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Exposure and Human Health Reassessment of 2,3,7,8-Tetrachlorodibenzo-*p*-Dioxin (TCDD) and Related Compounds

Part III: Integrated Summary and Risk Characterization for 2,3,7,8-Tetrachlorodibenzo-*p*-Dioxin (TCDD) and Related Compounds

NOTICE

THIS DOCUMENT IS A PRELIMINARY DRAFT. It has not been formally released by the U.S. Environmental Protection Agency and should not at this stage be construed to represent Agency policy. It is being circulated for comment on its technical accuracy and policy implications.

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DISCLAIMER

This document is a draft for review purposes only and does not constitute U.S. Environmental Protection Agency policy. It has been provided for review to the National Academy of Sciences (NAS). While the NAS review is being conducted and until a final agency assessment has been released, the draft dioxin reassessment (2003 version or other draft versions) remains draft, does not represent a final position, and is not intended to serve as the basis or rationale for regulatory and other policy action. However, EPA will continue its work to reduce human exposure to dioxin.

While the NAS review is underway and no final reassessment has been issued, in meeting their regulatory responsibilities, the agency will continue its current practice of utilizing the best available data that meet the EPA Information Quality Guidelines and the government-wide Information Quality Guidelines issued by OMB. The Agency will consider all such data and associated uncertainty to determine the strength of the evidence in proposing regulatory actions related to dioxin and dioxin-like compounds.

**Exposure and Human Health Reassessment
of 2,3,7,8-Tetrachlorodibenzo-*p*-Dioxin (TCDD)
and Related Compounds**

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LIST OF ACRONYMS, ABBREVIATIONS, AND SYMBOLS

Ah	aryl hydrocarbon
AHF	altered heptacellular foci
AhR	aryl hydrocarbon receptor
ALK	alkaline phosphatase
ALT	alanine aminotransferase
Arnt	aryl hydrocarbon receptor nuclear translocator
AST	aspartate aminotransferase
ATSDR	Agency for Toxic Substances and Disease Registry
AUC	area under the curve
BaP	benzo[a]pyrene
BDD	brominated dibenzodioxin
BDF	polybrominated dibenzofuran
BMD	benchmark dose
BW	body weight
CDC	Centers for Disease Control and Prevention
CDD	chlorinated dibenzodioxin
CFD	chlorinated dibenzofuran
CI	confidence interval
CTL	cytotoxic T lymphocyte
CYP1A1	cytochrome P4501A1 enzyme
CYP1A2	cytochrome P4501A2 enzyme
CYP1B1	cytochrome P4501B1 enzyme
DFP (subscript)	dioxins, furans, PCBs
DEN	diethylnitrosamine
DHT	5 α -dihydrotestosterone
DNA	deoxyribonucleic acid
ED	effective dose
ED ₀₁	effective dose at the 1% response level
EDC/VC	ethylene dichloride/vinyl chloride
EGF	epidermal growth factor
EGFR	epidermal growth factor receptor
EPA	U.S. Environmental Protection Agency
FSH	follicle-stimulating hormone
g	gram
GD	gestation day
GGT	gamma glutamyl transferase
HAH	halogenated aromatic hydrocarbons
HCDD	hexachlorodibenzo- <i>p</i> -dioxin
HIF	hypoxia-inducible factor
HpCDD	heptachlorodibenzo- <i>p</i> -dioxin

LIST OF ACRONYMS, ABBREVIATIONS, AND SYMBOLS (continued)

<i>hr</i>	hairless
IARC	International Agency for Research on Cancer
ID	immunosuppressive dose
IgA	immunoglobulin A
I-P	initiation-promotion
IPCS	International Programme on Chemical Safety (WHO)
I-TEQ	international TEF scheme adopted by EPA in 1989
kg	kilogram
L	liter
LABB	lifetime average body burden
LED ₀₁	lower bound of the effective dose at the 1% response level
LH	luteinizing hormone
LMS	linearized multistage
LOAEL	lowest-observed-adverse-effect level
MOE	margin of exposure
mRNA	messenger ribonucleic acid
MRL	minimal risk level (ATSDR)
NHANES	National Health and Nutrition Examination Survey
NHATS	National Human Adipose Tissue Survey
ng	nanogram
NIOSH	National Institute for Occupational Safety and Health
NTP	National Toxicology Program
NOAEL	no-observed-adverse-effect level
NOEL	no-observed-effect level
OCDD	octachlorodibenzo- <i>p</i> -dioxin
pg	picogram
PAH	polycyclic aromatic hydrocarbon
PBPK	physiologically based pharmacokinetic
PBDD	polybrominated dibenzodioxin
PBDF	polybrominated dibenzofuran
PCB	polychlorinated biphenyl
PCDD	polychlorinated dibenzodioxin
PCDF	polychlorinated dibenzofuran
PCP	pentachlorophenol
PCQ	polychlorinated quaterphenyl
PeCDD	pentachlorodibenzo- <i>p</i> -dioxin
PeCDF	pentachlorodibenzo- <i>p</i> -furan
PK	pharmacokinetic
POD	point of departure
POTW	publicly-owned treatment works

LIST OF ACRONYMS, ABBREVIATIONS, AND SYMBOLS (continued)

ppt	part per trillion
PVC	polyvinyl chloride
REP	relative potency
RfD	reference dose (EPA)
RR	relative risk
SAB	U.S. EPA's Science Advisory Board
SMR	standardized mortality ratio
SRBC	sheep red blood cells
2,4,5-T	2,4,5-trichlorophenoxyacetic acid
TDG	thyroid binding globulin
TCDD	2,3,7,8-tetrachlorodibenzo- <i>p</i> -dioxin
TCP	trichlorophenol
TDI	tolerable daily intake
TEF	toxic equivalency factor
TEQ	toxic equivalent
TEQ-WHO ₉₄	1994 WHO extension of the I-TEF scheme to include 13 dioxin-like PCBs
TEQ-WHO ₉₈	1998 WHO update to the previously established TEFs for dioxins, furans, and dioxin-like PCBs
TPA	tetradecanoyl phorbol acetate
TNP-LPS	trinitrophenyl-lipopolysaccharide
TSH	thyroid stimulating hormone
URL	unit risk level
WHO	World Health Organization
~	approximately
>	greater than
<	less than
≥	greater than or equal to
≤	less than or equal to
µg	microgram

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