OTS INFORMATION ARCHITECTURE

NOTEBOOK

Prepared by:

Henry Lau (Project Manager)

Loren Hall
Geri Nowak
Doug Sellers

The matrices included in this document were prepared by:

Tracor Jitco, Inc.

EPA Contract 68-01-6651

Project Officer: Doug Sellers
Technical Monitor: Geri Nowak

August, 1983

The OTS Information Architecture Notebook was prepared to identify sources of information available to the OTS staff. Users of this document may not be aware of where to obtain these services. MSD maintains two facilities to guide people in the acquisition of information.

- Non-CBI Information - For assistance in obtaining literature searches, ready reference, library services, article acquisition, or translations, people should contact:

  Chemical Information Center (CIC)
  Elain Suriano
  Room 447 East Tower
  Phone 382-3524

- CBI Information - Confidential Business Information including TDIS, CICIS, and PMN material, is included in the responsibilities of the-

  CBI Information Center
  Delores Evans
  Room 227 East Tower
  Phone: 382-7694

If you are not sure whether your request is for CBI or Non-CBI information, then contract the CIC at the number above.

I. INTRODUCTION

The purpose of the OTS TSCA Information Architecture Notebook is to document and analyze OTS scientific and technical information requirements for the successful implementation of the Toxic Substances Control Act (TSCA). Under TSCA, OTS is required to assess the potential risks and possible benefits of commercial chemicals not covered under other Federal authorizations. The investigation of chemical risks and benefits and the development of regulatory or non-regulatory decisions constantly require the effective gathering and utilization of pertinent information for in-depth review and analysis of the effects of the chemical substances on human health and the environment.

While TSCA provides a mechanism for OTS to collect certain specific data from industry by rulemaking or to develop data by conducting testing of chemicals, OTS needs supporting scientific and technical information from a wide variety of existing data sources. The supporting data are often avialable in the open literature, in Government owned or commercially available computerized data banks and data bases, as well as in manual or unpublished sources.

This Notebook represents an attempt to assess OTS information requirements and to identify the major information sources in which pertinent data are accessible. The ultimate objective is to identify major information gaps, based on identified requirements and system coverage, and to recommend a cost-effective mechanism to obtain or to develop such information. Since both information requirements and system coverage are likely to change with the passage of time, the Notebook must be used as a working document and will be updated periodically.

The Notebook is organized into ten sections, as outlined under the Table of Contents. Section II of the Notebook presents a summary of the major functions of OTS (e.g. Health Effects Analysis, Economic Analysis, etc.) and the major information resources needed in support of these functions. Section III describes the three major processes of OTS (i.e. New Chemicals Review, Existing Chemicals Review, Chemical Testing). In Section IV of the Notebook, the major data categories and sub-categories and their definitions are presented. Section V presents a Matrix matching a set of resource attributes, i.e., search and system attributes, against the major computerized information resources containing pertinent information in support of OTS functions and processes. This section also includes a listing of definitions for the resources attributes to facilitate understanding of the matrix.

In Section VI of the Notebook, there is a presentation of the OTS analytical capabilities for estimating physical chemical properties and predicting environmental fate and exposure of chemical substances. Two matrices are also included, depicting how the different classes of models and tools are used to support the various OTS functions and processes. Section VII presents a series of matrices, matching data categories and data sub-categories against the major information resources identified in this Notebook. In Section VIII, matrices matching data sub-categories against OTS functions are presented. Section IX is a discussion of the relationship between OTS processes and data categories and sub-categories. Finally, Section X summarizes and analyzes the major findings, and discusses major information gaps.

The matrices developed for this Notebook are intended to highlight information requirements for the OTS functions/ processes and indicate whether such requirements are being satisfied by currently available information resources. By including resource attributes in the matrices, an attempt was made to depict the quality as well as the accessibility of the available data. As a result, this should provide the readers with a better picture of information availabilities and major information gaps, and of the qualitative and quantitative aspects of the information available.

It is hoped that the TSCA Information Architecture Notebook will be a useful document for OTS. Specifically, the Notebook should be used as follows:

1. It should provide top OTS managers with a better understanding about how and what information is being used to support the OTS functions and processes. It should also provide sufficient knowledge in determining priorities and resource commitments for developing or obtaining data where information gaps are shown, and for analyzing and determining priorities for data base development.

2. For the OTS scientific & technical staff, the Notebook should be a handy reference describing the availabilities and accessibilities of different types of data from a variety of sources. Furthermore, the resource attributes will provide a better understanding of the usefulness and limitations of the information resources.

3. For information managers and information specialists, this should be used as a working document that highlights OTS information requirements and resources. By identifying and understanding the requirments for information and the availabilities of resources, better

information support services can be provided. Furthermore, efforts can be taken to develop information for those areas where gaps are identified and to improve the efficiency and cost-effectiveness of information retrieval. This Notebook also provides a continuing mechanism for communication between the service units (i.e. MSD) and the user community. Such a dialogue will lead to a better understanding of user requirements.

4. For system development managers and specialists, the information strategy should be used to determine needs and priorities for developing new OTS data bases. Information needs and data base needs could be significantly different. In determining needs for data base development, other factors besides information needs must be considered. These factors include frequency of use, cost for system development, and need for computerized retrieval and data manipulations, etc.

This Notebook is a working document. As information requirements and resource capabilities change, the Notebook will be updated periodically.

II. OTS FUNCTIONS & INFORMATION RESOURCES

This section describes the major OTS functions under TSCA and their relationship with the major information resources. For purposes of this Notebook, seven OTS functions are identified below:

- o Chemical Analysis
- o Control Technology Analysis
- o Economic Analysis
- o Health Effects Analysis
- o Environmental Effects Analysis
- o Exposure Analysis
- o Regulatory Options Analysis

No attempts are made to either associate these functions with OTS organizational units or to establish any sequential relationship of the functions.

Risk assessment, a function routinely performed by OTS, is not included here. From an organization standpoint, risk assessment integrates the hazard evaluations of the other functions except regulatory options analysis. Therefore, risk assessment utilizes the information gathered in support of the other functions and additional information requirements are minimal.

To a large extent, regulatory options analysis is similar to risk assessment in terms of additional information requirements. Like risk assessment, regulatory options analysis integrates the evaluative results of the other functions. However, it also needs information regarding other federal regulations, statutes and standards. This additional information does not come directly from the evaluative results of the other functions. For this reason, regulatory options analysis is included here as a function.

For each of the aforementioned functions, there is a descriptive statement about that function. This statement describes the various steps that are involved in a function. Following each functional statement, there is a listing of the major steps, i.e., sub-functions for that function, and the major information resources that are frequently used to support the sub-functions. No attempt is made here to associate an information resource with a sub-function, since such a relationship may sometimes be misleading.

Chemical Analysis
Functional Statement

Chemical analysis mainly provides broad technical support in the area of chemistry for both regulatory and non-regulatory decision making under the Toxic Substances Control Act. This analysis includes such areas as: validation of chemical identity; evaluation of chemical reactions during manufacturing, processing, and use; identification of impurities, by-products, solvents, and catalysts; estimation of physical and chemical properties relevant to manufacturing, processing and use; identification of chemical constraints on manufacturing, processing, and use conditions; identification of functional groups or structural features responsible for chemical reactivity; development of chemical data for TDIS; and, other aspects of chemical data that may be of interest to further reviewers. This analysis also identifies substructures of molecules that are important for identification of use analogues; classifies substances by use and reactivity; and, identifies structural and use analogues based on knowledge of chemical technology and the physical/chemical properties of molecules. Chemical analysis is used to support all of the other functions listed below; products of chemical analysis include initial and detailed assessments of premanufacture notices (PMN's), analyses to support section 5(h)(4) exemptions and follow-up activities, section 6 regulatory analyses, and analysis to support any other regulatory or non-regulatory decision making.

Chemical Analysis

Major Sub-functions

- Verify generic name
- Ensure description matches:
  chemical name,
  CAS Registry Number,
  molecular formula,
  molecular weight,
  chemical structure,
  synonymns.
- Define physical-chemical properties of chemicals
- Identify structural analogs
- Identify by-products/impurities (i.e., catalysts, solvents) used in the manufacture of the chemical
- Develop a literature search strategy
- Prepare detailed in-depth use analysis based on economic and market analysis
- From known properties of chemicals, identify potential new uses of the chemical

Information Resources

1. Computerized Data Bases (Non-bibliographic)

- CAS ONLINE
- Chemical Abstracts Service (Contract)
- CHEMLINE (MEDLARS)
- CHEMDEX (SDC)
- CHEMLAB (CIS)
- CHEMNAME (DIALOG)
- CHEMSEARCH (DIALOG)
- CHEMSIS (DIALOG)
- CHEMZERO (DIALOG)
- CTCP (CIS)
- DARC (Questel)
- SANSS (CIS)
- TSCA Inventory (CISIS)
- TDIS
- UVCB

2. Computerized Models

- CHEMEST (VAX)

3. Manual Data Bases

   o ICB Card File on Carcinogens

4. Other Sources

   o Chemical Dictionaries/Handbooks

Control Technology Analysis
Functional Statement

Control technology analysis provides support for studies and analyses of exposure to new chemical and technological alternatives for reducing human and environmental exposure including personal protective devices and other industrial hygiene measures, process changes, and effluent controls. It provides a review and evaluation of production technology and alternative technologies, and estimates the effects on release and worker exposue resulting from use of alternative control measures. This function performs control effectiveness analysis for specific projects according to the goals, scope, technical approach, and resource requirements planned for the project.

Control Technology Analysis

Major Sub-functions

- Determine methods of manufacture, processing or use, and related worker activities,
- Determine potential for and quantities of environmental release during manufacture,
- Determine scenarios for worker activities and possible levels of exposure,
- Describe workplace, engineering exposure controls, personal protective equipment commonly employed in industrial processing,
- Describe environmental release controls (i.e., waste control process) commonly used.

Information Resources

1. Computerized Data Bases (Bibliographic)

- BHRA FLUID OCCUPATIONAL HAZARD (DIALOG)
- CA SEARCH (DIALOG)
- CHEMICAL INDUSTRY NOTES (DIALOG)
- COMPENDEX (DIALOG)
- DOE ENERGY (DIALOG)
- ELECTRIC POWER (DIALOG)
- EIS INDUSTRIAL PLANTS (DIALOG)
- ENVIROLINE (DIALOG)
- INSPEC (DIALOG)
- ISMEC (DIALOG)
- MEDLINE (MEDLARS)
- METADEX (DIALOG)
- NIOSHTIC (DIALOG)
- NTIS (DIALOG)
- PAPERCHEM (DIALOG)
- POLLUTION ABSTRACTS (DIALOG)
- PTS F&S INDEXES (DIALOG)
- PTS PROMPT (DIALOG)
- RAPRA (DIALOG)
- SCISEARCH (DIALOG)
- SURFACE COATINGS (DIALOG)
- TEXTILE TECHNOLOGY DIGEST (DIALOG)
- TOXICOLOGY DATA BANK (MEDLARS)
- TOXLINE (MEDLARS)
- WORLD TEXTILES (DIALOG)

2. Computerized Data Bases (Non-bibliographic)

- Industry File
- Inventory
- TDIS

3. Other Sources

- Chemical Manufacturers National Inspection Summary Report (OSHA)
- Document Information Directory System (NIOSH) SRI
- Process Economic Profiles (SRI)
- Chemical Economic Handbook (SRI)
- Handbooks
- Kirk Othmer Encyclopedia
- National Occupational Hazard Survey (NIOSH)

Economic Analysis
Functional Statement

The main objective of economic analysis is the determination of potential economic costs and socioeconomic benefits of any regulatory and non-regulatory control actions on chemical substances for purposes of the Toxic Substances Control Act. This function involves analyses of the chemical market, industry trends, price, price trends, chemical uses, use trends, potential uses for new chemicals, chemical substitutes and their uses, etc. It provides economic policy studies as required by TSCA; provides economic and market studies of chemical compounds; estimates the economic and socioeconomic impacts of actions taken under section 4, 5, 6 and 8 of TSCA to gather information on, require testing of, and to control the manufacture, import, processing, use and distribution of chemical substances; prepares Regulatory Impact Analysis, Regulatory Flexibility Analysis and other economic analyses as required by statute or executive order; develops scenarios of incentive programs as alternatives to regulatory options and performs cost-benefit and cost-effectiveness analyses of alternative regulatory options.

Economic Analysis

Major Sub-functions

- Determine present and potential uses for chemical,
- Describe historic market patterns,
- Identify manufacturers, location of plants, and production volumes, prepare manufacturers profile,
- Identify import/export patterns, U.S. and international market conditions and trends,
- Identify market growth pattern,
- Evaluate economic feasibility of potential substitute chemicals,
- Evaluate economic impact of substitute chemicals,
- Determine potential substitutes for end product(s) the chemical is used to manufacture,
- Analyze effect of TSCA rulings on market, or report burden of cost and economic impact of testing.

Information Resources

1. Computerized Data Bases: (Non-bibliographic)

- CHEMICAL INDUSTRY NOTES (DIALOG)
- CICIS
- CLAIMS/CLASS (DIALOG)
- CLAIMS/PAT (DIALOG)
- Dun & Bradstreet
- DISCLOSURE (DIALOG)
- EIS INDUSTRIAL PLANTS (DIALOG)
- FIND/SVP REPORTS & STUDIES INDEX (DIALOG)
- FOREIGN TRADERS INDEX (DIALOG)
- HARFAX (DIALOG)
- Inventory (CAS)
- MILLION DOLLAR DIRECTORY (DIALOG)
- PAPERCHEM (DIALOG)
- PREDICASTS (DIALOG)
- PTS INDEXES (DIALOG)
- PTS PROMPT (DIALOG)
- Section 8(a) Level A Data Base
- TRADE & INDUSTRY INDEX (DIALOG)
- Toxic Economic Data Base
- X-Market

2. Manual Data Bases

- o PMN Case History Files
- o RIB Use Code Data Base

3. Other Sources

- o 1977 Census of Manufacturers
- o 1980 Census of Manufacturers
- o International Trade Commission Report
- o Interagency Testing Committee Reports
- o Kirk-Othmer Encyclopedia
- o Personal Contacts with Industry
- o Chemical Economics Handbook (SRI)
- o Directory of Chemical Producers (SRI)
- o Specialty Chemicals (SRI)
- o Process Economics Program (SRI)
- o Reference & Textbooks
- o Trade Journals

Health Effects Analysis
Functional Statement

Health effects analysis focuses on assessing the nature and biological significance of the hazards that chemicals may pose to human health. This function reviews, validates, and evaluates test data submitted by industry, along with other relevant research results, and determines chemical toxicity or other harmful effects in accordance with agency policy. This function identifies, evaluates, and applies new methods and techniques for epidemiological and laboratory testing in support of OTS programs. Specific areas of concern include acute, subchronic and chronic toxicity, onocogenicity, mutagenicity, teratogenicity, neurotoxicity, reproductive effects, and other health end points.

Health Effects Analysis

Major Sub-functions

- Relate chemical structure to potential health effects (i.e., acute and chronic toxicity, oncogenicity, teratogenicity, etc.)
- Substantiate health effects and list uncertainties of prediction
- Determine adequacy of testing procedures for chemicals for risk assessment; including evaluation and application of new test methods
- Screen for potential health effects

Information Resources

1. Computerized Data Bases: (Bibliographic)

- BIOSIA (DIALOG)
- CA ABSTRACTS (DIALOG)
- CANCERLINE (MEDLARS)
- EMIC (ORNL)
- ETIC (ORNL)
- EXCERPTA MEDICA (DIALOG)
- LIFE SCIENCES (DIALOG)
- MEDLINE (MEDLARS)
- NIOSHTIC
- NTIS (DIALOG)
- RTECS (MEDLARS)
- SCI SEARCH (DIALOG)
- TOXICOLOGY DATA BANK (MEDLARS)
- TOXLINE (MEDLARS)

2. Computerized Data Bases (Non-bibliographic):

- DARC (Questel)
- DERMAL ABSORPTION (SPHERE)
- GENE-TOX (SPHERE)
- SANSS (CIS)
- TERA-TOX (SPHERE)
- TDIS

3. Manual Data Bases

- Chemicals Identified in Human Biological Media
- ITC Profiles
- ITC Reviews
- OPP Registration Data
- Phthalate Clearing House
- Section 8(d) Studies
- TRDB Documents

4. Computerized Models

- ARTHUR (VAX)
- CHEMLAB (VAX)
- Dose Response and Low-Dose Extrapolation Models
- SAS (VAX)

5. Tracking Systems

- CECATS
  - Section 8(e) Notices
  - Pre-Chip Hazard Information Profile
  - Chip Documents
  - FYI Submissions

6. Other Sources

- Contract Reports
- Industry Studies

Environmental Effects Analysis
Functional Statement

Environmental effects analysis focuses on assessing the hazards which specific chemicals may pose to the environment. This function reviews and evaluates test data submitted by industry, along with other relevant research results. It estimates the acute potential and chronic effects that chemicals may have on aquatic and terrestrial organisms and ecological systems. This function includes identification of natural populations at risk and the effects on individual ecological components, and abiotic environmental systems such as the atmosphere. It identifies and evaluates new laboratory and field methods that can be used to more reliably and accurately predict potential environmental effects.

Environmental Effects Analysis

Major Sub-functions

- Determine acute and chronic environmental toxicity and bioconcentration potential of chemicals based on test and research results, or predict on basis of structure and knowledge of similar chemicals.
- Define affected ecological components, and natural and agricultural resources, and populations at risk.
- Develop methods for integrated, interdisciplinary environmental effect assessment procedures.
- Evaluate methods for field and laboratory studies of interest to TSCA.
- Screen for potential ecological effects.

Information Resources

1. Computerized Data Bases (Bibliographic)

- AGRICOLA (DIALOG)
- APTIC (DIALOG)
- AQUATIC SCIENCE & FISHERIES (DIALOG)
- AQUALINE (DIALOG)
- ENVIROLINE (DIALOG)
- ENVIRONMENTAL BIBLIOGRAPHY (DIALOG)
- EXCEPTA MEDICA (DIALOG)
- LIFE SCIENCES (DIALOG)
- NTIS (DIALOG)
- OCEANIC ABSTRACTS (DIALOG)
- POLLUTION ABSTRACTS (DIALOG)
- TOXLINE (MEDLARS)

2. Computerized Data Bases (Non-bibliographic)

- ACQUIRE (SPHERE)
- AQUATOX (SPHERE)
- CICIS
- DENVER WILDLIFE RESEARCH CENTER (SPHERE)
- EPA Database & Environmental Model Index (Information Clearinghouse)
- FISH REPRODUCTIVE (CHIB)
- IEO/GAGE (GEMS)
- ISHOW (SPHERE)
- Needs Survey Data Base (VAX)
- 1977 Census of Manufacturers (GEMS)
- OAQPS Human Activity Patterns (GEMS)
- PEST
- PHYTODOX (HERD)
- RTECS (CIS)

- o SANSS (CIS)
- o STAR (GEMS)
- o STORET
- o SYMN
- o TERATOX
- o TDIS (Exposure File)
- o UVCB
- o Wholesale Trade Data (GEMS)

3. Computerized Models

- o CLOGP (VAX)

4. Manual Data Bases

- o ITC Profiles
- o ITC Reviews

Exposure Analysis
Functional Statement

Exposure analysis uses laboratory and field monitoring data, as well as data from predictive models to generate, as quantitatively as possible, assessments of the levels and durations of environmental, occupational and consumer exposures to chemical substances. The data used include factors such as chemical transport and transformation, persistence, as well as data on physical or chemical factors which may affect exposure levels and duration. This function provides OTS with estimates of chemical quantities released to the environment subsequent to treatment and of the exposures of the population and environmental biota. This function identifies the ranges of exposure and the exposure to specific populations or subpopulations. This function also provides OTS with new procedures to identify potentially exposed populations or subpopulations, and for conducting exposure assessments; identifies or develops new techniques for chemical fate and exposure modeling and physiochemical property estimation; and examines production release and workplace exposure based on outputs of the control technology analysis.

Exposure Analysis

Major Sub-functions

- Substance identification and analysis
- Estimate physical/chemical properties
- Screen chemicals for potential human exposure or nature and extent of exposure
- Determine materials balances
- Characterize releases after treatment
- Conduct fate analyses/fate modeling
- Identify and characterize human and nonhuman receptor populations
- Estimate exposures
- Conduct integrated exposure assessments
- Perform control options exposure analysis
- Develop models, test and validate them
- Acquire data for models
- Implement models, data and data analysis programs
- Develop exposure methodologies
- Develop and compile data for exposure assessments
- Develop physical/chemical property and environmental fate test methods
- Design monitoring studies
- Collect and analyze chemical monitoring data

Information Sources

1. Computerized Data Bases (Non-bibligraphic)

- CHEMFATE
- CICIS
- cLogP (VAX)
- Federal Reporting Data System (FRDS)
- Gauging Station File ("Hydrologically Linked Data System" -- HLDS)
- Geoecology (GEMS)
- Hazardous & Trace Substances Emissions Systems (AEROS)
- Hazardous Waste Data Management System
- IEO/GAGE (GEMS)
- Industrial Facilities Discharge File (4 WDMS)
- National Emissions Data System (AEROS)
- National Occupational Hazard Survey (OTS)
- Needs Survey Data Base (VAX)
- 1977 Census of Manufacturers (GEMS)
- OAQPS Human Activity Patterns (GEMS)
- OHM-TADS (CIS)
- OSHA (DIPS)
- Reach File (HLDS)
- STAR (GEMS)
- Source Test Data System (AEROS)
- Storage & Retrieval of Aerometric Data (AEROS)
- STORET
- Water Supply Data Base (HLDS)

- Water Quality Monitoring Station File (HLDS)
- Wholesale Trade Data (GEMS)

2. Computerized Models

- ATM (GEMS)
- CHEMEST (GEMS)
- ENPART (GEMS)
- EXAMS (GEMS)
- CLOGP (VAX)
- PTMAX (GEMS)
- SESOIL (GEMS)

3. Other Sources

- NPDES Permits

Regulatory Options Available
Functional Statement

Regulatory options analysis evaluates alternative remedial control measures under TSCA, other federal statutes, and non-regulatory approaches to achieving control of chemical risk. This function enables OTS to keep abreast of regulatory and non-regulatory chemical control programs in all sectors of industry. Specifically, this function is responsible for the identification and analysis of regulatory and non-regulatory remedial options for reducing unreasonable risk of injury to health and the environment from new and existing chemicals under Sections 4,5,6,7,8 and 21 of TSCA. This function prepares development plans for general or specific regulatory and non-regulatory projects to prohibit, limit, or control the manner or method of manufacture, processing, distribution, use, or disposal of new and existing chemical substances, and for needed testing of new or existing chemicals. It provides policy options analyses in support of unreasonable risk determinations in coordination with the chemical analysis, control technology, chemical economics, and risk assessment functions, coordinates with the chemical economics function on the economic analysis and technological impacts of control programs. It also provides regulatory support for individual PMN's, TME's and exemption notices, and drafts 5(e) orders for chemicals which may cause unreasonable adverse effects. Finally, this function ensures that regulatory and non- regulatory analyses are accomplished within current and accepted practice and are in consonance with OTS and EPA policies including Executive Order 12291, and the Regulatory Flexibility Act.

Regulatory Options Analysis

Major Sub-functions

- Evaluate alternative remedial control measures under TSCA and other federal statutes.
- Prepare development for needed testing of new and existing chemicals.
- Develop plans for regulatory and non-regulatory projects to prohibit, limit or control the manufacture, method of manufacture, processing, distribution, or use of new and existing chemicals.
- Analyze policy options to support unreasonable risk determinations in coordination with program findings.
- Provides policy option analysis support for PMN's, TME's exemption notices, and 5(c) orders.
- Ensure accomplishment of above functions within accepted practice in consonance with OTS and EPA policies and the Regulatory Flexibility Act.

Information Resources

1. Computerized Data Bases (Bibliographic)

   - CHEMLAW (DIALOG)
   - CRGS (DIALOG)
   - FEDREG (ORBIT)
   - FRSS (CIS)

2. Other Sources

   - Federal Register
   - Legislative History
   - U.S. Codes
   - PMN Case History Files
   - PMS
   - TDIS

III. OTS PROCESSES & INFORMATION RESOURCES

The Office of Toxic Substances is organized around three major programs or processes. These are:

- o New Chemicals Review
- o Existing Chemicals Review
- o Chemical Testing

In order to implement a process, which is mandated by a specific section or sub-section of TSCA, various functions and sub-functions (as discussed in Section II of this Notebook) must be performed in support of that process.

This section discusses the three major processes in detail. In each of these processes, a descriptive statement and a flow diagram about that process are presented. For each process, the major milestones are identified in the corresponding flow diagram. In Section IX of this Notebook, the major interim products from each milestone and the final product for a process are identified. For each of these products, the pertinent information requirements are discussed.

Following the functional statements and the flow diagrams for the three OTS processes is a table listing the major information resources that are specifically designed or used in support of a process. A brief description about each of these systems and its capabilities are also included. For more detailed information about these information resources, please refer to the OTS Directory of Information Resources or the OTS Data Directory.

It must be pointed out that the information resources described in this section of the Notebook are different from the bibliographic or non-bibliographic scientific and technical data bases discussed under Section II or Section V. Since it is believed that these bibliographic and non-bibliographic data bases are used to support the various OTS functions which in turn support the processes, they are therefore not included in this section. (This will be discussed in detail in Section IX.) The information resources that are discussed in this section include indexing or tracking systems or information systems or files that are specifically designed to provide direct support to the three processes.

For purposes of this Notebook, the New Chemicals Review Process includes Premanufacture Notification Review and PMN follow-up. (Section 5(h)(4) exemption notices review is not included here, since it is not in implementation. It appears, however, that this review process may have information requirements similar to those for the PMN initial review). The Existing Chemicals Review Process covers both Chemical Hazard

Identification and Special Chemical Review. The Chemical Testing Process covers only Test Rules Development, since there is no obvious information requirement for the development of Test Guidelines.

New Chemicals Review Process

The New Chemicals Review Process has three highly interrelated components:

- Premanufacture notification review
- Follow-up
- Section 5(h)(4) exemption

Among these three components, only the first two have been in implementation. Since limited PMN's will still be submitted to EPA by manufacturers who wish to have their chemicals considered for 5(h)(4) exemptions, it is believed that information requirements for processing the exemption notices will closely resemble those for the initial review stage of a regular PMN submission. Information requirements for the exemption activity will be discussed in future updates of this Notebook.

The functional statements for the Premanufacture Notification Review and the Follow-up components of the New Chemicals Review Program are presented in the following pages. Descriptions for the major information, indexing and tracking systems used, and flow diagrams follow the functional statement.

New Chemicals Review Process
I. Premanufacture Notification Review
Functional Statement

The Premanufacture Notification Review Program is responsible for the receipt, evaluation, and disposition of TSCA section 5 premanufacture notices, test market exemptions and 5(h)(4) exemption notifications, within the time constraints imposed by TSCA or by regulation. The program is managed by CCD while the technical efforts in the program are carried out by other OTS divisions. The Premanufacture Notification Review Program: (1) receives, interprets and validates data submitted with each PMN; (2) gathers and reviews additional data; (3) prepares risk assessments; (4) communicates with the submitting company as necessary for clarification or for additional data; (5) determines either dropping or referring chemicals for more detailed risk and benefit/cost analysis, after preliminary risk screening; (6) recommends appropriate measures, informal or regulatory, to control and reduce risks; and (7) makes recommendations after appropriate analysis and review to follow up on new chemical uses.

The Premanufacture Notification Review Program: (1) is responsible for identifying and implementing needed action to ensure compliance with TSCA intent including actions for limitations or injunctions under TSCA section 5(e) or 5(f), in coordination with the Office of the General Counsel, and arranges for hearings, as necessary; (2) identifies new chemicals that require control, and recommends control alternatives; (3) negotiates for appropriate controls; (4) identifies new chemicals which may be controlled or otherwise affected by other EPA programs, or other Federal regulatory Agencies. The Premanufacture Review Program manages the development, evaluation, and revision of reporting procedures and forms for new chemical premanufacture review, and oversees public hearings on rules, procedures, and reporting forms associated with premanufacture review. (For more detailed information about the PMN process, see Description of PMN Review Process prepared by the OTS Chemical Control Division).

New Chemicals Review Process
II. Follow-Up Process
Functional Statement

The Follow-Up Process manages the development of specific rules under TSCA Section 5, negotiated control actions and other actions that may be necessary to achieve the reduction of unreasonable risk for chemicals with new uses. Recommends and implements OTS policy on TSCA section 5 exemptions, early exits, and significant new use rules (SNURS). Considers requests for exemptions, e.g., site-limited rule, low volume rule, polymer rule, and specific manufacturing exemptions. Manages the development and promulgation of all follow-up actions on chemicals not on the TSCA Initial Inventory (i.e., rules under 5(a)(2); rules for significant new uses of chemicals; development of section 8(a) follow-up rules). Manages the review and revision of general program rules as appropriate to program implementation, coordinating resources with the Premanufacture Notification Review Program and other OTS and EPA offices. Performs liaison with EPA headquarters and regional enforcement activities in establishing and maintaining an effective program of monitoring compliance with TSCA section 5 rules.

More specifically, this process evaluates chemicals using the following procedures:

- Follow-up focus meeting
- Toxicity validation
- Initial new use exposure analysis
- Technical integration reports

Determines whether regulatory action under section 5(a)(2) or 8(a) is warranted. OTS Division Directors review regulatory recommendations for each candidate and decide if regulatory analysis is required. If regulatory action is appropriate, regulatory development is initiatied. SNURS, 8(d) rules are drafted, sent for Agency review, and proposed as final rules.

Existing Chemical Review Program
Functional Statement

The Existing Chemical Review process develops, oversees, and manages projects to define specific existing chemical problems warranting detailed evaluation and possible risk reduction action by OTS. This process performs the initial evaluation of data and petitions submitted to EPA under TSCA Section 4, 8(a), 8(c), 9(d), 8(e) and 21, and similar data submitted by other routes to determine whether the data indicate a significant risk to human health and environment. It determines whether the submitted data, in conjunction with other available information, pose a definite potential "problem" in terms of identifying a specific chemical, activity, exposed population, and adverse effect which warrant referral to the appropriate program for further TSCA action. Where current information is strongly indicative of a potential problem but inadequate to fully define the problem, the Existing Chemical Review process identifies appropriate mechanisms to obtain additional information needed to reach a disposition such as encouraging voluntary data submission, using TSCA Section 8 authorities, using EPA chemical testing resources, or referring chemicals to the Interagency Testing Committee through the EPA member. It oversees the evaluation of regulatory and non-regulatory control alternatives and makes recommendations for the most appropriate mechanisms to reduce risk. Existing Chemical Review plans and manages programs to encourage use of specific exposure reduction practices by the chemical industry through informational programs and development of Risk Management Advisories. Where rulemaking under Section 5 (Significant New Use Rule) or Section 6 is necessary, this process refers to other OTS processes as appropriate.

Chemical Testing Process
Functional Statement

The Chemical Testing Process is responsible for the development of criteria and procedures for evaluating whether chemical substances or categories of chemical substances should be subject to test rules under section 4 of TSCA. While many technical efforts in support of the program are carried out by other OTS divisions, the Program reviews and makes appropriate recommendations on negotiated or regulatory actions on the chemical substances, mixtures, and categories recommended for testing consideration by the TSCA Interagency Testing Committee and others. The program, in coordination with the above-mentioned technical representatives, is also responsible for: (1) developing test guidelines and protocols for testing and developing Good Laboratory Practice requirements; (2) assessing the availability of adequate testing facilities and personnel; (3) preparing test rules or decisions not to test as required under section 4 and holding public hearings on such rules after proposal; and (4) developing rules and procedures for granting exemptions from testing and for reimbursement under section 4(c); (5) reviewing and responding to requests for exemptions; and (6) negotiating with industry to achieve testing through negotiation.

Major Information Resources Specifically Designed or Frequently Used in Support of OTS Processes

New Chemicals Review Process

- PMN Analog Card File
- PMN Card File
- PMN Case Files
- PMN Tracking System
- Technical Data Indexing System (TDIS)
- TSCA Master Inventory File

Existing Chemicals Review Process

- Chemical Regulations and Guidelines System (CRGS)
- CHIP Existing Chemicals Tracking System (CECATS)

Chemical Testing Process

- Global Indexing System (For Section 8(d) submissions)
- ITC Hazard Information Profiles*
- ITC Hazard Information Reviews*
- ITC Tracking System*
- Section 8(a) Level A Information System
- Test Rules Development Support Documents

* Used by the Interagency Testing Committee

Brief Summaries About the Information Resources Designed or Used in Support of OTS Processes

1. Chemical Regulations and Guidelines System (CRGS): An automated on-line system covering Federal statutes, promulgated regulations, and Federal guidelines and standards related to the control of chemical substances. Each chemical cited in a regulatory document is indexed by chemical name, CAS Registry Number, and a context in which the substance appears in the document. Each document is described in terms of publication date, title, abstract, index terms, and chemical identifiers.

2. CHIP Existing Chemicals Tracking System (CECATS): An automated document tracking system for existing chemicals, including all CHIP and pre-CHIP compounds, and those substances submitted under section 8(e) of TSCA or on an FYI basis. CECATS in organized into seven interconnected files. The user can use the system to document decisions and types of information included and determine status of the substance within OTS.

3. Global Indexing System (In Section 8(d) Submissions): A general indexing system designed to facilitate retrieval of documents. For 8(d) submissions, the user can search by chemical identifiers or by submitting company.

4. ITC Hazard Information Profiles: A manual file of brief and concise summaries of chemical, physical, health and environmental effects data on a chemical derived from limtied review of readily available information sources. The Interagency Testing Committee uses it for supporting TSCA Section 4 test rules development.

5. ITC Hazard Information Reviews: A manual file containing detailed information on exposure, chemical/physical properties, biochemistry, toxicity and environmental effects for specific chemicals and categories of chemicals selected for study by the Interagency Testing Committee.

6. ITC Tracking System: An automated system that provides quick tracking of chemicals studied by the Interagency Testing Committee and the decisions on each chemicals.

7. PMN Analog Card File: A manual file of chemicals that have been searched as analogs for PMN chemicals, including, for each substance, the CAS Registry Number, chemical nomenclature, and PMN number.

8. PMN Card File: A manual file of PMN and TME chemical names and structures, filed by both PMN number and chemical substructures. This file is used to identify previous PMN's that relate to ongoing reviews.

9. PMN Tracking System: An automated tracking system with statistical capability that is used in support of PMN review. It tracks the status of each PMN or TME submission from date of submission through notice of commencement of manufacture. It is used to prepare monthly and weekly reports to the PMN program.

10. Section 8(a) Level A Information System: An automated system containing the data collected under the Preliminary Assessment Information Rule under Section 8(a) of TSCA. This system provides such information as chemical identity, plant site location, plant site activities, manufacturer products and consumer uses of chemical substances designated for testing by the Interagency Testing Committee. The system provides a tracking capability to monitor form submissions under the reporting rule.

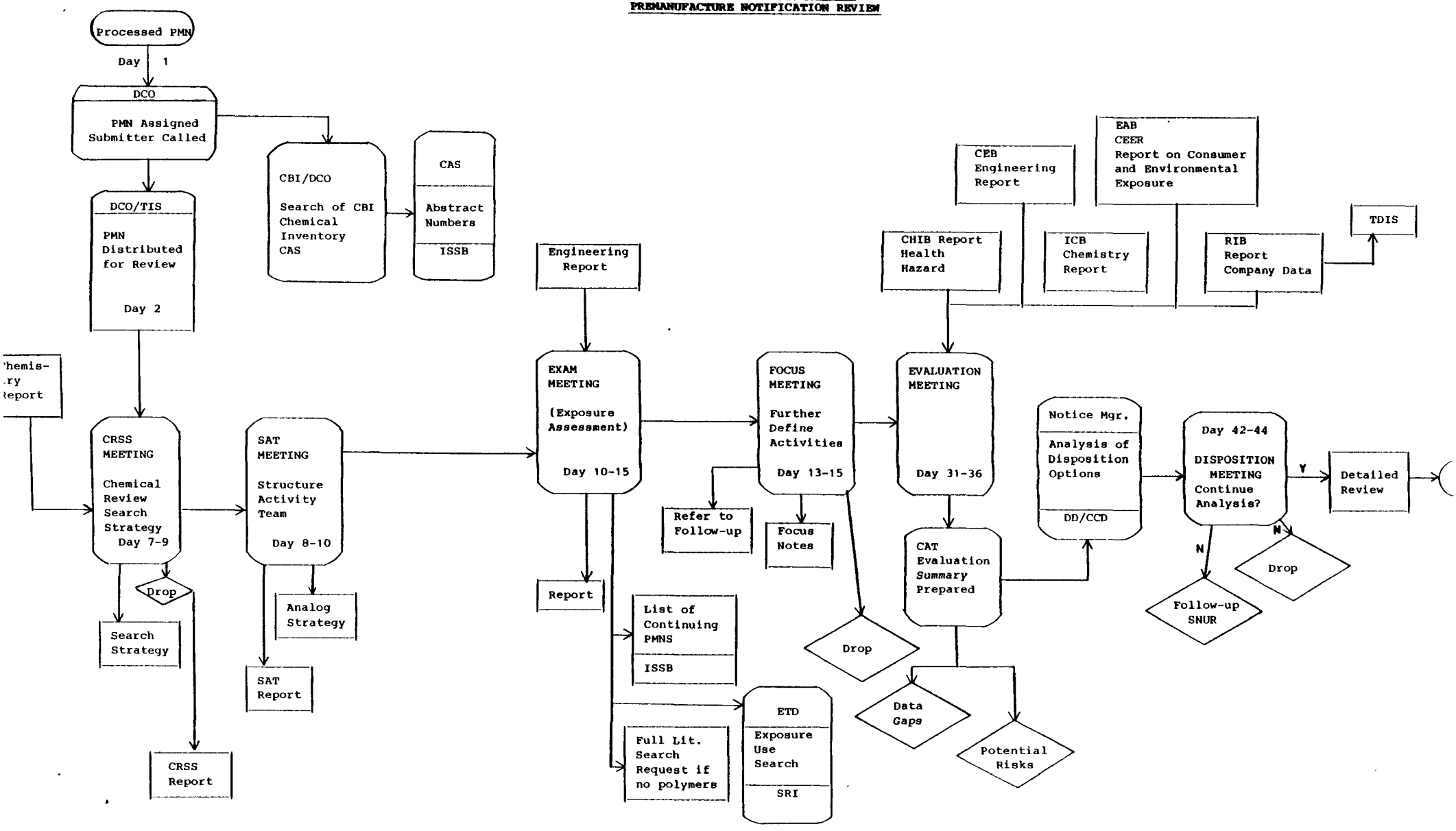
11. Technical Data Indexing System (TDIS): An automated system designed specifically for supporting the PMN review process by indexing PMN data and thereby providing quick referrals to historical analyses of chemicals similar to the subject chemical under review. Chemicals can be searched by name fragments and special functional codes. This system also allows for statistical analysis of trends in PMN decision-making.

12. Test Rules Development Support Documents: A manual file of review documents prepared to assist in evaluating the health and/or environmental effects of chemicals nominated for testing by the Interagency Testing Committee.

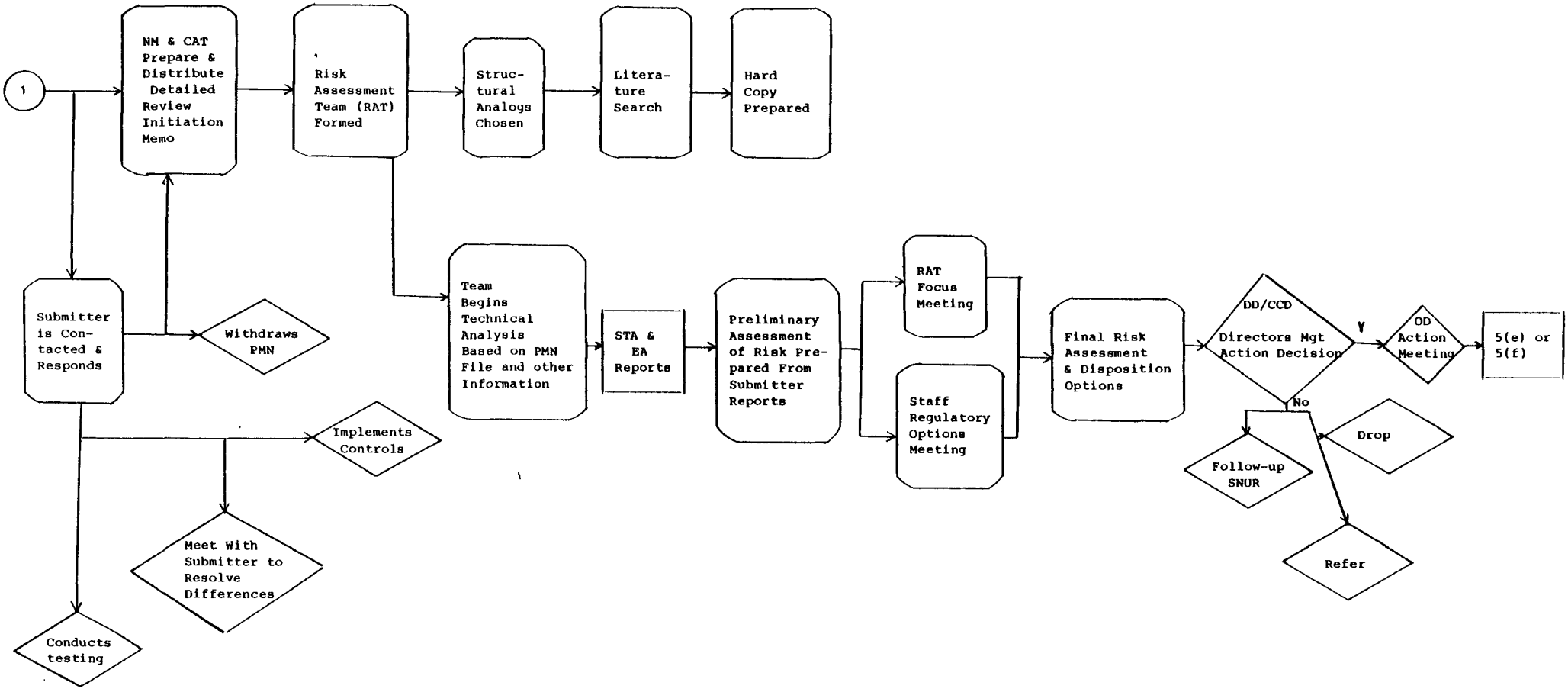
13. TSCA Master Inventory File: A collection of automated as well as manual files maintained by the Chemical Abstracts Service under contract with OTS. This file contains 60,000 chemicals and represents the most up-to-date file of substances reported for the Inventory and of substances that have been introduced into U.S. commerce after completing Section 5 PMN review. This file is used for supporting the PMN review process by conclusively determining whether a substance is on the Inventory.

PROCESS FLOW DIAGRAMS

NEW CHEMICAL REVIEW PROCESS
PREMANUFACTURE NOTIFICATION REVIEW

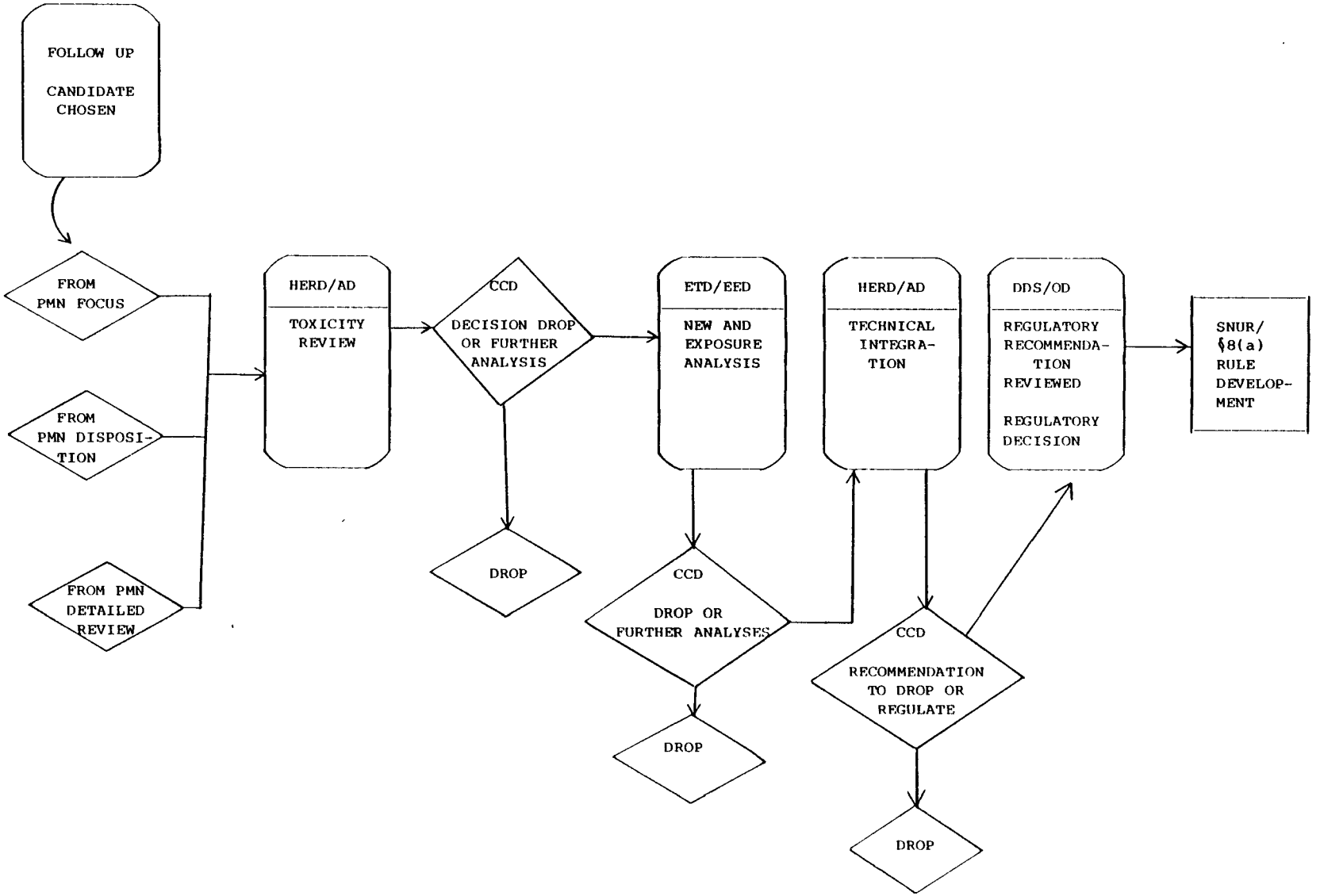


NEW CHEMICAL REVIEW PROCESS
PREMANUFACTURE NOTIFICATION REVIEW (continued)

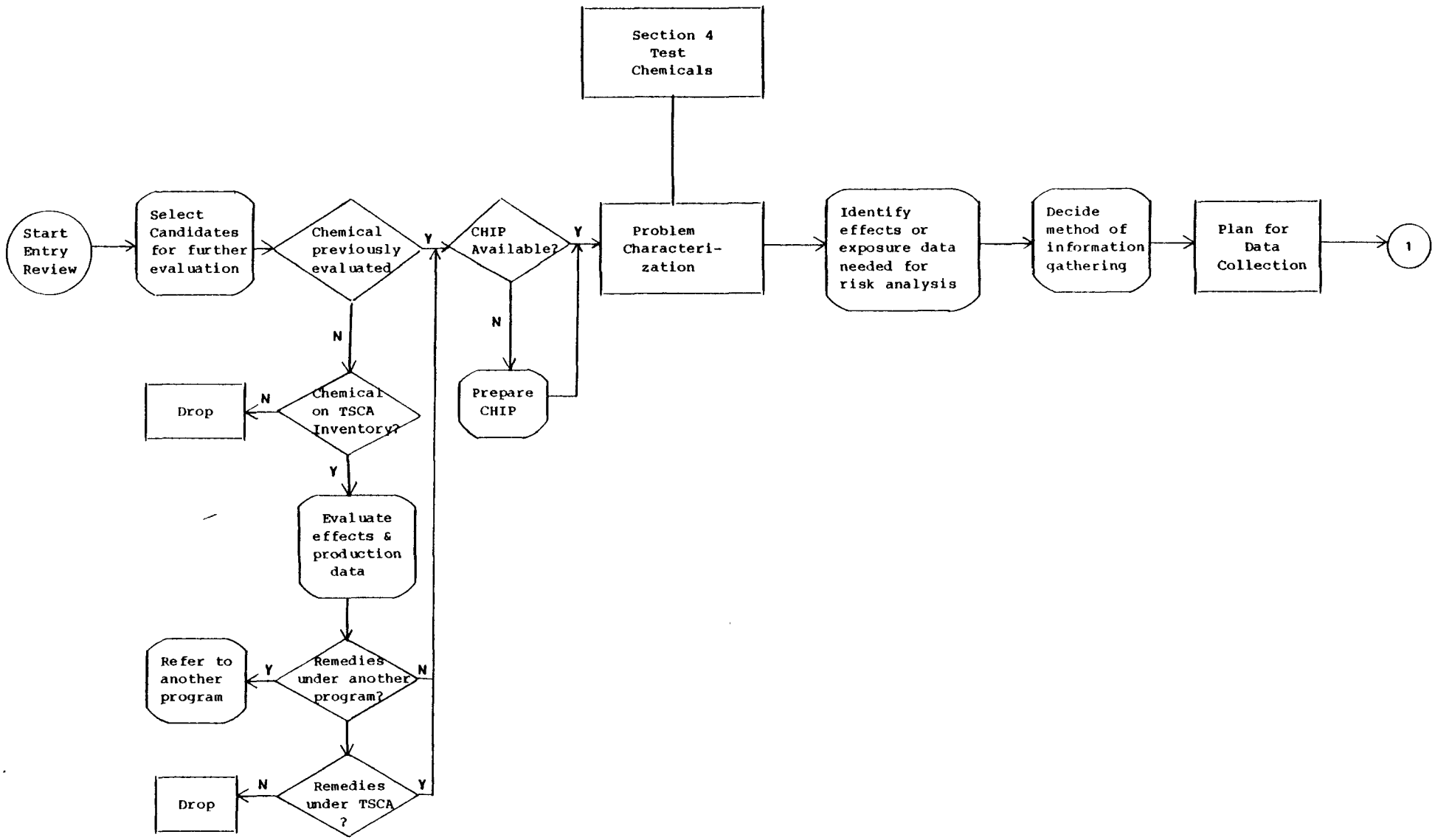


NEW CHEMICAL REVIEW PROCESS

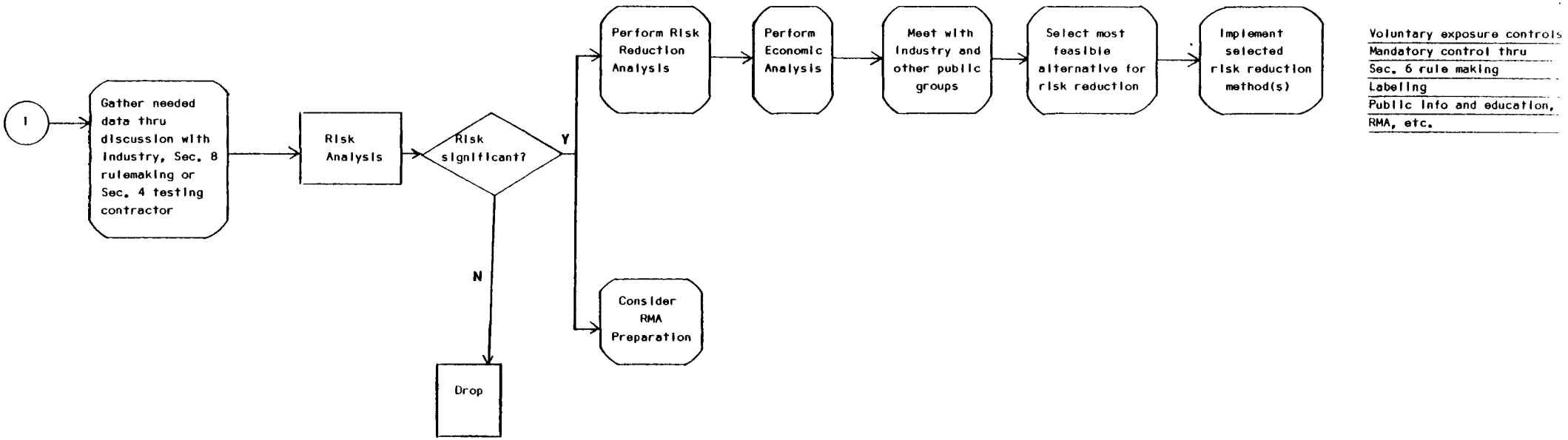
Follow-Up



EXISTING CHEMICALS REVIEW PROCESS

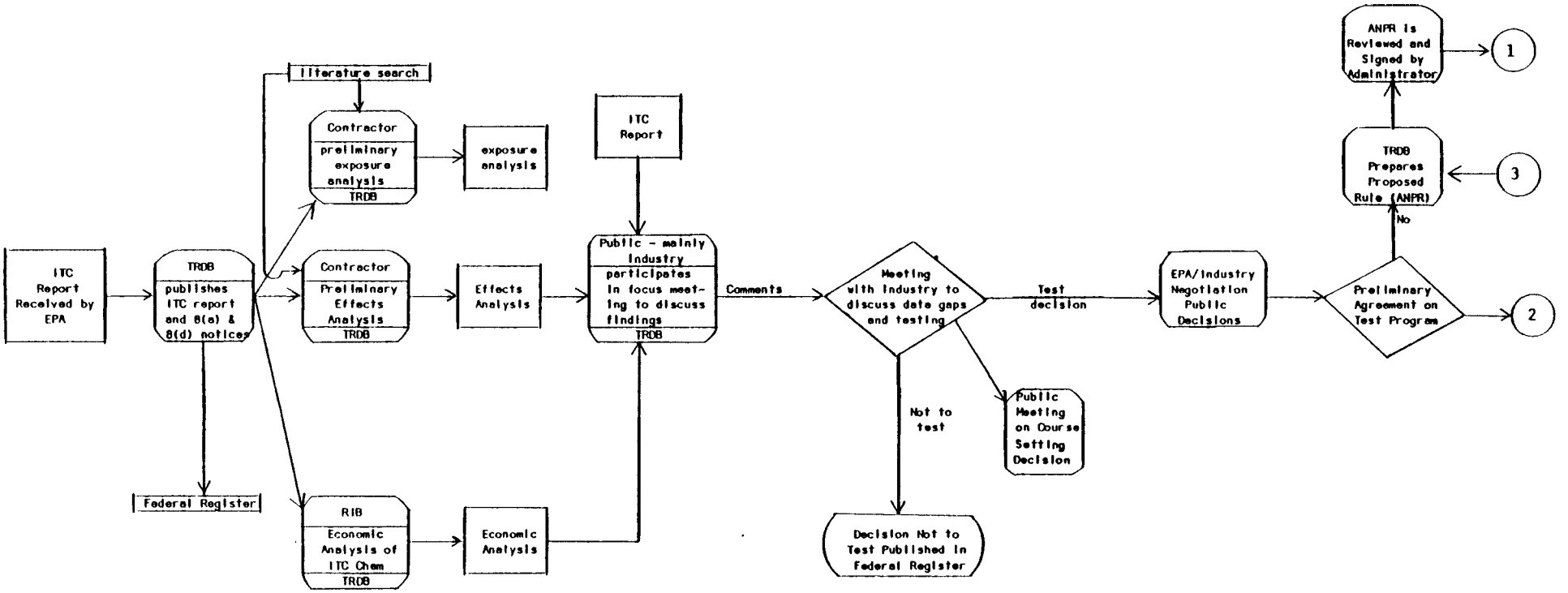


EXISTING CHEMICALS REVIEW PROCESS (cont.)



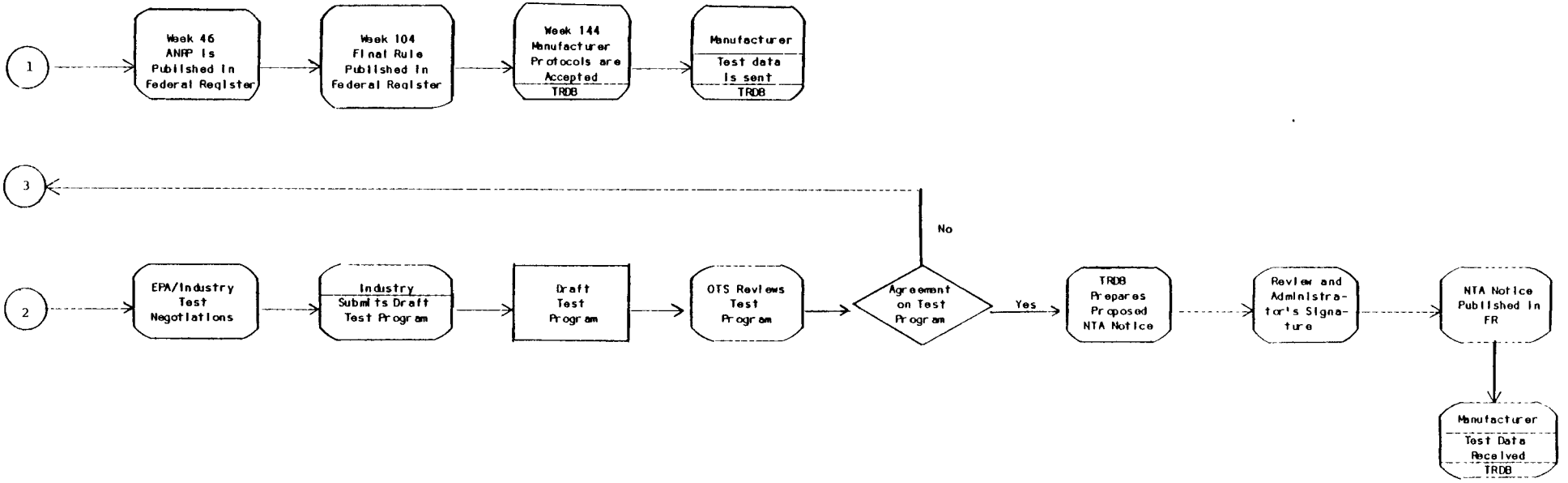
CHEMICAL TESTING PROCESS

TEST RULES DEVELOPMENT



CHEMICAL TESTING PROCESS

TEST RULES DEVELOPMENT (cont.)



IV. DATA CATEGORIES, SUB-CATEGORIES & DEFINITIONS

This section classifies the currently known OTS user information requirements into the following nine major data categories:

- o Substance Identification
- o Physical Chemical Properties
- o Health Effects
- o Environmental Effects
- o Production/Processing
- o Use/Disposal
- o Exposure
- o Chemical Economics
- o Regulations/Controls

Within each of the nine major data categories, sub-categories are identified. A sub-category is not necessarily a data element; it may, in some cases, represent a group of data elements.

The classification of data categories and sub-categories is a complex and difficult task. There is probably no one single "correct" way of categorizing the types of technical data that OTS needs in support of the implementation of TSCA. Therefore, some of the data categories were developed partially based on specific information requirements for certain OTS functions, e.g., Health Effects (for Health Effects Analysis), Environmental Effects (for Environmental Effects Analysis), or Chemical Economics (for Economic Analysis). However, certain data categories, e.g., Physical Chemical Properties, Use, etc. may reflect the traditional grouping of data elements from an information management standpoint, and do not necessarily align themselves with specific OTS functions. Physical Chemical Properties data, for example, are used in support of such OTS functions as Chemical Analysis, Exposure Analysis, and Environmental Effects Analysis.

In determining how certain sub-categories should be listed under a specific data category, two factors were taken into consideration. First, a sub-category is placed under a data category which, from a hierarchial standpoint, is the most logical parent of that sub-category. Therefore, for example, CA Index Name (a sub-category) is listed under Substance Identification (a major category). Second, if a sub-category can be logically placed under more than one major category, that sub-category is then listed under the more appropriate category. For example, Method of Manufacture (a sub-category) is listed under Substance Identification (a major category) instead of Production/Processing (another major category), since this information is often needed in establishing the identity of a substance.

To facilitate use and understanding of the data categories and their sub-categories, several data organization techniques are used. First, a scope note is included for each major data category, describing the scope or special features of that category. (A scope note is, nevertheless, not a definition and, therefore, does not define a category). Second, a definition (in some cases, a scope note) is developed for each sub-category. Third, where a sub-category may be logically placed under more than a single major category, the more appropriate category is chosen to incorporate that sub-category and its definition. The same term is repeated under the less appropriate category without a definition, and a "See" reference is used referring the reader to the more appropriate category. For example, Method of Manufacture is listed under Substance Identification with a definition. The same term is repeated under Production with a "See Substance Identification" cross reference. Fourth, for related sub-categories, "See also" references are used. For example, a "See also Production/Processing" cross reference is included for Method of Manufacture (under Substance Identification), alerting the reader that there is a related term, i.e., Production Technology, listed under Production/Processing. This will allow the reader to consult the related term if necessary.

In using this section of the Notebook, the following must be taken into consideration:

1. For each data category, only those sub-categories that are needed by OTS are included. Therefore, a category may not include all of the possible sub-categories.

2. Some of the sub-categories represent the types of information that are not readily available in either the open literature or existing information resources.

3. The definitions for the sub-categories are not necessarily the types of definitions that can be found in a text book or a dictionary. Many of the definitions are scope notes describing what is covered under a sub-category.

A. SUBSTANCE IDENTIFICATION
Sub-Categories

(Note: The data sub-categories included are those that are needed in establishing the identity of a chemical substance as defined by TSCA. Data elements for identifying Class II substances are also included.)

1. CA Index Name
2. CAS Registry Number
3. Synonym
4. Molecular formula
5. Chemical description/composition
6. Method of Manufacture (See Substance Identification: Synthetic Reactions and Constraints)
7. Synthetic reactions and constraints (See also Production/ Processing: Production Technology)
8. Structural diagram
9. Method of identification
10. Indices of structure
11. Linked substances*

*For purposes of this Notebook, this sub-category is not included in the matrices presented. From an informational standpoint, this sub-category is included under the other sub-categories of the Substance Identification category.

A. SUBSTANCE IDENTIFICATION
Definitions

1. CA Index Name: A unique, fully systematic name assigned by the Chemical Abstracts Service (CAS) in accordance with a set of rigorous and comprehensive nomenclature rules to ensure that a single preferred name can be developed for each chemical substance. The CA Index Name is sometimes referred to as the CAS Preferred Name. A CA Index Name may be made up of several parts, each playing a specific role in describing a chemical substance. The principal portion is the "heading parent" which describes the most significant feature(s) of the substance. Additional parts of the name are appended to the heading parent to describe substituent groups, derivative information, and stereochemistry.

2. CAS Registry Number: A number consisting of up to 9 digits is assigned by the Chemical Abstracts Service to represent only one chemical substance, insofar as that substance has been elucidated and defined. The CAS Registry Number is usually separated into 3 portions by hyphens. The first portion, starting from the left, has up to 6 digits; the second portion has 2 digits and the last portion consists of a single check digit which is used to validate of the entire Registry Number.

3. Synonym: A synonymous chemical name which may be a non-systematic chemical name, a common name, a trade name, a class name, a code, or a trivial name. Care must be exercised in using the synonymous names since they often do not uniquely describe a chemical substance.

4. Molecular Formula: A systematic summation of the actual numbers and kinds of atoms present in a molecule of a chemical substance. For Class II substances and polymers, the molecular formula often identifies only the kinds of atoms present, as the number of atoms is unknown or variable.

5. Chemical Description/Composition: In certain Class II substances and polymers, where the CAS Index/Preferred Name may not be sufficiently detailed, a chemical description is required to identify the substances completely. The definition may include descriptions of the synthetic reaction or reaction pathway, the relative amounts of precursors or reactants, composition, and certain physical/chemical properties.

6. Method of Manufacture: (See Substance Identification: Synthetic Reactions and Constraints)

7. Synthetic Reactions and Constraints: A description of the reactants, the synthetic reaction(s) used, and any chemical constraints on the reaction(s) that must be taken into account when the substance of interest is produced. Typical chemical constraints include the use of high pressure or heat and the exclusion of oxygen or water vapor. Synthetic reactions often include the mechanism of the reaction if this is unusual, or the identification of side-reactions if these are significant. A complete group of synthetic reactions and side-reactions should elucidate the origin of impurities, by-products, and co-products. (See also Production/Processing: Production Technology.)

8. Structural Diagram: A 2-dimensional representation of the bonds and atoms, their connections, and stereochemical relationships in a molecule of chemical substance. For Class II substances, this diagram will be illustrative only and may be incomplete. In the case of polymers, the range and average degree of polymerization may be included.

9. Method of Identification: The analytical technique and/or protocol used in establishing the identity of a chemical substance.

10. Indices of Structure: This section includes such things as codes for functional groups, rings, degree of complexity, and categories of Class II substances.

11. Linked Substances:

    (a) By-products: Chemical substances "produced without separate commercial intent during manufacture or processing of another chemical substance(s) or mixture(s)." FEDERAL REGISTER (42 FR 64575) Inventory Reporting Regulations (40 CFR 710.2)

    (b) Co-products: Chemical substances "produced for a commercial purpose during the manufacture, processing use, or disposal of another chemical substance(s) or mixture(s)." FEDERAL REGISTER (44 FR 2264) Premanufacture Notification Requirements and Review Procedures (40 CFR 720.2)

    (c) Impurities: Chemical substances "unintentionally present with another chemical substance." FEDERAL REGISTER (42 FR 64576) Inventory Reporting Regulations (40 CFR 710.2).

    (d) Stabilizers, emulsifiers, catalysts, and other additives, that are intentionally present. Not defined here.

B. PHYSICAL/CHEMICAL PROPERTIES
Sub-Categories

(Note: The listing of physical chemical properties covers only those that are frequently used by OTS for TSCA purposes.)

1. Melting Point
2. Boiling Point
3. Vapor Pressure
4. Partition Coefficient (Log P)
5. Solubility
6. Density
7. Relative Vapor Density
8. Henry's Law Constant
9. Adsorption Coefficient
10. Dissociation Constant (k_a or k_b)
11. Flash Point
12. Flammable Limits
13. Molecular Weight
14. Color
15. Odor
16. Physical State
17. Particle Size
18. Chemical Incompatibility
19. pH
20. Extractability
21. Hydrolysis Rate
22. Viscosity
23. Decomposition Temperature
24. Sublimation Temperature

B. PHYSICAL CHEMICAL PROPERTIES
Definitions

1. Melting Point: The melting point is the temperature at which a substance changes from the solid to the liquid state. It indiates at what temperature solid substances liquify.

2. Boiling Point: The boiling point is the temperature at which a liquid under standard atmospheric pressure (or other specified pressure) changes from the liquid to the gaseous state. It is an indication of the volatility of a substance. The distillation range in a separation process, the temperature at which the more volatile liquid of a mixture forms a vapor, is used for mixtures in the absence of a boiling point.

3. Vapor Pressure: The vapor pressure of a substance is the pressure which a vapor, in a closed container and in equilibrium with its solid or liquid form, exerts on the enclosing walls. It is a function of the substance and, if it reaches the prevailing atmospheric pressure, the liquid boils or sublimes. It provides an indication of the relative tendency of a substance to volatilize.

4. Partition Coefficient (log P): The n-octanol/water partition coefficient is the ratio of a substance's concentration in water-saturated octanol divided by its concentration in octanol-saturated water at equilibrium. The n-octanol/water partitioning system provides an indication of a substance's ability to bioconcentrate in aquatic and other organisms. The information is frequently reported as the common logarithm of the partition coefficient, log P, rather than as the partition coefficient itself.

5. Solubility: The solubility of a substance in water (or other solvent) is the weight of the dissolved substance per volume water of solution in water (or other solvent) when the solution is at equilibrium with an excess of the substance, i.e., saturated at a specific temperature. This definition is limited to homogeneous materials.

6. Density: Density is the mass of a liquid, solid or gas per unit volume of that substance, i.e., the mass in grams contained in 1 cubic centimeter of a substance at 20°C and 1 atmosphere pressure.

7. Relative Vapor Density: Relative Vapor Denisty is the ratio of the weight of a gas to the weight of an equal quantity of air. Air, the standard, is given the value of 1.

8. Henry's Law Constant: The Henry's Law Constant quantitatively expresses the effect pressure has on the solubility of gas. The Law states that the mass of a slightly soluble gas that dissolves in a definite mass of liquid at a given temperature is very nearly directly proportional to the partial pressure of that gas. This assumes that the gas does not unite chemically with the solvent.

9. Adsorption Coefficient: This coefficient, e.g., the Freundlich Adsorption Coefficient, attempts to quantify the adherence of a substance to a surface. The transport, degradation and bioavailability of a substance are greatly affected by its adsorption properties.

10. Dissociation Constant (K_a, K_b): The dissociation constant (K_a or K_b) represents the degree of ionization of Brønsted acids and bases in solution. Usually reported as the negative logarithm (pK_a or pK_b) of the dissociation constant.

11. Flash Point: The Flash Point is the temperature at which a liquid or volatile solid gives off a vapor sufficient to form an ignitable mixture with the air near the surface of the liquid or within the test vessel.

12. Flammable Limits: Flammable Limits denote the concentration range, of a vapor or gas in a mixture with air, at which the flammable or explosive mixture will ignite and continue burning on its own after ignition.

13. Molecular Weight: A summation of the individual atomic weights based on the numbers and kinds of atoms present in a molecule of a chemical substance. For polymers and certain Class II substances, this may include molecular weight distributions, ranges, and averages.

14. Color: The aspect of objects (including chemical substances) that may be described in terms of hue, lightness, and saturation. Includes both qualitative (e.g., buff-colored) and quantitative (e.g., absorption maximum at 5800 Angstroms) description of color.

15. Odor: A description of the smell of a chemical substance.

16. Physical State: Whether a chemical substance is a gas, liquid, or solid under ambient or other given conditions.

17. Particle Size: The average diameter of the individual particles in a particular solid. Often both average particle size and range of particle size are used.

18. Chemical Incompatibility: The capacity of a chemical substance for facile reaction with another chemical substance to produce an undesired product. For example, isocyanates are chemically incompatible with aqueous solutions, which hydrolyze the isocyanate groups.

19. pH: A value taken to represent the acidity of alkalinity of an aqueous solution; it is defined as the logarithm of the reciprocal of the hydrogen ion concentration of a solution:

$$pH = \log \frac{1}{[H^+]}$$

20. Extractability: This includes extractability by water or other solvents as reported according to various sources (ASTM, etc.).

21. Hydrolysis Rate: The rate of reaction of a chemical substance with water to form a new substance or substances. Usually not applied to reactions where oxidation or reduction of water is involved.

22. Viscosity: The internal resistance to flow exhibited by a fluid. A liquid has a viscosity of one poise of a force of one dyne per square centimeter causes two parallel liquid surfaces one square centimeter in area and one centimeter apart to move past one another at a velocity of one centimeter per second. Viscosity in poises divided by the liquid density at the same temperature gives kinematic viscosity in stokes.

23. Decomposition Temperature: The temperature at which heat causes the chemical degradation of a substance into two or more substances, which may differ from each other and from starting materials. The decomposition temperature of a substance is often of interest if it is below the melting point of the substance.

24. Sublimation Temperature: The temperature at which the partial pressure of a vapor in equilibrium with a solid substance is equal to one atmosphere. At this temperature, the solid passes directly into the vapor state without appearing in the intermediate liquid state.

C. HEALTH EFFECTS
Definitions

(Note: The sub-categories listed below represent the different types of human/animal toxicity data that OTS needs in evaluating the health effects of chemical substances for purposes of implementing TSCA. Headings in parenthesis are included for easy understanding of the sub-categories; they should not be used as sub-categories.)

(General Toxicity)

1. Acute/Subchronic Toxicity
2. Chronic Toxicity

(Local Toxicity)

3. Eye Irritation
4. Skin Irritation

(Specific Toxicity)

5. Mutagenicity
6. Neurotoxicity
7. Oncogenicity
8. Sensitization
9. Reproductive Toxicity
10. Teratogenicity

(ADME)

11. Absorption
12. Distribution
13. Metabolism
14. Excretion

(Epidemiology)

15. Epidemiology

C. HEALTH EFFECTS
Definitions

(Generalized Toxicity)

1. Acute/Subchronic Toxicity: Immediate or short term response of an organism to a single dose of a chemical substance through various routes of exposure. Refers to generalized toxic response with lethality usually being the observed endpoint. Includes LD_{50}, LC_{50}, LD_{Lo} and other quantitative endpoints.

2. Chronic Toxicity: Response of an organism to repeated, long-term exposure to a chemical substance. Length of exposure and time of response varies with the organism. Observed endpoints may be on sublethal or lethal effects.

(Local Toxicity)

3. Eye Irritation: Reactions produced in the eye after exposure to a chemical substance. Damage may be assessed by changes in the cornea, iris, and conjunctiva, in the intraocular pressure, in capillary permeability, and in other *in vivo* and *in vitro* conditions.

4. Skin Irritation: Local inflammatory response of the skin observed after exposure to a chemical substance. Exposure can be a single, repeated, or prolonged contact. Manifestations include erythema, edema, ulceration, necrosis, and formation of scar tissue. Skin irritation does not involve the immune mechanism.

(Specific Toxicity)

5. Mutagenicity: Inheritable changes in the linear structure of DNA caused by exposure to a chemical substance.

6. Neurotoxicity Behavior: Observed effects to the nervous system caused by exposure to a chemical substance. Includes effects to neuromuscular transmissions and pathological changes in nerves, spinal cord, or brain. Behavioral effects are also included under this category.

7. Oncogenicity: Tumor formation observed in organisms in response to exposure to a chemical substance. May include number, type, site, growth rate and ability to metastasize of tumor.

8. Sensitization: A response of the immune system (an allergic reaction) of a organism caused by its being exposed to a chemical substance.

9. Reproductive Toxicity: Observed effects on reproductive organs or reproductive performance of an organism caused by exposure to a chemical substances. Includes egg laying, fertilization, number of offspring, and sexual and asexual reproduction. Excludes tertogenic effects on offspring (See Teratogenicity).

10. Teratogenicity: Abnormalities observed in offspring of females exposed in utero via chemical substance, and changes in birth weight, developmental delays, or fetal death.

(ADME)

11. Absorption: The uptake of a chemical substance through a membrane, by an organism. Absorption may be represented quantitatively sometimes as rate.

12. Distribution: The internal transport and deposition of a chemical substance in body fluids, tissues, and organs. Distribution can be reported quantitatively.

13. Metabolism: The physical or chemical alteration of a chemical substance by an organism.

14. Excretion: Elimination of a chemical substance or its metabolites by an organism. Excretion can be represented quantitatively and may include rate.

(Epidemiology)

15. Epidemiology: Study of the exposure and toxic responses of human and animal populations to chemical substances. Can include frequency and geographic distribution.

D. ENVIRONMENTAL EFFECTS
Sub-Categories

(Note: The sub-categories listed below represent the different types of data that OTS needs in evaluating the environmental effects of chemical substances for purposes of implementing TSCA. Although some of the terminologies used are identical or similar to those listed under the Health Effects category, they nevertheless have different meanings and may be defined differently. Headings in parentheses are included for easy understanding of the sub-categories; they should not be used as sub-categories.)

(Aquatic Effects)

1. Acute Toxicity
2. Chronic Toxicity
3. Sublethal Toxicity
4. Bioconcentration/Biomagnification
5. Field Studies

(Terrestrial Effects)

6. Acute Toxicity
7. Chronic Toxicity
8. Behavioral Toxicity
9. Reproductive Toxicity/Teratogenicity
10. Absorption, Distribution, Metabolism, Excretion
11. Field Studies

D. ENVIRONMENTAL EFFECTS
Definitions

(Aquatic Effects: Includes effects of chemical substances on aquatic vertebrates and invertebrates as well as vascular and non-vascular aquatic plants.)

1. Acute Toxicity: Immediate, or short term response of an organism upon exposure to a chemical substance. Refers to generalized toxic response with lethality usually being the observed endpoint. Includes LD_{50}, LC_{50}, LD_{Lo} and other quantitative endpoints.

2. Chronic Toxicity: Response of an organism to repeated, long-term exposure to a chemical substance. Length of exposure and time of response varies with the organism. Observed endpoints may be based on sublethal or lethal effects.

3. Sublethal Effects: Response of an organism exposed to a chemical substance that results in effects other than mortality including: behavioral, reproductive, growth and physiological effects.

4. Bioconcentration/Biomagnification: The uptake and retention of a chemical substance in an organism or in organs or tissues of an organism (bioconcentration). An increase in the tissue concentration of organisms higher in the food chain (biomagnification).

5. Field Studies: An experiment in which organisms are exposed to a chemical substance in a body of water that is located outside the laboratory and is influenced by natural conditions.

(Terrestrial Effects: Includes the effects of chemical substances on terrestrial vertebrates and invertebrates as well as vascular and non-vascular terrestrial plants.)

6. Acute Toxicity: Immediate, or short term response of an organism to a single dose of a chemical substance through various routes of exposure. Refers to generalized toxic response with lethality usually being the observed endpoint. Includes LD_{50}, LC_{50}, LD_{Lo} and other quantitative endpoints.

7. Chronic Toxicity: Response of an organism to repeated, long-term exposure to a chemical substance. Length of exposure and time of response varies with the organism. Observed endpoints may be based on sublethal or lethal effects.

8. Behavioral Effects: Behavioral manifestations of a organism's response to a toxic chemical substance. May include avoidance, effects on motor activity, appetite and other behavioral characteristics specific to the organism.

9. Reproductive Effects: Observed effects on reproductive organs or reproductive performance of an organism caused by exposure to a chemical substance. Includes egg laying, fertilization, number of offspring, and sexual and asexual reproduction. (For teratogenicity, see Health Effects.)

10. Absorption, Distribution, Metabolism, Excretion: The uptake, by an organism, of a chemical substance through a membrane, may be represented as a rate value. The internal transport and deposition of a chemical substance in fluids, tissues and organs. The physical or chemical breakdown of a chemical substance by an organism, possibly including metabolites. The elimination of a chemical substance or its metabolites by an organism.

11. Field Studies: An experiment in which organisms are exposed to a chemical substance in a natural habitat or in an artificial habitat that is located outside the laboratory and operated under natural conditions.

E. PRODUCTION/PROCESSING
Sub-Categories

(Note: Production and processing are two of the several important stages in the flow of a chemical substance through the environment. The other stages are use and disposal which are covered under a separate category).

1. Manufacturer/Importer
2. Processor
3. Plant site (See also Exposure)
4. Method of manufacture (See Substance Identification)
5. Production technology
6. Processing technology
7. By-product (See Substance Identification)
8. Co-product (See Substance Identification)
9. Production volume
10. Amount by site
11. Production loss (See also Exposure)
12. Import volume
13. Export volume
14. Production trend
15. Production capacity by site (See Chemical Economics)
16. Sales volume

E. PRODUCTION/PROCESSING
Definitions

1. Manufacturer/Importer: The complete identification, i.e., name and address, of a chemical manufacturer or importer.

2. Processor: The complete identification, i.e., name and address, of a person who processes chemical substance.

3. Plant Site: The name and address of a specific manufacturing plant site for a chemical substance.

4. Method of Manufacture: (See Substance Identification)

5. Production Technology: The engineering process(es) employed by industry that yields the chemical substance in question.

6. Processing Technology: The group of unit operations utilized for processing a chemical substance.

7. By-product: (See Substance Identification)

8. Co-product: (See Substance Identification)

9. Production Volume: The total amount of a chemical substance produced in the U.S. in a given year.

10. Amount by Site: The amount of a chemical substance produced or processed at a specific plant site in a given year.

11. Production Loss: The estimated amount of a chemical substance that is lost during normal production process. (See also Exposure)

12. Import Volume: The amount of a chemical substance imported into the U.S. in a given year.

13. Export Volume: The amount of a chemical substance exported from the U.S. in a given year.

14. Production Trend: The trend in production volume for a 10-year (or less) period.

15. Production Capacity by Site: (See Chemical Economics)

16. Sales Volume: Amount actually purchased by customer.

F. USE/DISPOSAL
Sub-Categories

(Note: A categorizaion of use and disposal information should include data that are used in supporting estimation of exposure as well as chemical economic analysis. Use information covers both contained as well as dispersed uses.)

1. Function
2. Application
3. Additional use description (technical)
4. Additional use description (economic)
5. Mode of application
6. Use trend
7. Use amount
8. User location (See also Exposure and Production/ Processing)
9. Use analog (technical)
10. Use analog (economic)
11. Method of disposal
12. Amount disposed

F. USE/DISPOSAL
Definitions

1. Function: This describes "what, where and how" a chemical substance does in its prescribed use. This represents a general breakdown of use information.

2. Application: The end use application of a chemical substance. This is the manufacturing, service, or consumer activity in which the major function of a chemical substance is utilized. Application is therfore a specific breakdown of a major use type.

3. Additional Use Description (Technical): A detailed description of use based upon chemical structure, physical/chemical properties, and reactivity. This description highlights the technical aspects that make a particular substance suitable (or not suitable) for a particular use.

4. Additional Use Description (Economic): A detailed description of use based upon chemical marketing and other economic considerations. This description highlights the economic aspects of use.

5. Mode of Application: This describes how a chemical substance is applied in use. For example, spraying of paint.

6. Use Trend: The general trend and pattern for a use.

7. Use Amount: The amount of a chemical substance for a specific use category.

8. User Location: The name and address of a company which is a major user of a specific chemical substance. (See also Exposure: Geographic Distribution/Location Coordinates of Release and Production/Processing: Processor.)

9. Use Analog (Technical): A chemical substance that can perform the same function or application as another chemical substance, based on similarities of chemical structure, physical/chemical properties, and reactivities.

10. Use Analog (Economic): A chemical substance that can successfully substitute for another chemical substance in commerce. This definition also includes analogues for end use applications. These analogues are developed based on the price and availability of technical use analogues.

11. Method of Disposal: The method by which a chemical substance is discharged into the environment. Examples of disposal methods include incineration, open-burning, landfill, etc.

12. Amount Disposed: The amount of a chemical substance disposed by the various methods of disposal.

G. EXPOSURE
Sub-Categories

(Note: Exposure covers such areas as release, fate, populations, monitoring as well as general location. Effects data are not included here. Headings in parentheses are included for easy understanding of the sub-categories; they are not intended for use as sub-categories.)

(Chemical Release and Control)

1. Production Technology (See Production/Processing)
2. Engineering Control Technology
3. Amounts/Rates/Characteristics of Releases
4. Geographic Distribution/Location Coordinates of Releases
5. Release Source Characteristics
6. Product Formulation and Characteristics
7. Function(s)/Application(s)/Mode of Application (See Use/Disposal)
8. Worker Activities
9. Personal Protective Equipments

(Environmental Fate)

10. Physical/Chemical Properties (See Physical/Chemical Properties)
11. Environmental Characteristics
12. Transport/Tranformation Characteristics and Partitioning
13. Chemical Concentrations in Environmental Media

(Receptor Populations)

14. Geographic Distribution
15. Identity and Characteristics of Subpopulations
16. Behavioral/Demographic Characteristics
17. Non-human Populations

(Monitoring)

18. Source
19. Ambient
20. Personal
21. Tissue

(General Location)

22. Cartographic Data/Geographic Coding Files

(Route of Exposure)

23. Route of Exposure

G. EXPOSURE
Proposed Definitions

(CHEMICAL RELEASE AND CONTROL)

1. Production Technology: (See Production/Processing)

2. Engineering Control Technology: This identifies the hardware, unit operations or equipment operating practices which limit the release of the chemical substances to the workplace or environment and describes any treatment of the contaminated media at the release or receptor site before it reaches the receptor. Treatment efficiencies are determined. Examples include POTW and industrial waste treatment used, disposal methods, potable water purification, and air purification systems in indoor ventilation.

3. Amounts/Rates/Characteristics of Releases: These are determined for any chemical release to workplace, environment, or consumer vincinity during the life cycle of the chemical, i.e., during its manufacture, processing, distribution, commercial or consumer use, and disposal. Amount of release indicates quantity. Rate of release indicates periodicity (e.g., batch ejection from an industrial outfall, or slow continuous leaching form disposal site) and exit volume/time. Characteristics of release include relevant physical/chemical properties of the waste stream, form of the chemical, mass, concentration, frequency and duration, etc. For example, a solid, liquid, gas, or particulate might be dispersed in an aerosol or smoke.

4. Geographic Distribution/Location Coordinates of Releases: These are also determined for release points during all phases of a chemical's life. Latitude/longitude coordinates of sources are the most useful data. Precise coordinates are usually only relevant to manufacturing sites, e.g., individual outfalls along a river reach. Another type of example would be the gross number or density of dry cleaning facilities in a city.

5. Release Source Characteristics: In general, this will identify the nature of the release source, e.g., an open air refinery, an enclosed plant, a disposal site, a truck or railroad car spill. This category also includes specific characteristics such as stack height, number of plant outfalls, and average capacity of transport vehicles.

6. Product Formulation and Characteristics: This describes products with regard to the chemical concentration in the product, the physical form of the product, relevant dispersion media specific to the product (such as solvents), and the chemical relationship of the chemical to the product

formulation (e.g., is the chemical bound in the product matrix?). Also, the performance characteristics of the product are discussed.

7. Function(s)/Application(s)/Mode of Application: (See Use/Disposal)

8. Worker Activities: Steps taken by workers in the workplace which can result in potential exposure.

9. Personal Protective Equipments: Equipments which reduce worker exposure to chemical substances released in the workplace.

(ENVIRONMENTAL FATE)

10. Physical/Chemical Properties: (See Physical/Chemical Properties)

11. Environmental Characteristics: These identify and characterize the medium that becomes contaminated, such as air, ground and surface water, or soil. This category would include meteorological data, such as wind speeds and rainfall, surface and groundwater characteristics, and soil types and their physical/chemical characteristics.

12. Transport/Transformation Characteristics and Partitioning: Partitioning refers to the relative distribution of a chemical among environmental media. Transport refers to the potential movement of the chemical from one media compartment to another. Transport parameters would include volatilization from surface water and soils and adsorption to soil and sediments. Transformation refers to a chemical's change in structure. The major processes that can effect transformation are photolysis, oxidation, hydrolysis, biotransfor##well as abiotic media (e.g., air and water). Bioconcentration (see Environmental Effects) is relevant to this category with regard to chemical concentration estimates in biotic media.

(RECEPTOR POPULATIONS)

14. Geographic Distribution: This describes "where" exposure will occur. Location and density of human populations are evaluated. In different types of assessments the distribution of residences in a particular city or county, or in U.S. urbanized areas in general, would be of interest.

15. Identity and Characteristics of Subpopulations: This describes "who" will be exposed, whether consumer, worker or general population. The potentially affected populations are identified, enumerated, and characterized with parameters such as their age, sex, and sensitivity to certain chemicals or exposure situations.

16. Behavioral/Demographic Characteristics: This describes "how" or to what extent the population is exposed. Examples of those data include consumption patterns of consumer population(s) and commuting patterns of the residential population(s). With regard to occupational exposure, the duration and frequency of activity that results in exposure, and use of protective equipment are relevant items.

17. Non-Human Populations: This category includes the "where, who, and how" for exposure to non-human populations as described for human populations above.

(MONITORING)

18. Source: This category includes data on release source and characteristics measured at point of actual release. Sources discharging to the air include point, line, and area sources. Sources discharging to water include point and non-point sources. Sources can be both fugitive in nature or from confined equipments.

19. Ambient: Point at which release is in media and can no longer be controlled.

20. Personal: Personal monitoring refers to the data collected by a portable sample collector carried by a volunteer. These data can provide an integrated picture of chemical exposure in all the microenvironments through which the volunteer passes.

21. Tissue: Tissue monitoring data include the amount of chemical substance in particular tissues or organs at a given time.

(GENERAL LOCATION DATA)

22. Cartographic Data/Geographic Coding Files: Cartographic data refer to computerized data that are digitized representations of maps. These are typically used in displaying other (thematic) data. Examples include county and state boundary files. Geographic coding files may be in hard copy or computerized and relate one type of geographic area coding to another, e.g., census tracts within ZIP code areas or cities within states.

(ROUTE OF EXPOSURE)

23. Route of Exposure: The mode by which human or the environment is exposed to a chemical substance. For example, route of human exposure may be dermal contact or inhalation, and route of environmental exposure may be air, water or land.

H. CHEMICAL ECONOMICS**
Sub-Categories

(Note: The data sub-categories include all those that are needed by OTS in performing economic analysis of chemical substances for purposes of implementing TSCA. From a data organization standpoint, many of these sub-categories are more appropriately listed under other data categories.)

1. Manufacturer (See Production/Processing)
2. Plant site (See Production/Processing)
3. Total annual sales
4. Annual chemical sales
5. Production capacity by site (See also Production/Processing)
6. Price
7. Price trend
8. Function (See Use/Disposal)
9. Application (See Use/Disposal)
10. Use trend (See Use/Disposal)
11. Use amount (See Use/Disposal)
12. Method of manufacture (See Substance Identification)
13. Production technology (See Production/Processing)
14. Sales by end uses
15. Employment by plant site (See also Exposure)
16. Production trend (See Production/Processing)
17. Production volume (See Production/Processing)
18. Production cost
19. Demand elasticity
20. Sales volume (See Production/Processing)

**Other sub-categories listed under Production/Processing and/or Use Disposal may be needed for chemical economics analysis. Please refer to those two categories.

H. CHEMICAL ECONOMICS
Definitions

1. Manufacturers: (See Production/Processing)

2. Plant Site: (See Production; See also Exposure: Geographic Distribution/Location Coordinates of Releases.)

3. Total Annual Sales: The total annual sales of a company in terms of dollars for all products and services.

4. Annual Chemical Sales: The total annual sales of a company in terms of dollars for all chemical substances manufactured by that company.

5. Production Capacity by Site: The production capacity for a chemical substance within a plant site. (See also Production/Processing: Amount by Site.)

6. Price: The current sale price of a chemical substance.

7. Price Trend: The 10-year price trend of a chemical substance.

8. Function: (See Use/Disposal)

9. Application: (See Use/Disposal)

10. Use Trend: (See Use/Disposal)

11. Use Amount: (See Use/Disposal)

12. Method of Manufacture: (See Substance Identification)

13. Production Technology: (See Production/Processing)

14. Sales by End use: The amount of sales per use for a chemical substance.

15. Employment by Plant Site: The number of employees per plant site. This information is used to determine the number of employees that may be adversely affected by an EPA action. In many cases, the number of people outside a plant site (e.g., truck drivers) may also be needed. (See also Exposure)

16. Production Trend: (See Production/Processing)

17. Production Volume: (See Production/Processing)

18. Production Cost: The total cost for producing a chemical substance.

19. Demand Elasticity: The relationship between price and demand.

20. Sales Volume: (See Production/Processing)

V. INFORMATION RESOURCES ATTRIBUTES MATRIX

This section presents the resources attributes of the major computerized data banks and data bases that can be used in support of the OTS functions and processes under TSCA. Manual resources are included in Section VII of the Notebook since they have few but significantly different attributes.

There are two types of resources attributes that are used to describe a computerized information resource, i.e., search attributes and system attributes. While search attributes pertain mainly to the searchability and retrieval features of the data, system attributes describe characteristics of the system including hardware and software used and access mode. The search and system attributes of online data bases outline for the user what features, information, and capabilities are available. This display will help to make the user aware of the variety of information resources available, decide which attributes can facilitate access and select the most appropriate resource(s) which can solve the information problems.

This section contains three parts. The first part is the matrix outline, listing resources attributes in a hierarchial format. Following the hierarchial listing is a matrix matching search and system attributes against computerized information resources. In this matrix, the attributes are listed on the horizontal axis in the same sequence as they appear in the hierarchial listing. The computerized information resources are placed on the vertical axis of the matrix and are divided into two main groups, i.e., bibliographic data bases and non-bibliographic data banks. Within each of these two groups, the systems are listed in alphabetical sequence. The major computerized models as discussed in Section VI are also included in the Matrix. In the matrix, the information resources are either indexed by a "X" symbol or by some other alpha or numeric notations. For explanations on the notations used in the matrix, consult the attributes definitions in this Section. The last part of this section is a listing of definitions (or sometimes scope notes) for the attributes.

For additional information on the information resources, the readers may consult the OTS Directory of Information Resources or the OTS Data Dictionary.

OTS Information Resources Attributes
MATRIX Outline

I. Search Attributes

- I.A. Chemical Searching
  - I.A.1. Substructure
    - I.A.1.a) Connection Table
    - I.A.1.b) Wiswesser Line Notation (WLN)
    - I.A.1.c) Key (Screen) Codes
    - I.A.1.d) Graphics (Searchable)
  - I.A.2. Chemical Reference Numbers
    - I.A.2.a) CASRN
    - I.A.2.b) Other
  - I.A.3. Name Match
    - I.A.3.a) Exact
    - I.A.3.b) Fragment
    - I.A.3.c) Non-Systematic (Synonym)
    - I.A.3.d) Systematic
- I.B. Retrieval Features
  - I.B.1. Subject Seaching
    - I.B.1.a) Free Text
    - I.B.1.b) Proximity Search
    - I.B.1.c) Index Terms
    - I.B.1.d) Thesaurus

I.B.2. Numeric/Alphanumeric Availability

I.B.2.a) Data Values

I.B.2.b) Data Values (Rangeable)

I.B.3. Bibliographic Information

I.B.3.a) Author

I.B.3.b) Title (Source Document)

I.B.3.c) Year of Publication

I.B.3.d) Title (Journal, Book)

I.B.3.e) Abstract

I.B.3.f) Language

I.B.3.g) Abbreviated/Coded Citation

I.B.4. Logical Searching

I.B.4.a) Field (Indirect) Search

I.B.4.b) Boolean Logic (Within Field)

I.B.4.c) Boolean Logic (Across Field)

I.C. Resource Characteristics

I.C.1. Display Features

I.C.1.a) Abbreviated

I.C.1.b) User Defined

I.C.1.c) Tables

I.C.1.d) Graphics

I.C.1.e) Offline

I.C.2. File Size and Use

I.C.2.a) No. Records

I.C.2.b) No. Chemicals

I.C.2.c) Frequency of Use

I.C.3. Data Base Characteristics

I.C.3.a) Update Cycle

I.C.3.b) Cost

I.C.3.c) Period of Coverage

I.C.4. Search Aids

I.C.4.a) Printed Source

I.C.4.b) Online Help

I.C.5. File/Content Characteristics

I.C.5.a) Unpublished

I.C.5.b) Ongoing research

I.C.5.c) Data Quality

I.C.5.d) International Sources

II. System Attributes

II.A. System Access

II.A.1. Source

II.A.2. Status

II.A.3. Interactive

II.A.4. Telecommunication

II.A.5. Restricted Access

II.B. Hardware

II.B.1. Computer Utilized

II.B.2. Computer Owner [1-EPA; 2-Contractor; 3-Developer]

II.C. Software

II.C.1. Program Language [e.g., COBOL, PL/1, BASIC]

II.C.2. DBMS [e.g., System 2000, ADABAS]

II.C.3. Library Program [e.g., EASYTRIEVE, SAS, MARK IV]

II.C.4. Command Language [e.g., TSO]

II.D. Data Processing Features

II.D.1. Data Entry

II.D.2. Data Editing

II.D.3. Data Manipulation

II.E. System User Aids

II.E.1. System Documentation

II.E.2. Data Dictionary Defined

OTS Information Resource Attributes MATRIX
Attribute Definitions

Standard dictionary definitions have been used or attributes have been described according to their use or as applied to OTS information activities. The definitions are listed in a hierarchial manner as presented in the matrix outline:

I. Search Attributes:	characteristics of the data base which denote content and accessibility options.
I.A. Chemical Searching:	search and retrieval options available to represent chemical substances or parts thereof which
I.A.1. Substructure:	a partial chemical structure represented by atoms and their bonding.
I.A.1.a)	Connection table - a method of representing chemical structure. Each atom in the structure is listed together with its attached atoms and bonds. Search on this type of data may be transparent to the user; but essentially does not use codes to indicate the presence of specific rings or fragments.
I.A.1.b)	WLN - Wiswesser Line Notation, a system of symbols (alphanumeric characters) designed to describe molecular structures in detail and permit computer searches.
I.A.1.c)	Key (Screen) Codes - standard codes (sometimes called "screen codes") which are used to retrieve specific substructures or functional groups. An example would be input of '48' to retrieve six-membered rings.
I.A.1.d)	Graphics (Searchable) - the full or partial structure of a chemical can be used to retrieve data. G - the structure can be generated for searching graphically. K - the structure can be generated for searching using strings of characters.

I.A.2.	Reference Numbers:	any number used to uniquely identify a specific chemical or chemical class directly or indirectly.
	I.A.2.a)	CAS Registry Number - a number assigned by Chemical Abstracts Services (CAS) as each substance is registered. Note: a check in this column indicates that the CAS Registry Number can be used to search for chemicals, not just displayed in a record.
	I.A.2.b)	Other - any other alphanumeric term used to identify a chemical, company, standard, etc. and which refers directly or indirectly to a chemical or chemical class. Examples include NIOSH numbers (chemical), Standard Industrial Codes (company), and DOT label (standard).
I.A.3.	Name Match:	the ability to retrieve a substance based on nomenclature.
	I.A.3.a)	Exact - the name must be entered exactly as it appears in the database, including word order and punctuation.
	I.A.3.b)	Fragment - substances can be retrieved based on partial names.
	I.A.3.c)	Non-systematic (Synonym) - multiple names which may be available for a single substance. Such names may include trivial names, trade names, production names, or common names.
	I.A.3.d)	Systematic - a chemical name assigned based on a specific naming scheme indicating the exact structure of a chemical. The two most widely used schemes are those designed by CAS and IUPAC.
I.B.	Retrieval Features:	denotes the availability of textual and numeric information and the logical relationships available to access the information/data directly or serially.
I.B.1.	Subject Searching:	concepts, topics and descriptions which can be specified in a search.

I.B.1.a) Free Text - the data in the field is not taken from a controlled list of terms, but words are indexed as they are added.

I.B.1.b) Proximity Search - the user may specify that certain words must appear adjacent to each other in the text, in the same sentence, in the same field, etc.

I.B.1.c) Index Terms - a controlled vocabulary or terms used to describe the data in each field, which is available for searching.

I.B.1.d) Thesaurus - list of controlled vocabulary terms, usually cross-referenced and often showing the relationship between terms, which is available to the user from the computer while using the search system or in hard copy.

Coded: H = hard copy
L = ONLINE

I.B.2. Numeric/Alpha-numeric Availability: data is available in the record and can be searched and retrieved.

I.B.2.a) Data values - indicates whether the exact content of a specific field can be used as a basis for searches. For example, if a database carries boiling points and compounds with a boiling point of 10°C can be retrieved, this attribute will qualify as searchable. Similarly, if a database carries toxicity data but compounds with e.g., a specific LD50 that cannot be retrieved, the numeric data is not searchable. If this column is checked, it indicates that at least some of the data reported is searchable or rangeable.

I.B.2.b) Data (Rangeable) - data (as described above) can be searched by expressing a range of numeric values, rather than a specific value. For example, toxicities between 10 and 30 mg/kg or production volumes greater than 10,000 lbs/year. If this column is checked, it indicates that at least some data is range-searchable.

I.B.3.	Bibliographic Information:	General information referring the user to the document from which the data was extracted (source document). All bibliographic information columns are coded as follows: P - this type of data may be displayed but cannot be used for searching. s - this type of data can be used as the object of a search and/or displayed in retrieved records.
	I.B.3.a)	Author - the author of the source document.
	I.B.3.b)	Title - the title of the source document, including articles in journals.
	I.B.3.c)	Year of publication - data on which the document was published.
	I.B.3.d)	Journal - journal in which the source document appears.
	I.B.3.e)	Abstract - summary of the content of a specific article.
	I.B.3.f)	Abbreviated/coded citation - a truncated or less than full revision of the standard bibliographic reference, e.g., use of CODEN instead of journal title.
I.B.4	Logic Searching:	Operators or aids allowing manipulation of search terms to provide more specific comprehensive searches.
	I.B.4.a)	Field specific - capability to search selected specific fields (indirect search or serial search)
	I.B.4.b)	Boolean logic (within fields) - a method of logic developed by George Boole, an English mathematician, which uses logical operators - AND, OR, and NOT - to show relationships between sets or terms. In this case the sets or terms must involve the same field of data.

	I.B.4.c)	Boolean logic (between fields) - logical operators can be used to link separate fields, such as toxicity and production.
I.C.	Resource Characteristics:	Options for printing retrieved information and file-specific features relating to content, coverage, covering and cost.
I.C.1.	Display Features:	Display features allow the user to examine search results.
	I.C.1.a)	Abbreviated format - a portion of the record is shown, allowing the user to rapidly scan large files. This is preprogrammed, and varies in length.
	I.C.1.b)	User defined - user can specify which fields are to be displayed from the full record.
	I.C.1.c)	Tables - results can be displayed in a concise table, defined by the user.
	I.C.1.d)	Graphics - capability to display structures, maps, statistical and other pictorial representations. Structure - chemical structures can be displayed after retrieval. This column is coded as follows: T - structure can <u>only</u> be displayed on the user's terminal O - structure can be displayed on the user's terminal or in hard copy offline.
	I.C.1.e)	Offline - search results can be printed at the computer site, rather than on the user's terminal, and mailed to the user.
I.C.2.	File Size:	Number of total unit records and number of chemicals included in the file.
	I.C.2a) No Records:	A record is a unit of related information in a database. For example, a record is generally meant to include all the information stored for a particular document in a bibliographic system.

	I.C.2.b) No Chemicals:	Number of unique chemicals, substances, formulations, generic classes, etc., in a database.
I.C.3.	Data Base Characteristics:	Information on currency, cost, and coverage.
	I.C.3.a) Update Cycle:	Frequency of additions to the records in a database. This column is coded as follows: 0 - closed file 1 - daily 2 - weekly 3 - biweekly/semimonthly 4 - monthly 5 - bimonthly 6 - quarterly 7 - semiannually 8 - annually 9 - irregular
	I.C.3.b) Cost:	Cost per connect hour. This does not include subscript fees, print cost, or telecommunication fees.
	I.C.3.c) Coverage:	Span of coverage. Curr = only latest information (e.g., last 3 months)
I.C.4.	Search Aids:	Tutorial help on searching the file; or description of file contents.
	I.C.4.a.) Printed Source:	Data base, partial or complete, is available in hard copy.
	I.C.4.b) Online Help:	Provides options for search and retrieval relative to a user's status with this interaction in a system.
I.C.5.	File/Content Characteristics:	Denotes publication type and quality of the data as described by the data base producer.
	I.C.5.a) Unpublished Data:	Data which is not in the public domain, e.g., processing, communications, private files, etc.
	I.C.5.b) Ongoing Research:	Database contains references to research which is in progress.

I.C.5.c)	Data Quality:	Indicates whether the data has been evaluated by the database producer prior to incorporation, for accuracy, completeness, and quality. This column is coded as follows: 0 - No evaluation prior to incorporation (data may be taken from referred journals). 1 - Quality indicator available. 2 - Peer evaluated.
I.C.5.d.)	International Sources:	Data is taken from non-U.S. sources (may be in addition to U.S. sources).
II.	System Attributes:	Characteristics and features of the hardware and software.
II.A.	System Design Access:	Communication connections and availability of the data base to the end user.
II.A.1.	Source:	Availability of the data base to the end user. C = commercial P = private
II.A.2.	Status:	Denotes the current availability of a data base. D = developed U = under development
II.A.3.	Interactive:	A system which allows the user to input instructions, receive a response, and then modify or manipulate the results.
II.A.4.	Telecommunications:	The network which provided the link between the terminal and the host computer. This column is coded as follows: 1 - International/National access. Via telecommunications network. 2. - International access, no telecommunications network. 3. - Local access, i.e., long distance call outside computer area.

		4. - In-house access only, no telecommunications available.
II.A.5.	Restricted Access:	The system is available to a limited user community, e.g., contains confidential data, is available only for "in-house" use, etc.
II.B.	Hardware:	Denotes manufacturer name, series, level, model and owner of the equipment.
II.B.1	Computer Utilized:	Denotes specific hardware in which data base resides. VAX = VAX 11/780 IBM = IBM UNI = Univac
II.B.2	Computer Owner:	Organization which owns or leases hardware. 1 - EPA 2 - Contractor 3 - developer of data base
II.C.	Software:	Set of instructions (programs) or routines for handling input into the computer.
II.C.1.	Program Language:	Defined set of Characters and rules used for writing a computer routine e.g., COBOL, PL/1, BASIC.
II.C.2.	DBMS:	Denotes data base management system used e.g., System 2000, ADABAS.
II.C.3.	Library Program:	Denotes use of a canned or standard software program e.g., EASYTRIEVE, SAS, Mark IV.
II.C.4.	Command Language:	Provides direct interface with the central processing unit & determines data entry and editing facilities, submission and retrieval capabilities, and utility and data set manipulation functions e.g., TSO, ELHILL
II.D.	Data Processing Features:	Denotes existence of facilities, and utilizes for handling data by the end-user.
II.D.1	Data Entry:	Capability exists to input data.
II.D.2.	Data Editing:	Capability exists to add, delete, & modify data.

II.D.3.	Data Manipulation:	Capability for statistical analysis and computation.
II.E.	System User Aids:	Documentation for end user to facilitate interaction with the system.
II.E.1.	System Documentation:	User manual available
II.E.2.	Data Dictionary Defined:	Description of data element and its use within the organization that developed the data base.

VI. OTS ANALYTICAL CAPABILITIES

In addition to drawing upon existing information in the form of data bases and manual resources, OTS functions and processes often require the development of new information. Much of this information is the result of applying a variety of analytical capabilities to existing data in order to draw conclusions useful in risk assessment. This section discusses these analytical capabilities which include computer models and estimation techniques and describes how they are used in support of OTS functions and processes.

OTS scientists utilize: (1) general statistical packages such as the Statistical Analysis System (SAS); (2) more specialized statistical analysis capabilities to perform complex univariate and multivariate analyses (e.g., cluster analyses using ARTHUR); (3) programs to generate molecular properties (descriptors) for Structure-Activity Relationship (SAR) analyses which are too time-consuming to compute manually (e.g., CHEMLAB); (4) physical/chemical property estimation programs such as CHEMEST derived from SAR research; (5) environmental fate and exposure models to predict environmental concentrations of chemicals and estimate population exposures; and (6) dose-response models which are used to describe risks, extrapolate risks from high to low doses, and to estimate health impacts of particular exposure levels and doses.

Mathematical models may be of many different forms, and include models based on statistically developed correlations such as nonlinear dose-response models, as well as complex mechanistic multimedia environmental fate models.

In the paragraphs that follow, three major types of analytical capabilities are discussed. These capabilities are:

- Structure-Activity Relationship (SAR)
- Fate and Exposure Modeling
- Dose-Response Modeling

The discussion on SAR includes General Statistical Programs (e.g., SAS), Multivariate Data Analysis (e.g., ARTHUR), SAR Descriptor Generators (e.g., CHEMLAB), and Estimation Techniques (e.g., CHEMEST, CLOGP). Following each discussion, a table is included identifying the individual models or techniques that belong to each of the capabilities. Finally, there are two matrices matching the various classes of models and techniques against OTS functions and processes respectively. The purpose of these matrices is to indicate how these capabilities are used.

Structure-Activity Relationships

Structure Activity Relationships (SAR) are often established through statistical methods to relate the presence of specific chemical structural features to a given biological activity or other expression of a chemical's nature, such as its physical/chemical properties. These properties/activities can also be correlated with one another as in the case of boiling point and vapor pressure, or octanol/water partition coefficient and bio-concentration factor. A wide range of statistical programs can be used to mathematically investigate and describe structure-activity relationships, depending on their complexity. For simple and multiple linear regressions, any one of a number of widely available statistical programs may be used. The most notable example of such programs commonly used within OTS is probably the Statistical Analysis System (SAS), resident on the NCC IBM and planned for implementation on the OTS VAX and IBM 4341 computers. SAS, in addition to its large variety of univariate, data management, and graphics procedures, also includes multivariate data analysis capabilities needed for more complex structure activity analyses. Another program newly available on the NIH/EPA Chemical Information System (CIS) entitled ARTHUR features a variety of methods for performing exploratory multivariate data analyses, including several clustering analysis techniques.

The CHEMLAB program on CIS provides a way of generating several molecular descriptors such as molecular volume and surface area which may be useful in SAR investigations. These descriptors are usually difficult and time-consuming to calculate and hence have not been widely used in quantitative SAR (QSAR) research except for drug design. CHEMLAB thus offers OTS researchers the capability to use a wider range of molecular properties in the development of QSARs.

Once these statistical relationships have been codified and incorporated into a procedure or computer program which allows scientists to readily calculate the value of one feature from the values or presence of one or more others, it is often referred to as an estimation technique.

Estimation techniques are thus the product of research into structure-activity relationships which allow a reasonably reliable quantitative estimate to be generated on a regular basis. While much work has been and is being performed in the SAR area, relatively few such analyses have resulted in the development of useful estimation techniques. These are mostly found in the area of physical/chemical property estimation, although some work in the environmental fate and ecological effects areas has also been useful in OTS risk analyses. In general, health effects SAR research has not yet generated many

useful quantitative relationships applicable in OTS work, although much significant work has been done in the area of drug design.

The OTS use of analytical capabilities relating to SAR involves both development and application areas. Estimation technique programs such as CLOGP and CHEMEST are applied in many of the chemical assessment activities of the office. A validation effort has been undertaken in FY 83 to assess the performance of the estimation techniques for classes of chemicals frequently encountered in PMN submissions. This work could also serve as a basis to extend existing estimation techniques to wider classes of chemicals and to develop new relationships for use in risk assessment.

Structure-Activity Relationship (SAR) Analytical Capabilities

SAR Development

General Statistical Programs (e.g., SAS)

Specialized Statistical Programs (e.g., ARTHUR)

Descriptor Generators (e.g., CHEMLAB)

SAR Application

CHEMEST (boiling point, vapor pressure, water solubility, Henry's Constant, volatilization from water half-life, activity coefficient, adsorption coefficient, bioconcentration factor)

CLOGP* (log octanol water partition coefficient)

*This program requires the input of chemical structural data using either the SFILES or SMILES entry programs.

Fate and Exposure Modeling

OTS uses a variety of models to assess chemical fate and environmental or human exposure. These models predict the concentrations of chemicals in air, water and soil or a combination of environmental media. In a few cases, they also include programs to estimate the number of persons potentially exposed at specific levels. The models are used for screening-level applications as well as for detailed exposure analyses.

There is an ongoing effort to develop or acquire, implement and integrate models with data as part of the Graphical Exposure Modeling System (GEMS). This system, which also includes the CHEMEST and CLOGP property estimation program, is designed to give scientific users ready access to models, estimation techniques, data analysis, data management, and display capabilities. GEMS users are not required to be familiar with most of the computer-related aspects of running models; a subject-area knowledge plus a general familiarity with the program's features are usually sufficient to perform analyses. The program prompts users for English-language inputs and provides specific help information when necessary, thus allowing users to access data, run models or estimations and analyze results without using typical computer programming techniques.

The GEMS data bases are included in Section II. The estimation techniques and models available through GEMS are discussed in this section. A list of physical chemical properties which can be estimated using CHEMEST is included in the table entitled Structure-Activity Relationship: Analytical Capabilities. The table entitled "Fate and Exposure Models" lists the models available in GEMS by environmental media. In addition to the GEMS models, OTS has acquired a number of other models which also reside on the VAX 11/780 computer. These are much less frequently used than the first group, and hence have not yet been implemented in GEMS. They may be used for specific assessments as needed by creating special input data files. Because of this infrequent use, they are not discussed here in detail, with the exception of the Unified Transport Model-Toxics (UTM-TOX) which is planned for inclusion in GEMS in FY 84.

Fate and Exposure Models

Models in GEMS	Additional Models Available*
Atmospheric	
ATM80**	APRAC, CDM, CDMQC, CRSTER,
BOXMOD80**	HIWAY, PTMTP, PAL, VALLEY,
PTDIS	RAM
PTMAX	
Surface Water	
EXAMS	PEST, RIVMOD, EXAMS2
Soil Water or Runoff	
SESOIL	PRZM, ARM
Groundwater	
AT123D	
Multimedia	
ENPART	UTM-TOX
TOXSCREEN	

* These models have implemented on the VAX 11/780 and may be used outside of the GEMS environment.

**These models outputs include population exposures.

Dose-Response Modeling

Unlike fate/exposure models, which use, for the most part, deterministic simulations of environmental processes, dose-response models are typically stochastic representations of relationships between dose level and toxic effect(s). Ordinarily the "models" represent cumulative distribution functions of response conditional on dose. Several models currently in use presume tolerance distributions among individuals' responses. Others may functionally correspond to postulated biological mechanisms even though they have been developed totally from data description principles. Data from animal bioassay tests are usually input to the models, which use different statistical assumptions about the form of the relationship to estimate the probability a dose level is associated with a certain effect and/or how long it will be until the effect is manifested. To date, carcinogenicity is the effect which has been modeled most frequently in this manner.

The various computerized modeling programs are being unified by common input requirements and output variables. Interfaces with SAS graphics routines are being developed.

Dose-Response and Risk Estimation Models

Probit

MANTELAN

RISK 81

LOGIT

RISK 81

WEIBULL

RISK 81

WEIBULL 82

Multihit

MULTI80 G

RISK 81

One-Hit

ONE HIT MD

GLOBAL 82

MULTI 80 G

Multistage

GLOBAL 82

RANK 81

TIME-TO-OCCURRENCE

MRST

RANK 81

OTS FUNCTIONS/ANALYTICAL CAPABILITIES MATRIX*

OTS Analytical Capability Classes	OTS Functions: Chemical Analysis	Health Effects Analysis	Environmental Effects Analysis	Exposure Analysis	Risk Assessment
General Statistical Programs (e.g., SAS)		X		X	
Multivariate Data Analysis (ARTHUR)		X		X	
SAR Descriptor Generators (CHEMLAB)		X	X		
Estimation Techniques (CHEMEST, CLOGP)	X		X	X	
Fate/Exposure					
Atmospheric				X	
Land				X	
Water				X	
Groundwater				X	
Multimedia				X	
Dose-Response and Low-Dose Extrapolation Models		X			X

* Three OTS functions, i.e. Control Technology Analysis, Economic Analysis, and Regulatory Options Analysis do not use the analytical capabilities described herein. These three functions are not included in the matrix. Risk assessment, though not a function (see Section II), is included in the matrix.

OTS PROCESSES/ANALYTICAL CAPABILITIES MATRIX

OTS Analytical Capabilities Classes	OTS Processes: Chemical Testing	New Chemicals Review	Existing Chemicals Review
General Statistical Programs (e.g., SAS)*			X
Multivariate Data Analysis (ARTHUR)*			
SAR Descriptor Generators (CHEMLAB)*	X	X**	X
Estimation Techniques (CHEMEST, CLOGP)			
Fate/Exposure Models			
Atmospheric	X	X	X
Land	X	X	X
Water	X	X	X
Groundwater	X	X	X
Multimedia	X	X	X
Dose-Response and Low-Dose Extrapolation Models	X	X**	X

* These programs are primarily used in research and in general data analysis not related to a specific assessment. SAS is also used to analyze monitoring data on existing chemicals, however.

** For analogues of new chemicals.

VII. DATA CATEGORIES, DATA SUB-CATEGORIES/ INFORMATION RESOURCE MATRIX

This section presents three sets of matrices which match respectively data categories and sub-categories (described in Section IV) against major information resources. While non-bibliographic computerized information resources are matched against data sub-categories, both the bibliographic data bases and manual resources are indexed by data categories only. It would have been technically infeasible to match bibliographic data bases and manual resources against data sub-categories.

The purpose of the matrices is to document the types of information (i.e. data categories or data sub-categories) available in the major information resources. By comparing these matrices against the data sub-categories/OTS functions matrices in the next section, information gaps may be easily seen.

The first set of matrices matches data sub-categories against computerized non-bibliographic data bases and computer models. This set of matrices establishes the relationship between information resources and data by indicating the specific types of data, i.e., data sub-categories that are available in these information resources. In using these matrices, the readers may want to consult simultaneously the resource attributes matrices in Section V in order to obtain a complete understanding about the availabilities as well as searchabilities of data.

The second set of matrices matches data categories against computerized bibliographic data bases. This establishes the availabilities of major types of data, i.e. data categories, in the bibliographic data bases. Again, the readers are urged to consult the resource attributes matrices on bibliographic data bases in Section V.

The third set of matrices in this section matches data categories against manual information resources. A matrix outline is included in this section. For each of these manual sources listed in the matrices, its major search attributes are included and indexed. Note that these attributes are few but are significantly different from those listed in Section V for the computerized information resources. Wherever a manual source is available at the OTS Technical Information Center, it is so indicated in the matrices.

When scanning the Matrix, the reader must use the "OTS Printed Resources Attributes Matrix Definitions" included in this section in order to decode the information presented.

The citation number (last column) on the matrix refers the reader to the full bibliographic citation in the "Author Index".

Also included in this chapter is the "Glossary of Abbreviations" which is useful in deciphering the linguistic shorthand associated with this and other chapters.

OTS INFORMATION MATRIX——BIBLIOGRAPHIC DATABASES DATA CATEGORIES

SYSTEM TYPE/NAME / BIBLIOGRAPHIC DATABASES	CHEMICAL ACCESS		OTS DATA CATEGORIES								
	NO. CHEMICALS	CAS RN	SUBSTANCE IDENTIFICATION	PHYSICAL-CHEMICAL PROPERTIES	HEALTH EFFECTS	ENVIRONMENTAL EFFECTS	PRODUCTION/PROCESSING	USE/DISPOSAL	EXPOSURE	ECONOMICS	REGULATIONS/CONTROL
DIALOG DATABASES (CON'T.)											
HARFAX INDUSTRY DATA SOURCES			X				X			X	
IRL LIFE SCIENCES COLLECTION			X		X	X					
ISMEC			X	X			X	X		X	
NTIS			X		X	X	X	X	X	X	X
OCEANIC ABSTRACTS			X			X			X		X
PAPERCHEM			X		X	X	X	X	X	X	X
POLLUTION ABSTRACTS			X	X	X	X		X	X		X
PTS F&S INDEXES			X				X	X	X	X	
PTS INTERNATIONAL FORECASTS			X				X			X	
PTS PROMT			X				X	X		X	
PTS U.S. FORECASTS			X				X			X	
SCISEARCH			X	X	X	X	X	X	X	X	X
SURFACE COATINGS ABSTRACTS			X		X	X	X	X	X	X	X
TEXTILE TECHNOLOGY DIGEST			X		X		X	X	X	X	X
TRADE AND INDUSTRY INDEX			X				X			X	X
WATER RESOURCES ABSTRACTS			X		X	X			X		X
MEDLARS DATABASES											
CANCERLIT	347K	X	X		X				X		
CANCERPROJ	21K	X	X		X				X		
MEDLINE	800K	X	X		X				X		
TOXLINE	570K	X	X		X	X			X		
ORBIT DATABASES											
BIOSIS			X		X	X	X	U	X	X	X
CA SEARCH	3M	X	X	X	X			U			
ENVIROLINE			X	X	X	X	X	X	X	X	X
FEDERAL REGISTER			X								X
NTIS			X		X	X	X	U	X	X	X
APIPAT			X				X	U			X
U.S. CLASS							X	U			X

OTS INFORMATION MATRIX——BIBLIOGRAPHIC DATABASES DATA CATEGORIES

SYSTEM TYPE/NAME / BIBLIOGRAPHIC DATABASES	CHEMICAL ACCESS		OTS DATA CATEGORIES								
	NO. CHEMICALS	CAS RN	SUBSTANCE IDENTIFICATION	PHYSICAL-CHEMICAL PROPERTIES	HEALTH EFFECTS	ENVIRONMENTAL EFFECTS	PRODUCTION/PROCESSING	USE/DISPOSAL	EXPOSURE	ECONOMICS	REGULATIONS/CONTROL
ORBIT DATABASES (CON'T.)											
USPA							X	U			X
WPI/WPIL		X	X				X	U			X
TULSA				X			X				X
TSCA PLUS	58,000	X	X				X	U		X	X
MISCELLANEOUS DATABASES											
EMIC (ORNL)		X			X						
ETIC (ORNL)		X			X						
NIOSHTIC			X		X			U	X		
RAPRA ABSTRACTS (PERGAMON)							X	X		X	

OTS PRINTED RESOURCES ATTRIBUTES

MATRIX OUTLINE

I. Chemical Access

- A. No. (of) chemicals
- B. CAS Registry Number (CAS RN)

II. OTS Data Categories

- A. Substance Identification
- B. Physical-Chemical Properties
- C. Health Effects
- D. Environmental Effects
- E. Production/Processing
- F. Use/Disposal
- G. Exposure
- H. Economics
- I. Regulations/Control

III. Publication Location

- A. Publication Type
- B. Supplements
- C. Frequency of Revision
- D. Online Version

IV. Shelf Locations

- A. LC Call Number

V. Author Index

- A. Citation Number

VI. Glossary of Abbreviations

OTS PRINTED RESOURCES ATTRIBUTES MATRIX

DEFINITIONS

I. Chemical Access:

denotes access to a limited number of chemicals or to specific chemical identification.

I.A. No. (number of) chemicals:

denotes scope of coverage of chemical substances; an (*) asterisk denotes an undetermined number of chemicals are covered.

I.B. CAS RN:

denotes Chemical Abstract Service Registry Numbers are associated with the chemical nomenclature.

II. OTS Data Categories:

general areas of chemical information requirements of OTS. (See Section IV of the notebook.)

II.A. Substance Identification:

information is available to establish the identity of a chemical substance as defined by TSCA.

II.B. Physical-Chemical Properties:

characteristics of substances related to reactivity.

II.C. Health Effects:

contains human/animal toxicity data as well as biological and physiological effects of chemical substances.

II.D. Environmental Effects:

contains data that OTS needs in evaluating the environmental effects of chemical substances.

II.E. Production/Processing:

the processing of a chemical substance through the environment, includes source of emissions, amount produced, where and how a substance is produced.

II.F. Use/Disposal:

contained and dispersed uses of chemical substances and disposal methods. U = use data only, D = disposal data only, X = both use and disposal data

II.G. Exposure:

release, fate, populations, monitoring and geographic location of chemical and general substances.

II.H. Economics:

production, distribution, consumption of chemical substances.

II.I. Regulations/Control:

laws, standards, guidelines.

III. Publication Information:

features related to the printed source.

III.A. Publication Type:

1 - Handbook
2 - Monograph
3 - Encyclopedia
4 - Index
5 - Dictionary
6 - Other

III.B. Supplements:

continuation of the printed resource

III.C. Freq(uency) of Revision:

related to a time schedule followed for incorporating changes into the text.

1 - weekly
2 - monthly
3 - annually
4 - every 2-3 years
5 - every 4-5 years
6 - infrequent

III.D. Online Version:

printed source in whole or part is computerized and available interactively.

IV. Shelf Location:

Most resources are located in the OPTS Technical Information Center (TIC) E447, or EPA Headquarters Library M2404; other sources can be obtained on Interlibrary loan.

IV.A. LC Call Number:

Library of Congress call number is given to help locate the printed sources. The call number is interpreted as follows:

1 - a (✓) check after the call number indicates the book is in the TIC.

2 - an (*) asterisk following the call number indicates the book is in the HQ Library.

3 - ( ) brackets around the call number indicates an inter-library loan is necessary.

V. Author Index:

Full bibliographic citation.

V.A. Citation Number:

Reference number which leads the user from the Handbooks/Printed Sources Matrix to the author index.

VI. Glossary of Abbreviations:

Definitions of abbreviations and acronyms appearing in the matrices.

OTS INFORMATION RESOURCES MATRIX--HANDBOOKS/PRINTED SOURCES

TITLE OF PRINTED SOURCE	CHEMICAL ACCESS		OTS DATA CATEGORIES									PUBLICATION INFORMATION				SHELF LOCATION	AUTHOR INDEX
	NO. CHEMICALS	CAS RN	SUBSTANCE IDENTIFICATION	PHYSICAL-CHEMICAL PROPERTIES	HEALTH EFFECTS	ENVIRONMENTAL EFFECTS	PRODUCTION/PROCESSING	USE/DISPOSAL	EXPOSURE	ECONOMICS	REGULATIONS/CONTROL	PUBLICATION TYPE	SUPPLEMENTS	FREQ. OF REVISION	ONLINE VERSION	LC CALL NUMBER	CITATION NUMBER
ACCIDENT PREVENTION MANUAL FOR INDUSTRIAL ...	*		X	X		X			X			1		5		[T.55.A3 1974]	317
ACUTE TOXICTY IN THEORY AND PRACTICE ...	*		X		X				X			2		6		RA1270.P4B77✓	72
ADSORPTION OF POLYCHLORINATED BIPHENYL ...	1		X	X		X			X			6		6			195
ADVANCES IN FORENSIC AND CLINICAL ...	*				X			U	X			1		6		RA1211.C8*	114
ADVANCES IN MODERN TOXICOLOGY, VOL. 1, PT. 1	*		X		X				X			1		6		RA1199M48*	285
ADVANCES IN MODERN TOXICOLOGY, VOL. 4	*		X		X			U	X			1		6		RL72.D47*	272
ADVANCES IN MODERN TOXICOLOGY, VOL. 5	*		X	X	X		X	X	X		X	2		6		QH466.C6M87*	155
ADVANCES IN NEUROTOXICOLOGY	~180		X		X				X			1		6		RC347.I55✓	287
ADVANCES IN PHARMACOLOGY AND ...IL, VOL. V																	486
ADVERSE EFFECTS OF ENVIRONMENTAL ... VOL. 2	*				X				X			2		6		RA1190837✓	204
AEROSOLS, AIRWAYS AND ASTHMA	*		X		X				X			1		6		[RC591.A33 1981]	429
AGRICULTURAL CHEMICALS AND PESTICIDES ...	*		X	X	X	X					X	1		5	X		148
AGRICULTURAL RUNOFF MANAGEMENT ...	*					X		U	X			6		6			126
AIR POLLUTION																	454
AIR POLLUTION, 3 ED; VOL. I	*		X		X	X		D	X		X	1		6		TD883.S83*	406
AIR POLLUTION, 3 ED; VOL. II	*				X	X		D	X	X	X	1		6		TD883.S83*	408
AIR POLLUTION, 3 ED; VOL. III	*							D	X		X	1		6		TD883.S83*	407
AIR POLLUTION, 3 ED; VOL. IV	*						X	D	X		X	1		6		TD883.S83*	409
AIR POLLUTION, 3 ED; VOL. V																TD883.S83*	410
AIR POLLUTION FROM PESTICIDES AND AGRI ...	*		X		X	X	X	X	X	X	X	2		6		TD887.P45A35✓	240
THE AMPHETAMINES: TOXICITY AND ADDIC ...	*		X		X			X				2		6		[RA1242.A5K3]	221
ANALYTICAL TOXICOLOGY METHODS MANUAL ...	N/A															[RA1221.A5]	400
ANALYTICAL TOXICOLOGY METHODS MANUAL	*		X									1		6		[RA1221.A5 SUPPL.]	398
ANIMALS IN TOXICOLOGY RESEARCH, 1ST ED. ...			X		X				X			2				[RA1199.A54 1982]	45
AN ANNOTATED ACCESSION LIST OF DATA ...																	466
AN ANNOTATED BIBLIOGRAPHY OF COMPILED ...	*											6		6		QC100.U57✓	17
ANNUAL REVIEW OF PHARM. AND TOXICOLOGY, VOL. 1	*		X	X	X	X			X			6		3		RM16.A63✓	142
ANNUAL REVIEW OF PHARM AND TOXICOLOGY, VOL. 16	*		X		X			U	X			6		3		RM16.A63✓	143
ANNUAL REVIEW OF PHARM. AND TOXICOLOGY, VOL. 17	*		X		X	X			X			6		3		RM16.A63✓	144
ANNUAL REVIEW OF PHARM. AND TOXICOLOGY, VOL. 18	*		X		X							6		3		RM16.A63✓	167
ANNUAL REVIEW OF PHARM. AND TOXICOLOGY, VOL. 19	*		X		X		X	U	X			6		3		RM16.A63✓	168
ANNUAL REVIEW OF PHARM. AND TOXICOLOGY, VOL. 20	*		X		X			U				6		3		RM16.A63✓	169
ANNUAL REVIEW OF PHARM. AND TOXICOLOGY, VOL. 21	*		X		X			U				6		3		RM16.A63✓	170
ANNUAL REVIEW OF PHARM. AND TOXICOLOGY, VOL. 22	*		X	X	X			U	X			6		3		RM16.A63✓	171
AQUATIC AND ENVIRONMENTAL QUALITY: PROBLEMS						X	X	D				1		6		[TD226.H37]	189
AQUATIC TOXICOLOGY, VOL. I	*		X			X			X			1		6		[QH545.W3A85]	484
AQUATIC TOXICOLOGY AND HAZARDOUS ASS ...	*		X	X		X			X			6		6		QH545.W3.A95✓	89
AQUATIC TOXICOLOGY AND HAZARDOUS ASS ...	*		X	X		X			X			6		6		QH545.W3.S95✓	336
AQUATIC TOXICOLOGY AND HAZARDOUS EVAL ...	*		X	X		X			X			6		6		QH545.W3.S95✓	277
AQUATIC TOXICOLOGY, PROCEEDING OF 2ND ANNUAL ...	*		X	X		X			X			6		6		QH545.W3S95✓	289
AQUATIC TOXICOLOGY, PROCEEDING OF 3RD ANNUAL ...	*		X	X		X			X			6		6		QH545.W3S95✓	140
AROMATIC HYDROCARBONS MANUFACTURE ...	*		X	X			X	U				1		6		QD341.H95E17✓	383
ASSESSING TOXIC EFFECTS OF ENVIRONMENTAL ...	*				X				X			1		6		RA576.A2A87✓	241
ASSESSMENT OF AIRBORNE PARTICLES: FUNDAM ...	*				X				X		X	6		6		[QD549.R58]	290
ASSESSMENT OF INDUSTRIAL HAZARDOUS ...	*							D	X			6		6			236
ATMOSPHERIC CHEMISTRY MODELLING	*		X	X					X			6		2			84
A BASIC TOXICITY CLASSIFICATION OF ...	*		X		X				X		X	1		6		[WN650160018]	208
BEHAVIOR OF ORGANIC CHEMICALS IN THE ...	~700		X			X			X			1		6		TD427.67.W3*	364
BEILSTEIN'S HANDBOOK OF ORGANIC CHEM ...	*		X	X								1	X			[QD251.B42B44]	49

OTS INFORMATION RESOURCES MATRIX——HANDBOOKS/PRINTED SOURCES

TITLE OF PRINTED SOURCE	CHEMICAL ACCESS		OTS DATA CATEGORIES									PUBLICATION INFORMATION				SHELF LOCATION	AUTHOR INDEX
	NO. CHEMICALS	CAS RN	SUBSTANCE IDENTIFICATION	PHYSICAL-CHEMICAL PROPERTIES	HEALTH EFFECTS	ENVIRONMENTAL EFFECTS	PRODUCTION/PROCESSING	USE/DISPOSAL	EXPOSURE	ECONOMICS	REGULATIONS/CONTROL	PUBLICATION TYPE	SUPPLEMENTS	FREQ. OF REVISION	ONLINE VERSION	LC CALL NUMBER	CITATION NUMBER
BEILSTEIN'S HANDBOOK OF ORGANIC CHEM ...	*		X	X								1	X			[GD251.B42B45]	50
BENZINE TOXICITY: A CRITICAL EVALUATION	1		X		X							2		7		[RA1242.B4B48	237
BIOCHEMICAL TOXICOLOGY OF ENVIRONMENTAL ...	*		X		X	X						1		6		RA1226.F67✓	116
BIOCHEMISTS' HANDBOOK	*		X	X		X						1		6		REFQD246.L6✓	252
BIOCONVERSION: FUEL FROM BIOMASS	4											6		6		[7784975]	359
BIODEGRADATION AND DETOXIFICATION OF ...	*		X	X		X		X	X			6		6		QR88.B56✓	86
BIODEGRADATION OF PESTICIDES	61		X	X	X	X			X			6		6		[SB951.145.B54B58]	274
BIODEGRADATION OF POLYMERS AND ...	*		X			X			X			2		6		QP517.B155✓	377
BIODEGRADATION TECHNIQUES FOR INDUSTRIAL ...	*		X				X	D	X			3				[TD897.S858]	119
BIODETERIORATION: 4TH INTL. SYMPOSIUM	*		X			X			X		X	6		6		[QH530.S157]	330
BIODETERIORATION: 5TH INTL. SYMPOSIUM	*		X						X			1		6		[QH530.S157]	329
BIODETERIORATION OF MATERIALS, VOL. I	*		X			X			X			6		6		[TA418.74.I57]	480
BIODETERIORATION OF MATERIALS, VOL. II	*		X			X			X			6		6		TA418.74.I57*	481
BIOLOGICAL ABSTRACTS	*		X	X	X	X			X		X	6		2	X	—	56
BIOLOGICAL MONITORING FOR INDUSTRIAL...	*		X		X				X			1		6		RB40.L55✓	248
BIOLOGICAL REACTIVE INTERMEDIATES ...	*		X	X	X							1		6		RA1191.B56*	218
BULLETIN OF THERMODYNAMICS AND ...	*											6				[QD511.T452]	488
BURGER'S MEDICINAL CHEM, 4TH ED; PTS, I, II, III	*		X	X				U				6		6		RS.40388✓	490
CRC ATLAS OF SPECTRA DATA AND PHYSICAL ... 2ND ED	28,000		X	X								1		6		[QD291.C18]	182
CRC HANDBOOK OF ANALYTICAL TOXICOLOGY	~1,338		X	X	X	X					X	1		6		RA1221.C52✓	419
CRC HANDBOOK OF CHEM. AND PHY. 62ND ED.	~20,000		X	X								1		3		QD65.H3✓	483
CRC HANDBOOK OF LABORATORY SAFETY, 2ND ED.	*		X		X				X			1		6		QD51.S88*	403
CRC HANDBOOK SERIES IN NUTRITION AND FOOD ... VOL. I	*		X		X				X			1		6		[RC620.AIN87]	353
CRC PERSISTENT PESTICIDES IN THE ENV ...	*				X	X						2		6		QH545.P4E3✓	141
CADMIUM TOXICITY	1				X	X			X			1		6		QV290.C128✓	287
CARCINOGENESIS AND MUTAGENESIS	*		X		X				X			2		6			284
CARCINOGENESIS TESTING PROGRAM	273		X	X	X		X	U				2		6			304
CARCINOGEN AND CHRONIC TOXIC HAZARD ...	*		X		X				X		X	2		6		[QP971.S3]	374
CARDIAC TOXICOLOGY, VOL. I	*		X		X							2		6		RC682.C38✓	36
CARDIAC TOXICOLOGY, VOL. II	*		X		X							2		6		RC682.C38✓	37
CARDIAC TOXICOLOGY, VOL. III	*		X		X							2		6		RC682.C38	38
THE CARE, HANDLING AND DISPOSAL OF ...	~520		X	X	X			X	X			2		6		[TP.149.G24]	186
CASARETT AND DOULL'S TOXICOLOGY: THE ...	*		X		X	X		U	X		X	1		6		RA1211.C296	131
CATALOG OF TERATOGENIC AGENTS, 2ND ED	~600		X		X						1	1		6		QM691.S53	378
CELLULAR BIOLOGY AND TOXICITY ...	*		X		X			U				1		6		[RD78.3.C45]	152
CHEM. SOURCE U.S.A.	*		X				X					4		3		[TP12.C44]	11
CHEMCYCLOPEDIA	*		X	X			X	U		X	X	6		3		[TP12.C48]	3
CHEMICAL ABSTRACTS	*		X	X	X	X	X	X	X	X	X	6		1	X		9
CHEMICAL AND ENGINEERING NEWS ...	50		X				X	U		X		6	X	3			238
CHEMICAL CARCINOGENS	*		X		X							2		6		RC268.8C48*	375
CHEMICAL COMPOS. IN THE ATMOSPHERE	71,600		X	X								1		6		QC879.6G73✓	179
CHEMICAL CONSTITUTIONS. INTERMEDIATE ...	*		X	X			X					2		5		TP910.S62✓	105
CHEMICAL ECONOMIC HANDBOOK	~1,388		X				X			X		1		6		HD9651.A.S.79✓	385
CHEMICAL ENGINEERS' HANDBOOK			X	X								1		6		TP151.C52	339
CHEMICAL HAZARDS TO HUMAN REPRO ...	~25				X			U	X			6		6		QP251.C5	101
CHEMICAL MARKETING REPORTER	*		X				X	U		X		6		6			372
CHEMICAL MODELING IN AQUEOUS SYSTEMS	*		X	X		X			X			1		6		QD39.3.M3C48✓	217
CHEMICAL MUTAGENS	*	X	X		X			U				2		6		QH431.F57✓	154
CHEMICAL PROFILES	*		X				X	U		X		6		6			373
CHEMICAL REFERENCE MANUAL, VOL I	15K		X	X				D	X	X		6		6		[QD77M130]	266

OTS INFORMATION RESOURCES MATRIX——HANDBOOKS/PRINTED SOURCES

TITLE OF PRINTED SOURCE	CHEMICAL ACCESS		OTS DATA CATEGORIES									PUBLICATION INFORMATION				SHELF LOCATION	AUTHOR INDEX
	NO. CHEMICALS	CAS RN	SUBSTANCE IDENTIFICATION	PHYSICAL-CHEMICAL PROPERTIES	HEALTH EFFECTS	ENVIRONMENTAL EFFECTS	PRODUCTION/PROCESSING	USE/DISPOSAL	EXPOSURE	ECONOMICS	REGULATIONS/CONTROL	PUBLICATION TYPE	SUPPLEMENTS	FREQ. OF REVISION	ONLINE VERSION	LC CALL NUMBER	CITATION NUMBER
CHEMICAL REGULATION REPORTER, CURRENT...	*		X						X		X	6		1		[KF3958.AI58A7]	28
CHEMICAL REGULATION REPORTER, HAZARDOUS...	*		X						X		X	1	X	8		[KF3958.AI58A7]	23
CHEMICAL REGULATION REPORTER, INDEX...	*	X	X								X	4	X	6		[KF3958.A15BA7]	27
CHEMICAL REGULATION REPORTER, REF...	*		X	X	X			U	X		X	1	X	6		[KF3958.A15BA7]	25
CHEMICAL REVIEWS	5,800		X	X								1		6			242
CHEMICAL SAFETY DATA SHEETS	70		X	X	X			U	X		X	1		6		[RA1270.M29]	265
CHEMICAL STRUCTURE AND PROPERTIES...	16		X	X	X							6		6			159
CHEMICAL SOURCE EUROPE	28,000		X				X					4		3		REFTP12.C517*	92
CHEMICAL STUDIES ON BENCHWORK	*			X								6		6			93
CHEMICAL TECHNOLOGY: AN ENCYCLOPEDIC... IV	*		X	X			X	U		X		3		6		TP200.M35*	102
CHEMICAL WASTE DISPOSAL AND...								D				1		6			402
CHEMICAL WEEK 1979 BUYER'S GUIDE...	*		X	X			X	U		X		1	X	3		[TP12.C43]	278
CHEMICAL ZOOLOGY, VOL. 1-11	*		X		X	X						1		6		QP514.FS28✓	156
CHEMISTRY AND MODE OF ACTION...	*		X		X	X		U	X			1		6			161
CHLORINATED INSECTICIDES, VOL. II	*		X		X	X			X			1		6		SB952.C44B76	71
CIS INDEX TO PUBLICATION OF THE U.S....	*											1		6		T56.3.H3873	107
CLINICAL TOXICOLOGY, 2ND ED	*		X	X	X							1		6		[RA1211.P6]	343
CLINICAL TOXICOLOGY MANUAL	*		X		X		X	U	X			1		6		[RA1211.D393]	117
CLINICAL TOXICOLOGY OF AGRICULTURAL...	*		X	X	X	X		U	X		X	1		6		[RH1210.AHW33]	459
CLINICAL TOXICOLOGY OF COMMERCIAL...	~17,500	X	X	X	X			U				1	X	6	X	RA1211.G5✓	175
CLINICAL TOXICOLOGY OF DRUGS: PRIN...	*		X		X	X		X	X			1		6		[RA1238.C54.]	389
COMPREHENSIVE INORGANIC CHEM, VOL. 1-5	*		X	X			X	U				6		6		REFQD151.2C84*	30
COMPREHENSIVE ORGANIC CHEM, VOL. 1-6	~20,000		X	X								1		6		QDZ45.C65✓	44
COMPREHENSIVE ORGANOMETALLIC... VOL. 1-9	*		X	X								1		6		[QD411.C65]	166
CONCISE CHEMICAL AND TECH. DICTION...	~52,000		X	X				U				5		6		QD5.B4✓	51
CONDENSED CHEMICAL DICTIONARY	~390,000		X	X	X			U	X		X	5		6		QD5.C5✓	191
CONTAMINANTS & SEDIMENTS, VOL. 1	*		X		X	X		D	X			2		6		TD195.D72C66✓	33
CONTAMINANTS & SEDIMENTS, VOL. 2	*		X	X	X	X			X			1		6		TD195.D72C66✓	34
COPPER IN BIOLOGY AND MEDICINE...	1				X	X		U	X			2				[QP535.C9093]	328
CRITERIA FOR ORGANOCHLORINE PEST...	20		X	X	X	X		U	X			1		6		RA1270.P4C74✓	291
CRITERIA FOR A RECOMMENDED...	~100		X	X	X			X	X			2		5			306
CRITICAL EVALUATION OF DATA IN...																QC100.U.5753✓	383
CRITICAL MICELLE CONC. OF AQUEOUS...	*		X	X								1		6		QC100.U57✓	302
A CRITICAL REVIEW OF RECENT LIT. ON...	1		X	X		X			X			2		6		[SH.L77C83D66]	130
CRITICAL STABILITY CONSTANTS, VOL. I	*		X	X								1	X	6		[QD.503M.37]	270
CRITICAL STABILITY CONSTANTS, VOL. II	*		X	X								1	X	6		[QD.503M.37]	271
A CRITIQUE OF ACCEPTED REQ. AND...	*		X		X				X		X	6	X				88
CURRENT APPROACHES IN TOXICOLOGY	*		X		X							1		6		RA1211.C976*	41
CURRENT CONCEPTS IN CUTANEOUS...	*		X		X				X		X	1		6		[RL31.C623]	134
CURRENT INTELLIGENCE BULLETIN, 19-30	*		X		X	X		U	X		X	6		6		[QD.S03.M.37]	311
CUTANEOUS TOXICITY	*		X		X							6		6		RA1199.C85✓	133
DANGEROUS PLANTS, SNAKES, ARTHROPODS...			X		X							1		6		[QL100.E44 1978]	146
DANGEROUS PROPERTIES OF INDUSTRIAL...	~16,000		X	X	X			U	X		X	1		6		T55.3.H3S3✓	370
DEGRADATION OF SYNTHETIC ORGANIC...	87		X		X	X			X			6		6		QP517.B5D44*	314
DERMATOTOXICOLOGY, 2ND ED.	*		X		X			U			X	2		6		[RL72.D47 1983]	273
THE DETECTION AND HAZARDS OF...	*				X							6		6		TD172.M66	10
DEVELOPMENTAL AND GENETIC ASPECTS...	*		X		X	X			X			6		3		RA1190.E6*	137
DEVELOPMENTAL TOXICOLOGY	*		X		X			U				2		6			
DEVELOPMENTS IN BIODEGRADATION OF...	*		X	X		X			X			6		6		[QD305.H5D392]	482

OTS INFORMATION RESOURCES MATRIX--HANDBOOKS/PRINTED SOURCES

TITLE OF PRINTED SOURCE	CHEMICAL ACCESS		OTS DATA CATEGORIES									PUBLICATION INFORMATION				SHELF LOCATION	AUTHOR INDEX
	NO. CHEMICALS	CAS RN	SUBSTANCE IDENTIFICATION	PHYSICAL-CHEMICAL PROPERTIES	HEALTH EFFECTS	ENVIRONMENTAL EFFECTS	PRODUCTION/PROCESSING	USE/DISPOSAL	EXPOSURE	ECONOMICS	REGULATIONS/CONTROL	PUBLICATION TYPE	SUPPLEMENTS	FREQ. OF REVISION	ONLINE VERSION	LC CALL NUMBER	CITATION NUMBER
DEVELOPMENTS IN TOXICOLOGY AND ...	*											6		6		RA1199.S95✓	477
DICTIONARY OF ORGANIC COMPOUNDS ...	~1,300		X	X								5	X			QD251.D49✓*	425
DIRECTORY OF CHEMICAL PRODUCERS ...	~10,000		X				X					6	X	6		TP12.D54✓*	367
DISPOSITION OF TOXIC DRUGS AND ...	782		X		X			U	X			1		6		[RA122.B37 1982]	48
DISPOSITION OF TOXIC DRUGS AND ...	782		X		X			U	X			1		6		[RA122.B37 1982]	46
DISPOSITION OF TOXIC DRUGS AND ...	*		X		X			U	X			1		6		[RA1221.B37]	47
DISSOCIATION CONSTANTS OF INORGANIC ...	217		X	X								6				JK416.A3✓	338
DISSOCIATION CONSTANTS OF ORGANIC ...	3,790		X	X								6	X			QD273.P35✓	337
DOCUMENTATION OF THE THRESHOLD ...	*		X	X	X	X		U		X	X	1				RA1211.A6✓	1
DRUG EFFECTS IN HOSPITALIZED ...	*		X		X			U				1		6		[RM262.D68]	298
DRUG INDUCED CLINICAL TOXICITY ...	*		X		X						X	2		6		[RA1238.D794]	282
EASTMAN ORGANIC CHEMICAL BULLETIN	*		X	X	X		X	X				6		2			139
ECOLOGICAL ASPECTS OF TOXICITY TESTING ...	*		X			X			X			6		6		QH918.D4E25✓	54
ECOLOGICAL TOXICOLOGY RESEARCH: EFFECTS ...	~50		X	X					X			1		6		QH545.M45M37✓	280
ECONOMIC ANALYSIS OF EFFLUENT ...	~100						X			X		6		6			20
EFFECTS AND DOSE RESPONSE RELATIONSHIPS ...	*		X		X			U				6		6		RA1231.M52E33*	321
EFFECTS OF CHRONIC EXPOSURE TO ...	*		X		X				X			1		6		[RA1270.P4E34 1983]	87
EMERGENCY HANDLING OF HAZARDOUS ...	*		X	X					X			1		6		[T55.3H3AAR]	415
ENCYCLOPEDIA OF CHEMISTRY	*		X	X								3		6		QD5.E58✓	186
ENCYCLOPEDIA OF CHEMICAL TECHNOLOGY	*	X	X	X	X		X	U	X	X	X	3		6		TP9.E685✓	183
ENCYCLOPEDIA OF ENVIRONMENTAL SCIENCE ...	*		X	X	X	X		X	X			3		6		TA170.E5*	340
ENCYCLOPEDIA OF OCCUPATIONAL ...	*		X	X	X		X	U	X			3		6		[RC963.I6]	211
ENCYCLOPEDIA OF POLYMER SCIENCE AND ...	*		X	X			X	U		X		3		6		TP156.PGE5✓	268
ENERGY FROM BIOCONVERSION OF ...	*		X				X	D		X		6		6		TP762.D47✓	118
ENVIRONMENT AND BIRTH DEFECTS	*		X		X							2		6		RB152.W6✓	478
ENVIRONMENT REPORTER	*		X						X		X	6		1		KF3775.A6E49*	28
ENVIRONMENTAL AND OCCUPATIONAL ...	*		X	X	X			U	X		X	1		6		QM691.S53✓	361
ENVIRONMENTAL CHEMISTRY	*		X						X			6		6		[QD31.2M36]	262
ENVIRONMENTAL ENGINEER'S HANDBOOK	*		X	X	X	X	X	X	X	X	X	1		6		TD145.E57*	251
ENVIRONMENTAL FATE AND ...	~12		X	X		X			X			6		6			257
ENVIRONMENTAL HAZARDS OF METALS: ...	*		X	X	X				X			2		6		RA1231.M52B6813	68
ENVIRONMENTAL HEALTH CRITERIA	*		X	X	X			X	X			2		6			457
ENVIRONMENTAL ISSUES REPORT 10	5					X						6		6		GF75.E68✓	202
ENVIRONMENTAL LAW REPORTER	*										X	6		6			354
ENVIRONMENTAL POLLUTION AND TOXICOLOGY	*					X						2		6			352
ENVIRONMENTAL SCIENCE RESEARCH ...	*		X		X				X			6		6		RA1216.R58✓	466
ENVIRONMENTAL TOXICOLOGY: PRINCIPLES ...	*		X		X	X			X			6		6		[RA1191.E58]	394
ENZYMATIC BASIS OF DETOXIFICATION, VOL. 1	*		X									2		6		QP601.E515✓	212
ENZYMATIC BASIS OF DETOXIFICATION, VOL. 2	*		X	X	X							2		6		QP601.E515✓	213
EPIDEMIOLOGY AND DETECTION OF ...	1		X		X	X		U	X		X	1		6		[RA1231.I4E64]	188
ESSAYS IN TOXICOLOGY, VOLS. 1-7	*		X		X							2		6		RA1190.E77✓	193
ESSAYS IN TOXICOLOGY, VOL. 1	*		X		X	X		U	X			6		6		RA1190.E77✓	57
ESSENTIALS OF TOXICOLOGY	0				X				X			1		6		RA1211.L6✓	253
EVALUATION OF TOXICOLOGICAL DATA ...	*		X		X	X		U	X			6		6		RA1199.C64✓	206
EXPERIMENTAL AND CLINICAL ...	*		X	X	X	X	X	U				3		6		RC347.E99✓	397
FAO INVENTORY DATA ON ...	*					X						6		6		[SH1.F8716]	148
FAITH, KEYES AND CLARK'S INDUSTRIAL ...	140		X	X			X			X	X	1		6		TP200.F3✓	255
FATE OF POLLUTANTS IN THE AIR ... PART 1	*								X			6		6		TD180.A38✓	417

OTS INFORMATION RESOURCES MATRIX——HANDBOOKS/PRINTED SOURCES

TITLE OF PRINTED SOURCE	CHEMICAL ACCESS		OTS DATA CATEGORIES									PUBLICATION INFORMATION				SHELF LOCATION	AUTHOR INDEX
	NO. CHEMICALS	CAS RN	SUBSTANCE IDENTIFICATION	PHYSICAL-CHEMICAL PROPERTIES	HEALTH EFFECTS	ENVIRONMENTAL EFFECTS	PRODUCTION/PROCESSING	USE/DISPOSAL	EXPOSURE	ECONOMICS	REGULATIONS/CONTROL	PUBLICATION TYPE	SUPPLEMENTS	FREQ. OF REVISION	ONLINE VERSION	LC CALL NUMBER	CITATION NUMBER
FATE OF POLLUTANTS IN THE AIR . . . PART 2	*		X		X	X			X			6		6		TD180.A38✓	418
FATE OF SELECTED PESTICIDES IN THE . . .	22				X	X			X			6		6			368
FENAROLI'S HANDBOOK OF FLAVOR . . .	~200		X					U			X	1		6		TP460.F35*	182
FIFTEEN JAAR ZELFVERGIFTIGINGEN IN . . .	*		X		X				X			6		6		ISBN 90 6203-089-0	428
FINAL TREATMENT: THE FILE ON DR. X	1				X							6		6		[RA1228.L53]	247
FINDING FUNGACITY FEASIBLE	*		X	X		X			X		X	6		2			260
FLUORINE AND DENTAL HEALTH: THE . . .	1		X		X			U	X		X	6		6		[QP981.F55M8]	301
FORENSIC TOXICOLOGY	*		X		X	X			X			6		6		[RA1228.F67]	40
FORENSIC TOXICOLOGY: CONTROLLED . . .	*		X		X							6		6		[HV8073.L75]	251
FORENSIC TOXICOLOGY FOR THE LAW . . .	*		X		X							1		6		[RA1228.W54]	473
FORENSIC TOXICOLOGY: PROCEEDINGS . . .	~350		X		X			U			X	1		6		[RA1228.I57]	327
FUNCTION TOXICITY OF ANESTHESIA	~40		X		X			U	X			2		6		[RA1270.A53B78]	79
FURTHER STUDIES IN THE ASSESSMENT . . .	*		X		X				X			6	X	6			90
GLOBAL CHEMICAL CYCLES AND THEIR . . .	*		X			X			X			1		6		QE515.025*	416
THE GOLDFISH AS A TEST ANIMAL . . .	*		X		X				X			3		6		[QP941.P8]	345
GOOD LABORATORY PRACTICE: TOPICS . . .	*								X			6		6		[RA1199.66 1979]	333
GOVERNMENT CONTRACTS GUIDE	*		X								X	3		6		[KF849.C6]	178
GUIDELINES FOR ANALYTICAL . . .	*		X	X	X						X	1		6		RA1221.G84✓	424
GUIDELINES FOR ENVIRONMENTAL . . .	*		X	X		X			X			6		6		TX501.R47*	230
HANDBOOK FOR OBTAINING CHEMICAL USE . . .	*																380
HANDBOOK OF ADHESIVES	*		X	X			X	U		X		1		6		TP968.S58*	388
HANDBOOK OF CHEMICAL PROPERTY ESTIMATION . . .	*		X	X								1		6		[QD271.L95]	259
HANDBOOK OF EMERGENCY TOXICOLOGY	188		X	X	X			U				1		6		[RA1211.K3]	224
HANDBOOK OF EMERGENCY TOXICOLOGY: A GUIDE . . .	*		X	X	X							1		6		[RA1211.K3]	225
HANDBOOK OF ENVIRONMENTAL CONTROL (CRC)	*		X	X	X	X	X	X	X		X	1		6		TD145.C2✓	58
HANDBOOK OF ENVIRONMENTAL . . . ORGANIC CHEMICALS	~1,000		X	X	X	X	X	X	X		X	1		6		TD196.073V47✓	449
HANDBOOK OF EPOXY RESINS	*		X	X	X							1		6		[TP1180.E6L4]	239
HANDBOOK OF FINE CHEMICALS	~12,000	X	X	X			X	D		X	X	1		4			7
HANDBOOK OF IDENTIFIED CARCINOGENS AND . . .	~800	X	X		X				X			1		6		RC268.6.C725✓	393
HANDBOOK OF INDUSTRIAL TOXICOLOGY	*		X	X	X			U	X		X	1		6		RA1216.P55✓	342
HANDBOOK OF INTERNATIONAL FOOD . . . VOL. I	*					X					X	1		6		[RA1270.F6V47]	450
HANDBOOK OF INTERNATIONAL FOOD . . . VOL. II	*		X		X			U	X		X	1		6		[RA1270.P4V47]	451
HANDBOOK OF OCULAR TOXICITY	*		X		X		X	U			X	1		6		[RE901.T67564	390
HANDBOOK OF POISONING: DIAGNOSIS . . .	*		X	X	X			U				1		6		RA1211.D77✓	132
HANDBOOK OF REACTIVE CHEMICAL . . .	~7,000		X	X								1		6		T55.3.H3373✓	70
HANDBOOK OF SOLVENTS	*		X	X	X		X	U	X	X	X	1		6		TP247.5.S32*	371
HANDBOOK OF TABLES FOR ORGANIC COMPDS . . .	78,150		X	X								1		6		BKS QD291.R28.1967*	349
HANDBOOK OF TOXIC AND HAZARDOUS . . .	~600		X	X	X			X	X		X	1		6		RA1193.S58✓	387
HANDBOOK OF TOXICOLOGY, ACUTE, VOL. I	~2,383		X		X				X			1		6		[RA1211.H32]	391
HANDBOOK OF TOXICOLOGY, ANTIBIOTICS, VOL. II	340		X	X	X			U	X			1		6		RA1211.H32✓	396
HANDBOOK OF TOXICOLOGY, INSECTICIDES, VOL. III	164		X	X	X	X		U	X			1		6		[RA1211.H32]	319
HANDBOOK OF TOXICOLOGY, FUNGICIDES, VOL. IV	196		X	X	X	X		U	X			1		6		[RA1211.H32]	125
HANDBOOK OF VAPOR PRESSURES AND HEATS . . .	*		X	X								1		6		[QD305.H5W54]	474
HANDBOOK OF WATER SOLUBLE GUMS . . .	*	X	X	X	X	X	X	U	X		X	2		6		TP978.H26✓	116
THE HANSCH APPROACH	*		X	X	X	X			X			2		6		QD1.A356✓	177
HAZARDOUS AND TOXIC EFFECTS OF . . .	*		X		X				X		X	1		6		RA1229.S57*✓	385
HAZARDOUS CHEMICALS DATA	*		X	X	X				X		X	1		6		[T55.3.H39]	305
HAZARDOUS CHEMICALS DATA BOOK	~400		X	X	X	X	X		X		X	1		6		T55.3.H3H396✓*	467

OTS INFORMATION RESOURCES MATRIX——HANDBOOKS/PRINTED SOURCES

TITLE OF PRINTED SOURCE	CHEMICAL ACCESS		OTS DATA CATEGORIES									PUBLICATION INFORMATION				SHELF LOCATION	AUTHOR INDEX
	NO. CHEMICALS	CAS RN	SUBSTANCE IDENTIFICATION	PHYSICAL-CHEMICAL PROPERTIES	HEALTH EFFECTS	ENVIRONMENTAL EFFECTS	PRODUCTION/PROCESSING	USE/DISPOSAL	EXPOSURE	ECONOMICS	REGULATIONS/CONTROL	PUBLICATION TYPE	SUPPLEMENTS	FREQ. OF REVISION	ONLINE VERSION	LC CALL NUMBER	CITATION NUMBER
HAZARDOUS MATERIALS: EMERGENCY . . .	43		X	X	X	X		D	X			1		6		[TS5.3.H3455]	316
HAZARDOUS MATERIALS GUIDE: SHIPPING . . .	*		X								X	1		6		[KF3945.K44]	228
HEALTH HAZARD EVALUATION SUMMARIES	*		X		X		X		X		X	6		6		RA1242.B.43H281*	312
HERBICIDES: CHEMISTRY, DEGRADATION . . . VOL. I	*		X	X	X	X		U				1		6		SB951.4.K4✓	226
HERBICIDES: CHEMISTRY, DEGRADATION . . . VOL. II	*		X			X		U	X			6		6		SB951.4.K4*✓	227
HOW TO DISPOSE OF TOXIC SUBSTANCES . . .	*						X	X		X	X	1				TD897.P68*✓	348
THE I/O-CHARACTERS TO DESCRIBE . . .	7		X	X		X			X			6		6			275
IMMUNOLOGIC CONSIDERATIONS . . . VOL. I & II	*		X		X	X			X			1		6		QR188.35.I46✓	376
IMPORTS OF BENZENOID CHEMICALS . . .	*		X				X	U		X		6		6		TP963.I4*	443
INDEX HANDBOOKS OF OTOTOXIC . . .	*		X		X			U	X			4		6		[RF285.083I53]	482
INDUSTRIAL AND ENVIRONMENTAL . . .	~210				X							1		6	X	[RA1191.I53]	157
INDUSTRIAL CONTROL EQUIPMENT . . .	*		X	X	X	X		U	X	X		1		6		TD886.B86*	81
INDUSTRIAL HYGIENE AND . . . VOL. II	*		X	X	X			U	X			1		6			149
INDUSTRIAL WASTE DISPOSAL	0							D	X		X	6		6		TD897.R67*	382
INFORMATION RESOURCES IN TOXICOLOGY	*				X	X			X		X	6		6		[RA1193.4.W49]	469
INTERNATIONAL ENCYCLOPEDIA OF . . .	~50		X		X							1		6		[QP631.P48]	350
INTERNATIONAL ENVIRONMENT REPORTER	*		X								X	6		2		[JD169.1573]	24
INTERNATIONAL SYMPOSIUM ON . . .	*				X							1		6		RA4011615	358
INTRODUCTION TO BIOCHEMICAL . . .	*		X		X				X			1				RA1216.J55✓	201
INTRODUCTION TO ENVIRONMENTAL . . .	*		X		X	X	X	X	X		X	6		6		QH545.A1I575*	184
INTRODUCTION TO FORENSIC TOXICOLOGY . . .	*		X		X							6		6		[RA1228.J58]	111
KINGZETT'S CHEMICAL ENCYCLOPEDIA	*		X	X			X	U				3		6		[QD5.K4 1966]	194
KIRK-OTHMER ENCYCLOPEDIA, 2ND ED.	*		X	X	X		X	X	X	X	X	3	X	6		TP9.E685✓	401
KLINE GUIDE TO THE CHEMICAL . . .	~300						X	U		X	X	1		6		HD9651.4K57	283
KLINE GUIDE TO THE PLASTICS . . .	*		X				X	U	X	X	X	1				HD9661.U62C49✓	351
KLINE GUIDE TO THE PULP & PAPER . . .	*		X				X	U	X	X	X	1				HD9825.K62✓	205
LABOR. 29 CFR 1911.1 VOL. 29 PTS 911 . . .	0										X	6		3		QD561.P45✓	323
LABOR. 29 CFR 1926.1 VOL. 29 PTS 120 . . .	0										X	6		3		QD561.P45✓	324
LABORATORY MODEL ECOSYSTEM STUDIES . . .	*		X	X		X			X			1		6			296
LABORATORY WASTE DISPOSAL MANUAL . . .	1,121		X	X								1		6		QD6.E58✓	406
LANGE'S HANDBOOK OF CHEMISTRY . . .	4,000		X	X								1		1		QD65.LA✓	121
LEAD TOXICITY	1		X		X				X			2		6		RA1238I4L43*	379
LIGNIN BIODEGRADATION & TRANSFER	1		X			X						1		1		[QK898.L5C7]	113
LIGNIN BIODEGRADATION: MICROBIOLOGY . .	*		X	X		X						6				[TS933.L5L6]	233
MANAGEMENT OF TOXIC SUBSTANCES . . .	*		X		X	X			X			6		6		BKS QH545.AIM353✓	108
MANNSVILLE CHEMICAL PRODUCTS . . .	205		X	X	X		X	U	X	X		1		6			263
MATERIALS HANDBOOK, AN ENCYCLOPEDIA . . .	*		X	X								1		6		TA403.B75✓*	87
MECHANISM OF TOXIC ACTION IN SOME . . .	*		X		X				X			6		6		RA1190.E8✓	89
MECHANISMS OF ACTIONS OF NEUROTOXIC . . .	~30		X		X	X		U	X			2		6		[RC347.M42]	347
MECHANISMS OF TOXICITY AND . . .	*		X		X				X			6		6		RM21.I58✓	223
MECHANISMS IN RESPIRATORY TOXICOLOGY	*		X		X							1		6		[RC732.M43 1982]	478
MEMBRANE TOXICITY	*				X							6		6		[RA1199.R82]	297
MERCK INDEX	~10,000	X	X	X	X							3		6		[RS51.M4 1968]	292
METABOLIC INHIBITORS: A COMP . . .	*		X		X				X			1		6		QP801.A65H63✓	196
METABOLISM	*		X	X	X	X		X	X			1		6			8
METABOLISM OF PESTICIDES	*		X		X	X						1		6		[SK361.A256 NO.127]	288

OTS INFORMATION RESOURCES MATRIX--HANDBOOKS/PRINTED SOURCES

TITLE OF PRINTED SOURCE	CHEMICAL ACCESS		OTS DATA CATEGORIES									PUBLICATION INFORMATION				SHELF LOCATION	AUTHOR INDEX
	NO. CHEMICALS	CAS RN	SUBSTANCE IDENTIFICATION	PHYSICAL-CHEMICAL PROPERTIES	HEALTH EFFECTS	ENVIRONMENTAL EFFECTS	PRODUCTION/PROCESSING	USE/DISPOSAL	EXPOSURE	ECONOMICS	REGULATIONS/CONTROL	PUBLICATION TYPE	SUPPLEMENTS	FREQ. OF REVISION	ONLINE VERSION	LC CALL NUMBER	CITATION NUMBER
METABOLISM OF PESTICIDES: AN UPDATE	*		X		X	X						1		6		[SK361.A256 NO.184]	289
METABOLISM OF VOLATILE ANESTHETICS ...	*		X	X	X				X			1		6		[RD82.C64]	104
METAL TOXICITY IN MAMMALS, VOL 1 & 2 ...	*				X			U	X			6		6		RA1231.M52L82*✓	258
METHODOLOGY FOR ANALYTICAL TOX ...	~51		X		X							1		6		RA1221.H36 1975*	420
METHODS FOR ECOLOGICAL TOXICITY ...						X						6		6		QH541.15T68M47*✓	185
METHODS IN TOXICOLOGY	0											6		6		RA1221.M45*✓	331
METHODS USED IN USSR FOR ...	*		X		X						X	6		6		[QR357.F72]	454
MIDDLE MOLECULES IN UREMIA ...	*		X	X	X							6	X	6		*[RC915.S95 1980]*	235
MIDWEST RES. INST. LOADING FUNCTIONS ...	*		X						X			1		6			279
MODEL ECOSYSTEM FOR THE EVALUATION	~20		X	X		X			X			6		6			286
MODEL ECOSYSTEM STUDIES OF THE ...	*		X			X		U	X			6		6			294
MODELING NONPOINT POLLUTION FROM ...	*								X		X	6		6			127
MODERN TRENDS IN TOXICOLOGY, VOL 2	*		X		X	X			X			1		6			65
MOLECULAR BASIS OF BIOL. DEGRADATIVE ...	*				X							2		6		[QP609.P78M64]	52
MOLECULAR BASIS OF ENVIRON. TOXICITY	*		X		X	X						2		6		RA1191.M64✓	55
NATIONAL OCCUPATIONAL HAZARD ... VOL II												1		6			308
NEPHROTOXIC MECHANISMS OF DRUGS ...	~100		X		X				X			6		6		*[RC918.R4M48 1982]*	344
NERVOUS SYSTEM TOXICOLOGY ...	*		X		X							6		6		[RC347.N47]	299
NEUROTOXICITY OF THE VISUAL SYSTEM	~20		X	X	X				X			1		6		[RE91.R63]	293
NEUROTOXICOLOGY	*		X		X			U				6		6		[RC346.N48]	360
NICKEL TOXICOLOGY	~1		X	X	X			U	X			6		6		[RA1231.N44I57]	76
NITROGEN, PHOSPHORUS AND SULPHUR ...	*		X			X			X	X		3				*[QH344.N57]*	421
NON-AQUEOUS ELECTROLYTE HANDBOOK, VOL I	210		X	X								1		6		QD560.J36✓	215
NON-AQUEOUS ELECTROLYTE HANDBOOK, VOL II	310		X	X								1		6			216
NON-FLUORINATED PROPELLANTS AND ...	8		X	X	X			U	X			6		6		[RA1270.S8A94]	21
NON-POINT SOURCE MODEL: LOADING ...	*		X						X			1		6			437
NON-POINT SOURCE MODEL: MODELING NON ...	*								X		X	6		6			436
NON-POINT SOURCE MODEL: SIMULATION OF ...	*		X						X		X	1		6			439
NUTRITION AND THE BRAIN VOL. IV	*		X	X	X	X						6				[WLNU8632.V.4.]	483
NUTRITIONAL TOXICOLOGY VOL. I	*		X	X	X	X		U	X			1		6		[RC622N894 1982]	190
NUTRITION STRESS AND TOXIC CHEMS ...	*			X					X			2		6		[RB151.V33]	445
OPD CHEMICAL BUYERS DIRECTORY 69 ED	14,744		X				X					6		3		TP12.06✓	322
OCCUPATIONAL DISEASES: A GUIDE	*		X	X	X			U	X		X	1		6		RC964.N37	310
OCCUPATIONAL EXPOSURE GUIDE	*		X		X				X		X	1		6		[KF3570.K45]	229
OCCUPATIONAL HEALTH GUIDELINES ...	*		X	X	X			X	X			1		6		TD55.3.H3N564✓	261
OCCUPATIONAL SAFETY & HEALTH REPORTER	*		X						X		X	6		1		*[KF3570.A1025]*	29
ON THE EVALUATION OF THE ... IARC	~600	X	X	X	X		X	U	X	X	X	2	X	6		RC268.57.I.57	209
ORGAN DIRECTED TOXICITY. CHEMICAL ...	*		X		X			U	X			6		6		RA1191.S94 1981✓	74, 75
ORGANIC CHEMICAL PROCESS ENCYCLO ...	*		X					U				3		6		TP690.558 1969✓	381
PARENT COMPOUND HANDBOOK	*	X	X									1	X	4		QD281.R5P32✓	80
PARIKCHS TEXTBOOK OF MEDICAL ...	*	X			X				X			2		6		RA1051.P34✓	335
PARTITION COEFFFICIENT AND BIOACCUMULATION	34			X		X						6		6			94
PARTITION COEFFICIENTS AND THEIR USES	*		X	X								1		6			243
PARTITION COEFFICIENTS TO MEASURE ...	8		X	X		X			X			6		6			318
PATHOLOGY OF OXYGEN TOXICITY	1		X		X	X						1		6		[RA124.09834]	39
PATTY'S INDUSTRIAL HYGIENE & TOXICOL I	*		X		X			U	X			1		6		RC967.P37. 1978✓	97
PATTY'S INDUSTRIAL HYGIENE & TOXICOL IIA	*		X	X	X		X	U	X			1		6		RC967.P37 1978✓	98

OTS INFORMATION RESOURCES MATRIX——HANDBOOKS/PRINTED SOURCES

TITLE OF PRINTED SOURCE	CHEMICAL ACCESS		OTS DATA CATEGORIES									PUBLICATION INFORMATION				SHELF LOCATION	AUTHOR INDEX
	NO. CHEMICALS	CAS RN	SUBSTANCE IDENTIFICATION	PHYSICAL-CHEMICAL PROPERTIES	HEALTH EFFECTS	ENVIRONMENTAL EFFECTS	PRODUCTION/PROCESSING	USE/DISPOSAL	EXPOSURE	ECONOMICS	REGULATIONS/CONTROL	PUBLICATION TYPE	SUPPLEMENTS	FREQ. OF REVISION	ONLINE VERSION	LC CALL NUMBER	CITATION NUMBER
PATTY'S INDUSTRIAL HYGIENE & TOXICOL. IIB	*		X	X	X		X	U	X			1		6		RC967.P37 1978✓	98
PATTY'S INDUSTRIAL HYGIENE & TOXICOL. IIC	*		X	X	X		X	U	X			1		6		RC967.P37 1978✓	100
PATTY'S INDUSTRIAL HYGIENE & TOXICOL. III	*											1		6		RC967.P37 1978✓	110
PERSPECTIVES IN TOXICOLOGY	*		X		X							1		6		QP631.P46✓	53
PESTICIDE CHEMIST & MODERN TOXICOLOGY	*				X						X	6		6		TP248.P47 P48✓	42
PESTICIDE TRANSPORT AND RUNOFF . . .	*		X						X		X	6		6			112
PESTICIDES ABSTRACTS	*		X		X	X		X	X		X	6	X	6	X		434
PESTICIDES IN THE ENVIRONMENT, VOL. I PT I	*		X					U	X			6		6		SB951.W52*	470
PESTICIDES IN THE ENVIRONMENT, VOL. II	*		X					U	X			6		6		SB951.W52*	471
PESTICIDES IN THE ENVIRONMENT, VOL. III	*		X					U	X			6		6		SB951.W52*	472
PHARMACOLOGICAL METHODS IN TOXICOLOGY	*		X		X				X			3		6		RA1238.P45*	487
PHYSICAL AND THERMODYNAMIC PROPERTIES	722		X	X								2	X	6		QD305.A4.W39✓	475
A PHYSICAL CONCEPT OF SOIL-WATER . . .	~20		X	X		X			X			6		6			95
PHYSICAL PROPERTIES OF CHEMICAL I, II, III . . .	~1,400		X	X								1		6		QD473.073✓	135
PHYSICAL PROPERTIES OF MOLECULAR . . .	*		X	X								1		6		[QD476.B62]	59
PHYSICIANS' DESK REFERENCE . . .	*		X	X	X		X	U	X		X	1	X	3		RS75.P5✓	32
PHYSICS AND CHEMISTRY OF ORGANIC . . .	*		X	X								1		6		[QD906.F79]	158
PHYSIOCHEMICAL PROPERTIES OF SOME . . .	6		X	X	X	X			X			1		6			186
POISONING: DIAGNOSIS AND TREATMENT	~7,100		X		X				X			1		6		RA1211.M613✓	300
POISONING: DIAGNOSIS AND TREATMENT	*				X			U			X	1		6			444
POISONS — ANTIDOTES AND ANECDOTES	*				X			U			X	1		6		[RA1213.T65]	426
POLLUTION DETECTION AND MONITORING . . .	*				X	X						6		6		TD890.S57*	382
POLYNUCLEAR AROMATIC HYDROCARBON . . .	*		X	X	X				X			6		6		RC268.5.C36✓	219
POTENTIAL IND. CARCINOGENS & MUTA. VOL 4	>176	X	X		X		X	U	X			1		6		RC268.6.F57*	153
PREDICTING BIOLOGICAL EFFECTS AS A . . .	25		X	X	X				X			1		6			13
PREDICTING PESTICIDE RUNOFF FROM . . .						X			X			6		6			31
PREDICTION OF BIOCONCENTRATION . . .	16		X	X		X			X			6		6			358
PREDICTION OF CHRONIC TOXICITY . . .	*		X	X	X	X			X			6		6		RA1190.E8✓	138
PREDICTIVE TOXICOMETRICS	*		X	X	X			U				1		2		RC143.B69	63
PRELIMINARY ASSESSMENT OF SUSP . . .	253		X		X				X			2		6		[RA592.A1U53]	435
PRINCIPLES AND METHOD OF TOXICOLOGY	*											1		6		[RA1211.P74]	192
PRINCIPLES AND PROCEDURES FOR EVAL . . .												1		6		RA1199.37✓	106
PRINCIPLES OF BIOCHEMICAL TOXICOLOGY	*				X				X			2		6			427
PRINCIPLES OF GENETIC TOXICOLOGY	*				X							1		6		QH466.C5B78✓	80
A PRIORI PREDICTIVE METHODS OF . . .	0											6		6		[TD492.C66 1977] EHA	234
PRIORITY TOXIC POLLUTANTS: HEALTH . . .	129		X	X	X	X		U	X		X	3		6		RA1193.P74✓	386
PROC. OF THE 1ST INTER. CONG. ON TOXICOL.	*		X		X	X			X		X	6		6		RA1191.I6✓	341
PROC. INHALATION, TOXICOL. & TECHNOLOGY SYM.	*		X		X				X			6		6		RA1270.A34I54✓	245
PROC. OF THE INT'L COURSE ON THE . . .	*											1		6		[RA1211.P74]	183
PROGRAM AND ABSTRACTS SYMP. ON . . .	*					X			X			6		6			173
PROGRESS IN CHEMICAL TOXICOLOGY, 5 VOLS.	*		X		X			U	X			1		6		RA1221.P75*	413
PROGRESS IN TOXICOLOGY, VOL. I	~5		X		X							1		6		RA1238.234	485
PROGRESS IN TOXICOLOGY, VOL. II	0											1		6		RA1238.234	486
PROTECTION OF ENVIRONMENT .40CFR 1.1, VOL. 40	*								X		X	6		3		QD561.P54	440
PROTEIN DEFICIENCY AND PESTICIDE . . .	~20		X		X				X			1		6		[RC627.P7B69]	64
THE PROPERTIES OF GASES & LIQUIDS . . .	*		X	X								1		6		TP242.R4	357
PULMONARY TOXICOLOGY OF RESPIRABLE . . .	*		X	X	X				X			6		6		RC756.H3	369
QUALITY CONTROL IN TOXICOLOGY	0										X	1		6		[RA1199.Q3]	332
QUANTITATIVE TOXICOLOGY	*		X	X	X				X		X	2		6		BKS RA1229.Q3613	151

OTS INFORMATION RESOURCES MATRIX--HANDBOOKS/PRINTED SOURCES

TITLE OF PRINTED SOURCE	CHEMICAL ACCESS		OTS DATA CATEGORIES									PUBLICATION INFORMATION				SHELF LOCATION	AUTHOR INDEX
	NO. CHEMICALS	CAS RN	SUBSTANCE IDENTIFICATION	PHYSICAL-CHEMICAL PROPERTIES	HEALTH EFFECTS	ENVIRONMENTAL EFFECTS	PRODUCTION/PROCESSING	USE/DISPOSAL	EXPOSURE	ECONOMICS	REGULATIONS/CONTROL	PUBLICATION TYPE	SUPPLEMENTS	FREQ. OF REVISION	ONLINE VERSION	LC CALL NUMBER	CITATION NUMBER
QUICK REFERENCE TO CLINICAL TOXICOLOGY	*		X	X	X			U	X			1		6		[RA1211.Q53]	187
RADIOLOGY IN CLINICAL TOXICOLOGY	*		X		X			U	X			1		6		[RA1223.R33.A57]	14
A RAPID METHOD FOR ESTIMATING LOG p . . .	~50			X								6		2			446
REGISTRY OF TOXIC EFFECTS OF CHEMICAL . . .	168,096	X	X	X	X				X		X	1		3	X	RA1221.U56✓	313
REPRODUCTIVE HAZARDS OF INDUSTRIAL . . .	48		X		X			U	X		X	1		6			43
RESEARCH PROGRAM ON HAZARD . . .	80					X			X			6				PB 263 162*	348
REVIEW OF THE ENVIRONMENTAL FATE . . .	74		X	X	X	X	X		X			1		6			73
REVIEWS IN BIOCHEMICAL . . . VOL. I	*		X	X	X							1		3			197
REVIEWS IN BIOCHEMICAL . . . VOL. II	*		X	X	X							1		3			198
REVIEWS IN BIOCHEMICAL . . . VOL. III	*		X		X							1		6		[BKS RA1221.H5]	199
REVIEWS IN BIOCHEMICAL . . . VOL. IV	*		X	X	X							1		3			200
RODD'S CHEMISTRY OF CARBON CMPDS.	*		X	X								3		6		QD251.R62*	103
THE ROLE OF TERRESTRIAL AND AQUATIC . . .	*					X						2		6		[QK911.B7A35 NO.17]	12
SAFETY EVALUATION OF CHEMICALS IN FOOD . . .	38		X		X						X	1	X	6		Z7891.J57V47✓	452
SCIENTIFIC CONSIDERATIONS IN MONITORING . . .	0											1		6		RA1199.S34✓	189
SECOND TOP 50 CHEMICAL COMPANIES . . .	0						X			X		6	X	3		ISSN:0009-2347	414
SELECTED CONSTANTS: OXIDATION-REDUCTION . . .	~350		X	X								1	X	6		[QD63.O9C53]	91
SELECTED VALUES OF CHEMICAL THERMODYNAMIC . . .	*		X	X								1		6		QD156.5.U585✓	458
SELECTIVE TOXICITY AND RELATED TOPICS . . .	*		X		X							6		6		RM262.A5 1973*	4
SELECTIVE TOXICITY, THE PHYSICO-CHEMICAL . . . 5TH ED.	*		X	X	X	X		U	X			1		6		RM262.A5 1973*	5
SELECTIVE TOXICITY, THE PHYSICO-CHEMICAL . . . 6TH ED.			X	X	X			U	X			1		5		[RM262.A5 1979]	6
SIMULATION OF NUTRIENT LOADINGS IN . . .	*		X						X			1		6			128
SOLID WASTES: ORIGIN, COLLECTION, . . .	*							D	X		X	1		6		BKS TD897.M38*	268
SOLUBILITIES OF INORGANIC AND METAL-ORGANIC . . . VOL. I	~100		X	X								1		6		QD66.L5*	249
SOLUBILITIES OF INORGANIC AND METAL . . . VOL. II	~100		X	X								1		6		QD66.L5*	250
SOLUBILITIES OF INORGANIC AND ORGANIC . . .	*		X	X								1		6		[QD543.N72 1963]	404
SORPTION OF HYDROPHOBIC POLLUTANTS ON . . .	10			X					X			6		6			222
SPECIES-SPECIFIC POTENTIAL OF INVERT . . .	*											1		6		[RA1199.5.I57K34]	220
SPECIFICATIONS FOR THE IDENTITY AND PURITY . . .	~210		X		X				X			2		6			147
STANDARD OPERATING PROCEDURES IN . . .	*								X			1		6		BKS RA1199.57*	334
STANDARD OPERATING PROCEDURES IN VITRO . . .	*								X			1		6		ISBN:0-8391-4124-6	423
STORAGE AND DISPOSAL OF DANGEROUS . . .	*			X				D	X		X	6		2			453
STRUCTURE-ACTIVITY CORRELATIONS . . .	*		X	X	X	X						1		6		TD370.V3*	447
STRUCTURE-ACTIVITY RELATIONSHIPS . . .	14			X		X						6		6		TD370.V3✓	448
A STUDY OF HAZARDOUS WASTE MATERIALS . . . VOL. 1	~400		X		X	X	X	X	X			6		6			60
A STUDY OF HAZARDOUS WASTE MATERIALS . . . VOL. 2	13		X	X	X	X	X	X	X			6		6			61
A STUDY OF HAZARDOUS WASTE MATERIALS . . . VOL. 3	12		X	X	X	X	X	X	X	X		6		6			62
A STUDY OF INDUSTRIAL DATA ON CANDIDATE . . .	667		X		X		X	U	X	X		6		6		[TP9.58]	366
SURFACTANT BIODEGRADATION	*		X			X			X			1		6		TP994.S95*	422
SURVEY ANALYSIS AND SUPPLEMENTAL . . .	7,000		X						X		X	1		6			309
SURVEY MANUAL	~1,200		X								X	1		6	X		307
SURVEY OF COMPOUNDS WHICH HAVE . . .	~28,000	X	X		X							1	X	6		[RC262.H33]	303
SURVEY OF CONTEMPORARY TOXICOLOGY . . .	*		X	X	X	X		U	X			1		6		RA1211.S93*✓	431
SURVEY OF CONTEMPORARY TOXICOLOGY . . .	*		X		X				X			1		6		RA1211.S93✓	15
SYMPOSIUM ON IMPACT OF TOXICOLOGY ON . . .	*		X	X	X	X	X	U		X	X	6				[RA1270.F6I47]	22
SYMPOSIUM ON TOXICOLOGY AND NUTRITION . . .	*				X				X			6		6		[QP141.A1W59]	430
SYNTHETIC ORGANIC CHEMICALS: . . .	*						X			X		1		6		[HD9999.D9U5]	441
SYNTHETIC ORGANIC CHEMICALS	*		X				X			X		1		3		[HD9999.D9U5]	442

OTS INFORMATION RESOURCES MATRIX--HANDBOOKS/PRINTED SOURCES

TITLE OF PRINTED SOURCE	CHEMICAL ACCESS		OTS DATA CATEGORIES									PUBLICATION INFORMATION				SHELF LOCATION	AUTHOR INDEX
	NO. CHEMICALS	CAS RN	SUBSTANCE IDENTIFICATION	PHYSICAL-CHEMICAL PROPERTIES	HEALTH EFFECTS	ENVIRONMENTAL EFFECTS	PRODUCTION/PROCESSING	USE/DISPOSAL	EXPOSURE	ECONOMICS	REGULATIONS/CONTROL	PUBLICATION TYPE	SUPPLEMENTS	FREQ. OF REVISION	ONLINE VERSION	LC CALL NUMBER	CITATION NUMBER
TLVS THRESHOLD LIMIT VALUES FOR ...	~900		X	X	X			U	X		X	1	X	3		[RC963.3A84]	2
THERMOCHEMISTRY OF ORGANIC AND ...	*		X	X								1		6		QD511.C66*	109
THERMODYNAMIC PROPERTIES OF ...	*		X	X								1		6		QD501.J37	214
TIERED TESTING FOR CHEMICAL HAZARD ...	0				X	X				X		6		6		ISSN:0013-936X	207
TOXIC AND HAZARDOUS INDUSTRIAL CHEM ...	702		X	X	X	X		X			X	1	X	6		T55.3H3I55*	384
TOXIC METALS AND POLLUTION CONTROL ...	18		X	X	X	X	X	X	X	X	X	1		6		TD899.M45S58✓	210
TOXICITY AND METABOLISM OF INDUSTRIAL ...	135		X	X	X		X	U	X			1		6		RA1270.S8B72✓	77
TOXICITY AND SIDE EFFECTS OF PSYCHOTROPIC ...	*				X							6		6		[RA1190.E8]	35
TOXICITY OF 4346 CHEMICALS TO LARVAL ...	4,346					X						1		6			16
TOXICITY OF CHEMICALS AND PULPING ...	*					X			X			6		6		[SH177W64L66]	264
TOXICITY OF HEAVY METALS ... PT. 1	~25				X	X			X			6		6		RA1231.M5ZT89✓	326
TOXICITY OF HEAVY METALS ... PT. 2	~50				X	X			X		X	6		6		RA1231.M5ZT69✓	78
TOXICITY OF INDUSTRIAL METALS	45		X	X	X			U	X			1		6		[RA1231.M52B7]	325
TOXICITY OF PLUTONIUM, AMERICIUM ...	3		X	X	X			U	X			2		6		[RA1231.R55M46]	320
TOXICITY OF PURE FOODS	*		X		X			U				1		6		[RA1258.B68]	65
TOXICOLOGIC EMERGENCIES	*		X		X							1		6		[RA1219.T68]	174
TOXICOLOGICAL AND PATHOLOGICAL STUDIES ...	*		X	X	X				X			2		6		[RA1228.G87]	176
TOXICOLOGICAL ASPECTS OF FOOD ...	*		X		X			U	X			6	X	6		RA1190.E8	244
TOXICOLOGICAL EFFECTS OF EMISSIONS ...	*		X		X		X	U	X			2		6		[RA577.D53 D53]	248
TOXICOLOGICAL EVALUATION OF PARATHION	~40		X	X		X			X			2		6			129
TOXICOLOGY: MECHANISMS ... VOL. I	*		X	X	X				X			1		6		RA1121.S73*	411
TOXICOLOGY: MECHANISMS ... VOL. 2	*		X		X				X			1		6		RA1211.S73*	412
TOXICOLOGY AND BIOCHEMISTRY OF ...	*		X	X	X		X	U	X			2		6		RA1235.G4*	172
TOXICOLOGY AND OCCUPATIONAL MEDICINE ...	*				X			U				6		6		RA1191.J57✓	123
TOXICOLOGY AND POISON PREVENTION	*		X		X				X			1		6		[RA1211.T834]	481
TOXICOLOGY, BIODEGRADATION AND EFFICACY ..	~280		X	X	X	X			X		X	6		6			231
TOXICOLOGY IN THE TROPICS	*		X		X				X			1		6		TP994.S95*	391
TOXICOLOGY OF DRUGS AND CHEMICALS	*		X		X			U	X			1		6		[RA1211.D42]	122
TOXICOLOGY OF HALOGENATED HYDROCARBONS ...	*		X		X							6		6		[RA1242.H35T89]	232
TOXICOLOGY OF THE EYE	~1,600				X			U				1		6		RE48.G68✓	181
TOXICOLOGY: PRINCIPLES AND PRACTICE, VOL 1	*		X		X				X			1		6		RA1211.T637*	355
TOXICOLOGY: REVIEW AND PROSPECT	*				X							6		6		[RA1190.E8]	136
TOXICOLOGY: THE BASIC SCIENCE OF POISONS	*		X		X			U				1		6		RA1211.C296✓	85
TOXINS OF ANIMAL AND PLANT ORIGIN	*				X				X			6		6		[QP941.J48]	120
TRANSFER OF RADIOACTIVE MATERIALS ...	~30		X		X	X	X		X			2		6		TX571.G37✓	164
TREATISE ON POISONS IN RELATION ...	~100				X							1		6		[RA1211.C56]	96
TREATMENT AND DISPOSAL OF WASTES	0													6		[RA8.A25]	456
TREATMENT OF COMMON ACUTE POISONING	*		X		X				X			1		6		[RA1216.M36]	276
U.S. EXPORTS SCHEDULE B; COMMODITY ...	*		X				X			X		1		3			432
USE OF STRUCTURE-REACTIVITY ...	~30		X	X		X			X			6		6			479
	*																
WATER QUALITY CRITERIA, 2ND ED. ...	*		X			X		U				6		6		[TD380.W38]	281
WATER QUALITY CRITERIA	~75				X	X			X		X	6		6			315
WATER QUALITY CRITERIA DATA BOOK, VOL. 1 & 2	~270		X		X	X			X		X	1		6		[TD370.W394]	19
WATER-RELATED ENVIRONMENTAL FATE OF ...	~105		X	X		X			X			1		6		DOC EL8002845*	83
WATER-SOLUBLE POLYMERS: DEVELOPMENTS ...	*		X	X			X	U				1		6		QD382.W31443✓	286
WORKSHOP ON CELLULAR AND MOLECULAR ...	*		X		X	X			X			6		6		[RA1191.W66]	150

Citation Number

HANDBOOK/PRINTED SOURCES
AUTHOR INDEX

1. ACGIH. 1980. American Conference of Governmental Industrial Hygienists. Documentation of the threshold limit values. 4th ed. Cincinnati, OH: ACGIH.

2. ACGIH. 1982. American Conference of Governmental Industrial Hygienists. TLVs threshold limit values for chemical substances and physical agents in the work environment with intended changes for 1982. Cincinnati, OH: ACGIH.

3. ACS. 1982. American Chemical Society. Chemcyclopedia. Washington, DC: ACS.

4. Albert A. 1968. Selective toxicity and related topics, 4th ed. London: Methuen.

5. Albert A. 1973. Selective toxicity. The physico-chemical basis of therapy, 5th ed. London: Chapman and Hall.

6. Albert A. 1979. Selective toxicity: the physico-chemical basis of therapy, 6th ed. Chapman and Hall, London.

7. Aldrich Chemical Co. 1982-1983. Aldrich catalog/handbook of fine chemicals. Milwaukee, WI: Aldrich.

8. Altman PL, Dittmer DS, eds. 1968. Metabolism. Bethesda, MD: Federation of American societies for experimental biology handbooks.

9. American Chemical Society. 1934-present. Chemical Abstracts Service. Chemical abstracts, Columbus, OH: ACS.

10. Ames BN. 1979. The detection and hazards of environmental carcinogens/mutagens. In: Monitoring toxic substances ACS symposium series # 94. Washington , DC: ACS.

11. Anderson HJ, Baker MJ, Gandenberger EL et al., eds. 1983. Chem Sources. USA. Ormond Beach, FLA: Directories Publishing Company.

12. Anderson JM, Macfadyen A, eds. 1976. The role of terrestrial and aquatic organisms in the decomposition processes. Proceedings from the 17th Symposium of the British Ecological Society. Oxford: Blackwell Scientific Publication.

13. Andreyshcheva NG. 1976. Predicting biological effect as a function of the chemical structure and the primary physical and chemical properties of organic compounds. Environ Health Perspect 13:27-30.

14. Ansell G. 1974. Radiology in clinical toxicology. London: Butterworth.

15. Anthony T, ed. 1980. Survey of contemporary toxicology. Vol. 1. New York: Wiley.

16. Applegate VC, Howell JH, Hall AE, Smith MA. 1957. Toxicity of 4,346 chemicals to larval lampreys and fishes. Special Scientific Report - Fisheries No. 207. Washington, DC: US Fish and Wildlife Service, Dept. of the Interior.

17. Armstrong GT, Goldberg RN. 1976. An annotated bibliography of compiled thermodynamic data sources for biochemical and aqueous systems (1930-1975). Equilibrium, enthalpy, heat capacity, and entropy data. National Bureau of Standards, U.S. Dept. of Commerce.

18. Arthur D. Little Inc. 1970. Water quality criteria data book, Vol. 1: Organic chemical pollution of freshwater. Washington, DC: Water Quality Office, U.S. EPA. Contract 14-12-538.

19. Arthur D. Little, Inc. 1971. Water quality criteria data book, Vol. II: Inorganic chemical pollution of freshwater. Washington, DC: Water Quality Office, U.S. EPA. Contract # 14-12-538.

20. Arthur D. Little, Inc. 1975. Economic analysis of effluent guidelines-organic chemicals industry (major products). Washington, DC: Office of Planning and Evaluation, U.S. EPA. EPA-230/2-75-019. Contract 68-01-1541.

21. Aviado DM, Zakhari S, Watanabe T. 1977. Non-fluorinated propellants and solvents for aerosols. Cleveland, OH: CRC.

22. Ayres JC, Kirschman JC, eds. 1981. Symposium on impact of toxicology on food processing, June 6-7, 1980. Sponsers: Institute of Food Technologists and International Union of Food Science and Technology. Westport, CN: AVI.

23. BNA. 1978-1983. The Bureau of National Affairs. Chemical regulation reporter. Hazardous materials transportation. Washington, DC: BNA.

24. BNA. 1981. Bureau of National Affairs, Inc. International environment reporter. Washington, DC: BNA.

25. BNA. 1981, 1982. The Bureau of National Affairs. Chemical regulation reporter reference file. Washington, DC: BNA.

26. BNA. 1982. Bureau of National Affairs, Inc. Environment reporter. Washington, DC: BNA.

27. BNA. 1982, 1983. The Bureau of National Affairs. Chemical regulation reporter. Index to government regulation. Washington, DC: BNA.

28. BNA. 1983. The Bureau of National Affairs. Chemical regulation reporter. Current reports. Washington, DC: BNA.

29. BNA. 1983. Bureau of National Affairs, Inc. Occupational safety and health reporter. Washington, DC: BNA.

30. Bailar JC, Emeleus HJ, Nyholm R, et al, eds. 1973. Comprehensive inorganic chemistry, Vols. 1-5. New York: Pergamon.

31. Bailey GW, Swank RRH, Nicholson HP. 1974. Predicting pesticide runoff from agricultural land: A conceptual model. J Environ Qual 3(2):95-102.

32. Baker CE. 1982. Physicians' desk reference, 36th ed. Oradell, NJ: Medical Economics Company, Inc.

33. Baker RA, ed. 1980. Contaminants and sediments, Vol. 1. Fate and transport case studies, modeling, toxicity. Ann Arbor, MI: Ann Arbor Science.

34. Baker RA, ed. 1980. Contaminants and sediments, Vol. 2. Analysis, chemistry, biology. Ann Arbor, MI: Ann Arbor Science.

35. Baker SBD, Boissier JR, Koll W, eds. 1968. Toxicity and side-effects of psychotrophic drugs. Proceedings of the European Society for the Study of Drug Toxicity, Vol. IX, Paris, Feb. 1967. Amsterdam: Excerpta Medica.

36. Balazs T, ed. 1981. Cardiac toxicology, Vol I. Boca Raton, FL: CRC.

37. Balazs T, ed. 1981. Cardiac toxicology. Vol. II. Boca Raton, FL: CRC.

38. Balazs R, ed. 1981. Cardiac toxicology, Vol. III. Boca Raton, FL: CRC.

39. Balentine JD. 1982. Pathology of oxygen toxicity. New York: Academic.

40. Ballantyne B, ed. 1974. Forensic toxicology. Bristol: Wright.

41. Ballantyne B, ed. 1977. Current approaches in toxicology. Bristol: Wright.

42. Bandal SK, Marco GJ, Goldberg L, Leng ML, eds. 1981. The pesticide chemist and modern toxicology. Washington, DC: ACS.

43. Barlow SM, Sullivan FM, eds. 1982. Reproductive hazards of industrial chemicals: An evaluation of animal and human data. London: Academic.

44. Barton D, Ollis WD, eds. 1979. Comprehensive organic chemistry, Vols 1-6. New York: Pergamon.

45. Bartosek I, Guaitani A, Pacei E, eds. 1982. Animals in toxicological research, 1st ed. Monographs of the Mario Negri Institute for Pharmacological Research, Milan. New York: Raven.

46. Baselt RC. 1978. Disposition of toxic drugs and chemicals in man, Vol. I. Centrally acting drugs. Davis, CA: Biomedical

47. Baselt RC. 1978. Disposition of toxic drugs and chemicals in man. Vol. II. Peripherally-acting drugs and common toxic chemicals. Davis, CA: Biomedical.

48. Baselt RC. 1982. Disposition of toxic drugs and chemicals in man, 2nd ed. Davis,CA: Biomedical.

49. Beilstein Institute for Literature of Organic Chemistry. 1975. Beilsteins's handbook of organic chemistry and supplementary series I, II, III and IV. The literature to 1959 inclusive: Formula index for volumes 1-( ). 4th ed. New York: Springer-Verlag

50. Beilstein Institute for Literature of Organic Chemistry. 1975. Beilsteins's handbook of organic chemistry and supplementary series I, II, III and IV. The literature to 1959 inclusive: Subject index for volumes 1-( ). 4th ed. New York: Springer-Verlag

51. Bennett H, ed. 1974. Concise chemical and technical dictionary, 3rd ed. New York: Chemical Publishing Co.

52. Berlin RO, Herrmann H, Lepow IH, Tanzer JM, eds. 1978. Molecular basis of biological degradative processes. New York: Academic.

53. Bernheimer AW, ed. 1977. Perspectives in toxicology. New York: Wiley.

54. Beynon LR, Cowell EB, eds. 1974. Ecological aspects of toxicity testing of oils and dispersants. Proceedings of a workshop on the toxicity of oils and dispersants held at the Institute of Petroleum, London. New York: Wiley.

55. Bhatnager RS, ed. 1980. Molecular basis of environmental toxicity. Ann Arbor, MI: Ann Arbor Science.

56. Bioscience Information Service of Biological Abstracts. 1927-present. Biological abstracts. Philadelphia, PA: Bioscience Information Service of Biological Abstracts.

57. Blood FR, ed. 1969. Essays in toxicology, Vol. 1. New York: Academic.

58. Bond RG, Straub CP, Prober R. 1972-1975. Handbook of environmental control, 1st ed. 5 vols. Cleveland, OH: CRC.

59. Bondi A. 1968. Physical properties of molecular crystals, liquids, and glasses. New York: Wiley.

60. Booz Allen Applied Research, Inc. 1973. A study of hazardous waste materials, hazardous effects and disposal methods, Vol. I. Washington, DC: Office of Research and Development, U.S. EPA. EPA-670/2-73-14. PB 221 465.

61. Booz Allen Applied Research, Inc. 1973. A study of hazardous waste materials, hazardous effects and disposal methods, Vol. II. Washington, DC: Office of Research and Development, U.S. EPA. EPA-670/2-73-15. PB 221 466.

62. Booz Allen Applied Research, Inc. 1973. A study of hazardous waste materials, hazardous effects and disposal methods, Vol III. Washington, DC: Office of Research and Development, U.S. EPA. EPA-670/-2-73-16. PB 221-467.

63. Boyd EM. 1972. Predictive toxicometrics. Bristol, England: Scientechnica.

64. Boyd EM. 1972. Protein deficiency and pesticide toxicity. Springfield, IL: Charles C Thomas.

65. Boyd EM, Boyd CE. 1973. Toxicity of pure foods: Cleveland, OH: CRC.

66. Boyland E, Goulding R, eds. 1968. Modern trends in toxicology, Vol. 2. London: Butterworths.

67. Brady GS, Clauser HR. 1977. Materials handbook. An encyclopedia for managers, technical professionals, purchasing and production managers, technicians, supervisors, and foreman. New York: McGraw - Hill.

68. Brakhnova IT. 1975. Environmental hazards of metals. Toxicity of powdered metals and metal compounds. New York: Plenum.

69. Branson DR, Dickson KL, eds. 1981. Aquatic toxicology and hazard assessment: Proceedings of the Fourth Annual Symposium on Aquatic Toxicology. Sponser: ASTM, Am. Soc. for Testing and Materials, Philadelphia, PA.

70. Bretherick L. 1979. Handbook of reactive chemical hazards, 2nd ed. Boston, MA: Butterworths.

71. Brooks GT. 1975. Chlorinated insecticides, Vol. II. Biological and environmental aspects. Cleveland, OH: CRC.

72. Brown VK. 1980. Acute toxicity in theory and practice: With special reference to the toxicology of pesticides. New York: Wiley.

73. Brown SL, Chan FY, Jones JL, et al. 1975. Research program on hazard priority ranking of manufactured chemicals. Phase II - Final report. Washington, DC: Research Applied to National Needs (RANN), National Science Foundation. NTIS PB-263-161

74. Brown SS, Davies DS, eds. 1981. Organ directed toxicity. Chemical indices and mechanisms. Proceedings of the Symposium on Chemical Indices and Mechanisms of Organ-directed Toxicity. Barcelona, Spain, March 4-7, 1981. International union of pure and applied chemistry symposium series. Oxford: Pergamon.

75. Brown SS, Davies DS, eds. 1981. Organ-directed toxicity: Chemical indices and mechanisms. Proceedings of the Symposium on Chemical Indices and Mechanisms of Organ Directed Toxicity. Oxford: Pergamon.

76. Brown SS, Sunderman FW, eds. 1980. Nickel toxicology. Proceedings of the Second International Conference on Nickel Toxicology, Swansea, Wales, Sept. 3-5, 1980. New York: Academic.

77. Browning E. 1965. Toxicity and metabolism of industrial solvents. New York: Elsevier.

78. Browning E. 1969. Toxicity of industrial metals, 2nd ed. London: Butterworth.

79. Bruce DL. 1980. The functional toxicity of anesthesia. New York: Grune and Stratton.

80. Brusick DJ. 1980. Principles of genetic toxicology. New York: Plenum.

81. Buonicore A, Theodore L. 1975. Industrial control equipment for gaseous pollutants, Vol I. Cleveland, OH: CRC.

82. CAS. 1981. Chemical Abstracts Services. Parent-compounds handbook. Columbus, OH: ACS.

83. Callahan M, Slimak M, Gabel N. 1979. Water-related environmental fate of 129 priority pollutants, Vols. I and II, final report. Washington, DC: Office of Water Planning and Standards, U.S. EPA. Contract C8-01-3852.

84. Carrin M. 1978. Atmospheric chemistry modelling. J Chem Ed 55(4):210-215.

85. Casarett LJ, Doull J, eds. 1975. Toxicology: The basic science of poisons. New York: Macmillan.

86. Chakrabarty AM, ed. 1982. Biodegradation and detoxification of environmental pollutants. Boca Raton, FL: CRC.

87. Chambers JE, Yarbrough JD, eds. 1982. Effects of chronic exposures to pesticides on animal systems. New York: Raven.

88. Chambers PL, Chambers CM, eds. 1981. A critique of accepted requirements and methodology. Arch Toxicol Supplements, Vol 5:1-382.

89. Chambers PL, Gunzel P, ed. 1979. Mechanism of toxic action on some target organs. Proceedings of the European Society of Toxicology. Berlin: Springer-Verlag.

90. Chambers PL, Klinger W. eds. 1980. Further studies in the assessment of toxic actions. Proceedings of the European Society of Toxicology, Dresden, June 11-13, 1979. Arch Toxicol Supplement 4. p. 1-507.

91. Charlot G, Collumeau A, Marchon JC. 1971. Selected constants: Oxidation reduction potentials of inorganic substances in aqueous solution. International Union of Pure and Applied Chemistry London: Butterworths.

92. Chemical Sources Europe. 1974. 2nd ed. Flemington, NJ: Chemical Sources Europe.

93. Chiou CT, Freed VH. 1977. Chemical studies on bench mark industrial chemicals (annual report). Washington, DC: Research Applied to National Needs (RANN), Natl. Science Foundation. NTIS PB 274-263.

94. Chiou CT, Freed VH, Schmedding DW, Kohnert RL. 1977. Partition coefficient and bioaccumulation of selected organic chemicals. Environ Sci Technol 11(5):475-78.

95. Chiou CT, Peters LJ, Freed VH. 1979. A physical concept of soil-water equilibria for nonionic organic compounds. Science 206(4420):831-832.

96. Christison R. 1973. A treatise on posions in relation to medical jurisprudence, physiology, and the practice of physic. New York: AMS.

97. Clayton GD, Clayton FE, eds. 1978. Patty's industrial hygiene and toxicology, 3rd ed., Vol. 1. General Principles. New York: Wiley.

98. Clayton GD, Clayton FE, eds. 1981. Patty's industrial hygiene and toxicology, 3rd ed., Vol. 2A. Toxicology. New York: Wiley.

99. Clayton GD, Clayton FE, eds. 1981. Patty's industrial hygiene and toxicology, 3rd ed., Vol. 2B. Toxicology. New York: Wiley.

100. Clayton GD, Clayton FE, eds. 1982. Patty's industrial hygiene and toxicology, 3rd ed., Vol. 2C. Toxicology. New York: Wiley.

101. Clement Assoc., Inc. 1981. Chemical hazards to human reproduction. Council on Environmental Quality.

102. Codd LW, Dijkhoff K, Fearon JH, Van Oss CJ, Roebersen HG, Stanford EG, eds. 1972. Chemical technology: An encyclopedic treatment, Vol. IV. Petroleum and organic chemicals. New York: Barnes and Noble Books.

103. Coffey S. 1964. Rodd's chemistry of carbon compounds, 2nd ed. Amsterdam: Elsevier

104. Cohen EN, VanDyke RA. 1977. Metabolism of volatile anesthetics: Implications for toxicity. Reading, MA: Addison-Wesley.

105. Colour Index. 1971. 3rd ed. Vol. 4. Chemical constitutions. Intermediate compounds. Braford, England: Society of Dyers and Colourists.

106. Committee on Toxicology. 1964. Principles and procedures for evaluating the toxicity of household substances. Washington, DC: National Academy of Science-National Research Council. Pub. 1138.

107. Congressional Information Service, Inc. CIS Index to publications of the United States Congress. Washington, DC: Congressional Information Service, Inc.

108. Cornaby BW, ed. 1981. Management of toxic substances in our ecosystems. Ann Arbor, MI: Ann Arbor Science.

109. Cox JD, Pilcher G. 1970. Thermochemistry of organic and organometallic compounds. New York: Academic.

110. Cralley LV, Cralley LJ, eds. 1979. Patty's industrial hygiene and toxicology, Vol. III. Theory and rationale of industrial hygiene practice. New York: Wiley.

111. Cravey RH, Baselt RC. 1981. Introduction to forensic toxicology. Davis, CA: Biomedical Publications.

112. Crawford NH, Donigan AS, JR. 1973. Pesticide transport and runoff for agricultural lands. Washington, DC: Office of Research and Development, U.S. EPA. EPA-660/2-74-013. PB-235-723.

113. Crawford RL. 1981. Lignin biodegradation and transformation. New York: Wiley.

114. Curry AS. 1972. Advances in forensic and clinical toxicology. Cleveland, OH: CRC.

115. Davidson RL, ed. 1980. Handbook of water-soluble gums and resins. New York: McGraw-Hill.

116. De Bruin A. 1976. Biochemical toxicology of environmental agents. New York: Elsevier.

117. DeCastro FJ, Jaeger RW. 1978. Clinical toxicology manual. St Louis, MO: The Catholic Hospital Assoc.

118. DeRenzo DJ. 1977. Energy from bioconversion of waste materials. Park Ridge, NJ: Noyes Data.

119. DeRenzo DJ, ed. 1980. Biodegradation techniques for industrial organic wastes. Park Ridge, NJ: Noyes Data.

120. DeVries A, Kochva E, eds. 1971. Toxins of animal and plant origin. International Symposium on Animal and Plant Toxins, 2nd, Tel Aviv University, Tel Aviv, Israel, Feb. 22-28, 1970. New York: Gordon and Breach Science Publishers.

121. Dean JA, ed. 1979. Lange's handbook of chemistry, 12th ed. New York: McGraw-Hill.

122. Deichmann WB, Gerarde HW. 1969. Toxicology of drugs and chemicals. New York: Academic.

123. Deichmann WB, ed. 1979. Toxicology and occupational medicine. Proceedings on the 10th Inter-American Conference on Toxicology and Occupational Medicine, Key Biscayne, FL, Oct. 22-25, 1978. New York: Elsevier/North Holland.

124 DiCarlo FJ, ed. 1973-1983. Drug metabolisms reviews. Drugs and the pharmaceutical sciences. New York: Marcel Dekker.

125. Dittmer DS. 1959. Handbook of toxicology. Fungicides, Vol. V. Philadelphia: W.B. Saunders.

126. Donigan AS, Jr, Beyerlein DC, Davis HH, Jr, Crawford NH. 1977. Agricultural runoff management (ARM) model version II: Refinement and testing. Athens, GA: Environmental Research Laboratory, Office of Research and Development, U.S. EPA. EPA-600/3-77-098.

127. Donigan AS, Jr., Crawford NH. 1976. Modeling nonpoint pollution from the land surface. Athens, GA: Environmental Research Laboratory, Office of Research and Development, U.S. EPA. EPA 600/3-76-083. PB-257-089.

128. Donigan AS, Crawford NH. 1977. Hydrocomp Inc. Simulation of nutrient loadings in surface runoff with the NPS model. Athens, GA: Enivronmental Research Laboratory, Office of Research and Development, U.S. EPA. Research Grant No. R803315-01-2.

129. Dortland RJ. 1980. Toxicological evaluation of parathion and azinphosmethyl in freshwater model ecosystems. Wageningen: Center for Agricultural Publishing and Documentation (PUDOC).

130. Doudoroff P. 1980. A critical review of recent literature on the toxicity of cyanides to fish. Washington, DC: American Petroleum Inst.

131. Doull J, Klaassen CD, Amdur MO, eds. 1980. Casarett and Doull's toxicology: The basic science of poisons, 2nd ed. New York: MacMillan.

132. Dreisbach RH. 1977. Handbook of poisoning: Diagnosis and treamtent, 9th ed. Los Altos, CA: Lange Medical.

133. Drill VA, Lazar P, eds. 1977. Cutaneous toxicity. New York: Academic.

134. Drill VA, Lazar P, eds. 1980. Current concepts in cutaneous toxicity. New York: Academic.

135. Dreisbach RR. 1959. Physical properties of chemical compounds, Vols I, II, III. Washington, DC: Amercian Chemical Society.

136. Duncan WAM, ed. 1973. Toxicology: Review and prospect. Proceedings of the European Society for the Study of Drug Toxicity, Vol XIV, Utrecht, June 1972. Amsterdam: Excerpta Medica.

137. Duncan WAM, Julou L, Kramer M, eds. 1975. Developmental and genetic aspects of drug and environmental toxicity. Proceedings of the European Society of Toxicology, Vol. XVII. Amsterdam: Excerpta Medica.

138. Duncan WAM, Leonard BJ, Brunaud M, eds. 1976. The prediction of chronic toxicity from short term studies. Proceedings of the European Society of Toxicology, Vol. XVII, Montpellier, June 1975. New York: Elsevier.

139. Eastman Kodak Company. 1978. Eastman organic chemical bulletin, Vol. 50, Nos. 1&2. Rochester, NY: Eastman Kodak.

140. Eaton JG, Parrish PR, Hendricks AC, eds. 1980. Aquatic toxicology. Proceedings of the 3rd Annual Symposium on Aquatic Toxicology. Sponser: ASTM, American Society for Testing and Materials. Oct 17-18, 1978. Philadelphia, PA.

141. Edwards CA. 1970. CRC persistent pesticides in the environment. Cleveland, OH: CRC

142. Elliott HW, George R, Okun R, eds. 1976. Annual review of pharmacology and toxicology, Vol. 1. Palo Alto, CA: Annual Reviews Inc.

143. Elliott HW, George R, Okun R, eds. 1976. Annual review of pharmacology and toxicology, Vol. 16. Palo Alto, CA: Annual Reviews Inc.

144. Elliott HW, George R, Okun R, eds. 1977. Annual review of pharmacology and toxicology, Vol. 17. Palo Alto, CA: Annual Reviews Inc.

145. Ellis MD, ed. 1978. Dangerous plants, snakes, arthropods and marine life: Toxicity and treatment, 2nd ed. Hamilton, IL: Drug Intelligency Pub.

146. FAO. 1978. Food and Agriculture Organization of the United Nations. Fisheries Department. Inventory of data on contaminants in aquatic organisms. FAO Fisheries Circular No. 338, Revision I. Rome.

147. FAO/WHO. 1966. Specifications for the identity and purity of food additives and their toxicological evaluation: Some emulsifiers and stabilizers and certain other substances. 10th Report. Geneva. Food and Agriculture Organization, World Health Organization, United Nations.

148. Fairchild EJ, ed. 1978. Agricultural chemicals and pesticides: A handbook of the toxic effects. London: Castle House.

149. Fasset DW, Irish DD, eds. 1963. Industrial hygiene and toxicology, Vol. II. Toxicology. New York: Interscience.

150. Fawcett DW, Newberne JW. 1980. Workshop on cellular and molecular toxicology. Baltimore, MD: Wiliiam and Wilkins.

151. Filov VA, Golubev AA, Liubling EI, Tolokontsev NA. 1979. Quantitative toxicology. New York: Wiley.

152. Fink BR, ed. 1972. Cellular biology and toxicity of anesthetics. Baltimore, MD: Williams and Wilkins.

153. Fishbein L. 1979. Potential industrial carcinogens and mutagens, Vol. 4. New York: Elsevier.

154. Fishbein L, Flamm WG, Falk HL. 1970. Chemical mutagens. Environmental effects on biological systems. New York: Academic.

155. Flamm GW, Mehlman MA, eds. 1978. Advances in modern toxicology, Vol. 5. Mutagenesis. New York: Wiley.

156. Florkin M, Scheer BT, eds. 1967. Chemical zoology, Vols. 1-11. New York: Academic Press.

157. Fouts JR, Gut I. 1978. Industrial and environmental xenobiotics. In vitro versus in vivo biotransformation and toxicity. New York: Elsevier.

158. Fox D, Labes MM, Weissberger A, eds. 1963. Physics and chemistry of the organic solid state, 2 Vols. New York: Interscience.

159. Freed VH, Haque R, eds. 1976. Chemical structure and properties of selected benzene compounds in relation to biological activity. Environ Health Perspect 13:23-26.

160. Freed VH, Hague R, Schmedding D, Kohnert R. 1976. Physiochemical properties of some organphosphates in relation to their chronic toxicity. Environ Heatlh Perspect 13:77-81.

161. Fukuto TR. 1976. Chemistry and mode of action of insecticides. US EPA. U.S. Environment Protection Agency Office of Research and Development Health Effects Research Laboratory. Research Triangle Park, NC. EPA-600/1-76-004.

162. Furia TE, Bellanca N, eds. 1975. Fenaroli's handbook of flavor ingredients, 2nd ed., Vol. 1. Cleveland, OH: CRC.

163. Galli LC, Murphy SD, Paoletti R, eds. 1980. Proceedings of the International Course on the Principles and Methods in Modern Toxicology. Belgirate, Italy, Oct. 22-26, 1979. Sponser: Giovanni Lorenzini Foundation. Amsterdam: Elsevier.

164. Garner RJ. 1972. Transfer of radioactive materials from the terrestrial environment to animals and man. Cleveland, OH: CRC.

165. Gaston PJ. 1970. The care, handling and disposal of dangerous chemicals. Aberdeen, Scotland: Northern Publishers (Aberdeen) Ltd.

166. Geoffrey W, Stone FGA, Abel EW, eds. 1982. Comprehensive organometallic chemistry, Vols. 1-9. Elmsford, New York: Pergamon.

167. George R, Okun R, Cho A, eds. 1978. Annual review of pharmacology and toxicology. Vol. 18 Palo Alto, CA: Annual Reviews Inc.

168. George R, Okun R, Cho A, eds. 1979. Annual review of pharmacology and toxicology, Vol. 19. Palo Alto, CA: Annual Reviews Inc.

169. George R, Okun R, Cho A, eds. 1980. Annual review of pharmacology and toxicology, Vol. 20. Palo Alto, CA: Annual Reviews Inc.

170. George R, Okun R, Cho A, eds. 1981. Annual review of pharmacology and toxicology, Vol. 21. Palo Alto, CA: Annual Reviews Inc.

171. George R, Okun R, Cho A, eds. 1982. Annual review of pharmacology and toxicology, Vol. 22. Palo Alto, CA: Annual Reviews Inc.

172. Gerarde HW. 1960. Toxicology and biochemistry of aromatic hydrocarbons in Elsevier Monographs on Toxic Agents. New York: Elsevier.

173. Gevantman LH. 1976. Program and abstracts. Symposium on Nonbiological Transport and Transformation of Pollutants on Land and in Water: Processes and critical data required for predictive descirption, Gaithersburg, MD, May 11-13, 1976. Sponsor: National Bureau of Standards, U.S. Dept of Commerce. NTIS PB-257-347.

174. Goldfrank LR, ed. 1982. Toxicologic emergencies: A comprehensive handbook in problem solving. New York: Appleton-Century-Crofts.

175. Gosselin RE, Hodge HC, Smith RP, Gleason MN. 1976. Clinical toxicology of commercial products, 4th ed. Baltimore, MD: Williams and Wilkens.

176. Gottschalk LA, Cravey RH. 1980. Toxicological and pathological studies on psychoactive drug-involved deaths. Davis, CA: Biomedical Publications.

177. Gould RF, ed. 1972. Biological correlations - The Hansch approach. Symposium Sponsered by the Division of Pesticide Chemistry at the 161st Meeting of the Am. Chemical Soc., Los Angeles, CA. March 31 - April 1, 1970. Advances in Chemistry Series 114. Washington, DC: ACS.

178. Government Contracts Guide. 1972. Philadelphia, PA: Commerce Clearing House.

179. Graedel TE. 1978. Chemical compounds in the atmosphere. New York: Academic.

180. Gralla EJ, ed. 1981. Scientific considerations in monitoring and evaluating toxicological research. New York: Hemisphere Publishing.

181. Grant WM. 1974. Toxicology of the eye. Springfield, IL: Chas. C. Thomas.

182. Grasselli TG, Ritchey WM, eds. CRC Atlas of spectral data and physical constants of organic compounds, 2nd ed. Cleveland: CRC.

183. Grayson M. 1978. Kirk-Othmer, Encyclopedia of chemical technology, 3rd ed. New York: Wiley.

184. Guthrie FE, Perry JJ. 1980. Introduction to environmental toxicology. Oxford, England: Blackwell Scientific.

185. Hammons AS. 1981. Methods for ecological toxicity: A critical review of laboratory multispecies tests. Ann Arbor, MI: Ann Arbor Science.

186. Hampel CA, Hawley GG, eds. 1973. The Encyclopedia of chemistry, 3rd ed. New York: Van Nostrand Reinhold.

187. Hanenson IB, ed. 1980. Quick reference to clinical toxicology. Philadelphia: J.B. Lippincott.

188. Hardy HL, Goyer RA, Guinee VF, et al. 1976. Epidemiology and detection of lead toxicity. New York: MSS Information Corporation.

189. Harvey, HH. 1976. Aquatic and environmental quality: Problems and proposals. FRB Report No. 12: 1-37.

190. Hatchcock J, ed. 1982. Nutritional toxicology, Vol I. New York: Academic.

191. Hawley GG. 1981. Condensed chemical dictionary. New York: Van Nostrand Reinhold.

192. Hayes AW, ed. 1982. Principles and methods of toxicology. New York: Raven.

193. Hayes WT, ed. 1976. Essays in toxicology, Vols. 1-7. New York: Academic.

194. Hey DH, Beattie IR, Davies CW, Oesper P, Turkevich J. 1966. Kingzett's chemical encyclopedia. 9th ed. Princeton, NJ: Van Nostrand.

195. Hiraizumi Y, Takahashi M, Nishimura H. 1979. Adsorption of polychlorinated biphenyl onto sea bed sediment, marine plankton and other adsorbing agents. Environ Sci Technol 13(5):580-584.

196. Hochster RM, ed. 1973. Metabolic inhibitors: A comprehensive treatise, Vols. I-IV. New York: Academic.

197. Hodgson E, Bend JR, Philpot RM, eds. 1979. Reviews in biochemical toxicology, Vol. 1. New York: Elsevier Biomedical.

198. Hodgson E, Bend JR, Philpot RM, eds. 1980. Reviews in biochemical toxicology, Vol. 2. New York: Elsevier Biomedical.

199. Hodgson E, Bend JR, Philpot RM, eds. 1981. Reviews in biochemical toxicology, Vol. 3. New York: Elsevier Biomedical.

200. Hodgson E, Bend JR, Philpot RM, eds. 1982. Reviews in biochemical toxicology, Vol. 4. New York: Elsevier Biomedical.

201. Hodgson E, Guthrie FE, eds. 1980. Introduction to biochemical toxicology, 1st ed. New York: Elsevier.

202. Holdgate MW, White GF, eds. 1976. Environmental issues: Scope Report 10. New York: Wiley.

203. Holmstedt B, Lauwerys R, Mercier M, Roberfroid M, eds. 1980. Mechanisms of toxicity and hazard evaluation. Proceedings the Second International Congress on Toxicology, Brussels, Belgium, July 6-11, 1980. Amsterdam: Elsevier. (Developments in toxicology and environment science, Vol. 8)

204. Horvath M, ed. 1976. Adverse effects of environmental chemicals and psychotropic drugs, Vol. 2. Neurophysiological and behavioral tests. New York: Elsevier.

205. Huber J, ed. 1979. The Kline guide to the pulp and paper industry, 3rd ed. Fairfield, NJ: Kline and Co.

206. Hunter WJ, Smeets JGPM, eds. 1976. The evaluation of toxicological data for the protection of public health. Proceedings of the International Colloquim, Luxemburg, December 7-8, 1976. New York: Pergamon.

207. Hushon JM, Clerman RJ, Wagner BO. 1979. Tiered testing for chemical hazard assessment. Environ Sci Tech 13:1202-1207.

208. IAEA. 1963. International Atomic Energy Agency. A basic toxicity classification of radionuclides. Technical Reports Series No. 15. Vienna: IAEA.

209. IARC. 1972-1982. International Agency for Research on Cancer. On the evaluation of the carcinogenic risk of chemicals to man. IARC Monogr. 28 Vols.

210. ITI. 1977. The International Technical Information Insititute. Toxic and hazardous industrial chemicals safety manual: for handling and disposal with toxicity and hazard data. Tokyo, Japan: ITI.

211. International Labour Office. 1971. Encyclopedia of occupational health and safety. 2 Vols. New York: McGraw.

212. Jakoby WB, ed. 1980. Enzymatic basis of detoxification, Vol. I. Biochemical Pharmacology and Toxicology Ser. New York: Academic.

213. Jakoby WB, ed. 1980. Enzymatic basis of detoxification, Vol. II. Biochemical Pharmacology and Toxicology Ser. New York: Academic.

214. Janz G. 1967. Thermodynamic properties of organic compounds: Estimation methods, principles and practice. New York: Academic.

215. Janz GJ, Tomkins RPT, eds. 1972. Non-aqueous electrolyte handbook, Vol. 1. New York: Academic.

216. Janz GJ, Tomkins RPT, eds. 1973. Non-aqueous electrolyte handbook, Vol. II. New York: Academic.

217. Jenne EA, ed. 1979. Chemical modeling in aqueous systems. Based on a symposium held in Miami Beach, Florida, September 11-13, 1978. Sponsors: The Society of Environmental Geochemistry and Heatlh and the American Chemical Society Division of Environmental Chemistry. Washington, DC: ACS.

218. Jollow DJ, Kocsis JJ, Synder R, et al, eds. 1975. Biological reactive intermediates: Formation, toxicity and inactivation. New York: Plenum.

219. Jones PW, Freudenthal RI, eds. 1978. Polynuclear aromatic hydrocarbons: Second International Symposium on Analysis, Chemistry, and Biology. New York: Raven. (Carcinogensis - A comprehensive survey, Vol. III.)

220. Kaiser HE. 1980. Species-specific potential of invertebrates for toxicological research. Baltimore, MD: University Park Press.

221. Kalant DJ. 1973. The amphetamines: Toxicity and addiction, 2nd ed. Toronto, Canada: Univ. of Toronto Press.

222. Karickhoff SW, Brown DS, Scott TA. 1979. Sorption of hydrophobic pollutants on natural sediments. Water Res 13(3): 241-248.

223. Karki NT, ed. 1976. Mechanisms of toxicity and metabolism, Vol. 6. Proceedings of the Sixth International Congress of Pharmacology. Helsinki, Finland. 1975. Sponser: International Union of Pharmacology (IUPHAR).

224. Kaye S. 1970. Handbook of emergency toxicology, 3rd ed. Springfield, Ill: Charles C. Thomas.

225. Kaye S. 1980. Handbook of emergency toxicology: A guide to indentification, diagnosis and treatment of poisoning, 4th ed. Springfield: Charles C. Thomas.

226. Kearney PC, Kaufman DD, eds. 1969. Herbicides: Chemistry, degradation and mode of action, 2nd ed., Vol. 1. New York: Marcel Dekker.

227. Kearney PC, Kaufman DD, eds. 1976. Herbicides: Chemistry, degradation, and mode of action, Vol. 2. New York: Marcel Dekker.

228. Keller, JJ and Associates Inc. 1977. Hazardous materials guide: Shipping, materials handling and transportation. Neenah, WI: JJ Keller.

229. Keller, JJ and Associates Inc. 1981. Occupational exposure guide. Indentification, classification and regulation. Neenah, WI: J.J. Keller.

230. Kenaga EE. 1972. Guidelines for environmental study of pesticides: Determination of bioconcentration potential. Res Rev 44:73-113.

231. Khan MA, Haufe WO, eds. 1972. Toxicology, biodegradation and efficacy of livestock pesticides. Proceedings of an Advanced Study Institute on Toxicity of Pesticides Used on Livestock. Sponser: North Atlantic Treaty Organization. Amsterdam: Swets and Zeitlinger.

232. Khan MAQ, Stanton RH, eds. 1981. Toxicology of halogenated hydrocarbons: Health and ecological effects. Symposium of the 180th National Meeting of the ACS and 2nd Chemical Congress of the North American Continent, Las Vegas, NV, 1980. Sponsor: ACS Environmental Chemistry Division. New York: Pergamon.

233. Kirk TK, Higuchi T, Chang H, eds. 1980. Lignin biodegradation: Miocrobiology, chemistry, and potential applications, Vols. I and II. Boca Raton, FL: CRC.

234. Kland MJ. 1977. A priori predictive methods of assessing health effects of chemicals in the environment. Proceedings of the 2nd Conference on the Environmental Impact of Water Chlorination, Gatlinburg, TN, Oct, 31 - Nov. 4, 1977. Sponsor: Oak Ridge National Laboratory, U.S. EPA and the Department of Energy. IN: Jolley RL, Gorchev H, Hamilton DH, eds. 1978. Water Chlorination: Environmental Impact and Health Effects, Vol. II. Ann Arbor, MI: Ann Arbor Science, pp. 451-470.

235. Klinkmann H, Bergstrom J, Dzurik R, Brentano JLF, eds. 1981. Middle molecules in uremia and other diseases: Analytical techniques, metabolic toxicity, and clinical aspects. Proceedings of the Symposium of Present Status and Future Orientation of Middle Molecules in Uremia and Other Diseases, Avignon, France, Nov. 28-29, 1980. Sponsor: International Society for Artificial Organs. Cleveland, OH: International Society for Artificial Organs.

236. Kushnir JM, Nagy SF. 1978. Assessment of industrial hazardous waste practices, rubber and plastics industry. Washington, DC: Office of Solid Waste Management Programs, Hazardous Waste Management Division, U.S. EPA. EPA-530-SW-163C.30.S

237. Laskin S, Goldstein BD. 1977. Benzene toxicity a critical evaluation. Washington, DC: Hemisphere Publishing McGraw-Hill.

238. Layman PL, Storck WJ. 1982. Chemical and Engineering News' top fifty chemical products and producers. Chem Eng News 60(18):9-16.

239. Lee H, Neville K. 1967. Handbook of epoxy resins. New York: McGraw-Hill.

240. Lee RE, ed. 1976. Air pollution from pesticides and agricultural processess. Cleveland, OH: CRC.

241. Lee SD, Mudd JB, eds. 1979. Assessing toxic effects of environmental pollutants. Ann Arbor, MI: Ann Arbor Sci. Pub.

242. Leo A, Hansch C, Elkins D. 1971. Chemical reviews. 71(6). Claremont, CA: Department of Chemistry, Pomono College.

243. Leo A, Hansch C, Elkins D. 1971. Partition coefficients and their uses. Chem Rev 71(6):525-616.

244. Leonard BJ, ed. 1978. Toxicological aspects of food safety, suppl., Vol. 1. Proceedings of the European Society of Toxicology, Copenhagen, Denmark, June 19-22, 1977. Berlin: Springer-Verlag.

245. Leong BKJ, ed. 1981. Proceedings of the Inhalation Toxicology and Technology, Symposium. Ann Arbor, MI: Oct. 23-24, 1980. Ann Arbor Science. Sponser: The Upjohn Co. Kalamozoo, MI.

246. Lewtas J, ed. 1982. Toxicological effects of emissions from diesel engines. Proceedings of the Environmental Protection Agency 1981 Diesel Emissions Symposium, North Carolina, Oct. 5-7, 1981.

247. Lifflander ML. 1979. Final treatment: The file on Dr. X, 1st ed., New York: Norton.

248. Linch AL. 1974. Biological monitoring for industrial chemical exposure control. Cleveland OH: CRC.

249. Linke WF, ed. 1958. Solubilities of inorganic and metal-organic compounds, 4th ed., Vol. I. Princeton, NJ: Nostrand.

250. Linke WF, ed. 1965. Solubilities of inorganic and metal-organic compounds, 4th ed., Vol. II. Washington, DC: ACS.

251. Liptbak BG. 1974. Environmental engineers' handbook, 3 volumes. Radnor, PA: Chilton Book.

252. Long C, King EJ, Sperry WM. 1961. Biochemists' handbook. London: E. and F. N. SPON Ltd.

253. Loomis TA. 1978. Essentials of toxicology, 3rd ed. Philidelphia, PA: Lea and Febiger.

254. Louden L. 1979. Toxicity of chemicals and pulping wastes to fish. Bibliographic series, No. 265 Suppl. I. Appleton, WI: The Institute of Paper Chemistry.

255. Lowenheim FA, Moran MK. 1975. Faith, Keyes, and Clark's industrial chemicals, 4th ed. New York: Wiley.

256. Lowry WT, Garriott JC. 1979. Forensic toxicology: Controlled substances and dangerous drugs. New York: Plenum.

257. Lu P, Metcalf RL. 1975. Environmental fate and biodegradability of benzene derivatives as studied in a model aquatic ecosystem. Environ Health Perspect 10:269-284.

258. Luckey TD, Venugopal B. 1977. Metal toxicity in mammals, Vols. 1 and 2. New York: Plenum.

259. Lyman WJ, Reehl WF, Rosenblatt DH. 1982. Handbook of chemical property estimation methods. Environmental behavior of organic compounds. New York: McGraw-Hill.

260. MacKay D. 1979. Finding fungacity feasible. Environ Sci Technol 13(10): 1218-1223.

261. Mackison FW, Stricoft RS, Partridge LJ, eds. 1981. Occupational health guidelines for chemical hazards. U.S. Department of Health and Human Services. National Institute for Occupational Safety and Health. U.S. Department of Labor. Occupational Safety and Health Administration.

262. Manahan SE. 1979. Environmental chemistry, 3rd ed. Boston, MA: Willard Grant.

263. Mannsville Chemical Products. 1980. Mannsville chemical product synopsis. Cortland, NY: Mannsville.

264. Mantell CL, ed. 1975. Solid wastes: Origin, collection, processing, and disposal. New York: Wiley.

265. Manufacturing Chemists' Association. 1950 - 1958. Chemical safety data sheets. SD-1 to SD-70. Washington, DC: Maufacturing Chemists'.

266. Manufacturing Chemists. 1973. Chemical reference manual, Vol. I. Norwood, OH: Manufacturing Chemists.

267. Manzo L, ed. 1979. Advances in neurotoxicology. Proceedings of the International Congress on Neurotoxicology, Varese, Italy, Sept. 27-30, 1979. New York: Pergamon.

268. Mark HF, Gaylord NG, Bikales NM, eds. 1964-1972. Encyclopedia of polymer science and technology, 16 vols. New York: Interscience.

269. Marking LL, Kimerle RA, eds. 1979. Aquatic toxicology. Proceedings of the 2nd Annual Symposium on Aquatic Toxicology, Oct. 31 - Nov. 1, 1977. Sponsor: American Society for Testing and Materials. Philadelphia PA: ASTM.

270. Martell AE, Smith RM. 1974. Critical stability constants, Vol. 1. Amines. New York: Plenum.

271. Martell AE, Smith RM. 1974. Critical stability constants, Vol. 2. Amines. New York: Plenum.

272. Marzulli, Maibach HI, eds. 1977. Advances in modern toxicology, Vol. 4. Dermatotoxicology and pharmacology. New York: Hemisphere.

273. Marzulli FN, Maibach HI, eds. 1983. Dermatotoxicology. 2nd ed. Washington, DC: Hemisphere.

274. Matsumura F, Murti CRK, eds. 1982. Biodegradation of pesticides. New York: Plenum.

275. Matsuo M. 1979. The i/o characters to describe ecological magnification of some organo-phosphorus insecticides in fish. Chemosphere 8(7):447-485. 1979.

276. Matthew H, Lawson A. 1979. Treatment of common acute poisoning, 4th ed. New York: Churchill Livingstone.

277. Mayer FL, Hamelink JL, eds. 1977. Aquatic toxicology and hazard evaluation. Proceedings of the 1st Annual Symposium on Aquatic Toxicology, Oct. 25-26, 1976. Sponsor: Amercian Society for Testing and Materials. Philadelphia, PA: ASTM.

278. McCurdy PP, ed. in chief. 1978. Chemical Week 1979 buyer's guide issue. Chemical Week, Part 2, October 25, 1978.

279. McElroy AD, Chiu SY, Nebgen JW, Aleti A, Bennett FW. 1976. Midwest Research Institute. Loading functions for assessment of water pollution from nonpoint sources. Washington, DC: Office of Research and Development, U.S. EPA.

280. McIntyre AD, Mills CF, eds. 1975. Ecological toxicology research: Effects of heavy metal and organohalogen compounds, 1st ed. New York: Plenum.

281. McKee JE, Wolf HW. 1963. Water quality criteria, 2nd ed. Sacramento, CA: CA. State Water Resources Control Board, Publication 3-A.

282. McMahon FG, Beyer KH, Hailman HF, Taylor WJ, Zarafonetis CJ, eds. 1974. Drug induced clinical toxicity, Vol. II. Mount Kisko: Futura Pub.

283. Meegan MK, ed. 1977. The Kline guide to the chemical industry. Fairfield, NJ: Charles H. Kline.

284. Mehlman MA, Cranmer MF, Shaprio RE, eds. 1977. Carcinogenesis and mutagenesis. Proceedings of the Conference on the Status of Predictive Tools in the Application to Safety Evaluation: Present and Future. Sponsor: Natl. Center for Toxicological Research, Jefferson, AK and Natl. Inst. of Health Bethesda, MD. J Environ Pathol Toxicol 1:1-229.

285. Mehlman MA, Shaprio RE, Blumenthal H, eds. 1976. Advances in modern toxicology, Vol. 1, pt 1. New concepts in safety evaluation. Washington, DC: Wiley.

286. Meltzer YL. 1981. Water soluble polymers: Developments since 1978. Park Ridge, NJ: Noyes Data.

287. Mennear JH, ed. 1979. Cadmium toxicity. New York: Marcel Dekker.

288. Menzie CM. 1969. Metabolism of pesticides. Washington, DC: Bureau of Sport Fisheries and Wildlife, U.S. Department of the Interior Special Scientific Report - Wildlife No. 127.

289. Menzie CM. 1974. Metabolism of pesticides: An update. Washington, DC: Office of Environmental Assistance. Department of the Interior Special Scientific Report Wildlife No. 184.

290. Mercer TT, Morrow PE, Stober W, eds. 1972. Assessment of airborne particles: Fundamentals, applications and implications to inhalation toxicity. Proceedings of the 3rd Rochester International Conference on Environmental Toxicity. Springfield, IL: Charles C. Thomas.

291. Mercier M, ed. 1981. Criteria (dose/effect relationships) for organochlorine pesticides: Report of a working group of experts prepared for the Commission of the European Communities. New York: Pergamon.

292. Merck Index. 1977. An encyclopedia of chemicals and drugs, 9th ed. Rahway, NJ: Merck.

293. Merigan WH, Weiss B, eds. 1980. Neurotoxicity of the visual system. New York: Raven.

294. Metcalf RL, Kapoor IP, Lu P, et al, eds. 1973. Model ecosystem studies of the environmental fate of six organochlorine pesticides. Env Health Perspect 4:35.

295. Metcalf RL, Sanborn JB, Lu PY, Nye D. 1975. Laboratory model ecosystem studies of the degradation and fate of radiolabled tri-, tetra-, and pentachlorobiphenyl compared with DDE. Arch Environ Contam Toxicol 3(2):151-165.

296. Metcalf RL, Sangha GK, Kapoor IP. 1971. Model ecosystem for the evaluation of pesticide biodegradability and ecological magnification. Environ Sci and Technol 5(8):709-713.

297. Miller MW, Shamoo AE, eds. 1977. Membrane toxicity. Proceedings of the 9th Annual Rochester International Conference on Environmental Toxicity, Rochester, New York, May 24-26, 1976. IN: Advances in Experimental Medicine and Biology, Vol. 84. New York: Plenum.

298. Miller RR, Greenblatt DJ, eds. 1976. Drug effects in hospitalized patients: Experiences of the Boston collaborative drug surveillance program, 1966-1975. New York: Wiley.

299. Mitchell CL, ed. 1982. Nervous system toxicology. New York: Raven.

300. Moeschlin S. 1965. Poisoning: Diagnosis and treatment. New York: Grune and Stratton.

301. Muhler JC, Hine MK, eds. 1973. Fluorine and dental heatlh: The pharmacology and toxicology of fluorine. Bloomington, IN: Indiana University Press.

302. Mukerjee P, Mysels KJ. 1970. Critical micelle concentrations of aqueous surfactant systems. Washington, DC: Natl. Standard Reference Data System, Natl. Bureau of Standards, U.S. Dept. of Commerce.

303. NCI. 1978. National Cancer Institute. Survey of compounds which have been tested for carcinogenic activity. Bethesda, MD: NCI.

304. NCI. National Cancer Institute Bioassays. Carcinogenesis testing program division of cancer cause and prevention. National Cancer Institute Carcinogens Technical Report Series. U.S. Dept. Health, Education and Welfare.

305. NFPA. 1972. National Fire Protection Assoc. Hazardous chemicals data. Boston: NFPA.

306. NIOSH. National Institute Occupational Safety and Health. Criteria for a recommended standard: Occupational exposure to ... Washington, DC: NIOSH, U.S. Dept. Health, Education, and Welfare. DHEW Pub. NIOSH.

307. NIOSH. 1974. National Institute for Occupational Safety and Health. National occupational hazard survey, Vol. I. Survey manual. Rockville, MD: NIOSH, U.S. Dept. Health, Education, and Welfare. DHEW Pub. 74-127.

308. NIOSH. 1977. National Institute for Occupational Safety and Health. National occupational hazard survey, Vol II. Data editing and data base development. Cincinnati, OH: NIOSH, U.S. Dept. Health Education, and Welfare. DHEW Pub. NIOSH 77-213

309. NIOSH. 1977. National Institute for Occupatinal Safety and Health. National occupational hazard, Vol. III. Survey analysis and supplemental tables. Cincinnati, OH: NIOSH, U.S. Dept. Health, Education, and Welfare. DHEW Pub. NIOSH 78-114.

310. NIOSH. 1977. National Institute Occupational Safety and Health. Occupational diseases: A guide to their recognition. Washington, DC: NIOSH, U.S. Dept. Health, Education, and Welfare. DHEW Pub. NIOSH 77-181.

311. NIOSH. 1979. National Institute for Occupational Safety and Health. Current intelligence bulletin, bulletins 19-30. Rockville, MD: NIOSH, U.S. Dept. Health, Education, and Welfare, Office of Extramural Coordination and Special Projects. DHEW Pub. NIOSH 79-146.

312. NIOSH. 1980. National Institute Occupational Safety and Health. Health hazard evaluation summaries. Washington, DC: NIOSH U.S. Dept. Health, Education and Welfare.

313. NIOSH. 1980. National Institute Occupational Safety and Health. Registry of toxic effects of chemical substances, Vols. 1- 2 Washington, DC: NIOSH, U.S. Dept. of Health and Human Services.

314. National Academy of Sciences. 1972. Degradation of synthetic organic molecules in the biosphere. Proceedings of a Conference, San Francisco, CA., June 12-13, 1971. Sponsor: National Research Council. Washington, DC: National Academy of Sciences.

315. National Academy of Sciences and National Academy of Engineering. 1973. Water quality criteria. Washington, DC: U.S. EPA. EPA R3-73-033. PB 236 199/6GI.

316. National Highway Traffic Safety Administration. 1976. Hazardous materials: Emergency action guide. Washington, DC: U.S. Dept. of Transportation.

317. National Safety Council. 1974. Accident prevention manual for industrial operations, 7th ed. Chicago, IL: NSC.

318. Neely WB, Branson DR, Blau GE. 1974. Partition coefficient to measure bioconcentration potential of organic chemicals in fish. Environ Sci Technol 8(13):1113-1115.

319. Negherbon WO. 1959. Handbook of toxicology. Insecticides, Vol. III. Philadelphia: W.B. Sunders.

320. Nenot JC, Stather JW. 1979. The toxicity of plutonium, americium, and curium: A Report for the Commission of the European Communities. Oxford: Pergamon

321. Nordberg GF, ed. 1976. Effects of dose-response relationships of toxic metals. Proceeding from an International Meeting Organized by the Subcommitee on the Toxicology of the Permanent Commission and International Association on Occupational Health. New York: Elsevier.

322. OPD. Oils, Pigments and Drugs. 1981. Chemical Marketing Reporter. OPD chemical buyers directory, 69th ed. New York: Schnell.

323. OSHA. 1982. Labor. 29 CFR. 1911.1. Vol. 29, Parts 1911-1919. Revised as of July 1, 1982. Published by Office of the Fed. Reg., Natl. Archives and Records Service, and General Services Admin.

324. OSHA. 1982. Labor. 29 CFR. 1920.1. Vol. 29, Parts 1920-end. Revised as of July 1, 1982. Published by Office of the Fed. Reg., Natl. Archives and Records Service, and General Services Admin.

325. Oehme FW, ed. 1978. Toxicity of heavy metals in the environment. Hazardous and toxic substances series Part I. New York: Marcel Dekker.

326. Oehme FW, ed. 1979. Toxicity of heavy metals in the environment. Hazardous and toxic substances series Part II. New York: Marcel Dekker.

327. Oliver JS, ed. 1980. Forensic toxicology. Proceedings of the European Meeting of the International Assoc. of Forensic Toxicologists. Baltimore, MD: University Park.

328. Owen CA Jr. 1981. Copper in biology and medicine series. Copper deficiency and toxicity: Acquired and inherited, in plants, animals, and man. Park Ridge, NJ: Noyes.

329. Oxley TA, Barry S. 1983. Biodeterioration. Papers presented at the 5th International Biodeterioration Symposium, Aberdeen, Grampian, September 1981. New York: Wiley-Interscience.

330. Oxley TA, Becker HCG, Allsopp D, eds. 1980. Biodeterioration. The Proceedings of the 4th International Biodeterioration Symposium, Berlin, August - September 1978. London: Pitman.

331. Paget GE, ed. 1970. Methods in toxicology. Philadelphia, PA: F.A. Davis.

332. Paget GE, ed. 1977. Quality control in toxicology. Baltimore, MD: Unviersity Park.

333. Paget GE, ed. 1979. Good laboratory practice: Topics in toxicology. Sponsor: Inveresk Research. Baltimore, MD: University Park.

334. Paget GE, Thomson R, eds. 1979. Standard operating procedures in toxicology. Lancaster, England: Inveresk Research.

335. Parikh, CK. 1979. Parikh's textbook of medical jurisprudence and toxicology. Bombay, India: Medical.

336. Pearson JG, Foster RB, Bishop WE, eds. 1982. Aquatic toxicology and hazard assessment. Proceedings of the 5th Annual Symposium, Oct. 7-8, 1980. Sponsor: American Society for Testing and Materials. Philadelphia: ASTM.

337. Perrin DD. 1965. International union of pure and applied chemistry. Analytical chemistry division commission on electroanalytical chemistry. Dissociation constants of organic bases in aqueous solution. (Published as supplement to Pure and Applied Chemistry). London: Butterworths

338. Perrin DD. 1969. International union of pure and applied chemistry. Analytical chemistry division commission on electroanalytical chemistry. Dissociation constants of inorganic acids and bases in aqueous solution. (Contents of book appear in Pure and Applied Chemistry, Vol. 20, No. 2 (1969)). London: Butterworths

339. Perry RH, Chilton CH, eds. 1973. Chemical engineers' handbook. New York: McGraw-Hill.

340. Pfafflin JR, Ziegler EN. eds. 1976. Encyclopedia of environmental science and engineering. New York: Gordon and Breach Science.

341. Plaa GL, Duncan WAM, eds. 1977. Proceedings of the 1st International Congress on Toxicology: Toxicology as a predictive science. New York: Academic.

342. Plunkett ER. 1976. Handbook of industrial toxicology. New York: Chemical Publishing.

343. Polson CJ, Tattersall RN. 1969. Clincial toxicology, 2nd ed. Philadelphia, PA: Lippincott.

344. Porter GA, ed. 1982. Nephrotoxic mechanisms of drugs and environmental toxins. New York: Plenum.

345. Powers EB. 1967. The goldfish (Carassius carassius) as a test animal in the study of toxicity: Illinois Biological Monographs Vol. 4, No. 2. Urbana, IL

346. Powers PW. 1976. How to dispose of toxic substances and industrial wastes. Park Ridge, NJ: Noyes.

347. Prasad KN, Vernadakis A, eds. 1982. Mechanisms of actions of neurotoxic substances. New York: Raven.

348. Radding SB, Liu DH, Johnson HL, et al. 1977. Review of the environmental fate of selected chemicals. Final Report. Washington, DC: Office of Toxic Substances, U.S. EPA.

349. Rapport Z. 1967. Handbook of tables for organic compound indentification, 3rd ed. Cleveland, OH: CRC.

350. Raskova H, ed. 1971. International encyclopedia of pharmacology and therapeutics, section 71. Pharmacology and toxicology of naturally occurring toxins, Vols. 1 and II. New York: Pergamon.

351. Rauch JA, Huber JE, eds. 1978. The Kline guide to the plastics industry. Fairfield, NJ: Kline & Co.

352. Raychaudhari SP, Gupta DS, eds. 1979. Environmental pollution and toxicology. Proceedings of International Symposium, New Dehli, November 28-30, 1979. New Dehli: Today and Tomorrow's Printers and Publishers.

353. Rechcigl M, Jr, ed. 1977. CRC handbook series in nutrition and food. Section E: Nutritional disorders, Vol. I. West Palm Beach, FL: CRC.

354. Reed PD, McChesney FL, Groman H, Weinstein A, eds. 1983. Environmental law reporter. Washington, DC: Environmental Law Institute.

355. Reeves AL, ed. 1981. Toxicology: Principle and practice, Vol. I. New York: Wiley-Interscience.

356. Regamey RH, ed. 1977. International Symposium on Pyrogenicity, Innocuity and Toxicity Test Systems for Biological Products, Hungary, Sept. 8-9, 1976. New York: S. Karger Basel.

357. Reid RC, Prausnitz JM, Sherwood TK. 1977. The properties of gases and liquids, 3rd ed. New York: McGraw-Hill.

358. Renberg L, Sundstrom G. 1979. Prediction of bioconcentration potential of organic compounds using partition coefficients derived from reversed phase thin layer chromatography. Chemosphere. 8(7):449-459.

359. Robertson EE, 1977. Bioconversion: Fuels from biomass. Philadelphia: Franklin Institute.

360. Roizin L, Shiraki H. Greevic N, eds. 1977. Neurotoxicology. New York: Raven.

361. Rom WN. 1983. Environmental and occupational medicine. Boston: Little Brown and Co.

362. Ross RD. 1968. Industrial waste disposal. New York: Van Nostrand.

363. Rossmassler SA, ed. 1977 Critical evaluation of data in the physical sciences - A status report on the national standard reference data system. Technical Note 947. Washington, DC: Office of Standard Reference Data, Natl. Bureau of Standards, U.S. Dept. of Commerce.

364. Ryckman DW, Prabhakara Rao AVS, Buzzell JC, Jr. 1966. Behavior of organic chemicals in the aquatic environment. A literature critique. Washington, DC: Manufacturing Chemists.

365. SRI International. 1962. Stanford Research Institute. Chemical economics handbook. Chemical origins and markets. Menlo Park, CA: SRI.

366. SRI International. 1977. Stanford Research Institute. A study of industrial data on candidate chemicals for testing. Washington, DC: Office of Toxic Substances, U.S. EPA. EPA 560/5-77-006. PB-274-264.

367. SRI International. 1979. Stanford Research Institute. Directory of chemical producers - United States. Menlo Park, CA: SRI International.

368. Sanborn JR. 1974. The fate of selected pesticides in the aquatic environment. Corvallis, OR: Natl. Environmental Research Center, Office of Research and Development, U.S. EPA. EPA-660/3-74-025.

369. Sanders CL, Cross FT, Dagle GE, Mahaffey JA, eds. 1980. Pulmonary toxicology of respirable particles. Proceedings of the 19th Annual Hanford Life Sciences Symposium at Richland, WA, October 22-24, 1979. Sponsors: U.S. Dept. of Energy, Battelle Memorial Institute. Washington, DC: U.S. Department of Energy.

370. Sax NI. 1979. Dangerous properties of industrial materials, 5th ed. New York: Van Nostrand Reinhold.

371. Scheflan L, Jacobs MB. 1953. The handbook of solvents. New York: Van Nostrand.

372. Schnell Publishing Company. 1871-1983. Chemical Marketing Reporter. New York: Schnell Publishing.

373. Schnell Publishing Company. 1871-1983. Chemical Profiles (a section of Chemical Marketing Reporter) New York: Schnell Publishing.

374. Scott TS. 1962. Carcinogenic and chronic toxic hazards of aromatic amines. New York: Elsevier.

375. Searle CE, ed. 1976. Chemical carcinogens. ACS Monograph 173. Washington, DC: ACS.

376. Sharma RP. 1981. Immunologic consideration in toxicilogy, Vol I and Vol. II. Boca Raton, FL: CRC.

377. Sharpley JM, Kaplan AM, eds. 1976. Biodegradation of polymers and synthetic polymers. Proceedings of the Third International Biodegradation Symposium, Session VII. London: Applied Science.

378. Shepard TH. 1973. Catalog of teratogenic agents, 2nd ed. Baltimore, MD: The John Hopkins University Press.

379. Singhal RL, Thomas JA, eds. 1980. Lead toxicity. Baltimore, MD: Urban and Schwarzenberg.

380. Sittenfield M. 1980. Handbook for obtaining chemical use and related economic information. Washington, DC: Office of Toxic Substances, U.S. EPA. EPA 560/2-80-001

381. Sittig M. 1969. Organic chemical process encyclopedia, 2nd ed. Park Ridge, NJ: Noyes Development.

382. Sittig M. 1974. Pollution detection and monitoring handbook. Park Ridge, NJ: Noyes Data.

383. Sittig M. 1976. Aromatic hydrocarbons manufacture and technology. Park Ridge, NJ: Noyes Data.

384. Sittig M. 1976. Toxic metals: pollution control and workers protection. Park Ridge, NJ: Noyes Data.

385. Sittig M. 1979. Hazardous and toxic effects of industrial chemicals. Park Ridge, NJ: Noyes Data.

386. Sittig M, ed. 1980. Priority toxic pollutants: Health impacts and allowable limits. Park Ridge, NJ: Noyes Data.

387. Sittig M. 1981. Handbook of toxic and hazardous chemicals. Park Ridge, NJ: Noyes Data.

388. Skeist I, ed. 1962. Handbook of adhesives. New York: Reinhold.

389. Skoutakis V, ed. 1982. Clinical toxicology of drugs: Principles and practices. Phildelphia, PA: Lea and Febiger

390. Smith MB. 1976. Handbook of ocular toxicity. Acton, MA: Publishing Sciences Group.

391. Smith RL, Bababumi EA, eds. 1980. Toxicology in the tropics. London: Taylor and Francis.

392. Snell K, ed. 1982. Developmental toxicology. New York: Praeger.

393. Soderman JV, ed. 1982. Handbook of identified carcinogens and noncarcinogens: Carcinogenicity - mutagenicity database, Vols. I &II. Boca Raton, FL: CRC.

394. Somani SM, Cavender FL, eds. 1981. Environmental toxicology, principles and policies. Springfield, IL: Charles C. Thomas. Based on a symposium organized by Decatur/Springfield section of the American Chemical Society.

395. Spector WS. 1956. Handbook of toxicology. Acute toxicities of solids, liquids and gases to laboratory animals, Vol. I. Philadelphia: W.B. Saunders.

396. Spector WS. 1957. Handbook of toxicology. Antibiotics, Vol. II. Wright-Patterson Air Force Base, OH: Aero Medical Laboratory.

397. Spencer PS, Schaumburg HH. 1980. Experimental and clinical neurotoxicology. Baltimore: Williams and Wilkins.

398. Stahr HM. 1977. Analytical toxicology methods manual. Ames, IA: Iowa State Univ.

399. Unassigned number.

400. Stahr HM. 1980. Analytical toxicology methods manual: Supplement with cumulative index. Ames, IA: Iowa State Univ.

401. Standen A, ed. 1963. Kirk-Othmer encyclopedia of chemical technology, 2nd ed. New York: Interscience.

402. Steere NV, ed. 1967. Chemical waste disposal and disposal of hazardous waste. In: Handbook of laboratory safety. pp.34-40. Cleveland, OH: CRC.

403. Steere NV, ed. 1971. CRC handbook of laboratory safety, 2nd ed. Cleveland, OH: CRC.

404. Stephen H, Stephen T. 1963. Solubilities of inorganic and organic compounds. Vols. 1-3. MacMillan.

405. Stephenson FG, ed. 1973. Laboratory waste disposal manual revised ed. Washington, DC: Manufacturing Chemists.

406. Stern CA, ed. 1976. Air Pollution, 3rd ed. Vol. I. Air pollutants their transformation and transport. New York: Academic.

407. Stern CA, ed. 1976. Air Pollution, 3rd ed. Vol. III. Measuring, monitoring, and surveillance of air pollution. New York: Academic.

408. Stern CA, ed. 1977. Air Pollution, 3rd ed. Vol. II. The effects of air pollution. New York: Academic.

409. Stern CA, ed. 1977. Air Pollution, 3rd ed. Vol. IV. Engineering control of air pollution. New York: Academic.

410. Stern CA, ed. 1977. Air Pollution, 3rd ed. Vol. V. Air quality management. New York: Academic.

411. Stewart CP, Stolman A, eds. 1960. Toxicology: Mechanisms and analytical methods, 1st ed., Vol. 1. New York: Academic.

412. Stewart CP, Stolman A, eds. 1961. Toxicology: Mechanisms and analytical methods, 1st ed., Vol. II. New York: Academic.

413. Stolman A, ed. 1963-1969. Progress in chemical toxicology, 5 Vols. New York: Academic.

414. Storck WJ. 1982. (Second Top 50 Chemical Companies) Medium-sized Chemical Firms Post Fair Year. Chem Eng News 60(19):21-23.

415. Student PJ, ed. 1981. Emergency handling of hazardous materials in surface transportation. Bureau of explosives. Association of American Railroads, Washington, DC.

416. Stumm W, ed. 1977. Global chemical cycles and their alterations by man: Report of the Dahlem Workshop on global chemical cycles and their alteration by man. Germany: Dahlem Konferenzen.

417. Suffet IH, ed. 1977. Fate of pollutants in the air and water environments. Part 1. Mechanisms of interaction between environments and mathematical modeling and the physical fate of pollutants. Symposium " Fate of the Pollutants in the Air and Water Environments." 165th National American Chemical Society Meeting in the Environmental Chemistry Division. April 1975. New York: Wiley.

418. Suffet IH, ed. 1977. Fate of pollutants in the air and water environments. Part 2. Chemical and Biological Sympoisum "Fate of Pollutants in the Air and Water Environments." 165th National American Chemical Society Meeting in the Environmental Chemistry Division. April 1975. New York: Wiley.

419. Sunshine I, ed. 1969. CRC handbook of analytical toxicology. Boca Raton, FL: CRC.

420. Sunshine I, ed. 1975. Methodology for analytical toxicology. Cleveland, OH: CRC.

421. Svensson BH, Soderlund R, eds. Nitrogen, phosphorous and sulphur - Global Cycles. Scope Report 7. Ecological Bulletins No. 22. Stockholm, Sweden: Swedish Natural Research Council.

422. Swisher RD. 1970. Surfactant biodegradation. New York: Marcel Dekker.

423. Sword IP, Thomson R, eds. 1980. Standard operating procedures in vitro toxicology. Baltimore, MD: University Park.

424. Thoma JJ, Bondo PB, Sunshine I, eds. 1977. Guidelines for analytical toxicology programs, Vol. 1. Cleveland, OH: CRC.

425. Thomson JB, ed. 1978. Dictionary of oragnic compounds, 4th ed., 14th suppl. New York: Oxford University.

426. Tichy W. 1979. Poisons - antidotes and anecdotes. New York: Sterling Pub.

427. Timbrell JA. 1982. Principles of biochemical toxicology. London: Taylor and Francis.

428. Timmers H. 1975. 15 Jaar Zelfvergiftigingen in de Interne Kliniek. Amsterdam: Rodopi N.V.

429. Trautlein JJ. 1981. Aerosols, airways and asthma. New York: Spectrum.

430. Truhart R, Ferrando R. 1976. Symposium on Toxicology and Nutrition, Vol. 29, Alfort, France, Nov. 17-19, 1976. New York: Basel.

431. Tu AT, ed. 1982. Survey of contemporary toxicology, Vol II. New York: Wiley.

432. U.S. Bureau of Census. 1979. U.S. exports schedule B. Commodity by country. Washington, DC: Bureau of the Census, U.S. Dept. of Commerce.

433. UNIDO. 1979. United Nations Industrial Development Organization. Information sources on bioconversion of agricultural wastes. New York: UNIDO.

434. USEPA. 196?-1981. U.S. Environmental Protection Agency. Pesticides abstracts. Washington, DC: Office of Pesticides and Toxic Substances, USEPA.

435. USEPA. 1975. U.S. Environmental Protection Agency. Preliminary assessment of suspected carcinogens in drinking water. Report to Congress. Washington, DC: Office of Toxic Substance, USEPA.

436. USEPA. 1976. U.S. Environmental Protection Agency. Non-point source model: Modeling non-point pollution from the land. Washington, DC: U.S. EPA. EPA 600/3-73-083.

437. USEPA. 1976. U.S. Environmental Protection Agency. Non-point source model: Loading functions for assessment of water pollution. Washington, DC: U.S. EPA. EPA 600/2-76-151.

438. USEPA. 1977. U.S. Environmental Protection Agency. Non-point source model: Water quality modeling windland management: State-of-the-art assessment. Washington, DC: U.S. EPA. EPA 600/3-77-078.

439. USEPA. 1977. U.S. Environmental Protection Agency. Non-point source model: Simulation of nutrient loadings in surface runoff. Washington, DC: U.S. EPA. EPA 600/3-77-065.

440. USEPA. 1982. U.S. Environmental Protection Agency. Protection of environment. 40CFR1.1. Vol. 40, Parts 0-51. Revised as of July 1, Fed. Reg., Nat'l. Archives and Records Service, and General Services Admin.

441. USITC. 1980. United States International Trade Commission. Synthetic organic chemicals: United States production and sales. Washington, DC: USITC Pub. 1099.

442. USITC. 1981. United States International Trade Commission. 1981. Synthetic organic chemicals. United States production and sales, 1981. Washington, DC: USITC Pub. 1982.

443. USITC. 1982. United States International Trade Commission. Imports of Benzenoid chemicals and products 1981: United States general imports of intermediates, dyes, medicinals, flavor and perfume materials and other finished benzenoid products entered in 1981 under schedule 4, Part I, of the tariff schedules of the United States. Washington, DC: U.S. International Trade Commission. USITC Pub. 1272.

444. Vale JA, Meredith TJ, eds. 1981. Poisoning diagnosis and treatment. London: Update Books.

445. Vander AJ. 1981. Nutrition, stress and toxic chemicals: An approach to environment - health controversies. Ann Arbor: Univ. of Mich. Press.

446. Veith GD, Austin NM, Morris RT. 1979. A rapid method for estimating log P for organic chemicals. Water Research 13:43-47

447. Veith GD, Konasewich DE, eds. 1975. Structure-activity correlations in studies of toxicity and bioconcentration with aquatic organisms. Proceedings of a Symposium held in Burlington, Ontario, March 1975. Sponsor: Standing Committee on the Scientific Basis for Water Quality Criteria of the International Joint Commission's Research Advisory Board.

448. Veith GD, Konasewich DE, eds. 1975. Structure-activity relationships applied. In: Structure-activity correlations in studies of toxicity and bioconcentrations with aquatic organisms: Proceedings of the Symposium; Canada Center for Inland Waters; 1975 March 11-13; Burlington, ON.

449. Verschueren K. 1977. Handbook of environmental data on organic chemicals. New York: Van Nostrand.

450. Vettorazzi G. 1980. Handbook of international food regulatory toxicology, Vol. I. New York: SP Medical and Scientific Books.

451. Vettorazzi G. 1980. Handbook of international food regulatory toxicology, Vol. II. New York: SP. Medical and Scientific Books.

452. Vettorazzi G, Miles-Vettorazzi P. 1975. Safety evaluation of chemicals in food: Toxicological data profiles for pesticides. 1. Carbamate and organophosphorus insecticides used in agriculture and public health. Geneva: WHO.

453. Voeglein JF. 1966. XXIII Storage and disposal of dangerous chemicals. J Chem Educ 43p. 151A (1966)

454. WHO. 1961. World Health Organization. Air pollution. Geneva: WHO.

455. WHO. 1967. World Health Organization. Treatment and disposal of wastes. Technical Report Series No. 367. Geneva: WHO.

456. WHO. 1975. World Health Organization. Methods used in the USSR for establishing biologically safe levels of toxic substances. Meeting in Moscow December 12-19, 1972. Geneva, Switzerland: WHO.

457. WHO. 1982. World Health Organization. Environmental health criteria. Geneva: WHO.

458. Wagman DD, Evan WH, Harlow I, Parker VB, Bailey SM, Schumm RH. 1965. Selected values of chemical thermodynamic properties. Part 1. Tables for the first twenty-three elements in the standard order of arrangement. Technical note 270-1. Washington, DC: Natl. Bureau of Standards, U.S. Dept. of Commerce.

459. Wagner S. 1983. Clinical toxicology of agricultural chemicals. Park Ridge, NJ: Noyes Data.

460. Walters HA, Elphick JJ, eds. 1968. Biodeterioration of materials, Vol. I. Microbiological and allied aspects. Proceedings of the 1st International Biodeterioration Symposium, Southampton, September 9-14, 1968. London: Elsevier.

461. Walters AH, Hueck-Van Der Plas EH, eds. 1972. Biodegradation of materials, Vol. 2. Proceedings 2nd International Biodeterioration Symposium, Lunteren, Holland, Sept. 13-18, 1971. New York: Halsted.

462. Watkinson RJ. ed. 1978. Developments in biodegradation of hydrocarbons -I. London: Applied Science Publishers.

463. Weast RC, Astle MJ, eds. 1981. CRC handbook of chemistry and physics, 62nd ed. Boca Raton, FL: CRC.

464. Weber LJ, ed. 1982. Aquatic toxicology, Vol. I. New York: Raven.

465. Weisman HM, Sherwood GB. 1970. Annotated accession list of data compilations of the Office of Standard Reference Data. Technical note 554. Washington, DC: Office of Standard Reference Data, Natl. Bureau of Standards, U.S. Dept. of Commerce.

466. Weiss B, Laties VG, eds. 1975. Environmental Science Research Series, Vol. V. Behavioral toxicology. Conference: Rochester International on Environmental Toxicity, 5th, 1972. New York: Plenum.

467. Weiss G. 1980. Hazardous chemicals data book. Park Ridge, NJ: Noyes.

468. Westrum FF, ed. Bulletin of thermodynamics and thermochemistry, IUPAC, Ann Arbor: University of Michigan.

469. Wexler P. 1982. Information resources in toxicology. New York: Elsevier North Holland.

470. White-Stevens R, ed. 1971. Pesticides in the environment, Vol. I, Part I. New York: Marcel Dekker.

471. White-Stevens R, ed. 1976. Pesticides in the environment, Vol. II. New York: Marcel Dekker.

472. White-Stevens R, ed. 1977. Pesticides in the environment, Vol. III. New York: Marcel Dekker.

473. Wilber CG. 1980. Forensic toxicology for the law enforcement officer. Springfield, IL: Charles C. Thomas.

474. Wilhoit RC, Zwolinski BJ. 1971. Handbook of vapor pressures and heats of vaporization of hydrocarbons and related compounds. College Station, TX: Thermodynamics Research Center, Dept. of Chem. Texas A&M Univ. and the API.

475. Wilhoit RC, Zwolinski BJ. 1973. Physical and thermodynamic properties of aliphatic alcohols. J Phys Ref Data, 2(3 suppl).

476. Wilson JG. 1973. Environment and birth defects. New York: Academic.

477. Witschi HR, ed. 1980. Developments in toxicology and environmental science series, Vol. VI. The scientific basis of toxicity assessment. Proceedings of the Symposium on the Scientific Basis of Toxicity Assessment Gatlinburg, TN, April 15-19, 1979. New York: Elsevier

478. Witschi H, Netteschein P, eds. 1982. Mechanisms in respiratory toxicology. Vols. I & II. Boca Raton, FL: CRC.

479. Wolfe NL, Zepp RG, Paris DF. 1978. Use of structure-reactivity relationships to estimate hydrolytic persistence of carbamate pesticides. Water Res. 12(8):561-563.

480. Wolff ME, ed. 1980. Burger's medicinal chemistry, 4th ed., Parts I, II, and III. New York: Wiley

481. Wooltey BH, Temple AR, eds. 1977. Toxicology and poison prevention. :Symposia Specialist Inc.

482. Worthington EL, Lunin LF, Heath M, Catlin FI, eds. 1973. Index-Handbook of ototoxic agents 1966-1971. Baltimore, MD: Johns Hopkins Univ.

483. Wurtman RJ, Wurtman JJ, eds. 1979. Nutrition and the brain, Vol. 4. Toxic effects of food constituents on the brain. New York: Raven.

484. Yoshida H, Hagihara Y, Ebashi S, eds. 1982. Advances in pharmacology and therapeutics II, Vol. V. Toxicology and experimental models. Proceedings of the 8th International Congress of Pharmacology, Tokyo, Japan, 1981. New York: Pergamon.

485. Zbinden G. 1973. Progress in toxicology, Vol. 1. New York: Springer - Verlag.

486. Zbinden G. 1976. Progress in toxicology, Vol. 2. New York: Springer - Verlag.

487. Zbinden G, Gross F. 1979. Pharmacological methods in toxicology. Oxford: Pergamon.

Glossary of Abbreviations

ACS:	American Chemical Society
AD:	Assessment Division
ADCR:	Automated Document Control Register System
AEROS:	Aerometric and Emission Reporting System
AGRICOLA:	Agricultural Online Access
AIS:	Section 8(a) Asbestos Information System
APILIT:	Index to American Petroleum Institute Abstracts of Refining Literature
APIPAT:	Index to American Petroleum Institute Patents
APTIC:	Air Pollution Technical Information Center
AQUATOX:	Columbia National Fisheries Research Laboratory Data
AQUIRE:	Aquatic Toxicity Data File
ARM:	Agricultural Runoff Model-Version II
ASFA:	Aquatic Sciences and Fisheries Abstracts
ASI:	American Statistical Index
ASTM:	American Society for Testing and Materials
ATM:	Atmospheric Transport Model
BBIP:	BRS-Books in Print
BEHAVIORTOX:	Behavioral Effects Data File
BETS:	Basic Extramural Tracking System
BHRA FLUID ENGINEERING:	British Hydromechanics Research Association
BIOL:	Bilogical Sciences Information Service
BIOSIS:	Biological Sciences Information Service
BMDPS:	Bio-Medical Statistical Package
BPS:	Budget Planning System
BRS:	Bibliographic Retrieval Services
CA-CON:	Chemical Abstracts Condensates
CA SEARCH:	Chemical Abstracts Service Search
CAB ABSTRACTS:	Commonwealth Agricultural Bureaux Abstracts
CAB:	Commonwealth Agricultural Bureaux Abstracts
CANCERLIT:	Cancer Literature Information Online

CANCERPROJ:	Cancer Literature of Ongoing Research Projects
CAS:	Chemical Abstracts Services
CBI:	Confidential Business Information
CBDS:	Carcinogenesis Bioassay Data Systems
CCAS:	Central Chemical Assessment File
CCD:	Chemical Control Division
CCS:	Chemical Collection System
CDI:	Comprehensive Dissertation Index
CEB:	Chemical Engineering Branch
CECATS:	CHIB Existing Chemical Tracking System
CEER:	Consumer and Environmental Exposure Report
CFB:	Chemical Fate Branch
CFR:	Code of Federal Regulations
CHEM:	Chemical Abstracts Service Search
CHEMABS:	Chemical Abstracts Service Search
CHEMDEX:	Chemical Index Database
CHEMFATE:	Environmental Fate Database
CHEMLAB:	Chemical Modeling Laboratories
CHEMLINE:	Chemical Dictionary Online
CHEMNAME:	Chemical Abstracts Chemical Name Dictionary
CHEMSEARCH:	
CHEMSIS:	Chemical Dictionary for Singly Indexed Substances
CHIB:	Chemical Hazard Identification Branch
CHIP:	Chemical Hazard Information Profile
CHRIS:	Chemical Hazard Response Information System
CICIS:	Chemicals in Commerce Information System
CIN:	Chemical Industry Notes
CIDS:	Chemical Information and Data System (U.S. Army)
CIRB:	Chemical Information Reporting Branch
CIS:	Chemical Information System
CLAIMS/CLASS:	Index to U.S. Patent Office's Classification Codes

CLEAR:	EPA Data Base and Environmental Model Index
CLOGP:	A Program for Estimating log P
COMPENDEX:	Computerized Engineering Index
CPSC:	Consumer Product Safety Commission
CRB:	Chemical Regulation Branch
CRC:	The Chemical Rubber Company
CREB:	Chemical Review and Evaluation Branch
CRGS:	Chemical Regulations and Guidelines System
CRIS/USDA:	Current Research Information System
CSIN:	Chemical Substances Information Network
CSR/TSR:	Chemical Status Report or TSCA Status Report
CTCP:	Clinical Toxicology of Commercial Products
D&B:	Dun & Bradstreet
DARC:	Description Acquisition Recovery and Design
DDB:	Design and Development Branch
DDS:	Data Dictionary System
DMI:	Dun's Market Identifiers
DOE:	Department of Energy
DOE-EDB:	Department of Energy - Energy Data Base
DOT:	Department of Transportation
DTS:	Document Tracking System
DWRC:	Denver Wildlife Research Center
Dermal:	OTS Dermal Absorption Database
EAB:	Exposure Assessment Branch
EB:	Epidemiology Branch
EDNOHS:	Exposure Dictionary for National Occupational Hazards Survey
EDS:	Environmental Data Index - NOAA
EEB:	Environmental Effects Branch
EED:	Exposure Evaluation Division
EIS:	Economic Information Systems
EMIC:	Environmental Mutagen Information Center
ENDEX:	Environmental Data Index - NOAA
EN PART:	Environmental Partitioning Model

ENVIROLINE:	Environmental Abstracts Online
EPA:	Environmental Protection Agency
EPACASR:	EPA Chemical Activity Status Report
ERL:	Environmental Research Laboratory
ETD:	Economics and Technology Division
ETIC:	Environmental Teratogen Information Center
EXAMS:	Exposure Analysis Modeling System
EMBASE:	Excerpta Medica
FAO:	Food and Agricultural Organization
FDA:	Food and Drug Administration
FEDREG:	Federal Register Abstracts
FIND/SVP:	
FISH REPRODUCTIVE:	Fish Reproductive Toxicity Data File
FLUIDEX:	British Hydromechanics Research Association
FMIS:	Facilities Management Information System
FRSS:	Federal Register Search Service
FSB:	Full Studies Branch
FYI SUBMISSIONS:	For Your Information Submissions
GEMS:	Graphical Exposure Modeling Systems
GENE-TOX:	Mutagenicity Data File
GIS:	Global Indexing System
GLOBAL 79:	A Fortran Program to Extrapolate Dichotomous Animal Carcinogenicity to Low Doses
GRB:	General Regulations Branch
HANES II:	Health and Nutrition Survey
HERD:	Health and Environmental Review
HHS:	Health and Human Services
HWDMS:	Hazardous Waste Data Management System
IAEA:	International Atomic Energy Agency
IAO:	Industry Assistance Office
IARC:	International Agency for Research on Cancer
IRL:	Information Retrieval Ltd.
IRRS/CTS:	Inventory Reporting Regulation System/Correspondence Tracking System
ICB:	Industrial Chemistry Branch

ICRS:	Index Chemicals Registry System
IFD:	Industrial Facilities Discharge
IMSL:	International Mathematical and Statistical Library
ISHOW:	Information System for Hazardous Organics in Water
ISMEC:	Information Service in Mechanical Engineering
ISSB:	Information Support Services Branch
ITC PROFILES:	Interagency Testing Committee Hazard Information Profiles
ITC REVIEWS:	Interagency Testing Committee Hazard Information Reviews
ITC TRACKING SYSTEM:	Interagency Testing Committee Tracking System
ITI:	The International Technical Information Institute
IUPAC:	International Union of Pure and Applied Chemistry
IUPHAR:	International Union of Pharmacology
MANTELAN:	Mantel-Bryan Low-Dose Extrapolation Model
MEDLARS:	Medical Literature Analyses and Retrieval System
MEDLINE:	Medlars Online
METADEX:	Metals Abstracts/Alloys Index
MOB:	Management Operations Branch
MPTEA:	Multiple Point Gaussian Dispersion Algorithm with Optional Terrain Adjustment
MRST:	Statistical Methodology for Toxicological Research
MSD:	Management Support Branch
MSSS:	Mass Spectral Search System
MULTILOG 80:	A Computer Program for the Risk Assessment of Toxic Substances
NBS:	National Bureau of Standard
NCI:	National Cancer Institute
NFPA:	National Fire Protection Association

NHMS:	National Human Adipose Tissue Survey (Program)
NIOSH:	National Institute for Occupational Safety and Health
NIOSHTIC:	National Institute for Occupational Safety and Health Technical Information Center
NLM:	National Library of Medicine
NOHS:	National Occupational Hazard Survey
NPDES:	National Pollutant Discharge Elimination System
NRB:	Notice Review Branch
NTIS:	National Technical Information Service Bibliographic Data File
NWDS:	National Water Data System
OAQPS:	Office of Air Quality Planning and Standards
OB:	Oncology Branch
OCABS:	Oceanic Abstracts
OCLC:	Online Computer Library Center
ODW:	Drinking Water File
OHM-TADS:	Oil and Hazardous Materials Technical Assistance Data System
ONE HIT MD:	One-Hit Low-Dose Extrapolation Model
OPD:	Oils, Pigments and Drugs
OPP:	Office of Pesticide Programs
ORBIT:	Online Retrieval of Bibliographic Information, Timeshared
ORNL:	Oak Ridge National Laboratory
OSHA:	Occupational Safety and Health Administration
OTS:	Office of Toxic Substances
PAL:	Point, Area, Line Source Algorithm
PAPERCHEM:	Paper Chemistry Abstracts
PASCAL:	Programme Applique a la Selection et a la Compilation Automatiques de la Litterature
PERS:	Personnel System
PHYTOTOX/UTAB:	Phytotoxicity and Plant Uptake and Metabolism

PMN DATA:	Data Submitted Collected and Generated during PMN Assessment
PMN:	Premanufacturing Notification
POLLUTION:	Pollution Abstracts
PPDB:	Policy and Program Development Branch
PPS:	Project Performance System
PRE-CHIP:	Pre-Chemical Hazard Identification Profile
PREFER:	Preferred Chemical Name
PROMT:	Predicasts Overviews of Marketing and Technology
PTS:	Predicasts Terminal Systems
RANK TIME:	A Fortran Program for Risk Assessment Using Dose-Response Data Time-to-Occurrence
RANN:	Research Applied to National Need
RAPRA ABSTRACTS:	Rubber and Plastics Research Association Abstracts
RIB:	Regulatory Impacts Branch
RTECS:	Registry of Toxic Effects of Chemical Substances
RTP:	Research Triangle Park
RTS:	Request Tracking System
SANSS:	Structure and Nomenclature Search Service
SAS/ETS:	SAS/Econometrics and Time-Series Library
SAT:	Structure Activity Team
SCI:	Scisearch
SDB:	Systems Development Branch
SESOIL:	Seasonal Soil Model
SOB:	Systems Operation Branch
SPHERE:	Scientific Parameters in Health and the Environment-Retrieval and Estimation
SPSS:	Statistical Package for the Social Sciences
SRI:	Stanford Research Institute
STAR:	Stability Tubular Array
SWEMS:	Soil and Water Environmental Monitoring System
SYMN:	Synonyms of Chemical Names

TASRTP:	SDB Request Tracking
TDB:	Toxicology Data Bank
TDIS:	Technical Data Indexing System
TEB:	Toxic Effects Branch
TED:	Toxics Economics Database
TERATOX:	Teratology Data File
TERRE-TOX:	Published Terrestrial Toxicity Data File
TICIRC:	Technical Information Center Circulation Control
TLV:	Threshold Limit Values
TME DATA:	Data Submitted, Collected and Generated During Test Market Exemption Assessment
TOX-TIPS:	Toxicology Testing in Progress
TOXLINE:	Toxicology Information Online
TRDB:	Test Rules Development Branch
TSCA:	Toxic Substances Control Act
TSCAPP:	Toxic Substances Control Act Plant and Production Search System
TSI:	Test Study Inventory
TSSMS:	Time-Sharing Service Management System
ULRI:	Ulrich's International Periodicals Directory and Irregular Serials and Annuals
US CLASS:	U.S. Patent Master Classification File
USDA:	United States Department of Agriculture
USITC:	United States International Trade Commission
USPA/USP77/USP 70:	U.S. Patent Copies
UTM-TOX:	Unified Transport Model-Toxics
VAX:	An EPA Owned Computer Modelling System
UVCB:	Unidentified or Variable Composition, Complex Reaction Product, or Biological Chemicals
WATERDROP:	Water Distribution Register of Organic Pollutants
WHO:	World Health Organization
WNPI:	World Patent Index
WPIL:	World Patent Index Latest

VIII. DATA SUB-CATEGORIES/OTS FUNCTIONS MATRIX

This section is comprised of a series of matrices matching data sub-categories (as described in Section IV of the Notebook) against major OTS functions (as described in Section II of the Notebook). The purpose of these matrices is to establish a relationship between data sub-categories and OTS functions, showing the types of information needed in support of each of the functions. By comparing these matrices against the Date Sub-categories/Information Resources Matrix (See Section VII of the Notebook), major information gaps can be easily identified.

No attempt is made to match data sub-categories against OTS sub-functions. Such a matrix would be too complex to construct and may be misleading.

In general, the matrices highlight the following points:

1. Certain types of data are exclusively used in support of certain specific functions. These are:

Data Category	OTS Function
Chemical economics	Economics analysis
Health effects	Health effects analysis
Environmental effects	Environmental effects analysis
Exposure	Exposure analysis
Regulations/Controls	Regulatory options analysis

2. Other types of data are widely used to support more than one function. They are:

Data Category	OTS Function
Physical/Chemical properties	Chemical analysis Control technology analysis Exposure analysis Health effects analysis Environmental effects analysis
Production/Processing	Chemical analysis Control technology analysis Exposure analysis Economic analysis
Use/Disposal	Chemical analysis Control technology analysis Exposure analysis Economic analysis

3. Substance identification data appear to be widely used for supporting a number of the functions. This is not totally unexpected since OTS' mission is the investigation of chemical substances. Therefore, every function is chemically oriented and the substance in question has to be properly identified. However, it is believed that substance identification data are mainly used in support of the chemical analysis function, and that the other functions rely more on the results of chemical analysis for identifying the substances. The matrix, in this case, does not distinguish between gathering information directly from information resources and obtaining information from a product generated by a function that uses the information directly.

A total of nine matrices are presented, with each matrix matching a data category against the OTS functions. The sub-categories of a category are listed on the horizontal axis, and the functions are on the vertical axis of each matrix.

Each matrix shows what specific data sub-categories within a certain data category are used in support of the OTS functions. As discussed in Section IV of this Notebook, certain sub-categories may belong to more than one data category and cross-references are used to denote this relationship. In the aforementioned matrices, the cross-referenced sub-categories are included in all of the pertinent matrices. For example, "Method of Manufacture" appears in both the "Substance Identification vs. OTS Functions Matrix" as well as the "Production/Processing vs. OTS Functions Matrix." It is hoped tha the handling of cross-referenced sub-categories in this manner will make each matrix more complete and will allow the users to visualize immediately, without going into another matrix, the relationship between a data category and the functions.

As described in Section II of this Notebook, Regulatory Options Analysis mainly integrates products from other functions and has no specific information requirements except for data pertaining to regulations and controls. For this reason, information requirements for Regulatory Options Analysis are indicated only in the "Regulations and Controls vs. OTS Functions Matrix."

IX. DATA REQUIREMENTS FOR OTS PROCESSES

In Section III of this Notebook, the three major OTS processes, i.e., New Chemicals Review, Existing Chemicals Review, and Chemical Testing, are discussed. Associated with each of the three processes in Section III are the major information resources specifically designed or used in support of that process. These information resources are mostly indexing or tracking systems and do not include the traditional bibliographic or non-bibliographic scientific and technical information systems listed in Section V of this Notebook. This section defines data requirements for the three OTS processes.

For the OTS functions (see Section II), information requirements are identified in terms of data categories and sub-categories (see Section IV). Furthermore, the computerized scientific and technical bibliographic and non-bibliographic information systems (see Section V) and manual sources (see Section VII) containing pertinent data are presented. The data requirements for the functions are indexed in matrices (see Section VIII). Therefore, a direct relationship has been established among OTS functions, data categories and sub-categories, and information resources in terms of computerized and manual scientific and technical systems. In general, an OTS function is data specific, i.e., a function requires a specific category of data. The data are usually available in specific information systems.

The operation of OTS processes obviously needs support from a variety of scientific and technical systems and sources that are not included in Section III of this Notebook. However, unlike a function, a process is not data specific. This is because organizationally a process is largely supported by almost all functions. While different functions require different data categories, all data categories are required for a process since all functions are involved. Therefore, as far as scientific and technical data are concerned, the information requirements for the three processes are essentially identical. Nevertheless, each process may prescribe a slightly different responding time and depth of data coverage, based on the specific time constraints of that particular process. Additionally, each process has different requirements in terms of specific indexing or tracking systems, as discussed in Section III.

Instead of presenting a matrix matching a process against specific data categories or sub-categories, as in the case of the functions (see Section VIII), this section attempts to define data requirements for the processes in a different manner. If such a matrix were developed, almost all columns would be checked for all three processes.

(a) A quick search of a few major data bases on the PMN chemical.

Existing Chemicals Review Process

Milestones	Data Categories
1. Entry Review	
a. Step 1: substances not previously evaluated under TSCA	Substance identification Health effects Environmental effects Production/processing Use/disposal Regulations/control
b. Step 2: substances previously evaluated under TSCA (From CHIP or Section 4 Chemical Testing)	Health effects* Environmental effects* Exposure*
2. Problem Characterization	Physical/chemical properties
3. Information Gathering & Risk Analysis	Health effects Environmental effects Production/processing Use/disposal Exposure Chemical economics (Market profile & substitutes) Regulations/control (handling and labeling)
4. Risk Reduction Analysis	Chemical economics
5. Risk Management	Information obtained from above activities

*Information requirements for CHIP. Literature search is limited to secondary sources. For information requirements on Chemical Testing, see the table entitled Chemical Testing Process: Test Rules Development.

Chemical Testing Process
Test Rules Development

	Milestones	Data Categories
1.	Obtain data from ITC Report	Substance identification Production/processing Use/disposal Exposure
2.	Obtain unpublished health & safety studies from industry (Section 8(d) submissions)	Health effects Exposure Regulations/control
3.	Literature search for Testing Needs Analysis (also from Section 8(a) Level A submissions)	Substance identification Physical/chemical properties Health effects Environmental effects Production/processing Use/disposal Exposure Regulations/control
4.	Preliminary Economic Analysis	Production/processing Chemical economics
5.	Preliminary Exposure Analysis	Health effects Environmental effects Production/processing Use/disposal Exposure
6.	Preliminary Testing Needs Analysis	Information obtained from above activities
7.	Support Document	Same as 6
8.	Economics Analysis Document	Information from 5

X. CONCLUSION

The foregoing sections of this Notebook have identified information requirements for the OTS functions and processes as well as pertinent information resources and analytical capabilities that are currently available. Wherever feasible, matrices have been developed to highlight the relationship among information requirements, information resources and analytical capabilities, and OTS functions and processes. Furthermore, the resources attributes matrices facilitate both user awareness of the wide variety of information resources available and proper selection of the most appropriate resource(s) to satisfy an information requirement.

This section presents some analyses of the major findings in the foregoing sections of this Notebook. Major conclusions of these analyses are summarized as follows:

1. There are seven major functions and three processes within OTS, and each of these functions or processes has certain information requirements. In general, the information requirements for a process is much broader than those for a function. This can be explained by the simple fact that all functions are involved in supporting a process by performing technical and scientific reviews and analyses for that process. Scientific and technical data are therefore needed directly in support of these functions which in turn support the processes.

2. OTS has diversified information needs, based on the data categories and sub-categories that have been identified. Although all data categories and sub-categories are needed by OTS, the relative value of each data category or sub-category to the successful implementation of TSCA is, however, difficult to determine.

3. In general, functions are data specific. This means that instead of requiring all types of data, a function usually needs one or a few specific categories of data, as discussed in Section VIII of this Notebook. For example, health effects analysis requires essentially health effects data, and exposure analysis needs data on exposure, physical chemical properties, production/processing, and use/disposal of chemical substances.

4. Certain data categories are each exclusively used in support of one function while some other categories are used by more than one function. For example, chemical economics data are used exclusively in support of economic analysis while use information is needed for exposure analysis, economic analysis, chemical analysis, as well as control technology analysis.

5. Processes are not data specific. In general, a process requires all kinds of scientific and technical information. Therefore, unlike the functions, information requirements are almost identical for the three OTS processes. Each process,

however, may prescribe a slightly different responding time and different depth of the information coverage.

6. In addition to scientific and technical information, the processes also require systems to track process management decisions or to index submission data. As a result, several tracking or indexing systems have been specifically developed to support the processes. Examples of these systems include the TDIS, PMN Tracking System, CECATS, 8(a) Level A Information System, etc. Functions, on the other hand, use exclusively scientific and technical information.

7. For each of the three processes, major milestones and products are identified. In general, the preparation of these products requires the support of a number of the OTS functions and, therefore, a number of the data categories. In some cases, a product may be data specific, i.e. it requires a specific category of data. In any case, the same categories of data may be needed for different products for a particular process, as evidenced in Section IX of this Notebook. This may be explained by one of the following:

- The two different products requiring similar information may pertain to different chemicals, e.g., PMN subject chemicals and PMN analogs.
- Although the information requirements are similar in terms of data categories, the depth of coverage may be quite different. For example, one product may require only a quick search of a few major computer data bases, while another product needs a more comprehensive search including manual sources.
- Different products may be prepared at relatively the same period of time. Similar information is needed simultaneously in preparing these products. The time constraints do not allow these products to be prepared consecutively, so that the output from one product would become the input for the next product.

8. The analytical capabilities developed by OTS are used to support all three processes and essentially three functions, i.e. health effects analysis, environmental effects analysis, and exposure analysis. These analytical capabilities are used to supplement the existing computerized and manual resources as a source of information support for TSCA. Specifically, where certain types of critical data are lacking, OTS uses the analytical capabilities to develop data based on estimation or modeling techniques. Examples include the use of estimation techniques for generating physical/chemical properties, fate and exposure modeling techniques for assessing chemical fate and environmental or human exposure, and dose-response modeling techniques for estimating relationships between dose level and toxic effects.

9. The existing computerized bibliographic and non-bibliographic data bases alone cannot fully satisfy OTS information needs. These data bases are being supplemented by manual resources, expert opinions, and data development via rule-making or estimation techniques. Specifically, OTS relies on estimation techniques to develop many of the sub-categories for physical/chemical properties, and on computer models for certain kinds of exposure data. Furthermore, OTS uses manual and unpublished resources and depends on expert opinions for certain sub-categories of data on economics, production, processing, use and disposal of chemical substances. Health and environmental effects data in general appear to be more readily available in the computer data bases, with the exception of end-point and testing data.

10. There are approximately 200 computerized and 500 manual information resources which have been identified as pertinent sources for supporting the OTS functions and processes. A series of resource attributes matrices are developed to evaluate and document the usefulness of these information resources. However, the quality of either the data or the data bases cannot be determined. Each of these information resources contains certain information that is needed to support TSCA. Therefore, it will be counter-productive to compare or rank these information resources in terms of their relative usefulness or contribution to TSCA. The successful implementation of TSCA requires many different categories of data that are available from a wide variety of information resources, i.e., bibliographic data bases, non-bibliographic data bases, manual sources, unpublished data, expert opinion, etc.

11. The bibliographic data bases (e.g. Toxline, Medline) usually provide the users with abstracts and bibliographic information, while the non-bibliographic data bases (e.g. RTECS, SPHERE) contain end-point data or data in an extracted format. OTS needs to use both types of data bases, since they contain different data and serve different purposes. Different search techniques must be used to search the two different types of data bases. It appears that end-point data can be more readily used if only a preliminary review of a chemical is conducted. Abstracts and bibliographic data will be more useful for more in-depth reviews of chemicals.

12. OTS does not seem to rely heavily on peer-reviewed data. In fact, most of the scientists interviewed indicated that they prefer to conduct their own analyses and draw their own conclusions. However, in using the data bases, they would prefer to have data with certain types of quality indicators.

13. OTS must more actively and effectively utilize existing unpublished data. Currently, there does not seem to be a formal mechanism for identifying and acquiring unpublished data, especially those from other agencies.

14. In matching the data categories and sub-categories against information resources the following trends and data gaps are observed:

- o All data categories are covered to some extent by the bibliographic and non-bibliographic data bases, and manual resources.
- o The technical aspects of chemical information (i.e., Substance Identification, Physical-Chemical Properties, Health Effects, and Environmental Effects) appear to be adequately covered by the identified sources, with the exception of end-point and testing data.
- o The technological and economic aspects of chemical information (i.e., Production/Processing, Use/Disposal, Exposure, and Chemical Economics) need additional sources. In many cases, expert opinions are being used.
- o The legal aspects (i.e., Regulations/Control), with the exception of the Consumer Affairs sub-category, are covered but could use some additional sources.
- o Of the 19 sub-categories for Chemical Economics, 7 sub-categories (37%) have no source for data.
- o Of the 16 sub-categories for Production/Processing, 4 sub-categories (25%) have no information source.
- o For Use/Disposal category, 7 of the 12 sub-categories (58%) have no source for data.
- o Of the 23 sub-categories for Exposure, 4 subcategories (17%) have no source for data.
- o In the Health Effects Category, no information sources are found for the Epidemiology sub-category, an unexpected finding.

15. The TSCA Chemical Substances Inventory, in spite of the apparent obsolescence of some of its data, is still the most complete single source for production volume and manufacturing plant site data. If more current data are needed, OTS must obtain the data through rule-making.