UNITED STATES DISTRICT COURT
FOR THE DISTRICT OF RHODE ISLAND

EMHART INDUSTRIES, INC., Plaintiff and Counterclaim Defendant, v. NEW ENGLAND CONTAINER COMPANY, INC; et al., Defendants and Counterclaim Plaintiffs.	C.A. No. 06-218 S
EMHART INDUSTRIES, INC., Plaintiff and Counterclaim Defendant, v. UNITED STATES DEPARTMENT OF THE AIR FORCE; et al., Defendants, Counterclaim Plaintiffs, and Third-Party Plaintiffs, v. BLACK & DECKER, INC.; et al., Third-Party Defendants.	C.A. No. 11-023 S

PHASE II FINDINGS OF FACT AND CONCLUSIONS OF LAW

I. Introduction

Dioxin and other toxic chemical pollution at the Centredale Manor Restoration Project Superfund Site ("Centredale Site" or

"Site") in North Providence, Rhode Island, has led to going on ten years of litigation over which parties are responsible and what is the appropriate remedy. The Court divided the litigation into three phases. (See Eighth Revised Case Management Order, ECF No. 295.)[1] At the close of trial in Phase I, the Court found Emhart jointly and severally liable for the release of dioxin at the Site. The Court has now concluded Phase II of the trial[2] and must provide findings of fact and conclusions of law addressing the following two issues: (1) whether the Environmental Protection Agency's ("EPA") remedy-selection process was arbitrary, capricious, or otherwise not in accordance with law; and (2) whether Emhart had sufficient cause to refuse to comply with EPA's June 10, 2014 Administrative Order. The necessary contributions, if any, of third-party defendants will be addressed in Phase III of the trial.

The Court provided a comprehensive background discussion and procedural history of this case in its Phase I opinion and need

[1] The present case was also preceded by other insurance coverage litigation. The Centredale Site is truly a litigation gift that keeps on giving.

[2] The Court received evidence over the course of thirteen days, concluding on January 19, 2017. (See Trial Trs. vols. 1-13, ECF Nos. 448-57, 494-96.) This included thousands of pages of exhibits from both the United States (Bates numbered "US__") and Emhart (Bates numbered "Emhart__"). The parties supplied post-trial briefs thereafter. (See Emhart Post-Trial Brief, ECF No. 461; Gov't Post-Trial Brief, ECF No. 466; Emhart Post-Trial Reply Brief, ECF No. 497.) Lastly, the Court heard oral argument on April 4, 2017. (See Trial Tr. vol. 14, ECF No. 534.)

not repeat it here. (See Phase I Findings of Fact and Conclusions of Law ("Phase I Findings"), ECF No. 405.) However, since issuing the Phase I Findings, there have been three new and important developments in the case relating to the Phase II litigation. First, the parties have come to an agreement regarding the United States' past response costs in light of the Court's findings in Phase I. (See Stipulation Regarding United States' Past Response Costs, ECF No. 444.) As such, the Court need not determine the amount of past response costs.

Second, the Government moved to limit the scope of judicial review during Phase II. (Gov't Mot. to Limit Disc. and Scope of Review, ECF No. 415.) The Government argued that, because judicial review under CERCLA is strictly limited to the administrative record, Emhart should be prohibited from presenting any evidence or arguments not found in the administrative record. Emhart opposed the Government's motion, arguing that review under CERCLA is not so limited. (Emhart Obj., ECF No. 416.) The Court denied the Government's motion without prejudice, thereby allowing Emhart to conduct discovery and present the objected to evidence and arguments at trial. (Order Den. Mot. to Limit Disc. and Scope of Review 6, ECF No. 421.) However, the Court has reserved its judgment on the ultimate admissibility of the challenged evidence and arguments to this point. (Id. at 6.)

Third, and lastly, the Government moved to exclude certain portions of testimony provided by Emhart's expert, Mr. Jeffrey Loureiro. (Gov't Mot. to Exclude Certain Test. of Jeffrey Loureiro, ECF No. 447.) The Government argued that significant portions of Mr. Loureiro's opinions had not been disclosed in his expert report in violation of Rule 26(a)(2) of the Federal Rules of Civil Procedure. According to the Government, the admission of Mr. Loureiro's testimony would be "highly prejudicial . . . given the United States' inability to explore such opinions through discovery or to counter them effectively through rebuttal testimony." (Id. at 2.) In light of the Government's concerns, the Court decided to allow the testimony of Mr. Lourerio but provided the Government an opportunity to conduct additional discovery and to designate and utilize rebuttal experts to address the concerns highlighted in the Government's motion. The Court therefore denied that motion as moot. (Text Order of 10/07/2016.)

In this decision, the Court will set forth its findings of fact and conclusions of law with regards to the question of remedy, and address along the way the various issues reserved to this point. See Fed. R. Civ. P. 52(a)(1). The decision begins with an overview of the CERCLA process by which EPA may choose a response action, as well as the standards of judicial review for challenges to a response action. Next the Court provides specific findings of fact, starting with a history of EPA action at the Site, and then

moving into the topics which provide the bases for Emhart's challenge. After each topic the Court provides conclusions of law.

II. Remedy Selection

Congress enacted the Environmental Response, Compensation, and Liability Act ("CERCLA"), 42 U.S.C. § 9601 et seq., "in response to the serious environmental and health risks posed by industrial pollution." United States v. Bestfoods, 524 U.S. 51, 55 (1998). To address those risks, CERCLA "grants the President broad power to command government agencies and private parties to clean up hazardous waste sites." Id. (quoting Key Tronic Corp. v. United States, 511 U.S. 809, 814 (1994)). These cleanup efforts are called "response actions," and may require both "the cleanup or removal of released hazardous substances" as well as other "remedial action . . . to prevent or minimize the release of hazardous substances." 42 U.S.C. § 9601(23)-(25).

EPA acts on the President's behalf in choosing the appropriate response action. See Exec. Order No. 12580(b)(1), (g). In doing so, EPA must work within the framework provided by CERCLA and the National Contingency Plan ("NCP"). See 42 U.S.C. 9604(a)(1) (requiring EPA to act "consistent with the national contingency plan"); National Contingency Plan, 40 C.F.R. § 300, et seq. In addition, EPA has established various guidance documents to assist in the CERCLA process. While these guidance documents are non-binding on EPA, they do represent EPA's collective wisdom as to

best practices.[3] The steps required by CERCLA and the NCP, and implemented with the assistance of EPA guidance documents, are outlined below.

A. National Priorities List

The first step in the CERCLA process is placing a site on the National Priorities List ("NPL"). See 42 U.S.C. § 9605(a)(8)(b); 40 C.F.R. § 300.425. A site is appropriately included on the NPL if, for example, EPA determines that a hazardous substance poses "a significant threat to public health." Id. § 300.425(c)(3)(ii). A notice and comment period is required before a site is officially placed on the NPL. Id. § 300.425(d)(5). Once the notice and comment process is complete, and if EPA determines that NPL listing is still appropriate, EPA may begin the process of developing a response action for the site.

B. Remedial Investigation and Feasibility Study

EPA is required to conduct a remedial investigation ("RI") and feasibility study ("FS") before choosing a response action. The end goal of the RI/FS process is "to assess site conditions and evaluate alternatives to the extent necessary to select a remedy." Id. § 300.430(a)(2). The first step is the RI, which seeks to "collect data necessary to adequately characterize the

[3] (See, e.g., Ms. Taylor Test., Trial Tr. vol. 2, 5:3–9, ECF No. 449 (acknowledging that EPA guidance represents "the collective information and practices developed by EPA through its experience in implementing remedies").)

site for the purpose of developing and evaluating effective remedial alternatives." Id. § 300.430(d)(1). EPA is given significant leeway to develop a RI process specific to the site. But, at a minimum, EPA must conduct a field investigation (i.e., collect site-specific data) and create a baseline risk assessment. Id.

The data collected during the field investigation includes the physical characteristics of the site and the hazardous material present as well as the exposure pathways through which the hazardous material may affect human health and the environment. Id. § 300.430(d)(2)(i)-(vii). Part of this process involves estimating the reasonable maximum exposure that is likely to occur for both current and potential future land use at the site. (EPA, Interim Final Risk Assessment Guidance for Superfund ("IFRAGS"), vol. I, Emhart579-24.) EPA then uses this data in the baseline risk assessment to understand the extent to which hazardous materials pose a threat to human health and the environment, as well as what would be "acceptable exposure levels" for the site going forward. 40 C.F.R. § 300.430(d)(4).

At this point, EPA transitions from the RI process of collecting data to the FS process of finding a remedy.[4] "The

[4] While the RI and FS are labeled as separate steps in the CERCLA process, the RI does not end when the FS begins. Instead, "the RI and FS are interactive processes that are conducted concurrently," such that "field investigation activities will be

national goal of the remedy-selection process is to select remedies that are protective of human health and the environment, that maintain protection over time, and that minimize untreated waste." Id. § 300.430(a)(1)(i). As an aid to developing potential remedies that accomplish this overarching goal, EPA first establishes what are labeled Preliminary Remediation Goals ("PRGs") targeting "acceptable exposure levels that are protective of human health and the environment." Id. § 300.430(e)(2)(i). These PRGs must, among other things, comply with federal and state environmental laws[5] and limit the lifetime cancer risk from carcinogenic exposure. Id. § 300.430(e)(2)(i)(A)(1)-(2). EPA then develops a range of response alternatives that may achieve those PRGs.

In order to choose among the response options for the site, the various alternatives are initially screened using three criteria: (1) effectiveness; (2) implementability; and (3) cost. Id. § 300.430(e)(7)(i)-(iii). At this stage, alternatives that provide "significantly less effectiveness" or are "technically or

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ongoing during the development and screening of remedial action alternatives." EPA, The Remedial Investigation: Site Characterization and Treatability Studies, Emhart509-1; see also, 40 C.F.R. § 300.430(e)(1) ("Development of alternatives shall be fully integrated with the site characterization activities of the remedial investigation."); id. § 300.430(e)(1) ("Preliminary remediation goals should be modified, as necessary, as more information becomes available during the RI/FS.")

[5] These are referred to in CERCLA as Applicable and Relevant and Appropriate Requirements ("ARARs"). 40 C.F.R. § 300.505(d)(2)(iii).

administratively infeasible" may be eliminated. Id. § 300.430(e)(7)(i)-(ii). Additionally, "[c]osts that are grossly excessive compared to the overall effectiveness of alternatives may be considered as one of several factors used to eliminate alternatives." Id. § 300.430(e)(7)(iii).

Alternatives that survive the initial culling proceed to the "detailed analysis of alternatives." Id. § 300.430(e)(9). This requires "an assessment of individual alternatives against each of nine evaluation criteria and a comparative analysis that focuses upon the relative performance of each alternative against those criteria." Id. § 300.430(e)(9)(ii). The nine criteria used by EPA to compare alternatives are: (1) overall protection of human health and the environment; (2) compliance with federal and state environmental laws (i.e., "ARARs"[6]); (3) long-term effectiveness and permanence; (4) reduction of toxicity, mobility, or volume through treatment; (5) short-term effectiveness; (6) implementability; (7) cost; (8) state acceptance; and (9) community acceptance. See id. § 300.430(e)(9)(iii)(A)-(I). Once sufficient information has been gathered such that EPA can compare the alternatives based on the nine evaluation criteria, EPA may proceed with remedy selection.

[6] See id.

C. Remedy Selection

During remedy selection EPA places the nine evaluation criteria into three categories. The first category, labeled "threshold criteria," are the criteria "that each alternative must meet in order to be eligible for selection." Id. § 300.430(f)(1)(i)(A). The two threshold criteria are overall protection of human health and the environment and compliance with ARARs (criteria (1) and (2), above).[7]

Once EPA has screened out alternatives that do not meet the threshold criteria, EPA then compares the remaining alternatives based on the second category of criteria, labeled "primary balancing criteria." Id. § 300.430(f)(1)(i)(B). These include long-term effectiveness and permanence, reduction of toxicity, mobility, or volume through treatment, short-term effectiveness, implementability, and cost (criteria (3)-(7), above). Id. As the label suggests, these "primary balancing criteria" are balanced against one-another. In doing so, the NCP provides certain preferences. For instance, a remedy must be "cost-effective" in that "its costs are proportional to its overall effectiveness." Id. § 300.430(f)(1)(ii)(D). In addition, "balancing shall emphasize long-term effectiveness and reduction of toxicity,

[7] While compliance with ARARs is one of the "threshold criteria," there are limited circumstances where a chosen remedy need not meet those standards. See id. § 300.430(f)(1)(ii)(C).

mobility, or volume through treatment," thereby focusing on "permanent solutions . . . to the maximum extent practicable." Id. § 300.430(f)(1)(ii)(E). However, in the end, the NCP does not dictate exactly how the primary balancing criteria should be weighed. Instead, the NCP provides EPA with considerable discretion to select a remedy that "reflect[s] the scope and purpose of the actions being undertaken and how the action relates to long-term, comprehensive response at the site." Id. § 300.430(f)(a).

The last category EPA must consider is the "modifying criteria." Id. § 300.430(f)(1)(i)(C). The modifying criteria include state and community acceptance (criteria (8) and (9), above). Because the state and community provide formal input during the notice and comment period for the proposed plan, state and community acceptance is typically only considered, at this stage, "to the extent that information is available during the FS." EPA, A Guide to Preparing Superfund Proposed Plans, Records of Decision, and Other Remedy Selection Decision Documents, Emhart518-33. However, "after public comment is received on the Proposed Plan," the modifying criteria will be "fully considered." Id. This means that, "[i]n the final balancing of trade-offs between alternatives upon which the final remedy selection is based, modifying criteria are of equal importance to the balancing criteria." Id. This does not provide the state or community the power to veto a selected

remedy[8]; their input is simply considered along with the other balancing criteria.

After completing the "detailed analysis of alternatives" using the nine criteria, EPA chooses a remedy through a "two-step process." 40 C.F.R. § 300.430(f)(1)(ii). First, EPA "identifies a preferred alternative and presents it to the public in a proposed plan, for review and comment." Id. The proposed plan functions not only to "supplement the RI/FS," but also to "provide the public with a reasonable opportunity to comment on the preferred alternative for remedial action, as well as alternative plans under consideration, and to participate in the selection of remedial action at a site." Id. § 300.430(f)(2). To accomplish this, the proposed plan must, among other things, "[p]rovide a brief summary description of the remedial alternatives evaluated in the detailed analysis" as well as "[i]dentify and provide a discussion of the rationale that supports the preferred alternative." Id. The public is then given "a reasonable opportunity, not less than 30 calendar days, for submission of written and oral comments" as well as an "opportunity for a public meeting." Id. § 300.430(f)(3)(i)(C)-(D).

After receiving public input on the proposed remedy, the second step for remedy selection requires EPA to "review the public comments and consult with the state (or support agency) in order

[8] See, e.g., 42 U.S.C. § 9604(j); id. § 9621(e)(1); 40 C.F.R. § 300.400(d).

to determine if the [proposed plan] remains the most appropriate remedial action for the site or site problem." Id. § 300.430(f)(1)(ii). The NCP anticipates that public comments may provide "new information or points of view" that prompt EPA "to modify aspects of the preferred alternative or decide that another alternative provides a more appropriate balance." Id. § 300.430(f)(4). To the extent EPA makes any significant changes to the remedy, those changes must be documented.[9] EPA must then make the final remedy selection. Id. § 300.430(f)(4)(i).

Just as EPA is not required to remove all uncertainty at the RI/FS stage regarding the conditions at the site, EPA is also not required to provide complete details of the final remedy at the selection stage. The NCP envisions that EPA will fill in the details of the final remedy during the implementation (or "remedial design") phase and that the final remedy may require modifications. See generally id. § 300.435. The NCP also allows EPA to reserve decisions regarding how to handle certain portions of the remedy

[9] EPA must provide documentation in the record of decision where the final remedy "significantly differs from the original proposal." Id. § 300.430(f)(3)(ii). If the change is so drastic that it could not have been "reasonably anticipated by the public" based on the information in the proposed plan and administrative record, then EPA must allow for an additional notice and comment period on the revised plan. Id. § 300.430(f)(3)(ii)(B). If the changes to the plan could have been "reasonably anticipated," then EPA need only "[i]nclude a discussion in the record of decision of the significant changes and reasons for such changes." Id. § 300.430(f)(3)(ii)(A).

until remedial design. See, e.g., id. § 300.825(a)(1)-(2). This process is discussed below in the "Remedial Design and Remedial Action" section.

D. Documentation of the Remedy-Selection Process

After selecting the final remedy, EPA must "establish an administrative record that contains the documents that form the basis for the selection of a response action." 40 C.F.R. § 300.800. An important piece of the administrative record is the Record of Decision ("ROD"), which includes "all facts, analyses of facts, and site-specific policy determinations considered" by EPA in selecting the final remedy. Id. § 300.430(f)(5)(i). The ROD is essentially EPA's justification for its decision, explaining, for example, "[h]ow the selected remedy is protective of human health and the environment" and "provides overall effectiveness proportional to its costs." Id. § 300.430(f)(5)(ii)(A), (D). As part of this justification, the ROD also must include a "responsiveness summary," which is "a written summary of significant comments, criticisms, and new relevant information submitted during the public comment period and the lead agency response to each issue." Id. § 300.430(f)(3)(i)(F). Lastly, if EPA chooses to reserve certain decisions for a later date, it may, "[w]here appropriate, provide a commitment for further analysis." Id. § 300.430(f)(5)(iii)(D).

The administrative record is not a static document. Even after the final remedy is selected, EPA is responsible for updating the administrative record where necessary. For example, if the ROD did not address a portion of the response action or reserved certain decisions until the implementation phase, EPA must document those later decisions in the administrative record. Id. § 300.825(a)(1). Additionally, if EPA decides to modify the final remedy during remedial design, it must document those changes either through an "explanation of significant differences" or a ROD amendment, as appropriate. Id. § 300.825.[10]

E. Remedial Design and Remedial Action

The final step is "the development of the actual design of the selected remedy and implementation of the remedy through construction." Id. § 300.435(a). The NCP labels this as the "remedial design/remedial action (RD/RA) stage." Id. While the ROD establishes the final remedy, the NCP leaves it to the RD/RA stage for EPA to determine the remedy's final design. The "initial building block in developing" the final design is the information contained in the RI/FS, but EPA guidance also envisions that additional "data acquisition" and "sample analysis" will be necessary during RD/RA. EPA, Scoping the Remedial Design, Emhart516-2. EPA then recommends going through multiple design

[10] See infra note 11.

phases before coming to a "final design" and beginning construction. Id. at 0001. Once a final design is complete, EPA must – as a final notice to the public - "issue a fact sheet and provide, as appropriate, a public briefing prior to the initiation of remedial action." 40 C.F.R. § 300.435(c)(3). EPA may then implement the remedy, and as long as the "remedial action objectives and remediation goals in the ROD" are accomplished, the CERCLA response action process is largely complete. Id. § 300.435(f)(1); 42 U.S.C. § 9621(d) (stating that the response action must "attain a degree of cleanup . . . which assures protection of human health and the environment").

If strict adherence to the final design proves unworkable at any point, EPA guidance provides for significant "flexibility" to account for "any constraining factors of the particular site." EPA, Scoping the Remedial Design, Emhart516-1. The NCP also foresees that "[a]dditional work" may be "needed as a result of such unforeseen situations as newly discovered sources, types, or quantities of hazardous substances." 40 C.F.R. § 300.435(e)(1)(i). Because the "chief task" of RD/RA is "to achieve the goals of the Record of Decision . . . in a timely manner," EPA, Scoping the Remedial Design, Emhart516-1, as opposed to blind adherence to any particular design, EPA is permitted to change the remedial design

at any point. The NCP simply requires that sufficient notice and opportunity to comment is provided to the public.[11]

F. Unilateral Administrative Order

The parties responsible for the release of the hazard materials at the site are liable for the costs associated with the response action. See 42 U.S.C. § 9607(a). EPA can either complete the response action and seek reimbursement from the responsible parties or require the responsible parties to implement the response action themselves. Where EPA determines that "there may be an imminent and substantial endangerment to the public health or welfare or the environment," EPA is authorized to issue a unilateral administrative order ("UAO") requiring the responsible parties to implement the response action "as may be necessary to protect public health and welfare and the environment." Id. § 9606(a).

If a responsible party "willfully violates, or fails or refuses to comply with" the UAO, EPA may seek an order "in the

[11] If, after additional data collection or during construction, EPA determines that the final design will "differ[] significantly from the remedy selected in the ROD with respect to scope, performance, or cost," EPA must provide the public notice of this change. 40 C.F.R. § 300.435(c)(2). Where the differences "significantly change but do not fundamentally alter the remedy selected in the ROD," the lead agency will publish an "explanation of significant differences." Id. § 300.435(c)(2)(i). Alternatively, if EPA does "fundamentally alter" the final remedy in its final design, EPA must amend the ROD and provide for another period of notice and comment. Id. § 300.435(c)(2)(ii).

appropriate United States district court to enforce" the UAO. Id. § 9606(b)(1). Additionally, if the district court finds that the responsible party refused to comply with the UAO without "sufficient cause," the responsible party is subject to daily fines during the period of non-compliance as well as treble damages for any work EPA performed at the site. Id. § 9606(b)(1), 9607(c)(3). By regulation, the daily fine amount is $37,500 per day for every day of non-compliance between December 6, 2013 and November 2, 2015, and $54,789 per day thereafter. 40 C.F.R. §§ 19.2, 19.4.

III. Scope of Review

Having described the remedy-selection process as outlined by CERCLA and the NCP, the Court will now provide its findings of fact and conclusions of law regarding EPA's remedy-selection process at the Site. Before doing so, however, the Court must first determine what evidence and arguments it will consider, as well as the standard of review. As discussed previously, the Government moved, pre-trial, to limit the scope of discovery and judicial review. According to the Government, the Court should not consider evidence and arguments not contained in the administrative record when making its determination about the appropriateness of EPA's chosen remedy. The Court denied the Government's motion without prejudice, permitting Emhart to take discovery and present evidence and arguments at trial not contained in the administrative record. The Court "reserve[d] ruling on the admissibility of any

particular extra-record evidence until the time of trial." (Order Den. Mot. to Limit Disc. and Scope of Review 6.) The Government has reiterated its arguments at trial and in its post-trial briefs, and Emhart has again responded. (See Gov't Post-Trial Brief 8-13; Emhart Post-Trial Reply Brief 1-22.)

The two questions the Court must answer are: (1) whether the Court should consider evidence not contained in the administrative record; and (2) whether the Court should consider Emhart's arguments that were not made during the notice and comment period.

A. What Evidence Should the Court Consider?

CERCLA provides the following limitation to judicial review: "In any judicial action under this chapter, judicial review of any issues concerning the adequacy of any response action taken or ordered by the President shall be limited to the administrative record." 42 U.S.C. § 9613(j)(1) (emphasis added). CERCLA reiterates this limitation when describing the applicable standard of review: "In considering objections raised in any judicial action under this chapter, the court shall uphold the President's decision in selecting the response action unless the objecting party can demonstrate, on the administrative record, that the decision was arbitrary and capricious or otherwise not in accordance with law."

Id. § 9613 (j)(2) (emphasis added).[12] As these provisions make clear, "[u]nder CERCLA, judicial review normally is limited to the administrative record as it existed at the time of the challenged agency action." United States v. JG-24, Inc., 478 F.3d 28, 33-34 (1st Cir. 2007); see also Murphy v. Comm'r of Internal Revenue, 469 F.3d 27, 31 (1st Cir. 2006) ("[T]he Supreme Court has consistently stated that review of administrative decisions is ordinarily limited to consideration of the decision of the agency . . . and of the evidence on which it was based.") (internal quotations omitted). This ensures that the Court "take[s] into account 'neither more nor less information than did the agency when it made its decision.'" Linemaster Switch Corp. v. EPA, 938

[12] The administrative record is typically closed once the decision document has been signed, except in the following narrow circumstances:

> (a) The lead agency may add documents to the administrative record file after the decision document selecting the response action has been signed if: (1) The documents concern a portion of a response action decision that the decision document does not address or reserves to be decided at a later date; or (2) An explanation of significant differences required by § 300.435(c), or an amended decision document is issued, in which case, the explanation of significant differences or amended decision document and all documents that form the basis for the decision to modify the response action shall be added to the administrative record file.

40 C.F.R. § 300.825.

F.2d 1299, 1305 (D.C. Cir. 1991) (quoting Walter O. Boswell Mem'l Hosp. v. Heckler, 749 F.2d 788, 792 (D.C. Cir. 1984)).

However, while generally confining the scope of judicial review to the administrative record, CERCLA also provides that "[o]therwise applicable principles of administrative law shall govern whether any supplemental materials may be considered by the court." 42 U.S.C. § 9613(j)(1). Typically, "[c]ourts require a strong showing of bad faith or improper behavior before ordering the supplementation of the administrative record." Town of Norfolk v. U.S. Army Corps of Eng'rs, 968 F.2d 1438, 1458–59 (1st Cir. 1992); see also JG-24, Inc., 478 F.3d at 34 ("Normally, we do not allow supplementation of the administrative record unless the proponent points to specific evidence that the agency acted in bad faith."). This exception provides no assistance to Emhart, as there is no evidence that EPA crafted a remedy for the Site in bad faith or based on an improper motive, and EPA's "designation of the Administrative Record, like any established administrative procedure, is entitled to a presumption of administrative regularity." Nw. Bypass Grp. v. U.S. Army Corps of Eng'rs, No. CIV 06-CV-00258-JAW, 2007 WL 1498912, at *2 (D.N.H. May 14, 2007) (quoting Bar MK Ranches v. Yuetter, 994 F.2d 735, 740 (10th Cir. 1993)).

Emhart must therefore find some other legal avenue if it is to successfully inject evidence outside the administrative record

into this proceeding. Outside of a showing of bad faith, the First Circuit recognizes two other "exceptions to the rule against supplementation." Nw. Bypass Grp., 2007 WL 1498912, at *2.

First, "supplementation may be proper when . . . there is a record so inadequate that it prevents judicial review." Id. at *2-3 (citing Murphy, 469 F.3d at 31). This applies in very limited circumstances. For instance, the Supreme Court has recognized that, "where there are [no formal] administrative findings that were made at the same time as the decision, . . . it may be that the only way there can be effective judicial review is by examining the decisionmakers themselves." Citizens to Pres. Overton Park, Inc. v. Volpe, 401 U.S. 402, 420 (1971) (citing Shaughnessy v. Accardi, 349 U.S. 280 (1955)). This applies where the administrative agency's decision cannot be discerned or justified on the record. See Camp v. Pitts, 411 U.S. 138, 142–43 (1973) (reviewing whether "there was such failure to explain administrative action as to frustrate effective judicial review"). Therefore, supplemental materials are typically unnecessary when the administrative agency's judgment is based on a substantial record. See Nw. Bypass Grp., 2007 WL 1498912, at *3 (finding an administrative record "more than sufficient to allow for judicial review" because the administrative record was "hefty, 3,233 pages over seven volumes, with documents spanning from 1989 to 2006"). Where a substantial record is available, even if the administrative

agency's explanation is "curt," supplemental materials are unnecessary as long as the explanation "indicate[s] the determinative reason for the final action taken." Pitts, 411 U.S. at 143.

The second exception to the "rule against supplementation" applies where "additional testimony by experts" will "aid to understanding highly technical, environmental matters." Nw. Bypass Grp., 2007 WL 1498912, at *2 (quoting Valley Citizens for a Safe Env't v. Aldridge, 886 F.2d 458, 460 (1st Cir. 1989)). The Court may even allow "additional factual evidence as an aid to understanding." Valley Citizens for a Safe Env't, 886 F.2d at 460. The necessity of such evidence "is discretionary with the reviewing court." Id. However, it is important to note that the purpose of such evidence is "simply to help [the Court] understand matters in the agency record." Id. Therefore, the Court still "looks first and foremost at the record before the agency." Id.; see also Olsen v. United States, 414 F.3d 144, 155 (1st Cir. 2005) ("The focal point for judicial review should be the administrative record already in existence, not some new record made initially in the reviewing court.") (quoting Pitts, 411 U.S. at 142); United States v. Dravo Corp., No. 8:01CV500, 2003 WL 21434761, at *3 (D. Neb. June 20, 2003) (reviewing an EPA response action and refusing to "permit supplementation of the record absent a showing that it is

explanatory and not intended to invoke new material into the case").

In this case, given the extensive record compiled by EPA, as well as EPA's documentation of its decision-making process in the ROD, the Court does not find the record "so inadequate" as to require supplemental materials. However, the subject matter involved certainly falls under the umbrella of "highly technical, environmental matters" where the Court has discretion to consider "additional testimony by experts" and "additional factual evidence" as an aid to understanding the administrative record. Nw. Bypass Grp., 2007 WL 1498912, at *2 (quoting Valley Citizens for a Safe Env't, 886 F.2d at 460). The Court will therefore consider the expert testimony presented by both parties. With that said, in considering the expert testimony, the Court acknowledges that it must remain focused "first and foremost" on the administrative record, Valley Citizens for a Safe Env't, 886 F.2d at 460, as "the focal point for judicial review should be the administrative record already in existence, not some new record made initially in the reviewing court." Olsen, 414 F.3d at 155 (quoting Pitts, 411 U.S. at 142).

B. What Arguments Should the Court Consider?

Having established what evidence is admissible in this case, the Court must determine which of Emhart's arguments the Court will consider. According to EPA, the Court should not consider any

of Emhart's arguments that were not previously submitted during the official notice and comment period on the proposed remedy. Emhart, on the other hand, urges the Court to consider all of its arguments, including those made for the first time at trial.

There is limited precedent directly addressing this issue in the context of CERCLA. Generally speaking, arguments not made before an administrative agency are waived when a court reviews the administrative agency's decision:

> [w]e have recognized in more than a few decisions, and Congress has recognized in more than a few statutes, that orderly procedure and good administration require that objections to the proceedings of an administrative agency be made while it has opportunity for correction in order to raise issues reviewable by the courts.

United States v. L.A. Tucker Truck Lines, Inc., 344 U.S. 33, 36–37 (1952). This requirement is commonly referred to as "issue exhaustion." Sims v. Apfel, 530 U.S. 103, 107 (2000). As the First Circuit has explained, "this rule preserves judicial economy, agency autonomy, and accuracy of result by requiring full development of issues in the administrative setting to obtain judicial review." Pepperell Assocs. v. EPA, 246 F.3d 15, 27 (1st Cir. 2001) (citing Northern Wind, Inc. v. Daley, 200 F.3d 13, 18 (1st Cir. 1999)).

The doctrine of issue exhaustion was adhered to relatively recently by the First Circuit in Upper Blackstone Water Pollution Abatement Dist. v. EPA, 690 F.3d 9, 18 (1st Cir. 2012). That case

involved a sewage company ("petitioner") appealing a limitation imposed on it by EPA under the National Pollutant Discharge Elimination System. After notice and comment on the limitation, petitioner challenged EPA's decision in the First Circuit. Petitioner sought review of, among other things, "the limit placed on aluminum discharge, arguing that the EPA assembled and then relied upon an erroneous data set in deriving the limit." Id. at 33. The First Circuit refused to consider that argument, however, because it had not been raised during the notice and comment period.

The First Circuit explained that, by regulation, petitioner was required to "raise all reasonably ascertainable issues and submit all reasonably available arguments supporting their position by the close of the public comment period . . . ." Upper Blackstone, 690 F.3d at 30 (quoting 40 C.F.R. § 124.13). In light of this statutory requirement, the court found that petitioner had "waived the argument by failing to raise it during the public comment period of the permitting process. . . . By failing to give the EPA an opportunity to address the argument during the permitting process, [Upper Blackstone] has waived its claim." Id. (citing several cases, including L.A. Tucker Truck Lines, 344 U.S. 33, and Pepperell Assocs., 246 F.3d 15).

Emhart argues that Upper Blackstone is distinguishable from this case because, unlike the regulation at issue in Upper

Blackstone, CERCLA and its implementing regulations do not contain a clear issue exhaustion provision. The Court disagrees.

A determination of whether issue exhaustion applies to an administrative process "requires careful examination of the characteristics of the particular administrative procedure provided." Sims, 530 U.S. at 112–13 (O'Connor, J., concurring) (quoting McCarthy v. Madigan, 503 U.S. 140, 146 (1992)). And while the regulation reviewed by the First Circuit in Upper Blackstone may have been slightly more definitive than the language in CERCLA, the Court finds that CERCLA and its implementing regulations, when taken as a whole, clearly require interested parties to present arguments to EPA before bringing those issues before a federal court.

After identifying the "preferred" remedy, EPA is required to "present[] it to the public in a proposed plan, for review and comment." 40 C.F.R. § 300.430(f)(1)(ii). This ensures that the public has "a reasonable opportunity to comment on the preferred alternative for remedial action, as well as alternative plans under consideration, and to participate in the selection of remedial action at a site." Id. § 300.430(f)(2). At the completion of the notice and comment period, EPA is required to create a "responsiveness summary," which is "a written summary of significant comments, criticisms, and new relevant information submitted during the public comment period and the lead agency

response to each issue." Id. § 300.430(f)(3)(i)(F). The responsiveness summary is then placed in the administrative record. Id.

Importantly though, the responsiveness summary does not address comments made outside the public comment period. See id. § 300.825. As is mandated by CERCLA's implementing regulations, the responsiveness summary will not address comments made "after the close of the public comment period" unless the comments: (1) "contain significant information not contained elsewhere in the administrative record file"; (2) the information "could not have been submitted during the public comment period"; and (3) the information "substantially support[s] the need to significantly alter the response action." Id. § 300.825. Therefore, unless an issue raised after the public comment period falls under this exception, that issue will not be responded to in the responsiveness summary or included in the administrative record. And it is in this context that CERCLA explicitly limits judicial review to the information contained in the administrative record. See 42 U.S.C. § 9613(j)(1)-(2).

This statutory and regulatory scheme, when viewed as a whole, requires parties to make all of their known and available arguments regarding the merits of a remedy to EPA during the notice and comment period in the first instance. Only then, after EPA has had the opportunity to provide its response in the administrative

record, may a federal court review EPA's decision. See, e.g., JG-24, Inc., 478 F.3d at 33-34 ("Under CERCLA, judicial review normally is limited to the administrative record as it existed at the time of the challenged agency action."); Arco v. Travelers Ins. Co., 730 F. Supp. 59, 69 (W.D. Mich. 1989) ("[R]efusal to participate in this administrative process [under CERCLA] essentially allows the EPA a free-reign in dictating response methods since judicial review is limited to the administrative record."). To allow Emhart to make arguments it could have made directly to EPA for the first time on judicial review would frustrate this administrative scheme by depriving EPA of the opportunity to address Emhart's arguments in the first instance on administrative review. Upper Blackstone, 690 F.3d at 30.

However, while judicial review is generally limited to arguments presented during the notice and comment period, the Court also recognizes that there are some narrow exceptions to this rule. For instance, the Court of Appeals for the District of Columbia Circuit has recognized that EPA must justify "key assumptions" in its analysis, regardless of whether a party specifically objects during the notice and comment process:

> EPA has a preexisting duty to examine key assumptions as part of its affirmative burden of promulgating and explaining a non-arbitrary, non-capricious rule and therefore . . . must justify that assumption even if no one objects to it during the comment period.

Oklahoma Dep't of Envtl. Quality v. EPA, 740 F.3d 185, 192 (D.C. Cir. 2014) (quoting Appalachian Power Co. v. EPA, 135 F.3d 791, 818 (D.C. Cir. 1998)).[13]

While the First Circuit has not directly addressed this narrow exception, the Court agrees with the District of Columbia Circuit that issue waiver cannot absolve EPA of its responsibility to explain the key assumptions that underpin its remedy and that contain obvious mistakes. Therefore, while the Court will generally not consider Emhart's arguments that were not presented to EPA during the notice and comment period, the Court will consider several obvious issues relating to key assumptions that formed the basis of EPA's selected remedy.

C. Standard of Review

With the bounds of admissible evidence and argument established in the preceding sections, the Court turns to the applicable standard of review. The Court will uphold EPA's decision "unless the objecting party can demonstrate, on the administrative record, that the decision was arbitrary and capricious or otherwise

[13] Other Circuit Courts of Appeals have recognized similar exceptions for cases in which the allegedly waived issue should have been obvious to the reviewing agency. See, e.g., Sierra Club, Inc. v. Bostick, 787 F.3d 1043, 1048 (10th Cir. 2015) (holding that an issue not presented during the notice and comment period is not waived where that issue was "obvious"); Portland Gen. Elec. Co. v. Bonneville Power Admin., 501 F.3d 1009, 1024 (9th Cir. 2007) ("In general, we will not invoke the waiver rule in our review of a notice-and-comment proceeding if an agency has had an opportunity to consider the issue.").

not in accordance with law." 42 U.S.C. § 9613(j)(2). The "law" with which EPA must comply in selecting a remedial action is primarily found in CERCLA and the NCP. EPA's decisions made within that legal framework will qualify as "arbitrary and capricious" if EPA fails to "examine the relevant data and articulate a satisfactory explanation for its action." FCC v. Fox Television Stations, Inc., 556 U.S. 502, 513–14 (2009) (quoting Motor Vehicle Mfrs. Ass'n of United States, Inc. v. State Farm Mut. Auto. Ins. Co., 463 U.S. 29, 43 (1983)).

This is a "narrow" standard of review. Id. EPA's explanation need only be "plausible in light of the record as a whole" and "supported by substantial evidence in the record." Leahy v. Raytheon Co., 315 F.3d 11, 17 (1st Cir. 2002) (citations omitted). Furthermore, in reviewing the evidence, the Court is not permitted "to substitute its judgment for that of the agency." Fox Television Stations, 556 U.S. at 513–14 (quoting Bowman Transp., Inc. v. Arkansas–Best Freight Sys., Inc., 419 U.S. 281, 286 (1974)). Particularly when the Court reviews "a purely factual question within the area of competence of an administrative agency . . . and when resolution of that question depends on 'engineering and scientific' considerations," the Court must "recognize the relevant agency's technical expertise and experience, and defer to its analysis unless it is without substantial basis in fact." Browning-Ferris Indus. of S. Jersey, Inc. v. Muszynski, 899 F.2d

151, 160 (2d Cir. 1990) (quoting Federal Power Commission v. Florida Power & Light Co., 404 U.S. 453, 463 (1972)).

While certainly deferential, the arbitrary and capricious standard is not a shibboleth by which EPA may completely avoid judicial scrutiny. As the Supreme Court has explained, an action may qualify as arbitrary and capricious where the administrative agency: (1) "relied on factors which Congress has not intended it to consider," (2) "entirely failed to consider an important aspect of the problem," (3) "offered an explanation for its decision that runs counter to the evidence before the agency, or is so implausible that it could not be ascribed to a difference in view or the product of agency expertise," or (4) seeks to have its action upheld based on "post hoc rationalizations." Motor Vehicle Mfrs. Ass'n of U.S., Inc., 463 U.S. at 43. Courts also review whether an administrative agency has treated similar cases with "apparent irrational discrimination." Puerto Rico Sun Oil Co. v. EPA, 8 F.3d 73, 78 (1st Cir. 1993) (citing Green Country Mobilephone, Inc. v. FCC, 765 F.2d 235 (D.C. Cir. 1985)). Put simply, the Court must review EPA's analysis to ensure that it is "rational" and "makes sense." Penobscot Air Servs., Ltd. v. FAA, 164 F.3d 713, 720 (1999) (quotations, citations, and brackets omitted).

Emhart's arguments as to why EPA's actions qualify as arbitrary and capricious or otherwise not in accordance with law

address several aspects of EPA's processes as well as the merits of the selected remedy itself. Each of Emhart's arguments are addressed below.

IV. Case Specific Findings of Fact and Conclusions of Law

A. Background

1. Findings of Fact

In 1996 dioxin was discovered in fish collected from the Woonasquatucket River. (See Phase I Findings 12.)[14] An EPA investigation of the surrounding area – later labeled as the Centredale Manor Restoration Project Superfund Site - ensued. The Site covers a three-mile stretch of the Woonasquatucket River, which includes a nine-acre peninsula that has been identified as the "Source Area" of the Site's hazardous substances. (Id. at 10-11.) The Source Area contains two elderly housing facilities (Brook Village and Centredale Manor) and is bounded to the north by Smith Street, to the south by Allendale Pond, to the west by the Woonasquatucket River, and to the east by the "tailrace," a remnant of a narrow body of water used for water power by the mills that once occupied the peninsula. (Id.)

After passing by the Source Area, the Woonasquatucket River leads to the remainder of the Site. The river first runs into Allendale Pond, a .65-mile-long dammed pond that spans fifteen

[14] This and various other findings of fact are taken directly from the Court's Phase I Findings.

acres and has depths ranging from .5 to ten feet.[15] (ROD, US1444-12, 30.) The river next runs into Lyman Mill Pond, a .85-mile-long dammed pond spanning twenty-four acres with depths similar to Allendale Pond. (Id.) In between Allendale and Lyman Mill Ponds is the Oxbow Area, a forty-acre forested wetland habitat adjacent to the river channel. (U.S. Army Corps of Eng'rs, Oxbow Area Report, US1227-0005.) There are also various abutting residential and commercial properties throughout the Site. (Phase I Findings 10-11.)[16]

Ultimately, EPA determined that the entire Site, not just the Source Area, was polluted by a variety of contaminants, including dioxins (2, 3, 7, 8–TCDD, in particular), volatile organic compounds, polychlorinated biphenyls, semi-volatile organic compounds, polycyclic aromatic hydrocarbons, and various metals. (Phase I Findings 11-12.) This determination led EPA to list the Site on the National Priorities List of Superfund sites in 2000. (Id.)

The Site, in short, is complicated. It contains several types of toxic hazardous waste, and the Site's size and diversity require EPA to consider various types of flora, fauna, physical features, and human uses. As part of the cleanup effort EPA has required

[15] Unless specified otherwise, the lengths, sizes, and depths discussed by the Court are approximated.

[16] The ROD contains a map of the Site. (ROD, US1444-0012.)

several removal and remedial actions. These involved the construction of three interim protective caps as well as one RCRA[17] cap over portions of the Source Area[18]; reconstruction of the Allendale Dam and restoration of Allendale Pond to prevent further downstream migration of contaminants; excavation and removal of one hundred cubic yards of soil from eleven areas along Allendale and Lyman Mill Ponds; and erection of fences along the residential properties adjacent to the Site in order to prevent access to the contamination. (ROD, US1444-15-16.) To varying degrees, Emhart has participated in each of these removal actions. (Phase I Findings n.110.)

Additionally, EPA has pursued a "comprehensive" remedial action at the Site that will address "all current and potential future risks caused by soil, sediment, groundwater and surface water contamination." (ROD, US1444-6.) The first step in this process (after listing the Site on the NPL) was the remedial

[17] RCRA stands for the "Resource Conservation & Recovery Act." See 42 U.S.C. §§ 6901 et seq. "Congress enacted RCRA, a comprehensive environmental statute that governs the treatment, storage, and disposal of solid and hazardous waste, based . . . on its finding that waste disposal had become a national problem requiring federal involvement." AES Puerto Rico, LP v. Trujillo-Panisse, 857 F.3d 101, 103 (1st Cir. 2017) (quotations and citations omitted). RCRA governs the disposal of "hazardous waste" under subtitle C. Id. (citing 42 U.S.C. §§ 6921-6939g).

[18] The ROD contains a map of the work done on the Source Area. (ROD, US1444-13.)

investigation ("RI"). EPA's RI[19] utilized Site-specific data and modeling to characterize the nature and extent of contamination at the Site. (ROD, US 1444-16-17.) The culmination of this process was the RI report released in 2005. (ROD, US 1444-16-17; see also RI, US1098.) The RI included an assessment of the risks to human health (the Baseline Human Health Risk Assessment, or "BHHRA")[20] and ecology (the Baseline Ecological Risk Assessment, or "BERA")[21] posed by the Site.

Using the information collected during the RI, EPA developed remediation goals that, if achieved, would likely mitigate the risks to human health and the environment identified in EPA's risk assessment. (Feasibility Study, US1254-73-84.) EPA conducted an extensive feasibility study ("FS") in order to determine which remedial alternative would best achieve those targets.[22] The FS

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[19] The RI actually included a series of individual investigations conducted between 1999 and 2004. (See ROD, US 1444-16-17.)

[20] The BHHRA is comprised of several individual assessments, including: (1) 2005 BHHRA (US1101-1103); (2) 2011 Supplemental BHHRA & BERA (US1287); and (3) May 2012 Technical Memorandum on Impact of Dioxin Reassessment ("2012 Technical Memorandum") (US1392).

[21] The BERA is comprised of the 2004 BERA (US1040-1044) and the 2011 Supplemental BHHRA & BERA (US1287).

[22] In total, the FS consisted of 329 pages of analysis exclusive of references and appendices. Additionally, EPA issued an FS Addendum in September 2011 in order to incorporate information brought to EPA's attention after publication of the FS. (See FS Addendum, US1311.)

divides the Site into five "action areas," and provides potential remedial actions for each. (FS, US1254-10-14.) As is required by the NCP, the FS includes both an initial screening as well as a detailed analysis of the remedial alternatives for each action area. (FS, US1254-147-321.)

Based on the analysis in the FS, EPA drafted a Proposed Remedial Action Plan ("PRAP") in the fall of 2011. (See PRAP, US 1328.) This version of the remedy did not last long though. Soon after its publication, EPA released a nationwide change to its non-cancer toxicity value for dioxin. Since dioxin is present at the Site, EPA was forced to issue a "Technical Memorandum" updating the BHHRA, cleanup levels, and FS for the Site. (See 2012 Technical Mem., US1392.) These findings required several changes to the PRAP in the form of a PRAP Amendment. (See PRAP Amendment, US1393.) While much of the PRAP went unchanged, the PRAP Amendment did require, among other things, an expanded cleanup area at the Site. These changes were published in July, 2012.

Both the PRAP and PRAP Amendment were subject to notice and comment after their publication. The notice and comment period on the PRAP and PRAP Amendment went from November 14, 2011 to March 2, 2012, and July 19, 2012 to September 17, 2012, respectively. (ROD, US1444-24-25.) During that time EPA participated in public hearings and also accepted comments from a variety of sources,

including Emhart. (See Emhart Comments on PRAP, US1383; Emhart Comments on PRAP Amendment, US1418.)

On September 28, 2012, with the public comment period complete, EPA issued its Record of Decision ("ROD") explaining the remedial action plan. (See ROD, US1444.) The ROD provides EPA's justification for the chosen remedial action as well as a "Responsiveness Summary" that addresses significant public comments submitted to EPA on the PRAP and PRAP Amendment. In the end, the plan outlined in the ROD was substantially similar to the plan provided for in the PRAP and PRAP Amendment.

The remedy, as described in the ROD, contains the following basic characteristics. In the Source Area the ROD requires removal and off-Site treatment or disposal of waste material, installation of a RCRA C cap[23] over existing surfaces, and relocation of underground utilities into clean corridors. (ROD, US1444-7.) Sediment and floodplain soil in Allendale and Lyman Mill ponds will also be excavated. However, unlike in the Source Area, the majority of the excavated material in and around the ponds will be placed in a confined disposal facility ("CDF") near the Site, leaving only a small portion of the excavated material (estimated at approximately ten percent of the total) to be shipped off-Site[24]

[23] See supra note 17.

[24] EPA requires off-Site disposal or treatment only for particularly toxic materials that exceed EPA's treatment

for disposal or treatment. (Id. at 7.) A thin-layer cover will be placed over the remaining contaminated areas in the Oxbow wetland area and, if necessary, over remaining contaminated sediment in the Woonasquatucket River. (Id.) Going forward, the ROD requires continuous institutional controls that limit certain activities at the Site, such as construction and use of groundwater. (Id.) Additionally, long-term maintenance and monitoring is required, including of the CDF, damns, sediment, water, and biota located at the Site. (Id.) In total, EPA estimates that the remedial action will cost approximately $104,600,000. (Id. at 213.)

Lastly, the ROD commits that EPA will collect additional information during the remedial design phase. For instance, EPA will have to determine the location of the CDF. (ROD, US1444-6.) EPA must also collect additional soil samples to determine the precise amount of excavation required. (ROD, US1444-304.) It is possible that the remedy will change based on this information.[25] However, EPA maintains that it has the capacity to adequately

standards. Materials that do not exceed EPA's treatment standards may be disposed in a CDF.

[25] One example of this has already occurred since the ROD's publication. Several third party defendants collected additional information on the Source Area that led EPA to conclude that it "no longer expects that the removal of waste material and off-site treatment or disposal will be necessary in the Source Area." (Gov't Post-Trial Brief n.137 (citing Revised Draft Pre-Design Investigation Final Report, US1459).)

address such changes through, for example, an amendment to the remedial action plan or an "explanation of significant differences."[26]

EPA has compiled an extensive administrative record to document its remedy-selection process. The administrative record includes essentially all documents related to the development, creation, and implementation of the remedial action. The next step in EPA's process is to create a more in-depth design of the remedial action plan and implement it.[27] However, before the final design and implementation of the remedy occurred, Emhart challenged EPA's proposed remedy on several grounds.

2. Conclusions of Law

As a general matter, the Court finds that EPA followed the basic steps mandated by CERCLA and the NCP in developing its remedial action for the Site. These legal requirements were previously outlined by the Court. See supra Section II ("Remedy Selection"). However, Emhart argues that several of EPA's individual actions and decisions along the way were either arbitrary, capricious, or not in accordance with CERCLA or the NCP such that the remedy cannot withstand judicial scrutiny. The Court addresses each of Emhart's arguments below.

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[26] See supra note 9.

[27] The NCP labels this as the "remedial design/remedial action (RD/RA) stage." 40 C.F.R § 300.435(a).

B. Excavation and Treatment of Soil and Sediment

1. Findings of Fact

a. Excavation of Allendale and Lyman Mill Ponds

EPA's remedy calls for significant excavation of the sediment in Allendale and Lyman Mill Ponds. The goal of excavation is to achieve dioxin levels of approximately fifteen parts per trillion. (FS, US1254-75.) In order to determine how much excavation will be required to meet this target, EPA took sediment samples from both Allendale and Lyman Mill Ponds. Based on these samples, EPA estimates the average excavation depth in Allendale Pond required to achieve the target dioxin level is 2.2 feet. (ROD, US 1444-170.) For Lyman Mill Pond, the average excavation depth required to achieve EPA's target is 2.7 feet. (Id. at 170.) Both of these estimates assume .25 feet of over-excavation will occur. (Id.)

The data set used by EPA to come up with these estimates included 250 data records from Allendale Pond (ranging from 0.5 to twelve feet in depth) and 160 data records from Lyman Mill Pond (ranging from 0.5 feet to four feet in depth). (ROD, US1444-303; see also RI, US1098-29; FS, Tables G-3 and G-4, US1254-1458-1477.) The data most heavily relied upon by EPA were core samples taken in 2003 and 2005, which included ten sediment cores taken from Allendale Pond and sixteen sediment cores taken from Lyman Mill Pond. (FS, US1254-363-64.) Each core includes multiple soil samples all of which were collected with the specific objective of

detecting the vertical extent of contamination in the ponds. (Id. at 42, 679.) To that end, EPA conducted laboratory analysis using high resolution mass spectroscopy, a highly accurate method that can detect dioxin in parts per trillion. (Dr. Medine Test., Trial Tr. vol. 12, 13:16-14:18, ECF No. 495.)

Emhart's expert, Mr. Loureiro, testified that these samples were inadequate because only a small portion was taken at depths greater than one foot.[28] Furthermore, Mr. Loureiro pointed out that, in certain instances, dioxin levels were detected at levels above fifteen parts per trillion at depths greater than EPA's anticipated excavation depths.[29] As such, Mr. Loureiro opined that the available data was insufficient to accurately estimate the vertical extent of the contamination and, in turn, the amount of excavation that will be necessary to achieve EPA targets.

EPA agrees that additional sampling is needed. As EPA explained in the Feasibility Study, "[t]he proposed cleanup areas or remedial footprints are conceptual and more precise cleanup

[28] Mr. Loureiro testified that he evaluated the data and found only forty samples from Allendale Pond and eighteen samples from Lyman Mill Pond at depths below one foot. (Mr. Loureiro Test., Trial Tr. vol. 6, 105:7-9, 113:23-117:1, ECF No. 453.)

[29] Because EPA's anticipated excavation depth is an average, Emhart is able to point to samples where dioxin is still above fifteen parts per trillion past the average excavation depth, and EPA is able to point to samples where dioxin is less than fifteen parts per trillion even before reaching the average excavation depth.

footprints will be developed during the remedial design. For example, additional coring will need to be performed at Allendale and Lyman Mill Ponds to confirm the vertical extent of the contamination." (FS, US1254-327-28.) For this reason, EPA committed itself in the ROD to "perform[ing] additional sampling and analysis closer to the time of remediation to confirm the sediment cleanup depth and volume." (ROD, US1444-304.)

Given the uncertainty as to the vertical extent of the contamination, the exact amount of excavation required will likely differ from the amount estimated in the ROD. Precision in this area is likely impossible, however. As Mr. Loureiro pointed out, "certainly in my experience with excavation of all types, even a robust data set aren't adequate to actually describe the conditions you run into in the field." (Mr. Loureiro Test., Trial Tr. vol. 6, 19:5-8.) This means that this component of the cost of the remedy is to some extent uncertain and could potentially be more expensive.

Emhart did raise this general issue during the notice and comment period on the PRAP. (Emhart PRAP Comments US1383-8 ("EPA fails to adequately define the volume of soil and sediment requiring excavation."); see also id. at 51.) EPA responded in the ROD's "Responsiveness Summary" by explaining that, in its opinion, sufficient data had been collected to provide excavation estimates, particularly in light of the 0.25-foot over-excavation

allowance built into the estimate. (ROD, US1444-303-04.) EPA also noted that additional sampling will be done during remedial design in order to refine those estimates. (Id.) Lastly, to the extent that the proposed level of excavation does not achieve target dioxin levels, EPA suggests that "a 6-inch soil cover on the sediment bottom" could be used where "additional excavation is not feasible." (Id.)

b. Excavation of the Oxbow Area and the Floodplain Soil of Allendale and Lyman Mill Ponds

In February 2012, after publication of the PRAP, EPA established a nation-wide non-cancer toxicity value for dioxin. This new information forced EPA to reevaluate its remedial design for the Site. EPA did so by issuing a Technical Memorandum on the Impact of Dioxin Reassessment that updated EPA's human health risk assessment and feasibility study. (2012 Technical Memorandum, US1392.) The analysis of each remedial action alternative did not change significantly. (See ROD, US1444-347 ("Impacts resulting from these changed conditions are presented in EPA's May 2012 Technical Memorandum and are generally consistent with evaluations presented in . . . the FS.").)

However, EPA did determine that certain areas, not previously identified in the PRAP, would require excavation. These areas were primarily located in the Oxbow Area and floodplain soil around Allendale and Lyman Mill Ponds. (See PRAP Amendment, US1393-002.)

EPA's expanded excavation plan was documented in the PRAP Amendment and later adopted in the ROD. (PRAP Amendment, US1393-7-9; ROD, US1444-176-192.) Emhart submitted comments on the PRAP Amendment in which it argued that EPA had not collected sufficient Site-specific data in order to adequately characterize contamination at the Site. (See Emhart Comments on PRAP Amendment, US1418-7-9.)[30]

With regards to the floodplain soils, EPA determined which areas would require excavation using two types of Site-specific data: soil samples and FEMA floodplain maps. The soil samples were collected during the remedial investigation on the eastern shore floodplains[31] of the Allendale and Lyman Mill Pond reaches. EPA collected 226 samples in total, 212 of which detected some level of dioxin. (ROD, US1444-345.) Of those 212 samples detecting dioxin, "there are approximately 100 sampling locations where floodplain residential-use soil samples have [dioxin] concentrations greater than cleanup levels." (Id.; see also 2012 Technical Mem., US1392-24.) Based on this data EPA expanded the

[30] A review of those comments reveals that Emhart provided no specifics for what level of sampling it believed was necessary going forward or where that sampling needed to occur. Emhart simply asserted that additional sampling is required.

[31] EPA defined "floodplain areas" as "the area of water and land inundated during the highest point of the base, or 100-year, flood using maps prepared by the Federal Insurance Administration of the Federal Emergency Management Agency . . . ." (ROD, US1444-306.)

area requiring excavation and estimated an average excavation depth of one foot. (See 2012 Technical Mem., US1392-62.)[32]

Having established that unsafe levels of dioxin had migrated into floodplain soils, EPA then used Federal Emergency Management Agency ("FEMA") floodplain maps to determine other areas that likely contain similar dioxin levels. FEMA floodplain maps cannot substitute for field samples in determining the precise nature or extent of dioxin contamination in a given area. (Mr. Loureiro Test., Trial Tr. vol. 5, 183:23-184:11, ECF No. 452.) However, as Dr. Medine explained, such maps are commonly used "to aid in designing sampling programs to characterize the nature and extent of floodplain contamination" because they can act as "a guide to where to look for contamination and serve as indicator of where contamination may have come to rest." (Dr. Medine Test., Trial Tr. vol. 12, 81:13-15, 21-22, ECF No. 495.)

As for the Oxbow Area, EPA relied primarily on two Site-specific data sets in order to estimate the amount of required excavation. The first was a data set collected by EPA during the remedial investigation. (FS, US1254-188.) The second was a data set collected by Emhart as part of its 2010 Oxbow Area

[32] EPA's limited subsurface data suggests that excavation will be limited to one foot in most areas, though some areas will also likely require deeper excavation. (2012 Technical Mem., US1392-24.) The ROD explains that, generally speaking, excavation below surface soils is unlikely because "dioxins do not migrate easily through the soil column." (ROD, US1444-346.)

Investigation. (ROD, US1444-318.) That investigation collected forty-four floodplain soil samples and twenty-eight sediment samples at depths ranging from zero to thirty-six inches. (ROD, US1444-36.) After EPA came out with its toxicity value for dioxin, EPA utilized both data sets in the FS Addendum. The FS Addendum determined that 5,600 cubic yards of material needs to be excavated in addition to the areas identified in the PRAP. (See PRAP Amendment, US 1393-7, 10.)

For both the Oxbow Area and the floodplain soils the ROD requires that EPA collect additional information during the remedial design phase to delineate the exact counters and depths of excavation. (See, e.g., ROD, US1444-176, 346.) This information will consist primarily of additional soil samples. (Id. at 176, 181-83.) Once excavation is complete, "confirmation sampling will be conducted to verify that the cleanup levels are achieved . . . ." (Id. at 177; see also id. at 183.)

c. Amount of Soil Requiring Incineration

Once contaminated soil and sediment are excavated, the ROD calls for those materials to be either stored in a CDF or shipped off-Site for treatment (i.e., incineration). (ROD, US1444-172-73.) Whether treatment is required depends on the toxicity of the material. Material that contains dioxin at or above ten parts per billion must be treated; material that contains dioxin below ten parts per billion can be stored in a CDF. (Id. at 172.)

At the Site, EPA estimates that ninety percent of the excavated soils can be disposed of in a CDF while ten percent will need to be shipped off-Site for treatment. (ROD, US1444-172.) As with EPA's excavation estimates, certainty in this area is likely impossible. (See, e.g., Mr. Loureiro Test., Trial Tr. vol. 6, 19:5-8.) Emhart's 2010 Oxbow Area Investigation exemplifies this uncertainty. EPA initially estimated that no Oxbow Area floodplain soil would require incineration. (ROD, US1444-318; FS Addendum, US1311-27.) However, after more extensive sampling was conducted in the 2010 Oxbow Area Investigation, EPA changed its opinion and now estimates that up to ten percent of the Oxbow Area floodplain soil may require treatment. (ROD, US1444-318; FS Addendum, US1311-27.) As this example demonstrates, additional sampling can reveal that more material requires treatment than initially estimated thereby increasing the cost of the overall remedy.

However, uncertainty does not necessarily mean that the ultimate remedy will involve additional treatment or increased cost compared to the estimates in the ROD. The Source Area provides an example where the amount of material requiring treatment decreased as a result of additional sampling. At the time the ROD was published, EPA "assumed that all of the excavated potential buried waste material [in the Source Area] would be taken to an off-site incinerator for treatment." (ROD, US1444-164; see also id. at 214.) However, the ROD also called for additional sampling

"to determine off-site treatment requirements." (Id. at 164.) After publication of the ROD, several third-party defendants collected additional information on the Source Area that led EPA to conclude that it no longer anticipates that the Source Area material will require off-Site treatment. (See Revised Draft Pre-Design Investigation Final Report, US1459.)

The lack of certainty in the ROD as to the amount of material requiring treatment was addressed by Emhart during the notice and comment period on the PRAP. As Emhart explained, "EPA's estimate that only 10% of the soil and sediment will exceed the alternative treatment standards for soil is based on limited data. . . . [I]t appears possible that a much higher percentage of soil and sediment will contain dioxin at concentrations above the standard, therefore requiring off-Site disposal." (Emhart PRAP Comments, US1383-71.)

EPA responded to Emhart's comment in the ROD's Responsiveness Summary. EPA explained that its estimates were based on approximately 400 sediment samples from Allendale and Lyman Mill Ponds and 250 floodplain soil samples (not including Source Area soil). (ROD, US1444-318.) Dr. Medine also described how those samples were used in combination with a contouring analysis in order to estimate the volume of material requiring treatment. (See Dr. Medine Test., Trial Tr. vol. 12, 28:23-29:13; FS, US1254-1478-79.) As discussed above, EPA has committed to refining these

estimates through further sampling and analysis during remedial design.

2. Conclusions of Law

Emhart argues that EPA failed to collect sufficient Site-specific data to conduct a feasibility study in accordance with the NCP. Specifically, Emhart argues that EPA did not collect enough Site-specific data to accurately estimate the amount of material that will have to be excavated or shipped off-Site for treatment. Emhart's comments on the PRAP and PRAP Amendment did not provide any specifics as to the number of samples it believes need to be collected from the Site in order to conduct a feasibility study under the NCP. However, Emhart did raise this issue as a general matter by discussing the need "to adequately define the volume of soil and sediment requiring excavation" or "off-Site disposal" (Emhart PRAP Comments, US1383-8, 71), and EPA had the opportunity to respond. (See, e.g. ROD, US1444-303-04, 318.) Under these circumstances the Court finds that Emhart adequately preserved this issue.

As to the merits of Emhart's arguments, both Emhart and EPA agree that additional sampling is needed in order to characterize the lateral and vertical extent of contamination at the Site and obtain a more accurate excavation and incineration volume estimate. The disagreement is about the timing of that additional data collection. Emhart argues that such data should have been

collected for use in the feasibility study. EPA contends that it collected sufficient data to conduct a feasibility study and that the necessary additional sampling can be done during remedial design.

While the NCP requires that EPA conduct a remedial investigation and feasibility study that includes the collection of site-specific data, it does not require a specific number of samples or data points. Instead, EPA must collect sufficient data "to adequately characterize the site for the purpose of developing and evaluating effective remedial alternatives." 40 C.F.R. § 300.430(d)(1); see also id. § 300.430(a)(2) (requiring EPA to "assess site conditions . . . to the extent necessary to select a remedy"). One of the factors that EPA must be able to "adequately characterize" is the cost of the remedy. Id. § 300.430(e)(7)(ii) (cost is an initial screening factor); see also id. § 300.430(e)(9)(iii)(G) (cost as one of nine factors to be balanced during remedy selection).

Beyond these general guidelines, EPA is given significant leeway to develop a remedial investigation and feasibility study process specific to a site. This leeway includes the option of reserving a certain amount of data collection for remedial design. The NCP specifically allows the ROD to reserve certain decisions for a later date and, "[w]hen appropriate, provide a commitment for further analysis . . . ." Id. § 300.430(f)(5)(iii)(D).

Therefore, while the information contained in the feasibility study provides the "initial building block in developing" the final design, EPA guidance also envisions that additional "data acquisition" and "sample analysis" may be necessary during the remedial design phase. EPA, Scoping the Remedial Design, Emhart516-1-2.

There is no doubt that the amount of soil that must be excavated or shipped off-Site for incineration will affect the cost of the remedy. The question before the Court is whether EPA collected sufficient data to "to adequately characterize" the remedial alternatives, including their estimated costs, such that those alternatives could be effectively compared during the feasibility study. The Court finds that EPA has met that standard.

As described in the findings of fact, EPA analyzed multiple data sets that include hundreds of soil and sediment samples from across the Site. In examining these samples EPA used high resolution mass spectroscopy to detect dioxin levels down to the parts per trillion. The results of this sample analysis were reviewed in conjunction with other types of information, such as FEMA floodplain maps and contouring analysis, to further refine EPA's estimates. It is true that in none of the Site areas discussed in this section – Allendale and Lyman Mill Ponds, the floodplain soils, or the Oxbow Area – has EPA collected sufficient data to fully implement the remedy. As EPA recognizes, additional

sampling and analysis will be required during remedial design. But this sort of commitment to further analysis is permitted by the NCP and EPA guidance. At this point in the remediation process EPA is only required to have collected sufficient data to "adequately characterize" the estimated excavation and treatment volumes such that remedial alternatives can be compared in a feasibility study, which EPA has done.

While the Court finds that the current state of EPA's excavation and treatment estimates does not violate the NCP, this finding is based, in part, on EPA's commitment to conduct additional sampling and analysis during remedial design. If information uncovered during remedial design reveals that the cost will differ significantly from the cost outlined in the ROD, EPA has the responsibility to update the administrative record as necessary. This could potentially require an "explanation of significant differences," a ROD amendment, or even an updated feasibility study. EPA has shown a willingness to take these sorts of actions in the past. (See, e.g., FS Addendum, US1311; PRAP Amendment, US1328.) And while CERCLA and the NCP leave it up to EPA to determine whether such actions are necessary in the first instance, the Court retains jurisdiction over this matter in the event that Emhart, in light of new evidence, seeks to challenge EPA's decision.

C. Location of the Confined Disposal Facility

1. Findings of Fact

The ROD calls for the majority of excavated soil to be placed in a CDF. (ROD, US1444-167.) EPA initially identified three locations at the Site that could potentially accommodate a CDF. (PRAP Amendment, US1328-21; see also FS, US1254-389.) However, as Emhart noted in its comments on the PRAP, EPA did not establish the final location of the CDF. (Emhart Comments on PRAP, US1383-65.) In addition, the Town of Johnston has made it clear that it does not want a CDF placed at or near the Site.[33]

Despite these concerns, the ROD states that a CDF will be part of the final remedy. The ROD explains that EPA "continues to believe the upland CDF disposal option is the best approach to address contaminated sediment/soil." (ROD, US144-172.) As for the exact location, the CDF could still be located on-Site. However, given the lack of community acceptance for this option, EPA has also "expanded the area where an upland CDF could be located to locations outside the Town of Johnston and beyond what is in very close proximity to the Site." (Id. at 172.) The ROD further commits

[33] The Town was initially supportive of the CDF being located in Johnston. (See, e.g., PRAP Hearing at Centredale Manor, US1333-30.) The Town has since sent a letter to EPA explaining that it "is no longer supportive of consideration of any upland disposal of contaminated material associated with the Centredale Manor Superfund Site." (Letter from Town of Johnston to EPA dated 12/29/2011, US1344-1.)

EPA "to identify additional locations where an upland CDF could be located" as part of remedial design. (Id. at 172.)

EPA has already begun this process. (See Technical Mem. for Assessment of CDF, US1475.) However, to date, EPA has not identified a location for the CDF. Whether EPA will be able to identify a location in close proximity to the Site that is acceptable to the local community is unclear. If a CDF is not utilized as part of the remedy the cost of the remedy will likely rise significantly. Given the local community's resistance to a CDF and the likely cost increase that would result if a CDF is not built, Emhart's expert, Mr. Loureiro, provided his opinion that "there should be a defined location for the CDF, whether it's purchased or under contract or part of the site itself" before the remedy is selected. (Mr. Loureiro Test., Trial Tr. vol. 10, 10:8-10.) Having a "defined location," according to Mr. Loureiro, is the only way to ensure that the proposed remedy is "feasible" and therefore a "viable alternative." (Id. at 10:11-12.) EPA disagrees and "believes a location can be identified [during remedial design] that addresses most or all of the concerns raised by the public." (ROD, US1444-172.)

2. Conclusions of Law

Emhart contends that the CDF discussed in the ROD "does not, and will never, exist." (Emhart Post-Trial Brief 175.) It argues that EPA's failure to identify a "defined location" for the CDF in

the ROD violates the NCP. (Id. at 175; see also Mr. Loureiro Test., Trial Tr. vol. 10, 10:8-13.) EPA disagrees and argues that the location of a CDF can be determined during remedial design. Emhart preserved this issue in its comments on the PRAP. (Emhart Comments on PRAP, US1383-65.)

The Court finds that EPA's decision to determine the location of the CDF during remedial design does not constitute a violation of the NCP. There are two problems with Emhart's argument. First, Emhart's claim that the CDF can "never" exist is premised on the idea that the Town of Johnston has the authority to prohibit EPA from constructing a CDF at the Site. But this is not the case. See, e.g., 42 U.S.C. § 9604(j); id. § 9621(e)(1); 40 C.F.R. § 300.400(d). And while the Town of Johnston has made clear that it does not wish to provide a space for a CDF, community acceptance is only one of nine factors that EPA must consider. See 40 C.F.R. § 300.430(e)(9)(iii)(A)-(I). Therefore, it is possible that EPA could determine, in its final analysis, that other factors outweigh a lack of community acceptance and override the Town of Johnston.

Second, there is no provision of the NCP requiring the ROD to provide a "defined location" for a CDF. Nor is there any requirement that the land on which a CDF will be located must be either purchased or under contract before publication of the ROD. Instead, EPA need only collect sufficient information to effectively compare remedial alternatives. EPA has expressed its

judgment that it will be able to find a suitable location for a CDF during remedial design and compared remedial alternatives accordingly. (ROD, US1444-172.) This does not violate the NCP.

Of course, as discussed in the preceding section, EPA is required to document all significant changes made during remedial design. Therefore, if EPA ultimately does not select a location for the CDF in accordance with the cost estimate and description in the ROD, EPA must document that fact in accordance with the NCP. This could potentially require additional analysis by EPA of remedial alternatives and possible challenges. At this point though, before EPA has completed its remedial design, the lack of a defined location for the CDF does not constitute a violation of the NCP.

D. Dewatering Sediment, Controlling Ground and Surface Water, and Constructing Haul Roads

1. Findings of Fact

The ROD calls for significant excavation of contaminated sediment at the Site. This will require some level of ground and surface water controls in order to access the contaminated sediment, the construction of haul roads to move the sediment after excavation, and the creation of a dewatering facility to remove the water from the sediment. At trial Emhart’s expert, Mr. Loureiro, opined that these activities will require funding that is not provided for in EPA’s cost estimate.

For instance, Mr. Loureiro testified that, while the remedy will require a dewatering facility, the ROD does not account for the cost of creating and removing that facility. (Id. at 147:4-12.) Mr. Loureiro also testified that controlling ground and surface water will require a complex system of bypass pumping, and sheet piling will be necessary to separate excavation areas from river flow. (See, e.g., Mr. Loureiro Test., Trial Tr. vol. 6, 7:11-8:8; Mr. Loureiro Test., Trial Tr. vol. 10, 23:2-19.) Lastly, Mr. Loureiro described how that the ROD does not allocate sufficient funds for the construction of haul roads that will be necessary to transport contaminated sediment and soil. (Id. at 145:9-147:4.)

Emhart never mentioned any of these costs in its extensive comments on the PRAP or PRAP Amendment. Additionally, while the Court found Mr. Loureiro's overall presentation persuasive, there is reason to believe that his cost estimates are somewhat exaggerated. EPA's expert, Dr. Medine, noted several instances where Mr. Loureiro may have overlooked less expensive alternatives.[34] Mr. Loureiro also did not address all of the cost allocations already provided for by EPA's estimate, including

[34] For example, Dr. Medine called into question whether Mr. Loureiro's proposed bypass pumping system was necessary in light of cheaper alternatives such as installing culverts. (See, e.g., Dr. Medine Test., Trial Tr. vol. 12, 71:24-72:10.) Dr. Medine also called into question whether the cost of Mr. Loureiro's proposed dewatering facility was necessary in light of a smaller (i.e., cheaper) alternative. (Id. at 51:24-52:2.)

approximately $10,800,000 for dewatering contaminated sediment[35], $3,400,000 for acquisition, installation and removal of sheet piling[36], and $1,800,000 for construction of haul roads.[37] Lastly, Mr. Loureiro's cost estimate for water management assumes that the river channel adjacent to the Source Area must be excavated despite the fact that the ROD calls for dredging, not excavation, of that area. (ROD, US1444-170; see also FS, US1254-228.)

2. Conclusions of Law

Emhart argues that EPA failed to take into account several costs associated with the remedy, including costs of dewatering sediment, controlling surface and ground water, and construction of haul roads. None of these arguments were provided to EPA during the notice and comment period on the PRAP or PRAP Amendment. (See Emhart Comments on PRAP, US1383; Emhart Comments on PRAP Amendment, US1418.) As such, Emhart's arguments related to these topics are waived. See Upper Blackstone, 690 F.3d at 30. In addition, Emhart

[35] (See FS, US1254-1647:48-51 (describing approximately $8,613,000 in costs); see also id. at 1635 (providing for a 25% contingency).)

[36] (See FS Addendum, US1311-868:20-21 (estimating $804,600 to purchase the sheet piling and $1,933,742 to install and remove it); see also FS, US1254-1635 (providing for a 25% contingency).) Of note, EPA also allocated a "unit cost" for excavation, which could potentially provide funding for other water management requirements. (See FS Addendum, US1311-889.)

[37] (See ROD, US1444-198 (estimating cost for "mobilization and temporary roads"); see also FS Addendum, US1311-868 (explaining costs associated with haul roads).)

has failed to demonstrate that EPA miscalculated costs for the above-mentioned activities and that those miscalculations were "key assumptions" on which EPA based its selected remedy. See Oklahoma Dep't of Envtl. Quality, 740 F.3d at 192 (quoting Appalachian Power Co., 135 F.3d at 818).

EPA estimates that the remedy will cost approximately $104,600,000. (ROD, US1444-213.) This estimate includes funds for dewatering contaminated sediment, controlling ground and surface water, and constructing haul roads. While Mr. Loureiro believes EPA's estimates in these areas are low, it is unclear to what extent. But regardless of the exact number, any miscalculation by EPA in these areas likely constitutes a relatively small percentage of the total cost of the remedy, and any necessary recalculation is unlikely to fundamentally alter EPA's remedy selection. Under these circumstances, the Court finds that EPA did not fail to justify "key assumptions" such that an exception to issue exhaustion is warranted.

E. Baseline Ecological Risk Assessment

1. Findings of Fact

EPA conducted a remedial investigation of the Site that included an assessment of ecological risks. The results of that investigation can be found in EPA's Baseline Ecological Risk

Assessment, or "BERA."[38] The BERA characterized the risks to demersal fish, pelagic fish, piscivorous wildlife, and insectivorous wildlife, and the FS provided proposed cleanup goals based on those risks. (See FS, US1254-930-33.) However, EPA's remedial goals at the Site were primarily based on risks to human health, not risks to ecological receptors. (See, e.g., id. at 73 ("Biota PRGs are not presented in this FS because the sediment PRGs (based on fish consumption and direct contact/incidental ingestion) were used to determine proposed cleanup areas . . . ."); see also id. at 930-33; ROD, US144-120-22.) Furthermore, Emhart's objections to EPA's ecological risk calculations were not raised in its comments on the PRAP or PRAP Amendment. (See Emhart Comments on PRAP, US1383; Emhart Comments on PRAP Amendment, US1418.)

2. Conclusions of Law

At no point in Emhart's comments on the PRAP and PRAP Amendment did Emhart address potential flaws in EPA's ecological risk assessment, including EPA's findings on risks to demersal fish, pelagic fish, piscivorous wildlife, and insectivorous

[38] See supra note 21. The focus of the BERA is the "actual or potential impacts of site contaminants on plants and animals. . . . And the objectives of an ecological risk assessment . . . is to identify and characterize the current and potential threats to the environment" and "to identify cleanup levels that would protect those natural resources from risk." (Dr. Keenan, 138:24-139:8, ECF No. 451.)

wildlife. (See Emhart Comments on PRAP, US1383; Emhart Comments on PRAP Amendment, US1418.) Emhart's arguments related to these topics are therefore waived. Upper Blackstone, 690 F.3d at 30. In addition, Emhart has failed to demonstrate that EPA's determinations related to ecological risks constitute "key assumptions" on which EPA's selected remedy is based such that an exception to the doctrine of issue exhaustion is appropriate. See Oklahoma Dep't of Envtl. Quality, 740 F.3d at 192 (quoting Appalachian Power Co., 135 F.3d at 818).

A review of both the FS and the ROD reveals that EPA's remedial goals at the Site were primarily based on risks to human health, not risks to ecological receptors. (See, e.g., FS, US1254-73, 930-33; ROD, US144-120-22.) Even if the ecological risks were somehow mitigated, EPA has made clear that it would pursue essentially the same remedial design based on the risks to human health posed by the Site. (See, e.g., Gov't Post-Trial Brief 87 (explaining that "the results of the ecological risk assessment had little impact on the selection of the cleanup remedy" because "site cleanup was not driven by unacceptable ecological risk.").) As such, Emhart has failed to show how a change to EPA's ecological risk determinations would fundamentally change EPA's selected

remedy such that it constitutes a "key assumption" on which that remedy is based.[39]

F. Vernal Pool Habitats Located in the Oxbow Area

1. Findings of Fact

A vernal pool is a "seasonal pool of water that can provide [a] habitat for some plants and animals." (Dr. Keenan Test., Trial Tr. vol. 5, 92:9-10, ECF No. 452.) The 2004 BERA noted that "[s]everal likely vernal pools were observed in the forested floodplain area downstream from the Allendale damn." (2004 BERA, US1040-49.) The ROD also noted the potential presence of vernal pools in the Oxbow Area. (See ROD, US1444-181-82; 2011 Supplemental BHHRA & BERA, US1287-218.)

EPA's proposed remedy for the Oxbow Area includes excavation and the installation of a thin-layer cover. (ROD, US1444-7.) If vernal pools are found in the Oxbow Area, EPA recognizes that the current remedy "will face additional implementation issues." (FS, US1254-282.) The "implementation issues" consist primarily of taking "special care" not to disturb the vernal pool habitats during design and construction of the thin-layer cover. (ROD,

[39] The Court notes that, just as Emhart cannot establish that the remedy is invalid based on EPA's ecological risk calculations, EPA also cannot justify the proposed remedy based on those same ecological risk calculations. As EPA has argued, and the Court has agreed, EPA's selected remedy was the result of a process that focused on the risks to human health at the Site. EPA's selected remedy must therefore stand or fall based on those human health risk determinations.

US1444-156.) In light of these findings, EPA has committed to conducting "pre-design and design investigations [that] will include physical and ecological surveys to further . . . identify any potential vernal pools." (Id. at 181-82.)

Emhart did not raise any issues related to vernal pools in either its comments on the PRAP or the PRAP Amendment. Furthermore, at trial, Emhart's expert (Dr. Keenan) could not testify that EPA's remedy would cause damage to any potential vernal pools. (Dr. Keenan Test., Trial Tr. vol. 5, 92:12-16.) Instead, Dr. Keenan merely suggested that "it's something that needs to be investigated before it's implemented." (Id.)

2. Conclusions of Law

Emhart failed to address the potential presence of vernal pool habitats in the Oxbow Area in its comments on the PRAP and PRAP Amendment. (See Emhart Comments on PRAP, US1383; Emhart Comments on PRAP Amendment, US1418.) As such, Emhart's arguments on this topic are waived. See Upper Blackstone, 690 F.3d at 30. Moreover, Emhart has failed to demonstrate that EPA, by not confirming the presence of vernal pools, disregarded a "key assumption" on which the remedy is based. See Oklahoma Dep't of Envtl. Quality, 740 F.3d at 192 (quoting Appalachian Power Co., 135 F.3d at 818). The presence of vernal pools will not fundamentally change the remedy as a whole, but instead simply require that "special care" be taken not to disturb the vernal

pools in one of the five action areas at the Site. (ROD, US1444-156.) EPA has committed to further investigation of this issue during remedial design and can adjust the remedy as needed.

G. Classifying Site Soils and Sediments as Principal Threat Waste and F020 Listed Waste

1. Findings of Fact

EPA classified certain Site soils and sediments as Principal Threat Waste ("PTW")[40] and F020 listed waste.[41] Emhart challenged these classifications in their comments on the proposed remedy. (See Emhart Comments on Proposed Plan, US1383-83-90.) However, the ROD makes clear that the PTW and F020 classifications had no practical impact on remedy selection. (See, e.g., ROD, US1444-332 (explaining the PTW classification "had no practical effect on the selected remedy"); id. at 288 (explaining that the F020 classification "is not important for the purposes of the [conceptual site model]").) At trial Emhart's expert, Mr. Loureiro, essentially conceded this point. (See, e.g., Mr. Loureiro Test., Trial Tr. vol. 6, 161:12-15 ("And ultimately, at the end of the day it doesn't appear that [the PTW classification

[40] PTW is defined as material that is highly mobile and contains high concentrations of toxic compounds. 40 C.F.R. § 300.430(a)(1)(iii)(A).

[41] F020 listed waste is defined as "[w]astes . . . from the production or manufacturing use . . . of tri- or tetrachlorophenol, or of intermediates used to produce their pesticide derivatives." Id. § 261.31.

is] being used for any purpose in defining the scope of the work that needs to be done."); id. at 170:11-12 ("I don't think [the F020 classification has] any practical implication with regard to the costs of the remedy.").)

2. Conclusions of Law

Emhart argues that EPA's classification of certain soils and sediments as PTW and F020 listed waste was arbitrary and capricious. The Court finds that this question is moot. The ROD makes clear that these classifications had no practical impact on remedy selection. (See, e.g., ROD, US1444-288, 332.) Emhart agrees that the PTW classification "was not used for any purpose in defining the scope of work to be done." (Emhart Post-Trial Brief 228; see also Mr. Loureiro Test., Trial Tr. vol. 6, 161:12-15.) And Emhart's expert essentially conceded this same point with respect to the F020 classification. (See Mr. Loureiro Test., Trial Tr. vol. 6, 170:11-12.) The Court need not address the appropriateness of classifications that, if changed, would have no practical impact on the remedial action itself.

H. Classifying Source Area Ground Water as Drinking Water

1. Findings of Fact

For years the Rhode Island Department of Environmental Management ("RIDEM") has considered the Source Area groundwater to be so contaminated that it is unsuitable for potential use as drinking water. (FS, US1254-43.) The contamination is caused by

the Source Area, but also possibly by waste sites located close to the Woonasquatucket River upgradient from the Source Area. (ROD, US1444-58.) EPA's remedial investigation emphasized RIDEM's classification of the Source Area groundwater as non-potable and discussed several important uncertainties in its groundwater data, including the "vertical extent" of the contamination. (RI, US1098-88.) Based on this information, the FS determined that the groundwater was not a potential source of drinking water, which EPA labels as "Class III" groundwater. (FS, US1254-43.)

EPA later determined that its classification of the groundwater as Class III was not appropriate. As explained in the ROD, RIDEM's groundwater classification system had not "obtained EPA approval of a Comprehensive State Ground Water Protection Program." (ROD, US1444-57.)[42] EPA therefore could not base its classification decision on RIDEM's findings, and had to instead focus on the standards set by EPA guidance. (Id. at 343.) Citing these standards, the ROD explains that the Class III designation does not apply because the groundwater was not "so contaminated by naturally occurring conditions or the effects of broad-scale human activity (unrelated to a specific activity) that [it] cannot be

[42] This fact was brought to EPA's attention by the National Remedy Review Board, which "is a committee of EPA regional personnel that provide technical assistance and review large, complex, and costly Superfund sites." (Mr. Maccarone Test., Trial Tr. vol. 2, 169:25–170:9.)

cleaned up using treatment methods reasonably employed in public water supply systems." (Id. at 344.) This led EPA to label the Source Area groundwater as "Class II," which applies to "current and potential sources of drinking water." (Id.)

EPA made this determination despite the fact that EPA has recognized data gaps for Source Area groundwater. (See, e.g., RI, US1098-88.) For example, it is uncertain to what extent dense non-aqueous phase liquid ("DNAPL") is present in the Source Area and at what depths. (Compare Mr. Loureiro Test., Trial Tr. vol. 6, 172:9-173:6 with Dr. Medine Test., Trial Tr. vol. 12, 88:1-89:4.)[43] The vertical extent of that (and other) contamination is particularly important because the remedy – which partially relies on a RCRA C cap to prevent further contamination – will not be effective in stopping contamination sources located below the cap. (Mr. Loureiro Test., Trial Tr. vol. 6, 177:24-178:12; id. at 171:17-25; see also Mr. Loureiro Test., Trial Tr. vol. 5, 143:24-144:17.)

[43] EPA has collected some data that suggests DNAPL is not present in the Source Area groundwater. (See, e.g., RI, US1098-205-06; ROD, US1444-197.) However, EPA has also found some groundwater contamination in intermediate and deep samples in the southern end of the Source Area, the origin of which is not clear. (RI, US1098-54.) This issue was likely not more thoroughly investigated during the remedial investigation because, at that time, EPA did not consider the groundwater to be a potential source of drinking water.

In addition to possible DNAPL contamination, EPA recognizes that "there are numerous non-Superfund sources . . . that contribute or have the potential in the future to contribute to exceedances of drinking water standards away from the Source Area." (ROD, US1444-58.) Under these conditions, the ROD explains that "[f]uture groundwater uses are not expected to change significantly" and that water will continue to be supplied to the Source Area by outside sources. (Id.; id. at 62.) Nevertheless, EPA persists in classifying the groundwater as a potential source of drinking water.

The change in classification from Class III to Class II led EPA to adopt stricter cleanup goals for the Source Area groundwater. (FS Addendum, 1311-6, 79.) EPA also used the new classification as part of its justification for requiring a RCRA C cap over the Source Area. (ROD, US1444-339.) As explained in the ROD, the RCRA C cap will be used to prevent the migration of contamination from the soil to the groundwater. (ROD, US1444-7.) However, it is unclear whether this will be sufficient to prevent further Source Area groundwater contamination. (Id. at 342.) Therefore, the ROD calls for groundwater monitoring wells to be installed so that EPA can determine whether federal drinking water standards are achievable. (Id. at 7.)

2. Conclusions of Law

Emhart argues that EPA inappropriately classified Source Area groundwater as Class II as opposed to Class III. Emhart challenged EPA's classification of Source Area groundwater in its comments on the PRAP. (Emhart PRAP Comments, US1383-102-05; see also ROD, US1444-338.) Emhart has therefore preserved this issue for judicial review.

The NCP directs EPA "to return usable ground waters to their beneficial uses wherever practicable, within a timeframe that is reasonable given the particular circumstances of the site." 40 C.F.R. § 300.430(a)(1)(iii)(F). Where restoration is "not practicable" EPA need not restore the groundwater, but must instead take steps to "prevent further migration of the plume, prevent exposure to the contaminated ground water, and evaluate further risk reduction." Id. To that end, EPA has established guidelines that place groundwater into different "classes." (ROD, US1444-343.) Class II groundwater is considered a "current and potential sources of drinking water." (Id. at 344.) "Class III" groundwater, on the other hand, is "not considered potential sources of drinking water." (Id.) However, even where EPA guidelines would classify groundwater as Class II (i.e., a "potential" source of drinking water), the NCP still requires EPA to determine whether the application of drinking water standards is "technically impracticable." 40 C.F.R. § 300.430(f)(1)(ii)(C)(3); see also 42

U.S.C. § 9621(d)(4)(C). If restoration of the groundwater is impracticable, then a waiver is appropriate. Id.

In this case, EPA classified the groundwater as Class III in the vast majority of the Site. However, for the Source Area, EPA classified the groundwater as Class II. (ROD, US1444-342-43.) EPA explains that this finding is based on EPA guidelines, which permit the Class III label only where groundwater is "so contaminated by naturally occurring conditions or the effects of broad-scale human activity (unrelated to a specific activity) that [it] cannot be cleaned up using treatment methods reasonably employed in public water supply systems." (Id. at 344.)

As EPA has emphasized at several points in this litigation, EPA guidance is non-mandatory. (See, e.g., Gov't Post-Trial Brief 56-57.) Moreover, agency guidelines, while informative, cannot alter fundamental regulatory requirements. See United States v. S. Union Co., 643 F. Supp. 2d 201, 211-12 (D.R.I. 2009), aff'd, 630 F.3d 17 (1st Cir. 2010), rev'd and remanded on other grounds, 567 U.S. 343 (2012). Therefore, to justify the remedy, EPA cannot merely show that it followed EPA guidelines in classifying the groundwater as Class II. Instead, EPA must demonstrate that it complied with the NCP.

Unlike EPA guidelines, the NCP neither calls for nor permits a bright line rule that groundwater must be considered a potential source of drinking water anytime contamination is neither

"naturally occurring" nor the result of "broad-scale human activity." Instead, the NCP requires that EPA make a case-specific determination as to whether it is "practicable" to restore groundwater to its "beneficial use." 40 C.F.R. § 300.430(a)(1)(iii)(F). In addition, EPA is required to collect sufficient information to determine whether the remedy is likely to be "effective" in restoring the groundwater to any such use. Id. § 300.430(d)(1); see also id. § 300.430(e)(7)(i).

The evidence makes overwhelmingly clear that the Source Area groundwater is currently far too contaminated to provide a source of drinking water and that "[f]uture groundwater uses are not expected to change significantly." (ROD, US1444-58.) The ROD recognizes that there are likely several off-Site sources of contamination contributing to the contamination. (Id.) In addition, EPA has been on notice as far back as the remedial investigation that there are several important uncertainties in its data for the Source Area groundwater, including the "vertical extent" of the contamination. (RI, US1098-88.)

In light of these issues, the Court finds that EPA has not collected sufficient information or conducted sufficient analysis on which to base its finding that the Source Area groundwater is a potential source of drinking water or that the remedy is likely to effectuate that outcome. Specifically, there is currently insufficient analysis regarding (1) the vertical extent of the

contamination at the Site; and (2) the extent to which off-Site sources contribute to contamination in the Source Area groundwater. Going forward, EPA has broad discretion to determine how best to characterize the Site and make any necessary adjustments to the remedy. But, at a minimum, if EPA continues to classify the Source Area groundwater as a potential source of drinking water, EPA must present sufficient information and analysis to justify what are key findings under the NCP: that restoration of the groundwater is "practicable" and that the remedy will be "effective" in bringing about that restoration.

I. Requiring a RCRA C Cap in the Source Area

1. Findings of Fact

The Source Area, as its name suggests, contains a significant amount of contamination. Three interim protective caps as well as one RCRA cap have already been placed over several portions of the Source Area. (ROD, US1444-13.) Significant portions of what remains of the Source Area are covered by paved roads and parking lots that service two elderly housing facilities (Brook Village and Centredale Manor). (Id.)

EPA previously identified the existing caps and paved surfaces as a potential long-term solution. (See, e.g., EPA Action Mem. dated May 4, 1999, US605-14; 2004 Technical Mem. on Long-Term Remedy for Source Area Soils, US1048-25; 2005 BHHRA, US1101-57.) However, after EPA classified Source Area groundwater as potential

drinking water, EPA identified the RCRA C cap as the preferred remedy. (ROD, US1444-6.) Separate from remediation of the Source Area groundwater, EPA has presented evidence that the RCRA C cap is more durable and more likely to prevent direct human contact with contaminated soil. (Id. at 333.) However, it is unclear from the record whether, absent the change to groundwater classification, the ROD would have called for the installation of a RCRA C cap.

There are significant challenges to implementing a RCRA C cap on the Source Area. For example, installation of the cap will require removing paved surfaces and excavating substantial amounts of soil. This will inevitably cause inconvenience for the residents of Brook Village and Centredale Manor, and EPA will have to take special care to ensure that those residents are not exposed to the toxic soil that is being excavated in close proximity to their homes. (See, e.g., Mr. Loureiro Test., Trial Tr. vol. 6, 45:1-8 (discussing "life safety issues" for Site residents).) EPA considered many of these concerns in the FS. (See, e.g., FS, US1254-208, 313.)

2. Conclusions of Law

EPA is required to address whether a RCRA C cap is "relevant and appropriate" for the Source Area. See 42 U.S.C. § 9621(d). EPA determined that a RCRA C cap is "relevant and appropriate." (ROD, US1444-296.) Emhart concedes that the RCRA C cap is "relevant,"

but argues that it is not "appropriate." (Emhart Post-Trial Brief 190-91.) Emhart preserved this issue by bringing it to EPA's attention in its comments on the PRAP. (See generally Emhart Comments on PRAP, US1383-90-109.)

The Court already determined that EPA has not conducted sufficient analysis on which to base its finding that restoration of Source Area groundwater is practicable. On the current record, the Court also finds that EPA's decision to include a RCRA C cap as part of the remedy for the Source Area is inextricably intertwined with EPA's current remediation goals for Source Area groundwater. Therefore, EPA cannot justify the RCRA C cap absent further analysis with regards to the Source Area groundwater or a finding that the RCRA C cap is necessary regardless of EPA's groundwater remediation goals. This analysis will necessarily include a determination as to whether the benefits of the RCRA C cap outweigh the inconvenience and potential health and safety risks to Site residents. The Court reiterates that EPA has significant leeway in characterizing the Site going forward and making adjustments to the remedy as necessary. However, on the current record, the portion of the ROD requiring a RCRA C cap cannot survive judicial scrutiny.

J. Baseline Human Health Risk Assessment ("BHHRA")

1. Findings of Fact

a. Sampling of Residential Soils

EPA conducted a residential soil exposure risk assessment as part of the BHHRA. The goal was to evaluate the risks to human health caused by contact with the soils along Allendale and Lyman Mill Ponds. (See generally 2012 Technical Mem., US1392; PRAP Amendment, US1422.) Emhart submitted comments on the PRAP Amendment arguing that EPA had failed "to collect sufficient data in the area of the residential floodplain to derive appropriate exposure point concentrations for use in the [BHHRA]." (Emhart Comments on PRAP Amendment, US1418-14-15.)

During the remedial investigation conducted in 1999 EPA collected several samples from each of sixty-two residential lots located along the Woonasquatucket River. (RI, US1098-25.) EPA also collected a small number of additional samples in 2001. (See NTCRA, US1099-37-42.) In total, EPA evaluated 226 data records for dioxin in determining the potential human health risks posed by residential Site soils. (ROD, US1444-348-49.) Dioxin at concentrations "above the cleanup level for floodplain residential-use soil" was found "in approximately [forty-five percent] of the locations sampled along the eastern shore of Allendale and Lyman Mill Ponds." (Id. at 348-49.) While the ROD commits EPA to conducting additional sampling during remedial

design to define the exact contours of excavation, EPA determined that the current level of sampling was sufficient to assess the risk to human health posed by the Site. (Id. at 349.)

b. Estimates Used to Determine Risks from Recreational and Residential Pond and Soil Exposure

i. Relative Bioavailability of Dioxin

The BHHRA[44] considered the risks from dioxin exposure to recreational users and residents of the Site. This required that EPA estimate the relative bioavailabilty ("RBA") of dioxin in the soil and sediment. RBA is the availability of dioxin in the medium to which humans are likely being exposed (i.e., the soil and sediment) relative to the medium that was the source of the exposure. (Dr. Vorhees Test., Trial Tr. vol. 8, 65:14-25.) This number helps EPA estimate the rate at which humans are likely to absorb toxins at the Site. (Id.) EPA guidance suggests that RBA for dioxin "can be expected to be less than [one] hundred percent." (Id. at 66:21-24 (discussing EPA, Dioxin RBA Report, US1542-10).) Emhart therefore requested that EPA assume a RBA value of less than one hundred percent for the Site. (Emhart Comments on PRAP Amendment, US14418-12-14.)

EPA responded in the ROD that "there is not . . . a consensus protocol for determining a site-specific RBA for dioxin in soil, nor are such assessments a common practice." (ROD, US1444-357-58;

[44] See supra note 20.

see also Dr. Vorhees Test., Trial Tr. vol. 8, 66:25-67:5.) In the absence of a "consensus protocol" EPA declined to conduct any Site-specific RBA testing during the BHHRA. Instead, EPA used the "protective assumption[]" that that the Site soil and sediment had a RBA of one hundred percent. (Dr. Vorhees Test., Trial Tr. vol. 8, 68:7-11; see also ROD, US1444-357-58.) This is common practice for EPA at other CERCLA sites. (Id. at 67:10-22.) It is also consistent with EPA guidance. (See EPA, Dioxin RBA Report, US1542-10.)

ii. How Often People Use the Ponds

Having made a dioxin RBA assumption of one hundred percent, EPA then went on to consider the risks to persons swimming and wading in the ponds. In doing so EPA had to estimate how often people use the ponds. The BHHRA assumed that the Site is used for recreational activities from May through October, but specifically for wading and swimming only from June through August. (2005 BHHRA, US1101-81.) During these months the BHHRA used the Risk Assessment Guidance for Superfund to estimate the maximum exposure that would occur, which represents the upper percentile (95th-99.9th) of exposure for persons using the Site. (See EPA, Risk Assessment Guidance for Superfund ("RAGS"), vol. III, US1612-207.) The estimated maximum exposure frequency for wading was fifty-two days per year for young children (ages six and below) and thirty-nine days per year for adults and older children. (2005 BHHRA, US1101-

82.) Based on the "recommended exposure time for recreational swimming," EPA estimated that each exposure would last approximately one hour. (Id.)

Emhart submitted comments to EPA on the BHHRA. While Emhart conceded that the ponds were used recreationally, Emhart suggested that a lower frequency of use should be assumed because "[i]t is unlikely that most individuals will spend substantial amounts of time wading in the river or ponds that do not have beach areas." (Emhart Comments on BHHRA, US1151-47.) There is anecdotal evidence in the record suggesting that Allendale and Lyman Mill Ponds have not been frequently used for swimming and wading in the past. (See, e.g., 12/7/2011 Public Hearing, US1334-37-39; 8/15/2011 Email Correspondence, US1309.) This sentiment was echoed during trial by Emhart's expert. (Mr. Loureiro Test., Trial Tr. vol. 6, 196:14-197:1.) That visitors and residents would refrain from swimming and wading is understandable, as the ponds have been subject to historic industrial pollution (RI, US10998-57) and have portions that some consider unattractive. (See, e.g., Dr. Keenan Test., Trial Tr. vol. 4, 98:25-99:6; Mr. Loureiro Test., Trial Tr. vol. 6, 196:20-197:7.)

However, EPA presented evidence at trial demonstrating that the ponds are undoubtedly used for various recreational activities. Residents at the Site have yards that lead directly into the ponds, and various residents have placed docks and boats

in the ponds. (See Dr. Medine Test., Trial Tr. vol. 12, 58:25-59:6.) EPA's expert, Dr. Vorhees, also testified that she observed fisherman as well as evidence of other recreational activities at the Site. (Dr. Vorhees Test., Trial Tr. vol. 8, 11:21-12:19, 47:23-49:10.) Additionally, as a counter to Emhart's experts, Dr. Vorhees testified that she personally found various portions of the ponds to be "attractive." (Id. at 48:7-49:20.) This evidence suggests not only that the ponds are currently being used recreationally, but also that increased use could be expected after cleanup is complete.

iii. Incidental Ingestion Rates

In addition to estimating the frequency of pond use at the Site, EPA had to estimate the rate at which residents and recreational pond users incidentally ingest soils and sediments.[45] EPA estimated the upper range of incidental ingestion was a rate of approximately two hundred milligrams per day for young children and one hundred milligrams per day for older children and adults. (2012 Technical Mem., US1392-58.) These ingestion rates are based on EPA guidance. (See, e.g., IFRAGS, vol. I, US1620-13 (discussing "Standard Default Exposure Factors").) Dr. Vorhees testified at trial that the use of these ingestion rates is standard practice

[45] These ingestion rates were also used to estimate the risks from residential soil exposure.

at other CERCLA sites. (Dr. Vorhees Test., Trial Tr. vol. 8, 64:7-13.)

Emhart's expert, Dr. Keenan, testified at trial that these soil ingestion rates were unnecessarily high. Dr. Keenan explained that EPA's estimate is based primarily on research conducted by Dr. Edward Stanek and Dr. Edward Calabrese. (Dr. Keenan Test., Trial Tr. vol. 4, 103:16-21.) Those researchers have since cut their recommendations in half, suggesting a soil ingestion rate of approximately 100 milligrams per day for young children and fifty milligrams per day for older children and adults. (See Emhart Comments on BHHRA, US1151-61-64.) However, EPA has specifically considered this information and rejected the researchers' recommendations. (See EPA Response to Emhart Comments on the BHHRA, US1450-5.) As EPA's 2011 Exposure Factors Handbook explains, EPA has considered the available information (including the new research done by Dr. Stanek and Dr. Calabrese) and still recommends an upper percentile for soil ingestion of two hundred milligrams per day for young children. (See EPA, 2011 Exposure Factors Handbook, Emhart578-268-318.)

iv. Number of Days Per Year Residents are Exposed to Site Soils

As part of the residential soil risk assessment, EPA estimated the number of days Site residents are exposed to the soil surrounding their homes. EPA estimated that exposure occurs

approximately 350 days per year. (PRAP, US1393-5.) Emhart challenged this estimate during the notice and comment period on the PRAP, arguing that it was unrealistically high given seasonal weather changes in Rhode Island. (Emhart Comments on PRAP, US1418-11.) Emhart has also presented evidence that other CERCLA sites in New England have used the lower exposure frequency estimate of approximately 150 days per year. (ROD, US1444-356-357.)

There is no consensus way to determine the specific number of days EPA should use as the exposure frequency rate. (Dr. Vorhees Test., Trial Tr. vol. 8, 59:16-60:3.) EPA guidance provides for a national default exposure frequency rate of 350 days per year. However, EPA guidance also states that this default rate "may not be appropriate for all regions." (EPA, RAGS, vol. I, Emhart584-32.) For CERCLA sites in New England, EPA has previously recommended a lower exposure frequency of approximately 150 days per year. (Dr. Vorhees Test., Trial Tr. vol. 9, 4:21-6:15, 63:20-22.)

However, EPA released updated regional guidance in 2002 and since that time has typically used the national default rate of 350 days per year. (ROD, US1444-356-57 (citing EPA, Supplemental Soil Screening Guidance, US1637).) This is particularly true in Rhode Island where EPA's local counterpart (RIDEM) has also adopted a default exposure frequency rate of 350 days. (Dr. Vorhees Test., Trial Tr. vol. 8, 59:16-60:3.) For instance, the "Peterson Puritan"

site, located in Rhode Island, used an exposure frequency rate of 350 days. (Id. at 60:16-21.)

Furthermore, as noted in the ROD, there are reasons why EPA would assume that a 150-day estimate is too low for the Site. Unlike other cleanup locations, the Site contains a large residential population such that "access to this site is not restricted or otherwise limited." (EPA, IFRAGS, vol. I, Emhart579-116; see also id. ("[R]esidential land use is most often associated with the greatest exposure . . . ."); ROD, US1444-356.) As such, the residents (unlike recreational users) may have little choice but to venture outside and come into contact with the Site even in inclement weather. Additionally, because residents' houses are located on the Site, staying indoors does not prevent contact with contamination because Site soils and dust are easily tracked into the home. (Dr. Vorhees Test., Trial Tr. vol. 8, 60:5-15.)

c. Risks from Fish Consumption

EPA conducted a fish consumption risk assessment as part of the BHHRA. The goal was to determine the risks to human health posed by fish consumption at the Site and the cleanup levels of pond sediments necessary to mitigate those risks. To accomplish this goal, EPA had to estimate the frequency with which people consumed fish from the Site, the species of fish consumed, and the contamination levels present in the fish. EPA then determined the biota-to-sediment accumulation factor ("BSAF"), which is the ratio

between contamination levels in fish and contamination levels in the sediment. (Dr. Keenan Test., Trial Tr. vol. 4, 42:11-43:4.) By analyzing the frequency and toxicity of fish consumed in the ponds, in combination with the BSAF, EPA was able to make risk calculations and establish pond sediment remediation goals. Emhart challenged several aspects of EPA's fish consumption risk assessment in its comments on the BHHRA. (See Emhart Comments on BHHRA, US1151; see also EPA Response to Emhart Comments on BHHRA, US1450.)

i. Fish Sampling

Allendale Pond is sustained, in part, by a dam that prevents the majority of Allendale Pond waters from flowing downstream into Lyman Mill Pond. The dam has breached several times, including once in 1991 and twice in April and May of 2001. (See FS, US1254-43; Dr. Keenan Test., Trial Tr. vol. 4, 14:22-15:7.) The dam was restored after the 2001 breaches and by early 2002 Allendale Pond was restored to pre-breach water levels. (FS, US1254-43.)

Unfortunately, EPA's collection of fish samples in Allendale and Lyman Mill Ponds was conducted in July 2001, after the May 2001 breach but before Allendale pond had been restored. (ROD, US1444-71.) This led to two sampling issues. First, some of the fish collected from Lyman Mill Pond "may actually have been washed into Lyman Mill Pond from Allendale pond at the time of the

Allendale Dam breach." (MACTEC Mem., US1100-34.)[46] This means that the contamination levels of fish collected from Lyman Mill Pond "may not bear a meaningful relationship" to the sediment in Lyman Mill pond, such that EPA could not calculate an accurate BSAF. (CSTAG Recommendations, US1080-5.) The Contaminated Sediments Technical Advisory Group ("CSTAG")[47] highlighted this issue and "strongly recommend[ed] that new, co-located sediment and fish tissues samples be collected to develop a BSAF." (Id.)

EPA recognized this problem and employed MACTEC to find an adequate solution. MACTEC compared EPA's data collected after the Allendale dam breach to data collected before the breach and determined that, if certain steps were taken, "the available data appear to be sufficient for PRG development and additional sampling and analysis is not recommended at this time." (MACTEC 4/29/2005 Letter, US 1100.) The steps MACTEC recommended were for EPA to use fish tissue data and BSAFs from other parts of the Woonasquatucket River to determine PRGs. EPA complied with this recommendation. As EPA explained in the ROD, "[f]or [] Lyman Mill Pond, arithmetic mean BSAF for each fish species from five other exposure areas

[46] MACTEC is an EPA contractor that was used during the risk assessment to analyze data collected at the Site.

[47] CSTAG is EPA's internal technical advisory group that monitors the progress and provides advice for certain large and complex Superfund sites involving contaminated sediment. (See Principles for Managing Contaminated Sediment Risks at Hazardous Waste Sites, US909.)

. . . for each contaminant was used in the derivation of species-specific fish-consumption-based sediment PRGs for Lyman Mill Pond." (ROD, US1444-71 n.6.) This allowed EPA to estimate a BSAF for Lyman Mill Pond without using the data points objected to by Emhart.

The second sampling issue caused by the Allendale dam breach involved the species of fish collected. EPA collected equal numbers of eel, white sucker, and largemouth bass from Lyman Mill Pond. (2005 BHHRA, US1101-60.) However, when EPA sampled Allendale Pond, EPA collected only eel and white sucker, but no largemouth bass. (Id.) Based on that data EPA's risk calculations assumed that largemouth bass are not typically present in Allendale Pond. (See id. at 60, 78-79.)

This assumption is likely erroneous. As MACTEC explained to EPA after reviewing the BHHRA, "[t]he absence of largemouth bass in Allendale Pond in July 2001 suggests that largemouth bass may [] have been washed out of Allendale Pond into Lyman Mill Pond." (MACTEC Mem., US1100-34.) EPA recognized that assuming the absence of largemouth bass in Allendale Pond "may have resulted in an over- or under-estimation" in its risk assumptions. (ROD, US1444-71.) However, unlike with its BSAF calculations, EPA did not adjust its species assumptions to take into account the likely effects of the Allendale dam breach.

ii. Species of Fish Consumed

In 1999 the Rhode Island Department of Health established a fish-consumption advisory at the Site in order to deter people from consuming contaminated fish. (Dr. Vorhees Test., Trial Tr. vol. 8, 26:18-24.) As discussed below, despite this fish-consumption advisory, people still fish and consume fish from the Site. In order to estimate the risk to human health from fish consumption at the Site, EPA came up with protective assumptions about the species of fish people currently consume from the Site as well as the species of fish people would consume under possible future conditions. (See, e.g., id. at 32:14-16.) This reasonable maximum exposure is essentially the highest exposure that could be reasonably expected to occur at the Site. (Id. at 37:16-19; see also id. at 40:18-19 (describing "reasonable maximum exposure" as "the high end of possible exposure").)

One common way of accomplishing this is through a survey of local anglers. However, an angler survey would be of limited value at the Site because of the fish-consumption advisory that has been in place since 1999. (Id. at 26:18-27:12, 33:7-14.) The effects were evident, for example, in EPA's 2001 survey of local anglers. In that survey various respondents admitted to catching and consuming fish from the Site. (2005 BHHRA, US1101-80.) However, "most respondents were aware of the current advisory against consumption of fish and other biota from the river" and "indicated

they no longer consume fish from the river." (Id.) Given the effect of the fish-consumption advisory, EPA reasonably concluded that a Site-specific angler survey would be of limited value in coming up with reasonable estimates of fish consumption, particularly in estimating the reasonable maximum exposure of likely future consumption.

This led EPA to use several other sources of information to estimate current and future fish-consumption rates at the Site. As discussed above, EPA sampled fish from Allendale and Lyman Mill Ponds to determine the types of fish typically caught at the Site. These included bass, white sucker, and eel. (Id. at 60.) EPA also used surveys of people living near the site, academic literature, and input from local stakeholders to confirm that people were consuming fish at the Site and were likely to do so in the future. (Id. at 80.) Based on this information, EPA determined that the group most likely to be the subject of maximum exposure was certain Asian populations living near the Site.

The academic literature suggested that various parts of New England (including Rhode Island) are home to Asian populations that fish both recreationally and as a form of subsistence. (See, e.g., id. at 576, 583-89.) These populations often either ignore or misunderstand fishing advisories and regularly consume their catches regardless of size. (See, e.g., id. at 583-4.) Additionally, they catch and consume a wide variety of species,

including species identified at the Site. (See, e.g., id. at 583; U.S. Army Corps of Eng'rs, Identification of Preferred Target Species, US847-3-4.) EPA, in consultation with a wide variety of local subject matters experts[48], considered these findings persuasive.

The information garnered from the academic literature and local experts also corresponded with some Site-specific data. For instance, two surveys conducted at or near the Site suggested that certain Asian populations fish in that area. The first is the 1998 Urban River Use Survey of the Woonasquatucket River, which observed a diverse set of people – including persons of Asian descent – fishing in the Woonasquatucket River. (Id. at 80.) The second was the Tool Kit for Urban Rivers, which focused on the demographics of nearby Providence and found the "Southeast Asian population (Hmong, Camobodian, Laotian, & Vietnamese) and other ethnic groups were . . . high consumers of fish, eel, and turtles from local waterways, including the Woonasquatucket River." (Id.; see also EPA, Tool Kit for Urban Rivers, US1029-3; Dr. Vorhees Test., Trial Tr. vol. 8, 31:6-21.)

[48] EPA consulted with private groups (such as universities and non-profits) as well as RIDEM, the Rhode Island Department of Health, and the Rhode Island Division of Fish and Wildlife. (See, e.g., BHHRA, US1102-577, 583; U.S. Army Corps of Eng'rs, Identification of Preferred Target Species, US847-3.)

EPA recognized that the lack of an angler survey made EPA's analysis of the data more difficult. This meant that "[t]here was no quantitative information available that could be used to quantify the potential combined fish diet in a more detailed manner." (EPA Response to Emhart Comments on BHHRA, US1450-3.) EPA was therefore forced to use its "professional judgment in identifying the composition of the hypothetical future combined fish diet." (Id.) Taking into account the fact that certain Asian populations consumed a wide variety of fish, EPA decided to make the conservative estimate that the species of fish found in Allendale and Lyman Mill Ponds were consumed in equal portions.

In its comments on the BHHRA Emhart challenged EPA's assumption that certain populations may consume white sucker and eel at the same rate as largemouth bass. (Emhart Comments on BHHRA, US1151-41.) In the absence of a Site-specific angler survey, Emhart suggested that EPA consult the Maine Angler Survey ("MAS"). The MAS is an assessment of fish consumption practices in Maine from 1992. EPA's Exposure Factors Handbook includes some MAS data when providing recommended consumption rates. (Dr. Keenan Test., Trial Tr. vol. 4, 49:17-50:21; EPA, 1997 Exposure Factors Handbook, Emhart598-458-461.) Specifically addressing the consumable species identified at the Site, the MAS recommends a consumption ratio of approximately 83:11:3 (largemouth bass - white sucker – eel).

EPA, however, determined that the MAS should not be relied upon at the Site. Instead, EPA opted to use its "professional judgment" to determine the reasonable maximum exposure of a "hypothetical future combined fish diet." (EPA Response to Emhart Comments on BHHRA, US1450-3.) As discussed above, EPA determined its consumption ratios using academic literature, input from subject matter experts, and surveys of people living near the Site.

iii. Parts of Fish Consumed

In the BHHRA, EPA had to consider which parts of the fish people might consume. For the purposes of determining the reasonable maximum exposure, EPA assumed that people consume the fillets of largemouth bass and the whole body of eels and white sucker. Based on this assumption, EPA used the contamination concentrations in the fillets of largemouth bass and the whole-body contamination concentrations for eel and white sucker in the BHHRA. (Dr. Vorhees Test., Trial Tr. vol. 8, 33:23-34:5.) This increased the estimated risk to human health because whole-body contamination concentrations are higher than the contamination concentrations of fillets due to the fact that contamination concentrates to a higher degree in fish organs than in the flesh. (Id. at 34:9-16, 41:3-6.)

Emhart objected to EPA's use of whole-body contamination concentrations for white sucker in its comments on the BHHRA. While recognizing that "it may be reasonable to assume that the entire

eel is consumed in certain instances," Emhart argued that EPA lacked sufficient Site-specific data on which to base its assumption "that individuals eat the entire sucker, which is an extremely bony fish." (Emhart Comments on BHHRA, US1151-42.) At trial, Emhart also cited EPA guidance which suggests that "[m]ost fishers in the United States consume fish fillets." (EPA, Assessing Chemical Contaminant Data for Use in Fish Advisories, vol. II, Emhart590-95.) Absent "specific data on fish preparation methods," this guidance "recommends using fillets as the standard sample type for analyzing chemical contaminants." (Id. at 312.)

EPA responded to this criticism by referring again to its research on certain Asian populations that consume fish at or near the Site. Academic literature suggests not only that those groups consume a wide variety of fish, but also that they consume the whole body of those fish. For example, one study found that certain Asian populations fishing in Rhode Island often do not remove the skin, fat or organs of the fish before cooking. (2005 BHHRA, US1102-584.) That study also found that "fish cooking methods" include "boiling" such that "the broth may be used for soup." (Id.) Another study provided a similar observation of Asian fishers on the Housatonic River in Connecticut, noting that "[i]n addition to fillets," those populations eat "eyes, skin, and organs." (Id. at 589.)

These conclusions were also supported by EPA guidance. The same EPA guidance cited by Emhart also notes that "[c]ertain populations, including some Asian-Americans . . . eat parts of the fish other than the fillet and may consume the whole fish. Recipes from many cultures employ whole fish for making soups or stews. As a result, more of the fish contaminants are consumed." (EPA, Assessing Chemical Contaminant Data for Use in Fish Advisories, vol. II, Emhart590-309.) Based on this information EPA "assumed that white sucker might be most likely to be consumed if it were a component of a fish stew or similar meal (as a whole body)." (EPA Response to Emhart Comments on BHHRA, US1450-3.)

iv. Consumption Amounts from the Site

In considering the risks to human health posed by fish consumption, EPA had to estimate the reasonable maximum consumption rate of fish at the Site. EPA did this, in part, by considering data from the MAS. (2005 BHHRA, US1101-79.) According to that data, the upper end (i.e., 90th percentile) of adult fishers who do not share the fish they catch can be expected to consume approximately "23 half-pound fish meals in a year or . . . about one fish meal every two to three weeks" from the Site. (Dr. Vorhees Test., Trial Tr. vol. 8, 38:5-7; see also MAS, US1541-7; 2005 BHHRA, US1101-79.) This equates to approximately fourteen grams of fish per day from the Site. (Id.)

In its comments on the BHHRA Emhart challenged these consumption rates for two reasons. (Emhart Comments on BHHRA, US1151-44.) First, Emhart argued that EPA was overestimating the amount of fish consumed by adults. (Id. at 45.) As Emhart noted, the MAS found that most anglers share their catch with other members of the household and therefore typically consume less than fourteen grams per day. (Id.) Under these circumstances, Dr. Keenan opined at trial that EPA should have assumed household sharing of fish in calculating reasonable maximum consumption rates. (Dr. Keenan Test., Trial Tr. vol. 4, 69:6-71:14.)

Dr. Vorhees disagreed and testified that EPA's assumptions were reasonable. As she explained, in calculating the reasonable maximum exposure EPA "obviously had a concern about the angler who does not share their catch and wanted to be sure to protect them." (Dr. Vorhees Test., Trial Tr. vol. 8, 40:13-15.) According to Dr. Vorhees, EPA's decision was therefore reasonable "because [EPA] wanted to protect consumers who, in fact, catch fish and don't necessarily share their catch." (Id. at 39:3-5.)

Emhart's second challenge to EPA's consumption rates was based on EPA's assumption that all fourteen grams consumed by the adult fisher came from the Site. (Emhart Comments on BHHRA, US1151-45.) EPA has explained that its "fish consumption rates include only fish caught from the water bodies at the Site, and do not include fish caught at other locations nor fresh or preserved fish

purchased for consumption." (2005 BHHRA, US1101-79.) This suggests that EPA is assuming that the adult fisher consumes fourteen grams per day from the Site and also consumes significant additional fish from other sources.

While this assumption may be reasonable, it does not conform to the MAS data on which EPA basis its analysis. (Id.) In the context of its fourteen-gram estimate, The MAS explains that

> the study was designed to collect data on consumption from all flowing bodies of water, and not just the . . . contaminated water. Thus, although individuals may fish in affected river reaches some of the time, it is highly unlikely that all fishing effort is focused on these waters, particularly because there are numerous alternative fisheries in close proximity to each river. . . . Consequently, whereas the estimates for rivers and streams include all consumed fish from rivers and streams during the season, it is likely that only a portion of the consumption can be attributed to a single water body.

(MAS, US1541-7.) As this makes clear, the MAS's fourteen-gram estimate assumes that those fourteen grams come from multiple sources.

2. Conclusions of Law

Emhart previously challenged the sufficiency of the BHHRA in comments submitted to EPA. However, several of Emhart's specific arguments presented at trial were not submitted during the official notice and comment period. Such arguments are typically waived under the doctrine of issue exhaustion. However, because the Court finds that the portions of the BHHRA challenged by Emhart were so

foundational to EPA's remedy-selection process, and because Emhart previously brought many of these issues to EPA's attention, a limited exception is warranted. EPA has emphasized that the BHHRA was the primary driver of EPA's cleanup standards. (See, e.g., Gov't Post-Trial Brief 87.) Under these circumstances, EPA must be able to justify the BHHRA's "key assumptions." See Oklahoma Dep't of Envtl. Quality, 740 F.3d at 192 (quoting Appalachian Power Co., 135 F.3d at 818). These "key assumptions" include EPA's conclusions regarding the human health risks posed by soil exposure, pond exposure, and fish consumption at the Site.

a. Sampling of Residential Soils

Emhart challenges the sufficiency of EPA's sampling process, describing it as "sparse." (Emhart Post-Trial Brief 79.) Emhart points to the fact that EPA collected fewer than four samples containing dioxin data for each property at the Site. (Id. at 79-80.) However, as the Court explained in previous sections, the NCP does not require a specific number of samples. Instead, EPA need only "collect data necessary to adequately characterize the site for the purpose of developing and evaluating effective remedial alternatives." 40 C.F.R. § 300.430(d)(1). In characterizing the risks from residential soil exposure EPA reviewed approximately 226 data points, which included several samples from each of sixty-two residential properties at the Site. Emhart has failed to

demonstrate how this level of sampling is somehow insufficient under the NCP.

b. Estimates Used to Determine Risks from Recreational and Residential Pond and Soil Exposure

Emhart challenges various estimates made by EPA in conducting the pond and soil risk assessments. Emhart argues that EPA used inappropriately high estimates in characterizing: (1) the relative bioavailability ("RBA") of dioxin; (2) the rates at which people incidentally ingest contaminants; (3) how often people use the ponds at the Site; and (4) how often residents are exposed to Site soils.

In each of these areas, EPA did not rely solely on Site-specific data, but instead developed "conservative" estimates (in the sense that EPA erred on the side of protecting people from exposure) based on available scientific literature, EPA guidance, and experience at other CERCLA sites. This practice does not inherently violate the NCP. While the NCP requires that EPA collect sufficient site-specific data to adequately compare remedial options, it plainly does not mandate that every piece of data used by EPA be the result of sampling at the site. And in the absence of clear direction from either the NCP or CERCLA, the development of broadly applicable estimates for use on either a regional or national basis falls squarely within the purview of EPA. See Fox Television Stations, 556 U.S. at 513–14; Florida Power & Light

Co., 404 U.S. at 463. The question is whether EPA's use of these estimates for the Site was somehow arbitrary and capricious. The Court finds that it was not.

EPA's estimates are not "without substantial basis in fact." Muszynski, 899 F.2d at 160 (quoting Florida Power & Light Co., 404 U.S. at 463). EPA has surveyed the available data and provided reasonably conservative estimates for use at CERCLA sites. To be sure, there is no universal consensus on how to estimate the RBA of dioxin, incidental ingestion rates, or pond and soil exposure frequency. But it is precisely in these areas that involve evolving scientific considerations that deference to EPA's "technical expertise and experience" is appropriate. Id. (quoting Florida Power & Light Co., 404 U.S. at 463). And while EPA's assumptions are certainly conservative, that is by design. The NCP mandates that EPA's "goal . . . is to select remedies that are protective of human health and the environment, that maintain protection over time, and that minimize untreated waste." 40 C.F.R. § 300.430(a)(1)(i). In so doing, EPA estimates the reasonable maximum exposure that is likely to occur for both current and potential future land use at the Site. (EPA, IFRAGS, vol. I, Emhart579-24.) The use of a conservative estimate under these circumstances – erring on the side of caution when it comes to the risk of cancer (and other maladies) for those living in and around

the Site – is neither arbitrary, capricious, nor a violation of the NCP.

c. Risks from Fish Consumption

Emhart challenges several aspects of EPA's fish consumption estimates in the BHHRA. With regards to EPA's estimates about the types and parts of fish consumed from the Site, Emhart's challenges focus primarily on EPA's decision to forego a Site-specific angler survey and to rely on data from outside the MAS. Neither the NCP nor EPA guidance mandates that EPA conduct an angler survey or use data from the MAS. Instead, as discussed above, EPA need only "collect data necessary to adequately characterize the site for the purpose of developing and evaluating effective remedial alternatives." 40 C.F.R. § 300.430(d)(1). After collecting that data, EPA must then draw conclusions that are not arbitrary or "without substantial basis in fact." Muszynski, 899 F.2d at 160 (quoting Florida Power & Light Co., 404 U.S. at 463).

In determining species preference at the Site EPA reasonably concluded that an angler survey would be of little use because of the fish-consumption advisory in place at the Site. EPA therefore looked to alternative sources of information, including local subject matter experts, academic literature on fish-consumption in Rhode Island and surrounding states, surveys, and fish samples collected from the Site. This level of data collection provided an adequate, non-arbitrary, basis on which to determine the likely

species preferences of the most vulnerable populations near the Site for the purposes of developing a reasonable maximum exposure estimate. EPA certainly had to make judgment calls along the way, but these decisions deserve deference considering EPA's "technical expertise and experience," id. (quoting Florida Power & Light Co., 404 U.S. at 463), as well as EPA's duty to make conservative estimates in order to protect human health. See 40 C.F.R. § 300.430(a)(1)(i).

With that said, regarding EPA's estimates for the amount of fish consumed from the Site, the Court finds two instances where EPA's analysis was arbitrary. First, EPA relied on knowingly non-representative sampling to assume that no largemouth bass are consumed from Allendale Pond. Despite being on notice that largemouth bass are likely present in Allendale Pond, EPA excluded them from its Allendale Pond risk calculation. Emhart has demonstrated that this misstep arbitrarily increased the risk calculation for Allendale Pond. See Motor Vehicle Mfrs., 463 U.S. at 50 (describing agency action as arbitrary where the agency "entirely failed to consider an important aspect of the problem").

Second, EPA assumed that certain populations consume fourteen grams of fish per day from the Site. While the fourteen-grams estimate is based on the MAS, the MAS provides the caveat that "only a portion of the consumption can be attributed to a single water body." (MAS, US1541-7.) While EPA may ultimately determine

that fourteen grams is the appropriate reasonable maximum consumption rate at the Site, on the current record (i.e., basing its estimate on the MAS data alone) EPA's decision is arbitrary. See Motor Vehicle Mfrs., 463 U.S. at 50 (describing agency action as arbitrary where the agency "offered an explanation for its decision that runs counter to the evidence before the agency.")

Both of these missteps must be remedied before moving forward. How best to address these issues and identify any consequent changes to the remedy is appropriately addressed by EPA in the first instance. That is EPA's prerogative, to be reviewed by the Court only as provided under CERCLA.

K. Notice and Reasonable Opportunity to Comment

1. Findings of Fact

EPA drafted a PRAP in the fall of 2011. (PRAP, US1328.) Based on subsequent analysis, EPA made several changes to the PRAP in the form of a PRAP Amendment, which was published the following summer. (PRAP Amendment, US 1393.) Both the PRAP and PRAP Amendment were subject to notice and comment after their publication. The notice and comment period on the PRAP and PRAP Amendment went from November 14, 2011 to March 2, 2012, and July 19, 2012 to September 17, 2012, respectively. (ROD, US1444-24-25.) EPA provided the public notice of the PRAP and PRAP Amendment through newspaper announcements. (Id.) EPA then participated in public hearings and considered comments from a variety of sources, including Emhart.

(Id.; see also Emhart Comments on PRAP, US1383; Emhart Comments on PRAP Amendment, US1418.)

2. Conclusions of Law

Emhart argues that EPA failed to provide the public notice and a reasonable opportunity to comment on the PRAP and PRAP Amendment. Before publication of the ROD, EPA is required to present a PRAP to the public "for review and comment." 40 C.F.R. § 300.430(f)(1)(ii). The PRAP must "briefly describe[] the remedial alternatives analyzed by the lead agency, propose[] a preferred remedial action alternative, and summarize[] the information relied upon to select the preferred alternative." Id. § 300.430. EPA must then provide the public "a reasonable opportunity, not less than 30 calendar days, for submission of written and oral comments" as well as an "opportunity for a public meeting." Id. § 300.430(f)(3)(i)(C)-(D). The purpose of this process is to provide "the public with a reasonable opportunity to comment on the preferred alternative for remedial action, as well as alternative plans under consideration, and to participate in the selection of remedial action at a site." Id. § 300.430(f)(2).

EPA complied with these NCP requirements. However, the Court has found several instances where EPA's analysis was flawed and the results of that analysis were included in the PRAP and PRAP Amendment. EPA has also committed to conducting further analysis during remedial design and reserved the right to modify the remedy.

EPA is therefore responsible for updating the administrative record as necessary to correct flaws in its analysis and document future analysis conducted during remedial design. Id. § 300.825(a)(1). To the extent EPA's corrections or the remedial design process lead to a significant change to the remedy[49], EPA must provide for an additional notice and comment period as required by the NCP.

L. Failure to Comply with the Unilateral Administrative Order

1. Findings of Fact

Emhart initiated this litigation in May 2006. (Phase I Findings 3-4.) EPA did not issue the ROD until over six years later, in September 2012. (See ROD, US1444.) EPA then issued its Unilateral Administrative Order ("UAO") on June 10, 2014. (See UAO, US1490.) The UAO ordered Emhart "to perform the Remedial Design, Remedial Action, and Operation and Maintenance for the selected remedy . . . as described in the Record of Decision." (Id. at 5.) That UAO currently remains in place.

Since EPA's issuance of the UAO the Court has completed Phase I and II of this litigation. The Phase I trial lasted over twenty days beginning on May 18, 2015 and resulted in Emhart being found liable under CERCLA. However, the Court also found that "the

[49] What constitutes a "significant change" includes, among other things, a significant increase in the estimated amount of time it will take to implement the remedy, costs, and potential disruption to local residents.

Government is not yet entitled to judgment in its favor on this claim because the issues of costs and whether the remedy selected by the EPA is consistent with CERCLA first need to be litigated in the second phase of this trial." (Phase I Findings 185-86.) Emhart has continued to refuse to comply with the UAO through Phase II of this litigation based on its objections to the selected remedy.

2. Conclusions of Law

CERCLA authorizes EPA to issue "such orders as may be necessary to protect public health and welfare and the environment." 42 U.S.C. § 9606(a). This includes situations where there "may be an imminent and substantial endangerment to the public health or welfare or the environment because of an actual or threatened release of a hazardous substance from a facility." Id. Any entity that "willfully violates" such an order "without sufficient cause" may be liable for fines and punitive damages. Id. §§ 9606(b)(1); 9607(c)(3). These penalties are not mandatory, but are instead authorized at the discretion of the Court. See id. §§ 9606(b)(1), 9607(c)(3) (explaining that violators "may" be liable for penalties); Gen. Elec. Co. v. Jackson, 610 F.3d 110, 119 (D.C. Cir. 2010) ("[T]he district court has authority to decide not to impose fines even if it concludes that a recipient 'without sufficient cause, willfully violate[d], or fail[ed] or refuse[d] to comply with' a UAO.") (citing 42 U.S.C. §§ 9606(b), 9607(c)(3)).

What constitutes "sufficient cause" under CERCLA has not been addressed by the First Circuit. However, multiple other Circuit Courts of Appeal have interpreted "sufficient cause" to mean a "good faith" or "objectively reasonable basis for believing that the EPA's order was either invalid or inapplicable to it." Solid State Circuits, Inc. v. EPA, 812 F.2d 383, 391 (8th Cir. 1987); see also, e.g., Gen. Elec. Co., 610 F.3d at 119; Emp'rs Ins. of Wausau v. Browner, 52 F.3d 656, 661 (7th Cir. 1995). A party may meet this standard by demonstrating "that the applicable provisions of CERCLA, EPA regulations and policy statements, and any formal or informal hearings or guidance the EPA may provide, give rise to an objectively reasonable belief in the invalidity or inapplicability of the clean-up order." Solid State Circuits, 812 F.2d at 392.

In this case, Emhart does not challenge EPA's finding that the Site qualifies as a potential "imminent and substantial" environmental threat sufficient to justify a UAO. Moreover, in the aftermath of the Phase I trial, Emhart cannot assert that the UAO is somehow inapplicable to it. Instead, Emhart argues that it has a "sufficient basis" to not comply with the UAO based on its good faith challenges to the validity of EPA's selected remedy.

The Court has determined that several aspects of EPA analysis qualify as arbitrary, including the classification of Site groundwater as a potential source of drinking water and portions

of the fish consumption risk assessment. Emhart made timely objections highlighting these issues in its comments on the PRAP. These sorts of missteps on the part of EPA do not automatically provide potentially responsible parties sufficient cause to disregard a UAO. However, given that Emhart has continuously objected to critical aspects of the remedial design that the Court has now found arbitrary, and Emhart's previous participation in the cleanup process, the Court finds that Emhart's challenge to the UAO up to this point has been pursued in objective good faith.

V. Conclusion

EPA has developed a remedial action using the process outlined in CERCLA and the NCP. That remedial action, if completed, will mitigate the risks to human health and the environment EPA has identified at the Site. However, in developing that remedial action, EPA made several decisions that the Court finds violated CERCLA because they were arbitrary, capricious, or otherwise not in accordance with law; these must be addressed before moving forward with the remedial action.

The Court finds that Emhart has met its burden in establishing that, on the record as currently constituted, the following decisions were arbitrary, capricious, or otherwise not in accordance with law: (1) labelling Source Area groundwater as a potential source of drinking water; (2) assuming that there are no largemouth bass in Allendale Pond; and (3) using fourteen grams as

the reasonable maximum consumption rate for anglers fishing at the Site. The UAO is stayed until these matters are resolved, and Emhart is not required to pay the fines and fees stemming from its non-compliance with the UAO that have accrued up to this point.

The Court can envision several ways EPA could approach these deficiencies. EPA could find that the issues identified by the Court require EPA to reopen the remedial investigation and feasibility study process and publish a PRAP Amendment, as it has done in the past. The Court takes no view as to the appropriate course of action at this time and leaves it to EPA to address these issues in the first instance. However, the Court retains jurisdiction in this matter in order to ensure that the issues are addressed in a manner consistent with the law and not arbitrary or capricious.

Lastly, the Court notes that its decision is based, in part, on EPA's commitment to further sampling and analysis during the remedial design phase. EPA concedes that information discovered during remedial design may require alterations to EPA's analysis and the chosen remedy. For instance, EPA's estimates may change with regards to the amount of money and time it will take to implement the remedy or the potential hazards and inconvenience to local residents caused by implementation. Again, the Court retains

jurisdiction over this process to ensure that EPA's actions are consistent with the law and not arbitrary or capricious.

IT IS SO ORDERED.

William E. Smith
Chief Judge
Date: August 17, 2017