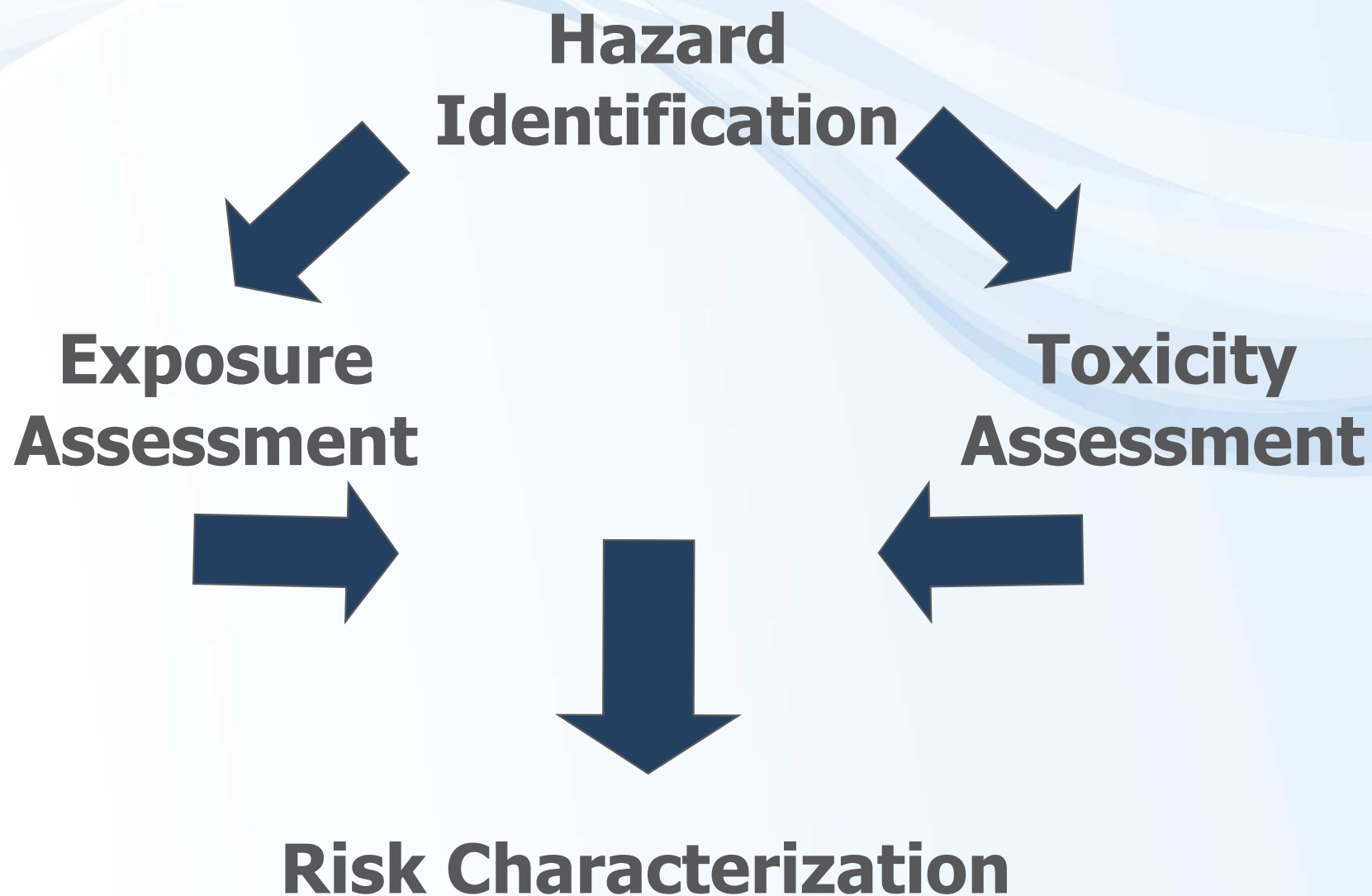




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# HUMAN HEALTH RISK ASSESSMENT

# Risk Assessment Process (U.S. EPA)

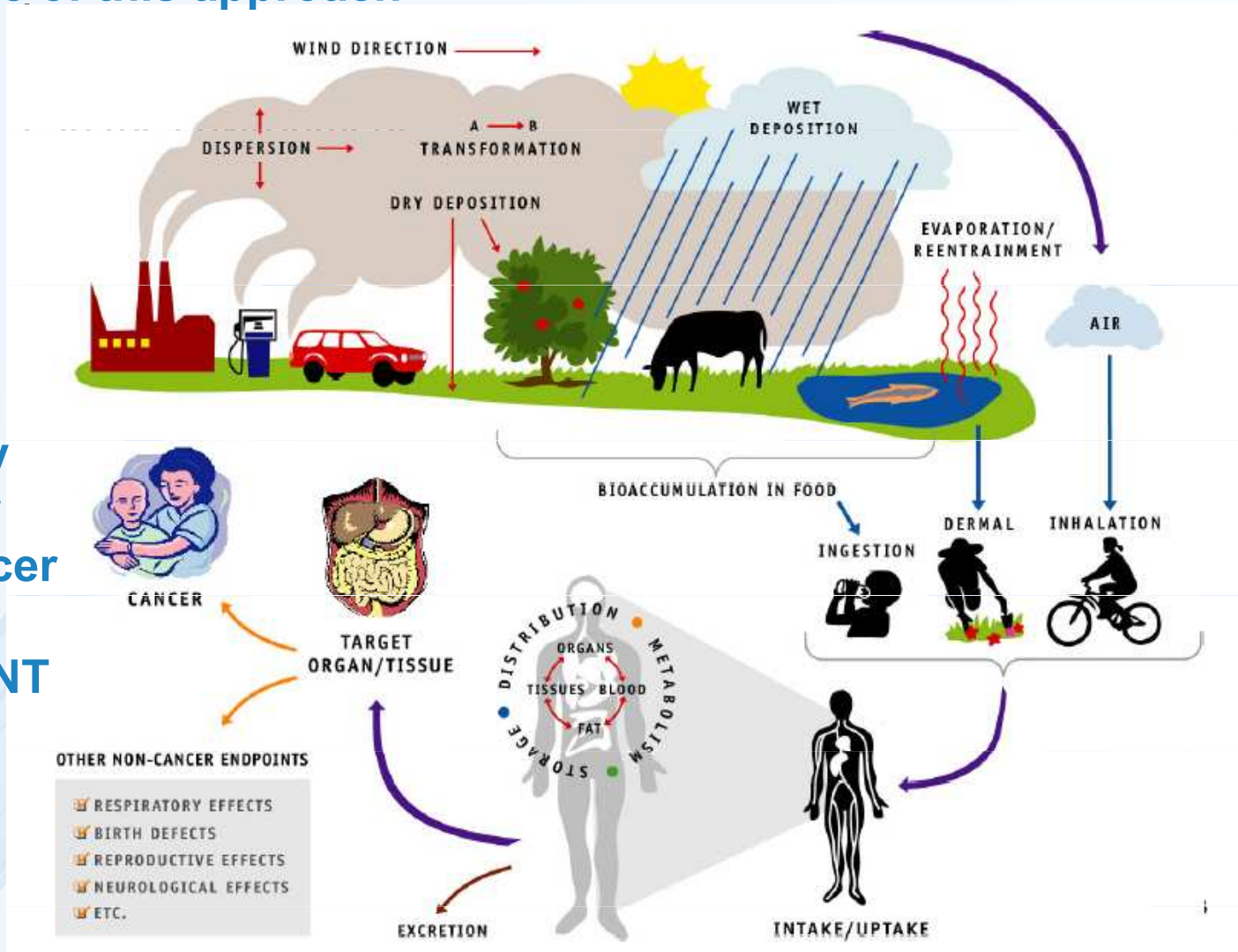


4 Main parts of  
this methodology



# RISK ASSESSMENT METHODOLOGY

## Advantage of this approach



Probability  
Of Cancer  
and Noncancer  
**RISK  
ASSESSMENT**

Prediction  
of Exposure  
scenarios



# Step 1: Hazard Identification

- Collect data on presence of chemical
  - Sampling
  - Modeling
  - Chemical fate and transport
- Determine if chemical may be toxic
- Develop model of how chemical may move through environment
  - Conceptual Site Model is used to organize information regarding chemicals and potential transport to people



AFCEE, 2002



## Step #2: Exposure Assessment



- Who is Exposed?
  - Adult, Child, Special Populations
- How Are They Exposed?
  - Ingestion, Inhalation, Skin Contact
- What is the Concentration of Chemical to Which They are Exposed?
  - ppm in Water or Soil
- How Often Are They Exposed?
  - Days per year, Number of years

Prediction  
of Exposure  
scenarios



Putting it all together. . .

$$\textit{Intake Dose (mg/kg-day)} = \frac{C \times CR \times EF \times ED}{BW \times AT}$$

- Intake Equation for Drinking Water Example

C= Chemical Concentration (Obtain from sampling)

CR= Contact Rate (2 liters water/day)

EF= Exposure Frequency (350 days/year)

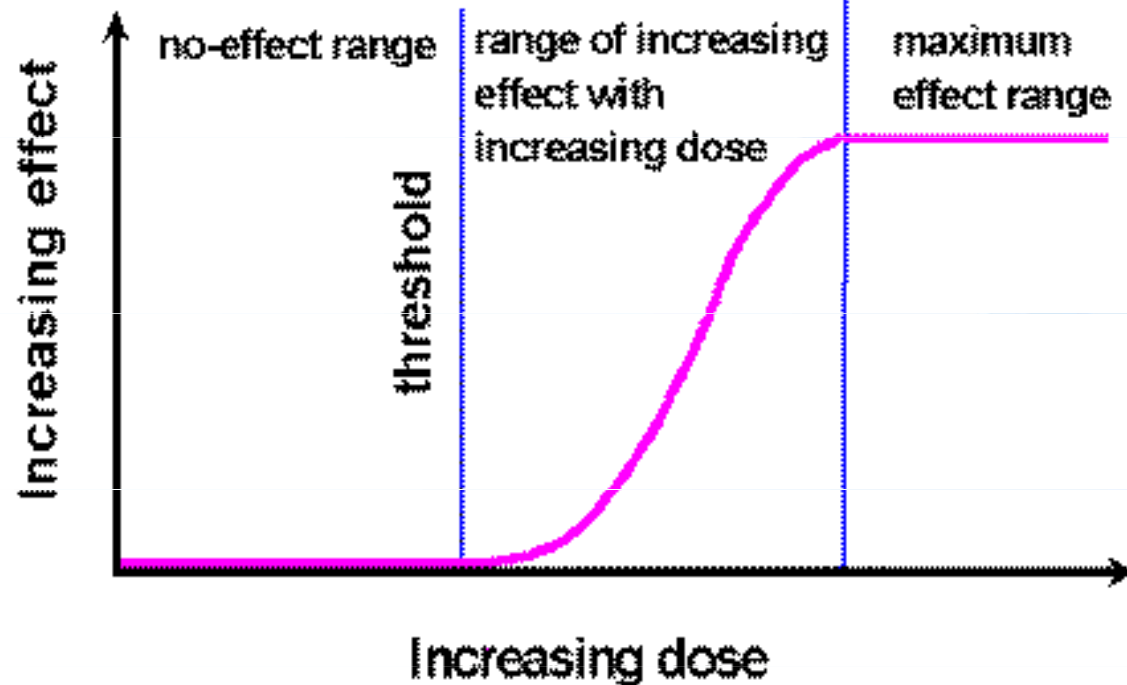
ED= Exposure Duration (30 years)

BW=Body Weight (70 kg.)

AT= Averaging Time (10,950 days)



## Step 3: Toxicity assessment / Dose-Response Curve relationship



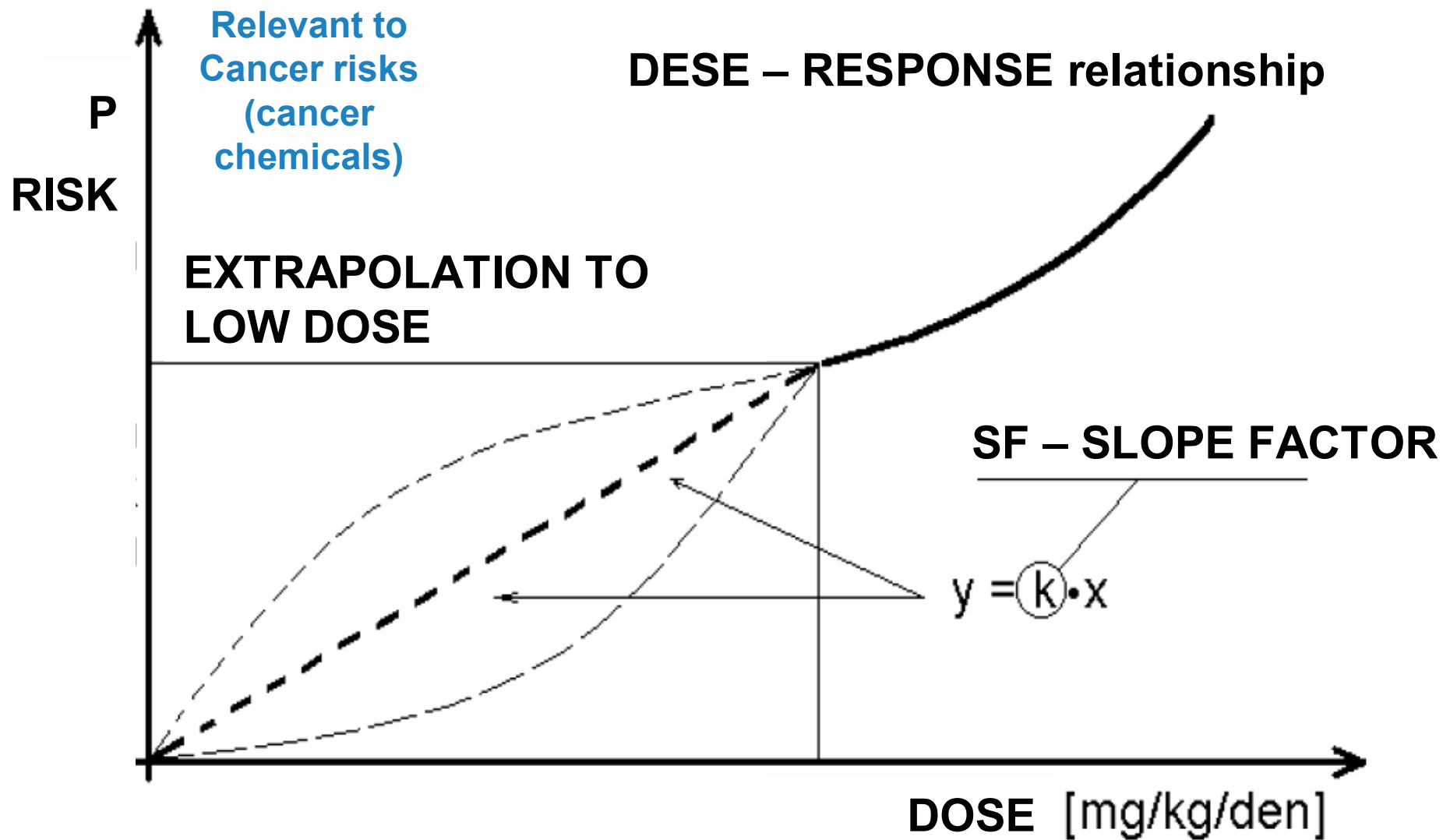
Noncancer  
risks  
(noncancer  
chemicals)

Reference Dose – Chemical concentration per unit body weight without significant effects

Dose – Chemical concentration per unit body weight

Response – Level of measured adverse effect





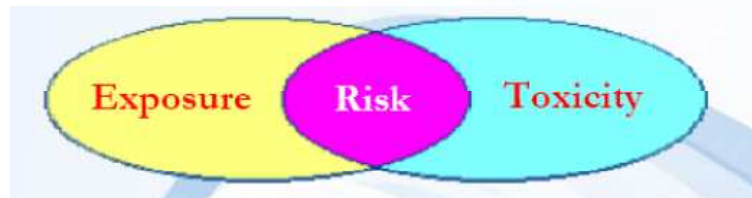
**!!! Databases of these RISK INDEXES - WEB**





## Step #4: Risk Characterization

The risk characterization combines the information obtained on toxicity with the calculated exposure to provide an estimate of risk.



Purdue, 1997



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# RISK ASSESSMENT METHODOLOGY

[C] concentrations

Exposure scenario models

Internal dose  
Chronic Daily Intake



- ➔ 7 PCBs
- ➔ DDT
- ➔ DDE
- ➔ DDD
- ➔ Gama-HCH
- ➔ Beta-HCH
- ➔ Alpha-HCH

physiologically based  
pharmacokinetic (PBPK) model

$$\text{RISK} = 1 - \exp(-\text{CDI} * \text{SF})$$

Cancer

$$\text{RISK} = \text{CDI} / \text{Rfd}$$

Noncancer

## Total RISK

(aditive sum of individual Chemical-risks)  
= expressed as a probability of health effects

**Cancer and Noncancer  
RISK ASSESSMENT**  
-U.S. EPA probabilistic approach



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Food pesticide levels

Soil/dust levels

Water pollutant levels

Air pollutant levels

**!!Emphasize!!  
Chemical stress is  
only ONE of all stressors  
and relevant  
PREDICTORS for final  
Human Health RISKS!!**

Nutritional health

Overall health

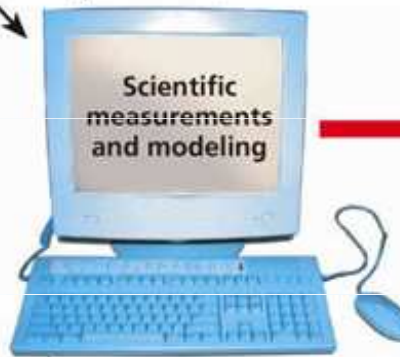
Lifestyle

Personal habits

Genetic predisposition

Lung, intestine, and skin absorption rates

Metabolism  
Accumulation  
Excretion



Predicted level of toxicant in people



# RISK ASSESSMENT METHODOLOGY



<http://www.genasis.cz>

[home](#) [contacts](#)



## Global Environmental Assessment Information System

[POPs](#)

[Stockholm Convention](#)

[Data sources](#)

[Analytical tools](#)

[Research topics](#) ▾

[Partners](#)

[Research topics](#) > [Health Risk Assessment](#)

### Human Health Risk Assessment

### Detail description

Environment contamination is one of the factors that are concerned in human health adverse effects. During the last decades a number of negative effects related to environment contamination are confirmed.

There is increased incidence of many diseases in exposed population in case of contaminated environment. To these health problems belong affections of the respiratory system, cardiovascular system, chronic obstructive pulmonary disease, increase reproduction, but also occurrence of tumor diseases that can be concerned with exposure to carcinogenic compounds.

Contamination data of partial environmental matrix are used to retrospective health risk assessment with emphasis on carcinogenic and noncarcinogenic effects of assessed pollutants. Health risk assessment is methodological procedure that provides estimation and quantification of health risks probability using systematic evaluation of adverse environmental stressors. Advantage of this procedure is also prospective modeling of still nonexistent situations.

Health risk assessment is primarily based on real exposure dose prediction using

Ambient air

Trajectories

Box models

Dispersion models

Ecological Risk Assessment

EcoRA tutorial

Health Risk Assessment



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# Integrated Risk Information System (IRIS)

Recent Additions | [Contact Us](#) Search:  All EPA  IRIS

You are here: [EPA Home](#) » [Research & Development](#) » [NCEA](#) » [IRIS Home](#) » Integrated Risk Information System (IRIS)

**IRIS** (Integrated Risk Information System) is a compilation of electronic reports on specific substances found in the environment and their potential to cause human health effects. IRIS was initially developed for EPA staff in response to a growing demand for consistent information on substances for use in risk assessments, decision-making and regulatory activities. The information in IRIS is intended for use by EPA staff and the public.

(CAS, chemicals..)

## Getting Started with IRIS



- [An overview of the web site](#)
- [What is IRIS?](#)
- [How does EPA decide which substances to add or update?](#)

[More frequent questions >>](#)

## Using the IRIS Database



- [Advanced Search in IRIS](#)
- [Compare IRIS Values](#)
- [Download IRIS](#)

## Upcoming Reviews and Documents



The following documents are under External Peer Review at this time:  
[More Recent Additions >>](#)

Substance	Milestone	Estimated Start Date
<a href="#">Propionaldehyde</a>	External Peer Review	3/5/2008
<a href="#">2-Hexanone</a>	External Peer Review	2/28/2008
<a href="#">Thallium</a>	External Peer Review	2/15/2008


**Search IRIS by Keyword**

IRIS Summaries/Toxicological Reviews

Entire IRIS Website

[List of IRIS Substances >>](#)

**Ask Peter**



I'm Peter, the IRIS Virtual Representative. I am an automated response system available weekdays 9 - 5 EST. I can answer questions from the public about the IRIS Assessments from an extensive database of chemical risk information. [Ask Peter](#)

[Web Satisfaction SURVEY](#)

**IRIS Track Status**

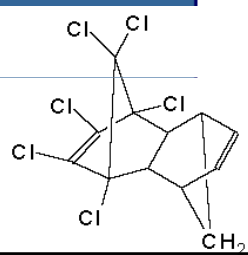
Final Assessment/Posting	14
External Peer Review	7
Interagency Review	10
Agency Review	7
Draft Development	22

[Detailed Status Report >>](#)  
[About IRIS Track >>](#)  
[IRIS Annual Agenda >>](#)

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- [A to Z List of IRIS Substances](#)
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- [Compare IRIS Values](#)
- [IRIS Guidance](#)
- [Download IRIS](#)
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- [Site Overview](#)
- [IRIS Glossary](#)
- [Frequent Questions](#)
- [Tools & Databases](#)
- [Related Links](#)

<http://www.epa.gov/iris>

example:  
309-00-2





United States  
National Library  
of Medicine

# TOXNET

Toxicology Data Network



TOXNET PDA Access

SIS Home

About Us

Site Map & Search

Contact Us

► Env. Health & Toxicology ► TOXNET

**TOXNET** - Databases on toxicology, hazardous chemicals, environmental health, and toxic releases.

### Select Database

- ChemIDplus ?
- HSDB ?
- TOXLINE ?
- CCRIS ?
- DART ?
- GENETOX ?
- IRIS ?
- ITER ?
- LactMed ?
- Multi-Database ?
- TRI ?
- Haz-Map ?
- Household Products ?
- TOXMAP ?

### Search All Databases

Enter term(s) to search all databases.

(e.g. asthma air pollution, ibuprofen fever, vinyl chloride)

Search

Clear

Help

### TOXNET Search Options

- Search all databases: Enter term(s) in box above
- Search a specific database: Click database at left
- Database description: Click on the ?

### Env. Health & Toxicology



Portal to  
environmental  
health and  
toxicology  
resources

VISIT SITE

### Support Pages

- Help
- TOXNET FAQ
- TOXNET Update Status
- Fact Sheet
- Database Description
- Training Manuals
- News

Additional Resource

IPCS INCHEM - Windows Internet Explorer

http://www.inchem.org/

Soubor Úpravy Zobrazit Obilbené položky Nástroje Nápověda

Obilbené položky IPCS INCHEM CHLORAMINE-T (ICSC)

Stránka Zabezpečení Nástroje

# IPCS International Programme on Chemical Safety

# INCHEM

Chemical Safety Information from Intergovernmental Organizations

**Search options:**

**Full-text Search**

Example: kidney <AND> DDT

**Chemical Identity Search**

CAS Number

Example: 108-88-3

OR

Chemical Name or Synonym

Example: Toluene

[Advanced Search](#)



Rapid access to internationally peer reviewed information on chemicals commonly used throughout the world, which may also occur as contaminants in the environment and food. It consolidates information from a number of intergovernmental organizations whose goal it is to assist in the sound management of chemicals.

**Browse content using links below:**

- ▶ Concise International Chemical Assessment Documents (CICADs)
- ▶ Environmental Health Criteria (EHC) Monographs
- ▶ Harmonization Project Publications
- ▶ Health and Safety Guides (HSGs)

Hotovo

Internet 100%

Start Windows Commander... Doručená pošta - Mo... RISK\_web odkazy na stránky RI... IPCS INCHEM - Wind... CS 21:58



<http://www.inchem.org/>  
<http://www.epa.gov/iris/>  
<http://cfpub.epa.gov/ncea/iris/index.cfm>  
<http://www.epa.gov/srs/>  
<http://www.epa.gov/reg3hwmd/risk/index.htm>  
<http://cfpub.epa.gov/ecotox/>  
<http://www.rivm.nl/bibliotheek/rapporten/601501001.html>  
<http://toxnet.nlm.nih.gov/>  
<http://www.tiem.utk.edu/~sada/index.shtml>  
<http://www.iuclid.eu>  
<http://www.oehha.ca.gov/risk/ChemicalDB/index.asp>  
[http://rais.ornl.gov/tox/tox\\_values.shtml](http://rais.ornl.gov/tox/tox_values.shtml)  
<http://www.atsdr.cdc.gov/mrls/index.html>  
<http://www.epa.gov/radiation/heast/>  
<http://www.state.nj.us/dep/airmon/airtoxics/atrisk.htm>  
<http://www.state.nj.us/dep/aqpp/downloads/techman/1003.pdf>  
<http://www.deq.state.va.us/vrprisk/>  
<http://www.piskac.cz/ETD/>  
<http://www.tera.org/iter/>  
<http://www.cdc.gov/niosh/database.html>  
<http://www.epa.gov/reg3hwmd/risk/index.htm>  
<http://www.intox.org/databank/index.htm>  
<http://www.chemdat.de/mda/index.html>  
<http://ehp.niehs.nih.gov/roc/toc10.html>  
<http://www.scorecard.org/chemical-profiles/>  
<http://www.santel.lu/SANTEL/toxico/toxico.html#toxico>

<http://www.reprotox.org/Login.aspx>  
<http://chemfinder.cambridgesoft.com/>  
<http://riskassessment.ornl.gov/hhra.cfm>  
<http://www.atsdr.cdc.gov/toxfaq.html>  
<http://www.tera.org/>  
<http://www.epa.gov/ncct/dsstox/index.html>  
<http://pmep.cce.cornell.edu/links.html>  
<http://www.nasdonline.org/>  
<http://www.cdc.gov/niosh/idlh/idlh-1.html>  
<http://www.cdc.gov/niosh/ipcs/nicstart.html>  
<http://www.cdc.gov/niosh/ipcs/icstart.html>  
<http://npic.orst.edu/rmpp.htm>  
<http://extoxnet.orst.edu/>  
<http://www.cdc.gov/niosh/vendors.html>  
<http://chem.sis.nlm.nih.gov/chemidplus/chemidheavy.jsp>  
<http://sis.nlm.nih.gov/>  
[http://www.ehsoftserve.com/chem\\_cheminfo.htm](http://www.ehsoftserve.com/chem_cheminfo.htm)  
<http://www.epa.gov/risk/guidance.htm#models>





Thank you for your attention



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