OECD Working Party on Exposure Assessment (WPEA)
Survey on Exposure Assessment Models used in a Regulatory Context

Scope and Objective

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Please fill in the blanks and send back to Koki TAKAKI (koki.takaki@oecd.org)

Model descriptions	Information to be filled in
Model name	American Meteorological Society/Environmental Protection Agency Regulatory Model (AERMOD)
General description	AERMOD is a steady-state Gaussian plume dispersion model that incorporates air dispersion based on plantary boundary layer turbulence structure and scaling concepts, including treatment of both surface and elevated sources and both simple and complex terrain. The AERMOD modeling system is comprised of several modeling routines that work together to estimate time-average air concentrations and deposition rates around emission sources. AERMOD can incorporate a variety of emission source characteristics, chemical deposition properties, complex terrain, and site-specific hourly meteorology to estimate air concentrations and deposition amounts at user-specified receptor distances and at a variety of averaging times. AERMOD is EPA's regulatory air dispersion model for near-field (<50 km) modeling applications.
Owner	United States Environmental Protection Agency
Website URL	https://www.epa.gov/scram/air-quality-dispersion-modeling-preferred-and-recommended-models
Released/last updated	Last updated April 2021

Compatibility	*(ex. compatible with Windows 10)*
Target substances	☒ Organic substances *(e.g. PAH, mixtures… if specified)* ☒ Inorganic substances (*Please specify (ex. Lead, Mercury)*) ☒ Others (*Please specify (ex. Organometallic substances, UVCBs)*)
Estimates exposure to:	☐ Consumers ☐ Workers ☒ General population ☒ Children ☐ Aquatic organisms ☐ Terrestrial organisms ☐ Benthic organisms ☒ Others Provides pollutant concentrations at user defined distances along with deposition characteristics.
Target Exposure compartments/source/routes/s	- *Exposure Source* ☐ Sources within the workplace ☒ Direct emission of Industrial chemicals to the environment from an industrial facility ☐ Use of industrial chemicals (professional workers and consumers) ☐ Use of consumer product ☐ Land contamination ☐ Waste ☐ Use of Pesticides ☐ Use of Biocides ☐ Use of Pharmaceuticals ☐ Use of Food additives ☐ Use of Feed additives ☐ Others (*Please specify*) **[Direct exposure to ☐ Consumers ☐ Workers ☒ General Public]** - *Exposure duration* ☒ Short Term exposure ☒ Long term exposure - *Exposure route* ☒ Inhalation ☐ Dermal ☐ Oral ☐ Others (*Please specify*) **[Exposure to the environment and indirect exposure to humans via the environment]** - *Exposure compartment* ☒ Air ☐ Soil ☐ Surface water ☐ Groundwater ☐ Sediment ☒ Dust - *Environmental Fate and behaviour* ☒ Environmental degradation ☒ Environmental mobility ☐ Environmental bioavailability ☐ Aquatic food web bioaccumulation ☐ Terrestrial food web bioaccumulation ☐Others (*Please specify*) - *Exposure route for indirect exposure to humans* ☒ Inhalation ☐ Dermal ☐ Ingestion ☒ Others Deposition
Other model functions	☒ Spatial distribution (Mapping) ☒ Simulate time-dependent exposure ☐ Sensitivity and Uncertainty analysis ☐ Others (*Please specify*)
Limitation and applicability	(*ex. for polar/non-polar substances, regional/local scale estimation*)

<table>
<tr><td>Availability</td><td>- Availability to general public
☒ Available (free) ☐ Licence needed ☐ Unavailable ☐ Others (Please specify)
- Accessibility to the model
☐ Web-based ☒ Download via website ☐ Distributed by request
☐ Others (Please specify)
- Disclosure of the model description (equation/formula, parameter values, etc.)
☒ Document published ☐ Confidential
☒ Disclosure of source code ☐ Described in a spreadsheet (ex. Excel-based)
☐ Others (Please specify)
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<tr><td>Default values</td><td>See information at https://www.epa.gov/scram/air-quality-dispersion-modeling-preferred-and-recommended-models#aermod</td></tr>
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☐ Industrial chemicals ☐ Pesticides ☒ Pollutant emission (to air, water, etc.)
☐ Land contamination ☐ Waste management ☐ Consumer product
☐ Occupational health ☐ Biocides ☐ Pharmaceuticals
☐ Contaminants in food ☐ Others (Please specify)

[Regulatory use]
- Incorporated in regulatory framework
☒ Screening assessment ☒ Higher tier assessment
☐ Assessment for substance registration by manufacturer/importer
☐ Others (Please specify)
<table><tr><td>Application examples</td><td>AERMOD was developed for use in implementing the National Ambient Air Quality Standards, and is also used in other EPA programs. It is used in the Toxic Substances Control Act (TSCA) to model exposure concentrations at user defined distances to inform exposure to general population receptors for risk evaluations where measured data are not available or needs to be supplemented https://www.epa.gov/assessing-and-managing-chemicals-under-tsca/risk-evaluations-existing-chemicals-under-tsca</td></tr></table></td></tr>
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Contact information	Organisation : United States Environmental Protection Agency Name : Tyler Fox Email address : fox.tyler@epa.gov Website :
Any other information	

If you want to lead drafting the report which summarizes the results of the survey, please tick this box ☐

If you want to participate in the discussion and review of the draft report, please tick this box ☐

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Please fill in the blanks and send back to Koki TAKAKI (koki.takaki@oecd.org)

Model descriptions	Information to be filled in
Model name	Consumer Exposure Model (CEM)
General description	The Consumer Exposure Model (CEM) estimates indoor air and dust concentrations, dermal exposure, and mouthing exposure for a variety of consumer products and materials. Inhalation, ingestion, and dermal exposures are calculated as single day doses and chronic average daily doses.
Owner	United States Environmental Protection Agency, Office of Pollution Prevention and Toxics
Website URL	https://www.epa.gov/tsca-screening-tools/approaches-estimate-consumer-exposure-under-tsca
Released/last updated	Version 2.1 last updated in 2019
Compatibility	Compatible with 2007 and 2010 version of Microsoft Office
Target substances	☒ Organic substances *(e.g. PAH, mixtures… if specified)* ☐ Inorganic substances (*Please specify (ex. Lead, Mercury)*) ☐ Others (*Please specify (ex. Organometallic substances, UVCBs)*)
Estimates exposure to:	☒ Consumers ☐ Workers ☐ General population ☒ Children

	☐ Aquatic organisms ☐ Terrestrial organisms ☐ Benthic organisms ☐ Others (*Please specify*)
Target Exposure compartments/source/routes/s	*- Exposure Source* ☐ Sources within the workplace ☐ Direct emission of Industrial chemicals to the environment from an industrial facility ☐ Use of industrial chemicals (professional workers and consumers) ☒ Use of consumer product ☐ Land contamination ☐ Waste ☐ Use of Pesticides ☐ Use of Biocides ☐ Use of Pharmaceuticals ☐ Use of Food additives ☐ Use of Feed additives ☐ Others (*Please specify*) **[Direct exposure to ☒ Consumers ☐ Workers ☐ General Public]** *- Exposure duration* ☒ Short Term exposure ☒ Long term exposure *- Exposure route* ☒ Inhalation ☒ Dermal ☒ Oral ☐ Others (*Please specify*) **[Exposure to the environment and indirect exposure to humans via the environment]** *- Exposure compartment* ☐ Air ☐ Soil ☐ Surface water ☐ Groundwater ☐ Sediment ☐ Dust *- Environmental Fate and behaviour* ☐ Environmental degradation ☐ Environmental mobility ☐ Environmental bioavailability ☐ Aquatic food web bioaccumulation ☐ Terrestrial food web bioaccumulation ☐Others (*Please specify*) *- Exposure route for indirect exposure to humans* ☐ Inhalation ☐ Dermal ☐ Ingestion ☐ Others (*Please specify*)
Other model functions	☐ Spatial distribution (Mapping) ☒ Simulate time-dependent exposure ☐ Sensitivity and Uncertainty analysis ☐ Others (*Please specify*)
Limitation and applicability	The primary application of CEM is in assessing consumer exposure under the Toxic Substances Control Act (TSCA) where measured data is unavailable or needs to be supplemented. Here are some limitations of CEM: only one chemical from one product or article category can be analyzed in a single CEM run; complex emission profiles or activity patterns of residents other than those already within CEM cannot be modelled (other models such as IECCU and/or MCCEM may be used for such scenarios); CEM is deterministic, rather than population-based; and CEM does not perform probabilistic analyses, although outputs from CEM can be used as inputs to probabilistic analyses.

<table>
<tr><td>Availability</td><td>- Availability to general public
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☐ Others (Please specify)
<table><tr><td>Relevant links</td><td>https://www.epa.gov/tsca-screening-tools/cem-consumer-exposure-model-download-and-install-instructions</td></tr></table></td></tr>
<tr><td>Data input and Confidential Business Information (CBI)</td><td>Does the information inputted into the model remain confidential to the user (i.e. stays protected and is not made available to others)? ☒ Yes ☐ No</td></tr>
<tr><td>Key references</td><td>USEPA (2011). Exposure Factors Handbook: 2011 Edition (EPA/600/R-09/052F). Washington, DC: U.S. Environmental Protection Agency
USEPA (2007). Exposure and fate assessment screening tool (E-FAST): Version 2.0, documentation manual
CEM User Guide: https://www.epa.gov/tsca-screening-tools/consumer-exposure-model-cem-version-21-users-guide</td></tr>
<tr><td>Peer review, validation or verification reference</td><td>CEM version 2.1 was peer reviewed in 2019 by external experts.</td></tr>
<tr><td>Default values</td><td>Values come from numerous sources including the Exposure Factors Handbook (USEPA 2011) and various peer reviewed literature souces. See Appendix B of CEM user guide for complete list: https://www.epa.gov/sites/default/files/2017-06/documents/cem_user_guide_appendices.pdf</td></tr>
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- Used the estimation result for risk communication by

☒ National government ☐ Local government ☐ Industry

☐ NGOs/NPOs ☐ Others (*Please specify*)

with

☒ National citizens ☐ Local residents ☐ Workers ☐ Consumers

☐ Downstream users ☐ Others (*Please specify*)

Application examples	Regulation of Chemicals under Section 6(a) of the Toxic Substances Control Act (TSCA) through existing chemical risk evaluations of high priority chemicals https://www.epa.gov/assessing-and-managing-chemicals-under-tsca/risk-evaluations-existing-chemicals-under-tsca and Section 5 of TSCA for new chemical risk evaluations https://www.epa.gov/reviewing-new-chemicals-under-toxic-substances-control-act-tsca

Contact information	Organisation :	U.S. Environmental Protection Agency
	Name :	Eva Wong
	Email address :	wong.eva@epa.gov
	Website :	https://www.epa.gov/tsca-screening-tools/approaches-estimate-consumer-exposure-under-tsca
Any other information		

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Model descriptions	Information to be filled in
Model name	Chemical Screening Tool for Exposures and Environmental Releases (ChemSTEER)
General description	The Chemical Screening Tool for Exposures and Environmental Releases (ChemSTEER) is a computer-based software program that can be used to estimate workplace exposures and environmental releases for chemicals manufactured, processed, and used in industrial/commercial settings.
Owner	United States Environmental Protection Agency (US EPA), Office of Pollution Prevention and Toxics
Website URL	https://www.epa.gov/tsca-screening-tools/chemsteer-chemical-screening-tool-exposures-and-environmental-releases
Released/last updated	Last updated in 2016 (Version 3.2)
Compatibility	Operating system - Windows XP or above
Target substances	☒ Organic substances *(e.g. PAH, mixtures… if specified)* ☒ Inorganic substances (*Please specify (ex. Lead, Mercury)*) ☒ Others Including mixtures
Estimates exposure to:	☐ Consumers ☒ Workers ☐ General population ☐ Children ☐ Aquatic organisms ☐ Terrestrial organisms ☐ Benthic organisms

	☐ Others (*Please specify*)
Target Exposure compartments/source/routes/s	- *Exposure Source* ☒ Sources within the workplace ☒ Direct emission of Industrial chemicals to the environment from an industrial facility ☒ Use of industrial chemicals (professional workers and consumers) ☐ Use of consumer product ☐ Land contamination ☐ Waste ☐ Use of Pesticides ☐ Use of Biocides ☐ Use of Pharmaceuticals ☐ Use of Food additives ☐ Use of Feed additives ☐ Others (*Please specify*) **[Direct exposure to ☐ Consumers ☒ Workers ☐ General Public]** - *Exposure duration* ☒ Short Term exposure ☒ Long term exposure - *Exposure route* ☒ Inhalation ☒ Dermal ☐ Oral ☐ Others (*Please specify*) **[Exposure to the environment and indirect exposure to humans via the environment]** - *Exposure compartment* ☐ Air ☐ Soil ☐ Surface water ☐ Groundwater ☐ Sediment ☐ Dust - *Environmental Fate and behaviour* ☐ Environmental degradation ☐ Environmental mobility ☐ Environmental bioavailability ☐ Aquatic food web bioaccumulation ☐ Terrestrial food web bioaccumulation ☐Others (*Please specify*) - *Exposure route for indirect exposure to humans* ☐ Inhalation ☐ Dermal ☐ Ingestion ☐ Others (*Please specify*)
Other model functions	☐ Spatial distribution (Mapping) ☒ Simulate time-dependent exposure ☐ Sensitivity and Uncertainty analysis ☐ Others (*Please specify*)
Limitation and applicability	A primary application is for assessing new chemicals that are submitted to EPA under Section 5 of the Toxic Substances Control Act (TSCA). ChemSTEER generates estimates for environmental releases of and worker exposures to a chemical manufactured and used in industrial and commercial operations (i.e. workplaces). ChemSTEER does not contain methods for estimating chemical exposures to the general public, to consumers, or to other species in the environment; the E-FAST model should be consulted for those exposure scenarios.
Availability	- *Availability to general public* ☒ Available (free) ☐ Licence needed ☐ Unavailable ☐ Others (*Please specify*) - *Accessibility to the model* ☐ Web-based ☒ Download via website ☐ Distributed by request ☐ Others (*Please specify*) - *Disclosure of the model description (equation/formula, parameter values, etc.)* ☒ Document published ☐ Confidential ☐ Disclosure of source code ☐ Described in a spreadsheet (ex. Excel-based) ☐ Others (*Please specify*) Relevant links: https://www.epa.gov/tsca-screening-tools/chemsteer-quick-start-guide-and-user-guide-tsca-predictive-screening-tool

Data input and Confidential Business Information (CBI)	Does the information inputted into the model remain confidential to the user (i.e. stays protected and is not made available to others)? ☐ Yes ☒ No
Key references	Please refer to the ChemSTEER User Guide for references: https://www.epa.gov/tsca-screening-tools/chemsteer-quick-start-guide-and-user-guide-tsca-predictive-screening-tool
Peer review, validation or verification reference	The methods and models in ChemSTEER have undergone internal EPA review and most have been used extensively in EPA assessments for over 10 years. Some models have been peer reviewed.
Default values	Default values are based on a variety of sources. Please refer to the ChemSTEER User Guide: https://www.epa.gov/tsca-screening-tools/chemsteer-quick-start-guide-and-user-guide-tsca-predictive-screening-tool
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Contact information	Organisation : United States Environmental Protection Agency (US EPA) Name : Ariel Hou Email address : Hou.Ariel@epa.gov

	Website :	https://www.epa.gov/tsca-screening-tools/chemsteer-chemical-screening-tool-exposures-and-environmental-releases
Any other information	EPA Technical Contacts are listed at the website provided.	

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Model name	Exposure and Fate Assessment Screening Tool (E-FAST)
General description	This tool estimates general population, consumer, and ecological exposures from environmental releases for chemicals manufactured and used in industrial/commercial settings.
Owner	United States Envirionmental Protection Agency Office of Pollution Prevention and Toxics
Website URL	https://www.epa.gov/tsca-screening-tools/e-fast-exposure-and-fate-assessment-screening-tool-version-2014
Released/last updated	(last updated in 2014)
Compatibility	*(ex. compatible with Windows 10)*
Target substances	☒ Organic substances *(e.g. PAH, mixtures… if specified)* ☒ Inorganic substances (*Please specify (ex. Lead, Mercury)*) ☐ Others (*Please specify (ex. Organometallic substances, UVCBs)*)
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Target Exposure compartments/source/routes/s	- *Exposure Source* ☐ Sources within the workplace ☐ Direct emission of Industrial chemicals to the environment from an industrial facility ☒ Use of industrial chemicals (professional workers and consumers) ☒ Use of consumer product ☒ Land contamination ☐ Waste ☐ Use of Pesticides ☐ Use of Biocides ☐ Use of Pharmaceuticals ☐ Use of Food additives ☐ Use of Feed additives ☐ Others (*Please specify*) **[Direct exposure to ☐ Consumers ☐ Workers ☐ General Public]** - *Exposure duration* ☒ Short Term exposure ☒ Long term exposure - *Exposure route* ☒ Inhalation ☒ Dermal ☒ Oral ☐ Others (*Please specify*) **[Exposure to the environment and indirect exposure to humans via the environment]** - *Exposure compartment* ☒ Air ☒ Soil ☒ Surface water ☒ Groundwater ☐ Sediment ☐ Dust - *Environmental Fate and behaviour* ☐ Environmental degradation ☐ Environmental mobility ☐ Environmental bioavailability ☐ Aquatic food web bioaccumulation ☐ Terrestrial food web bioaccumulation ☐Others (*Please specify*) - *Exposure route for indirect exposure to humans* ☒ Inhalation ☒ Dermal ☒ Ingestion ☐ Others (*Please specify*)
Other model functions	☐ Spatial distribution (Mapping) ☒ Simulate time-dependent exposure ☐ Sensitivity and Uncertainty analysis ☐ Others (*Please specify*)
Limitation and applicability	A primary application of E-FAST (2014) is to assess general population exposure and aquatic environmental exposure and risk resulting from industrial releases, the user enters: amount of chemical releases; media of release; days per year of release; certain chemical properties; where possible, detailed release location data; if no detailed location data is available, generic industry codes can be applied. E-FAST is used to assess exposure to new chemicals under Section 5 of the Toxic Substances Control Act (TSCA) where measured data are not available or need to be supplemented.
Availability	- *Availability to general public* ☒ Available (free) ☐ Licence needed ☐ Unavailable ☐ Others (*Please specify*) - *Accessibility to the model* ☐ Web-based ☒ Download via website ☐ Distributed by request ☐ Others (*Please specify*) - *Disclosure of the model description (equation/formula, parameter values, etc.)* ☒ Document published ☐ Confidential ☐ Disclosure of source code ☐ Described in a spreadsheet (ex. Excel-based) ☐ Others (*Please specify*) Relevant links: https://www.epa.gov/tsca-screening-tools/e-fast-exposure-and-fate-assessment-screening-tool-version-2014

Data input and Confidential Business Information (CBI)	Does the information inputted into the model remain confidential to the user (i.e. stays protected and is not made available to others)? ☒ Yes ☐ No
Key references	See information at https://www.epa.gov/tsca-screening-tools/e-fast-exposure-and-fate-assessment-screening-tool-version-2014
Peer review, validation or verification reference	The consumer portions of E-FAST have been peer reviewed by experts outside EPA, and EPA has developed E-FAST 2014 based on the external peer review for the general population, down-the-drain, environmental exposure and risk aspects of E-FAST.
Default values	E-FAST (2014) is appropriate to assess potential exposures from chemical discharges to air (stack or fugitive releases), surface water, or land. E-FAST (2014) can also be used to estimate potential inhalation and dermal exposures to consumer products, such as hard surface cleaners, soaps, air fresheners, paints, gasoline, and motor oil. Default values included in E-FAST are updated by the model user as appropriate.
Application and use for regulatory purpose	**[Regulatory field (Exposure source)]** ☒ Industrial chemicals ☐ Pesticides ☒ Pollutant emission (to air, water, etc.) ☒ Land contamination ☐ Waste management ☒ Consumer product ☐ Occupational health ☐ Biocides ☐ Pharmaceuticals ☐ Contaminants in food ☐ Others (*Please specify*) **[Regulatory use]** *- Incorporated in regulatory framework* ☒ Screening assessment ☐ Higher tier assessment ☒ Assessment for substance registration by manufacturer/importer ☐ Others (*Please specify*) Application examples: https://www.epa.gov/reviewing-new-chemicals-under-toxic-substances-control-act-tsca *- Supports decision making for* ☒ National government ☐ Local government ☐ Industry ☐ Others (*Please specify*)

	Application examples	https://www.epa.gov/reviewing-new-chemicals-under-toxic-substances-control-act-tsca
	- Used the estimation result for risk communication by ☒ National government ☐ Local government ☐ Industry ☐ NGOs/NPOs ☐ Others (*Please specify*) *with* ☒ National citizens ☐ Local residents ☐ Workers ☐ Consumers ☐ Downstream users ☐ Others (*Please specify*)	
	Application examples	https://www.epa.gov/reviewing-new-chemicals-under-toxic-substances-control-act-tsca
Contact information	Organisation : Name : Email address : Website :	United States Environmental Protection Agency Office of Pollution Prevention and Toxics Eva Wong and Nathan Mottl Wong.eva@epa.gov Mottl.Nathan@epa.gov https://www.epa.gov/tsca-screening-tools/e-fast-exposure-and-fate-assessment-screening-tool-version-2014
Any other information		

If you want to lead drafting the report which summarizes the results of the survey, please tick this box ☒

If you want to participate in the discussion and review of the draft report, please tick this box ☒

OECD Working Party on Exposure Assessment (WPEA)
Survey on Exposure Assessment Models used in a Regulatory Context

Scope and Objective

This survey is aimed at gathering information from your chemical regulation program on the application and use of Exposure models as an update of the previous survey (ENV/JM/MONO(2012)37) conducted a decade ago. It intends to list and classify exposure assessment models as well as the example of the application and use of those models in regulatory contexts. The survey is also aimed at identifying the applicability and limitation of the model to be used in a regulatory context. After the analysis of the survey result, an OECD report will be prepared to be published.

The scope of the application and use example in regulatory context includes that regulatory bodies use the exposure models to conduct a risk assessment of chemicals, incorporate the use of exposure models into their regulatory schemes, and use the estimation results of exposure models for decision making. Also, this scope can be expanded to the use in risk communication, i.e., the estimation results are used as communication tools between local government and residents and so on.

The scope of exposure models in this survey is about computational models which simulate (whether fully or partially) chemical fate and behaviours in the environment and exposures from sources to targets (human or organisms) including (multi)media models (e.g., environmental fate and transport models), consumer exposure models, and worker exposure models. Models estimating physicochemical property, estimating internal exposure such as skin absorption and PBPK models, and databases and scenario documents are thus beyond the focus of this survey.

In terms of the target substances, both organic and inorganic substances are included (see the questionnaire in detail), while nanomaterials are excluded in this study as the OECD WPMN is currently conducting a thorough study on the exposure models developed specifically for the assessment of nanomaterials.

By the outcome of the present survey, we hope to facilitate the appropriate use and application of exposure models.

Please fill in the blanks and send back to Koki TAKAKI (koki.takaki@oecd.org)

Model descriptions	Information to be filled in
Model name	**Indoor Environment Concentration in Buildings with Conditioned and Unconditioned Zones (IECCU)**
General description	IECCU is a simulation program which can be used as (1) a general-purpose indoor exposure model in buildings with multiple zones, multiple chemicals and multiple sources and sinks or (2) as a special purpose concentration model for simulating the effects of sources in unconditioned zones on the indoor environmental concentrations in conditioned zones.
Owner	United States Environmental Protection Agency Office of Pollution Prevention and Toxics
Website URL	https://www.epa.gov/tsca-screening-tools/approaches-estimate-consumer-exposure-under-tsca
Released/last updated	2017
Compatibility	*(ex. compatible with Windows 10)*
Target substances	☐ Organic substances *(e.g. PAH, mixtures… if specified)* ☐ Inorganic substances (*Please specify (ex. Lead, Mercury)*)

	☒ Others SVOCs, Spray Polyurethane Foam, some reactive mixtures
Estimates exposure to:	☒ Consumers ☒ Workers ☐ General population ☒ Children ☐ Aquatic organisms ☐ Terrestrial organisms ☐ Benthic organisms ☐ Others (*Please specify*)
Target Exposure compartments/source/routes/s	- *Exposure Source* ☐ Sources within the workplace ☐ Direct emission of Industrial chemicals to the environment from an industrial facility ☐ Use of industrial chemicals (professional workers and consumers) ☒ Use of consumer product ☐ Land contamination ☐ Waste ☐ Use of Pesticides ☐ Use of Biocides ☐ Use of Pharmaceuticals ☐ Use of Food additives ☐ Use of Feed additives ☐ Others (*Please specify*) **[Direct exposure to ☒ Consumers ☐ Workers ☐ General Public]** - *Exposure duration* ☒ Short Term exposure ☒ Long term exposure - *Exposure route* ☒ Inhalation ☐ Dermal ☐ Oral ☐ Others (*Please specify*) **[Exposure to the environment and indirect exposure to humans via the environment]** - *Exposure compartment* ☒ Air ☐ Soil ☐ Surface water ☐ Groundwater ☐ Sediment ☒ Dust - *Environmental Fate and behaviour* ☐ Environmental degradation ☐ Environmental mobility ☐ Environmental bioavailability ☐ Aquatic food web bioaccumulation ☐ Terrestrial food web bioaccumulation ☐Others (*Please specify*) - *Exposure route for indirect exposure to humans* ☒ Inhalation ☐ Dermal ☐ Ingestion ☐ Others (*Please specify*)
Other model functions	☐ Spatial distribution (Mapping) ☐ Simulate time-dependent exposure ☐ Sensitivity and Uncertainty analysis ☐ Others (*Please specify*)
Limitation and applicability	IECCU was developed to support exposure assessments for SVOCs, Spray Polyurethane Foam, some reactive mixtures
Availability	- *Availability to general public* ☒ Available (free) ☐ Licence needed ☐ Unavailable ☐ Others (*Please specify*) - *Accessibility to the model* ☐ Web-based ☒ Download via website ☐ Distributed by request ☐ Others (*Please specify*) - *Disclosure of the model description (equation/formula, parameter values, etc.)* ☒ Document published ☐ Confidential ☐ Disclosure of source code ☐ Described in a spreadsheet (ex. Excel-based) ☐ Others (*Please specify*) Relevant links: https://www.epa.gov/tsca-screening-tools/approaches-estimate-consumer-exposure-under-tsca

Data input and Confidential Business Information (CBI)	Does the information inputted into the model remain confidential to the user (i.e. stays protected and is not made available to others)? ☒ Yes ☐ No
Key references	See documentation at https://www.epa.gov/sites/default/files/2017-06/documents/ieccu_questions_and_answers.pdf
Peer review, validation or verification reference	An external (i.e., by scientists outside of EPA) peer review of IECCU was conducted in 2016. Beta-testing was also conducted in 2016 and 2017. Revisions to the model in response to the peer reviewers' comments were completed in 2017.
Default values	IECCU currently does not provide default values for input parameters. It is therefore the user's responsibility to choose appropriate moeling inputs for the chemical and exposure scenario of interest. Model inputs may be derived from empirical data or modeled estimates.
Application and use for regulatory purpose	**[Regulatory field (Exposure source)]** ☐ Industrial chemicals ☐ Pesticides ☐ Pollutant emission (to air, water, etc.) ☐ Land contamination ☐ Waste management ☒ Consumer product ☐ Occupational health ☐ Biocides ☐ Pharmaceuticals ☐ Contaminants in food ☐ Others (*Please specify*) **[Regulatory use]** *- Incorporated in regulatory framework* ☐ Screening assessment ☒ Higher tier assessment ☐ Assessment for substance registration by manufacturer/importer ☐ Others (*Please specify*) Application examples: Regulation of Chemicals under Section 6(a) of the Toxic Substances Control Act (TSCA) through existing chemical risk evaluations of high priority chemicals https://www.epa.gov/assessing-and-managing-chemicals-under-tsca/risk-evaluations-existing-chemicals-under-tsca and Section 5 of TSCA for new chemical risk evaluations https://www.epa.gov/reviewing-new-chemicals-under-toxic-substances-control-act-tsca, as appropriate. *- Supports decision making for* ☐ National government ☐ Local government ☐ Industry ☐ Others (*Please specify*) Application examples: Regulation of Chemicals under Section 6(a) of the Toxic Substances Control Act (TSCA) through existing chemical risk evaluations of high priority chemicals https://www.epa.gov/assessing-and-managing-chemicals-under-tsca/risk-evaluations-existing-chemicals-under-tsca and Section 5 of TSCA for new chemical risk evaluations https://www.epa.gov/reviewing-new-chemicals-under-toxic-substances-control-act-tsca, as appropriate. *- Used the estimation result for risk communication by*

	☒ National government ☐ Local government ☐ Industry ☐ NGOs/NPOs ☐ Others (*Please specify*) *with* ☒ National citizens ☐ Local residents ☐ Workers ☐ Consumers ☐ Downstream users ☐ Others (*Please specify*) Application examples: Regulation of Chemicals under Section 6(a) of the Toxic Substances Control Act (TSCA) through existing chemical risk evaluations of high priority chemicals https://www.epa.gov/assessing-and-managing-chemicals-under-tsca/risk-evaluations-existing-chemicals-under-tsca and Section 5 of TSCA for new chemical risk evaluations https://www.epa.gov/reviewing-new-chemicals-under-toxic-substances-control-act-tsca, as appropriate.	
Contact information	Organisation : Name : Email address : Website :	U.S. Environmental Protection Agency, Office of Pollution Prevention and Toxics Cathy Fehrenbacher Fehrenbacher.cathy@epa.gov https://www.epa.gov/tsca-screening-tools/approaches-estimate-consumer-exposure-under-tsca
Any other information		

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OECD Working Party on Exposure Assessment (WPEA)
Survey on Exposure Assessment Models used in a Regulatory Context

Scope and Objective

This survey is aimed at gathering information from your chemical regulation program on the application and use of Exposure models as an update of the previous survey (ENV/JM/MONO(2012)37) conducted a decade ago. It intends to list and classify exposure assessment models as well as the example of the application and use of those models in regulatory contexts. The survey is also aimed at identifying the applicability and limitation of the model to be used in a regulatory context. After the analysis of the survey result, an OECD report will be prepared to be published.

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The scope of exposure models in this survey is about computational models which simulate (whether fully or partially) chemical fate and behaviours in the environment and exposures from sources to targets (human or organisms) including (multi)media models (e.g., environmental fate and transport models), consumer exposure models, and worker exposure models. Models estimating physicochemical property, estimating internal exposure such as skin absorption and PBPK models, and databases and scenario documents are thus beyond the focus of this survey.

In terms of the target substances, both organic and inorganic substances are included (see the questionnaire in detail), while nanomaterials are excluded in this study as the OECD WPMN is currently conducting a thorough study on the exposure models developed specifically for the assessment of nanomaterials.

By the outcome of the present survey, we hope to facilitate the appropriate use and application of exposure models.

Please fill in the blanks and send back to Koki TAKAKI (koki.takaki@oecd.org)

Model descriptions	Information to be filled in
Model name	Integrated Indoor-Outdoor Air Calculator (IIOAC)
General description	IIOAC is a user-friendly Excel-tool based on EPA's AERMOD for use in assessing releases to air and exposure potential for new and existing chemicals.
Owner	Eva Wong, U.S. EPA U.S. Environmental Protection Agency Office of Pollution Prevention and Toxic Risk Assessment Division (7403M) 1200 Pennsylvania Avenue, N.W. Washington, DC 20460 E-mail: wong.eva@epa.gov
Website URL	https://www.epa.gov/tsca-screening-tools/iioac-integrated-indoor-outdoor-air-calculator
Released/last updated	Released in March 2019
Compatibility	Compatible with Windows OS and MS Excel 2010 or later
Target substances	☒ Organic substances *(e.g. PAH, mixtures… if specified)*

	☒ Inorganic substances (*Please specify (ex. Lead, Mercury)*) ☐ Others (*Please specify (ex. Organometallic substances, UVCBs)*)
Estimates exposure to:	☐ Consumers ☐ Workers ☒ General population ☒ Children ☐ Aquatic organisms ☐ Terrestrial organisms ☐ Benthic organisms ☒ Others Based on the user inputs, the tool will automatically calculate and display, for each emission scenario and at predefined receptor distances, particle deposition to surfaces.
Target Exposure compartments/source/routes/s	- *Exposure Source* ☐ Sources within the workplace ☒ Direct emission of Industrial chemicals to the environment from an industrial facility ☐ Use of industrial chemicals (professional workers and consumers) ☐ Use of consumer product ☐ Land contamination ☐ Waste ☐ Use of Pesticides ☐ Use of Biocides ☐ Use of Pharmaceuticals ☐ Use of Food additives ☐ Use of Feed additives ☐ Others (*Please specify*) **[Direct exposure to ☐ Consumers ☐ Workers ☒ General Public]** - *Exposure duration* ☒ Short Term exposure ☒ Long term exposure - *Exposure route* ☒ Inhalation ☐ Dermal ☐ Oral ☐ Others (*Please specify*) **[Exposure to the environment and indirect exposure to humans via the environment]** - *Exposure compartment* ☒ Air ☒ Soil ☒ Surface water ☐ Groundwater ☐ Sediment ☐ Dust - *Environmental Fate and behaviour* ☐ Environmental degradation ☒ Environmental mobility ☐ Environmental bioavailability ☐ Aquatic food web bioaccumulation ☐ Terrestrial food web bioaccumulation ☐Others (*Please specify*) - *Exposure route for indirect exposure to humans* ☒ Inhalation ☐ Dermal ☐ Ingestion ☒ Others Deposition
Other model functions	☐ Spatial distribution (Mapping) ☒ Simulate time-dependent exposure ☐ Sensitivity and Uncertainty analysis ☐ Others (*Please specify*)
Limitation and applicability	The IIOAC model was developed for us in the Toxic Substances Control Act (TSCA) where measured data are limited or need to be supplemented. The IIOAC model is based on pre-run AERMOD scenarios and results; and therefore, the user is unable to change certain parameters such as distance to the general population (i.e., closer than fenceline). The user is referred to AERMOD if additional flexibility or specificity is needed for modeling exposures.

Availability	- *Availability to general public* ☒ Available (free) ☐ Licence needed ☐ Unavailable ☐ Others (*Please specify*) - *Accessibility to the model* ☐ Web-based ☒ Download via website ☐ Distributed by request ☐ Others (*Please specify*) - *Disclosure of the model description (equation/formula, parameter values, etc.)* ☐ Document published ☐ Confidential ☐ Disclosure of source code ☐ Described in a spreadsheet (ex. Excel-based) ☐ Others (*Please specify*) Relevant links:
Data input and Confidential Business Information (CBI)	Does the information inputted into the model remain confidential to the user (i.e. stays protected and is not made available to others)? ☒ Yes ☐ No
Key references	
Peer review, validation or verification reference	IIOAC is a tool based on EPA's AERMOD. AERMOD is EPA's recommended air dispersion model and has been subject to peer review and model evaluation See information at: https://www.epa.gov/tsca-screening-tools/iioac-integrated-indoor-outdoor-air-calculator#review
Default values	Default release duration is 24 hours for all source types, and default values are conservative (protective). Climate regions and locations are all within the United States. The user has the option of selecting release durations of 1, 4, and 8 hours for point (stack, incinerators) and fugitive sources. See more info https://www.epa.gov/sites/default/files/2018-09/documents/getting_started_guide_integrated_indoor_outdoor_air_calculator.pdf
Application and use for regulatory purpose	**[Regulatory field (Exposure source)]** ☒ Industrial chemicals ☐ Pesticides ☒ Pollutant emission (to air, water, etc.) ☐ Land contamination ☐ Waste management ☐ Consumer product ☐ Occupational health ☐ Biocides ☐ Pharmaceuticals ☐ Contaminants in food ☐ Others (*Please specify*) **[Regulatory use]** - *Incorporated in regulatory framework* ☒ Screening assessment ☒ Higher tier assessment ☐ Assessment for substance registration by manufacturer/importer ☐ Others (*Please specify*) Application examples: https://www.epa.gov/reviewing-new-chemicals-under-toxic-substances-control-act-tsca

<table>
<tr><td></td><td>- Supports decision making for
☒ National government ☐ Local government ☐ Industry
☐ Others (Please specify)
<table><tr><td>Application examples</td><td>https://www.epa.gov/reviewing-new-chemicals-under-toxic-substances-control-act-tsca</td></tr></table>
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☒ National government ☐ Local government ☐ Industry
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<table><tr><td>Application examples</td><td>https://www.epa.gov/reviewing-new-chemicals-under-toxic-substances-control-act-tsca</td></tr></table></td></tr>
<tr><td>Contact information</td><td>Organisation :

Name :

Email address :

Website :</td><td>U.S. Environmental Protection Agency, Office of Pollution Prevention and Toxics

Liz Childs

Childs.Elizabeth@epa.gov

https://www.epa.gov/tsca-screening-tools/iioac-integrated-indoor-outdoor-air-calculator</td></tr>
<tr><td>Any other information</td><td colspan="2"></td></tr>
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OECD Working Party on Exposure Assessment (WPEA)
Survey on Exposure Assessment Models used in a Regulatory Context

Scope and Objective

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By the outcome of the present survey, we hope to facilitate the appropriate use and application of exposure models.

Please fill in the blanks and send back to Koki TAKAKI (koki.takaki@oecd.org)

Model descriptions	Information to be filled in
Model name	Multi- Chamber Concentration and Exposure Model (MCCEM) version 1.2 (via Internet Geographical Exposure Modeling System (IGEMS))
General description	MCCEM estimates average and peak indoor air concentrations of chemicals released from products or materials in houses, apartments, townhouses, or other residences.
Owner	U.S. Environmental Protection Agency Office of Pollution Prevention and Toxics
Website URL	https://www.epa.gov/tsca-screening-tools/igemscsm-internet-geographical-exposure-modeling-systemchemical-safety-mapper
Released/last updated	February 2001/ Transitioned to IGEMS 2018.
Compatibility	Web platform
Target substances	☒ Organic substances *(e.g. PAH, mixtures… if specified)* ☐ Inorganic substances (*Please specify (ex. Lead, Mercury)*) ☐ Others (*Please specify (ex. Organometallic substances, UVCBs)*)
Estimates exposure to:	☒ Consumers ☐ Workers ☒ General population ☒ Children ☐ Aquatic organisms ☐ Terrestrial organisms ☐ Benthic organisms

	☒ Others bystanders
Target Exposure compartments/source/routes/s	- *Exposure Source* ☐ Sources within the workplace ☐ Direct emission of Industrial chemicals to the environment from an industrial facility ☒ Use of industrial chemicals (professional workers and consumers) ☒ Use of consumer product ☐ Land contamination ☐ Waste ☐ Use of Pesticides ☐ Use of Biocides ☐ Use of Pharmaceuticals ☐ Use of Food additives ☐ Use of Feed additives ☐ Others (*Please specify*) **[Direct exposure to ☒ Consumers ☐ Workers ☐ General Public]** - *Exposure duration* ☒ Short Term exposure ☒ Long term exposure - *Exposure route* ☒ Inhalation ☐ Dermal ☐ Oral ☐ Others (*Please specify*) **[Exposure to the environment and indirect exposure to humans via the environment]** - *Exposure compartment* ☐ Air ☐ Soil ☐ Surface water ☐ Groundwater ☐ Sediment ☐ Dust - *Environmental Fate and behaviour* ☐ Environmental degradation ☐ Environmental mobility ☐ Environmental bioavailability ☐ Aquatic food web bioaccumulation ☐ Terrestrial food web bioaccumulation ☐Others (*Please specify*) - *Exposure route for indirect exposure to humans* ☐ Inhalation ☐ Dermal ☐ Ingestion ☐ Others (*Please specify*)
Other model functions	☐ Spatial distribution (Mapping) ☒ Simulate time-dependent exposure ☐ Sensitivity and Uncertainty analysis ☐ Others (*Please specify*)
Limitation and applicability	The MCCEM model was developed for application in the Toxic Substances Control Act (TSCA) where measured data are limited or need to be supplemented. The data libraries contained in MCCEM are limited to residential settings; however, the model can be used to assess other indoor environments (e.g. schools, offices) if the user supplies the necessary inputs.
Availability	- *Availability to general public* ☒ Available (free) ☐ Licence needed ☐ Unavailable ☐ Others (*Please specify*) - *Accessibility to the model* ☒ Web-based ☐ Download via website ☐ Distributed by request ☐ Others (*Please specify*) - *Disclosure of the model description (equation/formula, parameter values, etc.)* ☐ Document published ☐ Confidential ☐ Disclosure of source code ☐ Described in a spreadsheet (ex. Excel-based) ☐ Others (*Please specify*) Relevant links: https://ofmpub.epa.gov/igems-jsp/homeAction.do
Data input and Confidential Business Information (CBI)	Does the information inputted into the model remain confidential to the user (i.e. stays protected and is not made available to others)? ☒ Yes ☐ No

Key references	Koontz, MD, and Nagda, NL, 1991, "A Multichamber Model for Assessing Consumer Inhalation Exposure," Indoor Air, Vol. 4, pp 593-605.
Peer review, validation or verification reference	Described in the peer-reviewed literature (Koontz and Nagda, 1991)
Default values	Default values are included within the model where appropriate; the user provides additional input values as needed. https://www.epa.gov/sites/default/files/2015-09/documents/mccem_questions_and_answers_0.pdf
Application and use for regulatory purpose	**[Regulatory field (Exposure source)]** ☒ Industrial chemicals ☐ Pesticides ☒ Pollutant emission (to air, water, etc.) ☐ Land contamination ☐ Waste management ☒ Consumer product ☐ Occupational health ☐ Biocides ☐ Pharmaceuticals ☐ Contaminants in food ☐ Others (*Please specify*) **[Regulatory use]** *- Incorporated in regulatory framework* ☐ Screening assessment ☒ Higher tier assessment ☐ Assessment for substance registration by manufacturer/importer ☐ Others (*Please specify*) Application examples: Regulation of Chemicals under Section 6(a) of the Toxic Substances Control Act through existing chemical risk evaluations of high priority chemicals. *- Supports decision making for* ☒ National government ☐ Local government ☐ Industry ☐ Others (*Please specify*) Application examples: Regulation of Chemicals under Section 6(a) of the Toxic Substances Control Act through existing chemical risk evaluations of high priority chemicals. https://www.epa.gov/assessing-and-managing-chemicals-under-tsca/risk-evaluations-existing-chemicals-under-tsca *- Used the estimation result for risk communication by* ☒ National government ☐ Local government ☐ Industry ☐ NGOs/NPOs ☐ Others (*Please specify*) *with* ☐ National citizens ☐ Local residents ☐ Workers ☐ Consumers ☐ Downstream users ☐ Others (*Please specify*) Application examples: Regulation of Chemicals under Section 6(a) of the Toxic Substances Control Act through existing chemical risk evaluations of high priority chemicals. https://www.epa.gov/assessing-and-managing-chemicals-under-tsca/risk-evaluations-existing-chemicals-under-tsca

Contact information	Organisation : Name : Email address : Website :	U.S. EPA's Office of Pollution Prevention and Toxics Wen-Hsiung Lee lee.wen-hsiung@epa.gov https://www.epa.gov/tsca-screening-tools/multi-chamber-concentration-and-exposure-model-mccem-version-12
Any other information		

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The scope of exposure models in this survey is about computational models which simulate (whether fully or partially) chemical fate and behaviours in the environment and exposures from sources to targets (human or organisms) including (multi)media models (e.g., environmental fate and transport models), consumer exposure models, and worker exposure models. Models estimating physicochemical property, estimating internal exposure such as skin absorption and PBPK models, and databases and scenario documents are thus beyond the focus of this survey.

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By the outcome of the present survey, we hope to facilitate the appropriate use and application of exposure models.

Please fill in the blanks and send back to Koki TAKAKI (koki.takaki@oecd.org)

Model descriptions	Information to be filled in
Model name	Point Source Calculator (PSC) v1.05
General description	The Point Source Calculator (PSC) is a tool designed to estimate acute and chronic concentrations of chemicals directly applied to water bodies. Waterbodies may include flowing waters like streams and river segments and more static waters like lakes and ponds. Direct applications of chemical may be simulated in a flexible manner from simple to complex repetitive events or as completely unique daily events defined on a daily scale. The PSC is a graphical user interface which gathers the user's inputs and runs USEPA's Variable Volume Water Model (VVWM). Required inputs are the same as those for the VVWM, but the PSC graphical interface facilitates user interaction for the direct-application problem. Post processing of the PSC is also relevant to the direct-application problem and includes the ability to analyze concentrations in comparison to target concentrations of concern (CoC), including number of days above the CoC and number of consecutive days above the CoC.
Owner	U.S. Environmental Protection Agency; Office of Pesticide Programs
Website URL	https://www.epa.gov/tsca-screening-tools/point-source-calculator-version-105-psc-v105

Released/last updated	Updated in 2019
Compatibility	PSC v.1.05 is a stand-alone executable file programmed with Visual Basic and Fortran, and it is compatible with Windows 10 versions of Microsoft.
Target substances	☒ Organic substances *(e.g. PAH, mixtures… if specified)* ☒ Inorganic substances (*Please specify (ex. Lead, Mercury)*) ☐ Others (*Please specify (ex. Organometallic substances, UVCBs)*)
Estimates exposure to:	☐ Consumers ☐ Workers ☒ General population ☐ Children ☒ Aquatic organisms ☐ Terrestrial organisms ☒ Benthic organisms ☐ Others (*Please specify*)
Target Exposure compartments/source/routes/s	- *Exposure Source* ☐ Sources within the workplace ☐ Direct emission of Industrial chemicals to the environment from an industrial facility ☐ Use of industrial chemicals (professional workers and consumers) ☐ Use of consumer product ☐ Land contamination ☐ Waste ☐ Use of Pesticides ☐ Use of Biocides ☐ Use of Pharmaceuticals ☐ Use of Food additives ☐ Use of Feed additives ☐ Others (*Please specify*) **[Direct exposure to ☐ Consumers ☐ Workers ☐ General Public]** - *Exposure duration* ☐ Short Term exposure ☐ Long term exposure - *Exposure route* ☐ Inhalation ☐ Dermal ☐ Oral ☐ Others (*Please specify*) **[Exposure to the environment and indirect exposure to humans via the environment]** - *Exposure compartment* ☐ Air ☐ Soil ☒ Surface water ☐ Groundwater ☒ Sediment ☐ Dust - *Environmental Fate and behaviour* ☒ Environmental degradation ☐ Environmental mobility ☐ Environmental bioavailability ☐ Aquatic food web bioaccumulation ☐ Terrestrial food web bioaccumulation ☐Others (*Please specify*) - *Exposure route for indirect exposure to humans* ☐ Inhalation ☐ Dermal ☐ Ingestion ☐ Others (*Please specify*)
Other model functions	☐ Spatial distribution (Mapping) ☒ Simulate time-dependent exposure ☐ Sensitivity and Uncertainty analysis ☐ Others (*Please specify*)
Limitation and applicability	PSC v1.05 is a higher tier model that requires more inputs for performing an exposure assessment. The model allows for estimation of sediment exposures and could be used in risk assessment for benthic organisms. The PSC v1.05 model also may be useful for evaluating chemicals that partition strongly to air or sediment when the E-FAST's assumption that all of the chemical remains in the water is simplistic for the exposure assessments.

<table>
<tr><td>Availability</td><td>- Availability to general public
☒ Available (free) ☐ Licence needed ☐ Unavailable ☐ Others (Please specify)
- Accessibility to the model
☐ Web-based ☒ Download via website ☐ Distributed by request
☐ Others (Please specify)
- Disclosure of the model description (equation/formula, parameter values, etc.)
☒ Document published ☐ Confidential
☐ Disclosure of source code ☐ Described in a spreadsheet (ex. Excel-based)
☐ Others (Please specify)
<table><tr><td>Relevant links</td><td>Model landing page and download page:
https://www.epa.gov/tsca-screening-tools/point-source-calculator-version-105-psc-v105#install

Users Guide:
https://www.epa.gov/tsca-screening-tools/psc-v105-manual-and-user-guide</td></tr></table></td></tr>
<tr><td>Data input and Confidential Business Information (CBI)</td><td>Does the information inputted into the model remain confidential to the user (i.e. stays protected and is not made available to others)? ☒ Yes ☐ No</td></tr>
<tr><td>Key references</td><td>Young, D.F. 2014. The Variable Volume Water Model, EPA-734-F-14-003, United States EPA Washington DC.</td></tr>
<tr><td>Peer review, validation or verification reference</td><td>An external peer review was completed in 2004 for the Variable Volume Water Model that serves as foundation of the PSC model.</td></tr>
<tr><td>Default values</td><td>Default values are available in the users guide
https://www.epa.gov/sites/default/files/2019-06/documents/point_source_calculator_13_june_2019.ver_.2_clean.pdf</td></tr>
<tr><td>Application and use for regulatory purpose</td><td>[Regulatory field (Exposure source)]
☒ Industrial chemicals ☒ Pesticides ☒ Pollutant emission (to air, water, etc.)
☐ Land contamination ☐ Waste management ☐ Consumer product
☐ Occupational health ☐ Biocides ☐ Pharmaceuticals
☐ Contaminants in food ☐ Others (Please specify)

[Regulatory use]
- Incorporated in regulatory framework
☐ Screening assessment ☒ Higher tier assessment
☐ Assessment for substance registration by manufacturer/importer
☐ Others (Please specify)
<table><tr><td>Application examples</td><td>Indicate relevant chapters of legislations and/or guidance documents with links and brief descriptions</td></tr></table>
- Supports decision making for
☒ National government ☐ Local government ☐ Industry
☐ Others (Please specify)</td></tr>
</table>

	Application examples	*Indicate relevant reports or website with links and brief descriptions*
	- Used the estimation result for risk communication by ☒ National government ☐ Local government ☐ Industry ☐ NGOs/NPOs ☐ Others (*Please specify*) *with* ☒ National citizens ☐ Local residents ☐ Workers ☐ Consumers ☐ Downstream users ☐ Others (*Please specify*)	
	Application examples	*Indicate relevant reports or website with links and brief descriptions*
Contact information	Organisation : Name : Email address : Website :	Dirk F. Young U.S. Environmental Protection Agency Office of Pesticides Program Environmental and Fate Effects Division Young.dirk@epa.gov https://www.epa.gov/tsca-screening-tools/point-source-calculator-version-105-psc-v105
Any other information		

If you want to lead drafting the report which summarizes the results of the survey, please tick this box ☐

If you want to participate in the discussion and review of the draft report, please tick this box ☐

OECD Working Party on Exposure Assessment (WPEA)
Survey on Exposure Assessment Models used in a Regulatory Context

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Please fill in the blanks and send back to Koki TAKAKI (koki.takaki@oecd.org)

Model descriptions	Information to be filled in
Model name	EPA's Risk-Screening Environmental Indicators (RSEI) Model
General description	EPA's Risk-Screening Environmental Indicators (RSEI) is a geographically-based, multi-media model that helps policy makers, researchers, and communities quickly analyze large amounts of data on toxic chemicals from Toxics Release Inventory (TRI) reporting facilties. RSEI incorporates information from EPA's TRI database, which tracks certain toxic chemical releases and waste management activities at federal facilities and larger industrial facilities across the United States. RSEI incorporates over 30 years of TRI chemical release data, three U.S. censuses, toxicity and physicochemical properties for more than 400 chemicals, and geographical information for more than 50,000 facilities and thousands of streams and other waterbodies. All of this information is used to model and map the environmental fate and transport of each toxic chemical release through the environment and the potential human exposure that may result. The RSEI model then calculates numeric results that are designed to be compared to other RSEI model generated results. These RSEI results are designed to help users contextualize, understand, and better communicate the relative hazard and potential for risks posed by

	certain waste management activities of TRI chemicals (e.g., from releases to the environment). RSEI results and custom analyses can be used for screening level activities such as trend analyses that compare potential relative risks from year to year, or for prioritizing toxic chemicals, industry sectors, or geographic regions for strategic planning. RSEI can also be used in conjunction with other data sources and environmental information, to help policy makers, researchers, and communities establish priorities for further investigation and to look at changes in potential human health impacts over time.
Owner	U.S. Environmental Protection Agency (U.S. EPA)
Website URL	https://www.epa.gov/rsei
Released/last updated	RSEI Version 2.3.9 released January 2021
Compatibility	Windows and RSEI results accessible through internet browser
Target substances	☒ Organic substances *(e.g. PAH, mixtures… if specified)* ☒ Inorganic substances (*Please specify (ex. Lead, Mercury)*) ☒ Others (Models Toxics Release Inventory (TRI)-listed chemicals and chemical categories
Estimates exposure to:	☐ Consumers ☐ Workers ☒ General population ☐ Children ☐ Aquatic organisms ☐ Terrestrial organisms ☐ Benthic organisms ☐ Others (*Please specify*)
Target Exposure compartments/source/routes/s	- *Exposure Source* ☐ Sources within the workplace ☒ Direct emission of Industrial chemicals to the environment from an industrial facility ☐ Use of industrial chemicals (professional workers and consumers) ☐ Use of consumer product ☐ Land contamination ☐ Waste ☐ Use of Pesticides ☐ Use of Biocides ☐ Use of Pharmaceuticals ☐ Use of Food additives ☐ Use of Feed additives ☒ Others Certain waste management activities from transfers of the toxic chemical in waste to off-site locations. **[Direct exposure to ☐ Consumers ☐ Workers ☒ General Public]** - *Exposure duration* ☐ Short Term exposure ☒ Long term exposure - *Exposure route* ☒ Inhalation ☐ Dermal ☒ Oral ☐ Others (*Please specify*) **[Exposure to the environment and indirect exposure to humans via the environment]** - *Exposure compartment* ☒ Air ☐ Soil ☒ Surface water ☐ Groundwater ☐ Sediment ☐ Dust - *Environmental Fate and behaviour* ☒ Environmental degradation ☒ Environmental mobility ☒ Environmental bioavailability ☐ Aquatic food web bioaccumulation ☐ Terrestrial food web bioaccumulation ☐Others (*Please specify*) - *Exposure route for indirect exposure to humans* ☒ Inhalation ☐ Dermal ☒ Ingestion ☐ Others (*Please specify*)
Other model functions	☒ Spatial distribution (Mapping) ☐ Simulate time-dependent exposure ☐ Sensitivity and Uncertainty analysis ☐ Others (*Please specify*)

Limitation and applicability	RSEI is a screening-level model and uses worst-case assumptions about toxicity and potential exposure where data are lacking, and simplifying assumptions to reduce the complexity of the calculations. All RSEI results should be followed up with additional analyses and assessment before drawing conclusions or making decisions about the potential health impacts and/or risks posed to any particular population. RSEI does not produce a risk assessment, nor can RSEI results be used to determine whether a facility is in compliance with federal or state regulations. For more information see https://www.epa.gov/rsei/learn-about-rsei , https://www.epa.gov/rsei/how-rsei-should-be-used , and https://www.epa.gov/sites/default/files/2020-12/documents/rsei_methodology_v2.3.9.pdf
Availability	- *Availability to general public* ☒ Available (free) ☐ Licence needed ☐ Unavailable ☒ Others The underlying RSEI model itself is not made available to the general public but the documentation that describes the RSEI methodology and process underlying RSEI is publicly available, referenced, and fully documented. - *Accessibility to the model* ☒ Web-based ☒ Download via website ☒ Distributed by request ☒ Others RSEI model results (which are made available to the general public) are currently distributed in several different formats, for different users and stakeholders. Users are advised to check the RSEI website at https://www.epa.gov/rsei and https://www.epa.gov/rsei/ways-get-rsei-results for updates and new products and features. - *Disclosure of the model description (equation/formula, parameter values, etc.)* ☒ Document published ☐ Confidential ☐ Disclosure of source code ☒ Described in a spreadsheet (ex. Excel-based) ☒ Others (*Please specify*) Relevant links: Detailed information pertaining to the RSEI model, including input parameter values and data sources used are fully documented and described in RSEI's methodology document and through RSEI's technical appendices. See https://www.epa.gov/rsei/rsei-documentation-and-help for more information.
Data input and Confidential Business Information (CBI)	Does the information inputted into the model remain confidential to the user (i.e. stays protected and is not made available to others)? ☐ Yes ☐ No
Key references	https://www.epa.gov/rsei
Peer review, validation or verification reference	EPA's RSEI model has been peer reviewed by the Science Advisory Board (EPA-SAB-EEC-98-007)
Default values	See https://www.epa.gov/rsei/rsei-documentation-and-help for more information.
Application and use for regulatory purpose	**[Regulatory field (Exposure source)]** ☒ Industrial chemicals ☒ Pesticides ☒ Pollutant emission (to air, water, etc.) ☐ Land contamination ☒ Waste management ☐ Consumer product ☐ Occupational health ☒ Biocides ☒ Pharmaceuticals ☐ Contaminants in food ☐ Others (*Please specify*)

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Contact information	Organisation : U.S. Environmental Protection Agency Name : Mitchell Sumner Email address : Sumner.Mitchell@epa.gov Website : https://www.epa.gov/rsei/forms/contact-us-about-rsei-model
Any other information	

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Model descriptions	Information to be filled in
Model name	Wall Paint Exposure Model (via Internet Geographical Exposure Modeling System (IGEMS))
General description	The Wall Paints Exposure Assessment Model (WPEM) estimates the potential exposure of consumers and workers to the chemicals emitted from wall paint which is applied using a roller or a brush.
Owner	U.S. Environmental Protection Agency, Office of Pollution Prevention and Toxics
Website URL	https://www.epa.gov/tsca-screening-tools/wall-paint-exposure-assessment-model-wpem
Released/last updated	Released in March 2001/last updated in March 2001
Compatibility	To run WPEM via the web-based IGEMS platform, successfully, an Intel Pentium Four or above computer with a minimum of 1 Gig memory (RAM) and a fast Internet connection are strongly recommended. Either MS Internet Explorer or Firefox with Java plug-in can be used to run IGEMS.
Target substances	☒ Organic substances (e.g., volatile organic compounds) ☐ Inorganic substances (*Please specify (ex. Lead, Mercury)*) ☐ Others (*Please specify (ex. Organometallic substances, UVCBs)*)
Estimates exposure to:	☒ Consumers ☒ Workers ☒ General population ☒ Children

	☐ Aquatic organisms ☐ Terrestrial organisms ☐ Benthic organisms ☐ Others (*Please specify*)
Target Exposure compartments/source/routes/s	- *Exposure Source* ☒ Sources within the workplace ☐ Direct emission of Industrial chemicals to the environment from an industrial facility ☒ Use of industrial chemicals (professional workers and consumers) ☒ Use of consumer product ☐ Land contamination ☐ Waste ☐ Use of Pesticides ☐ Use of Biocides ☐ Use of Pharmaceuticals ☐ Use of Food additives ☐ Use of Feed additives ☒ Others (Sources within residence) **[Direct exposure to ☒ Consumers ☒ Workers ☒ General Public]** - *Exposure duration* ☒ Short Term exposure ☒ Long term exposure - *Exposure route* ☒ Inhalation ☐ Dermal ☐ Oral ☐ Others (*Please specify*) **[Exposure to the environment and indirect exposure to humans via the environment]** - *Exposure compartment* ☒ Air ☐ Soil ☐ Surface water ☐ Groundwater ☐ Sediment ☐ Dust - *Environmental Fate and behaviour* ☐ Environmental degradation ☐ Environmental mobility ☐ Environmental bioavailability ☐ Aquatic food web bioaccumulation ☐ Terrestrial food web bioaccumulation ☐Others (*Please specify*) - *Exposure route for indirect exposure to humans* ☒ Inhalation ☐ Dermal ☐ Ingestion ☐ Others (*Please specify*)
Other model functions	☐ Spatial distribution (Mapping) ☒ Simulate time-dependent exposure ☐ Sensitivity and Uncertainty analysis ☐ Others (*Please specify*)
Limitation and applicability	The WPEM model was developed to estimate exposures to alkyd and latex paints in residential buildings. Here are some limitations of WPEM: the model has no capability for Monte Carlo simulation as a means of addressing uncertainty, but another model (MCCEM) developed for OPPT has this capability; the sink model assumes that a very small fraction of the potential adsorption sites on the sink are occupied; the model is designed to estimate indoor-air concentrations and associated inhalation exposures for interior applications involving alkyd or latex primer/paint. The emission algorithms used in the model, and their relationship to chemical properties, are based on chamber tests specific to interior paints. At present there is no basis for applying these algorithms to other types of products. The emission and sink models used in WPEM are derived from a limited number of small-chamber tests, conducted at a fixed air exchange rate, a fixed loading of wallboard, and a fixed product application rate for one type of application (roller). A single-chamber model is used when an entire building is painted; when part of a building is painted, a two-chamber model (painted and unpainted parts) is used. Within the modeled compartment(s), uniform mixing is assumed; no distinction is made between airborne chemical concentrations in the applicator's breathing zone versus elsewhere in the compartment where paint is applied. Only one chemical can be modeled at a time; within a model run, it is not possible to combine different primer/paint types (e.g., alkyd primer and latex paint), but such a combination can be modeled through separate model runs. The indoor-outdoor air exchange rate is treated as a constant (i.e., it cannot vary over time). Model defaults for the air exchange rate assume a closed-building condition, as

	supporting data for other conditions (e.g., windows open or exhaust fans on) are limited. Dose estimates provided by the model are measures of potential inhaled dose (i.e., 100 percent uptake is assumed).
Availability	- *Availability to general public* ☒ Available (free) ☐ Licence needed ☐ Unavailable ☐ Others (*Please specify*) - *Accessibility to the model* ☒ Web-based ☒ Download via website ☐ Distributed by request ☐ Others (*Please specify*) - *Disclosure of the model description (equation/formula, parameter values, etc.)* ☒ Document published ☐ Confidential ☐ Disclosure of source code ☐ Described in a spreadsheet (ex. Excel-based) ☐ Others (*Please specify*) Relevant links: To download via website: https://www.epa.gov/tsca-screening-tools/forms/wpem-wall-paint-exposure-model-download-and-install-instructions For IGEMS web-based tool: https://ofmpub.epa.gov/igems-jsp/
Data input and Confidential Business Information (CBI)	Does the information inputted into the model remain confidential to the user (i.e. stays protected and is not made available to others)? ☒ Yes ☐ No
Key references	-WESTAT, 1987. Household Solvent Products: A National Usage Survey. Final report prepared for USEPA Office of Pollution Prevention and Toxics under EPA Contract No. 68-02-4243. -USEPA, 1992. Guidelines for Exposure Assessment. EPA/600/Z-92/001, U.S. Environmental Protection Agency, Office of Research and Development, Office of Health and Environmental Assessment. -USEPA, 1997. Exposure Factors Handbook, Volumes I-III. EPA/600/P-95/002Fa, b, c, U.S. Environmental Protection Agency, Office of Research and Development, National Center for Environmental Assessment.
Peer review, validation or verification reference	The model has been peer reviewed by experts outside EPA.
Default values	Several of the values come from the Exposure Factors Handbook (USEPA 1997), Volume III, Chapter 17 (Residence Characteristics). Default emission rates determined by the WPEM software are based on chamber tests of latex and alkyd paints (ARCADIS 1998) conducted under EPA's Designing Wall Paint for the Environment Project.
Application and use for regulatory purpose	**[Regulatory field (Exposure source)]** ☒ Industrial chemicals ☐ Pesticides ☒ Pollutant emission (to air, water, etc.) ☐ Land contamination ☐ Waste management ☒ Consumer product ☒ Occupational health ☐ Biocides ☐ Pharmaceuticals ☐ Contaminants in food ☐ Others (*Please specify*) **[Regulatory use]** - *Incorporated in regulatory framework* ☒ Screening assessment ☐ Higher tier assessment

<table>
<tr><td></td><td>☐ Assessment for substance registration by manufacturer/importer
☐ Others (Please specify)
<table><tr><td>Application examples</td><td>Regulation of Chemicals under Section 6(a) of the Toxic Substances Control Act through existing chemical risk evaluations of high priority chemicals.</td></tr></table>
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<tr><td>Contact information</td><td>Organisation :

Name :

Email address :

Website :</td><td>U.S. EPA’s Office of Pollution Prevention and Toxics

Wen-Hsiung Lee

lee.wen-hsiung@epa.gov

https://www.epa.gov/tsca-screening-tools/approaches-estimate-consumer-exposure-under-tsca</td></tr>
<tr><td>Any other information</td><td colspan="2">N/A</td></tr>
</table>

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