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RESTORATION ADVISORY BOARD MEETING AGENDA AND SLDIES 17 AUGUST 1995 NS MAYPORT FL
8/17/1995
RESTORATION ADVISORY BOARD

AGENDA
RAB Orientation Meeting
August 17, 1995, 6:30 p.m.

►	Welcome	Cheryl Mitchell
►	Overhead Presentation *INTRODUCTION TO RISK ASSESSMENT*	Dr. Marland Dulaney
►	Questions about the *GENERAL INFORMATION REPORT (GIR)* and *RCRA FACILITY ASSESSMENT (RFA)*	Frank Lesesne
►	RFA Fact Sheet Overview and Distribution	Cheryl Mitchell
►	NAVSTA Mayport RAB Charter	NAVSTA Mayport RAB Members
►	Questions & Answers	NAVSTA Mayport RAB Members
►	General Discussion	NAVSTA Mayport RAB Members

- Availability Session
- Soon to be released documents
- Other Topics

Parking Pass

HUMAN HEALTH RISK ASSESSMENT

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Is This Chemical Exposure Safe?

4 Basic Steps of Risk Assessment

- Identify the Chemicals of Concern
- Characterize the Extent of Chemical Exposure
- Evaluate the Toxicity of the Chemicals of Concern
- Estimate the Risk Associated with Chemical Exposure

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Identify the Chemicals of Concern

- Based upon Chemical Analysis
- Identify the Contaminated Media (e.g., Soil, Water, or Air)
- Quantitate the Level of Contamination
- Data Usability and Uncertainty Analysis
- Background Chemicals

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- ❑ **Characterize the Extent of Chemical Exposure**
- ❑ Evaluate the Toxicity of the Chemicals of Concern
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Characterize the Extent of Chemical Exposure

- ❑ Characterize the Physical Setting
- ❑ Identify Potentially Exposed Populations
- ❑ Identify Potential Exposure Pathways
- ❑ Estimate Exposure Concentrations
- ❑ Estimate Chemical Intakes

Duration of the Chemical Exposure

- Acute - 1 Day to 13 Days
- Subchronic - 14 Days to 7 Years
- Chronic - 7 years to a Lifetime

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Evaluate the Toxicity of the Chemicals of Concern

- Gather Qualitative and Quantitative Toxicity Information For Chemicals Being Evaluated
- Identify Exposure Periods Required for Toxicity to Occur
- Dose Response Assessment
  - Determine Toxicity Values for Noncarcinogenic Effects
  - Determine Toxicity Values for Carcinogenic Effects

Toxic Endpoint of Interest

- ❑ **Systemic Toxicity** – does it make you sick
- ❑ **Carcinogenicity** – causes cancer
- ❑ **Developmental Toxicity** – learning disabilities
- ❑ **Mutagenicity/Teratogenicity/Fetotoxicity**
  DNA changes

EPA Cancer Slope Factor

- A Plausible Upper-Bound Estimate of the Probability of a Response (Carcinogenic) per Unit Intake of a Chemical over a Lifetime

only 10 known human carcinogens

The Reference Dose (RfD)

The RfD is an Estimate (With Uncertainty Spanning Perhaps an Order of Magnitude or Greater) of the Daily Exposure to the Human Population (Including Sensitive Subgroups) That is Likely to be Without Appreciable Risk of Deleterious Effects During a Portion of the Lifetime, in the Case of a Subchronic RfD, or During the Lifetime, in the Case of a Chronic RfD (USEPA, 1989a).

Types of Reference Doses (RfDs)

- Chronic - Exposure From 7 Years to a Lifetime
- Subchronic - Exposure Between 2 Weeks and & 7 Years
- Developmental

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Linear Low-Dose Cancer Risk Equation

$$\text{Risk} = \text{CDI} \times \text{SF}$$

Where:

Risk = A Unitless Probability (e.g., 2×10^{-5}) of an Individual Developing Cancer;

CDI = Chronic Daily Intake Averaged Over 70 Years (mg/kg-day); and

SF = Slope Factor, Expressed in $(\text{mg/kg-day})^{-1}$

Cancer Risk Equation for Multiple Chemicals

$$Risk_{(Total)} = Risk_{(1)} + Risk_{(2)} + \ldots\ldots Risk_{(n)}$$

Non-Cancer Hazard Quotient (HQ)

$$HQ = \frac{\text{Exposure Dose (ED)}}{\text{Reference Dose (RfD)}}$$

ED and RfD are Expressed in the Same Units (mg/kg/Day) and Represent the Same Exposure Period (Chronic, Sub-Chronic, Short-Term).

Non-Cancer Total Hazard Index for Multiple Chemicals

$$\mathbf{HI}_{(\text{Total})} = \mathbf{HI}\ \text{Pathway}_1 + \mathbf{HI}\ \text{Pathway}_2 + \ldots\ldots \mathbf{HI}\ \text{Pathway}_n$$

Non-Cancer Pathway Hazard Index for Multiple Chemicals

$$\mathbf{HI}_{\text{(Pathway)}} = \mathbf{HQ}_1 + \mathbf{HQ}_2 + \ldots\ldots \mathbf{HQ}_n$$

Areas of Uncertainty Analysis

- Physical Setting (Future Land Use, Chemicals not Included in Risk Assessment, etc.)
- Exposure Pathway (Why Selected or not Selected)
- Models (Assumptions and Limitation of Each Model Used
- Derivation of Toxicity Values
- Data Gaps

Relevancy of Animal Studies to Humans

- The Fact that Almost All Human Carcinogens are Animal Carcinogens does not Prove that the Converse Relation Holds; i.e., It has not been Proven that All Animal Carcinogens are Human Carcinogens.

Risks that Increase Probability of Death by One Chance in a Million

Activity	Cause of Death
One Chest X-ray Taken in a Good Hospital	Cancer Caused by Radiation
Living 2 Months with a Cigarette Smoker	Cancer, Heart Disease
Eating 40 Tablespoons of Peanut Butter	Liver Cancer Caused by Aflatoxin B
Eating 100 Charcoal-Broiled Steaks	Cancer from Benzopyrene
Drinking Thirty 12-oz Cans Diet Soda	Cancer Caused by Saccharin

Source: Adapted from R. Wilson, Analyzing the Risks of Daily Life, *Technology Review.* **81** (1979). See also R. Wilson and E.A.C. Crouch, Risk Assessment and Comparison: an Introduction, *Science*, **236**, 267-270 (1987).

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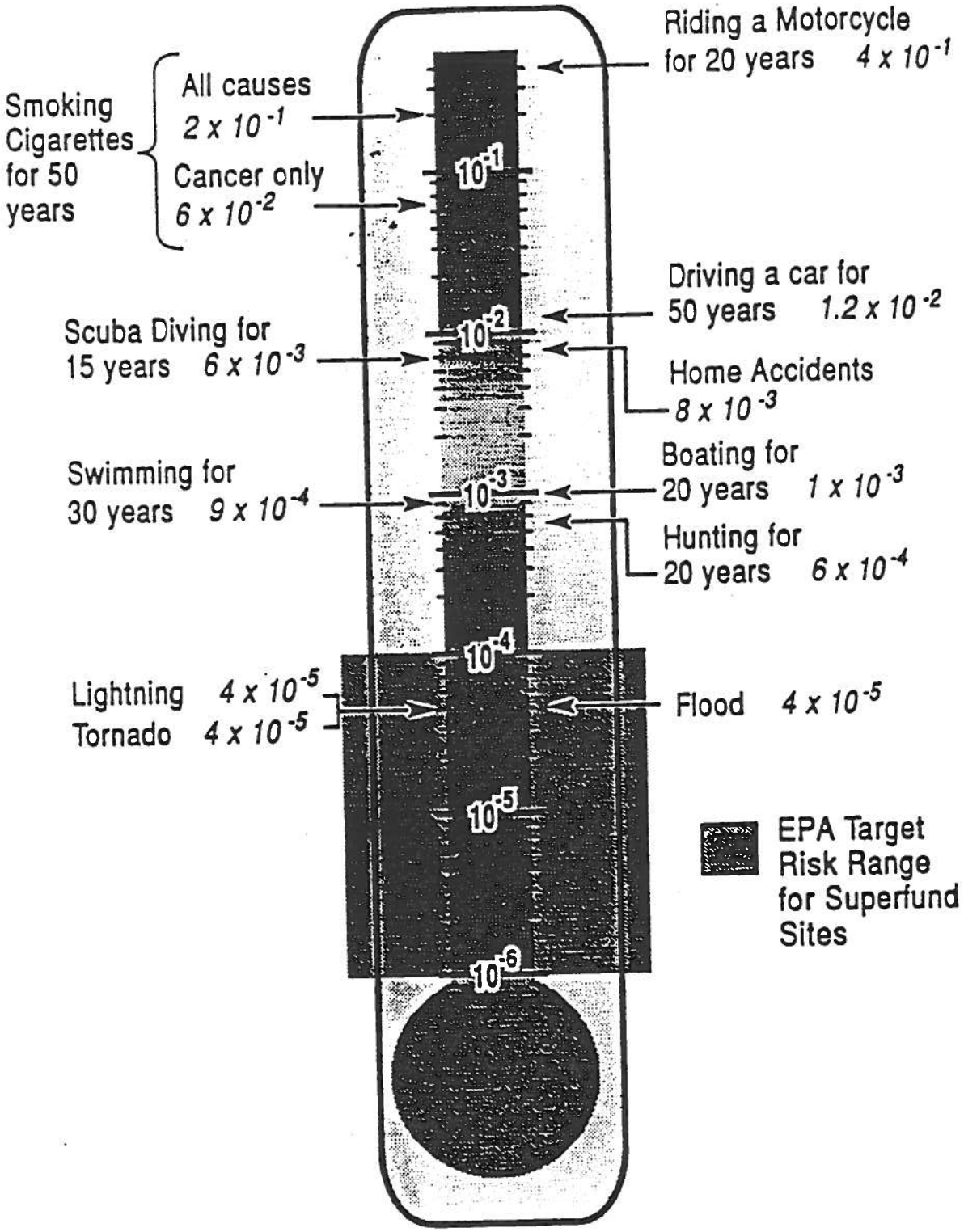

Fig. 1. A representation of excess risk involved with various activities in which the risk has been confirmed by direct observation.

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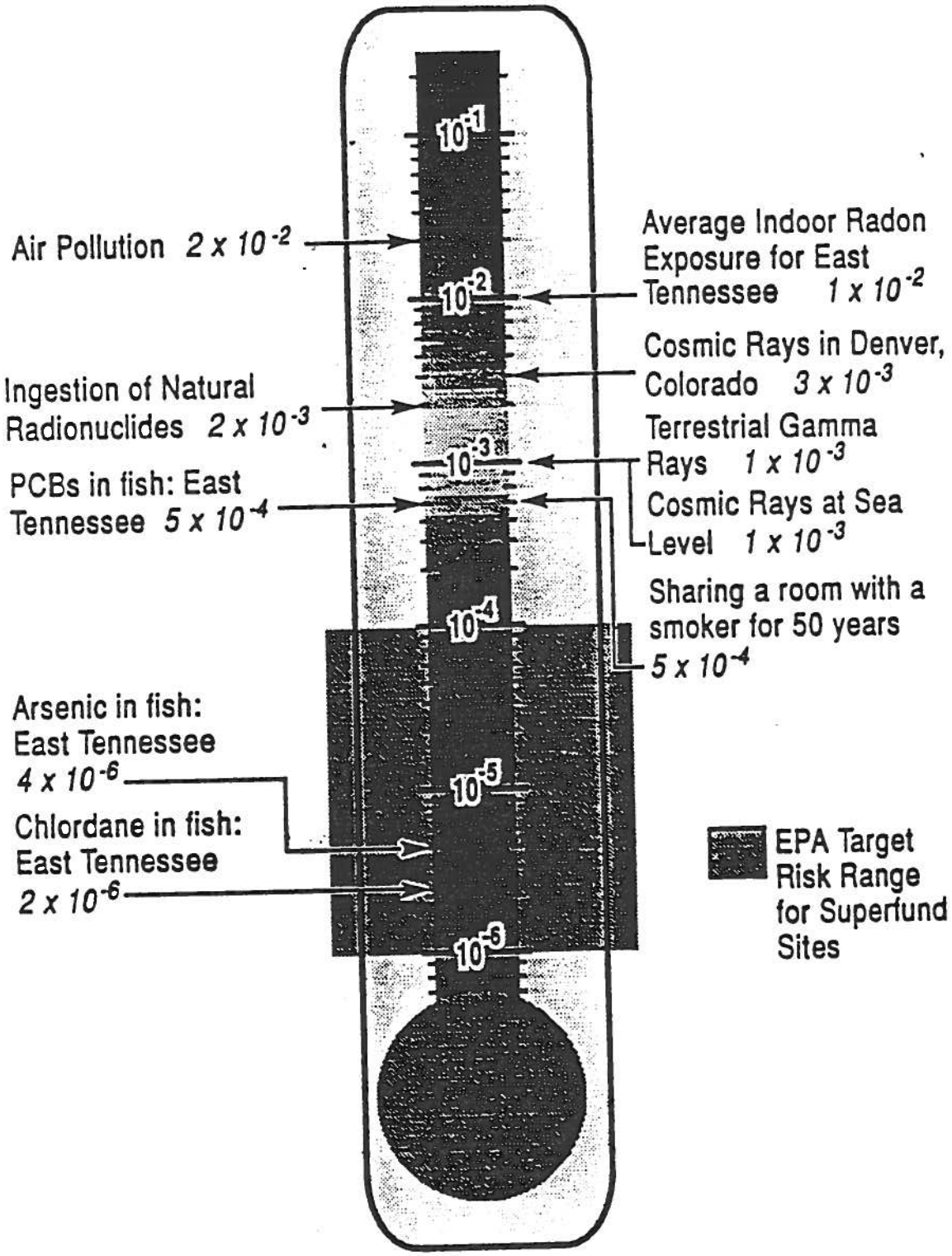


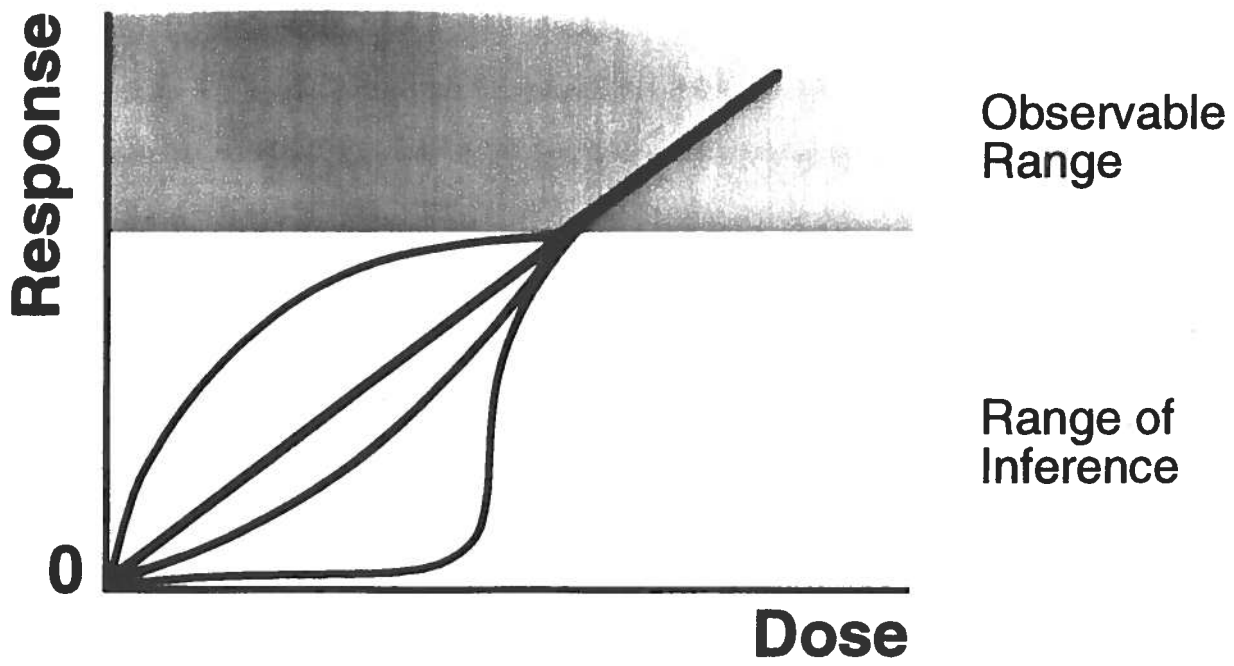
Fig. 2. Nonverifiable risks determined by mathematical extrapolation to low doses that are received from interaction with the environment.

Are These Estimates Real?

Factors Used in Risk Estimates

- ❑ Contaminant Concentrations
- ❑ Exposure Pathways
- ❑ Toxicity Data
- ❑ Toxicity Analysis
- ❑ Exposure Factors

Variability in Estimated Low-Dose Risks



Target Risk Ranges for Risk Management

- 10^{-4} to 10^{-7} - The Cleanup Policy Under the USEPA Superfund Cleanup Program.
- 10^{-4} to 10^{-7} - USEPA Drinking Water Standards (Maximum Contaminant Levels, or MCLs) Under the Safe Drinking Water Act.
- 10^{-4} to 10^{-7} - Alternate Concentration Limits (ACLs, a Form of Groundwater Regulation) Under the Resource Conservation and Recovery Act.
- 10^{-2} to 10^{-6} - National Emission Standards for Hazardous Air Pollutants (NESHAPs) Under the Clean Air Act.
- 10^{-5} - "No Significant Risk Level" Under California's Proposition 65 (Safe Drinking Water and Enforcement Act of 1986).