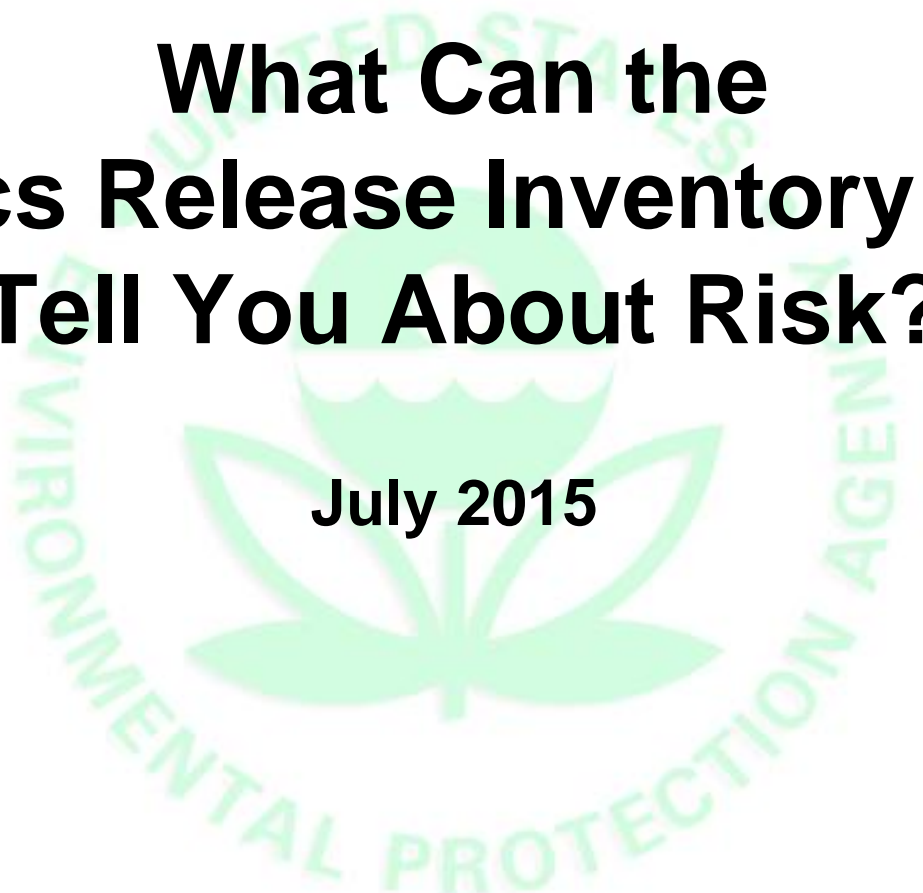




What Can the Toxics Release Inventory (TRI) Tell You About Risk?

July 2015





Overview

This training will cover:

- Background on chemical hazards and risk assessment
- Resources to help determine if a chemical or facility is a cause for concern



Goals of This Training

- Teach basic principles of risk assessment
- Promote appropriate use of TRI data
 - Clarify what TRI is and is not
 - Explain the relevant context needed to interpret TRI data when answering questions about risk (e.g., the risk of TRI chemicals varies based on the waste management method used for those chemicals)
- Provide a list of resources for further information



Part 1: Background on Chemical Hazards and Risk Assessment



Introduction to Risk

$$\text{Risk} = \text{Hazard} \times \text{Exposure}$$

- **Risk:** The chance that an exposure to an environmental stressor will lead to harmful effects to human or environmental health (e.g., the likelihood that a chemical exposure will result in cancer). It is mainly a function of hazard and exposure.
- **Hazard:** The ability of an environmental stressor (e.g., a chemical) to cause an increase in the incidence of specific adverse health effects (e.g., cancer, birth defects). Toxicity is a way to measure the hazard of a chemical.
- **Exposure:** When an environmental stressor comes into contact with a human or ecological receptor.



Introduction to Risk

- EPA uses risk assessments to characterize the nature and magnitude of **health risks to humans** (e.g., residents, workers) and **ecological receptors** (e.g., birds, fish) from chemical contaminants and other stressors that may be present in the environment.
- EPA conducts [human health risk assessments](#) and [ecological risk assessments](#) through two separate processes.



Two Essentials for Determining Risk of Chemicals

1. **Toxicity** of a chemical (a way to measure hazard)
2. **Exposure** to the chemical
 - *Paracelsus principle* (modified): The dose makes the disease (i.e., higher doses = greater health effects)
 - A small dose of a very toxic chemical or a big dose of a chemical with low toxicity can be serious
 - The timing of exposure may also be important (e.g., fetal exposure of chemicals that cause birth defects)

$$\text{Risk} = \text{Hazard} \times \text{Exposure}$$



Toxicity

- Types of toxicity:
 - **Ecotoxicity**: the ability of an environmental stressor to cause harm to organisms in the environment or to an ecosystem.
 - **Human toxicity**: the ability of an environmental stressor to cause harm to humans (note: often, experimental animal models are used to help study potential toxicity to humans).
- Chemicals can be added to the TRI Program's chemical list based on human toxicity or ecotoxicity.



Exposure

- There must be a release into the environment to have an effect
 - The environment must absorb the chemical that is released (it must go somewhere!)
 - If we are part of the environment then there is potential that we can be harmed in this process
 - But there must be an environmental pathway (fate and transport) from the chemical release to the person (receptor)
 - TRI has information on quantity and location of many chemical releases



Exposure

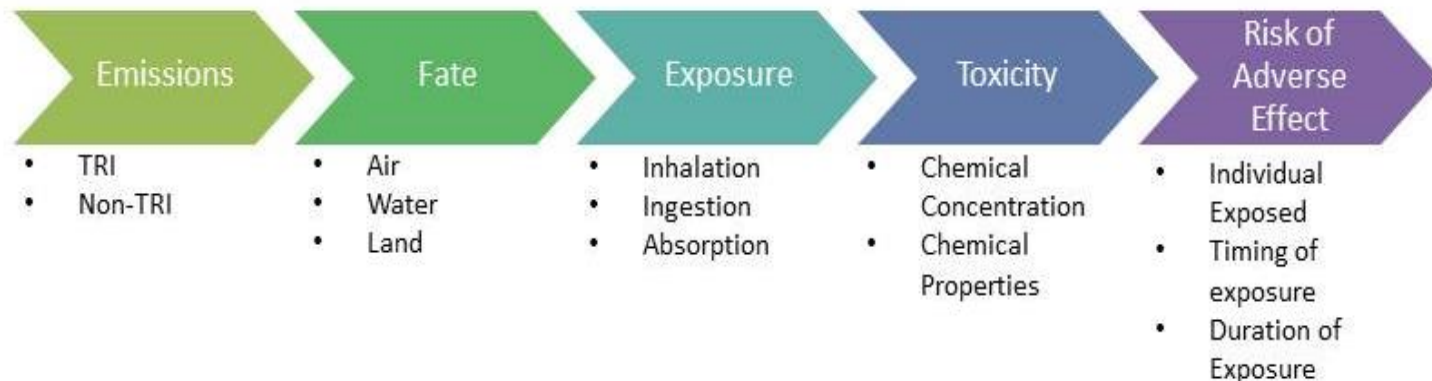
- Main environmental pathways:
 - AIR (inhalation and ingestion)
 - WATER (ingestion and skin contact)
 - SOIL (ingestion and skin contact)

Note: TRI data do not provide estimates of exposures



What Constitutes Risk?

- It is important to remember:
 - The storage, use, and/or release of toxic chemicals into the environment do not necessarily result in public exposure or adverse health effects.
- Risk results from a series of events.





Factors Influencing Risk	Description
Emissions	<ul style="list-style-type: none"> • TRI covers emissions of about 680 chemicals or chemical groups from stationary sources • TRI does not cover emissions from other sources, such as mobile sources or water runoff. These releases are, however, regulated by other EPA offices, and information can be obtained from other locations on the EPA website
Fate	<p>Where a chemical ultimately ends up depends on:</p> <ul style="list-style-type: none"> • How it is released (e.g., through a facility's stack, injected into the ground or discharged to open water) • Where it is released (e.g., in a valley, on a mountaintop) • When it is released (e.g., the time of day and the time of year) • Weather at the time of the release
Exposure	<p>Exposure to a release depends on:</p> <ul style="list-style-type: none"> • The fate of the chemical • Where an individual spends their time (e.g., indoors or outdoors, upwind or downwind from a facility) • Where the food and water the person ingests comes from • The individual's behavior (e.g., children playing in the dirt, a runner who lives in a city)
Toxicity	<p>The toxicity of an exposure depends on:</p> <ul style="list-style-type: none"> • Both the quantities released and specific properties of a chemical (i.e., small amounts of one chemical may be more toxic than large amount of another) • Duration and timing of exposure
Risk of Adverse Effect	<p>The risk of an adverse effect depends on:</p> <ul style="list-style-type: none"> • The individual who is exposed (e.g., a child, a diabetic, a healthy adult) • When in the person's life they are exposed (e.g., as a fetus, as a young adult, as an elderly person) • How long they are exposed (e.g., every day for ten hours a day for twenty years, for thirty seconds)



EPA's Role in Protecting Public Health

- As a matter of law and policy, EPA tends to err on the side of public health (i.e., EPA's risk estimates are “health conservative”)
- EPA uses **rules and regulations** to help accomplish its mission
 - Some have a **technology standard** or **health standard** for industry to achieve. Usually the technology standard has some sort of risk check behind it. (e.g., Clean Water Act, Clean Air Act)
 - Others encourage reductions in pollution **through public disclosure and communication** (e.g., Emergency Planning and Community Right-to-Know Act, the statute that created TRI; the National Environmental Policy Act)
 - For example, TRI data could be used to check that facilities are complying with their permits

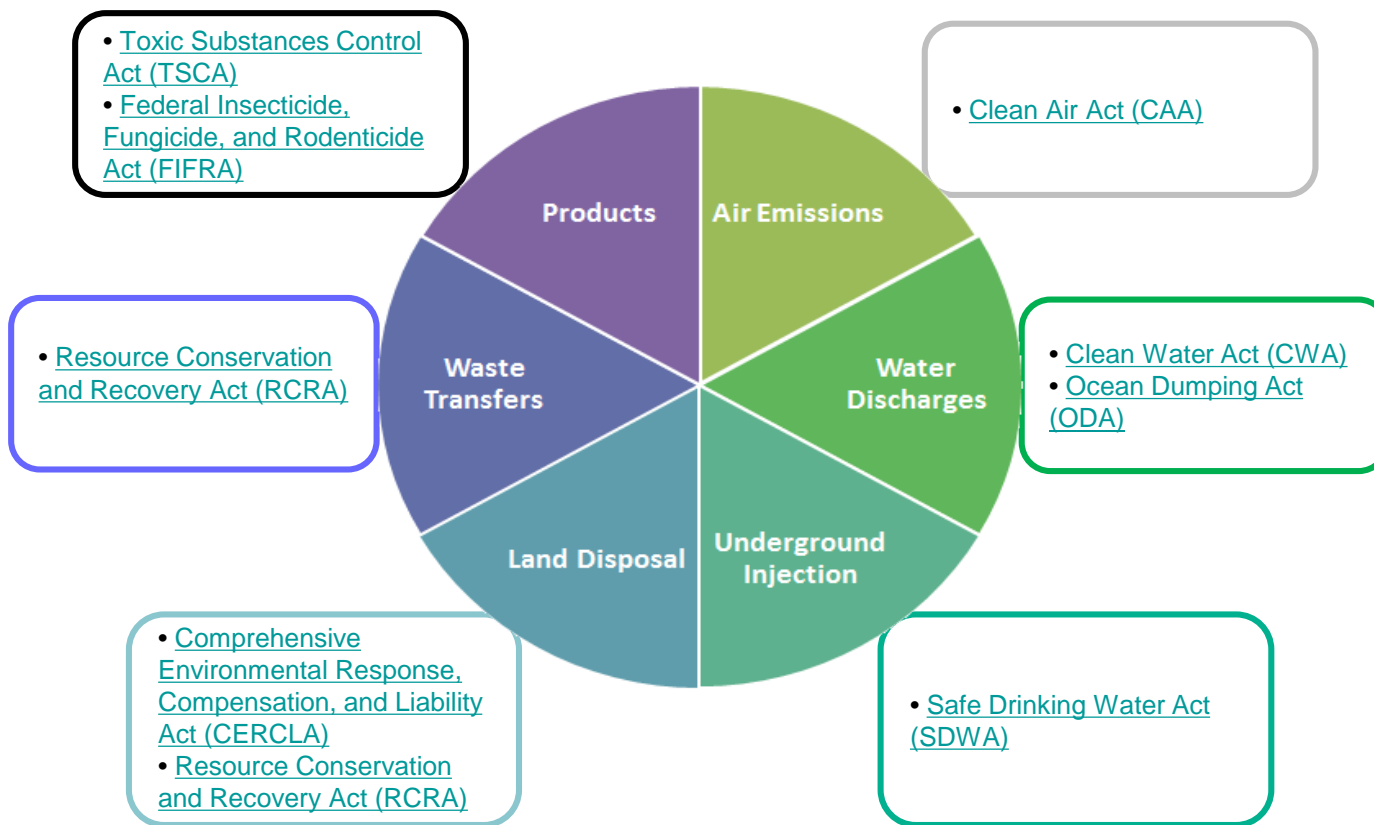


EPA's Role in Protecting Public Health

- **EPA issues regulations** that require facilities to make process changes, install and operate pollution controls, and undertake other environmental management activities.
- **EPA regulations control** how facilities use, handle, release, and dispose of toxic chemicals.
- **EPA (and state or tribal agencies) enforce** environmental regulations.



EPA's Role in Protecting Public Health



Note:

TRI has data on many of these possible pathways.

EPA's Enforcement Compliance History Online (ECHO) provides compliance information for facilities that must comply with these statutes.



The TRI Program Covers:	The TRI Program Does Not Cover:
<ul style="list-style-type: none">▪ More than 650 chemicals and chemical categories▪ Facilities which are in the following sectors, as well as federal facilities:<ul style="list-style-type: none">• manufacturing• metal mining• coal mining• coal and oil-fired electric utilities• chemical wholesale distributors• petroleum terminals• hazardous waste treatment and solvent recovery	<ul style="list-style-type: none">▪ Anything outside of the sectors listed to the left. Excluded sources include:<ul style="list-style-type: none">• agriculture• wastewater treatment facilities• services such as airports and hospitals• retail businesses such as gas stations• mobile sources (i.e. cars, trucks, buses, airplanes)• municipal solid waste landfills• facilities that do not meet TRI thresholds for reporting• facilities with fewer than 10 full-time employees• nuclear power plants (unless they are federal facilities)



Summary

- Risk = Toxicity x Exposure
- There must be a release for there to be an exposure, BUT
- Recognize that **releases do not equal exposure**
- EPA provides a variety of tools to help draw conclusions regarding cause for concern
- Remember that we face risks in our daily lives but we still live active lives, so...
 - Be realistic in considering personal risks
 - Evaluate risks as objectively as possible



Part 2: Resources to Help Determine if There Is A Cause for Concern



Determining if There is Cause for Concern

Concern may be justified if:

- The chemicals released in the neighborhood are associated with the adverse effect. (e.g., asthma, bladder cancer, burning eyes)
- There is a history of non-compliance at any of the facilities in the area.
- There are multiple facilities emitting the same chemical that has an associated adverse effect.
- The facilities in the neighborhood rank high in TRI chemical releases compared to similar facilities located elsewhere.



If There is a Cause for Concern, Consider Contacting:

- An EPA hotline:
 - <http://www2.epa.gov/home/epa-hotlines>
- A local government agency, such as your county health department:
 - <http://www2.epa.gov/home/health-and-environmental-agencies-us-states-and-territories>
 - <http://www.naccho.org/about/lhd/>
- The facility (TRI reporting forms list a public contact for facilities):
 - http://www.epa.gov/enviro/facts/tri/form_r_search.html



Using EPA Tools to Help Provide a Location-Specific Answer

Use a tool such as:

- **myRTK**: simple location, TRI release, health, compliance information (<http://www.epa.gov/tri/myrtk/index.htm>)
- **TRI Explorer**: detailed analyses of TRI releases (http://iaspub.epa.gov/triexplorer/tri_release.chemical)
- **ECHO**: detailed compliance information (<http://www.epa-echo.gov/echo/>)
- **Envirofacts**: detailed facility-specific information, including facility public contact information (<http://www.epa.gov/enviro/facts/topicsearch.html#toxics>)
- **P2 Search Tool**: detailed information on pollution prevention practices at facilities (<http://www.epa.gov/enviro/facts/tri/p2.html>)



Using EPA Tools

- Discuss results from using tools
- For example:
 - The number of facilities included in TRI or other permitted programs (**Use:** Envirofacts, myRTK, TRI.NET, TRI Explorer)
 - The chemicals these facilities emit (**Use:** Envirofacts, TRI Explorer, myRTK, TRI.NET)
 - The health effects associated with these chemicals (**Use:** myRTK, TRI-CHIP)
 - How the facilities rank compared to others in the county or nation (**Use:** myRTK, RSEI, TRI Explorer)



Using EPA Tools

- **Remember that there is often a limited connection between releases and exposure**
 - Releases reported to EPA do not equal exposures someone is experiencing
 - For example, landfills—especially those designated as Resource Conservation and Recovery Act Subtitle C landfills—can be very secure and may have a low likelihood of resulting in exposure
- **Remember the importance of the toxicity of the chemical**
 - A large release of a less toxic chemical may be of less concern than a small release of a more toxic chemical



Toxicity Resources

Where to find comprehensive toxicity information sources for TRI:

– TRI-CHIP (Chemical Hazard Information Profiles)

- Useful if you know the health effects that you're concerned about
- Useful if you know the chemicals that are released in your area
- TRI-CHIP allows searching of multiple sources of toxicity information according to:
 - » Biological effects (e.g., kidney, liver, etc.)
 - » Source of toxicity information; values provided by various government organizations (such as Agency for Toxic Substances and Disease Registry (ATSDR), EPA's Integrated Risk Information System (IRIS) and Office of Pesticide Programs (OPP))
- Can be downloaded to your computer
- Source: www.epa.gov/tri-chip/index.html



Toxicity Resources

- **Integrated Risk Information System (IRIS)**
 - An EPA database of human health effects that may result from exposure to various substances found in the environment
 - Source: <http://www.epa.gov/IRIS/>

- **Agency for Toxic Substances & Disease Registry (ATSDR) ToxFAQs™ factsheets**
 - Series of quick summaries about hazardous substances developed by ATSDR's Division of Toxicology
 - Information is from ATSDR Toxicological Profiles and Public Health Statements
 - Provides answers to frequently asked questions about exposure to hazardous substances found around hazardous waste sites and effects of exposure on human health
 - Easily printable and available in Spanish
 - Source: <http://www.atsdr.cdc.gov/toxfaqs/index.asp>



Risk Assessment Resources

- EPA's Risk Assessment Portal:
<http://www.epa.gov/riskassessment/>



Air-Related Websites

	Subtopic	Webpage	URL
AIR	Air	EPA - Indoor Air Home Page	http://www.epa.gov/iaq/
		CDC Indoor Environmental Quality	http://www.cdc.gov/niosh/topics/indoorenv/
		EPA – Air and Radiation	http://www.epa.gov/air/
		Air Pollution and Respiratory Health	http://www.cdc.gov/nceh/airpollution/health.html
		Air Pollution Topics – National Association of Clean Air Agencies	http://www.4cleanair.org/topics/details/air-pollutants
	Air Quality	Indoor Air: Where you Live	http://www.epa.gov/iaq/wherelive.html
		NATA	http://www.epa.gov/nata/
		Air Explorer	http://www.epa.gov/airdata/
	Air Emissions	National Emissions Inventory	http://www.epa.gov/ttn/chief/eiinformation.html
		Facility Emission Summaries	http://www.epa.gov/air/emissions/where.htm



Water-Related Websites

	Subtopic	Webpage	URL
WATER	Water	Storm Water Basic Information	http://water.epa.gov/polwaste/npdes/stormwater/Stormwater-Basic-Information.cfm
		National Pollution Discharge Elimination System Overview	http://cfpub.epa.gov/npdes/
		Water-Related Environmental Public Health	http://www.cdc.gov/nceh/hsb/cwh/default.htm
	Water Quality	Water Quality Assessments and TMDL Information	http://www.epa.gov/waters/ir/
		Surf Your Watershed	http://cfpub.epa.gov/surf/locate/index.cfm
	Water Discharges	Permit Compliance System and ICIS-NPDES	http://www.epa.gov/enviro/facts/pes-icis/



Other Helpful Websites

	Subtopic	Webpage	URL
OTHER	Hazardous Material Handling	RCRAInfo	http://www.epa.gov/epawaste/inforesources/online/index.htm
		Risk Management Plans	http://www2.epa.gov/rmp
	Multimedia	National Center for Environmental Health	http://www.cdc.gov/nceh/
		EPA's Risk Assessment Portal	http://epa.gov/risk/
	Environmental Quality	MyEnvironment	http://www.epa.gov/myenvironment/
	Compliance	Envirofacts	http://www.epa.gov/enviro/
		Enforcement and Compliance History Online (ECHO)	http://echo.epa.gov/



Contact the TRI Program

- Email:
 - tri.help@epa.gov
- Online form:
 - <http://www2.epa.gov/toxics-release-inventory-tri-program/forms/tri-program-contacts>