[redacted]

From: Orme-Zavaleta, Jennifer
Sent: Wednesday, October 31, 2018 5:40 PM
To: Dunlap, David; [redacted]
Subject: FW: Additional Information for IRIS nominations - OLEM priorities
Attachments: IRIS 4 nominations packet.pdf

Importance: High

Jennifer Orme-Zavaleta, PhD
Principal Deputy Assistant Administrator for Science
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[redacted]

From: Hilosky, Nick **On Behalf Of** Breen, Barry
Sent: Wednesday, October 31, 2018 5:28 PM
To: Orme-Zavaleta, Jennifer [redacted]
Subject: Additional Information for IRIS nominations - OLEM priorities
Importance: High

Jennifer,

As a follow-up to recent discussions between ORD and OLEM leadership, OLEM has identified four 'top priority' chemicals for which IRIS assessments are needed by OLEM. The list below comprises our 'top four' priorities (not in specific order), including the types of toxicity value needed for each chemical:

Arsenic: Oral and inhalation, cancer and non-cancer (RfD, RfC, CSF, IHR); if a choice needs to be made, we would prioritize oral over inhalation (RfD, CSF);
Chromium VI: Oral, inhalation, cancer, noncancer (RfD, RfC, CSF, IHR);
Mercury/methyl mercury: Oral and inhalation, cancer and noncancer (RfD, RfC, CSF, IHR); for methyl mercury, non-cancer, oral and inhalation would be of greatest priority;
PCBs: noncancer, inhalation and oral.

If there is a need to focus on OLEM priority requests for only three chemicals, PCBs may be of slightly lower priority than the others. Detailed information regarding the specific basis of our needs for these priority chemicals was provided on our previously submitted nomination forms for these chemicals (attached), but please let us know if something else is needed.

Beyond these four chemicals, it is our understanding that NCEA/IRIS has already completed considerable work on draft assessments for some of the chemicals included in our previous nomination submission. If it is determined that IRIS and/or NCEA has capacity beyond the top priority chemicals, OLEM would be very interested in participating in a discussion regarding what additional assessments might be possible (per our previous strong affirmation of the broader needs of our office with respect to chemical assessments).

We would also be very interested in pursuing opportunities for more targeted assessments of other chemicals (e.g., those not needing a full blown IRIS assessment). Examples of chemicals that might fall into this category would include the ones nominated by OUST in our prior nomination package (largely fuel additives) or a subset of the PFAS chemicals.

Please let us know if you need additional information regarding any of the above.

Barry

IRIS Assessment Request Form – Ongoing Assessments	
Requesting Office: OLEM	
Request Date: September, 2018	**Requested Completion Date:** As soon as possible, but we have long-term needs for this assessment.
Chemical Nominated for Assessment: Arsenic, inorganic	**Priority of Assessment: High**

General Background of Chemical:

"Arsenic is a naturally occurring element that is found in combination with either inorganic or organic substances to form many different compounds. Inorganic arsenic compounds are found in soils, sediments, and groundwater. These compounds occur either naturally or as a result of mining, ore smelting, and industrial use of arsenic. Organic arsenic compounds are found mainly in fish and shellfish. In the past, inorganic forms of arsenic were used in pesticides and paint pigment. They were also used as wood preservatives and as a treatment for a variety of ailments. Today, usage of arsenic-containing pesticides and wood preservatives is restricted.

People are most likely to be exposed to inorganic arsenic through drinking water and to a lesser extent through various foods. Water sources in some parts of the United States have higher naturally occurring levels of inorganic arsenic than other areas. Other sources of inorganic arsenic exposure include contact with contaminated soil or with wood preserved with arsenic. People are exposed to organic arsenic by consuming seafood. Long-term exposure to high levels of inorganic arsenic in drinking water has been associated with skin disorders and increased risks for diabetes, high blood pressure, and several types of cancer. Inorganic arsenic and arsenic compounds are considered to be cancer-causing chemicals."

Reference: CDC Fact Sheet on Arsenic. https://www.epa.gov/sites/production/files/2014-03/documents/arsenic_factsheet_cdc_2013.pdf. Accessed on 9/4/18)

The RfD for arsenic was lasted updated in 1991 and the cancer values were finalized in 1995. Since then a lot of newer studies have been conducted, including studies in the US and studies that include several noncancer outcomes that were not considered before, including diseases of the circulatory system, which appear to be a very sensitive endpoint.

Scope of Assessment Request:

OLEM programs and regions have a need for all relevant toxicity metrics that can be supported by the available data (oral and inhalation, cancer and noncancer, RfD, RfC, CSF, IUR). However, OLEM's primary need is for oral ingestion values and we would prioritize an updated CSF and RfD.

Need *(Please include decision context. Ex: regulatory driver; or to identify cleanup levels)*

See accompanying document summarizing OLEM program needs for IRIS assessments (Attachment 1).

Supporting OLEM programs: ORCR, OSRTI
Supporting Regions (submitted to OLEM): 2, 3, 4, [5], 9,10. [R5 submitted through another program.]
High priority for Regions 2, 5, 9, 10

Additional Chemical-specific information:

OSRTI and Regions: Arsenic is a contaminant of concern for at least 1028 Superfund Sites, and it is the risk driver at a number of these sites. We need updated toxicity values to develop protective

remedies that will return sites to anticipated use, and to complete our five-year reviews to ensure remedies are still protective when contamination is left in place.

ORCR: Arsenic is one of the most frequent risk drivers in recent national-level assessments. ORCR has needs related to arsenic both as a toxicity characteristic chemical and a corrective action chemical.

Region 2: COC at 156/218 Superfund sites. Arsenic was identified at landfills, former manufacturing facilities, scrap metal sites and federal facilities. It is found primarily in soil and groundwater. IRIS Chemical file for arsenic indicates that the oral Reference Dose (RfD) was last updated in 1991 and the cancer assessment was last updated 1995.

R9: Updated & revised toxicity criteria will be used to derive site-specific remedial goals for multimedia arsenic contamination in various RCRA, CERCLA & other cleanup sites within Region IX.

R10: The IRIS inorganic arsenic toxicity metrics will be used in the CERCLA program for hazard ranking, derivation of risk based goals, characterization of site risks, evaluation of remedial alternatives and derivation of cleanup goals. Updated information will also support the technical analyses of remedy effectiveness during the Five-Year Review process for ongoing cleanups actions.

Supporting

Barry Breen, Acting Assistant Administrator, Office of Land and Emergency Management	**ORD Principal Deputy Assistant Administrator for Science**

IRIS Assessment Request Form – Ongoing Assessments	
Requesting Office: OLEM	
Request Date: September, 2018	**Requested Completion Date:** As soon as possible; OLEM and Regional needs are ongoing
Chemical Nominated for Assessment: Hexavalent Chromium	**Priority of Assessment:** High

General Background of Chemical:

Chromium is a transition metal element. It is present in the Earth's crust and has oxidation states ranging from -2 to +6, with the +3 (trivalent) and +6 (hexavalent) states being the most predominant. Chromium can originate from both natural and man-made sources, but compounds containing the hexavalent oxidation state primarily arise from anthropogenic sources, with the largest releases occurring from industrial sources (ATSDR, 2012). Hexavalent chromium compounds are widely used as corrosion inhibitors, in the manufacture of pigments, in metal finishing and chrome plating, in stainless-steel production, in leather tanning, in wood preservatives, in textile dyeing processes, printing inks, drilling muds, pyrotechnics, water treatment, chemical synthesis, and plastics. Industries with the largest contribution to chromium release or disposal of chromium and chromium compounds include metal processing, tannery facilities, chromate production, stainless steel welding, electric utility companies, and ferrochrome and chrome pigment production (HSDB, 2014; U.S. EPA, 2014a). The general population may be exposed to hexavalent chromium compounds via inhalation of ambient air, ingestion of water or food, or dermal contact with chromium-containing products such as pressure-treated wood. Significant new epidemiologic and experimental animal toxicity information for Cr(VI) has become available since EPA's IRIS assessment for Cr(VI) was posted in 1998, including updates of occupational cohort studies (Proctor et al., 2016; Gibb et al., 2015) and a National Toxicology Program (NTP) bioassay that reported increased incidences of tumors in rats and mice exposed to Cr(VI) in drinking water (NTP, 2008). The NTP (2008) bioassay findings are significant because they provide evidence of carcinogenicity from ingested Cr(VI). The dose-response information from epidemiologic and experimental animal studies published since 1998 could result in changes to current toxicity values.

Source: Scoping Information, Preliminary Literature Search, Associated Strategy and Evidence Tables for Cr(VI) Part 2. (PDF)

References:

ATSDR (Agency for Toxic Substances and Disease Registry). (2012). Toxicological profile for chromium. Atlanta, GA: US Department of Health and Human Services, Public Health Service. http://www.atsdr.cdc.gov/toxprofiles/tp7.pdf

HSDB (Hazardous Substances Data Bank). (2014). Chromium compounds. Washington, D.C.: National Library of Medicine. http://toxnet.nlm.nih.gov/cgi-bin/sis/htmlgen?HSDB

U.S. EPA (U.S. Environmental Protection Agency). (2014b). The third Unregulated Contaminant Monitoring Rule (UCMR 3) occurrence data. Retrieved from http://water.epa.gov/lawsregs/rulesregs/sdwa/ucmr/data.cfm#ucmr2013

Scope of Assessment Request:
All toxicity metrics, oral and inhalation, cancer and noncancer (RfD, RfC, CSF, IUR)
Need *(Please include decision context. Ex: regulatory driver; or to identify cleanup levels)*
See accompanying document summarizing OLEM program needs for IRIS assessments (Attachment 1). Supporting OLEM programs: OSRTI, ORCR Supporting Regional programs: 1, 2, 3, 4, 5, 6, 7, 9, 10 High priority for regions 2, 4, 5, 7, 9, 10 Cr VI is found at a minimum of 131 Superfund sites.
Additional chemical specific information: ORCR: It is needed for RCRA Corrective Action, as well as being a toxicity characteristic chemical (total Cr). Region 2: Identified as COC at 21/218 sites which include circuit board and plating facilities, federal facilities, landfills and refining facilities. Oral Rfd, inhalation RfC and cancer assessment last updated in 1998. R5: Cr(VI) has been identified as a contaminant of concern at hazardous waste sites, including more than a thousand National Priority List sites. IRIS values are used to set remediation targets for contaminated sites. In the 2008 Appropriations Bill, Congress asked EPA to develop an updated health standard for ingested Cr(VI), and use this standard to revise the maximum contaminant level goal (MCLG) for drinking water as soon as possible. An updated IRIS assessment for Cr(VI) will be directly responsive to Congress and to the Administrator's commitment to develop a health assessment for Cr(VI). Chromium compounds are hazardous air pollutants under the CAA. Health risks from air toxics are assessed under the National-Scale Air Toxics Assessment (NATA). NATA provides estimates of cancer and noncancer health effects based on chronic inhalation exposure from outdoor sources, and is used to identify and prioritize air toxic emission source types and locations that are of greatest potential concern for contributing to population risk. Updated IRIS values for inhalation of Cr(VI) will be used in generating better assessments for population risks. R7: An oral cancer slope factor is currently not available from IRIS. However, in 2008, the National Toxicology Program found clear evidence of carcinogenicity in rats and mice exposed to hexavalent chromium in drinking water for two years. The EPA's Office of Pesticide Programs, CalEPA, and other state agencies used the NTP studies to establish cancer slope factors for hexavalent chromium. The regions currently use the CalEPA CSF for hexavalent chromium to evaluate potential health risks, but we use the MCL for total chromium as the cleanup goal for groundwater. For example, at the Ace Services site in Colby, Kansas, treated groundwater is discharged to the city public water system, with discharge limits of 17 µg/L hexavalent chromium and 100 µg/L total chromium, which is the MCL. Based on the CalEPA CSF, a discharge limit of 17 µg/L hexavalent chromium exceeds the EPA's target cancer risk range if the water is directly ingested. The Office of Water has indicated that a revised IRIS toxicological assessment is necessary before they can propose a new MCL based on the oral carcinogenicity of hexavalent chromium. Region 7 has several plating sites and federal facilities where hexavalent chromium is a chemical of concern. New IRIS toxicity values could result in a new MCL, which in turn could alter the remedies and cleanup goals used at our sites to ensure protection of human health. In the meantime, a state in Region 7 indicated, "Given the ongoing debate on this issue and lack of a consensus approach among agencies nationwide at the present time, [we] decided to seek an independent evaluation of the MOA for CrVI oral carcinogenicity and a weight-of-evidence

determination of the most scientifically defensible approach." This state ultimately approved the use of cleanup goals developed by a responsible party that were based on a non-linear mode of action. Lack of IRIS values for hexavalent chromium could lead to inconsistent decisions across our regions and our states, some of which may not adequately protect human health. We note that EPA began work on the hexavalent chromium toxicological review shortly after the NTP study was published in 2008, and completion of an Agency draft is anticipated in the third quarter of FY 2019. Region 7 encourages the IRIS program to complete this assessment as quickly as possible to meet a critical regional need.

R9: The derivation of health-based remedial goals for hazardous waste sites contaminated with Chrome +6 remains a high priority for both the Superfund & RCRA programs. The derivation of updated toxicity criteria will support cleanup actions taken by Cal-EPA at sites contaminated with hexavalent chrome.

R10: IRIS hexavalent chromium toxicity metrics are broadly used in CERCLA actions. These actions include, but are not limited to, site hazard ranking, derivation of risk-based goals, evaluation of total/background/site risks, characterization of site risks, evaluation of remedial alternatives and derivation of cleanup goals. Region 10 has recently issued a ROD for cleanup of hexavalent chromium in groundwater (Hanford 100 area), and more defensible toxicity criteria will be important to assess remedy effectiveness in the ongoing Five Year Reviews while the remedy is in progress.

Barry Breen, Acting Assistant Administrator, Office of Land and Emergency Management	**ORD Principal Deputy Assistant Administrator for Science**

IRIS Assessment Request Form – Ongoing Assessments	
Requesting Office: OLEM	
Request Date: September, 2018	**Requested Completion Date:** As soon as possible, but we have long-term needs for this assessment.
Chemical Nominated for Assessment: PCBs (noncancer)	**Priority of Assessment: High**

General Background of Chemical:

Polychlorinated biphenyls (PCBs) are a class of synthetic compounds characterized by a biphenyl structure with chlorine substitutions at up to ten positions. PCBs were manufactured and marketed in the United States between about 1930 and 1977 under the trade name Aroclor. PCBs were used in many industrial applications because of their electrical insulating properties, chemical stability, and relative inflammability. EPA issued final regulations banning the manufacture of PCBs and phasing out most PCB uses in 1979 under the Toxic Substances Control Act (TSCA) due to evidence that they persist and accumulate in the environment, and can cause toxic effects. Despite the ban on manufacturing, humans continue to be exposed to PCBs by inhalation of volatilized PCBs, inhalation of contaminated dust, contact with contaminated dust, contact with primary or secondary sources of PCBs, and ingestion of foods contaminated with PCBs. The non-cancer assessment for Aroclor 1016 was completed in 1993; assessments for Aroclors 1248 and 1254 were completed in 1994. The cancer assessment for environmental PCB mixtures was completed in 1996. There is no IRIS RfD for complex PCB mixtures in general. Nor is there an IRIS inhalation reference concentration (RfC) for PCBs. Since 1994, a number of studies on the non-cancer health effects of exposure to environmentally-relevant PCB mixtures (e.g., similar to those found in contaminated fish or human milk) have been conducted, and new data are available.

Source: Scoping and Problem Formulation Materials for Polychlorinated Biphenyls (PCBS): Effects Other Than Cancer (PDF)

Polychlorinated Biphenyls (PCBs) are high volume legacy pollutants found in every environmental compartment (soils, sediments, air). PCBs are highly persistent in the environment and bioaccumulate into and upward through the food train. Contamination of the food chain has resulted in fish consumption as a primary exposure pathway for the U.S. population, especially for recreational and subsistence fishers. In addition, PCBs are found as legacy contaminants in older buildings (constructed before 1978) because of PCBs residues in paint, caulking, and light ballasts. Many of the older buildings include schools where exposure to children is a significant potential.

Scope of Assessment Request:

OLEM: IRIS Toxicological Review, noncancer, inhalation and oral (RfD and RfC)
Region 2: Reference Concentration (RfC) for noncancer hazard calculations from air exposure
R5: The Non-Cancer IRIS assessment needs to be completed as an Agency-wide priority. The current EPA toxicity factors for PCB mixtures are outdated and based on toxicological data that is decades old. Current information shows that PCBs are developmental toxicants for children that affect neurological and immunological pathways. This new toxicological data needs to be included in the IRIS assessment.
R9: Region IX requests that the IRIS PCB assessment provide an updated RfD & a new RfC.

Need *(Please include decision context. Ex: regulatory driver; or to identify cleanup levels)*

See accompanying document summarizing OLEM program needs for IRIS assessments (Attachment 1).

Supporting OLEM programs: ORCR, OSRTI
Supporting Regions (submitted to OLEM): 1, 2, 3, 4, 5, 7, 9, 10
High priority for Regions 2, 4, 5, 9, 10

OLEM: This contaminant has been found at more than 407 OLEM sites. However, it is important to be aware that EPA's environmental occurrence data likely underestimates the actual occurrence because compounds without toxicity values are often not analyzed at sites.
OLEM-OSRTI: Superfund NPL Listing, Risk Assessment, Remedy Decisions, and Five Year Reviews.
OLEM-ORCR: RCRA Corrective Action chemical.
Region 2: Present at 66 of 218 Superfund sites. High profile sites addressing PCBs include: Hudson River, Passaic River, Massena area sites that include Indian Lands and large number of landfills. PCBs in air are a concern for Superfund sites where remediation is being conducted. Having the toxicological data to support developing health-based air screening levels is critical.
R5: PCBs are found as contaminants at many Region 5 Superfund and RCRA sites because of historical industrial operations which included use of PCB hydraulic fluid machinery for casting metal parts.
IRIS Toxicity Values are needed to support the following regulatory and remediation decisions:
Determination of Remediation Goals for 15-20 PCB sediment sites along the Great Lakes, including Great Lakes harbors and along Great Lakes tributaries.
Determination of PCB Remediation Goals for soils/sediments at 30-40 Superfund & RCRA sites in R5.
Risk-Based Approval Decisions needed for sites that fall under TSCA Enforcement. These includes sites where: a) PCBs have been unlawfully disposed to soils/sediments; and b) Buildings (including schools) where legacy PCBs are detected above TSCA regulatory levels in buildings materials.
R9: Toxicity Criteria for Lower Molecular Weight/Lower Chlorinated PCB Congeners
EPA currently has only two toxicity estimates for the non-cancer or systemically-toxic impacts associated with PCBs when they are identified by their Aroclor content. Reference dose values are available for PCB Aroclor 1254 and PCB Aroclor 1016 only. There remains an outstanding scientific need for additional toxicity information on inadvertent PCBs and more generally for the lower molecular weight (MW) or lower chlorinated (content) PCBs. A list of inadvertent congeners most likely to be found in products, the environment, or human blood has been generated by the Inadvertent PCB Workgroup, and could be used to narrow down the congeners assessed. The new ToxCast tools available to ORD may be a viable screening tool to begin assessment.
R10: PCBs are a ubiquitous contaminant and the primary risk driver on several large Region 10 NPL and sediment sites, including Portland Harbor, the Lower Duwamish Waterway, and Commencement Bay, as well as numerous sediment sites under state oversight. PCBs in fish tissue are a public health concern throughout our Region, disproportionally impacting Native American and U populations. EPA's current PCB assessment dates to 1994 and should be updated to include updated scientific information, such as the ability of PCBs to affect thyroid hormone function.

Cleanup goals PCB cancer risk and noncancer hazard estimates are the limiting factor for the cleanup of several CERCIA sites. EPA's 2011 draft was groundbreaking in its assessment of bioaccumulative exposure pathways to PCBs, and there is substantial evidence that the noncancer effects associated with PCB exposures are as critical as cancer risks. The cleanup of these large sediment mega-sites is ongoing, and a revised IRIS assessment will greatly inform the technical analyses of remedy effectiveness and performance in the Five Year Revlew process at these sites. RiO strongly supports the completion is this assessment.

Barry Breen, Acting Assistant Administrator, Office of Land and Emergency Management	**ORD Principal Deputy Assistant Administrator for Science**

IRIS Assessment Request Form – Ongoing Assessments	
Requesting Office:	
Request Date: September, 2018	**Requested Completion Date:** As soon as possible, but we have long-term needs for this assessment.
Chemical Nominated for Assessment: Mercury Salts	**Priority of Assessment: High**

General Background of Chemical:

Mercury occurs naturally in the environment and can exist as elemental, organic, or inorganic mercury. Inorganic mercury is formed when mercury combines with elements such as chlorine, sulfur, or oxygen. These mercury compounds are also called inorganic mercury salts. In this assessment health effects of three inorganic mercury salts – mercuric chloride (HgCl2), mercuric sulfide (HgS, cinnabar) and mercurous chloride (Hg2Cl2, calomel) will be assessed.

The most common natural forms of mercury found in the environment are metallic mercury, mercuric sulfide, mercuric chloride and methyl mercury (ATSDR, 1999). Inorganic mercury salts, formed from mercury interacting with other compounds in the air, can be transported to water or soil. Inorganic mercury enters the air from mining deposits of ores that contain mercury, from the emissions of coal-fired power plants, burning municipal and medical waste, uncontrolled releases in factories that use mercury. They can also enter water or soil from weather of rocks that contain mercury, from factories or water treatment facilities that release water contaminated with mercury.

Mercuric chloride is used in photography, topical antiseptic and disinfectant, wood preservatives and fungicides. Mercurous chloride has been widely used in medicinal products including laxatives, worming medications, and teething powders. Mercuric sulfide is used to color paints and one of the red coloring agents used in tattoo dyes.

Exposure to inorganic mercury salts may occur both in occupational and environmental settings (ATSDR, 1989). Exposure to mercurous chloride can occur when applying outdated medicinal products such as laxatives, worming medications and teething powders. Exposure to inorganic mercury salts can occur occupationally when workers are exposed from breather air that contains mercury vapors. Occupations that have greater exposure to mercury and its salts include mining, manufacturing electrical equipment, chemical processing plants that use mercury, metal processing etc.

Inorganic mercury compounds can enter the human body through inhalation, ingestion or through the skin. When inhaled, they are not expected to enter your body easily. However, when ingested, up to 40% can enter through the stomach and intestines. Small amounts of inorganic mercury can enter through skin. Once in the body, inorganic mercury gets into the bloodstream and moves to different tissues. Inorganic mercury salts accumulate mostly in the kidney and not as easily in the brain. However, occasionally some of methylmercury can be converted in inorganic mercury in the brain and if this happens, it can remain in the brain for a long time. It is excreted through urine or feces over a period of several weeks or months (ATSDR, 1999). The elimination half-life for inorganic salts is about 40 days (Goyer, 1991).

IRIS has derived an oral RfD for mercuric chloride based on autoimmune effects (autoimmune glomerulonephritis) of 3 x 104 mg/kg-day using Brown Norway rat subchronic feeding study in 1995. An RfD for mercuric sulfide is not available on IRIS. Derivation of a provisional RfD value was attempted in 2002, however, due to the lack of data in humans and of adequate subchronic or chronic oral data in animals, no provisional RfD was derived for mercuric sulfide.

Scope of Assessment Request:

Oral and Inhalation toxicity values, cancer and noncancer (RfC, RfD, IUR, CSF)

Need *(Please include decision context. Ex: regulatory driver; or to identify cleanup levels)*

See accompanying document summarizing OLEM program needs for IRIS assessments (Attachment 1).

Supporting OLEM programs: ORCR, OSRTI
Supporting Regions (submitted to OLEM): 1, 2, 3, 4, 7, 10.
High priority for Regions 2, 3, 10

OLEM: This contaminant has been found at more than 817 OLEM sites (analyzed as total Hg). However, it is important to be aware that EPA's environmental occurrence data likely underestimates the actual occurrence because compounds without toxicity values are often not analyzed at sites.

Region 2: Mercury was identified as a COC at 108 of 218 sites including high-profile sites such as Berry's Creek Study area of the Ventron/Vesicol site, as well as landfills, federal facilities and manufacturing facilities. The RfD assessment and the cancer assessment were last updated in 1995.
Region 10: Mercury salts are a contaminant of concern associated with mercury mining and processing. Region 10 supports updating the toxicity value which Is over 20 years old. EPA Region 10 is specifically Interested in a comprehensive assessment of mercuric sulfide, or cinnabar, which is a naturally occurring mineralized form of mercury found in many areas of Alaska and Oregon. IRIS mercury salt toxicity metrics will be used in the CERCLA program for hazard ranking, derivation of risk based goals, characterization of site risks, evaluation of remedial alternatives and derivation of cleanup goals. Updated information will also support the technical analyses of remedy effectiveness during the Five Year Review process for ongoing cleanups actions.

Barry Breen, Acting Assistant Administrator, Office of Land and Emergency Management	**ORD Principal Deputy Assistant Administrator for Science**

IRIS Assessment Request Form – Ongoing Assessments	
Requesting Office: OLEM	
Request Date: September, 2018	**Requested Completion Date:** As soon as possible, but we have long-term needs for this assessment.
Chemical Nominated for Assessment: Methylmercury	**Priority of Assessment: High**

General Background of Chemical:

Multiple health agencies (ATSDR, 1999; US EPA, 1997; US EPA, 2001; Health Canada, 2007), the National Academy of Sciences (NAS) (National Research Council (NRC), 2000), and international organizations (e.g., UNEP, 2002) have established that oral exposure to methylmercury in humans is a developmental neurotoxicity (DNT) hazard.

The existing IRIS RfD for methylmercury was published in 2001 (US EPA, 2001) and was based on analyses in an NAS assessment (NRC, 2000). The 2001 IRIS assessment identified developmental neuropsychological impairment as the critical effect, specifically, impaired cognitive function in children from a Faroe Islands cohort who were prenatally exposed to methylmercury, and derived the RfD from the associated epidemiological studies (Grandjean et al., 1997; Budtz-Jørgensen et al., 1999). Similarly, EPA's previous 1995 RfD for methylmercury was based on developmental neurotoxicity (DNT) effects using data from a 1971 Iraqi poisoning incident in which highly contaminated grains were consumed (derivation described in US EPA, 1997). In both assessments, DNT endpoints were concluded to be the most sensitive. The 2001 RfD of 0.1 µg/kg-day is based on maternal daily intakes of 0.86-1.47 µg/kg-day, estimated to result in the dose expressed in maternal blood corresponding to multiple DNT measures in 7-year-old children.

There are no current uses of methylmercury. However, elemental mercury is released into the atmosphere (e.g., the result of the burning of fossil fuels) and then falls to the ground with rain and snow. When it reaches water bodies, it is converted to methylmercury by microbes and accumulates up the food chain. Therefore, the major exposure pathway for methylmercury is through consumption of contaminated fish and shellfish (NRC, 2000). Average methylmercury blood levels in the U.S. population ranged from 0.434 to 0.498 µg/L between 2011 and 2014 (CDC, 2017). Estimated average daily intake of methylmercury for the general North American population was 6.1-69.5 ug/day, as reported by studies in the United States and Canada (Noisel et al., 2011; Stern, 2005).

When pregnant women are exposed to methylmercury, their fetuses are exposed as well because methylmercury readily crosses the placenta. Mercury also concentrates in cord blood at higher levels than in maternal blood (Stern et al., 2003). In addition, methylmercury is transferred to breastmilk in lactating women, which leads to infant exposures (ATSDR, 1999; CDC, 2009). As noted earlier, the developing nervous system is particularly sensitive to methylmercury exposure so these prenatal and postnatal exposures are of great concern.

Subsistence fishing communities and others with high dietary intake of top predatory fish species may be exposed to higher than average levels of methylmercury. People who consume fish from environments with large microbial populations that convert mercury to methylmercury may have particularly high exposures. This includes people eating fish from certain types of wetlands, dilute low-pH lakes in the Northeast and Northcentral United States, parts of the Florida Everglades, newly

flooded reservoirs, and coastal wetlands, particularly along the Gulf of Mexico, Atlantic Ocean, and San Francisco Bay (USGS, 2000). In some regions of the world, consumption of fish from waters polluted by small scale and artisanal gold mining may result in high methylmercury exposure as well.

From IRIS Assessment Plan for Methylmercury, September 2017

Scope of Assessment Request:

OLEM: IRIS Toxicological Review (inhalation and oral, RfD and RfC)
R5: Because of the large number of studies published on MeHg since 2001 and its many potential health effects, a reassessment of the DNT dose-response is needed because many recent epidemiology studies have evaluated DNT effects at lower MeHg exposure levels than were previously evaluated by the NAS (NRC, 2000) and EPA (US EPA, 2001). Many of these recent studies provide exposure-response information, which would enable re-evaluation of the current reference dose. EPA needs to explore the literature on several non-DNT health effects of methylmercury to determine if additional dose-response factors are warranted for other health effects, including behavioral, morphological, and electrophysiological. Many of Non-DNT outcomes affect the general population, and not just women of child-bearing age and their children. EPA needs to determine if there is sufficient evidence to conduct a hazard assessment and derive reference values for these other health outcomes.

Need *(Please include decision context. Ex: regulatory driver; or to identify cleanup levels)*

See accompanying document summarizing OLEM program needs for IRIS assessments (Attachment 1).

Supporting OLEM programs: ORCR, OSRTI
Supporting Regions (submitted to OLEM): 1, 2, 3, 4, 5, 6, 7, 10
High priority for Regions 2, 5, and 10

OLEM: This contaminant has been found at more than 817 OLEM sites (analyzed as total Hg), and at more than 10 sites (analyzed as methyl mercury). However, it is important to be aware that EPA's environmental occurrence data likely underestimates the actual occurrence because compounds without toxicity values are often not analyzed at sites.
OLEM-OSRTI: Superfund NPL Listing, Risk Assessment, Remedy Decisions, and Five Year Reviews.
OLEM-ORCR: Toxicity characteristic chemical and also found at RCRA Corrective Action Sites.
Region 2: Mercury was identified as a COC at 108 of 218 sites including high-profile sites such as Berry's Creek Study area of the Ventron/Vesicol site, as well as landfills, federal facilities and manufacturing facilities. The RfD assessment and the cancer assessment were last updated in 1995.
R5: Updated oral reference dose factors for MeHg are needed to complete accurate risk assessments for consumption of fish from waterbodies which receive Hg deposition of air emissions from facilities. These include facilities that conduct waste combustion and coal-fired utilities. The risk assessments are used to set EPA and State air regulatory and air permit emission limits for dozens of facilities in Region 5. Section 304(a) of the CWA requires EPA to develop water quality criteria for states and tribes to use to develop water quality standards. Section 303(c) requires states and tribes to adopt water quality criteria that protect designated uses such as fish consumption. Section 303(c)(1) requires that states and authorized tribes review their water quality standards every three years and modify them based on updated health effects studies derived by EPA.

Region 10: Region 10 supports updating the IRIS assessment for methylmercury, which has not been updated since 2001. Methylmercury is a concern for populations with high fish consumption rates in Region 10, including Native American and Alaskan subsistence consumers. Almost half of all federally recognized tribes reside in Region 10 where fish consumption isa foundation of Native American culture. The IRIS methylmercury RfD will be used in the CERCLA program for hazard ranking, derivation of risk based goals, characterization of site risks, evaluation of remedial alternatives and derivation of cleanup goals. Updated Information will also support the technical analyses of remedy effectiveness during the Five Year Review process for ongoing cleanups actions.	
Barry Breen, Acting Assistant Administrator, Office of Land and Emergency Management	**ORD Principal Deputy Assistant Administrator for Science**

IRIS Assessment Request Form

Requesting Office: Office of Water

Requested Completion Date: FY 21

Request Date: November 2018

Priority of Assessment: High

Chemical Nominated for Assessment: Hexavalent Chromium

HEXAVALENT CHROMIUM

General Background of Chemical:

Hexavalent Chromium is a potential carcinogen that occurs naturally in the environment from the erosion of natural chromium deposits and is also produced by industrial processes. There are examples of past instances of environmental release via leakage, poor storage, or inadequate industrial waste disposal practices.

Scope of Assessment Request:

RfD; oral cancer/non-cancer

Need *(Please include decision context. Ex: regulatory driver; or to identify cleanup levels)*

EPA set a maximum contaminant level (MCL) of 0.1 mg/L for total Chromium in 1991 under the Safe Drinking Water Act. The current standard is based on potential allergic dermatitis (skin reactions). Chromium VI (hexavalent) and Chromium III (trivalent) are covered under the total chromium drinking water standard because these forms of chromium can convert back and forth in water and in the human body. Recent studies from the National Toxicology program indicate that Chromium VI may be carcinogenic. Chromium VI was monitored under EPA's Third Unregulated Contaminant Monitoring program from 2013 to 2015. UCMR 3 data show that 4,400 out of 4,920 public water systems (PWSs) measured Chromium VI in drinking water. To determine if the levels of Chromium VI in drinking water are at levels of health concern and represent a meaningful opportunity for health risk reduction, the Agency requires a peer reviewed health assessment that provides a weight of evidence evaluation of the data on the potential toxic effects to humans. The Agency needs this information to determine if a revision to the Chromium drinking water standard is appropriate to improve public health protection. The SDWA requires that EPA complete its next review of the Chromium standard and other drinking water regulations by 2022.

IRIS product needed by December 2020

Signature: DRoss

David P. Ross
Assistant Administrator
Office of Water

Signature:

ORD Principal Deputy
Assistant Administrator for Science

IRIS Assessment Request Form

Requesting Office: Office of Water

Requested Completion Date: FY 21

Request Date: November 2018

Priority of Assessment: High

Chemical Nominated for Assessment: Arsenic, Inorganic

ARSENIC, INORGANIC

General Background of Chemical:

Arsenic is an inorganic chemical that is found in water due to erosion of natural deposits. It is a potential carcinogen and known to cause effects on the circulatory system, reproductive system, endocrine system, immune system, respiratory system, and skin.

Scope of Assessment Request:

RfD; oral cancer

Need *(Please include decision context. Ex: regulatory driver; or to identify clean up levels)*

EPA's initial approval of a water quality standard for arsenic in Idaho was challenged and that resulted in a consent decree with Northwest Environmental Advocates. The consent decree stipulated that EPA propose new arsenic human health criteria for Idaho by November 15, 2018 and issue a final rule by July 15, 2019. The updated schedule of the IRIS arsenic assessment was used as the basis for the timeline provided. An extension to propose a rule by November 15, 2022 was recently negotiated based on the current status of the development of the IRIS assessment.

In 2015, EPA updated 304(a) Human Health Criteria for a variety of contaminants, arsenic was not included at that time due to the ongoing work in the IRIS Program. Updating the arsenic 304(a) Human Health Criteria is a priority for OW because the current 304(a) Human Health Criteria for arsenic was finalized in 1992. Since that time, new science has been published on adverse health effects in humans and is being considered by IRIS.

IRIS product needed by December 2020

Signature: DRoss

Signature:

David P. Ross
Assistant Administrator
Office of Water

ORD Principal Deputy
Assistant Administrator for Science

IRIS Assessment Request Form

Requesting Office: Office of Water

Requested Completion Date: FY 21

Request Date: November 2018

Priority of Assessment: Medium

Chemical Nominated for Assessment: Vanadium

VANADIUM

General Background of Chemical:

Vanadium is a naturally occurring element. The effects found in animals ingesting vanadium compounds include hematological and neurological effects. Studies in animals exposed while pregnant also showed evidence of increase of birth defects and decreases in growth.

Scope of Assessment Request:

RfD; oral cancer/non-cancer

Need *(Please include decision context. Ex: regulatory driver; or to identify clean up levels)*

EPA published an IRIS assessment for vanadium pentoxide in 1987 and a reassessment is underway. Vanadium is on EPA's drinking water Contaminant Candidate List and was monitored under EPA's Third Unregulated Contaminant Monitoring (UCMR 3) program from 2013 to 2015. UCMR 3 data show that 3,625 out of 4,922 public water systems (PWSs) measured Vanadium in drinking water. The Agency needs the updated assessment to evaluate if the measured levels of vanadium in drinking are above levels of health concern using the best available peer reviewed health effects data. The health assessment is critical to EPA's evaluation of whether there is a meaningful opportunity for health risk reduction through a national primary drinking water regulation. EPA must complete the next round of regulatory determinations by 2021.

Developing new CWA 304(a) Human Health Criteria for vanadium is a priority for OST. The National Toxicology Program (NTP) has undertaken developmental toxicity studies with vanadium compounds at the request of NIEHS and EPA. Criteria representing the latest science should include the results of this study and other data published since the development of the IRIS assessment for vanadium pentoxide in 1987.

IRIS product needed by December 2020

Signature: DRoss

Signature:

David P. Ross
Assistant Administrator
Office of Water

ORD Principal Deputy Assistant Administrator for Science

IRIS Assessment Request Form

Requesting Office: Office of Water **Requested Completion Date:** FY 19

Request Date: November 2018 **Priority of Assessment:** High

Chemical Nominated for Assessment: PFAS compounds (PFBA, PFHxA, PFHxS, PFDA, and PFNA)

PFAS

General Background of Chemical:

PFAS is a group of synthetic chemicals that have been manufactured and used in a variety of industries around the globe.

PFAS are absorbed, and some PFAS accumulate in the body. There are multiple and various adverse effects associated with certain PFAS.

Scope of Assessment Request:

RfD; oral cancer/non-cancer

Need *(Please include decision context. Ex: regulatory driver; or to identify clean up levels)*

In the upcoming PFAS Management Plan, the EPA commits to developing cancer and noncancer toxicity values for PFAS where sufficient health effects data exist, are publicly available, and adequately support human health toxicity value derivation. Specifically, the agency highlights that it will complete toxicity assessments for PFBA, PFHxA, PFHxS, PFDA, and PFNA. Therefore, it is a priority for EPA to assess PFAS, and multiple offices, including ORD, may lead or play a role in these assessments. Note that while this nomination is for the IRIS program, OW also supports ORD completing these toxicity assessments quickly in a non-IRIS framework.

For the five PFAS for which OW is requesting toxicity assessments, three were measured in drinking water under EPA's Third Unregulated Contaminant Monitoring program from 2013 to 2015. Certain PFAS have been measured in people. For example, (PFNA) increased in women of child-bearing age between 1999-2000 and 2007-2008 and PFHxS was observed at constant levels.

Continued from previous page, PFAS compounds

Developing new CWA 304(a) Human Health Criteria and fish consumption advisories for PFAS are priorities for OST. Human Health Criteria provide information to states and tribes to protect their ambient waters, including drinking water sources, by controlling discharges of PFAS. With toxicity assessments and publicly available information on bioaccumulation, the Agency could develop national recommended CWA 304(a) human health criteria for PFAS, such as PFBA, PFHxA, PFHxS, PFDA, and PFNA. Fish consumption advisories provide information that can be considered by states, tribes, and local communities to inform any actions necessary to address PFAS contamination in fish, including warnings to consumers.

IRIS products or other toxicity assessments needed during 2019

Signature: DRoss	**Signature:**
David P. Ross **Assistant Administrator** **Office of Water**	**ORD Principal Deputy Assistant Administrator for Science**

[redacted]

From: Dunlap, David
Sent: Tuesday, November 13, 2018 2:47 PM
To: Orme-Zavaleta, Jennifer; [redacted]
Subject: FW: Soliciting Requests for IRIS Assessments
Attachments: OAR-IRIS-Response-11-2018.docx

Attached is the OAR response to the IRIS memo.

My interpretation – OAR has priority chemicals, but the research needs are unique and certainly less than a full IRIS assessment. OAR would welcome the opportunity to sit down with ORD/NCEA to discuss these specific needs and formulate a path forward.

DDD

From: Woods, Clint
Sent: Tuesday, November 13, 2018 12:36 PM
To: Dunlap, David [redacted]
Subject: RE: Soliciting Requests for IRIS Assessments

From: Woods, Clint
Sent: Tuesday, November 13, 2018 12:36 PM
To: Dunlap, David [redacted]
Subject: RE: Soliciting Requests for IRIS Assessments

David,

Please see updated response – Thanks!

Clint Woods
Deputy Assistant Administrator
Office of Air and Radiation, U.S. EPA
[redacted]

[redacted]

From: Dunlap, David
Sent: Friday, November 16, 2018 4:17 PM
To: [redacted]
Cc: Orme-Zavaleta, Jennifer
Subject: Fwd: IRIS Assessments

FYI

David D. Dunlap
Deputy Assistant Administrator
EPA Office of Research & Development
[redacted]

Begin forwarded message:

> **From:** "Orme-Zavaleta, Jennifer" [redacted]
> **Date:** November 16, 2018 at 3:48:55 PM EST
> **To:** "Kime, Robin" [redacted] "Dunlap, David" [redacted]
> **Cc:** "Bolen, Brittany" [redacted]
> **Subject: RE: IRIS Assessments**
>
> Thanks Robin
>
> Jennifer Orme-Zavaleta, PhD
> Principal Deputy Assistant Administrator for Science
> Office of Research and Development
> US Environmental Protection Agency
> [redacted]
>
> ---
>
> **From:** Kime, Robin
> **Sent:** Friday, November 16, 2018 3:44 PM
> **To:** Orme-Zavaleta, Jennifer [redacted] Dunlap, David
> <[redacted]
> **Cc:** Bolen, Brittany [redacted]
> **Subject:** IRIS Assessments
>
> Greetings,
>
> I hope you are well. I wanted to take a moment to apologize for some confusion that my email a while back caused with respect to IRIS assessments. To clarify, I did not intend to re-confirm any of the IRIS assessments whether current or new given that the Office of Policy is not one of the lead offices to make such requests. Instead, we will maintain our long-standing position of not being a source of requests for IRIS assessments and continue to partner with the media offices. Thanks very much and take care.
>
> Robin Kime
> Acting DAA, Office of Policy