UNITED STATES DISTRICT COURT
EASTERN DISTRICT OF TENNESSEE
AT KNOXVILLE

OAK RIDGE ENVIRONMENTAL PEACE ALLIANCE, NUCLEAR WATCH OF NEW MEXICO, NATURAL RESOURCES DEFENSE COUNCIL, RALPH HUTCHISON, ED SULLIVAN JACK CARL HOEFER and LINDA EWALD,	)	
Plaintiffs	)	
vs.	)	**No.: 3:18-cv-150 REEVES/POPLIN**
JAMES RICHARD PERRY, Secretary, UNITED STATES DEPARTMENT OF ENERGY and LISA E. GORDON-HAGERTY, Administrator, NATIONAL NUCLEAR SECURITY ADMINISTRATION	)	
Defendants.	)	

MEMORANDUM OPINION AND ORDER

In 1942, Brigadier General Leslie Groves laid eyes upon the Clinch River valley in Anderson County, Tennessee. As head of the newly formed Manhattan Engineer District (better known as the "Manhattan Project"), he was drawn to this well-barricaded, sparsely populated region as an ideal location to secretively enrich the uranium he would need to build the first ever nuclear bomb. The Clinch River winds its way in a southwesterly direction through Anderson County, which is defined by a series of steep ridges and valleys that run parallel to each other in a southwest to northwest direction. Deep underground, a series of faults run roughly in the same direction; geologists know this area as the East Tennessee Seismic Zone.

Less than three years later, Groves succeeded, and the town of Oak Ridge, Tennessee—built from scratch to house the uranium-enriching workforce—became forever synonymous with the weapon that ended World War II.

After the war, the "Oak Ridge Reservation" was transferred from military to civilian control. Today, it is controlled by of the Department of Energy ("DOE") and is comprised of two main complexes, the Oak Ridge National Laboratory and the Y-12 National Security Complex. DOE, acting through its sub-agency, the National Nuclear Security Administration ("NNSA"), continues to store and manufacture the highly-enriched uranium needed to sustain the country's nuclear weapons arsenal at Y-12.

In 1969, Congress passed the National Environmental Policy Act ("NEPA")—our "national charter" for protecting the environment. The Act requires federal agencies to prepare environmental impact statements for any "major" federal action. Although it does not police substantive decisions, NEPA does require agencies to follow a rigorous process for disclosing the resulting impacts of their actions on the environment.

In 1996, with the Cold War fading, DOE undertook a monumental effort to modernize the entire United States nuclear weapons infrastructure, and considered the resulting environmental impacts in a series of three "programmatic" statements. Under these plans, Y-12 would continue to be the primary location for manufacturing and storing highly-enriched, weapons-grade uranium. Thus, Y-12 would need to develop modernization plans of its own and discuss these environmental impacts of its plans in separate impact statements. The first such impact statement was finalized in 2001; in addition to disclosing the "site-wide" environmental impacts at Y-12, NNSA proposed eliminating the existing facilities where highly-enriched uranium was kept and condensing the storage of those materials into one new facility, dubbed the "Highly Enriched Uranium Materials

Facility," or HEUMF. In that same statement, NNSA contemplated the construction of a building—which came to be known as the "Uranium Processing Facility," or UPF—adjacent to the HEUMF. Ideally, the UPF would achieve the same goals for uranium manufacturing that the HEUMF would achieve for uranium storage by effectively consolidating all the manufacturing operations currently taking place in outdated buildings into a new, state-of-the-art facility.

By the mid-2000s, the HEUMF was built and preliminary plans for the UPF were being developed. As part of another site-wide impact statement, NNSA prepared in 2011 to evaluate the specific environmental impacts of its plans to upgrade Y-12's uranium manufacturing program. As required by NEPA, NNSA evaluated the environmental impacts of various alternative actions, which included a "no action" alternative, a plan called the "Upgrade in-Place" under which only existing facilities would be upgraded (and no new facilities would be built), and three plans for new manufacturing facilities that would be designed to handle different production capacities. Ultimately, NNSA settled on one of these "capability-sized" UPFs, and issued a record of decision in July 2011 that ratified this choice.

Shortly after NNSA decided on a course of action, it ran into roadblocks and quickly realized that building the UPF to specifications was going to cost much more than initially predicted. A little more than two years after the decision to build the UPF was made, those overseeing the project realized a change was necessary. A group known as the "Red Team" formed to evaluate the remaining feasible options, and issued a report recommending that all construction on the UPF stop immediately. In its place, the Red Team suggested building a much smaller-scale UPF, and refurbishing existing buildings that would have been demolished under the original plan.

The Red Team Report was released in early 2014. Later that same year, the United States Geological Survey ("USGS") issued updated "seismic hazard maps" for the entire country. As the

name suggests, these maps provide a general overview of earthquake risk across the United States and are updated roughly every five to six years to account for new evidence and improvements in the field of seismology. While the maps themselves are necessarily approximate, the underlying data provides a well-respected baseline for policymakers, government agencies, and private industry decisionmakers to evaluate location-specific earthquake risks and plan accordingly. Significantly for this case, the 2014 map indicated a much higher earthquake hazard for all of East Tennessee than any previous versions.

Meanwhile, the Defense Nuclear Facilities Safety Board ("DNFSB"), a government agency formed to ensure safety compliance at nuclear weapons production facilities, had been conducting structural reviews of existing buildings at Y-12 since at least 2009. Their reviews had revealed many structural deficiencies in the buildings that were now slated to remain at Y-12.

Between 2014 and 2016, NNSA and Consolidated Nuclear Security, LLC ("CNS"), the Y-12 site contractor, began implementing the Red Team's plan. As part of this process and in compliance with DOE's NEPA regulations, NNSA prepared a so-called "supplement analysis" in 2016 to determine whether the change in plans would require preparation of a new environmental impact statement. Under NEPA, an agency is required to prepare an updated, or "supplemental," impact statement whenever there is a change in circumstances or significant new information that would alter the analysis of environmental impacts from a prior statement.

NNSA concluded that no supplemental statement was necessary because, although there had admittedly been a change in circumstances, the 2011 site-wide impact statement had already evaluated the environmental impacts that would result from the adoption of an "Upgrade in-Place" alternative in addition to the UPF. Because, in essence, the Red Team had recommended building a smaller UPF in conjunction with the refurbishment of existing buildings, and the updated plan

had combined these two alternatives, NNSA concluded that NEPA did not require a new impact statement in these circumstances. In addition, NNSA discussed the 2014 seismic hazard map, and concluded the information contained therein did not warrant the preparation of a new impact statement to account for the increase in seismic hazard. Shortly thereafter, NNSA issued a formal notice of decision confirming its changed plans and reiterating its conclusion that no further environmental analysis was required under NEPA.

The Oak Ridge Environmental Peace Alliance is an organization that monitors and informs the public about nuclear weapons production at Y-12. Its members keep close track of activity at the facility, and they had taken every available opportunity to comment on the progress of the UPF. In July 2017, a year after NNSA published its formal decision declining to prepare a new impact statement, the Alliance, along with four of its members and two other organizations, brought this suit, arguing that DOE and NNSA had violated NEPA by failing to prepare a supplemental impact statement. In April, 2018, while the suit was pending, NNSA prepared a new draft supplement analysis (a less comprehensive form of environmental review than an environmental impact statement) to reassess the progress of its ongoing modernization plans since the 2011 site-wide statement had been prepared. After accepting comments to the draft, NNSA released its final analysis, again concluding that no further analysis of environmental impacts was necessary.

The April 2018 analysis disclosed new information regarding the scope of the modernization project. In response, Plaintiffs filed an amended complaint, bringing additional claims under NEPA. As it stands, they have alleged violations of NEPA under four separate theories.

First, that Defendants have improperly "segmented" the overall analysis of the Y-12 Modernization Plan to avoid disclosing potentially significant environmental impacts. Second, that they should prepare a new (or supplemental) impact statement because of the change in circumstances

resulting from NNSA's 2016 decision to downsize the UPF and refurbish existing buildings through the so-called "Extended Life Program," or ELP. Third, that NNSA masked the overall significance of the ELP through improper use of "categorical exclusions" (which agencies may legally use for certain actions that are presumptively considered not to have a significant environmental effect). And finally, that NNSA must prepare a supplemental impact statement in light of the new information contained in the 2014 USGS seismic hazard map in light of its conclusion that the overall seismic risk in East Tennessee has increased.

The parties have filed cross-motions for summary judgment, which are the subject of this Opinion. Although styled as motions for summary judgment, there are no factual disputes here. Instead, the parties argue over whether Defendants' conduct was legal based upon the administrative record. As authorized by the Administrative Procedure Act, this Court has authority to review the legality of an agency's decisions under NEPA, and if it finds the basis for the decision is arbitrary and capricious, it may remand to the agency for further proceedings.

For the reasons explained in this Opinion, the Court has reached the following conclusions. In Defendants' favor, the Court finds they have not improperly segmented the Y-12 Modernization Plan, and that a new environmental impact statement is not required in light of the changed circumstances that resulted from NNSA's decision to downsize the UPF and implement the Extended Life Program. But in favor of the Plaintiffs, the Court finds that Defendants have acted arbitrarily and capriciously in applying all sixty-nine categorical exclusions at issue and in their failure to properly evaluate the environmental impacts resulting from USGS's increased seismic hazard forecast for East Tennessee.

Consequently, both motions for summary judgment will be denied in part and granted in part. The 2016 Supplement Analysis, the 2016 Record of Decision, and the 2018 Supplement Analysis will accordingly be set aside and remanded to the agency for further NEPA analysis.

I. PARTIES

a. Plaintiffs

Seven plaintiffs—four individuals and three nonprofit organizations—have brought suit in this case. The first organizational plaintiff is the Oak Ridge Environmental Peace Alliance ("OREPA"), headquartered in Oak Ridge, Tennessee, the location of the Y-12 National Security Complex ("Y-12"). OREPA monitors and informs the public about nuclear weapon production at Y-12, with the goal of achieving a world free from the threat of nuclear weapons.

Nuclear Watch of New Mexico ("Nuclear Watch") is a project of the Southwest Research and Information Center, a nonprofit based in Albuquerque, New Mexico; it uses research, education, and citizen action to advocate for cleanup of nuclear facilities, including Y-12, and achieve a world free of nuclear weapons. Before filing suit, both OREPA and Nuclear Watch submitted petitions to Y-12 regarding the production of the requested environmental impact statements.

Natural Resources Defense Council ("NRDC") is a national nonprofit that engages in research, advocacy, media, and litigation to protect public health and the environment.

All four individual plaintiffs live within fifty miles of Y-12, and are members of OREPA; two are also members of NRDC.

b. Defendants

Defendant Lisa Gordon-Hagerty is the Administrator of the National Nuclear Security Administration ("NNSA"), which is responsible for maintaining the safety, reliability, and security of the United States nuclear weapons programs and facilities, including Y-12.

Defendant James Richard Perry is the Secretary of the Department of Energy ("DOE"), NNSA's parent agency.

II. PROCEDURAL BACKGROUND

Plaintiffs filed their Complaint on July 20, 2017, in the United States District Court for the District of Columbia [D. 1]. The court granted Defendants' motion to transfer venue, and this case was transferred to the Eastern District of Tennessee on April 13, 2018 [D. 18].

After filing an unopposed motion for leave, Plaintiffs filed an Amended Complaint on October 15, 2018, which is now the operative pleading [D. 47]. The Amended Complaint requests an Order granting the following relief:

- A declaration that Defendants have violated the National Environmental Policy Act ("NEPA") and the Administrative Procedure Act ("APA");
- An order vacating three NNSA decisions—the 2016 Supplement Analysis, the 2016 Amended Record of Decision, and the 2018 Supplement Analysis and the remand of those decisions to the agency with orders to prepare either a Supplemental Environmental Impact Statement or a new Site-Wide Environmental Impact Statement for Y-12;
- Directions for the NNSA to prepare an Environmental Impact Statement for the "Extended Life Program";
- An award to Plaintiffs of reasonable attorneys' fees and costs for this action; and
- Any further relief the Court may deem just and proper.

The parties agreed to an Amended Scheduling Order [D. 51] and filed cross-motions for summary judgment [D. 53, 54]. Response and reply briefs [D. 58, 61] have been filed in compliance with the Amended Order, and this matter is now ripe for decision.

III. APPLICABLE LAW

a. National Environmental Policy Act ("NEPA")

NEPA[1] is the "basic national charter for protection of the environment." It declares a "national policy which will encourage productive and enjoyable harmony" between people and the environment, and "promote[s] efforts which will prevent or eliminate damage to the environment and biosphere and stimulate the health and welfare of man." 42 U.S.C. § 4321; 40 C.F.R. § 1500.1(a). The law has "twin aims." *Baltimore Gas & Elec. Co. v. Nat. Res. Def. Council*, 462 U.S. 87, 97 (1983). First, it "places upon an agency the obligation to consider every significant aspect of the environmental impact of a proposed action." *Id.* (quoting *Vermont Yankee Nuclear Power Corp. v. Nat. Res. Def. Council*, 435 U.S. 519, 553 (1978)). Second, it ensures that the agency will inform the public that it has indeed considered environmental concerns in its decision making process. *Id.* (citing *Weinberger v. Catholic Action of Hawaii*, 454 U.S. 139, 143 (1981)); *Cf.* 40 C.F.R. 1500.1(b) ("[P]ublic scrutiny [is] essential to implementing NEPA.").

NEPA's regulations contain "action-forcing" provisions to ensure federal agencies act in accordance with the law's spirit and letter, 40 C.F.R. § 1500.1(a), but its mandate is "essentially procedural." *Tenn. Envtl. Council v. Tenn. Valley Auth.*, 32 F. Supp. 3d 876, 882-83 (E.D. Tenn. 2014) (citing *Robertson v. Methow Valley Citizens Council*, 490 U.S. 332, 350 (1989)). So while agencies must follow a certain process to evaluate the environmental impact of a project, NEPA does not require any substantive results. *Methow Valley*, 490 U.S. at 350; *see also Strycker's Bay Neighborhood Council, Inc. v. Karlen*, 444 U.S. 223, 227-28 (1980). Thus, "even agency action with adverse environmental effects can be NEPA-compliant so long as the agency has considered

[1] National Environmental Policy Act of 1969, Pub. L. No. 91-190 (1970).

those effects and determined that competing policy values outweigh those costs." *Kentuckians for the Commonwealth v. U.S. Army Corps of Eng'rs*, 746 F.3d 698, 706 (6th Cir. 2014).

b. Environmental Impact Statement ("EIS")

The "heart" of NEPA is the environmental impact statement, or "EIS." Daniel R. Mandelker et al., *NEPA Law and Litigation* § 1:1 (2d. ed., Westlaw 2018 update); 42 U.S.C. § 4332(2)(C). An EIS is the most detailed and comprehensive level of review under NEPA regulations, and it must be prepared for any "major Federal action[] significantly affecting the quality of the human environment." 42 U.S.C. § 4332(2)(C); *Tenn. Envtl. Council*, 32 F. Supp. 3d at 883.

Prior to preparing an EIS, the agency may prepare an Environmental Assessment ("EA") to see if an EIS is necessary. 40 C.F.R. § 1508.9; *Southwest Williamson Cty. Cmty. Ass'n, Inc. v. Slater*, 243 F.3d 270, 274 n. 3 (6th Cir. 2001). If the EA demonstrates a project will have no significant adverse environmental consequences, the agency may issue a finding of no significant environmental impact ("FONSI"); otherwise, an EIS is required. *Slater*, 243 F.3d at 274 n. 3; *see Anglers of the Au Sable v. U.S. Forest Serv.*, 565 F. Supp. 2d 812, 824 (E.D. Mich. 2008) (EA is a "rough cut, low-budget [EIS] designed to show whether a full-fledged [EIS]...which is very costly and time-consuming to prepare...is necessary") (quoting *La. Crawfish Prod. Ass'n-West v. Rowan*, 463 F.3d 352, 356 (5th Cir. 2006)).

To determine if an impact is "significant," NEPA requires agencies to consider both *context* and *intensity*. 40 C.F.R. § 1508.27. "Context" accounts for the fact that the significance of an action will vary with its setting. *Id.* § 1508.27(a); *see Nat'l Parks & Conserv. Ass'n v. Babbitt*, 241 F.3d 722, 731 (9th Cir. 2001) ("Context simply delimits the scope of the agency's action, including the interests affected."). To account for context, the agency must analyze any environmental impacts with respect to "society as a whole," the affected region, the affected interests, and the locality. *Id.*

"Intensity" refers to the "severity of the impact," and the agency may consider ten specifically enumerated factors when evaluating intensity. *Id.* § 1508.27(b); *see Nat'l Parks & Conserv. Ass'n*, 241 F.3d 722 ("Intensity relates to the degree to which the agency action affects the locale and interests identified in the context part of the inquiry."). Intensity is not evaluated according to a rote formula: The presence of one factor alone may require an EIS, while an agency may decline to prepare an EIS even when all ten factors are present. *Compare Klein v. U.S. Dep't of Energy*, 753 F.3d 576, 584 (6th Cir. 2014) ("[w]hile the ten factors show that the Department *could have* prepared an environmental impact statement, they do not show the Department acted arbitrarily and capriciously in not completing one") (emphasis in original) *with Ocean Advocates v. U.S. Army Corps of Eng'rs*, 402 F.3d 846, 865 (9th Cir. 2005) ("One of these factors may be sufficient to require preparation of an EIS in appropriate circumstances.").

In some cases, neither an EA nor an EIS is required. *Sierra Club v. U.S. Forest Serv.*, 828 F.3d 402, 408 (6th Cir. 2016). Instead, an agency may adopt a "categorical exclusion" for actions that "do not individually or cumulatively have a significant effect on the human environment." *Id.*; 40 C.F.R. § 1508.4. To use a categorical exclusion, the finding of no significant impact must be made according to procedures adopted by the agency, and these procedures must provide for "extraordinary circumstances" where a normally excluded action is found to have a significant environmental effect that requires further NEPA review. *Id.*; *see* 10 C.F.R. § 1021.410 (DOE's categorical exclusion procedures).

i. Scope

If the agency decides to prepare an EIS, it must next determine the scope of the EIS—that is, whether the action should be considered individually or along with other related actions. Mandelker, *supra* § 9:1. At minimum, the agency must discuss closely related or "connected" actions

in the same impact statement. 40 C.F.R. § 1508.25. Actions are "connected" if they: i) automatically trigger other actions which may require an EIS; ii) cannot or will not proceed unless other actions are taken previously or simultaneously; or iii) are interdependent parts of a larger action and depend on the larger action for their justification. *Id.* The unlawful failure to discuss connected actions together in the same impact statement is known as "segmentation." Mandelker, *supra* § 9:14. The rule against segmentation prevents agencies from evading their responsibilities under NEPA by artificially dividing a federal action into smaller components so the action would no longer be considered "major," or so that no significant environmental impacts would be detected (thus avoiding the need to prepare an EIS). *See id.*; *Jackson Cty., N.C. v. FERC*, 589 F.3d 1284, 1290 (D.C. Cir. 2009).

To avoid segmentation, an agency may group related actions together in what is known as a "programmatic" environmental impact statement ("PEIS"). *See* Mandelker, *supra* § 9:2. Such an impact statement may even be required when several proposals could have a "cumulative or synergistic" impact within a region or when projects are not geographically connected but are related in time or subject matter. *Kleppe v. Sierra Club*, 427 U.S. 390, 409 (1976); *see Envt'l Def. Fund v. Adams*, 434 F. Supp. 403 (D.D.C. 1977) (requiring preparation of PEIS to accompany agency's plan for development of public airports across the United States).

The preparation of a PEIS will not relieve an agency from its duty to prepare a later "site-specific" EIS covered in the prior statement. Mandelker, *supra* § 9:12. But the later site-specific statement will not need to be fashioned from whole cloth. Rather, through a process known as "tiering," the agency may incorporate by reference the general discussions contained in the programmatic EIS and concentrate solely on the issues specific to the later EIS. 40 C.F.R. §§ 1508.28,

1502.20; *Guidance Regarding NEPA Regulations*, 48 Fed. Reg. 34263, 34267-68 (1983) (By allowing the agency to incorporate earlier documents, tiering is "intended to streamline the existing process.").

ii. Format

Federal regulations provide a standard format for agencies to use in preparing an EIS, which should be followed unless the agency determines that there is a compelling reason to arrange the EIS differently. 40 C.F.R. § 1502.10. After briefly specifying the underlying purpose and need for the action, the EIS must describe the affected environment, along with the environmental consequences of a proposed action. *Id.* § 1502.13 (purpose and need); § 1502.15 (affected environment); § 1502.16 (environmental consequences); 42 U.S.C. § 4332(2)(C)(i)-(v). Just as the "heart" of NEPA is the EIS, the "heart" of the EIS is the analysis of alternatives, wherein the agency must "rigorously explore and objectively evaluate" all reasonable alternatives—including a "no action" alternative—in light of the information and analyses presented in the sections describing the affected environment and environmental consequences. 40 C.F.R. § 1502.14(a), (d). The range of alternatives discussed should encompass the same range of options being considered by the ultimate agency decision-maker. *Id.* § 1502.2(e).

An EIS is prepared in two stages. *Id.* § 1502.9. First, the lead agency prepares a draft statement, which should make "every effort" to disclose and discuss all major points of view on the environmental impacts of the alternatives presented, including the proposed action. *Id.* § 1502.9(a). The agency must invite comments on the draft from any involved federal, state, or local agency, along with the public, from which the agency must affirmatively solicit comments from persons or organizations who may be interested or affected. *Id.*; § 1503.1(a). Next, the final EIS is prepared.

Id. § 1502.9(b). The final statement shall respond to the comments provided, and discuss at "appropriate points" any responsible opposing view not adequately discussed in the draft statement, including a response to the issues raised by those commenters. *Id.*

The presentation of data must be "sufficient to enable those who did not have a part" in the compilation of the EIS "to understand and consider meaningfully the factors involved." *Izaak Walton League of Am. v. Marsh*, 655 F.2d 346, 368-69 (D.C. Cir. 1981) (quoting *Envtl. Def. Fund v. Corps of Eng'rs of U.S. Army*, 492 F.2d 1123, 1136 (5th Cir. 1974)). As such, the agency is obligated to "insure the professional integrity...of the discussions and analyses in [an EIS]," and identify any methodologies used with explicit reference to the scientific and other sources relied upon for any conclusions reached. 40 C.F.R. § 1502.24. But a full analysis of alternatives "may be presented without a complete, thorough documentation of every piece of data in the statement itself." *Crosby v. Young*, 512 F. Supp. 1363, 1369 (E.D. Mich. 1982). And when the agency relies on technical material as part of its analysis, it "shall" incorporate that material by reference when the effect will be to cut down on bulk, so long as the incorporation of the material does not impede agency and public review of the action. 40 C.F.R. § 1502.21. The "express purpose" of this regulatory requirement is to "decrease the bulk of the EIS without influencing the caliber of review." *Crosby*, 512 F. Supp. at 1369.

iii. Environmental Consequences

As mentioned, the EIS must consider any "reasonably foreseeable" effects or adverse impacts of the proposed action which will have environmental consequences. 40 C.F.R. §§ 1502.16, 1502.22. A "reasonably foreseeable" impact or effect may include those where the probability of occurrence is low, but the environmental consequences could be "catastrophic." *Id.* § 1502.22. The

DOE calls this review, where potential accident[2] scenarios are evaluated to ascertain the environmental consequences that would result, the "accident analysis" [AR 7766[3]]. U.S. Dep't of Energy, *Recommendations for Analyzing Accidents Under the National Environmental Policy Act* (July 2002); *see* Charles H. Eccleston, *The EIS Book: Managing and Preparing Environmental Impact Statements* § 5.10 (2014). The analysis is "necessary" for the agency to make a "reasoned choice among the proposed action and alternatives" and to allow for "appropriate consideration of mitigation measures" [AR 7766].

For the sake of efficiency, DOE authorizes the occasional use of a "bounding" analysis as part of the overall accident analysis. Under this type of analysis, multiple unlikely events are "bounded" together with simplifying assumptions and methods which overestimate the actual environmental impacts that would result if any one of these events occurred [AR 31735]. But even where overall impacts are small, DOE's own internal guidance suggests that a bounding analysis would be inappropriate if it obscures differences among alternatives or fails to address concerns the public has expressed [*Id.*].

c. Supplemental EIS

If, at any time, the agency makes a "substantial change" in the proposed action that is relevant to environmental concerns, or if "significant new circumstances or information" arise that bear on the proposed action (again, relevant to environmental concerns), the agency must prepare a supplemental EIS ("SEIS"). *Id.* § 1502.9(c). The same criteria used to determine if an EIS should be prepared in the first place is applied to determine if a SEIS is necessary—whether the change

[2] An accident is "a sequence of one or more unplanned events with potential outcomes that endanger the health and safety of workers and the public" [AR 17162].

[3] The entire administrative record ("AR") in this case (which includes internal agency guidance documents, such as the one cited above) has been entered into the court electronically on 3 DVDs [D. 13, 48, 52]. The documents are organized separately into individual PDF files, but are paginated continuously. All citations to the record will be made as [AR ####]. For example, the first page of the 2011 Site-Wide Environmental Impact Statement, which starts at Page 16,834 of the record, would be cited as [AR 16834].

in the action or the new information constitutes a major federal action that will significantly affect the quality of the human environment. *Marsh v. Or. Nat'l Res. Def. Council*, 490 U.S. 360, 374 (1989); *see also U.S. v. City of Detroit*, 329 F.3d 515, 529 (6th Cir. 2003) (Moore, J., concurring) ("NEPA makes no distinction between initial actions and subsequent changes to initial actions.").

When it is unclear whether a SEIS is required, DOE's own regulations require the preparation of a Supplement Analysis ("SA"). 10 C.F.R. § 1021.314(c); *see Hodges v. Abraham*, 253 F. Supp. 2d 846, 854 (D.S.C. 2002), *aff'd* 300 F.3d 432 (4th Cir. 2002). The SA must contain sufficient information for DOE to determine whether an existing EIS should be supplemented, whether an entirely new EIS should be prepared, or whether no further NEPA documentation is required. *Id.*

d. Timing

"NEPA's effectiveness depends entirely on involving environmental considerations in the initial decisionmaking process." *Metcalf v. Daley*, 214 F.3d 1135, 1145 (9th Cir. 2000) (citing *Methow Valley*, 490 U.S. at 349). Accordingly, agencies should integrate the NEPA process with other planning at the "earliest possible time." 40 C.F.R. § 1501.2. By complying with this requirement, the agency will be able to "[i]dentify environmental effects and values in adequate detail so they can be compared to economic and technical analyses." *Id.* § 1501.2(b). When new information or changed circumstances may require a new EIS, supplemental action will be required when there "remains major federal action to occur." *Ctr. for Biological Diversity v. Salazar*, 706 F.3d 1085, 1094 (9th Cir. 2013) (quoting *Norton v. S. Utah Wilderness All.*, 542 U.S. 55, 73 (2004)); *see Marsh*, 490 U.S. at 374 (the need for supplementation depends on "the value of the new information to the *still pending* decision-making process") (emphasis added).

IV. STANDARD OF REVIEW

a. Administrative Procedure Act

NEPA itself does not authorize a private right of action. Instead, judicial review is granted under the Administrative Procedure Act ("APA"). *See* 5 U.S.C. § 701-06; *Friends of Tims Ford v. Tenn. Valley Auth.*, 585 F.3d 955, 964 (6th Cir. 2009). The APA directs courts to hold unlawful and set aside agency action, findings, and conclusions found to be "arbitrary, capricious, an abuse of discretion, or otherwise not in accordance with law." *Sierra Club v. U.S. Forest Serv.*, 828 F.3d 402, 407 (6th Cir. 2016) (cleaned up). A decision is arbitrary or capricious under the APA if the agency has: i) relied on factors Congress had not intended it to consider; ii) entirely failed to consider an important aspect of the problem; iii) offered an explanation for its decision that runs counter to the evidence before it; or iv) is so implausible that the decision could not be ascribed to a difference in view or the product of agency expertise. *Id.* (cleaned up).

When reviewing claims under NEPA, which are often highly technical, courts should not act as "omnipotent scientists." *Tri-Valley CAREs v. U.S. Dep't of Energy*, 671 F.3d 1113, 1126 (9th Cir. 2012). And when analysis of the relevant documents requires a "high level of technical expertise," courts are at their "most deferential." *Marsh*, 490 U.S. at 377 (quoting *Kleppe*, 427 U.S. at 412 and *Baltimore Gas & Elec.*, 462 U.S. at 103). But "the deference accorded an agency's scientific or technical expertise is not unlimited," and "deference is not owed if 'the agency has completely failed to address some factor consideration of which was essential to making an informed decision[.]'" *Earth Island Inst. v. Elliott*, 318 F. Supp. 3d 1155, 1167 (E.D. Cal. 2018) (quoting *Brower v. Evans*, 257 F.3d 1058, 1067 (9th Cir. 2001)).

b. Summary Judgment

The parties have both moved for summary judgment, which is proper only if the record shows there is "no genuine dispute as to any material fact and the movant is entitled to judgment as a matter of law." FED. R. CIV. P. 56(a). But since this case involves the review of an administrative proceeding, the "usual rules governing summary judgment do not apply." *Integrity Gymnastics & Pure Power Cheerleading, LLC v. U.S. Citizenship & Immigration Servs.*, 131 F. Supp. 3d 721, 725 (S.D. Ohio 2015); *see Oregon Wild v. Cummins*, 239 F. Supp. 3d 1247, 1258 (D. Or. 2017) (in the NEPA and APA context, "summary judgment" is "simply a convenient label" for triggering judicial review) (citations omitted). Instead, under the APA, the agency resolves factual issues to arrive at a decision that should be supported by the administrative record. *Stuttering Found. of Am. v. Springer*, 498 F. Supp. 2d 203, 207 (D.D.C. 2007). The district court's only task is to determine whether or not the evidence in the record permitted the agency to make the decision it did, as a matter of law. *Id.* (citing *Occidental Eng'g Co. v. INS*, 753 F.2d 766, 769-70 (9th Cir. 1985). Thus, summary judgment serves as the "mechanism for deciding. . . .whether the agency action is supported by the administrative record and otherwise consistent with the APA standard of review." *Id.* (citing *Richards v. INS*, 554 F.2d 1173, 1177 n. 28 (D.C. Cir. 1977)).

V. TECHNICAL BACKGROUND

Having reviewed the law, the Court now moves to the facts of this case. But to properly understand the issues in dispute under this long and complex record, the reader needs basic familiarity with two scientific fields: nuclear physics and seismology.

a. Enriched Uranium

"Atomic energy requires an atom."[4] Every atom is composed of three parts: positively-charged protons, neutrally-charged neutrons, and negatively-charged electrons. Protons and neutrons are found together in the nucleus (and thus are collectively called "nucleons"), while electrons orbit the atom. An element will always have the same amount of protons—noted by the atomic number—but the amount of neutrons and electrons may vary. For example, uranium's atomic number is 92; no matter how many electrons or neutrons are present, every atom of uranium has 92 protons. But the same element can have different amounts of neutrons. So an element may have different *isotopes*, identified by the total number of nucleons.

Most uranium found in nature comes in the isotope uranium-238 ("U-238"), which has 92 protons and 146 neutrons (238 nucleons). The second most frequently occurring isotope is uranium-235 ("U-235"), which has 92 protons and 143 neutrons (235 nucleons). Over time, uranium will shed protons through "fission," and release energy in the process. In the early 20th century, scientists figured out a way to make that fission process happen much more quickly. By sending neutrons at a highly unstable isotope of uranium, a nuclear fission reaction will quickly be triggered. If other uranium atoms are nearby, the neutrons freed from the first reaction will hit the surrounding nuclei, triggering a nuclear chain reaction. The smallest amount of fissile material needed to sustain a chain reaction is the "critical mass." So in scientific lingo, an uninterrupted nuclear fission chain reaction is a "critical" reaction, otherwise known (and often referred to in this Opinion) simply as a "criticality" event.

[4] Richard Rhodes, *The Making of the Atomic Bomb* (1988). Much of the background for this section comes from documents in the record (for example, the introductions to the Programmatic EISs prepared by DOE [*see, e.g.*, AR 11973]), and Mr. Rhodes's book. This discussion is included largely so the reader may understand Y-12's purpose, which is very helpful for understanding the narrative in this case. Unlike the matter of earthquakes, the technical particulars of how enriched uranium is processed and manufactured are not directly at issue, so specific citations are not included in this background section on enriched uranium.

For (very) complicated reasons, isotopes having an even number will be less "fissile" (that is, more stable) than isotopes with odd numbers. So to produce energy through a fission reaction, whether for a nuclear reactor or a nuclear bomb, U-238 will not do.

It is impossible to mine *only* U-235 in such a concentrated form that one could effectively make a weapon from the mined uranium. So to build a weapon, scientists need to "enrich" the small amount of U-235 out of raw uranium that contains a mixture of mostly U-238 and a little bit of U-235. And to actually enrich the amount of U-235 needed for building a weapon requires a nearly superhuman feat of engineering.[5] Yet, the U.S. Army managed to do it at Y-12 in less than three years.

b. Seismology

One of the central documents in this case is "seismic hazard map" prepared by the United States Geological Survey ("USGS") in 2014, which is a document prepared by seismologists for other professional seismologists and engineers. Moreover, the dispute in this case largely centers on various structural engineering decisions made at Y-12, and many of the critical documents the Court has relied on in the administrative record are prepared by engineers for engineers. Which is to say that to understand this case, the reader needs to know some basic seismology.

i. Magnitude

Most people with a casual understanding of earthquakes likely know that earthquakes may vary by their magnitude, on something known as the Richter scale. In the most basic sense, an "earthquake" is what occurs when there is a crack in the earth's crust (a "fault") and the earth on either side of that fault moves.

[5] As Otto Frisch, a nuclear physicist who worked on the Manhattan Project, described it: "It was like getting a doctor who had after great labour made a miniscule quantity of a new drug and then saying to him: 'Now we want enough to pave the streets.'" Rhodes, *supra* at 339.

An earthquake's "magnitude" is simply an estimate of the size of its crustal movement, and it is designed to be manageable and conceptually intuitive. Susan E. Hough, *Earthshaking Science: What We Know (and Don't Know) About Earthquakes* 33 (2002). Seismologist Charles Richter created the first magnitude scale in the 1930s by assigning a number that corresponded to the magnitude of the deflection on a specially designed seismometer—the larger the deflection, the greater the magnitude. *Id.* Today, Richter's scale (otherwise known as local magnitude, or "ML") is one of four methods used to measure an earthquake's magnitude. The preferred scale is called the "moment magnitude" (or "Mw") scale.[6] *See* Hough, *supra* at 35. Although more difficult to compute, the Mw scale provides the most accurate measurements of large earthquakes. *Id.*

ii. Ground Motion

But, practically speaking, the size of an earthquake is not its most important attribute. When an earthquake occurs (when the earth's crust moves) a vibration results. Seismologists measure this "ground motion" through applying the physics of wave propagation. Hough, *supra* at 81; Peter M. Shearer, *Introduction to Seismology* 39 (6th ed. 2009).

Returning briefly to high school physics, the height of a wave is its *amplitude*—the greater the amplitude, the greater the energy. The horizontal distance of a wave is its *wavelength*, which measures the distance between two points of equal amplitude. The *frequency* of the wave is calculated by the equation: f = 1/T, where "f" is the frequency, and "T' is the *period*, or the amount of time it takes a wavelength to complete one cycle. "Hertz" (Hz) is the standard unit for measuring frequency, where "T" is set to a period of one second. As the equation shows, period and frequency

[6] *Earthquake Glossary, "Magnitude,"* U.S. Geological Survey, https://earthquake.usgs.gov/learn/glossary/?term=magnitude (last visited June 11, 2019). This Opinion makes frequent reference to the USGS website. Information taken from government websites is self-authenticating under FED. R. EVID. 902, and courts may accordingly take judicial notice of the information found on these websites. *See Demis v. Sniezek*, 558 F.3d 513 n. 2 (6th Cir. 2009) (taking notice of government website); *Newton v. Holland*, No. 13-61, 2014 WL 318567 at *1 (E.D. Ky. Jan. 29, 2014) (collecting cases).

are inversely related: A wave with a frequency of 2 Hz will have a period of .5 seconds, while a wave with a frequency of .5 Hz will have a period of 2 seconds.[7]

As the wave leaves its source, the amplitude of the wave will decrease with distance, just as the waves nearest a pebble thrown in a pond are larger than those farther out. So in general, the farther a given location is from an earthquake, the less severe its effects will be. Seismologists call this phenomenon "geometrical spreading." Hough, *supra* at 88.

However, the Earth's crust affects how exactly these waves propagate in the real world. *Attenuation* will describe how an earthquake with a given location, depth, and magnitude will impact the surrounding area. For example, waves move much more efficiently through the crust in the eastern United States than in the western United States. Therefore, earthquakes of a similar magnitude will be felt over a greater distance (that is, they will attenuate more slowly) in the east than the west.

Another important factor is *site response*. In practice, describing site response at a specific location is extremely complicated, but the concept is simple: The impact of an earthquake at a specific location is governed by geological factors specific to that location. The importance of site response can be illustrated by looking at one of the most infamous earthquakes in recent American history, the 1989 Loma Prieta earthquake.

"Loma Prieta" is a peak in the Santa Cruz Mountains, and it lies near the San Andreas fault about fifty miles from downtown San Francisco. On October 17, 1989, the fault slipped near Loma Prieta Peak, and the waves propagated in all directions. Yet the earthquake is remembered not because of what happened at Loma Prieta, but because of its devastating impact in San Francisco and the Bay Area.

[7] *Earthquake Glossary, "Frequency,"* U.S. Geological Survey, https://earthquake.usgs.gov/learn/glossary/?term=frequency; *"Wavelength,"* at https://earthquake.usgs.gov/learn/glossary/?term=wavelength (last visited June 11, 2019).

The impact was so great, in part, because the earthquake started at a point deep in the ground, and the resulting waves caromed off the "Moho"[8]—the boundary between the Earth's crust and the mantle—into the center of San Francisco. Thus, the shaking in San Francisco was about twice the intensity of what would "normally" be expected in the city fifty miles from the epicenter of an earthquake at that magnitude (Mw 6.9).[9] *See* John McPhee, *Assembling California* (1993).

Even within the Bay Area, the effects varied depending on the location. Most notably, and tragically, the top deck of the double-decker Nimitz freeway in Oakland collapsed. This was not happenstance: The freeway was built over a layer of bay mud that had been filled in so it could be developed. Hough, *supra* at 80. When the waves hit the mud, they slowed and the waves amplified—i.e., the energy of the waves increased—greatly increasing the severity of shaking compared to nearby sites built on harder rock. *Id.* The susceptibility of structures built in mud is well-known; seismologists think the same phenomenon increased shaking in Mexico City (which is built on a filled-in lake) during a 1985 earthquake that originated on the Pacific coast, about 180 miles away. Accordingly, when preparing a site-specific earthquake hazard assessment, one can learn a great deal about the particular earthquake risk by knowing the rock composition at the site.

iii. Intensity

So while knowing the magnitude of an earthquake is important, it does not fully describe the environmental and human impact of the earthquake. Because the 2014 USGS map changed the hazard assessment for ground motions at the Y-12 site, some technical discussion of techniques

[8] *Earthquake Glossary, "Moho,"* U.S. Geological Survey, https://earthquake.usgs.gov/learn/glossary/?term=moho (last visited June 12, 2019). The full name for this feature is the "Mohorovicic discontinuity," named after an eponymous Croatian seismologist.

[9] *Earthquake Hazards Program, M 6.9 Oct. 17, 1989 Loma Prieta Earthquake*, U.S. Geological Survey, https://earthquake.usgs.gov/earthquakes/events/1989lomaprieta/ (last visited July 29, 2019). One can view, from this page, a time lapse video showing the ground motion travel during the first seventy-five seconds of the earthquake, which provides a useful illustration of the point the Court is trying to make (that ground motion varies by individual quake, and is determined largely by site-specific geologic characteristics).

used to measure the ground motions of earthquakes—and how these measurements are used to forecast the intensity of future earthquakes—is needed to understand the contents of the map.

1. Peak Ground Acceleration

The first commonly used method for measuring ground motion is to calculate the "peak ground acceleration" (pga). Compared to spectral acceleration, pga is a little easier to understand—it simply represents the largest increase in velocity (that is, the greatest acceleration) recorded by a particular station during an earthquake. The acceleration is measured in units of gravity, or "g." Thus, a peak ground acceleration of 1*g* will exactly counter the force of gravity. If the pga is 1*g*, or higher, the acceleration will be great enough to lift an object off the ground.[10]

2. Spectral Acceleration

A more complicated method for calculating ground motion is to measure the so-called "spectral" acceleration. But knowing the likely spectral acceleration of a possible earthquake is critical for builders and engineers, making the extra calculation worth the effort.

a. Resonance Period

Every building has what is called a "natural" or "resonant" period,[11] and if the frequency of a wave produced by an earthquake approaches the building's natural period, the building will oscillate with a much larger amplitude than when a force is applied at other periods. In other words, it will shake much more violently, and is much more likely to be damaged in such an event. Hough, *supra* at 148-49. Consequently, a builder who knows the resonant period of the structure could construct a much safer building if she knew the acceleration of the ground motion associated with that building's resonant period.

[10] *Earthquake Glossary, "Acceleration,"* U.S. Geological Survey, https://earthquake.usgs.gov/learn/glossary/?term=acceleration (last visited June 12, 2019).
[11] As discussed above, the frequency at which a wave travels relates inversely to the wave's period (e.g., a frequency of 1 Hz = a period of 1 second; 2 Hz = a period of 0.5 seconds).

b. Calculating Spectral Acceleration

Spectral acceleration is best understood in two steps.[12] First, as discussed above, a single (and ideally symmetrical) wave has a given (and easily measured) frequency. In practice, an earthquake produces many waves at many frequencies. A "spectral frequency" graph will show the "frequency of the frequencies"; in other words, how many waves of a given frequency are produced by a given earthquake. Second, one can take a particular frequency, and mathematically derive the acceleration from each particular frequency, in theory producing a graph with the "frequency of the accelerations."[13]

Ideally, the "spectral acceleration" would measure the acceleration across every frequency, based on the frequency spectrum for that particular earthquake (which would be more representative of that earthquake as a whole than the peak acceleration). Hough, *supra* at 148. But doing so is extremely cumbersome.

For this reason, USGS records the peak spectral acceleration in large earthquakes at only a few periods. These periods are not selected randomly, but are calculated because they bracket the range of resonant periods that a typical building might have. *Id.* And, somewhat importantly for this case, USGS had previously modeled spectral acceleration at three periods—0.3 seconds, 1.0 second, and 3.0 seconds. *Id.* But when the 2014 seismic hazard map was released, spectral acceleration was calculated instead at periods of 0.2 seconds and 1.0 second.

[12] *See* Hough, *supra* at 85-88, 148-151; *Earthquake Hazards 201 – Technical Q&A*, U.S. Geological Survey, https://earthquake.usgs.gov/hazards/learn/technical.php (last visited July 29, 2019).

[13] The spectral acceleration can be modeled by measuring the displacement of a particle mass at the same natural period as the building. Then, "[i]f we take the derivative (rate of change) of the displacement record with respect to time we can get the velocity record. The maximum velocity can likewise be determined. Similarly for response acceleration (rate of change of velocity) also called response spectral acceleration, or simply spectral acceleration." *Earthquake Hazards 201 – Technical Q&A*, U.S. Geological Survey, https://earthquake.usgs.gov/hazards/learn/technical.php (last visited July 29, 2019).

3. Modified Mercalli Intensity ("MMI")

To measure the intensity at a particular location, seismologists in the United States may refer to the Modified Mercalli intensity (MMI) scale. Unlike the previously discussed intensity measurements, which incorporate objective data, the MMI scale does not have a mathematical basis. Rather, according to the USGS, it is "an arbitrary ranking based on observed effects," and is based on subjective human perceptions about the intensity of the earthquake.[14]

MMI values are used, in part, because it is a more accessible way to measure an earthquake's severity for the nonscientist than ground acceleration. *Id.* The MMI scale uses human observations to rate the "intensity" of the earthquake on a Roman numeral scale from I to X. At an intensity of I, the earthquake is "[n]ot felt except by a very few under especially favorable conditions." At an intensity of X, "extreme" shaking occurs; some well-built wooden structures, as well as most masonry and frame structures, are destroyed, and rails are bent. *Id.* (MMI can also be used to approximate the size and intensity of historical earthquakes that occurred before modern measuring equipment was available, by looking to contemporaneous accounts.)

USGS will solicit public input to calculate the MMI value. For example, on March 5, 2019, employees on the fourth floor of the Howard Baker, Jr. United States Courthouse, in Knoxville (ZIP code: 37902), felt a shaking around 4 PM EST.[15] Twenty people in the ZIP code reported their qualitative experience of the earthquake to USGS; from those intensity reports, the MMI intensity in the 37902 ZIP code was measured at III, corresponding to "weak" shaking.[16]

[14] *The Modified Mercalli Intensity Scale*, U.S. Geological Survey, https://earthquake.usgs.gov/learn/topics/mercalli.php (last visited June 12, 2019).
[15] *See* Jim Gaines, *3.4 Magnitude Earthquake Felt Near Maynardvillle*, KNOXVILLE NEWS SENTINEL, Mar. 5, 2019, https://www.knoxnews.com/story/news/2019/03/05/earthquake-near-maynardville/3070717002/.
[16] *M 3.4 – 7 km NE of Maynardville, Tennessee*, U.S. Geological Survey, https://earthquake.usgs.gov/earthquakes/eventpage/se60233907/dyfi/responses (last visited June 12, 2019).

c. Forecasting Earthquakes

Of course, in this case, Plaintiffs are not arguing Defendants failed to accurately measure a past earthquake, but contend that Defendants have not adequately taken into account the hazards presented by *future* earthquakes.

i. USGS Seismic Hazard Maps

As already mentioned, a key document in this case is the 2014 USGS Seismic Hazard Map. First developed in the 1970s, these maps are updated by USGS on a regular basis to incorporate the most recent innovations in measuring and forecasting earthquakes, in order to provide up-to-date and useful guidance for public and private decision makers who need to account for earthquake hazards in their work [AR 28673]. The maps have a host of practical applications, and are used, among other things, to draft building codes, structure insurance rates, and conduct site-specific engineering analyses [*Id.*].

The maps only provide probabilistic results; they do not offer predictions of when or where an earthquake might occur (which simply cannot be done with any accuracy, given the scientific complexities). Instead, they evaluate the long-term earthquake hazard within a given region. Hough, *supra* at 131. Specifically, the probability is expressed as the *probability of exceedance*, which calculates the likelihood that a given earthquake intensity (measured in terms of either peak ground acceleration or spectral acceleration) will be exceeded in a given timeframe. Conveniently, the USGS makes an online search tool—the "Unified Hazard Tool"—available to the public. Anyone can look up the seismic hazard for a particular location within the United States and see an earthquake forecast for that location.[17]

[17] *Unified Hazard Tool*, U.S. Geological Survey, https://earthquake.usgs.gov/hazards/interactive/ (last visited June 13, 2019).

To produce this forecast, USGS initially splits the United States into the "Central and Eastern United States" (CEUS) and the Western United States (which is further broken down into California, Cascadia, and the Intra-mountain West). Within the CEUS—the relevant region in this case—a probabilistic seismic hazard is derived from three types of source material: i) an earthquake catalog, recording rates and patterns of past earthquakes; ii) geologic studies identifying source faults, and iii) ground motion models applicable to CEUS (considered a "stable continental region," or SCR) [AR 28960].

The analysis then proceeds in two steps. First, the earthquake catalog and source fault information[18] are combined to calculate the "a-grid,"[19] which maps the seismicity rate (that is, how many earthquakes of a given magnitude can be expected to occur) within different subregions of the CEUS [AR 28697-700]. These a-grids are then fed into multiple ground motion models that express the ground motion intensity in terms of peak ground acceleration and spectral acceleration at various frequencies [*see* AR 28782-802]. The data from these models provide ground motion forecasts for each region at different probabilities of exceedance (and, as discussed, the data is incorporated into the Unified Hazard Tool).

VI. FACTUAL BACKGROUND

With this basic grounding in the science, the Court will summarize the history of this case.

a. Y-12 Background

[18] Source fault information in the CEUS is sparse, so USGS does its analysis by assuming uniform seismicity rates based on past data, and then updating with source fault information where available.

[19] According to the "Gutenberg-Richter" relationship, the magnitudes of future earthquakes can be forecasted based on the rate at which earthquakes at a given magnitude have occurred in the past. The relationship is given by $\log(N) = a - bM$. By assigning a magnitude value to M, one can calculate N, or the number of earthquakes above that magnitude. The *b*-value represents the slope of the line, which almost always nearly equals 1. The *a*-value is the magnitude of an average earthquake that occurs once a year within the region. Hough, *supra* at 56. So the "*a*-grid" is the collection of *a*-values across a given region.

i. History

Y-12 sits on the banks of the Clinch River, in Oak Ridge, Tennessee—about 15 miles from Knoxville, the largest city in East Tennessee. It is part of the larger "Oak Ridge Reservation," which is comprised of more than 1,200 DOE-owned buildings between Y-12 and the nearby Oak Ridge National Laboratory (ORNL).[20]

A century ago, the town of Oak Ridge did not exist. White settlers first entered the area between Walden Ridge (which marks the eastern boundary of the Cumberland Plateau) and the Clinch River in 1798. Throughout most of the nineteenth century, residents were subsistence farmers. In the late 1800's, many residents found work in newly developing coalfields to the west. This state of affairs lasted until the Great Depression.

The 1930's were a pivotal time throughout America, but perhaps nowhere did the Depression, and the ensuing government response, have a greater lasting impact than in Appalachia and East Tennessee. To address poverty in the Tennessee River watershed, which covers seven states across Appalachia, Congress created the Tennessee Valley Authority (TVA) in 1933. TVA was charged with using the abundant water and natural resources in the Tennessee Valley to provide work and cheap electricity to its residents. TVA went to work quickly, completing the construction of its first dam—Norris Dam, on the Clinch River to the northeast of present-day Oak Ridge—by 1936.

Far away from the verdant ridges and valleys of East Tennessee, German chemists had discovered the process of "nuclear fission" by late 1938. Two Hungarian immigrants, the nuclear physicists Eugene Wigner and Leo Szilard, realized this discovery could be used to produce fear-

[20] Most of the background used for this section was helpfully provided in the "Cultural Resources Management Plan" prepared for the Oak Ridge National Laboratory [AR 4947].

some weapons of mass destruction, as well as electricity for human consumption. Along with Albert Einstein, the physicists approached President Franklin Roosevelt in July 1939, to inform him of the discovery and its consequences. Later that year, a committee assembled by President Roosevelt agreed to provide $6,000 for uranium fission experimentation.

After Japanese planes bombed Pearl Harbor on December 7, 1941, the United States entered World War II, and the need to develop a nuclear weapon suddenly felt more urgent. Scientists quickly formed the secretively-named "Metallurgical Laboratory" at the University of Chicago to research techniques for enriching uranium and plutonium (the other highly fissile element that can be used in atomic weapons, and which is created as a byproduct of uranium decay), along with designing the bomb itself.

President Roosevelt assigned the task of producing nuclear weapons (along with the construction and management of uranium and plutonium plants) to the Army, and engineers were sent to scout locations where uranium and plutonium could be produced on a large scale. Three engineers visited a site in East Tennessee bordering the Clinch River. The site was adjacent to two railroads and had abundant electricity, thanks to TVA, but was safely hidden in a valley midway between the two largest (yet relatively small) towns in the area—Kingston and Clinton.

The Army Corps of Engineers formed a new district—the Manhattan Engineer District—on August 16, 1942. The district was indeed initially headquartered in Manhattan, New York, near Columbia University, where much of the groundbreaking nuclear physics research was taking place. But unlike any other Corps district, the Manhattan District was not bounded geographically. Instead, any facility devoted to producing an atomic bomb fell within its grasp. The activities that took place at all these sites became known as the "Manhattan Project," and the goal of the project

was to build an atomic bomb by 1945—a task later described as the "equivalent of building a Panama Canal each year" [AR 5009].

General Leslie Groves led the project, and he swiftly ordered the immediate purchase of land in the area now known as the Oak Ridge Reservation, which became the headquarters and the focal point of all uranium production for the project. By March 1943, the Corps had purchased 866 tracts of land encompassing 58,575 acres in Roane and Anderson counties. The land was code-named "Site X" (a plutonium manufacturing plant in Hanford, Washington became "Site W," and the weapons research center in Los Alamos, New Mexico was "Site Y").

Scientists had not yet perfected a technique for enriching uranium, so three buildings were constructed at Oak Ridge—code-named X-10, K-25, and Y-12—to implement three different methods for enriching uranium. Another location called "Townsite" (now the city of Oak Ridge, Tennessee), was built to house the workers who would enrich the uranium that was then sent to New Mexico, where it would be assembled into a bomb.

On August 6, 1945, a U.S. B-29 bomber took off from Tinian Naval Base in the Mariana Islands, weighed down with a 9,700 pound bomb named "Little Boy," containing 141 pounds of uranium enriched at K-25 and Y-12. The plane flew over Hiroshima, Japan and released the projectile. When it was 1,900 feet above Hiroshima, a mass of uranium inside the bomb fired into another, setting off a nuclear chain reaction.

Three days later, a second bomb (containing plutonium produced at "Site W" in Hanford, Washington), dropped over Nagasaki, Japan. Within a month, Japan formally surrendered, and World War II was over. Back in Oak Ridge, many of the workers at Townsite learned for the first time that they had helped build the bomb that ended the war.

ii. The Y-12 Modernization Plan

The Oak Ridge Reservation was not initially designed to last beyond the duration of the war, but plans were announced a mere three weeks after surrender to develop the Reservation into a permanent nuclear and scientific research facility. Congress passed the Atomic Energy Act[21] in August 1946, creating the Atomic Energy Commission and transferring atomic research into civilian hands; on New Year's Day, 1947, the Manhattan Engineer District ceased to exist. Two of the code-named sites, which had been built to enrich uranium for weapons, evolved beyond the original narrow mission. "X-10" became the Oak Ridge National Laboratory. Originally, it focused its research on developing nuclear reactors, but has since evolved well beyond its original mission into a multipurpose national laboratory. "K-25" began to produce low-enriched uranium for nuclear energy reactors; eventually it was renamed the "East Tennessee Technology Park," and it has since been torn down.

On the other hand, Y-12 has continued to manufacture and store the highly enriched uranium needed for nuclear weapons. Immediately after World War II, this meant producing more enriched uranium to build more nuclear weapons. But the mission of Y-12 changed substantially in the early 1990s, when the Soviet Union collapsed and the Cold War ended [AR 1274]. As a result, the "emphasis of the U.S. nuclear weapons program has shifted dramatically over the past few years from developing and producing new weapons to dismantlement and maintenance of a smaller, enduring stockpile" [*Id.*; AR 6366]. Since 1992, the United States has declared a moratorium on nuclear testing, and in 1996, President Bill Clinton became the first head of state to sign the U.N. Comprehensive Test Ban Treaty (which has not been ratified by the Senate). David S. Jonas, *The*

[21] Pub. L. No. 79-585, 60 Stat. 755 (1946).

Comprehensive Nuclear Test Ban Treaty: Current Legal Status in the United States and the Implications of a Nuclear Test Explosion, 39 N.Y.U. J. INT'L L. & POL. 1007, 1019 (2007).

In 1994, Congress established the "Stockpile Stewardship Program," directing the Secretary of Energy to ensure the "preservation of the core intellectual and technical competencies of the United States in nuclear weapons." FY 1994 National Defense Authorization Act, P.L. 103-160, § 3138 (1994). The Program is subdivided into five components: i) the "Life Extension Program" (i.e., refurbishing weapons and reusing or replacing components); ii) evaluation and surveillance; iii) weapons dismantlement and disposition; iv) materials management, storage, and disposition; and v) material recycle and recovery [AR 20407-09]. Y-12 plays a role in all of these missions, and also supplies reactor fuel for nuclear submarines, which run on highly enriched uranium [*Id.*]. Essentially, although Y-12 is not preoccupied with manufacturing enriched uranium at this point, any highly enriched uranium still used by the United States for its thousands of nuclear weapons has likely passed, or will pass, through the gates of Y-12.

Recognizing that no significant upgrades had been made at Y-12 (or other important nuclear sites) since World War II, and in light of its shifting mission, DOE published three "programmatic" environmental impact statements in 1996 that holistically analyzed the environmental impacts of its new approach to the use and storage of nuclear weapons at all existing facilities [*see* AR 1157; AR 1274; AR 1279]. Based on those documents, DOE issued a Record of Decision indicating its intent to maintain the existing national security mission of Y-12, while modernizing and downsizing the facilities [*see* AR 16888]. 61 Fed. Reg. 68014.

The "initial major step" taken to implement this effort was the 2001 "Site-Wide" Environmental Impact Statement for the Y-12 Complex (the "2001 SWEIS") [AR 6313; AR 16888]. DOE had envisioned a wholesale "modernization initiative," known as the "Y-12 Modernization Plan,"

that would consolidate Y-12 operations into fewer, more efficient facilities, and the 2001 SWEIS set a "baseline" for evaluating reasonable alternatives to implement the programmatic decision to modernize the storage of highly enriched uranium and special materials at Y-12 [AR 6344; AR 6366]. After review, DOE settled on a plan for Y-12 that included the continued maintenance of existing DOE and Defense programs, as well as the construction of new, safer, and more secure buildings. In turn, the 2001 SWEIS specifically analyzed the environmental impacts of alternative designs for the first two proposed buildings under the Modernization Plan: the Highly Enriched Uranium Materials Facility (HEUMF)[22], and the Special Materials Complex (SMC)[23] [AR 7520].

DOE published the 2001 SWEIS in September 2001. That same month, the September 11 terrorist attacks changed the geopolitical landscape, and the United States found itself exposed to a "new, broader threat environment" [AR 8965]. A classified "Nuclear Posture Review" was conducted in December 2001, which articulated goals for a "responsive nuclear weapons complex" that could meet a range of "plausible contingencies" [AR 8968]. A "New [Nuclear] Triad" was envisioned, with three goals: i) strategic offensive forces; ii) defensive forces; and iii) a "responsive infrastructure" [AR 9260]. And in 2005, DOE contemporaneously released two documents: a Notice of Intent to Prepare a New Site-Wide Environmental Impact Statement for Y-12, and a classified "Design Basis Threat" policy [AR 9679; AR 9683]. The Notice of Intent revealed plans to construct a modern "Uranium Processing Facility" (UPF) that could meet the latest Design Basis Threat policy guidance in a cost-effective manner [AR 9680; AR 9716].

[22] Essentially, a long-term storage facility for highly enriched uranium [AR 7532-33].
[23] "Special" materials are those besides uranium and plutonium that are needed for nuclear weapons. The SMC would be devoted to producing these materials [AR 7533, 7567].

b. The Uranium Processing Facility

The UPF would replace multiple aging facilities (some of which were more than fifty years old) and would be built next to the HEUMF, which was under construction by 2005[24] [AR 9716]. In 2008, a "Complex Transformation Supplemental Programmatic Environmental Impact Statement" (the "2008 SPEIS") was published [AR 11239]. This statement supplemented the 1996 programmatic statements, which needed updating after DOE set its policy of building a more "responsive" Nuclear Weapons Complex that could adapt to the new geopolitical context [AR 15071-72]. The 2008 PEIS fed into the 2011 Site-Wide Environmental Impact Statement for Y-12 (the "2011 SWEIS")—a key document in this case [AR 16834, 16869].

i. 2011 SWEIS

The 2011 SWEIS "expand[ed] on and update[d]" the analyses contained in the 2001 SWEIS [AR 16876]. In addition to this "site-wide" evaluation, the 2011 SWEIS also evaluated the environmental impacts of the various alternative plans for the UPF, in accordance with the previously issued Notice of Intent.

In compliance with NEPA regulations, NNSA first considered a "No Action Alternative" (labeled "**Alternative 1**"), that would preserve the status quo from the 2001 SWEIS [*Id.*].

Alternative 2—the "UPF Alternative"—proposed constructing the UPF, which would consolidate enriched uranium operations[25] into an "integrated manufacturing operation" [AR 16877]. Although it would require a major capital investment, the UPF would improve security, reduce operational costs, and "enhance worker, public, and environmental safety" [AR 16878].

[24] The project to build a Special Materials Complex, the other building discussed in the 2001 SWEIS, was cancelled by 2005 [AR 9680].

[25] Specifically, the UPF would allow for the consolidation of all "Category I" and "Category II" special nuclear materials into two buildings—the UPF and the newly operational (as of 2011) HEUMF [AR 16878]. Special nuclear materials are designated by quantity and type into four categories used to determine the necessary safeguards and security [*Id.*]. A "Category I" material requires the greatest degree of safeguard and security, and a "Category IV" material the least [*Id.*].

Alternative 3—the "Upgrade in-Place" Alternative—did not propose the construction of any new buildings [AR 16880]. But it would go beyond "no action" by modernizing both enriched and non-enriched uranium processing facilities to comply with contemporary environmental, safety, and security standards (including protection against seismic hazards) [*Id.*]. The upgrades would be limited by the fact that they were being made to existing structures, so it would not be possible to achieve the same level of safety, security, and efficiency as the UPF Alternative.

A production capacity of approximately 125 secondaries[26] and cases per year would be supported under any of the first three alternatives. **Alternative 4**—the "Capability-Sized" UPF Alternative—proposed building a smaller UPF that could produce about eighty secondaries and cases per year, to align with proposed reductions in the overall size of the nuclear stockpile [AR 16880-81]. **Alternative 5**—the "No Net Production/Capability-Sized" UPF Alternative—proposed a much smaller UPF (ten secondaries and cases per year) that envisioned a greater drop in production than Alternative 4 [AR 16881].

On July 20, 2011, NNSA published a Record of Decision ("ROD"), announcing its decision to adopt Alternative 4, the Capability-Sized UPF Alternative [AR 17908].

ii. Seismic Analysis in the 2011 SWEIS

Two parts of the 2011 SWEIS reviewed the existing seismic hazard at Y-12: the "Geology and Soils" analysis [AR 16994-17001], and the analysis of accidents [AR 17162-69].

[26] Unlike the bombs that dropped over Japan, which relied solely on nuclear fission (where energy is produced as the atom breaks apart into smaller elements), modern nuclear weapons use a combination of nuclear fission and fusion (where energy is produced by smaller elements combining to form a larger atom) to create an explosion. The "secondary" casing houses the part of the weapon that facilitates the fusion reaction, and Y-12 manufactures and repairs these casings, generally known as "secondaries." (This two-sentence summary is highly oversimplified, but hopefully sufficient for purposes of this Opinion.)

1. Geology and Soils Analysis

The Geology and Soils analysis is broken into four sections: i) Physiography; ii) Geology; iii) Seismology; and iv) Soils.

The Seismology analysis begins by noting that the greater Oak Ridge area lies in seismic zones 1 and 2 of the Uniform Building Code,[27] "indicating that minor to moderate damage could typically be expected from an earthquake" [AR 16998].

The analysis continues by referring to 10 C.F.R. pt. 100, a section of the federal regulations used by the Nuclear Regulatory Commission ("NRC") when evaluating proposed sites for nuclear stationary power reactors and nuclear research reactors (known as "testing" reactors). 10 C.F.R. § 100.1(a). An appendix to these regulations contains "Seismic and Geologic Siting Criteria" for nuclear power plants. *See id.* p. 100 app. A. These criteria require investigation of "vibratory ground motion" and "surface faulting," using the MMI scale for measuring intensity, and the Richter scale for measuring magnitude. *Id.* § IV. The depth of investigation required depends, in part, on whether there are "capable faults"[28] in the area surrounding the proposed location.

The SWEIS adopts this approach. Finding no evidence of capable faults, historical earthquakes are discussed in terms of intensity measured on the MMI scale, including a 1973 Maryville, Tennessee earthquake, which had an estimated MMI intensity of V to VI in the Oak Ridge area. The SWEIS does forecast that "[m]aximum horizontal ground surface accelerations of 0.06 to 0.30

[27] According to the USGS website, locations are no longer classified by "seismic zones," and the Uniform Building Code does not appear to have been in use since the 1990s. *See "Help Selecting a Seismic Design Tool," USGS*, https://earthquake.usgs.gov/hazards/designmaps/choosing.php (last visited June 21, 2019). While it cannot be determined what standards USGS applied in 2011 when the SWEIS was written, none of the seismic design tools currently available on the USGS website refer to "seismic zones."

[28] A "capable fault" exhibits one of the following characteristics: i) Movement at or near the ground surface at least once within the past 35,000 years or movement of a recurring nature within the past 500,000 years; ii) Macro-seismicity instrumentally determined with records of sufficient precision to demonstrate a direct relationship with the fault; or iii) a structural relationship to a capable fault meeting the criteria of i) or ii) such that movement on one could be reasonably expected to be accompanied by movement on the other. 10 C.F.R. pt. 100 app. A § III(g)(1)-(3).

due to gravity are estimated to result from an earthquake that could occur once every 500 to 2,000 years," but provides no source for this estimate.[29]

2. Accident Analysis

In a later section of the SWEIS, NNSA evaluated the *risks* (the likelihood that an event will occur) and *consequences* (the likely effects that would result) of various accident scenarios given each alternative proposal [*see* AR 16967]. The analysis was "bounded" by the accident with the highest potential consequences (a commercial airplane crash into Y-12) and the accident with the highest risk (a design-basis fire in a highly-enriched uranium storage facility) [*Id.*].

iii. Cost Overruns

Not long after the decision to construct the Capability-Sized UPF was announced, the project quickly encountered bureaucratic roadblocks. When the UPF was first proposed in 2004, NNSA set the upper bound of the cost range at $1.1 billion; by 2012, that upper bound had increased to $6.5 billion [AR 18022]. In June 2012, the Deputy Secretary of Energy approved an updated cost range and deferred significant portions of the project's original scope [AR 18025]. By August 2012, the contractor concluded that the UPF's roof would have to be raised, and construction would be delayed [*Id.*]. For this and other reasons, an additional $540 million in costs were incurred [*Id.*]. At the request of the Senate Appropriations Committee, the Government Accountability Office (GAO) conducted a performance audit of the UPF project in early 2013, and reported its findings to Congress in April of that year [AR 18019, 18024].

[29] The analysis was identical to the one conducted in the draft SWEIS [*see* AR 15882-84]. Commenters on the draft SWEIS—including representatives of both Nuclear Watch and OREPA—had raised concerns about the lack of detail in the seismic analysis [*see* AR 17536, 17571, 17649]. In response to these comments, NNSA repeated its capable fault analysis, and said that while a "moderate" seismic risk existed at Y-12, it should not negatively impact the construction and operation of facilities, as all new facilities and expansions would be designed to withstand the maximum expected earthquake ground acceleration [AR 17692-93].

The ballooning cost estimates led NNSA to change course. On January 15, 2014, Edward Bruce Held, NNSA's Acting Administrator, commissioned a peer review of the UPF project [AR 18102]. He asked Thomas Mason, the director of Oak Ridge National Laboratory, to lead a team that would "develop and recommend an alternative approach to the UPF Project" [*Id.*].

iv. The Red Team Report

The final Red Team[30] Report began on a bleak note: Y-12's current configuration created a "significant program risk" that interfered with its ability to safely manufacture and store highly-enriched uranium [AR 18131]. The delay in the UPF project schedule and increasing baseline cost only exacerbated these issues, and it would be necessary to use the existing facilities at Y-12 for the "foreseeable future" [*Id.*] The Red Team Report proposed a series of near-term actions that, in its opinion, were necessary to reduce safety and operational risks in the existing facilities [*Id.*].

The Report offered a blunt recommendation: Design efforts on the current "big box" UPF concept should stop immediately [*Id.*]. All resources instead should be poured into developing a revised "project baseline" in concert with an evaluation of projected funding [*Id.*]. Some operations envisioned for the current UPF design could not be incorporated in the new design, some would have to be housed in existing buildings, and some would be deployed in "new build" facilities [*Id.*]. Based on this recommendation, the Report then identified the existing buildings at Y-12 that were most in need of replacement or repair. Effectively, the Red Team conducted triage to determine which buildings were most at-risk and which could feasibly be refurbished.

[30] Although both parties refer to this as the "Red Team" Report, the term "Red Team" only appears a few times. From context, it appears the term was used colloquially by the group itself, which was composed of nuclear weapons experts from both government and private industry.

The "focal point" of Y-12's operations is the production of uranium metal and uranium oxide [AR 18141]. Secondary processes—mainly purification, conversion, and uranium waste management—support this underlying mission [*Id.*]. These operations were traditionally housed in three Buildings 9204-2E, 9212, and the "9215 Complex."[31] If the UPF were constructed, all three of these facilities would have been decommissioned or repurposed for less critical tasks.

The Report singled out Building 9212 as the highest-risk facility. Accordingly, the Red Team recommended decommissioning 9212, and developing a plan to reallocate all existing 9212 functions into the other two buildings, as well as the proposed new builds [AR 18137]. Further, the Team recommended designating the 9215 Complex as an "interim" facility (to last less than 25 years), while designating 9204-2E as an "enduring" facility (to last at least 25 years) [AR 18138]. To enable this continued use, investments would need to be made in the facility infrastructure and the equipment in the 9215 Complex and 9204-2E [*Id.*].

v. Downsized UPF

CNS, the Y-12 contractor, sprang into action. By December 2014, a project management plan was in place to implement the first step recommended by the Red Team—replacing Building 9212[32] [AR 19025]. The same month, NNSA presented a "UPF Project Update" that was consistent with the plan released by CNS [AR 19090].

The plan presented a "multi-facility option" for replacing Building 9212 [AR 19025]. The Main Process Building would be constructed to safely incorporate high-hazard nuclear materials and processes, while a Salvage and Accountability Building would incorporate low-hazard nuclear materials and processes [*Id.*]. Separately, a Mechanical/Electrical building would be constructed

[31] The "9215 Complex" consists of Buildings 9215, 9998, 9215A, 9811, 9996, and the A-2 Wing of Building 9212.
[32] At this time, the new build was still considered one part of the "UPF Project."

to non-nuclear specifications [*Id.*]. All three buildings would be constructed right next to the HEUMF, in the same location where the original UPF was proposed [AR 19092].

vi. Public Response

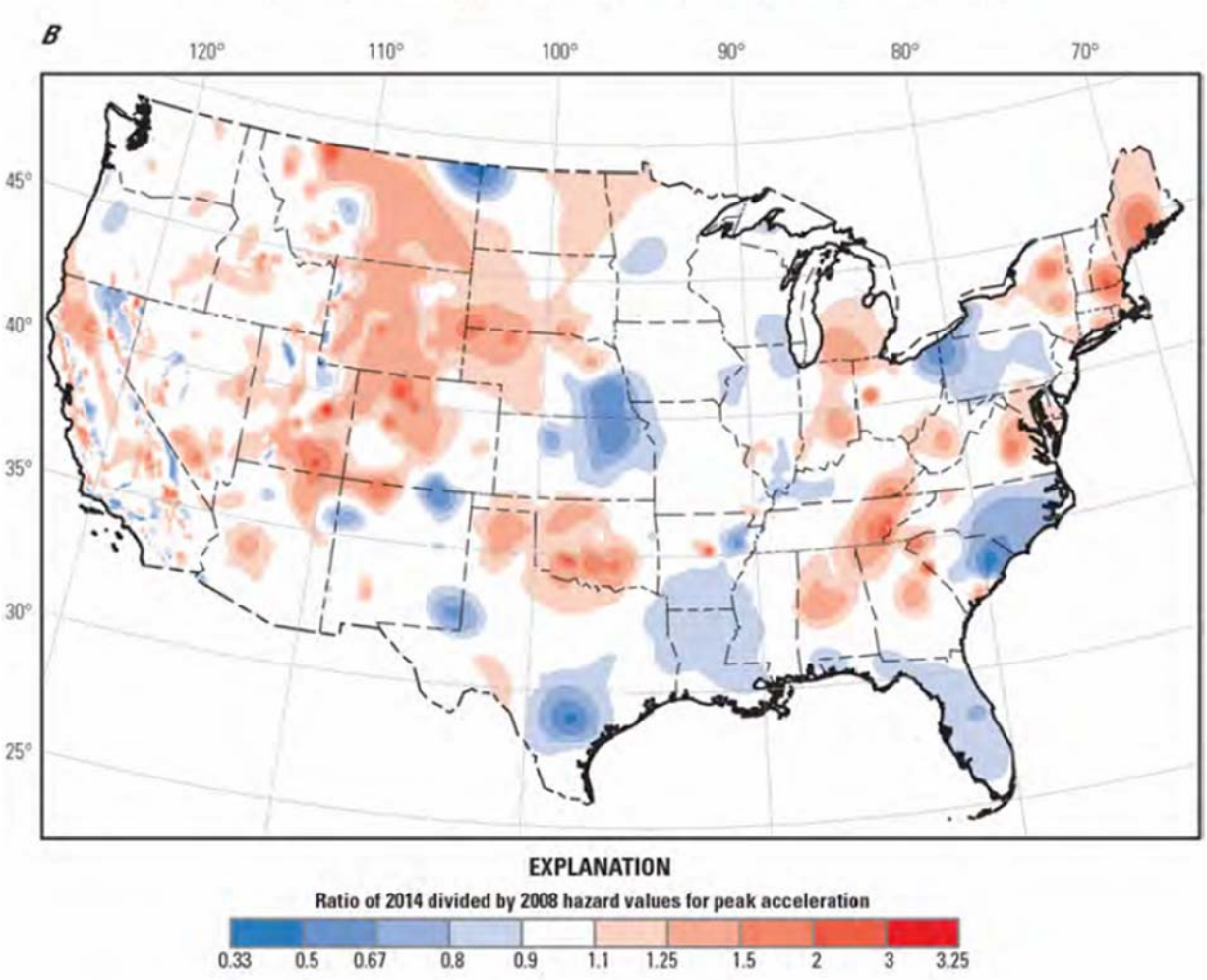
In July 2014, shortly after the Red Team Report was published, Plaintiff Ralph Hutchison wrote a letter on behalf of OREPA to an official in DOE's NEPA office, asking DOE to begin a fresh NEPA process in light of the Report (which had already been "verbally adopted" by NNSA, according to Mr. Hutchison) [AR 18357]. In the letter, Mr. Hutchison argued that a new EIS was required because the "reduction in scope of the UPF's operations, followed later by an abandonment of the plan to transition out of other aging facilities" was a "significant change" from the proposal made in 2011 [AR 18358]. In his view, the Red Team proposal was "significantly more complicated" than any alternative contemplated in the 2011 SWEIS, and carried "potentially greater" environmental risks [*Id.*]. DOE allegedly never responded to Mr. Hutchison, and no response appears in the record.

vii. New Seismic Information

Mr. Hutchison also related his concerns to DOE about the seismic risk at Y-12 in light of a just-released USGS seismic hazard map [AR 18359].

1. <u>2014 Seismic Hazard Map</u>

The 2014 seismic hazard maps showed increases in the two percent probability of exceedance for East Tennessee from 2008. This map shows it most clearly [AR 28684]:



The map expresses the ratio, between the 2014 and 2008 maps, of the change in estimated peak ground acceleration at two percent probability of exceedance; the darker the red, the greater the increase. As one can see, East Tennessee is covered in red. In Mr. Hutchison's mind, this "darkened red oval...changed the calculations on which the [2011] SWEIS relied for its assessment of natural phenomena hazards" [AR 18359].

2. DNFSB Oversight: Pre-2016 SA

Mr. Hutchinson also referred to "concerns" raised by the DNFSB regarding the seismic quality of Building 9212 and the UPF. Although the letter did not specify what these "concerns" were, the record reveals such a history stretching back at least to 2009.

a. DNFSB: Background

DNFSB ("the Board") is an independent executive branch agency that provides analysis, advice, and recommendations to the Secretary of Energy, to ensure adequate protection of public health and safety at defense nuclear facilities (the Board evaluates the structural condition of these facilities, but does not evaluate safety of the atomic weapons they produce). 42 U.S.C. §§ 2286, 2286a. The Board fulfills its mission by reviewing and evaluating design standards, conducting investigations, analyzing design and operations data, reviewing facility design and construction, and issuing recommendations. *Id.* § 2286a. To perform its functions, the Board may conduct hearings, compel testimony, require the production of documents, and hire staff that can then be assigned to any nuclear facility. *Id.* § 2286b. The Secretary of Energy must fully cooperate with the Board and provide it with the access to facilities, personnel, and information it needs to carry out its responsibilities. *Id.* § 2286c.

b. 2009 Staff Issue Report

In September 2009, Board staff members visited Y-12 to review the geotechnical and structural engineering design activities for the UPF [AR 16467]. In a staff report, published on December 1, 2009, and sent to NNSA in March 2010, the Board said "several outstanding technical issues" needed to be resolved [AR 16465]. The Board believed some of the issues stemmed from the "lack of a systematic plan and documented methodology" for integrating the geotechnical review with the structural engineering objectives [*Id.*]. Additionally, the Board was concerned that NNSA's oversight team was understaffed and incapable of conducting an independent review of the structural design for the UPF [AR 16466]. Given the importance of the UPF, the Board suggested it would be "prudent" to charter an NNSA peer review team that could provide adequate oversight of the UPF's design [*Id.*].

NNSA received the report after the Draft SWEIS had been published in October 2009, but before the final 2011 SWEIS. In the final version, NNSA noted it had received the report and that it would "consider the DNFSB comments in the UPF design process" and "work with DNFSB to ensure all seismic issues [were] appropriately addressed" [AR 16943].

c. 2014 Staff Issue Report

In late 2014, at the same time NNSA began considering the idea of a downsized UPF in conjunction with the refurbishment of existing buildings, the Board sent another review team to look at Buildings 9215 and 9204-2E and "identify gaps between these facilities' designs and modern seismic design practices" [AR 19128]. The gaps it found were significant. For example, under a site-specific earthquake of approximately .12*g* peak ground acceleration[33] at the 9215 Complex, the "structures will have reached a damage state where progressive collapse of the structure is likely, damaging or destroying many if not all areas of the structure as a result" [AR 19130].

The Board did not just express concerns with the buildings' structural design; it also suggested that NNSA's method for evaluating seismic hazard in existing facilities was understating the hazards. This criticism came in two forms.

First, the Board pointed out that DOE had updated its standards for natural phenomena hazards analysis in 2012 for the first time in ten years [AR 19133-34; *see* AR 17920]. Under the old guidance, existing facilities could be evaluated using a 50% reduction in return period from the standards required for a new building [AR 19134]. In other words, if a new building were required to meet standards based on a 2,475 year return period (corresponding to a 2% in 50 year probability of exceedance), an existing building could be evaluated against an approximately 1,250 year return

[33] For context, in December 2018, a 4.4 Mw earthquake struck in Meigs County, Tennessee, about halfway between Chattanooga and Knoxville. Peak ground accelerations as high as .05*g* were estimated near the epicenter of the earthquake, and .031*g* acceleration was recorded 30 kilometers away. *See M 4.4 – 12km NNE of Decatur, Tennessee*, https://earthquake.usgs.gov/earthquakes/eventpage/se60247871/shakemap/pga (last visited Aug. 14, 2019).

period. Because the return period is shorter, the expected accelerations along the hazard response spectrum would be smaller as well.

The 2012 revision had further restricted the appropriate level of hazard reduction to 20% when evaluating existing buildings, and the Board found the 50% reduction used by NNSA "inappropriate" in light of the clarified 2012 standard. While NNSA had justified the 50% reduction based on the previously anticipated remaining operational life for Buildings 9215 and 9204-2E (where both buildings would no longer be in use after building the UPF), the recent changes to the scope of the UPF project "change[d] the outlook" [AR 19134].

Second, in 2013, NNSA had considered whether a "major modification" (as defined by the updated DOE standard) would require significant structural upgrades to any of the existing buildings [*Id.*]. Using a "risk benefit" analysis, NNSA's contractor had concluded that even in the event of a major modification, a structural upgrade would not be prudent given the high cost of upgrades combined with the small risk of a significant seismic event during the period of operations [*Id.*]. The Board found that NNSA's 2014 decision to reduce the scope of the UPF, and maintain existing facilities longer than planned, rendered some of those assumptions invalid [AR 19135].

Based on the combination of new and more stringent guidance for evaluating seismic hazard in DOE facilities, combined with NNSA's recent decision to maintain existing facilities for longer, the Board ultimately recommended that NNSA perform an updated analysis with more accurate techniques under the new standards [*Id.*].

3. Inspector General Report

Another building at Y-12 was singled out in an agency-wide audit conducted by DOE's inspector general concerning the Department's management of excess high-risk facilities [*see* AR 19105]. The audit, published in January 2015, identified the "9201-05 Alpha 5 Facility" as the

"worst of the worst" among buildings across all nuclear defense sites [AR 19112]. Alpha 5 had been built in 1944 and the high risk it presented to both workers and the environment could only be solved—in the Inspector General's assessment—through demolition.

4. Seismic Peer Review Team

In October 2015, NNSA and CNS formed a "Seismic Peer Review" team[34] to review the work supporting the development of a "design basis earthquake response spectra" for the UPF project [AR 28331]. After receiving the recommendations, the UPF project team, managed by CNS, then issued its plan for implementing the Seismic Peer Review team's recommendations in March 2016 [*Id.*].

The team had issued a number of technical recommendations, including the following:

> The [UPF] project needs to develop a formal position on whether the seismic spectra will incorporate increased seismic hazard values for Eastern Tennessee that appear on the [USGS] 2014 National Seismic Hazard Map. The 2014 values are higher than the USGS 2008 Map, and they may be higher than the hazard derived from the Central and Eastern United States Seismic Source Characterization (CEUS-SSC)[35] for Nuclear Facilities, which was the basis for the Clinch River and UPF PSHA.[36]
>
> [AR 28341]

Despite the Seismic Peer Review team's recommendation, the UPF project team decided *not* to incorporate the seismic hazard results of the 2014 USGS map because the 2014 map had not been included in the "UPF Design Code of Record"—a periodically updated[37] document that contains laws, regulations, codes, standards, specifications, etc.—that formed the basis for the engineering design of the UPF [AR 28341, 26441]. The Project team did not foreclose the possibility

[34] The team was formed at a "Seismic Summit" held in March 2014 [AR 28343] and was comprised of an "expert panel" of outside engineers with seismic subject matter expertise [AR 30071].
[35] Published in 2011, and available online, the CEUS-SSC report was sponsored by DOE, NRC, and the Electric Power Research Institute. *See CEUS-SSC, Frequently Asked Questions*, http://www.ceus-ssc.com/Report/About.html. The report provides a seismic source model that individual nuclear facilities can then use to conduct their own localized probabilistic hazard assessments. *Id.*
[36] "Probabilistic Seismic Hazard Assessment."
[37] The Code of Record for the UPF project has been updated five times, most recently in September 2017 [AR 26348].

of considering the 2014 map at a later time, when the "maturity" of the data was established, specifically with regard to certain spectral accelerations and hazard frequencies that were being used in site-specific analyses not yet available for the 2014 map.

viii. Extended Life Program

In the meantime, NNSA and CNS ironed out their plans to improve and refurbish the remaining buildings. In January 2016, CNS unveiled the "Extended Life Program" (ELP) [AR 20425]. An accompanying report proposed four near-term actions: i) reducing material-at-risk (MAR) inventory in existing facilities; ii) relocating processes from Building 9212 into 9204-2E and the 9215 Complex, while also inserting new technologies into these buildings to reduce safety and production risks; iii) sustaining existing infrastructure to reduce safety and mission risk; and iv) "establishing new capabilities" in the UPF [AR 20442-43]. In the medium-term, the ELP proposed construction of a building next to the UPF that would completely replace the 9215 Complex by the "late 2030s" [AR 20443]. In the long-term (i.e., more than twenty-five years in the future), Building 9204-2E would be replaced by a third building [*Id.*; AR 20473].

Six months later, a "Safety Strategy Report" was prepared for the ELP in order to "allow[] key stakeholders to agree on the safety strategy to address risk mitigation or acceptance early in the planning process to prevent late changes that could have significant cost and schedule impacts" [AR 20682]. Since its original publication in June 2016, the Safety Strategy has undergone two revisions, with the latest in November 2017 [AR 26929, 29980]. In May 2017, DNFSB prepared a Staff Issue Report to evaluate the Safety Strategy.

ix. Categorical Exclusions

Once the ELP was in place, NNSA initiated "approximately" sixty-seven proposed ELP-related actions that it found were covered by "categorical exclusions" under 10 C.F.R. subpt. D

app. B (meaning the actions were exempt from any further NEPA review) [AR 31076]. The majority of the actions taken reflected the ELP's goal of "sustainment" and "bridging strategies" that would keep existing facilities viable in the near future while planning on eventual replacement in the longer term [*Id.*]. These actions included electrical improvements to the Buildings 9215 and 9204-2E, fire suppression upgrades, a "roof asset management" program, humidity control improvements, and multiple machining tool and controller equipment upgrades [*Id.*].

Prior to 2016, but after the 2011 SWEIS and ROD, NNSA had also used categorical exclusions for three other actions: The installation of a double seamer canning machine (used to safely can components from weapons tear downs) in 2014 [AR 18269-72]; installation of a "calciner furnace" that would solidify (that is, calcify) whatever enriched uranium is in "low-equity liquids" in 2013 [AR 18097-101]; and, most controversially, the "Electrorefining project," also in 2013 [AR 18010-13]. "Electrorefining" converts impure uranium metals into purified uranium metal by electrochemical means [AR 19688]. The technology has never been used at Y-12, and the proposed project would require significant investment and take three years to build [AR 19699].[38]

c. 2016 SA & AROD

Shortly after CNS released the report on the ELP, NNSA prepared a "Supplement Analysis" to the 2011 SWEIS in order to address whether the decision to discontinue the full-size (or "big box" UPF)—and instead build a downsized UPF while improving existing buildings under the ELP—required the NNSA to prepare a SEIS [AR 20595]. As discussed, when DOE or its sub-agency has already prepared an EIS for a proposed action and new circusmstances or information arise that may trigger a SEIS, DOE regulations require it to prepare a Supplement Analysis to

[38] All three were approved by NNSA under Categorical Exclusion B1.31, which applies to the "Installation or Relocation of Machinery and Equipment," and the Calciner was also approved under B1.3, which applies to "Routine Maintenance." *See* 10 C.F.R. § 1021 subpt. D app. B.

determine if a proposed change in the action may be implemented without further NEPA analysis. *See* 10 C.F.R. § 1021.314(c). NNSA concluded that no further NEPA analysis was required, and published an Amended Record of Decision ("AROD") in July 2016 [AR 20707].

i. Analysis of Alternatives

The AROD characterized the new decision to build a smaller UPF while upgrading existing buildings as a "hybrid" of the "Upgrade in-Place" alternative (Alternative 3) and the "Capability-Sized UPF" alternative (Alternative 4) from the 2011 SWEIS [AR 20709, 20604]. Thus, even though the circumstances had changed, NNSA decided further NEPA analysis was not required, because the environmental impacts would not be significantly different from what had been analyzed in the 2011 SWEIS [AR 20654].

ii. Seismic Analysis

The 2016 SA briefly rehashed the Geology & Soils analysis from the 2011 SWEIS, and found the information from that document "remain[ed] valid and relevant" and therefore NNSA did not repeat its analysis [AR 20614]. With regard to the more recent information in the 2014 USGS map, NNSA found that "[a]lthough different," the new USGS map did not change the "site-specific seismic data at Y-12 which is used to determine facility design and construction requirements [*Id.*]. Continuing, NNSA wrote:

> The site-specific design-basis[39] earthquake spectra that would be factored into the requirements for any new UPF buildings has been conservatively developed, and contains margin to address both current requirements and possible future modification of the spectra input, such as the input from the recent USGS seismic hazard changes. Any new facilities would be designed and constructed in accordance with all applicable requirements, including DOE Standard 1020-2012, Natural Phenomena Hazards Design and Evaluation Criteria for Department of Energy Facilities. [*Id.*]

[39] A "design-basis" earthquake is one that could reasonably be expected to happen, and thus the kind of earthquake that a building would be designed to withstand.

Regarding accident concerns, NNSA concluded "[t]he potential for impacts from accidents for the proposed action would not change compared to those impacts presented in the [2011] SWEIS" [AR 20648]. Accordingly, its conclusion that any analysis of accidents due to earthquakes should be bounded by the accidents with the "highest potential impacts to the offsite population"—an aircraft crash and a design-basis fire at the enriched uranium facilities—had not changed [*Id.*].

iii. Conclusion & AROD

Based on these evaluations, NNSA concluded the "identified and projected impacts of the proposed action would not be significantly different from those in the [2011] SWEIS" [AR 20654]. In accordance with the SA's conclusion, NNSA published an Amended Record of Decision in the Federal Register on July 12, 2016, confirming the finding that no further NEPA analysis was required [AR 20707].

d. 2018 SA

In May 2018, after the Complaint in this case had been filed, NNSA released a new Supplement Analysis in draft form, which it made available for public comment (which is not required under any DOE regulation) [AR 30796].

i. Draft SA

Unlike the 2016 SA, which was prepared specifically to evaluate whether the changes to the UPF—and the enriched uranium program and operations at Y-12—required NNSA to prepare a SEIS, the new SA had a broader "site-wide" scope, with a "focus on the changes and new information gather that have occurred at Y-12 since publication of the 2011 SWEIS, or [those] that [were] expected to occur within the next five years" [AR 30987]. Because the changes to the UPF had been blessed in the 2016 SA, the real focus of the 2018 SA—insofar as it affects this litigation—has to do with its updated seismic analysis (and related accident analysis).

As in the 2016 SA, NNSA concluded the 2011 SWEIS seismic analysis remained "valid and relevant" [AR 31010]. But, in a shift from 2016, NNSA "acknowledge[d] that the documented safety basis reports for the existing Y-12 facilities will need to be updated to reflect updated seismic hazard information from both the 2014 USGS report/maps" along with another seismic study being prepared (by NRC, DOE, and the Electric Power Research Institute ("EPRI")) [*Id.*] Once the latter study was complete in 2019, NNSA would integrate the results with the information in the 2019 study [*Id.*].

Nevertheless, NNSA "did not expect[] that this new seismic information [would] increase the accident consequences or risks associated with the continued operation of existing facilities, as reviewed in the 2011 SWEIS and 2016 SA" [*Id.*]. The principal reason for this finding was that, whatever results the site-specific seismic studies produced, NNSA had reduced the materials-at-risk ("MAR") in the 9215 Complex and Building 9204-2E, which meant that any increase in negative consequences would likely be counterbalanced by a reduction in hazardous materials [AR 31022-23]. Consequently, NNSA felt there was no need to "unbound" the accident analysis in the 2011 SWEIS (and thereby provide a more in-depth earthquake accident analysis) because it did "not believe there would be a significant change in bounding impacts as a result of the reports identified in the SA, or any new information that had become available since publication of the 2011 SWEIS [AR 31023].

ii. Comments

Many comments to the draft SA were submitted, including one from a well-credentialed geophysicist, Dr. David Jackson, that was prepared at the request of some of the Plaintiffs in this case [AR 31649]. He reviewed the relevant documents regarding NNSA's analysis of seismic risks

at Y-12 and found it to be "badly lacking" and "not a scientifically based review of seismic risks" [*Id.*]. He made three specific critiques.

First, he found NNSA's consideration of the USGS data to be "simplistic" because—essentially—NNSA had focused entirely on the image in the hazard map itself (which is necessarily approximate) rather than apparently considering the underlying data in the map [AR 31650]. Dr. Jackson reviewed the underlying data and found that "the underlying USGS data shows risks of significantly larger earthquake shaking than that which NNSA has superficially considered" [*Id.*].

Dr. Jackson also found room to criticize NNSA's "inappropriate focus" on so-called "capable faults," when it was "increasingly evident that large earthquakes can occur in the absence of a known 'capable fault.'" [AR 31651]. To bolster the immediacy of his claim, he appended a study performed by University of Tennessee scientists which found that there was "deep faulting" within the Eastern Tennessee Seismic Zone that is not evident in surface studies, like the one apparently relied on by NNSA in its "capable fault" determination [*Id.*; *see* AR 31670].

Finally, Dr. Jackson took NNSA to task for inadequately considering the seismic risk faced by the existing buildings at Y-12. The analysis was lacking, he argued, both because NNSA had failed to take into account certain "secondary hazards" (such as fires) that might result, and because NNSA had relied upon "linear modeling" techniques[40] [AR 31651-52].

iii. Final SA

The final version of the SA [AR 31061] incorporated none of these comments, and is a word-for-word restatement of the draft (in all the relevant parts discussed). The SA did include responses

[40] A linear analysis is a method that assumes the deformation a building undergoes scales in a linear fashion with the force of the earthquake [AR 31652]. So if the earthquake is twice as strong, the building would be damaged twice as badly. A "non-linear" analysis might account for factors such as "progressive degradation," where each shaking cycle would further weaken the structure; Dr. Jackson noted that DNFSB had suggested NNSA should undertake a non-linear analysis for its aging buildings [*Id.*].

to all the comments submitted, and while not calling Dr. Jackson out by name, did respond to his comments directly [*see* AR 31150-51]. Interestingly, NNSA did not really dispute most of Dr. Jackson's comments, but rather indicated that it was taking the more sophisticated data Dr. Jackson mentioned into account as part of the site-specific analysis it was preparing [*Id.*]. To date (as of late summer 2019), the site-specific analysis has not been released.

VII. DISCUSSION

a. Standing

Defendants have not challenged Plaintiffs' standing to sue. Nevertheless, the Court has a threshold obligation to ensure it is adjudicating a "case or controversy" under U.S. CONST. art. III § 2; *Imhoff Inv., L.L.C. v. Alfoccino, Inc.*, 792 F.3d 627, 631 (6th Cir. 2015).

Under the APA, a plaintiff seeking judicial review of agency action must demonstrate both constitutional and "prudential" standing. *Friends of Tims Ford v. Tenn. Valley Auth.*, 585 F.3d 955, 966-67 (6th Cir. 2009) (citing *Courtney v. Smith*, 297 F.3d 455, 460-61 (6th Cir. 2002)). Further, the three organizational plaintiffs must demonstrate so-called "associational" standing. *Id.*

i. Constitutional Standing

Constitutional standing requires the plaintiff to satisfy three elements: i) an allegation of "injury in fact," which is a concrete harm suffered by the plaintiff that is actual or imminent; ii) causation, which means there is a fairly traceable connection between the plaintiff's injury and the complained-of conduct; and iii) a demonstration of "redressability," or a likelihood that the requested relief will redress the alleged injury. *Id.* (citing *Steel Co. v. Citizens for a Better Env't*, 523 U.S. 83, 102-04 (1998)).

The injury-in-fact in this case would be considered a "procedural injury"—that is, an injury that is suffered when the agency's violation of certain procedural rules threatens the plaintiff's

concrete interests. *Id.* at 968. "It is well settled that, in a NEPA suit, a cognizable injury exists when a plaintiff alleges that a proper EIS has not been prepared [and] when the plaintiff also alleges a 'concrete' interest...that is threatened by the proposed actions." *Id.* (quoting *Ouachita Watch League v. Jacobs*, 463 F.3d 1163, 1170 (11th Cir. 2006)).

Here, the alleged injuries that might result include an earthquake-induced collapse of buildings containing material used for nuclear weapons [*see* D. 47 ¶¶ 3-24]. The harm that would result from such a collapse, which could include both a "criticality" event (i.e., a nuclear explosion) and the release of toxins into the surrounding environment, is certainly "concrete" and something Plaintiffs have a justified interest in avoiding.

As to causation, the individual Plaintiffs all live within a 50-mile radius of Y-12, which is the area that NNSA has recognized would be affected by the release of radioactive materials [*Id.*]. If the Court grants the requested relief, this injury would be redressed because the relief would reduce the risk of catastrophic environmental harms at Y-12, and provide Plaintiffs with information and analysis regarding the risks of such catastrophic events. Thus, the requirements for constitutional standing have been met.[41]

ii. Prudential Standing

To meet the requirement of prudential standing, Plaintiffs must pass the "zone of interest" test. The Supreme Court admits this test "has not proved self-explanatory," but as consolation of a sort, has found the test is "not meant to be especially demanding." *Courtney*, 297 F.3d at 461 (quoting *Clarke v. Sec. Indus. Ass'n*, 479 U.S. 388, 396 (1987)). The inquiry "consists of first

[41] In an attachment to their motion for summary judgment, all four individual plaintiffs swore to declarations confirming these facts [D. 53-2, -3, -4, -5].

discerning the interests arguably to be protected by the statutory provision at issue and then inquiring whether the plaintiff's interests affected by the agency action in question are among them." *Id.* (quoting *Nat'l Credit Union Ass'n v. First Nat'l Bank & Trust Co.*, 522 U.S. 479, 492 (1998)).

Under NEPA, as long as a plaintiff is asserting its *own* interests in the environmental consequences of a planned action, rather than those of a third party, courts will find a plaintiff has met the prudential standing requirement. *See Nulankeyutmonen Nkihtaqmikon v. Impson*, 503 F.3d 18, 28-29 (1st Cir. 2007); *Western Watersheds Project v. Kraayenbrink*, 632 F.3d 472, 485-86 (9th Cir. 2011). Here, all Plaintiffs have substantially detailed their interests and concerns regarding the environmental harms of nuclear weapons production. Thus, their interests fall within the zone of interests affected by NNSA's proposed actions, and the prudential standing requirement is met.

iii. Associational Standing

Finally, as organizations and not individuals, three Plaintiffs (OREPA, Nuclear Watch, and NRDC) must meet the requirements of another three-part test, for associational standing. *Friends of Tims Ford*, 585 F.3d at 967. First, the test requires a court to find the organization's members would "otherwise have standing to sue in their own right." *Id.* (quoting *Hung v. Wash. State Apple Adver. Comm'n*, 432 U.S. 333 (1977)). Second, the interests the organization seeks to protect are germane to the organization's purpose. *Id.* And third, neither the claim asserted nor the relief requested requires the participation of individual members. *Id.*

Here, two of the organizational Plaintiffs (OREPA and NRDC) have members who are part of this lawsuit, so the first prong has been met. Nuclear Watch, the other organizational Plaintiff, submitted comments to Defendants regarding the proposed action, and has alleged harm resulting from Defendants refusal to consider the information provided in those comments [D. 47, ¶ 9]. Since the "very purpose of NEPA" is to ensure that federal agencies are informed of environmental

consequences before making decisions and that the information is made available to the public, the agency's refusal to consider information submitted by a plaintiff is a cognizable injury. *Citizens for Better Forestry v. U.S. Dep't of Agric.*, 341 F.3d 961, 970-71 (9th Cir. 2003) (quoting *Okanogan Highlands All. v. Williams*, 236 F.3d 468, 473 (9th Cir. 2000)). Consequently, because the members of Nuclear Watch who submitted those comments would have standing on this basis if they had submitted the comments on their own behalf, Nuclear Watch has also satisfied this first requirement of organizational standing.

All three organizational Plaintiffs have clearly alleged an organizational interest in protecting the environment from the risks associated with nuclear weapons, so the second part of the associational standing test is easily satisfied. Finally, nothing about the requested claim or relief in this case requires the participation of individual members. All three organizational Plaintiffs have therefore cleared the final hurdle of associational standing.

Because the requirements of constitutional, prudential, and associational standing have been met for all seven Plaintiffs, and the Court will now consider the substantive claims raised, beginning with the allegation that Defendants have unlawfully segmented the Y-12 Modernization Plan.

b. Segmentation

As a quick refresher, the "Y-12 Modernization Plan" is NNSA's moniker for the overall consolidation of Y-12 operations into fewer, newer, and more efficient facilities. The Program has its origins in the three 1990s PEISs, which had evaluated the environmental impacts of proposed actions across the entire United States nuclear weapons infrastructure in response to the shifting geopolitical landscape. The 2001 SWEIS set the "baseline" at Y-12 for evaluating reasonable alternatives to implement the programmatic decisions announced in these prior agency-wide impact statements [AR 6344; AR 6366].

Plaintiffs argue that Defendants have avoided the required NEPA analysis by not evaluating the Y-12 Modernization Plan as part of a single impact statement.

i. Segmentation Generally

"Impermissible segmentation" occurs when parts of an otherwise "major" federal action have not been evaluated together in the same NEPA document—"segmented"—in order to avoid conducting the NEPA analysis that would be required if the segmented actions had been evaluated together. *Hirt v. Richardson*, 127 F. Supp. 2d 833, 842 (W.D. Mich. 1999); *see* 40 C.F.R. § 1508.25(a)(1) (requiring connected or closely related actions to be discussed in the same impact statement); *Citizens Comm. to Save Our Canyons v. U.S. Forest Serv.*, 297 F.3d 1012, 1028 (10th Cir. 2002) ("One of the primary reasons for requiring an agency to evaluate 'connected actions' in a single EIS is to prevent agencies from minimizing the potential environmental consequences of a proposed action (and thus short-circuiting NEPA review)[.]").

The "hallmark" of improper segmentation is the existence of two proposed actions where either one of the component actions has little or no independent utility. *Hirt*, 127 F. Supp. 2d at 842. The classic example would be the construction of a highway, where the agency builds small portions of a highway in (literal) "segments" that are each small enough to avoid being labeled as a "major" federal action individually. *See id.* (citing *Md. Conserv. Council v. Gilchrist*, 808 F.2d 1039 (4th Cir. 1986)). If the agency is especially crafty, it would build the segments so they meet in the middle; by the time it becomes clear that the action is more substantial than initially realized, completion of the entire project would have become a "fait accompli." *Md. Conserv. Council*, 808 F.2d at 1042; *see also Bragg v. Robertson*, 54 F. Supp. 2d 635, 649-50 (S.D.W.Va. 1999) (granting

preliminary injunction against agency that split mine construction into two phases so it could obtain permits for surface mining in the first phase under a categorical authorization for activities deemed to have a minimal adverse effect on the environment).

ii. Segmentation of Y-12 Modernization Plan

Plaintiffs argue Defendants have implemented the Y-12 Modernization Plan in a "scattershot" fashion, "preparing EAs for some activities, relying on CEs for others, and ignoring NEPA review for some actions altogether" [D. 53-1, p. 35]. This, Plaintiffs argue, amounts to segmentation because—according to the district court in *Hirt*—agencies must discuss cumulative actions, connected actions, and similar actions in the "same impact statement." *See Hirt*, 127 F. Supp. 2d at 842 (quoting 40 C.F.R. § 1508.25). But the regulation to which *Hirt* cites expressly provides that "the scope of an individual statement may depend on its relationships to other statements," with reference to the two regulations describing the practice of "tiering." 40 C.F.R. 1508.25.

1. Tiering

The fundamental issue with Plaintiffs' argument is that it ignores NEPA's "tiering" provisions. *See* 40 C.F.R. §§ 1502.20, 1508.28. Agencies may "tier" impact statements in sequence, incorporating by reference general discussions from the earlier statements into later, more specific statements. *Id.* § 1502.20. An agency may tier an impact statement by *scope* (e.g., from a programmatic to a site-specific statement), *id.* §1508.28(a), or it may tier the same action by stages (which may be useful for projects with multiple phases that are not fully funded from the beginning). *Id.* § 1508.28(b). Indeed, agencies are "*encouraged* to tier their environmental impact statements to eliminate repetitive discussion of the same issues and to focus on the actual issues ripe for decision at each level of environmental review." *Id.* § 1502.20 (emphasis added).

Thus, an agency may prepare an EIS that "reflects the broad environmental consequences attendant upon a wide-ranging federal program." *Isle Royale Boaters Ass'n v. Norton*, 154 F. Supp. 2d 1098, 1130 (W.D. Mich. 2001) (quoting *Nat'l Wildlife Fed'n v. Appalachian Reg'l Comm'n*, 677 F.2d 883, 888 (D.C. Cir. 1981)). It may then prepare a later statement to address more particularized, site-specific considerations once the overall program has reached the "second tier, or implementation stage of its development." *Id.* (quotation marks omitted).

2. Tiering of Y-12 Modernization Plan

Reviewing the timeline, DOE first decided in 1996, in a PEIS, to maintain the national security missions at Y-12 (while downsizing the plant in light of the reduced weapons stockpile requirements), provide for long-term storage of surplus enriched uranium at Y-12, and use Y-12 as one of four sites to "downblend" surplus highly-enriched uranium [AR 6343]. This PEIS, along with two others prepared in 1996, was the "starting point" for the 2001 SWEIS [*Id.*]. In other words, once DOE decided on a changed direction for Y-12, a site-specific analysis of the environmental impacts of this new direction was then evaluated in a site-wide impact statement.

One of the "primary purposes" of the 2001 SWEIS was to provide an "overall NEPA baseline for all DOE activities at Y-12, including modernization, that [would] *be useful as a reference when project-specific NEPA documents [were] prepared*" [AR 6346 (emphasis added)]. The "modernization initiative" (i.e. the "Y-12 Modernization Plan"), which technically launched in 1999, contemplated the eventual upgrade of select production and support facilities [AR 6345]. These included a material facility for storage (what became the HEUMF) and a facility for processing enriched uranium (what became the UPF) [AR 6344].

Because two of those projects[42] had moved into the "conceptual design phase" by 2001, a full impact statement of these projects was included in the 2001 SWEIS [AR 6346]. Other potential projects—including the UPF—were in the "very early planning phase," and therefore not at the stage where a full impact statement would be appropriate [*Id.*].

This SWEIS was incorporated into the 2008 "Complex Transformation" Supplemental PEIS ("2008 SPEIS") [AR 11320], which was prepared to "evaluate alternatives to transform the [Nuclear Weapons] Complex to improve its efficiency and responsiveness in meeting national security requirements and enhancing the security of special nuclear materials" [AR 11317]. (As discussed in the factual background, the notion of the "responsive Nuclear Weapons Complex" was developed in response to the September 11 terrorist attacks.)

The 2011 SWEIS explicitly incorporated all of these prior NEPA documents [*see* AR 16868-69]. So, in addition to evaluating the "site-specific issues associated with continued production operations at Y-12 in this SWEIS (specifically, the plans for the UPF)," NNSA would also "continue[] to assess alternatives for the modernization of Y-12," and continue to implement the decisions made in the 2008 SPEIS [AR 16868].

This division of the Y-12 Modernization Plan across multiple EISs is wholly reasonable. As other courts have recognized, "[c]ertain issues are best considered at different stages of a project." *Salmon River Concerned Citizens v. Robertson*, 798 F. Supp. 1434, 1440 (E.D. Cal. 1992) (citing *Northern Alaska Envtl. Ctr. v. Lujan*, 961 F.2d 886 (9th Cir. 1992) (which held that deferring consideration of certain environmental effects is "proper tiering" and does not foreclose later NEPA analysis)). Such flexibility is especially important at Y-12, where, as this timeline has shown, its mission can shift based on highly unpredictable and significant events which are outside

[42] The HEUMF and the "Special Materials Complex," which was later mothballed.

the control of anyone within the agency. While NEPA requires agencies to consider environmental impacts promptly, nothing about the law suggests that agencies are required to analyze all the environmental impacts of a large, multifaceted project in a *single* impact statement. So long as the NEPA analyses conducted for the same project are properly tiered, a court should not find the project has been unlawfully segmented. Defendants have not unlawfully tiered the Y-12 Modernization Plan in this instance, and therefore have not unlawfully segmented the Plan either.

There is no requirement under NEPA that all the activities comprising a complex, multifaceted action such as the Y-12 Modernization Plan be reviewed in one single impact statement. Here, in reviewing the NEPA documents that comprise the Y-12 Modernization Plan, the Court has not found evidence of arbitrary and capricious segmentation, and Plaintiffs' motion for summary judgment will be denied with respect to this argument.

c. Changed Circumstances

Plaintiffs next argue Defendants were required to prepare a new EIS or SEIS after the Red Team Report was issued and NNSA initiated its plans to build a smaller UPF and refurbish the 9215 Complex and Building 9204-2E (that is, the ELP). Under NEPA, an agency must prepare an EIS for any major federal action that has a significant impact on the environment. It must prepare a *supplemental* EIS when "there remains major federal action to occur," and the change in circumstances will affect the quality of the human environment in a significant manner or extent not already considered by the agency. *Marsh*, 490 U.S. at 374 (cleaned up). Thus, because the decision to prepare an EIS or SEIS rests on the same determination—whether the proposed action will affect the quality of the human environment in a manner not yet considered—the Court will analyze Plaintiffs' contentions that an (S)EIS should be prepared for the ELP as one claim, regardless of whether the ELP was a "new" action or a supplement to a previous action [*Cf.* D. 58, pp. 11-

24]. *See City of Detroit*, 329 F.3d at 529 (Moore, J., concurring) ("NEPA makes no distinction between initial actions and subsequent changes to initial actions.").

i. Case Law

In response to this claim, Defendants' argue they have properly characterized their amended decision as a hybrid of two previously considered alternatives—and adequately considered the environmental impacts that would arise from adopting either alternative. If they are correct, a substantial body of precedent in their favor indicates the agency is not required to prepare a new EIS. *See Great Old Broads for Wilderness v. Kimbell*, 709 F.3d 836, 854 (9th Cir. 2013) ("Supplementation is not required when two requirements are satisfied: i) the new alternative is a minor variation of one of the alternatives discussed in the [EIS], and ii) the new alternative is qualitatively within the spectrum of alternatives that were discussed in the [EIS]") (cleaned up); *In re Operation of Mo. River Sys. Litig.*, 516 F.3d 688, 694 (8th Cir. 2008) (SEIS is only required if the changed plans would affect the environment in a manner "not already considered by the federal agency") (quoting *Ark. Wildlife Fed'n v. U.S. Army Corps of Eng'rs*, 431 F.3d 1096 1102 (8th Cir. 2005)); *N.M. ex rel. Richardson v. Bureau of Land Mgmt.*, 565 F.3d 683, 705 (10th Cir. 2009) ("When 'the relevant environmental impacts have already been considered' earlier in the NEPA process, no supplement is required") (quoting *Friends of Marolt Park v. U.S. Dep't of Transp.*, 382 F.3d 1096-97 (10th Cir. 2004)).

In a case involving NNSA, *Hodges v. Abraham*, the Fourth Circuit affirmed a district court ruling in favor of DOE's decision to extend the amount of time it would store weapons-grade plutonium at the Savannah River nuclear site. 300 F.3d at 447-50. The original PEIS had examined various options for the long-term storage of plutonium in a planned new build for up to fifty years.

Id. at 447. When it became clear that the new build would not be completed in time to store incoming plutonium, DOE decided to store the plutonium in an existing building, and prepared an SA to determine if any environmental consequences not considered in the prior EIS would need to be evaluated in a new impact statement. DOE found no EIS was required. *Id.*

Later, it became apparent that the plutonium might be stored in the existing facility longer than anticipated, so a second SA was prepared. *Id.* at 448. The prior NEPA documents showed that the consequences arising from continued storage of surplus plutonium for an additional period were not "substantially different from those considered in the original impact statement." *Id.* Because it was apparent that the proposed change "did not create a new environmental picture" from that previously studied, no further NEPA documentation was necessary. *Id.*

Conversely, when the agency "neglects the fundamental nature of the environmental problem at issue," its refusal to engage in any supplemental analysis may be considered arbitrary and capricious. *N.M. ex rel. Richardson*, 565 F.3d at 706. In *N.M. ex rel. Richardson*, the court required the agency to prepare a SEIS when the previously considered alternatives had all assumed that endangered species would be protected in a contiguous habitat (the alternatives had differed by the overall size of the protected habitat). *Id.* In the modified alternative adopted by the agency without a SEIS, the habitats would not be contiguous, even though the size of the habitat area would stay the same. *Id.* Because "location, not merely total surface disturbance, affects habitat fragmentation," the modified alternative was "qualitatively different," and the agency was thus required to prepare a supplement analyzing the impacts of that modified alternative. *Id.* at 707; *see also Dubois v. U.S. Dep't of Agric.*, 102 F.3d 1273, 1292-93 (1st Cir. 1996) ("It would be one thing if [the agency] had adopted a new alternative that was actually within the range of previously considered alternatives. . . . It is quite another thing to adopt a proposal that is configured differently, in which

case public commenters might have pointed out, if given the opportunity. . . .wholly new problems posed by the new configuration.").

ii. Plaintiffs' Arguments: 2011 SWEIS

Borrowing a phrase from *Hodges*, this Court must decide whether the decision to downsize the UPF and implement the ELP creates a "new environmental picture" not previously studied. 300 F.3d at 448. To show a new EIS is necessary because of "changed circumstances," Plaintiffs raise a host of arguments that all attempt to prove that the 2011 SWEIS did not adequately evaluate the environmental impacts of the new, downsized UPF project, along with the ELP. Each argument will be dealt with in turn.

1. "New Program"

First, Plaintiffs argue the case law cited above does not apply, because these cases all discuss the preparation of a *supplemental* impact statement [D. 58, p. 16]. Rather, in this case, Plaintiffs suggest that NNSA's characterization of the ELP as a "new program" means that it could not have prepared a "supplemental" statement, because it would have been impossible to evaluate a program in 2011 that did not exist. At minimum, they believe an EA must be prepared to evaluate whether this "new" program will have a significant environmental impact under the appropriate context and intensity factors [D. 58, p. 19].

To make this argument, Plaintiffs cherry-pick a single use of the phrase "new program" from the appendix of a single document prepared for the ELP by CNS, and then repeat it for great effect [*see* AR 20473; D. 58, p. 11-12, 16, 19]. In doing so, they have manufactured a dubious factual premise, as a fuller review of the record suggests the ELP grew directly out of the decision to build the reduced-scope UPF [*see, e.g.*, AR 20439 ("The new Enriched Uranium Strategy, *based on* the reduced-scope Uranium Processing Facility, requires Buildings 9204-2E and 9215 [the ELP] to

operate for many decades") (emphasis added)]. This argument also ignores the fact that the proposed functions of the downsized UPF/ELP combination were the same as those for the original UPF; those functions would simply be reallocated among many buildings rather than all being housed in one [*see* AR 18138-40]. No significant new programs, operations, or activities were going to take place in the ELP that had not already been contemplated for the UPF (or at least, Plaintiffs have not pointed the Court to any such examples, aside from CNS's superficial labeling of the ELP as a "new" program).

More importantly, for the purpose of NEPA analysis, whether the ELP is internally characterized as a "new program" is irrelevant. In order to decide whether supplementation is necessary, the pertinent question is whether the *environmental impacts* of the change—regardless of whether the program in question is "new"—have been adequately evaluated in a NEPA document, and whether the information used for that evaluation is still accurate. 40 C.F.R. § 1502.9(c)(1)(i) ("Agencies [s]hall prepare supplements to [an EIS] if [t]he agency makes substantial changes in the proposed action *that are relevant to environmental concerns* or [t]here are significant new circumstances or information *relevant to environmental concerns*") (emphasis added).

And here, Defendants did consider the environmental effects that would result if the buildings in question were not upgraded to contemporary environmental standards. Under the no action alternative, Defendants have already considered the environmental effects of the status quo. Under the Upgrade in-Place alternative, they have considered the environmental effects of a decision to upgrade existing buildings to contemporary environmental standards, to the extent doing so would be feasible.[43] Between these two alternatives is a spectrum of environmental effects that might result, but Defendants are not tasked with analyzing the environmental effects at every point along

[43] The discussion, for purpose of this claim, assumes that the prior analysis of environmental effects was adequate. Whether that was indeed the case will be discussed in detail below.

this spectrum. The inquiry should focus on whether the "alternative finally selected...[is] within the range of alternatives the public could have reasonably anticipated the [agency] to be considering." *Russell Country Sportsmen v. U.S. Forest Serv.*, 668 F.3d 1037, 1045 n. 12 (9th Cir. 2011) (collecting cases) (quoting *State of Cal. v. Block*, 690 F.2d 753, 772 (9th Cir. 1982)). The single mention of the ELP as a "new" program (in a non-NEPA document) does not make the prior NEPA analysis irrelevant. Given the obvious similarities between the Upgrade in-Place program and the ELP, the public could have reasonably anticipated the development of a program like the ELP based on the description of the Upgrade in-Place plan from the 2011 SWEIS.

a. Emergency Operations Center

Plaintiffs have argued that the fairly recent decision to prepare an EA for the "Emergency Operations Center Project"—mentioned in the 2011 SWEIS—"highlights" NNSA's arbitrary and capricious decision not to prepare an EA or EIS for the ELP. [D. 53-1, p. 25 n. 8]. The Emergency Operations Center was previously referred as the "Complex Command Center" (CCC), and it was indeed mentioned in the 2011 SWEIS [AR 16876]. Plaintiffs argue by example that because the CCC was included in the 2011 SWEIS, but NNSA felt it necessary to prepare an EA at a later date, that the decision not to prepare an EA (or EIS) for the ELP makes no sense. But as the EA for the Emergency Operations Center notes, the 2011 SWEIS had explicitly reserved the decision to construct and operate a CCC for later [AR 19750]. In other words, although the Emergency Operations Center was mentioned in the 2011 SWEIS, the environmental impacts of the project were not evaluated in that document. The logic behind NNSA's decision to prepare a later EA for the Emergency Operations Center is obvious in the overall context of the record, and thus this example is easily distinguishable from the ELP, where the environmental impacts had been evaluated in the 2011 SWEIS, under the "Upgrade in-Place" moniker.

For all these reasons, the Court finds the record does not support Plaintiffs' factual premise: That the ELP was a "new program" requiring an EA or EIS. Nor does it agree with their legal premise: That because the ELP was a new program, it necessarily required an EA or EIS. The question is whether the environmental impacts of the program had been evaluated to the extent that the public could have "reasonably anticipated" an agency's course of action from the range of alternatives evaluated. Regardless of whether the ELP is a "new" program, the Court finds that NNSA's prior analysis in the 2011 SWEIS met this standard.

2. Purpose and Need Statement

Next, Plaintiffs contend the environmental effects of the ELP could not have been substantively evaluated in the 2011 SWEIS in general or for the Upgrade in-Place alternative in particular, as the "Purpose and Need" statement for the 2011 SWEIS only contemplated actions that would "comply with modern building codes and environment, safety, and health standards" [AR 16875-76; *see* D. 58, p. 12]. Therefore, they argue the ELP could not satisfy the purpose and need a statement "as a matter of law" [D. 58, p. 13].

Their argument follows a straightforward syllogism. First, the purpose and need for the 2011 SWEIS was to build structures that would comply with modern codes. But under NNSA's plans to refurbish older buildings (i.e., the ELP), it would be "prohibitively expensive" to bring facilities to existing environmental (specifically seismic) standards [*see* AR 20632]. Therefore, Defendants cannot rely on the 2011 SWEIS as evidence they have conducted a satisfactory environmental analysis of the ELP, because the purpose of the 2011 SWEIS was to build structures that would comply with modern codes, and the ELP, by definition, will achieve this goal.

This claim fails both as a matter of law and a matter of fact. As to the law, Plaintiffs cite to two cases which, according to them, stand for the notion that the "Purpose and Need" statement

"dictates" the range of alternatives considered [D. 58, p. 12]. *See Little Traverse Lake Prop. Owners Ass'n v. Nat'l Park Serv.*, 883 F.3d 644, 655 (6th Cir. 2018) and *Coal. for Advancement of Reg'l Transp. v. Fed. Highway Admin.*, 959 F. Supp. 2d 981, 1001 (W.D. Ky. 2013), *aff'd*, 576 F. App'x 477 (6th Cir. 2014). But both cases are distinguishable in critical and instructive ways.

In *Little Traverse Lake*, the plaintiffs, a group of property owners, had urged the National Park Service to construct a shorter bike path than the one the Park Service planned to build; the Park Service demurred on the grounds that such a path would fall outside the purpose and need statement (which had called for building a longer, continuous bike path). 883 F.3d at 655. The plaintiffs, in turn, argued the purpose and need statement was "unreasonably narrow." *Id.* The court, recognizing that agencies enjoy "considerable discretion in defining the purposes and needs of their proposed actions," found in the Park Service's favor. *Id.* (quoting *Webster v. U.S. Dep't of Agric.*, 685 F.3d 411, 422 (4th Cir. 2012)).

Similarly, in *Coalition for Advancement*, the plaintiffs argued that a too narrowly drawn purpose and need statement prevented the agency from considering appropriate and up-to-date socioeconomic data in its NEPA analysis. 959 F. Supp. 2d at 1002. The court found in favor of the defendants in that case as well, as the facts did not support the plaintiffs' claims that the agency had not conducted an adequate hard look when developing its purpose and need statement. *Id.*

Even though the agencies won in both cases, the courts acknowledged that where an overly constricted purpose and need statement would "compel the selection of a particular alternative," a court may find the agency acted in an arbitrary and capricious manner. *Little Traverse Lake*, 883 F.3d at 656 (quoting *Theodore Roosevelt Conservation P'ship v. Salazar*, 661 F.3d 66, 73 (D.C. Cir. 2011)). In theory, courts should also be on the lookout for a purpose and need statement that is overly broad. But such a scenario is more improbable, as it cuts against the agency's natural

impulse to minimize the administrative burden. *See Webster*, 685 F.3d at 422-23 ("[T]he potential for an agency to define a purpose [too] broadly appears remote," since doing so would "complicate[] an agency's drafting of an EIS by expanding the number of alternatives it must examine to a point that would make its task unmanageable.").

Plaintiffs argue the inverse proposition should bind Defendants in this case. That is, while in *Little Traverse Lake* and *Coalition for Advancement*, the courts confronted the issue of whether the agency had deliberately drawn its purpose and need too narrowly in order to limit the scope of its analysis, the puzzle here is to determine the extent to which the purpose and need statement should define the direction of the analysis that follows. Plaintiffs argue the purpose and need statement sets a rigid outer boundary for—in their words, that it "dictates"—the alternatives that may legally be considered. And more precisely, they argue that if the agency does consider environmental impacts beyond the scope of the purpose and need statement, the analysis of these impacts cannot be used to support a later decision finding a supplemental impact statement would be unnecessary. Once again, they argue for the application of rigid form in sharp contrast to the language of NEPA, which is much more flexible in its approach.

The requirements for what should be included in a purpose and need statement are vaguely defined. NEPA regulations only compel the agency to "*briefly* specify the underlying purpose and need to which the agency is responding[.]" 40 C.F.R. § 1502.13 (emphasis added). And the definition of purpose only sets the "contours" for the agency's exploration of available alternatives; the failure to include certain considerations in the definition of purpose does not foreclose the agency from incorporating those considerations into the overall analysis. *Webster*, 685 F.3d at 422 (citing *Wyo. v. U.S. Dep't of Agric.*, 661 F.3d 1209, 1244 (10th Cir. 2011)). So the text of NEPA's

regulations—and courts' interpretations of those same regulations—do not suggest the purpose and need statement should be given such determinative weight.

Thus, there are no grounds to suggest the ELP was not properly analyzed under the heading of the Upgrade in-Place alternative "as a matter of law," simply because the analysis of alternatives did not fall exactly within the boundaries defined by the Purpose and Need statement. Nor does the Court find merit in the factual premise underlying the legal argument—that Defendants "assured" the public the Upgrade in-Place alternative would comply with modern building codes [D. 58, p. 12]. Rather, the 2011 SWEIS said facilities would be upgraded to "contemporary environmental, safety, and security standards *to the extent possible within the limitations of existing structures*" under the Upgrade in-Place alternative [AR 16947 (emphasis added)]. Under the ELP, Defendants did admit in 2016 it would be fiscally impossible—or "prohibitively expensive"—to bring existing buildings up to current seismic standards[44] [AR 20632].

These fiscal restraints may have prevented NNSA from adopting the Plaintiffs' preferred course of action, but NEPA does not prevent an agency from deciding that other values or "appropriate considerations" outweigh the environmental costs. *Baltimore Gas & Elec.*, 462 U.S. at 97; *see Methow Valley*, 490 U.S. at 350 ("If the adverse environmental effects of the proposed action are adequately identified and evaluated, the agency is not constrained by NEPA from deciding that other values outweigh the environmental costs.").

[44] Plaintiffs argue that because the 2011 SWEIS did not explicitly consider costs as a potential limiting factor under the Upgrade in-Place alternative, using cost as a justification for the decision not to bring the ELP up to current seismic standards falls outside the meaning of the phrase "to the extent possible" as used in the 2011 SWEIS [D. 58, pp. 13-14]. Indeed, quite incredibly, Plaintiffs argue the Upgrade in-Place alternative was not limited by cost at all [*Id.*, p. 13]. But under NEPA, the agency does not need to provide a detailed cost analysis up front. *See, e.g.*, *Minisink Residents for Envt'l Protection & Safety v. FERC*, 762 F.3d 97, 112 (D.C. Cir. 2014) ("[T]o the extent Petitioners contend that the Commission should have focused more generally on the monetary costs and benefits of the respective proposals, we disagree that NEPA requires such an approach"). And regardless of whether it was said so explicitly, the Court rests assured that Defendants viewed cost as a potential limiting factor on any decision it made in 2011, and that a commonsense reading of the phrase "to the extent possible" incorporated financial considerations.

As with their argument that the ELP is a "new" program, Plaintiffs' argument that the ELP falls outside the stated Purpose and Need is too clever. They have combed the voluminous administrative record for any instance where they can highlight a contradiction, and in the process they end up breezing past the core legal principle at stake. The question before this Court is simple: Whether the 2011 SWEIS properly analyzed the substantive environmental effects of a range of alternatives, and whether the likely environmental effects of the ELP fell within that range. *See N.M. ex rel. Richardson*, 565 F.3d at 706 (supplement will not be required "where components of fully-analyzed alternatives [are] recombined or modified to create a 'new' alternative whose impacts could easily be predicted from the existing analysis."). Because the environmental effects in the 2011 SWEIS were evaluated along a spectrum—from "no action" at one end, to a brand-new UPF at the other, and with an "Upgrade in-Place" program occupying the middle—the Court again finds that the ELP was adequately considered as part of the 2011 SWEIS.

3. "Unequivocal" Rejection of Upgrade in-Place

In another effort to argue Defendants have violated NEPA as a matter of law, Plaintiffs suggest that where an agency "unequivocally" rejects an alternative in a prior EIS, it cannot then adopt an alternative "closely resembl[ing] the rejected alternative" at a later time without further NEPA documentation [D. 58, p. 19].

This argument fails for two reasons. First, the Court is skeptical that such a rule, if widely adopted, would stand up to a thorough NEPA analysis. If an agency could not later implement a previously rejected alternative (that was nonetheless adequately evaluated), it would cut against the well-settled notion that agencies do not have to reach particular substantive outcomes under NEPA. *See Tenn. Envtl. Council*, 32 F. Supp. 3d at 882-83.

Second, the case cited to back up this argument does not stand for the broad principle Plaintiffs have attributed to it. *See Klamath Siskiyou Wildlands Ctr. v. Boody*, 468 F.3d 549, 562 (9th Cir. 2006). In that case, the agency had rejected a prior alternative because it would put a protected species, the red tree vole, at risk. *Id.* at 560. Yet shortly after preparing the EIS, the agency formally adopted an alternative very similar to the one it had just rejected. The court found the "unequivocal" language in the prior EIS regarding the environmental effects of the proposed action raised "substantial questions" about whether the agency had properly accounted for these effects *in the absence of any significant new circumstances or information*. 468 F.3d at 562.

The language of the opinion suggests that if the agency could have pointed to such significant new circumstances or information, its decision to adopt the previously rejected alternative would be permissible under NEPA. The issue there was that the agency could point to no such facts, which is not the case here. *Klamath Siskiyou* does not hold that an unequivocal rejection of an alternative in an EIS will keep the agency from ever adopting that alternative, it just requires the agency to justify that decision using the appropriate NEPA process.

iii. 2016 SA

Which leads to the final point. Plaintiffs' arguments are further undercut by the simple fact that Defendants have conducted some NEPA analysis of the ELP: In accordance with DOE regulations, NNSA prepared an SA in 2016 to analyze whether the decision to scrap the "big box" UPF would require a SEIS. To assess the environmental impacts between the old plan and the new plan, NNSA took stock of possible differences between the new and old plans, including location, size, production levels, and types of operations, and compared those changes against the environmental impacts analysis in the 2011 SWEIS [AR 20636-49]. NNSA found the differences were not that substantial: All the operations that would have been have been performed under one roof in the

big-box UPF would principally be distributed, at approximately the same location, among two new facilities and three existing (but upgraded) facilities whose total square footage would roughly equal the size of the big box UPF [AR 20637-69].

Plaintiffs argue the 2016 SA was "backward-looking," and did not take the required "hard look" at the ELP, pointing out that the phrase "extended life program" was used only once [D. 58, pp. 14-15]. Again, Plaintiffs attempt to distract the Court from the substance of the analysis with a formal sleight of hand by insisting that because NNSA failed to mention the ELP by name, the correct magic words were not used. On this ground, they contend the underlying SA has somehow failed to contemplate the environmental effects that would result from its decision to maintain Building 9204-2E and the 9215 Complex longer than initially planned.

While the SA may not have satisfied Plaintiffs' particular formal demands, it did satisfy NEPA's substantive requirements. The SA has a section—entitled "Existing Facilities"—wherein NNSA looks at every operation[45] that would have been included in the "big box" UPF, but under the revised plan, would be housed in existing facilities [AR 20626]. It provides a chart detailing where those operations will be moved under the revised plans [*Id.*]. Then, with reference to the 2011 SWEIS's analysis of the Upgrade in-Place alternative, NNSA details the specific upgrades that would take place at 9215 and 9204-2E, while acknowledging practical limitations on the project (including, as discussed more extensively in a later section, a conclusion that it would be "prohibitively expensive" to upgrade the facilities to current seismic standards) [AR 20630-32].

[45] These include the machining of highly enriched uranium, metal purification and chip processing, low-energy (2 Mega electron-volt, or MeV) radiography, analytical chemistry, 9-MeV radiography, quality evaluation, assembly, and disassembly/dismantlement.

NNSA concluded those upgrades would be consistent with the analysis of the Upgrade in-Place alternative from the 2011 SWEIS, and accordingly, that no further NEPA review was required. The Court finds this analysis was reasonable under NEPA and the record before the Court.

iv. Conclusion

A rule requiring an agency to repeat the EIS process for any minor changes in the overall plan would lead it into a "[Z]eno's paradox, always being halfway to the end of the process, but never quite there." *N.M. ex rel. Richardson*, 565 F.3d at 708. As part of a plan to upgrade the enriched uranium manufacturing processes at Y-12, the 2011 SWEIS adequately accounted for the environmental impacts that would result from building a single "big box" UPF, as well as the impacts that would result if only existing buildings were renovated to meet modern environmental standards (to the extent doing so would be feasible). It also accounted for the environmental impacts that would result if no action were taken. NNSA initially endorsed the big box approach, but switched to a hybrid approach—which involved the construction of new buildings and the renovation of existing ones—because of legitimate cost concerns.

An agency may alter its plans without the preparation of a new impact statement so long as the environmental impacts of the new plans fall within the range of impacts considered by the alternatives in the original impact statement. NNSA properly concluded, in the 2016 SA, that the environmental impacts of its updated plans for enriched uranium manufacturing fell within the range of alternatives considered in the 2011 SWEIS. *See Hodges*, 300 F.3d at 447-50 (finding that SA sufficiently analyzed potentially new environmental impacts resulting from DOE's decision to store plutonium in existing buildings rather than a new building, as previously planned). Therefore, the Court finds Defendants' decision not to prepare a SEIS, after evaluating the changed circumstances in the 2016 SA, was permissible under NEPA.

d. Categorical Exclusions

Next, the Court must determine whether Defendants have unlawfully relied on categorical exclusions to implement the ELP in a "piecemeal" fashion so they could avoid preparing an EIS [D. 53-1, p. 25]. As mentioned above, the categorical exclusion claim is essentially an argument in the alternative: Plaintiffs contend that if the Court were to find (as it has) that the ELP is not a new "major" federal action requiring an EIS, then it reached that conclusion only because Defendants managed to obscure the significance of the ELP through the use of categorical exclusions.

As reviewed earlier in this Opinion, agencies may adopt "categorical exclusions" for actions that "do not individually or cumulatively have a significant effect on the human environment." *Sierra Club,* 828 F.3d at 408; 40 C.F.R. § 1508.4. To use a categorical exclusion, the finding of no significant effect must be made according to procedures adopted by the agency. *Id.* In many instances, a "brief statement that a categorical exclusion is being invoked will suffice." *Cal. v. Norton*, 311 F.3d 1162, 1176 (9th Cir. 2002); *see also Ctr. for Food Safety v. Johanns*, 451 F. Supp. 2d 1165, 1183 (D. Haw. 2006) ("At a bare minimum, an agency must state...that it is invoking a categorical exclusion."). But, if a plaintiff can point to substantial evidence in the record that an exception applies which would make the use of a categorical exclusion inappropriate, the agency may be required to provide a more thorough justification of its decision to apply the exclusion. *Id.*; *see also Wilderness Watch & Pub. Emps. for Envtl. Responsibility v. Mainella*, 375 F.3d 1085, 1095 (11th Cir. 2004) (endorsing substantial evidence rule from *Norton*); *Reed v. Salazar*, 744 F. Supp. 2d 98, 116 (D.D.C. 2010) (same).[46]

[46] This coheres with the overall policy for categorical exclusions, which is to reduce NEPA paperwork for workaday agency actions that will presumptively not have a significant impact on the environment. Mandelker, *supra* at § 7:15. Procedural safeguards are maintained by requiring all agencies to pass their categorical exclusion regulations through notice-and-comment rulemaking. *Id.* § 7:18.

DOE's categorical exclusion procedures are found at 10 C.F.R. § 1021.410. To properly invoke a categorical exclusion, DOE (or the relevant sub-agency) *shall* first determine the proposed action fits within a class of actions listed in one of two appendices. *Id.* § 1021.410(b)(1). Second, the agency *shall* determine there are no "extraordinary circumstances related to the proposal that may affect the significance of the environmental effects," including, but not limited to, scientific controversy about the environmental effects; uncertain effect; effects involving unique or unknown risks; and unresolved conflicts concerning alternative uses of available resources. *Id.* § 1021.410(b)(2). Third and finally, the agency *shall* determine the proposal has not been "segmented" to meet the definition of a categorical exclusion, which "can occur when a proposal is broken down into small parts in order to avoid the appearance of significance of the total action." *Id.* § 1021.410(b)(3). Plaintiffs argue Defendants have violated all three of these regulatory provisions, and the Court will address each in turn.

i. Application of Categorical Exclusions

The logic of the first claim is easy to understand—basically, Plaintiffs allege Defendants inappropriately applied categorical exclusions to certain actions in a manner that is unlawful by the very letter of the exclusion. Yet, as Defendants note, Plaintiffs hardly specify (other than to list by example), out of sixty-seven total categorical exclusions, any particular actions where they claim the exclusion was inappropriately applied [D. 55, pp. 27-28].

Plaintiffs do single out one example—the electrorefining project—where Defendants applied an exclusion for "Installation or relocation of machinery and equipment,"[47] as an "egregious

[47] Providing a categorical exclusion for "[i]nstallation or relocation and operation of machinery and equipment (including, but not limited to, laboratory equipment, electronic hardware, manufacturing machinery, maintenance equipment, and health and safety equipment), provided that uses of the installed or relocated items are consistent with the general missions of the receiving structure. Covered actions include modifications to an existing building, within or contiguous to a previously disturbed or developed area, that are necessary for equipment installation and relocation. Such modifications would not appreciably increase the footprint or height of the existing building or have the potential

example" of the unlawful use of categorical exclusions [D. 53-1, p. 29]. As evidence, Plaintiffs point to a comment to the 2018 SA submitted by Robert Alvarez, a former DOE employee with "extensive" knowledge of DOE's obligations under NEPA [AR 31659]. But in his letter, Mr. Alvarez does not say the exclusion was inappropriately applied. Rather, he says that DOE unlawfully failed to consider extraordinary circumstances as to that claim [AR 31665].

Otherwise, Plaintiffs argue that a suite of actions where Defendants found a categorical exclusion should apply were in fact improperly categorized under either the "installation or relocation" exclusion, or the exclusion for "routine maintenance."

1. "Installation or Relocation"

Plaintiffs challenge NNSA's decisions to categorically exclude the movement of enriched uranium "processes"—including a chip melt furnace, a specialty mill, and induction brazing equipment—between buildings [D. 53-1, pp. 28-29]. This claim is bizarre on its face: Plaintiffs are essentially arguing that an exclusion that applies to the "relocation of machinery and equipment" could not be used, basically, to move equipment from one building to another.

Plaintiffs argue around this by pointing to a recently prepared EA determination (that is, a short document used to determine whether an EA should be prepared) for a Lithium production facility at Y-12 [*Id.*, p. 29; *see* AR 30241]. In that EA determination, NNSA found that no categorical exclusions allow for the "relocation of *existing processes or operations* on the Y-12 Plant site" [AR 30242]. Plaintiffs' argument is essentially definitional—they argue the furnace, mill, and induction brazing equipment should count as "processes," rather than "equipment." Then, from a single use of the word "process" in the Lithium EA document, they suggest that when a "process"—rather than a piece of "equipment"—is relocated, the categorical exclusion should not

to cause significant changes to the type and magnitude of environmental impacts." 10 C.F.R. pt. 1021 subpt. D app. B § B1.31.

apply. Ergo, if the furnace, mill, and induction brazing equipment are in fact "processes," then the exclusions should not be applied.

Even ignoring the arbitrary and capricious standard of review for a moment, this argument is sorely lacking. First, no law, regulation, case, or internal guidance document defines "process" in this manner: The sole document provided in support of this interpretation is drawn from the context of the EA determination for the Lithium production facility. Second, Plaintiffs' argument belies a common sense understanding of "equipment," and if accepted, would lead to the absurd results, such as a finding "induction brazing equipment" does not meet the definition of "equipment" under DOE's own regulations.

And the standard of review is deferential, as an agency's interpretation of the meaning of its own categorical exclusion is generally given controlling weight unless plainly erroneous or inconsistent with the terms used in the regulation. *Alaska Ctr. for Env't v. U.S. Forest Serv.*, 189 F.3d 851, 857 (9th Cir. 1999) (collecting cases); *Nat'l Trust for Historic Pres. in U.S. v. Dole*, 828 F.2d 776, 781-82 (D.C. Cir. 1987) (district court properly deferred to agency's own interpretation of its categorical exclusion regulations). The language from a single EA determination does not override NNSA's determination in this instance that a furnace, mill, and "induction brazing equipment" are defined as "equipment" for purposes of applying the categorical exclusion. With nothing more, the Court will not find the application of these categorical exclusions arbitrary and capricious.

2. "Routine Maintenance"

The argument that "routine maintenance" exclusions were improperly applied fares no better for Plaintiffs.[48] Again, they provide an incomplete list of "commonly invoke[d]" exclusions that are a "far cry" from routine maintenance [D. 53-1, p. 29]. But rather than explaining why any one

[48] *See* 10 C.F.R. pt. 1021 subpt. D app. B § B1.3 (routine maintenance exclusion).

of these actions should not be considered "routine," Plaintiffs argue for guilt by association. Specifically, because some of these actions are part of the ELP, which is *not* "routine," the maintenance activities undertaken in support the ELP cannot be routine either [*Id.*, pp. 29-30].

Again, even setting aside the arbitrary and capricious review standard, this argument fails logically: While the ELP *as a whole* is not routine, individual actions undertaken in pursuit of the larger action may certainly count as such. For example, in one of the exclusions referenced by Plaintiffs, NNSA applied a categorical exclusion, in March of 2016, to "procure, install, and test" a new "vacuum arc remelt" (VAR) pump system for a furnace located in the northwest corner of a foundry in Building 9998 [AR 31377]. It is true that, but for the ELP, this exclusion likely would not have been applied—because Building 9998 would have been demolished under the original UPF plan, there would be no need to install a new VAR system in the first place. But this context does not change the fact that the procurement, installation, and testing of a pump is still a "routine" circumstance within the meaning of DOE's own regulations,[49] even if the larger context in which the action took place was more significant. The decision to apply the categorical exclusion in this case (and in the other instances of "routine maintenance" cursorily cited by Plaintiffs), does not amount to an arbitrary and capricious agency action.

ii. Extraordinary Circumstances

Even after the categorical exclusion has been properly classified, NNSA's review is not complete. As mentioned, when applying a categorical exclusion, DOE's own regulations require its agencies to determine that no "extraordinary circumstances" exist which may have significant environmental effects. 10 C.F.R. § 1021.410(b)(2). The argument here is over process: Plaintiffs argue Defendants do not even mention extraordinary circumstances in the "vast majority" of cases

[49] "Routine maintenance activities include, but are not limited to...[r]epair or replacement of facility equipment, such as lathes, mills, *pumps*, and presses." 10 C.F.R. pt. 1021 subpt. D app. B § B1.3(a) (emphasis added).

[D. 53-1, p. 30], and that in some cases, Defendants' "merely check[ed] a box to assert that no extraordinary circumstances applie[d]," which is "insufficient to demonstrate compliance with NEPA or agency regulations" [*Id.*, p. 31].

Most of the challenged documents follow the same format. For example, in the case of the "Rackable Can Storage Boxes Project" (which Defendants' use as an example in their brief [D. 55, pp. 34-35]), a "NEPA Review Report[50]" was prepared containing a brief description of the project, along with a checklist determining whether any concerns were raised under various environmental laws or internal agency guidance documents[51] [*See* AR 31404]. This analysis is consistent with a DOE regulation requiring its agencies to consider "integral elements" of the action prior to applying a categorical exclusion. 10 C.F.R. § 1021 subpt. D app. B, B(1)-(5); *see Nat'l Envtl. Policy Act Implementing Procedures*, 76 Fed. Reg. 63,764, 63,769 (Oct. 13, 2011) ("integral element" provisions "ensure that a categorical exclusion is not applied to any proposed action that would have the potential to cause significant environmental impacts due to, for example, a threatened violation of applicable environmental, safety, and health requirements, or by disturbing hazardous substances such that there would be uncontrolled or unpermitted releases.").

But the analysis is *inconsistent* with § 1021.410(b)(2), which provides that DOE "*shall* determine. . . .[t]here are no extraordinary circumstances related to the proposal that may affect the significance of the environmental effects of the proposal." Quite plainly, none of the "NEPA Review" reports[52] include a finding that no extraordinary circumstances exist. Nevertheless, Defendants argue that to require an express "extraordinary circumstances" determination for some of the

[50] In some cases this is called an "Environmental Review Report" [*See, e.g.*, AR 31642].
[51] Specifically, CERCLA (commonly known as the Superfund law), the Clean Air Act, EPCRA (which regulates the release of chemicals), the Clean Water Act, RCRA (regulating hazardous waste, including manmade chemicals known as PCBs), and the National Historic Preservation Act [*see* AR 31405-06]. The review also included pollution prevention and waste management considerations as mandated by Y-12 operating procedures [*Id.*].
[52] There are a total of sixty-nine categorical exclusions in the administrative record. By the Court's count, sixty-four of the exclusions in question follow this format [*see* AR 18269, 19677, 31349-31480, 31526-67, 31572-31642].

"mundane" projects at issue would "elevate form over substance" [D. 55, p. 35].

Defendants are correct that, under NEPA generally, a "brief statement that a categorical exclusion is being invoked" will ordinarily suffice. *Norton*, 311 F.3d at 1176 [*see* D. 55, p. 34]. Indeed, in the cases courts have found the invocation of a categorical exclusion to be arbitrary and capricious, it is usually because the agency produced *no* NEPA documentation whatsoever, or only provided its justification for the categorical exclusion after making its determination. *See Edmonds Institute v. Babbitt*, 42 F. Supp. 2d 1, 18 n. 11 (D.D.C. 1999) (clarifying that an agency need not prepare a "full-blown statement of reasons for invoking a categorical exclusion," but holding that a "post hoc" assertion of an exclusion during litigation, unsupported by *any* evidence that determination was made at appropriate time, was not justifiable); *Wilderness Watch*, 375 F.3d at 1095 (finding invocation of categorical exclusion unlawful when after reviewing record, court could not find "any indication that [the agency] considered the application of the categorical exclusion prior to its decision," and agency did not direct the court's attention to any such evidence).

But DOE's own NEPA regulations require more than what was necessary in those cases or under the text of the generic NEPA regulations. Specifically, they require a formal determination that "there are no extraordinary circumstances related to the proposal that may affect the significance of the environmental effects of the proposal." 10 C.F.R. 1021.410(b)(2). Yet, Defendants did not make an explicit finding of extraordinary circumstances in any of the sixty-four "NEPA Review" reports in the record, nor did they make this finding in five other cases, where the categorical exclusion determination was made in an e-mail [*see* AR 31484-31516].

Defendants argue they have surpassed this "minimal standard" because, through the review of various environmental statutes, they identified no resource or environmental issues that would

preclude the use of an exclusion [D. 55, p. 35]. As mentioned, this review was not gratuitous—in fact, it was mandatory under the "integral elements" regulation.

The mere fact that Defendants reviewed the project's compliance with other environmental statutes does not "demonstrate[] the lack of extraordinary circumstances" under NEPA, as they argue [*Id.*]. To be sure, compliance with another statute may suggest compliance with NEPA: A project that does not raise issues under the terms of the Clean Air Act may be less likely to present "extraordinary circumstances" that preclude the use of a categorical exclusion due to concerns about air quality. But the two determinations do not overlap entirely—they meet in the middle of a Venn diagram. So NNSA's determination that a project has satisfied DOE's "integral elements" regulation does not necessarily mean a project will not present "extraordinary circumstances."

And the same logic holds in the other direction—a finding of "extraordinary circumstances" does not mean the "integral elements" regulation has been satisfied. Which leads to the problem with the remaining five categorical exclusions.[53] In those cases, NNSA did make the appropriate finding under § 1021.410(b)(2), but it did not review the "integral elements" of the action, as it was required[54] to do under 10 C.F.R. § 1021 subpt. D app. B, B(1)-(5).

An agency's interpretation of its own categorical exclusion regulations "must be rejected when 'plainly erroneous or inconsistent with the regulation.'" *Sierra Club v. U.S.*, 255 F. Supp. 2d 1177, 1183 (D. Colo. 2002) (quoting *Mission Group Kan., Inc. v. Riley*, 146 F.3d 775, 780 (10th Cir. 1998)). Here, the failure to consider "extraordinary circumstances" (in some cases) and "integral elements" (in others) is inconsistent with a straightforward reading of 10 C.F.R. § 1021. *See id.* (finding DOE had "no rational basis" to conclude that a categorical exclusion applied under the

[53] AR 20665, 31524, 31525, 31571, and 31646.
[54] Precisely, under the Appendix B categorical exclusions (which includes all sixty-nine at issue here), the proposed project must be one that would trigger non-compliance with the relevant environmental provisions.

same regulation). Under the plain terms of the regulation, Defendants are required to satisfy the requirements of both form *and* substance. By clearly violating § 1021's formal requirements, they have acted arbitrarily and capriciously in violation of NEPA in issuing all sixty-nine categorical exclusions at issue.

iii. Segmentation

For the same reasons they violated § 1021.410(b)(2), Defendants have violated § 1021.410(b)(3), which requires NNSA to find that the proposal has not been "segmented to meet the definition of a categorical exclusion," in sixty-four of the sixty-nine cases. While Defendants' have argued that, in substance, they did not segment the project through the use of the categorical exclusions, the record shows they did not make the formal finding that the proposal had not been segmented at the time the categorical exclusion was issued. Again, the failure to do so is plainly inconsistent with DOE's regulations.

In response, Defendants' try to argue they have "tiered" the segmentation consideration. *See Ky. Coal Ass'n v. Tenn. Valley Auth.*, 804 F.3d 799, 805 (6th Cir. 2015). As discussed, tiering is a lawful means of avoiding duplicative environmental review where the agency incorporates a prior NEPA document by reference. It is true that, in many of the categorical exclusions, NNSA incorporated the 2011 SWEIS or 2016 SA by reference. Defendants' argue that because these prior documents were incorporated, they have not improperly segmented the proposal. But again, this substantive argument will not allow for an exception to § 1021.410's clear formal requirements, which have not been satisfied for most of the categorical exclusions in this case.

iv. Mootness

Defendants have indicated, in a footnote, that because a majority of the actions that were approved by categorical exclusion have now been completed, the claims as to those exclusions

would be moot [D. 55, p. 32]. The record does not provide up-to-date information on which of these projects have been completed, and Defendants' have not given the Court any more specifics. But the footnote implies that some projects are not complete, and therefore the Court's finding that the categorical exclusions have been unlawfully applied will still have tangible effect. Plaintiffs have also sought a declaratory judgment that the categorical exclusions were unlawfully applied, and the Court may grant that request now. Then on remand, the agency will be obliged to correct any categorical exclusions where the project is ongoing.

v. Conclusion

In conclusion, Defendants have unlawfully applied sixty-nine categorical exclusions, in violation of the requirements of 10 C.F.R. § 1021.410(b)(2)-(3) and § 1021 subpt. D app. B, B(1)-(5). All sixty-nine of these exclusions are thereby declared unlawful, and on remand, NNSA will be required to conduct further NEPA for any project that is not yet complete.

e. Significant New Information

Finally, in addition to their argument that a SEIS is required because of a self-inflicted change in circumstances, Plaintiffs also argue Defendants should prepare a SEIS due to "significant" new information—the 2014 USGS seismic hazard map—that came to light after the publication of the 2011 SWEIS.

This information is relevant in two respects. First, if significant, it would change the evaluation of seismic hazards that NNSA performed in the 2011 SWEIS. Second, the information may affect NNSA's evaluation of the environmental consequences that may result from the proposed action as a result of an earthquake at Y-12.

i. 2011 SWEIS

The first issue with the 2016 SA's treatment of the USGS map appears when the "Geology and Soils" analysis [AR 20614] is compared against the same analysis in the 2011 SWEIS [AR 16994]. As the factual background of this Opinion discusses, in the 2011 SWEIS, NNSA discussed the seismology of the area around Y-12 in accordance with a regulatory analysis prescribed by the NRC for siting nuclear power plants in areas without so-called "capable faults." *Supra*, pp. 32-33. The bulk of the analysis consists of discussing past earthquake intensities in terms of their Modified Mercalli Intensity (MMI) values, which are generally approximate measures of earthquake intensity. While useful for public engagement and for approximating the intensities of earthquakes that took place before the advent of modern seismology, MMI values are not a rigorous way of evaluating earthquake intensity with modern seismic measuring tools. Rather, earthquake intensity will typically be measured in terms of ground acceleration. In one sentence, the SWEIS does say that maximum ground accelerations of .06*g* to .3*g* would be estimated to result from an earthquake occurring once every 500 to 2,000 years, although no source document is cited [*Id.*].

By itself, the 2011 SWEIS is not necessarily flawed. But it lays a poor foundation for the 2016 SA, which at the time had found the "detailed discussion" from the 2011 SWEIS remained "valid and relevant." Regarding the more recent information found in the USGS map, NNSA acknowledged in the 2016 SA that peak ground acceleration was now expected to exceed 0.3*g* at a two-percent/fifty-year probability of exceedance [AR 20614]. Although the estimated peak ground acceleration had increased above the 0.2*g* estimate in the 2008 USGS map, NNSA found the new USGS map did not change the "site-specific design-basis earthquake spectra that would be factored into the requirements for any new UPF buildings" [*Id.*]. This spectra—which had been

"conservatively developed"—contained "margin to address both current requirements and possible future [modifications], such as the input from the recent USGS seismic hazard changes" [*Id.*].

When the analysis in this section of the 2016 SA is viewed with reference to the NEPA document that preceded it—the 2011 SWEIS—problems emerge. The bulk of the 2011 SWEIS's seismic analysis is devoted to cataloging previous earthquakes by their MMI value, and only mentions peak ground accelerations once, with no reference to the data source (in fact, the 2008 USGS seismic hazard map that preceded the 2014 map is never mentioned). The 2011 SWEIS also makes *no* mention of a "site-specific design-basis earthquake spectra," and the 2016 SA does not actually incorporate this site-specific analysis by reference.

NNSA must make "explicit reference" to any methodologies or scientific sources it relies upon for the conclusions it reaches. 40 C.F.R. § 1502.24. This is not an idle procedural requirement. Rather, it upholds NEPA's "guarantee" that the relevant information used by the agency to reach its decision "be made available to the larger audience that may also play a role in both the decision-making process and the implementation of that decision." *Methow Valley*, 490 U.S. at 349.

Thus, in evaluating the legality of NNSA's analysis, the Court must place itself in the shoes of the public, and ask whether a concerned citizen—who will not necessarily have access to the full record before the agency[55]—could discern the reasons behind the agency's decision from the NEPA documents and any material incorporated by reference. Here, if such a concerned citizen relied on the 2011 SWEIS and 2016 SA to learn how NNSA planned to incorporate the new information on predicted ground accelerations from the 2014 USGS map, she would be sorely lacking

[55] A particularly relevant consideration when applied to nuclear weapons agencies, whose day-to-day activity is highly classified.

for guidance, given that neither of the documents in question references *any* relevant site-specific analysis from Y-12.

By the very letter of NEPA, NNSA has violated its obligation to make "explicit" reference to any methodologies or studies upon which it relied. Considered alone, this raises concerns; those concerns are only elevated when one takes into account the information revealed in the record before NNSA at the time the SA was published in April 2016.

ii. Seismic Peer Review Team

As the factual background to this Opinion recounts, a "Seismic Peer Review Team" convened in late 2015 to review the work supporting the development of a new design basis earthquake response spectra [AR 28331]. The peer review team issued recommendations to the UPF project team, and the UPF team responded to the recommendations in writing in March 2016, one month before the publication of the 2016 SA [*Id.*].

One of those recommendations was as follows:

> The [UPF] project needs to develop a formal position on whether the seismic spectra will incorporate increased seismic hazard values for Eastern Tennessee that appear on the [USGS] 2014 National Seismic Hazard Map. The 2014 values are higher than the USGS 2008 Map, and they may be higher than the hazard derived from the Central and Eastern United States Seismic Source Characterization (CEUS-SSC) for Nuclear Facilities, which was the basis for the Clinch River and UPF PSHA.[56]
>
> [AR 28341]

CNS declined to follow this recommendation, for essentially two reasons. First, the existing DOE seismic design criteria, DOE-STD-1020-2012, required the use of ASCE/SEI[57] standards that incorporated results from the 2008 USGS map [*Id.*]. While the ASCE/SEI standards would be updated later in 2016, there was no guarantee that the anticipated update would adopt the 2014

[56] Again, "PSHA" stands for "Probabilistic Seismic Hazard Assessment."
[57] As mentioned previously, these abbreviations stand for "American Society of Civil Engineers," and "Seismic Engineering Institute," respectively.

USGS results [*Id.*]. Second, compared to the 2008 USGS data, the 2014 USGS map was less "mature," in the sense that data which CNS might incorporate into a site-specific analysis for Y-12 was simply not available (for example, USGS 2014 results were only available at three spectral frequencies, as compared to seven frequencies in USGS 2008) [*Id.*]. When the maturity of the data was established, CNS acknowledged it might consider the 2014 map data more closely in developing the new site-specific response spectra[58] [*Id.*].

The Court is cognizant of its obligation to refrain from acting as an "omnipotent scientist," *Tri-Valley CAREs*, 671 F.3d at 1126, and it does not question CNS's (and by extension, NNSA's) decision not to adopt this precise recommendation. What does concern the Court, however, is the mismatch between the reasoning given for rejecting the 2014 USGS map in the Peer Review team document and the reason given for rejecting further environmental review under NEPA in the 2016 SA, published only one month later.

To reiterate, in the 2016 SA, NNSA said the 2014 USGS map "did not change" the data used in the (unspecified) site-specific design-basis response spectra that would determine facility and construction requirements, and that those response spectra "contain[ed] margin" to address the input from the changes in the 2014 USGS map [AR 20614]. In other words, to the public, NNSA said that any further NEPA review was unnecessary in light of the new map because i) the map did not change the data already being used for the response spectra, and ii) to the extent the existing response spectra were factored into building standards for the UPF, the standards were conservative enough that any changes would be absorbed by the input from the 2014 USGS map.

[58] Specifically, CNS would consider an amendment to the "Design Code of Record," which (again, as mentioned above) is the document containing all the laws, codes, regulations, and standards that CNS would reference in constructing the UPF [AR 28341].

In private, as part of the development of *new* design-basis response spectra, CNS did not view the data so decisively. Essentially, the internal record shows that the UPF project team declined to consider the data from the 2014 USGS map for the time being, because the data needed to mature. Nowhere in the contemporaneous record does CNS echo the same certainty expressed in the 2016 SA, which suggested that even if the 2014 USGS map was considered, it would not change the construction requirements for any new[59] UPF buildings.

iii. 2016 AROD

In July 2016, three months after the 2016 SA was prepared, NNSA published its amended record of decision, the 2016 AROD, which concluded that no further NEPA analysis was required as a result of the 2016 SA [AR 20707]. "With regard to seismic risks specifically," NNSA said that both the 2011 SWEIS and the 2016 SA evaluated potential impacts of the release of radioactive materials that could result from severe seismic events [AR 20708]. Based on this evaluation, NNSA found that the conclusions of the accident analysis performed in the 2011 SWEIS had not changed as a result of the new map [AR 20708-09].

As with the 2016 SA, a comparison of the 2016 AROD against the peer review recommendations reveals a troubling inconsistency. According to the AROD, NNSA had already evaluated the seismic risks under the 2014 USGS map and concluded that nothing would change (or that if a change occurred, it would be within the "margin" of the existing safety basis). Again, this is not what the UPF project team said in response to the peer review recommendations. In fact, that group said they would not incorporate the data from the 2014 USGS map at the time, because doing so would either be premature or simply not useful based on the available data.

[59] The 2016 SA contains essentially no discussion of the ELP (that is, the plan to update old buildings to contemporary environmental standards), at least as it relates to seismic hazard analysis.

This public characterization of the internal documents in the 2016 SA and AROD is consistent with how the Defendants' described these documents in their argument [*see* D. 55, p. 41 (In the 2016 SA and AROD, NNSA "concluded that its quantification of risks remained valid and was not changed by the 2014 USGS seismic maps")]. Thus, Defendants have argued that in 2016, the issue was not that NNSA was uncertain about the effects of the USGS data. Rather, they say there was no issue, because NNSA had concluded the new data would not affect how NNSA would account for seismic risk in its overall plan for modernizing Y-12. Yet as shown, this argument is belied by the record before the agency at the time.

iv. Structural Deficiencies

Even worse, the record indicates there were serious concerns about the safety of the buildings at Y-12 after the 2016 SA was released. DNFSB, which had been pointing out structural deficiencies at Y-12 facilities since before the 2011 SWEIS was even drafted, conducted an on-site review for the Extended Life Program in November 2016 [AR 26300]. While at the time, DNFSB acknowledged "positive step[s]" were being taken, what they found was still troubling. For example, Building 9215 would be "unable to withstand certain design basis events" (that is, an event that is likely enough that the building should be designed to withstand it) [AR 26302]. Further, the CNS "safety strategy" indicated that it could not be demonstrated that certain processes would remain "subcritical" upon certain design basis events at both 9204-2E and 9215—that is, as designed, it could not be demonstrated that a nuclear explosion would not occur [*Id.*]. Further, the range of design-basis accidents of concern—including natural phenomena events—was not even known, such that safety analysts could not even predict the "structural configuration" if such an event occurred [AR 26302-03]. Based on all these factors, DNFSB analysts assumed

the worst-case scenario and "assumed nuclear materials could be affected in such a way as to make criticality accidents credible" [AR 26303].

This record information only sharpens the contrast between the facts on the ground and the facts as they were reported to the public in the 2016 SA. Not only was NNSA still grappling with the 2014 USGS data, it was also receiving information of dire structural conditions and substantial exposure to earthquake risks at the 9204-2E and 9215. Defendants say this is all OK, because, as the 2016 SA disclosed, NNSA was taking steps to reduce MAR, which could *potentially* reduce accident consequences at the facilities [AR 20648].

However, "a conclusion, even a correct one, that a given action might reduce a potential impact does not alone indicate that the impact would not be significant." *WildEarth Guardians v. Provencio*, 923 F.3d 655, 671 (9th Cir. 2019); *see also* 40 C.F.R. § 1508.27 ("A significant effect may exist even if the Federal agency believes that on balance the effect will be beneficial."). The DNFSB evaluations disclose highly negative impacts that might occur at Y-12 in the event of an earthquake (even one within the "design basis" range), and a suggestion that the reduction in MAR *might* offset any of these negative impacts is not sufficient to avoid further NEPA review.

v. 2018 SA

The 2018 SA does discuss DNFSB's 2016 walk-through, and it reveals that the "documented safety basis reports for the existing Y-12 facilities will need to be updated to reflect seismic hazard information from both the 2014 USGS [map]" [AR 31097]. In addition, the 2018 SA discusses another seismic study that was currently being prepared by NRC, DOE, and the Electric Power Research Institute (EPRI) [AR 31096]. Once the latter study was complete, it would be integrated with information from the USGS map to develop the design ground motions for Y-12 (in other words, a site-specific analysis) [*Id.*] Yet, even though the study was not complete, NNSA predicted

this new information would "increase the accident consequences or risks associated with the continued operation of existing facilities, as reviewed in the 2011 SWEIS and 2016 SA" [*Id.*].

The 2018 SA also revealed for the first time in any NEPA document (so far as the Court can tell), the existence of a 2003 site-specific hazard analysis "developed by the USGS" which had been used to conduct the existing accident analyses [*Id.*]. Indeed, the administrative record for the 2018 SA reveals a 2003 analysis [AR 27193], as well as a 2012 update to that analysis [AR 28306], but those documents are not referenced as part of the administrative record for either the 2011 SWEIS or 2016 SA.

It is odd that this information from 2003 is *never* mentioned or incorporated by reference into any other NEPA document, including in the 2011 SWEIS, where that site-specific analysis was apparently used to analyze the environmental consequences of a seismic event. Thus, while the 2018 SA is more thorough than its predecessor, its acknowledgement that the 2014 USGS map will be incorporated into site-specific analysis only makes the continued reference to the "detailed discussion of the seismic conditions" at Y-12 ring less true. The 2018 SA's acknowledgment that a site-specific analysis is now being conducted (four years after it was first requested)—combined with its assurance that whatever analysis is conducted will potentially reveal a *better* outlook than before—will not save Defendants. Rather, the sudden turn only highlights the arbitrary and capricious nature of the previous SA.

vi. Case Law

1. *Warm Springs Dam*

The arbitrary and capricious nature of Defendants' failure to timely consider the new information in its possession stands in glaring contrast to another case where an agency was forced to consider the impact of new seismic information on its project, *Warm Springs Dam Task Force v.*

Gribble, 621 F.2d 1017 (9th Cir. 1980). There, the Army Corps of Engineers had designed a dam located on an inactive earthquake fault, and nearby several active faults. *Id.* at 1019. The Corps had conducted preliminary tests (in preparation for a SEIS) of the seismic hazard on the assumption that two faults—the San Andreas and the Healdsburg—would generate earthquakes having the greatest destructive force. *Id.* at 1020. This analysis had not accounted for the consequences that might result from a third fault, known as the Maacama Fault, because the resulting destructive force would be less than that produced by the San Andreas and Healdsburg. *Id.*

But while the draft SEIS was being prepared, a USGS geologist was mapping faults in a nearby area, and his study revealed a possible continuation of the Maacama fault that could affect the analysis. *Id.* at 1020-21. As here, the court had to decide whether this new seismic information, which had come to the attention of the Corps after the publication of its SEIS,[60] required further supplementation. *Id.* at 1023.

The court acknowledged that the geologist's report (known as the Herd report), "threatened to undermine the major assumption underlying the [initial] SEIS," which was that an earthquake on the (unanalyzed) Maacama would not be worse than one on the (analyzed) San Andreas. *Id.* at 1025. The report itself was not conclusive, and the court considered it "more significant for the questions it raised than the answers it gave." *Id.* So while the information was not so definitive that it automatically compelled the Corps to initiate a formal supplementation process, the study raised "sufficient environmental concerns to require the Corps to take another hard look at the issues," which it eventually did. *Id.*

[60] To be clear, in that case, the issue was whether *another* SEIS should be prepared. Here, the analysis takes place one step earlier—the question is whether an SEIS should be prepared after the original EIS. But this is a distinction without a difference: In either situation, the question is whether significant new information required the preparation of an SEIS.

The study lasted ten months, and the Corps eventually did conclude—with far more certainty and precision—that a maximum credible earthquake on the Maacama would be less destructive than one on the San Andreas. *Id.* The Corps went even further, and commissioned a review of the ten-month study by two professors, who concluded the evaluation was "extremely conservative." *Id.* at 1025-26. On the basis of these studies, the Corps could "reasonably conclude" (as it did) that any adverse impacts disclosed by the Herd report were not significant and therefore did not require the preparation of another SEIS. *Id.* at 1026.

In *Warm Springs*, the court concluded, on the basis of a single geologist's study, that "another hard look at the issues" was required. The agency obliged, and engaged an extensive study to ensure that any earthquake hazards suggested by the initial report did not present new information that required a SEIS.

The performance by NNSA in this case here has been markedly different. First, the USGS Seismic Hazard Map is not an isolated report from a single geologist. It is a rigorously prepared and well-respected map that provides the seismic hazard baseline engineers (including those at DOE and NNSA) use for site-specific analyses throughout the entire country. In 2016—despite a contemporaneous recommendation that NNSA should be using the 2014 USGS map to prepare a new site-specific analysis—the agency rejected the possibility that the 2014 USGS Map would affect the seismic hazards evaluated at the site in the 2011 SWEIS (which did not reference a single seismic hazard analysis). Facing more pressure in 2018, NNSA informed the public that it would prepare a site-specific analysis which would not be finished until 2019, but nevertheless remained confident that any reported hazards from the analysis would not substantially increase the seismic hazards at the site.

2. *Blue Ridge*

Defendants have pointed the Court to several cases that purportedly show NNSA has given the proper "hard look" at the new information in this case and "reasonably decided that it did not warrant a [S]EIS" [D. 55, p. 40]. While the Court agrees that the "hard look" standard applies to this action, these cases are factually distinguishable from the situation at issue here.

The principal case Defendants rely on is *Blue Ridge Envtl. Def. League v. Nuclear Regulatory Comm'n*, 716 F.3d 183 (D.C. Cir. 2013). In that case, the Nuclear Regulatory Commission ("NRC")—which is responsible for granting nuclear energy reactor site permits—had, as part of a combined-license hearing, granted two early site permits in 2008 that were supported by an EIS. *Id.* On March 11, 2011, a catastrophic accident occurred at the Fukushima Dai-ichi Nuclear Power Station in Japan. *Id.* at 189. NRC promptly appointed a task force to review NRC processes and regulations to determine whether the agency should improve its regulatory system to avoid a similar accident at a nuclear power facility in the United States. *Id.*

The task force concluded that under the current regulatory approach, "a sequence of events like the Fukushima accident is unlikely to occur in the United States." *Id.* And specifically, the task force noted that all of the current early site permits (including the ones at issue in the case) already met the requirements of the task force recommendations. *Id.* "In sum, the [task force] recommended that. . . .the license application proceedings continue without interruption." *Id.*

Nevertheless, the petitioners argued that the license hearings should be reopened under NEPA, because the task force report was "new and significant" information requiring the preparation of an EIS. *Id.* at 196. The court viewed this argument skeptically, finding the petitioners had

provided "no explanation" as to how the task force recommendations raised previously unaddressed issues. *Id.* at 198. Rather, "[b]ecause the EIS addressed and dismissed precisely the risk that gave rise to the Fukushima accident," further NEPA review was not required. *Id.*

Blue Ridge is easily differentiated from this case. There, the court had concluded (quite reasonably, in this Court's view) that because the new information—the task force report—did not bring to light any environmental risks that had not been previously considered in the EIS, a SEIS was not required. Indeed, the task force report had gone one step further, specifically finding that the nuclear power sites at issue in the case were *not* at greater environmental risk based on the Fukushima catastrophe, which had taken place in an entirely different country.

Here, no one disputes that the 2014 USGS map indicated an increased risk of seismic hazard at a specific location—Y-12—at the same time NNSA was revising its plans to extend the life of older buildings at Y-12 which NNSA knew were at seismic risk. There is no reason to doubt the *Blue Ridge* court did not take a "hard look" at the agency's decision. But the fact that it did so and found nothing of concern has little bearing on the facts of this case, where a hard look has revealed numerous deficiencies in the agency's consideration of relevant new information that pertains to a particular site.[61]

vii. Accident Analysis

The decision of whether or not to incorporate the USGS data into a site-specific analysis is hardly trivial or academic. Y-12 is located in a populous and quickly growing part of the country [*see* AR 17040]. Within the range of possible NEPA cases that might come through its courthouse,

[61] Plaintiffs have also argued that an Inspector General's report from 2015, describing one building at Y-12—the "9201-05 Alpha 5 Facility"—as the "worst of the worst" [AR 19105], was also "significant new information" that triggered the need for further NEPA review [D. 53-1, p. 38]. But the 9201-05 facility is not part of the future plans at Y-12 and will be demolished, if it has not been already. The Inspector General's report does not raise any concerns regarding existing buildings that will continue to function at Y-12, and therefore no further NEPA review is required on the basis of the information in this particular report.

the Court is hard-pressed to imagine a more dramatic hypothetical than this, where it must contemplate what might occur if a major earthquake struck a nuclear weapons manufacturing facility located in a major population center. The rubber hits the road at the accident analysis. Here, NNSA did not conduct a full analysis of the environmental consequences that would result from an earthquake at Y-12, and instead decided to "bound" its discussion of the consequences and risks of the accident within purportedly more likely accident scenarios.

1. Bounding Analysis

The primary bone of contention regarding NNSA's accident analysis in the 2011 SWEIS is over whether NNSA's decision to use a "bounding" analysis—and its ratification of that analysis in both the 2016 and 2018 SAs—was arbitrary and capricious. The terminology is obscure—NEPA regulations do not ever discuss "bounding" analyses, and so far as the Court can tell, DOE is the only agency that even uses them. Nor does the term appear in DOE's own NEPA regulations [AR 31375]. The sole guidance provided to help determine when a bounding analysis is appropriate comes from a one-page DOE guidance document published in 2000 [*Id.*].

That guidance document defines "bounding" as "an analysis that uses simplifying assumptions and analytical methods that are certain to overestimate actual environmental impacts" [*Id.*]. Such an analysis is sanctioned when, for example, the information relevant to reasonably foreseeable impacts cannot be obtained, where DOE is conducting a broader analysis that requires simplifying assumptions (such as in a programmatic EIS), or where a simple conservative analysis is sufficient to show that an impact is significant and does not warrant further investigation [*Id.*]. In

the 2011 SWEIS (released in February 2011), NNSA justified its decision to use a bounding analysis, in part, because "detailed design descriptions" for a UPF were not available, and the reduction in accident risks could therefore not be quantified[62] [AR 16967].

Thus, DOE bounded its comparison of environmental impacts (between the various alternatives) based on the accident with the most severe *consequences* (an airplane crash into the enriched uranium facilities) and the accident with the highest *risk* (a design basis fire at the highly enriched uranium storage facility)[63] for the no action alternative [AR 16981]. This meant that no specific impacts were analyzed with respect to the UPF alternative, Upgrade in-Place alternative, or the Capability-Sized UPF alternatives. NNSA simply found there were "no greater impacts than the No Action alternative" [*Id.*].

While DOE acknowledges that "using conservative assumptions and analytical methods to bound an impact may be appropriate and even necessary in some cases," a bounding analysis should not be used "where more accurate and detailed assessment is possible and would better serve the purposes of NEPA" [AR 31375]. For example, DOE recommends against using a bounding analysis "where differences in impacts may help to decide among alternatives or to address

[62] Although Plaintiffs do not press on this point, the Court is skeptical of this explanation. In December 2009, DNFSB described the UPF as follows in a Staff Report: "The UPF main building is a two-story, rectangular reinforced concrete shear wall building extending from the foundation at grade to elevation 69 ft and subdivided by interior shear walls into individual modules forming a 4 x 3 grid. The first story (process level) rests on the foundation. The second story (utility level) consists of a reinforced concrete floor supported by a steel framing system; the reinforced concrete floor is designed to act compositely with the supporting steel beams. Several of the rooms contain a mezzanine level between the upper and lower floors" [AR 16467].

Continuing, the Report said "the building structure layout to serve as a basis for modeling was being completed; the geotechnical characterization and site seismic response analysis had been completed; the structural design, structural and seismic analyses were in preparation; and the soil-structure interaction (SSI) analysis had been initiated" [AR 16468]. Thus, more than a year before the SWEIS was published, the building design was far enough along that DNFSB could begin performing (and, in some cases, had completed) its own "accident analyses" for the UPF.

[63] The "consequence" of an action is the measure of its environmental impact [AR 7775]. DOE will quantitatively analyze the radiological consequences of an action on the humans by predicting the "latent cancer fatalities" (LCF) that would result from a given accident [AR 7775-78, 16967]. The "risk" of an action is the probability of the event occurring multiplied by its consequence [AR 7774]. Risk should "augment and not substitute" the separate presentation of probability and consequences [*Id.*]. *See Reserve Mining Co. v. Envtl. Prot. Agency*, 514 F.2d 492, 520 (8th Cir. 1975) ("[T]he parameters of each term must be identified before their interaction can be studied") (citation omitted)).

concerns the public has expressed" [*Id.*].

In both the 2016 and 2018 SAs, NNSA concluded the potential for impacts had not changed as a result of the new USGS seismic hazard map, and that further analysis of facility accidents was unnecessary [AR 20648, 31115]. In 2018, NNSA did concede that "the documented safety basis reports for the existing Y-12 facilities [would] need to be updated to reflect updated seismic hazard information" [AR 31115]. But "based on the best information available," NNSA felt there would be no significant change in impacts as a result of continued operations at Y-12 [*Id.*]. Further, NNSA had been reducing the amount of MAR in Buildings 9215 and 9204-2E, so any increase in the risk or consequences of a seismic accident would "likely" be offset by the reduction in MAR [AR 31108-09, 31115].

In affirming the sufficiency of the prior bounding analysis, Defendants have blatantly disregarded DOE's own guidance against using bounding analyses when a more detailed analysis would help to decide among alternatives or to address concerns the public has expressed.

The public concern over this case—and specifically, concerns regarding seismic hazard and potential accident risk—have been manifest ever since multiple commenters raised concerns in the Draft SWEIS in 2010 [*see* AR 17649, 17536-37, 17571-72]. Defendants argue that because the bounding analysis originated in the 2011 SWEIS, which was subject to public comment, and because they also offered public comment on the 2018 SA (which they were not required to do), they have "adequately involved" the public in review of the bounding analysis [D. 55, p. 46].

Defendants have missed the point—the issue is not whether the public has an opportunity to comment. The concern presented by a bounding analysis is that by using it, the agency may obscure differences in impacts among alternatives. And that is exactly what happened here. The 2011 SWEIS simply said that for any of the "action" alternatives (i.e., the UPF, Upgrade in-Place, and

Capability-Sized UPFs), the impacts would be "no greater" than the (bounded) impacts of the no action alternative [AR 16981]. Essentially, by using the bounding analysis, DOE avoided *any* comparison of the relative differences in impacts that might result when choosing between the action alternatives. Particularly, this meant that differences in impacts between the UPF alternative (where all buildings would be brand-new and all older buildings would be mothballed) and the Upgrade in-Place alternative (where older buildings would be improved "to the extent possible") would be completely obscured.

Per se, using a bounded analysis is not a NEPA violation. NEPA does require an agency to both consider "*every* significant aspect of the environmental impact of a proposed action," and to inform the public it has taken these impacts into account. *Baltimore Gas and Elec.*, 462 U.S. at 97 (quoting *Vermont Yankee*, 435 U.S. at 553) (emphasis added). And NNSA had skated out on to thinner ice by making its initial decision to use a bounding analysis, which provided a more cursory analysis of potential impacts and prevented the public from examining whatever analysis had been (or could have been) conducted. At the time of the 2011 SWEIS, the decision to use a bounding analysis was at least nominally justified by the fact that plans for the UPF were in their preliminary stages, which meant that a more detailed comparison between the action alternatives was simply not feasible.

In the intervening years, this justification began to crack under the weight of the 2014 USGS map, which suggested the seismic hazards at Y-12 might be greater than initially suspected. This information, when viewed in the context of the decision to downsize the UPF and pursue the Extended Life Program (essentially combining the Capability-Sized UPF with the Upgrade in-Place alternatives) made the need for an analysis of environmental impacts *between* these alternatives more pressing. This need for deeper analysis was only underscored by NNSA's finding in 2016

that "it would be prohibitively expensive to upgrade 50+ year old facilities to current seismic standards" [AR 20632].

It is true that in 2018, NNSA suggested it "may be possible" to upgrade both Building 9204-2E and the 9215 Complex to the "appropriate" seismic design requirements [AR 31097]. Further, Defendants argue the corresponding reduction in the MAR limit at these buildings had the "potential" to reduce the accident risks and consequences, which would make any further NEPA documentation (including a more detailed accident analysis) unnecessary [AR 31085-86; *see* D. 55, pp. 41-42]. These words are not exactly reassuring. But regardless of whether the accident consequences are actually reduced—because the facilities are upgraded to the highest standards, MAR limits are reduced,[64] or both—Defendants' argument begs the relevant question under NEPA. It does not matter whether the accident consequences are in fact reduced; what matters is that NNSA adequately discloses the potential environmental impacts of any decision it makes, and that it does so in a timely fashion.

As established, NEPA does not require agencies to ignore costs and other practical considerations that may impact their final decision, and consequently, NEPA does not prevent those agencies from choosing a substantive course of action that is less satisfactory—environmentally speaking—but ultimately more feasible. The trade-off for the agency is that it must strictly adhere to NEPA's procedural requirements, and fully disclose the environmental costs of a *range* of alternatives before a final decision is made.

This entire case is an object lesson in the reality that practical considerations may often prevent an agency from choosing the environmentally preferable alternative. While NNSA's present

[64] The record does reflect that in late 2017, CNS also suggested that an updated safety basis (that is, an assessment of existing safety risk) would reflect a reduction in overall risk because the MAR limit would be reduced [AR 30071]. However, that same report reflects that ELP physical upgrade activities are contingent on funding increases above existing levels [AR 30073].

intentions to reduce seismic risk at Y-12 are commendable, the mere assertion that overall environmental consequences *may* be reduced if all goes according to plan does not allow it to avoid conducting a transparent and complete analysis in a timely fashion. To hold otherwise would turn NEPA into a dead letter.

The record has shown that Y-12 is beset by persistent structural design issues in its older buildings. As was its right, NNSA cut costs and decided to maintain some of those existing buildings longer than previously anticipated. But this highlighted issues between the alternatives discussed in the 2011 SWEIS, which had reviewed the environmental effects of plans both to maintain existing buildings as well as plans to replace those buildings with entirely new facilities. By refusing to "unbound" its analysis of potential seismic accidents between the various action alternatives after its decision to adopt a hybrid of those two alternatives, even in the face of the new information contained in the 2014 USGS map, NNSA obscured critical differences in the environmental impacts of its previously considered alternatives.

viii. Conclusion

"The purpose of NEPA is to require disclosure of relevant environmental considerations that were given a 'hard look' by the agency." *Lands Council v. Powell*, 395 F.3d 1019, 1027 (9th Cir. 2005). "Public scrutiny [is] essential to implementing NEPA," 40 C.F.R. 1500.1(b), and one of the law's "twin aims" is ensuring that the agency will inform the public that it has indeed considered environmental concerns in its decision making process. *Baltimore Gas & Elec.*, 462 U.S. at 97; *see also Idaho Conservation League v. Lannom*, 200 F. Supp. 3d 1077, 1089 (D. Idaho 2016) ("[T]he agency's analysis—its reasoning that led to [the] conclusion—is not to be found in this record. It is this lack of analysis that violates NEPA."). Agencies are entitled to a wide degree of deference under NEPA and the APA, but the deference is "not unlimited." *Brower*, 257 F.3d at

1067. Particularly, when the agency has failed to consider a factor (in the NEPA document) "which was essential to making an informed decision," deference is not owed. *Id.*

NNSA's treatment of the concerns regarding seismic hazards, discussed extensively above, disregards NEPA's requirement for full and timely public disclosure. Further, its refusal to prepare an updated, and unbounded, accident analysis that would help the public fully comprehend the differences in earthquake hazards between the various buildings at Y-12 is arbitrary and capricious in light of the new information. For these reasons, the Court concludes that Defendants have violated NEPA by failing to consider the information presented in the USGS's 2014 seismic hazard map in a NEPA document, and by failing provide a more transparent analysis of the environmental consequences of seismic hazards at Y-12.

VIII. CONCLUSION

In conclusion, the Court rules as follows. Defendants' motion for summary judgment [D. 54] is **GRANTED** with respect to its claims that the Y-12 Modernization Plan was not unlawfully segmented, and that NNSA is not required to prepare a SEIS for the UPF project or the ELP due to changed circumstances. Plaintiffs' motion for summary judgment [D. 53] will be **DENIED** on these same grounds.

On the other hand, Plaintiffs' motion [D. 53] will be **GRANTED** with respect to the argument that new information revealed since the 2011 SWEIS requires further NEPA analysis, and that all sixty-nine categorical exclusions have been unlawfully invoked; Defendants' motion [D. 54] will be **DENIED** on the same grounds.

Consistent with this ruling, it is **DECLARED** that the 2016 SA, 2016 AROD, 2018 SA, and all sixty-nine categorical exclusions are in violation of NEPA. The 2016 SA, 2016 AROD, and

2018 SA, and any challenged categorical exclusion that has been approved for a project not yet complete is also **VACATED**.

This case is further **REMANDED** to NNSA, which shall conduct further NEPA analysis—including at minimum, a supplement analysis—that includes an unbounded accident analysis of earthquake consequences at the Y-12 site, performed using updated seismic hazard analyses that incorporate the 2014 USGS seismic hazard map. In addition, further NEPA analysis should be conducted for any currently ongoing project where NNSA has applied a categorical exclusion that was challenged in this case, and the relevant exclusions should be prepared in a manner consistent with the letter of the relevant DOE regulations.

And finally, as a prevailing party, Plaintiff is entitled to reasonable attorney's fees, to be determined after submission of an appropriate motion and supporting documentation. 28 U.S.C. § 2412(a)(1); *see Portland Audubon Soc'y v. Lujan*¸ 865 F. Supp. 1464, 1472 (D. Or. 1994) (finding that plaintiffs were a prevailing party in NEPA action seeking preparation of SEIS by agency).

Plaintiffs shall submit their application for attorney's fees and costs to the court within thirty (30) days of entry of judgment in this action.

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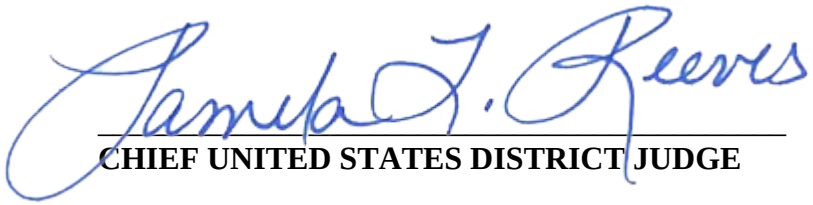

CHIEF UNITED STATES DISTRICT JUDGE