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Introduction to EPA's Risk-Screening Environmental Indicators (RSEI) Model

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Presentation Outline

- Overview of RSEI
- RSEI modeling and score calculation
- RSEI data products
  - Facility-level results
  - Geographic Microdata
- How to get more information about RSEI

Overview of RSEI

- Risk-Screening Environmental Indicators
- Screening-level model
- Assesses potential human health impacts
- RSEI uses risk-related concepts (hazard, dose, exposure), but is not a formal risk assessment.
- Uses Toxics Release Inventory (TRI) data
- Multi-media (air and water)

Overview of RSEI

- RSEI pre-processes large amounts of data so that use of the results interfaces is simple and fast.
  - Toxic chemical release and transfer data
  - Census population data
  - Stream/River characteristics
  - Chemical toxicity, physicochemical properties
  - Weather data

Overview of RSEI

RSEI considers:

- Amount of chemical released or transferred
- Chemical toxicity
- Fate and transport of the chemical in the environment
- Route and extent of human exposure
- Number of people potentially affected

Overview of RSEI

- RSEI is a screening-level model and prioritization tool.
- RSEI uses simplifying assumptions to speed up modeling, or in cases where specific data are not available.
- TRI does not cover all potential environmental risks, but RSEI can help screen releases across federal facilities and larger industrial facilities.

Why is RSEI Useful?

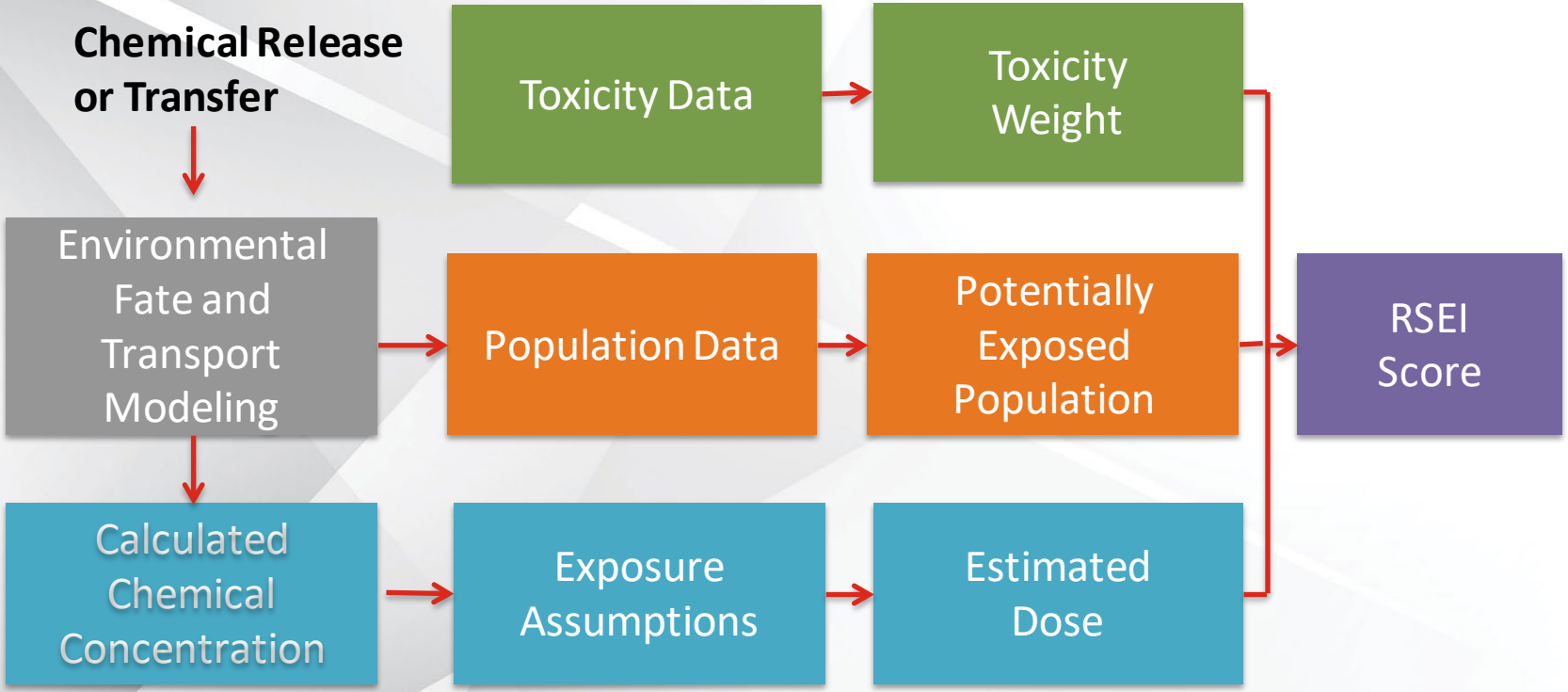
Exploring TRI facilities:

	Pounds Released	RSEI Score
 300,000 lbs Hydrochloric acid 26,000 lbs Ammonia 800 lbs Zinc compounds	326,800	930
 200,000 lbs Chloroprene 27,000 lbs Benzene 200 lbs Glycol ethers	227,200	4.4 million
 14,000 lbs Cobalt compounds 1,000 lbs Nickel compounds	15,000	13.6 million

How is RSEI Unique?

- With each annual version, RSEI updates all years of TRI reporting data (1988-current).
- A fully comparable time series is always available.
- RSEI Geographic Microdata provides disaggregated air and water results, with linked source-receptor information.
- RSEI models both air and water releases.
- RSEI Scores summarize information into one relative number.

RSEI Results-Calculating a RSEI Score



RSEI Score

- What the RSEI Score captures:
  - The relative size of environmental releases and transfers.
  - How toxic are the chemicals?
  - What is happening to the chemicals in the environment?
  - How many people are potentially exposed, and at what level?

RSEI Score

- RSEI Scores are relative.
- RSEI Scores are only meaningful in relation to other scores.
- RSEI Scores can only be used for comparisons, such as for prioritization and trend analyses, or to screen for situations that may warrant additional investigation.
- RSEI Scores are often expressed as percentiles.
- RSEI Scores do not describe a level of risk, such as excess cancer cases.

RSEI Score

- RSEI Scores are designed so they can be added together for different groups of chemical releases and for different levels of aggregation.
  - Combine and disaggregate results by chemical, facility, industry sector, geography, or environmental media.
  - Add RSEI Scores for all releases for a facility → RSEI facility Score
  - Add RSEI Scores for all facilities in a county →RSEI county Score

RSEI Scores

- RSEI models:
  - Stack and fugitive air releases
  - Direct surface water releases
  - Transfers to publicly owned treatment works (POTWs) and transfers to off-site incineration

- RSEI does not currently model:
  - Land releases (e.g., land disposal, underground injection)
  - Other off-site transfers for further waste management

Other Kinds of RSEI Results

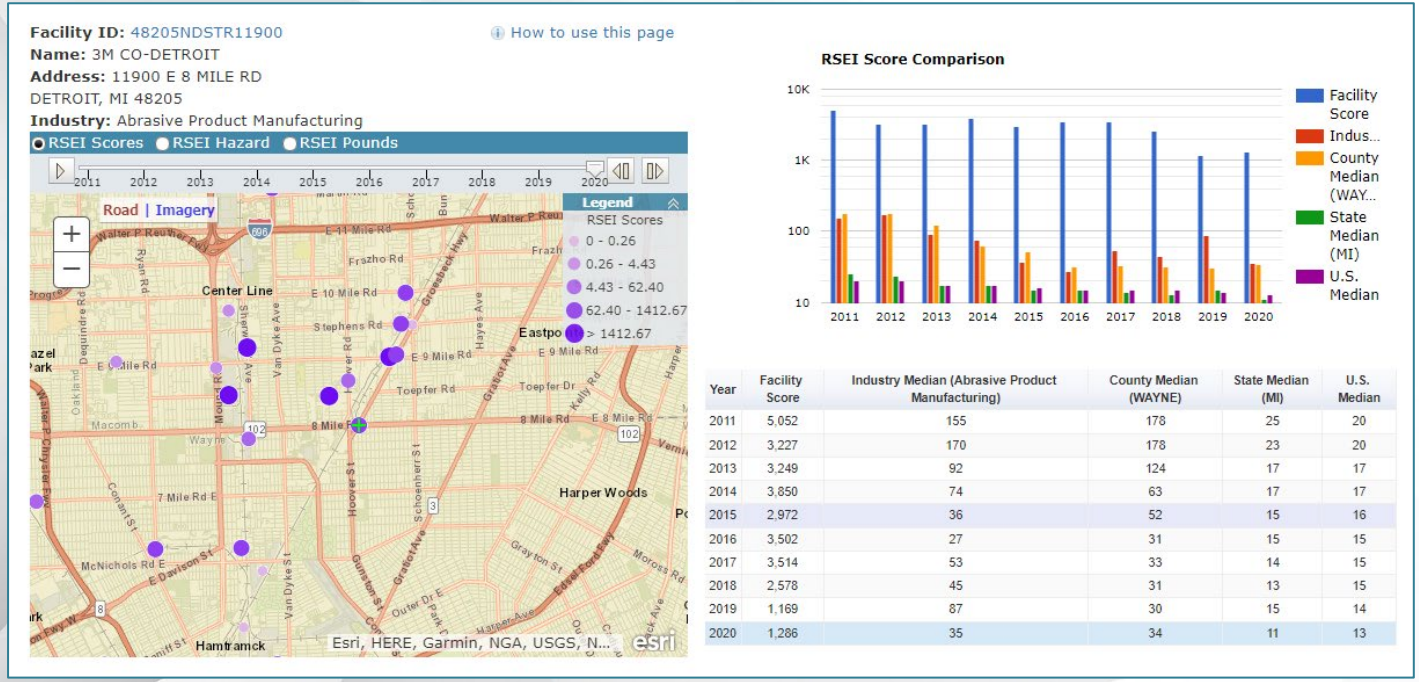
- RSEI Hazard =
  - toxicity weight * quantities released or transferred
- Separate results for cancer effects and noncancer effects:
  - Cancer Score, Cancer Hazard
  - Noncancer Score, Noncancer Hazard

Facility-Level Results

- Distributed in:
  - TRI Toxics Tracker
  - TRI's National Analysis
  - Envirofacts
  - EasyRSEI

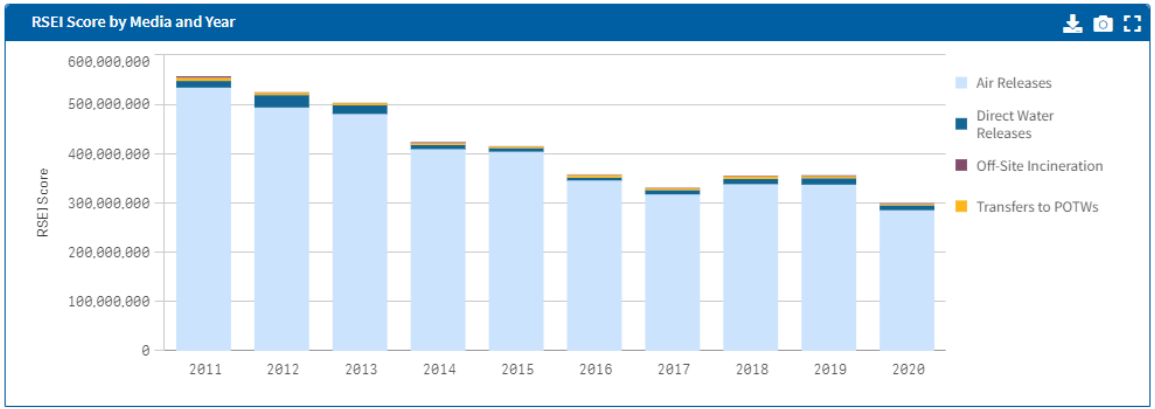
Getting RSEI Results

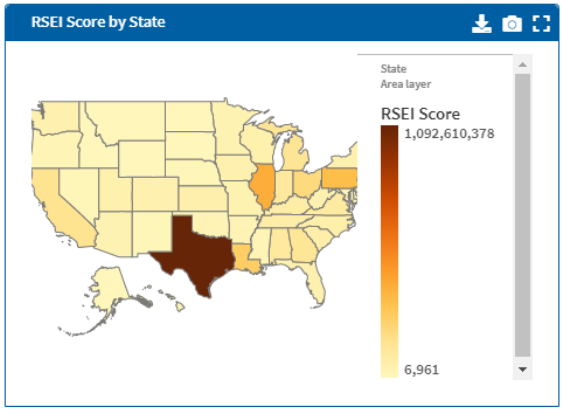
- **Ways to Get RSEI Results** on the RSEI website has links to the RSEI reports in Envirofacts

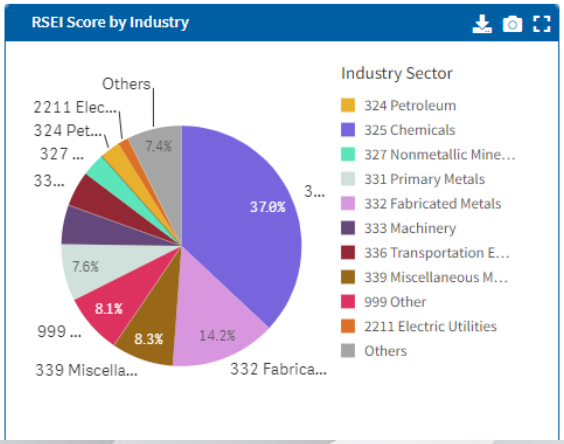


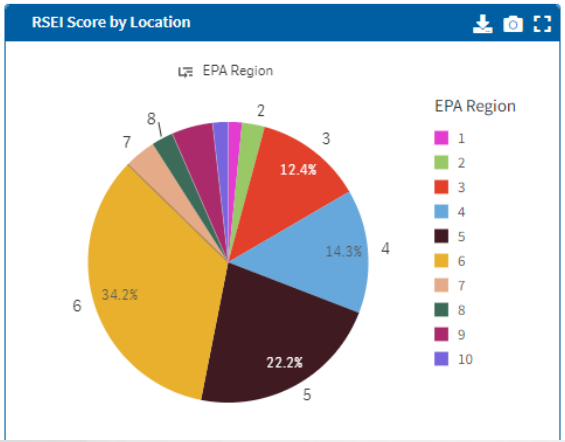
Year	Facility Score	Industry Median (Abrasive Product Manufacturing)	County Median (WAYNE)	State Median (MI)	U.S. Median
2011	5,052	155	178	25	20
2012	3,227	170	178	23	20
2013	3,249	92	124	17	17
2014	3,850	74	63	17	17
2015	2,972	36	52	15	16
2016	3,502	27	31	15	15
2017	3,514	53	33	14	15
2018	2,578	45	31	13	15
2019	1,169	87	30	15	14
2020	1,286	35	34	11	13

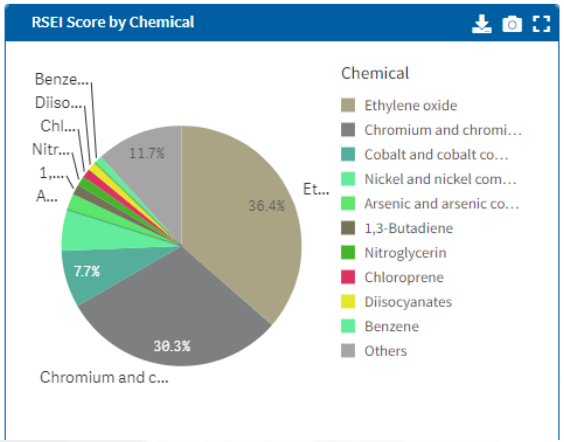
EasyRSEI Dashboard





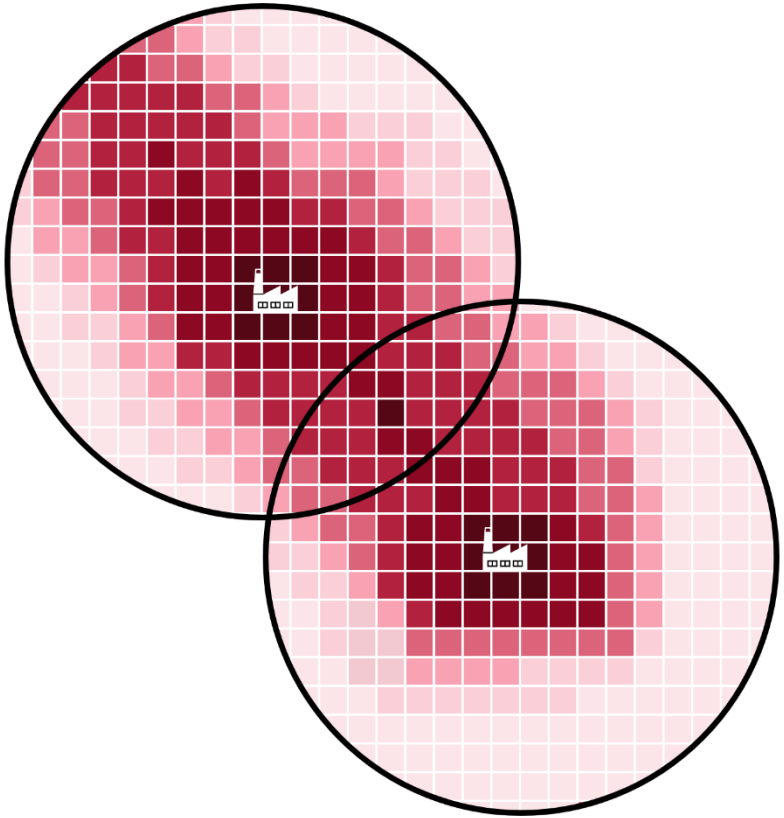




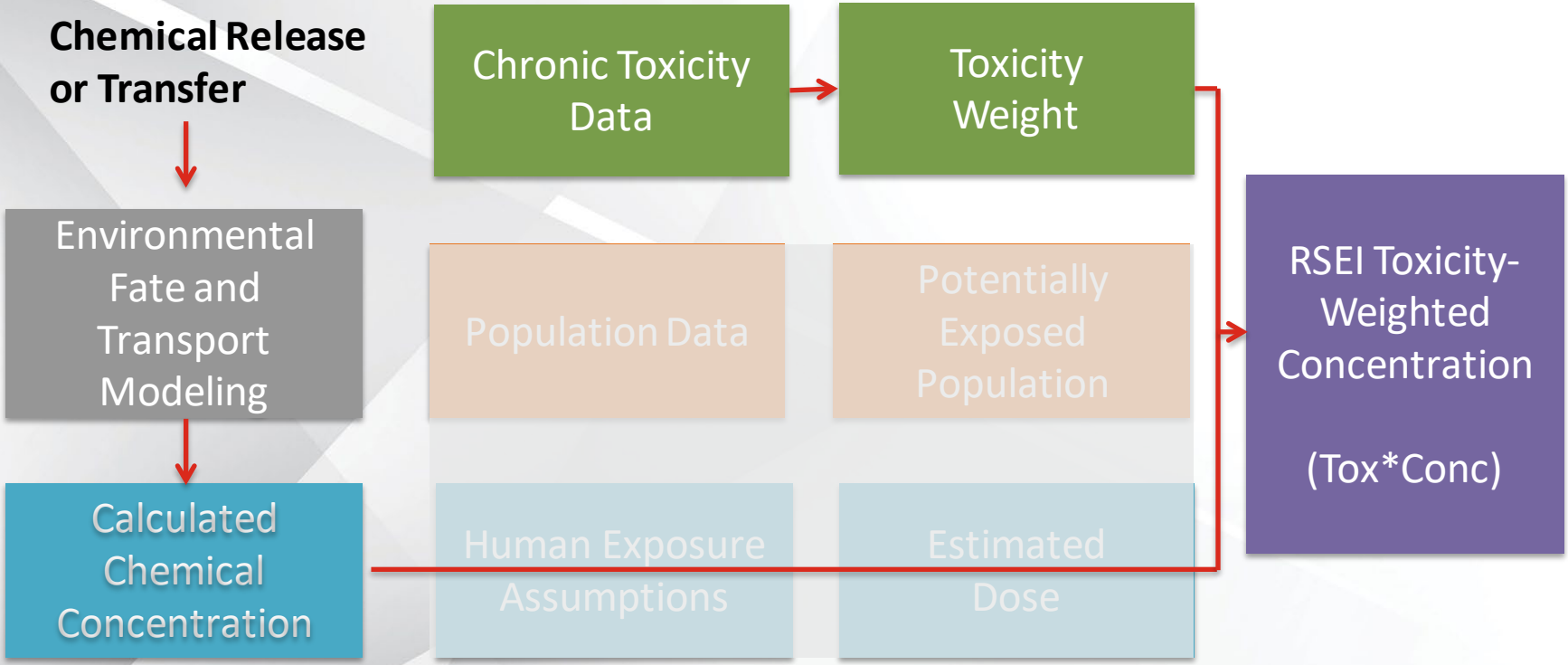


RSEI Geographic Microdata

- Receptor-based results for potentially impacted geographic areas.
- Impacts from different/multiple facilities are summed at the grid cell level.
- Modeled environmental concentrations, toxicity-weighted concentrations, RSEI Scores.
- Separate results for air and water.



Calculating Toxicity-Weighted Concentration



RSEI Geographic Microdata

- What is the estimated cumulative impact from TRI chemical releases on a specific geographic area?
- What are the sources of that potential impact?
- Closest or biggest facilities may not be the biggest contributors.

RSEI Geographic Microdata

- Microdata comes in many different formats:
  - Geographic unit: Grid cells, block groups, census tracts or ZIP codes.
  - Aggregation: Each release presented separately or summed by geographic unit.
  - Chemical/facility set. Core, Core01, all chemicals/facilities.
- All files are national in scope except for state-specific grid cell files for most recent year only.
- Produced on a two-year cycle.
- Use “Contact Us” form on the RSEI website to request.

RSEI Water Microdata

- New water Microdata formats
- Distributed separately from air Microdata
- Results include concentration, toxicity-weighted concentration by stream segment (flowline)

More Information on RSEI

- **Ways to Get RSEI Results** on the RSEI website has a link to the RSEI file transfer protocol (ftp) site plus links to other sites that use RSEI data:
    - Toxic 100
    - CalEnviroScreen
- Bibliography on the RSEI website lists studies that have used RSEI results.

Things to Remember

- RSEI is a screening-level model and prioritization tool.
- RSEI adds more context to TRI data and helps users focus on environmental releases of TRI-listed chemicals that may contribute to potential health impacts.
- RSEI and TRI do not cover all sources of environmental pollution.
- Always follow up with additional investigation and information before drawing conclusions about potential risks and situations of potential concern.

For More Information

www.epa.gov/rsei

- Help on using RSEI and interpreting results
- Information on toxicity weights and modeling
- How to find EasyRSEI, Microdata and other tools and resources
- EasyRSEI help, data dictionary
- Documentation and data sources
- Easy-to-understand videos on RSEI topics

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