



Review of US Environmental Protection Agency General Exposure Scenario Modeling for Evaluating Chemical Safety

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- **Background on Generic Scenario Documents**
- **Process for Review of Generic Scenarios**
- **Types of Occupational Exposures and Releases to the Environment Modeled by Generic Scenario Development**
- **Shortcomings of Current Modeling**
- **Approaches to Simplify Human Exposure Modeling**

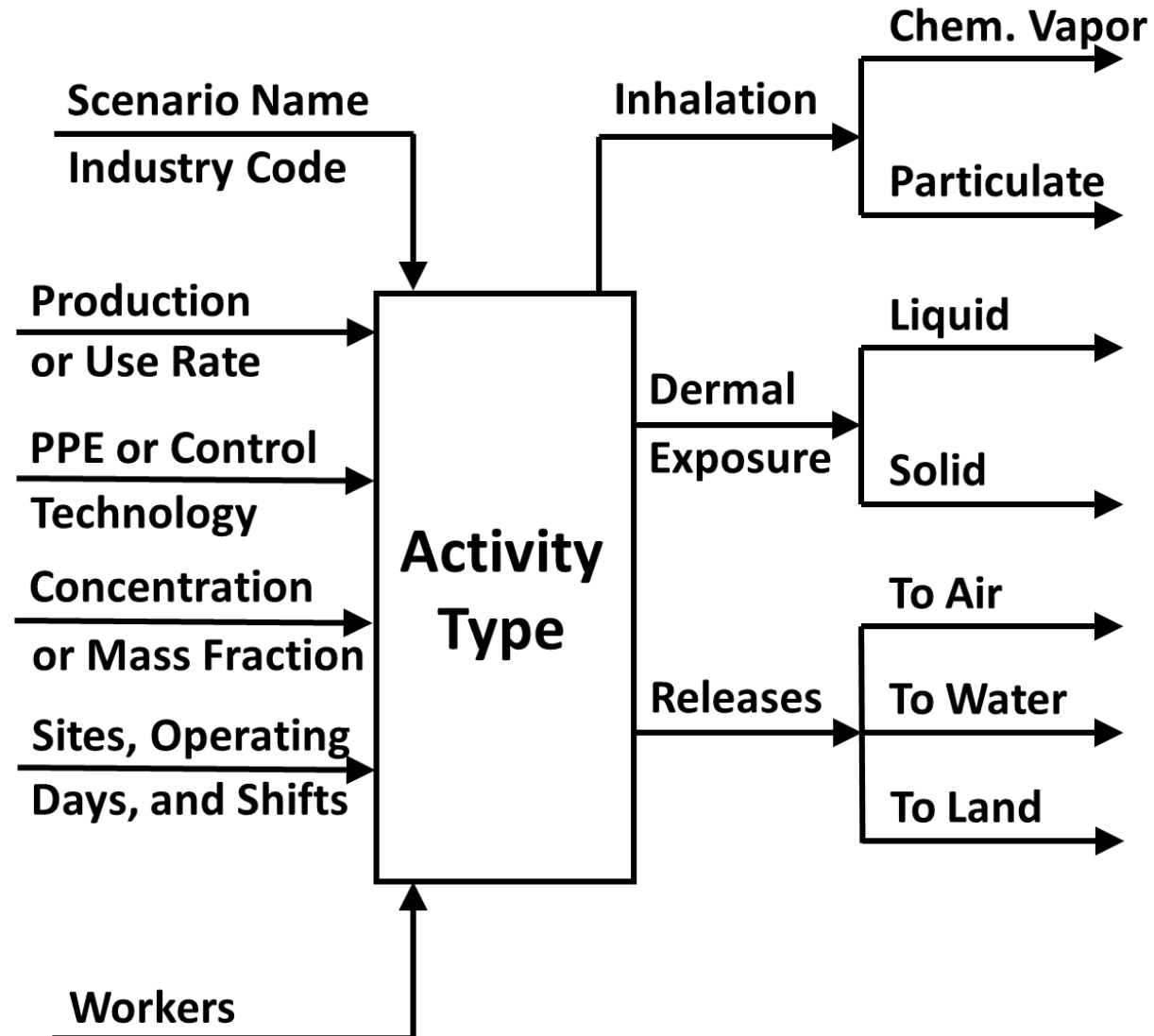
What Are Generic Scenarios?

- A set of conditions about sources, pathways, production processes and use patterns that quantify the emissions (or releases) of a chemical from production, formulation, processing, private use (or use in the household) and recovery/disposal into water, air and solid waste.
- Provide estimates of environmental releases and occupational exposures associated with chemical uses across industries.
- Released are modeled based upon activities (such as emptying a drum) performed within an industry.
- Framework for collection of models for exposure assessment associated with the industry. Cumulative emissions models.

Components of a Generic Scenarios

- A description of the industry or use.
- A description of the types of substance used and their function in the industry area
- Information on the scale or size of operations in the industry area
- Identification of the points of release in this use area, and estimates of the amounts of substance related at these points
- Information on emission control methods for the industry
- Instructions on how to use the information in the document, and examples of calculations

Generic Scenario Modeling



Document Review

- **A total of 70 Generic Scenario Documents were reviewed to catalog the different inputs and outputs of the modeling activities.**
- **General Facility Information – Use/Production Rates (either daily or annual), Number of Exposed Workers, Number of Facilities/Sites, etc.**
- **Environmental Releases – This will typically include methodology for quantifying release amounts (either daily or annual), as well as media of release (air, water, landfill, incineration, etc.)**
- **Occupational Exposures – This will typically include methodology for quantifying exposure estimates as well as the route of exposure (dermal or inhalation typically, sometimes may include ingestion)**
- **Source/Reference for the data element**

Review Data Compilation

Data Element	Description
Element Number	Incremental Count of Data Elements
ESD/GS Name	Title of the Exposure or Generic Scenario Document containing the Data Element
Data Element	Information about the Data Element. Could include process description indicate whether the element included a Occupational Exposure of Environmental Release,
Sub-Element Type	Information describing the data element.
Sub-Element Type 2	Further information about the data element.
Sub-Element Exposure Type	Type of Occupational Exposure
Sub-Element Activity/Source	Activity or Source associated with the data element.
Sub-Element (Media of Release)	Media where environmental release occurs
Data Element Source Summary	Value or description of the data element
Data Element Source (up to 6)	Reference used in ESD/GS for the data element.

Occupational Exposures

Activity	Inhalation				Dermal			
	Vapor	Particulate	Not Specified	Total	Liquid	Solid	Not Categorized	Total
Cleaning	5	1	19	24	4	2	39	45
Dumping	0	0	0	0	0	0	1	1
Drying	0	0	12	12	0	0	2	2
Evaporating	0	0	0	0	0	0	0	0
Fugitive	0	0	1	1	0	0	0	0
Disposal	0	0	2	2	0	0	6	6
Residual	0	0	0	0	0	0	0	0
Particulate	0	0	7	7	0	0	4	4
Sampling	2	0	5	7	2	0	6	8
Loading	4	2	40	45	3	2	54	59
Spent Materials	0	0	0	0	0	0	2	2
Process	2	0	55	57	1	0	45	46
Not Specified	0	0	0	0	0	0	0	0

Environmental Releases

Activity	Release to Air	Release to Land	Release to Water	Release Not Specified	Total Releases
Cleaning	58	38	32	31	100
Dumping	0	0	1	0	1
Drying	1	0	1	1	3
Evaporating	0	0	0	0	0
Fugitive	20	5	8	0	22
Disposal	18	26	28	7	56
Residual	16	15	11	3	25
Particulate	12	12	9	2	18
Sampling	10	5	5	0	10
Loading	33	14	10	7	43
Spent Materials	2	1	3	1	6
Process	56	19	36	5	88
Not Specified	0	0	0	0	0

Model Shortcomings

- The models used to estimate emissions are very generic.
 - Major factor is the quantity of chemical used – estimates are a fraction of chemical used.
 - No consideration of release and transport mechanisms.
- Focus of exposure scenario is the fact of exposure, not risk characterization.
- Risk of occupational exposure primary consideration is the number of potential exposed workers and exposure time.
- No consideration of chemical toxicity.

Opportunities for Improvement

- Develop high-throughput exposure models that utilize multiple input parameters for groups or individual chemicals.
- Tie occupational exposure to chemical toxicity to provide risk characterization.

Conclusions

- Current generic scenario modeling uses limited models with minimal input data.
- The endpoint of the analysis is release and exposure quantification.
- There is a need to consider the uncertainty of release and exposure estimates.

Thank you for your attention!
Any Questions?