Using SDS to Help Guide TUR Decisions

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Role of SDS in TUR Planning

- Identify hazards of current chemicals to determine whether opportunity exists
- Examine and compare hazards of potential substitutions
- Information for calculations and reporting

Agenda

Effectively use SDS and other info sources for TUR planning and reporting

- SDS Refresher and Evaluation
- SDS Role in Reporting
- Additional Resources for Chemical Hazard Info

What's your level of experience with SDS?

SDS Background Info

OSHA Hazard Communication Standard (HazCom)

- Updated in 2012
  - SDS & label requirements
  - Adoption of Globally Harmonized System of Classification & Labeling (GHS)

MSDS vs SDS

- MSDS obsolete as of 2015
  - Suppliers required to provide SDS for active products
  - Discontinued products pre-2015 may not have SDS

SDS Format

- **Section 1**: Product and company identification
- **Section 2**: Hazard(s) identification
- **Section 3**: Composition/information on ingredients
- **Section 4**: First-aid measures
- **Section 5**: Fire-fighting measures
- **Section 6**: Accidental release measures
- **Section 7**: Handling and storage
- **Section 8**: Exposure controls/personal protection
- **Section 9**: Physical and chemical properties
- **Section 10**: Stability and reactivity
- **Section 11**: Toxicological information
- **Section 12**: Ecological information
- **Section 13**: Disposal considerations
- **Section 14**: Transport information
- **Section 15**: Regulatory information
- **Section 16**: Other information

GHS

- Developed by United Nations
  - Systematic approach to identifying and communicating chemical hazards
  - Created as “building blocks” to allow countries flexibility during adoption
  - “Purple Book” updated every 2 years

GHS

- H is for Harmonized…?
  - Building block approach allows for discrepancies between countries
    - i.e., US did not adopt environmental endpoints
  - Countries adopted own additional hazards in some cases
    - i.e., US HNOC - combustible dust, pyrophoric gases, simple asphyxiants

GHS Basic Elements

- Hazard class and category
  - Physical 17
  - Health 10
  - Environmental 2
- Pictogram (9)
- Signal word (2)
- Hazard statement
  - H###
- Precautionary statements
  - P###

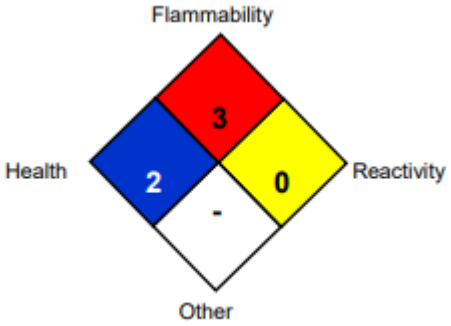
Section 2: Hazard ID/GHS - Example

- Hazard class and category
  - i.e., Skin irritation, Category 2
- Pictogram

- Signal word
  - WARNING
- Hazard statements
  - H315: Causes skin irritation
- Precautionary statements
  - P264: Wash hands thoroughly after handling
  - P280: Wear protective gloves/protective clothing/eye protection/face protection
  - P302+P352: IF ON SKIN: wash with plenty of soap and water
  - P332+P313: If skin irritation occurs: get medical advice/attention
  - P362+P364: Take off contaminated clothing and wash it before reuse

NFPA/HMIS vs GHS

- GHS category numbers and HMIS/NFPA ratings are OPPOSITE
  - GHS: *low* number = higher hazard
  - NFPA/HMIS: *high* number = higher hazard



HAZARDOUS MATERIAL IDENTIFICATION SYSTEM	
HEALTH HAZARD (BLUE)	2
FLAMMABILITY HAZARD (RED)	3
PHYSICAL HAZARD (YELLOW)	0

SDS: The Good & The Bad

What Are the Positive Aspects of SDS?

Benefits of SDS

- Provide basic product and company information
- Arranged in standardized format
- Aid workplace compliance efforts
- Essential to emergency situations

What Challenges Do You Have Regarding SDS?

Limitations of the SDS

- Age
- Quality
- Consistency
- Completeness
- Proprietary Ingredients

Evaluating SDS

General

- Read the entire doc
- Age
  - SDS vs MSDS
  - Ideally < 3 years old
- Country formats
  - Should be US but worth checking
  - Check heading, GHS classification
- Contact manufacturer for SDS update

Component ID

- Section 3, to start
  - Hazardous components at >= 0.1% / 1% must be listed
- Always check Section 15
  - Components that may not be listed in section 3
- Trade secrets
  - Potential clues in Sections 8, 5/10, 14
  - Search for different country format SDS

Hazard ID

- Section 2, to start
  - Presentation of hazards can vary by country!
- Search for other country format SDS
- Check other sections
  - Section 11 – Test data/interpretation
  - Section 12 – Environmental hazards not adopted in US
  - Section 13/14 – Different classification criteria, but may raise other hazards to consider

Activity #1

Evaluate the following SDS and discuss with your group: LOCTITE AA 3381; Green Earth Glass Cleaner

- How old is the SDS? Is a newer one available?
- What country was it written for?
- What are the components? Any clues beyond section 3?
- What are the hazards? Any endpoints for further evaluation?

SDS: Role in Reporting

Mixtures & Identifying Substances

- How to handle % ranges for reporting and planning
- CAS#'s/Categories/Isomers
  - E.g. Diisocyanates/Metals
- Does the SDS represent the mixture or individual components
- How to handle CBI/proprietary substances

Determining Concentrations in Mixtures or Other Trade Name Products

- Determine whether thresholds were exceeded for listed chemicals in a mixture (40 CFR § 372.30(b)(3)):
  - **Exact concentration - use concentration provided:**
    - *SDS = 25%* *Use 25%*
  - **Upper bound - use upper limit**
    - *SDS < 25%* *Use 25%*
  - **Range - use the midpoint of the range**
    - *SDS: 30 – 50% Use 40%*
  - **Lower bound - subtract out other known constituents, create a range, and use the midpoint of range**
    - *SDS: >75% toxic chemical* *Use 87.5% (top of range = 100%)*
    - *SDS: >75% toxic chemical 15% water* *Use 80% (range = 75% - 85%)*

TRI chemical concentration calculation when lower bound concentration is zero

If a facility only knows the upper bound concentration of a TRI chemical in a mixture, the upper bound must be used for threshold determinations. If a facility knows both the lower and upper bound concentrations of the TRI chemical, EPA recommends that the midpoint of the two concentrations be used for threshold determinations. If a covered facility receives a material safety data sheet (MSDS) from its supplier that states that the concentration of the TRI substance in the mixture ranges between zero and 10 percent, can the facility estimate the concentration of the TRI chemical in the mixture by using zero as the lower bound?

TRI Chemical Concentration calculation when lower bound concentration is zero!

No, a facility cannot estimate the concentration of a TRI chemical in a mixture by using zero as a "lower bound" concentration, even if the facility receives an MSDS from a supplier stating that the concentration of a TRI substance is between zero and a stated upper bound. If an MSDS shows zero as the "lower bound" of the concentration range, then the lower bound concentration is unknown, and the facility must use the provided upper bound for threshold determinations (40 CFR §372.30(b)(3)(ii)). Therefore, in the scenario above, since the facility only knows that the upper bound is 10 percent, it must calculate the amount of TRI chemical in the mixture based on the 10 percent concentration.

Which TRI/TURA chemicals are reportable: De Minimis

- Chemical A (de minimis 1.0%), 0-1%
- Chemical B (de minimis 1.0%), 0-1.75%
- Chemical C (de minimis 0.1%), 0- 0.09%
- Chemical D (de minimis 0.1%), 0-0.1%
- Chemical E (PBT), 0-10%
- Chemical F (PBT), 0-30%

When in doubt:

- Call the supplier
- Call the manufacturer
- Certificates of analysis
- Purchasing or procurement specifications

When the range straddles the Di Minimis

Scenario 2: As in the previous example, manganese is present in a mixture, of which 8,000,000 pounds is processed. The SDS states the mixture contains 0.2 percent to 1.2 percent manganese. The amount of mixture subject to reporting (at or above *de minimis* limit) is:

[(8,000,000) × (1.2% - 0.9%)] ÷ (1.2% - 0.2%)

The average concentration of manganese that is not exempt (at or above *de minimis* limit) is:

(1.2% + 1.0%) ÷ (2)

Therefore, the amount of manganese that is subject to threshold determinations and release and other waste management estimates is:

$$\left[\frac{(8{,}000{,}000)\times(1.2\%-0.9\%)}{(1.2\%-0.2\%)}\right]\times\left[\frac{(1.2\%+1.0\%)}{(2)}\right]=26{,}400 pounds$$

= 26,400 pounds manganese (which is above the processing threshold for manganese)

Additional Sources of Chemical Hazard Info

When you need more information…

- Resources for further investigation
  - Good screening tools: ChemHAT, PubChem
  - EPA ChemView and SRS
  - REACH Database
  - eChem Portal
  - TURI Library
    - Toxplanet
    - Pharos

Check out the Environmental, Health and Safety Data Resources Guide at: guides.turi.org/beyondmsds

ChemHAT.org

Dichloromethane (methylene chloride)

CAS: 75-09-2

How can this chemical affect my health?

Stronger effect / evidence ... Weaker effect / evidence

Acute (Short Term) Effects

How do we know

Toxic to Humans & Animals – Can be fatal on contact, ingestion or inhalation for humans and other mammals.

Irritates the Eyes – Can cause irritation or serious damage to the eye.

Irritates the Skin – Can cause irritation or serious damage to the skin.

Chronic (Long Term) Effects

How do we know

Cancer – Can cause or increase the risk of cancer.

Endocrine Disruption – Can interfere with hormone communication between cells which controls metabolism, development, growth, reproduction and behavior (the endocrine system).

Brain/Nervous System Harm – Can cause damage to the nervous system including the brain.

Other Health Effects – Can cause serious damage on contact or ingestion.

PBT (Persistent Bioaccumulative Toxicant) – Does not break down readily from natural processes, accumulates in organisms concentrating as it moves up the food chain, and is harmful in small quantities.

Breast Cancer – Known to increase mammary gland tumors in animals.

Inherent Hazards

How do we know

Restricted List – This chemical is on a list from an authoritative body recommending that its use be avoided.

How does this chemical impact the environment?

How do we know

Immediate Harm to Aquatic Ecosystems – A single exposure may result in severe biological harm or death to fish or other aquatic organisms.

Long-Term Harm to Aquatic Ecosystems – Long term exposure may result in irreversible harm to fish or other aquatic organisms.

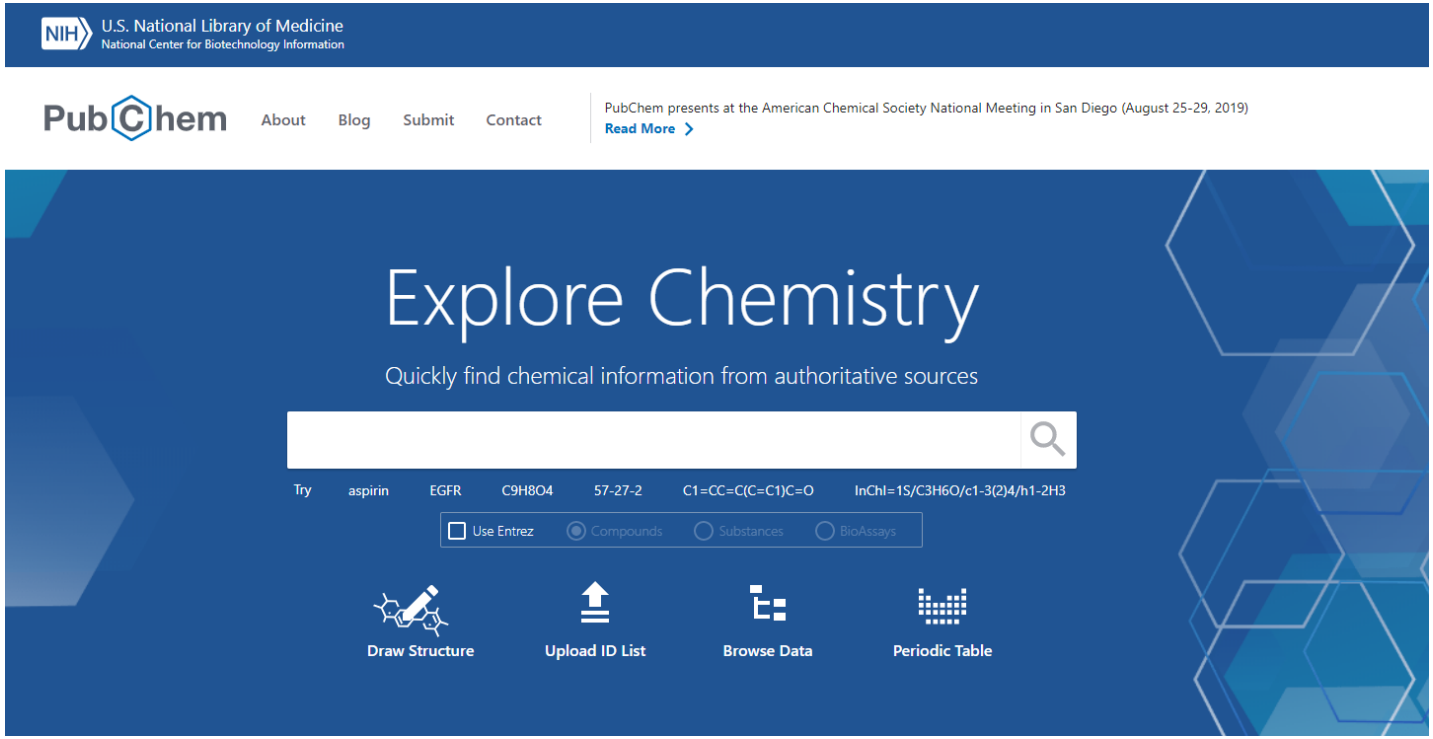
Harmful to Land Ecosystems – Can cause harm to land based plants, animals or microorganisms.

What safer alternatives are available for this chemical?

Find case studies related to substitutions for this chemical in SubsPORT, the substitution support portal.

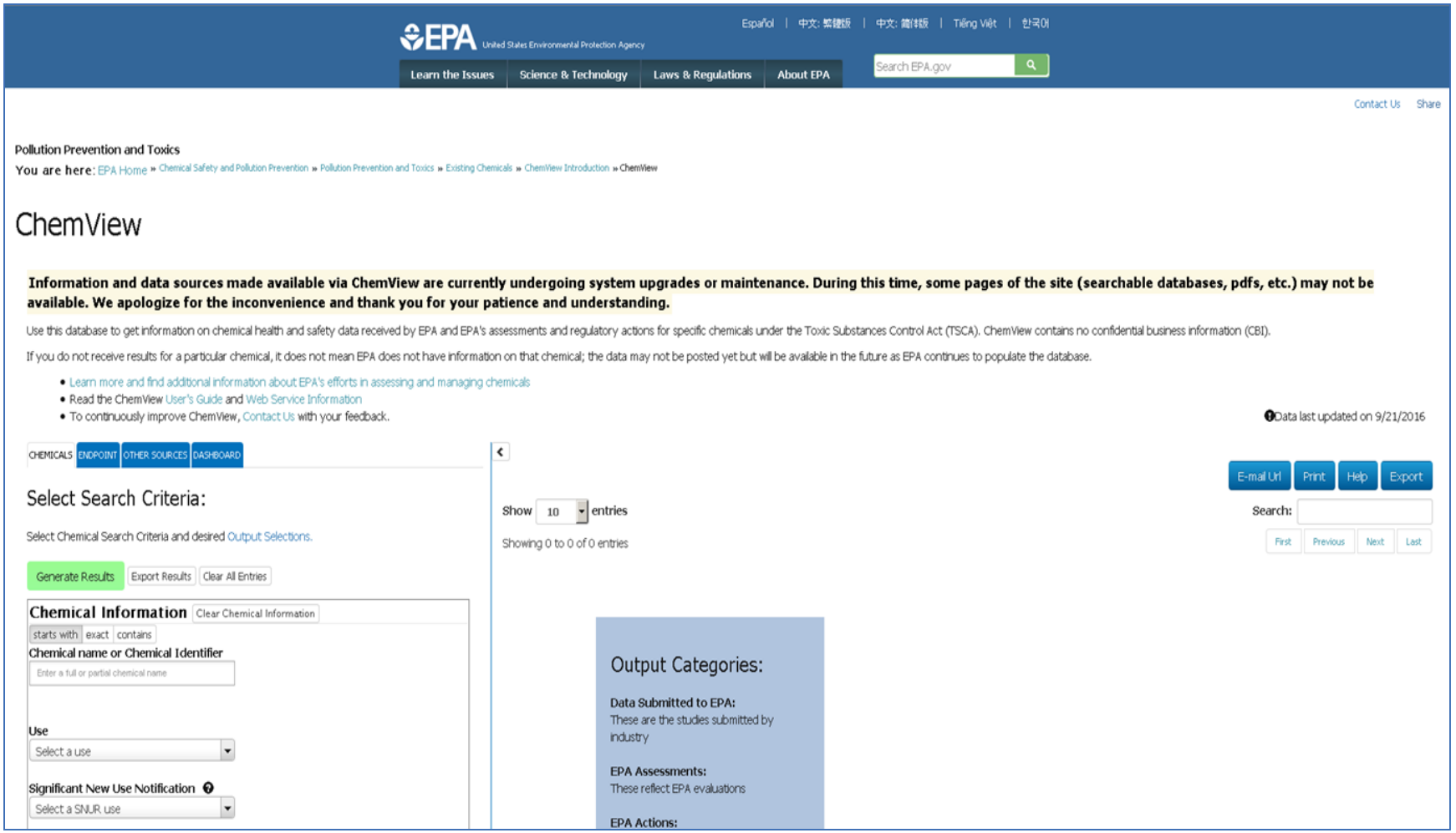
ChemHAT.org Designed *for* workers *by* workers.

TOXNET Transition

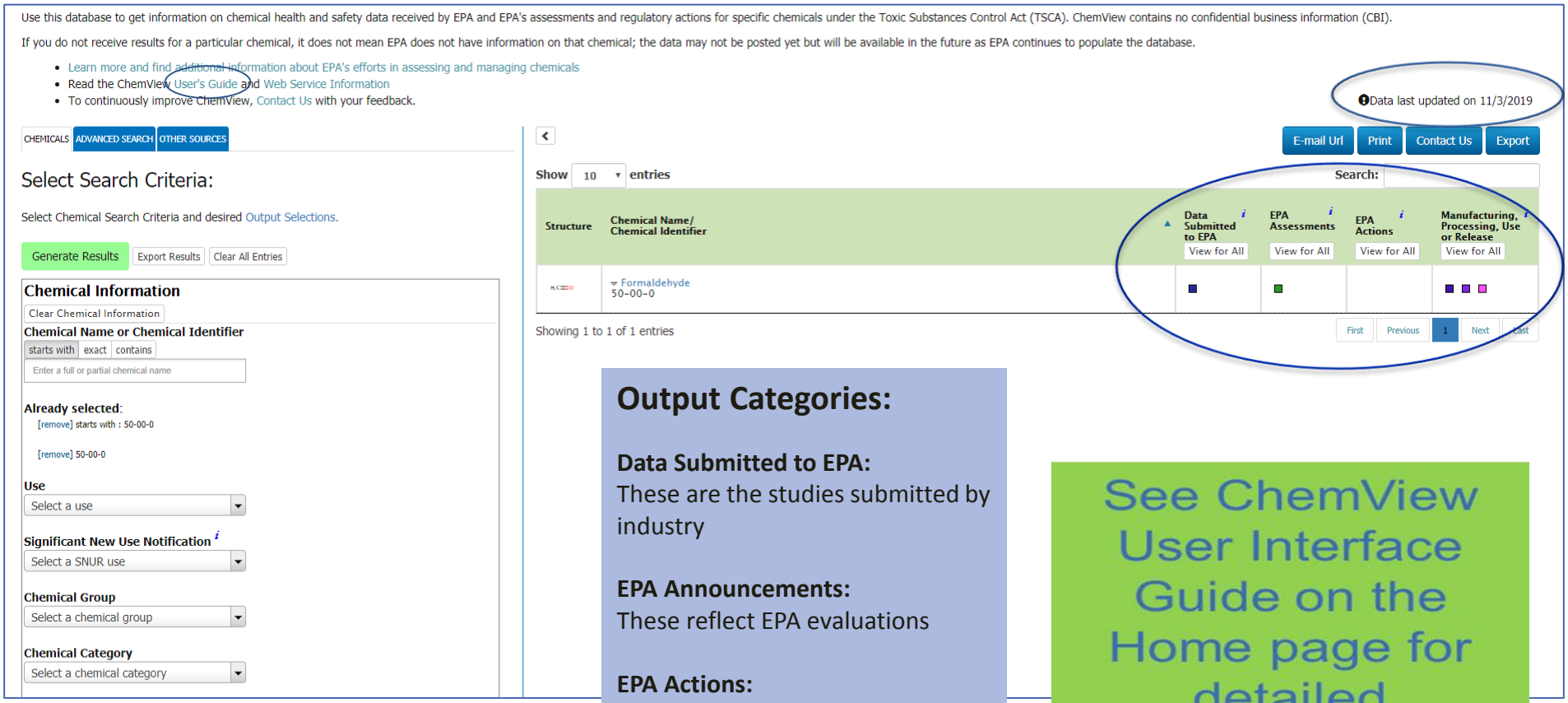


- Toxnet will be transitioning to PubChem, PubMed, and Bookshelf
- HSDB, ChemIDplus, TOXLINE, and DART will continue to be updated and integrated into PubChem
- Haz-Map, TOXMAP, TRI, CTD, Household Products Database, IRIS, and ITER will all be ***retired in December 2019***

EPA ChemView - Home



EPA ChemView - Results



Output Categories:

Data Submitted to EPA:
These are the studies submitted by industry

EPA Announcements:
These reflect EPA evaluations

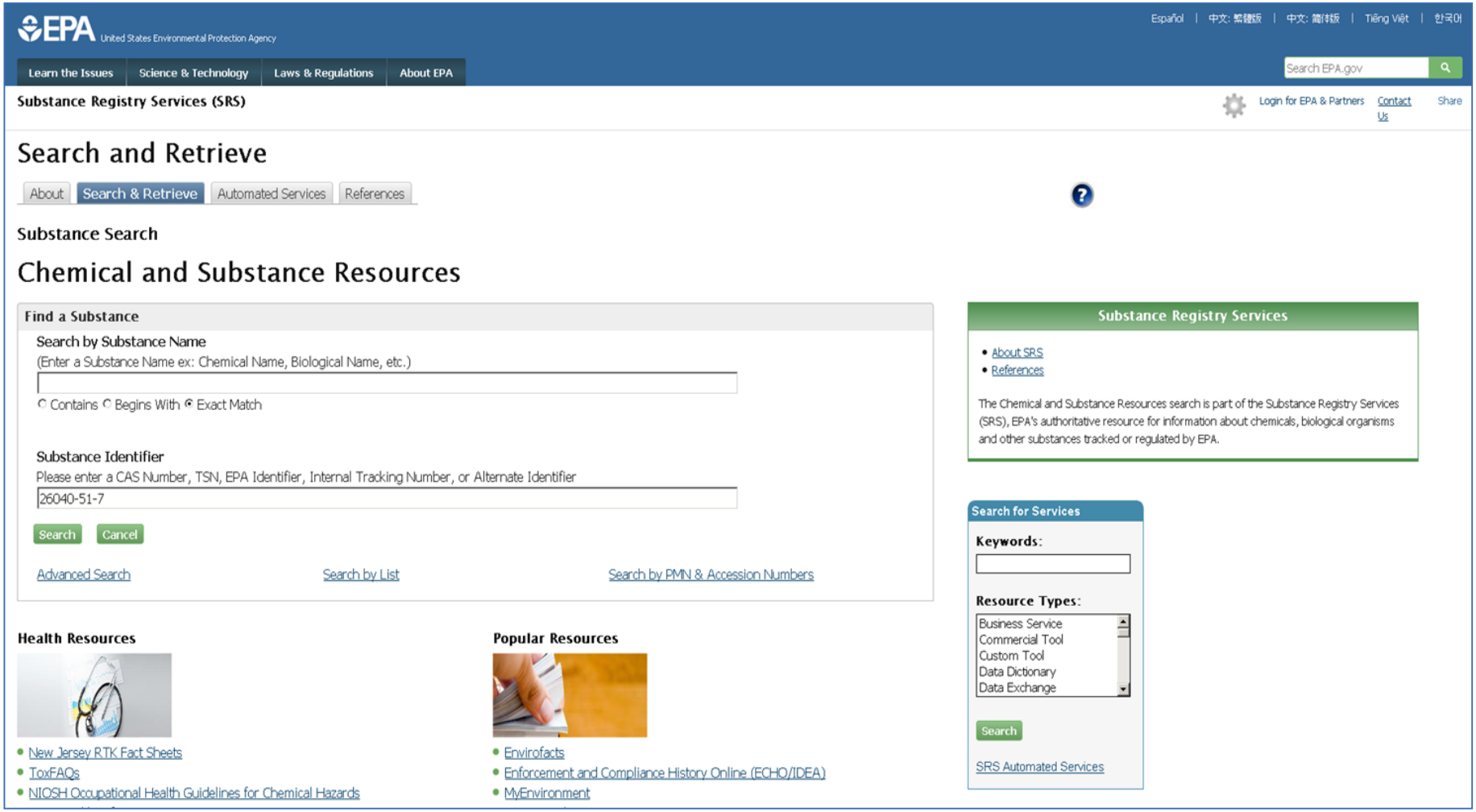
EPA Actions:
These are regulatory or non-regulatory actions based on an assessment of the chemical. The assessment is based on data and/or an analog of the chemical

See ChemView User Interface Guide on the Home page for detailed information on results

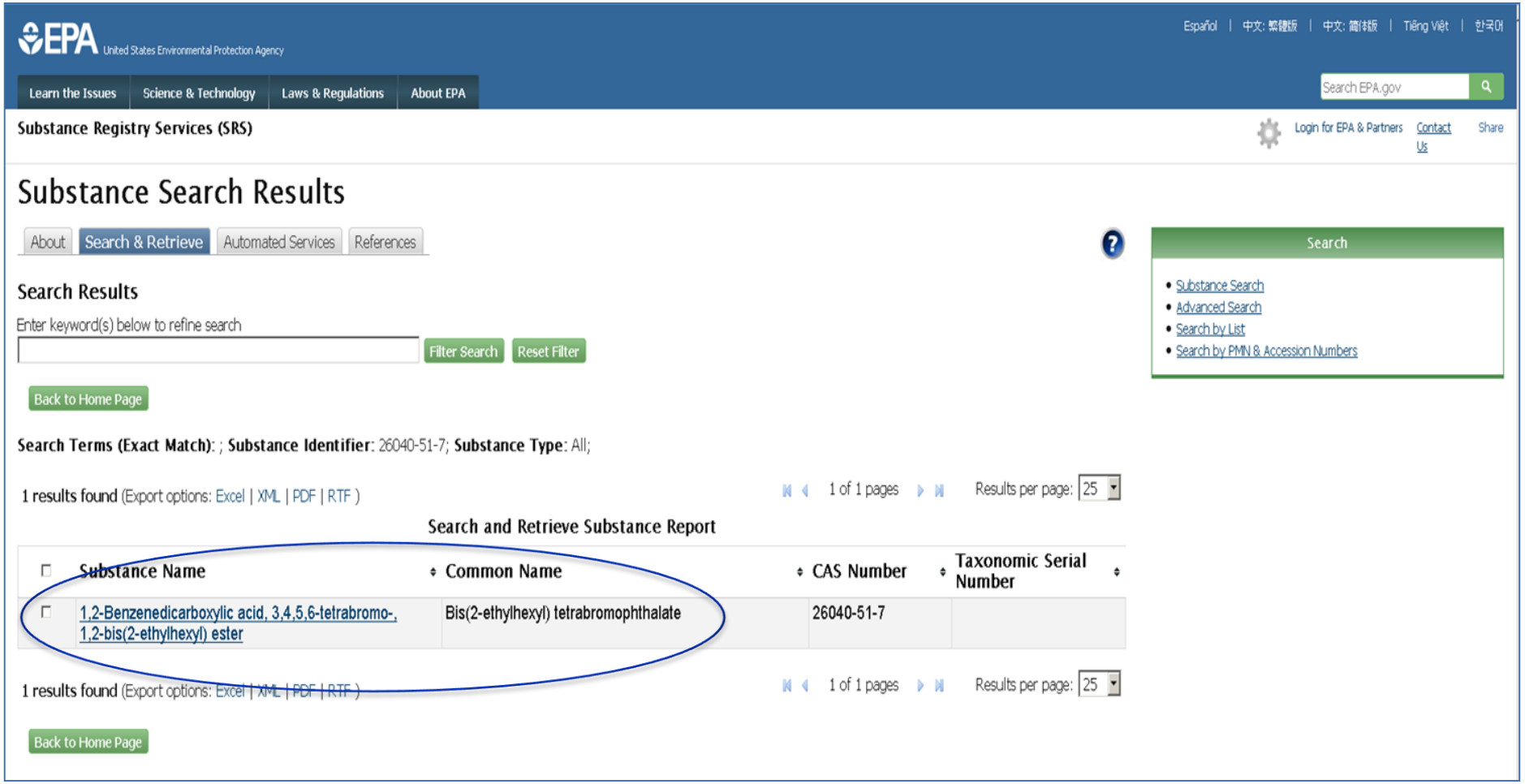
How can The Substance Registry System (SRS) help me?

- The Substance Registry System (SRS) can help you discover information about substances that are tracked or regulated at EPA.
- It can point to sources at EPA where you can find additional data about the substance.
- And the SRS can tell you which synonym for a substance is used by that program office.
- SRS is a one-stop resource for finding health and safety fact sheets or other information about a substance developed by other federal, state, or international organization.
- You can access SRS at: www.epa.gov/srs

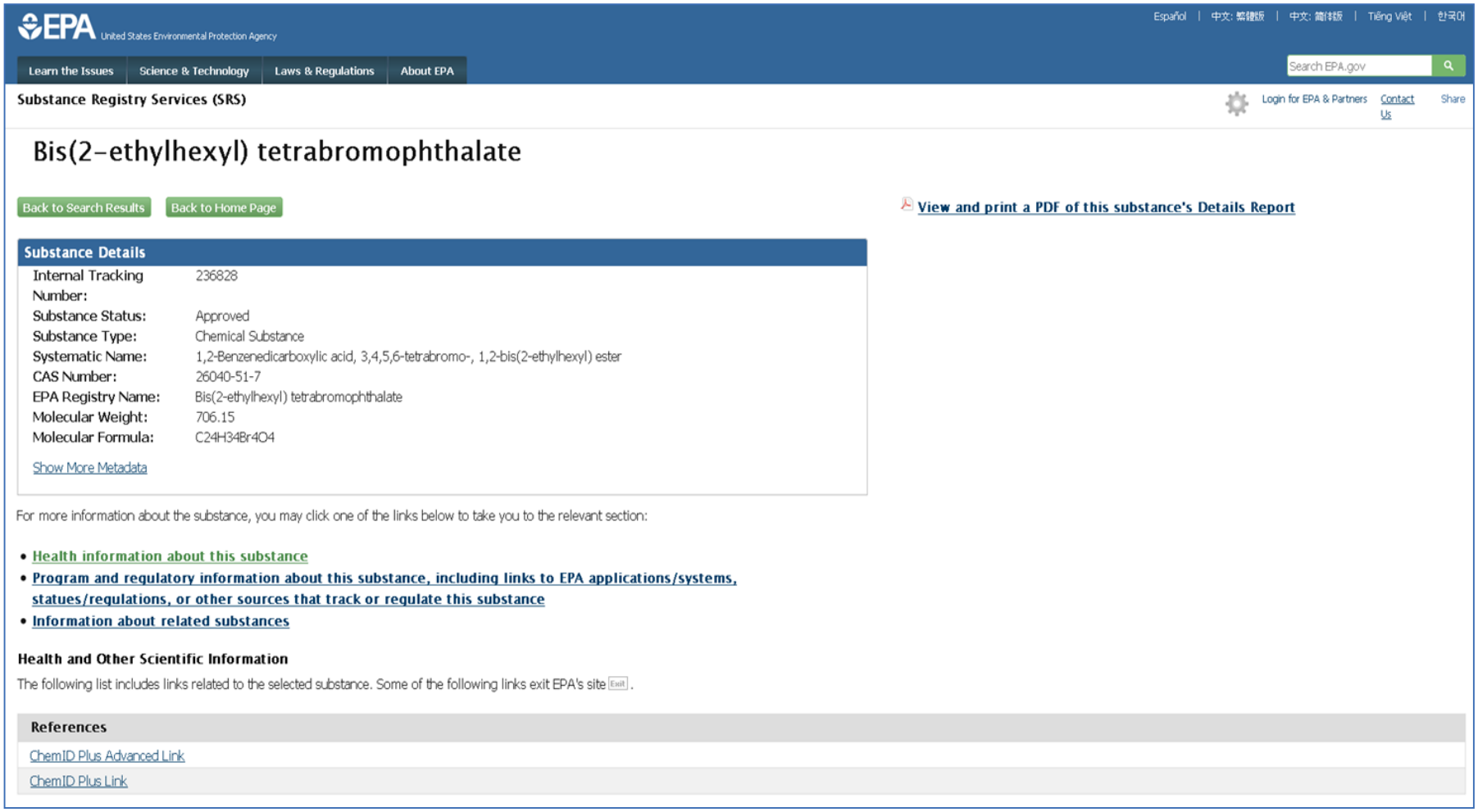
EPA – SRS - Home



EPA – SRS – Results



EPA – SRS – Results (cont.)



EPA – SRS – Results (cont.)

Program and Regulatory Information

Statutes/Regulations

Below are the EPA applications/systems, statutes/regulations, or other sources that track or regulate this substance. This table shows how each list refers to the substance. To view more metadata about the specific Synonym, click on the Synonym.

Statutes/Regulations	Synonym	Synonym Quality	Effective Date	End Date
2016 CDR TSCA Inv	Bis(2-ethylhexyl) tetrabromophthalate	Valid		
TSCA Inv	1,2-Benzenedicarboxylic acid, 3,4,5,6-tetrabromo-, 1,2-bis(2-ethylhexyl) ester	Valid		

EPA Applications/Systems

Below are the EPA applications/systems, statutes/regulations, or other sources that track or regulate this substance. This table shows how each list refers to the substance. To view more metadata about the specific Synonym, click on the Synonym.

EPA Applications/Systems	Synonym	Synonym Quality	Effective Date	End Date
2012 CDR	1,2-Benzenedicarboxylic acid, 3,4,5,6-tetrabromo-, bis(2-ethylhexyl) ester	Valid		
2012 CDR	Phthalic acid, tetrabromo-, bis(2-ethylhexyl) ester	Valid		
GCES	Phthalic acid, tetrabromo-, bis(2-ethylhexyl) ester	Valid		
HPVC List	Phthalic acid, tetrabromo-, bis(2-ethylhexyl) ester	Valid		
HPVIS	1,2-Benzenedicarboxylic acid, 3,4,5,6-tetrabromo-, bis(2-ethylhexyl) ester	Valid		
TSCA Inv Syns	Phthalic acid, tetrabromo-, di(2-ethylhexyl) ester	Valid		

Other Sources

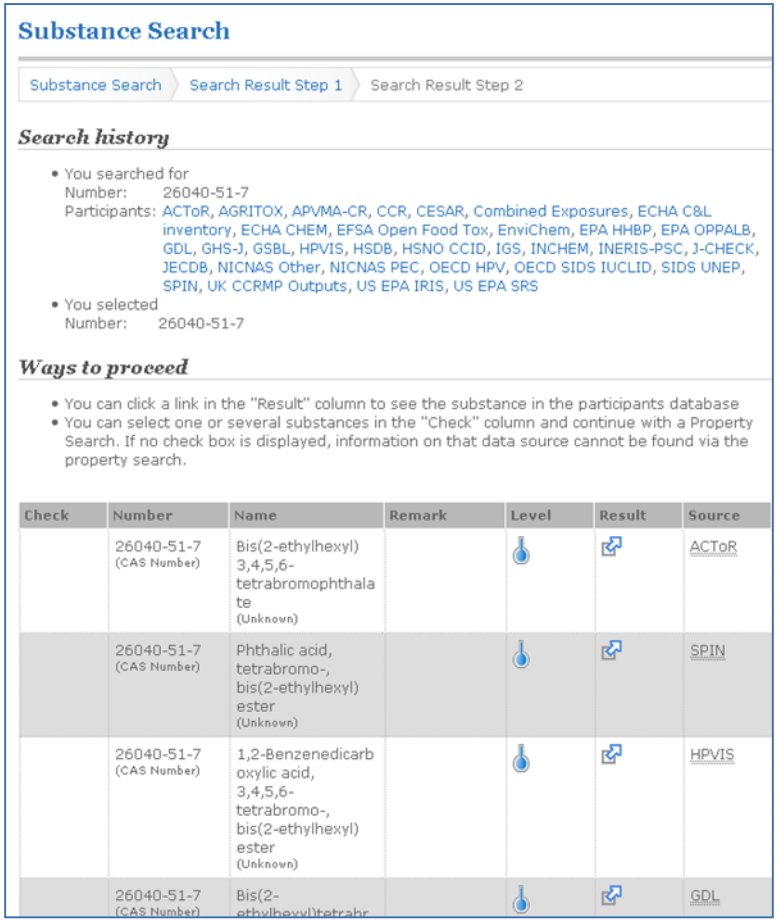
Below are the EPA applications/systems, statutes/regulations, or other sources that track or regulate this substance. This table shows how each list refers to the substance. To view more metadata about the specific Synonym, click on the Synonym.

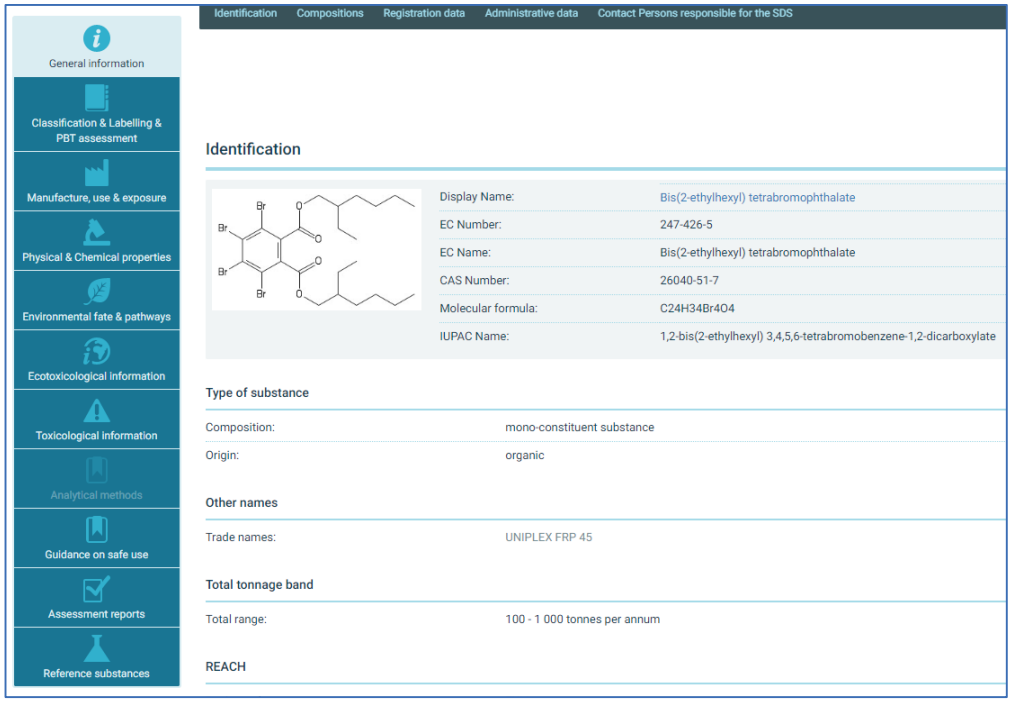
Other Sources	Synonym	Synonym Quality	Effective Date	End Date
CUS98	1,2-Benzenedicarboxylic acid, 3,4,5,6-tetrabromo-, bis(2-ethylhexyl) ester	Valid		
CA Index	1,2-Benzenedicarboxylic acid, 3,4,5,6-tetrabromo-, 1,2-bis(2-ethylhexyl) ester	Valid	01/20/2010	
ChemIDStd	Bis(2-ethylhexyl) tetrabromophthalate	Valid		
CUS94	Phthalic acid, tetrabromo-, bis(2-ethylhexyl) ester	Valid		
CUS02	1,2-Benzenedicarboxylic acid, 3,4,5,6-tetrabromo-, bis(2-ethylhexyl) ester	Valid		
CUS90	Phthalic acid, tetrabromo-, bis(2-ethylhexyl) ester	Valid		

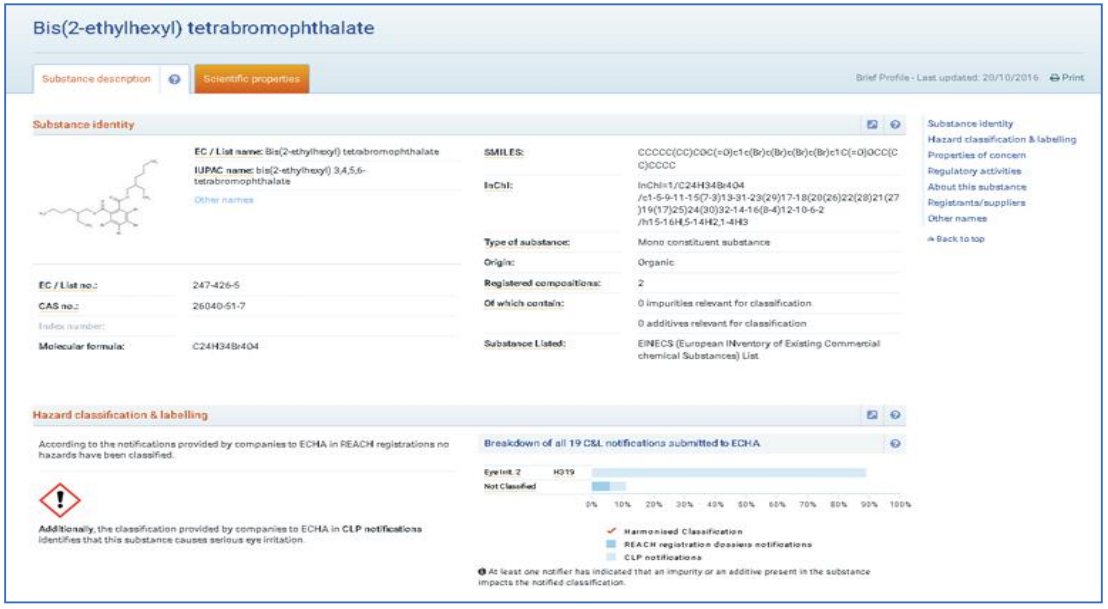
Ad Hoc List

Ad Hoc List	Synonym	Synonym Quality	Effective Date	End Date

ECHA REACH Database & OECD eChem Portal

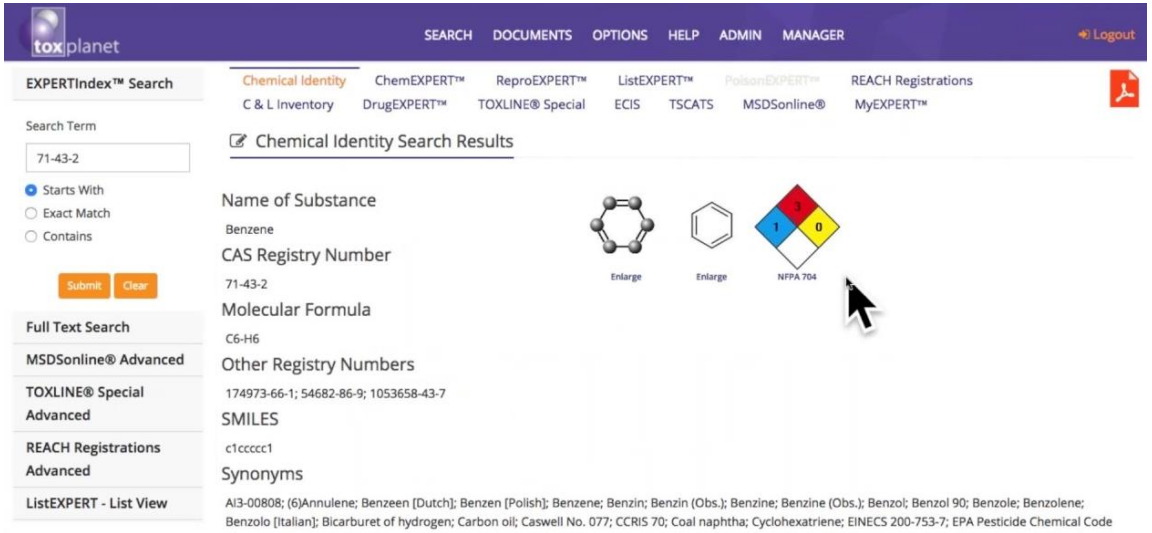




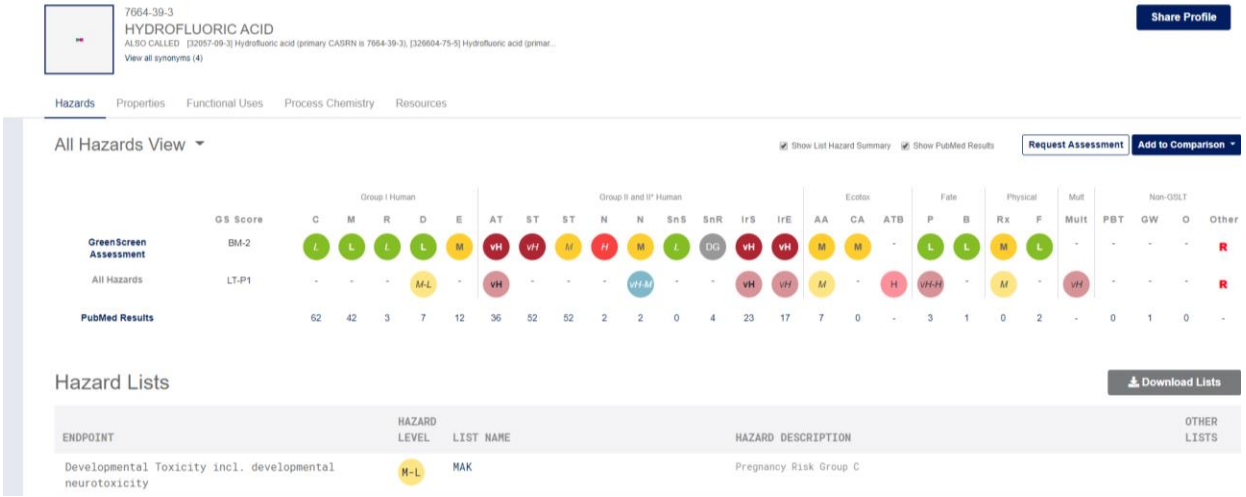


Databases Available Through the TURI Library

toxplanet



Pharos



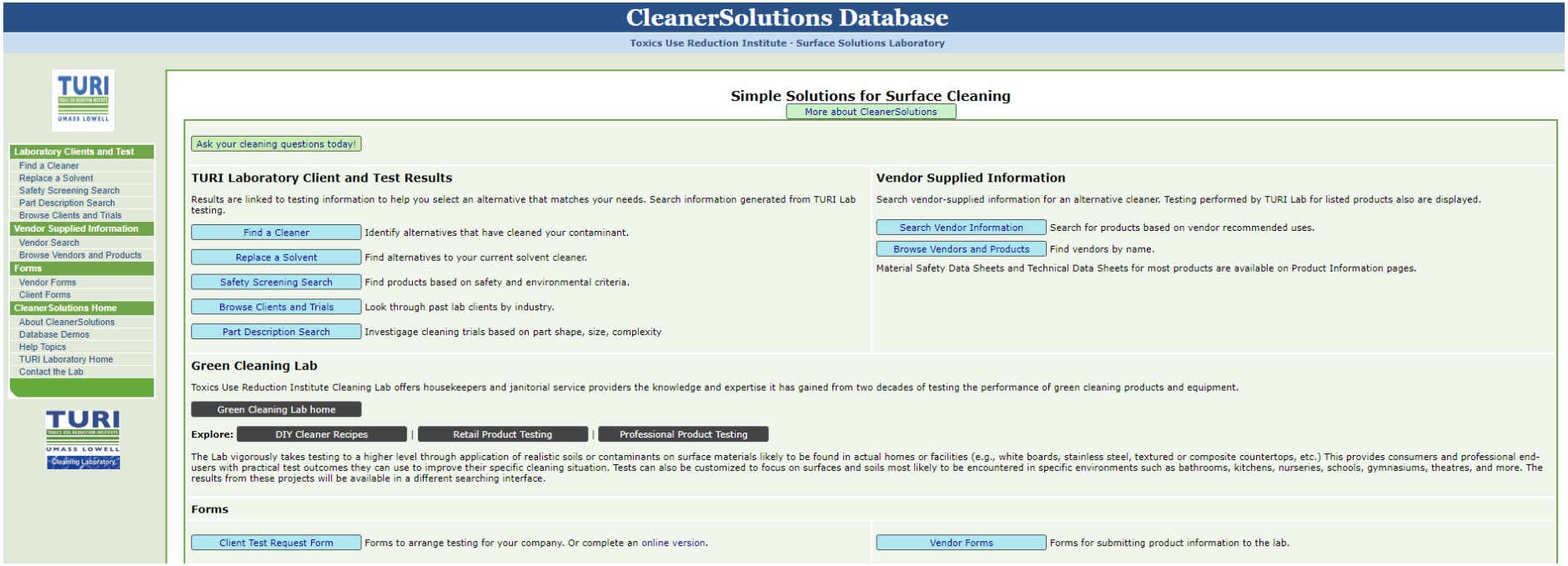
Identifying and Evaluating TUR Options

- Where do I start?
- How can I find alternatives specific to my process and application?
- What tools to use to screen alternative chemistries?

Cleaner Solutions

- Database of chemicals tested in the lab over the last 25 years
- Performance results
- Quick hazard screening “safety score”
- “Replace a solvent” option allows for you to select the substrate, contaminant, process/equipment, and chemical you want to replace.

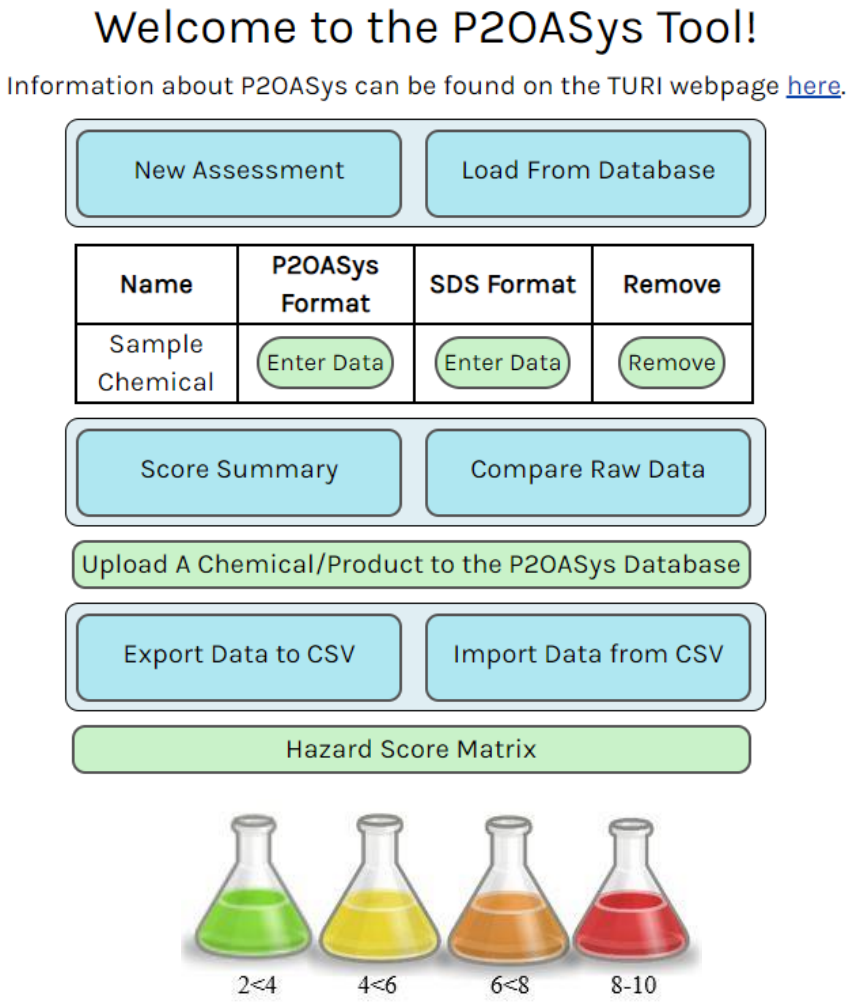
CleanerSolutions Database



- If its not there, call the lab and they can test it for you!
- https://www.cleanersolutions.org/

Pollution Prevention Options Analysis System (P2OASys)

- Use P2OASys to evaluate your alternatives!
- By using P2OASys, unforeseen negative environmental, worker or public health impacts may be identified prior to adopting the proposed changes.
- https://p2oasys.turi.org/



Activity #2

- Searching online resources
- Using TURI tools to identify and evaluate safer alternatives

Questions? Final Thoughts?

- Cleaner Solutions Upgrade
- P2OASys Upgrade
  - Updated information options
    - User friendly?
    - Load from database
    - Chronic Hazard, etc…

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