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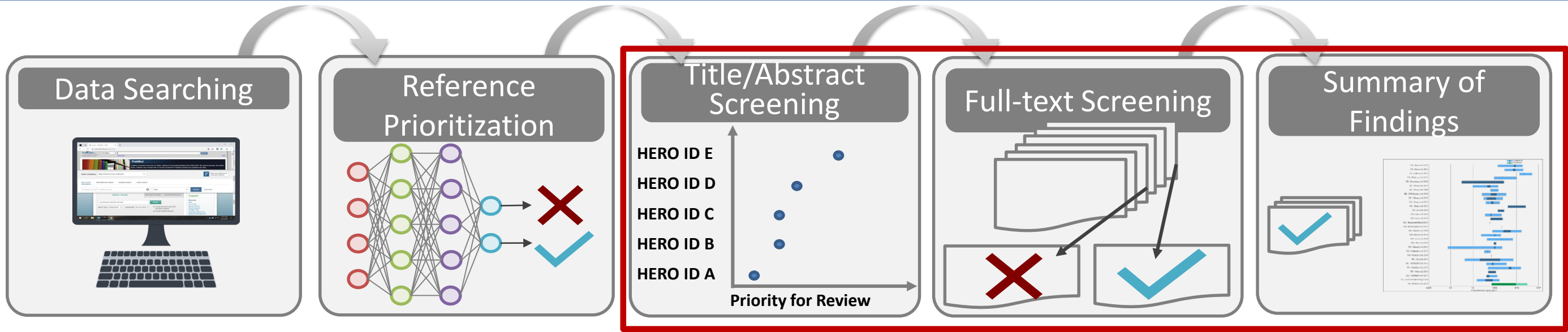
Evidence Mapping for Engineering & Exposure: Title/Abstract and Full-Text Screening

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General Workflow for Engineering & Exposure Evidence Mapping



Within **Engineering & Exposure Evidence Mapping Workflow**, the set of literature references is de-duplicated and then prioritized using the SWIFT-Review software. After this step, the prioritized references undergo Title/Abstract Screening and Full-Text Screening.

Each reference is screened against a **RESO** (Engineering) or **PECO** (Exposure) statement to determine relevance. These statements define the *inclusion criteria* for data sources/references during screening. RESO statements are chemical-agnostic. PECO statements are generally chemical agnostic. However, additional guidance is provided as needed to account for 1) chemical isomers, synonyms, and formulas and 2) whether there are plans to assess a specific pathway of exposure.

Engineering: RESO Statement
Receptors
Humans: Workers, including occupational non-users Environment: Aquatic ecological receptors (relevant release estimates input to Exposure)
Exposure
- Worker exposure to and relevant occupational environmental releases of the chemical substance of interest - Dermal and inhalation exposure routes (as indicated in the conceptual model) - Surface water (as indicated in the conceptual model)
Setting or Scenario
Any occupational setting or scenario resulting in worker exposure and relevant environmental releases (includes all manufacturing, processing, use, disposal indicated in Table A-3.
Outcomes
- Quantitative estimates* of worker exposures and of relevant environmental releases from occupational settings - General information and data related and relevant to the occupational estimates*

Exposure: PECO Statement
Population
Human: General population; consumers; bystanders in the home; near-facility populations; children; susceptible populations, pregnant women; lactating women, women of child bearing age. Ecological: aquatic species, terrestrial species, terrestrial plants, aquatic plants (field studies only)
Exposure
Pathways: - indoor air/vapor/mist; indoor dust; particles; surface water; groundwater; outdoor/ambient air; drinking water; land disposal; biosolids/sludge; soil; sediment; aquatic species; terrestrial species; human biomonitoring; dietary; consumer product uses in the home (including consumer product containing chemical) Routes of Exposure: - Inhalation, Oral, Dermal
Comparator (Scenario)
Human: Media-specific background exposure scenarios and use/source specific exposure scenarios as well as which receptors are/are not reasonably exposed across the projected exposure scenarios. Ecological: Media-specific background exposure scenarios and use/source specific exposure scenarios as well as which receptors are and are not reasonably exposed across the projected exposure scenarios.
Outcomes
Human: Acute, subchronic, and/or indoor air and water concentration estimates (mg/m3 or mg/L). Both external potential dose and internal dose based on biomonitoring and reverse dosimetry mg/kg/day will be considered. Characteristics of consumer products or articles (weight fraction, emission rates, etc) containing chemical. Ecological: A wide range of ecological receptors will be considered (range depending on available ecotoxicity data) using surface water concentrations, sediment concentrations.

Title/Abstract Screening (TIAB) and Full-Text Screening

- Title/Abstract Screening** is performed in SWIFT-Active Screener, which employs an active machine learning algorithm to reduce time for manual screening
- Full-Text Screening** is performed in Evidence Partners’ Distiller^{SR} software, which requires manual review of each reference

Screening: Each reference is screened by two reviewers. Conflicts (if any) of the screening result are resolved by a third, independent reviewer

Calibration Prior to TIAB, each reviewer participating in the screening will undergo a **“Calibration Exercise”** where they screen a standardized set of references against the applicable RESO/PECO to determine whether each reference was on- or off-topic. The reviewer’s results are then compared to the expected results and discussed. This calibration exercise ensures consistency in how the references are screened among different individuals, and reduces conflicts during actual screening.

Tagging: During TIAB and Full-Text Screening, included references are tagged for the specific engineering or exposure data elements they contain.

Example Engineering Tags –

- General Facility Estimates
 - Production / Import / Use volume; Process description
- Occupational Exposures
 - Personal sampling data; Exposure duration; Number of workers
- Environmental Releases
 - Release quantity; Emission factor; Waste treatment method

Example Exposure Tags –

- Pathways
 - Surface water; Ground water; Drinking water; Ambient air; Indoor air; Land
- Human Receptors
 - Consumer; Human biomonitoring/epidemiological
- Ecological Receptors
 - Terrestrial species; Aquatic species; Sediment; Soil; Biosolids/Sludge

Summary of Findings

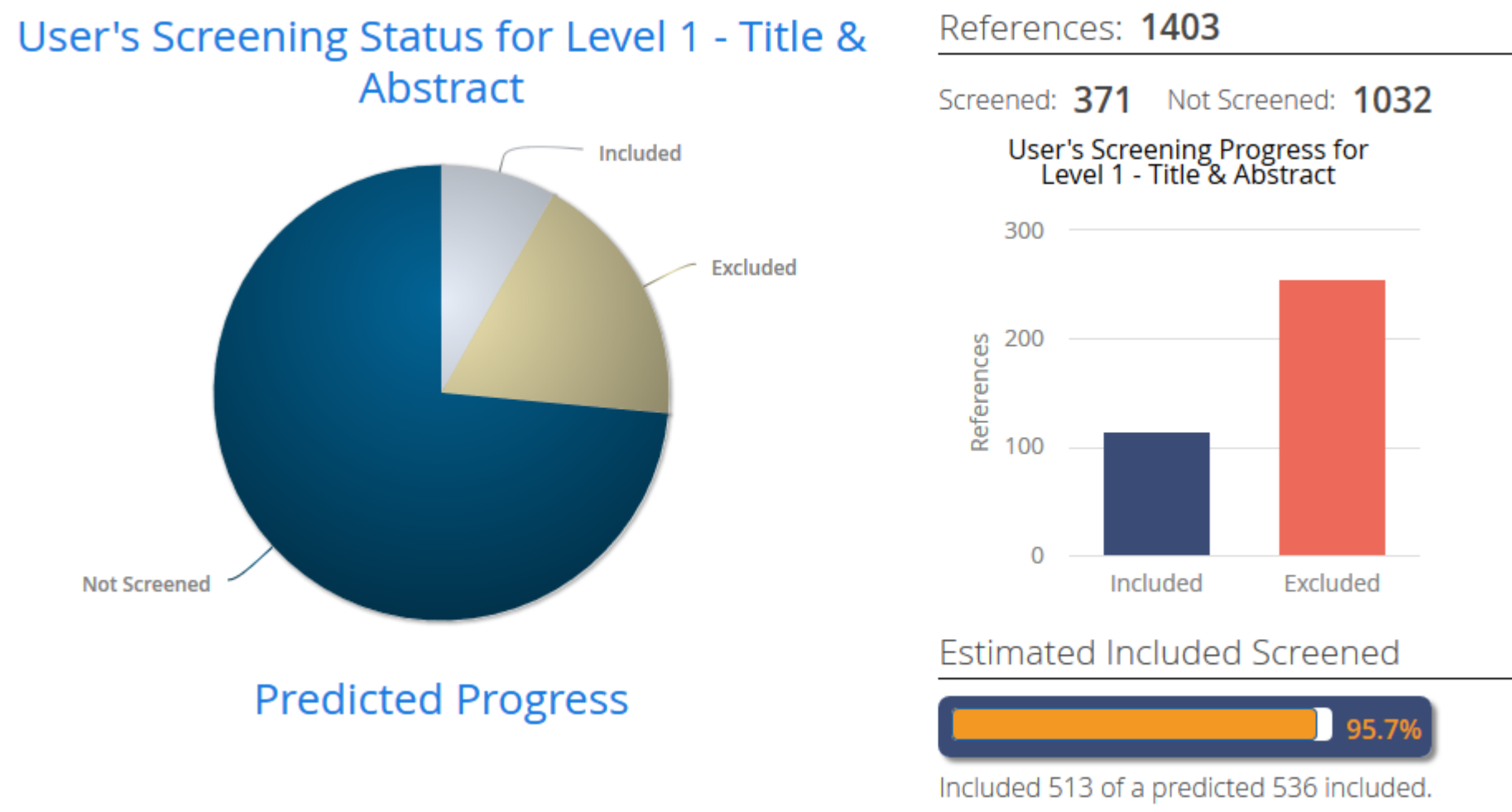


Figure 1. Example TIAB Screening using SWIFTActiveScreener

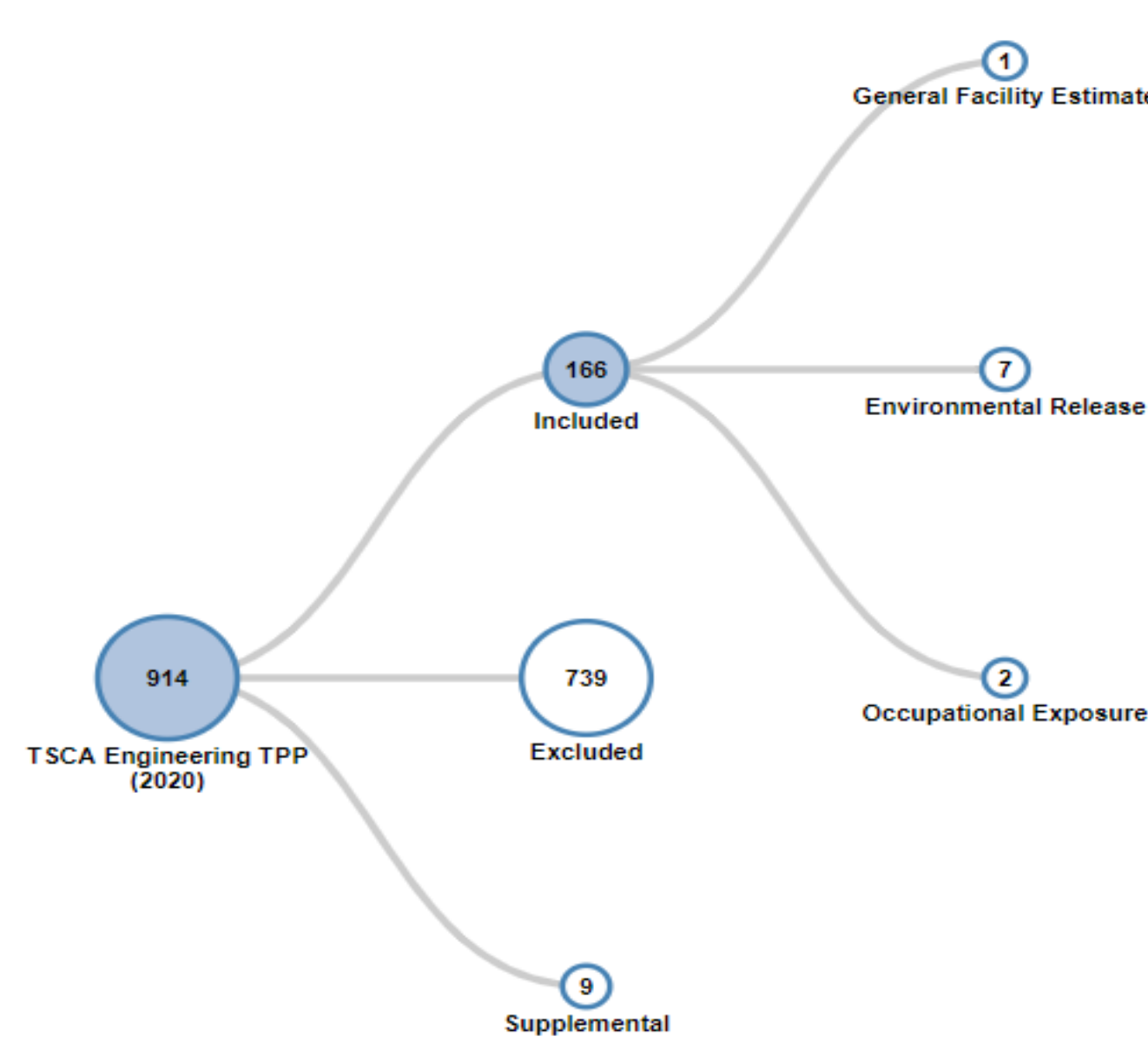


Figure 2. Example Engineering TIAB Screening Results of Peer-Reviewed Literature

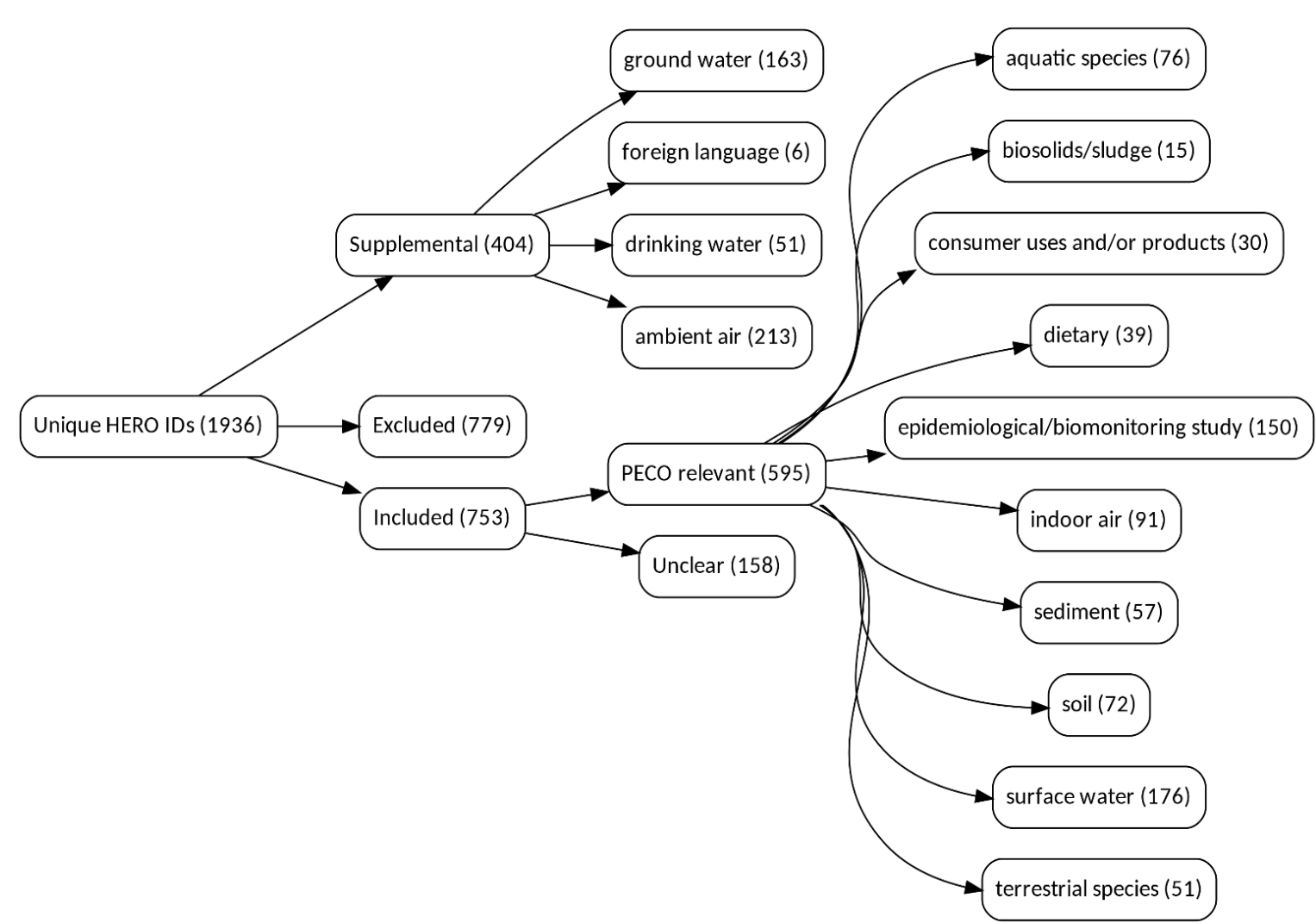


Figure 3. Example Exposure TIAB Screening Results of Peer-Reviewed Literature

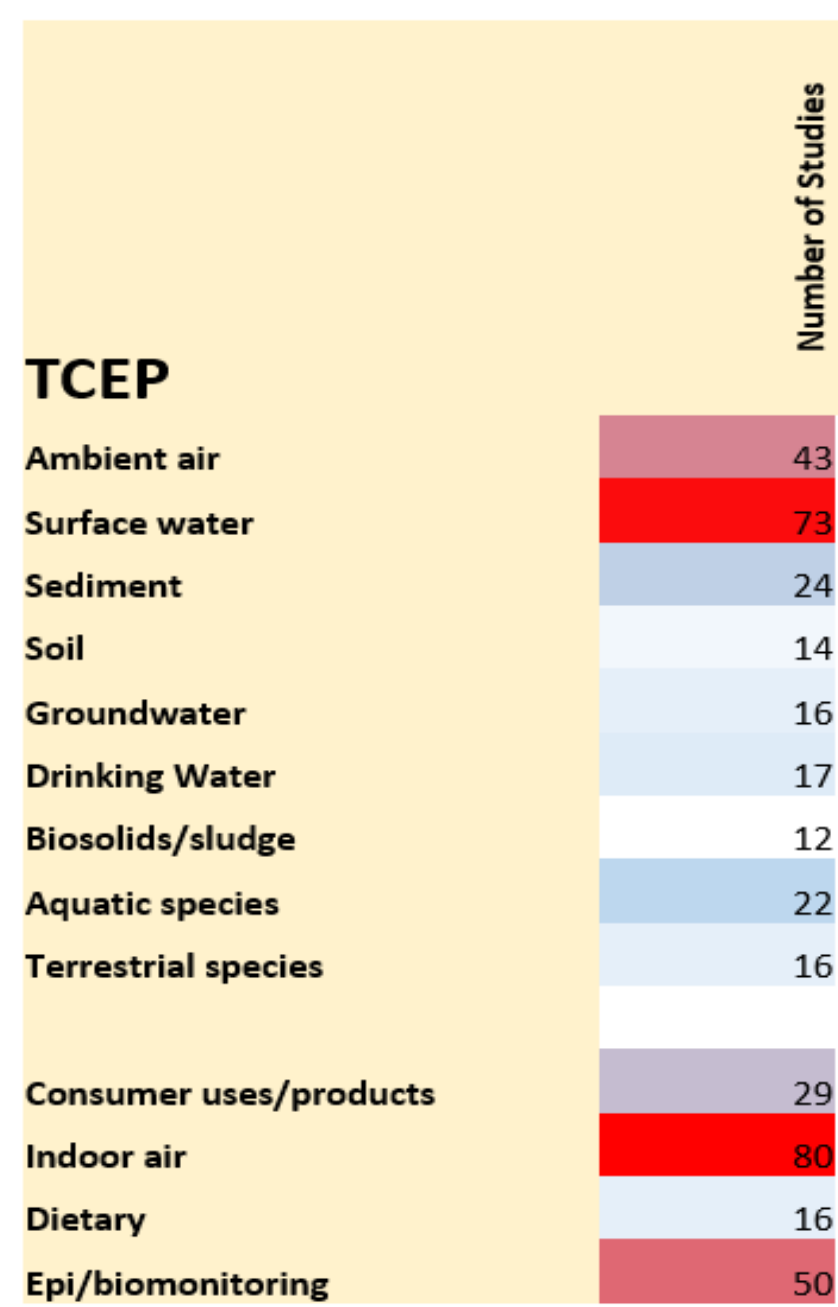


Figure 4. Preliminary example Exposure Heat Map full text Screening Results

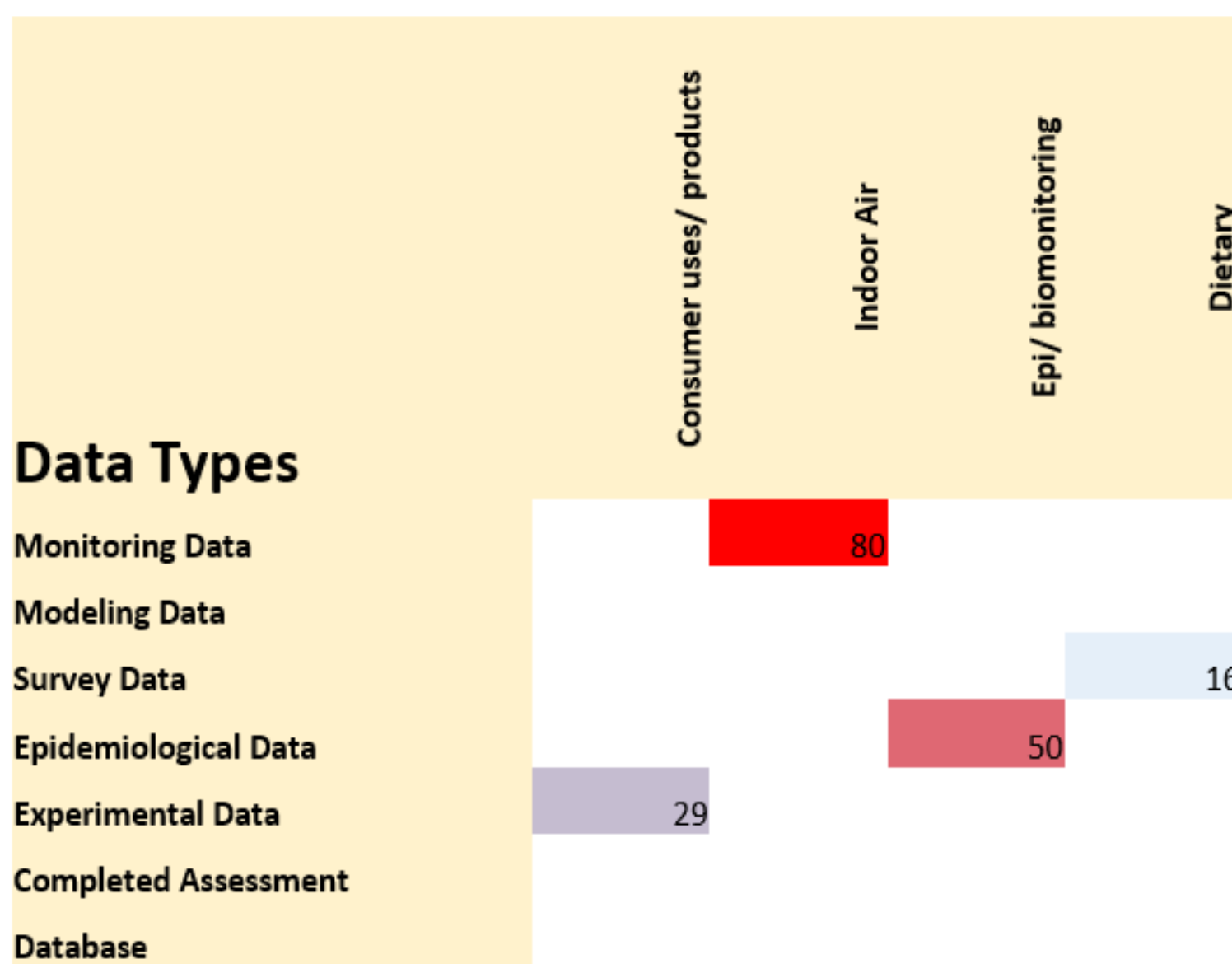


Figure 5. Preliminary example Exposure Heat Map full text Screening Results

Figure 1 provides an example of TIAB screening using SWIFT-Active Screener. With the machine learning algorithm, only a subset of all references (371 of 1,403) had to be manually screened. Based on results of manual screening, SWIFT-Active Screener predicts which and how many of the remaining references are on-topic, and periodically prioritizes references that are likely to be on-topic. TIAB Screening is complete when **95% of the predicted on-topic references** have been manually screened.

Lessons Learned:

- Important of calibration and screening consistency in “teaching” the algorithm
- Active machine learning algorithm is improved with larger set of literature references (>3,000)

Figure 2 and Figure 3 graphically illustrate the tagging structure and example results from TIAB screening. As shown in these figures, “Included” references, or those that are determined to be on-topic based on criteria defined in the RESO/PECO statement, are further tagged by data elements – e.g., environmental release, occupational exposure, aquatic species, consumer uses, epidemiological / biomonitoring study, indoor air, and others.

At the TIAB stage, these tags allow EPA to identify what data may be available from the literature pool for TSCA Risk Evaluation.

EPA is currently performing full-text screening of Engineering and Exposure References. The full-text screening process identifies additional data elements and streams that may be available for TSCA Risk Evaluation based on more detailed review of the references. After screening is complete, EPA will develop *heat maps* to illustrate findings of the screening.

Figure 4 and 5 are two possible heat maps for Exposure evidence tagging. Figure 4 is an example heat map that illustrates screening results by media and categories of exposure, whereas Figure 5 is an example heat map that illustrates screening results based on data type. Additional tags can be included in these heat maps to provide a more refined data landscape.

Note: these figures are preliminary at this time and are subject to change.