UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

WASHINGTON, D.C. 20460

July 31, 2023

OFFICE OF
LAND AND EMERGENCY
MANAGEMENT

MEMORANDUM

SUBJECT: CSTAG Recommendations on Operable Unit 4, Anniston PCB Site. CSTAG Final Milestone Meeting

FROM: Karl Gustavson, Chair, on behalf of the Contaminated Sediments Technical Advisory Group (CSTAG), Office of Superfund Remediation and Technology Innovation, U.S. Environmental Protection Agency (EPA).

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BACKGROUND

OSWER Directive 9285.6-08, Principles for Managing Contaminated Sediment Risks at Hazardous Waste Sites (February 12, 2002)[1], established the Contaminated Sediments Technical Advisory Group (CSTAG) to "monitor the progress of and provide advice regarding a small number of large, complex, or controversial contaminated sediment Superfund sites," which are known as "Tier 2" sites. CSTAG members are site managers, scientists, and engineers from EPA and the U.S. Army Corps of Engineers (USACE) with expertise in Superfund sediment site characterization, remediation, and decision-making. One purpose of CSTAG is to help Regions manage sediment sites in accordance with the 11 risk management principles described in the 2002 OSWER Directive, the 2005 Contaminated Sediment Remediation Guidance for Hazardous Waste Sites (EPA-540-R-05-012)[2], and the 2017 OLEM Directive on Remediating Contaminated Sediments (OLEM Directive 9200.1-130)[3].

The Anniston PCB site in Anniston, AL is a Tier 2 CSTAG site, and the contaminated sediment actions are subject to CSTAG review per CSTAG's policies and procedures[4]. (Other areas and media in Operable Unit [OU]4 are subject to headquarters review conducted by the Region 4 remedy coordinator.) CSTAG met at the site in 2005 during planning for the remedial investigation (RI). In 2020, CSTAG reviewed milestones 2 and 3 during development of the feasibility study (FS), including the site's remedial action objectives (RAOs), preliminary remedial goals (PRGs), overall risk reduction strategy, and the

[1] Available at: https://semspub.epa.gov/src/document/HQ/174512
[2] Available at: https://semspub.epa.gov/src/document/HQ/174471
[3] Available at: https://semspub.epa.gov/src/document/11/196834
[4] Available at: https://semspub.epa.gov/src/document/HQ/100003253

development and evaluation of remedial alternatives. That meeting included a stakeholder and community listening session. This review is the final milestone review, conducted prior to issuing the proposed plan. CSTAG's written recommendations and Regional responses from its meetings are available at the CSTAG website.[5]

BRIEF DESCRIPTION OF THE SITE

The Anniston PCB Site is located in the city of Anniston, and parts of Calhoun and Talladega Counties, approximately 50 miles east of Birmingham, AL. The Anniston PCB Site includes commercial, industrial and residential properties and downstream areas of Snow and Choccolocco Creek and their floodplains.

PCBs were produced at the facility from 1929 to 1971. Chlorine was also produced using a mercury cell process between the 1950s and 1969 to support PCB manufacturing. During precipitation events, surface water flowed through areas with PCB-containing soil or waste, across the Solutia facility, and into various drainage ditches leading to Snow Creek. Subsequently, PCBs sorbed to suspended solids and settled in the floodplains of these drainage ditches, Snow Creek, Choccolocco Creek, and possibly further downstream. Surface water, sediments, floodplain soils, and riverbanks are contaminated with PCBs throughout the site, posing a significant threat to human health and the environment.

OU-1 and OU-2 of the site include residential and nonresidential properties, respectively, around and downstream of the facility along Snow Creek to US Highway 78. A combined OU-1/OU-2 Record of Decision (ROD) was issued in 2017. OU-3 includes the facility and two closed landfills adjoining the facility. An interim ROD for OU-3 was issued in 2011 and a future final ROD for OU-3 groundwater is anticipated. OU-4 is the most geographically expansive of the current OUs. It includes approximately 37 miles of Snow and Choccolocco Creeks and 6,000 acres of floodplain. OU4 includes the lower end of Snow Creek from downstream of Highway 78 to the confluence of Snow and Choccolocco Creeks, and Choccolocco Creek from the backwater area upstream of the Snow Creek confluence downstream to Lake Logan Martin (a reservoir on the Coosa River). EPA has committed to the State of Alabama and the Natural Resource Trustees to consider whether additional investigations are necessary in the Coosa River downstream of OU-4.

SITE REVIEW

This CSTAG review was held May 23-25, 2023 and included a site tour, material review, discussions with Region 4, and CSTAG deliberation sessions. To support CSTAG's review, the Anniston project team provided a site information package that included the Tier 2 consultation memo describing the site's consideration of sediment risk management principles and supporting references including the site's RI (including the human health and ecological risk assessments), FS, an early draft of the proposed plan, and other supporting documents. CSTAG also relied on its 2020 review and the site's online public document repository. The following recommendations represent the consensus view of the CSTAG.

[5] https://www.epa.gov/superfund/large-sediment-sites-tiers-1-2

DISCUSSION AND RECOMMENDATIONS

1. Protectiveness of the proposed final remedial alternatives

The Region's current plan is to select a final and protective remedy for the 37 river miles of OU4 (i.e., a remedy that will achieve remediation goals in fish tissue and the sediment bed in a reasonable timeframe and satisfy RAOs and ARARs). All the proposed remedial alternatives focus on an identical 25-acre sediment footprint and near-identical bank areas in the most upstream 7.5 miles. Below, CSTAG describes significant concerns with the primary approaches and assumptions used to support the determination that the alternatives will be final and protective.

PCB loading estimates – Since CSTAG's 2020 review of the alternatives and supporting materials, additional documentation was provided on the data, assumptions, and calculations used to apply the Bank Stability and Toe Erosion Model (BSTEM) (FS, Appendix F). This model was used to predict the effect of creek bank source control actions and to justify the exclusion of the lower 29.5 river miles from consideration for bank remediation. This model combined estimates of creek bank recession (erosion) with predicted average PCB concentration for lengths of the creek to estimate annual PCB loadings (FS, Table F-5 and F-6).

CSTAG appreciates that simple models can help managers understand system processes and potential outcomes. However, the riverbank erosion model and the contaminated sediment loading estimates have a high level of assumption, oversimplification, and uncertainty. The approach uses a simplistic model (BSTEM) with no calibration or validation; it is parameterized with coarse resolution, often surrogate COC data[6,7]; the model is coupled to an incomplete hydrologic data set[8]; and model calculations are based on two river cross sections that are extrapolated to the entire river system using riverbank erosion classifications (where erosion rates of 3 of 5 erosion classifications are estimated, not calculated [FS Appendix F, pp. F-3, F-7]). This approach predicts that banks with moderate-to-severe erosion located upstream of RM 29.5 contribute 81% of PCB loading, 91% of the modeled load if areas of minor erosion upstream of RM 29.5 are included [FS Appendix F, Figure F-10]).

These results are then used to justify the exclusion of the lower 29.5 river miles from consideration for bank remediation in any of the alternatives. CSTAG observes a stark discontinuity between the model's high level of assumption and extrapolation and its use to derive a highly certain and consequential contaminated sediment management decision. This level of analysis is more appropriate to generally indicate that upstream areas are sources to be addressed in an early or interim action, but not to exonerate nearly 30 miles of downstream contaminated banks from further consideration.

Monitored Natural Recovery (MNR) modeling – The remedies rely significantly on MNR to achieve a final, protective condition (e.g., one model indicates approximately 38 years of natural recovery to achieve the sediment remediation goal over approximately 28 river miles). The site-specific information needed to support MNR as a viable remedy does not meet expectations set forth in EPA's contaminated sediment guidance (see recommendation 8c in the 2020 CSTAG recommendations). The MNR predictions continue to be based on the simplistic decay curves reviewed by CSTAG in 2020. Declines in surface sediment concentrations for the 9 miles of river downstream of Jackson Shoals are simulated by

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[6] CSTAG requested but did not receive the data set used to derive the concentrations.

[7] "To develop an understanding of the PCB concentrations along the creek bank areas, PCB results within a 33-footwide swath on both sides of Snow Creek and Choccolocco Creek were averaged along several reaches." (FS, Appendix F, p. F-6).

[8] Flows beyond the average 10-year flow event are not contemplated (see Figure F-4), despite data in the FS (Figure 4-62) that support a 50-year flow event of 52,000 cfs. However, the hydraulics for the BSTEM were developed using site-specific data collected from 1984 through 2012 and the probability distribution based on this data set (Figure F-4) shows 0 percent probability of exceedance beyond a daily mean of 10,000 cfs.

applying a decay rate obtained from analyzing one core in an embayment of the Lake Logan Martin backwater area.[9] Concentration declines in the upstream 28 river miles are based on "winnowing-out of PCB-containing fine-grained materials from the sediment bed in areas where active remediation is not conducted" (FS, Appendix G, p. G-2). The "winnowing out" is represented by a universally applied 6% decay rate for which the basis is not stated.[10]

There is insufficient evidence for the fundamental assumptions behind these sediment recovery models (Appendix G and FS Figure 10-2) and for the assumption that they represent sitewide processes (e.g., that the approximately 31 river miles upstream of Jackson Shoals will behave uniformly and release contaminated solids at a constant rate to the point of depuration, or that areas downstream of Jackson Shoals will all decay in a manner similar to core MLM7's calculated decay from 1990-1999). The downstream depositional model should not have been used in a riverine watershed system that is subject to flash floods during runoff events and it contains incorrect assumptions (e.g., that resuspension and subsequent transport does not occur and that the surface layer has a constant volume and is perfectly mixed). The upstream and downstream MNR models are not technically defensible and do not provide adequate support for the resulting contaminated sediment management decisions. The result is a lack of certainty regarding whether MNR will achieve remediation goals as predicted in the FS.

Sediment bed sampling and analysis – The current sediment dataset is not suitable for identifying areas requiring remediation, leaving large uncertainty as to whether the proposed remedies would be protective of ecological and human health. The proposed sediment remedies are based on two quantitative criteria: removal of sediment with PCB concentrations greater than 2.6 mg/kg, and a post-remedy surface-weighted average concentration (SWAC) of less than 1 mg/kg[11]. After analysis of surface sediment data (RI, Table 4-6), CSTAG can state with confidence that the previous sediment sampling efforts missed areas where sediment PCB concentrations exceeded the remedial action level (RAL) of 2.6 mg/kg.[12] Furthermore, the downriver distance between samples often exceeded 1000 feet, with some stretches exceeding a mile. This is potentially much further than the distance where sediment PCB concentrations correlate with one another, leaving large portions of the riverbed uncharacterized.[13]

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[9] "Based on rate of decline in PCB in geochronological core MLM7 from 1990 to 1999" (FS, Appendix G, p. G-4).

[10] "This projection is based on an annual 6% PCB mass loss rate (winnowing or exchange rate) for fine-grained particles within the sediment matrix for these portions of the creek." (FS, p. 10-36).

[11] The second RAL used in the FS is "achieving a post-remediation SWAC less than 1 mg/kg as a RAL" (FS, p. 7-10). A RAL is a contaminant threshold commonly used to identify areas for remedial action when samples exceed the RAL. CSTAG has not previously seen a "SWAC RAL" and this unconventional application would seem to trigger the active remediation of a whole river reach. CSTAG could not find a basis for the 1 mg/kg threshold or for its application to broad river reaches (however, 1 mg/kg PCB applied at point location is a RAL at several other contaminated sediment Superfund sites). At this site, a 1 mg/kg SWAC RAL is considered a "target goal" (FS p. 7-10) used to determine that upstream riverbed remediation meets that goal. This approach is confusing, unconventional, apparently not associated with the site PRGs, and afflicted by the sampling and statistical issues identified in this section.

[12] Based on an analysis of RI Table 4.6, CSTAG used two approaches to conclude that areas exceeding 2.6 mg/kg were missed. First, for the reach of Coldwater Creek to Cheaha Creek, only 1 sample from the RFI exceeded the RAL of 2.6 mg/kg PCB. The more recent Phase 2 Ecological sampling found 8 more samples that exceeded 2.6 mg/kg. Were we to assume the RFI sampling found all areas exceeding the RAL, no additional sample exceedances would have been found. Second, CSTAG conducted a more quantitative analysis of the "coarse" surface (top 6") sediment class samples in the Coldwater Creek to Cheaha Creek reach. Of 155 coarse sediment samples taken in this reach, 42 were analyzed for PCBs, leaving 113 sample locations with no PCB data. The distribution of PCB concentrations in the 42 samples was approximately fit to a lognormal distribution that was slightly biased toward lower concentrations. A Monte Carlo sampling (n = 10000) of the lognormal distribution for the other 113 unanalyzed samples showed that, had the other 113 samples been analyzed, at least one sample would have exceeded 2.6 mg/kg in 98% of the simulations, with an average number of 4 samples exceeding 2.6 mg/kg.

[13] There are many statistical methods to develop the confidence that most hotspots have been found, but no such analysis was presented to CSTAG or to the Region. One such analysis is a semivariogram, which can estimate the a "zone of influence" of

More extensive sampling is needed to better identify sediment areas that exceed RALs. The proposed predesign sampling is not adequate to correct for this shortcoming. It does not attempt to fill in these gaps and focuses only on delineating areas that exceeded 2.6 mg/kg in samples taken 14-24 years ago (see recommendation 5 for further discussion).

CSTAG also has concerns regarding the calculation of SWACs that were used in site decisions (such as the RAL comparison described in footnote 11). SWACs were calculated based on estimated areas of sediment texture instead of a spatial area. This is a novel approach that needs more quantitative justification.[14] The sediment texture was determined from visual inspection of sediment transects of the river approximately 1000 feet apart, and a fraction of the samples collected from these transects were analyzed for PCBs. This method (FS p. 4-38) has three issues. First, no protocol for assigning the sediment texture between transects was described, giving considerable uncertainty to the estimated areas for each sediment texture within each reach. Second, the calculation method assigns mean PCB concentrations of analyzed locations to unanalyzed areas, based on the assigned sediment texture. To do so, enough samples need to be analyzed from each sediment texture in each reach to have high confidence in the sample mean of each class (e.g., 95% UCL of mean within a factor 1.5 of the mean).[15] No quantitative analysis of the representativeness or uncertainty of analyzed samples is given, and thus CSTAG has low confidence in the appropriateness of applying the analyzed mean values to the unanalyzed samples for calculating the SWAC. Lastly, "not recoverable" was considered a sediment texture that was then assigned to unsampled areas which in turn were assigned a non-detect concentration. In some reaches, this decreased the SWAC by a factor of 2. Not including the non-recoverable area in SWAC calculations would be a more conservative estimate and better align with more likely aquatic habitats and areas driving PCB exposure.

Recommendations

a. Consistent with its 2020 recommendations, CSTAG does not agree that the OU4 FS can support a final ROD. Doing so puts the Region on record as assuring the public and the court of their confidence that the proposed remedy will achieve remediation goals at appropriate spatial scales throughout OU4, in a reasonable timeframe. CSTAG's previous and current evaluations do not indicate that a record exists to support that conclusion. Instead, CSTAG recommends the Region consider moving forward with one of the following options:

Interim OU4 ROD: CSTAG suggests that the assembled record better supports an interim action. The interim remedy could be positioned as a source control action that targets OU4's creek bank sources of COCs and the highest COC concentration bed sediments to decrease COC exposure and downstream transport. After remediating the riverbanks identified as PCB source areas and sediments throughout OU4 that exceed a RAL, the Region could determine if the interim remedy is effective and if natural recovery is occurring in downstream areas as predicted to develop a record to support a final OU4 ROD.

Split OU4 into two OUs: The NCP (300.430 (a)(ii)(B)) states "Sites should generally be remediated in operable units when early actions are necessary or appropriate to achieve significant risk reduction quickly, when phased analysis and response is necessary or appropriate

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samples (i.e., the distance from a sample where the sediment concentration no longer correlates with the concentration at the sample location).

[14] The approach is also different than the SWAC calculation method presented in FS Appendix H (p. H-1) which reviews SWAC application at U.S. contaminated sediment sites.

[15] The Hudson River Superfund site is one example where this approach was used: https://www3.epa.gov/hudson/Design_Support_FSP_10_final.pdf

given the size or complexity of the site, or to expedite the completion of total site cleanup." The Region could consider dividing OU4 into two OUs and pursue a final ROD upstream of RM 29.5 where bank remediation is proposed while deferring action on the downstream OU until the remedy has been implemented and sufficient time has elapsed to recharacterize the downstream OU. This would require analyses that demonstrate protectiveness in the upstream OU and compare alternatives against the nine NCP criteria and each other.

b. CSTAG recommends that these options require 1) predesign sampling throughout OU4 to fill data gaps (not just in areas identified in the pre-2008 RI/FS sampling) with the objective of identifying sediments greater than RAL concentrations and establishing a pre-remediation baseline concentration (recommendation 5a) in appropriately sized SWAC exposure areas (recommendation 3); 2) post-remediation sampling within the remediated areas to establish effectiveness and document post-remediation conditions (recommendation 6a); 3) MNR evaluations of trends in fish, sediment, and surface water PCB concentrations (see recommendation 6c); and 4) a plan with a timeline to conduct the early action (interim or upper OU), assess goals, and establish decision time points to determine whether additional remediation is warranted for a final remedy (see 2020 recommendation 9b). The Region should also consult EPA's adaptive site management framework[16] that describes how to implement interim actions to support a final remedy through planning, goal identification, and iterations of remediation, monitoring, and evaluation.

2. RAO refinement

CSTAG appreciates that the Region incorporated RAOs to reduce migration of COCs from creek bank soil and to prevent the long-term downstream transport of COCs in the creek. These RAOs can also serve as interim remedy RAOs that are focused on source control in reaches with active remediation. These RAOs specify that an objective of the remediation is to lessen inputs of contaminated banks to Choccolocco Creek and transport of contaminants to downstream, less contaminated areas, thus providing an additional basis for the action beyond reducing risk to human and ecological receptors.

Recommendation

CSTAG recommends that language be incorporated into the RAO or PRG descriptions to clarify how achievement of the downstream transport and riverbank soil migration RAOs will be assessed. For example, if a protective PRG is attained in the sediment bed, then it is anticipated that the objective of reducing downstream migration of contaminants will be achieved. Contaminated sediment sites commonly use contaminant thresholds (RALs) for the management of contaminated media, including riverbanks. If erosive banks that exceed the RAL value are stabilized or removed, then it is anticipated that the riverbank RAO will be achieved.

3. Remediation goals and SWACs

The Region presented remediation goals for PCBs in fish tissue, sediment, and water. Sediment remediation goals were presented in the draft FS for ecological protection using a point not-to-exceed (NTE) concentration of 2.6 mg/kg in sediments and a SWAC of 0.63 mg/kg (FS, p. 6-14). In the FS, PRGs for the protection of human health via the consumption of contaminated fish were developed with different values applied to areas upstream or downstream of Jackson Shoals (0.056 or 0.11 mg/kg PCB in fish tissue and 0.1 or 0.2 mg/kg PCB as a sediment SWAC, respectively) (FS, p. 6-18).

[16] Available at: https://semspub.epa.gov/work/HQ/100003040.pdf

The area over which a SWAC will be applied and measured (i.e., the exposure unit) is central to whether it is an appropriate goal for the receptor and exposure pathway. If the SWAC area is too large, areas not relevant to receptor exposures are included; if it is too small, relevant areas are excluded. Currently, the smallest SWAC areas (described on FS, p. 7-10) are river reaches above and below Jackson Shoals (approximately a 9 or 28 river mile SWAC). The SWAC for the protection of ecological receptors appears to be site wide (37 river miles). SWAC exposure areas of this size are not likely to be biologically relevant because the SWAC assumes that all areas of the 9-, 28-, or 37-mile long reach equally drive exposure to the receptor, which is unlikely. In all cases, applying SWACS across such large river reaches could result in areas with significant PCB concentrations in sediment/porewater, and fish tissue goals may never be achieved.

Recommendation

Similar to CSTAG's 2020 recommendation 6 on SWAC application in OU4, CSTAG recommends that the Region specify the area over which the SWACs will apply and provide a rationale for choosing these areas. CSTAG recommends developing biologically and physically relevant exposure area/units using the physical characteristics of the river and biological characteristics of the receptor. The smallest exposure area relevant to the human health and ecological risk receptors should be used in SWAC derivation and application. The SWAC-based remediation goals will be evaluated in these areas. A "moving window" analysis based on the smallest relevant exposure area may be preferred in the absence of physical barriers or other logical separations. Throughout the RI and FS, OU4 is divided into ten reaches and various evaluations have been conducted in each reach. At a minimum, the SWAC remediation goal for PCBs that is protective of human health through fish consumption could be evaluated over each of these 10 river reaches.

4. Additional alternatives

In 2020, CSTAG recommended that if the Region intended to develop a final ROD, the FS should evaluate a range of alternatives varying in the degree of cleanup from MNR-only to the "*maximum extent feasible*" sediment bed and creek bank remediation. CSTAG also recommended that bank removal alternatives should be based on PCB loading potential, independent of river mile (recommendation 8a). The FS now contains a subset of alternatives that also includes bank remediation with minor erosion (instead of only banks with moderate and severe erosion). However, active remediation is only applied upstream of RM 29.5.[17]

All six active remedial alternatives address the same 25-acre sediment footprint and rely on MNR to the same extent.[18] The result is a relatively narrow range of alternatives, with the estimated cost of the six active alternatives not varying substantially (i.e., $43.6 to $54.0 million). There is considerable uncertainty as to whether any of the remedial alternatives can achieve remediation goals in a reasonable timeframe given the significant reliance on MNR. Because none of the alternatives consider

[17] The FS does not include or screen an alternative with a lower RAL. However, the text describes an "alternative scenario" using a PCB RAL of 0.1 mg/kg to "provide context for the remedial alternatives for sediment presented in this OU-4 FS" (FS, p. 7-11). This text confuses a RAL with a SWAC PRG which inflates the footprint and degree of remediation. A RAL of 0.1 mg/kg is likely not needed to achieve a SWAC of 0.1 mg/kg aggregated over a SWAC exposure area. This "alternative scenario" simply considered removing all sediment in the OU (estimated at 2 million cubic yards of sediment, 85% of which resides downstream of Jackson Shoals).

[18] With extensive reliance on dispersion (i.e., "winnowing out") as the mechanism of natural recovery. "Dispersion is least preferable basis for MNR in remedy selection because "it generally increases exposure to contaminants and may result in unacceptable risks to downstream areas or other receiving water bodies" (EPA 2005 Contaminated Sediment Remediation Guidance, p. 4-1).

more active sediment remediation to lessen the reliance on MNR, the uncertainty in the ability of any of the alternatives to meet remediation goals in a reasonable time frame is similar across alternatives. Evaluation of the NCP's balancing factors and selection of the optimal remedy is not possible without a broader range of alternatives that includes larger active remediation footprints.

Even for an interim remedy, it is problematic for the FS to consider such a narrow set of alternatives. The site does not have a singular waste area to be managed. The 37 river miles is a continuum of PCB source and exposure levels. If an interim remedy is intended to improve conditions so that a no action remedy may be viable in a future, final ROD, then managers should have information to optimize the size of the interim remedy (in particular, to balance the degree of remediation, the degree of MNR sampling, and the potential need for future active remediation). While fewer and more limited alternatives are anticipated for an interim remedy (ROD guidance[19], highlight 8-7), EPA FS guidance[20] is clear: "Alternatives should be developed that will provide decision-makers with an appropriate range of options and sufficient information to adequately compare alternatives against one another" (p. 4-7).

Recommendations

a. The interim action approach recommended by CSTAG above (recommendation 1a) should consider a broader range of RALs that lessen the reliance on MNR and provide the decision maker with sufficient information to compare alternatives.

b. CSTAG does not recommend proceeding with a final ROD for OU4 as currently defined. However, if the Region intends to pursue a final remedy for OU4 (or the upper portion of OU4), the proposed cleanup plan should present a full range of remedial alternatives, including alternatives with lower RALs that lessen the reliance on MNR. A full range of alternatives would vary in the degree of active remedy from MNR only to a "maximum extent feasible" sediment bed and creek bank remediation. For example, at least two additional alternatives should be included that rely less on MNR to achieve the remediation goal: 1) a "maximum extent feasible" sediment bed and creek bank remediation alternative, which would include achieving the sediment remediation goal/CUL upon completion of remediation (i.e., an analysis of the RAL that will achieve the CUL/RG in each SWAC exposure unit and inclusion of erosive banks greater than a bank source control RAL); and 2) an alternative with an intermediate RAL that evaluates more sediment bed and creek bank active remediation than the alternatives, but less than the "maximum extent feasible" alternative. Alternatives would evaluate the post-remediation SWAC achieved within each SWAC exposure area compared to the PRG and whether PRGs are achieved post-remediation or within a reasonable time frame (e.g., 20 years). Similar to recommendation 1b above, common elements would include river-wide predesign sampling, post-remediation sampling, and long-term monitoring (see recommendations 5 and 6).

CSTAG reiterates that a primary issue with this approach is that MNR, especially for extended time periods, would have to be considered as unreliable or unknown, which would decrease the acceptability of MNR-reliant alternatives in the nine criteria evaluation. The uncertainty associated with MNR could potentially be ameliorated with robust post-implementation remediation goal monitoring program with unambiguous triggers and timelines for additional remediation if media COC concentrations are not met.

[19] Available at: https://www.epa.gov/sites/default/files/2015-02/documents/rod_guidance.pdf
[20] Available at: https://semspub.epa.gov/work/HQ/100001529.pdf

5. Predesign sampling

Potential remedies will rely heavily on predesign sampling. Most of the chemical and physical data in the FS used to characterize Choccolocco Creek downstream of the backwater area were collected in the late 1990s as part of the 2000 “Offsite RCRA Facility Investigation (RFI) Report”. In that report, the aforementioned transect sampling was used to establish bathymetry and sediment thickness (by probing), sediment texture and grain size, sediment bed PCB (by analyzing a subset of sediment samples [described above]), and riverbank PCB concentrations (by “top of bank” sampling at 36 locations [RFI Report, p. 3-19]). Site remediation is intended to control PCB sources and to remove contaminated sediments that exceed a RAL, so remedy effectiveness will be dictated by whether those materials are accurately identified for remediation.

Sediment sampling – CSTAG has significant concerns with the use of the outdated data and proposed approaches to support remedial design. The current data set is insufficient to identify all the areas within the OU that exceed the RAL (see recommendation 1, “sediment bed sampling and analysis”). To address this issue, predesign sampling was included in the FS “to completely define the current nature and extent of PCBs in sediment in the areas targeted for remediation” (FS, p. 9-8). However, the proposed sampling applies only to areas where historic samples exceeded 2.6 mg/kg and it employs a composite sampling approach over the river reach surrounding the point RAL exceedance.[21] Compositing will likely dilute any RAL exceedances and it effectively changes the metric for evaluating a RAL exceedance (by converting a point concentration RAL exceedance criterion into a SWAC exceedance criterion). The effect of the proposed approach can only be to eliminate areas from the proposed remediation footprint, it cannot identify new areas or areas missed in the sparse historic sampling described in recommendation 1.

Recommendations

a. CSTAG recommends that predesign sediment sampling be conducted throughout OU4, (including in areas previously estimated to be “not recoverable”). The sampling design objectives should be to provide assurance that RAL exceedances will be identified if they are present and to generate a statistically robust estimate of the SWAC concentration in the exposure areas for use as a baseline in remedy effectiveness evaluations. Here and in the other phases of sampling, a sample density greater than that used in the RI will be needed, preferably using a spatially balanced, random stratified survey design to reduce potential biases and increase statistical confidence in the monitoring design and SWAC estimates. The sampling density should have numbers sufficient to calculate SWAC statistics (e.g., 95% UCL on mean) with certainty over the relevant exposure scale defined by the biological endpoints.

b. CSTAG recommends that the Region consult with Agency resources to develop a procedure for updating and objectively determining the location of sediment deposits and developing strata for sediment sampling and analysis to support remedial design. This effort should include an updated, comprehensive sediment bed characterization that combines modern techniques such as LiDAR, sampling, and geomorphology to establish the location of actionable sediment deposits. If the remedial design is performed by PRPs, this procedure would be shared with those parties to incorporate into the remedial design.

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[21] “The estimated remedial footprint was… based on going to locations where the surface sediment PCB concentrations exceed 2.6 mg/kg and extending a removal footprint upstream and downstream halfway to locations where the PCB concentrations were equal to or below 2.6 mg/kg” (FS, p. 7-11).

Bank sampling – Despite the small number of bank samples and the importance of source control in contaminated sediment management, the FS does not appear to consider whether banks downstream of river mile 29.5 should be evaluated for PCB levels and considered for remediation (or even whether riverbanks upstream of 29.5 should be sampled for PCBs prior to their removal). Recontamination from uncharacterized or unremediated COC sources is a primary reason why the EPA guidance emphasizes that source control is critical to reaching remedial action objectives in a reasonable time frame (EPA 2005 Contaminated Sediment Remediation Guidance, p. 4-11). In 2020, CSTAG recommended bank management based on PCB loading potential, independent of river mile because of the limited understanding of bank PCB concentrations and the potential for banks to serve as a PCB source to the system.[22] Understanding the presence (or absence) of PCB sources is critical to effective site management.

Recommendation

c. CSTAG recommends that the Region evaluate whether bank sampling is sufficient to provide confidence that PCB sources have been identified throughout OU4. Source control should occur where sources are present, independent of river mile. If current sampling is inadequate, it should be updated during pre-design sampling and results incorporated in the remedial design to ensure that PCB sources are controlled**.**

6. Post-remediation monitoring

The 2005 Contaminated Sediment Remediation Guidance states that post-remediation monitoring should be conducted "1) to assess compliance with design and performance standards; 2) to assess short-term remedy performance and effectiveness in meeting sediment cleanup levels; and/or 3) to evaluate long-term remedy effectiveness in achieving remedial action objectives…" Short- and long-term monitoring elements are discussed below.

Performance monitoring in the remediation areas – Except for the alternatives that specified a 1-foot dredge prior to capping, the FS is vague about the technology's performance objectives, performance standards within the RAL footprint[23], and the need for performance monitoring.

Recommendation

a. CSTAG recommends that the proposed plan includes post-remediation monitoring to verify that dredging achieved its objectives in the areas it was applied. To support this, the expectations of the remediation approaches should be explicitly stated (i.e., that dredging is intended to excavate materials to the depth of native or unimpacted sediment, verified by using a PCB performance standard in the excavation footprint).

MNR sampling – EPA's 2017 Directive on Remediating Contaminated Sediments recommends to "collect baseline contaminant trend data in all appropriate media and use monitoring data to evaluate remedial effectiveness." Similarly, Appendix B of the FS describes the site's long-term monitoring plan that includes baseline and long-term monitoring timeframes and states objectives to assess remedy effectiveness based on the RAOs and PRGs for OU4. Monitoring "will also be used to assess the potential

[22] The FS sampling (Appendix F, p. F-7) describes average PCB concentrations in banks throughout the system as higher than the proposed sediment RAL, indicating the potential of bank soils to serve as a source of PCBs to contaminated sediment.
[23] For example, the typical description is "Dredging would be conducted in the high-energy and low-energy areas using PCB RALs of 2.6 mg/kg as an NTE value and a SWAC less than 1 mg/kg" (FS p. 10-48).

for changes in the monitoring program or refinements to the remedy as part of the five-year review process using ASM [adaptive site management]" (FS, Appendix B, p. B-2).

MNR is a central component of the evaluated alternatives (and potential interim action) so the sampling plan should be able to evaluate whether MNR is functioning as intended by reducing COC concentrations to achieve PRGs in fish, sediment, and water in the anticipated timeframe. Several elements of the plan support this overall objective, but others are lacking. The monitoring plan focuses on media directly relevant to the remediation goals (sediments, water, and fish tissue) and contains other evaluations to better understand observations (sediment traps, porewater sampling, and fish tracking). The plan appropriately includes an objective to update baseline concentrations prior to remediation to provide a basis for comparison to post-remediation data. The post-remediation frequency is planned at years 1, 3, and 5 following remedy implementation and then every 5 years (FS, Appendix B, p. B-4). Greater sampling frequency followed by decreased frequency is common in long-term monitoring program design, however, there is no discussion on how that timing reflects the site's anticipated changes in concentrations and if that timing can support decisions on remedy effectiveness and adaptation. The plan has few monitoring stations (4) for 37 miles of river. This program is much smaller than the 9 RI/FS sampling areas designed to characterize the nature and extent of contamination in fish tissue and to support the OU4 HHRA, and a rationale was not provided for deviating from that precedent. CSTAG also notes that the "background" stations are now placed in the downstream Lake Logan Martin and not the Choccolocco Creek background area upstream of the site. Despite the use of SWAC-based sediment remediation goals, the sampling design does not develop SWACs. In fact, it appears that only 1 sediment sample is planned in each of the 4 locations (FS, Appendix B, p. B-4). Four sediment samples in OU4 are inadequate to reflect remedy effectiveness or attainment of the sediment remediation goal. The fish tissue sampling appears more robust, with different fish species, trophic guilds, fillet, and whole-body samples, and replicates of 10 individuals at each station with a consideration for increasing the fish sample number to accommodate fish compositing strategies (FS, appendix B, p. B-7). These data can also be used to further refine the fish tissue BSAFs (when SWACs are appropriately measured) to ensure that sediments are managed to COC levels that correspond with acceptable fish tissue concentrations. The sampling plan's proposed water, porewater, and fish tracking studies can further support developing this understanding.[24]

Recommendation

b. CSTAG recommends that the sampling frequency be revisited to ensure it supports the needs of the action (e.g., an interim action approach may need higher resolution in the years prior to selecting a final remedy). Sampling time points should be based on the expected post-remediation conditions and COC trends to provide an appropriate basis for remedy decisions.

c. CSTAG recommends that MNR monitoring directly address whether natural recovery of sediment PCBs is occurring, in the relevant area, over the specified time frame. Sampling should replicate the proposed baseline effort (recommendation 5a) and be designed to demonstrate the progress toward (or attainment) of remediation goals. The sample distribution and density should be sufficient to calculate SWAC statistics of each SWAC area with certainty for comparison to SWAC PRGs.

[24] "To supplement the traditional monitoring methods, the long-term monitoring program includes collecting dissolved-phase surface water and porewater data and conducting fish tracking studies. These studies will be useful to understand the long-term distribution and time-based constituent concentrations in fish, and ultimately the effectiveness of the OU-4 remedy over time" (FS, Appendix B, p. B-2).

d. CSTAG recommends the Region consider replicating the upstream background areas and fish sampling areas used to support the RI/FS. Lake Logan Martin sampling areas may play a role in decision making for the lake, but they have low relevance as background for Choccolocco Creek. The "CERCLA program fish tissue sampling" investigation was used to depict fish trends in OU4 and risk to receptors in the RI/FS. Gaps in spatial characterization may exist with this design, but sampled fish likely integrate exposures over larger areas and the monitoring program recommended includes comprehensive sediment sampling. As such, retaining this sampling design for fish tissue is a reasonable balance that would provide a longer term, more complete record to evaluate fish tissue COC trends.

7. Lake Logan Martin special studies

Appendix A of the FS describes special studies that are needed to "fill data gaps regarding the nature and extent" of PCBs and other COCs in areas downstream of OU-4. The appendix describes that the special studies can be used by EPA "to evaluate the nature and extent of contamination and communicate current conditions to local stakeholders for areas downstream of OU-4" (p. A-1). Following a review of existing PCB data, special studies were proposed, stating that sampling in Lake Logan Martin will provide information to support the following:

- "Document continued concentration declines and exposure conditions.
- Assess remedy effectiveness monitoring for upstream sources, including the Coosa River and the Site.
- Assist with closure for the total maximum daily load process for the Coosa River that is linked to completing upstream source controls, including the Site remedies" (FS, Appendix A, p. A-20).

Seven multimedia (e.g., water, sediment, and fish) sampling sites of the 40-mile-long lake stretch were proposed to collect the necessary information to evaluate the conditions upstream and downstream of the input from with Choccolocco Creek. Furthermore, tracking of fish movement was proposed to evaluate each receptor's geographical domain and the overlap with known regions of contamination.

While the data collection will improve EPA's ability to understand downstream contamination resulting from upstream OUs, there is an unclear connection between the stated objectives and EPA's needs for Superfund decision making. The design appears insufficient to resolve the nature, extent, and trends of contamination in fish and surface and subsurface sediments, but without more clearly stated objectives, the appropriateness of the design is unable to be discerned.

Recommendation

EPA's expectation is "Environmental programs performed for, or by, the Agency be supported by environmental data of an appropriate type and quality for their expected use."[25] CSTAG recommends the Region use the data quality objective process to clearly state the objectives of the collection and expected uses in Superfund site decision making. This process will allow the development of study design capable of satisfying the study questions, discerning if objectives have been met, and arriving at a decision regarding whether Superfund activities are necessary in the Coosa River downstream of OU4. The OU4 and downstream monitoring programs should be coordinated and consistent to permit site wide comparisons.

[25] https://www.epa.gov/sites/default/files/documents/guidance_systematic_planning_dqo_process.pdf

8. Community concerns

The Region discussed the outreach efforts they have used to understand community concerns and communicate EPA decisions to the communities impacted by the actions taken to date at OU1, OU2 and OU3. While some of these communities may also be impacted by potential remedies at OU4, some of the communities that are affected by OU4 are new.

Recommendation

CSTAG recommends that the Region consider developing or updating a Community Involvement Plan (CIP) for OU4. The development of the CIP will include identifying and interviewing people in these communities who understand how people may most effectively receive information, including identifying social media options and which communities use these tools. The CIP would clearly document environmental justice factors identified using EJ Screen that the Region would need to understand and integrate into remedy evaluation and communication.