

**Endocrine Disruptor Screening and Testing  
Advisory Committee  
(EDSTAC)**

**Final Report**

**August 1998**

## Table of Contents

### Executive Summary

### Chapter One: Introduction

I.	Overview .....	1-1
II.	The EDSTAC's Origin .....	1-1
III.	About the EDSTAC Report .....	1-3

### Chapter Two: Background

I.	The Endocrine System as it Relates to the Endocrine Disruptor Screening and Testing Program .....	2-1
II.	Statutory Basis for Endocrine Disruptor Screening and Testing .....	2-5
III.	Literature Cited .....	2-12

### Chapter Three: Conceptual Framework and Principles

I.	Introduction .....	3-1
II.	Description of Endocrine Disruptor .....	3-3
III.	Definition of Other Key Terms .....	3-4
IV.	Overview of the EDSTAC Conceptual Framework .....	3-5
V.	Scope of the EDSTAC Conceptual Framework .....	3-6
VI.	Where Endocrine Disruption Fits in the Broader Context .....	3-6
VII.	General Principles to Guide the Development of the Endocrine Disruptor Screening and Testing Program .....	3-7
VIII.	The EDSTAC Conceptual Framework .....	3-9
IX.	Additional Components and Clarifications to the Original EDSTAC Conceptual Framework .....	3-11
X.	Compilation of Chapter Three Recommendations .....	3-14
XI.	Literature Cited .....	3-18

### Chapter Four: Priority Setting

I.	Introduction .....	4-1
II.	Overview of the Sorting and Priority Setting Recommendations .....	4-4
III.	Exposure-Related Information and Criteria .....	4-15
IV.	Effects-Related Information and Criteria .....	4-23
V.	High Throughput Pre-Screening .....	4-28
VI.	Recommendations for Handling Polymers .....	4-36

VII.	Recommendations for Handling Mixtures . . . . .	4-45
VIII.	Recommendation to Screen Naturally Occurring Non-Steroidal Estrogens . .	4-51
IX.	Recommendation for a Nominations Process . . . . .	4-53
X.	The Endocrine Disruptor Priority Setting Database . . . . .	4-56
XI.	Recommended Approach to Priority Setting . . . . .	4-65
XII.	Compilation of Chapter Four Recommendations . . . . .	4-78
XIII.	Literature Cited . . . . .	4-87

## **Chapter Five: Screening and Testing**

I.	Chapter Overview . . . . .	5-1
II.	Tier 1 Screening Concepts and Design Parameters . . . . .	5-2
III.	Recommended Tier 1 Screening Battery . . . . .	5-4
IV.	General Principles in Evaluating Tier 1 and Tier 2 Results . . . . .	5-32
V.	Tier 2 Testing Concepts and Design Parameters . . . . .	5-40
VI.	Recommended Tier 2 Testing Battery . . . . .	5-54
VII.	Validation, Standardization, Methods Development, and Research . . . . .	5-67
VIII.	Compilation of Chapter Five Recommendations . . . . .	5-77
IX.	Literature Cited . . . . .	5-80

## **Chapter Six: Communications and Outreach**

I.	Introduction . . . . .	6-1
II.	Need for Communication . . . . .	6-2
III.	Recommendations . . . . .	6-3
IV.	Generalized Schedule for Implementation . . . . .	6-17
V.	Compilation of Chapter Six Recommendations . . . . .	6-19
VI.	Literature Cited . . . . .	6-21

## **Chapter Seven: Compilation of EDSTAC Recommendations**

I.	Chapter Overview . . . . .	7-1
II.	Recommendations: Chapter Three – Conceptual Framework and Principles . .	7-1
III.	Recommendations: Chapter Four – Priority Setting . . . . .	7-5
IV.	Recommendations: Chapter Five – Screening and Testing . . . . .	7-14
V.	Recommendations: Chapter Six – Communications and Outreach . . . . .	7-18

## Acronyms

ACGIH	American Conference of Governmental Industrial Hygienists
ADME	Absorption, Distribution, Metabolism, and Excretion
AGD	Anogenital Distance
AMRT	Alternative Mammalian Reproduction Test
AR	Androgen Receptor
ASO	Accessory Sex Organ
ATSDR	Agency for Toxic Substances Disease Registry
CAS	Chemical Abstracts Service
CASRN	Chemical Abstracts Service Registry Number
CAT	Chloramphenicol Acetyl Transferase
CBI	Confidential Business Information
CDFA	California Department of Food and Agriculture
CDPR	California Department of Pesticide Regulation
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
COWG	Communications and Outreach Work Group
CWA	Clean Water Act
DCI	Data Call-In
DDT	dichlorodiphenyltrichloroethane
DES	diethylstilbestrol
DSP	Daily Sperm Production
EAFUS	Everything Added to Food in the United States
EAC	Endocrine Active Compounds
EAT	Estrogen, Androgen, and Thyroid
ECA	Enforceable Consent Agreement
EDCs	Endocrine Disrupting Compound
EDPSD	Endocrine Disruptor Priority Setting Database
EDSTAC	Endocrine Disruptor Screening and Testing Advisory Committee
EDSTP	Endocrine Disruptor Screening and Testing Program
EFDB	Environmental Fate Databases
EMAP	Environmental Monitoring and Assessment Program
EPA	U.S. Environmental Protection Agency
ER	Estrogen Receptor
EU	European Union
FDA	U.S. Food and Drug Administration
FIFRA	Federal Insecticide, Fungicide, and Rodenticide Act
FQPA	Food Quality Protection Act
FSIS	Food Safety Inspection Service
GD	Gestational Day
GLP	Good Laboratory Practice
GRAS	Generally Regarded As Safe
GUI	Graphical User Interface

GUS	Groundwater Ubiquitous Source
HPG	Hypothalamic-Pituitary-Gonadal
HPT	Hypothalamic-Pituitary-Thyroid
HSDB	Hazardous Substances Databank
HSEES	Hazardous Substances Emergency Event Surveillance
HTPS	High Throughput Pre-Screening
IARC	International Agency for Research on Cancer
ITC	International Trade Commission
$K_{ow}$	Octanol: Water Partition Coefficient
MARCIS	Microbiological and Residue Computer Information Systems
MBP	Myelin Basic Protein
NAS	The National Academy of Sciences
NGO	Non-Governmental Organizations
NIOSH	National Institute for Occupational Safety and Health
NLM	National Library of Medicine
NOAA	National Oceanic and Atmospheric Administration
NOEC	Naturally Occurring Estrogenic Compounds
NONE	Naturally Occurring Nonsteroidal Estrogenic Compound
NPA	Not Publicly Available
NTIS	National Technology Information Service
OECD	Organization of Economic Cooperation and Development
OPP	Office of Pesticide Programs
OPPTS	Office of Prevention, Pesticides, and Toxic Substances
OSHA	Occupational Safety and Health Administration
PAH	Polyaromatic Hydrocarbon
PCBs	Polychlorinated Biphenyls
PCNA	Proliferating Cell Nuclear Antigen
PDM	Probabilistic Dilution Model
PDMS	Pesticide Document Management System
PELs	Permissible Exposure Limit
PMN	Pre-Manufacture Notification
PND	Postnatal Day
PSWG	Priority Setting Work Group
PVC	Persistent Vaginal Cornification
QA/QC	Quality Assurance/Quality Control
QSAR	Quantitative Structure Activity Relationship
RBA	Relative Binding Affinity
RED	Registration Eligibility Decision
REL	Recommended Exposure Limits
RfD	Reference Dose
RVIS	Residue Violation Information System
SAB	Science Advisory Board
SAP	Science Advisory Panel
SAR	Structure Activity Relationship
SARA	Superfund Amendments and Reauthorization Act

SDWA	Safe Drinking Water Act
SHC	Spermatid Head Counts
SI	Steroidogenesis Inhibition
STWG	Screening and Testing Work Group
SuCCSES	Substructure-based Computerized Chemical Selection Expert System
SWDA	Safe Drinking Water Act
T1S	Tier 1 Screening
T2T	Tier 2 Testing
TCDD	tetrachlorodibenzodioxin
TLV	Threshold Limit Value
TR	Thyroid Receptor
TRH	Thyrotropin-Releasing Hormone
TRI	Toxic Release Inventory
TSCA	Toxic Substances Control Act
TSCATS-HE	Toxic Substances Control Act Test Submissions - Health Effects
VO	Vaginal Opening
VOCs	Volatile Organic Compounds
VP	Vaginal Patency

## Appendices

- Appendix A: Endocrine Disruptor Screening and Testing Advisory Committee Participant List
- Appendix B: Principles Work Group Participant List
- Appendix C: Priority Setting Work Group Participant List
- Appendix D: Screening and Testing Work Group Participant List
- Appendix E: Communications and Outreach Work Group Participant List
- Appendix F: References and Sources for Chapter Four, Priority Setting
- Appendix G: Data Source Matrices
- Appendix H: Fate and Transport Tables
- Appendix I: Feasibility Demonstration Project for HTPS
- Appendix J: References and Sources for Chapter Five, Screening and Testing
- Appendix K: Brief Overview of Assays Considered for Tier 1 Screening
- Appendix L: Protocols for Tier 1 Screening Assays
- Appendix M: Assays not Included in Tier 1 Screening
- Appendix N: Endocrine Disruption and Invertebrates
- Appendix O: Protocol for Possible *In Utero* Developmental Screening Assay
- Appendix P: Examples of “Weight of Evidence” Determinations
- Appendix Q: Tier 2 Testing Study Designs
- Appendix R: Preliminary Categorization of Tier 1 Screens and Tier 2 Tests by the Screening and Testing Work Group
- Appendix S: Survey of Cost Estimates for EDSTAC’s Proposed Endocrine Disruptor Screening and Testing Assays
- Appendix T: Summary of EPA’s September, 1997 Outreach Questionnaire
- Appendix U: Compilation of Public Comment