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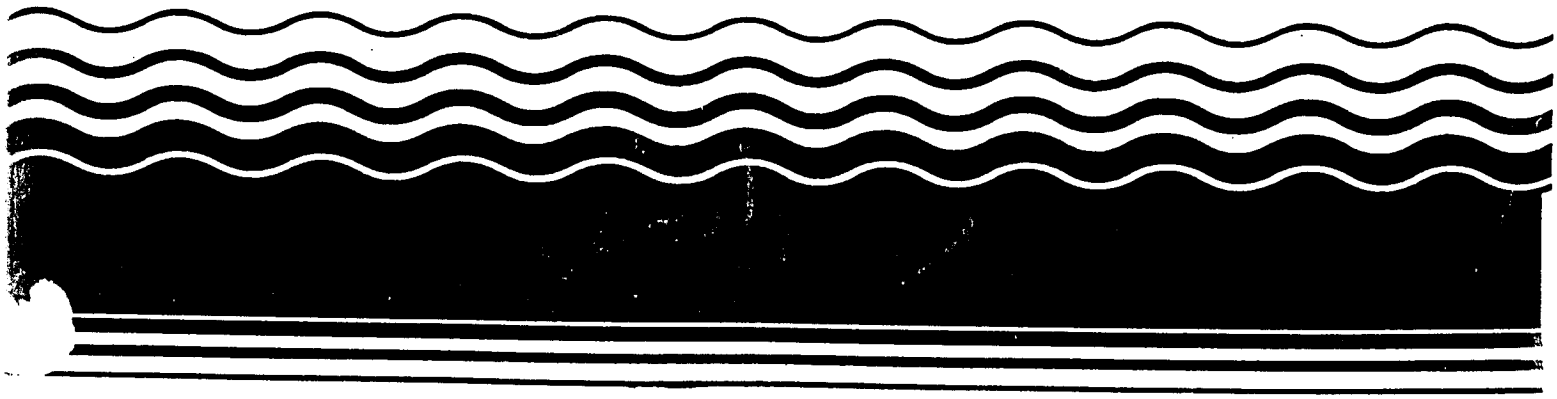
FY 1997 Update



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PB97-921199
July 1997

HEALTH EFFECTS ASSESSMENT

SUMMARY TABLES

FY-1997 Update

Office of Research and Development
Office of Emergency and Remedial Response
U.S. Environmental Protection Agency
Washington, DC 20460

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HEALTH EFFECTS ASSESSMENT SUMMARY TABLES
FY-1997 UPDATE

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DISCLAIMER

This report has been prepared by the U.S. Environmental Protection Agency. The information contained herein has been taken from final documents prepared by the National Center for Environmental Assessment for the Office of Solid Waste and Emergency Response and the Office of Water, Washington, DC and the Office of Air Quality Planning and Standards, Research Triangle Park, NC. These documents were reviewed in accordance with Agency policy and approved for publication. Mention of trade names or commercial products does not constitute endorsement or recommendation for use.

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INTRODUCTION

This document is an FY97 Update of the Health Effects Assessment Summary Tables (HEAST) prepared by EPA's National Center for Environmental Assessment, Cincinnati, OH (NCEA-CIN) for use at both Superfund and RCRA sites. It is intended to replace former editions and supplements of the HEAST. The HEAST will be updated annually if sufficient new data exist.

The HEAST is a comprehensive listing consisting almost entirely of PROVISIONAL RISK ASSESSMENT INFORMATION relative to oral and inhalation routes for chemicals of interest to Superfund, the Resource Conservation and Recovery Act (RCRA), and the EPA in general. Although these entries in the HEAST have undergone review and have the concurrence of individual Agency Program Offices, and each is supported by an Agency reference, they have not had enough review to be recognized as high quality, Agency-wide consensus information.

The Integrated Risk Information System (IRIS) is the Agency's official repository of Agency-wide consensus chronic human health risk information. Until recently, IRIS evaluations were conducted by the Agency's Work Group Review process. To improve IRIS and to make it more useful, EPA requested and received public comment. As a consequence the Agency has initiated an IRIS Pilot program to replace the Reference Dose/Reference Concentration (RfD/RfC) and the Carcinogen Risk Assessment Verification Endeavor (CRAVE) Work Groups.

The Pilot will produce new or updated toxicological reviews and IRIS entries containing Agency consensus scientific positions on potential adverse human health effects that may result from chronic exposure to environmental contaminants.

The Pilot process consists of (1) a call for public involvement for interested parties to have some level of input into IRIS technical information, (2) a search of the relevant literature,

(3) development of toxicological reviews and draft IRIS summaries, (4) internal peer review within EPA, (5) external peer review by experts selected for each substance outside EPA, (6) consensus review and management approval within EPA, (7) preparation of final IRIS summaries and supporting documents, and (8) entry of summaries into the IRIS database.

Currently, the Pilot process, which has been underway since early FY 1996, is being applied to a select group of chemical substances chosen on the basis of the Agency's need for new or updated hazard or dose-response information. These assessments will be included in IRIS, and do not appear in the HEAST.

There are two exceptions to the above discussion. The HEAST also contains information on chemicals included under the National Ambient Air Quality Standards (NAAQS) and the Drinking Water Criteria Document (DWCD) series. In each of these cases, the chemicals are subject to extensive scientific peer review for quality assurance.

CHEMICAL STATUS DEFINITIONS

Chemicals previously reviewed by the Agency for consensus are classified according to their status as either "verified," "not verifiable," or "under review." The toxicity values (other than NAAQS or DWCD values) listed on the HEAST are considered to be "provisional." The Agency has no official definitions for these terms, but the HEAST user may interpret them as follows:

> **Provisional:** A toxicity value or a cancer value is "provisional" if the value has had some form of Agency review, but it does not appear on the IRIS system. These values are generated in several ways. Often they are determined in the course of developing an Agency document on a chemical or on a class of chemicals. Some have been generated through the earlier Work Group process, but have not yet been input to the IRIS system. At the time each value was derived, all available information on the chemical was evaluated, the value was calculated using the most current methodology, and a consensus was reached on the value by Agency scientists.
>
> Brackets are placed around the names of toxicity and carcinogenicity values on the HEAST to distinguish these "provisional" values from information on IRIS.

The following names are affected: RfD to [RfD], RfC to [RfC], slope factor to [slope factor], EPA group to [EPA Group] and unit risk to [unit risk].

These "provisional" values are found on the HEAST. They do not appear on IRIS.

Verified: A toxicity value or a cancer value receives Agency consensus as "verified" after all available information has been reviewed and a value has been calculated using current methodology. Verified values are entered on IRIS.

Some numbers that have achieved unanimous consensus by the previous Agency Work Groups may appear on the HEAST as "provisional" values.

These "verified" numbers only appear on IRIS. They do not appear on the HEAST.

Not verifiable: A toxicity value is "not verifiable" if all available data on a chemical was determined by the Agency to be inadequate to generate a value that would be suitable for inclusion on IRIS. No toxicity value is calculated; no toxicity value is available for IRIS or the HEAST.

This "not verifiable" status is noted on IRIS, and is sometimes found on the HEAST, with a pointer to the IRIS system.

Under Review: A toxicity value is "under review" if it is undergoing the Pilot process of considering all available data. All Pilot chemicals will have this status until the toxicity value is placed on IRIS.

This "under review" status may be indicated on IRIS or on the HEAST. During this time, "provisional" toxicity values may appear on the HEAST.

Note: In all cases, the status of a chemical may change as new data become available, and the assessment is revisited, reviewed and verified through the Pilot Proces previously described.

CAUTION

It is imperative for each user of the HEAST to recognize that the values listed in the toxicity tables and the cancer table are generally considered to be PROVISIONAL RISK ASSESSMENT INFORMATION. The user is referred to IRIS for earlier "Work Group Verified" values. It is also important to remember that the numbers in these tables alone tell very little

about the adverse effects of a chemical or the quality of evidence on which risk assessment information is based. Original assessment documents must be consulted by users of the HEAST in order to fully appreciate the strengths and limitations of a specific data base. Original source documents will allow for the most complete characterization of potential toxicity associated with the range of exposure pathways generally evaluated at Superfund and RCRA sites. The Reference Tables point the user to these sources.

CONTRIBUTORS

Chemicals commonly found at RCRA sites as identified by the Office of Solid Waste's (OSW) Technical Assessment Branch are included in the HEAST. The Office of Radiation Programs has provided data on radionuclide carcinogenicity for Table 4. Finally, the Office of Air Quality Planning and Standards (OAQPS) has provided information on chemicals for which Air Quality Criteria Documents and National Ambient Air Quality Standards have been developed.

CHEMICALS LISTED

Most of the chemicals included on the toxicity tables and carcinogenicity table are those for which at least one of the following EPA documents has been written: Health Effects Assessment Document (HEA), Health and Environmental Effects Profile (HEEP), Health and Environmental Effects Document (HEED), Health Assessment Document (HAD), Air Quality Criteria Document (AQCD), Drinking Water Criteria Document (DWCD). A description of each is provided in Appendix A, Section I. In a few cases, the values are supported by other written material, such as Work Group meeting notes or Carcinogen Assessment Group (CAG) Profiles. Radionuclide slope factor values are calculated by the EPA's Office of Radiation Programs.

The names of criteria pollutants that are regulated as National Ambient Air Quality Standards (NAAQS) under the Clean Air Act are listed in the main body of the HEAST, but the actual criteria are included as Section V of Appendix A. The NAAQS were not included in the tables in order to distinguish them from the reference concentration ([RfC]) values. The NAAQS and [RfC]s represent different levels of review and different methods of calculation and thus, must be interpreted and used differently.

HIERARCHY OF SOURCES

It is recognized that at any point in time there may be multiple old and new Agency documents or data bases that present different values on a specific chemical. For chemicals other than those represented by the NAAQS or DWCDs, the following hierarchy of sources is recommended in evaluating chemical toxicity for Superfund sites:

1. The Agency's Integrated Risk Information System (IRIS) and cited references. Changes are made in this data base on a monthly basis, but there may be data gaps. Call the RISK INFORMATION HOTLINE at (513)569-7254 for further information.

2. The Health Effects Assessment Summary Tables (HEAST) and cited references.

3. Consultation with the Superfund Health Risk Technical Support Center (TSC) at (513)569-7300.

4. Do not consult either the toxicity tables (Appendix A) in the Superfund Public Health Evaluation Manual (SPHEM, U.S. EPA, 1986) or the September 1988 Public Health Risk Evaluation Data Base (PHRED) as these sources are likely to contain numerous values that have since become out-of-date.

QUESTIONS

Chemical Toxicity and Carcinogenicity

Questions regarding the contents of the chemical toxicity and carcinogenicity tables on the HEAST (e.g., chemicals not covered, chemicals with pending [RfD]s) may be directed to

EPA's Superfund Health Risk Technical Support Center (TSC) in Cincinnati, OH at (513)569-7300 [FAX#: (513)569-7159]. Requests should include the following information:

- Superfund site name, site location and twelve-digit site number;
- Name and phone number of the site Remedial Project Manager (RPM) or Regional Risk Assessor/Toxicologist;
- Detailed description of the risk assessment related question.

Written requests should be mailed to:

Superfund Health Risk Technical Support Center
US EPA
26 W. Martin Luther King Dr.
National Center for Environmental Assessment
MS - G44
Cincinnati, OH 45268

Radionuclide Carcinogenicity

Questions concerning radionuclide carcinogenicity should first be addressed by contacting the appropriate Regional Radiation Program Manager. A revised listing of these managers and several contacts in the Office of Radiation Programs can be found in Exhibit 2 of the User's Guide - Radionuclide Carcinogenicity.

REFERENCES

Most cited Agency references (e.g., HEAs, HEEPs, HEEDs), are available through the National Technical Information Service (NTIS), 5285 Port Royal Road, Springfield, VA 22161 [(703)487-4650]. Carcinogen Assessment Group (CAG) Profiles cited in Table 3 are available through the RCRA docket (703)603-9230.

Drinking water documents are available by calling the Water Resource Center at (202)260-7786.

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ORDERING INFORMATION

Limited copies of the HEAST are available for EPA Superfund staff, State Superfund programs and other Federal agencies working on Superfund sites, and EPA contractors working for the EPA Superfund program. Users in these groups can call International Consultants, Inc. (513)569-7300 to be put on the mailing list. Regional OSW staff are reminded that copies are sent to all EPA Regional libraries.

Users of the HEAST in EPA's Office of Air and Radiation and State air programs should call Roy Smith of EPA's Office of Air Quality Planning and Standards at (919)541-5632.

All other users must purchase the document from:

National Technical Information Service (NTIS)

5285 Port Royal Road

Springfield, VA 22161

(703)487-4650

For ordering information, call the NTIS Subscriptions Department at (703)487-4630. NTIS normally ships 4th class United States mail. When ordering the 1997 Health Effects Assessment Summary Table annual update from NTIS refer to the following order number:

PB97-921199: FY97 Annual HEAST update

STRUCTURE OF THE HEAST

The HEAST Introduction contains explanatory material relative to the quality of information on the HEAST, its sources, and its availability. This is followed by a listing of changes since the last HEAST was published and then by User's Guides for both Chemical Toxicity and Carcinogenicity, and Radionuclide Carcinogenicity. The values on the HEAST are

presented in a series of five tables that contain toxicity information and three tables of references. The information contained in each table and their designations are as follows:

HEAST TABLE 1: SUBCHRONIC AND CHRONIC TOXICITY (OTHER THAN CARCINOGENICITY)
Table 1 lists subchronic and chronic non-cancer toxicity values that were calculated using the methodology practiced by the RfD/RfC Work Group.

HEAST TABLE 1 REFERENCES: SUBCHRONIC AND CHRONIC TOXICITY (OTHER THAN CARCINOGENICITY)
The references for Table 1 are numerically coded to associate each toxicity value clearly with its corresponding reference.

HEAST TABLE 2: ALTERNATE METHODS - SUBCHRONIC AND CHRONIC TOXICITY (OTHER THAN CARCINOGENICITY)
Table 2 lists subchronic and chronic non-cancer toxicity values that are found in Agency documents, but were calculated by alternative methods that were not practiced by the RfD/RfC Work Group. These values are considered to be adequate provisional values for risk assessment purposes at Superfund and RCRA sites, but are to be reviewed and revised when necessary to reflect current information.

HEAST TABLE 2 REFERENCES: ALTERNATE METHODS - SUBCHRONIC AND CHRONIC TOXICITY (OTHER THAN CARCINOGENICITY)
The references for Table 2 are numerically coded to associate each toxicity value clearly with its corresponding reference.

HEAST TABLE 3: CARCINOGENICITY
Table 3 lists carcinogenicity values that were calculated by the CRAVE Work Group using Agency methodology.

HEAST TABLE 3 REFERENCES: CARCINOGENICITY
The references for Table 3 are numerically coded to associate each toxicity value clearly with its corresponding reference.

HEAST TABLE 4: RADIONUCLIDE CARCINOGENICITY - SLOPE FACTORS (In Units of Picocuries)
Table 4 lists ingestion, inhalation and external exposure carcinogenicity slope factors for radionuclides in units of picocuries and a factor to convert into the International System (SI) activity units of becquerels (Bq).

Following the tables, a Technical Appendix (Appendix A) is available, containing the following sections:

I. Data Sources and Selection Criteria Used in HEAST

II. Dose Conversions on HEAST

III. Chemical Name and Chemical Abstracts Service Registry Number Cross Reference

IV. Effect Level Definitions

V. National Ambient Air Quality Standards (NAAQS)

WHAT'S NEW IN THE FY97 ANNUAL HEAST

GENERAL CHANGES -- CHEMICAL TOXICITY AND CARCINOGENICITY

The changes in this version of the HEAST reflect changes in IRIS through July 1, 1997.

CHEMICAL-SPECIFIC CHANGES -- CHEMICAL TOXICITY AND CARCINOGENICITY

A. CHEMICAL-SPECIFIC CHANGES ON HEAST TABLE 1: SUBCHRONIC AND CHRONIC TOXICITY (OTHER THAN CARCINOGENICITY)

Benzo[b]fluoranthene 000205-99-2
Removed from Table 1 due to incomplete subchronic [RfC] assessment.

Bis(2-chloroisopropyl)ether 039638-32-9
Removed general comment from Table 1.

Chlorobenzene 000108-92-7
Removed from Table 1 the subchronic [RfD] comment due to incomplete assessment.

Dichloroethane, 1,2- 000107-06-2
Removed from Table 1 due to incomplete subchronic [RfC] and [RfD] assessments.

Manganese 007439-96-5
Removed the subchronic oral water [RfD] from Table 1 and citation 010850 from References to Table 1.

Trichloroethane, 1,1,1- 000071-55-6
Removed subchronic [RfC] comment from Table 1 due to incomplete assessment.

Uranium, Soluble Salts No CAS #
Removed from Table 1 due to incomplete assessment.

B. CHEMICAL-SPECIFIC CHANGES ON HEAST TABLE 2: ALTERNATE METHODS -- SUBCHRONIC AND CHRONIC TOXICITY (OTHER THAN CARCINOGENICITY)

Dicyclopentadiene 000077-73-6
Changed target organ from liver to kidney.

C. CHEMICAL-SPECIFIC CHANGES ON HEAST TABLE 3: CARCINOGENICITY

Allyl chloride 000107-05-1
The general comment, "contact the Health Assessment Section" is removed from Table 3.

Arsenic, inorganic 007440-38-2
Removed inhalation [slope] factor value and comment from Table 3.

Benzo(b)fluoranthene 000205-99-2
Removed general comment.

Benzo(k)fluoranthene 000207-08-9
Removed the general comment, "contact the Health Assessment Section".

Chloromethyl methyl ether 000107-30-2
The general comment, "contact the Health Assessment Section" is removed.

Chrysene 000218-01-9
The general comment, "contact the Health Assessment Section" is removed.

Dibenzo[a,h]anthracene 000053-70-3
The general comment, "contact the Health Assessment Section" is removed.

Dichloroethane, 1,2- 000107-06-2
The inhalation [slope] factor and comment are removed from Table 3.

Dimethylbenz[a]anthracene, 7,12- 000057-97-6
Removed from Table 3. The general comment, "contact the Health Assessment Section" is removed from Table 3 References.

Methylcolanthracene, 3- 000056-49-5
Removed from Table 3 and from Table 3 References.

Nitroso-n-ethylurea, N- 000759-73-9
Removed the general comment, "contact the Health Assessment Section".

Polychlorinated biphenyls 001336-36-3
Added general comment: Carcinogenicity information was changed on IRIS.

D. CHEMICAL-SPECIFIC CHANGES ON HEAST TABLE 4: RADIONUCLIDE CARCINOGENICITY -- SLOPE FACTORS

No changes made to Table 4.

CHEMICAL SPECIFIC CHANGES MADE IN THE NOVEMBER 1995 SUPPLEMENT TO THE MAY 1995 HEAST ANNUAL UPDATE

The following changes were made in the November 1995 supplemental edition of the May 1995 HEAST Annual Update. Because some users may have been unaware of the publication of the November 1995 supplement, the following information should be noted.

A. CHEMICAL-SPECIFIC CHANGES ON HEAST TABLE 1: SUBCHRONIC AND CHRONIC TOXICITY (OTHER THAN CARCINOGENICITY)

Antimony trioxide 001309-64-4
An indicator was added to show that an inhalation RfC has been added to IRIS. The chronic inhalation RfC was adopted as the subchronic inhalation [RfC].

Boron, elemental 007440-42-8
The subchronic oral [RfD] was removed because the chronic oral RfD on which it was based is under review by the RfD/RfC Work Group.

Carbon disulfide 000075-15-0
An indicator was added to show that an inhalation RfC has been added to IRIS. The chronic inhalation RfC was adopted as the subchronic inhalation [RfC].

Hydrogen sulfide 007783-06-4
After a reevaluation of uncertainty factors by the RfD/RfC Work Group, the chronic inhalation RfC was modified to estimate the subchronic inhalation [RfC].

Mercuric chloride 007487-94-7
After a reevaluation of uncertainty factors by the RfD/RfC Work Group, The chronic oral RfD was modified to estimate the subchronic oral [RfD].

Phosphine 007803-51-2
An indicator was added to show that an inhalation RfC has been added to IRIS. The chronic inhalation RfC was modified to estimate the subchronic inhalation [RfC].

B. CHEMICAL-SPECIFIC CHANGES ON HEAST TABLE 2: ALTERNATE METHODS - SUBCHRONIC AND CHRONIC TOXICITY (OTHER THAN CARCINOGENICITY)

There were no changes to Table 2.

C. CHEMICAL-SPECIFIC CHANGES ON HEAST TABLE 3: CARCINOGENICITY

Arsenic, inorganic 007440-38-2
Indicators were added to show that an oral slope factor and an oral unit risk have been added to IRIS.

Bis(2-chloro-1-methylethyl) ether 000108-60-1
A typographical error in the CAS Registry Number has been corrected. There were no other changes to the record.

D. CHEMICAL-SPECIFIC CHANGES ON HEAST TABLE 4: RADIONUCLIDE CARCINOGENICITY - SLOPE FACTORS

For the November 1995 Supplement of the HEAST for radionuclides, EPA's Office of Radiation and Indoor Air (ORIA) has:

✓ corrected the factor in Table 4 for converting radionuclide slope factors from the customary units of picocuries (Ci) to the International System (SI) units of becquerels (Bq). (To convert radionuclides slope factors into the SI units of Bq, users should multiply each value in Table 4 by 27.03, not by 3.70E-02, the conversion factor provided in the May 1995 update.)

✓ added ingestion, inhalation, and external exposure slope factors for californium (Cf-252), iridium (Ir-192), thallium (Tl-207), and silver (Ag-110m+D).

✓ removed the ingestion, inhalation, and external slope factors for Cm-243+D and Pu-241+D. (EPA/ORIA re-evaluated the derivation and use of "+D" slope factors for decay chains that include a parent radionuclide (e.g., Cm-243 or Pu-241) with a radioactive half-life much shorter than the half-life of its immediate decay product (e.g., Pu-239 in the case of Cm-243 and Am-241 in the case of Pu-241). ORIA concluded that using "+D" slope factors for these types of radionuclides and decay chains may significantly underestimate radiation exposure and risk at certain sites, because such factors cannot be derived to cover all possible equilibrium conditions in the environment. At sites contaminated with these types of radionuclides, ORIA recommends that users (1) determine the radioactivity concentrations of the parent and each decay product radionuclides separately, (2) apply the appropriate slope factors in Table 4 for each radionuclide individually, and (3) add the individual risks from each radionuclide to calculate the collective risk posed by the site.)

✓ corrected the external slope factor values for Ac-227+D, Ce-144+D, Pu-244+D, Th-228+D, Th-229+D, and U-238+D in Table 4.

✓ corrected the branching factor for Ce-144 to Pr-144 from 9% to 98%, and corrected the half-life for Ra-228 from 8 years to 6 years in Exhibit 1.

USER'S GUIDE: CHEMICAL TOXICITY

The HEAST summarizes provisional toxicity and cancer values as well as values developed for the NAAQS and DWCD chemicals. The provisional status of the toxicity and cancer values is indicated by placing brackets around the title of the value. These include provisional reference concentrations ([RfC]) and provisional reference doses ([RfD]) for toxicity from subchronic and chronic inhalation and oral exposure (Tables 1 and 2) and provisional slope factors ([slope factor]), provisional cancer classifications ([EPA Group]) and provisional unit risk values ([unit risk]) for carcinogenicity, based on lifetime inhalation and oral exposure (Table 3). Brackets should be included with the acronym whenever a user quotes the value in an assessment document, and the provisional nature of the value should be noted. A more complete discussion of how Superfund develops and considers the toxicity assessment in hazardous waste sites is presented in Chapter 7 of Risk Assessment Guidance for Superfund Volume 1: Human Health Evaluation Manual, Part A, EPA/540/1-89/002.

The references listed for each chemical in the Reference Tables for Tables 1, 2 and 3 represent the study or studies that are the basis for the [RfC], [RfD], [slope factor], [EPA Group], or [unit risk], as well as the EPA reference that is the source of the Agency analysis or risk assessment information. In some cases, additional EPA documents are also listed as a source of information on the chemical. Verified values found on IRIS are not found on the HEAST, but are indicated in the tables by the word "IRIS" in place of the number.

TABLE 1: SUBCHRONIC AND CHRONIC TOXICITY (OTHER THAN CARCINOGENICITY)

The [RfC] or [RfD] is a provisional estimate (with uncertainty spanning perhaps an order of magnitude) of the daily exposure to the human population (including sensitive subgroups) that is likely to be without an appreciable risk of deleterious effects during a portion of the lifetime, in the case of a subchronic [RfC] or [RfD], or during a lifetime, in the case of a chronic [RfC] or [RfD]. The [RfC] and [RfD] values are listed in Tables 1 and 2 in columns with the headings "Subchronic" and "Chronic". The critical dose or concentration level is usually a No-Observed-Adverse-Effect Level (NOAEL) or a Lowest-Observed-Adverse-Effect Level (LOAEL) (See Appendix A, Section IV: Effect Level Definitions, for more information). The [RfC] or [RfD] is derived by dividing the NOAEL or LOAEL by an uncertainty factor (UF) times a modifying factor (MF):

$$[RfC] \text{ or } [RfD] = \frac{NOAEL \text{ or } LOAEL}{UF \times MF}$$

In Tables 1 and 2, the information listed is the following:

Chemical	=	Chemical Name/CASRN
Level	=	Effect Level
Dose	=	Administered Dose or Concentration
Route	=	Route of Administration
Species	=	Tested Species
Experiment Length	=	Length of Exposure
Target	=	Target Organ(s) Affected at Critical Level
Critical Effect	=	Effect(s) Observed at Critical Level
Subchronic [RfC]	=	Subchronic Inhalation [Reference Concentration]
UF	=	Uncertainty Factor for the Subchronic Inhalation [Reference Concentration]
Subchronic [RfD]	=	Subchronic Oral [Reference Dose]
UF	=	Uncertainty Factor for the Subchronic Oral [Reference Dose]
Chronic [RfC]	=	Chronic Inhalation [Reference Concentration]

UF	=	Uncertainty Factor for the Chronic Inhalation [Reference Concentration]
Chronic [RfD]	=	Chronic Oral [Reference Dose]
UF	=	Uncertainty Factor for the Chronic Oral [Reference Dose]
Reference	=	Reference Identification Number for All Toxicity Values on the Same Line.

An example of this information is shown in Figure 1, HEAST Table 1:

Chemical	=	GLYCIDALDEHYDE/000765-34-4
Level	=	NOAEL
Dose	=	10 PPM
Route	=	INHALATION: INTERMITTENT
Species	=	RAT
Experiment Length	=	12 WEEKS
Target	=	WHOLE BODY, BLOOD, KIDNEY
Critical Effect	=	DECREASED WEIGHT GAIN, HEMATOPOIETIC EFFECTS
Subchronic [RfC]	=	1E-2 mg/cu.m
UF	=	300
Subchronic [RfD]	=	4E-3 mg/kg/day
UF	=	300
Chronic [RfC]	=	1E-3 mg/cu.m
UF	=	3000
Chronic [RfD]	=	IRIS
UF	=	IRIS
Reference	=	005968

Notice that a Chronic RfD for Glycidaldehyde is available on IRIS, so it is not listed here. Also notice that there are footnotes for this chemical that indicate a route-to-route extrapolation was performed and that there is information available on Table 3: Carcinogenicity.

Also given in Figure 1 is an example of the References for Table 1 for the same chemical. The reference is identified by the chemical name (Glycidaldehyde), the CASRN (00765-34-4), and the reference number that links it with the toxicity values (005968).

FIGURE 1

Example Data and References for Chemical Toxicity

HEAST TABLE 1: SUBCHRONIC AND CHRONIC TOXICITY (OTHER THAN CARCINOGENICITY)

January 1992

CHEMICAL / LEVEL	DOSE / ROUTE	SPECIES / EXPERIMENT	LENGTH	TARGET	CRITICAL EFFECT	Subchronic [RfC] (mg/cu m) UF	Subchronic [RfD] (mg/kg/day) UF	Chronic [RfC] (mg/cu m) UF	Chronic [RfD] (mg/kg/day)	REFERENCE
GLYCIDALDEHYDE		000765-34-4								
NOAEL	10 PPM	RAT				1E-2	4E-3	1E-3	IRIS	005968
	INHALATION:	12 WEEKS		WHOLE BODY	DECREASED WEIGHT GAIN	300	300	3000		
	INTERMITTENT			BLOOD	HEMATOPOIETIC EFFECTS					
				KIDNEY	EFFECTS					

SUBCHRONIC [RfD] COMMENT: BASED ON ROUTE TO ROUTE EXTRAPOLATION USING AN ABSORPTION FACTOR OF 0.5.
CHRONIC [RfD] COMMENT: BASED ON ROUTE TO ROUTE EXTRAPOLATION USING AN ABSORPTION FACTOR OF 0.5.
GENERAL COMMENT: ALSO SEE TABLE 3: CARCINOGENICITY.

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REFERENCES FOR HEAST TABLE 1: SUBCHRONIC AND CHRONIC TOXICITY (OTHER THAN CARCINOGENICITY)

January 1992

GLYCIDALDEHYDE 000765-34-4

005968 HINE CH, RJ GUZMAN, MK DUNLAP, R LIMA AND GS LOQUVAM. 1961. STUDIES ON THE TOXICITY OF GLYCIDALDEHYDE. ARCH ENVIRON HEALTH. 2: 23-30.

US EPA. 1989. HEALTH AND ENVIRONMENTAL EFFECTS DOCUMENTFOR GLYCIDALDEHYDE. PREPARED BY THE OFFICE OF HEALTH AND ENVIRONMENTAL ASSESSMENT, National Center for Environmental Assessment, CINCINNATI, OH FOR THE OFFICE OF SOLID WASTE AND EMERGENCY RESPONSE, WASHINGTON, DC.

The uncertainty factor used in calculating the [RfC] or [RfD] reflects scientific judgment regarding the various types of data used to estimate [RfC] or [RfD] values. An uncertainty factor of 10 is usually used to account for variation in human sensitivity among populations. An additional 10-fold factor is usually used to account for each of the uncertainties assumed when extrapolating from animal data to humans, when extrapolating from a LOAEL to a NOAEL, and when extrapolating from subchronic to chronic exposure. In order to reflect professional assessment of the uncertainties of the study and the data base not explicitly addressed by the above uncertainty factors (e.g., completeness of the overall data base), an additional uncertainty factor or modifying factor ranging from greater than 0 to less than or equal to 10 is applied. The default value for this modifying factor is 1.

For chemicals for which a chronic [RfC] or [RfD] is presented in Tables 1 and 2, a subchronic [RfC] or [RfD] is usually derived, if not previously derived in the Agency documents that originally addressed the chemical. Subchronic toxicity values are not evaluated by the RfD/RfC Work Group. The subchronic [RfC] or [RfD] is derived in either of two ways: 1) If an uncertainty factor was used to account for extrapolation from subchronic to chronic exposure in the derivation of the chronic [RfC] or [RfD], then, the subchronic [RfC] or [RfD] is derived from the same benchmark concentration or dose without applying the uncertainty factor for subchronic to chronic exposure extrapolation. 2) If the chronic [RfC] or [RfD] was derived without use of an uncertainty factor for extrapolating from subchronic to chronic exposure (e.g., if chronic data were available), then, the chronic [RfC] or [RfD] is adopted as the subchronic [RfC] or [RfD].

Tables 1 and 2 list the uncertainty factor and modifying factor, multiplied together, to form a single factor under the heading "Uncertainty Factor." For example, the uncertainty factor of 3000 listed for the chronic inhalation [RfC] for Glycidaldehyde reflects an uncertainty factor of 1000 (10 for human sensitivity, 10 for extrapolation from animal to human, and 10 for extrapolation from subchronic to chronic) and a modifying factor of 3 (for an inadequate data base); the uncertainty factor of 500 listed for the subchronic oral [RfD] for cyanide reflects an uncertainty factor of 100 (10 for human sensitivity, and 10 for extrapolation from animal to human) and a modifying factor of 5 (to account for tolerance to cyanide when ingested by food rather than administration by gavage or by drinking water).

[RfC] and [RfD] values are specific for the route of exposure for which they are listed on Tables 1 and 2. In the few instances where an [RfD] or [RfC] has been determined from another exposure route, route-to-route extrapolation is indicated by a footnote.

The current methodology for the derivation of inhalation RfCs is detailed in the document, "Interim Methods for Development of Inhalation Reference Doses" (U.S. EPA, 1990, EPA/600/8-88/066F, NTIS PB90-145723). These methods are different from those used for oral RfDs because of (1) the dynamics of the respiratory system and its diversity across species, and (2) differences in the physicochemical properties of contaminants (such as the size and shape of a particle or whether the contaminant is an aerosol or a gas). Parameters such as deposition, clearance mechanisms and the physicochemical properties of the inhaled agent are considered in the determination of the effective dose delivered to the target organ.

An RfC value calculated using this interim methodology is generally reported as a concentration in air (mg/m^3), although it may be converted to a corresponding inhaled dose (mg/kg/day) by dividing by 70 kg (an assumed human body weight), multiplying by 20 m^3/day (an assumed human inhalation rate), and adjusting by an appropriate absorption factor. This conversion, however, may often be technically incorrect, and the appropriateness of doing this must be evaluated on a case-by-case basis. It is recommended that HEAST users that plan to use this technique read a further discussion of the difficulties inherent in this dose conversion that can be found in Appendix A, Section II: Dose Conversions On HEAST.

Inhalation [RfC] values reported in HEAs and early HEEDs that were finalized prior to the implementation of the interim methods were calculated using methods similar in concept to those used for oral [RfD]s. These values are reported both as a concentration in air (in mg/m^3 for continuous, 24 hours/day exposure) under the column [RfC], and as a corresponding inhaled dose (in mg/kg/day) in the footnotes called, Chronic (Subchronic) [RfC] Comment. These chemicals are listed in Table 2: Alternate Methods - Subchronic and Chronic Toxicity (Other Than Carcinogenicity).

[RfD] values for oral exposure are reported as mg/kg/day. An oral [RfD] value can be converted to a corresponding concentration in drinking water, assuming human body weight of 70 kg and water consumption of 2 L/day, as follows:

$$mg/L \text{ in water} = \frac{\text{oral [RfD] (in mg/kg/day)} \times 70 \text{ kg}}{2 \text{ L/day}}$$

The [RfC] or [RfD] is used as a reference point for gauging the potential effects of other exposures. Usually, exposures that are less than the [RfC] or [RfD] are not

likely to be associated with health risks. As the frequency of exposures exceeding the [RfC] or [RfD] increases and as the size of the excess increases, the probability increases that adverse health effects may be observed in a human population. Nonetheless, a clear distinction that would categorize all exposures below the [RfC] or [RfD] as "acceptable" (risk-free) and all exposures in excess of the [RfC] or [RfD] as "unacceptable" (causing adverse effects) cannot be made. In addition, [RfC] and [RfD] values, and particularly those with limitations in the quality or quantity of supporting data, are subject to change as additional information becomes available.

When [RfC] or [RfD] values are listed in Tables 1 or 2 for chemicals that are carcinogens, a footnote will refer to Table 3 if additional information concerning carcinogenicity is available in that table. [RfC] and [RfD] values that have been derived for carcinogens are based on noncancer endpoints only and should not be assumed to be protective against carcinogenicity.

TABLE 2: ALTERNATE METHODS - SUBCHRONIC AND CHRONIC TOXICITY (OTHER THAN CARCINOGENICITY)

Chemicals are listed in Table 2 when the [RfD] or [RfC] was derived from alternative methods that were not practiced by the RfD/RfC Work Group. The table consists primarily of inhalation [RfC] values determined from methodology that does not follow the interim inhalation methods adopted by the Agency, and [RfC] or [RfD] values based on route-to-route extrapolation with inadequate pharmacokinetic and toxicity data. A footnote is added to each chemical to provide a short explanation of the specific methodology used in calculating these provisional toxicity values. Most of

these toxicity values were formerly listed in Table 1. In some instances, the chemical may be listed in both Tables 1 and 2 if the chemical has more than one toxicity value. Table 2 follows the same format as Table 1 (refer to Figure 1).

TABLE 3: CARCINOGENICITY

In assessing the carcinogenic potential of a chemical, the Human Health Assessment Group (HHAG) of EPA classifies the chemical into one of the following groups, according to the weight of evidence from epidemiologic and animal studies:

Group A - Human Carcinogen (sufficient evidence of carcinogenicity in humans)

Group B - Probable Human Carcinogen (B1 - limited evidence of carcinogenicity in humans; B2 - sufficient evidence of carcinogenicity in animals with inadequate or lack of evidence in humans)

Group C - Possible Human Carcinogen (limited evidence of carcinogenicity in animals and inadequate or lack of human data)

Group D - Not Classifiable as to Human Carcinogenicity (inadequate or no evidence)

Group E - Evidence of Noncarcinogenicity for Humans (no evidence of carcinogenicity in adequate studies).

These classifications are shown under [EPA Group] on Table 3.

Quantitative carcinogenic risk assessments are performed for chemicals in Groups A and B, and on a case-by-case basis for chemicals in Group C. Cancer [slope factors] (formerly called cancer potency factors in the Superfund Public Health Evaluation Manual) are estimated through the use of mathematical extrapolation models, most

commonly the linearized multistage model, for estimating the largest possible linear slope (within the 95% confidence limit) at low extrapolated doses that is consistent with the data. The [slope factor] or risk is characterized as an upper-bound estimate, i.e., the true risk to humans, while not identifiable, is not likely to exceed the upper-bound estimate and in fact may be lower.

Quantitative carcinogenic estimates listed in Table 3 include the following:

[slope factor] = risk per unit dose = risk per mg/kg/day

[unit risk] for inhalation exposure = risk per concentration unit in air = risk per $\mu g/m^3$

[unit risk] for oral exposure = risk per concentration unit in water = risk per $\mu g/L$

[Unit risk] estimates for inhalation and oral exposure can be calculated by dividing the appropriate [slope factor] by 70 kg and multiplying by the inhalation rate (20 m^3/day) or the water consumption rate (2 L/day), respectively, for risk associated with unit concentration in air or water. Hence,

$$\text{risk per } \mu g/m^3 \text{ (air)} = (\text{risk per mg/kg/day}) \times \frac{1}{70 \text{ kg}} \times 20\ m^3/\text{day} \times 10^{-3}\ (\text{mg}/\mu g)$$

$$\text{risk per } \mu g/L \text{ (water)} = (\text{risk per mg/kg/day}) \times \frac{1}{70 \text{ kg}} \times 2\ L/\text{day} \times 10^{-3}\ (\text{mg}/\mu g)$$

Quantitative estimates of carcinogenic risk are listed under [Unit Risk] or [Slope Factor] in Table 3. Information on the study and data set used for estimation of the [slope factor] is given in the other columns of Table 3.

In Table 3, the information listed is the following:

Chemical	=	Chemical Name/CASRN
Route	=	Route of Administration
Species	=	Tested Species
Experiment Length	=	Length of Exposure
Target	=	Target Organ(s) Affected at Critical Level
Cancer	=	Tumors Observed at Critical Level (Not Specified if More Than One Type of Tumor)
[EPA Group]	=	EPA Classification by Weight of Evidence
Oral [Slope Factor]	=	Risk Per Unit Dose
Inhalation [Slope Factor]	=	Risk Per Unit Dose
Oral [Unit Risk]	=	Risk Per Concentration Unit in Water
Inhalation [Unit Risk]	=	Risk Per Concentration Unit in Air
Reference	=	Reference Identification Number for All Toxicity Values on the Same Line.

An example of this information is shown in Figure 2, HEAST Table 3:

Chemical	=	DIMETHYLHYDRAZINE, 1,2-/000077-78-1
Route	=	ORAL: DRINKING WATER
Species	=	MOUSE
Experiment Length	=	LIFETIME
Target	=	CARDIOVASCULAR SYSTEM
Cancer	=	TUMORS
[EPA Group]	=	B2
Oral [Slope Factor]	=	3.7E+1 (MG/KG/DAY)-1
Inhalation [Slope Factor]	=	3.7E+1 (MG/KG/DAY)-1
Oral [Unit Risk]	=	1.1E-3 (UG/L)-1
Inhalation [Unit Risk]	=	1.1E-2 (UG/CU M)-1
Reference	=	009993

Notice that the inhalation values for 1,2-Dimethylhydrazine was extrapolated from the oral data.

Also given in Figure 2 is an example of the References for Table 3 for the same chemical. The reference is identified by the chemical name (Dimethylhydrazine, 1,2-), the CASRN (000077-78-1), and the reference number that links it with the toxicity values (009993).

FIGURE 2
Example Data and References for Carcinogenicity

HEAST TABLE 3: CARCINOGENICITY

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CHEMICAL ROUTE	EXPERIMENT LENGTH / SPECIES	TARGET	CANCER	[EPA GROUP]	[SLOPE FACTOR] ORAL (mg/kg/day)$^{-1}$	[SLOPE FACTOR] INHALATION (mg/kg/day)$^{-1}$	[UNIT RISK] ORAL (ug/L)$^{-1}$	[UNIT RISK] INHALATION (ug/cu m)$^{-1}$	REFERENCE
DIMETHYLHYDRAZINE,1,2- 000077-78-1									
ORAL: DRINKING WATER	LIFETIME			B2	3.7E+1	3.7E+1	1.1E-3	1.1E-2	009993
	MOUSE	CARDIOVASCULAR SYSTEM	TUMORS						
Inhalation [Slope] Comment:	BASED ON ROUTE TO ROUTE EXTRAPOLATION.								

REFERENCES FOR HEAST TABLE 3: CARCINOGENICITY

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DIMETHYLHYDRAZINE, 1,2- 000077-78-1

009993 TOTH B AND K PATEL. 1982. CARCINOGENICITY DOSE-RESPONSE STUDY BY CONTINUOUS ADMINISTRATION OF 1,2-DIMETHYLHYDRAZINE DI-HYDROCHLORIDE IN MICE. I. LIGHT AND TRANSMISSION ELECTRON MICROSCOPIC STUDY OF COLONOIC NEOPLASMS. AM. J. OF PATH. 84:69-86.

US EPA. 1988. CARCINOGEN RISK ASSESSMENT VERIFICATION ENDEAVOR (CRAVE) WORK GROUP.

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Quantitative carcinogenic estimates are specific for the route of exposure for which they are listed on Table 3. Footnotes are used to indicate those instances in which the values for inhalation or oral exposure are based on extrapolation from another route of exposure. The route-to-route conversion required to present inhalation [slope factors] in the units of mg/kg/day is considered by the CRAVE Work Group to be technically incorrect. It is recommended that HEAST users who plan to use this information read a further discussion of the difficulties inherent in this dose conversion which can be found in Appendix A, Section II: Dose Conversions On HEAST.

To estimate risk-specific concentrations in air from the [unit risk] in air as presented in Table 3, the specified level of risk is divided by the [unit risk] for air. Hence, the air concentration (in $\mu g/m^3$) corresponding to an upper-bound increased lifetime cancer risk of $1x10^{-5}$ is calculated as follows:

$$\mu g/m^3 \text{ in air} = \frac{1x10^{-5}}{[\text{unit risk}] \text{ in } (\mu g/m^3)^{-1}}$$

To estimate risk-specific concentrations in drinking water from the oral [slope factor] values presented in Table 3, the specified level of risk is multiplied by 70 kg and divided by the [slope factor] times 2 L/day. Hence, the water concentration corresponding to an upper-bound increased lifetime cancer risk of $1x10^{-5}$ is calculated as follows:

$$\text{mg/L in water} = \frac{1x10^{-5} \times 70 \text{ kg}}{[\text{slope factor}] \text{ in } (\text{mg/kg/day})^{-1} \times 2 \text{ L/day}}$$

USER'S GUIDE: RADIONUCLIDE CARCINOGENICITY

Introduction

EPA classifies all radionuclides as Group A carcinogens. HEAST Table 4 lists ingestion, inhalation and external exposure cancer slope factors for radionuclides in units of picocuries (pCi).[1] Ingestion and inhalation slope factors are central estimates in a linear model of the age-averaged, lifetime attributable radiation cancer incidence (fatal and nonfatal cancer) risk per unit of activity inhaled or ingested, expressed as risk/pCi. External exposure slope factors are central estimates of lifetime attributable radiation cancer incidence risk for each year of exposure to external radiation from photon-emitting radionuclides distributed uniformly in a thick layer of soil, and are expressed as risk/yr per pCi/gram soil. When combined with site-specific media concentration data and appropriate exposure assumptions[2], slope factors can be used to estimate lifetime cancer risks to members of the general population due to radionuclide exposures.

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[1]Slope factors are reported in Table 4 in the customary units of picocuries (1 pCi = 10^{-12} curies (Ci) = 3.7×10^{-2} nuclear transformations per second) for consistency with the system used for radionuclides in the IRIS database. If required, slope factors in Table 4 can be converted into the International System (SI) units of becquerels (1 Bq = 1 nuclear transformation per second) by multiplying each inhalation, ingestion, or external exposure value by 27.03. Users can calculate cancer risks using slope factors expressed in either customary units or SI units with equivalent results, provided that they also use air, water and soil concentration values in the same system of units.

[2]Agency standardized default exposure scenarios and assumptions for use in baseline risk assessment are provided in EPA (1991), *Risk Assessment Guidance for Superfund, Vol. I, Human Health Evaluation Manual, Supplemental Guidance:* "Standard Default Exposure Factors" (Interim Final), Office of Emergency and Remedial Response, OSWER Directive 9285.6-03. [NTIS order number: PB 91-921314.]

Intended Users and Applications

HEAST users include individuals from the EPA, other Federal agencies, States and contractors who are responsible for the identification, characterization and remediation of sites contaminated with radioactive materials. Radionuclide slope factors are calculated by EPA's Office of Radiation and Indoor Air (ORIA) to assist HEAST users with risk-related evaluations and decision-making at various stages of the remediation process. During site assessment, for example, slope factors are used in EPA's Hazard Ranking System (HRS) to assign toxicity factor values to radionuclides to calculate site scores. During the remedial investigation and feasibility study (RI/FS), slope factors are used to determine baseline site risk, to develop preliminary remediation goals, and to evaluate cleanup alternatives. For further examples on the application of radionuclide slope factors in risk evaluations, users are referred to the following EPA documents:

- Hazard Ranking System (HRS), Federal Register (55 FR 515320), December 1990.
- *Risk Assessment Guidance for Superfund; Volume I - Human Health Evaluation Manual* (RAGS/HHEM), Part A, Baseline Risk Assessment (EPA/540/1-89/002).
- RAGS/HHEM Part B, Development of Risk-Based Preliminary Remediation Goals (OSWER Directive 9285.7-01B). [NTIS order number: PB 92-963333.]
- RAGS/HHEM Part C, Risk Evaluation of Remedial Alternatives (OSWER Directive 9285.7-01C). [NTIS order number: PB 92-963334.]

Copies of RAGS/HHEM Parts A, B and C are available to the public from the National Technical Information Service (NTIS) at (703) 487-4650. Copies are available to EPA staff by calling the Superfund Documents Center at (703) 603-8917.

Radiation Effects

Ionizing radiation has been shown to be a carcinogen, a mutagen, and a teratogen. Radiation can induce cancers in nearly any tissue or organ in both humans and animals, and the probability of cancer induction increases with increasing radiation dose. Cancer induction is a delayed response that has been documented extensively in epidemiological studies of Japanese atomic bomb survivors, underground uranium miners, radium dial painters, and patients subject to a variety of radiation treatments. Laboratory animal research and mammalian tissue culture studies have provided additional, collaborative data.

Mutagenic effects of radiation have been demonstrated primarily in animal and tissue culture studies; limited data from studies of A-bomb survivors indicate that humans may be as sensitive or less sensitive than animals to radiogenic mutagenicity. Data are also available from both human and animal studies on the teratogenic effects of radiation. These data show that the fetus is most sensitive to radiation injury during the early stages of organ development (between 8 and 15 weeks for the human fetus). Resultant radiation-induced malformations depend on which cells are most actively differentiating at the time of exposure.

EPA classifies all radionuclides as Group A carcinogens, based on their property of emitting ionizing radiation and on the extensive weight of evidence provided by epidemiological studies of radiogenic cancers in humans. At Superfund radiation sites, EPA generally evaluates potential human health risks based on the radiotoxicity, i.e., adverse health effects caused by ionizing radiation, rather than on the chemical toxicity, of each radionuclide present. These evaluations consider the carcinogenic effects of

radionuclides only. In most cases, cancer risks are limiting, exceeding both mutagenic and teratogenic risks.

Derivation of Radionuclide Slope Factors

EPA's Office of Radiation and Indoor Air (ORIA) calculates radionuclide slope factor values using health effects data and dose and risk models from a number of national and international scientific advisory commissions and organizations, including the National Academy of Sciences (NAS), the National Council on Radiation Protection and Measurements (NCRP), the United Nations Scientific Committee on the Effects of Atomic Radiation (UNSCEAR), and the International Commission on Radiological Protection (ICRP). A detailed discussion of ORIA's approach and assumptions is provided in *Estimating Radiogenic Cancer Risks* (EPA 402-R-93-076).

Radionuclide slope factors are calculated for each radionuclide individually, based on its unique chemical, metabolic and radioactive properties. The calculation uses dose estimates from EPA's computer code RADRISK[3], vital statistics from the *U.S. Decennial Life Tables for 1979-1981* (described in EPA 402-R-93-076), and cancer risk estimates based largely on the results of the NAS BEIR V report[4], ICRP Publication 60[5],

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[3]Dunning, D.E. Jr., Leggett, R.W., and Yalcinatas, M.G. (1980). "A Combined Methodology for Estimating Dose Rates and Health Effects from Exposure to Radioactive Pollutants," ORNL/TM-7105.

[4]National Academy of Sciences (1990). Health Effects of Exposure to Low Levels of Ionizing Radiation, BEIR V, Committee on the Biological Effects of Ionizing Radiations, National Research Council, Washington, D.C.

[5]International Commission on Radiological Protection (1991), 1990 Recommendations of the International Commission on Radiological Protection, ICRP Publication 60, Pergamon Press, New York, NY.

and U.S. Nuclear Regulatory Commission (NRC) analyses[6]. Ingestion and inhalation slope factors for radionuclides account for:

- the amount of radionuclide transported into the bloodstream from either the gastrointestinal (GI) tract following ingestion, or from the lungs following inhalation;
- the ingrowth and decay of radioactive progeny produced within the body subsequent to intake;
- the distribution and retention of each radionuclide (and its associated progeny, if appropriate) in body tissues and organs;
- the radiation dose delivered to body tissues and organs from the radionuclide (and its associated progeny, if appropriate); and
- the sex, age, and organ-specific risk factors over the lifetime of exposure.

The slope factors are the average risk per unit intake or exposure for an individual in a stationary population with vital statistics (mortality rates) of the United States in 1980. (The expected lifetime for an individual in this population is about 74 years.) Consequently, radionuclide ingestion and inhalation slope factors are <u>not</u> expressed as a function of body weight and time, and do <u>not</u> require corrections for GI absorption or lung transfer efficiencies.

<u>NOTE</u>: ***The GI absorption values (f_1), ICRP lung classifications (D, W, Y) and radioactive half-lives are provided in HEAST Table 4 for reference only and should not be used to correct, modify, or in any way adjust radionuclide slope factors or intake assumptions in risk calculations.***

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[6]U.S. Nuclear Regulatory Commission (1991, 1993), <u>Health Effects Models for Nuclear Power Plant Accident Consequence Analysis</u>, NUREG/CR-4214. Addenda documenting the scientific basis for radiogenic risk models published in 1991 (for low-LET radiation) and 1993 (for alpha radiation). See EPA 402-R-93-076 for discussion of these models.

External slope factors provide cancer risk estimates per unit exposure to a uniform radionuclide concentration in soil. These factors, which account for photon energy flux attenuation and buildup in soil, are calculated for each radionuclide using volume and surface dose factors derived using the computer code DFSOIL.[7]

Because of the radiation risk models employed for both internal and external exposures, slope factors for radionuclides are characterized as central estimates in a linear model of the age-averaged lifetime total radiation cancer incidence risk per unit intake or exposure.

About the Information Provided in Table 4

Table 4 lists ingestion, inhalation and external exposure slope factors for principal radionuclides, and provides key parameter values used in the derivation of slope factor values. Radionuclides are presented alphabetically by element and atomic weight.

Selected radionuclides and radioactive decay chain products are designated in HEAST Table 4 with the suffix "+D" (e.g., U-238+D, Ra-226+D, Cs-137+D) to indicate that cancer risk estimates for these radionuclides include the contributions from their short-lived decay products, assuming equal activity concentrations (i.e., secular equilibrium) with the principal or parent nuclide in the environment.[8] Decay chains are identified in Exhibit 1.

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[7]Sjoreen, A.L., Kocher, D.C., Killough, G.G. and Miller C.W. (1984). "MLSOIL and DFSOIL - Computer Codes to Estimate Effective Ground Surface Concentrations for Dose Computations," ORNL-5974, Oak Ridge National Laboratory, Oak Ridge, TN.

[8]There is one exception to the assumption of secular equilibrium. For the inhalation slope factor for Rn-222+D reported in HEAST Table 4, ORIA assumes a 50% equilibrium value for radon decay products (Po-218, Pb-214, Bi-214 and Po-214) in air.

In most cases, site-specific analytical data should be used to establish the actual degree of equilibrium between each parent radionuclide and its decay products in each media sampled. However, in the absence of empirical data, the "+D" values for radionuclides should be used unless there are compelling reasons not to. For example, the external slope factors for Cs-137 and Cs-137+D are 0.0 and $2x10^{-6}$ (risk per year per pCi/gram), respectively. The value for Cs-137+D is higher because it includes the risk contribution from cesium's short-lived gamma-emitting decay product Ba-137m (half-life, 25.5 minutes) which, under most environmental conditions, will be in secular equilibrium with Cs-137.

Note that there may be circumstances, such as long disposal times or technologically enhanced concentrations of naturally occurring radionuclides, that may necessitate the combination of the risks of a parent radionuclide and its decay products over several contiguous subchains. For example, Ra-226 soil analyses at a site might show that all radium decay products are present in secular equilibrium down to stable Pb-206 (See Exhibit 1). In this case, Ra-226 risk calculations should be based on the ingestion, inhalation and external exposure slope factors for the Ra-226+D subchain, plus the ingestion, inhalation and external exposure factors for the Pb-210+D subchain. For actual sites, users should consult with a health physicist or radiochemist (1) to evaluate the site-specific analytical data to determine the degree of equilibrium between parent radionuclides and decay members of contiguous decay chains and (2) to assist in the combination of appropriate slope factor values. For health physics and radioanalytical support, HEAST users may contact EPA's Regional Radiation Program Managers, ORIA's National Air and Radiation Environmental Laboratory (NAREL) in

Montgomery, Alabama, ORIA's Las Vegas Laboratory (ORIA-LV) in Las Vegas, Nevada, or the ORIA contact at EPA headquarters in Washington, D.C., listed in Exhibit 2.

A Chemical Abstract System Reference Number (CASRN) is assigned to each radionuclide for identification and reporting accuracy during risk assessments, and radioactive half-lives are provided for reference.

The designations "D", "W", and "Y" presented in Table 4 under the heading "ICRP Lung Class" in the tables refer to the lung clearance times for inhaled particulate radionuclides, expressed as days (D), weeks (W), or years (Y), as recommended by the International Commission on Radiological Protection (ICRP). Gaseous radionuclides, e.g., Rn-222, are designated with an asterisk ("*"). "GI Absorption Factors, f_1" are the fractional amounts of each radionuclide that may be absorbed from the gastrointestinal (GI) tract into blood following an oral intake. The ICRP lung clearance classifications and GI absorption factors provided in Table 4 are the default values that EPA used to calculate radionuclide slope factors for inhalation and ingestion exposures, respectively. These factors are provided *for reference only* (see the Note Box).

Where to Address Questions About Radionuclide Slope Factors:

EPA continuously reviews the scientific literature on radiation effects to ensure that the Agency's risk assessment methodologies are consistent with current models and assumptions. As risk methodologies are refined, EPA will revise and update the slope factors in Table 4.

HEAST users with questions about radionuclide slope factor values and their use in radiation risk assessments should contact Michael Boyd of the Remedial Guidance Section of the Radiation Assessment Branch of ORIA at (202) 233-9395. Written requests for assistance can be sent by fax to (202) 233-9650.

Exhibit 1. Radionuclide Decay Chains Considered Explicitly in HEAST Table 4[9]

Principal Radionuclide [a]		Associated Decay Chain [b]	Terminal Nuclide or Radionuclide [c]	
Nuclide	Half-life (yr)		Nuclide	Half-life (yr)
Ac-227+D	22	[Th-227 (98.62%, 19 d)] Fr-223 (1.38%, 22 min) Ra-223 (11 d) Rn-219 (4 s) Po-215 (2 ms) Pb-211 (36 min) Bi-211 (2 min) [Tl-207 (99.72%, 5 min) Po-211 (0.28%, 0.5 s)]	Pb-207	*
Ag-108m+D	127	-[d] Ag-108 (8.90%, 2 min)	Pd-108 (91.1%) [Cd-108 (97.65%) Pd-108 (2.35%)]	* * *
Ag-110m+D	0.7	- Ag-110 (1.33%, 25 s)	Cd-110 (98.67%) [Cd-110 (99.7%) Pd-110 (0.3%)]	* * *
Am-243+D	7.4×10^3	Np-239 (2 d)	Pu-239	2.4×10^4
Ce-144+D	0.8	[Pr-144 (98.22%, 17 min) Pr-144m (1.78%, 7 min)]	Nd-144	*
Cs-137+D	30	Ba-137m (94.6%, 3 min)	Ba-137	*
Np-237+D	2.1×10^6	Pa-233 (27 d)	U-233	1.6×10^5
Pb-210+D	22	Bi-210 (5 d) Po-210 (138 d)	Pb-206	*
Pu-244+D	8.3×10^7	U-240 (14 h) Np-240m (7.4 min)	Pu-240	6.5×10^3
Ra-226+D	1.6×10^3	Rn-222 (4 d) Po-218 (3 min) [Pb-214 (99.98%, 27 min) At-218 (0.02%, 2 s)] Bi-214 (99.99%, 20 min) [Po-214 (99.98%, 1.64×10^{-4} s) Tl-210 (0.02%, 1 min)]	Pb-210	22
Ra-228+D	6	Ac-228 (6 h)	Th-228	2
Ru-106+D	1	Rh-106 (30 s)	Pd-106	*

[9]Source: International Commission on Radiological Protection (1983). Radionuclide Transformations: Energy and Intensity of Emission, ICRP Publication 38, Annals of the ICRP, Vols. 11-13, Pergamon Press, New York, NY.

Exhibit 1. Radionuclide Decay Chains Considered Explicitly in HEAST Table (Continued)

Principal Radionuclide [a]		Associated Decay Chain [b]	Terminal Nuclide or Radionuclide [c]	
Nuclide	Half-life (yr)		Nuclide	Half-life (yr)
Sb-125+D	3	Te-125m (22.8%, 58 d)	Te-125	*
Sr-90+D	29	Y-90 (64 h)	Zr-90	*
Th-228+D	2	Ra-224 (4 d) Rn-220 (56 s) Po-216 (0.2 s) Pb-212 (11 h) Bi-212 (61 min) [Po-212 (64.07%, 0.3 μs) Tl-208 (35.93%, 3 min)]	Pb-208	*
Th-229+D	7.3×10^3	Ra-225 (15 d) Ac-225 (10 d) Fr-221 (5 min) At-217 (32 ms) Bi-213 (46 min) [Po-213 (97.8%, 4 μs) Tl-209 (2.2%, 2 min)] Pd-209 (3 h)	Bi-209	*
U-235+D	7.0×10^8	Th-231 (26 h)	Pa-231	3.3×10^4
U-238+D	4.5×10^9	Th-234 (24 d) [Pa-234m (99.80%, 1 min) Pa-234 (0.33%, 7 h)]	U-234	2.4×10^5

(a) Radionuclides with half-lives greater than six months. "+D" designates principal radionuclides with associated decay chains.

(b) The chain of decay products of a principal radionuclide extending to (but not including) the next principal radionuclide or a stable radionuclide. Half-lives are given in parentheses. Branches are indicated by square brackets with branching percentages in parentheses.

(c) The principal radionuclide or stable nuclide that terminates an associated decay chain. Stable nuclides are indicated by an asterisk (*) in place of a half-life.

(d) A hyphen indicates that there are no associated decay products.

Exhibit 2. EPA Radition Program Managers

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Jim Cherniack U.S. EPA/Region 1 (CPT) JF Kennedy Federal Bldg. Boston, MA 02203	(617) 565-3234	(617) 565-4940
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NAME/ADDRESS	PHONE #	FAX #
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Jed Harrison, Director Office of Radiation and Indoor Air Las Vegas Laboratory EPA Facilities P.O. Box 98517 Las Vegas, NV 89193-8517	(702) 798-2476	(702) 798-2465
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CHEMICAL / LEVEL	DOSE / ROUTE	SPECIES / EXPERIMENT / LENGTH	TARGET	CRITICAL EFFECT	Subchronic [RfC] (mg/cu m) UF	Subchronic [RfD] (mg/kg/day) UF	Chronic [RfC] (mg/cu m) UF	Chronic [RfD] (mg/kg/day) UF	REFERENCE
ACENAPHTHENE		**000083-32-9**							
NOAEL 175 MG/KG/DAY		MOUSE							
	ORAL: GAVAGE	90 DAYS	LIVER	HEPATOTOXICITY		6E-1 300		IRIS	010165
ACENAPTHYLENE		**000208-96-8**							
GENERAL COMMENT: DATA INADEQUATE FOR QUANTITATIVE RISK ASSESSMENT									005202
ACEPHATE		**030560-19-1**							
LOAEL 2 PPM		RAT							
	ORAL: DIET	13 WEEKS	BRAIN	DECREASED CHOLINESTERASE ACTIVITY		4E-3 30		IRIS	005833
GENERAL COMMENT: ALSO SEE HEAST TABLE 3: CARCINOGENICITY.									
ACETONE		**000067-64-1**							
NOEL 100 MG/KG/DAY		RAT							
	ORAL: GAVAGE	90 DAYS	LIVER	INCREASED WEIGHT		1E+0		IRIS	005204
			KIDNEY	INCREASED WEIGHT		100			
			KIDNEY	NEPHROTOXICITY					
ACETONE CYANOHYDRIN / (2-METHYLLACTONITRILE)		**000075-86-5**							
NOAEL 8.75 MG/(KG-DAY)		RAT							
	ORAL: GAVAGE	90 DAYS	LIVER	INCREASED RELATIVE WEIGHT		8E-3 300		8E-4 3000	005776

SUBCHRONIC [RfC] COMMENT: ALSO SEE HEAST TABLE 2: ALTERNATE METHODS -- SUBCHRONIC AND CHRONIC TOXICITY (OTHER THAN CARCINOGENICITY)
CHRONIC [RfC] COMMENT: ALSO SEE HEAST TABLE 2: ALTERNATE METHODS -- SUBCHRONIC AND CHRONIC TOXICITY (OTHER THAN CARCINOGENICITY)

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CHEMICAL / LEVEL	DOSE / ROUTE	SPECIES / EXPERIMENT LENGTH	TARGET	CRITICAL EFFECT	Subchronic [RfC] (mg/cu m) UF	Subchronic [RfD] (mg/kg/day) UF	Chronic [RfC] (mg/cu m) UF	Chronic [RfD] (mg/kg/day) UF	REFERENCE
ACETONITRILE		**000075-05-8**							
NOAEL 100 PPM		MOUSE							
	INHALATION:	92 DAYS	ERYTHROCYTES	DECREASED CELL COUNT		6E-2		IRIS	005210
	INTERMITTENT		BLOOD	DECREASED HEMATOCRIT		300			
			LIVER	HEPATIC LESIONS					
SUBCHRONIC [RfC] COMMENT: ALSO SEE HEAST TABLE 2: ALTERNATE METHODS -- SUBCHRONIC AND CHRONIC TOXICITY (OTHER THAN CARCINOGENICITY)									
SUBCHRONIC [RfD] COMMENT: BASED ON ROUTE TO ROUTE EXTRAPOLATION USING AN ABSORPTION FACTOR OF 0.5.									
CHRONIC [RfC] COMMENT: ALSO SEE HEAST TABLE 2: ALTERNATE METHODS -- SUBCHRONIC AND CHRONIC TOXICITY (OTHER THAN CARCINOGENICITY)									
CHRONIC [RfD] COMMENT: BASED ON ROUTE TO ROUTE EXTRAPOLATION USING AN ABSORPTION FACTOR OF 0.5. UNDER REVIEW. CURRENT NUMBER SUBJECT TO CHANGE.									
ACETOPHENONE		**000098-86-2**							
NOAEL 10.000 PPM		RAT							
	ORAL: DIET	17 WEEKS		NONE OBSERVED		1E+0		IRIS	005212
						300			
									010874
CHRONIC [RfC] COMMENT: THE CHRONIC INHALATION [RfC] IS CONSIDERED NOT VERIFIABLE (06/25/92) BY THE RfD/RfC WORK GROUP.									
ACROLEIN		**000107-02-8**							
NOAEL 15.6 MG/KG/DAY		RAT							
	ORAL: WATER	90 DAYS						2E-2	010390
								1000	
GENERAL COMMENT: ALSO SEE HEAST TABLE 3: CARCINOGENICITY.							IRIS		010856

HEAST TABLE 1: SUBCHRONIC AND CHRONIC TOXICITY (OTHER THAN CARCINOGENICITY)

July 1997

CHEMICAL LEVEL	DOSE ROUTE	SPECIES EXPERIMENT LENGTH	TARGET	CRITICAL EFFECT	Subchronic [RfC] (mg/cu m) UF	Subchronic [RfD] (mg/kg/day) UF	Chronic [RfC] (mg/cu m) UF	Chronic [RfD] (mg/kg/day) UF	REFERENCE
ACRYLAMIDE		**000079-06-1**							
NOEL 0.2 MG/KG/DAY		RAT							
	ORAL: DRINKING WATER	90 DAYS	NERVE	DAMAGE		2E-3 100		IRIS	005835
	GENERAL COMMENT: ALSO SEE HEAST TABLE 3: CARCINOGENICITY.								
							IRIS		010876
	CHRONIC RfC COMMENT: THE CHRONIC INHALATION RfC IS CONSIDERED NOT VERIFIABLE (09/20/90) BY THE RfD/RfC WORK GROUP.								
ACRYLIC ACID		**000079-10-7**							
NOAEL 53 MG/KG/DAY		RAT							
	ORAL: DRINKING WATER	2 GENERATION	WHOLE BODY	DECREASED PUP WEIGHT		5E-1 100		IRIS	005836
	SUBCHRONIC [RfD] COMMENT: THE CHRONIC ORAL RfD ON IRIS WAS ADOPTED AS THE SUBCHRONIC ORAL [RfD].								
LOAEL 5 PPM		MOUSE							
	INHALATION: INTERMITTENT	13 WEEKS	NASAL MUCOSA	LESIONS	3E-3 100		IRIS		010346
ACRYLONITRILE		**000107-13-1**							
NOAEL 1 MG/(KG-DAY)		MOUSE							
	ORAL: GAVAGE	60 DAYS	TESTES TESTES	DECREASED SPERM COUNTS SEMINIFEROUS TUBULE DEGENERATION		1E-2 100		1E-3 1000	010939
	SUBCHRONIC [RfD] COMMENT: THE CHRONIC ORAL [RfD] UNDER REVIEW BY THE RfD/RfC WORK GROUP WAS MODIFIED TO ESTIMATE THE SUBCHRONIC ORAL [RfD].								
	GENERAL COMMENT: ALSO SEE HEAST TABLE 3: CARCINOGENICITY								
ADIPONITRILE		**000111-69-3**							
	GENERAL COMMENT: DATA INADEQUATE FOR QUANTITATIVE RISK ASSESSMENT								005157

CHEMICAL / LEVEL	DOSE / ROUTE	SPECIES / EXPERIMENT / LENGTH	TARGET	CRITICAL EFFECT	Subchronic [RfC] (mg/cu m) UF	Subchronic [RfD] (mg/kg/day) UF	Chronic [RfC] (mg/cu m) UF	Chronic [RfD] (mg/kg/day) UF	REFERENCE
ALACHLOR		**015972-60-8**							
NOEL	1 MG/KG/DAY	DOG							
	ORAL: CAPSULE	1 YEAR	BLOOD-	ANEMIA		1E-2		IRIS	005837
			SITES, MULTIPLE	HEMOSIDEROSIS		100			
	SUBCHRONIC [RfD] COMMENT: THE CHRONIC ORAL RfD WAS ADOPTED AS THE SUBCHRONIC ORAL [RfD].								
	GENERAL COMMENT: ALSO SEE HEAST TABLE 3: CARCINOGENICITY.								
ALDICARB		**000116-06-3**							
NOAEL	0.01 MG/KG-DAY	HUMAN							
	ORAL	ACUTE	CENTRAL NERVOUS SYSTEM	SWEATING		1E-3 10		IRIS	010960
	SUBCHRONIC [RfD] COMMENT: THE CHRONIC ORAL RfD WAS ADOPTED AS THE SUBCHRONIC ORAL [RfD].								
	GENERAL COMMENT: CLINICAL SIGNS OF ACETYL CHOLINESTERASE INHIBITION INCLUDING SWEATING, PINPOINT PUPILS, LEG WEAKNESS, NAUSEA, DIARRHEA AND OTHER EFFECTS WERE OBSERVED IN THE PRINCIPAL AND SUPPORTING STUDIES.								
ALDRIN		**000309-00-2**							
LOAEL	0.025 MG/KG/DAY	RAT							
	ORAL: DIET	2 YEARS	LIVER	LESIONS		3E-5 1000		IRIS	005159
	SUBCHRONIC [RfD] COMMENT: THE CHRONIC ORAL RfD WAS ADOPTED AS THE SUBCHRONIC ORAL [RfD].								
	GENERAL COMMENT: ALSO SEE HEAST TABLE 3: CARCINOGENICITY.								
ALLIDOCHLOR		**000093-71-0**							
	GENERAL COMMENT: DATA INADEQUATE FOR QUANTITATIVE RISK ASSESSMENT.								005838

CHEMICAL LEVEL	DOSE ROUTE	SPECIES EXPERIMENT LENGTH	TARGET	CRITICAL EFFECT	Subchronic [RfC] (mg/cu m) UF	Subchronic [RfD] (mg/kg/day) UF	Chronic [RfC] (mg/cu m) UF	Chronic [RfD] (mg/kg/day) UF	REFERENCE
ALLYL ALCOHOL		**000107-18-6**							
NOEL 50 PPM		RAT							
	ORAL: DRINKING WATER	15 WEEKS	LIVER	EFFECTS		5E-2		IRIS	005839
			KIDNEY	EFFECTS		100			
ALLYL CHLORIDE		**000107-05-1**							
NOAEL 17 MG/CU M		RABBIT							
	INHALATION: INTERMITTENT	5 MONTHS	NERVOUS SYSTEM	NEUROTOXICITY	1E-2 300		IRIS		010369
	GENERAL COMMENT: ALSO SEE HEAST TABLE 3: CARCINOGENICITY.								
ALUMINUM		**007429-90-5**							
	GENERAL COMMENT: DATA INADEQUATE FOR QUANTITATIVE RISK ASSESSMENT								005162
ALUMINUM PHOSPHIDE		**020859-73-8**							
NOAEL 0.43 MG/KG/DAY		RAT							
	ORAL: DIET	2 YEARS	WHOLE BODY	ALTERED WEIGHT		4E-4		IRIS	010255
			UNSPECIFIED	ALTERED CLINICAL PARAMETERS		100			
AMETRYN		**000834-12-8**							
NOEL 10 MG/KG/DAY		RAT							
	ORAL: GAVAGE	13 WEEKS	LIVER	EFFECTS		9E-2 100		IRIS	005841
AMINO-2-NAPHTHOL, 1-		**002834-92-6**							
	GENERAL COMMENT: DATA INADEQUATE FOR QUANTITATIVE RISK ASSESSMENT.								005842
AMINO-2-NAPHTOL HYDROCHLORIDE, 1-		**001198-27-2**							
	GENERAL COMMENT: DATA INADEQUATE FOR QUANTITATIVE RISK ASSESSMENT.								005843

CHEMICAL / LEVEL	DOSE / ROUTE	SPECIES / EXPERIMENT / LENGTH	TARGET	CRITICAL EFFECT	Subchronic [RfC] (mg/cu m) UF	Subchronic [RfD] (mg/kg/day) UF	Chronic [RfC] (mg/cu m) UF	Chronic [RfD] (mg/kg/day) UF	REFERENCE
AMINOPHENOL, M-		**000591-27-5**							
NOAEL 1300 PPM	ORAL: DIET	RAT 13 WEEKS	WHOLE BODY	ALTERED WEIGHT		7E-1		7E-2	005844
			THYROID	ALTERED WEIGHT		100		1000	
AMINOPHENOL, O-		**000095-55-6**							
GENERAL COMMENT: DATA INADEQUATE FOR QUANTITATIVE RISK ASSESSMENT.									005845
AMINOPHENOL, P-		**000123-30-8**							
GENERAL COMMENT: DATA INADEQUATE FOR QUANTITATIVE RISK ASSESSMENT.									005846
AMINOPYRIDINE, 4-		**000504-24-5**							
NOAEL 3 PPM	ORAL: DIET	RAT 90 DAYS	LIVER	INCREASED WEIGHT		2E-4		2E-5	005847
			BRAIN	INCREASED WEIGHT		1000		10000	
AMMONIA		**007664-41-7**							
NOAEL 34 MG/L	ORAL: DRINKING WATER	HUMAN	SENSORY	TASTE THRESHOLD		34 MG/L 1		34 MG/L 1	005166
SUBCHRONIC [RfD] COMMENT: GIVEN AS CONCENTRATION IN DRINKING WATER. SPECIFICALLY RELATED TO ORGANOLEPTIC THRESHOLD. SAFE CONCENTRATION MAY BE HIGHER, BUT DATA ARE INADEQUATE TO ASSESS.									
CHRONIC [RfD] COMMENT: GIVEN AS CONCENTRATION IN DRINKING WATER. SPECIFICALLY RELATED TO ORGANOLEPTIC THRESHOLD. SAFE CONCENTRATION MAY BE HIGHER, BUT DATA ARE INADEQUATE TO ASSESS.									
NOAEL 6.4 MG/CU M	INHALATION: INTERMITTENT	HUMAN	NASAL CAVITY	RHINITIS	1E-1		IRIS		010392
			LUNGS	PNEUMONIA	30				
			LUNGS	LESIONS					

HEAST TABLE 1: SUBCHRONIC AND CHRONIC TOXICITY (OTHER THAN CARCINOGENICITY)

July 1997

CHEMICAL / LEVEL	DOSE / ROUTE	SPECIES / EXPERIMENT / LENGTH	TARGET	CRITICAL EFFECT	Subchronic [RfC] (mg/cu m) UF	Subchronic [RfD] (mg/kg/day) UF	Chronic [RfC] (mg/cu m) UF	Chronic [RfD] (mg/kg/day) UF	REFERENCE
ANILINE		**000062-53-3**							
NOAEL 19 MG/CU M		MOUSE							
	INHALATION: INTERMITTENT	20-26 WEEKS	SPLEEN	PATHOLOGY	1E-2 300		IRIS		010370
		RAT							
		20-26 WEEKS	SPLEEN	PATHOLOGY					
		GUINEA PIG							
		20-26 WEEKS	SPLEEN	PATHOLOGY					
	GENERAL COMMENT: ALSO SEE HEAST TABLE 3: CARCINOGENICITY.								
ANTHRACENE		**000120-12-7**							
NOEL 1000 MG/KG/DAY		MOUSE							
	ORAL: GAVAGE	90 DAYS		NONE OBSERVED		3E+0 300		IRIS	010166
	CHRONIC [RfC] COMMENT: THE CHRONIC INHALATION [RfC] IS CONSIDERED NOT VERIFIABLE (08/04/94) BY THE RfD/RfC WORK GROUP.								010964
ANTIMONY PENTOXIDE		**001314-60-9**							
LOAEL 0.46 MG/KG/DAY		RAT							
	ORAL: DRINKING WATER	LIFETIME	WHOLE BODY	INCREASED MORTALITY		5E-4		5E-4	005174
			BLOOD	ALTERED CHEMISTRIES		1000		1000	
	SUBCHRONIC [RfD] COMMENT: CALCULATED BY ANALOGY TO ANTIMONY BY CORRECTING FOR DIFFERENCES IN MOLECULAR WEIGHT.								
	CHRONIC [RfD] COMMENT: CALCULATED BY ANALOGY TO ANTIMONY BY CORRECTING FOR DIFFERENCES IN MOLECULAR WEIGHT.								

CHEMICAL LEVEL	DOSE ROUTE	SPECIES EXPERIMENT LENGTH	TARGET	CRITICAL EFFECT	Subchronic [RfC] (mg/cu m) UF	Subchronic [RfD] (mg/kg/day) UF	Chronic [RfC] (mg/cu m) UF	Chronic [RfD] (mg/kg/day) UF	REFERENCE
ANTIMONY POTASSIUM TARTRATE 000304-61-0									
LOAEL 0.91 MG/KG/DAY	RAT								
	ORAL: DRINKING WATER	LIFETIME	WHOLE BODY	INCREASED MORTALITY		9E-4		9E-4	005234
			BLOOD	ALTERED CHEMISTRIES		1000		1000	
SUBCHRONIC [RfD] COMMENT: CALCULATED BY ANALOGY TO ANTIMONY BY CORRECTING FOR DIFFERENCES IN MOLECULAR WEIGHT.									
CHRONIC [RfD] COMMENT: CALCULATED BY ANALOGY TO ANTIMONY BY CORRECTING FOR DIFFERENCES IN MOLECULAR WEIGHT. .									
ANTIMONY TETROXIDE 001332-81-6									
LOAEL 0.44 MG/KG/DAY	RAT								
	ORAL: DRINKING WATER	LIFETIME	WHOLE BODY	INCREASED MORTALITY		4E-4		4E-4	005238
			BLOOD	ALTERED CHEMISTRIES		1000		1000	
SUBCHRONIC [RfD] COMMENT: CALCULATED BY ANALOGY TO ANTIMONY BY CORRECTING FOR DIFFERENCES IN MOLECULAR WEIGHT.									
CHRONIC [RfD] COMMENT: CALCULATED BY ANALOGY TO ANTIMONY BY CORRECTING FOR DIFFERENCES IN MOLECULAR WEIGHT.									
ANTIMONY TRIOXIDE 001309-64-4									
LOAEL 0.42 MG/KG/DAY	RAT								
	ORAL: DRINKING WATER	LIFETIME	WHOLE BODY	INCREASED MORTALITY		4E-4		4E-4	005242
			BLOOD	ALTERED CHEMISTRIES		1000		1000	
SUBCHRONIC [RfD] COMMENT: CALCULATED BY ANALOGY TO ANTIMONY BY CORRECTING FOR DIFFERENCES IN MOLECULAR WEIGHT.									
CHRONIC [RfD] COMMENT: CALCULATED BY ANALOGY TO ANTIMONY BY CORRECTING FOR DIFFERENCES IN MOLECULAR WEIGHT.									
BMC 0.87 MG/CU M	RAT								
	INHALATION, INTERMITTENT	1 YEAR	LUNG	PULMONARY TOXICITY	2E-4		IRIS		010974
			LUNG	INTERSTITIAL INFLAMMATION, CHRONIC	30				
CHRONIC RfC COMMENT: A BENCHMARK DOSE APPROACH WAS USED RATHER THAN A NOAEL/LOAEL TO DERIVE THE RfC.									
SUBCHRONIC [RfC] COMMENT: THE CHRONIC INHALATION RfC IS ADOPTED AS THE SUBCHRONIC INHALATION [RfC].									

HEAST TABLE 1: SUBCHRONIC AND CHRONIC TOXICITY (OTHER THAN CARCINOGENICITY)

July 1997

CHEMICAL / LEVEL	DOSE / ROUTE	SPECIES / EXPERIMENT / LENGTH	TARGET	CRITICAL EFFECT	Subchronic [RfC] (mg/cu m) / UF	Subchronic [RfD] (mg/kg/day) / UF	Chronic [RfC] (mg/cu m) / UF	Chronic [RfD] (mg/kg/day) / UF	REFERENCE
ANTIMONY, METALLIC		**007440-36-0**							
LOAEL 0.35 MG SB/KG/DAY		RAT							
	ORAL: DRINKING WATER	LIFETIME	WHOLE BODY	INCREASED MORTALITY		4E-4		IRIS	005170
			BLOOD	ALTERED CHEMISTRIES		1000			
ARAMITE		**000140-57-8**							
NOAEL 100 PPM		RAT							
	ORAL: DIET	104 WEEKS	LIVER	INCREASED WEIGHT				5E-2	005850
								100	
NOAEL 500 PPM		DOG							
	ORAL: DIET	52 WEEKS	LIVER	DEGENERATION		1E-1			005849
						100			
GENERAL COMMENT: ALSO SEE HEAST TABLE 3: CARCINOGENICITY.									
AROCLOR 1248		**012672-29-6**							
								IRIS	
CHRONIC RfD COMMENT: THE CHRONIC ORAL RfD IS CONSIDERED NOT VERIFIABLE (07/20/93) BY THE RfD/RfC WORK GROUP.									010940
AROCLOR 1254		**011097-69-1**							
LOAEL 0.005 MG/KG/DAY									
	ORAL: CAPSULE	MONKEY >5 YEARS	IMMUNE SYSTEM	TOXICITY		5E-5		IRIS	010963
						100			
SUBCHRONIC [RfD] COMMENT: THE CHRONIC ORAL RfD WAS MODIFIED TO ESTIMATE THE SUBCHRONIC ORAL [RfD].									

CHEMICAL / LEVEL	DOSE / ROUTE	SPECIES / EXPERIMENT / LENGTH	TARGET	CRITICAL EFFECT	Subchronic [RfC] (mg/cu m) UF	Subchronic [RfD] (mg/kg/day) UF	Chronic [RfC] (mg/cu m) UF	Chronic [RfD] (mg/kg/day) UF	REFERENCE
ARSENIC, INORGANIC		**007440-38-2**							
NOAEL 0.009 MG/L	ORAL	HUMAN	SKIN	KERATOSIS		3E-4		IRIS	010434
			SKIN	HYPERPIGMENTATION		3			
SUBCHRONIC [RfD] COMMENT: THE CHRONIC ORAL RfD WAS ADOPTED AS THE SUBCHRONIC ORAL [RfD].									
GENERAL COMMENT: ALSO SEE HEAST TABLE 3: CARCINOGENICITY.									
ATRAZINE		**001912-24-9**							
NOEL 3.5 MG/KG/DAY	ORAL: DIET	RAT 2 YEARS	WHOLE BODY	DECREASED WEIGHT GAIN		3.5E-2		IRIS	010855
						100			
SUBCHRONIC [RfD] COMMENT: THE CHRONIC ORAL RfD WAS ADOPTED AS THE SUBCHRONIC ORAL [RfD].									
GENERAL COMMENT: ALSO SEE HEAST TABLE 3: CARCINOGENICITY.									
BARIUM		**007440-39-3**							
NOAEL 0.21 MG/KG/DAY	ORAL: WATER	HUMAN 10 WEEKS	CARDIOVASCULAR SYSTEM	INCREASED BLOOD PRESSURE		7E-2		IRIS	010348
						3			
SUBCHRONIC [RfC] COMMENT: ALSO SEE HEAST TABLE 2: ALTERNATE METHODS -- SUBCHRONIC AND CHRONIC TOXICITY (OTHER THAN CARCINOGENICITY)									
SUBCHRONIC [RfD] COMMENT: THE CHRONIC ORAL RfD WAS ADOPTED AS THE SUBCHRONIC ORAL [RfD].									
CHRONIC [RfC] COMMENT: ALSO SEE HEAST TABLE 2: ALTERNATE METHODS -- SUBCHRONIC AND CHRONIC TOXICITY (OTHER THAN CARCINOGENICITY)									
BARIUM CYANIDE		**000542-62-1**							
CHRONIC [RfD] COMMENT: THE CHRONIC ORAL [RfD] IS CONSIDERED NOT VERIFIABLE (07/20/93) BY THE RfD/RfC WORK GROUP.									010941

CHEMICAL / LEVEL	DOSE / ROUTE	SPECIES / EXPERIMENT LENGTH	TARGET	CRITICAL EFFECT	Subchronic [RfC] (mg/cu m) UF	Subchronic [RfD] (mg/kg/day) UF	Chronic [RfC] (mg/cu m) UF	Chronic [RfD] (mg/kg/day) UF	REFERENCE
BENEFIN		**001861-40-1**							
NOAEL 25 MG/KG/DAY		DOG							
	ORAL: DIET	1 YEAR	ERYTHROCYTE	DECREASED COUNT		3E-1 100		IRIS	005852
SUBCHRONIC [RfD] COMMENT: THE CHRONIC ORAL RfD WAS ADOPTED AS THE SUBCHRONIC ORAL [RfD].									
BENZAL CHLORIDE		**000098-87-3**							
GENERAL COMMENT: DATA INADEQUATE FOR QUANTITATIVE RISK ASSESSMENT.									005853
BENZALDEHYDE		**000100-52-7**							
NOEL 200 MG/KG/DAY		RAT							
	ORAL: GAVAGE	13 WEEKS	KIDNEY FORESTOMACH	EFFECTS LESIONS		1E+0 100		IRIS	005854
SUBCHRONIC [RfD] CPMMENT: THE CHRONIC ORAL RfD WAS MODIFIED TO ESTIMATE THE SUBCHRONIC ORAL [RfD].									
BENZALDEHYDE CYANOHYDRIN		**000532-28-5**							
GENERAL COMMENT: DATA INADEQUATE FOR QUANTITATIVE RISK ASSESSMENT									005781
BENZENE		**000071-43-2**							
SUBCHRONIC [RfC] COMMENT: CONTACT THE SUPERFUND HEALTH RISK TECHNICAL SUPPORT CENTER: (513) 569-7300. GENERAL COMMENT: ALSO SEE HEAST TABLE 3: CARCINOGENICITY.									
BENZENETHIOL / (THIOPHENOL)		**000108-98-5**							
LOAEL 0.1 MG/(KG-DAY)		RAT							
	ORAL: GAVAGE	90 DAYS	LIVER	CENTRILOBULAR EOSINOPHILIC CHANGES		1E-4 1000		1E-5 10.000	010942
SUBCHRONIC [RfD] COMMENT: THE CHRONIC ORAL [RfD] UNDER REVIEW BY THE RfD/RfC WORKGROUP WAS MODIFIED TO ESTIMATE THE SUBCHRONIC ORAL [RfD].									

CHEMICAL / LEVEL	DOSE / ROUTE	SPECIES / EXPERIMENT / LENGTH	TARGET	CRITICAL EFFECT	Subchronic [RfC] (mg/cu m) UF	Subchronic [RfD] (mg/kg/day) UF	Chronic [RfC] (mg/cu m) UF	Chronic [RfD] (mg/kg/day) UF	REFERENCE
BENZIDINE		**000092-87-5**							
LOAEL 2.7 MG/KG/DAY	ORAL: DRINKING WATER	MOUSE 33 MONTHS	BRAIN	CELLULAR CHANGES		3E-3 1000		IRIS	005830
			LIVER	CELLULAR CHANGES					
SUBCHRONIC [RfD] COMMENT: THE CHRONIC ORAL RfD WAS ADOPTED AS THE SUBCHRONIC ORAL [RfD].									
GENERAL COMMENT: ALSO SEE HEAST TABLE 3: CARCINOGENICITY.									
							IRIS		010877
CHRONIC RfC COMMENT: THE CHRONIC INHALATION RfC IS CONSIDERED NOT VERIFIABLE (03/28/91) BY THE RfD/RfC WORK GROUP.									
BENZO[A]ANTHRACENE		**000056-55-3**							
CHRONIC [RfC] COMMENT: THE CHRONIC INHALATION [RfC] IS CONSIDERED NOT VERIFIABLE (08/04/94) BY THE RfD/RfC WORK GROUP.									010965
GENERAL COMMENT: ALSO SEE HEAST TABLE 3: CARCINOGENICITY.									
BENZOIC ACID		**000065-85-0**							
NOAEL 312 MG/DAY	ORAL: DIET	HUMAN		NONE OBSERVED		4E+0 1		IRIS	005260
SUBCHRONIC [RfD] COMMENT: THE HUMAN DAILY PER CAPITA INTAKE WAS USED AS THE CRITICAL DOSE LEVEL. THE CHRONIC ORAL RfD WAS ADOPTED AS THE SUBCHRONIC ORAL [RfD].									
CHRONIC [RfD] COMMENT: THE HUMAN DAILY PER CAPITA INTAKE WAS USED AS THE CRITICAL DOSE LEVEL.									
BENZYL ALCOHOL		**000100-51-6**							
LOAEL 286 MG/KG/DAY	ORAL: GAVAGE	RAT 103 WEEKS	FORESTOMACH	EPITHELIAL HYPERPLASIA				3E-1 1000	005855
NOAEL 143 MG/KG/DAY	ORAL: GAVAGE	RAT 13 WEEKS	WHOLE BODY	DECREASED WEIGHT		1E+0 100			005856

CHEMICAL LEVEL / DOSE ROUTE	SPECIES EXPERIMENT LENGTH	TARGET	CRITICAL EFFECT	Subchronic [RfC] (mg/cu m) UF	Subchronic [RfD] (mg/kg/day) UF	Chronic [RfC] (mg/cu m) UF	Chronic [RfD] (mg/kg/day) UF	REFERENCE
BERYLLIUM **007440-41-7**								
NOAEL 0.54 MG/KG/DAY ORAL: DRINKING WATER	RAT LIFETIME		NONE OBSERVED		5E-3 100		IRIS	005262
SUBCHRONIC [RfD] COMMENT: THE CHRONIC ORAL RfD WAS ADOPTED AS THE SUBCHRONIC ORAL [RfD]. GENERAL COMMENT: ALSO SEE HEAST TABLE 3: CARCINOGENICITY.								
BIPHENYL, 1,1' **000092-52-4**								
NOAEL 50 MG/KG/DAY ORAL: DIET	RAT 700 DAYS	KIDNEY	DAMAGE		5E-2 1000		IRIS	005857
SUBCHRONIC [RfD] COMMENT: THE CHRONIC ORAL RfD WAS ADOPTED AS THE SUBCHRONIC ORAL [RfD].								
CHRONIC RfC COMMENT: THE CHRONIC INHALATION RfC IS CONSIDERED NOT VERIFIABLE (09/20/90) BY THE RfD/RfC WORK GROUP.						IRIS		010878
BIS(2-CHLOROISOPROPYL) ETHER **039638-32-9**								
NOAEL 35.8 MG/KG/DAY ORAL: DIET	MOUSE 2 YEARS	ERYTHROCYTES	DECREASED HEMOGLOBIN		4E-2 1000		IRIS	010257
BIS(2-ETHYLHEXYL) PHTHALATE / (DEHP) **000117-81-7**							IRIS	010859
SUBCHRONIC [RfC] COMMENT: CONTACT THE SUPERFUND HEALTH RISK TECHNICAL SUPPORT CENTER: (513) 569-7300. SUBCHRONIC [RfD] COMMENT: CONTACT THE SUPERFUND HEALTH RISK TECHNICAL SUPPORT CENTER: (513) 569-7300. GENERAL COMMENT: ALSO SEE HEAST TABLE 3: CARCINOGENICITY.								

HEAST TABLE 1: SUBCHRONIC AND CHRONIC TOXICITY (OTHER THAN CARCINOGENICITY)

July 1997

CHEMICAL / LEVEL	DOSE / ROUTE	SPECIES / EXPERIMENT LENGTH	TARGET	CRITICAL EFFECT	Subchronic [RfC] (mg/cu m) / UF	Subchronic [RfD] (mg/kg/day) / UF	Chronic [RfC] (mg/cu m) / UF	Chronic [RfD] (mg/kg/day) / UF	REFERENCE
BISPHENOL A		**000080-05-7**						IRIS	005268
NOAEL 750 PPM		RAT							
	ORAL	13 WEEKS	WHOLE BODY	DECREASED WEIGHT		6E-1 100			005266
BORON TRIFLUORIDE		**007637-07-2**							
NOAEL 6 MG/CU M		RAT							
	INHALATION: INTERMITTENT	13 WEEKS	KIDNEY	NECROSIS	7E-3 300		7E-4 3000		010395
BORON, ELEMENTAL		**007440-42-8**							
NOAEL 8.8 MG/KG/DAY		DOG						IRIS	005272
	ORAL: DIET	2 YEARS	TESTIS	LESIONS					

SUBCHRONIC [RfD] COMMENT: THE SUBCHRONIC ORAL [RfD] WAS REMOVED BECAUSE THE CHRONIC ORAL RfD UPON WHICH IT WAS BASED IS UNDER REVIEW BY THE RfD/RfC WORK GROUP.
CHRONIC RfD COMMENT: THE CHRONIC ORAL RfD, WHILE STILL ON IRIS, IS BEING RECONSIDERED BY THE RfD/RfC WORK GROUP.

LOAEL 4.5 MG/CU M		HUMAN							
	INHALATION: INTERMITTENT		RESPIRATORY TRACT BRONCHUS	IRRITATION BRONCHITIS	2E-2 100		2E-2 100		005269

SUBCHRONIC [RfC] COMMENT: THE SUBCHRONIC INHALATION [RfC] IS SPECIFICALLY FOR ANHYDROUS BORAX.
CHRONIC [RfC] COMMENT: THE CHRONIC INHALATION [RfC] IS SPECIFICALLY FOR ANHYDROUS BORAX.

BROMINATED DIBENZO-P-DIOXINS 005858

GENERAL COMMENT: DATA INADEQUATE FOR QUANTITATIVE RISK ASSESSMENT.

CHEMICAL LEVEL	DOSE ROUTE	SPECIES EXPERIMENT LENGTH	TARGET	CRITICAL EFFECT	Subchronic [RfC] (mg/cu m) UF	Subchronic [RfD] (mg/kg/day) UF	Chronic [RfC] (mg/cu m) UF	Chronic [RfD] (mg/kg/day) UF	REFERENCE
BROMINATED DIBENZOFURANS									
GENERAL COMMENT: DATA INADEQUATE FOR QUANTITATIVE RISK ASSESSMENT.									005859
BROMOACETONE **000598-31-2**									
GENERAL COMMENT: DATA INADEQUATE FOR QUANTITATIVE RISK ASSESSMENT.									005860
BROMOCHLOROETHANES									
GENERAL COMMENT: DATA INADEQUATE FOR QUANTITATIVE RISK ASSESSMENT.									005861
BROMODICHLOROMETHANE **000075-27-4**									
LOAEL 17.9 MG/KG/DAY		MOUSE							
	ORAL: GAVAGE	102 WEEKS	KIDNEY	CYTOMEGALY		2E-2 1000		IRIS	005715
SUBCHRONIC [RfD] COMMENT: THE CHRONIC ORAL RfD WAS ADOPTED AS THE SUBCHRONIC ORAL [RfD].									
BROMOETHENE / (VINYL BROMIDE) **000593-60-2**									
LOAEL 9.7 PPM		RAT							
	INHALATION:	24 MONTHS	LIVER	HYPERTROPHY	3E-3		IRIS		010929
	INTERMITTENT		LIVER	BASOPHILIC FOCI	3000				
			LIVER	EOSINOPHILIC FOCI					
SUBCHRONIC [RfC] COMMENT: THE CHRONIC INHALATION RfC WAS ADOPTED AS THE SUBCHRONIC INHALATION [RfC].									
GENERAL COMMENT: ALSO SEE HEAST TABLE 3: CARCINOGENICITY.									

CHEMICAL / LEVEL	DOSE / ROUTE	SPECIES / EXPERIMENT / LENGTH	TARGET	CRITICAL EFFECT	Subchronic [RfC] (mg/cu m) UF	Subchronic [RfD] (mg/kg/day) UF	Chronic [RfC] (mg/cu m) UF	Chronic [RfD] (mg/kg/day) UF	REFERENCE
BROMOFORM		**000075-25-2**							
NOEL	17.9 MG/KG/DAY	RAT							
	ORAL: GAVAGE	13 WEEKS	LIVER	EFFECTS		2E-1 100		IRIS	005722
GENERAL COMMENT: ALSO SEE HEAST TABLE 3: CARCINOGENICITY.									
							IRIS		010961
CHRONIC RfC COMMENT: THE CHRONIC INHALATION RfC IS CONSIDERED NOT VERIFIABLE (02/11/93) BY THE RfD/RfC WORK GROUP.									
BROMOMETHANE		**000074-83-9**							
								IRIS	010861
							IRIS		010860
SUBCHRONIC [RfC] COMMENT: CONTACT THE SUPERFUND HEALTH RISK TECHNICAL SUPPORT CENTER: (513) 569-7300.									
SUBCHRONIC [RfD] COMMENT: CONTACT THE SUPERFUND HEALTH RISK TECHNICAL SUPPORT CENTER: (513) 569-7300.									
BROMOPHENYL PHENYL ETHER, 4-		**000101-55-3**							
GENERAL COMMENT: DATA INADEQUATE FOR QUANTITATIVE RISK ASSESSMENT.									005864.
BROMOPHOS		**002104-96-3**							
NOAEL	5 MG/KG/DAY	RAT							
	ORAL: DIET	3 GENERATIONS	BLOOD	DECREASED CHOLINESTERASE ACTIVITY		5E-2 100		5E-3 1000	005865
			LIVER	DECREASED CHOLINESTERASE ACTIVITY					
SUBCHRONIC [RfD] COMMENT: BASED ON A REPRODUCTION STUDY.									
CHRONIC [RfD] COMMENT: BASED ON A REPRODUCTION STUDY.									

HEAST TABLE 1: SUBCHRONIC AND CHRONIC TOXICITY (OTHER THAN CARCINOGENICITY)

July 1997

CHEMICAL / LEVEL	DOSE / ROUTE	SPECIES / EXPERIMENT / LENGTH	TARGET	CRITICAL EFFECT	Subchronic [RfC] (mg/cu m) UF	Subchronic [RfD] (mg/kg/day) UF	Chronic [RfC] (mg/cu m) UF	Chronic [RfD] (mg/kg/day) UF	REFERENCE
BROMOXYNIL		**001689-84-5**							
NOEL	5 MG/KG/DAY	RAT							
	ORAL: DIET	2 YEARS		NONE OBSERVED		2E-2 300		IRIS	005866
	SUBCHRONIC [RfD] COMMENT: THE CHRONIC ORAL RfD WAS ADOPTED AS THE SUBCHRONIC ORAL [RfD].								
BROMOXYNIL OCTANOATE		**001689-99-2**							
NOEL	7.3 MG/KG/DAY	RAT							
	ORAL: DIET	2 YEARS		NONE OBSERVED		2E-2 300		IRIS	005867
	SUBCHRONIC [RfD] COMMENT: THE CHRONIC ORAL RfD WAS ADOPTED AS THE SUBCHRONIC ORAL [RfD].								
BUSAN 77		**031512-74-0**							
	GENERAL COMMENT: DATA INADEQUATE FOR QUANTITATIVE RISK ASSESSMENT.								005868
BUSAN 90		**002491-38-5**							
	GENERAL COMMENT: DATA INADEQUATE FOR QUANTITATIVE RISK ASSESSMENT.								005869
BUTANOL, 1-		**000071-36-3**							
NOAEL	125 MG/KG/DAY	RAT							
	ORAL: GAVAGE	13 WEEKS	CENTRAL NERVOUS SYSTEM	HYPOACTIVITY		1E+0 100		IRIS	005870
			CENTRAL NERVOUS SYSTEM	ATAXIA					

CHEMICAL / LEVEL	DOSE / ROUTE	SPECIES / EXPERIMENT / LENGTH	TARGET	CRITICAL EFFECT	Subchronic [RfC] (mg/cu m) / UF	Subchronic [RfD] (mg/kg/day) / UF	Chronic [RfC] (mg/cu m) / UF	Chronic [RfD] (mg/kg/day) / UF	REFERENCE
BUTYL BENZYL PHTHALATE, N- 000085-68-7									
NOAEL 159 MG/KG/DAY		RAT							
	ORAL: DIET	26 WEEKS	LIVER	ALTERED WEIGHT		2E+0 100		IRIS	005616
GENERAL COMMENT: ALSO SEE HEAST TABLE 3: CARCINOGENICITY.									
BUTYLATE 002008-41-5									
NOEL 5 MG/KG/DAY		DOG							
	ORAL: CAPSULE	12 MONTHS	LIVER	INCREASED RELATIVE WEIGHT		5E-2 100		IRIS	005871
SUBCHRONIC [RfD] COMMENT: THE CHRONIC ORAL RfD WAS ADOPTED AS THE SUBCHRONIC ORAL [RfD].									
BUTYLCHLORIDE, T- 000507-20-0									
GENERAL COMMENT: DATA INADEQUATE FOR QUANTITATIVE RISK ASSESSMENT.									005810
BUTYROLACTONE, GAMMA- 000096-48-0									
GENERAL COMMENT: DATA INADEQUATE FOR QUANTITATIVE RISK ASSESSMENT.									005872
CACODYLIC ACID 000075-60-5									
NOEL 9.2 MG/KG/DAY		RAT							
	ORAL: DIET	90 DAYS		NONE OBSERVED		3E-2 300		3E-3 3000	005873
SUBCHRONIC [RfD] COMMENT: CALCULATED BY ANALOGY TO ARSENIC BY CORRECTING FOR DIFFERENCES IN MOLECULAR WEIGHT.									
CHRONIC [RfD] COMMENT: CALCULATED BY ANALOGY TO ARSENIC BY CORRECTING FOR DIFFERENCES IN MOLECULAR WEIGHT.									
CADMIUM 007440-43-9									
GENERAL COMMENT: ALSO SEE HEAST TABLE 3: CARCINOGENICITY.								IRIS	005280

CHEMICAL / LEVEL	DOSE / ROUTE	SPECIES / EXPERIMENT / LENGTH	TARGET	CRITICAL EFFECT	Subchronic [RfC] (mg/cu m) UF	Subchronic [RfD] (mg/kg/day) UF	Chronic [RfC] (mg/cu m) UF	Chronic [RfD] (mg/kg/day) UF	REFERENCE
CALCIUM CYANIDE		**000592-01-8**							
NOAEL 19.1 MG/KG/DAY		RAT							
	ORAL: DIET	2 YEARS	WHOLE BODY	DECREASED WEIGHT		4E-2		IRIS	010258
			THYROID	EFFECTS		500			
			NERVE	MYELIN DEGENERATION					
CAPROLACTAM		**000105-60-2**							
								IRIS	005284
NOAEL 50 MG/KG/DAY		RAT							
	ORAL: DIET	90 DAYS	KIDNEY	EFFECTS		5E-1			005282
						100			
							IRIS		010966
CAPTAFOL		**002425-06-1**							
LOAEL 2 MG/KG/DAY		DOG							
	ORAL: CAPSULE	12 MONTHS	KIDNEY	EFFECTS		2E-3		IRIS	005874
			BLADDER	EFFECTS		1000			

SUBCHRONIC [RfD] COMMENT: CALCULATED BY ANALOGY TO FREE CYANIDE BY CORRECTING FOR DIFFERENCES IN MOLECULAR WEIGHT. THE CHRONIC ORAL RfD WAS ADOPTED AS THE SUBCHRONIC ORAL [RfD].
CHRONIC [RfD] COMMENT: CALCULATED BY ANALOGY TO FREE CYANIDE BY CORRECTING FOR DIFFERENCES IN MOLECULAR WEIGHT.

SUBCHRONIC [RfD] COMMENT: THE CHRONIC ORAL RfD WAS ADOPTED AS THE SUBCHRONIC ORAL [RfD].
GENERAL COMMENT: ALSO SEE HEAST TABLE 3: CARCINOGENICITY.

CHEMICAL / DOSE LEVEL / ROUTE	SPECIES / EXPERIMENT / LENGTH	TARGET	CRITICAL EFFECT	Subchronic [RfC] (mg/cu m) UF	Subchronic [RfD] (mg/kg/day) UF	Chronic [RfC] (mg/cu m) UF	Chronic [RfD] (mg/kg/day) UF	REFERENCE
CAPTAN	**000133-06-2**							
NOEL 12.5 MG/KG/DAY	RAT							
ORAL: DIET		WHOLE BODY	DECREASED WEIGHT		1.3E-1 100		IRIS	005875
SUBCHRONIC [RfD] COMMENT: THE CHRONIC ORAL RfD WAS ADOPTED AS THE SUBCHRONIC ORAL [RfD].								
CHRONIC [RfC] COMMENT: THE CHRONIC INHALATION [RfC] IS CONSIDERED NOT VERIFIABLE (05/27/92) BY THE RfD/RfC WORK GROUP.								
CHRONIC [RfD] COMMENT: BASED ON A MULTI-GENERATION REPRODUCTION STUDY.								
GENERAL COMMENT: ALSO SEE HEAST TABLE 3: CARCINOGENICITY.								
CARBARYL	**000063-25-2**							
NOAEL 9.6 MG/KG/DAY	RAT							
ORAL: DIET	2 YEARS	KIDNEY LIVER	TOXICITY TOXICITY		1E-1 100		IRIS	005876
SUBCHRONIC [RfD] COMMENT: THE CHRONIC ORAL RfD WAS ADOPTED AS THE SUBCHRONIC ORAL [RfD].								
						IRIS		010882
CHRONIC RfC COMMENT: THE CHRONIC INHALATION RfC IS CONSIDERED NOT VERIFIABLE (08/15/91) BY THE RfD/RfC WORK GROUP.								
CARBOFURAN	**001563-66-2**							
NOEL 0.5 MG/KG/DAY	DOG							
ORAL: DIET	1 YEAR	BLOOD TESTIS UTERUS	CHOLINESTERASE INHIBITION EFFECTS EFFECTS		5E-3 100		IRIS	005877
SUBCHRONIC [RfD] COMMENT: THE CHRONIC ORAL RfD WAS ADOPTED AS THE SUBCHRONIC ORAL [RfD].								

CHEMICAL / LEVEL	DOSE / ROUTE	SPECIES / EXPERIMENT / LENGTH	TARGET	CRITICAL EFFECT	Subchronic [RfC] (mg/cu m) UF	Subchronic [RfD] (mg/kg/day) UF	Chronic [RfC] (mg/cu m) UF	Chronic [RfD] (mg/kg/day) UF	REFERENCE
CARBON DISULFIDE		**000075-15-0**							
NOEL	11 MG/KG/DAY	RABBIT							
	INHALATION: INTERMITTENT		FETUS	TOXICITY		1E-1 100		IRIS	010259
	SUBCHRONIC [RfD] COMMENT: THE CHRONIC ORAL RfD WAS ADOPTED AS THE SUBCHRONIC ORAL [RfD].								
	CHRONIC [RfD] COMMENT: THE CHRONIC ORAL RfD WAS DETERMINED FROM A TERATOLOGY STUDY WITH EXPOSURES BEFORE AND DURING THE ENTIRE GESTATION PERIOD.								
BMC	19.7 MG/CU M	HUMAN OCCUPATIONAL							
	INHALATION: INTERMITTENT	12.1 +/- 6.9 YEARS	PERIPHERAL NERVOUS SYSTEM	DYSFUNCTION	7E-1 30		IRIS		010975
	CHRONIC RfC COMMENT: A BENCHMARK DOSE APPROACH WAS USED RATHER THAN A NOAEL/LOAEL TO DERIVE THE RfC.								
	SUBCHRONIC [RfC] COMMENT: THE CHRONIC INHALATION RfC WAS ADOPTED AS THE SUBCHRONIC INHALATION [RfC].								
CARBON MONOXIDE		**000630-05-0**							
	CHRONIC [RfC] COMMENT: REFER TO APPENDIX A: TECHNICAL INFORMATION, SECTION V ON NATIONAL AMBIENT AIR QUALITY STANDARDS.								010493
CARBON TETRACHLORIDE		**000056-23-5**						IRIS	010862
	SUBCHRONIC [RfC] COMMENT: CONTACT THE SUPERFUND HEALTH RISK TECHNICAL SUPPORT CENTER: (513) 569-7300.								
	SUBCHRONIC [RfD] COMMENT: CONTACT THE SUPERFUND HEALTH RISK TECHNICAL SUPPORT CENTER: (513) 569-7300.								
	GENERAL COMMENT: ALSO SEE HEAST TABLE 3: CARCINOGENICITY.								
CHLORAL		**000075-87-6**							
	LOAEL 15.7 MG/KG/DAY	MOUSE							
	ORAL: DRINKING WATER	90 DAYS	LIVER	EFFECTS		2E-2 1000		IRIS	005290
	SUBCHRONIC [RfD] COMMENT: THE CHRONIC ORAL RfD WAS ADOPTED AS THE SUBCHRONIC ORAL [RfD].								

CHEMICAL / LEVEL	DOSE / ROUTE	SPECIES / EXPERIMENT LENGTH	TARGET	CRITICAL EFFECT	Subchronic [RfC] (mg/cu m) UF	Subchronic [RfD] (mg/kg/day) UF	Chronic [RfC] (mg/cu m) UF	Chronic [RfD] (mg/kg/day) UF	REFERENCE
CHLORDANE		**000057-74-9**							
NOEL	0.055 MG/KG/DAY	RAT							
	ORAL: DIET	130 WEEKS	LIVER	HYPERTROPHY		6E-5 1000		IRIS	005296
	SUBCHRONIC [RfD] COMMENT: THE CHRONIC ORAL RfD WAS ADOPTED AS THE SUBCHRONIC ORAL [RfD].								
	GENERAL COMMENT: ALSO SEE HEAST TABLE 3: CARCINOGENICITY.								
CHLORINE CYANIDE		**000506-77-4**							
NOAEL	25.3 MG/KG/DAY	RAT							
	ORAL: DIET	2 YEARS	WHOLE BODY	DECREASED WEIGHT		5E-2		IRIS	010261
			THYROID	EFFECTS		500			
			NERVE	MYELIN DEGENERATION					
	SUBCHRONIC [RfD] COMMENT: THE CHRONIC ORAL RfD WAS ADOPTED AS THE SUBCHRONIC ORAL [RfD].								
CHLORO-1,3-BUTADIENE, 2- / (CHLOROPRENE)		**000126-99-8**							
NOAEL	32 PPM	RAT							
	INHALATION	90 DAYS	OLFACTORY	DEGENERATION	7E-2		7E-3		010515
			EPITHELIUM		30		300		
	SUBCHRONIC [RfD] COMMENT: ALSO SEE HEAST TABLE 2: ALTERNATE METHODS -- SUBCHRONIC AND CHRONIC TOXICITY (OTHER THAN CARCINOGENICITY)								
	CHRONIC [RfD] COMMENT: ALSO SEE HEAST TABLE 2: ALTERNATE METHODS -- SUBCHRONIC AND CHRONIC TOXICITY (OTHER THAN CARCINOGENICITY)								
CHLORO-M-CRESOL, P-		**000059-50-7**							
NOAEL	200 MG/KG/DAY	RAT							
	ORAL: GAVAGE	28 DAYS	WHOLE BODY	DECREASED WEIGHT GAIN		2E+0 100			005366
CHLOROACETALDEHYDE		**000107-20-0**							
	GENERAL COMMENT: DATA INADEQUATE FOR QUANTITATIVE RISK ASSESSMENT.								005342

CHEMICAL / LEVEL	DOSE / ROUTE	SPECIES / EXPERIMENT / LENGTH	TARGET	CRITICAL EFFECT	Subchronic [RfC] (mg/cu m) UF	Subchronic [RfD] (mg/kg/day) UF	Chronic [RfC] (mg/cu m) UF	Chronic [RfD] (mg/kg/day) UF	REFERENCE
CHLOROACETIC ACID		**000079-11-8**							
LOAEL 30 MG/KG		RAT							
	ORAL: GAVAGE	13 WEEKS	HEART	MYOCARDITIS		2E-2 1000		2E-3 10000	005346
CHLOROANILINE, 2-		**000095-51-2**							
	GENERAL COMMENT: DATA INADEQUATE FOR QUANTITATIVE RISK ASSESSMENT								005347
CHLOROANILINE, 3-		**000108-42-9**							
	GENERAL COMMENT: DATA INADEQUATE FOR QUANTITATIVE RISK ASSESSMENT								005348
CHLOROANILINE, 4-		**000106-47-8**							
LOAEL 12.5 MG/KG/DAY		RAT							
	ORAL: DIET	78 WEEKS	SPLEEN	PROLIFERATIVE LESIONS		4E-3 3000		IRIS	005349
	SUBCHRONIC [RfD] COMMENT: THE CHRONIC ORAL RfD WAS ADOPTED AS THE SUBCHRONIC ORAL [RfD].								
CHLOROBENZENE		**000108-90-7**							
								IRIS	010863
	SUBCHRONIC [RfC] COMMENT: CONTACT THE SUPERFUND HEALTH RISK TECHNICAL SUPPORT CENTER: (513) 569-7300.								
	CHRONIC [RfC] COMMENT: ALSO SEE HEAST TABLE 2: ALTERNATE METHODS -- SUBCHRONIC AND CHRONIC TOXICITY (OTHER THAN CARCINOGENICITY).								

CHEMICAL / LEVEL	DOSE / ROUTE	SPECIES / EXPERIMENT LENGTH	TARGET	CRITICAL EFFECT	Subchronic [RfC] (mg/cu m) UF	Subchronic [RfD] (mg/kg/day) UF	Chronic [RfC] (mg/cu m) UF	Chronic [RfD] (mg/kg/day) UF	REFERENCE
CHLOROBENZILATE		**000510-15-6**							
NOEL	5 MG/KG/DAY	RABBIT							
	ORAL: GAVAGE	13 DAYS	GASTRO-INTESTINAL SYSTEM	DECREASED STOOL QUANTITY		2E-2 300		IRIS	010260
			WHOLE BODY	DECREASED FOOD CONSUMPTION					
			WHOLE BODY	DECREASED WEIGHT GAIN					
			NERVOUS SYSTEM	HYPERIRRITABILITY					
SUBCHRONIC [RfD] COMMENT: THE CHRONIC ORAL RfD WAS ADOPTED AS THE SUBCHRONIC ORAL [RfD]. BASED ON A TERATOLOGY STUDY WITH EXPOSURES DURING DAYS 7-19 OF GESTATION.									
CHRONIC [RfD] COMMENT: BASED ON A TERATOLOGY STUDY WITH EXPOSURES DURING DAYS 7-19 OF GESTATION.									010931
CHRONIC [RfC] COMMENT: THE CHRONIC INHALATION [RfC] IS CONSIDERED NOT VERIFIABLE (02/11/93) BY THE RfD/RfC WORK GROUP.									
CHLOROBENZOIC ACID, P-		**000074-11-3**							
NOAEL	26 MG/DAY	RAT							
	ORAL: DIET	5 MONTHS		NONE OBSERVED		2E+0 100		2E-1 1000	005360
CHLOROBENZOTRIFLUORIDE, 4-		**000098-56-6**							
NOAEL	15 MG/KG/DAY	RAT							
	ORAL: GAVAGE		KIDNEY	TUBULAR DEGENERATION		2E-1 100		2E-2 1000	005364
SUBCHRONIC [RfD] COMMENT: BASED ON A 2-GENERATION REPRODUCTION STUDY WITH EXPOSURES 4 WEEKS PRIOR TO MATING. DURING GESTATION. AND FOR 90 DAYS POST-WEANING.									
CHRONIC [RfD] COMMENT: BASED ON A 2-GENERATION REPRODUCTION STUDY WITH EXPOSURES 4 WEEKS PRIOR TO MATING. DURING GESTATION. AND FOR 90 DAYS POST-WEANING.									

CHEMICAL / LEVEL	DOSE / ROUTE	SPECIES / EXPERIMENT / LENGTH	TARGET	CRITICAL EFFECT	Subchronic [RfC] (mg/cu m) UF	Subchronic [RfD] (mg/kg/day) UF	Chronic [RfC] (mg/cu m) UF	Chronic [RfD] (mg/kg/day) UF	REFERENCE
CHLOROBUTANE, 1-		**000109-69-3**							
NOAEL 43 MG/KG/DAY		RAT							
	ORAL: GAVAGE	103 WEEKS	WHOLE BODY	INCREASED MORTALITY				4E-1	005808
			CENTRAL NERVOUS SYSTEM	EFFECTS				100	
			BLOOD	HEMATOLOGIC EFFECTS					
NOAEL 86 MG/KG/DAY		RAT							
	ORAL: GAVAGE	13 WEEKS	WHOLE BODY	DECREASED WEIGHT GAIN		9E-1			005806
			CENTRAL NERVOUS SYSTEM	EFFECTS		100			
			SPLEEN	HEMATOPOIESIS					
CHLOROBUTANE, 2-		**000078-86-4**							
GENERAL COMMENT: DATA INADEQUATE FOR QUANTITATIVE RISK ASSESSMENT.									005809
CHLOROCYCLOPENTADIENE		**041851-50-7**							
GENERAL COMMENT: DATA INADEQUATE FOR QUANTITATIVE RISK ASSESSMENT									005297
CHLOROFORM		**000067-66-3**							
LOAEL 12.9 MG/KG/DAY		DOG							
	ORAL: CAPSULE	7.5 YEARS	LIVER	LESIONS		1E-2 1000		IRIS	005372

SUBCHRONIC [RfD] COMMENT: THE CHRONIC ORAL RfD WAS ADOPTED AS THE SUBCHRONIC ORAL [RfD].
GENERAL COMMENT: ALSO SEE HEAST TABLE 3: CARCINOGENICITY.
SUBCHRONIC [RfC] COMMENT: CONTACT THE SUPERFUND HEALTH RISK TECHNICAL SUPPORT CENTER: (513) 569-7300.

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CHEMICAL / LEVEL	DOSE / ROUTE	SPECIES / EXPERIMENT LENGTH	TARGET	CRITICAL EFFECT	Subchronic [RfC] (mg/cu m) UF	Subchronic [RfD] (mg/kg/day) UF	Chronic [RfC] (mg/cu m) UF	Chronic [RfD] (mg/kg/day) UF	REFERENCE
CHLOROMETHANE / (METHYL CHLORIDE) 000074-87-3									010005
SUBCHRONIC [RfC] COMMENT: CONTACT THE SUPERFUND HEALTH RISK TECHNICAL SUPPORT CENTER: (513) 569-7300.									
GENERAL COMMENT: ALSO SEE HEAST TABLE 3: CARCINOGENICITY.									
CHLORONITROBENZENE, M- 000121-73-3									005879
GENERAL COMMENT: DATA INADEQUATE FOR QUANTITATIVE RISK ASSESSMENT.									
CHLOROPHENOL, 2- 000095-57-8									
NOAEL 50 PPM	ORAL: DRINKING WATER	RAT	REPRODUCTION	REPRODUCTIVE EFFECTS		5E-2 100		IRIS	010436
SUBCHRONIC [RfD] COMMENT: BASED ON A REPRODUCTIVE STUDY WITH EXPOSURE 10 WEEKS PRIOR TO AND DURING MATING, GESTATION AND WEANING.									
CHRONIC [RfD] COMMENT: BASED ON A REPRODUCTIVE STUDY WITH EXPOSURE 10 WEEKS PRIOR TO AND DURING MATING, GESTATION AND WEANING.									
CHLOROPHENOL, 3- 000108-43-0									005309
GENERAL COMMENT: DATA INADEQUATE FOR QUANTITATIVE RISK ASSESSMENT									
CHLOROPHENOL, 4- 000106-48-9									005310
GENERAL COMMENT: DATA INADEQUATE FOR QUANTITATIVE RISK ASSESSMENT									
CHLOROPROPANE, 2- 000075-29-6									
NOAEL 91.4 MG/KG/DAY	INHALATION: INTERMITTENT	RAT 4 WEEKS	LIVER	EFFECTS	1E+0 100		1E-1 1000		010444
CHLOROTOLUENE, M- 000108-41-8									005880
GENERAL COMMENT: DATA INADEQUATE FOR QUANTITATIVE RISK ASSESSMENT.									

CHEMICAL / LEVEL	DOSE / ROUTE	SPECIES / EXPERIMENT LENGTH	TARGET	CRITICAL EFFECT	Subchronic [RfC] (mg/cu m) UF	Subchronic [RfD] (mg/kg/day) UF	Chronic [RfC] (mg/cu m) UF	Chronic [RfD] (mg/kg/day) UF	REFERENCE
CHLOROTOLUENE, O-		**000095-49-8**							
NOAEL 20 MG/KG/DAY		RAT							
	ORAL: GAVAGE	103 DAYS	WHOLE BODY	DECREASED WEIGHT GAIN		2E-1 100		IRIS	010167
CHLOROTOLUENE, P-		**000106-43-4**							
	GENERAL COMMENT: DATA INADEQUATE FOR QUANTITATIVE RISK ASSESSMENT.								010200
CHLORPYRIFOS		**002921-88-2**							
NOEL 0.03 MG/KG/DAY		HUMAN							
	ORAL: CAPSULE	20 DAYS OR 9 DAYS	BLOOD	DECREASED CHOLINESTERASE ACTIVITY		3E-3 10		IRIS	005881
	SUBCHRONIC [RfD] COMMENT: THE CHRONIC ORAL RfD WAS ADOPTED AS THE SUBCHRONIC ORAL [RfD].								
CHLORPYRIFOS METHYL		**005598-13-0**							
NOAEL 1 MG/KG/DAY		RAT							
	ORAL: DIET	3 GENERATIONS	REPRODUCTION	DECREASED FERTILITY		1E-2 100		1E-2 100	005882
		RAT 2 YEARS	LIVER	EFFECTS					
CHLOROTHALONIL		**001897-45-6**							
NOEL 1.5 MG/KG/DAY		DOG							
	ORAL: DIET	2 YEARS	KIDNEY	EFFECTS		1.5E-2 100		IRIS	005883
	SUBCHRONIC [RfD] COMMENT: THE CHRONIC ORAL RfD WAS ADOPTED AS THE SUBCHRONIC ORAL [RfD].								
	GENERAL COMMENT: ALSO SEE HEAST TABLE 3: CARCINOGENICITY.								

CHEMICAL / LEVEL	DOSE / ROUTE	SPECIES / EXPERIMENT LENGTH	TARGET	CRITICAL EFFECT	Subchronic [RfC] (mg/cu m) / UF	Subchronic [RfD] (mg/kg/day) / UF	Chronic [RfC] (mg/cu m) / UF	Chronic [RfD] (mg/kg/day) / UF	REFERENCE
CHLORTHIOPHOS		**060238-56-4**							
NOAEL 0.08 MG/KG/DAY		RAT							
	ORAL: DIET	2 YEARS		NONE OBSERVED		8E-4 100		8E-4 100	005884
SUBCHRONIC [RfD] COMMENT: THE CHRONIC ORAL [RfD] WAS ADOPTED AS THE SUBCHRONIC ORAL [RfD].									
CHROMIUM(III)		**016065-83-1**							
NOEL 5 % (CR2O3)		RAT							
	ORAL: DIET	840 DAYS		NONE OBSERVED		1E+0 1000		IRIS	005731
SUBCHRONIC [RfD] COMMENT: THE CHRONIC ORAL RfD WAS ADOPTED AS THE SUBCHRONIC ORAL [RfD].									
CHRONIC [RfC] COMMENT: INHALATION ISSUES ARE UNDER REVIEW BY THE RFD/RFC WORK GROUP.									
SUBCHRONIC [RfC] COMMENT: CONTACT THE SUPERFUND HEALTH RISK TECHNICAL SUPPORT CENTER: (513) 569-7300.									
CHROMIUM(VI)		**018540-29-9**							
NOAEL 2.4 MG/KG/DAY		RAT							
	ORAL: DRINKING WATER	1 YEAR		NONE OBSERVED		2E-2 100		IRIS	005522
CHRONIC [RfC] COMMENT: INHALATION ISSUES ARE UNDER REVIEW BY THE RFD/RFC WORK GROUP.									
SUBCHRONIC [RfC] COMMENT: CONTACT THE SUPERFUND HEALTH RISK TECHNICAL SUPPORT CENTER: (513) 569-7300.									
CHRYSENE		**000218-01-9**							
GENERAL COMMENT: DATA INADEQUATE FOR QUANTITATIVE RISK ASSESSMENT. ALSO SEE HEAST TABLE 3: CARCINOGENICITY.									005885

HEAST TABLE 1: SUBCHRONIC AND CHRONIC TOXICITY (OTHER THAN CARCINOGENICITY)

July 1997

CHEMICAL / LEVEL	DOSE / ROUTE	SPECIES / EXPERIMENT LENGTH	TARGET	CRITICAL EFFECT	Subchronic [RfC] (mg/cu m) UF	Subchronic [RfD] (mg/kg/day) UF	Chronic [RfC] (mg/cu m) UF	Chronic [RfD] (mg/kg/day) UF	REFERENCE
COPPER		**007440-50-8**							
LOAEL 5.3 MG		HUMAN							
	ORAL	SINGLE DOSE	GASTRO-INTESTINAL SYSTEM	IRRITATION		1.3 MG/L		1.3 MG/L	005374
	SUBCHRONIC [RfD] COMMENT: CURRENT DRINKING WATER STANDARD OF 1.3 MG/L. DWCD (1987) CONCLUDED TOXICITY DATA WERE INADEQUATE FOR CALCULATION OF AN RfD FOR COPPER.								
	CHRONIC [RfD] COMMENT: CURRENT DRINKING WATER STANDARD OF 1.3 MG/L. DWCD (1987) CONCLUDED TOXICITY DATA WERE INADEQUATE FOR CALCULATION OF AN RfD FOR COPPER.								
COPPER CYANIDE		**000544-92-3**							
NOAEL 5 MG/KG/DAY		RAT							
	ORAL: GAVAGE	90 DAYS	LIVER	HISTOPATHOLOGY		5E-2		IRIS	010262
			KIDNEY	HISTOPATHOLOGY		100			
			WHOLE BODY	DECREASED WEIGHT					
			ORGANS	DECREASED WEIGHT					
CRESOL, M- / (3-METHYLPHENOL)		**000108-39-4**							
NOAEL 50 MG/KG/DAY		RAT							
	ORAL: GAVAGE	90 DAYS	WHOLE BODY	DECREASED WEIGHT GAIN		5E-1		IRIS	005380
			NERVOUS SYSTEM	NEUROTOXICITY		100			
	GENERAL COMMENT: ALSO SEE HEAST TABLE 3: CARCINOGENICITY.								
							IRIS		010888
	CHRONIC RfC COMMENT: THE CHRONIC INHALATION RfC IS CONSIDERED NOT VERIFIABLE (12/11/91) BY THE RfD/RfC WORK GROUP.								

HEAST TABLE 1: SUBCHRONIC AND CHRONIC TOXICITY (OTHER THAN CARCINOGENICITY)

July 1997

CHEMICAL / LEVEL	DOSE / ROUTE	SPECIES / EXPERIMENT LENGTH	TARGET	CRITICAL EFFECT	Subchronic [RfC] (mg/cu m) UF	Subchronic [RfD] (mg/kg/day) UF	Chronic [RfC] (mg/cu m) UF	Chronic [RfD] (mg/kg/day) UF	REFERENCE
CRESOL, O- / (2-METHYLPHENOL) 000095-48-7									
NOAEL 50 MG/KG/DAY	ORAL: GAVAGE	RAT 90 DAYS	WHOLE BODY	DECREASED WEIGHT GAIN		5E-1 100		IRIS	005384
			NERVOUS SYSTEM	NEUROTOXICITY					
GENERAL COMMENT: ALSO SEE HEAST TABLE 3: CARCINOGENICITY.									
							IRIS		010889
CHRONIC RfC COMMENT: THE CHRONIC INHALATION RfC IS CONSIDERED NOT VERIFIABLE (12/11/91) BY THE RfD/RfC WORK GROUP.									
CRESOL, P- / (4-METHYLPHENOL) 000106-44-5									
NOAEL 5 MG/(KG-DAY)	ORAL: GAVAGE	RABBIT GESTATION DAYS 6-18	CENTRAL NERVOUS SYSTEM	HYPOACTIVITY		5E-3 1000		5E-3 1000	010516
			RESPIRATORY SYSTEM	DISTRESS					
			WHOLE BODY	MATERNAL DEATH					
SUBCHRONIC [RfD] COMMENT: THE CHRONIC ORAL [RfD] WAS ADOPTED AS THE SUBCHRONIC ORAL [RfD].									
GENERAL COMMENT: ALSO SEE HEAST TABLE 3: CARCINOGENICITY.									
							IRIS		010890
CHRONIC RfC COMMENT: THE CHRONIC INHALATION RfC IS CONSIDERED NOT VERIFIABLE (12/11/91) BY THE RfD/RfC WORK GROUP.									
CUMENE 000098-82-8									
NOAEL 154 MG/KG/DAY	ORAL: GAVAGE	RAT 194 DAYS	KIDNEY	INCREASED WEIGHT		4E-1 300		IRIS	005392
NOAEL 105.1 PPM	INHALATION: INTERMITTENT	RAT 4 WEEKS	CENTRAL NERVOUS SYSTEM	INVOLVEMENT	9E-2 1000		9E-3 10000		005908
			NOSE	IRRITATION					

IRIS, EPA'S INTEGRATED RISK INFORMATION SYSTEM. IS UPDATED MONTHLY. FURTHER INFORMATION: RISK INFORMATION HOTLINE: (513) 569-7254.

CHEMICAL LEVEL	DOSE ROUTE	SPECIES EXPERIMENT LENGTH	TARGET	CRITICAL EFFECT	Subchronic [RfC] (mg/cu m) UF	Subchronic [RfD] (mg/kg/day) UF	Chronic [RfC] (mg/cu m) UF	Chronic [RfD] (mg/kg/day) UF	REFERENCE
CYANAZINE		**021725-46-2**							
NOEL 0.625 MG/KG/DAY		DOG							
	ORAL: DIET	1 YEAR	WHOLE BODY	DECREASED WEIGHT		2E-3		2E-3	010411
			BLOOD	INCREASED PLATELET COUNT		300		300	
			BLOOD	ALTERED CLINICAL CHEMISTRY PARAMETERS					
SUBCHRONIC [RfD] COMMENT: THE CHRONIC ORAL [RfD] WAS ADOPTED AS THE SUBCHRONIC ORAL [RfD].									
CHRONIC [RfD] COMMENT: THE CHRONIC ORAL RfD WAS WITHDRAWN FROM IRIS (07/01/92). UNDER REVIEW. CURRENT NUMBER SUBJECT TO CHANGE.									
GENERAL COMMENT: ALSO SEE HEAST TABLE 3: CARCINOGENICITY.									
CYANIDE		**000057-12-5**							
NOAEL 10.8 MG/KG/DAY		RAT							
	ORAL: DIET	104 WEEKS	WHOLE BODY	DECREASED WEIGHT		2E-2		IRIS	005396
			THYROID	EFFECTS		500			
			NERVE	MYELIN DEGENERATION					
SUBCHRONIC [RfD] COMMENT: THE CHRONIC ORAL RfD WAS ADOPTED AS THE SUBCHRONIC ORAL [RfD].									
GENERAL COMMENT: THE CASRN FOR CN- IS 000057-12-5; THE CASRN FOR HCN IS 000074-90-8.									
CYANOGEN		**000460-19-5**							
NOAEL 21.6 MG/KG/DAY		RAT							
	ORAL: DIET	2 YEARS	WHOLE BODY	DECREASED WEIGHT		4E-2		IRIS	010263
			THYROID	EFFECTS		500			
			NERVE	MYELIN DEGENERATION					
SUBCHRONIC [RfD] COMMENT: CALCULATED BY ANALOGY TO FREE CYANIDE BY CORRECTING FOR DIFFERENCES IN MOLECULAR WEIGHT. THE CHRONIC ORAL RfD WAS ADOPTED AS THE SUBCHRONIC ORAL [RfD].									

CHEMICAL / LEVEL	DOSE / ROUTE	SPECIES / EXPERIMENT / LENGTH	TARGET	CRITICAL EFFECT	Subchronic [RfC] (mg/cu m) UF	Subchronic [RfD] (mg/kg/day) UF	Chronic [RfC] (mg/cu m) UF	Chronic [RfD] (mg/kg/day) UF	REFERENCE
CYANOGEN BROMIDE		**000506-68-3**							
NOAEL 44 MG/KG/DAY		RAT							
	ORAL: DIET	2 YEARS	WHOLE BODY	DECREASED WEIGHT		9E-2		IRIS	010264
			THYROID	EFFECTS		500			
			NERVE	MYELIN DEGENERATION					
SUBCHRONIC [RfD] COMMENT: CALCULATED BY ANALOGY TO FREE CYANIDE BY CORRECTING FOR DIFFERENCES IN MOLECULAR WEIGHT. THE CHRONIC ORAL RfD WAS ADOPTED AS THE SUBCHRONIC ORAL [RfD].									
CYCLOATE		**001134-23-2**							
GENERAL COMMENT: DATA INADEQUATE FOR QUANTITATIVE RISK ASSESSMENT.									005886
CYCLOHEXANOL		**000108-93-0**							
GENERAL COMMENT: DATA INADEQUATE FOR QUANTITATIVE RISK ASSESSMENT.									005887
CYCLOHEXYLAMINE		**000108-91-8**						IRIS	005400
NOAEL 30 MG/KG/DAY		RAT							
	ORAL: DIET	90 DAYS	WHOLE BODY	DECREASED WEIGHT GAIN		3E-1			005398
			TESTIS	DECREASED WEIGHT		100			
CYCLOPENTADIENE		**000542-92-7**							010494
GENERAL COMMENT: ALSO SEE HEAST TABLE 2: ALTERNATE METHODS -- SUBCHRONIC AND CHRONIC TOXICITY (OTHER THAN CARCINOGENICITY)									

CHEMICAL / LEVEL	DOSE / ROUTE	SPECIES / EXPERIMENT / LENGTH	TARGET	CRITICAL EFFECT	Subchronic [RfC] (mg/cu m) UF	Subchronic [RfD] (mg/kg/day) UF	Chronic [RfC] (mg/cu m) UF	Chronic [RfD] (mg/kg/day) UF	REFERENCE
DACTHAL		**001861-32-1**							
NOAEL 1	MG/KG/DAY	RAT							
	ORAL: DIET	2 YEARS	LUNG	EFFECTS		1E-2		IRIS	005888
			LIVER	EFFECTS		100			
			KIDNEY	EFFECTS					
			THYROID	EFFECTS					
			THYROID HORMONES	EFFECTS					
	SUBCHRONIC [RfD] COMMENT: THE CHRONIC ORAL RfD WAS ADOPTED AS THE SUBCHRONIC ORAL [RfD].								
DALAPON		**000075-99-0**							
NOEL	8.45 MG/KG/DAY	RAT							
	ORAL: DIET	2 YEARS	KIDNEY	INCREASED RELATIVE WEIGHT		3E-2		IRIS	005889
						300			
	SUBCHRONIC [RfD] COMMENT: CALCULATED BY ANALOGY TO DALAPON SODIUM BY CORRECTING FOR DIFFERENCES IN MOLECULAR WEIGHT. THE CHRONIC ORAL RfD WAS ADOPTED AS THE SUBCHRONIC ORAL [RfD].								
DDT		**000050-29-3**							
NOEL	0.05 MG/KG/DAY	RAT							
	ORAL: DIET	27 WEEKS	LIVER	LESIONS		5E-4		IRIS	005408
						100			
	SUBCHRONIC [RfD] COMMENT: THE CHRONIC ORAL RfD WAS ADOPTED AS THE SUBCHRONIC ORAL [RfD]. GENERAL COMMENT: ALSO SEE HEAST TABLE 3: CARCINOGENICITY.								

CHEMICAL / LEVEL	DOSE / ROUTE	SPECIES / EXPERIMENT LENGTH	TARGET	CRITICAL EFFECT	Subchronic [RfC] (mg/cu m) UF	Subchronic [RfD] (mg/kg/day) UF	Chronic [RfC] (mg/cu m) UF	Chronic [RfD] (mg/kg/day) UF	REFERENCE
DECABROMODIPHENYL ETHER		**001163-19-5**							
NOEL	1 MG/KG/DAY	RAT				1E-2		IRIS	005891
	ORAL: DIET	2 YEARS	LIVER	INCREASED WEIGHT		100			
SUBCHRONIC [RfD] COMMENT: THE CHRONIC ORAL RfD WAS ADOPTED AS THE SUBCHRONIC ORAL [RfD].									
GENERAL COMMENT: ALSO SEE HEAST TABLE 3: CARCINOGENICITY.									
DI-N-OCTYL PHTHALATE		**000117-84-0**							
LOAEL	175 MG/KG/DAY	RAT				2E-2		2E-2	010275
	ORAL: DIET	7-12 MONTHS	KIDNEY	INCREASED WEIGHT		1000		1000	
			LIVER	INCREASED WEIGHT					
			LIVER	INCREASED SGOT ACTIVITY					
			LIVER	INCREASED SGPT ACTIVITY					
DIAZINON		**000333-41-5**							
NOAEL	0.09 MG/KG/DAY	RAT				9E-4		9E-4	005892
	ORAL: DIET	35-42 DAYS	BLOOD	DECREASED CHOLINESTERASE ACTIVITY		100		100	
DIBENZOFURAN		**000132-64-9**							
GENERAL COMMENT: DATA INADEQUATE FOR QUANTITATIVE RISK ASSESSMENT.									005409
DIBROMOBENZENE, 1,4-		**000106-37-6**							
NOAEL	10 MG/KG/DAY	RAT				1E-1		IRIS	005893
	ORAL: GAVAGE	45 OR 90 DAYS	LIVER	INCREASED RELATIVE WEIGHT		100			
			LIVER	ALTERED ENZYME ACTIVITIES					

CHEMICAL / LEVEL	DOSE / ROUTE	SPECIES / EXPERIMENT / LENGTH	TARGET	CRITICAL EFFECT	Subchronic [RfC] (mg/cu m) UF	Subchronic [RfD] (mg/kg/day) UF	Chronic [RfC] (mg/cu m) UF	Chronic [RfD] (mg/kg/day) UF	REFERENCE
DIBROMOCHLOROMETHANE		**000124-48-1**							
NOEL	21.4 MG/KG/DAY	RAT							
	ORAL: GAVAGE	13 WEEKS	LIVER	LESIONS		2E-1 100		IRIS	005894
GENERAL COMMENT: ALSO SEE HEAST TABLE 3: CARCINOGENICITY.									
DIBROMOETHANE, 1,2-		**000106-93-4**							
LOAEL	88 PPB	HUMAN							
	INHALATION: INTERMITTENT		SPERM	EFFECTS	2E-3 100		2E-4 1000		010854
SUBCHRONIC [RfC] COMMENT: THE CHRONIC INHALATION [RfC] WAS MODIFIED TO ESTIMATE THE SUBCHRONIC INHALATION [RfC]. CHRONIC [RfC] COMMENT: UNDER REVIEW. CURRENT NUMBER SUBJECT TO CHANGE. GENERAL COMMENT: ALSO SEE HEAST TABLE 3: CARCINOGENICITY.									
DIBUTYL PHTHALATE		**000084-74-2**							
NOAEL	125 MG/KG/DAY	RAT							
	ORAL: DIET	52 WEEKS	WHOLE BODY	INCREASED MORTALITY		1E+0 100		IRIS	005622
							IRIS		010892
CHRONIC RfC COMMENT: THE CHRONIC INHALATION RfC IS CONSIDERED NOT VERIFIABLE (07/26/90) BY THE RfD/RfC WORK GROUP.									
DICAMBA		**001918-00-9**							
NOAEL	3 MG/KG/DAY	RABBIT							
	ORAL: GAVAGE	GESTATION DAYS 6-18	FETUS	DECREASED WEIGHT		3E-2		IRIS	010945
			FETUS	INCREASED POST-IMPLANTATION LOSSES		100			
			FETUS	INCREASED MORTALITY					
			DAM	DECREASED WEIGHT GAIN					
SUBCHRONIC [RfD] COMMENT: THE CHRONIC ORAL RfD WAS ADOPTED AS THE SUBCHRONIC ORAL [RfD].									

CHEMICAL / LEVEL	DOSE / ROUTE	SPECIES / EXPERIMENT / LENGTH	TARGET	CRITICAL EFFECT	Subchronic [RfC] (mg/cu m) UF	Subchronic [RfD] (mg/kg/day) UF	Chronic [RfC] (mg/cu m) UF	Chronic [RfD] (mg/kg/day) UF	REFERENCE
DICHLOROBENZENE, 1,2- **000095-50-1**								IRIS	010864
GENERAL COMMENT: ALSO SEE HEAST TABLE 2: ALTERNATE METHODS -- SUBCHRONIC AND CHRONIC TOXICITY (OTHER THAN CARCINOGENICITY)									
DICHLOROBENZENE, 1,3- **000541-73-1**									005414
CHRONIC [RfD] COMMENT: THE CHRONIC ORAL [RfD] IS CONSIDERED NOT VERIFIABLE (06/23/92) BY THE RfD/RfC WORK GROUP.									
DICHLOROBENZENE, 1,4- **000106-46-7**									
NOAEL 75 MG/CU M	INHALATION: INTERMITTENT	RAT MULTI-GENERATION	LIVER	INCREASED WEIGHT IN MALE PARENTS	2.5E+0 30			IRIS	010840
SUBCHRONIC [RfC] COMMENT: THE CHRONIC INHALATION RfC WAS MODIFIED TO ESTIMATE THE SUBCHRONIC INHALATION [RfC].									
GENERAL COMMENT: ALSO SEE HEAST TABLE 3: CARCINOGENICITY.									
DICHLOROBUTENES									005415
GENERAL COMMENT: DATA INADEQUATE FOR QUANTITATIVE RISK ASSESSMENT.									
DICHLORODIFLUOROMETHANE **000075-71-8**								IRIS	005498
NOAEL 90 MG/KG/DAY	ORAL: DIET	DOG 90 DAYS		NONE OBSERVED		9E-1 100			005496
SUBCHRONIC [RfC] COMMENT: ALSO SEE HEAST TABLE 2: ALTERNATE METHODS -- SUBCHRONIC AND CHRONIC TOXICITY (OTHER THAN CARCINOGENICITY)									
CHRONIC [RfC] COMMENT: ALSO SEE HEAST TABLE 2: ALTERNATE METHODS -- SUBCHRONIC AND CHRONIC TOXICITY (OTHER THAN CARCINOGENICITY)									

HEAST TABLE 1: SUBCHRONIC AND CHRONIC TOXICITY (OTHER THAN CARCINOGENICITY)

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CHEMICAL LEVEL / DOSE ROUTE / SPECIES EXPERIMENT LENGTH	TARGET.	CRITICAL EFFECT	Subchronic [RfC] (mg/cu m) UF	Subchronic [RfD] (mg/kg/day) UF	Chronic [RfC] (mg/cu m) UF	Chronic [RfD] (mg/kg/day) UF	REFERENCE
DICHLOROETHANE, 1,1- 000075-34-3							
NOEL 115 MG/KG/DAY RAT INHALATION: 13 WEEKS INTERMITTENT		NONE OBSERVED		1E+0 100		1E-1 1000	005790
SUBCHRONIC [RfC] COMMENT: ALSO SEE HEAST TABLE 2: ALTERNATE METHODS -- SUBCHRONIC AND CHRONIC TOXICITY (OTHER THAN CARCINOGENICITY) SUBCHRONIC [RfD] COMMENT: BASED ON ROUTE TO ROUTE EXTRAPOLATION. CHRONIC [RfC] COMMENT: ALSO SEE HEAST TABLE 2: ALTERNATE METHODS -- SUBCHRONIC AND CHRONIC TOXICITY (OTHER THAN CARCINOGENICITY) CHRONIC [RfD] COMMENT: BASED ON ROUTE TO ROUTE EXTRAPOLATION. GENERAL COMMENT: ALSO SEE HEAST TABLE 3: CARCINOGENICITY.							
DICHLOROETHYLENE, 1,1- 000075-35-4							
LOAEL 9 MG/KG/DAY RAT ORAL: DRINKING WATER 2 YEARS	LIVER	LESIONS		9E-3 1000		IRIS	005419
SUBCHRONIC [RfD] COMMENT: THE CHRONIC ORAL RfD WAS ADOPTED AS THE SUBCHRONIC ORAL [RfD]. CHRONIC [RfD] COMMENT: UNDER REVIEW. CURRENT NUMBER SUBJECT TO CHANGE. GENERAL COMMENT: ALSO SEE HEAST TABLE 3: CARCINOGENICITY.							
DICHLOROETHYLENE, 1,2- (MIXED ISOMERS) 000540-59-0							
LOAEL 50 PPM RAT ORAL: DRINKING WATER 2 YEARS	LIVER	LESIONS		9E-3 1000		9E-3 1000	010509
SUBCHRONIC [RfD] COMMENT: VALUES DERIVED FOR 1,1-DICHLOROETHYLENE WERE ADOPTED FOR 1,2- DICHLOROETHYLENE MIXED ISOMERS BASED ON ANALOGY. CHRONIC [RfD] COMMENT: VALUES DERIVED FOR 1,1-DICHLOROETHYLENE (000075-35-4) WERE ADOPTED FOR 1,2-DICHLOROETHYLENE MIXED ISOMERS BASED ON ANALOGY.							

CHEMICAL / LEVEL	DOSE / ROUTE	SPECIES / EXPERIMENT / LENGTH	TARGET	CRITICAL EFFECT	Subchronic [RfC] (mg/cu m) UF	Subchronic [RfD] (mg/kg/day) UF	Chronic [RfC] (mg/cu m) UF	Chronic [RfD] (mg/kg/day) UF	REFERENCE
DICHLOROETHYLENE, 1,2-C- 000156-59-2									
NOAEL 32 MG/KG/DAY		RAT							
	ORAL: GAVAGE	90 DAYS	BLOOD	DECREASED HEMATOCRIT		1E-1		1E-2	005420
			BLOOD	DECREASED HEMOGLOBIN		300		3000	
CHRONIC [RfD] COMMENT: UNDER REVIEW. CURRENT NUMBER SUBJECT TO CHANGE.									
DICHLOROETHYLENE, 1,2-T- 000156-60-5									
NOAEL 17 MG/KG/DAY		MOUSE							
	ORAL: DRINKING WATER	90 DAYS	BLOOD	INCREASED ALKALINE PHOSPHATASE		2E-1 100		IRIS	005895
DICHLOROPHENOL, 2,3- 000576-24-9									
GENERAL COMMENT: DATA INADEQUATE FOR QUANTITATIVE RISK ASSESSMENT									005315
DICHLOROPHENOL, 2,4- 000120-83-2									
NOEL 3 PPM		RAT							
	ORAL: DRINKING WATER	2 GENERATIONS	IMMUNE SYSTEM	ALTERED IMMUNE FUNCTION		3E-3 100		IRIS	005314
SUBCHRONIC [RfD] COMMENT: THE CHRONIC ORAL RfD WAS ADOPTED AS THE SUBCHRONIC ORAL [RfD]. CHRONIC [RfD] COMMENT: BASED ON A 2-GENERATION REPRODUCTION STUDY WITH EXPOSURES BEFORE AND DURING GESTATION, PARTURITION, AND WEANING OF PUPS.									
DICHLOROPHENOL, 2,5- 000583-78-8									
GENERAL COMMENT: DATA INADEQUATE FOR QUANTITATIVE RISK ASSESSMENT									005316
DICHLOROPHENOL, 2,6- 000087-65-0									
GENERAL COMMENT: DATA INADEQUATE FOR QUANTITATIVE RISK ASSESSMENT									005317

CHEMICAL LEVEL / DOSE ROUTE	SPECIES EXPERIMENT LENGTH	TARGET	CRITICAL EFFECT	Subchronic [RfC] (mg/cu m) UF	Subchronic [RfD] (mg/kg/day) UF	Chronic [RfC] (mg/cu m) UF	Chronic [RfD] (mg/kg/day) UF	REFERENCE
DICHLOROPHENOL, 3,4- 000095-77-2								
GENERAL COMMENT: DATA INADEQUATE FOR QUANTITATIVE RISK ASSESSMENT								005318
DICHLOROPHENOL, 3,5- 000591-35-5								
GENERAL COMMENT: DATA INADEQUATE FOR QUANTITATIVE RISK ASSESSMENT								005319
DICHLOROPHENOXY ACETIC ACID, 2,4- 000094-75-7								
NOAEL 1 MG/KG/DAY	RAT							
ORAL: DIET	91 DAYS	BLOOD	TOXICITY		1E-2		IRIS	010265
		LIVER	TOXICITY		100			
		KIDNEY	TOXICITY					
SUBCHRONIC [RfD] COMMENT: THE CHRONIC ORAL RfD WAS ADOPTED AS THE SUBCHRONIC ORAL [RfD].								
DICHLOROPHENOXY) BUTYRIC ACID, 4-(2,4- / (2,4-DB) 000094-82-6								
NOAEL 8 MG/KG/DAY	DOG							
ORAL: DIET	90 DAYS	CARDIOVASCULAR SYSTEM	HEMORRHAGE		8E-2		IRIS	005890
					100			
		WHOLE BODY	INCREASED MORTALITY					
DICHLOROPROPANE, 1,1- 000078-99-9								
GENERAL COMMENT: DATA INADEQUATE FOR QUANTITATIVE RISK ASSESSMENT.								005897
DICHLOROPROPANE, 1,2- 000078-87-5								
NOAEL 69.3 MG/CU	RAT							
INHALATION:	13 WEEKS	NASAL MUCOSA	HYPERPLASIA	1.3E-2		IRIS		005898
INTERMITTENT				100				
GENERAL COMMENT: ALSO SEE HEAST TABLE 3: CARCINOGENICITY.								

CHEMICAL / LEVEL	DOSE / ROUTE	SPECIES / EXPERIMENT / LENGTH	TARGET	CRITICAL EFFECT	Subchronic [RfC] (mg/cu m) UF	Subchronic [RfD] (mg/kg/day) UF	Chronic [RfC] (mg/cu m) UF	Chronic [RfD] (mg/kg/day) UF	REFERENCE
DICHLOROPROPANE, 1,3- **000142-28-9**									
GENERAL COMMENT: DATA INADEQUATE FOR QUANTITATIVE RISK ASSESSMENT.									005899
DICHLOROPROPANE, 2,2- **000594-20-7**									
GENERAL COMMENT: DATA INADEQUATE FOR QUANTITATIVE RISK ASSESSMENT.									005900
DICHLOROPROPENE, 1,3- / (TELONE II) **000542-75-6**									
NOEL 3 MG/KG/DAY	ORAL: DIET	RAT 90 DAYS	ORGANS	INCREASED WEIGHT		3E-3 1000		IRIS	005901
GENERAL COMMENT: ALSO SEE HEAST TABLE 3: CARCINOGENICITY.									
NOAEL 5 PPM	INHALATION:	MOUSE 2 YEARS	NASAL MUCOSA	HYPERTROPHY	2E-2		IRIS		010351
	INTERMITTENT		NASAL MUCOSA	HYPERPLASIA	30				
SUBCHRONIC [RfC] COMMENT: THE CHRONIC INHALATION RfC WAS ADOPTED AS THE SUBCHRONIC INHALATION [RfC].									
DICHLORPROP **000120-36-5**									
GENERAL COMMENT: DATA INADEQUATE FOR QUANTITATIVE RISK ASSESSMENT.									005896
DICYCLOPENTADIENE **000077-73-6**									
NOEL 32 MG/KG/DAY	ORAL: DIET	RAT 3 GENERATIONS		NONE OBSERVED		3E-1 100		3E-2 1000	005425
SUBCHRONIC [RfC] COMMENT: ALSO SEE HEAST TABLE 2: ALTERNATE METHODS -- SUBCHRONIC AND CHRONIC TOXICITY (OTHER THAN CARCINOGENICITY)									
SUBCHRONIC [RfD] COMMENT: BASED ON A 3-GENERATION REPRODUCTION STUDY.									
CHRONIC [RfC] COMMENT: ALSO SEE HEAST TABLE 2: ALTERNATE METHODS -- SUBCHRONIC AND CHRONIC TOXICITY (OTHER THAN CARCINOGENICITY)									
CHRONIC [RfD] COMMENT: BASED ON A 3-GENERATION REPRODUCTION STUDY.									

CHEMICAL LEVEL / DOSE ROUTE / SPECIES EXPERIMENT LENGTH	TARGET	CRITICAL EFFECT	Subchronic [RfC] (mg/cu m) UF	Subchronic [RfD] (mg/kg/day) UF	Chronic [RfC] (mg/cu m) UF	Chronic [RfD] (mg/kg/day) UF	REFERENCE
DIELDRIN 000060-57-1							
NOAEL 0.005 MG/KG/DAY RAT							
ORAL: DIET 2 YEARS	LIVER	LESIONS		5E-5 100		IRIS	005429
SUBCHRONIC [RfD] COMMENT: THE CHRONIC ORAL RfD WAS ADOPTED AS THE SUBCHRONIC ORAL [RfD].							
GENERAL COMMENT: ALSO SEE HEAST TABLE 3: CARCINOGENICITY.							
DIETHYL PHTHALATE 000084-66-2							
NOAEL 750 MG/KG/DAY RAT							
ORAL: DIET 16 WEEKS	WHOLE BODY ORGANS	DECREASED GROWTH DECREASED WEIGHT		8E+0 100		IRIS	005620
DIETHYL-P-NITROPHENYL PHOSPHATE 000311-45-5							
GENERAL COMMENT: DATA INADEQUATE FOR QUANTITATIVE RISK ASSESSMENT							005922
DIETHYLANILINE, N,N- 000091-66-7							
GENERAL COMMENT: DATA INADEQUATE FOR QUANTITATIVE RISK ASSESSMENT.							005903
DIETHYLENE GLYCOL MONOBUTYL ETHER 000112-34-5							
NOAEL 18 PPM RAT							
		NONE OBSERVED	2E-1 100		2E-2 1000		005482
CHRONIC [RfC] COMMENT: UNDER REVIEW.							

CHEMICAL LEVEL / DOSE ROUTE / SPECIES EXPERIMENT LENGTH	TARGET	CRITICAL EFFECT	Subchronic [RfC] (mg/cu m) UF	Subchronic [RfD] (mg/kg/day) UF	Chronic [RfC] (mg/cu m) UF	Chronic [RfD] (mg/kg/day) UF	REFERENCE
DIETHYLENE GLYCOL MONOETHYL ETHER 000111-90-0							
NOEL 200 MG/KG/DAY RAT ORAL: DRINKING WATER	KIDNEY	HISTOPATHOLOGY				2E+0 100	005478
CHRONIC [RfD] COMMENT: BASED ON A 3-GENERATION REPRODUCTION STUDY.							
NOEL 500 MG/KG/DAY RAT ORAL: DIET 90 DAYS	KIDNEY TESTIS	IMPAIRED FUNCTION INCREASED WEIGHT		5E+0 100			005476
DIETHYLFORMAMIDE 000617-84-5							
NOEL 0.546 MG/DAY, 5 DAYS/WEEK RAT ORAL: GAVAGE 73 WEEKS		NONE OBSERVED		1.1E-2 100		1.1E-2 100	010437
DIETHYLHYDRAZINE, 1,2- 001615-80-1							
GENERAL COMMENT: DATA INADEQUATE FOR QUANTITATIVE RISK ASSESSMENT. ALSO SEE HEAST TABLE 3: CARCINOGENICITY.							005921
DIMETHOATE 000060-51-5							
NOEL 0.05 MG/KG/DAY RAT ORAL: DIET 2 YEARS	BRAIN	DECREASED CHOLINESTERASE ACTIVITY		2E-4 300		IRIS	005923
SUBCHRONIC [RfD] COMMENT: THE CHRONIC ORAL RfD WAS ADOPTED AS THE SUBCHRONIC ORAL [RfD].							
DIMETHYLANILINE, N,N- 000121-69-7							
LOAEL 22.32 MG/KG/DAY MOUSE ORAL: GAVAGE 13 WEEKS	SPLEEN	EFFECTS		2E-2 1000		IRIS	005924

CHEMICAL LEVEL	DOSE ROUTE	SPECIES EXPERIMENT LENGTH	TARGET	CRITICAL EFFECT	Subchronic [RfC] (mg/cu m) UF	Subchronic [RfD] (mg/kg/day) UF	Chronic [RfC] (mg/cu m) UF	Chronic [RfD] (mg/kg/day) UF	REFERENCE
DIMETHYLFORMAMIDE, N,N- 000068-12-2									
NOAEL 96 MG/KG/DAY		RAT							
	ORAL: DIET	119 DAYS	LIVER	EFFECTS		1E+0 100		1E-1 1000	005925
LOAEL 22 MG/CU M		HUMAN							
	INHALATION:		LIVER	EFFECTS	3E-2		IRIS.		010352
	INTERMITTENT		GASTRO INTESTINAL SYSTEM	EFFECTS	300				
SUBCHRONIC [RfC] COMMENT: THE CHRONIC INHALATION RFC WAS ADOPTED AS THE SUBCHRONIC INHALATION [RFC].									
DIMETHYLPHENOL, 2,3- 000526-75-0									
GENERAL COMMENT: DATA INADEQUATE FOR QUANTITATIVE RISK ASSESSMENT									005926
DIMETHYLPHENOL, 2,4- 000105-67-9									
NOAEL 50 MG/KG/DAY		MOUSE							
	ORAL: GAVAGE	90 DAYS	NERVOUS SYSTEM	EFFECTS		2E-1		IRIS	010266
			BLOOD	ALTERATIONS		300			
DIMETHYLPHENOL, 2,5- 000095-87-4									
GENERAL COMMENT: DATA INADEQUATE FOR QUANTITATIVE RISK ASSESSMENT.									005928
DIMETHYLPHENOL, 2,6- 000576-26-1									
NOEL 0.6 MG/KG/DAY		RAT							
	ORAL	8 MONTHS	WHOLE BODY	INCREASED WEIGHT		6E-3		IRIS	005431
			ORGANS, MAJOR	LESIONS		100			

CHEMICAL / LEVEL	DOSE / ROUTE	SPECIES / EXPERIMENT LENGTH	TARGET	CRITICAL EFFECT	Subchronic [RfC] (mg/cu m) UF	Subchronic [RfD] (mg/kg/day) UF	Chronic [RfC] (mg/cu m) UF	Chronic [RfD] (mg/kg/day) UF	REFERENCE
DIMETHYLPHENOL, 3,4-	**000095-65-8**								
NOEL	1.4 MG/KG/DAY	RAT							
	ORAL	8 MONTHS	WHOLE BODY	DECREASED WEIGHT		1E-2		IRIS	005437
			ORGANS, MAJOR	LESIONS		100			
			CARDIOVASCULAR SYSTEM	ALTERED BLOOD PRESSURE					
DIMETHYLPHTHALATE	**000131-11-3**								
CHRONIC RfD COMMENT: THE CHRONIC ORAL [RfD] IS CONSIDERED NOT VERIFIABLE (02/16/94) BY THE RfD/RfC WORK GROUP.									010267
								IRIS	010894
CHRONIC RfC COMMENT: THE CHRONIC INHALATION RfC IS CONSIDERED NOT VERIFIABLE (07/26/90) BY THE RfD/RfC WORK GROUP.									
DIMETHYLTEREPHTHALATE	**000120-61-6**								
LOAEL	125 MG/KG/DAY	RAT							
	ORAL: DIET	103 WEEKS	KIDNEY	INFLAMMATION		1E-1		IRIS	005930
						1000			
SUBCHRONIC [RfD] COMMENT: THE CHRONIC ORAL RfD WAS ADOPTED AS THE SUBCHRONIC ORAL [RfD].									
DIMETHYLUREA, N,N-	**000598-94-7**								
GENERAL COMMENT: DATA INADEQUATE FOR QUANTITATIVE RISK ASSESSMENT									005931
DINITRO-O-CRESOL, 4,6-	**000534-52-1**								
CHRONIC [RfC] COMMENT: THE CHRONIC INHALATION [RfC] IS CONSIDERED NOT VERIFIABLE (02/11/93) BY THE RfD/RfC WORK GROUP.									010470
DINITRO-P-CRESOL, 2,6-	**000609-93-8**								
GENERAL COMMENT: DATA INADEQUATE FOR QUANTITATIVE RISK ASSESSMENT									005934

CHEMICAL LEVEL / DOSE ROUTE / SPECIES EXPERIMENT LENGTH	TARGET	CRITICAL EFFECT	Subchronic [RfC] (mg/cu m) UF	Subchronic [RfD] (mg/kg/day) UF	Chronic [RfC] (mg/cu m) UF	Chronic [RfD] (mg/kg/day) UF	REFERENCE
DINITROBENZENE, 1,2- 000528-29-0							
NOAEL 0.4 MG/KG/DAY RAT							
ORAL: DRINKING WATER 16 WEEKS	SPLEEN	INCREASED WEIGHT		4E-3 100		4E-4 1000	010201
SUBCHRONIC [RfD] COMMENT: DERIVED BY ANALOGY TO 1,3-DINITROBENZENE.							
CHRONIC [RfD] COMMENT: DERIVED BY ANALOGY TO 1,3-DINITROBENZENE.							
DINITROBENZENE, 1,3- 000099-65-0							
NOAEL 0.4 MG/KG/DAY RAT							
ORAL: DRINKING WATER	SPLEEN	INCREASED WEIGHT		1E-3 100		IRIS	010471
DINITROBENZENE, 1,4- 000100-25-4							
NOAEL 0.4 MG/KG/DAY RAT							
ORAL: DRINKING WATER 16 WEEKS	SPLEEN	INCREASED WEIGHT		4E-3 100		4E-4 1000	010202
SUBCHRONIC [RfD] COMMENT: DERIVED BY ANALOGY TO 1,3-DINITROBENZENE.							
CHRONIC [RfD] COMMENT: DERIVED BY ANALOGY TO 1,3-DINITROBENZENE.							
DINITROPHENOL, 2,3- 000066-56-8							
GENERAL COMMENT: DATA INADEQUATE FOR QUANTITATIVE RISK ASSESSMENT							005936
DINITROPHENOL, 2,4- 000051-28-5							
LOAEL 2 MG/KG/DAY HUMAN							
ORAL	EYE	CATARACT		2E-3 1000		IRIS	010438
SUBCHRONIC [RfD] COMMENT: THE CHRONIC ORAL RfD WAS ADOPTED AS THE SUBCHRONIC ORAL [RfD].							
CHRONIC RfC COMMENT: THE CHRONIC INHALATION RfC IS CONSIDERED NOT VERIFIABLE (06/13/91) BY THE RfD/RfC WORK GROUP.					IRIS		010895

CHEMICAL / LEVEL	DOSE / ROUTE	SPECIES / EXPERIMENT LENGTH	TARGET	CRITICAL EFFECT	Subchronic [RfC] (mg/cu m) UF	Subchronic [RfD] (mg/kg/day) UF	Chronic [RfC] (mg/cu m) UF	Chronic [RfD] (mg/kg/day) UF	REFERENCE
DINITROPHENOL, 2,5- **000329-71-5**									
GENERAL COMMENT: DATA INADEQUATE FOR QUANTITATIVE RISK ASSESSMENT									005937
DINITROPHENOL, 2,6- **000573-56-8**									
GENERAL COMMENT: DATA INADEQUATE FOR QUANTITATIVE RISK ASSESSMENT									005938
DINITROPHENOL, 3,5- **000586-11-8**									
GENERAL COMMENT: DATA INADEQUATE FOR QUANTITATIVE RISK ASSESSMENT									005939
DINITROTOLUENE, 2,3- **000602-01-7**									
GENERAL COMMENT: DATA INADEQUATE FOR QUANTITATIVE RISK ASSESSMENT									005940
DINITROTOLUENE, 2,4- **000121-14-2**									
NOAEL 0.2 MG/KG/DAY	DOG								
ORAL: GELATIN CAPSULE	UP TO 2 YEARS	CENTRAL NERVOUS SYSTEM	NEUROTOXICITY			2E-3 100		IRIS	005941
		ERYTHROCYTES	HEINZ BODIES						
		BILIARY TRACT	HYPERPLASIA						
SUBCHRONIC [RfD] COMMENT: THE CHRONIC ORAL RfD IS ADOPTED AS THE SUBCHRONIC ORAL [RfD].									
GENERAL COMMENT: ALSO SEE HEAST TABLE 3: CARCINOGENICITY.									
							IRIS		010896
CHRONIC RfC COMMENT: THE CHRONIC INHALATION RfC IS CONSIDERED NOT VERIFIABLE (12/20/90) BY THE RfD/RfC WORK GROUP.									
DINITROTOLUENE, 2,5- **000619-15-8**									
GENERAL COMMENT: DATA INADEQUATE FOR QUANTITATIVE RISK ASSESSMENT									005942

CHEMICAL / LEVEL	DOSE / ROUTE	SPECIES / EXPERIMENT / LENGTH	TARGET	CRITICAL EFFECT	Subchronic [RfC] (mg/cu m) UF	Subchronic [RfD] (mg/kg/day) UF	Chronic [RfC] (mg/cu m) UF	Chronic [RfD] (mg/kg/day) UF	REFERENCE
DINITROTOLUENE, 2,6-		**000606-20-2**							
NOAEL 4 MG/KG/DAY		DOG							
	ORAL: DIET	13 WEEKS	WHOLE BODY	MORTALITY		1E-2		1E-3	005943
			CENTRAL NERVOUS SYSTEM	NEUROTOXICITY		300		3000	
			BLOOD	HEINZ BODIES					
			BLOOD	METHEMOGLOBINEMIA					
			BILE DUCT	HYPERPLASIA					
			KIDNEY	HISTOPATHOLOGY					
CHRONIC [RfD] COMMENT: UNDER REVIEW. CURRENT NUMBER SUBJECT TO CHANGE.									
GENERAL COMMENT: ALSO SEE HEAST TABLE 3: CARCINOGENICITY.									
DINITROTOLUENE, 3,4-		**000610-39-9**							
GENERAL COMMENT: DATA INADEQUATE FOR QUANTITATIVE RISK ASSESSMENT									005944
DINOSEB		**000088-85-7**							
LOAEL 1 MG/KG/DAY		RAT							
	ORAL: DIET	29 WEEKS	FETUS	DECREASED WEIGHT		1E-3 1000		IRIS	005945
SUBCHRONIC [RfD] COMMENT: THE CHRONIC ORAL RFD WAS ADOPTED AS THE SUBCHRONIC ORAL [RFD].									
CHRONIC [RfD] COMMENT: THE CHRONIC ORAL RFD WAS DETERMINED FROM A 3-GENERATION REPRODUCTION STUDY.									
DIPHENYLAMINE, N,N-		**000122-39-4**							
NOEL 2.5 MG/KG/DAY		DOG							
	ORAL: DIET	2 YEARS	WHOLE BODY	DECREASED WEIGHT GAIN		2.5E-2		IRIS	005946
			LIVER	INCREASED WEIGHT		100			
			KIDNEY	INCREASED WEIGHT					
SUBCHRONIC [RfD] COMMENT: THE CHRONIC ORAL RfD WAS ADOPTED AS THE SUBCHRONIC ORAL [RfD].									

CHEMICAL / LEVEL	DOSE / ROUTE	SPECIES / EXPERIMENT LENGTH	TARGET	CRITICAL EFFECT	Subchronic [RfC] (mg/cu m) UF	Subchronic [RfD] (mg/kg/day) UF	Chronic [RfC] (mg/cu m) UF	Chronic [RfD] (mg/kg/day) UF	REFERENCE
DIRECT LIGHTFAST BLUE	**004399-55-7**								
GENERAL COMMENT: DATA INADEQUATE FOR QUANTITATIVE RISK ASSESSMENT									005947
DISULFOTON	**000298-04-4**								
LOAEL 0.04 MG/KG/DAY	ORAL: DIET	RAT 2 YEARS	EYE	DEGENERATION		4E-5		IRIS	010412
			BLOOD	CHOLINESTERASE INHIBITION		1000			
SUBCHRONIC [RfD] COMMENT: THE CHRONIC ORAL RfD WAS ADOPTED AS THE SUBCHRONIC ORAL [RfD].									
ENDOSULFAN	**000115-29-7**								
NOAEL 15 PPM	ORAL: DIET	RAT 2 YEARS	WHOLE BODY	DECREASED WEIGHT GAIN		6E-3		IRIS	010926
			KIDNEY	GLOMERULONEPHROSIS		100			
			BLOOD VESSEL	ANEURYSMS					
NOAEL 10 PPM	ORAL: DIET	DOG 1 YEAR	WHOLE BODY	DECREASED WEIGHT GAIN					010938
SUBCHRONIC [RfD] COMMENT: THE CHRONIC ORAL RfD WAS ADOPTED AS THE SUBCHORNIC ORAL [RfD]. BASED ON CO-CRITICAL RAT AND DOG STUDIES.									
ENDOTHALL	**000145-73-3**								
NOEL 2 MG/KG/DAY	ORAL: DIET	DOG 2 YEARS	STOMACH	INCREASED WEIGHT		2E-2		IRIS	005948
			SMALL INTESTINE	INCREASED WEIGHT		100			
SUBCHRONIC [RfD] COMMENT: THE CHRONIC ORAL RfD WAS ADOPTED AS THE SUBCHRONIC ORAL [RfD].									

CHEMICAL LEVEL	DOSE ROUTE	SPECIES EXPERIMENT LENGTH	TARGET	CRITICAL EFFECT	Subchronic [RfC] (mg/cu m) UF	Subchronic [RfD] (mg/kg/day) UF	Chronic [RfC] (mg/cu m) UF	Chronic [RfD] (mg/kg/day) UF	REFERENCE
ENDRIN		**000072-20-8**							
NOEL	0.025 MG/KG/DAY	DOG							
	ORAL: DIET	2 YEARS	CENTRAL NERVOUS SYSTEM	CONVULSIONS		3E-4 100		IRIS	005445
			LIVER	LESIONS					
SUBCHRONIC [RfD] COMMENT: THE CHRONIC ORAL RfD WAS ADOPTED AS THE SUBCHRONIC ORAL [RfD].									
EPICHLOROHYDRIN		**000106-89-8**							
LOAEL	37.8 MG/CU M	RAT							
	INHALATION: INTERMITTENT	136 WEEKS	KIDNEY	LESIONS		2E-3 1000		2E-3 1000	010440
SUBCHRONIC [RfD] COMMENT: BASED ON ROUTE-TO-ROUTE EXTRAPOLATION. THE CHRONIC ORAL [RfD] WAS ADOPTED AS THE SUBCHRONIC ORAL [RfD]. CHRONIC [RfD] COMMENT: WITHDRAWN FROM IRIS (04/01/92). GENERAL COMMENT: ALSO SEE HEAST TABLE 3: CARCINOGENICITY.									
NOAEL	19 MG/CU M	RAT							
	INHALATION: INTERMITTENT	90 DAYS	NASAL EPITHELIUM	LESIONS	1E-2 100		IRIS		010492
EPTC		**000759-94-4**							
NOEL	2.5 MG/KG/DAY	RAT							
	ORAL: DIET	2 GENERATIONS	HEART	DEGENERATIVE CARDIOMYOPATHY		2.5E-2 100		IRIS	005959
SUBCHRONIC [RfD] COMMENT: THE CHRONIC ORAL RfD WAS ADOPTED AS THE SUBCHRONIC ORAL [RfD]. CHRONIC [RfD] COMMENT: THE CHRONIC ORAL RFD WAS DETERMINED FROM A 2-GENERATION REPRODUCTION STUDY.									
ETHOPROP		**013194-48-4**							
GENERAL COMMENT: DATA INADEQUATE FOR QUANTITATIVE RISK ASSESSMENT									005951

CHEMICAL LEVEL / DOSE ROUTE	SPECIES EXPERIMENT LENGTH	TARGET	CRITICAL EFFECT	Subchronic [RfC] (mg/cu m) UF	Subchronic [RfD] (mg/kg/day) UF	Chronic [RfC] (mg/cu m) UF	Chronic [RfD] (mg/kg/day) UF	REFERENCE
ETHOXYETHANOL ACETATE, 2- 000111-15-9								010507
SUBCHRONIC [RfD] COMMENT: ALSO SEE HEAST TABLE 2: ALTERNATE METHODS -- SUBCHRONIC AND CHRONIC TOXICITY (OTHER THAN CARCINOGENICITY)								
CHRONIC [RfD] COMMENT: ALSO SEE HEAST TABLE 2: ALTERNATE METHODS -- SUBCHRONIC AND CHRONIC TOXICITY (OTHER THAN CARCINOGENICITY)								
ETHOXYETHANOL ACRYLATE, 2- 000106-74-1								005953
GENERAL COMMENT: DATA INADEQUATE FOR QUANTITATIVE RISK ASSESSMENT								
ETHOXYETHANOL DODECANOATE, 2- 000106-13-8								005956
GENERAL COMMENT: DATA INADEQUATE FOR QUANTITATIVE RISK ASSESSMENT								
ETHOXYETHANOL PHOSPHATE, 2- 068554-00-7								005955
GENERAL COMMENT: DATA INADEQUATE FOR QUANTITATIVE RISK ASSESSMENT								
ETHOXYETHANOL, 2- 000110-80-5								
LOAEL 357 MG/KG/DAY ORAL: GAVAGE	RAT 103 WEEKS	WHOLE BODY	DECREASED WEIGHT				4E-1 1000	005470
NOEL 50 uL/KG/DAY ORAL: GAVAGE	RAT 21 DAYS	FETUS	SKELETAL MALFORMATIONS		5E-1 100			.005468
SUBCHRONIC [RfD] COMMENT: BASED ON A REPRODUCTION STUDY WITH EXPOSURES DURING DAYS 1-21 OF GESTATION.								
NOAEL 380 MG/CU M INHALATION: INTERMITTENT	RABBIT 13 WEEKS	BLOOD	ALTERED HEMATOLOGY	2E+0 30		IRIS		010441
ETHOXYETHYL METHACRYLATE, 2- 002370-63-0								005954
GENERAL COMMENT: DATA INADEQUATE FOR QUANTITATIVE RISK ASSESSMENT								

CHEMICAL / LEVEL	DOSE / ROUTE	SPECIES / EXPERIMENT / LENGTH	TARGET	CRITICAL EFFECT	Subchronic [RfC] (mg/cu m) UF	Subchronic [RfD] (mg/kg/day) UF	Chronic [RfC] (mg/cu m) UF	Chronic [RfD] (mg/kg/day) UF	REFERENCE
ETHYL ACETATE		**000141-78-6**							
NOEL	900 MG/KG/DAY	RAT							
	ORAL: GAVAGE	90 DAYS	WHOLE BODY	INCREASED MORTALITY		9E+0		IRIS	005957
			WHOLE BODY	DECREASED WEIGHT		100			
ETHYL BENZENE		**000100-41-4**							
								IRIS	010867
							IRIS		010866
SUBCHRONIC [RfC] COMMENT: CONTACT THE SUPERFUND HEALTH RISK TECHNICAL SUPPORT CENTER: (513) 569-7300.									
SUBCHRONIC [RfD] COMMENT: CONTACT THE SUPERFUND HEALTH RISK TECHNICAL SUPPORT CENTER: (513) 569-7300.									
ETHYL CHLORIDE		**000075-00-3**							
NOAEL	1504 PPM	MOUSE							
	INHALATION: INTERMITTENT	10 DAYS	FETUS	DEVELOPMENTAL TOXICITY	1E+1 300		IRIS		010371
SUBCHRONIC [RfC] COMMENT: THE CHRONIC INHALATION RfC WAS ADOPTED AS THE SUBCHRONIC INHALATION [RfC].									
CHRONIC [RfC] COMMENT: BASED ON A DEVELOPMENTAL STUDY WITH EXPOSURES DURING DAYS 6-15 OF GESTATION.									
ETHYL ETHER		**000060-29-7**							
NOAEL	500 MG/KG/DAY	RAT							
	ORAL: GAVAGE	90 DAYS	LIVER	EFFECTS		2E+0 300		IRIS	010396

CHEMICAL / LEVEL	DOSE / ROUTE	SPECIES / EXPERIMENT LENGTH	TARGET	CRITICAL EFFECT	Subchronic [RfC] (mg/cu m) / UF	Subchronic [RfD] (mg/kg/day) / UF	Chronic [RfC] (mg/cu m) / UF	Chronic [RfD] (mg/kg/day) / UF	REFERENCE
ETHYL METHACRYLATE		**000097-63-2**							
NOEL	7.5 MG/KG/DAY	RAT				9E-2		9E-2	005961
	ORAL: DRINKING WATER	2 YEARS	KIDNEY	INCREASED RELATIVE WEIGHT		100		100	
	CHRONIC [RfD] COMMENT: CALCULATED FROM METHYL METHACRYLATE DATA BY MULTIPLYING BY THE RATIO OF THE MOLECULAR WEIGHTS (114.5/100.13).								
ETHYL-O-XYLENE, 4-		**000934-80-5**							
	GENERAL COMMENT: DATA INADEQUATE FOR QUANTITATIVE RISK ASSESSMENT.								010472
ETHYLANILINE, N-		**000103-69-5**							
	GENERAL COMMENT: DATA INADEQUATE FOR QUANTITATIVE RISK ASSESSMENT								005958
ETHYLENE CYANOHYDRIN		**000109-78-4**							
NOEL	30 MG/KG/DAY	RAT				3E-1		3E-1	005780
	ORAL: DRINKING WATER	90 DAYS	HEART	DECREASED WEIGHT		100		100	
			BRAIN	DECREASED WEIGHT					
ETHYLENE DIAMINE		**000107-15-3**							
NOAEL	22.6 MG/KG/DAY	RAT				2E-1		2E-2	005796
	ORAL: DIET	3 MONTHS	HEART	DECREASED WEIGHT		100		1000	
			BLOOD	HEMATOLOGIC CHANGES					
							IRIS		010898
	CHRONIC RfC COMMENT: THE CHRONIC INHALATION RfC IS CONSIDERED NOT VERIFIABLE (12/18/90) BY THE RfD/RfC WORK GROUP.								

CHEMICAL / LEVEL	DOSE / ROUTE	SPECIES / EXPERIMENT / LENGTH	TARGET	CRITICAL EFFECT	Subchronic [RfC] (mg/cu m) UF	Subchronic [RfD] (mg/kg/day) UF	Chronic [RfC] (mg/cu m) UF	Chronic [RfD] (mg/kg/day) UF	REFERENCE
ETHYLENE GLYCOL		**000107-21-1**							
								IRIS	005454
NOEL	200 MG/KG/DAY	RAT							
	ORAL: DIET		FETUS	FETOTOXICITY		2E+0 100			005452
SUBCHRONIC [RfD] COMMENT: BASED ON A REPRODUCTION STUDY WITH EXPOSURES DURING DAYS 6-15 OF GESTATION.									
ETHYLENE GLYCOL MONOBUTYL ETHER		**000111-76-2**							
NOAEL	121 MG/CU M	RAT							
	INHALATION: INTERMITTENT	13 WEEKS	BLOOD	ALTERED HEMATOLOGY	2E-1 100		2E-2 1000		010353
CHRONIC [RfC] COMMENT: UNDER REVIEW. CURRENT NUMBER SUBJECT TO CHANGE.									
ETHYLENE THIOUREA		**000096-45-7**							
LOAEL	0.25 MG/KG/DAY	RAT							
	ORAL: DIET	24 MONTHS	THYROID	HYPERPLASIA		8E-5 3000		IRIS	010397
SUBCHRONIC [RfD] COMMENT: THE CHRONIC ORAL RfD WAS ADOPTED AS THE SUBCHRONIC ORAL [RfD].									
GENERAL COMMENT: ALSO SEE HEAST TABLE 3: CARCINOGENICITY.									
CHRONIC [RfC] COMMENT: THE CHRONIC INHALATION [RfC] IS CONSIDERED NOT VERIFIABLE (08/12/92) BY THE RfD/RfC WORK GROUP.									010899
ETHYLTOLUENE, M-		**000620-14-4**							
GENERAL COMMENT: DATA INADEQUATE FOR QUANTITATIVE RISK ASSESSMENT									005963
ETHYLTOLUENE, O-		**000611-14-3**							
GENERAL COMMENT: DATA INADEQUATE FOR QUANTITATIVE RISK ASSESSMENT									005962

CHEMICAL / LEVEL	DOSE / ROUTE	SPECIES / EXPERIMENT / LENGTH	TARGET	CRITICAL EFFECT	Subchronic [RfC] (mg/cu m) UF	Subchronic [RfD] (mg/kg/day) UF	Chronic [RfC] (mg/cu m) UF	Chronic [RfD] (mg/kg/day) UF	REFERENCE
ETHYLTOLUENE, P-		**000622-96-8**							
GENERAL COMMENT: DATA INADEQUATE FOR QUANTITATIVE RISK ASSESSMENT									005964
FLUORANTHENE		**000206-44-0**							
NOAEL 125 MG/KG/DAY	ORAL: GAVAGE	MOUSE 90 DAYS	KIDNEY	NEPHROPATHY		4E-1		IRIS	010168
			LIVER	WEIGHT CHANGES		300			
			BLOOD	HEMATOLOGICAL CHANGES					
CHRONIC [RfC] COMMENT: THE CHRONIC INHALATION [RfC] IS CONSIDERED NOT VERIFIABLE (08/04/94) BY THE RfD/RfC WORK GROUP.									010967
FLUORENE		**000086-73-7**							
NOAEL 125 MG/KG/DAY	ORAL: GAVAGE	MOUSE 13 WEEKS	ERYTHROCYTES	DECREASED COUNTS		4E-1		IRIS	010169
						300			
FLUORINE / (SOLUBLE FLUORIDE)		**007782-41-4**							
NOAEL 0.06 MG/KG/DAY	ORAL: DRINKING WATER	HUMAN	TOOTH	FLUOROSIS		6E-2		IRIS	005965
						1			
FLURIDONE		**059756-60-4**							
NOEL 200 PPM	ORAL: DIET	RAT 2 YEARS	KIDNEY	GLOMERULONEPHRITIS		8E-2		IRIS	005966
			TESTIS	ATROPHY		100			
			WHOLE BODY	DECREASED WEIGHT					
			ORGANS	DECREASED WEIGHT					
SUBCHRONIC [RfD] COMMENT: THE CHRONIC ORAL RfD WAS ADOPTED AS THE SUBCHRONIC ORAL [RfD].									

HEAST TABLE 1: SUBCHRONIC AND CHRONIC TOXICITY (OTHER THAN CARCINOGENICITY)

July 1997

CHEMICAL / LEVEL	DOSE / ROUTE	SPECIES / EXPERIMENT / LENGTH	TARGET	CRITICAL EFFECT	Subchronic [RfC] (mg/cu m) UF	Subchronic [RfD] (mg/kg/day) UF	Chronic [RfC] (mg/cu m) UF	Chronic [RfD] (mg/kg/day) UF	REFERENCE
FOLPET		**000133-07-3**							
NOEL	10 MG/KG/DAY	DOG							
	ORAL: CAPSULE	1 YEAR	WHOLE BODY	ALTERED WEIGHT GAIN		1E-1		IRIS	005967
			BLOOD	ALTERED CHEMISTRY		100			
	SUBCHRONIC [RfD] COMMENT: THE CHRONIC ORAL RfD WAS ADOPTED AS THE SUBCHRONIC ORAL [RfD].								
	GENERAL COMMENT: ALSO SEE HEAST TABLE 3: CARCINOGENICITY.								
FORMALDEHYDE		**000050-00-0**							
NOAEL	15 MG/KG/DAY	RAT							
	ORAL: WATER	2 YEARS	GASTRO-INTESTINAL TRACT	LESIONS		2E-1 100		IRIS	010398
	GENERAL COMMENT: ALSO SEE HEAST TABLE 3: CARCINOGENICITY.								
FORMALDEHYDE CYANOHYDRIN		**000107-16-4**							
	GENERAL COMMENT: DATA INADEQUATE FOR QUANTITATIVE RISK ASSESSMENT								005782
FORMIC ACID		**000064-18-6**							
NOAEL	200 MG/KG/DAY	RAT							
	ORAL: WATER	MULTI-GENERATION	WHOLE BODY	DECREASED GROWTH		2E+0 100		2E+0 100	010268
	CHRONIC [RfD] COMMENT: BASED ON A MULTI-GENERATION STUDY. WITHDRAWN FROM IRIS (12/01/90). UNDER REVIEW. CURRENT NUMBER SUBJECT TO CHANGE.								
FURAN		**000110-00-9**							
NOAEL	1.4 MG/KG/DAY	MOUSE							
	ORAL: GAVAGE	13 WEEKS	LIVER	LESIONS		1E-2 100		IRIS	005462

HEAST TABLE 1: SUBCHRONIC AND CHRONIC TOXICITY (OTHER THAN CARCINOGENICITY)

July 1997

CHEMICAL / LEVEL	DOSE / ROUTE	SPECIES / EXPERIMENT	LENGTH	TARGET	CRITICAL EFFECT	Subchronic [RfC] (mg/cu m) UF	Subchronic [RfD] (mg/kg/day) UF	Chronic [RfC] (mg/cu m) UF	Chronic [RfD] (mg/kg/day) UF	REFERENCE
FURFURAL		**000098-01-1**								
LOAEL 7.9 MG/KG/DAY		RAT								
	ORAL: GAVAGE	13 WEEKS		LIVER	HEPATOTOXICITY		3E-2 300		IRIS	005466
SUBCHRONIC [RfC] COMMENT: ALSO SEE HEAST TABLE 2: ALTERNATE METHODS - SUBCHRONIC AND CHRONIC TOXICITY (OTHER THAN CARCINOGENICITY)										
CHRONIC [RfC] COMMENT: ALSO SEE HEAST TABLE 2: ALTERNATE METHODS - SUBCHRONIC AND CHRONIC TOXICITY (OTHER THAN CARCINOGENICITY)										
GLYCIDALDEHYDE		**000765-34-4**								
NOAEL 29 MG/CU M		RAT								
	INHALATION:	12 WEEKS		WHOLE BODY	DECREASED WEIGHT	1E-2	4E-3	1E-3	IRIS	005968
	INTERMITTENT			KIDNEY	EFFECTS	300	300	3000		
SUBCHRONIC [RfD] COMMENT: BASED ON ROUTE TO ROUTE EXTRAPOLATION USING AN ABSORPTION FACTOR OF 0.5.										
CHRONIC [RfD] COMMENT: BASED ON ROUTE TO ROUTE EXTRAPOLATION USING AN ABSORPTION FACTOR OF 0.5.										
GENERAL COMMENT: ALSO SEE HEAST TABLE 3: CARCINOGENICITY.										
HEPTACHLOR		**000076-44-8**								
NOEL 0.15 MG/KG/DAY		RAT								
	ORAL: DIET	2 YEARS		LIVER	INCREASED WEIGHT		5E-4 300		IRIS	005506
SUBCHRONIC [RfD] COMMENT: THE CHRONIC ORAL RfD WAS ADOPTED AS THE SUBCHRONIC ORAL [RfD].										
GENERAL COMMENT: ALSO SEE HEAST TABLE 3: CARCINOGENICITY										
HEPTACHLOR EPOXIDE		**001024-57-3**								
LOAEL 0.0125 MG/KG/DAY		DOG								
	ORAL: DIET	60 WEEKS		LIVER	INCREASED RELATIVE WEIGHT		1.3E-5 1000		IRIS	010399
SUBCHRONIC [RfD] COMMENT: THE CHRONIC ORAL RfD WAS ADOPTED AS THE SUBCHRONIC ORAL [RfD].										
GENERAL COMMENT: ALSO SEE HEAST TABLE 3: CARCINOGENICITY.										

CHEMICAL / LEVEL	DOSE / ROUTE	SPECIES / EXPERIMENT / LENGTH	TARGET	CRITICAL EFFECT	Subchronic [RfC] (mg/cu m) / UF	Subchronic [RfD] (mg/kg/day) / UF	Chronic [RfC] (mg/cu m) / UF	Chronic [RfD] (mg/kg/day) / UF	REFERENCE
HEPTANE, N- 000142-82-5									
GENERAL COMMENT: DATA INADEQUATE FOR QUANTITATIVE RISK ASSESSMENT									005969
HEXABROMOBENZENE 000087-82-1									
NOAEL 2 MG/KG/DAY	ORAL: DIET	RAT 12 WEEKS	LIVER	INDUCED CARBOXYLESTERASE ACTIVITY		2E-2 100		IRIS	005970
HEXACHLOROBENZENE 000118-74-1								IRIS	010868
							IRIS		010900
CHRONIC RfC COMMENT: THE CHRONIC INHALATION RfC IS CONSIDERED NOT VERIFIABLE (11/15/90) BY THE RfD/RfC WORK GROUP.									
SUBCHRONIC [RfC] COMMENT: CONTACT THE SUPERFUND HEALTH RISK TECHNICAL SUPPORT CENTER: (513) 569-7300.									
GENERAL COMMENT: ALSO SEE HEAST TABLE 3: CARCINOGENICITY.									
HEXACHLOROBUTADIENE 000087-68-3									
LOAEL 0.5 MG/KG/DAY	ORAL: DIET	MOUSE 13 WEEKS	RENAL TUBULES	REGENERATION				2E-4 1000	010927
CHRONIC [RfD] COMMENT: WITHDRAWN FROM IRIS (05/01/93). UNDER REVIEW. CURRENT NUMBER SUBJECT TO CHANGE.									
SUBCHRONIC [RfD] COMMENT: CONTACT THE SUPERFUND HEALTH RISK TECHNICAL SUPPORT CENTER: (513) 569-7300.									
HEXACHLOROCYCLOHEXANE, DELTA- 000319-86-8									
GENERAL COMMENT: DATA INADEQUATE FOR QUANTITATIVE RISK ASSESSMENT. ALSO SEE HEAST TABLE 3: CARCINOGENICITY.									010495
HEXACHLOROCYCLOHEXANE, EPSILON- 006108-10-7									
GENERAL COMMENT: DATA INADEQUATE FOR QUANTITATIVE RISK ASSESSMENT. ALSO SEE HEAST TABLE 3: CARCINOGENICITY.									010496

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CHEMICAL LEVEL / DOSE ROUTE	SPECIES EXPERIMENT LENGTH	TARGET	CRITICAL EFFECT	Subchronic [RfC] (mg/cu m) UF	Subchronic [RfD] (mg/kg/day) UF	Chronic [RfC] (mg/cu m) UF	Chronic [RfD] (mg/kg/day) UF	REFERENCE
HEXACHLOROCYCLOHEXANE, GAMMA- 000058-89-9								
NOAEL 0.33 MG/KG/DAY ORAL: DIET	RAT 12 WEEKS	LIVER KIDNEY	TOXICITY TOXICITY		3E-3 100		IRIS	005537
GENERAL COMMENT: ALSO SEE HEAST TABLE 3: CARCINOGENICITY.								010903
CHRONIC [RfC] COMMENT: THE CHRONIC INHALATION [RfC] IS CONSIDERED NOT VERIFIABLE (05/27/92) BY THE RfD/RfC WORK GROUP.								
HEXACHLOROCYCLOPENTADIENE 000077-47-4								
NOAEL 7.1 MG/KG/DAY ORAL	RAT 13 WEEKS	FORESTOMACH	LESIONS		7E-2 100		IRIS	005299
NOAEL 0.15 PPM INHALATION: INTERMITTENT	RAT 13 WEEKS	NASAL CAVITY	SQUAMOUS METAPLASIA	7E-4 100		7E-5 1000		010445
HEXACHLOROETHANE 000067-72-1								
NOAEL 1 MG/KG/DAY ORAL: DIET	RAT 16 WEEKS	KIDNEY	DEGENERATION		1E-2 100		IRIS	005518
GENERAL COMMENT: ALSO SEE HEAST TABLE 3: CARCINOGENICITY.								010904
CHRONIC [RfC] COMMENT: THE CHRONIC INHALATION [RfC] IS CONSIDERED NOT VERIFIABLE (11/05/92). BY THE RfD/RfC WORK GROUP.								
HEXACHLOROPHENE 000070-30-4								
LOAEL 0.75 MG/KG/DAY ORAL: DIET	DOG 13 WEEKS	NERVOUS SYSTEM	EFFECTS		3E-3 300		IRIS	005972

CHEMICAL / LEVEL	DOSE / ROUTE	SPECIES / EXPERIMENT / LENGTH	TARGET	CRITICAL EFFECT	Subchronic [RfC] (mg/cu m) UF	Subchronic [RfD] (mg/kg/day) UF	Chronic [RfC] (mg/cu m) UF	Chronic [RfD] (mg/kg/day) UF	REFERENCE
HEXAMETHYLENE DIAMINE		**000124-09-4**							
GENERAL COMMENT: DATA INADEQUATE FOR QUANTITATIVE RISK ASSESSMENT									005973
HEXANE, N-		**000110-54-3**							
LOAEL 570 MG/KG/DAY	ORAL	RAT	NERVOUS SYSTEM TESTIS	NEUROPATHY ATROPHY		6E-1 1000		6E-2 10000	005974
LOAEL 73 MG/CU M	INHALATION: INTERMITTENT	HUMAN	NERVOUS SYSTEM	NEUROTOXICITY	2E-1 300		IRIS		010273
SUBCHRONIC [RfC] COMMENT: THE CHRONIC INHALATION RfC WAS ADOPTED AS THE SUBCHRONIC INHALATION [RfC].									
HEXANONE, 2-		**000591-78-6**							
GENERAL COMMENT: DATA INADEQUATE FOR QUANTITATIVE RISK ASSESSMENT									005976
HYDROGEN SULFIDE		**007783-06-4**							
NOAEL 3.1 MG/KG/DAY	ORAL: FOOD	PIG 105 DAYS	GASTRO-INTESTINAL SYSTEM	DISTURBANCE		3E-2 100		IRIS	010269
NOAEL 42 MG/CU M	INHALATION: INTERMITTENT	MOUSE 13 WEEKS	NASAL MUCOSA	INFLAMMATION	1E-2 100		IRIS		010354

CHEMICAL / LEVEL	DOSE / ROUTE	SPECIES / EXPERIMENT / LENGTH	TARGET	CRITICAL EFFECT	Subchronic [RfC] (mg/cu m) UF	Subchronic [RfD] (mg/kg/day) UF	Chronic [RfC] (mg/cu m) UF	Chronic [RfD] (mg/kg/day) UF	REFERENCE
HYDROQUINONE		**000123-31-9**							
NOAEL 4.29 MG/KG/DAY		HUMAN							
	ORAL	3-5 MONTHS	BLOOD	HEMATOLOGICAL EFFECTS		4E-1 10		4E-2 100	005526
							IRIS		010905
CHRONIC RfC COMMENT: THE CHRONIC INHALATION RfC IS CONSIDERED NOT VERIFIABLE (10/01/90) BY THE RfD/RfC WORK GROUP.									
IRON		**007439-89-6**							
GENERAL COMMENT: DATA INADEQUATE FOR QUANTITATIVE RISK ASSESSMENT									005527
ISOBUTYL ALCOHOL		**000078-83-1**							
NOEL 316 MG/KG/DAY		RAT							
	ORAL: GAVAGE	13 WEEKS	NERVOUS SYSTEM	HYPOACTIVITY		3E+0		IRIS	005977
			NERVOUS SYSTEM	ATAXIA		100			
ISOPHORONE		**000078-59-1**							
NOEL 150 MG/KG/DAY		DOG							
	ORAL: CAPSULE	90 DAYS	KIDNEY	LESIONS		2E+0 100		IRIS	005910
GENERAL COMMENT: ALSO SEE HEAST TABLE 3: CARCINOGENICITY.									
							IRIS		010906
CHRONIC RfC COMMENT: THE CHRONIC INHALATION RfC IS CONSIDERED NOT VERIFIABLE (11/15/90) BY THE RfD/RfC WORK GROUP.									
ISOPROPALIN		**033820-53-0**							
NOEL 15 MG/KG/DAY		RAT							
	ORAL: DIET	90 DAYS	BLOOD	HEMATOLIGICAL EFFECTS		1.5E-1		IRIS	005978
			ORGANS, UNSPECIFIED	ALTERED WEIGHTS		100			
LACTONITRILE		**000078-97-7**							
GENERAL COMMENT: DATA INADEQUATE FOR QUANTITATIVE RISK ASSESSMENT									005783

CHEMICAL / LEVEL	DOSE / ROUTE	SPECIES / EXPERIMENT LENGTH	TARGET	CRITICAL EFFECT	Subchronic [RfC] (mg/cu m) UF	Subchronic [RfD] (mg/kg/day) UF	Chronic [RfC] (mg/cu m) UF	Chronic [RfD] (mg/kg/day) UF	REFERENCE
LEAD		**007439-92-1**							010447
CHRONIC [RfC] COMMENT: REFER TO APPENDIX A: TECHNICAL INFORMATION, SECTION V ON NATIONAL AMBIENT AIR QUALITY STANDARDS.									
CHRONIC [RfD] COMMENT: REFER TO IRIS									
GENERAL COMMENT: ALSO SEE HEAST TABLE 3: CARCINOGENICITY.									
LEAD ALKYLS									010448
CHRONIC [RfC] COMMENT: REFER TO APPENDIX A: TECHNICAL INFORMATION, SECTION V ON NATIONAL AMBIENT AIR QUALITY STANDARDS.									
CHRONIC [RfD] COMMENT: REFER TO IRIS									
GENERAL COMMENT: DIMETHYLETHYL LEAD; METHYLTRIETHYL LEAD; TETRABUTYL LEAD; TETRAETHYL LEAD; TETRAMETHYL LEAD; TETRAPROPYL LEAD; TRIETHYL LEAD; TRIMETHYL LEAD; TRIMETHYLETHYL LEAD; TRIPROPYL LEAD									
LINURON		**000330-55-2**							
LOAEL 0.625 MG/KG/DAY		DOG							
	ORAL: DIET	2 YEARS	BLOOD	HEMATOLOGICAL EFFECTS	2E-3 300			IRIS	005990
SUBCHRONIC [RfD] COMMENT: THE CHRONIC ORAL RfD WAS ADOPTED AS THE SUBCHRONIC ORAL [RfD].									
GENERAL COMMENT: ALSO SEE HEAST TABLE 3: CARCINOGENICITY.									
MALATHION		**000121-75-5**							
NOEL 0.23 MG/KG/DAY		HUMAN							
	ORAL: CAPSULE	47 DAYS	BLOOD	HEMATOLOGICAL EFFECTS	2E-2 10			IRIS	005991
SUBCHRONIC [RfD] COMMENT: THE CHRONIC ORAL RfD WAS ADOPTED AS THE SUBCHRONIC ORAL [RfD].									
CHRONIC [RfC] COMMENT: UNDER REVIEW.									

CHEMICAL / LEVEL	DOSE / ROUTE	SPECIES / EXPERIMENT LENGTH	TARGET	CRITICAL EFFECT	Subchronic [RfC] (mg/cu m) UF	Subchronic [RfD] (mg/kg/day) UF	Chronic [RfC] (mg/cu m) UF	Chronic [RfD] (mg/kg/day) UF	REFERENCE
MALEIC ANHYDRIDE		**000108-31-6**							
NOAEL 10 MG/KG/DAY	ORAL: DIET	RAT 2 YEARS	KIDNEY	LESIONS		1E-1 100		IRIS	005992
SUBCHRONIC [RfD] COMMENT: THE CHRONIC ORAL RfD WAS ADOPTED AS THE SUBCHRONIC ORAL [RfD].									
MALEIC HYDRAZIDE		**000123-33-1**							
LOAEL 500 MG/KG/DAY	ORAL: DIET	RAT 28 MONTHS	KIDNEY	ALTERED FUNCTION		5E-1 1000		IRIS	005993
SUBCHRONIC [RfD] COMMENT: THE CHRONIC ORAL RfD WAS ADOPTED AS THE SUBCHRONIC ORAL [RfD].									
MALONONITRILE		**000109-77-3**							
LOAEL 0.21 MG/KG/DAY	ORAL: GAVAGE	RAT 120 DAYS	LIVER	EFFECTS		2E-4		2E-5	005994
			SPLEEN	EFFECTS		1000		10000	
MANCOZEB		**008018-01-7**							
NOEL 2.9 MG/KG/DAY	ORAL: DIET	RAT 90 WEEKS	THYROID	GOITROGENIC EFFECTS		3E-2 100		3E-2 100	005995
MANEB		**012427-38-2**							
NOEL 5 MG/KG/DAY	ORAL: DIET	MONKEY 6 MONTHS	THYROID	INCREASED WEIGHT		5E-2 100		IRIS	005996

CHEMICAL / LEVEL	DOSE / ROUTE	SPECIES / EXPERIMENT / LENGTH	TARGET	CRITICAL EFFECT	Subchronic [RfC] (mg/cu m) UF	Subchronic [RfD] (mg/kg/day) UF	Chronic [RfC] (mg/cu m) UF	Chronic [RfD] (mg/kg/day) UF	REFERENCE
MANGANESE		**007439-96-5**							
NOAEL 0.14 MG/KG/DAY		HUMAN							
	ORAL: DIET	CHRONIC	CENTRAL NERVOUS SYSTEM	EFFECTS		1.4E-1 1		IRIS	010851
	SUBCHRONIC [RfD] COMMENT: THE CHRONIC ORAL FOOD RfD WAS ADOPTED AS THE SUBCHRONIC ORAL FOOD [RfD]. SEE IRIS FOR SPECIFIC DIETARY INFORMATION.								
							IRIS		010959
	SUBCHRONIC [RfC] COMMENT: A SUBCHRONIC [RfC] HAS NOT BEEN DERIVED FOR MANGANESE.								
MEPHOSFOLAN		**000950-10-7**							
NOEL 0.09 MG/KG/DAY		RAT							
	ORAL: DIET	17 WEEKS	LIVER	ALTERED WEIGHT		9E-4		9E-5	005997
			KIDNEY	ALTERED WEIGHT		100		1000	
			BLOOD	DECREASED CHOLINESTERASE ACTIVITY					
			ERYTHROCYTES	DECREASED CHOLINESTERASE ACTIVITY					
			BRAIN	DECREASED CHOLINESTERASE ACTIVITY					
MERCURIC CHLORIDE		**007487-94-7**							
		RAT							
	ORAL: SUBCUTANEOUS		IMMUNE SYSTEM	AUTOIMMUNE EFFECTS		3E-3 100		IRIS	005800
MERCURY, ELEMENTAL		**007439-97-6**							
NOAEL 0.009 MG/CU M		HUMAN							
	INHALATION:		NERVOUS SYSTEM	NEUROTOXICITY	3E-4 30		3E-4 30		010270
	CHRONIC [RfC] COMMENT: UNDER REVIEW. CURRENT NUMBER SUBJECT TO CHANGE.								

CHEMICAL / LEVEL	DOSE / ROUTE	SPECIES / EXPERIMENT LENGTH	TARGET	CRITICAL EFFECT	Subchronic [RfC] (mg/cu m) UF	Subchronic [RfD] (mg/kg/day) UF	Chronic [RfC] (mg/cu m) UF	Chronic [RfD] (mg/kg/day) UF	REFERENCE
MERPHOS		**000150-50-5**							
NOEL	0.1 MG/KG/DAY	HEN							
	ORAL: CAPSULE	3 MONTHS	NERVOUS SYSTEM	ATAXIA		3E-4		IRIS	005998
			NERVOUS SYSTEM	DELAYED NEUROTOXICITY		300			
			WHOLE BODY	DECREASED WEIGHT					
									010907
MERPHOS OXIDE		**000078-48-8**							
NOEL	0.1 MG/KG/DAY	HEN							
	ORAL: CAPSULE	3 MONTHS	NERVOUS SYSTEM	ATAXIA		3E-4		IRIS	005999
			NERVOUS SYSTEM	DELAYED NEUROTOXICITY		300			
			WHOLE BODY	DECREASED WEIGHT					
									010908
METHACRYLONITRILE		**000126-98-7**							
NOAEL	3.2 PPM	DOG							
	INHALATION: INTERMITTENT	90 DAYS	LIVER	INCREASED SGOT		1E-3		IRIS	005812
			LIVER	INCREASED SGPT		300			
			CENTRAL NERVOUS SYSTEM	LOSS OF HINDLIMB MOTOR CONTROL					
			BRAIN	LESIONS					

CHRONIC [RfC] COMMENT: THE CHRONIC INHALATION [RfC] IS CONSIDERED NOT VERIFIABLE (06/25/92) BY THE RfD/RfC WORK GROUP.
SUBCHRONIC [RfD] CPMMENT: THE CHRONIC ORAL RfD WAS MODIFIED TO ESTIMATE THE SUBCHRONIC ORAL [RfD].

CHRONIC [RfC] COMMENT: THE CHRONIC INHALATION [RfC] IS CONSIDERED NOT VERIFIABLE (06/25/92) BY THE RfD/RfC WORK GROUP.
SUBCHRONIC [RfD] CPMMENT: THE CHRONIC ORAL RfD WAS MODIFIED TO ESTIMATE THE SUBCHRONIC ORAL [RfD].

SUBCHRONIC [RfC] COMMENT: ALSO SEE HEAST TABLE 2: ALTERNATE METHODS - SUBCHRONIC AND CHRONIC TOXICITY (OTHER THAN CARCINOGENICITY)
SUBCHRONIC [RfD] COMMENT: BASED ON ROUTE TO ROUTE EXTRAPOLATION.
CHRONIC [RfC] COMMENT: ALSO SEE HEAST TABLE 2: ALTERNATE METHODS - SUBCHRONIC AND CHRONIC TOXICITY (OTHER THAN CARCINOGENICITY)
CHRONIC [RfD] COMMENT: BASED ON ROUTE TO ROUTE EXTRAPOLATION.

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CHEMICAL / LEVEL	DOSE / ROUTE	SPECIES / EXPERIMENT / LENGTH	TARGET	CRITICAL EFFECT	Subchronic [RfC] (mg/cu m) UF	Subchronic [RfD] (mg/kg/day) UF	Chronic [RfC] (mg/cu m) UF	Chronic [RfD] (mg/kg/day) UF	REFERENCE
METHANOL		**000067-56-1**							
NOEL	500 MG/KG/DAY	RAT							
	ORAL: GAVAGE	90 DAYS	BLOOD	INCREASED ALKALINE PHOSPHATASE		5E+0		IRIS	010271
			BLOOD	INCREASED SGPT		100			
			BRAIN	DECREASED WEIGHT					
METHOMYL		**016752-77-5**							
NOEL	2.5 MG/KG/DAY	DOG							
	ORAL: DIET	24 MONTHS	KIDNEY	LESIONS		2.5E-2		IRIS	005802
						100			
	SUBCHRONIC [RfD] COMMENT: THE CHRONIC ORAL RfD WAS ADOPTED AS THE SUBCHRONIC ORAL [RfD].								
METHOXYCHLOR		**000072-43-5**							
NOEL	5.01 MG/KG/DAY	RABBIT							
	ORAL: GAVAGE	13 DAYS	REPRODUCTION	LOSS OF LITTERS		5E-3		IRIS	010357
						1000			
	SUBCHRONIC [RfD] COMMENT: THE CHRONIC ORAL RfD WAS ADOPTED AS THE SUBCHRONIC ORAL [RfD].								
							IRIS		010909
	CHRONIC RfC COMMENT: THE CHRONIC INHALATION RfC IS CONSIDERED NOT VERIFIABLE (11/07/91) BY THE RfD/RfC WORK GROUP.								
METHOXYETHANOL ACETATE, 2-		**000110-49-6**							
									010497
	CHRONIC [RfD] COMMENT: ALSO SEE HEAST TABLE 2: ALTERNATE METHODS -- SUBCHRONIC AND CHRONIC TOXICITY (OTHER THAN CARCINOGENICITY)								
	SUBCHRONIC [RfD] COMMENT: ALSO SEE HEAST TABLE 2: ALTERNATE METHODS -- SUBCHRONIC AND CHRONIC TOXICITY (OTHER THAN CARCINOGENICITY)								

CHEMICAL / LEVEL	DOSE / ROUTE	SPECIES / EXPERIMENT / LENGTH	TARGET	CRITICAL EFFECT	Subchronic [RfC] (mg/cu m) UF	Subchronic [RfD] (mg/kg/day) UF	Chronic [RfC] (mg/cu m) UF	Chronic [RfD] (mg/kg/day) UF	REFERENCE
METHOXYETHANOL, 2-		**000109-86-4**							
NOAEL 93 MG/CU M		RABBIT							
	INHALATION: INTERMITTENT	13 WEEKS	TESTICLE	EFFECTS	2E-1 100		IRIS		010372
SUBCHRONIC [RfD] COMMENT: ALSO SEE HEAST TABLE 2: ALTERNATE METHODS -- SUBCHRONIC AND CHRONIC TOXICITY (OTHER THAN CARCINOGENICITY).									
CHRONIC [RfD] COMMENT: ALSO SEE HEAST TABLE 2: ALTERNATE METHODS -- SUBCHRONIC AND CHRONIC TOXICITY (OTHER THAN CARCINOGENICITY).									
METHYL ACETATE		**000079-20-9**							
NOEL 1156 MG/KG/DAY		RAT							
	ORAL: GAVAGE	90 DAYS	LIVER	INCREASED ALKALINE PHOSPHATASE	1E+1		1E+0		010002
			LIVER	INCREASED SGPT	100		1000		
CHRONIC [RfD] COMMENT: CALCULATED FROM DATA OBTAINED WITH METHANOL BY MULTIPLYING BY THE MOLECULAR WEIGHT RATIO (74.08/32.04).									
METHYL ACRYLATE		**000096-33-3**							010498
CHRONIC [RfD] COMMENT: ALSO SEE HEAST TABLE 2: ALTERNATE METHODS -- SUBCHRONIC AND CHRONIC TOXICITY (OTHER THAN CARCINOGENICITY)									
GENERAL COMMENT: ALSO SEE HEAST TABLE 2: ALTERNATE METHODS -- SUBCHRONIC AND CHRONIC TOXICITY (OTHER THAN CARCINOGENICITY)									
METHYL CHLOROCARBONATE		**000079-22-1**							
CHRONIC [RfD] COMMENT: WITHDRAWN FROM IRIS (05/01/89).									
GENERAL COMMENT: CONTACT THE SUPERFUND HEALTH RISK TECHNICAL SUPPORT CENTER: (513) 569-7300.									

CHEMICAL / LEVEL	DOSE / ROUTE	SPECIES / EXPERIMENT / LENGTH	TARGET	CRITICAL EFFECT	Subchronic [RfC] (mg/cu m) UF	Subchronic [RfD] (mg/kg/day) UF	Chronic [RfC] (mg/cu m) UF	Chronic [RfD] (mg/kg/day) UF	REFERENCE
METHYL ETHYL KETONE		**000078-93-3**							
NOAEL 1711 MG/KG/DAY		RAT							
	ORAL: DRINKING WATER	MULTI-GENERATION	FETUS	DECREASED BIRTH WEIGHT		2E+0 1000		IRIS	010853
SUBCHRONIC [RfD] COMMENT: THE CHRONIC ORAL RfD WAS MODIFIED TO ESTIMATE THE SUBCHRONIC ORAL [RfD].									
GENERAL COMMENT: MULTI-GENERATION DEVELOPMENTAL STUDY PERFORMED WHT THE SURROGATE 2-BUTANOL, A METABOLITE OF METHYL ETHYL KETONE.									
NOAEL 1010 PPM		MOUSE							
	INHALATION: INTERMITTENT	10 DAYS	FETUS	DECREASED BIRTH WEIGHT	1E+0 3000		IRIS		010845
SUBCHRONIC [RfC] COMMENT: THE CHRONIC INHALATION RfC WAS ADOPTED AS THE SUBCHRONIC INHALATION [RfC].									
METHYL ETHYL KETONE PEROXIDE		**001338-23-4**							
CHRONIC [RfD] COMMENT: THE CHRONIC ORAL [RfD] IS CONSIDERED NOT VERIFIABLE (07/22/93) BY THE RfD/RfC WORK GROUP.									010948
METHYL ISOBUTYL KETONE		**000108-10-1**							
NOAEL 250 MG/(KG-DAY)		RAT							
	ORAL: GAVAGE	13 WEEKS	WHOLE BODY	LETHARGY		8E-1		8E-2	010949
			LIVER	INCREASED RELATIVE WEIGHT IN FEMALES		300		3000	
			LIVER	INCREASED ABSOLUTE WEIGHT IN FEMALES					
			KIDNEY	INCREASED RELATIVE WEIGHT IN FEMALES					
			KIDNEY	INCREASED ABSOLUTE WEIGHT IN FEMALES					
			KIDNEY	INCREASED URINARY PROTEIN LEVELS IN FEMALES					
SUBCHRONIC [RfC] COMMENT: ALSO SEE HEAST TABLE 2: ALTERNATE METHODS - SUBCHRONIC AND CHRONIC TOXICITY (OTHER THAN CARCINOGENICITY)									
CHRONIC [RfC] COMMENT: ALSO SEE HEAST TABLE 2: ALTERNATE METHODS - SUBCHRONIC AND CHRONIC TOXICITY (OTHER THAN CARCINOGENICITY)									
CHRONIC [RfD] COMMENT: WITHDRAWN FROM IRIS (03/01/91). UNDER REVIEW. CURRENT NUMBER SUBJECT TO CHANGE.									

CHEMICAL / LEVEL	DOSE / ROUTE	SPECIES / EXPERIMENT / LENGTH	TARGET	CRITICAL EFFECT	Subchronic [RfC] (mg/cu m) UF	Subchronic [RfD] (mg/kg/day) UF	Chronic [RfC] (mg/cu m) UF	Chronic [RfD] (mg/kg/day) UF	REFERENCE
METHYL ISOCYANATE		**000624-83-9**					IRIS		010013
CHRONIC RfC COMMENT: THE CHRONIC INHALATION RfC IS CONSIDERED NOT VERIFIABLE (12/18/90) BY THE RfD/RfC WORK GROUP.									
METHYLMERCURY		**022967-92-6**							
CRITICAL ORAL DOSE 0.001 MG/KG/DAY		HUMAN		DEVELOPMENTAL NEUROLOGICAL ABNORMALITIES IN HUMAN INFANTS		1E-4 10	IRIS		010970
SUBCHRONIC [RfD] COMMENT: THE CHRONIC ORAL RfD WAS ADOPTED AS THE SUBCHRONIC ORAL [RfD].									
CHRONIC [RfD] COMMENT: A BENCHMARK DOSE APPROACH WAS USED RATHER THAN A NOAEL/LOAEL TO DERIVE THE RfD.									
METHYL METHACRYLATE		**000080-62-6**							
NOEL 7.5 MG/KG/DAY	ORAL: WATER	RAT 24 MONTHS	KIDNEY	INCREASED RELATIVE WEIGHT		8E-2 100		8E-2 100	010014
METHYL PARATHION		**000298-00-0**						IRIS	010015
NOAEL 2.5 PPM	ORAL: DIET	RAT 90 DAYS	ERYTHROCYTES	CHOLINESTERASE INHIBITION		2E-3 100			010846
METHYL STYRENE (MIXED ISOMERS)		**025013-15-4**							010500
CHRONIC [RfD] COMMENT: UNDER REVIEW. ALSO SEE HEAST TABLE 2: ALTERNATE METHODS -- SUBCHRONIC AND CHRONIC TOXICITY (OTHER THAN CARCINOGENICITY)									
GENERAL COMMENT: ALSO SEE HEAST TABLE 2: ALTERNATE METHODS -- SUBCHRONIC AND CHRONIC TOXICITY (OTHER THAN CARCINOGENICITY)									
METHYL STYRENE, ALPHA		**000098-83-9**							010499
GENERAL COMMENT: ALSO SEE HEAST TABLE 2: ALTERNATE METHODS -- SUBCHRONIC AND CHRONIC TOXICITY (OTHER THAN CARCINOGENICITY)									

CHEMICAL LEVEL	DOSE ROUTE	SPECIES EXPERIMENT LENGTH	TARGET	CRITICAL EFFECT	Subchronic [RfC] (mg/cu m) UF	Subchronic [RfD] (mg/kg/day) UF	Chronic [RfC] (mg/cu m) UF	Chronic [RfD] (mg/kg/day) UF	REFERENCE
METHYL-4-CHLOROPHENOXY) BUTYRIC ACID, 4-(2- 000094-81-5									
NOEL	12 MG/KG/DAY	RAT							
	ORAL: DIET	13 WEEKS	LIVER	EFFECTS		1E-1		IRIS	010008
			KIDNEY	EFFECTS		100			
		DOG							
	ORAL: DIET	13 WEEKS	LIVER	EFFECTS					
			KIDNEY	EFFECTS					
METHYL-4-CHLOROPHENOXY) PROPIONIC ACID, 2-(2- 000093-65-2									
NOEL	3 MG/KG/DAY	RAT							
	ORAL: DIET	90 DAYS	KIDNEY	ALTERED WEIGHT		1E-2		IRIS	010009
						300			
METHYL-4-CHLOROPHENOXYACETIC ACID, 2- 000094-74-6									
NOEL	0.15 MG/KG/DAY	DOG							
	ORAL: DIET	52 WEEKS	KIDNEY	EFFECTS		5E-4		IRIS	010007
			LIVER	EFFECTS		300			
SUBCHRONIC [RfD] COMMENT: THE CHRONIC ORAL RfD WAS ADOPTED AS THE SUBCHRONIC ORAL [RfD].									
METHYLCYCLOHEXANE 000108-87-2									
NOAEL	287 MG/CU M	RAT							
	INHALATION:	1 YEAR	KIDNEY	MINERALIZATION	3E+0		3E+0		010431
	INTERMITTENT		KIDNEY	PAPILLARY HYPERPLASIA	100		100		
METHYLENE BROMIDE 000074-95-3									010501
GENERAL COMMENT: ALSO SEE HEAST TABLE 2: ALTERNATE METHODS -- SUBCHRONIC AND CHRONIC TOXICITY (OTHER THAN CARCINOGENICITY)									

CHEMICAL LEVEL	DOSE ROUTE	SPECIES EXPERIMENT LENGTH	TARGET	CRITICAL EFFECT	Subchronic [RfC] (mg/cu m) UF	Subchronic [RfD] (mg/kg/day) UF	Chronic [RfC] (mg/cu m) UF	Chronic [RfD] (mg/kg/day) UF	REFERENCE
METHYLENE CHLORIDE (DICHLOROMETHANE) 000075-09-2									
NOAEL 5.85 MG/KG/DAY	ORAL: DRINKING WATER	RAT 24 MONTHS	LIVER	TOXICITY		6E-2 100		IRIS	005553
SUBCHRONIC [RfD] COMMENT: THE CHRONIC ORAL RfD WAS ADOPTED AS THE SUBCHRONIC ORAL [RfD].									
NOAEL 694.8 MG/CU M	INHALATION: INTERMITTENT	RAT 2 YEARS	LIVER	TOXICITY	3E+0 100		3E+0 100		005552
GENERAL COMMENT: ALSO SEE HEAST TABLE 3: CARCINOGENICITY.									
METHYLENE-BIS(2-CHLOROANILINE), 4,4'- 000101-14-4									
LOAEL 7.3 MG/KG/DAY	ORAL	DOG 9 YEARS	LIVER BLADDER	EFFECTS EFFECTS		7E-4 10000		7E-4 10000	010413 010933
CHRONIC [RfC] COMMENT: THE CHRONIC INHALATION [RfC] IS CONSIDERED NOT VERIFIABLE 02/10/93) BY THE RfD/RfC WORK GROUP.									
METHYLENEDIPHENYL ISOCYANATE, 4,4- (DIPHENYLMETHANE DIISOCYANATE) 000101-68-8									
NOAEL 0.2 MG/CU M	INHALATION: INTERMITTENT	RAT 24 MONTHS	NASAL CAVITY	LESIONS	2E-5 300		IRIS		010449
SUBCHRONIC [RfC] COMMENT: THE CHRONIC INHALATION RfC ON IRIS WAS ADOPTED AS THE SUBCHRONIC INHALATION [RfC].									

CHEMICAL / LEVEL	DOSE / ROUTE	SPECIES / EXPERIMENT / LENGTH	TARGET	CRITICAL EFFECT	Subchronic [RfC] (mg/cu m) / UF	Subchronic [RfD] (mg/kg/day) / UF	Chronic [RfC] (mg/cu m) / UF	Chronic [RfD] (mg/kg/day) / UF	REFERENCE
METOLACHLOR		**051218-45-2**							
NOAEL 300 PPM		RAT							
	ORAL: DIET	2 YEARS	WHOLE BODY	DECREASED WEIGHT GAIN		1.5E-1 100		1.5E-1 100	010950
SUBCHRONIC [RfD] COMMENT: THE CHRONIC ORAL [RfD] WAS ADOPTED AS THE SUCHRONIC ORAL [RfD].									
METRIBUZIN		**021087-64-9**							
NOAEL 100 PPM		DOG							
	ORAL: DIET	2 YEARS	LIVER	EFFECTS				IRIS	010928
			KIDNEY	EFFECTS					
			WHOLE BODY	MORTALITY					
			WHOLE BODY	DECREASED WEIGHT					
SUBCHRONIC [RfD] COMMENT: THE SUBCHRONIC ORAL [RfD] WAS REMOVED BECAUSE THE CHRONIC ORAL RfD UPON WHICH IT WAS BASED IS UNDER REVIEW BY THE RfD/RfC WORK GROUP. CHRONIC RfD COMMENT: THE CHRONIC ORAL RfD. WHILE STILL ON IRIS. IS BEING RECONSIDERED BY THE RfD/RfC WORK GROUP.									
MIREX		**002385-85-5**							
NOAEL 0.07 MG/KG/DAY		RAT							
	ORAL: DIET	2 YEARS	LIVER	CYTOMEGALY		2E-4		IRIS	010841
			LIVER	FATTY METAMORPHOSIS		300			
			LIVER	ANGIECTASIS					
			THYROID	CYSTIC FOLLICLES					
SUBCHRONIC [RfD] COMMENT: THE CHRONIC ORAL RfD WAS ADOPTED AS THE SUBCHRONIC ORAL [RfD]. GENERAL COMMENT: ALSO SEE HEAST TABLE 3: CARCINOGENICITY.									

CHEMICAL / LEVEL	DOSE / ROUTE	SPECIES / EXPERIMENT LENGTH	TARGET	CRITICAL EFFECT	Subchronic [RfC] (mg/cu m) UF	Subchronic [RfD] (mg/kg/day) UF	Chronic [RfC] (mg/cu m) UF	Chronic [RfD] (mg/kg/day) UF	REFERENCE
MOLINATE		**002212-67-1**							
NOEL	0.2 MG/KG/DAY	RAT							
	ORAL: GAVAGE		REPRODUCTIVE SYSTEM	TOXICITY		2E-3 100		IRIS	010017
SUBCHRONIC [RfD] COMMENT: THE CHRONIC ORAL RfD WAS ADOPTED AS THE SUBCHRONIC ORAL [RfD].									
CHRONIC [RfD] COMMENT: BASED ON A REPRODUCTION STUDY.									
MOLYBDENUM		**007439-98-7**							
LOAEL	0.14 MG/KG/DAY	HUMAN							
	ORAL: WATER, DIET		URINE	INCREASED URIC ACID		5E-3		IRIS	010489
			JOINTS	PAIN, SWELLING		30			
			BLOOD	DECREASED COPPER LEVELS					
SUBCHRONIC [RfD] COMMENT: THE CHRONIC ORAL RfD WAS ADOPTED AS THE SUBCHRONIC ORAL [RFD].									
MONOCHLORAMINE		**010599-90-3**							
NOAEL	9.5 MG/KG/DAY	RAT							
	ORAL: DRINKING WATER	2 YEARS	WHOLE BODY	WEIGHT CHANGES		1E-1		IRIS	010517
			LIVER	WEIGHT CHANGES		100			
			KIDNEY	WEIGHT CHANGES					
SUBCHRONIC [RfD] COMMENT: THE CHRONIC ORAL RfD WAS ADOPTED AS THE SUBCHRONIC ORAL [RfD].									
NAPHTHALENE		**000091-20-3**							
CHRONIC [RfD] COMMENT: CONTACT THE SUPERFUND HEALTH RISK TECHNICAL SUPPORT CENTER: (513) 569-7300.									
NAPHTHOQUINONE, 1,4-		**000130-15-4**							
GENERAL COMMENT: DATA INADEQUATE FOR QUANTITATIVE RISK ASSESSMENT									010020
NICKEL CYANIDE		**000557-19-7**							
CHRONIC [RfD] COMMENT: THE CHRONIC ORAL [RfD] IS CONSIDERED NOT VERIFIABLE (07/20/93) BY THE RfD/RfC WORK GROUP.									010953

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CHEMICAL / LEVEL	DOSE / ROUTE	SPECIES / EXPERIMENT LENGTH	TARGET	CRITICAL EFFECT	Subchronic [RfC] (mg/cu m) UF	Subchronic [RfD] (mg/kg/day) UF	Chronic [RfC] (mg/cu m) UF	Chronic [RfD] (mg/kg/day) UF	REFERENCE
NICKEL, SOLUBLE SALTS		**VARIOUS**							
NOAEL 100 PPM		RAT							
	ORAL: DIET	2 YEARS	WHOLE BODY	DECREASED WEIGHT		2E-2		IRIS	005579
			ORGANS, MAJOR	DECREASED WEIGHT		300			
SUBCHRONIC [RfD] COMMENT: THE CHRONIC ORAL RfD WAS ADOPTED AS THE SUBCHRONIC ORAL [RfD].									
CHRONIC [RfD] COMMENT: THE CHRONIC ORAL [RfD] WAS DERIVED FROM NICKEL MOIETY OF ADMINISTERED NICKEL CHLORIDE.									
NICOTINONITRILE		**000100-54-9**							
GENERAL COMMENT: DATA INADEQUATE FOR QUANTITATIVE RISK ASSESSMENT									005584
NITRIC OXIDE		**010102-43-9**							
CHRONIC [RfC] COMMENT: REFER TO APPENDIX A: TECHNICAL INFORMATION, SECTION V ON NATIONAL AMBIENT AIR QUALITY STANDARDS.									010451
CHRONIC [RfD] COMMENT: THE CHRONIC ORAL RfD HAS BEEN PERMANENTLY WITHDRAWN (09/01/94) FROM IRIS.									
NITRITE		**014797-65-0**							
NOEL 10 PPM		HUMAN							
	ORAL: WATER		BLOOD	METHEMOGLOBINEMIA		1E-1		IRIS	010021
						10			
SUBCHRONIC [RfD] COMMENT: THIS VALUE IS BASED ON NITRATE (NITROGEN) DATA FROM THE MOST SENSITIVE HUMAN POPULATION (INFANTS). THE CHRONIC ORAL RfD WAS ADOPTED AS THE SUBCHRONIC ORAL [RfD].									
CHRONIC [RfD] COMMENT: THIS VALUE IS BASED ON NITRATE (NITROGEN) DATA FROM THE MOST SENSITIVE HUMAN POPULATION (INFANTS).									
NITROANILINE, 2-		**000088-74-4**							
CHRONIC [RfD] COMMENT: THE CHRONIC ORAL [RFD] IS CONSIDERED NOT VERIFIABLE (06/23/92) BY THE RFD/RFC WORK GROUP.									010936
LOAEL 9.8 MG/CU M		RAT							
	INHALATION: INTERMITTENT	4 WEEKS	BLOOD	HEMATOLOGICAL EFFECTS	2E-3		2E-4		010935
					1000		10000		

CHEMICAL / LEVEL	DOSE / ROUTE	SPECIES / EXPERIMENT LENGTH	TARGET	CRITICAL EFFECT	Subchronic [RfC] (mg/cu m) UF	Subchronic [RfD] (mg/kg/day) UF	Chronic [RfC] (mg/cu m) UF	Chronic [RfD] (mg/kg/day) UF	REFERENCE
NITROANILINE, M-		**000099-09-2**							
GENERAL COMMENT: DATA INADEQUATE FOR QUANTITATIVE RISK ASSESSMENT									010400
NITROANILINE, P-		**000100-01-6**							
GENERAL COMMENT: DATA INADEQUATE FOR QUANTITATIVE RISK ASSESSMENT									010024
NITROBENZENE		**000098-95-3**							
LOAEL 25 MG/CU M		MOUSE							
	INHALATION: INTERMITTENT	90 DAYS	BLOOD	HEMATOLOGICAL EFFECTS	5E-3			IRIS	005589
			ADRENAL	LESIONS	1000				
			KIDNEY	LESIONS					
			LIVER	LESIONS					
		RAT							
	INHALATION: INTERMITTENT	90 DAYS	BLOOD	HEMATOLOGICAL EFFECTS					
			ADRENAL	LESIONS					
			KIDNEY	LESIONS					
			LIVER	LESIONS					
SUBCHRONIC [RfC] COMMENT: ALSO SEE HEAST TABLE 2: ALTERNATE METHODS - SUBCHRONIC AND CHRONIC TOXICITY (OTHER THAN CARCINOGENICITY).									
SUBCHRONIC [RfD] COMMENT: BASED ON ROUTE TO ROUTE EXTRAPOLATION.									
CHRONIC [RfC] COMMENT: ALSO SEE HEAST TABLE 2: ALTERNATE METHODS SUBCHRONIC AND CHRONICTOXICITY (OTHER THAN CARCINOGENICITY)									
CHRONIC [RfD] COMMENT: THE ORAL RFD, WHILE STILL AVAILABLE ON IRIS, IS BEING RECONSIDERED BY THE RFD WORKGROUP. BASED ON ROUTE TO ROUTE EXTRAPOLATION.									
GENERAL COMMENT: ALSO SEE HEAST TABLE 3: CARCINOGENICITY.									
NITROFURANTOIN		**000067-20-9**							
NOAEL 300 PPM		MOUSE							
	ORAL: DIET	13 WEEKS	TESTIS	DAMAGE	7E-1			7E-2	005593
					100			1000	

CHEMICAL LEVEL	DOSE ROUTE	SPECIES EXPERIMENT LENGTH	TARGET	CRITICAL EFFECT	Subchronic [RfC] (mg/cu m) UF	Subchronic [RfD] (mg/kg/day) UF	Chronic [RfC] (mg/cu m) UF	Chronic [RfD] (mg/kg/day) UF	REFERENCE
NITROGEN DIOXIDE		**010102-44-0**							
CHRONIC [RfD] COMMENT: THE CHRONIC ORAL RfD HAS BEEN PERMANENTLY WITHDRAWN (09/01/94) FROM IRIS.									010402
CHRONIC [RfC] COMMENT: REFER TO APPENDIX A: TECHNICAL INFORMATION, SECTION V ON NATIONAL AMBIENT AIR QUALITY STANDARDS.									010912
NITROGEN OXIDES									
CHRONIC [RfC] COMMENT: REFER TO APPENDIX A: TECHNICAL INFORMATION, SECTION V ON NATIONAL AMBIENT AIR QUALITY STANDARDS.									010170
NITROMETHANE		**000075-52-5**							
GENERAL COMMENT: DATA INADEQUATE FOR QUANTITATIVE RISK ASSESSMENT									010026
NITROPHENOLS									
GENERAL COMMENT: DATA INADEQUATE FOR QUANTITATIVE RISK ASSESSMENT									005594
NITROPROPANE, 2-		**000079-46-9**							
LOAEL 78 MG/CU M		RAT							
	INHALATION: INTERMITTENT	22 MONTHS	LIVER	LESIONS	2E-2 1000		IRIS		010374
SUBCHRONIC [RfC] COMMENT: THE CHRONIC INHALATION RfC WAS ADOPTED AS THE SUBCHRONIC INHALATION [RfC].									
NITROSODIPHENYLAMINE, P-		**000156-10-5**							
GENERAL COMMENT: DATA INADEQUATE FOR QUANTITATIVE RISK ASSESSMENT									010027
NITROTOLUENE, M-		**000099-08-1**							
LOAEL 200 MG/KG/DAY		RAT							
	ORAL: GAVAGE	6 MONTHS	SPLEEN	LESIONS		1E-1 1000		1E-2 10000	010029
SUBCHRONIC [RfD] COMMENT: BASED ON DATA OBTAINED WITH O-NITROTOLUENE.									
CHRONIC [RfD] COMMENT: BASED ON DATA OBTAINED WITH O-NITROTOLUENE.									

CHEMICAL / LEVEL	DOSE / ROUTE	SPECIES / EXPERIMENT LENGTH	TARGET	CRITICAL EFFECT	Subchronic [RfC] (mg/cu m) UF	Subchronic [RfD] (mg/kg/day) UF	Chronic [RfC] (mg/cu m) UF	Chronic [RfD] (mg/kg/day) UF	REFERENCE
NITROTOLUENE, O-	**000088-72-2**								
LOAEL 200 MG/KG/DAY	RAT					1E-1		1E-2	010028
	ORAL: GAVAGE	6 MONTHS	SPLEEN	LESIONS		1000		10000	
NITROTOLUENE, P-	**000099-99-0**								
LOAEL 200 MG/KG/DAY	RAT					1E-1		1E-2	010030
	ORAL: GAVAGE	6 MONTHS	SPLEEN	LESIONS		1000		10000	
SUBCHRONIC [RfD] COMMENT: BASED ON DATA OBTAINED WITH O-NITROTOLUENE.									
CHRONIC [RfD] COMMENT: BASED ON DATA OBTAINED WITH O-NITROTOLUENE.									
OCTABROMODIPHENYL ETHER	**032536-52-0**								
NOAEL 2.5 MG/KG/DAY	RAT					3E-2		IRIS	010032
	ORAL: GAVAGE	90 DAYS	LIVER	HISTOLOGICAL CHANGES		100			
OCTAMETHYLPYROPHOSPHORAMIDE	**000152-16-9**								
NOAEL 0.02 MG/KG/DAY	HUMAN					2E-3		2E-3	010031
	ORAL	AT LEAST 30 DAYS	BLOOD	DECREASED CHOLINESTERASE ACTIVITY		10		10	
OSMIUM TETROXIDE	**020816-12-0**								
CHRONIC [RfD] COMMENT: THE CHRONIC ORAL [RfD] IS CONSIDERED NOT VERIFIABLE (07/22/93) BY THE RfD/RfC WORK GROUP.									010954
OZONE	**010028-15-6**								
CHRONIC [RfC] COMMENT: REFER TO APPENDIX A: TECHNICAL INFORMATION, SECTION V ON NATIONAL AMBIENT AIR QUALITY STANDARDS.									010171
PARALDEHYDE	**000123-63-7**								
GENERAL COMMENT: DATA INADEQUATE FOR QUANTITATIVE RISK ASSESSMENT.									010033

HEAST TABLE 1: SUBCHRONIC AND CHRONIC TOXICITY (OTHER THAN CARCINOGENICITY)

July 1997

CHEMICAL / DOSE LEVEL	ROUTE	SPECIES / EXPERIMENT	LENGTH	TARGET	CRITICAL EFFECT	Subchronic [RfC] (mg/cu m) UF	Subchronic [RfD] (mg/kg/day) UF	Chronic [RfC] (mg/cu m) UF	Chronic [RfD] (mg/kg/day) UF	REFERENCE
PARATHION		**000056-38-2**								
NOAEL 0.064 MG/KG/DAY		HUMAN								
	ORAL			CHOLINESTERASE	DECREASED CHOLINESTERASE ACTIVITY		6E-3 10		6E-3 10	005598
SUBCHRONIC [RfD] COMMENT: THE CHRONIC ORAL [RfD] WAS ADOPTED AS THE SUBCHRONIC ORAL [RfD].										
GENERAL COMMENT: ALSO SEE HEAST TABLE 3: CARCINOGENICITY.										
PARTICULATE MATTER										
CHRONIC [RfC] COMMENT: REFER TO APPENDIX A: TECHNICAL INFORMATION, SECTION V ON NATIONAL AMBIENT AIR QUALITY STANDARDS.										010034
PEBULATE		**001114-71-2**								
NOEL 5 MG/KG/DAY		RAT								
	ORAL: DIET	SUBCHRONIC		BLOOD	INCREASED CLOTTING TIME		5E-2 100		5E-2 100	010036
PENDIMETHALIN		**040487-42-1**								
NOEL 12.5 MG/KG/DAY		DOG								
	ORAL: CAPSULE	2 YEARS		LIVER	EFFECTS		4E-2 300		IRIS	010037
SUBCHRONIC [RfD] COMMENT: THE CHRONIC ORAL RfD WAS ADOPTED AS THE SUBCHRONIC ORAL [RfD].										
PENTABROMODIPHENYL ETHER		**032534-81-9**								
NOAEL 1.8 MG/KG/DAY		RAT								
	ORAL: GAVAGE	90 DAYS		LIVER	ALTERED ENZYME ACTIVITIES		2E-2 100		IRIS	010038

CHEMICAL / LEVEL	DOSE / ROUTE	SPECIES / EXPERIMENT LENGTH	TARGET	CRITICAL EFFECT	Subchronic [RfC] (mg/cu m) / UF	Subchronic [RfD] (mg/kg/day) / UF	Chronic [RfC] (mg/cu m) / UF	Chronic [RfD] (mg/kg/day) / UF	REFERENCE
PENTACHLOROBENZENE		**000608-93-5**							
LOAEL 8.3 MG/KG/DAY		RAT							
	ORAL: DIET	100 DAYS	LIVER	TOXICITY		8E-3		IRIS	010039
			KIDNEY	TOXICITY		1000			
PENTACHLOROCYCLOPENTADIENE		**025329-35-5**							
GENERAL COMMENT: DATA INADEQUATE FOR QUANTITATIVE RISK ASSESSMENT.									005302
PENTACHLORONITROBENZENE		**000082-68-8**							
NOEL 0.75 MG/KG/DAY		DOG							
	ORAL: DIET	2 YEARS	LIVER	TOXICITY		3E-3		IRIS	010040
						300			
SUBCHRONIC [RfD] COMMENT: THE CHRONIC ORAL RfD WAS ADOPTED AS THE SUBCHRONIC ORAL [RfD].									
GENERAL COMMENT: ALSO SEE HEAST TABLE 3: CARCINOGENICITY.									
PENTACHLOROPHENOL		**000087-86-5**							
NOEL 3 MG/KG/DAY		RAT							
	ORAL: GAVAGE	62 DAYS	FETUS	FETOTOXICITY		3E-2		IRIS	005600
						100			
SUBCHRONIC [RfD] COMMENT: BASED ON A TERATOLOGY STUDY WITH EXPOSURE 62 DAYS PRIOR TO MATING AND THROUGHOUT GESTATION AND LACTATION.									
GENERAL COMMENT: ALSO SEE HEAST TABLE 3: CARCINOGENICITY.									
PENTACHLOROPROPENE, 1,1,2,3,3,-		**001600-37-9**							
GENERAL COMMENT: DATA INADEQUATE FOR QUANTITATIVE RISK ASSESSMENT									010041
PENTANE, N-		**000109-66-0**							
GENERAL COMMENT: DATA INADEQUATE FOR QUANTITATIVE RISK ASSESSMENT									005603

CHEMICAL / LEVEL	DOSE / ROUTE	SPECIES / EXPERIMENT LENGTH	TARGET	CRITICAL EFFECT	Subchronic [RfC] (mg/cu m) UF	Subchronic [RfD] (mg/kg/day) UF	Chronic [RfC] (mg/cu m) UF	Chronic [RfD] (mg/kg/day) UF	REFERENCE
PHENANTHRENE		**000085-01-8**							
GENERAL COMMENT: DATA INADEQUATE FOR QUANTITATIVE RISK ASSESSMENT									005604
CHRONIC [RfC] COMMENT: THE CHRONIC INHALATION [RfC] IS CONSIDERED NOT VERIFIABLE (08/04/94) BY THE RfD/RfC WORK GROUP.									
PHENOL		**000108-95-2**							
NOAEL 60 MG/KG/DAY		RAT							
	ORAL: GAVAGE		FETUS	DECREASED WEIGHT		6E-1 100		IRIS	005824
SUBCHRONIC [RfD] COMMENT: BASED ON A DEVELOPMENTAL STUDY WITH EXPOSURES DURING DAYS 6-15 OF GESTATION. THE ORAL CHRONIC RfD WAS ADOPTED AS THE SUBCHRONIC ORAL [RfD].									
CHRONIC [RfD] COMMENT: BASED ON A DEVELOPMENTAL STUDY WITH EXPOSURES DURING DAYS 6-15 OF GESTATION.									
							IRIS		010913
CHRONIC RfC COMMENT: THE CHRONIC INHALATION RfC IS CONSIDERED NOT VERIFIABLE (02/22/90) BY THE RfD/RfC WORK GROUP.									
PHENYLENEDIAMINE, M-		**000108-45-2**							
NOEL 6 MG/KG/DAY		RAT							
	ORAL	90 DAYS	LIVER	LESIONS		6E-2 100		IRIS	010044
PHENYLENEDIAMINE, O-		**000095-54-5**							
GENERAL COMMENT: DATA INADEQUATE FOR QUANTITATIVE RISK ASSESSMENT. ALSO SEE HEAST TABLE 3: CARCINOGENICITY.									010042
PHENYLENEDIAMINE, P-		**000106-50-3**							
NOAEL 18.7 MG/KG/DAY		RAT							
	ORAL: DIET	2 YEARS	WHOLE BODY	EFFECTS				1.9E-1 100	010043

CHEMICAL / LEVEL	DOSE / ROUTE	SPECIES / EXPERIMENT / LENGTH	TARGET	CRITICAL EFFECT	Subchronic [RfC] (mg/cu m) / UF	Subchronic [RfD] (mg/kg/day) / UF	Chronic [RfC] (mg/cu m) / UF	Chronic [RfD] (mg/kg/day) / UF	REFERENCE
PHENYLMERCURIC ACETATE	**000062-38-4**								
NOAEL	0.0084 MG/KG/DAY ORAL: DIET	RAT 2 YEARS	KIDNEY	DAMAGE		8E-5 100		IRIS	010277
SUBCHRONIC [RfD] COMMENT: THE CHRONIC ORAL RfD WAS ADOPTED AS THE SUBCHRONIC ORAL [RfD]. CALCULATED BY ANALOGY TO MERCURY BY CORRECTING FOR DIFFERENCES IN MOLECULAR WEIGHT.									
CHRONIC [RfD] COMMENT: CALCULATED BY ANALOGY TO MERCURY BY CORRECTING FOR DIFFERENCES IN MOLECULAR WEIGHT.									
PHORATE	**000298-02-2**								
NOAEL	0.033 MG/KG/DAY ORAL: DIET	RAT 13 WEEKS	CHOLINESTERASE	INHIBITION		2E-4 200		2E-4 200	010403
SUBCHRONIC [RfD] COMMENT: THE CHRONIC ORAL [RfD] WAS ADOPTED AS THE SUBCHRONIC ORAL [RfD].									
PHOSGENE	**000075-44-5**						IRIS		010045
CHRONIC RfC COMMENT: THE CHRONIC INHALATION RfC IS CONSIDERED NOT VERIFIABLE (10/01/90) BY THE RfD/RfC WORK GROUP.									
PHOSPHINE	**007803-51-2**								
NOEL	0.026 MG/KG/DAY ORAL: DIET	RAT 2 YEARS				3E-4 100		IRIS	010174
SUBCHRONIC [RfD] COMMENT: THE CHRONIC ORAL RfD WAS ADOPTED AS THE SUBCHRONIC ORAL [RfD].									
NOAEL	1.4 MG/CU M INHALATION: INTERMITTENT	MOUSE 13 WEEKS	WHOLE BODY	DECREASED WEIGHT	3E-3 100		IRIS		010976

CHEMICAL / LEVEL	DOSE / ROUTE	SPECIES / EXPERIMENT / LENGTH	TARGET	CRITICAL EFFECT	Subchronic [RfC] (mg/cu m) UF	Subchronic [RfD] (mg/kg/day) UF	Chronic [RfC] (mg/cu m) UF	Chronic [RfD] (mg/kg/day) UF	REFERENCE
PHOSPHORUS, WHITE		**007723-14-0**						IRIS	010452
GENERAL COMMENT: FORMERLY LISTED AS PHOSPHORUS (INORGANIC COMPOUNDS).									
PHOTOCHEMICAL OXIDANTS									
GENERAL COMMENT: DATA INADEQUATE FOR QUANTITATIVE RISK ASSESSMENT.									010172
PHTHALIC ACID, M-		**000121-91-5**							
GENERAL COMMENT: DATA INADEQUATE FOR QUANTITATIVE RISK ASSESSMENT									010047
PHTHALIC ACID, O-		**000088-99-3**							
GENERAL COMMENT: DATA INADEQUATE FOR QUANTITATIVE RISK ASSESSMENT									010046
PHTHALIC ACID, P-		**000100-21-0**							
NOEL	142 MG/KG/DAY	RAT							
	ORAL: DIET	2 YEARS	BLADDER	HYPERPLASIA		1E+0 100		1E+0 100	010048
PHTHALIC ANHYDRIDE		**000085-44-9**							
LOAEL	1562 MG/KG/DAY	MOUSE							
	ORAL: DIET	104 WEEKS	LUNG	HISTOPATHOLOGY		2E+0		IRIS	010049
			KIDNEY	HISTOPATHOLOGY		1000			
SUBCHRONIC [RfD] COMMENT: THE CHRONIC ORAL RfD WAS ADOPTED AS THE SUBCHRONIC ORAL [RfD].									
LOAEL	0.1 MG/CU M	HUMAN							
	INHALATION:	12 YEARS	NOSE	RHINITIS	1.2E-1		1.2E-1		010847
	INTERMITTENT		LUNGS	BRONCHITIS	300		300		
SUBCHRONIC [RfC] COMMENT: THE CHRONIC INHALATION [RfC] WAS ADOPTED AS THE SUBCHRONIC INHALATION [RfC].									

CHEMICAL / LEVEL	DOSE / ROUTE	SPECIES / EXPERIMENT LENGTH	TARGET	CRITICAL EFFECT	Subchronic [RfC] (mg/cu m) UF	Subchronic [RfD] (mg/kg/day) UF	Chronic [RfC] (mg/cu m) UF	Chronic [RfD] (mg/kg/day) UF	REFERENCE
POLYBROMINATED BIPHENYLS									
LOAEL 0.07 MG/KG/DAY		RAT							
	ORAL: GAVAGE	25 WEEKS	LIVER	INCREASED WEIGHT		7E-5		7E-6	010050
			LIVER	LESIONS		1000		10000	
GENERAL COMMENT: ALSO SEE HEAST TABLE 3: CARCINOGENICITY.									
POTASSIUM CYANIDE		**000151-50-8**							
NOAEL 27 MG/KG/DAY		RAT							
	ORAL: DIET	2 YEARS	WHOLE BODY	DECREASED WEIGHT		5E-2		IRIS	010278
			THYROID	EFFECTS		500			
			NERVE	MYELIN DEGENERATION					
SUBCHRONIC [RfD] COMMENT: CALCULATED BY ANALOGY TO FREE CYANIDE BY CORRECTING FOR DIFFERENCES IN MOLECULAR WEIGHT. THE ORAL CHRONIC RfD WAS ADOPTED AS THE SUBCHRONIC ORAL [RfD].									
CHRONIC [RfD] COMMENT: CALCULATED BY ANALOGY TO FREE CYANIDE BY CORRECTING FOR DIFFERENCES IN MOLECULAR WEIGHT.									
POTASSIUM SILVER CYANIDE		**000506-61-6**							
NOAEL 82.7 MG/KG/DAY		RAT							
	ORAL: DIET	2 YEARS	WHOLE BODY	DECREASED WEIGHT		2E-1		IRIS	010279
			THYROID	EFFECTS		500			
			NERVE	MYELIN DEGENERATION					
SUBCHRONIC [RfD] COMMENT: CALCULATED BY ANALOGY TO FREE CYANIDE BY CORRECTING FOR DIFFERENCES IN MOLECULAR WEIGHT. THE ORAL CHRONIC RfD WAS ADOPTED AS THE SUBCHRONIC ORAL [RfD].									
CHRONIC [RfD] COMMENT: CALCULATED BY ANALOGY TO FREE CYANIDE BY CORRECTING FOR DIFFERENCES IN MOLECULAR WEIGHT.									
PROFLURALIN		**026399-36-0**							
NOEL 3 MG/KG/DAY		RAT							
	ORAL: DIET	SUBCHRONIC		NONE OBSERVED		6E-3		6E-3	010051
						500		500	

CHEMICAL / LEVEL	DOSE / ROUTE	SPECIES / EXPERIMENT / LENGTH	TARGET	CRITICAL EFFECT	Subchronic [RfC] (mg/cu m) UF	Subchronic [RfD] (mg/kg/day) UF	Chronic [RfC] (mg/cu m) UF	Chronic [RfD] (mg/kg/day) UF	REFERENCE
PRONAMIDE		**023950-58-5**							
NOEL	7.5 MG/KG/DAY	DOG							
	ORAL: DIET	2 YEARS		NONE OBSERVED		7.5E-2 100		IRIS	010280
	SUBCHRONIC [RfD] COMMENT: THE CHRONIC ORAL RfD WAS ADOPTED AS THE SUBCHRONIC ORAL [RfD].								
PROPACHLOR		**001918-16-7**							
NOEL	13.3 MG/KG/DAY	RAT							
	ORAL: DIET	90 DAYS	WHOLE BODY	DECREASED WEIGHT GAIN		1.3E-1 100		IRIS	010175
PROPAZINE		**000139-40-2**							
NOEL	5 MG/KG/DAY	RAT							
	ORAL: DIET	2 YEARS	WHOLE BODY	DECREASED WEIGHT GAIN		2E-2 300		IRIS	010052
	SUBCHRONIC [RfD] COMMENT: THE CHRONIC ORAL RfD WAS ADOPTED AS THE SUBCHRONIC ORAL [RfD].								
PROPIONITRILE		**000107-12-0**							
	GENERAL COMMENT: DATA INADEQUATE FOR QUANTITATIVE RISK ASSESSMENT								010053
PROPYL ALCOHOL, N-		**000071-23-8**							
	GENERAL COMMENT: DATA INADEQUATE FOR QUANTITATIVE RISK ASSESSMENT								005627

HEAST TABLE 1: SUBCHRONIC AND CHRONIC TOXICITY (OTHER THAN CARCINOGENICITY)

July 1997

CHEMICAL LEVEL	DOSE ROUTE	SPECIES EXPERIMENT LENGTH	TARGET	CRITICAL EFFECT	Subchronic [RfC] (mg/cu m) UF	Subchronic [RfD] (mg/kg/day) UF	Chronic [RfC] (mg/cu m) UF	Chronic [RfD] (mg/kg/day) UF	REFERENCE
PROPYLENE GLYCOL		**000057-55-6**							
NOEL	50000 PPM ORAL: DIET	DOG 2 YEARS	ERYTHROCYTES BLOOD BLOOD	DECREASED COUNT DECREASED HEMATOCRIT DECREASED HEMOGLOBIN				2E+1 100	005631
NOEL	6 % ORAL: DIET	RAT 20 WEEKS	KIDNEY	LESIONS		3E+1 100			005629
							IRIS		010914
CHRONIC RfC COMMENT: THE CHRONIC INHALATION RfC IS CONSIDERED NOT VERIFIABLE (04/25/91) BY THE RfD/RfC WORK GROUP.									
PROPYLENE GLYCOL MONOETHYL ETHER		**001569-02-4**							
NOEL	680 MG/KG/DAY ORAL: DRINKING WATER	RAT 30 DAYS	WHOLE BODY	DECREASED WEIGHT GAIN		7E+0 100		7E-1 1000	005488
							IRIS		010915
CHRONIC RfC COMMENT: THE CHRONIC INHALATION RfC IS CONSIDERED NOT VERIFIABLE (04/25/91) BY THE RfD/RfC WORK GROUP.									
PROPYLENE GLYCOL MONOMETHYL ETHER		**000107-98-2**							
NOEL	947 MG/KG/DAY ORAL: GAVAGE	RAT 35 DAYS	LIVER KIDNEY	HISTOPATHOLOGY HISTOPATHOLOGY		7E+0 100		7E-1 1000	005486
NOAEL	1000 PPM INHALATION: INTERMITTENT	RAT, RABBIT 13 WEEKS	CENTRAL NERVOUS SYSTEM	EFFECTS	2E+1 30		IRIS		010276

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IRIS, EPA'S INTEGRATED RISK INFORMATION SYSTEM, IS UPDATED MONTHLY. FURTHER INFORMATION: RISK INFORMATION HOTLINE: (513) 569-7254.

~~1-84~~

CHEMICAL / LEVEL	DOSE / ROUTE	SPECIES / EXPERIMENT / LENGTH	TARGET	CRITICAL EFFECT	Subchronic [RfC] (mg/cu m) UF	Subchronic [RfD] (mg/kg/day) UF	Chronic [RfC] (mg/cu m) UF	Chronic [RfD] (mg/kg/day) UF	REFERENCE
PROPYLENE OXIDE		**000075-56-9**							
LOAEL 71 MG/CU M		RAT							
	INHALATION:	2 YEARS	EPITHELIUM	UNSPECIFIED	3E-2		IRIS		010375
	INTERMITTENT				100				
SUBCHRONIC [RfC] COMMENT: THE CHRONIC INHALATION RfC WAS ADOPTED AS THE SUBCHRONIC INHALATION [RFC].									
GENERAL COMMENT: ALSO SEE HEAST TABLE 3: CARCINOGENICITY.									
PYRENE		**000129-00-0**							
NOAEL 75 MG/KG/DAY		MOUSE							
	ORAL: GAVAGE	13 WKS	KIDNEY	EFFECTS		3E-1		IRIS	010176
						300			
CHRONIC [RfC] COMMENT: THE CHRONIC INHALATION [RfC] IS CONSIDERED NOT VERIFIABLE (08/04/94) BY THE RfD/RfC WORK GROUP.									010968
PYRIDINE		**000110-86-1**							
NOAEL 1 MG/KG/DAY		RAT							
	ORAL: GAVAGE	90 DAYS	LIVER	INCREASED WEIGHT		1E-2		IRIS	010055
			LIVER	INCREASED RELATIVE WEIGHT		100			
RDX / (CYCLONITE)		**000121-82-4**							
NOEL 0.3 MG/KG/DAY		RAT							
	ORAL	105 WEEKS	PROSTATE	INFLAMMATION		3E-3		IRIS	010056
			PROSTATE	HEMOSIDEROSIS		100			
SUBCHRONIC [RfD] COMMENT: THE CHRONIC ORAL RfD WAS ADOPTED AS THE SUBCHRONIC ORAL [RfD].									
GENERAL COMMENT: ALSO SEE HEAST TABLE 3: CARCINOGENICITY.									
RONNEL		**000299-84-3**							
NOAEL 5 MG/KG/DAY		RAT							
	ORAL: DIET	2 YEARS	LIVER	EFFECTS		5E-2		5E-2	010057
						100		100	

HEAST TABLE 1: SUBCHRONIC AND CHRONIC TOXICITY (OTHER THAN CARCINOGENICITY)

July 1997

CHEMICAL / LEVEL	DOSE / ROUTE	SPECIES / EXPERIMENT LENGTH	TARGET	CRITICAL EFFECT	Subchronic [RfC] (mg/cu m) / UF	Subchronic [RfD] (mg/kg/day) / UF	Chronic [RfC] (mg/cu m) / UF	Chronic [RfD] (mg/kg/day) / UF	REFERENCE
SELENIOUS ACID		**007783-00-8**							
NOAEL 0.046 MG/KG/DAY	HUMAN								
ORAL: DIET		WHOLE BODY	SELENOSIS, CLINICAL			5E-3 3		IRIS	010504
SUBCHRONIC [RfD] COMMENT: THE CHRONIC ORAL RfD WAS ADOPTED AS THE SUBCHRONIC ORAL [RfD].									
SELENIUM		**007782-49-2**							
NOAEL 0.853 MG/DAY	HUMAN								
ORAL: DIET		WHOLE BODY	SELENOSIS, CLINICAL			5E-3 3		IRIS	010404
SUBCHRONIC [RfD] COMMENT: THE CHRONIC ORAL RfD WAS ADOPTED AS THE SUBCHRONIC ORAL [RfD].									
SELENOUREA		**000630-10-4**							
NOAEL 0.072 MG/KG/DAY	HUMAN								
ORAL: DIET		WHOLE BODY	SELENOSIS			5E-3 15		5E-3 15	010473
CHRONIC [RfD] COMMENT: WITHDRAWN FROM IRIS (05/01/91). UNDER REVIEW. CURRENT NUMBER SUBJECT TO CHANGE.									
SILVER		**007440-22-4**							
LOAEL 0.014 MG/KG/DAY	HUMAN								
IV	2-9 YEARS	SKIN	ARGYRIA			5E-3 3		IRIS	010453
SUBCHRONIC [RfD] COMMENT: THE CHRONIC ORAL RfD WAS ADOPTED AS THE SUBCHRONIC ORAL [RfD]. CHRONIC [RfD] COMMENT: BASED ON A TOTAL IV DOSE OF 1 GRAM.									

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CHEMICAL LEVEL	DOSE ROUTE	SPECIES EXPERIMENT LENGTH	TARGET	CRITICAL EFFECT	Subchronic [RfC] (mg/cu m) UF	Subchronic [RfD] (mg/kg/day) UF	Chronic [RfC] (mg/cu m) UF	Chronic [RfD] (mg/kg/day) UF	REFERENCE
SILVER CYANIDE		**000506-64-9**							
NOAEL 55.7 MG/KG/DAY		RAT							
	ORAL: DIET	2 YEARS	WHOLE BODY	DECREASED WEIGHT		1E-1		IRIS	010283
			THYROID	EFFECTS		500			
			NERVE	MYELIN DEGENERATION					
SUBCHRONIC [RfD] COMMENT: CALCULATED BY ANALOGY TO FREE CYANIDE BY CORRECTING FOR DIFFERENCES IN MOLECULAR WEIGHT. THE ORAL CHRONIC RfD WAS ADOPTED AS THE SUBCHRONIC ORAL [RfD].									
CHRONIC [RfD] COMMENT: CALCULATED BY ANALOGY TO FREE CYANIDE BY CORRECTING FOR DIFFERENCES IN MOLECULAR WEIGHT.									
SIMAZINE		**000122-34-9**							
NOAEL 0.52 MG/(KG-DAY)		RAT							
	ORAL: DIET	2 YEARS	WHOLE BODY	DECREASED WEIGHT GAIN		5E-3		IRIS	010955
			BLOOD	HEMATOLOGICAL EFFECTS		100			
SUBCHRONIC [RfD] COMMENT: THE ORAL CHRONIC RfD WAS ADOPTED AS THE SUBCHRONIC ORAL [RfD].									
GENERAL COMMENT: ALSO SEE HEAST TABLE 3: CARCINOGENICITY									
SODIUM CYANIDE		**000143-33-9**							
NOAEL 20.4 MG/KG/DAY		RAT							
	ORAL: DIET		CENTRAL NERVOUS SYSTEM	EFFECTS		4E-2 500		IRIS	005640
SUBCHRONIC [RfD] COMMENT: CALCULATED BY ANALOGY TO FREE CYANIDE BY CORRECTING FOR DIFFERENCES IN MOLECULAR WEIGHT. THE ORAL CHRONIC RfD WAS ADOPTED AS THE SUBCHRONIC ORAL [RfD].									
CHRONIC [RfD] COMMENT: CALCULATED BY ANALOGY TO FREE CYANIDE BY CORRECTING FOR DIFFERENCES IN MOLECULAR WEIGHT.									
SODIUM DIETHYLDITHIOCARBAMATE		**000148-18-5**							
NOEL 30 MG/KG/DAY		RAT							
	ORAL	90 DAYS	EYE	CATARACTS		3E-1		IRIS	005644
			WHOLE BODY	DECREASED WEIGHT		100			
GENERAL COMMENT: ALSO SEE HEAST TABLE 3: CARCINOGENICITY.									

CHEMICAL / LEVEL	DOSE / ROUTE	SPECIES / EXPERIMENT LENGTH	TARGET	CRITICAL EFFECT	Subchronic [RfC] (mg/cu m) UF	Subchronic [RfD] (mg/kg/day) UF	Chronic [RfC] (mg/cu m) UF	Chronic [RfD] (mg/kg/day) UF	REFERENCE
SODIUM METAVANADATE		**013718-26-8**							
NOAEL 10 PPM	ORAL: DRINKING WATER	RAT 3 MONTHS	KIDNEY	IMPAIRED FUNCTION		1E-2 100		1E-3 1000	005735
STRONTIUM, STABLE		**007440-24-6**							
NOAEL 190 MG/KG/DAY	ORAL: DRINKING WATER	RAT, YOUNG 20 DAYS	BONE	RACHITIC CHANGES		6E-1 300		IRIS	010842
SUBCHRONIC [RfD] COMMENT: THE CHRONIC ORAL RfD WAS ADOPTED AS THE SUBCHRONIC ORAL [RfD].									
STRYCHNINE		**000057-24-9**							
LOAEL 2.5 MG/KG/DAY	ORAL: GAVAGE	RAT 28 DAYS	UNSPECIFIED UNSPECIFIED	TOXICITY HISTOPATHOLOGY		3E-3 1000		IRIS	010285
GENERAL COMMENT: THE LOAEL IS ALSO THE FEL.									
STYRENE		**000100-42-5**						IRIS	010059
NOAEL 22 PPM	INHALATION: OCCUPATIONAL	HUMAN	CENTRAL NERVOUS SYSTEM	EFFECTS	3E+0 10		IRIS		010511
CHRONIC [RfC] COMMENT: THE MEAN DURATION OF EXPOSURE FOR 50 WORKERS WAS 8.6 YEARS. AIR EXPOSURE CONCENTRATIONS WERE ESTIMATED FROM THE SUMMATION OF THE PRINCIPLE URINARY METABOLITES OF STYRENE, MANDELIC ACID AND PHENYLGLYOXYLIC ACID. SEE IRIS FOR MORE INFORMATION.									
GENERAL COMMENT: ALSO SEE HEAST TABLE 3: CARCINOGENICITY.									
SUCCINONITRILE		**000110-61-2**							
GENERAL COMMENT: DATA INADEQUATE FOR QUANTITATIVE RISK ASSESSMENT									005585

CHEMICAL / LEVEL	DOSE / ROUTE	SPECIES / EXPERIMENT / LENGTH	TARGET	CRITICAL EFFECT	Subchronic [RfC] (mg/cu m) UF	Subchronic [RfD] (mg/kg/day) UF	Chronic [RfC] (mg/cu m) UF	Chronic [RfD] (mg/kg/day) UF	REFERENCE
SULFUR DIOXIDE		**007446-09-5**							
CHRONIC [RfC] COMMENT: REFER TO APPENDIX A: TECHNICAL INFORMATION, SECTION V ON NATIONAL AMBIENT AIR QUALITY STANDARDS.									010505
SULFUR OXIDES									
CHRONIC [RfC] COMMENT: REFER TO APPENDIX A: TECHNICAL INFORMATION, SECTION V ON NATIONAL AMBIENT AIR QUALITY STANDARDS.									010035
SULFURIC ACID		**007664-93-9**							
NOAEL 0.066-0.098 MG/CU M	INHALATION	HUMAN	RESPIRATORY SYSTEM	RESPIRATORY EFFECTS					005647
CHRONIC [RfC] COMMENT: REPORTED EFFECTS OCCURRED AT PORTAL OF ENTRY. ESTIMATES OF MG/DAY REFERENCE DOSES ARE INAPPROPRIATE BECAUSE EFFECTS AT PORTAL OF ENTRY DEPEND ON CONCENTRATION IN AIR. AN ACCEPTABLE AIR CONCENTRATION OF 0.07 MG/CU M WAS ESTIMATED BY CARSON ET AL (1981) FROM AVAILABLE DATA.									
TEMEPHOS		**003383-96-8**							
NOAEL 200 PPM	ORAL: DIET	RAT 99 DAYS				2E-1 100		2E-2 1000	010060
TERBUFOS		**013071-79-9**							
NOAEL 0.0025 MG/KG/DAY	ORAL: DIET	DOG 6 MONTHS	CHOLINESTERASE	INHIBITION		2.5E-5 100		2.5E-5 100	010408
TEREPHTHALIC ACID		**000100-21-0**							
GENERAL COMMENT: DATA INADEQUATE FOR QUANTITATIVE RISK ASSESSMENT.									010474
TETRACHLOROAZOXYBENZENE		**021232-47-3**							
GENERAL COMMENT: DATA INADEQUATE FOR QUANTITATIVE RISK ASSESSMENT									010064

CHEMICAL / LEVEL	DOSE / ROUTE	SPECIES / EXPERIMENT LENGTH	TARGET	CRITICAL EFFECT	Subchronic [RfC] (mg/cu m) UF	Subchronic [RfD] (mg/kg/day) UF	Chronic [RfC] (mg/cu m) UF	Chronic [RfD] (mg/kg/day) UF	REFERENCE
TETRACHLOROBENZENE, 1,2,4,5- 000095-94-3									
NOAEL 0.34 MG/KG/DAY		RAT							
	ORAL: DIET	13 WEEKS	KIDNEY	LESIONS		3E-3 100		IRIS	010286
TETRACHLOROCYCLOPENTADIENE 000695-77-2									
GENERAL COMMENT: DATA INADEQUATE FOR QUANTITATIVE RISK ASSESSMENT									005303
TETRACHLOROETHANE, 1,1,1,2- 000630-20-6									
LOAEL 89.3 MG/KG/DAY		RAT							
	ORAL: GAVAGE	103 WEEKS	LIVER	LESIONS		3E-2		IRIS	010407
			KIDNEY	LESIONS		3000			
SUBCHRONIC [RfD] COMMENT: THE CHRONIC ORAL RfD WAS ADOPTED AS THE SUBCHRONIC ORAL [RfD].									
GENERAL COMMENT: ALSO SEE HEAST TABLE 3: CARCINOGENICITY.									
TETRACHLOROETHYLENE 000127-18-4									
NOAEL 14 MG/KG/DAY		MOUSE							
	ORAL	6 WEEKS	LIVER	HEPATOTOXICITY		1E-1 100		IRIS	005650
GENERAL COMMENT: ALSO SEE HEAST TABLE 3: CARCINOGENICITY.									
TETRACHLOROHYDRAZOBENZENE 071753-42-9									
GENERAL COMMENT: DATA INADEQUATE FOR QUANTITATIVE RISK ASSESSMENT									010065
TETRACHLOROPHENOL, 2,3,4,5- 004901-51-3									
GENERAL COMMENT: DATA INADEQUATE FOR QUANTITATIVE RISK ASSESSMENT									005324

CHEMICAL / LEVEL	DOSE / ROUTE	SPECIES / EXPERIMENT / LENGTH	TARGET	CRITICAL EFFECT	Subchronic [RfC] (mg/cu m) UF	Subchronic [RfD] (mg/kg/day) UF	Chronic [RfC] (mg/cu m) UF	Chronic [RfD] (mg/kg/day) UF	REFERENCE
TETRACHLOROPHENOL, 2,3,4,6- 000058-90-2									
NOAEL 25 MG/KG/DAY		RAT							
	ORAL: GAVAGE	90 DAYS	LIVER	INCREASED WEIGHT		3E-1		IRIS	005323
			LIVER	CENTRILOBULAR HYPERTROPHY		100			
TETRACHLOROPHENOL, 2,3,5,6- 000935-95-5									
GENERAL COMMENT: DATA INADEQUATE FOR QUANTITATIVE RISK ASSESSMENT									005325
TETRACHLOROPROPENE, 1,1,2,3- 010436-39-2									
GENERAL COMMENT: DATA INADEQUATE FOR QUANTITATIVE RISK ASSESSMENT									010066
TETRACHLOROVINPHOS / (STIROPHOS) 000961-11-5									
NOEL 3.1 MG/KG/DAY		DOG							
	ORAL: DIET	2 YEARS	LIVER	INCREASED WEIGHT		3E-2		IRIS	010067
			KIDNEY	INCREASED WEIGHT		100			
			WHOLE BODY						
SUBCHRONIC [RfD] COMMENT: THE CHRONIC ORAL RfD WAS ADOPTED AS THE SUBCHRONIC ORAL [RfD].									
GENERAL COMMENT: ALSO SEE HEAST TABLE 3: CARCINOGENICITY.									
TETRAETHYL DITHIOPYROPHOSPHATE 003689-24-5									
NOEL 0.5 MG/KG/DAY		RAT							
	ORAL: DIET	3 MONTHS	ERYTHROCYTES	DECREASED CHOLINESTERASE ACTIVITY		5E-3		IRIS	010287
						100			
			BLOOD	DECREASED CHOLINESTERASE ACTIVITY					
THALLIC OXIDE 001314-32-5									
CHRONIC [RfD] COMMENT: THE CHRONIC ORAL [RfD] IS CONSIDERED NOT VERIFIABLE (07/22/93) BY THE RfD/RfC WORK GROUP.									010956

CHEMICAL LEVEL	DOSE ROUTE	SPECIES EXPERIMENT LENGTH	TARGET	CRITICAL EFFECT	Subchronic [RfC] (mg/cu m) UF	Subchronic [RfD] (mg/kg/day) UF	Chronic [RfC] (mg/cu m) UF	Chronic [RfD] (mg/kg/day) UF	REFERENCE
THALLIUM (I) ACETATE		**000563-68-8**							
NOAEL 0.26 MG/KG/DAY		RAT							
	ORAL	90 DAYS	LIVER	INCREASED SGOT		9E-4		IRIS	005664
			BLOOD	INCREASED SERUM LDH		300			
			HAIR	ALOPECIA					
SUBCHRONIC [RfD] COMMENT: CALCULATED BY ANALOGY TO THALLIUM (I) SULFATE BY CORRECTING FOR MOLECULAR WEIGHT DIFFERENCES.									
CHRONIC [RfD] COMMENT: CALCULATED BY ANALOGY TO THALLIUM (I) SULFATE BY CORRECTING FOR MOLECULAR WEIGHT DIFFERENCES.									
THALLIUM (I) CARBONATE		**006533-73-9**							
NOAEL 0.23 MG/KG/DAY		RAT							
	ORAL	90 DAYS	LIVER	INCREASED SGOT		8E-4		IRIS	005668
			BLOOD	INCREASED SERUM LDH		300			
			HAIR	ALOPECIA					
SUBCHRONIC [RfD] COMMENT: CALCULATED BY ANALOGY TO THALLIUM (I) SULFATE BY CORRECTING FOR MOLECULAR WEIGHT DIFFERENCES.									
CHRONIC [RfD] COMMENT: CALCULATED BY ANALOGY TO THALLIUM (I) SULFATE BY CORRECTING FOR MOLECULAR WEIGHT DIFFERENCES.									
THALLIUM (I) CHLORIDE		**007791-12-0**							
NOAEL 0.23 MG/KG/DAY		RAT							
	ORAL	90 DAYS	LIVER	INCREASED SGOT		8E-4		IRIS	005672
			BLOOD	INCREASED SERUM LDH		300			
			HAIR	ALOPECIA					
SUBCHRONIC [RfD] COMMENT: CALCULATED BY ANALOGY TO THALLIUM (I) SULFATE BY CORRECTING FOR MOLECULAR WEIGHT DIFFERENCES.									
CHRONIC [RfD] COMMENT: CALCULATED BY ANALOGY TO THALLIUM (I) SULFATE BY CORRECTING FOR MOLECULAR WEIGHT DIFFERENCES.									
THALLIUM, INSOLUBLE SALTS									
CHRONIC [RfD] COMMENT: REFER TO IRIS FOR OTHER THALLIUM SALTS.									010458

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CHEMICAL LEVEL	DOSE ROUTE	SPECIES EXPERIMENT LENGTH	TARGET	CRITICAL EFFECT	Subchronic [RfC] (mg/cu m) UF	Subchronic [RfD] (mg/kg/day) UF	Chronic [RfC] (mg/cu m) UF	Chronic [RfD] (mg/kg/day) UF	REFERENCE
THALLIUM (I) NITRATE		**010102-45-1**							
NOAEL 0.26 MG/KG/DAY		RAT							
	ORAL	90 DAYS	LIVER	INCREASED SGOT		9E-4		IRIS	005676
			BLOOD	INCREASED SERUM LDH		300			
			HAIR	ALOPECIA					
SUBCHRONIC [RfD] COMMENT: CALCULATED BY ANALOGY TO THALLIUM (I) SULFATE BY CORRECTING FOR MOLECULAR WEIGHT DIFFERENCES.									
CHRONIC [RfD] COMMENT: CALCULATED BY ANALOGY TO THALLIUM (I) SULFATE BY CORRECTING FOR MOLECULAR WEIGHT DIFFERENCES.									
THALLIUM SELENITE		**012039-52-0**							010957
CHRONIC [RfD] COMMENT: THE CHRONIC ORAL RfD WAS WITHDRAWN FROM IRIS (08/01/93). THE CHRONIC ORAL [RfD] IS CONSIDERED NOT VERIFIABLE (07/22/93) BY THE RfD/RfC WORK GROUP.									
THALLIUM (I) SULFATE		**007446-18-6**							
NOAEL 0.25 MG/KG/DAY		RAT							
	ORAL	90 DAYS	LIVER	INCREASED SGOT		8E-4		IRIS	005682
			BLOOD	INCREASED SERUM LDH		300			
			HAIR	ALOPECIA					
THIOCYANOMETHYLTHIO)BENZOTHIAZOLE, 2-(		**021564-17-0**							
NOEL 25 MG/KG/DAY		RAT							
	ORAL: DIET	SUBCHRONIC	STOMACH	LESIONS		3E-1		3E-2	010068
						100		1000	
SUBCHRONIC [RfD] COMMENT: BASED ON CONFIDENTIAL BUSINESS INFORMATION DATA									
CHRONIC [RfD] COMMENT: BASED ON CONFIDENTIAL BUSINESS INFORMATION DATA									

CHEMICAL / LEVEL	DOSE / ROUTE	SPECIES / EXPERIMENT LENGTH	TARGET	CRITICAL EFFECT	Subchronic [RfC] (mg/cu m) / UF	Subchronic [RfD] (mg/kg/day) / UF	Chronic [RfC] (mg/cu m) / UF	Chronic [RfD] (mg/kg/day) / UF	REFERENCE
THIOFANOX		**013196-18-4**							
NOAEL 0.025 MG/KG/DAY	ORAL	DOG 8 DAYS	CHOLINESTERASE	DECREASED CHOLINESTERASE ACTIVITY		3E-4 100		3E-4 100	010069
SUBCHRONIC [RfD] COMMENT: BASED ON CONFIDENTIAL BUSINESS INFORMATION DATA.									
CHRONIC [RfD] COMMENT: BASED ON CONFIDENTIAL BUSINESS INFORMATION DATA.									
THIRAM		**000137-26-8**						IRIS	010459
NOAEL 0.61 MG/KG/DAY	ORAL	FERRET 24 WEEKS	REPRODUCTION	IMPAIRED		6E-3 100			010070
TIN AND COMPOUNDS									
NOAEL 2000 PPM	ORAL: DIET	RAT 2 YEARS	LIVER	LESIONS		6E-1 100		6E-1 100	005688
			KIDNEY	LESIONS					
SUBCHRONIC [RfD] COMMENT: CALCULATED BY ANALOGY TO STANNOUS CHLORIDE BY CORRECTING FOR DIFFERENCES IN MOLECULAR WEIGHT.									
CHRONIC [RfD] COMMENT: CALCULATED BY ANALOGY TO STANNOUS CHLORIDE BY CORRECTING FOR DIFFERENCES IN MOLECULAR WEIGHT.									
TOLUENE		**000108-88-3**							
NOAEL 223 MG/KG/DAY	ORAL: GAVAGE	RAT 13 WEEKS	LIVER	ALTERED WEIGHT		2E+0 100		IRIS	010469
			KIDNEY	ALTERED WEIGHT					
							IRIS		010844
SUBCHRONIC [RfC] COMMENT: CONTACT THE SUPERFUND HEALTH RISK TECHNICAL SUPPORT CENTER: (513) 569-7300.									

HEAST TABLE 1: SUBCHRONIC AND CHRONIC TOXICITY (OTHER THAN CARCINOGENICITY)

July 1997

CHEMICAL / LEVEL	DOSE / ROUTE	SPECIES / EXPERIMENT / LENGTH	TARGET	CRITICAL EFFECT	Subchronic [RfC] (mg/cu m) UF	Subchronic [RfD] (mg/kg/day) UF	Chronic [RfC] (mg/cu m) UF	Chronic [RfD] (mg/kg/day) UF	REFERENCE
TOLUENE-2,5-DIAMINE		**000095-70-5**							
NOAEL 56 MG/KG/DAY		RAT							
	ORAL: DIET	78 WEEKS				6E-1 100		6E-1 100	010073
SUBCHRONIC [RfD] COMMENT: DETERMINED FROM DATA OBTAINED WITH THE SULFATE SALT.									
CHRONIC [RfD] COMMENT: DETERMINED FROM DATA OBTAINED WITH THE SULFATE SALT.									
TOLUENE-2,6-DIAMINE		**000823-40-5**							
NOAEL 16 MG/KG/DAY		RAT							
	ORAL: DIET	2 YEARS				2E-1 100		2E-1 100	010074
SUBCHRONIC [RfD] COMMENT: DETERMINED FROM DATA OBTAINED WITH THE DIHYDROCHLORIDE.									
CHRONIC [RfD] COMMENT: DETERMINED FROM DATA OBTAINED WITH THE DIHYDROCHLORIDE.									
TOLUENEDIAMINE, 2,3-		**002687-25-4**							
GENERAL COMMENT: DATA INADEQUATE FOR QUANTITATIVE RISK ASSESSMENT									010071
TOLUENEDIAMINE, 3,4-		**000496-72-0**							
GENERAL COMMENT: DATA INADEQUATE FOR QUANTITATIVE RISK ASSESSMENT									010072
TOLUIDINE, M-		**000108-44-1**							
GENERAL COMMENT: DATA INADEQUATE FOR QUANTITATIVE RISK ASSESSMENT									010075
TRIALLATE		**002303-17-5**							
NOAEL 1.275 MG/KG/DAY		DOG							
	ORAL: DIET	24 MONTHS	SPLEEN LIVER	EFFECTS EFFECTS		1.3E-2 100		IRIS	010076
SUBCHRONIC [RfD] COMMENT: THE CHRONIC ORAL RfD WAS ADOPTED AS THE SUBCHRONIC ORAL [RfD].									

HEAST TABLE 1: SUBCHRONIC AND CHRONIC TOXICITY (OTHER THAN CARCINOGENICITY)

July 1997

CHEMICAL / LEVEL	DOSE / ROUTE	SPECIES / EXPERIMENT LENGTH	TARGET	CRITICAL EFFECT	Subchronic [RfC] (mg/cu m) / UF	Subchronic [RfD] (mg/kg/day) / UF	Chronic [RfC] (mg/cu m) / UF	Chronic [RfD] (mg/kg/day) / UF	REFERENCE
TRIBROMOBENZENE, 1,2,4- **000615-54-3**									
NOAEL 5 MG/KG/DAY	ORAL: DIET	RAT 45 OR 90 DAYS	LIVER LIVER	ALTERED WEIGHT ENZYME INDUCTION		5E-2 100		IRIS	010077
TRICHLORO-1,2,2-TRIFLUOROETHANE, 1,1,2- **000076-13-1**								IRIS	010460
NOEL 2000 PPM	INHALATION: INTERMITTENT	RAT 24 MONTHS	WHOLE BODY	DECREASED WEIGHT	3E+1 100	3E+0 100	3E+1 100		010376
SUBCHRONIC [RfD] COMMENT: BASED ON ROUTE TO ROUTE EXTRAPOLATION USING AN ABSORPTION FACTOR OF 0.2.									
TRICHLORO-2'-HYDROXYDIPHENYLETHER, 2,2,4'- **003380-34-5**									
NOEL 500 MG/KG/DAY	ORAL	RAT 4 WEEKS	WHOLE BODY	DECREASED WEIGHT		4E+0 100			005492
TRICHLOROBENZENE, 1,2,4- **000120-82-1**									
NOAEL 100 PPM	ORAL: DRINKING WATER	RAT	ADRENAL	INCREASED WEIGHT		1E-2 1000		IRIS	010506
SUBCHRONIC [RfD] COMMENT: BASED ON A MULTIGENERATION REPRODUCTION STUDY.									
NOAEL 104 PPM	INHALATION	RAT, RABBIT, DOG, MONKEY 6 AND 26 WEEKS	LIVER	NON-ADVERSE WEIGHT CHANGES	2E+0 100		2E-1 1000		010958
TRICHLOROCYCLOPENTADIENE **077323-84-3**									
GENERAL COMMENT: DATA INADEQUATE FOR QUANTITATIVE RISK ASSESSMENT									005304

IRIS, EPA'S INTEGRATED RISK INFORMATION SYSTEM, IS UPDATED MONTHLY. FURTHER INFORMATION: RISK INFORMATION HOTLINE: (513) 569-7254.

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HEAST TABLE 1: SUBCHRONIC AND CHRONIC TOXICITY (OTHER THAN CARCINOGENICITY)

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CHEMICAL LEVEL / DOSE ROUTE	SPECIES EXPERIMENT LENGTH	TARGET	CRITICAL EFFECT	Subchronic [RfC] (mg/cu m) UF	Subchronic [RfD] (mg/kg/day) UF	Chronic [RfC] (mg/cu m) UF	Chronic [RfD] (mg/kg/day) UF	REFERENCE
TRICHLOROETHANE, 1,1,1- **000071-55-6**								
SUBCHRONIC [RfD] COMMENT: CONTACT THE SUPERFUND HEALTH RISK TECHNICAL SUPPORT CENTER: (513) 569-7300.								
TRICHLOROETHANE, 1,1,2- **000079-00-5**								
NOAEL 3.9 MG/KG/DAY ORAL: DRINKING WATER	MOUSE 90 DAYS	BLOOD	CLINICAL CHEMISTRY ALTERATIONS		4E-2 100		IRIS	005702
GENERAL COMMENT: ALSO SEE HEAST TABLE 3: CARCINOGENICITY.								
TRICHLOROFLUOROMETHANE **000075-69-4**							IRIS	005502
LOAEL 1000 MG/KG/DAY ORAL	RAT 6 WEEKS	WHOLE BODY	INCREASED MORTALITY		7E-1 1000			005500
SUBCHRONIC [RfC] COMMENT: ALSO SEE HEAST TABLE 2: ALTERNATE METHODS - SUBCHRONIC AND CHRONIC TOXICITY (OTHER THAN CARCINOGENICITY) CHRONIC [RfC] COMMENT: ALSO SEE HEAST TABLE 2: ALTERNATE METHODS - SUBCHRONIC AND CHRONIC TOXICITY (OTHER THAN CARCINOGENICITY)								
TRICHLOROPHENOL, 2,3,4- **015950-66-0**								
GENERAL COMMENT: DATA INADEQUATE FOR QUANTITATIVE RISK ASSESSMENT								005330
TRICHLOROPHENOL, 2,3,5- **000933-78-8**								
GENERAL COMMENT: DATA INADEQUATE FOR QUANTITATIVE RISK ASSESSMENT								005331
TRICHLOROPHENOL, 2,3,6- **000933-75-5**								
GENERAL COMMENT: DATA INADEQUATE FOR QUANTITATIVE RISK ASSESSMENT								005332

CHEMICAL / LEVEL	DOSE / ROUTE	SPECIES / EXPERIMENT / LENGTH	TARGET	CRITICAL EFFECT	Subchronic [RfC] (mg/cu m) UF	Subchronic [RfD] (mg/kg/day) UF	Chronic [RfC] (mg/cu m) UF	Chronic [RfD] (mg/kg/day) UF	REFERENCE
TRICHLOROPHENOL, 2,4,5- 000095-95-4									
NOEL	1000 PPM	RAT				1E+0		IRIS	005329
	ORAL: DIET	98 DAYS	LIVER	HEPATOTOXICITY					
			KIDNEY	EFFECTS		100			
							IRIS		010919
CHRONIC RfC COMMENT: THE CHRONIC INHALATION RfC IS CONSIDERED NOT VERIFIABLE (04/24/91) BY THE RfD/RfC WORK GROUP.									
TRICHLOROPHENOL, 2,4,6- 000088-06-2							IRIS		010461
CHRONIC RfC COMMENT: THE CHRONIC INHALATION RfC IS CONSIDERED NOT VERIFIABLE (04/24/91) BY THE RfD/RfC WORK GROUP.									
GENERAL COMMENT: ALSO SEE HEAST TABLE 3: CARCINOGENICITY.									
TRICHLOROPHENOL, 3,4,5- 000609-19-8									005333
GENERAL COMMENT: DATA INADEQUATE FOR QUANTITATIVE RISK ASSESSMENT									
TRICHLOROPHENOXY) PROPIONIC ACID, 2(2,4,5- 000093-72-1									
NOEL	0.75 MG/KG/DAY	DOG				8E-3		IRIS	010284
	ORAL: DIET	2 YEARS	LIVER	HISTOPATHOLOGY		100			
SUBCHRONIC [RfD] COMMENT: THE CHRONIC ORAL RfD WAS ADOPTED AS THE SUBCHRONIC ORAL [RfD].									
TRICHLOROPHENOXYACETIC ACID, 2,4,5- 000093-76-5								IRIS	010178
NOEL	10 MG/KG/DAY	RAT				1E-1			010179
	ORAL: DIET	90 DAYS	KIDNEY	WEIGHT EFFECTS					
			LIVER	WEIGHT EFFECTS		100			
TRICHLOROPROPANE, 1,1,1- 007789-89-1									005705
GENERAL COMMENT: DATA INADEQUATE FOR QUANTITATIVE RISK ASSESSMENT									

HEAST TABLE 1: SUBCHRONIC AND CHRONIC TOXICITY (OTHER THAN CARCINOGENICITY)

July 1997

CHEMICAL LEVEL	DOSE ROUTE	SPECIES EXPERIMENT	LENGTH	TARGET	CRITICAL EFFECT	Subchronic [RfC] (mg/cu m) UF	Subchronic [RfD] (mg/kg/day) UF	Chronic [RfC] (mg/cu m) UF	Chronic [RfD] (mg/kg/day) UF	REFERENCE
TRICHLOROPROPANE, 1,1,2- 000598-77-6										
NOEL 100 MG/L		RAT								
	ORAL: DRINKING WATER	13 WEEKS		LIVER	HISTOPATHOLOGY		5E-2		IRIS	005708
				KIDNEY	HISTOPATHOLOGY		300			
				THYROID	HISTOPATHOLOGY					
TRICHLOROPROPANE, 1,2,2- 003175-23-3										
GENERAL COMMENT: DATA INADEQUATE FOR QUANTITATIVE RISK ASSESSMENT										005706
TRICHLOROPROPANE, 1,2,3- 000096-18-4										
NOAEL 8 MG/KG/DAY		RAT								
	ORAL	120 DAYS		WHOLE BODY	TOXICITY		6E-2		IRIS	005714
				LIVER	LESIONS		100			
				KIDNEY	LESIONS					
				ERYTHROCYTES	DECREASED COUNT					
				BLOOD	DECREASED HEMATOCRIT					
				BLOOD	DECREASED HEMOGLOBIN					
GENERAL COMMENT: ALSO SEE HEAST TABLE 3: CARCINOGENICITY.										
TRICHLOROPROPENE, 1,2,3- 000096-19-5										
NOEL 18 MG/CU M		DOG								
	INHALATION: INTERMITTENT	66 WEEKS		EYE	IRRITATION		5E-3 100		5E-3 100	010078

SUBCHRONIC [RfD] COMMENT: BASED ON ROUTE TO ROUTE EXTRAPOLATION USING AN ABSORPTION FACTOR OF 0.5.
CHRONIC [RfD] COMMENT: BASED ON ROUTE TO ROUTE EXTRAPOLATION USING AN ABSORPTION FACTOR OF 0.5.

CHEMICAL / LEVEL	DOSE / ROUTE	SPECIES / EXPERIMENT LENGTH	TARGET	CRITICAL EFFECT	Subchronic [RfC] (mg/cu m) UF	Subchronic [RfD] (mg/kg/day) UF	Chronic [RfC] (mg/cu m) UF	Chronic [RfD] (mg/kg/day) UF	REFERENCE
TRICHLOROTOLUENE, 2,3,6-		**002077-46-5**							
LOAEL 0.5 PPM		RAT							
	ORAL: DIET	28 DAYS	LIVER	LESIONS		5E-5			005335
			KIDNEY	LESIONS		1000			
			THYROID	LESIONS					
TRICHLOROTOLUENE, ALPHA,2,6-		**002014-83-7**							
LOAEL 0.5 PPM		RAT							
	ORAL: DIET	28 DAYS	LIVER	LESIONS		5E-5			005339
			KIDNEY	LESIONS		1000			
			THYROID	LESIONS					
TRIFLURALIN		**001582-09-8**							
NOEL 0.75 MG/KG/DAY		DOG							
	ORAL: DIET	12 MONTHS	LIVER	INCREASED WEIGHT		7.5E-3		IRIS	010080
			BLOOD	METHEMOGLOBINEMIA		100			
SUBCHRONIC [RfD] COMMENT: THE CHRONIC ORAL RfD WAS ADOPTED AS THE SUBCHRONIC ORAL [RfD].									
GENERAL COMMENT: ALSO SEE HEAST TABLE 3: CARCINOGENICITY.									
TRIMETHYLBENZENES									
GENERAL COMMENT: DATA INADEQUATE FOR QUANTITATIVE RISK ASSESSMENT									005727
TRINITROBENZENE, 1,3,5-		**000099-35-4**							
NOAEL 0.51 MG/KG/DAY		RAT							
	ORAL: WATER	16 WEEKS	SPLEEN	INCREASED WEIGHT		5E-4		IRIS	010081
						1000			
SUBCHRONIC [RfD] COMMENT: CALCULATED FROM DATA OBTAINED WITH 1,3-DINITROBENZENE.									
CHRONIC [RfD] COMMENT: CALCULATED FROM DATA OBTAINED WITH 1,3-DINITROBENZENE.									

CHEMICAL / LEVEL	DOSE / ROUTE	SPECIES / EXPERIMENT / LENGTH	TARGET	CRITICAL EFFECT	Subchronic [RfC] (mg/cu m) UF	Subchronic [RfD] (mg/kg/day) UF	Chronic [RfC] (mg/cu m) UF	Chronic [RfD] (mg/kg/day) UF	REFERENCE
TRINITROPHENOLS									
GENERAL COMMENT: DATA INADEQUATE FOR QUANTITATIVE RISK ASSESSMENT									010082
TRINITROPHENYLMETHYLNITRAMINE 000479-45-8									
LOAEL 125 MG/KG/DAY		RABBIT							
	ORAL: GAVAGE	9 MONTHS	LIVER	HISTOPATHOLOGICAL EFFECTS		1E-1		1E-2	010377
			KIDNEY	HISTOPATHOLOGICAL EFFECTS		1000		10000	
			SPLEEN	HISTOPATHOLOGICAL EFFECTS					
TRINITROTOLUENE, 2,4,6- 000118-96-7									
LOAEL 0.5 MG/KG/DAY		DOG							
	ORAL: GAVAGE		LIVER	EFFECTS		5E-4		IRIS	010416
						1000			
SUBCHRONIC [RfD] COMMENT: THE CHRONIC ORAL RfD WAS ADOPTED AS THE SUBCHRONIC ORAL [RfD].									
GENERAL COMMENT: . ALSO SEE HEAST TABLE 3: CARCINOGENICITY.									
VANADIUM 007440-62-2									
NOAEL 5 PPM		RAT							
	ORAL: DRINKING WATER	LIFETIME				7E-3		7E-3	005739
						100		100	
VANADIUM PENTOXIDE 001314-62-1									
NOAEL 17.85 PPM		RAT							
	ORAL: DIET	LIFETIME				9E-3		IRIS	005743
						100			
SUBCHRONIC [RfD] COMMENT: THE CHRONIC ORAL RfD WAS ADOPTED AS THE SUBCHRONIC ORAL [RfD].									

CHEMICAL / LEVEL	DOSE / ROUTE	SPECIES / EXPERIMENT LENGTH	TARGET	CRITICAL EFFECT	Subchronic [RfC] (mg/cu m) UF	Subchronic [RfD] (mg/kg/day) UF	Chronic [RfC] (mg/cu m) UF	Chronic [RfD] (mg/kg/day) UF	REFERENCE
VANADIUM SULFATE		**036907-42-3**							
NOAEL 2.24 MG/KG/DAY	ORAL: DRINKING WATER	RAT LIFETIME				2E-2 100		2E-2 100	005747
VERNAM / (VERNOLATE)		**001929-77-7**							
NOEL 1 MG/KG/DAY	ORAL: DIET	RAT	WHOLE BODY	DECREASED WEIGHT		1E-2 100		IRIS	010083
VINYL ACETATE		**000108-05-4**							
NOAEL 100 MG/KG/DAY	ORAL: WATER	RAT 2 YEARS	WHOLE BODY KIDNEY	ALTERED WEIGHT ALTERED WEIGHT		1E+0 100		1E+0 100	010417
NOAEL 176 MG/CU M	INHALATION: INTERMITTENT	MOUSE 104 WEEKS	NASAL CAVITY	LESIONS	2E-1 30		IRIS		010418

SUBCHRONIC [RfC] COMMENT: THE CHRONIC INHALATION RfC WAS ADOPTED AS THE SUBCHRONIC INHALATION [RfC].

VINYL CHLORIDE **000075-01-4**

SUBCHRONIC [RfC] COMMENT: CONTACT THE SUPERFUND HEALTH RISK TECHNICAL SUPPORT CENTER: (513) 569-7300.
SUBCHRONIC [RfD] COMMENT: CONTACT THE SUPERFUND HEALTH RISK TECHNICAL SUPPORT CENTER: (513) 569-7300.
GENERAL COMMENT: ALSO SEE HEAST TABLE 3: CARCINOGENICITY.

VINYL-1-CYCLOHEXENE, 4- **000100-40-3**

GENERAL COMMENT: DATA INADEQUATE FOR QUANTITATIVE RISK ASSESSMENT 010084

HEAST TABLE 1: SUBCHRONIC AND CHRONIC TOXICITY (OTHER THAN CARCINOGENICITY)

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CHEMICAL / LEVEL	DOSE / ROUTE	SPECIES / EXPERIMENT / LENGTH	TARGET	CRITICAL EFFECT	Subchronic [RfC] (mg/cu m) UF	Subchronic [RfD] (mg/kg/day) UF	Chronic [RfC] (mg/cu m) UF	Chronic [RfD] (mg/kg/day) UF	REFERENCE
WARFARIN		**000081-81-2**							
LOAEL	2 MG/DAY ORAL	HUMAN	BLOOD	INCREASED PROTHROMBIN TIME		3E-4 100		IRIS	010409
SUBCHRONIC [RfD] COMMENT: THE CHRONIC ORAL RfD WAS ADOPTED AS THE SUBCHRONIC ORAL [RfD].									
XYLENE, M-		**000108-38-3**							
NOAEL	250 MG/KG ORAL: GAVAGE	RAT 103 WEEKS	CENTRAL NERVOUS SYSTEM WHOLE BODY	HYPERACTIVITY DECREASED WEIGHT				2E+0 100	005755
SUBCHRONIC [RfD] COMMENT: CONTACT THE SUPERFUND HEALTH RISK TECHNICAL SUPPORT CENTER: (513) 569-7300.									
CHRONIC [RfC] COMMENT: THE CHRONIC INHALATION [RfC] IS CONSIDERED NOT VERIFIABLE (12/11/91) BY THE RfD/RfC WORK GROUP.									010920
XYLENE, MIXTURE		**001330-20-7**							
								IRIS	010872
SUBCHRONIC [RfD] COMMENT: CONTACT THE SUPERFUND HEALTH RISK TECHNICAL SUPPORT CENTER: (513) 569-7300.									
CHRONIC [RfC] COMMENT: THE CHRONIC INHALATION [RfC] IS CONSIDERED NOT VERIFIABLE (12/11/91) BY THE RfD/RfC WORK GROUP.									010921
XYLENE, O-		**000095-47-6**							
NOEL	250 MG/KG ORAL: GAVAGE	RAT 103 WEEKS	CENTRAL NERVOUS SYSTEM WHOLE BODY	HYPERACTIVITY DECREASED WEIGHT				2E+0 100	005751
SUBCHRONIC [RfD] COMMENT: CONTACT THE SUPERFUND HEALTH RISK TECHNICAL SUPPORT CENTER: (513) 569-7300.									
CHRONIC [RfC] COMMENT: THE CHRONIC INHALATION [RfC] IS CONSIDERED NOT VERIFIABLE (12/11/91) BY THE RfD/RfC WORK GROUP.									010922

CHEMICAL / LEVEL	DOSE / ROUTE	SPECIES / EXPERIMENT / LENGTH	TARGET	CRITICAL EFFECT	Subchronic [RfC] (mg/cu m) UF	Subchronic [RfD] (mg/kg/day) UF	Chronic [RfC] (mg/cu m) UF	Chronic [RfD] (mg/kg/day) UF	REFERENCE
XYLENE, P-		**000106-42-3**							
SUBCHRONIC [RfD] COMMENT: CONTACT THE SUPERFUND HEALTH RISK TECHNICAL SUPPORT CENTER: (513) 569-7300.									010923
CHRONIC [RfC] COMMENT: THE CHRONIC INHALATION [RfC] IS CONSIDERED NOT VERIFIABLE (12/11/91) BY THE RfD/RfC WORK GROUP.									
ZINC (METALLIC)		**007440-66-6**							
LOAEL 1.0 MG/KG/DAY	HUMAN								
ORAL: DIET	10 WEEKS	BLOOD	DECREASED BLOOD ENZYME			3E-1		IRIS	010937
SUPPLEMENT						3			
CHRONIC [RfD] COMMENT: THE CHRONIC ORAL RfD WAS ADOPTED AS THE SUBCHRONIC ORAL [RfD].									
ZINC CYANIDE		**000557-21-1**							
NOAEL 24.3 MG/KG/DAY	RAT								
ORAL: DIET	2 YEARS	WHOLE BODY	DECREASED WEIGHT			5E-2		IRIS	010289
		THYROID	EFFECTS			500			
		NERVE	MYELIN DEGENERATION						
SUBCHRONIC [RfD] COMMENT: CALCULATED BY ANALOGY TO FREE CYANIDE BY CORRECTING FOR DIFFERENCES IN MOLECULAR WEIGHT.									
CHRONIC [RfD] COMMENT: CALCULATED BY ANALOGY TO FREE CYANIDE BY CORRECTING FOR DIFFERENCES IN MOLECULAR WEIGHT.									
ZINC PHOSPHIDE		**001314-84-7**							
LOAEL 3.48 MG/KG/DAY	RAT								
ORAL: DIET	13 WEEKS	WHOLE BODY	DECREASED WEIGHT			3E-3		IRIS	010290
		WHOLE BODY	DECREASED FOOD INTAKE			1000			
ZINEB		**012122-67-7**							
LOAEL 25 MG/KG/DAY	RAT								
ORAL: DIET	2 YEARS	THYROID	HYPERPLASIA			5E-2		IRIS	010085
						500			
SUBCHRONIC [RfD] COMMENT: THE CHRONIC ORAL RfD WAS ADOPTED AS THE SUBCHRONIC ORAL [RfD].									

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HEAST TABLE 2: ALTERNATE METHODS - SUBCHRONIC AND CHRONIC TOXICITY (OTHER THAN CARCINOGENICITY)

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CHEMICAL / LEVEL	DOSE / ROUTE	SPECIES / EXPERIMENT LENGTH	TARGET	CRITICAL EFFECT	Subchronic [RfC] (mg/cu m) UF	Subchronic [RfD] (mg/kg/day) UF	Chronic [RfC] (mg/cu m) UF	Chronic [RfD] (mg/kg/day) UF	REFERENCE
ACETONE CYANOHYDRIN		**000075-86-5**							
NOEL	4.0 MG/KG/DAY	RAT							
	INHALATION:	14 WEEKS	CENTRAL NERVOUS	EFFECTS	1E-1		1E-2		010432
	INTERMITTENT		SYSTEM		100		1000		

SUBCHRONIC [RfC] COMMENT: 4E-2 MG/KG/DAY (SEE APPENDIX A-II, DOSE CONVERSIONS ON HEAST). AN ERROR IN THE UNCERTAINTY FACTOR THAT WAS REPORTED IN HEED (1988) WAS CORRECTED.
CHRONIC [RfC] COMMENT: 4E-2 MG/KG/DAY (SEE APPENDIX A-II, DOSE CONVERSIONS ON HEAST).
GENERAL COMMENT: THE SUBCHRONIC AND CHRONIC INHALATION [RfC] VALUES WERE DERIVED FROM METHODOLOGY THAT IS NOT CURRENT WITH THE INTERIM INHALATION METHODOLOGY USED BY THE RfD/RfC WORK GROUP. ALSO SEE TABLE 1: SUBCHRONIC AND CHRONIC TOXICITY.

ACETONITRILE		**000075-05-8**							
NOAEL	100 PPM	MOUSE							
	INHALATION:	92 DAYS	LIVER	INCREASED RELATIVE WEIGHT	5E-1		5E-2		005208
	INTERMITTENT				300		.3000		

SUBCHRONIC [RfC] COMMENT: 1E-1 MG/KG/DAY (SEE APPENDIX A-II, DOSE CONVERSIONS ON HEAST).
CHRONIC [RfC] COMMENT: 1E-2 MG/KG/DAY. (SEE APPENDIX A-II, DOSE CONVERSIONS ON HEAST). UNDER REVIEW, CURRENT NUMBER SUBJECT TO CHANGE.
GENERAL COMMENT: THE SUBCHRONIC AND CHRONIC INHALATION [RfC] VALUES WERE DERIVED FROM METHODOLOGY THAT IS NOT CURRENT WITH THE INTERIM INHALATION METHODOLOGY USED BY THE RfD/RfC WORK GROUP. ALSO SEE TABLE 1: SUBCHRONIC AND CHRONIC TOXICITY.

BARIUM		**007440-39-3**							
NOEL	0.8 MG/CU M	RAT							
	INHALATION:	4 MONTHS	FETUS	FETOTOXICITY	5E-3		5E-4		005249
	INTERMITTENT				100		1000		

SUBCHRONIC [RfC] COMMENT: 1E-3 MG/KG/DAY (SEE APPENDIX A-II, DOSE CONVERSIONS ON HEAST). BASED ON A REPRODUCTION STUDY.
CHRONIC [RfC] COMMENT: 1E-4 MG/KG/DAY (SEE APPENDIX A-II, DOSE CONVERSIONS ON HEAST). BASED ON A REPRODUCTION STUDY.
GENERAL COMMENT: THE SUBCHRONIC AND CHRONIC INHALATION [RfC] VALUES WERE DERIVED FROM METHODOLOGY THAT IS NOT CURRENT WITH THE INTERIM INHALATION METHODOLOGY USED BY THE RfD/RfC WORK GROUP. ALSO SEE TABLE 1: SUBCHRONIC AND CHRONIC TOXICITY.

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HEAST TABLE 2: ALTERNATE METHODS - SUBCHRONIC AND CHRONIC TOXICITY (OTHER THAN CARCINOGENICITY)

July 1997

CHEMICAL / LEVEL	DOSE / ROUTE	SPECIES / EXPERIMENT LENGTH	TARGET	CRITICAL EFFECT	Subchronic [RfC] (mg/cu m) / UF	Subchronic [RfD] (mg/kg/day) / UF	Chronic [RfC] (mg/cu m) / UF	Chronic [RfD] (mg/kg/day) / UF	REFERENCE
CHLORO-1,3-BUTADIENE / (CHLOROPRENE)		**000126-99-8**							
NOAEL 10 PPM		RAT							
	INHALATION:	2 YEARS	HAIR	ALOPECIA		2E-2		2E-2	005878
	INTERMITTENT		WHOLE BODY	DECREASED WEIGHT GAIN		100		100	

SUBCHRONIC [RfD] COMMENT: BASED ON ROUTE TO ROUTE EXTRAPOLATION ASSUMING AN INHALATION ABSORPTION FACTOR OF 0.5.
CHRONIC [RfD] COMMENT: BASED ON ROUTE TO ROUTE EXTRAPOLATION ASSUMING AN INHALATION ABSORPTION FACTOR OF 0.5.
GENERAL COMMENT: SEE ALSO HEAST TABLE 1: SUBCHRONIC AND CHRONIC TOXICITY (OTHER THAN CARCINOGENICITY).

CHLOROBENZENE		**000108-90-7**							
LOAEL 75 PPM		RAT							
	INHALATION:	120 DAYS	LIVER	EFFECTS			2E-2		005353
	INTERMITTENT		KIDNEY	EFFECTS			10000		

CHRONIC [RfC] COMMENT: 5E-3 MG/KG/DAY (SEE APPENDIX A-II, DOSE CONVERSIONS ON HEAST). UNDER REVIEW, CURRENT NUMBER SUBJECT TO CHANGE.
GENERAL COMMENT: THE SUBCHRONIC AND CHRONIC INHALATION [RfC] VALUES WERE DERIVED FROM METHODOLOGY THAT IS NOT CURRENT WITH THE INTERIM INHALATION METHODOLOGY USED BY THE RfD/RfC WORK GROUP. ALSO SEE TABLE 1: SUBCHRONIC AND CHRONIC TOXICITY.

CYCLOPENTADIENE		**000542-92-7**							
NOEL 87.3 MG/KG/DAY		RAT							
	INHALATION:	194 DAYS	LIVER	LESIONS		3E+0			005401
	INTERMITTENT		KIDNEY	LESIONS		100			

SUBCHRONIC [RfC] COMMENT: 9E-1 MG/KG/DAY (SEE APPENDIX A-II, DOSE CONVERSIONS ON HEAST).
GENERAL COMMENT: THE SUBCHRONIC INHALATION [RfC] VALUE WAS DERIVED FROM METHODOLOGY THAT IS NOT CURRENT WITH THE INTERIM INHALATION METHODOLOGY USED BY THE RfD/RfC WORK GROUP.

HEAST TABLE 2: ALTERNATE METHODS - SUBCHRONIC AND CHRONIC TOXICITY (OTHER THAN CARCINOGENICITY)

July 1997

CHEMICAL / LEVEL	DOSE / ROUTE	SPECIES / EXPERIMENT LENGTH	TARGET	CRITICAL EFFECT	Subchronic [RfC] (mg/cu m) / UF	Subchronic [RfD] (mg/kg/day) / UF	Chronic [RfC] (mg/cu m) / UF	Chronic [RfD] (mg/kg/day) / UF	REFERENCE
DICHLOROBENZENE, 1,2-		**000095-50-1**							
NOEL 49 PPM		RAT							
	INHALATION:	UP TO 7	WHOLE BODY	DECREASED WEIGHT GAIN	2E+0		2E-1		005412
	INTERMITTENT	MONTHS			100		1000		

CHRONIC [RfC] COMMENT: 4E-2 MG/KG/DAY (SEE APPENDIX A-II, DOSE CONVERSIONS ON HEAST).
GENERAL COMMENT: THE SUBCHRONIC AND CHRONIC INHALATION [RfC] VALUES WERE DERIVED FROM METHODOLOGY THAT IS NOT CURRENT WITH THE INTERIM INHALATION METHODOLOGY USED BY THE RfD/RfC WORK GROUP. ALSO SEE TABLE 1: SUBCHRONIC AND CHRONIC TOXICITY.

DICHLORODIFLUOROMETHANE		**000075-71-8**							
LOAEL 482.3 MG/KG/DAY		GUINEA PIG							
	INHALATION:	6 WEEKS	LIVER	LESIONS	2E+0		2E-1		005497
	INTERMITTENT				1000		10000		

SUBCHRONIC [RfC] COMMENT: 5E-1 MG/KG/DAY (SEE APPENDIX A-II, DOSE CONVERSIONS ON HEAST).
CHRONIC [RfC] COMMENT: 5E-2 MG/KG/DAY (SEE APPENDIX A-II, DOSE CONVERSIONS ON HEAST).
GENERAL COMMENT: THE SUBCHRONIC AND CHRONIC INHALATION [RfC] VALUES WERE DERIVED FROM METHODOLOGY THAT IS NOT CURRENT WITH THE INTERIM INHALATION METHODOLOGY USED BY THE RfD/RfC WORK GROUP. ALSO SEE TABLE 1: SUBCHRONIC AND CHRONIC TOXICITY.

DICHLOROETHANE, 1,1-		**000075-34-3**							
NOEL 138 MG/KG/DAY		CAT							
	INHALATION:	13 WEEKS	KIDNEY	DAMAGE	5E+0		5E-1		005789
	INTERMITTENT				100		1000		

SUBCHRONIC [RfC] COMMENT: 1E+0 MG/KG/DAY (SEE APPENDIX A-II, DOSE CONVERSIONS ON HEAST).
CHRONIC [RfC] COMMENT: 1E-1 MG/KG/DAY (SEE APPENDIX A-II, DOSE CONVERSIONS ON HEAST).
GENERAL COMMENT: THE SUBCHRONIC AND CHRONIC INHALATION [RfC] VALUES WERE DERIVED FROM METHODOLOGY THAT IS NOT CURRENT WITH THE INTERIM INHALATION METHODOLOGY USED BY THE RfD/RfC WORK GROUP. ALSO SEE HEAST TABLE 1: CHRONIC AND SUBCHRONIC TOXICITY AND

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HEAST TABLE 2: ALTERNATE METHODS - SUBCHRONIC AND CHRONIC TOXICITY
(OTHER THAN CARCINOGENICITY)

July 1997

CHEMICAL / LEVEL	DOSE / ROUTE	SPECIES / EXPERIMENT LENGTH	TARGET	CRITICAL EFFECT	Subchronic [RfC] (mg/cu m) UF	Subchronic [RfD] (mg/kg/day) UF	Chronic [RfC] (mg/cu m) UF	Chronic [RfD] (mg/kg/day) UF	REFERENCE
DICYCLOPENTADIENE		**000077-73-6**							
LOAEL 1 PPM	INHALATION: INTERMITTENT	RAT 90 DAYS	KIDNEY	DYSFUNCTION	2E-3 1000		2E-4 10000		005424

SUBCHRONIC [RfC] COMMENT: 6E-4 MG/KG/DAY (SEE APPENDIX A-II, DOSE CONVERSIONS ON HEAST).
CHRONIC [RfC] COMMENT: 6E-5 MG/KG/DAY (SEE APPENDIX A-II, DOSE CONVERSIONS ON HEAST).
GENERAL COMMENT: THE SUBCHRONIC AND CHRONIC INHALATION [RfC] VALUES WERE DERIVED FROM METHODOLOGY THAT IS NOT CURRENT WITH THE INTERIM INHALATION METHODOLOGY USED BY THE RfD/RfC WORK GROUP. ALSO SEE TABLE 1: SUBCHRONIC AND CHRONIC TOXICITY.

ETHOXYETHANOL ACETATE, 2-		**000111-15-9**							
NOEL 30.1 MG/KG/DAY	INHALATION: INTERMITTENT	RAT DAY 6-18 OF GESTATION	FETUS	DECREASED OSSIFICATION		3E-1 100		3E-1 100	005952

SUBCHRONIC [RfD] COMMENT: BASED ON ROUTE TO ROUTE EXTRAPOLATION. THE SUBCHRONIC ORAL [RfD]WAS BASED ON A REPRODUCTION STUDY WITH EXPOSURES DURING DAYS 6-18 OF GESTATION.
CHRONIC [RfD] COMMENT: BASED ON ROUTE TO ROUTE EXTRAPOLATION. THE CHRONIC ORAL [RfD] WAS BASED ON A REPRODUCTION STUDY WITH EXPOSURES DURING DAYS 6-18 OF GESTATION.
GENERAL COMMENT: NO PHARMACOKINETIC DATA WERE PROVIDED TO JUSTIFY ROUTE TO ROUTE EXTRAPOLATION FOR THE ORAL [RfD] VALUES. ALSO SEE TABLE 1: SUBCHRONIC AND CHRONIC TOXICITY VALUES.

FURFURAL		**000098-01-1**							
NOAEL 20 PPM	INHALATION: INTERMITTENT	HAMSTER 13 WEEKS	NASAL CAVITY	OLFACTORY DEGENERATION	5E-1 100		5E-2 1000		005465

SUBCHRONIC [RfC] COMMENT: 1E-1 MG/KG/DAY (SEE APPENDIX A-11, DOSE CONVERSIONS ON HEAST).
CHRONIC [RfC] COMMENT: 1E-2 MG/KG/DAY (SEE APPENDIX A-11, DOSE CONVERSIONS ON HEAST).
GENERAL COMMENT: THE SUBCHRONIC AND CHRONIC INHALATION [RfC] VALUES WERE DERIVED FROM METHODOLOGY THAT IS NOT CURRENT WITH THE INTERIM INHALATION METHODOLOGY USED BY THE RfD/RfC WORK GROUP. ALSO SEE TABLE 1: SUBCHRONIC AND CHRONIC TOXICITY.

HEAST TABLE 2: ALTERNATE METHODS - SUBCHRONIC AND CHRONIC TOXICITY (OTHER THAN CARCINOGENICITY)

July 1997

CHEMICAL / LEVEL	DOSE / ROUTE	SPECIES / EXPERIMENT LENGTH	TARGET	CRITICAL EFFECT	Subchronic [RfC] (mg/cu m) UF	Subchronic [RfD] (mg/kg/day) UF	Chronic [RfC] (mg/cu m) UF	Chronic [RfD] (mg/kg/day) UF	REFERENCE
METHACRYLONITRILE		**000126-98-7**							
NOEL 3.2 PPM		DOG							
	INHALATION:	90 DAYS	LIVER	INCREASED SGOT	7E-3		7E-4		005811
	INTERMITTENT		LIVER	INCREASED SGPT	300		3000		

SUBCHRONIC [RfC] COMMENT: 2E-3 MG/KG/DAY (SEE APPENDIX A-II, DOSE CONVERSIONS ON HEAST). THESE VALUES DIFFER FROM THOSE IN THE 1987 HEED.
CHRONIC [RfC] COMMENT: 2E-4 MG/KG/DAY (SEE APPENDIX A-II, DOSE CONVERSIONS ON HEAST). THESE VALUES DIFFER FROM THOSE IN THE 1987 HEED.
GENERAL COMMENT: THE SUBCHRONIC AND CHRONIC INHALATION [RfC] VALUES WERE DERIVED FROM METHODOLOGY THAT IS NOT CURRENT WITH THE INTERIM INHALATION METHODOLOGY USED BY THE RfD/RfC WORK GROUP. ALSO SEE TABLE 1: SUBCHRONIC AND CHRONIC TOXICITY.

METHOXYETHANOL ACETATE, 2-		**000110-49-6**							
NOAEL 10 PPM		RABBIT							
	INHALATION:	13 WEEKS	TESTIS	DEGENERATION		2E-2		2E-3	010001
	INTERMITTENT					100		1000	

SUBCHRONIC [RfD] COMMENT: BASED ON ROUTE TO ROUTE EXTRAPOLATION USING AN ABSORPTION FACTOR OF 0.5. CALCULATED FROM DATA OBTAINED WITH METHOXYETHANOL CONVERTED BY MULTIPLYING BY THE MOLECULAR WEIGHT RATIO (118.13/76.09).
CHRONIC [RfD] COMMENT: BASED ON ROUTE TO ROUTE EXTRAPOLATION USING AN ABSORPTION FACTOR OF 0.5. CALCULATED FROM DATA OBTAINED WITH METHOXYETHANOL CONVERTED BY MULTIPLYING BY THE MOLECULAR WEIGHT RATIO (118.13/76.09).
GENERAL COMMENT: NO PHARMACOKINETIC DATA WERE PROVIDED TO JUSTIFY ROUTE TO ROUTE EXTRAPOLATION FOR THE ORAL [RfD] VALUES.

METHOXYETHANOL, 2-		**000109-86-4**							
NOAEL 31 MG/CU M		RABBIT							
	INHALATION:	13 WEEKS	TESTICLE	EFFECTS		1E-2		1E-3	010910
	INTERMITTENT					100		1000	

SUBCHRONIC [RfD] COMMENT: BASED ON ROUTE TO ROUTE EXTRAPOLATION.
CHRONIC [RfD] COMMENT: BASED ON ROUTE TO ROUTE EXTRAPOLATION.
GENERAL COMMENT: ALSO SEE TABLE 1: SUBCHRONIC AND CHRONIC TOXICITY (OTHER THAN CARCINOGENICITY).

HEAST TABLE 2: ALTERNATE METHODS - SUBCHRONIC AND CHRONIC TOXICITY (OTHER THAN CARCINOGENICITY)

July 1997

CHEMICAL LEVEL	DOSE ROUTE	SPECIES EXPERIMENT LENGTH	TARGET	CRITICAL EFFECT	Subchronic [RfC] (mg/cu m) UF	Subchronic [RfD] (mg/kg/day) UF	Chronic [RfC] (mg/cu m) UF	Chronic [RfD] (mg/kg/day) UF	REFERENCE
METHYL ACRYLATE		**000096-33-3**							
NOEL 15 PPM		RAT							
	INHALATION:	2 YEARS		NONE OBSERVED		3E-2		3E-2	010003
	INTERMITTENT					100		100	

SUBCHRONIC [RfD] COMMENT: BASED ON ROUTE TO ROUTE EXTRAPOLATION.
CHRONIC [RfD] COMMENT: BASED ON ROUTE TO ROUTE EXTRAPOLATION.
GENERAL COMMENT: NO PHARMACOKINETIC DATA WERE PROVIDED TO JUSTIFY ROUTE TO ROUTE EXTRAPOLATION FOR THE ORAL [RfD] VALUES.

METHYL ISOBUTYL KETONE		**000108-10-1**							
NOEL 50 PPM		RAT							
	INHALATION:	90 DAYS	LIVER	INCREASED WEIGHT	8E-1		8E-2		005562
	INTERMITTENT		KIDNEY	EFFECTS	100		1000		

SUBCHRONIC [RfC] COMMENT: 2E-1 MG/KG/DAY (SEE APPENDIX A-II, DOSE CONVERSION ON HEAST).
CHRONIC [RfC] COMMENT: 2E-2 MG/KG/DAY (SEE APPENDIX A-II, DOSE CONVERSION ON HEAST).
GENERAL COMMENT: THE SUBCHRONIC AND CHRONIC INHALATION [RfC] VALUES WERE DERIVED FROM METHODOLOGY THAT IS NOT CURRENT WITH THE INTERIM INHALATION METHODOLOGY USED BY THE RfD/RfC WORK GROUP. ALSO SEE TABLE 1: SUBCHRONIC AND CHRONIC TOXICITY.

HEAST TABLE 2: ALTERNATE METHODS - SUBCHRONIC AND CHRONIC TOXICITY (OTHER THAN CARCINOGENICITY)

July 1997

CHEMICAL LEVEL / DOSE ROUTE	SPECIES EXPERIMENT LENGTH	TARGET	CRITICAL EFFECT	Subchronic [RfC] (mg/cu m) UF	Subchronic [RfD] (mg/kg/day) UF	Chronic [RfC] (mg/cu m) UF	Chronic [RfD] (mg/kg/day) UF	REFERENCE
METHYL STYRENE (MIXED ISOMERS) 025013-15-4								
LOAEL 5.6 MG/KG/DAY	MOUSE							
INHALATION:	103 WEEKS	NASAL CAVITY	LESIONS		6E-3		6E-3	005567
INTERMITTENT					1000		1000	
SUBCHRONIC [RfD] COMMENT: BASED ON ROUTE TO ROUTE EXTRAPOLATION WITH AN ABSORPTION FACTOR OF 0.5.								
CHRONIC [RfD] COMMENT: BASED ON ROUTE TO ROUTE EXTRAPOLATION WITH AN ABSORPTION FACTOR OF 0.5.								
GENERAL COMMENT: NO PHARMACOKINETIC DATA WERE PROVIDED TO JUSTIFY ROUTE TO ROUTE EXTRAPOLATION FOR THE ORAL [RfD] VALUES.								
LOAEL 11.2 MG/KG/DAY	MOUSE							
INHALATION:	103 WEEKS	NASAL CAVITY	LESIONS	4E-2		4E-2		005566
INTERMITTENT				1000		1000		
SUBCHRONIC [RfC] COMMENT: 1E-2 MG/KG/DAY (SEE APPENDIX A-II, DOSE CONVERSIONS ON HEAST).								
CHRONIC [RfC] COMMENT: 1E-2 MG/KG/DAY (SEE APPENDIX A-II, DOSE CONVERSIONS ON HEAST).								
GENERAL COMMENT: THE SUBCHRONIC AND CHRONIC INHALATION [RfC] VALUES WERE DERIVED FROM METHODOLOGY THAT IS NOT CURRENT WITH THE INTERIM INHALATION METHODOLOGY USED BY THE RfD/RfC WORK GROUP.								
METHYL STYRENE, ALPHA 000098-83-9								
NOEL 970 MG/CU M	RAT							
INHALATION:	197 DAYS	LIVER	INCREASED WEIGHT		7E-1		7E-2	010016
INTERMITTENT		KIDNEY	INCREASED WEIGHT		100		1000	
SUBCHRONIC [RfD] COMMENT: BASED ON ROUTE TO ROUTE EXTRAPOLATION USING AN ABSORPTION FACTOR OF 0.5.								
CHRONIC [RfD] COMMENT: BASED ON ROUTE TO ROUTE EXTRAPOLATION USING AN ABSORPTION FACTOR OF 0.5.								
GENERAL COMMENT: NO PHARMACOKINETIC DATA WERE PROVIDED TO JUSTIFY ROUTE TO ROUTE EXTRAPOLATION FOR THE ORAL [RfD] VALUES.								

HEAST TABLE 2: ALTERNATE METHODS - SUBCHRONIC AND CHRONIC TOXICITY (OTHER THAN CARCINOGENICITY)

July 1997

CHEMICAL / LEVEL	DOSE / ROUTE	SPECIES / EXPERIMENT LENGTH	TARGET	CRITICAL EFFECT	Subchronic [RfC] (mg/cu m) UF	Subchronic [RfD] (mg/kg/day) UF	Chronic [RfC] (mg/cu m) UF	Chronic [RfD] (mg/kg/day) UF	REFERENCE
METHYLENE BROMIDE		**000074-95-3**							
NOAEL 11 MG/KG/DAY		RAT							
	INHALATION:	90 DAYS	BLOOD	INCREASED CARBOXYHEMOGLOBIN		1E-1		1E-2	010011
	INTERMITTENT					100		1000	
SUBCHRONIC [RfD] COMMENT: BASED ON ROUTE TO ROUTE EXTRAPOLATION, INCLUDING AN ABSORPTION FACTOR OF 0.5.									
CHRONIC [RfD] COMMENT: BASED ON ROUTE TO ROUTE EXTRAPOLATION, INCLUDING AN ABSORPTION FACTOR OF 0.5.									
GENERAL COMMENT: NO PHARMACOKINETIC DATA WERE PROVIDED TO JUSTIFY ROUTE TO ROUTE EXTRAPOLATION FOR THE ORAL [RfD] VALUES.									
NITROBENZENE		**000098-95-3**							
LOAEL 25 MG/CU M		MOUSE							
	INHALATION:	90 DAYS	BLOOD	HEMATOLOGICAL EFFECTS	2E-2		2E-3		010518
	INTERMITTENT		ADRENAL	LESIONS	1000		10000		
			KIDNEY	LESIONS					
			LIVER	LESIONS					
		RAT							
	INHALATION:	90 DAYS	BLOOD	HEMATOLOGICAL EFFECTS					
	INTERMITTENT		ADRENAL	LESIONS					
			KIDNEY	LESIONS					
			LIVER	LESIONS					
SUBCHRONIC [RfC] COMMENT: 6E-3 MG/KG/DAY (SEE APPENDIX A-II, DOSE CONVERSIONS ON HEAST).									
CHRONIC [RfC] COMMENT: 6E-4 MG/KG/DAY (SEE APPENDIX A-II, DOSE CONVERSIONS ON HEAST).									
GENERAL COMMENT: THE SUBCHRONIC AND CHRONIC INHALATION [RfC] VALUES WERE DERIVED FROM METHODOLOGY THAT IS NOT CURRENT WITH THE INTERIM INHALATION METHODOLOGY USED BY THE RfD/RfC WORK GROUP. ALSO SEE TABLE 1: SUBCHRONIC AND CHRONIC TOXICITY.									
TRICHLOROBENZENE, 1,2,4-		**000120-82-1**							
GENERAL COMMENT: INFORMATION REMOVED FROM THIS TABLE. SEE TABLE 1: SUBCHRONIC AND CHRONIC TOXICITY (OTHER THAN CARCINOGENICITY).									

HEAST TABLE 2: ALTERNATE METHODS - SUBCHRONIC AND CHRONIC TOXICITY (OTHER THAN CARCINOGENICITY)

July 1997

CHEMICAL LEVEL	DOSE ROUTE	SPECIES EXPERIMENT LENGTH	TARGET	CRITICAL EFFECT	Subchronic [RfC] (mg/cu m) UF	Subchronic [RfD] (mg/kg/day) UF	Chronic [RfC] (mg/cu m) UF	Chronic [RfD] (mg/kg/day) UF	REFERENCE
TRICHLOROFLUOROMETHANE		**000075-69-4**							
LOAEL 1940 MG/KG/DAY		DOG							
	INHALATION:	90 DAYS	KIDNEY	INCREASED BUN	7E+0		7E-1		005501
	CONTINUOUS		LUNG	INFLAMMATION	1000		10000		

SUBCHRONIC [RfC] COMMENT: 2E+0 MG/KG/DAY (SEE APPENDIX A-II. DOSE CONVERSIONS ON HEAST).
CHRONIC [RfC] COMMENT: 2E-1 MG/KG/DAY (SEE APPENDIX A-II. DOSE CONVERSIONS ON HEAST).
GENERAL COMMENT: THE SUBCHRONIC AND CHRONIC INHALATION [RfC] VALUES WERE DERIVED FROM METHODOLOGY THAT IS NOT CURRENT WITH THE INTERIM INHALATION METHODOLOGY USED BY THE RfD/RfC WORK GROUP. ALSO SEE TABLE 1: SUBCHRONIC AND CHRONIC TOXICITY.

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(OTHER THAN CARCINOGENICITY) July 1997

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(OTHER THAN CARCINOGENICITY)

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REFERENCES FOR HEAST TABLE 2: ALTERNATE METHODS -- SUBCHRONIC AND CHRONIC TOXICITY
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HEAST TABLE 3: CARCINOGENICITY

July 1997

CHEMICAL	ROUTE	EXPERIMENT LENGTH / SPECIES	TARGET	CANCFR	[EPA GROUP]	[SLOPE FACTOR] ORAL (mg/kg/day)$^{-1}$	[SLOPE FACTOR] INHALATION (mg/kg/day)$^{-1}$	[UNIT RISK] ORAL (ug/L)$^{-1}$	[UNIT RISK] INHALATION (ug/cu m)-1	REFERENCE
ACEPHATE		**030560-19-1**								
					IRIS	IRIS		IRIS		010086
GENERAL COMMENT: ALSO SEE HEAST TABLE 1: SUBCHRONIC AND CHRONIC TOXICITY (OTHER THAN CARCINOGENICITY).										
ACROLEIN		**000107-02-8**								
					IRIS					005001
GENERAL COMMENT: ALSO SEE HEAST TABLE 1: SUBCHRONIC AND CHRONIC TOXICITY (OTHER THAN CARCINOGENICITY).										
ACRYLAMIDE		**000079-06-1**								
	ORAL: DRINKING WATER	2 YEARS RAT	MAMMARY	TUMORS	IRIS	IRIS	4.5E+0	IRIS	IRIS	010087
			THYROID	TUMORS						
			UTERUS	TUMORS						
			ORAL CAVITY	TUMORS						
			CENTRAL NERVOUS SYSTEM	TUMORS						
INHALATION [SLOPE] COMMENT: SEE APPENDIX A-II. DOSE CONVERSIONS ON HEAST.										
GENERAL COMMENT: ALSO SEE HEAST TABLE 1: SUBCHRONIC AND CHRONIC TOXICITY (OTHER THAN CARCINOGENICITY).										
ACRYLONITRILE		**000107-13-1**								
					IRIS	IRIS		IRIS		005004
	INHALATION: OCCUPATIONAL	HUMAN	LUNG	TUMORS	IRIS		2.4E-1		IRIS	005003
INHALATION [SLOPE] COMMENT: SEE APPENDIX A-II. DOSE CONVERSIONS ON HEAST.										

CHEMICAL	ROUTE	EXPERIMENT LENGTH / SPECIES	TARGET	CANCER	[EPA GROUP]	[SLOPE FACTOR] ORAL (mg/kg/day)$^{-1}$	[SLOPE FACTOR] INHALATION (mg/kg/day)$^{-1}$	[UNIT RISK] ORAL (ug/L)$^{-1}$	[UNIT RISK] INHALATION (ug/cu m)$^{-1}$	REFERENCE
ALACHLOR	**015972-60-8**									
	ORAL: DIET	MULTIPLE SITES	TUMORS		B2	8E-2		2.3E-6		010180
	ORAL [SLOPE] COMMENT: UNDER REVIEW, NUMBER SUBJECT TO CHANGE.									
	GENERAL COMMENT: ALSO SEE HEAST TABLE 1: SUBCHRONIC AND CHRONIC TOXICITY (OTHER THAN CARCINOGENICITY).									
ALDRIN	**000309-00-2**									
	ORAL: DIET	MOUSE	LIVER	CARCINOMA	IRIS	IRIS	1.7E+1	IRIS	IRIS	005006
	INHALATION [SLOPE] COMMENT: SEE APPENDIX A-II, DOSE CONVERSIONS ON HEAST.									
	INHALATION [UNIT RISK] COMMENT: BASED ON ROUTE TO ROUTE EXTRAPOLATION.									
	GENERAL COMMENT: ALSO SEE HEAST TABLE 1: SUBCHRONIC AND CHRONIC TOXICITY (OTHER THAN CARCINOGENICITY).									
ALLYL CHLORIDE	**000107-05-1**									
					IRIS					010181
	GENERAL COMMENT: ALSO SEE HEAST TABLE 1: SUBCHRONIC AND CHRONIC TOXICITY (OTHER THAN CARCINOGENICITY)									
ANILINE	**000062-53-3**									
					IRIS	IRIS		IRIS		010088
	GENERAL COMMENT: ALSO SEE HEAST TABLE 1: SUBCHRONIC AND CHRONIC TOXICITY (OTHER THAN CARCINOGENICITY).									
ARAMITE	**000140-57-8**									
	ORAL: DIET	104 WKS RAT	LIVER	TUMORS	IRIS	IRIS	2.5E-2	IRIS	IRIS	010206
	INHALATION [SLOPE] COMMENT: BASED ON ROUTE TO ROUTE EXTRAPOLATION. SEE APPENDIX A-II, DOSE CONVERSIONS ON HEAST.									
	GENERAL COMMENT: ALSO SEE HEAST TABLE 1: SUBCHRONIC AND CHRONIC TOXICITY (OTHER THAN CARCINOGENICITY).									

HEAST TABLE 3: CARCINOGENICITY

July 1997

CHEMICAL	ROUTE	EXPERIMENT LENGTH / SPECIES	TARGET	CANCER	[EPA GROUP]	[SLOPE FACTOR] ORAL (mg/kg/day)$^{-1}$	[SLOPE FACTOR] INHALATION (mg/kg/day)$^{-1}$	[UNIT RISK] ORAL (ug/L)$^{-1}$	[UNIT RISK] INHALATION (ug/cu m)-1	REFERENCE
ARSENIC, INORGANIC		**007440-38-2**								
						IRIS		IRIS		010925
	INHALATION:				IRIS		IRIS		IRIS	005007
	OCCUPATIONAL	HUMAN	RESPIRATORY SYSTEM	TUMORS						
	GENERAL COMMENT: ALSO SEE HEAST TABLE 1: SUBCHRONIC AND CHRONIC TOXICITY (OTHER THAN CARCINOGENICITY).									
ASBESTOS		**001332-21-4**								
					IRIS					005010
					IRIS				IRIS	005919
ATRAZINE		**001912-24-9**								
	ORAL: DIET	2 YEARS RAT	MAMMARY GLAND	ADENOMA	C	2.22E-1		6.3E-6		010380
			MAMMARY GLAND	FIBROADENOMA						
			MAMMARY GLAND	ADENOCARCINOMA						
			MAMMARY GLAND	CARCINOSARCOMA						
	ORAL [SLOPE] COMMENT: UNDER REVIEW. NUMBER SUBJECT TO CHANGE.									
	GENERAL COMMENT: ALSO SEE HEAST TABLE 1: SUBCHRONIC AND CHRONIC TOXICITY (OTHER THAN CARCINOGENICITY)									
AZOBENZENE		**000103-33-3**								
	ORAL: DIET	2 YEARS RAT	ABDOMINAL CAVITY	SARCOMA	IRIS	IRIS	1.1E-1	IRIS	IRIS	010089
	INHALATION [SLOPE] COMMENT: SEE APPENDIX A-II, DOSE CONVERSIONS ON HEAST.									

IRIS, EPA'S INTEGRATED RISK INFORMATION SYSTEM, IS UPDATED MONTHLY. FURTHER INFORMATION: RISK INFORMATION HOTLINE: (513) 569-7254.

HEAST TABLE 3: CARCINOGENICITY

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CHEMICAL	ROUTE	EXPERIMENT LENGTH / SPECIES	TARGET	CANCER	[EPA GROUP]	[SLOPE FACTOR] ORAL (mg/kg/day)$^{-1}$	[SLOPE FACTOR] INHALATION (mg/kg/day)$^{-1}$	[UNIT RISK] ORAL (ug/L)$^{-1}$	[UNIT RISK] INHALATION (ug/cu m)-1	REFERENCE
BENZENE	**000071-43-2**									
	INHALATION: OCCUPATIONAL	HUMAN	BLOOD	LEUKEMIA	IRIS	IRIS	2.9E-2	IRIS	IRIS	005011
	ORAL [SLOPE] COMMENT: BASED ON ROUTE TO ROUTE EXTRAPOLATION.									
	INHALATION [SLOPE] COMMENT: SEE APPENDIX A-II, DOSE CONVERSIONS ON HEAST.									
	GENERAL COMMENT: ALSO SEE HEAST TABLE 1: SUBCHRONIC AND CHRONIC TOXICITY (OTHER THAN CARCINOGENICITY)									
BENZIDINE	**000092-87-5**				IRIS	IRIS	IRIS	IRIS	IRIS	005014
	GENERAL COMMENT: ALSO SEE HEAST TABLE 1: SUBCHRONIC AND CHRONIC TOXICITY (OTHER THAN CARCINOGENICITY).									
BENZOTRICHLORIDE	**000098-07-7**				IRIS	IRIS		IRIS		010092
BENZO[A]ANTHRACENE	**000056-55-3**				IRIS					010182
BENZO[A]PYRENE	**000050-32-8**				IRIS	IRIS		IRIS		010508
BENZO[B]FLUORANTHENE	**000205-99-2**				IRIS					010183
BENZO[K]FLUORANTHENE	**000207-08-9**				IRIS					010090
BENZYL CHLORIDE	**000100-44-7**				IRIS	IRIS		IRIS		010093

HEAST TABLE 3: CARCINOGENICITY

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CHEMICAL	ROUTE	EXPERIMENT LENGTH / SPECIES	TARGET	CANCER	[EPA GROUP]	[SLOPE FACTOR] ORAL (mg/kg/day)$^{-1}$	[SLOPE FACTOR] INHALATION (mg/kg/day)$^{-1}$	[UNIT RISK] ORAL (ug/L)$^{-1}$	[UNIT RISK] INHALATION (ug/cu m)-1	REFERENCE
BERYLLIUM		**007440-41-7**								
					IRIS	IRIS		IRIS		005018
GENERAL COMMENT: ALSO SEE HEAST TABLE 1: SUBCHRONIC AND CHRONIC TOXICITY (OTHER THAN CARCINOGENICITY).										
	INHALATION:				IRIS		8.4E+0		IRIS	005017
	OCCUPATIONAL	HUMAN	LUNG	TUMORS						
INHALATION [SLOPE] COMMENT: SEE APPENDIX A-II. DOSE CONVERSIONS ON HEAST.										
BIS(2-CHLOROETHYL) ETHER		**000111-44-4**								
	ORAL	560 DAYS			IRIS	IRIS	1.1E+0	IRIS	IRIS	005076
		MOUSE	LIVER	TUMORS						
INHALATION [SLOPE] COMMENT: BASED ON ROUTE TO ROUTE EXTRAPOLATION. SEE APPENDIX A-II. DOSE CONVERSIONS ON HEAST.										
BIS(2-CHLORO-1-METHYLETHYL) ETHER		**000108-60-1**								
	ORAL: GAVAGE	2 YEARS			C	7E-2	3.5E-2	2E-6	1E-5	005079
		MOUSE	LIVER	TUMORS						
			LUNG	TUMORS						
INHALATION [SLOPE] COMMENT: BASED ON ROUTE TO ROUTE EXTRAPOLATION (50% RESPIRATORY ABSORPTION). SEE APPENDIX A-II: DOSE CONVERSIONS ON HEAST. GENERAL COMMENT: COMPOUND TESTED CONTAINED 70% BIS(2-CHLORO-1-METHYLETHYL)ETHER AND 30% BIS(2-CHLOROISOPROPYL)ETHER. ALSO SEE HEAST TABLE 1: SUBCHRONIC AND CHRONIC TOXICITY (OTHER THAN CARCINOGENICITY).										
BIS(2-ETHYLHEXYL) PHTHALATE / (DEHP)		**000117-81-7**								
					IRIS	IRIS		IRIS		005120
GENERAL COMMENT: ALSO SEE HEAST TABLE 1: SUBCHRONIC AND CHRONIC TOXICITY (OTHER THAN CARCINOGENICITY).										

CHEMICAL	ROUTE	EXPERIMENT LENGTH / SPECIES	TARGET	CANCER	[EPA GROUP]	[SLOPE FACTOR] ORAL (mg/kg/day)$^{-1}$	[SLOPE FACTOR] INHALATION (mg/kg/day)$^{-1}$	[UNIT RISK] ORAL (ug/L)$^{-1}$	[UNIT RISK] INHALATION (ug/cu m)-1	REFERENCE
BIS(CHLOROMETHYL) ETHER	**000542-88-1**									
	INHALATION: INTERMITTENT	10-100 DAYS RAT	RESPIRATORY SYSTEM	TUMORS	IRIS	IRIS	2.2E+2	IRIS	IRIS	005077
	ORAL [SLOPE] COMMENT: BASED ON ROUTE TO ROUTE EXTRAPOLATION.									
	INHALATION [SLOPE] COMMENT: SEE APPENDIX A-II. DOSE CONVERSIONS ON HEAST.									
BROMODICHLOROMETHANE	**000075-27-4**									
					IRIS	IRIS		IRIS		005148
	GENERAL COMMENT: ALSO SEE HEAST TABLE 1: SUBCHRONIC AND CHRONIC TOXICITY (OTHER THAN CARCINOGENICITY).									
BROMOETHENE / (VINYL BROMIDE)	**000593-60-2**									
	INHALATION: INTERMITTENT	2 YEARS RAT	LIVER	TUMORS	B2		1.1E-1		3.2E-5	010094
	INHALATION [SLOPE] COMMENT: SEE APPENDIX A-II: DOSE CONVERSIONS ON HEAST.									
	GENERAL COMMENT: ALSO SEE HEAST TABLE 1: SUBCHRONIC AND CHRONIC TOXICITY (OTHER THAN CARCINOGENICITY)									
BROMOFORM	**000075-25-2**									
	ORAL: GAVAGE	2 YEARS RAT	INTESTINE, LARGE	ADENOMATOUS POLYP ADENOCARCINOMA	IRIS	IRIS	3.9E-3	IRIS	IRIS	005150
	INHALATION [SLOPE] COMMENT: BASED ON ROUTE TO ROUTE EXTRAPOLATION. SEE APPENDIX A-II. DOSE CONVERSIONS ON HEAST.									
	GENERAL COMMENT: ALSO SEE HEAST TABLE 1: SUBCHRONIC AND CHRONIC TOXICITY (OTHER THAN CARCINOGENICITY).									
BUTADIENE, 1,3-	**000106-99-0**									
	INHALATION: INTERMITTENT	MOUSE	MULTIPLE SITES	TUMORS	IRIS		1.8E+0		IRIS	010477
	INHALATION [SLOPE] COMMENT: SEE APPENDIX A-II. DOSE CONVERSIONS ON HEAST.									

CHEMICAL	ROUTE	EXPERIMENT LENGTH / SPECIES	TARGET	CANCER	[EPA GROUP]	[SLOPE FACTOR] ORAL (mg/kg/day)$^{-1}$	[SLOPE FACTOR] INHALATION (mg/kg/day)$^{-1}$	[UNIT RISK] ORAL (ug/L)$^{-1}$	[UNIT RISK] INHALATION (ug/cu m)$^{-1}$	REFERENCE
BUTYL BENZYL PHTHALATE, N-	**000085-68-7**									
					IRIS					005122
GENERAL COMMENT: ALSO SEE HEAST TABLE 1: SUBCHRONIC AND CHRONIC TOXICITY (OTHER THAN CARCINOGENICITY)										
CADMIUM	**007440-43-9**									
					IRIS				IRIS	005019
ORAL [SLOPE] COMMENT: THERE IS INADEQUATE EVIDENCE FOR THE CARCINOGENICITY OF THIS COMPOUND BY THE ORAL ROUTE.										
GENERAL COMMENT: ALSO SEE HEAST TABLE 1: SUBCHRONIC AND CHRONIC TOXICITY (OTHER THAN CARCINOGENICITY).										
CAPTAFOL	**002425-06-1**									
	ORAL: DIET	MOUSE	LYMPHATIC SYSTEM	LYMPHOSARCOMA	C	8.6E-3		2.4E-7		010095
ORAL [SLOPE] COMMENT: UNDER REVIEW. NUMBER SUBJECT TO CHANGE.										
GENERAL COMMENT: ALSO SEE HEAST TABLE 1: SUBCHRONIC AND CHRONIC TOXICITY (OTHER THAN CARCINOGENICITY).										
CAPTAN	**000133-06-2**									
					B2	3.5E-3		1.0E-7		010184
ORAL [SLOPE] COMMENT: UNDER REVIEW. NUMBER SUBJECT TO CHANGE.										
GENERAL COMMENT: ALSO SEE HEAST TABLE 1: SUBCHRONIC AND CHRONIC TOXICITY (OTHER THAN CARCINOGENICITY).										
CARBAZOLE	**000086-74-8**									
	ORAL: DIET	96 WEEKS MOUSE	LIVER	TUMORS	B2	2E-2		5.7E-7		010096
CARBON TETRACHLORIDE	**000056-23-5**									
	ORAL: DIET		LIVER	TUMORS	IRIS	IRIS	5.3E-2	IRIS	IRIS	005022
INHALATION [SLOPE] COMMENT: SEE APPENDIX A-II: DOSE CONVERSIONS ON HEAST.										
INHALATION [UNIT RISK] COMMENT: BASED ON ROUTE TO ROUTE EXTRAPOLATION. INCORPORATES AN ABSORPTION FACTOR OF 0.4.										
GENERAL COMMENT: ALSO SEE HEAST TABLE 1: SUBCHRONIC AND CHRONIC TOXICITY (OTHER THAN CARCINOGENICITY).										

CHEMICAL	ROUTE	EXPERIMENT LENGTH SPECIES	TARGET	CANCER	[EPA GROUP]	[SLOPE FACTOR] ORAL (mg/kg/day)$^{-1}$	[SLOPE FACTOR] INHALATION (mg/kg/day)$^{-1}$	[UNIT RISK] ORAL (ug/L)$^{-1}$	[UNIT RISK] INHALATION (ug/cu m)-1	REFERENCE
CHLORANIL		**000118-75-2**								
	ORAL: DIET	82 WEEKS			C	4.03E-1		1.2E-5		010097
		MOUSE	LIVER	TUMORS						
			LUNG	TUMORS						
CHLORDANE		**000057-74-9**								
	ORAL: DIET				IRIS	IRIS	1.3E+0	IRIS	IRIS	005024
		MOUSE	LIVER	CARCINOMA						
	INHALATION [SLOPE] COMMENT: BASED ON ROUTE TO ROUTE EXTRAPOLATION. SEE APPENDIX A-II: DOSE CONVERSIONS ON HEAST.									
	GENERAL COMMENT: ALSO SEE HEAST TABLE 1: SUBCHRONIC AND CHRONIC TOXICITY (OTHER THAN CARCINOGENICITY).									
CHLORO-2-METHYLANILINE HYDROCHLORIDE, 4-		**003165-93-3**								
	ORAL: DIET	18 MONTHS			B2	4.6E-1		1.3E-5		010419
		MOUSE	CARDIOVASCULAR SYSTEM	HEMANGIOMA						
			CARDIOVASCULAR SYSTEM	HEMANGIOSARCOMA						
CHLORO-2-METHYLANILINE, 4-		**000095-69-2**								
	ORAL: DIET	18 MONTHS			B2	5.8E-1		1.6E-5		010098
		MOUSE	CARDIOVASCULAR SYSTEM	HEMANGIOMA						
			CARDIOVASCULAR SYSTEM	HEMANGIOSARCOMA						
	ORAL [SLOPE] COMMENT: BASED ON VASCULAR TUMORS IN MICE TREATED WITH 4-CHLORO-2-METHYLANILINE HYDROCHLORIDE.									

CHEMICAL	ROUTE	EXPERIMENT LENGTH / SPECIES	TARGET	CANCER	[EPA GROUP]	[SLOPE FACTOR] ORAL (mg/kg/day)$^{-1}$	[SLOPE FACTOR] INHALATION (mg/kg/day)$^{-1}$	[UNIT RISK] ORAL (ug/L)$^{-1}$	[UNIT RISK] INHALATION (ug/cu m)-1	REFERENCE
CHLOROBENZILATE		**000510-15-6**								
	ORAL: GAVAGE, DIET	82 WEEKS MOUSE	LIVER	HEPATOMA	B2	2.7E-1	2.7E-1	7.8E-6	7.8E-5	010848
	INHALATION [SLOPE] COMMENT: ABSORBANCE BY THE INHALATION ROUTE WAS ASSUMED TO EQUAL ORAL ABSORPTION SINCE THERE WERE NO PHARMACOKINETIC DATA TO THE CONTRARY. SEE APPENDIX A-II: DOSE CONVERSIONS ON HEAST.									
	INHALATION [UNIT RISK] COMMENT: ABSORBANCE BY THE INHALATION ROUTE WAS ASSUMED TO EQUAL ORAL ABSORPTION SINCE THERE WERE NO PHARMACOKINETIC DATA TO THE CONTRARY.									
	GENERAL COMMENT: ALSO SEE HEAST TABLE 1: SUBCHRONIC AND CHRONIC TOXICITY (OTHER THAN CARCINOGENICITY).									
CHLOROFORM		**000067-66-3**								
					IRIS	IRIS		IRIS		005036
	ORAL: GAVAGE	78 WEEKS MOUSE	LIVER	CARCINOMA	IRIS		8.1E-2		IRIS	005035
	INHALATION [SLOPE] COMMENT: BASED ON ROUTE TO ROUTE EXTRAPOLATION. SEE APPENDIX A-II. DOSE CONVERSIONS ON HEAST.									
	GENERAL COMMENT: ALSO SEE HEAST TABLE 1: SUBCHRONIC AND CHRONIC TOXICITY (OTHER THAN CARCINOGENICITY).									
CHLOROMETHANE		**000074-87-3**								
	INHALATION: INTERMITTENT	24 MONTHS MOUSE	KIDNEY	TUMORS	C	1.3E-2	6.3E-3	3.7E-7	1.8E-6	005038
	ORAL [SLOPE] COMMENT: BASED ON ROUTE TO ROUTE EXTRAPOLATION.									
	GENERAL COMMENT: ALSO SEE HEAST TABLE 1: SUBCHRONIC AND CHRONIC TOXICITY (OTHER THAN CARCINOGENCIITY).									
CHLOROMETHYL METHYL ETHER		**000107-30-2**								
					IRIS					005081
CHLORONITROBENZENE, O-		**000088-73-3**								
	ORAL: DIET	18 MONTHS MOUSE	LIVER	TUMORS	B2	2.5E-2		7.1E-7		010099

CHEMICAL	ROUTE	EXPERIMENT LENGTH / SPECIES	TARGET	CANCER	[EPA GROUP]	[SLOPE FACTOR] ORAL (mg/kg/day)$^{-1}$	[SLOPE FACTOR] INHALATION (mg/kg/day)$^{-1}$	[UNIT RISK] ORAL (ug/L)$^{-1}$	[UNIT RISK] INHALATION (ug/cu m)-1	REFERENCE
CHLORONITROBENZENE, P-	**000100-00-5**									
	ORAL: DIET	18 MONTHS MOUSE	CARDIOVASCULAR SYSTEM	TUMORS	B2	1.8E-2		5.1E-7		010100
CHLOROTHALONIL	**001897-45-6**									
	ORAL: DIET	27-32 MONTHS RAT	KIDNEY	TUMOR	B2	1.1E-2		3.1E-7		010384
	ORAL [SLOPE] COMMENT: UNDER REVIEW. NUMBER SUBJECT TO CHANGE.									
	GENERAL COMMENT: ALSO SEE HEAST TABLE 1: SUBCHRONIC AND CHRONIC TOXICITY (OTHER THAN CARCINOGENICITY).									
CHROMIUM(VI)	**018540-29-9**									
	INHALATION: OCCUPATIONAL	HUMAN	LUNG	TUMORS	IRIS		4.1E+1		IRIS	005091
	INHALATION [SLOPE] COMMENT: SEE APPENDIX A-II. DOSE CONVERSIONS ON HEAST.									
	GENERAL COMMENT: ALSO SEE HEAST TABLE 1: SUBCHRONIC AND CHRONIC TOXICITY (OTHER THAN CARCINOGENICITY).									
CHRYSENE	**000218-01-9**									
					IRIS					010185
	GENERAL COMMENT: SEE HEAST TABLE 1: SUBCHRONIC AND CHRONIC TOXICITY (OTHER THAN CARCINOGENICITY).									
COKE OVEN EMISSIONS	**008007-45-2**									
	INHALATION: OCCUPATIONAL	HUMAN	LUNG	TUMORS	IRIS		2.2E+0		IRIS	005039
	INHALATION [SLOPE] COMMENT: SEE APPENDIX A-II. DOSE CONVERSIONS ON HEAST.									
	GENERAL COMMENT: FORMERLY LISTED UNDER COAL TARS.									
CREOSOTE, COAL TAR	**008001-58-9**									
					IRIS					005042

CHEMICAL	ROUTE	EXPERIMENT LENGTH / SPECIES	TARGET	CANCER	[EPA GROUP]	[SLOPE FACTOR] ORAL (mg/kg/day)$^{-1}$	[SLOPE FACTOR] INHALATION (mg/kg/day)$^{-1}$	[UNIT RISK] ORAL (ug/L)$^{-1}$	[UNIT RISK] INHALATION (ug/cu m)-1	REFERENCE
CRESOL, M- / (3-METHYLPHENOL) 000108-39-4										
					IRIS					010187
GENERAL COMMENT: ALSO SEE HEAST TABLE 1: SUBCHRONIC AND CHRONIC TOXICITY (OTHER THAN CARCINOGENICITY).										
CRESOL, O- / (2-METHYLPHENOL) 000095-48-7										
					IRIS					010186
GENERAL COMMENT: ALSO SEE HEAST TABLE 1: SUBCHRONIC AND CHRONIC TOXICITY (OTHER THAN CARCINOGENICITY).										
CRESOL, P- / (4-METHYLPHENOL) 000106-44-5										
					IRIS					010188
GENERAL COMMENT: ALSO SEE HEAST TABLE 1: SUBCHRONIC AND CHRONIC TOXICITY (OTHER THAN CARCINOGENICITY).										
CROTONALDEHYDE 000123-73-9										
	ORAL: DRINKING WATER	113 WKS RAT	LIVER	TUMOR	IRIS	1.9E+0		5.4E-5		010190
ORAL [SLOPE] COMMENT: UNDER REVIEW. NUMBER SUBJECT TO CHANGE.										
CYANAZINE 021725-46-2										
	ORAL: DIET	2 YEARS RAT	MAMMARY GLAND	ADENOMA/ CARCINOMA, COMBINED	C	8.4E-1		2.4E-5		010944
GENERAL COMMENT: ALSO SEE HEAST TABLE 1: SUBCHRONIC AND CHRONIC TOXICITY (OTHER THAN CARCINOGENICITY).										
DDD 000072-54-8										
					IRIS	IRIS		IRIS		010291

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IRIS, EPA'S INTEGRATED RISK INFORMATION SYSTEM, IS UPDATED MONTHLY. FURTHER INFORMATION: RISK INFORMATION HOTLINE: (513) 569-7254.

HEAST TABLE 3: CARCINOGENICITY

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CHEMICAL	ROUTE	EXPERIMENT LENGTH / SPECIES	TARGET	CANCER	[EPA GROUP]	[SLOPE FACTOR] ORAL (mg/kg/day)$^{-1}$	[SLOPE FACTOR] INHALATION (mg/kg/day)$^{-1}$	[UNIT RISK] ORAL (ug/L)$^{-1}$	[UNIT RISK] INHALATION (ug/cu m)-1	REFERENCE
DDE		**000072-55-9**			IRIS	IRIS		IRIS		010292
DDT	ORAL: DIET	**000050-29-3** MOUSE, RAT	LIVER	TUMORS	IRIS	IRIS	3.4E-1	IRIS	IRIS	005044
	INHALATION [SLOPE] COMMENT: BASED ON ROUTE TO ROUTE EXTRAPOLATION. SEE APPENDIX A-II, DOSE CONVERSIONS ON HEAST.									
	GENERAL COMMENT: ALSO SEE HEAST TABLE 1: SUBCHRONIC AND CHRONIC TOXICITY (OTHER THAN CARCINOGENICITY).									
DECABROMODIPHENYL ETHER		**001163-19-5**			IRIS					010102
	GENERAL COMMENT: ALSO SEE HEAST TABLE 1: SUBCHRONIC AND CHRONIC TOXICITY (OTHER THAN CARCINOGENICITY).									
DIALLATE	ORAL	**002303-16-4** 19 MONTHS MOUSE	LIVER	TUMORS	B2	6.1E-2		1.7E-6		010103
DIBENZO[A,H]ANTHRACENE		**000053-70-3**			IRIS					010191

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CHEMICAL	ROUTE	EXPERIMENT LENGTH / SPECIES	TARGET	CANCER	[EPA GROUP]	[SLOPE FACTOR] ORAL (mg/kg/day)$^{-1}$	[SLOPE FACTOR] INHALATION (mg/kg/day)$^{-1}$	[UNIT RISK] ORAL (ug/L)$^{-1}$	[UNIT RISK] INHALATION (ug/cu m)-1	REFERENCE
DIBROMO-3-CHLOROPROPANE, 1,2	**000096-12-8**									
	ORAL: DIET				B2	1.4E+0		4E-5		010484
			STOMACH	TUMORS						
			KIDNEY	TUMORS						
			LIVER	TUMORS						
	[EPA GROUP] COMMENT: UNDER REVIEW. CLASSIFICATION SUBJECT TO CHANGE.									
	INHALATION [SLOPE] COMMENT: SEE APPENDIX A-II: DOSE CONVERSIONS ON HEAST.									
	INHALATION:				B2		2.4E-3		6.9E-7	010519
	INTERMITTENT	RAT, MOUSE	NASAL CAVITY	TUMORS						
DIBROMOCHLOROMETHANE	**000124-48-1**									
					IRIS	IRIS		IRIS		010891
	GENERAL COMMENT: FORMERLY LISTED AS CHLORODIBROMOMETHANE. ALSO SEE HEAST TABLE 1: SUBCHRONIC AND CHRONIC TOXICITY (OTHER THAN CARCINOGENICITY).									
DIBROMOETHANE, 1,2-	**000106-93-4**									
					IRIS	IRIS		IRIS		005818
	GENERAL COMMENT: FORMERLY LISTED UNDER ETHYLENE DIBROMIDE									
	INHALATION:	88-103 WEEKS			IRIS		7.6E-1		IRIS	005071
	INTERMITTENT	RAT	NASAL CAVITY	TUMORS						
	INHALATION [SLOPE] COMMENT: SEE APPENDIX A-II. DOSE CONVERSIONS ON HEAST.									
	GENERAL COMMENT: ALSO SEE HEAST TABLE 1: SUBCHRONIC AND CHRONIC TOXICITY (OTHER THAN CARCINOGENICITY).									

CHEMICAL	ROUTE	EXPERIMENT LENGTH / SPECIES	TARGET	CANCER	[EPA GROUP]	[SLOPE FACTOR] ORAL (mg/kg/day)$^{-1}$	[SLOPE FACTOR] INHALATION (mg/kg/day)$^{-1}$	[UNIT RISK] ORAL (ug/L)$^{-1}$	[UNIT RISK] INHALATION (ug/cu m)-1	REFERENCE
DICHLORO-2-BUTENE, 1,4-	**000764-41-0**									
	INHALATION: INTERMITTENT	90 DAYS RAT	NASAL PASSAGES	TUMORS	B2		9.3E+0		2.6E-3	005053
	INHALATION [SLOPE] COMMENT: SEE APPENDIX A-II: DOSE CONVERSIONS ON HEAST.									
	GENERAL COMMENT: FORMERLY LISTED UNDER DICHLOROBUTENES									
DICHLOROBENZENE, 1,4-	**000106-46-7**									
	ORAL: GAVAGE	103 WEEKS MOUSE	LIVER	TUMORS	C	2.4E-2		6.8E-7		005050
	ORAL [SLOPE] COMMENT: UNDER REVIEW, NUMBER SUBJECT TO CHANGE.									
	GENERAL COMMENT: ALSO SEE HEAST TABLE 1: SUBCHRONIC AND CHRONIC TOXICITY (OTHER THAN CARCINOGENICITY).									
DICHLOROBENZIDINE, 3,3'-	**000091-94-1**				IRIS	IRIS		IRIS		005815
DICHLOROETHANE, 1,1-	**000075-34-3**				IRIS					005055
	GENERAL COMMENT: ALSO SEE HEAST TABLE 1: SUBCHRONIC AND CHRONIC TOXICITY (OTHER THAN CARCINOGENICITY).									
DICHLOROETHANE, 1,2-	**000107-06-2**				IRIS	IRIS		IRIS	IRIS	005058
	ORAL: GAVAGE	78 WEEKS RAT	CIRCULATORY SYSTEM	SARCOMA						
	GENERAL COMMENT: ALSO SEE HEAST TABLE 1: SUBCHRONIC AND CHRONIC TOXICITY (OTHER THAN CARCINOGENICITY)									

CHEMICAL	ROUTE	EXPERIMENT LENGTH / SPECIES	TARGET	CANCER	[EPA GROUP]	[SLOPE FACTOR] ORAL (mg/kg/day)[1]	[SLOPE FACTOR] INHALATION (mg/kg/day)[1]	[UNIT RISK] ORAL (ug/L)[1]	[UNIT RISK] INHALATION (ug/cu m)-1	REFERENCE
DICHLOROETHYLENE, 1,1-	**000075-35-4**									
					IRIS	IRIS		IRIS		005060
	INHALATION	12 MONTHS MOUSE	KIDNEY	ADENOCARCINOMA	IRIS		1.2E+0		IRIS	005059
	INHALATION [SLOPE] COMMENT: SEE APPENDIX A-II, DOSE CONVERSIONS ON HEAST.									
	GENERAL COMMENT: ALSO SEE HEAST TABLE 1: SUBCHRONIC AND CHRONIC TOXICITY (OTHER THAN CARCINOGENICITY).									
DICHLOROPROPANE, 1,2-	**000078-87-5**									
	ORAL: GAVAGE	MOUSE	LIVER	TUMORS	B2	6.8E-2		1.9E-6		005062
	ORAL [SLOPE] COMMENT: UNDER REVIEW, NUMBER SUBJECT TO CHANGE.									
	GENERAL COMMENT: ALSO SEE HEAST TABLE 1: SUBCHRONIC AND CHRONIC TOXICITY (OTHER THAN CARCINOGENICITY)									

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CHEMICAL	ROUTE	EXPERIMENT LENGTH / SPECIES	TARGET	CANCER	[EPA GROUP]	[SLOPE FACTOR] ORAL (mg/kg/day)$^{-1}$	[SLOPE FACTOR] INHALATION (mg/kg/day)$^{-1}$	[UNIT RISK] ORAL (ug/L)$^{-1}$	[UNIT RISK] INHALATION (ug/cu m)-1	REFERENCE
DICHLOROPROPENE, 1,3- / (TELONE II)	**000542-75-6**									
	ORAL: GAVAGE	104 WEEKS MOUSE	BLADDER	CARCINOMA	IRIS	1.8E-1		5E-6		010946
			RESPIRATORY SYSTEM	ALVEOLAR/ BRONCHIOLAR ADENOMA						
			FORESTOMACH	PAPILLOMA/ CARCINOMA						
	ORAL: GAVAGE	104 WEEKS RAT	LIVER	NEOPLASTIC NODULE/CARCINOMA						
			FORESTOMACH	PAPILLOMA/ CARCINOMA						
	ORAL [SLOPE] COMMENT: THE [SLOPE] IS THE GEOMETRIC MEAN OF SLOPE FACTORS OF COMBINED TUMORS LISTED. GENERAL COMMENT: ALSO SEE HEAST TABLE 1: SUBCHRONIC AND CHRONIC TOXICITY (OTHER THAN CARCINOGENICITY)									
	INHALATION: INTERMITTENT	2 YEARS MOUSE	LUNG	ADENOMA	IRIS		1.3E-1		3.7E-5	010104
	INHALATION [SLOPE] COMMENT: SEE APPENDIX A-II: DOSE CONVERSIONS ON HEAST. GENERAL COMMENT: ALSO SEE HEAST TABLE 1: SUBCHRONIC AND CHRONIC TOXICITY (OTHER THAN CARCINOGENICITY).									
DIELDRIN	**000060-57-1**									
	ORAL: DIET	MOUSE	LIVER	CARCINOMA	IRIS	IRIS	1.6E+1	IRIS	IRIS	005816
	INHALATION [SLOPE] COMMENT: SEE APPENDIX A-II, DOSE CONVERSIONS ON HEAST. INHALATION [UNIT RISK] COMMENT: BASED ON ROUTE-TO-ROUTE EXTRAPOLATION. GENERAL COMMENT: ALSO SEE HEAST TABLE 1: SUBCHRONIC AND CHRONIC TOXICITY (OTHER THAN CARCINOGENICITY).									

CHEMICAL	ROUTE	EXPERIMENT LENGTH / SPECIES	TARGET	CANCER	[EPA GROUP]	[SLOPE FACTOR] ORAL (mg/kg/day)$^{-1}$	[SLOPE FACTOR] INHALATION (mg/kg/day)$^{-1}$	[UNIT RISK] ORAL (ug/L)$^{-1}$	[UNIT RISK] INHALATION (ug/cu m)-1	REFERENCE
DIETHYLSTILBESTROL		**000056-53-1**								
	ORAL: DIET	MOUSE	MAMMARY GLAND	CARCINOMA	A	4.7E+3		1.3E-1		010485
DIMETHOXYBENZIDINE, 3,3'-		**000119-90-4**								
	ORAL: DIET	LIFETIME HAMSTER	FORESTOMACH	PAPILLOMA	B2	1.4E-2		4E-7		010106
DIMETHYLANILINE HYDROCHLORIDE, 2,4-		**021436-96-4**								
	ORAL: DIET	18 MONTHS MOUSE	LUNG	TUMORS	C	5.8E-1		1.7E-5		010108
DIMETHYLANILINE, 2,4-		**000095-68-1**								
	ORAL: DIET	18 MONTHS MOUSE	LUNG	TUMORS	C	7.5E-1		2.1E-5		010107
DIMETHYLBENZIDINE, 3,3'-		**000119-93-7**								
	ORAL: GAVAGE	30 DAYS RAT	MAMMARY	TUMORS	B2	9.2E+0		2.6E-4		010109
DIMETHYLHYDRAZINE, 1,1-		**000057-14-7**								
	GENERAL COMMENT: NO EPA GROUP CLASSIFICATION WAS PROVIDED IN THE REFERENCE DOCUMENT, THEREFORE THIS COMPOUND WAS REMOVED FROM TABLE 3.									
DIMETHYLHYDRAZINE, 1,2-		**000540-73-8**			B2					010962
DIMETHYLSULFATE		**000077-78-1**			IRIS					010112

IRIS, EPA'S INTEGRATED RISK INFORMATION SYSTEM, IS UPDATED MONTHLY. FURTHER INFORMATION: RISK INFORMATION HOTLINE: (513) 569-7254.

CHEMICAL	ROUTE	EXPERIMENT LENGTH / SPECIES	TARGET	CANCER	[EPA GROUP]	[SLOPE FACTOR] ORAL (mg/kg/day)-1	[SLOPE FACTOR] INHALATION (mg/kg/day)-1	[UNIT RISK] ORAL (ug/L)-1	[UNIT RISK] INHALATION (ug/cu m)-1	REFERENCE
DINITROTOLUENE, 2,4-	**000121-14-2**				IRIS	IRIS		IRIS		005066
GENERAL COMMENT: LISTED AS "DINITROTOLUENE MIXTURE, 2,4-/2,6-" ON IRIS. ALSO SEE HEAST TABLE 1: SUBCHRONIC AND CHRONIC TOXICITY (OTHER THAN CARCINOGENICITY).										
DINITROTOLUENE, 2,6-	**000606-20-2**				IRIS	IRIS		IRIS		005068
GENERAL COMMENT: LISTED AS "DINITROTOLUENE MIXTURE, 2,4-/2,6-" ON IRIS. ALSO SEE HEAST TABLE 1: SUBCHRONIC AND CHRONIC TOXICITY (OTHER THAN CARCINOGENICITY).										
DIOXANE, 1,4-	**000123-91-1**				IRIS	IRIS		IRIS		010298
DIPHENYLHYDRAZINE, 1,2-	**000122-66-7**				IRIS	IRIS	8.0E-1	IRIS	IRIS	005070
ORAL: DIET	2 YEARS / RAT		LIVER	TUMORS						
INHALATION [SLOPE] COMMENT: BASED ON ROUTE TO ROUTE EXTRAPOLATION. SEE APPENDIX A-II, DOSE CONVERSIONS ON HEAST.										
DIRECT BLACK 38	**001937-37-7**				A	8.6E+0		2.4E-4		010113
ORAL: DIET	93 DAYS / RAT		LIVER	TUMORS						
ORAL [SLOPE] COMMENT: UNDER REVIEW, NUMBER SUBJECT TO CHANGE.										
DIRECT BLUE 6	**002602-46-2**				A	8.1E+0		2.3E-4		010114
ORAL: DIET	91 DAYS / RAT		LIVER	TUMORS						
ORAL [SLOPE] COMMENT: UNDER REVIEW, NUMBER SUBJECT TO CHANGE.										

CHEMICAL	ROUTE	EXPERIMENT LENGTH / SPECIES	TARGET	CANCER	[EPA GROUP]	[SLOPE FACTOR] ORAL (mg/kg/day)$^{-1}$	[SLOPE FACTOR] INHALATION (mg/kg/day)$^{-1}$	[UNIT RISK] ORAL (ug/L)$^{-1}$	[UNIT RISK] INHALATION (ug/cu m)-1	REFERENCE
DIRECT BROWN 95		**016071-86-6**								
	ORAL: DIET	91 DAYS			A	9.3E+0		2.6E-4		010115
		RAT	LIVER	TUMORS						
	ORAL [SLOPE] COMMENT: UNDER REVIEW. NUMBER SUBJECT TO CHANGE.									
DIRECT SKY BLUE 6B		**002610-05-1**								
					B2					010116
	[EPA GROUP] COMMENT: BASED ON THE FACT THAT 3,3-DIMETHOXYBENZIDINE, A KNOWN EPA GROUP B2 CARCINOGEN, IS A METABOLITE OF DIRECT SKY BLUE 6B.									
EPICHLOROHYDRIN		**000106-89-8**								
					IRIS	IRIS		IRIS		010198
	INHALATION: INTERMITTENT	30 DAYS, OBSERVED LIFETIME			IRIS		4.2E-3		IRIS	010117
		RAT	NASAL CAVITY	TUMORS						
	INHALATION [SLOPE] COMMENT: SEE APPENDIX A-II, DOSE CONVERSIONS ON HEAST. GENERAL COMMENT: ALSO SEE HEAST TABLE 1: SUBCHRONIC AND CHRONIC TOXICITY (OTHER THAN CARCINOGENICITY).									
ETHYL ACRYLATE		**000140-88-5**								
	ORAL: GAVAGE	104 WEEKS			B2	4.8E-2		1.4E-6		010118
		RAT	FORESTOMACH	TUMORS						

HEAST TABLE 3: CARCINOGENICITY

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CHEMICAL	ROUTE	EXPERIMENT LENGTH / SPECIES	TARGET	CANCER	[EPA GROUP]	[SLOPE FACTOR] ORAL (mg/kg/day)$^{-1}$	[SLOPE FACTOR] INHALATION (mg/kg/day)$^{-1}$	[UNIT RISK] ORAL (ug/L)$^{-1}$	[UNIT RISK] INHALATION (ug/cu m)-1	REFERENCE
ETHYLENE OXIDE		**000075-21-8**								
	ORAL: GAVAGE	LIFETIME, TWICE WEEKLY RAT	STOMACH	TUMORS	B1	1.02E+0		2.9E-5		010421
	ORAL [SLOPE] COMMENT: UNDER REVIEW, NUMBER SUBJECT TO CHANGE.									
	INHALATION: INTERMITTENT	2 YEARS RAT	BLOOD BRAIN	LEUKEMIA GLIOMA	B1		3.5E-1		1E-4	010422
	INHALATION [UNIT RISK] COMMENT: UNDER REVIEW, NUMBER SUBJECT TO CHANGE.									
ETHYLENE THIOUREA		**000096-45-7**								
	ORAL: GAVAGE	2 YEARS MOUSE	LIVER	ADENOMA/ CARCINOMA, COMBINED	B2	1.1E-1		3.4E-6		010947
	GENERAL COMMENT: ALSO SEE HEAST TABLE 1: SUBCHRONIC AND CHRONIC TOXICITY (OTHER THAN CARCINOGENICITY)									
FOLPET		**000133-07-3**			IRIS	IRIS		IRIS		010120
	GENERAL COMMENT: ALSO SEE HEAST TABLE 1: SUBCHRONIC AND CHRONIC TOXICITY (OTHER THAN CARCINOGENICITY).									
FORMALDEHYDE		**000050-00-0**								
	INHALATION	24 MONTHS RAT	NASAL CAVITY	TUMORS	IRIS		4.5E-2		IRIS	010121
	INHALATION [SLOPE] COMMENT: SEE APPENDIX A-II: DOSE CONVERSIONS ON HEAST. GENERAL COMMENT: ALSO SEE HEAST TABLE 1: SUBCHRONIC AND CHRONIC TOXICITY (OTHER THAN CARCINOGENICITY).									

IRIS, EPA'S INTEGRATED RISK INFORMATION SYSTEM, IS UPDATED MONTHLY. FURTHER INFORMATION: RISK INFORMATION HOTLINE: (513) 569-7254.

CHEMICAL	ROUTE	EXPERIMENT LENGTH / SPECIES	TARGET	CANCER	[EPA GROUP]	[SLOPE FACTOR] ORAL (mg/kg/day)$^{-1}$	[SLOPE FACTOR] INHALATION (mg/kg/day)$^{-1}$	[UNIT RISK] ORAL (ug/L)$^{-1}$	[UNIT RISK] INHALATION (ug/cu m)-1	REFERENCE
FURAZOLIDONE		**000067-45-8**								
	ORAL: DIET	45 WEEKS			B2	3.8E+0		1E-4		005106
		RAT	MAMMARY	TUMORS						
	GENERAL COMMENT: FORMERLY LISTED UNDER NITROFURANS									
FURIUM		**000531-82-8**								
	ORAL: DIET	28 WEEKS			B2	5.0E+1		1 4E-3		005108
		MOUSE	BLOOD	LEUKEMIA						
	GENERAL COMMENT: FORMERLY LISTED UNDER NITROFURANS									
GLYCIDALDEHYDE		**000765-34-4**								
					IRIS					010122
	GENERAL COMMENT: ALSO SEE HEAST TABLE 1: SUBCHRONIC AND CHRONIC TOXICITY (OTHER THAN CARCINOGENICITY).									
HEPTACHLOR		**000076-44-8**								
	ORAL: DIET				IRIS	IRIS	4.5E+0	IRIS	IRIS	005820
		MOUSE	LIVER	CARCINOMA						
	INHALATION [SLOPE] COMMENT: BASED ON ROUTE TO ROUTE EXTRAPOLATION. SEE APPENDIX A-II, DOSE CONVERSIONS ON HEAST.									
	GENERAL COMMENT: ALSO SEE HEAST TABLE 1: SUBCHRONIC AND CHRONIC TOXICITY (OTHER THAN CARCINOGENICITY).									
HEPTACHLOR EPOXIDE		**001024-57-3**								
	ORAL: DIET	18-24 MONTHS			IRIS	IRIS	9.1E+0	IRIS	IRIS	010424
		MOUSE	LIVER	CARCINOMA						
	INHALATION [SLOPE] COMMENT: BASED ON ROUTE TO ROUTE EXTRAPOLATION. SEE APPENDIX A-II, DOSE CONVERSIONS ON HEAST.									
	GENERAL COMMENT: ALSO SEE HEAST TABLE 1: SUBCHRONIC AND CHRONIC TOXICITY (OTHER THAN CARCINOGENICITY).									

CHEMICAL	ROUTE	EXPERIMENT LENGTH / SPECIES	TARGET	CANCER	[EPA GROUP]	[SLOPE FACTOR] ORAL (mg/kg/day)$^{-1}$	[SLOPE FACTOR] INHALATION (mg/kg/day)$^{-1}$	[UNIT RISK] ORAL (ug/L)$^{-1}$	[UNIT RISK] INHALATION (ug/cu m)-1	REFERENCE
HEXACHLOROBENZENE	**000118-74-1**									
	ORAL: DIET	RAT	LIVER	TUMORS	IRIS	IRIS	1.6E+0	IRIS	IRIS	010365
	INHALATION [SLOPE] COMMENT: BASED ON ROUTE TO ROUTE EXTRAPOLATION. SEE APPENDIX A-II. DOSE CONVERSIONS ON HEAST.									
	GENERAL COMMENT: ALSO SEE HEAST TABLE 1: SUBCHRONIC AND CHRONIC TOXICITY (OTHER THAN CARCINOGENICITY).									
HEXACHLOROBUTADIENE	**000087-68-3**									
	ORAL: DIET	22-24 MONTHS RAT	KIDNEY	TUMORS	IRIS	IRIS	7.8E-2	IRIS	IRIS	005088
	INHALATION [SLOPE] COMMENT: BASED ON ROUTE TO ROUTE EXTRAPOLATION. SEE APPENDIX A-II. DOSE CONVERSIONS ON HEAST.									
	GENERAL COMMENT: ALSO SEE HEAST TABLE 1: SUBCHRONIC AND CHRONIC TOXICITY (OTHER THAN CARCINOGENICITY).									
HEXACHLOROCYCLOHEXANE, ALPHA-	**000319-84-6**									
	ORAL: DIET	24 WEEKS MOUSE	LIVER	TUMORS	IRIS	IRIS	6.3E+0	IRIS	IRIS	010123
	INHALATION [SLOPE] COMMENT: BASED ON ROUTE TO ROUTE EXTRAPOLATION. SEE APPENDIX A-II. DOSE CONVERSIONS ON HEAST.									
HEXACHLOROCYCLOHEXANE, BETA-	**000319-85-7**									
	ORAL: DIET	110 WEEKS MOUSE	LIVER	TUMORS	IRIS	IRIS	1.8E+0	IRIS	IRIS	010124
	INHALATION [SLOPE] COMMENT: BASED ON ROUTE TO ROUTE EXTRAPOLATION. SEE APPENDIX A-II. DOSE CONVERSIONS ON HEAST.									
HEXACHLOROCYCLOHEXANE, DELTA-	**000319-86-8**				IRIS					010125
	GENERAL COMMENT: ALSO SEE HEAST TABLE 1: SUBCHRONIC AND CHRONIC TOXICITY (OTHER THAN CARCINOGENICITY).									
HEXACHLOROCYCLOHEXANE, EPSILON-	**006108-10-7**				IRIS					010126
	GENERAL COMMENT: ALSO SEE HEAST TABLE 1: SUBCHRONIC AND CHRONIC TOXICITY (OTHER THAN CARCINOGENICITY).									

CHEMICAL	ROUTE	EXPERIMENT LENGTH / SPECIES	TARGET	CANCER	[EPA GROUP]	[SLOPE FACTOR] ORAL (mg/kg/day)$^{-1}$	[SLOPE FACTOR] INHALATION (mg/kg/day)$^{-1}$	[UNIT RISK] ORAL (ug/L)$^{-1}$	[UNIT RISK] INHALATION (ug/cu m)-1	REFERENCE
HEXACHLOROCYCLOHEXANE, GAMMA- 000058-89-9										
	ORAL: DIET	110 WEEKS MOUSE	LIVER	TUMORS	B2-C	1.3E+0		3.7E-5		005098
	ORAL [SLOPE] COMMENT: UNDER REVIEW, NUMBER SUBJECT TO CHANGE. GENERAL COMMENT: ALSO SEE HEAST TABLE 1: SUBCHRONIC AND CHRONIC TOXICITY (OTHER THAN CARCINOGENICITY).									
HEXACHLOROCYCLOHEXANE-TECHNICAL 000608-73-1										
	ORAL: DIET	6-20 MONTHS MOUSE	LIVER	TUMORS	IRIS	IRIS	1.8E+0	IRIS	IRIS	010127
	INHALATION [SLOPE] COMMENT: BASED ON ROUTE TO ROUTE EXTRAPOLATION. SEE APPENDIX A-II, DOSE CONVERSIONS ON HEAST.									
HEXACHLOROETHANE 000067-72-1										
	ORAL: GAVAGE	78 WEEKS MOUSE	LIVER	CARCINOMA	IRIS	IRIS	1.4E-2	IRIS	IRIS	005090
	INHALATION [SLOPE] COMMENT: BASED ON ROUTE TO ROUTE EXTRAPOLATION. SEE APPENDIX A-II, DOSE CONVERSIONS ON HEAST. GENERAL COMMENT: ALSO SEE HEAST TABLE 1: SUBCHRONIC AND CHRONIC TOXICITY (OTHER THAN CARCINOGENICITY).									
HYDRAZINE 000302-01-2										
					IRIS	IRIS		IRIS		010129
	INHALATION: INTERMITTENT	1 YEAR RAT	NASAL CAVITY	TUMORS	IRIS		1.7E+1		IRIS	010128
	INHALATION [SLOPE] COMMENT: SEE APPENDIX A-II, DOSE CONVERSIONS ON HEAST.									

CHEMICAL	ROUTE	EXPERIMENT LENGTH / SPECIES	TARGET	CANCER	[EPA GROUP]	[SLOPE FACTOR] ORAL (mg/kg/day)$^{-1}$	[SLOPE FACTOR] INHALATION (mg/kg/day)$^{-1}$	[UNIT RISK] ORAL (ug/L)$^{-1}$	[UNIT RISK] INHALATION (ug/cu m)-1	REFERENCE
HYDRAZINE SULFATE		**010034-93-2**			IRIS	IRIS		IRIS		010131
	INHALATION: INTERMITTENT	1 YEAR RAT	NASAL CAVITY	TUMORS	IRIS		1.7E+1		IRIS	010130
	INHALATION [SLOPE] COMMENT: SEE APPENDIX A-II, DOSE CONVERSIONS ON HEAST. GENERAL COMMENT: LISTED UNDER "HYDRAZINE" ON IRIS.									
INDENO[1,2,3-CD]PYRENE		**000193-39-5**			IRIS					010192
ISOPHORONE		**000078-59-1**			IRIS	IRIS		IRIS		005094
	GENERAL COMMENT: ALSO SEE HEAST TABLE 1: SUBCHRONIC AND CHRONIC TOXICITY (OTHER THAN CARCINOGENICITY).									
LEAD		**007439-92-1**			IRIS					005096
	GENERAL COMMENT: ALSO SEE HEAST TABLE 1: SUBCHRONIC AND CHRONIC TOXICITY (OTHER THAN CARCINOGENICITY).									
LINURON		**000330-55-2**			IRIS					010383
	GENERAL COMMENT: ALSO SEE HEAST TABLE 1: SUBCHRONIC AND CHRONIC TOXICITY (OTHER THAN CARCINOGENICITY).									
MERCURIC CHLORIDE		**007487-94-7**			IRIS					010971
	GENERAL COMMENT: ALSO SEE HEAST TABLE 1: SUBCHRONIC AND CHRONIC TOXICITY (OTHER THAN CARCINOGENICITY).									

CHEMICAL	ROUTE	EXPERIMENT LENGTH / SPECIES	TARGET	CANCER	[EPA GROUP]	[SLOPE FACTOR] ORAL (mg/kg/day)[1]	[SLOPE FACTOR] INHALATION (mg/kg/day)[1]	[UNIT RISK] ORAL (ug/L)[1]	[UNIT RISK] INHALATION (ug/cu m)-1	REFERENCE
MERCURY, ELEMENTAL		**007439-97-6**								
					IRIS					010973
GENERAL COMMENT: ALSO SEE HEAST TABLE 1: SUBCHRONIC AND CHRONIC TOXICITY (OTHER THAN CARCINOGENICITY).										
METHOXY-5-NITROANILINE, 2-		**000099-59-2**								
	ORAL: DIET	104 WEEKS			B2	4.6E-2		1.3E-6		010132
		RAT	SKIN	CARCINOMA						
METHYLHYDRAZINE		**000060-34-4**								
GENERAL COMMENT: NO EPA GROUP CLASSIFICATION WAS PROVIDED IN THE REFERENCE DOCUMENT. THEREFORE THIS COMPOUND WAS REMOVED FROM TABLE 3.										
METHYL-5-NITROANILINE, 2-		**000099-55-8**								
	ORAL: DIET	98 WEEKS			C	3.3E-2		9.4E-7		010140
		MOUSE	LIVER	CARCINOMA						
METHYLANILINE HYDROCHLORIDE, 2-		**000636-21-5**								
	ORAL: DIET	93 WEEKS			B2	1.8E-1		5.1E-6		010134
		RAT	SKIN	FIBROMA						
METHYLANILINE, 2-		**000095-53-4**								
	ORAL: DIET	93 WEEKS			B2	2.4E-1		6.9E-6		010133
		RAT	SKIN	FIBROMA						
GENERAL COMMENT: THE 1984 HEEP CALLED THIS COMPOUND O-TOLUIDINE, THE 1987 HEEP CALLED IT 2-METHYLANILINE.										
METHYLENE CHLORIDE / (DICHLOROMETHANE)		**000075-09-2**								
					IRIS	IRIS		IRIS		005100
					IRIS				IRIS	005904
GENERAL COMMENT: ALSO SEE HEAST TABLE 1: SUBCHRONIC AND CHRONIC TOXICITY (OTHER THAN CARCINOGENICITY)										

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CHEMICAL	ROUTE	EXPERIMENT LENGTH / SPECIES	TARGET	CANCER	[EPA GROUP]	[SLOPE FACTOR] ORAL (mg/kg/day)$^{-1}$	[SLOPE FACTOR] INHALATION (mg/kg/day)$^{-1}$	[UNIT RISK] ORAL (ug/L)$^{-1}$	[UNIT RISK] INHALATION (ug/cu m)-1	REFERENCE
METHYLENE-BIS(BENZENEAMINE), 4,4- / (4,4'-METHYLENEDIANILINE) 000101-77-9										
GENERAL COMMENT: NO EPA GROUP CLASSIFICATION WAS PROVIDED IN THE REFERENCE DOCUMENT. THEREFORE THIS COMPOUND WAS REMOVED FROM TABLE 3.										
METHYLENE-BIS(2-CHLOROANILINE), 4,4'- 000101-14-4										
	ORAL: DIET	2 YEARS RAT	LUNG	TUMORS	B2	1.3E-1	1.3E-1	3.7E-6	3.7E-5	010425
INHALATION [SLOPE] COMMENT: SEE APPENDIX A-II: DOSE CONVERSIONS ON HEAST. BASED ON ROUTE TO ROUTE EXTRAPOLATION.										
METHYLENE-BIS(N,N'-DIMETHYL)ANILINE, 4,4'- 000101-61-1					IRIS	IRIS		IRIS		010137
GENERAL COMMENT: ALSO SEE HEAST TABLE 1: SUBCHRONIC AND CHRONIC TOXICITY (OTHER THAN CARCINOGENICITY).										
METHYLMERCURY 0022967-92-6					IRIS					010972
GENERAL COMMENT: ALSO SEE HEAST TABLE 1: SUBCHRONIC AND CHRONIC TOXICITY (OTHER THAN CARCINOGENICITY).										
METOLACHLOR 051218-45-2					IRIS					010951
MIREX 002385-85-5										
	ORAL: DIET	2 YEARS RAT	LIVER	ADENOMA	B2					010952
			LIVER	CARCINOMA						
[EPA GROUP] COMMENT: UNDER REVIEW. CLASSIFICATION SUBJECT TO CHANGE. GENERAL COMMENT: ALSO SEE HEAST TABLE 1: SUBCHRONIC AND CHRONIC TOXICITY (OTHER THAN CARCINOGENICITY)										
NIAGARA BLUE 4B 002429-74-5					B2					010141
[EPA GROUP] COMMENT: BASED ON THE FACT THAT 3,3-DIMETHOXYBENZIDINE, A KNOWN EPA GROUP B2 CARCINOGEN, IS A METABOLITE OF NIAGARA BLUE 4B.										

CHEMICAL	ROUTE	EXPERIMENT LENGTH / SPECIES	TARGET	CANCER	[EPA GROUP]	[SLOPE FACTOR] ORAL (mg/kg/day)$^{-1}$	[SLOPE FACTOR] INHALATION (mg/kg/day)$^{-1}$	[UNIT RISK] ORAL (ug/L)$^{-1}$	[UNIT RISK] INHALATION (ug/cu m)-1	REFERENCE
NICKEL REFINERY DUST										
	INHALATION:				IRIS		8.4E-1		IRIS	005103
	OCCUPATIONAL	HUMAN	RESPIRATORY SYSTEM	TUMORS						
	INHALATION [SLOPE] COMMENT: SEE APPENDIX A-II. DOSE CONVERSIONS ON HEAST.									
	GENERAL COMMENT: FORMERLY LISTED AS NICKEL. ALSO SEE HEAST TABLE 1: SUBCHRONIC AND CHRONIC TOXICITY (UNDER NICKEL, SOLUBLE SALTS).									
NICKEL SUBSULFIDE		012035-72-2								
	INHALATION:				IRIS		1.7E+0		IRIS	005768
	OCCUPATIONAL	HUMAN	RESPIRATORY SYSTEM	TUMORS						
	INHALATION [SLOPE] COMMENT: SEE APPENDIX A-II. DOSE CONVERSIONS ON HEAST.									
	GENERAL COMMENT: FORMERLY LISTED AS NICKEL. ALSO SEE HEAST TABLE 1: SUBCHRONIC AND CHRONIC TOXICITY (UNDER NICKEL).									
NITROBENZENE		000098-95-3								
	INHALATION	2 YEAR MICE	LUNG	ADENOMA	B2					010969
			LUNG	CARCINOMA						
			THYROID	ADENOMA						
			MAMMARY	ADENOCARCINOMA						
	INHALATION	2 YEAR RAT	LIVER	ADENOMA						
			LIVER	CARCINOMA						
			KIDNEY	ADENOMA						
			KIDNEY	ADENOCARCINOMA						
			UTERUS	ENDIOMETRIAL POLYPS						
	GENERAL COMMENT: ALSO SEE HEAST TABLE 1: SUBCHRONIC AND CHRONIC TOXICITY.									

CHEMICAL	ROUTE	EXPERIMENT LENGTH / SPECIES	TARGET	CANCER	[EPA GROUP]	[SLOPE FACTOR] ORAL (mg/kg/day)-1	[SLOPE FACTOR] INHALATION (mg/kg/day)-1	[UNIT RISK] ORAL (ug/L)-1	[UNIT RISK] INHALATION (ug/cu m)-1	REFERENCE
NITROFURAZONE		**000059-87-0**								
	ORAL: DIET	46 WEEKS RAT	MAMMARY	TUMORS	B2	1.5E+0		4.3E-5		005110
NITROPROPANE, 2-		**000079-46-9**								
	INHALATION: INTERMITTENT	22 MONTHS RAT	LIVER	TUMORS	B2		9.4E+0		2.7E-3	010142
	INHALATION [SLOPE] COMMENT: SEE APPENDIX A-II: DOSE CONVERSIONS ON HEAST.									
NITROSO-DI-N-BUTYLAMINE, N-		**000924-16-3**								
	ORAL: DRINKING WATER	LIFETIME MOUSE	BLADDER ESOPHAGUS	TUMORS TUMORS	IRIS	IRIS	5.4E+0	IRIS	IRIS	010143
	INHALATION [SLOPE] COMMENT: BASED ON ROUTE TO ROUTE EXTRAPOLATION. SEE APPENDIX A-II. DOSE CONVERSIONS ON HEAST.									
NITROSO-DI-N-PROPYLAMINE, N-		**000621-64-7**			IRIS	IRIS		IRIS		010147
NITROSO-N-ETHYLUREA, N-		**000759-73-9**								
	ORAL: DRINKING WATER	203 DAYS RAT	INTESTINE	GASTROINTESTINAL TUMORS	B2	1.4E+2				010426
	[EPA GROUP] COMMENT: UNDER REVIEW. CLASSIFICATION SUBJECT TO CHANGE.									

CHEMICAL	ROUTE	EXPERIMENT LENGTH / SPECIES	TARGET	CANCER	[EPA GROUP]	[SLOPE FACTOR] ORAL (mg/kg/day)$^{-1}$	[SLOPE FACTOR] INHALATION (mg/kg/day)$^{-1}$	[UNIT RISK] ORAL (ug/L)$^{-1}$	[UNIT RISK] INHALATION (ug/cu m)-1	REFERENCE
NITROSO-N-METHYLUREA, N- 000684-93-5										
	ORAL: GAVAGE	308 DAYS			B2					010427
		GUINEA PIG	PANCREAS	ADENOCARCINOMA						
	[EPA GROUP] COMMENT: UNDER REVIEW, CLASSIFICATION SUBJECT TO CHANGE.									
	GENERAL COMMENT: THE CRAVE WORK GROUP (04/01/92) STATES THERE IS NO ACCEPTABLE QUANTITATION FOR NITROSO-N-METHYLUREA, N-.									
NITROSODIETHANOLAMINE, N- 001116-54-7										
					IRIS	IRIS		IRIS		010144
NITROSODIETHYLAMINE, N- 000055-18-5										
	ORAL: DRINKING WATER	6 OR 12 MONTHS			IRIS	IRIS	1.5E+2	IRIS	IRIS	010145
		RAT	LIVER	TUMORS						
	INHALATION [SLOPE] COMMENT: BASED ON ROUTE TO ROUTE EXTRAPOLATION. SEE APPENDIX A-II, DOSE CONVERSIONS ON HEAST.									
NITROSODIMETHYLAMINE, N- 000062-75-9										
	ORAL: DRINKING WATER				IRIS	IRIS	5.1E+1	IRIS	IRIS	010146
		RAT	LIVER	TUMORS						
	INHALATION [SLOPE] COMMENT: BASED ON ROUTE TO ROUTE EXTRAPOLATION. SEE APPENDIX A-II, DOSE CONVERSIONS ON HEAST.									
NITROSODIPHENYLAMINE, N- 000086-30-6										
					IRIS	IRIS		IRIS		005112
NITROSOMETHYLETHYLAMINE, N- 010595-95-6										
					IRIS	IRIS		IRIS		010148

CHEMICAL	ROUTE	EXPERIMENT LENGTH / SPECIES	TARGET	CANCER	[EPA GROUP]	[SLOPE FACTOR] ORAL (mg/kg/day)$^{-1}$	[SLOPE FACTOR] INHALATION (mg/kg/day)$^{-1}$	[UNIT RISK] ORAL (ug/L)$^{-1}$	[UNIT RISK] INHALATION (ug/cu m)-1	REFERENCE
NITROSOMETHYLVINYLAMINE, N	**004549-40-0**									
	INHALATION	RAT	UPPER RESPIRATORY TRACT	CARCINOMAS	B2					010149
	ORAL: DRINKING WATER		UPPER DIGESTIVE TRACT	CARCINOMAS						
NITROSOPYRROLIDINE, N-	**000930-55-2**									
	ORAL: DIET	LIFETIME RAT	LIVER	TUMORS	IRIS	IRIS	2.1E+0	IRIS	IRIS	010300
	INHALATION [SLOPE] COMMENT: BASED ON ROUTE TO ROUTE EXTRAPOLATION. SEE APPENDIX A-II, DOSE CONVERSIONS ON HEAST.									
PARATHION	**000056-38-2**									
					IRIS					005116
	GENERAL COMMENT: ALSO SEE HEAST TABLE 1: SUBCHRONIC AND CHRONIC TOXICITY (OTHER THAN CARCINOGENICITY).									
PENTABROMO-6-CHLOROCYCLOHEXANE, 1,2,3,4,5-	**000087-84-3**									
	ORAL: DIET	2 YEARS RAT	INTESTINE, LARGE	TUMORS	C	2.3E-2		6.6E-7		010150
	ORAL [SLOPE] COMMENT: BASED ON RESULTS WITH THE ALPHA ISOMER.									
PENTACHLORONITROBENZENE	**000082-68-8**									
	ORAL	72 WEEKS MOUSE	LIVER	TUMORS	C	2.6E-1		7.4E-6		010151
	ORAL [SLOPE] COMMENT: UNDER REVIEW, NUMBER SUBJECT TO CHANGE. GENERAL COMMENT: ALSO SEE HEAST TABLE 1: SUBCHRONIC AND CHRONIC TOXICITY (OTHER THAN CARCINOGENICITY).									

CHEMICAL	ROUTE	EXPERIMENT LENGTH / SPECIES	TARGET	CANCER	[EPA GROUP]	[SLOPE FACTOR] ORAL (mg/kg/day)[1]	[SLOPE FACTOR] INHALATION (mg/kg/day)[1]	[UNIT RISK] ORAL (ug/L)[1]	[UNIT RISK] INHALATION (ug/cu m)-1	REFERENCE
PENTACHLOROPHENOL	**000087-86-5**				IRIS	IRIS		IRIS		010381
GENERAL COMMENT: ALSO SEE HEAST TABLE 1: SUBCHRONIC AND CHRONIC TOXICITY (OTHER THAN CARCINOGENICITY).										
PHENYLENEDIAMINE, O-	**000095-54-5**									
	ORAL: DIET	548 DAYS			B2	4.7E-2		1.3E-6		010152
		RAT	LIVER	TUMORS						
ORAL [SLOPE] COMMENT: BASED ON LIVER TUMORS IN RATS TREATED WITH O-PHENYLENEDIAMINE DIHYDROCHLORIDE.										
GENERAL COMMENT: ALSO SEE HEAST TABLE 1: SUBCHRONIC AND CHRONIC TOXICITY.										
PHENYLPHENOL, 2-	**000090-43-7**									
	ORAL: DIET	637 DAYS			C	1.94E-3		5.5E-8		010153
		RAT	URINARY BLADDER	TUMORS						
POLYBROMINATED BIPHENYLS										
	ORAL: GAVAGE	25 WEEKS			B2	8.9E+0		2.5E-4		010154
		RAT	LIVER	CARCINOMA						
			LIVER	NEOPLASTIC NODULE						
GENERAL COMMENT: ALSO SEE HEAST TABLE 1: SUBCHRONIC AND CHRONIC TOXICITY (OTHER THAN CARCINOGENICITY)										
POLYCHLORINATED BIPHENYLS	**001336-36-3**				IRIS	IRIS		IRIS		005118
GENERAL COMMENT: CARCINOGENICITY INFORMATION WAS CHANGED ON IRIS.										

CHEMICAL	ROUTE	EXPERIMENT LENGTH / SPECIES	TARGET	CANCER	[EPA GROUP]	[SLOPE FACTOR] ORAL (mg/kg/day)$^{-1}$	[SLOPE FACTOR] INHALATION (mg/kg/day)$^{-1}$	[UNIT RISK] ORAL (ug/L)$^{-1}$	[UNIT RISK] INHALATION (ug/cu m)-1	REFERENCE
PROPYLENE OXIDE		**000075-56-9**								
					IRIS	IRIS		IRIS		010156
	INHALATION: INTERMITTENT	2 YEARS MOUSE	NASAL CAVITY	TUMORS	IRIS		1.3E-2		IRIS	010155
	INHALATION [SLOPE] COMMENT: SEE APPENDIX A-II, DOSE CONVERSIONS ON HEAST.									
	GENERAL COMMENT: ALSO SEE HEAST TABLE 1: SUBCHRONIC AND CHRONIC TOXICITY (OTHER THAN CARCINOGENICITY).									
QUINOLINE		**000091-22-5**								
	ORAL: DIET	20-40 WEEKS RAT	LIVER	TUMORS	C	1.2E+1		3.5E-4		010158
RDX / (CYCLONITE)		**000121-82-4**								
					IRIS	IRIS		IRIS		010157
	GENERAL COMMENT: ALSO SEE HEAST TABLE 1: SUBCHRONIC AND CHRONIC TOXICITY (OTHER THAN CARCINOGENICITY).									
SELENIUM SULFIDE		**007446-34-6**								
					IRIS					010194
	ORAL [SLOPE] COMMENT: STUDY RESULTS WERE CONSIDERED INCONCLUSIVE FOR QUANTITATIVE RISK ASSESSMENT.									
SIMAZINE		**000122-34-9**								
	ORAL: DIET	2 YEARS RAT	MAMMARY	CARCINOMA	C	1.2E-1		3.4E-6		010195
	ORAL [SLOPE] COMMENT: UNDER REVIEW, NUMBER SUBJECT TO CHANGE.									
	GENERAL COMMENT: ALSO SEE HEAST TABLE 1: SUBCHRONIC AND CHRONIC TOXICITY (OTHER THAN CARCINOGENICITY).									

CHEMICAL	ROUTE	EXPERIMENT LENGTH / SPECIES	TARGET	CANCER	[EPA GROUP]	[SLOPE FACTOR] ORAL (mg/kg/day)$^{-1}$	[SLOPE FACTOR] INHALATION (mg/kg/day)$^{-1}$	[UNIT RISK] ORAL (ug/L)$^{-1}$	[UNIT RISK] INHALATION (ug/cu m)-1	REFERENCE
SODIUM DIETHYLDITHIOCARBAMATE 000148-18-5										
	ORAL: DIET	77 WEEKS MOUSE	LIVER	TUMORS	C	2.7E-1		7.7E-6		005126
	GENERAL COMMENT: ALSO SEE HEAST TABLE 1: SUBCHRONIC AND CHRONIC TOXICITY (OTHER THAN CARCINOGENICITY).									
STYRENE 000100-42-5										010480
	GENERAL COMMENT: CONTACT THE SUPERFUND HEALTH RISK TECHNICAL SUPPORT CENTER: (513) 569-7300. ALSO SEE HEAST TABLE 1: SUBCHRONIC AND CHRONIC TOXICITY (OTHER THAN CARCINOGENICITY).									
TCDD, 2,3,7,8- 001746-01-6										
	ORAL: DIET	720 DAYS			B2	1.5E+5	1.5E+5	4.5E+0	3.3E-5 (PG/CU M)-1	005128
		RAT	RESPIRATORY SYSTEM	TUMORS						
			LIVER	TUMORS						
	ORAL [SLOPE] COMMENT: UNDER REVIEW. NUMBER SUBJECT TO CHANGE. INHALATION [SLOPE] COMMENT: SEE APPENDIX A-II: DOSE CONVERSIONS ON HEAST. INHALATION [UNIT RISK] COMMENT: UNDER REVIEW. NUMBER SUBJECT TO CHANGE. BASED ON ROUTE TO ROUTE EXTRAPOLATION. AN ABSORPTION FACTOR OF 75% IS USED TO CALCULATE THE UNIT RISK FROM THE SLOPE FACTOR.									
TETRACHLOROETHANE, 1,1,1,2- 000630-20-6										
	ORAL: GAVAGE	103 WEEKS			IRIS	IRIS	2.6E-2	IRIS	IRIS	010302
			LIVER	TUMOR						
	INHALATION [SLOPE] COMMENT: BASED ON ROUTE TO ROUTE EXTRAPOLATION. SEE APPENDIX A-II, DOSE CONVERSIONS ON HEAST.									

CHEMICAL	ROUTE	EXPERIMENT LENGTH / SPECIES	TARGET	CANCER	[EPA GROUP]	[SLOPE FACTOR] ORAL (mg/kg/day)$^{-1}$	[SLOPE FACTOR] INHALATION (mg/kg/day)$^{-1}$	[UNIT RISK] ORAL (ug/L)$^{-1}$	[UNIT RISK] INHALATION (ug/cu m)-1	REFERENCE
TETRACHLOROETHANE, 1,1,2,2- **000079-34-5**										
	ORAL: GAVAGE	75 WEEKS MOUSE	LIVER	CARCINOMA	IRIS	IRIS	2.0E-1	IRIS	IRIS	005130
	INHALATION [SLOPE] COMMENT: BASED ON ROUTE TO ROUTE EXTRAPOLATION. SEE APPENDIX A-II. DOSE CONVERSIONS ON HEAST.									
TETRACHLOROETHYLENE **000127-18-4**										010482
	GENERAL COMMENT: CONTACT THE SUPERFUND HEALTH RISK TECHNICAL SUPPORT CENTER: (513) 569-7300. ALSO SEE HEAST TABLE 1: SUBCHRONIC AND CHRONIC TOXICITY (OTHER THAN CARCINOGENICITY).									
TETRACHLOROTOLUENE, PARA, ALPHA, ALPHA, ALPHA- **005216-25-1**										
	ORAL: GAVAGE	17.5 WEEKS MOUSE	LUNG	ADENOCARCINOMA	B2	2.0E+1		5.7E-4		005028
TETRACHLOROVINPHOS / (STIROFOS) **000961-11-5**										
	ORAL: DIET	560 DAYS MOUSE	LIVER	TUMORS	C	2.4E-2		6.9E-7		010159
	[EPA GROUP] COMMENT: UNDER REVIEW. CLASSIFICATION SUBJECT TO CHANGE. GENERAL COMMENT: ALSO SEE HEAST TABLE 1: SUBCHRONIC AND CHRONIC TOXICITY (OTHER THAN CARCINOGENICITY).									
TOLUENE-2,4-DIAMINE **000095-80-7**										
	ORAL: DIET	84-103 WEEKS RAT	MAMMARY	TUMORS	B2	3.2E+0		9.1E-5		010160
TOLUIDINE, P- **000106-49-0**										
	ORAL: DIET	18 MONTHS MOUSE	LIVER	TUMORS	C	1.9E-1		5.4E-6		010162

CHEMICAL	ROUTE	EXPERIMENT LENGTH / SPECIES	TARGET	CANCER	[EPA GROUP]	[SLOPE FACTOR] ORAL (mg/kg/day)$^{-1}$	[SLOPE FACTOR] INHALATION (mg/kg/day)$^{-1}$	[UNIT RISK] ORAL (ug/L)$^{-1}$	[UNIT RISK] INHALATION (ug/cu m)$^{-1}$	REFERENCE
TOXAPHENE		**008001-35-2**								
	ORAL: DIET	18 MONTHS MOUSE	LIVER	TUMORS	IRIS	IRIS	1.1E+0	IRIS	IRIS	005134
	INHALATION [SLOPE] COMMENT: SEE APPENDIX A-II. DOSE CONVERSIONS ON HEAST. INHALATION [UNIT RISK] COMMENT: BASED ON ROUTE TO ROUTE EXTRAPOLATION.									
TRICHLOROANILINE HYDROCHLORIDE, 2,4,6-		**033663-50-2**								
	ORAL: DIET	18 MONTHS MOUSE	VASCULAR SYSTEM	TUMORS	C	2.9E-2		8.2E-7		005142
TRICHLOROANILINE, 2,4,6-		**000634-93-5**								
	ORAL: DIET	18 MONTHS MOUSE	VASCULAR SYSTEM	TUMORS	C	3.4E-2		1E-6		010487
TRICHLOROETHANE, 1,1,2-		**000079-00-5**								
	ORAL: GAVAGE	78 WEEKS MOUSE	LIVER	CARCINOMA	IRIS	IRIS	5.7E-2	IRIS	IRIS	005144
	INHALATION [SLOPE] COMMENT: BASED ON ROUTE TO ROUTE EXTRAPOLATION. SEE APPENDIX A-II. DOSE CONVERSIONS ON HEAST. GENERAL COMMENT: ALSO SEE HEAST TABLE 1: SUBCHRONIC AND CHRONIC TOXICITY (OTHER THAN CARCINOGENICITY).									
TRICHLOROETHYLENE		**000079-01-6**								010483
	GENERAL COMMENT: CONTACT THE SUPERFUND HEALTH RISK TECHNICAL SUPPORT CENTER: (513) 569-7300.									

CHEMICAL	ROUTE	EXPERIMENT LENGTH / SPECIES	TARGET	CANCER	[EPA GROUP]	[SLOPE FACTOR] ORAL (mg/kg/day)-1	[SLOPE FACTOR] INHALATION (mg/kg/day)-1	[UNIT RISK] ORAL (ug/L)-1	[UNIT RISK] INHALATION (ug/cu m)-1	REFERENCE
TRICHLOROPHENOL, 2,4,6-	**000088-06-2**									
	ORAL: DIET	107 WEEKS RAT	BLOOD	LEUKEMIA	IRIS	IRIS	1E-2	IRIS	IRIS	010428
	INHALATION [SLOPE] COMMENT: BASED ON ROUTE TO ROUTE EXTRAPOLATION. SEE APPENDIX A-II, DOSE CONVERSIONS ON HEAST.									
	GENERAL COMMENT: ALSO SEE HEAST TABLE 1: SUBCHRONIC AND CHRONIC TOXICITY (OTHER THAN CARCINOGENICITY).									
TRICHLOROPROPANE, 1,2,3-	**000096-18-4**									
	ORAL: GAVAGE	RAT	MULTIPLE SITES	TUMORS, BENIGN/MALIGNANT, COMBINED	B2	7E+0		2E-4		010849
	[EPA GROUP] COMMENT: UNDER REVIEW. CLASSIFICATION SUBJECT TO CHANGE.									
	GENERAL COMMENT: ALSO SEE HEAST TABLE 1: SUBCHRONIC AND CHRONIC TOXICITY (OTHER THAN CARCINOGENICITY).									
TRIFLURALIN	**001582-09-8**									
					IRIS	IRIS		IRIS		010163
	GENERAL COMMENT: ALSO SEE HEAST TABLE 1: SUBCHRONIC AND CHRONIC TOXICITY (OTHER THAN CARCINOGENICITY).									
TRIMETHYL PHOSPHATE	**000512-56-1**									
	ORAL: GAVAGE	103 WEEKS MOUSE	UTERUS	TUMORS	B2	3.7E-2		1.1E-6		010164
TRINITROTOLUENE, 2,4,6-	**000118-96-7**									
					IRIS	IRIS		IRIS		010476
	GENERAL COMMENT: ALSO SEE HEAST TABLE 1: SUBCHRONIC AND CHRONIC TOXICITY (OTHER THAN CARCINOGENICITY).									

HEAST TABLE 3: CARCINOGENICITY

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CHEMICAL	ROUTE	EXPERIMENT LENGTH / SPECIES	TARGET	CANCER	[EPA GROUP]	[SLOPE FACTOR] ORAL (mg/kg/day)$^{-1}$	[SLOPE FACTOR] INHALATION (mg/kg/day)$^{-1}$	[UNIT RISK] ORAL (ug/L)$^{-1}$	[UNIT RISK] INHALATION (ug/cu m)-1	REFERENCE
VINYL CHLORIDE		**000075-01-4**								
	ORAL: DIET	1001 DAYS			A	1.9E+0		5.4E-5		010368
		RAT	LUNG	TUMORS						
			LIVER	TUMORS						
	ORAL [SLOPE] COMMENT: UNDER REVIEW. NUMBER SUBJECT TO CHANGE.									
	INHALATION:	1 YEAR			A		3.0E-1		8.4E-5	010367
	INTERMITTENT	RAT	LIVER	TUMORS						

INHALATION [SLOPE] COMMENT: SEE APPENDIX A-II: DOSE CONVERSIONS ON HEAST.
INHALATION [UNIT RISK] COMMENT: UNDER REVIEW. NUMBER SUBJECT TO CHANGE.
GENERAL COMMENT: THE MOST RECENTLY REVIEWED QUANTITATIVE TOXICITY VALUES LISTED HERE APPEAR IN EPA DOCUMENTS PUBLISHED IN 1984 AND 1985. USE OF THESE VALUES ON AN INTERIM BASIS WAS VALIDATED BY CRAVE (04/05/90). THE AGENCY IS AWARE THAT THESE VALUES DO NOT INCORPORATE CONSIDERABLE INFORMATION THAT IS NOW AVAILABLE. THE OFFICE OF HEALTH AND ENVIRONMENTAL ASSESSMENT'S POSITION IS THAT THESE TOXICITY VALUES DO NOT REFLECT STATE-OF-THE-ART SCIENCE FOR VINYL CHLORIDE. EPA NOW HAS INDIVIDUAL ANIMAL DATA, NOT AVAILABLE WHEN THE ORAL UNIT RISK WAS CALCULATED, THAT MAY INFLUENCE THIS VALUE. ADDITIONAL INFORMATION THAT MAY BE FACTORED INTO A REVISED QUANTITATIVE TOXICITY VALUE INCLUDES DATA ON INCREASED SENSITIVITY OBSERVED IN YOUNG ANIMALS AND DATA ON METABOLISM/PHARMACOKINETICS. A UNIT RISK FOR AIR THAT CONSIDERS INFORMATION ON YOUNG AGE EXPOSURE INCREASES THE RISK (I.E., LOWERS THE RISK SPECIFIC DOSE) BY AT LEAST 3-FOLD. THE CONSIDERATION OF METABOLISM PHARMACOKINETICS WILL FURTHER INCREASE THE RISK. ONE UNPUBLISHED PHYSIOLOGICALLY-BASED PHARMACOKINETIC MODEL PREDICTION RESULTS IN A 100-FOLD INCREASED RISK.

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CHLOROMETHYL METHYL ETHER 000107-30-2

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CHLORONITROBENZENE, P- **000100-00-5**

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010482 CONTACT THE SUPERFUND HEALTH RISK TECHNICAL SUPPORT CENTER: (513) 569-7300.

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TRICHLOROETHYLENE **000079-01-6**

010483 CONTACT THE SUPERFUND HEALTH RISK TECHNICAL SUPPORT CENTER: (513) 569-7300.

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TRINITROTOLUENE, 2,4,6- 000118-96-7

010476 US DOD (DEPARTMENT OF DEFENSE). 1984. AD-A168637. DEFENSE TECHNICAL CENTER. CAMERON STATION, ALEXANDRIA, VA.

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US EPA. 1988. CARCINOGEN RISK ASSESSMENT VERIFICATION ENDEAVOR (CRAVE) WORK GROUP.

VINYL CHLORIDE **000075-01-4**

010368 FERON, VJ, CFM HENDRIKSEN, AJ SPEEK, ET AL. 1981. LIFESPAN ORAL TOXICITY STUDY OF VINYL CHLORIDE IN RATS. FOOD COSMET TOXICOL. 19(3): 317-333.

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US EPA. 1985. DRINKING WATER CRITERIA DOCUMENT FOR VINYL CHLORIDE. PREPARED BY THE OFFICE OF HEALTH AND ENVIRONMENTAL ASSESSMENT, ENVIRONMENTAL CRITERIA AND ASSESSMENT OFFICE, CINCINNATI OH FOR THE OFFICE OF DRINKING WATER, WASHINGTON, DC.

US EPA. 1990. CARCINOGEN RISK ASSESSMENT VERIFICATION ENDEAVOR (CRAVE) WORK GROUP.

010367 MALTONI, C, G LEFEMINE, A CILIBERTI ET AL. 1980. VINYL CHLORIDE CARCINOGENICITY BIOASSAYS (BT PROJECT) AS AN EXPERIMENTAL MODEL FOR RISK IDENTIFICATION AND ASSESSMENT IN ENVIRONMENTAL AND OCCUPATIONAL CARCINOGENESIS. EPIDEMIOL ANIM EPIDEMIOL HUM: CAS CHLORURE VINYLE MONOMERE, (REUN CLUB CANCEROG CHIM), 20TH, MEETING DATE 1979, P. 11-112. PUBL ESSENT, PARIS, FRANCE.

MALTONI, C, G LEFEMINE, A CILIBERTI ET AL. 1981. CARCINOGENICITY BIOASSAYS OF VINYL CHLORIDE MONOMER: A MODEL OF RISK ASSESSMENT ON AN EXPERIMENTAL BASIS. ENVIRON HEALTH PERSPECT. 41: 329.

US EPA. 1985. HEALTH AND ENVIRONMENTAL EFFECTS PROFILE FOR CHLOROETHENE. PREPARED BY THE OFFICE OF HEALTH AND ENVIRONMENTAL ASSESSMENT, ENVIRONMENTAL CRITERIA AND ASSESSMENT OFFICE, CINCINNATI, OH FOR THE OFFICE OF SOLID WASTE AND EMERGENCY RESPONSE, WASHINGTON, DC.

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9200.6-303(95-1)
EPA 540/R-95-036
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May 1995

HEALTH EFFECTS ASSESSMENT

SUMMARY TABLES

FY-1995 Annual

Office of Research and Development
Office of Emergency and Remedial Response
U.S. Environmental Protection Agency
Washington, DC 20460

DISCLAIMER

This report has been prepared by the U.S. Environmental Protection Agency. The information contained herein has been taken from final documents prepared by the Office of Health and Environmental Assessment (hereafter referred to as the National Center for Environmental Assessment) for the Office of Solid Waste and Emergency Response and the Office of Water, Washington, DC and the Office of Air Quality Planning and Standards, Research Triangle Park, NC. These documents were reviewed in accordance with Agency policy and approved for publication. Mention of trade names or commercial products does not constitute endorsement or recommendation for use.

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INTRODUCTION

This document is the FY95 Annual Update of the Health Effects Assessment Summary Tables (HEAST) prepared by EPA's National Center for Environmental Assessment, Cincinnati, OH (NCEA-CIN) for use at both Superfund and RCRA sites. It completely replaces all former editions and supplements of the HEAST.

This version of the HEAST will be updated by a November 1995 Supplement. The supplement will supercede the information in this document, the May 1995 HEAST Annual Update. Therefore, if the supplement is available it should be checked whenever this document is consulted. The supplement, however, will not be produced to stand alone and will not contain the User's Guides or Appendix that are available in the annual update. Thus, the user should refer to the May 1995 HEAST Annual Update for this information.

The HEAST is a comprehensive listing consisting almost entirely of PROVISIONAL RISK ASSESSMENT INFORMATION relative to oral and inhalation routes for chemicals of interest to Superfund, the Resource Conservation and Recovery Act (RCRA), and the EPA in general. These entries in the HEAST are limited to chemicals that have undergone review and have the concurrence of individual Agency Program Offices, and each is supported by an Agency reference. This risk assessment information has not, however, had enough review to be recognized as high quality, Agency-wide consensus information.

The Integrated Risk Information System (IRIS) is the Agency's official repository of Agency-wide consensus chronic human health risk information. IRIS evaluations are conducted by the Agency's Work Group Review process, i.e., they have been examined by either the Reference Dose/Reference Concentration (RfD/RfC) Work Group or the Carcinogen Risk Assessment Verification Endeavor (CRAVE) Work Group. These Agency Work Groups conduct a process that leads to internal Agency scientific consensus regarding risk assessment

information on a chemical. This information is recorded on IRIS, is considered to be "Work Group Verified," and does not appear on the HEAST. Thus, provisional risk assessment information on the HEAST is subject to possible review and revision by these Agency Work Groups.

There are two exceptions to the above discussion. The HEAST also contains information on chemicals that are a part of the National Ambient Air Quality Standards (NAAQS) or the Drinking Water Criteria Document (DWCD) series. In each of these cases, the chemicals are subject to extensive scientific peer review processes of extremely high quality.

CHEMICAL STATUS DEFINITIONS

Chemicals reviewed by the Agency Work Groups are classified according to their status as either "verified," "not verifiable," or "under review." The toxicity values (other than NAAQS or DWCD values) listed on the HEAST are considered to be "provisional." The Agency has no official definitions for these terms, but the HEAST user may interpret them as follows:

> **Provisional:** A toxicity value or a cancer value is "provisional" if the value has had some form of Agency review, but it does not appear on the IRIS system. These values are generated in several ways. Often they are determined in the course of developing an Agency document on a chemical or on a class of chemicals. Some have been generated through the Work Group process, but have not yet been input to the IRIS system. At the time each value was derived, all available information on the chemical was evaluated, the value was calculated using the most current methodology, and a consensus was reached on the value by Agency scientists.
>
> Brackets are placed around the names of toxicity and carcinogenicity values on the HEAST to distinguish these "provisional" values from information on IRIS. The following names are affected: RfD to [RfD], RfC to [RfC], slope factor to [slope factor], EPA group to [EPA Group] and unit risk to [unit risk].
>
> **These "provisional" values are found on the HEAST. They do not appear on IRIS.**
>
> **Verified:** A toxicity value or a cancer value is "Work Group Verified" if all available information on the value has been examined by an Agency Work Group, the value has been calculated using current Work Group methodology, a

unanimous consensus has been reached on the value by the Work Group, and the value appears on IRIS.

Some numbers that have achieved unanimous concensus by the Work Group may appear on the HEAST for a short time until they are loaded onto IRIS, at which time they are termed, "verified." During the interim, they are considered to be "provisional" values that are still "under review" by the Work Group.

These "verified" numbers only appear on IRIS. They do not appear on the HEAST.

Not verifiable: A toxicity value is "not verifiable" if an Agency Work Group has considered all available data on a chemical and has unanimously determined that data are inadequate to generate a value that would be suitable for inclusion on IRIS. No toxicity value is calculated; no toxicity value is available for IRIS or the HEAST.

This "not verifiable" status is noted on IRIS, and is sometimes found on the HEAST, with a pointer to the IRIS system.

Under Review: A toxicity value is "under review" if an Agency Work Group is in the process of considering all available data on a chemical. All Work Group chemicals will have this status until the toxicity value is placed on the IRIS system. Toxicity values that have been withdrawn from IRIS by a Work Group for further review will have this status.

This "under review" status may be indicated on IRIS or on the HEAST. During this time, "provisional" toxicity values may appear on the HEAST.

In all cases, the status of a chemical may change as new data become available, and the assessment is revisited.

CAUTION

It is imperative for each user of the HEAST to recognize that the values listed in the toxicity tables and the cancer table are generally considered to be PROVISIONAL RISK ASSESSMENT INFORMATION. The user is referred to IRIS for "Work Group Verified" values. It is also important to remember that the numbers in these tables alone tell very little about the adverse effects of a chemical or the quality of evidence on which risk assessment information is based. Original assessment documents must be consulted by users of the HEAST in order to

fully appreciate the strengths and limitations of a specific data base. Original source documents will allow for the most complete characterization of potential toxicity associated with the range of exposure pathways generally evaluated at Superfund and RCRA sites. The Reference Tables point the user to these sources.

CONTRIBUTORS

Chemicals commonly found at RCRA sites as identified by the Office of Solid Waste's (OSW) Technical Assessment Branch are included in the HEAST. The Office of Radiation Programs has provided data on radionuclide carcinogenicity for Table 4. Finally, the Office of Air Quality Planning and Standards (OAQPS) has provided information on chemicals for which Air Quality Criteria Documents and National Ambient Air Quality Standards have been developed.

CHEMICALS LISTED

Most of the chemicals included on the toxicity tables and carcinogenicity table are those for which at least one of the following EPA documents has been written: Health Effects Assessment Document (HEA), Health and Environmental Effects Profile (HEEP), Health and Environmental Effects Document (HEED), Health Assessment Document (HAD), Air Quality Criteria Document (AQCD), Drinking Water Criteria Document (DWCD). A description of each is provided in Appendix A, Section I. In a few cases, the values are supported by other written material, such as Work Group meeting notes or Carcinogen Assessment Group (CAG) Profiles. Radionuclide slope factor values are calculated by the EPA's Office of Radiation Programs.

The names of criteria pollutants that are regulated as National Ambient Air Quality Standards (NAAQS) under the Clean Air Act are listed in the main body of the HEAST, but the actual criteria are included as Section V of Appendix A: Technical Information. The NAAQS

were not included in the tables in order to distinguish them from the reference concentration ([RfC]) values. The NAAQS and [RfC]s represent different levels of review and different methods of calculation and thus, must be interpreted and used differently.

HIERARCHY OF SOURCES

It is recognized that at any point in time there may be multiple old and new Agency documents or data bases that present different values on a specific chemical. For chemicals other than those represented by the NAAQS or DWCDs, the following hierarchy of sources is recommended in evaluating chemical toxicity for Superfund sites:

1. The Agency's Integrated Risk Information System (IRIS) and cited references. Changes are made in this data base on a monthly basis, but there may be data gaps. Call RISK INFORMATION HOTLINE at (513)569-7254 for further information.

2. The Health Effects Assessment Summary Tables (HEAST) and cited references.

3. Consultation with the Superfund Health Risk Technical Support Center (TSC) at (513)569-7300.

4. Do not consult either the toxicity tables (Appendix A) in the Superfund Public Health Evaluation Manual (SPHEM, U.S. EPA, 1986) or the September 1988 Public Health Risk Evaluation Data Base (PHRED) as these sources are likely to contain numerous values that have since become out-of-date.

QUESTIONS

Chemical Toxicity and Carcinogenicity

Regional EPA Superfund Staff may direct questions regarding the contents of the chemical toxicity and carcinogenicity tables on the HEAST (e.g., chemicals not covered, chemicals with pending [RfD]s) to EPA's Superfund Health Risk Technical Support Center

(TSC) in Cincinnati, OH at (513)569-7300. Questions from other users must be submitted to the TSC in writing and must contain the following information:

- Superfund site name, site location and twelve-digit site number;
- Name and phone number of the site Remedial Project Manager (RPM) or Regional Risk Assessor/Toxicologist;
- Detailed description of the risk assessment related question.

Please send requests via mail or FAX to:

Superfund Health Risk Technical Support Center
US EPA
26 W. ML King Dr.
National Center for Environmental Assessment
MS 117
Cincinnati, OH 45268
FAX#: (513)569-7159

RCRA Chemicals

Questions about RCRA chemicals may be addressed by calling the Office of Solid Waste at (202)260-4761.

Radionuclide Carcinogenicity

Questions concerning radionuclide carcinogenicity should first be addressed by contacting the appropriate Regional Radiation Program Manager. A listing of these managers and several contacts in the Office of Radiation Programs can be found in Exhibit 2 of the User's Guide - Radionuclide Carcinogenicity.

REFERENCES

Most cited Agency references (e.g., HEAs, HEEPs, HEEDs), are (or will soon be) available through the National Technical Information Service (NTIS), 5285 Port Royal Road,

Springfield, VA 22161 [(703)487-4650]. Carcinogen Assessment Group (CAG) Profiles cited in Table 3 are available through the RCRA docket (202)260-9327.

Drinking water documents are available by calling the Drinking Water Docket at (202)260-3027.

ORDERING INFORMATION

Limited copies of the HEAST are available for EPA Superfund staff, State Superfund programs and other Federal agencies working on Superfund sites, and EPA contractors working for the EPA Superfund program. Users in these groups can call Syracuse Research Corporation (202)479-0881 to be put on the mailing list.

EPA's Office of Solid Waste (OSW) requests that their users (i.e., OSW staff, contractors, State solid waste programs) call the Health Assessment Section (202)260-4761 to obtain copies of the HEAST. Regional OSW staff are reminded that copies are sent to all EPA Regional libraries.

Users of the HEAST in EPA's Office of Air and Radiation and State air programs should call Kelly Rimer of EPA's Office of Air Quality Planning and Standards at (919)541-2962.

All other users must purchase the document from:

National Technical Information Service (NTIS)
5285 Port Royal Road
Springfield, VA 22161
(703)487-4650

For ordering information, call the NTIS Subscriptions Department at (703)487-4630. NTIS normally ships 4th class United States mail. When ordering the 1995 Health Effects Assessment Summary Table annual update from NTIS refer to the following order number:

PB95-921199: FY95 Annual HEAST update

STRUCTURE OF THE HEAST

The HEAST Introduction contains explanatory material relative to the quality of information on the HEAST, its sources, and its availability. This is followed by a listing of changes since the last HEAST was published and then by User's Guides for both Chemical Toxicity and Carcinogenicity, and Radionuclide Carcinogenicity. The values on the HEAST are presented in a series of five tables that contain toxicity information and three tables of references. The information contained in each table and their designations are as follows:

HEAST TABLE 1: SUBCHRONIC AND CHRONIC TOXICITY (OTHER THAN CARCINOGENICITY)
Table 1 lists subchronic and chronic non-cancer toxicity values that were calculated using the current methodology practiced by the RfD/RfC Work Group.

HEAST TABLE 1 REFERENCES: SUBCHRONIC AND CHRONIC TOXICITY (OTHER THAN CARCINOGENICITY)
The references for Table 1 are numerically coded to associate each toxicity value clearly with its corresponding reference.

HEAST TABLE 2: ALTERNATE METHODS - SUBCHRONIC AND CHRONIC TOXICITY (OTHER THAN CARCINOGENICITY)
Table 2 lists subchronic and chronic non-cancer toxicity values that are found in Agency documents, but were calculated by alternative methods that are not currently practiced by the RfD/RfC Work Group. These values are considered to be adequate provisional values for risk assessment purposes at Superfund and RCRA sites, but are subject to being reviewed by the RfD/RfC Work Group and revised when necessary to reflect current work group practices.

HEAST TABLE 2 REFERENCES: ALTERNATE METHODS - SUBCHRONIC AND CHRONIC TOXICITY (OTHER THAN CARCINOGENICITY)
The references for Table 2 are numerically coded to associate each toxicity value clearly with its corresponding reference.

HEAST TABLE 3: CARCINOGENICITY
Table 3 lists carcinogenicity values that were calculated using the current methodology of the CRAVE Work Group.

HEAST TABLE 3 REFERENCES: CARCINOGENICITY
The references for Table 3 are numerically coded to associate each toxicity value clearly with its corresponding reference.

HEAST TABLE 4: RADIONUCLIDE CARCINOGENICITY - SLOPE FACTORS (In Units of Picocuries)

Table 4 lists ingestion, inhalation and external exposure carcinogenicity slope factors for radionuclides in units of picocuries and a factor to convert into the International System (SI) activity units of becquerels (Bq).

Following the tables, a Technical Appendix (Appendix A) is available, containing the following sections:

I. Data Sources and Selection Criteria Used in HEAST

II. Dose Conversions on HEAST

III. Chemical Name and Chemical Abstracts Service Registry Number Cross Reference

IV. Effect Level Definitions

V. National Ambient Air Quality Standards (NAAQS)

WHAT'S NEW IN THE FY95 ANNUAL HEAST

GENERAL CHANGES -- CHEMICAL TOXICITY AND CARCINOGENICITY

The changes in this version of the HEAST reflect changes in IRIS through May 1, 1995. It is also current with RfD/RfC and CRAVE Work Group activities through May 1, 1995.

CHEMICAL-SPECIFIC CHANGES -- CHEMICAL TOXICITY AND CARCINOGENICITY

A. CHEMICAL-SPECIFIC CHANGES ON HEAST TABLE 1: SUBCHRONIC AND CHRONIC TOXICITY (OTHER THAN CARCINOGENICITY)

Aroclor 1254 011097-69-1
An indicator was added to show that the chronic oral RfD is now on IRIS. The chronic oral RfD is adopted as the subchronic oral [RfD].

Endosulfan 000115-29-7
An indicator was added to show that the chronic oral RfD is now on IRIS.

Mercuric Chloride 007487-94-7
This is a new entry to the table with a comment indicating that the chronic oral RfD was adopted as the subchronic oral [RfD].

Mercury, Inorganic 007439-97-6
The HEAST entry is changed to Mercury, Elemental and a comment indicating that the chronic [RfC] is under review.

Methylmercury 022967-92-6
A critical oral dose entry is indicated with a change in target and critical effect. The subchronic [RfD] is also changed from 3E-4 to 1E-4. A comment is added to indicate that a benchmark dose approach was used to derive the RfD.

Metribuzin 021087-64-9
The subchronic oral [RfD] was removed because the chronic oral RfD upon which it is based in under review by the RfD/RfC Work Group.

Nickel (Metallic) 007440-02-0
The HEAST entry is changed to Nickel, Soluble Salts. "Various" is used for CAS registry number since there is none for salts. A comment was added to indicate that the chronic oral [RfD] was derived from the nickel moiety of the administered nickel chloride salt.

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B. CHEMICAL-SPECIFIC CHANGES ON HEAST TABLE 2: ALTERNATE METHODS – SUBCHRONIC AND CHRONIC TOXICITY (OTHER THAN CARCINOGENICITY)

Nitrobenzene 000098-95-3

A typographical error was discovered in earlier issues of HEAST Table 2. The subchronic [RfC] comment should read 6E-3 mg/kg/day, and has been corrected accordingly.

C. CHEMICAL-SPECIFIC CHANGES ON HEAST TABLE 3: CARCINOGENICITY

Dichlorobenzene, 1,4- 000106-46-7
Carcinogenicity value in HEAST Table 3 is changed to reflect 1987 FR (July 8). 52:25690-25717.

Mercuric Chloride 007487-94-7
An indicator was added to show that the EPA Group Classification is available on IRIS.

Mercury, Elemental 007439-97-6
An indicator was added to show that the EPA Group Classification is available on IRIS.

Methylmercury 0022967-92-6
An indicator was added to show that the EPA Group Classification is available on IRIS.

Nitrobenzene 000098-95-3
The EPA Group Classification under review by the CRAVE Work Group was added to Table 3.

D. CHEMICAL-SPECIFIC CHANGES ON HEAST TABLE: RADIONUCLIDE CARCINOGENICITY – SLOPE FACTORS

CHEMICAL SPECIFIC CHANGES MADE IN THE JULY 1994 SUPPLEMENT NO. 1 AND THE NOVEMBER 1994 SUPPLEMENT NO. 2 TO THE MARCH 1994 HEAST ANNUAL UPDATE

The following changes were made in the July 1994 and November 1994 supplemental editions of the March 1994 HEAST Annual Update and represent changes that have occurred between the publication of the March 1994 HEAST Annual Update and this document, the May 1995 HEAST Annual Update. Because some HEAST users may have been unaware of the publication of these supplements, the following information

will indicate additional changes in toxicity information that should be noted. [Note:

These changes have been incorporated into the May 1995 Annual Update.]

A. CHEMICAL-SPECIFIC CHANGES IN THE JULY 1994 AND NOVEMBER 1994 SUPPLEMENTS ON HEAST TABLE 1: SUBCHRONIC AND CHRONIC TOXICITY (OTHER THAN CARCINOGENICITY)

Acetone cyanohydrin / (2-Methyllactonitrile) 000075-86-5
The chronic oral [RfD] now under review by the RfD/RfC Work Group was added to Table 1. The chronic oral [RfD] was modified to derive the subchronic oral [RfD]. The synonym used by the RfD/RfC Work Group in its latest review is now included in HEAST.

Acrolein 000107-02-8
The subchronic [RfD] and [RfC] Risk Assessment Issue Papers for this compound were not reexamined by ECAO this year and the comment to contact the Superfund Health Risk Technical Support Center was removed from HEAST. No further change to the table.

Acrylic acid 000079-10-7
The chronic oral RfD has been replaced on IRIS. The chronic oral RfD on IRIS was adopted as the subchronic oral [RfD].

Anthracene 000120-12-7
A comment was added to indicate that the chronic inhalation [RfC] is considered not verifiable (08/04/94) by the RfD/RfC Work Group.

Aroclor 1248 012672-29-6
An indicator was added to show that a comment is now on IRIS that the chronic oral RfD is considered not verifiable by the RfD/RfC (07/20/93) Work Group.

Aroclor 1254 012672-29-6
The chronic oral [RfD] under review by the RfD/RfC Work Group was added to the table. The chronic oral [RfD] was modified to derive the subchronic oral [RfD].

Benzo[a]anthracene 000056-55-3
A comment was added to indicate that the chronic inhalation [RfC] is considered not verifiable (08/04/94) by the RfD/RfC Work Group.

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Caprolactam 000105-60-2
An indicator was added to show that a comment is now on IRIS that the chronic inhalation RfC is considered not verifiable (08/03/94) by the RfD/RfC Work Group.

Carbon disulfide 000075-15-0
No change to the table. Reference to the 1989 RfD/RfC Work Group was added.

Chlordane 000057-74-9
The subchronic [RfC] Risk Assessment Issue Paper for this compound was not reexamined by NCEA this year and the comment to contact the Superfund Health Risk Technical Support Center was removed from HEAST. No further change to the table.

Dacthal 001861-32-1
The chronic oral RfD has been replaced on IRIS. The chronic oral RfD on IRIS was adopted as the subchronic oral [RfD].

Dibromoethane, 1,2- 000106-93-4
The subchronic inhalation [RfC] was modified to be consistent with the chronic inhalation [RfC].

Dichlorobenzene, 1,2- 000095-50-1
The subchronic [RfD] Risk Assessment Issue Paper for this compound was not reexamined by NCEA this year and the comment to contact the Superfund Health Risk Technical Support Center was removed from HEAST. No further change to the table.

Dichloroethane, 1,2- 000107-06-2
The subchronic [RfD] and [RfC] Risk Assessment Issue Papers for this compound were not reexamined by NCEA this year. The comment to contact the Superfund Health Risk Technical Support Center was the only information on Table 1, therefore the compound was removed from Table 1.

Dimethylphthalate 000131-11-3
The chronic oral [RfD] has been removed. A comment was added to show that the chronic oral [RfD] is considered not verifiable by the RfD/RfC (02/16/94) Work Group.

Fluoranthene 000206-44-0
A comment was added to indicate that the chronic inhalation [RfC] is considered not verifiable (08/04/93) by the RfD/RfC Work Group.

Hexachlorobenzene 000118-74-1
The subchronic [RfD] Risk Assessment Issue Paper for this compound was not reexamined by NCEA this year and the comment to contact the Superfund Health Risk Technical Support Center was removed from HEAST. No further change to the table.

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Hexachlorobutadiene 000087-68-3
The subchronic [RfC] Risk Assessment Issue Paper for this compound was not reexamined by NCEA this year and the comment to contact the Superfund Health Risk Technical Support Center was removed from HEAST. No further change to the table.

Methylenediphenyl isocyanate, 4,4- / (Diphenylmethanediisocyanate) 000101-68-8
An indicator was added to show that the chronic inhalation RfC is now on IRIS. The chronic inhalation RfC on IRIS was adopted as the subchronic inhalation [RfC].

Nitric oxide 010102-43-9
The chronic oral RfD for this compound has been permanently withdrawn (09/01/94) from IRIS.

Nitrogen dioxide 010102-44-0
The chronic oral RfD for this compound has been permanently withdrawn (09/01/94) from IRIS. The subchronic oral [RfD] was removed from HEAST.

Phenanthrene 000085-01-8
A comment was added to indicate that the chronic inhalation [RfC] is considered not verifiable (08/04/94) by the RfD/RfC Work Group.

Pyrene 000129-00-0
A comment was added to indicate that the chronic inhalation [RfC] is considered not verifiable (08/04/94) by the RfD/RfC Work Group.

Styrene 000100-42-5
The subchronic [RfD] Risk Assessment Issue Paper for this compound was not reexamined by NCEA this year and the comment to contact the Superfund Health Risk Technical Support Center was removed from HEAST. No further change to the table.

Trichloroethane, 1,1,1- 000071-55-6
A comment pertaining to the subchronic [RfC] was added to the table.

B. CHEMICAL-SPECIFIC CHANGES IN THE JULY 1994 AND NOVEMBER 1994 SUPPLEMENTS ON HEAST TABLE 2: ALTERNATE METHODS – SUBCHRONIC AND CHRONIC TOXICITY (OTHER THAN CARCINOGENICITY)

No changes were made to HEAST Table 2.

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C. CHEMICAL-SPECIFIC CHANGES IN THE JULY 1994 AND NOVEMBER 1994 SUPPLEMENTS ON HEAST TABLE 3: CARCINOGENICITY

Bis(2-chloroisopropyl) ether 039638-32-9
Removed from Table 3. Compound tested was **Technical bis(2-chloro-1-methylethyl) ether** containing 70% **bis(2-chloro-1-methylethyl) ether** and 30% **bis(2-chloroisopropyl) ether**. [Slope factor], [unit risk], and [EPA Group] classification were only derived for **bis(2-chloro-1-methylethyl) ether**.

Bis(2-chloro-1-methylethyl) ether 000108-06-1
Replaced on Table 3. Compound tested was **Technical bis(2-chloro-1-methylethyl) ether** containing 70% **bis(2-chloro-1-methylethyl) ether** and 30% **bis(2-chloroisopropyl) ether**. [Slope factor], [unit risk], and [EPA Group] classification were only derived for **bis(2-chloro-1-methylethyl) ether**.

Dimethylhydrazine, 1,2- 000540-73-8
The general comment, "Contact the Superfund Health Risk Technical Support Center" has been removed from the table.

Vinyl chloride 000075-01-4
No change in values. The General Comment was changed to reflect additional review by the CRAVE Work Group.

D. CHEMICAL-SPECIFIC CHANGES IN THE JULY 1994 AND NOVEMBER 1994 SUPPLEMENTS ON HEAST TABLE 4: RADIONUCLIDE CARCINOGENICITY – SLOPE FACTORS

EPA's Office of Radiation and Indoor Air (ORIA) has recently revised its methodology for estimating radiogenic cancer risks and for deriving radionuclide slope factors[1]. Specifically, ORIA has:

✓ revised its risk models for potential cancer sites based on current epidemiological data on radiogenic cancers in humans and on recent recommendations of the National Academy of Sciences (NAS) Biological Effects of Ionizing Radiation

[1] Radionuclide ingestion and inhalation slope factors are central estimates in a linear model of the age-averaged, lifetime attributable radiation cancer incidence (fatal and nonfatal cancer) risk per unit of activity inhaled or ingested, expressed as risk per picocurie (pCi). External exposure slope factors are central estimates of lifetime attributable radiation cancer incidence risk for each year of exposure to external radiation from photon-emitting radionuclides distributed uniformly in a thick layer of soil, and are expressed as risk/yr per pCi/g soil.

(BEIR) Committee[2], the International Commission on Radiological Protection (ICRP)[3], and the U.S. Nuclear Regulatory Commission (NRC)[4]; (EPA's previous radiogenic cancer risk models were based primarily upon NAS BEIR III Committee recommendations.)

✓ incorporated a dose and dose rate effectiveness factor (DDREF) of 2 for low-LET radiation for all cancer sites except breast (DDREF=1) whenever the total dose is below 20 rad (0.2 Gy) or the dose rate is below 10 mrad/min (0.1 mGy/min); (In EPA's previous methodology, a value of DDREF=1 was assumed for low-LET radiation for all cancer sites. For high-LET alpha radiation, EPA has retained the value of DDREF=1.)

✓ revised the relative biological effectiveness (RBE) for alpha particles to RBE=20 for all cancer sites except breast (RBE=10) and leukemia (RBE=1); (In the previous methodology, EPA assumed a value of RBE=8 all cancer sites with the exception of leukemia (RBE=1.117).)

✓ taken survival data and vital statistics from the *U.S. Decennial Life Tables for 1979-1981*; (Previously, EPA used life table data for the 1970 decennial U.S. population in the calculation of radionuclide slope factors.)

✓ revised its method for integrating vital statistics and risk models for reference populations;

✓ re-evaluated and revised (as appropriate) the radiation dose estimates used to derive the slope factors;

✓ increased the Agency's estimate of the lifetime fatal cancer risk associated with uniform, whole-body irradiation of the U.S. population from low-LET radiation at low doses and dose rates by approximately 24% from 392 to 509 per 10^6 person-rad (392 to 509 per 10^4 person-Gy); and

✓ increased the Agency's cancer morbidity risk estimate from 623 to 761 per 10^6 person-rad (623 to 761 per 10^4 person-Gy).

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[2] National Academy of Sciences (1990). Health Effects of Exposure to Low Levels of Ionizing Radiation, BEIR V, Committee on the Biological Effects of Ionizing Radiations, National Research Council, Washington, D.C.

[3] International Commission on Radiological Protection (1991), 1990 Recommendations of the International Commission on Radiological Protection, ICRP Publication 60, Pergamon Press, New York, NY.

[4] U.S. Nuclear Regulatory Commission (1991, 1993), Health Effects Models for Nuclear Power Plant Accident Consequence Analysis, NUREG/CR-4214. Addenda documenting the scientific basis for radiogenic risk models published in 1991 (for low-LET radiation) and 1993 (for alpha radiation). See EPA 402-R-93-076 for discussion of these models.

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As a result of these changes in risk assessment methodology, assumptions, and calculations, ORIA has also rederived its lifetime excess cancer incidence slope factors for all radionuclides listed in previous HEAST updates and for a few new radionuclides added to this update. The HEAST User's Guide on Radionuclide Carcinogenicity provides an overview of ORIA's revised methodology for deriving radionuclide slope factors, and interested users are directed to *Estimating Radiogenic Cancer Risks* (EPA 402-R-93-076) for a more detailed discussion of ORIA's approach and assumptions.

For simplicity and to minimize the possibility of confusion and errors, this HEAST update includes a single table—Table 4—of radionuclide slope factors in customary activity units of picocuries (pCi) only, consistent with the reporting format for radionuclide slope factors in EPA's Integrated Risk Information System (IRIS) data base. Previous HEAST updates presented radionuclide slope factors in both customary units and the International System (SI) units of becquerels (Bq) in Tables 4A and 4B, respectively.

Similar to the former HEAST Tables 4A and 4B, the new Table 4 provides reference toxicity information for each radionuclide, including a Chemical Abstract Service Reference Number (CASRN), radioactive half-life, lung clearance classification and gastrointestinal (GI) absorption factor (where appropriate). *It should be noted that the GI absorption factors, lung classifications and radioactive half-lives are provided in HEAST Table 4 for reference only and should not be used to correct, modify, or in any way adjust radionuclide slope factors or intake assumptions in risk calculations.*

Inhalation, ingestion and external exposure slope factors for radionuclides marked with the suffix "+D" in Table 4 include the added risks from associated radioactive decay chain products with half-lives less than or equal to six months, assuming equilibrium with the principal or parent radionuclide in the environment. (Note that slope factors for all radionuclides always account for associated decay products created within the body after intake.)

In summary, key features of this HEAST update for radionuclides are:

- **All radionuclide ingestion, inhalation and external exposure cancer slope factors have been updated** to incorporate EPA's revised methodology for estimating radiogenic cancer risk.

- **Table 4 presents radionuclide slope factors in customary activity units of picocuries (pCi) only**, consistent with EPA's IRIS data base format for radionuclides.

- **Additional slope factors are now provided for the following six radionuclide decay chains:**
  Ag-108m+D, Ce-144+D, Cm-243+D, Pu-241+D, Pu-244+D, and Sb-125+D.

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USER'S GUIDE: CHEMICAL TOXICITY

The HEAST summarizes provisional toxicity and cancer values as well as values developed for the NAAQS and DWCD chemicals. The provisional status of the toxicity and cancer values is indicated by placing brackets around the title of the value. These include provisional reference concentrations ([RfC]) and provisional reference doses ([RfD]) for toxicity from subchronic and chronic inhalation and oral exposure (Tables 1 and 2) and provisional slope factors ([slope factor]), provisional cancer classifications ([EPA Group]) and provisional unit risk values ([unit risk]) for carcinogenicity, based on lifetime inhalation and oral exposure (Table 3). Brackets should be included with the acronym whenever a user quotes the value in an assessment document, and the provisional nature of the value should be noted. A more complete discussion of how Superfund develops and considers the toxicity assessment in hazardous waste sites is presented in Chapter 7 of Risk Assessment Guidance for Superfund Volume 1: Human Health Evaluation Manual, Part A, EPA/540/1-89/002.

The references listed for each chemical in the Reference Tables for Tables 1, 2 and 3 represent the study or studies that are the basis for the [RfC], [RfD], [slope factor], [EPA Group], or [unit risk], as well as the EPA reference that is the source of the Agency analysis or risk assessment information. In some cases, additional EPA documents are also listed as a source of information on the chemical. Work Group verified values found on IRIS are not found on the HEAST, but are indicated in the tables by the word "IRIS" in place of the number.

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TABLE 1: SUBCHRONIC AND CHRONIC TOXICITY (OTHER THAN CARCINOGENICITY)

The [RfC] or [RfD] is a provisional estimate (with uncertainty spanning perhaps an order of magnitude) of the daily exposure to the human population (including sensitive subgroups) that is likely to be without an appreciable risk of deleterious effects during a portion of the lifetime, in the case of a subchronic [RfC] or [RfD], or during a lifetime, in the case of a chronic [RfC] or [RfD]. The [RfC] and [RfD] values are listed in Tables 1 and 2 in columns with the headings "Subchronic" and "Chronic". The critical dose or concentration level is usually a No-Observed-Adverse-Effect Level (NOAEL) or a Lowest-Observed-Adverse-Effect Level (LOAEL) (See Appendix A, Section IV: Effect Level Definitions, for more information). The [RfC] or [RfD] is derived by dividing the NOAEL or LOAEL by an uncertainty factor (UF) times a modifying factor (MF):

$$[RfC] \text{ or } [RfD] = \frac{NOAEL \text{ or } LOAEL}{UF \times MF}$$

In Tables 1 and 2, the information listed is the following:

Chemical	=	Chemical Name/CASRN
Level	=	Effect Level
Dose	=	Administered Dose or Concentration
Route	=	Route of Administration
Species	=	Tested Species
Experiment Length	=	Length of Exposure
Target	=	Target Organ(s) Affected at Critical Level
Critical Effect	=	Effect(s) Observed at Critical Level
Subchronic [RfC]	=	Subchronic Inhalation [Reference Concentration]
UF	=	Uncertainty Factor for the Subchronic Inhalation [Reference Concentration]
Subchronic [RfD]	=	Subchronic Oral [Reference Dose]
UF	=	Uncertainty Factor for the Subchronic Oral [Reference Dose]
Chronic [RfC]	=	Chronic Inhalation [Reference Concentration]

UF	=	Uncertainty Factor for the Chronic Inhalation [Reference Concentration]
Chronic [RfD]	=	Chronic Oral [Reference Dose]
UF	=	Uncertainty Factor for the Chronic Oral [Reference Dose]
Reference	=	Reference Identification Number for All Toxicity Values on the Same Line.

An example of this information is shown in Figure 1, HEAST Table 1:

Chemical	=	GLYCIDALDEHYDE/000765-34-4
Level	=	NOAEL
Dose	=	10 PPM
Route	=	INHALATION: INTERMITTENT
Species	=	RAT
Experiment Length	=	12 WEEKS
Target	=	WHOLE BODY, BLOOD, KIDNEY
Critical Effect	=	DECREASED WEIGHT GAIN, HEMATOPOIETIC EFFECTS
Subchronic [RfC]	=	1E-2 mg/cu.m
UF	=	300
Subchronic [RfD]	=	4E-3 mg/kg/day
UF	=	300
Chronic [RfC]	=	1E-3 mg/cu.m
UF	=	3000
Chronic [RfD]	=	IRIS
UF	=	IRIS
Reference	=	005968

Notice that a Chronic RfD for Glycidaldehyde is available on IRIS, so it is not listed here. Also notice that there are footnotes for this chemical that indicate a route-to-route extrapolation was performed and that there is information available on Table 3: Carcinogenicity.

Also given in Figure 1 is an example of the References for Table 1 for the same chemical. The reference is identified by the chemical name (Glycidaldehyde), the CASRN (00765-34-4), and the reference number that links it with the toxicity values (005968).

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FIGURE 1

Example Data and References for Chemical Toxicity

HEAST TABLE 1: SUBCHRONIC AND CHRONIC TOXICITY (OTHER THAN CARCINOGENICITY)

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CHEMICAL / DOSE LEVEL / ROUTE	SPECIES / EXPERIMENT / LENGTH / TARGET	CRITICAL EFFECT	Subchronic [RfC] (mg/cu m) UF	Subchronic [RfD] (mg/kg/day) UF	Chronic [RfC] (mg/cu m) UF	Chronic [RfD] (mg/kg/day)	REFERENCE
GLYCIDALDEHYDE 000765-34-4			1E-2	4E-3	1E-3	IRIS	005968
NOAEL 10 PPM INHALATION: INTERMITTENT	RAT 12 WEEKS WHOLE BODY BLOOD KIDNEY	DECREASED WEIGHT GAIN HEMATOPOIETIC EFFECTS EFFECTS	300	300	3000		

SUBCHRONIC [RfD] COMMENT: BASED ON ROUTE TO ROUTE EXTRAPOLATION USING AN ABSORPTION FACTOR OF 0.5.
CHRONIC [RfD] COMMENT: BASED ON ROUTE TO ROUTE EXTRAPOLATION USING AN ABSORPTION FACTOR OF 0.5.
GENERAL COMMENT: ALSO SEE TABLE 3: CARCINOGENICITY.

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REFERENCES FOR HEAST TABLE 1: SUBCHRONIC AND CHRONIC TOXICITY (OTHER THAN CARCINOGENICITY)

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GLYCIDALDEHYDE 000765-34-4

005968 HINE CH, RJ GUZMAN, MK DUNLAP, R LIMA AND GS LOQUVAM. 1961. STUDIES ON THE TOXICITY OF GLYCIDALDEHYDE. ARCH ENVIRON HEALTH. 2: 23-30.

US EPA. 1989. HEALTH AND ENVIRONMENTAL EFFECTS DOCUMENTFOR GLYCIDALDEHYDE. PREPARED BY THE OFFICE OF HEALTH AND ENVIRONMENTAL ASSESSMENT, National Center for Environmental Assessment, CINCINNATI, OH FOR THE OFFICE OF SOLID WASTE AND EMERGENCY RESPONSE, WASHINGTON, DC.

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The uncertainty factor used in calculating the [RfC] or [RfD] reflects scientific judgment regarding the various types of data used to estimate [RfC] or [RfD] values. An uncertainty factor of 10 is usually used to account for variation in human sensitivity among populations. An additional 10-fold factor is usually used to account for each of the uncertainties assumed when extrapolating from animal data to humans, when extrapolating from a LOAEL to a NOAEL, and when extrapolating from subchronic to chronic exposure. In order to reflect professional assessment of the uncertainties of the study and the data base not explicitly addressed by the above uncertainty factors (e.g., completeness of the overall data base), an additional uncertainty factor or modifying factor ranging from greater than 0 to less than or equal to 10 is applied. The default value for this modifying factor is 1.

For chemicals for which a chronic [RfC] or [RfD] is presented in Tables 1 and 2, a subchronic [RfC] or [RfD] is usually derived, if not previously derived in the Agency documents that originally addressed the chemical. Subchronic toxicity values are not evaluated by the RfD/RfC Work Group. The subchronic [RfC] or [RfD] is derived in either of two ways: 1) If an uncertainty factor was used to account for extrapolation from subchronic to chronic exposure in the derivation of the chronic [RfC] or [RfD], then, the subchronic [RfC] or [RfD] is derived from the same benchmark concentration or dose without applying the uncertainty factor for subchronic to chronic exposure extrapolation. 2) If the chronic [RfC] or [RfD] was derived without use of an uncertainty factor for extrapolating from subchronic to chronic exposure (e.g., if chronic data were available), then, the chronic [RfC] or [RfD] is adopted as the subchronic [RfC] or [RfD].

Tables 1 and 2 list the uncertainty factor and modifying factor, multiplied together, to form a single factor under the heading "Uncertainty Factor." For example, the uncertainty factor of 3000 listed for the chronic inhalation [RfC] for Glycidaldehyde reflects an uncertainty factor of 1000 (10 for human sensitivity, 10 for extrapolation from animal to human, and 10 for extrapolation from subchronic to chronic) and a modifying factor of 3 (for an inadequate data base); the uncertainty factor of 500 listed for the subchronic oral [RfD] for cyanide reflects an uncertainty factor of 100 (10 for human sensitivity, and 10 for extrapolation from animal to human) and a modifying factor of 5 (to account for tolerance to cyanide when ingested by food rather than administration by gavage or by drinking water).

[RfC] and [RfD] values are specific for the route of exposure for which they are listed on Tables 1 and 2. In the few instances where an [RfD] or [RfC] has been determined from another exposure route, route-to-route extrapolation is indicated by a footnote.

The current methodology for the derivation of inhalation RfCs is detailed in the document, "Interim Methods for Development of Inhalation Reference Doses" (U.S. EPA, 1990, EPA/600/8-88/066F, NTIS PB90-145723). These methods are different from those used for oral RfDs because of (1) the dynamics of the respiratory system and its diversity across species, and (2) differences in the physicochemical properties of contaminants (such as the size and shape of a particle or whether the contaminant is an aerosol or a gas). Parameters such as deposition, clearance mechanisms and the physicochemical properties of the inhaled agent are considered in the determination of the effective dose delivered to the target organ.

An RfC value calculated using this interim methodology is generally reported as a concentration in air (mg/m^3), although it may be converted to a corresponding inhaled dose (mg/kg/day) by dividing by 70 kg (an assumed human body weight), multiplying by 20 m^3/day (an assumed human inhalation rate), and adjusting by an appropriate absorption factor. This conversion, however, may often be technically incorrect, and the appropriateness of doing this must be evaluated on a case-by-case basis. It is recommended that HEAST users that plan to use this technique read a further discussion of the difficulties inherent in this dose conversion that can be found in Appendix A, Section II: Dose Conversions On HEAST.

Inhalation [RfC] values reported in HEAs and early HEEDs that were finalized prior to the implementation of the interim methods were calculated using methods similar in concept to those used for oral [RfD]s. These values are reported both as a concentration in air (in mg/m^3 for continuous, 24 hours/day exposure) under the column [RfC], and as a corresponding inhaled dose (in mg/kg/day) in the footnotes called, Chronic (Subchronic) [RfC] Comment. These chemicals are listed in Table 2: Alternate Methods - Subchronic and Chronic Toxicity (Other Than Carcinogenicity).

[RfD] values for oral exposure are reported as mg/kg/day. An oral [RfD] value can be converted to a corresponding concentration in drinking water, assuming human body weight of 70 kg and water consumption of 2 L/day, as follows:

$$mg/L \text{ in water} = \frac{\text{oral [RfD] (in mg/kg/day)} \times 70 \text{ kg}}{2 \text{ L/day}}$$

The [RfC] or [RfD] is used as a reference point for gauging the potential effects of other exposures. Usually, exposures that are less than the [RfC] or [RfD] are not

likely to be associated with health risks. As the frequency of exposures exceeding the [RfC] or [RfD] increases and as the size of the excess increases, the probability increases that adverse health effects may be observed in a human population. Nonetheless, a clear distinction that would categorize all exposures below the [RfC] or [RfD] as "acceptable" (risk-free) and all exposures in excess of the [RfC] or [RfD] as "unacceptable" (causing adverse effects) cannot be made. In addition, [RfC] and [RfD] values, and particularly those with limitations in the quality or quantity of supporting data, are subject to change as additional information becomes available.

When [RfC] or [RfD] values are listed in Tables 1 or 2 for chemicals that are carcinogens, a footnote will refer to Table 3 if additional information concerning carcinogenicity is available in that table. [RfC] and [RfD] values that have been derived for carcinogens are based on noncancer endpoints only and should not be assumed to be protective against carcinogenicity.

TABLE 2: ALTERNATE METHODS - SUBCHRONIC AND CHRONIC TOXICITY (OTHER THAN CARCINOGENICITY)

Chemicals are listed in Table 2 when the [RfD] or [RfC] was derived from alternative methods that are not currently practiced by the RfD/RfC Work Group. The table consists primarily of inhalation [RfC] values determined from methodology that does not follow the interim inhalation methods adopted by the Agency, and [RfC] or [RfD] values based on route-to-route extrapolation with inadequate pharmacokinetic and toxicity data. A footnote is added to each chemical to provide a short explanation of the specific methodology used in calculating these provisional toxicity values. Most of these toxicity values were formerly listed in Table 1. In some instances, the chemical

may be listed in both Tables 1 and 2 if the chemical has more than one toxicity value. Table 2 follows the same format as Table 1 (refer to Figure 1).

TABLE 3: CARCINOGENICITY

In assessing the carcinogenic potential of a chemical, the Human Health Assessment Group (HHAG) of EPA classifies the chemical into one of the following groups, according to the weight of evidence from epidemiologic and animal studies:

Group A - Human Carcinogen (sufficient evidence of carcinogenicity in humans)

Group B - Probable Human Carcinogen (B1 - limited evidence of carcinogenicity in humans; B2 - sufficient evidence of carcinogenicity in animals with inadequate or lack of evidence in humans)

Group C - Possible Human Carcinogen (limited evidence of carcinogenicity in animals and inadequate or lack of human data)

Group D - Not Classifiable as to Human Carcinogenicity (inadequate or no evidence)

Group E - Evidence of Noncarcinogenicity for Humans (no evidence of carcinogenicity in adequate studies).

These classifications are shown under [EPA Group] on Table 3.

Quantitative carcinogenic risk assessments are performed for chemicals in Groups A and B, and on a case-by-case basis for chemicals in Group C. Cancer [slope factors] (formerly called cancer potency factors in the Superfund Public Health Evaluation Manual) are estimated through the use of mathematical extrapolation models, most commonly the linearized multistage model, for estimating the largest possible linear

slope (within the 95% confidence limit) at low extrapolated doses that is consistent with the data. The [slope factor] or risk is characterized as an upper-bound estimate, i.e., the true risk to humans, while not identifiable, is not likely to exceed the upper-bound estimate and in fact may be lower.

Quantitative carcinogenic estimates listed in Table 3 include the following:

[slope factor] = risk per unit dose = risk per mg/kg/day

[unit risk] for inhalation exposure = risk per concentration unit in air = risk per $\mu g/m^3$

[unit risk] for oral exposure = risk per concentration unit in water = risk per µg/L

[Unit risk] estimates for inhalation and oral exposure can be calculated by dividing the appropriate [slope factor] by 70 kg and multiplying by the inhalation rate (20 m^3/day) or the water consumption rate (2 L/day), respectively, for risk associated with unit concentration in air or water. Hence,

$$\text{risk per } \mu g/m^3 \text{ (air)} = (\text{risk per mg/kg/day}) \times \frac{1}{70 \text{ kg}} \times 20\ m^3/\text{day} \times 10^3\ (\text{mg}/\mu g)$$

$$\text{risk per } \mu g/L \text{ (water)} = (\text{risk per mg/kg/day}) \times \frac{1}{70 \text{ kg}} \times 2\ L/\text{day} \times 10^{-3}\ (\text{mg}/\mu g)$$

Quantitative estimates of carcinogenic risk are listed under [Unit Risk] or [Slope Factor] in Table 3. Information on the study and data set used for estimation of the [slope factor] is given in the other columns of Table 3.

In Table 3, the information listed is the following:

Chemical	= Chemical Name/CASRN
Route	= Route of Administration
Species	= Tested Species

Experiment Length	=	Length of Exposure
Target	=	Target Organ(s) Affected at Critical Level
Cancer	=	Tumors Observed at Critical Level (Not Specified if More Than One Type of Tumor)
[EPA Group]	=	EPA Classification by Weight of Evidence
Oral [Slope Factor]	=	Risk Per Unit Dose
Inhalation [Slope Factor]	=	Risk Per Unit Dose
Oral [Unit Risk]	=	Risk Per Concentration Unit in Water
Inhalation [Unit Risk]	=	Risk Per Concentration Unit in Air
Reference	=	Reference Identification Number for All Toxicity Values on the Same Line.

An example of this information is shown in Figure 2, HEAST Table 3:

Chemical	=	DIMETHYLHYDRAZINE, 1,2-/000077-78-1
Route	=	ORAL: DRINKING WATER
Species	=	MOUSE
Experiment Length	=	LIFETIME
Target	=	CARDIOVASCULAR SYSTEM
Cancer	=	TUMORS
[EPA Group]	=	B2
Oral [Slope Factor]	=	3.7E+1 (MG/KG/DAY)-1
Inhalation [Slope Factor]	=	3.7E+1 (MG/KG/DAY)-1
Oral [Unit Risk]	=	1.1E-3 (UG/L)-1
Inhalation [Unit Risk]	=	1.1E-2 (UG/CU M)-1
Reference	=	009993

Notice that the inhalation values for 1,2-Dimethylhydrazine was extrapolated from the oral data.

Also given in Figure 2 is an example of the References for Table 3 for the same chemical. The reference is identified by the chemical name (Dimethylhydrazine, 1,2-), the CASRN (000077-78-1), and the reference number that links it with the toxicity values (009993).

Quantitative carcinogenic estimates are specific for the route of exposure for which they are listed on Table 3. Footnotes are used to indicate those instances in which the values for inhalation or oral exposure are based on extrapolation from another route of

FIGURE 2
Example Data and References for Carcinogenicity

HEAST TABLE 3: CARCINOGENICITY

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CHEMICAL ROUTE	EXPERIMENT LENGTH / SPECIES	TARGET	CANCER	[EPA GROUP]	[SLOPE FACTOR] ORAL (mg/kg/day)$^{-1}$	[SLOPE FACTOR] INHALATION (mg/kg/day)$^{-1}$	[UNIT RISK] ORAL (ug/L)$^{-1}$	[UNIT RISK] INHALATION (ug/cu m)$^{-1}$	REFERENCE
DIMETHYLHYDRAZINE,1,2- 000077-78-1									
ORAL: DRINKING WATER	LIFETIME			B2	3.7E+1	3.7E+1	1.1E-3	1.1E-2	009993
	MOUSE	CARDIOVASCULAR SYSTEM	TUMORS						
Inhalation [Slope] Comment:	BASED ON ROUTE TO ROUTE EXTRAPOLATION.								

REFERENCES FOR HEAST TABLE 3: CARCINOGENICITY

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DIMETHYLHYDRAZINE, 1,2- 000077-78-1

009993 TOTH B AND K PATEL. 1982. CARCINOGENICITY DOSE-RESPONSE STUDY BY CONTINUOUS ADMINISTRATION OF 1,2-DIMETHYLHYDRAZINE DI-HYDROCHLORIDE IN MICE. I. LIGHT AND TRANSMISSION ELECTRON MICROSCOPIC STUDY OF COLONOIC NEOPLASMS. AM. J. OF PATH. 84:69-86.

US EPA. 1988. CARCINOGEN RISK ASSESSMENT VERIFICATION ENDEAVOR (CRAVE) WORK GROUP.

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exposure. The route-to-route conversion required to present inhalation [slope factors] in the units of mg/kg/day is considered by the CRAVE Work Group to be technically incorrect. It is recommended that HEAST users who plan to use this information read a further discussion of the difficulties inherent in this dose conversion which can be found in Appendix A, Section II: Dose Conversions On HEAST.

To estimate risk-specific concentrations in air from the [unit risk] in air as presented in Table 3, the specified level of risk is divided by the [unit risk] for air. Hence, the air concentration (in $\mu g/m^3$) corresponding to an upper-bound increased lifetime cancer risk of 1×10^{-5} is calculated as follows:

$$\mu g/m^3 \text{ in air} = \frac{1 \times 10^{-5}}{[\text{unit risk}] \text{ in } (\mu g/m^3)^{-1}}$$

To estimate risk-specific concentrations in drinking water from the oral [slope factor] values presented in Table 3, the specified level of risk is multiplied by 70 kg and divided by the [slope factor] times 2 L/day. Hence, the water concentration corresponding to an upper-bound increased lifetime cancer risk of 1×10^{-5} is calculated as follows:

$$\text{mg/L in water} = \frac{1 \times 10^{-5} \times 70 \text{ kg}}{[\text{slope factor}] \text{ in } (\text{mg/kg/day})^{-1} \times 2 \text{ L/day}}$$

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USER'S GUIDE: RADIONUCLIDE CARCINOGENICITY

Introduction

EPA classifies all radionuclides as Group A carcinogens. HEAST Table 4 lists ingestion, inhalation and external exposure cancer slope factors for radionuclides in units of picocuries (pCi).[5] Ingestion and inhalation slope factors are central estimates in a linear model of the age-averaged, lifetime attributable radiation cancer incidence (fatal and nonfatal cancer) risk per unit of activity inhaled or ingested, expressed as risk/pCi. External exposure slope factors are central estimates of lifetime attributable radiation cancer incidence risk for each year of exposure to external radiation from photon-emitting radionuclides distributed uniformly in a thick layer of soil, and are expressed as risk/yr per pCi/gram soil. When combined with site-specific media concentration data and appropriate exposure assumptions[6], slope factors can be used to estimate lifetime cancer risks to members of the general population due to radionuclide exposures.

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[5] Slope factors are reported in Table 4 in the customary units of picocuries (1 pCi = 10^{-12} curies (Ci) = 3.7×10^{-2} nuclear transformations per second) for consistency with the system used for radionuclides in the IRIS database. If required, slope factors in Table 4 can be converted into the International System (SI) units of becquerels (1 Bq = 1 nuclear transformation per second) by dividing each inhalation, ingestion, or external exposure value by 27.03. Users can calculate cancer risks using slope factors expressed in either customary units or SI units with equivalent results, provided that they also use air, water and soil concentration values in the same system of units.

[6] Agency standardized default exposure scenarios and assumptions for use in baseline risk assessment are provided in EPA (1991), *Risk Assessment Guidance for Superfund, Vol. I, Human Health Evaluation Manual, Supplemental Guidance:* "Standard Default Exposure Factors" (Interim Final), Office of Emergency and Remedial Response, OSWER Directive 9285.6-03. [NTIS order number: PB 91-921314.]

Intended Users and Applications

HEAST users include individuals from the EPA, other Federal agencies, States and contractors who are responsible for the identification, characterization and remediation of sites contaminated with radioactive materials. Radionuclide slope factors are calculated by EPA's Office of Radiation and Indoor Air (ORIA) to assist HEAST users with risk-related evaluations and decision-making at various stages of the remediation process. During site assessment, for example, slope factors are used in EPA's Hazard Ranking System (HRS) to assign toxicity factor values to radionuclides to calculate site scores. During the remedial investigation and feasibility study (RI/FS), slope factors are used to determine baseline site risk, to develop preliminary remediation goals, and to evaluate cleanup alternatives. For further examples on the application of radionuclide slope factors in risk evaluations, users are referred to the following EPA documents:

- Hazard Ranking System (HRS), Federal Register (55 FR 515320), December 1990.
- *Risk Assessment Guidance for Superfund; Volume I - Human Health Evaluation Manual* (RAGS/HHEM), Part A, Baseline Risk Assessment (EPA/540/1-89/002).
- RAGS/HHEM Part B, Development of Risk-Based Preliminary Remediation Goals (OSWER Directive 9285.7-01B). [NTIS order number: PB 92-963333.]
- RAGS/HHEM Part C, Risk Evaluation of Remedial Alternatives (OSWER Directive 9285.7-01C). [NTIS order number: PB 92-963334.]

Copies of RAGS/HHEM Parts A, B and C are available to the public from the National Technical Information Service (NTIS) at (703) 487-4650. Copies are available to EPA staff by calling the Superfund Documents Center at (703) 603-8917.

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Radiation Effects

Ionizing radiation has been shown to be a carcinogen, a mutagen, and a teratogen. Radiation can induce cancers in nearly any tissue or organ in both humans and animals, and the probability of cancer induction increases with increasing radiation dose. Cancer induction is a delayed response that has been documented extensively in epidemiological studies of Japanese atomic bomb survivors, underground uranium miners, radium dial painters, and patients subject to a variety of radiation treatments. Laboratory animal research and mammalian tissue culture studies have provided additional, collaborative data.

Mutagenic effects of radiation have been demonstrated primarily in animal and tissue culture studies; limited data from studies of A-bomb survivors indicate that humans may be as sensitive or less sensitive than animals to radiogenic mutagenicity. Data are also available from both human and animal studies on the teratogenic effects of radiation. These data show that the fetus is most sensitive to radiation injury during the early stages of organ development (between 8 and 15 weeks for the human fetus). Resultant radiation-induced malformations depend on which cells are most actively differentiating at the time of exposure.

EPA classifies all radionuclides as Group A carcinogens, based on their property of emitting ionizing radiation and on the extensive weight of evidence provided by epidemiological studies of radiogenic cancers in humans. At Superfund radiation sites, EPA generally evaluates potential human health risks based on the radiotoxicity, i.e., adverse health effects caused by ionizing radiation, rather than on the chemical toxicity, of each radionuclide present. These evaluations consider the carcinogenic effects of radionuclides only. In most cases, cancer risks are limiting, exceeding both mutagenic and teratogenic risks.

Derivation of Radionuclide Slope Factors

EPA's Office of Radiation and Indoor Air (ORIA) calculates radionuclide slope factor values using health effects data and dose and risk models from a number of national and international scientific advisory commissions and organizations, including the National Academy of Sciences (NAS), the National Council on Radiation Protection and Measurements (NCRP), the United Nations Scientific Committee on the Effects of Atomic Radiation (UNSCEAR), and the International Commission on Radiological Protection (ICRP). A detailed discussion of ORIA's approach and assumptions is provided in *Estimating Radiogenic Cancer Risks* (EPA 402-R-93-076).

Radionuclide slope factors are calculated for each radionuclide individually, based on its unique chemical, metabolic and radioactive properties. The calculation uses dose estimates from EPA's computer code RADRISK[7], vital statistics from the *U.S. Decennial Life Tables for 1979-1981* (described in EPA 402-R-93-076), and cancer risk estimates based largely on the results of the NAS BEIR V report[8], ICRP Publication 60[9], and U.S. Nuclear Regulatory Commission (NRC) analyses.[10] Ingestion and inhalation slope factors for radionuclides account for:

- the amount of radionuclide transported into the bloodstream from either the gastrointestinal (GI) tract following ingestion, or from the lungs following inhalation;
- the ingrowth and decay of radioactive progeny produced within the body subsequent to intake;

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[7] Dunning, D.E. Jr., Leggett, R.W., and Yalcinatas, M.G. (1980). "A Combined Methodology for Estimating Dose Rates and Health Effects from Exposure to Radioactive Pollutants," ORNL/TM-7105.

[8] National Academy of Sciences (1990). Health Effects of Exposure to Low Levels of Ionizing Radiation, BEIR V, Committee on the Biological Effects of Ionizing Radiations, National Research Council, Washington, D.C.

[9] International Commission on Radiological Protection (1991), 1990 Recommendations of the International Commission on Radiological Protection, ICRP Publication 60, Pergamon Press, New York, NY.

[10] U.S. Nuclear Regulatory Commission (1991, 1993), Health Effects Models for Nuclear Power Plant Accident Consequence Analysis, NUREG/CR-4214. Addenda documenting the scientific basis for radiogenic risk models published in 1991 (for low-LET radiation) and 1993 (for alpha radiation). See EPA 402-R-93-076 for discussion of these models.

- the distribution and retention of each radionuclide (and its associated progeny, if appropriate) in body tissues and organs;
- the radiation dose delivered to body tissues and organs from the radionuclide (and its associated progeny, if appropriate); and
- the sex, age, and organ-specific risk factors over the lifetime of exposure.

The slope factors are the average risk per unit intake or exposure for an individual in a stationary population with vital statistics (mortality rates) of the United States in 1980. (The expected lifetime for an individual in this population is about 74 years.) Consequently, radionuclide ingestion and inhalation slope factors are <u>not</u> expressed as a function of body weight and time, and do <u>not</u> require corrections for GI absorption or lung transfer efficiencies.

<u>NOTE</u>: ***The GI absorption values (f_1), ICRP lung classifications (D, W, Y) and radioactive half-lives are provided in HEAST Table 4 for reference only and should not be used to correct, modify, or in any way adjust radionuclide slope factors or intake assumptions in risk calculations.***

External slope factors provide cancer risk estimates per unit exposure to a uniform radionuclide concentration in soil. These factors, which account for photon energy flux attenuation and buildup in soil, are calculated for each radionuclide using volume and surface dose factors derived using the computer code DFSOIL.[11]

Because of the radiation risk models employed for both internal and external exposures, slope factors for radionuclides are characterized as central estimates in a linear model of the age-averaged lifetime total radiation cancer incidence risk per unit intake or exposure.

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[11] Sjoreen, A.L., Kocher, D.C., Killough, G.G. and Miller C.W. (1984). "MLSOIL and DFSOIL - Computer Codes to Estimate Effective Ground Surface Concentrations for Dose Computations," Oak Ridge National Laboratory, Oak Ridge, TN, ORNL-5974.

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About the Information Provided in Table 4

Table 4 lists ingestion, inhalation and external exposure slope factors of principal radionuclides, and provides key parameter values used in the derivation of slope factor values. Radionuclides are presented alphabetically by element and atomic weight.

Selected radionuclides and radioactive decay chain products are designated in HEAST Table 4 with the suffix "+D" (e.g., U-238+D, Ra-226+D, Cs-137+D) to indicate that cancer risk estimates for these radionuclides include the contributions from their short-lived decay products, assuming equal activity concentrations (i.e., secular equilibrium) with the principal or parent nuclide in the environment.[12] Decay chains are identified in Exhibit 1.

In most cases, site-specific analytical data should be used to establish the actual degree of equilibrium between each parent radionuclide and its decay products in each media sampled. However, in the absence of empirical data, the "+D" values for radionuclides should be used unless there are compelling reasons not to. For example, the external slope factors for Cs-137 and Cs-137+D are 0.0 and 2×10^{-6} (risk per year per pCi/gram), respectively. The value for Cs-137+D is higher because it includes the risk contribution from cesium's short-lived gamma-emitting decay product Ba-137m (half-life, 25.5 minutes) which, under most environmental conditions, will be in secular equilibrium with Cs-137.

Note that there may be circumstances, such as long disposal times or technologically enhanced concentrations of naturally occurring radionuclides, that may necessitate the combination of the risks of a parent radionuclide and its decay products over several contiguous subchains. For example, Ra-226 soil analyses at a site might show that all radium decay products are present in secular equilibrium down to stable Pb-206 (See Exhibit 1). In this case, Ra-226 risk calculations should be based on the

[12] There is one exception to the assumption of secular equilibrium. For the inhalation slope factor for Rn-222+D reported in HEAST Table 4, ORIA assumes a 50% equilibrium value for radon decay products (Po-218, Pb-214, Bi-214 and Po-214) in air.

ingestion, inhalation and external exposure slope factors for the Ra-226+D subchain, plus the ingestion, inhalation and external exposure factors for the Pb-210+D subchain. For actual sites, users should consult with a health physicist or radiochemist (1) to evaluate the site-specific analytical data to determine the degree of equilibrium between parent radionuclides and decay members of contiguous decay chains and (2) to assist in the combination of appropriate slope factor values. For health physics and radioanalytical support, HEAST users may contact EPA's Regional Radiation Program Managers, ORIA's National Air and Radiation Laboratory (NAREL) in Montgomery, Alabama, ORIA's Las Vegas Laboratory (ORIA-LV) in Las Vegas, Nevada, or the ORIA contact at EPA headquarters in Washington, D.C., listed in Exhibit 2.

A Chemical Abstract System Reference Number (CASRN) is assigned to each radionuclide for identification and reporting accuracy during risk assessments, and radioactive half-lives are provided for reference.

The designations "D", "W", and "Y" presented in Table 4 under the heading "ICRP Lung Class" in the tables refer to the lung clearance times for inhaled particulate radionuclides, expressed as days (D), weeks (W), or years (Y), as recommended by the International Commission on Radiological Protection (ICRP). Gaseous radionuclides, e.g., Rn-222, are designated with an asterisk ("*"). "GI Absorption Factors, f_1" are the fractional amounts of each radionuclide that may be absorbed from the gastrointestinal (GI) tract into blood following an oral intake. The ICRP lung clearance classifications and GI absorption factors provided in Table 4 are the default values that EPA used to calculate radionuclide slope factors for inhalation and ingestion exposures, respectively. These factors are provided *for reference only* (see the Note Box).

Where to Address Questions About Radionuclide Slope Factors:

EPA continuously reviews the scientific literature on radiation effects to ensure that the Agency's risk assessment methodologies are consistent with current models

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and assumptions. As risk methodologies are refined, EPA will revise and update the slope factors in Table 4.

HEAST users with questions about radionuclide slope factor values and their use in radiation risk assessments should contact Michael Boyd of the Remedial Guidance Section of the Radiation Assessment Branch of ORIA at (202) 233-9395. Written requests for assistance can be sent by fax to (202) 233-9650.

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Exhibit 1. Radionuclide Decay Chains Considered Explicitly in HEAST Table 4*

Principal Radionuclide[a]		Associated Decay Chain[b]	Terminal Nuclide or Radionuclide[c]	
Nuclide	Half-life (yr)		Nuclide	Half-life (yr)
Ac-227+D	22	[Th-227 (98.6%, 19 d)] Fr-223 (1.4%, 22 min) Ra-223 (11 d) Rn-219 (4 s) Po-215 (2 ms) Pb-211 (36 min) Bi-211 (2 min) [Tl-207 (99.7%, 5 min) Po-211 (0.3%, 0.5 s)]	Pb-207	*
Ag-108m+D	127	-[d] Ag-108 (9%, 2 min)	Pd-108 (91%) [Cd-108 (98%) Pd-108 (2%)]	* * *
Ag-110m+D	0.7	- Ag-110 (1%, 25 s)	Cd-110 (99%) [Cd-110 (99.7%) Pd-110 (0.3%)	* * *
Am-243+D	7.4×10^3	Np-239 (2 d)	Pu-239	2.4×10^4
Ce-144+D	0.8	[Pr-144 (9%, 17 min) Pr-144m (2%, 7 min)]	Nd-144	*
Cs-137+D	30	Ba-137m (95%, 3 min)	Ba-137	*
Np-237+D	2.1×10^6	Pa-233 (27 d)	U-233	1.6×10^5
Pb-210+D	22	Bi-210 (5 d) Po-210 (138 d)	Pb-206	*
Pu-241+D	14	[Am-241 (~100%, 432 y) U-237 (7 d)][e]	Np-237	2.1×10^6
Pu-244+D	8.3×10^7	U-240 (~100%, 14 h) Np-240	Pu-240	6.5×10^3
Ra-226+D	1.6×10^3	Rn-222 (4 d) Po-218 (3 min) Pb-214 (~100%, 27 min) Bi-214 (20 min) Po-214 (~100%, 1 min)	Pb-210	22
Ra-228+D	8	Ac-228 (6 h)	Th-228	2
Ru-106+D	1	Rh-106 (30 s)	Pd-106	*
Sb-125+D	3	Te-125m (23%, 58 d)	Te-125	*
Sr-90+D	29	Y-90 (64 h)	Zr-90	*

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Exhibit 1 (Continued)

Principal Radionuclide[a]		Associated Decay Chain[b]	Terminal Nuclide or Radionuclide[c]	
Nuclide	Half-life (yr)		Nuclide	Half-life (yr)
Th-228+D	2	Ra-224 (4 d) Rn-220 (56 s) Po-216 (0.2 s) Pb-212 11 h) Bi-212 (61 min) [Po-212 (64%, 0.3 μs) Tl-208 (36%, 3 min)]	Pb-208	*
Th-229+D	7.3×10^3	Ra-225 (15 d) Ac-225 (10 d) Fr-221 (5 min) At-217 (32 ms) Bi-213 (46 min) [Po-213 (98%, 4 μs) Tl-209 (2%, 2 min)] Pd-209 (3 h)	Bi-209	*
U-235+D	7.0×10^8	Th-231 (26 h)	Pa-231	3.4×10^4
U-238+D	4.5×10^9	Th-234 (24 d) [Pa-234m (99.8%, 1 min) Pa-234 (0.2%, 7 h)]	U-234	2.4×10^5

[a] Radionuclides with half-lives greater than six months. "+D" designates principal radionuclides with associated decay chains.

[b] The chain of decay products of a principal radionuclide extending to (but not including) the next principal radionuclide or a stable radionuclide. Half-lives are given in parentheses. Branches are indicated by square brackets with branching ratios in parentheses.

[c] The principal radionuclide or stable nuclide that terminates an associated decay chain. Stable nuclides are indicated by an asterisk (*) in place of a half-life.

[d] A hyphen indicates that there are no associated decay products.

[e] The branching decay for Pu-241 and Cm-243 involves multiple principal radionuclides and associated radionuclides.

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* Table adapted from: C. Yu, et al. (1994), "Manual for Implementing Residual Radioactive Materials Guidelines Using RESRAD, Version 5.0," Argonne National Laboratory.

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Exhibit 2. EPA Radiation Program Staff

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Exhibit 2 (Continued)

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HEAST TABLE 1: SUBCHRONIC AND CHRONIC TOXICITY (OTHER THAN CARCINOGENICITY)

May 1995

CHEMICAL LEVEL	DOSE ROUTE	SPECIES EXPERIMENT LENGTH	TARGET	CRITICAL EFFECT	Subchronic [RfC] (mg/cu m) UF	Subchronic [RfD] (mg/kg/day) UF	Chronic [RfC] (mg/cu m) UF	Chronic [RfD] (mg/kg/day) UF	REFERENCE
ACENAPHTHENE		**000083-32-9**							
NOAEL 175 MG/KG/DAY		MOUSE				6E-1		IRIS	010165
	ORAL: GAVAGE	90 DAYS	LIVER	HEPATOTOXICITY		300			
ACENAPTHYLENE		**000208-96-8**							005202
GENERAL COMMENT: DATA INADEQUATE FOR QUANTITATIVE RISK ASSESSMENT									
ACEPHATE		**030560-19-1**							
LOAEL 2 PPM		RAT				4E-3		IRIS	005833
	ORAL: DIET	13 WEEKS	BRAIN	DECREASED CHOLINESTERASE ACTIVITY		30			
GENERAL COMMENT: ALSO SEE HEAST TABLE 3: CARCINOGENICITY.									
ACETONE		**000067-64-1**							
NOEL 100 MG/KG/DAY		RAT				1E+0		IRIS	005204
	ORAL: GAVAGE	90 DAYS	LIVER	INCREASED WEIGHT		100			
			KIDNEY	INCREASED WEIGHT					
			KIDNEY	NEPHROTOXICITY					
ACETONE CYANOHYDRIN / (2-METHYLLACTONITRILE)		**000075-86-5**							
NOAEL 8.75 MG/(KG-DAY)		RAT				8E-3		8E-4	005776
	ORAL: GAVAGE	90 DAYS	LIVER	INCREASED RELATIVE WEIGHT		300		3000	

SUBCHRONIC [RfC] COMMENT: ALSO SEE HEAST TABLE 2: ALTERNATE METHODS -- SUBCHRONIC AND CHRONIC TOXICITY (OTHER THAN CARCINOGENICITY)
CHRONIC [RfC] COMMENT: ALSO SEE HEAST TABLE 2: ALTERNATE METHODS -- SUBCHRONIC AND CHRONIC TOXICITY (OTHER THAN CARCINOGENICITY)

HEAST TABLE 1: SUBCHRONIC AND CHRONIC TOXICITY (OTHER THAN CARCINOGENICITY)

May 1995

CHEMICAL / LEVEL	DOSE / ROUTE	SPECIES / EXPERIMENT LENGTH	TARGET	CRITICAL EFFECT	Subchronic [RfC] (mg/cu m) UF	Subchronic [RfD] (mg/kg/day) UF	Chronic [RfC] (mg/cu m) UF	Chronic [RfD] (mg/kg/day) UF	REFERENCE
ACETONITRILE		**000075-05-8**							
NOAEL 100 PPM	INHALATION: INTERMITTENT	MOUSE 92 DAYS	ERYTHROCYTES BLOOD LIVER	DECREASED CELL COUNT DECREASED HEMATOCRIT HEPATIC LESIONS		6E-2 300		IRIS	005210
ACETOPHENONE		**000098-86-2**							
NOAEL 10.000 PPM	ORAL: DIET	RAT 17 WEEKS		NONE OBSERVED		1E+0 300		IRIS	005212 010874
ACROLEIN		**000107-02-8**							
NOAEL 15.6 MG/KG/DAY	ORAL: WATER	RAT 90 DAYS						2E-2 1000	010390
								IRIS	010856

SUBCHRONIC [RfC] COMMENT: ALSO SEE HEAST TABLE 2: ALTERNATE METHODS -- SUBCHRONIC AND CHRONIC TOXICITY (OTHER THAN CARCINOGENICITY)
SUBCHRONIC [RfD] COMMENT: BASED ON ROUTE TO ROUTE EXTRAPOLATION USING AN ABSORPTION FACTOR OF 0.5.
CHRONIC [RfC] COMMENT: ALSO SEE HEAST TABLE 2: ALTERNATE METHODS -- SUBCHRONIC AND CHRONIC TOXICITY (OTHER THAN CARCINOGENICITY)
CHRONIC [RfD] COMMENT: BASED ON ROUTE TO ROUTE EXTRAPOLATION USING AN ABSORPTION FACTOR OF 0.5. UNDER REVIEW. CURRENT NUMBER SUBJECT TO CHANGE.

CHRONIC [RfC] COMMENT: THE CHRONIC INHALATION [RfC] IS CONSIDERED NOT VERIFIABLE (06/25/92) BY THE RfD/RfC WORK GROUP.

GENERAL COMMENT: ALSO SEE HEAST TABLE 3: CARCINOGENICITY.

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HEAST TABLE 1: SUBCHRONIC AND CHRONIC TOXICITY (OTHER THAN CARCINOGENICITY)

CHEMICAL / LEVEL	DOSE / ROUTE	SPECIES / EXPERIMENT LENGTH	TARGET	CRITICAL EFFECT	Subchronic [RfC] (mg/cu m) / UF	Subchronic [RfD] (mg/kg/day) / UF	Chronic [RfC] (mg/cu m) / UF	Chronic [RfD] (mg/kg/day) / UF	REFERENCE
ACRYLAMIDE		**000079-06-1**							
NOEL	0.2 MG/KG/DAY ORAL: DRINKING WATER	RAT 90 DAYS	NERVE	DAMAGE		2E-3 100		IRIS	005835
	GENERAL COMMENT: ALSO SEE HEAST TABLE 3: CARCINOGENICITY.						IRIS		010876
	CHRONIC RfC COMMENT: THE CHRONIC INHALATION RfC IS CONSIDERED NOT VERIFIABLE (09/20/90) BY THE RfD/RfC WORK GROUP.								
ACRYLIC ACID		**000079-10-7**							
NOAEL	53 MG/KG/DAY ORAL: DRINKING WATER	RAT 2 GENERATION	WHOLE BODY	DECREASED PUP WEIGHT		5E-1 100		IRIS	005836
	SUBCHRONIC [RfD] COMMENT: THE CHRONIC ORAL RfD ON IRIS WAS ADOPTED AS THE SUBCHRONIC ORAL [RfD].								
LOAEL	5 PPM INHALATION: INTERMITTENT	MOUSE 13 WEEKS	NASAL MUCOSA	LESIONS	3E-3 100		IRIS		010346
ACRYLONITRILE		**000107-13-1**							
NOAEL	1 MG/(KG-DAY) ORAL: GAVAGE	MOUSE 60 DAYS	TESTES TESTES	DECREASED SPERM COUNTS SEMINIFEROUS TUBULE DEGENERATION		1E-2 100		1E-3 1000	010939
	SUBCHRONIC [RfD] COMMENT: THE CHRONIC ORAL [RfD] UNDER REVIEW BY THE RfD/RfC WORK GROUP WAS MODIFIED TO ESTIMATE THE SUBCHRONIC ORAL [RfD]. GENERAL COMMENT: ALSO SEE HEAST TABLE 3: CARCINOGENICITY								
ADIPONITRILE		**000111-69-3**							
	GENERAL COMMENT: DATA INADEQUATE FOR QUANTITATIVE RISK ASSESSMENT								005157

CHEMICAL / LEVEL	DOSE / ROUTE	SPECIES / EXPERIMENT LENGTH	TARGET	CRITICAL EFFECT	Subchronic [RfC] (mg/cu m) UF	Subchronic [RfD] (mg/kg/day) UF	Chronic [RfC] (mg/cu m) UF	Chronic [RfD] (mg/kg/day) UF	REFERENCE
ALACHLOR		**015972-60-8**							
NOEL	1 MG/KG/DAY ORAL: CAPSULE	DOG 1 YEAR	BLOOD SITES, MULTIPLE	ANEMIA HEMOSIDEROSIS		1E-2 100		IRIS	005837
	SUBCHRONIC [RfD] COMMENT: THE CHRONIC ORAL RfD WAS ADOPTED AS THE SUBCHRONIC ORAL [RfD]. GENERAL COMMENT: ALSO SEE HEAST TABLE 3: CARCINOGENICITY.								
ALDICARB		**000116-06-3**							
NOAEL	0.01 MG/KG-DAY ORAL	HUMAN ACUTE	CENTRAL NERVOUS SYSTEM	SWEATING		1E-3 10		IRIS	010960
	SUBCHRONIC [RfD] COMMENT:. THE CHRONIC ORAL RfD WAS ADOPTED AS THE SUBCHRONIC ORAL [RfD]. GENERAL COMMENT: CLINICAL SIGNS OF ACETYL CHOLINESTERASE INHIBITION INCLUDING SWEATING, PINPOINT PUPILS, LEG WEAKNESS, NAUSEA, DIARRHEA AND OTHER EFFECTS WERE OBSERVED IN THE PRINCIPAL AND SUPPORTING STUDIES.								
ALDRIN		**000309-00-2**							
LOAEL	0.025 MG/KG/DAY ORAL: DIET	RAT 2 YEARS	LIVER	LESIONS		3E-5 1000		IRIS	005159
	SUBCHRONIC [RfD] COMMENT: THE CHRONIC ORAL RfD WAS ADOPTED AS THE SUBCHRONIC ORAL [RfD]. GENERAL COMMENT: ALSO SEE HEAST TABLE 3: CARCINOGENICITY.								
ALLIDOCHLOR		**000093-71-0**							005838
	GENERAL COMMENT: DATA INADEQUATE FOR QUANTITATIVE RISK ASSESSMENT.								

HEAST TABLE 1: SUBCHRONIC AND CHRONIC TOXICITY (OTHER THAN CARCINOGENICITY)

CHEMICAL / LEVEL	DOSE / ROUTE	SPECIES / EXPERIMENT LENGTH	TARGET	CRITICAL EFFECT	Subchronic [RfC] (mg/cu m) UF	Subchronic [RfD] (mg/kg/day) UF	Chronic [RfC] (mg/cu m) UF	Chronic [RfD] (mg/kg/day) UF	REFERENCE
ALLYL ALCOHOL		**000107-18-6**							
NOEL 50 PPM	ORAL: DRINKING WATER	RAT 15 WEEKS	LIVER KIDNEY	EFFECTS EFFECTS		5E-2 100		IRIS	005839
ALLYL CHLORIDE		**000107-05-1**							
NOAEL 17 MG/CU M	INHALATION: INTERMITTENT	RABBIT 5 MONTHS	NERVOUS SYSTEM	NEUROTOXICITY	1E-2 300		IRIS		010369
GENERAL COMMENT: ALSO SEE HEAST TABLE 3: CARCINOGENICITY.									
ALUMINUM		**007429-90-5**							005162
GENERAL COMMENT: DATA INADEQUATE FOR QUANTITATIVE RISK ASSESSMENT									
ALUMINUM PHOSPHIDE		**020859-73-8**							
NOAEL 0.43 MG/KG/DAY	ORAL: DIET	RAT 2 YEARS	WHOLE BODY UNSPECIFIED	ALTERED WEIGHT ALTERED CLINICAL PARAMETERS		4E-4 100		IRIS	010255
AMETRYN		**000834-12-8**							
NOEL 10 MG/KG/DAY	ORAL: GAVAGE	RAT 13 WEEKS	LIVER	EFFECTS		9E-2 100		IRIS	005841
AMINO-2-NAPHTHOL, 1-		**002834-92-6**							005842
GENERAL COMMENT: DATA INADEQUATE FOR QUANTITATIVE RISK ASSESSMENT.									
AMINO-2-NAPHTOL HYDROCHLORIDE, 1-		**001198-27-2**							005843
GENERAL COMMENT: DATA INADEQUATE FOR QUANTITATIVE RISK ASSESSMENT.									

HEAST TABLE 1: SUBCHRONIC AND CHRONIC TOXICITY (OTHER THAN CARCINOGENICITY)

CHEMICAL / LEVEL	DOSE / ROUTE	SPECIES / EXPERIMENT LENGTH	TARGET	CRITICAL EFFECT	Subchronic [RfC] (mg/cu m) / UF	Subchronic [RfD] (mg/kg/day) / UF	Chronic [RfC] (mg/cu m) / UF	Chronic [RfD] (mg/kg/day) / UF	REFERENCE
AMINOPHENOL, M-		**000591-27-5**							
NOAEL 1300 PPM	ORAL: DIET	RAT 13 WEEKS	WHOLE BODY	ALTERED WEIGHT		7E-1		7E-2	005844
			THYROID	ALTERED WEIGHT		100		1000	
AMINOPHENOL, O-		**000095-55-6**							
GENERAL COMMENT: DATA INADEQUATE FOR QUANTITATIVE RISK ASSESSMENT.									005845
AMINOPHENOL, P-		**000123-30-8**							
GENERAL COMMENT: DATA INADEQUATE FOR QUANTITATIVE RISK ASSESSMENT.									005846
AMINOPYRIDINE, 4-		**000504-24-5**							
NOAEL 3 PPM	ORAL: DIET	RAT 90 DAYS	LIVER	INCREASED WEIGHT		2E-4		2E-5	005847
			BRAIN	INCREASED WEIGHT		1000		10000	
AMMONIA		**007664-41-7**							
NOAEL 34 MG/L	ORAL: DRINKING WATER	HUMAN	SENSORY	TASTE THRESHOLD		34 MG/L 1		34 MG/L 1	005166
SUBCHRONIC [RfD] COMMENT: GIVEN AS CONCENTRATION IN DRINKING WATER. SPECIFICALLY RELATED TO ORGANOLEPTIC THRESHOLD. SAFE CONCENTRATION MAY BE HIGHER, BUT DATA ARE INADEQUATE TO ASSESS.									
CHRONIC [RfD] COMMENT: GIVEN AS CONCENTRATION IN DRINKING WATER. SPECIFICALLY RELATED TO ORGANOLEPTIC THRESHOLD. SAFE CONCENTRATION MAY BE HIGHER, BUT DATA ARE INADEQUATE TO ASSESS.									
NOAEL 6.4 MG/CU M	INHALATION: INTERMITTENT	HUMAN	NASAL CAVITY	RHINITIS	1E-1		IRIS		010392
			LUNGS	PNEUMONIA	30				
			LUNGS	LESIONS					

HEAST TABLE 1: SUBCHRONIC AND CHRONIC TOXICITY (OTHER THAN CARCINOGENICITY)

CHEMICAL / DOSE LEVEL / DOSE ROUTE	SPECIES / EXPERIMENT LENGTH	TARGET	CRITICAL EFFECT	Subchronic [RfC] (mg/cu m) / UF	Subchronic [RfD] (mg/kg/day) / UF	Chronic [RfC] (mg/cu m) / UF	Chronic [RfD] (mg/kg/day) / UF	REFERENCE
ANILINE	**000062-53-3**							
NOAEL 19 MG/CU M INHALATION: INTERMITTENT	MOUSE 20-26 WEEKS	SPLEEN	PATHOLOGY	1E-2 300		IRIS		010370
	RAT 20-26 WEEKS	SPLEEN	PATHOLOGY					
	GUINEA PIG 20-26 WEEKS	SPLEEN	PATHOLOGY					
GENERAL COMMENT: ALSO SEE HEAST TABLE 3: CARCINOGENICITY.								
ANTHRACENE	**000120-12-7**							
NOEL 1000 MG/KG/DAY ORAL: GAVAGE	MOUSE 90 DAYS		NONE OBSERVED		3E+0 300		IRIS	010166
CHRONIC [RfC] COMMENT: THE CHRONIC INHALATION [RfC] IS CONSIDERED NOT VERIFIABLE (08/04/94) BY THE RfD/RfC WORK GROUP.								010964
ANTIMONY PENTOXIDE	**001314-60-9**							
LOAEL 0.46 MG/KG/DAY ORAL: DRINKING WATER	RAT LIFETIME	WHOLE BODY BLOOD	INCREASED MORTALITY ALTERED CHEMISTRIES		5E-4 1000		5E-4 1000	005174
SUBCHRONIC [RfD] COMMENT: CALCULATED BY ANALOGY TO ANTIMONY BY CORRECTING FOR DIFFERENCES IN MOLECULAR WEIGHT. CHRONIC [RfD] COMMENT: CALCULATED BY ANALOGY TO ANTIMONY BY CORRECTING FOR DIFFERENCES IN MOLECULAR WEIGHT.								

HEAST TABLE 1: SUBCHRONIC AND CHRONIC TOXICITY (OTHER THAN CARCINOGENICITY)

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CHEMICAL / LEVEL	DOSE / ROUTE	SPECIES / EXPERIMENT LENGTH	TARGET	CRITICAL EFFECT	Subchronic [RfC] (mg/cu m) UF	Subchronic [RfD] (mg/kg/day) UF	Chronic [RfC] (mg/cu m) UF	Chronic [RfD] (mg/kg/day) UF	REFERENCE
ANTIMONY POTASSIUM TARTRATE 000304-61-0									
LOAEL 0.91 MG/KG/DAY	ORAL: DRINKING WATER	RAT LIFETIME	WHOLE BODY BLOOD	INCREASED MORTALITY ALTERED CHEMISTRIES		9E-4 1000		9E-4 1000	005234
SUBCHRONIC [RfD] COMMENT: CALCULATED BY ANALOGY TO ANTIMONY BY CORRECTING FOR DIFFERENCES IN MOLECULAR WEIGHT.									
CHRONIC [RfD] COMMENT: CALCULATED BY ANALOGY TO ANTIMONY BY CORRECTING FOR DIFFERENCES IN MOLECULAR WEIGHT.									
ANTIMONY TETROXIDE 001332-81-6									
LOAEL 0.44 MG/KG/DAY	ORAL: DRINKING WATER	RAT LIFETIME	WHOLE BODY BLOOD	INCREASED MORTALITY ALTERED CHEMISTRIES		4E-4 1000		4E-4 1000	005238
SUBCHRONIC [RfD] COMMENT: CALCULATED BY ANALOGY TO ANTIMONY BY CORRECTING FOR DIFFERENCES IN MOLECULAR WEIGHT.									
CHRONIC [RfD] COMMENT: CALCULATED BY ANALOGY TO ANTIMONY BY CORRECTING FOR DIFFERENCES IN MOLECULAR WEIGHT.									
ANTIMONY TRIOXIDE 001309-64-4									
LOAEL 0.42 MG/KG/DAY	ORAL: DRINKING WATER	RAT LIFETIME	WHOLE BODY BLOOD	INCREASED MORTALITY ALTERED CHEMISTRIES		4E-4 1000		4E-4 1000	005242
SUBCHRONIC [RfD] COMMENT: CALCULATED BY ANALOGY TO ANTIMONY BY CORRECTING FOR DIFFERENCES IN MOLECULAR WEIGHT.									
CHRONIC [RfD] COMMENT: CALCULATED BY ANALOGY TO ANTIMONY BY CORRECTING FOR DIFFERENCES IN MOLECULAR WEIGHT.									
ANTIMONY, METALLIC 007440-36-0									
LOAEL 0.35 MG SB/KG/DAY	ORAL: DRINKING WATER	RAT LIFETIME	WHOLE BODY BLOOD	INCREASED MORTALITY ALTERED CHEMISTRIES		4E-4 1000		IRIS	005170

HEAST TABLE 1: SUBCHRONIC AND CHRONIC TOXICITY (OTHER THAN CARCINOGENICITY)

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CHEMICAL LEVEL	DOSE ROUTE	SPECIES EXPERIMENT LENGTH	TARGET	CRITICAL EFFECT	Subchronic [RfC] (mg/cu m) UF	Subchronic [RfD] (mg/kg/day) UF	Chronic [RfC] (mg/cu m) UF	Chronic [RfD] (mg/kg/day) UF	REFERENCE
ARAMITE		**000140-57-8**							
NOAEL 100 PPM	ORAL: DIET	RAT 104 WEEKS	LIVER	INCREASED WEIGHT				5E-2 100	005850
NOAEL 500 PPM	ORAL: DIET	DOG 52 WEEKS	LIVER	DEGENERATION		1E-1 100			005849
GENERAL COMMENT: ALSO SEE HEAST TABLE 3: CARCINOGENICITY.									
AROCLOR 1248		**012672-29-6**						IRIS	
CHRONIC RfD COMMENT: THE CHRONIC ORAL RfD IS CONSIDERED NOT VERIFIABLE (07/20/93) BY THE RfD/RfC WORK GROUP.									010940
AROCLOR 1254		**011097-69-1**							
LOAEL 0.005 MG/KG/DAY	ORAL: CAPSULE	MONKEY >5 YEARS	IMMUNE SYSTEM	TOXICITY		5E-5 100		IRIS	010963
SUBCHRONIC [RfD] COMMENT: THE CHRONIC ORAL RfD WAS MODIFIED TO ESTIMATE THE SUBCHRONIC ORAL [RfD].									
ARSENIC, INORGANIC		**007440-38-2**							
NOAEL 0.009 MG/L	ORAL	HUMAN	SKIN SKIN	KERATOSIS HYPERPIGMENTATION		3E-4 3		IRIS	010434
SUBCHRONIC [RfD] COMMENT: THE CHRONIC ORAL RfD WAS ADOPTED AS THE SUBCHRONIC ORAL [RfD]. GENERAL COMMENT: ALSO SEE HEAST TABLE 3: CARCINOGENICITY.									

HEAST TABLE 1: SUBCHRONIC AND CHRONIC TOXICITY (OTHER THAN CARCINOGENICITY)

CHEMICAL / LEVEL	DOSE / ROUTE	SPECIES / EXPERIMENT LENGTH	TARGET	CRITICAL EFFECT	Subchronic [RfC] (mg/cu m) UF	Subchronic [RfD] (mg/kg/day) UF	Chronic [RfC] (mg/cu m) UF	Chronic [RfD] (mg/kg/day) UF	REFERENCE
ATRAZINE		**001912-24-9**							
NOEL	3.5 MG/KG/DAY ORAL: DIET	RAT 2 YEARS	WHOLE BODY	DECREASED WEIGHT GAIN		3.5E-2 100		IRIS	.010855
	SUBCHRONIC [RfD] COMMENT: THE CHRONIC ORAL RfD WAS ADOPTED AS THE SUBCHRONIC ORAL [RfD]. GENERAL COMMENT: ALSO SEE HEAST TABLE 3: CARCINOGENICITY.								
BARIUM		**007440-39-3**							
NOAEL	0.21 MG/KG/DAY ORAL: WATER	HUMAN 10 WEEKS	CARDIOVASCULAR SYSTEM	INCREASED BLOOD PRESSURE		7E-2 3		IRIS	010348
	SUBCHRONIC [RfC] COMMENT: ALSO SEE HEAST TABLE 2: ALTERNATE METHODS -- SUBCHRONIC AND CHRONIC TOXICITY (OTHER THAN CARCINOGENICITY) SUBCHRONIC [RfD] COMMENT: THE CHRONIC ORAL RfD WAS ADOPTED AS THE SUBCHRONIC ORAL [RfD]. CHRONIC [RfC] COMMENT: ALSO SEE HEAST TABLE 2: ALTERNATE METHODS -- SUBCHRONIC AND CHRONIC TOXICITY (OTHER THAN CARCINOGENICITY)								
BARIUM CYANIDE		**000542-62-1**							
	CHRONIC [RfD] COMMENT: THE CHRONIC ORAL [RfD] IS CONSIDERED NOT VERIFIABLE (07/20/93) BY THE RfD/RfC WORK GROUP.								010941
BENEFIN		**001861-40-1**							
NOAEL	25 MG/KG/DAY ORAL: DIET	DOG 1 YEAR	ERYTHROCYTE	DECREASED COUNT		3E-1 100		IRIS	005852
	SUBCHRONIC [RfD] COMMENT: THE CHRONIC ORAL RfD WAS ADOPTED AS THE SUBCHRONIC ORAL [RfD].								
BENZAL CHLORIDE		**000098-87-3**							
	GENERAL COMMENT: DATA INADEQUATE FOR QUANTITATIVE RISK ASSESSMENT.								005853

CHEMICAL / LEVEL	DOSE / ROUTE	SPECIES / EXPERIMENT LENGTH	TARGET	CRITICAL EFFECT	Subchronic [RfC] (mg/cu m) UF	Subchronic [RfD] (mg/kg/day) UF	Chronic [RfC] (mg/cu m) UF	Chronic [RfD] (mg/kg/day) UF	REFERENCE
BENZALDEHYDE		**000100-52-7**							
NOEL	200 MG/KG/DAY	RAT				1E+0		IRIS	005854
	ORAL: GAVAGE	13 WEEKS	KIDNEY	EFFECTS		100			
			FORESTOMACH	LESIONS					
SUBCHRONIC [RfD] CPMMENT: THE CHRONIC ORAL RfD WAS MODIFIED TO ESTIMATE THE SUBCHRONIC ORAL [RfD].									
BENZALDEHYDE CYANOHYDRIN		**000532-28-5**							005781
GENERAL COMMENT: DATA INADEQUATE FOR QUANTITATIVE RISK ASSESSMENT									
BENZENE		**000071-43-2**							
SUBCHRONIC [RfC] COMMENT: CONTACT THE SUPERFUND HEALTH RISK TECHNICAL SUPPORT CENTER: (513) 569-7300.									
GENERAL COMMENT: ALSO SEE HEAST TABLE 3: CARCINOGENICITY.									
BENZENETHIOL / (THIOPHENOL)		**000108-98-5**							
LOAEL	0.1 MG/(KG-DAY)	RAT				1E-4		1E-5	010942
	ORAL: GAVAGE	90 DAYS	LIVER	CENTRILOBULAR EOSINOPHILIC CHANGES		1000		10.000	
SUBCHRONIC [RfD] COMMENT: THE CHRONIC ORAL [RfD] UNDER REVIEW BY THE RfD/RfC WORKGROUP WAS MODIFIED TO ESTIMATE THE SUBCHRONIC ORAL [RfD].									
BENZIDINE		**000092-87-5**							
LOAEL	2.7 MG/KG/DAY	MOUSE				3E-3		IRIS	005830
	ORAL: DRINKING WATER	33 MONTHS	BRAIN	CELLULAR CHANGES		1000			
			LIVER	CELLULAR CHANGES					
SUBCHRONIC [RfD] COMMENT: THE CHRONIC ORAL RfD WAS ADOPTED AS THE SUBCHRONIC ORAL [RfD].									
GENERAL COMMENT: ALSO SEE HEAST TABLE 3: CARCINOGENICITY.							IRIS		010877
CHRONIC RfC COMMENT: THE CHRONIC INHALATION RfC IS CONSIDERED NOT VERIFIABLE (03/28/91) BY THE RfD/RfC WORK GROUP.									

HEAST TABLE 1: SUBCHRONIC AND CHRONIC TOXICITY (OTHER THAN CARCINOGENICITY)

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CHEMICAL / LEVEL	DOSE / ROUTE	SPECIES / EXPERIMENT LENGTH	TARGET	CRITICAL EFFECT	Subchronic [RfC] (mg/cu m) UF	Subchronic [RfD] (mg/kg/day) UF	Chronic [RfC] (mg/cu m) UF	Chronic [RfD] (mg/kg/day) UF	REFERENCE
BENZO[A]ANTHRACENE		**000056-55-3**							
CHRONIC [RfC] COMMENT: THE CHRONIC INHALATION [RfC] IS CONSIDERED NOT VERIFIABLE (08/04/94) BY THE RfD/RfC WORK GROUP.									010965
GENERAL COMMENT: ALSO SEE HEAST TABLE 3: CARCINOGENICITY.									
BENZOIC ACID		**000065-85-0**							
NOAEL 312 MG/DAY	ORAL: DIET	HUMAN		NONE OBSERVED		4E+0 1		IRIS	005260
SUBCHRONIC [RfD] COMMENT: THE HUMAN DAILY PER CAPITA INTAKE WAS USED AS THE CRITICAL DOSE LEVEL. THE CHRONIC ORAL RfD WAS ADOPTED AS THE SUBCHRONIC ORAL [RfD].									
CHRONIC [RfD] COMMENT: THE HUMAN DAILY PER CAPITA INTAKE WAS USED AS THE CRITICAL DOSE LEVEL.									
BENZO[B]FLUORANTHENE		**000205-99-2**							
SUBCHRONIC [RfC] COMMENT: CONTACT THE SUPERFUND HEALTH RISK TECHNICAL SUPPORT CENTER: (513) 569-7300.									
GENERAL COMMENT: ALSO SEE HEAST TABLE 3: CARCINOGENICITY.									
BENZYL ALCOHOL		**000100-51-6**							
LOAEL 286 MG/KG/DAY	ORAL: GAVAGE	RAT 103 WEEKS	FORESTOMACH	EPITHELIAL HYPERPLASIA				3E-1 1000	005855
NOAEL 143 MG/KG/DAY	ORAL: GAVAGE	RAT 13 WEEKS	WHOLE BODY	DECREASED WEIGHT		1E+0 100			005856

HEAST TABLE 1: SUBCHRONIC AND CHRONIC TOXICITY (OTHER THAN CARCINOGENICITY)

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CHEMICAL / LEVEL	DOSE / ROUTE	SPECIES / EXPERIMENT / LENGTH	TARGET	CRITICAL EFFECT	Subchronic [RfC] (mg/cu m) UF	Subchronic [RfD] (mg/kg/day) UF	Chronic [RfC] (mg/cu m) UF	Chronic [RfD] (mg/kg/day) UF	REFERENCE
BERYLLIUM		**007440-41-7**							
NOAEL 0.54 MG/KG/DAY	ORAL: DRINKING WATER	RAT LIFETIME		NONE OBSERVED		5E-3 100		IRIS	005262
SUBCHRONIC [RfD] COMMENT: THE CHRONIC ORAL RfD WAS ADOPTED AS THE SUBCHRONIC ORAL [RfD].									
GENERAL COMMENT: ALSO SEE HEAST TABLE 3: CARCINOGENICITY.									
BIPHENYL, 1,1'		**000092-52-4**							
NOAEL 50 MG/KG/DAY	ORAL: DIET	RAT 700 DAYS	KIDNEY	DAMAGE		5E-2 1000		IRIS	005857
SUBCHRONIC [RfD] COMMENT: THE CHRONIC ORAL RfD WAS ADOPTED AS THE SUBCHRONIC ORAL [RfD].									
CHRONIC RfC COMMENT: THE CHRONIC INHALATION RfC IS CONSIDERED NOT VERIFIABLE (09/20/90) BY THE RfD/RfC WORK GROUP.							IRIS		010878
BIS(2-CHLOROISOPROPYL) ETHER		**039638-32-9**							
NOAEL 35.8 MG/KG/DAY	ORAL: DIET	MOUSE 2 YEARS	ERYTHROCYTES	DECREASED HEMOGLOBIN		4E-2 1000		IRIS	010257
GENERAL COMMENT: ALSO SEE HEAST TABLE 3: CARCINOGENICITY.									
BIS(2-ETHYLHEXYL) PHTHALATE / (DEHP)		**000117-81-7**						IRIS	010859
SUBCHRONIC [RfC] COMMENT: CONTACT THE SUPERFUND HEALTH RISK TECHNICAL SUPPORT CENTER: (513) 569-7300.									
SUBCHRONIC [RfD] COMMENT: CONTACT THE SUPERFUND HEALTH RISK TECHNICAL SUPPORT CENTER: (513) 569-7300.									
GENERAL COMMENT: ALSO SEE HEAST TABLE 3: CARCINOGENICITY.									

CHEMICAL / LEVEL	DOSE / ROUTE	SPECIES / EXPERIMENT LENGTH	TARGET	CRITICAL EFFECT	Subchronic [RfC] (mg/cu m) UF	Subchronic [RfD] (mg/kg/day) UF	Chronic [RfC] (mg/cu m) UF	Chronic [RfD] (mg/kg/day) UF	REFERENCE
BISPHENOL A		**000080-05-7**						IRIS	005268
NOAEL 750 PPM	ORAL	RAT 13 WEEKS	WHOLE BODY	DECREASED WEIGHT		6E-1 100			005266
BORON TRIFLUORIDE		**007637-07-2**							
NOAEL 6 MG/CU M	INHALATION: INTERMITTENT	RAT 13 WEEKS	KIDNEY	NECROSIS	7E-3 300		7E-4 3000		010395
BORON, ELEMENTAL		**007440-42-8**							
NOAEL 8.8 MG/KG/DAY	ORAL: DIET	DOG 2 YEARS	TESTIS	LESIONS		9E-2 100		IRIS	005272
SUBCHRONIC [RfD] COMMENT: THE CHRONIC ORAL RfD WAS ADOPTED AS THE SUBCHRONIC ORAL [RfD].									
LOAEL 4.5 MG/CU M	INHALATION: INTERMITTENT	HUMAN	RESPIRATORY TRACT BRONCHUS	IRRITATION BRONCHITIS	2E-2 100		2E-2 100		005269
SUBCHRONIC [RfC] COMMENT: THE SUBCHRONIC INHALATION [RfC] IS SPECIFICALLY FOR ANHYDROUS BORAX.									
CHRONIC [RfC] COMMENT: THE CHRONIC INHALATION [RfC] IS SPECIFICALLY FOR ANHYDROUS BORAX.									
BROMINATED DIBENZO-P-DIOXINS									005858
GENERAL COMMENT: DATA INADEQUATE FOR QUANTITATIVE RISK ASSESSMENT.									
BROMINATED DIBENZOFURANS									005859
GENERAL COMMENT: DATA INADEQUATE FOR QUANTITATIVE RISK ASSESSMENT.									

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CHEMICAL / LEVEL	DOSE / ROUTE	SPECIES / EXPERIMENT / LENGTH	TARGET	CRITICAL EFFECT	Subchronic [RfC] (mg/cu m) UF	Subchronic [RfD] (mg/kg/day) UF	Chronic [RfC] (mg/cu m) UF	Chronic [RfD] (mg/kg/day) UF	REFERENCE
BROMOACETONE 000598-31-2									
GENERAL COMMENT: DATA INADEQUATE FOR QUANTITATIVE RISK ASSESSMENT.									005860
BROMOCHLOROETHANES									
GENERAL COMMENT: DATA INADEQUATE FOR QUANTITATIVE RISK ASSESSMENT.									005861
BROMODICHLOROMETHANE 000075-27-4									
LOAEL 17.9 MG/KG/DAY	ORAL: GAVAGE	MOUSE 102 WEEKS	KIDNEY	CYTOMEGALY		2E-2 1000		IRIS	005715
SUBCHRONIC [RfD] COMMENT: THE CHRONIC ORAL RfD WAS ADOPTED AS THE SUBCHRONIC ORAL [RfD].									
BROMOETHENE / (VINYL BROMIDE) 000593-60-2									
LOAEL 9.7 PPM	INHALATION: INTERMITTENT	RAT 24 MONTHS	LIVER	HYPERTROPHY	3E-3		IRIS		010929
			LIVER	BASOPHILIC FOCI	3000				
			LIVER	EOSINOPHILIC FOCI					
SUBCHRONIC [RfC] COMMENT: THE CHRONIC INHALATION RfC WAS ADOPTED AS THE SUBCHRONIC INHALATION [RfC].									
GENERAL COMMENT: ALSO SEE HEAST TABLE 3: CARCINOGENICITY.									
BROMOFORM 000075-25-2									
NOEL 17.9 MG/KG/DAY	ORAL: GAVAGE	RAT 13 WEEKS	LIVER	EFFECTS		2E-1 100		IRIS	005722
GENERAL COMMENT: ALSO SEE HEAST TABLE 3: CARCINOGENICITY.									
							IRIS		010961
CHRONIC RfC COMMENT: THE CHRONIC INHALATION RfC IS CONSIDERED NOT VERIFIABLE (02/11/93) BY THE RfD/RfC WORK GROUP.									

CHEMICAL / LEVEL	DOSE / ROUTE	SPECIES / EXPERIMENT LENGTH	TARGET	CRITICAL EFFECT	Subchronic [RfC] (mg/cu m) UF	Subchronic [RfD] (mg/kg/day) UF	Chronic [RfC] (mg/cu m) UF	Chronic [RfD] (mg/kg/day) UF	REFERENCE
BROMOMETHANE		**000074-83-9**						IRIS	010861
							IRIS		010860
SUBCHRONIC [RfC] COMMENT: CONTACT THE SUPERFUND HEALTH RISK TECHNICAL SUPPORT CENTER: (513) 569-7300.									
SUBCHRONIC [RfD] COMMENT: CONTACT THE SUPERFUND HEALTH RISK TECHNICAL SUPPORT CENTER: (513) 569-7300.									
BROMOPHENYL PHENYL ETHER, 4-		**000101-55-3**							005864
GENERAL COMMENT: DATA INADEQUATE FOR QUANTITATIVE RISK ASSESSMENT.									
BROMOPHOS		**002104-96-3**							
NOAEL 5 MG/KG/DAY	ORAL: DIET	RAT 3 GENERATIONS	BLOOD	DECREASED CHOLINESTERASE ACTIVITY		5E-2		5E-3	005865
						100		1000	
			LIVER	DECREASED CHOLINESTERASE ACTIVITY					
SUBCHRONIC [RfD] COMMENT: BASED ON A REPRODUCTION STUDY.									
CHRONIC [RfD] COMMENT: BASED ON A REPRODUCTION STUDY.									
BROMOXYNIL		**001689-84-5**							
NOEL 5 MG/KG/DAY	ORAL: DIET	RAT 2 YEARS		NONE OBSERVED		2E-2		IRIS	005866
						300			
SUBCHRONIC [RfD] COMMENT: THE CHRONIC ORAL RfD WAS ADOPTED AS THE SUBCHRONIC ORAL [RfD].									

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HEAST TABLE 1: SUBCHRONIC AND CHRONIC TOXICITY (OTHER THAN CARCINOGENICITY)

May 1995

CHEMICAL LEVEL	DOSE ROUTE	SPECIES EXPERIMENT LENGTH	TARGET	CRITICAL EFFECT	Subchronic [RfC] (mg/cu m) UF	Subchronic [RfD] (mg/kg/day) UF	Chronic [RfC] (mg/cu m) UF	Chronic [RfD] (mg/kg/day) UF	REFERENCE
BROMOXYNIL OCTANOATE		**001689-99-2**							
NOEL	7.3 MG/KG/DAY	RAT				2E-2		IRIS	005867
	ORAL: DIET	2 YEARS		NONE OBSERVED		300			
SUBCHRONIC [RfD] COMMENT: THE CHRONIC ORAL RfD WAS ADOPTED AS THE SUBCHRONIC ORAL [RfD].									
BUSAN 77		**031512-74-0**							005868
GENERAL COMMENT: DATA INADEQUATE FOR QUANTITATIVE RISK ASSESSMENT.									
BUSAN 90		**002491-38-5**							005869
GENERAL COMMENT: DATA INADEQUATE FOR QUANTITATIVE RISK ASSESSMENT.									
BUTANOL, 1-		**000071-36-3**							
NOAEL	125 MG/KG/DAY	RAT				1E+0		IRIS	005870
	ORAL: GAVAGE	13 WEEKS	CENTRAL NERVOUS SYSTEM	HYPOACTIVITY		100			
			CENTRAL NERVOUS SYSTEM	ATAXIA					
BUTYL BENZYL PHTHALATE, N-		**000085-68-7**							
NOAEL	159 MG/KG/DAY	RAT				2E+0		IRIS	005616
	ORAL: DIET	26 WEEKS	LIVER	ALTERED WEIGHT		100			
GENERAL COMMENT: ALSO SEE HEAST TABLE 3: CARCINOGENICITY.									

HEAST TABLE 1: SUBCHRONIC AND CHRONIC TOXICITY (OTHER THAN CARCINOGENICITY)

CHEMICAL LEVEL	DOSE ROUTE	SPECIES EXPERIMENT LENGTH	TARGET	CRITICAL EFFECT	Subchronic [RfC] (mg/cu m) UF	Subchronic [RfD] (mg/kg/day) UF	Chronic [RfC] (mg/cu m) UF	Chronic [RfD] (mg/kg/day) UF	REFERENCE
BUTYLATE		**002008-41-5**							
NOEL	5 MG/KG/DAY ORAL: CAPSULE	DOG 12 MONTHS	LIVER	INCREASED RELATIVE WEIGHT		5E-2 100		IRIS	005871
SUBCHRONIC [RfD] COMMENT: THE CHRONIC ORAL RfD WAS ADOPTED AS THE SUBCHRONIC ORAL [RfD].									
BUTYLCHLORIDE, T-		**000507-20-0**							005810
GENERAL COMMENT: DATA INADEQUATE FOR QUANTITATIVE RISK ASSESSMENT.									
BUTYROLACTONE, GAMMA-		**000096-48-0**							005872
GENERAL COMMENT: DATA INADEQUATE FOR QUANTITATIVE RISK ASSESSMENT.									
CACODYLIC ACID		**000075-60-5**							
NOEL	9.2 MG/KG/DAY ORAL: DIET	RAT 90 DAYS		NONE OBSERVED		3E-2 300		3E-3 3000	005873
SUBCHRONIC [RfD] COMMENT: CALCULATED BY ANALOGY TO ARSENIC BY CORRECTING FOR DIFFERENCES IN MOLECULAR WEIGHT. CHRONIC [RfD] COMMENT: CALCULATED BY ANALOGY TO ARSENIC BY CORRECTING FOR DIFFERENCES IN MOLECULAR WEIGHT.									
CADMIUM		**007440-43-9**							
GENERAL COMMENT: ALSO SEE HEAST TABLE 3: CARCINOGENICITY.							IRIS	005280	

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CHEMICAL / LEVEL	DOSE / ROUTE	SPECIES / EXPERIMENT / LENGTH	TARGET	CRITICAL EFFECT	Subchronic [RfC] (mg/cu m) UF	Subchronic [RfD] (mg/kg/day) UF	Chronic [RfC] (mg/cu m) UF	Chronic [RfD] (mg/kg/day) UF	REFERENCE
CALCIUM CYANIDE		**000592-01-8**							
NOAEL 19.1 MG/KG/DAY		RAT							
	ORAL: DIET	2 YEARS	WHOLE BODY	DECREASED WEIGHT		4E-2		IRIS	010258
			THYROID	EFFECTS		500			
			NERVE	MYELIN DEGENERATION					
CAPROLACTAM		**000105-60-2**						IRIS	005284
NOAEL 50 MG/KG/DAY		RAT							
	ORAL: DIET	90 DAYS	KIDNEY	EFFECTS		5E-1			005282
						100			
							IRIS		010966
CAPTAFOL		**002425-06-1**							
LOAEL 2 MG/KG/DAY		DOG							
	ORAL: CAPSULE	12 MONTHS	KIDNEY	EFFECTS		2E-3		IRIS	005874
			BLADDER	EFFECTS		1000			

SUBCHRONIC [RfD] COMMENT: CALCULATED BY ANALOGY TO FREE CYANIDE BY CORRECTING FOR DIFFERENCES IN MOLECULAR WEIGHT. THE CHRONIC ORAL RfD WAS ADOPTED AS THE SUBCHRONIC ORAL [RfD].
CHRONIC [RfD] COMMENT: CALCULATED BY ANALOGY TO FREE CYANIDE BY CORRECTING FOR DIFFERENCES IN MOLECULAR WEIGHT.

SUBCHRONIC [RfD] COMMENT: THE CHRONIC ORAL RfD WAS ADOPTED AS THE SUBCHRONIC ORAL [RfD].
GENERAL COMMENT: ALSO SEE HEAST TABLE 3: CARCINOGENICITY.

HEAST TABLE 1: SUBCHRONIC AND CHRONIC TOXICITY (OTHER THAN CARCINOGENICITY)

CHEMICAL / LEVEL	DOSE / ROUTE	SPECIES / EXPERIMENT LENGTH	TARGET	CRITICAL EFFECT	Subchronic [RfC] (mg/cu m) UF	Subchronic [RfD] (mg/kg/day) UF	Chronic [RfC] (mg/cu m) UF	Chronic [RfD] (mg/kg/day) UF	REFERENCE
CAPTAN		**000133-06-2**							
NOEL	12.5 MG/KG/DAY ORAL: DIET	RAT	WHOLE BODY	DECREASED WEIGHT		1.3E-1 100		IRIS	005875
SUBCHRONIC [RfD] COMMENT: THE CHRONIC ORAL RfD WAS ADOPTED AS THE SUBCHRONIC ORAL [RfD].									
CHRONIC [RfC] COMMENT: THE CHRONIC INHALATION [RfC] IS CONSIDERED NOT VERIFIABLE (05/27/92) BY THE RfD/RfC WORK GROUP.									
CHRONIC [RfD] COMMENT: BASED ON A MULTI-GENERATION REPRODUCTION STUDY.									
GENERAL COMMENT: ALSO SEE HEAST TABLE 3: CARCINOGENICITY.									
CARBARYL		**000063-25-2**							
NOAEL	9.6 MG/KG/DAY ORAL: DIET	RAT 2 YEARS	KIDNEY LIVER	TOXICITY TOXICITY		1E-1 100		IRIS	005876
SUBCHRONIC [RfD] COMMENT: THE CHRONIC ORAL RfD WAS ADOPTED AS THE SUBCHRONIC ORAL [RfD].									
CHRONIC RfC COMMENT: THE CHRONIC INHALATION RfC IS CONSIDERED NOT VERIFIABLE (08/15/91) BY THE RfD/RfC WORK GROUP.							IRIS		010882
CARBOFURAN		**001563-66-2**							
NOEL	0.5 MG/KG/DAY ORAL: DIET	DOG 1 YEAR	BLOOD TESTIS UTERUS	CHOLINESTERASE INHIBITION EFFECTS EFFECTS		5E-3 100		IRIS	005877
SUBCHRONIC [RfD] COMMENT: THE CHRONIC ORAL RfD WAS ADOPTED AS THE SUBCHRONIC ORAL [RfD].									

HEAST TABLE 1: SUBCHRONIC AND CHRONIC TOXICITY (OTHER THAN CARCINOGENICITY)

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CHEMICAL / LEVEL	DOSE / ROUTE	SPECIES / EXPERIMENT / LENGTH	TARGET	CRITICAL EFFECT	Subchronic [RfC] (mg/cu m) UF	Subchronic [RfD] (mg/kg/day) UF	Chronic [RfC] (mg/cu m) UF	Chronic [RfD] (mg/kg/day) UF	REFERENCE
CARBON DISULFIDE		**000075-15-0**							
NOEL	11 MG/KG/DAY INHALATION: INTERMITTENT	RABBIT	FETUS	TOXICITY		1E-1 100		IRIS	010259
	SUBCHRONIC [RfD] COMMENT: THE CHRONIC ORAL RfD WAS ADOPTED AS THE SUBCHRONIC ORAL [RfD]. CHRONIC [RfD] COMMENT: THE CHRONIC ORAL RfD WAS DETERMINED FROM A TERATOLOGY STUDY WITH EXPOSURES BEFORE AND DURING THE ENTIRE GESTATION PERIOD.								
NOAEL	10 MG/CU M INHALATION: INTERMITTENT	RAT GESTATION	FETUS	TOXICITY	1E-2 1000		1E-2 1000		010430
	SUBCHRONIC [RfC] COMMENT: THE CHRONIC INHALATION [RfC] WAS ADOPTED AS THE SUBCHRONIC INHALATION [RfC].								
CARBON MONOXIDE		**000630-05-0**							
	CHRONIC [RfC] COMMENT: REFER TO APPENDIX A: TECHNICAL INFORMATION, SECTION V ON NATIONAL AMBIENT AIR QUALITY STANDARDS.								010493
CARBON TETRACHLORIDE		**000056-23-5**						IRIS	010862
	SUBCHRONIC [RfC] COMMENT: CONTACT THE SUPERFUND HEALTH RISK TECHNICAL SUPPORT CENTER: (513) 569-7300. SUBCHRONIC [RfD] COMMENT: CONTACT THE SUPERFUND HEALTH RISK TECHNICAL SUPPORT CENTER: (513) 569-7300. GENERAL COMMENT: ALSO SEE HEAST TABLE 3: CARCINOGENICITY.								
CHLORAL		**000075-87-6**							
LOAEL	15.7 MG/KG/DAY ORAL: DRINKING WATER	90 DAYS MOUSE	LIVER	EFFECTS		2E-2 1000		IRIS	005290
	SUBCHRONIC [RfD] COMMENT: THE CHRONIC ORAL RfD WAS ADOPTED AS THE SUBCHRONIC ORAL [RfD].								

HEAST TABLE 1: SUBCHRONIC AND CHRONIC TOXICITY (OTHER THAN CARCINOGENICITY)

CHEMICAL / LEVEL	DOSE / ROUTE	SPECIES / EXPERIMENT LENGTH	TARGET	CRITICAL EFFECT	Subchronic [RfC] (mg/cu m) UF	Subchronic [RfD] (mg/kg/day) UF	Chronic [RfC] (mg/cu m) UF	Chronic [RfD] (mg/kg/day) UF	REFERENCE
CHLORDANE		**000057-74-9**							
NOEL	0.055 MG/KG/DAY ORAL: DIET	RAT 130 WEEKS	LIVER	HYPERTROPHY		6E-5 1000		IRIS	005296
SUBCHRONIC [RfD] COMMENT: THE CHRONIC ORAL RfD WAS ADOPTED AS THE SUBCHRONIC ORAL [RfD].									
GENERAL COMMENT: ALSO SEE HEAST TABLE 3: CARCINOGENICITY.									
CHLORINE CYANIDE		**000506-77-4**							
NOAEL	25.3 MG/KG/DAY ORAL: DIET	RAT 2 YEARS	WHOLE BODY THYROID NERVE	DECREASED WEIGHT EFFECTS MYELIN DEGENERATION		5E-2 500		IRIS	010261
SUBCHRONIC [RfD] COMMENT: THE CHRONIC ORAL RfD WAS ADOPTED AS THE SUBCHRONIC ORAL [RfD].									
CHLORO-1,3-BUTADIENE, 2- / (CHLOROPRENE)		**000126-99-8**							
NOAEL	32 PPM INHALATION	RAT 90 DAYS	OLFACTORY EPITHELIUM	DEGENERATION	7E-2 30		7E-3 300		010515
SUBCHRONIC [RfD] COMMENT: ALSO SEE HEAST TABLE 2: ALTERNATE METHODS -- SUBCHRONIC AND CHRONIC TOXICITY (OTHER THAN CARCINOGENICITY)									
CHRONIC [RfD] COMMENT: ALSO SEE HEAST TABLE 2: ALTERNATE METHODS -- SUBCHRONIC AND CHRONIC TOXICITY (OTHER THAN CARCINOGENICITY)									
CHLORO-M-CRESOL, P-		**000059-50-7**							
NOAEL	200 MG/KG/DAY ORAL: GAVAGE	RAT 28 DAYS	WHOLE BODY	DECREASED WEIGHT GAIN		2E+0 100			005366
CHLOROACETALDEHYDE		**000107-20-0**							005342
GENERAL COMMENT: DATA INADEQUATE FOR QUANTITATIVE RISK ASSESSMENT.									

HEAST TABLE 1: SUBCHRONIC AND CHRONIC TOXICITY (OTHER THAN CARCINOGENICITY)

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CHEMICAL / LEVEL	DOSE / ROUTE	SPECIES / EXPERIMENT LENGTH	TARGET	CRITICAL EFFECT	Subchronic [RfC] (mg/cu m) / UF	Subchronic [RfD] (mg/kg/day) / UF	Chronic [RfC] (mg/cu m) / UF	Chronic [RfD] (mg/kg/day) / UF	REFERENCE
CHLOROACETIC ACID		**000079-11-8**							
LOAEL 30 MG/KG		RAT				2E-2		2E-3	005346
	ORAL: GAVAGE	13 WEEKS	HEART	MYOCARDITIS		1000		10000	
CHLOROANILINE, 2-		**000095-51-2**							
	GENERAL COMMENT: DATA INADEQUATE FOR QUANTITATIVE RISK ASSESSMENT								005347
CHLOROANILINE, 3-		**000108-42-9**							
	GENERAL COMMENT: DATA INADEQUATE FOR QUANTITATIVE RISK ASSESSMENT								005348
CHLOROANILINE, 4-		**000106-47-8**							
LOAEL 12.5 MG/KG/DAY		RAT				4E-3		IRIS	005349
	ORAL: DIET	78 WEEKS	SPLEEN	PROLIFERATIVE LESIONS		3000			
	SUBCHRONIC [RfD] COMMENT: THE CHRONIC ORAL RfD WAS ADOPTED AS THE SUBCHRONIC ORAL [RfD].								
CHLOROBENZENE		**000108-90-7**						IRIS	010863

SUBCHRONIC [RfC] COMMENT: CONTACT THE SUPERFUND HEALTH RISK TECHNICAL SUPPORT CENTER: (513) 569-7300.
SUBCHRONIC [RfD] COMMENT: CONTACT THE SUPERFUND HEALTH RISK TECHNICAL SUPPORT CENTER: (513) 569-7300.
CHRONIC [RfC] COMMENT: ALSO SEE HEAST TABLE 2: ALTERNATE METHODS -- SUBCHRONIC AND CHRONIC TOXICITY (OTHER THAN CARCINOGENICITY).

HEAST TABLE 1: SUBCHRONIC AND CHRONIC TOXICITY (OTHER THAN CARCINOGENICITY)

CHEMICAL / LEVEL	DOSE / ROUTE	SPECIES / EXPERIMENT LENGTH	TARGET	CRITICAL EFFECT	Subchronic [RfC] (mg/cu m) / UF	Subchronic [RfD] (mg/kg/day) / UF	Chronic [RfC] (mg/cu m) / UF	Chronic [RfD] (mg/kg/day) / UF	REFERENCE
CHLOROBENZILATE		**000510-15-6**							
NOEL	5 MG/KG/DAY	RABBIT							
	ORAL: GAVAGE	13 DAYS	GASTRO-INTESTINAL SYSTEM	DECREASED STOOL QUANTITY		2E-2		IRIS	010260
						300			
			WHOLE BODY	DECREASED FOOD CONSUMPTION					
			WHOLE BODY	DECREASED WEIGHT GAIN					
			NERVOUS SYSTEM	HYPERIRRITABILITY					

SUBCHRONIC [RfD] COMMENT: THE CHRONIC ORAL RfD WAS ADOPTED AS THE SUBCHRONIC ORAL [RfD]. BASED ON A TERATOLOGY STUDY WITH EXPOSURES DURING DAYS 7-19 OF GESTATION.

CHRONIC [RfD] COMMENT: BASED ON A TERATOLOGY STUDY WITH EXPOSURES DURING DAYS 7-19 OF GESTATION. 010931

CHRONIC [RfC] COMMENT: THE CHRONIC INHALATION [RfC] IS CONSIDERED NOT VERIFIABLE (02/11/93) BY THE RfD/RfC WORK GROUP.

CHLOROBENZOIC ACID, P-		**000074-11-3**							
NOAEL	26 MG/DAY	RAT							
	ORAL: DIET	5 MONTHS		NONE OBSERVED		2E+0		2E-1	005360
						100		1000	
CHLOROBENZOTRIFLUORIDE, 4-		**000098-56-6**							
NOAEL	15 MG/KG/DAY	RAT							
	ORAL: GAVAGE		KIDNEY	TUBULAR DEGENERATION		2E-1		2E-2	005364
						100		1000	

SUBCHRONIC [RfD] COMMENT: BASED ON A 2-GENERATION REPRODUCTION STUDY WITH EXPOSURES 4 WEEKS PRIOR TO MATING, DURING GESTATION, AND FOR 90 DAYS POST-WEANING.

CHRONIC [RfD] COMMENT: BASED ON A 2-GENERATION REPRODUCTION STUDY WITH EXPOSURES 4 WEEKS PRIOR TO MATING, DURING GESTATION, AND FOR 90 DAYS POST-WEANING.

IRIS, EPA'S INTEGRATED RISK INFORMATION SYSTEM, IS UPDATED MONTHLY. FURTHER INFORMATION: RISK INFORMATION HOTLINE: (513) 569-7254.

CHEMICAL LEVEL / DOSE ROUTE	SPECIES EXPERIMENT LENGTH	TARGET	CRITICAL EFFECT	Subchronic [RfC] (mg/cu m) UF	Subchronic [RfD] (mg/kg/day) UF	Chronic [RfC] (mg/cu m) UF	Chronic [RfD] (mg/kg/day) UF	REFERENCE
CHLOROBUTANE, 1- **000109-69-3**								
NOAEL 43 MG/KG/DAY	RAT						4E-1	005808
ORAL: GAVAGE	103 WEEKS	WHOLE BODY	INCREASED MORTALITY				100	
		CENTRAL NERVOUS SYSTEM	EFFECTS					
		BLOOD	HEMATOLOGIC EFFECTS					
NOAEL 86 MG/KG/DAY	RAT				9E-1			005806
ORAL: GAVAGE	13 WEEKS	WHOLE BODY	DECREASED WEIGHT GAIN		100			
		CENTRAL NERVOUS SYSTEM	EFFECTS					
		SPLEEN	HEMATOPOIESIS					
CHLOROBUTANE, 2- **000078-86-4**								005809
GENERAL COMMENT: DATA INADEQUATE FOR QUANTITATIVE RISK ASSESSMENT.								
CHLOROCYCLOPENTADIENE **041851-50-7**								005297
GENERAL COMMENT: DATA INADEQUATE FOR QUANTITATIVE RISK ASSESSMENT								
CHLOROFORM **000067-66-3**								
LOAEL 12.9 MG/KG/DAY	DOG				1E-2		IRIS	005372
ORAL: CAPSULE	7.5 YEARS	LIVER	LESIONS		1000			

SUBCHRONIC [RfD] COMMENT: THE CHRONIC ORAL RfD WAS ADOPTED AS THE SUBCHRONIC ORAL [RfD].
GENERAL COMMENT: ALSO SEE HEAST TABLE 3: CARCINOGENICITY.
SUBCHRONIC [RfC] COMMENT: CONTACT THE SUPERFUND HEALTH RISK TECHNICAL SUPPORT CENTER: (513) 569-7300.

HEAST TABLE 1: SUBCHRONIC AND CHRONIC TOXICITY (OTHER THAN CARCINOGENICITY)

CHEMICAL / LEVEL	DOSE / ROUTE	SPECIES / EXPERIMENT LENGTH	TARGET	CRITICAL EFFECT	Subchronic [RfC] (mg/cu m) / UF	Subchronic [RfD] (mg/kg/day) / UF	Chronic [RfC] (mg/cu m) / UF	Chronic [RfD] (mg/kg/day) / UF	REFERENCE
CHLOROMETHANE / (METHYL CHLORIDE) 000074-87-3									010005
SUBCHRONIC [RfC] COMMENT: CONTACT THE SUPERFUND HEALTH RISK TECHNICAL SUPPORT CENTER: (513) 569-7300.									
GENERAL COMMENT: ALSO SEE HEAST TABLE 3: CARCINOGENICITY.									
CHLORONITROBENZENE, M- 000121-73-3									005879
GENERAL COMMENT: DATA INADEQUATE FOR QUANTITATIVE RISK ASSESSMENT.									
CHLOROPHENOL, 2- 000095-57-8									
NOAEL 50 PPM	ORAL: DRINKING WATER	RAT	REPRODUCTION	REPRODUCTIVE EFFECTS		5E-2 100		IRIS	010436
SUBCHRONIC [RfD] COMMENT: BASED ON A REPRODUCTIVE STUDY WITH EXPOSURE 10 WEEKS PRIOR TO AND DURING MATING, GESTATION AND WEANING.									
CHRONIC [RfD] COMMENT: BASED ON A REPRODUCTIVE STUDY WITH EXPOSURE 10 WEEKS PRIOR TO AND DURING MATING, GESTATION AND WEANING.									
CHLOROPHENOL, 3- 000108-43-0									005309
GENERAL COMMENT: DATA INADEQUATE FOR QUANTITATIVE RISK ASSESSMENT									
CHLOROPHENOL, 4- 000106-48-9									005310
GENERAL COMMENT: DATA INADEQUATE FOR QUANTITATIVE RISK ASSESSMENT									
CHLOROPROPANE, 2- 000075-29-6									
NOAEL 91.4 MG/KG/DAY	INHALATION: INTERMITTENT	RAT 4 WEEKS	LIVER	EFFECTS	1E+0 100		1E-1 1000		010444
CHLOROTOLUENE, M- 000108-41-8									005880
GENERAL COMMENT: DATA INADEQUATE FOR QUANTITATIVE RISK ASSESSMENT.									

CHEMICAL / DOSE LEVEL / ROUTE	SPECIES / EXPERIMENT / LENGTH	TARGET	CRITICAL EFFECT	Subchronic [RfC] (mg/cu m) UF	Subchronic [RfD] (mg/kg/day) UF	Chronic [RfC] (mg/cu m) UF	Chronic [RfD] (mg/kg/day) UF	REFERENCE
CHLOROTOLUENE, O- **000095-49-8**								
NOAEL 20 MG/KG/DAY ORAL: GAVAGE	RAT 103 DAYS	WHOLE BODY	DECREASED WEIGHT GAIN		2E-1 100		IRIS	010167
CHLOROTOLUENE, P- **000106-43-4**								
GENERAL COMMENT: DATA INADEQUATE FOR QUANTITATIVE RISK ASSESSMENT.								010200
CHLORPYRIFOS **002921-88-2**								
NOEL 0.03 MG/KG/DAY ORAL: CAPSULE	HUMAN 20 DAYS OR 9 DAYS	BLOOD	DECREASED CHOLINESTERASE ACTIVITY		3E-3 10		IRIS	005881
SUBCHRONIC [RfD] COMMENT: THE CHRONIC ORAL RfD WAS ADOPTED AS THE SUBCHRONIC ORAL [RfD].								
CHLORPYRIFOS METHYL **005598-13-0**								
NOAEL 1 MG/KG/DAY ORAL: DIET	RAT 3 GENERATIONS	REPRODUCTION	DECREASED FERTILITY		1E-2 100		1E-2 100	005882
	RAT 2 YEARS	LIVER	EFFECTS					
CHLOROTHALONIL **001897-45-6**								
NOEL 1.5 MG/KG/DAY ORAL: DIET	DOG 2 YEARS	KIDNEY	EFFECTS		1.5E-2 100		IRIS	005883
SUBCHRONIC [RfD] COMMENT: THE CHRONIC ORAL RfD WAS ADOPTED AS THE SUBCHRONIC ORAL [RfD]. GENERAL COMMENT: ALSO SEE HEAST TABLE 3: CARCINOGENICITY.								

HEAST TABLE 1: SUBCHRONIC AND CHRONIC TOXICITY (OTHER THAN CARCINOGENICITY)

CHEMICAL LEVEL	DOSE ROUTE	SPECIES EXPERIMENT LENGTH	TARGET	CRITICAL EFFECT	Subchronic [RfC] (mg/cu m) UF	Subchronic [RfD] (mg/kg/day) UF	Chronic [RfC] (mg/cu m) UF	Chronic [RfD] (mg/kg/day) UF	REFERENCE
CHLORTHIOPHOS		**060238-56-4**							
NOAEL 0.08 MG/KG/DAY		RAT				8E-4		8E-4	005884
	ORAL: DIET	2 YEARS		NONE OBSERVED		100		100	
SUBCHRONIC [RfD] COMMENT: THE CHRONIC ORAL [RfD] WAS ADOPTED AS THE SUBCHRONIC ORAL [RfD].									
CHROMIUM(III)		**016065-83-1**							
NOEL 5 % (CR2O3)		RAT				1E+0		IRIS	005731
	ORAL: DIET	840 DAYS		NONE OBSERVED		1000			
SUBCHRONIC [RfD] COMMENT: THE CHRONIC ORAL RfD WAS ADOPTED AS THE SUBCHRONIC ORAL [RfD].									
CHRONIC [RfC] COMMENT: INHALATION ISSUES ARE UNDER REVIEW BY THE RFD/RFC WORK GROUP.									
SUBCHRONIC [RfC] COMMENT: CONTACT THE SUPERFUND HEALTH RISK TECHNICAL SUPPORT CENTER: (513) 569-7300.									
CHROMIUM(VI)		**018540-29-9**							
NOAEL 2.4 MG/KG/DAY		RAT				2E-2		IRIS	005522
	ORAL: DRINKING WATER	1 YEAR		NONE OBSERVED		100			
CHRONIC [RfC] COMMENT: INHALATION ISSUES ARE UNDER REVIEW BY THE RFD/RFC WORK GROUP.									
SUBCHRONIC [RfC] COMMENT: CONTACT THE SUPERFUND HEALTH RISK TECHNICAL SUPPORT CENTER: (513) 569-7300.									
CHRYSENE		**000218-01-9**							
GENERAL COMMENT: DATA INADEQUATE FOR QUANTITATIVE RISK ASSESSMENT. ALSO SEE HEAST TABLE 3: CARCINOGENICITY.									005885

HEAST TABLE 1: SUBCHRONIC AND CHRONIC TOXICITY (OTHER THAN CARCINOGENICITY)

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CHEMICAL / LEVEL	DOSE / ROUTE	SPECIES / EXPERIMENT LENGTH	TARGET	CRITICAL EFFECT	Subchronic [RfC] (mg/cu m) UF	Subchronic [RfD] (mg/kg/day) UF	Chronic [RfC] (mg/cu m) UF	Chronic [RfD] (mg/kg/day) UF	REFERENCE
COPPER		**007440-50-8**							
LOAEL 5.3 MG	ORAL	HUMAN / SINGLE DOSE	GASTRO-INTESTINAL SYSTEM	IRRITATION		1.3 MG/L		1.3 MG/L	005374
SUBCHRONIC [RfD] COMMENT: CURRENT DRINKING WATER STANDARD OF 1.3 MG/L. DWCD (1987) CONCLUDED TOXICITY DATA WERE INADEQUATE FOR CALCULATION OF AN RfD FOR COPPER.									
CHRONIC [RfD] COMMENT: CURRENT DRINKING WATER STANDARD OF 1.3 MG/L. DWCD (1987) CONCLUDED TOXICITY DATA WERE INADEQUATE FOR CALCULATION OF AN RfD FOR COPPER.									
COPPER CYANIDE		**000544-92-3**							
NOAEL 5 MG/KG/DAY	ORAL: GAVAGE	RAT / 90 DAYS	LIVER	HISTOPATHOLOGY		5E-2		IRIS	010262
			KIDNEY	HISTOPATHOLOGY		100			
			WHOLE BODY	DECREASED WEIGHT					
			ORGANS	DECREASED WEIGHT					
CRESOL, M- / (3-METHYLPHENOL)		**000108-39-4**							
NOAEL 50 MG/KG/DAY	ORAL: GAVAGE	RAT / 90 DAYS	WHOLE BODY	DECREASED WEIGHT GAIN		5E-1		IRIS	005380
			NERVOUS SYSTEM	NEUROTOXICITY		100			
GENERAL COMMENT: ALSO SEE HEAST TABLE 3: CARCINOGENICITY.							IRIS		010888
CHRONIC RfC COMMENT: THE CHRONIC INHALATION RfC IS CONSIDERED NOT VERIFIABLE (12/11/91) BY THE RfD/RfC WORK GROUP.									

HEAST TABLE 1: SUBCHRONIC AND CHRONIC TOXICITY (OTHER THAN CARCINOGENICITY)

May 1995

CHEMICAL / LEVEL	DOSE / ROUTE	SPECIES / EXPERIMENT LENGTH	TARGET	CRITICAL EFFECT	Subchronic [RfC] (mg/cu m) / UF	Subchronic [RfD] (mg/kg/day) / UF	Chronic [RfC] (mg/cu m) / UF	Chronic [RfD] (mg/kg/day) / UF	REFERENCE
CRESOL, O- / (2-METHYLPHENOL) 000095-48-7									
NOAEL 50 MG/KG/DAY	ORAL: GAVAGE	RAT 90 DAYS	WHOLE BODY	DECREASED WEIGHT GAIN		5E-1		IRIS	005384
			NERVOUS SYSTEM	NEUROTOXICITY		100			
GENERAL COMMENT: ALSO SEE HEAST TABLE 3: CARCINOGENICITY.							IRIS		010889
CHRONIC RfC COMMENT: THE CHRONIC INHALATION RfC IS CONSIDERED NOT VERIFIABLE (12/11/91) BY THE RfD/RfC WORK GROUP.									
CRESOL, P- / (4-METHYLPHENOL) 000106-44-5									
NOAEL 5 MG/(KG-DAY)	ORAL: GAVAGE	RABBIT GESTATION DAYS 6-18	CENTRAL NERVOUS SYSTEM	HYPOACTIVITY		5E-3		5E-3	010516
						1000		1000	
			RESPIRATORY SYSTEM	DISTRESS					
			WHOLE BODY	MATERNAL DEATH					
SUBCHRONIC [RfD] COMMENT: THE CHRONIC ORAL [RfD] WAS ADOPTED AS THE SUBCHRONIC ORAL [RfD].									
GENERAL COMMENT: ALSO SEE HEAST TABLE 3: CARCINOGENICITY.							IRIS		010890
CHRONIC RfC COMMENT: THE CHRONIC INHALATION RfC IS CONSIDERED NOT VERIFIABLE (12/11/91) BY THE RfD/RfC WORK GROUP.									
CUMENE 000098-82-8									
NOAEL 154 MG/KG/DAY	ORAL: GAVAGE	RAT 194 DAYS	KIDNEY	INCREASED WEIGHT		4E-1		IRIS	005392
						300			
NOAEL 105.1 PPM	INHALATION: INTERMITTENT	RAT 4 WEEKS	CENTRAL NERVOUS SYSTEM	INVOLVEMENT	9E-2		9E-3		005908
					1000		10000		
			NOSE	IRRITATION					

CHEMICAL / LEVEL	DOSE / ROUTE	SPECIES / EXPERIMENT LENGTH	TARGET	CRITICAL EFFECT	Subchronic [RfC] (mg/cu m) UF	Subchronic [RfD] (mg/kg/day) UF	Chronic [RfC] (mg/cu m) UF	Chronic [RfD] (mg/kg/day) UF	REFERENCE
CYANAZINE		**021725-46-2**							
NOEL	0.625 MG/KG/DAY	DOG							
	ORAL: DIET	1 YEAR	WHOLE BODY	DECREASED WEIGHT		2E-3		2E-3	010411
			BLOOD	INCREASED PLATELET COUNT		300		300	
			BLOOD	ALTERED CLINICAL CHEMISTRY PARAMETERS					
SUBCHRONIC [RfD] COMMENT: THE CHRONIC ORAL [RfD] WAS ADOPTED AS THE SUBCHRONIC ORAL [RfD].									
CHRONIC [RfD] COMMENT: THE CHRONIC ORAL RfD WAS WITHDRAWN FROM IRIS (07/01/92). UNDER REVIEW. CURRENT NUMBER SUBJECT TO CHANGE.									
GENERAL COMMENT: ALSO SEE HEAST TABLE 3: CARCINOGENICITY.									
CYANIDE		**000057-12-5**							
NOAEL	10.8 MG/KG/DAY	RAT							
	ORAL: DIET	104 WEEKS	WHOLE BODY	DECREASED WEIGHT		2E-2		IRIS	005396
			THYROID	EFFECTS		500			
			NERVE	MYELIN DEGENERATION					
SUBCHRONIC [RfD] COMMENT: THE CHRONIC ORAL RfD WAS ADOPTED AS THE SUBCHRONIC ORAL [RfD].									
GENERAL COMMENT: THE CASRN FOR CN- IS 000057-12-5; THE CASRN FOR HCN IS 000074-90-8.									
CYANOGEN		**000460-19-5**							
NOAEL	21.6 MG/KG/DAY	RAT							
	ORAL: DIET	2 YEARS	WHOLE BODY	DECREASED WEIGHT		4E-2		IRIS	010263
			THYROID	EFFECTS		500			
			NERVE	MYELIN DEGENERATION					
SUBCHRONIC [RfD] COMMENT: CALCULATED BY ANALOGY TO FREE CYANIDE BY CORRECTING FOR DIFFERENCES IN MOLECULAR WEIGHT. THE CHRONIC ORAL RfD WAS ADOPTED AS THE SUBCHRONIC ORAL [RfD].									

CHEMICAL / LEVEL	DOSE / ROUTE	SPECIES / EXPERIMENT LENGTH	TARGET	CRITICAL EFFECT	Subchronic [RfC] (mg/cu m) UF	Subchronic [RfD] (mg/kg/day) UF	Chronic [RfC] (mg/cu m) UF	Chronic [RfD] (mg/kg/day) UF	REFERENCE
CYANOGEN BROMIDE		**000506-68-3**							
NOAEL 44 MG/KG/DAY	RAT							IRIS	010264
ORAL: DIET	2 YEARS	WHOLE BODY	DECREASED WEIGHT			9E-2			
		THYROID	EFFECTS			500			
		NERVE	MYELIN DEGENERATION						
SUBCHRONIC [RfD] COMMENT: CALCULATED BY ANALOGY TO FREE CYANIDE BY CORRECTING FOR DIFFERENCES IN MOLECULAR WEIGHT. THE CHRONIC ORAL RfD WAS ADOPTED AS THE SUBCHRONIC ORAL [RfD].									
CYCLOATE		**001134-23-2**							005886
GENERAL COMMENT: DATA INADEQUATE FOR QUANTITATIVE RISK ASSESSMENT.									
CYCLOHEXANOL		**000108-93-0**							005887
GENERAL COMMENT: DATA INADEQUATE FOR QUANTITATIVE RISK ASSESSMENT.									
CYCLOHEXYLAMINE		**000108-91-8**						IRIS	005400
NOAEL 30 MG/KG/DAY	RAT								005398
ORAL: DIET	90 DAYS	WHOLE BODY	DECREASED WEIGHT GAIN			3E-1			
		TESTIS	DECREASED WEIGHT			100			
CYCLOPENTADIENE		**000542-92-7**							010494
GENERAL COMMENT: ALSO SEE HEAST TABLE 2: ALTERNATE METHODS -- SUBCHRONIC AND CHRONIC TOXICITY (OTHER THAN CARCINOGENICITY)									

CHEMICAL / LEVEL	DOSE / ROUTE	SPECIES / EXPERIMENT LENGTH	TARGET	CRITICAL EFFECT	Subchronic [RfC] (mg/cu m) UF	Subchronic [RfD] (mg/kg/day) UF	Chronic [RfC] (mg/cu m) UF	Chronic [RfD] (mg/kg/day) UF	REFERENCE
DACTHAL		**001861-32-1**							
NOAEL 1 MG/KG/DAY	ORAL: DIET	RAT 2 YEARS	LUNG	EFFECTS		1E-2		IRIS	005888
			LIVER	EFFECTS		100			
			KIDNEY	EFFECTS					
			THYROID	EFFECTS					
			THYROID HORMONES	EFFECTS					
SUBCHRONIC [RfD] COMMENT: THE CHRONIC ORAL RfD WAS ADOPTED AS THE SUBCHRONIC ORAL [RfD].									
DALAPON		**000075-99-0**							
NOEL 8.45 MG/KG/DAY	ORAL: DIET	RAT 2 YEARS	KIDNEY	INCREASED RELATIVE WEIGHT		3E-2		IRIS	005889
						300			
SUBCHRONIC [RfD] COMMENT: CALCULATED BY ANALOGY TO DALAPON SODIUM BY CORRECTING FOR DIFFERENCES IN MOLECULAR WEIGHT. THE CHRONIC ORAL RfD WAS ADOPTED AS THE SUBCHRONIC ORAL [RfD].									
DDT		**000050-29-3**							
NOEL 0.05 MG/KG/DAY	ORAL: DIET	RAT 27 WEEKS	LIVER	LESIONS		5E-4		IRIS	005408
						100			
SUBCHRONIC [RfD] COMMENT: THE CHRONIC ORAL RfD WAS ADOPTED AS THE SUBCHRONIC ORAL [RfD]. GENERAL COMMENT: ALSO SEE HEAST TABLE 3: CARCINOGENICITY.									
DECABROMODIPHENYL ETHER		**001163-19-5**							
NOEL 1 MG/KG/DAY	ORAL: DIET	RAT 2 YEARS	LIVER	INCREASED WEIGHT		1E-2		IRIS	005891
						100			
SUBCHRONIC [RfD] COMMENT: THE CHRONIC ORAL RfD WAS ADOPTED AS THE SUBCHRONIC ORAL [RfD]. GENERAL COMMENT: ALSO SEE HEAST TABLE 3: CARCINOGENICITY.									

CHEMICAL / LEVEL	DOSE / ROUTE	SPECIES / EXPERIMENT LENGTH	TARGET	CRITICAL EFFECT	Subchronic [RfC] (mg/cu m) UF	Subchronic [RfD] (mg/kg/day) UF	Chronic [RfC] (mg/cu m) UF	Chronic [RfD] (mg/kg/day) UF	REFERENCE
DI-N-OCTYL PHTHALATE		**000117-84-0**							
LOAEL 175 MG/KG/DAY	ORAL: DIET	RAT 7-12 MONTHS	KIDNEY	INCREASED WEIGHT		2E-2 1000		2E-2 1000	010275
			LIVER	INCREASED WEIGHT					
			LIVER	INCREASED SGOT ACTIVITY					
			LIVER	INCREASED SGPT ACTIVITY					
DIAZINON		**000333-41-5**							
NOAEL 0.09 MG/KG/DAY	ORAL: DIET	RAT 35-42 DAYS	BLOOD	DECREASED CHOLINESTERASE ACTIVITY		9E-4 100		9E-4 100	005892
DIBENZOFURAN		**000132-64-9**							005409
GENERAL COMMENT: DATA INADEQUATE FOR QUANTITATIVE RISK ASSESSMENT.									
DIBROMOBENZENE, 1,4-		**000106-37-6**							
NOAEL 10 MG/KG/DAY	ORAL: GAVAGE	RAT 45 OR 90 DAYS	LIVER	INCREASED RELATIVE WEIGHT		1E-1 100		IRIS	005893
			LIVER	ALTERED ENZYME ACTIVITIES					
DIBROMOCHLOROMETHANE		**000124-48-1**							
NOEL 21.4 MG/KG/DAY	ORAL: GAVAGE	RAT 13 WEEKS	LIVER	LESIONS		2E-1 100		IRIS	005894
GENERAL COMMENT: ALSO SEE HEAST TABLE 3: CARCINOGENICITY.									

CHEMICAL LEVEL / DOSE ROUTE / SPECIES EXPERIMENT LENGTH	TARGET	CRITICAL EFFECT	Subchronic [RfC] (mg/cu m) UF	Subchronic [RfD] (mg/kg/day) UF	Chronic [RfC] (mg/cu m) UF	Chronic [RfD] (mg/kg/day) UF	REFERENCE
DIBROMOETHANE, 1,2- **000106-93-4**							
LOAEL 88 PPB HUMAN							
INHALATION:	SPERM	EFFECTS	2E-3		2E-4		010854
INTERMITTENT			100		1000		
SUBCHRONIC [RfC] COMMENT: THE CHRONIC INHALATION [RfC] WAS MODIFIED TO ESTIMATE THE SUBCHRONIC INHALATION [RfC].							
CHRONIC [RfC] COMMENT: UNDER REVIEW. CURRENT NUMBER SUBJECT TO CHANGE.							
GENERAL COMMENT: ALSO SEE HEAST TABLE 3: CARCINOGENICITY.							
DIBUTYL PHTHALATE **000084-74-2**							
NOAEL 125 MG/KG/DAY RAT							
ORAL: DIET 52 WEEKS	WHOLE BODY	INCREASED MORTALITY		1E+0		IRIS	005622
				100			
					IRIS		010892
CHRONIC RfC COMMENT: THE CHRONIC INHALATION RfC IS CONSIDERED NOT VERIFIABLE (07/26/90) BY THE RfD/RfC WORK GROUP.							
DICAMBA **001918-00-9**							
NOAEL 3 MG/KG/DAY RABBIT							
ORAL: GAVAGE GESTATION DAYS 6-18	FETUS	DECREASED WEIGHT		3E-2		IRIS	010945
	FETUS	INCREASED POST-IMPLANTATION LOSSES		100			
	FETUS	INCREASED MORTALITY					
	DAM	DECREASED WEIGHT GAIN					
SUBCHRONIC [RfD] COMMENT: THE CHRONIC ORAL RfD WAS ADOPTED AS THE SUBCHRONIC ORAL [RfD].							
DICHLOROBENZENE, 1,2- **000095-50-1**							
						IRIS	010864
GENERAL COMMENT: ALSO SEE HEAST TABLE 2: ALTERNATE METHODS -- SUBCHRONIC AND CHRONIC TOXICITY (OTHER THAN CARCINOGENICITY)							

CHEMICAL / LEVEL	DOSE / ROUTE	SPECIES / EXPERIMENT / LENGTH	TARGET	CRITICAL EFFECT	Subchronic [RfC] (mg/cu m) UF	Subchronic [RfD] (mg/kg/day) UF	Chronic [RfC] (mg/cu m) UF	Chronic [RfD] (mg/kg/day) UF	REFERENCE
DICHLOROBENZENE, 1,3-	**000541-73-1**								005414
CHRONIC [RfD] COMMENT: THE CHRONIC ORAL [RfD] IS CONSIDERED NOT VERIFIABLE (06/23/92) BY THE RfD/RfC WORK GROUP.									
DICHLOROBENZENE, 1,4-	**000106-46-7**								
NOAEL 75 MG/CU M	RAT								
INHALATION:	MULTI-GENERA	LIVER		INCREASED WEIGHT IN MALE	2.5E+0		IRIS		010840
INTERMITTENT	TION			PARENTS	30				
SUBCHRONIC [RfC] COMMENT: THE CHRONIC INHALATION RfC WAS MODIFIED TO ESTIMATE THE SUBCHRONIC INHALATION [RfC].									
GENERAL COMMENT: ALSO SEE HEAST TABLE 3: CARCINOGENICITY.									
DICHLOROBUTENES									005415
GENERAL COMMENT: DATA INADEQUATE FOR QUANTITATIVE RISK ASSESSMENT.									
DICHLORODIFLUOROMETHANE	**000075-71-8**						IRIS		005498
NOAEL 90 MG/KG/DAY	DOG								
ORAL: DIET	90 DAYS			NONE OBSERVED		9E-1			005496
						100			
SUBCHRONIC [RfC] COMMENT: ALSO SEE HEAST TABLE 2: ALTERNATE METHODS -- SUBCHRONIC AND CHRONIC TOXICITY (OTHER THAN CARCINOGENICITY)									
CHRONIC [RfC] COMMENT: ALSO SEE HEAST TABLE 2: ALTERNATE METHODS -- SUBCHRONIC AND CHRONIC TOXICITY (OTHER THAN CARCINOGENICITY)									

HEAST TABLE 1: SUBCHRONIC AND CHRONIC TOXICITY (OTHER THAN CARCINOGENICITY)

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CHEMICAL LEVEL	DOSE ROUTE	SPECIES EXPERIMENT LENGTH	TARGET	CRITICAL EFFECT	Subchronic [RfC] (mg/cu m) UF	Subchronic [RfD] (mg/kg/day) UF	Chronic [RfC] (mg/cu m) UF	Chronic [RfD] (mg/kg/day) UF	REFERENCE
DICHLOROETHANE, 1,1-		**000075-34-3**							
NOEL 115 MG/KG/DAY	INHALATION: INTERMITTENT	RAT 13 WEEKS		NONE OBSERVED		1E+0 100		1E-1 1000	005790

SUBCHRONIC [RfC] COMMENT: ALSO SEE HEAST TABLE 2: ALTERNATE METHODS -- SUBCHRONIC AND CHRONIC TOXICITY (OTHER THAN CARCINOGENICITY)
SUBCHRONIC [RfD] COMMENT: BASED ON ROUTE TO ROUTE EXTRAPOLATION.
CHRONIC [RfC] COMMENT: ALSO SEE HEAST TABLE 2: ALTERNATE METHODS -- SUBCHRONIC AND CHRONIC TOXICITY (OTHER THAN CARCINOGENICITY)
CHRONIC [RfD] COMMENT: BASED ON ROUTE TO ROUTE EXTRAPOLATION.
GENERAL COMMENT: ALSO SEE HEAST TABLE 3: CARCINOGENICITY.

DICHLOROETHANE, 1,2- **000107-06-2**

SUBCHRONIC [RfC] COMMENT: CONTACT THE SUPERFUND HEALTH RISK TECHNICAL SUPPORT CENTER: (513) 569-7300.
SUBCHRONIC [RfD] COMMENT: CONTACT THE SUPERFUND HEALTH RISK TECHNICAL SUPPORT CENTER: (513) 569-7300.
GENERAL COMMENT: ALSO SEE HEAST TABLE 3: CARCINOGENICITY.

DICHLOROETHYLENE, 1,1-		**000075-35-4**							
LOAEL 9 MG/KG/DAY	ORAL: DRINKING WATER	RAT 2 YEARS	LIVER	LESIONS		9E-3 1000		IRIS	005419

SUBCHRONIC [RfD] COMMENT: THE CHRONIC ORAL RfD WAS ADOPTED AS THE SUBCHRONIC ORAL [RfD].
CHRONIC [RfD] COMMENT: UNDER REVIEW, CURRENT NUMBER SUBJECT TO CHANGE.
GENERAL COMMENT: ALSO SEE HEAST TABLE 3: CARCINOGENICITY.

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HEAST TABLE 1: SUBCHRONIC AND CHRONIC TOXICITY (OTHER THAN CARCINOGENICITY)

CHEMICAL LEVEL	DOSE ROUTE	SPECIES EXPERIMENT LENGTH	TARGET	CRITICAL EFFECT	Subchronic [RfC] (mg/cu m) UF	Subchronic [RfD] (mg/kg/day) UF	Chronic [RfC] (mg/cu m) UF	Chronic [RfD] (mg/kg/day) UF	REFERENCE
DICHLOROETHYLENE, 1,2- (MIXED ISOMERS) 000540-59-0									
LOAEL 50 PPM	ORAL: DRINKING WATER	RAT 2 YEARS	LIVER	LESIONS		9E-3 1000		9E-3 1000	010509
SUBCHRONIC [RfD] COMMENT: VALUES DERIVED FOR 1,1-DICHLOROETHYLENE WERE ADOPTED FOR 1,2- DICHLOROETHYLENE MIXED ISOMERS BASED ON ANALOGY.									
CHRONIC [RfD] COMMENT: VALUES DERIVED FOR 1,1-DICHLOROETHYLENE (000075-35-4) WERE ADOPTED FOR 1,2-DICHLOROETHYLENE MIXED ISOMERS BASED ON ANALOGY.									
DICHLOROETHYLENE, 1,2-C- 000156-59-2									
NOAEL 32 MG/KG/DAY	ORAL: GAVAGE	RAT 90 DAYS	BLOOD BLOOD	DECREASED HEMATOCRIT DECREASED HEMOGLOBIN		1E-1 300		1E-2 3000	005420
CHRONIC [RfD] COMMENT: UNDER REVIEW. CURRENT NUMBER SUBJECT TO CHANGE.									
DICHLOROETHYLENE, 1,2-T- 000156-60-5									
NOAEL 17 MG/KG/DAY	ORAL: DRINKING WATER	MOUSE 90 DAYS	BLOOD	INCREASED ALKALINE PHOSPHATASE		2E-1 100		IRIS	005895
DICHLOROPHENOL, 2,3- 000576-24-9									005315
GENERAL COMMENT: DATA INADEQUATE FOR QUANTITATIVE RISK ASSESSMENT									

CHEMICAL LEVEL	DOSE ROUTE	SPECIES EXPERIMENT LENGTH	TARGET	CRITICAL EFFECT	Subchronic [RfC] (mg/cu m) UF	Subchronic [RfD] (mg/kg/day) UF	Chronic [RfC] (mg/cu m) UF	Chronic [RfD] (mg/kg/day) UF	REFERENCE
DICHLOROPHENOL, 2,4-		**000120-83-2**							
NOEL 3 PPM		RAT							
	ORAL: DRINKING WATER	2 GENERATIONS	IMMUNE SYSTEM	ALTERED IMMUNE FUNCTION		3E-3 100		IRIS	005314

SUBCHRONIC [RfD] COMMENT: THE CHRONIC ORAL RfD WAS ADOPTED AS THE SUBCHRONIC ORAL [RfD].
CHRONIC [RfD] COMMENT: BASED ON A 2-GENERATION REPRODUCTION STUDY WITH EXPOSURES BEFORE AND DURING GESTATION, PARTURITION, AND WEANING OF PUPS.

DICHLOROPHENOL, 2,5- **000583-78-8**
GENERAL COMMENT: DATA INADEQUATE FOR QUANTITATIVE RISK ASSESSMENT 005316

DICHLOROPHENOL, 2,6- **000087-65-0**
GENERAL COMMENT: DATA INADEQUATE FOR QUANTITATIVE RISK ASSESSMENT 005317

DICHLOROPHENOL, 3,4- **000095-77-2**
GENERAL COMMENT: DATA INADEQUATE FOR QUANTITATIVE RISK ASSESSMENT 005318

DICHLOROPHENOL, 3,5- **000591-35-5**
GENERAL COMMENT: DATA INADEQUATE FOR QUANTITATIVE RISK ASSESSMENT 005319

DICHLOROPHENOXY ACETIC ACID, 2,4-		**000094-75-7**							
NOAEL 1 MG/KG/DAY		RAT							
	ORAL: DIET	91 DAYS	BLOOD	TOXICITY		1E-2		IRIS	010265
			LIVER	TOXICITY		100			
			KIDNEY	TOXICITY					

SUBCHRONIC [RfD] COMMENT: THE CHRONIC ORAL RfD WAS ADOPTED AS THE SUBCHRONIC ORAL [RfD].

HEAST TABLE 1: SUBCHRONIC AND CHRONIC TOXICITY (OTHER THAN CARCINOGENICITY)

CHEMICAL LEVEL	DOSE ROUTE	SPECIES EXPERIMENT LENGTH	TARGET	CRITICAL EFFECT	Subchronic [RfC] (mg/cu m) UF	Subchronic [RfD] (mg/kg/day) UF	Chronic [RfC] (mg/cu m) UF	Chronic [RfD] (mg/kg/day) UF	REFERENCE
DICHLOROPHENOXY) BUTYRIC ACID, 4-(2,4- / (2,4-DB)		**000094-82-6**							
NOAEL 8 MG/KG/DAY		DOG							
	ORAL: DIET	90 DAYS	CARDIOVASCULAR SYSTEM	HEMORRHAGE		8E-2		IRIS	005890
			WHOLE BODY	INCREASED MORTALITY		100			
DICHLOROPROPANE, 1,1-		**000078-99-9**							005897
GENERAL COMMENT:		DATA INADEQUATE FOR QUANTITATIVE RISK ASSESSMENT.							
DICHLOROPROPANE, 1,2-		**000078-87-5**							
NOAEL 69.3 MG/CU		RAT							
	INHALATION: INTERMITTENT	13 WEEKS	NASAL MUCOSA	HYPERPLASIA	1.3E-2		IRIS		005898
					100				
GENERAL COMMENT:		ALSO SEE HEAST TABLE 3: CARCINOGENICITY.							
DICHLOROPROPANE, 1,3-		**000142-28-9**							005899
GENERAL COMMENT:		DATA INADEQUATE FOR QUANTITATIVE RISK ASSESSMENT.							
DICHLOROPROPANE, 2,2-		**000594-20-7**							005900
GENERAL COMMENT:		DATA INADEQUATE FOR QUANTITATIVE RISK ASSESSMENT.							

CHEMICAL / LEVEL	DOSE / ROUTE	SPECIES / EXPERIMENT / LENGTH	TARGET	CRITICAL EFFECT	Subchronic [RfC] (mg/cu m) UF	Subchronic [RfD] (mg/kg/day) UF	Chronic [RfC] (mg/cu m) UF	Chronic [RfD] (mg/kg/day) UF	REFERENCE
DICHLOROPROPENE, 1,3- / (TELONE II)		**000542-75-6**							
NOEL	3 MG/KG/DAY	RAT							
	ORAL: DIET	90 DAYS	ORGANS	INCREASED WEIGHT		3E-3 1000		IRIS	005901
GENERAL COMMENT: ALSO SEE HEAST TABLE 3: CARCINOGENICITY.									
NOAEL	5 PPM	MOUSE							
	INHALATION:	2 YEARS	NASAL MUCOSA	HYPERTROPHY	2E-2		IRIS		010351
	INTERMITTENT		NASAL MUCOSA	HYPERPLASIA	30				
SUBCHRONIC [RfC] COMMENT: THE CHRONIC INHALATION RfC WAS ADOPTED AS THE SUBCHRONIC INHALATION [RfC].									
DICHLORPROP		**000120-36-5**							
GENERAL COMMENT: DATA INADEQUATE FOR QUANTITATIVE RISK ASSESSMENT.									005896
DICYCLOPENTADIENE		**000077-73-6**							
NOEL	32 MG/KG/DAY	RAT							
	ORAL: DIET	3 GENERATIONS		NONE OBSERVED		3E-1 100		3E-2 1000	005425
SUBCHRONIC [RfC] COMMENT: ALSO SEE HEAST TABLE 2: ALTERNATE METHODS -- SUBCHRONIC AND CHRONIC TOXICITY (OTHER THAN CARCINOGENICITY)									
SUBCHRONIC [RfD] COMMENT: BASED ON A 3-GENERATION REPRODUCTION STUDY.									
CHRONIC [RfC] COMMENT: ALSO SEE HEAST TABLE 2: ALTERNATE METHODS -- SUBCHRONIC AND CHRONIC TOXICITY (OTHER THAN CARCINOGENICITY)									
CHRONIC [RfD] COMMENT: BASED ON A 3-GENERATION REPRODUCTION STUDY.									
DIELDRIN		**000060-57-1**							
NOAEL	0.005 MG/KG/DAY	RAT							
	ORAL: DIET	2 YEARS	LIVER	LESIONS		5E-5 100		IRIS	005429
SUBCHRONIC [RfD] COMMENT: THE CHRONIC ORAL RfD WAS ADOPTED AS THE SUBCHRONIC ORAL [RfD].									
GENERAL COMMENT: ALSO SEE HEAST TABLE 3: CARCINOGENICITY.									

HEAST TABLE 1: SUBCHRONIC AND CHRONIC TOXICITY (OTHER THAN CARCINOGENICITY)

CHEMICAL / LEVEL	DOSE / ROUTE	SPECIES / EXPERIMENT / LENGTH	TARGET	CRITICAL EFFECT	Subchronic [RfC] (mg/cu m) / UF	Subchronic [RfD] (mg/kg/day) / UF	Chronic [RfC] (mg/cu m) / UF	Chronic [RfD] (mg/kg/day) / UF	REFERENCE
DIETHYL PHTHALATE		**000084-66-2**							
NOAEL 750 MG/KG/DAY	ORAL: DIET	RAT 16 WEEKS	WHOLE BODY ORGANS	DECREASED GROWTH DECREASED WEIGHT		8E+0 100		IRIS	005620
DIETHYL-P-NITROPHENYL PHOSPHATE		**000311-45-5**							005922
GENERAL COMMENT: DATA INADEQUATE FOR QUANTITATIVE RISK ASSESSMENT									
DIETHYLANILINE, N,N-		**000091-66-7**							005903
GENERAL COMMENT: DATA INADEQUATE FOR QUANTITATIVE RISK ASSESSMENT.									
DIETHYLENE GLYCOL MONOBUTYL ETHER		**000112-34-5**							
NOAEL 18 PPM		RAT		NONE OBSERVED	2E-1 100		2E-2 1000		005482
CHRONIC [RfC] COMMENT: UNDER REVIEW.									
DIETHYLENE GLYCOL MONOETHYL ETHER		**000111-90-0**							
NOEL 200 MG/KG/DAY	ORAL: DRINKING WATER	RAT	KIDNEY	HISTOPATHOLOGY				2E+0 100	005478
CHRONIC [RfD] COMMENT: BASED ON A 3-GENERATION REPRODUCTION STUDY.									
NOEL 500 MG/KG/DAY	ORAL: DIET	RAT 90 DAYS	KIDNEY TESTIS	IMPAIRED FUNCTION INCREASED WEIGHT		5E+0 100			005476

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IRIS, EPA'S INTEGRATED RISK INFORMATION SYSTEM, IS UPDATED MONTHLY. FURTHER INFORMATION: RISK INFORMATION HOTLINE: (513) 569-7254.

CHEMICAL / DOSE LEVEL / ROUTE	SPECIES / EXPERIMENT LENGTH	TARGET	CRITICAL EFFECT	Subchronic [RfC] (mg/cu m) UF	Subchronic [RfD] (mg/kg/day) UF	Chronic [RfC] (mg/cu m) UF	Chronic [RfD] (mg/kg/day) UF	REFERENCE
DIETHYLFORMAMIDE	**000617-84-5**							
NOEL 0.546 MG/DAY, 5 DAYS/WEEK	RAT							
ORAL: GAVAGE	73 WEEKS		NONE OBSERVED		1.1E-2 100		1.1E-2 100	010437
DIETHYLHYDRAZINE, 1,2-	**001615-80-1**							
GENERAL COMMENT: DATA INADEQUATE FOR QUANTITATIVE RISK ASSESSMENT. ALSO SEE HEAST TABLE 3: CARCINOGENICITY.								005921
DIMETHOATE	**000060-51-5**							
NOEL 0.05 MG/KG/DAY	RAT							
ORAL: DIET	2 YEARS	BRAIN	DECREASED CHOLINESTERASE ACTIVITY		2E-4 300		IRIS	005923
SUBCHRONIC [RfD] COMMENT: THE CHRONIC ORAL RfD WAS ADOPTED AS THE SUBCHRONIC ORAL [RfD].								
DIMETHYLANILINE, N,N-	**000121-69-7**							
LOAEL 22.32 MG/KG/DAY	MOUSE							
ORAL: GAVAGE	13 WEEKS	SPLEEN	EFFECTS		2E-2 1000		IRIS	005924
DIMETHYLFORMAMIDE, N,N-	**000068-12-2**							
NOAEL 96 MG/KG/DAY	RAT							
ORAL: DIET	119 DAYS	LIVER	EFFECTS		1E+0 100		1E-1 1000	005925
LOAEL 22 MG/CU M	HUMAN							
INHALATION: INTERMITTENT		LIVER GASTRO INTESTINAL SYSTEM	EFFECTS EFFECTS	3E-2 300		IRIS		010352
SUBCHRONIC [RfC] COMMENT: THE CHRONIC INHALATION RFC WAS ADOPTED AS THE SUBCHRONIC INHALATION [RFC].								

HEAST TABLE 1: SUBCHRONIC AND CHRONIC TOXICITY (OTHER THAN CARCINOGENICITY)

CHEMICAL / DOSE LEVEL / ROUTE	SPECIES / EXPERIMENT LENGTH	TARGET	CRITICAL EFFECT	Subchronic [RfC] (mg/cu m) / UF	Subchronic [RfD] (mg/kg/day) / UF	Chronic [RfC] (mg/cu m) / UF	Chronic [RfD] (mg/kg/day) / UF	REFERENCE
DIMETHYLPHENOL, 2,3- 000526-75-0								005926
GENERAL COMMENT: DATA INADEQUATE FOR QUANTITATIVE RISK ASSESSMENT								
DIMETHYLPHENOL, 2,4- 000105-67-9								
NOAEL 50 MG/KG/DAY ORAL: GAVAGE	MOUSE 90 DAYS	NERVOUS SYSTEM BLOOD	EFFECTS ALTERATIONS		2E-1 300		IRIS	010266
DIMETHYLPHENOL, 2,5- 000095-87-4								005928
GENERAL COMMENT: DATA INADEQUATE FOR QUANTITATIVE RISK ASSESSMENT.								
DIMETHYLPHENOL, 2,6- 000576-26-1								
NOEL 0.6 MG/KG/DAY ORAL	RAT 8 MONTHS	WHOLE BODY ORGANS, MAJOR	INCREASED WEIGHT LESIONS		6E-3 100		IRIS	005431
DIMETHYLPHENOL, 3,4- 000095-65-8								
NOEL 1.4 MG/KG/DAY ORAL	RAT 8 MONTHS	WHOLE BODY ORGANS, MAJOR CARDIOVASCULAR SYSTEM	DECREASED WEIGHT LESIONS ALTERED BLOOD PRESSURE		1E-2 100		IRIS	005437
DIMETHYLPHTHALATE 000131-11-3								010267
CHRONIC RfD COMMENT: THE CHRONIC ORAL [RfD] IS CONSIDERED NOT VERIFIABLE (02/16/94) BY THE RfD/RfC WORK GROUP.							IRIS	010894
CHRONIC RfC COMMENT: THE CHRONIC INHALATION RfC IS CONSIDERED NOT VERIFIABLE (07/26/90) BY THE RfD/RfC WORK GROUP.								

CHEMICAL / LEVEL	DOSE / ROUTE	SPECIES / EXPERIMENT LENGTH	TARGET	CRITICAL EFFECT	Subchronic [RfC] (mg/cu m) UF	Subchronic [RfD] (mg/kg/day) UF	Chronic [RfC] (mg/cu m) UF	Chronic [RfD] (mg/kg/day) UF	REFERENCE
DIMETHYLTEREPHTHALATE		**000120-61-6**							
LOAEL 125 MG/KG/DAY		RAT							
	ORAL: DIET	103 WEEKS	KIDNEY	INFLAMMATION		1E-1 1000		IRIS	005930
SUBCHRONIC [RfD] COMMENT: THE CHRONIC ORAL RfD WAS ADOPTED AS THE SUBCHRONIC ORAL [RfD].									
DIMETHYLUREA, N,N-		**000598-94-7**							
GENERAL COMMENT: DATA INADEQUATE FOR QUANTITATIVE RISK ASSESSMENT									005931
DINITRO-O-CRESOL, 4,6-		**000534-52-1**							
CHRONIC [RfC] COMMENT: THE CHRONIC INHALATION [RfC] IS CONSIDERED NOT VERIFIABLE (02/11/93) BY THE RfD/RfC WORK GROUP.									010470
DINITRO-P-CRESOL, 2,6-		**000609-93-8**							
GENERAL COMMENT: DATA INADEQUATE FOR QUANTITATIVE RISK ASSESSMENT									005934
DINITROBENZENE, 1,2-		**000528-29-0**							
NOAEL 0.4 MG/KG/DAY		RAT							
	ORAL: DRINKING WATER	16 WEEKS	SPLEEN	INCREASED WEIGHT		4E-3 100		4E-4 1000	010201
SUBCHRONIC [RfD] COMMENT: DERIVED BY ANALOGY TO 1,3-DINITROBENZENE. CHRONIC [RfD] COMMENT: DERIVED BY ANALOGY TO 1,3-DINITROBENZENE.									
DINITROBENZENE, 1,3-		**000099-65-0**							
NOAEL 0.4 MG/KG/DAY		RAT							
	ORAL: DRINKING WATER		SPLEEN	INCREASED WEIGHT		1E-3 100		IRIS	010471

HEAST TABLE 1: SUBCHRONIC AND CHRONIC TOXICITY (OTHER THAN CARCINOGENICITY)

CHEMICAL / LEVEL	DOSE / ROUTE	SPECIES / EXPERIMENT LENGTH	TARGET	CRITICAL EFFECT	Subchronic [RfC] (mg/cu m) / UF	Subchronic [RfD] (mg/kg/day) / UF	Chronic [RfC] (mg/cu m) / UF	Chronic [RfD] (mg/kg/day) / UF	REFERENCE
DINITROBENZENE, 1,4- **000100-25-4**									
NOAEL 0.4 MG/KG/DAY	ORAL: DRINKING WATER	RAT 16 WEEKS	SPLEEN	INCREASED WEIGHT		4E-3 100		4E-4 1000	010202
SUBCHRONIC [RfD] COMMENT: DERIVED BY ANALOGY TO 1,3-DINITROBENZENE.									
CHRONIC [RfD] COMMENT: DERIVED BY ANALOGY TO 1,3-DINITROBENZENE.									
DINITROPHENOL, 2,3- **000066-56-8**									
GENERAL COMMENT: DATA INADEQUATE FOR QUANTITATIVE RISK ASSESSMENT									005936
DINITROPHENOL, 2,4- **000051-28-5**									
LOAEL 2 MG/KG/DAY	ORAL	HUMAN	EYE	CATARACT		2E-3 1000		IRIS	010438
SUBCHRONIC [RfD] COMMENT: THE CHRONIC ORAL RfD WAS ADOPTED AS THE SUBCHRONIC ORAL [RfD].									
CHRONIC RfC COMMENT: THE CHRONIC INHALATION RfC IS CONSIDERED NOT VERIFIABLE (06/13/91) BY THE RfD/RfC WORK GROUP.							IRIS		010895
DINITROPHENOL, 2,5- **000329-71-5**									
GENERAL COMMENT: DATA INADEQUATE FOR QUANTITATIVE RISK ASSESSMENT									005937
DINITROPHENOL, 2,6- **000573-56-8**									
GENERAL COMMENT: DATA INADEQUATE FOR QUANTITATIVE RISK ASSESSMENT									005938
DINITROPHENOL, 3,5- **000586-11-8**									
GENERAL COMMENT: DATA INADEQUATE FOR QUANTITATIVE RISK ASSESSMENT									005939
DINITROTOLUENE, 2,3- **000602-01-7**									
GENERAL COMMENT: DATA INADEQUATE FOR QUANTITATIVE RISK ASSESSMENT									005940

CHEMICAL / LEVEL	DOSE / ROUTE	SPECIES / EXPERIMENT LENGTH	TARGET	CRITICAL EFFECT	Subchronic [RfC] (mg/cu m) UF	Subchronic [RfD] (mg/kg/day) UF	Chronic [RfC] (mg/cu m) UF	Chronic [RfD] (mg/kg/day) UF	REFERENCE
DINITROTOLUENE, 2,4-		**000121-14-2**							
NOAEL 0.2 MG/KG/DAY		DOG				2E-3		IRIS	005941
	ORAL: GELATIN CAPSULE	UP TO 2 YEARS	CENTRAL NERVOUS SYSTEM	NEUROTOXICITY		100			
			ERYTHROCYTES	HEINZ BODIES					
			BILIARY TRACT	HYPERPLASIA					
SUBCHRONIC [RfD] COMMENT: THE CHRONIC ORAL RfD IS ADOPTED AS THE SUBCHRONIC ORAL [RfD].									
GENERAL COMMENT: ALSO SEE HEAST TABLE 3: CARCINOGENICITY.							IRIS		010896
CHRONIC RfC COMMENT: THE CHRONIC INHALATION RfC IS CONSIDERED NOT VERIFIABLE (12/20/90) BY THE RfD/RfC WORK GROUP.									
DINITROTOLUENE, 2,5-		**000619-15-8**							005942
GENERAL COMMENT: DATA INADEQUATE FOR QUANTITATIVE RISK ASSESSMENT									
DINITROTOLUENE, 2,6-		**000606-20-2**							
NOAEL 4 MG/KG/DAY		DOG				1E-2		1E-3	005943
	ORAL: DIET	13 WEEKS	WHOLE BODY	MORTALITY		300		3000	
			CENTRAL NERVOUS SYSTEM	NEUROTOXICITY					
			BLOOD	HEINZ BODIES					
			BLOOD	METHEMOGLOBINEMIA					
			BILE DUCT	HYPERPLASIA					
			KIDNEY	HISTOPATHOLOGY					
CHRONIC [RfD] COMMENT: UNDER REVIEW. CURRENT NUMBER SUBJECT TO CHANGE.									
GENERAL COMMENT: ALSO SEE HEAST TABLE 3: CARCINOGENICITY.									
DINITROTOLUENE, 3,4-		**000610-39-9**							005944
GENERAL COMMENT: DATA INADEQUATE FOR QUANTITATIVE RISK ASSESSMENT									

HEAST TABLE 1: SUBCHRONIC AND CHRONIC TOXICITY (OTHER THAN CARCINOGENICITY)

CHEMICAL / LEVEL	DOSE / ROUTE	SPECIES / EXPERIMENT LENGTH	TARGET	CRITICAL EFFECT	Subchronic [RfC] (mg/cu m) / UF	Subchronic [RfD] (mg/kg/day) / UF	Chronic [RfC] (mg/cu m) / UF	Chronic [RfD] (mg/kg/day) / UF	REFERENCE
DINOSEB		**000088-85-7**							
LOAEL 1 MG/KG/DAY		RAT							
	ORAL: DIET	29 WEEKS	FETUS	DECREASED WEIGHT		1E-3 1000		IRIS	005945
SUBCHRONIC [RfD] COMMENT: THE CHRONIC ORAL RFD WAS ADOPTED AS THE SUBCHRONIC ORAL [RFD].									
CHRONIC [RfD] COMMENT: THE CHRONIC ORAL RFD WAS DETERMINED FROM A 3-GENERATION REPRODUCTION STUDY.									
DIPHENYLAMINE, N,N-		**000122-39-4**							
NOEL 2.5 MG/KG/DAY		DOG							
	ORAL: DIET	2 YEARS	WHOLE BODY	DECREASED WEIGHT GAIN		2.5E-2 100		IRIS	005946
			LIVER	INCREASED WEIGHT					
			KIDNEY	INCREASED WEIGHT					
SUBCHRONIC [RfD] COMMENT: THE CHRONIC ORAL RfD WAS ADOPTED AS THE SUBCHRONIC ORAL [RfD].									
DIRECT LIGHTFAST BLUE		**004399-55-7**							
GENERAL COMMENT: DATA INADEQUATE FOR QUANTITATIVE RISK ASSESSMENT									005947
DISULFOTON		**000298-04-4**							
LOAEL 0.04 MG/KG/DAY		RAT							
	ORAL: DIET	2 YEARS	EYE	DEGENERATION		4E-5		IRIS	010412
			BLOOD	CHOLINESTERASE INHIBITION		1000			
SUBCHRONIC [RfD] COMMENT: THE CHRONIC ORAL RfD WAS ADOPTED AS THE SUBCHRONIC ORAL [RfD].									

HEAST TABLE 1: SUBCHRONIC AND CHRONIC TOXICITY (OTHER THAN CARCINOGENICITY)

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CHEMICAL / LEVEL	DOSE / ROUTE	SPECIES / EXPERIMENT LENGTH	TARGET	CRITICAL EFFECT	Subchronic [RfC] (mg/cu m) UF	Subchronic [RfD] (mg/kg/day) UF	Chronic [RfC] (mg/cu m) UF	Chronic [RfD] (mg/kg/day) UF	REFERENCE
ENDOSULFAN		**000115-29-7**							
NOAEL 15 PPM		RAT							
	ORAL: DIET	2 YEARS	WHOLE BODY	DECREASED WEIGHT GAIN		6E-3		IRIS	010926
			KIDNEY	GLOMERULONEPHROSIS		100			
			BLOOD VESSEL	ANEURYSMS					
NOAEL 10 PPM		DOG							
	ORAL: DIET	1 YEAR	WHOLE BODY	DECREASED WEIGHT GAIN					010938
SUBCHRONIC [RfD] COMMENT: THE CHRONIC ORAL RfD WAS ADOPTED AS THE SUBCHORNIC ORAL [RfD]. BASED ON CO-CRITICAL RAT AND DOG STUDIES.									
ENDOTHALL		**000145-73-3**							
NOEL 2 MG/KG/DAY		DOG							
	ORAL: DIET	2 YEARS	STOMACH	INCREASED WEIGHT		2E-2		IRIS	005948
			SMALL INTESTINE	INCREASED WEIGHT		100			
SUBCHRONIC [RfD] COMMENT: THE CHRONIC ORAL RfD WAS ADOPTED AS THE SUBCHRONIC ORAL [RfD].									
ENDRIN		**000072-20-8**							
NOEL 0.025 MG/KG/DAY		DOG							
	ORAL: DIET	2 YEARS	CENTRAL NERVOUS SYSTEM	CONVULSIONS		3E-4		IRIS	005445
			LIVER	LESIONS		100			
SUBCHRONIC [RfD] COMMENT: THE CHRONIC ORAL RfD WAS ADOPTED AS THE SUBCHRONIC ORAL [RfD].									

CHEMICAL / LEVEL	DOSE / ROUTE	SPECIES / EXPERIMENT LENGTH	TARGET	CRITICAL EFFECT	Subchronic [RfC] (mg/cu m) UF	Subchronic [RfD] (mg/kg/day) UF	Chronic [RfC] (mg/cu m) UF	Chronic [RfD] (mg/kg/day) UF	REFERENCE
EPICHLOROHYDRIN		**000106-89-8**							
LOAEL 37.8 MG/CU M	INHALATION: INTERMITTENT	RAT 136 WEEKS	KIDNEY	LESIONS		2E-3 1000		2E-3 1000	010440
SUBCHRONIC [RfD] COMMENT: BASED ON ROUTE-TO-ROUTE EXTRAPOLATION. THE CHRONIC ORAL [RfD] WAS ADOPTED AS THE SUBCHRONIC ORAL [RfD].									
CHRONIC [RfD] COMMENT: WITHDRAWN FROM IRIS (04/01/92).									
GENERAL COMMENT: ALSO SEE HEAST TABLE 3: CARCINOGENICITY.									
NOAEL 19 MG/CU M	INHALATION: INTERMITTENT	RAT 90 DAYS	NASAL EPITHELIUM	LESIONS	1E-2 100		IRIS		010492
EPTC		**000759-94-4**							
NOEL 2.5 MG/KG/DAY	ORAL: DIET	RAT 2 GENERATIONS	HEART	DEGENERATIVE CARDIOMYOPATHY		2.5E-2 100		IRIS	005959
SUBCHRONIC [RfD] COMMENT: THE CHRONIC ORAL RfD WAS ADOPTED AS THE SUBCHRONIC ORAL [RfD].									
CHRONIC [RfD] COMMENT: THE CHRONIC ORAL RFD WAS DETERMINED FROM A 2-GENERATION REPRODUCTION STUDY.									
ETHOPROP		**013194-48-4**							
GENERAL COMMENT: DATA INADEQUATE FOR QUANTITATIVE RISK ASSESSMENT									005951
ETHOXYETHANOL ACETATE, 2-		**000111-15-9**							010507
SUBCHRONIC [RfD] COMMENT: ALSO SEE HEAST TABLE 2: ALTERNATE METHODS -- SUBCHRONIC AND CHRONIC TOXICITY (OTHER THAN CARCINOGENICITY)									
CHRONIC [RfD] COMMENT: ALSO SEE HEAST TABLE 2: ALTERNATE METHODS -- SUBCHRONIC AND CHRONIC TOXICITY (OTHER THAN CARCINOGENICITY)									
ETHOXYETHANOL ACRYLATE, 2-		**000106-74-1**							
GENERAL COMMENT: DATA INADEQUATE FOR QUANTITATIVE RISK ASSESSMENT									005953

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CHEMICAL LEVEL	DOSE ROUTE	SPECIES EXPERIMENT LENGTH	TARGET	CRITICAL EFFECT	Subchronic [RfC] (mg/cu m) UF	Subchronic [RfD] (mg/kg/day) UF	Chronic [RfC] (mg/cu m) UF	Chronic [RfD] (mg/kg/day) UF	REFERENCE
ETHOXYETHANOL DODECANOATE, 2- 000106-13-8									
GENERAL COMMENT: DATA INADEQUATE FOR QUANTITATIVE RISK ASSESSMENT									005956
ETHOXYETHANOL PHOSPHATE, 2- 068554-00-7									
GENERAL COMMENT: DATA INADEQUATE FOR QUANTITATIVE RISK ASSESSMENT									005955
ETHOXYETHANOL, 2- 000110-80-5									
LOAEL 357 MG/KG/DAY	ORAL: GAVAGE	RAT 103 WEEKS	WHOLE BODY	DECREASED WEIGHT				4E-1 1000	005470
NOEL 50 uL/KG/DAY	ORAL: GAVAGE	RAT 21 DAYS	FETUS	SKELETAL MALFORMATIONS		5E-1 100			005468
SUBCHRONIC [RfD] COMMENT: BASED ON A REPRODUCTION STUDY WITH EXPOSURES DURING DAYS 1-21 OF GESTATION.									
NOAEL 380 MG/CU M	INHALATION: INTERMITTENT	RABBIT 13 WEEKS	BLOOD	ALTERED HEMATOLOGY	2E+0 30		IRIS		010441
ETHOXYETHYL METHACRYLATE, 2- 002370-63-0									
GENERAL COMMENT: DATA INADEQUATE FOR QUANTITATIVE RISK ASSESSMENT									005954
ETHYL ACETATE 000141-78-6									
NOEL 900 MG/KG/DAY	ORAL: GAVAGE	RAT 90 DAYS	WHOLE BODY WHOLE BODY	INCREASED MORTALITY DECREASED WEIGHT		9E+0 100		IRIS	005957

HEAST TABLE 1: SUBCHRONIC AND CHRONIC TOXICITY (OTHER THAN CARCINOGENICITY)

CHEMICAL / LEVEL	DOSE / ROUTE	SPECIES / EXPERIMENT LENGTH	TARGET	CRITICAL EFFECT	Subchronic [RfC] (mg/cu m) UF	Subchronic [RfD] (mg/kg/day) UF	Chronic [RfC] (mg/cu m) UF	Chronic [RfD] (mg/kg/day) UF	REFERENCE
ETHYL BENZENE		**000100-41-4**						IRIS	010867
							IRIS		010866
SUBCHRONIC [RfC] COMMENT: CONTACT THE SUPERFUND HEALTH RISK TECHNICAL SUPPORT CENTER: (513) 569-7300.									
SUBCHRONIC [RfD] COMMENT: CONTACT THE SUPERFUND HEALTH RISK TECHNICAL SUPPORT CENTER: (513) 569-7300.									
ETHYL CHLORIDE		**000075-00-3**							
NOAEL 1504 PPM	MOUSE								
INHALATION: INTERMITTENT	10 DAYS		FETUS	DEVELOPMENTAL TOXICITY	1E+1 300		IRIS		010371
SUBCHRONIC [RfC] COMMENT: THE CHRONIC INHALATION RfC WAS ADOPTED AS THE SUBCHRONIC INHALATION [RfC].									
CHRONIC [RfC] COMMENT: BASED ON A DEVELOPMENTAL STUDY WITH EXPOSURES DURING DAYS 6-15 OF GESTATION.									
ETHYL ETHER		**000060-29-7**							
NOAEL 500 MG/KG/DAY	RAT								
ORAL: GAVAGE	90 DAYS		LIVER	EFFECTS		2E+0 300		IRIS	010396
ETHYL METHACRYLATE		**000097-63-2**							
NOEL 7.5 MG/KG/DAY	RAT								
ORAL: DRINKING WATER	2 YEARS		KIDNEY	INCREASED RELATIVE WEIGHT		9E-2 100		9E-2 100	005961
CHRONIC [RfD] COMMENT: CALCULATED FROM METHYL METHACRYLATE DATA BY MULTIPLYING BY THE RATIO OF THE MOLECULAR WEIGHTS (114.5/100.13).									
ETHYL-O-XYLENE, 4-		**000934-80-5**							010472
GENERAL COMMENT: DATA INADEQUATE FOR QUANTITATIVE RISK ASSESSMENT:									

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CHEMICAL / LEVEL	DOSE / ROUTE	SPECIES / EXPERIMENT / LENGTH	TARGET	CRITICAL EFFECT	Subchronic [RfC] (mg/cu m) UF	Subchronic [RfD] (mg/kg/day) UF	Chronic [RfC] (mg/cu m) UF	Chronic [RfD] (mg/kg/day) UF	REFERENCE
ETHYLANILINE, N-		**000103-69-5**							
GENERAL COMMENT: DATA INADEQUATE FOR QUANTITATIVE RISK ASSESSMENT									005958
ETHYLENE CYANOHYDRIN		**000109-78-4**							
NOEL	30 MG/KG/DAY	RAT							
	ORAL: DRINKING WATER	90 DAYS	HEART	DECREASED WEIGHT		3E-1		3E-1	005780
			BRAIN	DECREASED WEIGHT		100		100	
ETHYLENE DIAMINE		**000107-15-3**							
NOAEL	22.6 MG/KG/DAY	RAT							
	ORAL: DIET	3 MONTHS	HEART	DECREASED WEIGHT		2E-1		2E-2	005796
			BLOOD	HEMATOLOGIC CHANGES		100		1000	
							IRIS		010898
CHRONIC RfC COMMENT: THE CHRONIC INHALATION RfC IS CONSIDERED NOT VERIFIABLE (12/18/90) BY THE RfD/RfC WORK GROUP.									
ETHYLENE GLYCOL		**000107-21-1**							
								IRIS	005454
NOEL	200 MG/KG/DAY	RAT							
	ORAL: DIET		FETUS	FETOTOXICITY		2E+0			005452
						100			
SUBCHRONIC [RfD] COMMENT: BASED ON A REPRODUCTION STUDY WITH EXPOSURES DURING DAYS 6-15 OF GESTATION.									
ETHYLENE GLYCOL MONOBUTYL ETHER		**000111-76-2**							
NOAEL	121 MG/CU M	RAT							
	INHALATION: INTERMITTENT	13 WEEKS	BLOOD	ALTERED HEMATOLOGY	2E-1		2E-2		010353
					100		1000		
CHRONIC [RfC] COMMENT: UNDER REVIEW. CURRENT NUMBER SUBJECT TO CHANGE.									

CHEMICAL / LEVEL	DOSE / ROUTE	SPECIES / EXPERIMENT LENGTH	TARGET	CRITICAL EFFECT	Subchronic [RfC] (mg/cu m) / UF	Subchronic [RfD] (mg/kg/day) / UF	Chronic [RfC] (mg/cu m) / UF	Chronic [RfD] (mg/kg/day) / UF	REFERENCE
ETHYLENE THIOUREA	**000096-45-7**								
LOAEL 0.25 MG/KG/DAY	RAT								
ORAL: DIET	24 MONTHS	THYROID	HYPERPLASIA			8E-5 3000		IRIS	010397
SUBCHRONIC [RfD] COMMENT: THE CHRONIC ORAL RfD WAS ADOPTED AS THE SUBCHRONIC ORAL [RfD].									
GENERAL COMMENT: ALSO SEE HEAST TABLE 3: CARCINOGENICITY.									010899
CHRONIC [RfC] COMMENT: THE CHRONIC INHALATION [RfC] IS CONSIDERED NOT VERIFIABLE (08/12/92) BY THE RfD/RfC WORK GROUP.									
ETHYLTOLUENE, M-	**000620-14-4**								
GENERAL COMMENT: DATA INADEQUATE FOR QUANTITATIVE RISK ASSESSMENT									005963
ETHYLTOLUENE, O-	**000611-14-3**								
GENERAL COMMENT: DATA INADEQUATE FOR QUANTITATIVE RISK ASSESSMENT									005962
ETHYLTOLUENE, P-	**000622-96-8**								
GENERAL COMMENT: DATA INADEQUATE FOR QUANTITATIVE RISK ASSESSMENT									005964
FLUORANTHENE	**000206-44-0**								
NOAEL 125 MG/KG/DAY	MOUSE								
ORAL: GAVAGE	90 DAYS	KIDNEY	NEPHROPATHY			4E-1		IRIS	010168
		LIVER	WEIGHT CHANGES			300			
		BLOOD	HEMATOLOGICAL CHANGES						
CHRONIC [RfC] COMMENT: THE CHRONIC INHALATION [RfC] IS CONSIDERED NOT VERIFIABLE (08/04/94) BY THE RfD/RfC WORK GROUP.									010967
FLUORENE	**000086-73-7**								
NOAEL 125 MG/KG/DAY	MOUSE								
ORAL: GAVAGE	13 WEEKS	ERYTHROCYTES	DECREASED COUNTS			4E-1 300		IRIS	010169

CHEMICAL / LEVEL	DOSE / ROUTE	SPECIES / EXPERIMENT LENGTH	TARGET	CRITICAL EFFECT	Subchronic [RfC] (mg/cu m) UF	Subchronic [RfD] (mg/kg/day) UF	Chronic [RfC] (mg/cu m) UF	Chronic [RfD] (mg/kg/day) UF	REFERENCE
FLUORINE / (SOLUBLE FLUORIDE) 007782-41-4									
NOAEL 0.06 MG/KG/DAY	ORAL: DRINKING WATER	HUMAN	TOOTH	FLUOROSIS		6E-2 1		IRIS	005965
FLURIDONE 059756-60-4									
NOEL 200 PPM	ORAL: DIET	RAT 2 YEARS	KIDNEY TESTIS WHOLE BODY ORGANS	GLOMERULONEPHRITIS ATROPHY DECREASED WEIGHT DECREASED WEIGHT		8E-2 100		IRIS	005966
SUBCHRONIC [RfD] COMMENT: THE CHRONIC ORAL RfD WAS ADOPTED AS THE SUBCHRONIC ORAL [RfD].									
FOLPET 000133-07-3									
NOEL 10 MG/KG/DAY	ORAL: CAPSULE	DOG 1 YEAR	WHOLE BODY BLOOD	ALTERED WEIGHT GAIN ALTERED CHEMISTRY		1E-1 100		IRIS	005967
SUBCHRONIC [RfD] COMMENT: THE CHRONIC ORAL RfD WAS ADOPTED AS THE SUBCHRONIC ORAL [RfD]. GENERAL COMMENT: ALSO SEE HEAST TABLE 3: CARCINOGENICITY.									
FORMALDEHYDE 000050-00-0									
NOAEL 15 MG/KG/DAY	ORAL: WATER	RAT 2 YEARS	GASTRO-INTESTINAL TRACT	LESIONS		2E-1 100		IRIS	010398
GENERAL COMMENT: ALSO SEE HEAST TABLE 3: CARCINOGENICITY.									
FORMALDEHYDE CYANOHYDRIN 000107-16-4									
GENERAL COMMENT: DATA INADEQUATE FOR QUANTITATIVE RISK ASSESSMENT									005782

HEAST TABLE 1: SUBCHRONIC AND CHRONIC TOXICITY (OTHER THAN CARCINOGENICITY)

CHEMICAL / LEVEL	DOSE / ROUTE	SPECIES / EXPERIMENT / LENGTH	TARGET	CRITICAL EFFECT	Subchronic [RfC] (mg/cu m) / UF	Subchronic [RfD] (mg/kg/day) / UF	Chronic [RfC] (mg/cu m) / UF	Chronic [RfD] (mg/kg/day) / UF	REFERENCE
FORMIC ACID		**000064-18-6**							
NOAEL 200 MG/KG/DAY	ORAL: WATER	RAT MULTI-GENERATION	WHOLE BODY	DECREASED GROWTH		2E+0 100		2E+0 100	010268
CHRONIC [RfD] COMMENT: BASED ON A MULTI-GENERATION STUDY. WITHDRAWN FROM IRIS (12/01/90). UNDER REVIEW. CURRENT NUMBER SUBJECT TO CHANGE.									
FURAN		**000110-00-9**							
NOAEL 1.4 MG/KG/DAY	ORAL: GAVAGE	MOUSE 13 WEEKS	LIVER	LESIONS		1E-2 100		IRIS	005462
FURFURAL		**000098-01-1**							
LOAEL 7.9 MG/KG/DAY	ORAL: GAVAGE	RAT 13 WEEKS	LIVER	HEPATOTOXICITY		3E-2 300		IRIS	005466
SUBCHRONIC [RfC] COMMENT: ALSO SEE HEAST TABLE 2: ALTERNATE METHODS - SUBCHRONIC AND CHRONIC TOXICITY (OTHER THAN CARCINOGENICITY) CHRONIC [RfC] COMMENT: ALSO SEE HEAST TABLE 2: ALTERNATE METHODS - SUBCHRONIC AND CHRONIC TOXICITY (OTHER THAN CARCINOGENICITY)									
GLYCIDALDEHYDE		**000765-34-4**							
NOAEL 29 MG/CU M	INHALATION: INTERMITTENT	RAT 12 WEEKS	WHOLE BODY KIDNEY	DECREASED WEIGHT EFFECTS	1E-2 300	4E-3 300	1E-3 3000	IRIS	005968
SUBCHRONIC [RfD] COMMENT: BASED ON ROUTE TO ROUTE EXTRAPOLATION USING AN ABSORPTION FACTOR OF 0.5. CHRONIC [RfD] COMMENT: BASED ON ROUTE TO ROUTE EXTRAPOLATION USING AN ABSORPTION FACTOR OF 0.5. GENERAL COMMENT: ALSO SEE HEAST TABLE 3: CARCINOGENICITY.									

CHEMICAL / LEVEL	DOSE / ROUTE	SPECIES / EXPERIMENT / LENGTH	TARGET	CRITICAL EFFECT	Subchronic [RfC] (mg/cu m) / UF	Subchronic [RfD] (mg/kg/day) / UF	Chronic [RfC] (mg/cu m) / UF	Chronic [RfD] (mg/kg/day) / UF	REFERENCE
HEPTACHLOR		**000076-44-8**							
NOEL	0.15 MG/KG/DAY	RAT							
	ORAL: DIET	2 YEARS	LIVER	INCREASED WEIGHT		5E-4 300		IRIS	005506
SUBCHRONIC [RfD] COMMENT: THE CHRONIC ORAL RfD WAS ADOPTED AS THE SUBCHRONIC ORAL [RfD].									
GENERAL COMMENT: ALSO SEE HEAST TABLE 3: CARCINOGENICITY									
HEPTACHLOR EPOXIDE		**001024-57-3**							
LOAEL	0.0125 MG/KG/DAY	DOG							
	ORAL: DIET	60 WEEKS	LIVER	INCREASED RELATIVE WEIGHT		1.3E-5 1000		IRIS	010399
SUBCHRONIC [RfD] COMMENT: THE CHRONIC ORAL RfD WAS ADOPTED AS THE SUBCHRONIC ORAL [RfD].									
GENERAL COMMENT: ALSO SEE HEAST TABLE 3: CARCINOGENICITY.									
HEPTANE, N-		**000142-82-5**							
GENERAL COMMENT: DATA INADEQUATE FOR QUANTITATIVE RISK ASSESSMENT									005969
HEXABROMOBENZENE		**000087-82-1**							
NOAEL	2 MG/KG/DAY	RAT							
	ORAL: DIET	12 WEEKS	LIVER	INDUCED CARBOXYLESTERASE ACTIVITY		2E-2 100		IRIS	005970
HEXACHLOROBENZENE		**000118-74-1**						IRIS	010868
							IRIS		010900
CHRONIC RfC COMMENT: THE CHRONIC INHALATION RfC IS CONSIDERED NOT VERIFIABLE (11/15/90) BY THE RfD/RfC WORK GROUP.									
SUBCHRONIC [RfC] COMMENT: CONTACT THE SUPERFUND HEALTH RISK TECHNICAL SUPPORT CENTER: (513) 569-7300.									
GENERAL COMMENT: ALSO SEE HEAST TABLE 3: CARCINOGENICITY.									

CHEMICAL / LEVEL	DOSE / ROUTE	SPECIES / EXPERIMENT LENGTH	TARGET	CRITICAL EFFECT	Subchronic [RfC] (mg/cu m) / UF	Subchronic [RfD] (mg/kg/day) / UF	Chronic [RfC] (mg/cu m) / UF	Chronic [RfD] (mg/kg/day) / UF	REFERENCE
HEXACHLOROBUTADIENE	**000087-68-3**								
LOAEL 0.5 MG/KG/DAY	ORAL: DIET	MOUSE 13 WEEKS	RENAL TUBULES	REGENERATION				2E-4 1000	010927
CHRONIC [RfD] COMMENT: WITHDRAWN FROM IRIS (05/01/93). UNDER REVIEW. CURRENT NUMBER SUBJECT TO CHANGE. SUBCHRONIC [RfD] COMMENT: CONTACT THE SUPERFUND HEALTH RISK TECHNICAL SUPPORT CENTER: (513) 569-7300.									
HEXACHLOROCYCLOHEXANE, DELTA-	**000319-86-8**								
GENERAL COMMENT: DATA INADEQUATE FOR QUANTITATIVE RISK ASSESSMENT. ALSO SEE HEAST TABLE 3: CARCINOGENICITY.									010495
HEXACHLOROCYCLOHEXANE, EPSILON-	**006108-10-7**								
GENERAL COMMENT: DATA INADEQUATE FOR QUANTITATIVE RISK ASSESSMENT. ALSO SEE HEAST TABLE 3: CARCINOGENICITY.									010496
HEXACHLOROCYCLOHEXANE, GAMMA-	**000058-89-9**								
NOAEL 0.33 MG/KG/DAY	ORAL: DIET	RAT 12 WEEKS	LIVER KIDNEY	TOXICITY TOXICITY		3E-3 100		IRIS	005537
GENERAL COMMENT: ALSO SEE HEAST TABLE 3: CARCINOGENICITY.									010903
CHRONIC [RfC] COMMENT: THE CHRONIC INHALATION [RfC] IS CONSIDERED NOT VERIFIABLE (05/27/92) BY THE RfD/RfC WORK GROUP.									
HEXACHLOROCYCLOPENTADIENE	**000077-47-4**								
NOAEL 7.1 MG/KG/DAY	ORAL	RAT 13 WEEKS	FORESTOMACH	LESIONS		7E-2 100		IRIS	005299
NOAEL 0.15 PPM	INHALATION: INTERMITTENT	RAT 13 WEEKS	NASAL CAVITY	SQUAMOUS METAPLASIA	7E-4 100		7E-5 1000		010445

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CHEMICAL / DOSE LEVEL / ROUTE	SPECIES / EXPERIMENT / LENGTH	TARGET	CRITICAL EFFECT	Subchronic [RfC] (mg/cu m) UF	Subchronic [RfD] (mg/kg/day) UF	Chronic [RfC] (mg/cu m) UF	Chronic [RfD] (mg/kg/day) UF	REFERENCE
HEXACHLOROETHANE **000067-72-1**								
NOAEL 1 MG/KG/DAY ORAL: DIET	RAT 16 WEEKS	KIDNEY	DEGENERATION		1E-2 100		IRIS	005518
GENERAL COMMENT: ALSO SEE HEAST TABLE 3: CARCINOGENICITY.								010904
CHRONIC [RfC] COMMENT: THE CHRONIC INHALATION [RfC] IS CONSIDERED NOT VERIFIABLE (11/05/92), BY THE RfD/RfC WORK GROUP.								
HEXACHLOROPHENE **000070-30-4**								
LOAEL 0.75 MG/KG/DAY ORAL: DIET	DOG 13 WEEKS	NERVOUS SYSTEM	EFFECTS		3E-3 300		IRIS	005972
HEXAMETHYLENE DIAMINE **000124-09-4**								
GENERAL COMMENT: DATA INADEQUATE FOR QUANTITATIVE RISK ASSESSMENT								005973
HEXANE, N- **000110-54-3**								
LOAEL 570 MG/KG/DAY ORAL	RAT	NERVOUS SYSTEM TESTIS	NEUROPATHY ATROPHY		6E-1 1000		6E-2 10000	005974
LOAEL 73 MG/CU M INHALATION: INTERMITTENT	HUMAN	NERVOUS SYSTEM	NEUROTOXICITY	2E-1 300		IRIS		010273
SUBCHRONIC [RfC] COMMENT: THE CHRONIC INHALATION RfC WAS ADOPTED AS THE SUBCHRONIC INHALATION [RfC].								
HEXANONE, 2- **000591-78-6**								
GENERAL COMMENT: DATA INADEQUATE FOR QUANTITATIVE RISK ASSESSMENT								005976

CHEMICAL / LEVEL	DOSE / ROUTE	SPECIES / EXPERIMENT / LENGTH	TARGET	CRITICAL EFFECT	Subchronic [RfC] (mg/cu m) UF	Subchronic [RfD] (mg/kg/day) UF	Chronic [RfC] (mg/cu m) UF	Chronic [RfD] (mg/kg/day) UF	REFERENCE
HYDROGEN SULFIDE		**007783-06-4**							
NOAEL 3.1 MG/KG/DAY	ORAL: FOOD	PIG 105 DAYS	GASTRO-INTESTINAL SYSTEM	DISTURBANCE		3E-2 100		IRIS	010269
NOAEL 42 MG/CU M	INHALATION: INTERMITTENT	MOUSE 13 WEEKS	NASAL MUCOSA	INFLAMMATION	9E-3 100		IRIS		010354
HYDROQUINONE		**000123-31-9**							
NOAEL 4.29 MG/KG/DAY	ORAL	HUMAN 3-5 MONTHS	BLOOD	HEMATOLOGICAL EFFECTS		4E-1 10		4E-2 100	005526
							IRIS		010905
CHRONIC RfC COMMENT: THE CHRONIC INHALATION RfC IS CONSIDERED NOT VERIFIABLE (10/01/90) BY THE RfD/RfC WORK GROUP.									
IRON		**007439-89-6**							005527
GENERAL COMMENT: DATA INADEQUATE FOR QUANTITATIVE RISK ASSESSMENT									
ISOBUTYL ALCOHOL		**000078-83-1**							
NOEL 316 MG/KG/DAY	ORAL: GAVAGE	RAT 13 WEEKS	NERVOUS SYSTEM NERVOUS SYSTEM	HYPOACTIVITY ATAXIA		3E+0 100		IRIS	005977
ISOPHORONE		**000078-59-1**							
NOEL 150 MG/KG/DAY	ORAL: CAPSULE	DOG 90 DAYS	KIDNEY	LESIONS		2E+0 100		IRIS	005910
GENERAL COMMENT: ALSO SEE HEAST TABLE 3: CARCINOGENICITY.									
							IRIS		010906
CHRONIC RfC COMMENT: THE CHRONIC INHALATION RfC IS CONSIDERED NOT VERIFIABLE (11/15/90) BY THE RfD/RfC WORK GROUP.									

CHEMICAL / DOSE LEVEL / DOSE ROUTE	SPECIES / EXPERIMENT LENGTH	TARGET	CRITICAL EFFECT	Subchronic [RfC] (mg/cu m) UF	Subchronic [RfD] (mg/kg/day) UF	Chronic [RfC] (mg/cu m) UF	Chronic [RfD] (mg/kg/day) UF	REFERENCE
ISOPROPALIN 033820-53-0								
NOEL 15 MG/KG/DAY ORAL: DIET	RAT 90 DAYS	BLOOD ORGANS, UNSPECIFIED	HEMATOLIGICAL EFFECTS ALTERED WEIGHTS		1.5E-1 100		IRIS	005978
LACTONITRILE 000078-97-7								
GENERAL COMMENT: DATA INADEQUATE FOR QUANTITATIVE RISK ASSESSMENT								005783
LEAD 007439-92-1								010447
CHRONIC [RfC] COMMENT: REFER TO APPENDIX A: TECHNICAL INFORMATION, SECTION V ON NATIONAL AMBIENT AIR QUALITY STANDARDS. CHRONIC [RfD] COMMENT: REFER TO IRIS GENERAL COMMENT: ALSO SEE HEAST TABLE 3: CARCINOGENICITY.								
LEAD ALKYLS								010448
CHRONIC [RfC] COMMENT: REFER TO APPENDIX A: TECHNICAL INFORMATION. SECTION V ON NATIONAL AMBIENT AIR QUALITY STANDARDS. CHRONIC [RfD] COMMENT: REFER TO IRIS GENERAL COMMENT: DIMETHYLETHYL LEAD; METHYLTRIETHYL LEAD; TETRABUTYL LEAD; TETRAETHYL LEAD; TETRAMETHYL LEAD; TETRAPROPYL LEAD; TRIETHYL LEAD; TRIMETHYL LEAD; TRIMETHYLETHYL LEAD; TRIPROPYL LEAD								
LINURON 000330-55-2								
LOAEL 0.625 MG/KG/DAY ORAL: DIET	DOG 2 YEARS	BLOOD	HEMATOLOGICAL EFFECTS		2E-3 300		IRIS	005990
SUBCHRONIC [RfD] COMMENT: THE CHRONIC ORAL RfD WAS ADOPTED AS THE SUBCHRONIC ORAL [RfD]. GENERAL COMMENT: ALSO SEE HEAST TABLE 3: CARCINOGENICITY.								

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HEAST TABLE 1: SUBCHRONIC AND CHRONIC TOXICITY (OTHER THAN CARCINOGENICITY)

CHEMICAL / LEVEL	DOSE / ROUTE	SPECIES / EXPERIMENT LENGTH	TARGET	CRITICAL EFFECT	Subchronic [RfC] (mg/cu m) / UF	Subchronic [RfD] (mg/kg/day) / UF	Chronic [RfC] (mg/cu m) / UF	Chronic [RfD] (mg/kg/day) / UF	REFERENCE
MALATHION		**000121-75-5**							
NOEL	0.23 MG/KG/DAY	HUMAN				2E-2		IRIS	005991
	ORAL: CAPSULE	47 DAYS	BLOOD	HEMATOLOGICAL EFFECTS		10			
	SUBCHRONIC [RfD] COMMENT: THE CHRONIC ORAL RfD WAS ADOPTED AS THE SUBCHRONIC ORAL [RfD].								
	CHRONIC [RfC] COMMENT: UNDER REVIEW.								
MALEIC ANHYDRIDE		**000108-31-6**							
NOAEL	10 MG/KG/DAY	RAT				1E-1		IRIS	005992
	ORAL: DIET	2 YEARS	KIDNEY	LESIONS		100			
	SUBCHRONIC [RfD] COMMENT: THE CHRONIC ORAL RfD WAS ADOPTED AS THE SUBCHRONIC ORAL [RfD].								
MALEIC HYDRAZIDE		**000123-33-1**							
LOAEL	500 MG/KG/DAY	RAT				5E-1		IRIS	005993
	ORAL: DIET	28 MONTHS	KIDNEY	ALTERED FUNCTION		1000			
	SUBCHRONIC [RfD] COMMENT: THE CHRONIC ORAL RfD WAS ADOPTED AS THE SUBCHRONIC ORAL [RfD].								
MALONONITRILE		**000109-77-3**							
LOAEL	0.21 MG/KG/DAY	RAT				2E-4		2E-5	005994
	ORAL: GAVAGE	120 DAYS	LIVER	EFFECTS		1000		10000	
			SPLEEN	EFFECTS					
MANCOZEB		**008018-01-7**							
NOEL	2.9 MG/KG/DAY	RAT				3E-2		3E-2	005995
	ORAL: DIET	90 WEEKS	THYROID	GOITROGENIC EFFECTS		100		100	

CHEMICAL / LEVEL	DOSE / ROUTE	SPECIES / EXPERIMENT / LENGTH	TARGET	CRITICAL EFFECT	Subchronic [RfC] (mg/cu m) UF	Subchronic [RfD] (mg/kg/day) UF	Chronic [RfC] (mg/cu m) UF	Chronic [RfD] (mg/kg/day) UF	REFERENCE
MANEB		**012427-38-2**							
NOEL	5 MG/KG/DAY ORAL: DIET	MONKEY 6 MONTHS	THYROID	INCREASED WEIGHT		5E-2 100		IRIS	005996
MANGANESE		**007439-96-5**							
NOAEL	0.005 MG/KG/DAY ORAL: DRINKING WATER	HUMAN CHRONIC	CENTRAL NERVOUS SYSTEM	EFFECTS		5E-3 1		IRIS	010850
	SUBCHRONIC [RfD] COMMENT: THE CHRONIC ORAL WATER RfD WAS ADOPTED AS THE SUBCHRONIC ORAL WATER [RfD]. SEE IRIS FOR SPECIFIC DIETARY INFORMATION.								
NOAEL	0.14 MG/KG/DAY ORAL: DIET	HUMAN CHRONIC	CENTRAL NERVOUS SYSTEM	EFFECTS		1.4E-1 1		IRIS	010851
	SUBCHRONIC [RfD] COMMENT: THE CHRONIC ORAL FOOD RfD WAS ADOPTED AS THE SUBCHRONIC ORAL FOOD [RfD]. SEE IRIS FOR SPECIFIC DIETARY INFORMATION.								
	SUBCHRONIC [RfC] COMMENT: A SUBCHRONIC [RfC] HAS NOT BEEN DERIVED FOR MANGANESE.						IRIS		010959
MEPHOSFOLAN		**000950-10-7**							
NOEL	0.09 MG/KG/DAY ORAL: DIET	RAT 17 WEEKS	LIVER KIDNEY BLOOD ERYTHROCYTES BRAIN	ALTERED WEIGHT ALTERED WEIGHT DECREASED CHOLINESTERASE ACTIVITY DECREASED CHOLINESTERASE ACTIVITY DECREASED CHOLINESTERASE ACTIVITY		9E-4 100		9E-5 1000	005997

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HEAST TABLE 1: SUBCHRONIC AND CHRONIC TOXICITY (OTHER THAN CARCINOGENICITY)

CHEMICAL / DOSE LEVEL / DOSE ROUTE	SPECIES / EXPERIMENT / LENGTH	TARGET	CRITICAL EFFECT	Subchronic [RfC] (mg/cu m) / UF	Subchronic [RfD] (mg/kg/day) / UF	Chronic [RfC] (mg/cu m) / UF	Chronic [RfD] (mg/kg/day) / UF	REFERENCE
MERCURIC CHLORIDE	**007487-94-7**							
ORAL: PARENTERAL	RAT	KIDNEY	AUTOIMMUNE EFFECTS		3E-4 1000		IRIS	005800
SUBCHRONIC [RfD] COMMENT: THE CHRONIC ORAL RfD WAS ADOPTED AS THE SUBCHRONIC ORAL [RfD].								
MERCURY, ELEMENTAL	**007439-97-6**							
NOAEL 0.009 MG/CU M INHALATION:	HUMAN	NERVOUS SYSTEM	NEUROTOXICITY	3E-4 30		3E-4 30		010270
CHRONIC [RfC] COMMENT: UNDER REVIEW. CURRENT NUMBER SUBJECT TO CHANGE.								
MERPHOS	**000150-50-5**							
NOEL 0.1 MG/KG/DAY ORAL: CAPSULE	HEN 3 MONTHS	NERVOUS SYSTEM NERVOUS SYSTEM WHOLE BODY	ATAXIA DELAYED NEUROTOXICITY DECREASED WEIGHT		3E-4 300		IRIS	005998
								010907
CHRONIC [RfC] COMMENT: THE CHRONIC INHALATION [RfC] IS CONSIDERED NOT VERIFIABLE (06/25/92) BY THE RfD/RfC WORK GROUP. SUBCHRONIC [RfD] CPMMENT: THE CHRONIC ORAL RfD WAS MODIFIED TO ESTIMATE THE SUBCHRONIC ORAL [RfD].								
MERPHOS OXIDE	**000078-48-8**							
NOEL 0.1 MG/KG/DAY ORAL: CAPSULE	HEN 3 MONTHS	NERVOUS SYSTEM NERVOUS SYSTEM WHOLE BODY	ATAXIA DELAYED NEUROTOXICITY DECREASED WEIGHT		3E-4 300		IRIS	005999
								010908
CHRONIC [RfC] COMMENT: THE CHRONIC INHALATION [RfC] IS CONSIDERED NOT VERIFIABLE (06/25/92) BY THE RfD/RfC WORK GROUP. SUBCHRONIC [RfD] CPMMENT: THE CHRONIC ORAL RfD WAS MODIFIED TO ESTIMATE THE SUBCHRONIC ORAL [RfD].								

CHEMICAL / LEVEL	DOSE / ROUTE	SPECIES / EXPERIMENT LENGTH	TARGET	CRITICAL EFFECT	Subchronic [RfC] (mg/cu m) UF	Subchronic [RfD] (mg/kg/day) UF	Chronic [RfC] (mg/cu m) UF	Chronic [RfD] (mg/kg/day) UF	REFERENCE
METHACRYLONITRILE		**000126-98-7**							
NOAEL 3.2 PPM		DOG							
	INHALATION:	90 DAYS	LIVER	INCREASED SGOT		1E-3		IRIS	005812
	INTERMITTENT		LIVER	INCREASED SGPT		300			
			CENTRAL NERVOUS SYSTEM	LOSS OF HINDLIMB MOTOR CONTROL					
			BRAIN	LESIONS					
METHANOL		**000067-56-1**							
NOEL	500 MG/KG/DAY	RAT							
	ORAL: GAVAGE	90 DAYS	BLOOD	INCREASED ALKALINE PHOSPHATASE		5E+0		IRIS	010271
			BLOOD	INCREASED SGPT		100			
			BRAIN	DECREASED WEIGHT					
METHOMYL		**016752-77-5**							
NOEL	2.5 MG/KG/DAY	DOG							
	ORAL: DIET	24 MONTHS	KIDNEY	LESIONS		2.5E-2		IRIS	005802
						100			

SUBCHRONIC [RfC] COMMENT: ALSO SEE HEAST TABLE 2: ALTERNATE METHODS - SUBCHRONIC AND CHRONIC TOXICITY (OTHER THAN CARCINOGENICITY)
SUBCHRONIC [RfD] COMMENT: BASED ON ROUTE TO ROUTE EXTRAPOLATION.
CHRONIC [RfC] COMMENT: ALSO SEE HEAST TABLE 2: ALTERNATE METHODS - SUBCHRONIC AND CHRONIC TOXICITY (OTHER THAN CARCINOGENICITY)
CHRONIC [RfD] COMMENT: BASED ON ROUTE TO ROUTE EXTRAPOLATION.

SUBCHRONIC [RfD] COMMENT: THE CHRONIC ORAL RfD WAS ADOPTED AS THE SUBCHRONIC ORAL [RfD].

CHEMICAL / LEVEL	DOSE / ROUTE	SPECIES / EXPERIMENT / LENGTH	TARGET	CRITICAL EFFECT	Subchronic [RfC] (mg/cu m) / UF	Subchronic [RfD] (mg/kg/day) / UF	Chronic [RfC] (mg/cu m) / UF	Chronic [RfD] (mg/kg/day) / UF	REFERENCE
METHOXYCHLOR		**000072-43-5**							
NOEL	5.01 MG/KG/DAY	RABBIT							
	ORAL: GAVAGE	13 DAYS	REPRODUCTION	LOSS OF LITTERS		5E-3		IRIS	010357
						1000			
SUBCHRONIC [RfD] COMMENT: THE CHRONIC ORAL RfD WAS ADOPTED AS THE SUBCHRONIC ORAL [RfD].									
							IRIS		010909
CHRONIC RfC COMMENT: THE CHRONIC INHALATION RfC IS CONSIDERED NOT VERIFIABLE (11/07/91) BY THE RfD/RfC WORK GROUP.									
METHOXYETHANOL ACETATE, 2-		**000110-49-6**							010497
CHRONIC [RfD] COMMENT: ALSO SEE HEAST TABLE 2: ALTERNATE METHODS -- SUBCHRONIC AND CHRONIC TOXICITY (OTHER THAN CARCINOGENICITY)									
SUBCHRONIC [RfD] COMMENT: ALSO SEE HEAST TABLE 2: ALTERNATE METHODS -- SUBCHRONIC AND CHRONIC TOXICITY (OTHER THAN CARCINOGENICITY)									
METHOXYETHANOL, 2-		**000109-86-4**							
NOAEL	93 MG/CU M	RABBIT							
	INHALATION: INTERMITTENT	13 WEEKS	TESTICLE	EFFECTS	2E-1		IRIS		010372
					100				
SUBCHRONIC [RfD] COMMENT: ALSO SEE HEAST TABLE 2: ALTERNATE METHODS -- SUBCHRONIC AND CHRONIC TOXICITY (OTHER THAN CARCINOGENICITY).									
CHRONIC [RfD] COMMENT: ALSO SEE HEAST TABLE 2: ALTERNATE METHODS -- SUBCHRONIC AND CHRONIC TOXICITY (OTHER THAN CARCINOGENICITY).									
METHYL ACETATE		**000079-20-9**							
NOEL	1156 MG/KG/DAY	RAT							
	ORAL: GAVAGE	90 DAYS	LIVER	INCREASED ALKALINE PHOSPHATASE	1E+1		1E+0		010002
			LIVER	INCREASED SGPT	100		1000		
CHRONIC [RfD] COMMENT: CALCULATED FROM DATA OBTAINED WITH METHANOL BY MULTIPLYING BY THE MOLECULAR WEIGHT RATIO (74.08/32.04).									

Table 4

Radionuclide Carcinogencity -- Slope Factors (In Units of Picocuries)

JULY 1997

NOTE: To convert radionuclide slope factors into the International System (SI) activity units of becquerels (Bq), multiply each value in Table 4 by 27.03.

Table 4: Radionuclide Carcinogenicity -- Slope Factors[a] JULY 1997
(In Units of Picocuries[b])

Element (Atomic Number)	Isotope[c]	CASRN[d]	Radioactive Half-life[e]		ICRP Lung Class[f]	GI Absorption Factor (f_1)[g]	Slope Factor Lifetime Excess Total Cancer Risk Per Unit Intake or Exposure: Ingestion (Risk/pCi)	Inhalation (Risk/pCi)	External Exposure (Risk/yr per pCi/g soil)
Actinium (89)	Ac-225	014265-85-1	1.00E+01	D	Y	1.00E-03	1.42E-10	4.16E-09	7.81E-09
	Ac-227	014952-40-0	2.18E+01	Y	Y	1.00E-03	3.52E-10	7.08E-08	2.35E-11
	Ac-227+D	014952-40-0(+D)	2.18E+01	Y	Y	1.00E-03	6.26E-10	7.87E-08	5.97E-07
	Ac-228	014331-83-0	6.13E+00	H	Y	1.00E-03	1.62E-12	3.27E-11	3.28E-06
Americium (95)	Am-241	014596-10-2	4.32E+02	Y	W	1.00E-03	3.28E-10	3.85E-08	4.59E-09
	Am-242	013981-54-9	1.60E+01	H	W	1.00E-03	1.47E-12	1.04E-11	5.76E-09
	Am-242m	013981-54-9(m)	1.52E+02	Y	W	1.00E-03	2.92E-10	3.49E-08	8.76E-11
	Am-243	014993-75-0	7.38E+03	Y	W	1.00E-03	3.27E-10	3.82E-08	2.43E-08
	Am-243+D	014993-75-0(+D)	7.38E+03	Y	W	1.00E-03	3.31E-10	3.82E-08	2.66E-07
Antimony (51)	Sb-122	014374-79-9	2.70E+00	D	W	1.00E-01	8.81E-12	5.46E-12	1.61E-06
	Sb-124	014683-10-4	6.02E+01	D	W	1.00E-01	1.07E-11	1.32E-11	7.35E-06
	Sb-125	014234-35-6	2.77E+00	Y	W	1.00E-01	2.97E-12	5.20E-12	1.34E-06
	Sb-125+D	014234-35-6(+D)	2.77E+00	Y	W	1.00E-01	3.54E-12	5.85E-12	1.34E-06
	Sb-126	015756-32-8	1.24E+01	D	W	1.00E-01	9.73E-12	8.41E-12	1.03E-05
	Sb-126m	015756-32-8(m)	1.90E+01	M	W	1.00E-01	7.28E-14	6.43E-14	5.78E-06
	Sb-127	013968-50-8	3.85E+00	D	W	1.00E-01	8.48E-12	6.05E-12	2.40E-06
	Sb-129	014331-88-5	4.40E+00	H	W	1.00E-01	1.86E-12	8.60E-13	5.56E-06
Argon (18)	Ar-41	014163-25-8	1.83E+00	H	*	---	---	4.71E-16	---

[Table 4 continues on the following page: Refer to Endnotes on the last page.]

Table 4: Radionuclide Carcinogenicity -- Slope Factors[a] (In Units of Picocuries[b])

JULY 1997

Element (Atomic Number)	Isotope[c]	CASRN[d]	Radioactive Half-life[e]		ICRP Lung Class[f]	GI Absorption Factor (f_1)[g]	Slope Factor Lifetime Excess Total Cancer Risk Per Unit Intake or Exposure		
							Ingestion (Risk/pCi)	Inhalation (Risk/pCi)	External Exposure (Risk/yr per pCi/g soil)
Astatine (85)	At-217	017239-90-6	3.23E-02	S	D	9.50E-01	8.99E-18	5.14E-16	8.71E-10
Barium (56)	Ba-131	014914-75-1	1.18E+01	D	D	1.00E-01	1.70E-12	4.79E-13	1.27E-06
	Ba-133	013981-41-4	1.05E+01	Y	D	1.00E-01	2.70E-12	4.03E-12	9.15E-07
	Ba-133m	013981-41-4(m)	3.89E+01	H	D	1.00E-01	2.76E-12	5.60E-13	1.00E-07
	Ba-137m	013981-97-0(m)	2.55E+00	M	D	1.00E-01	2.43E-15	1.57E-15	2.21E-06
	Ba-139	014378-25-7	8.31E+01	M	D	1.00E-01	3.04E-13	1.53E-13	8.35E-08
	Ba-140	014798-08-4	1.28E+01	D	D	1.00E-01	1.18E-11	3.17E-12	6.00E-07
Beryllium (4)	Be-7	013966-02-4	5.34E+01	D	Y	5.00E-03	8.64E-14	1.78E-13	1.73E-07
Bismuth (83)	Bi-206	015776-19-9	6.24E+00	D	W	5.00E-02	7.11E-12	5.07E-12	1.20E-05
	Bi-207	013982-38-2	3.34E+01	Y	W	5.00E-02	5.05E-12	9.42E-12	5.49E-06
	Bi-210	014331-79-4	5.01E+00	D	W	5.00E-02	7.29E-12	5.12E-11	0.00E+0
	Bi-211	015229-37-5	2.13E+00	M	W	5.00E-02	1.82E-14	1.74E-12	1.48E-07
	Bi-212	014913-49-6	6.06E+01	M	W	5.00E-02	6.20E-13	3.65E-11	6.67E-07
	Bi-213	015776-20-2	4.57E+01	M	W	5.00E-02	4.40E-13	3.09E-11	4.62E-07
	Bi-214	014733-03-0	1.99E+01	M	W	5.00E-02	1.95E-13	1.46E-11	6.02E-06
Bromine (35)	Br-82	014686-69-2	3.53E+01	H	D	9.50E-01	1.42E-12	7.86E-13	1.01E-05
Cadmium (20)	Cd-109	014109-32-1	4.64E+02	D	Y	5.00E-02	8.01E-12	1.85E-11	5.62E-10
	Cd-115	014336-68-6	5.35E+01	H	Y	5.00E-02	7.29E-12	4.93E-12	7.02E-07

[Table 4 continues on the following page: Refer to Endnotes on the last page.]

Table 4: Radionuclide Carcinogenicity -- Slope Factors[a] JULY 1997
(In Units of Picocuries[b])

Element (Atomic Number)	Isotope[c]	CASRN[d]	Radioactive Half-life[e]		ICRP Lung Class[f]	GI Absorption Factor (f_1)[g]	Slope Factor Lifetime Excess Total Cancer Risk Per Unit Intake or Exposure		
							Ingestion (Risk/pCi)	Inhalation (Risk/pCi)	External Exposure (Risk/yr per pCi/g soil)
	Cd-115m	014336-68-6(m)	4.46E+01	D	Y	5.00E-02	1.42E-11	1.70E-11	8.55E-08
Calcium (20)	Ca-45	013966-05-7	1.63E+02	D	W	3.00E-01	2.02E-12	2.51E-12	3.88E-18
	Ca-47	001439-99-2	4.54E+00	D	W	3.00E-01	6.66E-12	5.22E-12	4.12E-06
Carbon (6)	C-11	014333-33-6	2.05E+01	M	D	9.50E-01	4.49E-14	3.38E-14	3.61E-06
	C-14	014762-75-5	5.73E+03	Y	*	1.00E+00	1.03E-12	6.99E-15	0.00E+0
	C-15	015929-23-4	2.45E+00	S	D	9.50E-01	6.62E-16	8.06E-16	---
Cerium (58)	Ce-141	013967-74-3	3.25E+01	D	Y	3.00E-04	3.91E-12	4.32E-12	1.41E-07
	Ce-143	014119-19-8	3.30E+01	H	Y	3.00E-04	5.91E-12	3.84E-12	7.32E-07
	Ce-144	014762-78-8	2.84E+02	D	Y	3.00E-04	2.96E-11	1.08E-10	2.58E-08
	Ce-144+D	014762-78-8(+D)	2.84E+02	D	Y	3.00E-04	2.97E-11	1.08E-10	1.56E-07
Cesium (55)	Cs-131	014914-76-2	9.69E+00	D	D	9.50E-01	1.80E-13	1.06E-13	2.34E-09
	Cs-134	013967-70-9	2.06E+00	Y	D	9.50E-01	4.73E-11	2.89E-11	5.88E-06
	Cs-134m	013967-70-9(m)	2.90E+00	H	D	9.50E-01	4.54E-14	3.10E-14	1.96E-08
	Cs-135	015726-30-4	2.30E+06	Y	D	9.50E-01	4.53E-12	2.71E-12	0.00E+0
	Cs-136	014234-29-8	1.32E+01	D	D	9.50E-01	7.74E-12	4.65E-12	8.13E-06
	Cs-137	010045-97-3	3.02E+01	Y	D	9.50E-01	3.16E-11	1.91E-11	0.00E+0
	Cs-137+D	010045-97-3(+D)	3.02E+01	Y	D	9.50E-01	3.16E-11	1.91E-11	2.09E-06
	Cs-138	015758-29-9	3.22E+01	M	D	9.50E-01	1.76E-13	1.30E-13	9.45E-06

[Table 4 continues on the following page: Refer to Endnotes on the last page.]

Table 4: Radionuclide Carcinogenicity -- Slope Factors[a] JULY 1997
(In Units of Picocuries[b])

Element (Atomic Number)	Isotope[c]	CASRN[d]	Radioactive Half-life[e]		ICRP Lung Class[f]	GI Absorption Factor (f_1)[g]	Slope Factor Lifetime Excess Total Cancer Risk Per Unit Intake or Exposure		
							Ingestion (Risk/pCi)	Inhalation (Risk/pCi)	External Exposure (Risk/yr per pCi/g soil)
Chlorine (17)	Cl-36	013981-43-6	3.01E+05	Y	D	9.50E-01	2.23E-12	1.30E-12	0.00E+0
	Cl-38	014158-34-0	3.72E+01	M	D	9.50E-01	2.07E-13	1.63E-13	6.47E-06
Chromium (24)	Cr-51	014392-02-0	2.77E+01	D	Y	1.00E-01	1.38E-13	1.74E-13	1.02E-07
Cobalt (27)	Co-57	013981-50-5	2.71E+02	D	Y	3.00E-01	9.71E-13	2.88E-12	2.07E-07
	Co-58	01381-38-9	7.08E+01	D	Y	3.00E-01	2.82E-12	5.17E-12	3.73E-06
	Co-58m	01381-38-9(m)	9.15E+00	H	Y	3.00E-01	9.46E-14	8.90E-14	3.21E-11
	Co-60	010198-40-0	5.27E+00	Y	Y	3.00E-01	1.89E-11	6.88E-11	9.76E-06
Copper (29)	Cu-64	013981-25-4	1.27E+01	H	Y	5.00E-01	5.25E-13	4.18E-13	6.72E-07
Curium (96)	Cm-242	015510-73-3	1.63E+02	D	W	1.00E-03	3.83E-11	3.16E-09	2.34E-11
	Cm-243	015757-87-6	2.85E+01	Y	W	1.00E-03	2.51E-10	2.89E-08	1.71E-07
	Cm-243+D	015757-87-6(+D)	2.85E+01	Y	W	1.00E-03	2.52E-10	2.90E-08	1.72E-07
	Cm-244	013981-15-2	1.81E+01	Y	W	1.00E-03	2.11E-10	2.43E-08	2.07E-11
	Cm-245	015621-76-8	8.50E+03	Y	W	1.00E-03	3.35E-10	3.92E-08	5.51E-08
	Cm-246	015757-90-1	4.75E+03	Y	W	1.00E-03	3.32E-10	3.90E-08	1.81E-11
	Cm-247	015758-32-4	1.56E+07	Y	W	1.00E-03	3.09E-10	3.58E-08	1.03E-06
	Cm-248	015758-33-5	3.39E+05	Y	W	1.00E-03	1.31E-09	1.46E-07	1.47E-11
Dysprosium (66)	Dy-165	013967-64-1	2.33E+00	H	W	3.00E-04	3.26E-13	2.24E-13	6.18E-08
	Dy-166	015840-01-4	8.16E+01	H	W	3.00E-04	9.42E-12	7.82E-12	2.72E-08

SLH

[Table 4 continues on the following page: Refer to Endnotes on the last page.]

Table 4: Radionuclide Carcinogenicity -- Slope Factors[a] JULY 1997
(In Units of Picocuries[b])

Element (Atomic Number)	Isotope[c]	CASRN[d]	Radioactive Half-life[e]		ICRP Lung Class[f]	GI Absorption Factor (f_1)[g]	Slope Factor Lifetime Excess Total Cancer Risk Per Unit Intake or Exposure: Ingestion (Risk/pCi)	Inhalation (Risk/pCi)	External Exposure (Risk/yr per pCi/g soil)
Erbium (63)	Er-169	015840-13-8	9.40E+00	D	W	3.00E-04	2.12E-12	1.51E-12	6.52E-12
	Er-171	014391-45-8	7.52E+00	H	W	3.00E-04	1.63E-12	7.50E-13	1.04E-06
*Europium (63)	Eu-152	014683-23-9	1.36E+01	Y	W	1.00E-03	5.73E-12	7.91E-11	4.08E-06
	Eu-154	015585-10-1	8.80E+00	Y	W	1.00E-03	9.37E-12	9.15E-11	4.65E-06
	Eu-155	014391-16-3	4.96E+00	Y	W	1.00E-03	1.65E-12	9.60E-12	6.08E-08
	Eu-156	014280-35-4	1.52E+01	D	W	1.00E-03	1.09E-11	9.26E-12	5.40E-06
Fluorine (9)	F-18	013981-56-1	1.10E+02	M	D	9.50E-01	1.09E-13	6.54E-14	3.50E-06
Francium (87)	Fr-221	015756-41-9	4.80E+00	M	D	9.50E-01	1.45E-13	8.02E-12	6.74E-08
	Fr-223	015756-98-6	2.18E+00	M	D	9.50E-01	4.46E-13	5.90E-13	4.17E-08
Gadolinium (64)	Gd-153	014276-65-4	2.42E+02	D	W	3.00E-04	1.32E-12	3.20E-12	7.22E-08
	Gd-159	014041-42-0	1.86E+01	H	W	3.00E-04	2.60E-12	1.24E-12	9.59E-08
Gallium (31)	Ga-67	014119-09-6	3.26E+00	D	W	1.00E-03	8.36E-13	5.14E-13	3.61E-07
	Ga-72	013982-22-4	1.41E+01	H	W	1.00E-03	4.77E-12	2.17E-12	1.12E-05
Germanium (32)	Ge-71	014374-81-3	1.18E+01	D	W	9.50E-01	1.18E-14	5.84E-14	1.56E-11
Gold (79)	Au-196	014914-16-0	6.18E+00	D	Y	1.00E-01	1.30E-12	1.04E-12	1.41E-06
	Au-198	010043-49-0	2.70E+00	D	Y	1.00E-01	5.28E-12	3.64E-12	1.37E-06
Holmium (67)	Ho-166	013967-65-2	2.68E+01	H	W	3.00E-04	7.57E-12	4.06E-12	6.96E-08
Hydrogen (1)	H-3	010028-17-8	1.23E+01	Y	V	1.00E+00	7.15E-14	9.59E-14	0.00E+0

[Table 4 continues on the following page: Refer to Endnotes on the last page.]

Table 4: Radionuclide Carcinogenicity -- Slope Factors[a] JULY 1997
(In Units of Picocuries[b])

Element (Atomic Number)	Isotope[c]	CASRN[d]	Radioactive Half-life[e]		ICRP Lung Class[f]	GI Absorption Factor (f_1)[g]	Slope Factor Lifetime Excess Total Cancer Risk Per Unit Intake or Exposure		
							Ingestion (Risk/pCi)	Inhalation (Risk/pCi)	External Exposure (Risk/yr per pCi/g soil)
Indium (49)	In-113m	014885-78-0(m)	1.66E+00	H	W	2.00E-02	8.30E-14	5.77E-14	7.82E-07
	In-114	013981-55-0	7.19E+01	S	W	2.00E-02	4.53E-15	5.81E-15	1.13E-07
	In-114m	013981-55-0(m)	4.95E+01	D	W	2.00E-02	2.06E-11	2.53E-11	2.00E-07
	In-115	014191-71-0	4.60e+15	Y	W	2.00E-02	3.49E-11	2.07E-10	0.00E+0
	In-115m	014191-71-0(m)	4.36E+00	H	W	2.00E-02	3.42E-13	1.75E-13	4.29E-07
Iodine (53)	I-122	018287-75-7	3.62E+00	M	D	9.50E-01	2.16E-14	2.24E-14	3.41E-06
	I-123	015715-08-9	1.31E+01	H	D	9.50E-01	5.42E-13	2.94E-13	2.52E-07
	I-125	014158-31-7	6.01E+01	D	D	9.50E-01	2.58E-11	1.71E-11	2.39E-09
	I-126	014158-32-8	1.29E+01	D	D	9.50E-01	4.82E-11	3.15E-11	1.49E-06
	I-129	015046-84-1	1.57E+07	Y	D	9.50E-01	1.84E-10	1.22E-10	2.69E-09
	I-130	014914-02-4	1.24E+01	H	D	9.50E-01	4.85E-12	2.61E-12	7.93E-06
	I-131	010043-66-0	8.04E+00	D	D	9.50E-01	3.62E-11	2.33E-11	1.25E-06
	I-132	014683-16-0	2.30E+00	H	D	9.50E-01	6.62E-13	3.52E-13	8.75E-06
	I-133	014834-67-4	2.08E+01	H	D	9.50E-01	1.06E-11	6.02E-12	2.20E-06
	I-134	014914-27-3	5.26E+01	M	D	9.50E-01	2.31E-13	1.38E-13	1.02E-05
	I-135	014834-68-5	6.61E+00	H	D	9.50E-01	2.27E-12	1.18E-12	6.23E-06
Iridium (77)	Ir-190	014981-91-0	1.18E+01	D	Y	1.00E-02	4.95E-12	4.49E-12	4.65E-06
	Ir-194	014158-35-1	1.92E+01	H	Y	1.00E-02	7.00E-12	4.18E-12	3.17E-07

LLH

[Table 4 continues on the following page: Refer to Endnotes on the last page.]

Table 4: Radionuclide Carcinogenicity -- Slope Factors[a] JULY 1997
(In Units of Picocuries[b])

Element (Atomic Number)	Isotope[c]	CASRN[d]	Radioactive Half-life[e]		ICRP Lung Class[f]	GI Absorption Factor (f_1)[g]	Slope Factor Lifetime Excess Total Cancer Risk Per Unit Intake or Exposure		
							Ingestion (Risk/pCi)	Inhalation (Risk/pCi)	External Exposure (Risk/yr per pCi/g soil)
Iron (26)	Fe-55	014681-59-5	2.70E+00	Y	W	1.00E-01	3.51E-13	5.60E-13	0.00E+0
	Fe-59	014596-12-4	4.46E+01	D	W	1.00E-01	5.87E-12	7.08E-12	4.63E-06
Krypton (36)	Kr-83m	013965-98-5(m)	1.83E+00	H	*	---	---	3.48E-17	---
	Kr-85	013983-27-2	1.07E+01	Y	*	---	---	2.87E-16	---
	Kr-85m	013983-27-2(m)	4.48E+00	H	*	---	---	2.75E-16	---
	Kr-87	014809-68-8	7.63E+01	M	*	---	---	1.20E-15	---
	Kr-88	014995-61-0	2.84E+00	H	*	---	---	2.20E-15	---
	Kr-89	016316-03-3	3.16E+00	M	*	---	---	1.61E-15	---
	Kr-90	015741-13-6	3.23E+01	S	*	---	---	1.60E-15	---
Lanthanum (57)	La-140	013981-28-7	4.02E+01	H	W	1.00E-03	9.46E-12	5.10E-12	9.11E-06
Lead (82)	Pb-203	014687-25-3	5.20E+01	H	D	2.00E-01	1.03E-12	3.10E-13	6.40E-07
	Pb-209	014119-30-3	3.25E+00	H	D	2.00E-01	2.09E-13	6.85E-14	0.00E+0
	Pb-210	014255-04-0	2.23E+01	Y	D	2.00E-01	6.75E-10	1.67E-09	1.12E-10
	Pb-210+D	014255-04-0(+D)	2.23E+01	Y	D	2.00E-01	1.01E-09	3.86E-09	1.45E-10
	Pb-211	015816-77-0	3.61E+01	M	D	2.00E-01	3.38E-13	1.03E-11	1.85E-07
	Pb-212	015092-94-1	1.06E+01	H	D	2.00E-01	1.80E-11	3.85E-11	3.00E-07
	Pb-214	015067-28-4	2.68E+01	M	D	2.00E-01	2.94E-13	6.23E-12	7.09E-07
Lutetium (71)	Lu-177	014265-75-9	6.71E+00	D	Y	3.00E-04	2.95E-12	2.20E-12	7.22E-08

[Table 4 continues on the following page: Refer to Endnotes on the last page.]

Table 4: Radionuclide Carcinogenicity -- Slope Factors[a] JULY 1997
(In Units of Picocuries[b])

Element (Atomic Number)	Isotope[c]	CASRN[d]	Radioactive Half-life[e]		ICRP Lung Class[f]	GI Absorption Factor (f_1)[g]	Slope Factor Lifetime Excess Total Cancer Risk Per Unit Intake or Exposure		
							Ingestion (Risk/pCi)	Inhalation (Risk/pCi)	External Exposure (Risk/yr per pCi/g soil)
Manganese (25)	Mn-52	014092-99-0	5.59E+00	D	W	1.00E-01	6.01E-12	4.40E-12	1.34E-05
	Mn-54	013966-31-9	3.13E+02	D	W	1.00E-01	1.96E-12	3.69E-12	3.26E-06
	Mn-56	014681-52-8	2.58E+00	H	W	1.00E-01	8.57E-13	5.21E-13	6.95E-06
Mercury (80)	Hg-197	013981-51-6	6.41E+01	H	W	2.00E-02	1.18E-12	6.95E-13	5.47E-08
	Hg-203	013982-78-0	4.66E+01	D	W	2.00E-02	2.64E-12	3.03E-12	6.27E-07
Molybdenum (42)	Mo-99	014119-15-4	6.60E+01	H	Y	8.00E-01	2.27E-12	4.48E-12	5.46E-07
Neodymium (60)	Nd-147	014269-74-0	1.10E+01	D	Y	3.00E-04	5.88E-12	4.84E-12	3.22E-07
	Nd-149	015749-81-2	1.73E+00	H	Y	3.00E-04	4.55E-13	4.22E-13	1.08E-06
Neptunium (93)	Np-236	015700-36-4	1.15E+05	Y	W	1.00E-03	9.31E-13	3.87E-12	9.22E-08
	Np-237	013994-20-2	2.14E+06	Y	W	1.00E-03	2.95E-10	3.45E-08	7.56E-09
	Np-237+D	013994-20-2(+D)	2.14E+06	Y	W	1.00E-03	3.00E-10	3.45E-08	4.62E-07
	Np-238	015766-25-3	2.12E+00	D	W	1.00E-03	4.56E-12	4.68E-12	1.95E-06
	Np-239	013968-59-7	2.36E+00	D	W	1.00E-03	4.27E-12	2.41E-12	2.42E-07
	Np-240	015690-84-3	6.50E+01	M	W	1.00E-03	1.77E-13	1.31E-13	3.65E-06
	Np-240m	015690-84-3(m)	7.40E+00	M	W	1.00E-03	2.42E-14	2.83E-14	1.05E-06
Nickel (28)	Ni-59	014336-70-0	7.50E+04	Y	W	5.00E-02	1.85E-13	4.01E-13	0.00E+0
	Ni-63	013981-37-8	1.00E+02	Y	W	5.00E-02	5.50E-13	1.01E-12	0.00E+0
	Ni-65	014833-49-9	2.52E+00	H	W	5.00E-02	5.62E-13	3.59E-13	2.14E-06

[Table 4 continues on the following page: Refer to Endnotes on the last page.]

Table 4: Radionuclide Carcinogenicity -- Slope Factors[a] JULY 1997
(In Units of Picocuries[b])

Element (Atomic Number)	Isotope[c]	CASRN[d]	Radioactive Half-life[e]		ICRP Lung Class[f]	GI Absorption Factor (f_1)[g]	Slope Factor Lifetime Excess Total Cancer Risk Per Unit Intake or Exposure		
							Ingestion (Risk/pCi)	Inhalation (Risk/pCi)	External Exposure (Risk/yr per pCi/g soil)
Niobium (41)	Nb-93m	007440-03-1(m)	1.46E+01	Y	Y	1.00E-02	6.64E-13	4.33E-12	3.64E-11
	Nb-94	014681-63-1	2.03E+04	Y	Y	1.00E-02	6.91E-12	8.20E-11	6.08E-06
	Nb-95	013967-76-5	3.51E+01	D	Y	1.00E-02	2.25E-12	3.11E-12	2.94E-06
	Nb-95m	013967-76-5(m)	8.66E+01	H	Y	1.00E-02	3.06E-12	2.25E-12	8.71E-08
	Nb-97	018496-04-3	7.21E+01	M	Y	1.00E-02	1.75E-13	2.13E-13	2.49E-06
	Nb-97m	018496-04-3(m)	6.00E+01	S	Y	1.00E-02	3.27E-15	3.34E-15	2.78E-06
Osmium (76)	Os-185	015766-50-4	9.36E+01	D	Y	1.00E-02	1.80E-12	4.62E-12	2.45E-06
	Os-191	014119-24-5	1.54E+01	D	Y	1.00E-02	3.04E-12	2.70E-12	8.74E-08
	Os-191m	014119-24-5(m)	1.30E+01	H	Y	1.00E-02	4.95E-13	3.32E-13	3.22E-09
	Os-193	016057-77-5	3.00E+01	H	Y	1.00E-02	4.36E-12	2.68E-12	1.82E-07
Palladium (46)	Pd-100	015690-69-4	3.64E+00	D	Y	5.00E-03	3.74E-12	3.55E-12	---
	Pd-101	015749-54-9	8.48E+00	H	Y	5.00E-03	3.74E-13	2.29E-13	---
	Pd-103	014967-68-1	1.70E+01	D	Y	5.00E-03	1.05E-12	1.08E-12	5.38E-10
	Pd-107	017637-99-9	6.50E+06	Y	Y	5.00E-03	2.09E-13	1.46E-12	0.00E+0
	Pd-109	014981-64-7	1.35E+01	H	Y	5.00E-03	3.33E-12	1.99E-12	2.43E-09
Phosphorus (15)	P-32	014596-37-3	1.43E+01	D	D	8.00E-01	6.11E-12	2.93E-12	0.00E+0
	P-33	015749-66-3	2.54E+01	D	D	8.00E-01	7.81E-13	3.96E-13	0.00E+0
Platinum (78)	Pt-191	015706-36-2	2.71E+00	D	D	1.00E-02	1.50E-12	4.13E-13	6.74E-07

[Table 4 continues on the following page: Refer to Endnotes on the last page.]

Table 4: Radionuclide Carcinogenicity -- Slope Factors[a] JULY 1997
(In Units of Picocuries[b])

Element (Atomic Number)	Isotope[c]	CASRN[d]	Radioactive Half-life[e]		ICRP Lung Class[f]	GI Absorption Factor (f_1)[g]	Slope Factor Lifetime Excess Total Cancer Risk Per Unit Intake or Exposure: Ingestion (Risk/pCi)	Inhalation (Risk/pCi)	External Exposure (Risk/yr per pCi/g soil)
	Pt-193	015735-70-3	5.00E+01	Y	D	1.00E-02	1.62E-13	7.89E-14	0.00E+0
	Pt-193m	015735-70-3(m)	4.33E+00	D	D	1.00E-02	2.51E-12	5.76E-13	7.44E-09
	Pt-197	015735-74-7	1.83E+01	H	D	1.00E-02	2.12E-12	4.54E-13	3.15E-08
	Pt-197m	015735-74-7(m)	9.44E+01	M	D	1.00E-02	3.25E-13	1.00E-13	1.65E-07
Plutonium (94)	Pu-236	015411-92-4	2.85E+00	Y	Y	1.00E-03	7.68E-11	1.34E-08	2.32E-11
	Pu-238	013981-16-3	8.78E+01	Y	Y	1.00E-03	2.95E-10	2.74E-08	1.94E-11
	Pu-239	015117-48-3	2.41E+04	Y	Y	1.00E-03	3.16E-10	2.78E-08	1.26E-11
	Pu-240	014119-33-6	6.57E+03	Y	Y	1.00E-03	3.15E-10	2.78E-08	1.87E-11
	Pu-241	014119-32-5	1.44E+01	Y	Y	1.00E-03	5.20E-12	2.81E-10	0.00E+0
	Pu-241+D	014119-32-5(+D)	1.44E+01	Y	Y	1.00E-03	3.33E-10	3.88E-08	4.59E-09
	Pu-242	013982-10-0	3.76E+05	Y	Y	1.00E-03	3.00E-10	2.64E-08	1.55E-11
	Pu-243	015706-37-3	4.96E+00	H	Y	1.00E-03	3.69E-13	2.67E-13	1.89E-08
	Pu-244	014119-34-7	8.26E+07	Y	Y	1.00E-03	3.13E-10	2.67E-08	1.29E-11
	Pu-244+D	014119-34-7(+D)	8.26E+07	Y	Y	1.00E-03	3.19E-10	2.67E-08	3.65E-06
Polonium (84)	Po-210	013981-52-7	1.38E+02	D	W	1.00E-01	3.26E-10	2.14E-09	3.30E-11
	Po-212	015389-34-1	2.98E-07	S	W	1.00E-01	4.51E-23	5.93E-21	0.00E+0
	Po-213	015756-57-7	4.20E-06	S	W	1.00E-01	6.70E-22	7.80E-20	1.18E-10
	Po-214	015735-67-8	1.64E-04	S	W	1.00E-01	2.12E-20	2.77E-18	3.23E-10

[Table 4 continues on the following page: Refer to Endnotes on the last page.]

Table 4: Radionuclide Carcinogenicity -- Slope Factors[a] JULY 1997
(In Units of Picocuries[b])

Element (Atomic Number)	Isotope[c]	CASRN[d]	Radioactive Half-life[e]		ICRP Lung Class[f]	GI Absorption Factor (f_1)[g]	Slope Factor Lifetime Excess Total Cancer Risk Per Unit Intake or Exposure		
							Ingestion (Risk/pCi)	Inhalation (Risk/pCi)	External Exposure (Risk/yr per pCi/g soil)
	Po-215	015706-52-2	1.78E-03	S	W	1.00E-01	4.99E-19	4.48E-17	5.11E-10
	Po-216	015756-58-8	1.46E-01	S	W	1.00E-01	8.79E-17	2.95E-15	5.62E-11
	Po-218	015422-24-9	3.05E+00	M	W	1.00E-01	5.08E-14	3.69E-12	0.00E+0
Potassium (19)	K-40	013966-00-2	1.28E+09	Y	D	9.50E-01	1.25E-11	7.46E-12	6.11E-07
	K-42	014378-21-3	1.24E+01	H	D	9.50E-01	1.29E-12	7.56E-13	1.09E-06
Praseodymium (59)	Pr-142	014191-64-1	1.91E+01	H	Y	3.00E-04	6.98E-12	4.16E-12	2.34E-07
	Pr-143	014981-79-4	1.36E+01	D	Y	3.00E-04	6.60E-12	5.60E-12	3.41E-14
	Pr-144	014119-05-2	1.73E+01	M	Y	3.00E-04	8.08E-14	1.31E-13	1.33E-07
	Pr-144m	014119-05-2(m)	7.20E+00	M	Y	3.00E-04	3.23E-14	5.61E-14	1.85E-09
Promethium (61)	Pm-147	014380-75-7	2.62E+00	Y	Y	3.00E-04	1.41E-12	7.49E-12	6.35E-12
	Pm-148	014683-19-3	5.37E+00	D	Y	3.00E-04	1.44E-11	1.05E-11	2.21E-06
	Pm-148m	014683-19-3(m)	4.13E+01	D	Y	3.00E-04	9.93E-12	2.95E-11	7.32E-06
	Pm-149	015765-31-8	5.31E+01	H	Y	3.00E-04	5.52E-12	3.57E-12	3.65E-08
Protactinium (91)	Pa-231	014331-85-2	3.73E+04	Y	Y	1.00E-03	1.49E-10	2.42E-08	2.71E-08
	Pa-233	013981-14-1	2.70E+01	D	Y	1.00E-03	4.69E-12	4.92E-12	4.54E-07
	Pa-234	015100-28-4	6.70E+00	H	Y	1.00E-03	2.13E-12	1.30E-12	6.60E-06
	Pa-234m	015100-28-4(m)	1.17E+00	M	Y	1.00E-03	4.77E-15	6.27E-15	4.05E-08
Radium (88)	Ra-223	015623-45-7	1.14E+01	D	W	2.00E-01	2.34E-10	3.60E-09	2.44E-07

[Table 4 continues on the following page: Refer to Endnotes on the last page.]

Table 4: Radionuclide Carcinogenicity -- Slope Factors[a] JULY 1997
(In Units of Picocuries[b])

Element (Atomic Number)	Isotope[c]	CASRN[d]	Radioactive Half-life[e]		ICRP Lung Class[f]	GI Absorption Factor (f_1)[g]	Slope Factor Lifetime Excess Total Cancer Risk Per Unit Intake or Exposure		
							Ingestion (Risk/pCi)	Inhalation (Risk/pCi)	External Exposure (Risk/yr per pCi/g soil)
	Ra-224	013233-32-4	3.62E+00	D	W	2.00E-01	1.49E-10	2.25E-09	2.48E-08
	Ra-225	013981-53-8	1.48E+01	D	W	2.00E-01	1.57E-10	2.38E-09	1.71E-09
	Ra-226	013982-63-3	1.60E+03	Y	W	2.00E-01	2.95E-10	2.72E-09	1.31E-08
	Ra-226+D	013982-63-3(+D)	1.60E+03	Y	W	2.00E-01	2.96E-10	2.75E-09	6.74E-06
	Ra-228	015262-20-1	5.75E+00	Y	W	2.00E-01	2.46E-10	9.61E-10	0.00E+0
	Ra-228+D	015262-20-1(+D)	5.75E+00	Y	W	2.00E-01	2.48E-10	9.94E-10	3.28E-06
Radon (86)	Rn-219	014835-02-0	3.96E+00	S	*	---	---	6.91E-14	1.72E-07
	Rn-220	022481-48-7	5.56E+01	S	*	---	---	1.92E-13	1.88E-09
	Rn-222+D[1]	014859-67-7(+D)	3.82E+00	D	*	---	---	7.57E-12	---
Rhodium (45)	Rh-103m	007440-16-6(m)	5.61E+01	M	Y	5.00E-02	8.19E-15	1.28E-14	5.85E-11
	Rh-105	014913-89-4	3.54E+01	H	Y	5.00E-02	1.93E-12	1.22E-12	2.49E-07
	Rh-105m	014913-89-4(m)	4.50E+01	S	Y	5.00E-02	1.08E-15	9.25E-16	2.27E-08
	Rh-106	014234-34-5	2.99E+01	S	Y	5.00E-02	3.63E-15	4.62E-15	7.57E-07

[1] To derive the inhalation slope factor for Rn-222+D, EPA's Office of Radiation and Indoor Air (ORIA) uses a slightly different risk model and set of exposure assumptions, including an inhalation rate of 2.2E+04 L/day; 50% equilibrium for decay products; and a risk coefficient of 2.36E-4 cases per working level month (WLM). A more detailed description of ORIA's radon risk assessment methodology is provided in the EPA CRAVE Summary Sheet, *Inhaled Rn-222 and its Short Half-Life Decay Products.*

[Table 4 continues on the following page: Refer to Endnotes on the last page.]

Table 4: Radionuclide Carcinogenicity -- Slope Factors[a] JULY 1997
(In Units of Picocuries[b])

Element (Atomic Number)	Isotope[c]	CASRN[d]	Radioactive Half-life[e]		ICRP Lung Class[f]	GI Absorption Factor (f_1)[g]	Slope Factor Lifetime Excess Total Cancer Risk Per Unit Intake or Exposure: Ingestion (Risk/pCi)	Inhalation (Risk/pCi)	External Exposure (Risk/yr per pCi/g soil)
Rubidium (37)	Rb-82	014391-63-0	1.25E+00	M	D	9.50E-01	1.05E-14	1.17E-14	3.89E-06
	Rb-86	014932-53-7	1.87E+01	D	D	9.50E-01	7.12E-12	4.21E-12	3.71E-07
	Rb-87	013982-13-3	4.73e+10	Y	D	9.50E-01	3.68E-12	2.26E-12	0.00E+0
	Rb-88	014928-36-0	1.78E+01	M	D	9.50E-01	1.46E-13	1.36E-13	2.68E-06
	Rb-89	014191-65-2	1.54E+01	M	D	9.50E-01	8.65E-14	6.92E-14	8.47E-06
Ruthenium (44)	Ru-97	015758-35-7	2.90E+00	D	Y	5.00E-02	5.88E-13	4.09E-13	4.52E-07
	Ru-103	013968-53-1	3.94E+01	D	Y	5.00E-02	3.32E-12	4.59E-12	1.70E-06
	Ru-105	014331-95-4	4.44E+00	H	Y	5.00E-02	1.15E-12	8.02E-13	2.88E-06
	Ru-106	013967-48-1	3.68E+02	D	Y	5.00E-02	3.45E-11	1.15E-10	0.00E+0
	Ru-106+D	013967-48-1(+D)	3.68E+02	D	Y	5.00E-02	3.45E-11	1.15E-10	7.57E-07
Samarium (62)	Sm-147	014392-33-7	1.06e+11	Y	W	3.00E-04	2.51E-11	6.93E-09	0.00E+0
	Sm-151	015715-94-3	9.00E+01	Y	W	3.00E-04	4.60E-13	4.63E-12	2.92E-13
	Sm-153	015766-00-4	4.67E+01	H	W	3.00E-04	4.02E-12	2.18E-12	4.65E-08
Scandium (21)	Sc-46	013967-63-0	8.38E+01	D	Y	1.00E-04	5.73E-12	1.31E-11	7.89E-06
	Sc-47	014391-96-9	3.42E+00	D	Y	1.00E-04	2.95E-12	2.01E-12	2.50E-07
	Sc-48	014391-86-7	4.37E+01	H	Y	1.00E-04	6.65E-12	4.20E-12	1.31E-05
Selenium (34)	Se-75	014265-71-5	1.20E+02	D	W	8.00E-01	6.53E-12	4.92E-12	8.89E-07
Silicon (14)	Si-31	014276-49-4	1.57E+02	M	W	1.00E-02	5.04E-13	3.29E-13	3.45E-09

[Table 4 continues on the following page: Refer to Endnotes on the last page.]

Table 4: Radionuclide Carcinogenicity -- Slope Factors[a] (In Units of Picocuries[b])

JULY 1997

Element (Atomic Number)	Isotope[c]	CASRN[d]	Radioactive Half-life[e]		ICRP Lung Class[f]	GI Absorption Factor (f_1)[g]	Slope Factor Lifetime Excess Total Cancer Risk Per Unit Intake or Exposure		
							Ingestion (Risk/pCi)	Inhalation (Risk/pCi)	External Exposure (Risk/yr per pCi/g soil)
Silver (47)	Ag-105	014928-14-4	4.13E+01	D	Y	5.00E-02	1.63E-12	2.33E-12	---
	Ag-108	014391-65-2	2.37E+00	M	Y	5.00E-02	6.94E-15	9.43E-15	5.78E-08
	Ag-108m	014391-65-2m	1.27E+02	Y	Y	5.00E-02	6.05E-12	7.02E-11	5.61E-06
	Ag-108m+D	014391-65-2m(+D)	1.27E+02	Y	Y	5.00E-02	6.05E-12	7.02E-11	5.62E-06
	Ag-109m	014378-38-2(m)	3.96E+01	S	Y	5.00E-02	2.71E-16	3.46E-16	1.16E-09
	Ag-110	014391-76-5	2.46E+01	S	Y	5.00E-02	2.44E-15	3.16E-15	1.13E-07
	Ag-110m	014391-76-5(m)	2.50E+02	D	Y	5.00E-02	8.43E-12	3.21E-11	1.05E-05
	Ag-111	157690-04-0	7.46E+00	D	Y	5.00E-02	6.83E-12	5.24E-12	8.51E-08
Sodium (11)	Na-22	013966-32-0	2.60E+00	Y	D	9.50E-01	8.02E-12	4.88E-12	8.18E-06
	Na-24	013982-04-2	1.50E+01	H	D	9.50E-01	1.38E-12	7.51E-13	1.77E-05
Strontium (38)	Sr-82	014809-50-8	2.50E+01	D	D	3.00E-01	2.58E-11	8.87E-12	9.00E-11
	Sr-85	013967-73-2	6.48E+01	D	D	3.00E-01	1.40E-12	1.14E-12	1.54E-06
	Sr-85m	013967-73-2(m)	6.77E+01	M	D	3.00E-01	1.80E-14	7.13E-15	5.24E-07
	Sr-89	014158-27-1	5.06E+01	D	D	3.00E-01	1.03E-11	3.68E-12	5.38E-10
	Sr-90	010098-97-2	2.86E+01	Y	D	3.00E-01	4.09E-11	5.94E-11	0.00E+0
	Sr-90+D	010098-97-2(+D)	2.86E+01	Y	D	3.00E-01	5.59E-11	6.93E-11	0.00E+0
	Sr-91	014331-91-0	9.50E+00	H	D	3.00E-01	2.82E-12	7.79E-13	2.67E-06
	Sr-92	014928-29-1	2.71E+00	H	D	3.00E-01	2.03E-12	4.70E-13	5.20E-06

[Table 4 continues on the following page: Refer to Endnotes on the last page.]

Table 4: Radionuclide Carcinogenicity -- Slope Factors[a] JULY 1997
(In Units of Picocuries[b])

Element (Atomic Number)	Isotope[c]	CASRN[d]	Radioactive Half-life[e]		ICRP Lung Class[f]	GI Absorption Factor (f_1)[g]	Slope Factor Lifetime Excess Total Cancer Risk Per Unit Intake or Exposure		
							Ingestion (Risk/pCi)	Inhalation (Risk/pCi)	External Exposure (Risk/yr per pCi/g soil)
Sulfur (16)	S-35	015117-53-0	8.74E+01	D	D	8.00E-01	4.16E-13	1.85E-13	0.00E+0
Tantalum (73)	Ta-182	013982-00-8	1.15E+02	D	Y	1.00E-03	7.03E-12	1.65E-11	4.66E-06
Technetium (43)	Tc-95	014809-56-4	2.00E+01	H	W	8.00E-01	6.81E-14	3.38E-14	2.72E-06
	Tc-95m	014809-56-4(m)	6.10E+01	D	W	8.00E-01	1.24E-12	2.10E-12	2.08E-06
	Tc-96	014808-44-7	4.28E+00	D	W	8.00E-01	2.28E-12	1.94E-12	9.36E-06
	Tc-96m	014808-44-7(m)	5.15E+01	M	W	8.00E-01	2.61E-14	2.26E-14	7.72E-08
	Tc-97	015759-35-0	2.60E+06	Y	W	8.00E-01	1.58E-13	3.44E-13	2.49E-10
	Tc-97m	015759-35-0(m)	8.90E+01	D	W	8.00E-01	1.20E-12	1.96E-12	2.67E-10
	Tc-99	014133-76-7	2.13E+05	Y	W	8.00E-01	1.40E-12	2.89E-12	6.19E-13
	Tc-99m	014133-76-7(m)	6.02E+00	H	W	8.00E-01	5.58E-14	3.49E-14	2.51E-07
Tellurium (52)	Te-125m	014390-73-9(m)	5.80E+01	D	W	2.00E-01	2.51E-12	2.85E-12	2.16E-09
	Te-127	013981-49-2	9.35E+00	H	W	2.00E-01	8.55E-13	4.32E-13	1.62E-08
	Te-127m	013981-49-2(m)	1.09E+02	D	W	2.00E-01	6.01E-12	1.31E-11	7.10E-10
	Te-129	014269-71-7	6.96E+01	M	W	2.00E-01	1.48E-13	1.46E-13	1.46E-07
	Te-129m	014269-71-7(m)	3.36E+01	D	W	2.00E-01	1.17E-11	1.33E-11	6.92E-08
	Te-131	014683-12-6	2.50E+01	M	W	2.00E-01	3.90E-13	2.48E-13	1.35E-06
	Te-131m	014683-12-6(m)	3.00E+01	H	W	2.00E-01	8.81E-12	8.40E-12	5.31E-06
	Te-132	014234-28-7	7.82E+01	H	W	2.00E-01	1.22E-11	8.38E-12	4.31E-07

[Table 4 continues on the following page: Refer to Endnotes on the last page.]

Table 4: Radionuclide Carcinogenicity -- Slope Factors[a] JULY 1997
(In Units of Picocuries[b])

Element (Atomic Number)	Isotope[c]	CASRN[d]	Radioactive Half-life[e]		ICRP Lung Class[f]	GI Absorption Factor (f_1)[g]	Slope Factor Lifetime Excess Total Cancer Risk Per Unit Intake or Exposure: Ingestion (Risk/pCi)	Inhalation (Risk/pCi)	External Exposure (Risk/yr per pCi/g soil)
Terbium (65)	Tb-158	015759-55-4	1.50E+02	Y	W	3.00E-04	4.20E-12	7.04E-11	---
	Tb-160	013981-29-8	7.23E+01	D	W	3.00E-04	7.62E-12	1.14E-11	4.03E-06
Thallium (81)	Tl-202	015720-57-7	1.22E+01	D	D	9.50E-01	1.01E-12	6.07E-13	1.42E-06
	Tl-204	013968-51-9	3.78E+00	Y	D	9.50E-01	1.97E-12	1.15E-12	8.72E-10
	Tl-208	014913-50-9	3.05E+00	M	D	9.50E-01	1.75E-14	1.36E-14	1.45E-05
	Tl-209	015690-73-0	2.20E+00	M	D	9.50E-01	1.40E-14	1.12E-14	7.83E-06
Thorium (90)	Th-227	015623-47-9	1.87E+01	D	Y	2.00E-04	4.04E-11	4.31E-09	1.74E-07
	Th-228	014274-82-9	1.91E+00	Y	Y	2.00E-04	6.29E-11	9.45E-08	5.28E-10
	Th-228+D	014274-82-9(+D)	1.91E+00	Y	Y	2.00E-04	2.31E-10	9.68E-08	9.94E-07
	Th-229	015594-54-4	7.34E+03	Y	Y	2.00E-04	5.65E-11	7.60E-08	5.94E-08
	Th-229+D	015594-54-4(+D)	7.34E+03	Y	Y	2.00E-04	3.56E-10	8.26E-08	5.99E-07
	Th-230	014269-63-7	7.70E+04	Y	Y	2.00E-04	3.75E-11	1.72E-08	4.40E-11
	Th-231	014932-40-2	2.55E+01	H	Y	2.00E-04	1.79E-12	1.10E-12	2.09E-09
	Th-232	007440-29-1	1.41E+10	Y	Y	2.00E-04	3.28E-11	1.93E-08	1.97E-11
	Th-234	015065-10-8	2.41E+01	D	Y	2.00E-04	1.93E-11	1.90E-11	3.50E-09
Thulium (69)	Tm-170	013981-30-1	1.29E+02	D	W	3.00E-04	7.50E-12	1.10E-11	3.84E-09
	Tm-171	014333-45-0	1.92E+00	Y	W	3.00E-04	5.86E-13	1.84E-12	3.15E-10
Tin (50)	Sn-113	013966-06-8	1.15E+02	D	W	2.00E-02	3.72E-12	6.61E-12	2.96E-09

[Table 4 continues on the following page: Refer to Endnotes on the last page.]

Table 4: Radionuclide Carcinogenicity -- Slope Factors[a] JULY 1997
(In Units of Picocuries[b])

Element (Atomic Number)	Isotope[c]	CASRN[d]	Radioactive Half-life[e]		ICRP Lung Class[f]	GI Absorption Factor (f_1)[g]	Slope Factor Lifetime Excess Total Cancer Risk Per Unit Intake or Exposure: Ingestion (Risk/pCi)	Inhalation (Risk/pCi)	External Exposure (Risk/yr per pCi/g soil)
	Sn-121	014683-06-8	2.71E+01	H	W	2.00E-02	1.22E-12	6.13E-13	---
	Sn-121m	014683-06-8(m)	5.55E+01	Y	W	2.00E-02	2.00E-12	7.46E-12	---
	Sn-125	014683-08-0	9.64E+00	D	W	2.00E-02	1.68E-11	1.19E-11	1.21E-06
	Sn-126	015832-50-5	1.00E+05	Y	W	2.00E-02	2.12E-11	4.26E-11	3.32E-08
Tungsten (74)	W-181	015749-46-9	1.21E+02	D	D	3.00E-01	2.72E-13	8.02E-14	2.11E-08
	W-185	014932-41-3	7.51E+01	D	D	3.00E-01	2.04E-12	4.26E-13	5.03E-11
	W-187	014983-48-3	2.38E+01	H	D	3.00E-01	2.46E-12	5.29E-13	1.63E-06
Uranium (92)	U-232	014158-29-3	7.20E+01	Y	Y	5.00E-02	8.12E-11	5.29E-08	3.42E-11
	U-233	013968-55-3	1.59E+05	Y	Y	5.00E-02	4.48E-11	1.41E-08	3.52E-11
	U-234	013966-29-5	2.45E+05	Y	Y	5.00E-02	4.44E-11	1.40E-08	2.14E-11
	U-235	015117-96-1	7.04E+08	Y	Y	5.00E-02	4.52E-11	1.30E-08	2.63E-07
	U-235+D	015117-96-1(+D)	7.04E+08	Y	Y	5.00E-02	4.70E-11	1.30E-08	2.65E-07
	U-236	013982-70-2	2.34E+07	Y	Y	5.00E-02	4.21E-11	1.32E-08	1.72E-11
	U-237	014269-75-1	6.75E+00	D	Y	5.00E-02	3.98E-12	3.12E-12	1.37E-07
	U-238	007440-61-1	4.47E+09	Y	Y	5.00E-02	4.27E-11	1.24E-08	1.50E-11
	U-238+D	007440-61-1(+D)	4.47E+09	Y	Y	5.00E-02	6.20E-11	1.24E-08	5.25E-08
	U-240	015687-53-3	1.41E+01	H	Y	5.00E-02	5.47E-12	3.35E-12	1.09E-10
Vanadium (23)	V-48	014331-97-6	1.60E+01	D	W	1.00E-02	7.56E-12	6.84E-12	1.12E-05

[Table 4 continues on the following page: Refer to Endnotes on the last page.]

Table 4: Radionuclide Carcinogenicity -- Slope Factors[a] (In Units of Picocuries[b])

JULY 1997

Element (Atomic Number)	Isotope[c]	CASRN[d]	Radioactive Half-life[e]		ICRP Lung Class[f]	GI Absorption Factor (f_1)[g]	Slope Factor Lifetime Excess Total Cancer Risk Per Unit Intake or Exposure		
							Ingestion (Risk/pCi)	Inhalation (Risk/pCi)	External Exposure (Risk/yr per pCi/g soil)
Xenon (54)	Xe-122	015151-09-4	2.01E+01	H	*	---	---	3.08E-15	---
	Xe-123	015700-10-4	2.14E+00	H	*	---	---	8.92E-16	---
	Xe-125	013994-18-8	1.68E+01	H	*	---	---	1.20E-15	---
	Xe-127	013994-19-9	3.64E+01	D	*	---	---	4.09E-16	---
	Xe-129m	013965-99-6(m)	8.89E+00	D	*	---	---	5.74E-16	---
	Xe-131m	014683-11-5(m)	1.18E+01	D	*	---	---	4.13E-16	---
	Xe-133	014932-42-4	5.25E+00	D	*	---	---	4.14E-16	---
	Xe-133m	014932-42-4(m)	2.19E+00	D	*	---	---	5.12E-16	---
	Xe-135	014995-62-1	9.11E+00	H	*	---	---	7.45E-16	---
	Xe-135m	014995-62-1(m)	1.54E+01	M	*	---	---	1.88E-16	---
	Xe-137	014835-21-3	3.83E+00	M	*	---	---	1.39E-15	---
	Xe-138	015751-81-2	1.41E+01	M	*	---	---	2.06E-15	---
Yttrium (39)	Y-90	010098-91-6	6.41E+01	H	Y	1.00E-04	1.50E-11	9.90E-12	0.00E+0
	Y-91	014234-24-3	5.85E+01	D	Y	1.00E-04	1.35E-11	1.85E-11	1.41E-08
	Y-91m	014234-24-3(m)	4.97E+01	M	Y	1.00E-04	3.69E-14	2.99E-14	1.90E-06
	Y-92	015751-59-4	3.54E+00	H	Y	1.00E-04	1.95E-12	1.61E-12	9.80E-07
	Y-93	014981-70-5	1.01E+01	H	Y	1.00E-04	5.74E-12	3.48E-12	3.41E-07
Zinc (30)	Zn-65	013982-39-3	2.44E+02	D	Y	5.00E-01	9.93E-12	9.98E-12	2.27E-06

[Table 4 continues on the following page: Refer to Endnotes on the last page.]

Table 4: Radionuclide Carcinogenicity -- Slope Factors[a] JULY 1997
(In Units of Picocuries[b])

Element (Atomic Number)	Isotope[c]	CASRN[d]	Radioactive Half-life[e]		ICRP Lung Class[f]	GI Absorption Factor (f_1)[g]	Slope Factor Lifetime Excess Total Cancer Risk Per Unit Intake or Exposure		
							Ingestion (Risk/pCi)	Inhalation (Risk/pCi)	External Exposure (Risk/yr per pCi/g soil)
	Zn-69	013982-23-5	5.56E+01	M	Y	5.00E-01	6.19E-14	1.04E-13	2.03E-11
	Zn-69m	013982-23-5(m)	1.38E+01	H	Y	5.00E-01	1.52E-12	1.17E-12	1.43E-06
Zirconium (40)	Zr-93	015751-77-6	1.53E+06	Y	W	2.00E-03	5.21E-13	5.26E-12	0.00E+0
	Zr-95	013967-71-0	6.40E+01	D	W	2.00E-03	3.92E-12	6.48E-12	2.81E-06
	Zr-97	014928-30-4	1.69E+01	H	W	2.00E-03	1.04E-11	4.73E-12	6.85E-07

[Table 4 continues on the following page: Refer to Endnotes on the last page.]

Table 4: Radionuclide Carcinogenicity -- Slope Factors[a] (In Units of Picocuries[b)]

JULY 1997

ENDNOTES:

[a] EPA classifies all radionuclides as Group A (known human) carcinogens. Radionuclide slope factors are calculated by EPA's Office of Radiation and Indoor Air (ORIA) to assist HEAST users with risk-related evaluations and decision-making at various stages of the remediation process. Ingestion and inhalation slope factors are central estimates in a linear model of the age-averaged, lifetime attributable radiation cancer incidence (fatal and nonfatal cancer) risk per unit of activity inhaled or ingested, expressed as risk/picocurie (pCi). External exposure slope factors are central estimates of the lifetime attributable radiation cancer incidence risk for each year of exposure to external radiation from photon-emitting radionuclides distributed uniformly in a thick layer of soil, and are expressed as risk/yr per pCi/gram of soil. If required, slope factors in Table 4 can be converted into the International System (SI) units of becquerels (1 Bq = 1 nuclear transformation per second) by dividing each inhalation, ingestion, or external exposure value by 27.03. Users can calculate cancer risks using slope factors expressed in either customary units or SI units with equivalent results, provided that they also use air, water and soil concentration values in the same system of units. For a discussion on the derivation of radionuclide slope factors and guidance on their use, refer to the User's Guide section on radionuclide carcinogenicity.

[b] A curie (Ci), the customary unit of activity, is equal to 3.7×10^{10} nuclear transformations per second. 1 picocurie (pCi) = 10^{12} Ci.

[c] For each radionuclide listed, slope factors correspond to the risks per unit intake or exposure for that radionuclide only, except when marked with a "+D" to indicate that the risks from associated short-lived radioactive decay products (i.e., those decay products with radioactive half-lives less than or equal to 6 months) are also included. Refer to Exhibit 1 in the User's Guide section on radionuclide carcinogenicity for guidance on determining slope factors for partial or complete radioactive decay chains.

[d] Chemical Abstract Service Reference Number (CASRN). For risk calculations involving decay chains, a CASRN should be reported for the parent radionuclide and each chain member.

[e] Radioactive half-life: S = Second, M = Minute, D = Day, Y = Year. For those radionuclides with decay products (+D), half-lives are listed for the parent radionuclide.

[f] Lung clearance classification recommended by the International Commission on Radiological Protection (ICRP): Y = Year, W = Week, D = Day, * = Gas.

[g] Gastrointestinal (GI) absorption factors are the fractional amounts of each radionuclide absorbed across the GI tract into the bloodstream. Lung clearance classifications and GI absorption factors are provided for reference only. Do not use these factors to adjust inhalation or ingestion slope factors. See the User's Guide for instructions.

APPENDIX A: TECHNICAL INFORMATION

I. DATA SOURCES AND SELECTION CRITERIA USED IN HEAST

II. DOSE CONVERSIONS ON HEAST

III. CHEMICAL NAME AND CHEMICAL ABSTRACTS SERVICE REGISTRY NUMBER CROSS REFERENCE

IV. EFFECT LEVEL DEFINITIONS

V. NATIONAL AMBIENT AIR QUALITY STANDARDS (NAAQS)

APPENDIX A-I

I. DATA SOURCES AND SELECTION CRITERIA USED IN HEAST

A. Description of Sources and Documents Cited in HEAST

1. The Integrated Risk Information System (IRIS)

IRIS is an on-line data base developed by the EPA for compilation of risk assessment and regulatory information on chemicals and physical agents. IRIS is the primary communications mechanism for distribution of health hazard assessment information derived by the various intra-Agency Work Groups. The primary intent of IRIS is to provide guidance to EPA personnel in making risk management decisions. An IRIS chemical file contains a Work Group verified summary of the available information on hazard and dose-response assessment for noncarcinogenic and/or carcinogenic effects for that chemical and is not an extensive toxicologic data base. Risk assessment values placed on IRIS are considered Agency consensus and take precedence over differing risk assessment values from other EPA sources. Each file includes referenced citations and EPA contacts for obtaining further information on any specific chemical or agent. The IRIS data base was made available to State and local governments, as well as to the public, in April 1988.

* Questions concerning IRIS: Call RISK INFORMATION HOTLINE at (513) 569-7254

2. EPA Work Groups and the IRIS Pilot:

Risk assessment values for chemicals currently being considered by EPA, but not yet on IRIS, are included in HEAST. In the past the EPA Reference Dose/Reference Concentration (RfD/RfC) and the Carcinogen Risk Assessment Verification Endeavor (CRAVE) Work Groups used to validate Agency systemic toxicity and carcinogen risk assessments, respectively. These Work Groups are now replaced by the IRIS Pilot which will be responsible for resolving any conflicts regarding toxicity values developed by various Program Offices. The IRIS Pilot peer review panels represent different EPA offices and external scientists experienced in issues related to both the qualitative and quantitative risk assessment of carcinogenic and toxic agents. Values verified by this system must undergo extensive peer review and represent an Agency consensus. Verified risk assessment values or changes are entered into the IRIS data base monthly.

* Questions concerning the IRIS Pilot: Call Amy Mills, NCEA Washington at (202) 260-0569.

3. Office of Research and Development (ORD/National Center for Environmental Assessment (NCEA) OSWER-OAQPS (Office of Solid Waste and Emergency Response-Office of Air Quality Planning and Standards) Documents:

A listing of most ORD/NCEA OSWER-OAQPS documents can be found in the Chemical Assessments and Related Activities (CARA) list (available through NTIS) or in the CERI (Center for Environmental Research Information) Office of Research and Development publications list. The CARA is produced by the National Center for Environmental Assessment (NCEA). All OSWER-OAQPS documents are subject to a minimum of internal EPA peer review or a maximum of EPA/Peer Review Workshop/Science Advisory Board and public comments prior to finalization.

* Information on the availability of OSWER-OAQPS documents can be obtained from the following sources:

All Documents:

Technical Information Staff
National Center for Environmental Assessment (RD-689)
U.S. Environmental Protection Agency
401 M Street, S.W.
Washington, D.C. 20460
(202) 260-7345

Published Documents:

Technology Transfer and Support Division, National Risk Management Research Laboratory†
Office of Research and Development
U.S. Environmental Protection Agency
26 W. Martin Luther King Drive
Cincinnati, OH 45268
(513) 569-7562
†Formerly, Center for Environmental Research Information (CERI)

Documents Available Through RCRA/Superfund:

Hotline Number 1-800-424-9346

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Documents Available from NTIS:

National Technical Information Service (NTIS)
5285 Port Royal Road
Springfield, VA 22161
(703) 487-4650

Health Effects Assessments (HEAs): This document series was prepared by the National Center for Environmental Assessment (NCEA-CIN) for the Office of Emergency and Remedial Response (Superfund). HEAs are intended for use by the OERR in evaluating risk for its preliminary assessment process at uncontrolled sites, and for appraising clean-up alternatives in its remedial investigation/feasibility studies. HEAs are brief, quantitatively oriented, preliminary assessment of relevant health effects data. HEAs are subject to internal EPA review by staff within the Office of Health and Environmental Assessment. Final drafts of HEAs become part of the RCRA and Superfund dockets and are available through NTIS. This series has recently been incorporated into the following HEED series.

Health and Environmental Effects Documents (HEEDs): This document series is prepared by the National Center for Environmental Assessment (NCEA-CIN) for the Office of Solid Waste and Emergency Response (OSWER). HEEDs are intended to support listings under the Resource Conservation and Recovery Act (RCRA) as well as to provide health-related limits and goals for emergency and remedial actions under the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA). Within a HEED, both published literature and information within Agency Program Offices are evaluated as they pertain to potential human health, aquatic life and environmental effects of hazardous waste constituents. Quantitative estimates, including reference doses for chronic and subchronic duration for both inhalation and oral exposures, carcinogenic potency factors, unit risk estimates for air and drinking water, and reportable quantities (RQs) based on chronic toxicity and carcinogenicity are determined when sufficient data are available. HEEDs are subject to internal EPA review by staff within the Office of Health and Environmental Assessment and the Office of Pesticides and Toxic Substances. Final drafts of HEEDs become part of the RCRA and Superfund public dockets and are available through NTIS.

Health and Environmental Effects Profiles (HEEPs): This document series was prepared by the National Center for Environmental Assessment (NCEA-CIN) for the Office of Solid Waste and Emergency Response (OSWER). HEEPs have been superseded by HEEDs since mid-FY87. HEEPs are intended to support listings of hazardous constituents of a wide range of waste streams under Section 3001 of the Resource Conservation and Recovery Act (RCRA), as well as to provide health-related limits for emergency actions under Section 010 of the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA). HEEPs are summaries of the

literature concerning health hazards associated with environmental exposures to chemicals or compounds and are very similar to HEEDs as described above. HEEPs were subject to internal EPA review by staff within the Office of Health and Environmental Assessment. HEEPS are part of the RCRA and CERCLA public dockets. Final drafts are available through NTIS.

Air Quality Criteria Documents (AQCDs): This document series is prepared by the National Center for Environmental Assessment (NCEA-RTP) for the Office of Air and Radiation (OAR). AQCDs are intended to support National Ambient Air Quality Standards (NAAQS) set under Sections 108-110 of the Clean Air Act. These documents are evaluations of the available scientific literature on the potential health effects of air pollutants. AQCDs are subject to internal EPA review by staff within the Office of Health and Environmental Assessment and the Office of Air and Radiation. Further review is conducted by the Science Advisory Board/Clean Air Scientific Advisory Committee, and then, these documents are subject to peer review workshops and public comments. The AQCDs are mandated by the Clean Air Act and are revised at 5-year intervals. AQCDs become part of the OAR public docket and final drafts are available through NTIS.

Health Assessment Documents (HADs): This document series is prepared by the National Center for Environmental Assessment (NCEA-RTP and NCEA-CIN) for the Office of Air and Radiation (OAR). HADs are intended for use by the Office of Air Quality Planning and Standards (OAQPS) to determine possible listing of hazardous air pollutants (HAP) under sections 111 and 112 of the Clean Air Act. These documents are evaluations of the available scientific literature on the potential health effects of air pollutants and serve as the scientific data base for establishing relationships between exposure concentrations and potential health risks. HADs are subject to internal EPA review by staff within the Office of Health and Environmental Assessment and the Office of Air and Radiation. Further review is conducted by the Science Advisory Board/Clean Air Scientific Advisory Committee, and then, these documents are subject to peer review workshops and public comments. HADs become part of the OAR public docket and final drafts are available through NTIS.

4. Miscellaneous Documents:

Drinking Water Criteria Documents (DWCDs): The National Center for Environmental Assessment (NCEA-CIN) prepares a portion of this document series for the Office of Water (OW). DWCDs are intended to assist the OW in deriving criteria standards for chemicals in drinking water, as required under Section 412(b)(3)(A) of the Safe Drinking Water Act, as amended in 1986. The DWCDs are comprehensive evaluations of potential health effects, including mechanisms of toxicity, with specific emphasis on data providing dose-response information. DWCDs contain Health Advisories (Has) for 1-day, 10-day and longer-term exposures and drinking water equivalent levels for

lifetime exposures. DWCDs are subject to internal EPA review by staff within the Office of Health and Environmental Assessment and the Office of Water. Selected documents are reviewed by the Science Advisory Board and are subject to peer review workshops and public comments. DWCDs become part of the Safe Drinking Water (SDW) public docket and final drafts are available through NTIS.

B. Selection Criteria and Sources of HEAST Values

Chemicals with derived noncarcinogenic and/or carcinogen risk assessment values that have had some level of peer review (i.e., those in peer reviewed EPA documents or under review by EPA Work Groups) are included in HEAST; this does not include many interim values (values not found in final EPA documents or not being considered by Work Groups) derived for various purposes within Superfund and other Program Offices. In updating the HEAST, the first source that is checked is the Integrated Risk Information System (IRIS) for revised or newly added risk assessment values. Secondly, the status of chemicals under discussion by the RfD/RfC and CRAVE Work Groups is reviewed. The National Center for Environmental Assessment's Chemical Assessments and Related Activities (CARA) list is also reviewed for new Office of Water, Office of Air Quality Planning and Standards, and Office of Solid Waste and Emergency Response risk assessment documents (HEEDs, HEEPs, HEAs, HADs, AQCDs, DWCDs).

The HEAST also contains chemicals commonly found at RCRA (Resource Conservation and Recovery Act) sites as identified by the Office of Solid Waste's Technical Assessment Branch. Questions about RCRA chemicals may be addressed by calling the Health Assessment Section (Office of Solid Waste) at (202) 260-4761. Finally, the Office of Radiation Programs provides data on radionuclides for Table 4 of the HEAST. Radionuclides included are those thought to be most commonly encountered at Superfund sites. Questions concerning radionuclides carcinogenicity should first be addressed by contacting the appropriate Regional Radiation Program Manager. A listing of these managers and several contacts in the Office of Radiation Programs can be found in Exhibit 2 of the User's Guide -Radionuclide Carcinogenicity.

APPENDIX A-II

APPENDIX A-II

II. DOSE CONVERSIONS ON HEAST

In January 1991, the decision was made to replace inhalation Reference Doses (RfDi) for noncancer toxicity and inhalation slope factors for carcinogenicity, previously available on the IRIS data base, with Reference Concentrations (RFC) and inhalation unit risks, respectively. RfCs and unit risks are expressed in terms of concentration in air (mg/m^3), not in terms of "dose" (mg/kg-day) like the RfDs and the oral and inhalation slope factors. This presents a problem for the Superfund program, since the current Hazard Ranking System (HRS) and the Risk Assessment Guidance for superfund (RAGS): Human Health Evaluation manual, Parts A and B were developed using chronic daily intakes and health criteria expressed in units of mg/kg-day.

The decision to replace inhalation slope factors and RfDi values expressed in mg/kg-day with unit risk and RfC values expressed in mg/m_3 was based on two major factors: 1) the workgroups felt that it was technically more accurate to base toxicity values directly on measured air concentrations instead of making the metabolic pharmacokinetic and/or surface area adjustments required to estimate an "internal dose"; and 2) there are compounds that elicit route-of-entry effects (e.g., sensitizers and irritants) where the toxic effect is to the respiratory system or exchange boundary where a measure of "internal dose" might inappropriately imply effects to other organ systems or effects from other exposure routes.

Superfund recognizes the importance of these issues and is actively working with EPA's Office of Research and Development to evaluate the impact of these changes on its program regulations and guidance. In the short term, however, modification of program regulations and guidance is not a viable option. Therefore, the chairs of the RfD/RfC and CRAVE Work Groups were consulted regarding Superfund's need to make the conversion from a concentration in air to dose. There was agreement that, in many cases, converting the air concentration data to a dose (in mg/kg-day) may not add significant uncertainty to the Superfund risk assessment process, and therefore may be a reasonable use of the data given appropriate circumstances and Superfund program objectives.

Generally, the Superfund Health Risk Technical Support Center will be responsible for making all appropriate conversions and the values will be identified with appropriate highlights or footnotes in the Health Effects Assessment Summary Tables (HEAST). Therefore, HEAST users are strongly advised against making such conversions themselves. However, it is a critical responsibility of the risk assessor to consult the original reports cited in the HEAST and to appropriately characterize or caveat the resulting risk estimates derived from these values so that managers are fully informed of their origin and related uncertainties.

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APPENDIX A-III

III. CHEMICAL NAME AND CHEMICAL ABSTRACTS SERVICE REGISTRY NUMBER CROSS REFERENCE

This section lists chemicals and their respective Chemical Abstracts Service Registry Number (CASRN) for cross referencing. Chemicals may be searched either alphabetically by compound name or numerically by the CASRN.

The list has been updated to only include chemicals that are currently documented in this issue of the HEAST.

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CHEMICAL NAME AND CHEMICAL ABSTRACTS SERVICE REGISTRY NUMBER CROSS REFERENCE
(LISTED BY NAME)

July 1997

ACENAPHTHENE	000083-32-9	BENZIDINE	000092-87-5	CHLORAL	000075-87-6
ACENAPTHYLENE	000208-96-8	BENZOIC ACID	000065-85-0	CHLORANIL	000118-75-2
ACEPHATE	030560-19-1	BENZOTRICHLORIDE	000098-07-7	CHLORDANE	000057-74-9
ACETONE	000067-64-1	BENZO[A]ANTHRACENE	000056-55-3	CHLORINE CYANIDE	000506-77-4
ACETONE CYANOHYDRIN	000075-86-5	BENZO[A]PYRENE	000050-32-8	CHLORO-1,3-BUTADIENE, 2- / (CHLOROPRENE)	000126-99-8
ACETONITRILE	000075-05-8	BENZO[K]FLUORANTHENE	000207-08-9		
ACETOPHENONE	000098-86-2	BENZYL ALCOHOL	000100-51-6	CHLORO-2-METHYLANILINE, 4-	000095-69-2
ACROLEIN	000107-02-8	BENZYL CHLORIDE	000100-44-7	CHLORO-2-METHYLANILINE HYDROCHLORIDE, 4-	003165-93-3
ACRYLAMIDE	000079-06-1	BERYLLIUM	007440-41-7		
ACRYLIC ACID	000079-10-7	BIPHENYL, 1,1'	000092-52-4	CHLORO-M-CRESOL, P-	000059-50-7
ACRYLONITRILE	000107-13-1	BIS(2-CHLOROETHYL) ETHER	000111-44-4	CHLOROACETALDEHYDE	000107-20-0
ADIPONITRILE	000111-69-3	BIS(2-CHLOROISOPROPYL) ETHER	039638-32-9	CHLOROACETIC ACID	000079-11-8
ALACHLOR	015972-60-8	BIS(2-CHLORO-1-METHYLETHYL) ETHER	000108-60-1	CHLOROANILINE, 2-	000095-51-2
ALDICARB	000116-06-3	BIS(2-ETHYLHEXYL) PHTHALATE / (DEHP)	000117-81-7	CHLOROANILINE, 3-	000108-42-9
ALDRIN	000309-00-2	BIS(CHLOROMETHYL) ETHER	000542-88-1	CHLOROANILINE, 4-	000106-47-8
ALLIDOCHLOR	000093-71-0	BISPHENOL A	000080-05-7	CHLOROBENZENE	000108-90-7
ALLYL ALCOHOL	000107-18-6	BORON, ELEMENTAL	007440-42-8	CHLOROBENZILATE	000510-15-6
ALLYL CHLORIDE	000107-05-1	BORON TRIFLUORIDE	007637-07-2	CHLOROBENZOIC ACID, P-	000074-11-3
ALUMINUM	007429-90-5	BROMINATED DIBENZO-P-DIOXINS	NO CASRN	CHLOROBENZOTRIFLUORIDE, 4-	000098-56-6
ALUMINUM PHOSPHIDE	020859-73-8	BROMINATED DIBENZOFURANS	NO CASRN	CHLOROBUTANE, 1-	000109-69-3
AMETRYN	000834-12-8	BROMOACETONE	000598-31-2	CHLOROBUTANE, 2-	000078-86-4
AMINO-2-NAPHTHOL, 1-	002834-92-6	BROMOCHLOROETHANES	NO CASRN	CHLOROCYCLOPENTADIENE	041851-50-7
AMINO-2-NAPHTOL HYDROCHLORIDE, 1-	001198-27-2	BROMODICHLOROMETHANE	000075-27-4	CHLOROFORM	000067-66-3
AMINOPHENOL, M-	000591-27-5	BROMOETHENE / (VINYL BROMIDE)	000593-60-2	CHLOROMETHANE / (METHYL CHLORIDE)	000074-87-3
AMINOPHENOL, O-	000095-55-6	BROMOFORM	000075-25-2	CHLOROMETHYL METHYL ETHER	000107-30-2
AMINOPHENOL, P-	000123-30-8	BROMOMETHANE	000074-83-9	CHLORONITROBENZENE, M-	000121-73-3
AMINOPYRIDINE, 4-	000504-24-5	BROMOPHENYL PHENYL ETHER, 4-	000101-55-3	CHLORONITROBENZENE, O-	000088-73-3
AMMONIA	007664-41-7	BROMOPHOS	002104-96-3	CHLORONITROBENZENE, P-	000100-00-5
ANILINE	000062-53-3	BROMOXYNIL	001689-84-5	CHLOROPHENOL, 2-	000095-57-8
ANTHRACENE	000120-12-7	BROMOXYNIL OCTANOATE	001689-99-2	CHLOROPHENOL, 3-	000108-43-0
ANTIMONY, METALLIC	007440-36-0	BUSAN 77	031512-74-0	CHLOROPHENOL, 4-	000106-48-9
ANTIMONY PENTOXIDE	001314-60-9	BUSAN 90	002491-38-5	CHLOROPRENE	000126-99-8
ANTIMONY POTASSIUM TARTRATE	000304-61-0	BUTADIENE, 1,3-	000106-99-0	CHLOROPROPANE, 2-	000075-29-6
ANTIMONY TETROXIDE	001332-81-6	BUTANOL, 1-	000071-36-3	CHLOROTHALONIL	001897-45-6
ANTIMONY TRIOXIDE	001309-64-4	BUTYL BENZYL PHTHALATE, N-	000085-68-7	CHLOROTOLUENE, M-	000108-41-8
ARAMITE	000140-57-8	BUTYLATE	002008-41-5	CHLOROTOLUENE, O-	000095-49-8
AROCLOR 1248	012672-29-6	BUTYLCHLORIDE, T-	000507-20-0	CHLOROTOLUENE, P-	000106-43-4
AROCLOR 1254	011097-69-1	BUTYROLACTONE, GAMMA-	000096-48-0	CHLORPYRIFOS	002921-88-2
ARSENIC, INORGANIC	007440-38-2	CACODYLIC ACID	000075-60-5	CHLORPYRIFOS METHYL	005598-13-0
ASBESTOS	001332-21-4	CADMIUM	007440-43-9	CHLORTHIOPHOS	060238-56-4
ATRAZINE	001912-24-9	CALCIUM CYANIDE	000592-01-8	CHROMIUM(III)	016065-83-1
AZOBENZENE	000103-33-3	CAPROLACTAM	000105-60-2	CHROMIUM(VI)	018540-29-9
BARIUM	007440-39-3	CAPTAFOL	002425-06-1	CHRYSENE	000218-01-9
BARIUM CYANIDE	000542-62-1	CAPTAN	000133-06-2	COKE OVEN EMISSIONS	008007-45-2
BENEFIN	001861-40-1	CARBARYL	000063-25-2	COPPER	007440-50-8
BENZAL CHLORIDE	000098-87-3	CARBAZOLE	000086-74-8	COPPER CYANIDE	000544-92-3
BENZALDEHYDE	000100-52-7	CARBOFURAN	001563-66-2	CREOSOTE, COAL TAR	008001-58-9
BENZALDEHYDE CYANOHYDRIN	000532-28-5	CARBON DISULFIDE	000075-15-0	CRESOL, M- / (3-METHYLPHENOL)	000108-39-4
BENZENE	000071-43-2	CARBON MONOXIDE	000630-05-0	CRESOL, O- / (2-METHYLPHENOL)	000095-48-7
BENZENETHIOL / (THIOPHENOL)	000108-98-5	CARBON TETRACHLORIDE	000056-23-5	CRESOL, P- / (4-METHYLPHENOL)	000106-44-5

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CUMENE	000098-82-8
CYANAZINE	021725-46-2
CYANIDE	000057-12-5
CYANOGEN	000460-19-5
CYANOGEN BROMIDE	000506-68-3
CYCLOATE	001134-23-2
CYCLOHEXANOL	000108-93-0
CYCLOHEXYLAMINE	000108-91-8
CYCLONITE	000121-82-4
CYCLOPENTADIENE	000542-92-7
DACTHAL	001861-32-1
DALAPON	000075-99-0
2,4-DB	000094-82-6
DDD	000072-54-8
DDE	000072-55-9
DDT	000050-29-3
DECABROMODIPHENYL ETHER	001163-19-5
DEHP	000117-81-7
DI-N-OCTYL PHTHALATE	000117-84-0
DIALLATE	002303-16-4
DIAZINON	000333-41-5
DIBENZOFURAN	000132-64-9
DIBENZO[A,H]ANTHRACENE	000053-70-3
DIBROMO-3-CHLOROPROPANE, 1,2	000096-12-8
DIBROMOBENZENE, 1,4-	000106-37-6
DIBROMOCHLOROMETHANE	000124-48-1
DIBROMOETHANE, 1,2-	000106-93-4
DIBUTYL PHTHALATE	000084-74-2
DICAMBA	001918-00-9
DICHLORO-2-BUTENE, 1,4-	000764-41-0
DICHLOROBENZENE, 1,2-	000095-50-1
DICHLOROBENZENE, 1,3-	000541-73-1
DICHLOROBENZENE, 1,4-	000106-46-7
DICHLOROBENZIDINE, 3,3'-	000091-94-1
DICHLOROBUTENES	NO CASRN
DICHLORODIFLUOROMETHANE	000075-71-8
DICHLOROETHANE, 1,1-	000075-34-3
DICHLOROETHYLENE, 1,1-	000075-35-4
DICHLOROETHYLENE, 1,2- (MIXED ISOMERS)	000540-59-0
DICHLOROETHYLENE, 1,2-C-	000156-59-2
DICHLOROETHYLENE, 1,2-T-	000156-60-5
DICHLOROMETHANE	000075-09-2
DICHLOROPHENOL, 2,3-	000576-24-9
DICHLOROPHENOL, 2,4-	000120-83-2
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DICHLOROPHENOL, 3,4-	000095-77-2
DICHLOROPHENOL, 3,5-	000591-35-5
DICHLOROPHENOXY ACETIC ACID, 2,4-	000094-75-7
DICHLOROPHENOXY) BUTYRIC ACID, 4-(2,4- / (2,4-DB)	000094-82-6
DICHLOROPROPANE, 1,1-	000078-99-9
DICHLOROPROPANE, 1,2-	000078-87-5
DICHLOROPROPANE, 1,3-	000142-28-9
DICHLOROPROPANE, 2,2-	000594-20-7
DICHLOROPROPENE, 1,3- / (TELONE II)	000542-75-6
DICHLORPROP	000120-36-5
DICYCLOPENTADIENE	000077-73-6
DIELDRIN	000060-57-1
DIETHYL-P-NITROPHENYL PHOSPHATE	000311-45-5
DIETHYL PHTHALATE	000084-66-2
DIETHYLANILINE, N,N-	000091-66-7
DIETHYLENE GLYCOL MONOBUTYL ETHER	000112-34-5
DIETHYLENE GLYCOL MONOETHYL ETHER	000111-90-0
DIETHYLFORMAMIDE	000617-84-5
DIETHYLHYDRAZINE, 1,2-	001615-80-1
DIETHYLSTILBESTROL	000056-53-1
DIMETHOATE	000060-51-5
DIMETHOXYBENZIDINE, 3,3'-	000119-90-4
DIMETHYLANILINE, 2,4-	000095-68-1
DIMETHYLANILINE HYDROCHLORIDE, 2,4-	021436-96-4
DIMETHYLANILINE, N,N-	000121-69-7
DIMETHYLBENZIDINE, 3,3'-	000119-93-7
DIMETHYLFORMAMIDE, N,N-	000068-12-2
DIMETHYLHYDRAZINE, 1,1-	000057-14-7
DIMETHYLHYDRAZINE, 1,2-	000540-73-8
DIMETHYLPHENOL, 2,3-	000526-75-0
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DIMETHYLPHENOL, 2,5-	000095-87-4
DIMETHYLPHENOL, 2,6-	000576-26-1
DIMETHYLPHENOL, 3,4-	000095-65-8
DIMETHYLPHTHALATE	000131-11-3
DIMETHYLSULFATE	000077-78-1
DIMETHYLTEREPHTHALATE	000120-61-6
DIMETHYLUREA, N,N-	000598-94-7
DINITRO-O-CRESOL, 4,6-	000534-52-1
DINITRO-P-CRESOL, 2,6-	000609-93-8
DINITROBENZENE, 1,2-	000528-29-0
DINITROBENZENE, 1,3-	000099-65-0
DINITROBENZENE, 1,4-	000100-25-4
DINITROPHENOL, 2,3-	000066-56-8
DINITROPHENOL, 2,4-	000051-28-5
DINITROPHENOL, 2,5-	000329-71-5
DINITROPHENOL, 2,6-	000573-56-8
DINITROPHENOL, 3,5-	000586-11-8
DINITROTOLUENE, 2,3-	000602-01-7
DINITROTOLUENE, 2,4	000121-14-2
DINITROTOLUENE, 2,5-	000619-15-8
DINITROTOLUENE, 2,6-	000606-20-2
DINITROTOLUENE, 3,4-	000610-39-9
DINOSEB	000088-85-7
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DIPHENYLAMINE, N,N-	000122-39-4
DIPHENYLHYDRAZINE, 1,2-	000122-66-7
DIPHENYLMETHANE DIISOCYANATE	000101-68-8
DIRECT BLACK 38	001937-37-7
DIRECT BLUE 6	002602-46-2
DIRECT BROWN 95	016071-86-6
DIRECT LIGHTFAST BLUE	004399-55-7
DIRECT SKY BLUE 6B	002610-05-1
DISULFOTON	000298-04-4
ENDOSULFAN	000115-29-7
ENDOTHALL	000145-73-3
ENDRIN	000072-20-8
EPICHLOROHYDRIN	000106-89-8
EPTC	000759-94-4
ETHOPROP	013194-48-4
ETHOXYETHANOL, 2-	000110-80-5
ETHOXYETHANOL ACETATE, 2-	000111-15-9
ETHOXYETHANOL ACRYLATE, 2-	000106-74-1
ETHOXYETHANOL DODECANOATE, 2-	000106-13-8
ETHOXYETHANOL PHOSPHATE, 2-	068554-00-7
ETHOXYETHYL METHACRYLATE, 2-	002370-63-0
ETHYL ACETATE	000141-78-6
ETHYL ACRYLATE	000140-88-5
ETHYL BENZENE	000100-41-4
ETHYL CHLORIDE	000075-00-3
ETHYL ETHER	000060-29-7
ETHYL METHACRYLATE	000097-63-2
ETHYL-O-XYLENE, 4-	000934-80-5
ETHYLANILINE, N-	000103-69-5
ETHYLENE CYANOHYDRIN	000109-78-4
ETHYLENE DIAMINE	000107-15-3
ETHYLENE GLYCOL	000107-21-1
ETHYLENE GLYCOL MONOBUTYL ETHER	000111-76-2
ETHYLENE OXIDE	000075-21-8
ETHYLENE THIOUREA	000096-45-7
ETHYLTOLUENE, M-	000620-14-4
ETHYLTOLUENE, O-	000611-14-3
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FLUORANTHENE	000206-44-0
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FLUORINE / (SOLUBLE FLUORIDE)	007782-41-4
FLURIDONE	059756-60-4
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FORMALDEHYDE CYANOHYDRIN	000107-16-4
FORMIC ACID	000064-18-6
FURAN	000110-00-9
FURAZOLIDONE	000067-45-8
FURFURAL	000098-01-1
FURIUM	000531-82-8
GLYCIDALDEHYDE	000765-34-4
HEPTACHLOR	000076-44-8
HEPTACHLOR EPOXIDE	001024-57-3
HEPTANE, N-	000142-82-5
HEXABROMOBENZENE	000087-82-1
HEXACHLOROBENZENE	000118-74-1
HEXACHLOROBUTADIENE	000087-68-3
HEXACHLOROCYCLOHEXANE, ALPHA-	000319-84-6
HEXACHLOROCYCLOHEXANE, BETA-	000319-85-7
HEXACHLOROCYCLOHEXANE, DELTA-	000319-86-8
HEXACHLOROCYCLOHEXANE, EPSILON-	006108-10-7
HEXACHLOROCYCLOHEXANE, GAMMA-	000058-89-9
HEXACHLOROCYCLOHEXANE-TECHNICAL	000608-73-1
HEXACHLOROCYCLOPENTADIENE	000077-47-4
HEXACHLOROETHANE	000067-72-1
HEXACHLOROPHENE	000070-30-4
HEXAMETHYLENE DIAMINE	000124-09-4
HEXANE, N-	000110-54-3
HEXANONE, 2-	000591-78-6
HYDRAZINE	000302-01-2
HYDRAZINE SULFATE	010034-93-2
HYDROGEN SULFIDE	007783-06-4
HYDROQUINONE	000123-31-9
INDENO[1,2,3-CD]PYRENE	000193-39-5
IRON	007439-89-6
ISOBUTYL ALCOHOL	000078-83-1
ISOPHORONE	000078-59-1
ISOPROPALIN	033820-53-0
LACTONITRILE	000078-97-7
LEAD	007439-92-1
LEAD ALKYLS	NO CASRN
LINURON	000330-55-2
MALATHION	000121-75-5
MALEIC ANHYDRIDE	000108-31-6
MALEIC HYDRAZIDE	000123-33-1
MALONONITRILE	000109-77-3
MANCOZEB	008018-01-7
MANEB	012427-38-2
MANGANESE	007439-96-5
MEPHOSFOLAN	000950-10-7
MERCURIC CHLORIDE	007487-94-7
MERCURY, ELEMENTAL	007439-97-6
MERPHOS	000150-50-5
MERPHOS OXIDE	000078-48-8
METHACRYLONITRILE	000126-98-7
METHANOL	000067-56-1
METHOMYL	016752-77-5
METHOXY-5-NITROANILINE, 2-	000099-59-2
METHOXYCHLOR	000072-43-5
METHOXYETHANOL, 2-	000109-86-4
METHOXYETHANOL ACETATE, 2-	000110-49-6
METHYL-4-CHLOROPHENOXY) BUTYRIC ACID, 4-(2-	000094-81-5
METHYL-4-CHLOROPHENOXY) PROPIONIC ACID, 2-(2-	000093-65-2
METHYL-4-CHLOROPHENOXY ACETIC ACID, 2-	000094-74-6
METHYL-5-NITROANILINE, 2-	000099-55-8
METHYL ACETATE	000079-20-9
METHYL ACRYLATE	000096-33-3
METHYL CHLORIDE	000074-87-3
METHYL CHLOROCARBONATE	000079-22-1
METHYL ETHYL KETONE	000078-93-3
METHYL ETHYL KETONE PEROXIDE	001338-23-4
METHYL HYDRAZINE	000060-34-4
METHYL ISOBUTYL KETONE	000108-10-1
METHYL ISOCYANATE	000624-83-9
METHYL MERCURY	022967-92-6
METHYL METHACRYLATE	000080-62-6
METHYL PARATHION	000298-00-0
METHYL STYRENE (MIXED ISOMERS)	025013-15-4
METHYL STYRENE, ALPHA	000098-83-9
METHYLANILINE, 2-	000095-53-4
METHYLANILINE HYDROCHLORIDE, 2-	000636-21-5
METHYLCYCLOHEXANE	000108-87-2
METHYLENE-BIS(2-CHLOROANILINE), 4,4'-	000101-14-4
METHYLENE-BIS(N,N'-DIMETHYL)ANILINE, 4,4'-	000101-61-1
METHYLENE BROMIDE	000074-95-3
METHYLENE CHLORIDE / (DICHLOROMETHANE)	000075-09-2
METHYLENE-BIS(BENZENEAMINE), 4,4- / (METHYLENE DIANILINE, 4,4-)	000101-77-9
METHYLENEDIPHENYL ISOCYANATE, 4,4- / (DIPHENYLMETHANE DIISOCYANATE)	000101-68-8
2-METHYLLACTONITRILE	000075-86-5
2-METHYLPHENOL	000095-48-7
3-METHYLPHENOL	000108-39-4
4-METHYLPHENOL	000106-44-5
METOLACHLOR	051218-45-2
METRIBUZIN	021087-64-9
MIREX	002385-85-5
MOLINATE	002212-67-1
MOLYBDENUM	007439-98-7
MONOCHLORAMINE	010599-90-3
NAPHTHALENE	000091-20-3
NAPHTHOQUINONE, 1,4-	000130-15-4
NIAGARA BLUE 4B	002429-74-5
NICKEL CYANIDE	000557-19-7
NICKEL, REFINERY DUST	NO CASRN
NICKEL, SOLUBLE SALTS	Various
NICKEL SUBSULFIDE	012035-72-2
NICOTINONITRILE	000100-54-9
NITRIC OXIDE	010102-43-9
NITRITE	014797-65-0
NITROANILINE, 2-	000088-74-4
NITROANILINE, M-	000099-09-2
NITROANILINE, P-	000100-01-6
NITROBENZENE	000098-95-3
NITROFURANTOIN	000067-20-9
NITROFURAZONE	000059-87-0
NITROGEN DIOXIDE	010102-44-0
NITROGEN OXIDES	NO CASRN
NITROMETHANE	000075-52-5
NITROPHENOLS	NO CASRN
NITROPROPANE, 2-	000079-46-9
NITROSO-DI-N-BUTYLAMINE, N-	000924-16-3
NITROSO-DI-N-PROPYLAMINE, N-	000621-64-7
NITROSO-N-ETHYLUREA, N-	000759-73-9
NITROSO-N-METHYLUREA, N-	000684-93-5
NITROSODIETHANOLAMINE, N-	001116-54-7
NITROSODIETHYLAMINE, N-	000055-18-5
NITROSODIMETHYLAMINE, N-	000062-75-9
NITROSODIPHENYLAMINE, P-	000156-10-5
NITROSODIPHENYLAMINE, N-	000086-30-6
NITROSOMETHYLETHYLAMINE, N-	010595-95-6
NITROSOMETHYLVINYLAMINE, N	004549-40-0
NITROSOPYRROLIDINE, N-	000930-55-2
NITROTOLUENE, M-	000099-08-1
NITROTOLUENE, O-	000088-72-2
NITROTOLUENE, P-	000099-99-0
OCTABROMODIPHENYL ETHER	032536-52-0
OCTAMETHYLPYROPHOSPHORAMIDE	000152-16-9
OSMIUM TETROXIDE	020816-12-0
OZONE	010028-15-6
PARALDEHYDE	000123-63-7
PARATHION	000056-38-2
PARTICULATE MATTER	NO CASRN
PEBULATE	001114-71-2

PENDIMETHALIN	040487-42-1
PENTABROMO-6-CHLOROCYCLOHEXANE, 1,2,3,4,5-	000087-84-3
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PENTACHLOROBENZENE	000608-93-5
PENTACHLOROCYCLOPENTADIENE	025329-35-5
PENTACHLORONITROBENZENE	000082-68-8
PENTACHLOROPHENOL	000087-86-5
PENTACHLOROPROPENE, 1,1,2,3,3,-	001600-37-9
PENTANE, N-	000109-66-0
PHENANTHRENE	000085-01-8
PHENOL	000108-95-2
PHENYLENEDIAMINE, M-	000108-45-2
PHENYLENEDIAMINE, O-	000095-54-5
PHENYLENEDIAMINE, P-	000106-50-3
PHENYLMERCURIC ACETATE	000062-38-4
PHENYLPHENOL, 2-	000090-43-7
PHORATE	000298-02-2
PHOSGENE	000075-44-5
PHOSPHINE	007803-51-2
PHOSPHORUS, WHITE	007723-14-0
PHOTOCHEMICAL OXIDANTS	NO CASRN
PHTHALIC ACID, M-	000121-91-5
PHTHALIC ACID, O-	000088-99-3
PHTHALIC ACID, P-	000100-21-0
PHTHALIC ANHYDRIDE	000085-44-9
POLYBROMINATED BIPHENYLS	NO CASRN
POLYCHLORINATED BIPHENYLS	001336-36-3
POTASSIUM CYANIDE	000151-50-8
POTASSIUM SILVER CYANIDE	000506-61-6
PROFLURALIN	026399-36-0
PRONAMIDE	023950-58-5
PROPACHLOR	001918-16-7
PROPAZINE	000139-40-2
PROPIONITRILE	000107-12-0
PROPYL ALCOHOL, N-	000071-23-8
PROPYLENE GLYCOL	000057-55-6
PROPYLENE GLYCOL MONOETHYL ETHER	001569-02-4
PROPYLENE GLYCOL MONOMETHYL ETHER	000107-98-2
PROPYLENE OXIDE	000075-56-9
PYRENE	000129-00-0
PYRIDINE	000110-86-1
QUINOLINE	000091-22-5
RDX / (CYCLONITE)	000121-82-4
RONNEL	000299-84-3
SELENIOUS ACID	007783-00-8
SELENIUM	007782-49-2
SELENIUM SULFIDE	007446-34-6
SELENOUREA	000630-10-4
SILVER	007440-22-4
SILVER CYANIDE	000506-64-9
SIMAZINE	000122-34-9
SODIUM CYANIDE	000143-33-9
SODIUM DIETHYLDITHIOCARBAMATE	000148-18-5
SODIUM METAVANADATE	013718-26-8
STIROPHOS	000961-11-5
STRONTIUM, STABLE	007440-24-6
STRYCHNINE	000057-24-9
STYRENE	000100-42-5
SUCCINONITRILE	000110-61-2
SULFUR DIOXIDE	007446-09-5
SULFUR OXIDES	NO CASRN
SULFURIC ACID	007664-93-9
TCDD, 2,3,7,8-	001746-01-6
TELONE II	000542-75-6
TEMEPHOS	003383-96-8
TERBUFOS	013071-79-9
TEREPHTHALIC ACID	000100-21-0
TETRACHLOROAZOXYBENZENE	021232-47-3
TETRACHLOROBENZENE, 1,2,4,5-	000095-94-3
TETRACHLOROCYCLOPENTADIENE	000695-77-2
TETRACHLOROETHANE, 1,1,1,2-	000630-20-6
TETRACHLOROETHANE, 1,1,2,2-	000079-34-5
TETRACHLOROETHYLENE	000127-18-4
TETRACHLOROHYDRAZOBENZENE	071753-42-9
TETRACHLOROPHENOL, 2,3,4,5-	004901-51-3
TETRACHLOROPHENOL, 2,3,4,6-	000058-90-2
TETRACHLOROPHENOL, 2,3,5,6-	000935-95-5
TETRACHLOROPROPENE, 1,1,2,3-	010436-39-2
TETRACHLOROTOLUENE, PARA, ALPHA, ALPHA, ALPHA-	005216-25-1
TETRACHLOROVINPHOS / (STIROPHOS)	000961-11-5
TETRAETHYL DITHIOPYROPHOSPHATE	003689-24-5
THALLIC OXIDE	001314-32-5
THALLIUM (I) ACETATE	000563-68-8
THALLIUM (I) CARBONATE	006533-73-9
THALLIUM (I) CHLORIDE	007791-12-0
THALLIUM, INSOLUBLE SALTS	NO CASRN
THALLIUM (I) NITRATE	010102-45-1
THALLIUM SELENITE	012039-52-0
THALLIUM (I) SULFATE	007446-18-6
THIOCYANOMETHYLTHIO)BENZOTHIAZOLE, 2-(	021564-17-0
THIOFANOX	013196-18-4
THIOPHENOL	000108-98-5
THIRAM	000137-26-8
TIN AND COMPOUNDS	NO CASRN
TOLUENE	000108-88-3
TOLUENE-2,4-DIAMINE	000095-80-7
TOLUENE-2,5-DIAMINE	000095-70-5
TOLUENE-2,6-DIAMINE	000823-40-5
TOLUENEDIAMINE, 2,3-	002687-25-4
TOLUENEDIAMINE, 3,4-	000496-72-0
TOLUIDINE, M-	000108-44-1
TOLUIDINE, P-	000106-49-0
TOXAPHENE	008001-35-2
TRIALLATE	002303-17-5
TRIBROMOBENZENE, 1,2,4-	000615-54-3
TRICHLORO-1,2,2-TRIFLUOROETHANE, 1,1,2-	000076-13-1
TRICHLORO-2'-HYDROXYDIPHENYLETHER, 2,2,4'-	003380-34-5
TRICHLOROANILINE, 2,4,6-	000634-93-5
TRICHLOROANILINE HYDROCHLORIDE, 2,4,6-	033663-50-2
TRICHLOROBENZENE, 1,2,4-	000120-82-1
TRICHLOROCYCLOPENTADIENE	077323-84-3
TRICHLOROETHANE, 1,1,1-	000071-55-6
TRICHLOROETHANE, 1,1,2-	000079-00-5
TRICHLOROETHYLENE	000079-01-6
TRICHLOROFLUOROMETHANE	000075-69-4
TRICHLOROPHENOL, 2,3,4-	015950-66-0
TRICHLOROPHENOL, 2,3,5-	000933-78-8
TRICHLOROPHENOL, 2,3,6-	000933-75-5
TRICHLOROPHENOL, 2,4,5-	000095-95-4
TRICHLOROPHENOL, 2,4,6-	000088-06-2
TRICHLOROPHENOL, 3,4,5-	000609-19-8
TRICHLOROPHENOXY) PROPIONIC ACID, 2(2,4,5-	000093-72-1
TRICHLOROPHENOXY ACETIC ACID, 2,4,5-	000093-76-5
TRICHLOROPROPANE, 1,1,1-	007789-89-1
TRICHLOROPROPANE, 1,1,2-	000598-77-6
TRICHLOROPROPANE, 1,2,2-	003175-23-3
TRICHLOROPROPANE, 1,2,3-	000096-18-4
TRICHLOROPROPENE, 1,2,3-	000096-19-5
TRICHLOROTOLUENE, 2,3,6-	002077-46-5
TRICHLOROTOLUENE, ALPHA,2,6-	002014-83-7
TRIFLURALIN	001582-09-8
TRIMETHYL PHOSPHATE	000512-56-1
TRIMETHYLBENZENES	NO CASRN
TRINITROBENZENE, 1,3,5-	000099-35-4
TRINITROPHENOLS	NO CASRN
TRINITROPHENYLMETHYLNITRAMINE	000479-45-8

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TRINITROTOLUENE, 2,4,6-	000118-96-7
VANADIUM	007440-62-2
VANADIUM PENTOXIDE	001314-62-1
VANADIUM SULFATE	036907-42-3
VERNAM / (VERNOLATE)	001929-77-7
VERNOLATE	001929-77-7
VINYL-1-CYCLOHEXENE, 4-	000100-40-3
VINYL ACETATE	000108-05-4
VINYL BROMIDE	000593-60-2
VINYL CHLORIDE	000075-01-4
WARFARIN	000081-81-2
XYLENE, M-	000108-38-3
XYLENE, MIXTURE	001330-20-7
XYLENE, O-	000095-47-6
XYLENE, P-	000106-42-3
ZINC (METALLIC)	007440-66-6
ZINC CYANIDE	000557-21-1
ZINC PHOSPHIDE	001314-84-7
ZINEB	012122-67-7

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000050-00-0 FORMALDEHYDE
000050-29-3 DDT
000050-32-8 BENZO[A]PYRENE
000051-28-5 DINITROPHENOL, 2,4-
000053-70-3 DIBENZO[A,H]ANTHRACENE
000055-18-5 NITROSODIETHYLAMINE, N-
000056-23-5 CARBON TETRACHLORIDE
000056-38-2 PARATHION
000056-53-1 DIETHYLSTILBESTROL
000056-55-3 BENZO[A]ANTHRACENE
000057-12-5 CYANIDE
000057-14-7 DIMETHYLHYDRAZINE, 1,1-
000057-24-9 STRYCHNINE
000057-55-6 PROPYLENE GLYCOL
000057-74-9 CHLORDANE
000058-89-9 HEXACHLOROCYCLOHEXANE, GAMMA-
000058-90-2 TETRACHLOROPHENOL, 2,3,4,6-
000059-50-7 CHLORO-M-CRESOL, P-
000059-87-0 NITROFURAZONE
000060-29-7 ETHYL ETHER
000060-34-4 METHYL HYDRAZINE
000060-51-5 DIMETHOATE
000060-57-1 DIELDRIN
000062-38-4 PHENYLMERCURIC ACETATE
000062-53-3 ANILINE
000062-75-9 NITROSODIMETHYLAMINE, N-
000063-25-2 CARBARYL
000064-18-6 FORMIC ACID
000065-85-0 BENZOIC ACID
000066-56-8 DINITROPHENOL, 2,3-
000067-20-9 NITROFURANTOIN
000067-45-8 FURAZOLIDONE
000067-56-1 METHANOL
000067-64-1 ACETONE
000067-66-3 CHLOROFORM
000067-72-1 HEXACHLOROETHANE
000068-12-2 DIMETHYLFORMAMIDE, N,N-
000070-30-4 HEXACHLOROPHENE
000071-23-8 PROPYL ALCOHOL, N-
000071-36-3 BUTANOL, 1-
000071-43-2 BENZENE
000071-55-6 TRICHLOROETHANE, 1,1,1-
000072-20-8 ENDRIN
000072-43-5 METHOXYCHLOR
000072-54-8 DDD
000072-55-9 DDE
000074-11-3 CHLOROBENZOIC ACID, P-
000074-83-9 BROMOMETHANE
000074-87-3 METHYL CHLORIDE
000074-87-3 CHLOROMETHANE
000074-95-3 METHYLENE BROMIDE
000075-00-3 ETHYL CHLORIDE
000075-01-4 VINYL CHLORIDE
000075-05-8 ACETONITRILE
000075-09-2 METHYLENE CHLORIDE
000075-09-2 DICHLOROMETHANE
000075-15-0 CARBON DISULFIDE
000075-21-8 ETHYLENE OXIDE
000075-25-2 BROMOFORM
000075-27-4 BROMODICHLOROMETHANE
000075-29-6 CHLOROPROPANE, 2-
000075-34-3 DICHLOROETHANE, 1,1-
000075-35-4 DICHLOROETHYLENE, 1,1-
000075-44-5 PHOSGENE
000075-52-5 NITROMETHANE
000075-56-9 PROPYLENE OXIDE
000075-60-5 CACODYLIC ACID
000075-69-4 TRICHLOROFLUOROMETHANE
000075-71-8 DICHLORODIFLUOROMETHANE
000075-86-5 2-METHYLLACTONITRILE
000075-86-5 ACETONE CYANOHYDRIN
000075-87-6 CHLORAL
000075-99-0 DALAPON
000076-13-1 TRICHLORO-1,2,2-TRIFLUOROETHANE, 1,1,2-
000076-44-8 HEPTACHLOR
000077-47-4 HEXACHLOROCYCLOPENTADIENE
000077-73-6 DICYCLOPENTADIENE
000077-78-1 DIMETHYLSULFATE
000078-48-8 MERPHOS OXIDE
000078-59-1 ISOPHORONE
000078-83-1 ISOBUTYL ALCOHOL
000078-86-4 CHLOROBUTANE, 2-
000078-87-5 DICHLOROPROPANE, 1,2-
000078-93-3 METHYL ETHYL KETONE
000078-97-7 LACTONITRILE
000078-99-9 DICHLOROPROPANE, 1,1-
000079-00-5 TRICHLOROETHANE, 1,1,2-
000079-01-6 TRICHLOROETHYLENE
000079-06-1 ACRYLAMIDE
000079-10-7 ACRYLIC ACID
000079-11-8 CHLOROACETIC ACID
000079-20-9 METHYL ACETATE
000079-22-1 METHYL CHLOROCARBONATE
000079-34-5 TETRACHLOROETHANE, 1,1,2,2-
000079-46-9 NITROPROPANE, 2-
000080-05-7 BISPHENOL A
000080-62-6 METHYL METHACRYLATE
000081-81-2 WARFARIN
000082-68-8 PENTACHLORONITROBENZENE
000083-32-9 ACENAPHTHENE
000084-66-2 DIETHYL PHTHALATE
000084-74-2 DIBUTYL PHTHALATE
000085-01-8 PHENANTHRENE
000085-44-9 PHTHALIC ANHYDRIDE
000085-68-7 BUTYL BENZYL PHTHALATE, N-
000086-30-6 NITROSODIPHENYLAMINE, N-
000086-73-7 FLUORENE
000086-74-8 CARBAZOLE
000087-65-0 DICHLOROPHENOL, 2,6-
000087-68-3 HEXACHLOROBUTADIENE
000087-82-1 HEXABROMOBENZENE
000087-84-3 PENTABROMO-6-CHLOROCYCLOHEXANE, 1,2,3,4,5-
000087-86-5 PENTACHLOROPHENOL
000088-06-2 TRICHLOROPHENOL, 2,4,6-
000088-72-2 NITROTOLUENE, O-
000088-73-3 CHLORONITROBENZENE, O-
000088-74-4 NITROANILINE, 2-
000088-85-7 DINOSEB
000088-99-3 PHTHALIC ACID, O-
000090-43-7 PHENYLPHENOL, 2-
000091-20-3 NAPHTHALENE
000091-22-5 QUINOLINE
000091-66-7 DIETHYLANILINE, N,N-
000091-94-1 DICHLOROBENZIDINE, 3,3'-
000092-52-4 BIPHENYL, 1,1'
000092-87-5 BENZIDINE
000093-65-2 METHYL-4-CHLOROPHENOXY) PROPIONIC ACID, 2-(2-
000093-71-0 ALLIDOCHLOR
000093-72-1 TRICHLOROPHENOXY) PROPIONIC ACID, 2(2,4,5-
000093-76-5 TRICHLOROPHENOXY ACETIC ACID, 2,4,5-
000094-74-6 METHYL-4-CHLOROPHENOXY ACETIC ACID, 2-
000094-75-7 DICHLOROPHENOXY ACETIC ACID, 2,4-
000094-81-5 METHYL-4-CHLOROPHENOXY) BUTYRIC ACID, 4-(2-
000094-82-6 2,4-DB
000094-82-6 DICHLOROPHENOXY) BUTYRIC ACID, 4-(2,4-
000095-47-6 XYLENE, O-
000095-48-7 CRESOL, O-
000095-48-7 2-METHYLPHENOL
000095-49-8 CHLOROTOLUENE, O-
000095-50-1 DICHLOROBENZENE, 1,2-
000095-51-2 CHLOROANILINE, 2-
000095-53-4 METHYLANILINE, 2-

000095-54-5 PHENYLENEDIAMINE, O-
000095-55-6 AMINOPHENOL, O-
000095-57-8 CHLOROPHENOL, 2-
000095-65-8 DIMETHYLPHENOL, 3,4-
000095-68-1 DIMETHYLANILINE, 2,4-
000095-69-2 CHLORO-2-METHYLANILINE, 4-
000095-70-5 TOLUENE-2,5-DIAMINE
000095-77-2 DICHLOROPHENOL, 3,4-
000095-80-7 TOLUENE-2,4-DIAMINE
000095-87-4 DIMETHYLPHENOL, 2,5-
000095-94-3 TETRACHLOROBENZENE, 1,2,4,5-
000095-95-4 TRICHLOROPHENOL, 2,4,5-
000096-12-8 DIBROMO-3-CHLOROPROPANE, 1,2
000096-18-4 TRICHLOROPROPANE, 1,2,3-
000096-19-5 TRICHLOROPROPENE, 1,2,3-
000096-33-3 METHYL ACRYLATE
000096-45-7 ETHYLENE THIOUREA
000096-48-0 BUTYROLACTONE, GAMMA-
000097-63-2 ETHYL METHACRYLATE
000098-01-1 FURFURAL
000098-07-7 BENZOTRICHLORIDE
000098-56-6 CHLOROBENZOTRIFLUORIDE, 4-
000098-82-8 CUMENE
000098-83-9 METHYL STYRENE, ALPHA
000098-86-2 ACETOPHENONE
000098-87-3 BENZAL CHLORIDE
000098-95-3 NITROBENZENE
000099-08-1 NITROTOLUENE, M-
000099-09-2 NITROANILINE, M-
000099-35-4 TRINITROBENZENE, 1,3,5-
000099-55-8 METHYL-5-NITROANILINE, 2-
000099-59-2 METHOXY-5-NITROANILINE, 2-
000099-65-0 DINITROBENZENE, 1,3-
000099-99-0 NITROTOLUENE, P-
000100-00-5 CHLORONITROBENZENE, P-
000100-01-6 NITROANILINE, P-
000100-21-0 PHTHALIC ACID, P-
000100-21-0 TEREPHTHALIC ACID
000100-25-4 DINITROBENZENE, 1,4-
000100-40-3 VINYL-1-CYCLOHEXENE, 4-
000100-41-4 ETHYL BENZENE
000100-42-5 STYRENE
000100-44-7 BENZYL CHLORIDE
000100-51-6 BENZYL ALCOHOL
000100-52-7 BENZALDEHYDE
000100-54-9 NICOTINONITRILE
000101-14-4 METHYLENE-BIS(2-CHLOROANILINE), 4,4'-
000101-55-3 BROMOPHENYL PHENYL ETHER, 4-
000101-61-1 METHYLENE-BIS(N,N'-DIMETHYL)ANILINE, 4,4'-
000101-68-8 DIPHENYLMETHANE DIISOCYANATE
000101-68-8 METHYLENEDIPHENYL ISOCYANATE, 4,4-
000101-77-9 METHYLENE-BIS(BENZENEAMINE), 4,4-
000103-33-3 AZOBENZENE
000103-69-5 ETHYLANILINE, N-
000105-60-2 CAPROLACTAM
000105-67-9 DIMETHYLPHENOL, 2,4-
000106-13-8 ETHOXYETHANOL DODECANOATE, 2-
000106-37-6 DIBROMOBENZENE, 1,4-
000106-42-3 XYLENE, P-
000106-43-4 CHLOROTOLUENE, P-
000106-44-5 4-METHYLPHENOL
000106-44-5 CRESOL, P-
000106-46-7 DICHLOROBENZENE, 1,4-
000106-47-8 CHLOROANILINE, 4-
000106-48-9 CHLOROPHENOL, 4-
000106-49-0 TOLUIDINE, P-
000106-50-3 PHENYLENEDIAMINE, P-
000106-74-1 ETHOXYETHANOL ACRYLATE, 2-
000106-89-8 EPICHLOROHYDRIN
000106-93-4 DIBROMOETHANE, 1,2-
000106-99-0 BUTADIENE, 1,3-
000107-02-8 ACROLEIN
000107-05-1 ALLYL CHLORIDE
000107-12-0 PROPIONITRILE
000107-13-1 ACRYLONITRILE
000107-15-3 ETHYLENE DIAMINE
000107-16-4 FORMALDEHYDE CYANOHYDRIN
000107-18-6 ALLYL ALCOHOL
000107-20-0 CHLOROACETALDEHYDE
000107-21-1 ETHYLENE GLYCOL
000107-30-2 CHLOROMETHYL METHYL ETHER
000107-98-2 PROPYLENE GLYCOL MONOMETHYL ETHER
000108-05-4 VINYL ACETATE
000108-10-1 METHYL ISOBUTYL KETONE
000108-31-6 MALEIC ANHYDRIDE
000108-38-3 XYLENE, M-
000108-39-4 3-METHYLPHENOL
000108-39-4 CRESOL, M-
000108-41-8 CHLOROTOLUENE, M-
000108-42-9 CHLOROANILINE, 3-
000108-43-0 CHLOROPHENOL, 3-
000108-44-1 TOLUIDINE, M-
000108-45-2 PHENYLENEDIAMINE, M-
000108-60-1 BIS(2-CHLORO-1-METHYLETHYL) ETHER
000108-87-2 METHYLCYCLOHEXANE
000108-88-3 TOLUENE
000108-90-7 CHLOROBENZENE
000108-91-8 CYCLOHEXYLAMINE
000108-93-0 CYCLOHEXANOL
000108-95-2 PHENOL
000108-98-5 THIOPHENOL
000108-98-5 BENZENETHIOL
000109-66-0 PENTANE, N-
000109-69-3 CHLOROBUTANE, 1-
000109-77-3 MALONONITRILE
000109-78-4 ETHYLENE CYANOHYDRIN
000109-86-4 METHOXYETHANOL, 2-
000110-00-9 FURAN
000110-49-6 METHOXYETHANOL ACETATE, 2-
000110-54-3 HEXANE, N-
000110-61-2 SUCCINONITRILE
000110-80-5 ETHOXYETHANOL, 2-
000110-86-1 PYRIDINE
000111-15-9 ETHOXYETHANOL ACETATE, 2-
000111-44-4 BIS(2-CHLOROETHYL) ETHER
000111-69-3 ADIPONITRILE
000111-76-2 ETHYLENE GLYCOL MONOBUTYL ETHER
000111-90-0 DIETHYLENE GLYCOL MONOETHYL ETHER
000112-34-5 DIETHYLENE GLYCOL MONOBUTYL ETHER
000115-29-7 ENDOSULFAN
000116-06-3 ALDICARB
000117-81-7 BIS(2-ETHYLHEXYL) PHTHALATE
000117-81-7 DEHP
000117-84-0 DI-N-OCTYL PHTHALATE
000118-74-1 HEXACHLOROBENZENE
000118-75-2 CHLORANIL
000118-96-7 TRINITROTOLUENE, 2,4,6-
000119-90-4 DIMETHOXYBENZIDINE, 3,3'-
000119-93-7 DIMETHYLBENZIDINE, 3,3'-
000120-12-7 ANTHRACENE
000120-36-5 DICHLORPROP
000120-61-6 DIMETHYLTEREPHTHALATE
000120-82-1 TRICHLOROBENZENE, 1,2,4-
000120-83-2 DICHLOROPHENOL, 2,4-
000121-14-2 DINITROTOLUENE, 2,4
000121-69-7 DIMETHYLANILINE, N,N-
000121-73-3 CHLORONITROBENZENE, M-
000121-75-5 MALATHION
000121-82-4 CYCLONITE
000121-82-4 RDX
000121-91-5 PHTHALIC ACID, M-
000122-34-9 SIMAZINE
000122-39-4 DIPHENYLAMINE, N,N-
000122-66-7 DIPHENYLHYDRAZINE, 1,2-

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000123-30-8	AMINOPHENOL, P-	000319-86-8	HEXACHLOROCYCLOHEXANE, DELTA-	000608-73-1	HEXACHLOROCYCLOHEXANE-TECHNICAL
000123-31-9	HYDROQUINONE	000329-71-5	DINITROPHENOL, 2,5-	000608-93-5	PENTACHLOROBENZENE
000123-33-1	MALEIC HYDRAZIDE	000330-55-2	LINURON	000609-19-8	TRICHLOROPHENOL, 3,4,5-
000123-63-7	PARALDEHYDE	000333-41-5	DIAZINON	000609-93-8	DINITRO-P-CRESOL, 2,6-
000123-73-9	CROTONALDEHYDE	000460-19-5	CYANOGEN	000610-39-9	DINITROTOLUENE, 3,4-
000123-91-1	DIOXANE, 1,4-	000479-45-8	TRINITROPHENYLMETHYLNITRAMINE	000611-14-3	ETHYLTOLUENE, O-
000124-09-4	HEXAMETHYLENE DIAMINE	000496-72-0	TOLUENEDIAMINE, 3,4-	000615-54-3	TRIBROMOBENZENE, 1,2,4-
000124-48-1	DIBROMOCHLOROMETHANE	000504-24-5	AMINOPYRIDINE, 4-	000617-84-5	DIETHYLFORMAMIDE
000126-98-7	METHACRYLONITRILE	000506-61-6	POTASSIUM SILVER CYANIDE	000619-15-8	DINITROTOLUENE, 2,5-
000126-99-8	CHLORO-1,3-BUTADIENE, 2-	000506-64-9	SILVER CYANIDE	000620-14-4	ETHYLTOLUENE, M-
000126-99-8	CHLOROPRENE	000506-68-3	CYANOGEN BROMIDE	000621-64-7	NITROSO-DI-N-PROPYLAMINE, N-
000127-18-4	TETRACHLOROETHYLENE	000506-77-4	CHLORINE CYANIDE	000622-96-8	ETHYLTOLUENE, P-
000129-00-0	PYRENE	000507-20-0	BUTYLCHLORIDE, T-	000624-83-9	METHYL ISOCYANATE
000130-15-4	NAPHTHOQUINONE, 1,4-	000510-15-6	CHLOROBENZILATE	000630-05-0	CARBON MONOXIDE
000131-11-3	DIMETHYLPHTHALATE	000512-56-1	TRIMETHYL PHOSPHATE	000630-10-4	SELENOUREA
000132-64-9	DIBENZOFURAN	000526-75-0	DIMETHYLPHENOL, 2,3-	000630-20-6	TETRACHLOROETHANE, 1,1,1,2-
000133-06-2	CAPTAN	000528-29-0	DINITROBENZENE, 1,2-	000634-93-5	TRICHLOROANILINE, 2,4,6-
000133-07-3	FOLPET	000531-82-8	FURIUM	000636-21-5	METHYLANILINE HYDROCHLORIDE, 2-
000137-26-8	THIRAM	000532-28-5	BENZALDEHYDE CYANOHYDRIN	000684-93-5	NITROSO-N-METHYLUREA, N-
000139-40-2	PROPAZINE	000534-52-1	DINITRO-O-CRESOL, 4,6-	000695-77-2	TETRACHLOROCYCLOPENTADIENE
000140-57-8	ARAMITE	000540-59-0	DICHLOROETHYLENE, 1,2- (MIXED ISOMERS)	000759-73-9	NITROSO-N-ETHYLUREA, N-
000140-88-5	ETHYL ACRYLATE	000540-73-8	DIMETHYLHYDRAZINE, 1,2-	000759-94-4	EPTC
000141-78-6	ETHYL ACETATE	000541-73-1	DICHLOROBENZENE, 1,3-	000764-41-0	DICHLORO-2-BUTENE, 1,4-
000142-28-9	DICHLOROPROPANE, 1,3-	000542-62-1	BARIUM CYANIDE	000765-34-4	GLYCIDALDEHYDE
000142-82-5	HEPTANE, N-	000542-75-6	TELONE II	000823-40-5	TOLUENE-2,6-DIAMINE
000143-33-9	SODIUM CYANIDE	000542-75-6	DICHLOROPROPENE, 1,3-	000834-12-8	AMETRYN
000145-73-3	ENDOTHALL	000542-88-1	BIS(CHLOROMETHYL) ETHER	000924-16-3	NITROSO-DI-N-BUTYLAMINE, N-
000148-18-5	SODIUM DIETHYLDITHIOCARBAMATE	000542-92-7	CYCLOPENTADIENE	000930-55-2	NITROSOPYRROLIDINE, N-
000150-50-5	MERPHOS	000544-92-3	COPPER CYANIDE	000933-75-5	TRICHLOROPHENOL, 2,3,6-
000151-50-8	POTASSIUM CYANIDE	000557-19-7	NICKEL CYANIDE	000933-78-8	TRICHLOROPHENOL, 2,3,5-
000152-16-9	OCTAMETHYLPYROPHOSPHORAMIDE	000557-21-1	ZINC CYANIDE	000934-80-5	ETHYL-O-XYLENE, 4-
000156-10-5	NITROSODIPHENYLAMINE, P-	000563-68-8	THALLIUM (I) ACETATE	000935-95-5	TETRACHLOROPHENOL, 2,3,5,6-
000156-59-2	DICHLOROETHYLENE, 1,2-C-	000573-56-8	DINITROPHENOL, 2,6-	000950-10-7	MEPHOSFOLAN
000156-60-5	DICHLOROETHYLENE, 1,2-T-	000576-24-9	DICHLOROPHENOL, 2,3-	000961-11-5	TETRACHLOROVINPHOS
000193-39-5	INDENO[1,2,3-CD]PYRENE	000576-26-1	DIMETHYLPHENOL, 2,6-	000961-11-5	STIROPHOS
000206-44-0	FLUORANTHENE	000583-78-8	DICHLOROPHENOL, 2,5-	001024-57-3	HEPTACHLOR EPOXIDE
000207-08-9	BENZO[K]FLUORANTHENE	000586-11-8	DINITROPHENOL, 3,5-	001114-71-2	PEBULATE
000208-96-8	ACENAPTHYLENE	000591-27-5	AMINOPHENOL, M-	001116-54-7	NITROSODIETHANOLAMINE, N-
000218-01-9	CHRYSENE	000591-35-5	DICHLOROPHENOL, 3,5-	001134-23-2	CYCLOATE
000298-00-0	METHYL PARATHION	000591-78-6	HEXANONE, 2-	001163-19-5	DECABROMODIPHENYL ETHER
000298-02-2	PHORATE	000592-01-8	CALCIUM CYANIDE	001198-27-2	AMINO-2-NAPHTOL HYDROCHLORIDE, 1-
000298-04-4	DISULFOTON	000593-60-2	VINYL BROMIDE	001309-64-4	ANTIMONY TRIOXIDE
000299-84-3	RONNEL	000593-60-2	BROMOETHENE	001314-32-5	THALLIC OXIDE
000302-01-2	HYDRAZINE	000594-20-7	DICHLOROPROPANE, 2,2-	001314-60-9	ANTIMONY PENTOXIDE
000304-61-0	ANTIMONY POTASSIUM TARTRATE	000598-31-2	BROMOACETONE	001314-62-1	VANADIUM PENTOXIDE
000309-00-2	ALDRIN	000598-77-6	TRICHLOROPROPANE, 1,1,2-	001314-84-7	ZINC PHOSPHIDE
000311-45-5	DIETHYL-P-NITROPHENYL PHOSPHATE	000598-94-7	DIMETHYLUREA, N,N-	001330-20-7	XYLENE, MIXTURE
000319-84-6	HEXACHLOROCYCLOHEXANE, ALPHA-	000602-01-7	DINITROTOLUENE, 2,3-	001332-21-4	ASBESTOS
000319-85-7	HEXACHLOROCYCLOHEXANE, BETA-	000606-20-2	DINITROTOLUENE, 2,6-	001332-81-6	ANTIMONY TETROXIDE

CHEMICAL ABSTRACTS SERVICE REGISTRY NUMBER AND CHEMICAL NAME CROSS REFERENCE
(LISTED BY CHEMICAL ABSTRACTS REGISTRY NUMBER) Continued

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001336-36-3 POLYCHLORINATED BIPHENYLS
001338-23-4 METHYL ETHYL KETONE PEROXIDE
001563-66-2 CARBOFURAN
001569-02-4 PROPYLENE GLYCOL MONOETHYL ETHER
001582-09-8 TRIFLURALIN
001600-37-9 PENTACHLOROPROPENE, 1,1,2,3,3,-
001615-80-1 DIETHYLHYDRAZINE, 1,2-
001689-84-5 001689-99-2BROMOXYNIL OCTANOATE
001746-01-6 TCDD, 2,3,7,8-
001861-32-1 DACTHAL
001861-40-1 BENEFIN
001897-45-6 CHLOROTHALONIL
001912-24-9 ATRAZINE
001918-00-9 DICAMBA
001918-16-7 PROPACHLOR
001929-77-7 VERNOLATE
001929-77-7 VERNAM
001937-37-7 DIRECT BLACK 38
002008-41-5 BUTYLATE
002014-83-7 TRICHLOROTOLUENE, ALPHA,2,6-
002077-46-5 TRICHLOROTOLUENE, 2,3,6-
002104-96-3 BROMOPHOS
002212-67-1 MOLINATE
002303-16-4 DIALLATE
002303-17-5 TRIALLATE
002370-63-0 ETHOXYETHYL METHACRYLATE, 2-
002385-85-5 MIREX
002425-06-1 CAPTAFOL
002429-74-5 NIAGARA BLUE 4B
002491-38-5 BUSAN 90
002602-46-2 DIRECT BLUE 6
002610-05-1 DIRECT SKY BLUE 6B
002687-25-4 TOLUENEDIAMINE, 2,3-
002834-92-6 AMINO-2-NAPHTHOL, 1-
002921-88-2 CHLORPYRIFOS
003165-93-3 CHLORO-2-METHYLANILINE HYDROCHLORIDE, 4-
003175-23-3 TRICHLOROPROPANE, 1,2,2-
003380-34-5 TRICHLORO-2'-HYDROXYDIPHENYLETHER, 2,2,4'-
003383-96-8 TEMEPHOS
003689-24-5 TETRAETHYL DITHIOPYROPHOSPHATE
004399-55-7 DIRECT LIGHTFAST BLUE
004549-40-0 NITROSOMETHYLVINYLAMINE, N
004901-51-3 TETRACHLOROPHENOL, 2,3,4,5-
005216-25-1 TETRACHLOROTOLUENE, PARA, ALPHA, ALPHA, ALPHA-
005598-13-0 CHLORPYRIFOS METHYL
006108-10-7 HEXACHLOROCYCLOHEXANE, EPSILON-
006533-73-9 THALLIUM (I) CARBONATE
007429-90-5 ALUMINUM
007439-89-6 IRON
007439-92-1 LEAD
007439-96-5 MANGANESE
007439-97-6 MERCURY, ELEMENTAL
007439-98-7 MOLYBDENUM
007440-22-4 SILVER
007440-24-6 STRONTIUM, STABLE
007440-36-0 ANTIMONY, METALLIC
007440-38-2 ARSENIC, INORGANIC
007440-39-3 BARIUM
007440-41-7 BERYLLIUM
007440-42-8 BORON, ELEMENTAL
007440-43-9 CADMIUM
007440-50-8 COPPER
007440-62-2 VANADIUM
007440-66-6 ZINC (METALLIC)
007446-09-5 SULFUR DIOXIDE
007446-18-6 THALLIUM (I) SULFATE
007446-34-6 SELENIUM SULFIDE
007487-94-7 MERCURIC CHLORIDE
007637-07-2 BORON TRIFLUORIDE
007664-41-7 AMMONIA
007664-93-9 SULFURIC ACID
007723-14-0 PHOSPHORUS, WHITE
007782-41-4 FLUORINE / (SOLUBLE FLUORIDE)
007782-49-2 SELENIUM
007783-00-8 SELENIOUS ACID
007783-06-4 HYDROGEN SULFIDE
007789-89-1 TRICHLOROPROPANE, 1,1,1-
007791-12-0 THALLIUM (I) CHLORIDE
007803-51-2 PHOSPHINE
008001-35-2 TOXAPHENE
008001-58-9 CREOSOTE, COAL TAR
008007-45-2 COKE OVEN EMISSIONS
008018-01-7 MANCOZEB
010028-15-6 OZONE
010034-93-2 HYDRAZINE SULFATE
010102-43-9 NITRIC OXIDE
010102-44-0 NITROGEN DIOXIDE
010102-45-1 THALLIUM (I) NITRATE
010436-39-2 TETRACHLOROPROPENE, 1,1,2,3-
010595-95-6 NITROSOMETHYLETHYLAMINE, N-
010599-90-3 MONOCHLORAMINE
011097-69-1 AROCLOR 1254
012035-72-2 NICKEL SUBSULFIDE
012039-52-0 THALLIUM SELENITE
012122-67-7 ZINEB
012427-38-2 MANEB
012672-29-6 AROCLOR 1248
013071-79-9 TERBUFOS
013194-48-4 ETHOPROP
013196-18-4 THIOFANOX
013718-26-8 SODIUM METAVANADATE
014797-65-0 NITRITE
015950-66-0 TRICHLOROPHENOL, 2,3,4-
015972-60-8 ALACHLOR
016065-83-1 CHROMIUM(III)
016071-86-6 DIRECT BROWN 95
016752-77-5 METHOMYL
018540-29-9 CHROMIUM(VI)
020816-12-0 OSMIUM TETROXIDE
020859-73-8 ALUMINUM PHOSPHIDE
021087-64-9 METRIBUZIN
021232-47-3 TETRACHLOROAZOXYBENZENE
021436-96-4 DIMETHYLANILINE HYDROCHLORIDE, 2,4-
021564-17-0 THIOCYANOMETHYLTHIO)BENZOTHIAZOLE, 2-(
021725-46-2 CYANAZINE
022967-92-6 METHYL MERCURY
023950-58-5 PRONAMIDE
025013-15-4 METHYL STYRENE (MIXED ISOMERS)
025329-35-5 PENTACHLOROCYCLOPENTADIENE
026399-36-0 PROFLURALIN
030560-19-1 ACEPHATE
031512-74-0 BUSAN 77
032534-81-9 PENTABROMODIPHENYL ETHER
032536-52-0 OCTABROMODIPHENYL ETHER
033663-50-2 TRICHLOROANILINE HYDROCHLORIDE, 2,4,6-
033820-53-0 ISOPROPALIN

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036907-42-3	VANADIUM SULFATE
039638-32-9	BIS(2-CHLOROISOPROPYL) ETHER
040487-42-1	PENDIMETHALIN
041851-50-7	CHLOROCYCLOPENTADIENE
051218-45-2	METOLACHLOR
059756-60-4	FLURIDONE
060238-56-4	CHLORTHIOPHOS
068554-00-7	ETHOXYETHANOL PHOSPHATE, 2-
071753-42-9	TETRACHLOROHYDRAZOBENZENE
077323-84-3	TRICHLOROCYCLOPENTADIENE
VARIOUS	BROMINATED DIBENZOFURANS
NO CASRN	BROMINATED DIBENZO-P-DIOXINS
NO CASRN	BROMOCHLOROETHANES
NO CASRN	DICHLOROBUTENES
NO CASRN	LEAD ALKYLS
NO CASRN	NICKEL, REFINERY DUST
VARIOUS	NICKEL, SOLUBLE SALTS
NO CASRN	NITROGEN OXIDES
NO CASRN	NITROPHENOLS
NO CASRN	PARTICULATE MATTER
NO CASRN	PHOTOCHEMICAL OXIDANTS
NO CASRN	POLYBROMINATED BIPHENYLS
NO CASRN	SULFUR OXIDES
NO CASRN	THALLIUM, INSOLUBLE SALTS
NO CASRN	TIN AND COMPOUNDS
NO CASRN	TRIMETHYLBENZENES
NO CASRN	TRINITROPHENOLS

APPENDIX A-IV

APPENDIX A-IV

IV. EFFECT LEVEL DEFINITIONS

Adverse effect. A biochemical change, functional impairment, or pathologic lesion that either singly or in combination adversely affects the performance of the whole organism, or reduces an organism's ability to respond to an additional environmental challenge.

Frank-effect-level (FEL). The exposure level at which there are statistically or biologically significant increases in frequency or severity of severe effects between the exposed population and its appropriate control group. These severe effects produce an unmistakable adverse health effect (such as severe convulsions or death).

Lowest-observed-adverse-effect level (LOAEL). The lowest exposure level at which there are statistically or biologically significant increases in frequency or severity of adverse effects between the exposed population and its appropriate control group.

Lowest-observed-effect level (LOEL). The lowest exposure level at which there are statistically or biologically significant increases in frequency or severity of any effects between the exposed population and its appropriate control group. The effects that are seen at this level may or may not be considered as adverse.

No-observed-adverse-effect level (NOAEL). An exposure level at which there are no statistically or biologically significant increases in the frequency or severity of adverse effects between the exposed population and its appropriate control; some effects may be produced at this level, but they are not considered to be adverse.

No-observed-effect level (NOEL). An exposure level at which there are no statistically or biologically significant increases in the frequency or severity of any effect between the exposed population and its appropriate control.

Adapted from: U.S. EPA. 1991. Integrated Risk Information System (IRIS). Online. National Center for Environmental Assessment, Cincinnati, OH.

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APPENDIX A-V

APPENDIX A-V

V. NATIONAL AMBIENT AIR QUALITY STANDARDS (NAAQS)

The Clean Air Act requires that National Ambient Air Quality Standards (NAAQS) be set and ultimately met for any air pollutant which, if present in air, may reasonably be anticipated to endanger public health or welfare and whose presence in the air results from numerous or diverse mobile and/or stationary sources. Since the primary NAAQS and the inhalation RfC serve essentially the same function, and the primary NAAQS have extensive data bases rigorously reviewed, the primary NAAQS with annual averaging times should be used *in lieu* of an inhalation RfC, except for lead. In deriving a risk assessment number for lead (Pb), the Integrated Exposure Uptake Biokinetics (IEUBK) model should be used instead of the RfC. Primary standards are designed to protect public health and secondary standards are designed to protect public welfare. Each primary NAAQS has either one or two averaging times depending on the health effects of the chemical. To date, six NAAQS have been established: Carbon Monoxide (CO), Lead (Pb), Nitrogen Dioxide (NO_2), Particulate Matter, less than 10 µm in size, (PM_{10}), Ozone (O_3) and Sulfur Dioxide (SO_2). A table of the most recent NAAQS is provided as Table A-V-1.

The process of establishing and revising the NAAQS is detailed by Padgett and Richmond (Journal of the Air Pollution Control Association, 33:13-16, 1983). The primary NAAQS are solely health based and designed to protect the most sensitive group of individuals (but not necessarily the most sensitive members of that group) against adverse health effects. Thus, by definition, the NAAQS primary standards define allowable pollutant concentrations which can be present in the atmosphere without causing adverse effects, and essentially serve the same function as an inhalation RfC in a risk assessment/risk management decision, except for lead. The data bases supporting each of the NAAQS are extensive. More importantly, the NAAQS are set by the USEPA Administrator as mandated by Congress after numerous reviews and a public comment process.

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TABLE A-V-1

NATIONAL AMBIENT AIR QUALITY STANDARDS[a]
(as of December 2, 1991)

Pollutant	Primary Standards[b]	Averaging Time	Secondary Standards[b]
Carbon monoxide (CO)	9 ppm (10 mg/m^3) 35 ppm (40 mg/m^3)	8 hour[c] 1 hour[c]	None
Lead (Pb) (and Lead compounds	1.5 µg/m^3	Quarterly	Same as primary
Nitrogen dioxide (NO_2) (Nitrogen oxide) (Nitric oxide)	0.053 ppm (100 µg/m^3)	Annual	Same as primary
Particulate Matter (PM_{10})	50 µg/m^3 150 µg/m^3	Annual[d] 24 hours[e]	Same as primary
Ozone (O_3)	0.12 ppm (235 µg/m^3)	1 hour[f]	Same as primary
Sulfur dioxide (SO_2) (Sulfur oxide)	0.03 ppm (80 µg/m^3)	Annual	---
	0.14 ppm (365 µg/m^3)	24 hours[c]	---
	---	3 hours[c]	0.5 ppm (1300 µg/m^3)

[a]Source: U.S. EPA 1991. Subchapter C - Air Programs. Part 50 -National Primary and Secondary Ambient Air Quality Standards. Code of Federal Regulations 50: 693-697. Revised 7/1/91.

[b]Primary standards are designed to protect public health; Secondary standards are designed to protect public welfare.

[c]Not to be exceeded more than once per year.

[d]The standard is attained when the expected annual arithmetic mean concentration is less than or equal to 50 µg/m^3.

[e]The standard is attained when the expected number of days per calendar year with a 24-hour average concentration above 150 µg/m^3 is equal to or less than 1.

[f]The standard is attained when the expected number of days per calendar year with maximum hourly average concentrations above 0.12 ppm is equal to or less than 1.

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CHEMICAL / LEVEL	DOSE / ROUTE	SPECIES / EXPERIMENT / LENGTH	TARGET	CRITICAL EFFECT	Subchronic [RfC] (mg/cu m) UF	Subchronic [RfD] (mg/kg/day) UF	Chronic [RfC] (mg/cu m) UF	Chronic [RfD] (mg/kg/day) UF	REFERENCE
METHYL ACRYLATE	**000096-33-3**								010498
CHRONIC [RfD] COMMENT: ALSO SEE HEAST TABLE 2: ALTERNATE METHODS -- SUBCHRONIC AND CHRONIC TOXICITY (OTHER THAN CARCINOGENICITY)									
GENERAL COMMENT: ALSO SEE HEAST TABLE 2: ALTERNATE METHODS -- SUBCHRONIC AND CHRONIC TOXICITY (OTHER THAN CARCINOGENICITY)									
METHYL CHLOROCARBONATE	**000079-22-1**								
CHRONIC [RfD] COMMENT: WITHDRAWN FROM IRIS (05/01/89).									
GENERAL COMMENT: CONTACT THE SUPERFUND HEALTH RISK TECHNICAL SUPPORT CENTER: (513) 569-7300.									
METHYL ETHYL KETONE	**000078-93-3**								
NOAEL 1711 MG/KG/DAY	ORAL: DRINKING WATER	RAT MULTI-GENERATION	FETUS	DECREASED BIRTH WEIGHT		2E+0 1000		IRIS	010853
SUBCHRONIC [RfD] COMMENT: THE CHRONIC ORAL RfD WAS MODIFIED TO ESTIMATE THE SUBCHRONIC ORAL [RfD].									
GENERAL COMMENT: MULTI-GENERATION DEVELOPMENTAL STUDY PERFORMED WHT THE SURROGATE 2-BUTANOL, A METABOLITE OF METHYL ETHYL KETONE.									
NOAEL 1010 PPM	INHALATION: INTERMITTENT	MOUSE 10 DAYS	FETUS	DECREASED BIRTH WEIGHT	1E+0 3000			IRIS	010845
SUBCHRONIC [RfC] COMMENT: THE CHRONIC INHALATION RfC WAS ADOPTED AS THE SUBCHRONIC INHALATION [RfC].									
METHYL ETHYL KETONE PEROXIDE	**001338-23-4**								
CHRONIC [RfD] COMMENT: THE CHRONIC ORAL [RfD] IS CONSIDERED NOT VERIFIABLE (07/22/93) BY THE RfD/RfC WORK GROUP.									010948

HEAST TABLE 1: SUBCHRONIC AND CHRONIC TOXICITY (OTHER THAN CARCINOGENICITY)

CHEMICAL / LEVEL	DOSE / ROUTE	SPECIES / EXPERIMENT LENGTH	TARGET	CRITICAL EFFECT	Subchronic [RfC] (mg/cu m) / UF	Subchronic [RfD] (mg/kg/day) / UF	Chronic [RfC] (mg/cu m) / UF	Chronic [RfD] (mg/kg/day) / UF	REFERENCE
METHYL ISOBUTYL KETONE	**000108-10-1**								
NOAEL 250 MG/(KG-DAY)	RAT		WHOLE BODY	LETHARGY		8E-1		8E-2	010949
ORAL: GAVAGE	13 WEEKS		LIVER	INCREASED RELATIVE WEIGHT IN FEMALES		300		3000	
			LIVER	INCREASED ABSOLUTE WEIGHT IN FEMALES					
			KIDNEY	INCREASED RELATIVE WEIGHT IN FEMALES					
			KIDNEY	INCREASED ABSOLUTE WEIGHT IN FEMALES					
			KIDNEY	INCREASED URINARY PROTEIN LEVELS IN FEMALES					

SUBCHRONIC [RfC] COMMENT: ALSO SEE HEAST TABLE 2: ALTERNATE METHODS - SUBCHRONIC AND CHRONIC TOXICITY (OTHER THAN CARCINOGENICITY)
CHRONIC [RfC] COMMENT: ALSO SEE HEAST TABLE 2: ALTERNATE METHODS - SUBCHRONIC AND CHRONIC TOXICITY (OTHER THAN CARCINOGENICITY)
CHRONIC [RfD] COMMENT: WITHDRAWN FROM IRIS (03/01/91). UNDER REVIEW. CURRENT NUMBER SUBJECT TO CHANGE.

METHYL ISOCYANATE	**000624-83-9**							IRIS	010013

CHRONIC RfC COMMENT: THE CHRONIC INHALATION RfC IS CONSIDERED NOT VERIFIABLE (12/18/90) BY THE RfD/RfC WORK GROUP.

METHYLMERCURY	**022967-92-6**								
CRITICAL ORAL DOSE	HUMAN			DEVELOPMENTAL NEUROLOGICAL ABNORMALITIES		1E-4		IRIS	010970
0.001 MG/KG/DAY				IN HUMAN INFANTS		10			

SUBCHRONIC [RfD] COMMENT: THE CHRONIC ORAL RfD WAS ADOPTED AS THE SUBCHRONIC ORAL [RfD].
CHRONIC [RfD] COMMENT: A BENCHMARK DOSE APPROACH WAS USED RATHER THAN A NOAEL/LOAEL TO DERIVE THE RfD.

CHEMICAL / LEVEL	DOSE / ROUTE	SPECIES / EXPERIMENT LENGTH	TARGET	CRITICAL EFFECT	Subchronic [RfC] (mg/cu m) UF	Subchronic [RfD] (mg/kg/day) UF	Chronic [RfC] (mg/cu m) UF	Chronic [RfD] (mg/kg/day) UF	REFERENCE
METHYL METHACRYLATE		**000080-62-6**							
NOEL 7.5 MG/KG/DAY		RAT							
	ORAL: WATER	24 MONTHS	KIDNEY	INCREASED RELATIVE WEIGHT		8E-2 100		8E-2 100	010014
METHYL PARATHION		**000298-00-0**							
								IRIS	010015
NOAEL 2.5 PPM		RAT							
	ORAL: DIET	90 DAYS	ERYTHROCYTES	CHOLINESTERASE INHIBITION		2E-3 100			010846
METHYL STYRENE (MIXED ISOMERS)		**025013-15-4**							010500
CHRONIC [RfD] COMMENT: UNDER REVIEW. ALSO SEE HEAST TABLE 2: ALTERNATE METHODS -- SUBCHRONIC AND CHRONIC TOXICITY (OTHER THAN CARCINOGENICITY)									
GENERAL COMMENT: ALSO SEE HEAST TABLE 2: ALTERNATE METHODS -- SUBCHRONIC AND CHRONIC TOXICITY (OTHER THAN CARCINOGENICITY)									
METHYL STYRENE, ALPHA		**000098-83-9**							010499
GENERAL COMMENT: ALSO SEE HEAST TABLE 2: ALTERNATE METHODS -- SUBCHRONIC AND CHRONIC TOXICITY (OTHER THAN CARCINOGENICITY)									
METHYL-4-CHLOROPHENOXY) BUTYRIC ACID, 4-(2-		**000094-81-5**							
NOEL 12 MG/KG/DAY		RAT							
	ORAL: DIET	13 WEEKS	LIVER	EFFECTS		1E-1		IRIS	010008
			KIDNEY	EFFECTS		100			
		DOG							
	ORAL: DIET	13 WEEKS	LIVER	EFFECTS					
			KIDNEY	EFFECTS					

HEAST TABLE 1: SUBCHRONIC AND CHRONIC TOXICITY (OTHER THAN CARCINOGENICITY)

CHEMICAL / LEVEL	DOSE / ROUTE	SPECIES / EXPERIMENT / LENGTH	TARGET	CRITICAL EFFECT	Subchronic [RfC] (mg/cu m) / UF	Subchronic [RfD] (mg/kg/day) / UF	Chronic [RfC] (mg/cu m) / UF	Chronic [RfD] (mg/kg/day) / UF	REFERENCE
METHYL-4-CHLOROPHENOXY) PROPIONIC ACID, 2-(2-		**000093-65-2**							
NOEL	3 MG/KG/DAY	RAT				1E-2		IRIS	010009
	ORAL: DIET	90 DAYS	KIDNEY	ALTERED WEIGHT		300			
METHYL-4-CHLOROPHENOXYACETIC ACID, 2-		**000094-74-6**							
NOEL	0.15 MG/KG/DAY	DOG				5E-4		IRIS	010007
	ORAL: DIET	52 WEEKS	KIDNEY	EFFECTS		300			
			LIVER	EFFECTS					
SUBCHRONIC [RfD] COMMENT: THE CHRONIC ORAL RfD WAS ADOPTED AS THE SUBCHRONIC ORAL [RfD].									
METHYLCYCLOHEXANE		**000108-87-2**							
NOAEL	287 MG/CU M	RAT			3E+0		3E+0		010431
	INHALATION:	1 YEAR	KIDNEY	MINERALIZATION	100		100		
	INTERMITTENT		KIDNEY	PAPILLARY HYPERPLASIA					
METHYLENE BROMIDE		**000074-95-3**							010501
GENERAL COMMENT: ALSO SEE HEAST TABLE 2: ALTERNATE METHODS -- SUBCHRONIC AND CHRONIC TOXICITY (OTHER THAN CARCINOGENICITY)									

CHEMICAL LEVEL / DOSE ROUTE / SPECIES EXPERIMENT LENGTH	TARGET	CRITICAL EFFECT	Subchronic [RfC] (mg/cu m) UF	Subchronic [RfD] (mg/kg/day) UF	Chronic [RfC] (mg/cu m) UF	Chronic [RfD] (mg/kg/day) UF	REFERENCE
METHYLENE CHLORIDE (DICHLOROMETHANE) 000075-09-2							
NOAEL 5.85 MG/KG/DAY RAT ORAL: DRINKING WATER 24 MONTHS	LIVER	TOXICITY		6E-2 100		IRIS	005553
SUBCHRONIC [RfD] COMMENT: THE CHRONIC ORAL RfD WAS ADOPTED AS THE SUBCHRONIC ORAL [RfD].							
NOAEL 694.8 MG/CU M RAT INHALATION: INTERMITTENT 2 YEARS	LIVER	TOXICITY	3E+0 100		3E+0 100		005552
GENERAL COMMENT: ALSO SEE HEAST TABLE 3: CARCINOGENICITY.							
METHYLENE-BIS(2-CHLOROANILINE), 4,4'- 000101-14-4							
LOAEL 7.3 MG/KG/DAY DOG ORAL 9 YEARS	LIVER BLADDER	EFFECTS EFFECTS		7E-4 10000		7E-4 10000	010413 010933
CHRONIC [RfC] COMMENT: THE CHRONIC INHALATION [RfC] IS CONSIDERED NOT VERIFIABLE 02/10/93) BY THE RfD/RfC WORK GROUP.							
METHYLENEDIPHENYL ISOCYANATE, 4,4- (DIPHENYLMETHANE DIISOCYANATE) 000101-68-8							
NOAEL 0.2 MG/CU M RAT INHALATION: INTERMITTENT 24 MONTHS	NASAL CAVITY	LESIONS	2E-5 300		IRIS		010449
SUBCHRONIC [RfC] COMMENT: THE CHRONIC INHALATION RfC ON IRIS WAS ADOPTED AS THE SUBCHRONIC INHALATION [RfC].							

HEAST TABLE 1: SUBCHRONIC AND CHRONIC TOXICITY (OTHER THAN CARCINOGENICITY)

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CHEMICAL / LEVEL	DOSE / ROUTE	SPECIES / EXPERIMENT LENGTH	TARGET	CRITICAL EFFECT	Subchronic [RfC] (mg/cu m) / UF	Subchronic [RfD] (mg/kg/day) / UF	Chronic [RfC] (mg/cu m) / UF	Chronic [RfD] (mg/kg/day) / UF	REFERENCE
METOLACHLOR		**051218-45-2**							
NOAEL 300 PPM	ORAL: DIET	RAT 2 YEARS	WHOLE BODY	DECREASED WEIGHT GAIN		1.5E-1 100		1.5E-1 100	010950
SUBCHRONIC [RfD] COMMENT: THE CHRONIC ORAL [RfD] WAS ADOPTED AS THE SUCHRONIC ORAL [RfD].									
METRIBUZIN		**021087-64-9**							
NOAEL 100 PPM	ORAL: DIET	DOG 2 YEARS	LIVER KIDNEY WHOLE BODY WHOLE BODY	EFFECTS EFFECTS MORTALITY DECREASED WEIGHT				IRIS	010928
SUBCHRONIC [RfD] COMMENT: THE SUBCHRONIC ORAL [RfD] WAS REMOVED BECAUSE THE CHRONIC ORAL RfD UPON WHICH IT WAS BASED IS UNDER REVIEW BY THE RfD/RfC WORK GROUP. CHRONIC RfD COMMENT: THE CHRONIC ORAL RfD, WHILE STILL ON IRIS, IS BEING RECONSIDERED BY THE RfD/RfC WORK GROUP.									
MIREX		**002385-85-5**							
NOAEL 0.07 MG/KG/DAY	ORAL: DIET	RAT 2 YEARS	LIVER LIVER LIVER THYROID	CYTOMEGALY FATTY METAMORPHOSIS ANGIECTASIS CYSTIC FOLLICLES		2E-4 300		IRIS	010841
SUBCHRONIC [RfD] COMMENT: THE CHRONIC ORAL RfD WAS ADOPTED AS THE SUBCHRONIC ORAL [RfD]. GENERAL COMMENT: ALSO SEE HEAST TABLE 3: CARCINOGENICITY.									

CHEMICAL / LEVEL	DOSE / ROUTE	SPECIES / EXPERIMENT / LENGTH	TARGET	CRITICAL EFFECT	Subchronic [RfC] (mg/cu m) UF	Subchronic [RfD] (mg/kg/day) UF	Chronic [RfC] (mg/cu m) UF	Chronic [RfD] (mg/kg/day) UF	REFERENCE
MOLINATE		**002212-67-1**							
NOEL	0.2 MG/KG/DAY ORAL: GAVAGE	RAT	REPRODUCTIVE SYSTEM	TOXICITY		2E-3 100		IRIS	010017
SUBCHRONIC [RfD] COMMENT: THE CHRONIC ORAL RfD WAS ADOPTED AS THE SUBCHRONIC ORAL [RfD].									
CHRONIC [RfD] COMMENT: BASED ON A REPRODUCTION STUDY.									
MOLYBDENUM		**007439-98-7**							
LOAEL	0.14 MG/KG/DAY ORAL: WATER, DIET	HUMAN	URINE JOINTS BLOOD	INCREASED URIC ACID PAIN, SWELLING DECREASED COPPER LEVELS		5E-3 30		IRIS	010489
SUBCHRONIC [RfD] COMMENT: THE CHRONIC ORAL RfD WAS ADOPTED AS THE SUBCHRONIC ORAL [RFD].									
MONOCHLORAMINE		**010599-90-3**							
NOAEL	9.5 MG/KG/DAY ORAL: DRINKING WATER	RAT 2 YEARS	WHOLE BODY LIVER KIDNEY	WEIGHT CHANGES WEIGHT CHANGES WEIGHT CHANGES		1E-1 100		IRIS	010517
SUBCHRONIC [RfD] COMMENT: THE CHRONIC ORAL RfD WAS ADOPTED AS THE SUBCHRONIC ORAL [RfD].									
NAPHTHALENE		**000091-20-3**							
CHRONIC [RfD] COMMENT: CONTACT THE SUPERFUND HEALTH RISK TECHNICAL SUPPORT CENTER: (513) 569-7300.									
NAPHTHOQUINONE, 1,4-		**000130-15-4**							010020
GENERAL COMMENT: DATA INADEQUATE FOR QUANTITATIVE RISK ASSESSMENT									
NICKEL CYANIDE		**000557-19-7**							010953
CHRONIC [RfD] COMMENT: THE CHRONIC ORAL [RfD] IS CONSIDERED NOT VERIFIABLE (07/20/93) BY THE RfD/RfC WORK GROUP.									

CHEMICAL / LEVEL	DOSE / ROUTE	SPECIES / EXPERIMENT LENGTH	TARGET	CRITICAL EFFECT	Subchronic [RfC] (mg/cu m) UF	Subchronic [RfD] (mg/kg/day) UF	Chronic [RfC] (mg/cu m) UF	Chronic [RfD] (mg/kg/day) UF	REFERENCE
NICKEL, SOLUBLE SALTS		**VARIOUS**							
NOAEL 100 PPM	ORAL: DIET	RAT 2 YEARS	WHOLE BODY	DECREASED WEIGHT		2E-2		IRIS	005579
			ORGANS, MAJOR	DECREASED WEIGHT		300			
SUBCHRONIC [RfD] COMMENT: THE CHRONIC ORAL RfD WAS ADOPTED AS THE SUBCHRONIC ORAL [RfD].									
CHRONIC [RfD] COMMENT: THE CHRONIC ORAL [RfD] WAS DERIVED FROM NICKEL MOIETY OF ADMINISTERED NICKEL CHLORIDE.									
NICOTINONITRILE		**000100-54-9**							005584
GENERAL COMMENT: DATA INADEQUATE FOR QUANTITATIVE RISK ASSESSMENT									
NITRIC OXIDE		**010102-43-9**							010451
CHRONIC [RfC] COMMENT: REFER TO APPENDIX A: TECHNICAL INFORMATION, SECTION V ON NATIONAL AMBIENT AIR QUALITY STANDARDS.									
CHRONIC [RfD] COMMENT: THE CHRONIC ORAL RfD HAS BEEN PERMANENTLY WITHDRAWN (09/01/94) FROM IRIS.									
NITRITE		**014797-65-0**							
NOEL 10 PPM	ORAL: WATER	HUMAN	BLOOD	METHEMOGLOBINEMIA		1E-1 10		IRIS	010021
SUBCHRONIC [RfD] COMMENT: THIS VALUE IS BASED ON NITRATE (NITROGEN) DATA FROM THE MOST SENSITIVE HUMAN POPULATION (INFANTS). THE CHRONIC ORAL RfD WAS ADOPTED AS THE SUBCHRONIC ORAL [RfD].									
CHRONIC [RfD] COMMENT: THIS VALUE IS BASED ON NITRATE (NITROGEN) DATA FROM THE MOST SENSITIVE HUMAN POPULATION (INFANTS).									
NITROANILINE, 2-		**000088-74-4**							010936
CHRONIC [RfD] COMMENT: THE CHRONIC ORAL [RFD] IS CONSIDERED NOT VERIFIABLE (06/23/92) BY THE RFD/RFC WORK GROUP.									
LOAEL 9.8 MG/CU M	INHALATION: INTERMITTENT	RAT 4 WEEKS	BLOOD	HEMATOLOGICAL EFFECTS	2E-3 1000		2E-4 10000		010935

CHEMICAL / LEVEL	DOSE / ROUTE	SPECIES / EXPERIMENT / LENGTH	TARGET	CRITICAL EFFECT	Subchronic [RfC] (mg/cu m) UF	Subchronic [RfD] (mg/kg/day) UF	Chronic [RfC] (mg/cu m) UF	Chronic [RfD] (mg/kg/day) UF	REFERENCE
NITROANILINE, M-		**000099-09-2**							
GENERAL COMMENT: DATA INADEQUATE FOR QUANTITATIVE RISK ASSESSMENT									010400
NITROANILINE, P-		**000100-01-6**							
GENERAL COMMENT: DATA INADEQUATE FOR QUANTITATIVE RISK ASSESSMENT									010024
NITROBENZENE		**000098-95-3**							
LOAEL 25 MG/CU M		MOUSE							
	INHALATION:	90 DAYS	BLOOD	HEMATOLOGICAL EFFECTS		5E-3		IRIS	005589
	INTERMITTENT		ADRENAL	LESIONS		1000			
			KIDNEY	LESIONS					
			LIVER	LESIONS					
		RAT							
	INHALATION:	90 DAYS	BLOOD	HEMATOLOGICAL EFFECTS					
	INTERMITTENT		ADRENAL	LESIONS					
			KIDNEY	LESIONS					
			LIVER	LESIONS					
SUBCHRONIC [RfC] COMMENT: ALSO SEE HEAST TABLE 2: ALTERNATE METHODS - SUBCHRONIC AND CHRONIC TOXICITY (OTHER THAN CARCINOGENICITY).									
SUBCHRONIC [RfD] COMMENT: BASED ON ROUTE TO ROUTE EXTRAPOLATION.									
CHRONIC [RfC] COMMENT: ALSO SEE HEAST TABLE 2: ALTERNATE METHODS SUBCHRONIC AND CHRONICTOXICITY (OTHER THAN CARCINOGENICITY)									
CHRONIC [RfD] COMMENT: THE ORAL RFD, WHILE STILL AVAILABLE ON IRIS, IS BEING RECONSIDERED BY THE RFD WORKGROUP. BASED ON ROUTE TO ROUTE EXTRAPOLATION.									
GENERAL COMMENT: ALSO SEE HEAST TABLE 3: CARCINOGENICITY.									
NITROFURANTOIN		**000067-20-9**							
NOAEL 300 PPM		MOUSE							
	ORAL: DIET	13 WEEKS	TESTIS	DAMAGE		7E-1		7E-2	005593
						100		1000	

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HEAST TABLE 1: SUBCHRONIC AND CHRONIC TOXICITY (OTHER THAN CARCINOGENICITY)

CHEMICAL / LEVEL	DOSE / ROUTE	SPECIES / EXPERIMENT LENGTH	TARGET	CRITICAL EFFECT	Subchronic [RfC] (mg/cu m) / UF	Subchronic [RfD] (mg/kg/day) / UF	Chronic [RfC] (mg/cu m) / UF	Chronic [RfD] (mg/kg/day) / UF	REFERENCE
NITROGEN DIOXIDE		**010102-44-0**							010402
CHRONIC [RfD] COMMENT: THE CHRONIC ORAL RfD HAS BEEN PERMANENTLY WITHDRAWN (09/01/94) FROM IRIS.									010912
CHRONIC [RfC] COMMENT: REFER TO APPENDIX A: TECHNICAL INFORMATION, SECTION V ON NATIONAL AMBIENT AIR QUALITY STANDARDS.									
NITROGEN OXIDES									010170
CHRONIC [RfC] COMMENT: REFER TO APPENDIX A: TECHNICAL INFORMATION, SECTION V ON NATIONAL AMBIENT AIR QUALITY STANDARDS.									
NITROMETHANE		**000075-52-5**							010026
GENERAL COMMENT: DATA INADEQUATE FOR QUANTITATIVE RISK ASSESSMENT									
NITROPHENOLS									005594
GENERAL COMMENT: DATA INADEQUATE FOR QUANTITATIVE RISK ASSESSMENT									
NITROPROPANE, 2-		**000079-46-9**							
LOAEL 78 MG/CU M	INHALATION: INTERMITTENT	RAT / 22 MONTHS	LIVER	LESIONS	2E-2 / 1000		IRIS		010374
SUBCHRONIC [RfC] COMMENT: THE CHRONIC INHALATION RfC WAS ADOPTED AS THE SUBCHRONIC INHALATION [RfC].									
NITROSODIPHENYLAMINE, P-		**000156-10-5**							010027
GENERAL COMMENT: DATA INADEQUATE FOR QUANTITATIVE RISK ASSESSMENT									
NITROTOLUENE, M-		**000099-08-1**							
LOAEL 200 MG/KG/DAY	ORAL: GAVAGE	RAT / 6 MONTHS	SPLEEN	LESIONS		1E-1 / 1000		1E-2 / 10000	010029
SUBCHRONIC [RfD] COMMENT: BASED ON DATA OBTAINED WITH O-NITROTOLUENE.									
CHRONIC [RfD] COMMENT: BASED ON DATA OBTAINED WITH O-NITROTOLUENE.									

HEAST TABLE 1: SUBCHRONIC AND CHRONIC TOXICITY (OTHER THAN CARCINOGENICITY)

CHEMICAL / LEVEL	DOSE / ROUTE	SPECIES / EXPERIMENT / LENGTH	TARGET	CRITICAL EFFECT	Subchronic [RfC] (mg/cu m) / UF	Subchronic [RfD] (mg/kg/day) / UF	Chronic [RfC] (mg/cu m) / UF	Chronic [RfD] (mg/kg/day) / UF	REFERENCE
NITROTOLUENE, O-	**000088-72-2**								
LOAEL	200 MG/KG/DAY	RAT				1E-1		1E-2	010028
	ORAL: GAVAGE	6 MONTHS	SPLEEN	LESIONS		1000		10000	
NITROTOLUENE, P-	**000099-99-0**								
LOAEL	200 MG/KG/DAY	RAT				1E-1		1E-2	010030
	ORAL: GAVAGE	6 MONTHS	SPLEEN	LESIONS		1000		10000	
SUBCHRONIC [RfD] COMMENT: BASED ON DATA OBTAINED WITH O-NITROTOLUENE.									
CHRONIC [RfD] COMMENT: BASED ON DATA OBTAINED WITH O-NITROTOLUENE.									
OCTABROMODIPHENYL ETHER	**032536-52-0**								
NOAEL	2.5 MG/KG/DAY	RAT				3E-2		IRIS	010032
	ORAL: GAVAGE	90 DAYS	LIVER	HISTOLOGICAL CHANGES		100			
OCTAMETHYLPYROPHOSPHORAMIDE	**000152-16-9**								
NOAEL	0.02 MG/KG/DAY	HUMAN				2E-3		2E-3	010031
	ORAL	AT LEAST 30 DAYS	BLOOD	DECREASED CHOLINESTERASE ACTIVITY		10		10	
OSMIUM TETROXIDE	**020816-12-0**								010954
CHRONIC [RfD] COMMENT: THE CHRONIC ORAL [RfD] IS CONSIDERED NOT VERIFIABLE (07/22/93) BY THE RfD/RfC WORK GROUP.									
OZONE*	**010028-15-6**								010171
CHRONIC [RfC] COMMENT: REFER TO APPENDIX A: TECHNICAL INFORMATION, SECTION V ON NATIONAL AMBIENT AIR QUALITY STANDARDS.									
PARALDEHYDE	**000123-63-7**								010033
GENERAL COMMENT: DATA INADEQUATE FOR QUANTITATIVE RISK ASSESSMENT.									

IRIS, EPA'S INTEGRATED RISK INFORMATION SYSTEM, IS UPDATED MONTHLY. FURTHER INFORMATION: RISK INFORMATION HOTLINE: (513) 569-7254.

HEAST TABLE 1: SUBCHRONIC AND CHRONIC TOXICITY (OTHER THAN CARCINOGENICITY)

CHEMICAL / LEVEL	DOSE / ROUTE	SPECIES / EXPERIMENT LENGTH	TARGET	CRITICAL EFFECT	Subchronic [RfC] (mg/cu m) / UF	Subchronic [RfD] (mg/kg/day) / UF	Chronic [RfC] (mg/cu m) / UF	Chronic [RfD] (mg/kg/day) / UF	REFERENCE
PARATHION		**000056-38-2**							
NOAEL 0.064 MG/KG/DAY	ORAL	HUMAN	CHOLINESTERASE	DECREASED CHOLINESTERASE ACTIVITY		6E-3 10		6E-3 10	005598
SUBCHRONIC [RfD] COMMENT: THE CHRONIC ORAL [RfD] WAS ADOPTED AS THE SUBCHRONIC ORAL [RfD].									
GENERAL COMMENT: ALSO SEE HEAST TABLE 3: CARCINOGENICITY.									
PARTICULATE MATTER									010034
CHRONIC [RfC] COMMENT: REFER TO APPENDIX A: TECHNICAL INFORMATION, SECTION V ON NATIONAL AMBIENT AIR QUALITY STANDARDS.									
PEBULATE		**001114-71-2**							
NOEL 5 MG/KG/DAY	ORAL: DIET	RAT SUBCHRONIC	BLOOD	INCREASED CLOTTING TIME		5E-2 100		5E-2 100	010036
PENDIMETHALIN		**040487-42-1**							
NOEL 12.5 MG/KG/DAY	ORAL: CAPSULE	DOG 2 YEARS	LIVER	EFFECTS		4E-2 300		IRIS	010037
SUBCHRONIC [RfD] COMMENT: THE CHRONIC ORAL RfD WAS ADOPTED AS THE SUBCHRONIC ORAL [RfD].									
PENTABROMODIPHENYL ETHER		**032534-81-9**							
NOAEL 1.8 MG/KG/DAY	ORAL: GAVAGE	RAT 90 DAYS	LIVER	ALTERED ENZYME ACTIVITIES		2E-2 100		IRIS	010038

CHEMICAL / DOSE LEVEL	ROUTE	SPECIES / EXPERIMENT LENGTH	TARGET	CRITICAL EFFECT	Subchronic [RfC] (mg/cu m) UF	Subchronic [RfD] (mg/kg/day) UF	Chronic [RfC] (mg/cu m) UF	Chronic [RfD] (mg/kg/day) UF	REFERENCE
PENTACHLOROBENZENE		**000608-93-5**							
LOAEL 8.3 MG/KG/DAY		RAT							
	ORAL: DIET	100 DAYS	LIVER	TOXICITY		8E-3		IRIS	010039
			KIDNEY	TOXICITY		1000			
PENTACHLOROCYCLOPENTADIENE		**025329-35-5**							
GENERAL COMMENT: DATA INADEQUATE FOR QUANTITATIVE RISK ASSESSMENT.									005302
PENTACHLORONITROBENZENE		**000082-68-8**							
NOEL 0.75 MG/KG/DAY		DOG							
	ORAL: DIET	2 YEARS	LIVER	TOXICITY		3E-3		IRIS	010040
						300			
SUBCHRONIC [RfD] COMMENT: THE CHRONIC ORAL RfD WAS ADOPTED AS THE SUBCHRONIC ORAL [RfD].									
GENERAL COMMENT: ALSO SEE HEAST TABLE 3: CARCINOGENICITY.									
PENTACHLOROPHENOL		**000087-86-5**							
NOEL 3 MG/KG/DAY		RAT							
	ORAL: GAVAGE	62 DAYS	FETUS	FETOTOXICITY		3E-2		IRIS	005600
						100			
SUBCHRONIC [RfD] COMMENT: BASED ON A TERATOLOGY STUDY WITH EXPOSURE 62 DAYS PRIOR TO MATING AND THROUGHOUT GESTATION AND LACTATION.									
GENERAL COMMENT: ALSO SEE HEAST TABLE 3: CARCINOGENICITY.									
PENTACHLOROPROPENE, 1,1,2,3,3,-		**001600-37-9**							
GENERAL COMMENT: DATA INADEQUATE FOR QUANTITATIVE RISK ASSESSMENT									010041
PENTANE, N-		**000109-66-0**							
GENERAL COMMENT: DATA INADEQUATE FOR QUANTITATIVE RISK ASSESSMENT									005603

CHEMICAL / LEVEL	DOSE / ROUTE	SPECIES / EXPERIMENT LENGTH	TARGET	CRITICAL EFFECT	Subchronic [RfC] (mg/cu m) UF	Subchronic [RfD] (mg/kg/day) UF	Chronic [RfC] (mg/cu m) UF	Chronic [RfD] (mg/kg/day) UF	REFERENCE
PHENANTHRENE		**000085-01-8**							005604
GENERAL COMMENT: DATA INADEQUATE FOR QUANTITATIVE RISK ASSESSMENT									
CHRONIC [RfC] COMMENT: THE CHRONIC INHALATION [RfC] IS CONSIDERED NOT VERIFIABLE (08/04/94) BY THE RfD/RfC WORK GROUP.									
PHENOL		**000108-95-2**							
NOAEL 60 MG/KG/DAY	RAT					6E-1		IRIS	005824
ORAL: GAVAGE			FETUS	DECREASED WEIGHT		100			
SUBCHRONIC [RfD] COMMENT: BASED ON A DEVELOPMENTAL STUDY WITH EXPOSURES DURING DAYS 6-15 OF GESTATION. THE ORAL CHRONIC RfD WAS ADOPTED AS THE SUBCHRONIC ORAL [RfD].									
CHRONIC [RfD] COMMENT: BASED ON A DEVELOPMENTAL STUDY WITH EXPOSURES DURING DAYS 6-15 OF GESTATION.									
							IRIS		010913
CHRONIC RfC COMMENT: THE CHRONIC INHALATION RfC IS CONSIDERED NOT VERIFIABLE (02/22/90) BY THE RfD/RfC WORK GROUP.									
PHENYLENEDIAMINE, M-		**000108-45-2**							
NOEL 6 MG/KG/DAY	RAT					6E-2		IRIS	010044
ORAL	90 DAYS		LIVER	LESIONS		100			
PHENYLENEDIAMINE, O-		**000095-54-5**							010042
GENERAL COMMENT: DATA INADEQUATE FOR QUANTITATIVE RISK ASSESSMENT. ALSO SEE HEAST TABLE 3: CARCINOGENICITY.									
PHENYLENEDIAMINE, P-		**000106-50-3**							
NOAEL 18.7 MG/KG/DAY	RAT							1.9E-1	010043
ORAL: DIET	2 YEARS		WHOLE BODY	EFFECTS				100	

CHEMICAL / LEVEL	DOSE / ROUTE	SPECIES / EXPERIMENT LENGTH	TARGET	CRITICAL EFFECT	Subchronic [RfC] (mg/cu m) UF	Subchronic [RfD] (mg/kg/day) UF	Chronic [RfC] (mg/cu m) UF	Chronic [RfD] (mg/kg/day) UF	REFERENCE
PHENYLMERCURIC ACETATE		**000062-38-4**							
NOAEL	0.0084 MG/KG/DAY ORAL: DIET	RAT 2 YEARS	KIDNEY	DAMAGE		8E-5 100		IRIS	010277
SUBCHRONIC [RfD] COMMENT: THE CHRONIC ORAL RfD WAS ADOPTED AS THE SUBCHRONIC ORAL [RfD]. CALCULATED BY ANALOGY TO MERCURY BY CORRECTING FOR DIFFERENCES IN MOLECULAR WEIGHT.									
CHRONIC [RfD] COMMENT: CALCULATED BY ANALOGY TO MERCURY BY CORRECTING FOR DIFFERENCES IN MOLECULAR WEIGHT.									
PHORATE		**000298-02-2**							
NOAEL	0.033 MG/KG/DAY ORAL: DIET	RAT 13 WEEKS	CHOLINESTERASE	INHIBITION		2E-4 200		2E-4 200	010403
SUBCHRONIC [RfD] COMMENT: THE CHRONIC ORAL [RfD] WAS ADOPTED AS THE SUBCHRONIC ORAL [RfD].									
PHOSGENE		**000075-44-5**							
							IRIS		010045
CHRONIC RfC COMMENT: THE CHRONIC INHALATION RfC IS CONSIDERED NOT VERIFIABLE (10/01/90) BY THE RfD/RfC WORK GROUP.									
PHOSPHINE		**007803-51-2**							
NOEL	0.026 MG/KG/DAY ORAL: DIET	RAT 2 YEARS				3E-4 100		IRIS	010174
SUBCHRONIC [RfD] COMMENT: THE CHRONIC ORAL RfD WAS ADOPTED AS THE SUBCHRONIC ORAL [RfD].									
NOAEL	1.4 MG/CU M INHALATION: INTERMITTENT	RAT 24 WKS	KIDNEY	RENAL EFFECTS	3E-4 1000		3E-5 10000		010173

CHEMICAL / LEVEL	DOSE / ROUTE	SPECIES / EXPERIMENT LENGTH	TARGET	CRITICAL EFFECT	Subchronic [RfC] (mg/cu m) UF	Subchronic [RfD] (mg/kg/day) UF	Chronic [RfC] (mg/cu m) UF	Chronic [RfD] (mg/kg/day) UF	REFERENCE
PHOSPHORUS, WHITE		**007723-14-0**						IRIS	010452
GENERAL COMMENT: FORMERLY LISTED AS PHOSPHORUS (INORGANIC COMPOUNDS).									
PHOTOCHEMICAL OXIDANTS									010172
GENERAL COMMENT: DATA INADEQUATE FOR QUANTITATIVE RISK ASSESSMENT.									
PHTHALIC ACID, M-		**000121-91-5**							010047
GENERAL COMMENT: DATA INADEQUATE FOR QUANTITATIVE RISK ASSESSMENT									
PHTHALIC ACID, O-		**000088-99-3**							010046
GENERAL COMMENT: DATA INADEQUATE FOR QUANTITATIVE RISK ASSESSMENT .									
PHTHALIC ACID, P-		**000100-21-0**							
NOEL	142 MG/KG/DAY ORAL: DIET	RAT 2 YEARS	BLADDER	HYPERPLASIA		1E+0 100		1E+0 100	010048
PHTHALIC ANHYDRIDE		**000085-44-9**							
LOAEL	1562 MG/KG/DAY ORAL: DIET	MOUSE 104 WEEKS	LUNG KIDNEY	HISTOPATHOLOGY HISTOPATHOLOGY		2E+0 1000		IRIS	010049
SUBCHRONIC [RfD] COMMENT: THE CHRONIC ORAL RfD WAS ADOPTED AS THE SUBCHRONIC ORAL [RfD].									
LOAEL	0.1 MG/CU M INHALATION: INTERMITTENT	HUMAN 12 YEARS	NOSE LUNGS	RHINITIS BRONCHITIS	1.2E-1 300		1.2E-1 300		010847
SUBCHRONIC [RfC] COMMENT: THE CHRONIC INHALATION [RfC] WAS ADOPTED AS THE SUBCHRONIC INHALATION [RfC].									

CHEMICAL / LEVEL	DOSE / ROUTE	SPECIES / EXPERIMENT / LENGTH	TARGET	CRITICAL EFFECT	Subchronic [RfC] (mg/cu m) UF	Subchronic [RfD] (mg/kg/day) UF	Chronic [RfC] (mg/cu m) UF	Chronic [RfD] (mg/kg/day) UF	REFERENCE
POLYBROMINATED BIPHENYLS									
LOAEL 0.07 MG/KG/DAY		RAT							
	ORAL: GAVAGE	25 WEEKS	LIVER	INCREASED WEIGHT		7E-5		7E-6	010050
			LIVER	LESIONS		1000		10000	
GENERAL COMMENT: ALSO SEE HEAST TABLE 3: CARCINOGENICITY.									
POTASSIUM CYANIDE		**000151-50-8**							
NOAEL 27 MG/KG/DAY		RAT							
	ORAL: DIET	2 YEARS	WHOLE BODY	DECREASED WEIGHT		5E-2		IRIS	010278
			THYROID	EFFECTS		500			
			NERVE	MYELIN DEGENERATION					
SUBCHRONIC [RfD] COMMENT: CALCULATED BY ANALOGY TO FREE CYANIDE BY CORRECTING FOR DIFFERENCES IN MOLECULAR WEIGHT. THE ORAL CHRONIC RfD WAS ADOPTED AS THE SUBCHRONIC ORAL [RfD].									
CHRONIC [RfD] COMMENT: CALCULATED BY ANALOGY TO FREE CYANIDE BY CORRECTING FOR DIFFERENCES IN MOLECULAR WEIGHT.									
POTASSIUM SILVER CYANIDE		**000506-61-6**							
NOAEL 82.7 MG/KG/DAY		RAT							
	ORAL: DIET	2 YEARS	WHOLE BODY	DECREASED WEIGHT		2E-1		IRIS	010279
			THYROID	EFFECTS		500			
			NERVE	MYELIN DEGENERATION					
SUBCHRONIC [RfD] COMMENT: CALCULATED BY ANALOGY TO FREE CYANIDE BY CORRECTING FOR DIFFERENCES IN MOLECULAR WEIGHT. THE ORAL CHRONIC RfD WAS ADOPTED AS THE SUBCHRONIC ORAL [RfD].									
CHRONIC [RfD] COMMENT: CALCULATED BY ANALOGY TO FREE CYANIDE BY CORRECTING FOR DIFFERENCES IN MOLECULAR WEIGHT.									
PROFLURALIN		**026399-36-0**							
NOEL 3 MG/KG/DAY		RAT							
	ORAL: DIET	SUBCHRONIC		NONE OBSERVED		6E-3		6E-3	010051
						500		500	

HEAST TABLE 1: SUBCHRONIC AND CHRONIC TOXICITY (OTHER THAN CARCINOGENICITY)

CHEMICAL LEVEL	DOSE ROUTE	SPECIES EXPERIMENT LENGTH	TARGET	CRITICAL EFFECT	Subchronic [RfC] (mg/cu m) UF	Subchronic [RfD] (mg/kg/day) UF	Chronic [RfC] (mg/cu m) UF	Chronic [RfD] (mg/kg/day) UF	REFERENCE
PRONAMIDE		**023950-58-5**							
NOEL	7.5 MG/KG/DAY ORAL: DIET	DOG 2 YEARS		NONE OBSERVED		7.5E-2 100		IRIS	010280
SUBCHRONIC [RfD] COMMENT: THE CHRONIC ORAL RfD WAS ADOPTED AS THE SUBCHRONIC ORAL [RfD].									
PROPACHLOR		**001918-16-7**							
NOEL	13.3 MG/KG/DAY ORAL: DIET	RAT 90 DAYS	WHOLE BODY	DECREASED WEIGHT GAIN		1.3E-1 100		IRIS	010175
PROPAZINE		**000139-40-2**							
NOEL	5 MG/KG/DAY ORAL: DIET	RAT 2 YEARS	WHOLE BODY	DECREASED WEIGHT GAIN		2E-2 300		IRIS	010052
SUBCHRONIC [RfD] COMMENT: THE CHRONIC ORAL RfD WAS ADOPTED AS THE SUBCHRONIC ORAL [RfD].									
PROPIONITRILE		**000107-12-0**							
GENERAL COMMENT: DATA INADEQUATE FOR QUANTITATIVE RISK ASSESSMENT									010053
PROPYL ALCOHOL, N-		**000071-23-8**							
GENERAL COMMENT: DATA INADEQUATE FOR QUANTITATIVE RISK ASSESSMENT									005627

HEAST TABLE 1: SUBCHRONIC AND CHRONIC TOXICITY (OTHER THAN CARCINOGENICITY)

May 1995

CHEMICAL LEVEL	DOSE ROUTE	SPECIES EXPERIMENT LENGTH	TARGET	CRITICAL EFFECT	Subchronic [RfC] (mg/cu m) UF	Subchronic [RfD] (mg/kg/day) UF	Chronic [RfC] (mg/cu m) UF	Chronic [RfD] (mg/kg/day) UF	REFERENCE
PROPYLENE GLYCOL		**000057-55-6**							
NOEL	50000 PPM ORAL: DIET	DOG 2 YEARS	ERYTHROCYTES BLOOD BLOOD	DECREASED COUNT DECREASED HEMATOCRIT DECREASED HEMOGLOBIN				2E+1 100	005631
NOEL	6 % ORAL: DIET	RAT 20 WEEKS	KIDNEY	LESIONS		3E+1 100			005629
							IRIS		010914
CHRONIC RfC COMMENT: THE CHRONIC INHALATION RfC IS CONSIDERED NOT VERIFIABLE (04/25/91) BY THE RfD/RfC WORK GROUP.									
PROPYLENE GLYCOL MONOETHYL ETHER		**001569-02-4**							
NOEL	680 MG/KG/DAY ORAL: DRINKING WATER	RAT 30 DAYS	WHOLE BODY	DECREASED WEIGHT GAIN		7E+0 100		7E-1 1000	005488
							IRIS		010915
CHRONIC RfC COMMENT: THE CHRONIC INHALATION RfC IS CONSIDERED NOT VERIFIABLE (04/25/91) BY THE RfD/RfC WORK GROUP.									
PROPYLENE GLYCOL MONOMETHYL ETHER		**000107-98-2**							
NOEL	947 MG/KG/DAY ORAL: GAVAGE	RAT 35 DAYS	LIVER KIDNEY	HISTOPATHOLOGY HISTOPATHOLOGY		7E+0 100		7E-1 1000	005486
NOAEL	1000 PPM INHALATION: INTERMITTENT	RAT, RABBIT 13 WEEKS	CENTRAL NERVOUS SYSTEM	EFFECTS	2E+1 30		IRIS		010276

HEAST TABLE 1: SUBCHRONIC AND CHRONIC TOXICITY (OTHER THAN CARCINOGENICITY)

May 1995

CHEMICAL / LEVEL	DOSE / ROUTE	SPECIES / EXPERIMENT LENGTH	TARGET	CRITICAL EFFECT	Subchronic [RfC] (mg/cu m) / UF	Subchronic [RfD] (mg/kg/day) / UF	Chronic [RfC] (mg/cu m) / UF	Chronic [RfD] (mg/kg/day) / UF	REFERENCE
PROPYLENE OXIDE	**000075-56-9**								
LOAEL 71 MG/CU M	INHALATION: INTERMITTENT	RAT 2 YEARS	EPITHELIUM	UNSPECIFIED			3E-2 100	IRIS	010375
SUBCHRONIC [RfC] COMMENT: THE CHRONIC INHALATION RfC WAS ADOPTED AS THE SUBCHRONIC INHALATION [RFC].									
GENERAL COMMENT: ALSO SEE HEAST TABLE 3: CARCINOGENICITY.									
PYRENE	**000129-00-0**								
NOAEL 75 MG/KG/DAY	ORAL: GAVAGE	MOUSE 13 WKS	KIDNEY	EFFECTS		3E-1 300		IRIS	010176
CHRONIC [RfC] COMMENT: THE CHRONIC INHALATION [RfC] IS CONSIDERED NOT VERIFIABLE (08/04/94) BY THE RfD/RfC WORK GROUP.									010968
PYRIDINE	**000110-86-1**								
NOAEL 1 MG/KG/DAY	ORAL: GAVAGE	RAT 90 DAYS	LIVER	INCREASED WEIGHT		1E-2		IRIS	010055
			LIVER	INCREASED RELATIVE WEIGHT		100			
RDX / (CYCLONITE)	**000121-82-4**								
NOEL 0.3 MG/KG/DAY	ORAL	RAT 105 WEEKS	PROSTATE	INFLAMMATION		3E-3		IRIS	010056
			PROSTATE	HEMOSIDEROSIS		100			
SUBCHRONIC [RfD] COMMENT: THE CHRONIC ORAL RfD WAS ADOPTED AS THE SUBCHRONIC ORAL [RfD].									
GENERAL COMMENT: ALSO SEE HEAST TABLE 3: CARCINOGENICITY.									
RONNEL	**000299-84-3**								
NOAEL 5 MG/KG/DAY	ORAL: DIET	RAT 2 YEARS	LIVER	EFFECTS		5E-2 100		5E-2 100	010057

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IRIS, EPA'S INTEGRATED RISK INFORMATION SYSTEM, IS UPDATED MONTHLY. FURTHER INFORMATION: RISK INFORMATION HOTLINE: (513) 569-7254.

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HEAST TABLE 1: SUBCHRONIC AND CHRONIC TOXICITY (OTHER THAN CARCINOGENICITY)

May 1995

CHEMICAL / LEVEL	DOSE / ROUTE	SPECIES / EXPERIMENT / LENGTH	TARGET	CRITICAL EFFECT	Subchronic [RfC] (mg/cu m) UF	Subchronic [RfD] (mg/kg/day) UF	Chronic [RfC] (mg/cu m) UF	Chronic [RfD] (mg/kg/day) UF	REFERENCE
SELENIOUS ACID		**007783-00-8**							
NOAEL 0.046 MG/KG/DAY		HUMAN							
	ORAL: DIET		WHOLE BODY	SELENOSIS, CLINICAL		5E-3 3		IRIS	010504
SUBCHRONIC [RfD] COMMENT: THE CHRONIC ORAL RfD WAS ADOPTED AS THE SUBCHRONIC ORAL [RfD].									
SELENIUM		**007782-49-2**							
NOAEL 0.853 MG/DAY		HUMAN							
	ORAL: DIET		WHOLE BODY	SELENOSIS, CLINICAL		5E-3 3		IRIS	010404
SUBCHRONIC [RfD] COMMENT: THE CHRONIC ORAL RfD WAS ADOPTED AS THE SUBCHRONIC ORAL [RfD].									
SELENOUREA		**000630-10-4**							
NOAEL 0.072 MG/KG/DAY		HUMAN							
	ORAL: DIET		WHOLE BODY	SELENOSIS		5E-3 15		5E-3 15	010473
CHRONIC [RfD] COMMENT: WITHDRAWN FROM IRIS (05/01/91). UNDER REVIEW, CURRENT NUMBER SUBJECT TO CHANGE.									
SILVER		**007440-22-4**							
LOAEL 0.014 MG/KG/DAY		HUMAN							
	IV	2-9 YEARS	SKIN	ARGYRIA		5E-3 3		IRIS	010453
SUBCHRONIC [RfD] COMMENT: THE CHRONIC ORAL RfD WAS ADOPTED AS THE SUBCHRONIC ORAL [RfD]. CHRONIC [RfD] COMMENT: BASED ON A TOTAL IV DOSE OF 1 GRAM.									

HEAST TABLE 1: SUBCHRONIC AND CHRONIC TOXICITY (OTHER THAN CARCINOGENICITY)

CHEMICAL / LEVEL	DOSE / ROUTE	SPECIES / EXPERIMENT LENGTH	TARGET	CRITICAL EFFECT	Subchronic [RfC] (mg/cu m) UF	Subchronic [RfD] (mg/kg/day) UF	Chronic [RfC] (mg/cu m) UF	Chronic [RfD] (mg/kg/day) UF	REFERENCE
SILVER CYANIDE		**000506-64-9**							
NOAEL 55.7 MG/KG/DAY		RAT							
	ORAL: DIET	2 YEARS	WHOLE BODY	DECREASED WEIGHT		1E-1		IRIS	010283
			THYROID	EFFECTS		500			
			NERVE	MYELIN DEGENERATION					

SUBCHRONIC [RfD] COMMENT: CALCULATED BY ANALOGY TO FREE CYANIDE BY CORRECTING FOR DIFFERENCES IN MOLECULAR WEIGHT. THE ORAL CHRONIC RfD WAS ADOPTED AS THE SUBCHRONIC ORAL [RfD].
CHRONIC [RfD] COMMENT: CALCULATED BY ANALOGY TO FREE CYANIDE BY CORRECTING FOR DIFFERENCES IN MOLECULAR WEIGHT.

SIMAZINE		**000122-34-9**							
NOAEL 0.52 MG/(KG-DAY)		RAT							
	ORAL: DIET	2 YEARS	WHOLE BODY	DECREASED WEIGHT GAIN		5E-3		IRIS	010955
			BLOOD	HEMATOLOGICAL EFFECTS		100			

SUBCHRONIC [RfD] COMMENT: THE ORAL CHRONIC RfD WAS ADOPTED AS THE SUBCHRONIC ORAL [RfD].
GENERAL COMMENT: ALSO SEE HEAST TABLE 3: CARCINOGENICITY

SODIUM CYANIDE		**000143-33-9**							
NOAEL 20.4 MG/KG/DAY		RAT							
	ORAL: DIET		CENTRAL NERVOUS SYSTEM	EFFECTS		4E-2		IRIS	005640
						500			

SUBCHRONIC [RfD] COMMENT: CALCULATED BY ANALOGY TO FREE CYANIDE BY CORRECTING FOR DIFFERENCES IN MOLECULAR WEIGHT. THE ORAL CHRONIC RfD WAS ADOPTED AS THE SUBCHRONIC ORAL [RfD].
CHRONIC [RfD] COMMENT: CALCULATED BY ANALOGY TO FREE CYANIDE BY CORRECTING FOR DIFFERENCES IN MOLECULAR WEIGHT.

SODIUM DIETHYLDITHIOCARBAMATE		**000148-18-5**							
NOEL 30 MG/KG/DAY		RAT							
	ORAL	90 DAYS	EYE	CATARACTS		3E-1		IRIS	005644
			WHOLE BODY	DECREASED WEIGHT		100			

GENERAL COMMENT: ALSO SEE HEAST TABLE 3: CARCINOGENICITY.

CHEMICAL / LEVEL	DOSE / ROUTE	SPECIES / EXPERIMENT LENGTH	TARGET	CRITICAL EFFECT	Subchronic [RfC] (mg/cu m) UF	Subchronic [RfD] (mg/kg/day) UF	Chronic [RfC] (mg/cu m) UF	Chronic [RfD] (mg/kg/day) UF	REFERENCE
SODIUM METAVANADATE		**013718-26-8**							
NOAEL 10 PPM	ORAL: DRINKING WATER	RAT 3 MONTHS	KIDNEY	IMPAIRED FUNCTION		1E-2 100		1E-3 1000	005735
STRONTIUM, STABLE		**007440-24-6**							
NOAEL 190 MG/KG/DAY	ORAL: DRINKING WATER	RAT, YOUNG 20 DAYS	BONE	RACHITIC CHANGES		6E-1 300		IRIS	010842
SUBCHRONIC [RfD] COMMENT: THE CHRONIC ORAL RfD WAS ADOPTED AS THE SUBCHRONIC ORAL [RfD].									
STRYCHNINE		**000057-24-9**							
LOAEL 2.5 MG/KG/DAY	ORAL: GAVAGE	RAT 28 DAYS	UNSPECIFIED UNSPECIFIED	TOXICITY HISTOPATHOLOGY		3E-3 1000		IRIS	010285
GENERAL COMMENT: THE LOAEL IS ALSO THE FEL.									
STYRENE		**000100-42-5**						IRIS	010059
NOAEL 22 PPM	INHALATION: OCCUPATIONAL	HUMAN	CENTRAL NERVOUS SYSTEM	EFFECTS	3E+0 10		IRIS		010511
CHRONIC [RfC] COMMENT: THE MEAN DURATION OF EXPOSURE FOR 50 WORKERS WAS 8.6 YEARS. AIR EXPOSURE CONCENTRATIONS WERE ESTIMATED FROM THE SUMMATION OF THE PRINCIPLE URINARY METABOLITES OF STYRENE, MANDELIC ACID AND PHENYLGLYOXYLIC ACID. SEE IRIS FOR MORE INFORMATION.									
GENERAL COMMENT: ALSO SEE HEAST TABLE 3: CARCINOGENICITY.									
SUCCINONITRILE		**000110-61-2**							
GENERAL COMMENT: DATA INADEQUATE FOR QUANTITATIVE RISK ASSESSMENT									005585

CHEMICAL LEVEL	DOSE ROUTE	SPECIES EXPERIMENT LENGTH	TARGET	CRITICAL EFFECT	Subchronic [RfC] (mg/cu m) UF	Subchronic [RfD] (mg/kg/day) UF	Chronic [RfC] (mg/cu m) UF	Chronic [RfD] (mg/kg/day) UF	REFERENCE
SULFUR DIOXIDE		**007446-09-5**							
CHRONIC [RfC] COMMENT: REFER TO APPENDIX A: TECHNICAL INFORMATION, SECTION V ON NATIONAL AMBIENT AIR QUALITY STANDARDS.									010505
SULFUR OXIDES									
CHRONIC [RfC] COMMENT: REFER TO APPENDIX A: TECHNICAL INFORMATION, SECTION V ON NATIONAL AMBIENT AIR QUALITY STANDARDS.									010035
SULFURIC ACID		**007664-93-9**							
NOAEL 0.066-0.098 MG/CU M	INHALATION	HUMAN	RESPIRATORY SYSTEM	RESPIRATORY EFFECTS					005647
CHRONIC [RfC] COMMENT: REPORTED EFFECTS OCCURRED AT PORTAL OF ENTRY. ESTIMATES OF MG/DAY REFERENCE DOSES ARE INAPPROPRIATE BECAUSE EFFECTS AT PORTAL OF ENTRY DEPEND ON CONCENTRATION IN AIR. AN ACCEPTABLE AIR CONCENTRATION OF 0.07 MG/CU M WAS ESTIMATED BY CARSON ET AL. (1981) FROM AVAILABLE DATA.									
TEMEPHOS		**003383-96-8**							
NOAEL 200 PPM	ORAL: DIET	RAT 99 DAYS			2E-1 100		2E-2 1000		010060
TERBUFOS		**013071-79-9**							
NOAEL 0.0025 MG/KG/DAY	ORAL: DIET	DOG 6 MONTHS	CHOLINESTERASE	INHIBITION	2.5E-5 100		2.5E-5 100		010408
TEREPHTHALIC ACID		**000100-21-0**							
GENERAL COMMENT: DATA INADEQUATE FOR QUANTITATIVE RISK ASSESSMENT.									010474
TETRACHLOROAZOXYBENZENE		**021232-47-3**							
GENERAL COMMENT: DATA INADEQUATE FOR QUANTITATIVE RISK ASSESSMENT									010064

CHEMICAL / LEVEL	DOSE / ROUTE	SPECIES / EXPERIMENT LENGTH	TARGET	CRITICAL EFFECT	Subchronic [RfC] (mg/cu m) UF	Subchronic [RfD] (mg/kg/day) UF	Chronic [RfC] (mg/cu m) UF	Chronic [RfD] (mg/kg/day) UF	REFERENCE
TETRACHLOROBENZENE, 1,2,4,5- 000095-94-3									
NOAEL 0.34 MG/KG/DAY		RAT							
	ORAL: DIET	13 WEEKS	KIDNEY	LESIONS		3E-3 100		IRIS	010286
TETRACHLOROCYCLOPENTADIENE 000695-77-2									
GENERAL COMMENT: DATA INADEQUATE FOR QUANTITATIVE RISK ASSESSMENT									005303
TETRACHLOROETHANE, 1,1,1,2- 000630-20-6									
LOAEL 89.3 MG/KG/DAY		RAT							
	ORAL: GAVAGE	103 WEEKS	LIVER	LESIONS		3E-2		IRIS	010407
			KIDNEY	LESIONS		3000			
SUBCHRONIC [RfD] COMMENT: THE CHRONIC ORAL RfD WAS ADOPTED AS THE SUBCHRONIC ORAL [RfD].									
GENERAL COMMENT: ALSO SEE HEAST TABLE 3: CARCINOGENICITY.									
TETRACHLOROETHYLENE 000127-18-4									
NOAEL 14 MG/KG/DAY		MOUSE							
	ORAL	6 WEEKS	LIVER	HEPATOTOXICITY		1E-1 100		IRIS	005650
GENERAL COMMENT: ALSO SEE HEAST TABLE 3: CARCINOGENICITY.									
TETRACHLOROHYDRAZOBENZENE 071753-42-9									
GENERAL COMMENT: DATA INADEQUATE FOR QUANTITATIVE RISK ASSESSMENT									010065
TETRACHLOROPHENOL, 2,3,4,5- 004901-51-3									
GENERAL COMMENT: DATA INADEQUATE FOR QUANTITATIVE RISK ASSESSMENT									005324

HEAST TABLE 1: SUBCHRONIC AND CHRONIC TOXICITY (OTHER THAN CARCINOGENICITY)

CHEMICAL LEVEL	DOSE ROUTE	SPECIES EXPERIMENT LENGTH	TARGET	CRITICAL EFFECT	Subchronic [RfC] (mg/cu m) UF	Subchronic [RfD] (mg/kg/day) UF	Chronic [RfC] (mg/cu m) UF	Chronic [RfD] (mg/kg/day) UF	REFERENCE
TETRACHLOROPHENOL, 2,3,4,6- **000058-90-2**									
NOAEL 25 MG/KG/DAY		RAT							
	ORAL: GAVAGE	90 DAYS	LIVER	INCREASED WEIGHT		3E-1		IRIS	005323
			LIVER	CENTRILOBULAR HYPERTROPHY		100			
TETRACHLOROPHENOL, 2,3,5,6- **000935-95-5**									005325
GENERAL COMMENT: DATA INADEQUATE FOR QUANTITATIVE RISK ASSESSMENT									
TETRACHLOROPROPENE, 1,1,2,3- **010436-39-2**									010066
GENERAL COMMENT: DATA INADEQUATE FOR QUANTITATIVE RISK ASSESSMENT									
TETRACHLOROVINPHOS / (STIROPHOS) **000961-11-5**									
NOEL 3.1 MG/KG/DAY		DOG							
	ORAL: DIET	2 YEARS	LIVER	INCREASED WEIGHT		3E-2		IRIS	010067
			KIDNEY	INCREASED WEIGHT		100			
			WHOLE BODY						
SUBCHRONIC [RfD] COMMENT: THE CHRONIC ORAL RfD WAS ADOPTED AS THE SUBCHRONIC ORAL [RfD].									
GENERAL COMMENT: ALSO SEE HEAST TABLE 3: CARCINOGENICITY.									
TETRAETHYL DITHIOPYROPHOSPHATE **003689-24-5**									
NOEL 0.5 MG/KG/DAY		RAT							
	ORAL: DIET	3 MONTHS	ERYTHROCYTES	DECREASED CHOLINESTERASE ACTIVITY		5E-3		IRIS	010287
						100			
			BLOOD	DECREASED CHOLINESTERASE ACTIVITY					
THALLIC OXIDE **001314-32-5**									010956
CHRONIC [RfD] COMMENT: THE CHRONIC ORAL [RfD] IS CONSIDERED NOT VERIFIABLE (07/22/93) BY THE RfD/RfC WORK GROUP.									

HEAST TABLE 1: SUBCHRONIC AND CHRONIC TOXICITY (OTHER THAN CARCINOGENICITY)

May 1995

CHEMICAL LEVEL	DOSE ROUTE	SPECIES EXPERIMENT LENGTH	TARGET	CRITICAL EFFECT	Subchronic [RfC] (mg/cu m) UF	Subchronic [RfD] (mg/kg/day) UF	Chronic [RfC] (mg/cu m) UF	Chronic [RfD] (mg/kg/day) UF	REFERENCE
THALLIUM (I) ACETATE		**000563-68-8**							
NOAEL 0.26 MG/KG/DAY		RAT							
	ORAL	90 DAYS	LIVER	INCREASED SGOT		9E-4		IRIS	005664
			BLOOD	INCREASED SERUM LDH		300			
			HAIR	ALOPECIA					
SUBCHRONIC [RfD] COMMENT: CALCULATED BY ANALOGY TO THALLIUM (I) SULFATE BY CORRECTING FOR MOLECULAR WEIGHT DIFFERENCES.									
CHRONIC [RfD] COMMENT: CALCULATED BY ANALOGY TO THALLIUM (I) SULFATE BY CORRECTING FOR MOLECULAR WEIGHT DIFFERENCES.									
THALLIUM (I) CARBONATE		**006533-73-9**							
NOAEL 0.23 MG/KG/DAY		RAT							
	ORAL	90 DAYS	LIVER	INCREASED SGOT		8E-4		IRIS	005668
			BLOOD	INCREASED SERUM LDH		300			
			HAIR	ALOPECIA					
SUBCHRONIC [RfD] COMMENT: CALCULATED BY ANALOGY TO THALLIUM (I) SULFATE BY CORRECTING FOR MOLECULAR WEIGHT DIFFERENCES.									
CHRONIC [RfD] COMMENT: CALCULATED BY ANALOGY TO THALLIUM (I) SULFATE BY CORRECTING FOR MOLECULAR WEIGHT DIFFERENCES.									
THALLIUM (I) CHLORIDE		**007791-12-0**							
NOAEL 0.23 MG/KG/DAY		RAT							
	ORAL	90 DAYS	LIVER	INCREASED SGOT		8E-4		IRIS	005672
			BLOOD	INCREASED SERUM LDH		300			
			HAIR	ALOPECIA					
SUBCHRONIC [RfD] COMMENT: CALCULATED BY ANALOGY TO THALLIUM (I) SULFATE BY CORRECTING FOR MOLECULAR WEIGHT DIFFERENCES.									
CHRONIC [RfD] COMMENT: CALCULATED BY ANALOGY TO THALLIUM (I) SULFATE BY CORRECTING FOR MOLECULAR WEIGHT DIFFERENCES.									
THALLIUM, INSOLUBLE SALTS									
CHRONIC [RfD] COMMENT: REFER TO IRIS FOR OTHER THALLIUM SALTS.									010458

CHEMICAL / LEVEL	DOSE / ROUTE	SPECIES / EXPERIMENT / LENGTH	TARGET	CRITICAL EFFECT	Subchronic [RfC] (mg/cu m) / UF	Subchronic [RfD] (mg/kg/day) / UF	Chronic [RfC] (mg/cu m) / UF	Chronic [RfD] (mg/kg/day) / UF	REFERENCE
THALLIUM (I) NITRATE		**010102-45-1**							
NOAEL 0.26 MG/KG/DAY	RAT		LIVER	INCREASED SGOT		9E-4		IRIS	005676
ORAL	90 DAYS		BLOOD	INCREASED SERUM LDH		300			
			HAIR	ALOPECIA					
SUBCHRONIC [RfD] COMMENT: CALCULATED BY ANALOGY TO THALLIUM (I) SULFATE BY CORRECTING FOR MOLECULAR WEIGHT DIFFERENCES.									
CHRONIC [RfD] COMMENT: CALCULATED BY ANALOGY TO THALLIUM (I) SULFATE BY CORRECTING FOR MOLECULAR WEIGHT DIFFERENCES.									
THALLIUM SELENITE		**012039-52-0**							010957
CHRONIC [RfD] COMMENT: THE CHRONIC ORAL RfD WAS WITHDRAWN FROM IRIS (08/01/93). THE CHRONIC ORAL [RfD] IS CONSIDERED NOT VERIFIABLE (07/22/93) BY THE RfD/RfC WORK GROUP.									
THALLIUM (I) SULFATE		**007446-18-6**							
NOAEL 0.25 MG/KG/DAY	RAT		LIVER	INCREASED SGOT		8E-4		IRIS	005682
ORAL	90 DAYS		BLOOD	INCREASED SERUM LDH		300			
			HAIR	ALOPECIA					
THIOCYANOMETHYLTHIO)BENZOTHIAZOLE, 2-(		**021564-17-0**							
NOEL 25 MG/KG/DAY.	RAT					3E-1		3E-2	010068
ORAL: DIET	SUBCHRONIC		STOMACH	LESIONS		100		1000	
SUBCHRONIC [RfD] COMMENT: BASED ON CONFIDENTIAL BUSINESS INFORMATION DATA									
CHRONIC [RfD] COMMENT: BASED ON CONFIDENTIAL BUSINESS INFORMATION DATA									

CHEMICAL / LEVEL	DOSE / ROUTE	SPECIES / EXPERIMENT LENGTH	TARGET	CRITICAL EFFECT	Subchronic [RfC] (mg/cu m) / UF	Subchronic [RfD] (mg/kg/day) / UF	Chronic [RfC] (mg/cu m) / UF	Chronic [RfD] (mg/kg/day) / UF	REFERENCE
THIOFANOX		**013196-18-4**							
NOAEL 0.025 MG/KG/DAY		DOG							
	ORAL	8 DAYS	CHOLINESTERASE	DECREASED CHOLINESTERASE ACTIVITY		3E-4 100		3E-4 100	010069
SUBCHRONIC [RfD] COMMENT: BASED ON CONFIDENTIAL BUSINESS INFORMATION DATA.									
CHRONIC [RfD] COMMENT: BASED ON CONFIDENTIAL BUSINESS INFORMATION DATA.									
THIRAM		**000137-26-8**							
								IRIS	010459
NOAEL 0.61 MG/KG/DAY		FERRET							
	ORAL	24 WEEKS	REPRODUCTION	IMPAIRED		6E-3 100			010070
TIN AND COMPOUNDS									
NOAEL 2000 PPM		RAT							
	ORAL: DIET	2 YEARS	LIVER	LESIONS		6E-1 100		6E-1 100	005688
			KIDNEY	LESIONS					
SUBCHRONIC [RfD] COMMENT: CALCULATED BY ANALOGY TO STANNOUS CHLORIDE BY CORRECTING FOR DIFFERENCES IN MOLECULAR WEIGHT.									
CHRONIC [RfD] COMMENT: CALCULATED BY ANALOGY TO STANNOUS CHLORIDE BY CORRECTING FOR DIFFERENCES IN MOLECULAR WEIGHT.									
TOLUENE		**000108-88-3**							
NOAEL 223 MG/KG/DAY		RAT							
	ORAL: GAVAGE	13 WEEKS	LIVER	ALTERED WEIGHT		2E+0 100		IRIS	010469
			KIDNEY	ALTERED WEIGHT					
							IRIS		010844
SUBCHRONIC [RfC] COMMENT: CONTACT THE SUPERFUND HEALTH RISK TECHNICAL SUPPORT CENTER: (513) 569-7300.									

HEAST TABLE 1: SUBCHRONIC AND CHRONIC TOXICITY (OTHER THAN CARCINOGENICITY)

CHEMICAL LEVEL	DOSE ROUTE	SPECIES EXPERIMENT LENGTH	TARGET	CRITICAL EFFECT	Subchronic [RfC] (mg/cu m) UF	Subchronic [RfD] (mg/kg/day) UF	Chronic [RfC] (mg/cu m) UF	Chronic [RfD] (mg/kg/day) UF	REFERENCE
TOLUENE-2,5-DIAMINE		**000095-70-5**							
NOAEL 56 MG/KG/DAY		RAT				6E-1		6E-1	010073
	ORAL: DIET	78 WEEKS				100		100	
SUBCHRONIC [RfD] COMMENT: DETERMINED FROM DATA OBTAINED WITH THE SULFATE SALT.									
CHRONIC [RfD] COMMENT: DETERMINED FROM DATA OBTAINED WITH THE SULFATE SALT.									
TOLUENE-2,6-DIAMINE		**000823-40-5**							
NOAEL 16 MG/KG/DAY		RAT				2E-1		2E-1	010074
	ORAL: DIET	2 YEARS				100		100	
SUBCHRONIC [RfD] COMMENT: DETERMINED FROM DATA OBTAINED WITH THE DIHYDROCHLORIDE.									
CHRONIC [RfD] COMMENT: DETERMINED FROM DATA OBTAINED WITH THE DIHYDROCHLORIDE.									
TOLUENEDIAMINE, 2,3-		**002687-25-4**							010071
GENERAL COMMENT: DATA INADEQUATE FOR QUANTITATIVE RISK ASSESSMENT									
TOLUENEDIAMINE, 3,4-		**000496-72-0**							010072
GENERAL COMMENT: DATA INADEQUATE FOR QUANTITATIVE RISK ASSESSMENT									
TOLUIDINE, M-		**000108-44-1**							010075
GENERAL COMMENT: DATA INADEQUATE FOR QUANTITATIVE RISK ASSESSMENT									
TRIALLATE		**002303-17-5**							
NOAEL 1.275 MG/KG/DAY		DOG				1.3E-2		IRIS	010076
	ORAL: DIET	24 MONTHS	SPLEEN	EFFECTS		100			
			LIVER	EFFECTS					
SUBCHRONIC [RfD] COMMENT: THE CHRONIC ORAL RfD WAS ADOPTED AS THE SUBCHRONIC ORAL [RfD].									

CHEMICAL / LEVEL	DOSE / ROUTE	SPECIES / EXPERIMENT / LENGTH	TARGET	CRITICAL EFFECT	Subchronic [RfC] (mg/cu m) UF	Subchronic [RfD] (mg/kg/day) UF	Chronic [RfC] (mg/cu m) UF	Chronic [RfD] (mg/kg/day) UF	REFERENCE
TRIBROMOBENZENE, 1,2,4- 000615-54-3									
NOAEL	5 MG/KG/DAY	RAT							
	ORAL: DIET	45 OR 90 DAYS	LIVER	ALTERED WEIGHT		5E-2		IRIS	010077
			LIVER	ENZYME INDUCTION		100			
TRICHLORO-1,2,2-TRIFLUOROETHANE, 1,1,2- 000076-13-1								IRIS	010460
NOEL	2000 PPM	RAT							
	INHALATION: INTERMITTENT	24 MONTHS	WHOLE BODY	DECREASED WEIGHT	3E+1	3E+0	3E+1		010376
					100	100	100		
SUBCHRONIC [RfD] COMMENT: BASED ON ROUTE TO ROUTE EXTRAPOLATION USING AN ABSORPTION FACTOR OF 0.2.									
TRICHLORO-2'-HYDROXYDIPHENYLETHER, 2,2,4'- 003380-34-5									
NOEL	500 MG/KG/DAY	RAT							
	ORAL	4 WEEKS	WHOLE BODY	DECREASED WEIGHT		4E+0			005492
						100			
TRICHLOROBENZENE, 1,2,4- 000120-82-1									
NOAEL	100 PPM	RAT							
	ORAL: DRINKING WATER		ADRENAL	INCREASED WEIGHT		1E-2		IRIS	010506
						1000			
SUBCHRONIC [RfD] COMMENT: BASED ON A MULTIGENERATION REPRODUCTION STUDY.									
NOAEL	104 PPM	RAT, RABBIT, DOG, MONKEY							
	INHALATION	6 AND 26 WEEKS	LIVER	NON-ADVERSE WEIGHT CHANGES	2E+0		2E-1		010958
					100		1000		
TRICHLOROCYCLOPENTADIENE 077323-84-3									
GENERAL COMMENT: DATA INADEQUATE FOR QUANTITATIVE RISK ASSESSMENT									005304

HEAST TABLE 1: SUBCHRONIC AND CHRONIC TOXICITY (OTHER THAN CARCINOGENICITY)

CHEMICAL LEVEL	DOSE ROUTE	SPECIES EXPERIMENT LENGTH	TARGET	CRITICAL EFFECT	Subchronic [RfC] (mg/cu m) UF	Subchronic [RfD] (mg/kg/day) UF	Chronic [RfC] (mg/cu m) UF	Chronic [RfD] (mg/kg/day) UF	REFERENCE
TRICHLOROETHANE, 1,1,1-		**000071-55-6**							
SUBCHRONIC [RfD] COMMENT: CONTACT THE SUPERFUND HEALTH RISK TECHNICAL SUPPORT CENTER: (513) 569-7300.									
SUBCHRONIC [RfC] COMMENT: CONTACT THE SUPERFUND HEALTH RISK TECHNICAL SUPPORT CENTER: (513) 569-7300.									
TRICHLOROETHANE, 1,1,2-		**000079-00-5**							
NOAEL 3.9 MG/KG/DAY	MOUSE					4E-2			005702
	ORAL: DRINKING WATER	90 DAYS	BLOOD	CLINICAL CHEMISTRY ALTERATIONS		100		IRIS	
GENERAL COMMENT: ALSO SEE HEAST TABLE 3: CARCINOGENICITY.									
TRICHLOROFLUOROMETHANE		**000075-69-4**						IRIS	005502
LOAEL 1000 MG/KG/DAY	RAT					7E-1			005500
	ORAL	6 WEEKS	WHOLE BODY	INCREASED MORTALITY		1000			
SUBCHRONIC [RfC] COMMENT: ALSO SEE HEAST TABLE 2: ALTERNATE METHODS - SUBCHRONIC AND CHRONIC TOXICITY (OTHER THAN CARCINOGENICITY)									
CHRONIC [RfC] COMMENT: ALSO SEE HEAST TABLE 2: ALTERNATE METHODS - SUBCHRONIC AND CHRONIC TOXICITY (OTHER THAN CARCINOGENICITY)									
TRICHLOROPHENOL, 2,3,4-		**015950-66-0**							005330
GENERAL COMMENT: DATA INADEQUATE FOR QUANTITATIVE RISK ASSESSMENT									
TRICHLOROPHENOL, 2,3,5-		**000933-78-8**							005331
GENERAL COMMENT: DATA INADEQUATE FOR QUANTITATIVE RISK ASSESSMENT									
TRICHLOROPHENOL, 2,3,6-		**000933-75-5**							005332
GENERAL COMMENT: DATA INADEQUATE FOR QUANTITATIVE RISK ASSESSMENT									

CHEMICAL / LEVEL	DOSE / ROUTE	SPECIES / EXPERIMENT / LENGTH	TARGET	CRITICAL EFFECT	Subchronic [RfC] (mg/cu m) / UF	Subchronic [RfD] (mg/kg/day) / UF	Chronic [RfC] (mg/cu m) / UF	Chronic [RfD] (mg/kg/day) / UF	REFERENCE
TRICHLOROPHENOL, 2,4,5- 000095-95-4									
NOEL 1000 PPM		RAT							
	ORAL: DIET	98 DAYS	LIVER	HEPATOTOXICITY		1E+0		IRIS	005329
			KIDNEY	EFFECTS		100			
							IRIS		010919
CHRONIC RfC COMMENT: THE CHRONIC INHALATION RfC IS CONSIDERED NOT VERIFIABLE (04/24/91) BY THE RfD/RfC WORK GROUP.									
TRICHLOROPHENOL, 2,4,6- 000088-06-2									
							IRIS		010461
CHRONIC RfC COMMENT: THE CHRONIC INHALATION RfC IS CONSIDERED NOT VERIFIABLE (04/24/91) BY THE RfD/RfC WORK GROUP.									
GENERAL COMMENT: ALSO SEE HEAST TABLE 3: CARCINOGENICITY.									
TRICHLOROPHENOL, 3,4,5- 000609-19-8									
GENERAL COMMENT: DATA INADEQUATE FOR QUANTITATIVE RISK ASSESSMENT									005333
TRICHLOROPHENOXY) PROPIONIC ACID, 2(2,4,5- 000093-72-1									
NOEL 0.75 MG/KG/DAY		DOG							
	ORAL: DIET	2 YEARS	LIVER	HISTOPATHOLOGY		8E-3		IRIS	010284
						100			
SUBCHRONIC [RfD] COMMENT: THE CHRONIC ORAL RfD WAS ADOPTED AS THE SUBCHRONIC ORAL [RfD].									
TRICHLOROPHENOXYACETIC ACID, 2,4,5- 000093-76-5									
								IRIS	010178
NOEL 10 MG/KG/DAY		RAT							
	ORAL: DIET	90 DAYS	KIDNEY	WEIGHT EFFECTS		1E-1			010179
			LIVER	WEIGHT EFFECTS		100			
TRICHLOROPROPANE, 1,1,1- 007789-89-1									
GENERAL COMMENT: DATA INADEQUATE FOR QUANTITATIVE RISK ASSESSMENT									005705

HEAST TABLE 1: SUBCHRONIC AND CHRONIC TOXICITY (OTHER THAN CARCINOGENICITY)

May 1995

CHEMICAL / LEVEL	DOSE / ROUTE	SPECIES / EXPERIMENT / LENGTH	TARGET	CRITICAL EFFECT	Subchronic [RfC] (mg/cu m) / UF	Subchronic [RfD] (mg/kg/day) / UF	Chronic [RfC] (mg/cu m) / UF	Chronic [RfD] (mg/kg/day) / UF	REFERENCE
TRICHLOROPROPANE, 1,1,2- 000598-77-6									
NOEL	100 MG/L	RAT				5E-2		IRIS	005708
	ORAL: DRINKING WATER	13 WEEKS	LIVER	HISTOPATHOLOGY		300			
			KIDNEY	HISTOPATHOLOGY					
			THYROID	HISTOPATHOLOGY					
TRICHLOROPROPANE, 1,2,2- 003175-23-3									005706
GENERAL COMMENT: DATA INADEQUATE FOR QUANTITATIVE RISK ASSESSMENT									
TRICHLOROPROPANE, 1,2,3- 000096-18-4									
NOAEL	8 MG/KG/DAY	RAT				6E-2		IRIS	005714
	ORAL	120 DAYS	WHOLE BODY	TOXICITY		100			
			LIVER	LESIONS					
			KIDNEY	LESIONS					
			ERYTHROCYTES	DECREASED COUNT					
			BLOOD	DECREASED HEMATOCRIT					
			BLOOD	DECREASED HEMOGLOBIN					
GENERAL COMMENT: ALSO SEE HEAST TABLE 3: CARCINOGENICITY.									
TRICHLOROPROPENE, 1,2,3- 000096-19-5									
NOEL	18 MG/CU M	DOG				5E-3		5E-3	010078
	INHALATION: INTERMITTENT	66 WEEKS	EYE	IRRITATION		100		100	
SUBCHRONIC [RfD] COMMENT: BASED ON ROUTE TO ROUTE EXTRAPOLATION USING AN ABSORPTION FACTOR OF 0.5.									
CHRONIC [RfD] COMMENT: BASED ON ROUTE TO ROUTE EXTRAPOLATION USING AN ABSORPTION FACTOR OF 0.5.									

CHEMICAL / LEVEL	DOSE / ROUTE	SPECIES / EXPERIMENT / LENGTH	TARGET	CRITICAL EFFECT	Subchronic [RfC] (mg/cu m) UF	Subchronic [RfD] (mg/kg/day) UF	Chronic [RfC] (mg/cu m) UF	Chronic [RfD] (mg/kg/day) UF	REFERENCE
TRICHLOROTOLUENE, 2,3,6- 002077-46-5									
LOAEL 0.5 PPM		RAT							
	ORAL: DIET	28 DAYS	LIVER	LESIONS		5E-5			005335
			KIDNEY	LESIONS		1000			
			THYROID	LESIONS					
TRICHLOROTOLUENE, ALPHA,2,6- 002014-83-7									
LOAEL 0.5 PPM		RAT							
	ORAL: DIET	28 DAYS	LIVER	LESIONS		5E-5			005339
			KIDNEY	LESIONS		1000			
			THYROID	LESIONS					
TRIFLURALIN 001582-09-8									
NOEL 0.75 MG/KG/DAY		DOG							
	ORAL: DIET	12 MONTHS	LIVER	INCREASED WEIGHT		7.5E-3		IRIS	010080
			BLOOD	METHEMOGLOBINEMIA		100			
SUBCHRONIC [RfD] COMMENT: THE CHRONIC ORAL RfD WAS ADOPTED AS THE SUBCHRONIC ORAL [RfD].									
GENERAL COMMENT: ALSO SEE HEAST TABLE 3: CARCINOGENICITY.									
TRIMETHYLBENZENES									
GENERAL COMMENT: DATA INADEQUATE FOR QUANTITATIVE RISK ASSESSMENT									005727
TRINITROBENZENE, 1,3,5- 000099-35-4									
NOAEL 0.51 MG/KG/DAY		RAT							
	ORAL: WATER	16 WEEKS	SPLEEN	INCREASED WEIGHT		5E-4		IRIS	010081
						1000			
SUBCHRONIC [RfD] COMMENT: CALCULATED FROM DATA OBTAINED WITH 1,3-DINITROBENZENE.									
CHRONIC [RfD] COMMENT: CALCULATED FROM DATA OBTAINED WITH 1,3-DINITROBENZENE.									

HEAST TABLE 1: SUBCHRONIC AND CHRONIC TOXICITY (OTHER THAN CARCINOGENICITY)

CHEMICAL LEVEL	DOSE ROUTE	SPECIES EXPERIMENT LENGTH	TARGET	CRITICAL EFFECT	Subchronic [RfC] (mg/cu m) UF	Subchronic [RfD] (mg/kg/day) UF	Chronic [RfC] (mg/cu m) UF	Chronic [RfD] (mg/kg/day) UF	REFERENCE
TRINITROPHENOLS									010082
GENERAL COMMENT: DATA INADEQUATE FOR QUANTITATIVE RISK ASSESSMENT									
TRINITROPHENYLMETHYLNITRAMINE		**000479-45-8**							
LOAEL 125 MG/KG/DAY		RABBIT							
	ORAL: GAVAGE	9 MONTHS	LIVER	HISTOPATHOLOGICAL EFFECTS		1E-1		1E-2	010377
			KIDNEY	HISTOPATHOLOGICAL EFFECTS		1000		10000	
			SPLEEN	HISTOPATHOLOGICAL EFFECTS					
TRINITROTOLUENE, 2,4,6-		**000118-96-7**							
LOAEL 0.5 MG/KG/DAY		DOG							
	ORAL: GAVAGE		LIVER	EFFECTS		5E-4		IRIS	010416
						1000			
SUBCHRONIC [RfD] COMMENT: THE CHRONIC ORAL RfD WAS ADOPTED AS THE SUBCHRONIC ORAL [RfD].									
GENERAL COMMENT: ALSO SEE HEAST TABLE 3: CARCINOGENICITY.									
URANIUM, SOLUBLE SALTS									
SUBCHRONIC [RfD] COMMENT: CONTACT THE SUPERFUND HEALTH RISK TECHNICAL SUPPORT CENTER: (513) 569-7300.									
VANADIUM		**007440-62-2**							
NOAEL 5 PPM		RAT				7E-3		7E-3	005739
	ORAL: DRINKING WATER	LIFETIME				100		100	
VANADIUM PENTOXIDE		**001314-62-1**							
NOAEL 17.85 PPM		RAT				9E-3		IRIS	005743
	ORAL: DIET	LIFETIME				100			
SUBCHRONIC [RfD] COMMENT: THE CHRONIC ORAL RfD WAS ADOPTED AS THE SUBCHRONIC ORAL [RfD].									

IRIS, EPA'S INTEGRATED RISK INFORMATION SYSTEM, IS UPDATED MONTHLY. FURTHER INFORMATION: RISK INFORMATION HOTLINE: (513) 569-7254.

CHEMICAL / LEVEL	DOSE / ROUTE	SPECIES / EXPERIMENT / LENGTH	TARGET	CRITICAL EFFECT	Subchronic [RfC] (mg/cu m) UF	Subchronic [RfD] (mg/kg/day) UF	Chronic [RfC] (mg/cu m) UF	Chronic [RfD] (mg/kg/day) UF	REFERENCE
VANADIUM SULFATE		**036907-42-3**							
NOAEL	2.24 MG/KG/DAY	RAT				2E-2		2E-2	005747
	ORAL: DRINKING WATER	LIFETIME				100		100	
VERNAM / (VERNOLATE)		**001929-77-7**							
NOEL	1 MG/KG/DAY	RAT							
	ORAL: DIET		WHOLE BODY	DECREASED WEIGHT		1E-2		IRIS	010083
						100			
VINYL ACETATE		**000108-05-4**							
NOAEL	100 MG/KG/DAY	RAT				1E+0		1E+0	010417
	ORAL: WATER	2 YEARS	WHOLE BODY	ALTERED WEIGHT					
			KIDNEY	ALTERED WEIGHT		100		100	
NOAEL	176 MG/CU M	MOUSE							
	INHALATION: INTERMITTENT	104 WEEKS	NASAL CAVITY	LESIONS	2E-1		IRIS		010418
					30				
	SUBCHRONIC [RfC] COMMENT: THE CHRONIC INHALATION RfC WAS ADOPTED AS THE SUBCHRONIC INHALATION [RfC].								
VINYL CHLORIDE		**000075-01-4**							
	SUBCHRONIC [RfC] COMMENT: CONTACT THE SUPERFUND HEALTH RISK TECHNICAL SUPPORT CENTER: (513) 569-7300.								
	SUBCHRONIC [RfD] COMMENT: CONTACT THE SUPERFUND HEALTH RISK TECHNICAL SUPPORT CENTER: (513) 569-7300.								
	GENERAL COMMENT: ALSO SEE HEAST TABLE 3: CARCINOGENICITY.								
VINYL-1-CYCLOHEXENE, 4-		**000100-40-3**							
	GENERAL COMMENT: DATA INADEQUATE FOR QUANTITATIVE RISK ASSESSMENT								010084

HEAST TABLE 1: SUBCHRONIC AND CHRONIC TOXICITY (OTHER THAN CARCINOGENICITY)

May 1995

CHEMICAL / LEVEL	DOSE / ROUTE	SPECIES / EXPERIMENT LENGTH	TARGET	CRITICAL EFFECT	Subchronic [RfC] (mg/cu m) UF	Subchronic [RfD] (mg/kg/day) UF	Chronic [RfC] (mg/cu m) UF	Chronic [RfD] (mg/kg/day) UF	REFERENCE
WARFARIN		**000081-81-2**							
LOAEL	2 MG/DAY ORAL	HUMAN	BLOOD	INCREASED PROTHROMBIN TIME		3E-4 100		IRIS	010409
SUBCHRONIC [RfD] COMMENT: THE CHRONIC ORAL RfD WAS ADOPTED AS THE SUBCHRONIC ORAL [RfD].									
XYLENE, M-		**000108-38-3**							
NOAEL	250 MG/KG ORAL: GAVAGE	RAT 103 WEEKS	CENTRAL NERVOUS SYSTEM WHOLE BODY WHOLE BODY	HYPERACTIVITY DECREASED WEIGHT				2E+0 100	005755
SUBCHRONIC [RfD] COMMENT: CONTACT THE SUPERFUND HEALTH RISK TECHNICAL SUPPORT CENTER: (513) 569-7300.									010920
CHRONIC [RfC] COMMENT: THE CHRONIC INHALATION [RfC] IS CONSIDERED NOT VERIFIABLE (12/11/91) BY THE RfD/RfC WORK GROUP.									
XYLENE, MIXTURE		**001330-20-7**						IRIS	010872
SUBCHRONIC [RfD] COMMENT: CONTACT THE SUPERFUND HEALTH RISK TECHNICAL SUPPORT CENTER: (513) 569-7300.									010921
CHRONIC [RfC] COMMENT: THE CHRONIC INHALATION [RfC] IS CONSIDERED NOT VERIFIABLE (12/11/91) BY THE RfD/RfC WORK GROUP.									
XYLENE, O-		**000095-47-6**							
NOEL	250 MG/KG ORAL: GAVAGE	RAT 103 WEEKS	CENTRAL NERVOUS SYSTEM WHOLE BODY	HYPERACTIVITY DECREASED WEIGHT				2E+0 100	005751
SUBCHRONIC [RfD] COMMENT: CONTACT THE SUPERFUND HEALTH RISK TECHNICAL SUPPORT CENTER: (513) 569-7300.									010922
CHRONIC [RfC] COMMENT: THE CHRONIC INHALATION [RfC] IS CONSIDERED NOT VERIFIABLE (12/11/91) BY THE RfD/RfC WORK GROUP.									

IRIS, EPA'S INTEGRATED RISK INFORMATION SYSTEM, IS UPDATED MONTHLY. FURTHER INFORMATION: RISK INFORMATION HOTLINE: (513) 569-7254.

CHEMICAL / LEVEL	DOSE / ROUTE	SPECIES / EXPERIMENT LENGTH	TARGET	CRITICAL EFFECT	Subchronic [RfC] (mg/cu m) UF	Subchronic [RfD] (mg/kg/day) UF	Chronic [RfC] (mg/cu m) UF	Chronic [RfD] (mg/kg/day) UF	REFERENCE
XYLENE, P-		**000106-42-3**							
SUBCHRONIC [RfD] COMMENT: CONTACT THE SUPERFUND HEALTH RISK TECHNICAL SUPPORT CENTER: (513) 569-7300.									010923
CHRONIC [RfC] COMMENT: THE CHRONIC INHALATION [RfC] IS CONSIDERED NOT VERIFIABLE (12/11/91) BY THE RfD/RfC WORK GROUP.									
ZINC (METALLIC)		**007440-66-6**							
LOAEL 1.0 MG/KG/DAY	ORAL: DIET SUPPLEMENT	HUMAN 10 WEEKS	BLOOD	DECREASED BLOOD ENZYME		3E-1 3		IRIS	010937
CHRONIC [RfD] COMMENT: THE CHRONIC ORAL RfD WAS ADOPTED AS THE SUBCHRONIC ORAL [RfD].									
ZINC CYANIDE		**000557-21-1**							
NOAEL 24.3 MG/KG/DAY	ORAL: DIET	RAT 2 YEARS	WHOLE BODY THYROID NERVE	DECREASED WEIGHT EFFECTS MYELIN DEGENERATION		5E-2 500		IRIS	010289
SUBCHRONIC [RfD] COMMENT: CALCULATED BY ANALOGY TO FREE CYANIDE BY CORRECTING FOR DIFFERENCES IN MOLECULAR WEIGHT.									
CHRONIC [RfD] COMMENT: CALCULATED BY ANALOGY TO FREE CYANIDE BY CORRECTING FOR DIFFERENCES IN MOLECULAR WEIGHT.									
ZINC PHOSPHIDE		**001314-84-7**							
LOAEL 3.48 MG/KG/DAY	ORAL: DIET	RAT 13 WEEKS	WHOLE BODY WHOLE BODY	DECREASED WEIGHT DECREASED FOOD INTAKE		3E-3 1000		IRIS	010290
ZINEB		**012122-67-7**							
LOAEL 25 MG/KG/DAY	ORAL: DIET	RAT 2 YEARS	THYROID	HYPERPLASIA		5E-2 500		IRIS	010085
SUBCHRONIC [RfD] COMMENT: THE CHRONIC ORAL RfD WAS ADOPTED AS THE SUBCHRONIC ORAL [RfD].									

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DICHLOROETHANE, 1,1- **000075-34-3**

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DICHLOROETHYLENE, 1,2- (MIXED ISOMERS) 000540-59-0

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HEAST TABLE 2: ALTERNATE METHODS - SUBCHRONIC AND CHRONIC TOXICITY (OTHER THAN CARCINOGENICITY)

May 1995

CHEMICAL / LEVEL	DOSE / ROUTE	SPECIES / EXPERIMENT / LENGTH	TARGET	CRITICAL EFFECT	Subchronic [RfC] (mg/cu m) UF	Subchronic [RfD] (mg/kg/day) UF	Chronic [RfC] (mg/cu m) UF	Chronic [RfD] (mg/kg/day) UF	REFERENCE
ACETONE CYANOHYDRIN		**000075-86-5**							
NOEL	4.0 MG/KG/DAY	RAT							
	INHALATION:	14 WEEKS	CENTRAL NERVOUS	EFFECTS	1E-1		1E-2		010432
	INTERMITTENT		SYSTEM		100		1000		

SUBCHRONIC [RfC] COMMENT: 4E-2 MG/KG/DAY (SEE APPENDIX A-II, DOSE CONVERSIONS ON HEAST). AN ERROR IN THE UNCERTAINTY FACTOR THAT WAS REPORTED IN HEED (1988) WAS CORRECTED.
CHRONIC [RfC] COMMENT: 4E-2 MG/KG/DAY (SEE APPENDIX A-II, DOSE CONVERSIONS ON HEAST).
GENERAL COMMENT: THE SUBCHRONIC AND CHRONIC INHALATION [RfC] VALUES WERE DERIVED FROM METHODOLOGY THAT IS NOT CURRENT WITH THE INTERIM INHALATION METHODOLOGY USED BY THE RfD/RfC WORK GROUP. ALSO SEE TABLE 1: SUBCHRONIC AND CHRONIC TOXICITY.

ACETONITRILE		**000075-05-8**							
NOAEL	100 PPM	MOUSE							
	INHALATION:	92 DAYS	LIVER	INCREASED RELATIVE WEIGHT	5E-1		5E-2		005208
	INTERMITTENT				300		3000		

SUBCHRONIC [RfC] COMMENT: 1E-1 MG/KG/DAY (SEE APPENDIX A-II, DOSE CONVERSIONS ON HEAST).
CHRONIC [RfC] COMMENT: 1E-2 MG/KG/DAY. (SEE APPENDIX A-II, DOSE CONVERSIONS ON HEAST). UNDER REVIEW. CURRENT NUMBER SUBJECT TO CHANGE.
GENERAL COMMENT: THE SUBCHRONIC AND CHRONIC INHALATION [RfC] VALUES WERE DERIVED FROM METHODOLOGY THAT IS NOT CURRENT WITH THE INTERIM INHALATION METHODOLOGY USED BY THE RfD/RfC WORK GROUP. ALSO SEE TABLE 1: SUBCHRONIC AND CHRONIC TOXICITY.

BARIUM		**007440-39-3**							
NOEL	0.8 MG/CU M	RAT							
	INHALATION:	4 MONTHS	FETUS	FETOTOXICITY	5E-3		5E-4		005249
	INTERMITTENT				100		1000		

SUBCHRONIC [RfC] COMMENT: 1E-3 MG/KG/DAY (SEE APPENDIX A-II, DOSE CONVERSIONS ON HEAST). BASED ON A REPRODUCTION STUDY.
CHRONIC [RfC] COMMENT: 1E-4 MG/KG/DAY (SEE APPENDIX A-II, DOSE CONVERSIONS ON HEAST). BASED ON A REPRODUCTION STUDY.
GENERAL COMMENT: THE SUBCHRONIC AND CHRONIC INHALATION [RfC] VALUES WERE DERIVED FROM METHODOLOGY THAT IS NOT CURRENT WITH THE INTERIM INHALATION METHODOLOGY USED BY THE RfD/RfC WORK GROUP. ALSO SEE TABLE 1: SUBCHRONIC AND CHRONIC TOXICITY.

HEAST TABLE 2: ALTERNATE METHODS - SUBCHRONIC AND CHRONIC TOXICITY (OTHER THAN CARCINOGENICITY)

May 1995

CHEMICAL / LEVEL	DOSE / ROUTE	SPECIES / EXPERIMENT LENGTH	TARGET	CRITICAL EFFECT	Subchronic [RfC] (mg/cu m) / UF	Subchronic [RfD] (mg/kg/day) / UF	Chronic [RfC] (mg/cu m) / UF	Chronic [RfD] (mg/kg/day) / UF	REFERENCE
CHLORO-1,3-BUTADIENE / (CHLOROPRENE)		**000126-99-8**							
NOAEL 10 PPM		RAT							
	INHALATION:	2 YEARS	HAIR	ALOPECIA		2E-2		2E-2	005878
	INTERMITTENT		WHOLE BODY	DECREASED WEIGHT GAIN		100		100	

SUBCHRONIC [RfD] COMMENT: BASED ON ROUTE TO ROUTE EXTRAPOLATION ASSUMING AN INHALATION ABSORPTION FACTOR OF 0.5.
CHRONIC [RfD] COMMENT: BASED ON ROUTE TO ROUTE EXTRAPOLATION ASSUMING AN INHALATION ABSORPTION FACTOR OF 0.5.
GENERAL COMMENT: SEE ALSO HEAST TABLE 1: SUBCHRONIC AND CHRONIC TOXICITY (OTHER THAN CARCINOGENICITY).

CHLOROBENZENE		**000108-90-7**							
LOAEL 75 PPM		RAT							
	INHALATION:	120 DAYS	LIVER	EFFECTS			2E-2		005353
	INTERMITTENT		KIDNEY	EFFECTS			10000		

CHRONIC [RfC] COMMENT: 5E-3 MG/KG/DAY (SEE APPENDIX A-II, DOSE CONVERSIONS ON HEAST). UNDER REVIEW. CURRENT NUMBER SUBJECT TO CHANGE.
GENERAL COMMENT: THE SUBCHRONIC AND CHRONIC INHALATION [RfC] VALUES WERE DERIVED FROM METHODOLOGY THAT IS NOT CURRENT WITH THE INTERIM INHALATION METHODOLOGY USED BY THE RfD/RfC WORK GROUP. ALSO SEE TABLE 1: SUBCHRONIC AND CHRONIC TOXICITY.

CYCLOPENTADIENE		**000542-92-7**							
NOEL 87.3 MG/KG/DAY		RAT							
	INHALATION:	194 DAYS	LIVER	LESIONS	3E+0				005401
	INTERMITTENT		KIDNEY	LESIONS	100				

SUBCHRONIC [RfC] COMMENT: 9E-1 MG/KG/DAY (SEE APPENDIX A-II, DOSE CONVERSIONS ON HEAST).
GENERAL COMMENT: THE SUBCHRONIC INHALATION [RfC] VALUE WAS DERIVED FROM METHODOLOGY THAT IS NOT CURRENT WITH THE INTERIM INHALATION METHODOLOGY USED BY THE RfD/RfC WORK GROUP.

HEAST TABLE 2: ALTERNATE METHODS - SUBCHRONIC AND CHRONIC TOXICITY (OTHER THAN CARCINOGENICITY)

May 1995

CHEMICAL / LEVEL	DOSE / ROUTE	SPECIES / EXPERIMENT LENGTH	TARGET	CRITICAL EFFECT	Subchronic [RfC] (mg/cu m) UF	Subchronic [RfD] (mg/kg/day) UF	Chronic [RfC] (mg/cu m) UF	Chronic [RfD] (mg/kg/day) UF	REFERENCE
DICHLOROBENZENE, 1,2-	**000095-50-1**								
NOEL 49 PPM	INHALATION: INTERMITTENT	RAT UP TO 7 MONTHS	WHOLE BODY	DECREASED WEIGHT GAIN	2E+0 100		2E-1 1000		005412
CHRONIC [RfC] COMMENT: 4E-2 MG/KG/DAY (SEE APPENDIX A-II, DOSE CONVERSIONS ON HEAST).									
GENERAL COMMENT: THE SUBCHRONIC AND CHRONIC INHALATION [RfC] VALUES WERE DERIVED FROM METHODOLOGY THAT IS NOT CURRENT WITH THE INTERIM INHALATION METHODOLOGY USED BY THE RfD/RfC WORK GROUP. ALSO SEE TABLE 1: SUBCHRONIC AND CHRONIC TOXICITY.									
DICHLORODIFLUOROMETHANE	**000075-71-8**								
LOAEL 482.3 MG/KG/DAY	INHALATION: INTERMITTENT	GUINEA PIG 6 WEEKS	LIVER	LESIONS	2E+0 1000		2E-1 10000		005497
SUBCHRONIC [RfC] COMMENT: 5E-1 MG/KG/DAY (SEE APPENDIX A-II, DOSE CONVERSIONS ON HEAST).									
CHRONIC [RfC] COMMENT: 5E-2 MG/KG/DAY (SEE APPENDIX A-II, DOSE CONVERSIONS ON HEAST).									
GENERAL COMMENT: THE SUBCHRONIC AND CHRONIC INHALATION [RfC] VALUES WERE DERIVED FROM METHODOLOGY THAT IS NOT CURRENT WITH THE INTERIM INHALATION METHODOLOGY USED BY THE RfD/RfC WORK GROUP. ALSO SEE TABLE 1: SUBCHRONIC AND CHRONIC TOXICITY.									
DICHLOROETHANE, 1,1-	**000075-34-3**								
NOEL 138 MG/KG/DAY	INHALATION: INTERMITTENT	CAT 13 WEEKS	KIDNEY	DAMAGE	5E+0 100		5E-1 1000		005789
SUBCHRONIC [RfC] COMMENT: 1E+0 MG/KG/DAY (SEE APPENDIX A-II, DOSE CONVERSIONS ON HEAST).									
CHRONIC [RfC] COMMENT: 1E-1 MG/KG/DAY (SEE APPENDIX A-II, DOSE CONVERSIONS ON HEAST).									
GENERAL COMMENT: THE SUBCHRONIC AND CHRONIC INHALATION [RfC] VALUES WERE DERIVED FROM METHODOLOGY THAT IS NOT CURRENT WITH THE INTERIM INHALATION METHODOLOGY USED BY THE RfD/RfC WORK GROUP. ALSO SEE HEAST TABLE 1: CHRONIC AND SUBCHRONIC TOXICITY AND									

HEAST TABLE 2: ALTERNATE METHODS - SUBCHRONIC AND CHRONIC TOXICITY (OTHER THAN CARCINOGENICITY)

May 1995

CHEMICAL / DOSE LEVEL	ROUTE	SPECIES / EXPERIMENT LENGTH	TARGET	CRITICAL EFFECT	Subchronic [RfC] (mg/cu m) / UF	Subchronic [RfD] (mg/kg/day) / UF	Chronic [RfC] (mg/cu m) / UF	Chronic [RfD] (mg/kg/day) / UF	REFERENCE
DICYCLOPENTADIENE		**000077-73-6**							
LOAEL 1 PPM	INHALATION: INTERMITTENT	RAT 90 DAYS	LIVER	DYSFUNCTION	2E-3 1000		2E-4 10000		005424

SUBCHRONIC [RfC] COMMENT: 6E-4 MG/KG/DAY (SEE APPENDIX A-II, DOSE CONVERSIONS ON HEAST).
CHRONIC [RfC] COMMENT: 6E-5 MG/KG/DAY (SEE APPENDIX A-II, DOSE CONVERSIONS ON HEAST).
GENERAL COMMENT: THE SUBCHRONIC AND CHRONIC INHALATION [RfC] VALUES WERE DERIVED FROM METHODOLOGY THAT IS NOT CURRENT WITH THE INTERIM INHALATION METHODOLOGY USED BY THE RfD/RfC WORK GROUP. ALSO SEE TABLE 1: SUBCHRONIC AND CHRONIC TOXICITY.

ETHOXYETHANOL ACETATE, 2-		**000111-15-9**							
NOEL 30.1 MG/KG/DAY	INHALATION: INTERMITTENT	RAT DAY 6-18 OF GESTATION	FETUS	DECREASED OSSIFICATION		3E-1 100		3E-1 100	005952

SUBCHRONIC [RfD] COMMENT: BASED ON ROUTE TO ROUTE EXTRAPOLATION. THE SUBCHRONIC ORAL [RfD]WAS BASED ON A REPRODUCTION STUDY WITH EXPOSURES DURING DAYS 6-18 OF GESTATION.
CHRONIC [RfD] COMMENT: BASED ON ROUTE TO ROUTE EXTRAPOLATION. THE CHRONIC ORAL [RfD] WAS BASED ON A REPRODUCTION STUDY WITH EXPOSURES DURING DAYS 6-18 OF GESTATION.
GENERAL COMMENT: NO PHARMACOKINETIC DATA WERE PROVIDED TO JUSTIFY ROUTE TO ROUTE EXTRAPOLATION FOR THE ORAL [RfD] VALUES. ALSO SEE TABLE 1: SUBCHRONIC AND CHRONIC TOXICITY VALUES.

FURFURAL		**000098-01-1**							
NOAEL 20 PPM	INHALATION: INTERMITTENT	HAMSTER 13 WEEKS	NASAL CAVITY	OLFACTORY DEGENERATION	5E-1 100		5E-2 1000		005465

SUBCHRONIC [RfC] COMMENT: 1E-1 MG/KG/DAY (SEE APPENDIX A-II, DOSE CONVERSIONS ON HEAST).
CHRONIC [RfC] COMMENT: 1E-2 MG/KG/DAY (SEE APPENDIX A-II, DOSE CONVERSIONS ON HEAST).
GENERAL COMMENT: THE SUBCHRONIC AND CHRONIC INHALATION [RfC] VALUES WERE DERIVED FROM METHODOLOGY THAT IS NOT CURRENT WITH THE INTERIM INHALATION METHODOLOGY USED BY THE RfD/RfC WORK GROUP. ALSO SEE TABLE 1: SUBCHRONIC AND CHRONIC TOXICITY.

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CHEMICAL / LEVEL	DOSE / ROUTE	SPECIES / EXPERIMENT LENGTH	TARGET	CRITICAL EFFECT	Subchronic [RfC] (mg/cu m) / UF	Subchronic [RfD] (mg/kg/day) / UF	Chronic [RfC] (mg/cu m) / UF	Chronic [RfD] (mg/kg/day) / UF	REFERENCE
METHACRYLONITRILE		**000126-98-7**							
NOEL 3.2 PPM		DOG							
	INHALATION:	90 DAYS	LIVER	INCREASED SGOT	7E-3		7E-4		005811
	INTERMITTENT		LIVER	INCREASED SGPT	300		3000		

SUBCHRONIC [RfC] COMMENT: 2E-3 MG/KG/DAY (SEE APPENDIX A-II, DOSE CONVERSIONS ON HEAST). THESE VALUES DIFFER FROM THOSE IN THE 1987 HEED.
CHRONIC [RfC] COMMENT: 2E-4 MG/KG/DAY (SEE APPENDIX A-II, DOSE CONVERSIONS ON HEAST). THESE VALUES DIFFER FROM THOSE IN THE 1987 HEED.
GENERAL COMMENT: THE SUBCHRONIC AND CHRONIC INHALATION [RfC] VALUES WERE DERIVED FROM METHODOLOGY THAT IS NOT CURRENT WITH THE INTERIM INHALATION METHODOLOGY USED BY THE RfD/RfC WORK GROUP. ALSO SEE TABLE 1: SUBCHRONIC AND CHRONIC TOXICITY.

METHOXYETHANOL ACETATE, 2-		**000110-49-6**							
NOAEL 10 PPM		RABBIT							
	INHALATION:	13 WEEKS	TESTIS	DEGENERATION		2E-2		2E-3	010001
	INTERMITTENT					100		1000	

SUBCHRONIC [RfD] COMMENT: BASED ON ROUTE TO ROUTE EXTRAPOLATION USING AN ABSORPTION FACTOR OF 0.5. CALCULATED FROM DATA OBTAINED WITH METHOXYETHANOL CONVERTED BY MULTIPLYING BY THE MOLECULAR WEIGHT RATIO (118.13/76.09).
CHRONIC [RfD] COMMENT: BASED ON ROUTE TO ROUTE EXTRAPOLATION USING AN ABSORPTION FACTOR OF 0.5. CALCULATED FROM DATA OBTAINED WITH METHOXYETHANOL CONVERTED BY MULTIPLYING BY THE MOLECULAR WEIGHT RATIO (118.13/76.09).
GENERAL COMMENT: NO PHARMACOKINETIC DATA WERE PROVIDED TO JUSTIFY ROUTE TO ROUTE EXTRAPOLATION FOR THE ORAL [RfD] VALUES.

METHOXYETHANOL, 2-		**000109-86-4**							
NOAEL 31 MG/CU M		RABBIT							
	INHALATION:	13 WEEKS	TESTICLE	EFFECTS		1E-2		1E-3	010910
	INTERMITTENT					100		1000	

SUBCHRONIC [RfD] COMMENT: BASED ON ROUTE TO ROUTE EXTRAPOLATION.
CHRONIC [RfD] COMMENT: BASED ON ROUTE TO ROUTE EXTRAPOLATION.
GENERAL COMMENT: ALSO SEE TABLE 1: SUBCHRONIC AND CHRONIC TOXICITY (OTHER THAN CARCINOGENICITY).

HEAST TABLE 2: ALTERNATE METHODS - SUBCHRONIC AND CHRONIC TOXICITY (OTHER THAN CARCINOGENICITY)

May 1995

CHEMICAL / LEVEL	DOSE / ROUTE	SPECIES / EXPERIMENT / LENGTH	TARGET	CRITICAL EFFECT	Subchronic [RfC] (mg/cu m) UF	Subchronic [RfD] (mg/kg/day) UF	Chronic [RfC] (mg/cu m) UF	Chronic [RfD] (mg/kg/day) UF	REFERENCE
METHYL ACRYLATE		**000096-33-3**							
NOEL	15 PPM INHALATION: INTERMITTENT	RAT 2 YEARS		NONE OBSERVED		3E-2 100		3E-2 100	010003

SUBCHRONIC [RfD] COMMENT: BASED ON ROUTE TO ROUTE EXTRAPOLATION.
CHRONIC [RfD] COMMENT: BASED ON ROUTE TO ROUTE EXTRAPOLATION.
GENERAL COMMENT: NO PHARMACOKINETIC DATA WERE PROVIDED TO JUSTIFY ROUTE TO ROUTE EXTRAPOLATION FOR THE ORAL [RfD] VALUES.

CHEMICAL / LEVEL	DOSE / ROUTE	SPECIES / EXPERIMENT / LENGTH	TARGET	CRITICAL EFFECT	Subchronic [RfC] (mg/cu m) UF	Subchronic [RfD] (mg/kg/day) UF	Chronic [RfC] (mg/cu m) UF	Chronic [RfD] (mg/kg/day) UF	REFERENCE
METHYL ISOBUTYL KETONE		**000108-10-1**							
NOEL	50 PPM INHALATION: INTERMITTENT	RAT 90 DAYS	LIVER KIDNEY	INCREASED WEIGHT EFFECTS	8E-1 100		8E-2 1000		005562

SUBCHRONIC [RfC] COMMENT: 2E-1 MG/KG/DAY (SEE APPENDIX A-II, DOSE CONVERSION ON HEAST).
CHRONIC [RfC] COMMENT: 2E-2 MG/KG/DAY (SEE APPENDIX A-II, DOSE CONVERSION ON HEAST).
GENERAL COMMENT: THE SUBCHRONIC AND CHRONIC INHALATION [RfC] VALUES WERE DERIVED FROM METHODOLOGY THAT IS NOT CURRENT WITH THE INTERIM INHALATION METHODOLOGY USED BY THE RfD/RfC WORK GROUP. ALSO SEE TABLE 1: SUBCHRONIC AND CHRONIC TOXICITY.

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HEAST TABLE 2: ALTERNATE METHODS - SUBCHRONIC AND CHRONIC TOXICITY (OTHER THAN CARCINOGENICITY)

May 1995

CHEMICAL / DOSE LEVEL	ROUTE	SPECIES / EXPERIMENT / LENGTH	TARGET	CRITICAL EFFECT	Subchronic [RfC] (mg/cu m) / UF	Subchronic [RfD] (mg/kg/day) / UF	Chronic [RfC] (mg/cu m) / UF	Chronic [RfD] (mg/kg/day) / UF	REFERENCE
METHYL STYRENE (MIXED ISOMERS) 025013-15-4									
LOAEL 5.6 MG/KG/DAY	INHALATION: INTERMITTENT	MOUSE 103 WEEKS	NASAL CAVITY	LESIONS		6E-3 1000		6E-3 1000	005567
SUBCHRONIC [RfD] COMMENT: BASED ON ROUTE TO ROUTE EXTRAPOLATION WITH AN ABSORPTION FACTOR OF 0.5.									
CHRONIC [RfD] COMMENT: BASED ON ROUTE TO ROUTE EXTRAPOLATION WITH AN ABSORPTION FACTOR OF 0.5.									
GENERAL COMMENT: NO PHARMACOKINETIC DATA WERE PROVIDED TO JUSTIFY ROUTE TO ROUTE EXTRAPOLATION FOR THE ORAL [RfD] VALUES.									
LOAEL 11.2 MG/KG/DAY	INHALATION: INTERMITTENT	MOUSE 103 WEEKS	NASAL CAVITY	LESIONS	4E-2 1000		4E-2 1000		005566
SUBCHRONIC [RfC] COMMENT: 1E-2 MG/KG/DAY (SEE APPENDIX A-II, DOSE CONVERSIONS ON HEAST).									
CHRONIC [RfC] COMMENT: 1E-2 MG/KG/DAY (SEE APPENDIX A-II, DOSE CONVERSIONS ON HEAST).									
GENERAL COMMENT: THE SUBCHRONIC AND CHRONIC INHALATION [RfC] VALUES WERE DERIVED FROM METHODOLOGY THAT IS NOT CURRENT WITH THE INTERIM INHALATION METHODOLOGY USED BY THE RfD/RfC WORK GROUP.									
METHYL STYRENE, ALPHA 000098-83-9									
NOEL 970 MG/CU M	INHALATION: INTERMITTENT	RAT 197 DAYS	LIVER	INCREASED WEIGHT		7E-1 100		7E-2 1000	010016
			KIDNEY	INCREASED WEIGHT					
SUBCHRONIC [RfD] COMMENT: BASED ON ROUTE TO ROUTE EXTRAPOLATION USING AN ABSORPTION FACTOR OF 0.5.									
CHRONIC [RfD] COMMENT: BASED ON ROUTE TO ROUTE EXTRAPOLATION USING AN ABSORPTION FACTOR OF 0.5.									
GENERAL COMMENT: NO PHARMACOKINETIC DATA WERE PROVIDED TO JUSTIFY ROUTE TO ROUTE EXTRAPOLATION FOR THE ORAL [RfD] VALUES.									

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HEAST TABLE 2: ALTERNATE METHODS - SUBCHRONIC AND CHRONIC TOXICITY (OTHER THAN CARCINOGENICITY)

May 1995

CHEMICAL / LEVEL	DOSE / ROUTE	SPECIES / EXPERIMENT LENGTH	TARGET	CRITICAL EFFECT	Subchronic [RfC] (mg/cu m) / UF	Subchronic [RfD] (mg/kg/day) / UF	Chronic [RfC] (mg/cu m) / UF	Chronic [RfD] (mg/kg/day) / UF	REFERENCE
METHYLENE BROMIDE		**000074-95-3**							
NOAEL 11 MG/KG/DAY	INHALATION: INTERMITTENT	RAT 90 DAYS	BLOOD	INCREASED CARBOXYHEMOGLOBIN		1E-1 100		1E-2 1000	010011
SUBCHRONIC [RfD] COMMENT: BASED ON ROUTE TO ROUTE EXTRAPOLATION, INCLUDING AN ABSORPTION FACTOR OF 0.5.									
CHRONIC [RfD] COMMENT: BASED ON ROUTE TO ROUTE EXTRAPOLATION, INCLUDING AN ABSORPTION FACTOR OF 0.5.									
GENERAL COMMENT: NO PHARMACOKINETIC DATA WERE PROVIDED TO JUSTIFY ROUTE TO ROUTE EXTRAPOLATION FOR THE ORAL [RfD] VALUES.									
NITROBENZENE		**000098-95-3**							
LOAEL 25 MG/CU M	INHALATION: INTERMITTENT	MOUSE 90 DAYS	BLOOD ADRENAL KIDNEY LIVER	HEMATOLOGICAL EFFECTS LESIONS LESIONS LESIONS	2E-2 1000		2E-3 10000		010518
	INHALATION: INTERMITTENT	RAT 90 DAYS	BLOOD ADRENAL KIDNEY LIVER	HEMATOLOGICAL EFFECTS LESIONS LESIONS LESIONS					
SUBCHRONIC [RfC] COMMENT: 6E-3 MG/KG/DAY (SEE APPENDIX A-II, DOSE CONVERSIONS ON HEAST).									
CHRONIC [RfC] COMMENT: 6E-4 MG/KG/DAY (SEE APPENDIX A-II, DOSE CONVERSIONS ON HEAST).									
GENERAL COMMENT: THE SUBCHRONIC AND CHRONIC INHALATION [RfC] VALUES WERE DERIVED FROM METHODOLOGY THAT IS NOT CURRENT WITH THE INTERIM INHALATION METHODOLOGY USED BY THE RfD/RfC WORK GROUP. ALSO SEE TABLE 1: SUBCHRONIC AND CHRONIC TOXICITY.									
TRICHLOROBENZENE, 1,2,4-		**000120-82-1**							
GENERAL COMMENT: INFORMATION REMOVED FROM THIS TABLE. SEE TABLE 1: SUBCHRONIC AND CHRONIC TOXICITY (OTHER THAN CARCINOGENICITY).									

HEAST TABLE 2: ALTERNATE METHODS - SUBCHRONIC AND CHRONIC TOXICITY (OTHER THAN CARCINOGENICITY)

May 1995

CHEMICAL / LEVEL	DOSE / ROUTE	SPECIES / EXPERIMENT LENGTH	TARGET	CRITICAL EFFECT	Subchronic [RfC] (mg/cu m) UF	Subchronic [RfD] (mg/kg/day) UF	Chronic [RfC] (mg/cu m) UF	Chronic [RfD] (mg/kg/day) UF	REFERENCE
TRICHLOROFLUOROMETHANE		**000075-69-4**							
LOAEL 1940 MG/KG/DAY		DOG							
	INHALATION:	90 DAYS	KIDNEY	INCREASED BUN	7E+0		7E-1		005501
	CONTINUOUS		LUNG	INFLAMMATION	1000		10000		

SUBCHRONIC [RfC] COMMENT: 2E+0 MG/KG/DAY (SEE APPENDIX A-II, DOSE CONVERSIONS ON HEAST).
CHRONIC [RfC] COMMENT: 2E-1 MG/KG/DAY (SEE APPENDIX A-II, DOSE CONVERSIONS ON HEAST).
GENERAL COMMENT: THE SUBCHRONIC AND CHRONIC INHALATION [RfC] VALUES WERE DERIVED FROM METHODOLOGY THAT IS NOT CURRENT WITH THE INTERIM INHALATION METHODOLOGY USED BY THE RfD/RfC WORK GROUP. ALSO SEE TABLE 1: SUBCHRONIC AND CHRONIC TOXICITY.

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REFERENCES FOR HEAST TABLE 2: ALTERNATE METHODS -- SUBCHRONIC AND CHRONIC TOXICITY (OTHER THAN CARCINOGENICITY)

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METHYL STYRENE, ALPHA **000098-83-9**

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REFERENCES FOR HEAST TABLE 2: ALTERNATE METHODS -- SUBCHRONIC AND CHRONIC TOXICITY
(OTHER THAN CARCINOGENICITY)

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CHEMICAL	ROUTE	EXPERIMENT LENGTH SPECIES	TARGET	CANCER	[EPA GROUP]	[SLOPE FACTOR] ORAL (mg/kg/day)$^{-1}$	[SLOPE FACTOR] INHALATION (mg/kg/day)$^{-1}$	[UNIT RISK] ORAL (ug/L)$^{-1}$	[UNIT RISK] INHALATION (ug/cu m)-1	REFERENCE
ACEPHATE		**030560-19-1**								
					IRIS	IRIS		IRIS		010086
GENERAL COMMENT: ALSO SEE HEAST TABLE 1: SUBCHRONIC AND CHRONIC TOXICITY (OTHER THAN CARCINOGENICITY).										
ACROLEIN		**000107-02-8**								
					IRIS					005001
GENERAL COMMENT: ALSO SEE HEAST TABLE 1: SUBCHRONIC AND CHRONIC TOXICITY (OTHER THAN CARCINOGENICITY).										
ACRYLAMIDE		**000079-06-1**								
	ORAL: DRINKING WATER	2 YEARS RAT	MAMMARY	TUMORS	IRIS	IRIS	4.5E+0	IRIS	IRIS	010087
			THYROID	TUMORS						
			UTERUS	TUMORS						
			ORAL CAVITY	TUMORS						
			CENTRAL NERVOUS SYSTEM	TUMORS						
INHALATION [SLOPE] COMMENT: SEE APPENDIX A-II. DOSE CONVERSIONS ON HEAST.										
GENERAL COMMENT: ALSO SEE HEAST TABLE 1: SUBCHRONIC AND CHRONIC TOXICITY (OTHER THAN CARCINOGENICITY).										
ACRYLONITRILE		**000107-13-1**								
					IRIS	IRIS		IRIS		005004
	INHALATION: OCCUPATIONAL	HUMAN	LUNG	TUMORS	IRIS		2.4E-1		IRIS	005003
INHALATION [SLOPE] COMMENT: SEE APPENDIX A-II. DOSE CONVERSIONS ON HEAST.										

HEAST TABLE 3: CARCINOGENICITY

CHEMICAL	ROUTE	EXPERIMENT LENGTH / SPECIES	TARGET	CANCER	[EPA GROUP]	[SLOPE FACTOR] ORAL (mg/kg/day)$^{-1}$	[SLOPE FACTOR] INHALATION (mg/kg/day)$^{-1}$	[UNIT RISK] ORAL (ug/L)$^{-1}$	[UNIT RISK] INHALATION (ug/cu m)$^{-1}$	REFERENCE
ALACHLOR		**015972-60-8**								
	ORAL: DIET	MULTIPLE SITES	TUMORS		B2	8E-2		2.3E-6		010180
	ORAL [SLOPE] COMMENT: UNDER REVIEW. NUMBER SUBJECT TO CHANGE.									
	GENERAL COMMENT: ALSO SEE HEAST TABLE 1: SUBCHRONIC AND CHRONIC TOXICITY (OTHER THAN CARCINOGENICITY).									
ALDRIN		**000309-00-2**								
	ORAL: DIET	MOUSE	LIVER	CARCINOMA	IRIS	IRIS	1.7E+1	IRIS	IRIS	005006
	INHALATION [SLOPE] COMMENT: SEE APPENDIX A-II. DOSE CONVERSIONS ON HEAST.									
	INHALATION [UNIT RISK] COMMENT: BASED ON ROUTE TO ROUTE EXTRAPOLATION.									
	GENERAL COMMENT: ALSO SEE HEAST TABLE 1: SUBCHRONIC AND CHRONIC TOXICITY (OTHER THAN CARCINOGENICITY).									
ALLYL CHLORIDE		**000107-05-1**								
					IRIS					010181
	GENERAL COMMENT: FOR RCRA ACTIVITIES ONLY. CONTACT THE HEALTH ASSESSMENT SECTION (202) 260-4761 FOR RCRA APPROVED NUMERIC ASSESSMENT OF THIS COMPOUND.									
	GENERAL COMMENT: ALSO SEE HEAST TABLE 1: SUBCHRONIC AND CHRONIC TOXICITY (OTHER THAN CARCINOGENICITY)									
ANILINE		**000062-53-3**								
					IRIS	IRIS		IRIS		010088
	GENERAL COMMENT: ALSO SEE HEAST TABLE 1: SUBCHRONIC AND CHRONIC TOXICITY (OTHER THAN CARCINOGENICITY).									
ARAMITE		**000140-57-8**								
	ORAL: DIET	104 WKS RAT	LIVER	TUMORS	IRIS	IRIS	2.5E-2	IRIS	IRIS	010206
	INHALATION [SLOPE] COMMENT: BASED ON ROUTE TO ROUTE EXTRAPOLATION. SEE APPENDIX A-II. DOSE CONVERSIONS ON HEAST.									
	GENERAL COMMENT: ALSO SEE HEAST TABLE 1: SUBCHRONIC AND CHRONIC TOXICITY (OTHER THAN CARCINOGENICITY).									

HEAST TABLE 3: CARCINOGENICITY

May 1995

CHEMICAL	ROUTE	EXPERIMENT LENGTH / SPECIES	TARGET	CANCER	[EPA GROUP]	[SLOPE FACTOR] ORAL (mg/kg/day)$^{-1}$	[SLOPE FACTOR] INHALATION (mg/kg/day)$^{-1}$	[UNIT RISK] ORAL (ug/L)$^{-1}$	[UNIT RISK] INHALATION (ug/cu m)$^{-1}$	REFERENCE
ARSENIC, INORGANIC		**007440-38-2**						IRIS		010925
	INHALATION: OCCUPATIONAL	HUMAN	RESPIRATORY SYSTEM	TUMORS	IRIS		5.0E+1		IRIS	005007
INHALATION [SLOPE] COMMENT: SEE APPENDIX A-II, DOSE CONVERSIONS ON HEAST. GENERAL COMMENT: ALSO SEE HEAST TABLE 1: SUBCHRONIC AND CHRONIC TOXICITY (OTHER THAN CARCINOGENICITY).										
ASBESTOS		**001332-21-4**			IRIS					005010
					IRIS				IRIS	005919
ATRAZINE		**001912-24-9**								
	ORAL: DIET	2 YEARS RAT	MAMMARY GLAND	ADENOMA	C	2.22E-1		6.3E-6		010380
			MAMMARY GLAND	FIBROADENOMA						
			MAMMARY GLAND	ADENOCARCINOMA						
			MAMMARY GLAND	CARCINOSARCOMA						
ORAL [SLOPE] COMMENT: UNDER REVIEW, NUMBER SUBJECT TO CHANGE. GENERAL COMMENT: ALSO SEE HEAST TABLE 1: SUBCHRONIC AND CHRONIC TOXICITY (OTHER THAN CARCINOGENICITY)										
AZOBENZENE		**000103-33-3**			IRIS	IRIS	1.1E-1	IRIS	IRIS	010089
	ORAL: DIET	2 YEARS RAT	ABDOMINAL CAVITY	SARCOMA						
INHALATION [SLOPE] COMMENT: SEE APPENDIX A-II, DOSE CONVERSIONS ON HEAST.										

IRIS, EPA'S INTEGRATED RISK INFORMATION SYSTEM, IS UPDATED MONTHLY. FURTHER INFORMATION: RISK INFORMATION HOTLINE: (513) 569-7254.

HEAST TABLE 3: CARCINOGENICITY

May 1995

CHEMICAL	ROUTE	EXPERIMENT LENGTH / SPECIES	TARGET	CANCER	[EPA GROUP]	[SLOPE FACTOR] ORAL (mg/kg/day)$^{-1}$	[SLOPE FACTOR] INHALATION (mg/kg/day)$^{-1}$	[UNIT RISK] ORAL (ug/L)$^{-1}$	[UNIT RISK] INHALATION (ug/cu m)-1	REFERENCE
BENZENE		**000071-43-2**			IRIS	IRIS	2.9E-2	IRIS	IRIS	005011
	INHALATION: OCCUPATIONAL	HUMAN	BLOOD	LEUKEMIA						
	ORAL [SLOPE] COMMENT: BASED ON ROUTE TO ROUTE EXTRAPOLATION.									
	INHALATION [SLOPE] COMMENT: SEE APPENDIX A-II. DOSE CONVERSIONS ON HEAST.									
	GENERAL COMMENT: ALSO SEE HEAST TABLE 1: SUBCHRONIC AND CHRONIC TOXICITY (OTHER THAN CARCINOGENICITY)									
BENZIDINE		**000092-87-5**			IRIS	IRIS	IRIS	IRIS	IRIS	005014
	GENERAL COMMENT: ALSO SEE HEAST TABLE 1: SUBCHRONIC AND CHRONIC TOXICITY (OTHER THAN CARCINOGENICITY).									
BENZOTRICHLORIDE		**000098-07-7**			IRIS	IRIS		IRIS		010092
BENZO[A]ANTHRACENE		**000056-55-3**			IRIS					010182
BENZO[A]PYRENE		**000050-32-8**			IRIS	IRIS		IRIS		010508
BENZO[B]FLUORANTHENE		**000205-99-2**			IRIS					010183
	GENERAL COMMENT: ALSO SEE HEAST TABLE 1: SUBCHRONIC AND CHRONIC TOXICITY (OTHER THAN CARCINOGENICITY).									
BENZO[K]FLUORANTHENE		**000207-08-9**			IRIS					010090
	GENERAL COMMENT: FOR RCRA ACTIVITIES ONLY. CONTACT THE HEALTH ASSESSMENT SECTION (202) 260-4761 FOR RCRA APPROVED NUMERIC ASSESSMENT OF THIS COMPOUND.									

CHEMICAL	ROUTE	EXPERIMENT LENGTH / SPECIES	TARGET	CANCER	[EPA GROUP]	[SLOPE FACTOR] ORAL (mg/kg/day)$^{-1}$	[SLOPE FACTOR] INHALATION (mg/kg/day)$^{-1}$	[UNIT RISK] ORAL (ug/L)$^{-1}$	[UNIT RISK] INHALATION (ug/cu m)$^{-1}$	REFERENCE
BENZYL CHLORIDE		**000100-44-7**								
					IRIS	IRIS		IRIS		010093
BERYLLIUM		**007440-41-7**								
					IRIS	IRIS		IRIS		005018
GENERAL COMMENT: ALSO SEE HEAST TABLE 1: SUBCHRONIC AND CHRONIC TOXICITY (OTHER THAN CARCINOGENICITY).										
INHALATION:					IRIS		8.4E+0		IRIS	005017
OCCUPATIONAL		HUMAN	LUNG	TUMORS						
INHALATION [SLOPE] COMMENT: SEE APPENDIX A-II. DOSE CONVERSIONS ON HEAST.										
BIS(2-CHLOROETHYL) ETHER		**000111-44-4**								
	ORAL	560 DAYS			IRIS	IRIS	1.1E+0	IRIS	IRIS	005076
		MOUSE	LIVER	TUMORS						
INHALATION [SLOPE] COMMENT: BASED ON ROUTE TO ROUTE EXTRAPOLATION. SEE APPENDIX A-II. DOSE CONVERSIONS ON HEAST.										
BIS(2-CHLORO-1-METHYLETHYL) ETHER		**000108-06-1**								
	ORAL: GAVAGE	2 YEARS			C	7E-2	3.5E-2	2E-6	1E-5	005079
		MOUSE	LIVER	TUMORS						
			LUNG	TUMORS						
INHALATION [SLOPE] COMMENT: BASED ON ROUTE TO ROUTE EXTRAPOLATION (50% RESPIRATORY ABSORPTION). SEE APPENDIX A-II: DOSE CONVERSIONS ON HEAST. GENERAL COMMENT: COMPOUND TESTED CONTAINED 70% BIS(2-CHLORO-1-METHYLETHYL)ETHER AND 30% BIS(2-CHLOROISOPROPYL)ETHER. ALSO SEE HEAST TABLE 1: SUBCHRONIC AND CHRONIC TOXICITY (OTHER THAN CARCINOGENICITY).										
BIS(2-ETHYLHEXYL) PHTHALATE / (DEHP)		**000117-81-7**								
					IRIS	IRIS		IRIS		005120
GENERAL COMMENT: ALSO SEE HEAST TABLE 1: SUBCHRONIC AND CHRONIC TOXICITY (OTHER THAN CARCINOGENICITY).										

HEAST TABLE 3: CARCINOGENICITY

CHEMICAL	ROUTE	EXPERIMENT LENGTH / SPECIES	TARGET	CANCER	[EPA GROUP]	[SLOPE FACTOR] ORAL (mg/kg/day)$^{-1}$	[SLOPE FACTOR] INHALATION (mg/kg/day)$^{-1}$	[UNIT RISK] ORAL (ug/L)$^{-1}$	[UNIT RISK] INHALATION (ug/cu m)$^{-1}$	REFERENCE
BIS(CHLOROMETHYL) ETHER	**000542-88-1**				IRIS	IRIS	2.2E+2	IRIS	IRIS	005077
	INHALATION: INTERMITTENT	10-100 DAYS RAT	RESPIRATORY SYSTEM	TUMORS						
	ORAL [SLOPE] COMMENT: BASED ON ROUTE TO ROUTE EXTRAPOLATION.									
	INHALATION [SLOPE] COMMENT: SEE APPENDIX A-II. DOSE CONVERSIONS ON HEAST.									
BROMODICHLOROMETHANE	**000075-27-4**				IRIS	IRIS		IRIS		005148
	GENERAL COMMENT: ALSO SEE HEAST TABLE 1: SUBCHRONIC AND CHRONIC TOXICITY (OTHER THAN CARCINOGENICITY).									
BROMOETHENE / (VINYL BROMIDE)	**000593-60-2**				B2		1.1E-1		3.2E-5	010094
	INHALATION: INTERMITTENT	2 YEARS RAT	LIVER	TUMORS						
	INHALATION [SLOPE] COMMENT: SEE APPENDIX A-II: DOSE CONVERSIONS ON HEAST.									
	GENERAL COMMENT: ALSO SEE HEAST TABLE 1: SUBCHRONIC AND CHRONIC TOXICITY (OTHER THAN CARCINOGENICITY)									
BROMOFORM	**000075-25-2**				IRIS	IRIS	3.9E-3	IRIS	IRIS	005150
	ORAL: GAVAGE	2 YEARS RAT	INTESTINE, LARGE	ADENOMATOUS POLYP ADENOCARCINOMA						
	INHALATION [SLOPE] COMMENT: BASED ON ROUTE TO ROUTE EXTRAPOLATION. SEE APPENDIX A-II, DOSE CONVERSIONS ON HEAST.									
	GENERAL COMMENT: ALSO SEE HEAST TABLE 1: SUBCHRONIC AND CHRONIC TOXICITY (OTHER THAN CARCINOGENICITY).									
BUTADIENE, 1,3-	**000106-99-0**				IRIS		1.8E+0		IRIS	010477
	INHALATION: INTERMITTENT	MOUSE	MULTIPLE SITES	TUMORS						
	INHALATION [SLOPE] COMMENT: SEE APPENDIX A-II. DOSE CONVERSIONS ON HEAST.									

CHEMICAL	ROUTE	EXPERIMENT LENGTH / SPECIES	TARGET	CANCER	[SLOPE FACTOR] [EPA GROUP]	ORAL (mg/kg/day)$^{-1}$	INHALATION (mg/kg/day)$^{-1}$	[UNIT RISK] ORAL (ug/L)$^{-1}$	INHALATION (ug/cu m)$^{-1}$	REFERENCE
BUTYL BENZYL PHTHALATE, N-	**000085-68-7**									
					IRIS					005122

GENERAL COMMENT: ALSO SEE HEAST TABLE 1: SUBCHRONIC AND CHRONIC TOXICITY (OTHER THAN CARCINOGENICITY)

CADMIUM	**007440-43-9**									
					IRIS				IRIS	005019

ORAL [SLOPE] COMMENT: THERE IS INADEQUATE EVIDENCE FOR THE CARCINOGENICITY OF THIS COMPOUND BY THE ORAL ROUTE.
GENERAL COMMENT: ALSO SEE HEAST TABLE 1: SUBCHRONIC AND CHRONIC TOXICITY (OTHER THAN CARCINOGENICITY).

CAPTAFOL	**002425-06-1**									
	ORAL: DIET	MOUSE	LYMPHATIC SYSTEM	LYMPHOSARCOMA	C	8.6E-3		2.4E-7		010095

ORAL [SLOPE] COMMENT: UNDER REVIEW, NUMBER SUBJECT TO CHANGE.
GENERAL COMMENT: ALSO SEE HEAST TABLE 1: SUBCHRONIC AND CHRONIC TOXICITY (OTHER THAN CARCINOGENICITY).

CAPTAN	**000133-06-2**									
					B2	3.5E-3		1.0E-7		010184

ORAL [SLOPE] COMMENT: UNDER REVIEW, NUMBER SUBJECT TO CHANGE.
GENERAL COMMENT: ALSO SEE HEAST TABLE 1: SUBCHRONIC AND CHRONIC TOXICITY (OTHER THAN CARCINOGENICITY).

CARBAZOLE	**000086-74-8**									
	ORAL: DIET	96 WEEKS MOUSE	LIVER	TUMORS	B2	2E-2		5.7E-7		010096

CARBON TETRACHLORIDE	**000056-23-5**									
	ORAL: DIET		LIVER	TUMORS	IRIS	IRIS	5.3E-2	IRIS	IRIS	005022

INHALATION [SLOPE] COMMENT: SEE APPENDIX A-II: DOSE CONVERSIONS ON HEAST.
INHALATION [UNIT RISK] COMMENT: BASED ON ROUTE TO ROUTE EXTRAPOLATION. INCORPORATES AN ABSORPTION FACTOR OF 0.4.
GENERAL COMMENT: ALSO SEE HEAST TABLE 1: SUBCHRONIC AND CHRONIC TOXICITY (OTHER THAN CARCINOGENICITY).

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HEAST TABLE 3: CARCINOGENICITY

CHEMICAL	ROUTE	EXPERIMENT LENGTH / SPECIES	TARGET	CANCER	[EPA GROUP]	[SLOPE FACTOR] ORAL (mg/kg/day)$^{-1}$	[SLOPE FACTOR] INHALATION (mg/kg/day)$^{-1}$	[UNIT RISK] ORAL (ug/L)$^{-1}$	[UNIT RISK] INHALATION (ug/cu m)-1	REFERENCE
CHLORANIL		**000118-75-2**								
	ORAL: DIET	82 WEEKS MOUSE	LIVER LUNG	TUMORS TUMORS	C	4.03E-1		1.2E-5		010097
CHLORDANE		**000057-74-9**								
	ORAL: DIET	MOUSE	LIVER	CARCINOMA	IRIS	IRIS	1.3E+0	IRIS	IRIS	005024
	INHALATION [SLOPE] COMMENT: BASED ON ROUTE TO ROUTE EXTRAPOLATION. SEE APPENDIX A-II: DOSE CONVERSIONS ON HEAST. GENERAL COMMENT: ALSO SEE HEAST TABLE 1: SUBCHRONIC AND CHRONIC TOXICITY (OTHER THAN CARCINOGENICITY).									
CHLORO-2-METHYLANILINE HYDROCHLORIDE, 4-		**003165-93-3**								
	ORAL: DIET	18 MONTHS MOUSE	CARDIOVASCULAR SYSTEM CARDIOVASCULAR SYSTEM	HEMANGIOMA HEMANGIOSARCOMA	B2	4.6E-1		1.3E-5		010419
CHLORO-2-METHYLANILINE, 4-		**000095-69-2**								
	ORAL: DIET	18 MONTHS MOUSE	CARDIOVASCULAR SYSTEM CARDIOVASCULAR SYSTEM	HEMANGIOMA HEMANGIOSARCOMA	B2	5.8E-1		1.6E-5		010098
	ORAL [SLOPE] COMMENT: BASED ON VASCULAR TUMORS IN MICE TREATED WITH 4-CHLORO-2-METHYLANILINE HYDROCHLORIDE.									

CHEMICAL	ROUTE	EXPERIMENT LENGTH / SPECIES	TARGET	CANCER	[EPA GROUP]	[SLOPE FACTOR] ORAL (mg/kg/day)$^{-1}$	[SLOPE FACTOR] INHALATION (mg/kg/day)$^{-1}$	[UNIT RISK] ORAL (ug/L)$^{-1}$	[UNIT RISK] INHALATION (ug/cu m)$^{-1}$	REFERENCE
CHLOROBENZILATE	**000510-15-6**									
	ORAL: GAVAGE, DIET	82 WEEKS MOUSE	LIVER	HEPATOMA	B2	2.7E-1	2 7E-1	7.8E-6	7.8E-5	010848
	INHALATION [SLOPE] COMMENT: ABSORBANCE BY THE INHALATION ROUTE WAS ASSUMED TO EQUAL ORAL ABSORPTION SINCE THERE WERE NO PHARMACOKINETIC DATA TO THE CONTRARY. SEE APPENDIX A-II: DOSE CONVERSIONS ON HEAST.									
	INHALATION [UNIT RISK] COMMENT: ABSORBANCE BY THE INHALATION ROUTE WAS ASSUMED TO EQUAL ORAL ABSORPTION SINCE THERE WERE NO PHARMACOKINETIC DATA TO THE CONTRARY.									
	GENERAL COMMENT: ALSO SEE HEAST TABLE 1: SUBCHRONIC AND CHRONIC TOXICITY (OTHER THAN CARCINOGENICITY).									
CHLOROFORM	**000067-66-3**				IRIS	IRIS		IRIS		005036
	ORAL: GAVAGE	78 WEEKS MOUSE	LIVER	CARCINOMA	IRIS		8.1E-2		IRIS	005035
	INHALATION [SLOPE] COMMENT: BASED ON ROUTE TO ROUTE EXTRAPOLATION. SEE APPENDIX A-II. DOSE CONVERSIONS ON HEAST.									
	GENERAL COMMENT: ALSO SEE HEAST TABLE 1: SUBCHRONIC AND CHRONIC TOXICITY (OTHER THAN CARCINOGENICITY).									
CHLOROMETHANE	**000074-87-3**									
	INHALATION: INTERMITTENT	24 MONTHS MOUSE	KIDNEY	TUMORS	C	1.3E-2	6.3E-3	3.7E-7	1.8E-6	005038
	ORAL [SLOPE] COMMENT: BASED ON ROUTE TO ROUTE EXTRAPOLATION.									
	GENERAL COMMENT: ALSO SEE HEAST TABLE 1: SUBCHRONIC AND CHRONIC TOXICITY (OTHER THAN CARCINOGENCIITY).									
CHLOROMETHYL METHYL ETHER	**000107-30-2**				IRIS					005081
	GENERAL COMMENT: FOR RCRA ACTIVITIES ONLY, CONTACT THE HEALTH ASSESSMENT SECTION (202) 260-4761 FOR RCRA APPROVED NUMERIC ASSESSMENT OF THIS COMPOUND.									

HEAST TABLE 3: CARCINOGENICITY

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CHEMICAL	ROUTE	EXPERIMENT LENGTH / SPECIES	TARGET	CANCER	[EPA GROUP]	[SLOPE FACTOR] ORAL (mg/kg/day)$^{-1}$	[SLOPE FACTOR] INHALATION (mg/kg/day)$^{-1}$	[UNIT RISK] ORAL (ug/L)$^{-1}$	[UNIT RISK] INHALATION (ug/cu m)-1	REFERENCE
CHLORONITROBENZENE, O-	**000088-73-3**									
	ORAL: DIET	18 MONTHS MOUSE	LIVER	TUMORS	B2	2.5E-2		7.1E-7		010099
CHLORONITROBENZENE, P-	**000100-00-5**									
	ORAL: DIET	18 MONTHS MOUSE	CARDIOVASCULAR SYSTEM	TUMORS	B2	1.8E-2		5.1E-7		010100
CHLOROTHALONIL	**001897-45-6**									
	ORAL: DIET	27-32 MONTHS RAT	KIDNEY	TUMOR	B2	1.1E-2		3.1E-7		010384

ORAL [SLOPE] COMMENT: UNDER REVIEW, NUMBER SUBJECT TO CHANGE.
GENERAL COMMENT: ALSO SEE HEAST TABLE 1: SUBCHRONIC AND CHRONIC TOXICITY (OTHER THAN CARCINOGENICITY).

CHROMIUM(VI)	**018540-29-9**									
	INHALATION: OCCUPATIONAL	HUMAN	LUNG	TUMORS	IRIS		4.1E+1		IRIS	005091

INHALATION [SLOPE] COMMENT: SEE APPENDIX A-II, DOSE CONVERSIONS ON HEAST.
GENERAL COMMENT: ALSO SEE HEAST TABLE 1: SUBCHRONIC AND CHRONIC TOXICITY (OTHER THAN CARCINOGENICITY).

CHRYSENE	**000218-01-9**									
					IRIS					010185

GENERAL COMMENT: FOR RCRA ACTIVITIES ONLY, CONTACT THE HEALTH ASSESSMENT SECTION (202) 260-4761 FOR RCRA APPROVED NUMERIC ASSESSMENT OF THIS COMPOUND. ALSO SEE HEAST TABLE 1: SUBCHRONIC AND CHRONIC TOXICITY (OTHER THAN CARCINOGENICITY).

HEAST TABLE 3: CARCINOGENICITY

May 1995

CHEMICAL	ROUTE	EXPERIMENT LENGTH / SPECIES	TARGET	CANCER	[EPA GROUP]	[SLOPE FACTOR] ORAL (mg/kg/day)$^{-1}$	[SLOPE FACTOR] INHALATION (mg/kg/day)$^{-1}$	[UNIT RISK] ORAL (ug/L)$^{-1}$	[UNIT RISK] INHALATION (ug/cu m)-1	REFERENCE
COKE OVEN EMISSIONS	**008007-45-2**									
	INHALATION: OCCUPATIONAL	HUMAN	LUNG	TUMORS	IRIS		2.2E+0		IRIS	005039
	INHALATION [SLOPE] COMMENT: SEE APPENDIX A-II, DOSE CONVERSIONS ON HEAST.									
	GENERAL COMMENT: FORMERLY LISTED UNDER COAL TARS.									
CREOSOTE, COAL TAR	**008001-58-9**				IRIS					005042
CRESOL, M- / (3-METHYLPHENOL)	**000108-39-4**				IRIS					010187
	GENERAL COMMENT: ALSO SEE HEAST TABLE 1: SUBCHRONIC AND CHRONIC TOXICITY (OTHER THAN CARCINOGENICITY).									
CRESOL, O- / (2-METHYLPHENOL)	**000095-48-7**				IRIS					010186
	GENERAL COMMENT: ALSO SEE HEAST TABLE 1: SUBCHRONIC AND CHRONIC TOXICITY (OTHER THAN CARCINOGENICITY).									
CRESOL, P- / (4-METHYLPHENOL)	**000106-44-5**				IRIS					010188
	GENERAL COMMENT: ALSO SEE HEAST TABLE 1: SUBCHRONIC AND CHRONIC TOXICITY (OTHER THAN CARCINOGENICITY).									
CROTONALDEHYDE	**000123-73-9**									
	ORAL: DRINKING WATER	113 WKS RAT	LIVER	TUMOR	IRIS	1.9E+0		5.4E-5		010190
	ORAL [SLOPE] COMMENT: UNDER REVIEW, NUMBER SUBJECT TO CHANGE.									

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HEAST TABLE 3: CARCINOGENICITY

May 1995

CHEMICAL	ROUTE	EXPERIMENT LENGTH / SPECIES	TARGET	CANCER	[EPA GROUP]	[SLOPE FACTOR] ORAL (mg/kg/day)$^{-1}$	[SLOPE FACTOR] INHALATION (mg/kg/day)$^{-1}$	[UNIT RISK] ORAL (ug/L)$^{-1}$	[UNIT RISK] INHALATION (ug/cu m)$^{-1}$	REFERENCE
CYANAZINE		**021725-46-2**								
	ORAL: DIET	2 YEARS RAT	MAMMARY GLAND	ADENOMA/ CARCINOMA, COMBINED	C	8.4E-1		2.4E-5		010944
	GENERAL COMMENT: ALSO SEE HEAST TABLE 1: SUBCHRONIC AND CHRONIC TOXICITY (OTHER THAN CARCINOGENICITY).									
DDD		**000072-54-8**			IRIS	IRIS		IRIS		010291
DDE		**000072-55-9**			IRIS	IRIS		IRIS		010292
DDT		**000050-29-3**			IRIS	IRIS	3.4E-1	IRIS	IRIS	005044
	ORAL: DIET	MOUSE, RAT	LIVER	TUMORS						
	INHALATION [SLOPE] COMMENT: BASED ON ROUTE TO ROUTE EXTRAPOLATION. SEE APPENDIX A-II. DOSE CONVERSIONS ON HEAST. GENERAL COMMENT: ALSO SEE HEAST TABLE 1: SUBCHRONIC AND CHRONIC TOXICITY (OTHER THAN CARCINOGENICITY).									
DECABROMODIPHENYL ETHER		**001163-19-5**			IRIS					010102
	GENERAL COMMENT: ALSO SEE HEAST TABLE 1: SUBCHRONIC AND CHRONIC TOXICITY (OTHER THAN CARCINOGENICITY).									
DIALLATE		**002303-16-4**			B2	6.1E-2		1.7E-6		010103
	ORAL	19 MONTHS MOUSE	LIVER	TUMORS						

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CHEMICAL	ROUTE	EXPERIMENT LENGTH / SPECIES	TARGET	CANCER	[EPA GROUP]	[SLOPE FACTOR] ORAL (mg/kg/day)$^{-1}$	[SLOPE FACTOR] INHALATION (mg/kg/day)$^{-1}$	[UNIT RISK] ORAL (ug/L)$^{-1}$	[UNIT RISK] INHALATION (ug/cu m)$^{-1}$	REFERENCE
DIBENZO[A,H]ANTHRACENE	**000053-70-3**				IRIS					010191
GENERAL COMMENT: FOR RCRA ACTIVITIES ONLY, CONTACT THE HEALTH ASSESSMENT SECTION (202) 260-4761 FOR RCRA APPROVED NUMERIC ASSESSMENT OF THIS COMPOUND.										
DIBROMO-3-CHLOROPROPANE, 1,2	**000096-12-8**									
ORAL: DIET			STOMACH	TUMORS	B2	1.4E+0		4E-5		010484
			KIDNEY	TUMORS						
			LIVER	TUMORS						
[EPA GROUP] COMMENT: UNDER REVIEW, CLASSIFICATION SUBJECT TO CHANGE. INHALATION [SLOPE] COMMENT: SEE APPENDIX A-II: DOSE CONVERSIONS ON HEAST.										
INHALATION: INTERMITTENT	RAT, MOUSE		NASAL CAVITY	TUMORS	B2		2.4E-3		6.9E-7	010519
DIBROMOCHLOROMETHANE	**000124-48-1**				IRIS	IRIS		IRIS		010891
GENERAL COMMENT: FORMERLY LISTED AS CHLORODIBROMOMETHANE. ALSO SEE HEAST TABLE 1: SUBCHRONIC AND CHRONIC TOXICITY (OTHER THAN CARCINOGENICITY).										
DIBROMOETHANE, 1,2-	**000106-93-4**				IRIS	IRIS		IRIS		005818
GENERAL COMMENT: FORMERLY LISTED UNDER ETHYLENE DIBROMIDE										
INHALATION: INTERMITTENT	88-103 WEEKS RAT		NASAL CAVITY	TUMORS	IRIS		7.6E-1		IRIS	005071
INHALATION [SLOPE] COMMENT: SEE APPENDIX A-II, DOSE CONVERSIONS ON HEAST. GENERAL COMMENT: ALSO SEE HEAST TABLE 1: SUBCHRONIC AND CHRONIC TOXICITY (OTHER THAN CARCINOGENICITY).										

CHEMICAL	ROUTE	EXPERIMENT LENGTH / SPECIES	TARGET	CANCER	[EPA GROUP]	[SLOPE FACTOR] ORAL (mg/kg/day)$^{-1}$	[SLOPE FACTOR] INHALATION (mg/kg/day)$^{-1}$	[UNIT RISK] ORAL (ug/L)$^{-1}$	[UNIT RISK] INHALATION (ug/cu m)-1	REFERENCE
DICHLORO-2-BUTENE, 1,4- **000764-41-0**										
	INHALATION: INTERMITTENT	90 DAYS RAT	NASAL PASSAGES	TUMORS	B2		9.3E+0		2.6E-3	005053
	INHALATION [SLOPE] COMMENT: SEE APPENDIX A-II: DOSE CONVERSIONS ON HEAST. GENERAL COMMENT: FORMERLY LISTED UNDER DICHLOROBUTENES									
DICHLOROBENZENE, 1,4- **000106-46-7**										
	ORAL: GAVAGE	103 WEEKS MOUSE	LIVER	TUMORS	C	2.4E-2		6.8E-7		005050
	ORAL [SLOPE] COMMENT: UNDER REVIEW. NUMBER SUBJECT TO CHANGE. GENERAL COMMENT: ALSO SEE HEAST TABLE 1: SUBCHRONIC AND CHRONIC TOXICITY (OTHER THAN CARCINOGENICITY).									
DICHLOROBENZIDINE, 3,3'- **000091-94-1**					IRIS	IRIS		IRIS		005815
DICHLOROETHANE, 1,1- **000075-34-3**					IRIS					005055
	GENERAL COMMENT: ALSO SEE HEAST TABLE 1: SUBCHRONIC AND CHRONIC TOXICITY (OTHER THAN CARCINOGENICITY).									
DICHLOROETHANE, 1,2- **000107-06-2**					IRIS	IRIS	9.1E-2	IRIS	IRIS	005058
	ORAL: GAVAGE	78 WEEKS RAT	CIRCULATORY SYSTEM	SARCOMA						
	INHALATION [SLOPE] COMMENT: BASED ON ROUTE TO ROUTE EXTRAPOLATION. SEE APPENDIX A-II. DOSE CONVERSIONS ON HEAST. GENERAL COMMENT: ALSO SEE HEAST TABLE 1: SUBCHRONIC AND CHRONIC TOXICITY (OTHER THAN CARCINOGENICITY)									

HEAST TABLE 3: CARCINOGENICITY

May 1995

CHEMICAL	ROUTE	EXPERIMENT LENGTH / SPECIES	TARGET	CANCER	[EPA GROUP]	[SLOPE FACTOR] ORAL (mg/kg/day)$^{-1}$	[SLOPE FACTOR] INHALATION (mg/kg/day)$^{-1}$	[UNIT RISK] ORAL (ug/L)$^{-1}$	[UNIT RISK] INHALATION (ug/cu m)$^{-1}$	REFERENCE
DICHLOROETHYLENE, 1,1-	**000075-35-4**									
					IRIS	IRIS		IRIS		005060
	INHALATION	12 MONTHS MOUSE	KIDNEY	ADENOCARCINOMA	IRIS		1.2E+0		IRIS	005059
	INHALATION [SLOPE] COMMENT: SEE APPENDIX A-II, DOSE CONVERSIONS ON HEAST.									
	GENERAL COMMENT: ALSO SEE HEAST TABLE 1: SUBCHRONIC AND CHRONIC TOXICITY (OTHER THAN CARCINOGENICITY).									
DICHLOROPROPANE, 1,2-	**000078-87-5**									
	ORAL: GAVAGE				B2	6.8E-2		1.9E-6		005062
		MOUSE	LIVER	TUMORS						
	ORAL [SLOPE] COMMENT: UNDER REVIEW, NUMBER SUBJECT TO CHANGE.									
	GENERAL COMMENT: ALSO SEE HEAST TABLE 1: SUBCHRONIC AND CHRONIC TOXICITY (OTHER THAN CARCINOGENICITY)									

HEAST TABLE 3: CARCINOGENICITY

May 1995

CHEMICAL	ROUTE	EXPERIMENT LENGTH / SPECIES	TARGET	CANCER	[EPA GROUP]	[SLOPE FACTOR] ORAL (mg/kg/day)$^{-1}$	[SLOPE FACTOR] INHALATION (mg/kg/day)$^{-1}$	[UNIT RISK] ORAL (ug/L)$^{-1}$	[UNIT RISK] INHALATION (ug/cu m)-1	REFERENCE
DICHLOROPROPENE, 1,3- / (TELONE II)		**000542-75-6**								
	ORAL: GAVAGE	104 WEEKS MOUSE	BLADDER	CARCINOMA	IRIS	1.8E-1		5E-6		010946
			RESPIRATORY SYSTEM	ALVEOLAR/ BRONCHIOLAR ADENOMA						
			FORESTOMACH	PAPILLOMA/ CARCINOMA						
	ORAL: GAVAGE	104 WEEKS RAT	LIVER	NEOPLASTIC NODULE/CARCINOMA						
			FORESTOMACH	PAPILLOMA/ CARCINOMA						
	INHALATION: INTERMITTENT	2 YEARS MOUSE	LUNG	ADENOMA	IRIS		1.3E-1		3.7E-5	010104
DIELDRIN		**000060-57-1**								
	ORAL: DIET	MOUSE	LIVER	CARCINOMA	IRIS	IRIS	1.6E+1	IRIS	IRIS	005816

ORAL [SLOPE] COMMENT: THE [SLOPE] IS THE GEOMETRIC MEAN OF SLOPE FACTORS OF COMBINED TUMORS LISTED.
GENERAL COMMENT: ALSO SEE HEAST TABLE 1: SUBCHRONIC AND CHRONIC TOXICITY (OTHER THAN CARCINOGENICITY)

INHALATION [SLOPE] COMMENT: SEE APPENDIX A-II: DOSE CONVERSIONS ON HEAST.
GENERAL COMMENT: ALSO SEE HEAST TABLE 1: SUBCHRONIC AND CHRONIC TOXICITY (OTHER THAN CARCINOGENICITY).

INHALATION [SLOPE] COMMENT: SEE APPENDIX A-II. DOSE CONVERSIONS ON HEAST.
INHALATION [UNIT RISK] COMMENT: BASED ON ROUTE-TO-ROUTE EXTRAPOLATION.
GENERAL COMMENT: ALSO SEE HEAST TABLE 1: SUBCHRONIC AND CHRONIC TOXICITY (OTHER THAN CARCINOGENICITY).

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HEAST TABLE 3: CARCINOGENICITY

May 1995

CHEMICAL	ROUTE	EXPERIMENT LENGTH / SPECIES	TARGET	CANCER	[EPA GROUP]	[SLOPE FACTOR] ORAL (mg/kg/day)$^{-1}$	[SLOPE FACTOR] INHALATION (mg/kg/day)$^{-1}$	[UNIT RISK] ORAL (ug/L)$^{-1}$	[UNIT RISK] INHALATION (ug/cu m)-1	REFERENCE
DIETHYLSTILBESTROL		**000056-53-1**								
	ORAL: DIET	MOUSE	MAMMARY GLAND	CARCINOMA	A	4.7E+3		1.3E-1		010485
DIMETHOXYBENZIDINE, 3,3'-		**000119-90-4**								
	ORAL: DIET	LIFETIME HAMSTER	FORESTOMACH	PAPILLOMA	B2	1.4E-2		4E-7		010106
DIMETHYLANILINE HYDROCHLORIDE, 2,4-		**021436-96-4**								
	ORAL: DIET	18 MONTHS MOUSE	LUNG	TUMORS	C	5.8E-1		1.7E-5		010108
DIMETHYLANILINE, 2,4-		**000095-68-1**								
	ORAL: DIET	18 MONTHS MOUSE	LUNG	TUMORS	C	7.5E-1		2.1E-5		010107
DIMETHYLBENZIDINE, 3,3'-		**000119-93-7**								
	ORAL: GAVAGE	30 DAYS RAT	MAMMARY	TUMORS	B2	9.2E+0		2.6E-4		010109
DIMETHYLBENZ[A]ANTHRACENE, 7,12-		**000057-97-6**								010297

GENERAL COMMENT: FOR RCRA ACTIVITIES ONLY, CONTACT THE HEALTH ASSESSMENT SECTION (202) 260-4761 FOR RCRA APPROVED NUMERIC ASSESSMENT OF THIS COMPOUND.

DIMETHYLHYDRAZINE, 1,1- **000057-14-7**

GENERAL COMMENT: NO EPA GROUP CLASSIFICATION WAS PROVIDED IN THE REFERENCE DOCUMENT, THEREFORE THIS COMPOUND WAS REMOVED FROM TABLE 3.

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CHEMICAL	ROUTE	EXPERIMENT LENGTH / SPECIES	TARGET	CANCER	[EPA GROUP]	[SLOPE FACTOR] ORAL (mg/kg/day)$^{-1}$	[SLOPE FACTOR] INHALATION (mg/kg/day)$^{-1}$	[UNIT RISK] ORAL (ug/L)$^{-1}$	[UNIT RISK] INHALATION (ug/cu m)$^{-1}$	REFERENCE
DIMETHYLHYDRAZINE, 1,2-	**000540-73-8**				B2					010962
DIMETHYLSULFATE	**000077-78-1**				IRIS					010112
DINITROTOLUENE, 2,4-	**000121-14-2**				IRIS	IRIS		IRIS		005066
GENERAL COMMENT: LISTED AS "DINITROTOLUENE MIXTURE, 2,4-/2,6-" ON IRIS. ALSO SEE HEAST TABLE 1: SUBCHRONIC AND CHRONIC TOXICITY (OTHER THAN CARCINOGENICITY).										
DINITROTOLUENE, 2,6-	**000606-20-2**				IRIS	IRIS		IRIS		005068
GENERAL COMMENT: LISTED AS "DINITROTOLUENE MIXTURE, 2,4-/2,6-" ON IRIS. ALSO SEE HEAST TABLE 1: SUBCHRONIC AND CHRONIC TOXICITY (OTHER THAN CARCINOGENICITY).										
DIOXANE, 1,4-	**000123-91-1**				IRIS	IRIS		IRIS		010298
DIPHENYLHYDRAZINE, 1,2-	**000122-66-7**				IRIS	IRIS	8.0E-1	IRIS	IRIS	005070
	ORAL: DIET	2 YEARS / RAT	LIVER	TUMORS						
INHALATION [SLOPE] COMMENT: BASED ON ROUTE TO ROUTE EXTRAPOLATION. SEE APPENDIX A-II, DOSE CONVERSIONS ON HEAST.										
DIRECT BLACK 38	**001937-37-7**				A	8.6E+0		2.4E-4		010113
	ORAL: DIET	93 DAYS / RAT	LIVER	TUMORS						
ORAL [SLOPE] COMMENT: UNDER REVIEW, NUMBER SUBJECT TO CHANGE.										

CHEMICAL	ROUTE	EXPERIMENT LENGTH / SPECIES	TARGET	CANCER	[EPA GROUP]	[SLOPE FACTOR] ORAL (mg/kg/day)$^{-1}$	[SLOPE FACTOR] INHALATION (mg/kg/day)$^{-1}$	[UNIT RISK] ORAL (ug/L)$^{-1}$	[UNIT RISK] INHALATION (ug/cu m)$^{-1}$	REFERENCE
DIRECT BLUE 6		**002602-46-2**								
	ORAL: DIET	91 DAYS RAT	LIVER	TUMORS	A	8.1E+0		2.3E-4		010114
	ORAL [SLOPE] COMMENT: UNDER REVIEW. NUMBER SUBJECT TO CHANGE.									
DIRECT BROWN 95		**016071-86-6**								
	ORAL: DIET	91 DAYS RAT	LIVER	TUMORS	A	9.3E+0		2.6E-4		010115
	ORAL [SLOPE] COMMENT: UNDER REVIEW. NUMBER SUBJECT TO CHANGE.									
DIRECT SKY BLUE 6B		**002610-05-1**			B2					010116
	[EPA GROUP] COMMENT: BASED ON THE FACT THAT 3,3-DIMETHOXYBENZIDINE, A KNOWN EPA GROUP B2 CARCINOGEN, IS A METABOLITE OF DIRECT SKY BLUE 6B.									
EPICHLOROHYDRIN		**000106-89-8**			IRIS	IRIS		IRIS		010198
	INHALATION: INTERMITTENT	30 DAYS, OBSERVED LIFETIME RAT	NASAL CAVITY	TUMORS	IRIS		4.2E-3		IRIS	010117
	INHALATION [SLOPE] COMMENT: SEE APPENDIX A-II, DOSE CONVERSIONS ON HEAST. GENERAL COMMENT: ALSO SEE HEAST TABLE 1: SUBCHRONIC AND CHRONIC TOXICITY (OTHER THAN CARCINOGENICITY).									
ETHYL ACRYLATE		**000140-88-5**			B2	4.8E-2		1.4E-6		010118
	ORAL: GAVAGE	104 WEEKS RAT	FORESTOMACH	TUMORS						

HEAST TABLE 3: CARCINOGENICITY

May 1995

CHEMICAL	ROUTE	EXPERIMENT LENGTH / SPECIES	TARGET	CANCER	[EPA GROUP]	[SLOPE FACTOR] ORAL (mg/kg/day)$^{-1}$	[SLOPE FACTOR] INHALATION (mg/kg/day)$^{-1}$	[UNIT RISK] ORAL (ug/L)$^{-1}$	[UNIT RISK] INHALATION (ug/cu m)$^{-1}$	REFERENCE
ETHYLENE OXIDE		**000075-21-8**								
	ORAL: GAVAGE	LIFETIME, TWICE WEEKLY RAT	STOMACH	TUMORS	B1	1.02E+0		2.9E-5		010421
	ORAL [SLOPE] COMMENT: UNDER REVIEW, NUMBER SUBJECT TO CHANGE.									
	INHALATION: INTERMITTENT	2 YEARS RAT	BLOOD BRAIN	LEUKEMIA GLIOMA	B1		3.5E-1		1E-4	010422
	INHALATION [UNIT RISK] COMMENT: UNDER REVIEW, NUMBER SUBJECT TO CHANGE.									
ETHYLENE THIOUREA		**000096-45-7**								
	ORAL: GAVAGE	2 YEARS MOUSE	LIVER	ADENOMA/ CARCINOMA, COMBINED	B2	1.1E-1		3.4E-6		010947
	GENERAL COMMENT: ALSO SEE HEAST TABLE 1: SUBCHRONIC AND CHRONIC TOXICITY (OTHER THAN CARCINOGENICITY)									
FOLPET		**000133-07-3**			IRIS	IRIS		IRIS		010120
	GENERAL COMMENT: ALSO SEE HEAST TABLE 1: SUBCHRONIC AND CHRONIC TOXICITY (OTHER THAN CARCINOGENICITY).									
FORMALDEHYDE		**000050-00-0**								
	INHALATION	24 MONTHS RAT	NASAL CAVITY	TUMORS	IRIS		4.5E-2		IRIS	010121
	INHALATION [SLOPE] COMMENT: SEE APPENDIX A-II: DOSE CONVERSIONS ON HEAST. GENERAL COMMENT: ALSO SEE HEAST TABLE 1: SUBCHRONIC AND CHRONIC TOXICITY (OTHER THAN CARCINOGENICITY).									

IRIS, EPA'S INTEGRATED RISK INFORMATION SYSTEM, IS UPDATED MONTHLY. FURTHER INFORMATION: RISK INFORMATION HOTLINE: (513) 569-7254.

CHEMICAL	ROUTE	EXPERIMENT LENGTH / SPECIES	TARGET	CANCER	[EPA GROUP]	[SLOPE FACTOR] ORAL (mg/kg/day)$^{-1}$	[SLOPE FACTOR] INHALATION (mg/kg/day)$^{-1}$	[UNIT RISK] ORAL (ug/L)$^{-1}$	[UNIT RISK] INHALATION (ug/cu m)$^{-1}$	REFERENCE
FURAZOLIDONE		**000067-45-8**								
	ORAL: DIET	45 WEEKS RAT	MAMMARY	TUMORS	B2	3.8E+0		1E-4		005106
	GENERAL COMMENT: FORMERLY LISTED UNDER NITROFURANS									
FURIUM		**000531-82-8**								
	ORAL: DIET	28 WEEKS MOUSE	BLOOD	LEUKEMIA	B2	5.0E+1		1.4E-3		005108
	GENERAL COMMENT: FORMERLY LISTED UNDER NITROFURANS									
GLYCIDALDEHYDE		**000765-34-4**			IRIS					010122
	GENERAL COMMENT: ALSO SEE HEAST TABLE 1: SUBCHRONIC AND CHRONIC TOXICITY (OTHER THAN CARCINOGENICITY).									
HEPTACHLOR		**000076-44-8**								
	ORAL: DIET	MOUSE	LIVER	CARCINOMA	IRIS	IRIS	4.5E+0	IRIS	IRIS	005820
	INHALATION [SLOPE] COMMENT: BASED ON ROUTE TO ROUTE EXTRAPOLATION. SEE APPENDIX A-II, DOSE CONVERSIONS ON HEAST. GENERAL COMMENT: ALSO SEE HEAST TABLE 1: SUBCHRONIC AND CHRONIC TOXICITY (OTHER THAN CARCINOGENICITY).									
HEPTACHLOR EPOXIDE		**001024-57-3**								
	ORAL: DIET	18-24 MONTHS MOUSE	LIVER	CARCINOMA	IRIS	IRIS	9.1E+0	IRIS	IRIS	010424
	INHALATION [SLOPE] COMMENT: BASED ON ROUTE TO ROUTE EXTRAPOLATION. SEE APPENDIX A-II, DOSE CONVERSIONS ON HEAST. GENERAL COMMENT: ALSO SEE HEAST TABLE 1: SUBCHRONIC AND CHRONIC TOXICITY (OTHER THAN CARCINOGENICITY).									

HEAST TABLE 3: CARCINOGENICITY

CHEMICAL	ROUTE	EXPERIMENT LENGTH / SPECIES	TARGET	CANCER	[EPA GROUP]	[SLOPE FACTOR] ORAL (mg/kg/day)$^{-1}$	[SLOPE FACTOR] INHALATION (mg/kg/day)$^{-1}$	[UNIT RISK] ORAL (ug/L)$^{-1}$	[UNIT RISK] INHALATION (ug/cu m)$^{-1}$	REFERENCE
HEXACHLOROBENZENE	**000118-74-1**									
	ORAL: DIET	RAT	LIVER	TUMORS	IRIS	IRIS	1.6E+0	IRIS	IRIS	010365
	INHALATION [SLOPE] COMMENT: BASED ON ROUTE TO ROUTE EXTRAPOLATION. SEE APPENDIX A-II. DOSE CONVERSIONS ON HEAST.									
	GENERAL COMMENT: ALSO SEE HEAST TABLE 1: SUBCHRONIC AND CHRONIC TOXICITY (OTHER THAN CARCINOGENICITY).									
HEXACHLOROBUTADIENE	**000087-68-3**									
	ORAL: DIET	22-24 MONTHS RAT	KIDNEY	TUMORS	IRIS	IRIS	7.8E-2	IRIS	IRIS	005088
	INHALATION [SLOPE] COMMENT: BASED ON ROUTE TO ROUTE EXTRAPOLATION. SEE APPENDIX A-II. DOSE CONVERSIONS ON HEAST.									
	GENERAL COMMENT: ALSO SEE HEAST TABLE 1: SUBCHRONIC AND CHRONIC TOXICITY (OTHER THAN CARCINOGENICITY).									
HEXACHLOROCYCLOHEXANE, ALPHA-	**000319-84-6**									
	ORAL: DIET	24 WEEKS MOUSE	LIVER	TUMORS	IRIS	IRIS	6.3E+0	IRIS	IRIS	010123
	INHALATION [SLOPE] COMMENT: BASED ON ROUTE TO ROUTE EXTRAPOLATION. SEE APPENDIX A-II. DOSE CONVERSIONS ON HEAST.									
HEXACHLOROCYCLOHEXANE, BETA-	**000319-85-7**									
	ORAL: DIET	110 WEEKS MOUSE	LIVER	TUMORS	IRIS	IRIS	1.8E+0	IRIS	IRIS	010124
	INHALATION [SLOPE] COMMENT: BASED ON ROUTE TO ROUTE EXTRAPOLATION. SEE APPENDIX A-II. DOSE CONVERSIONS ON HEAST.									
HEXACHLOROCYCLOHEXANE, DELTA-	**000319-86-8**									
					IRIS					010125
	GENERAL COMMENT: ALSO SEE HEAST TABLE 1: SUBCHRONIC AND CHRONIC TOXICITY (OTHER THAN CARCINOGENICITY).									
HEXACHLOROCYCLOHEXANE, EPSILON-	**006108-10-7**									
					IRIS					010126
	GENERAL COMMENT: ALSO SEE HEAST TABLE 1: SUBCHRONIC AND CHRONIC TOXICITY (OTHER THAN CARCINOGENICITY).									

IRIS, EPA'S INTEGRATED RISK INFORMATION SYSTEM, IS UPDATED MONTHLY. FURTHER INFORMATION: RISK INFORMATION HOTLINE: (513) 569-7254.

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CHEMICAL	ROUTE	EXPERIMENT LENGTH / SPECIES	TARGET	CANCER	[EPA GROUP]	[SLOPE FACTOR] ORAL (mg/kg/day)$^{-1}$	[SLOPE FACTOR] INHALATION (mg/kg/day)$^{-1}$	[UNIT RISK] ORAL (ug/L)$^{-1}$	[UNIT RISK] INHALATION (ug/cu m)-1	REFERENCE
HEXACHLOROCYCLOHEXANE, GAMMA- 000058-89-9										
	ORAL: DIET	110 WEEKS MOUSE	LIVER	TUMORS	B2-C	1.3E+0		3.7E-5		005098
	ORAL [SLOPE] COMMENT: UNDER REVIEW. NUMBER SUBJECT TO CHANGE. GENERAL COMMENT: ALSO SEE HEAST TABLE 1: SUBCHRONIC AND CHRONIC TOXICITY (OTHER THAN CARCINOGENICITY).									
HEXACHLOROCYCLOHEXANE-TECHNICAL 000608-73-1										
	ORAL: DIET	6-20 MONTHS MOUSE	LIVER	TUMORS	IRIS	IRIS	1.8E+0	IRIS	IRIS	010127
	INHALATION [SLOPE] COMMENT: BASED ON ROUTE TO ROUTE EXTRAPOLATION. SEE APPENDIX A-II. DOSE CONVERSIONS ON HEAST.									
HEXACHLOROETHANE 000067-72-1										
	ORAL: GAVAGE	78 WEEKS MOUSE	LIVER	CARCINOMA	IRIS	IRIS	1.4E-2	IRIS	IRIS	005090
	INHALATION [SLOPE] COMMENT: BASED ON ROUTE TO ROUTE EXTRAPOLATION. SEE APPENDIX A-II. DOSE CONVERSIONS ON HEAST. GENERAL COMMENT: ALSO SEE HEAST TABLE 1: SUBCHRONIC AND CHRONIC TOXICITY (OTHER THAN CARCINOGENICITY).									
HYDRAZINE 000302-01-2										
					IRIS	IRIS		IRIS		010129
	INHALATION: INTERMITTENT	1 YEAR RAT	NASAL CAVITY	TUMORS	IRIS		1.7E+1		IRIS	010128
	INHALATION [SLOPE] COMMENT: SEE APPENDIX A-II. DOSE CONVERSIONS ON HEAST.									

HEAST TABLE 3: CARCINOGENICITY

CHEMICAL	ROUTE	EXPERIMENT LENGTH / SPECIES	TARGET	CANCER	[EPA GROUP]	[SLOPE FACTOR] ORAL (mg/kg/day)$^{-1}$	[SLOPE FACTOR] INHALATION (mg/kg/day)$^{-1}$	[UNIT RISK] ORAL (ug/L)$^{-1}$	[UNIT RISK] INHALATION (ug/cu m)$^{-1}$	REFERENCE
HYDRAZINE SULFATE	010034-93-2				IRIS	IRIS		IRIS		010131
	INHALATION: INTERMITTENT	1 YEAR / RAT	NASAL CAVITY	TUMORS	IRIS		1.7E+1		IRIS	010130
	INHALATION [SLOPE] COMMENT: SEE APPENDIX A-II, DOSE CONVERSIONS ON HEAST.									
	GENERAL COMMENT: LISTED UNDER "HYDRAZINE" ON IRIS.									
INDENO[1,2,3-CD]PYRENE	000193-39-5				IRIS					010192
ISOPHORONE	000078-59-1				IRIS	IRIS		IRIS		005094
	GENERAL COMMENT: ALSO SEE HEAST TABLE 1: SUBCHRONIC AND CHRONIC TOXICITY (OTHER THAN CARCINOGENICITY).									
LEAD	007439-92-1				IRIS					005096
	GENERAL COMMENT: ALSO SEE HEAST TABLE 1: SUBCHRONIC AND CHRONIC TOXICITY (OTHER THAN CARCINOGENICITY).									
LINURON	000330-55-2				IRIS					010383
	GENERAL COMMENT: ALSO SEE HEAST TABLE 1: SUBCHRONIC AND CHRONIC TOXICITY (OTHER THAN CARCINOGENICITY).									
MERCURIC CHLORIDE	007487-94-7				IRIS					010971
	GENERAL COMMENT: ALSO SEE HEAST TABLE 1: SUBCHRONIC AND CHRONIC TOXICITY (OTHER THAN CARCINOGENICITY).									

IRIS, EPA'S INTEGRATED RISK INFORMATION SYSTEM, IS UPDATED MONTHLY. FURTHER INFORMATION: RISK INFORMATION HOTLINE: (513) 569-7254.

CHEMICAL	ROUTE	EXPERIMENT LENGTH / SPECIES	TARGET	CANCER	[EPA GROUP]	[SLOPE FACTOR] ORAL (mg/kg/day)$^{-1}$	[SLOPE FACTOR] INHALATION (mg/kg/day)$^{-1}$	[UNIT RISK] ORAL (ug/L)$^{-1}$	[UNIT RISK] INHALATION (ug/cu m)-1	REFERENCE
MERCURY, ELEMENTAL	**007439-97-6**				IRIS					010973
GENERAL COMMENT: ALSO SEE HEAST TABLE 1: SUBCHRONIC AND CHRONIC TOXICITY (OTHER THAN CARCINOGENICITY).										
METHOXY-5-NITROANILINE, 2-	**000099-59-2**									
	ORAL: DIET	104 WEEKS RAT	SKIN	CARCINOMA	B2	4.6E-2		1.3E-6		010132
METHYLHYDRAZINE	**000060-34-4**									
GENERAL COMMENT: NO EPA GROUP CLASSIFICATION WAS PROVIDED IN THE REFERENCE DOCUMENT. THEREFORE THIS COMPOUND WAS REMOVED FROM TABLE 3.										
METHYL-5-NITROANILINE, 2-	**000099-55-8**									
	ORAL: DIET	98 WEEKS MOUSE	LIVER	CARCINOMA	C	3.3E-2		9.4E-7		010140
METHYLANILINE HYDROCHLORIDE, 2-	**000636-21-5**									
	ORAL: DIET	93 WEEKS RAT	SKIN	FIBROMA	B2	1.8E-1		5.1E-6		010134
METHYLANILINE, 2-	**000095-53-4**									
	ORAL: DIET	93 WEEKS RAT	SKIN	FIBROMA	B2	2.4E-1		6.9E-6		010133
GENERAL COMMENT: THE 1984 HEEP CALLED THIS COMPOUND O-TOLUIDINE. THE 1987 HEEP CALLED IT 2-METHYLANILINE.										
METHYLCHOLANTHRACENE, 3-	**000056-49-5**									010299
GENERAL COMMENT: FOR RCRA ACTIVITIES ONLY. CONTACT THE HEALTH ASSESSMENT SECTION (202) 260-4761 FOR RCRA APPROVED NUMERIC ASSESSMENT OF THIS COMPOUND.										

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CHEMICAL	ROUTE	EXPERIMENT LENGTH / SPECIES	TARGET	CANCER	[EPA GROUP]	[SLOPE FACTOR] ORAL (mg/kg/day)-1	[SLOPE FACTOR] INHALATION (mg/kg/day)-1	[UNIT RISK] ORAL (ug/L)-1	[UNIT RISK] INHALATION (ug/cu m)-1	REFERENCE
METHYLENE CHLORIDE / (DICHLOROMETHANE)	**000075-09-2**				IRIS	IRIS		IRIS		005100
					IRIS				IRIS	005904
	GENERAL COMMENT: ALSO SEE HEAST TABLE 1: SUBCHRONIC AND CHRONIC TOXICITY (OTHER THAN CARCINOGENICITY)									
METHYLENE-BIS(BENZENEAMINE), 4,4- / (4,4'-METHYLENEDIANILINE)	**000101-77-9**									
	GENERAL COMMENT: NO EPA GROUP CLASSIFICATION WAS PROVIDED IN THE REFERENCE DOCUMENT. THEREFORE THIS COMPOUND WAS REMOVED FROM TABLE 3.									
METHYLENE-BIS(2-CHLOROANILINE), 4,4'-	**000101-14-4**									
	ORAL: DIET	2 YEARS / RAT	LUNG	TUMORS	B2	1.3E-1	1.3E-1	3.7E-6	3.7E-5	010425
	INHALATION [SLOPE] COMMENT: SEE APPENDIX A-II: DOSE CONVERSIONS ON HEAST. BASED ON ROUTE TO ROUTE EXTRAPOLATION.									
METHYLENE-BIS(N,N'-DIMETHYL)ANILINE, 4,4'-	**000101-61-1**									
					IRIS	IRIS		IRIS		010137
	GENERAL COMMENT: ALSO SEE HEAST TABLE 1: SUBCHRONIC AND CHRONIC TOXICITY (OTHER THAN CARCINOGENICITY).									
METHYLMERCURY	**0022967-92-6**									
					IRIS					010972
	GENERAL COMMENT: ALSO SEE HEAST TABLE 1: SUBCHRONIC AND CHRONIC TOXICITY (OTHER THAN CARCINOGENICITY).									
METOLACHLOR	**051218-45-2**									
					IRIS					010951
MIREX	**002385-85-5**									
	ORAL: DIET	2 YEARS / RAT	LIVER	ADENOMA	B2					010952
			LIVER	CARCINOMA						
	[EPA GROUP] COMMENT: UNDER REVIEW. CLASSIFICATION SUBJECT TO CHANGE.									
	GENERAL COMMENT: ALSO SEE HEAST TABLE 1: SUBCHRONIC AND CHRONIC TOXICITY (OTHER THAN CARCINOGENICITY)									

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CHEMICAL	ROUTE	EXPERIMENT LENGTH / SPECIES	TARGET	CANCER	[SLOPE FACTOR] [EPA GROUP]	ORAL (mg/kg/day)$^{-1}$	INHALATION (mg/kg/day)$^{-1}$	[UNIT RISK] ORAL (ug/L)$^{-1}$	INHALATION (ug/cu m)-1	REFERENCE
NIAGARA BLUE 4B		**002429-74-5**			B2					010141
	[EPA GROUP] COMMENT: BASED ON THE FACT THAT 3,3-DIMETHOXYBENZIDINE, A KNOWN EPA GROUP B2 CARCINOGEN, IS A METABOLITE OF NIAGARA BLUE 4B.									
NICKEL REFINERY DUST	INHALATION: OCCUPATIONAL	HUMAN	RESPIRATORY SYSTEM	TUMORS	IRIS	8.4E-1		IRIS		005103
	INHALATION [SLOPE] COMMENT: SEE APPENDIX A-II, DOSE CONVERSIONS ON HEAST. GENERAL COMMENT: FORMERLY LISTED AS NICKEL. ALSO SEE HEAST TABLE 1: SUBCHRONIC AND CHRONIC TOXICITY (UNDER NICKEL, SOLUBLE SALTS).									
NICKEL SUBSULFIDE		**012035-72-2**								
	INHALATION: OCCUPATIONAL	HUMAN	RESPIRATORY SYSTEM	TUMORS	IRIS	1.7E+0		IRIS		005768
	INHALATION [SLOPE] COMMENT: SEE APPENDIX A-II, DOSE CONVERSIONS ON HEAST. GENERAL COMMENT: FORMERLY LISTED AS NICKEL. ALSO SEE HEAST TABLE 1: SUBCHRONIC AND CHRONIC TOXICITY (UNDER NICKEL).									

CHEMICAL	ROUTE	EXPERIMENT LENGTH / SPECIES	TARGET	CANCER	[EPA GROUP]	[SLOPE FACTOR] ORAL (mg/kg/day)$^{-1}$	[SLOPE FACTOR] INHALATION (mg/kg/day)$^{-1}$	[UNIT RISK] ORAL (ug/L)$^{-1}$	[UNIT RISK] INHALATION (ug/cu m)$^{-1}$	REFERENCE
NITROBENZENE		**000098-95-3**								
	INHALATION	2 YEAR MICE			B2					010969
			LUNG	ADENOMA						
			LUNG	CARCINOMA						
			THYROID	ADENOMA						
			MAMMARY	ADENOCARCINOMA						
	INHALATION	2 YEAR RAT								
			LIVER	ADENOMA						
			LIVER	CARCINOMA						
			KIDNEY	ADENOMA						
			KIDNEY	ADENOCARCINOMA						
			UTERUS	ENDIOMETRIAL POLYPS						
	GENERAL COMMENT: ALSO SEE HEAST TABLE 1: SUBCHRONIC AND CHRONIC TOXICITY.									
NITROFURAZONE		**000059-87-0**								
	ORAL: DIET	46 WEEKS RAT	MAMMARY	TUMORS	B2	1.5E+0		4.3E-5		005110
NITROPROPANE, 2-		**000079-46-9**								
	INHALATION: INTERMITTENT	22 MONTHS RAT	LIVER	TUMORS	B2		9.4E+0		2.7E-3	010142
	INHALATION [SLOPE] COMMENT: SEE APPENDIX A-II: DOSE CONVERSIONS ON HEAST.									
NITROSO-DI-N-BUTYLAMINE, N-		**000924-16-3**								
	ORAL: DRINKING WATER	LIFETIME MOUSE	BLADDER	TUMORS	IRIS	IRIS	5.4E+0	IRIS	IRIS	010143
			ESOPHAGUS	TUMORS						
	INHALATION [SLOPE] COMMENT: BASED ON ROUTE TO ROUTE EXTRAPOLATION. SEE APPENDIX A-II. DOSE CONVERSIONS ON HEAST.									

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IRIS, EPA'S INTEGRATED RISK INFORMATION SYSTEM. IS UPDATED MONTHLY. FURTHER INFORMATION: RISK INFORMATION HOTLINE: (513) 569-7254.

HEAST TABLE 3: CARCINOGENICITY

CHEMICAL	ROUTE	EXPERIMENT LENGTH / SPECIES	TARGET	CANCER	[EPA GROUP]	[SLOPE FACTOR] ORAL (mg/kg/day)$^{-1}$	[SLOPE FACTOR] INHALATION (mg/kg/day)$^{-1}$	[UNIT RISK] ORAL (ug/L)$^{-1}$	[UNIT RISK] INHALATION (ug/cu m)-1	REFERENCE
NITROSO-DI-N-PROPYLAMINE, N- 000621-64-7					IRIS	IRIS		IRIS		010147
NITROSO-N-ETHYLUREA, N- 000759-73-9	ORAL: DRINKING WATER	203 DAYS RAT	INTESTINE	GASTROINTESTINAL TUMORS	B2	1.4E+2				010426
NITROSO-N-METHYLUREA, N- 000684-93-5	ORAL: GAVAGE	308 DAYS GUINEA PIG	PANCREAS	ADENOCARCINOMA	B2					010427
NITROSODIETHANOLAMINE, N- 001116-54-7					IRIS	IRIS		IRIS		010144
NITROSODIETHYLAMINE, N- 000055-18-5	ORAL: DRINKING WATER	6 OR 12 MONTHS RAT	LIVER	TUMORS	IRIS	IRIS	1.5E+2	IRIS	IRIS	010145
NITROSODIMETHYLAMINE, N- 000062-75-9	ORAL: DRINKING WATER	RAT	LIVER	TUMORS	IRIS	IRIS	5.1E+1	IRIS	IRIS	010146

[EPA GROUP] COMMENT: UNDER REVIEW. CLASSIFICATION SUBJECT TO CHANGE.
GENERAL COMMENT: FOR RCRA ACTIVITIES ONLY, CONTACT THE HEALTH ASSESSMENT SECTION (202) 382-4761 FOR RCRA-APPROVED NUMERIC ASSESSMENT FOR THIS COMPOUND. UNDER REVIEW.

[EPA GROUP] COMMENT: UNDER REVIEW. CLASSIFICATION SUBJECT TO CHANGE.
GENERAL COMMENT: THE CRAVE WORK GROUP (04/01/92) STATES THERE IS NO ACCEPTABLE QUANTITATION FOR NITROSO-N-METHYLUREA, N-.

INHALATION [SLOPE] COMMENT: BASED ON ROUTE TO ROUTE EXTRAPOLATION. SEE APPENDIX A-II, DOSE CONVERSIONS ON HEAST.

CHEMICAL	ROUTE	EXPERIMENT LENGTH / SPECIES	TARGET	CANCER	[EPA GROUP]	[SLOPE FACTOR] ORAL (mg/kg/day)$^{-1}$	[SLOPE FACTOR] INHALATION (mg/kg/day)$^{-1}$	[UNIT RISK] ORAL (ug/L)$^{-1}$	[UNIT RISK] INHALATION (ug/cu m)$^{-1}$	REFERENCE
	INHALATION [SLOPE] COMMENT: BASED ON ROUTE TO ROUTE EXTRAPOLATION. SEE APPENDIX A-II. DOSE CONVERSIONS ON HEAST.									
NITROSODIPHENYLAMINE, N-		**000086-30-6**			IRIS	IRIS		IRIS		005112
NITROSOMETHYLETHYLAMINE, N-		**010595-95-6**			IRIS	IRIS		IRIS		010148
NITROSOMETHYLVINYLAMINE, N		**004549-40-0**			B2					010149
	INHALATION	RAT	UPPER RESPIRATORY TRACT	CARCINOMAS						
	ORAL: DRINKING WATER		UPPER DIGESTIVE TRACT	CARCINOMAS						
NITROSOPYRROLIDINE, N-		**000930-55-2**			IRIS	IRIS	2.1E+0	IRIS	IRIS	010300
	ORAL: DIET	LIFETIME RAT	LIVER	TUMORS						
	INHALATION [SLOPE] COMMENT: BASED ON ROUTE TO ROUTE EXTRAPOLATION. SEE APPENDIX A-II. DOSE CONVERSIONS ON HEAST.									
PARATHION		**000056-38-2**			IRIS					005116
	GENERAL COMMENT: ALSO SEE HEAST TABLE 1: SUBCHRONIC AND CHRONIC TOXICITY (OTHER THAN CARCINOGENICITY).									

CHEMICAL	ROUTE	EXPERIMENT LENGTH / SPECIES	TARGET	CANCER	[EPA GROUP]	[SLOPE FACTOR] ORAL (mg/kg/day)$^{-1}$	[SLOPE FACTOR] INHALATION (mg/kg/day)$^{-1}$	[UNIT RISK] ORAL (ug/L)$^{-1}$	[UNIT RISK] INHALATION (ug/cu m)-1	REFERENCE
PENTABROMO-6-CHLOROCYCLOHEXANE, 1,2,3,4,5- 000087-84-3										
	ORAL: DIET	2 YEARS RAT	INTESTINE, LARGE	TUMORS	C	2.3E-2		6.6E-7		010150
	ORAL [SLOPE] COMMENT: BASED ON RESULTS WITH THE ALPHA ISOMER.									
PENTACHLORONITROBENZENE 000082-68-8										
	ORAL	72 WEEKS MOUSE	LIVER	TUMORS	C	2.6E-1		7.4E-6		010151
	ORAL [SLOPE] COMMENT: UNDER REVIEW, NUMBER SUBJECT TO CHANGE. GENERAL COMMENT: ALSO SEE HEAST TABLE 1: SUBCHRONIC AND CHRONIC TOXICITY (OTHER THAN CARCINOGENICITY).									
PENTACHLOROPHENOL 000087-86-5										
					IRIS	IRIS		IRIS		010381
	GENERAL COMMENT: ALSO SEE HEAST TABLE 1: SUBCHRONIC AND CHRONIC TOXICITY (OTHER THAN CARCINOGENICITY).									
PHENYLENEDIAMINE, O- 000095-54-5										
	ORAL: DIET	548 DAYS RAT	LIVER	TUMORS	B2	4.7E-2		1.3E-6		010152
	ORAL [SLOPE] COMMENT: BASED ON LIVER TUMORS IN RATS TREATED WITH O-PHENYLENEDIAMINE DIHYDROCHLORIDE. GENERAL COMMENT: ALSO SEE HEAST TABLE 1: SUBCHRONIC AND CHRONIC TOXICITY.									
PHENYLPHENOL, 2- 000090-43-7										
	ORAL: DIET	637 DAYS RAT	URINARY BLADDER	TUMORS	C	1.94E-3		5.5E-8		010153

HEAST TABLE 3: CARCINOGENICITY

May 1995

CHEMICAL	ROUTE	EXPERIMENT LENGTH / SPECIES	TARGET	CANCER	[EPA GROUP]	[SLOPE FACTOR] ORAL (mg/kg/day)$^{-1}$	[SLOPE FACTOR] INHALATION (mg/kg/day)$^{-1}$	[UNIT RISK] ORAL (ug/L)$^{-1}$	[UNIT RISK] INHALATION (ug/cu m)$^{-1}$	REFERENCE
POLYBROMINATED BIPHENYLS										
	ORAL: GAVAGE	25 WEEKS RAT	LIVER LIVER	CARCINOMA NEOPLASTIC NODULE	B2	8.9E+0		2.5E-4		010154
	GENERAL COMMENT: ALSO SEE HEAST TABLE 1: SUBCHRONIC AND CHRONIC TOXICITY (OTHER THAN CARCINOGENICITY)									
POLYCHLORINATED BIPHENYLS		001336-36-3			IRIS	IRIS		IRIS		005118
PROPYLENE OXIDE		000075-56-9			IRIS	IRIS		IRIS		010156
	INHALATION: INTERMITTENT	2 YEARS MOUSE	NASAL CAVITY	TUMORS	IRIS		1.3E-2		IRIS	010155
	INHALATION [SLOPE] COMMENT: SEE APPENDIX A-II, DOSE CONVERSIONS ON HEAST. GENERAL COMMENT: ALSO SEE HEAST TABLE 1: SUBCHRONIC AND CHRONIC TOXICITY (OTHER THAN CARCINOGENICITY).									
QUINOLINE		000091-22-5			C	1.2E+1		3.5E-4		010158
	ORAL: DIET	20-40 WEEKS RAT	LIVER	TUMORS						
RDX / (CYCLONITE)		000121-82-4			IRIS	IRIS		IRIS		010157
	GENERAL COMMENT: ALSO SEE HEAST TABLE 1: SUBCHRONIC AND CHRONIC TOXICITY (OTHER THAN CARCINOGENICITY).									
SELENIUM SULFIDE		007446-34-6			IRIS					010194
	ORAL [SLOPE] COMMENT: STUDY RESULTS WERE CONSIDERED INCONCLUSIVE FOR QUANTITATIVE RISK ASSESSMENT.									

HEAST TABLE 3: CARCINOGENICITY

May 1995

CHEMICAL	ROUTE	EXPERIMENT LENGTH / SPECIES	TARGET	CANCER	[EPA GROUP]	[SLOPE FACTOR] ORAL (mg/kg/day)$^{-1}$	[SLOPE FACTOR] INHALATION (mg/kg/day)$^{-1}$	[UNIT RISK] ORAL (ug/L)$^{-1}$	[UNIT RISK] INHALATION (ug/cu m)$^{-1}$	REFERENCE
SIMAZINE		**000122-34-9**								
	ORAL: DIET	2 YEARS RAT	MAMMARY	CARCINOMA	C	1.2E 1		3.4E-6		010195
	ORAL [SLOPE] COMMENT: UNDER REVIEW. NUMBER SUBJECT TO CHANGE. GENERAL COMMENT: ALSO SEE HEAST TABLE 1: SUBCHRONIC AND CHRONIC TOXICITY (OTHER THAN CARCINOGENICITY).									
SODIUM DIETHYLDITHIOCARBAMATE		**000148-18-5**								
	ORAL: DIET	77 WEEKS MOUSE	LIVER	TUMORS	C	2.7E-1		7.7E-6		005126
	GENERAL COMMENT: ALSO SEE HEAST TABLE 1: SUBCHRONIC AND CHRONIC TOXICITY (OTHER THAN CARCINOGENICITY).									
STYRENE		**000100-42-5**								010480
	GENERAL COMMENT: CONTACT THE SUPERFUND HEALTH RISK TECHNICAL SUPPORT CENTER: (513) 569-7300. ALSO SEE HEAST TABLE 1: SUBCHRONIC AND CHRONIC TOXICITY (OTHER THAN CARCINOGENICITY).									
TCDD, 2,3,7,8-		**001746-01-6**								
	ORAL: DIET	720 DAYS RAT	RESPIRATORY SYSTEM	TUMORS	B2	1.5E+5	1.5E+5	4.5E+0	3.3E-5 (PG/CU M)$^{-1}$	005128
			LIVER	TUMORS						
	ORAL [SLOPE] COMMENT: UNDER REVIEW. NUMBER SUBJECT TO CHANGE. INHALATION [SLOPE] COMMENT: SEE APPENDIX A-II: DOSE CONVERSIONS ON HEAST. INHALATION [UNIT RISK] COMMENT: UNDER REVIEW. NUMBER SUBJECT TO CHANGE. BASED ON ROUTE TO ROUTE EXTRAPOLATION. AN ABSORPTION FACTOR OF 75% IS USED TO CALCULATE THE UNIT RISK FROM THE SLOPE FACTOR.									

HEAST TABLE 3: CARCINOGENICITY

CHEMICAL / ROUTE	EXPERIMENT LENGTH / SPECIES	TARGET	CANCER	[EPA GROUP]	[SLOPE FACTOR] ORAL (mg/kg/day)$^{-1}$	[SLOPE FACTOR] INHALATION (mg/kg/day)$^{-1}$	[UNIT RISK] ORAL (ug/L)$^{-1}$	[UNIT RISK] INHALATION (ug/cu m)-1	REFERENCE
TETRACHLOROETHANE, 1,1,1,2- 000630-20-6									
ORAL: GAVAGE	103 WEEKS	LIVER	TUMOR	IRIS	IRIS	2.6E-2	IRIS	IRIS	010302
INHALATION [SLOPE] COMMENT: BASED ON ROUTE TO ROUTE EXTRAPOLATION. SEE APPENDIX A-II. DOSE CONVERSIONS ON HEAST.									
TETRACHLOROETHANE, 1,1,2,2- 000079-34-5									
ORAL: GAVAGE	75 WEEKS MOUSE	LIVER	CARCINOMA	IRIS	IRIS	2.0E-1	IRIS	IRIS	005130
INHALATION [SLOPE] COMMENT: BASED ON ROUTE TO ROUTE EXTRAPOLATION. SEE APPENDIX A-II. DOSE CONVERSIONS ON HEAST.									
TETRACHLOROETHYLENE 000127-18-4									010482
GENERAL COMMENT: CONTACT THE SUPERFUND HEALTH RISK TECHNICAL SUPPORT CENTER: (513) 569-7300. ALSO SEE HEAST TABLE 1: SUBCHRONIC AND CHRONIC TOXICITY (OTHER THAN CARCINOGENICITY).									
TETRACHLOROTOLUENE, PARA, ALPHA, ALPHA, ALPHA- 005216-25-1									
ORAL: GAVAGE	17.5 WEEKS MOUSE	LUNG	ADENOCARCINOMA	B2	2.0E+1		5.7E-4		005028
TETRACHLOROVINPHOS / (STIROFOS) 000961-11-5									
ORAL: DIET	560 DAYS MOUSE	LIVER	TUMORS	C	2.4E-2		6.9E-7		010159
[EPA GROUP] COMMENT: UNDER REVIEW, CLASSIFICATION SUBJECT TO CHANGE. GENERAL COMMENT: ALSO SEE HEAST TABLE 1: SUBCHRONIC AND CHRONIC TOXICITY (OTHER THAN CARCINOGENICITY).									
TOLUENE-2,4-DIAMINE 000095-80-7									
ORAL: DIET	84-103 WEEKS RAT	MAMMARY	TUMORS	B2	3.2E+0		9.1E-5		010160

CHEMICAL	ROUTE	EXPERIMENT LENGTH / SPECIES	TARGET	CANCER	[EPA GROUP]	[SLOPE FACTOR] ORAL (mg/kg/day)$^{-1}$	[SLOPE FACTOR] INHALATION (mg/kg/day)$^{-1}$	[UNIT RISK] ORAL (ug/L)$^{-1}$	[UNIT RISK] INHALATION (ug/cu m)$^{-1}$	REFERENCE
TOLUIDINE, P-	**000106-49-0**									
	ORAL: DIET	18 MONTHS MOUSE	LIVER	TUMORS	C	1.9E-1		5.4E-6		010162
TOXAPHENE	**008001-35-2**									
	ORAL: DIET	18 MONTHS MOUSE	LIVER	TUMORS	IRIS	IRIS	1.1E+0	IRIS	IRIS	005134
	INHALATION [SLOPE] COMMENT: SEE APPENDIX A-II, DOSE CONVERSIONS ON HEAST.									
	INHALATION [UNIT RISK] COMMENT: BASED ON ROUTE TO ROUTE EXTRAPOLATION.									
TRICHLOROANILINE HYDROCHLORIDE, 2,4,6-	**033663-50-2**									
	ORAL: DIET	18 MONTHS MOUSE	VASCULAR SYSTEM	TUMORS	C	2.9E-2		8.2E-7		005142
TRICHLOROANILINE, 2,4,6-	**000634-93-5**									
	ORAL: DIET	18 MONTHS MOUSE	VASCULAR SYSTEM	TUMORS	C	3.4E-2		1E-6		010487
TRICHLOROETHANE, 1,1,2-	**000079-00-5**									
	ORAL: GAVAGE	78 WEEKS MOUSE	LIVER	CARCINOMA	IRIS	IRIS	5.7E-2	IRIS	IRIS	005144
	INHALATION [SLOPE] COMMENT: BASED ON ROUTE TO ROUTE EXTRAPOLATION. SEE APPENDIX A-II, DOSE CONVERSIONS ON HEAST.									
	GENERAL COMMENT: ALSO SEE HEAST TABLE 1: SUBCHRONIC AND CHRONIC TOXICITY (OTHER THAN CARCINOGENICITY).									
TRICHLOROETHYLENE	**000079-01-6**									010483
	GENERAL COMMENT: CONTACT THE SUPERFUND HEALTH RISK TECHNICAL SUPPORT CENTER: (513) 569-7300.									

HEAST TABLE 3: CARCINOGENICITY

CHEMICAL	ROUTE	EXPERIMENT LENGTH / SPECIES	TARGET	CANCER	[EPA GROUP]	[SLOPE FACTOR] ORAL (mg/kg/day)$^{-1}$	[SLOPE FACTOR] INHALATION (mg/kg/day)$^{-1}$	[UNIT RISK] ORAL (ug/L)$^{-1}$	[UNIT RISK] INHALATION (ug/cu m)$^{-1}$	REFERENCE
TRICHLOROPHENOL, 2,4,6-	**000088-06-2**				IRIS	IRIS	1E-2	IRIS	IRIS	010428
	ORAL: DIET	107 WEEKS MOUSE	BLOOD	LEUKEMIA						
	INHALATION [SLOPE] COMMENT: BASED ON ROUTE TO ROUTE EXTRAPOLATION. SEE APPENDIX A-II, DOSE CONVERSIONS ON HEAST.									
	GENERAL COMMENT: ALSO SEE HEAST TABLE 1: SUBCHRONIC AND CHRONIC TOXICITY (OTHER THAN CARCINOGENICITY).									
TRICHLOROPROPANE, 1,2,3-	**000096-18-4**				B2	7E+0		2E-4		010849
	ORAL: GAVAGE	RAT	MULTIPLE SITES	TUMORS, BENIGN/MALIGNANT, COMBINED						
	[EPA GROUP] COMMENT: UNDER REVIEW, CLASSIFICATION SUBJECT TO CHANGE.									
	GENERAL COMMENT: ALSO SEE HEAST TABLE 1: SUBCHRONIC AND CHRONIC TOXICITY (OTHER THAN CARCINOGENICITY).									
TRIFLURALIN	**001582-09-8**				IRIS	IRIS		IRIS		010163
	GENERAL COMMENT: ALSO SEE HEAST TABLE 1: SUBCHRONIC AND CHRONIC TOXICITY (OTHER THAN CARCINOGENICITY).									
TRIMETHYL PHOSPHATE	**000512-56-1**				B2	3.7E-2		1.1E-6		010164
	ORAL: GAVAGE	103 WEEKS MOUSE	UTERUS	TUMORS						
TRINITROTOLUENE, 2,4,6-	**000118-96-7**				IRIS	IRIS		IRIS		010476
	GENERAL COMMENT: ALSO SEE HEAST TABLE 1: SUBCHRONIC AND CHRONIC TOXICITY (OTHER THAN CARCINOGENICITY).									

CHEMICAL	ROUTE	EXPERIMENT LENGTH / SPECIES	TARGET	CANCER	[EPA GROUP]	[SLOPE FACTOR] ORAL (mg/kg/day)$^{-1}$	[SLOPE FACTOR] INHALATION (mg/kg/day)$^{-1}$	[UNIT RISK] ORAL (ug/L)$^{-1}$	[UNIT RISK] INHALATION (ug/cu m)$^{-1}$	REFERENCE
VINYL CHLORIDE	**000075-01-4**									
	ORAL: DIET	1001 DAYS			A	1.9E+0		5.4E-5		010368
		RAT	LUNG	TUMORS						
			LIVER	TUMORS						
	INHALATION: INTERMITTENT	1 YEAR			A		3.0E-1		8.4E-5	010367
		RAT	LIVER	TUMORS						

ORAL [SLOPE] COMMENT: UNDER REVIEW, NUMBER SUBJECT TO CHANGE.

INHALATION [SLOPE] COMMENT: SEE APPENDIX A-II: DOSE CONVERSIONS ON HEAST.
INHALATION [UNIT RISK] COMMENT: UNDER REVIEW, NUMBER SUBJECT TO CHANGE.
GENERAL COMMENT: THE MOST RECENTLY REVIEWED QUANTITATIVE TOXICITY VALUES LISTED HERE APPEAR IN EPA DOCUMENTS PUBLISHED IN 1984 AND 1985. USE OF THESE VALUES ON AN INTERIM BASIS WAS VALIDATED BY CRAVE (04/05/90). THE AGENCY IS AWARE THAT THESE VALUES DO NOT INCORPORATE CONSIDERABLE INFORMATION THAT IS NOW AVAILABLE. THE OFFICE OF HEALTH AND ENVIRONMENTAL ASSESSMENT'S POSITION IS THAT THESE TOXICITY VALUES DO NOT REFLECT STATE-OF-THE-ART SCIENCE FOR VINYL CHLORIDE. EPA NOW HAS INDIVIDUAL ANIMAL DATA, NOT AVAILABLE WHEN THE ORAL UNIT RISK WAS CALCULATED, THAT MAY INFLUENCE THIS VALUE. ADDITIONAL INFORMATION THAT MAY BE FACTORED INTO A REVISED QUANTITATIVE TOXICITY VALUE INCLUDES DATA ON INCREASED SENSITIVITY OBSERVED IN YOUNG ANIMALS AND DATA ON METABOLISM/PHARMACOKINETICS. A UNIT RISK FOR AIR THAT CONSIDERS INFORMATION ON YOUNG AGE EXPOSURE INCREASES THE RISK (I.E., LOWERS THE RISK SPECIFIC DOSE) BY AT LEAST 3-FOLD. THE CONSIDERATION OF METABOLISM PHARMACOKINETICS WILL FURTHER INCREASE THE RISK. ONE UNPUBLISHED PHYSIOLOGICALLY-BASED PHARMACOKINETIC MODEL PREDICTION RESULTS IN A 100-FOLD INCREASED RISK.

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LINURON

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METHYLCHOLANTHRACENE, 3- 000056-49-5

010299 FOR RCRA ACTIVITIES ONLY, CONTACT THE HEALTH ASSESSMENT SECTION (202) 260-4761 FOR RCRA APPROVED NUMERIC ASSESSMENT OF THIS COMPOUND.

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TETRACHLOROETHYLENE **000127-18-4**

010482 CONTACT THE SUPERFUND HEALTH RISK TECHNICAL SUPPORT CENTER: (513) 569-7300.

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TRICHLOROETHYLENE **000079-01-6**

010483 CONTACT THE SUPERFUND HEALTH RISK TECHNICAL SUPPORT CENTER: (513) 569-7300.

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US EPA. 1994. CARCINOGEN RISK ASSESSMENT VERIFICATION ENDEAVOR (CRAVE) WORK GROUP.

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Table 4

Radionuclide Carcinogencity -- Slope Factors (In Units of Picocuries)

MAY 1995

NOTE: To convert radionuclide slope factors into the International System (SI) activity units of becquerels (Bq), multiply each value in Table 4 by 3.70E-02.

Table 4: Radionuclide Carcinogenicity -- Slope Factors[a] (In Units of Picocuries[b])

MAY 1995

Element (Atomic Number)	Isotope[c]	CASRN[d]	Radioactive Half-life[e]		ICRP Lung Class[f]	GI Absorption Factor (f_1)[g]	Slope Factor Lifetime Excess Total Cancer Risk Per Unit Intake or Exposure: Ingestion (Risk/pCi)	Inhalation (Risk/pCi)	External Exposure (Risk/yr per pCi/g soil)
Actinium (89)	Ac-225	014265-85-1	1.00E+01	D	Y	1.00E-03	1.42E-10	4.16E-09	7.81E-09
	Ac-227	014952-40-0	2.18E+01	Y	Y	1.00E-03	3.52E-10	7.08E-08	2.35E-11
	Ac-227+D	014952-40-0(+D)	2.18E+01	Y	Y	1.00E-03	6.26E-10	7.87E-08	5.97E-07
	Ac-228	014331-83-0	6.13E+00	H	Y	1.00E-03	1.62E-12	3.27E-11	3.28E-06
Americium (95)	Am-241	014596-10-2	4.32E+02	Y	W	1.00E-03	3.28E-10	3.85E-08	4.59E-09
	Am-242	013981-54-9	1.60E+01	H	W	1.00E-03	1.47E-12	1.04E-11	5.76E-09
	Am-242m	013981-54-9(m)	1.52E+02	Y	W	1.00E-03	2.92E-10	3.49E-08	8.76E-11
	Am-243	014993-75-0	7.38E+03	Y	W	1.00E-03	3.27E-10	3.82E-08	2.43E-08
	Am-243+D	014993-75-0(+D)	7.38E+03	Y	W	1.00E-03	3.31E-10	3.82E-08	2.66E-07
Antimony (51)	Sb-122	014374-79-9	2.70E+00	D	W	1.00E-01	8.81E-12	5.46E-12	1.61E-06
	Sb-124	014683-10-4	6.02E+01	D	W	1.00E-01	1.07E-11	1.32E-11	7.35E-06
	Sb-125	014234-35-6	2.77E+00	Y	W	1.00E-01	2.97E-12	5.20E-12	1.34E-06
	Sb-125+D	014234-35-6(+D)	2.77E+00	Y	W	1.00E-01	3.54E-12	5.85E-12	1.34E-06
	Sb-126	015756-32-8	1.24E+01	D	W	1.00E-01	9.73E-12	8.41E-12	1.03E-05
	Sb-126m	015756-32-8(m)	1.90E+01	M	W	1.00E-01	7.28E-14	6.43E-14	5.78E-06
	Sb-127	013968-50-8	3.85E+00	D	W	1.00E-01	8.48E-12	6.05E-12	2.40E-06
	Sb-129	014331-88-5	4.40E+00	H	W	1.00E-01	1.86E-12	8.60E-13	5.56E-06
Argon (18)	Ar-41	014163-25-8	1.83E+00	H	*	---	---	4.71E-16	---

[Table 4 continues on the following page: Refer to Endnotes on the last page.]

Table 4: Radionuclide Carcinogenicity -- Slope Factors[a] (In Units of Picocuries[b])

MAY 1995

Element (Atomic Number)	Isotope[c]	CASRN[d]	Radioactive Half-life[e]		ICRP Lung Class[f]	GI Absorption Factor (f_1)[g]	Slope Factor Lifetime Excess Total Cancer Risk Per Unit Intake or Exposure		
							Ingestion (Risk/pCi)	Inhalation (Risk/pCi)	External Exposure (Risk/yr per pCi/g soil)
Astatine (85)	At-217	017239-90-6	3.23E-02	S	D	9.50E-01	8.99E-18	5.14E-16	8.71E-10
Barium (56)	Ba-131	014914-75-1	1.18E+01	D	D	1.00E-01	1.70E-12	4.79E-13	1.27E-06
	Ba-133	013981-41-4	1.05E+01	Y	D	1.00E-01	2.70E-12	4.03E-12	9.15E-07
	Ba-133m	013981-41-4(m)	3.89E+01	H	D	1.00E-01	2.76E-12	5.60E-13	1.00E-07
	Ba-137m	013981-97-0(m)	2.55E+00	M	D	1.00E-01	2.43E-15	1.57E-15	2.21E-06
	Ba-139	014378-25-7	8.31E+01	M	D	1.00E-01	3.04E-13	1.53E-13	8.35E-08
	Ba-140	014798-08-4	1.28E+01	D	D	1.00E-01	1.18E-11	3.17E-12	6.00E-07
Beryllium (4)	Be-7	013966-02-4	5.34E+01	D	Y	5.00E-03	8.64E-14	1.78E-13	1.73E-07
Bismuth (83)	Bi-206	015776-19-9	6.24E+00	D	W	5.00E-02	7.11E-12	5.07E-12	1.20E-05
	Bi-207	013982-38-2	3.34E+01	Y	W	5.00E-02	5.05E-12	9.42E-12	5.49E-06
	Bi-210	014331-79-4	5.01E+00	D	W	5.00E-02	7.29E-12	5.12E-11	0.00E+0
	Bi-211	015229-37-5	2.13E+00	M	W	5.00E-02	1.82E-14	1.74E-12	1.48E-07
	Bi-212	014913-49-6	6.06E+01	M	W	5.00E-02	6.20E-13	3.65E-11	6.67E-07
	Bi-213	015776-20-2	4.57E+01	M	W	5.00E-02	4.40E-13	3.09E-11	4.62E-07
	Bi-214	014733-03-0	1.99E+01	M	W	5.00E-02	1.95E-13	1.46E-11	6.02E-06
Bromine (35)	Br-82	014686-69-2	3.53E+01	H	D	9.50E-01	1.42E-12	7.86E-13	1.01E-05
Cadmium (20)	Cd-109	014109-32-1	4.64E+02	D	Y	5.00E-02	8.01E-12	1.85E-11	5.62E-10
	Cd-115	014336-68-6	5.35E+01	H	Y	5.00E-02	7.29E-12	4.93E-12	7.02E-07

[Table 4 continues on the following page: Refer to Endnotes on the last page.]

Table 4: Radionuclide Carcinogenicity -- Slope Factors[a] MAY 1995
(In Units of Picocuries[b])

Element (Atomic Number)	Isotope[c]	CASRN[d]	Radioactive Half-life[e]		ICRP Lung Class[f]	GI Absorption Factor (f_1)[g]	Slope Factor Lifetime Excess Total Cancer Risk Per Unit Intake or Exposure		
							Ingestion (Risk/pCi)	Inhalation (Risk/pCi)	External Exposure (Risk/yr per pCi/g soil)
	Cd-115m	014336-68-6(m)	4.46E+01	D	Y	5.00E-02	1.42E-11	1.70E-11	8.55E-08
Calcium (20)	Ca-45	013966-05-7	1.63E+02	D	W	3.00E-01	2.02E-12	2.51E-12	3.88E-18
	Ca-47	001439-99-2	4.54E+00	D	W	3.00E-01	6.66E-12	5.22E-12	4.12E-06
Carbon (6)	C-11	014333-33-6	2.05E+01	M	D	9.50E-01	4.49E-14	3.38E-14	3.61E-06
	C-14	014762-75-5	5.73E+03	Y	*	1.00E+00	1.03E-12	6.99E-15	0.00E+0
	C-15	015929-23-4	2.45E+00	S	D	9.50E-01	6.62E-16	8.06E-16	---
Cerium (58)	Ce-141	013967-74-3	3.25E+01	D	Y	3.00E-04	3.91E-12	4.32E-12	1.41E-07
	Ce-143	014119-19-8	3.30E+01	H	Y	3.00E-04	5.91E-12	3.84E-12	7.32E-07
	Ce-144	014762-78-8	2.84E+02	D	Y	3.00E-04	2.96E-11	1.08E-10	2.58E-08
	Ce-144+D	014762-78-8(+D)	2.84E+02	D	Y	3.00E-04	2.97E-11	1.08E-10	1.56E-07
Cesium (55)	Cs-131	014914-76-2	9.69E+00	D	D	9.50E-01	1.80E-13	1.06E-13	2.34E-09
	Cs-134	013967-70-9	2.06E+00	Y	D	9.50E-01	4.73E-11	2.89E-11	5.88E-06
	Cs-134m	013967-70-9(m)	2.90E+00	H	D	9.50E-01	4.54E-14	3.10E-14	1.96E-08
	Cs-135	015726-30-4	2.30E+06	Y	D	9.50E-01	4.53E-12	2.71E-12	0.00E+0
	Cs-136	014234-29-8	1.32E+01	D	D	9.50E-01	7.74E-12	4.65E-12	8.13E-06
	Cs-137	010045-97-3	3.02E+01	Y	D	9.50E-01	3.16E-11	1.91E-11	0.00E+0
	Cs-137+D	010045-97-3(+D)	3.02E+01	Y	D	9.50E-01	3.16E-11	1.91E-11	2.09E-06
	Cs-138	015758-29-9	3.22E+01	M	D	9.50E-01	1.76E-13	1.30E-13	9.45E-06

[Table 4 continues on the following page: Refer to Endnotes on the last page.]

Table 4: Radionuclide Carcinogenicity -- Slope Factors[a] (In Units of Picocuries[b])

MAY 1995

Element (Atomic Number)	Isotope[c]	CASRN[d]	Radioactive Half-life[e]		ICRP Lung Class[f]	GI Absorption Factor (f_1)[g]	Slope Factor Lifetime Excess Total Cancer Risk Per Unit Intake or Exposure: Ingestion (Risk/pCi)	Inhalation (Risk/pCi)	External Exposure (Risk/yr per pCi/g soil)
Chlorine (17)	Cl-36	013981-43-6	3.01E+05	Y	D	9.50E-01	2.23E-12	1.30E-12	0.00E+0
	Cl-38	014158-34-0	3.72E+01	M	D	9.50E-01	2.07E-13	1.63E-13	6.47E-06
Chromium (24)	Cr-51	014392-02-0	2.77E+01	D	Y	1.00E-01	1.38E-13	1.74E-13	1.02E-07
Cobalt (27)	Co-57	013981-50-5	2.71E+02	D	Y	3.00E-01	9.71E-13	2.88E-12	2.07E-07
	Co-58	01381-38-9	7.08E+01	D	Y	3.00E-01	2.82E-12	5.17E-12	3.73E-06
	Co-58m	01381-38-9(m)	9.15E+00	H	Y	3.00E-01	9.46E-14	8.90E-14	3.21E-11
	Co-60	010198-40-0	5.27E+00	Y	Y	3.00E-01	1.89E-11	6.88E-11	9.76E-06
Copper (29)	Cu-64	013981-25-4	1.27E+01	H	Y	5.00E-01	5.25E-13	4.18E-13	6.72E-07
Curium (96)	Cm-242	015510-73-3	1.63E+02	D	W	1.00E-03	3.83E-11	3.16E-09	2.34E-11
	Cm-243	015757-87-6	2.85E+01	Y	W	1.00E-03	2.51E-10	2.89E-08	1.71E-07
	Cm-243+D	015757-87-6(+D)	2.85E+01	Y	W	1.00E-03	2.52E-10	2.90E-08	1.72E-07
	Cm-244	013981-15-2	1.81E+01	Y	W	1.00E-03	2.11E-10	2.43E-08	2.07E-11
	Cm-245	015621-76-8	8.50E+03	Y	W	1.00E-03	3.35E-10	3.92E-08	5.51E-08
	Cm-246	015757-90-1	4.75E+03	Y	W	1.00E-03	3.32E-10	3.90E-08	1.81E-11
	Cm-247	015758-32-4	1.56E+07	Y	W	1.00E-03	3.09E-10	3.58E-08	1.03E-06
	Cm-248	015758-33-5	3.39E+05	Y	W	1.00E-03	1.31E-09	1.46E-07	1.47E-11
Dysprosium (66)	Dy-165	013967-64-1	2.33E+00	H	W	3.00E-04	3.26E-13	2.24E-13	6.18E-08
	Dy-166	015840-01-4	8.16E+01	H	W	3.00E-04	9.42E-12	7.82E-12	2.72E-08

[Table 4 continues on the following page: Refer to Endnotes on the last page.]

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Table 4: Radionuclide Carcinogenicity -- Slope Factors[a] MAY 1995
(In Units of Picocuries[b])

Element (Atomic Number)	Isotope[c]	CASRN[d]	Radioactive Half-life[e]		ICRP Lung Class[f]	GI Absorption Factor (f_1)[g]	Slope Factor Lifetime Excess Total Cancer Risk Per Unit Intake or Exposure		
							Ingestion (Risk/pCi)	Inhalation (Risk/pCi)	External Exposure (Risk/yr per pCi/g soil)
Erbium (63)	Er-169	015840-13-8	9.40E+00	D	W	3.00E-04	2.12E-12	1.51E-12	6.52E-12
	Er-171	014391-45-8	7.52E+00	H	W	3.00E-04	1.63E-12	7.50E-13	1.04E-06
Europium (63)	Eu-152	014683-23-9	1.36E+01	Y	W	1.00E-03	5.73E-12	7.91E-11	4.08E-06
	Eu-154	015585-10-1	8.80E+00	Y	W	1.00E-03	9.37E-12	9.15E-11	4.65E-06
	Eu-155	014391-16-3	4.96E+00	Y	W	1.00E-03	1.65E-12	9.60E-12	6.08E-08
	Eu-156	014280-35-4	1.52E+01	D	W	1.00E-03	1.09E-11	9.26E-12	5.40E-06
Fluorine (9)	F-18	013981-56-1	1.10E+02	M	D	9.50E-01	1.09E-13	6.54E-14	3.50E-06
Francium (87)	Fr-221	015756-41-9	4.80E+00	M	D	9.50E-01	1.45E-13	8.02E-12	6.74E-08
	Fr-223	015756-98-6	2.18E+00	M	D	9.50E-01	4.46E-13	5.90E-13	4.17E-08
Gadolinium (64)	Gd-153	014276-65-4	2.42E+02	D	W	3.00E-04	1.32E-12	3.20E-12	7.22E-08
	Gd-159	014041-42-0	1.86E+01	H	W	3.00E-04	2.60E-12	1.24E-12	9.59E-08
Gallium (31)	Ga-67	014119-09-6	3.26E+00	D	W	1.00E-03	8.36E-13	5.14E-13	3.61E-07
	Ga-72	013982-22-4	1.41E+01	H	W	1.00E-03	4.77E-12	2.17E-12	1.12E-05
Germanium (32)	Ge-71	014374-81-3	1.18E+01	D	W	9.50E-01	1.18E-14	5.84E-14	1.56E-11
Gold (79)	Au-196	014914-16-0	6.18E+00	D	Y	1.00E-01	1.30E-12	1.04E-12	1.41E-06
	Au-198	010043-49-0	2.70E+00	D	Y	1.00E-01	5.28E-12	3.64E-12	1.37E-06
Holmium (67)	Ho-166	013967-65-2	2.68E+01	H	W	3.00E-04	7.57E-12	4.06E-12	6.96E-08
Hydrogen (1)	H-3	010028-17-8	1.23E+01	Y	V	1.00E+00	7.15E-14	9.59E-14	0.00E+0

[Table 4 continues on the following page: Refer to Endnotes on the last page.]

Table 4: Radionuclide Carcinogenicity -- Slope Factors[a] MAY 1995
(In Units of Picocuries[b])

Element (Atomic Number)	Isotope[c]	CASRN[d]	Radioactive Half-life[e]		ICRP Lung Class[f]	GI Absorption Factor (f_1)[g]	Slope Factor Lifetime Excess Total Cancer Risk Per Unit Intake or Exposure: Ingestion (Risk/pCi)	Inhalation (Risk/pCi)	External Exposure (Risk/yr per pCi/g soil)
Indium (49)	In-113m	014885-78-0(m)	1.66E+00	H	W	2.00E-02	8.30E-14	5.77E-14	7.82E-07
	In-114	013981-55-0	7.19E+01	S	W	2.00E-02	4.53E-15	5.81E-15	1.13E-07
	In-114m	013981-55-0(m)	4.95E+01	D	W	2.00E-02	2.06E-11	2.53E-11	2.00E-07
	In-115	014191-71-0	4.60e+15	Y	W	2.00E-02	3.49E-11	2.07E-10	0.00E+0
	In-115m	014191-71-0(m)	4.36E+00	H	W	2.00E-02	3.42E-13	1.75E-13	4.29E-07
Iodine (53)	I-122	018287-75-7	3.62E+00	M	D	9.50E-01	2.16E-14	2.24E-14	3.41E-06
	I-123	015715-08-9	1.31E+01	H	D	9.50E-01	5.42E-13	2.94E-13	2.52E-07
	I-125	014158-31-7	6.01E+01	D	D	9.50E-01	2.58E-11	1.71E-11	2.39E-09
	I-126	014158-32-8	1.29E+01	D	D	9.50E-01	4.82E-11	3.15E-11	1.49E-06
	I-129	015046-84-1	1.57E+07	Y	D	9.50E-01	1.84E-10	1.22E-10	2.69E-09
	I-130	014914-02-4	1.24E+01	H	D	9.50E-01	4.85E-12	2.61E-12	7.93E-06
	I-131	010043-66-0	8.04E+00	D	D	9.50E-01	3.62E-11	2.33E-11	1.25E-06
	I-132	014683-16-0	2.30E+00	H	D	9.50E-01	6.62E-13	3.52E-13	8.75E-06
	I-133	014834-67-4	2.08E+01	H	D	9.50E-01	1.06E-11	6.02E-12	2.20E-06
	I-134	014914-27-3	5.26E+01	M	D	9.50E-01	2.31E-13	1.38E-13	1.02E-05
	I-135	014834-68-5	6.61E+00	H	D	9.50E-01	2.27E-12	1.18E-12	6.23E-06
Iridium (77)	Ir-190	014981-91-0	1.18E+01	D	Y	1.00E-02	4.95E-12	4.49E-12	4.65E-06
	Ir-194	014158-35-1	1.92E+01	H	Y	1.00E-02	7.00E-12	4.18E-12	3.17E-07

[Table 4 continues on the following page: Refer to Endnotes on the last page.]

Table 4: Radionuclide Carcinogenicity -- Slope Factors[a] MAY 1995
(In Units of Picocuries[b])

Element (Atomic Number)	Isotope[c]	CASRN[d]	Radioactive Half-life[e]		ICRP Lung Class[f]	GI Absorption Factor (f_1)[g]	Slope Factor Lifetime Excess Total Cancer Risk Per Unit Intake or Exposure		
							Ingestion (Risk/pCi)	Inhalation (Risk/pCi)	External Exposure (Risk/yr per pCi/g soil)
Iron (26)	Fe-55	014681-59-5	2.70E+00	Y	W	1.00E-01	3.51E-13	5.60E-13	0.00E+0
	Fe-59	014596-12-4	4.46E+01	D	W	1.00E-01	5.87E-12	7.08E-12	4.63E-06
Krypton (36)	Kr-83m	013965-98-5(m)	1.83E+00	H	*	---	---	3.48E-17	---
	Kr-85	013983-27-2	1.07E+01	Y	*	---	---	2.87E-16	---
	Kr-85m	013983-27-2(m)	4.48E+00	H	*	---	---	2.75E-16	---
	Kr-87	014809-68-8	7.63E+01	M	*	---	---	1.20E-15	---
	Kr-88	014995-61-0	2.84E+00	H	*	---	---	2.20E-15	---
	Kr-89	016316-03-3	3.16E+00	M	*	---	---	1.61E-15	---
	Kr-90	015741-13-6	3.23E+01	S	*	---	---	1.60E-15	---
Lanthanum (57)	La-140	013981-28-7	4.02E+01	H	W	1.00E-03	9.46E-12	5.10E-12	9.11E-06
Lead (82)	Pb-203	014687-25-3	5.20E+01	H	D	2.00E-01	1.03E-12	3.10E-13	6.40E-07
	Pb-209	014119-30-3	3.25E+00	H	D	2.00E-01	2.09E-13	6.85E-14	0.00E+0
	Pb-210	014255-04-0	2.23E+01	Y	D	2.00E-01	6.75E-10	1.67E-09	1.12E-10
	Pb-210+D	014255-04-0(+D)	2.23E+01	Y	D	2.00E-01	1.01E-09	3.86E-09	1.45E-10
	Pb-211	015816-77-0	3.61E+01	M	D	2.00E-01	3.38E-13	1.03E-11	1.85E-07
	Pb-212	015092-94-1	1.06E+01	H	D	2.00E-01	1.80E-11	3.85E-11	3.00E-07
	Pb-214	015067-28-4	2.68E+01	M	D	2.00E-01	2.94E-13	6.23E-12	7.09E-07
Lutetium (71)	Lu-177	014265-75-9	6.71E+00	D	Y	3.00E-04	2.95E-12	2.20E-12	7.22E-08

[Table 4 continues on the following page: Refer to Endnotes on the last page.]

Table 4: Radionuclide Carcinogenicity -- Slope Factors[a] MAY 1995
(In Units of Picocuries[b])

Element (Atomic Number)	Isotope[c]	CASRN[d]	Radioactive Half-life[e]		ICRP Lung Class[f]	GI Absorption Factor (f_1)[g]	Slope Factor Lifetime Excess Total Cancer Risk Per Unit Intake or Exposure: Ingestion (Risk/pCi)	Inhalation (Risk/pCi)	External Exposure (Risk/yr per pCi/g soil)
Manganese (25)	Mn-52	014092-99-0	5.59E+00	D	W	1.00E-01	6.01E-12	4.40E-12	1.34E-05
	Mn-54	013966-31-9	3.13E+02	D	W	1.00E-01	1.96E-12	3.69E-12	3.26E-06
	Mn-56	014681-52-8	2.58E+00	H	W	1.00E-01	8.57E-13	5.21E-13	6.95E-06
Mercury (80)	Hg-197	013981-51-6	6.41E+01	H	W	2.00E-02	1.18E-12	6.95E-13	5.47E-08
	Hg-203	013982-78-0	4.66E+01	D	W	2.00E-02	2.64E-12	3.03E-12	6.27E-07
Molybdenum (42)	Mo-99	014119-15-4	6.60E+01	H	Y	8.00E-01	2.27E-12	4.48E-12	5.46E-07
Neodymium (60)	Nd-147	014269-74-0	1.10E+01	D	Y	3.00E-04	5.88E-12	4.84E-12	3.22E-07
	Nd-149	015749-81-2	1.73E+00	H	Y	3.00E-04	4.55E-13	4.22E-13	1.08E-06
Neptunium (93)	Np-236	015700-36-4	1.15E+05	Y	W	1.00E-03	9.31E-13	3.87E-12	9.22E-08
	Np-237	013994-20-2	2.14E+06	Y	W	1.00E-03	2.95E-10	3.45E-08	7.56E-09
	Np-237+D	013994-20-2(+D)	2.14E+06	Y	W	1.00E-03	3.00E-10	3.45E-08	4.62E-07
	Np-238	015766-25-3	2.12E+00	D	W	1.00E-03	4.56E-12	4.68E-12	1.95E-06
	Np-239	013968-59-7	2.36E+00	D	W	1.00E-03	4.27E-12	2.41E-12	2.42E-07
	Np-240	015690-84-3	6.50E+01	M	W	1.00E-03	1.77E-13	1.31E-13	3.65E-06
	Np-240m	015690-84-3(m)	7.40E+00	M	W	1.00E-03	2.42E-14	2.83E-14	1.05E-06
Nickel (28)	Ni-59	014336-70-0	7.50E+04	Y	W	5.00E-02	1.85E-13	4.01E-13	0.00E+0
	Ni-63	013981-37-8	1.00E+02	Y	W	5.00E-02	5.50E-13	1.01E-12	0.00E+0
	Ni-65	014833-49-9	2.52E+00	H	W	5.00E-02	5.62E-13	3.59E-13	2.14E-06

[Table 4 continues on the following page: Refer to Endnotes on the last page.]

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Table 4: Radionuclide Carcinogenicity -- Slope Factors[a] MAY 1995
(In Units of Picocuries[b])

Element (Atomic Number)	Isotope[c]	CASRN[d]	Radioactive Half-life[e]		ICRP Lung Class[f]	GI Absorption Factor (f_1)[g]	Slope Factor Lifetime Excess Total Cancer Risk Per Unit Intake or Exposure		
							Ingestion (Risk/pCi)	Inhalation (Risk/pCi)	External Exposure (Risk/yr per pCi/g soil)
Niobium (41)	Nb-93m	007440-03-1(m)	1.46E+01	Y	Y	1.00E-02	6.64E-13	4.33E-12	3.64E-11
	Nb-94	014681-63-1	2.03E+04	Y	Y	1.00E-02	6.91E-12	8.20E-11	6.08E-06
	Nb-95	013967-76-5	3.51E+01	D	Y	1.00E-02	2.25E-12	3.11E-12	2.94E-06
	Nb-95m	013967-76-5(m)	8.66E+01	H	Y	1.00E-02	3.06E-12	2.25E-12	8.71E-08
	Nb-97	018496-04-3	7.21E+01	M	Y	1.00E-02	1.75E-13	2.13E-13	2.49E-06
	Nb-97m	018496-04-3(m)	6.00E+01	S	Y	1.00E-02	3.27E-15	3.34E-15	2.78E-06
Osmium (76)	Os-185	015766-50-4	9.36E+01	D	Y	1.00E-02	1.80E-12	4.62E-12	2.45E-06
	Os-191	014119-24-5	1.54E+01	D	Y	1.00E-02	3.04E-12	2.70E-12	8.74E-08
	Os-191m	014119-24-5(m)	1.30E+01	H	Y	1.00E-02	4.95E-13	3.32E-13	3.22E-09
	Os-193	016057-77-5	3.00E+01	H	Y	1.00E-02	4.36E-12	2.68E-12	1.82E-07
Palladium (46)	Pd-100	015690-69-4	3.64E+00	D	Y	5.00E-03	3.74E-12	3.55E-12	---
	Pd-101	015749-54-9	8.48E+00	H	Y	5.00E-03	3.74E-13	2.29E-13	---
	Pd-103	014967-68-1	1.70E+01	D	Y	5.00E-03	1.05E-12	1.08E-12	5.38E-10
	Pd-107	017637-99-9	6.50E+06	Y	Y	5.00E-03	2.09E-13	1.46E-12	0.00E+0
	Pd-109	014981-64-7	1.35E+01	H	Y	5.00E-03	3.33E-12	1.99E-12	2.43E-09
Phosphorus (15)	P-32	014596-37-3	1.43E+01	D	D	8.00E-01	6.11E-12	2.93E-12	0.00E+0
	P-33	015749-66-3	2.54E+01	D	D	8.00E-01	7.81E-13	3.96E-13	0.00E+0
Platinum (78)	Pt-191	015706-36-2	2.71E+00	D	D	1.00E-02	1.50E-12	4.13E-13	6.74E-07

[Table 4 continues on the following page: Refer to Endnotes on the last page.]

Table 4: Radionuclide Carcinogenicity -- Slope Factors[a] MAY 1995
(In Units of Picocuries[b])

Element (Atomic Number)	Isotope[c]	CASRN[d]	Radioactive Half-life[e]		ICRP Lung Class[f]	GI Absorption Factor (f_1)[g]	Slope Factor Lifetime Excess Total Cancer Risk Per Unit Intake or Exposure: Ingestion (Risk/pCi)	Inhalation (Risk/pCi)	External Exposure (Risk/yr per pCi/g soil)
	Pt-193	015735-70-3	5.00E+01	Y	D	1.00E-02	1.62E-13	7.89E-14	0.00E+0
	Pt-193m	015735-70-3(m)	4.33E+00	D	D	1.00E-02	2.51E-12	5.76E-13	7.44E-09
	Pt-197	015735-74-7	1.83E+01	H	D	1.00E-02	2.12E-12	4.54E-13	3.15E-08
	Pt-197m	015735-74-7(m)	9.44E+01	M	D	1.00E-02	3.25E-13	1.00E-13	1.65E-07
Plutonium (94)	Pu-236	015411-92-4	2.85E+00	Y	Y	1.00E-03	7.68E-11	1.34E-08	2.32E-11
	Pu-238	013981-16-3	8.78E+01	Y	Y	1.00E-03	2.95E-10	2.74E-08	1.94E-11
	Pu-239	015117-48-3	2.41E+04	Y	Y	1.00E-03	3.16E-10	2.78E-08	1.26E-11
	Pu-240	014119-33-6	6.57E+03	Y	Y	1.00E-03	3.15E-10	2.78E-08	1.87E-11
	Pu-241	014119-32-5	1.44E+01	Y	Y	1.00E-03	5.20E-12	2.81E-10	0.00E+0
	Pu-241+D	014119-32-5(+D)	1.44E+01	Y	Y	1.00E-03	3.33E-10	3.88E-08	4.59E-09
	Pu-242	013982-10-0	3.76E+05	Y	Y	1.00E-03	3.00E-10	2.64E-08	1.55E-11
	Pu-243	015706-37-3	4.96E+00	H	Y	1.00E-03	3.69E-13	2.67E-13	1.89E-08
	Pu-244	014119-34-7	8.26E+07	Y	Y	1.00E-03	3.13E-10	2.67E-08	1.29E-11
	Pu-244+D	014119-34-7(+D)	8.26E+07	Y	Y	1.00E-03	3.19E-10	2.67E-08	3.65E-06
Polonium (84)	Po-210	013981-52-7	1.38E+02	D	W	1.00E-01	3.26E-10	2.14E-09	3.30E-11
	Po-212	015389-34-1	2.98E-07	S	W	1.00E-01	4.51E-23	5.93E-21	0.00E+0
	Po-213	015756-57-7	4.20E-06	S	W	1.00E-01	6.70E-22	7.80E-20	1.18E-10
	Po-214	015735-67-8	1.64E-04	S	W	1.00E-01	2.12E-20	2.77E-18	3.23E-10

[Table 4 continues on the following page: Refer to Endnotes on the last page.]

Table 4: Radionuclide Carcinogenicity -- Slope Factors[a] (In Units of Picocuries[b])

MAY 1995

Element (Atomic Number)	Isotope[c]	CASRN[d]	Radioactive Half-life[e]		ICRP Lung Class[f]	GI Absorption Factor (f_1)[g]	Slope Factor Lifetime Excess Total Cancer Risk Per Unit Intake or Exposure: Ingestion (Risk/pCi)	Inhalation (Risk/pCi)	External Exposure (Risk/yr per pCi/g soil)
	Po-215	015706-52-2	1.78E-03	S	W	1.00E-01	4.99E-19	4.48E-17	5.11E-10
	Po-216	015756-58-8	1.46E-01	S	W	1.00E-01	8.79E-17	2.95E-15	5.62E-11
	Po-218	015422-24-9	3.05E+00	M	W	1.00E-01	5.08E-14	3.69E-12	0.00E+0
Potassium (19)	K-40	013966-00-2	1.28E+09	Y	D	9.50E-01	1.25E-11	7.46E-12	6.11E-07
	K-42	014378-21-3	1.24E+01	H	D	9.50E-01	1.29E-12	7.56E-13	1.09E-06
Praseodymium (59)	Pr-142	014191-64-1	1.91E+01	H	Y	3.00E-04	6.98E-12	4.16E-12	2.34E-07
	Pr-143	014981-79-4	1.36E+01	D	Y	3.00E-04	6.60E-12	5.60E-12	3.41E-14
	Pr-144	014119-05-2	1.73E+01	M	Y	3.00E-04	8.08E-14	1.31E-13	1.33E-07
	Pr-144m	014119-05-2(m)	7.20E+00	M	Y	3.00E-04	3.23E-14	5.61E-14	1.85E-09
Promethium (61)	Pm-147	014380-75-7	2.62E+00	Y	Y	3.00E-04	1.41E-12	7.49E-12	6.35E-12
	Pm-148	014683-19-3	5.37E+00	D	Y	3.00E-04	1.44E-11	1.05E-11	2.21E-06
	Pm-148m	014683-19-3(m)	4.13E+01	D	Y	3.00E-04	9.93E-12	2.95E-11	7.32E-06
	Pm-149	015765-31-8	5.31E+01	H	Y	3.00E-04	5.52E-12	3.57E-12	3.65E-08
Protactinium (91)	Pa-231	014331-85-2	3.73E+04	Y	Y	1.00E-03	1.49E-10	2.42E-08	2.71E-08
	Pa-233	013981-14-1	2.70E+01	D	Y	1.00E-03	4.69E-12	4.92E-12	4.54E-07
	Pa-234	015100-28-4	6.70E+00	H	Y	1.00E-03	2.13E-12	1.30E-12	6.60E-06
	Pa-234m	015100-28-4(m)	1.17E+00	M	Y	1.00E-03	4.77E-15	6.27E-15	4.05E-08
Radium (88)	Ra-223	015623-45-7	1.14E+01	D	W	2.00E-01	2.34E-10	3.60E-09	2.44E-07

[Table 4 continues on the following page: Refer to Endnotes on the last page.]

Table 4: Radionuclide Carcinogenicity -- Slope Factors[a] (In Units of Picocuries[b])

MAY 1995

Element (Atomic Number)	Isotope[c]	CASRN[d]	Radioactive Half-life[e]		ICRP Lung Class[f]	GI Absorption Factor (f_1)[g]	Slope Factor Lifetime Excess Total Cancer Risk Per Unit Intake or Exposure: Ingestion (Risk/pCi)	Inhalation (Risk/pCi)	External Exposure (Risk/yr per pCi/g soil)
	Ra-224	013233-32-4	3.62E+00	D	W	2.00E-01	1.49E-10	2.25E-09	2.48E-08
	Ra-225	013981-53-8	1.48E+01	D	W	2.00E-01	1.57E-10	2.38E-09	1.71E-09
	Ra-226	013982-63-3	1.60E+03	Y	W	2.00E-01	2.95E-10	2.72E-09	1.31E-08
	Ra-226+D	013982-63-3(+D)	1.60E+03	Y	W	2.00E-01	2.96E-10	2.75E-09	6.74E-06
	Ra-228	015262-20-1	5.75E+00	Y	W	2.00E-01	2.46E-10	9.61E-10	0.00E+0
	Ra-228+D	015262-20-1(+D)	5.75E+00	Y	W	2.00E-01	2.48E-10	9.94E-10	3.28E-06
Radon (86)	Rn-219	014835-02-0	3.96E+00	S	*	---	---	6.91E-14	1.72E-07
	Rn-220	022481-48-7	5.56E+01	S	*	---	---	1.92E-13	1.88E-09
	Rn-222+D[l]	014859-67-7(+D)	3.82E+00	D	*	---	---	7.57E-12	---
Rhodium (45)	Rh-103m	007440-16-6(m)	5.61E+01	M	Y	5.00E-02	8.19E-15	1.28E-14	5.85E-11
	Rh-105	014913-89-4	3.54E+01	H	Y	5.00E-02	1.93E-12	1.22E-12	2.49E-07
	Rh-105m	014913-89-4(m)	4.50E+01	S	Y	5.00E-02	1.08E-15	9.25E-16	2.27E-08
	Rh-106	014234-34-5	2.99E+01	S	Y	5.00E-02	3.63E-15	4.62E-15	7.57E-07

[l] To derive the inhalation slope factor for Rn-222+D, EPA's Office of Radiation and Indoor Air (ORIA) uses a slightly different risk model and set of exposure assumptions, including an inhalation rate of 2.2E+04 L/day; 50% equilibrium for decay products; and a risk coefficient of 2.36E-4 cases per working level month (WLM). A more detailed description of ORIA's radon risk assessment methodology is provided in the EPA CRAVE Summary Sheet, *Inhaled Rn-222 and its Short Half-Life Decay Products.*

[Table 4 continues on the following page: Refer to Endnotes on the last page.]

Table 4: Radionuclide Carcinogenicity -- Slope Factors[a] MAY 1995
(In Units of Picocuries[b])

Element (Atomic Number)	Isotope[c]	CASRN[d]	Radioactive Half-life[e]		ICRP Lung Class[f]	GI Absorption Factor (f_1)[g]	Slope Factor Lifetime Excess Total Cancer Risk Per Unit Intake or Exposure		
							Ingestion (Risk/pCi)	Inhalation (Risk/pCi)	External Exposure (Risk/yr per pCi/g soil)
Rubidium (37)	Rb-82	014391-63-0	1.25E+00	M	D	9.50E-01	1.05E-14	1.17E-14	3.89E-06
	Rb-86	014932-53-7	1.87E+01	D	D	9.50E-01	7.12E-12	4.21E-12	3.71E-07
	Rb-87	013982-13-3	4.73e+10	Y	D	9.50E-01	3.68E-12	2.26E-12	0.00E+0
	Rb-88	014928-36-0	1.78E+01	M	D	9.50E-01	1.46E-13	1.36E-13	2.68E-06
	Rb-89	014191-65-2	1.54E+01	M	D	9.50E-01	8.65E-14	6.92E-14	8.47E-06
Ruthenium (44)	Ru-97	015758-35-7	2.90E+00	D	Y	5.00E-02	5.88E-13	4.09E-13	4.52E-07
	Ru-103	013968-53-1	3.94E+01	D	Y	5.00E-02	3.32E-12	4.59E-12	1.70E-06
	Ru-105	014331-95-4	4.44E+00	H	Y	5.00E-02	1.15E-12	8.02E-13	2.88E-06
	Ru-106	013967-48-1	3.68E+02	D	Y	5.00E-02	3.45E-11	1.15E-10	0.00E+0
	Ru-106+D	013967-48-1(+D)	3.68E+02	D	Y	5.00E-02	3.45E-11	1.15E-10	7.57E-07
Samarium (62)	Sm-147	014392-33-7	1.06e+11	Y	W	3.00E-04	2.51E-11	6.93E-09	0.00E+0
	Sm-151	015715-94-3	9.00E+01	Y	W	3.00E-04	4.60E-13	4.63E-12	2.92E-13
	Sm-153	015766-00-4	4.67E+01	H	W	3.00E-04	4.02E-12	2.18E-12	4.65E-08
Scandium (21)	Sc-46	013967-63-0	8.38E+01	D	Y	1.00E-04	5.73E-12	1.31E-11	7.89E-06
	Sc-47	014391-96-9	3.42E+00	D	Y	1.00E-04	2.95E-12	2.01E-12	2.50E-07
	Sc-48	014391-86-7	4.37E+01	H	Y	1.00E-04	6.65E-12	4.20E-12	1.31E-05
Selenium (34)	Se-75	014265-71-5	1.20E+02	D	W	8.00E-01	6.53E-12	4.92E-12	8.89E-07
Silicon (14)	Si-31	014276-49-4	1.57E+02	M	W	1.00E-02	5.04E-13	3.29E-13	3.45E-09

[Table 4 continues on the following page: Refer to Endnotes on the last page.]

Table 4: Radionuclide Carcinogenicity -- Slope Factors[a] MAY 1995
(In Units of Picocuries[b])

Element (Atomic Number)	Isotope[c]	CASRN[d]	Radioactive Half-life[e]		ICRP Lung Class[f]	GI Absorption Factor (f_1)[g]	Slope Factor Lifetime Excess Total Cancer Risk Per Unit Intake or Exposure: Ingestion (Risk/pCi)	Inhalation (Risk/pCi)	External Exposure (Risk/yr per pCi/g soil)
Silver (47)	Ag-105	014928-14-4	4.13E+01	D	Y	5.00E-02	1.63E-12	2.33E-12	---
	Ag-108	014391-65-2	2.37E+00	M	Y	5.00E-02	6.94E-15	9.43E-15	5.78E-08
	Ag-108m	014391-65-2m	1.27E+02	Y	Y	5.00E-02	6.05E-12	7.02E-11	5.61E-06
	Ag-108m+D	014391-65-2m(+D)	1.27E+02	Y	Y	5.00E-02	6.05E-12	7.02E-11	5.62E-06
	Ag-109m	014378-38-2(m)	3.96E+01	S	Y	5.00E-02	2.71E-16	3.46E-16	1.16E-09
	Ag-110	014391-76-5	2.46E+01	S	Y	5.00E-02	2.44E-15	3.16E-15	1.13E-07
	Ag-110m	014391-76-5(m)	2.50E+02	D	Y	5.00E-02	8.43E-12	3.21E-11	1.05E-05
	Ag-111	157690-04-0	7.46E+00	D	Y	5.00E-02	6.83E-12	5.24E-12	8.51E-08
Sodium (11)	Na-22	013966-32-0	2.60E+00	Y	D	9.50E-01	8.02E-12	4.88E-12	8.18E-06
	Na-24	013982-04-2	1.50E+01	H	D	9.50E-01	1.38E-12	7.51E-13	1.77E-05
Strontium (38)	Sr-82	014809-50-8	2.50E+01	D	D	3.00E-01	2.58E-11	8.87E-12	9.00E-11
	Sr-85	013967-73-2	6.48E+01	D	D	3.00E-01	1.40E-12	1.14E-12	1.54E-06
	Sr-85m	013967-73-2(m)	6.77E+01	M	D	3.00E-01	1.80E-14	7.13E-15	5.24E-07
	Sr-89	014158-27-1	5.06E+01	D	D	3.00E-01	1.03E-11	3.68E-12	5.38E-10
	Sr-90	010098-97-2	2.86E+01	Y	D	3.00E-01	4.09E-11	5.94E-11	0.00E+0
	Sr-90+D	010098-97-2(+D)	2.86E+01	Y	D	3.00E-01	5.59E-11	6.93E-11	0.00E+0
	Sr-91	014331-91-0	9.50E+00	H	D	3.00E-01	2.82E-12	7.79E-13	2.67E-06
	Sr-92	014928-29-1	2.71E+00	H	D	3.00E-01	2.03E-12	4.70E-13	5.20E-06

[Table 4 continues on the following page: Refer to Endnotes on the last page.]

Table 4: Radionuclide Carcinogenicity -- Slope Factors[a] MAY 1995
(In Units of Picocuries[b])

Element (Atomic Number)	Isotope[c]	CASRN[d]	Radioactive Half-life[e]		ICRP Lung Class[f]	GI Absorption Factor (f_1)[g]	Slope Factor Lifetime Excess Total Cancer Risk Per Unit Intake or Exposure		
							Ingestion (Risk/pCi)	Inhalation (Risk/pCi)	External Exposure (Risk/yr per pCi/g soil)
Sulfur (16)	S-35	015117-53-0	8.74E+01	D	D	8.00E-01	4.16E-13	1.85E-13	0.00E+0
Tantalum (73)	Ta-182	013982-00-8	1.15E+02	D	Y	1.00E-03	7.03E-12	1.65E-11	4.66E-06
Technetium (43)	Tc-95	014809-56-4	2.00E+01	H	W	8.00E-01	6.81E-14	3.38E-14	2.72E-06
	Tc-95m	014809-56-4(m)	6.10E+01	D	W	8.00E-01	1.24E-12	2.10E-12	2.08E-06
	Tc-96	014808-44-7	4.28E+00	D	W	8.00E-01	2.28E-12	1.94E-12	9.36E-06
	Tc-96m	014808-44-7(m)	5.15E+01	M	W	8.00E-01	2.61E-14	2.26E-14	7.72E-08
	Tc-97	015759-35-0	2.60E+06	Y	W	8.00E-01	1.58E-13	3.44E-13	2.49E-10
	Tc-97m	015759-35-0(m)	8.90E+01	D	W	8.00E-01	1.20E-12	1.96E-12	2.67E-10
	Tc-99	014133-76-7	2.13E+05	Y	W	8.00E-01	1.40E-12	2.89E-12	6.19E-13
	Tc-99m	014133-76-7(m)	6.02E+00	H	W	8.00E-01	5.58E-14	3.49E-14	2.51E-07
Tellurium (52)	Te-125m	014390-73-9(m)	5.80E+01	D	W	2.00E-01	2.51E-12	2.85E-12	2.16E-09
	Te-127	013981-49-2	9.35E+00	H	W	2.00E-01	8.55E-13	4.32E-13	1.62E-08
	Te-127m	013981-49-2(m)	1.09E+02	D	W	2.00E-01	6.01E-12	1.31E-11	7.10E-10
	Te-129	014269-71-7	6.96E+01	M	W	2.00E-01	1.48E-13	1.46E-13	1.46E-07
	Te-129m	014269-71-7(m)	3.36E+01	D	W	2.00E-01	1.17E-11	1.33E-11	6.92E-08
	Te-131	014683-12-6	2.50E+01	M	W	2.00E-01	3.90E-13	2.48E-13	1.35E-06
	Te-131m	014683-12-6(m)	3.00E+01	H	W	2.00E-01	8.81E-12	8.40E-12	5.31E-06
	Te-132	014234-28-7	7.82E+01	H	W	2.00E-01	1.22E-11	8.38E-12	4.31E-07

[Table 4 continues on the following page: Refer to Endnotes on the last page.]

Table 4: Radionuclide Carcinogenicity -- Slope Factors[a] MAY 1995
(In Units of Picocuries[b])

Element (Atomic Number)	Isotope[c]	CASRN[d]	Radioactive Half-life[e]		ICRP Lung Class[f]	GI Absorption Factor (f_1)[g]	Slope Factor Lifetime Excess Total Cancer Risk Per Unit Intake or Exposure: Ingestion (Risk/pCi)	Inhalation (Risk/pCi)	External Exposure (Risk/yr per pCi/g soil)
Terbium (65)	Tb-158	015759-55-4	1.50E+02	Y	W	3.00E-04	4.20E-12	7.04E-11	---
	Tb-160	013981-29-8	7.23E+01	D	W	3.00E-04	7.62E-12	1.14E-11	4.03E-06
Thallium (81)	Tl-202	015720-57-7	1.22E+01	D	D	9.50E-01	1.01E-12	6.07E-13	1.42E-06
	Tl-204	013968-51-9	3.78E+00	Y	D	9.50E-01	1.97E-12	1.15E-12	8.72E-10
	Tl-208	014913-50-9	3.05E+00	M	D	9.50E-01	1.75E-14	1.36E-14	1.45E-05
	Tl-209	015690-73-0	2.20E+00	M	D	9.50E-01	1.40E-14	1.12E-14	7.83E-06
Thorium (90)	Th-227	015623-47-9	1.87E+01	D	Y	2.00E-04	4.04E-11	4.31E-09	1.74E-07
	Th-228	014274-82-9	1.91E+00	Y	Y	2.00E-04	6.29E-11	9.45E-08	5.28E-10
	Th-228+D	014274-82-9(+D)	1.91E+00	Y	Y	2.00E-04	2.31E-10	9.68E-08	9.94E-07
	Th-229	015594-54-4	7.34E+03	Y	Y	2.00E-04	5.65E-11	7.60E-08	5.94E-08
	Th-229+D	015594-54-4(+D)	7.34E+03	Y	Y	2.00E-04	3.56E-10	8.26E-08	5.99E-07
	Th-230	014269-63-7	7.70E+04	Y	Y	2.00E-04	3.75E-11	1.72E-08	4.40E-11
	Th-231	014932-40-2	2.55E+01	H	Y	2.00E-04	1.79E-12	1.10E-12	2.09E-09
	Th-232	007440-29-1	1.41E+10	Y	Y	2.00E-04	3.28E-11	1.93E-08	1.97E-11
	Th-234	015065-10-8	2.41E+01	D	Y	2.00E-04	1.93E-11	1.90E-11	3.50E-09
Thulium (69)	Tm-170	013981-30-1	1.29E+02	D	W	3.00E-04	7.50E-12	1.10E-11	3.84E-09
	Tm-171	014333-45-0	1.92E+00	Y	W	3.00E-04	5.86E-13	1.84E-12	3.15E-10
Tin (50)	Sn-113	013966-06-8	1.15E+02	D	W	2.00E-02	3.72E-12	6.61E-12	2.96E-09

[Table 4 continues on the following page: Refer to Endnotes on the last page.]

Table 4: Radionuclide Carcinogenicity -- Slope Factors[a] MAY 1995
(In Units of Picocuries[b])

Element (Atomic Number)	Isotope[c]	CASRN[d]	Radioactive Half-life[e]		ICRP Lung Class[f]	GI Absorption Factor (f_1)[g]	Slope Factor Lifetime Excess Total Cancer Risk Per Unit Intake or Exposure: Ingestion (Risk/pCi)	Inhalation (Risk/pCi)	External Exposure (Risk/yr per pCi/g soil)
	Sn-121	014683-06-8	2.71E+01	H	W	2.00E-02	1.22E-12	6.13E-13	---
	Sn-121m	014683-06-8(m)	5.55E+01	Y	W	2.00E-02	2.00E-12	7.46E-12	---
	Sn-125	014683-08-0	9.64E+00	D	W	2.00E-02	1.68E-11	1.19E-11	1.21E-06
	Sn-126	015832-50-5	1.00E+05	Y	W	2.00E-02	2.12E-11	4.26E-11	3.32E-08
Tungsten (74)	W-181	015749-46-9	1.21E+02	D	D	3.00E-01	2.72E-13	8.02E-14	2.11E-08
	W-185	014932-41-3	7.51E+01	D	D	3.00E-01	2.04E-12	4.26E-13	5.03E-11
	W-187	014983-48-3	2.38E+01	H	D	3.00E-01	2.46E-12	5.29E-13	1.63E-06
Uranium (92)	U-232	014158-29-3	7.20E+01	Y	Y	5.00E-02	8.12E-11	5.29E-08	3.42E-11
	U-233	013968-55-3	1.59E+05	Y	Y	5.00E-02	4.48E-11	1.41E-08	3.52E-11
	U-234	013966-29-5	2.45E+05	Y	Y	5.00E-02	4.44E-11	1.40E-08	2.14E-11
	U-235	015117-96-1	7.04E+08	Y	Y	5.00E-02	4.52E-11	1.30E-08	2.63E-07
	U-235+D	015117-96-1(+D)	7.04E+08	Y	Y	5.00E-02	4.70E-11	1.30E-08	2.65E-07
	U-236	013982-70-2	2.34E+07	Y	Y	5.00E-02	4.21E-11	1.32E-08	1.72E-11
	U-237	014269-75-1	6.75E+00	D	Y	5.00E-02	3.98E-12	3.12E-12	1.37E-07
	U-238	007440-61-1	4.47E+09	Y	Y	5.00E-02	4.27E-11	1.24E-08	1.50E-11
	U-238+D	007440-61-1(+D)	4.47E+09	Y	Y	5.00E-02	6.20E-11	1.24E-08	5.25E-08
	U-240	015687-53-3	1.41E+01	H	Y	5.00E-02	5.47E-12	3.35E-12	1.09E-10
Vanadium (23)	V-48	014331-97-6	1.60E+01	D	W	1.00E-02	7.56E-12	6.84E-12	1.12E-05

[Table 4 continues on the following page: Refer to Endnotes on the last page.]

Table 4: Radionuclide Carcinogenicity -- Slope Factors[a] MAY 1995
(In Units of Picocuries[b])

Element (Atomic Number)	Isotope[c]	CASRN[d]	Radioactive Half-life[e]		ICRP Lung Class[f]	GI Absorption Factor (f_1)[g]	Slope Factor Lifetime Excess Total Cancer Risk Per Unit Intake or Exposure: Ingestion (Risk/pCi)	Inhalation (Risk/pCi)	External Exposure (Risk/yr per pCi/g soil)
Xenon (54)	Xe-122	015151-09-4	2.01E+01	H	*	---	---	3.08E-15	---
	Xe-123	015700-10-4	2.14E+00	H	*	---	---	8.92E-16	---
	Xe-125	013994-18-8	1.68E+01	H	*	---	---	1.20E-15	---
	Xe-127	013994-19-9	3.64E+01	D	*	---	---	4.09E-16	---
	Xe-129m	013965-99-6(m)	8.89E+00	D	*	---	---	5.74E-16	---
	Xe-131m	014683-11-5(m)	1.18E+01	D	*	---	---	4.13E-16	---
	Xe-133	014932-42-4	5.25E+00	D	*	---	---	4.14E-16	---
	Xe-133m	014932-42-4(m)	2.19E+00	D	*	---	---	5.12E-16	---
	Xe-135	014995-62-1	9.11E+00	H	*	---	---	7.45E-16	---
	Xe-135m	014995-62-1(m)	1.54E+01	M	*	---	---	1.88E-16	---
	Xe-137	014835-21-3	3.83E+00	M	*	---	---	1.39E-15	---
	Xe-138	015751-81-2	1.41E+01	M	*	---	---	2.06E-15	---
Yttrium (39)	Y-90	010098-91-6	6.41E+01	H	Y	1.00E-04	1.50E-11	9.90E-12	0.00E+0
	Y-91	014234-24-3	5.85E+01	D	Y	1.00E-04	1.35E-11	1.85E-11	1.41E-08
	Y-91m	014234-24-3(m)	4.97E+01	M	Y	1.00E-04	3.69E-14	2.99E-14	1.90E-06
	Y-92	015751-59-4	3.54E+00	H	Y	1.00E-04	1.95E-12	1.61E-12	9.80E-07
	Y-93	014981-70-5	1.01E+01	H	Y	1.00E-04	5.74E-12	3.48E-12	3.41E-07
Zinc (30)	Zn-65	013982-39-3	2.44E+02	D	Y	5.00E-01	9.93E-12	9.98E-12	2.27E-06

[Table 4 continues on the following page: Refer to Endnotes on the last page.]

Table 4: Radionuclide Carcinogenicity -- Slope Factors[a] MAY 1995
(In Units of Picocuries[b])

Element (Atomic Number)	Isotope[c]	CASRN[d]	Radioactive Half-life[e]		ICRP Lung Class[f]	GI Absorption Factor (f_1)[g]	Slope Factor Lifetime Excess Total Cancer Risk Per Unit Intake or Exposure		
							Ingestion (Risk/pCi)	Inhalation (Risk/pCi)	External Exposure (Risk/yr per pCi/g soil)
	Zn-69	013982-23-5	5.56E+01	M	Y	5.00E-01	6.19E-14	1.04E-13	2.03E-11
	Zn-69m	013982-23-5(m)	1.38E+01	H	Y	5.00E-01	1.52E-12	1.17E-12	1.43E-06
Zirconium (40)	Zr-93	015751-77-6	1.53E+06	Y	W	2.00E-03	5.21E-13	5.26E-12	0.00E+0
	Zr-95	013967-71-0	6.40E+01	D	W	2.00E-03	3.92E-12	6.48E-12	2.81E-06
	Zr-97	014928-30-4	1.69E+01	H	W	2.00E-03	1.04E-11	4.73E-12	6.85E-07

[Table 4 continues on the following page: Refer to Endnotes on the last page.]

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Table 4: Radionuclide Carcinogenicity -- Slope Factors[a] MAY 1995
(In Units of Picocuries[b])

ENDNOTES:

a EPA classifies all radionuclides as Group A (known human) carcinogens. Radionuclide slope factors are calculated by EPA's Office of Radiation and Indoor Air (ORIA) to assist HEAST users with risk-related evaluations and decision-making at various stages of the remediation process. Ingestion and inhalation slope factors are central estimates in a linear model of the age-averaged, lifetime attributable radiation cancer incidence (fatal and nonfatal cancer) risk per unit of activity inhaled or ingested, expressed as risk/picocurie (pCi). External exposure slope factors are central estimates of the lifetime attributable radiation cancer incidence risk for each year of exposure to external radiation from photon-emitting radionuclides distributed uniformly in a thick layer of soil, and are expressed as risk/yr per pCi/gram of soil. If required, slope factors in Table 4 can be converted into the International System (SI) units of becquerels (1 Bq = 1 nuclear transformation per second) by dividing each inhalation, ingestion, or external exposure value by 27.03. Users can calculate cancer risks using slope factors expressed in either customary units or SI units with equivalent results, provided that they also use air, water and soil concentration values in the same system of units. For a discussion on the derivation of radionuclide slope factors and guidance on their use, refer to the User's Guide section on radionuclide carcinogenicity.

b A curie (Ci), the customary unit of activity, is equal to 3.7×10^{10} nuclear transformations per second. 1 picocurie (pCi) = 10^{-12} Ci.

c For each radionuclide listed, slope factors correspond to the risks per unit intake or exposure for that radionuclide only, except when marked with a "+D" to indicate that the risks from associated short-lived radioactive decay products (i.e., those decay products with radioactive half-lives less than or equal to 6 months) are also included. Refer to Exhibit 1 in the User's Guide section on radionuclide carcinogenicity for guidance on determining slope factors for partial or complete radioactive decay chains.

d Chemical Abstract Service Reference Number (CASRN). For risk calculations involving decay chains, a CASRN should be reported for the parent radionuclide and each chain member.

e Radioactive half-life: S = Second, M = Minute, D = Day, Y = Year. For those radionuclides with decay products (+D), half-lives are listed for the parent radionuclide.

f Lung clearance classification recommended by the International Commission on Radiological Protection (ICRP): Y = Year, W = Week, D = Day, * = Gas.

g Gastrointestinal (GI) absorption factors are the fractional amounts of each radionuclide absorbed across the GI tract into the bloodstream. Lung clearance classifications and GI absorption factors are provided for reference only. Do not use these factors to adjust inhalation or ingestion slope factors. See the User's Guide for instructions.

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APPENDIX A: TECHNICAL INFORMATION

I. DATA SOURCES AND SELECTION CRITERIA USED IN HEAST

II. DOSE CONVERSIONS ON HEAST

III. CHEMICAL NAME AND CHEMICAL ABSTRACTS SERVICE REGISTRY NUMBER CROSS REFERENCE

IV. EFFECT LEVEL DEFINITIONS

V. NATIONAL AMBIENT AIR QUALITY STANDARDS (NAAQS)

APPENDIX A-I

I. DATA SOURCES AND SELECTION CRITERIA USED IN HEAST

A. Description of Sources and Documents Cited in HEAST

1. The Integrated Risk Information System (IRIS)

IRIS is an on-line data base developed by the EPA for compilation of risk assessment and regulatory information on chemicals and physical agents. IRIS is the primary communications mechanism for distribution of health hazard assessment information derived by the various intra-Agency Work Groups. The primary intent of IRIS is to provide guidance to EPA personnel in making risk management decisions. An IRIS chemical file contains a Work Group verified summary of the available information on hazard and dose-response assessment for noncarcinogenic and/or carcinogenic effects for that chemical and is not an extensive toxicologic data base. Risk assessment values placed on IRIS are considered Agency consensus and take precedence over differing risk assessment values from other EPA sources. Each file includes referenced citations and EPA contacts for obtaining further information on any specific chemical or agent. The IRIS data base was made available to State and local governments, as well as to the public, in April 1988.

* Questions concerning IRIS: Call RISK INFORMATION HOTLINE at (513) 569-7254

2. EPA Work Groups:

Risk assessment values for chemicals currently being considered by EPA Work Groups, but not yet on IRIS, are included in HEAST. The EPA Reference Dose/Reference Concentration (RfD/RfC) Work Group and the Carcinogen Risk Assessment Verification Endeavor (CRAVE) Work Group validates Agency systemic toxicity and carcinogen risk assessments, respectively. These Work Groups are also responsible for resolving any conflicts regarding toxicity values developed by various Program Offices. Work Group members represent many different EPA offices and are scientists experienced in issues related to both the qualitative and quantitative risk assessment of carcinogenic and toxic agents. Values verified by these Work Groups have undergone extensive peer review and represent an Agency consensus. Verified risk assessment values are entered into the IRIS data base monthly.

* Questions concerning RfD/RfC Work Group: Call Annie Jarabek NCEA-Research Triangle Park (RTP) at (919) 541-4847

* Questions concerning CRAVE Work Group: Call Jim Cogliano at (202) 260-3814 NCEA-Washington, DC

3. Office of Research and Development (ORD/National Center for Environmental Assessment (NCEA) OSWER-OAQPS (Office of Solid Waste and Emergency Response-Office of Air Quality Planning and Standards) Documents:

A listing of most ORD/NCEA OSWER-OAQPS documents can be found in the Chemical Assessments and Related Activities (CARA) list (available through NTIS) or in the CERI (Center for Environmental Research Information) Office of Research and Development publications list. The CARA is produced by the National Center for Environmental Assessment (NCEA). All OSWER-OAQPS documents are subject to a minimum of internal EPA peer review or a maximum of EPA/Peer Review Workshop/Science Advisory Board and public comments prior to finalization.

* Information on the availability of OSWER-OAQPS documents can be obtained from the following sources:

All Documents:

Technical Information Staff
National Center for Environmental Assessment (RD-689)
U.S. Environmental Protection Agency
401 M Street, S.W.
Washington, D.C. 20460
(202) 260-7345

Published Documents:

Technology Transfer and Support Division, National Risk Management Research Laboratory†
Office of Research and Development
U.S. Environmental Protection Agency
26 W. Martin Luther King Drive
Cincinnati, OH 45268
(513) 569-7562
†Formerly, Center for Environmental Research Information (CERI)

Documents Available Through RCRA/Superfund:

Hotline Number 1-800-424-9346

Documents Available from NTIS:

National Technical Information Service (NTIS)
5285 Port Royal Road
Springfield, VA 22161
(703) 487-4650

Health Effects Assessments (HEAs): This document series was prepared by the National Center for Environmental Assessment (NCEA-CIN) for the Office of Emergency and Remedial Response (Superfund). HEAs are intended for use by the OERR in evaluating risk for its preliminary assessment process at uncontrolled sites, and for appraising clean-up alternatives in its remedial investigation/feasibility studies. HEAs are brief, quantitatively oriented, preliminary assessment of relevant health effects data. HEAs are subject to internal EPA review by staff within the Office of Health and Environmental Assessment. Final drafts of HEAs become part of the RCRA and Superfund dockets and are available through NTIS. This series has recently been incorporated into the following HEED series.

Health and Environmental Effects Documents (HEEDs): This document series is prepared by the National Center for Environmental Assessment (NCEA-CIN) for the Office of Solid Waste and Emergency Response (OSWER). HEEDs are intended to support listings under the Resource Conservation and Recovery Act (RCRA) as well as to provide health-related limits and goals for emergency and remedial actions under the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA). Within a HEED, both published literature and information within Agency Program Offices are evaluated as they pertain to potential human health, aquatic life and environmental effects of hazardous waste constituents. Quantitative estimates, including reference doses for chronic and subchronic duration for both inhalation and oral exposures, carcinogenic potency factors, unit risk estimates for air and drinking water, and reportable quantities (RQs) based on chronic toxicity and carcinogenicity are determined when sufficient data are available. HEEDs are subject to internal EPA review by staff within the Office of Health and Environmental Assessment and the Office of Pesticides and Toxic Substances. Final drafts of HEEDs become part of the RCRA and Superfund public dockets and are available through NTIS.

Health and Environmental Effects Profiles (HEEPs): This document series was prepared by the National Center for Environmental Assessment (NCEA-CIN) for the Office of Solid Waste and Emergency Response (OSWER). HEEPs have been superseded by HEEDs since mid-FY87. HEEPs are intended to support listings of hazardous constituents of a wide range of waste streams under Section 3001 of the Resource Conservation and Recovery Act (RCRA), as well as to provide health-related limits for emergency actions under Section 010 of the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA). HEEPs are summaries of the

literature concerning health hazards associated with environmental exposures to chemicals or compounds and are very similar to HEEDs as described above. HEEPs were subject to internal EPA review by staff within the Office of Health and Environmental Assessment. HEEPS are part of the RCRA and CERCLA public dockets. Final drafts are available through NTIS.

Air Quality Criteria Documents (AQCDs): This document series is prepared by the National Center for Environmental Assessment (NCEA-RTP) for the Office of Air and Radiation (OAR). AQCDs are intended to support National Ambient Air Quality Standards (NAAQS) set under Sections 108-110 of the Clean Air Act. These documents are evaluations of the available scientific literature on the potential health effects of air pollutants. AQCDs are subject to internal EPA review by staff within the Office of Health and Environmental Assessment and the Office of Air and Radiation. Further review is conducted by the Science Advisory Board/Clean Air Scientific Advisory Committee, and then, these documents are subject to peer review workshops and public comments. The AQCDs are mandated by the Clean Air Act and are revised at 5-year intervals. AQCDs become part of the OAR public docket and final drafts are available through NTIS.

Health Assessment Documents (HADs): This document series is prepared by the National Center for Environmental Assessment (NCEA-RTP and NCEA-CIN) for the Office of Air and Radiation (OAR). HADs are intended for use by the Office of Air Quality Planning and Standards (OAQPS) to determine possible listing of hazardous air pollutants (HAP) under sections 111 and 112 of the Clean Air Act. These documents are evaluations of the available scientific literature on the potential health effects of air pollutants and serve as the scientific data base for establishing relationships between exposure concentrations and potential health risks. HADs are subject to internal EPA review by staff within the Office of Health and Environmental Assessment and the Office of Air and Radiation. Further review is conducted by the Science Advisory Board/Clean Air Scientific Advisory Committee, and then, these documents are subject to peer review workshops and public comments. HADs become part of the OAR public docket and final drafts are available through NTIS.

4. Miscellaneous Documents:

Drinking Water Criteria Documents (DWCDs): The National Center for Environmental Assessment (NCEA-CIN) prepares a portion of this document series for the Office of Water (OW). DWCDs are intended to assist the OW in deriving criteria standards for chemicals in drinking water, as required under Section 412(b)(3)(A) of the Safe Drinking Water Act, as amended in 1986. The DWCDs are comprehensive evaluations of potential health effects, including mechanisms of toxicity, with specific emphasis on data providing dose-response information. DWCDs contain Health Advisories (Has) for 1-day, 10-day and longer-term exposures and drinking water equivalent levels for

lifetime exposures. DWCDs are subject to internal EPA review by staff within the Office of Health and Environmental Assessment and the Office of Water. Selected documents are reviewed by the Science Advisory Board and are subject to peer review workshops and public comments. DWCDs become part of the Safe Drinking Water (SDW) public docket and final drafts are available through NTIS.

B. Selection Criteria and Sources of HEAST Values

Chemicals with derived noncarcinogenic and/or carcinogen risk assessment values that have had some level of peer review (i.e., those in peer reviewed EPA documents or under review by EPA Work Groups) are included in HEAST; this does not include many interim values (values not found in final EPA documents or not being considered by Work Groups) derived for various purposes within Superfund and other Program Offices. In updating the HEAST, the first source that is checked is the Integrated Risk Information System (IRIS) for revised or newly added risk assessment values. Secondly, the status of chemicals under discussion by the RfD/RfC and CRAVE Work Groups is reviewed. The National Center for Environmental Assessment's Chemical Assessments and Related Activities (CARA) list is also reviewed for new Office of Water, Office of Air Quality Planning and Standards, and Office of Solid Waste and Emergency Response risk assessment documents (HEEDs, HEEPs, HEAs, HADs, AQCDs, DWCDs).

The HEAST also contains chemicals commonly found at RCRA (Resource Conservation and Recovery Act) sites as identified by the Office of Solid Waste's Technical Assessment Branch. Questions about RCRA chemicals may be addressed by calling the Health Assessment Section (Office of Solid Waste) at (202) 260-4761. Finally, the Office of Radiation Programs provides data on radionuclides for Table 4A and 4B of the HEAST. Radionuclides included are those thought to be most commonly encountered at Superfund sites. Questions concerning radionuclides carcinogenicity should first be addressed by contacting the appropriate Regional Radiation Program Manager. A listing of these managers and several contacts in the Office of Radiation Programs can be found in Exhibit 2 of the User's Guide -Radionuclide Carcinogenicity.

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APPENDIX A-II

II. DOSE CONVERSIONS ON HEAST

In January 1991, the decision was made to replace inhalation Reference Doses (RfDi) for noncancer toxicity and inhalation slope factors for carcinogenicity, previously available on the IRIS data base, with Reference Concentrations (RFC) and inhalation unit risks, respectively. RfCs and unit risks are expressed in terms of concentration in air (mg/m^3), not in terms of "dose" (mg/kg-day) like the RfDs and the oral and inhalation slope factors. This presents a problem for the Superfund program, since the current Hazard Ranking System (HRS) and the Risk Assessment Guidance for superfund (RAGS): Human Health Evaluation manual, Parts A and B were developed using chronic daily intakes and health criteria expressed in units of mg/kg-day.

The decision to replace inhalation slope factors and RfDi values expressed in mg/kg-day with unit risk and RfC values expressed in mg/m_3 was based on two major factors: 1) the workgroups felt that it was technically more accurate to base toxicity values directly on measured air concentrations instead of making the metabolic pharmacokinetic and/or surface area adjustments required to estimate an "internal dose"; and 2) there are compounds that elicit route-of-entry effects (e.g., sensitizers and irritants) where the toxic effect is to the respiratory system or exchange boundary where a measure of "internal dose" might inappropriately imply effects to other organ systems or effects from other exposure routes.

Superfund recognizes the importance of these issues and is actively working with EPA's Office of Research and Development to evaluate the impact of these changes on its program regulations and guidance. In the short term, however, modification of program regulations and guidance is not a viable option. Therefore, the chairs of the RfD/RfC and CRAVE Work Groups were consulted regarding Superfund's need to make the conversion from a concentration in air to dose. There was agreement that, in many cases, converting the air concentration data to a dose (in mg/kg-day) may not add significant uncertainty to the Superfund risk assessment process, and therefore may be a reasonable use of the data given appropriate circumstances and Superfund program objectives. These Work Groups will continue to work with the Superfund program to identify specific instances where it is not appropriate to make the conversion from unit risk/RfC to inhalation slope factor/RfD due to the large uncertainty introduced by the assumptions used in the conversion.

Generally, the Superfund Health Risk Technical Support Center will be responsible for making all appropriate conversions and the values will be identified with appropriate highlights or footnotes in the Health Effects Assessment Summary Tables (HEAST). Therefore, HEAST users are strongly advised against making such conversions themselves. However, it is a critical responsibility of the risk assessor to

consult the original reports cited in the HEAST and to appropriately characterize or caveat the resulting risk estimates derived from these values so that managers are fully informed of their origin and related uncertainties.

APPENDIX A-III

III. CHEMICAL NAME AND CHEMICAL ABSTRACTS SERVICE REGISTRY NUMBER CROSS REFERENCE

This section lists chemicals and their respective Chemical Abstracts Service Registry Number (CASRN) for cross referencing on the HEAST. Chemicals may be searched either alphabetically by chemical name or numerically by the CASRN.

CHEMICAL NAME AND CHEMICAL ABSTRACTS SERVICE REGISTRY NUMBER CROSS REFERENCE
(LISTED BY NAME)

May 1995

ACENAPHTHENE	000083-32-9
ACENAPTHYLENE	000208-96-8
ACEPHATE	030560-19-1
ACETONE	000067-64-1
ACETONE CYANOHYDRIN	000075-86-5
ACETONITRILE	000075-05-8
ACETOPHENONE	000098-86-2
ACROLEIN	000107-02-8
ACRYLAMIDE	000079-06-1
ACRYLIC ACID	000079-10-7
ACRYLONITRILE	000107-13-1
ADIPONITRILE	000111-69-3
ALACHLOR	015972-60-8
ALDICARB	000116-06-3
ALDRIN	000309-00-2
ALLIDOCHLOR	000093-71-0
ALLYL ALCOHOL	000107-18-6
ALLYL CHLORIDE	000107-05-1
ALUMINUM	007429-90-5
ALUMINUM PHOSPHIDE	020859-73-8
AMETRYN	000834-12-8
AMINO-2-NAPHTHOL, 1-	002834-92-6
AMINO-2-NAPHTOL HYDROCHLORIDE, 1-	001198-27-2
AMINOPHENOL, M-	000591-27-5
AMINOPHENOL, O-	000095-55-6
AMINOPHENOL, P-	000123-30-8
AMINOPYRIDINE, 4-	000504-24-5
AMMONIA	007664-41-7
ANILINE	000062-53-3
ANTHRACENE	000120-12-7
ANTIMONY, METALLIC	007440-36-0
ANTIMONY PENTOXIDE	001314-60-9
ANTIMONY POTASSIUM TARTRATE	000304-61-0
ANTIMONY TETROXIDE	001332-81-6
ANTIMONY TRIOXIDE	001309-64-4
ARAMITE	000140-57-8
AROCLOR 1248	012672-29-6
AROCLOR 1254	011097-69-1
ARSENIC, INORGANIC	007440-38-2
ASBESTOS	001332-21-4
ATRAZINE	001912-24-9
AZOBENZENE	000103-33-3
BARIUM	007440-39-3
BARIUM CYANIDE	000542-62-1
BENEFIN	001861-40-1
BENZAL CHLORIDE	000098-87-3
BENZALDEHYDE	000100-52-7
BENZALDEHYDE CYANOHYDRIN	000532-28-5
BENZENE	000071-43-2
BENZENETHIOL / (THIOPHENOL)	000108-98-5
BENZIDINE	000092-87-5
BENZOIC ACID	000065-85-0
BENZOTRICHLORIDE	000098-07-7
BENZO[A]ANTHRACENE	000056-55-3
BENZO[A]PYRENE	000050-32-8
BENZO[B]FLUORANTHENE	000205-99-2
BENZO[K]FLUORANTHENE	000207-08-9
BENZYL ALCOHOL	000100-51-6
BENZYL CHLORIDE	000100-44-7
BERYLLIUM	007440-41-7
BIPHENYL, 1,1'	000092-52-4
BIS(2-CHLOROETHYL) ETHER	000111-44-4
BIS(2-CHLOROISOPROPYL) ETHER	039638-32-9
BIS(2-CHLORO-1-METHYLETHYL) ETHER	000108-06-1
BIS(2-ETHYLHEXYL) PHTHALATE / (DEHP)	000117-81-7
BIS(CHLOROMETHYL) ETHER	000542-88-1
BISPHENOL A	000080-05-7
BORON, ELEMENTAL	007440-42-8
BORON TRIFLUORIDE	007637-07-2
BROMINATED DIBENZO-P-DIOXINS	NO CASRN
BROMINATED DIBENZOFURANS	NO CASRN
BROMOACETONE	000598-31-2
BROMOCHLOROETHANES	NO CASRN
BROMODICHLOROMETHANE	000075-27-4
BROMOETHENE / (VINYL BROMIDE)	000593-60-2
BROMOFORM	000075-25-2
BROMOMETHANE	000074-83-9
BROMOPHENYL PHENYL ETHER, 4-	000101-55-3
BROMOPHOS	002104-96-3
BROMOXYNIL	001689-84-5
BROMOXYNIL OCTANOATE	001689-99-2
BUSAN 77	031512-74-0
BUSAN 90	002491-38-5
BUTADIENE, 1,3-	000106-99-0
BUTANOL, 1-	000071-36-3
BUTYL BENZYL PHTHALATE, N-	000085-68-7
BUTYLATE	002008-41-5
BUTYLCHLORIDE, T-	000507-20-0
BUTYROLACTONE, GAMMA-	000096-48-0
CACODYLIC ACID	000075-60-5
CADMIUM	007440-43-9
CALCIUM CYANIDE	000592-01-8
CAPROLACTAM	000105-60-2
CAPTAFOL	002425-06-1
CAPTAN	000133-06-2
CARBARYL	000063-25-2
CARBAZOLE	000086-74-8
CARBOFURAN	001563-66-2
CARBON DISULFIDE	000075-15-0
CARBON MONOXIDE	000630-05-0
CARBON TETRACHLORIDE	000056-23-5
CHLORAL	000075-87-6
CHLORANIL	000118-75-2
CHLORDANE	000057-74-9
CHLORINE CYANIDE	000506-77-4
CHLORO-1,3-BUTADIENE, 2- / (CHLOROPRENE)	000126-99-8
CHLORO-2-METHYLANILINE, 4-	000095-69-2
CHLORO-2-METHYLANILINE HYDROCHLORIDE, 4-	003165-93-3
CHLORO-M-CRESOL, P-	000059-50-7
CHLOROACETALDEHYDE	000107-20-0
CHLOROACETIC ACID	000079-11-8
CHLOROANILINE, 2-	000095-51-2
CHLOROANILINE, 3-	000108-42-9
CHLOROANILINE, 4-	000106-47-8
CHLOROBENZENE	000108-90-7
CHLOROBENZILATE	000510-15-6
CHLOROBENZOIC ACID, P-	000074-11-3
CHLOROBENZOTRIFLUORIDE, 4-	000098-56-6
CHLOROBUTANE, 1-	000109-69-3
CHLOROBUTANE, 2-	000078-86-4
CHLOROCYCLOPENTADIENE	041851-50-7
CHLOROFORM	000067-66-3
CHLOROMETHANE / (METHYL CHLORIDE)	000074-87-3
CHLOROMETHYL METHYL ETHER	000107-30-2
CHLORONITROBENZENE, M-	000121-73-3
CHLORONITROBENZENE, O-	000088-73-3
CHLORONITROBENZENE, P-	000100-00-5
CHLOROPHENOL, 2-	000095-57-8
CHLOROPHENOL, 3-	000108-43-0
CHLOROPHENOL, 4-	000106-48-9
CHLOROPRENE	000126-99-8
CHLOROPROPANE, 2-	000075-29-6
CHLOROTHALONIL	001897-45-6
CHLOROTOLUENE, M-	000108-41-8
CHLOROTOLUENE, O-	000095-49-8
CHLOROTOLUENE, P-	000106-43-4
CHLORPYRIFOS	002921-88-2
CHLORPYRIFOS METHYL	005598-13-0
CHLORTHIOPHOS	060238-56-4
CHROMIUM(III)	016065-83-1
CHROMIUM(VI)	018540-29-9
CHRYSENE	000218-01-9

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COKE OVEN EMISSIONS	008007-45-2
COPPER	007440-50-8
COPPER CYANIDE	000544-92-3
CREOSOTE, COAL TAR	008001-58-9
CRESOL, M- / (3-METHYLPHENOL)	000108-39-4
CRESOL, O- / (2-METHYLPHENOL)	000095-48-7
CRESOL, P- / (4-METHYLPHENOL)	000106-44-5
CROTONALDEHYDE	000123-73-9
CUMENE	000098-82-8
CYANAZINE	021725-46-2
CYANIDE	000057-12-5
CYANOGEN	000460-19-5
CYANOGEN BROMIDE	000506-68-3
CYCLOATE	001134-23-2
CYCLOHEXANOL	000108-93-0
CYCLOHEXYLAMINE	000108-91-8
CYCLONITE	000121-82-4
CYCLOPENTADIENE	000542-92-7
DACTHAL	001861-32-1
DALAPON	000075-99-0
2,4-DB	000094-82-6
DDD	000072-54-8
DDE	000072-55-9
DDT	000050-29-3
DECABROMODIPHENYL ETHER	001163-19-5
DEHP	000117-81-7
DI-N-OCTYL PHTHALATE	000117-84-0
DIALLATE	002303-16-4
DIAZINON	000333-41-5
DIBENZOFURAN	000132-64-9
DIBENZO[A,H]ANTHRACENE	000053-70-3
DIBROMO-3-CHLOROPROPANE, 1,2	000096-12-8
DIBROMOBENZENE, 1,4-	000106-37-6
DIBROMOCHLOROMETHANE	000124-48-1
DIBROMOETHANE, 1,2-	000106-93-4
DIBUTYL PHTHALATE	000084-74-2
DICAMBA	001918-00-9
DICHLORO-2-BUTENE, 1,4-	000764-41-0
DICHLOROBENZENE, 1,2-	000095-50-1
DICHLOROBENZENE, 1,3-	000541-73-1
DICHLOROBENZENE, 1,4-	000106-46-7
DICHLOROBENZIDINE, 3,3'-	000091-94-1
DICHLOROBUTENES	NO CASRN
DICHLORODIFLUOROMETHANE	000075-71-8
DICHLOROETHANE, 1,1-	000075-34-3
DICHLOROETHANE, 1,2-	000107-06-2
DICHLOROETHYLENE, 1,1-	000075-35-4
DICHLOROETHYLENE, 1,2- (MIXED ISOMERS)	000540-59-0
DICHLOROETHYLENE, 1,2-C-	000156-59-2
DICHLOROETHYLENE, 1,2-T-	000156-60-5
DICHLOROMETHANE	000075-09-2
DICHLOROPHENOL, 2,3-	000576-24-9
DICHLOROPHENOL, 2,4-	000120-83-2
DICHLOROPHENOL, 2,5-	000583-78-8
DICHLOROPHENOL, 2,6-	000087-65-0
DICHLOROPHENOL, 3,4-	000095-77-2
DICHLOROPHENOL, 3,5-	000591-35-5
DICHLOROPHENOXY ACETIC ACID, 2,4-	000094-75-7
DICHLOROPHENOXY) BUTYRIC ACID, 4-(2,4- / (2,4-DB)	000094-82-6
DICHLOROPROPANE, 1,1-	000078-99-9
DICHLOROPROPANE, 1,2-	000078-87-5
DICHLOROPROPANE, 1,3-	000142-28-9
DICHLOROPROPANE, 2,2-	000594-20-7
DICHLOROPROPENE, 1,3- / (TELONE II)	000542-75-6
DICHLORPROP	000120-36-5
DICYCLOPENTADIENE	000077-73-6
DIELDRIN	000060-57-1
DIETHYL-P-NITROPHENYL PHOSPHATE	000311-45-5
DIETHYL PHTHALATE	000084-66-2
DIETHYLANILINE, N,N-	000091-66-7
DIETHYLENE GLYCOL MONOBUTYL ETHER	000112-34-5
DIETHYLENE GLYCOL MONOETHYL ETHER	000111-90-0
DIETHYLFORMAMIDE	000617-84-5
DIETHYLHYDRAZINE, 1,2-	001615-80-1
DIETHYLSTILBESTROL	000056-53-1
DIMETHOATE	000060-51-5
DIMETHOXYBENZIDINE, 3,3'-	000119-90-4
DIMETHYLANILINE, 2,4-	000095-68-1
DIMETHYLANILINE HYDROCHLORIDE, 2,4-	021436-96-4
DIMETHYLANILINE, N,N-	000121-69-7
DIMETHYLBENZIDINE, 3,3'-	000119-93-7
DIMETHYLBENZ[A]ANTHRACENE, 7,12-	000057-97-6
DIMETHYLFORMAMIDE, N,N-	000068-12-2
DIMETHYLHYDRAZINE, 1,1-	000057-14-7
DIMETHYLHYDRAZINE, 1,2-	000540-73-8
DIMETHYLPHENOL, 2,3-	000526-75-0
DIMETHYLPHENOL, 2,4-	000105-67-9
DIMETHYLPHENOL, 2,5-	000095-87-4
DIMETHYLPHENOL, 2,6-	000576-26-1
DIMETHYLPHENOL, 3,4-	000095-65-8
DIMETHYLPHTHALATE	000131-11-3
DIMETHYLSULFATE	000077-78-1
DIMETHYLTEREPHTHALATE	000120-61-6
DIMETHYLUREA, N,N-	000598-94-7
DINITRO-O-CRESOL, 4,6-	000534-52-1
DINITRO-P-CRESOL, 2,6-	000609-93-8
DINITROBENZENE, 1,2-	000528-29-0
DINITROBENZENE, 1,3-	000099-65-0
DINITROBENZENE, 1,4-	000100-25-4
DINITROPHENOL, 2,3-	000066-56-8
DINITROPHENOL, 2,4-	000051-28-5
DINITROPHENOL, 2,5-	000329-71-5
DINITROPHENOL, 2,6-	000573-56-8
DINITROPHENOL, 3,5-	000586-11-8
DINITROTOLUENE, 2,3-	000602-01-7
DINITROTOLUENE, 2,4	000121-14-2
DINITROTOLUENE, 2,5-	000619-15-8
DINITROTOLUENE, 2,6-	000606-20-2
DINITROTOLUENE, 3,4-	000610-39-9
DINOSEB	000088-85-7
DIOXANE, 1,4-	000123-91-1
DIPHENYLAMINE, N,N-	000122-39-4
DIPHENYLHYDRAZINE, 1,2-	000122-66-7
DIPHENYLMETHANE DIISOCYANATE	000101-68-8
DIRECT BLACK 38	001937-37-7
DIRECT BLUE 6	002602-46-2
DIRECT BROWN 95	016071-86-6
DIRECT LIGHTFAST BLUE	004399-55-7
DIRECT SKY BLUE 6B	002610-05-1
DISULFOTON	000298-04-4
ENDOSULFAN	000115-29-7
ENDOTHALL	000145-73-3
ENDRIN	000072-20-8
EPICHLOROHYDRIN	000106-89-8
EPTC	000759-94-4
ETHOPROP	013194-48-4
ETHOXYETHANOL, 2-	000110-80-5
ETHOXYETHANOL ACETATE, 2-	000111-15-9
ETHOXYETHANOL ACRYLATE, 2-	000106-74-1
ETHOXYETHANOL DODECANOATE, 2-	000106-13-8
ETHOXYETHANOL PHOSPHATE, 2-	068554-00-7
ETHOXYETHYL METHACRYLATE, 2-	002370-63-0
ETHYL ACETATE	000141-78-6
ETHYL ACRYLATE	000140-88-5
ETHYL BENZENE	000100-41-4
ETHYL CHLORIDE	000075-00-3
ETHYL ETHER	000060-29-7
ETHYL METHACRYLATE	000097-63-2
ETHYL-O-XYLENE, 4-	000934-80-5
ETHYLANILINE, N-	000103-69-5
ETHYLENE CYANOHYDRIN	000109-78-4
ETHYLENE DIAMINE	000107-15-3

ETHYLENE GLYCOL	000107-21-1
ETHYLENE GLYCOL MONOBUTYL ETHER	000111-76-2
ETHYLENE OXIDE	000075-21-8
ETHYLENE THIOUREA	000096-45-7
ETHYLTOLUENE, M-	000620-14-4
ETHYLTOLUENE, O-	000611-14-3
ETHYLTOLUENE, P-	000622-96-8
FLUORANTHENE	000206-44-0
FLUORENE	000086-73-7
FLUORINE / (SOLUBLE FLUORIDE)	007782-41-4
FLURIDONE	059756-60-4
FOLPET	000133-07-3
FORMALDEHYDE	000050-00-0
FORMALDEHYDE CYANOHYDRIN	000107-16-4
FORMIC ACID	000064-18-6
FURAN	000110-00-9
FURAZOLIDONE	000067-45-8
FURFURAL	000098-01-1
FURIUM	000531-82-8
GLYCIDALDEHYDE	000765-34-4
HEPTACHLOR	000076-44-8
HEPTACHLOR EPOXIDE	001024-57-3
HEPTANE, N-	000142-82-5
HEXABROMOBENZENE	000087-82-1
HEXACHLOROBENZENE	000118-74-1
HEXACHLOROBUTADIENE	000087-68-3
HEXACHLOROCYCLOHEXANE, ALPHA-	000319-84-6
HEXACHLOROCYCLOHEXANE, BETA-	000319-85-7
HEXACHLOROCYCLOHEXANE, DELTA-	000319-86-8
HEXACHLOROCYCLOHEXANE, EPSILON-	006108-10-7
HEXACHLOROCYCLOHEXANE, GAMMA-	000058-89-9
HEXACHLOROCYCLOHEXANE-TECHNICAL	000608-73-1
HEXACHLOROCYCLOPENTADIENE	000077-47-4
HEXACHLOROETHANE	000067-72-1
HEXACHLOROPHENE	000070-30-4
HEXAMETHYLENE DIAMINE	000124-09-4
HEXANE, N-	000110-54-3
HEXANONE, 2-	000591-78-6
HYDRAZINE	000302-01-2
HYDRAZINE SULFATE	010034-93-2
HYDROGEN SULFIDE	007783-06-4
HYDROQUINONE	000123-31-9
INDENO[1,2,3-CD]PYRENE	000193-39-5
IRON	007439-89-6
ISOBUTYL ALCOHOL	000078-83-1
ISOPHORONE	000078-59-1
ISOPROPALIN	033820-53-0
LACTONITRILE	000078-97-7
LEAD	007439-92-1
LEAD ALKYLS	NO CASRN
LINURON	000330-55-2
MALATHION	000121-75-5
MALEIC ANHYDRIDE	000108-31-6
MALEIC HYDRAZIDE	000123-33-1
MALONONITRILE	000109-77-3
MANCOZEB	008018-01-7
MANEB	012427-38-2
MANGANESE	007439-96-5
MEPHOSFOLAN	000950-10-7
MERCURIC CHLORIDE	007487-94-7
MERCURY, ELEMENTAL	007439-97-6
MERPHOS	000150-50-5
MERPHOS OXIDE	000078-48-8
METHACRYLONITRILE	000126-98-7
METHANOL	000067-56-1
METHOMYL	016752-77-5
METHOXY-5-NITROANILINE, 2-	000099-59-2
METHOXYCHLOR	000072-43-5
METHOXYETHANOL, 2-	000109-86-4
METHOXYETHANOL ACETATE, 2-	000110-49-6
METHYL-4-CHLOROPHENOXY) BUTYRIC ACID, 4-(2-	000094-81-5
METHYL-4-CHLOROPHENOXY) PROPIONIC ACID, 2-(2-	000093-65-2
METHYL-4-CHLOROPHENOXY ACETIC ACID, 2-	000094-74-6
METHYL-5-NITROANILINE, 2-	000099-55-8
METHYL ACETATE	000079-20-9
METHYL ACRYLATE	000096-33-3
METHYL CHLORIDE	000074-87-3
METHYL CHLOROCARBONATE	000079-22-1
METHYL ETHYL KETONE	000078-93-3
METHYL ETHYL KETONE PEROXIDE	001338-23-4
METHYL HYDRAZINE	000060-34-4
METHYL ISOBUTYL KETONE	000108-10-1
METHYL ISOCYANATE	000624-83-9
METHYL MERCURY	022967-92-6
METHYL METHACRYLATE	000080-62-6
METHYL PARATHION	000298-00-0
METHYL STYRENE (MIXED ISOMERS)	025013-15-4
METHYL STYRENE, ALPHA	000098-83-9
METHYLANILINE, 2-	000095-53-4
METHYLANILINE HYDROCHLORIDE, 2-	000636-21-5
METHYLCHOLANTHRACENE, 3-	000056-49-5
METHYLCYCLOHEXANE	000108-87-2
METHYLENE-BIS(2-CHLOROANILINE), 4,4'-	000101-14-4
METHYLENE-BIS(N,N'-DIMETHYL)ANILINE, 4,4'-	000101-61-1
METHYLENE BROMIDE	000074-95-3
METHYLENE CHLORIDE / (DICHLOROMETHANE)	000075-09-2
METHYLENE-BIS(BENZENEAMINE), 4,4- / (METHYLENE DIANILINE, 4,4-)	000101-77-9
METHYLENEDIPHENYL ISOCYANATE, 4,4- / (DIPHENYLMETHANE DIISOCYANATE)	000101-68-8
2-METHYLLACTONITRILE	000075-86-5
2-METHYLPHENOL	000095-48-7
3-METHYLPHENOL	000108-39-4
4-METHYLPHENOL	000106-44-5
METOLACHLOR	051218-45-2
METRIBUZIN	021087-64-9
MIREX	002385-85-5
MOLINATE	002212-67-1
MOLYBDENUM	007439-98-7
MONOCHLORAMINE	010599-90-3
NAPHTHALENE	000091-20-3
NAPHTHOQUINONE, 1,4-	000130-15-4
NIAGARA BLUE 4B	002429-74-5
NICKEL CYANIDE	000557-19-7
NICKEL, REFINERY DUST	NO CASRN
NICKEL, SOLUBLE SALTS	Various
NICKEL SUBSULFIDE	012035-72-2
NICOTINONITRILE	000100-54-9
NITRIC OXIDE	010102-43-9
NITRITE	014797-65-0
NITROANILINE, 2-	000088-74-4
NITROANILINE, M-	000099-09-2
NITROANILINE, P-	000100-01-6
NITROBENZENE	000098-95-3
NITROFURANTOIN	000067-20-9
NITROFURAZONE	000059-87-0
NITROGEN DIOXIDE	010102-44-0
NITROGEN OXIDES	NO CASRN
NITROMETHANE	000075-52-5
NITROPHENOLS	NO CASRN
NITROPROPANE, 2-	000079-46-9
NITROSO-DI-N-BUTYLAMINE, N-	000924-16-3
NITROSO-DI-N-PROPYLAMINE, N-	000621-64-7
NITROSO-N-ETHYLUREA, N-	000759-73-9
NITROSO-N-METHYLUREA, N-	000684-93-5
NITROSODIETHANOLAMINE, N-	001116-54-7
NITROSODIETHYLAMINE, N-	000055-18-5
NITROSODIMETHYLAMINE, N-	000062-75-9

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NITROSODIPHENYLAMINE, P-	000156-10-5
NITROSODIPHENYLAMINE, N-	000086-30-6
NITROSOMETHYLETHYLAMINE, N-	010595-95-6
NITROSOMETHYLVINYLAMINE, N	004549-40-0
NITROSOPYRROLIDINE, N-	000930-55-2
NITROTOLUENE, M-	000099-08-1
NITROTOLUENE, O-	000088-72-2
NITROTOLUENE, P-	000099-99-0
OCTABROMODIPHENYL ETHER	032536-52-0
OCTAMETHYLPYROPHOSPHORAMIDE	000152-16-9
OSMIUM TETROXIDE	020816-12-0
OZONE	010028-15-6
PARALDEHYDE	000123-63-7
PARATHION	000056-38-2
PARTICULATE MATTER	NO CASRN
PEBULATE	001114-71-2
PENDIMETHALIN	040487-42-1
PENTABROMO-6-CHLOROCYCLOHEXANE, 1,2,3,4,5-	000087-84-3
PENTABROMODIPHENYL ETHER	032534-81-9
PENTACHLOROBENZENE	000608-93-5
PENTACHLOROCYCLOPENTADIENE	025329-35-5
PENTACHLORONITROBENZENE	000082-68-8
PENTACHLOROPHENOL	000087-86-5
PENTACHLOROPROPENE, 1,1,2,3,3,-	001600-37-9
PENTANE, N-	000109-66-0
PHENANTHRENE	000085-01-8
PHENOL	000108-95-2
PHENYLENEDIAMINE, M-	000108-45-2
PHENYLENEDIAMINE, O-	000095-54-5
PHENYLENEDIAMINE, P-	000106-50-3
PHENYLMERCURIC ACETATE	000062-38-4
PHENYLPHENOL, 2-	000090-43-7
PHORATE	000298-02-2
PHOSGENE	000075-44-5
PHOSPHINE	007803-51-2
PHOSPHORUS, WHITE	007723-14-0
PHOTOCHEMICAL OXIDANTS	NO CASRN
PHTHALIC ACID, M-	000121-91-5
PHTHALIC ACID, O-	000088-99-3
PHTHALIC ACID, P-	000100-21-0
PHTHALIC ANHYDRIDE	000085-44-9
POLYBROMINATED BIPHENYLS	NO CASRN
POLYCHLORINATED BIPHENYLS	001336-36-3
POTASSIUM CYANIDE	000151-50-8
POTASSIUM SILVER CYANIDE	000506-61-6
PROFLURALIN	026399-36-0
PRONAMIDE	023950-58-5
PROPACHLOR	001918-16-7
PROPAZINE	000139-40-2
PROPIONITRILE	000107-12-0
PROPYL ALCOHOL, N-	000071-23-8
PROPYLENE GLYCOL	000057-55-6
PROPYLENE GLYCOL MONOETHYL ETHER	001569-02-4
PROPYLENE GLYCOL MONOMETHYL ETHER	000107-98-2
PROPYLENE OXIDE	000075-56-9
PYRENE	000129-00-0
PYRIDINE	000110-86-1
QUINOLINE	000091-22-5
RDX / (CYCLONITE)	000121-82-4
RONNEL	000299-84-3
SELENIOUS ACID	007783-00-8
SELENIUM	007782-49-2
SELENIUM SULFIDE	007446-34-6
SELENOUREA	000630-10-4
SILVER	007440-22-4
SILVER CYANIDE	000506-64-9
SIMAZINE	000122-34-9
SODIUM CYANIDE	000143-33-9
SODIUM DIETHYLDITHIOCARBAMATE	000148-18-5
SODIUM METAVANADATE	013718-26-8
STIROPHOS	000961-11-5
STRONTIUM, STABLE	007440-24-6
STRYCHNINE	000057-24-9
STYRENE	000100-42-5
SUCCINONITRILE	000110-61-2
SULFUR DIOXIDE	007446-09-5
SULFUR OXIDES	NO CASRN
SULFURIC ACID	007664-93-9
TCDD, 2,3,7,8-	001746-01-6
TELONE II	000542-75-6
TEMEPHOS	003383-96-8
TERBUFOS	013071-79-9
TEREPHTHALIC ACID	000100-21-0
TETRACHLOROAZOXYBENZENE	021232-47-3
TETRACHLOROBENZENE, 1,2,4,5-	000095-94-3
TETRACHLOROCYCLOPENTADIENE	000695-77-2
TETRACHLOROETHANE, 1,1,1,2-	000630-20-6
TETRACHLOROETHANE, 1,1,2,2-	000079-34-5
TETRACHLOROETHYLENE	000127-18-4
TETRACHLOROHYDRAZOBENZENE	071753-42-9
TETRACHLOROPHENOL, 2,3,4,5-	004901-51-3
TETRACHLOROPHENOL, 2,3,4,6-	000058-90-2
TETRACHLOROPHENOL, 2,3,5,6-	000935-95-5
TETRACHLOROPROPENE, 1,1,2,3-	010436-39-2
TETRACHLOROTOLUENE, PARA, ALPHA, ALPHA, ALPHA-	005216-25-1
TETRACHLOROVINPHOS / (STIROPHOS)	000961-11-5
TETRAETHYL DITHIOPYROPHOSPHATE	003689-24-5
THALLIC OXIDE	001314-32-5
THALLIUM (I) ACETATE	000563-68-8
THALLIUM (I) CARBONATE	006533-73-9
THALLIUM (I) CHLORIDE	007791-12-0
THALLIUM, INSOLUBLE SALTS	NO CASRN
THALLIUM (I) NITRATE	010102-45-1
THALLIUM SELENITE	012039-52-0
THALLIUM (I) SULFATE	007446-18-6
THIOCYANOMETHYLTHIO)BENZOTHIAZOLE, 2-(	021564-17-0
THIOFANOX	013196-18-4
THIOPHENOL	000108-98-5
THIRAM	000137-26-8
TIN AND COMPOUNDS	NO CASRN
TOLUENE	000108-88-3
TOLUENE-2,4-DIAMINE	000095-80-7
TOLUENE-2,5-DIAMINE	000095-70-5
TOLUENE-2,6-DIAMINE	000823-40-5
TOLUENEDIAMINE, 2,3-	002687-25-4
TOLUENEDIAMINE, 3,4-	000496-72-0
TOLUIDINE, M-	000108-44-1
TOLUIDINE, P-	000106-49-0
TOXAPHENE	008001-35-2
TRIALLATE	002303-17-5
TRIBROMOBENZENE, 1,2,4-	000615-54-3
TRICHLORO-1,2,2-TRIFLUOROETHANE, 1,1,2-	000076-13-1
TRICHLORO-2'-HYDROXYDIPHENYLETHER, 2,2,4'-	003380-34-5
TRICHLOROANILINE, 2,4,6-	000634-93-5
TRICHLOROANILINE HYDROCHLORIDE, 2,4,6-	033663-50-2
TRICHLOROBENZENE, 1,2,4-	000120-82-1
TRICHLOROCYCLOPENTADIENE	077323-84-3
TRICHLOROETHANE, 1,1,1-	000071-55-6
TRICHLOROETHANE, 1,1,2-	000079-00-5
TRICHLOROETHYLENE	000079-01-6
TRICHLOROFLUOROMETHANE	000075-69-4
TRICHLOROPHENOL, 2,3,4-	015950-66-0
TRICHLOROPHENOL, 2,3,5-	000933-78-8
TRICHLOROPHENOL, 2,3,6-	000933-75-5
TRICHLOROPHENOL, 2,4,5-	000095-95-4

TRICHLOROPHENOL, 2,4,6-	000088-06-2
TRICHLOROPHENOL, 3,4,5-	000609-19-8
TRICHLOROPHENOXY) PROPIONIC ACID, 2(2,4,5-	000093-72-1
TRICHLOROPHENOXY ACETIC ACID, 2,4,5-	000093-76-5
TRICHLOROPROPANE, 1,1,1-	007789-89-1
TRICHLOROPROPANE, 1,1,2-	000598-77-6
TRICHLOROPROPANE, 1,2,2-	003175-23-3
TRICHLOROPROPANE, 1,2,3-	000096-18-4
TRICHLOROPROPENE, 1,2,3-	000096-19-5
TRICHLOROTOLUENE, 2,3,6-	002077-46-5
TRICHLOROTOLUENE, ALPHA,2,6-	002014-83-7
TRIFLURALIN	001582-09-8
TRIMETHYL PHOSPHATE	000512-56-1
TRIMETHYLBENZENES	NO CASRN
TRINITROBENZENE, 1,3,5-	000099-35-4
TRINITROPHENOLS	NO CASRN
TRINITROPHENYLMETHYLNITRAMINE	000479-45-8
TRINITROTOLUENE, 2,4,6-	000118-96-7
URANIUM, SOLUBLE SALTS	NO CASRN
VANADIUM	007440-62-2
VANADIUM PENTOXIDE	001314-62-1
VANADIUM SULFATE	036907-42-3
VERNAM / (VERNOLATE)	001929-77-7
VERNOLATE	001929-77-7
VINYL-1-CYCLOHEXENE, 4-	000100-40-3
VINYL ACETATE	000108-05-4
VINYL BROMIDE	000593-60-2
VINYL CHLORIDE	000075-01-4
WARFARIN	000081-81-2
XYLENE, M-	000108-38-3
XYLENE, MIXTURE	001330-20-7
XYLENE, O-	000095-47-6
XYLENE, P-	000106-42-3
ZINC (METALLIC)	007440-66-6
ZINC CYANIDE	000557-21-1
ZINC PHOSPHIDE	001314-84-7
ZINEB	012122-67-7

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CHEMICAL ABSTRACTS SERVICE REGISTRY NUMBER AND CHEMICAL NAME CROSS REFERENCE
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000050-00-0 FORMALDEHYDE
000050-29-3 DDT
000050-32-8 BENZO[A]PYRENE
000051-28-5 DINITROPHENOL, 2,4-
000053-70-3 DIBENZO[A,H]ANTHRACENE
000055-18-5 NITROSODIETHYLAMINE, N-
000056-23-5 CARBON TETRACHLORIDE
000056-38-2 PARATHION
000056-49-5 METHYLCHOLANTHRACENE, 3-
000056-53-1 DIETHYLSTILBESTROL
000056-55-3 BENZO[A]ANTHRACENE
000057-12-5 CYANIDE
000057-14-7 DIMETHYLHYDRAZINE, 1,1-
000057-24-9 STRYCHNINE
000057-55-6 PROPYLENE GLYCOL
000057-74-9 CHLORDANE
000057-97-6 DIMETHYLBENZ[A]ANTHRACENE, 7,12-
000058-89-9 HEXACHLOROCYCLOHEXANE, GAMMA-
000058-90-2 TETRACHLOROPHENOL, 2,3,4,6-
000059-50-7 CHLORO-M-CRESOL, P-
000059-87-0 NITROFURAZONE
000060-29-7 ETHYL ETHER
000060-34-4 METHYL HYDRAZINE
000060-51-5 DIMETHOATE
000060-57-1 DIELDRIN
000062-38-4 PHENYLMERCURIC ACETATE
000062-53-3 ANILINE
000062-75-9 NITROSODIMETHYLAMINE, N-
000063-25-2 CARBARYL
000064-18-6 FORMIC ACID
000065-85-0 BENZOIC ACID
000066-56-8 DINITROPHENOL, 2,3-
000067-20-9 NITROFURANTOIN
000067-45-8 FURAZOLIDONE
000067-56-1 METHANOL
000067-64-1 ACETONE
000067-66-3 CHLOROFORM
000067-72-1 HEXACHLOROETHANE
000068-12-2 DIMETHYLFORMAMIDE, N,N-
000070-30-4 HEXACHLOROPHENE
000071-23-8 PROPYL ALCOHOL, N-
000071-36-3 BUTANOL, 1-
000071-43-2 BENZENE
000071-55-6 TRICHLOROETHANE, 1,1,1-
000072-20-8 ENDRIN
000072-43-5 METHOXYCHLOR
000072-54-8 DDD
000072-55-9 DDE

000074-11-3 CHLOROBENZOIC ACID, P-
000074-83-9 BROMOMETHANE
000074-87-3 METHYL CHLORIDE
000074-87-3 CHLOROMETHANE
000074-95-3 METHYLENE BROMIDE
000075-00-3 ETHYL CHLORIDE
000075-01-4 VINYL CHLORIDE
000075-05-8 ACETONITRILE
000075-09-2 METHYLENE CHLORIDE
000075-09-2 DICHLOROMETHANE
000075-15-0 CARBON DISULFIDE
000075-21-8 ETHYLENE OXIDE
000075-25-2 BROMOFORM
000075-27-4 BROMODICHLOROMETHANE
000075-29-6 CHLOROPROPANE, 2-
000075-34-3 DICHLOROETHANE, 1,1-
000075-35-4 DICHLOROETHYLENE, 1,1-
000075-44-5 PHOSGENE
000075-52-5 NITROMETHANE
000075-56-9 PROPYLENE OXIDE
000075-60-5 CACODYLIC ACID
000075-69-4 TRICHLOROFLUOROMETHANE
000075-71-8 DICHLORODIFLUOROMETHANE
000075-86-5 2-METHYLLACTONITRILE
000075-86-5 ACETONE CYANOHYDRIN
000075-87-6 CHLORAL
000075-99-0 DALAPON
000076-13-1 TRICHLORO-1,2,2-TRIFLUOROETHANE, 1,1,2-
000076-44-8 HEPTACHLOR
000077-47-4 HEXACHLOROCYCLOPENTADIENE
000077-73-6 DICYCLOPENTADIENE
000077-78-1 DIMETHYLSULFATE
000078-48-8 MERPHOS OXIDE
000078-59-1 ISOPHORONE
000078-83-1 ISOBUTYL ALCOHOL
000078-86-4 CHLOROBUTANE, 2-
000078-87-5 DICHLOROPROPANE, 1,2-
000078-93-3 METHYL ETHYL KETONE
000078-97-7 LACTONITRILE
000078-99-9 DICHLOROPROPANE, 1,1-
000079-00-5 TRICHLOROETHANE, 1,1,2-
000079-01-6 TRICHLOROETHYLENE
000079-06-1 ACRYLAMIDE
000079-10-7 ACRYLIC ACID
000079-11-8 CHLOROACETIC ACID
000079-20-9 METHYL ACETATE
000079-22-1 METHYL CHLOROCARBONATE

000079-34-5 TETRACHLOROETHANE, 1,1,2,2-
000079-46-9 NITROPROPANE, 2-
000080-05-7 BISPHENOL A
000080-62-6 METHYL METHACRYLATE
000081-81-2 WARFARIN
000082-68-8 PENTACHLORONITROBENZENE
000083-32-9 ACENAPHTHENE
000084-66-2 DIETHYL PHTHALATE
000084-74-2 DIBUTYL PHTHALATE
000085-01-8 PHENANTHRENE
000085-44-9 PHTHALIC ANHYDRIDE
000085-68-7 BUTYL BENZYL PHTHALATE, N-
000086-30-6 NITROSODIPHENYLAMINE, N-
000086-73-7 FLUORENE
000086-74-8 CARBAZOLE
000087-65-0 DICHLOROPHENOL, 2,6-
000087-68-3 HEXACHLOROBUTADIENE
000087-82-1 HEXABROMOBENZENE
000087-84-3 PENTABROMO-6-CHLOROCYCLOHEXANE, 1,2,3,4,5-
000087-86-5 PENTACHLOROPHENOL
000088-06-2 TRICHLOROPHENOL, 2,4,6-
000088-72-2 NITROTOLUENE, O-
000088-73-3 CHLORONITROBENZENE, O-
000088-74-4 NITROANILINE, 2-
000088-85-7 DINOSEB
000088-99-3 PHTHALIC ACID, O-
000090-43-7 PHENYLPHENOL, 2-
000091-20-3 NAPHTHALENE
000091-22-5 QUINOLINE
000091-66-7 DIETHYLANILINE, N,N-
000091-94-1 DICHLOROBENZIDINE, 3,3'-
000092-52-4 BIPHENYL, 1,1'
000092-87-5 BENZIDINE
000093-65-2 METHYL-4-CHLOROPHENOXY) PROPIONIC ACID, 2-(2-
000093-71-0 ALLIDOCHLOR
000093-72-1 TRICHLOROPHENOXY) PROPIONIC ACID, 2(2,4,5-
000093-76-5 TRICHLOROPHENOXY ACETIC ACID, 2,4,5-
000094-74-6 METHYL-4-CHLOROPHENOXY ACETIC ACID, 2-
000094-75-7 DICHLOROPHENOXY ACETIC ACID, 2,4-
000094-81-5 METHYL-4-CHLOROPHENOXY) BUTYRIC ACID, 4-(2-
000094-82-6 2,4-DB
000094-82-6

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DICHLOROPHENOXY) BUTYRIC ACID, 4-(2,4-
000095-47-6 XYLENE, O-
000095-48-7 CRESOL, O-
000095-48-7 2-METHYLPHENOL
000095-49-8 CHLOROTOLUENE, O-
000095-50-1 DICHLOROBENZENE, 1,2-
000095-51-2 CHLOROANILINE, 2-
000095-53-4 METHYLANILINE, 2-
000095-54-5 PHENYLENEDIAMINE, O-
000095-55-6 AMINOPHENOL, O-
000095-57-8 CHLOROPHENOL, 2-
000095-65-8 DIMETHYLPHENOL, 3,4-
000095-68-1 DIMETHYLANILINE, 2,4-
000095-69-2 CHLORO-2-METHYLANILINE, 4-
000095-70-5 TOLUENE-2,5-DIAMINE
000095-77-2 DICHLOROPHENOL, 3,4-
000095-80-7 TOLUENE-2,4-DIAMINE
000095-87-4 DIMETHYLPHENOL, 2,5-
000095-94-3 TETRACHLOROBENZENE, 1,2,4,5-
000095-95-4 TRICHLOROPHENOL, 2,4,5-
000096-12-8 DIBROMO-3-CHLOROPROPANE, 1,2
000096-18-4 TRICHLOROPROPANE, 1,2,3-
000096-19-5 TRICHLOROPROPENE, 1,2,3-
000096-33-3 METHYL ACRYLATE
000096-45-7 ETHYLENE THIOUREA
000096-48-0 BUTYROLACTONE, GAMMA-
000097-63-2 ETHYL METHACRYLATE
000098-01-1 FURFURAL
000098-07-7 BENZOTRICHLORIDE
000098-56-6 CHLOROBENZOTRIFLUORIDE, 4-
000098-82-8 CUMENE
000098-83-9 METHYL STYRENE, ALPHA
000098-86-2 ACETOPHENONE
000098-87-3 BENZAL CHLORIDE
000098-95-3 NITROBENZENE
000099-08-1 NITROTOLUENE, M-
000099-09-2 NITROANILINE, M-
000099-35-4 TRINITROBENZENE, 1,3,5-
000099-55-8 METHYL-5-NITROANILINE, 2-
000099-59-2 METHOXY-5-NITROANILINE, 2-
000099-65-0 DINITROBENZENE, 1,3-
000099-99-0 NITROTOLUENE, P-
000100-00-5 CHLORONITROBENZENE, P-
000100-01-6 NITROANILINE, P-
000100-21-0 PHTHALIC ACID, P-
000100-21-0 TEREPHTHALIC ACID
000100-25-4 DINITROBENZENE, 1,4-
000100-40-3 VINYL-1-CYCLOHEXENE, 4-
000100-41-4 ETHYL BENZENE
000100-42-5 STYRENE
000100-44-7 BENZYL CHLORIDE
000100-51-6 BENZYL ALCOHOL
000100-52-7 BENZALDEHYDE
000100-54-9 NICOTINONITRILE
000101-14-4 METHYLENE-BIS(2-CHLOROANILINE), 4,4'-
000101-55-3 BROMOPHENYL PHENYL ETHER, 4-
000101-61-1 METHYLENE-BIS(N,N'-DIMETHYL)ANILINE, 4,4'-
000101-68-8 DIPHENYLMETHANE DIISOCYANATE
000101-68-8 METHYLENEDIPHENYL ISOCYANATE, 4,4-
000101-77-9 METHYLENE-BIS(BENZENEAMINE), 4,4-
000103-33-3 AZOBENZENE
000103-69-5 ETHYLANILINE, N-
000105-60-2 CAPROLACTAM
000105-67-9 DIMETHYLPHENOL, 2,4-
000106-13-8 ETHOXYETHANOL DODECANOATE, 2-
000106-37-6 DIBROMOBENZENE, 1,4-
000106-42-3 XYLENE, P-
000106-43-4 CHLOROTOLUENE, P-
000106-44-5 4-METHYLPHENOL
000106-44-5 CRESOL, P-
000106-46-7 DICHLOROBENZENE, 1,4-
000106-47-8 CHLOROANILINE, 4-
000106-48-9 CHLOROPHENOL, 4-
000106-49-0 TOLUIDINE, P-
000106-50-3 PHENYLENEDIAMINE, P-
000106-74-1 ETHOXYETHANOL ACRYLATE, 2-
000106-89-8 EPICHLOROHYDRIN
000106-93-4 DIBROMOETHANE, 1,2-
000106-99-0 BUTADIENE, 1,3-
000107-02-8 ACROLEIN
000107-05-1 ALLYL CHLORIDE
000107-06-2 DICHLOROETHANE, 1,2-
000107-12-0 PROPIONITRILE
000107-13-1 ACRYLONITRILE
000107-15-3 ETHYLENE DIAMINE
000107-16-4 FORMALDEHYDE CYANOHYDRIN
000107-18-6 ALLYL ALCOHOL
000107-20-0 CHLOROACETALDEHYDE
000107-21-1 ETHYLENE GLYCOL
000107-30-2 CHLOROMETHYL METHYL ETHER
000107-98-2 PROPYLENE GLYCOL MONOMETHYL ETHER
000108-05-4 VINYL ACETATE
000108-10-1 METHYL ISOBUTYL KETONE
000108-31-6 MALEIC ANHYDRIDE
000108-38-3 XYLENE, M-
000108-39-4 3-METHYLPHENOL
000108-39-4 CRESOL, M-
000108-41-8 CHLOROTOLUENE, M-
000108-42-9 CHLOROANILINE, 3-
000108-43-0 CHLOROPHENOL, 3-
000108-44-1 TOLUIDINE, M-
000108-45-2 PHENYLENEDIAMINE, M-
000108-87-2 METHYLCYCLOHEXANE
000108-88-3 TOLUENE
000108-90-7 CHLOROBENZENE
000108-91-8 CYCLOHEXYLAMINE
000108-93-0 CYCLOHEXANOL

000108-95-2	PHENOL
000108-98-5	THIOPHENOL
000108-98-5	BENZENETHIOL
000108-06-1	BIS(2-CHLORO-1-METHYLETHYL) ETHER
000109-66-0	PENTANE, N-
000109-69-3	CHLOROBUTANE, 1-
000109-77-3	MALONONITRILE
000109-78-4	ETHYLENE CYANOHYDRIN
000109-86-4	METHOXYETHANOL, 2-
000110-00-9	FURAN
000110-49-6	METHOXYETHANOL ACETATE, 2-
000110-54-3	HEXANE, N-
000110-61-2	SUCCINONITRILE
000110-80-5	ETHOXYETHANOL, 2-
000110-86-1	PYRIDINE
000111-15-9	ETHOXYETHANOL ACETATE, 2-
000111-44-4	BIS(2-CHLOROETHYL) ETHER
000111-69-3	ADIPONITRILE
000111-76-2	ETHYLENE GLYCOL MONOBUTYL ETHER
000111-90-0	DIETHYLENE GLYCOL MONOETHYL ETHER
000112-34-5	DIETHYLENE GLYCOL MONOBUTYL ETHER
000115-29-7	ENDOSULFAN
000116-06-3	ALDICARB
000117-81-7	BIS(2-ETHYLHEXYL) PHTHALATE
000117-81-7	DEHP
000117-84-0	DI-N-OCTYL PHTHALATE
000118-74-1	HEXACHLOROBENZENE
000118-75-2	CHLORANIL
000118-96-7	TRINITROTOLUENE, 2,4,6-
000119-90-4	DIMETHOXYBENZIDINE, 3,3'-
000119-93-7	DIMETHYLBENZIDINE, 3,3'-
000120-12-7	ANTHRACENE
000120-36-5	DICHLORPROP
000120-61-6	DIMETHYLTEREPHTHALATE
000120-82-1	TRICHLOROBENZENE, 1,2,4-
000120-83-2	DICHLOROPHENOL, 2,4-
000121-14-2	DINITROTOLUENE, 2,4
000121-69-7	DIMETHYLANILINE, N,N-
000121-73-3	CHLORONITROBENZENE, M-
000121-75-5	MALATHION
000121-82-4	CYCLONITE
000121-82-4	RDX
000121-91-5	PHTHALIC ACID, M-
000122-34-9	SIMAZINE
000122-39-4	DIPHENYLAMINE, N,N-
000122-66-7	DIPHENYLHYDRAZINE, 1,2-
000123-30-8	AMINOPHENOL, P-
000123-31-9	HYDROQUINONE
000123-33-1	MALEIC HYDRAZIDE
000123-63-7	PARALDEHYDE
000123-73-9	CROTONALDEHYDE
000123-91-1	DIOXANE, 1,4-
000124-09-4	HEXAMETHYLENE DIAMINE
000124-48-1	DIBROMOCHLOROMETHANE
000126-98-7	METHACRYLONITRILE
000126-99-8	CHLORO-1,3-BUTADIENE, 2-
000126-99-8	CHLOROPRENE
000127-18-4	TETRACHLOROETHYLENE
000129-00-0	PYRENE
000130-15-4	NAPHTHOQUINONE, 1,4-
000131-11-3	DIMETHYLPHTHALATE
000132-64-9	DIBENZOFURAN
000133-06-2	CAPTAN
000133-07-3	FOLPET
000137-26-8	THIRAM
000139-40-2	PROPAZINE
000140-57-8	ARAMITE
000140-88-5	ETHYL ACRYLATE
000141-78-6	ETHYL ACETATE
000142-28-9	DICHLOROPROPANE, 1,3-
000142-82-5	HEPTANE, N-
000143-33-9	SODIUM CYANIDE
000145-73-3	ENDOTHALL
000148-18-5	SODIUM DIETHYLDITHIOCARBAMATE
000150-50-5	MERPHOS
000151-50-8	POTASSIUM CYANIDE
000152-16-9	OCTAMETHYLPYROPHOSPHORAMIDE
000156-10-5	NITROSODIPHENYLAMINE, P-
000156-59-2	DICHLOROETHYLENE, 1,2-C-
000156-60-5	DICHLOROETHYLENE, 1,2-T-
000193-39-5	INDENO[1,2,3-CD]PYRENE
000205-99-2	BENZO[B]FLUORANTHENE
000206-44-0	FLUORANTHENE
000207-08-9	BENZO[K]FLUORANTHENE
000208-96-8	ACENAPTHYLENE
000218-01-9	CHRYSENE
000298-00-0	METHYL PARATHION
000298-02-2	PHORATE
000298-04-4	DISULFOTON
000299-84-3	RONNEL
000302-01-2	HYDRAZINE
000304-61-0	ANTIMONY POTASSIUM TARTRATE
000309-00-2	ALDRIN
000311-45-5	DIETHYL-P-NITROPHENYL PHOSPHATE
000319-84-6	HEXACHLOROCYCLOHEXANE, ALPHA-
000319-85-7	HEXACHLOROCYCLOHEXANE, BETA-
000319-86-8	HEXACHLOROCYCLOHEXANE, DELTA-
000329-71-5	DINITROPHENOL, 2,5-
000330-55-2	LINURON
000333-41-5	DIAZINON
000460-19-5	CYANOGEN
000479-45-8	TRINITROPHENYLMETHYLNITRAMINE
000496-72-0	TOLUENEDIAMINE, 3,4-
000504-24-5	AMINOPYRIDINE, 4-
000506-61-6	POTASSIUM SILVER CYANIDE
000506-64-9	SILVER CYANIDE
000506-68-3	CYANOGEN BROMIDE
000506-77-4	CHLORINE CYANIDE
000507-20-0	BUTYLCHLORIDE, T-
000510-15-6	CHLOROBENZILATE
000512-56-1	TRIMETHYL PHOSPHATE
000526-75-0	DIMETHYLPHENOL, 2,3-
000528-29-0	DINITROBENZENE, 1,2-
000531-82-8	FURIUM
000532-28-5	BENZALDEHYDE CYANOHYDRIN
000534-52-1	DINITRO-O-CRESOL, 4,6-
000540-59-0	DICHLOROETHYLENE, 1,2- (MIXED ISOMERS)
000540-73-8	DIMETHYLHYDRAZINE, 1,2-
000541-73-1	DICHLOROBENZENE, 1,3-
000542-62-1	BARIUM CYANIDE
000542-75-6	TELONE II
000542-75-6	DICHLOROPROPENE, 1,3-
000542-88-1	BIS(CHLOROMETHYL) ETHER
000542-92-7	CYCLOPENTADIENE
000544-92-3	COPPER CYANIDE
000557-19-7	NICKEL CYANIDE
000557-21-1	ZINC CYANIDE
000563-68-8	THALLIUM (I) ACETATE
000573-56-8	DINITROPHENOL, 2,6-
000576-24-9	DICHLOROPHENOL, 2,3-
000576-26-1	DIMETHYLPHENOL, 2,6-
000583-78-8	DICHLOROPHENOL, 2,5-
000586-11-8	DINITROPHENOL, 3,5-
000591-27-5	AMINOPHENOL, M-
000591-35-5	DICHLOROPHENOL, 3,5-
000591-78-6	HEXANONE, 2-
000592-01-8	CALCIUM CYANIDE
000593-60-2	VINYL BROMIDE
000593-60-2	BROMOETHENE
000594-20-7	DICHLOROPROPANE, 2,2-
000598-31-2	BROMOACETONE
000598-77-6	TRICHLOROPROPANE, 1,1,2-
000598-94-7	DIMETHYLUREA, N,N-
000602-01-7	DINITROTOLUENE, 2,3-

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000606-20-2	DINITROTOLUENE, 2,6-
000608-73-1	HEXACHLOROCYCLOHEXANE-TECHNICAL
000608-93-5	PENTACHLOROBENZENE
000609-19-8	TRICHLOROPHENOL, 3,4,5-
000609-93-8	DINITRO-P-CRESOL, 2,6-
000610-39-9	DINITROTOLUENE, 3,4-
000611-14-3	ETHYLTOLUENE, O-
000615-54-3	TRIBROMOBENZENE, 1,2,4-
000617-84-5	DIETHYLFORMAMIDE
000619-15-8	DINITROTOLUENE, 2,5-
000620-14-4	ETHYLTOLUENE, M-
000621-64-7	NITROSO-DI-N-PROPYLAMINE, N-
000622-96-8	ETHYLTOLUENE, P-
000624-83-9	METHYL ISOCYANATE
000630-05-0	CARBON MONOXIDE
000630-10-4	SELENOUREA
000630-20-6	TETRACHLOROETHANE, 1,1,1,2-
000634-93-5	TRICHLOROANILINE, 2,4,6-
000636-21-5	METHYLANILINE HYDROCHLORIDE, 2-
000684-93-5	NITROSO-N-METHYLUREA, N-
000695-77-2	TETRACHLOROCYCLOPENTADIENE
000759-73-9	NITROSO-N-ETHYLUREA, N-
000759-94-4	EPTC
000764-41-0	DICHLORO-2-BUTENE, 1,4-
000765-34-4	GLYCIDALDEHYDE
000823-40-5	TOLUENE-2,6-DIAMINE
000834-12-8	AMETRYN
000924-16-3	NITROSO-DI-N-BUTYLAMINE, N-
000930-55-2	NITROSOPYRROLIDINE, N-
000933-75-5	TRICHLOROPHENOL, 2,3,6-
000933-78-8	TRICHLOROPHENOL, 2,3,5-
000934-80-5	ETHYL-O-XYLENE, 4-
000935-95-5	TETRACHLOROPHENOL, 2,3,5,6-
000950-10-7	MEPHOSFOLAN
000961-11-5	TETRACHLOROVINPHOS
000961-11-5	STIROPHOS
001024-57-3	HEPTACHLOR EPOXIDE
001114-71-2	PEBULATE
001116-54-7	NITROSODIETHANOLAMINE, N-
001134-23-2	CYCLOATE
001163-19-5	DECABROMODIPHENYL ETHER
001198-27-2	AMINO-2-NAPHTOL HYDROCHLORIDE, 1-
001309-64-4	ANTIMONY TRIOXIDE
001314-32-5	THALLIC OXIDE
001314-60-9	ANTIMONY PENTOXIDE
001314-62-1	VANADIUM PENTOXIDE
001314-84-7	ZINC PHOSPHIDE
001330-20-7	XYLENE, MIXTURE
001332-21-4	ASBESTOS
001332-81-6	ANTIMONY TETROXIDE
001336-36-3	POLYCHLORINATED BIPHENYLS
001338-23-4	METHYL ETHYL KETONE PEROXIDE
001563-66-2	CARBOFURAN
001569-02-4	PROPYLENE GLYCOL MONOETHYL ETHER
001582-09-8	TRIFLURALIN
001600-37-9	PENTACHLOROPROPENE, 1,1,2,3,3,-
001615-80-1	DIETHYLHYDRAZINE, 1,2-
001689-84-5	001689-99-2BROMOXYNIL OCTANOATE
001746-01-6	TCDD, 2,3,7,8-
001861-32-1	DACTHAL
001861-40-1	BENEFIN
001897-45-6	CHLOROTHALONIL
001912-24-9	ATRAZINE
001918-00-9	DICAMBA
001918-16-7	PROPACHLOR
001929-77-7	VERNOLATE
001929-77-7	VERNAM
001937-37-7	DIRECT BLACK 38
002008-41-5	BUTYLATE
002014-83-7	TRICHLOROTOLUENE, ALPHA,2,6-
002077-46-5	TRICHLOROTOLUENE, 2,3,6-
002104-96-3	BROMOPHOS
002212-67-1	MOLINATE
002303-16-4	DIALLATE
002303-17-5	TRIALLATE
002370-63-0	ETHOXYETHYL METHACRYLATE, 2-
002385-85-5	MIREX
002425-06-1	CAPTAFOL
002429-74-5	NIAGARA BLUE 4B
002491-38-5	BUSAN 90
002602-46-2	DIRECT BLUE 6
002610-05-1	DIRECT SKY BLUE 6B
002687-25-4	TOLUENEDIAMINE, 2,3-
002834-92-6	AMINO-2-NAPHTHOL, 1-
002921-88-2	CHLORPYRIFOS
003165-93-3	CHLORO-2-METHYLANILINE HYDROCHLORIDE, 4-
003175-23-3	TRICHLOROPROPANE, 1,2,2-
003380-34-5	TRICHLORO-2'-HYDROXYDIPHENYLETHER, 2,2,4'-
003383-96-8	TEMEPHOS
003689-24-5	TETRAETHYL DITHIOPYROPHOSPHATE
004399-55-7	DIRECT LIGHTFAST BLUE
004549-40-0	NITROSOMETHYLVINYLAMINE, N
004901-51-3	TETRACHLOROPHENOL, 2,3,4,5-
005216-25-1	TETRACHLOROTOLUENE, PARA, ALPHA, ALPHA, ALPHA-
005598-13-0	CHLORPYRIFOS METHYL
006108-10-7	HEXACHLOROCYCLOHEXANE, EPSILON-
006533-73-9	THALLIUM (I) CARBONATE
007429-90-5	ALUMINUM
007439-89-6	IRON
007439-92-1	LEAD
007439-96-5	MANGANESE
007439-97-6	MERCURY, ELEMENTAL
007439-98-7	MOLYBDENUM
007440-22-4	SILVER
007440-24-6	STRONTIUM, STABLE
007440-36-0	ANTIMONY, METALLIC
007440-38-2	ARSENIC, INORGANIC
007440-39-3	BARIUM
007440-41-7	BERYLLIUM
007440-42-8	BORON, ELEMENTAL
007440-43-9	CADMIUM
007440-50-8	COPPER
007440-62-2	VANADIUM
007440-66-6	ZINC (METALLIC)
007446-09-5	SULFUR DIOXIDE
007446-18-6	THALLIUM (I) SULFATE
007446-34-6	SELENIUM SULFIDE
007487-94-7	MERCURIC CHLORIDE
007637-07-2	BORON TRIFLUORIDE
007664-41-7	AMMONIA
007664-93-9	SULFURIC ACID
007723-14-0	PHOSPHORUS, WHITE
007782-41-4	FLUORINE / (SOLUBLE FLUORIDE)
007782-49-2	SELENIUM
007783-00-8	SELENIOUS ACID
007783-06-4	HYDROGEN SULFIDE
007789-89-1	TRICHLOROPROPANE, 1,1,1-
007791-12-0	THALLIUM (I) CHLORIDE
007803-51-2	PHOSPHINE
008001-35-2	TOXAPHENE
008001-58-9	CREOSOTE, COAL TAR
008007-45-2	COKE OVEN EMISSIONS
008018-01-7	MANCOZEB
010028-15-6	OZONE
010034-93-2	HYDRAZINE SULFATE
010102-43-9	NITRIC OXIDE
010102-44-0	NITROGEN DIOXIDE
010102-45-1	THALLIUM (I) NITRATE
010436-39-2	TETRACHLOROPROPENE, 1,1,2,3-
010595-95-6	NITROSOMETHYLETHYLAMINE, N-
010599-90-3	MONOCHLORAMINE

011097-69-1	AROCLOR 1254	NO CASRN
012035-72-2	NICKEL SUBSULFIDE	NO CASRN
012039-52-0	THALLIUM SELENITE	NO CASRN
012122-67-7	ZINEB	NO CASRN
012427-38-2	MANEB	NO CASRN
012672-29-6	AROCLOR 1248	VARIOUS
013071-79-9	TERBUFOS	NO CASRN
013194-48-4	ETHOPROP	NO CASRN
013196-18-4	THIOFANOX	NO CASRN
013718-26-8	SODIUM METAVANADATE	NO CASRN
014797-65-0	NITRITE	NO CASRN
015950-66-0	TRICHLOROPHENOL, 2,3,4-	NO CASRN
015972-60-8	ALACHLOR	NO CASRN
016065-83-1	CHROMIUM(III)	NO CASRN
016071-86-6	DIRECT BROWN 95	NO CASRN
016752-77-5	METHOMYL	NO CASRN
018540-29-9	CHROMIUM(VI)	NO CASRN
020816-12-0	OSMIUM TETROXIDE	
020859-73-8	ALUMINUM PHOSPHIDE	
021087-64-9	METRIBUZIN	
021232-47-3	TETRACHLOROAZOXYBENZENE	
021436-96-4	DIMETHYLANILINE HYDROCHLORIDE, 2,4-	
021564-17-0	THIOCYANOMETHYLTHIO)BENZOTHIAZOLE, 2-(	
021725-46-2	CYANAZINE	
022967-92-6	METHYL MERCURY	
023950-58-5	PRONAMIDE	
025013-15-4	METHYL STYRENE (MIXED ISOMERS)	
025329-35-5	PENTACHLOROCYCLOPENTADIENE	
026399-36-0	PROFLURALIN	
030560-19-1	ACEPHATE	
031512-74-0	BUSAN 77	
032534-81-9	PENTABROMODIPHENYL ETHER	
032536-52-0	OCTABROMODIPHENYL ETHER	
033663-50-2	TRICHLOROANILINE HYDROCHLORIDE, 2,4,6-	
033820-53-0	ISOPROPALIN	
036907-42-3	VANADIUM SULFATE	
039638-32-9	BIS(2-CHLOROISOPROPYL) ETHER	
040487-42-1	PENDIMETHALIN	
041851-50-7	CHLOROCYCLOPENTADIENE	
051218-45-2	METOLACHLOR	
059756-60-4	FLURIDONE	
060238-56-4	CHLORTHIOPHOS	
068554-00-7	ETHOXYETHANOL PHOSPHATE, 2-	
071753-42-9	TETRACHLOROHYDRAZOBENZENE	
077323-84-3	TRICHLOROCYCLOPENTADIENE	
VARIOUS	BROMINATED DIBENZOFURANS	
	BROMINATED DIBENZO-P-DIOXINS	
	BROMOCHLOROETHANES	
	DICHLOROBUTENES	
	LEAD ALKYLS	
	NICKEL, REFINERY DUST	
	NICKEL, SOLUBLE SALTS	
	NITROGEN OXIDES	
	NITROPHENOLS	
	PARTICULATE MATTER	
	PHOTOCHEMICAL OXIDANTS	
	POLYBROMINATED BIPHENYLS	
	SULFUR OXIDES	
	THALLIUM, INSOLUBLE SALTS	
	TIN AND COMPOUNDS	
	TRIMETHYLBENZENES	
	TRINITROPHENOLS	
	URANIUM, SOLUBLE SALTS	

APPENDIX A-IV

IV. EFFECT LEVEL DEFINITIONS

Adverse effect. A biochemical change, functional impairment, or pathologic lesion that either singly or in combination adversely affects the performance of the whole organism, or reduces an organism's ability to respond to an additional environmental challenge.

Frank-effect-level (FEL). The exposure level at which there are statistically or biologically significant increases in frequency or severity of severe effects between the exposed population and its appropriate control group. These severe effects produce an unmistakable adverse health effect (such as severe convulsions or death).

Lowest-observed-adverse-effect level (LOAEL). The lowest exposure level at which there are statistically or biologically significant increases in frequency or severity of adverse effects between the exposed population and its appropriate control group.

Lowest-observed-effect level (LOEL). The lowest exposure level at which there are statistically or biologically significant increases in frequency or severity of any effects between the exposed population and its appropriate control group. The effects that are seen at this level may or may not be considered as adverse.

No-observed-adverse-effect level (NOAEL). An exposure level at which there are no statistically or biologically significant increases in the frequency or severity of adverse effects between the exposed population and its appropriate control; some effects may be produced at this level, but they are not considered to be adverse.

No-observed-effect level (NOEL). An exposure level at which there are no statistically or biologically significant increases in the frequency or severity of any effect between the exposed population and its appropriate control.

Adapted from: U.S. EPA. 1991. Integrated Risk Information System (IRIS). Online. National Center for Environmental Assessment, Cincinnati, OH.

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APPENDIX A-V

V. NATIONAL AMBIENT AIR QUALITY STANDARDS (NAAQS)

The Clean Air Act requires that National Ambient Air Quality Standards (NAAQS) be set and ultimately met for any air pollutant which, if present in air, may reasonably be anticipated to endanger public health or welfare and whose presence in the air results from numerous or diverse mobile and/or stationary sources. Since the primary NAAQS and the inhalation RfC serve essentially the same function, and the primary NAAQS have extensive data bases rigorously reviewed, the primary NAAQS with annual averaging times should be used *in lieu* of an inhalation RfC, except for lead. In deriving a risk assessment number for lead (Pb), the Integrated Exposure Uptake Biokinetics (IEUBK) model should be used instead of the RfC. Primary standards are designed to protect public health and secondary standards are designed to protect public welfare. Each primary NAAQS has either one or two averaging times depending on the health effects of the chemical. To date, six NAAQS have been established: Carbon Monoxide (CO), Lead (Pb), Nitrogen Dioxide (NO_2), Particulate Matter, less than 10 μm in size, (PM_{10}), Ozone (O_3) and Sulfur Dioxide (SO_2). A table of the most recent NAAQS is provided as Table A-V-1.

The process of establishing and revising the NAAQS is detailed by Padgett and Richmond (Journal of the Air Pollution Control Association, 33:13-16, 1983). The primary NAAQS are solely health based and designed to protect the most sensitive group of individuals (but not necessarily the most sensitive members of that group) against adverse health effects. Thus, by definition, the NAAQS primary standards define allowable pollutant concentrations which can be present in the atmosphere without causing adverse effects, and essentially serve the same function as an inhalation RfC in a risk assessment/risk management decision, except for lead. The data bases supporting each of the NAAQS are extensive. More importantly, the NAAQS are set by the USEPA Administrator as mandated by Congress after numerous reviews and a public comment process.

TABLE A-V-1

NATIONAL AMBIENT AIR QUALITY STANDARDS[a]
(as of December 2, 1991)

Pollutant	Primary Standards[b]	Averaging Time	Secondary Standards[b]
Carbon monoxide (CO)	9 ppm (10 mg/m^3) 35 ppm (40 mg/m^3)	8 hour[c] 1 hour[c]	None
Lead (Pb) (and Lead compounds	1.5 µg/m^3	Quarterly	Same as primary
Nitrogen dioxide (NO_2) (Nitrogen oxide) (Nitric oxide)	0.053 ppm (100 µg/m^3)	Annual	Same as primary
Particulate Matter (PM_{10})	50 µg/m^3 150 µg/m^3	Annual[d] 24 hours[e]	Same as primary
Ozone (O_3)	0.12 ppm (235 µg/m^3)	1 hour[f]	Same as primary
Sulfur dioxide (SO_2) (Sulfur oxide)	0.03 ppm (80 µg/m^3)	Annual	—
	0.14 ppm (365 µg/m^3)	24 hours[c]	—
	—	3 hours[c]	0.5 ppm (1300 µg/m^3)

[a]Source: U.S. EPA 1991. Subchapter C - Air Programs. Part 50 -National Primary and Secondary Ambient Air Quality Standards. Code of Federal Regulations 50: 693-697. Revised 7/1/91.

[b]Primary standards are designed to protect public health; Secondary standards are designed to protect public welfare.

[c]Not to be exceeded more than once per year.

[d]The standard is attained when the expected annual arithmetic mean concentration is less than or equal to 50 µg/m^3.

[e]The standard is attained when the expected number of days per calendar year with a 24-hour average concentration above 150 µg/m^3 is equal to or less than 1.

[f]The standard is attained when the expected number of days per calendar year with maximum hourly average concentrations above 0.12 ppm is equal to or less than 1.

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