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Strategy for Conducting Literature Searches for 1-Bromopropane (1-BP): Supplemental Document to the TSCA Scope Document

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1 Overall Approach

This appendix describes EPA/OPPT's initial methods, approaches and procedures for identifying, compiling, and screening publicly available information supporting TSCA risk evaluation for 1-bromopropane (1-BP). The literature searches were conducted by EPA¹ and contractor² staff for the following seven broad topic areas:

1. Physical/chemical properties (hereafter "pchem properties"),
2. Conditions of use of 1-BP, including known, intended, and reasonably foreseen industrial, commercial, and consumer uses,
3. Fate and transport in the environment (hereafter "fate"),
4. Chemical engineering, occupational exposure and environmental releases (hereafter "engineering"),
5. General population, consumer, and ecological exposure (hereafter "exposure"),
6. Human health hazard identification and dose-response (hereafter "human health hazard"), and
7. Environmental hazard identification and concentration-response (hereafter "environmental hazard")

The following steps were generally conducted, with the exception of topic areas #1, 2 and 7:

1. Define the specific objectives of the literature search as part of the overall systematic review
2. Develop specific search strategies and execute search
3. Develop inclusion/exclusion criteria to determine which search results are "on-topic" versus "off-topic"
4. Develop topic-specific categories (or tags) to further categorize the search results
5. Screen literature search results
6. Validate the search strategy and tagging procedure (ongoing)

EPA¹ and contractors² worked simultaneously to conduct the literature searches and leveraged existing information, wherever possible, to facilitate the data gathering effort supporting the risk evaluation. The current process included the following:

- EPA/OPPT chemists conducted the literature searches for pchem properties (topic area #1, Section **Error! Reference source not found.**) using an approach similar to the one used in the TSCA New Chemicals Program, but not the steps described above. When applicable, the chemists relied on literature already gathered in previous EPA/OPPT assessments to support the characterization of pchem properties.

¹ EPA staff supported the literature searches for topic areas 1 and 2.

² ICF supported the literature searches for topic areas 3 to 6. ERG supported supplemental searches under topic area #4 to develop the life cycle diagrams. CSRA supported the literature search for ecological data under topic area #7.

- EPA/OPPT staff consulted a variety of sources to identify conditions of use (topic area #2) and to develop the *Preliminary Information on Manufacturing, Processing, Distribution, Use and Disposal for 1-Bromopropane* (hereafter “public use documents”)³. Though the strategy did not include all the steps described above, EPA/OPPT included information reported to EPA, literature searches, trade publications, and reports developed for prior EPA and international assessments. These public use documents were used to elicit public feedback on conditions of use of the priority chemicals during and following a public meeting on February 14, 2017. Relevant public input was incorporated into this chemical’s scope document.
- Searches for the fate, exposure, engineering and human health literature (topic areas #3 to 6) were conducted to (1) support the development of the initial life cycle and conceptual model diagrams, and (2) broadly capture information that would be necessary for preparing the environmental and occupational exposure and risk assessments⁴. These searches followed the steps described above.
- EPA/OPPT searched and screened the ecological literature following well accepted methods, approaches and procedures established for the ECOTOX knowledge base and used in EPA’s ecological risk assessments⁵ (topic area #7). In general, the process was similar to the one outlined above.

Subsequent sections describe the steps undertaken for each of these topic areas, with additional detail provided in the Appendices. Since the strategies for topic areas 3, 4, 5 and 6 (i.e., fate, engineering, exposure, and human health hazard) are similar, their strategies are in the same section.

The results of the initial search based on title and abstract screening can be found in the “1-Bromopropane (CASRN: 106-94-5) Bibliography: Supplemental File for the TSCA Scope Document”. EPA/OPPT is currently evaluating the performance of the search and screening strategy (step 6) prior to commencing full-text screening. The literature search strategy may be refined and updated as the assessment progresses. Also, EPA/OPPT anticipates refinements to the literature search and screening strategy across chemicals to optimize the process for future chemicals.

2 Step 1: Define Specific Objectives for the Searches

The information needs for each topic area were developed to translate the broad regulatory mandate of TSCA into questions that could be clearly addressed with the literature search. Table 2-1 Table 2-1 provides a broad overview of the information needs for each topic area. A

³ Initial compilation of data and/or information reported in the *Preliminary Information on Manufacturing, Processing, Distribution, Use and Disposal for 1-Bromopropane* released as part of the background materials for the public meeting on risk evaluation scoping efforts under TSCA for 10 chemical substances (February 14, 2017; <https://www.epa.gov/assessing-and-managing-chemicals-under-tsca/public-meeting-risk-evaluation-scoping-efforts-under-0>).

⁴ Topic areas #2 and #4 complement each other.

⁵ ECOTOX database: <https://cfpub.epa.gov/ecotox/>. EPA’s Office of Pesticides (OPP) and the Office of Research and Development (ORD) frequently use ECOTOX for ecological risk assessments.

full list of information needs is provided in Appendix A for most of the topic areas. Note that general information needs for pchem properties, information on conditions of use and environmental hazard are in Table 2-1, but not in Appendix A. The ECOTOX standard operating procedures (SOPs) provide details about the information needs driving the ecological literature searches⁶.

Table 2-1. Overview of Literature Search for 1-Bromopropane (1-BP) across All Topic Areas

| Discipline | Information needs |
|--------------------------------|--|
| Physical/Chemical Properties | <ul style="list-style-type: none"> Collection of pchem properties to inform the fate, exposure and hazard assessments of the risk evaluation |
| Conditions of Use ¹ | <ul style="list-style-type: none"> Known, intended, and reasonably foreseen conditions of use, including manufacturing, processing, distribution, industrial, commercial and consumer uses, and disposal |
| Fate | <ul style="list-style-type: none"> Environmental mobility Environmental degradation Bioaccumulation and environmental persistence Wastewater removal processes |
| Engineering | <ul style="list-style-type: none"> Lifecycle and process related information Environmental releases Occupational exposure |
| Exposure | <ul style="list-style-type: none"> Lifecycle information to inform general population and consumer exposures Media concentrations in the environment Biomonitoring data Information to identify potentially exposed and susceptible subpopulations |
| Human Health Hazard | <ul style="list-style-type: none"> Information about health hazards including critical health effects and corresponding points of departure, associated with exposure via all routes, durations, sources, and pathways Characterization of exposure for general and potentially exposed and susceptible subpopulations Toxicokinetics Mode of action (MOA) Information to identify potentially exposed and susceptible subpopulations² |
| Environmental Hazard | <ul style="list-style-type: none"> Information about environmental hazard s associated with acute and chronic toxic effects on aquatic and terrestrial species |

Notes:

1. The initial literature search and compilation of data and/or information are in the *Preliminary Information on Manufacturing, Processing, Distribution, Use and Disposal for 1-Bromopropane* released to the public in February 2017 as part of the background materials for the public meeting on risk evaluation scoping efforts under TSCA for 10 chemical substances (February 14, 2017; Docket ID EPA-HQ-OPPT-2016-0723 at regulations.gov and also at <https://www.epa.gov/assessing-and-managing-chemicals-under-tsca/public-meeting-risk-evaluation-scoping-efforts-under-0>). Also, EPA’s “Use and Market Profile for 1-Bromopropane” contains data and/or information on conditions of use in the scope document (EPA, 2017b).
2. Literature search for identifying potentially exposed and susceptible subpopulations was designed to be broad to capture information about possible susceptible subpopulations such as infants, children, pregnant women, and elderly.

⁶ ECOTOX and related SOPs (<https://cfpub.epa.gov/ecotox/help.cfm?helptabs=tab4>)

3 Step 2: Develop Search Strategies

EPA/OPPT considered different categories of data sources when developing the search strategies:

1. Existing problem formulations, draft or final assessments completed by U.S. government agencies (e.g., EPA IRIS assessments⁷),
2. Databases containing peer-reviewed literature (e.g., PubMed, Web of Science),
3. Gray literature, which is defined as the broad category of studies not found in standard, peer-reviewed literature databases (e.g., PubMed). Gray literature includes studies that are difficult to find in conventional bibliographic databases, such as white papers, conference proceedings, technical reports, reference books, dissertations, and information on various stakeholder websites.

Error! Reference source not found. provides an overview of the search strategies for 1-BP. Additional details, including full lists of search terms and sources, are provided in Appendix B (peer reviewed literature) and Appendix C (gray literature).

Table 3-1. Overview of Search Strategies for 1-Bromopropane (1-BP) by Topic Area and Source Type

| Discipline | Use of Existing Assessments ¹ | Peer-Reviewed Literature Database Search Strategies | Gray Literature Search Strategies |
|---------------------------------|---|--|--|
| Physical/Chemical Properties | EPA/OPPT Existing Chemical Assessment | Databases: public databases that redirect to primary sources; see “Search Strategies for Physical/Chemical Properties” section Date limit: none Key Words: CAS Registry Number (CASRN), chemical name, and chemical structure | Sources: public databases; see “Search Strategies for Physical/Chemical Properties” section Date limit: none Key words: CAS Registry Number (CASRN), chemical name, and chemical structure |
| Conditions of Use | EPA/OPPT Existing Chemical Assessment | Databases: see “Search Strategies for Conditions of Use” section Date limit: Safety Data Sheets: 2000; see “Search Strategies for Conditions of Use” section Key Words: CAS Registry Number (CASRN), chemical names, synonyms, trade names, and common misspellings | Sources: list of resources; see “Search Strategies for Conditions of Use” section Date limit: none; “Search Strategies for Conditions of Use” section for more information Key words: CAS Registry Number (CASRN), chemical names, synonyms, trade names, and common misspellings |
| Fate, Engineering, and Exposure | EPA/OPPT Existing Chemical Assessment / ATSDR Toxicological Profile August 2016 | Databases: Web of Science Date limit: none; search conducted February 28, 2017 Key Words: See Appendix A | Sources: Curated list of resources; see Appendix B Date limit: none; search conducted February 7-28, 2017 Key words: Varies by source; see Appendix B |

⁷ Integrated Risk Information System (IRIS), <https://www.epa.gov/iris>

| | | | |
|----------------------|---------------------------------------|--|--|
| Human Health Hazard | NTP Report on Carcinogens (RoC) 2013 | Databases: PubMed, Web of Science, and Toxline Date limit: January 1, 2013 – February 14, 2017 Key Words: See Appendix A | |
| Environmental Hazard | EPA/OPPT Existing Chemical Assessment | Databases: Science Direct, Agricola, Toxline, Scifinder, Proquest. Refer to ECOTOX SOP ² Date limit: none; search conducted December 7, 2016 Key Words: See Appendix D | Sources: Curated list of resources, see Appendix D. Date limit: none; search conducted December 7, 2016 Key words: Varies by source; see Appendix D |

Notes:

¹ In general, EPA/OPPT existing chemical assessments, EPA’s IRIS assessments and ATSDR Toxicological Profiles were used if available. EPA/OPPT assessments may include draft or final TSCA Work Plan risk assessments and final problem formulations. When available, the EPA/OPPT assessments were used to identify pertinent references supporting pchem properties, fate, use, exposure and hazard information. In this case, EPA/OPPT considered, when pertinent, the data and/or information reported in the TSCA Work Plan Chemical Risk Assessment Peer Review Draft for 1-Bromopropane (<https://www.epa.gov/assessing-and-managing-chemicals-under-tasca/assessments-tasca-work-plan-chemicals>). An ATSDR Toxicological Profile and RoC has been developed for 1-BP. No IRIS assessment has been developed for 1-BP.

² *ECOTOX Literature Searches, Citation Identification and Skimming*
(<https://cfpub.epa.gov/ecotox/blackbox/help/ECOTOXLiteratureSearchesCitationIdentificationandSkimming.pdf>)

3.1 Search Strategies for Physical/Chemical Properties

Most of the physical/chemical (pchem) property searches were already conducted when EPA/OPPT was preparing the TSCA Work Plan chemical risk assessment peer review draft for 1-BP. The physical/chemical information pchem properties cited in this document was retained for the scope document unless the chemist found newer studies through supplemental searches between December 2016 and March 2017.

The general approach for determining pchem properties is to first search for the specific substance in question (using CAS Registry Number (CASRN), chemical name, or the chemical structure) by following an organized path of literature and database sources, starting with public databases such as STN and REAXYS online, which links directly to the primary references. Additional searches may be conducted using resources such as ChemSpider, which provides both measured and predicted values, with limited primary references. Values that are sought, as a minimum, for any physical/chemical pchem property search include: the physical state of the substance at ambient temperature (gaseous, liquid, or solid), melting point (MP) for solids, normal boiling point (BP) at 760 mmHg for liquids, vapor pressure (ideally at 25 °C), solubility in water (ideally at 25 °C) and octanol/water partition coefficient (log Kow).

3.2 Search Strategies for Conditions of Use

EPA/OPPT conducted internet searches between December 2016 and January 2017 to identify the conditions of use of 1-BP, using CAS numbers, chemical names, synonyms, trade names, and common misspellings. Various sources were searched including, but not limited to, information reported to EPA (e.g., Chemical Data Reporting⁸), trade publications, reports in the open literature, or citations in EPA and international assessments⁹. To identify formulated products, EPA searched for safety data sheets (SDS) using internet searches, EPA’s Chemical

⁸ Chemical Data Reporting (CDR) under TSCA: <https://www.epa.gov/chemical-data-reporting>

⁹ e.g., EPA/OPPT TSCA Work Plan assessments, <https://www.epa.gov/assessing-and-managing-chemicals-under-tasca/assessments-tasca-work-plan-chemicals>

and Product Categories (CPCat) data, the National Institute for Health's (NIH) Household Product Database, and other resources in which a SDS could be found. Each SDS was then cross-checked with company websites to make sure that each product SDS was current. The list of products was crosschecked with public data, publicly available literature, and trade publications to find known uses of 1-BP. SDS dated prior to 2000 were excluded if additional sources supporting their accuracy could not be located.

The full list of data sources for conditions of use information can be found in the public use document for 1-BP released as background material for the public meeting on February 14, 2017 (<https://www.regulations.gov/docket?D=EPA-HQ-OPPT-2016-0741>). EPA/OPPT also communicated with companies and industry groups to make sure the list of uses was correct, complete, and up-to-date. EPA/OPPT integrated into the scope document for this chemical relevant public input submitted to the docket for the public meeting (EPA-HQ-OPPT-2017-0002) and for this chemical, (EPA-HQ-OPPT-2016-0741), as well as information from other engagements with stakeholders. Summaries of the public engagement are in this chemical's docket (EPA-HQ-OPPT-2016-0741).

3.3 Search Strategies for Fate, Engineering/Occupational Exposure, Exposure, and Human Health Hazard

A broad search and a targeted search were conducted. The fate, engineering, exposure, and human health hazard topic areas were searched broadly to capture data and/or information that would be necessary for preparing the environmental and occupational exposure assessments. For the scope documents, a second targeted search was conducted to locate information needed to create the lifecycle diagrams and conceptual models. The first three sections below discuss the broad search, while the fourth describes the targeted lifecycle/conceptual model search.

3.3.1 Use of Existing Assessments

Where possible, EPA/OPPT used existing U.S. government assessments or summaries as a starting point for the literature searches when these assessments asked similar literature search questions to the current TSCA assessment. The 2013 NTP Report on Carcinogens (RoC) monograph on 1-BP was used as the starting point for the human health hazard searches; the search strategy is described.

The literature search for the majority of the primary literature for 1-BP was conducted using three online scientific databases: PubMed, Scopus, and Web of Science. An initial search was conducted and updated multiple times using monthly search alerts prior to submitting the draft monograph for peer review and prior to finalizing the monograph in September 2013. The search of computerized databases was supplemented by a review of general data sources for information pertaining to 1-BP and a review of potential sources for exposure-related information and physical-chemical properties. Additional searches referenced in the monograph include a search of a QUOSA-based library containing 6,000 occupational case-control studies, a special topic-focused search related to immunosuppression, and "cited reference" searches conducted in Web of Science on citations identified from authoritative reviews or other key papers.

All studies cited in the 2013 1-BP RoC monograph were evaluated as to whether they were on-topic for human health. A supplemental literature search was conducted to identify new literature published after the RoC monograph using the search strategy presented in Appendix B. PubMed, Web of Science, and Toxline were searched from January 1, 2009 to March 1, 2017.

Finally, EPA/OPPT conducted a draft risk assessment for 1-BP in April 2015. All citations cited in that document were included in the current search results and automatically tagged as “*on-topic*”.

3.3.2 Peer-Reviewed Literature Database Search Strategies

A professional librarian developed the database search strategies for each topic area by:

- 1) Considering search terms and data sources identified by EPA/OPPT’s assessment team,
- 2) Considering strategies used for human health hazard in RoC documents,
- 3) Incorporating known chemical synonyms for 1-BP (see Appendix B), and
- 4) Tailoring terms for each database to make use of any additional details or categories available in that database (e.g., MeSH terms for the PubMed search strategy and research areas for the Web of Science search).

Relevant subject headings and text words were crafted into a search strategy that was designed to maximize the sensitivity and specificity of the search results (Appendix B). Because each database has its own search architecture, the resulting search strategy was tailored to account for each database's unique search functionality. The search strategies were executed, and EPA/OPPT is in the process of assessing their performance (see Section 6).

Literature search results were imported into EndNote® reference management software to automatically remove duplicates. Since EndNote may not remove all duplicates, additional duplicates were identified and removed manually by comparing fields (e.g., title, author, year). All of the unique references were then sent to Health & Environmental Research Online (HERO)¹⁰, where they were assigned a unique HERO ID linked to their citation information.

3.3.3 Gray Literature Search Strategies

Automated searches were used to gather information from the gray literature using Google API (application program interface), with custom code to “scrape” (i.e., locate and download) all the targeted PDFs (e.g., NIOSH Health Hazard Evaluations). Some sites required manual searching, including databases and those with internal search functions (see Table_Apx C-2). The complete list of sites and search methods is in Appendix C.

The following data sources were considered when generating the list of websites/sources to search:

- Lists of sources identified by EPA/OPPT’s assessment team,
- U.S. and International Government and Non-Government Organizations (NGOs) websites,
- Chemical/production dictionaries/encyclopedias,
- References used for the searches for conditions of use identified in EPA/OPPT’s public use documents,

¹⁰ EPA/OPPT plans to use the HERO database for the draft risk evaluation, <https://hero.epa.gov/hero/>

- State government websites covering environmental quality/management, environmental health/human health, and occupational health and safety,
- Trade Associations websites of member organizations from the National Association of Manufacturers (<http://www.nam.org/Alliances/CMA/CMA-Member-Organizations/>) and additional trade groups identified by the assessment team (Appendix C). Each trade group website was reviewed to identify data and/or information related to the potential uses of 1-BP based on the information reported in the public use document. If the industrial sector was likely to engage in use activity identified in the public use document, the sector was included in the list of trade associations.

In general, different search terms were required for the different sources depending on the content structure of the website; all sources and search terms are documented in Appendix C. EPA/OPPT reviewed the list of sources; sites that were initially considered but removed during the search process are also listed in Appendix C. In general, these were sites requiring subscription/membership, sites that provided duplicative information, or sites that were not operational at the time of the search.

The search was performed by going to all URLs in the gray literature sources list and searching for 1-BP-specific information. The search results were either PDF's or a URL describing the search result. Because each result did not have a pre-made citation that could appear in a bibliography, each search result was assigned as a specific "result ID", and the PDF was named to match that result ID.

3.3.4 Initial Lifecycle/Conceptual Model Targeted Search

Specific sources from the gray literature search were used to inform the initial lifecycle diagram and initial conceptual models; these sources were chosen based on existing SOPs and expert judgment by engineers. The sources searched are denoted in Appendix C with an asterisk. In addition, the existing draft assessment for 1-BP was consulted for on-topic information. The results of the search are included in the "*1-Bromopropane (CASRN: 106-94-5) Bibliography: Supplemental File for the TSCA Scope Document*". As with the broad gray literature search, the search was performed by going to the URLs and searching for 1-BP-specific information. The search results were either PDF's or a URL describing the search result.

3.4 Search Strategies for Environmental Hazard

For the ECOTOX database, the ecological literature was identified through comprehensive and well-documented literature searches using the ECOTOX SOPs¹¹. These searches are conducted manually or electronically. Manual searches consist of skimming of reference sections of review or summary articles that are not the primary source of data, and papers that document test method procedures. Electronic searches consist of searching electronic abstracting services such as Science Direct, Agricola, Toxline, Scifinder, and Proquest. Sources and search terms are documented in Appendix D.

¹¹ ECOTOX and related SOPs (<https://cfpub.epa.gov/ecotox/help.cfm?helptabs=tab4>)

4 Step 3 and 4: Develop Inclusion/Exclusion Criteria and Tags to Categorize Search Results

4.1 Inclusion/Exclusion Criteria for Physical/Chemical Properties

Pchem studies were eligible for inclusion if they provided values on the exact substance. If no primary data was available, computer estimation programs were used. All estimated values as well as measured ones are critically reviewed and deemed reasonable based on professional judgement. Studies were excluded from further consideration if they had the following characteristics:

- Lack of reporting data for the pchem property of interest,
- Inadequate reporting of methodology used to measure pchem property,
- Inadequate characterization of the chemical substance of interest, including impurities.

These general criteria were used to identify relevant studies reporting the pchem properties of 1-BP.

4.2 Inclusion/Exclusion Criteria for Conditions of Use

Information from sources available to EPA/OPPT, including information reported to EPA/OPPT, trade publications, internet searches, public comments, stakeholder meetings, and public databases, among others, was eligible for inclusion if it provided data or information on:

- Manufacturing, processing, distribution, use or disposal data or relevant information about this chemical,
- Trends in manufacturing (including import) volumes of this chemical,
- Number and location of sites that manufacture, process, distribute, use, recycle, or dispose of this chemical,
- Functional uses for this chemical,
- Which industry sectors use this chemical,
- What concentrations (weight fraction) of this chemical are used in industrial, commercial, and consumer applications,
- What types of products or articles contain this chemical,
- Methods of distribution, e.g. internet sales,
- What volume of this chemical is used for each type of use,
- Which uses have been discontinued or phased out,
- The likelihood that other chemicals will replace this chemical and the names of the other chemicals,¹²
- The likelihood that this chemical will replace other chemicals with similar functional uses,¹²
- Uses for recycled materials containing this chemical and volume of material recycled,
- Approximate number and description of individuals who can be exposed to this chemical, e.g. industrial workers, commercial workers, high-frequency consumer use, low-frequency consumer use, children,

¹² Information on alternative chemicals sometimes provides useful information for the exposure assessment.

- The typical setting for uses (e.g. outdoors, indoors, industrial commercial, residential, vehicular).

Data or information not within these characteristics were excluded for further consideration.

4.3 Inclusion/Exclusion Criteria and Tags for Fate, Engineering/Occupational Exposure, Exposure, and Human Health Hazard

Because the searches were designed to be broad, they necessarily returned results that are not on topic for EPA/OPPT's risk evaluations. Based on the information needs identified in Step 1, EPA/OPPT developed specific criteria to determine which references should be tagged as "on-topic" (inclusion criteria) and "off-topic" (exclusion criteria). These were created for each topic area, with gray literature having additional inclusion/exclusion criteria for each source as presented in Section 4.4. The gray literature source-specific criteria are in Appendix C. Specific inclusion/exclusion criteria were not developed for the lifecycle/conceptual model search; the search was conducted by engineers with experience developing lifecycle diagrams and conceptual models, and professional judgment was used to determine which resources were on-topic.

Additional sub-categories (or sub-tags) were also included in the tagging structure to allow for additional categorization by source type (e.g., published peer reviewed article versus government report); data type (a primary data source versus a review article or assessment document); topic area (e.g., tagging general population exposure separately from consumer exposure), and chemical-specific and use-specific data or information. These sub-categories are described in Appendix E and will be used to organize the different streams of evidence during the stages of data evaluation and integration. These steps are not reported in the scope document but will be documented in the draft risk evaluation. Although these sub-categories are discussed in this document, they are not included in the *"1-Bromopropane (CASRN: 106-94-5) Bibliography: Supplemental File for the TSCA Scope Document"* because EPA/OPPT is currently reviewing and refining the results of the categorization, including possible changes to the tagging structure.

4.4 Inclusion/Exclusion Criteria for Fate, Engineering/Occupational Exposure, Exposure, and Human Health Hazard Gray Literature

The gray literature includes a diverse set of sources that were searched using either a manual or automated search technique. The following overall inclusion/exclusion criteria were applied to the gray literature in conjunction with judgment based on subject matter expertise. The ecological search results were assessed using different criteria.

1. General Inclusion Criteria for Gray Literature:

- Quantitative data retrieved from database searches
- Documents that contain quantitative information or assessments of the chemical of interest
- White papers, position papers, regulatory lists, and other information that summarizes how a particular government/agency prioritizes or characterizes the chemical of interest

- Data provided to the Agency by chemical companies and other stakeholders that is publicly available,
- Additional links within the website that link to sites within the same domain/agency
- Information about best practices for remediating or limiting exposure to the chemical

2. General Exclusion Criteria for Gray Literature:

- Documents not available to the public, including information stored within EPA's firewall that is not accessible on the EPA webpage (e.g., TSCA submissions), Confidential Business Information, and information requiring a paid subscription or membership for access
- Links that were broken at the time of the search
- Public comments (usually those without quantitative data) on documents other than the EPA/OPPT existing chemicals dockets
- High level fact sheets and PowerPoint presentations that primarily translate scientific information for the public
- Case studies (primarily occupational exposure) that do not have quantitative information
- Documents that do not explicitly mention the chemical of interest
- FR notices with no quantitative values
- Documents that describe analytical method development but provide no actual measurements useful for characterizing exposure
- Documents captured in searches of other sources
- Researcher CVs and contact information
- Documents reached via a link on the website that are from other government websites
- Landing pages with links, when those links are also captured by the search
- General lists of resources
- Peer-reviewed articles – peer reviewed literature was assumed to be captured in searches of the databases of peer-reviewed literature.
- Draft or earlier versions of documents previously captured
- Duplicate documents (same exact document found in two different result ID's for the same chemical)

These criteria were applied to each gray literature resource, and that application required some judgment. Thus, Table_Apx C-2 in Appendix C provides information specific to that source that indicates how the inclusion and exclusion criteria were interpreted and applied.

4.5 Inclusion/Exclusion Criteria and Tags for Environmental Hazard

On-topic (or applicable) ecological studies obtained through the ECOTOX literature search were required to meet specific acceptability criteria. Additionally, rejection criteria were developed and are documented through ECOTOX codes. Specific details concerning the inclusion/exclusion criteria for ecological studies are included in Appendix E.

5 Step 5: Screen Search Results

5.1 Screening and Tagging for Physical/Chemical Properties

The screening of pchem studies was conducted by an experienced chemist, who applied the inclusion/exclusion criteria when reviewing the title and abstract, and if necessary, the full text, of the studies. Following the identification of relevant studies, the chemist reviewed the quality and acceptability of the studies. The included studies are cited in Section 2.2 and Table 2-1 of the scope document. No tagging was developed or incorporated for the information on pchem properties.

5.2 Screening and Tagging for Conditions of Use

EPA/OPPT screened literature and publicly-available databases, among other sources, to identify information on this chemical's manufacturing, processing, distribution, use, and disposal. Preliminary information was included in the public use document. No tagging was done for this information on conditions of use.

5.3 Screening and Tagging for Fate, Engineering/Occupational Exposure, Exposure, and Human Health Hazard

5.3.1 Peer-Reviewed Literature Database Search Results

Following the database search, the references were imported into DRAGON¹³, a database system used to manage aspects of the systematic review process, including literature screening, risk of bias evaluation, and data integration for screening and tagging. DRAGON was used to facilitate the title/abstract screening across a large team. DRAGON allows references to be assigned to different individuals for screening, it allows tracking of the status of screening, and it stores all of the screening decisions. DRAGON does not perform any of the screening; all screening is done manually by trained individuals.

The title and abstract of each reference identified by the literature search was reviewed/screened, by a single reviewer, to determine if the study was *on-topic* or *off-topic*. On-topic references were then tagged, or categorized, using the topic area tags. All individuals who conducted the screening were trained and provided instructions and definitions of tags as shown in Appendix D. As part of the training process, a senior-level technical expert in the topic area of interest independently reviewed the appropriateness of the assigned tags for the first batch of studies reviewed by an individual screener and provided feedback to the screener. Necessary revisions or clarifications to the screening/tagging instructions and definitions were made and circulated to all screeners. Senior-level technical experts also provided feedback and guidance on specific references to the individual screeners as needed during the screening and tagging process. At the conclusion of the title and abstract review for all topic areas, all final tags applied to references were exported from DRAGON and then uploaded into the HERO database.

¹³ EPA/OPPT is in the process of migrating from DRAGON to Distiller for the next steps of the screening process, <https://www.icf.com/solutions-and-apps/dragon-online-tool-systematic-review>

5.3.2 Gray Literature Search Results

Screening and tagging for the gray literature was performed using Excel to organize and tag the unique search results. Because these types of references generally do not have titles and abstracts, screening and tagging was done on the full text. For references that were searched using the Google API, up to 100 unique results were retrieved for each URL searched. All 100 were then screened to determine if they were *on-topic* or *off-topic*. For references that had to be searched manually, the screener went to each URL and screened all available information for 1-BP on that site, preferentially searching by CAS number.

During a pilot phase of the broad search, each screener tagged 10 references, which were independently reviewed by the senior level technical expert. Discrepancies between the screener and the technical expert were discussed generating specific feedback to the screener before he/she continued with tagging. After the pilot phase, the remaining results were reviewed and tagged according to the tagging structure.

A targeted gray literature search was conducted and an experienced engineer screened the search results to support the development of the initial lifecycle diagram/conceptual models.

5.4 Screening and Tagging for Environmental Hazard

The ECOTOX inclusion/exclusion criteria were used to identify *on-topic* and *off-topic* ecological studies. Reviewers used codes to record the reasons for including or excluding studies.

Additional details about the screening and coding procedures can be found in the document “*ECOTOX Literature Searches, Citation, Identification and Skimming*”,

<https://cfpub.epa.gov/ecotox/blackbox/help/ECOTOXLiteratureSearchesCitationIdentificationandSkimming.pdf>.

6 Step 6. Quality Assessment Procedure for Screening and Tagging

Before proceeding with systematic review and data evaluation, EPA/OPPT will assess the specificity and efficiency of the literature searches. Examples of how EPA/OPPT plans to evaluate the performance of the search strategies include:

- Comparison of the references cited in existing EPA/OPPT TSCA problem formulation and risk assessment documents against those identified by the initial search,
- Comparison of the references cited in the public use documents and supporting the life cycle diagrams against those found by the initial search, and
- Comparison of the references cited in review articles.

EPA/OPPT will also assess the performance of the categorization (or tagging) conducted during the title/abstract screening for both the peer-reviewed and gray literature. As a result, some references may move from the *on-topic* to the *off-topic* category, and vice versa. Additional on-topic references could be identified and targeted supplemental searches may be conducted during the analysis phase (e.g., to locate specific information for exposure modeling).

APPENDICES

A. LITERATURE SEARCH INFORMATION NEEDS FOR 1-BROMOPROPANE (1-BP)

A-1 Fate Information Needs

Table_Apx A-1. Fate Information Needs for 1-Bromopropane (1-BP)

| Objectives | Information Needs |
|----------------|--|
| All Objectives | Fate and transport related pchem properties (e.g., octanol-water partition coefficient, organic carbon-water partition coefficient, Henry's Law constant), Bioaccumulation and bioconcentration, biodegradation and metabolism, abiotic degradation (e.g., hydrolysis, photolysis, abiotic reduction), Removal processes in wastewater treatment plants, and Environmental mobility |

A-2 Engineering/Occupational Exposure Information Needs

Table_Apx A-2. Engineering/Occupational Exposure Information Needs for 1-Bromopropane (1-BP)

| Objectives | Information Needs |
|--|---|
| All Objectives (including both Occupational Exposure and Environmental Releases) | Description of the life cycle of the chemical(s) of interest, from manufacture to end-of-life (e.g., each manufacturing, processing, or use step), and material flow between the industrial and commercial life cycle stages. The total annual US volume (lb/yr or kg/yr) of the chemical(s) of interest manufactured, imported, processed, and used; and the share of total annual manufacturing and import volume that is processed or used in each life cycle step. Description of processes, equipment, unit operations, and material flows and frequencies (lb/site-day or kg/site-day and days/yr; lb/site-batch and batches/yr) of the chemical(s) of interest during each industrial/ commercial life cycle step. Note: if available, include weight fractions of the chemicals (s) of interest and material flows of all associated primary chemicals (especially water). Basic chemical properties relevant for assessing exposures and releases, e.g., molecular weight, normal boiling point, melting point, physical forms, and room temperature vapor pressure. Number of sites that manufacture, process, or use the chemical(s) of interest for each industrial/ commercial life cycle step and site locations. |
| Occupational Exposures | Description of worker activities with exposure potential during the manufacture, processing, or use of the chemical(s) of interest in each industrial/commercial life cycle stage. Potential routes of exposure (e.g., inhalation, dermal). Physical form of the chemical(s) of interest for each exposure route (e.g., liquid, vapor, mist) and activity. Breathing zone (personal sample) measurements of occupational exposures to the chemical(s) of interest, measured as time-weighted averages (TWAs), short-term exposures, or peak exposures in each occupational life cycle stage (or in a workplace scenario similar to an occupational life cycle stage). |

| | |
|------------------------|--|
| | <p>Area or stationary measurements of airborne concentrations of the chemical(s) of interest in each occupational setting and life cycle stage (or in a workplace scenario similar to the life cycle stage of interest).</p> <p>For solids, bulk and dust particle size characterization data.</p> <p>Dermal exposure data.</p> <p>Information needs associated with mathematical modeling (will be determined on a case-by-case basis).</p> <p>Exposure duration.</p> <p>Exposure frequency.</p> <p>Number of workers who potentially handle or have exposure to the chemical(s) of interest in each occupational life cycle stage.</p> <p>Personal protective equipment (PPE) types employed by the industries within scope.</p> <p>Engineering controls employed to reduce occupational exposures in each occupational life cycle stage (or in a workplace scenario similar to the life cycle stage of interest), and associated data or estimates of exposure reductions</p> |
| Environmental Releases | <p>Description of sources of potential environmental releases, including cleaning of residues from process equipment and transport containers, involved during the manufacture, processing, or use of the chemical(s) of interest in each life cycle stage.</p> <p>Estimated mass (lb or kg) of the chemical(s) of interest released from industrial and commercial sites to each environmental medium (air, water, land) and treatment and disposal methods (publicly owned treatment works (POTW), incineration, landfill), including:</p> <ul style="list-style-type: none"> ○ Releases per site and aggregated over all sites; ○ Annual release rates; ○ Daily release rates; ○ Release or emission factors; and ○ Number of release days per year. <p>Information needs associated with mathematical modeling (will be determined on a case-by-case basis).</p> <p>Waste treatment methods and pollution control devices employed by the industries within scope and associated data on release/emission reductions.</p> |

A-3 Exposure Information Needs

Table_Apx A-3. Exposure Information Needs for 1-Bromopropane (1-BP)

| Objectives | Information Needs |
|---|---|
| Lifecycle, general population, and consumer exposures | <p>What products contain this chemical?</p> <p>What articles contain this chemical?</p> <p>How are products/articles typically disposed of?</p> <p>What are the use patterns/frequencies for different age groups for the products/articles?</p> <p>Are there existing assessments (including modeled data) looking at exposure to the general population?</p> <p>Are there existing assessments (including modeled data) looking at exposure to consumers?</p> <p>What specific activities have the potential for consumer exposures to chemicals?</p> <p>What are the likely routes of exposure?</p> <p>What are the number of consumers potentially exposed?</p> <p>Are any modeled exposures available?</p> |
| Presence in the environment/ Biomonitoring data | <p>Is there monitoring data for the concentration of this chemical in:</p> <ul style="list-style-type: none"> ○ Foods, either individually or as a "market basket" ○ Drinking water in the United States, either from well water or public drinking water sources |

| | |
|------------------------|---|
| | <ul style="list-style-type: none"> ○ Ambient Air ○ Indoor Air ○ Indoor Dust ○ Soil ○ Wastewater/sludge ○ Sediment ○ Plant life/crops/biota ○ Terrestrial Wildlife/livestock/fish/ aquatic wildlife ○ Blood (for US populations) ○ Urine (for US populations) ○ Cord blood (for US populations) ○ Human tissues (for US populations) |
| Environmental Releases | <p>Are there documented populations near manufacturing facilities or in other hot spots receiving higher-than-average exposure?</p> <p>Is there chemical-specific emission rate data for the products/articles containing the chemical?</p> |

A-4 Human Health Information Needs

Table_Apx A-4. Human Health Information Needs for 1-Bromopropane (1-BP)

| Objectives | Information Needs |
|----------------------|---|
| Overall Objectives | <ul style="list-style-type: none"> ● Identify and document all health hazards associated with exposure to the chemical via all relevant routes, durations and sources/pathways of exposure, using hazard data from: <ul style="list-style-type: none"> ○ Animal and human (epidemiological and experimental) studies ○ Acute/immediate effects, delayed acute effects, chronic/long-term effects ● Identify critical health effect(s) such as acute effects, low-dose effects and/or severe effects (e.g., cancer, non-cancer target organ effects, reproductive/developmental effects) <ul style="list-style-type: none"> ○ Identify key studies for critical effect(s) ○ Identify dose (or concentration)-response data ● Identify points of departures (PODs) for critical effect(s) for each relevant exposure route (e.g., inhalation, oral, dermal) and exposure duration (e.g., acute, sub chronic and chronic) |
| Toxicokinetics | <ul style="list-style-type: none"> ● Identify toxicokinetic data, i.e. on absorption, distribution, metabolism, excretion (ADME): <ul style="list-style-type: none"> ○ Animal and human studies ○ <i>In vitro</i> studies ○ Modelled ADME data ○ Physiologically-based pharmacokinetic (PBPK) models |
| Mode of Action (MOA) | <ul style="list-style-type: none"> ● Identify studies that support a MOA for critical effects e.g., for threshold or non-threshold cancer and non-cancer effects from: |

| | |
|--|--|
| | <ul style="list-style-type: none"> ○ <i>In vitro</i> mechanistic studies ○ Genotoxicity studies ○ <i>In vivo</i> mechanistic studies ○ Experimental studies in humans ○ Studies that link exposure to a carcinogenic effect |
| Occupational Exposures | <ul style="list-style-type: none"> ● Characterization of health effects associated with occupational exposures: <ul style="list-style-type: none"> ○ Health effects associated with various exposure routes and/or physical forms of the chemical ○ For solid dusts – differences in health effects associated with particle size fraction |
| Potentially Exposed and Susceptible Subpopulations | <ul style="list-style-type: none"> ● Characterization of factors that may make humans more vulnerable to develop adverse effects |

B. DATABASE (PEER-REVIEWED) LITERATURE SEARCHES FOR FATE, ENGINEERING/OCCUPATIONAL EXPOSURE, EXPOSURE, AND HUMAN HEALTH HAZARD

B-1 1-Bromopropane (1-BP) Synonyms

These are the synonyms of 1-BP that were considered during the development of the database searches for fate, engineering, exposure and human health hazard information.

- 106-94-5
- 1-bromopropane
- n-propylbromide
- nPB
- 1-BP
- n-PB
- n propylbromide
- n propyl bromide
- 1-bromo propane
- n-propyl bromide
- 1-propyl bromide
- 3-bromopropane
- Abzol JG
- Ascusol MC
- Drysolv
- Ensolv
- Leksol
- Propyl bromide
- PS Cleaner
- Tech
- Triagen
- UN 2344

B-2 Literature Search Strategies for Database Literature Searches for Fate, Engineering/Occupational Exposure, and Exposure

Table_Apx B-1. 1-Bromopropane (1-BP) Fate, Engineering/Occupational Exposure, and Exposure Search Strategy for Web of Science

| Search | Search Strategy |
|-------------------------------------|---|
| Chemical Terms* | (1-propyl-bromide OR Ensolv OR 1-bromopropane OR nPB OR 1-BP OR n-PB OR n-propylbromide OR n-propyl-bromide OR 1-bromo-propane OR 106-94-5 OR 3-bromopropane OR Propyl-bromide) |
| Use Terms | AND (adhesive OR adhesives OR aerosol OR aerosols OR Agricultur* OR airless OR Asphalt OR batch OR Clean* OR closed OR Computer* OR Construction OR continuous OR conveyor* OR Degreas* OR Electric* OR Electronic* OR Fabricat* OR Finish* OR Furniture OR hot-dips* OR mass-balance OR Metal OR multi-zone OR non-aero* OR open-top-vapor* OR Sealant* OR Soap* OR solvent OR solvents OR spot-remov* OR spray OR Toilet* OR Two-zone OR type-1-5-systems OR vacuum OR vapor OR web) |
| Exposure, Engineering, & Fate Terms | OR ((OECD AND Guideline*) OR (OPPTS AND guideline*) OR (OCSPP AND Guideline*) OR abiotic OR absorb OR absorption OR accumulation-rate OR activi* OR adipose OR adsorp* OR aerob* OR aerosol OR aerosols OR aged OR aggregate OR air OR amount-used OR anaerob* OR analy* OR anoxic OR area-source OR atm-m3/mol OR automotive OR BAF OR BCF OR bioaccumulat* OR bioavail* OR bioconcentrat* OR biodegrad* OR biomagnification OR biomoni* OR biosolids OR biota OR biotrans* OR breakdown-product OR breakdown-products OR breastmilk OR breast-milk OR breathing-zone OR brush-applied OR BSAF OR BSAFs OR building-envelope OR chamber OR chelation OR children OR coagulation OR coating OR commercial OR complexation OR conc* OR consumer OR contamination OR controls OR crawling OR creatinine OR cultural OR cumulative OR decay-rate OR degrad* OR degreaser OR dermal OR detect OR diffusion-coefficient OR disadvantaged OR disease OR dispers* OR disposal OR dissolution OR distribution OR diy OR do-it-yourself OR dose OR drinking-water OR dust OR education-level OR effluent OR elderly OR emission OR emissions OR engineering-controls OR English-as-a-second-language OR environmental-fate OR environmental-justice OR ethnicity OR evaporation-from-water OR excretion OR exposure OR facili* OR Female OR Females OR fence-line-population OR fetal OR fetus OR fish* OR flocculation OR flux OR formula OR fugacity OR garage OR gas-phase-mass-transfer OR gender OR general-population OR genetic-polymorphism OR genetic-traits OR geography OR geophag* OR geriatric OR German-human-biomonitoring-values OR groundwater OR ground-water OR guns OR half-life OR hand-to-mouth OR health-status OR henry's-law OR hobb* OR homeless OR hydroly* OR illegal-immigrants OR immunocompromised OR import* OR incinerate OR incineration OR income OR indigenous OR indoor-outdoor-ratio OR industrial OR infants OR influent OR ingestion OR inhal* OR intake OR inter-individual OR inter-zonal-air-flow OR intra-individual OR KAW OR Kd OR kinetics OR KOA OR KOC OR lacquer OR lactat* OR landfill OR landfills OR leach* OR lifecycle OR life-cycle OR lifestage OR life-stage OR lifestages OR life-stages OR lifestyle OR liquid-phase-mass-transfer OR loading OR Male OR males OR manuf* OR mass-transfer-coefficient OR menopaus* OR metaboli* OR microcosm OR migrat* OR modified-state-space OR monitoring OR mouthing OR near-facility-population OR nutrition-status OR occupa* OR occur OR occurrence OR OCSPP OR ocular OR older-adults OR on-site-treatment OR oral OR overspray-fraction OR partic* OR particle-size OR particulate OR partition* OR pathway OR pathways OR penetration-factor OR penetration-ratio OR perinatal OR persisten* OR personal OR photoly* OR photostability OR pica OR placenta OR plasma OR plume OR PM-10 OR PM-2.5 OR point-source OR point-sources OR pore-water OR postnatal OR POTW OR PPE OR preexisting-disease OR pregnan* OR prenatal OR preparedness OR pretreatment-program OR process* OR product OR protective OR |

| Search | Search Strategy |
|---|---|
| | proximity OR race OR recover* OR recreation* OR recycling OR redox OR release OR releases OR remed* OR residential OR residual OR rolled OR route OR routes OR rural OR sample OR samples OR school-age* OR sediment OR senior OR seniors OR sensitiv* OR serum OR SES OR sewage-treatment OR short-term OR shower* OR single-parent OR single-parents OR sink OR sinks OR site OR sites OR skin OR sludge OR socioeconomic-status OR soil OR solvent OR solvents OR sorb* OR sorp* OR source OR sources OR spray-applied OR stress* OR subpopulation OR subsistence OR subsurface-intrusion OR Superfund OR surface-water-concentration OR susceptib* OR time-weighted-average OR toddler OR toddlers OR transfer OR transformation OR tribal OR trophic-magnification OR urban OR urine OR use OR uses OR vapor OR ventilat* OR volatil* OR volume OR vulnerab* OR wait-time OR wastewater-treatment OR water OR weight-fraction OR wildlife OR wipe OR women-of-childbearing-age OR Worker OR workers OR workplace OR WWTP OR young) |
| Limits | <ul style="list-style-type: none"> Refined by: RESEARCH AREAS: (AGRICULTURE OR GEOCHEMISTRY GEOPHYSICS OR MARINE FRESHWATER BIOLOGY OR PUBLIC ENVIRONMENTAL OCCUPATIONAL HEALTH OR MATERIALS SCIENCE OR CONSTRUCTION BUILDING TECHNOLOGY OR METEOROLOGY ATMOSPHERIC SCIENCES OR ENGINEERING OR ENVIRONMENTAL SCIENCES ECOLOGY OR FISHERIES OR WATER RESOURCES OR ZOOLOGY) Indexes=SCI-EXPANDED, SSCI |
| Date of Search: 2/28/2017 | |
| *Synonyms not found in Web of Science were removed from search string | |

B-3 Literature Search Strategies for Database Literature Searches for Human Health

Table_Apx B-2. 1-Bromopropane (1-BP) Human Health Hazard Peer-Reviewed Literature Search Strategy

| Search | Search Strategy |
|----------------------------|--|
| Pub Med¹ | |
| Chemical Terms | (1-bromopropane[tiab] OR nPB[tiab] OR 1-BP[tiab] OR n-PB[tiab] OR n-propylbromide[tiab] OR n-propyl-bromide[tiab] OR 1-bromo-propane[tiab] OR 1-bromopropane[Supplementary Concept] OR 106-94-5[rn] OR 3-bromopropane[tiab] OR Propyl-bromide[tiab]) |
| Health Effect Terms | AND ((DNA[tiab] AND breaks[tiab]) OR absorption[tiab] OR absorption[mh] OR activate[tiab] OR activated[tiab] OR acute[tiab] OR adverse[tiab] OR adverse-effects[sh] OR Ames-assay[tiab] OR Ames-test[tiab] OR animal[tiab] OR blood[tiab] OR blood[mh] OR brain[mh] OR brain[tiab] OR cancer[tiab] OR carcinogen[tiab] OR carcinogenesis[tiab] OR carcinogenic[tiab] OR carcinogenicity[tiab] OR carcinogens[tiab] OR carcinogens[mh] OR cardiac[tiab] OR case-control[tiab] OR case-control-studies[mh] OR case-referent[tiab] OR case-report[tiab] OR case-reports[tiab] OR case-reports[pt] OR cell[tiab] OR cell-proliferation[mh] OR cells[tiab] OR cells[mh] OR chemokine[tiab] OR chemokines[tiab] OR chromosomal-aberration[tiab] OR chromosomal-aberration[tiab] OR chromosomal-aberrations[tiab] OR chromosomal-aberrations[mh] OR chronic[tiab] OR cognitive[tiab] OR cohort[tiab] OR cohort-studies[mh] OR congenital-abnormalities[mh] OR corrosion[mh] OR corrosion[tiab] OR crosslink[tiab] OR cytogenicity[tiab] OR cytokine[tiab] OR cytokines[tiab] OR cytokines[mh] OR cytotoxic[tiab] OR cytotoxicity[tiab] OR dam[tiab] OR dams[tiab] OR death[mh] OR death[tiab] OR dermal[tiab] OR detoxification[tiab] OR detoxify[tiab] OR development[tiab] OR developmental[tiab] OR diet[mh] OR diet[tiab] OR dietary[tiab] OR diets[tiab] OR |

| Search | Search Strategy |
|--------|---|
| | <p>distribution[tiab] OR DNA-adduct[tiab] OR DNA-adducts[mh] OR DNA-adducts[tiab] OR DNA-breaks[mh] OR DNA-damage[mh] OR DNA-damage[tiab] OR DNA-repair[mh] OR DNA-repair[tiab] OR dog[tiab] OR dogs[tiab] OR dogs[mh] OR dose[tiab] OR drinking-water[tiab] OR drinking-water[mh] OR eliminate[tiab] OR elimination[tiab] OR embryo[tiab] OR embryonic[tiab] OR embryos[tiab] OR employee[tiab] OR employees[tiab] OR endocrine[tiab] OR endpoint[tiab] OR endpoints[tiab] OR enteral-nutrition[mh] OR epidemiologic[tiab] OR epidemiological[tiab] OR epidemiology[mh] OR epidemiology[sh] OR epidemiology[tiab] OR epigenetic[tiab] OR epigenetics[tiab] OR epigenomics[tiab] OR epigenomics[mh] OR female[tiab] OR females[tiab] OR fetal[tiab] OR fetus[tiab] OR fetus[mh] OR fetuses[tiab] OR gavage[tiab] OR Gene[tiab] OR gene-expression[mh] OR genes[tiab] OR genes[mh] OR genetic[tiab] OR genetics[tiab] OR genotoxic[tiab] OR genotoxicity[tiab] OR germ-line-mutation[tiab] OR germ-line-mutation[mh] OR growth-and-development[mh] OR guinea-pig[tiab] OR guinea-pigs[tiab] OR guinea-pigs[mh] OR hamster[tiab] OR hamsters[tiab] OR hazard[tiab] OR heart[tiab] OR heart[mh] OR hemotoxic[tiab] OR hemotoxicity[tiab] OR hemotoxin[tiab] OR hemotoxins[tiab] OR hepatic[tiab] OR hepatotoxic[tiab] OR hepatotoxicity[tiab] OR hepatotoxin[tiab] OR hepatotoxins[tiab] OR human[tiab] OR humans[tiab] OR humans[mh] OR immunotoxic[tiab] OR immunotoxicity[tiab] OR immunotoxin[tiab] OR immunotoxins[tiab] OR immunotoxins[mh] OR incidence[tiab] OR incidences[tiab] OR individual[tiab] OR individuals[tiab] OR inflammation[tiab] OR inflammation[mh] OR inflammatory[tiab] OR inhalation[tiab] OR inhalation[mh] OR inhale[tiab] OR inhaled[tiab] OR inhibit[tiab] OR inhibited[tiab] OR inhibitory[tiab] OR interact[tiab] OR interacted[tiab] OR interaction[tiab] OR intestine[tiab] OR intestines[tiab] OR intestines[mh] OR in-vitro[tiab] OR in-vitro-techniques[mh] OR in-vivo[tiab] OR irritation[tiab] OR kidney[tiab] OR kidney[mh] OR LC50[tiab] OR LD50[tiab] OR lethal-concentration-50[tiab] OR Lethal-Dose-50[tiab] OR Lethal-Dose-50[mh] OR litter[tiab] OR litters[tiab] OR liver[tiab] OR liver[mh] OR LOAEC[tiab] OR LOAEL[tiab] OR LOEL[tiab] OR longitudinal[tiab] OR long-term-adverse-effects[mh] OR lung[tiab] OR lung[mh] OR male[tiab] OR malformation[tiab] OR malformations[tiab] OR malformed[tiab] OR malignancies[tiab] OR malignancy[tiab] OR malignant[tiab] OR margin-of-exposure[tiab] OR maternal[tiab] OR mechanism[tiab] OR mechanisms[tiab] OR mechanistic[tiab] OR metabolism[tiab] OR metabolism[mh] OR metabolism[sh] OR metastasis[tiab] OR metastasize[tiab] OR metastatic[tiab] OR mg/kg/day[tiab] OR mg/kg-bw/day[tiab] OR mg/L[tiab] OR mg/m3[tiab] OR mg-kg/day[tiab] OR mice[mh] OR mice[tiab] OR micronuclei[tiab] OR micronucleus[tiab] OR mode-of-action[tiab] OR monkey[tiab] OR monkeys[tiab] OR mortality[mh] OR mortality[tiab] OR mouse[tiab] OR mouth[tiab] OR mouth[mh] OR mutagen[tiab] OR mutagenesis[tiab] OR mutagenic[tiab] OR mutagens[mh] OR mutagens[tiab] OR mutation[tiab] OR mutation[mh] OR nasal[tiab] OR neoplasm[tiab] OR neoplasms[tiab] OR neoplasms[mh] OR neoplastic[tiab] OR nephrotoxic[tiab] OR nephrotoxicity[tiab] OR nephrotoxin[tiab] OR nephrotoxins[tiab] OR nested[tiab] OR neurobehavior[tiab] OR neurobehavioral[tiab] OR neurologic[tiab] OR neurological[tiab] OR neurophysiological[tiab] OR neuropsychological[tiab] OR neurotoxic[tiab] OR neurotoxicity[tiab] OR neurotoxin[tiab] OR neurotoxins[tiab] OR neurotoxins[mh] OR NOAEC[tiab] OR NOAEL[tiab] OR NOEL[tiab] OR nonmalignant[tiab] OR nonneoplastic[tiab] OR nose[tiab] OR nose[mh] OR OECD-Test-Guideline[tiab] OR OECD-Test-Guidelines[tiab] OR oncogene[tiab] OR oncogenes[tiab] OR oncogenes[mh] OR oncogenesis[tiab] OR oral[tiab] OR organ[tiab] OR organs[tiab] OR ototoxic[tiab] OR ototoxicity[tiab] OR oxidative-damage[tiab] OR oxidative-stress[tiab] OR oxidative-stress[mh] OR participant[tiab] OR participants[tiab] OR paternal[tiab] OR PBPK[tiab] OR people[tiab] OR perinatal[tiab] OR person[tiab] OR pharmacodynamic[tiab] OR pharmacodynamics[tiab] OR pharmacokinetic[tiab] OR pharmacokinetics[mh] OR pharmacokinetics[tiab] OR pharmacokinetics[sh] OR pharmacology[sh] OR pharmacology[mh] OR pharmacology[tiab] OR polyploid[tiab] OR polyploidy[tiab] OR polyploidy[mh] OR postnatal[tiab] OR pregnancy[mh] OR pregnancy[tiab] OR pregnancy-complications[mh] OR pregnant[tiab] OR prenatal[tiab] OR prevalence[tiab] OR prevalent[tiab] OR promote[tiab] OR promotion[tiab] OR pulmonary[tiab] OR rabbit[tiab]</p> |

| Search | Search Strategy |
|-----------------------------------|--|
| | <p>OR rabbits[tiab] OR rabbits[mh] OR rat[tiab] OR rats[mh] OR rats[tiab] OR registries[mh] OR registries[tiab] OR registry[tiab] OR renal[tiab] OR reproduction[tiab] OR reproduction[mh] OR reproductive[tiab] OR reprotoxic[tiab] OR reprotoxicity[tiab] OR respiration[mh] OR respiration[tiab] OR respiratory[tiab] OR rodent[tiab] OR rodents[tiab] OR SCE[tiab] OR sensitization[tiab] OR sensitized[tiab] OR sensitizer[tiab] OR sensitizing[tiab] OR sister-chromatid-exchange[mh] OR sister-chromatid-exchange[tiab] OR skeletal[tiab] OR skin[tiab] OR skin[mh] OR subchronic[tiab] OR subchronic[mh] OR subject[tiab] OR subjects[tiab] OR systemic[tiab] OR teratogen[tiab] OR teratogenic[tiab] OR teratogens[tiab] OR teratogens[mh] OR toxic[tiab] OR toxicant[tiab] OR toxicants[tiab] OR toxicity[sh] OR Toxicity[tiab] OR Toxicity[sh] OR toxicodynamic[tiab] OR toxicodynamics[tiab] OR toxicokinetic[tiab] OR toxicokinetics[tiab] OR toxicokinetics[mh] OR toxicology[mh] OR toxicology[tiab] OR tumor[tiab] OR tumorigenic[tiab] OR tumors[tiab] OR weight[tiab] OR worker[tiab] OR workers[tiab] OR Adolescen*[tiab] OR Adult*[tiab] OR Age[tiab] OR aged[tiab] OR age-groups[mh] OR ages[tiab] OR Alcohol[tiab] OR At-risk[tiab] OR BMI[tiab] OR body-mass-index[tiab] OR body-mass-index[mh] OR boy[tiab] OR boys[tiab] OR child[tiab] OR children[tiab] OR cigar[tiab] OR Cigarette[tiab] OR cigarettes[tiab] OR cigars[tiab] OR Coexposure[tiab] OR co-exposure[tiab] OR Critical-window*[tiab] OR Diabetes[tiab] OR diabetes-insipidus[mh] OR diabetes-mellitus[mh] OR disadvantaged[tiab] OR Early-life[tiab] OR Elderly[tiab] OR Environmental-justice[tiab] OR Ethanol[tiab] OR Ethnic[tiab] OR ethnic-groups[mh] OR ethnicit*[tiab] OR Females[tiab] OR gastrointestinal-microbiome[mh] OR Gender[tiab] OR Genotype[tiab] OR genotype[mh] OR Genotypes[tiab] OR genotypic[tiab] OR Geriatric[tiab] OR gestation[tiab] OR gestational[tiab] OR girl[tiab] OR girls[tiab] OR Gut[tiab] OR Haplotype[tiab] OR Haplotypes[tiab] OR haplotypes[mh] OR Health-status[mh] OR Health-status[tiab] OR Inequalit*[tiab] OR Inequit*[tiab] OR infancy[tiab] OR infant[tiab] OR infants[tiab] OR In-utero[tiab] OR lifestage[tiab] OR Life-stage[tiab] OR lifestages[tiab] OR Life-stages[tiab] OR Males[tiab] OR Men[mh] OR Men[tiab] OR Metagenomic[tiab] OR metagenomics[tiab] OR metagenomics[mh] OR methylation[mh] OR Methylation[tiab] OR Microbiome[tiab] OR Microbiomes[tiab] OR Microbiota[tiab] OR minorities[tiab] OR minorities[tiab] OR Minority[tiab] OR minority-groups[mh] OR Modifying-factor[tiab] OR Modifying-factors[tiab] OR natal[tiab] OR newborn[tiab] OR newborns[tiab] OR Nicotine[tiab] OR nicotine[mh] OR nutritional-status[mh] OR nutritional-status[tiab] OR placenta[mh] OR placenta[tiab] OR placental[tiab] OR Polymorphism[tiab] OR polymorphism,-genetic[mh] OR polymorphisms[tiab] OR poverty[mh] OR Poverty[tiab] OR Preexisting[tiab] OR pre-existing[tiab] OR pregnant-women[mh] OR Preschool[tiab] OR preschooler[tiab] OR preschoolers[tiab] OR Race[tiab] OR Racial[tiab] OR racism[mh] OR racism[tiab] OR Sensitive-population[tiab] OR Sensitive-populations[tiab] OR SES[tiab] OR sex[mh] OR Sex[tiab] OR smoke[tiab] OR Smoke[mh] OR smoker[tiab] OR smokers[tiab] OR smoking[tiab] OR smoking[mh] OR Sociocultural[tiab] OR sociodemographic[tiab] OR Socioeconomic[tiab] OR socio-economic[tiab] OR socioeconomic-factors[mh] OR Susceptibilities[tiab] OR Susceptibility[tiab] OR Susceptible[tiab] OR teenager[tiab] OR teenagers[tiab] OR teens[tiab] OR Tobacco[tiab] OR tobacco-products[mh] OR toddler[tiab] OR toddlers[tiab] OR underserved[tiab] OR Vulnerabilities[tiab] OR Vulnerability[tiab] OR Vulnerable[tiab] OR vulnerable-populations[mh] OR Women[mh] OR Women[tiab] OR cardiovascular[tiab])</p> |
| Limits | 2013 to present |
| Date of Search: 2/14/2017 | |
| Web of Science² | |
| Chemical Terms | (1-propyl-bromide OR Ensolv OR 1-bromopropane OR nPB OR 1-BP OR n-PB OR n-propylbromide OR n-propyl-bromide OR 1-bromo-propane OR 106-94-5 OR 3-bromopropane OR Propyl-bromide) |
| Health Effect Terms | AND |

| Search | Search Strategy |
|--------|--|
| | <p>((DNA AND breaks) OR absorption OR activate OR activated OR acute OR adverse OR Ames-assay OR Ames-test OR animal OR blood OR brain OR cancer OR carcinogen OR carcinogenesis OR carcinogenic OR carcinogenicity OR carcinogens OR cardiac OR case-control OR case-referent OR case-report OR case-reports OR cell OR cells OR chemokine OR chemokines OR chromosomal-aberration OR chromosomal-aberration OR chromosomal-aberrations OR chronic OR cognitive OR cohort OR corrosion OR crosslink OR cytogenicity OR cytokine OR cytokines OR cytotoxic OR cytotoxicity OR dam OR dams OR death OR dermal OR detoxification OR detoxify OR development OR developmental OR diet OR dietary OR diets OR distribution OR DNA-adduct OR DNA-adducts OR DNA-damage OR DNA-repair OR dog OR dogs OR dose OR drinking-water OR eliminate OR elimination OR embryo OR embryonic OR embryos OR employee OR employees OR endocrine OR endpoint OR endpoints OR epidemiologic OR epidemiological OR epidemiology OR epigenetic OR epigenetics OR epigenomics OR female OR females OR fetal OR fetus OR fetuses OR gavage OR Gene OR genes OR genetic OR genetics OR genotoxic OR genotoxicity OR germ-line-mutation OR guinea-pig OR guinea-pigs OR hamster OR hamsters OR hazard OR heart OR hemotoxic OR hemotoxicity OR hemotoxin OR hemotoxins OR hepatic OR hepatotoxic OR hepatotoxicity OR hepatotoxin OR hepatotoxins OR human OR humans OR immunotoxic OR immunotoxicity OR immunotoxin OR immunotoxins OR incidence OR incidences OR individual OR individuals OR inflammation OR inflammatory OR inhalation OR inhale OR inhaled OR inhibit OR inhibited OR inhibitory OR interact OR interacted OR interaction OR intestine OR intestines OR in-vitro OR in-vivo OR irritation OR kidney OR LC50 OR LD50 OR lethal-concentration-50 OR Lethal-Dose-50 OR litter OR litters OR liver OR LOAEC OR LOAEL OR LOEL OR longitudinal OR lung OR male OR malformation OR malformations OR malformed OR malignancies OR malignancy OR malignant OR margin-of-exposure OR maternal OR mechanism OR mechanisms OR mechanistic OR metabolism OR metastasis OR metastasize OR metastatic OR mg/kg/day OR mg/kg-bw/day OR mg/L OR mg/m3 OR mg-kg/day OR mice OR micronuclei OR micronucleus OR mode-of-action OR monkey OR monkeys OR mortality OR mouse OR mouth OR mutagen OR mutagenesis OR mutagenic OR mutagens OR mutation OR nasal OR neoplasm OR neoplasms OR neoplastic OR nephrotoxic OR nephrotoxicity OR nephrotoxin OR nephrotoxins OR nested OR neurobehavior OR neurobehavioral OR neurologic OR neurological OR neurophysiological OR neuropsychological OR neurotoxic OR neurotoxicity OR neurotoxin OR neurotoxins OR NOAEC OR NOAEL OR NOEL OR nonmalignant OR nonneoplastic OR nose OR OECD-Test-Guideline OR OECD-Test-Guidelines OR oncogene OR oncogenes OR oncogenesis OR oral OR organ OR organs OR ototoxic OR ototoxicity OR oxidative-damage OR oxidative-stress OR participant OR participants OR paternal OR PBPK OR people OR perinatal OR person OR pharmacodynamic OR pharmacodynamics OR pharmacokinetic OR pharmacokinetics OR pharmacology OR polyploid OR polyploidy OR postnatal OR pregnancy OR pregnant OR prenatal OR prevalence OR prevalent OR promote OR promotion OR pulmonary OR rabbit OR rabbits OR rat OR rats OR registries OR registry OR renal OR reproduction OR reproductive OR reprotoxic OR reprotoxicity OR respiration OR respiratory OR rodent OR rodents OR SCE OR sensitization OR sensitized OR sensitizer OR sensitizing OR sister-chromatid-exchange OR skeletal OR skin OR subchronic OR sub-chronic OR subject OR subjects OR systemic OR teratogen OR teratogenic OR teratogens OR toxic OR toxicant OR toxicants OR Toxicity OR toxicodynamic OR toxicodynamics OR toxicokinetic OR toxicokinetics OR toxicology OR tumor OR tumorigenic OR tumors OR weight OR worker OR workers OR Adolescen* OR Adult* OR Age OR aged OR ages OR Alcohol OR At-risk OR BMI OR body-mass-index OR boy OR boys OR child OR children OR cigar OR Cigarette OR cigarettes OR cigars OR Coexposure OR co-exposure OR Critical-window* OR Diabetes OR disadvantaged OR Early-life OR Elderly OR Environmental-justice OR Ethanol OR Ethnic OR ethnic* OR Females OR Gender OR Genotype OR Genotypes OR genotypic OR Geriatric OR gestation OR gestational OR girl OR girls OR Gut OR Haplotype OR Haplotypes OR Health-status OR Inequalit* OR Inequit* OR infancy OR infant OR infants OR In-utero OR lifestage OR Life-stage OR lifestages OR Life-stages OR Males OR Men OR Metagenomic OR metagenomics</p> |

| Search | Search Strategy |
|----------------------------|--|
| | OR Methylation OR Microbiome OR Microbiomes OR Microbiota OR minorities OR minorities OR Minority OR Modifying-factor OR Modifying-factors OR natal OR newborn OR newborns OR Nicotine OR nutritional-status OR placenta OR placental OR Polymorphism OR polymorphisms OR Poverty OR Preexisting OR pre-existing OR Preschool OR preschooler OR preschoolers OR Race OR Racial OR racism OR Sensitive-population OR Sensitive-populations OR SES OR Sex OR smoke OR smoker OR smokers OR smoking OR Sociocultural OR sociodemographic OR Socioeconomic OR socio-economic OR Susceptibilities OR Susceptibility OR Susceptible OR teenager OR teenagers OR teens OR Tobacco OR toddler OR toddlers OR underserved OR Vulnerabilities OR Vulnerability OR Vulnerable OR Women OR cardiovascular) |
| Limits | <ul style="list-style-type: none"> • 2013 to present • Refined by: RESEARCH AREAS: (GENERAL INTERNAL MEDICINE OR ANATOMY MORPHOLOGY OR PATHOLOGY OR PEDIATRICS OR IMMUNOLOGY OR PHARMACOLOGY PHARMACY OR BEHAVIORAL SCIENCES OR INFECTIOUS DISEASES OR BIOCHEMISTRY MOLECULAR BIOLOGY OR CARDIOVASCULAR SYSTEM CARDIOLOGY OR CELL BIOLOGY OR PUBLIC ENVIRONMENTAL OCCUPATIONAL HEALTH OR MATHEMATICAL COMPUTATIONAL BIOLOGY OR REPRODUCTIVE BIOLOGY OR DERMATOLOGY OR DEVELOPMENTAL BIOLOGY OR NEUROSCIENCES NEUROLOGY OR ENDOCRINOLOGY METABOLISM OR NUTRITION DIETETICS OR TOXICOLOGY OR UROLOGY NEPHROLOGY OR ONCOLOGY OR VETERINARY SCIENCES OR GASTROENTEROLOGY HEPATOLOGY) • Indexes=SCI-EXPANDED, SSCI |
| Date of Search: 2/14/2017 | |
| Toxline³ | |
| Chemical Terms | (106-94-5) |
| Health Effect Terms | Identical to Web of Science Health Effect Terms |
| Limits | <ul style="list-style-type: none"> • 2013 to present • Include CASRNs and synonyms • Exclude PubMed records |
| Date of Search: 2/14/2017 | |

¹Synonyms not found in PubMed were removed from consideration in the search; [mh] searched in MeSH field; [tiab] searched in title or abstract fields; [sh] searched in subheading field.

²Synonyms not found in Web of Science were removed from consideration in the search.

³Synonyms searched automatically

C. GRAY LITERATURE SEARCHES FOR FATE, ENGINEERING/OCCUPATIONAL EXPOSURE, EXPOSURE, AND HUMAN HEALTH HAZARD

The gray literature search for fate, engineering, exposure, and human health hazard was done with a goal of efficiency. For this reason, websites were automatically searched wherever possible. After creating the list of sites to search, three categories of websites were identified that required a different search strategy as explained below.

- *Websites that can be effectively searched using Google:* these websites and corresponding subsites have relevant documents that can be searched using Google. EPA/OPPT used Google's API that allows the user to create custom searches restricted by both keyword list and URL list. This approach greatly increased the speed of the searches, since code was written to implement the searches automatically. The following key restrictions, however, were encountered during the search:
 - The API returns the first 100 sites found, after sorting for predicted relevancy. As with all Google searches, Google attempts to rank the returned URLs in terms of overall relevancy to the search terms. However, if 3,600 sites are returned by the search, only the first 100 according to Google's ranked order are returned.
 - The search strings in Google and the Google API are restricted to 128 characters. For 1-Bromopropane, the following search string was created to have the maximum number of chemical synonyms/CAS numbers without exceeding 128 characters: "106-94-5" OR "1-bromopropane" OR "1-BP" OR "n-propyl bromide" OR "Propane, 1-bromo-"
- *Websites that can be searched using custom code but not using Google:* these websites have relevant data and/or information in the form of PDFs and the searches can be automated by developing custom code that locates and downloads (i.e., "scrapes") all of the targeted PDFs.
 - ATSDR and NIOSH documents: ATSDR has a series of Public Health Assessments and Health Consultations, and NIOSH has a series of Human Hazard Evaluations that may have documents relevant for the TSCA risk evaluation. Each document is housed at specific URLs within the ATSDR and NIOSH websites. Python code was used to automatically download 100 documents from each site.
 - EPA National Electronic Publications Information System (NEPIS) website: The EPA NEPIS website was another one that used custom code to search. NEPIS houses EPA reports and documents that can be searched by keyword. The NEPIS site uses its own search engine that is not retrievable using Google. Thus, python code was developed to directly access the website search engine and automatically pull the top 100 returned PDFs.
- *Websites that are searched manually:* a manual search is required because the websites house a database or they use their own search engine to retrieve information (e.g., ChemView, NHANES).

The overall strategy for searching these sites is shown in . The lists of sites that were searched (with site-specific inclusion/exclusion criteria) are provided in Table_Apx C-2 and Table_Apx C-3. The sites that were originally on the list but removed during curation are provided in Table_Apx C-4.

Table_Apx C-1. Overview of Search Strategy for Gray Literature for Fate, Engineering/Occupational Exposure, Exposure, and Human Health Hazard Topic Areas

| Search Type | How was List Created? | Sub Search Type | How Was Source Searched? | Search Terms | Date Limit | Literature Search Notes |
|--|---|---|--|---|------------|--|
| US Government and International Websites | Compiling list of sources, sources cited in existing problem formulation and assessment documents, and sources cited in the public use document | Manual (sites that cannot be searched using Google) | Searched manually | "106-94-5" OR "1-bromopropane" OR "1-BP" | None | <ul style="list-style-type: none"> Searched all sites and subsites using the 1-bromopropane CAS number (106-94-5) or the substance name (1-bromopropane or 1-BP) Pulled the most recent draft (either draft or final) for assessments. |
| | | Automated, Google API | Searched using Google API | "106-94-5" OR "1-bromopropane" OR "1-BP" OR "n-propyl bromide" OR "Propane, 1-bromo-" | None | <ul style="list-style-type: none"> Search string is 85 characters (below the 128 character limit) Google's API returns the top 100 hits from each site |
| | | Automated, EPA NEPIS | Searched using code that pulls 100 subsites/pdfs | "bromopropane" | 1991 | <ul style="list-style-type: none"> The NEPIS database is a warehouse for EPA documents and reports, and it is not accessible by Google. ICF wrote a custom search for that website. The site is searchable by keyword only, so it was searched using the keyword "bromopropane" The database was searched using a date limit of 1991 to prioritize the 100 most recent EPA documents. |
| | | Automated, ATSDR and NIOSH | Searched using code that pulls 100 subsites/pdfs | "1-bromopropane" OR "n-propyl bromide" | None | <ul style="list-style-type: none"> Both sources contain a large number of assessments on specific subsites Up to 100 documents were downloaded for each chemical |
| Trade Association Websites | Using National Association of Manufacturers members list and public use document | Google API | Searched using Google API | "106-94-5" OR "1-bromopropane" OR "1-BP" OR "n-propyl bromide" OR "Propane, 1-bromo-" | None | <ul style="list-style-type: none"> Search string is 85 characters (below the 128 character limit) Google's API returns the top 100 hits from each site |
| State Websites | Searching for environ. quality/ management, environ. health/human health, and occupational health and safety subsites | Google API | Searched using Google API | ("106-94-5" OR "1-bromopropane" OR "1-BP") AND (assessment OR data) | None | <ul style="list-style-type: none"> State sites tended to have a lot of regulatory or outreach documents which are expected to be less on-topic To focus on reports, assessments, and data, the search string was modified to include the words "data" and "assessment" |

Table_Apx C-2. Sources Used For Gray Literature Search for Fate, Engineering/Occupational Exposure, Exposure, and Human Health Hazard Topic Areas with Source-Specific Inclusion/Exclusion Criteria

| ID | Trusted Source Category | Source | Source Address | Manual or Automated | Search by? | Search Terms ¹ | Source-Specific Inclusion Criteria | Source-Specific Exclusion Criteria |
|------|-------------------------|---|---|---------------------|-------------------|---|--|--|
| 1001 | US EPA Resources | Office of Water: EPA Water Regulations* | https://www.epa.gov/regulatory-information-topic/regulatory-information-topic-water | Manual | Chemical | CAS or chemical name | Drinking water regulations under development or currently in place | None |
| 1006 | US EPA Resources | Drinking Water Standards and Health Advisories | https://www.epa.gov/sites/production/files/2015-09/documents/dwstandards2012.pdf | Manual | Chemical | CAS or chemical name | All chemicals covered by the 2012 standards | None |
| 1008 | US EPA Resources | Office of Water: STORET and WQX | https://www.epa.gov/waterdata/storage-and-retrieval-and-water-quality-exchange | Manual | Chemical | CAS or chemical name | The database was downloaded and text files with data specific to included chemicals (metadata and results) were saved in zip files. The website states that the data warehouse includes all data supplied to EPA since 1999. | None |
| 1010 | US EPA Resources | Office of Air Quality Planning and Standards (OAQPS) | epa.gov/airquality/ | Automated | Chemical | Google API terms | Documents containing information about control technologies used to control emissions | FR notices not directly pertaining to chemical of interest; broken links |
| 1011 | US EPA Resources | Office of Air: Air Emission Factors* | https://www.epa.gov/air-emissions-factors-and-quantification/ap-42-Compilation-air-emission-factors | Manual | Industrial Sector | Sectors and uses identified from public use document and Chemical Data Reporting data | Reviewed chapters to identify information relevant to industrial sectors using professional experience/judgment | None |
| 1012 | US EPA Resources | Office of Air: Emission Inventory Improvement Program | https://www.epa.gov/air-emissions-inventories/emi | Manual | NAICS Code | NAICS Code | This source will be searched once the assessment team determines the list of NAICS codes to search the database likely during problem formulation. | |

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|------|------------------|---|---|-----------|------------|----------------------|---|--|
| | | | ssion-inventory-improvement-program-eiip | | | | | |
| 1013 | US EPA Resources | Office of Air: National Emissions Inventory (NEI) | https://www.epa.gov/air-emissions-inventories/national-emissions-inventory | Manual | NAICS Code | NAICS Code | This source will be searched once the assessment team determines the list of NAICS codes to search the database likely during problem formulation. | |
| 1014 | US EPA Resources | Office of Air: Ambient Water Quality Criteria documents | epa.gov/wqc | Automated | Chemical | Google API terms | Most-recent water quality criteria human health tables and supporting documents | Previous (prior to 2015) water quality criteria documents; documents not directly pertaining to the chemical of interest |
| 1015 | US EPA Resources | Office of Air: HAPS | epa.gov/haps/initial-list-hazardous-air-pollutants-modifications | Automated | Chemical | Google API terms | None | Lists of chemical classified as hazardous air pollutants covered in other sources (covered in the "Lists of Lists" source) |
| 1016 | US EPA Resources | Office of Air: NESHAP* | epa.gov/technical-air-pollution-resources | Automated | Chemical | Google API terms | No results returned by search | No results returned by search |
| 1031 | US EPA Resources | Office of Air: Urban Air Toxics | https://www.epa.gov/urban-air-toxics/urban-air-toxic-pollutants | Manual | Chemical | CAS or chemical name | List of chemicals classified as urban air toxics | None |
| 1032 | US EPA Resources | OPPT: TRI, including TRI Guidance Documents* | epa.gov/tri | Automated | Chemical | Google API terms | Statistics on emission reductions. Additional data supporting the lifecycle diagram/conceptual model was reviewed using professional judgment/experience. | Fact sheets, reporting forms, grant program information, data (data is provided in a different source) |
| 1038 | US EPA Resources | OPPT: TSCA Analog Identification Methodology (AIM) | http://www.epa.gov/tscascreening-tools/analog-identification-methodology-aim-tool | Manual | Chemical | CAS or chemical name | The AIM tool was downloaded and searched to find records for 1-BP | None |
| 1059 | US EPA Resources | Significant New Alternatives Policy (SNAP) | epa.gov/snap | Automated | Chemical | Google API terms | None | Lists of substitutes in different use sectors that link to specific FR notices from the 1990's |
| 1061 | US EPA Resources | Safer Choice | epa.gov/saferchoice/ | Automated | Chemical | Google API terms | None | Very high-level fact sheets or assessment overviews; assessments found in other sources; staff directories |
| 1064 | US EPA Resources | Pollution Prevention | epa.gov/p2/ | Automated | Chemical | Google API terms | None | Very high-level fact sheets and case studies; contact information |

| | | | | | | | | |
|------|------------------|--|---|-----------|----------|----------------------|--|--|
| 1070 | US EPA Resources | Pesticide Chemical Search | https://iaspub.epa.gov/apex/pesticides/f?p=chemicalsearch:1 | Manual | Chemical | CAS or chemical name | The database was searched by CAS number and all information returned was included in PDFs | Additional links on the search return page (included in other sources) |
| 1073 | US EPA Resources | InertFinder | https://iaspub.epa.gov/apex/pesticides/f?p=101:1: | Manual | Chemical | CAS or chemical name | The database was searched by CAS number and all information returned was included in PDFs | None |
| 1075 | US EPA Resources | Pesticide Ingredients | epa.gov/ingredients-used-pesticide-products | Automated | Chemical | Google API terms | None | High level summaries supporting decisions about classifying inert ingredients |
| 1078 | US EPA Resources | Hazardous Waste | epa.gov/hw/ | Automated | Chemical | Google API terms | Reports to Congress or other material supporting regulatory decisions | Regulatory documents |
| 1080 | US EPA Resources | Superfund chemical data matrix | https://www.epa.gov/superfund/superfund-chemical-data-matrix-scdm-query | Manual | Chemical | CAS or chemical name | The database was searched by CAS number and all information returned was included in PDFs | None |
| 1081 | US EPA Resources | Superfund Enterprise Management System (SEMS) | cumulis.epa.gov/supercpad/cursites | Automated | Chemical | Google API terms | Quantitative risk assessments performed for Superfund sites | General Superfund site information that did not include quantitative measures of contaminant or exposure |
| 1083 | US EPA Resources | CPCat | https://actor.epa.gov/cpcat/faces/search.xhtml | Manual | Chemical | CAS or chemical name | The database was searched by CAS number and all information returned was included in PDFs | None |
| 1090 | US EPA Resources | NCEA IRIS | epa.gov/iris | Automated | Chemical | Google API terms | Supporting information for IRIS assessments | Main IRIS landing pages and information from the IRIS Tracker |
| 1097 | US EPA Resources | NCEA IRIS | https://cfpub.epa.gov/ncea/iris/search/ | Manual | Chemical | CAS or chemical name | IRIS overview pages, summary pages, and full toxicological profiles | None |
| 1101 | US EPA Resources | ChemView (CDR/IUR)*, with links to hazard characterizations, substantial risk reports, chemical reporting data, chemical test rule data, High Production Volume Information System (HPVIS) data, and alternatives assessments. | http://java.epa.gov/chemview | Manual | Chemical | CAS or chemical name | The database was searched by CAS number and all information returned was included in PDFs, other than IRIS assessments that were returned from other sources | None |

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| 1103 | US EPA Resources | Stationary Sources Air Pollution | epa.gov/stationary-sources-air-pollution/ | Automated | Chemical | Google API terms | Documents supporting NESHAP that may contain quantitative data | NESHAP rules and FR notices (regulatory only) |
| 1110 | US EPA Resources | Economic and cost assessment | epa.gov/economic-and-cost-analysis-air-pollution-regulations | Automated | Chemical | Google API terms | Documents containing quantitative data | Documents not containing quantitative data |
| 1113 | US EPA Resources | NSCEP documents (NEPIS) | https://nepis.epa.gov/Exe/ZyNET.exe?ZyActionL=Register&User=anonymous&Password=anonymous&Client=EPA&Init=1 | Automated | Chemical | NEPIS | Documents providing quantitative assessments or data | Fact sheets; documents supporting rules that do not have quantitative data |
| 1118 | US EPA Resources | Regulatory Development and Retrospective Review Tracker | yosemite.epa.gov/oepi/rulegate.nsf/ | Automated | Chemical | Google API terms | None | Lists of regulations expected to affect particular interests |
| 1120 | US EPA Resources | "List of Lists" | https://www.epa.gov/sites/production/files/2015-03/documents/list_of_lists.pdf | Manual | Chemical | CAS or chemical name | List of chemicals covered by specific EPA programs | None |
| 1123 | US EPA Resources | TSCATS 2.0 | https://yosemite.epa.gov/oppts/epatscat8.nsf/reportsearch?openform | Manual | Chemical | CAS or chemical name | The database was searched and all low detail report results were PDFed | None |
| 1125 | US EPA Resources | EPA Manufacturing/Use | Search epa.gov for each manufacturing sector and use and key words for each manufacturing sector | Manual | NAICS Code | NAICS Code | This source will be searched once the assessment team determines the list of NAICS codes to search the database likely during problem formulation. | |
| 1141 | US EPA Resources | OECA Sector Notebooks | The Sector Notebooks have been archived. Conduct an internet search | Manual | NAICS Code | NAICS Code | This source will be searched once the assessment team determines the list of NAICS codes to search the database likely during problem formulation. | |

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| | | | with the keyword "OECA sector notebook" to see whether there has been a Sector Notebook prepared for the relevant industry | | | | | |
| 1143 | US EPA Resources | EPA Generic Scenarios* | Review the list of currently approved Generic Scenarios for relevant information. The scenarios provide information on process descriptions and guidelines for release and exposure estimates for specific industry sectors. | Manual | Industrial Sector | Sectors and uses identified from public use document and Chemical Data Reporting data | Reviewed the list of currently approved Generic Scenarios for relevant information using professional judgment/experience. The scenarios provide information on process descriptions and guidelines for release and exposure estimates for specific industry sectors. | Information that does not inform the lifecycle diagram or conceptual model. |
| 1144 | US EPA Resources | HPV challenge submissions* | cfpub.epa.gov/hpv-s/ | Automated | Chemical | Google API terms | Documents providing information relevant to the lifecycle diagrams and conceptual model using professional judgment/experience. Additional quantitative assessments or data were also pulled as part of the broad search. | Broken links |
| 1145 | US EPA Resources | OPPT Hazard Characterizations | https://ofmpub.epa.gov/oppt/hpv/hc/characterization.get_report_by_cas?doctype=2 [the list of chemicals that have hazard characterizations] with | Manual | Chemical | CAS or chemical name | No results returned by search | No results returned by search |

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| | | | supplemental search for the hazard characterization documents, which are published at https://java.epa.gov/chemview (source id 1101) | | | | | |
| 1146 | US EPA Resources | EHPV Program Submissions | https://www.regulations.gov/doctype?D=EPA-HQ-OPPT-2006-1020 | Manual | Chemical | CAS or chemical name | No results returned by search | No results returned by search |
| 1147 | US EPA Resources | CDAT | https://java.epa.gov/oppt_chemical_search/ | Manual | Chemical | CAS or chemical name | The database was searched by CAS number and all information returned was included in PDFs | None |
| 1148 | US EPA Resources | OPPT Risk-Based Prioritizations | https://iaspub.epa.gov/opthpv/existchem_hpv_prioritizations_report [the list of chemicals that have prioritizations] with supplemental search for the prioritization reports, which are published at https://java.epa.gov/chemview (source id 1101) | Manual | Chemical | CAS or chemical name | No results returned by search | No results returned by search |
| 1149 | US EPA Resources | Office of Air: NATA | https://www.epa.gov/national-air-toxics-assessment/2011-nata-assessment- | Manual | Chemical | CAS or chemical name | The database was searched by CAS number and all information returned was included in zip files | None |

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| | | | results#pollutant | | | | | |
| 1150 | US EPA Resources | Office of Air: AQS | http://aqsd1.epa.gov/aqsweb/aqstmp/airdata/download_files.html#Annual | Manual | Chemical | CAS or chemical name | The database was searched by CAS number and all information returned was included in csv files | None |
| 1151 | US EPA Resources | OPPT Monitoring Database | Monitoring database | Manual | Chemical | CAS or chemical name | All monitoring data | None |
| 1152 | US EPA Resources | TSCA public use document and stakeholder input | https://www.epa.gov/assessing-and-managing-chemicals-under-tasca/evaluating-risk-existing-chemicals-under-tasca | Manual | Chemical | CAS or chemical name | Quantitative data, use information, and information in public input | None |
| 1153 | US EPA Resources | TSCA Problem Formulations, Risk Assessments, and Public Comments | https://www.epa.gov/assessing-and-managing-chemicals-under-tasca/assessments-tasca-work-plan-chemicals | Manual | Chemical | CAS or chemical name | Quantitative data, lifecycle information, production information, use information, and information in public comments | None |
| 2001 | Other US Agency Resources | National Institutes of Health (NIH) ChemIDplus | http://chem.sis.nlm.nih.gov/chemidplus/ | Manual | Chemical | CAS or chemical name | The database was searched by CAS number and the result page (with active links) PDFed | The PDF has active links, but not all links were followed and subsequently tagged |
| 2010 | Other US Agency Resources | NIH PubChem Compound Database | https://www.ncbi.nlm.nih.gov/pcccompound | Manual | Chemical | CAS or chemical name | The database was searched by CAS number and the result page (with active links) PDFed | The PDF has active links, but not all links were followed and subsequently tagged |
| 2018 | Other US Agency Resources | NIH HazMap* | http://hazmap.nlm.nih.gov/index.html | Manual | Chemical | CAS or chemical name | The database was searched by CAS number and the result page (with active links) PDFed Additional data supporting the lifecycle diagram/conceptual model was reviewed using professional judgment/experience. | The PDF has active links, but not all links were followed and subsequently tagged |
| 2019 | Other US Agency Resources | NIH Household Products Database | http://householdproducts.nlm.nih.gov/ | Manual | Chemical | CAS or chemical name | The database was searched by CAS number and the result page (with active links) PDFed | The PDF has active links, but not all links were followed and subsequently tagged |
| 2020 | Other US Agency Resources | NIH Hazardous Substance Data Bank (HSDB)* | https://toxnet.nlm.nih.gov/newtoxnet/hsdb.htm | Manual | Chemical | CAS or chemical name | The database was searched by CAS number and the result page (with active links) PDFed Additional data supporting the lifecycle | None |

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| | | | | | | | diagram/conceptual model was reviewed using professional judgment/experience. | |
| 2021 | Other US Agency Resources | NIH LACTMED | https://toxnet.nlm.nih.gov/newtoxnet/lactmed.htm | Manual | Chemical | CAS or chemical name | No results returned by search | No results returned by search |
| 2022 | Other US Agency Resources | NIH NLM Drug Information Portal | https://druginfo.nlm.nih.gov/drugportal/ | Manual | Chemical | CAS or chemical name | The database was searched by CAS number and all information returned was included in zip files | None |
| 2027 | Other US Agency Resources | NTP Report on Carcinogens (RoC) | https://ntp.niehs.nih.gov/pubhealth/roc/index-1.html#C | Manual | Chemical | CAS or chemical name | Report on Carcinogens substance profiles | Fact sheets; scientific review documents (covered in another source) |
| 2028 | Other US Agency Resources | NTP Report on Carcinogens (RoC) Supplemental Materials | https://ntp.niehs.nih.gov/pubhealth/roc/listings/index.html | Manual | Chemical | CAS or chemical name | Report on Carcinogens 2013 monograph, substance information sheets, nomination documents, and review documents | Older Report on Carcinogens monographs (2013 document is comprehensive) |
| 2039 | Other US Agency Resources | NTP Health Assessment and Translation Completed Reports | https://ntp.niehs.nih.gov/pubhealth/hat/noms/index.html | Manual | Chemical | CAS or chemical name | NTP monographs for applicable chemicals from list of all documents. | None |
| 2100 | Other US Agency Resources | CDC ATSDR Tox Profiles* | http://www.atsdr.cdc.gov/toxprofiles/index.asp | Manual | Chemical | CAS or chemical name | ATSDR tox profiles | None |
| 2101 | Other US Agency Resources | CDC ATSDR Minimal Risk Levels (MRLs) for Hazardous Substances | https://www.atsdr.cdc.gov/mrls/mrllist.asp | Manual | Chemical | CAS or chemical name | Minimum risk levels | None |
| 2103 | Other US Agency Resources | CDC ATSDR | atsdr.cdc.gov/ | Automated | Chemical | ATSDR/NIOSH | Case studies; addendums to tox profiles | Fact sheets; quantitative information already given in tox profiles; documents that do not provide quantitative data |
| 2104 | Other US Agency Resources | CDC ATSDR Health Hazard Consultations | www.atsdr.cdc.gov/hac/pha/ | Automated | Chemical | ATSDR/NIOSH | Health Hazard Consultations for the chemicals of interest | None |
| 2111 | Other US Agency Resources | CDC National Report on Human Exposure to Environmental Chemicals | cdc.gov/exposurereport/index.html | Manual | Chemical | CAS or chemical name | NHANES data summaries | None |
| 2113 | Other US Agency Resources | CDC NIOSH* | cdc.gov/niosh/ | Automated | Chemical | ATSDR/NIOSH | Documents providing quantitative data. Additional data supporting the lifecycle diagram/conceptual model was reviewed using professional judgment/experience. | Documents captured in manual search; methods for detection (NMAM manuals); peer review articles captured in peer-reviewed literature search; draft versions of documents previously captured; letters; PowerPoint presentations for public; very high-level fact sheets and case studies; public |

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| | | | | | | | | comments; documents discussing TALC (asbestos free); case report on single occupational exposure; general lists of resources. |
| 2115 | Other US Agency Resources | CDC NIOSH* | http://www.cdc.gov/niosh/ngg/nggdcas.html | Manual | Chemical | CAS or chemical name | Selected entries from list by Chemical Name and CAS number; NIOSH Pocket Guide to Chemical Hazards captured for all chemicals. Additional data supporting the lifecycle diagram/conceptual model was reviewed using professional judgment/experience. | None |
| 2116 | Other US Agency Resources | CDC NIOSH | http://www.cdc.gov/niosh/topics/chemical.html | Manual | Chemical | CAS or chemical name | Documents from chemical-topic pages. | Methods for detection (NMAM manuals); documents captured in other NIOSH manual search; linked out documents from other government agencies. |
| 2123 | Other US Agency Resources | CDC NIOSH Health Hazard Evaluations* | https://www2a.cdc.gov/hhe/search.asp | Manual | Chemical | CAS or chemical name | Human hazard evaluation reports | Human hazard evaluation reports that do not measure chemicals of interest |
| 2125 | Other US Agency Resources | CDC NIOSH Immediately Dangerous to Life or Health | https://www.cdc.gov/niosh/idlh/intridl4.html | Manual | Chemical | CAS or chemical name | Immediately Dangerous to Life or Health summary pages captured for all chemicals, selected from list. | None |
| 2128 | Other US Agency Resources | CDC NIOSH International Chemical Safety Cards (ICSC) | https://www.cdc.gov/niosh/ipcs/neng/nengcas.html | Manual | Chemical | CAS or chemical name | Searched by CAS number; International Chemical Safety Cards (ICSC) captured for all chemicals. | None |
| 2200 | Other US Agency Resources | Bureau of Labor Statistics (BLS) | bls.gov/ | Automated | Chemical | Google API terms | No results returned by search | No results returned by search |
| 2202 | Other US Agency Resources | Census Bureau | census.gov | Automated | NAICS Code | NAICS Code | This source will be searched once the assessment team determines the list of NAICS codes to search the database likely during problem formulation. | |
| 2204 | Other US Agency Resources | Census Bureau: NAICS Determination* | http://www.census.gov/eos/www/naics/ | Manual | NAICS Code | NAICS Code | Data supporting the lifecycle diagram/conceptual model was reviewed using professional judgment/experience. | None |
| 2205 | Other US Agency Resources | Census Bureau: SIC and NAICS codes | http://www.census.gov/eos/www/naics/concordances/concordances.html | Manual | NAICS Code | NAICS Code | This source will be searched once the assessment team determines the list of NAICS codes to search the database likely during problem formulation. | |
| 2206 | Other US Agency Resources | Census Bureau: Current Industrial Reports | http://www.census.gov/manufacturing/cir/index.html | Manual | NAICS Code | NAICS Code | This source will be searched once the assessment team determines the list of NAICS codes to search the database likely during problem formulation. | |

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| 2207 | Other US Agency Resources | Census Bureau: Annual Survey of Manufacturers | http://www.census.gov/programs-surveys/asm.html ; http://www.census.gov/manufacturing/asm/index.html | Manual | NAICS Code | NAICS Code | This source will be searched once the assessment team determines the list of NAICS codes to search the database likely during problem formulation. |
| 2208 | Other US Agency Resources | Census Bureau: County Business Patterns | http://www.census.gov/programs-surveys/cbp.html ; http://www.census.gov/econ/cbp/index.html | Manual | NAICS Code | NAICS Code | This source will be searched once the assessment team determines the list of NAICS codes to search the database likely during problem formulation. |
| 2210 | Other US Agency Resources | Census Bureau: Data Sources for Manufacturing from the US Census Bureau | http://www.census.gov/econ/manufacturing.html | Manual | NAICS Code | NAICS Code | This source will be searched once the assessment team determines the list of NAICS codes to search the database likely during problem formulation. |
| 2211 | Other US Agency Resources | Census Bureau: American Housing Survey | https://www.census.gov/programs-surveys/ahs/data/interactive/ahstablecreator.html#?s_areas=a0000&s_year=n2015&s_tableName=Table1&s_byGroup1=a1&s_byGroup2=a1&s_filterGroup1=t1&s_filterGroup2=g1 | Manual | None | CAS or chemical name | This source will be searched once the assessment team determines the list of NAICS codes to search the database likely during problem formulation. |
| 2212 | Other US Agency Resources | Census Bureau: American Community Survey | http://www.census.gov/acs/www/data/data-tables-and-tools/data-profiles/2015/ | Manual | None | CAS or chemical name | This source will be searched once the assessment team determines the list of NAICS codes to search the database likely during problem formulation. |

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| 2213 | Other US Agency Resources | Census Bureau: Commodity Flow Survey | http://www.census.gov/econ/cfs/ | Manual | NAICS Code | NAICS Code | This source will be searched once the assessment team determines the list of NAICS codes to search the database likely during problem formulation. | |
| 2214 | Other US Agency Resources | Census Bureau: Foreign Trade | http://www.census.gov/foreign-trade/about/index.html | Manual | NAICS Code | NAICS Code | This source will be searched once the assessment team determines the list of NAICS codes to search the database likely during problem formulation. | |
| 2215 | Other US Agency Resources | Census Bureau: Survey of Plant Capacity Utilization | http://www.census.gov/manufacturing/capacity/ | Manual | NAICS Code | NAICS Code | This source will be searched once the assessment team determines the list of NAICS codes to search the database likely during problem formulation. | |
| 2216 | Other US Agency Resources | Census Bureau: Statistics of US Businesses | http://www.census.gov/programs-surveys/susb/data.html | Manual | NAICS Code | NAICS Code | This source will be searched once the assessment team determines the list of NAICS codes to search the database likely during problem formulation. | |
| 2217 | Other US Agency Resources | CPSC Consumer Product Safety Commission | cpsc.gov/ | Automated | Chemical | Google API terms | No results returned by search | No results returned by search |
| 2300 | Other US Agency Resources | FDA Food and Drug Administration | fda.gov | Automated | Chemical | Google API terms | Chemicals of interest noted in drug labels, drug use, or other documents; guidance for industry documents; FR notices with helpful use/product information or quantitative values; Relevant GRAS notices; FDA Total Diet Study Survey results; list of prohibited chemicals for cosmetics. | Documents captured in manual search; CV of FDA researchers, FR notices with no quantitative values; documents related to drugs for mesothelioma treatment; public comments with no quantitative data; documents that state chemical measured in product, but not detected; PowerPoint presentations for public; very high-level fact sheets; citizen petition. |
| 2301 | Other US Agency Resources | FDA Databases | accessdata.fda.gov/ | Automated | Chemical | Google API terms | Chemicals of interest noted in drug labels, drug use, production info or other relevant documents; FR notices with helpful use/product information or quantitative values. | Documents captured in manual search; FR notices with no quantitative values; documents discussing TALC (asbestos free); documents with no chemical-specific information; DCM mentioned as used as a solvent; methods for detection; very high-level fact sheets. |
| 2304 | Other US Agency Resources | FDA Cumulative Estimated Daily Intake | http://www.accessdata.fda.gov/scripts/sda/sdNavigation.cfm?sd=edisrev | Manual | Chemical | CAS or chemical name | Searched by CAS number; all Cumulative Estimates Daily Intakes captured for chemicals having this information. | None |
| 2306 | Other US Agency Resources | FDA Everything Added to Food in the United States (EAFUS) | http://www.fda.gov/Food/IngredientsPackagingLabeling/FoodAdditivesIngredients | Manual | Chemical | CAS or chemical name | Database searched by CAS number; all entries captured. | None |

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| | | | nts/ucm115326.htm | | | | | |
| 2307 | Other US Agency Resources | FDA List of Indirect Additives Used in Food Contact Substances | http://www.fda.gov/Food/IngredientsPackaging/Labeling/PackagingFCS/IndirectAdditives/ucm115333.htm | Manual | Chemical | CAS or chemical name | Database searched by CAS number; all entries captured. | None |
| 2400 | Other US Agency Resources | OSHA Occupational Safety and Health Administration | osha.gov/ | Automated | Chemical | Google API terms | Regulatory limits; reports with quantitative data; data from the occupational chemical database | Detection methods papers; factsheets and evaluation guidance |
| 2414 | Other US Agency Resources | OSHA Chemical Exposure Health Data* | https://www.osha.gov/opengov/healthsamples.html | Manual | Chemical | CAS or chemical name | OSHA PELs. Additional data supporting the lifecycle diagram/conceptual model was reviewed using professional judgment/experience. | None |
| 2502 | Other US Agency Resources | NIST | NIST.gov | Automated | Chemical | Google API terms | Conference proceedings that may not be in peer-reviewed search | Peer-reviewed articles; detection method papers |
| 2504 | Other US Agency Resources | NOAA CAMEO database | https://cameochemicals.noaa.gov/ | Manual | Chemical | CAS or chemical name | The database was searched by CAS number and the result page PDFed | None |
| 2507 | Other US Agency Resources | Protective Action Criteria (PAC) Database | https://sp.eota.energy.gov/pac/teel/search.html | Manual | Chemical | CAS or chemical name | The database was searched by CAS number and the result page PDFed | None |
| 2509 | Other US Agency Resources | US Geological Survey | usgs.gov | Automated | Chemical | Google API terms | Documents providing quantitative data. | Peer reviewed papers; employee contact information; |
| 2511 | Other US Agency Resources | Department of Energy | www.energy.gov | Automated | Chemical | Google API terms | Medical Surveillance Program information and needs assessments | Fact sheets; documents containing no quantitative data |
| 2512 | Other US Agency Resources | PNNL Pacific Northwest National Laboratory | pnnl.gov/ | Automated | Chemical | Google API terms | Documents providing quantitative data. | Fact sheets; employee contact information; documents that do not provide quantitative data |
| 2513 | Other US Agency Resources | US Geological Survey publications | https://pubs.er.usgs.gov/ | Automated | Chemical | Google API terms | Groundwater quality data; documents containing use information or quantitative data | Peer reviewed papers; documents that do not provide quantitative data |
| 3000 | International Resources | European Commission | ec.europa.eu | Manual | Chemical | CAS or chemical name | Documents containing quantitative data or use information | Documents not containing quantitative data or use information |
| 3005 | International Resources | European Commission | eur-lex.europa.eu/collecion/eu-law.html | Automated | Chemical | Google API terms | Documents containing quantitative data or use information | Documents not containing quantitative data or use information |

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| 3057 | International Resources | ECHA Documents | echa.europa.eu/documents/ | Manual | Chemical | CAS or chemical name | Documents containing quantitative data or use information | Documents not containing quantitative data or use information |
| 3100 | International Resources | IARC Monograph | http://monographs.iarc.fr/ENG/Monographs/PDFs/index.php | Manual | Chemical | CAS or chemical name | Most-recent IARC monographs | Previous (not current) IARC monographs |
| 3150 | International Resources | OECD HPV Programme | http://webnet.oecd.org/hpv/ui/Search.aspx | Manual | Chemical | CAS or chemical name | Initial assessments, final assessments, and recommendations | None |
| 3155 | International Resources | OECD Emission Scenario Documents* | oecd.org/chemicalsafety/risk-assessment/emissionscenariodocuments.htm | Manual | NAICS Code | NAICS Code | Data supporting the lifecycle diagram/conceptual model was reviewed using professional judgment/experience. | None |
| 3156 | International Resources | OECD Substitution and Alternatives Assessment Tool Selector – Case Studies | oecd.org/chemicalsafety/risk-assessment/emissionscenariodocuments.htm | Manual | Chemical | CAS or chemical name | The database was searched by CAS number and the result page PDFed | None |
| 3200 | International Resources | United Nations Environment Program (UNEP) | unep.org/ | Automated | Chemical | Google API terms | No results returned by search | No results returned by search |
| 3250 | International Resources | WHO Institutional Repository for Information Sharing (IRIS) | apps.who.int/iris/ | Automated | Chemical | Google API terms | Documents containing quantitative data or use information | Documents not containing quantitative data or use information |
| 3253 | International Resources | World Health Organization-Regional Office for Europe | euro.who.int/en/home | Automated | Chemical | Google API terms | None | Fact sheets |
| 3300 | International Resources | Stockholm Convention on Persistent Organic Pollutants | http://chm.pops.int/TheConvention/ThePOPs/ListingofPOPs/tabid/2509/Default.aspx | Manual | Chemical | CAS or chemical name | Risk Profiles | None |
| 3350 | International Resources | Australian Government: Department of Health, National Industrial Chemicals; NICNAS | nicnas.gov.au/ | Automated | Chemical | Google API terms | Chemical profiles; public reports with quantitative data; | Regulatory lists; fact sheets; reports with no quantitative data |

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| 3421 | International Resources | Canada Chemicals Portal | chemicalsubstanceschimiques.gc.ca/index-eng.php | Manual | Chemical | CAS or chemical name | Screening assessments and general descriptions of Canada's actions on chemicals of interest | Documents not containing quantitative data or use information |
| 3425 | International Resources | Carex Canada | carexcanada.ca/en/ | Automated | Chemical | Google API terms | Documents containing quantitative data or use information | Documents not containing quantitative data or use information |
| 3450 | International Resources | GESTIS Database | http://limitvalue.ifa.dguv.de/ | Manual | Chemical | CAS or chemical name | Lists of international regulatory limits | None |
| 3520 | International Resources | Government of Japan: Ministry of the Environment | env.go.jp/en/ | Automated | Chemical | Google API terms | Documents containing quantitative data or use information | Documents not containing quantitative data or use information |
| 3600 | International Resources | Substances in Preparations in Nordic Countries (SPIN) Database | http://www.spin2000.net/spinmyphp/ | Manual | Chemical | CAS or chemical name | The database was searched by CAS number and the result page PDFed | None |
| 5000 | Other Resources | Lowell Center for Sustainable Production | sustainableproduction.org | Automated | Chemical | Google API terms | Documents containing quantitative data or use information; recommendations or overall chemical summaries | Fact sheets; press releases; older versions of current reports (e.g., causes of cancer) |
| 5011 | International Resources | eChemPortal | http://www.echemportal.org/echemportal/index?pageID=0&request_locale=en | Manual | Chemical | CAS or chemical name | The database was searched by CAS number and the result page PDFed | None |
| 5014 | Other Resources | Toxicology Excellence for Risk Assessment | http://www.tera.org/ | Manual | Chemical | CAS or chemical name | Documents containing quantitative data or recommendations for analysis | Documents not containing quantitative data or recommendations for analysis |
| 5019 | Other Resources | Consumer Products Information Database (CPID) | https://www.wahatsinproducts.com/chemicals/index/1 | Manual | Chemical | CAS or chemical name | The database was searched by CAS number and the result page PDFed | None |
| 5020 | Other Resources | Pollution Prevention Infohouse | infohouse.p2ric.org/ | Automated | Chemical | Google API terms | Documents containing quantitative data or regulatory lists of chemicals by state | Documents not containing quantitative data or regulatory lists of chemicals by state |
| 5027 | Other Resources | Kirk Othmer Encyclopedia* | Book | Manual | Chemical | CAS or chemical name | Searched by chemical name in volume index. Captured all entries pertaining to chemical of interest. | Brief mentions of chemical in entries for other chemicals not included in this search |
| 5028 | Other Resources | Ashford's Dictionary of Industrial Chemicals, 2001 | Book | Manual | Chemical | CAS or chemical name | Searched by chemical name in index. Captured dictionary entries for chemical of interest. | None |
| 5029 | Other Resources | Hawley's Chemical Dictionary, 2016 | Book | Manual | Chemical | CAS or chemical name | Searched by chemical name in index. Captured dictionary entries for chemical of interest. | None |
| 6000 | States | Custom search engine using States | multiple | Automated | Chemical | States | Documents containing quantitative data or regulatory lists of chemicals by state | Documents not containing quantitative data or regulatory lists of chemicals by state, including fact sheets |

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| | | sites (see separate table) | | | | | | |
| 7141 | Trade/ Professional | American Composites Manufacturers Association | www.acmanet.org | Automated | Chemical | Google API terms | Trade association websites were searched by search strings containing CAS number and common chemical synonyms. If a search result was a pdf file it was captured automatically, otherwise a webpage with active links was captured. On-topic documents included industrial processes and uses, production and trade data, court proceedings, regulatory response from industry, and regulatory guidance documents. | Documents such as news releases that do not contain quantitative data beyond general use information. Documents describing analytical processes where chemical was used in apparatus, reagent, or reference material. Documents describing non-current use such as pre 1980 uses of asbestos. Documents describing alternative use compounds to the chemical being searched. |
| 7142 | Trade/ Professional | Aerospace Industries Association of America | www.aia-aerospace.org | Automated | Chemical | Google API terms | | |
| 7144 | Trade/ Professional | American Chemistry Council | www.americanchemistry.com | Automated | Chemical | Trade association terms | | |
| 7146 | Trade/ Professional | Asphalt Roofing Manufacturers Association | www.asphaltroofing.org | Automated | Chemical | Trade association terms | | |
| 7153 | Trade/ Professional | Chemistry Industry Association of Canada | www.canadianchemistry.ca | Automated | Chemical | Trade association terms | | |
| 7156 | Trade/ Professional | European Flame Retardant Association | www.cefic-efra.com | Automated | Chemical | Trade association terms | | |
| 7159 | Trade/ Professional | Consumer Specialty Products Association | www.cspa.org | Automated | Chemical | Trade association terms | | |
| 7163 | Trade/ Professional | European Brominated Flame Retardant Industry Panel | www.ebfrip.org | Automated | Chemical | Trade association terms | | |
| 7172 | Trade/ Professional | Juvenile Products Manufacturers Association | www.jpma.org | Automated | Chemical | Trade association terms | | |
| 7176 | Trade/ Professional | National Association of Manufacturers | www.nam.org | Automated | Chemical | Trade association terms | | |
| 7200 | Trade/ Professional | Phosphorous, Inorganic, & Nitrogen Flame Retardants Association | www.pinfa.org | Automated | Chemical | Trade association terms | | |
| 7201 | Trade/ Professional | Plastic Pipes Institute | www.plasticpipe.org | Automated | Chemical | Trade association terms | | |
| 7209 | Trade/ Professional | Structural Insulated Panel Association | www.sips.org | Automated | Chemical | Trade association terms | | |
| 7210 | Trade/ Professional | Society of Chemical Manufacturers and Affiliates | www.socma.com | Automated | Chemical | Trade association terms | | |

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|------|------------------------|---|--|-----------|----------|-------------------------------|
| 7224 | Trade/ Professional | American Composites Manufacturers Association | www.acmanet.org | Automated | Chemical | Trade association terms |
| 7233 | Trade/ Professional | American Fiber Manufacturers Association | www.afma.org | Automated | Chemical | Trade association terms |
| 7235 | Trade/ Professional | American Foundry Society | www.afsinc.org | Automated | Chemical | Trade association terms |
| 7237 | Trade/ Professional | American Gas Association | www.aga.org | Automated | Chemical | Trade association terms |
| 7242 | Trade/ Professional | Air-Conditioning, Heating, & Refrigeration Institute | www.ahrinet.org | Automated | Chemical | Trade association terms |
| 7245 | Trade/ Professional | Aluminum Association | www.aluminum.org | Automated | Chemical | Trade association terms |
| 7247 | Trade/ Professional | Association for Manufacturing Excellence | www.ame.org | Automated | Chemical | Trade association terms |
| 7250 | Trade/ Professional | American Chemistry Council | www.americanchemistry.com | Automated | Chemical | Trade association terms |
| 7254 | Trade/ Professional | American National Standards Institute | www.ansi.org | Automated | Chemical | Trade association terms |
| 7256 | Trade/ Professional | American Petroleum Institute | www.api.org | Automated | Chemical | Trade association terms |
| 7260 | Trade/ Professional | The Adhesive and Sealant Council | www.ascouncil.org | Automated | Chemical | Trade association terms |
| 7266 | Trade/ Professional | American Wood Council | www.awc.org | Automated | Chemical | Trade association terms |
| 7274 | Trade/ Professional | Business & Institutional Furniture Mfrs Association | www.bifma.org | Automated | Chemical | Trade association terms |
| 7281 | Trade/ Professional | Can Manufacturers Institute | www.cancentral.com | Automated | Chemical | Trade association terms |
| 7295 | Trade/ Professional | European Chlorinated Solvents Association | www.chlorinated-solvents.eu | Automated | Chemical | Trade association terms |

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|------|------------------------|---|--|-----------|----------|-------------------------------|--|--|
| 7298 | Trade/ Professional | Council of Industrial Boiler Owners | www.cibo.org | Automated | Chemical | Trade association terms | | |
| 7300 | Trade/ Professional | American Cleaning Institute | www.cleaninginstitute.org | Automated | Chemical | Trade association terms | | |
| 7304 | Trade/ Professional | Copper Development Association Inc | www.copper.org | Automated | Chemical | Trade association terms | | |
| 7308 | Trade/ Professional | Consumer Specialty Products Association | www.cspa.org | Automated | Chemical | Trade association terms | | |
| 7346 | Trade/ Professional | Flexible Packaging Association | www.flexpack.org | Automated | Chemical | Trade association terms | | |
| 7354 | Trade/ Professional | Gasket Fabricators Association | www.gasketfab.com | Automated | Chemical | Trade association terms | | |
| 7358 | Trade/ Professional | Global Automakers | www.globalautomakers.org | Automated | Chemical | Trade association terms | | |
| 7359 | Trade/ Professional | Grocery Manufacturers Association | www.gmaonline.org | Automated | Chemical | Trade association terms | | |
| 7374 | Trade/ Professional | Halogenated Solvents Industry Alliance, Inc. (HSIA) | www.hsia.org | Automated | Chemical | Trade association terms | | |
| 7382 | Trade/ Professional | Independent Lubricant Manufacturers Association | www.ilma.org | Automated | Chemical | Trade association terms | | |
| 7386 | Trade/ Professional | Association of Nonwoven Fabrics Industry | www.inda.org | Automated | Chemical | Trade association terms | | |
| 7392 | Trade/ Professional | Association Connecting Electronics Industries | www.ipc.org | Automated | Chemical | Trade association terms | | |
| 7395 | Trade/ Professional | Institute of Scrap Recycling Industries | www.isri.org | Automated | Chemical | Trade association terms | | |
| 7396 | Trade/ Professional | The Worldwide Cleaning Industry Association | www.issa.com | Automated | Chemical | Trade association terms | | |
| 7398 | Trade/ Professional | Juvenile Products Manufacturers Association | www.jpma.org | Automated | Chemical | Trade association terms | | |

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|------|------------------------|--|--|-----------|----------|-------------------------------|
| 7419 | Trade/ Professional | Motor & Equipment Manufacturers Association | www.mema.org | Automated | Chemical | Trade association terms |
| 7433 | Trade/ Professional | National Association for Surface Finishing | www.nasf.org | Automated | Chemical | Trade association terms |
| 7440 | Trade/ Professional | National Electrical Manufacturers Association | www.nema.org | Automated | Chemical | Trade association terms |
| 7444 | Trade/ Professional | Natural Gas Supply Association | www.ngsa.org | Automated | Chemical | Trade association terms |
| 7453 | Trade/ Professional | N-Methylpyrrolidone Producers Group, Inc. | www.nmpgroup.com | Automated | Chemical | Trade association terms |
| 7471 | Trade/ Professional | Petroleum Equipment Institute | www.pei.org | Automated | Chemical | Trade association terms |
| 7473 | Trade/ Professional | Personal Care Products Council | www.personalcarecouncil.org | Automated | Chemical | Trade association terms |
| 7483 | Trade/ Professional | Precision Machined Products Association | www.pmpa.org | Automated | Chemical | Trade association terms |
| 7485 | Trade/ Professional | Power Tool Institute, Inc. | www.powertoolinstitute.com | Automated | Chemical | Trade association terms |
| 7489 | Trade/ Professional | Printing Industries of America | www.printing.org | Automated | Chemical | Trade association terms |
| 7490 | Trade/ Professional | Pressure Sensitive Tape Council | www.pstc.org | Automated | Chemical | Trade association terms |
| 7498 | Trade/ Professional | Roof Coatings Manufacturers Association | www.roofcoatings.org | Automated | Chemical | Trade association terms |
| 7502 | Trade/ Professional | Specialty Equipment Market Association | www.sema.org | Automated | Chemical | Trade association terms |
| 7511 | Trade/ Professional | Society of Manufacturing Engineers | www.sme.org | Automated | Chemical | Trade association terms |
| 7513 | Trade/ Professional | Society of Chemical Manufacturers & Affiliates | www.socma.com | Automated | Chemical | Trade association terms |

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|------|------------------------|--|--|-----------|----------|-------------------------|--|--|
| 7516 | Trade/ Professional | SteelWorks | www.steel.org | Automated | Chemical | Trade association terms | | |
| 7520 | Trade/ Professional | Textile Care Allied Trades Association | www.tcata.org | Automated | Chemical | Trade association terms | | |
| 7531 | Trade/ Professional | Textile Rental Services Association of America | www.trsa.org | Automated | Chemical | Trade association terms | | |
| 7541 | Trade/ Professional | Vinyl Siding Institute | www.vinylsiding.org | Automated | Chemical | Trade association terms | | |
| 7554 | Trade/ Professional | Extruded Polystyrene Foam Association | www.xpsa.com | Automated | Chemical | Trade association terms | | |

* Asterisk denotes sources that were part of the lifecycle/conceptual model search.

¹ See Table_Apx C-1 for list of search terms and keywords

Table_Apx C-3. List of State Websites Included in the “States” Search for Fate, Engineering/Occupational Exposure, Exposure, and Human Health Hazard Topic Areas

| State | Type | Title | URL |
|-------------|-----------------------------|---|--|
| Alabama | Environment | Alabama Department of Environmental Management | www.adem.state.al.us |
| Alabama | Occupational Health | Alabama Occupational Safety and Health | www.labor.alabama.gov |
| Alabama | Environmental Health/Health | Environmental - Home - Alabama Department of Public Health | www.adph.org/environmental |
| Alaska | Environment | Alaska Department of Environmental Conservation - State of Alaska | www.dec.alaska.gov |
| Alaska | Environment | Environment - Environment Alaska | www.environmentalaska.us |
| Alaska | Occupational Health | Alaska Occupational Safety and Health Section - Alaska Department ... | www.labor.state.ak.us/lss/oshhome.htm |
| Arizona | Environment | ADEQ Arizona Department of Environmental Quality Our mission is ... | www.azdeg.gov |
| Arizona | Occupational Health | ADOSH Main Page Industrial Commission of Arizona | www.azica.gov/our-organization/adosh |
| Arizona | Environmental Health/Health | Arizona Department of Health Services | www.azdhs.gov |
| Arizona | Environmental Health/Health | ADEQ Arizona Department of Environmental Quality Our mission is ... | www.azdeg.gov |
| Arizona | Environmental Health/Health | Arizona Children's Environmental Health Program | www.legacy.azdeg.gov/ceh/ |
| Arkansas | Environment | Arkansas Department of Environmental Quality (ADEQ) | www.adeg.state.ar.us |
| Arkansas | Occupational Health | Occupational Health and Safety Compliance Program | www.labor.arkansas.gov/occupational-safety-and-health-compliance-program-aosh |
| Arkansas | Environmental Health/Health | ADH: Environmental Health - Arkansas Department of Health | www.healthy.arkansas.gov |
| California | Environment | California Environmental Protection Agency: CalEPA | www.calepa.ca.gov |
| California | Environment | California Department of Conservation | www.conservation.ca.gov |
| California | Environment | California Department of Toxic Substances Control | www.dtsc.ca.gov |
| California | Occupational Health | Occupational Health Branch main page - California Department of ... | www.cdph.ca.gov |
| California | Occupational Health | Cal/OSHA - Division of Occupational Safety and Health - Home Page | www.dir.ca.gov/dosh |
| California | Environmental Health/Health | Biomonitoring California | www.biomonitoring.ca.gov |
| California | Environmental Health/Health | Office of Environmental Health Hazard Assessment | www.oehha.ca.gov |
| California | Environmental Health/Health | Department of Public Health: Environmental Health | www.cdph.ca.gov/programs/Pages/CenterEnvironmentalHealth.aspx |
| Colorado | Environmental Health/Health | Colorado Department of Public Health and Environment | www.cdph.state.co.us |
| Connecticut | Environment | Connecticut Department of Energy & Environmental Protection | www.ct.gov/dep/ |
| Connecticut | Occupational Health | DPH: Occupational Health Unit - CT.gov | www.ct.gov/dph/occupationalhealth |

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|-------------|-----------------------------|--|--|
| Connecticut | Occupational Health | Occupational Safety & Health (CONN-OSHA) - State of Connecticut ... | www.ctdol.state.ct.us/osha/osha.htm |
| Connecticut | Environmental Health/Health | Department of Public Health: Environmental Health | www.ct.gov/dph/ |
| Delaware | Environment | Delaware Department of Natural Resources and Environmental ... | www.dnrec.state.de.us |
| Delaware | Environment | State of Delaware - Topics - Environment | www.delaware.gov/topics/environment |
| Delaware | Occupational Health | Delaware Office of Occupational Health | www.dhss.delaware.gov/dph/hsp/oh.html |
| Delaware | Environmental Health/Health | Division of Public Health - Delaware Health and Social Services ... | www.dhss.delaware.gov/dhss/dph/ |
| Florida | Environment | Welcome Florida Department of Environmental Protection (DEP) | www.dep.state.fl.us |
| Florida | Environmental Health/Health | Environmental Health | www.floridahealth.gov/environmental-health/ |
| Georgia | Environment | Environmental Protection Division A Division of the Georgia ... | www.epd.georgia.gov |
| Georgia | Occupational Health | Georgia Occupational Health and Safety Surveillance Program ... | www.dph.georgia.gov/georgia-occupational-health-and-safety-surveillance-program |
| Georgia | Environmental Health/Health | Environmental Health Georgia Department of Public Health | www.dph.georgia.gov/environmental-health |
| Hawaii | Environment | Office of Environmental Quality Control (OEQC) - Hawaii Department ... | www.health.hawaii.gov |
| Hawaii | Occupational Health | Hawaii Occupational Safety and Health - Department of Labor and ... | www.labor.hawaii.gov |
| Hawaii | Environmental Health/Health | Hawaii Environmental Health Portal | www.eha-cloud.doh.hawaii.gov |
| Idaho | Environment | Idaho Department of Environmental Quality: Home | www.deq.idaho.gov |
| Idaho | Environmental Health/Health | Environmental Health - Idaho Department of Health and Welfare | www.healthandwelfare.idaho.gov |
| Illinois | Environment | Illinois Environmental Protection Agency | www.epa.illinois.gov |
| Illinois | Occupational Health | Illinois OSHA: Illinois OSHA | www.osha.illinois.gov |
| Illinois | Environmental Health/Health | Illinois Department of Public Health | www.idph.state.il.us |
| Indiana | Environment | Indiana Department of Environmental Management - IN.gov | www.in.gov/idem/ |
| Indiana | Occupational Health | IOSHA - IN.gov | www.in.gov/dol/iosha.htm |
| Indiana | Environmental Health/Health | Indiana Environmental Health Website | www.in.gov/isdh |
| Iowa | Environment | Environmental Protection - Iowa Department of Natural Resources | www.iowadnr.gov |
| Iowa | Occupational Health | Iowa OSHA www.iowadivisionoflabor.gov | www.iowaosha.gov |
| Iowa | Environmental Health/Health | EHS - Home - Iowa Department of Public Health - Iowa.gov | www.idph.iowa.gov/ehs |
| Kansas | Environment | Kansas Department of Health & Environment: Division of Environment | www.kdheks.gov/environment/ |
| Kansas | Occupational Health | Kansas Department of Labor: workplace safety | www.dol.ks.gov/Safety |
| Kansas | Environmental Health/Health | Kansas Department of Health & Environment: Division of Public Health | www.kdheks.gov |

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|---------------|-----------------------------|---|--|
| Kentucky | Environment | Department for Environmental Protection Welcome - Kentucky.gov | www.dep.ky.gov |
| Kentucky | Environment | Kentucky Environmental Quality Commission Welcome to the EQC | www.eqc.ky.gov |
| Kentucky | Environment | Energy and Environment Cabinet Welcome - Kentucky.gov | www.eec.ky.gov |
| Kentucky | Occupational Health | Kentucky Labor Cabinet - Occupational Safety and Health Program | www.labor.ky.gov/dows/oshp/Pages/Occupational-Safety-and-Health-Program.aspx |
| Kentucky | Environmental Health/Health | Kentucky: Cabinet for Health and Family Services - DPH Home | www.chfs.ky.gov/dph/ |
| Louisiana | Environment | Louisiana Department of Environmental Quality & HOME | www.deq.louisiana.gov |
| Louisiana | Environmental Health/Health | About Environmental Health - Louisiana Department of Health and ... | www.dhh.louisiana.gov |
| Louisiana | Environmental Health/Health | Health Data Portal | www.healthdata.dhh.la.gov |
| Maine | Environment | Maine Department of Environmental Protection (DEP) - Maine.gov | www.maine.gov/dep/ |
| Maine | Occupational Health | Maine Department of Labor: Workplace Safety and Health - Maine.gov | www.maine.gov/labor/workplace_safety/ |
| Maine | Environmental Health/Health | Division of Environmental Health - Maine CDC: DHHS ... - Maine.gov | www.maine.gov/dhhs/mecdc/environmental-health/el/ |
| Maine | Environmental Health/Health | Maine DHHS - Environmental Health - Maine.gov | www.maine.gov/dhhs/environmental_health.shtml |
| Maryland | Environment | Maryland Department of the Environment | www.mde.state.md.us |
| Maryland | Occupational Health | Maryland Occupational Safety and Health (MOSH) - Division of ... | www.dlir.state.md.us |
| Maryland | Environmental Health/Health | Environmental Health - Maryland Department of Health and Mental ... | www.dhmh.maryland.gov |
| Maryland | Environmental Health/Health | Environmental Health - Prevention and Health Promotion ... | www.phpa.dhmh.maryland.gov |
| Massachusetts | Environment | Massachusetts Department of Environmental Protection MassDEP | www.mass.gov/eea/agencies/massdep/ |
| Massachusetts | Occupational Health | Occupational Health Surveillance Program - Mass.Gov | www.mass.gov/dph/ohsp |
| Massachusetts | Environmental Health/Health | Environmental Health - Mass.Gov | www.mass.gov/eohhs/gov/departments/dph/programs/environmental-health/ |
| Michigan | Environment | DEQ - Department of Environmental Quality - State of Michigan | www.michigan.gov/deq/ |
| Michigan | Occupational Health | MI Occupational Safety & Health Administration - State of Michigan | www.michigan.gov/lara/ |
| Michigan | Environmental Health/Health | MDHHS - Public Safety & Environmental Health - State of Michigan | www.michigan.gov/mdhhs/ |
| Minnesota | Environment | Minnesota Pollution Control Agency | www.pca.state.mn.us |
| Minnesota | Environment | Minnesota Environmental Quality Board | www.eqb.state.mn.us |
| Minnesota | Occupational Health | Minnesota Center for Occupational Health and Safety | www.health.state.mn.us/occhealth/ |
| Minnesota | Environmental Health/Health | Environmental Health - Minnesota Dept. of Health | www.health.state.mn.us |
| Minnesota | Environmental Health/Health | Environmental Safety - Minnesota.gov | www.mn.gov/portal/health-and-safety/environmental-safety/ |
| Mississippi | Environment | Mississippi Department of Environmental Quality | www.deq.state.ms.us |

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|----------------|--|--|--|
| Mississippi | Occupational Health | Occupational Health - Mississippi State Department of Health | www.msdh.ms.gov |
| Missouri | Environment | Division of Environmental Quality - Missouri Department of Natural ... | www.dnr.mo.gov/env |
| Missouri | Occupational Health | Workplace Safety Missouri Labor | www.labor.mo.gov/DLS/workplaceSafety |
| Missouri | Environmental Health/Health | Environmental Health Operational Guidelines Missouri Department ... | www.health.mo.gov |
| Missouri | Environmental Health/Health | Missouri Environmental Public Health Tracking | www.ephtn.dhss.mo.gov |
| Missouri | Environmental Health/Health | Environmental Public Health | www.kcmo.gov/health/environmental-health-services/e |
| Montana | Environment | Air - Montana DEQ > Home - Montana.gov | www.deq.mt.gov |
| Montana | Occupational Health | Occupational Safety and Health - Employment Relations Division | www.erd.dli.mt.gov/safety-health/occupational-safety-and-health |
| Montana | Environmental Health/Health | Environmental Health - DPHHS Home - Montana.gov | www.dphhs.mt.gov/publichealth/Environmental-Health |
| Nebraska | Environment | Nebraska Department of Environmental Quality | www.deq.state.ne.us |
| Nebraska | Occupational Health | Department of Labor Office of Safety | www.dol.nebraska.gov/Safety/ |
| Nebraska | Environmental Health/Health | Nebraska DHHS: Environmental Health | www.dhhs.ne.gov |
| Nevada | Environment | Nevada Division of Environmental Protection | www.ndep.nv.gov |
| Nevada | Occupational Health | Department of Industrial Relations, OSHA | www.dir.nv.gov/OSHA/Home/ |
| Nevada | Environmental Health/Health | Nevada Division of Public and Behavioral Health - State of Nevada, Environmental Health Section | www.dpbh.nv.gov |
| New Hampshire | Environment | Welcome NH Department of Environmental Services | www.des.nh.gov |
| New Hampshire | Environment | Environmental Protection Bureau NH Department of Justice | www.doj.nh.gov/environmental-protection/index.htm |
| New Hampshire | Occupational Health | Occupational Health Surveillance Program at University of New Hampshire, in conjunction with the state | www.iod.unh.edu/projects/occupational-health-surveillance-program |
| New Hampshire | Environmental Health/Health | Welcome New Hampshire Environmental Public Health Tracking Program | www.nh.gov/epht |
| New Jersey | Environment | NJDEP New Jersey Department of Environmental Protection | www.nj.gov/dep |
| New Jersey | Occupational Health and Environmental Health | Department of Health, The Consumer, Environmental and Occupational Health Service | www.nj.gov/health/ceohs/ |
| New Mexico | Environment | New Mexico Environment Department Home Web Site Homepage ... | www.env.nm.gov |
| New York | Environment | New York State Department of Environmental Conservation | www.dec.ny.gov |
| New York | Occupational Health | NYS Occupational Health Clinic Network - New York State ... | www.health.ny.gov/environmental/workplace/ |
| North Carolina | Environment | NC DEQ | www.deq.nc.gov |
| North Carolina | Occupational Health | N.C. Department of Labor, Occupational Health Division | www.nclabor.com/osha/ |

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|----------------|-----------------------------|--|--|
| North Carolina | Environmental Health/Health | State of North Carolina: Environmental Health | www.nc.gov/agency/environmental-health |
| North Dakota | Environment | Environmental Services - nd.gov: Official Portal for North Dakota ... | www.nd.gov |
| North Dakota | Environment | Environmental and Transportation Services Division - North Dakota ... | www.dot.nd.gov/public/divdist/environmental.htm |
| North Dakota | Environmental Health/Health | Environmental Health Air Quality Section | www.ndhealth.gov/aq/ |
| North Dakota | Environmental Health/Health | Environmental Health Section - North Dakota Department of Health | www.ndhealth.gov/ehs/ |
| Ohio | Environment | Ohio EPA Home | www.epa.state.oh.us |
| Ohio | Occupational Health | Ohio Bureau of Workers Compensation, Division of Safety & Hygiene services | www.bwc.ohio.gov/employer/programs/safety/ |
| Ohio | Environmental Health/Health | Environmental Health - Ohio Department of Health | www.odh.ohio.gov/environmentalhealth |
| Oklahoma | Environment | Welcome to the Oklahoma Department of Environmental Quality | www.deq.state.ok.us |
| Oklahoma | Occupational Health | Oklahoma Department of Labor - Safety and Health (PEOSH) | www.ok.gov/odol/Services/Safety_and_Health_(PEOSH) |
| Oregon | Environment | State of Oregon: Department of Environmental Quality - Home | www.oregon.gov/DEQ/ |
| Oregon | Occupational Health | State of Oregon: Oregon OSHA - Home | www.osha.oregon.gov |
| Oregon | Environmental Health/Health | Healthy Environments - Oregon Public Health Division - Oregon.gov | www.public.health.oregon.gov/HealthyEnvironments |
| Pennsylvania | Environment | Pennsylvania Department of Environmental Protection | www.dep.pa.gov |
| Pennsylvania | Occupational Health | Occupational and Industrial Safety - PA Department of Labor ... | www.dli.pa.gov/Individuals/Labor-Management-Relations/bois/Pages/default.aspx |
| Pennsylvania | Environmental Health/Health | Pennsylvania Department of Health | www.health.pa.gov/My%20Health/Environmental%20Health/Pages/default.aspx#.WLDHiW_ytJ8 |
| Rhode Island | Environment | Home- Rhode Island -Department of Environmental Management | www.dem.ri.gov |
| Rhode Island | Occupational Health | Occupational Safety, Workforce Regulation and Safety, RI ... | www.dlt.ri.gov/occusafe/ |
| Rhode Island | Environmental Health/Health | Environmental Health, Division of - Rhode Island Department of Health | www.health.ri.gov/programs/detail.php?pgm_id=1052 |
| South Dakota | Environment | South Dakota Department of Environment and Natural Resources | www.denr.sd.gov |
| South Dakota | Environmental Health/Health | South Dakota Environmental Health Laboratory | www.doh.sd.gov/lab/environmental/ |
| South Carolina | Environment | Environment - SC.gov | www.sc.gov/HealthAndSafety/Pages/Environment.aspx |
| South Carolina | Occupational Health | South Carolina Occupational Safety and Health Administration | www.scosha.llronline.com/ |
| South Carolina | Environmental Health/Health | S.C. Department of Health & Environmental Control | www.scdhec.gov |

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|---------------|-----------------------------|--|--|
| Tennessee | Environment | Department of Environment & Conservation - State of Tennessee | www.tennessee.gov/environment/ |
| Tennessee | Environment | Division of Water Resources - TN.Gov | www.tn.gov/environment/section/wr-water-resources |
| Tennessee | Occupational Health | Tennessee Occupational Safety and Health Administration - TN.Gov | www.tn.gov/workforce/section/tosha |
| Tennessee | Environmental Health/Health | Tennessee Department of Health - TN.Gov | www.tn.gov/health/section/eh |
| Texas | Environment | TCEQ Homepage - TCEQ - www.tceq.texas.gov | www.tceq.texas.gov |
| Texas | Occupational Health | OSHA - Workplace Safety and Health Requirements | www.twc.state.tx.us |
| Texas | Occupational Health | OSHCN: Occupational Safety and Health Consultation Program | www.tdi.texas.gov |
| Texas | Environmental Health/Health | Texas Department of State Health Services, Texas Environmental Health Institute | www.dshs.texas.gov |
| Utah | Environment | Utah Department of Environmental Quality | www.deq.utah.gov |
| Utah | Environment | Utah DEQ: Division of Air Quality | www.airquality.utah.gov |
| Utah | Occupational Health | Utah Occupational Safety and Health | www.laborcommission.utah.gov/divisions/UOSH/ |
| Utah | Environmental Health/Health | UT-EPHT - Welcome to Utah's Environmental Public Health Tracking ... | www.epht.health.utah.gov |
| Vermont | Environment | Vermont Department of Environmental Conservation | www.dec.vermont.gov |
| Vermont | Environment | Department of Environmental Conservation - Vermont Agency of ... | www.anr.vermont.gov |
| Vermont | Occupational Health | VOSHA Vermont Department of Labor | www.labor.vermont.gov |
| Vermont | Environmental Health/Health | Vermont Department of Health | www.healthvermont.gov |
| Vermont | Environmental Health/Health | Vermont Department of Health | www.han.vermont.gov |
| Virginia | Environment | The Virginia Department of Environmental Quality: Virginia DEQ | www.deq.virginia.gov |
| Virginia | Occupational Health | Office of Occupational Safety and Health Home | www.va.gov/vasafety |
| Virginia | Environmental Health/Health | Virginia Department of Health | www.vdh.virginia.gov |
| Washington | Environment | Access Washington - Environment | www.access.wa.gov/topics/environment |
| Washington | Environment | Washington State Department of Ecology | www.ecy.wa.gov |
| Washington | Occupational Health | Department of Labor and Industries: Centers of Occupational Health and Education | www.cohe.lni.wa.gov |
| Washington | Environmental Health/Health | Environmental Public Health :: Washington State Department of Health | www.doh.wa.gov |
| West Virginia | Environment | WV Department of Environmental Protection | www.dep.wv.gov |
| West Virginia | Environmental Health/Health | Welcome to the Bureau for Public Health - West Virginia Department ... | www.dhhr.wv.gov/bph |
| Wisconsin | Environment | The State of Wisconsin's Environment - Wisconsin Department of ... | www.dnr.wi.gov |

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| Wisconsin | Occupational Health | Wisconsin Occupational Health Program Wisconsin Department of ... | www.dhs.wisconsin.gov/occupational-health/ |
| Wisconsin | Environmental Health/Health | | www.dhs.wisconsin.gov/environmental/ |
| Wyoming | Environment | DEQ Wyoming Department of Environmental Quality | www.deq.state.wy.us |
| Wyoming | Environment | Air Quality Wyoming Department of Environmental Quality | www.deq.wyoming.gov |
| Wyoming | Occupational Health | | www.wyomingworkforce.org/businesses/osh/ |
| Wyoming | Environmental Health/Health | Wyoming Department of Health: Home Page | www.health.wyo.gov |

Table_Apx C-4. List of Gray Literature Sources Removed from Search During Curation for Fate, Engineering/Occupational Exposure, Exposure, and Human Health Hazard Topic Areas

| Searched ID | Description | URL | Reason |
|-------------|---|--|---|
| 1007 | Office of Water Effluent Guidelines | https://www.epa.gov/eg | Provides a list of chemicals only |
| 1009 | Water Quality Criteria 1986 | | Outdated |
| 1018 | Government Publishing Office (GPO) | https://www.gpo.gov/ | Search this last because most hits will be duplicates |
| 1077 | Greener products and services | https://www.epa.gov/greenerproducts/identify-greener-products-and-services | Public fact sheets without sufficient level of detail |
| 1089 | ECOTOX Database | https://cfpub.epa.gov/ecotox/quick_query.htm | Removed because ecotox team is covering this reference |
| 1121 | US EPA Resources | Fact Sheets | Public fact sheets without sufficient level of detail |
| 1123 | EPA Reports | Search epa.gov for each chemical with the key word "report"; only keep those that wouldn't be caught by other sources | Other searches caught this information |
| 1125 | EPA Manufacturing/Use | Search epa.gov for each manufacturing sector and use and key words "fact sheet" or "report" | Other searches caught this information |
| 1130 | Substance Registry Services (SRS) | https://iaspub.epa.gov/sor_internet/registry/substreg/searchandretrieve/substancesearch/search.do | Site provides links to other trusted sources; was used to ensure no part of SRS was excluded from overall trusted source list |
| 1142 | EPA Existing Chemicals Engineering Files | EPA has an archive of hardcopy engineering assessments from previous Existing Chemicals assessments. If directed by the EPA Task Manager, ERG will contact the EPA WA COR to inquire as to the location of these hardcopy files and will review them for relevant information. | This information is internal to OPPT and not public; it may be searched in the future |
| 2023 | NTP National Toxicology Program | ntp.niehs.nih.gov/ | Too general; refined search strategy to target specific subsites |
| 2024 | NTP National Toxicology Program - Search | http://ntpsearch.niehs.nih.gov/ | Too general; refined search strategy to target specific subsites |
| 2025 | NTP National Toxicology Program - Substances studied by NTP | https://ntp.niehs.nih.gov/testing/status/agents/ts-11297-e.html | All NTP studies are captured in Toxline |
| 2033 | NTP Genetically Modified Model Report Series | https://ntp.niehs.nih.gov/testing/types/altmodels/reports/index.html | All NTP studies are captured in Toxline |
| 2034 | NTP Technical Report Series | https://ntp.niehs.nih.gov/results/pubs/longterm/reports/longterm/index.html | All NTP studies are captured in Toxline |
| 2035 | NTP Toxicity Report Series | https://ntp.niehs.nih.gov/results/pubs/shortterm/reports/index.html | All NTP studies are captured in Toxline |

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|------|--|---|---|
| 2036 | NTP Developmental Toxicity Study Abstracts | https://ntp.niehs.nih.gov/testing/types/dev/abstracts/index.html | All NTP studies are captured in Toxline |
| 2037 | NTP Immunotoxicity Study Abstracts | https://ntp.niehs.nih.gov/testing/types/imm/abstracts/index.html | All NTP studies are captured in Toxline |
| 2038 | NTP Reproductive Assessment by Continuous Breeding Study Abstracts | https://ntp.niehs.nih.gov/testing/types/repro/abstracts/index.html | All NTP studies are captured in Toxline |
| 2040 | NTP- Chemical Effects in Biological Systems (CEBS) database | https://tools.niehs.nih.gov/cebs3/ui/ | All NTP studies are captured in Toxline |
| 2102 | CDC ATSDR Public Health Statements | https://www.atsdr.cdc.gov/phs/phs.asp?id=953&tid=199 | Already covered by the ATSDR tox profiles in ID 2100 |
| 2112 | CDC NHANES | https://www.cdc.gov/nchs/nhanes/ | Other searches caught this information |
| 2124 | CDC NIOSH | https://www.cdc.gov/niosh/ | A targeted NIOSH search was done instead |
| 2126 | CDC NIOSH Pocket Guide to Chemical Hazards | https://www.cdc.gov/niosh/npg/search.html | Already covered under ID 2116 (Pocket guide to chemical hazards) |
| 2201 | Bureau of Labor Statistics: American Time Use Survey | https://www.bls.gov/tus/tables.htm | Does not provide chemical-specific information and is already incorporated into OPPT generic exposure scenarios |
| 2209 | Census Bureau: American Fact Finder Database | https://factfinder.census.gov/faces/nav/jsf/pages/searchresults.xhtml?refresh=t | Does not provide chemical-specific information and is already incorporated into OPPT generic exposure scenarios |
| 2225 | Electronic Code of Federal Regulations | http://www.ecfr.gov/ | This provides regulatory information only |
| 2401 | OSHA Permissible Exposure Limits Table Z-1 | https://www.osha.gov/dsg/annotated-pels/tablez-1.html | Other searches caught this information |
| 2402 | OSHA Permissible Exposure Limits Table Z-2 | https://www.osha.gov/dsg/annotated-pels/tablez-2.html | Other searches caught this information |
| 2403 | OSHA Permissible Exposure Limits Table Z-3 | https://www.osha.gov/dsg/annotated-pels/tablez-3.html | Other searches caught this information |
| 2503 | NOAA National Oceanic and Atmospheric Administration | www.noaa.gov | Data provided in cameo database already |
| 2508 | US International Trade Commission | https://www.usitc.gov/ | Provides export information, which is not on topic for this search |
| 2510 | USGS US Geological Survey, National Water Information System | http://waterdata.usgs.gov/nwis | Included in EPA OPPT monitoring database |
| 2511 | CDC National Report on Human Exposure to Environmental Chemicals | cdc.gov/exposurereport/index.html | Moved from automated to manual search |

| | | | |
|------|---|---|--|
| 3050 | ECHA | echa.europa.eu/ | Too general; refined search strategy to target specific subsites |
| 3056 | Japan NITE CHEmicals Collaborative Knowledge database | http://www.safe.nite.go.jp/jcheck/search.action?request_locale=en | Other searches caught this information |
| 3075 | International Resources | https://echa.europa.eu/registration-dossier/ | Other searches caught this information |
| 3149 | OECD | http://webnet.oecd.org/CCRWEB/Search.aspx | This is captured by the echemportal.org site which also provides record for Japan, Finland, Australia, The Netherlands |
| 3154 | OECD eChemPortal | http://www.echemportal.org/echemportal/index?pageID=0&request_locale=en | This is a duplicate |
| 3255 | WHO International Program on Chemical Safety (UN) | http://www.who.int/ipcs/en/ | These data appear in inchem, which is in echemportal |
| 3400 | Environment Canada | http://www.ec.gc.ca/default.asp?lang=En&n=FD9B0E51-1 | Chemical Substances page links to relevant pages at this site |
| 3411 | Health Canada | http://www.hc-sc.gc.ca/index-eng.php | Chemical Substances page links to relevant pages at this site |
| 3430 | Government of Alberta, Canada | http://work.alberta.ca | Other provinces were not searched, so this was eliminated for consistency |
| 3500 | Japan Chemical Risk Information Platform (CHIRP) | http://www.nite.go.jp/en/chem/chrip/chrip_search/systemTop | Other searches caught this information |
| 5002 | Toxic Use Reduction Institute | http://www.turi.org | Links back to regulatory documents captured in other sources |
| 5005 | Environmental Fate Database (EFDB) | http://www.srcinc.com/what-we-do/efdb.aspx | No longer exists |
| 5004 | SRI International | - | Paid access to market reports only |
| 5006 | SRC FatePointers Search Module PHYSPROP | http://esc.syrres.com/fatepointer/search.asp | Provides information captured in other sources |
| 5010 | ChemSpider | http://www.chemspider.com | Not needed since we have chemidplus |
| 5012 | inchem | inchem.org | Captured in 5011 results echemportal |
| 5015 | ITER | iter.ctc.com/publicURL/pub_search_list.cfm | Provides information captured in other sources |
| 5017 | Global Science Gateway | http://www.worldwidescience.org | Other searches caught this information |
| 5018 | Cambridge University | http://www-jmg.ch.cam.ac.uk/cil/SGTL/database/ | Access only granted to Cambridge researchers and students |
| 5022 | Lowell Center for Sustainable Production | http://www.chemicalspolicy.org/chemicalspolicy.us.state.database.php | Only provides regulatory information |
| 5023 | ACGIH | Search the ACGIH handbook to determine whether ACGIH Threshold Limit Value (TLV) has been established for specific chemicals of interest | Only provides regulatory information |

| | | | |
|------|---------------------------------------|---|---|
| 5024 | Pollution Prevention Reference Manual | http://infohouse.p2ric.org/ | Other searches caught this information |
| 7264 | ASTM International | www.astm.org | Paid access to standard methods only |
| 7381 | IHS Market | www.ihs.org | Paid access to market reports only |
| 7467 | American Coatings Association | www.paint.org | Documents restricted to members only |
| | Regulations.gov | regulations.gov | Assumed that technical support documents will be caught using other methods |
| | Federal Register | www.federalregister.gov | Assumed that technical support documents will be caught using other methods |

D. LITERATURE SEARCHES FOR ENVIRONMENTAL HAZARD

The sources searched in the environmental hazard literature search are provided in Table_Apx D-1. The specific search strategies are provided in the remainder of Appendix D.

Table_Apx D-1. Sources Used For Gray Literature Search for the Ecotoxicity Topic Area

| Trusted Source Category | Source | Manual or Automated? | Searched By: | Keywords | Source Address |
|-------------------------|--|----------------------|--------------|-----------------------------|--|
| Other US Agencies | eChemPortal | Manual | Chemical | CAS Number or chemical name | http://www.echemportal.org/echemportal/participant/page.action?pageID=9 |
| International Resources | OECD HPV/SIDS/IUCLID | Manual | Chemical | CAS Number or chemical name | http://webnet.oecd.org/hpv/ui/Search.aspx |
| International Resources | ECHA information on Registered Substances | Manual | Chemical | CAS Number or chemical name | http://echa.europa.eu/information-on-chemicals/registered-substances |
| International Resources | ECHA Information from the Existing Substances Regulation (ESR) | Manual | Chemical | CAS Number or chemical name | http://echa.europa.eu/information-on-chemicals/information-from-existing-substances-regulation |
| International Resources | Environment Canada | Manual | Chemical | CAS Number or chemical name | http://www.ec.gc.ca/default.asp?lang=En&n=ECD35C36 |
| International Resources | Environment Canada: Toxic Substances Managed Under CEPA | Manual | Chemical | CAS Number or chemical name | http://www.ec.gc.ca/toxiques-toxics/Default.asp?lang=En&n=98E80CC6-1 |
| International Resources | Environment Canada: Draft and Final CEPA Assessments | Manual | Chemical | CAS Number or chemical name | http://www.ec.gc.ca/lcpe-cepa/default.asp?lang=En&xml=09F567A7-B1EE-1FEE-73DB-8AE6C1EB7658 http://www.ec.gc.ca/lcpe-cepa/default.asp?lang=En&xml=6892C255-5597-C162-95FC-4B905320F8C9 |

A. Chemical verification process

1. Verify the chemical substance using chemical verification sources as noted in the *ECOTOX Chemical Verification and Entry Procedure* (<https://cfpub.epa.gov/ecotox/help.cfm?helptabs=tab4>).

Chemical verification ensures that the chemical name and CAS Number for the chemical substance linked and correct. Chemical verification sources are searched by the name and/or CAS Number and are cross-checked to ensure the chemical name - CAS Number relationship is valid. Additional information including synonyms and molecular formulas are also located in the verification sources. Once the name and CAS Number have been verified, they are entered into the U.S.EPA's ECOTOX chemical file for use. The primary source for chemical verification is STN International, <http://www.stn-international.com> (operated by Chemical Abstract Services) and contains information on all classes of chemicals, organic, pesticides, inerts, solvents, etc. The chemical verification sources include:

- Online Databases, e.g. STN International (<http://www.stn-international.com>)
 - Chemical Compendiums, e.g. Dictionary of Organic Chemicals, Registry of Toxic Effects of Chemical Substances
 - Chemical Catalogs, e.g. Sigma-Aldrich (<https://www.sigmaaldrich.com>)
 - Internet websites, e.g. company websites displaying chemical MSDS and label information
2. Find related chemicals that may be of interest to OPPT RAD (the relationship of the chemicals are noted in Table_Apx D-2, column headed Relationship, e.g. Parent, is the chemical substance requested, Degradates (chemicals formed as the chemical substance is degraded), and Related compounds (similar in structure to the chemical substance requested, e.g. isomers)), if located. Synonym names and trade names to include in the literature search strategy are also located. Sources for related chemicals and synonym chemical names are at:

- PAN: The Pesticide Action Network (<http://www.pesticideinfo.org>) is a site that provides information about pesticides and also includes inerts and solvents used in chemical formulations. After entering a name or CAS number into the search field, choose the chemical of interest from the search results and scroll down to the bottom of the page. Related chemicals will be listed here along with a reason. Parent chemicals, derivatives, and degradates/metabolites can be found here.
- PFATE: EPA's Pesticide Fate Database (located at the contractor's site) is a database that provides degradates for chemicals, mostly pesticides. Searching on a chemical name returns associated degradates.
- DOC: Dictionary of Chemical Names and Synonyms for synonym names. STN should also be used for the synonym search if a search was conducted to verify the chemical.
- ECOTOX: Search the U.S. EPA's ECOTOX chemical database for chemical synonyms and related chemicals. (www.epa.gov/ecotox)

- Additional chemical verification sources, if needed from Appendix A from the *ECOTOX Chemical Verification and Entry Procedure* (<https://cfpub.epa.gov/ecotox/help.cfm?helptabs=tab4>) contains a list of approved sources of verification for chemical names and structures. Common sources searched may include:
 - Registry of Toxic Effects of Chemical Substances
 - TSCA Chemical Substances Inventory
 - Compendium of Pesticide Common Names
 - California Department of Pesticide Regulation
- If the chemical cannot be found on these websites or any other approved sources, an Internet search is performed to locate additional information.

B. UNIFY Chemical Report Setup Worksheet

Step 1. Identifying the chemical name(s), CAS number(s) and related chemicals. If related chemicals are located, add a line Table_Apx D-2.

Chemical requested: 1-Bromopropane

STN International (STN) - <http://www.stn-international.com>

CAS # 106-94-5

1-Bromopropane
 1-Propyl bromide
 3-Bromopropane
 Abzol JG
 Ascusol MC
 Drysol
 Leksol
 n-Propyl bromide
 Propyl bromide
 PS Cleaner

Pesticide Action Network (PAN) - <http://www.pesticideinfo.org/>

1-Bromopropane– 106-94-5(Parent compound)
 Chemical Uses: PAN – Solvent

1-Bromopropane , 106-94-5 (CAS number) , 106945 (CAS number without hyphens) , 1Bromopropane

Related chemical: 2-Bromopropane, CAS# 75-26-3

PFATE

No additional or related chemical information located.

ECOTOX Chemical database

Contains "Bromopropane"

Related Chemical: 1,2-Dibromopropane, CAS# 78-75-1

Related Chemical: 1,3-Dibromopropane, CAS# 109-64-8

Related Chemical: 1,2,3-Tribromopropane, CAS# 96-11-7

**Online - https://hero.epa.gov/hero/index.cfm/reference/details/reference_id/1733974
supplementary materials**

Related Chemical: Bromoacetone, CAS# 598-31-2

Related Chemical: 3-Bromopropanoic acid, CAS# 590-92-1

Related Chemical: 3-Bromopropionaldehyde, CAS# 65032-54-4

Related Chemical: Acetone, CAS# 67-64-1

Related Chemical: O₂NOOCH₂CH₂CH₂Br (Unable to Verify)

Table_Apx D-2. Chemical(s) located for 1-Bromopropane (1-BP)

*Related compounds were not included in the search per EPA.

| Chemical Name | CAS # | Relationship (Parent, Degradate, etc.) and Source |
|---|------------------|--|
| 1-Bromopropane | 106945 | Parent (PAN) |
| *2-Bromopropane | 75263 | Related (PAN) |
| *1,2-Dibromopropane | 78751 | Related (UNIFY) |
| *1,3-Dibromopropane | 109648 | Related (UNIFY) |
| *1,2,3-Tribromopropane | 96117 | Related (UNIFY) |
| *Bromoacetone | 598312 | Related (ONLINE) |
| *3-Bromopropanoic acid | 590921 | Related (ONLINE) |
| *3-Bromopropionaldehyde | 65032544 | Related (ONLINE) |
| *Acetone | 67641 | Related (ONLINE) |
| *O ₂ NOOCH ₂ CH ₂ CH ₂ Br | Unable to Verify | Related (ONLINE) |

Step 2. Create a unique list of Chemical Search Terms

From the searches conducted in Step 1, chemical terms from searches are listed below, create a unique list of chemical terms to be used for the Chemical of Concern literature search. Non-English, long scientific chemical names and terms documented to cause false hits are not used and are not in bold. Note that if one term is part of another term, e.g. Tetrachloromethane and 1,1,1,1-Tetrachloromethane, only the first term is used, e.g. Tetrachloromethane. Terms used to generate the final list of chemical terms are in **BOLD**.

1. STN

1-Bromopropane
1-Propyl bromide
3-Bromopropane
Abzol JG
Ascusol MC
Drysoiv
Leksol
n-Propyl bromide
Propyl bromide
PS Cleaner

Related Chemicals from STN (not to be included in the search per email from Tracy Wright on 11/30/2016)

CAS# 75-26-3
2-Bromopropane
Isopropyl bromide
sec-Propyl bromide

CAS# 78-75-1
1,2-Dibromopropane
2,3-Dibromopropane
Propylene dibromide

CAS# 109-64-8
1,3-Dibromopropane
alpha,gamma-Dibromopropane
omega,omega'-Dibromopropane
1,3-Bis(bromo)propane
NSC 62663
Trimethylene bromide
Trimethylene dibromide

CAS# 96-11-7
1,2,3-Tribromopropane
Glycerol tribromohydrin
NSC 78932
sym-Tribromopropane

2. PAN

1-Bromopropane , 106-94-5 (CAS number) , 106945 (CAS number without hyphens) , 1Bromopropane

Final chemical terms to use for the Chemical of Concern Literature search derived from the chemical lists above.

CAS Number(s):

106-94-5

Chemical Names:

1-Bromopropane

1-Propyl bromide

3-Bromopropane

Abzol JG

Ascusol MC

Drysolv

Leksol

Propyl bromide

PS Cleaner

GENERAL: *These are the search terms compiled from the Chemical Report for 1-Bromopropane to be used in the search strategies for each of the databases listed below.*

1-Bromopropane OR 1-Propyl bromide OR 3-Bromopropane OR Abzol JG OR Ascusol MC OR Drysolv OR Leksol OR n-Propyl bromide OR Propyl bromide OR PS Cleaner

Based upon the online search manuals for the respective databases below, it was necessary to construct searches as follows:

SCIENCE DIRECT: (www.sciencedirect.com) *General Search Terms applied to the search strategy for Science Direct*

Date Searched: 12/07/2016

Date Range of Search: 1823 to Present

N=57

Tak("1-Bromopropane" OR "1-Propyl bromide" OR "3-Bromopropane" OR "Abzol JG" OR "Ascusol MC" OR Drysolv OR Leksol OR "n-Propyl bromide" OR "Propyl bromide" OR "PS Cleaner") AND NOT key(human* or child* or occupat* OR infant* OR homind* OR woman OR women OR patient* OR OSHA OR chromatograph* OR Spectrometr* OR pediatric*)

AGRICOLA: (www.nal.usda.gov) *General Search Terms applied to the search strategy for Agricola. The Agricola database contains a significant amount of gray literature including proceedings, symposia, and progress reports from government and educational institutions. This database categorizes literature as an "article" or a "book."*

Date Searched: 12/07/2016

Date Range of Search: 15th Century to Present

N=11

Agricola limits the search to 383 characters and therefore it is searched in sections to cover all of the compiled General Terms.

Articles:

"1-Bromopropane" OR "1-Propyl bromide" OR "3-Bromopropane" OR "Abzol JG" OR "Ascusol MC" OR Drysol OR Leksol OR "n-Propyl bromide" OR "Propyl bromide" OR "PS Cleaner"

Search Results: Displaying 1 through 11 of 11 entries.

Books:

"1-Bromopropane" OR "1-Propyl bromide" OR "3-Bromopropane" OR "Abzol JG" OR "Ascusol MC" OR Drysol OR Leksol OR "n-Propyl bromide" OR "Propyl bromide" OR "PS Cleaner"

Search resulted in no hits.

TOXNET: (toxnet.nlm.nih.gov/cgi-bin/sis/htmlgen?TOXLINE) *General Search Terms applied to the search strategy for TOXNET.*

Date Searched: 12/07/2016

Date Range of Search: 1900 to Present

N=132

106-94-5

SearchDatabaseQueryTimeResult# 1toxline("1 bromopropane" OR "propyl bromide" OR "n propyl bromide" OR 106-94-5 [rn]) AND 1900:2016 [yr] AND (eng [la]) AND (BIOSIS [org] OR NTIS [org] OR PESTAB [org] OR PUBMED [org] OR TSCATS [org])14:33:47132

PROQUEST CSA: (www.csa.com) *General Search Terms applied to the search strategy for ProQuest CSA.*

Date Searched: 12/07/2016

Date Range of Search: 1900 to Present

N=71

ALL("1-Bromopropane" OR "1-Propyl bromide" OR "3-Bromopropane" OR "Abzol JG" OR "Ascusol MC" OR Drysol OR Leksol OR "n-Propyl bromide" OR "Propyl bromide" OR "PS Cleaner") NOT IF(m?n or human* or child* or occupant* or infant* or wom?n or patient* or pediatric) AND LA(ENG)

PROQUEST DISSABS: (search.proquest.com) *General Search Terms applied to the search strategy for ProQuest DISSABS.*

Date Searched: 12/07/2016

Date Range of Search: 1900 to Present

N=22

ALL("1-Bromopropane" OR "1-Propyl bromide" OR "3-Bromopropane" OR "Abzol JG" OR "Ascusol MC" OR Drysol OR Leksol OR "n-Propyl bromide" OR "Propyl bromide" OR "PS Cleaner") NOT IF(m?n or human* or child* or occupant* or infant* or wom?n or patient* or pediatric) AND LA(ENG)

CURRENT CONTENTS: (<https://access.webofknowledge.com/>) *General Search Terms applied to the search strategy for Current Contents.*

Date Searched: 12/07/2016

Date Range of Search: 1970 to Present

N=95

TS=("1-Bromopropane" OR "1-Propyl bromide" OR "3-Bromopropane" OR "Abzol JG" OR "Ascusol MC" OR Drysol OR Leksol OR "n-Propyl bromide" OR "Propyl bromide" OR "PS Cleaner")

ECOTOX (production.ecodev.csgov.com/unify/) *Results from the ECOTOX search strategy. These results are derived from the publications that are available in the ECOTOX database. This website is not accessible to the public.*

Date Searched: 12/07/2016

Date Range of Search: 01/01/1900 to 12/07/2016

N = 13

The two sources listed below are used if very few articles are identified in the searches above. The two sources listed below have very high non-applicability rates and not cost effective in most cases.

SCIFINDER: (www.cas.org/)

SciFinder search was not run.

PUB MED: (www.ncbi.nlm.nih.gov/PubMed/)

PubMed search was not run.

E. DEVELOPMENT OF TAGS WITH INCLUSION/EXCLUSION CRITERIA

E-1 Inclusion/Exclusion Criteria and Tags for the Fate Literature

Table_Apx E-1. Tags and Inclusion/Exclusion Criteria for 1-Bromopropane (1-BP) for the Fate Topic Area

| Tag | Inclusion/Exclusion Criteria | Example Keywords |
|------------------------------------|---|--|
| ON TOPIC, GENERAL FATE TAGS | | |
| Fate and Transport Data | <p>INCLUDE:</p> <ul style="list-style-type: none"> Studies providing pchem property data that describe/impact fate and transport <p>EXCLUDE:</p> <ul style="list-style-type: none"> Laboratory experiments using laboratory-derived chemicals or laboratory simulations, not using environmental samples, unless rate constant or coefficient is derived; Laboratory experiments using environmental sample under non-natural conditions or added substrates, not naturally occurring in environment | K _{OA} , K _{OW} , K _{AW} , K _{OC} , K _d , partitioning coefficient, fugacity, flux, groundwater, migration, sediment, leach, soil, sorb, sorption, adsorption, dust, particles, aerosol, volatility, solubility |
| Environmental Persistence | <p>INCLUDE:</p> <ul style="list-style-type: none"> Studies that indicate persistence, transformation, and degradation in the environment | Persistence, half-life, hydrolysis, photolysis, photostability, biodegradation, aerobic, anaerobic, metabolism, reduction, degradation, transformation |
| Bioaccumulation | <p>INCLUDE:</p> <ul style="list-style-type: none"> studies pertaining to bioaccumulation, bioconcentration, and trophic magnification <p>EXCLUDE:</p> <ul style="list-style-type: none"> Studies where chemical is given to animal in lab setting where conditions where conditions are clearly not relevant to naturally-occurring conditions Studies in humans, these can fall under Human Health, ADME | BCF, BAF, BSAF, trophic magnification, biomagnification, bioaccumulation, bioconcentration, biota sediment accumulation factor, biotransfer |
| Wastewater Removal | <p>INCLUDE:</p> <ul style="list-style-type: none"> sewage or wastewater treatment, treatment facilities, and effluent | Sewage or wastewater treatment, WWTP, POTW, sludge, effluent |

| | | |
|-------------------------------------|---|---|
| | EXCLUDE: <ul style="list-style-type: none"> test systems, laboratory experiments, or demonstrations where conditions are clearly not relevant to naturally-occurring conditions | |
| Other supporting fate and transport | INCLUDE: <ul style="list-style-type: none"> studies supporting or possibly supporting fate and transport, but not a study that can be included in one or more of the preceding relevant categories | |
| ON TOPIC, GENERAL STUDY TAGS | | |
| Data Type | INCLUDE: Empirical Modeled | Empirical: measured Modeled: simulated, estimated, modeled |
| Source Type | INCLUDE: Database Search Gray Literature <ul style="list-style-type: none"> EPA Source Other Government Source Industry-Specific Source Peer-reviewed Literature Direct Communications Primary Source Secondary Source | Determination of source type of database search or gray literature is by search type, rather than keyword. Primary Source: Novel, experimental, modeling Secondary Source: Review |
| Use Specific | INCLUDE: Source contains use-specific data or information | adhesives, soaps, sealants, electronics |
| Chemical Specific | INCLUDE: Source contains information specific to the chemical of interest | 1-BP and synonyms |
| Regulatory | INCLUDE: Source contains a regulatory value/limit | Water quality criteria, NAAQS ² , IRIS ² |
| OFF TOPIC | | |
| Off Topic | INCLUDE: Off topic in context of identified information needs | |
| OTHER | | |
| Not peer-reviewed | INCLUDE: Published without formal peer review. Use in addition to relevant or not relevant (not an exclusive tag). | |
| Foreign language | INCLUDE: | |

| | | |
|--|--|--|
| | Full-text published in non-English language. Use in addition to relevant or not relevant (not an exclusive tag). | |
|--|--|--|

¹National Ambient Air Quality Standard

²Integrated Risk Information System

E-2 Inclusion/Exclusion Criteria and Tags for the Engineering Literature

Table_Apx E-2. Tags and Inclusion/Exclusion Criteria for 1-Bromopropane (1-BP) for the Engineering Topic Area

| Tag | Inclusion/Exclusion Criteria | Example Keywords |
|---|---|--|
| ON TOPIC, GENERAL ENGINEERING TAGS | | |
| Process Info | <p>INCLUDE:</p> <ul style="list-style-type: none"> Studies pertaining to chemical processes containing information on life cycle, production volume, descriptions of processes, and manufacturing sites <p>EXCLUDE:</p> <ul style="list-style-type: none"> Studies involving Superfund sites, these might fall under Exposure | Life cycle, production volume, use volume, import, process description, process flow diagram, product concentration, sites, manufacture, process |
| Occupational Exposure | <p>INCLUDE:</p> <ul style="list-style-type: none"> Occupational exposure studies that contain or may contain information on worker activities, amount of workers exposed, routes of exposure, personal and work area monitoring data (job titles), exposure modeling, and/or interventions to reduce exposure such as PPE or engineering controls | Worker, worker activities, worker exposure, occupational exposure, inhalation, dermal, personal sample, time-weighted average, breathing zone, PPE, personal protective equipment, engineering controls, exposure reduction, ventilation |
| Environmental Releases | <p>INCLUDE:</p> <ul style="list-style-type: none"> Studies pertaining to releases from manufacturing waste streams and end of life cycle processing | Release, emission, release rate, release frequency, point source, area source, air, water, landfill, incineration, POTW, on-site treatment, disposal, pretreatment program, recycling, air concentration |
| Other supporting | <p>INCLUDE:</p> <ul style="list-style-type: none"> Studies supporting or possibly supporting engineering sections, but <u>not</u> a study included in one or more of the preceding relevant categories | |
| ON TOPIC, GENERAL STUDY TAGS | | |
| Data Type | <p>INCLUDE:</p> <p>Empirical Modeled</p> | Empirical: measured Modeled: simulated, estimated, modeled |
| Source Type | <p>INCLUDE:</p> <p>Database Search Gray Literature</p> <ul style="list-style-type: none"> ○ EPA Source ○ Other Government Source ○ Industry-Specific Source | <p>Determination of source type of database search or gray literature is by search type, rather than keyword.</p> <p>Primary Source: Novel, experimental, modeling</p> <p>Secondary Source: Review</p> |

| | | |
|-------------------|--|--|
| | <ul style="list-style-type: none"> ○ Peer-reviewed Literature ○ Direct Communications <p>Primary Source Secondary Source</p> | |
| Use Specific | INCLUDE: Source contains use-specific data or information | adhesives, soaps, sealants, electronics |
| Chemical Specific | INCLUDE: Source contains information specific to the chemical of interest | 1-BP and synonyms |
| Regulatory | INCLUDE: Source contains a regulatory value/limit | Water quality criteria, NAAQS ¹ , IRIS ² |
| OFF TOPIC | | |
| Off topic | INCLUDE: Off topic in context of identified information needs | |
| OTHER | | |
| Not peer-reviewed | INCLUDE: Published without formal peer review. Use in addition to relevant or not relevant (not an exclusive tag). | |
| Foreign language | INCLUDE: Full-text published in non-English language. Use in addition to relevant or not relevant (not an exclusive tag). | |

¹National Ambient Air Quality Standard

²Integrated Risk Information System.

E-3 Inclusion/Exclusion Criteria and Tags for the Exposure Literature

Table_Apx E-3. Exposure Inclusion/Exclusion Criteria 1-Bromopropane (1-BP) and Tags

| Tag | Inclusion/Exclusion Criteria | Example Keywords |
|--|---|---|
| ON TOPIC, GENERAL EXPOSURE TAGS | | |
| Ecological | <p>INCLUDE:</p> <ul style="list-style-type: none"> Covers ecological exposure, including exposure to flora and fauna <p>EXCLUDE:</p> <ul style="list-style-type: none"> Studies limited to describing concentrations in mineral deposits only Pchem properties of environmental sample or chemical structure without concentration data | concentration, mammal, avian, fish, aquatic |
| General Population | <p>INCLUDE:</p> <ul style="list-style-type: none"> Covers exposure to the general population due to ambient concentrations in environmental media/food <p>EXCLUDE:</p> <ul style="list-style-type: none"> Studies involving exposures to laboratory-produced chemical or chemical mixture in a lab setting, rather than environmentally-derived samples Studies without measured or modeled concentrations Studies involving measured dust concentrations from consumer products, these should be tagged to Consumer Exposure | general population exposure/dose, releases, background levels, ambient/outdoor air, deposition, surface water, drinking water, ground water, soil, sediment, sludge, disposal, life cycle |
| Consumers | <p>INCLUDE:</p> <ul style="list-style-type: none"> Covers exposure to consumers who use a product or article containing the chemical <p>EXCLUDE:</p> <ul style="list-style-type: none"> Studies involving exposures to laboratory-produced chemical, rather than environmentally-derived samples | consumer product exposure/dose, indoor/residential, product, article, aerosol, dust, indoor air, hand-to-mouth, surface, shower, dermal loading |

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|-------------------------------------|---|---|
| Susceptible Population | INCLUDE: <ul style="list-style-type: none"> Covers exposure for a particular potentially exposed and susceptible subpopulation | susceptible/sensitive subpopulation, infants, children, pregnancy, senior, aged, elderly, older women, men, gender, immunocompromised, diseased population, preexisting disease, genetics, socioeconomic status, race |
| Highly Exposed Population | INCLUDE: <ul style="list-style-type: none"> Covers a population exposed at a level higher than the general population | highly-exposed sub population, near-facility population, higher-than-average exposure, above background, populations near manufacturing facilities |
| Other Exposure | INCLUDE: <ul style="list-style-type: none"> Mentions uses or regulatory limits but does not contain exposure values/estimates; tag also to regulatory or use-specific if applicable Studies supporting or possibly supporting exposure sections, but <u>not</u> a study included in one or more of the preceding relevant categories | |
| ON TOPIC, GENERAL STUDY TAGS | | |
| Data Type | INCLUDE: Empirical Modeled | Empirical: measured Modeled: simulated, estimated, modeled |
| Source Type | INCLUDE: Database Search Gray Literature <ul style="list-style-type: none"> EPA Source Other Government Source Industry-Specific Source Peer-reviewed Literature Direct Communications Primary Source Secondary Source | Determination of source type of database search or gray literature is by search type, rather than keyword. Primary Source: Novel, experimental, modeling Secondary Source: Review |
| Use Specific | INCLUDE: Source contains use-specific data or information | adhesives, soaps, sealants, electronics |
| Chemical Specific | INCLUDE: Source contains information specific to the chemical of interest | 1-BP and synonyms |
| Regulatory | INCLUDE: Source contains a regulatory value/limit | Water quality criteria, NAAQS ² , IRIS ³ |
| OFF TOPIC | | |
| Off topic | INCLUDE: Off topic in context of identified information needs | |
| Human Health | INCLUDE: | |

| | | |
|-------------------|---|--|
| | Contains information that is potentially on-topic for the human health hazard topic area | |
| OTHER | | |
| Not peer-reviewed | INCLUDE: Published without formal peer review. Use in addition to relevant or not relevant (not an exclusive tag). | |
| Foreign language | INCLUDE: Full-text published in non-English language. Use in addition to relevant or not relevant (not an exclusive tag). | |

¹Ecological search results may overlap with environmental hazard search results. EPA intends to harmonize results during the refinement phase.

²National Ambient Air Quality Standard

³Integrated Risk Information System

E-4 Inclusion/Exclusion Criteria and Tags for the Human Health Hazard Literature

Table_Apx E-4. Human Health Hazard Inclusion/Exclusion Criteria and Tags

| Tag Category | Inclusion/Exclusion Criteria | Example Keywords |
|--|--|---|
| ON TOPIC, GENERAL HUMAN HEALTH TAGS | | |
| Human Hazard ID | <p>INCLUDE:</p> <ul style="list-style-type: none"> Studies evaluating human health effects resulting from exposure to the chemical. Includes epidemiology studies (measure an adverse outcome in an exposed population), experimental studies (e.g. individuals exposed to chemical in a controlled study) and case studies (e.g. individual case report on accidental exposure to chemical) Acute, subchronic, and chronic exposures <p>**Also choose applicable health effect tags in next section "1-Bromopropane (1-BP) Health Effect Tags"</p> | case-control study; cohort study; odds ratio; risk ratio; incidence; prevalence |
| Animal Hazard ID | <p>INCLUDE:</p> <ul style="list-style-type: none"> Studies evaluating animal health effects resulting from controlled exposure to the chemical in mammals such as primates, rodents, dog, rabbit, and mink. <p>**Also choose applicable health effect tags in next section "1-Bromopropane (1-BP) Health Effect Tags"</p> <p>EXCLUDE:</p> <ul style="list-style-type: none"> Studies in birds and fish; these can be tagged to MOA and/or ADME if applicable | chronic; developmental; incidence; NOEL/LOEL; NOAEL/LOAEL; dose; response |
| ADME | <p>INCLUDE:</p> <ul style="list-style-type: none"> Studies describing the absorption, distribution, metabolism and elimination (ADME) of the chemical. This may include <i>in vitro</i> studies | absorption, distribution, metabolism, elimination, bioavailability, tissue burden, metabolites, analytes, excretion, elimination rates, clearance, half-life, dose-duration, km, ki, vmax, lactational transfer, inhalation pharmacokinetics, toxicokinetics, PBPK, PBTK accumulation or retention in breast milk, serum, plasma, blood, urine, feces, adipose tissue |
| MOA | <p>INCLUDE:</p> <ul style="list-style-type: none"> Studies evaluating the mode of action (MOA) of a chemical (i.e., molecular | <i>in vitro</i> models, genomics, proteomics, genotoxicity, indirect |

| | | |
|---|--|---|
| | <p>events occurring after exposure that may contribute to the development of adverse health effects) in animals and humans</p> <ul style="list-style-type: none"> • Evaluation of specific pathways (e.g., through the use of antioxidants to determine importance of ROS in hepatic effects) • Studies in knockout mice • Assessment of hormone levels or gland function, immune system parameters | genotoxicity, changes in gene expression or mRNA levels |
| Susceptibility | <p>INCLUDE:</p> <ul style="list-style-type: none"> • Studies that specifically evaluate genetic traits or variations, subpopulations or lifestages, in relation to 1-BP exposure/effects <p>EXCLUDE:</p> <ul style="list-style-type: none"> • Studies using knock-out mice | influence of genetic traits, variations, genetic polymorphisms (e.g. single nucleotide polymorphisms; SNPs) on health effects relating to the chemical |
| ON TOPIC, 1-BROMOPROPANE (1-BP) HEALTH EFFECT TAGS | | |
| Hepatic non-cancer | <p>INCLUDE:</p> <ul style="list-style-type: none"> • Studies evaluating hepatic effects in the liver, biliary tract, gall bladder | fatty degeneration, cirrhosis, fibrosis, necrosis, hypertrophy, hyperplasia, proliferation, increased/decreased liver enzymes, bile acids, cholesterol and triglycerides in serum/blood, increased/decreased liver weight, jaundice, vacuolization |
| Renal non-cancer | <p>INCLUDE:</p> <ul style="list-style-type: none"> • Studies evaluating renal effects in the kidney, bladder, ureter and related | nephropathy, oliguria, increased/decreased blood urea nitrogen, nephritis, nephrosis, hyaline droplet formation, necrosis and regeneration of proximal tubules, markers of kidney damage e.g. excretion of proteins/blood in urine, alpha 2U globulin |
| Neurological non-cancer | <p>INCLUDE:</p> <ul style="list-style-type: none"> • Studies evaluating effects in the central nervous system (CNS) or peripheral nervous system (PNS), brain, nerves, behavior, neurochemical alterations, sensory effects, neurodevelopmental effects in exposed infants and children | changes in brain pathology, CNS depression (dizziness, drowsiness, sleepiness, loss of consciousness/anesthesia, hypo activity, ataxia, lethargy, impaired coordination or balance, narcosis), nerve/neuronal injury and/or degeneration, neuropsychological outcomes (e.g. mood/personality changes), changes in neurobehavioral tests (cognitive, motor function) and neurophysiological effects (visual and auditory function), memory |
| Reproductive/Developmental non-cancer | <p>INCLUDE:</p> | reduced fertility, effects on reproductive organs, sperm, estrous cycle, increased resorption and post |

| | | |
|-------------------------------------|---|---|
| | <ul style="list-style-type: none"> Studies examining reproductive outcomes, offspring and/or studies examining developmental effects <p>Notes:</p> <ul style="list-style-type: none"> Developmental neurotoxicity effects are categorized in the Reproductive/Developmental non-cancer tag and Neurological non-cancer tag | implantation loss, viability, fetal death, birth weight, growth, maturation, teratogenicity, birth defects, visceral and/or skeletal malformations, follicle counts |
| Carcinogenicity | <p>INCLUDE:</p> <ul style="list-style-type: none"> Studies that evaluate any cancer effect | NA |
| Other non-cancer health effect | <p>INCLUDE:</p> <ul style="list-style-type: none"> Studies in which other non-cancer health effects, not defined by the categories above, were examined | NA |
| ON TOPIC, GENERAL STUDY TAGS | | |
| Source Type | <p>INCLUDE:</p> <ul style="list-style-type: none"> Database Search Gray Literature <ul style="list-style-type: none"> EPA Source Other Government Source Industry-Specific Source Peer-reviewed Literature Direct Communications Primary Source Secondary Source | <p>Determination of source type of database search or gray literature is by search type, rather than keyword</p> <p>Primary Source: Novel, experimental, modeling</p> <p>Secondary Source: Review</p> |
| NOT ON TOPIC | | |
| Not on topic | <p>INCLUDE:</p> <ul style="list-style-type: none"> Reference is not on topic in the context of any of the outlined categories (or tags) | NA |
| Exposure ¹ | <p>INCLUDE:</p> <ul style="list-style-type: none"> Reference contains exposure information only, i.e., without associated information on health effects (e.g. clinical signs or symptoms in exposed population) and will be evaluated by that team. <p>Notes:</p> <ul style="list-style-type: none"> Levels of the chemical in biological tissues or fluids were considered related to the human health discipline and categorized under the ADME tag | industrial hygiene surveys, general populations exposures (e.g. measured in air, water and food) |
| OTHER | | |
| Foreign language study | <p>INCLUDE:</p> <ul style="list-style-type: none"> Full-text reference published in non-English language. Use in addition to “on topic” or “off topic” tags. | Title will likely be in brackets or journal title will be in foreign language only |

¹An exposure tag was included to capture references potentially relevant to the exposure topic area to be reviewed by exposure experts

E-5 Inclusion/Exclusion Criteria for the Environmental Hazard Literature

The following are the inclusion criteria used for the results of the ECOTOX literature search. Studies that meet the acceptability criteria are considered on-topic (or applicable).

1. The paper reports toxicology information for the chemical of interest.
2. The article is published in the English language.
3. The study is presented as a full article.
4. The paper is a publicly available document.
5. The paper is the primary source of the data.
6. The paper reports a calculated endpoint.
7. The paper reports that treatment(s) were compared to an acceptable control.
8. The paper reports an explicit duration of exposure.
9. The paper reports a concurrent environmental chemical concentration/dose or application rate.
10. The paper reports the location of the study (e.g., laboratory vs. field).
11. The paper reports a biological effect.
12. The paper reports the species that was tested; and this species can be verified in a reliable source.
13. The paper reports effects associated with a single chemical exposure.

For more information, refer to the document “*ECOTOX Literature Searches, Citation Identification and Skimming*”

(<https://cfpub.epa.gov/ecotox/blackbox/help/ECOTOXLiteratureSearchesCitationIdentificationandSkimming.pdf>).

The following is a list of ECOTOX rejection codes, exclusion terms and definitions utilized under the ECOTOX database efforts. Each citation that is identified as off topic (or not applicable) to the ECOTOX database will have one or more of these codes.

For more information, refer to the document *ECOTOX Literature Searches, Citation, Identification and Skimming*

(<https://cfpub.epa.gov/ecotox/blackbox/help/ECOTOXLiteratureSearchesCitationIdentificationandSkimming.pdf>) under Appendix C: Unify References Data Fields and Codes.

Table_Apx E-5. ECOTOX Codes Denoting Exclusion Criteria

| Keyword | Description |
|---------------------|---|
| ABSTRACT | Study results published as an abstract only. |
| ADDENDUM | Publication is a supplement to another publication and attach to that full publication (erratum or addendum). |
| BACTERIA | Bacteria and microbes - for microbes, enter bacteria as keyword, Includes microbes and Microtox tests. |
| BENEFICIAL EFFECT | Studies that result in a positive effects (improving the health of the organism |
| BIOLOGICAL TOXICANT | General biological toxicants including venoms, fungal toxins, Bacillus thuringiensis, and other plant, animal or microbial extracts or toxins not purified. |
| CAS # UNAVAILABLE | Chemical is not verifiable or no CAS # available. |

| | |
|-----------------------------|---|
| CHEM METHODS | The description of chemical analysis procedures and measurements in a laboratory setting. No organism or biochemical measurements are reported in the paper. |
| ECOCHEM VERIFICATION SOURCE | Publication used to verify chemical CAS or physical/chemical properties. |
| EFFLUENT | Includes sewage and polluted runoff. Used in aquatic publications. Terrestrial categorized under MIXTURE keyword. |
| FATE | Chemical distribution in natural media (water, soil, air) and residue not measured in the organism or valid ECOTOX organism not present. |
| FOOD | Test organism is dead or harvested in the form of consumer-ready food products. Frequently studies include analyses of fresh meat or produce purchased in a market, or processed and packaged foods (e.g., wine, cheese, canned fish, sausages, packaged milk, or cereal products). This includes market studies used to enhance the marketability of an organism and maximize a producer's profit. Optimum marbling of meat, color of apple skins, and firmness of bananas for durability in shipping. |
| HUMAN HEALTH | Studies with human subjects or with surrogate animal subjects for human health risk assessment. If a surrogate laboratory rodent (RODE) or domestic animal (DOM,DOMA) is tested, citations will be rejected unless the effect is GRO, MOR, POP, BEH (feeding/reproductive behavior only) or REP. |
| INCIDENT | Reports of animal deaths by poison, which lacks a usable concentration and/or duration. |
| INCOMPLETE CITATION | Citation is not complete; order status ARCHIVE. |
| INCORRECT CITATION | Citation is wrong; order status ARCHIVE. |
| INHALE | Inhalation dose route only. Keyword also used for intratracheal instillation of a chemical directly into the lungs. |
| METHODS | Publication provides documentation for toxicology test methods, experimental design, statistical methods, standard terminology, recently developed test methods. |
| MIXTURE | No single chemical tests reported. The exception for In Situ studies (field studies of chemicals mixtures) are coded for bioaccumulation, if the exposure duration and concentrations of any specific chemical component of the ambient water or effluent is given for caged or transplanted organisms. |
| MODELING | Modeling only, no new organism exposure data; modeling studies may report original toxicity tests performed as comparisons or as a basis for extrapolation, if so, papers are ordered. |
| NO CONC | No usable dose or concentration reported after examination of the entire paper; includes lead shot studies lacking dose information and which report only the number of pellets. Concentrations reported in log units only are not coded. |
| NO DURATION | No duration reported (entire publication examined). |
| NO EFFECT | No organism effect reported. Chemical metabolism is included (defined as biological effect on the chemical). |
| NO SOURCE | Source of publication undetermined; order status ARCHIVE (includes internal chemical company document and personal communication citations). |
| NO TOXICANT | No chemical toxicant added or not ecotoxicologically relevant chemical. - includes ambient air component chemicals (ozone, CO ₂ , SO ₂) and pollution -other ambient conditions including changes in conditions (other than chemical addition), including radioactivity, ultraviolet light (UV), temperature, pH, salinity, dissolved oxygen (DO), or other water, air or soil parameters |
| NON-ENGLISH | Paper's full text language other than English - (these papers do not receive Ecoref numbers). |
| NUTRIENT | <i>In situ</i> chemicals tested as nutrients. |
| OIL | Oil and petroleum products |
| PUBL AS | Paper (by same author/study) was published in another journal or book, Ecoref number of other paper listed in References citation. Ex. Publ As ##### |
| QSAR | Quantitative Structure Activity Relationships. |
| REFS CHECKED | References in a REVIEW have been checked. |

| | |
|-----------------------------|--|
| RETRACTED | Retracted article from publication by journal. |
| REVIEW | All toxicity tests reported elsewhere; REVIEW bibliography may be skimmed to identify relevant citations. |
| SEDIMENT CONC | Chemical concentration reported in sediment only (if pore or overlying water concentrations reported, then applicable). |
| SKIMMED | Used to show that publication has been skimmed for applicable sections. |
| SPECIES VERIFICATION SOURCE | Publication used to verify species common or scientific name. |
| SURVEY | Measured chemical present in organism, but lacking quantification of exposure; lacks usable concentration and/or duration. |
| VIRUS | Virus used as a test organism. |
| YEAST | Yeast used as test organism. |