OFFICE OF RESOURCE CONSERVATION AND RECOVERY
WASHINGTON, D.C. 20460

June 18, 2024

MEMORANDUM

SUBJECT: Implementing Climate Resilience in PCB Cleanup, Storage, Treatment and/or Disposal Approvals

FROM: Carolyn Hoskinson, Director

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Date: 2024.06.18 16:41:02 -04'00'

TO: Land, Chemicals, and Redevelopment Division Directors, Regions 1-10

PURPOSE

The purpose of this memorandum is to communicate the United States Environmental Protection Agency's (EPA or Agency) approach on when and how to consider potential adverse climate change impacts in the polychlorinated biphenyl (PCB) cleanup, storage, treatment, and/or disposal[1] approval process ("PCB approval(s)").[2] This memorandum clarifies that, for PCB approvals issued under Title 40 of the Code of Federal Regulations part 761, for which EPA is required to make a determination of no unreasonable risk of injury to health or the environment, EPA's determination of no unreasonable risk is to be inclusive of not only current but future conditions; thus, consideration of climate change impacts is part of the risk determination at sites and facilities vulnerable to potential adverse climate change impacts. Additional information may be needed to evaluate whether certain approval applications present or do not present unreasonable risk in consideration of current and future conditions at sites and facilities vulnerable to potential adverse climate change impacts.

Adverse impacts of climate change can include the frequency and intensity of extreme weather events, changing wind patterns, temperature fluctuations, increased precipitation, sea level rise, storm surges, inland and coastal flooding, bank and shoreline erosion, changes in groundwater levels and direction, drought, increased risk of wildfires, and permafrost thaw. These potential impacts can threaten the resilience of engineering and other controls at cleanup sites and commercial storage and disposal facilities for which applicants seek PCB approvals from EPA under section 6(e) of the Toxic Substances Control Act (TSCA), 15 U.S.C. § 2605(e), and its implementing regulations at 40 CFR part

[1] Disposal refers to both offsite and onsite disposal of PCBs, e.g., PCB-impacted soil disposed onsite with appropriate controls.

[2] This memorandum addresses only certain PCB approvals issued under the relevant regulatory provisions identified in Attachment 1, which relate to cleanup, storage, treatment, and/or disposal of PCBs.

761. This memorandum identifies authorities, provides interpretations of relevant TSCA provisions, and recommends approaches to ensure that controls will provide long-term effectiveness through resilience to potential adverse climate change impacts into the future.[3]

BACKGROUND

EPA released a Climate Adaptation Plan (CAP) in October 2021 which laid out five priority actions for the Agency to implement in the coming years, including integrating consideration of climate impacts into EPA's programs, policies, rulemaking processes, and enforcement activities.[4] In October 2022, EPA's Office of Land and Emergency Management (OLEM) released its Climate Adaptation Implementation Plan, which included the commitment to incorporate climate adaptation into OLEM's mission, programs, and management functions.

IMPLEMENTATION

No Unreasonable Risk Determination

As noted above, for PCB cleanup, storage, treatment, and/or disposal approvals issued under 40 CFR part 761, for which EPA is required to make a determination of no unreasonable risk of injury to health or the environment, EPA's determination of no unreasonable risk is to be inclusive of not only current but future conditions at sites and facilities vulnerable to potential adverse climate change impacts.

EPA Regional Offices are generally delegated authority under the TSCA PCB regulations to make site-specific determinations of no unreasonable risk that account for circumstances particular to individual sites and facilities within their Regions.[5] Attachment 1 identifies the relevant regulatory provisions under which EPA issues approvals based on a determination of no unreasonable risk. Attachment 2 provides a recommended methodology to screen and, if necessary, assess the climate vulnerability and long-term effectiveness of controls proposed in the cleanup, storage, treatment, and/or disposal plan submitted by the applicant ("submitted plan") or otherwise needed for EPA's approval under current site conditions. This methodology consists of a PCB Site/Facility Climate Vulnerability Screening and, if needed, a PCB Climate Vulnerability Assessment or "PCVA." The vulnerability screening is a high-level screening step to determine if a site or facility is located in a geographic area at risk to potential adverse climate change impacts. EPA may conduct an initial vulnerability screening, using conservative, worst case scenarios, to determine whether a PCVA is needed. A PCVA is an assessment of the likelihood and magnitude of potential adverse climate change impacts, pathways for PCB mobilization and exposure, and identification of climate resilience measures. EPA may utilize the recommended PCVA methodology or an alternative PCVA

[3] This document does not substitute for the statute or regulations, nor is it a regulation itself. Thus, it cannot impose legally binding requirements and may not apply to a particular situation based upon the circumstances. Any decisions regarding a particular situation will be made based on the statute and the regulations, and EPA decision makers retain the discretion to adopt approaches on a site-specific basis that differ from these recommendations where appropriate.

[4] For additional information, see https://www.epa.gov/climate-adaptation/climate-adaptation-plan.

[5] EPA Headquarters has authority to issue approvals for: 1) multi-regional PCB storage and disposal operations, and 2) mobile PCB disposal technologies that may be operated nationwide.

methodology to account for climate change impacts in evaluating whether a submitted plan presents no unreasonable risk. Attachment 3 presents examples of climate resilience measures that may be included in approvals where appropriate.

EPA may need additional information from the applicant to evaluate the vulnerability of the site or facility to climate impacts and the long-term effectiveness of the submitted plan with respect to the applicable regulatory provisions identified in Attachment 1, in that such information may be deemed necessary to make a determination of no unreasonable risk of injury to health or the environment. Such information may include, for example, identification of adverse climate change impacts that have already occurred in the area, modeled projections of potential adverse climate change impacts for the area, and whether resilience measures for the potential adverse climate change impacts are in place. Projections can come from models, maps, or tools developed by federal, regional, and state government agencies. If the submitted plan is not appropriately protective, the applicant may revise it to include additional climate resilience measures or provide information demonstrating the submitted plan's long-term effectiveness for EPA's consideration, or EPA may establish approval conditions incorporating climate resilience measures necessary to support EPA's determination of no unreasonable risk. EPA also may establish approval conditions, when appropriate, that reserve the right for EPA to modify, revoke and reissue, or terminate approvals that are later found to not meet the no unreasonable risk standard with respect to climate change resilience measures. Attachment 4 provides example general conditions that may be included in approvals for this purpose.[6]

Depending on site- or facility-specific conditions, the level of evaluation necessary to determine whether a submitted plan is resilient to adverse climate impacts may vary from simple to complex. Generally, a PCVA should evaluate all applicable factors that may potentially: 1) impact the long-term effectiveness of the controls; or 2) result in changes to site conditions, such as fate and transport mechanisms. For PCB commercial disposal facilities, the evaluation should cover all stages of the cleanup or operations of the facility, such as site characterization, control design and implementation, operations and maintenance, post-closure care, and contingency planning. EPA may conduct a PCVA, request a PCVA where appropriate, and/or review a PCVA submitted by the applicant.

Generally, the PCVA should utilize intermediate to high impact modeling scenarios in order to implement the most effective design and adaptation measure decisions. While high impact, worst case modeling scenarios are useful for the vulnerability screening, it may not always be feasible or effective to implement adaptation measures to those projections. Additionally, the PCVA should account for uncertainties specific to expected climate scenarios over a long period of time due to the long-lasting nature of PCBs.[7] The projected timeframe for the PCVA depends on the anticipated duration of the proposed activity but may account for projection scenarios specific to the long-term management of PCBs at the site. For example, if EPA receives a submitted plan for a risk-based cleanup under § 761.61(c) that leaves PCBs in soil onsite indefinitely, the PCVA should have a long-term timeframe for climate scenario projections, e.g., through the year 2100, beyond which most currently available climate mapping tools developed by federal, regional, and state government agencies do not include modeling scenarios. Climate modeling uncertainty grows the farther out the model is projected, and

[6] To ensure consistency throughout EPA guidance documents, the conditions in Attachment 4 include language relevant to environmental justice, as well as climate adaptation. Environmental justice concerns may or may not be appropriate to include in approvals with climate change resilience measures.

[7] Additional details are provided in Attachment 2.

projections beyond 100 years are neither generally available nor recommended. Similarly, for approvals under § 761.62(c) and § 761.75(c) for onsite disposal of PCBs indefinitely, the PCVA should have a long-term timeframe for climate scenario projections. EPA may consider using national scale mapping tools or those developed by state, regional, or local government agencies which can include a higher degree of local accuracy. As mapping tools are updated to include modeling scenarios beyond 2100, the projected timeframe for the PCVA may be extended accordingly. Reevaluation of updated modeling scenarios may reasonably be done at the time of renewal or modification of the approval (as applicable), or if needed to address significant changes in climate projections relative to assumptions contained in an approved PCVA, where these changes could affect site-specific findings. Alternatively, if the Agency receives a submitted plan for a proposed activity with a fixed duration, such as commercial storage of PCBs under § 761.65(d) for a period of no more than ten years, then a projected timeframe for the PCVA that accounts for that limited time period may be appropriate.[8] In addition, when considering a submitted plan for modification or renewal of a previously issued PCB approval or when a PCB approval is administratively extended, EPA may consider whether to re-evaluate the PCVA to incorporate updated climate projections and any changes in the conditions of the previously approved activity, advances in technology, local infrastructure (e.g., sea walls), or other relevant factors.

Short-term climate resilience measures for PCB cleanup, storage, treatment, and/or disposal approvals may include near-term actions to be implemented as part of the submitted plan, that remove or prevent mobilization of PCB-containing media (e.g., removing contaminated soil, installing a permanent physical barrier, adjusting cap design). Long-term climate resilience measures may include re-evaluating climate projections over time; tracking or monitoring site conditions (e.g., monitoring groundwater, tracking the condition and continued effectiveness of engineering controls, reporting observed changes in site conditions); implementing phased adaptive or contingency measures (e.g., if a project such as a sea wall or levee is not completed as scheduled, certain provisions would trigger to prevent unreasonable risk); and establishing response actions to climate events that may affect the site or facility or its engineering or other controls. Examples of short-term and long-term climate resilience measures are provided in Attachment 3. In general and as appropriate, EPA may give preference to short-term climate resilience measures that remove contamination and have long-term permanence.

EPA project managers should summarize the Agency's finding of no unreasonable risk with respect to climate vulnerability and long-term protectiveness of the submitted plan in the PCB approval or supporting documentation. The summary should identify any climate resilience measures, tools, or other site- or facility-specific factors related to climate resilience relied upon in the no unreasonable risk determination. Any resilience measures that are necessary for achieving no unreasonable risk should be included as conditions of the approval, or incorporated into the approval by reference if they are in the submitted plan.

Self-implementing PCB cleanups

This memorandum also clarifies applicability of climate resilience considerations to self-implementing

[8] The appropriate projected timeframe for the PCVA can be defined as either the permit end date or the anticipated closure date of the storage facility, whichever is longer.

PCB cleanups carried out under 40 CFR 761.61(a) of the TSCA PCB regulations. The self-implementing procedure requires submission of a notification to EPA that includes the information specified in § 761.61(a)(3)(i). Under § 761.61(a)(3)(i)(D), the notification must include a cleanup plan, which should contain options and contingencies to be used if unanticipated higher concentrations or wider distributions of PCB remediation waste are found, or other obstacles force changes in the cleanup approach. If EPA has reason to believe that the PCB cleanup site is located in a geographic area that is vulnerable to adverse climate impacts that present a potential obstacle to the longevity of the proposed cleanup approach, and the submitted notification lacks an option or contingency to effectively protect the remedial activity from those impacts, EPA may require additional information and take other actions consistent with § 761.61(a)(3)(ii). For example, if the proposed cleanup approach is to dispose of PCBs in soil onsite underneath an engineered cap or behind a fence designed to be effective under current climate conditions, but which may fail under projected future climate conditions, this could be considered a potential obstacle to the longevity of the cleanup approach.

CONCLUSION

Throughout the PCB approval process, including issuance of initial approvals, approval renewals, and approval modifications, EPA will be employing the approaches discussed in this memorandum to address potential adverse climate change impacts, thus ensuring that PCB approvals are protective of human health and the environment in the face of those impacts.

If you have questions about this document or would like assistance with evaluating climate vulnerabilities and resilience measures as they relate to PCB approvals, please contact Luke Weber, Office of Resource Conservation and Recovery (ORCR), at weber.luke@epa.gov.

Attachments

1. Relevant Regulatory Provisions Under 40 CFR Part 761
2. Recommended PCB Climate Vulnerability Methodology
3. Climate Resilience Measure Examples
4. General TSCA PCB Approval Conditions to Help Implement Environmental Justice and Climate Adaptation Consideration
5. Example Climate Adaptation Mapping Tools

Relevant Regulatory Provisions Under 40 CFR Part 761	
Citation	**Requirement**
No Unreasonable Risk Determinations PCB Approvals	
Alternative Technology §§ 761.60(e) and 761.60(j)(3)	(e) …Requests for approval of alternate methods that will be operated in only one Region must be submitted to the appropriate EPA Regional Administrator. The applicant must show that his or her method of destroying PCBs will not present an unreasonable risk of injury to health or the environment. On the basis of such information and any available information, EPA may, in its discretion, approve the use of the alternate method if it finds that the alternate disposal method provides PCB destruction equivalent to disposal in a § 761.60 incinerator or a § 761.61 high efficiency boiler and will not present an unreasonable risk of injury to health or the environment. Any approval must be stated in writing and may include such conditions and provisions as EPA deems appropriate. The person to whom such waiver is issued must comply with all limitations contained in such determination. No person may use the alternate method of destroying PCBs or PCB items prior to obtaining permission from the appropriate EPA official. (j)(3) The EPA Regional Administrator for the Region in which an R&D for PCB disposal activity is conducted may determine, at any time, that an R&D PCB disposal approval is required under paragraphs (e) and (i)(2) of this section or § 761.70(d) to ensure that any R&D for PCB disposal activity does not present an unreasonable risk of injury to health or the environment.
Risk-Based Cleanup §§ 761.61(c)(1) and 761.61(c)(2)	(c)(1) …Each application must include information described in the notification required by paragraph (a)(3) of this section. EPA may request other information that it believes necessary to evaluate the application. No person may conduct cleanup activities under this paragraph prior to obtaining written approval by EPA. (c)(2) EPA will issue a written decision on each application for a risk-based method for PCB remediation wastes. EPA will approve such an application if it finds that the method will not pose an unreasonable risk of injury to health or the environment.

Risk-based Disposal or Storage of PCB bulk product waste §§ 761.62(c)(1) and 761.62(c)(2)	(c)(1) …Each application must contain information indicating that, based on technical, environmental, or waste-specific characteristics or considerations, the proposed sampling, disposal, or storage methods or locations will not pose an unreasonable risk or injury to health or the environment. EPA may request other information that it believes necessary to evaluate the application. No person may conduct sampling, disposal, or storage activities under this paragraph prior to obtaining written approval by EPA. (c)(2) EPA will issue a written decision on each application for a risk-based sampling, disposal, or storage method for PCB bulk product wastes. EPA will approve such an application if it finds that the method will not pose an unreasonable risk of injury to health or the environment.
Storage at an approved facility § 761.65(a)(4)	(a)(4) Increased time for storage may be granted as a condition of any TSCA PCB storage or disposal approval, by the EPA Regional Administrator for the Region in which the PCBs or PCB Items are to be stored or disposed of, or by the appropriate official at EPA Headquarters, if EPA determines that there is a demonstrated need or justification for additional time, that the owner or operator of the facility is pursuing relevant treatment or disposal options, and that no unreasonable risk of injury to health or the environment will result from the increased storage time. In making this determination, EPA will consider such factors as absence of any approved treatment technology and insufficient time to complete the treatment or destruction process. EPA may require as a condition of the approval that the owner or operator submit periodic progress reports.
Approval of commercial storers of PCB waste §§ 761.65(d)(2)(vi) and 761.65(d)(4)(iv)	(d)(2) The Regional Administrator for the region in which the storage facility is located (or the appropriate official at EPA Headquarters, if the commercial storage area is ancillary to a disposal facility for which an official at EPA Headquarters has approval authority) shall grant written, final approval to engage in the commercial storage of PCB waste upon a determination that the criteria in paragraph (d)(2)(i) through (d)(2)(vii) of this section have been met by the applicant: …(vi) The operation of the storage facility will not pose an unreasonable risk of injury to health or the environment. (d)(4) The written approval issued by EPA shall include, but not be limited to, the following: …(iv) Such other conditions as deemed necessary by EPA to ensure that the operations of the PCB storage facility will not pose an unreasonable risk of injury to health or the environment.

Commercial Storage Closure Plans §§ 761.65(e)(1), 761.65(e)(1)(i), 761.65(e)(1)(v), and 761.65(e)(2)	(e)(1) A commercial storer of PCB waste shall have a written closure plan that identifies the steps that the owner or operator of the facility shall take to close the PCB waste storage facility in a manner that eliminates the potential for post-closure releases of PCBs which may present an unreasonable risk to human health or the environment. An acceptable closure plan must include, at a minimum, all of the following: (e)(1)(i) A description of how the PCB storage areas of the facility will be closed in a manner that eliminates the potential for post-closure releases of PCBs into the environment. (e)(1)(v) A detailed description of other activities necessary during the closure period to ensure that any post-closure releases of PCBs will not present unreasonable risks to human health or the environment. This includes activities such as ground-water monitoring, run-on and run-off control, and facility security. (e)(2) A written closure plan determined to be acceptable by EPA under this section shall become a condition of any approval granted under paragraph (d) of this section.
Incineration §§ 761.70(d)(3) and 761.70(d)(4)(ii)	(d)(3) In addition to the information contained in the report and plan described in paragraphs (d)(1) and (2) of this section, EPA may require the owner or operator to submit any other information that the EPA finds to be reasonably necessary to determine whether an incinerator shall be approved. (d)(4)(ii) In addition to the requirements in paragraphs (a) and/or (b) of this section, EPA may include in an approval any other requirements that EPA finds are necessary to ensure that operation of the incinerator does not present an unreasonable risk of injury to health or the environment from PCBs.
High Efficiency Boilers § 761.71(b)(3)	(b)(3) On the basis of information in paragraph (b)(2) of this section and any other available information, the Regional Administrator may, at his/her discretion, find that the alternate disposal method will not present an unreasonable risk of injury to health or the environment and approve use of the boiler.
Chemical Waste Landfills §§ 761.75(c)(2) and 761.75(c)(3)	(c)(2) In addition to the information contained in the report described in paragraph (c)(1) of this section, the Regional Administrator may require the owner or operator to submit any other information that the Regional Administrator finds

	to be reasonably necessary to determine whether a chemical waste landfill should be approved. Such other information shall be restricted to the types of information required in paragraphs (c)(1)(i) through (ix) of this section. (c)(3) In addition to the requirements of paragraph (b) of this section, the Regional Administrator may include in an approval any other requirements or provisions that the Regional Administrator finds are necessary to ensure that operation of the chemical waste landfill does not present an unreasonable risk of injury to health or the environment from PCBs.
Self-implementing PCB Cleanups	
Self-Implementing Cleanup §§ 761.61(a)(3)(i)(D) and 761.61(a)(3)(ii)	(a)(3)(i) At least 30 days prior to the date that the cleanup of a site begins, the person in charge of the cleanup or the owner of the property where the PCB remediation waste is located shall notify, in writing, the EPA Regional Administrator, the Director of the State or Tribal environmental protection agency, and the Director of the county or local environmental protection agency where the cleanup will be conducted. The notice shall include: …(D) A cleanup plan for the site, including schedule, disposal technology, and approach. This plan should contain options and contingencies to be used if unanticipated higher concentrations or wider distributions of PCB remediation waste are found or other obstacles force changes in the cleanup approach. (a)(3)(ii) Within 30 calendar days of receiving the notification, the EPA Regional Administrator will respond in writing approving of the self-implementing cleanup, disapproving of the self-implementing cleanup, or requiring additional information.…

Recommended PCB Climate Vulnerability Methodology

PCB Site/Facility Climate Vulnerability Screening

Assess Geographic Climate Vulnerability

- **Is the site or facility vulnerable to adverse climate change impact(s)?** Consider potential adverse climate change impacts relevant to the state or Region in which the site or facility is located (e.g., the frequency and intensity of extreme weather events, changing wind patterns, temperature fluctuations, increased precipitation, sea level rise, storm surges, inland and coastal flooding, bank and shoreline erosion, changes in groundwater levels, drought, increased risk of wildfires, and permafrost thaw). Determine if the site or facility is located in a geographic area at risk of altered future conditions due to one or more climate impacts utilizing conservative, worst case scenarios. Use of a climate adaptation mapping resource is recommended, and example climate adaptation mapping tools are provided in Attachment 5.[9] This initial screening step is intended to be a high-level assessment, as opposed to an in-depth evaluation of projected climate impacts at a particular site or facility.

  If the geographic climate vulnerability screening does not indicate that a site or facility is vulnerable to potential adverse climate change impacts, then no contemporaneous assessment of climate vulnerability is necessary.[10] If the site or facility is determined to be located in a geographic area vulnerable to an adverse climate impact(s), then a PCB Climate Vulnerability Assessment should be conducted using the recommended method in this Attachment or an alternative method, if appropriate.

PCB Climate Vulnerability Assessment (PCVA)

Step 1: Define Site Geographic Vulnerability to Adverse Climate Change Impacts

- **How is the site/facility projected to be impacted by potential adverse climate change impact(s)?** Utilizing, at minimum, projections for the 50th percentile of intermediate to high impact modeling scenarios for climate change threats and conservative assumptions to account for uncertainties, identify the specific altered conditions at the location of the site or facility and the timeframe in which the altered conditions are projected to occur. Use of a climate adaptation mapping resource is recommended.

[9] Climate mapping tools developed by state, regional, or local government agencies may also be used if such tools provide an equivalent or higher degree of accuracy in projected local climate impacts. Examples of climate adaptation mapping resources can also be found at EPA's Superfund climate resilience webpage (https://www.epa.gov/superfund/superfund-climate-resilience-vulnerability-assessment).

[10] EPA's approval should discuss this finding to indicate that the site or facility has been screened for climate vulnerability.

Step 1 Questions to Address	1. What is the projected change in site conditions corresponding to the climate threats, e.g., the projected maximum height of storm surge and groundwater table rise at the site or facility under an intermediate to high impact modeling scenario? Is the entire site/facility or only a portion of it projected to be affected by the identified climate impact(s) under various modeling scenarios? For example, does a particular modeling scenario identify only a low-lying portion of a larger site/facility as subject to flooding during the projected timeframe? 2. What is the earliest timeframe the altered climate conditions could affect the site/facility? 3. Are there any data gaps in the potential adverse climate change impacts that need to be addressed?
General Factors	• Long-term projections (e.g., through 2100). Consider changes in the frequency and intensity of extreme weather events, temperature fluctuations, sea level rise, storm surges, inland and coastal flooding, changes in groundwater levels, drought, increased risk of wildfires[11], and permafrost thaw in northern areas • Intermediate to high impact scenarios • Combined effects of climate threats (e.g., sea level rise plus storm surge impacts on total water levels at the site and shoreline erosion, if applicable) • Projected changes in a 100-year event (e.g., floods, wildfires) if available
Site-Specific Factors	• Location • Elevation • Proximity to water bodies • Groundwater table depth

Step 2: Identify Potential Pathways of PCB Mobilization & Exposure

- **Could PCBs potentially mobilize in a new or expanded pathway of exposure following implementation of the submitted plan under the altered site conditions identified in Step 1?** Consider areas of the site and media (e.g., soil, concrete, building materials) in which PCBs at any concentration will remain in place following cleanup and/or disposal implementation. For sites at which a human risk, but not ecological risk, pathway of exposure is present under current conditions, consider whether an ecological risk pathway could emerge under future site conditions altered by climate change. If one or more potential human or ecological PCB transport and exposure pathways are identified under the altered site conditions, continue to Step 3.

[11] Sites and facilities located in both moderate wildfire risk zones and high wildfire risk zones should be assessed as a conservative approach to addressing sites and facilities at risk of wildfires.

Step 2 Questions to Address	1. Will the altered site conditions change the existing Conceptual Site Model[12] or the degree to which human or ecological exposure pathways remain incomplete? 2. Could PCB-containing media be transported via a new or expanded exposure pathway not currently present (or not anticipated to be present following cleanup and/or disposal under current climate conditions)? Does the projected climate condition present an increased risk of transport of onsite soils into a water body, where the onsite soils contain PCBs at levels protective of human health but not ecological species? Will the altered site conditions potentially impact the durability or effectiveness of the controls following implementation? • Could it disturb or change the condition of PCB-containing media to be stored onsite, such as saturate currently dry PCB-containing soil under a planned cap or pose greater erosive force on a clean soil sidewall barrier? • Is there increased risk of any controls failing and releasing PCBs under the altered site conditions? 3. Is the potential new or expanded pathway of exposure relevant to humans, ecological species, or both? 4. Are the PCBs at risk of partial combustion to more harmful dioxins?
General Factors	• Fate & Transport via: ▪ groundwater ▪ stormwater runoff (storm drains or overland flow) ▪ sidewall, cap, or other erosion ▪ air release (atmospheric dispersion, including particulate distribution and volatilization, and settlement) • Colloidal and non-colloidal PCB groundwater transport • Exposure routes (e.g., human consumption of fish, ecological food chain)
Site-Specific Factors	• Locations and spatial distribution of PCB-containing media to be stored or disposed onsite (including residual PCBs in soils) • Depths of PCB-containing media to be stored or disposed onsite • Hydrologic connectivity to groundwater and/or surface water bodies • Proximity of PCB-containing media to the depth of the groundwater table and potential leaching to groundwater with a rising groundwater table • Site features that may exacerbate potential climate event impacts, e.g., vegetation susceptible to drought or fire hazard

[12] More information on Conceptual Site Models can be found at EPA's Technologies for Cleaning Up Contaminated Sites webpage: https://www.epa.gov/remedytech/environmental-cleanup-best-management-practices-effective-use-project-life-cycle.

	• Proposed engineering control design (e.g., cap design), if applicable[13] • Presence or absence of co-solvents • Planned condition of site surfaces and sidewalls following implementation of the submitted plan, including features that may facilitate transport of PCB-containing media, e.g., storm drainage, as well as features that may obstruct transport, e.g., ≥ 2 feet of clean fill and vegetated landscaping on top of PCB-containing soil • Presence or absence of existing or planned permanent physical barriers between PCB-containing media and potential fate and transport endpoints[14]

Step 3: Evaluate Risk Magnitude

- **Does the potential for PCB mobilization identified in Step 2 pose an unreasonable risk to human and/or ecological health?** Consider the PCB concentrations in site media that are to remain after the submitted plan is implemented. Given the PCB concentrations in site media, assess the magnitude of human and/or ecological impacts this would present and the likelihood of PCBs migrating into the new or expanded pathway(s) identified in Step 2. For climate vulnerabilities concerning flooding or groundwater rise, use of hydrological and/or hydrogeological models to simulate and predict site-specific conditions may be helpful for improved accuracy. If the evaluation determines the potential for PCB mobilization presents minimal to no increased risk to both human and ecological health, do not continue to Step 4.

Step 3 Questions to Address	1. Do the PCB concentrations in site media vulnerable to transport via the human or ecological exposure pathway identified in Step 2 exceed an applicable PCB human or ecological screening level (or calculated site-specific risk level)? 2. Are site-specific factors present (and will remain present despite the potential adverse climate change impacts) to attenuate PCB levels available for transport to the identified exposure endpoints to below the risk screening level (or calculated site-specific risk level)? 3. Under the intermediate to high modeling scenario of the climate threats identified in Step 1, are there site-specific factors that either reduce or increase the likelihood of PCB-containing media mobilizing into the identified exposure pathways, e.g., surface or groundwater flow dynamics?

[13] Consider threat of damage to tanks or containers used to store PCBs or to engineering controls or monitoring systems from adverse climate impacts, which can include the frequency and intensity of extreme weather events, temperature fluctuations, sea level rise, storm surges, inland and coastal flooding, changes in groundwater levels, drought, increased risk of wildfires, and permafrost thaw in northern areas.

[14] If an existing or planned physical barrier could be damaged, overtopped, or otherwise rendered ineffective in preventing transport of PCB-containing media into an identified human or ecological exposure pathway, continue to Step 3, as it may be necessary to address longevity and maintenance of the physical barrier if relied upon to demonstrate no unreasonable risk to human health or the environment.

	4. Should the entire suite of "Compounds with Dioxin-Like Activity" be prioritized for media-specific analyses based on the Conceptual Site Model?
General Factors	• PCB Regional Screening Levels (RSLs)[15] for human health • Environmental Screening Levels (ESLs)[16] • PCB Threshold Effect Concentration (TEC) for sediments (marine or freshwater aquatic life, as applicable)[17] • Recommended Toxicity Equivalence Factors (TEFs) for Human Health Risk Assessments of 2,3,7,8- Tetrachlorodibenzo-p-dioxin and Dioxin-Like Compounds[18]
Site-Specific Factors	• Planned PCB concentrations and volume in site media following implementation of cleanup and/or disposal actions in the submitted plan • Distance of PCB-containing media to a water body (e.g., stream, lake, river, ocean, estuary) or other exposure endpoints and attenuation factor if appropriate • Features that may exacerbate potential climate event impacts, e.g., vegetation susceptible to drought or fire hazard • Ecological species present in an identified exposure pathway and/or endpoint • Groundwater flow dynamics (e.g., speed, distance to water bodies) • Surface water flow dynamics following implementation of cleanup and/or disposal actions in the submitted plan for the intermediate to high impact climate change scenario flood risk

Step 4: Identify Climate Resilience Measures

- **What measures can be implemented to prevent and/or significantly reduce the risk of PCB mobilization identified in Step 3?** Consider 1) short-term measures to remove or prevent mobilization of PCB-containing media (e.g., remove contaminated soil, install a permanent physical barrier, change cap design); and 2) long-term measures to re-evaluate climate projections over time, track or monitor site conditions, monitor PCB levels (e.g., in groundwater), evaluate the condition/effectiveness of engineered

[15] EPA's Regional Screening Levels for PCBs can be found on the following website: https://www.epa.gov/risk/regional-screening-levels-rsls.

[16] While EPA has promulgated soil ESLs for a small list of contaminants, this list does not include PCBs. Many state agencies have developed ESLs for soil, sediment, and groundwater. Check with the appropriate water agency to identify ESLs applicable to the area in which the site or facility is located.

[17] EPA has not promulgated sediment screening levels. Consult with the ecological risk assessor for the applicable EPA Regional Office as to which PCB sediment toxicity benchmarks from scientific literature or other government agencies are endorsed for use in the Region. As an example, the following scientific literature references identify TECs for PCBs in sediment of 0.0598 mg/kg (freshwater) and 0.048 mg/kg (marine), respectively. References: https://www.waterboards.ca.gov/water_issues/programs/tmdl/docs/303d_policydocs/241.pdf https://setac.onlinelibrary.wiley.com/doi/full/10.1002/etc.5620190524.

[18] https://www.epa.gov/risk/documents-recommended-toxicity-equivalency-factors-human-health-risk-assessments-dioxin-and.

controls, and establish response actions to climate events that may affect the site or engineered controls.

Step 4 Questions to Address	1. Which short-term measures, long-term measures, or combination of short-term and long-term measures are most relevant to the identified climate threat and PCB mobilization exposure pathway risk? 2. Which measures are likely to be the most effective at reducing or preventing the identified risk? Of these measures, which have the greatest longevity, and which are the most cost-effective? 3. For long-term measures, what is an effective mechanism to ensure continued implementation over time (e.g., long-term land use covenant, operation & maintenance plan, soil management plan, groundwater monitoring and contingency plan)?

Climate Resilience Measure Examples[19]
• Remove for appropriate disposal PCB-impacted soil/materials in lieu of disposal in place
• Provide for extended long-term groundwater monitoring of PCBs, and/or other contaminants that may increase the mobility of PCBs, downgradient of areas where PCBs will remain in soil/media that may be inundated in future years
• Incorporate climate-change related provisions into the site groundwater contingency plan
• Construct physical barriers (e.g., sand cap, retaining wall), to contain PCBs that are impervious to the identified climate threat (e.g., flooding, intense storms, fire)
• Design containers, monitoring & treatment systems, and subgrade infrastructure to withstand changing conditions from the identified climate threat
• Design caps to be impervious to the identified threat, e.g., use drought-resistant plants for a vegetated soil cap for long-term erosion control
• Incorporate into the site/facility long-term management plan provisions for tracking altered site conditions due to potential adverse climate change impacts and response actions addressing potential adverse climate change impacts, e.g., inspections immediately following a flood or wildfire event that could adversely impact the integrity of a soil or vegetated cap
• Incorporate into the site/facility long-term management plan periodic climate vulnerability assessment updates to account for any observed changes to site conditions or climate projection updates and to provide for re-evaluation of PCB fate & transport and site remedial measures
• For disposal systems reliant on power, ensure the contingency plan contains measures to address power outages.

[19] Additional climate resilience measures can be found in guidance prepared by the Interstate Technology Regulatory Council: https://srr-1.itrcweb.org/appendix-d/.

General TSCA PCB Approval Conditions to Help Implement Environmental Justice and Climate Adaptation Considerations

Condition to modify, revoke and reissue, or terminate the Approval. Pursuant to section 6(e) of the Toxic Substances Control Act and the federal PCB regulations at 40 CFR part 761, including [insert citation(s) for approval provision(s)], EPA reserves the right to modify (including by imposing additional conditions), revoke and reissue, or terminate this Approval when any of the following circumstances exist:

(a) EPA has reason to believe [insert approved action(s), e.g., storage, treatment, disposal, or remediation activities] [is/are] not achieving the relevant [insert performance standards, remedy goals, if applicable] or otherwise [is/are] not in compliance with this Approval;
(b) EPA has reason to believe [insert approved action(s), e.g., storage, treatment, disposal or remediation activities] presents or may present an unreasonable risk of injury to health or the environment;
(c) EPA becomes aware of new or previously undisclosed information that may substantively impact its previous finding of no unreasonable risk and require modifications to this Approval; or
(d) EPA issues new regulations or standards that impact conditions of this Approval.

EPA will make efforts, taking into account the nature of the risk, to provide reasonable advance notice to [insert responsible party's/owner's name] and to provide opportunity for [insert responsible party's/owner's name] to comment on any proposed modification, revocation, or termination of the Approval. EPA may require [insert responsible party's/owner's name] to immediately suspend [insert approved action(s), e.g., storage, treatment, disposal, or remediation activities] while the Agency is deciding whether to modify, revoke and reissue, or terminate this Approval.

Condition to require additional information. When any of the circumstances described above exist, EPA reserves the right to require [insert responsible party's/owner's name] to provide additional information relevant to the Agency's determination whether to modify, revoke and reissue, or terminate this Approval. This may include information to inform EPA's finding that [insert approved action(s), e.g., storage, treatment, disposal or remediation activities] does not present an unreasonable risk of injury to health or the environment, such as information related to the risks or impacts of the [insert short descriptor of approved action(s) such as storage, treatment, disposal, or remediation activities] on surrounding communities and communities with environmental justice concerns, including those related to climate change and cumulative impacts of environmental and other burdens. Additionally, this may include information to inform EPA's finding whether [insert approved action(s), e.g., storage, treatment, disposal, or remediation activities] are resilient to climate change impacts, and whether vulnerability to climate change impacts does not present an unreasonable risk of injury to health or the environment.

Condition to provide additional information. If [insert responsible party's/owner's name] becomes aware of new or previously undisclosed information that may substantively impact EPA's previous finding that [insert approved action(s), e.g., storage, treatment, disposal, or remediation activities] does not present an unreasonable risk of injury to health or the environment, [insert responsible party's/owner's name] must provide that information to the Agency as soon as possible but no later

than [insert timeframe]. This may include information related to the risks or impacts of the [insert short descriptor of approved action(s) such as, storage, treatment, disposal, or remediation activities] on surrounding communities and communities with environmental justice concerns, including risks or impacts related to climate change and cumulative impacts of environmental and other burdens. Additionally, this may include information related to the resilience of the [insert short descriptor of approved action(s) such as, storage, treatment, disposal, or remediation activities] to climate change impacts.

Example Climate Adaptation Mapping Tools

- Climate Mapping for Resilience and Adaptation (CMRA)
- National Climate Assessment
- National Climate Assessment Atlas
- Climate Risk and Resilience Portal
- NOAA Sea Level Rise Viewer
- Interagency Sea Level Rise Scenario Tool
- FEMA National Risk Index
- FEMA Flood Maps
- Federal Flood Standard Support Tool
- USDA Forest Service Wildfire Risk to Communities
- Drought.gov
- Heat.gov
- EPA Adaption Resource Center (ARC-X)
- EPA EJScreen
- Climate and Economic Justice Screening Tool (CEJST)
- Climate Resilience Toolkit