1958.

Harstad, A.E., Control of Odors from Feather Processing, J. Air Pollution Control Assoc., March 1956.

Hartenstein, H., 1987, Assessment and Redesign of an Existing Biofiltration System, Masters Thesis presented to the Department of Environmental Engineering Sciences, Univ of Fla, Gainesville, 1987.

Hartmans S., de Bont J., Tramper J., Luyben K., Application of bacteria to remove chlorinated hydrocarbons from industrial waste gases, Biotech. Letters, 1985.

Hasbach, A.. Closed-Loop System Controls Sewage Odors. Pollution Engineering, 24. 1992.

Hasbach, A.. Quicklime Cuts City's Sludge Cost and Odor. Pollution Engineering, 25. 1993.

Haug, R.T., Compost Engineering, Principles and Practice, Ann Arbor Science Co., Ann Arbor, MI, (1980), pp 223.

Hawkins, J.C.. Engineering Problems with Effluents from Livestock. Commission of the European Communities, Publication Eur 6249. 1979.

Hedden, K., L. Huber, and R. Rao. Adsorptive Reinigung von schwefelwasserstoffhaltigen Abgasen. In: Technische Sorptionverfahren zur Reinhaltung der Luft. Tagung Nurnberg 1975, 6. VDI-Verlag, Dusseldorf, 1976.

Heilman, B.. Study of Costs of Non-Condensable Fume Incinerators for Rendering Plant Effluents. National Renderers Association Odor Control Manual. 1971.

Hein, G.M.. Odor Control by Catalytic and High-Temperature Oxidation. Annals of the New York Academy of Sciences, 116. 1964.

Heller, K.. Odor Control in the Vapor Phase. Water/Eng Management, 138. 1991.

Heller, K.J.. Vapor Phase Reactions and Their Use in Controlling Organic Odors. In: Recent Developments and Current Practices in Odor Regulations, Controls and Technology. A&WMA Transactions Series, 18. Pittsburgh, Pennsylvania, 1991.

Hellman, T.M., and B.R. Taylor. Odor Control by High-Temperature Oxidation. Annals of the New York Academy of Sciences, 237. 1974.

Hellman, T.M.. Odor Control by Adsorption. In: Air Pollution Control and Design Handbook. Pt. 2. Pollution Engineering and Technology 2. Basel: Marcel Dekker. New York, 1977.

Hellmann, T.M.. Odor Control by Odor Modification. In: Air Pollution Control and Design Handbook Pt. 2. Pollution Engineering and Technology 2. Basel: Marcel Dekker. New York, 1977.

Hemeon, W.C.L.. Plant and Process Ventilation. The Industrial Press. New York, 1955.

Hemion, W.C.L.. Technique and Apparatus for Quantitative Measurement of Odor Emissions. Journal of the Air Pollution Control Association, 18. 1968.

Henderson, Y. & H.W. Haggard. The Elimination of Industrial Organic Odors. J. Ind. Eng. Chem., 14. Code C1, 1922.

Hendrickson, E.R., and C.I. Harding, Black Liquor Oxidation as a Method for Reducing Air Pollution from Sulfate Pulping, J. Air Pollution Control Assoc. 14(12):487, 1964.

Hendrickson, E.R.. Recent Trends in Odor Control from Kraft Pulp Mills. In: Air Pollution Control and Industrial Energy Production. Ann Arbor Science Publishers Inc. Ann Arbor, 1975.

Henshaw, T.B.. Odor Control at a 2,4-D Production Plant. Journal of the Air Pollution Control Association, 15. 1965.

Hentz, L.H.Jr., and Others. Odor Control Research at the Montgomery County Regional Composting Facility. Water Environ Res, 64. 1992.

Herr, G.A.. Odor Control in the Pharmaceutical Industry. In: Industrial Odor Technology Assessment. Ann Arbor Science Publications Inc.. Ann Arbor, 1975.

Herzing, D.R., V.L. Snoeyink, and N.F. Wood. Activated Carbon Adsorption of the Odorous Compounds 2-Methylisoborneol and Geosmin. Journal of the Water Works Association, 69. 1977.

Hesketh, Howard E. and Frank L. Cross. Odor control Including Hazardous / Toxic Odors. Lancaster, Pennsylvania: Technomic Publishing Co., Inc., 1989.

High, M.D., and T.L. Puma. Control of Odors from a Rendering Plant. Presented at the 64th Annual Meeting of the Air Pollution Control Association. Atlantic City, New Jersey, 1971.

Hoambrecker, S., and P. Becker. Chemical Addition to Collection System Curbs Treatment Plant Odors. Water and Environmental Technology, 4. 1992.

Hochmuth, F.W., Odor Control System for Chemical Recovery Units, Paper Trade J. 150, Sept. 1968.

Hofmann, G., and D. Schmidt. Neue Ergebnisse zum Thema: "Tierhaltungsbedingte Geruchsbelastigung." Biochemisch Wirkende Praparate zur Gullebehandlung im Verleichenden Laborversuch. Tierzuchter, 5. 1975.

Hogan, P.S., and J.D. Heller. Odor Control Technology Satisfies Citizens. Water and Environmental Technology, 5. 1993.

Holtz, R.J.. H_2S Odor Eliminated with Scrubber System. Chemical Processing. Chicago, 38. 1975.

Homans, W.J., and E. Paul. Biologische Abluftaufbereitung in Giessereien. Giesserei, 63. 1976.

Hopton, F. J., and Laughlin, R. G. W., Brewhouse Odors Characterization and Control, Prepared for Labatt Breweries of Canada Limited, London, Ontario, Report No. P. 1444/1, Ontaroi Research Foundation, Sheridan Park, Ontario, not dated.

Horst, W.G., and Others. Operational Changes Benefit Odor Management. Biocycle, 32. 1991.

Horst, W.G., Mattern, F., Vold, S.H., and J.M. Walker, Controlling Compost Odors, In: Biocycle Journal of Waste Recycling, Vol. 32, No. 11, pp. 46-51, November 1991.

Huang, J.Y.C., G.E. Wilson, and T.W. Schroepfer. Evaluation of Activated Carbon Adsorption for Sewer Odor Control. Journal of the Water Pollution Control Federation, 51. 1979.

Huang, J.Y.C., G.E. Wilson, and T.W. Schroepfer. Evaluation of Sludge Odor Control Alternatives. American Society of Civil Engineers. Environmental Engineering Division. Journal, 104(EE6). 1978.

Huch, R., H. Beine, and W. Brocke. Studies and Developments in the Reduction of Environmental Odors. International Union of Air Pollution Prevention Associations. 1970.

Huch, R.. Moglichkeiten zur Beschrankung der Emissionen von Anlagen zum Rauchern von Lebensmitteln. Luft Btr., 20. Wasser, 1976.

Huch, R.. Speziell Verfahren der Emissionsminderung. Staub, Luft 35, 10. Reinhalt, 1975.

Huchschlag, W.. Biotechniques for Air Pollution and Odour Control Policies. Elsevier Science Publishers. Amsterdam, 1992.

Huey, N.A., L.C. Broering, G.A. Jutze, and C.W. Bruber. Objective Odor Pollution Control Investigations. Journal of the Air Pollution Control Association, 10. 1960.

Hunt, P., Communications and Odor Control, In: Biocycle The Journal of Waste Recycling, Vol. 31, No. 1, pp. 43-45, January, 1990.

Husemann, G.. Abluftreinigung nach dem ADSOX-Verfahren. In: Neue Problemlosungen fur Lufteinigungstechnik und Gasreinigung. Ceagfilter und Entstaubungstechnik GmbH. Dortmund, 1978.

Hydrogen Peroxide Cures Sulfur Odors. American City Cty, 105. 1990.

Hydrogen Peroxide Solves Wastewater Odor Dilemma. Pollution Engineering, 25. 1993.

Ikehata, A., and Y. Kumagai. Removal of Odor from Wastewater from a Potatoe Starch Plant. Kogai to Taisaku, 4. 1968.

Irwin, J.G., T.A. Dorling, and R.L. Moss. The Efficiency of Supported platinum Catalysts for the destructive Oxidation of Odorous Compounds in Air. Atmospheric Environment, 13. 1979.

Ishii., T.. Odor Control of Kraft Pulp Mill With Ozone. Kogai to Taisaku, 7. 1971.

Isopolyester Structures Solve Sewer Tunnel Odors. Water/Eng Management, 141. 1994.

Jaecklin, F.P.. Desodierung der Klaranlage Staz (Celerina, St. Moritz) mit Bodenfiltern. In:Forschungs- und Entwicklungsinstitut fur Industrie- und Siedlungswasserwirtschaft sowie Abfallwirtschaft e.V. Stuttgart: Geruchsbekampfung auf Klaranlagen. Kommissionsverlag R. Oldenbourg. Munchen, 1977.

Jaffe, S.. Odor Fix Starts in New York. ENR, 231. 1993.

Jager, J., and H. Schildknecht. Grundlagen der Biologischen Abluftreinigung. Teil I. Chemie der Organischen Luftverunreinigungen und Geruchsstoffe. Staub, Luft 39, 5. Reinhalt, 1979.

Jannessen D., Scheper A., Dijkhuizen L., Witholt B., Degradation of halagenated aliphatic compounds by Xanthobacter Autotrophicus, Appl&Env. Microbiology, Vol 49, 1985.

Janssen D., Scheper A., Witholt B., Biodegradation of 2-Chloroethanol and 1,2-Dichloroethane by pure bacterial cultures, Innovations in Biotechnology, ed Houwink E., Elsevier Science Publ., Amsterdam, 1984.

Janssen D.B., Kuijk L., Wilholt B., Feasibility of specialized cultures for the removal of Xenobiotic compounds, Abstracts "Biological Treatment of Ind. Waste Gases", DECHEMA Heidelberg, 24-26 March 1987.

Jarosz, J.. Identification et Destruction par l'Ozone dans les Stations d'Epuration. Water Research, 13. 1979.

Jensen, F.-H.. Die Wirkung Aerober Schweineflussigdungbehandlung auf dei Geruchsminderung. KTBL-Schriften-Vertrieb im Landwirtschaftsverlag GmbH, 141. Hiltrup, 1974.

Jensen, R.A.. Thrust Augmentation to Avoid Odor Problems from Point Sources. Fourteenth Annual Purdue Air Quality Conference. 1975.

Jongebreur, A.A.. Animal Waste Management in the Netherlands. In: Animal Wastes. Applied Science Publishers. London, 1977.

Joyce, J., and Others. Emergency Odor Crisis Eliminated in Eight Days. Public Works, 123. 1992.

Joyce, J., and Others. Houston's Odor Crisis Solved in Eight Days. Water and Environmental Technology, 4. 1992.

Joyce, J.. Quick-Fix Measures Reduce Odor Complaints. Public Works, 122. 1991.

Joyce, R.S., J.R. Lutchko, R.J. Sinh, and J.E. Urbanic. New Developments in Ambient Odor Control by Adsorption. Presented at the Conference on Odors, Evaluation, Utilization and Control. Annals of New York Academy of Science, 237. New York, 1974.

Kachru, R.P.. Incineration System for Controling Noxious Odors in a Layer House. Environmental Resources, 9. 1975.

Kaneko, S., and K. Yamanaka. Environmental Measures in Sewage Works. Water and Environmental Technology, 3. 1991.

Karney, P.T.. Odor Control, Sludge is the Solution, the Jacksonville Experience. Presented at the 58th Annual Conference of the Water Pollution Control Federation. Kansas City, Missouri, 1985.

Karnowsky, F.. Geruchsprobleme auf Klaranlagen. Forum Stadte-Hygiene 29, 5. 1978.

Kasior, R.. Der Kurmeierturm zur Beseitigung von Organischen Geruchen in der Abluft von Tierkorperverwertungsanstalten und Artverwandten Betrieben, Fischmehlfabriken und aus Klaranlagen. Forum Stadte-Hygiene, 28. 1977

Kassam, K., and Others. Accumulation and Adsorption Capacity of PAC in a Slurry Recirculating Clarifier. American Water Works Association Journal, 83. 1991.

Keller, F.R.. Method for Drying Sludge and Incinerating Odor Bodies. Government Reports Announcements, 75. Patent-3 805 715. 1975.

Kellum, J.. Sewer Odor Control. Water and Waste Engineering. 1970.

Kersting, U.. Biotechniques for Air Pollution Abatement and Odour Control Policies. Elsevier Science Publishers. Amsterdam, 1992.

Kethley, T.W.. Air Treatment for Odor Control in the Hospital. U.S. Department of Commerce. Springfield, Virginia, 1974.

Klages S., Hatami Miri, Bardtke D., Vergleichender Mikrobiologische Untersuchungen an Biofiltern zur Abgasreinigung, Diplomarbeit, Universitat Stuttgart, Marz, 1987.

Klecka G., Fate and Effect of Methylene Chloride in activated sludge, Appl. & Env. Microbiology, Vol 44, 1982.

Kleinschmidt, R.V.. Factors in Spray Scrubber Design. Chemical and Metallurgical Engineering, 46. 1939.

Klooster, H.J, G.A. Vogt, and D.G. Bernhart. Applied Odor Control Within a Petroleum Refinery. Floor Engineers and Constructors. Los Angeles, California. Air Pollution Control Association 68th Annual Meeting and Exhibition. Boston, 1975.

Klug, J., and M. Roschke. Die Beurteilung der Desodorierung von Rindergulle aus Hygienisch-Mikrobiologischer Sicht. Z. Gesamte Hyg. Grenzgeb., 25. 1979.

Koch, W., H.G. Liebe, and B. Streifler. Experiences with Biofilters for the Reduction of Odorous Air Emissions. Stayb-Reinhaltung der Luft. 1982.

Kohler, G.. Schwefelwasserstoffmessungen in Industriellen Uberwachungsgebieten Bayerns. Staub, Luft, 39. Reinhalt, 1979.

Konings J., Ottengraf S.P.P., Emission of Micro-organisms from biofilters, in Vorbereitung, Technische Universitat Eindhoven (NL).

Koster, E.P. et.al., Population panels in odour control: the development of a direct method for judging annoyance caused by odours, Proceedings of International

Symposium ‘Characterisation and control of odigerous pollutants in process industry’, Louvain-la-Neuve, April 1984, pp. 99-126.

Koster, E.P.. Population Panels in Odour Control: the Development of a Direct Method for Judging Annoyance Caused by Odours. Proceedings of International Symposium ‘Characterization and Control of Oderiferous Pollutants in Process Industry’. Louvain-la-Neuve, 1984.

Krane, D.. Emission Problems in Chicken Farms. Experiences with the Elimination of Disagreeable Odors. Wasser Luft Betrieb, 12. 1968.

Kraus, J. Jr.. Fullkorper-Saurewascher zur Desodorierung von Abluft bei der Cold-Box-Kernherstellung. Giesserei, 65. 1978.

Kreis, R.D.. Control of Animal Production Orders: The State-of-the-Art. Robert S. Kerr Environmental Research Lab. Ada, Oklahoma, 1978.

Kreis, R.D.. Limiting the Environmental Impact of Animal Production Odors. Environment International, 1. 1978.

Krill, H.. Adsorption Organischer Stoffean Aktivkohle. In: Technische Sorptionsverfahren zur Reinhaltung der Luft. Tagung Nurnberg 1975. VDI-Verlag. Dusseldorf, 1976.

Kroehling, J.H.. Catalytic Oxidation. An Energy Saving Approach to Fume and Odor Control. In: Air Pollution Control Association Specialty Conference Proceedings. State-of-the-Art of Odor Control Technology II. Pittsburgh, Pennsylvania, 1977.

Krotosynski, B.K. & A. Dravnieks. Systemization of Analytical and Odor Control Data on Odorous Air. IIT Research Institute, Internal Report, undated.

Kruse, R.J.. Packed Towers in Municipal Odor Control Applications - Principle of Operation. In: Recent Developments and Current Practices in Odor Regulations, Controls and Technology. A&WMA Transactions Series, 18. Pittsburgh, Pennsylvania, 1991.

Kulka, K.. Odor Control by Modification. New York Academy of Sciences, 116. 1964.

Kuschel, H.. Adsorptive Entfernung eines Losemittelgemisches aus der Abluft eines Folienverarbeitenden Betriebes. In: Technische Sorptionsverfahren zur Reinhaltung der Luft. VDI-Verlag. Duuseldorf, 1976.

Kutsuma, J., T. Ohira, K. Koyama, and T. Ishiguro. Deodorization of Desiccator Flue Gas at Fish Meal Plants. Taiki Osen Kenkyu, 4. 1969.

Kyriss, K.. Finding Biological Solutions to Odor and Taste Problems. Water/Eng Management, 138. 1991.

Lalonge, L.E.. Venturi Gas Scrubbers, A Literature Survey of the Design and Uses of the Venturi Scrubber. Faculty of Applied Science, University of Windsor. 1972.

Lang, M.E., and R.A. Jager. Odor Control For Municipal Sludge Composting. BioCycle, 33. 1992.

LaPat-Polasko E., McCarty P., Zehnder A., Secondary substrate utilization of Methylene Chloride by an isolated strain of Psuedomonas sp., Appl.&Env Microbiology, vol 47, 1984.

Larsen, R.I.. Relating Air Pollutant Effects to Concentration and Control. Journal of the Air Pollution Control Association. 1970.

Lauren, O.B., and R.A. Young. Odor Modification and Masking. In: Air Pollution Control association Specialty Conference Proceedings. State-of-the-Art of Odor Control Technology II. Pittsburgh, Pennsylvania, 1977.

Lauren, O.B.. Odor Modification and Applications. Photonic Environment Corporation. Chicago, Illinois, 1973.

Lauren, O.B.. Odor Modification Concepts and Applications. Presented at the 12th Annual Purdue Air Quality Conference. 1973.

Lauren, O.B.. Odor Modification. In: Industrial Odor Technology Assessment. Ann Arbor Science Publications Inc.. Ann Arbor, 1975.

Leson, Gero & Winer, and M. Arthur. Biofiltration: An Innovative Air Pollution Control Technology for VOC Emissions. Journal of the Air Pollution Control Association, 41. 1991.

Leva, M.. Gas Absorption in beds of Rings and Saddles. American Industrial Chemical Engineering Journal, 1. 1955.

Lime Application Solves Odor Problem. Water/Eng Management, 140. 1993.

Lindemann, E.H.. Odor Control-1953. Annls of New York Academy of Sciences, 116. 1964.

Lindvall, T., O. Noren, and L. Thyselius. On the Abatement of Animal Manure Odours. Proceedings of the Third International Clean Air Congress. VDI-Verlag. Dusseldorf, 1973.

Lipke, S., and B. Vitello. Combustion Solves Problem in Newark. Waste Age, 23. 1992.

Long, S.. Low-Pressure Aeration Reduces Odor, COD of Complex Mixture. Chemical Processing. Chicago, 1978.

Lovett, W.D. and F.T. Cunniff. Activated Carbon Methods for Controlling Stationary Source Air Pollutants. Presented at 66th Annual Meeting of the American Institute of Chemical Engineers. Philadelphia, 1973.

Lovett, W.D., and R.L. Poltorak. Activated Carbon and the Control of Odorous Air Pollutants. In: Industrial Odor technology assessment. Ann Arbor Science Publishers Inc.. Ann Arbor, 1975.

Lovett, W.D., and R.L. Poltorak. Activated Carbon Used to Control Odors. Water and Sewage Works Including Industrial wastes, 121. 1974.

Lusk, G.. Chemical Control of Grease and Odors. American City Magazine. 1958.

Lutchko, J. R., Wagner, N. J., and Sinha, R. K., Measurement of Odor Emission and Their Control b Activated Carbon, Paper No. 128, Presented at Pittsburgh Conference on Analytical Chemistry and Applied Spectroscopy, Cleveland, Ohio, March 1, 1977.

Maass, A.E.. Successful Odor Control at Michigan Wastewater Treatment Plant. Water and Sewage Works. 1967.

Mackowiak, J.. Biotechniques for Air Pollution Abatement and Odour Control Policies. Elsevier Science Publishers. Amsterdam, 1992.

Manley, T.C., S.J. Niegowski, and G.F. Connell. Ozone Applied to Control of Exhaust Gas Odors. Air Engineering. 1966.

Mansfield, L.A., and Others. H_2S Problem Solved in Honolulu. Water and Environmental Technology, 5. 1993.

Mansfield, L.A., and Others. Selection and Full-Scale use of a Chelated Iron Absorbent for Odor Control. Water Environ Res, 64. 1992.

Mapes, W.H. and R.F. Vance. Efficiency Evaluation of Odor Control Devices. American Society of Heating, Refrigeration and Air Conditioning Engineers, Report No. 2195. 1971.

Martin, G., K. Gaid, M. Lemasle, and P. Nogrix. Etude d'un Procede Biologique de Desodorisation. Atmospheric Pollution, 81. 1979.

Maton, A., and R. Priem. Odour Characterization and Control. Agriculture and Environment 3, 306. 1976.

Matthes, B.. Die Beseitigung bzw. Verwertung von Tierischen und Pflanzlichen Abfallen unter Besonderer Berucksichtigung der Luft- und Gewasserreinhaltung. Luft Betrieb, 5. Wasser, 1980.

Matthews, D.G.. Hydrogen Peroxide Controls Odor, Corrosion in Collection Systems. Water Sewage Works, 124. 1977.

Matthews, P.J.. Air Pollution in Sewerage and Sewer Treatment. Water Pollution Control, 75. 1976.

Mayers, M.A.. Odor Technology: Where We Are, Where We Are Going. New York Academy of Sciences, 116. 1964.

McCammon, W.H.. Ozonation for Odor Control. Presented at the 79th National Meeting, American Institutional Chemical Engineers. Houston, Texas, 1975.

McCord, C. P. and Witherridge, W. M., Odors: Physiology and Control, McGraw-Hill Book Company, New York, 1949.

McDermott, H.. Handbook of Ventilation for Contaminant Control. Butterworth Publishers. 1985.

McElligott, A.S.. Odor Investigation and Control Strategy of VOC Emissions from a Magnetic Tape Manufacturing Plant. 84th Annual Meeting and Exhibition Abstracts of the Air Pollution Control Association. Vancouver, British Columbia, 1991.

McEnhill, T.J.. Cost Effective Odor Control Technologies in the Process Industries. What is the Best Approach?. In: Recent Developments and Current Practices in Odor regulations, Controls and Technology. A&WMA Transactions Series, 18. Pittsburgh, Pennsylvania, 1991.

Mehta K. K., Odor Abatement at Terpene Chemical Plants, Florida Section APCA, San Destin, Florida, 1988.

Meier zu Kocker, H.. Abgasreinigung durch Thermische Verbrennung. Teil I: Thermische Stabilitat im Warmetauscherrohr. Staub, Luft 38, 3. Reinhalt, 1978.

Meier zu Kocker, H.. Abgasreinigung durch Thermische Verbrennung. Teil II: Thermische Abluftverbrennung mit Indirekter Beheizung. Staub, Luft 38, 5. Reinhalt, 1978.

Meier zu Kocker, H.. Abgasreinigung durch Thermische Verbrennung. Teil III: Thermische Abluftverbrennung mit Flammenbeheizung. Staub, Luft 38, 9. Reinhalt, 1978.

Menig, H.. Luftreinhaltung durch Adsorption, Absorption und Oxidation. Deutscher Fachschriften-Verlag Braun & Co., KG.. Weisbaden, 1977.

Meuly, W.C.. Cataban Process for the Removal of Hydrogen Sulfide from Gaseous and Liquid Streams. Presented at the 12th Annual Purdue Air Quality Conference. 1973.

Meyers, F.D., and J. Waitkus. Fume Incineration with Combustion Air at Elevated Temerature. Journal of the Air Pollution Control Association, 16. 1966.

Miedema, H.M.E., J.M. Ham R.G. de Jong, and J.A. Don. Odour Annoyance in the Living Environment. VDI-colloquium 'Odorants'. Baden-Baden, 1985.

Miller, F.J.. Upline Sewage Treatment Eliminates Odors, Reduces BOD, Cuts Complaints. Water and Wastes Engineering, 3. 1966.

Miller, M.R., and H.J. Wilhoyte. A Study of Catalyst Support Systems for Fume-Abatement of Hydrocarbon Solvents. Journal of the Air Pollution Control Association, 17. 1967.

Miller, R.G.. Hydrogen Peroxide Solves Sludge Odor Problem. Water Sewage Works, 123. 1976.

Miller, T.L.. Controlling Rendering Plant Odors. In: Air Pollution Control and Industrial Energy Production. Ann Arbor Science Publishers Inc.. Ann Arbor, 1975.

Mills, J.L., J. A. Danielson, and L.K. Smith. Control of Odors from Inedible Rendering and Fish Meal Reduction in Los Angeles County. Presented at the 60th Annual Meeting of the Air Pollution Control Association. Cleveland, Ohio, 1967.

Miner, J.R., and R.W. Stark. Evaluation of Alternative Approaches to Control to Odors from Animal Feedlots. Idaho Research Foundation, inc.. Moskow, 1975.

Miner, J.R.. Control of Odors from Anaerobic Lagoons Treating Food Processing Wastewaters. Department of Agricultural Engineering, Oregon State University. Corvallis.

Mist Scrubbers Control Odors in Plant. American City Cty, 105. 1990.

Mizuno, A., and Others. AC Energized Ferroelectric Pellet Bed Gas Cleaner. IEEE Trans Industrial Applications, 28. 1992.

Moncrieff, R.W.. Odour Counteraction. Perfumery and Essential Oil Record, 49. 1958.

Morris, G.A., and J. Jackson. Absorption Towers. Butterworths. 1953.

Moss, R.L. Developments in the Measurement and Control of Process Odours'. National Society for Clean Air 50th Annual Conference, Torquay, 1983.

Motohiro, T., and H. Terachi. Prevention of Offensive Odor from Fish Processing Plants. II. Effect of Enzymes and Nitrohumic Acid Treatments on the Reduction of Odor from Squid Waste. Hokkaido Daigaku Suisan Gakubu Kenkyu Iho, 20. Japan, 1969.

Muehling, A.J.. The treatment and Handling of Swine Wastes. John Wiley and Sons. 1975.

Mueller, J.C.. Peat in Pollution Abatement. British Columbia Research Council, Reprint 351.

Muirhead, T., and Others. Air Handling and Retrofits Optimize Odor Control. BioCycle, 34. 1993.

Muirhead, T., and Others. Odor Control for Biosolids Composting. BioCycle, 34. 1993.

Muirhead, T.. Improvements Control Plant and Composting Odors. Water and Environmental Technology, 4. 1992.

Mullins, W.H.. Aerators Control Lift Station Odor and Corrosion. Water and Sewage Works, 124. 1977.

Multiple U-Tube Installed at City of Keene Wastewater Treatment System. Water/Eng Management, 138. 1991.

Multiple U-Tube Solves City's Wastewater Odor Problem. Pollution Engineering, 23. 1991.

Muranaka, H., H. Hashimoto, K. Araki, T. Ioku, A. Yamamoto, T. Tatsumi, T. Tsuchida, K. Konishi, and H. Ikeda. Efficiency of a Chemical System for Removing an Offensive Odor from a Bonemeal Fertilizer Plant. Kagaku To Kogyo, 44. Osaka, Japan, 1970.

Murthy, B.N.. Odor Control Research. Division of Process Control Engineering, National Air Pollution Control Administration, DHEW. Cincinnati, Ohio, 1969.

Najm, I.N., and Others. Removal of 2,4,6-Trichlorophenol and Natural Organic Matter from Water Supplies Using PAC in Floc-Blanket Reactors. Water Res, 27. 1993.

Nakai, Y.. Classification and Selection of Apparatus for Odorous Gas Elimination. Kankyo Sozo, 4. 1974.

Nakano, T.. An Example of Odor Control with Ozone. Kogai to Taisaku, 4. Japan, 1968.

Narayan, L.V., and W.J. Nunez III. Biological Control: Isolation and Bacterial Oxidation of the Taste-and-Odor Compound Geosmin. Journal of the American Water Works Association, 66. 1974.

Natusch, D.F.S.. Adsorption of Odorous Pollutants by Active Manganese Dioxide. US Department of Commerce. Springfield, Virginia, 1974.

Nebel, C., and R.D. Gottschling. Industrial Odor Control by Oxidation with Ozone. In: Industrial Odor Technology Assessment. Ann Arbor Science Publishers Inc.. Ann Arbor, 1975.

Nebel, C., W.J. Lehr, H.J. O'Neill, and T.C. Manley. Controling Odors by Ozone Oxidation. Plant Engineer. 1974.

Neff, C.R.. Biological Degradation System for Odor Control. In: Recent Developments and Current Practices in Odor Regulations, Controls and Technology. A&WMA Transactions Series, 18.

Neukermans, G., H. Vanstaen, M. Debruyckere, and W. Verstraete. La Desodorisation dans le Voisinage Immediat des Etables par Lavage Biologique de l'Air. Revue Agricultural, 2. 1977.

New System Prevents Sewer Repair Odors in L.A.. Water/Eng, 141. 1994.

Norman, W.S.. Absorption, Distillation and Cooling Towers. Wiley. 1962.

Oberthur, R.. Biotechniques for Air Pollution Abatement and Odour Control Policies. Elsevier. Amsterdam, 1992.

Odor Control and Sludge Disposal. Water and Environmental Technology, 4. 1992.

Odor Control in Honolulu. Public Works, 123. 1992.

Odor Control in Poultry By-Products Rendering, A Case History. Industrial Standards Committee, National Renderers Association Odor Control Manual. 1971.

Odor Control with Activated Carbon, Barnebey-Cheney Company, J. Air Pollution Control Association, 13, 150, 1963.

Odor Problems Solved in Schenectady. American City CTY, 106. 1991.

Odour Control - A Concise Guide' (eds. F.H.H. Valentin and A.A. North), Stevenage: Warren Spring Laboratory, 1980.

Oetterer, D.. Grosstechnische Erfahrungen mit der Katalytischen Nachverbrennung. In: Technik der Abgasreinigung. Tagung Lufthygiene 1976. Grugg-Windisch, 1976.

Ohta, Y., and M. Ikeda. Deodorization of Pig Feces by Actinomycetes. Applied Environmental Micriobiology, 36. 1978.

Okuno, T.. The Reaction of Odorous Substances With Ozone. Kogai to Taisaku, 5. 1969.

Olenik, T.J.. Domestic Sewage and Refuse Odor Control. In: Industrial Odor Technology Assessment. Ann Arbor Science Publications Inc.. Ann Arbor, 1975.

Ostojic, N., and Others. Activated Sludge Treatment for Odor Control. BioCycle, 33. 1992.

Ottengraf S.P.P., Aerobic Fixed Film Processes, Biotechnology, Rehm H.J., Reed G. eds, VCH Verlaggesellschaft Weinheim, 1981.

Ottengraf S.P.P., Diks R.M.M., Bioilogical Purification of waste gases, bald verottentlicht, Chemica Oggi (It), Technische Universitat Eindhoven.

Ottengraf S.P.P., Oever A. van den, Kinetics of organic compound removal from waste gases with a biofilter, Biotech & Bioeng, Vol. XXV.

Ottengraf, S.P.P., and A.G.C. Van Den Oever, 1983, Kinetics of Organic Compound Removal from Waste Gases with a Biological Filter, Biotechnology and Bioengineering, Vol. XXV, pgs. 3089-3102, 1983.

Ottengraf, S.P.P.. Exhaust Gas Purification. Biotechnology Band 8: Microbial Degradation. Weinheim, 1992.

Oudman, P.. Good Odorant Practices Ensure Safer Operations. Pipeline Gas Journal, 220. 1993.

Paduch, M.. Market Survey of Biological Waste Gas Purification Methods. Staub-Reinhaltung der Luft 53. Dusseldorf, 1993.

Paino, B., and C.E. Olsen. Odor and Insect Control at an Open Landfill Operation. Public Works Magazine. 1959.

Palczynski, R., and B. Glowiak. Off-Gas Deodorizing. Gaz. Woda. Tech. Sanit., 42. Poland, 1968.

Patczynski, R., and R. Gtowiak. Methods of Deodorizing Waste Gases. Gaz. Woda Tech. Sanit., 42. Warsaw, 1968.

Pateman, S.G.. Oxnard Sewage Plant Solves Odor Control Problem. Water and Sewage Works. 1969.

Penkala, S.J.. Gas and Odor Control by Dispersion. In: Air Pollution Control Association Specialty Conference Proceedings. State-of-the-Art of Odor Control Technology II. Pittsburgh Pennsylvania,1977.

Penman, A., and W.J. Borlase. Chemicals Reduce System Odours. Water and Pollution Control, 113. 1975.

Performance of the Federal Emission Control Act - Best Available Technology to Abate Odorous Emissions with Biofiltration. RdErl. d. MB, 1983.

Perry, J.H.. Chemical Engineer's Handbook, 4th Edition. McGraw Hill.

Perryman, R. Guidelines for the Implementation of Odour Treatment.

Persson, G.A.. Air Pollution Control in the Swedish Pulp Industry. Proceedings of the 1975 Clean Air Conference: Vol. 2. Ann Arbor Science Publishers. Ann Arbor, 1975.

Pierce, L.M.. Line Plugs New Product into a Slot (Air Fresheners Called Glade Plug Ins). Packaging, 36. 1991.

Pipes, W.O.. Biodegradation of Taste and Odour Compounds. Proceedings of the 3rd International Biodegradation Symposium Sessions. Applied Science Publishers Ltd. London, 1976.

Pittsburgh, Pennsylvania, 1991.

Polta, R., Odor Experience/Research at Metropolitan Waste Control Commission, Paper given at AWMA International Specialty Conference on Recent Developments and Current Practices in Odor Regulations, Controls and Technology, Detroit, October 1989.

Poltorak, R.L.. Foundry Odor Control with Activated Carbon. Modern Casting. 1973.

Pomeroy, R.D.. Biological Treatment of Odorous Air. Journal of the Air Pollution Control Association, 54. 1982.

Pope, D, D.S. Walker, and R.L. Moss. Evaluation of Platinum-Honeycomb Catalysts for the Destructive Oxidation of Low Concentrations of Odorous Compounds in Air. Atmospheric Environment, 12. 1978.

Post, N.. Counteraction of Sewage Odors. Sewage and Industrial Wastes, 28. 1956.

Pountney, P.J.. Hydrogen Peroxide makes an Excellent Sludge Deodorant. Water and Wastes Engineering, 16. 1979.

Powesland, W.H., C.H. Knight, and J.W. Smith. Dry Catalytic Removal of Hydrogen Sulphide from Mineral Wool Cupola Flue Gas. Proceedings of the 4th International

Clean Air Congress. The Japanese Union of Air Pollution Prevention Associations, 5. Tokyo, 1977.

Prahacs, S., S.P. Bhatia, T.L.C. de Souza, and M.K. Azarniouch. Novel Wet Scrubbing Techniques for the Removal of H_2S and Organic Sulphur Compounds. Proceedings of the 4th International Clean Air Congress. The Japanese Union of Air Pollution Prevention Associations, 22. 1977.

Price, E.C., and P.N. Cheremisinoff. Sewage Treatment Plants Combat Odor Pollution Problems. Water and Sewage Works, 125. 1978.

Price, L., and H. Curran. Experiments with Odor Control in Sewers. Public Works Magazine. 1958.

Prober, R., R.G. Bond, and C.O. Staub. CRC Handbook of Environmental control. Vol I: Air Pollution. CRC Press. Cleveland, Ohio, 1972.

Prokop, W.H., and H.L. Bohn, 1985, Soil Bed System for Control of Rendering Plant Odors, J. Air Pollution Control Association, Vol. 35, No. 12, pgs. 1332-1338, December 1985.

Prokop, W.H.. Developing Odor Control Regulations: Guidelines and Considerations. APCA TT-4 Odor Committee. 1974.

Puri, R.. Automatic Control of Reagent Feed Boosts Wet-Scrubber Efficiency. Chemical Engineering, 85. 1978.

Purkape, J.D., C. McGowan, and R.M. Bethea. Gas Phase Oxidation of Onion Dehydration Odors with Ozone. Air Pollution Control Association 71st Annual Meeting and Exhibition: Abstracts and Papers. Pittsburgh, Pennsylvania, 1978.

Putz, M., H.-D. Bartholot, and H.-J. Muche. Immissionsschutz-Kontrolle durch Beschwerdekataster. Umwelt. 1978.

Qasim, S.R., and Others. Study Aimed at Odor Reduction in Water from Reservoir. Water/Eng Management, 139. 1992.

Rafson, H.J.. Mist Scrubbing Technology. In: Recent Developments and Current Practices in Odor Regulations, Controls and Technology. A&WMA Transactions Series, 18. Pittsburgh, Pennsylvania, 1991.

Raleigh, C.W.. Odor Control with Hydrogen Peroxide. In: Industrial Odor Technology Assessment. Ann Arbor Science Publications Inc.. Ann Arbor, 1975.

Rands, M.B., D.E. Cooper, C. Woo, G.C. Fletcher, and K.A. Rolfe. Composting Filters for H_2S Removal from Anaerobic Digestion and Rendering Exhaust. Journal of the Water Pollution Control Federation, 53. 1981.

Rauh, J.S.. Disinfection and Oxidation of Wastes by Chlorine Dioxide. Journal of Environmental Sciences, 22. 1979.

Reither, K.. Report on Tests With a Pilot Plant for the Removal of Odours With Aqueous Ozone Solutions. Presented at the 2nd International Symposium on Ozone Technology. Montreal, Canada, 1975.

Reither, K.. Versuchsergebnisse mit einer Pilot-Anlage zur Geruchsbeseitigung mit Wassrigen O_3-Losungen. Chem.-Ing.-Techn., 48. 1976.

Resplandy, A.. Pollution Atmospherique Specifique des usines de Viscose. Pollution Atmospheric, 17. 1975.

Rice, G.R., and M.E. Browning. Ozone: Analytical Aspects and Odor Control. The International Ozone Institute, Inc.. Syracuse, New York, 1976.

Rice, R.G., P. Pichet, and M.-A. Vincent. Second International Symposium on Ozone Technology: Proceeding. International Ozone Institute. Syracuse, New York, 1976.

Ridgway, S.L., and J.C. Lair. The Design and Performance of a Bootstrap Direct Flame Afterburner. Journal of the Air Pollution Control Association, 12. 1962.

Riemann, U.. Geruchsemissionen aus Tierhaltungen. Tierzuchter 27. 1975.

Ries, K.M.. Engineering Requirements and Implementation for Air Pollution Control. Presented at the 12th Annual Purdue Air Quality Conference. 1973.

Riggin, C.W.. Eliminate Fermentation Odor. Food Engineering, 44. 1972.

Ritter, W.F., N.E. Collins Jr., and R.P. Eastburn. Chemical Treatment of Liquid Dairy Manure to Reduce Malodors. In: Managing Livestock Wastes. Proceedings 3rd International Symposium in Livestock Wastes. American Society of Agricultural Engineers, 6. St. Joseph, Michigan, 1975.

Rogalla, F., and Others. Washing Wastewater the Wise Way. Water and Environmental Technology, 4. 1992.

Roos, C., J.A. Don, and J.A. Schaefer. Characterization of Odour Polluted Air. Proceedings of International Symposium ‘Characterization and Control of Odoriferous Pollutants in Process Industries’. Louvain-la-Neuve, Belgium, 1984.

Rosenbaum, D.B.. Plant Upgrade Tackles Odors. ENR, 226. 1991.

Ross, D.S., R.A. Aldrich, D.E. Younkin, G.W. Sherritt, and J.A. McCurdy. Exhaust Systems for Underfloor Liquid Manure Pits. American Society of Agricultural Engineers, 8. St. Joseph, Michigan, 1975.

Rowe, N.R.. Odor Control With Activated Charcoal. Journal of the Air Pollution Control Association, 13.Pittsburgh, Pennsylvania, 1963.

Ruffer, H., B. Fischer, and W. Nurnberger. Erfahrungen bei der Bekampfung von Geruchen aus Abwasser- und Klarschlamm-Anlagen. GWF Wasser-Abwasser, 120. 1979.

Rutkowski, J.D., and G. Sega-Hlibowicka. Mercaptan Vapor Removal from Polluted Air by Anion Exchangers. In: Air Pollution Control Association. State-of-the-Art of Odor Control Technology II. APCA Specialty Conference Proceedings, 3. Pittsburgh, Pennsylvania, 1977.

Saeki, S., K. Umeda, S. Unoki, H. Shikayama, and H. Nakagawa. Experiments on the Removal of Mono-Terpene Group Elements. Yosiu to Haisu, 16. Japan, 1974.

Sandomirsky, A.G., D.M. Benforado, L.D. Grames, and C.E. Pauletta. Fume Control in Rubber Processing by Direct-Flame Incineration. Journal of the Air Pollution Control Association, 16. 1966.

Sanjana, B.H.. Westvaco Installs New Blow-Heat Recovery System at Charleston Mill. Pulp and Paper, 51. 1977.

Santry, I.W.. Hydrogen Sulfide Odor Control Measures. Journal of the Water Pollution Control Federation. 1966.

Schafer, P.L.. Odor Control Systems from an Engineering Firm's Viewpoint. In:Recent Developments and Current Practices in Odor Regulations, Controls and Technology. A&WMA Transactions Series, 18. Pittsburgh, Pennsylvania, 1991.

Schaum, J.. Chrysler Initiates Odor Control at Huber Avenue Foundry. Modern Casting, No. 8. 1973.

Schifftner, K.. Particulate and Odor Control in the Organic Fertilizer Industry: A Case History. In: Air Pollution Control and design Handbook, Pt. 2. Pollution Engineering and Technology 2. Basel: Marcel Dekker. New York, 1977.

Schirz, S.. Abluftwascher fur Geflugelstalle. Scheineproduktion 27. Geflugelwirtsch, 1975.

Schirz, S.. Geruchsbelastigung durch Intensivtierhaltung. In: Erfassen und Begrenzen von Emmissionen aus diffusen Quellen. Deutscher Ingenieurtag NurnBerg 1979. VDI-Verlag. Dusseldorf, 1979.

Schneider, W.. Moglichkeiten der Luftreinhaltung, Insbesondere der Oxidation von Geruchsstoffen durch eine Wasche mit Ozonhaltigen Waschlosungen. In: Abgas, Abwasser, Abfall und Recycling und Aktuelle Probleme der Luftreinhaltung und ihre Losungswege. Verlag Chemie GmbH, 5. Weinheim, 1976.

Scholtz R., Schmuckle A., Cook A., Leisinger T., Degradation of eighteen 1-Monohaloalkanes by Arthobacter sp. strain HA1, J of Gen. Microbiology, 1987.

Schwartz, H.. Quarternary Ammonium Salts Control Odors. Industrial Wastes, 22. 1976.

Schwirz, S.. On Protection Against Emissions: Removal of Offending Smells. Landtechnik, 25. Germany, 1970.

Scrubbers Stop Odor, Adapted For Mobile Use. Pollution Engineering, 25. 1993.

Searles, R.A.. Clean Air Through Catalysis. Chemistry and Industry, 22. 1974.

Sellzer, R.T.. Monsato Develops Malodor Counteractant. Chemical Engineering News, 53. 1975.

Semrau, K. and C.L. Witham. Wet Scrubber Liquid Utilization. US Department of Commerce. Springfield, 1974.

Sereno, D.J., and Others. Dewatered Sludge Storage Emissions Control Using Multistage Wet Scrubbing. Water Environ Res, 65. 1993.

Sharp, S.-U.. Manure Gases and Air Currents in Livestock Housing. 3rd International Symposium Managing Livestock Wastes Urbana/Illinois, USA. American Society Agricultural Engineering, Proceedings 275. 1975.

Sherwood, P.W.. A New Job for the Perfume Industry: Industrial Odor Removal. Parfum., Cosmet., Savons 5. 1962.

Shigeta, Y.. Odor Emission Control Measures and Examples. PPM, 3. Japan, 1972.

Shigeta, Y.. Odor Treatment and Its Cost at Rendering Factories. PPM, 2. Japan, 1971.

Shigeta, Y.. Research on Odor Abatement and Control in USA. Akusho no Kenkyu (Odor Research Journal of Japan), 1. 1971.

Shigeta, Y.. The Problem of Odor Nuisances. 6. The Bad-Odor Nuisance and Its Control. Taiki Osen Kenkyu, 2. Japan, 1967.

Shirgaonkar, I.Z., and Others. Adsorption Equilibrium Data for Submitted Phenols on Activated Carbon. Journal of Chemical Engineering Data, 37. 1992.

Simons, D.. Der Oxidationsgraben zur Aufbereitung von Flussigmist-Grundlagen und Anwendung. Landtechnik der Rheinischen Friedrich-Wilhelms-University Bonn., 164. 1976.

Simpson, C.A.. 3 Ways to Get a Grip on Sludge. Pollution Engineering, 25. 1993.

Sims, A.F.E.. Hydrogen Peroxide in Sewage Treatment. Environmental Pollution Management, 9. 1979.

Sittig, M.. Odorous Compounds. In: How to Remove Pollutants and Toxic Materials from Air and Water. A Practical Guide. Pollution Technology Review, 32. Park Ridge, New Jersey, 1977.

Smith, D.. Our Plant **MUST** Be A Good Neighbor. The American City Magazine. 1971.

Smith, P.B., and D. Yates. Experiences of High-Rate Biological Filtration at Derby Sewage-Treatment Works. Water Pollution Control, 79. 1980.

Snow, R.H., J.E. Huff, and W. Boehme. Odor Control by Scrubbing in the Rendering Industry. Fats and Proteins Research Foundation, Inc.. Des Plaines, Illinois, 1976.

Snow, R.H., J.E. Huff, and W. Boehme. Optimizing Wet Scrubber Systems for Odor Control in the Rendering Industry. Fourteenth Annual Purdue Air Quality Conference. 1975.

Snow, R.H., J.E. Huff, W. Boehme. Control of Rendering Plant Odors by Wet Scrubbers: Results of Plant Tests. Air Pollution Control Association 68th Annual Meeting and Exhibition, 6. Boston, 1975.

Sohr, R.T.. Applications for Chemical Absorbtion, Odor Removal in the Corn Processing Industry. Pollution Control Systems. Chicago.

Spence, A.. The end of the “Battersea Smell”. A Leadig Maize Wet Miller Solves its Odour Problems. Environmental Pollution Management, 8. 1978.

Springer, K.J. and R.C. Stahman. Control of Diesel Exhaust Odors. Presented at Conference on Odors: Evaluation, Utilization and Control, New York Academy of Sciences. 1973. Annals of the New York Academy of Sciences, 237. 1974.

Springer, K.J., and R,C. Stahman. Diesel Emission Control Through Retrofits. Society of Automotive Engineers. Detroit, Michigan, 1975.

Stabilized Chlorine Dioxide for Odor Control. Public Works, 166. 1968.

Staschick, G.. Ruckgewinnung von Losemitteln aus der Abluft von Lackieranlagen. In: Neue Problemlosungen fur Lufreinigungstechnik und Gasreinigung. Ceagfilter und Entstaubungstechnik GmbH. Dortmund, 1978.

Steinmuller, W., g. Claus, and H.J. Kutzner. Grundlagen der Biologischen Abluftreinigung. Teil II. Mikrobiologischer Abbau von Luftverunreinigenden Stoffen. Staub, Luft 39, 5. Reinhalt, 1979.

Stern, A.C.. Air Pollution, 3rd Edition. Vol. IV: Engineering Control of Air Pollution. Academic Press Inc.. New York, 1976.

Storp, K.. Technische Massnahmen zur Verminderung Organischer Dampfe unter Berucksichtigung der Tatigkeit der VDI-Kommission “Reinhaltung der Luft”. In: Organische Verunreinigungen in der Umwelt. Erich Schmidt Verlag. Berlin, 1978.

Strauss, H.-J.. Adsorptionsverfahren zur Geruchsabscheidung. In: Tachnische Sorptionsverfahren zur Reinhaltung der Luft. VDI-Berichte 253. Tagung Nurnberg, 1975.

Strauss, W.. The Development of a Condenser for Odor Control from Dry Rendering Plants. Journal of the Air pollution Control Association, 14. 1964.

Strehl, Y.. Le Gaz Naturel et la Lutte Contre la Pollution Atmospherique d’Origine Industrielle. Nuisances Environmental, 63. 1977.

Stucki G., Galli R., Ebershold H., Leisinger T., Bacterial Degradation of DCM, Arch.Microbiology, 1981.

Stucki, G., A. Goy, R. Schmuckli, and P. Cedraschi. Biological Off-Gas Purification in the Chemical Industry. Staub-Reinhaltung der Luft 55. 1995.

Suggested Basic Operator Training Course Outline - Odors and Their Control. Journal of the Water Pollution Federation. 1964.

Sullivan, J.L., F.L. Kafka, and L.M. Ferrari. An Evaluation of Catalytic and Direct Fired Afterburners for Coffee and Chicory Roasting Odors. Journal of the Air Pollution Control Association, 15. 1965.

Sullivan, R.J., Air Pollution Aspects of Odorous Compounds, Litton Systems, Inc. Environmental Systems Division 7300 Pearl Street, Bethesda, Maryland 20014, Prepared for the National Air Pollution Control Administration Consumer Protection & Environmental Health Service Department of Health, Education, and Welfare (Contract No. PH-22-68-25), September 1969.

Summer, W., Odor Pollution of Air-Causes and Control, Part II, Chapter 12, Leonard Hill, London 1971.

Summer, W.. Deodorization of Air and Water. Stau-Reinhaltung Luft, 30. Germany, 1970.

Summer, W.. Methods of Air Deodorization. Elsevier. 1963.

Summer, W.. Odor Suppression with Activated Oxygen. Luftverunreinigung. Germany, 1969.

Summer, W.. Odour Destruction (technical and Legal Aspects and How They Affect the Affect the Ventilating Engineer). Journal of Institutional Heating and Ventilating Engineers, 34. London, 1966.

Suzuki, M., and A. Osawa. Development of an In-Digester Oxidation System for Kraft Odor Control. Technical Association of the Pulp and Paper Industry. 1977.

Swift, L.K.. An Engineering Approach to Pulp Mill Odorous Emission Containment. Technical Association of the Pulp and Paper Industry. 1976.

Sylvester, R.W.. Untitled: The Choice of Technology Should Include Performance, Environmental, and Economic Considerations. 84th Annual Meeting and Exhibition Abstracts of the Air Pollution Control Association. Vancouver, British Columbia, 1991.

Tabasaran, O., L. Affoyon, and G. Rettengerger. Einsatz von Biofiltern zur Deponiegasdesodorierung. Mull Abfall, 5. 1979.

Tanada, S., and K. Boki. Adsorption of Various Kinds of Offensive Odor Substances on Activated Carbon and Zeolite. Bulletin of Environmental Contamination Toxicology, 23. 1979.

Tanaka, H., M. Tajimo, and Y. Takahashi. A Practical Example of Odor Removal at a Chemical Plant Processing Fish and Shells - Oxidation of Odorous Substances by an Ozone Process. Kogai to Taisaku, 2. Japan, 1966.

Taste and Odor Control in Water Purification, 2nd Edition. West Virginia Pulp and Paper Company. Industrial Chemicals Sales Division. New York, 1959.

Taylor, E.F. & F.T. Bodurtha. Control of Dimethylamine Odors. Ind. Wastes., 5, no. 4. Code C2, 1960.

Tchobanoglous, G.. Wastewater Engineering: Treatment, Disposal, and Reuse. 2nd Edition. McGraw-Hill Bock Company. New York, 1979.

Terabe, M.. Bad Odors and Countermeasures for the Public Nuisance. Sangyo Kogai, 5. Japan, 1969.

Thaer, R.. Probleme der Aeroben Behandlung von Flussigmist in Flussiger Phase. Grundl. Landtechnik, 28. 1978.

Thistlewayte, D.K.B., B. Hardwick, and E.E. Goleb. Odour Nuisances from Waste Disposal Works and Techniques for Deodorization. Cim. Ind. Genie Chim., 106. Paris, 1973.

Thompson, J., Effectivemess of Odor Control Systems (On-Site). Presented at the USEPA Workshop on Controlling Sewage Sludge Composting Odors in Arlington, VA. Sponsored by OWEC, Washington, DC, 1990.

Tohata, H. Odor Control Technology. Kagaku Kogaku, 36. Japan, 1972.

Tollefsrud, V.. Hypochlorate Kills Lift Station Odor. Water and Sewage Works, 126. 1979.

Trieff, N.M., and V.M. Sadagopa Ramanujam. Removal of Odorous Aromatic Amine Environmental Pollutants By Chloramine-T. Bulletin of Environmental Contamination Toxicology, 18. 1977.

Trieff, N.M., and V.M.S. Ramanujam. Oxidation of Aromatic Amine Air Pollutants using Chloramine-T and Hypochlorous Acid. Air Pollution Control Association 68th Annual Meeting and Exhibition: Abstracts. 1975.

Trieff, N.M., N.M. Made Gowda, V.M. Sadagopa Ramanujam. Chloramine-T as a Potential Scrubbing Agent: Removal of Odorous Sulfur-Containing Environmental Pollutants. Bulletin of Environmental Contamination Toxicology, 24. 1980.

Trimm, D.L.. Design and Development of Industrial Catalysts. Chemistry and Industry. 1973.

Turk, A. "Adsorption." Chapter 8 in Air Pollution, 3rd Ed., Vol. IV, A. Stern, Ed., Academic Press, Orlando, FL, 1977.

Turk, A. et al.. Enhanced Desorption of Atmospheric Samples from Activated Carbon. Journal of the Air Pollution Control Association, 16. 1966.

Turk, A., E. Sakalis, J. Lessuck, H. Karamitsos & O. Rago. Deodorization of Sulfidic Gases in Air by the Ammonia/Activated Carbon System. For Presentation at the 80th Annual Meeting of APCP, New York, NY, 1987.

Turk, A., Harry, R. C., and R. W. Okey, Cost Effectiveness Relationships in Odor Control, Annals New York Academy of Sci., 237, 328, 1974.

Turk, A., R.C. Haring and R.W. Okey. Odor Control Technology. Environmental Science and Technology, 6. 1972.

Turk, A.. Chemical Oxidation Rate Differences Determine Success of Odor Control Systems. Pollution Engineering, 7. 1975.

Turk, A.. Deodorization of Sulfidic Gases in Air by the Ammonia/Activated Carbon System. 80th Annual Meeting and Exhibition Abstracts of the Air Pollution Control Association. New York, New York, 1987.

Turk, A.. Industrial Odor Control and Its Problems. Chemical Engineering, 76. 1969.

Turk, A.. Industrial Odor Control. Chemical Engineering, 77. 1970.

Tutt, W.E.. Successful Application of Odor Control Technology at a Polyester Resin Manufacturing Facility. 84th Annual Meeting and Exhibition Abstracts of the Air Pollution Control Association. Vancouver, British Columbia, 1991.

Tutt, W.E.. Unique Odor Problems and Proposed Solutions in Jacksonville, Florida. Bio-Environmental Services Division. Jacksonville, Florida. Presented at the 80th Annual Meeting of Air Pollution Control Association. New York, New York, 1987.

Ueda, H., and M. Hamayoshi. Sepiolite as a Deodorant Material: an ESR Study of its Properties. Journal of Materials Science, 27. 1992.

Ulich, W.L., and J.P. Ford. Malodor Reduction in Beef Cattle Feedlots. In: Managing Livestock Wastes. Proceedings 3rd International Symposium on Livestock Wastes. American Society of Agricultural Engineers, 15. St. Joseph, Michigan, 1975.

Unangst, P.C., and C.A. Nebel. Ozone Treatment of Sewage Plant Odors. Proceedings of the First International Symposium on Ozone for Water anf Wastewater Treatment. Syracuse, New York, 1975.

Underwood, G. P., Classification, Evaluation and Control of Industrial Odors, A Major Paper, M.A.Sc. Thesis, University of Windsor, Windsor, 1974.

University of Southern California Tests Biofiltration System. Journal of the Air and Waste Management Association, 43. 1993.

USEPA. 1991. Report on Odor Generation and Alternate Control Measures for the City of Springfield, MA Regional Wastewater Treatment Plant, In Draft, Office of Water Enforcement and Compliance (OWEC), Washington, DC.

Van Durme, G.P., and E.A. Kobylinski. Wastewater Treatment Facilities Prepare to Clear the Air. Water/Eng Management, 139. 1992.

Van Durme, G.P., and Others. Bench-Scale Removal of Odor and Volatile Organic Compounds at a Composting Facility. Water Environ Res, 64. 1992.

van Harreveld, A.Ph.. Introduction and Related Practical Aspects of Odour Regulations in the Netherlands.

Van Lith, C., 1989, Design Criteria for Biofilters, Paper Presented at the 82th Annual Meeting of the Air Pollution Control Association in Anaheim, CA, June 1989.

Vapor-Phase Odor Control System Fitted to New Lift Station. Water/Eng Management, 140. 1993.

Vapor-Phase Technology Curbs Wastewater Treatment Plant Odors. Pollution Engineering, 24. 1992.

VDI (1984), VDI-3477, Biologische Abluftreinigung - Biofilter (Biological Waste Air Purification - Biofilters), VDI-Handbuch Reingaltung der Luft, Band 6, Dec. 1984, West Germany.

VDI 3471 Emission Control - Livestock Farming - Hens (in German, June 1986), Berlin, Beuth Verlag GmbH.

VDI 3471 Emission Control - Livestock Farming - Pigs (in German, June 1986), Berlin, Beuth Verlag GmbH.

VDI, 1984, Biologische Abluftreininung - Biofilter (Biological Waste Air Purification - Biofilters), VDI Handbuck Reinhaltung der Luft, VDI No. 3477, Band 6, Dec 1984, West Germany.

VDI-Kommission Reinhalting der luft, Geruche, Stand der Erkenntnisse zur Ermittlung von Belastung und Belastigung, Workshop 28. November 1989, Dusseldorf.

Vermuelen, T., M. Douglas Levan, K.K. Hiester and G.Klein,Adsorption and Ion Exchange, chapter in Perry's Chemical Engineer's Handbook, 6th ed. McGraw-Hill Book Co., New York. 1984, pp 16-22.

Verstraete, R.. Ozone Control of Odors in a Sewage Plant. Engineering Digest. 1975.

Vettenranta, I.. Enso-Biox Method: A Biological Method for Purifying Kraft Pulp Mill Condensates. Canadian Pulp and Paper Association, Technical Section. 1976.

Vidic, R.D., and M.T. Suidan. Operating Capacity of GAC Adsorbers-Dissolved Oxygen and Extended Service Life. Water Environ Res, 64. 1992.

Vincent, G.P., J.O. MacMahon & J.F. Synan. The Use of Chorine Dioxide in Water Treatment. Am. J. Public Health, 36. Code C1, 1946.

Vollheim, G.. Catalytic Afterburning of Industrial Waste Gases - Its Basis and Technical Application. Dechema Monograph, 52. Germany, 1964.

Von Bergen, J.. Latest Methods You Can Use for Industrial Odor Control. Chemical Engineering, 64. 1957.

von YuBishie, H.. Deodorixation Method for Human and Animal Excreta. Japan Patent 1972-31025. Japan, 1972.

Voorhees, J.. Economical Waste-Water Disposal and Odor Control. Food Processing. 1959.

Waarvick, C., and Others. Automated Odor Control Systems. InTech, 40. 1993.

Wackerman T., Kandler G., O'Brien J., Kummler R., Song D., and Warner P., Odor Prediction and Control Study-Ann Arbor Sanitary Landfill, Applied Science & Technology Inc., Volume 1, March 1989.

Waid, D.E.. The Control of Odors dy Direct Fired Gas Thermal Incineration. Presented at the 64th Annual meeting of the Air Pollution Control Association. Atlantic City, New Jersey, 1971.

Waid, D.E.. Thermal Oxidation or Incineration. In: Air Pollution Control Association Specialty Conference Proceedings. State-of-the-Art of Odor Control Technology II. Pittsburgh, Pennsylvania, 1977.

Walker, John, Fundamentals of Odor Control, In: Biocycle Journal of Waste Recycling, Vol. 32, No. 9, pp. 50-56, September 1991.

Wallach, A.. Some Data and Observations of Combustion of Gaseous Effluents from Baked Lithograph Coatings. Journal of the Air Pollution Control Association, 12. 1962.

Walsh, J.L., and Others. Agricultural Waste. Water Environ Res, 64. 1992.

Walther, J.E. and H.R. Amberg. A Positive Air Quality Control Program at a New Kraft Mill. Journal of the Air Pollution Control Association, 20. 1970.

Warner, P.O., and A. Greenberg. Preventing Odor Problems with New Sources. 74th Annual Meeting of the Air Pollution Control Association, Vol. 2. Detroit, Michigan, 1981.

Warren, G.A.. Designing for Odor Control. " The Composting Plant at the Westborough, Massachusetts Wastewater Facility Will Include a Carefully-Developed Odor Filtration System". BioCycle. 1983.

Wasfi, A.K., G.P. Mathur, C.C. St. Pierre, and A.W. Gnyp. Evaluation of Catalysts for Vapor Phase Oxidation of Odorous Organic Compounds. Atmospheric Environment, 12. 1978.

Water Pollution Control; Disinfection, Odor prevention and Control. Public Works, 123. 1992.

Water Pollution Control; Disinfection, Odor Prevention and Control. Public Works, 122. 1991.

Water Supply and Treatment; Disinfection, Taste and Odor Control. Public Works, 123. 1992.

Water Supply and Treatment; Disinfection, Taste and Odor Control. Public Works, 122. 1991.

Wechter, W.H.. Sewage Odors at Military Posts Corrected by Chemical Treatment. Wastes Engineering. 1958.

Weinaug, R.J.. Early Experiences with a Low-Odor Recovery System. Journal of the Air Pollution Control Association, 56. 1973.

Weisburd, M.I.. Field Operations and Enforcement Manual for Air Pollution Control. Vol. III: Inspection Procedures for Specific Industries. US EPA. Research Triangle Park, North Carolina, 1972.

Wells, B.D.. Case Studies in Activated Carbon Adsorption. In: Air Pollution Control Association Specialty Conference Proceedings, State-of-the-Art of Odor control Technology II. Pittsburgh, Pennsylvania, 1977.

Wells, D.M., F.J. Humenik, E.J. Middlebrooks, and D.S. Airan. Animal Waste Management: State-of-the-Art. American Society of Civil Engineers. Environmental Engineering Division, Journal 04(EE6). 1978.

Wente, H.. Purification and Deodorization of Industrial Waste Gases. Knecht Filterwerke GmbH. Stuttgart, Germany, 1971.

Werner, K.D.. Catalytic Oxidation of Industrial Waste Gases. Chemical Engineering, 1968.

Wheeler, M.L., and R.J. Fleming. City Meets Environmental Goals Through Composting. Public Works, 122. 1991.

White, R.K, and D.L. Forster. Evaluation and Economic Analysis of Livestock Waste Management Systems. Us EPA, Office of Research and Development, Publication EPA-600/2-78-102. 1978.

Wieland, M.. Diffuse Quellen in der Fleischwirtschaft. In: Erfassen und Begrenzen von Emissionen aus diffusen Quellen. Deutscher Ingenieurtag Nurnberg 1979. VDI-Verlag. Dusseldorf, 1979.

Wilber, Clyde, Overview of Essentials for Odor Measurement and Control. Presented at the USEPA Workshop on Controlling Sewage Sludge Composting Odors in Arlington, VA. Sponsored By OWEC, Washington, DC, 1990.

Wilke, Hougen, Trans, Am. Inst. Chem. Eng., 41: 445 (1945).

Williams, T.O., and F.C. Miller. Biofilters and Facility Operations. BioCycle, 33. 1992.

Williams, T.O., and F.C. Miller. Odor Control Using Biofilters. BioCycle, 33. 1992.

Wilson, B.H., G.B. Smith, and J.F. Rees, Biotransformations of Selected Alkylbenzenes and Halogenated Aliphatic Hydrocarbons in Methanogenic Aquifer Material: A Microcosm Study, Environmental Science and Technology, Vol. 20, No. 10, Oct. 1986, pp. 997-1002.

Wilson, G.E., and T.W. Schroepfer. Sewage Sludge Management Program. Volume 4C: Odor Studies, 1978. Development of Design Criteria for Wind Machines and Barriers. Sacramento Area Consultants, California, 1979.

Wilson, G.E., and T.W. Schroepfer. Sewage Sludge Management Program. Volume 3B: Odor Studies, 1975-1977. Development of Odor Criteria for Large Emission Areas. Sacramento Area Consultants, California, 1979.

Wilson, G.E., J.Y.C. Huang, and T.W. Schroepfer. Atmospheric Sublayer Transport and Odor Control. American Society of Civil Engineers. Environmental Engineering Division. Journal, 106(EE2). 1980.

Winkel, J.. Abluftreininung in Klaranlagen. Chemical Technology, 9. 1980.

Winneke, G. & M. Paduch. Measurement and Evaluation of Odors in Air Quality Control. Proceedings of 8th World Clean Air Congress, Holland, 1989.

Winneke, G. and J. Kasta, Comparison of odour-annoyance data from different industrial sources: problems and indications. In: T.S. Koelega (ed.), Environmental annoyance: characterization, measurement and control, Elsevier Science Publishers, Amsterdam, pp. 129-139, 1987.

Winneke, G. und J. Kastka. Comparison of odour annoyance data from different industrial sources: Problems and implications In: Koelega, H.S. (ed.). Environmental annoyance: Characterization, Measurement, and Control.- Amsterdam, New York, Oxford:Elsevier, 1987, 129140.

Witheridge, W.N.. Air Sanitation and Industrial Ventilation. Edwards Brothers, Inc.. Ann Arbor, Michigan, 1947.

Wittig, P.. Desodorierung in TKV. In: Tierkorperbeseitigung und Vertwertung. Fischer Verlag. Jena, 1980.

Wolfermann, H.-F., and J. Hornig. Oxidationsgraben im Scheinestall-unter Teilspaltenboden. In: Arbeitsgemeinschaft Landtechnik und Bauwesen Hessen e.V. ALB-Hessen, 10. Kassel, 1975.

Wolters, N.. Zur Entstehung der Geruchsstoffe der Mull-Klarschlamm-Kompostierungsanlage Russelsheim am Schindberg. Forum Stadte-Hygiene, 30. 1979.

Wright, R.H., and F.E. Murray. Curtailment of Malodor from Flame Fishmeal Driers. Canadian Fisherman. 1958.

Wright, R.H.. Odour Counteraction. Chemistry in Canada, 10. 1958.

Yang, M.Y., and P.N. Cheremisinoff. Wet Scrubbing for Odor Control. In: Industrial Odor Technology Assessment. Ann Arbor Science Publishers Inc.. Ann Arbor, 1975.

Yano, T., and T. Suetaka. Studies on the Elimination of Bad Odors. 1. Introduction. Osaka-fu Taiki Osen Boshi Gijutsu Shiryo, No. 9. Japan, 1973.

Yocom, J.E., and R.A. Duffee. Controling Industrial Odors. Chemical Engineering, 77. 1970.

Yoshitsuka, H., Y. Nagao, and G. Kikuchi. Offensive Odors and Preventive Methods. Porima no Tomo, 9. Japan, 1972.

Young P.J. and Parker A., Origin and Control of Landfill Odors, Chemistry and Industry, May 7 1988.

Zeisig, H.D.. Erdfilteranlagen. Bau- und Btriebsanleitung. Bayerisches Staatsministerium fur Landesentwicklung und Umweltfragen, 23.

Zeisig, H.D.. Technische Moglichkeiten zur Geruchsarmen Beseitigung von Exkrementan aus Intensivtierhaltungen. In: 5. Symposium uber Branchenspezifische Emissionen, Intensivtierhaltungen. Vortrage, Munchen,4. 1977.

Zietz, U.. Die Beseitigung von Geruchsaktivem Schwefelwasserstoff aus dem Abwasser von Klaranlagen. GWF Wasser-Abwasser, 120. 1979.

Zmuda, J.. Controlling VOCs and Odor. Pollution Engineering, 26. 1994.

7.0 REGULATIONS

Presently, no legislation exists for the regulation of odours. With increasing public perception and education, governments will be forced to develop some type of odour regulating legislation. For this inevitable occurrence, many works have been produced to assist in the framework for adequate legislation. These works include topics which deal with process restrictions for known odour producing sources, control equipment requirements for specific sources and nuisance type restrictions based on ambient air detection of odours.

The goal of any odour regulation should be to eliminate community annoyance caused by odourous emissions. The regulation should be applicable to all new and current facilities that produce odourous emissions which create a community annoyance.

7.1 REFERENCES

A Digest of State Air Pollution Laws, 1967 ed., U.S. Public Health Serv. Publ. 711, 1967.

Air Pollution Control Ordinance No. 9160, City of Lincoln Nebraska, Section 10, Emissions of Odorous Matter. Lincoln-Lancaster County Health Department, Air Pollution Control Agency. 1967.

Alibaev, T.S. Hygienic Standards for Cyclohexane and Its Mixture with Benzene in Air. Hyg. Sanit. USSR, 35. [English translation of Russian article]. Code B2, 1970.

American Conference of Governmental Industrial Hygienists. TLVs - Threshold Limit Values and Biological Exposure Indicies for 1986-1987. Cincinnati, Ohio: American Conference of Industrial Hygienists, 1986.

American Industrial Hygiene Association. Odor Thresholds for Chemicals with Established Occupational Health Standards, 1989.

Amoore, J.E. & E. Hautala. Odor as an Aid to Chemical Safety: Odor Thresholds Compared with Threshold Limit Values and Volitilities for 214 Industrial Chemicals in Air and Water Dilution. Journal of Applied Toxicology, 3, 1983.

Andreescheva, N.G.. Substantiation of the Maximum Permissible Concentration of Nitrobenzene in the Atmospheric Air. Hyg. Sanit. USSR, 29. [English translation of Russian article]. Code B2, 1964.

Anon.. Industrial Hygiene Department, E.K. Co., June 6. In: Documentation of the Threshold Limit Values, p. 411. American Conference of Governmental Industrial Hygienists, Third Edition 1971, Fourth Printing 1977. Code D3, 1969.

Anonymous. U.S. EPA Views as "Unwarranted" Federal Regulatory Involvement in Odor Control. Journal of the Air Pollution Control Association, 30. 1980.

Anzion, C.J.M., L.T.M. Hermans, A.J. Drajt, and H. Wijnen. Standardization of Olfactometers in the Netherlands. Proceedings of the 8th World Clean Air Congress. Elsevier Science Publishers. Amsterdam, 1989.

Basmadzhieva, K. & M. Argirova. Maximum Permissible Concentration of Hydrogen Sulfide and Phenol During Their Simultaneous Presence in the Atmosphere. Chem. Abstr., 69 (1968) 69522p. Code B2, 1968.

Bay Area Air Quality Management District, San Fransisco, CA. Regulation No. 7, Odorous Substances, Effective May, 1980.

Beck, L.. New Jersey's Approach to Odor Problems. In: Recent Developments and Current Practices in Odor Regulations, Controls and Technology. A&WMA Transactions Series, 18. Pittsburgh, Pennsylvania, 1991.

Benforado, D.M., et al.. Odor Control Legislation. In: Evaluation, Utilization, and Control. Annals of the New York Academy of Sciences, 237. 1974.

Benforado, D.M.. Survey of States for Odor Information. In: Recent Developments and Current Practices in Odor Regulations, Controls and Technology. A&WMA Transactions Series, 18. Pittsburgh, Pennsylvania, 1991.

Billings, C.E. & L. C. Jonas. Odor Thresholds in Air as Compared to Threshold Limit Values. Am. Ind. Hyg. Ass. J., 42, 1981.

Blinova, A.E. Industrial Standards for Substances Emitting Strong Odors. Hyg. Sanit. USSR, 30. [English translation of Russian article]. Code B2, 1965.

Blosser, R.O., and H.B.H. Cooper. Atmospheric Pollution Literature Review. Atmospheric Pollution Technical Bulletin, 40. 1969.

Both, R., K. Otterbeck, and B. Rinz. The Odour Immissin Regulation. Commentary and Application in Practice. Staub-Reinhaltung der Luft 53. Essen, 1993.

Bouscaren, R.. Revue Critique des Reglementations pour la Prevention des Emissions d'Hydrocarbures (sources fixes) des Polluants Odorants. CITEPA Etudes Documentaires, 51. 1977.

Busik, J.R., and R.C. Marshall. Kraft Pulp Mill Inspection Guide. Prepared by PEDCo Environmental, inc. for the US EPA Division of Stationary Source Enforcement. Washington, D.C., 1983.

California Standards for Ambient Air Quality and for Motor Vehicle Emissions, State of California, Dept. of Public Health, Bureau of Air Sanitation, March 1967.

California Standards for Ambient Air Quality and Motor Vehicle Exhaust, Suppl. No. 2, Additional Ambient Air Quality Standards. State of California, Dept. of Public Health, 1962.

Cathala, R., J.M. Roche, and J.A. Tregouet. Le Point sur la Legislation et la Reglementation sur L'Air. Nuisances Environmentales, 60. 1977.

Chao-Chen-Tzi. Data for Deterimining the Standard Maximim Permissible Concentration of Methanol Vapours in the Atmospheric Air. Gig. Sanit., 24. [English translation of Russian article]. Code B2, 1959.

Chaset, L.G.. Enforcement Mechanisms for Resolving Community Odor Problems: A Legal Viewpoint. 84th Annual Meeting and Exhibition, Abstracts of the Air and Waste Management Association. Vancouver, British Columbia, 1991.

Chizhikov, V.A. Data for Substantiating the Maximum Permissible Concentration of Toluilendiisocyanate in the Atmolpheric Air. Gig. Sanit., 28. [English summary of Russian article]. Code D6, 1963.

Danielson, J.A.. Air Pollution Engineering Manual. EPA. Research Triangle Park, North Carolina, 1973.

Danish Environment Protection Agency, Guidelines for Abatement of Odour Pollution. 4/1985, Miljostyrelsen, 1985 (in Danish).

Derenzo, David R., Gnyp, Alex, (eds.), Recent Developments and Current Practices in Odor Regulations, Controls and Technology, Papers from an International Specialty Conference. Air and Waste Management Association, ISSN 1040-8177; No. 18, Pittsburgh, Pennsylvania, 1989.

Dixon, G.A. & K.G. Ikels. Olfactory Threshold of Chlorine in Oxygen. U.S. NTIS, AD Rep., AD-A 046015. Dept. of Commerce, 5285 Port Royal Rd., Springfield, VA 22161. Code A, 1977.

Dubrovskaya, F.I. One-time Maximum Concentration of Caproic Acid in Air. Hyg. Sanit. USSR, 34. [English translation of Russian article]. Code B2, 1969.

Enforcement Ordinances of Air Pollution Control Law. Air Quality Bureau, Environment Agency. Tokyo, Japan, 1972.

Englund, H.M., and W.T. Beery. Proceedings of the Second International Clean Air Congress. Academic Press. New York, 1971.

EPA, Air Emissions From Municipal Solid Waste Landfills-Background Information for Proposed Standards and Guidelines, Priliminary Draft, Emission Standard Division, March 1988.

Exosite Bans Secret Odors for Sure. American City Cty, 108. 1993.

Fazzalari, F.A.. Compilation of Odor and Taste Threshold Values Data. American Soc. Testing and Materials DS 48A. Philadelphia, 1978.

Feisinger, E.G.. Dealing with Environmental Regulations and Agencies - An Industrial Perspective. 84th Annual Meeting and Exhibition, Abstracts of the Air and Waste Management Association. Vancouver, British Columbia, 1991.

Feldman, Yu.G. Data for Determining the Maximum Permissible Concentration of Acetone in the Atmosphere. Gig. Sanit., 25. [English summary of Russian article]. Code B2, 1960.

Feldstein, M., Levaggi, D. A., and Thuillier, R., Odor Regulation by Emission Limitation, Paper 73-273, Annual Meeting, Air Pollution Control Association, June 1973.

Feldstein, M., T.E. Story, and T.S. Mangat. Control of Odour by Emission Limitations. Clean Air , 12. Melbourne, Australia, 1978.

First General Ordonnance for the Federal Immission Control Act GMBl. G 3191 A Bd. No. 7 dated 28 Feb. 1986 (Federal Republic of Germany, in German)

First, M.W.. A Model Odor Control Ordinance. Proceedings of the Second International Clean Air Congress. Academic Press. New York, 1971.

Franz,J.J.. Report on Proposed Odor Terminology TT-4 Odor Committee. In: Air Pollution Control Specialty Conference Proceedings. State-of-the-Art of Odor Control Technology II. Pittsburgh, Pennsylvania, 1977.

Gemert, L.J., and A.H. van Nettebreyer. Compilation of Odour Threshold Values in Air and Water. RID-CIVO/TNO. 1977 plus supplements 1985.

Ghosh, A., D. Granger, K. Haralampides, J. Hayward, N. Kordonskaya, K. Madill, C. Manzon, L. Saad, and D. Mercier. A Framework For Establishing Legislation Governing Odours in Ambient Air. University of Windsor, Department of Civil and Environmental Engineering (Course 93-532). Windsor, Ontario, 1996.

Greenfield, D.. Local Sensitivities Could Lead To Odor Regulations. Mod Paint Coat, 84. 1994.

Guide for Air Pollution Episode Avoidance. US EPA. Research Triangle Park, North Carolina, 1971.

Guide for Control of Air Pollution in Medium-Sized Urban Areas. US EPA. Research Triangle Park, North Carolina, 1971.

Guide for Control of Air Pollution in Small Urban Areas. US EPA. Research Triangle Park, North Carolina, 1971.

Hangartner, M., G. Winneke, M. Paduch. Activities of the VDI Commission on Air Pollution Prevention to Standardise the Methods of Odor Assessment.

Hangartner, M.. Activities of the VDI Commission on Air Pollution Prevention to Standardize the Methods of Odor Assment. In: Recent Developments and Current

Practices in Odor Regulations, Controls and Technology. Transactions Series, 18. Pittsburgh, Pennsylvania, 1991.

Heeres, P., and H. Harssema. Progress of Standardization of Olfactometers in the Netherlands. Staub-Reinhaltung der Luft 50. Wageningen, 1990.

Hemeon, W.C.L.. Malodors - A Basis for Regulations. Journal of the Air Pollution Control Association. 1971.

Hildenskiold, R.S. Maximum Permissible Concentration of Carbon Bisulphide in the Atmospheric Air of Residential Districts (in Russ.). Gig. Sanit., 24. [English summary of Russian article]. Code B2, 1959.

Holland, J. Memorandum to S.C. Kelton Jr., Rohm & Hass Co. In: Documentation of the Threshold Limit Values, p. 411. American Conference of Governmental Industrial Hygienists, Third Edition 1971, Fourth printing 1977. Cininnatti, Ohio. Code D2, 1974.

Hoshika, Y., and Others. International Comparison of Odor Threshold Values of Several Odorants in Japan and in the Netherlands. Environmental Research, 61. 1993.

Imasheva, N.B. The Substantiation of the Maximum Permissible Concentrations of Acetophenon in the Atmospheric Air. Gig. Sanit., 28. Code B2, 1963.

Johnson, R.A.. The Terminology of Odor Technology in Air Pollution Applications. Odor Consultant. Houston, Texas, 1984.

Kaloyanova, F., A. Bainova, G. Dimov & M. Mukhtarova. Experimental Determination of the Maximum Permissible Concentration of Dipterex in the Atmosphere. Hyg. Sanit. USSR, 32. [English translation of Russian article]. Code B2, 1968.

Khikmatullaeva, Sh.S. Maximum Permissible Concentration of Thiophene in the Atmosphere. Hyg. Sanit. USSR, 32. [English translation of Russian article]. Code B2, 1967.

Kraft Pulp Mills- Background Information for Promulgated Revisions to Standards. US EPA, Emission Standards and Engineering Division. Research Triangle Park, North Carolina, 1986.

Kristesashvili, Ts.S. The Maximum Permissible Concentration of Pyridine in the Air. Hyg. Sanit. USSR, 30. [English translation of Russian Article]. Code B2, 1965.

Larsen, R.L.. A Mathematical Model for Relating Air Quality Measurements to Air Quality Standards. EPA Publication No. AP-89. 1971.

Lawrence, E.. Canada's Environmental Legislation, 1994/95 Edition. Templegate Information Services Inc.. Toronto, Ontario, 1994.

Leonardo, G., A Critical Review of Regulations for the Control of Odors, JAPCA 24:456, 1974.

Leonardos, G.. A Critical Review of Regulations for the Control of Odors. Journal of the Air Pollution Control Association. 1974.

Li-Shen. Data for Substantiating the Maximum Permissible Concentration of Styrol in the Atmospheric Air. Gig. Sanit., 26. [English summary of Russian article]. Code B2, 1961.

Loginova, R.A. Basic Principles for the Determination of Limits of Allowable Concentrations of Hydrogen Sulfide in Atmospheric Air. In: V.A. Ryzanov (Ed.). Limits of Allowable Concentrations of Atmospheric Pollutants. Book 3. Code B2, 1957.

Martin, W., and A.C. Stern. The World's Air Quality Management Standards. US EPA. Washington, D.C., 1974.

Martirosyan, A.S. Maximum Permissible Concentration of Methyl Vinyl Ketone in the Air of a Working Area. Tr. Klin. Otd. Nauch.-Issued. Inst. Gig. Profzabol., no. 1. (From: Chem. Abstr., 77 (1972) 156013g). Code B5, 1970.

McCague, G.R., and K.H. Sharpe. Industrial Abatement: Air Management, Vol I. Ontario Ministry of the Environment, Training and Certification Section of the Pollution Control Branch. Toronto, Ontario, 1978.

Melekhina, V.P. The Maximum Permissible Concentration of Formaldehyde in the Atmospheric Air. Gig. Sanit., 23. [English summary of Russian article]. Code B2, 1958.

Mellberg, J.R. et. al (TRC Environmental Corporation). Reference Guide to Odour Thresholds for Hazardous Air Pollutants Listed in the Clean Air Act Amendments of 1990. Windsor, Connecticut, 1991.

Minaev, A.A. Determination of the Maximum Permissible Concentration of V-methylstyrene Vapours in the Atmosphere. Hyg. Sanit., USSR, 31. [English translation of Russian article]. Code B2, 1966.

Miryakubova, D.A. Basis for the Maximum Single Permissible Concentration of Hexachloran in the Atmosphere. Chem. Abstr., 74 (1971) 90813x. Code B2, 1970.

Mnatsakanyan, A.V. Basic Experimental Information for the Determination of the Limit of Allowable Chloroprene Concentration in Atmospheric Air. In: V.A. Ryzanov (Ed.). Limits of Allowable Concentrations of Atmospheric Pollutants, Book 5. Code B, 1962.

Morse, H.N.. Odor and the Clean Air Act. Journal of the Air and Waste Management Association, 43. 1993.

Mukhamedova, S. Yu. Maximum Permissible Concentration of Butiphos in Air. Hyg. Sanit. USSR, 33. [English translation of Russian article]. Code B2, 1962.

Mukhitov, B.M. Experimental Data for Substatiating Maximum Permissible Concentration of Phenol in the Atmospheric Air (in Russ.). Gig. Sanit., 27. Code B2, 1962.

Nicell J.A., Preliminary Assessment of the Odor Impact Model as a Regulatory Strategy, M.A.Sc. Thesis, University of Windsor, Windsor, Ontario. 1986.

Nikiforov, B. Basis for the Single Maximum Permissible Level of Carbon Tetrachloride in the Atmosphere. Chem. Abstr., 74, (1971) 57059h. Code B5, 1970.

Novikov, Yu.V. The Determination of Limits of Allowable Concentrations of Benzene in Atmospheric Air. In: V.A. Ryazanov (Ed.). Limits of Allowable Concentrations of Atmospheric Pollutants, Book 3. Code B2, 1957.

Odoshashvili, D.G. Data for Substantiating the Level of Maximum Permissible Concentration of Dimethylformamide in the Atmospheric Air. Gig. Sanit., 27. [English summary of Russian article]. Code B2, 1962.

Olsen, K.R. Odour Management and Regulations in Denmark. Danish Boiler Owners' Association, 1989.

Olsen, K.R.. Odour Management and Regulations in Denmark. In: Recent Developments and Current Practices in Odor Regulations, Controls and Technology. Transactions Series, 18. Pittsburgh, Pennsylvania, 1991.

Paulson, D.J.. Commercial Feedlots-Nuisance, Zoning and Regulation. Washburn Law Journal, 6. 1967.

Performance of the Federal Immission Control Act - Best available technology to abate odorous emissions with biofiltration) RdErl. d. MB dated 21 July, 1983, Nds. Mbl. No. 391983, p 749 (in German)

Polta, R., Odor Experience/Research at Metropolitan Waste Control Commission, Paper given at AWMA International Specialty Conference on Recent Developments and Current Practices in Odor Regulations, Controls and Technology, Detroit, October 1989.

Prokop W. H., Industry View Toward Odor Regulatory Needs, National Renderers Association, Des Plaines, Illinois, Presented at the 77th Annual Meeting of the Air Pollution Control Association, San Grancisco, California, June 24-25, 1984.

Prokop, W.H.. Developing Odor Control Regulations: Guidelines and Considerations. Journal of the Air Pollution Control Association, 28. 1978.

Prokop, W.H.. Status of Regulations for Source Emission and Ambient Odors. Presented at The New York Academy of Sciences, Conference on Odors: Evaluation, Utilization and Control. 1973.

Prokop, W.H.. Status of Regulations for Source Emission and Ambient Odors. Annals of the New York Academy of Sciences, 237. 1974.

Proposed Air Quality Standards and Regulations, Part IV, Control of Odors in the Ambient Air. Wyoming Air Resources Council. 1969.

Regulatory Options for the Control of Odors, U.S. Environmental Protection Agency, Research Triangle Park, NC, EPA-400/5-80-003, U.S. Department of Commerce, National Technical Information Service, February 1980.

Regulatory Options for the Control of Odors. A Report to the Congress of the United States, Strategies and Air Standards Division, Office of Air Quality Planning and Standards, US EPA. Research Triangle Park, North Carolina, 1979.

Sadilova, M.S. Studies in the Standardization of Maximum Allowable Hydrogen Fluoride Concentrations in the Air of Inhibited Areas. In: USSR Literature on Air Pollution and Related Occupational Diseases Volume 17. Code B2, 1968.

Saifutdinov, M.M. Maximum Permissible Concentration of Ammonia in the Atmosphere. Hyg. Sanit., USSR 31. [English translation of Russian article]. Code B2, 1966.

Sander, H.P.. Abwassergeruche in Rechtlicher Sicht. In: Institut fur Gewerbliche Wasserwirtschaft und Luftreinhaltung e.V.. Geruchsprobleme durch Gewerbliche Abwasser im Betrieb, in der Kanalisation und in Abwasserbehandlungsanlagen - Ursachen und Gegenmassnahmen. IWL-Forum. 1978.

Schirz, S., and H.F. Wolfermann. Probleme der Stansorwahl. In: Abfalle aus der Tierhaltung. Anfall, Umweltbelastung, Behandlung, Verwertung. Eugen Ulmer Verlag. Stuttgart, 1977.

Schroeder, S.W.. Legal Aspects of Odor Control. In: Industrial Odor Technology Assessment. Ann Arbor Science Publishers Inc.. Ann Arbor, 1975.

Searles, R.A.. Compilation of Odor and Taste Threshold Values Data. ASTM Data Series DS48. Philadelphia, Pennsylvania, 1973.

Selyuzhitskii, G.V. Experimental Data Used to Determine the Maximum Permissible Concentration of Methyl Mercaptan, Dimethyl Sulfide, and Dimethyl Disulfide in the Air of the Production Area of Paper and Pulp Plants (in Russ.). Gig. Tr. Prof. Zabol., 16. Code E1, 1972.

Solomin, G.I. Data Substantiating Maximum Permissible Concentration of Dinyl in Atmospheric Air. Gig. Sanit., 26. [English summary of Russian article]. Code B2, 1961.

Solomin, G.I. Experimental Data for Hygienic Substantiation of the Single Permissible Concentrations of Isopropylbenzol and Isopropylbenzene Hydrogenperoxide in Atmospheric Air. Hyg. Sanit., USSR, 29. [English translation of Russian article]. Code B2, 1964.

St. Louis County Air Pollution Control Code, Regulation XV, Control of Odors in the Ambient Air. St. Louis County Health Department, Division of Air Pollution Control. 1967.

Stahl, W.H.. Compilation of Odor and Taste Threshold Values Data. American Society for Testing and Materials. Philadelphia, Pennsylvania, 1973.

Stern, A.C.. Air Pollution, 3rd Edition. Vol. V: Air Quality Management. Academic Press Inc.. New York, 1976.

Storm, P.-Ch.. Rechsvorschriften zum Schutz der Allgemeinheit vor Verunreinigungen des Bodens und Wassers durch Tierische Exkremente sowie vor Geruchs-, Staub- und Keimemissionen aus der Tierproduktion. In: Abfalle aus der Tierhaltung. Anfall, Umweltbelastung, Behandlung, Verwertung. Eugen Ulmer Verlag. Stuttgart, 1977.

Styazhkin, V.M. Experimental Basis for the Determination of Allowable Concentrations of Chlorine and Hcl Gas Simultaneously Present in Atmospheric Air. In: USSR Literature on Air Pollution and Related Occupational Diseases. Volume 8. Code E2, 1963.

Styazhkin, V.M. & H.Kh. Khachaturyan. Data for Validating the Maximum Permissible Concentration of Butyric Acid in Atmospheric Air. In: M.Y. Nuttonson (Ed.) American Institute of Crop Ecology (AICE) Survey of USSR Air Pollution Literature, Volume XIX. Code B2, 1973.

Sullivan, R.J., Air Pollution Aspects of Odorous Compounds, Litton Systems, Inc. Environmental Systems Division 7300 Pearl Street, Bethesda, Maryland 20014, Prepared for the National Air Pollution Control Administration Consumer Protection & Environmental Health Service Department of Health, Education, and Welfare (Contract No. PH-22-68-25), September 1969.

Takhiroff, M.T. Maximum Allowable Concentration of Chlorine in the Atmosphere Based on Experimental Data. Gig. Sanit., 22. [English translation of Russian article]. Code B2, 1957.

Tarkhova, L.P. Materials for Determining the Maximum Permissible Concentration of Chlorobenzol in Atmospheric Air. Hyg. Sanit. USSR., 30. [English translation of Russian article]. Code B2, 1965.

Threshold Limit Values and Biological Exposure Indices for 1985-86, American Conference of Governmetal Industrial Hygienists, 2nd Printing, 1985.

Tkachev, P.G. Data for Substantiating the Maximum Permissible Concentration of Aniline in the Atmospheric Air. Gig. Sanit., 28. [English summary of Russian article]. Code B2, 1963.

Tkachev, P.G. Monoethylamine in the Atmosphere; Hygienic Siginficance and Standards. Hyg. Sanit. USSR., 34. [English translation of Russian article]. Code B5, 1969.

Tkachev, P.G. Triethylamine in Air: Hygienic Significance and Hygienic Standards. Hyg. Sanit. USSR, 35. [English translation of Russian article]. Code B5, 1970.

Tutt W. E., Setting an Ambient Odor Standard. AWMA Annual Meeting, Anaheim, California, 1989.

Tutt W.E., Mehta K.K., et al, Final Report - Chemical Odor Task Force. Jacksonville, Florida, 1987.

Tutt, W.E.. A Regulatory Approach for Controlling Odors in the Terpene Chemical Manufacturing Industry. In: Recent Developments and Current Practices in Odor Regulations, Controls and Technology. transactions Series, 18. Pittsburgh, Pennsylvania, 1991.

Tutt, W.E.. Alternative Approaches to Regulating Ambient Odors. Bio-Environmental Services Division. Jacksonville, Florida. 1983.

Ubaidullaev, R. Data Substantiating the Maximum Permissible Concentration of Furfurol in Atmospheric Air. Gig. Sanit., 26. [English summary of Russian article]. Code B2, 1961.

van Gemert, L.J., and A.H. Nettenbreijer. Compilation of Odor Thresholds Values in Air and Water. National Institute for Water Supply/Central Institute for Nutrition and Food Research TNO. 1977.

van Harreveld, A.Ph.. Introduction and Related Practical Aspects of Odour Regulations in the Netherlands. Project Research Amsterdam BV. Amsterdam, The Netherlands.

van Harreveld, A.Ph.. Introduction and Related Practical Aspects of Odour regulations in the Netherlands. In: Recent Developments and Current Practices in Odor Regulations, Controls and Technology. A&WMA Transactions Series, 18. Pittsburgh, Pennsylvania, 1991.

van Harreveld, A.Ph.. Introduction of Odour Regulations in the Netherlands and Related Practical Aspects. Project Research Amsterdam BV. Amsterdam, The Netherlands, 1989.

VDI-Kommission Reinhalting der luft, Geruche, Stand der Erkenntnisse zur Ermittlung von Belastung und Belastigung, Workshop 28. November 1989, Dusseldorf.

Von Bodungen, G.A. and O. Tanner Jr.. A State's View of Odor Regulations. Louisiana Department of Environmental Quality. Baton Rouge, Louisiana, 1984.

Wada, M.. On Enactment of Offensive Odors Control Law. Kogai to Taisaku, 7.. Japan, 1971.

Wahl, G.H.Jr.. Regulatory Options for the Control of Odors. Environmental Protection Agency Publication 450/5-80-003. Research Triangle Park, North Carolina, 1980.

Wijnen H., Air quality standards on odours in the Netherlands. In: VDI Berichte 561, Dusseldorf, VDI-Verlag GrbH, pp 365-386.

Wijnen, H.. Air Quality Standards on Odours in the Netherlands. VDI-Berichte, 561. 1986.

Young, R.A., and H.A. Young. Odor Control Case Law. In: Industrial Odor Technology Assessment. Ann Arbor Science Publishers Inc.. Ann Arbor, 1975.

Yuldashev, T. Maximum Permissible Concentration of Ethylene Oxide in the Atmosphere. Hyg. Sanit. USSR., 30. [English translation of Russian article]. Code B2, 1965.