

An Interactive Web-Based Approach to Risk Assessment for Resource Efficiency and Public Health Protection: State Environmental Agency Risk Collaboration for Harmonization (SEARCH)

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Abstract

U.S. state environmental agencies are charged with making risk management decisions that protect public health and the environment while managing limited technical, financial, and human resources. Meanwhile, the federal risk assessment community that provides risk assessment guidance to state agencies is challenged by the rapid growth of the global chemical inventory. When chemical toxicity profiles are unavailable on the U.S. Environmental Protection Agency's Integrated Risk Information System (IRIS) or other federal resources, each state agency must act independently to identify and select appropriate chemical risk values for application in human health risk assessment. This practice can lead to broad interstate variation in the toxicity values selected for any one chemical, and calls into question the scientific credibility of health risk assessments based on these values. Within this context, this paper describes the decision-making process and resources used by states in the absence of federal guidance. The risk management of trichloroethylene (TCE) in the U.S. serves as a useful case study to demonstrate the need for a collaborative approach toward identification and selection of chemical risk values. The regulatory experience with TCE is contrasted with collaborative risk science models, such as the European Union's efforts in risk assessment harmonization. Finally, we introduce State Environmental Agency Risk Collaboration for Harmonization (SEARCH), a free online interactive tool designed to help create a collaborative network among state agencies to provide a vehicle for efficiently sharing information and resources, and for the advancement of harmonization in risk values used among U.S. states.

The Challenges

State environmental agencies are facing real challenges that impact risk decisions.

- Limited technical, financial, and human resources.
- Chemical data gaps due to the large number of substances currently in use.
- Untimely dissemination of toxicological data through IRIS.

Current Approach

Interstate Technology & Regulatory Council (2008)
Hierarchy of human health data

Tier 1

EPA's Integrated Risk Information System (IRIS) values. The chemicals listed in IRIS have undergone peer review and are continuously re-reviewed.

Tier 2

EPA's Provisional Peer-Reviewed Toxicity Values (PPRTVs). The Office of Research and Development/National Center for Environmental Assessment/Superfund Health Risk Technical Support Center develops PPRTVs on a chemical-specific basis when requested by EPA's Superfund program for use in site-specific risk assessments. PPRTVs are developed in a shorter period of time, and although these assessments undergo external peer review, their development does not include a multi-program consensus review as is done with the IRIS assessments.

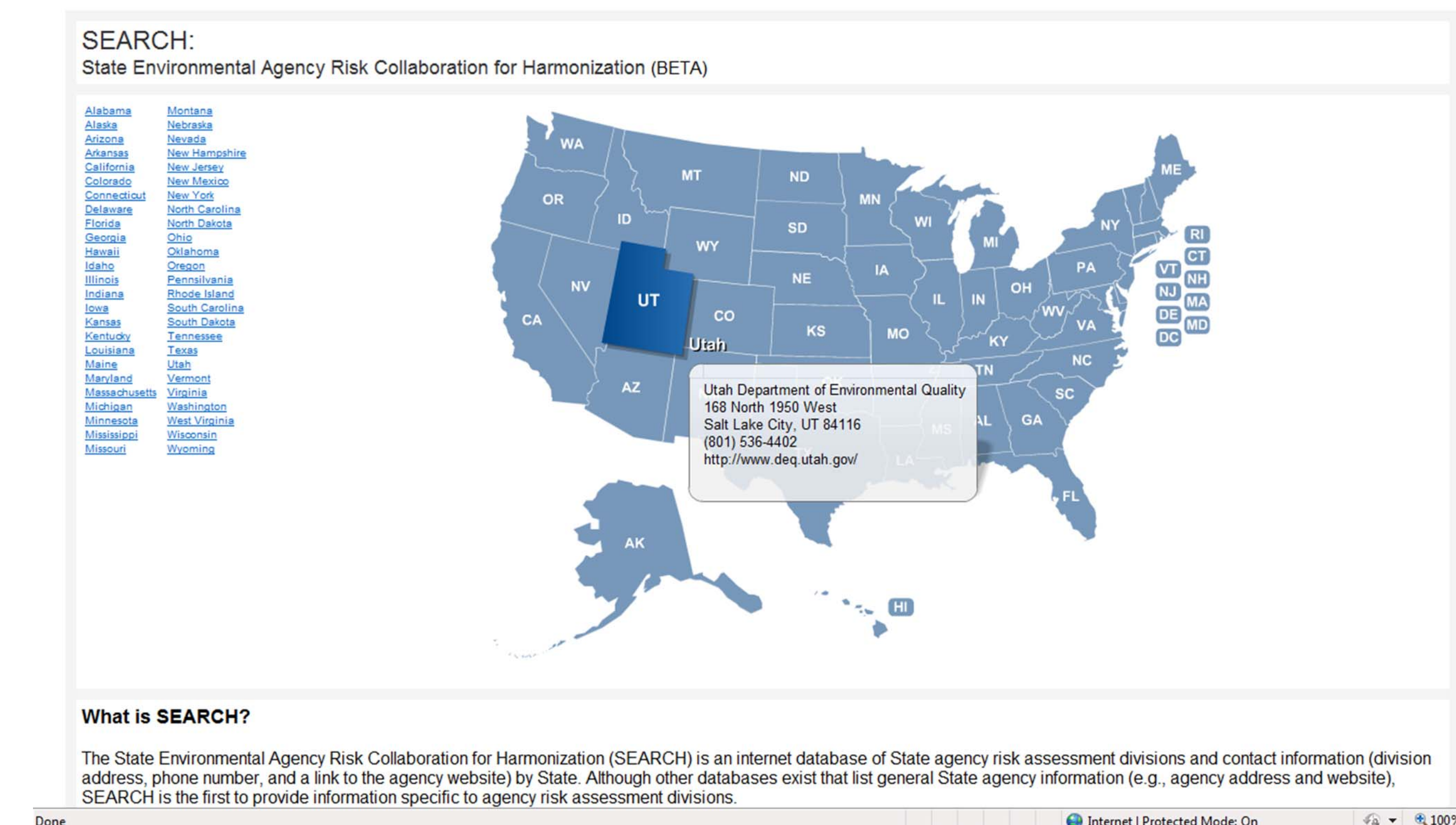
Tier 3

Other Toxicity Values. This tier includes additional EPA/non-EPA sources of toxicity information. Priority should be given to sources of information that are most current, peer-reviewed, transparent, and publicly available. Example sources include the California Environmental Protection Agency (CalEPA) toxicity values, the Agency for Toxic Substances and Disease Registry (ATSDR) minimal risk levels, and Health Effects Assessment Summary Tables (HEAST) values.

The Case of Trichloroethylene (TCE)

The case of TCE helps demonstrate the need for a new approach. In 1989, EPA withdrew toxicity values from Integrated Risk Information System (IRIS). In 2001, EPA's National Center for Environmental Assessment (NCEA) issued a draft in 2001, but it was challenged and not finalized. States continued to address ongoing clean-up decision-making despite not having federal guidance. In 2007, Indiana Department of Environmental Management (IDEM) surveyed states to provide insight as to how states approached the situation. The survey revealed that:

- States work independently in selecting or deriving TCE risk values
- Large disparities in toxicity values (reference dose values differed by three orders of magnitude, slope factors differed by two orders of magnitude)
- Variety of toxicological sources are used, some outdated



State Environmental Agency Risk Collaboration for Harmonization (SEARCH)

A first and critical step toward collaboration is increasing communications among State agencies. SEARCH is to our knowledge the only Internet database that identifies state agency risk assessment divisions and contact information by state.

SEARCH will ensure that state risk assessors can access this information quickly by providing a direct contact to the division or department responsible for risk assessments within each state, thereby facilitating communications among state risk assessors and encouraging states to share risk information.

SEARCH is free and easily accessible at:

www.allianceforrisk.org/SEARCH.html

Summary Statistics for RfDi, RfDo, SFi, and SFo				
Statistic of Interest	RfDi mg/kg-day	RfDo mg/kg-day	SFi (mg/kg-day) ¹	SFo (mg/kg-day) ¹
No. of States with No Value Specified	8	9	2	2
No. of Values	44	42	51	50
MEAN	0.04	0.02	0.21	0.20
MEDIAN	0.011	0.0003	0.322	0.090
Most Conservative Value	0.00567	0.0003	0.4	0.4
No. of States Using Most Conservative Value	2	25	24	23
% of States Using Most Conservative Value	-4.6	-60	-47	46
Least Conservative Value	0.17	0.5	0.00595	0.00572
No. of States Using Least Conservative Value	7	1	1	1
% of States Using Least Conservative Value	-16	-2.4	-2.0	2.0
Magnitude of Difference	-30	-1700	-67	-70

NOTES:
¹Mean and Median exclude states with no value specified.
²% of States Using calculated by dividing "No. of States Using" by "No. of Values".
³Magnitude of Difference = LOG10("Least Conservative" / "Most Conservative").

SEARCH Data Collection

Conducted a web search to identify agency contacts for each of the 50 states.

E-mailed each state agency contact with 4 questions:

- Identify risk assessment division & provide contact information
- Provide input for resources they would find useful in the map
- List any databases that to their knowledge resembled ours
- Would they allow us to contact again for further input

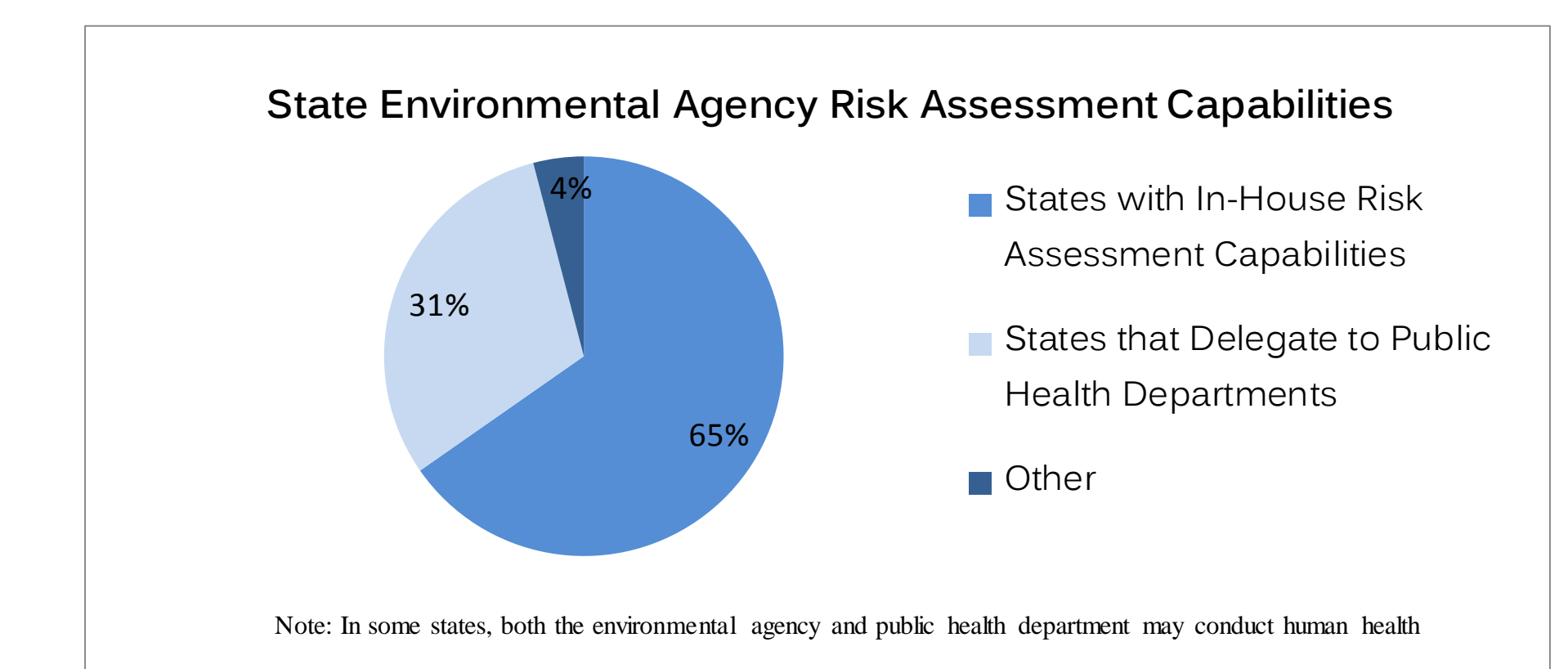
State Survey Outcome

41 states responded

States showed much enthusiasm about this tool

Example suggestions for future expansion of SEARCH:

- List of risk values by state & assumptions (21 states)
- State-specific risk guidance documents & policies



Collaboration

SEARCH represents a step toward collaboration. With limited funding, in-house expertise, and technical resources, state efforts to protect public health will benefit from improved inter-organizational communication. A collaborative approach will:

- Increase communications & improve problem solving
- Avoid duplicating efforts
- Enhance resource efficiency & effectiveness
- Produce more measureable results
- Lead to harmonization of risk values
- Result more protective of public health