REGISTRY OF TOXIC EFFECTS OF CHEMICAL SUBSTANCES (RTECS®)

COMPREHENSIVE GUIDE TO THE RTECS®

DORIS V. SWEET

EDITOR

U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES
Public Health Service
Centers for Disease Control and Prevention
National Institute for Occupational Safety and Health
Cincinnati, Ohio 45226

July 1997

ACKNOWLEDGMENT

The invaluable assistance of Barbara C. Cromer, Ann Votaw and Mitsuko Estese in producing the camera-ready copy of this publication is gratefully acknowledged.

DHHS (NIOSH) PUBLICATION NO. 97-119

PREFACE

This is the first revision of the Comprehensive Guide, originally published in 1993. A guide to RTECS® had been a part of each printed and each microfiche edition of the Registry. In 1993, we recognized the need to provide to the users of the several electronic formats of RTECS® the information such as the Detailed File Description, tables, codes, abbreviations, and tape layout. This volume is provided as a service to our users in making such information readily available.

The last printed edition of RTECS®, the 1985-86 edition, is now out of print and there are no plans for future printed editions. Production of the microfiche edition ceased in July 1993. However, the Registry is maintained and updated electronically each quarter by the National Institute for Occupational Safety and Health (NIOSH). The July 1997 update marked the twenty-sixth annual update prepared in accordance with the requirements of Section 20(a)(6) of the Occupational Safety and Health Act of 1970 (Public Law 91-596). The original list, then known as the Toxic Substances List, was completed on June 28, 1971, and contained approximately 4,000 substances. As of July 1997, RTECS® contained 139,704 chemical entries.

Since the first edition, the database has expanded to include primary skin and eye irritation, mutagenic effects, reproductive effects, tumorigenic effects, acute toxicity, and other multiple dose toxicity data. From its inception, the policy of NIOSH has been to record the lowest dose or lowest exposure concentration reported to cause the tabulated effect. It has also been the policy of NIOSH not to evaluate the data, but to tabulate the values reported. The logic for this is twofold: (1) while most references are drawn from a core list of about 150 technical journals, sources of data also include abstracts, textbooks, government reports, compendia, proceedings of scientific meetings, symposia, industry reports and letters, professional society reports, reports by research institutions, personal communications, and publications from a large number of non-English language journals (most recently patent literature from the United States and other countries has proved to be a rich source of new data); (2) the resources available to the RTECS® program do not allow the time and effort required to perform an evaluation of the vast amount of data that has been accumulated and reported. It was decided that the offering of data from a broad spectrum of sources not generally accessible was of major value to the database users.

RTECS® EDITORIAL REVIEW BOARD

The RTECS® Editorial Review Board was established to serve as a source of advice and technical review for the RTECS® data file. The Board consists of representatives from various NIOSH Divisions and from other Agencies that have a direct interest in the RTECS® program. The Board meets periodically to resolve questions of policy and to review current and projected RTECS® operations.

TABLE OF CONTENTS

TABLE OF CONTENTS (continued)

If you would like a microfiche copy of the complete RTECS® Bibliographic CODEN File, it will be supplied on request from the Editor. FAX Number 513/533-8347.

INTRODUCTION

Recent Changes

This Comprehensive Guide to the Registry of Toxic Effects of Chemical Substances (RTECS®) describes the types of data, and their format, contained in the January 1997 update of the RTECS®. Since this Guide was issued in 1993, there have been a few changes that will be discussed in this volume. Listed below are the most notable of these changes (additions).

(1) The Chemical Abstracts Service Registry Number field has been retitled CHEMICAL REGISTRY NUMBERS. It now includes Chemical Abstracts Service (CAS) Registry numbers, both current and previous, Beilstein Registry numbers, and Beilstein Handbook Reference numbers. See Section 3 of the Detailed File Description for full information about this new service.

(2) The listings for the Permissible Exposure Limits (PELs) of the Occupational Safety and Health Administration (OSHA) have undergone a format change. Current listings reflect the enforceable limits in the four categories regulated by OSHA: General Industry, Construction, Shipyards, and Standards for Federal Contractors. Each of these is specified in its own section of Title 29 of the Code of Federal Regulations (29 CFR). The 1989 PELs, which were set aside by court order, are no longer listed. These changes are described fully in Section 18 of the Detailed File Description.

(3) There have been some revisions in the Mutagenic Effects test systems. Two have been combined, a new system identified, and a change in nomenclature of another system has been adopted. These changes are described in Section 11 of the Detailed File Description.

(4) There have been some additions to the Toxic Effects Code Table to reflect effects described in the Other Multiple Dose Data Field.

(5) A new Compound Descriptor Code, “P” for Human Data, has been added. See Section 9 of the Detailed File Description for an explanation.

(6) The Department of Transportation (DOT) Shipping and Labeling Regulations have been updated to reflect changes in the current Hazardous Materials List found in the current issue of the Code of Federal Regulations, Title 49 (CFR 49).

(7) The Environmental Protection Agency (EPA) Toxic Substances Control Act (TSCA) Chemical Inventory status lines have been updated to reflect the most recent version of the EPA TSCA Inventory. Also, the 8(d) line, noting Health and Safety studies, has been added to the file.

(8) Data from the National Toxicology Program (NTP) Biennial Report on Carcinogens have been updated to reflect the substances reported in the most recent version. The data from NTP Technical Reports and Toxicity Studies are added as they become available. The NTP Chemtrack Data are updated quarterly.

9) The International Occupational Exposure Limits (OELs), which were first entered in 1993, have

been updated for the first time this year. Details on the sources from which RTECS® derived these values are presented in Section 18 of the Detailed File Description.

(10) The chemical names listed in the RTECS® file have been converted from an all capital letter format to a lower case with initial capital letter format.

(11) In response to suggestions offered in a Focus Group of RTECS® users, a series of facsimiles of the RTECS® records for two chemicals, 2,4,6-Trinitrotoluene and 2,4-dichlorophenoxy Acetic Acid, in the formats of the several online and CD/ROM vendors, have been reproduced in this volume and labeled as Figures 1 though 14.

RTECS® Data Selection, Evaluation, and Use

The toxicity information appearing in the Registry is derived from reports of the toxic effects of chemical substances. The absence of a substance from the Registry does not imply that the substance is non-toxic. A substance may not appear for a variety of reasons. Four reasons include the following: (1) the test results could not be cited because the protocol of the study did not meet the RTECS® selection criteria; (2) the substance has not yet been tested; (3) the substance has been tested, but the RTECS® literature search has not yet uncovered the data; or (4) the data are not publicly available.

RTECS®`consists of tabulations of the lowest dose reported to have caused the listed toxic effect in the designated species by the designated route of administration. The Registry includes substances which have been selected primarily for the toxic effect produced by single doses. However, when the toxic effect has been described by the author as mutagenic, tumorigenic, or as a reproductive toxicant, the toxic dose data are reported for both single and multiple dose studies. A newly established toxicity field, "Other Multiple Dose Toxicity Data and References," includes any other effects from multiple dose studies and in time will become a significant part of the Registry.

For human data, any reported adverse effect is included.

The report of the lowest total dose administered to produce the toxic effect is given preference although some editorial license is taken so that additional references might be cited. No restrictions are placed on the amount of a substance producing death in an experimental animal nor on the time period over which the dose was given. The inclusion of data with the notation "LD50>__mg/kg' or LC50>__ ppm" is intended to indicate that the substance cited has been tested up to the indicated level without reaching that level of toxicity.

The Detailed File Description of RTECS® provides details of the format and content of the various toxicity data lines. Studies reporting primary irritation to the skin and eyes are described in ¶ 10; ¶ 11 describes the mutagenic test systems and the organisms and cell types used in mutagenic testing; elements of the reproductive effects toxicity lines are described in ¶ 12; reports of positive or equivocal tumorigenic effects included in the Registry are described in ¶ 13. (Other tumorigenic data may be found on the International Agency for Research on Cancer [IARC] review lines [described in ¶ 17b] and the NTP carcinogenesis bioassay status lines [¶ 20c].) ¶ 14 describes acute toxicity data, including the system of Toxic Effects Codes (TEC). The most recently developed toxicity field, Other Multiple Dose Data, is described in ¶ 15.

Toxicity data reported in the literature are transformed into Registry format using the criteria presented in the Detailed File Description. The quality of the data on which the report is based has not been evaluated. In most cases no attempt is made to resolve any questions about the data. One of the responsibilities of theRTECS® Editorial Review Board is to review a limited number of citations to resolve any ambiguities. Citations may be suggested for Board consideration by the data abstractors, the editor, or the Registry readership. The Board will review citations for resolution of ambiguities, but will not judge the relative merits of several publications which present contradictory data on the same substance. The Registry strives to represent accurately the literature as it exists, leaving to others the problem of resolving contradictory data.

It is not the purpose of the Registry to quantitate a hazard through the use of the toxic concentration or dose data that are presented with each substance. **UNDER NO CIRCUMSTANCES CAN THE**

TOXIC DOSE VALUES PRESENTED WITH THESE CHEMICAL SUBSTANCES BE CONSIDERED DEFINITIVE VALUES FOR DESCRIBING SAFE VERSUS TOXIC DOSES FOR HUMAN EXPOSURE.

General Comments

The Editor will appreciate assistance from representatives of the industrial, academic, and governmental communities in supplying data for this Registry. Such assistance may be offered in the form of reprints of scientific publications, technical data sheets, sales or promotional material, other publicly available reference material, and data presented on unpublished studies. All material received will be considered to be in the public domain and as such may be made available to any person or organization. Data cited and published in the Registry will be selected according to the criteria presented herein. Information on errors in the file is also solicited as are general comments or recommendations. All correspondence should be addressed to:

The Editor
Registry of Toxic Effects of Chemical Substances
National Institute for Occupational Safety and Health
4676 Columbia Parkway
Cincinnati, Ohio 45226
FAX: (513) 533-8347

DETAILED FILE DESCRIPTION

Selection

Substances Included. For the purpose of this publication, the phrase "all known toxic substances" is interpreted by the Editor to mean all mined, manufactured, processed, synthesized, and naturally occurring inorganic and organic compounds. The list of substances includes drugs, food additives, preservatives, ores, pesticides, dyes, detergents, lubricants, soaps, plastics, extracts from plant and animal sources, plants and animals which are toxic by contact or consumption, and industrial intermediates and waste products from production processes. Some of the information in the file thus refers to materials whose composition is not perfectly known. The chemical substances included in this list are assumed to exhibit the reported toxic effect in their pure state unless otherwise noted. However, even in the case of a supposedly "pure" substance, there is usually some degree of uncertainty as to its exact composition and the impurities which may be present. This possibility must be considered in attempting to interpret the data presented since the toxic effects observed could in some cases be caused by a contaminant.

Substances Excluded. Excluded from the Registry are trade name products representing compounded or formulated proprietary mixtures available as commercial products. These exclusions are necessary because of difficulties in assessing the contribution of each component of a mixture to the toxicity of that substance and because the formulation of a product is often changed by varying the components, their concentration, or the purity of the ingredients. Commercial product trade names are included, however, when they represent a single active chemical entity or a well-defined mixture of relatively consistent composition. Radioactive substances are included, but the effect reported is the chemically produced effect rather than the radiation effect.

Format

All substance prime names and synonyms in the file are listed in alphabetical order, ignoring special characters, such as numerals, Greek letters, and prefixes indicating substituent locations, and stereochemical or other structural features. These components are taken into account for secondary ordering in ascending alphabetical and numerical order.

In the computer tape, each substance prime name is identified by a nine-position sequence number (two letters and seven numbers) which varies directly with the alphabetic sequence of the name, so that toluene, for example, has a higher number than benzene. Each synonym is cross-referenced to its appropriate prime name sequence number. The sequence number is simply an identifier assigned alphabetically and numerically to each substance in the Registry. It is not intentionally related to the toxicity or structure of the compound although compounds with alphabetically similar names and, in some cases, therefore, similar structures are grouped together.

For each prime name sequence number the following data are provided when available: the substance prime name and synonyms; a description of the substance (where necessary); date when the RTECS® data record was last updated; CAS Number; Beilstein Reference Number; RTECS® Number; molecular formula; molecular weight; Wiswesser Line Notation (WLN); compound descriptor code(s); primary irritation; mutagenic, reproductive, and tumorigenic effects data; acute toxicity data; other multiple dose toxicity data; ACGIH Threshold Limit Values, IARC Monograph reviews; and toxicological reviews; existing

Federal standards; NIOSH Criteria Documents, Current Intelligence Bulletins, recommended exposure levels, surveillance data and analytical methods; the NTP Carcinogenesis Testing Program; and the EPA TSCA Inventory, GENE-TOX, TSCATS Database, Section 8(a) preliminary assessment, Section 8(b) chemical inventory, and Section 8(e) status programs. Each data line and citation is referenced by CODEN to the source from which the information was extracted. A list of CODEN abbreviations and their respective titles is provided in the CODEN Master File. Each field in the RTECS® data record is discussed below and tabulated in Section C.

1. Substance Prime Name (Data Type A). The prime name of each substance in the Registry is derived from the nomenclature used by the American Chemical Society's Chemical Abstracts Service (CAS) in the Collective Index of Chemical Abstracts. The names are given in the inverted form. The complete RTECS® data record for each substance follows its prime name.

Some entries, however, appear under the chemical or descriptive names used in the reference from which the toxic data were obtained. This is particularly true for those substances of questionable composition, such as plant or animal extracts. These prime names are accompanied by a brief description or definition ("DEF") (Data Type C) listing the source of the substance, a general statement of constituents, or other pertinent information, and the CODEN citation of the reference that contained the definition.

2. Update (Data Type E). This field specifies when the data record of a substance was last changed. The format is YYYYMM, e.g., 198105 = May 1981. All 33,929 substances in the file as of January 1979 were initialized with a date of 197901. When data on a new substance are first input to the file, the update field is assigned the month of entry. When the data record is subsequently revised, the date is changed to reflect the month the change was made. Any revision, for example, deletion of an invalid synonym, addition of new toxicity data, change in the NTP status, or correction of a molecular formula, will cause the update field of the substance to change.

3. Chemical Registry Number (Data Type D). There are now two types of chemical registry numbers included in this field. The CAS number is a numeric designation assigned by the Chemical Abstracts Service of the American Chemical Society that uniquely identifies a specific chemical compound, regardless of the name or nomenclature system used.

Because CAS, on occasion, assigns new numbers to selected chemicals without withdrawing the previously assigned numbers, confusion sometimes arises. This situation occurs when a substance is better described or more accurately identified. The former RTECS® policy of listing only the current CAS number for a substance and dropping the earlier number with its periodic updates has resulted in the loss of previously accepted CAS numbers accessed by users of the database. Therefore, RTECS® will list the most recent CAS number available for a chemical and, to preserve continuity and prevent confusion, will include a second CAS number line which will list "PREVIOUS" CAS numbers. Up to ten (10) such previous CAS numbers will be listed for a substance.

An additional set of Registry Numbers for organic chemicals only is now included in this data field. These are the Beilstein Registry Numbers (BRN) and Beilstein Handbook References (BHR) of the BEILSTEIN INSTITUTE of Frankfurt am Main, Germany. This Institute, which was the publisher of the well known "HANDBUCH DER ORGANISCHE CHEMIE," currently maintains a computerized file of more than three and one half million organic chemicals, listing structures, properties, and reactions.

NIOSH and the BEILSTEIN INSTITUTE have negotiated a cross-reference agreement whereby RTECS® Numbers will appear in the Beilstein file, and Beilstein Registry Numbers will appear in RTECS®. This cross-referencing system will serve the users of each data base with a ready pointer to an additional rich source of technical information.

Each of these numbers is assigned a specific line number within the field.

4. RTECS® Number (Data Type G). The RTECS® number is a unique 9-position alphanumeric designation assigned to each prime chemical name. These numbers are permanently assigned and will not change. (They are not to be confused with the alphanumeric sequence numbers by which the file is sorted.)

5. Molecular Weight (MW) (Data Type H). The molecular weight is calculated from the molecular formula using standard elemental molecular weights (carbon = 12.01).

6. Molecular Formula (MF) (Data Type F). The molecular formula designating the elemental composition of the substances is structured according the Hill System (See Journal of the American Chemical Society, 22(8):478-494, 1900), in which carbon and hydrogen (if present) are listed first, followed by the other elemental symbols in alphabetical order. The formulas for compounds that do not contain carbon are ordered strictly alphabetically by elemental symbol. Compounds such as salts or those containing waters of hydration have molecular formulas incorporating the CAS dot-disconnect convention, in which the components are listed individually and separated by a period. The individual components of the formula are generally given in order of decreasing carbon atom count and component ratios. A lower case "x" indicates that the ratio is unknown. A lower case "n" indicates a repeating polymer-like structure. The formula is obtained from one of the cited references or a chemical reference text, or is derived from the name of the substance.

7. Wiswesser Line Notation (WLN) (Data Type J). The Wiswesser Line Notation is a line-formula chemical notation that precisely and concisely describes the structural formula of a chemical compound. This linear representation for a three-dimensional structure facilitates substructure searching for special functional groups and constituents that are part of the molecule. The WLNs allow machine retrieval by chemical characteristics.

8. Synonyms (Data Type L). Synonyms for the substance prime name are listed alphabetically according to the rule described under ***Format***. Synonyms include other chemical names, trade names, common or general names, foreign language names (with the language in parentheses), or codes. Some synonyms consist wholly or in part of registered trademarks. These trademarks are not identified as such in the RTECS® file because of limitations in the computer character sets used to produce the Registry. The Editor is aware of the problem of trademarks becoming generic trade names through common usage. While the Registry does not presently have a mechanism for noting trademarks, the lack of the appropriate registered trademark symbol does not imply that the trademarks contained herein are considered generic synonyms by NIOSH. Those trade names that are known to be obsolete, either because production and marketing of the substance has ceased or because the compound is currently manufactured under another name, are indicated with the abbreviation "(OBS)."

The American Conference of Governmental Industrial Hygienists (ACGIH) in their listing of Threshold Limit Values (TLV®), Department of Transportation (DOT) in the Hazardous Substances List, and the Occupational Safety and Health Administration in the listing of Permissible Exposure Limits (PELs) on

occasion use other than the prime chemical name in their designations. For the convenience of the user, RTECS® adds to the appropriate synonymous name in parentheses the designation ACGIH, DOT, and/or OSHA. For example, the prime name chemical 2-Pentanone, 4-Hydroxy-4-Methyl includes in its synonym field the following: Diacetone Alcohol (ACGIH, DOT, OSHA).

The reader is cautioned that some synonyms, particularly common names, may be ambiguous and refer to more than one substance. The substances may or may not be chemically similar. For example, some common names are applied in the literature both to a particular compound and to various metallic salts of that compound. In addition, the Registry's list of synonyms is not exhaustive, and the file may not include an entry for every existing use of a particular common name. Therefore, when using a synonym to look up data in the Registry, care must be taken to ensure that the substance record retrieved is for the particular substance in question and not for one with an identical common name.

9. Compound Descriptor Codes (Data Type N). For each data type "N" code found in position 10, a one-letter code appears in column 14. These codes are listed below and can be used as selection keys to extract defined subfiles of the master file. A substance entry may contain multiple "N" records.

CODE	COMPOUND DESCRIPTION
A	Agricultural Chemical
C	Tumorigen
D	Drug
H	Hormone
M	Mutagen
N	Natural Product
O	Organometallic
P	Human Data
S	Primary Irritant
T	Reproductive Effector

This compound descriptor field was developed as a search tool and, therefore, was never included in the printed edition of RTECS® or the microfiche edition.

The RTECS® compound descriptor codes do not represent an evaluation of the toxicity of a substance, nor are the codes all-inclusive with respect to use (that is, there may be some substances in the RTECS® file that should be, but are not, coded as belonging to certain application classes). The codes must be interpreted only in conjunction with the other information found in each substance data record.

The RTECS® descriptor codes fall into two categories: (1) those based on the types of toxicity data found in the substance data records and (2) those based on related information found in the references from which the data were extracted. In the first category are the following descriptor codes: tumorigen, mutagen, reproductive effector, primary irritant, and human data. As mentioned, these five classifications do not represent an evaluation of the overall toxicity of a substance by NIOSH. Rather, they indicate the type(s) of toxicity data line(s) found in the substance data record.

The descriptor code "tumorigen" is something of a misnomer. More specifically, it denotes a "substance with positive or negative tumorigen citation(s)." That is, any substance with the descriptor code

"tumorigen" will have one or more of the following in its RTECS® data record:

- One or more tumorigenic data lines (Data Type S, see Section 2. ¶13).

- One or more U.N. International Agency for Research on Cancer (IARC) review lines (Data Type V), regardless of whether the IARC review concluded that the carcinogenicity of the substance was noted as Sufficient Evidence, Limited Evidence, Inadequate Evidence, or No Evidence.

- One or more National Toxicology Program (NTP) carcinogenesis bioassay studies status lines (Data Type Y), regardless of whether the substance had only been selected for test or whether the NTP study showed Clear Evidence, Some Evidence, Equivocal Evidence, or No Evidence of Carcinogenicity, or that the test is still in progress.

Based on the above criteria, therefore, there may be some substances in RTECS® that have only negative IARC reviews or NTP status lines, but that still appear with the descriptor code "tumorigen." This is done to bring the significance of the results of the IARC reviews and the NTP studies to the user's attention. Again, this points out the need to review the complete data record before drawing any conclusion about the total toxic potential of a substance. The user must not rely solely on the descriptor code.

Any substance with the descriptor code "reproductive effector" will contain:

- One or more reproductive effects data lines (Data Type R) or

- One or more tumorigenic data lines (Data Type S) that cite either transplacental carcinogenesis (Toxic Effects Code [TEC] T65) or tumors to the reproductive system (TEC T61, T62, T63, T64, or T69). Thus, a substance reported to cause these latter two types of effects will contain both tumorigen and reproductive effector compound descriptor codes.

Any substance described as a "primary irritant" will contain one or more skin or eye irritation data lines (data Type P) in its RTECS® data record.

Finally, the descriptor code "Human Data" was added to correct a problem. In most databases, it is possible to call up all data lines containing human data with a single keystroke. This was not true of RTECS® because its editors had chosen to refine the "human data" into 5 categories (human, man, woman, child, infant). Therefore, calling for human data would yield only a portion of the desired datalines. By adding the compound descriptor code "P," all human data can be accessed with a single keystroke, and the specificity of requesting lines having the following species labels are not lost to the original toxicity data.

Hum	human
Man	man
Wmn	woman
Chd	child
Inf	infant.

The remaining five descriptor codes (agricultural chemical and pesticide, drug, organometallic, hormone, and natural product) are use or application codes and are included in the file based only on information

found in the references cited in RTECS®. For example, if an article that reports an oral-rat LD50 value for a substance indicates the substance is used as a drug or a pesticide, then it will be so coded in the file. However, if the article makes no such indication, descriptor codes will not be added the data record. Therefore, the user should recognize that these classifications are not all-inclusive; they are based solely on information in the references from which the RTECS® is compiled.

Agricultural chemicals include those used improve crop yields, such as fertilizers and pesticides of all kinds. Drugs include both commercially available (approved) compounds, as well as those that have been identified as experimental. Hormones include both those naturally found in the body and synthetic substances that act like hormones. Natural products include organic compounds that are produced by plants, animals, and microorganisms and that are not commercially synthesized.

10. Skin and Eye Irritation Data (Data Type P). Each irritation data line includes, in sequence, the tissue tested (skin or eye); the species of animal tested; the total dose and where applicable, the duration of exposure; for skin tests only, whether open or occlusive; an interpretation of the irritation response severity when noted by the author; and the reference from which the information was extracted. Only positive irritation test results are included in the Registry.

Substances that are applied topically the skin or the mucous membranes can elicit either (a) systemic effects of an acute or chronic nature or (b) local effects, more properly termed "primary irritation." A primary irritant is a substance that, if present in sufficient quantity for a sufficient period of time, will produce a non-allergic, inflammatory reaction of the skin or of the mucous membrane at the site of contact. Primary irritants are further limited by the editor to those substances that are not corrosive. Hence, concentrated sulfuric acid is not classified as a primary irritant.

a. Primary Skin Irritation. In experimental animals, a primary skin irritant is defined as a chemical substance that produces an irritant response on first exposure in a majority of the test subjects. However, in some instances compounds act more subtly and require either repeated contact or special environmental conditions (humidity, temperature, occlusion, etc.) to produce a response.

The most standard animal irritation test is the Draize procedure (Journal of Pharmacology and Experimental Therapeutics, 82: 377-390, 1944). This procedure has been modified and adopted as a regulatory test by the Consumer Product Safety Commission (CPSC) in 16 CFR 1500.41 (formerly 21 CFR 191.11). In this test a known amount (0.5 ml of a liquid or 0.5 gm of a solid or semisolid) of the test substance is introduced under a one square inch gauze patch. The patch is applied to the skin (clipped free of hair) of twelve albino rabbits. Six rabbits are tested with intact skin and six with abraded skin. The abrasions are minor incisions made through the stratum corneum, but are not sufficiently deep to disturb the dermis or produce bleeding. The patch is secured in place with adhesive tape, and the entire trunk of the animal is wrapped with an impervious material, such as rubberized cloth, for a 24-hour period. The animal is immobilized during exposure. After 24 hours the patches are removed and the resulting reaction evaluated for erythema, eschar, and edema formation. The reaction is again scored at the end of 72 hours (48 hours after the initial reading), and the two readings are averaged. A substance producing any degree of positive reaction is cited in the Registry as an irritant.

As the modified Draize procedure described above has become the standard test specified by the U.S. Government, nearly all of the primary skin irritation data either strictly adhere to the test protocol or involve only simple modifications to it. When test procedures other than those described above are

reported in the literature, appropriate codes are included in the irritation data line to indicate those deviations.

The most common modification is the lack of occlusion of the test patch, so that the treated area is left open the atmosphere. In such cases, the notation "open" appears in the irritation data line. Another frequent modification involves whole arm or whole body immersion in the test substance or, more commonly, in a dilute aqueous solution of the test substance. This type of test is often conducted on soap or detergent solutions. Immersion data are identified by the abbreviation "imm" in the data line.

The dose reported is based first on the lowest dose producing an irritant effect and second on the latest study published. The dose is expressed as follows:

- Single application by the modified Draize procedure is indicated by only a dose amount. If no exposure time is given, then the data are for the standard 72-hour test. For test times other than 72 hours, the dose data are given in mg (or in an appropriate unit)/duration of exposure, e.g., 10 mg/24H.

- Multiple applications involve administration of the dose in divided portions applied periodically. The total dose of test substance is expressed in mg (or appropriate unit)/duration of exposure, with the symbol "I" indicating intermittent exposure, e.g., 5 mg/6D-I.

The method of testing substances for primary skin irritation given in the Code of Federal Regulations does not indicate an interpretation of the response. However, some authors do include a subjective rating of the irritation observed. If such a severity rating is given, it is included in the data line as mild ("MLD"), moderate ("MOD"), or severe ("SEV"). The Draize procedure employs a rating which is included here for informational purposes only since other researchers may not categorize response in this manner.

Category Draize	Code	Skin Reaction
Mild	MLD	Well defined erythema and slight edema (edges of area well defined by definite raising)
Moderate	MOD	Moderate to severe erythema and moderate edema (area raised approximately 1 mm)
Severe	SEV	Severe erythema (beet redness) to slight eschar formation (injuries in depth) and severe edema (raised more than 1 mm and extending beyond area of exposure)

b. Primary Eye Irritation. In experimental animals, a primary eye irritant is defined as a chemical substance that produces an irritant response in the test subject on first exposure. Eye irritation study procedures developed by Draize have been modified and adopted as a regulatory test by CPSC in 16 CFR 1500.42. In this procedure, a known amount of the test material (0.1 ml of a liquid or 100 mg of a solid or paste) is placed in one eye of each of six albino rabbits; the other eye remains untreated, serving as a control. The eyes are not washed after instillation and are examined at 24, 48, and 72 hours for ocular reaction. After the recording of ocular reaction at 24 hours, any or all eyes may be further examined,

following the application of fluorescein. Any or all of eyes may also be washed with a sodium chloride solution (U.S.P. or equivalent) after the 24-hour reaction has been recorded.

A test is scored positive if any of the following effects are observed: (1) ulceration (besides fine stippling); (2) opacity of the cornea (other than slight dulling of normal luster); (3) inflammation of the iris (other than a slight deepening of the rugae or circumcorneal injection of the blood vessel); (4) swelling of the conjunctiva (excluding the cornea and iris) with eversion of the eyelid; or (5) a diffuse crimson-red color with individual vessels not clearly identifiable. A substance is an eye irritant if four of six rabbits score positive. It is considered a nonirritant if none or only one of six animals exhibits irritation. If intermediate results are obtained, the test is performed again. For the purpose of RTECS®, substances producing any degree of irritation in the eye are identified in the Registry as irritants. When an author has designated a substance as either a mild, moderate, or severe eye irritant, this designation is also reported.

The dose reported is based first on the lowest dose producing an irritant effect and second on the latest study published. Single and multiple applications are indicated as described in ¶10a above. Test times other than 72 hours are noted in the dose. All eye irritant test exposures are assumed to be continuous, unless the reference states that the eyes were washed after instillation. In this case, the notation "rns" (rinsed) is included in the data line.

c. Species Exposed. Since Draize procedures for determining both skin and eye irritation specify rabbits as the test species, most of the animal irritation data in the Registry are for rabbits, although any of the species listed in Table II may be used. The editor endeavors to include as much human data as possible since this information is directly applicable to occupational exposure. Much of this data comes from studies conducted on volunteers (such as the cosmetic or soap ingredients) or from persons accidentally exposed. When an accidental exposure, such as a spill, is cited, the data line includes the abbreviation "nse" (non-standard exposure). In these cases it is often very difficult to determine the precise amount of the substance to which the individual was exposed. Therefore, for accidental exposures an estimate of the concentration or the strength of the substance, rather than a total dose amount, is generally provided.

11. Mutation Data (Data Type Q).. Mutation data include both whole animal and *in vitro* studies. Each mutation data line includes, in sequence, the mutation test system utilized, the species of tested organism (and, where applicable, the route of administration or cell type), the exposure concentration or dose, and the reference from which the information was extracted. Only positive mutation test results are cited in the Registry.

A mutation is defined as any heritable change in genetic material. Unlike irritation, reproductive effects, tumorigenic, acute, and other multiple dose toxicity data (see ¶¶ 10, 11, 12, 13, 14, and 15, respectively), which report the results of whole animal studies, mutation data also include studies on lower organisms such as bacteria, yeasts, molds, and insects, as well as *in vitro* mammalian cell cultures. Studies of plant mutagenesis are not now included in the Registry. No attempt is made to evaluate the significance of the data or to rate the relative potency of the compound as a mutagenic risk to man.

a. Mutation Test System. A number of test systems are used to detect genetic alterations caused by chemical substances. Those systems currently cited in the Registry are listed below. Others found in the literature have been grouped together under the general term "other mutation test system" (oms). Each test system is identified by the 3-letter code shown in parentheses. For additional information about mutation tests, the reader may wish consult the Handbook of Mutagenicity Test Procedures, edited by B.J. Kilbey,

M. Legator, W. Nichols, and C. Ramel (Amsterdam: Elsevier, Second Edition, 1984).

- Mutation in Microorganisms (mmo) - System is based on the detection of heritable genetic alterations in microorganisms exposed directly the chemical substance. An enzymatic activation step is automatically included in the test procedure. To differentiate between early tests in which the activation step was not an automatic inclusion, the notation “with S9" or “without S9" will appear on the dataline.

- Micronucleus Test (mnt) - System utilizes the fact that chromosomes or chromosome fragments may not be incorporated into one or the other of the daughter nuclei during cell division.

- Specific Locus Test (slt) - System utilizes a method for detecting and measuring rates of mutation at any or all of several recessive loci.

- DNA Damage (dnd) - System detects the damage to DNA strands, including strand breaks, crosslinks, and other abnormalities.

- DNA Repair (dnr) - System utilizes methods of monitoring DNA repair as a function of induced genetic damage.

- Unscheduled DNA Synthesis (dns) - System detects the synthesis of DNA during usually non-synthetic phases.

- DNA Inhibition (dni) - System detects inhibition of DNA synthesis.

- Gene Conversion and Mitotic Recombination (mrc) - System utilizes unequal recovery of genetic markers in the region of the exchange during genetic recombination.

- Cytogenetic Analysis (cyt) - System utilizes cultured cells or cell lines to assay for chromosomal aberrations following the administration of chemical substances.

- Sister Chromatid Exchange (sce) - System detects the interchange of DNA in cytological preparations of metaphase chromosomes between replication products at apparently homologous loci.

- Sex Chromosome Loss and Nondisjunction (sln) - System measures the nonseparation of homologous chromosomes at meiosis and mitosis.

- Dominant Lethal Test (dlt) - A dominant lethal is a genetic change in a gamete that kills the zygote produced by that gamete. In mammals, the dominant lethal test measures the reduction of litter size by examining the uterus and noting the number of surviving and dead implants.

- Mutation in Mammalian Somatic Cells (msc) - System utilizes the induction and isolation of mutants in cultured mammalian cells by identification of the gene change.

- Host-Mediated Assay (hma) - System uses two separate species, generally mammalian and bacterial, to detect heritable genetic alteration caused by metabolic conversion of chemical

substances administered to host mammalian species in the bacterial indicator species.

- Sperm Morphology (spm) - System measures the departure from normal in the appearance of sperm.

- Heritable Translocation Test (trn) - Test measures the transmissibility of induced translocations to subsequent generations. In mammals, the test uses sterility and reduced fertility in the progeny of the treated parent. In addition, cytological analysis of the F_1 progeny or subsequent progeny of the treated parent is carried out to prove the existence of the induced translocation. In Drosophila, heritable translocations are detected genetically using easily distinguishable phenotypic markers, and these translocations can be verified with cytogenetic techniques.

- Morphological Transformation (mtr) - System utilizes morphological criteria to detect cytological differences between normal and transformed tumorigenic cells.

- Phage Inhibition Capacity (pic) - System utilizes a lysogenic virus to detect a change in the genetic characteristics by the transformation of the virus from noninfectious to infectious.

- Body Fluid Assay (bfa) - System uses two separate species, usually mammalian and bacterial. Test substance is first administered to host, from whom body fluid (e.g., blood or urine) is subsequently taken. This body fluid is then tested *in vitro*, and mutations are measured in the bacterial species.

- DNA Adduct (dna) - System detects the covalent bonding of chemical substances to DNA through the identification of modified nucleotides.

b. Those test species that are peculiar to mutation data cited in the Registry are designated by the 3-letter codes shown in the following table. Other species are listed in Table V.

Code		Species
Bacteria:	bcs	Bacillus subtilis
	esc	Escherichia coli
	hmi	Haemophilus influenzae
	klp	Klebsiella pneumoniae
	sat	Salmonella typhimurium
	srm	Serratia marcescens
Molds:	asn	Aspergillus nidulans
	nsc	Neurospora crassa
Yeasts:	smc	Saccharomyces cerevisiae
	ssp	Schizosaccharomyces pombe
Protozoa:	clr	Chylamydomonas reinhardi
	eug	Euglena gracilis
	omi	Other microorganisms
Insects:	dmg	Drosophila melanogaster
	dpo	Drosophila pseudo-obscura
	grh	Grasshopper

	slw	Silkworm
	oin	Other insect
Fish:	sal	Salmon
	ofs	Other fish

If the test organism is a cell type from a particular species (generally mammalian), the parent species is reported, followed by a colon and the cell type designation. For example, human leukocytes are coded "hmn:leu." The various cell types currently cited in the Registry are listed below:

Designation	Cell Type
ast	Ascites tumor
bmr	Bone marrow
emb	Embryo
fbr	Fibroblast
hla	HeLa cell
kdy	Kidney
leu	Leukocyte
lng	Lung
lvr	Liver
mmr	Mammary gland
tes	Testis
oth	Other cell types not listed above

In the case of host-mediated and body fluid assays, the host and indicator organisms are given as follows: host organism/indicator organism, e.g., "ham/sat" for a test in which hamsters were exposed the test chemical and S. Typhimurium was used as the indicator organism.

For *in vivo* mutagenic studies, the route of administration is specified following the species designation, e.g., "mus-orl" for oral administration to mice. See Table I for a complete list of routes cited in the Registry. The route of administration is not specified for *in vitro* data.

c. Units of Exposure. The lowest dose producing a positive effect is cited. The author's calculations are used to determine the lowest dose at which a positive effect was observed. If the author fails to state the lowest effective dose, two times the control dose will be used. Ideally, the dose should be reported in universally accepted toxicological units such as milligrams of test chemical per kilogram of test animal body weight. While this is possible when the actual intake of a chemical by an organism of known weight is reported, it is not possible in many systems using insect and bacterial species. When a dose is reported or where the amount can be converted to a dose unit, it is normally listed as milligrams per kilogram (mg/kg). However, micrograms (μg), nanograms (ng), or picograms (pg) per kilogram may also be used for convenience of presentation. Concentrations of gaseous substances in air are listed as parts per hundred (pph), million (ppm), billion (ppb), or trillion (ppt).

Test systems using microbial organisms usually report exposure data as an amount of chemical per liter (L), or amount per plate, well, or disc. The amount may be on a weight (gm, mg, μg, ng, or pg) or molar (millimole [mmol], micromole [μmole], nanomole [nmole], or picomole [pmole]) basis. These units

describe the exposure concentration rather than the dose actually taken up by the test species. Insufficient data currently exist to permit the development of dose amounts from this information. In such cases, therefore, the substance concentration units used by the author are reported.

Since the exposure values reported in host-mediated assays are the doses delivered to the host organism, no attempt is made to estimate the exposure concentration to the indicator organism. The exposure values cited for host-mediated assay data are in units of milligrams (or other appropriate unit of weight) of substance administered per kilogram of host body weight or in parts of vapor or gas per million (ppm) parts of air (or other appropriate concentration) by volume.

12. Reproductive Effects Data (Data Type R). Each reproductive effects data line includes, in sequence, the reproductive effects code(s), the route of exposure, the species of animal tested, the type of dose, the total dose amount administered, the time and duration of administration, and the reference from which the information was extracted. Only positive reproductive effects data for mammalian species are cited in the Registry. Because of differences in the reproductive systems among species and the systems' varying responses to chemical exposures, no attempt is made to extrapolate animal data or to evaluate the significance of a substance as a reproductive risk to humans. Each element of the reproductive effects data line is discussed below:

a. Reproductive Effects Code. For purposes of the Registry, the reproductive effects for which dose data are cited have been grouped into seven categories: paternal effects, maternal effects, effects on fertility, effects on the embryo or fetus, specific developmental abnormalities, tumorigenic effects, and effects on the newborn. Within these seven categories, 65 specific effects have been defined. The effects cited on a given data line were reported to occur in the species and at the dose level given on that line. Up to three reproductive effects are cited on a single data line. If more than three reproductive effects are reported for the same route-species-dose level-duration combination, duplicate lines will appear in this section of the file to allow complete coding of the reproductive effects.

b. Route of Exposure or Administration. See Table IV for a complete list of abbreviations and definitions of the various routes of exposure reported in the Registry. For reproductive effects data, the specific route is listed in RTECS® either when the substance was administered to only one of the parents or when the substance was administered to both parents by the same route. However, if the substance was administered to each parent by a different route, the route is indicated as "mul" (multiple).

c. Species Exposed. Reproductive effects data are cited in the Registry for mammalian species only. Species abbreviations are the same as those used for acute toxicity data and are shown in Table V. Also shown in Table V are approximate gestation periods.

d. Type of Exposure. Only two types of exposure, TDLo and TCLo, are used to describe the dose amounts reported for reproductive effects data. These two terms, which are also used to describe toxic dose data, are defined in ¶14d.

e. Dose Amounts and Units. The total dose amount that was administered to the exposed parent is given. If the substance was administered to both parents, the individual amounts to each parent are added together and the total amount shown. Where necessary, appropriate conversion of dose units is made. The dose amounts listed are those for which the reported effects are statistically significant. The statistical test is that used by the author. If no statistic is reported, a Fisher's Exact Test is applied with significance at

the 0.05 level, unless the author makes a strong case for significance at some other level.

Dose units are usually given as an amount administered per unit body weight or as parts of vapor or gas per million parts of air by volume. A complete description of dose units is given in ¶14e. There is no limitation on either the quantity or concentration of the dose or the duration of exposure reported to have caused the reproductive effect.

f. Time and Duration of Treatment. The time when a substance is administered to either or both parents may significantly affect the results of a reproductive study, because there are differing critical periods during the reproductive cycles of each species. Therefore, to provide some indication of when the substance was administered, which should facilitate selection of specific data for analysis by the reader, a series of up to four terms follows the dose amount. These terms indicate to which parent(s) and at what time the substance was administered. The terms take the general form:

(uD male/vD pre/w-xD preg/yD post)

where u = total number of days of administration to male prior to mating
v = total number of days of administration to female prior to mating
w = first day of administration to pregnant female during gestation
x = last day of administration to pregnant female during gestation
y = total number of days of administration to lactating mother after birth of offspring

If administration is to the male only, then only the first of the above four terms is shown following the total dose to the male, e.g., 10 mg/kg (5D male). If administration is to the female only, then only the second, third, or fourth term, or any combination thereof, is shown following the total dose to the female. For example:

10 mg/kg (3D pre)
10 mg/kg (3D pre/4-7D preg)
10 mg/kg (3D pr/4-7D per/5D post)
10 mg/kg (3D pre/5D post)
10 mg/kg (4-7D preg)
10 mg/kg (4-7D preg/5D post)
10 mg/kg (5D post) (NOTE: This example indicates administration to the lactating mother only after birth of the offspring.)

If the administration is to both parents, then the first term and any combination of the last three terms are listed, e.g., 10 mg/kg (5D male/3D preg/4-7D post). If administration is continuous through two or more of the above periods, the above format is abbreviated by replacing the slash (/) with a dash (-). For example, 10 mg/kg (3D pre-5D post) means a total of 10 mg/kg administered to the female for three days prior to mating, on each day during gestation, and for five days following birth. Approximate gestation period for various species are shown in Table V.

g. Multigeneration Studies. Some reproductive studies entail administration of a substance to several consecutive generations, with the reproductive effects measured in the final generation. The protocols for such studies vary widely. Therefore, because of the inherent complexity and variability of these studies,

they are cited in RTECS® in a simplified format as follows:

The specific route of administration is reported if it was the same for all parents of all generations; otherwise, the abbreviation "mul" is used. The total dose amount shown is that administered to the F_0 generation only (as described in ¶12e above); doses to the F_n (where n = 1,2,3, etc.) generations are not reported. The time and duration of treatment for multigeneration studies are not included in the data line. Instead, the dose amount is followed by multigeneration, e.g., 10 mg/kg multigeneration. The reader must consult the cited reference for complete details of the study protocol.

13. Tumorigenic Data (Data Type S). Tumorigenic dose data also appear under data type R. The format of these data types are identical to that of the acute toxicity data line, which is described in detail in ¶14. Briefly, each tumorigenic data line sequentially includes toxic effects code(s), the route of exposure, the species of animal studied, the type of dose (either TDLo or TCLo), the total dose amount administered, the duration of exposure, and the reference from which the information was extracted. Only positive or equivocal tumorigenic reports are cited in this section. For other information about tumorigenicity, the reader should see the IARC monograph review lines (¶17b), the ACGIH review lines (¶17a), and the NTP status lines (¶20d).

The importance attached to reports of the carcinogenic activity of substances necessitates a more detailed discussion of the criteria used to include this type of data in the Registry. Tumorigenic citations are classified according to the reported results of the study only to aid the reader in selecting appropriate references for in-depth review and evaluation. The two classifications used are V01, indicating a positive carcinogenic finding, and V02, indicating a study producing benign tumors. A third classification, V03, was added to denote those studies reporting uncertain, but seemingly positive, results. The criteria for these three classifications are listed below. As explained in the Introduction, these criteria are used to abstract the data in individual reports on a consistent basis and do not represent a comprehensive evaluation of the tumorigenic potential of a substance to humans.

Because of the increasing concern with carcinogens in the occupational environment, the Registry cites multiple studies in which tumorigenic responses were reported. That is, for a given substance, a particular route-species combination may be cited more than once if the results of the multiple studies are coded V01, V02, or V03. These multiple tumorigenic entries have been cited simply with a toxicity measure of TD (toxic dose) or TC (toxic concentration).

The following nine technical criteria are used by RTECS® to abstract the toxicological literature and classify studies that report positive tumorigenic responses. NO ATTEMPTS ARE MADE EITHER TO EVALUATE THE VARIOUS TEST PROCEDURES OR TO CORRELATE RESULTS FROM DIFFERENT EXPERIMENTS.

(a) A citation is coded with the TEC "V01" (carcinogenic) when review of an article reveals that <u>all</u> of the following criteria are satisfied:

! A statistically significant increase in the incidence of tumors in the test animals. The statistical test is that used by the author. If no statistic is reported, a Fisher's Exact Test is applied with significance at the 0.05 level, unless the author makes a strong case for significance at some other level.

- A control group of animals is used and the treated and control animals are maintained under identical conditions.

- The sole experimental variable between the groups is the administration or non-administration of the test substance (see i below).

- The tumors consist of autonomous populations of cells of abnormal cytology capable of invading and destroying normal tissues, or the tumors metastasize as confirmed by histopathology.

(b) A citation is coded with the TEC "V02" (neoplastic) when review of an article reveals that all of the following criteria are satisfied:

- A statistically significant increase in the incidence of tumors in the test animals. The statistical test is that used by the author. If no statistic is reported, a Fisher's Exact Test is applied with significance at the 0.05 level, unless the author makes a strong case for significance at some other level.

- A control group of animals is used, and the treated and control animals are maintained under identical conditions.

- The sole experimental variable between the groups is the administration or non-administration of the test substance (see i below).

- The tumors consist of cells that closely resemble the tissue of origin, that are not grossly abnormal cytologically, that may compress surrounding tissues, but that neither invade tissues nor metastasize; or

- The tumors produced cannot definitely be classified as either benign or malignant.

(c) A citation is coded with the TEC "V03" (equivocal tumorigenic agent) when some evidence of tumorigenic activity is presented, but one or more of the criteria listed in (1) or (2) above is lacking. Thus, a report with positive pathological findings, but with no mention of control animals, is coded V03. Reports in which the results are not interpretable are not cited in the Registry.

(d) Since an author may make statements or conclusions based on a larger context than that of the particular data reported, papers in which the author's conclusions differ substantially from the evidence presented in the paper are subject to review by the RTECS® Editorial Review Board.

(e) All doses except for those for transplacental carcinogenesis are reported in RTECS® in one of the following formats.

- For all routes of administration other than inhalation: Cumulative dose in mg (or other appropriate unit)/kg/duration of administration.

Whenever the dose reported in the reference is not in the above units, conversion to this format is made based on the information given in ¶14e. The total cumulative dose is derived from the lowest dose level that produces tumors in the test group.

! For inhalation experiments: Concentrations in ppm (or mg/m^3)/total duration of exposure. The concentration refers to the lowest concentration that produces tumors.

(f) Transplacental carcinogenic doses are reported in RTECS® in one of the following formats:

! For all routes of administration other than inhalation: Cumulative dose in mg/kg/(time of administration during pregnancy). The cumulative dose is derived from the lowest single dose that produces tumors in the offspring. The chemical is administered to the mother.

! For inhalation experiments: Concentration in ppm (or mg/m^3)/(time of exposure during pregnancy). The concentration refers to the lowest concentration that produces tumors in the offspring. The mother is exposed to the chemical either during pregnancy or lactation.

(g) For the purposes of RTECS®, all test chemicals are reported as pure, unless otherwise stated by the author. This does not rule out the possibility that unknown impurities may have been present.

(h) A mixture of compounds whose test results satisfy the criteria in (1), (2), or (3) above is included if the composition of the mixture can be clearly defined.

(i) For tests involving promoters or initiators, a study is included if the following conditions are satisfied (in addition to the criteria in (1), (2), or (3) above:

! The test chemical is applied first followed by an application of a standard promoter. A positive control group in which the test animals are subjected to the same standard promoter under identical conditions is maintained throughout the duration of the experiment. The data are not used if no mention of positive and negative control groups is made in the reference.

! A known carcinogen is first applied as an initiator, followed by application of the test chemical as a promoter. A positive control group in which the test animals are subjected to the same initiator under identical conditions is maintained throughout the duration of the experiment. The data are not used if no mention of positive and negative control groups is made in the reference.

14. Acute Toxicity Data (Data Type T). Each dose data line sequentially includes toxic effects; the route of exposure; the species of animal studied; the type of dose; the amount of substance per body weight or concentration per unit of air volume and, where applicable, the duration of exposure; and the reference from which the information was extracted. Each element of the acute toxicity line is discussed below.

a. Toxic Effects. The toxic effects listed in the Registry should not be viewed as an exhaustive representation of all the potential toxic effects of a compound. Beginning in October 1980, a coding system was developed to include over 400 different effects. These effects are noted in the Registry by means of an alphanumeric Toxic Effects Code (TEC). The TEC permits a detailed coding of the toxic effects reported in the literature and is included for human and animal data.

In the computer tape, the TEC is the first entry on the toxicity data line; it appears to the left of the route of administration. Each TEC is made up of one or more code segments, each of which contains three characters. Each TEC, which may contain as many as three code segments, is preceded by a single digit (1, 2, or 3) that indicates the number of segments. For example, the entry "2J18K13" indicates two code

segments: J18 and K13. An explanation of the individual code segments is given below.

The first position of each segment is alphabetic and describes an organ, tissue or functional system, or other major physiological or behavioral grouping. Positions two and three are numeric damage codes that specify individual toxic effects within each system. A complete list of TECs, including all major system groupings and individual damage coded, appears in Table II. Using Table II to decode the preceding example (2J18K13), the reader finds that for the "J18" TEC segment, the "J" represents the lung as the affected organ and the "18" indicates pleural thickening. For "K13," "K" represents the gastrointestinal system and "13" means nausea or vomiting.

In selected CD-ROM and online versions, the codes have been expanded to their verbal equivalents as reported in Tables II and III.

In using the TEC, the reader should be aware of the following restrictions:

- Specific TECs included in Table II may change as more experience is gained in coding the literature. Some may be deleted, while others may be added. The TEC is not static and will be changed to reflect the information reported in the literature.

- TECs listed in each line describe effects reported only for the route and species specified on that line.

- The TECs listed in the Registry should not be viewed as an exhaustive representation of all the potential toxic effects of a compound. This caution results from two considerations. The first is that each RTECS® data line is limited to a maximum of three code segments. For studies in which more than three effects were reported, only those deemed most significant will be listed. Second, the effects are limited to those that meet the basic selection criteria for inclusion in the Registry, i.e., lowest dose for a given route-species combination. Unique effects reported in studies not cited in the Registry would, therefore, not be listed herein. This restriction is important because, for example, studies done to determine acute LD50 values often report little other information besides the LD50 itself.

b. Route of Exposure or Administration. Although many exposures to substances in the industrial community occur via the respiratory tract or skin, most studies in the published literature report exposures of experimental animals in which the test substances were introduced primarily through the mouth by pills, in food, in drinking water, or by intubation directly into the stomach. The abbreviations and definitions of the various routes of exposure reported in the Registry are found in Table IV.

c. Species Exposed. Since the effects of exposure of humans are of primary concern, we have indicated, when available, whether the results were observed in man, woman, child, or infant. If no such distinction was made in the reference, the abbreviation "hmn" (human) is used. (NOTE: it is also possible to search out all human data by using the Compound Descriptor Code "P" for human data). However, the results of studies on rats or mice are the most frequently reported and hence provide the most useful data for comparative purposes. The species and abbreviations used in reporting toxic dose data are listed alphabetically in Table V.

d. Description of Exposure. Six abbreviations are used to describe the administered dose reported in

the literature. These abbreviations indicate whether the dose caused death (LD) or other toxic non-lethal effect (TD), or whether it was administered as a lethal concentration (LC) or toxic concentration (TC) in the inhaled air. In general, the term "Lo" is used where the number of subjects studied was not a significant number from the population or the calculated percentage of subjects showing an effect was 100. The doses and concentrations are defined as follows:

TDLo--Toxic Dose Low--The lowest dose of a substance introduced by any route, other than inhalation, over any given period of time and reported to produce any toxic effect in humans or to produce tumorigenic, reproductive, or multiple dose effects in animals.

TCLo--Toxic Concentration Low--the lowest concentration of a substance in air to which humans or animals have been exposed for any given period of time that has produced any toxic effect in humans or produced tumorigenic, reproductive, or multiple dose effects in animals.

LDLo--Lethal Dose Low--the lowest dose (other than LD50) of a substance introduced by any route, other than inhalation, over any given period of time in one or more divided portions and reported to have caused death in humans or animals.

LD50--Lethal Dose Fifty--a calculated dose of a substance which is expected to cause the death of 50% of an entire defined experimental animal population. It is determined from the exposure to the substance by any route other than inhalation of a significant number from that population. Other lethal dose percentages, such as LD1, LD10, LD30, and LD99, may be published in the scientific literature for the specific purposes of the author. Such data would be published in the Registry if these figures, in the absence of a calculated lethal dose (LD50), were the lowest found in the literature.

LCLo--Lethal Concentration Low--the lowest concentration of a substance in air, other than LC50, which has been reported to have caused death in humans or animals. The reported concentrations may be entered for periods of exposure that are less than 24 hours (acute) or greater than 24 hours (subacute and chronic).

LC50--Lethal Concentration Fifty--a calculated concentration of substance in air, exposure to which for a specified length of time is expected to cause the death of 50% of an entire defined experimental animal population. It is determined from the exposure to the substance of a significant number from that population.

e. Units of Dose Measurement. As in almost all experimental toxicology, the doses given are expressed in terms of the quantity administered per unit body weight, or quantity per skin surface area, or quantity per unit volume of the respired air. In addition, the duration of time over which the dose was administered is also listed, as needed.

Dose amounts are generally expressed as milligrams (one thousandth of a gram) per kilogram (mg/kg). In some cases, because of dose size and its practical presentation in the file, micrograms (one millionth of a gram) per kilogram (μg/kg), or nanograms (one billionth of a gram) per kilogram (ng/kg) are used. Volume measurements of dose were converted to weight units by appropriate calculations. Densities were obtained from standard reference texts. Where densities were not readily available, doses were reported as milliliters per kilogram (ml/kg).

All body weights are converted to kilograms (kg) for uniformity. For those references in which the dose

was reported to have been administered to an animal of unspecified weight or a given number of animals in a group (e.g., feeding studies) without weight data, the weights of the respective animal species are assumed to be those listed in Table V and the dose listed on a per kilogram body weight basis. Assumptions for daily food and water intake are found in Table V to allow approximating dosages for humans and experimental animals where the dose was originally reported as a concentration in food or water. The values presented are selections which are reasonable for the species and convenient for dose calculations.

Concentrations of a gaseous substance in air are generally listed as parts of vapor or gas per million parts of air by volume (ppm). However, parts per hundred (pph or percent), parts per billion (ppb), or parts per trillion (ppt) may be used for convenience of presentation. If the substance is a solid or a liquid, the concentrations are listed preferably as milligrams per cubic meter (mg/m^3), but may, as applicable, be listed as micrograms per cubic meter (μ/m^3), nanograms per cubic meter (ng/m^3), or picograms per cubic meter (pg/m^3) of air. For those cases in which other measurements of contaminants are used, such as the number of fibers or particles, the measurement is spelled out.

f. Duration of Exposure. The duration of exposure is included to give an indication of the testing period during which the animal was exposed to the total dose.

Where the duration of exposure is available, time is presented as minutes (M), hours (H), days (D), weeks (W), or years (Y). Additionally, continuous (C) indicates that the exposure was continuous over the time administered, such as ad libitum feeding studies or 24-hour, 7-day per week inhalation exposures. Intermittent (I) indicates that the dose was administered during discrete periods, such as daily, twice weekly, etc. In all cases, the total duration of exposure appears first after the kilogram body weight and slash, followed by descriptive data; e.g., 10 mg/kg/3W-I means ten milligrams per kilogram body weight administered over a period of three weeks, intermittently in a number of separate, discrete doses. This description is intended to provide the reader with enough information for an approximation of the experimental conditions, which can be further clarified by studying the reference cited.

g. Frequency of Exposure. Frequency of exposure to the test substance varies depending on the nature of the experiment. For the purposes of the Registry, frequency of exposure is given for inhalation experiments, for human exposures (where applicable), or where reproductive, tumorigenic, or other multiple dose data are specified (see ¶ 12, 13, and 15 respectively).

15. Other Multiple Dose Toxicity Data (Data Type U). Citations in this field include the results of multiple dose toxicity studies, of variable duration, which relate to other than mutagenic, reproductive, or tumorigenic effects. The format is similar to that found in the tumorigenic effects data field, where toxic rather than lethal doses are indicated, including duration of exposure. The numerical dose data is a cumulative amount over the duration of the study. The most common study designs include thirteen week, twenty-six week, fifty-two week, and two year studies. Because the effects described in this field are nonlethal, the TECs assume an important descriptive role.

Shown below is a summary of the several categories of toxicity data entries (¶ 12-15), where they appear in the file, and how they are used.

			Toxic Data Type	
	Exposure Regime	**Route of Exposure**	**Human**	**Animal**
LD50	Single dose	All except inhalation	Not applicable	Acute lethality (data type T) statistically determined
LC50	Single dose	Inhalation	Not applicable	Acute lethality (data type T) statistically determined
LDLo	Single dose (except for human data)	All except inhalation	Data type T	Acute lethality (data type T)
LCLo	Single dose (except for human data)	Inhalation	Data type T	Acute lethality (data type T)
LD	Single dose	All except inhalation	Not applicable	Acute lethality (data type T) lethal dose > dose reported
LC	Single dose	Inhalation	Not applicable	Acute lethality (data type T) lethal dose > dose reported
TDLo	Single or multiple dose	All except inhalation	All non-lethal (data types R, S, T, U)	Non-lethal (data types R, S, U)
TCLo	Single or multiple dose	Inhalation	All non-lethal (data types R, S, T, U)	Non-lethal (data types R, S, U)
TD	Single or multiple dose	All except inhalation	Not applicable	Tumorigenic (data type S)
TC	Single or multiple dose	Inhalation	Not applicable	Tumorigenic (data type S)

16. Cited References. The final entry on each irritation, mutation, reproductive effects, tumorigenic, acute toxicity, and multiple dose data line is the reference from which the information was extracted. All references cited are publicly available. No government classified documents have been used for source information. All references have been given a unique six-letter CODEN character code (derived from the American Society for Testing and Materials "CODEN for Periodical Titles," which identifies periodicals, serial publications, and individual published works). For example, "CNREA8" is the CODEN for Cancer Research, and "PCBPBS" for Pesticide Biochemistry and Physiology. For those references for which no CODEN was found, the corresponding six-letter codes includes asterisks (*) in the last one or two positions, following the first four or five letters of the acronym for the publication title. Following the CODEN designation (for most entries) is the number of the volume, followed by a comma; the

page number of the first page of the article, followed by a comma; and a four-digit number, indicating the year of publication. When the cited reference is a report, the report number is listed. Where contributors have provided information on their unpublished studies, the CODEN consists of the first three letters of the last name, the initials of the first and middle names, and a number sign (#). The date of the letter supplying the information is listed. All CODEN acronyms are listed in alphabetical order and defined in the CODEN Master File (see Section C.2).

17. Reviews (Data Type V). Three types of reviews are listed: (1) Threshold Limit Values (TLVs®), which recommend limits proposed by the American Conference of Governmental Industrial Hygienists (ACGIH); (2) International Agency for Research on Cancer (IARC) monograph reviews, which are published by the United Nations World Health Organization (WHO); and (3) general toxicology review articles.

a. Threshold Limit Value (TLV®). The TLV® is an ACGIH-recommended concentration of a substance to which most workers can be exposed without adverse effect. The TLV® may be expressed as a time-weighted average (TWA), as a short term exposure limit (STEL), or as a ceiling value (CL). The TWA is for a normal 8-hour workday or 40-hour work week. The STEL is the maximum concentration to which workers can be exposed for up to 15 minutes, provided no more than four excursions per day are permitted with at least 60 minutes between exposure periods and provided the daily TWA is not also exceeded. The CL is the concentration that should not be exceeded even instantaneously. The notation "(skin)" indicates that even though the air concentration may be below the limit value, significant additional exposure to the skin may be dangerous.

A separate TLV® review line is included for those substances that ACGIH has classified as human carcinogens (either with or without an assigned TLV®) or suspected carcinogens.

The TLVs® are taken from the "DOCUMENTATION OF THE THRESHOLD LIMIT VALUES FOR SUBSTANCES IN WORKROOM AIR" (sixth edition, 1990 and subsequent annual editions). Copies of the complete TLV® Documentation may be ordered from:

ACGIH
1330 Kemper Meadow Drive
Cincinnati, Ohio 45240
Telephone (513) 742-2020, FAX (513) 742-3355.

The reader is cautioned that the TLVs® are revised periodically. A "Notice of Intended Changes" for substances for which either a TLV® is proposed for the first time or for which a change to an existing TLV® is proposed is published annually by ACGIH. Proposed changes are considered trial limits for two years, after which they are considered for inclusion as adopted TLVs®. Only substances for which TLVs® have been adopted and final documentation prepared are cited in the Registry.

In addition, some TLVs® are recommended for classes of substances rather than for individual compounds. These classes may be based on certain chemical or physical properties, such as solubility, that have not been determined for all potential members of the class. This makes it difficult to cite individual substances belonging to the class. Any questions about the TLV® citations in the Registry should be directed to ACGIH. Any errors should be brought to the attention of the RTECS® Editor at the address given in the Introduction.

b. IARC Cancer Reviews. In the United Nations International Agency for Research on Cancer (IARC) monographs, information on suspected environmental carcinogens is examined, and summaries of available data with appropriate references are presented. Included in these reviews are synonyms, physical and chemical properties, uses and occurrence, and biological data relevant to the evaluation of carcinogenic risk to humans. The 66 monographs in the series contain an evaluation of approximately 1,000 substances. Single copies of the individual monographs (specify volume number) can be ordered from WHO Publications Centre, U.S.A., 49 Sheridan Avenue, Albany, New York 12210, telephone (518) 436-9686.

The entry "IARC CANCER REVIEW" indicates that some carcinogenicity data pertaining to a compound has been reviewed by the IARC committee. The Registry summarizes the committee's conclusion in three words. The first indicates whether the data pertains to humans or to animals. The next two words indicate the degree of carcinogenic risk as defined by IARC.

The evidence of carcinogenicity in experimental animals is assessed by IARC and judged to fall into one of four groups defined as follows:

- SUFFICIENT EVIDENCE of carcinogenicity is provided when there is an increased incidence of malignant tumors: (1) in multiple species or strains; or (2) in multiple experiments (preferably with different routes of administration or using different dose levels); or (3) to an unusual degree with regard to the incidence, site or type of tumor, or age at onset. Additional evidence may be provided by data on dose-response effects.

- LIMITED EVIDENCE of carcinogenicity is available when the data suggest a carcinogenic effect but are limited because (1) the studies involve a single species, strain, or experiment; (2) the experiments are restricted by inadequate dosage levels, inadequate duration of exposure to the agent, inadequate period of follow-up, poor survival, too few animals, or inadequate reporting; or (3) the neoplasms produced often occur spontaneously and, in the past, have been difficult to classify as malignant by histological criteria alone (e.g., lung adenomas and adenocarcinomas, and liver tumors in certain strains of mice).

- INADEQUATE EVIDENCE is available when, because of major qualitative or quantitative limitations, the studies cannot be interpreted as showing either the presence or absence of a carcinogenic effect.

- NO EVIDENCE applies when several adequate studies are available which show that

within the limitations of the tests used, the chemical is not carcinogenic.

It should be noted that the categories SUFFICIENT EVIDENCE and LIMITED EVIDENCE refer only to the strength of the experimental evidence that these chemicals are carcinogenic and not to the extent of their carcinogenic activity, nor to the mechanism involved. The classification of any chemical may change as new information becomes available.

The evidence for carcinogenicity from studies in humans is assessed by the IARC committee and judged to fall into one of four groups defined as follows:

- SUFFICIENT EVIDENCE of carcinogenicity indicates that there is a causal relationship between the exposure and human cancer.

- LIMITED EVIDENCE of carcinogenicity indicates that a causal relationship is credible, but that alternative explanations, such as chance, bias, or confounding, could not adequately be excluded.

- INADEQUATE EVIDENCE, which applies to both positive and negative evidence, indicated that one of two conditions prevailed: (a) there are few pertinent data; or (b) the available studies, while showing evidence of association, do not exclude chance, bias, or confounding.

- NO EVIDENCE applies when several adequate studies are available which do not show evidence of carcinogenicity.

IARC has also published, as Supplement 7, a volume entitled "Overall Evaluation of Carcinogenicity: An Updating of IARC Monographs Volumes 1 to 42." In this Supplement, and in monographs 43 onward, chemicals have been classified in the following groups:

Group 1. The Working Group concluded that the listed agents are carcinogenic to humans.

Group 2A The Working Group concluded that the listed agents are **probably** carcinogenic to humans.

Group 2B The Working Group concluded that the listed agents are **possibly** carcinogenic to humans.

Group 3 The Working Group concluded that the listed agents are not classifiable as to their carcinogenicity to humans.

Group 4 The working Group concluded that the listed agent is probably not carcinogenic to humans.

For any chemical listed in RTECS® which appears in one of these groups, its group designation is noted in the Review field, immediately following the IARC Monograph lines.

These cancer reviews reflect only the conclusions of the IARC committees based on the data available for the committee's evaluation. Hence, for some substances there may be disagreement between the IARC determination and the information on the tumorigenic data lines (see ¶13). Also, some substances previously reviewed by IARC may be reexamined as additional data become available. These substances will contain multiple IARC review lines, each of which is referenced to the appropriate IARC volume.

c. Toxicology Reviews. The entry "TOXICOLOGY REVIEWS" indicates that the cited review article has been located in the literature. Each review is identified by its CODEN citation. These articles discuss one or more facets of the toxicology of the substance or the general class to which the substance belongs. Most of these references do not contain specific dose value that can be cited in the Registry. However, the reviews do provide useful information about the toxicity of the substance or group of related substances. The reader is cautioned that the scope of discussion varies greatly among the reviews. Some articles may contain a complete, detailed description of the toxicity of a substance; others may address only a particular aspect of the toxicity (e.g., effect of a substance on fetal development, or body fluid and tissue levels of a substance found under conditions of poisoning); and others may only list the substance in a general discussion of the toxicity of a class of compounds.

18. Standards and Regulations (Data Type W). This section contains notations indicating the substance is regulated by an agency of the United States Government, either by DOT, EPA, MSHA, or OSHA, or as Occupational Exposure Limits (OEL) by other nations around the world. DOT refers to substances regulated for shipment by the U.S. Department of Transportation. EPA refers to substances regulated by the Federal Insecticide Fungicide, and Rodenticide Act (FIFRA) of the U.S. Environmental Protection Agency. MSHA refers to standards promulgated by the Mine Safety and Health Administration, under Subpart D, Section 56 of the Federal Mine Safety and Health Act of 1977. These have been codified in 30CFR 56.0001. OSHA refers to standards promulgated under Section 6 of the Occupational Safety and Health Act of 1970. These have been codified in the Code of Federal Regulations (CFR), Part 29, and are referred to as Permissible Exposure Limits (PELs). OEL refers to the Occupational Exposure Limits published by several nations around the world.

All United States standards and regulations are listed in the appropriate Federal Register (FR) or Code of Federal Regulations (CFR) reference. Because of frequent changes to and litigation of federal regulations, it is recommended that the reader contact the applicable agency for information about the current standards for a particular substance. Omission of a substance or regulatory notation from the Registry does not imply any relief from regulatory responsibility.

a. DOT (or occasionally International Maritime Organization [IMO]) regulations are noted by the entry "DOT" or "IMO," followed by (a) the hazard class and (b) the label(s) required. Except

for certain export and import shipments, no person may offer or accept a hazardous material, as defined by the Code of Federal Regulations, Title 49, for transportation in commerce within the United States unless that material is properly classed, described, packaged, marked, labeled, and in the condition for shipment as specified by 49CFR, Parts 100 to 189. For transportation purposes, a hazardous material means a substance or material which has been determined by the Secretary of Transportation to be capable of posing an unreasonable risk to health, safety, and property when transported in commerce and which has been so designated.

Specific definitions are given for each hazard class addressed in 49 CFR; however, DOT reserves the right to regulate materials whether or not they meet these definitions. The basic hazard classes include compressed gases, flammables, oxidizers, corrosives, explosives, radioactive materials, and poisons. Although a material may be designated by only one hazard class, additional hazards may be indicated by adding labels or by using other means directed by the DOT.

It is essential, therefore, to know the hazard class of a substance and to use the proper label. Generally, a material meeting the DOT definition of a poison must always be labeled as a poison, regardless of the other labeling requirements to ensure adherence to the prohibition against shipping poisons with foodstuffs.

Specific shipping names are designated for hazardous materials listed in 49 CFR. Because of the presence of many nontechnical names or the use of archaic names for some materials, it is necessary to identify the DOT shipping names. The approved DOT shipping names are included as synonyms of the prime names and are identified by the addition of "(DOT)" to the name.

Substances not specified in 49 CFR and not appearing in the Registry are not necessarily exempt from DOT regulations. The Registry contains only those substances specifically identified in 49 CFR. Generic names or general descriptive names, such as "insecticide, liquid," are not included in the Registry. Determination of the correct classification for transportation of materials not specifically identified in 49 CFR is the responsibility of the shipper.

b. EPA FIFRA standards indicate pesticides that are subject to registration or reregistration under the Federal Insecticide, Fungicide, and Rodenticide Act, as amended. The amendments were issued in four parts, representing four lists of pesticides: (a) Federal Register 54(35), page 7740, Feb 22, 1989; (b) Federal Register 54(100), page 22706, March 25, 1989; (c) Federal Register 54(140), page 30848, July 24, 1989; and (d) Federal Register 54(204), page 4388, October 24, 1989.

c. MSHA air contaminants standards are noted with the entry "air," followed by "MSHA STANDARD." The standards for coal mines are defined in Subpart D, Section 56.0001 of 30 CFR as follows: "The exposure to airborne contaminants shall not exceed, on the basis of a time-weighted average, the threshold limit values adopted by the American Conference of Governmental Industrial Hygienists, as set forth and explained in the 1972 edition of the

publication, entitled 'TLVs® Threshold Limit Values for Chemical Substances in Workroom Air' adopted and published by ACGIH for 1972, pages 1 through 54." Standards for metal and nonmetal mines were adopted in like manner from the 1973 edition of "TLV® Threshold Limit Values for Chemical Substances in Workroom Air." For those substances where a change in TLV® was adopted in 1973, the air contaminant standards for coal mines and for metal and nonmetal mines differ. Therefore, these RTECS® substances will include two lines: (1) MSHA Coal Mine Standard; and (2) MSHA metal and nonmetal mine standard.

d. OSHA air contaminant standards are noted by the entry "OSHA PEL" (Permissible Exposure Limit). These PELs are derived from four sections (tables) of 29CFR. The four cited sections are:

General Industry Standards	29CFR 1910.1000, 94
Constructions Standards	29CFR 1926.55, 94
Shipyard Standards	29CFR 1915.1000,93
Standards for Federal Contractors	41 CFR 50-204.50,94.

The PEL may be further described by one or more of the following terms: "8-hour TWA"(time-weighted average); "STEL" (short term exposure limit); or "CL" (ceiling). The TWA is the employee's airborne exposure in any 8-hour work shift of a 40-hour work week which shall not be exceeded. The STEL is the employee's 15-minute time-weighted average, which shall not be exceeded at any time during the work day. A time period other than 15 minutes may be specified in parentheses behind the notation "STEL." The CL is the employee's exposure, which shall not be exceeded at any time during the work shift. The notation "(skin)," following the PEL for a substance indicates that even though the air concentration may be below the PEL, significant additional exposure to the skin may be dangerous. The use of personal protective equipment, engineering controls, or work practices is required. (Another designation is applied to substances listed on the Z-2 table: "PK," which refers to the acceptable maximum peak concentration above the ceiling concentration.)

Some workplace exposures consist of more than one contaminant. OSHA regulations provide for the reduction of PELs based on additive or synergistic health effects.

OSHA Cancer Hazard and OSHA Suspect Cancer Agent designations may appear on a subsequent data line for selected substances regulated by OSHA as carcinogens.

The reader is cautioned that some OSHA PELs are promulgated for classes of compounds rather than for individual substances. These classes may be based on certain chemical or physical properties that have not been well defined for every member of the class. Any questions about specific OSHA PELs should be directed to:

OSHA
Office of Public Affairs
Room N-3647

Department of Labor
200 Constitution Avenue, NW
Washington, D.C. 20210
Telephone (202) 219-8151.

e. International Occupational Exposure Limits (OELs). In recent years, RTECS® has become widely used around the world. Therefore, to increase RTECS® relevance to the international scientific community (from which its data are drawn), OELs from many nations were acquired, collated, and added to the RTECS® in 1993. These data have just been updated (in 1996). The nations whose standards are listed, and the source from which RTECS® obtained the OELs are as follows:

Arab Republic of Egypt	Letter from: National Institute of Occupational Safety and Health, Heliopolis, A.R.E. Mrs. Laila El Hariry, General Director of the International Relations Department
Argentina	Letter from Dr. Carlos Anibal Rodrigues, Ministerio de Trabajo y Seguridad Social de la Nacion Buenos Aires, Argentina
Australia	Occupational Safety and Health Series, No. 37 Occupational Exposure Limits for Airborne Toxic Substances International Labour Office, Geneva
Austria	Maximale Arbeitsplatz-Konzentrationen Gesundheitsschädlicher Arbeitsstoffe MAK-Werte-Liste
Belgium	Occupational Safety and Health Series, No. 37 Occupational Exposure Limits for Airborne Toxic Substances International Labour Office, Geneva
Colombia	Letter from: Consejo Colombiano de Seguridad Renan Alfonso Rojas Gutierrez, Executive Director
Denmark	Grænseværdier for stoffer og materialer Copenhagen

France	Valeurs limites d'exposition professionnelle Aux agents chimiques en France
Germany	Deutsche Forschungsgemeinschaft List of MAK and BAT Values, 1974 Commission for the Investigation of Health Hazards of Chemical Compounds In the Work Area Report No. 30
Hungary	Letter from: ORSZAGOS Munkavedelmi Tudomanyos Kutató Intézet Dr. Jenó Molnar, Director
India	Directorate General Factory Advice Service and Labour Institute Government of Industry, Ministry of Labour H. N. Gupta, Director General
Japan	Occupational Exposure Limits for Airborne Toxic Substances Occupational Safety and Health Series, No.37 International Labour Office, Geneva
Jordan	Letter from: The Hashemite Kingdom of Jordan Vocational Training Corporation Occupational Safety and Health Institute A. Abdel-Jaber, Director
Korea	Korea Industrial Safety Corporation (KISCO) Industrial Safety and Health Research Institute Seoul, Korea Park Pil - Soo, December 21, 1996
The Netherlands	De Nationale MAC-lijst - 1995 - P 145
New Zealand	Letter and booklet (Workplace Exposure Standards) from: Occupational Safety and Health General Manager's Office Wellington, New Zealand Phillip Marshal, Information Manager

Norway	Letter and list from: Direktortet for Arbeidstilysnet Oslo, Norway Nils-Petter Wedege, Deputy Director-General
The Philippines	Letter from: Republic of the Philippines; Occupational Safety and Health Center; Department of Labor and Employment Evelyn F. Tablang, Officer-in-Charge
Poland	Interdepartmental Commission for Updating the Register of Maximum Allowable Concentrations and Intensities for Harmful Agents in the Working Environment Ministry of Labour and Social Policy Poland
Portugal	Letter from Instituto de Desenvolvimento e Inspecção das Condições de Trabalho Álvaro Durão O Vice-presidente Lisboa, Portugal
Russia	Occupational Exposure Limits for Airborne Toxic Substances International Labour Office, Geneve
Singapore	Letter from: Republic of Singapore Department of Industrial Health Ministry of Labour Tan Kia Tang, Director
Sweden	Statute Book of the Swedish National Board Of Occupational Safety and Health: Occupational Exposure Limit Values
Switzerland	Valeurs limites d'exposition and postes de travail SUVA-CNA-INSAI

Thailand	Letter and table of values from: National Institute for the Improvement of Working Conditions and Environment (NICE) Department of Labour Bangkok, Thailand Dr.Chaiyuth Chavalitnitikul, Director
Turkey	Letter from: Occupational Health and Safety Institute P.K. 393 06443 Yenişehir Ankara, Turkey Dr. Handan Uysal Sabir, Director
United Kingdom	Occupational Exposure Limits Guidance Note EH 40/95 Health and Safety Executive

19. NIOSH Standards Development and Surveillance Data (Data Type X). This section contains information generated by NIOSH in two areas of endeavor. The Standards Development Programs produces Recommended Exposure Levels (RELs). The Surveillance Program has conducted two nationwide surveys of work sites and some of its findings are noted in this "X" field.

a. NIOSH Recommended Exposure Level (REL). This section indicates that a NIOSH recommendation for occupational exposure has been published. The RELs may appear in any of several document forms: Criteria Documents, Current Intelligence Bulletins, Special Hazard Reviews, Occupational Hazard Assessments, and Technical Guidelines. NIOSH also periodically presents testimony before various Congressional committees and at regulatory hearings convened by OSHA and MSHA. The testimony presented always includes the current NIOSH policy concerning the particular hazard in question. A summary of NIOSH recommendations is contained in DHHS (NIOSH) Publication 92-100.

b. NIOSH Occupational Exposure Survey data. NIOSH Survey Data (NOHS, 1974, or NOES, 1983) lines indicate that data on potential occupational exposure to the substance exist in one or both of the databases assembled as a result of national surveys of industry in the United States. The first survey, the National Occupational Hazard Survey (NOHS) was conducted from February 1972 to June 1974; the second, the National Occupational Exposure Survey (NOES) from November 1980 to May 1983. The intent of both surveys was to associate potential exposure agents (chemical, physical, and biological) with industry types, occupations, and specific surveyed facilities.

In both surveys, the sample of surveyed facilities was designed to permit projections to the national level based, on survey results. It is possible, for example, to estimate the total number of people potentially exposed to a particular agent. Among other data reporting capabilities of each survey are the actual number of industries, occupations, or facilities in which an agent was observed.

There are several limitations, dictating the need for caution and some reservations, that must be observed in the interpretation and any subsequent use of the occupational exposure data presented in this field.

- The occupational exposure data presented for each survey were representative of the workplace at the respective times each survey was conducted. The data are becoming progressively more dated, and as a consequence, less representative of the current situation.

- Data in both surveys were collected using observational techniques. No environmental levels of chemical or biological contaminants or degrees of physical hazards were actually measured.

- Neither survey covered industries in mining or agriculture. The sample universe of the NOHS did not include rural areas. The NOES did not include Federal, State, or local governments, financial, real estate, or retail trade industries.

- Exposure data reported for both surveys are provisional. In both cases, the majority of exposure data (approximately 70%) recorded during both surveys was by trade name product. Subsequent detailed component information for these trade name products was sought from the manufacturers and incorporated into the respective survey databases.

Basic Parameters of both surveys are as follows:

	Survey	
Parameter	**NOHS**	**NOES**
Start date of field survey	February 1972	November 1980
End date for field survey	June 1974	May 1983
Estimated number of plants in the survey universe	739,244	508,697
Estimated number of employees in the survey universe	38,262,627	33,409,031
Number of plants surveyed	4,636	4,490
Number of employees surveyed	893,725	1,830,330
Number of different occupations surveyed	453	410
Number of agents seen	8,000+	9,000+
Number of unique trade name products	80,000	100,000

Types of data appearing on the survey data lines for each substance and the abbreviations used in

the text are as follows.

HAZARD CODE (HZD) - a five-position identifier used exclusively by NIOSH for search and retrieval of data from either survey database.

NUMBER OF INDUSTRIES (NIS) - number of industries, as defined by standard 4-digit industrial classification (SIC) codes, in which the agent was observed.

TOTAL NUMBER OF FACILITIES (TNF) - estimated (nationwide) total number of facilities in which the agent is thought to be present.

NUMBER OF OCCUPATIONS (NOS) - number of occupations, as defined by the Bureau of Census Occupational codes, in which the agent was observed.

TOTAL NUMBER OF EMPLOYEES (TNE) - estimated (nationwide) total number of employees thought to be exposed to the agent.

TOTAL NUMBER OF FEMALE EMPLOYEES (TFE)* - estimated (nationwide) total number of female employees thought to be exposed to the agent.

*NOTE: These data are available for the NOES only.

Questions specific to the occupational survey data reported in the Registry should be directed to:

NIOSH
Surveillance Branch, Hazard Section
Mail Stop R-19
4676 Columbia Parkway
Cincinnati, Ohio 45226
FAX: (513) 841-4489

Detailed descriptions of the surveys and their resulting databases are available in the following NIOSH technical reports:

Survey Manual (NOHS)
DHEW (NIOSH) Publication No. 74-127 (1974)
Available from the National Technical Information Service (NTIS)
Stock No. PB 274241

Data Editing and Database Development (NOHS)
DHEW (NIOSH) Publication No. 77-213 (1977)
Available from the National Technical Information Service (NTIS)
Stock No. PB274819

Survey Analysis and Supplemental Tables (NOHS)
DHEW (NIOSH) Publication No. 78-114 (1977)
Available from the National Technical Information Service (NTIS)
Stock No. PB82-229881

Survey Manual (NOES)*
DHHS (NIOSH) Publication No. 88-106 (1987)

Sampling Methodology (NOES)*
DHHS (NIOSH) Publication No. 89-102 (1989)

Analysis of Management Interview Responses (NOES)*
DHHS (NIOSH) Publication No. 89-103 (1989)

* Available while supplies last from:
NIOSH Publications Office
4676 Columbia Parkway
Cincinnati, Ohio 45226
FAX: (513) 533-8573

20. Status (Data Type Y). This section provides information on the activities of various governmental agencies regarding the substance. Status lines are currently listed for ATSDR, EPA, NIOSH, NTP, and OSHA.

a. The Agency for Toxic Substances and Disease Registry (ATSDR) has been directed by the Superfund Amendments and Reauthorization Act of 1986 (SARA) to prepare toxicological profiles for hazardous substances that pose the most significant potential threat to human health, as determined by ATSDR and the Environmental Protection Agency (EPA). Each profile is intended to characterize the toxicological and adverse health effects information for the hazardous substance being described. The currently available profiles are noted in the Status field of the appropriate chemical records. Also noted is the NTIS Stock Number of each profile.

b. EPA status entries are included for five portions of the Toxic Substances Control Act (TCSA), Public Law 94-469: Section 8(a) preliminary assessment information, Section 8(b) chemical inventory, Section 8(d) Health and safety studies, and Section 8(e) substantial risk information, and TSCA Test Submissions Database (TSCATS). Additional status lines are listed for two other EPA programs: GENE-TOX and IRIS.

A TSCA inventory citation indicates that the substance appears on the Chemical Inventory prepared in 1986 by the EPA in accordance with provisions of Section 8(b) of TSCA. Substances reported in the inventory include those that are produced commercially in or imported into this country. The reader should note, however, that substances already regulated by EPA under

FIFRA and by the Food and Drug Administration (FDA) under the Food, Drug, and Cosmetic Act, as amended, are not included in the TSCA inventory. Similarly, alcohol, tobacco, and explosive substances are not regulated under TSCA. TSCA regulations should be consulted for an exact definition of reporting requirements. Approximately eight percent of the RTECS® chemicals are contained in the TSCA inventory.

A preliminary assessment information status line indicates that EPA has promulgated both a final and a proposed rule under Section 8(a) of TSCA, reporting and retention of information. The final rule requires chemical manufacturers and, in some cases, processors and importers to report production and exposure-related data on approximately 250 chemicals to EPA. Included in this status line is a citation to the Federal Register issue (volume 47, page 26992, June 22, 1982) in which the rule appeared. This reference should be consulted for a complete explanation of the rule. The proposed rule (Federal Register, volume 47, page 27009, June 22, 1982) covered an additional 350 chemicals for which similar reporting would be required.

Under TSCA Section 8(d), manufacturers, importers, and/or processors of a substance specified by the EPA Administrator must submit lists and copies of unpublished health and safety studies on that substance. Specified substances include chemical substances that are selected for consideration for testing rules under TSCA section 4, as well as other chemicals that EPA had identified as of concern under TSCA. A "health and safety" study is interpreted broadly and may include not only formal studies but also other types of information relating to health and environmental effects, including relevant monitoring and exposure data.

A substantial risk status line indicates that EPA has received and reviewed information submitted under Section 8(e) of TSCA, which requires that persons who obtain information which reasonably supports the conclusion that a substance presents substantial risk of injury to human health or the environment must notify EPA within 15 days. These notices are reviewed by EPA and an initial evaluation is prepared containing, if appropriate, follow-up questions to the submitter, referrals to other agencies, and decisions to list the chemical for a Section 8 reporting rule or to undertake a formal risk assessment. The submissions and the initial evaluations are in the Public Reading Room, 447 East Tower, Waterside Mall, 401 M Street, SW, Washington, D.C. 20460. Persons wishing to request a copy of these notices may write to the EPA Freedom of Information Office (A-101), Washington, D.C. 20460. A duplication fee will be charged. The reader should note that many 8(e) notices represent a company's first review of a situation or datum and a judgment in compliance with the statute to submit a notice within 15 days of obtaining the information. EPA published its evaluations of these notices in order to make widely available this Section 8(e) information in a form understandable to the general public.

The TSCATS was developed to make unpublished test data submitted to EPA available to the public. Test is broadly defined to include case reports, episodic incidents (such as spills), and formal test study presentations. The database (except for the microfiche version) allows searching of test submissions according to specific chemical identity or type of study. Studies are indexed under three broad subject areas: health effects, environmental effects, and environmental fate.

Additional controlled vocabulary index terms are assigned that describe the experimental protocol and test observations. Records identify reference information needed to locate the source document, as well as the submitting organization and reason for submission of the test data. This database is updated quarterly on magnetic tape and is made available to the public through NTIS. Microfiche copies of the unpublished documents cited in TSCATS are also available through NTIS.

GENE-TOX: A Genetic Toxicology program status line indicates that the substance has been reported in the literature for potential genetic effects. The test protocol in the literature is evaluated by an EPA Expert Panel on Mutations and a positive or negative effect of the substance is evaluated and reported. To obtain additional information about this program, contact GENE-TOX Program, EPA, 401 M Street SW, TS796, Washington, D.C. 20460, telephone (202) 260-1513.

IRIS: The Integrated Risk Information System is the EPA electronic on-line database of summary health risk assessment and regulatory information on chemical substances. The primary purpose of IRIS is to provide guidance risk values to EPA risk assessors and decision makers for use in EPA risk management decisions. EPA staff and EPA contractors are expected to use the risk information in IRIS for those chemicals in the database. The information contained in IRIS, except as specifically noted, has been reviewed and agreed upon by intra-agency review groups comprised of EPA scientists, having extensive experience in risk assessment. Thus, the information in IRIS represents an expert Agency consensus.

c. NIOSH status lines are included for those substances for which an analytical method(s) has been developed by NIOSH or for substances for which NIOSH Current Intelligence Bulletins (CIBs) have been issued. The chemicals listed in the Fourth Edition of the "NIOSH Manual of Analytical Methods (NMAM)" are also cited in the RTECS®. The sampling and measurement methods in the NMAM Fourth Edition are revisions and additions to those contained in the previous editions

d. There are two types of National Toxicology (NTP) status lines listed in the RTECS® file. The first indicates that the substance has been or is being tested by the NTP under its Carcinogenesis Testing Program. These entries were identified as National Cancer Institute (NCI) status lines in issues of the Registry prior to July 1980. However, the NCI Carcinogenesis Testing Program has been absorbed by NTP, and the status lines have been reformatted accordingly. The following different citations are used to reflect the current test status of the compound: nominated for test; selected for test; currently undergoing test; or test completed. These citations are updated as each bioassay progresses. Selection of a chemical for bioassay does not necessarily imply that it is a carcinogen. Also, a compound originally selected and even scheduled for bioassay may be withdrawn from the program anytime during testing or before testing actually begins. This initial selection is cited in the Registry but is deleted when the compound is removed from the test. It is, therefore, important that the reader monitor these status lines for changes. The bioassay itself normally takes about two and one half years to

conduct, and another year is required to prepare the final report. When this report is released, the report number and test results are listed, and, where applicable, specific tumorigenic dose lines (see ¶10) are generated. In June 1983, NTP adopted five categories of interpretive conclusions for use in their technical reports. The Registry citations make use of these same five categories in the NTP Status Lines. As defined by NTP, the categories (which refer to the strength of the experimental evidence) are as follows:

CLEAR EVIDENCE of Carcinogenicity is demonstrated by studies that are interpreted as showing a chemically related increased incidence of malignant neoplasms, studies that exhibit a substantially increased incidence of benign neoplasms, or studies that exhibit an increased incidence of a combination of malignant and benign neoplasms where each increases with dose.

SOME EVIDENCE of Carcinogenicity is demonstrated by studies that are interpreted as showing a chemically related increased incidence of benign neoplasms, studies that exhibit marginal increases in neoplasms of several organs/tissues, or studies that exhibit a slight increase in uncommon malignant or benign neoplasms.

EQUIVOCAL EVIDENCE of Carcinogenicity is demonstrated by studies that are interpreted as showing a chemically related marginal increase of neoplasms.

NO EVIDENCE of Carcinogenicity is demonstrated by studies that are interpreted as showing no chemically related increases in malignant or benign neoplasms.

INADEQUATE STUDY of Carcinogenicity demonstrates that because of major qualitative or quantitative limitations, the studies cannot be interpreted as valid for showing either the presence or absence of a carcinogenic effect.

Final reports for some bioassays may not be published because the data are insufficient, and this is noted in the Registry where applicable. Also, some substances may be selected by NTP for retest after the first bioassay is completed and the final report issued. These duplicate studies are noted on a separate NTP status line. Some of the early NCI testing was not done in accordance with the strict experimental protocols now used. The results of these studies were not published as NCI bioassay reports, but instead appeared in the literature as journal articles. These are noted on the NTP status lines as “studies” rather than “bioassays,” and reference to the journals are given. To obtain additional information about the Carcinogenesis Testing Program or the status of a particular substance under test, or to obtain copies of the final bioassay reports, contact the Central Data Management, Mail Drop E1-02, NIEHS, P.O. Box 12233, Research Triangle Park, North Carolina 27709, telephone (919) 541-3991.

The second type of NTP status line indicates that the substance is listed in the “NTP Biennial Report on Carcinogens.” This cumulative list is published in accordance with Public Law 95-622, which requires that the Secretary of Health and Human Services publish a biennial report containing “. . . a list of all substances (i) which either are known to be carcinogens or which may

reasonable be anticipated to be carcinogens and (ii) to which a significant number of persons residing in the United States are exposed . . ." Included for each of the 198 chemicals in the report is a description of the substance, including a brief synopsis of the scientific evidence that led to its inclusion in the report. This is immediately followed by information about the regulatory activities of the NTP-participating federal agencies. For additional information about the report, contact the Environmental Health Information Service (EHIS), telephone (919) 541-3841 National Toxicology Program, P.O. Box 12233, Research Triangle Park, North Carolina 27709, telephone (919) 541-3841. Subsequent NTP reports on Carcinogens will be cited in future issues of the Registry.

e. OSHA Status: The OSHA status line that now appears in RTECS® is a notation that a validated analytical method(s) has been developed for the chemical by OSHA and appears in its Manual of Analytical Methods. The manual, in loose leaf form, can be ordered from the American Conference for Governmental Industrial Hygienists (ACGIH) (513) 742-2020. OSHA Manual of Analytical Methods: Inorganic Methods (ID-101 to ID-210) publication number 4545; Organic Methods (#1-80) publication number 4542, Organic Methods Supplement (#55-80) publication number 4544.

RTECS® ON-LINE

The NIOSH Registry of Toxic Effects of Chemical Substances (RTECS®) is available as a real-time interactive computer database from six different sources: (1) the National Library of Medicine (NLM) TOXNET System; (2) the Chemical Information System [CIS]; (3) Chemical Abstracts Service-Science and Technology Network [CAS/STN];
(4) DataStar®, produced by Knight-Ridder Information, Inc.; (5) Deutsches Institute für Medizinsche Dokumentation und Information [DIMDI]; and (6) DIALOG®, produced by Knight-Ridder Information, Inc. These systems permit the user to search the RTECS® file for specific data or subsets of data and to compile RTECS® subfiles tailored to a specific need. Updates to these systems are provided on a quarterly basis.

NATIONAL LIBRARY OF MEDICINE: MEDLARS/TOXNET SYSTEM

MEDLARS is NLM's computerized literature retrieval service, which is available through a nationwide network of more than 1300 NLM on-line centers. The MEDLARS RTECS® file is accessed like other NLM files on the TOXNET system and is available as a standard service to all NLM on-line service subscribers. The RTECS® data fields are structured in a format similar to that in which they previously appeared in the printed and microfiche Registry. RTECS® records can be searched on a given route, species, toxic dose type, toxic effect, etc., and can be retrieved by entering their names, RTECS® accession numbers, or Chemical Abstracts Service (CAS) registry numbers. Terms may be entered singly or combined using AND, OR, and AND NOT. One can generate subfiles of compounds having similar attributes -- for example, all substances for which IARC monographs have been issued. Records can be printed online at the user's terminal, or offline and mailed to the user from NLM.

For additional information on how to interrogate the medlars RTECS® file contact:

National Library of Medicine
6200 Rockville Pike
Bethesda, Maryland 20894
Phone: 301-496-1131
Toll Free: 1-800-525-9083
FAX: 301-480-3537
Internet: http://www.nlm.nih.gov/
publications/factsheets/online_databases.html

CHEMICAL ABSTRACTS SERVICE-SCIENCE AND TECHNOLOGY NETWORK (CAS-STN)

In October 1991, RTECS® became available on STN International. Special features of this online system include chemical structure display for all records, which include CAS Registry Numbers, easily read tabular displays of toxicity date, RTECS® in the locator (LC) field of the Registry file to identify substances covered in RTECS®, easy crossover to related files, such as MSDS-CCOHS, MEDLARS, and the CA File, tabular FA (Field Available) display for complete data list, and complete numerical searching capability.

For information contact:

CAS/STN® International
Chemical Abstracts Service
P.O. Box 3012
Columbus, Ohio 43210
Phone: 614-447-3600
Toll Free: 1-800-848-6538
(U.S. and Canada only)
FAX: 614-447-3713
Internet: http://info.cas.org/ONLINE/CATALOG/rtecs.html
E-mail: help@cas.org

THE CHEMICAL INFORMATION SYSTEM (CIS)

The Chemical Information System (CIS) consists of a collection of chemical databases that were initially developed by the National Institutes of Health and the Environmental Protection Agency. These databases, which now include RTECS®, are available commercially through CIS. Twenty-three RTECS® data fields are available for searching. Range searching of toxicity data, a feature not generally available, can be performed. Using the "SANS" component of CIS, one can specify an actual chemical structure or substructure or its name and generate a list of all compounds in the RTECS® file that contain the feature. Chemical structures may also be displayed. Data may be displayed in an abbreviated or an expanded format.

For information contact:

Chemical Information System
810 Gleneagles Court, Suite 300
Towson, Maryland 21286
Phone: 410-321-8440
Toll Free: 1-800-CIS-USER
FAX: 410-296-0712

DATASTAR®

DataStar® and DataStar®/DIALOG® Europe are products of the Knight-Ridder Information, Inc., and carry RTECS® on both systems.

For information, contact:

DataStar®
Knight-Ridder Information, Inc.
2440 W. El Camino Real
Mountain View, California 94040
Phone: 415-254-8800
Toll Free: 1-800-334-2564
Internet: http://www.krinfo.ch/krinfo/products/datastar/sheets/RTECS.HTM

DataStar®/DIALOG® Europe
Knight-Ridder Information, Inc.
Haymarket House, 1 Oxendon Street
London SW1 Y4EE
UNITED KINGDOM
Phone: 011-44-171-930-5503

DEUTSCHES INSTITUTE FÜR MEDIZINISCHE DOKUMENTATION UND INFORMATION/DIMDI

For information, contact:

DIMDI
Weisshausstrasse 27
D50939
Koeln GERMANY
Phone: 011-221-472-4252
FAX: 011-49-221-411429
Internet: http://www.dimdi.de/

DIALOG®

The DIALOG® network offers RTECS® as File 336. The database can be accessed over the DIALOG/NET, TYMNET, TELENET, and INWATS telecommunications systems in the United States and abroad.

Once a user's search has been established, the output can be accessed and/or printed either in abbreviated form or fully spelled out. DIALOG® offers several search enhancements, e.g., (S) proximity operator and Key Word in Context (KWIC) format. They have also prepared a detailed documentation of the layout and characteristics of the RTECS® file.

For information, contact:

DIALOG®
Knight-Ridder Information, Inc.
2440 W. El Camino Real
Mountain View, California 94040
Phone: 415-254-8800
Toll Free: 1-800-334-2564
FAX: 415-254-8785
Internet: http://www.krinfo.com/dialog/databases/dialog3.html

RTECS® ON CD-ROM

The most recent addition to the RTECS® formats is the laser-read compact disc system known as Compact Disc-Read Only Memory (CD-ROM), which is similar in principle to the digital audio compact discs. These systems offer the convenience of a personal computer to search the database without the need for telecommunications. The complete RTECS® file (with additional selected databases) is contained on a single, 3.72-inch diameter disc and enables the user to search the database, build subfiles, print paper copies, or download to floppy discs as desired.

A CD-ROM reader-driver, which can be used for the many information packages now being produced in this medium, is required. Quarterly updates, including operating software, are provided by the vendors of these systems on a yearly lease program. At this time, the following three commercial versions of RTECS® on CD-ROM are being marketed.

CCINFODisc by CANADIAN CENTRE FOR OCCUPATIONAL HEALTH AND SAFETY

The CCINFODisc System, produced by the Canadian Centre for Occupational Health and Safety (CCOHS), presents RTECS® in both English and French on their C2 chemical information compact disc. The data are expanded and no abbreviations or codes are used. It is produced for use on MS-DOS, MS-WINDOWS™, and MACINTOSH™ Systems. Using the "Findit" software system, the user can access RTECS® data via any of the twenty-six data fields.

For information, contact:

Canadian Centre for Occupational Health and Safety
250 Main Street, East
Hamilton, Ontario
CANADA L8N IH6
Phone: 905-570-8094
Toll Free: 1-800-668-4284 (U.S. and Canada only)
FAX: 905-572-2206
Internet: http://www.ccohs.ca/
E-mail: custserv@ccohs.ca

CHEM-BANK™ by SilverPlatter Information, Inc.

The CHEM-BANK™ compact disc marketed by SilverPlatter Information, Inc., contains the complete RTECS® file along with the Hazardous Substance Data Bank (HSDB), produced by the National Library of Medicine (NLM), Oil and Hazardous Materials Technical Assistance Data System (OHMTADS), and the Integrated Risk Information System (IRIS), both produced by the Environmental Protection Agency (EPA) and the Chemical Hazard Response Information System (CHRIS), produced by the United States Coast Guard. Free text searching is possible and desired subfiles can be extracted using Boolean operators. Introductory screens are provided to identify

field designations and techniques for developing search strategies. It is also possible to "browse" through the file using the "INDEX" operator. The information can be displayed in either DOS or WINDOWS™ format.

For information, Contact:

SilverPlatter® Information, Ltd.
10 Barley Mow Passage
Cheswick, London W4 4PH
UNITED KINGDOM
Phone: 011-44-81-995-8242
FAX: 011-44-81-995-5159
Internet: http://www.silverplatter.com/

OR

SilverPlatter® Information, Inc
100 River Ridge Drive
Norwood, Mass. 02062-5026
Phone: 617-769-2599
Toll Free: 1-800-343-0064
FAX: 617-769-8763
Internet: http://www.silverplatter.com/

ENVIRONMENTAL HEALTH AND SAFETY SERIES by MICROMEDEX

The Environmental Health and Safety Series (including TOMES PLUS®) disc produced by Micromedex, Inc. was developed to provide data in the areas of toxicology, occupational medicine, and environmental science. It is produced in DOS and WINDOWS formats. RTECS® is part of the collection, which also includes the Hazardous Substance Data Bank (HSDB) from the National Library of Medicine, the Integrated Risk Information System (IRIS) from the Environmental Protection Agency, the Teratogen Information System (TERIS) from the University of Washington, the NIOSH Pocket Guide to Chemical Hazards, and several others.

By using menu-driven software, the system will access RTECS® records by chemical name or name fragments, RTECS® number or CAS Registry numbers. It offers a direct approach, especially aimed at easy access of individual substance records, which are displayed in a systematic outline format.

For information contact:

Micromedex, Inc.
6200 South Syracuse Way
Suite 300
Englewood, Colorado 80111-4740
Phone: 303-486-6400
Toll Free: 1-800-525-9083
FAX: 303-486-6464
Internet; HTTP://WWW.MDX.COM
E-MAIL; info@mdx.com

RTECS® ON COMPUTER TAPE

The RTECS® Computer Tape is composed of two major sections that are described separately below:

1. RTECS® Master File is composed of 107-character fixed length records. Each record (line) contains a sequence number, a data type (code that defines the type of information on the line), a line number, and the actual data. The file is arranged sequentially by ascending sequence number. The first three fields define the data in the fourth field and determine the sequence of each record in the file.

RTECS® MASTER FILE LAYOUT

FIELD NO.	FIELD NAME	POSITION	DESCRIPTION
1	Sequence Number	1-9	Alphanumeric
2	Data Type	10	Alphabetic
3	Line Number	11-13	Numeric
4	Data	14-107	Alphanumeric

Data Feld No. 2 contains 1of the 21 codes shown in Table VI, and Data Field No. 4 contains the corresponding data. All data except types “G” and “H” are variable-fielded, beginning in position 14. Data type “G” is fix-fielded (with the format AANNNNNNN) in positions 14-22. Data type “H” is fix-fielded (with the format xxx.xx) in positions 14-20. Only data types “A,” “B,” “C,” “J,” and “L” can have more than one data record line; i.e., data beginning on line 010 may be continued on line 011 if necessary.

The following material is a tabular description of the file layout:

The listing below specifies elements of the data lines in fields “A” through “Y” and their columnar positions in the file.

FIELD	POSITION	DATA DESCRIPTION
A. - Prime Chemical Name (Section B, ¶1)	14-107	Name may occupy additional lines, e.g., A011, A012, etc.
B - Cross Reference	14-107	Synonymous name, Sequence Number of Prime Name. May occupy multiple lines.
C - Definition	14-107	Identification of natural products. May occupy multiple lines.
D - Chemical identification Numbers (Section B, ¶3)	14-107	CAS Registry Number. Format: leading zeros Beilstein Handbook Reference. Format: xx-xx-xx Beilstein Registry Number
E - Update field (Section B, ¶2)	14-17	Date record last changed. Format: YYYYMM
F - Molecular Formula (Section B, ¶6)	14-107	Empirical formula.
G - RTECS® Number (Section B, ¶4)	14-22	Unique identifier. Format: AANNNNNNN.
H - Molecular Weight (Section B, ¶5)	14-20	Format: xxx.xx
J - Wiswesser Line Notation (Section B, ¶7)	14-107	May occupy multiple lines.
L - Synonyms (Section B, ¶8)	14-107	May occupy multiple lines.
N - Compound Descriptor Code (Section B, ¶ 9)	14	Alphabetic symbol.
P - Irritation Data (Section B, ¶10)	14-16 18-20 22-42 64-107	Route of Administration Species Tested Dose Data CODEN
Q - Mutation Data (Section B, ¶11)	14-16 18-20 22-50 OR 14-16 18-20 22-24 26-56 64-107	Mutation Test System. Organism Dose Data Mutation Test System Indicator Organism Tissue Tested Dose Data CODEN
R - Reproductive Data (Section B, ¶ 12)	14 15-17, 18-20, 21-23	Number of TECs (1, 2, or 3) Toxic Effect Codes (TEC)

	24-26	Route of Administration.
	28-30	Species Tested
	32-35	TDLo or TCLo
	37-60	Dose Data
	74-107	CODEN
S - Tumorigenic Data	14	Number of TECs (1, 2, or 3).
(Section B, ¶ 13)	15-17, 18-20, 21-23	TECs
	24-26	Route of Administration.
	28-30	Species Tested.
	32-35	TDLo or TCLo.
	37-70	Dose Data.
	74-107	CODEN
T - Acute Toxicity Data	14	Number of TECs (1, 2, or 3).
(Section B, ¶ 14)	15-17, 18-20, 21-23	TECs.
	24-26	Route of Administration
	28-30	Species Tested.
	32-35	LD50, LC50, LDLo, LCLo, TDLo, or TCLo.
	37-70	Dose Data
	74-107	CODEN
U - Other Multiple Dose Data	14	Number of TECs (1, 2, or 3)
(Section B, ¶ 15)	15-17, 18-20, 21-23	TECs.
	24-26	Route of Administration.
	28-30	Species Tested.
	32-35	TD, TDLo, TC, or TCLo.
	37-60	Dose Data.
	74-107	CODEN
V - Reviews	14-62	ACGIH, IARC, or TOXICOLOGY Reviews
(Section B, ¶ 17)	64-107	CODEN
W - Standards and Regulations	14-82	DOT, EPA, MSHA, OSHA Regs., OELs.
(Section B, ¶ 18)	84-107	CODEN
X - NIOSH Documentation and Surveillance	14-82	Recommended Exposure Levels
(Section B, ¶ 19)	84-107	CODEN
	OR	
	14-107	NOHS, NOES (Two lines for each entry)
Y - Status	14-82	ATSDR, EPA, NIOSH, NTP, or OSHA Status
(Section B, ¶ 20)	84-107	CODEN

2. RTECS® CODEN Master File. The CODEN file, the second file of the 1997 RTECS® computer tape, is formatted as shown below. This file provides the complete bibliographic citation for each CODEN on the data type C, P, Q, R, S, T, U, V, W, and Y lines. See ¶ 16 of the Detailed File Description.

Field No.	Field Name	Position	Description
1	CODEN	1-6	Alphanumeric
2	Line Number	7-8	Numeric
3	Bibliographic Data	9-107	Alphanumeric

A full listing of all CODEN designations currently listed in RTECS® is available on request from the editor. `

TABLE I. RTECS® ABBREVIATIONS

asn -Aspergillis nidulans
ast -Ascites tumor
bcs -Bacillus subtilis
bfa -body fluid assay
BHR -Beilstein Handbook Reference
bmr -bone marrow
brd -bird (domestic)
BRN -Beilstein Reference Number
bwd -wild bird species
C -continuous
cc -cubic centimeter
chd -child
ckn -chicken
CL -ceiling concentration
clr -Chlamydomonas reinhardi
ctl -cattle
cyt -Cytogenetic Analysis
D -day
dck -duck
DEF -definition
dlt -Dominant Lethal Strain
dmg -Drosophila melanogaster
dna -DNA Adduct
dnd -DNA Damage
dni -DNA Inhibition
dnr -DNA repair
dns -Unscheduled DNA Synthesis
dom -domestic
DOT -Department of Transportation
dpo -Drosophila pseudo-obscura
emb -embryo
EPA -Environmental Protection Agency
esc -Escherichia coli

eug -Euglena gracillis
eye -administration into the eye (irritant)
fb -fiber
fbr -fibroblast
frg -frog
gm -gram
gpg -guinea pig
grb -gerbil
grh -grasshopper
H -hour
ham -hamster
gram)
hla -HeLa cell
hma -Host-mediated Assay

hmn -human
hor -horse, donkey
I -intermittent
ial -intraaural
IARC -International Agency for Research on Cancer
iat -intraarterial
ice -intracerebral
icv -intracervical
idr -intradermal
idu -intraduodenal
ihl -inhalation
imm -immersion
imp -implant
ims -intramuscular
inf -infant
ipc -intraplacental
ipl -intrapleural
ipr -intraperitoneal
irn -intrarenal
isp -intraspinal
itr -intratracheal
itt -intratesticular
iu -international unit
iut -intrauterine
ivg -intravaginal
ivn -intravenous
kdy -kidney
kg -kilogram (one thousand grams)
klp -Klebsiella pneumoniae
L -liter
LC50 -lethal concentration, 50 percent kill
LCLo -lowest published lethal concentration

LD50 -lethal dose, 50 percent kill
LDLo -lowest published lethal dose
leu -leukocyte
liq -liquid
lng -lung
lvr -liver
lym -lymphocyte
M -minute
m^3 -cubic meter
mam -mammal (species unspecified)
mg -milligram (one thousandth gram, 10^{-3}

mky -monkey
mL -milliliter

hmi -Haemophilus influenzae

MLD -mild irritant effect

TABLE I. RTECS® ABBREVIATIONS (continued)

mmo -Mutation in Microorganism
mmol -millimole
mmr -mammary gland
mnt -Micronucleus Test
MOD -moderate irritation effect
mol -mole
mppcf -million particles per cubic foot
mrc -Gene Conversion and Mitotic Recombination
msc -Mutation in Mammalian Somatic Cells
MSHA-Mine Safety and Health Administration
mtr -Morphological Transform
mul -multiple routes
mus -mouse
ng -nanogram (one billionth of a gram, 10^{-9} gram)
nml -non-mammalian species
nmol -nanomole
NOES -National Occupational Exposure Survey
NOHS -National Occupational Hazard Survey
nsc -Neurospora crassa
NTP -National Toxicology Program
OBS -obsolete (trade name)
ocu -ocular
OEL -Occupational Exposure Limit
ofs -other fish
omi -other microorganisms
oms -other mutation test systems
oin -other insects
open -open irritation test
orl -oral
ORM -Other Regulated Materials (DOT)
OSHA -Occupational Safety and Health Administration
oth -other cell types
ovr -ovary
par -parenteral
PEL -Permissible Exposure Limit (OSHA)
pg -picogram (one trillionth of a gram, 10^{-12} gram)
pgn -pigeon
pic -Phage Inhibition Capacity
pig -pig
pph -parts per hundred (v/v)(percent)
ppm -parts per million (v/v)
gram)
ppt -parts per trillion (v/v)
pre -prior to copulation
preg -pregnant
qal -quail
rat -rat
rbt -rabbit
rec -rectal
REGS -Standards and Regulations
REL -Recommended Exposure Level
rns -rinsed with water
RTECS® -Registry of Toxic Effects of Chemical Substances
S -second
sal -salmon
sat -Salmonella typhimurium
sce -Sister Chromatid Exchange
SCP -Standards Completion Program
scu -subcutaneous
SEV -severe irritation effect
skn -administration onto the skin
sln -Sex Chromosome Loss and Nondisjunction
slw -silkworm
smc -Saccharomyces cerevisiae
spm -sperm
sql -squirrel
srm -Serratia marcescens
ssp -Schizosaccharomyces pombe
STEL -Short Term Exposure Limit
TC -toxic concentration (other than lowest)
TDLo -lowest published toxic dose
tes -testis
TLV™ -Threshold Limit Value
tod -toad
trk -turkey
trn -Heritable Translocation Test
TWA -time-weighted average
unr -unreported
W -week
wmn -woman
Y -year
µg -microgram (one millionth gram, 10^{-6}
µmole -micromole

TABLE II. TOXIC EFFECTS CODE (TEC)

Position 1 - Organ, Tissue, or Functional System

A	Brain and Coverings
B	Spinal Cord
C	Peripheral Nerve and Sensation
D	Sense Organs and Special Senses (Nose, Eye, Ear, and Taste)
E	Autonomic Nervous System
F	Behavioral
G	Cardiac
H	Vascular
J	Lung, Thorax, or Respiration
K	Gastrointestinal
L	Liver
M	Kidney, Ureter, and Bladder
N	Endocrine
P	Blood
Q	Musculoskeletal
R	Skin and Appendages
T	Reproductive
U	Nutritional and Gross Metabolic
V	Tumorigenic
Y	Biochemical
Z	Related to Chronic Data

TABLE II. TOXIC EFFECTS CODE (TEC) (Continued)

Positions 2 and 3 - Damage Codes, two digits

Each of the major headings below correspond to one of the organs, tissues, or functional systems listed in Position 1.

A. BRAIN AND COVERINGS

01	Meningeal changes
02	Changes in cerebral spinal fluid
03	Increased intracranial pressure
04	Changes in circulation (Hemorrhage, thrombosis, etc.)
05	Encephalitis
06	Demyelination
10	Changes in surface EEG
11	Recordings from specific areas of CNS
30	Other degenerative changes
60	Tumors
70	Changes in brain weight

B. SPINAL CORD

01	Meningeal changes
02	Changes in circulation
03	Inflammatory changes
04	Demyelination
30	Other degenerative changes
60	Tumors

C. PERIPHERAL NERVE AND SENSATION

01	Associated connective tissue
02	Sensory syndrome diagnostic of central lesion
03	Sensory change involving trigeminal nerve
04	Sensory change involving peripheral nerve
05	Sensory change involving segmental distribution
06	Spastic paralysis with or without sensory change
07	Flaccid paralysis with appropriate anesthesia
08	Flaccid paralysis without anesthesia (usually neuromuscular blockage)
09	Fasciculations
10	Paresthesis
15	Recording from afferent nerve
16	Recording from peripheral motor nerve
17	Local anesthetic
18	Structural change in nerve or sheath
60	Peripheral nerve tumors

TABLE II. TOXIC EFFECTS CODE (TEC) (Continued)

D. SENSE ORGANS AND SPECIAL SENSES (NOSE, EYE, EAR, and TASTE)

Olfaction:

01	Deviated nasal septum
02	Ulcerated nasal septum
03	Change in olfactory nerve
04	Change in sensation of smell
07	Other changes
09	Tumors

Eye:

10	Optic nerve neuropathy
11	Cycloplegia
12	Changes in refraction
13	Ciliary spasm
14	Visual field changes
15	Miosis (pupillary constriction)
16	Mydriasis (pupillary dilation)
17	Lacrimation
18	Chromodacyrorrhea
19	Increased intraocular pressure
20	Retinal changes (pigmentary depositions, retinitis, other)
21	Hemorrhage
22	Changes in circulation
23	Diplopia
24	Changes in extra-ocular muscles
25	Conjunctive irritation
26	Corneal damage
27	Iritis
28	Ptosis
29	Tumors
35	Other

Ear:

40	Change in acuity
41	Tinnitus
43	Changes in vestibular functions
44	Changes in cochlear structure or function
45	Other

Taste:

50	Change in function

II. TOXIC EFFECT TABLE S CODE (TEC) (Continued)

E. AUTONOMIC NERVOUS SYSTEM

01	Sympathomimetic
02	Alpha adrenergic blockage
03	Beta adrenergic blockage
04	Central sympatholytic
05	Ganglion blocker
06	Ganglion facilitant
08	Other (direct) parasympathomimetic
09	Intensity beta adrenergic effects
15	Smooth muscle relaxant (mechanism undefined, spasmolytic)
16	Parasympatholytic

F. BEHAVIORAL

01	General anesthetic
02	Anticonvulsant
03	Wakefulness
04	Sleep
05	Altered sleep time (including change in righting reflex)
06	Euphoria
07	Somnolence (general depressed activity)
08	Hallucinations, distorted perceptions
09	Change in REM sleep (human)
10	Toxic psychosis
11	Tremor
12	Convulsions or effect on seizure threshold
13	Excitement
14	Anorexia (human)
15	Food intake (animal)
16	Fluid intake
17	Changes in motor activity (specific assay)
18	Muscle weakness
19	Ataxia
20	Stiffness
21	Rigidity (including catalepsy)
22	Tetany
23	Muscle contraction or spasticity
24	Coma
25	Antipsychotic
26	Antianxiety
27	Headache
29	Analgesia
30	Tolerance
31	Withdrawal
32	Abuse
33	Irritability

II. TOXIC EFFECT TABLE S CODE (TEC) (Continued)

34 Straub tail
40 Alteration of classical conditioning
41 Alteration of operant conditioning
42 Changes in psychophysiological tests
43 Aggression

G. CARDIAC

01 Cardiomyopathy including infarction
02 Changes in coronary arteries
03 Pericarditis
04 Arrhythmias (including changes in conduction)
05 Cardiomegaly
06 EKG changes not diagnostic of above
07 Pulse rate increase without fall in BP
08 Pulse rate
09 Change in force of contraction
10 Change in rate
11 Change in conduction velocity
12 Cardiac output
13 Change in resting or action potential
30 Other changes
60 Tumors
70 Changes in heart weight

H. VASCULAR

01 BP elevation not characterized in autonomic section
02 BP lowering not characterized in autonomic section
03 Pulse pressure increase
04 Regional or general arteriolar constriction
05 Regional or general arteriolar or venous dilation
06 Measurement of regional blood flow
07 Change in plasma or blood volume
08 Shock
15 Acute arterial occlusion
16 Structural changes in vessels
17 Thrombosis distant from injection site
20 Contraction (isolated tissues)
21 Relaxation (isolated tissues)
30 Other changes
35 Effect on gills and gill functions
60 Tumors

J. LUNGS, THORAX, OR RESPIRATION

01 Ciliary function changes
02 Structural or functional change in trachea or bronchi

03 Bronchiolar dilation
04 Bronchiolar constriction
05 Bronchiectasis
06 Emphysema
07 Changes in pulmonary vascular resistance
08 Consolidation
12 Fibrosis, focal (pneumoconiosis)
13 Fibrosis (interstitial)
14 Fibrosing alveolitis
15 Acute pulmonary edema
16 Chronic pulmonary edema
17 Pleural effusion
18 Pleural thickening
20 Respiratory obstruction
21 Cough
22 Dyspnea
23 Sputum
24 Cyanosis
25 Respiratory depression
26 Respiratory stimulation
27 Pulmonary emboli
30 Other changes
60 Tumors
61 Bronchiogenic carcinoma
70 Changes in lung weight

K. GASTROINTESTINAL

01 Changes in structure or function of salivary glands
02 Changes in structure or function of endocrine pancreas
03 Change in structure or function of esophagus
04 Alteration in gastric secretion
05 Gastritis
06 Ulceration or bleeding from stomach
07 Ulceration or bleeding from duodenum
08 Ulceration or bleeding from small intestine
09 Ulceration or bleeding from large intestine
12 Hypermotility, diarrhea
13 Nausea or vomiting
14 Decreased motility or constipation
15 Malabsorption
17 Peritonitis
20 Necrotic changes
30 Other changes
31 Contraction (isolated tissue)
32 Relaxation (isolated tissue)
60 Tumors
61 Colon tumors
70 Changes in pancreatic weight

II. TOXIC EFFECT TABLE S CODE (TEC) (Continued)

L. LIVER

01	Hepatitis (hepatocellular necrosis), diffuse
02	Hepatitis (hepatocellular necrosis), zonal
03	Fatty liver degeneration
04	Hepatitis, fibrous (cirrhosis, post-necrotic scarring)
19	Jaundice (or hyerbilirubinemia) hepatocellular
11	Jaundice, cholestatic
12	Jaundice, other or unclassified
14	Liver function tests impaired
15	Change in gall bladder structure or function
30	Other changes
50	Multiple effects
60	Tumors
61	Angiosarcoma
70	Changes in liver weight

M. KIDNEY, URETER, AND BLADDER

01	Changes in blood vessels or in circulation of kidney
02	Changes primarily in glomeruli
03	Changes in tubules (including acute renal failure, acute tubular necrosis)
04	Changes in both tubules and glomeruli
05	Interstitial nephritis
10	Urine volume increased
11	Urine volume decreased
12	Renal function tests depressed
13	Proteinuria
14	Hematuria
16	Other changes in urine composition
20	Inflammation, necrosis, or scarring of bladder
21	Structural or functional changes in ureter
29	Incontinence
30	Other changes
60	Tumors
61	Kidney tumors
70	Changes in bladder weight
71	Changes in kidney weight

N. ENDOCRINE

01	Antidiuresis
02	Change in LH
03	Change in GH
04	Change in gonadotropins
05	Thyroid weight (goiter)
06	Toxic goiter - hypofunction
07	Evidence of thyroid hyperfunction
08	Evidence of thyroid hypofunction

TABLE II. TOXIC EFFECTS CODE (TEC) (Continued)

10 Hyperparathyroidism
12 Adrenal cortex hyperplasia
13 Adrenal cortex hypoplasia
15 Aldosternism
16 Androgenic
17 Estrogenic
18 Differential effect of sex or castration on observed toxicity
19 Effect on menstrual cycle
20 Gynecomastia
21 Diabetes mellitis
22 Hypoglycemia
23 Ketosis
24 Hyperglycemia
25 Diabetes insipidus (nephrogenic or CNS)
30 Other changes
60 Tumors
61 Adrenal cortex tumors
62 Thyroid tumors
70 Changes in endocrine weight (unspecified)
71 Changes in pituitary weight
72 Changes in adrenal weight
73 Changes in spleen weight
74 Changes in thymus weight
75 Changes in thyroid weight

P. BLOOD

01 Hemorrhage
02 Change in clotting factors
05 Normocytic anemia
06 Microcytosis with or without anemia
07 Macrocytosis
08 Pigmented or nucleated red blood cells
13 Granulocytopenia
14 Leukopenia
15 Agranulocytosis
16 Eosinophilia
17 Thrombocytopenia
20 Changes in cell count (unspecified)
22 Oxidant related (GPD deficient) anemia
23 Other hemolysis with or without anemia
24 Methemoglobinemia-Carboxyhemoglobin
25 Aplastic anemia
26 Changes in bone marrow not included above
27 Changes in spleen
28 Changes in serum composition (e.g., TP, bilirubin, cholesterol)
30 Other changes
60 Tumors
61 Leukemia
62 Lymphoma, including Hodgkin’s disease

TABLE II. TOXIC EFFECTS CODE (TEC) (Continued)

70 Changes in other cell count (unspecified)
71 Changes in erythrocyte (RBC) count
72 Changes in leucocyte (WBC) count
73 Changes in platelet count

Q. MUSCULOSKELETAL

See also Behavioral for muscle change secondary to CNS or metabolic changes

01 Changes in teeth and supporting structures
02 Osteoporosis
10 Osteomalacia
15 Joints
30 Other changes
60 Tumors

R. SKIN AND APPENDAGES

Skin

After systemic exposure:
01 Dermatitis, allergic
02 Dermatitis, irritative
03 Dermatitis, other
04 Photosensitivity

After topical exposure:
10 Primary irritation
11 Corrosive
12 Dermatitis, allergic
13 Cutaneous sensitization (experimental)
14 Photosensitivity

Other:
20 Sweating
21 Hair
22 Nails
25 Breast
30 Other glands
60 Tumors

S. IMMUNOLOGICAL INCLUDING ALLERGIC

01 Increase in cellular immune response
02 Decrease in cellular immune response
03 Increase in humoral immune response
04 Decrease in humoral immune response
05 Decreased immune response
06 Increased immune response

TABLE II. TOXIC EFFECTS CODE (TEC) (Continued)

Allergic (Multiple organ involvement)

When single organs are involved code under organ
Cholesterol jaundice - see Liver
Aplastic anemia, agranulocytoses - see Blood
Allergic dermatitis - see Skin

15 Anaphylaxis
16 Other immediate (humoral) uticaria, allergic rhinitis, serum sickness
18 Hypersensitivity delayed
20 Autoimmune
25 Uncharacterized

U. NUTRITIONAL AND GROSS METABOLIC

See also biochemical (Intermediary Metabolism)

01 Weight loss or decreased weight gain
02 Conditioned vitamin deficiency
03 Dehydration

Changes in:
05 Na
06 Cl
07 Ca
08 P
09 Fe
10 K
11 Other metals
20 Metabolic acidosis
21 Metabolic alkalosis
25 Body temperature increase
28 Body temperature decrease
30 Other changes

V. TUMORIGENIC

01 Carcinogenic by RTECS® criteria
02 Neoplastic by RTECS® criteria
03 Equivocal tumorigenic agent by RTECS® criteria
05 Cells (cultured) transformed
08 Increased incidence of tumors in susceptible strains
10 Tumors at site of application
15 Tumor types after systemic administration not seen spontaneously
16 Facilitates action of known carcinogen
25 Protects against induction of experimental tumors
30 Active as anti-cancer agent

TABLE II. TOXIC EFFECTS CODE (TEC) (Continued)

Y. BIOCHEMICAL

Enzyme inhibition, induction, or change in blood or tissue levels

01 True cholinesterase
02 Other esterases
03 Phosphatases
04 Other hydrolases
05 Carbonic anhydrase
06 Xanthine oxidases
07 Hepatic microsomal mixed oxidase (dealkylation, hydroxylation, etc.)
08 Monoamine oxidase
09 Cytochrome oxidases (including oxidative phosphorylation)
10 Dehydrogenases
11 Catalases
12 Other oxidoreductases
13 Phosphokinase
14 Hexokinases
15 Transaminases
16 Other transferases
17 Peptidases
18 Proteases
19 Isomerases
20 Multiple enzyme effects
21 Other enzymes
23 Reactivates cholinesterase

Effect on specific coenzyme:

25 B vitamins, including folate
26 CoA
27 NAD, NADP
28 Others
29 Proportion of isoenzymes
30 Disturbed regulation

Metabolism (intermediary):

35 Xanthine, purine, or nucleotides including urate
36 Porphyrin, including bile pigments
37 Lipids, including transport
38 Amino acids (including renal excretion)
39 Plasma proteins not involving coagulation
40 Other proteins
41 Glycolytic
42 TCS cycle
43 Pentase shunt
44 Other carbohydrates
45 Histamines (including liberation not immunochemical in origin)

TABLE II. TOXIC EFFECTS CODE (TEC) (Continued)

50 Effect on mitochondrial function
51 Effect on active transport
52 Effect on Na-K pump
53 Other
54 Effect on cyclic nucleotides
55 Effect on inflammation or mediation of inflammation

Neurotransmitters or modulators (putative):

60 Catecholamine levels in sympathetic nerves
61 Catecholamine levels in CNS
64 Dopamine in striatum
65 Dopamine at other sites

Z. RELATED TO CHRONIC DATA

01 Death in the “U” data type field
71 Changes in ovarian weight
72 Changes in prostate weight
73 Changes in testicular weight
74 Changes in uterine weight

TABLE III. REPRODUCTIVE EFFECTS CODE

Paternal Effects

T01	Spermatogenesis (including genetic material, sperm morphology, motility, and count)
T02	Testes, epididymis, sperm duct
T03	Prostate, seminal vessicle, Cowper's gland, accessory glands
T04	Impotence
T05	Breast development
T09	Other effects on male

Maternal Effects

T11	Oogenesis
T12	Ovaries, fallopian tubes
T13	Uterus, cervix, vagina
T14	Menstrual cycle changes or disorders
T15	Breasts, lactation (prior to or during pregnancy)
T16	Parturition
T17	Postpartum
T19	Other effects

Effects on Fertility

T21	Mating performance (e.g., # sperm positive females per # females mated; # copulations per # estrus cycles)
T22	Female fertility index (e.g., # females pregnant per # sperm positive females, # females pregnant per # females mated)
T23	Male fertility index (e.g., # males impregnating females per # males exposed to fertile nonpregnant females)
T24	Pre-implantation mortality (e.g., reduction in number of implants per female; total number of implants per corpora lutea)
T25	Post-implantation mortality (*e.g., dead and/or resorbed implants per total number of implants)
T26	Litter size (e.g., # fetuses per litter; measured before birth)
T27	Abortion
T29	Other measures of fertility

Effects on Embryo or Fetus

T31	Extra embryonic structures (e.g., placenta, umbilical cord)
T32	Maternal-fetal exchange
T33	Cytological changes (including somatic cell genetic material)
T34	Fetotoxicity (except death, e.g., stunted fetus)
T35	Fetal death
T39	Other effects on embryo

Specific Developmental Abnormalities

T41	Central nervous system
T42	Eye, ear
T43	Craniofacial (including nose and tongue)
T44	Skin and skin appendages

TABLE III. REPRODUCTIVE EFFECT CODE (Continued)

T45	Body wall
T46	Musculoskeletal system
T47	Cardiovascular (circulatory) system
T48	Blood and lymphatic system (including spleen and marrow)
T49	Respiratory system
T50	Gastrointestinal system
T51	Hepatobiliary system
T52	Endocrine system
T53	Urogenital system
T54	Immune and reticuloendothelial system
T55	Homeostasis
T59	Other developmental abnormalities

Tumorigenic Effects

T61	Testicular tumors
T62	Prostate tumors
T63	Ovarian tumors
T64	Uterine tumors
T65	Transplacental tumorigenesis
T69	Other reproductive system tumors

Effects on Newborn

T71	Stillbirth
T72	Live birth index (similar to T26, except measured after birth)
T73	Sex ratio
T74	Apgar score (human only)
T75	Viability index (e.g., # alive at day 4 per # born alive)
T76	Weaning or lactation index (e.g., # alive at weaning per # alive at day 4)
T77	Other neonatal measures or effects
T81	Growth statistics (e.g., reduced weight gain)
T82	Germ cell effects (in offspring)
T83	Biochemical and metabolic
T84	Drug dependence
T85	Behavioral
T86	Physical
T87	Other postnatal measures or effects
T91	Delayed effects

TABLE IV. ROUTES OF ADMINISTRATION TO, OR EXPOSURE OF, ANIMAL SPECIES TO TOXIC SUBSTANCES

Abbreviation	Route	Definition
eye	Eyes	Administration directly onto the surface of the eye; used exclusively for primary irritation data; see Ocular
ial	Intraaural	Administration into the ear
iat	Intraarterial	Administration into the artery
ice	Intracerebral	Administration into the cerebrum
icv	Intracervical	Administration into the cervix
idr	Intradermal	Administration within the dermis by hypodermic needle
idu	Intraduodenal	Administration into the duodenum
ihl	Inhalation	Inhalation in chamber, by cannulation, or through mask
imp	Implant	Placed surgically within the body location described in reference
ims	Intramuscular	Administration into the muscle by hypodermic needle
ipc	Intraplacental	Administration into the placenta
ipl	Intrapleural	Administration into the pleural cavity by hypodermic needle
ipr	Intraperitoneal	Administration into the peritoneal cavity
irn	Intrarenal	Administration into the kidney
isp	Intraspinal	Administration into the spinal canal
itr	Intratracheal	Administration into the trachea
itt	Intratesticular	Administration into the testes
iut	Intrauterine	Administration into the uterus
ivg	Intravginal	Administration into the vagina
ivn	Intravenous	Administration directly into the vein by hypodermic needle
mul	Multiple	Administration by more than one route
ocu	Ocular	Administration directly onto the surface of the eye or into the conjunctival sac; used exclusiely for systemic toxicity data; see Eyes
orl	Oral	Per os, intragastric feeding, or introduction with drinking water
par	Parenteral	Administration into the body through the skin. Reference used is not specific concerning the route used; could be ipr, scu. ivn, ipl, ims, irn, or ice
rec	Rectal	Administration into the rectum or colon in the form of enema or suppository
scu	Subcutaneous	Administration under the skin
skn	Skin	Application directly onto the skin, either intact or abraded; used for both systemic toxicity and primary irritant effects
unr	Unreported	Dose, but not route, is specified in the reference

TABLE V. SPECIES

With Assumptions for Toxic Dose Calculation From Non-specific Data*

Abbrev.	Species	Age	Weight	Consumption Food gm/day	(Approx.) Water ml/day	1ppm in Food Equals in mg/kg/D	Approximate Gestation Period in Days
brd	Bird - domestic or laboratory Bird not otherwise identified		1 kg				
bwd	Bird - wild bird species		40 gm				
cat	Cat, adult		2 kg	100	100	0.05	64 (59-68)
chd	Child	1-13Y	20 kg				
ckn	Chicken, adult (male or female)	8 W	800 gm	140	200	0.175	
ctl	Cattle, horse		500 kg	10,000		0.02	284 (279-290)
dck	Duck, adult (domestic)	8 W	2,500 gm	250	500	0.1	
Dog	Dog, adult	52 W	10 kg	250	500	0.025	62 (56-68)
dom	Domestic animals - goat, sheep		60 kg	2,400		0.04	G: 152 (148-156) S: 146 (144-147)
frg	Frog, adult		33 gm				
gpg	Guinea pig, adult		500 gm	30	85	0.06	68
grb	Gerbil		100 gm	5	5	0.05	25 (24-26)
ham	Hamster	14 W	125 gm	15	10	0.12	16
hmn	Human	Adult	70 kg				
hor	Horse, donkey		500 kg	10,000			H: 339 (333-345) D: 365
inf	Infant	0-1 Y	5 kg				
mam	Mammal - species unspecified		200 gm				
man	Man	adult	70 kg				
mky	Monkey	2.5 Y	5 kg	250	500	0.05	165
mus	Mouse	8 W	25 gm	3	5	0.12	21
nml	Non-mammalian species						
pgn	Pigeon	8 W	500 gm				
pig	Pig		60 kg	2,400		0.041	114 (112-115)
qal	Quail (laboratory)		160 gm				
rat	Rat, adult female	14 W	200 gm	10	20	0.05	22
rat	Rat, adult male	14 W	250 gm	15	25	0.06	
rat	Rat, adult, sex unspecified	14 W	200 gm	15	25		
rat	Rat, weaning	3 W	50 gm	15	25	0.3	
Rbt	Rabbit, adult	12 W	2 kg	60	330	0.03	31
sql	Squirrel		500 gm				44
tod	Toad		100 gm				
trk	Turkey	18 W	5 kg				
wmn	Woman	Adult	50 kg				270

*NOTE: Values given here are within reasonable limits usually found in the published literature and are selected to facilitate calculations for data from publications in which toxic dose information has not been presented for an individual animal of the study. See, for example, Association of Food and Drug Officials, *Quarterly Bulletin*, volume 18, page 66, 1954, and Guyton, *American Journal of Physiology*, volume 150, page 75, 1947. Data for lifetime exposure are calculated from the assumptions for adult animals for the entire period of exposure. For definitive dose data, the reader must review the referenced publications.

TABLE VI. MASTER FILE DATA TYPES (POSITION 10)

CODE NUMBER	DATA TYPE	DETAILED FILE DESCRIPTION FORMAT SECTION
A	Prime Name	1
B	Cross Reference	1
C	Chemical Definition	1
D	Chemical Registry Number Chemical Abstracts Service Beilstein Registry	3
E	Update Field	2
F	Molecular Formula	5
G	RTECS® Number	6
H	Molecular Weight	4
J	Wiswesser Line Notation	7
L	Synonym	8
N	Compound Descriptor Code	9
P	Irritation Data	10, 16
Q	Mutation Data	11, 16
R	Reproductive Data	12, 16
S	Tumorigenic Data	13, 16
T	Acute Toxicity Data	14, 16
U	Other Multiple Dose Toxicity Data	15, 16
V	Reviews	17
W	Standards and Regulations	18
X	NIOSH Documentation and Surveillance Data	19
Y	ATSDR, EPA, NIOSH, NTP, and OSHA Status	20

TABLE VII. LINE NUMBERS FOR "V," "W," "X," and "Y" DATA

LINE #	DATA
V010-039	ACGIH TLV™ Data
V100-299	IARC Cancer Reviews
V300	IARC Cancer Review, Supplement 7
V800-899	Toxicology Review References
W100-110	DOT Hazardous Substances Data
W200	EPA Farm Worker Field Re-entry Data
W400-410	MSHA Standard Data
W500	OSHA PEL (General Industry)
W505	OSHA PEL (Construction)
W510	OSHA PEL (Shipyards)
W515	OSHA PEL (Federal Contractors)
W550	OSHA Cancer Suspect Agent
W600-699	International Occupational Exposure Levels
X500-510	NIOSH REL Data
X600	NOHS (1974)
X610	NOES (21983)
Y010-035	EPA Genetic Toxicology Program Data
Y050	EPA TSCA Chemical Inventory Status 8(d)
Y100	EPA TSCA 8(a)
Y130	EPA TSCA 8(b)

FIGURE 1. TNT ON NLM TOXNET

1 - RTECS
RTECS RECORD NUMBER 84869
LAST REVISION DATE 9607
UPDATE HISTORY 10/18/96, 6 fields
UPDATE HISTORY 08/21/96, 6 fields
UPDATE HISTORY 06/06/96, 2 fields
UPDATE HISTORY 02/07/96, 3 fields
UPDATE HISTORY 11/15/95, 2 fields
UPDATE HISTORY 08/18/95, 3 fields
RECORD LENGTH 6580
RTECS ACCESSION NUMBER NIOSH/XU0175000
NAME OF SUBSTANCE Toluene, 2,4,6-trinitro-
CAS REGISTRY NUMBER 118-96-7
SYNONYMS Benzene, 2-methyl-1,3,5-trinitro-
SYNONYMS Entsufon
SYNONYMS 2-Methyl-1,3,5-trinitrobenzene
SYNONYMS NCI-C56155
SYNONYMS TNT
SYNONYMS alpha-Tnt
SYNONYMS TNT (OSHA)
SYNONYMS TNT, dry or wetted with <30% water, by weight (UN02
SYNONYMS TNT-tolite (French)
SYNONYMS Tolit
SYNONYMS Tolite
SYNONYMS 2,4,6-Trinitrotolueen (Dutch)
SYNONYMS Trinitrotoluene
SYNONYMS Trinitrotoluene (UN0209) (DOT)
SYNONYMS Trinitrotoluene, wetted with not <30% water, by wei
SYNONYMS s-Trinitrotoluene
SYNONYMS sym-Trinitrotoluene
SYNONYMS 2,4,6-Trinitrotoluene (ACGIH:OSHA)
SYNONYMS s-Trinitrotoluol
SYNONYMS sym-Trinitrotoluol
SYNONYMS 2,4,6-Trinitrotoluol (German)
SYNONYMS Tritol
SYNONYMS Triton
SYNONYMS Trojnitrotoluen (Polish)
SYNONYMS Trotyl
SYNONYMS Trotyl oil
SYNONYMS UN0209 (DOT)
SYNONYMS UN1356 (DOT)
MOLECULAR FORMULA C7-H5-N3-O6
MOLECULAR WEIGHT 227.15
CLASSIFICATION CODE Agricultural Chemical
CLASSIFICATION CODE Tumor data
CLASSIFICATION CODE Mutation data
CLASSIFICATION CODE Reproductive Effect
CLASSIFICATION CODE Human Data
CLASSIFICATION CODE Skin/Eye Irritant
CLASSIFICATION CODE Unspecified/Unclassified pesticide
WISWESSER LINE NOTATION WNR B1 CNW ENW
DATA TYPE Mutagenicity
DATA TYPE Skin/Eye Irritation
DATA TYPE General Toxicity
DATA TYPE Reproductive Studies
DATA TYPE Multiple Dose Studies
MUTAGENICITY STUDIES
o TEST SYSTEM : mutation in microorganisms
o SPECIES/ROUTE/ CELL TYPE : S. typhimurium

FIGURE 1. TNT ON NLM:TOXNET (continued)

o DOSE : 10 ug/plate (+/-S9)
o REFERENCE : Natl Tech Inf Serv[AD-A080-146] (NTIS**)
MUTAGENICITY STUDIES
o TEST SYSTEM : body fluid assay
o SPECIES/ROUTE/ CELL TYPE : rat/S. typhimurium
o DOSE : 50 mg/kg
o REFERENCE : Mutat Res, vol 262, pg 167, 1991 (MUREAV)
MUTAGENICITY STUDIES
o TEST SYSTEM : gene mutation in mammalian cells
o SPECIES/ROUTE/ CELL TYPE : mouse:lymphocyte
o DOSE : 40 mg/L
o REFERENCE : Cancer Lett, vol 20, pg 103, 1983 (CALEDQ)
SKIN AND EYE IRRITATION STUDIES
o ROUTE : skin
o SPECIES : rabbit
o DOSE : 500 mg/24H
o EFFECT : MILD
o REFERENCE : Natl Tech Inf Serv[AD-B011-150] (NTIS**)
GENERAL TOXICITY STUDIES
o ROUTE : oral
o SPECIES : human
o STUDY TYPE : LDLo
o DOSE : 28 gm/kg
o EFFECT : BEHAVIORAL (Hallucinations, distorted percept
o EFFECT : LUNGS, THORAX OR RESPIRATION (Cyanosis)
o EFFECT : GASTROINTESTINAL (Other changes)
o REFERENCE : Toxicol Drugs Chem 1969, pg 610, 1969 (34ZIAG
GENERAL TOXICITY STUDIES
o ROUTE : oral
o SPECIES : rat
o STUDY TYPE : LD50
o DOSE : 795 mg/kg
o EFFECT : BEHAVIORAL (Somnolence; Tremor; Convulsions o threshold)
o REFERENCE : J Toxicol Environ Health, vol 9, pg 565, 1982
GENERAL TOXICITY STUDIES
o ROUTE : oral
o SPECIES : mouse
o STUDY TYPE : LD50
o DOSE : 660 mg/kg
o EFFECT : BEHAVIORAL (Somnolence; Tremor; Convulsions o threshold)
o REFERENCE : J Toxicol Environ Health, vol 9, pg 565, 1982
GENERAL TOXICITY STUDIES
o ROUTE : oral
o SPECIES : cat
o STUDY TYPE : LDLo
o DOSE : 1850 mg/kg
o EFFECT : LUNGS, THORAX OR RESPIRATION (Dyspnea; Cyanos
o EFFECT : SKIN AND APPENDAGES (After systemic exposure: allergic)
o REFERENCE : Med Res Counc Spec Rep Ser, vol 58, pg 32, 19
GENERAL TOXICITY STUDIES
o ROUTE : subcutaneous
o SPECIES : cat
o STUDY TYPE : LDLo
o DOSE : 200 mg/kg
o EFFECT : LUNGS, THORAX OR RESPIRATION (Dyspnea; Cyanos
o EFFECT : SKIN AND APPENDAGES (After systemic exposure: allergic)
o REFERENCE : Med Res Counc Spec Rep Ser, vol 58, pg 32, 19

FIGURE 1. TNT ON NLM TOXNET (continued)

GENERAL TOXICITY STUDIES
o ROUTE : oral
o SPECIES : rabbit
o STUDY TYPE : LDLo
o DOSE : 500 mg/kg
o EFFECT : BEHAVIORAL (Convulsions or effect on seizure
o EFFECT : GASTROINTESTINAL (Hypermotility, diarrhea)
o EFFECT : LUNGS, THORAX OR RESPIRATION (Cyanosis)
o REFERENCE : Med Res Counc Spec Rep Ser, vol 58, pg 32, 19
GENERAL TOXICITY STUDIES
o ROUTE : subcutaneous
o SPECIES : rabbit
o STUDY TYPE : LDLo
o DOSE : 500 mg/kg
o EFFECT : BEHAVIORAL (Convulsions or effect on seizure
o EFFECT : GASTROINTESTINAL (Hypermotility, diarrhea)
o EFFECT : LUNGS, THORAX OR RESPIRATION (Cyanosis)
o REFERENCE : Med Res Counc Spec Rep Ser, vol 58, pg 32, 19
REPRODUCTIVE STUDIES
o ROUTE : oral
o SPECIES : rat
o STUDY TYPE : TDLo
o DOSE : 5376 mg/kg (28D male)
o EFFECT : PATERNAL EFFECTS (Testes, epididymis, sperm d
o REFERENCE : J Toxicol Environ Health, vol 9, pg 565, 1982
MULTIPLE DOSE TOXICITY STUDIES
o ROUTE : oral
o SPECIES : rat
o STUDY TYPE : TDLo
o DOSE : 7200 mg/kg/6W-I
o EFFECT : LIVER (Other changes)
o EFFECT : BLOOD (Changes in serum composition TP, bilir cholesterol...)
o EFFECT : OTHER MULTIPLE DOSE TOXICITY DATA (Changes in
o REFERENCE : Toxicol Lett, vol 55, pg 343, 1991 (TOLED5)
MULTIPLE DOSE TOXICITY STUDIES
o ROUTE : oral
o SPECIES : rat
o STUDY TYPE : TDLo
o DOSE : 11375 mg/kg/13W-C
o EFFECT : BEHAVIORAL (Food intake)
o EFFECT : BLOOD (Normocytic anemia)
o EFFECT : NUTRITIONAL AND GROSS METABOLIC (Weight loss gain)
o REFERENCE : Toxicology, vol 32, pg 253, 1984 (TXCYAC)
MULTIPLE DOSE TOXICITY STUDIES
o ROUTE : oral
o SPECIES : rat
o STUDY TYPE : TDLo
o DOSE : 3 gm/kg/30D-I
o EFFECT : LIVER (Other changes)
o EFFECT : BIOCHEMICAL EFFECTS (Monoamine oxidase; Lipid transport)
o REFERENCE : Gig Tr Prof Zabol, vol 18(10), pg 57, 1974 (G
MULTIPLE DOSE TOXICITY STUDIES
o ROUTE : oral
o SPECIES : mouse
o STUDY TYPE : TDLo
o DOSE : 11 mg/kg/13W-C
o EFFECT : LIVER (Changes in liver weight)
o EFFECT : ENDOCRINE (Changes in spleen weight)

FIGURE 1. TNT ON NLM TOXNET (continued)

o EFFECT : BLOOD (Changes in spleen)
o REFERENCE : J Toxicol Environ Health, vol 9, pg 565, 1982
MULTIPLE DOSE TOXICITY STUDIES
o ROUTE : oral
o SPECIES : dog
o STUDY TYPE : TDLo
o DOSE : 182 mg/kg/13W-C
o EFFECT : LIVER (Changes in liver weight)
o EFFECT : BLOOD (Normocytic anemia)
o EFFECT : NUTRITIONAL AND GROSS METABOLIC (Weight loss gain)
o REFERENCE : J Toxicol Environ Health, vol 9, pg 565, 1982
MULTIPLE DOSE TOXICITY STUDIES
o ROUTE : oral
o SPECIES : dog
o STUDY TYPE : TDLo
o DOSE : 1456 mg/kg/26W-I
o EFFECT : LIVER (Changes in liver weight)
o EFFECT : BLOOD (Normocytic anemia; Changes in spleen)
o REFERENCE : Toxicology, vol 63, pg 233, 1990 (TXCYAC)
TOXICOLOGY REVIEW TOXICOLOGY REVIEW; NTIS** AD778-725; Natl Tech Inf
TOXICOLOGY REVIEW TOXICOLOGY REVIEW; CRTXB2 1(1),93,71; CRC Crit Rev
TOXICOLOGY REVIEW TOXICOLOGY REVIEW; PAREAQ 4,1,52; Pharmacol Rev
CANCER REVIEW IARC CANCER REVIEW; Animal Inadequate Evidence; IME Monogr Eval Carcinog Risk Chem Man
CANCER REVIEW IARC CANCER REVIEW; Human Inadequate Evidence; IMEM Monogr Eval Carcinog Risk Chem Man
CANCER REVIEW IARC CANCER REVIEW; Group 3; IMEMDT 65,449,96; IARC Carcinog Risk Chem Man
THRESHOLD LIMIT VALUE ACGIH THRESHOLD LIMIT VALUE REVIEW; TWA 0.5 mg/m3 (6,1652,91; Doc Threshold Limit Values
NIOSH RECOMMENDED LIMITS NIOSH REL TO 2,4,6-TRINITROTOLUENE-air:10H TWA 0.5 DHHS #92-100,92; Natl Inst Occup Saf Health
NIOSH EXPOSURE SURVEYS NATIONAL OCCUPATIONAL EXPOSURE SURVEY 1983: Hazard# industries: 2; total number of facilities: 10; numb 1; total number of employees: 31
STANDARDS AND REGULATIONS DOT-HAZARD:EXPLOSIVE 1.1D; LABEL:EXPLOSIVE 1.1D (UN 49,172.101,92; Code Fed Regul
STANDARDS AND REGULATIONS DOT-HAZARD:4.1; LABEL:FLAMMABLE SOLID (UN1356); CFR Code Fed Regul
STANDARDS AND REGULATIONS MSHA STANDARD-air:TWA 0.2 ppm (0.5 mg/m3) (skin); D Threshold Limit Values
STANDARDS AND REGULATIONS OSHA PEL (Gen Indu):8H TWA 1.50 mg/m3 (skin); CFRGB Code Fed Regul
STANDARDS AND REGULATIONS OSHA PEL (Construc):8H TWA 1.50 mg/m3 (skin); CFRGB Code Fed Regul
STANDARDS AND REGULATIONS OSHA PEL (Shipyard):8H TWA 1.50 mg/m3 (skin); CFRGB Code Fed Regul
STANDARDS AND REGULATIONS OSHA PEL (Fed Cont):8H TWA 1.50 mg/m3 (skin); CFRGB Code Fed Regul
STANDARDS AND REGULATIONS OEL-ARAB Republic of Egypt:TWA 0.5 mg/m3 JAN93
STANDARDS AND REGULATIONS OEL-AUSTRALIA:TWA 0.5 mg/m3;Skin JAN93
STANDARDS AND REGULATIONS OEL-BELGIUM:TWA 0.5 mg/m3;Skin JAN93
STANDARDS AND REGULATIONS OEL-DENMARK:STEL 0.5 mg/m3;Skin JAN93
STANDARDS AND REGULATIONS OEL-FINLAND:TWA 0.5 mg/m3;STEL 3 mg/m3;Skin JAN93
STANDARDS AND REGULATIONS OEL-FRANCE:TWA 0.5 mg/m3;Skin JAN93
STANDARDS AND REGULATIONS OEL-GERMANY:TWA 0.01 ppm (0.1 mg/m3);Skin;Carcinoge
STANDARDS AND REGULATIONS OEL-HUNGARY:TWA 0.3 mg/m3;STEL 0.5 mg/m3;Skin JAN93
STANDARDS AND REGULATIONS OEL-THE NETHERLANDS:TWA 0.5 mg/m3;Skin JAN93
STANDARDS AND REGULATIONS OEL-THE PHILIPPINES:TWA 1.5 mg/m3;Skin JAN93
STANDARDS AND REGULATIONS OEL-RUSSIA:TWA 0.1 mg/m3;STEL 0.5 mg/m3;Skin JAN93

FIGURE 1. TNT ON NLM TOXNET (continued)

STANDARDS AND REGULATIONS OEL-SWITZERLAND:TWA 0.01 ppm (0.1 mg/m3);STEL 0.02
STANDARDS AND REGULATIONS OEL-TURKEY:TWA 1.5 mg/m3;Skin JAN93
STANDARDS AND REGULATIONS OEL-UNITED KINGDOM:TWA 0.5 mg/m3;STEL 0.5 mg/m3 JAN
STANDARDS AND REGULATIONS OEL IN BULGARIA, COLOMBIA, JORDAN, KOREA check ACGI
STANDARDS AND REGULATIONS OEL IN NEW ZEALAND, SINGAPORE, VIETNAM check ACGIH
FEDERAL PROGRAM STATUS EPA GENETOX PROGRAM 1988, Positive: Histidine rever
FEDERAL PROGRAM STATUS EPA TSCA Section 8(b) CHEMICAL INVENTORY
FEDERAL PROGRAM STATUS EPA TSCA Section 8(d) unpublished health/safety stu
FEDERAL PROGRAM STATUS On EPA IRIS database
FEDERAL PROGRAM STATUS EPA TSCA TEST SUBMISSION (TSCATS) DATA BASE, JULY 1
FEDERAL PROGRAM STATUS OSHA ANALYTICAL METHOD #44

[RTECS] SS 2 /cf?
USER:

FIGURE 2. 2,4-D NLM TOXNET

1 - RTECS
RTECS RECORD NUMBER 2099
LAST REVISION DATE 9607
UPDATE HISTORY 08/21/96, 4 fields
UPDATE HISTORY 06/04/96, 3 fields
UPDATE HISTORY 02/07/96, 4 fields
UPDATE HISTORY 11/09/95, 5 fields
UPDATE HISTORY 08/02/95, 4 fields
RECORD LENGTH 13528
RTECS ACCESSION NUMBER NIOSH/AG6825000
NAME OF SUBSTANCE Acetic acid, (2,4-dichlorophenoxy)-
CAS REGISTRY NUMBER 94-75-7
SYNONYMS Acide 2,4-dichloro phenoxyacetique (French)
SYNONYMS Acido(2,4-dicloro-fenossi)-acetico (Italian)
SYNONYMS Acme amine 4
SYNONYMS Acme butyl ester 4
SYNONYMS Acme LV 4
SYNONYMS Agrotect
SYNONYMS Amidox
SYNONYMS Amoxone
SYNONYMS Aqua-Kleen
SYNONYMS Barrage
SYNONYMS BH 2,4-D
SYNONYMS Brush-rhap
SYNONYMS B-Selektonon
SYNONYMS Chipco turf herbicide "D"
SYNONYMS Chloroxone
SYNONYMS Citrus fix
SYNONYMS Crop rider
SYNONYMS 2,4-D (ACGIH:OSHA)
SYNONYMS 2,4-D acid
SYNONYMS Debroussaillant 600
SYNONYMS Decamine
SYNONYMS Deherban
SYNONYMS (2,4-Dichloor-fenoxy)-azijnzuur (Dutch)
SYNONYMS Dichlorophenoxyacetic acid
SYNONYMS 2,4-Dichlorophenoxyacetic acid
SYNONYMS Dichlorophenoxyacetic acid (OSHA)
SYNONYMS 2,4-Dichlorphenoxyacetic acid
SYNONYMS (2,4-Dichlor-phenoxy)-essigsaeure (German)
SYNONYMS Dicopur
SYNONYMS DMA-4
SYNONYMS Dormone
SYNONYMS 2,4-Dwuchlorofenoksyoctowy kwas (Polish)
SYNONYMS Emulsamine BK
SYNONYMS Emulsamine E-3
SYNONYMS ENT 8,538
SYNONYMS Envert 171
SYNONYMS Envert DT
SYNONYMS Estone
SYNONYMS Farmco
SYNONYMS Fernimine
SYNONYMS Fernoxone
SYNONYMS Ferxone
SYNONYMS Foredex 75
SYNONYMS Hedonal
SYNONYMS Hedonal (the herbicide)
SYNONYMS Herbidal
SYNONYMS Hivol-44

FIGURE 2. 2,4-D NLM TOXNET (continued)

SYNONYMS Ipaner
SYNONYMS Kwasu 2,4-dwuchlorofenoksyoctowego (Polish)
SYNONYMS Kwas 2,4-dwuchlorofenoksyoctowy (Polish)
SYNONYMS Kyselina 2,4-dichlorfenoxyoctova (Czech)
SYNONYMS Lawn-keep
SYNONYMS Macrondray
SYNONYMS Miracle
SYNONYMS Monosan
SYNONYMS Moxone
SYNONYMS Netagrone
SYNONYMS Netagrone 600
SYNONYMS NSC 423
SYNONYMS Pennamine
SYNONYMS Pennamine D
SYNONYMS Phenox
SYNONYMS Pielik
SYNONYMS Plantgard
SYNONYMS RCRA waste number U240
SYNONYMS Rhodia
SYNONYMS Spritz-hormin/2,4-D
SYNONYMS Spritz-hormit/2,4-D
SYNONYMS Superormone concentre
SYNONYMS U-5043
SYNONYMS U 46DP
SYNONYMS Vergemaster
SYNONYMS Verton
SYNONYMS Verton D
SYNONYMS Verton 2D
SYNONYMS Vidon 638
SYNONYMS Weed-Ag-Bar
SYNONYMS Weedar-64
SYNONYMS Weedatul
SYNONYMS Weedez Wonder BAR
SYNONYMS Weedone LV4
SYNONYMS Weed-rhap
SYNONYMS Weed TOX
SYNONYMS Weedtrol
MOLECULAR FORMULA C8-H6-Cl2-O3
MOLECULAR WEIGHT 221.04
CLASSIFICATION CODE Agricultural Chemical
CLASSIFICATION CODE Tumor data
CLASSIFICATION CODE Mutation data
CLASSIFICATION CODE Reproductive Effect
CLASSIFICATION CODE Human Data
CLASSIFICATION CODE Skin/Eye Irritant
CLASSIFICATION CODE Herbicide
CLASSIFICATION CODE Growth regulator/Fertilizer
WISWESSER LINE NOTATION QV1OR BG DG
DATA TYPE Mutagenicity
DATA TYPE Skin/Eye Irritation
DATA TYPE General Toxicity
DATA TYPE Reproductive Studies
DATA TYPE Multiple Dose Studies
MUTAGENICITY STUDIES
o TEST SYSTEM : mutation in microorganisms
o SPECIES/ROUTE/ CELL TYPE : S. typhimurium
o DOSE : 250 ug/plate (-S9)
o REFERENCE : Mutat Res, vol 204, pg 615, 1988 (MUREAV)
MUTAGENICITY STUDIES
o TEST SYSTEM : DNA repair
o SPECIES/ROUTE/ CELL TYPE : E. coli

o DOSE : 5 mg/disc
o REFERENCE : Natl Tech Inf Serv[PB80-133226] (NTIS**)
MUTAGENICITY STUDIES
o TEST SYSTEM : DNA adduct
o SPECIES/ROUTE/ CELL TYPE : E. coli
o DOSE : 20 umol/L
o REFERENCE : Mutat Res, vol 89, pg 95, 1981 (MUREAV)
MUTAGENICITY STUDIES
o TEST SYSTEM : DNA repair
o SPECIES/ROUTE/ CELL TYPE : B. subtilis
o DOSE : 5 mg/disc
o REFERENCE : Natl Tech Inf Serv[PB80-133226] (NTIS**)
MUTAGENICITY STUDIES
o TEST SYSTEM : mutation in microorganisms
o SPECIES/ROUTE/ CELL TYPE : microorganisms
o DOSE : 1 gm/L (-S9)
o REFERENCE : Microbios Lett, vol 5, pg 103, 1977 (MILEDM)
MUTAGENICITY STUDIES
o TEST SYSTEM : mutation in microorganisms
o SPECIES/ROUTE/ CELL TYPE : microorganisms
o DOSE : 1 gm/L (-S9)
o REFERENCE : Microbios Lett, vol 5, pg 103, 1977 (MILEDM)
MUTAGENICITY STUDIES
o TEST SYSTEM : mutation in microorganisms
o SPECIES/ROUTE/ CELL TYPE : microorganisms
o DOSE : 1 gm/L (-S9)
o REFERENCE : Microbios Lett, vol 5, pg 103, 1977 (MILEDM)
MUTAGENICITY STUDIES
o TEST SYSTEM : mutation in microorganisms
o SPECIES/ROUTE/ CELL TYPE : microorganisms
o DOSE : 1 gm/L (-S9)
o REFERENCE : Microbios Lett, vol 5, pg 103, 1977 (MILEDM)
MUTAGENICITY STUDIES
o TEST SYSTEM : specific locus
o SPECIES/ROUTE/ CELL TYPE : D. melanogaster-oral
o DOSE : 5 mmol/L
o REFERENCE : Mutat Res, vol 319, pg 237, 1993 (MUREAV)
MUTAGENICITY STUDIES
o TEST SYSTEM : specific locus
o SPECIES/ROUTE/ CELL TYPE : D. melanogaster-multiple
o DOSE : 10 ppb
o REFERENCE : Environ Mol Mutagen, vol 25, pg 148, 1995 (EM
MUTAGENICITY STUDIES
o TEST SYSTEM : sex chromosome loss and nondisjunction
o SPECIES/ROUTE/ CELL TYPE : D. melanogaster-oral
o DOSE : 25 ppm
o REFERENCE : Ecol Bull, vol 27, pg 190, 1978 (ECBUDQ)
MUTAGENICITY STUDIES
o TEST SYSTEM : sex chromosome loss and nondisjunction
o SPECIES/ROUTE/ CELL TYPE : D. melanogaster-unreported route
o DOSE : 1000 ppm/15D
o REFERENCE : Ecol Bull, vol 27, pg 182, 1978 (ECBUDQ)
MUTAGENICITY STUDIES
o TEST SYSTEM : mutation in microorganisms
o SPECIES/ROUTE/ CELL TYPE : S. cerevisiae
o DOSE : 150 mg/L (-S9)
o REFERENCE : Ecol Bull, vol 27, pg 193, 1978 (ECBUDQ)
MUTAGENICITY STUDIES
o TEST SYSTEM : gene conversion and mitotic recombination
o SPECIES/ROUTE/ CELL TYPE : A. nidulans
o DOSE : 4 umol/L

FIGURE 2. 2,4-D NLM TOXNET (continued)

o REFERENCE : Mutat Res, vol 204, pg 615, 1988 (MUREAV)
MUTAGENICITY STUDIES
o TEST SYSTEM : DNA damage
o SPECIES/ROUTE/ CELL TYPE : salmon:sperm
o DOSE : 1 mmol/L
o REFERENCE : Phytochemistry, vol 11, pg 3135, 1972 (PYTCAS
MUTAGENICITY STUDIES
o TEST SYSTEM : unscheduled DNA synthesis
o SPECIES/ROUTE/ CELL TYPE : human:fibroblast
o DOSE : 1 umol/L
o REFERENCE : Mutat Res, vol 42, pg 161, 1977 (MUREAV)
MUTAGENICITY STUDIES
o TEST SYSTEM : cytogenetic analysis
o SPECIES/ROUTE/ CELL TYPE : human:lymphocyte
o DOSE : 20 ug/L
o REFERENCE : Cytol Genet, vol 8(3), pg 6, 1974 (CYGEDX)
MUTAGENICITY STUDIES
o TEST SYSTEM : sister chromatid exchange
o SPECIES/ROUTE/ CELL TYPE : human:lymphocyte
o DOSE : 10 mg/L
o REFERENCE : J Hered, vol 73, pg 224, 1982 (JOHEA8)
MUTAGENICITY STUDIES
o TEST SYSTEM : cytogenetic analysis
o SPECIES/ROUTE/ CELL TYPE : rat-intraperitoneal
o DOSE : 100 ug/kg
o REFERENCE : Cytologia, vol 52, pg 275, 1987 (CYTOAN)
MUTAGENICITY STUDIES
o TEST SYSTEM : DNA inhibition
o SPECIES/ROUTE/ CELL TYPE : mouse-oral
o DOSE : 200 mg/kg
o REFERENCE : Mutat Res, vol 55, pg 197, 1978 (MUREAV)
MUTAGENICITY STUDIES
o TEST SYSTEM : cytogenetic analysis
o SPECIES/ROUTE/ CELL TYPE : mouse-oral
o DOSE : 100 mg/kg
o REFERENCE : Cytol Genet, vol 8(3), pg 6, 1974 (CYGEDX)
MUTAGENICITY STUDIES
o TEST SYSTEM : DNA inhibition
o SPECIES/ROUTE/ CELL TYPE : hamster:ovary
o DOSE : 1 mmol/L
o REFERENCE : Toxicol Lett, vol 29, pg 137, 1985 (TOLED5)
MUTAGENICITY STUDIES
o TEST SYSTEM : cytogenetic analysis
o SPECIES/ROUTE/ CELL TYPE : hamster:ovary
o DOSE : 2400 mg/L
o REFERENCE : Environ Mol Mutagen, vol 10(Suppl 10), pg 1,
MUTAGENICITY STUDIES
o TEST SYSTEM : sister chromatid exchange
o SPECIES/ROUTE/ CELL TYPE : hamster:ovary
o DOSE : 167 mg/L
o REFERENCE : Environ Mol Mutagen, vol 10(Suppl 10), pg 1,
MUTAGENICITY STUDIES
o TEST SYSTEM : gene mutation in mammalian cells
o SPECIES/ROUTE/ CELL TYPE : hamster:lung
o DOSE : 10 umol/L
o REFERENCE : Chem Biol Interact, vol 19, pg 369, 1977 (CBI
MUTAGENICITY STUDIES
o TEST SYSTEM : cytogenetic analysis
o SPECIES/ROUTE/ CELL TYPE : cattle:kidney
o DOSE : 1 ppm
o REFERENCE : In Vitro, vol 8, pg 416, 1973 (ITCSAF)

FIGURE 2. 2,4-D NLM TOXNET (continued)

MUTAGENICITY STUDIES
o TEST SYSTEM : DNA damage
o SPECIES/ROUTE/ CELL TYPE : mammal:lymphocyte
o DOSE : 1 mmol/L
o REFERENCE : Phytochemistry, vol 11, pg 3135, 1972 (FYTCAS
SKIN AND EYE IRRITATION STUDIES
o ROUTE : skin
o SPECIES : rabbit
o DOSE : 500 mg/24H
o EFFECT : MILD
o REFERENCE : Sb Vysledku Toxikologickeho Vysetreni Latek A 279, 1972 (28ZPAK)
SKIN AND EYE IRRITATION STUDIES
o ROUTE : eye
o SPECIES : rabbit
o DOSE : 750 ug/24H
o EFFECT : SEVERE
o REFERENCE : Sb Vysledku Toxikologickeho Vysetreni Latek A 279, 1972 (28ZPAK)
GENERAL TOXICITY STUDIES
o ROUTE : oral
o SPECIES : man
o STUDY TYPE : TDLo
o DOSE : 2 gm/kg
o EFFECT : BEHAVIORAL (Coma)
o EFFECT : LUNGS, THORAX OR RESPIRATION (Respiratory dep
o REFERENCE : Arch Toxicol, vol 66, pg 518, 1992 (ARTODN)
GENERAL TOXICITY STUDIES
o ROUTE : oral
o SPECIES : man
o STUDY TYPE : TDLo
o DOSE : 5714 mg/kg
o EFFECT : BEHAVIORAL (Coma)
o EFFECT : CARDIAC (Change in rate)
o EFFECT : LUNGS, THORAX OR RESPIRATION (Respiratory dep
o REFERENCE : Arch Toxicol, vol 66, pg 518, 1992 (ARTODN)
GENERAL TOXICITY STUDIES
o ROUTE : oral
o SPECIES : human
o STUDY TYPE : LDLo
o DOSE : 80 mg/kg
o EFFECT : GASTROINTESTINAL (Nausea or vomiting)
o EFFECT : BEHAVIORAL (Coma; Somnolence)
o REFERENCE : Arch Pathol, vol 94, pg 270, 1972 (ARPAAQ)
GENERAL TOXICITY STUDIES
o ROUTE : oral
o SPECIES : man
o STUDY TYPE : LDLo
o DOSE : 93 mg/kg
o EFFECT : BEHAVIORAL (Convulsions or effect on seizure
o REFERENCE : Pharmacol Rev, vol 14, pg 225, 1962 (PAREAQ)
GENERAL TOXICITY STUDIES
o ROUTE : oral
o SPECIES : rat
o STUDY TYPE : LD50
o DOSE : 375 mg/kg
o EFFECT : DETAILS NOT REPORTED
o REFERENCE : Farm Chem Handb, pg C174, 1991 (FMCHA2)
GENERAL TOXICITY STUDIES
o ROUTE : skin
o SPECIES : rat

FIGURE 2. 2,4-D NLM TOXNET (continued)

o STUDY TYPE : LD50
o DOSE : 1500 mg/kg
o EFFECT : DETAILS NOT REPORTED
o REFERENCE : World Rev Pest Control, vol 9, pg 119, 1970 (
GENERAL TOXICITY STUDIES
o ROUTE : intraperitoneal
o SPECIES : rat
o STUDY TYPE : LD50
o DOSE : 666 mg/kg
o EFFECT : PERIPHERAL NERVE AND SENSATION (Spastic paral
sensory change)
o EFFECT : BEHAVIORAL (Muscle weakness; Coma)
o REFERENCE : J Ind Hyg Toxicol, vol 29, pg 85, 1947 (JIHTA
GENERAL TOXICITY STUDIES
o ROUTE : oral
o SPECIES : mouse
o STUDY TYPE : LD50
o DOSE : 347 mg/kg
o EFFECT : DETAILS NOT REPORTED
o REFERENCE : Rocz Panstw Zakl Hig, vol 31, pg 373, 1980 (R
GENERAL TOXICITY STUDIES
o ROUTE : intraperitoneal
o SPECIES : mouse
o STUDY TYPE : LDLo
o DOSE : 125 mg/kg
o EFFECT : DETAILS NOT REPORTED
o REFERENCE : Toxicol Appl Pharmacol, vol 23, pg 288, 1972
GENERAL TOXICITY STUDIES
o ROUTE : oral
o SPECIES : dog
o STUDY TYPE : LD50
o DOSE : 100 mg/kg
o EFFECT : BEHAVIORAL (Stiffness; Coma)
o REFERENCE : Arch Environ Health, vol 7, pg 202, 1963 (AEH
GENERAL TOXICITY STUDIES
o ROUTE : oral
o SPECIES : rabbit
o STUDY TYPE : LDLo
o DOSE : 800 mg/kg
o EFFECT : DETAILS NOT REPORTED
o REFERENCE : Arch Mal Prof Med Trav Secur Soc, vol 12, pg
GENERAL TOXICITY STUDIES
o ROUTE : skin
o SPECIES : rabbit
o STUDY TYPE : LD50
o DOSE : 1400 mg/kg
o EFFECT : BEHAVIORAL (Ataxia)
o EFFECT : SKIN AND APPENDAGES (Primary irritation)
o REFERENCE : Assoc Food Drug Off US Q Bull, vol 16, pg 3,
GENERAL TOXICITY STUDIES
o ROUTE : intraperitoneal
o SPECIES : rabbit
o STUDY TYPE : LD50
o DOSE : 400 mg/kg
o EFFECT : PERIPHERAL NERVE AND SENSATION (Spastic paral
sensory change)
o EFFECT : BEHAVIORAL (Muscle weakness; Coma)
o REFERENCE : J Ind Hyg Toxicol, vol 29, pg 85, 1947 (JIHTA
GENERAL TOXICITY STUDIES
o ROUTE : intravenous
o SPECIES : rabbit

FIGURE 2. 2,4-D NLM TOXNET (continued)

o STUDY TYPE : LD50
o DOSE : 400 mg/kg
o EFFECT : PERIPHERAL NERVE AND SENSATION (Spastic paral sensory change)
o EFFECT : BEHAVIORAL (Muscle weakness; Coma)
o REFERENCE : J Ind Hyg Toxicol, vol 29, pg 85, 1947 (JIHTA
GENERAL TOXICITY STUDIES
o ROUTE : oral
o SPECIES : guinea pig
o STUDY TYPE : LD50
o DOSE : 469 mg/kg
o EFFECT : DETAILS NOT REPORTED
o REFERENCE : Am J Vet Res, vol 15, pg 622, 1954 (AJVRAH)
GENERAL TOXICITY STUDIES
o ROUTE : intraperitoneal
o SPECIES : guinea pig
o STUDY TYPE : LD50
o DOSE : 666 mg/kg
o EFFECT : PERIPHERAL NERVE AND SENSATION (Spastic paral sensory change)
o EFFECT : BEHAVIORAL (Muscle weakness; Coma)
o REFERENCE : J Ind Hyg Toxicol, vol 29, pg 85, 1947 (JIHTA
GENERAL TOXICITY STUDIES
o ROUTE : oral
o SPECIES : hamster
o STUDY TYPE : LD50
o DOSE : 500 mg/kg
o EFFECT : DETAILS NOT REPORTED
o REFERENCE : Toxicol Appl Pharmacol, vol 48, pg A192, 1979
GENERAL TOXICITY STUDIES
o ROUTE : oral
o SPECIES : chicken
o STUDY TYPE : LD50
o DOSE : 541 mg/kg
o EFFECT : GASTROINTESTINAL (Gastritis)
o EFFECT : BEHAVIORAL (Somnolence)
o EFFECT : LIVER (Fatty liver degeneration)
o REFERENCE : Am J Vet Res, vol 15, pg 622, 1954 (AJVRAH)
GENERAL TOXICITY STUDIES
o ROUTE : oral
o SPECIES : mammal
o STUDY TYPE : LD50
o DOSE : 375 mg/kg
o EFFECT : DETAILS NOT REPORTED
o REFERENCE : Science, vol 165, pg 465, 1969 (SCIEAS)
REPRODUCTIVE STUDIES
o ROUTE : oral
o SPECIES : rat
o STUDY TYPE : TDLo
o DOSE : 220 ug/kg (1-22D preg)
o EFFECT : SPECIFIC DEVELOPMENTAL ABNORMALITIES (Blood a systems)
o REFERENCE : Gig Sanit, vol 50(10), pg 76, 1985 (GISAAA)
REPRODUCTIVE STUDIES
o ROUTE : oral
o SPECIES : rat
o STUDY TYPE : TDLo
o DOSE : 1 gm/kg (6-15D preg)
o EFFECT : SPECIFIC DEVELOPMENTAL ABNORMALITIES (Musculo
o EFFECT : EFFECTS ON EMBRYO OR FETUS (Fetotoxicity; Fet
o REFERENCE : Toxicol Appl Pharmacol, vol 22, pg 14, 1972 (

FIGURE 2. 2,4-D NLM TOXNET (continued)

REPRODUCTIVE STUDIES
o ROUTE : oral
o SPECIES : rat
o STUDY TYPE : TDLo
o DOSE : 125 mg/kg (6-15D preg)
o EFFECT : SPECIFIC DEVELOPMENTAL ABNORMALITIES (Musculo
o REFERENCE : Food Cosmet Toxicol, vol 9, pg 801, 1971 (FCT
REPRODUCTIVE STUDIES
o ROUTE : oral
o SPECIES : rat
o STUDY TYPE : TDLo
o DOSE : 500 mg/kg (6-15D preg)
o EFFECT : EFFECTS ON EMBRYO OR FETUS (Fetotoxicity)
o EFFECT : SPECIFIC DEVELOPMENTAL ABNORMALITIES (Central Urogenital system)
o REFERENCE : Food Cosmet Toxicol, vol 9, pg 801, 1971 (FCT
REPRODUCTIVE STUDIES
o ROUTE : oral
o SPECIES : rat
o STUDY TYPE : TDLo
o DOSE : 500 mg/kg (6-15D preg)
o EFFECT : SPECIFIC DEVELOPMENTAL ABNORMALITIES (Homeost
o EFFECT : EFFECTS ON NEWBORN (Growth statistics)
o REFERENCE : Food Cosmet Toxicol, vol 9, pg 801, 1971 (FCT
REPRODUCTIVE STUDIES
o ROUTE : oral
o SPECIES : mouse
o STUDY TYPE : TDLo
o DOSE : 707 mg/kg (11-14D preg)
o EFFECT : EFFECTS ON EMBRYO OR FETUS (Fetotoxicity; Fet
o EFFECT : SPECIFIC DEVELOPMENTAL ABNORMALITIES (Craniof
o REFERENCE : Arch Environ Contam Toxicol, vol 6, pg 33, 19
REPRODUCTIVE STUDIES
o ROUTE : oral
o SPECIES : mouse
o STUDY TYPE : TDLo
o DOSE : 900 mg/kg (6-14D preg)
o EFFECT : EFFECTS ON FERTILITY (Litter size)
o EFFECT : EFFECTS ON EMBRYO OR FETUS (Extra embryonic s
o EFFECT : SPECIFIC DEVELOPMENTAL ABNORMALITIES (Eye, ea
o REFERENCE : Natl Tech Inf Serv[PB223-160] (NTIS**)
REPRODUCTIVE STUDIES
o ROUTE : oral
o SPECIES : mouse
o STUDY TYPE : TDLo
o DOSE : 438 mg/kg (8-12D preg)
o EFFECT : EFFECTS ON NEWBORN (Growth statistics)
o REFERENCE : Teratogen Carcinog Mutagen, vol 7, pg 7, 1987
REPRODUCTIVE STUDIES
o ROUTE : subcutaneous
o SPECIES : mouse
o STUDY TYPE : TDLo
o DOSE : 882 mg/kg (6-14D preg)
o EFFECT : EFFECTS ON EMBRYO OR FETUS (Fetal death)
o EFFECT : SPECIFIC DEVELOPMENTAL ABNORMALITIES (Central
o EFFECT : EFFECTS ON EMBRYO OR FETUS (Extra embryonic s
o REFERENCE : Natl Tech Inf Serv[PB223-160] (NTIS**)
REPRODUCTIVE STUDIES
o ROUTE : subcutaneous
o SPECIES : mouse
o STUDY TYPE : TDLo

FIGURE 2. 2,4-D NLM TOXNET (continued)

o DOSE : 900 mg/kg (6-14D preg)
o EFFECT : EFFECTS ON EMBRYO OR FETUS (Fetotoxicity)
o EFFECT : SPECIFIC DEVELOPMENTAL ABNORMALITIES (Eye, ea
o REFERENCE : Natl Tech Inf Serv[PB223-160] (NTIS**)
REPRODUCTIVE STUDIES
o ROUTE : subcutaneous
o SPECIES : mouse
o STUDY TYPE : TDLo
o DOSE : 900 mg/kg (6-14D preg)
o EFFECT : EFFECTS ON FERTILITY (Pre-implantation mortal
o REFERENCE : Natl Tech Inf Serv[PB223-160] (NTIS**)
REPRODUCTIVE STUDIES
o ROUTE : oral
o SPECIES : hamster
o STUDY TYPE : TDLo
o DOSE : 200 mg/kg (7-11D preg)
o EFFECT : EFFECTS ON FERTILITY (Litter size)
o REFERENCE : Bull Environ Contam Toxicol, vol 6, pg 559, 1
MULTIPLE DOSE TOXICITY STUDIES
o ROUTE : oral
o SPECIES : rat
o STUDY TYPE : TDLo
o DOSE : 13650 mg/kg/13W-C
o EFFECT : NUTRITIONAL AND GROSS METABOLIC (Weight loss gain)
o REFERENCE : Fundam Appl Toxicol, vol 9, pg 423, 1987 (FAA
MULTIPLE DOSE TOXICITY STUDIES
o ROUTE : oral
o SPECIES : rat
o STUDY TYPE : TDLo
o DOSE : 200 mg/kg/5W-I
o EFFECT : BEHAVIORAL (Muscle weakness)
o REFERENCE : Neurobehav Toxicol Teratol, vol 5, pg 331, 19
MULTIPLE DOSE TOXICITY STUDIES
o ROUTE : oral
o SPECIES : rat
o STUDY TYPE : TDLo
o DOSE : 54750 mg/kg/1Y-C
o EFFECT : SENSE ORGANS AND SPECIAL SENSES (Retinal chan
o EFFECT : BEHAVIORAL (Change in motor activity)
o REFERENCE : Toxicologist, vol 15, pg 23, 1995 (TOXID9)
MULTIPLE DOSE TOXICITY STUDIES
o ROUTE : oral
o SPECIES : dog
o STUDY TYPE : TDLo
o DOSE : 700 mg/kg/90D-I
o EFFECT : BLOOD (Changes in other cell countunspecified
o EFFECT : NUTRITIONAL AND GROSS METABOLIC (Weight loss gain)
o EFFECT : OTHER MULTIPLE DOSE TOXICITY DATA (Death in t data field)
o REFERENCE : AMA Arch Ind Hyg Occup Med, vol 7, pg 61, 195
MULTIPLE DOSE TOXICITY STUDIES
o ROUTE : oral
o SPECIES : dog
o STUDY TYPE : TDLo
o DOSE : 1820 mg/kg/52W-C
o EFFECT : KIDNEY, URETER, BLADDER (Changes in tubules)
o EFFECT : LIVER (Other changes)
o EFFECT : BLOOD (Changes in serum composition TP, bilir cholesterol...)

FIGURE 2. 2,4-D NLM TOXNET (continued)

o REFERENCE : Fundam Appl Toxicol, vol 29, pg 78, 1996 (FAA
MULTIPLE DOSE TOXICITY STUDIES
o ROUTE : intravenous
o SPECIES : dog
o STUDY TYPE : TDLo
o DOSE : 300 mg/kg/6D-I
o EFFECT : MUSCULO-SKELETAL (Changes in teeth and suppor
o EFFECT : SKIN AND APPENDAGES (After systemic exposure:
o EFFECT : OTHER MULTIPLE DOSE TOXICITY DATA (Death in t
data field)
o REFERENCE : J Ind Hyg Toxicol, vol 29, pg 85, 1947 (JIHTA
TOXICOLOGY REVIEW TOXICOLOGY REVIEW; RREVAH 59,1,75; Residue Rev
TOXICOLOGY REVIEW TOXICOLOGY REVIEW; DTTIAF 80,485,73; Dtsch Tieraerz
TOXICOLOGY REVIEW TOXICOLOGY REVIEW; RREVAH 56,107,75; Residue Rev
TOXICOLOGY REVIEW TOXICOLOGY REVIEW; ECMAAI 14,141,73; Econ Med Anim
TOXICOLOGY REVIEW TOXICOLOGY REVIEW; BIOGAL 40(2),44,74; Biologico
TOXICOLOGY REVIEW TOXICOLOGY REVIEW; HYSAAV 31(7-9),383,66; Hyg Sanit
CANCER REVIEW IARC CANCER REVIEW; Human Limited Evidence; IMEMDT
Monogr Eval Carcinog Risk Chem Man
CANCER REVIEW IARC CANCER REVIEW; Animal Inadequate Evidence; IME
Monogr Eval Carcinog Risk Chem Man
THRESHOLD LIMIT VALUE ACGIH THRESHOLD LIMIT VALUE REVIEW; TWA 10 mg/m3; 8
Threshold Limit Values
NIOSH RECOMMENDED LIMITS NIOSH REL TO 2,4-D-air:10H TWA 10 mg/m3; NIOSH* DHH
Inst Occup Saf Health
NIOSH EXPOSURE SURVEYS NATIONAL OCCUPATIONAL HAZARD SURVEY 1974: Hazard#:
industries: 6; total number of facilities: 1132; nu
occupations: 8; total number of employees: 6266
NIOSH EXPOSURE SURVEYS NATIONAL OCCUPATIONAL EXPOSURE SURVEY 1983: Hazard#
industries: 1; total number of facilities: 94; numb
1; total number of employees: 471
STANDARDS AND REGULATIONS EPA FIFRA 1988 PESTICIDE SUBJECT TO REGISTRATION OR
FEREAC 54,7740,89; Fed Regist
STANDARDS AND REGULATIONS MSHA STANDARD-air:TWA 10 mg/m3; DTLVS* 3,67,71; Doc
Values
STANDARDS AND REGULATIONS OSHA PEL (Gen Indu):8H TWA 10 mg/m3; CFRGBR 29,1910
Regul
STANDARDS AND REGULATIONS OSHA PEL (Construc):8H TWA 10 mg/m3; CFRGBR 29,1926
Regul
STANDARDS AND REGULATIONS OSHA PEL (Shipyard):8H TWA 10 mg/m3; CFRGBR 29,1915
Regul
STANDARDS AND REGULATIONS OSHA PEL (Fed Cont):8H TWA 10 mg/m3; CFRGBR 41,50-2
Regul
STANDARDS AND REGULATIONS OEL-AUSTRALIA:TWA 10 mg/m3 JAN93
STANDARDS AND REGULATIONS OEL-AUSTRIA:TWA 10 mg/m3 JAN93
STANDARDS AND REGULATIONS OEL-BELGIUM:TWA 10 mg/m3 JAN93
STANDARDS AND REGULATIONS OEL-DENMARK:TWA 5 mg/m3 JAN93
STANDARDS AND REGULATIONS OEL-FINLAND:TWA 10 mg/m3;STEL 20 mg/m3;Skin JAN93
STANDARDS AND REGULATIONS OEL-FRANCE:TWA 10 mg/m3 JAN93
STANDARDS AND REGULATIONS AOEL-GERMANY:TWA 10 mg/m3 JAN93
STANDARDS AND REGULATIONS OEL-HUNGARY:TWA 1 mg/m3;STEL 2 mg/m3;Skin JAN93
STANDARDS AND REGULATIONS OEL-THE NETHERLANDS:TWA 10 mg/m3 JAN93
STANDARDS AND REGULATIONS OEL-THE PHILIPPINES:TWA 10 mg/m3 JAN93
STANDARDS AND REGULATIONS OEL-POLAND:TWA 7 mg/m3 JAN93
STANDARDS AND REGULATIONS OEL-SWITZERLAND:TWA 10 mg/m3;STEL 50 mg/m3 JAN93
STANDARDS AND REGULATIONS OEL-THAILAND:TWA 10 mg/m3 JAN93
STANDARDS AND REGULATIONS OEL-TURKEY:TWA 10 mg/m3 JAN93
STANDARDS AND REGULATIONS OEL-UNITED KINGDOM:TWA 10 mg/m3;STEL 20 mg/m3 JAN93
STANDARDS AND REGULATIONS OEL IN BULGARIA, COLOMBIA, JORDAN, KOREA check ACGI
STANDARDS AND REGULATIONS OEL IN NEW ZEALAND, SINGAPORE, VIETNAM check ACGIH
FEDERAL PROGRAM STATUS EPA GENETOX PROGRAM 1988, Positive: In vivo cytogen

FIGURE 2. 2,4-D NLM TOXNET (continued)

```
                marrow
FEDERAL PROGRAM STATUS    EPA GENETOX PROGRAM 1988, Positive: In vitro cytoge
                lymphocyte
FEDERAL PROGRAM STATUS    EPA GENETOX PROGRAM 1988, Positive: B subtilis rec
                without S9
FEDERAL PROGRAM STATUS    EPA GENETOX PROGRAM 1988, Positive: V79 cell cultur
FEDERAL PROGRAM STATUS    EPA GENETOX PROGRAM 1988, Positive: S cerevisiae ge
FEDERAL PROGRAM STATUS    EPA GENETOX PROGRAM 1988, Negative: D melanogaster-
                loss
FEDERAL PROGRAM STATUS    EPA GENETOX PROGRAM 1988, Negative: D melanogaster-
FEDERAL PROGRAM STATUS    EPA GENETOX PROGRAM 1988, Negative: Histidine rever
FEDERAL PROGRAM STATUS    EPA GENETOX PROGRAM 1988, Negative: D melanogaster
FEDERAL PROGRAM STATUS    EPA GENETOX PROGRAM 1988, Negative: In vitro UDS-hu
                reversion
FEDERAL PROGRAM STATUS    EPA GENETOX PROGRAM 1988, Negative: S cerevisiae-ho
FEDERAL PROGRAM STATUS    EPA GENETOX PROGRAM 1988, Inconclusive: Carcinogeni
                Mammalian micronucleus
FEDERAL PROGRAM STATUS    EPA TSCA Section 8(b) CHEMICAL INVENTORY
FEDERAL PROGRAM STATUS    EPA TSCA Section 8(d) unpublished health/safety stu
FEDERAL PROGRAM STATUS    On EPA IRIS database
FEDERAL PROGRAM STATUS    EPA TSCA TEST SUBMISSION (TSCATS) DATA BASE, JULY 1
FEDERAL PROGRAM STATUS    NIOSH Analytical Method, 1994: 2,4-D, 5001
FEDERAL PROGRAM STATUS    NTP Carcinogenesis studies; on test (prechronic stu

[RTECS] SS 3 /cf?
USER:
```

FIGURE 3. TNT IN DIALOG

DIALOG(R)File 336:RTECS
Comp & dist by NIOSH, Intl Copyright All . All rts. reserv.

128887 RTECS Number: XU0175000
Substance Name: Toluene, 2,4,6-trinitro-
CAS Registry Number: 118-96-7 Molecular Formula: C7H5N3O6
Molecular Weight: 227.15
Synonyms: Benzene, 2-methyl-1,3,5-trinitro- ; Entsufon ;
2-Methyl-1,3,5-trinitrobenzene ; NCI-C56155 ; TNT ; alpha-Tnt ; TNT (OSHA) ; TNT, dry or wetted with <30% water, by weight (UN0209) (DOT) ; TNT-tolite (French) ; Tolit ; Tolite ; 2,4,6-Trinitrotolueen (Dutch) ; Trinitrotoluene ; Trinitrotoluene (UN0209) (DOT) ; Trinitrotoluene, wetted with not <30% water, by weight (UN1356) (DOT) ; s-Trinitrotoluene ; sym-Trinitrotoluene ; 2,4,6-Trinitrotoluene (ACGIH:OSHA) ; s-Trinitrotoluol ; sym-Trinitrotoluol ; 2,4,6-Trinitrotoluol (German) ; Tritol ; Triton ; Trojnitrotoluen (Polish) ; Trotyl ; Trotyl oil ; UN0209 (DOT) ; UN1356 (DOT)
Compound Class: Agricultural Chemical; Tumorigen; Mutagen; Reproductive Effector; Human Data; Primary Irritant
Wiswesser Line Notation: WNR B1 CNW ENW
Record Date: 9607

IRRITATION DATA:
Skin Rabbit 500 mg/24H Mild NTIS** AD-B011-150

MUTATION DATA:
Mutation in microorganisms Salmonella typhimurium 10 ug/plate NTIS** AD-A080-146
Body fluid assay Rat Salmonella typhimurium 50 mg/kg MUREAV 262,167,91
Mutation in mammalian somatic cells Mouse Lymphocyte 40 mg/L CALEDQ 20,103,83

REPRODUCTIVE EFFECTS DATA:
Testes, epididymis, sperm duct Oral Rat TDLo 5376 mg/kg 28D male JTEHD6 9,565,82

TOXICITY EFFECTS DATA:
Hallucinations, distorted perceptions ;Cyanosis ;Gastrointestinal—Other changes Oral Human LDLo 28 gm/kg 34ZIAG -,610,69
Somnolence (general depressed activity) ;Tremor ;Convulsions or effect on seizure threshold Oral Rat LD50 795 mg/kg JTEHD6 9,565,82
Somnolence (general depressed activity) ;Tremor ;Convulsions or effect on seizure threshold Oral Mouse LD50 660 mg/kg JTEHD6 9,565,82
Dyspnea ;Cyanosis ;Dermatitis, allergic (after systemic exposure) Oral Cat LDLo 1850 mg/kg MRCSAB 58,32,21

Dyspnea ;Cyanosis ;Dermatitis, allergic (after systemic exposure)
Subcutaneous Cat LDLo 200 mg/kg MRCSAB 58,32,21
Convulsions or effect on seizure threshold ;Hypermotility, diarrhea ;Cyanosis Oral Rabbit LDLo 500 mg/kg MRCSAB 58,32,21
Convulsions or effect on seizure threshold ;Hypermotility, diarrhea ;Cyanosis Subcutaneous Rabbit LDLo 500 mg/kg MRCSAB 58,32,21

OTHER MULTIPLE DOSE EFFECTS DATA:
Liver--Other changes ; Changes in serum composition (e.g., TP, bilirubin, cholesterol) ; Changes in testicular weight ; Oral Rat TDLo 7200 mg/kg/6W-I TOLED5 55,343,91
Food intake (animal) ; Normocytic anemia ; Weight loss or decreased weight gain ; Oral Rat TDLo 11375 mg/kg/13W-C TXCYAC 32,253,84

Liver--Other changes ; Monamine oxidase ; Lipids including transport ; Oral Rat TDLo 3 gm/kg/30D-I GTPZAB 18(10),57,74
Changes in liver weight ; Changes in Spleen weight ; Changes in spleen ; Oral Mouse TDLo 11 mg/kg/13W-C JTEHD6 9,565,82
Changes in liver weight ; Normocytic anemia ; Weight loss or decreased weight gain ; Oral Dog TDLo 182 mg/kg/13W-C JTEHD6 9,565,82
Changes in liver weight ; Normocytic anemia ; Changes in spleen ; Oral Dog TDLo 1456 mg/kg/26W-I TXCYAC 63,233,90

REVIEWS:
ACGIH TLV-TWA 0.5 mg/m3 (skin) 85INA8 6,1652,91
IARC Cancer Review:Animal Inadequate Evidence IMEMDT 65,449,96
IARC Cancer Review:Human Inadequate Evidence IMEMDT 65,449,96
IARC Cancer Review:Group 3 IMEMDT 65,449,96
TOXICOLOGY REVIEW NTIS** AD778-725
TOXICOLOGY REVIEW CRTXB2 1(1),93,71
TOXICOLOGY REVIEW PAREAQ 4,1,52

STANDARDS AND REGULATIONS:
DOT-HAZARD EXPLOSIVE 1.1D; LABEL:EXPLOSIVE 1.1D (UN0209) CFRGBR 49,172.101,92
DOT-HAZARD 4.1; LABEL:FLAMMABLE SOLID (UN1356) CFRGBR 49,172.101,92
MSHA STANDARD-air TWA 0.2 ppm (0.5 mg/m3) (skin) DTLVS* 3,270,71
OSHA PEL (Gen Indu) 8H TWA 1.50 mg/m3 (skin) CFRGBR 29,1910.1000,94
OSHA PEL (Construc) 8H TWA 1.50 mg/m3 (skin) CFRGBR 29,1926.55,94
OSHA PEL (Shipyard) 8H TWA 1.50 mg/m3 (skin) CFRGBR 29,1915.1000,93
OSHA PEL (Fed Cont) 8H TWA 1.50 mg/m3 (skin) CFRGBR 41,50-204.50,94
OEL-ARAB Republic of Egypt TWA 0.5 mg/m3 JAN93
OEL-AUSTRALIA TWA 0.5 mg/m3;Skin JAN93
OEL-BELGIUM TWA 0.5 mg/m3;Skin JAN93
OEL-DENMARK STEL 0.5 mg/m3;Skin JAN93
OEL-FINLAND TWA 0.5 mg/m3;STEL 3 mg/m3;Skin JAN93

OEL-FRANCE TWA 0.5 mg/m3;Skin JAN93
OEL-GERMANY TWA 0.01 ppm (0.1 mg/m3);Skin;Carcinogen JAN93
OEL-HUNGARY TWA 0.3 mg/m3;STEL 0.5 mg/m3;Skin JAN93
OEL-THE NETHERLANDS TWA 0.5 mg/m3;Skin JAN93
OEL-THE PHILIPPINES TWA 1.5 mg/m3;Skin JAN93
OEL-RUSSIA TWA 0.1 mg/m3;STEL 0.5 mg/m3;Skin JAN93
OEL-SWITZERLAND TWA 0.01 ppm (0.1 mg/m3);STEL 0.02 ppm;Skin JAN93
OEL-TURKEY TWA 1.5 mg/m3;Skin JAN93
OEL-UNITED KINGDOM TWA 0.5 mg/m3;STEL 0.5 mg/m3 JAN93
OEL IN BULGARIA COLOMBIA, JORDAN, KOREA check ACGIH TLV
OEL IN NEW ZEALAND SINGAPORE, VIETNAM check ACGIH TLV

NIOSH CRITERIA DOCUMENTS:
NIOSH REL TO 2,4,6 TRINITROTOLUENE-air:10H TWA 0.5 mg/m3 (Sk) NIOSH* DHHS #92-100,92
NOES 1983: HZD 74550; NIS 2; TNF 10; NOS 1; TNE 31

NTP, NIOSH, EPA STATUS:
EPA GENETOX PROGRAM 1988, Positive: Histidine reversion-Ames test
EPA TSCA Section 8(b) CHEMICAL INVENTORY
EPA TSCA Section 8(d) unpublished health/safety studies
On EPA IRIS database
EPA TSCA TEST SUBMISSION (TSCATS) DATA BASE, JULY 1996
OSHA ANALYTICAL METHOD #44

IRRITATION EFFECTS JOURNAL REFERENCES:
NTIS** National Technical Information Service. Springfield, VA 22161 Formerly U.S. Clearinghouse for Scientific & Technical Information.

MUTATION EFFECTS JOURNAL REFERENCES:
CALEDQ Cancer Letters (Shannon, Ireland). Elsevier Scientific Pub. Ireland Ltd., POB 85, Limerick, Ireland V.1- 1975-
MUREAV Mutation Research. Elsevier Science Pub. B.V., POB 211, 1000 AE Amsterdam, Netherlands V.1- 1964-
NTIS** National Technical Information Service. Springfield, VA 22161 Formerly U.S. Clearinghouse for Scientific & Technical Information.

REPRODUCTIVE EFFECTS JOURNAL REFERENCES:
JTEHD6 Journal of Toxicology and Environmental Health. Hemisphere Pub., 1025 Vermont Ave., NW, Washington, DC 20005 V.1- 1975/76-

FIGURE 3. TNT IN DIALOG (continued)

TOXICITY EFFECTS JOURNAL REFERENCES:
JTEHD6 Journal of Toxicology and Environmental Health. Hemisphere Pub., 1025 Vermont Ave., NW, Washington, DC 20005 V.1- 1975/76-
MRCSAB Special Report Series--Medical Research Council (United Kingdom). Her Majesty's Stationery Office, P.O. Box 569, London SE1 9NH, UK No.1- 1915-
34ZIAG Toxicology of Drugs and Chemicals, Deichmann, W.B., New York, Academic Press, Inc., 1969

OTHER MULTIPLE DOSE EFFECTS JOURNAL REFERENCES:
GTPZAB Gigiena Truda i Professional'nye Zabolevaniya. Labor Hygiene and Occupational Diseases. V/O Mezhdunarodnaya Kniga, 113095 Moscow, USSR V.1- 1957-
JTEHD6 Journal of Toxicology and Environmental Health. Hemisphere Pub., 1025 Vermont Ave., NW, Washington, DC 20005 V.1- 1975/76-
TOLED5 Toxicology Letters. Elsevier Science Pub. B.V., POB 211, 1000 AE Amsterdam, Netherlands V.1- 1977-
TXCYAC Toxicology. Elsevier Scientific Pub. Ireland, Ltd., POB 85, Limerick, Ireland V.1- 1973-

REVIEWS JOURNAL REFERENCES:
CRTXB2 CRC Critical Reviews in Toxicology. CRC Press, Inc., 2000 Corporate Blvd., NW, Boca Raton, FL 33431 V.1- 1971-
IMEMDT IARC Monographs on the Evaluation of Carcinogenic Risk of Chemicals to Man. WHO Publications Centre USA, 49 Sheridan Ave., Albany, NY 12210 V.1- 1972-
NTIS** National Technical Information Service. Springfield, VA 22161 Formerly U.S. Clearinghouse for Scientific & Technical Information.
PAREAQ Pharmacological Reviews. Williams & Wilkins, 428 E. Preston St., Baltimore, MD 21202 V.1- 1949-
85INA8 Documentation of the Threshold Limit Values and Biological Exposure Indices, 5th ed., Cincinnati, OH, American Conference of Governmental Industrial Hygienists, Inc., 1986

STANDARDS & REGULATIONS JOURNAL REFERENCES:
CFRGBR Code of Federal Regulations. U.S. Government Printing Office, Supt. of Documents, Washington, DC 20402
DTLVS* Documentation of Threshold Limit Values for Substances in Workroom Air. For publisher information, see 85INA8.

DATA PRESENT: Irritation Effects; Mutation Effects; Reproductive Effects; Toxicity Effects; Human Toxicity Effects; Other Multiple Dose Effects; Reviews; Standards and Regulations; NIOSH Criteria Documents; NTP, NIOSH, EPA Status

FIGURE 4. 2,4-D IN DIALOG

DIALOG(R)File 336:RTECS
Comp & dist by NIOSH, Intl Copyright All . All rts. reserv.

004374 RTECS Number: AG6825000
Substance Name: Acetic acid, (2,4-dichlorophenoxy)-
CAS Registry Number: 94-75-7 Molecular Formula: C8H6Cl2O3
Molecular Weight: 221.04
Synonyms: Acide 2,4-dichloro phenoxyacetique (French) ;
Acido(2,4-dicloro-fenossi)-acetico (Italian) ; Acme amine 4 ; Acme butyl ester 4 ; Acme LV 4 ; Agrotect ; Amidox ; Amoxone ; Aqua-Kleen ; Barrage ; BH 2,4-D ; Brush-rhap ; B-Selektonon ; Chipco turf herbicide "D" ; Chloroxone ; Citrus fix ; Crop rider ; 2,4-D (ACGIH:OSHA) ; 2,4-D acid ; Debroussaillant 600 ; Decamine ; Deherban ; (2,4-Dichloor-fenoxy)-azijnzuur (Dutch) ; Dichlorophenoxyacetic acid ; 2,4-Dichlorophenoxyacetic acid ; Dichlorophenoxyacetic acid (OSHA) ; 2,4-Dichlorphenoxyacetic acid ; (2,4-Dichlor-phenoxy)-essigsaeure (German) ; Dicopur ; DMA-4 ; Dormone ; 2,4-Dwuchlorofenoksyoctowy kwas (Polish) ; Emulsamine BK ; Emulsamine E-3 ; ENT 8,538 ; Envert 171 ; Envert DT ; Estone ; Farmco ; Fernimine ; Fernoxone ; Ferxone ; Foredex 75 ; Hedonal ; Hedonal (the herbicide) ; Herbidal ; Hivol-44 ; Ipaner ; Kwasu 2,4-dwuchlorofenoksyoctowego (Polish) ; Kwas 2,4-dwuchlorofenoksyoctowy (Polish) ; Kyselina 2,4-dichlorfenoxyoctova (Czech) ; Lawn-keep ; Macrondray ; Miracle ; Monosan ; Moxone ; Netagrone ; Netagrone 600 ; NSC 423 ; Pennamine ; Pennamine D ; Phenox ; Pielik ; Plantgard ; RCRA waste number U240 ; Rhodia ; Spritz-hormin/2,4-D ; Spritz-hormit/2,4-D ; Superormone concentre ; U-5043 ; U 46DP ; Vergemaster ; Verton ; Verton D ; Verton 2D ; Vidon 638 ; Weed-Ag-Bar ; Weedar-64 ; Weedatul ; Weedez Wonder BAR ; Weedone LV4 ; Weed-rhap ; Weed TOX ; Weedtrol
Compound Class: Agricultural Chemical; Tumorigen; Mutagen; Reproductive Effector; Human Data; Primary Irritant
Wiswesser Line Notation: QV1OR BG DG
Record Date: 9607

IRRITATION DATA:
Skin Rabbit 500 mg/24H Mild 28ZPAK -,279,72
Eye Rabbit 750 ug/24H Severe 28ZPAK -,279,72

MUTATION DATA:
Mutation in microorganisms Salmonella typhimurium 250 ug/plate MUREAV 204,615,88
DNA repair Escherichia coli 5 mg/disc NTIS** PB80-133226
DNA adduct Escherichia coli 20 umol/L MUREAV 89,95,81
DNA repair Bacillus subtilis 5 mg/disc NTIS** PB80-133226
Mutation in microorganisms Other microorganisms 1 gm/L MILEDM 5,103,77

FIGURE 4. 2,4-D IN DIALOG (continued)

Mutation in microorganisms Other microorganisms 1 gm/L MILEDM 5,103,77
Mutation in microorganisms Other microorganisms 1 gm/L MILEDM 5,103,77
Mutation in microorganisms Other microorganisms 1 gm/L MILEDM 5,103,77
Specific locus test Drosophila melanogaster Oral 5 mmol/L MUREAV 319,237,93
Specific locus test Drosophila melanogaster Multiple routes 10 ppb EMMUEG 25,148,95
Sex chromosome loss and nondisjunction Drosophila melanogaster Oral 25 ppm ECBUDQ 27,190,78
Sex chromosome loss and nondisjunction Drosophila melanogaster Unreported 1000 ppm/15D ECBUDQ 27,182,78
Mutation in microorganisms Saccharomyces cerevisiae 150 mg/L ECBUDQ 27,193,78
Gene conversion and mitotic recombination Aspergillus nidulans 4 umol/L MUREAV 204,615,88
DNA damage Salmon Sperm 1 mmol/L PYTCAS 11,3135,72
Unscheduled DNA synthesis Human Fibroblast 1 umol/L MUREAV 42,161,77
Cytogenetic analysis Human Lymphocyte 20 ug/L CYGEDX 8(3),6,74
Sister chromatid exchange Human Lymphocyte 10 mg/L JOHEA8 73,224,82
Cytogenetic analysis Rat Intraperitoneal 100 ug/kg CYTOAN 52,275,87
DNA inhibition Mouse Oral 200 mg/kg MUREAV 55,197,78
Cytogenetic analysis Mouse Oral 100 mg/kg CYGEDX 8(3),6,74
DNA inhibition Hamster Ovary 1 mmol/L TOLED5 29,137,85
Cytogenetic analysis Hamster Ovary 2400 mg/L EMMUEG 10(Suppl
Sister chromatid exchange Hamster Ovary 167 mg/L EMMUEG 10(Suppl

Mutation in mammalian somatic cells Hamster Lung 10 umol/L CBINA8 19,369,77
Cytogenetic analysis Cattle Kidney 1 ppm ITCSAF 8,416,73
DNA damage Mammal (species unspecified) Lymphocyte 1 mmol/L PYTCAS 11,3135,72

REPRODUCTIVE EFFECTS DATA:
Developmental Abnormalities: Blood and lymphatic systems Oral Rat TDLo 220 ug/kg 1-22D preg GISAAA 50(10),76,85
Developmental Abnormalities: Musculoskeletal system ;Fetotoxicity (except death) ;Fetal death Oral Rat TDLo 1 gm/kg 6-15D preg TXAPA9 22,14,72
Developmental Abnormalities: Musculoskeletal system Oral Rat TDLo 125 mg/kg 6-15D preg FCTXAV 9,801,71

FIGURE 4. 2,4-D IN DIALOG (continued)

Fetotoxicity (except death) ;Developmental Abnormalities: Central nervous system ;Developmental Abnormalities: Urogenital system Oral Rat TDLo 500 mg/kg 6-15D preg FCTXAV 9,801,71
Developmental Abnormalities: Homeostasis ;Growth statistics Oral Rat TDLo 500 mg/kg 6-15D preg FCTXAV 9,801,71
Fetotoxicity (except death) ;Fetal death ;Developmental Abnormalities: Craniofacial Oral Mouse TDLo 707 mg/kg 11-14D preg AECTCV 6,33,77
Litter size ;Extra embryonic structures ;Developmental Abnormalities: Eye, ear Oral Mouse TDLo 900 mg/kg 6-14D preg NTIS** PB223-160
Growth statistics Oral Mouse TDLo 438 mg/kg 8-12D preg TCMUD8 7,7,87
Fetal death ;Developmental Abnormalities: Central nervous system ;Extra embryonic structures Subcutaneous Mouse TDLo 882 mg/kg 6-14D preg NTIS** PB223-160
Fetotoxicity (except death) ;Developmental Abnormalities: Eye, ear ;Developmental Abnormalities: Craniofacial Subcutaneous Mouse TDLo 900 mg/kg 6-14D preg NTIS** PB223-160
Pre-implantation mortality ;Litter size Subcutaneous Mouse TDLo 900 mg/kg 6-14D preg NTIS** PB223-160
Litter size Oral Hamster TDLo 200 mg/kg 7-11D preg BECTA6 6,559,71

TOXICITY EFFECTS DATA:
Coma ;Respiratory depression Oral Man TDLo 2 gm/kg ARTODN 66,518,92
Coma ;Change in rate ;Respiratory depression Oral Man TDLo 5714 mg/kg ARTODN 66,518,92
Nausea or vomiting ;Coma ;Somnolence (general depressed activity) Oral Human LDLo 80 mg/kg ARPAAQ 94,270,72
Convulsions or effect on seizure threshold Oral Man LDLo 93 mg/kg PAREAQ 14,225,62
* Oral Rat LD50 375 mg/kg FMCHA2 -,C174,91
* Skin Rat LD50 1500 mg/kg WRPCA2 9,119,70
Spastic paralysis with or without sensory change ;Muscle weakness ;Coma Intraperitoneal Rat LD50 666 mg/kg JIHTAB 29,85,47
* Oral Mouse LD50 347 mg/kg RPZHAW 31,373,80
* Intraperitoneal Mouse LDLo 125 mg/kg TXAPA9 23,288,72
Stiffness ;Coma Oral Dog LD50 100 mg/kg AEHLAU 7,202,63
* Oral Rabbit LDLo 800 mg/kg AMPMAR 12,26,51
Ataxia ;Primary irritation (after topical application) Skin Rabbit LD50 1400 mg/kg AFDOAQ 16,3,52
Spastic paralysis with or without sensory change ;Muscle weakness ;Coma Intraperitoneal Rabbit LD50 400 mg/kg JIHTAB 29,85,47

Spastic paralysis with or without sensory change ;Muscle weakness ;Coma
Intravenous Rabbit LD50 400 mg/kg JIHTAB 29,85,47
* Oral Guinea pig LD50 469 mg/kg AJVRAH 15,622,54
Spastic paralysis with or without sensory change ;Muscle weakness ;Coma
Intraperitoneal Guinea pig LD50 666 mg/kg JIHTAB 29,85,47
* Oral Hamster LD50 500 mg/kg TXAPA9 48,A192,79
Gastritis ;Somnolence (general depressed activity) ;Fatty liver
degeneration Oral Chicken LD50 541 mg/kg AJVRAH 15,622,54
* Oral Mammal (species unspecified) LD50 375 mg/kg SCIEAS
165,465,69

OTHER MULTIPLE DOSE EFFECTS DATA:
Weight loss or decreased weight gain ; Oral Rat TDLo 13650
mg/kg/13W-C FAATDF 9,423,87
Muscle weakness ; Oral Rat TDLo 200 mg/kg/5W-I NTOTDY 5,331,83
Retinal changes ; Change in motor activity (specific assay) ; Oral Rat
TDLo 54750 mg/kg/1Y-C TOXID9 15,23,95
Changes in other cell count (unspecified) ; Weight loss or decreased
weight gain ; Death in the "U" date type field ; Oral Dog TDLo 700
mg/kg/90D-I AMIHBC 7,61,53
Changes in tubules ; Liver–Other changes ; Changes in serum composition
(e.g., TP, bilirubin, cholesterol) ; Oral Dog TDLo 1820
mg/kg/52W-C FAATDF 29,78,96
Changes in teeth and supporting structures ; Dermatitis, other (after
systemic exposure) ; Death in the "U" date type field ; Intravenous
Dog TDLo 300 mg/kg/6D-I JIHTAB 29,85,47

REVIEWS:
ACGIH TLV-TWA 10 mg/m3 85INA8 6,375,91
IARC Cancer Review:Human Limited Evidence IMEMDT 41,357,86
IARC Cancer Review:Animal Inadequate Evidence IMEMDT 15,111,77
TOXICOLOGY REVIEW RREVAH 59,1,75
TOXICOLOGY REVIEW DTTIAF 80,485,73
TOXICOLOGY REVIEW RREVAH 56,107,75
TOXICOLOGY REVIEW ECMAAI 14,141,73
TOXICOLOGY REVIEW BIOGAL 40(2),44,74
TOXICOLOGY REVIEW HYSAAV 31(7-9),383,66

STANDARDS AND REGULATIONS:
EPA FIFRA 1988 PESTICIDE SUBJECT TO REGISTRATION OR RE REGISTRATION
FEREAC 54,7740,89
MSHA STANDARD-air TWA 10 mg/m3 DTLVS* 3,67,71
OSHA PEL (Gen Indu) 8H TWA 10 mg/m3 CFRGBR 29,1910.1000,94
OSHA PEL (Construc) 8H TWA 10 mg/m3 CFRGBR 29,1926.55,94
OSHA PEL (Shipyard) 8H TWA 10 mg/m3 CFRGBR 29,1915.1000,93
OSHA PEL (Fed Cont) 8H TWA 10 mg/m3 CFRGBR 41,50-204.50,94

FIGURE 4. 2,4-D IN DIALOG (continued)

OEL-AUSTRALIA TWA 10 mg/m3 JAN93
OEL-AUSTRIA TWA 10 mg/m3 JAN93
OEL-BELGIUM TWA 10 mg/m3 JAN93
OEL-DENMARK TWA 5 mg/m3 JAN93
OEL-FINLAND TWA 10 mg/m3;STEL 20 mg/m3;Skin JAN93
OEL-FRANCE TWA 10 mg/m3 JAN93
AOEL-GERMANY TWA 10 mg/m3 JAN93
OEL-HUNGARY TWA 1 mg/m3;STEL 2 mg/m3;Skin JAN93
OEL-THE NETHERLANDS TWA 10 mg/m3 JAN93
OEL-THE PHILIPPINES TWA 10 mg/m3 JAN93
OEL-POLAND TWA 7 mg/m3 JAN93
OEL-SWITZERLAND TWA 10 mg/m3;STEL 50 mg/m3 JAN93
OEL-THAILAND TWA 10 mg/m3 JAN93
OEL-TURKEY TWA 10 mg/m3 JAN93
OEL-UNITED KINGDOM TWA 10 mg/m3;STEL 20 mg/m3 JAN93
OEL IN BULGARIA COLOMBIA, JORDAN, KOREA check ACGIH TLV
OEL IN NEW ZEALAND SINGAPORE, VIETNAM check ACGIH TLV
NIOSH CRITERIA DOCUMENTS:
NIOSH REL TO 2,4 D-air:10H TWA 10 mg/m3 NIOSH* DHHS #92-100,92
NOHS 1974: HZD 24270; NIS 6; TNF 1132; NOS 8; TNE 6266
NOES 1983: HZD 24270; NIS 1; TNF 94; NOS 1; TNE 471

NTP, NIOSH, EPA STATUS:
EPA GENETOX PROGRAM 1988, Positive: In vivo cytogenetics-nonhuman bone marrow
EPA GENETOX PROGRAM 1988, Positive: In vitro cytogenetics-human lymphocyte
EPA GENETOX PROGRAM 1988, Positive: B subtilis rec assay; E coli polA without S9
EPA GENETOX PROGRAM 1988, Positive: V79 cell culture-gene mutation
EPA GENETOX PROGRAM 1988, Positive: S cerevisiae gene conversion
EPA GENETOX PROGRAM 1988, Negative: D melanogaster-whole sex chrom. loss
EPA GENETOX PROGRAM 1988, Negative: D melanogaster-nondisjunction
EPA GENETOX PROGRAM 1988, Negative: Histidine reversion-Ames test
EPA GENETOX PROGRAM 1988, Negative: D melanogaster Sex-linked lethal
EPA GENETOX PROGRAM 1988, Negative: In vitro UDS-human fibroblast; TRP reversion
EPA GENETOX PROGRAM 1988, Negative: S cerevisiae-homozygosis
EPA GENETOX PROGRAM 1988, Inconclusive: Carcinogenicity-mouse/rat; Mammalian micronucleus
EPA TSCA Section 8(b) CHEMICAL INVENTORY
EPA TSCA Section 8(d) unpublished health/safety studies
On EPA IRIS database
EPA TSCA TEST SUBMISSION (TSCATS) DATA BASE, JULY 1996
NIOSH Analytical Method, 1994: 2,4-D, 5001
NTP Carcinogenesis studies; on test (prechronic studies), May 1996

IRRITATION EFFECTS JOURNAL REFERENCES:

28ZPAK Sbornik Vysledku Toxixologickeho Vysetreni Latek A Pripravku, Marhold, J.V., Institut Pro Vychovu Vedoucicn Pracovniku Chemickeho Prumyclu Praha, Czechoslovakia, 1972

MUTATION EFFECTS JOURNAL REFERENCES:

CBINA8 Chemico-Biological Interactions. Elsevier Scientific Pub. Ireland Ltd., POB 85, Limerick, Ireland V.1- 1969-

CYGEDX Cytology and Genetics (English Translation). Translation of TGANAK. Allerton Press Inc., 150 Fifth Ave., New York, NY 10011 V.8- 1974-

CYTOAN Cytologia. (Japan Pub. Trading Co. USA), 1255 Howard St., San Francisco, CA 94103 V.1- 1929-

ECBUDQ Ecological Bulletins. Editorial Service of FRN, Box 6710, S-11385, Stockholm, Sweden No.19- 1975-

EMMUEG Environmental and Molecular Mutagenesis. Alan R. Liss, Inc., 41 E. 11th St., New York, NY 10003 V.10- 1987-

ITCSAF In Vitro. Rockville, MD V.1-20, 1965-85. For publisher information, see ICDBEO.

JOHEA8 Journal of Heredity. American Genetic Assoc., 818 18th St., NW, Washington, DC 20006 V.5- 1914-

MILEDM Microbios Letters. Faculty Press, 88 Regent St., Cambridge, UK V.1- 1976-

MUREAV Mutation Research. Elsevier Science Pub. B.V., POB 211, 1000 AE Amsterdam, Netherlands V.1- 1964-

NTIS** National Technical Information Service. Springfield, VA 22161 Formerly U.S. Clearinghouse for Scientific & Technical Information.

PYTCAS Phytochemistry. An International Journal of Plant Biochemistry. Pergamon Press Inc., Maxwell House, Fairview Park, Elmsford, NY 10523 V.1- 1961-

TOLED5 Toxicology Letters. Elsevier Science Pub. B.V., POB 211, 1000 AE Amsterdam, Netherlands V.1- 1977-

REPRODUCTIVE EFFECTS JOURNAL REFERENCES:

AECTCV Archives of Environmental Contamination and Toxicology. Springer-Verlag New York, Inc., Service Center, 44 Hartz Way, Secaucus, NJ 070944 V.1- 1973-

BECTA6 Bulletin of Environmental Contamination and Toxicology. Springer-Verlag New York, Inc., Service Center, 44 Hartz Way, Secaucus, NJ 07094 V.1- 1966-

FCTXAV Food and Cosmetics Toxicology. London, UK V.1-19, 1963-81. For publisher information, see FCTOD7.

GISAAA Gigiena i Sanitariya. For English translation, see HYSAAV. V/O Mezhdunarodnaya Kniga, 113095 Moscow, USSR V.1- 1936-

NTIS** National Technical Information Service. Springfield, VA 22161 Formerly U.S. Clearinghouse for Scientific & Technical Information.

TCMUD8 Teratogenesis, Carcinogenesis, and Mutagenesis. Alan R. Liss, Inc., 41 E. 11th St., New York, NY 10003 V.1- 1980-
TXAPA9 Toxicology and Applied Pharmacology. Academic Press, Inc., 1 E. First St., Duluth, MN 55802 V.1- 1959-

TOXICITY EFFECTS JOURNAL REFERENCES:
AEHLAU Archives of Environmental Health. Heldref Pub., 4000 Albemarle St., NW, Washington, DC 20016 V.1- 1960-
AFDOAQ Quarterly Bulletin--Association of Food and Drug Officials of the United States. Denver, CO V.3-38, 1939-74.
AJVRAH American Journal of Veterinary Research. American Veterinary Medical Assoc., 930 N. Meacham Rd., Schaumburg, IL 60196 V.1- 1940-
AMPMAR Archives des Maladies Professionnelles de Medecine du Travail et de Securite Sociale. SPPIF, B.P.22, F-41353 Vineuil, France V.7- 1946-
ARPAAQ Archives of Pathology. (Chicago, IL) V.5(3)-50 3, 1928-50; V.70-99, 1960-75. For publisher information, see APLMAS.
ARTODN Archives of Toxicology. Springer-Verlag, Heidelberger Pl. 3, D-1000 Berlin 33, Fed. Rep. Ger. V.32- 1974-
FMCHA2 Farm Chemicals Handbook. Meister Pub., 37841 Euclid Ave., Willoughy, OH 44094
JIHTAB Journal of Industrial Hygiene and Toxicology. Cambridge, MA V.18-31, 1936-49. For publisher information, see AEHLAU.
PAREAQ Pharmacological Reviews. Williams & Wilkins, 428 E. Preston St., Baltimore, MD 21202 V.1- 1949-
RPZHAW Roczniki Panstwowego Zakladu Higieny. Ars Polona, POB 1001, 00-068 Warsaw 1, Poland V.1- 1950-
SCIEAS Science. American Assoc. for the Advancement of Science, 1333 H St., NW, Washington, DC 20005 V.1- 1895-
TXAPA9 Toxicology and Applied Pharmacology. Academic Press, Inc., 1 E. First St., Duluth, MN 55802 V.1- 1959-
WRPCA2 World Review of Pest Control. London, UK V.1-10, 1962-71. Discontinued.

OTHER MULTIPLE DOSE EFFECTS JOURNAL REFERENCES:
AMIHBC AMA Archives of Industrial Hygiene and Occupational Medicine. Chicago, IL V.2-10, 1950-54. For publisher information, see AEHLAU.
FAATDF Fundamental and Applied Toxicology. Academic Press, Inc., 1 E. First St., Duluth, MN 55802 V.1- 1981-
JIHTAB Journal of Industrial Hygiene and Toxicology. Cambridge, MA V.18-31, 1936-49. For publisher information, see AEHLAU.
NTOTDY Neurobehavioral Toxicology and Teratology. Fayetteville, NY V.3-8, 1981-86. For publisher information, see NETEEC.
TOXID9 Toxicologist. Soc. of Toxicology, Inc., 475 Wolf Ledge Parkway, Akron, OH 44311 V.1- 1981-

FIGURE 4. 2,4-D IN DIALOG (continued)

REVIEWS JOURNAL REFERENCES:

BIOGAL Biologico. Instituto Biologica, Av. Cons. Rodriques Alves, 1252, CEP 04014, Sao Paulo, Brazil V.1- 1935-

DTTIAF Deutsche Tieraerztliche Wochenschrift. Hanover, Fed. Rep. Ger. V.1-77, 1893-1970.

ECMAAI Economie et Medecine Animales. Paris, France V.1-17, 1960-76. Discontinued.

HYSAAV Hygiene and Sanitation (USSR). English translation of GISAAA. Springfield, VA 1964-71. Discontinued.

IMEMDT IARC Monographs on the Evaluation of Carcinogenic Risk of Chemicals to Man. WHO Publications Centre USA, 49 Sheridan Ave., Albany, NY 12210 V.1- 1972-

RREVAH Residue Reviews. Springer-Verlag New York, Inc., Service Center, 44 Hartz Way, Secaucus, NJ 07094 V.1- 1962-

85INA8 Documentation of the Threshold Limit Values and Biological Exposure Indices, 5th ed., Cincinnati, OH, American Conference of Governmental Industrial Hygienists, Inc., 1986

STANDARDS & REGULATIONS JOURNAL REFERENCES:

CFRGBR Code of Federal Regulations. U.S. Government Printing Office, Supt. of Documents, Washington, DC 20402

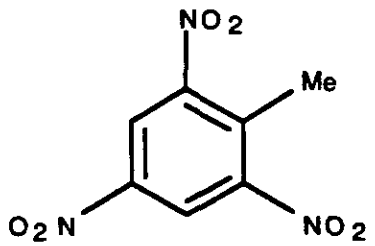
DTLVS* Documentation of Threshold Limit Values for Substances in Workroom Air. For publisher information, see 85INA8.

FEREAC Federal Register. U.S. Government Printing Office, Supt. of Documents, Washington, DC 20402 V.1- 1936-

DATA PRESENT: Irritation Effects; Mutation Effects; Reproductive Effects; Toxicity Effects; Human Toxicity Effects; Other Multiple Dose Effects; Reviews; Standards and Regulations; NIOSH Criteria Documents; NTP, NIOSH, EPA Status

FIGURE 5. TNT ON CAS/STN

CAS Registry Number (RN): **118-96-7** RTECS
RTECS Number (RTN): XU0175000
Molecular Formula (MF): C7 H5 N3 O6
Formula Weight (FW): 227.15
Chemical Name (CN): Toluene, 2,4,6-trinitro-
Benzene, 2-methyl-1,3,5-trinitro-; Entsufon; 2-Methyl-1,3,5-trinitrobenzene; NCI-C56155; TNT; alpha-Tnt; TNT (OSHA); TNT, dry or wetted with <30% water, by weight (UN0209) (DOT); TNT-tolite (French); Tolit; Tolite; 2,4,6-Trinitrotolueen (Dutch); Trinitrotoluene; Trinitrotoluene (UN0209) (DOT); Trinitrotoluene, wetted with not <30% water, by weight (UN1356) (DOT); s-Trinitrotoluene; sym-Trinitrotoluene; 2,4,6-Trinitrotoluene (ACGIH:OSHA); s-Trinitrotoluol; sym-Trinitrotoluol; 2,4,6-Trinitrotoluol (German); Tritol; Triton; Trojnitrotoluen (Polish); Trotyl; Trotyl oil; UN0209 (DOT); UN1356 (DOT);
Class Identifier (CI): Agricultural Chemical; Tumorigen; Mutagen; Reproductive Effector; P; Primary Irritant
Wiswesser Notation (WLN): WNR B1 CNW ENW
Entry/Update Date (DATE): Oct 1996
Character Count: 7600



IRRITATION DATA (IRR):

Route RTE	Organism ORGN	Dose DOSE	Duration DUR	Effect EFF	Source SO
skin	rabbit	500 mg	24H	Mild	NTIS** AD-B011-150

IRRITATION DATA REFERENCES:
NTIS** National Technical Information Service (Springfield, VA 22161)
Formerly U.S. Clearinghouse for Scientific & Technical Information.

FIGURE 5. TNT IN CAS/STN (continued)

MUTATION DATA (MUT):

System SYS	Organism ORGN	Cell Type CELL	Dose DOSE	Source SO
mutation in microorganisms	Salmonella typhimurium		10 ug/plate (+/-S9)	NTIS** AD-A080-146
body fluid assay	rat		50 mg/kg	MUREAV 262,167,91
mutation in mammalian somatic cells	mouse	lymphocyte	40 mg/L	CALEDQ 20,103,83

MUTATION DATA REFERENCES:
NTIS** National Technical Information Service (Springfield, VA 22161) Formerly U.S. Clearinghouse for Scientific & Technical Information.
MUREAV Mutation Research (Elsevier Science Pub. B.V., POB 211, 1000 AE Amsterdam, Netherlands) V.1- 1964-
CALEDQ Cancer Letters (Shannon, Ireland) (Elsevier Scientific Pub. Ireland Ltd., POB 85, Limerick, Ireland) V.1- 1975-

REPRODUCTIVE EFFECTS DATA (REP):

Effect EFF	Route RTE	Organism ORGN	Dose DOSE	Duration DUR	Source SO
T02	oral	rat	TDLo 5376 mg/kg	28D male	JTEHD6 9,565,82

REPRODUCTIVE EFFECTS REFERENCES:
JTEHD6 Journal of Toxicology and Environmental Health (Hemisphere Pub., 1025 Vermont Ave., NW, Washington, DC 20005) V.1- 1975/76-

FIGURE 5. TNT IN CAS/STN (continued)

TOXICITY DATA (TOX):

Effect EFF	Route RTE	Organism ORGN	Dose DOSE	Source SO
F08;J24;K30	oral	human	LDLo 28 g/kg	34ZIAG -,610,69
F07;F11;F12	oral	rat	LD50 795 mg/kg	JTEHD6 9,565,82
F07;F11;F12	oral	mouse	LD50 660 mg/kg	JTEHD6 9,565,82
J22;J24;R01	oral	cat	LDLo 1850 mg/kg	MRCSAB 58,32,21
J22;J24;R01	subcutaneous	cat	LDLo 200 mg/kg	MRCSAB 58,32,21
F12;K12;J24	oral	rabbit	LDLo 500 mg/kg	MRCSAB 58,32,21
F12;K12;J24	subcutaneous	rabbit	LDLo 500 mg/kg	MRCSAB 58,32,21

TOXICITY DATA REFERENCES:
34ZIAG "Toxicology of Drugs and Chemicals," Deichmann, W.B., New York, Academic Press, Inc., 1969
JTEHD6 Journal of Toxicology and Environmental Health (Hemisphere Pub., 1025 Vermont Ave., NW, Washington, DC 20005) V.1- 1975/76-
MRCSAB Special Report Series--Medical Research Council (United Kingdom) (Her Majesty's Stationery Office, P.O. Box 569, London SE1 9NH, UK) No.1- 1915-

CANCER REVIEW (CREV):
IARC Cancer Review:Animal Inadequate Evidence IMEMDT 65,449,96
IARC Cancer Review:Human Inadequate Evidence IMEMDT 65,449,96
IARC Cancer Review:Group 3 IMEMDT 65,449,96

CANCER REVIEW REFERENCES:
IMEMDT IARC Monographs on the Evaluation of Carcinogenic Risk of Chemicals to Man (WHO Publications Centre USA, 49 Sheridan Ave., Albany, NY 12210) V.1- 1972-

TOXICOLOGY REVIEW (TREV):
TOXICOLOGY REVIEW NTIS** AD778-725
TOXICOLOGY REVIEW CRTXB2 1(1),93,71
TOXICOLOGY REVIEW PAREAQ 4,1,52

TOXICOLOGY REVIEW REFERENCES:
NTIS** National Technical Information Service (Springfield, VA 22161) Formerly U.S. Clearinghouse for Scientific & Technical Information.

CRTXB2 CRC Critical Reviews in Toxicology (CRC Press, Inc., 2000 Corporate Blvd., NW, Boca Raton, FL 33431) V.1- 1971-
PAREAQ Pharmacological Reviews (Williams & Wilkins, 428 E. Preston St., Baltimore, MD 21202) V.1- 1949-

FIGURE 5. TNT IN CAS/STN (continued)

```
THRESHOLD LIMIT VALUE (TLV):
ACGIH TLV-TWA 0.5 mg/m3 (skin)    85INA8 6,1652,91

THRESHOLD LIMIT VALUE REFERENCES:
85INA8 "Documentation of the Threshold Limit Values and Biological
Exposure Indices," 5th ed., Cincinnati, OH, American Conference of
Governmental Industrial Hygienists, Inc., 1986


STANDARD AND REGULATIONS (SREG):
DOT-HAZARD:EXPLOSIVE 1.1D; LABEL:EXPLOSIVE 1.1D (UN0209)    CFRGBR
49,172.101,92
DOT-HAZARD:4.1; LABEL:FLAMMABLE SOLID (UN1356)    CFRGBR 49,172.101,92
MSHA STANDARD-air:TWA 0.2 ppm (0.5 mg/m3) (skin)    DTLVS* 3,270,71
OSHA PEL (Gen Indu):8H TWA 1.50 mg/m3 (skin)    CFRGBR 29,1910.1000,94
OSHA PEL (Construc):8H TWA 1.50 mg/m3 (skin)    CFRGBR 29,1926.55,94
OSHA PEL (Shipyard):8H TWA 1.50 mg/m3 (skin)    CFRGBR 29,1915.1000,93
OSHA PEL (Fed Cont):8H TWA 1.50 mg/m3 (skin)    CFRGBR 41,50-204.50,94
OEL-ARAB Republic of Egypt:TWA 0.5 mg/m3 JAN93
OEL-AUSTRALIA:TWA 0.5 mg/m3;Skin JAN93
OEL-BELGIUM:TWA 0.5 mg/m3;Skin JAN93
OEL-DENMARK:STEL 0.5 mg/m3;Skin JAN93
OEL-FINLAND:TWA 0.5 mg/m3;STEL 3 mg/m3;Skin JAN93
OEL-FRANCE:TWA 0.5 mg/m3;Skin JAN93
OEL-GERMANY:TWA 0.01 ppm (0.1 mg/m3);Skin;Carcinogen JAN93
OEL-HUNGARY:TWA 0.3 mg/m3;STEL 0.5 mg/m3;Skin JAN93
OEL-THE NETHERLANDS:TWA 0.5 mg/m3;Skin JAN93
OEL-THE PHILIPPINES:TWA 1.5 mg/m3;Skin JAN93
OEL-RUSSIA:TWA 0.1 mg/m3;STEL 0.5 mg/m3;Skin JAN93
OEL-SWITZERLAND:TWA 0.01 ppm (0.1 mg/m3);STEL 0.02 ppm;Skin JAN93
OEL-TURKEY:TWA 1.5 mg/m3;Skin JAN93
OEL-UNITED KINGDOM:TWA 0.5 mg/m3;STEL 0.5 mg/m3 JAN93
OEL IN BULGARIA, COLOMBIA, JORDAN, KOREA check ACGIH TLV
OEL IN NEW ZEALAND, SINGAPORE, VIETNAM check ACGIH TLV

STANDARDS AND REGULATIONS REFERENCES:
CFRGBR Code of Federal Regulations    (U.S. Government Printing Office,
Supt. of Documents, Washington, DC 20402)

DTLVS* "Documentation of Threshold Limit Values for Substances in
Workroom Air."  For publisher information, see 85INA8.


NIOSH RECOMMENDATIONS (NREC):
NIOSH REL TO 2,4,6-TRINITROTOLUENE-air:10H TWA 0.5 mg/m3 (Sk)    NIOSH*
DHHS #92-100,92

NATIONAL OCCUPATIONAL SURVEY (SURV):
NOES 1983: HZD 74550; NIS 2; TNF 10; NOS 1; TNE 31

FEDERAL AGENCY STATUS (ASTA):
EPA GENETOX PROGRAM 1988, Positive: Histidine reversion-Ames test
EPA TSCA Section 8(b) CHEMICAL INVENTORY
EPA TSCA Section 8(d) unpublished health/safety studies
On EPA IRIS database
EPA TSCA TEST SUBMISSION (TSCATS) DATA BASE, OCTOBER 1996
OSHA ANALYTICAL METHOD #44
```

FIGURE 6. 2,4-D IN CAS/STN

CAS Registry Number (RN):	**94-75-7**RTECS
RTECS Number (RTN):	AG6825000
Molecular Formula (MF):	C8 H6 Cl2 O3
Formula Weight (FW):	221.04
Chemical Name (CN):	Acetic acid, (2,4-dichlorophenoxy)- Acide 2,4-dichloro phenoxyacetique (French); Acido(2,4-dicloro-fenossi)-acetico (Italian); Acme amine 4; Acme butyl ester 4; Acme LV 4; Agrotect; Amidox; Amoxone; Aqua-Kleen; Barrage; BH 2,4-D; Brush-rhap; B-Selektonon; Chipco turf herbicide "D"; Chloroxone; Citrus fix; Crop rider; 2,4-D (ACGIH:OSHA); 2,4-D acid; Debroussaillant 600; Decamine; Deherban; (2,4-Dichloor-fenoxy)-azijnzuur (Dutch); Dichlorophenoxyacetic acid; 2,4-Dichlorophenoxyacetic acid; Dichlorophenoxyacetic acid (OSHA); 2,4-Dichlorphenoxyacetic acid; (2,4-Dichlor-phenoxy)-essigsaeure (German); Dicopur; DMA-4; Dormone; 2,4- Dwuchlorofenoksyoctowy kwas (Polish); Emulsamine BK; Emulsamine E-3; ENT 8,538; Envert 171; Envert DT; Estone; Farmco; Fernimine; Fernoxone; Ferxone; Foredex 75; Hedonal; Hedonal (the herbicide); Herbidal; Hivol-44; Ipaner; Kwasu 2,4- dwuchlorofenoksyoctowego (Polish); Kwas 2,4-dwuchlorofenoksyoctowy (Polish); Kyselina 2,4-dichlorfenoxyoctova (Czech); Lawn-keep; Macrondray; Miracle; Monosan; Moxone; Netagrone; Netagrone 600; NSC 423; Pennamine; Pennamine D; Phenox; Pielik; Plantgard; RCRA waste number U240; Rhodia; Spritz-hormin/2,4-D; Spritz-hormit/2,4-D; Superormone concentre; U-5043; U 46DP; Vergemaster; Verton; Verton D; Verton 2D; Vidon 638; Weed-Ag-Bar; Weedar-64; Weedatul; Weedez Wonder BAR; Weedone LV4; Weed-rhap; Weed TOX; Weedtrol;
Class Identifier (CI):	Agricultural Chemical; Tumorigen; Mutagen; Reproductive Effector; P; Primary Irritant
Wiswesser Notation (WLN):	QV1OR BG DG
Entry/Update Date (DATE):	Oct 1996
Character Count:	19388

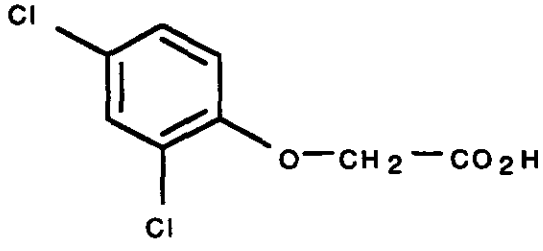


FIGURE 6. 2,4-D IN CAS/STN (continued)

IRRITATION DATA (IRR):

Route RTE	Organism ORGN	Dose DOSE	Duration DUR	Effect EFF	Source SO
skin	rabbit	500 mg	24H	Mild	28ZPAK -,279,72
eyes	rabbit	750 ug	24H	Severe	28ZPAK -,279,72

IRRITATION DATA REFERENCES:
28ZPAK "Sbornik Vysledku Toxixologickeho Vysetreni Latek A Pripravku," Marhold, J.V., Institut Pro Vychovu Vedoucicn Pracovniku Chemickeho Prumyclu Praha, Czechoslovakia, 1972

MUTATION DATA (MUT):

System SYS	Organism ORGN	Cell Type CELL	Route RTE	Dose DOSE	Dur. DUR	Source SO
mutation in microorganisms	Salmonella typhimurium			250 ug/plate (-S9)		MUREAV 204,615,88
DNA repair	Escherichia coli			5 mg/disc		NTIS** PB80-133226
dna	Escherichia coli			20 umol/L		MUREAV 89,95,81
DNA repair	Bacillus subtilis			5 mg/disc		NTIS** PB80-133226
mutation in microorganisms	other microorganisms			1 gm/L (-S9)		MILEDM 5,103,77
mutation in microorganisms	other microorganisms			1 gm/L (-S9)		MILEDM 5,103,77
mutation in microorganisms	other microorganisms			1 gm/L (-S9)		MILEDM 5,103,77
mutation in microorganisms	other microorganisms			1 gm/L (-S9)		MILEDM 5,103,77
specific locus test	Drosophila melanogaster		oral	5 mmol/L		MUREAV 319,237,93
specific locus test	Drosophila melanogaster		multiple	10 ppb		EMMUEG 25,148,95
sex chromosome loss and nondisjunction	Drosophila melanogaster		oral	25 ppm		ECBUDQ 27,190,78

FIGURE 6. 2,4-D IN CAS/STN (continued)

sex chromosome loss and nondisjunction	Drosophila melanogaster		unreported	1000 ppm	15D	ECBUDQ 27,182,78
mutation in microorganisms	Saccharomyces cerevisiae			150 mg/L (-S9)		ECBUDQ 27,193,78
gene conversion and mitotic recombination	Aspergillus nidulans			4 umol/L		MUREAV 204,615,88
DNA damage	salmon	sperm		1 mmol/L		PYTCAS 11,3135,72
unscheduled DNA synthesis	human	fibroblast		1 umol/L		MUREAV 42,161,77
cytogenic analysis	human	lymphocyte		20 ug/L		CYGEDX 8(3),6,74
sister chromatid exchange	human	lymphocyte		10 mg/L		JOHEA8 73,224,82
cytogenic analysis	rat		intraperit oneal	100 ug/kg		CYTOAN 52,275,87
DNA inhibitor	mouse		oral	200 mg/kg		MUREAV 55,197,78
cytogenic analysis	mouse		oral	100 mg/kg		CYGEDX 8(3),6,74
DNA inhibitor	hamster	ovary		1 mmol/L		TOLED5 29,137,85
cytogenic analysis	hamster	ovary		2400 mg/L		EMMUEG 10(Suppl 10),1,87
sister chromatid exchange	hamster	ovary		167 mg/L		EMMUEG 10(Suppl 10),1,87
mutation in mammalian somatic cells	hamster	lung		10 umol/L		CBINA8 19,369,77
cytogenic analysis	cattle	kidney		1 ppm		ITCSAF 8,416,73
DNA damage	mammal (species unspecified)	lymphocyte		1 mmol/L		PYTCAS 11,3135,72

MUTATION DATA REFERENCES:
MUREAV Mutation Research (Elsevier Science Pub. B.V., POB 211, 1000 AE Amsterdam, Netherlands) V.1- 1964-
NTIS** National Technical Information Service (Springfield, VA 22161) Formerly U.S. Clearinghouse for Scientific & Technical Information.
MILEDM Microbios Letters (Faculty Press, 88 Regent St., Cambridge, UK) V.1- 1976-
EMMUEG Environmental and Molecular Mutagenesis (Alan R. Liss, Inc., 41 E. 11th St., New York, NY 10003) V.10- 1987-
ECBUDQ Ecological Bulletins (Editorial Service of FRN, Box 6710, S-11385, Stockholm, Sweden) No.19- 1975-
PYTCAS Phytochemistry An International Journal of Plant Biochemistry. (Pergamon Press Inc., Maxwell House, Fairview Park, Elmsford, NY 10523) V.1- 1961-
CYGEDX Cytology and Genetics (English Translation) Translation of TGANAK. (Allerton Press Inc., 150 Fifth Ave., New York, NY 10011) V.8- 1974-
JOHEA8 Journal of Heredity (American Genetic Assoc., 818 18th St., NW, Washington, DC 20006) V.5- 1914-
CYTOAN Cytologia (Japan Pub. Trading Co. (USA), 1255 Howard St., San Francisco, CA 94103) V.1- 1929-
TOLED5 Toxicology Letters (Elsevier Science Pub. B.V., POB 211, 1000 AE Amsterdam, Netherlands) V.1- 1977-
CBINA8 Chemico-Biological Interactions (Elsevier Scientific Pub. Ireland Ltd., POB 85, Limerick, Ireland) V.1- 1969-
ITCSAF In Vitro (Rockville, MD) V.1-20, 1965-85. For publisher information, see ICDBEO.

REPRODUCTIVE EFFECTS DATA (REP):

Effect EFF	Route RTE	Organism ORGN	Dose DOSE	Duration DUR	Source SO
T48	oral	rat	TDLo 220 ug/kg	1-22D preg	GISAAA 50(10),76, 85
T46;T34;T35	oral	rat	TDLo 1 g/kg	6-15D preg	TXAPA9 22,14,72
T46	oral	rat	TDLo 125 mg/kg	6-15D preg	FCTXAV 9,801,71
T34;T41;T53	oral	rat	TDLo 500 mg/kg	6-15D preg	FCTXAV 9,801,71
T55;T81	oral	rat	TDLo 500 mg/kg	6-15D preg	FCTXAV 9,801,71
T34;T35;T43	oral	mouse	TDLo 707 mg/kg	11-14D preg	AECTCV 6,33,77
T26;T31;T42	oral	mouse	TDLo 900 mg/kg	6-14D preg	NTIS** PB223-160

FIGURE 6. 2,4-D IN CAS/STN (continued)

T81	oral	mouse	TDLo 438 mg/kg	8-12D preg	TCMUD8 7,7,87
T35;T41;T31	subcutaneous	mouse	TDLo 882 mg/kg	6-14D preg	NTIS** PB223-160
T34;T42;T43	subcutaneous	mouse	TDLo 900 mg/kg	6-14D preg	NTIS** PB223-160
T24;T26	subcutaneous	mouse	TDLo 900 mg/kg	6-14D preg	NTIS** PB223-160
T26	oral	hamster	TDLo 200 mg/kg	7-11D preg	BECTA6 6,559,71

REPRODUCTIVE EFFECTS REFERENCES:
GISAAA Gigiena i Sanitariya For English translation, see HYSAAV. (V/O Mezhdunarodnaya Kniga, 113095 Moscow, USSR) V.1- 1936-
TXAPA9 Toxicology and Applied Pharmacology (Academic Press, Inc., 1 E. First St., Duluth, MN 55802) V.1- 1959-
FCTXAV Food and Cosmetics Toxicology (London, UK) V.1-19, 1963-81. For publisher information, see FCTOD7.
AECTCV Archives of Environmental Contamination and Toxicology (Springer-Verlag New York, Inc., Service Center, 44 Hartz Way, Secaucus, NJ 070944) V.1- 1973-
NTIS** National Technical Information Service (Springfield, VA 22161) Formerly U.S. Clearinghouse for Scientific & Technical Information.
TCMUD8 Teratogenesis, Carcinogenesis, and Mutagenesis (Alan R. Liss, Inc., 41 E. 11th St., New York, NY 10003) V.1- 1980-
BECTA6 Bulletin of Environmental Contamination and Toxicology (Springer-Verlag New York, Inc., Service Center, 44 Hartz Way, Secaucus, NJ 07094) V.1- 1966-

TOXICITY DATA (TOX):

Effect EFF	Route RTE	Organism ORGN	Dose DOSE	Source SO
F24;J25	oral	man	TDLo 2 g/kg	ARTODN 66,518,92
F24;G10;J25	oral	man	TDLo 5714 mg/kg	ARTODN 66,518,92
K13;F24;F07	oral	human	LDLo 80 mg/kg	ARPAAQ 94,270,72
F12	oral	man	LDLo 93 mg/kg	PAREAQ 14,225,62
	oral	rat	LD50 375 mg/kg	FMCHA2 -,C174,91
	skin	rat	LD50 1500 mg/kg	WRPCA2 9,119,70
C06;F18;F24	intraperitoneal	rat	LD50 666 mg/kg	JIHTAB 29,85,47
	oral	mouse	LD50 347 mg/kg	RPZHAW 31,373,80
	intraperitoneal	mouse	LDLo 125 mg/kg	TXAPA9 23,288,72
F20;F24	oral	dog	LD50 100 mg/kg	AEHLAU 7,202,63
	oral	rabbit	LDLo 800 mg/kg	AMPMAR 12,26,51
F19;R10	skin	rabbit	LD50 1400 mg/kg	AFDOAQ 16,3,52
C06;F18;F24	intraperitoneal	rabbit	LD50 400 mg/kg	JIHTAB 29,85,47
C06;F18;F24	intravenous	rabbit	LD50 400 mg/kg	JIHTAB 29,85,47
	oral	guinea pig	LD50 469 mg/kg	AJVRAH 15,622,54
C06;F18;F24	intraperitoneal	guinea pig	LD50 666 mg/kg	JIHTAB 29,85,47
	oral	hamster	LD50 500 mg/kg	TXAPA9 48,A192,79
K05;F07;L03	oral	chicken	LD50 541 mg/kg	AJVRAH 15,622,54
	oral	mammal (species unspecified)	LD50 375 mg/kg	SCIEAS 165,465,69

FIGURE 6. 2,4-D IN CAS/STN (continued)

TOXICITY DATA REFERENCES:
ARTODN Archives of Toxicology (Springer-Verlag, Heidelberger Pl. 3, D-1000 Berlin 33, Fed. Rep. Ger.) V.32- 1974-
ARPAAQ Archives of Pathology (Chicago, IL) V.5(3)-50(3), 1928-50; V.70-99, 1960-75. For publisher information, see APLMAS.
PAREAQ Pharmacological Reviews (Williams & Wilkins, 428 E. Preston St., Baltimore, MD 21202) V.1- 1949-
FMCHA2 Farm Chemicals Handbook (Meister Pub., 37841 Euclid Ave., Willoughy, OH 44094)
WRPCA2 World Review of Pest Control (London, UK) V.1-10, 1962-71. Discontinued.
JIHTAB Journal of Industrial Hygiene and Toxicology (Cambridge, MA) V.18-31, 1936-49. For publisher information, see AEHLAU.
RPZHAW Roczniki Panstwowego Zakladu Higieny (Ars Polona, POB 1001, 00-068 Warsaw 1, Poland) V.1- 1950-
TXAPA9 Toxicology and Applied Pharmacology (Academic Press, Inc., 1 E. First St., Duluth, MN 55802) V.1- 1959-
AEHLAU Archives of Environmental Health (Heldref Pub., 4000 Albemarle St., NW, Washington, DC 20016) V.1- 1960-
AMPMAR Archives des Maladies Professionnelles de Medecine du Travail et de Securite Sociale (SPPIF, B.P.22, F-41353 Vineuil, France) V.7- 1946-
AFDOAQ Quarterly Bulletin--Association of Food and Drug Officials of the United States (Denver, CO) V.3-38, 1939-74.
AJVRAH American Journal of Veterinary Research (American Veterinary Medical Assoc., 930 N. Meacham Rd., Schaumburg, IL 60196) V.1- 1940-
SCIEAS Science (American Assoc. for the Advancement of Science, 1333 H St., NW, Washington, DC 20005) V.1- 1895-

CANCER REVIEW (CREV):
IARC Cancer Review:Human Limited Evidence IMEMDT 41,357,86
IARC Cancer Review:Animal Inadequate Evidence IMEMDT 15,111,77

CANCER REVIEW REFERENCES:
IMEMDT IARC Monographs on the Evaluation of Carcinogenic Risk of Chemicals to Man (WHO Publications Centre USA, 49 Sheridan Ave., Albany, NY 12210) V.1- 1972-

TOXICOLOGY REVIEW (TREV):
TOXICOLOGY REVIEW RREVAH 59,1,75
TOXICOLOGY REVIEW DTTIAF 80,485,73
TOXICOLOGY REVIEW RREVAH 56,107,75
TOXICOLOGY REVIEW ECMAAI 14,141,73
TOXICOLOGY REVIEW BIOGAL 40(2),44,74
TOXICOLOGY REVIEW HYSAAV 31(7-9),383,66

TOXICOLOGY REVIEW REFERENCES:
RREVAH Residue Reviews (Springer-Verlag New York, Inc., Service Center, 44 Hartz Way, Secaucus, NJ 07094) V.1- 1962-

DTTIAF Deutsche Tieraerztliche Wochenschrift (Hanover, Fed. Rep. Ger.) V.1-77, 1893-1970.
ECMAAI Economie et Medecine Animales (Paris, France) V.1-17, 1960-76. Discontinued.
BIOGAL Biologico (Instituto Biologica, Av. Cons. Rodriques Alves, 1252, CEP 04014, Sao Paulo, Brazil) V.1- 1935-
HYSAAV Hygiene and Sanitation (USSR) English translation of GISAAA. (Springfield, VA) 1964-71. Discontinued.

FIGURE 7. TNT IN DIMDI

```
1.00/000001 DIMDI: -RTECS /COPYRIGHT NIOSH
++DAT    DATAMAINTENANCE
  ND:  YE3820000  BASE: RT00
  MD:  961106     LR  : 9610       RL: 12241
++IDEN   IDENTIFICATION
  NAME  NAME                  : Toluene, 2,4,6-trinitro-
  CR    CAS REGISTRY NUMBER   : 118-96-7
  RTEC  RTECS ACCESSION NO    : XU0175000
  WL    WISWESSER LINE NOTATION: WNR B1 CNW ENW
  SY    SYNONYMS              : Benzene, 2-methyl-1,3,5-trinitro-;
         Entsufon; 2-Methyl-1,3,5-trinitrobenzene; NCI-C56155; TNT;
         alpha-Tnt; TNT (OSHA);
         TNT, dry or wetted with <30% water, by weight (UN0209) (DOT);
         TNT-tolite (French); Tolit; Tolite;
         2,4,6-Trinitrotolueen (Dutch); Trinitrotoluene;
         Trinitrotoluene (UN0209) (DOT);
         Trinitrotoluene, wetted with not <30% water, by weight (UN1356)
        (DOT); s-Trinitrotoluene; sym-Trinitrotoluene;
         2,4,6-Trinitrotoluene (ACGIH:OSHA); s-Trinitrotoluol;
         sym-Trinitrotoluol; 2,4,6-Trinitrotoluol (German); Tritol;
         Triton; Trojnitrotoluen (Polish); Trotyl; Trotyl oil;
         UN0209 (DOT); UN1356 (DOT)
  MF    MOLECULAR FORMULA     : C7-H5-N3-O6
  MW    MOLECULAR WEIGHT      :    227.15
  GRC   GROUP OF COMPOUND     : Agricultural Chemical; Tumorigen;
         Mutagen; Reproductive Effector; Primary Irritant
++TOXR   TOXICOLOGY AND CARCINOGENICITY REVIEW
 +TREV  TOXICOLOGY REVIEW
**  TOXICOLOGY REVIEW; NTIS** AD778-725; National Technical Information
       Service. (Springfield, VA 22161) Formerly U.S. Clearinghouse for
       Scientific & Technical Information.
**  TOXICOLOGY REVIEW; CRTXB2 1(1),93,71; CRC Critical Reviews in
       Toxicology. (CRC Press, Inc., 2000 Corporate Blvd., NW, Boca
       Raton, FL 33431) V.1- 1971-
**  TOXICOLOGY REVIEW; PAREAQ 4,1,52; Pharmacological Reviews. (Williams
       & Wilkins, 428 E. Preston St., Baltimore, MD 21202) V.1- 1949-
 +CREV  CANCER REVIEW
**  IARC Cancer Review; Animal Inadequate Evidence; IMEMDT 65,449,96;
       IARC Monographs on the Evaluation of Carcinogenic Risk of
       Chemicals to Man. (WHO Publications Centre USA, 49 Sheridan
       Ave., Albany, NY 12210) V.1- 1972-
**  IARC Cancer Review; Human Inadequate Evidence; IMEMDT 65,449,96;
       IARC Monographs on the Evaluation of Carcinogenic Risk of
       Chemicals to Man. (WHO Publications Centre USA, 49 Sheridan
       Ave., Albany, NY 12210) V.1- 1972-
**  IARC Cancer Review; Group 3; IMEMDT 65,449,96; IARC Monographs on
       the Evaluation of Carcinogenic Risk of Chemicals to Man. (WHO
       Publications Centre USA, 49 Sheridan Ave., Albany, NY 12210)
       V.1- 1972-
 +TLV   THRESHOLD LIMIT VALUE
**  ACGIH TLV; TWA 0.5 mg/m3 (skin); 85INA8 6,1652,91; "Documentation of
       the Threshold Limit Values and Biological Exposure Indices," 5th
       ed., Cincinnati, OH, American Conference of Governmental
       Industrial Hygienists, Inc., 1986
 +NREC  NIOSH RECOMMENDATIONS
**  NIOSH REL TO 2,4,6-TRINITROTOLUENE-air:10H TWA 0.5 mg/m3 (Sk);
       NIOSH* DHHS #92-100,92; National Institute for Occupational
       Safety and Health, U.S. Dept. of Health, Education, and Welfare,
```

FIGURE 7. TNT IN DIMDI (continued)

```
        Reports and Memoranda.
 +NEXP  NIOSH EXPOSURE SURVEYS
**  NATIONAL OCCUPATIONAL EXPOSURE SURVEY 1983: Hazard#: 74550; number
        of industries: 2; total number of facilities: 10; number of
        occupations: 1; total number of employees: 31
++EXSR   EXPOSURE STANDARDS AND REGULATIONS
 +SR    STANDARDS AND REGULATIONS
**  DOT-HAZARD:EXPLOSIVE 1.1D; LABEL:EXPLOSIVE 1.1D (UN0209); CFRGBR
        49,172.101,92; Code of Federal Regulations. (U.S. Government
        Printing Office, Supt. of Documents, Washington, DC 20402)
**  DOT-HAZARD:4.1; LABEL:FLAMMABLE SOLID (UN1356); CFRGBR
        49,172.101,92; Code of Federal Regulations. (U.S. Government
        Printing Office, Supt. of Documents, Washington, DC 20402)
**  MSHA STANDARD-air:TWA 0.2 ppm (0.5 mg/m3) (skin); DTLVS* 3,270,71;
        "Documentation of Threshold Limit Values for Substances in
        Workroom Air." For publisher information, see 85INA8.
**  OSHA PEL (Gen Indu):8H TWA 1.50 mg/m3 (skin); CFRGBR
        29,1910.1000,94; Code of Federal Regulations. (U.S. Government
        Printing Office, Supt. of Documents, Washington, DC 20402)
**  OSHA PEL (Construc):8H TWA 1.50 mg/m3 (skin); CFRGBR 29,1926.55,94;
        Code of Federal Regulations. (U.S. Government Printing Office,
        Supt. of Documents, Washington, DC 20402)
**  OSHA PEL (Shipyard):8H TWA 1.50 mg/m3 (skin); CFRGBR
        29,1915.1000,93; Code of Federal Regulations. (U.S. Government
        Printing Office, Supt. of Documents, Washington, DC 20402)
**  OSHA PEL (Fed Cont):8H TWA 1.50 mg/m3 (skin); CFRGBR
        41,50-204.50,94; Code of Federal Regulations. (U.S. Government
        Printing Office, Supt. of Documents, Washington, DC 20402)
**  OEL-ARAB Republic of Egypt:TWA 0.5 mg/m3 JAN93
**  OEL-AUSTRALIA:TWA 0.5 mg/m3;Skin JAN93
**  OEL-BELGIUM:TWA 0.5 mg/m3;Skin JAN93
**  OEL-DENMARK:STEL 0.5 mg/m3;Skin JAN93
**  OEL-FINLAND:TWA 0.5 mg/m3;STEL 3 mg/m3;Skin JAN93
**  OEL-FRANCE:TWA 0.5 mg/m3;Skin JAN93
**  OEL-GERMANY:TWA 0.01 ppm (0.1 mg/m3);Skin;Carcinogen JAN93
**  OEL-HUNGARY:TWA 0.3 mg/m3;STEL 0.5 mg/m3;Skin JAN93
**  OEL-THE NETHERLANDS:TWA 0.5 mg/m3;Skin JAN93
**  OEL-THE PHILIPPINES:TWA 1.5 mg/m3;Skin JAN93
**  OEL-RUSSIA:TWA 0.1 mg/m3;STEL 0.5 mg/m3;Skin JAN93
**  OEL-SWITZERLAND:TWA 0.01 ppm (0.1 mg/m3);STEL 0.02 ppm;Skin JAN93
**  OEL-TURKEY:TWA 1.5 mg/m3;Skin JAN93
**  OEL-UNITED KINGDOM:TWA 0.5 mg/m3;STEL 0.5 mg/m3 JAN93
**  OEL IN BULGARIA, COLOMBIA, JORDAN, KOREA check ACGIH TLV
**  OEL IN NEW ZEALAND, SINGAPORE, VIETNAM check ACGIH TLV
 +TSTA  STATUS OF TESTS
**  EPA GENETOX PROGRAM 1988, Positive: Histidine reversion-Ames test
**  EPA TSCA Section 8(b) CHEMICAL INVENTORY
**  EPA TSCA Section 8(d) unpublished health/safety studies
**  On EPA IRIS database
**  EPA TSCA TEST SUBMISSION (TSCATS) DATA BASE, OCTOBER 1996
**  OSHA ANALYTICAL METHOD #44
++TOXI   TOXICITY DATA
 +GSTU   GENERAL TOXICITY STUDIES          TOTAL NUMBER: 7
 +MDSTU  MULTIPLE DOSE STUDIES             TOTAL NUMBER: 6
 +MSTU   MUTAGENICITY STUDIES              TOTAL NUMBER: 3
 +RSTU   REPRODUCTIVE STUDIES              TOTAL NUMBER: 1
 +SSTU   SKIN AND EYE IRRITATION STUDIES   TOTAL NUMBER: 1
**DTYP DATA TYPE    : GSTU
```

FIGURE 7. TNT IN DIMDI (continued)

```
  ROU  ROUTE        : oral
  SPE  SPECIES      : human
  STU  STUDY        : LDLo
  DOS  DOSE         : 28 gm/kg
  EFF  EFFECT       : BEHAVIORAL (Hallucinations, distorted perceptions);
       LUNGS,THORAX, OR RESPIRATION (Cyanosis); GASTROINTESTINAL (Other
       changes)
  RF   REFERENCE    : "Toxicology of Drugs and Chemicals," Deichmann,
       W.B., New York, Academic Press, Inc., 1969, vol -, pg 610, 69
**DTYP DATA TYPE    : GSTU
  ROU  ROUTE        : oral
  SPE  SPECIES      : rat
  STU  STUDY        : LD50
  DOS  DOSE         : 795 mg/kg
  EFF  EFFECT       : BEHAVIORAL (Somnolence; Tremor; Convulsions or
       effect on seizure threshold)
  RF   REFERENCE    : Journal of Toxicology and Environmental Health.
       (Hemisphere Pub., 1025 Vermont Ave., NW, Washington, DC 20005)
       V.1- 1975/76-, vol 9, pg 565, 82
**DTYP DATA TYPE    : GSTU
  ROU  ROUTE        : oral
  SPE  SPECIES      : mouse
  STU  STUDY        : LD50
  DOS  DOSE         : 660 mg/kg
  EFF  EFFECT       : BEHAVIORAL (Somnolence; Tremor; Convulsions or
       effect on seizure threshold)
  RF   REFERENCE    : Journal of Toxicology and Environmental Health.
       (Hemisphere Pub., 1025 Vermont Ave., NW, Washington, DC 20005)
       V.1- 1975/76-, vol 9, pg 565, 82
**DTYP DATA TYPE    : GSTU
  ROU  ROUTE        : oral
  SPE  SPECIES      : cat
  STU  STUDY        : LDLo
  DOS  DOSE         : 1850 mg/kg
  EFF  EFFECT       : LUNGS,THORAX, OR RESPIRATION (Dyspnea; Cyanosis);
       SKIN AND APPENDAGES (Dermatitis, allergic)
  RF   REFERENCE    : Special Report Series--Medical Research Council
       (United Kingdom). (Her Majesty's Stationery Office, P.O. Box
       569, London SE1 9NH, UK) No.1- 1915-, vol 58, pg 32, 21
**DTYP DATA TYPE    : GSTU
  ROU  ROUTE        : subcutaneous
  SPE  SPECIES      : cat
  STU  STUDY        : LDLo
  DOS  DOSE         : 200 mg/kg
  EFF  EFFECT       : LUNGS,THORAX, OR RESPIRATION (Dyspnea; Cyanosis);
       SKIN AND APPENDAGES (Dermatitis, allergic)
  RF   REFERENCE    : Special Report Series--Medical Research Council
       (United Kingdom). (Her Majesty's Stationery Office, P.O. Box
       569, London SE1 9NH, UK) No.1- 1915-, vol 58, pg 32, 21
**DTYP DATA TYPE    : GSTU
  ROU  ROUTE        : oral
  SPE  SPECIES      : rabbit
  STU  STUDY        : LDLo
  DOS  DOSE         : 500 mg/kg
  EFF  EFFECT       : BEHAVIORAL (Convulsions or effect on seizure
       threshold); GASTROINTESTINAL (Hypermotility, diarrhea); LUNGS,
       THORAX, OR RESPIRATION (Cyanosis)
  RF   REFERENCE    : Special Report Series--Medical Research Council
```

```
        (United Kingdom). (Her Majesty's Stationery Office, P.O. Box
        569, London SE1 9NH, UK) No.1- 1915-, vol 58, pg 32, 21
**DTYP DATA TYPE    : GSTU
  ROU  ROUTE        : subcutaneous
  SPE  SPECIES      : rabbit
  STU  STUDY        : LDLo
  DOS  DOSE         : 500 mg/kg
  EFF  EFFECT       : BEHAVIORAL (Convulsions or effect on seizure
        threshold); GASTROINTESTINAL (Hypermotility, diarrhea); LUNGS,
        THORAX, OR RESPIRATION (Cyanosis)
  RF   REFERENCE    : Special Report Series--Medical Research Council
        (United Kingdom). (Her Majesty's Stationery Office, P.O. Box
        569, London SE1 9NH, UK) No.1- 1915-, vol 58, pg 32, 21
**DTYP DATA TYPE    : MDSTU
  ROU  ROUTE        : oral
  SPE  SPECIES      : rat
  STU  STUDY        : TDLo
  DOS  DOSE         : 7200 mg/kg/6W-I
  EFF  EFFECT       : LIVER (Other changes); BLOOD (Changes in serum
        composition); RELATED TO CHRONIC DATA (Changes in testicular
        weight)
  RF   REFERENCE    : Toxicology Letters. (Elsevier Science Pub. B.V.,
        POB 211, 1000 AE Amsterdam, Netherlands) V.1- 1977-, vol 55,
        pg 343, 91
**DTYP DATA TYPE    : MDSTU
  ROU  ROUTE        : oral
  SPE  SPECIES      : rat
  STU  STUDY        : TDLo
  DOS  DOSE         : 11375 mg/kg/13W-C
  EFF  EFFECT       : BEHAVIORAL (Food intake); BLOOD (Normocytic
        anemia); NUTRITIONAL AND GROSS METABOLIC (Weight loss or
        decreased weight gain)
  RF   REFERENCE    : Toxicology. (Elsevier Scientific Pub. Ireland,
        Ltd., POB 85, Limerick, Ireland) V.1- 1973-, vol 32, pg 253, 84
**DTYP DATA TYPE    : MDSTU
  ROU  ROUTE        : oral
  SPE  SPECIES      : rat
  STU  STUDY        : TDLo
  DOS  DOSE         : 3 gm/kg/30D-I
  EFF  EFFECT       : LIVER (Other changes); BIOCHEMICAL (Monoamine
        oxidase; Lipids including transport)
  RF   REFERENCE    : Gigiena Truda i Professional'nye Zabolevaniya.
        Labor Hygiene and Occupational Diseases. (V/O Mezhdunarodnaya
        Kniga, 113095 Moscow, USSR) V.1- 1957-, vol 18(10), pg 57, 74
**DTYP DATA TYPE    : MDSTU
  ROU  ROUTE        : oral
  SPE  SPECIES      : mouse
  STU  STUDY        : TDLo
  DOS  DOSE         : 11 mg/kg/13W-C
  EFF  EFFECT       : LIVER (Changes in liver weight); ENDOCRINE (Changes
        in spleen weight); BLOOD (Changes in spleen)
  RF   REFERENCE    : Journal of Toxicology and Environmental Health.
        (Hemisphere Pub., 1025 Vermont Ave., NW, Washington, DC 20005)
        V.1- 1975/76-, vol 9, pg 565, 82
**DTYP DATA TYPE    : MDSTU
  ROU  ROUTE        : oral
  SPE  SPECIES      : dog
  STU  STUDY        : TDLo
```

FIGURE 7. TNT IN DIMDI (continued)

```
  DOS  DOSE          : 182 mg/kg/13W-C
  EFF  EFFECT        : LIVER (Changes in liver weight); BLOOD (Normocytic
       anemia); NUTRITIONAL AND GROSS METABOLIC (Weight loss or
       decreased weight gain)
  RF   REFERENCE     : Journal of Toxicology and Environmental Health.
       (Hemisphere Pub., 1025 Vermont Ave., NW, Washington, DC 20005)
       V.1- 1975/76-, vol 9, pg 565, 82
**DTYP DATA TYPE     : MDSTU
  ROU  ROUTE         : oral
  SPE  SPECIES       : dog
  STU  STUDY         : TDLo
  DOS  DOSE          : 1456 mg/kg/26W-I
  EFF  EFFECT        : LIVER (Changes in liver weight); BLOOD (Normocytic
       anemia; Changes in spleen)
  RF   REFERENCE     : Toxicology. (Elsevier Scientific Pub. Ireland,
       Ltd., POB 85, Limerick, Ireland) V.1- 1973-, vol 63, pg 233, 90
**DTYP DATA TYPE     : MSTU
  TSY  TEST SYSTEM   : Mutation in Microorganisms
  SCR  SPECIES/CELL TYPE/ROUTE : Salmonella typhimurium
  DOS  DOSE          : 10 ug/plate (+/-S9)
  RF   REFERENCE     : National Technical Information Service.
       (Springfield, VA 22161) Formerly U.S. Clearinghouse for
       Scientific & Technical Information., AD-A080-146
**DTYP DATA TYPE     : MSTU
  TSY  TEST SYSTEM   : Body Fluid Assay
  SCR  SPECIES/CELL TYPE/ROUTE : rat/ Salmonella typhimurium- Salmonella
     typhimurium
  DOS  DOSE          : 50 mg/kg
  RF   REFERENCE     : Mutation Research. (Elsevier Science Pub. B.V., POB
       211, 1000 AE Amsterdam, Netherlands) V.1- 1964-, vol 262, pg
       167, 91
**DTYP DATA TYPE     : MSTU
  TSY  TEST SYSTEM   : Mutation in Mammalian Somatic Cells
  SCR  SPECIES/CELL TYPE/ROUTE : mouse- Lymphocyte
  DOS  DOSE          : 40 mg/L
  RF   REFERENCE     : Cancer Letters (Shannon, Ireland). (Elsevier
       Scientific Pub. Ireland Ltd., POB 85, Limerick, Ireland) V.1-
       1975-, vol 20, pg 103, 83
**DTYP DATA TYPE     : RSTU
  ROU  ROUTE         : oral
  SPE  SPECIES       : rat
  STU  STUDY         : TDLo
  DOS  DOSE          : 5376 mg/kg (28D male)
  EFF  EFFECT        : Paternal Effects (Testes, epididymis, sperm duct)
  RF   REFERENCE     : Journal of Toxicology and Environmental Health.
       (Hemisphere Pub., 1025 Vermont Ave., NW, Washington, DC 20005)
       V.1- 1975/76-, vol 9, pg 565, 82
**DTYP DATA TYPE     : SSTU
  ROU  ROUTE         : skin
  SPE  SPECIES       : rabbit
  DOS  DOSE          : 500 mg/24H MLD
  RF   REFERENCE     : National Technical Information Service.
       (Springfield, VA 22161) Formerly U.S. Clearinghouse for
       Scientific & Technical Information., AD-B011-150
```

FIGURE 8. 2,4-D IN DIMDI

```
I.00/000002 DIMDI: -RTECS /COPYRIGHT NIOSH
++DAT    DATAMAINTENANCE
  ND:  AI5240000  BASE: RT00
  MD:  961106     LR  : 9610       RL: 26557
++IDEN   IDENTIFICATION
  NAME  NAME                  : Acetic acid, (2,4-dichlorophenoxy)-
  CR    CAS REGISTRY NUMBER   : 94-75-7
  RTEC  RTECS ACCESSION NO    : AG6825000
  WL    WISWESSER LINE NOTATION: QV1OR BG DG
  SY    SYNONYMS              : Acide 2,4-dichloro phenoxyacetique
        (French); Acido(2,4-dicloro-fenossi)-acetico (Italian);
         Acme amine 4; Acme butyl ester 4; Acme LV 4; Agrotect; Amidox;
         Amoxone; Aqua-Kleen; Barrage; BH 2,4-D; Brush-rhap;
         B-Selektonon; Chipco turf herbicide "D"; Chloroxone;
         Citrus fix; Crop rider; 2,4-D (ACGIH:OSHA); 2,4-D acid;
         Debroussaillant 600; Decamine; Deherban;
         (2,4-Dichloor-fenoxy)-azijnzuur (Dutch);
         Dichlorophenoxyacetic acid; 2,4-Dichlorophenoxyacetic acid;
         Dichlorophenoxyacetic acid (OSHA);
         2,4-Dichlorphenoxyacetic acid;
         (2,4-Dichlor-phenoxy)-essigsaeure (German); Dicopur; DMA-4;
         Dormone; 2,4-Dwuchlorofenoksyoctowy kwas (Polish);
         Emulsamine BK; Emulsamine E-3; ENT 8,538; Envert 171;
         Envert DT; Estone; Farmco; Fernimine; Fernoxone; Ferxone;
         Foredex 75; Hedonal; Hedonal (the herbicide); Herbidal;
         Hivol-44; Ipaner; Kwasu 2,4-dwuchlorofenoksyoctowego (Polish);
         Kwas 2,4-dwuchlorofenoksyoctowy (Polish);
         Kyselina 2,4-dichlorfenoxyoctova (Czech); Lawn-keep;
         Macrondray; Miracle; Monosan; Moxone; Netagrone; Netagrone 600;
         NSC 423; Pennamine; Pennamine D; Phenox; Pielik; Plantgard;
         RCRA waste number U240; Rhodia; Spritz-hormin/2,4-D;
         Spritz-hormit/2,4-D; Superormone concentre; U-5043; U 46DP;
         Vergemaster; Verton; Verton D; Verton 2D; Vidon 638;
         Weed-Ag-Bar; Weedar-64; Weedatul; Weedez Wonder BAR;
         Weedone LV4; Weed-rhap; Weed TOX; Weedtrol
  MF    MOLECULAR FORMULA     : C8-H6-C12-03
  MW    MOLECULAR WEIGHT      :    221.04
  GRC   GROUP OF COMPOUND     : Agricultural Chemical; Tumorigen;
         Mutagen; Reproductive Effector; Primary Irritant
++TOXR   TOXICOLOGY AND CARCINOGENICITY REVIEW
 +TREV  TOXICOLOGY REVIEW
**  TOXICOLOGY REVIEW; RREVAH 59,1,75; Residue Reviews. (Springer-Verlag
        New York, Inc., Service Center, 44 Hartz Way, Secaucus, NJ
        07094) V.1- 1962-
**  TOXICOLOGY REVIEW; DTTIAF 80,485,73; Deutsche Tieraerztliche
        Wochenschrift. (Hanover, Fed. Rep. Ger.) V.1-77, 1893-1970.
**  TOXICOLOGY REVIEW; RREVAH 56,107,75; Residue Reviews.
        (Springer-Verlag New York, Inc., Service Center, 44 Hartz Way,
        Secaucus, NJ 07094) V.1- 1962-
**  TOXICOLOGY REVIEW; ECMAAI 14,141,73; Economie et Medecine Animales.
        (Paris, France) V.1-17, 1960-76. Discontinued.
**  TOXICOLOGY REVIEW; BIOGAL 40(2),44,74; Biologico. (Instituto
        Biologica, Av. Cons. Rodriques Alves, 1252, CEP 04014, Sao
        Paulo, Brazil) V.1- 1935-
**  TOXICOLOGY REVIEW; HYSAAV 31(7-9),383,66; Hygiene and Sanitation
        (USSR). English translation of GISAAA. (Springfield, VA)
        1964-71. Discontinued.
 +CREV  CANCER REVIEW
```

FIGURE 8. 2,4-D IN DIMDI (continued)

```
**  IARC Cancer Review; Human Limited Evidence; IMEMDT 41,357,86; IARC
      Monographs on the Evaluation of Carcinogenic Risk of Chemicals
      to Man. (WHO Publications Centre USA, 49 Sheridan Ave., Albany,
      NY 12210) V.1- 1972-
**  IARC Cancer Review; Animal Inadequate Evidence; IMEMDT 15,111,77;
      IARC Monographs on the Evaluation of Carcinogenic Risk of
      Chemicals to Man. (WHO Publications Centre USA, 49 Sheridan
      Ave., Albany, NY 12210) V.1- 1972-
 +TLV   THRESHOLD LIMIT VALUE
**  ACGIH TLV; TWA 10 mg/m3; 85INA8 6,375,91; "Documentation of the
      Threshold Limit Values and Biological Exposure Indices," 5th
      ed., Cincinnati, OH, American Conference of Governmental
      Industrial Hygienists, Inc., 1986
 +NREC  NIOSH RECOMMENDATIONS
**  NIOSH REL TO 2,4-D-air:10H TWA 10 mg/m3; NIOSH* DHHS #92-100,92;
      National Institute for Occupational Safety and Health, U.S.
      Dept. of Health, Education, and Welfare, Reports and Memoranda.
 +NEXP  NIOSH EXPOSURE SURVEYS
**  NATIONAL OCCUPATIONAL HAZARD SURVEY 1974: Hazard#: 24270; number of
      industries: 6; total number of facilities: 1132; number of
      occupations: 8; total number of employees: 6266
**  NATIONAL OCCUPATIONAL EXPOSURE SURVEY 1983: Hazard#: 24270; number
      of industries: 1; total number of facilities: 94; number of
      occupations: 1; total number of employees: 471
++EXSR   EXPOSURE STANDARDS AND REGULATIONS
 +SR    STANDARDS AND REGULATIONS
**  EPA FIFRA 1988 PESTICIDE SUBJECT TO REGISTRATION OR RE-REGISTRATION;
      FEREAC 54,7740,89; Federal Register. (U.S. Government Printing
      Office, Supt. of Documents, Washington, DC 20402) V.1- 1936-
**  MSHA STANDARD-air:TWA 10 mg/m3; DTLVS* 3,67,71; "Documentation of
      Threshold Limit Values for Substances in Workroom Air." For
      publisher information, see 85INA8.
**  OSHA PEL (Gen Indu):8H TWA 10 mg/m3; CFRGBR 29,1910.1000,94; Code of
      Federal Regulations. (U.S. Government Printing Office, Supt. of
      Documents, Washington, DC 20402)
**  OSHA PEL (Construc):8H TWA 10 mg/m3; CFRGBR 29,1926.55,94; Code of
      Federal Regulations. (U.S. Government Printing Office, Supt. of
      Documents, Washington, DC 20402)
**  OSHA PEL (Shipyard):8H TWA 10 mg/m3; CFRGBR 29,1915.1000,93; Code of
      Federal Regulations. (U.S. Government Printing Office, Supt. of
      Documents, Washington, DC 20402)
**  OSHA PEL (Fed Cont):8H TWA 10 mg/m3; CFRGBR 41,50-204.50,94; Code of
      Federal Regulations. (U.S. Government Printing Office, Supt. of
      Documents, Washington, DC 20402)
**  OEL-AUSTRALIA:TWA 10 mg/m3 JAN93
**  OEL-AUSTRIA:TWA 10 mg/m3 JAN93
**  OEL-BELGIUM:TWA 10 mg/m3 JAN93
**  OEL-DENMARK:TWA 5 mg/m3 JAN93
**  OEL-FINLAND:TWA 10 mg/m3;STEL 20 mg/m3;Skin JAN93
**  OEL-FRANCE:TWA 10 mg/m3 JAN93
**  AOEL-GERMANY:TWA 10 mg/m3 JAN93
**  OEL-HUNGARY:TWA 1 mg/m3;STEL 2 mg/m3;Skin JAN93
**  OEL-THE NETHERLANDS:TWA 10 mg/m3 JAN93
**  OEL-THE PHILIPPINES:TWA 10 mg/m3 JAN93
**  OEL-POLAND:TWA 7 mg/m3 JAN93
**  OEL-SWITZERLAND:TWA 10 mg/m3;STEL 50 mg/m3 JAN93
**  OEL-THAILAND:TWA 10 mg/m3 JAN93
**  OEL-TURKEY:TWA 10 mg/m3 JAN93
```

FIGURE 8. 2,4-D IN DIMDI (continued)

```
**  OEL-UNITED KINGDOM:TWA 10 mg/m3;STEL 20 mg/m3 JAN93
**  OEL IN BULGARIA, COLOMBIA, JORDAN, KOREA check ACGIH TLV
**  OEL IN NEW ZEALAND, SINGAPORE, VIETNAM check ACGIH TLV
 +TSTA  STATUS OF TESTS
**  EPA GENETOX PROGRAM 1988, Positive: In vivo cytogenetics-nonhuman
       bone marrow
**  EPA GENETOX PROGRAM 1988, Positive: In vitro cytogenetics-human
       lymphocyte
**  EPA GENETOX PROGRAM 1988, Positive: B subtilis rec assay; E coli
       polA without S9
**  EPA GENETOX PROGRAM 1988, Positive: V79 cell culture-gene mutation
**  EPA GENETOX PROGRAM 1988, Positive: S cerevisiae gene conversion
**  EPA GENETOX PROGRAM 1988, Negative: D melanogaster-whole sex chrom.
       loss
**  EPA GENETOX PROGRAM 1988, Negative: D melanogaster-nondisjunction
**  EPA GENETOX PROGRAM 1988, Negative: Histidine reversion-Ames test
**  EPA GENETOX PROGRAM 1988, Negative: D melanogaster Sex-linked
       lethal
**  EPA GENETOX PROGRAM 1988, Negative: In vitro UDS-human fibroblast;
       TRP reversion
**  EPA GENETOX PROGRAM 1988, Negative: S cerevisiae-homozygosis
**  EPA GENETOX PROGRAM 1988, Inconclusive: Carcinogenicity-mouse/rat;
       Mammalian micronucleus
**  EPA TSCA Section 8(b) CHEMICAL INVENTORY
**  EPA TSCA Section 8(d) unpublished health/safety studies
**  On EPA IRIS database
**  EPA TSCA TEST SUBMISSION (TSCATS) DATA BASE, OCTOBER 1996
**  NIOSH Analytical Method, 1994: 2,4-D, 5001
**  NTP Carcinogenesis studies; on test (prechronic studies), May 1996
++TOXI   TOXICITY DATA
 +GSTU   GENERAL TOXICITY STUDIES          TOTAL NUMBER: 19
 +MDSTU  MULTIPLE DOSE STUDIES             TOTAL NUMBER: 6
 +MSTU   MUTAGENICITY STUDIES              TOTAL NUMBER: 27
 +RSTU   REPRODUCTIVE STUDIES              TOTAL NUMBER: 10
 +SSTU   SKIN AND EYE IRRITATION STUDIES   TOTAL NUMBER: 2
**DTYP DATA TYPE    : GSTU
  ROU  ROUTE        : oral
  SPE  SPECIES      : man
  STU  STUDY        : TDLo
  DOS  DOSE         : 2 gm/kg
  EFF  EFFECT       : BEHAVIORAL (Coma); LUNGS,THORAX, OR RESPIRATION
       (Respiratory depression)
  RF   REFERENCE    : Archives of Toxicology. (Springer-Verlag,
       Heidelberger Pl. 3, D-1000 Berlin 33, Fed. Rep. Ger.) V.32-
       1974-, vol 66, pg 518, 92
**DTYP DATA TYPE    : GSTU
  ROU  ROUTE        : oral
  SPE  SPECIES      : man
  STU  STUDY        : TDLo
  DOS  DOSE         : 5714 mg/kg
  EFF  EFFECT       : BEHAVIORAL (Coma); CARDIAC (Change in rate); LUNGS,
       THORAX, OR RESPIRATION (Respiratory depression)
  RF   REFERENCE    : Archives of Toxicology. (Springer-Verlag,
       Heidelberger Pl. 3, D-1000 Berlin 33, Fed. Rep. Ger.) V.32-
       1974-, vol 66, pg 518, 92
**DTYP DATA TYPE    : GSTU
  ROU  ROUTE        : oral
  SPE  SPECIES      : human
```

FIGURE 8. 2,4-D IN DIMDI (continued)

```
  STU  STUDY        : LDLo
  DOS  DOSE         : 80 mg/kg
  EFF  EFFECT       : GASTROINTESTINAL (Nausea or vomiting); BEHAVIORAL
       (Coma; Somnolence)
  RF   REFERENCE    : Archives of Pathology. (Chicago, IL) V.5(3)-50(3),
       1928-50; V.70-99, 1960-75. For publisher information, see
       APLMAS., vol 94, pg 270, 72
**DTYP DATA TYPE    : GSTU
  ROU  ROUTE        : oral
  SPE  SPECIES      : man
  STU  STUDY        : LDLo
  DOS  DOSE         : 93 mg/kg
  EFF  EFFECT       : BEHAVIORAL (Convulsions or effect on seizure
       threshold)
  RF   REFERENCE    : Pharmacological Reviews. (Williams & Wilkins, 428
       E. Preston St., Baltimore, MD 21202) V.1- 1949-, vol 14, pg 225,
       62
**DTYP DATA TYPE    : GSTU
  ROU  ROUTE        : oral
  SPE  SPECIES      : rat
  STU  STUDY        : LD50
  DOS  DOSE         : 375 mg/kg
  RF   REFERENCE    : Farm Chemicals Handbook. (Meister Pub., 37841
       Euclid Ave., Willoughy, OH 44094), vol -, pg C174, 91
**DTYP DATA TYPE    : GSTU
  ROU  ROUTE        : skin
  SPE  SPECIES      : rat
  STU  STUDY        : LD50
  DOS  DOSE         : 1500 mg/kg
  RF   REFERENCE    : World Review of Pest Control. (London, UK) V.1-10,
       1962-71. Discontinued., vol 9, pg 119, 70
**DTYP DATA TYPE    : GSTU
  ROU  ROUTE        : intraperitoneal
  SPE  SPECIES      : rat
  STU  STUDY        : LD50
  DOS  DOSE         : 666 mg/kg
  EFF  EFFECT       : PERIPHERAL NERVE AND SENSATION (Spastic paralysis
       with or without sensory change); BEHAVIORAL (Muscle weakness;
       Coma)
  RF   REFERENCE    : Journal of Industrial Hygiene and Toxicology.
       (Cambridge, MA) V.18-31, 1936-49. For publisher information, see
       AEHLAU., vol 29, pg 85, 47
**DTYP DATA TYPE    : GSTU
  ROU  ROUTE        : oral
  SPE  SPECIES      : mouse
  STU  STUDY        : LD50
  DOS  DOSE         : 347 mg/kg
  RF   REFERENCE    : Roczniki Panstwowego Zakladu Higieny. (Ars Polona,
       POB 1001, 00-068 Warsaw 1, Poland) V.1- 1950-, vol 31, pg 373,
       80
**DTYP DATA TYPE    : GSTU
  ROU  ROUTE        : intraperitoneal
  SPE  SPECIES      : mouse
  STU  STUDY        : LDLo
  DOS  DOSE         : 125 mg/kg
  RF   REFERENCE    : Toxicology and Applied Pharmacology. (Academic
       Press, Inc., 1 E. First St., Duluth, MN 55802) V.1- 1959-, vol
       23, pg 288, 72
```

FIGURE 8. 2,4-D IN DIMDI (continued)

```
**DTYP DATA TYPE    : GSTU
  ROU  ROUTE        : oral
  SPE  SPECIES      : dog
  STU  STUDY        : LD50
  DOS  DOSE         : 100 mg/kg
  EFF  EFFECT       : BEHAVIORAL (Stiffness; Coma)
  RF   REFERENCE    : Archives of Environmental Health. (Heldref Pub.,
       4000 Albemarle St., NW, Washington, DC 20016) V.1- 1960-, vol 7,
       pg 202, 63
**DTYP DATA TYPE    : GSTU
  ROU  ROUTE        : oral
  SPE  SPECIES      : rabbit
  STU  STUDY        : LDLo
  DOS  DOSE         : 800 mg/kg
  RF   REFERENCE    : Archives des Maladies Professionnelles de Medecine
       du Travail et de Securite Sociale. (SPPIF, B.P.22, F-41353
       Vineuil, France) V.7- 1946-, vol 12, pg 26, 51
**DTYP DATA TYPE    : GSTU
  ROU  ROUTE        : skin
  SPE  SPECIES      : rabbit
  STU  STUDY        : LD50
  DOS  DOSE         : 1400 mg/kg
  EFF  EFFECT       : BEHAVIORAL (Ataxia); SKIN AND APPENDAGES (Primary
       irritation)
  RF   REFERENCE    : Quarterly Bulletin--Association of Food and Drug
       Officials of the United States. (Denver, CO) V.3-38, 1939-74.,
       vol 16, pg 3, 52
**DTYP DATA TYPE    : GSTU
  ROU  ROUTE        : intraperitoneal
  SPE  SPECIES      : rabbit
  STU  STUDY        : LD50
  DOS  DOSE         : 400 mg/kg
  EFF  EFFECT       : PERIPHERAL NERVE AND SENSATION (Spastic paralysis
       with or without sensory change); BEHAVIORAL (Muscle weakness;
       Coma)
  RF   REFERENCE    : Journal of Industrial Hygiene and Toxicology.
       (Cambridge, MA) V.18-31, 1936-49. For publisher information, see
       AEHLAU., vol 29, pg 85, 47
**DTYP DATA TYPE    : GSTU
  ROU  ROUTE        : intravenous
  SPE  SPECIES      : rabbit
  STU  STUDY        : LD50
  DOS  DOSE         : 400 mg/kg
  EFF  EFFECT       : PERIPHERAL NERVE AND SENSATION (Spastic paralysis
       with or without sensory change); BEHAVIORAL (Muscle weakness;
       Coma)
  RF   REFERENCE    : Journal of Industrial Hygiene and Toxicology.
       (Cambridge, MA) V.18-31, 1936-49. For publisher information, see
       AEHLAU., vol 29, pg 85, 47
**DTYP DATA TYPE    : GSTU
  ROU  ROUTE        : oral
  SPE  SPECIES      : guinea pig
  STU  STUDY        : LD50
  DOS  DOSE         : 469 mg/kg
  RF   REFERENCE    : American Journal of Veterinary Research. (American
       Veterinary Medical Assoc., 930 N. Meacham Rd., Schaumburg, IL
       60196) V.1- 1940-, vol 15, pg 622, 54
**DTYP DATA TYPE    : GSTU
```

FIGURE 8. 2,4-D IN DIMDI (continued)

```
  ROU  ROUTE        : intraperitoneal
  SPE  SPECIES      : guinea pig
  STU  STUDY        : LD50
  DOS  DOSE         : 666 mg/kg
  EFF  EFFECT       : PERIPHERAL NERVE AND SENSATION (Spastic paralysis
       with or without sensory change); BEHAVIORAL (Muscle weakness;
       Coma)
  RF   REFERENCE    : Journal of Industrial Hygiene and Toxicology.
       (Cambridge, MA) V.18-31, 1936-49. For publisher information, see
       AEHLAU., vol 29, pg 85, 47
**DTYP DATA TYPE    : GSTU
  ROU  ROUTE        : oral
  SPE  SPECIES      : hamster
  STU  STUDY        : LD50
  DOS  DOSE         : 500 mg/kg
  RF   REFERENCE    : Toxicology and Applied Pharmacology. (Academic
       Press, Inc., 1 E. First St., Duluth, MN 55802) V.1- 1959-, vol
       48, pg A192, 79
**DTYP DATA TYPE    : GSTU
  ROU  ROUTE        : oral
  SPE  SPECIES      : chicken
  STU  STUDY        : LD50
  DOS  DOSE         : 541 mg/kg
  EFF  EFFECT       : GASTROINTESTINAL (Gastritis); BEHAVIORAL
       (Somnolence); LIVER (Fatty liver degeneration)
  RF   REFERENCE    : American Journal of Veterinary Research. (American
       Veterinary Medical Assoc., 930 N. Meacham Rd., Schaumburg, IL
       60196) V.1- 1940-, vol 15, pg 622, 54
**DTYP DATA TYPE    : GSTU
  ROU  ROUTE        : oral
  SPE  SPECIES      : mammal
  STU  STUDY        : LD50
  DOS  DOSE         : 375 mg/kg
  RF   REFERENCE    : Science. (American Assoc. for the Advancement of
       Science, 1333 H St., NW, Washington, DC 20005) V.1- 1895-, vol
       165, pg 465, 69
**DTYP DATA TYPE    : MDSTU
  ROU  ROUTE        : oral
  SPE  SPECIES      : rat
  STU  STUDY        : TDLo
  DOS  DOSE         : 13650 mg/kg/13W-C
  EFF  EFFECT       : NUTRITIONAL AND GROSS METABOLIC (Weight loss or
       decreased weight gain)
  RF   REFERENCE    : Fundamental and Applied Toxicology. (Academic
       Press, Inc., 1 E. First St., Duluth, MN 55802) V.1- 1981-, vol
       9, pg 423, 87
**DTYP DATA TYPE    : MDSTU
  ROU  ROUTE        : oral
  SPE  SPECIES      : rat
  STU  STUDY        : TDLo
  DOS  DOSE         : 200 mg/kg/5W-I
  EFF  EFFECT       : BEHAVIORAL (Muscle weakness)
  RF   REFERENCE    : Neurobehavioral Toxicology and Teratology.
       (Fayetteville, NY) V.3-8, 1981-86. For publisher information,
       see NETEEC., vol 5, pg 331, 83
**DTYP DATA TYPE    : MDSTU
  ROU  ROUTE        : oral
  SPE  SPECIES      : rat
```

FIGURE 8. 2,4-D IN DIMDI (continued)

```
  STU  STUDY          : TDLo
  DOS  DOSE           : 54750 mg/kg/1Y-C
  EFF  EFFECT         : SENSE ORGANS AND SPECIAL SENSES (NOSE,EYE,EAR, AND
       TASTE) (Retinal changes); BEHAVIORAL (Change in motor activity)
  RF   REFERENCE      : Toxicologist. (Soc. of Toxicology, Inc., 475 Wolf
       Ledge Parkway, Akron, OH 44311) V.1- 1981-, vol 15, pg 23, 95
**DTYP DATA TYPE      : MDSTU
  ROU  ROUTE          : oral
  SPE  SPECIES        : dog
  STU  STUDY          : TDLo
  DOS  DOSE           : 700 mg/kg/90D-I
  EFF  EFFECT         : BLOOD (Changes in other cell count); NUTRITIONAL
       AND GROSS METABOLIC (Weight loss or decreased weight gain);
       RELATED TO CHRONIC DATA (Death in the "U" date type field)
  RF   REFERENCE      : AMA Archives of Industrial Hygiene and Occupational
       Medicine. (Chicago, IL) V.2-10, 1950-54. For publisher
       information, see AEHLAU., vol 7, pg 61, 53
**DTYP DATA TYPE      : MDSTU
  ROU  ROUTE          : oral
  SPE  SPECIES        : dog
  STU  STUDY          : TDLo
  DOS  DOSE           : 1820 mg/kg/52W-C
  EFF  EFFECT         : KIDNEY, URETER, BLADDER (Changes in tubules); LIVER
       (Other changes); BLOOD (Changes in serum composition)
  RF   REFERENCE      : Fundamental and Applied Toxicology. (Academic
       Press, Inc., 1 E. First St., Duluth, MN 55802) V.1- 1981-, vol
       29, pg 78, 96
**DTYP DATA TYPE      : MDSTU
  ROU  ROUTE          : intravenous
  SPE  SPECIES        : dog
  STU  STUDY          : TDLo
  DOS  DOSE           : 300 mg/kg/6D-I
  EFF  EFFECT         : MUSCOLOSKELETAL (Changes in teeth and supporting
       structures); SKIN AND APPENDAGES (Dermatitis, other); RELATED TO
       CHRONIC DATA (Death in the "U" date type field)
  RF   REFERENCE      : Journal of Industrial Hygiene and Toxicology.
       (Cambridge, MA) V.18-31, 1936-49. For publisher information, see
       AEHLAU., vol 29, pg 85, 47
**DTYP DATA TYPE      : MSTU
  TSY  TEST SYSTEM    : Mutation in Microorganisms
  SCR  SPECIES/CELL TYPE/ROUTE : Salmonella typhimurium
  DOS  DOSE           : 250 ug/plate (-S9)
  RF   REFERENCE      : Mutation Research. (Elsevier Science Pub. B.V., POB
       211, 1000 AE Amsterdam, Netherlands) V.1- 1964-, vol 204, pg
       615, 88
**DTYP DATA TYPE      : MSTU
  TSY  TEST SYSTEM    : DNA Repair
  SCR  SPECIES/CELL TYPE/ROUTE : Escherichia coli
  DOS  DOSE           : 5 mg/disc
  RF   REFERENCE      : National Technical Information Service.
       (Springfield, VA 22161) Formerly U.S. Clearinghouse for
       Scientific & Technical Information., PB80-133226
**DTYP DATA TYPE      : MSTU
  TSY  TEST SYSTEM    : DNA Adduct
  SCR  SPECIES/CELL TYPE/ROUTE : Escherichia coli
  DOS  DOSE           : 20 umol/L
  RF   REFERENCE      : Mutation Research. (Elsevier Science Pub. B.V., POB
       211, 1000 AE Amsterdam, Netherlands) V.1- 1964-, vol 89, pg 95,
```

```
       81
**DTYP DATA TYPE    : MSTU
  TSY  TEST SYSTEM : DNA Repair
  SCR  SPECIES/CELL TYPE/ROUTE : Bacillus subtilis
  DOS  DOSE         : 5 mg/disc
  RF   REFERENCE    : National Technical Information Service.
       (Springfield, VA 22161) Formerly U.S. Clearinghouse for
       Scientific & Technical Information., PB80-133226
**DTYP DATA TYPE    : MSTU
  TSY  TEST SYSTEM : Mutation in Microorganisms
  SCR  SPECIES/CELL TYPE/ROUTE : other microorganisms
  DOS  DOSE         : 1 gm/L (-S9)
  RF   REFERENCE    : Microbios Letters. (Faculty Press, 88 Regent St.,
       Cambridge, UK) V.1- 1976-, vol 5, pg 103, 77
**DTYP DATA TYPE    : MSTU
  TSY  TEST SYSTEM : Mutation in Microorganisms
  SCR  SPECIES/CELL TYPE/ROUTE : other microorganisms
  DOS  DOSE         : 1 gm/L (-S9)
  RF   REFERENCE    : Microbios Letters. (Faculty Press, 88 Regent St.,
       Cambridge, UK) V.1- 1976-, vol 5, pg 103, 77
**DTYP DATA TYPE    : MSTU
  TSY  TEST SYSTEM : Mutation in Microorganisms
  SCR  SPECIES/CELL TYPE/ROUTE : other microorganisms
  DOS  DOSE         : 1 gm/L (-S9)
  RF   REFERENCE    : Microbios Letters. (Faculty Press, 88 Regent St.,
       Cambridge, UK) V.1- 1976-, vol 5, pg 103, 77
**DTYP DATA TYPE    : MSTU
  TSY  TEST SYSTEM : Mutation in Microorganisms
  SCR  SPECIES/CELL TYPE/ROUTE : other microorganisms
  DOS  DOSE         : 1 gm/L (-S9)
  RF   REFERENCE    : Microbios Letters. (Faculty Press, 88 Regent St.,
       Cambridge, UK) V.1- 1976-, vol 5, pg 103, 77
**DTYP DATA TYPE    : MSTU
  TSY  TEST SYSTEM : Specific Locus Test
  SCR  SPECIES/CELL TYPE/ROUTE : Drosophila melanogaster
  DOS  DOSE         : 5 mmol/L
  RF   REFERENCE    : Mutation Research. (Elsevier Science Pub. B.V., POB
       211, 1000 AE Amsterdam, Netherlands) V.1- 1964-, vol 319, pg
       237, 93
**DTYP DATA TYPE    : MSTU
  TSY  TEST SYSTEM : Specific Locus Test
  SCR  SPECIES/CELL TYPE/ROUTE : Drosophila melanogaster
  DOS  DOSE         : 10 ppb
  RF   REFERENCE    : Environmental and Molecular Mutagenesis. (Alan R.
       Liss, Inc., 41 E. 11th St., New York, NY 10003) V.10- 1987-, vol
       25, pg 148, 95
**DTYP DATA TYPE    : MSTU
  TSY  TEST SYSTEM : Sex Chromosome Loss and Nondisjunction
  SCR  SPECIES/CELL TYPE/ROUTE : Drosophila melanogaster
  DOS  DOSE         : 25 ppm
  RF   REFERENCE    : Ecological Bulletins. (Editorial Service of FRN,
       Box 6710, S-11385, Stockholm, Sweden) No.19- 1975-, vol 27, pg
       190, 78
**DTYP DATA TYPE    : MSTU
  TSY  TEST SYSTEM : Sex Chromosome Loss and Nondisjunction
  SCR  SPECIES/CELL TYPE/ROUTE : Drosophila melanogaster
  DOS  DOSE         : 1000 ppm/15D
  RF   REFERENCE    : Ecological Bulletins. (Editorial Service of FRN,
```

```
        Box 6710, S-11385, Stockholm, Sweden) No.19- 1975-, vol 27, pg
        182, 78
**DTYP DATA TYPE    : MSTU
  TSY  TEST SYSTEM : Mutation in Microorganisms
  SCR  SPECIES/CELL TYPE/ROUTE : Saccharomyces cerevisiae
  DOS  DOSE         : 150 mg/L (-S9)
  RF   REFERENCE    : Ecological Bulletins. (Editorial Service of FRN,
        Box 6710, S-11385, Stockholm, Sweden) No.19- 1975-, vol 27, pg
        193, 78
**DTYP DATA TYPE    : MSTU
  TSY  TEST SYSTEM : Gene Conversion and Mitotic Recombination
  SCR  SPECIES/CELL TYPE/ROUTE : Aspergillus nidulans
  DOS  DOSE         : 4 umol/L
  RF   REFERENCE    : Mutation Research. (Elsevier Science Pub. B.V., POB
        211, 1000 AE Amsterdam, Netherlands) V.1- 1964-, vol 204, pg
        615, 88
**DTYP DATA TYPE    : MSTU
  TSY  TEST SYSTEM : DNA Damage
  SCR  SPECIES/CELL TYPE/ROUTE : Salmon- Sperm
  DOS  DOSE         : 1 mmol/L
  RF   REFERENCE    : Phytochemistry. An International Journal of Plant
        Biochemistry. (Pergamon Press Inc., Maxwell House, Fairview
        Park, Elmsford, NY 10523) V.1- 1961-, vol 11, pg 3135, 72
**DTYP DATA TYPE    : MSTU
  TSY  TEST SYSTEM : Unscheduled DNA Synthesis
  SCR  SPECIES/CELL TYPE/ROUTE : human- Fibrolast
  DOS  DOSE         : 1 umol/L
  RF   REFERENCE    : Mutation Research. (Elsevier Science Pub. B.V., POB
        211, 1000 AE Amsterdam, Netherlands) V.1- 1964-, vol 42, pg 161,
        77
**DTYP DATA TYPE    : MSTU
  TSY  TEST SYSTEM : Cytogenetic Analysis
  SCR  SPECIES/CELL TYPE/ROUTE : human- Lymphocyte
  DOS  DOSE         : 20 ug/L
  RF   REFERENCE    : Cytology and Genetics (English Translation).
        Translation of TGANAK. (Allerton Press Inc., 150 Fifth Ave., New
        York, NY 10011) V.8- 1974-, vol 8(3), pg 6, 74
**DTYP DATA TYPE    : MSTU
  TSY  TEST SYSTEM : Sister Chromatid Exchange
  SCR  SPECIES/CELL TYPE/ROUTE : human- Lymphocyte
  DOS  DOSE         : 10 mg/L
  RF   REFERENCE    : Journal of Heredity. (American Genetic Assoc., 818
        18th St., NW, Washington, DC 20006) V.5- 1914-, vol 73, pg 224,
        82
**DTYP DATA TYPE    : MSTU
  TSY  TEST SYSTEM : Cytogenetic Analysis
  SCR  SPECIES/CELL TYPE/ROUTE : rat
  DOS  DOSE         : 100 ug/kg
  RF   REFERENCE    : Cytologia. (Japan Pub. Trading Co. (USA), 1255
        Howard St., San Francisco, CA 94103) V.1- 1929-, vol 52, pg 275,
        87
**DTYP DATA TYPE    : MSTU
  TSY  TEST SYSTEM : DNA Inhibition
  SCR  SPECIES/CELL TYPE/ROUTE : mouse
  DOS  DOSE         : 200 mg/kg
  RF   REFERENCE    : Mutation Research. (Elsevier Science Pub. B.V., POB
        211, 1000 AE Amsterdam, Netherlands) V.1- 1964-, vol 55, pg 197,
        78
```

FIGURE 8. 2,4-D IN DIMDI (continued)

```
**DTYP DATA TYPE    : MSTU
  TSY  TEST SYSTEM  : Cytogenetic Analysis
  SCR  SPECIES/CELL TYPE/ROUTE : mouse
  DOS  DOSE         : 100 mg/kg
  RF   REFERENCE    : Cytology and Genetics (English Translation).
       Translation of TGANAK. (Allerton Press Inc., 150 Fifth Ave., New
       York, NY 10011) V.8- 1974-, vol 8(3), pg 6, 74
**DTYP DATA TYPE    : MSTU
  TSY  TEST SYSTEM  : DNA Inhibition
  SCR  SPECIES/CELL TYPE/ROUTE : hamster- Ovary
  DOS  DOSE         : 1 mmol/L
  RF   REFERENCE    : Toxicology Letters. (Elsevier Science Pub. B.V.,
       POB 211, 1000 AE Amsterdam, Netherlands) V.1- 1977-, vol 29, pg
       137, 85
**DTYP DATA TYPE    : MSTU
  TSY  TEST SYSTEM  : Cytogenetic Analysis
  SCR  SPECIES/CELL TYPE/ROUTE : hamster- Ovary
  DOS  DOSE         : 2400 mg/L
  RF   REFERENCE    : Environmental and Molecular Mutagenesis. (Alan R.
       Liss, Inc., 41 E. 11th St., New York, NY 10003) V.10- 1987-, vol
       10(Suppl 10), pg 1, 87
**DTYP DATA TYPE    : MSTU
  TSY  TEST SYSTEM  : Sister Chromatid Exchange
  SCR  SPECIES/CELL TYPE/ROUTE : hamster- Ovary
  DOS  DOSE         : 167 mg/L
  RF   REFERENCE    : Environmental and Molecular Mutagenesis. (Alan R.
       Liss, Inc., 41 E. 11th St., New York, NY 10003) V.10- 1987-, vol
       10(Suppl 10), pg 1, 87
**DTYP DATA TYPE    : MSTU
  TSY  TEST SYSTEM  : Mutation in Mammalian Somatic Cells
  SCR  SPECIES/CELL TYPE/ROUTE : hamster- Lung
  DOS  DOSE         : 10 umol/L
  RF   REFERENCE    : Chemico-Biological Interactions. (Elsevier
       Scientific Pub. Ireland Ltd., POB 85, Limerick, Ireland) V.1-
       1969-, vol 19, pg 369, 77
**DTYP DATA TYPE    : MSTU
  TSY  TEST SYSTEM  : Cytogenetic Analysis
  SCR  SPECIES/CELL TYPE/ROUTE : cattle- Kidney
  DOS  DOSE         : 1 ppm
  RF   REFERENCE    : In Vitro. (Rockville, MD) V.1-20, 1965-85. For
       publisher information, see ICDBEO., vol 8, pg 416, 73
**DTYP DATA TYPE    : MSTU
  TSY  TEST SYSTEM  : DNA Damage
  SCR  SPECIES/CELL TYPE/ROUTE : mammal- Lymphocyte
  DOS  DOSE         : 1 mmol/L
  RF   REFERENCE    : Phytochemistry. An International Journal of Plant
       Biochemistry. (Pergamon Press Inc., Maxwell House, Fairview
       Park, Elmsford, NY 10523) V.1- 1961-, vol 11, pg 3135, 72
**DTYP DATA TYPE    : RSTU
  ROU  ROUTE        : oral
  SPE  SPECIES      : rat
  STU  STUDY        : TDLo
  DOS  DOSE         : 220 ug/kg (1-22D preg)
  EFF  EFFECT       : Specific Developmental Abnormalities (Mlood and
       lymphatic system)
  RF   REFERENCE    : Gigiena i Sanitariya. For English translation, see
       HYSAAV. (V/O Mezhdunarodnaya Kniga, 113095 Moscow, USSR) V.1-
       1936-, vol 50(10), pg 76, 85
```

FIGURE 8. 2,4-D IN DIMDI (continued)

```
**DTYP DATA TYPE    : RSTU
  ROU  ROUTE        : oral
  SPE  SPECIES      : rat
  STU  STUDY        : TDLo
  DOS  DOSE         : 1 gm/kg (6-15D preg)
  EFF  EFFECT       : Specific Developmental Abnormalities
       (Musculoskeletal system); Effects on Embryo or Fetus
       (Fetotoxicity; Fetal death)
  RF   REFERENCE    : Toxicology and Applied Pharmacology. (Academic
       Press, Inc., 1 E. First St., Duluth, MN 55802) V.1- 1959-, vol
       22, pg 14, 72
**DTYP DATA TYPE    : RSTU
  ROU  ROUTE        : oral
  SPE  SPECIES      : rat
  STU  STUDY        : TDLo
  DOS  DOSE         : 125 mg/kg (6-15D preg)
  EFF  EFFECT       : Specific Developmental Abnormalities
       (Musculoskeletal system)
  RF   REFERENCE    : Food and Cosmetics Toxicology. (London, UK) V.1-19,
       1963-81. For publisher information, see FCTOD7., vol 9, pg 801,
       71
**DTYP DATA TYPE    : RSTU
  ROU  ROUTE        : oral
  SPE  SPECIES      : rat
  STU  STUDY        : TDLo
  DOS  DOSE         : 500 mg/kg (6-15D preg)
  EFF  EFFECT       : Effects on Embryo or Fetus (Fetotoxicity); Specific
       Developmental Abnormalities (Central nervous system; Urogenital
       system; Homeostasis); Effects on Newborn (Growth statistics)
  RF   REFERENCE    : Food and Cosmetics Toxicology. (London, UK) V.1-19,
       1963-81. For publisher information, see FCTOD7., vol 9, pg 801,
       71
**DTYP DATA TYPE    : RSTU
  ROU  ROUTE        : oral
  SPE  SPECIES      : mouse
  STU  STUDY        : TDLo
  DOS  DOSE         : 707 mg/kg (11-14D preg)
  EFF  EFFECT       : Effects on Embryo or Fetus (Fetotoxicity; Fetal
       death); Specific Developmental Abnormalities (Craniofacial)
  RF   REFERENCE    : Archives of Environmental Contamination and
       Toxicology. (Springer-Verlag New York, Inc., Service Center, 44
       Hartz Way, Secaucus, NJ 070944) V.1- 1973-, vol 6, pg 33, 77
**DTYP DATA TYPE    : RSTU
  ROU  ROUTE        : oral
  SPE  SPECIES      : mouse
  STU  STUDY        : TDLo
  DOS  DOSE         : 900 mg/kg (6-14D preg)
  EFF  EFFECT       : Effects on Fertility (Litter size); Effects on
       Embryo or Fetus (Extra embryonic structures); Specific
       Developmental Abnormalities (Eye, ear)
  RF   REFERENCE    : National Technical Information Service.
       (Springfield, VA 22161) Formerly U.S. Clearinghouse for
       Scientific & Technical Information., PB223-160
**DTYP DATA TYPE    : RSTU
  ROU  ROUTE        : oral
  SPE  SPECIES      : mouse
  STU  STUDY        : TDLo
  DOS  DOSE         : 438 mg/kg (8-12D preg)
```

FIGURE 8. 2,4-D IN DIMDI (continued)

```
  EFF  EFFECT      : Effects on Newborn (Growth statistics)
  RF   REFERENCE   : Teratogenesis, Carcinogenesis, and Mutagenesis.
       (Alan R. Liss, Inc., 41 E. 11th St., New York, NY 10003) V.1-
       1980-, vol 7, pg 7, 87
**DTYP DATA TYPE   : RSTU
  ROU  ROUTE       : subcutaneous
  SPE  SPECIES     : mouse
  STU  STUDY       : TDLo
  DOS  DOSE        : 882 mg/kg (6-14D preg)
  EFF  EFFECT      : Effects on Embryo or Fetus (Fetal death); Specific
       Developmental Abnormalities (Central nervous system); Effects on
       Embryo or Fetus (Extra embryonic structures)
  RF   REFERENCE   : National Technical Information Service.
       (Springfield, VA 22161) Formerly U.S. Clearinghouse for
       Scientific & Technical Information., PB223-160
**DTYP DATA TYPE   : RSTU
  ROU  ROUTE       : subcutaneous
  SPE  SPECIES     : mouse
  STU  STUDY       : TDLo
  DOS  DOSE        : 900 mg/kg (6-14D preg)
  EFF  EFFECT      : Effects on Embryo or Fetus (Fetotoxicity); Specific
       Developmental Abnormalities (Eye, ear; Craniofacial); Effects on
       Fertility (Pre-implantation mortality; Litter size)
  RF   REFERENCE   : National Technical Information Service.
       (Springfield, VA 22161) Formerly U.S. Clearinghouse for
       Scientific & Technical Information., PB223-160
**DTYP DATA TYPE   : RSTU
  ROU  ROUTE       : oral
  SPE  SPECIES     : hamster
  STU  STUDY       : TDLo
  DOS  DOSE        : 200 mg/kg (7-11D preg)
  EFF  EFFECT      : Effects on Fertility (Litter size)
  RF   REFERENCE   : Bulletin of Environmental Contamination and
       Toxicology. (Springer-Verlag New York, Inc., Service Center, 44
       Hartz Way, Secaucus, NJ 07094) V.1- 1966-, vol 6, pg 559, 71
**DTYP DATA TYPE   : SSTU
  ROU  ROUTE       : skin
  SPE  SPECIES     : rabbit
  DOS  DOSE        : 500 mg/24H MLD
  RF   REFERENCE   : "Sbornik Vysledku Toxixologickeho Vysetreni Latek A
       Pripravku," Marhold, J.V., Institut Pro Vychovu Vedoucicn
       Pracovniku Chemickeho Prumyclu Praha, Czechoslovakia, 1972, vol
       -, pg 279, 72
**DTYP DATA TYPE   : SSTU
  ROU  ROUTE       : eye
  SPE  SPECIES     : rabbit
  DOS  DOSE        : 750 ug/24H SEV
  RF   REFERENCE   : "Sbornik Vysledku Toxixologickeho Vysetreni Latek A
       Pripravku," Marhold, J.V., Institut Pro Vychovu Vedoucicn
       Pracovniku Chemickeho Prumyclu Praha, Czechoslovakia, 1972, vol
       -, pg 279, 72
```

FIGURE 9. TNT ON CCINFO DISC

```
* * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * *
*                          R T E C S(R)                                   *
*                                                                         *
* Produced by : National Institute for Occupational Safety and Health    *
* Provided by : Canadian Centre for Occupational Health and Safety       *
* * * * * * * * * * * * * * * * * * * * Issue : 96-4 (November, 1996)    *

                    *** CHEMICAL IDENTIFICATION ***

RTECS NUMBER              : XU0175000
CHEMICAL NAME             : Toluene, 2,4,6-trinitro-
CAS REGISTRY NUMBER       : 118-96-7
LAST UPDATED              : 9607
DATA ITEMS CITED          : 56
MOLECULAR FORMULA         : C7-H5-N3-O6
MOLECULAR WEIGHT          : 227.15
WISWESSER LINE NOTATION   : WNR B1 CNW ENW
COMPOUND DESCRIPTOR       : Agricultural Chemical
                            Tumorigen
                            Mutagen
                            Reproductive Effector
                            Human
                            Primary Irritant
SYNONYMS/TRADE NAMES :
   * Benzene, 2-methyl-1,3,5-trinitro-
   * Entsufon
   * 2-Methyl-1,3,5-trinitrobenzene
   * NCI-C56155
   * TNT
   * alpha-Tnt
   * TNT (OSHA)
   * TNT, dry or wetted with <30% water, by weight (UN0209) (DOT)
   * TNT-tolite
   * Tolit
   * Tolite
   * 2,4,6-Trinitrotolueen
   * Trinitrotoluene
   * Trinitrotoluene (UN0209) (DOT)
   * Trinitrotoluene, wetted with not <30% water, by weight (UN1356) (DOT)
   * s-Trinitrotoluene
   * sym-Trinitrotoluene
   * 2,4,6-Trinitrotoluene (ACGIH:OSHA)
   * s-Trinitrotoluol
   * sym-Trinitrotoluol
   * 2,4,6-Trinitrotoluol
   * Tritol
   * Triton
   * Trojnitrotoluen
   * Trotyl
   * Trotyl oil
   * UN0209 (DOT)
   * UN1356 (DOT)

                     *** HEALTH HAZARD DATA ***

                    ** SKIN/EYE IRRITATION DATA **

TYPE OF TEST              : Standard Draize test
```

FIGURE 9. TNT ON CCINFO DISC (continued)

```
ROUTE OF EXPOSURE        : Administration onto the skin
SPECIES OBSERVED         : Rodent - rabbit
DOSE/DURATION            : 500 mg/24H
REACTION SEVERITY        : Mild
REFERENCE :
   NTIS** National Technical Information Service.  (Springfield, VA 22161)
   Formerly U.S. Clearinghouse for Scientific & Technical Information.
   Volume(issue)/page/year: AD-B011-150

                         ** ACUTE TOXICITY DATA **

TYPE OF TEST             : LDLo - Lowest published lethal dose
ROUTE OF EXPOSURE        : Oral
SPECIES OBSERVED         : Human
DOSE/DURATION            : 28 gm/kg
TOXIC EFFECTS :
   Behavioral - hallucinations, distorted perceptions
   Lungs, Thorax, or Respiration - cyanosis
   Gastrointestinal - other changes
REFERENCE :
   34ZIAG "Toxicology of Drugs and Chemicals," Deichmann, W.B., New York, Academic
   Press, Inc., 1969  Volume(issue)/page/year: -,610,69

TYPE OF TEST             : LD50 - Lethal dose, 50 percent kill
ROUTE OF EXPOSURE        : Oral
SPECIES OBSERVED         : Rodent - rat
DOSE/DURATION            : 795 mg/kg
TOXIC EFFECTS :
   Behavioral - somnolence (general depressed activity)
   Behavioral - tremors
   Behavioral - convulsions or effect on seizure threshold
REFERENCE :
   JTEHD6 Journal of Toxicology and Environmental Health.  (Hemisphere Pub., 1025
   Vermont Ave., NW, Washington, DC 20005)  V.1-    1975/76-
   Volume(issue)/page/year: 9,565,82

TYPE OF TEST             : LD50 - Lethal dose, 50 percent kill
ROUTE OF EXPOSURE        : Oral
SPECIES OBSERVED         : Rodent - mouse
DOSE/DURATION            : 660 mg/kg
TOXIC EFFECTS :
   Behavioral - somnolence (general depressed activity)
   Behavioral - tremors
   Behavioral - convulsions or effect on seizure threshold
REFERENCE :
   JTEHD6 Journal of Toxicology and Environmental Health.  (Hemisphere Pub., 1025
   Vermont Ave., NW, Washington, DC 20005)  V.1-    1975/76-
   Volume(issue)/page/year: 9,565,82

TYPE OF TEST             : LDLo - Lowest published lethal dose
ROUTE OF EXPOSURE        : Oral
SPECIES OBSERVED         : Mammal - cat
DOSE/DURATION            : 1850 mg/kg
TOXIC EFFECTS :
   Lungs, Thorax, or Respiration - dyspnea
   Lungs, Thorax, or Respiration - cyanosis
   Skin and Appendages - dermatitis, allergic (after systemic exposure)
REFERENCE :
```

```
   MRCSAB Special Report Series--Medical Research Council (United Kingdom). (Her
   Majesty's Stationery Office, P.O. Box 569, London SE1 9NH, UK)  No.1- 1915-
   Volume(issue)/page/year: 58,32,21

TYPE OF TEST              : LDLo - Lowest published lethal dose
ROUTE OF EXPOSURE         : Subcutaneous
SPECIES OBSERVED          : Mammal - cat
DOSE/DURATION             : 200 mg/kg
TOXIC EFFECTS :
   Lungs, Thorax, or Respiration - dyspnea
   Lungs, Thorax, or Respiration - cyanosis
   Skin and Appendages - dermatitis, allergic (after systemic exposure)
REFERENCE :
   MRCSAB Special Report Series--Medical Research Council (United Kingdom). (Her
   Majesty's Stationery Office, P.O. Box 569, London SE1 9NH, UK)  No.1- 1915-
   Volume(issue)/page/year: 58,32,21

TYPE OF TEST              : LDLo - Lowest published lethal dose
ROUTE OF EXPOSURE         : Oral
SPECIES OBSERVED          : Rodent - rabbit
DOSE/DURATION             : 500 mg/kg
TOXIC EFFECTS :
   Behavioral - convulsions or effect on seizure threshold
   Gastrointestinal - hypermotility, diarrhea
   Lungs, Thorax, or Respiration - cyanosis
REFERENCE :
   MRCSAB Special Report Series--Medical Research Council (United Kingdom). (Her
   Majesty's Stationery Office, P.O. Box 569, London SE1 9NH, UK)  No.1- 1915-
   Volume(issue)/page/year: 58,32,21

TYPE OF TEST              : LDLo - Lowest published lethal dose
ROUTE OF EXPOSURE         : Subcutaneous
SPECIES OBSERVED          : Rodent - rabbit
DOSE/DURATION             : 500 mg/kg
TOXIC EFFECTS :
   Behavioral - convulsions or effect on seizure threshold
   Gastrointestinal - hypermotility, diarrhea
   Lungs, Thorax, or Respiration - cyanosis
REFERENCE :
   MRCSAB Special Report Series--Medical Research Council (United Kingdom). (Her
   Majesty's Stationery Office, P.O. Box 569, London SE1 9NH, UK)  No.1- 1915-
   Volume(issue)/page/year: 58,32,21

                ** OTHER MULTIPLE DOSE TOXICITY DATA **

TYPE OF TEST              : TDLo - Lowest published toxic dose
ROUTE OF EXPOSURE         : Oral
SPECIES OBSERVED          : Rodent - rat
DOSE/DURATION             : 7200 mg/kg/6W-I
TOXIC EFFECTS :
   Liver - other changes
   Blood - changes in serum composition (TP, bilirubin, cholesterol)
   Related to Chronic Data - changes in testicular weight
REFERENCE :
   TOLED5 Toxicology Letters.  (Elsevier Science Pub. B.V., POB 211, 1000 AE
   Amsterdam, Netherlands) V.1-    1977-  Volume(issue)/page/year: 55,343,91

TYPE OF TEST              : TDLo - Lowest published toxic dose
```

FIGURE 9. TNT ON CCINFO DISC (continued)

```
ROUTE OF EXPOSURE        : Oral
SPECIES OBSERVED         : Rodent - rat
DOSE/DURATION            : 11375 mg/kg/13W-C
TOXIC EFFECTS :
   Behavioral - food intake (animal)
   Blood - normocytic anemia
   Nutritional and Gross Metabolic - weight loss or decreased weight gain
REFERENCE :
   TXCYAC Toxicology.  (Elsevier Scientific Pub. Ireland, Ltd., POB 85, Limerick,
   Ireland) V.1-    1973-  Volume(issue)/page/year: 32,253,84

TYPE OF TEST             : TDLo - Lowest published toxic dose
ROUTE OF EXPOSURE        : Oral
SPECIES OBSERVED         : Rodent - rat
DOSE/DURATION            : 3 gm/kg/30D-I
TOXIC EFFECTS :
   Liver - other changes
   Biochemical - Enzyme inhibition, induction, or change in blood or tissue levels
   - monoamine oxidase
   Biochemical - Metabolism (Intermediary) - lipids including transport
REFERENCE :
   GTPZAB Gigiena Truda i Professional'nye Zabolevaniya.  Labor Hygiene and
   Occupational Diseases. (V/O Mezhdunarodnaya Kniga, 113095 Moscow, USSR) V.1-
   1957-  Volume(issue)/page/year: 18(10),57,74

TYPE OF TEST             : TDLo - Lowest published toxic dose
ROUTE OF EXPOSURE        : Oral
SPECIES OBSERVED         : Rodent - mouse
DOSE/DURATION            : 11 mg/kg/13W-C
TOXIC EFFECTS :
   Liver - changes in liver weight
   Endocrine - changes in spleen weight
   Blood - changes in spleen
REFERENCE :
   JTEHD6 Journal of Toxicology and Environmental Health.  (Hemisphere Pub., 1025
   Vermont Ave., NW, Washington, DC 20005)  V.1-    1975/76-
   Volume(issue)/page/year: 9,565,82

TYPE OF TEST             : TDLo - Lowest published toxic dose
ROUTE OF EXPOSURE        : Oral
SPECIES OBSERVED         : Mammal - dog
DOSE/DURATION            : 182 mg/kg/13W-C
TOXIC EFFECTS :
   Liver - changes in liver weight
   Blood - normocytic anemia
   Nutritional and Gross Metabolic - weight loss or decreased weight gain
REFERENCE :
   JTEHD6 Journal of Toxicology and Environmental Health.  (Hemisphere Pub., 1025
   Vermont Ave., NW, Washington, DC 20005)  V.1-    1975/76-
   Volume(issue)/page/year: 9,565,82

TYPE OF TEST             : TDLo - Lowest published toxic dose
ROUTE OF EXPOSURE        : Oral
SPECIES OBSERVED         : Mammal - dog
DOSE/DURATION            : 1456 mg/kg/26W-I
TOXIC EFFECTS :
   Liver - changes in liver weight
   Blood - normocytic anemia
```

FIGURE 9. TNT ON CCINFO DISC (continued)

```
   Blood - changes in spleen
REFERENCE :
   TXCYAC Toxicology.  (Elsevier Scientific Pub. Ireland, Ltd., POB 85, Limerick,
   Ireland) V.1-    1973-  Volume(issue)/page/year: 63,233,90

                          ** REPRODUCTIVE DATA **

TYPE OF TEST             : TDLo - Lowest published toxic dose
ROUTE OF EXPOSURE        : Oral
SPECIES OBSERVED         : Rodent - rat
DOSE                     : 5376 mg/kg
SEX/DURATION             : male 28 day(s) pre-mating
TOXIC EFFECTS :
   Reproductive - Paternal Effects - testes, epididymis, sperm duct
REFERENCE :
   JTEHD6 Journal of Toxicology and Environmental Health.  (Hemisphere Pub., 1025
   Vermont Ave., NW, Washington, DC 20005)  V.1-    1975/76-
   Volume(issue)/page/year: 9,565,82

                          ** MUTATION DATA **

TYPE OF TEST             : Mutation in microorganisms
TEST SYSTEM              : Bacteria - Salmonella typhimurium
DOSE/DURATION            : 10 ug/plate
REFERENCE :
   NTIS** National Technical Information Service.  (Springfield, VA 22161)
   Formerly U.S. Clearinghouse for Scientific & Technical Information.
   Volume(issue)/page/year: AD-A080-146

TYPE OF TEST             : Body fluid assay
TEST SYSTEM              : Rodent - rat Bacteria - Salmonella typhimurium
DOSE/DURATION            : 50 mg/kg
REFERENCE :
   MUREAV Mutation Research.  (Elsevier Science Pub. B.V., POB 211, 1000 AE
   Amsterdam, Netherlands) V.1-    1964-  Volume(issue)/page/year: 262,167,91

TYPE OF TEST             : Mutation in mammalian somatic cells
TEST SYSTEM              : Rodent - mouse Lymphocyte
DOSE/DURATION            : 40 mg/L
REFERENCE :
   CALEDQ Cancer Letters (Shannon, Ireland).  (Elsevier Scientific Pub. Ireland
   Ltd., POB 85, Limerick, Ireland)  V.1-    1975- Volume(issue)/page/year:
   20,103,83

                          *** REVIEWS ***

   ACGIH TLV-TWA 0.5 mg/m3 (skin)
      85INA8 "Documentation of the Threshold Limit Values and Biological Exposure
   Indices," 5th ed., Cincinnati, OH, American Conference of Governmental
   Industrial Hygienists, Inc., 1986  Volume(issue)/page/year: 6,1652,91

   IARC Cancer Review:Animal Inadequate Evidence
      IMEMDT IARC Monographs on the Evaluation of Carcinogenic Risk of Chemicals
   to Man.  (WHO Publications Centre USA, 49 Sheridan Ave., Albany, NY 12210) V.1-
      1972-  Volume(issue)/page/year: 65,449,96

   IARC Cancer Review:Human Inadequate Evidence
      IMEMDT IARC Monographs on the Evaluation of Carcinogenic Risk of Chemicals
```

to Man. (WHO Publications Centre USA, 49 Sheridan Ave., Albany, NY 12210) V.1-
1972- Volume(issue)/page/year: 65,449,96

IARC Cancer Review:Group 3
IMEMDT IARC Monographs on the Evaluation of Carcinogenic Risk of Chemicals
to Man. (WHO Publications Centre USA, 49 Sheridan Ave., Albany, NY 12210) V.1-
1972- Volume(issue)/page/year: 65,449,96

TOXICOLOGY REVIEW
NTIS** National Technical Information Service. (Springfield, VA 22161)
Formerly U.S. Clearinghouse for Scientific & Technical Information.
Volume(issue)/page/year: AD778-725

TOXICOLOGY REVIEW
CRTXB2 CRC Critical Reviews in Toxicology. (CRC Press, Inc., 2000 Corporate
Blvd., NW, Boca Raton, FL 33431) V.1- 1971- Volume(issue)/page/year:
1(1),93,71

TOXICOLOGY REVIEW
PAREAQ Pharmacological Reviews. (Williams & Wilkins, 428 E. Preston St.,
Baltimore, MD 21202) V.1- 1949- Volume(issue)/page/year: 4,1,52

*** U.S. STANDARDS AND REGULATIONS ***

DOT-HAZARD:EXPLOSIVE 1.1D; LABEL:EXPLOSIVE 1.1D (UN0209)
CFRGBR Code of Federal Regulations. (U.S. Government Printing Office, Supt.
of Documents, Washington, DC 20402) Volume(issue)/page/year: 49,172.101,92

DOT-HAZARD:4.1; LABEL:FLAMMABLE SOLID (UN1356)
CFRGBR Code of Federal Regulations. (U.S. Government Printing Office, Supt.
of Documents, Washington, DC 20402) Volume(issue)/page/year: 49,172.101,92

MSHA STANDARD-air:TWA 0.2 ppm (0.5 mg/m3) (skin)
DTLVS* "Documentation of Threshold Limit Values for Substances in Workroom
Air." For publisher information, see 85INA8. Volume(issue)/page/year:
3,270,71

OSHA PEL (Gen Indu):8H TWA 1.50 mg/m3 (skin)
CFRGBR Code of Federal Regulations. (U.S. Government Printing Office, Supt.
of Documents, Washington, DC 20402) Volume(issue)/page/year: 29,1910.1000,94

OSHA PEL (Construc):8H TWA 1.50 mg/m3 (skin)
CFRGBR Code of Federal Regulations. (U.S. Government Printing Office, Supt.
of Documents, Washington, DC 20402) Volume(issue)/page/year: 29,1926.55,94

OSHA PEL (Shipyard):8H TWA 1.50 mg/m3 (skin)
CFRGBR Code of Federal Regulations. (U.S. Government Printing Office, Supt.
of Documents, Washington, DC 20402) Volume(issue)/page/year: 29,1915.1000,93

OSHA PEL (Fed Cont):8H TWA 1.50 mg/m3 (skin)
CFRGBR Code of Federal Regulations. (U.S. Government Printing Office, Supt.
of Documents, Washington, DC 20402) Volume(issue)/page/year: 41,50-204.50,94

*** OCCUPATIONAL EXPOSURE LIMITS ***

OEL-ARAB Republic of Egypt:TWA 0.5 mg/m3 JAN93

OEL-AUSTRALIA:TWA 0.5 mg/m3;Skin JAN93

FIGURE 9. TNT ON CCINFO DISC (continued)

```
   OEL-BELGIUM:TWA 0.5 mg/m3;Skin JAN93

   OEL-DENMARK:STEL 0.5 mg/m3;Skin JAN93

   OEL-FINLAND:TWA 0.5 mg/m3;STEL 3 mg/m3;Skin JAN93

   OEL-FRANCE:TWA 0.5 mg/m3;Skin JAN93

   OEL-GERMANY:TWA 0.01 ppm (0.1 mg/m3);Skin;Carcinogen JAN93

   OEL-HUNGARY:TWA 0.3 mg/m3;STEL 0.5 mg/m3;Skin JAN93

   OEL-THE NETHERLANDS:TWA 0.5 mg/m3;Skin JAN93

   OEL-THE PHILIPPINES:TWA 1.5 mg/m3;Skin JAN93

   OEL-RUSSIA:TWA 0.1 mg/m3;STEL 0.5 mg/m3;Skin JAN93

   OEL-SWITZERLAND:TWA 0.01 ppm (0.1 mg/m3);STEL 0.02 ppm;Skin JAN93

   OEL-TURKEY:TWA 1.5 mg/m3;Skin JAN93

   OEL-UNITED KINGDOM:TWA 0.5 mg/m3;STEL 0.5 mg/m3 JAN93

   OEL IN BULGARIA, COLOMBIA, JORDAN, KOREA check ACGIH TLV

   OEL IN NEW ZEALAND, SINGAPORE, VIETNAM check ACGIH TLV

         *** NIOSH STANDARDS DEVELOPMENT AND SURVEILLANCE DATA ***

NIOSH RECOMMENDED EXPOSURE LEVEL (REL) :
   NIOSH REL TO 2,4,6-TRINITROTOLUENE-air:10H TWA 0.5 mg/m3 (Sk)
REFERENCE :
   NIOSH* National Institute for Occupational Safety and Health, U.S. Dept. of
   Health, Education, and Welfare, Reports and Memoranda. Volume(issue)/page/year:
   DHHS #92-100,92

NIOSH OCCUPATIONAL EXPOSURE SURVEY DATA :
   NOES - National Occupational Exposure Survey (1983)
     NOES Hazard Code - 74550
       No. of Facilities: 10 (estimated)
       No. of Industries: 2
       No. of Occupations: 1
       No. of Employees: 31 (estimated)

                          *** STATUS IN U.S. ***

   EPA GENETOX PROGRAM 1988, Positive: Histidine reversion-Ames test

   EPA TSCA Section 8(b) CHEMICAL INVENTORY

   EPA TSCA Section 8(d) unpublished health/safety studies

   On EPA IRIS database

   EPA TSCA TEST SUBMISSION (TSCATS) DATA BASE, JULY 1996
```

FIGURE 9. TNT ON CCINFO DISC (continued)

OSHA ANALYTICAL METHOD #44

*** END OF RECORD ***

FIGURE 10. 2,4-D ON CCINFO/DISC

```
* * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * *
*                          R T E C S(R)                                 *
*                                                                       *
* Produced by : National Institute for Occupational Safety and Health *
* Provided by : Canadian Centre for Occupational Health and Safety     *
* * * * * * * * * * * * * * * * * * * * Issue : 96-4 (November, 1996) *

                    *** CHEMICAL IDENTIFICATION ***

RTECS NUMBER             : AG6825000
CHEMICAL NAME            : Acetic acid, (2,4-dichlorophenoxy)-
CAS REGISTRY NUMBER      : 94-75-7
LAST UPDATED             : 9607
DATA ITEMS CITED         : 119
MOLECULAR FORMULA        : C8-H6-Cl2-O3
MOLECULAR WEIGHT         : 221.04
WISWESSER LINE NOTATION  : QV1OR BG DG
COMPOUND DESCRIPTOR      : Agricultural Chemical
                           Tumorigen
                           Mutagen
                           Reproductive Effector
                           Human
                           Primary Irritant
SYNONYMS/TRADE NAMES :
   * Acide 2,4-dichloro phenoxyacetique
   * Acido(2,4-dicloro-fenossi)-acetico
   * Acme amine 4
   * Acme butyl ester 4
   * Acme LV 4
   * Agrotect
   * Amidox
   * Amoxone
   * Aqua-Kleen
   * Barrage
   * BH 2,4-D
   * Brush-rhap
   * B-Selektonon
   * Chipco turf herbicide "D"
   * Chloroxone
   * Citrus fix
   * Crop rider
   * 2,4-D (ACGIH:OSHA)
   * 2,4-D acid
   * Debroussaillant 600
   * Decamine
   * Deherban
   * (2,4-Dichloor-fenoxy)-azijnzuur
   * Dichlorophenoxyacetic acid
   * 2,4-Dichlorophenoxyacetic acid
   * Dichlorophenoxyacetic acid (OSHA)
   * 2,4-Dichlorphenoxyacetic acid
   * (2,4-Dichlor-phenoxy)-essigsaeure
   * Dicopur
   * DMA-4
   * Dormone
   * 2,4-Dwuchlorofenoksyoctowy kwas
   * Emulsamine BK
   * Emulsamine E-3
```

FIGURE 10. 2,4-D ON CCINFO/DISC (Continued)

```
  * ENT 8,538
  * Envert 171
  * Envert DT
  * Estone
  * Farmco
  * Fernimine
  * Fernoxone
  * Ferxone
  * Foredex 75
  * Hedonal
  * Hedonal (the herbicide)
  * Herbidal
  * Hivol-44
  * Ipaner
  * Kwasu 2,4-dwuchlorofenoksyoctowego
  * Kwas 2,4-dwuchlorofenoksyoctowy
  * Kyselina 2,4-dichlorfenoxyoctova
  * Lawn-keep
  * Macrondray
  * Miracle
  * Monosan
  * Moxone
  * Netagrone
  * Netagrone 600
  * NSC 423
  * Pennamine
  * Pennamine D
  * Phenox
  * Pielik
  * Plantgard
  * RCRA waste number U240
  * Rhodia
  * Spritz-hormin/2,4-D
  * Spritz-hormit/2,4-D
  * Superormone concentre
  * U-5043
  * U 46DP
  * Vergemaster
  * Verton
  * Verton D
  * Verton 2D
  * Vidon 638
  * Weed-Ag-Bar
  * Weedar-64
  * Weedatul
  * Weedez Wonder BAR
  * Weedone LV4
  * Weed-rhap
  * Weed TOX
  * Weedtrol

                    *** HEALTH HAZARD DATA ***

                   ** SKIN/EYE IRRITATION DATA **

TYPE OF TEST            : Standard Draize test
ROUTE OF EXPOSURE       : Administration onto the skin
SPECIES OBSERVED        : Rodent - rabbit
```

FIGURE 10. 2,4-D ON CCINFO/DISC (continued)

```
DOSE/DURATION            : 500 mg/24H
REACTION SEVERITY        : Mild
REFERENCE :
   28ZPAK "Sbornik Vysledku Toxixologickeho Vysetreni Latek A Pripravku," Marhold,
   J.V., Institut Pro Vychovu Vedoucicn Pracovniku Chemickeho Prumyclu Praha,
   Czechoslovakia, 1972  Volume(issue)/page/year: -,279,72

TYPE OF TEST             : Standard Draize test
ROUTE OF EXPOSURE        : Administration into the eye
SPECIES OBSERVED         : Rodent - rabbit
DOSE/DURATION            : 750 ug/24H
REACTION SEVERITY        : Severe
REFERENCE :
   28ZPAK "Sbornik Vysledku Toxixologickeho Vysetreni Latek A Pripravku," Marhold,
   J.V., Institut Pro Vychovu Vedoucicn Pracovniku Chemickeho Prumyclu Praha,
   Czechoslovakia, 1972  Volume(issue)/page/year: -,279,72

                         ** ACUTE TOXICITY DATA **

TYPE OF TEST             : TDLo - Lowest published toxic dose
ROUTE OF EXPOSURE        : Oral
SPECIES OBSERVED         : Human - man
DOSE/DURATION            : 2 gm/kg
TOXIC EFFECTS :
   Behavioral - coma
   Lungs, Thorax, or Respiration - respiratory depression
REFERENCE :
   ARTODN Archives of Toxicology.  (Springer-Verlag, Heidelberger Pl. 3, D-1000
   Berlin 33, Fed. Rep. Ger.)  V.32-    1974-  Volume(issue)/page/year: 66,518,92

TYPE OF TEST             : TDLo - Lowest published toxic dose
ROUTE OF EXPOSURE        : Oral
SPECIES OBSERVED         : Human - man
DOSE/DURATION            : 5714 mg/kg
TOXIC EFFECTS :
   Behavioral - coma
   Cardiac - change in rate
   Lungs, Thorax, or Respiration - respiratory depression
REFERENCE :
   ARTODN Archives of Toxicology.  (Springer-Verlag, Heidelberger Pl. 3, D-1000
   Berlin 33, Fed. Rep. Ger.)  V.32-    1974-  Volume(issue)/page/year: 66,518,92

TYPE OF TEST             : LDLo - Lowest published lethal dose
ROUTE OF EXPOSURE        : Oral
SPECIES OBSERVED         : Human
DOSE/DURATION            : 80 mg/kg
TOXIC EFFECTS :
   Gastrointestinal - nausea or vomiting
   Behavioral - coma
   Behavioral - somnolence (general depressed activity)
REFERENCE :
   ARPAAQ Archives of Pathology.  (Chicago, IL)  V.5(3)-50(3), 1928-50; V.70-99,
   1960-75.  For publisher information, see APLMAS. Volume(issue)/page/year:
   94,270,72

TYPE OF TEST             : LDLo - Lowest published lethal dose
ROUTE OF EXPOSURE        : Oral
SPECIES OBSERVED         : Human - man
```

FIGURE 10. _2,4-D ON CCINFO/DISC (continued)

```
DOSE/DURATION          : 93 mg/kg
TOXIC EFFECTS :
   Behavioral - convulsions or effect on seizure threshold
REFERENCE :
   PAREAQ Pharmacological Reviews.  (Williams & Wilkins, 428 E. Preston St.,
   Baltimore, MD 21202) V.1-    1949-  Volume(issue)/page/year: 14,225,62

TYPE OF TEST           : LD50 - Lethal dose, 50 percent kill
ROUTE OF EXPOSURE      : Oral
SPECIES OBSERVED       : Rodent - rat
DOSE/DURATION          : 375 mg/kg
TOXIC EFFECTS :
   Details of toxic effects not reported other than lethal dose value
REFERENCE :
   FMCHA2 Farm Chemicals Handbook.  (Meister Pub., 37841 Euclid Ave., Willoughy,
   OH 44094)  Volume(issue)/page/year: -,C174,91

TYPE OF TEST           : LD50 - Lethal dose, 50 percent kill
ROUTE OF EXPOSURE      : Administration onto the skin
SPECIES OBSERVED       : Rodent - rat
DOSE/DURATION          : 1500 mg/kg
TOXIC EFFECTS :
   Details of toxic effects not reported other than lethal dose value
REFERENCE :
   WRPCA2 World Review of Pest Control.  (London, UK)  V.1-10, 1962-71.
   Discontinued.  Volume(issue)/page/year: 9,119,70

TYPE OF TEST           : LD50 - Lethal dose, 50 percent kill
ROUTE OF EXPOSURE      : Intraperitoneal
SPECIES OBSERVED       : Rodent - rat
DOSE/DURATION          : 666 mg/kg
TOXIC EFFECTS :
   Peripheral Nerve and Sensation - spastic paralysis with or without sensory
   change
   Behavioral - muscle weakness
   Behavioral - coma
REFERENCE :
   JIHTAB Journal of Industrial Hygiene and Toxicology.  (Cambridge, MA) V.18-31,
   1936-49.  For publisher information, see AEHLAU. Volume(issue)/page/year:
   29,85,47

TYPE OF TEST           : LD50 - Lethal dose, 50 percent kill
ROUTE OF EXPOSURE      : Oral
SPECIES OBSERVED       : Rodent - mouse
DOSE/DURATION          : 347 mg/kg
TOXIC EFFECTS :
   Details of toxic effects not reported other than lethal dose value
REFERENCE :
   RPZHAW Roczniki Panstwowego Zakladu Higieny.  (Ars Polona, POB 1001, 00-068
   Warsaw 1, Poland) V.1-    1950-  Volume(issue)/page/year: 31,373,80

TYPE OF TEST           : LDLo - Lowest published lethal dose
ROUTE OF EXPOSURE      : Intraperitoneal
SPECIES OBSERVED       : Rodent - mouse
DOSE/DURATION          : 125 mg/kg
TOXIC EFFECTS :
   Details of toxic effects not reported other than lethal dose value
REFERENCE :
```

TXAPA9 Toxicology and Applied Pharmacology. (Academic Press, Inc., 1 E. First St., Duluth, MN 55802) V.1- 1959- Volume(issue)/page/year: 23,288,72

TYPE OF TEST : LD50 - Lethal dose, 50 percent kill
ROUTE OF EXPOSURE : Oral
SPECIES OBSERVED : Mammal - dog
DOSE/DURATION : 100 mg/kg
TOXIC EFFECTS :
Behavioral - stiffness
Behavioral - coma
REFERENCE :
AEHLAU Archives of Environmental Health. (Heldref Pub., 4000 Albemarle St., NW, Washington, DC 20016) V.1- 1960- Volume(issue)/page/year: 7,202,63

TYPE OF TEST : LDLo - Lowest published lethal dose
ROUTE OF EXPOSURE : Oral
SPECIES OBSERVED : Rodent - rabbit
DOSE/DURATION : 800 mg/kg
TOXIC EFFECTS :
Details of toxic effects not reported other than lethal dose value
REFERENCE :
AMPMAR Archives des Maladies Professionnelles de Medecine du Travail et de Securite Sociale. (SPPIF, B.P.22, F-41353 Vineuil, France) V.7- 1946- Volume(issue)/page/year: 12,26,51

TYPE OF TEST : LD50 - Lethal dose, 50 percent kill
ROUTE OF EXPOSURE : Administration onto the skin
SPECIES OBSERVED : Rodent - rabbit
DOSE/DURATION : 1400 mg/kg
TOXIC EFFECTS :
Behavioral - ataxia
Skin and Appendages - primary irritation (after topical exposure)
REFERENCE :
AFDOAQ Quarterly Bulletin--Association of Food and Drug Officials of the United States. (Denver, CO) V.3-38, 1939-74. Volume(issue)/page/year: 16,3,52

TYPE OF TEST : LD50 - Lethal dose, 50 percent kill
ROUTE OF EXPOSURE : Intraperitoneal
SPECIES OBSERVED : Rodent - rabbit
DOSE/DURATION : 400 mg/kg
TOXIC EFFECTS :
Peripheral Nerve and Sensation - spastic paralysis with or without sensory change
Behavioral - muscle weakness
Behavioral - coma
REFERENCE :
JIHTAB Journal of Industrial Hygiene and Toxicology. (Cambridge, MA) V.18-31, 1936-49. For publisher information, see AEHLAU. Volume(issue)/page/year: 29,85,47

TYPE OF TEST : LD50 - Lethal dose, 50 percent kill
ROUTE OF EXPOSURE : Intravenous
SPECIES OBSERVED : Rodent - rabbit
DOSE/DURATION : 400 mg/kg
TOXIC EFFECTS :
Peripheral Nerve and Sensation - spastic paralysis with or without sensory change
Behavioral - muscle weakness

```
   Behavioral - coma
REFERENCE :
   JIHTAB Journal of Industrial Hygiene and Toxicology. (Cambridge, MA) V.18-31,
   1936-49. For publisher information, see AEHLAU. Volume(issue)/page/year:
   29,85,47

TYPE OF TEST            : LD50 - Lethal dose, 50 percent kill
ROUTE OF EXPOSURE       : Oral
SPECIES OBSERVED        : Rodent - guinea pig
DOSE/DURATION           : 469 mg/kg
TOXIC EFFECTS :
   Details of toxic effects not reported other than lethal dose value
REFERENCE :
   AJVRAH American Journal of Veterinary Research. (American Veterinary Medical
   Assoc., 930 N. Meacham Rd., Schaumburg, IL 60196) V.1-    1940-
   Volume(issue)/page/year: 15,622,54

TYPE OF TEST            : LD50 - Lethal dose, 50 percent kill
ROUTE OF EXPOSURE       : Intraperitoneal
SPECIES OBSERVED        : Rodent - guinea pig
DOSE/DURATION           : 666 mg/kg
TOXIC EFFECTS :
   Peripheral Nerve and Sensation - spastic paralysis with or without sensory
   change
   Behavioral - muscle weakness
   Behavioral - coma
REFERENCE :
   JIHTAB Journal of Industrial Hygiene and Toxicology. (Cambridge, MA) V.18-31,
   1936-49. For publisher information, see AEHLAU. Volume(issue)/page/year:
   29,85,47

TYPE OF TEST            : LD50 - Lethal dose, 50 percent kill
ROUTE OF EXPOSURE       : Oral
SPECIES OBSERVED        : Rodent - hamster
DOSE/DURATION           : 500 mg/kg
TOXIC EFFECTS :
   Details of toxic effects not reported other than lethal dose value
REFERENCE :
   TXAPA9 Toxicology and Applied Pharmacology. (Academic Press, Inc., 1 E. First
   St., Duluth, MN 55802) V.1-    1959-  Volume(issue)/page/year: 48,A192,79

TYPE OF TEST            : LD50 - Lethal dose, 50 percent kill
ROUTE OF EXPOSURE       : Oral
SPECIES OBSERVED        : Bird - chicken
DOSE/DURATION           : 541 mg/kg
TOXIC EFFECTS :
   Gastrointestinal - gastritis
   Behavioral - somnolence (general depressed activity)
   Liver - fatty liver degeneration
REFERENCE :
   AJVRAH American Journal of Veterinary Research. (American Veterinary Medical
   Assoc., 930 N. Meacham Rd., Schaumburg, IL 60196) V.1-    1940-
   Volume(issue)/page/year: 15,622,54

TYPE OF TEST            : LD50 - Lethal dose, 50 percent kill
ROUTE OF EXPOSURE       : Oral
SPECIES OBSERVED        : Mammal - species unspecified
DOSE/DURATION           : 375 mg/kg
```

```
TOXIC EFFECTS :
   Details of toxic effects not reported other than lethal dose value
REFERENCE :
   SCIEAS Science. (American Assoc. for the Advancement of Science, 1333 H St.,
   NW, Washington, DC 20005) V.1-    1895-  Volume(issue)/page/year: 165,465,69

                ** OTHER MULTIPLE DOSE TOXICITY DATA **

TYPE OF TEST            : TDLo - Lowest published toxic dose
ROUTE OF EXPOSURE       : Oral
SPECIES OBSERVED        : Rodent - rat
DOSE/DURATION           : 13650 mg/kg/13W-C
TOXIC EFFECTS :
   Nutritional and Gross Metabolic - weight loss or decreased weight gain
REFERENCE :
   FAATDF Fundamental and Applied Toxicology. (Academic Press, Inc., 1 E. First
   St., Duluth, MN 55802) V.1-    1981-  Volume(issue)/page/year: 9,423,87

TYPE OF TEST            : TDLo - Lowest published toxic dose
ROUTE OF EXPOSURE       : Oral
SPECIES OBSERVED        : Rodent - rat
DOSE/DURATION           : 200 mg/kg/5W-I
TOXIC EFFECTS :
   Behavioral - muscle weakness
REFERENCE :
   NTOTDY Neurobehavioral Toxicology and Teratology. (Fayetteville, NY) V.3-8,
   1981-86. For publisher information, see NETEEC. Volume(issue)/page/year:
   5,331,83

TYPE OF TEST            : TDLo - Lowest published toxic dose
ROUTE OF EXPOSURE       : Oral
SPECIES OBSERVED        : Rodent - rat
DOSE/DURATION           : 54750 mg/kg/1Y-C
TOXIC EFFECTS :
   Sense Organs and Special Senses (Eye) - retinal changes (pigmentary
   depositions, retinitis, other)
   Behavioral - change in motor activity (specific assay)
REFERENCE :
   TOXID9 Toxicologist. (Soc. of Toxicology, Inc., 475 Wolf Ledge Parkway, Akron,
   OH 44311) V.1-    1981-  Volume(issue)/page/year: 15,23,95

TYPE OF TEST            : TDLo - Lowest published toxic dose
ROUTE OF EXPOSURE       : Oral
SPECIES OBSERVED        : Mammal - dog
DOSE/DURATION           : 700 mg/kg/90D-I
TOXIC EFFECTS :
   Blood - changes in other cell count (unspecified)
   Nutritional and Gross Metabolic - weight loss or decreased weight gain
   Reproductive - Tumorigenic effects - other reproductive system tumors
REFERENCE :
   AMIHBC AMA Archives of Industrial Hygiene and Occupational Medicine. (Chicago,
   IL) V.2-10, 1950-54. For publisher information, see AEHLAU.
   Volume(issue)/page/year: 7,61,53

TYPE OF TEST            : TDLo - Lowest published toxic dose
ROUTE OF EXPOSURE       : Oral
SPECIES OBSERVED        : Mammal - dog
DOSE/DURATION           : 1820 mg/kg/52W-C
```

FIGURE 10. 2,4-D ON CCINFO/DISC (continued)

```
TOXIC EFFECTS :
   Kidney, Ureter, Bladder - changes in tubules (including acute renal failure,
   acute tubular necrosis)
   Liver - other changes
   Blood - changes in serum composition (TP, bilirubin, cholesterol)
REFERENCE :
   FAATDF Fundamental and Applied Toxicology.  (Academic Press, Inc., 1 E. First
   St., Duluth, MN 55802) V.1-    1981-  Volume(issue)/page/year: 29,78,96

TYPE OF TEST              : TDLo - Lowest published toxic dose
ROUTE OF EXPOSURE         : Intravenous
SPECIES OBSERVED          : Mammal - dog
DOSE/DURATION             : 300 mg/kg/6D-I
TOXIC EFFECTS :
   Musculoskeletal - changes in teeth and supporting structures
   Skin and Appendages - dermatitis, other (after systemic exposure)
   Reproductive - Tumorigenic effects - other reproductive system tumors
REFERENCE :
   JIHTAB Journal of Industrial Hygiene and Toxicology.  (Cambridge, MA) V.18-31,
   1936-49.  For publisher information, see AEHLAU. Volume(issue)/page/year:
   29,85,47

                          ** REPRODUCTIVE DATA **

TYPE OF TEST              : TDLo - Lowest published toxic dose
ROUTE OF EXPOSURE         : Oral
SPECIES OBSERVED          : Rodent - rat
DOSE                      : 220 ug/kg
SEX/DURATION              : female 1-22 day(s) after conception
TOXIC EFFECTS :
   Reproductive - Specific Developmental Abnormalities - blood and lymphatic
   systems (including spleen and marrow)
REFERENCE :
   GISAAA Gigiena i Sanitariya.  For English translation, see HYSAAV.  (V/O
   Mezhdunarodnaya Kniga, 113095 Moscow, USSR)  V.1-    1936-
   Volume(issue)/page/year: 50(10),76,85

TYPE OF TEST              : TDLo - Lowest published toxic dose
ROUTE OF EXPOSURE         : Oral
SPECIES OBSERVED          : Rodent - rat
DOSE                      : 1 gm/kg
SEX/DURATION              : female 6-15 day(s) after conception
TOXIC EFFECTS :
   Reproductive - Specific Developmental Abnormalities - musculoskeletal system
   Reproductive - Effects on Embryo or Fetus - fetotoxicity (except death, e.g.,
   stunted fetus)
   Reproductive - Effects on Embryo or Fetus - fetal death
REFERENCE :
   TXAPA9 Toxicology and Applied Pharmacology.  (Academic Press, Inc., 1 E. First
   St., Duluth, MN 55802) V.1-    1959-  Volume(issue)/page/year: 22,14,72

TYPE OF TEST              : TDLo - Lowest published toxic dose
ROUTE OF EXPOSURE         : Oral
SPECIES OBSERVED          : Rodent - rat
DOSE                      : 125 mg/kg
SEX/DURATION              : female 6-15 day(s) after conception
TOXIC EFFECTS :
   Reproductive - Specific Developmental Abnormalities - musculoskeletal system
```

FIGURE 10. 2,4-D ON CCINFO/DISC (continued)

```
REFERENCE :
   FCTXAV Food and Cosmetics Toxicology. (London, UK) V.1-19, 1963-81. For
   publisher information, see FCTOD7. Volume(issue)/page/year: 9,801,71

TYPE OF TEST            : TDLo - Lowest published toxic dose
ROUTE OF EXPOSURE       : Oral
SPECIES OBSERVED        : Rodent - rat
DOSE                    : 500 mg/kg
SEX/DURATION            : female 6-15 day(s) after conception
TOXIC EFFECTS :
   Reproductive - Effects on Embryo or Fetus - fetotoxicity (except death, e.g.,
   stunted fetus)
   Reproductive - Specific Developmental Abnormalities - Central Nervous System
   Reproductive - Specific Developmental Abnormalities - urogenital system
REFERENCE :
   FCTXAV Food and Cosmetics Toxicology. (London, UK) V.1-19, 1963-81. For
   publisher information, see FCTOD7. Volume(issue)/page/year: 9,801,71

TYPE OF TEST            : TDLo - Lowest published toxic dose
ROUTE OF EXPOSURE       : Oral
SPECIES OBSERVED        : Rodent - rat
DOSE                    : 500 mg/kg
SEX/DURATION            : female 6-15 day(s) after conception
TOXIC EFFECTS :
   Reproductive - Specific Developmental Abnormalities - homeostasis
   Reproductive - Effects on Newborn - growth statistics (e.g.%, reduced weight
   gain)
REFERENCE :
   FCTXAV Food and Cosmetics Toxicology. (London, UK) V.1-19, 1963-81. For
   publisher information, see FCTOD7. Volume(issue)/page/year: 9,801,71

TYPE OF TEST            : TDLo - Lowest published toxic dose
ROUTE OF EXPOSURE       : Oral
SPECIES OBSERVED        : Rodent - mouse
DOSE                    : 707 mg/kg
SEX/DURATION            : female 11-14 day(s) after conception
TOXIC EFFECTS :
   Reproductive - Effects on Embryo or Fetus - fetotoxicity (except death, e.g.,
   stunted fetus)
   Reproductive - Effects on Embryo or Fetus - fetal death
   Reproductive - Specific Developmental Abnormalities - craniofacial (including
   nose and tongue)
REFERENCE :
   AECTCV Archives of Environmental Contamination and Toxicology. (Springer-Verlag
   New York, Inc., Service Center, 44 Hartz Way, Secaucus, NJ 070944) V.1-
   1973- Volume(issue)/page/year: 6,33,77

TYPE OF TEST            : TDLo - Lowest published toxic dose
ROUTE OF EXPOSURE       : Oral
SPECIES OBSERVED        : Rodent - mouse
DOSE                    : 900 mg/kg
SEX/DURATION            : female 6-14 day(s) after conception
TOXIC EFFECTS :
   Reproductive - Fertility - litter size (e.g. # fetuses per litter; measured
   before birth)
   Reproductive - Effects on Embryo or Fetus - extra-embryonic structures (e.g.,
   placenta, umbilical cord)
   Reproductive - Specific Developmental Abnormalities - eye/ear
```

FIGURE 10. 2,4-D ON CCINFO/DISC (continued)

```
REFERENCE :
   NTIS** National Technical Information Service.  (Springfield, VA 22161)
   Formerly U.S. Clearinghouse for Scientific & Technical Information.
   Volume(issue)/page/year: PB223-160

TYPE OF TEST              : TDLo - Lowest published toxic dose
ROUTE OF EXPOSURE         : Oral
SPECIES OBSERVED          : Rodent - mouse
DOSE                      : 438 mg/kg
SEX/DURATION              : female 8-12 day(s) after conception
TOXIC EFFECTS :
   Reproductive - Effects on Newborn - growth statistics (e.g.%, reduced weight
   gain)
REFERENCE :
   TCMUD8 Teratogenesis, Carcinogenesis, and Mutagenesis.  (Alan R. Liss, Inc., 41
   E. 11th St., New York, NY 10003)  V.1-    1980- Volume(issue)/page/year: 7,7,87

TYPE OF TEST              : TDLo - Lowest published toxic dose
ROUTE OF EXPOSURE         : Subcutaneous
SPECIES OBSERVED          : Rodent - mouse
DOSE                      : 882 mg/kg
SEX/DURATION              : female 6-14 day(s) after conception
TOXIC EFFECTS :
   Reproductive - Effects on Embryo or Fetus - fetal death
   Reproductive - Specific Developmental Abnormalities - Central Nervous System
   Reproductive - Effects on Embryo or Fetus - extra-embryonic structures (e.g.,
   placenta, umbilical cord)
REFERENCE :
   NTIS** National Technical Information Service.  (Springfield, VA 22161)
   Formerly U.S. Clearinghouse for Scientific & Technical Information.
   Volume(issue)/page/year: PB223-160

TYPE OF TEST              : TDLo - Lowest published toxic dose
ROUTE OF EXPOSURE         : Subcutaneous
SPECIES OBSERVED          : Rodent - mouse
DOSE                      : 900 mg/kg
SEX/DURATION              : female 6-14 day(s) after conception
TOXIC EFFECTS :
   Reproductive - Effects on Embryo or Fetus - fetotoxicity (except death, e.g.,
   stunted fetus)
   Reproductive - Specific Developmental Abnormalities - eye/ear
   Reproductive - Specific Developmental Abnormalities - craniofacial (including
   nose and tongue)
REFERENCE :
   NTIS** National Technical Information Service.  (Springfield, VA 22161)
   Formerly U.S. Clearinghouse for Scientific & Technical Information.
   Volume(issue)/page/year: PB223-160

TYPE OF TEST              : TDLo - Lowest published toxic dose
ROUTE OF EXPOSURE         : Subcutaneous
SPECIES OBSERVED          : Rodent - mouse
DOSE                      : 900 mg/kg
SEX/DURATION              : female 6-14 day(s) after conception
TOXIC EFFECTS :
   Reproductive - Fertility - pre-implantation mortality (e.g. reduction in number
   of implants per female; total number of implants per corpora lutea)
   Reproductive - Fertility - litter size (e.g. # fetuses per litter; measured
   before birth)
```

FIGURE 10. 2,4-D ON CCINFO/DISC (continued)

```
REFERENCE :
   NTIS** National Technical Information Service.  (Springfield, VA 22161)
   Formerly U.S. Clearinghouse for Scientific & Technical Information.
   Volume(issue)/page/year: PB223-160

TYPE OF TEST            : TDLo - Lowest published toxic dose
ROUTE OF EXPOSURE       : Oral
SPECIES OBSERVED        : Rodent - hamster
DOSE                    : 200 mg/kg
SEX/DURATION            : female 7-11 day(s) after conception
TOXIC EFFECTS :
   Reproductive - Fertility - litter size (e.g. # fetuses per litter; measured
   before birth)
REFERENCE :
   BECTA6 Bulletin of Environmental Contamination and Toxicology. (Springer-Verlag
   New York, Inc., Service Center, 44 Hartz Way, Secaucus, NJ 07094)  V.1-
   1966-  Volume(issue)/page/year: 6,559,71

                          ** MUTATION DATA **

TYPE OF TEST            : Mutation in microorganisms
TEST SYSTEM             : Bacteria - Salmonella typhimurium
DOSE/DURATION           : 250 ug/plate
REFERENCE :
   MUREAV Mutation Research.  (Elsevier Science Pub. B.V., POB 211, 1000 AE
   Amsterdam, Netherlands) V.1-    1964-  Volume(issue)/page/year: 204,615,88

TYPE OF TEST            : DNA repair
TEST SYSTEM             : Bacteria - Escherichia coli
DOSE/DURATION           : 5 mg/disc
REFERENCE :
   NTIS** National Technical Information Service.  (Springfield, VA 22161)
   Formerly U.S. Clearinghouse for Scientific & Technical Information.
   Volume(issue)/page/year: PB80-133226

TYPE OF TEST            : DNA adduct
TEST SYSTEM             : Bacteria - Escherichia coli
DOSE/DURATION           : 20 umol/L
REFERENCE :
   MUREAV Mutation Research.  (Elsevier Science Pub. B.V., POB 211, 1000 AE
   Amsterdam, Netherlands) V.1-    1964-  Volume(issue)/page/year: 89,95,81

TYPE OF TEST            : DNA repair
TEST SYSTEM             : Bacteria - Bacillus subtilis
DOSE/DURATION           : 5 mg/disc
REFERENCE :
   NTIS** National Technical Information Service.  (Springfield, VA 22161)
   Formerly U.S. Clearinghouse for Scientific & Technical Information.
   Volume(issue)/page/year: PB80-133226

TYPE OF TEST            : Mutation in microorganisms
TEST SYSTEM             : Microorganism - not otherwise specified
DOSE/DURATION           : 1 gm/L
REFERENCE :
   MILEDM Microbios Letters.  (Faculty Press, 88 Regent St., Cambridge, UK) V.1-
    1976-  Volume(issue)/page/year: 5,103,77

TYPE OF TEST            : Mutation in microorganisms
```

FIGURE 10. 2,4-D ON CCINFO/DISC (continued)

```
TEST SYSTEM                : Microorganism - not otherwise specified
DOSE/DURATION              : 1 gm/L
REFERENCE :
   MILEDM Microbios Letters.  (Faculty Press, 88 Regent St., Cambridge, UK) V.1-
    1976-  Volume(issue)/page/year: 5,103,77

TYPE OF TEST               : Mutation in microorganisms
TEST SYSTEM                : Microorganism - not otherwise specified
DOSE/DURATION              : 1 gm/L
REFERENCE :
   MILEDM Microbios Letters.  (Faculty Press, 88 Regent St., Cambridge, UK) V.1-
    1976-  Volume(issue)/page/year: 5,103,77

TYPE OF TEST               : Mutation in microorganisms
TEST SYSTEM                : Microorganism - not otherwise specified
DOSE/DURATION              : 1 gm/L
REFERENCE :
   MILEDM Microbios Letters.  (Faculty Press, 88 Regent St., Cambridge, UK) V.1-
    1976-  Volume(issue)/page/year: 5,103,77

TYPE OF TEST               : Specific locus test
ROUTE OF EXPOSURE          : Oral
TEST SYSTEM                : Insect - Drosophila melanogaster
DOSE/DURATION              : 5 mmol/L
REFERENCE :
   MUREAV Mutation Research.  (Elsevier Science Pub. B.V., POB 211, 1000 AE
   Amsterdam, Netherlands) V.1-    1964-  Volume(issue)/page/year: 319,237,93

TYPE OF TEST               : Specific locus test
ROUTE OF EXPOSURE          : Multiple routes
TEST SYSTEM                : Insect - Drosophila melanogaster
DOSE/DURATION              : 10 ppb
REFERENCE :
   EMMUEG Environmental and Molecular Mutagenesis.  (Alan R. Liss, Inc., 41 E.
   11th St., New York, NY 10003)  V.10-    1987-  Volume(issue)/page/year:
   25,148,95

TYPE OF TEST               : Sex chromosome loss and nondisjunction
ROUTE OF EXPOSURE          : Oral
TEST SYSTEM                : Insect - Drosophila melanogaster
DOSE/DURATION              : 25 ppm
REFERENCE :
   ECBUDQ Ecological Bulletins.  (Editorial Service of FRN, Box 6710, S-11385,
   Stockholm, Sweden) No.19-    1975-  Volume(issue)/page/year: 27,190,78

TYPE OF TEST               : Sex chromosome loss and nondisjunction
ROUTE OF EXPOSURE          : Unreported
TEST SYSTEM                : Insect - Drosophila melanogaster
DOSE/DURATION              : 1000 ppm/15D
REFERENCE :
   ECBUDQ Ecological Bulletins.  (Editorial Service of FRN, Box 6710, S-11385,
   Stockholm, Sweden) No.19-    1975-  Volume(issue)/page/year: 27,182,78

TYPE OF TEST               : Mutation in microorganisms
TEST SYSTEM                : Yeast - Saccharomyces cerevisiae
DOSE/DURATION              : 150 mg/L
REFERENCE :
   ECBUDQ Ecological Bulletins.  (Editorial Service of FRN, Box 6710, S-11385,
```

Stockholm, Sweden) No.19- 1975- Volume(issue)/page/year: 27,193,78

TYPE OF TEST : Gene conversion and mitotic recombination
TEST SYSTEM : Mold - Aspergillus nidulans
DOSE/DURATION : 4 umol/L
REFERENCE :
MUREAV Mutation Research. (Elsevier Science Pub. B.V., POB 211, 1000 AE Amsterdam, Netherlands) V.1- 1964- Volume(issue)/page/year: 204,615,88

TYPE OF TEST : DNA damage
TEST SYSTEM : Fish - salmon Sperm
DOSE/DURATION : 1 mmol/L
REFERENCE :
PYTCAS Phytochemistry. An International Journal of Plant Biochemistry. (Pergamon Press Inc., Maxwell House, Fairview Park, Elmsford, NY 10523) V.1- 1961- Volume(issue)/page/year: 11,3135,72

TYPE OF TEST : Unscheduled DNA synthesis
TEST SYSTEM : Human Fibroblast
DOSE/DURATION : 1 umol/L
REFERENCE :
MUREAV Mutation Research. (Elsevier Science Pub. B.V., POB 211, 1000 AE Amsterdam, Netherlands) V.1- 1964- Volume(issue)/page/year: 42,161,77

TYPE OF TEST : Cytogenetic analysis
TEST SYSTEM : Human Lymphocyte
DOSE/DURATION : 20 ug/L
REFERENCE :
CYGEDX Cytology and Genetics (English Translation). Translation of TGANAK. (Allerton Press Inc., 150 Fifth Ave., New York, NY 10011) V.8- 1974- Volume(issue)/page/year: 8(3),6,74

TYPE OF TEST : Sister chromatid exchange
TEST SYSTEM : Human Lymphocyte
DOSE/DURATION : 10 mg/L
REFERENCE :
JOHEA8 Journal of Heredity. (American Genetic Assoc., 818 18th St., NW, Washington, DC 20006) V.5- 1914- Volume(issue)/page/year: 73,224,82

TYPE OF TEST : Cytogenetic analysis
ROUTE OF EXPOSURE : Intraperitoneal
TEST SYSTEM : Rodent - rat
DOSE/DURATION : 100 ug/kg
REFERENCE :
CYTOAN Cytologia. (Japan Pub. Trading Co. (USA), 1255 Howard St., San Francisco, CA 94103) V.1- 1929- Volume(issue)/page/year: 52,275,87

TYPE OF TEST : DNA inhibition
ROUTE OF EXPOSURE : Oral
TEST SYSTEM : Rodent - mouse
DOSE/DURATION : 200 mg/kg
REFERENCE :
MUREAV Mutation Research. (Elsevier Science Pub. B.V., POB 211, 1000 AE Amsterdam, Netherlands) V.1- 1964- Volume(issue)/page/year: 55,197,78

TYPE OF TEST : Cytogenetic analysis
ROUTE OF EXPOSURE : Oral
TEST SYSTEM : Rodent - mouse

```
DOSE/DURATION            : 100 mg/kg
REFERENCE :
   CYGEDX Cytology and Genetics (English Translation). Translation of TGANAK.
   (Allerton Press Inc., 150 Fifth Ave., New York, NY 10011) V.8-    1974-
   Volume(issue)/page/year: 8(3),6,74

TYPE OF TEST             : DNA inhibition
TEST SYSTEM              : Rodent - hamster Ovary
DOSE/DURATION            : 1 mmol/L
REFERENCE :
   TOLED5 Toxicology Letters. (Elsevier Science Pub. B.V., POB 211, 1000 AE
   Amsterdam, Netherlands) V.1-    1977- Volume(issue)/page/year: 29,137,85

TYPE OF TEST             : Cytogenetic analysis
TEST SYSTEM              : Rodent - hamster Ovary
DOSE/DURATION            : 2400 mg/L
REFERENCE :
   EMMUEG Environmental and Molecular Mutagenesis. (Alan R. Liss, Inc., 41 E.
   11th St., New York, NY 10003) V.10-    1987- Volume(issue)/page/year:
   10(Suppl 10),1,87

TYPE OF TEST             : Sister chromatid exchange
TEST SYSTEM              : Rodent - hamster Ovary
DOSE/DURATION            : 167 mg/L
REFERENCE :
   EMMUEG Environmental and Molecular Mutagenesis. (Alan R. Liss, Inc., 41 E.
   11th St., New York, NY 10003) V.10-    1987- Volume(issue)/page/year:
   10(Suppl 10),1,87

TYPE OF TEST             : Mutation in mammalian somatic cells
TEST SYSTEM              : Rodent - hamster Lung
DOSE/DURATION            : 10 umol/L
REFERENCE :
   CBINA8 Chemico-Biological Interactions. (Elsevier Scientific Pub. Ireland
   Ltd., POB 85, Limerick, Ireland) V.1-    1969- Volume(issue)/page/year:
   19,369,77

TYPE OF TEST             : Cytogenetic analysis
TEST SYSTEM              : Mammal - cattle Kidney
DOSE/DURATION            : 1 ppm
REFERENCE :
   ITCSAF In Vitro. (Rockville, MD) V.1-20, 1965-85. For publisher information,
   see ICDBEO. Volume(issue)/page/year: 8,416,73

TYPE OF TEST             : DNA damage
TEST SYSTEM              : Mammal - species unspecified Lymphocyte
DOSE/DURATION            : 1 mmol/L
REFERENCE :
   PYTCAS Phytochemistry. An International Journal of Plant Biochemistry.
   (Pergamon Press Inc., Maxwell House, Fairview Park, Elmsford, NY 10523) V.1-
   1961- Volume(issue)/page/year: 11,3135,72

                          *** REVIEWS ***

   ACGIH TLV-TWA 10 mg/m3
      85INA8 "Documentation of the Threshold Limit Values and Biological Exposure
   Indices," 5th ed., Cincinnati, OH, American Conference of Governmental
   Industrial Hygienists, Inc., 1986 Volume(issue)/page/year: 6,375,91
```

FIGURE 10. 2,4-D ON CCINFO/DISC (continued)

IARC Cancer Review:Human Limited Evidence
IMEMDT IARC Monographs on the Evaluation of Carcinogenic Risk of Chemicals to Man. (WHO Publications Centre USA, 49 Sheridan Ave., Albany, NY 12210) V.1-1972- Volume(issue)/page/year: 41,357,86

IARC Cancer Review:Animal Inadequate Evidence
IMEMDT IARC Monographs on the Evaluation of Carcinogenic Risk of Chemicals to Man. (WHO Publications Centre USA, 49 Sheridan Ave., Albany, NY 12210) V.1-1972- Volume(issue)/page/year: 15,111,77

TOXICOLOGY REVIEW
RREVAH Residue Reviews. (Springer-Verlag New York, Inc., Service Center, 44 Hartz Way, Secaucus, NJ 07094) V.1- 1962- Volume(issue)/page/year: 59,1,75

TOXICOLOGY REVIEW
DTTIAF Deutsche Tieraerztliche Wochenschrift. (Hanover, Fed. Rep. Ger.) V.1-77, 1893-1970. Volume(issue)/page/year: 80,485,73

TOXICOLOGY REVIEW
RREVAH Residue Reviews. (Springer-Verlag New York, Inc., Service Center, 44 Hartz Way, Secaucus, NJ 07094) V.1- 1962- Volume(issue)/page/year: 56,107,75

TOXICOLOGY REVIEW
ECMAAI Economie et Medecine Animales. (Paris, France) V.1-17, 1960-76. Discontinued. Volume(issue)/page/year: 14,141,73

TOXICOLOGY REVIEW
BIOGAL Biologico. (Instituto Biologica, Av. Cons. Rodriques Alves, 1252, CEP 04014, Sao Paulo, Brazil) V.1- 1935- Volume(issue)/page/year: 40(2),44,74

TOXICOLOGY REVIEW
HYSAAV Hygiene and Sanitation (USSR). English translation of GISAAA. (Springfield, VA) 1964-71. Discontinued. Volume(issue)/page/year: 31(7-9),383,66

*** U.S. STANDARDS AND REGULATIONS ***

EPA FIFRA 1988 PESTICIDE SUBJECT TO REGISTRATION OR RE-REGISTRATION
FEREAC Federal Register. (U.S. Government Printing Office, Supt. of Documents, Washington, DC 20402) V.1- 1936- Volume(issue)/page/year: 54,7740,89

MSHA STANDARD-air:TWA 10 mg/m3
DTLVS* "Documentation of Threshold Limit Values for Substances in Workroom Air." For publisher information, see 85INA8. Volume(issue)/page/year: 3,67,71

OSHA PEL (Gen Indu):8H TWA 10 mg/m3
CFRGBR Code of Federal Regulations. (U.S. Government Printing Office, Supt. of Documents, Washington, DC 20402) Volume(issue)/page/year: 29,1910.1000,94

OSHA PEL (Construc):8H TWA 10 mg/m3
CFRGBR Code of Federal Regulations. (U.S. Government Printing Office, Supt. of Documents, Washington, DC 20402) Volume(issue)/page/year: 29,1926.55,94

OSHA PEL (Shipyard):8H TWA 10 mg/m3

FIGURE 10. 2,4-D ON CCINFO/DISC (continued)

```
   CFRGBR Code of Federal Regulations. (U.S. Government Printing Office, Supt.
of Documents, Washington, DC 20402) Volume(issue)/page/year: 29,1915.1000,93

OSHA PEL (Fed Cont):8H TWA 10 mg/m3
   CFRGBR Code of Federal Regulations. (U.S. Government Printing Office, Supt.
of Documents, Washington, DC 20402) Volume(issue)/page/year: 41,50-204.50,94

                *** OCCUPATIONAL EXPOSURE LIMITS ***

OEL-AUSTRALIA:TWA 10 mg/m3 JAN93

OEL-AUSTRIA:TWA 10 mg/m3 JAN93

OEL-BELGIUM:TWA 10 mg/m3 JAN93

OEL-DENMARK:TWA 5 mg/m3 JAN93

OEL-FINLAND:TWA 10 mg/m3;STEL 20 mg/m3;Skin JAN93

OEL-FRANCE:TWA 10 mg/m3 JAN93

AOEL-GERMANY:TWA 10 mg/m3 JAN93

OEL-HUNGARY:TWA 1 mg/m3;STEL 2 mg/m3;Skin JAN93

OEL-THE NETHERLANDS:TWA 10 mg/m3 JAN93

OEL-THE PHILIPPINES:TWA 10 mg/m3 JAN93

OEL-POLAND:TWA 7 mg/m3 JAN93

OEL-SWITZERLAND:TWA 10 mg/m3;STEL 50 mg/m3 JAN93

OEL-THAILAND:TWA 10 mg/m3 JAN93

OEL-TURKEY:TWA 10 mg/m3 JAN93

OEL-UNITED KINGDOM:TWA 10 mg/m3;STEL 20 mg/m3 JAN93

OEL IN BULGARIA, COLOMBIA, JORDAN, KOREA check ACGIH TLV

OEL IN NEW ZEALAND, SINGAPORE, VIETNAM check ACGIH TLV

      *** NIOSH STANDARDS DEVELOPMENT AND SURVEILLANCE DATA ***

NIOSH RECOMMENDED EXPOSURE LEVEL (REL) :
   NIOSH REL TO 2,4-D-air:10H TWA 10 mg/m3
REFERENCE :
   NIOSH* National Institute for Occupational Safety and Health, U.S. Dept. of
   Health, Education, and Welfare, Reports and Memoranda. Volume(issue)/page/year:
   DHHS #92-100,92

NIOSH OCCUPATIONAL EXPOSURE SURVEY DATA :
   NOHS - National Occupational Hazard Survey (1974)
     NOHS Hazard Code - 24270
       No. of Facilities: 1132 (estimated)
       No. of Industries: 6
       No. of Occupations: 8
```

FIGURE 10. 2,4-D ON CCINFO/DISC (continued)

```
    No. of Employees: 6266 (estimated)

NOES - National Occupational Exposure Survey (1983)
  NOES Hazard Code - 24270
    No. of Facilities: 94 (estimated)
    No. of Industries: 1
    No. of Occupations: 1
    No. of Employees: 471 (estimated)

                        *** STATUS IN U.S. ***

EPA GENETOX PROGRAM 1988, Positive: In vivo cytogenetics-nonhuman bone marrow

EPA GENETOX PROGRAM 1988, Positive: In vitro cytogenetics-human lymphocyte

EPA GENETOX PROGRAM 1988, Positive: B subtilis rec assay; E coli polA without
S9

EPA GENETOX PROGRAM 1988, Positive: V79 cell culture-gene mutation

EPA GENETOX PROGRAM 1988, Positive: S cerevisiae gene conversion

EPA GENETOX PROGRAM 1988, Negative: D melanogaster-whole sex chrom. loss

EPA GENETOX PROGRAM 1988, Negative: D melanogaster-nondisjunction

EPA GENETOX PROGRAM 1988, Negative: Histidine reversion-Ames test

EPA GENETOX PROGRAM 1988, Negative: D melanogaster Sex-linked lethal

EPA GENETOX PROGRAM 1988, Negative: In vitro UDS-human fibroblast; TRP
reversion

EPA GENETOX PROGRAM 1988, Negative: S cerevisiae-homozygosis

EPA GENETOX PROGRAM 1988, Inconclusive: Carcinogenicity-mouse/rat; Mammalian
micronucleus

EPA TSCA Section 8(b) CHEMICAL INVENTORY

EPA TSCA Section 8(d) unpublished health/safety studies

On EPA IRIS database

EPA TSCA TEST SUBMISSION (TSCATS) DATA BASE, JULY 1996

NIOSH Analytical Method, 1994: 2,4-D, 5001

NTP Carcinogenesis studies; on test (prechronic studies), May 1996

                        *** END OF RECORD ***
```

FIGURE 11. SILVERPLATTER

PC-SPIRS 3.30 RTECS (through October 1996)

1 of 1
Marked Record

AN: XU0175000
PN: Toluene, 2,4,6-trinitro-
RN: Current: 118-96-7
UD: 9610
MF: C7-H5-N3-O6
MW: 227.15
WL: WNR B1 CNW ENW
SY: Benzene, 2-methyl-1,3,5-trinitro-; Entsufon; 2-Methyl-1,3,5-trinitrobenzene; NCI-C56155; TNT; alpha-Tnt; TNT (OSHA); TNT, dry or wetted with <30% water, by weight (UN0209) (DOT); TNT-tolite (French); Tolit; Tolite; 2,4,6-Trinitrotolueen (Dutch); Trinitrotoluene; Trinitrotoluene (UN0209) (DOT); Trinitrotoluene, wetted with not <30% water, by weight (UN1356) (DOT); s-Trinitrotoluene; sym-Trinitrotoluene; 2,4,6-Trinitrotoluene (ACGIH:OSHA); s-Trinitrotoluol; sym-Trinitrotoluol; 2,4,6-Trinitrotoluol (German); Tritol; Triton; Trojnitrotoluen (Polish); Trotyl; Trotyl oil; UN0209 (DOT); UN1356 (DOT)
CC: Agricultural-Chemical-and-Pesticide (A); Tumorigen (C); Mutagen (M); Reproductive-Effector (T); Human-Data (P); Primary-Irritant (S)
ID:
skn-rbt 500 mg/24H MLD
National Technical Information Service. AD-B011-150 (NTIS**)
ME:
mmo-sat 10 ug/plate (+/-S9)
National Technical Information Service. AD-A080-146 (NTIS**);
bfa-rat/sat 50 mg/kg
Mutation Research. 262,167,91 (MUREAV);
msc-mus-lym 40 mg/L
Cancer Letters (Shannon, Ireland). 20,103,83 (CALEDQ)
RE:
T02 orl-rat TDLo: 5376 mg/kg (28D male)
Journal of Toxicology and Environmental Health. 9,565,82 (JTEHD6)
AT:
F08-J24-K30 orl-hmn LDLo: 28 gm/kg
"Toxicology of Drugs and Chemicals," Deichmann, W.B., New York, Academic Press, Inc., 1969 -,610,69 (34ZIAG);
F07-F11-F12 orl-rat LD50: 795 mg/kg
Journal of Toxicology and Environmental Health. 9,565,82 (JTEHD6);
F07-F11-F12 orl-mus LD50: 660 mg/kg
Journal of Toxicology and Environmental Health. 9,565,82 (JTEHD6);
J22-J24-R01 orl-cat LDLo: 1850 mg/kg
Special Report Series--Medical Research Council (United Kingdom). 58,32,21 (MRCSAB);
J22-J24-R01 scu-cat LDLo: 200 mg/kg
Special Report Series--Medical Research Council (United Kingdom). 58,32,21 (MRCSAB);
F12-K12-J24 orl-rbt LDLo: 500 mg/kg
Special Report Series--Medical Research Council (United Kingdom). 58,32,21 (MRCSAB);
F12-K12-J24 scu-rbt LDLo: 500 mg/kg
Special Report Series--Medical Research Council (United Kingdom). 58,32,21 (MRCSAB)

FIGURE 11. SILVERPLATTER (continued)

```
MD:
L30-P28-Z73 orl-rat TDLo: 7200 mg/kg/6W-I
   Toxicology Letters. 55,343,91 (TOLED5);
F15-P05-U01 orl-rat TDLo: 11375 mg/kg/13W-C
   Toxicology. 32,253,84 (TXCYAC);
L30-Y08-Y37 orl-rat TDLo: 3 gm/kg/30D-I
   Gigiena Truda i Professional'nye Zabolevaniya. 18(10),57,74 (GTPZAB);
L70-N73-P27 orl-mus TDLo: 11 mg/kg/13W-C
   Journal of Toxicology and Environmental Health. 9,565,82 (JTEHD6);
L70-P05-U01 orl-dog TDLo: 182 mg/kg/13W-C
   Journal of Toxicology and Environmental Health. 9,565,82 (JTEHD6);
L70-P05-P27 orl-dog TDLo: 1456 mg/kg/26W-I
   Toxicology. 63,233,90 (TXCYAC)
TR:
ACGIH TLV-TWA 0.5 mg/m3 (skin)
   "Documentation of the Threshold Limit Values and Biological
   Exposure Indices," 5th ed., Cincinnati, OH, American Conference
   of Governmental Industrial Hygienists, Inc., 1986
   6,1652,91 (85INA8);
IARC Cancer Review: Animal Inadequate Evidence
   IARC Monographs on the Evaluation of Carcinogenic Risk of
   Chemicals to Man. 65,449,96 (IMEMDT);
IARC Cancer Review: Human Inadequate Evidence
   IARC Monographs on the Evaluation of Carcinogenic Risk of
   Chemicals to Man. 65,449,96 (IMEMDT);
IARC Cancer Review: Group 3
   IARC Monographs on the Evaluation of Carcinogenic Risk of
   Chemicals to Man. 65,449,96 (IMEMDT);
TOXICOLOGY REVIEW
   National Technical Information Service. AD778-725 (NTIS**);
TOXICOLOGY REVIEW
   CRC Critical Reviews in Toxicology. 1(1),93,71 (CRTXB2);
TOXICOLOGY REVIEW
   Pharmacological Reviews. 4,1,52 (PAREAQ)
SR: DOT-HAZARD: EXPLOSIVE 1.1D; LABEL: EXPLOSIVE 1.1D (UN0209)
   Code of Federal Regulations. 49,172.101,92 (CFRGBR);
DOT-HAZARD: 4.1; LABEL: FLAMMABLE SOLID (UN1356)
   Code of Federal Regulations. 49,172.101,92 (CFRGBR);
MSHA STANDARD-air: TWA 0.2 ppm (0.5 mg/m3) (skin)
   "Documentation of Threshold Limit Values for Substances in
   Workroom Air."  For publisher information, see 85INA8.
   3,270,71 (DTLVS*);
OSHA PEL (Gen Indu): 8H TWA 1.50 mg/m3 (skin)
   Code of Federal Regulations. 29,1910.1000,94 (CFRGBR);
OSHA PEL (Construc): 8H TWA 1.50 mg/m3 (skin)
   Code of Federal Regulations. 29,1926.55,94 (CFRGBR);
OSHA PEL (Shipyard): 8H TWA 1.50 mg/m3 (skin)
   Code of Federal Regulations. 29,1915.1000,93 (CFRGBR);
OSHA PEL (Fed Cont): 8H TWA 1.50 mg/m3 (skin)
   Code of Federal Regulations. 41,50-204.50,94 (CFRGBR).
OEL-ARAB Republic of Egypt:TWA 0.5 mg/m3 JAN93.
OEL-AUSTRALIA:TWA 0.5 mg/m3;Skin JAN93.
OEL-BELGIUM:TWA 0.5 mg/m3;Skin JAN93.
OEL-DENMARK:STEL 0.5 mg/m3;Skin JAN93.
OEL-FINLAND:TWA 0.5 mg/m3;STEL 3 mg/m3;Skin JAN93.
OEL-FRANCE:TWA 0.5 mg/m3;Skin JAN93.
OEL-GERMANY:TWA 0.01 ppm (0.1 mg/m3);Skin;Carcinogen JAN93.
OEL-HUNGARY:TWA 0.3 mg/m3;STEL 0.5 mg/m3;Skin JAN93.
OEL-THE NETHERLANDS:TWA 0.5 mg/m3;Skin JAN93.
OEL-THE PHILIPPINES:TWA 1.5 mg/m3;Skin JAN93.
OEL-RUSSIA:TWA 0.1 mg/m3;STEL 0.5 mg/m3;Skin JAN93.
```

FIGURE 11. SILVERPLATTER (continued)

```
OEL-SWITZERLAND:TWA 0.01 ppm (0.1 mg/m3);STEL 0.02 ppm;Skin JAN93.
OEL-TURKEY:TWA 1.5 mg/m3;Skin JAN93.
OEL-UNITED KINGDOM:TWA 0.5 mg/m3;STEL 0.5 mg/m3 JAN93.
OEL IN BULGARIA, COLOMBIA, JORDAN, KOREA check ACGIH TLV.
OEL IN NEW ZEALAND, SINGAPORE, VIETNAM check ACGIH TLV
ND: NIOSH REL TO 2,4,6-TRINITROTOLUENE-air: 10H TWA 0.5 mg/m3 (Sk)
   National Institute for Occupational Safety and Health, U.
   DHHS #92-100,92 (NIOSH*);
NOES 1983: HZD 74550; NIS 2; TNF 10; NOS 1; TNE 31
SL: EPA GENETOX PROGRAM 1988, Positive: Histidine reversion-Ames test
EPA TSCA Section 8(b) CHEMICAL INVENTORY
EPA TSCA Section 8(d) unpublished health/safety studies
On EPA IRIS database
EPA TSCA TEST SUBMISSION (TSCATS) DATA BASE, OCTOBER 1996
OSHA ANALYTICAL METHOD #44
OD: Also in OHMTADS: 7217371 in acc
```

FIGURE 12. 2,4-D ON SILVERPLATTER

PC-SPIRS 3.30 RTECS (through October 1996)

1 of 1
Marked Record

AN: AG6825000
PN: Acetic acid, (2,4-dichlorophenoxy)-
RN: Current: 94-75-7
UD: 9610
MF: C8-H6-Cl2-O3
MW: 221.04
WL: QV1OR BG DG
SY: Acide 2,4-dichloro phenoxyacetique (French);
Acido(2,4-dicloro-fenossi)-acetico (Italian); Acme amine 4; Acme butyl ester 4;
Acme LV 4; Agrotect; Amidox; Amoxone; Aqua-Kleen; Barrage; BH 2,4-D;
Brush-rhap; B-Selektonon; Chipco turf herbicide "D"; Chloroxone; Citrus fix;
Crop rider; 2,4-D (ACGIH:OSHA); 2,4-D acid; Debroussaillant 600; Decamine;
Deherban; (2,4-Dichloor-fenoxy)-azijnzuur (Dutch); Dichlorophenoxyacetic acid;
2,4-Dichlorophenoxyacetic acid; Dichlorophenoxyacetic acid (OSHA);
2,4-Dichlorphenoxyacetic acid; (2,4-Dichlor-phenoxy)-essigsaeure (German);
Dicopur; DMA-4; Dormone; 2,4-Dwuchlorofenoksyoctowy kwas (Polish); Emulsamine
BK; Emulsamine E-3; ENT 8,538; Envert 171; Envert DT; Estone; Farmco;
Fernimine; Fernoxone; Ferxone; Foredex 75; Hedonal; Hedonal (the herbicide);
Herbidal; Hivol-44; Ipaner; Kwasu 2,4-dwuchlorofenoksyoctowego (Polish); Kwas
2,4-dwuchlorofenoksyoctowy (Polish); Kyselina 2,4-dichlorfenoxyoctova (Czech);
Lawn-keep; Macrondray; Miracle; Monosan; Moxone; Netagrone; Netagrone 600; NSC
423; Pennamine; Pennamine D; Phenox; Pielik; Plantgard; RCRA waste number U240;
Rhodia; Spritz-hormin/2,4-D; Spritz-hormit/2,4-D; Superormone concentre;
U-5043; U 46DP; Vergemaster; Verton; Verton D; Verton 2D; Vidon 638;
Weed-Ag-Bar; Weedar-64; Weedatul; Weedez Wonder BAR; Weedone LV4; Weed-rhap;
Weed TOX; Weedtrol
CC: Agricultural-Chemical-and-Pesticide (A); Tumorigen (C); Mutagen (M);
Reproductive-Effector (T); Human-Data (P); Primary-Irritant (S)
ID:
skn-rbt 500 mg/24H MLD
"Sbornik Vysledku Toxixologickeho Vysetreni Latek A Pripravku,"
Marhold, J.V., Institut Pro Vychovu Vedoucicn Pracovniku Chemickeho
Prumyclu Praha, Czechoslovakia, 1972 -,279,72 (28ZPAK);
eye-rbt 750 ug/24H SEV
"Sbornik Vysledku Toxixologickeho Vysetreni Latek A Pripravku,"
Marhold, J.V., Institut Pro Vychovu Vedoucicn Pracovniku Chemickeho
Prumyclu Praha, Czechoslovakia, 1972 -,279,72 (28ZPAK)
ME:
mmo-sat 250 ug/plate (-S9)
Mutation Research. 204,615,88 (MUREAV);
dnr-esc 5 mg/disc
National Technical Information Service. PB80-133226 (NTIS**);
dna-esc 20 umol/L
Mutation Research. 89,95,81 (MUREAV);
dnr-bcs 5 mg/disc
National Technical Information Service. PB80-133226 (NTIS**);
mmo-omi 1 gm/L (-S9)
Microbios Letters. 5,103,77 (MILEDM);
mmo-omi 1 gm/L (-S9)
Microbios Letters. 5,103,77 (MILEDM);
mmo-omi 1 gm/L (-S9)

```
   Microbios Letters. 5,103,77 (MILEDM);
mmo-omi 1 gm/L (-S9)
   Microbios Letters. 5,103,77 (MILEDM);
slt-dmg-orl 5 mmol/L
   Mutation Research. 319,237,93 (MUREAV);
slt-dmg-mul 10 ppb
   Environmental and Molecular Mutagenesis. 25,148,95 (EMMUEG);
sln-dmg-orl 25 ppm
   Ecological Bulletins. 27,190,78 (ECBUDQ);
sln-dmg-unr 1000 ppm/15D
   Ecological Bulletins. 27,182,78 (ECBUDQ);
mmo-smc 150 mg/L (-S9)
   Ecological Bulletins. 27,193,78 (ECBUDQ);
mrc-asn 4 umol/L
   Mutation Research. 204,615,88 (MUREAV);
dnd-sal-spr 1 mmol/L
   Phytochemistry. 11,3135,72 (PYTCAS);
dns-hmn-fbr 1 umol/L
   Mutation Research. 42,161,77 (MUREAV);
cyt-hmn-lym 20 ug/L
   Cytology and Genetics (English Translation). 8(3),6,74 (CYGEDX);
sce-hmn-lym 10 mg/L
   Journal of Heredity. 73,224,82 (JOHEA8);
cyt-rat-ipr 100 ug/kg
   Cytologia. 52,275,87 (CYTOAN);
dni-mus-orl 200 mg/kg
   Mutation Research. 55,197,78 (MUREAV);
cyt-mus-orl 100 mg/kg
   Cytology and Genetics (English Translation). 8(3),6,74 (CYGEDX);
dni-ham-ovr 1 mmol/L
   Toxicology Letters. 29,137,85 (TOLED5);
cyt-ham-ovr 2400 mg/L
   Environmental and Molecular Mutagenesis. 10(Suppl 10),1,87 (EMMUEG);
sce-ham-ovr 167 mg/L
   Environmental and Molecular Mutagenesis. 10(Suppl 10),1,87 (EMMUEG);
msc-ham-lng 10 umol/L
   Chemico-Biological Interactions. 19,369,77 (CBINA8);
cyt-ctl-kdy 1 ppm
   In Vitro. 8,416,73 (ITCSAF);
dnd-mam-lym 1 mmol/L
   Phytochemistry. 11,3135,72 (PYTCAS)
RE:
T48          orl-rat TDLo: 220 ug/kg (1-22D preg)
   Gigiena i Sanitariya. 50(10),76,85 (GISAAA);
T46-T34-T35 orl-rat TDLo: 1 gm/kg (6-15D preg)
   Toxicology and Applied Pharmacology. 22,14,72 (TXAPA9);
T46          orl-rat TDLo: 125 mg/kg (6-15D preg)
   Food and Cosmetics Toxicology. 9,801,71 (FCTXAV);
T34-T41-T53 orl-rat TDLo: 500 mg/kg (6-15D preg)
   Food and Cosmetics Toxicology. 9,801,71 (FCTXAV);
T55-T81      orl-rat TDLo: 500 mg/kg (6-15D preg)
   Food and Cosmetics Toxicology. 9,801,71 (FCTXAV);
T34-T35-T43 orl-mus TDLo: 707 mg/kg (11-14D preg)
   Archives of Environmental Contamination and Toxicology.
   6,33,77 (AECTCV);
T26-T31-T42 orl-mus TDLo: 900 mg/kg (6-14D preg)
   National Technical Information Service. PB223-160 (NTIS**);
T81          orl-mus TDLo: 438 mg/kg (8-12D preg)
   Teratogenesis, Carcinogenesis, and Mutagenesis. 7,7,87 (TCMUD8);
T35-T41-T31 scu-mus TDLo: 882 mg/kg (6-14D preg)
   National Technical Information Service. PB223-160 (NTIS**);
```

```
T34-T42-T43 scu-mus TDLo: 900 mg/kg (6-14D preg)
   National Technical Information Service. PB223-160 (NTIS**);
T24-T26     scu-mus TDLo: 900 mg/kg (6-14D preg)
   National Technical Information Service. PB223-160 (NTIS**);
T26         orl-ham TDLo: 200 mg/kg (7-11D preg)
   Bulletin of Environmental Contamination and Toxicology.
   6,559,71 (BECTA6)
AT:
F24-J25     orl-man TDLo: 2 gm/kg
   Archives of Toxicology. 66,518,92 (ARTODN);
F24-G10-J25 orl-man TDLo: 5714 mg/kg
   Archives of Toxicology. 66,518,92 (ARTODN);
K13-F24-F07 orl-hmn LDLo: 80 mg/kg
   Archives of Pathology. 94,270,72 (ARPAAQ);
F12         orl-man LDLo: 93 mg/kg
   Pharmacological Reviews. 14,225,62 (PAREAQ);
T/E unlistd orl-rat LD50: 375 mg/kg
   Farm Chemicals Handbook. -,C174,91 (FMCHA2);
T/E unlistd skn-rat LD50: 1500 mg/kg
   World Review of Pest Control. 9,119,70 (WRPCA2);
C06-F18-F24 ipr-rat LD50: 666 mg/kg
   Journal of Industrial Hygiene and Toxicology. 29,85,47 (JIHTAB);
T/E unlistd orl-mus LD50: 347 mg/kg
   Roczniki Panstwowego Zakladu Higieny. 31,373,80 (RPZHAW);
T/E unlistd ipr-mus LDLo: 125 mg/kg
   Toxicology and Applied Pharmacology. 23,288,72 (TXAPA9);
F20-F24     orl-dog LD50: 100 mg/kg
   Archives of Environmental Health. 7,202,63 (AEHLAU);
T/E unlistd orl-rbt LDLo: 800 mg/kg
   Archives des Maladies Professionnelles de Medecine du Travail
   et de Securite Sociale. 12,26,51 (AMPMAR);
F19-R10     skn-rbt LD50: 1400 mg/kg
   Quarterly Bulletin--Association of Food and Drug Officials
   of the United States. 16,3,52 (AFDOAQ);
C06-F18-F24 ipr-rbt LD50: 400 mg/kg
   Journal of Industrial Hygiene and Toxicology. 29,85,47 (JIHTAB);
C06-F18-F24 ivn-rbt LD50: 400 mg/kg
   Journal of Industrial Hygiene and Toxicology. 29,85,47 (JIHTAB);
T/E unlistd orl-gpg LD50: 469 mg/kg
   American Journal of Veterinary Research. 15,622,54 (AJVRAH);
C06-F18-F24 ipr-gpg LD50: 666 mg/kg
   Journal of Industrial Hygiene and Toxicology. 29,85,47 (JIHTAB);
T/E unlistd orl-ham LD50: 500 mg/kg
   Toxicology and Applied Pharmacology. 48,A192,79 (TXAPA9);
K05-F07-L03 orl-ckn LD50: 541 mg/kg
   American Journal of Veterinary Research. 15,622,54 (AJVRAH);
T/E unlistd orl-mam LD50: 375 mg/kg
   Science. 165,465,69 (SCIEAS)
MD:
U01         orl-rat TDLo: 13650 mg/kg/13W-C
   Fundamental and Applied Toxicology. 9,423,87 (FAATDF);
F18         orl-rat TDLo: 200 mg/kg/5W-I
   Neurobehavioral Toxicology and Teratology. 5,331,83 (NTOTDY);
D20-F17     orl-rat TDLo: 54750 mg/kg/1Y-C
   Toxicologist. 15,23,95 (TOXID9);
P70-U01-Z01 orl-dog TDLo: 700 mg/kg/90D-I
   AMA Archives of Industrial Hygiene and Occupational Medicine.
   7,61,53 (AMIHBC);
M03-L30-P28 orl-dog TDLo: 1820 mg/kg/52W-C
   Fundamental and Applied Toxicology. 29,78,96 (FAATDF);
Q01-R03-Z01 ivn-dog TDLo: 300 mg/kg/6D-I
```

```
   Journal of Industrial Hygiene and Toxicology. 29,85,47 (JIHTAB)
TR:
ACGIH TLV-TWA 10 mg/m3
   "Documentation of the Threshold Limit Values and Biological
   Exposure Indices," 5th ed., Cincinnati, OH, American Conference
   of Governmental Industrial Hygienists, Inc., 1986
   6,375,91 (85INA8);
IARC Cancer Review: Human Limited Evidence
   IARC Monographs on the Evaluation of Carcinogenic Risk of
   Chemicals to Man. 41,357,86 (IMEMDT);
IARC Cancer Review: Animal Inadequate Evidence
   IARC Monographs on the Evaluation of Carcinogenic Risk of
   Chemicals to Man. 15,111,77 (IMEMDT);
TOXICOLOGY REVIEW
   Residue Reviews. 59,1,75 (RREVAH);
TOXICOLOGY REVIEW
   Deutsche Tieraerztliche Wochenschrift. 80,485,73 (DTTIAF);
TOXICOLOGY REVIEW
   Residue Reviews. 56,107,75 (RREVAH);
TOXICOLOGY REVIEW
   Economie et Medecine Animales. 14,141,73 (ECMAAI);
TOXICOLOGY REVIEW
   Biologico. 40(2),44,74 (BIOGAL);
TOXICOLOGY REVIEW
   Hygiene and Sanitation (USSR). 31(7-9),383,66 (HYSAAV)
SR: EPA FIFRA 1988 PESTICIDE SUBJECT TO REGISTRATION OR RE-REGISTRATION
   Federal Register. 54,7740,89 (FEREAC);
MSHA STANDARD-air: TWA 10 mg/m3
   "Documentation of Threshold Limit Values for Substances in
   Workroom Air." For publisher information, see 85INA8.
   3,67,71 (DTLVS*);
OSHA PEL (Gen Indu): 8H TWA 10 mg/m3
   Code of Federal Regulations. 29,1910.1000,94 (CFRGBR);
OSHA PEL (Construc): 8H TWA 10 mg/m3
   Code of Federal Regulations. 29,1926.55,94 (CFRGBR);
OSHA PEL (Shipyard): 8H TWA 10 mg/m3
   Code of Federal Regulations. 29,1915.1000,93 (CFRGBR);
OSHA PEL (Fed Cont): 8H TWA 10 mg/m3
   Code of Federal Regulations. 41,50-204.50,94 (CFRGBR).
OEL-AUSTRALIA:TWA 10 mg/m3 JAN93.
OEL-AUSTRIA:TWA 10 mg/m3 JAN93.
OEL-BELGIUM:TWA 10 mg/m3 JAN93.
OEL-DENMARK:TWA 5 mg/m3 JAN93.
OEL-FINLAND:TWA 10 mg/m3;STEL 20 mg/m3;Skin JAN93.
OEL-FRANCE:TWA 10 mg/m3 JAN93.
AOEL-GERMANY:TWA 10 mg/m3 JAN93.
OEL-HUNGARY:TWA 1 mg/m3;STEL 2 mg/m3;Skin JAN93.
OEL-THE NETHERLANDS:TWA 10 mg/m3 JAN93.
OEL-THE PHILIPPINES:TWA 10 mg/m3 JAN93.
OEL-POLAND:TWA 7 mg/m3 JAN93.
OEL-SWITZERLAND:TWA 10 mg/m3;STEL 50 mg/m3 JAN93.
OEL-THAILAND:TWA 10 mg/m3 JAN93.
OEL-TURKEY:TWA 10 mg/m3 JAN93.
OEL-UNITED KINGDOM:TWA 10 mg/m3;STEL 20 mg/m3 JAN93.
OEL IN BULGARIA, COLOMBIA, JORDAN, KOREA check ACGIH TLV.
OEL IN NEW ZEALAND, SINGAPORE, VIETNAM check ACGIH TLV
ND: NIOSH REL TO 2,4-D-air: 10H TWA 10 mg/m3
   National Institute for Occupational Safety and Health, U.
   DHHS #92-100,92 (NIOSH*);
NOHS 1974: HZD 24270; NIS 6; TNF 1132; NOS 8; TNE 6266;
NOES 1983: HZD 24270; NIS 1; TNF 94; NOS 1; TNE 471
```

FIGURE 12. 2,4-D ON SILVERPLATTER (continued)

SL: EPA GENETOX PROGRAM 1988, Positive: In vivo cytogenetics-nonhuman bone marrow
EPA GENETOX PROGRAM 1988, Positive: In vitro cytogenetics-human lymphocyte
EPA GENETOX PROGRAM 1988, Positive: B subtilis rec assay; E coli polA without S9
EPA GENETOX PROGRAM 1988, Positive: V79 cell culture-gene mutation
EPA GENETOX PROGRAM 1988, Positive: S cerevisiae gene conversion
EPA GENETOX PROGRAM 1988, Negative: D melanogaster-whole sex chrom. loss
EPA GENETOX PROGRAM 1988, Negative: D melanogaster-nondisjunction
EPA GENETOX PROGRAM 1988, Negative: Histidine reversion-Ames test
EPA GENETOX PROGRAM 1988, Negative: D melanogaster Sex-linked lethal
EPA GENETOX PROGRAM 1988, Negative: In vitro UDS-human fibroblast; TRP reversion
EPA GENETOX PROGRAM 1988, Negative: S cerevisiae-homozygosis
EPA GENETOX PROGRAM 1988, Inconclusive: Carcinogenicity-mouse/rat; Mammalian micronucleus
EPA TSCA Section 8(b) CHEMICAL INVENTORY
EPA TSCA Section 8(d) unpublished health/safety studies
On EPA IRIS database
EPA TSCA TEST SUBMISSION (TSCATS) DATA BASE, OCTOBER 1996
NIOSH Analytical Method, 1994: 2,4-D, 5001
NTP Carcinogenesis studies; on test (prechronic studies), May 1996
OD: Also in OHMTADS: 7215096 in acc; Also in CHRIS: 94-75-7 in rn

FIGURE 13. TNT ON MICROMEDEX

RTECS(R)

Topic: Toluene, 2,4,6-trinitro-

1.0 SUBSTANCE IDENTIFICATION
RTECS NUMBER: XU0175000
CHEMICAL NAME: Toluene, 2,4,6-trinitro-
CAS NUMBER: 118-96-7
MOLECULAR FORMULA: C7-H5-N3-O6
MOLECULAR WEIGHT: 227.15
WISWESSER NOTATION: WNR B1 CNW ENW
SUBSTANCE INVESTIGATED AS: Agricultural Chemical, Mutagen, Reproductive Effector, Human Data, Primary Irritant
LAST REVISION DATE: 9601

2.0 SYNONYM(S) / TRADE NAME(S)
1. Benzene, 2-methyl-1,3,5-trinitro-
2. Entsufon
3. NCI-C56155
4. TNT
5. alpha-Tnt
6. TNT (OSHA)
7. TNT, dry or wetted with <30% water, by weight (UN0209) (DOT)
8. TNT-tolite (French)
9. Tolit
10. Tolite
11. 2,4,6-Trinitrotolueen (Dutch)
12. Trinitrotoluene
13. Trinitrotoluene (UN0209) (DOT)
14. Trinitrotoluene, wetted with not <30% water, by weight (UN1356) (DOT)
15. s-Trinitrotoluene
16. sym-Trinitrotoluene
17. 2,4,6-Trinitrotoluene (ACGIH:OSHA)
18. s-Trinitrotoluol
19. sym-Trinitrotoluol
20. 2,4,6-Trinitrotoluol (German)
21. Tritol
22. Triton
23. Trojnitrotoluen (Polish)
24. Trotyl
25. Trotyl oil
26. UN0209 (DOT)
27. UN1356 (DOT)

3.0 HEALTH HAZARD DATA
3.1 ACUTE TOXICITY
3.1.2 LDLO/LCLO - LOWEST PUBLISHED LETHAL DOSE/CONC
A. HUMAN
1. LDLo; ROUTE: Oral; DOSE: 28 gm/kg; TOXIC EFFECTS: BEHAVIORAL - Hallucinations, distorted perceptions; LUNGS, THORAX, OR RESPIRATION - Cyanosis; GASTROINTESTINAL - Other changes; REFERENCE: "Toxicology of Drugs and Chemicals," Deichmann, W.B.,

Produced by Micromedex, Inc. Vol. 30 Expires 10/31/96

New York, Academic Press, Inc., 1969 -:610, 1969. <CODEN 34ZIAG>

B. RABBIT

1. LDLo; ROUTE: Oral; DOSE: 500 mg/kg; TOXIC EFFECTS: BEHAVIORAL - Convulsions or effect on seizure threshold; GASTROINTESTINAL - Hypermotility, diarrhea; LUNGS, THORAX, OR RESPIRATION - Cyanosis; REFERENCE: Special Report Series--Medical Research Council 58:32, 1921. <CODEN MRCSAB>
2. LDLo; ROUTE: Subcutaneous; DOSE: 500 mg/kg; TOXIC EFFECTS: BEHAVIORAL - Convulsions or effect on seizure threshold; GASTROINTESTINAL - Hypermotility, diarrhea; LUNGS, THORAX, OR RESPIRATION - Cyanosis; REFERENCE: Special Report Series--Medical Research Council 58:32, 1921. <CODEN MRCSAB>

C. CAT

1. LDLo; ROUTE: Oral; DOSE: 1850 mg/kg; TOXIC EFFECTS: LUNGS, THORAX, OR RESPIRATION - Dyspnea; LUNGS, THORAX, OR RESPIRATION - Cyanosis; SKIN AND APPENDAGES - Dermatitis, allergic; REFERENCE: Special Report Series--Medical Research Council 58:32, 1921. <CODEN MRCSAB>
2. LDLo; ROUTE: Subcutaneous; DOSE: 200 mg/kg; TOXIC EFFECTS: LUNGS, THORAX, OR RESPIRATION - Dyspnea; LUNGS, THORAX, OR RESPIRATION - Cyanosis; SKIN AND APPENDAGES - Dermatitis, allergic; REFERENCE: Special Report Series--Medical Research Council 58:32, 1921. <CODEN MRCSAB>

3.1.3 LD50/LC50 - LETHAL DOSE/CONC 50% KILL

A. RAT

1. LD50; ROUTE: Oral; DOSE: 795 mg/kg; TOXIC EFFECTS: BEHAVIORAL - Somnolence (general depressed activity); BEHAVIORAL - Tremor; BEHAVIORAL - Convulsions or effect on seizure threshold; REFERENCE: Journal of Toxicology and Environmental Health 9:565, 1982. <CODEN JTEHD6>

B. MOUSE

1. LD50; ROUTE: Oral; DOSE: 660 mg/kg; TOXIC EFFECTS: BEHAVIORAL - Somnolence (general depressed activity); BEHAVIORAL - Tremor; BEHAVIORAL - Convulsions or effect on seizure threshold; REFERENCE: Journal of Toxicology and Environmental Health 9:565, 1982. <CODEN JTEHD6>

3.2 IRRITATION

3.2.1 SKIN - STANDARD DRAIZE TEST

A. RABBIT

1. ROUTE: Skin; DOSE: 500 mg/24H; REACTION: mild; REFERENCE: National Technical Information Service AD-B011-150. <CODEN NTIS**>

3.3 REPRODUCTIVE EFFECTS

A. RAT

RTECS(R)

Topic: Toluene, 2,4,6-trinitro-

1. ROUTE: Oral; DOSE: 5376 mg/kg; DURATION: male 28D prior to mating; TOXIC EFFECTS: PATERNAL EFFECTS - Testes, epididymis, sperm duct; REFERENCE: Journal of Toxicology and Environmental Health 9:565, 1982. <CODEN JTEHD6>

3.4 GENETIC EFFECTS

3.4.6 MUTATIONS IN MICROORGANISMS

A. BACTERIA - S TYPHIMURIUM

1. DOSE: 10 ug/plate (+/-S9); REFERENCE: National Technical Information Service AD-A080-146. <CODEN NTIS**>

3.4.7 MUTATIONS IN MAMMALIAN SOMATIC CELLS

A. MOUSE

1. CELL TYPE: lymphocyte; DOSE: 40 mg/L; REFERENCE: Cancer Letters 20:103, 1983. <CODEN CALEDQ>

3.4.12 BODY FLUID ASSAY

A. RAT

1. INDICATOR ORGANISM: BACTERIA - S TYPHIMURIUM; DOSE: 50 mg/kg; REFERENCE: Mutation Research 262:167, 1991. <CODEN MUREAV>

3.6 OTHER MULTIPLE DOSE TOXICITY DATA

A. RAT

1. ROUTE: Oral; DOSE: 7200 mg/kg/6W-I; TOXIC EFFECTS: LIVER - Other changes; BLOOD - Changes in serum composition; DEATH - Changes in testicular weight; REFERENCE: Toxicology Letters 55:343, 1991. <CODEN TOLED5>
2. ROUTE: Oral; DOSE: 11375 mg/kg/13W-C; TOXIC EFFECTS: BEHAVIORAL - Food intake (animal); BLOOD - Normocytic anemia; NUTRITIONAL AND GROSS METABOLIC - Weight loss or decreased weight gain; REFERENCE: Toxicology 32:253, 1984. <CODEN TXCYAC>
3. ROUTE: Oral; DOSE: 3 gm/kg/30D-I; TOXIC EFFECTS: LIVER - Other changes; BIOCHEMICAL - Monoamine oxidase; BIOCHEMICAL - Lipids including transport; REFERENCE: Gigiena Truda i Professional'nye Zabolevaniya. Labor Hygiene and Occupational Diseases 18(10):57, 1974. <CODEN GTPZAB>

B. MOUSE

1. ROUTE: Oral; DOSE: 11 mg/kg/13W-C; TOXIC EFFECTS: LIVER - Changes in liver weight; ENDOCRINE - Changes in spleen weight; BLOOD - Changes in spleen; REFERENCE: Journal of Toxicology and Environmental Health 9:565, 1982. <CODEN JTEHD6>

C. DOG

1. ROUTE: Oral; DOSE: 182 mg/kg/13W-C; TOXIC EFFECTS: LIVER - Changes in liver weight; BLOOD - Normocytic anemia; NUTRITIONAL AND GROSS METABOLIC - Weight loss or decreased weight gain; REFERENCE: Journal of Toxicology and Environmental Health 9:565, 1982. <CODEN JTEHD6>
2. ROUTE: Oral; DOSE: 1456 mg/kg/26W-I; TOXIC EFFECTS:

RTECS(R)

Topic: Toluene, 2,4,6-trinitro-

LIVER - Changes in liver weight; BLOOD - Normocytic anemia; BLOOD - Changes in spleen; REFERENCE: Toxicology 63:233, 1990. <CODEN TXCYAC>

4.0 STANDARDS AND REGULATIONS

1. DOT-HAZARD:EXPLOSIVE 1.1D; LABEL:EXPLOSIVE 1.1D (UN0209) REFERENCE: Code of Federal Regulations 49:172.101, 1992. <CODEN CFRGBR>
2. DOT-HAZARD:4.1; LABEL:FLAMMABLE SOLID (UN1356) REFERENCE: Code of Federal Regulations 49:172.101, 1992. <CODEN CFRGBR>
3. MSHA STANDARD-air:TWA 0.2 ppm (0.5 mg/m3) (skin) REFERENCE: "Documentation of Threshold Limit Values for Substances in Workroom Air." 3:270, 1971. <CODEN DTLVS*>
4. OSHA PEL (Gen Indu):8H TWA 1.50 mg/m3 (skin) REFERENCE: Code of Federal Regulations 29:1910.1000, 1994. <CODEN CFRGBR>
5. OSHA PEL (Construc):8H TWA 1.50 mg/m3 (skin) REFERENCE: Code of Federal Regulations 29:1926.55, 1994. <CODEN CFRGBR>
6. OSHA PEL (Shipyard):8H TWA 1.50 mg/m3 (skin) REFERENCE: Code of Federal Regulations 29:1915.1000, 1993. <CODEN CFRGBR>
7. OSHA PEL (Fed Cont):8H TWA 1.50 mg/m3 (skin) REFERENCE: Code of Federal Regulations 41:50-204.50, 1994. <CODEN CFRGBR>
8. OEL-ARAB Republic of Egypt:TWA 0.5 mg/m3 JAN93.
9. OEL-AUSTRALIA:TWA 0.5 mg/m3;Skin JAN93.
10. OEL-BELGIUM:TWA 0.5 mg/m3;Skin JAN93.
11. OEL-CZECHOSLOVAKIA:TWA 0.5 mg/m3;STEL 2.5 mg/m3 JAN93.
12. OEL-DENMARK:STEL 0.5 mg/m3;Skin JAN93.
13. OEL-FINLAND:TWA 0.5 mg/m3;STEL 3 mg/m3;Skin JAN93.
14. OEL-FRANCE:TWA 0.5 mg/m3;Skin JAN93.
15. OEL-GERMANY:TWA 0.01 ppm (0.1 mg/m3);Skin;Carcinogen JAN93.
16. OEL-HUNGARY:TWA 0.3 mg/m3;STEL 0.5 mg/m3;Skin JAN93.
17. OEL-THE NETHERLANDS:TWA 0.5 mg/m3;Skin JAN93.
18. OEL-THE PHILIPPINES:TWA 1.5 mg/m3;Skin JAN93.
19. OEL-RUSSIA:TWA 0.1 mg/m3;STEL 0.5 mg/m3;Skin JAN93.
20. OEL-SWITZERLAND:TWA 0.01 ppm (0.1 mg/m3);STEL 0.02 ppm;Skin JAN93.
21. OEL-TURKEY:TWA 1.5 mg/m3;Skin JAN93.
22. OEL-UNITED KINGDOM:TWA 0.5 mg/m3;STEL 0.5 mg/m3 JAN93.
23. OEL IN BULGARIA, COLOMBIA, JORDAN, KOREA check ACGIH TLV.
24. OEL IN NEW ZEALAND, SINGAPORE, VIETNAM check ACGIH TLV.

5.0 NIOSH DOCUMENTS

1. NIOSH REL TO 2,4,6-TRINITROTOLUENE-air:10H TWA 0.5 mg/m3 (Sk) REFERENCE: National Institute for Occupational Safety and Health, U.S. Dept. of Health, Education, and Welfare, Reports and Memoranda. DHHS #92-100,92. <CODEN NIOSH*>

Produced by Micromedex, Inc. Vol. 30 Expires 10/31/96

FIGURE 13. TNT ON MICROMEDEX (continued)

RTECS(R)

Topic: Toluene, 2,4,6-trinitro-

2. National Occupational Exposure Survey 1983: Hazard Code 74550; Number of Industries 2; Total Number of Facilities 10; Number of Occupations 1; Total Number of Employees 31.

6.0 REVIEWS

1. ACGIH TLV-TWA 0.5 mg/m3 (skin) REFERENCE: "Documentation of the Threshold Limit Values and Biological Exposure Indices," 5th ed., Cincinnati, OH, American Conference of Governmental Industrial Hygienists, Inc., 1986 6:1652, 1991. <CODEN 85INA8>
2. TOXICOLOGY REVIEW REFERENCE: National Technical Information Service AD778-725. <CODEN NTIS**>
3. TOXICOLOGY REVIEW REFERENCE: CRC Critical Reviews in Toxicology 1(1):93, 1971. <CODEN CRTXB2>
4. TOXICOLOGY REVIEW REFERENCE: Pharmacological Reviews 4:1, 1952. <CODEN PAREAQ>

7.0 STATUS IN U.S.

1. EPA GENETOX PROGRAM 1988, Positive: Histidine reversion-Ames test.
2. EPA TSCA Section 8(b) CHEMICAL INVENTORY.
3. EPA TSCA Section 8(d) unpublished health/safety studies.
4. On EPA IRIS database.
5. EPA TSCA TEST SUBMISSION (TSCATS) DATA BASE, APRIL 1996.
6. OSHA ANALYTICAL METHOD #44.

FIGURE 14. 2,4-D MICROMEDEX

RTECS(R)

Topic: Acetic acid, (2,4-dichlorophenoxy)-

1.0 SUBSTANCE IDENTIFICATION
RTECS NUMBER: AG6825000
CHEMICAL NAME: Acetic acid, (2,4-dichlorophenoxy)-
CAS NUMBER: 94-75-7
MOLECULAR FORMULA: C8-H6-Cl2-O3
MOLECULAR WEIGHT: 221.04
WISWESSER NOTATION: QV1OR BG DG
SUBSTANCE INVESTIGATED AS: Agricultural Chemical, Tumorigen, Mutagen, Reproductive Effector, Human Data, Primary Irritant
LAST REVISION DATE: 9603

2.0 SYNONYM(S) / TRADE NAME(S)
1. Acide 2,4-dichloro phenoxyacetique (French)
2. Acido(2,4-dicloro-fenossi)-acetico (Italian)
3. Acme amine 4
4. Acme butyl ester 4
5. Acme LV 4
6. Agrotect
7. Amidox
8. Amoxone
9. Aqua-Kleen
10. Barrage
11. BH 2,4-D
12. Brush-rhap
13. B-Selektonon
14. Chipco turf herbicide "D"
15. Chloroxone
16. Citrus fix
17. Crop rider
18. 2,4-D (ACGIH:OSHA)
19. 2,4-D acid
20. Debroussaillant 600
21. Decamine
22. Deherban
23. (2,4-Dichloor-fenoxy)-azijnzuur (Dutch)
24. Dichlorophenoxyacetic acid
25. 2,4-Dichlorophenoxyacetic acid
26. Dichlorophenoxyacetic acid (OSHA)
27. 2,4-Dichlorphenoxyacetic acid
28. (2,4-Dichlor-phenoxy)-essigsaeure (German)
29. Dicopur
30. DMA-4
31. Dormone
32. 2,4-Dwuchlorofenoksyoctowy kwas (Polish)
33. Emulsamine BK
34. Emulsamine E-3
35. ENT 8,538
36. Envert 171
37. Envert DT

Produced by Micromedex, Inc. Vol. 30 Expires 10/31/96

RTECS(R)
Topic: Acetic acid, (2,4-dichlorophenoxy)-

38. Estone
39. Farmco
40. Fernimine
41. Fernoxone
42. Ferxone
43. Foredex 75
44. Hedonal
45. Hedonal (the herbicide)
46. Herbidal
47. Hivol-44
48. Ipaner
49. Kwasu 2,4-dwuchlorofenoksyoctowego (Polish)
50. Kwas 2,4-dwuchlorofenoksyoctowy (Polish)
51. Kyselina 2,4-dichlorfenoxyoctova (Czech)
52. Lawn-keep
53. Macrondray
54. Miracle
55. Monosan
56. Moxone
57. Netagrone
58. Netagrone 600
59. NSC 423
60. Pennamine
61. Pennamine D
62. Phenox
63. Pielik
64. Plantgard
65. RCRA waste number U240
66. Rhodia
67. Spritz-hormin/2,4-D
68. Spritz-hormit/2,4-D
69. Superormone concentre
70. U-5043
71. U 46DP
72. Vergemaster
73. Verton
74. Verton D
75. Verton 2D
76. Vidon 638
77. Weed-Ag-Bar
78. Weedar-64
79. Weedatul
80. Weedez Wonder BAR
81. Weedone LV4
82. Weed-rhap
83. Weed TOX
84. Weedtrol

3.0 HEALTH HAZARD DATA
3.1 ACUTE TOXICITY

Produced by Micromedex, Inc. Vol. 30 Expires 10/31/96

RTECS(R)

Topic: Acetic acid, (2,4-dichlorophenoxy)-

3.1.1 TDLO/TCLO - LOWEST PUBLISHED TOXIC DOSE/CONC

A. MAN

1. TDLo; ROUTE: Oral; DOSE: 2 gm/kg; TOXIC EFFECTS: BEHAVIORAL - Coma; LUNGS, THORAX, OR RESPIRATION - Respiratory depression; REFERENCE: Archives of Toxicology 66:518, 1992. <CODEN ARTODN>
2. TDLo; ROUTE: Oral; DOSE: 5714 mg/kg; TOXIC EFFECTS: BEHAVIORAL - Coma; CARDIAC - Change in rate; LUNGS, THORAX, OR RESPIRATION - Respiratory depression; REFERENCE: Archives of Toxicology 66:518, 1992. <CODEN ARTODN>

3.1.2 LDLO/LCLO - LOWEST PUBLISHED LETHAL DOSE/CONC

A. HUMAN

1. LDLo; ROUTE: Oral; DOSE: 80 mg/kg; TOXIC EFFECTS: GASTROINTESTINAL - Nausea or vomiting; BEHAVIORAL - Coma; BEHAVIORAL - Somnolence (general depressed activity); REFERENCE: Archives of Pathology 94:270, 1972. <CODEN ARPAAQ>

B. MAN

1. LDLo; ROUTE: Oral; DOSE: 93 mg/kg; TOXIC EFFECTS: BEHAVIORAL - Convulsions or effect on seizure threshold; REFERENCE: Pharmacological Reviews 14:225, 1962. <CODEN PAREAQ>

C. MOUSE

1. LDLo; ROUTE: Intraperitoneal; DOSE: 125 mg/kg; REFERENCE: Toxicology and Applied Pharmacology 23:288, 1972. <CODEN TXAPA9>

D. RABBIT

1. LDLo; ROUTE: Oral; DOSE: 800 mg/kg; REFERENCE: Archives des Maladies Professionnelles de Medecine du Travail et de Securite Sociale 12:26, 1951. <CODEN AMPMAR>

3.1.3 LD50/LC50 - LETHAL DOSE/CONC 50% KILL

A. RAT

1. LD50; ROUTE: Oral; DOSE: 375 mg/kg; REFERENCE: Farm Chemicals Handbook -:C174, 1991. <CODEN FMCHA2>
2. LD50; ROUTE: Skin; DOSE: 1500 mg/kg; REFERENCE: World Review of Pest Control 9:119, 1970. <CODEN WRPCA2>
3. LD50; ROUTE: Intraperitoneal; DOSE: 666 mg/kg; TOXIC EFFECTS: PERIPHERAL NERVE AND SENSATION - Spastic parapysis with or without sensory change; BEHAVIORAL - Muscle weakness; BEHAVIORAL - Coma; REFERENCE: Journal of Industrial Hygiene and Toxicology 29:85, 1947. <CODEN JIHTAB>

B. MOUSE

1. LD50; ROUTE: Oral; DOSE: 347 mg/kg; REFERENCE: Roczniki Panstwowego Zakladu Higieny 31:373, 1980. <CODEN RPZHAW>

C. RABBIT

1. LD50; ROUTE: Skin; DOSE: 1400 mg/kg; TOXIC EFFECTS:

RTECS(R)
Topic: Acetic acid, (2,4-dichlorophenoxy)-

BEHAVIORAL - Ataxia; SKIN AND APPENDAGES - Primary irritation; REFERENCE: Quarterly Bulletin--Association of Food and Drug Officials of the United States 16:3, 1952. <CODEN AFDOAQ>

2. LD50; ROUTE: Intraperitoneal; DOSE: 400 mg/kg; TOXIC EFFECTS: PERIPHERAL NERVE AND SENSATION - Spastic parapysis with or without sensory change; BEHAVIORAL - Muscle weakness; BEHAVIORAL - Coma; REFERENCE: Journal of Industrial Hygiene and Toxicology 29:85, 1947. <CODEN JIHTAB>
3. LD50; ROUTE: Intravenous; DOSE: 400 mg/kg; TOXIC EFFECTS: PERIPHERAL NERVE AND SENSATION - Spastic parapysis with or without sensory change; BEHAVIORAL - Muscle weakness; BEHAVIORAL - Coma; REFERENCE: Journal of Industrial Hygiene and Toxicology 29:85, 1947. <CODEN JIHTAB>

D. GUINEA PIG
1. LD50; ROUTE: Oral; DOSE: 469 mg/kg; REFERENCE: American Journal of Veterinary Research 15:622, 1954. <CODEN AJVRAH>
2. LD50; ROUTE: Intraperitoneal; DOSE: 666 mg/kg; TOXIC EFFECTS: PERIPHERAL NERVE AND SENSATION - Spastic parapysis with or without sensory change; BEHAVIORAL - Muscle weakness; BEHAVIORAL - Coma; REFERENCE: Journal of Industrial Hygiene and Toxicology 29:85, 1947. <CODEN JIHTAB>

E. HAMSTER
1. LD50; ROUTE: Oral; DOSE: 500 mg/kg; REFERENCE: Toxicology and Applied Pharmacology 48:A192, 1979. <CODEN TXAPA9>

F. DOG
1. LD50; ROUTE: Oral; DOSE: 100 mg/kg; TOXIC EFFECTS: BEHAVIORAL - Stiffness; BEHAVIORAL - Coma; REFERENCE: Archives of Environmental Health 7:202, 1963. <CODEN AEHLAU>

G. MAMMAL - UNSPECIFIED SPECIES
1. LD50; ROUTE: Oral; DOSE: 375 mg/kg; REFERENCE: Science 165:465, 1969. <CODEN SCIEAS>

H. CHICKEN
1. LD50; ROUTE: Oral; DOSE: 541 mg/kg; TOXIC EFFECTS: GASTROINTESTINAL - Gastritis; BEHAVIORAL - Somnolence (general depressed activity); LIVER - Fatty liver degeneration; REFERENCE: American Journal of Veterinary Research 15:622, 1954. <CODEN AJVRAH>

3.2 IRRITATION

3.2.1 SKIN - STANDARD DRAIZE TEST

A. RABBIT
1. ROUTE: Skin; DOSE: 500 mg/24H; REACTION: mild; REFERENCE: "Sbornik Vysledku Toxixologickeho Vysetreni

RTECS(R)
Topic: Acetic acid, (2,4-dichlorophenoxy)-

Latek A Pripravku," Marhold, J.V., Institut Pro Vychovu Vedoucicn Pracovniku Chemickeho Prumyclu Praha, Czechoslovakia, 1972 -:279, 1972. <CODEN 28ZPAK>

3.2.4 EYE - STANDARD DRAIZE TEST
A. RABBIT
1. ROUTE: Eye; DOSE: 750 ug/24H; REACTION: severe; REFERENCE: "Sbornik Vysledku Toxixologickeho Vysetreni Latek A Pripravku," Marhold, J.V., Institut Pro Vychovu Vedoucicn Pracovniku Chemickeho Prumyclu Praha, Czechoslovakia, 1972 -:279, 1972. <CODEN 28ZPAK>

3.3 REPRODUCTIVE EFFECTS
A. RAT
1. ROUTE: Oral; DOSE: 220 ug/kg; DURATION: female 1-22D of pregnancy; TOXIC EFFECTS: SPECIFIC DEVELOPMENTAL ABNORMALITIES - Blood and lymphatic systems (including spleen and marrow); REFERENCE: Gigiena i Sanitariya 50(10):76, 1985. <CODEN GISAAA>
2. ROUTE: Oral; DOSE: 1 gm/kg; DURATION: female 6-15D of pregnancy; TOXIC EFFECTS: SPECIFIC DEVELOPMENTAL ABNORMALITIES - Musculoskeletal system; EFFECTS ON EMBRYO OR FETUS - Fetotoxicity; EFFECTS ON EMBRYO OR FETUS - Fetal death; REFERENCE: Toxicology and Applied Pharmacology 22:14, 1972. <CODEN TXAPA9>
3. ROUTE: Oral; DOSE: 125 mg/kg; DURATION: female 6-15D of pregnancy; TOXIC EFFECTS: SPECIFIC DEVELOPMENTAL ABNORMALITIES - Musculoskeletal system; REFERENCE: Food and Cosmetics Toxicology 9:801, 1971. <CODEN FCTXAV>
4. ROUTE: Oral; DOSE: 500 mg/kg; DURATION: female 6-15D of pregnancy; TOXIC EFFECTS: EFFECTS ON EMBRYO OR FETUS - Fetotoxicity; SPECIFIC DEVELOPMENTAL ABNORMALITIES - Central nervous system; SPECIFIC DEVELOPMENTAL ABNORMALITIES - Urogenital system; REFERENCE: Food and Cosmetics Toxicology 9:801, 1971. <CODEN FCTXAV>
5. ROUTE: Oral; DOSE: 500 mg/kg; DURATION: female 6-15D of pregnancy; TOXIC EFFECTS: SPECIFIC DEVELOPMENTAL ABNORMALITIES - Homeostasis; EFFECTS ON NEWBORN - Growth statistics; REFERENCE: Food and Cosmetics Toxicology 9:801, 1971. <CODEN FCTXAV>

B. MOUSE
1. ROUTE: Oral; DOSE: 707 mg/kg; DURATION: female 11-14D of pregnancy; TOXIC EFFECTS: EFFECTS ON EMBRYO OR FETUS - Fetotoxicity; EFFECTS ON EMBRYO OR FETUS - Fetal death; SPECIFIC DEVELOPMENTAL ABNORMALITIES - Craniofacial (including nose and tongue); REFERENCE: Archives of Environmental Contamination and Toxicology 6:33, 1977. <CODEN AECTCV>
2. ROUTE: Oral; DOSE: 900 mg/kg; DURATION: female 6-14D of pregnancy; TOXIC EFFECTS: EFFECTS ON FERTILITY - Litter size; EFFECTS ON EMBRYO OR FETUS - Extra embryonic

structures; SPECIFIC DEVELOPMENTAL ABNORMALITIES - Eye, ear; REFERENCE: National Technical Information Service PB223-160. <CODEN NTIS**>

3. ROUTE: Oral; DOSE: 438 mg/kg; DURATION: female 8-12D of pregnancy; TOXIC EFFECTS: EFFECTS ON NEWBORN - Growth statistics; REFERENCE: Teratogenesis, Carcinogenesis, and Mutagenesis 7:7, 1987. <CODEN TCMUD8>
4. ROUTE: Subcutaneous; DOSE: 882 mg/kg; DURATION: female 6-14D of pregnancy; TOXIC EFFECTS: EFFECTS ON EMBRYO OR FETUS - Fetal death; SPECIFIC DEVELOPMENTAL ABNORMALITIES - Central nervous system; EFFECTS ON EMBRYO OR FETUS - Extra embryonic structures; REFERENCE: National Technical Information Service PB223-160. <CODEN NTIS**>
5. ROUTE: Subcutaneous; DOSE: 900 mg/kg; DURATION: female 6-14D of pregnancy; TOXIC EFFECTS: EFFECTS ON EMBRYO OR FETUS - Fetotoxicity; SPECIFIC DEVELOPMENTAL ABNORMALITIES - Eye, ear; SPECIFIC DEVELOPMENTAL ABNORMALITIES - Craniofacial (including nose and tongue); REFERENCE: National Technical Information Service PB223-160. <CODEN NTIS**>
6. ROUTE: Subcutaneous; DOSE: 900 mg/kg; DURATION: female 6-14D of pregnancy; TOXIC EFFECTS: EFFECTS ON FERTILITY - Pre-implantation mortality; EFFECTS ON FERTILITY - Litter size; REFERENCE: National Technical Information Service PB223-160. <CODEN NTIS**>

C. HAMSTER

1. ROUTE: Oral; DOSE: 200 mg/kg; DURATION: female 7-11D of pregnancy; TOXIC EFFECTS: EFFECTS ON FERTILITY - Litter size; REFERENCE: Bulletin of Environmental Contamination and Toxicology 6:559, 1971. <CODEN BECTA6>

3.4 GENETIC EFFECTS

3.4.1 DNA DAMAGE

A. MAMMAL - UNSPECIFIED SPECIES

1. CELL TYPE: lymphocyte; DOSE: 1 mmol/L; REFERENCE: Phytochemistry. An International Journal of Plant Biochemistry 11:3135, 1972. <CODEN PYTCAS>

B. FISH - SALMON

1. CELL TYPE: sperm; DOSE: 1 mmol/L; REFERENCE: Phytochemistry. An International Journal of Plant Biochemistry 11:3135, 1972. <CODEN PYTCAS>

3.4.2 DNA REPAIR

A. BACTERIA - B SUBTILIS

1. DOSE: 5 mg/disc; REFERENCE: National Technical Information Service PB80-133226. <CODEN NTIS**>

B. BACTERIA - E COLI

1. DOSE: 5 mg/disc; REFERENCE: National Technical Information Service PB80-133226. <CODEN NTIS**>

3.4.3 UNSCHEDULED DNA SYNTHESIS

RTECS(R)
Topic: Acetic acid, (2,4-dichlorophenoxy)-

A. HUMAN
1. CELL TYPE: fibroblast; DOSE: 1 umol/L; REFERENCE: Mutation Research 42:161, 1977. <CODEN MUREAV>

3.4.4 DNA INHIBITION
A. MOUSE
1. ROUTE: Oral; DOSE: 200 mg/kg; REFERENCE: Mutation Research 55:197, 1978. <CODEN MUREAV>
B. HAMSTER
1. CELL TYPE: ovary; DOSE: 1 mmol/L; REFERENCE: Toxicology Letters 29:137, 1985. <CODEN TOLED5>

3.4.5 DNA ADDUCT
A. BACTERIA - E COLI
1. DOSE: 20 umol/L; REFERENCE: Mutation Research 89:95, 1981. <CODEN MUREAV>

3.4.6 MUTATIONS IN MICROORGANISMS
A. BACTERIA - S TYPHIMURIUM
1. DOSE: 250 ug/plate (-S9); REFERENCE: Mutation Research 204:615, 1988. <CODEN MUREAV>
B. YEAST - S CEREVISIAE
1. DOSE: 150 mg/L (-S9); REFERENCE: Ecological Bulletins 27:193, 1978. <CODEN ECBUDQ>
C. OTHER MICROORGANISMS
1. DOSE: 1 gm/L (-S9); REFERENCE: Microbios Letters 5:103, 1977. <CODEN MILEDM>
2. DOSE: 1 gm/L (-S9); REFERENCE: Microbios Letters 5:103, 1977. <CODEN MILEDM>
3. DOSE: 1 gm/L (-S9); REFERENCE: Microbios Letters 5:103, 1977. <CODEN MILEDM>
4. DOSE: 1 gm/L (-S9); REFERENCE: Microbios Letters 5:103, 1977. <CODEN MILEDM>

3.4.7 MUTATIONS IN MAMMALIAN SOMATIC CELLS
A. HAMSTER
1. CELL TYPE: lung; DOSE: 10 umol/L; REFERENCE: Chemico-Biological Interactions 19:369, 1977. <CODEN CBINA8>

3.4.8 CYTOGENETIC ANALYSIS
A. HUMAN
1. CELL TYPE: lymphocyte; DOSE: 20 ug/L; REFERENCE: Cytology and Genetics 8(3):6, 1974. <CODEN CYGEDX>
B. RAT
1. ROUTE: Intraperitoneal; DOSE: 100 ug/kg; REFERENCE: Cytologia 52:275, 1987. <CODEN CYTOAN>
C. MOUSE
1. ROUTE: Oral; DOSE: 100 mg/kg; REFERENCE: Cytology and Genetics 8(3):6, 1974. <CODEN CYGEDX>
D. HAMSTER
1. CELL TYPE: ovary; DOSE: 2400 mg/L; REFERENCE: Environmental and Molecular Mutagenesis 10(Suppl 10):1, 1987. <CODEN EMMUEG>

Produced by Micromedex, Inc. Vol. 30 Expires 10/31/96

RTECS(R)
Topic: Acetic acid, (2,4-dichlorophenoxy)-

E. CATTLE
1. CELL TYPE: kidney; DOSE: 1 ppm; REFERENCE: In Vitro 8:416, 1973. <CODEN ITCSAF>

3.4.9 SISTER CHROMATID EXCHANGE
A. HUMAN
1. CELL TYPE: lymphocyte; DOSE: 10 mg/L; REFERENCE: Journal of Heredity 73:224, 1982. <CODEN JOHEA8>
B. HAMSTER
1. CELL TYPE: ovary; DOSE: 167 mg/L; REFERENCE: Environmental and Molecular Mutagenesis 10(Suppl 10):1, 1987. <CODEN EMMUEG>

3.4.14 SPECIFIC LOCUS TEST
A. INSECTS - D MELANOGASTER
1. ROUTE: Oral; DOSE: 5 mmol/L; REFERENCE: Mutation Research 319:237, 1993. <CODEN MUREAV>
2. ROUTE: Multiple routes; DOSE: 10 ppb; REFERENCE: Environmental and Molecular Mutagenesis 25:148, 1995. <CODEN EMMUEG>

3.4.15 GENE CONVERSION/MITOTIC RECOMBINATION
A. MOLD - A NIDULANS
1. DOSE: 4 umol/L; REFERENCE: Mutation Research 204:615, 1988. <CODEN MUREAV>

3.4.16 SEX CHROMOSOME LOSS/NONDISJUNCTION
A. INSECTS - D MELANOGASTER
1. ROUTE: Oral; DOSE: 25 ppm; REFERENCE: Ecological Bulletins 27:190, 1978. <CODEN ECBUDQ>
2. ROUTE: Unreported; DOSE: 1000 ppm/15D; REFERENCE: Ecological Bulletins 27:182, 1978. <CODEN ECBUDQ>

3.6 OTHER MULTIPLE DOSE TOXICITY DATA
A. RAT
1. ROUTE: Oral; DOSE: 13650 mg/kg/13W-C; TOXIC EFFECTS: NUTRITIONAL AND GROSS METABOLIC - Weight loss or decreased weight gain; REFERENCE: Fundamental and Applied Toxicology 9:423, 1987. <CODEN FAATDF>
2. ROUTE: Oral; DOSE: 200 mg/kg/5W-I; TOXIC EFFECTS: BEHAVIORAL - Muscle weakness; REFERENCE: Neurobehavioral Toxicology and Teratology 5:331, 1983. <CODEN NTOTDY>
3. ROUTE: Oral; DOSE: 54750 mg/kg/1Y-C; TOXIC EFFECTS: SENSE ORGANS AND SPECIAL SENSES - Retinal changes (pigmentary deposition, retinitis, other); BEHAVIORAL - Change in motor activity (specific assay); REFERENCE: Toxicologist 15:23, 1995. <CODEN TOXID9>

B. DOG
1. ROUTE: Oral; DOSE: 700 mg/kg/90D-I; TOXIC EFFECTS: BLOOD - Changes in other cell count; NUTRITIONAL AND GROSS METABOLIC - Weight loss or decreased weight gain; DEATH; REFERENCE: AMA Archives of Industrial Hygiene and Occupational Medicine 7:61, 1953. <CODEN AMIHBC>
2. ROUTE: Intravenous; DOSE: 300 mg/kg/6D-I; TOXIC EFFECTS:

RTECS(R)
Topic: Acetic acid, (2,4-dichlorophenoxy)-

MUSCULOSKELITAL - Changes in teeth and supporting structures; SKIN AND APPENDAGES - Dermatitis, other; DEATH; REFERENCE: Journal of Industrial Hygiene and Toxicology 29:85, 1947. <CODEN JIHTAB>

4.0 STANDARDS AND REGULATIONS

1. EPA FIFRA 1988 PESTICIDE SUBJECT TO REGISTRATION OR RE-REGISTRATION REFERENCE: Federal Register 54:7740, 1989. <CODEN FEREAC>
2. MSHA STANDARD-air:TWA 10 mg/m3 REFERENCE: "Documentation of Threshold Limit Values for Substances in Workroom Air." 3:67, 1971. <CODEN DTLVS*>
3. OSHA PEL (Gen Indu):8H TWA 10 mg/m3 REFERENCE: Code of Federal Regulations 29:1910.1000, 1994. <CODEN CFRGBR>
4. OSHA PEL (Construc):8H TWA 10 mg/m3 REFERENCE: Code of Federal Regulations 29:1926.55, 1994. <CODEN CFRGBR>
5. OSHA PEL (Shipyard):8H TWA 10 mg/m3 REFERENCE: Code of Federal Regulations 29:1915.1000, 1993. <CODEN CFRGBR>
6. OSHA PEL (Fed Cont):8H TWA 10 mg/m3 REFERENCE: Code of Federal Regulations 41:50-204.50, 1994. <CODEN CFRGBR>
7. OEL-AUSTRALIA:TWA 10 mg/m3 JAN93.
8. OEL-AUSTRIA:TWA 10 mg/m3 JAN93.
9. OEL-BELGIUM:TWA 10 mg/m3 JAN93.
10. OEL-DENMARK:TWA 5 mg/m3 JAN93.
11. OEL-FINLAND:TWA 10 mg/m3;STEL 20 mg/m3;Skin JAN93.
12. OEL-FRANCE:TWA 10 mg/m3 JAN93.
13. OEL-GERMANY:TWA 10 mg/m3 JAN93.
14. OEL-HUNGARY:TWA 1 mg/m3;STEL 2 mg/m3;Skin JAN93.
15. OEL-THE NETHERLANDS:TWA 10 mg/m3 JAN93.
16. OEL-THE PHILIPPINES:TWA 10 mg/m3 JAN93.
17. OEL-POLAND:TWA 7 mg/m3 JAN93.
18. OEL-SWITZERLAND:TWA 10 mg/m3;STEL 50 mg/m3 JAN93.
19. OEL-THAILAND:TWA 10 mg/m3 JAN93.
20. OEL-TURKEY:TWA 10 mg/m3 JAN93.
21. OEL-UNITED KINGDOM:TWA 10 mg/m3;STEL 20 mg/m3 JAN93.
22. OEL IN BULGARIA, COLOMBIA, JORDAN, KOREA check ACGIH TLV.
23. OEL IN NEW ZEALAND, SINGAPORE, VIETNAM check ACGIH TLV.

5.0 NIOSH DOCUMENTS

1. NIOSH REL TO 2,4-D-air:10H TWA 10 mg/m3 REFERENCE: National Institute for Occupational Safety and Health, U.S. Dept. of Health, Education, and Welfare, Reports and Memoranda. DHHS #92-100,92. <CODEN NIOSH*>
2. National Occupational Hazard Survey 1974: Hazard Code 24270; Number of Industries 6; Total Number of Facilities 1132; Number of Occupations 8; Total Number of Employees 6266.
3. National Occupational Exposure Survey 1983: Hazard Code 24270; Number of Industries 1; Total Number of Facilities 94; Number of Occupations 1; Total Number of Employees 471.

6.0 REVIEWS

Produced by Micromedex, Inc. Vol. 30 Expires 10/31/96

FIGURE 14. 2,4-D ON MICROMEDEX (continued)

RTECS(R)

Topic: Acetic acid, (2,4-dichlorophenoxy)-

1. ACGIH TLV-TWA 10 mg/m3 REFERENCE: "Documentation of the Threshold Limit Values and Biological Exposure Indices," 5th ed., Cincinnati, OH, American Conference of Governmental Industrial Hygienists, Inc., 1986 6:375, 1991. <CODEN 85INA8>
2. IARC Cancer Review:Human Limited Evidence REFERENCE: IARC Monographs on the Evaluation of Carcinogenic Risk of Chemicals to Man 41:357, 1986. <CODEN IMEMDT>
3. IARC Cancer Review:Animal Inadequate Evidence REFERENCE: IARC Monographs on the Evaluation of Carcinogenic Risk of Chemicals to Man 15:111, 1977. <CODEN IMEMDT>
4. TOXICOLOGY REVIEW REFERENCE: Residue Reviews 59:1, 1975. <CODEN RREVAH>
5. TOXICOLOGY REVIEW REFERENCE: Deutsche Tieraerztliche Wochenschrift 80:485, 1973. <CODEN DTTIAF>
6. TOXICOLOGY REVIEW REFERENCE: Residue Reviews 56:107, 1975. <CODEN RREVAH>
7. TOXICOLOGY REVIEW REFERENCE: Economie et Medecine Animales 14:141, 1973. <CODEN ECMAAI>
8. TOXICOLOGY REVIEW REFERENCE: Biologico 40(2):44, 1974. <CODEN BIOGAL>
9. TOXICOLOGY REVIEW REFERENCE: Hygiene and Sanitation 31(7-9):383, 1966. <CODEN HYSAAV>

7.0 STATUS IN U.S.

1. EPA GENETOX PROGRAM 1988, Positive: In vivo cytogenetics-nonhuman bone marrow.
2. EPA GENETOX PROGRAM 1988, Positive: In vitro cytogenetics-human lymphocyte.
3. EPA GENETOX PROGRAM 1988, Positive: B subtilis rec assay; E coli polA without S9.
4. EPA GENETOX PROGRAM 1988, Positive: V79 cell culture-gene mutation.
5. EPA GENETOX PROGRAM 1988, Positive: S cerevisiae gene conversion.
6. EPA GENETOX PROGRAM 1988, Negative: D melanogaster-whole sex chrom. loss.
7. EPA GENETOX PROGRAM 1988, Negative: D melanogaster-nondisjunction.
8. EPA GENETOX PROGRAM 1988, Negative: Histidine reversion-Ames test.
9. EPA GENETOX PROGRAM 1988, Negative: D melanogaster Sex-linked lethal.
10. EPA GENETOX PROGRAM 1988, Negative: In vitro UDS-human fibroblast; TRP reversion.
11. EPA GENETOX PROGRAM 1988, Negative: S cerevisiae-homozygosis.
12. EPA GENETOX PROGRAM 1988, Inconclusive: Carcinogenicity-mouse/rat; Mammalian micronucleus.
13. EPA TSCA Section 8(b) CHEMICAL INVENTORY.

Produced by Micromedex, Inc. Vol. 30 Expires 10/31/96

RTECS(R)
Topic: Acetic acid, (2,4-dichlorophenoxy)-

14. EPA TSCA Section 8(d) unpublished health/safety studies.
15. On EPA IRIS database.
16. EPA TSCA TEST SUBMISSION (TSCATS) DATA BASE, APRIL 1996.
17. NIOSH Analytical Method, 1994: 2,4-D, 5001.
18. NTP Carcinogenesis Studies; on test (prechronic studies), February 1996.