CHAPTER I

DEFINITION & REFERENCES

1. General

1.1 The MIOSHA CHEMICAL INFORMATION MANUAL presents, in concise form, data on a large number of chemical substances that may be encountered in industrial hygiene investigations. It is intended as a basic reference for industrial hygienists engaged in occupational health field activity. It has been adapted from federal OSHA's CHEMICAL INFORMATION MANUAL.

1.2 A similar online database version, the CHEMICAL INFORMATION FILE, is updated and maintained by the Salt Lake Technical Center as part of the OSHA Computerized Information System (OCIS).

1.3 For more information on operation and calibration of field sampling devices refer to the INDUSTRIAL HYGIENE TECHNICAL MANUAL.

2. Identification, Exposure Limits, Description and Physical Properties

(Abbreviations are underlined)

2.1 The substances are primarily listed by the Chemical name as it appears in the MIOSHA PELs, Rules 2101, 2102, 2103 or 2104; as it appears in the AMERICAN CONFERENCE OF GOVERNMENTAL INDUSTRIAL HYGIENISTS (ACGIH) THRESHOLD LIMIT VALUES (TLVs); or by common name.

2.2 IMIS, IMIS No., the substance code currently assigned by OSHA to each substance for reporting specific violations in the field. IMIS Codes are used for completion of some reporting forms. See Appendix C for Substances by IMIS Code.

2.3 SYN, synonyms, only the more common synonyms are included. Sources: MIOSHA PELs, OSHA PELs, CFR TITLE 29 1910.1000; ACGIH TLV LIST; and NIOSH REGISTRY OF TOXIC EFFECTS. See Appendix A for Substances by Synonym.

2.4 CAS, CAS No., Chemical Abstracts Service Registry Numbers, Sources: NIOSH REGISTRY OF TOXIC EFFECTS; EPA TSCA INVENTORY. See Appendix B for Substances by CAS Numbers.

2.5 DOT, Department of Transportation regulation No., as listed in the NIOSH

POCKET GUIDE TO CHEMICAL HAZARDS.

2.6 MIOSHA or OSHA, OSHA or MIOSHA Permissible Exposure Limit - Transitional Limits and Final Rules, Action Level, Excursion Limit (EL), 8-Hour Time Weighted Average (TWA), Short Term Exposure Limit (STEL), Ceiling, or Stayed.

2.7 NIOSH, REGISTRY OF TOXIC EFFECTS (RTECS) identification No.

2.8 DESC, description and physical properties of a chemical, extracted from MERCK INDEX; CONDENSED CHEMICAL DICTIONARY; and NIOSH/OSHA HEALTH GUIDELINES.

MW: molecular weight
MOLFM: molecular formula
VP: vapor pressure, (mm = mm Hg at 20 C or other specific temperature listed, also 1 mm Hg = 1.333224 E+2 Pa)
ATM: atmosphere, 760 mm at 0 C
BP: boiling point
UEL: upper explosibility limit
FP: flash point
SP GR: specific gravity

2.9 INCOM, potentially hazardous incompatibilities. Source: NIOSH POCKET GUIDE TO CHEMICAL HAZARDS, and Material Safety Data Sheets (MSDSs).

3. Carcinogen Status

3.1 NTP, carcinogenic classification as listed in the National Toxicology's (NTP), FIFTH ANNUAL REPORT ON CARCINOGENS.

3.1.1 HUMAN CARCINOGEN: know to be carcinogenic with evidence from human studies.

3.1.2 SUSPECT HUMAN CARCINOGEN: reasonably anticipated to be carcinogenic, with limited evidence from humans or sufficient evidence from experimental animals.

3.2 IARC, carcinogenic classification as indicated by International Agency for Research on Cancer (IARC), IARC MONOGRAPHS ON THE EVALUATION OF THE CARCINOGENIC RISK OF CHEMICALS TO HUMANS. Data includes chemicals covered through Volume 46.

3.2.1 Group 1 - "The agent is carcinogenic to humans." This category is used only when there is sufficient evidence of carcinogenicity in humans.

3.2.2 Group 2A - "The agent is probably carcinogenic to humans." This category is used when there is limited evidence of carcinogenicity in experimental animals. Exceptionally, an agent may be classified into this category solely on the basis of limited evidence of carcinogenicity in experimental animals strengthened by supporting evidence from other relevant data.

3.2.3 Group 2B - "The agent is possibly carcinogenic to humans." This category is generally used for agents for which there are the absence of sufficient evidence in experimental animals. It may also be used when there is inadequate evidence of carcinogenicity in humans or when human data are nonexistent but there is sufficient evidence of carcinogenicity in experimental animals. In some instances, an agent for which there is inadequate evidence or no data in humans but limited evidence of carcinogenicity in experimental animals, together with supporting evidence from other relevant data, may be placed in this group.

3.2.4 Group 3 - "The agent is not classifiable as to its carcinogenicity to humans." Agents are placed in this category when they do not fall into any other group.

3.2.5 Group 4 - "The agent is probably not carcinogenic to humans." This category is used for agents for which there are evidence-suggesting lack of carcinogenicity in humans together with evidence suggesting lack of carcinogenicity in experimental animals. In some circumstances, agents for which there is inadequate evidence of or no data on carcinogenicity in humans but evidence suggesting lack of carcinogenicity in experimental animals, consistently and strongly supported by a broad range of other relevant data, may be classified in this group.

4. Health Effects and Toxicology

4.1 SYMPT, potential symptoms as a result of inhalation, skin absorption, ingestion, or skin or eye contact. As listed in NIOSH POCKET GUIDE TO CHEMICAL HAZARDS (NIOSH No. 85-114), condensed from NIOSH/OSHA OCCUPATIONAL HEALTH GUIDELINES FOR CHEMICAL HAZARDS (NIOSH No. 81-123).

4.2 ORGAN, the organs that are affected by exposure to each substance. As listed in NIOSH POCKET GUIDE TO CHEMICAL HAZARDS (NIOSH No. 85-114), condensed from NIOSH/OSHA OCCUPATIONAL HEALTH GUIDELINES FOR CHEMICAL HAZARDS (NIOSH No. 81-123).

4.3 HLTH, Principal effect(s) of exposure to each substance, listed by OSHA Health Code and Health Effects. Health codes are used in determining if a violation of an air contaminant standard is serious or other-than-serious, based on guidelines in the Field Operations Manual, OSHA Instruction CPL 2.45B, chapter IV. Health Codes and Health Effects are reviewed and updated under contract. For some chemicals, additional toxicology information has been added from other sources. Abbreviations for this information includes: SKIN IRR = Skin Irritation; SKIN ABS = Skin Absorption; INGES ACUTE = Ingestion Acute; and INGES CHRONIC = Ingestion Chronic.

4.4 HEALTH

CODE	HEALTH EFFECTS
HE1	Cancer---Currently regulated by OSHA as a carcinogen.
HE2	Chronic (Cumulative) Toxicity---Known or Suspected animal or human carcinogen, mutagen (except Code HE1 chemicals).
HE3	Chronic (Cumulative) Toxicity---Long-term organ toxicity other than nervous, respiratory, hematologic or reproductive.
HE4	Acute Toxicity---Short-term high risk effects.
HE5	Reproductive Hazards---Teratogenesis or other reproductive impairment.
HE6	Nervous System Disturbances---Cholinesterase inhibition.
HE7	Nervous System Disturbances---Nervous system affects other than narcosis.
HE8	Nervous System Disturbances---Narcosis.
HE9	Respiratory Effects Other Than Irritation---Respiratory sensitization (asthma or other).
HE10	Respiratory Effects Other Than Irritation---Cumulative lung damage.
HE11	Respiratory Effects---Acute lung damage/edema or other.
HE12	Hematologic (Blood) Disturbances---Anemias.
HE13	Hematologic (Blood) Disturbances---Methemoglobinemia.
HE14	Irritation-Eyes, Nose, Throat, Skin---Marked.
HE15	Irritation-Eyes, Nose, Throat, Skin---Moderate.
HE16	Irritation-Eyes, Nose, Throat, Skin---Mild.

HE17 Asphyxiants, Anoxiants.
HE18 Explosive, Flammable, Safety (No Adverse Effects Encountered When Good Housekeeping Practices are Followed).
HE19 Generally Low Risk Health Effects---Nuisance particulates, vapors or gases.
HE20 Generally Low Risk Health Effects---Odor.

5. Sampling & Analysis

5.1 LESS1, sampling method recommended by the Occupational Health Laboratory (OHL), Laboratory and Equipment Services Section (LESS), Management and Technical Services Division (MTSD) Michigan Department of Labor and Economic Growth (DLEG).

SLC1, OSHA Salt Lake Technical Center (SLTC) sampling method for OSHA compliance.

5.1.1 MEDIA, sampling media. See Appendix D for Commercial Sources of Sampling Media. The LESS media codes are included in parentheses.

5.1.2 ANL SOLVENT, Analytical solvent used in referenced method for desorption or extraction. If compounds to be sampled use the same media and also use the same analytical or alternate solvent, they may generally be analyzed from the same sample.

5.1.3 ALT SOLVENT, Alternate solvent for desorption or extraction evaluated at LESS or SLTC. If compounds to be sampled use the same media and also use the same analytical or alternate solvent, they may generally be analyzed from the same sample.

5.1.4 Volume and Flow Rate. Volumes listed are guidelines but should not be exceeded for solid sorbents.

(1) MAX V maximum volume
MAX F maximum flow rate
(2) MIN V minimum volume
(3) REC V recommended volume
REC F recommended flow rate
(4) MIN T minimum time
(5) CAPTURE R capture rate

5.1.5 ANL 1, current Michigan Occupational Health Laboratory or OSHA Salt Lake Technical Center analytical method.

5.1.6 ANL A, alternate OSHA Salt Lake Technical Center analytical method.

5.1.7 REF, method reference, for listing of references, see page I-7.

5.1.8 SAE, sampling and analytical error. The SAE is a measure of the precision and accuracy of the combined sampling and analytical process. It shall be applied by the Industrial Hygienist to sample results according to the methods described in Section I, Appendix I: 1-6, pages I: 1-26 through I: 1-30 of the OHD INDUSTRIAL HYGIENE TECHNICAL MANUAL, Revision 7-97. The values have been computed by multiplying the coefficient of variation by the appropriate statistical factor for one-sided 95-percent confidence intervals.

5.1.9 CLASS, method class (for SLTC or LESS).

(1) FULLY VALIDATED: sampling and analytical method that has been thoroughly evaluated for collection efficiency, storage stability, sensitivity, precision and accuracy.

(2) PARTIALLY VALIDATED: a method which has had limited evaluation of the above factors.

(3) NOT VALIDATED: a method with limited or unverified information on the above factors.

5.1.10 NOTE, special instructions on sampling or obtaining sampling media from LESS.

5.2 WOHL, Wisconsin Occupational Health Laboratory Methods are listed for several substances in which WOHL methods differ from the OSHA or Michigan OHL method or an OSHA or Michigan OHL method does not exist.

5.3 SAM2, Secondary sampling methods. Methods not in general use by OSHA's SLTC or MDLEG's LESS. Detector tubes and direct reading instrument information has not been reviewed, except as noted.

5.3.1 ANL, any analytical method used in conjunction with a secondary sampling method. Some of these are NIOSH methods that are not in use by OSHA's SLTC or MDLEG'S LESS.

5.3.2 for other subheadings see LESS1 or SLC1 above.

5.4 DET TUBE, Detector tubes are used for screening to determine whether

additional sampling is needed. If detector tube readings exceed 1/2 the PEL, IH's should sample with the OHL method.

NOTE: The Michigan Department of Labor and Economic Growth does not evaluate detector tubes and OSHA has evaluated only a few detector tubes. OSHA evaluates detector tubes primarily to select tubes for OSHA use. OSHA does not certify detector tubes, nor endorse products of any manufacturer. Omission of other manufacturers tubes does not mean the tubes have been found unsatisfactory. OSHA may not have tested tubes of all manufacturers.

5.5 WIPE, Indicates whether wipe samples should be used. For some chemicals, specific filter and solvent information is included. Information in this field has not been extensively reviewed.

5.6 BULK, Information for submitting bulk samples. For some chemicals, analytical information is also included.

5.7 BIOL, Biological methods, Sampling method for personnel screening using human biological media, e.g. urine, blood, hair.

6. Sampling & Analytical Methods References

(References listed in fields LESS1, SLC1, and SAM2)

REF: REFERENCE

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12. OCCUPATIONAL EXPOSURE SAMPLING STRATEGY MANUAL (77-173), DHHS, National Institute for Occupational Safety and Health, Cincinnati, Ohio, (1977).

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15. U.S. Code of Federal Regulations (CFR), Title 29, Part 1910, U.S. Government Printing Office, Washington, D.C.

16. Eller, P.E.: Determination of Nickel Carbonyl by Charcoal Tube Collection and Furnace Atomic Absorption Spectrophotometry. APPL. IND. HYG. (1) 3. Sept 1986, pp. 115-118.

17. OCCUPATIONAL HEALTH LABORATORY METHOD MANUAL, Michigan

Department of Labor and Economic Growth, Lansing, Michigan, 1999.

7. General References.

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2. THE CONDENSED CHEMICAL DICTIONARY, ELEVENTH EDITION, Van Nostrand Reinhold Co., New York, 1987.

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