List of Alternative Test Methods and Strategies (or New Approach Methodologies [NAMs])

Second Update: February 4th, 2021:[1]

UPDATES FROM THE DECEMBER 2019 LIST

For the Second Update of the TSCA Section 4(h)(2)(C) List of NAMs [hereinafter the "List"], a few changes were made to the List. No new Organization for Economic Cooperation and Development (OECD) Test Guidelines (TG) were adopted this year; therefore, there were no additions to the List. However, certain updates and corrections were made to OECD TGs on June 26, 2020; the links provided in the List are to the updated TGs. . One test, specific for endocrine active substances (OPPTS 890.1200), was added to the List of Test Guidelines for Human Health Effects. Two changes were incorporated into the List of EPA NAM-Related Policies Which May Be Relevant to TSCA, including the addition of EPA's *Draft Guidance for Waiving Acute Dermal Toxicity Tests for Pesticide Technical Chemicals & Supporting Retrospective Analysis,* which was released in September 2020. The link for the *Final Guidance for Waiving Sub-Acute Avian Dietary Tests for Pesticide Registration & Supporting Retrospective Analysis*, which was released in February 2020, was also updated. In addition, OncoLogic™ version 9.0 was added to the List of Other NAMs Used for TSCA. OncoLogic™ is an expert system that uses mechanistic and structure-activity relationship information to predict the carcinogenicity of organic chemicals (Version 9.0) and fibers, metals, and polymers (Version 8.0).

INTRODUCTION

The Toxic Substances Control Act (TSCA) Section 4(h)(2)(C) requires EPA to develop "a list, which the Administrator shall update on a regular basis, of particular alternative test methods or strategies the Administrator has identified that do not require new vertebrate animal testing and are scientifically reliable, relevant, and capable of providing information of equivalent or better scientific reliability and quality to that which would be obtained from vertebrate animal testing."

The New Approach Methodologies (NAMs) presented in the List are not meant to be an exhaustive list of NAMs that could be used for TSCA decisions.[2] Rather, the List provides representative NAMs that EPA may consider. Many of the NAMs have been reviewed and established by different organizations[3] (*i.e.*, OECD,[4] EURL-ECVAM, and ICCVAM) and meet

[1] The Second Update to the List replaces the First Update to the List published on December 5, 2019.

[2] Consistent with Sections 4 (testing), 5 (new chemicals), and 6 (existing chemicals) of TSCA, EPA expects to consider NAMs for the following TSCA decision contexts, among others where testing issues may arise: screening existing chemical substances for prioritization, prioritizing existing chemical substances as low- or high-priority substances, conducting risk evaluations on high-priority substances, informing risk determinations for both new and existing chemical substances, assessing data gaps for the purposes of issuing test orders or requiring testing as part of a consent order, and other risk-based decision-making activities. These contexts follow the concept of "fit-for-purpose" which is interpreted to mean that a particular NAM may be suitable for one regulatory use and not for others.

[3] OECD = Organization for Economic Cooperation and Development; EURL-ECVAM = European Union Reference Laboratory for Alternatives to Animal Testing; ICCVAM = Interagency Coordinating Committee for the Validation of Alternative Methods.

[4] EPA has played a key role for many years in the review and validation/vetting process for the OECD test guidelines program, including the new performance-based and defined approach methods identified in Chapter 5 of

the Section 4(h)(2)(C) criteria for scientific relevance (*i.e.*, accuracy) and reliability (*i.e.*, repeatability/reproducibility). The extensive test method evaluation process, developed by EURL-ECVAM[5] and ICCVAM,[6] is an internationally accepted process, as described in the OECD Guidance Document 34,[7] and was designed to identify NAMs for regulatory acceptance. In addition, there are some NAMs on the List that represent existing practices or policies within EPA.

CONTENTS OF THE LIST/TSCA DECISION CONTEXT

Appendix A includes lists of different methods and approaches that do not use vertebrate animals to develop new data/information. Two are based on accepted test guidelines/methods, including those adopted by the OECD. The others represent EPA-specific NAMs. One includes EPA-specific guidance documents/policies adopted by one or both offices within the Office of Chemical Safety and Pollution Prevention (OCSPP) (*i.e.*, the Office of Pesticide Programs [OPP] and the Office of Pollution Prevention & Toxics [OPPT]). The other includes NAMs that have been historically used for the TSCA new chemicals program in OPPT.

Appendix B includes "Other Useful Information" which are tools and approaches which may enhance the use of NAMs for regulatory use under TSCA.

Importantly, EPA will review any potential NAM that it receives, and determine the merits/relevance of the information based on whether it meets both the information needs and the objectives of TSCA Section 4(h). To this end, EPA encourages all stakeholders to consult with EPA on the development and/or use of NAMs.

EPA understands that as science progresses and as stakeholders develop new methods/approaches, OPPT is in a unique position to inform the development of NAMs, which may be submitted to OPPT in various stages of development to support TSCA notifications for new chemical substances. Thus, OPPT may have early knowledge of possible NAMs that are under development and could eventually be included on the List. EPA views this as an important opportunity for building confidence in the understanding and use of NAMs for regulatory purposes.

Finally, EPA expects to consider NAMs for a number of TSCA decision contexts, including screening and prioritizing existing chemical substances and informing risk determinations for both new and existing chemical substances. However, the NAMs will need to be considered in a "fit-for-purpose" context because a particular NAM may be suitable for one regulatory decision context (*e.g.*, prioritization) but not for others (*e.g.*, quantification of hazard or risk).

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the Strategic Plan. ICCVAM has been a recognized, official partner in these OECD deliberations since 2018. The collaboration of NICEATM, ICCVAM, and EPA is an important and strong presence in the international arena as new NAMs are being identified, developed, and implemented for EPA's regulatory use.

[5] https://ec.europa.eu/jrc/en/eurl/ecvam/alternative-methods-toxicity-testing/validation

[6] https://ntp.niehs.nih.gov/pubhealth/evalatm/resources-for-test-method-developers/submissions/index.html

[7] http://www.oecd.org/officialdocuments/publicdisplaydocumentpdf/?cote=env/jm/mono(2005)14&doclanguage=en

At this time, EPA understands that the value of most of the NAMs on the List is that they provide information that may be used as part of the weight of scientific evidence in characterizing a mode(s) of action or a hazard(s) that can be used in risk-based decision-making for a chemical substance. As such, EPA anticipates that each NAM will contribute to EPA's understanding of the "fit-for-purpose" context in which it is applied (*e.g.*, prioritization). However, some NAMs may be combined for a specific purpose. For example, the several defined approaches (DAs) available for evaluating skin sensitization use 2-3 separate OECD Test Guidelines which, taken together, will result in a decision whether a chemical substance may be considered a skin sensitizer.[8]

NAM CRITERIA FOR RELEVANCE AND RELIABILITY

The methods and approaches on the List meet the eight criteria for NAMs to be listed under TSCA as described in Chapter 5 of the *Strategic Plan* (link) and reproduced below:

1. The decision context should be clearly defined.
2. Where possible, the NAMs should be mechanistically and/or biologically relevant to the hazard being assessed. The chemical domain of applicability of the NAMs should also be defined to determine relevance to the TSCA chemical landscape.
3. The criteria for selecting reference or training chemicals should be defined and supporting information should be adequately referenced.
4. The reliability of the NAM should be considered within the context of intended use and accepted best practices within the given field and the variability of the existing animal model.
5. The NAMs should be transparently described and information made available to the public (*e.g.*, any datasets are publicly available, and its known limitations are clearly described). Information claimed as CBI may not allow public accessibility of all information in some cases.
6. Uncertainty should be described to the fullest extent possible, both independently and compared to the existing animal model (if possible).
7. The NAMs should undergo an independent review in order to raise confidence in the approach.
8. Access and use by third parties should be possible (*i.e.*, the alternative approach must be readily accessible commercially and/or the relevant protocols should be available).

[8] See: OCSPP (2018) *Interim Science Policy: Use of Alternative Approaches for Skin Sensitization as a Replacement for Laboratory Animal Testing* (hereinafter the "OCSPP Skin Sensitization Policy"), Draft for Public Comment, April 4, 2018, EPA's Office of Chemical Safety and Pollution Prevention (OCSPP): Office of Pesticides Program and Office of Pollution Prevention and Toxics, 13 pp., available at: https://beta.regulations.gov/document/EPA-HQ-OPP-2016-0093-0090

THE LIST

Below is a brief description of the List in Appendix A.

Test Guidelines for Human Health Effects.
Identifies NAM Test Guidelines that have gone through the OECD Test Guidelines Programme, the ICCVAM process, or the EURL-ECVAM process and thus meet the scientific criteria for relevance and reliability under Section 4(h)(2)(C) of TSCA. These NAMs are all experimental methods designed to identify/evaluate an adverse human health effect or endpoint and do not use intact vertebrate animals. Appendix B includes "Other Useful Information" with links for how some of these experimental methods may be combined as part of Integrated Approaches to Testing and Assessment (IATA) or with DAs for specific regulatory use scenarios.

Test Guidelines for Effects on Biotic Systems.
Identifies NAM Test Guidelines that have gone through the OECD Test Guidelines Programme and thus meet the scientific criteria for relevance and reliability under Section 4(h)(2)(C) of TSCA. These NAMs are all experimental methods designed to identify/evaluate an adverse effect or endpoint to environmental organisms. Though many of the methods in this section use plants or invertebrate species, these data are valuable in helping to determine possible species sensitivities/distribution and thus possibly obviate the need to perform testing in environmental vertebrate species.

EPA NAM-Related Guidance Documents/Policies Which May Be Relevant to TSCA.
Includes EPA NAM guidance documents/policies adopted by EPA's OCSPP; four are more relevant to OPP but may be used/relevant to OPPT (*i.e.*, the acute dermal toxicity waiver guidance, the acute toxicity waiver for birds, the acute toxicity waiver/bridging guidance, and the eye irritation alternative testing framework); and one is relevant for screening for endocrine activity under OPP's Endocrine Disruptor Screening Program. The OCSPP Skin Sensitization Policy is currently in use by OPP/OPPT and explains OCSPP's general approach to replace vertebrate animal tests for skin sensitization with non-animal tests. Each of the tests incorporated under the policy are existing OECD Test Guidelines (*i.e.*, 442C, D, and E). The OCSPP Skin Sensitization Policy uses two DAs that the OECD is reviewing for use in a regulatory context (see "Other Useful Information" under Appendix B).

Other NAMs Used for TSCA.
Includes NAMs (*e.g.*, computational toxicology tools, chemical category and tiered testing approaches, and screening methods) that have been used by OPPT in the new chemicals program. EPA has been using (and plans to use) other models/approaches developed by other EPA offices or by organizations external to EPA as they become available. For example, OPPT has been using tools that are available through EPA's National Center for Computational Toxicology (NCCT), some of which are in the early stages of deployment in the new chemicals program. OPPT has also been using the OECD QSAR Toolbox, which contains several EPA models and has been vetted through the OECD. The NCCT tools are presented under "Other Useful Information" in Appendix B, and the OECD QSAR Toolbox is presented under "Other NAMs Used for TSCA" in Appendix A.

Appendix A – The List

Test Guidelines for Human Health Effects[1]		
Source	**Title**	**Information Gathered**
OECD TG No. 428	Skin Absorption: *In Vitro* Method	Provides information on absorption of a test substance (can be from human or animal source)
OECD TG No. 430	*In Vitro* Skin Corrosion: Transcutaneous Electrical Resistance Test Method (TER)	Evaluates corrosivity (rat skin as source)
OECD TG No. 431	*In Vitro* Skin Corrosion: Reconstructed Human Epidermis (Rhe) Test Method	Evaluates corrosivity (human skin as source)
OECD TG No. 432	*In Vitro* 3T3 NRU Phototoxicity Test	Evaluates Phototoxicity to mouse cells in culture
OECD TG No. 435	*In Vitro* Membrane Barrier Test Method for Skin Corrosion	Evaluates corrosion using a synthetic membrane
OECD TG No. 437	Bovine Corneal Opacity and Permeability Test Method for Identifying i) Chemicals Inducing Serious Eye Damage and ii) Chemicals Not Requiring Classification for Eye Irritation or Serious Eye Damage	Evaluates eye irritation/corrosivity in bovine eyes
OECD TG No. 438	Isolated Chicken Eye Test Method for Identifying i) Chemicals Inducing Serious Eye Damage and ii) Chemicals Not Requiring Classification for Eye Irritation or Serious Eye Damage	Evaluates eye irritation/corrosivity in chick eyes
OECD TG No. 439	*In Vitro* Skin Irritation: Reconstructed Human Epidermis Test Method	Evaluates irritation (human skin as source)
OECD TG No. 442C	*In Chemico* Skin Sensitisation: Assays addressing the Adverse Outcome Pathway key event on covalent binding to proteins	No animal or human cells used, evaluates simple binding of a chemical to a synthetic peptide
OECD TG No. 442D	*In Vitro* Skin Sensitisation: ARE-Nrf2 Luciferase Test Method	Skin sensitization evaluated – human cells used
OECD TG No. 442E	*In Vitro* Skin Sensitisation: *In Vitro* Skin Sensitisation assays addressing the Key Event on activation of dendritic cells on the Adverse Outcome Pathway for Skin Sensitisation	Skin sensitization evaluated – human cells used
OECD TG No. 455	Performance-Based Test Guideline for Stably Transfected Transactivation *In Vitro* Assays to Detect Estrogen Receptor Agonists and Antagonists	Evaluates estrogenic effects – human cells used
OECD TG No. 456	H295R Steroidogenesis Assay	Evaluates possible endocrine effects – human cells used

Test Guidelines for Human Health Effects[1]		
Source	**Title**	**Information Gathered**
OECD TG No. 458	Stably Transfected Human Androgen Receptor Transcriptional Activation Assay for Detection of Androgenic Agonist and Antagonist Activity of Chemicals	Evaluates androgenic effects using chinese hamster ovary cells
OECD TG No. 460	Fluorescein Leakage Test Method for Identifying Ocular Corrosives and Severe Irritants	Evaluates eye corrosivity/severe irritation with canine kidney cells
OECD TG No. 471	Bacterial Reverse Mutation Test	Evaluates mutagenicity in bacterial cells
OECD TG No. 473	*In Vitro* Mammalian Chromosome Aberration Test	Evaluates chromosomal effects in either human or rodent cells
OECD TG No. 476	*In Vitro* Mammalian Cell Gene Mutation Tests using the Hprt and xprt genes	Evaluates gene mutations in either human or rodent cells
OECD TG No. 487	*In Vitro* Mammalian Cell Micronucleus Test	Evaluates chromosomal effects in either human or rodent cells
OECD TG No. 490	*In Vitro* Mammalian Cell Gene Mutation Tests Using the Thymidine Kinase Gene	Evaluates gene mutations in either human or rodent cells
OECD TG No. 491	Short-time Exposure *In Vitro* Test Method for Identifying i) Chemicals Inducing Serious Eye Damage and ii) Chemicals Not Requiring Classification for Eye Irritation or Serious Eye Damage	Evaluates eye corrosivity/severe irritation with rabbit cornea cells
OECD TG No. 492	Reconstructed Human Cornea-like Epithelium (RhCE) Test Method for Identifying Chemicals Not Requiring Classification and Labelling for Eye Irritation or Serious Eye Damage	Evaluates eye irritation with reconstructed human cells (either eye or skin)
OECD TG No. 493	Performance-Based Test Guideline for Human Recombinant Estrogen Receptor (hrER) *In Vitro* Assays to Detect Chemicals with ER Binding Affinity	Evaluates estrogenicity in human cells
OECD TG No. 494	Vitrigel-Eye Irritancy Test Method for Identifying Chemicals Not Requiring Classification and Labelling for Eye Irritation or Serious Eye Damage	Recommended to identify chemicals not requiring classification for serious eye damage or eye irritation
OECD TG No. 495	Ros (Reactive Oxygen Species) Assay for Photoreactivity	Evaluates photoreactivity *in chemico*
OECD TG No. 496[4]	*In Vitro* Macromolecular Test Method for Identifying Chemicals Inducing Serious Eye Damage and Chemicals Not Requiring Classification for Eye Irritation or Serious Eye Damage	Recommended as initial step of a testing strategy (see OECD Guidance Document [GD] No. 263 under "Other Useful Information" in Appendix B) to identify chemicals that induce serious eye damage

Test Guidelines for Human Health Effects[1]		
Source	**Title**	**Information Gathered**
TM2016-08 (US)[2]	The ToxCast Estrogen Receptor Agonist Pathway Model	Mathematical model that combines results from 18 assays to predict estrogen receptor agonism
TM2004-07 (EU)[2]	*In Vitro* BALB/c 3T3 Cell Transformation Assay	Assay to measure carcinogenicity potential
TM2006-02 (EU)[2,4]	Ocular Irritection	Assay to predict potential eye irritation for classification/labelling purposes
TM2007-03 (EU) [2]	3T3 Neutral Red Uptake Cytotoxicity Assay	Assay to specifically identify non-classified chemicals (for classification/labelling purposes) with a cutoff value of 2000 mg/kg-bw (oral)
ICCVAM Eye Irritation Test [3]	The Cytosensor Microphysiometer Test Method	Recommended as a screening test to identify some types of water-soluble substances that may cause permanent or severe eye injuries, and for a limited range of substances, to identify chemicals and products that do not present sufficient potential to cause eye injuries to require eye hazard labeling
OPPTS 890.1200	Endocrine Disruptor Screening Program Test Guidelines: Aromatase (Human Recombinant)	Assay to identify chemicals that inhibit aromatase activity

[1] OECD Test Guidelines (Health), ICCVAM (Alternative Methods Accepted by US Agencies; excludes methods used for evaluating other types of substances by other agencies (*e.g.*, biologics by the U.S. Food and Drug Administration), and EURL-ECVAM source (filtered by "regulatory acceptance/Standards" by Step and "finalized" by Step Status.
[2] From EURL-ECVAM (see table note 1)
[3] From ICCVAM (see table note 1).
[4] In the first update, the following EURL-ECVAM method was added – Ocular Irritection (link); however this same method was adopted by the OECD as TG No. 496 in October of 2019.

Test Guidelines for Effects on Biotic Systems[1]		
Source	**Title**	**Information Gathered**
OECD TG No. 201	Freshwater Alga and Cyanobacteria, Growth Inhibition Test	Evaluates toxicity to algae
OECD TG No. 202	*Daphnia* sp. Acute Immobilization test	Evaluates toxicity to freshwater invertebrates
OECD TG No. 207	Earthworm Acute, Toxicity test	Evaluates toxicity to soil invertebrates
OECD TG No. 211	*Daphnia magna* Reproduction Test	Evaluates reproductive effects in freshwater invertebrates
OECD TG No. 212	Fish, Short-term Toxicity Test on Embryo and Sac-Fry Stages	Evaluates toxicity to fish development.
OECD TG No. 218	Sediment-Water Chironomid Toxicity Using Spiked Sediment	Evaluates toxicity to sediment-dwelling invertebrates

Test Guidelines for Effects on Biotic Systems[1]		
Source	**Title**	**Information Gathered**
OECD TG No. 219	Sediment-Water Chironomid Toxicity Using Spiked Water	Evaluates toxicity to sediment-dwelling invertebrates
OECD TG No. 221	*Lemna* sp. Growth Inhibition Test	Evaluates toxicity to freshwater aquatic plants of the genus *Lemna* (duckweed)
OECD TG No. 222	Earthworm Reproduction Toxicity Test (*Eisenia fetida*/*Eisenia andrei*)	Evaluates reproductive effects in soil invertebrates
OECD TG No. 225	Sediment-Water *Lumbriculus* Toxicity Test Using Spiked Sediment	Evaluates toxicity of sediment-associated chemicals endobenthic living organisms
OECD TG No. 233	Sediment-Water Chironomid Life-Cycle Toxicity Test Using Spiked Water or Spiked Sediment	Evaluates chronic toxicity to the life-cycle of sediment-dwelling freshwater dipteran Chironomus species
OECD TG No. 235	*Chironomus* sp., Acute Immobilisation test	Evaluates acute toxicity (immobilisation) to chironomids
OECD TG No. 236	Fish Embryo Acute Toxicity (FET)	Evaluates toxicity to fish using zebrafish embryos
OECD TG No. 238	Sediment-Free *Myriophyllum spicatum* Toxicity Test	Evaluates toxicity to a submerged, rooted macrophyte species (water milfoil)
OECD TG No. 239	Water-Sediment *Myriophyllum spicatum* Toxicity Test	Evaluates toxicity to a submerged, rooted macrophyte species (water milfoil)
OECD TG No. 242	*Potamopyrgus antipodarum* Reproduction Test	Evaluates reproductive toxicity to the mudsnail
OECD TG No. 243	*Lymnaea stagnalis* Reproduction Test	Evaluates reproductive toxicity to a freshwater snail
OECD TG No. 319A[2]	Determination of *In Vitro* Intrinsic Clearance Using Cryopreserved Rainbow Trout Hepatocytes (RT-HEP)	Evaluates the capacity for fish (rainbow trout) to metabolically clear chemical *via* the liver. This *in vitro* clearance measurement can be applied to models to predict chemical bioconcentration in fish (BCF). The application is described in the guidance document (see OECD Guidance Document [GD] No. 280 under "Other Useful Information" in Appendix B
OECD TG No. 319B[2]	Determination of *In Vitro* Intrinsic Clearance Using Rainbow Trout Liver S9 Sub-Cellular Fraction (RT-S9)	

[1] Does not include tests in terrestrial plant species.
[2] The OECD includes these TGs under *Section 3: Environmental Fate and Behaviour.*

EPA NAM-Related Guidance Documents/Policies Which May Be Relevant to TSCA		
Title	**Type of NAM**	**Information Gathered**
OCSPP Skin Sensitization Policy (To be updated when finalized)	Choice of Two Defined Approaches (DAs)	Combination of NAMs to predict skin sensitization in humans
Guidance for Waiving Acute Dermal Toxicity Tests for Pesticide Formulations & Supporting Retrospective Analysis	Waiving dermal toxicity testing for pesticide formulations; but may be applicable to industries considering performing these studies for TSCA purposes	Acute dermal toxicity
Guidance for Waiving Acute Dermal Toxicity Tests for Pesticide Technical Chemicals & Supporting Retrospective Analysis [1]	Waiving dermal toxicity testing for pesticide technical chemicals; but may be applicable to industries considering performing these studies for TSCA purposes	Acute dermal toxicity
Final Guidance for Waiving Sub-Acute Avian Dietary Tests for Pesticide Registration and Supporting Retrospective Analysis	Waiving Sub-Acute Avian Dietary Tests	Points to consider when evaluating subacute avian dietary tests data waivers
Guidance for Waiving or Bridging of Mammalian Acute Toxicity Tests for Pesticides and Pesticide Products (Acute Oral, Acute Dermal, Acute Inhalation, Primary Eye, Primary Dermal, and Dermal Sensitization)	Waiving or the use of Bridging (read-across)	Acute toxicity for pesticides (by route and including irritation/sensitization)
Use of An Alternative Testing Framework for Classification of Eye Irritation Potential of EPA Pesticide Products	Decision tree for *in vitro* testing for labeling	Eye irritation
Process for Evaluating & Implementing Alternative Approaches to Traditional In Vivo Toxicity Studies for FIFRA Regulatory Use	Alternative approaches to evaluating acute toxicity in lieu of an *in vivo* study	Documents a process to be followed to submit to EPA (Office of Pesticide Programs)
Use of High Throughput Assays and Computational Tools in the Endocrine Disruptor Screening	Use of NAMs for endocrine disruptor screening	Screening for tiered testing for endocrine activity
[1] Added to the List on Second Update (February 2021)		

Other NAMs Used for TSCA[1]	
Source	**Parameter/ Information Gathered**
The OECD QSAR Toolbox	Compilation of models and information to predict physical-chemical properties and hazards of chemicals. EPA has contributed models to this tool, and it is used by scientists at EPA to understand and evaluate new and existing chemicals under TSCA.
OncoLogic™	Hazard[2,3] - Predictive system that uses knowledge-based rules to predict cancer concern for more than 52 classes of organic chemicals (Version 9.0), as well as fibers, metals, and polymers (Version 8.0).
Analog Identification Methodology (AIM)	Hazard[3] - Database tool to facilitate identification of analogs for read-across
Chemical Assessment Clustering Engine (ChemACE)	Hazard[3] – Database tool to facilitate structural clustering
New Chemical Categories Document	Hazard[3] – Documentation of TSCA chemical categories
Estimation Programs Interface (EPISuite™)	Physical/chemical properties and environmental fate[4] – *e.g.*, bioconcentration/bioaccumulation
Chemical Screening Tool for Exposures and Environmental Releases (ChemSTEER)	Exposure[4] – tools and models to estimate environmental releases and worker exposures
Exposure and Fate Assessment Screening Tool (E-FAST)	Exposure[4] - tools and models to estimate consumer, general public and environmental exposures to chemicals.
Approaches to Estimate Consumer Exposure	Exposure[4] – a variety of tools and models to estimate exposure to various consumer products and materials

[1] General Guidance on all approaches - https://www.epa.gov/tsca-screening-tools
[2] Version 9.0 added to the List on Second Update (February 2021)
[3] Hazard - https://www.epa.gov/tsca-screening-tools/using-predictive-methods-assess-hazard-under-tsca#models;
[4] Physical/Chemical Properties, Environmental Fate, and Exposure - https://www.epa.gov/tsca-screening-tools/using-predictive-methods-assess-exposure-and-fate-under-tsca#fate

Appendix B – Other Information or Strategies

Appendix B includes non-specific tests/experimental methods that are different from the information presented in Appendix A. This section includes tools developed by entities outside of OPPT, important findings reported by advisory committees formed under the Federal Advisory Committee Act (FACA) for OCSPP evaluations/work products that use NAMs, and OECD guidance documents (GD) considered as international consensus documents.

As with the TSCA Section 4(h)(2)(C) list above, the "Other Useful Information" below is not meant to be exhaustive. It includes information/tools that OPPT has knowledge of and experience with under TSCA. Links and a brief description of the source of information identified. General information on the publications from the OECD can be found under the OECD's Series on Testing and Assessment/Adopted Guidance and Review Documents (link).

Other Useful Information	
Source	**Title/Content**
EPA Comp Tox Chemicals Dashboard	Compilation of publicly available information on over 850,000 chemicals.
FIFRA SAP January 2013[1]	Prioritizing the Universe of Endocrine Disruptor Screening Program (EDSP) Chemicals Using Computational Toxicology Tools
FIFRA SAP November, 2017	Continuing Development of Alternative High-Throughput Screens to Determine Endocrine Disruption, Focusing on Androgen Receptor, Steroidogenesis, and Thyroid Pathways
FIFRA SAP December, 2018	Evaluation of a Proposed Approach to Refine the Inhalation Risk Assessment for Point of Contact Toxicity: A Case Study Using a New Approach Methodology (NAM)
OECD guidance document (GD) No. 34	Guidance Document on the Validation and International Acceptance of New or Updated Test Methods for Hazard Assessment
OECD GD No. 69:	Guidance Document on the Validation of (Quantitative) Structure-Activity Relationship [(Q)SAR] Models
OECD GD No. 102:	Guidance Document for Using the OECD (Q)SAR Application Toolbox to Develop Chemical Categories According to the OECD Guidance on Grouping Chemicals
OECD GD No. 184	Revised Guidance Document on Developing and Assessing Adverse Outcome Pathways
OECD GD No. 194:	Guidance on Grouping of Chemicals, Second Edition
OECD GD No. 203:	New Guidance Document on an Integrated Approach on Testing and Assessment (IATA) for Skin Corrosion and Irritation
OECD GD No. 211	Guidance Document for Describing Non-Guideline *In Vitro* Test Methods
OECD GD No. 214	Guidance Document on the *In Vitro* Syrian Hamster Embryo (SHE) Cell Transformation Assay
OECD GD No. 231	Guidance Document on the *In Vitro* Bhas 42 Cell Transformation Assay

Other Useful Information	
Source	**Title/Content**
OECD GD No. 237	Guidance Document on Considerations for Waiving or Bridging of Mammalian Acute Toxicity Tests
OECD GD No. 255	Guidance Document on the Reporting of Defined Approaches to be Used Within Integrated Approaches to Testing and Assessment
OECD GD No. 256	Guidance Document on the Reporting of Defined Approaches and Individual Information Sources to be Used Within Integrated Approaches to Testing and Assessment (IATA) for Skin Sensitisation, Annex 1, Annex 2
OECD GD No. 260	Guidance Document for the Use of Adverse Outcome Pathways in Developing Integrated Approaches to Testing and Assessment (IATA)
OECD GD No. 263	Guidance Document on an Integrated Approach on Testing and Assessment (IATA) for Serious Eye Damage and Eye Irritation
OECD GD No. 280	Guidance Document on the Determination of *In Vitro* Intrinsic Clearance Using Cryopreserved Hepatocytes (RT-HEP) or Liver S9 Sub-Cellular Fractions (RT-S9) from Rainbow Trout and Extrapolation to *In Vivo* Intrinsic Clearance
[1] FIFRA SAP = Federal Insecticide, Fungicide and Rodenticide Act, Scientific Advisory Panel. The general FIFRA SAP website is available at (Link). Although several meetings/evaluations are presented here, interested parties are encouraged to review the general FIFRA SAP link for other meetings related to NAMs.	