Appendix B, Part 2: HERA Scientific Portfolio Overview

The following are anticipated products responsive to the research objectives and outputs outlined in the HERA FY 2019 – FY 2022 Strategic Research Action Plan (StRAP). Products and product types may change as new scientific findings or needs emerge. Completion of outputs and products is contingent on appropriate resources being available. Product list was updated as of January 2021.

Research Area 1: Science Assessment Development		
Output 1.1: Portfolio of interim assessment products to support decision-making		
Product Number	**Product Title**	**Product Type**
1.1.1	Protocol – Systematic Review Protocol for the Polychlorinated Biphenyls (PCBs) Noncancer IRIS Assessment	Assessment
1.1.2	Protocol - Systematic Review Protocol for the PFBA, PFHxA, PFHxS, PFNA, and PFDA IRIS Assessments	Assessment
1.1.3	Protocol - Systematic Review Protocol for the Methylmercury (MeHg) IRIS Assessment	Assessment
1.1.4	Protocol – Systematic Review Protocol for the Inorganic Mercury Salts IRIS Assessment	Assessment
1.1.5	IAP – IRIS Assessment Plan (IAP) for Oral Exposure to Vanadium and Compounds	Assessment
1.1.6	Draft – PFBA IRIS Assessment	Assessment
1.1.7	Draft – PFHxA IRIS Assessment	Assessment
1.1.8	IAP – IRIS Assessment Plan (IAP) for Inorganic Mercury Salts	Assessment
1.1.9	Draft – Inorganic Arsenic IRIS Assessment	Assessment
1.1.10	Draft – Chloroform IRIS Assessment	Assessment
1.1.11	Draft – Hexavalent Chromium IRIS Assessment	Assessment
1.1.12	IAP – IRIS Assessment Plan (IAP) for Inhalation Exposure to Vanadium and Compounds	Assessment
1.1.13	Draft – Inorganic Mercury Salts IRIS Assessment	Assessment
1.1.15	Draft – PFDA IRIS Assessment	Assessment
1.1.17	Draft – PFHxS IRIS Assessment	Assessment
1.1.18	Draft – PFNA IRIS Assessment	Assessment
1.1.19	Protocol – Systematic Review Protocol for the Vanadium and Compounds (Inhalation) IRIS Assessment	Assessment
1.1.20	Protocol – Systematic Review Protocol for the Vanadium and Compounds (Oral) IRIS Assessment	Assessment
1.1.21	Draft – Vanadium and Compounds (Oral) IRIS Assessment	Assessment
Output 1.2: Portfolio of final assessment products to support decision-making		
1.2.1	Final Perfluorobutane Sulfonic Acid (PFBS) Toxicity Assessment	Assessment
1.2.2	Final Integrated Science Assessment for Particulate Matter	Assessment
1.2.3	Final Integrated Science Assessment for Ozone	Assessment
1.2.4	Final Ethyl Tertiary Butyl Ether (ETBE) IRIS Assessment	Assessment
1.2.5	Final tert-Butyl Alcohol (TBA) IRIS Assessment	Assessment

1.2.6	Traditional PPRTV Assessments for FY20	Assessment
1.2.7	Read-across PPRTV Assessments for FY20	Assessment
1.2.8	Final Integrated Science Assessment for Oxides of Nitrogen, Oxides of Sulfur and Particulate Matter Ecological Criteria	Assessment
1.2.9	Final PFBA IRIS Assessment	Assessment
1.2.10	Final PFDA IRIS Assessment	Assessment
1.2.11	Final PFHxA IRIS Assessment	Assessment
1.2.12	Final PFHxS IRIS Assessment	Assessment
1.2.13	Final PFNA IRIS Assessment	Assessment
1.2.14	Final PPRTV - Benzo(e)pyrene (read-across)	Assessment
1.2.15	Final PPRTV - Pentaerythritol tetranitrate (PETN)	Assessment
1.2.16	Final PPRTV - Crotonaldehyde, trans-	Assessment
1.2.17	Final PPRTV - Toluenediamine, 2,3-	Assessment
1.2.18	Final PPRTV - Toluenediamine, 3,4-	Assessment
1.2.19	Final PPRTV - Bromo-2-Chloroethane, 1-	Assessment
1.2.20	Final PPRTV - Ammonium phosphate salts	Assessment
1.2.21	Final PPRTV - Dinitroaniline, 3,5-	Assessment
1.2.22	Final PPRTV - Inorganic phosphates (monovalent salts)	Assessment
1.2.23	Final PPRTV - Aluminum phosphate salts	Assessment
1.2.24	Final PPRTV - Calcium and magnesium phosphate salts	Assessment
1.2.25	Final PPRTV - Isobutyl alcohol	Assessment
1.2.26	Final PPRTV - TPH (Aliphatic Low, Low Carbon Range Aliphatic Fraction)	Assessment
1.2.27	Final PPRTV - TPH (Aromatic Medium, Medium Range Aromatic Fraction)	Assessment
1.2.28	Final PPRTV - TPH (Aromatic High, High Carbon Aromatic Fraction)	Assessment
1.2.29	Final PPRTV - TPH (Complex Mixtures of Aliphatic and Aromatic Hydrocarbons)	Assessment
Research Area 2: Science Assessment Translation		
Output 2.1: Technical support to EPA Regions and states through the STSC and ERASC		
Product Number	**Product Title**	**Product Type**
2.1.1	Superfund Technical Support Centers Annual Report	Report
2.1.2	Ecological Risk Assessment Support Center White Papers	Report
2.1.3	Evaluation of Health Impacts of Lead Remediation at ASARCO Superfund Site	Journal Article
Output 2.2: Core translational research modules for expert technical support		
2.2.1	Translating assessment expertise and team readiness for technical support	Report
2.2.2	Support for effective Intra-Agency consultations and communications on science topics	Report
Research Area 3: Emerging and Innovative Assessment Methodologies		
Output 3.1: Advance, translate and build confidence in the application of new approach methods (NAMs) and data in risk assessment		

BOSC Product Table

Product Number	Product Title	Product Type
3.1.1	Advancing the practice and application of read-across methodology incorporating critical lessons and future outlooks methodologies to fill data gaps in human health risk assessment	Journal Article
3.1.2	Integration of in vitro, in silico and analytical data to evaluate metabolism for chemicals with toxicokinetic database deficiencies	Journal Article
3.1.3	Application of transcriptomic data in qualitative and quantitative risk assessment	Journal Article
3.1.4	Development and Proof-of-Concept Application of AOP Footprint approach to mixtures risk assessment to Support HERA-related Activities	Journal Article
3.1.5	Inhalation Dosimetry: Applications to Advance IVIVE, IATA, and NAMs	Journal Article
3.1.6	Approaches to AEP and AOP Integration to Support Source-to-outcome Approaches and Cumulative Risk	Journal Article
Output 3.2: Conduct case study applications of rapid assessment methodologies to inform parameters of interest to risk decision contexts		
3.2.1	Application of RapidTox Workflows to Support HERA-related Activities	Journal Article
3.2.2	Advancing the practice of rapid evidence assessment methods for environmental management	Journal Article
3.2.3	Systematic evidence mapping (SEM) to support EPA program and regional offices	Report
3.2.4	Systematic evidence mapping for PFAS structures to characterize human health literature for 8000+ PFAS included in the EPA Chemicals Dashboard	Report
Output 3.3: Evaluate and develop improved methods for dose extrapolation and the related uncertainty characterization in human health risk assessment via classical methods and integration of pharmacokinetic (PK) models		
3.3.1	Analysis of uncertainty in PK extrapolation across dose extrapolation methods	Journal Article
3.3.2	Development and proof of application of a PBPK model code “template”	Journal Article
3.3.3	Enzyme Ontogeny: Database and Model to Extrapolate Metabolism Across Lifestages	Journal Article
Output 3.4: Advance methods for systematic review, including evidence integration		
3.4.1	ORD staff handbook for developing IRIS assessments	Report
3.4.2	Optimizing the systematic evaluation of internal validity and sensitivity in studies informing human and ecological health assessment	Journal Article
3.4.3	Operationalizing and testing frameworks for the organization and systematic analysis of mechanistic information	Journal Article
3.4.4	Semantic Ontology Concept Mapping to Improve Systematic Reviews	Journal Article
3.4.5	Improving machine learning algorithms for literature identification and data extraction tools for systematic review	Journal Article

3.4.6	Optimizing the application of evidence synthesis and integration approaches for use in chemical assessment	Journal Article
Output 3.5: Advance methods in exposure/dose-response modeling with application to risk assessment		
3.5.1	Research in support of informative parameter priors used in Bayesian model averaging of dichotomous and continuous endpoint	Journal Article and Scientific Data, Software, and Models
3.5.2	Development of multivariate benchmark dose modeling for traditional toxicological and toxicogenomic data	Journal Article and Scientific Data, Software, and Models
3.5.3	Development of a unified model suite for dichotomous and continuous toxicological data	Report and Scientific Data, Software, and Models
3.5.4	Advancement of nested dose-response modeling for developmental toxicity data	Scientific Data, Software, and Models
3.5.5	Characterizing Determinants of Risk: Concentration, Duration and Timing of Exposure	Journal Article
3.5.6	Case Studies and Advancements in Uncertainty Analysis	Report
3.5.7	Trend test analysis for continuous responses	Journal Article
3.5.8	Evaluation of in utero exposures to environmental pollutants and considerations for cumulative risk estimation	Journal Article
3.5.9	Developing dose-response methods for epidemiologic data	Journal Article
3.5.10	Identification of associations between organ weight changes and histopathologic findings	Journal Article
Research Area 4: Essential Assessment and Infrastructure Tools		
Output 4.1: Innovate, develop, and maintain a suite of essential software and support tools for risk assessment		
Product Number	**Product Title**	**Product Type**
4.1.1	Health and Environmental Research Online (HERO) Database Development, Operations, and Interoperability	Scientific Data, Software, and Models
4.1.2	Heath Assessment Workplace Collaborative (HAWC) Development, Operations, and Interoperability	Scientific Data, Software, and Models
4.1.3	Development, Operation, and Interoperability of Existing and Implementation of Planned Critical Components of BMDS and CatReg	Scientific Data, Software, and Models
4.1.4	Development and Operation of Ecological and Exposure Science Toolboxes	Scientific Data, Software, and Models

4.1.5	All Ages Lead Model	Scientific Data, Software, and Models
4.1.6	Evaluation of the Integrated Exposure Uptake Biokinetic (IEUBK) Model version 2.0	Scientific Data, Software, and Models
4.1.7	Multi-path Particle Dosimetry (MPPD) model	Scientific Data, Software, and Models
4.1.8	FY20 HERO Database Development, Operations, and Interoperability	Scientific Data, Software, and Models
4.1.9	FY20 HAWC Development, Operations, and Interoperability	Scientific Data, Software, and Models
4.1.10	Development, Operation, and Interoperability of BMDS 3.2	Scientific Data, Software, and Models
Output 4.2: Innovate, develop, and maintain a training program on the advances in risk assessment and systematic review		
4.2.1	Risk Assessment Training to Improve the Harmonization and Collaboration between ORD and EPA Regional/Program Offices, State/Local/Tribal Agencies, and International Organizations	Report
4.2.2	Development and Maintenance of Systematic Review Tool Training Materials for Support of Systematic Review	Report
4.2.3	Development and Maintenance of BMDS and CatReg Documentation and Training Manual	Report