In the United States Court of Federal Claims

No. 12-389C

(Filed: April 15, 2015)

SYSTEM FUELS, INC. and ENTERGY ARKANSAS, INC., **Plaintiffs,** **v.** **UNITED STATES,** **Defendant.**	Post-trial decision in "Phase II" spent nuclear fuel case; causation; but-for world regarding incurred costs of characterizing and loading; obstruction by government through refusal to answer discovery requests; seismic stability analyses and mitigation; payroll loader allocation; property taxes; offset

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OPINION AND ORDER[1]

LETTOW, Judge.

This case constitutes the second phase of litigation between the parties regarding damages for the Department of Energy's ("DOE's") breach of its obligation to dispose of spent

[1] A protective order relating to confidential or proprietary information was previously entered in this case. Nonetheless, no such information was admitted into evidence at trial or addressed in briefing. Accordingly, this opinion is being issued publicly as an initial matter.

nuclear fuel ("SNF") and high-level radioactive waste ("HLW") generated at the two-unit Arkansas Nuclear One ("ANO") power plant. System Fuels, Inc. and Entergy Arkansas, Inc. (collectively, "System Fuels" or "plaintiffs") filed their first complaint against the United States in 2003, alleging partial breach of contract. The court granted System Fuels summary judgment on liability for a partial breach of contract, see System Fuels, Inc. v. United States, 65 Fed. Cl. 163 (2005) ("System Fuels I"), and held a trial to adjudicate issues of fact respecting damages incurred through June 30, 2006 as a result of that breach. System Fuels ultimately recovered $47,813,498 in damages for that "Phase I" case. See System Fuels, Inc. v. United States, 110 Fed. Cl. 583 (2013) ("System Fuels VI"). The breach by the government has continued, and System Fuels has returned to the court claiming a sum of $31,490,272 in damages for costs it incurred from July 1, 2006 through June 30, 2012.[2] The government contests approximately $8.5 million of System Fuels' claims.

The court conducted an eight-day trial in Washington, D.C., from September 15, 2014 through September 24, 2014. Post-trial briefing has concluded and closing argument was held on February 18, 2015. The case is now ready for disposition.

FACTS[3]

A. Nuclear Waste Policy Act

Spent radioactive materials are generated by the operation of nuclear reactors. Recognizing that "radioactive waste creates potential risks and requires safe and environmentally acceptable methods of disposal," 42 U.S.C. § 10131(a)(1), Congress enacted the Nuclear Waste Policy Act of 1982, Pub. L. No. 97-425, 96 Stat. 2201 (Jan. 7, 1983) ("NWPA") (codified as amended at 42 U.S.C. §§ 10101-10270). The NWPA specified that signatory plant operators were required to pay fees into the Nuclear Waste Fund. See 42 U.S.C. §§ 10131(b)(4), 10222(a). In exchange, DOE committed to accept SNF and HLW from those utilities beginning no later than January 31, 1998. 10 C.F.R. § 961.11.[4] To implement these material obligations, the

[2]Given that the breach is partial, System Fuels may only "obtain recovery for post-breach damages as they are incurred." Indiana Michigan Power Co. v. United States, 422 F.3d 1369, 1377 (Fed. Cir. 2005). Accordingly, System Fuels and other operators of nuclear power plants are required to bring "any future action for damages related to DOE's breach of the Standard Contract within six years of incurring such damages." Id. at 1378 (taking account of the six-year statute of limitations set out at 28 U.S.C. § 2501).

[3]The recitation of facts constitutes the court's principal findings under Rule 52(a) of the Rules of the Court of Federal Claims ("RCFC"). Additional findings of fact and rulings on questions of mixed fact and law are set forth in the analysis that follows.

[4]In the 1987 amendments to the NWPA, Congress designated Yucca Mountain, Nevada, as the site for the United States' nuclear waste repository. 42 U.S.C. § 10172(a)-(b). The designation remains in effect. See id. A detailed discussion of DOE's unsuccessful attempts to implement a repository in Yucca Mountain and its continued failure to collect and dispose of spent fuel can be found in In re Aiken Cnty., 725 F.3d 255 (D.C. Cir. 2013); see also National

NWPA authorized "the Secretary [of DOE] to enter into [Standard Contracts with any entity that] generates or holds title to high-level radioactive waste, or spent nuclear fuel, of domestic origin for the acceptance of title, subsequent transportation, and disposal of such waste or spent fuel." 42 U.S.C. § 10222(a)(1). Congress effectively made entry into a Standard Contract mandatory for operators of nuclear power facilities because the NWPA prohibited the Nuclear Regulatory Commission ("NRC") from issuing or renewing licenses to any plant operator who had not "entered into a [Standard Contract] with the Secretary" or who was not "actively and in good faith negotiating with the Secretary for a contract." 42 U.S.C. §§ 10222(b)(1)(A)(i)-(ii); see also Maine Yankee Atomic Power Co. v. United States, 225 F.3d 1336, 1337 (Fed. Cir. 2000).

B. *ANO's Standard Contract*

System Fuels, on behalf of itself and Entergy Arkansas, entered into a "Contract for Disposal of Spent Nuclear Fuel and/or High-Level Radioactive Waste" ("the Standard Contract" or "the contact") with DOE on June 30, 1983. See PX 617 (Standard Contract).[5] The contract covers both units at ANO. Standard Contract at App. A. Under its terms, System Fuels is responsible for paying a one-time fee based on energy produced and sold before April 7, 1983 and a continuing fee based on the amount of energy generated after that date. Standard Contract art. VIII.A.1-2. In accord with the terms of the Standard Contract, System Fuels chose to defer payment of the one-time fee with interest. See System Fuels I, 65 Fed. Cl. at 168; see also Standard Contract art. VIII.B.2. The Standard Contract further states that DOE must obtain the radioactive waste "as expeditiously as practicable," Standard Contract at 1, although the contract does not specify a rate or schedule for the collection of spent fuel, System Fuels VI, 110 Fed. Cl. at 587. On December 28, 1995, DOE approved System Fuels' proposed delivery date of 2001, which was "dependent upon the existence of an operational repository or an interim storage facility constructed under the act." System Fuels I, 65 Fed. Cl. at 168. System Fuels has fully performed its obligations under the Standard Contract and has been making each of the required continuing-fee payments, which amount to approximately $14 million per year. Compl. ¶ 11. As of the end of the claim period, System Fuels has paid into the Nuclear Waste Fund a total of $344 million, see Tr. 59:14-28 (Test. of Frank Rives, Entergy Services' Director of Nuclear Fuels), while DOE has failed to collect any SNF or HLW from ANO, see Compl. ¶ 1.

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*Ass'n of R*egulatory Utility Comm'rs v. United States *Dep't. of Energy*, 736 F.3d 517 (2013). Seventeen months ago, the obligations of plant operators to pay fees into the Nuclear Waste Fund were suspended by court order due to DOE's refusal to proceed with licensing and operation of a repository at Yucca Mountain. *National Ass'n of Regulatory Utility Comm'rs*, 736 F.3d at 520-21.

[5]Citations to plaintiffs' exhibits are denoted as "PX __," and defendant's exhibits are identified as "DX __." Plaintiffs' demonstrative exhibits are cited as "PDX __," and defendant's demonstrative exhibits are cited as "DDX __." Citations to the trial transcript are to "Tr. __."

C. Mitigation at ANO

1. *ANO's o*perational characteristics.

ANO is a two-reactor nuclear plant located on the shore of Lake Dardanelle, an impoundment of the Arkansas River. System Fuels, Inc. v. United States, 79 Fed. Cl. 37, 48 (2007) ("System Fuels III"), recons. denied, 79 Fed. Cl. 182 (2007), *aff'd in part*, *rev'd in part*, and remanded, 457 Fed. Appx. 930 (Fed. Cir. 2010) ("System Fuels V"); see also PDX 2 (aerial photograph of ANO). The Babcock & Wilcox reactor (Unit 1) began commercial operation in 1974 and is licensed by the NRC to operate through the year 2034. Id. The Combustion Engineering reactor (Unit 2) began commercial operation in 1978 and is licensed through the year 2038. Id.[6] Each reactor holds 177 assemblies in its core. Id. Typically a core will "burn" for eighteen months before a refueling outage occurs. The fuel that is spent and not loaded for a second or third burn is stored in wet pools. Id. The wet pool of Unit 1 has an operating capacity of 930 assemblies, and the pool of Unit 2 has an operating capacity of 918 assemblies. Id.

2. *System Fuels' mitigation efforts*.

To mitigate DOE's breach, System Fuels began off-loading the "cooler" spent fuel from the wet pools into dry storage casks during the mid- to late-1990s. System Fuels III, 79 Fed. Cl. at 49. The dry storage casks were transferred to a secure independent spent fuel storage installation ("ISFSI") at ANO pending the promised collection of spent fuel by DOE under the terms of the Standard Contract. Id. Initially, System Fuels used VSC-24 dry storage casks, each holding twenty-four assemblies and which accepted fuel that had cooled for at least ten years. System Fuels VI, 110 Fed. Cl. at 590. The first VSC-24 cask from ANO Unit 1 was loaded in 1996, and the first VSC-24 cask from ANO Unit 2 was loaded in 1997. System Fuels III, 79 Fed. Cl. at 49. System Fuels purchased a total of twenty-four VSC-24 casks and loaded its last cask of this type in June 2003. Recognizing that the supplier of VSC-24 casks was going out of business and that ANO required a cask system capable of storing "hotter" fuel, System Fuels subsequently switched to using the Holtec dry cask storage system. Id. The Holtec cask system comprises a stainless steel multi-purpose canister ("MPC"), a steel transfer cask ("HI-TRAC"), and a steel and concrete storage module ("HI-STORM"). See PDX 3 (HI-STORM 100 System). The HI-STORM cask is capable of storing 24 or 32 assemblies, depending on the Unit involved, and can accept spent fuel that has cooled for seven to eight years. System Fuels VI, 110 Fed. Cl. at 590.

System Fuels began loading Holtec casks in 2003. System Fuels VI, 110 Fed. Cl. at 590, 599-600; see also Tr. 273:19-20 (Test. of Christopher Walker, ANO's Senior Engineer). That year it also completed an expansion of the ISFSI to encompass the additional storage casks. See System Fuels VI, 110 Fed. Cl. at 590; PX 171 at 11 (Report by Kenneth P. Metcalfe, an expert who testified on behalf of System Fuels, regarding damages). As of June 30, 2006, System Fuels had loaded twenty-two Holtec casks, received two additional Holtec MPCs and HI-STORM

[6]Both reactors employ pressurized-water systems. See System Fuels III, 79 Fed. Cl. at 48.

casks, and made progress payments on four more Holtec cask systems that had not yet been delivered to ANO. System Fuels III, 79 Fed. Cl. at 50. During the claim period in this Phase II case, July 1, 2006 through June 30, 2012, System Fuels incurred costs to procure twenty-four Holtec casks, fifteen of which were loaded and placed at the ISFSI. PX 171 at 21; see also PDX 32 at 23-24 (Metcalfe Trial Presentation). By the end of June 30, 2012, System Fuels had loaded a total of 24 VSC-24 casks and 37 Holtec casks, all of which are currently being stored at the expanded ISFSI at ANO. PX 171 at 11.

D. Litigation

1. Phase I.

System Fuels' suit in 2003 alleged partial breach of contract, breach of the implied covenant of good faith and fair dealing, and an uncompensated taking. System Fuels sought and was granted summary judgment on liability for partial breach of contract. System Fuels I, 65 Fed. Cl. at 175-76. After the decision in System Fuels I, plaintiffs sought leave to amend and supplement their complaint to include damages incurred through June 30, 2006. See System Fuels, Inc. v. United States, 73 Fed. Cl. 206 (2006) ("System Fuels II"). The court granted that motion, id. at 214, and held a seventeen-day trial on damages, spanning February, March, and April 2007, System Fuels III, 79 Fed. Cl. at 40. At trial, the parties used the year 2001 as the starting point for DOE's collection of SNF at ANO, but differed in their choice of an acceptance rate for calculating damages. Id. at 55. In a post-trial decision, the court held that System Fuels was entitled to recover a total of $48,651,728 in damages, using an industry-wide acceptance rate of 3,000 metric tons of uranium ("MTU") to calculate the amount of SNF which would have been removed per year by DOE had it performed under the Standard Contract. Id. at 55, 74.[7] Both parties appealed the court's decision to the United States Court of Appeals for the Federal Circuit. On appeal, the Federal Circuit affirmed-in-part and reversed-in-part the court's decision. System Fuels V, 457 Fed. Appx. at 936.[8] It remanded the case to this court for an analysis of causation and damages based on an acceptance rate identified in DOE's 1987 Annual Capacity Report ("the 1987 rate"), rather than the 3,000 MTU rate. Id. at 934.[9] The court conducted a seven-day trial on remand during October and November 2012 and ultimately awarded System

[7]The court rejected plaintiffs' claims for project financing costs, engineering and overhead costs, as well as capital-suspense-loader costs and certain payroll-loader costs. System Fuels III, 79 Fed. Cl. at 54, 64-68. The court denied the government's proposed offset associated with System Fuels' deferral of a one-time fee. Id. at 74.

[8]The Federal Circuit affirmed the trial court's denial of an offset based on the one-time fee and the denial of System Fuels' claim for financing costs. System Fuels V, 457 Fed. Appx. at 936. The trial court's denial of System Fuels' capital-suspense-loader costs was reversed. Id.

[9]"In the interim between the post-trial decision and judgment and the resulting appeals, the Federal Circuit had issued two significant opinions touching upon causation in NWPA partial-breach cases: Pacific Gas and Elec. Co. v. United States, 536 F.3d 1282 (Fed. Cir. 2008), and Yankee Atomic Elec. Co. v. United States, 536 F.3d 1268 (Fed. Cir. 2008). Adhering to the holdings of those two cases, the Federal Circuit found that the court had erred by adopting the 3[,]000 [MTU] rate in its causation analysis." System Fuels VI, 110 Fed. Cl. at 593.

Fuels $47,813,498 in damages. System Fuels VI, 110 Fed. Cl. at 604.[10] Neither party appealed the decision.

2. Phase II.

System Fuels filed its "Phase II" complaint on June 18, 2012 seeking to recover damages for expenses incurred during the period July 1, 2006 through June 30, 2012,[11] see Compl. ¶¶ 24-36, in the amount of $31,490,272, Pls.' Post-Trial Br. at 1, ECF No. 63, see also Joint Stipulations Regarding Damages ¶ 1, ECF No. 38. System Fuels classifies its damages into three groups, with the largest category pertaining to costs incurred to purchase twenty-four Holtec casks pursuant to two agreements dating from September 1, 2000 and February 6, 2009. Id. at 7; see also PDX 32 at 30; PX 171 at 21-22. The breakdown of costs sought by System Fuels in this phase is as follows:

Dry Cask Procurement and Equipment:	$	24,967,055
Dry Cask Loading:	$	5,697,057
Dry Storage-Related Property Tax:	$	826,160[12]
Total Amount:	$	31,490,272

Pls.' Post-Trial Br. at 7-8; see also PDX 32 at 46.[13] These three general categories of costs encompass a number of smaller elements, Pls.' Post-Trial Br. at 8, see also Joint Stipulations

[10]The court found that "System Fuels is entitled to its claimed damages for the cost of upgrading its L-3 crane (amounting to $3,291,974), the cost of installing a permanent water transfer system at ANO (amounting to $1,415,847), and the cost of all additional dry storage casks past the first fifteen VSC-24 casks (amounting to $9,110,424)." System Fuels VI, 110 Fed. Cl. at 604. The court further determined that "the government's breach was not a but-for cause of the Boraflex degradation at ANO, and therefore [it did] not award the $4,105,842 of damages claimed for the costs associated with mitigating that product failure." Id. Finally, the court reduced System Fuels' damages claim by $56,320 to account for avoided costs resulting from the replacement of a water transfer system. Id.

[11]"For purposes of the instant action, the parties have agreed that damages are 'cut off' as of June 30, 2012, with [p]laintiffs retaining the right to bring future actions for damages incurred after this date resulting from the [g]overnment's continuing partial breach of the Standard Contract." Pls.' Post-Trial Br. at 3 n.3.

[12]The claim of $826,160 was understated by $30,000 because an incorrect millage rate was applied to taxes paid in the year 2008. Tr. 801:21 to 802:6, 832:25 to 833:23 (Test. of Patricia Galbraith, Entergy Services' Managing Director, Tax) (testifying that a .0453 millage rate should have been applied to the 2008 collection year rather than a .0384 rate).

[13]The initial claim for damages included costs pertaining to Boraflex degradation at ANO. In light of this court's holding in System Fuels VI, 110 Fed. Cl. at 604, plaintiffs withdrew their claim for recovery of Boraflex mitigation costs and reduced their initial claim by

Regarding Damages ¶ 4, several of which are disputed by the government, see Def.'s Post-Trial Br. at 2-3, ECF No. 62, see also DDX 2 at 3-7, 11-32. The government challenges the following particular costs claimed by System Fuels:

Characterization and Loading of Spent Fuel:	$	6,475,497
Seismic Stability Issues:	$	565,104
Payroll Loader Allocation:	$	284,788[14]
Dry-Storage-Related Property Taxes:	$	826,160
Holtec-Related Costs:	$	266,289
Rail Maintenance Costs:	$	65,182
VSC-24 Cask-Related Costs:	$	14,094
Total Amount:	$	8,497,114

Def.'s Post-Trial Br. at 2-3; see also DDX 2 at 3-7, 11-32; Joint Stipulations Regarding Damages ¶ 4. The government further propounds that System Fuels' damages claim must be reduced by $53,731 "to account for costs that it avoided by installing and using the new water transfer system at ANO." Def.'s Post-Trial Br. at 50; see also DDX 2 at 28-31; Supplemental Joint Stipulations Regarding Damages, ECF No. 42. Accordingly, the parties dispute $8,550,845 of the damages claim. See Def.'s Post-Trial Br. at 2-3, 50; see also DDX 2.

STANDARDS FOR DECISION

It is axiomatic that DOE's continued failure to begin accepting and disposing of spent fuel at ANO constitutes a partial breach of the Standard Contract. Indiana Michigan, 422 F.3d at 1374; Maine Yankee, 225 F.3d at 1342. Given that the partial breach of the Standard Contract has already been established, System Fuels seeks damages for costs of its mitigation of DOE's failure to collect spent fuel from the pools at ANO. See Pls.' Post-Trial Br. at 28. A non-breaching party has an obligation to mitigate its damages once it "'has reason to know that performance by the other party will not be forthcoming.'" Indiana Michigan, 422 F.3d at 1375 (quoting Restatement (Second) of Contracts § 350 cmt. b (1981)); see also System Fuels III, 79 Fed. Cl. at 51-52 ("If one party to a contract provides notice that it does not intend to perform under the contract, the other, non-breaching party acquires an obligation to mitigate, i.e., to take steps to avoid further losses or damage stemming from the breach."); Tennessee Valley Auth. v.

$9,769,326. Pls.' Post-Trial Br. at 4 n.4. Upon achieving a settlement of a separate dispute, System Fuels further reduced its claim by $211,439, "the pro rata amount of a Welding Services, Inc. settlement allocated to ANO." Id. Taking into consideration these adjustments, the net damages claim in this Phase II case amounts to $31,490,272. Id.

These adjustments were made after the issuance of the damages report written by System Fuels' expert, Kenneth Metcalfe. See Tr. 1046:4 to 1047:5 (Metcalfe); see also PX 171 at 20.

[14]The government misstated System Fuels' claimed damages for this element by $1. Compare Def.'s Post-Trial Br. at 32, with Joint Stipulations Regarding Damages ¶ 4(f), (g).

United States, 69 Fed. Cl. 515, 523 (2006). Mitigation damages are recoverable when: "(1) the damages were reasonably foreseeable by the breaching party at the time of contracting; (2) the breach is a substantial causal factor in the damages; and (3) the damages are shown with reasonable certainty." Indiana Michigan, 422 F.3d at 1373 (citing Energy Capital Corp. v. United States, 302 F.3d 1314, 1320 (Fed. Cir. 2002)).

To satisfy the first element of a claim for mitigation damages, "'the injury actually suffered . . . must be one of a kind that the defendant had reason to foresee [at the time of contracting] and of an amount that is not beyond the bounds of reasonable prediction.'" Vermont Yankee Nuclear Power Corp. v. Entergy Nuclear Vermont Yankee, 683 F.3d 1330, 1344 (Fed. Cir. 2012) (emphasis in original) (quoting Joseph M. Perillo, 11 Corbin on Contracts § 56.7, at 108 (rev. ed. 2005)); see also Landmark Land Co. v. Federal Deposit Ins. Corp., 256 F.3d 1365, 1378 (Fed. Cir. 2001) ("[A] plaintiff must prove that both the magnitude and type of damages were foreseeable."). In proving causation, the second element, a "non-breaching plaintiff bears the burden of persuasion to establish both the costs that it incurred and the costs that it avoided as a result of a breach of contract." Boston Edison Co. v. United States, 658 F.3d 1361, 1369 (Fed. Cir. 2011) (citing Southern Nuclear Operating Co. v. United States, 637 F.3d 1297, 1304 (Fed. Cir. 2011)). This analysis requires a "comparison between the breach and non-breach worlds." Yankee Atomic, 536 F.3d at 1273. "It is only by comparing this hypothetical 'but-for' scenario with the parties' actual conduct that a court can determine what costs were actually caused by the breach, as opposed to costs that would have been incurred anyway." Energy Nw. v. United States, 641 F.3d 1300, 1305 (Fed. Cir. 2011); see also Yankee Atomic, 536 F.3d at 1273 ("Without record evidence about the [plaintiffs'] condition with full [g]overnment performance, the Court of Federal Claims could not perform the necessary comparison between the breach and non-breach worlds and thus could not accurately assess [plaintiffs'] damages."). The breaching party has a duty to assist the non-breaching party in developing the comparative model:

> [W]e have insisted in prior cases that the plaintiff's model of damages incorporate reasonable assumptions about the costs that it would have incurred absent breach of contract, see, e.g., Energy Nw., 641 F.3d at 1307-08. If such a model cannot be produced without assistance from the breaching party, and the breaching party fails to aid the plaintiff in constructing a model of the non-breach world, the trial court may be justified in drawing factual inferences regarding that issue in favor of the plaintiff. Id.

Boston Edison, 658 F.3d at 1369-70. Finally, although the amount of damages must be proven with reasonable certainty, "absolute exactness or mathematical precision" is not required. San Carlos Irr. & Drainage Dist. v. United States, 111 F.3d 1557, 1563 (Fed. Cir. 1997) (citations omitted); see also System Fuels VI, 110 Fed. Cl. at 593. Proof that enables the court to make a "'fair and reasonable approximation'" of damages is sufficient. Bluebonnet Sav. Bank, F.S.B. v. United States, 266 F.3d 1348, 1355 (Fed. Cir. 2001) (quoting Electronic & Missile Facilities, Inc. v. United States, 416 F.2d 1345, 1358 (Ct. Cl. 1969) (in turn quoting Specialty Assembling & Packing Co. v. United States, 355 F.2d 554, 572 (Ct. Cl. 1966))); see also Southern California Edison Co. v. United States, 93 Fed. Cl. 337, 355 (2010), *aff*'d, 655 F.3d 1319 (Fed. Cir. 2011). Nevertheless, "recovery for speculative damages is precluded." Indiana Michigan, 422 F.3d at

1373 (citing San Carlos, 111 F.3d at 1563); see also Portland Gen. Elec. Co. v. United States, 107 Fed. Cl. 633, 642 (2012) (citing cases).

The breaching party may reduce a damages award by establishing that the non-breaching party failed to take reasonable efforts to mitigate its damages or that the efforts it undertook were insufficient or unreasonable. System Fuels VI, 110 Fed. Cl. at 594; see also Tennessee Valley Auth., 69 Fed. Cl. at 523 ("'The amount of loss that [the non-breaching party] could reasonably have avoided by . . . making substitute arrangements or otherwise is simply subtracted from the amount that would otherwise have been recoverable as damages.'") (alteration in original) (quoting Restatement (Second) of Contracts § 350 cmt. b). Reasonableness is determined under the facts and circumstances of the case. See Home Sav. of Am. v. United States, 399 F.3d 1341, 1353 (Fed. Cir. 2005); see also Indiana Michigan, 422 F.3d at 1375 ("Mitigation is appropriate where a reasonable person, in light of the known facts and circumstances, would have taken steps to avoid damage.") (citations omitted). If a non-breaching party takes steps that are reasonable at the time, "'it is immaterial that hindsight may later prove that the method of cover used was not the cheapest or most effective.'" S. J. Groves & Sons Co. v. Warner Co., 576 F.2d 524, 528 (3d Cir. 1978) (citation omitted); see also Yankee Atomic, 536 F.3d at 1276 ("Because [the non-breaching party's] efforts were reasonable, foreseeable, and caused by the [g]overnment's partial breach, [its] ultimate success and usage is irrelevant."); Citizens Fed. Bank v. United States, 66 Fed. Cl. 179, 185 (2005), *aff'*d, 474 F.3d 1314 (Fed. Cir. 2007) ("It is a bedrock principle of mitigation of damages, however, that even where the [non-breaching party] bears the burden of mitigation, such Monday-morning quarterbacking is irrelevant to an award of mitigation costs.").

Further, the breaching party "may seek to offset a damages award due to avoided costs (i.e., non-breach-world costs that the plaintiff avoided because of the breach)." Energy Nw., 641 F.3d at 1308 n.5; see also Boston Edison, 658 F.3d at 1369. The breaching party is responsible for "pointing out the costs it believes the plaintiff avoided because of its breach." Southern Nuclear, 637 F.3d at 1304. "Only then does the burden shift to the [non-breaching party] to incorporate those saved costs into its formulation of a plausible but-for world." Id.; see also Boston Edison, 658 F.3d at 1369 ("The breaching party may be responsible for affirmatively pointing out costs that were avoided, but once such costs have been identified, the plaintiff must incorporate them into a plausible model of the damages that it would have incurred absent the breach.").

ANALYSIS

In the second phase of this litigation, System Fuels has sought damages in the amount of $31,490,272. Joint Stipulations Regarding Damages ¶ 1. The government has not challenged $22,939,427 of System Fuels' claimed costs for its mitigation. The remaining disputed costs, amounting to $8,550,845, fall into the following categories: (1) characterization and loading of spent fuel; (2) seismic stability analyses and expenditures; (3) payroll loader allocation; (4) dry-storage-related property taxes; (5) Holtec-related costs; (6) rail maintenance costs; and (7) VSC-24 cask-related costs. Def.'s Post-Trial Br. at 2-3; see also DDX 2 at 16-17. Additionally, the government seeks an offset for costs avoided relating to (8) the water transfer system. Def.'s

Post-Trial Br. at 50; see also DDX 2 at 28-31. The court will address each disputed element, in turn.

A. Characterization and Loading of Spent Fuel

Under the Standard Contract, in connection with a pickup of SNF by DOE, System Fuels is required to provide "all preparation, packaging, required inspections, and loading activities necessary for the transportation of SNF and/or HLW to the DOE facility." Standard Contract art. IV(A)(2)(a). System Fuels does not dispute this contractual duty. See Pls.' Post-Trial Reply Br. at 23-24, ECF No. 67.

The government contests $6,475,497 of System Fuels' costs for characterizing and loading SNF at ANO. See Def.'s Post-Trial Br. at 28-31; see also Def.'s Post-Trial Reply Br. at 2-9, ECF No. 68.[15] The government insists that all of the characterization and loading costs that are sought are unrecoverable because System Fuels has failed to meet its burden of presenting what the non-breach costs would have been for the work that would have been necessary at ANO had DOE performed. Def.'s Post-Trial Reply Br. at 6-8.[16] To support this contention, the government points to Alabama Power Co. v. United States, 119 Fed. Cl. 615, 627-29 (2014). In Alabama Power, plaintiffs sought to recover fuel characterization and loading costs under the theory that those costs "w[ould] be incurred again in the future[] when the DOE ultimately performs." Alabama Power, 119 Fed. Cl. at 627. The government argued that plaintiffs should be denied recovery because they failed to make any showing of the costs they would have incurred in the but-for world. Id. If they had, the government asserted, "it would have shown that [plaintiffs] would have characterized [their] fuel before loading to DOE, just as [they] did to load to dry storage." Id. (internal quotation marks omitted). As to loading, the court "[did] not fault plaintiffs for their inability to provide a precise calculation of the cost difference between DOE and Holtec casks," id. at 628 (citations omitted), but ultimately agreed with the government, holding that "[w]ithout proof of a difference between the breach world and non-breach world costs as to characterizing and loading, the court cannot find that plaintiffs have yet been injured," id.

1. *Government's obstruction in discovery.*

The holding of Alabama Power is not dispositive in this case. Here, System Fuels has endeavored to make a viable evidentiary showing of its costs as to characterization and loading with DOE performance, but has been frustrated by hindrance and obstacles raised and fabricated by the government. Contrastingly, the court in Alabama Power found that plaintiffs in that case had "failed to make any showing at all that the loading costs would be different for any other

[15]The total amount initially challenged by the government was $6,643,588, but that figure was reduced by $168,091 because the original amount reflected some payroll loader costs, which have been stated as a separate damages element. See DX 1114 at Attach. 8; see also Tr. 1811:25 to 1812:9 (Test. of Robert Peterson, defendant's damage expert).

[16]The court's prior judgment in Phase I of litigation concerned a distinct factual record and resolved factual issues separate from the one presented by this aspect of the Phase II case. The government is therefore not precluded from challenging System Fuels' preparation and loading costs. See generally Restatement (Second) of Judgments § 28 cmt. b (1982).

available cask system." 119 Fed. Cl. at 628 (emphasis in original). Ordinarily, "[t]he discovery process affords litigants the opportunity to learn even confidential details of what each other knew, or planned, or what was technically possible, at various points in time." Energy Nw., 641 F.3d at 1308. In this instance, System Fuels in discovery sought but received little or nothing from the government that was "helpful in terms of enabling [it] to map out, elucidate, construct, depict, present, and project the but-for world in the detail that [the government] now says is required of [it]." Closing Argument Hr'g Tr. 79:11-14 (Feb. 18, 2015).[17] Specifically, in preparing for trial, System Fuels served its First Set of Interrogatories upon the government, requesting that the government:

> [i]dentify what cask and ancillary equipment DOE would have provided to [ANO] . . . if DOE had begun performance in the industry in 1998, including the manufacturer and model, cask dimensions, materials of construction, capacity in number of assemblies, weight of the cask when empty, weight limit of the cask when loaded, type of closure (welded or bolted), limits on fuel burnup (if any), limits on decay heat per cask, limits on partial loading of the cask (if any) . . . .

PX 827 at 7 (Def.'s Response to Pls.' First Set of Interrogatories (Feb. 11, 2014)). This interrogatory regarding the but-for world produced nothing of value. The government objected to the "portion of the interrogatory that [sought] information on the 'limits on fuel burnup (if any), limits on decay heat per cask, [and] limits on partial loading of the cask (if any)' as irrelevant and not reasonably calculated to lead to the discovery of admissible evidence." Id. The government further responded that "[t]he claims and defenses advanced in this litigation do not require knowledge of the limits on fuel burnup, limits on decay heat per cask, or limits on partial loading of the cask for the cask DOE would have provided to [ANO] had DOE begun performance in 1998." Id. The government's only meaningful, but meager, answer to System Fuels' pertinent discovery requests came with its response to System Fuels' First Set of Requests for Admission, in which it admitted "that it would have supplied transportation casks with bolted closures, pursuant to the terms of the Standard Contract, had it begun performance in 1998." PDX 828 at 10 (Def.'s Response to Pls.' First Set of Requests for Admission (Feb. 11, 2014)).

Given the paucity of information provided by the government's responses in discovery, System Fuels looked to the opinions of experts to fill gaps regarding how ANO's actual operations to mitigate the breach might have compared to a but-for world with DOE performance. See Energy Nw., 641 F.3d at 1308 ("The opinions of experts can be leveraged to fill gaps."); see also Gen. Elec. Co. v. United States, 112 Fed. Cl. 1, 21 (2013). Much of ANO's evidence at trial was aimed at addressing the questions the government refused to answer during discovery. Additionally, a substantial part of the evidence provided by an expert testifying on behalf of the government also was directed toward delineating loading operations in the but-for world of DOE's performance.

[17]Further citations to the transcript of the post-trial closing argument held on February 18, 2015 are to "Hr'g Tr. __" and will omit reference to the date.

2. Defining the but-for world.

Some of the comparative evidence adduced to define the but-for world was rudimentary. In his testimony at trial, the plaintiffs' damages expert, Mr. Kenneth Metcalfe, presented a fuel management model that compared spent fuel inventory at ANO in the breach and non-breach worlds. See Tr. 1060:3 to 1072:10, 1182:3 to 1195:5 (Metcalfe); see also PDX 32 at 10-26. Additionally, in an expert report prepared on behalf of System Fuels, Ms. Eileen Supko identified general features of a conjectural DOE-supplied transportation cask that could have been used to accept SNF from ANO in the non-breach world. PX 3 at 22-23 (Supko's Expert Report Regarding DOE's Plausible Non-Breach Performance and Plant Modifications (Apr. 1, 2013)) (describing cask dimensions, cask weight, and cask handling operations for possible DOE casks in the non-breach scenario); see also Tr. 999:1-15 (Supko). Although, short of rampant speculation, "it [was] not possible to identify the cask designer, specific cask capacity, and specific cask features of the cask DOE would have brought to ANO in the non-breach world," PX 3 at 19, Ms. Supko was able to identify a few cask designs "that [were] within the parameters of [transportation] casks suitable for use at the ANO station," id. at 22.

Two issues in defining the but-for world are simple and straightforward. System Fuels established at trial that the costs to load DOE transportation casks would have been different (and less) than the costs to load its dry fuel storage casks. Notably, both the Holtec and the VSC-24 cask systems involve a storage module, which a transportation cask would not. After the spent fuel was and is loaded into canisters at ANO, the canisters were and are then placed within HI-STORM storage modules. None of the steps to place the canisters into the storage modules and then to transport the modules to the ISFSI at ANO would have been required in the but-for world of DOE's performance. Of lesser importance, both the Holtec and VSC-24 systems use a welded closure, see Tr. 1571:7-9 (Test. of Warren Brewer, defendant's expert),[18] but in the non-breach world DOE would have brought a bolted transportation cask system to ANO, PX 828 at 10. As to welding rather than bolting, on cross-examination, the government's expert, Mr. Warren Brewer, acknowledged that "[w]elding is a little more complex than doing bolting in some sense;" it requires several steps, which are not necessary to close a cask with bolted closures. See Tr. 1637:13 to 1642:3 (Brewer). Mr. Brewer further conceded that a bolted cask would be less expensive to load than the Holtec cask:

> Q. Now, if the [c]ourt were to disallow ANO's costs for loading and closing the Holtec casks . . . then the [p]laintiffs would be out more money than it would have cost them to load DOE bolted systems, correct?
>
> A. I think that's the conclusion one has to reach based on our discussion here that if an equivalent amount of fuel -- or if the

[18]With the Holtec system, the welding occurs to affix the closure lid to the multi-purpose canister, see System Fuels III, 79 Fed. Cl. at 50 (setting out a detailed description of the steps required to take spent fuel assemblies out of the wet pool, load them into a canister, close the canister, decontaminate the container and attendant apparatus, and transfer the canister to a HI-STORM storage module).

> same number of bolted casks were loaded there would be some difference in cost, yes.

Tr. 1644:6-13 (Brewer).

Putting the storage-module and welding-bolting issues aside, the government contends that the Holtec multi-purpose canisters that were loaded to HI-STORM storage modules at ANO could be accepted as-is and transported by DOE consistent with System Fuels' obligations pursuant to the Standard Contract. See Def.'s Post-Trial Br. at 28-31. This position is untenable, however, for several reasons. In his expert report, Mr. Brewer relied on documents from DOE as evidence that the agency will remove dual-purpose canisters from ANO when it ultimately collects the SNF. See DX 1115 at 9-13 (Brewer's Expert Witness Report); see also Tr. 1518:20 to 1522:13, 1627:23 to 1628:9 (Brewer). For example, he explained that "the Safety Analysis Report (SAR) for the Yucca Mountain repository submitted to the NRC by DOE indicated that . . . commercial spent nuclear fuel could arrive at the repository in what it refers to as dual-purpose canisters . . . currently used in independent spent fuel storage systems . . . ." DX 1115 at 10 (quotation marks and citation omitted). This report, like a waste management document cited by Mr. Brewer, see id., was published "prior to the closure of the Yucca Mountain project, when the industry firmly believed that the program was going to move forward" and that SNF would be in dry storage for only a short period of time.[19] Tr. 1993:8-16 (Supko); see also PX 4 at 23-24 (Supko's Rebuttal to the Expert Witness Report of Warren Brewer).[20] But, as currently written, the Standard Contract does not cover acceptance of canistered SNF. Tr. 729:3-11 (Test. of David Zabransky, DOE's Director of the Office of Standard Contract Management). Absent an amendment to the Standard Contract, "canistered fuel would need to be . . . [unloaded from the canister] and [repackaged] in a transportation cask for acceptance." Tr. 729:12-21 (Zabransky); see also PX 828 at 13 ("[D]efendant admits that the Standard Contract for [ANO] will have to be

[19]Mr. Brewer also cited a decommissioning report for ANO. See DDX 1 at 28 (Brewer Trial Presentation); see also DX 1102 (Letter from John F. McCann to NRC regarding ISFSI Decommissioning Funding Plans (10 C.F.R. § 72.30) (Dec. 17, 2012)). This report was submitted to the NRC by ANO pursuant to the requirements set forth in 10 C.F.R. § 72.30. Tr. 1629:23 to 1630:2 (Brewer). According to Mr. Brewer, it reflects the operating assumption of ANO that Holtec multi-purpose canisters will be extracted from the Holtec HI-STORM storage casks and transported by DOE because the report made "clear . . . that the VSC-24 casks will be reopened and the fuel repackaged into something that can be transported[, but there was] no similar statement in there for the Holtec cask systems." Tr. 1537:23 to 1538:1 (Brewer). This inference from an omission in the decommissioning report is not viable given the regulatory regime in effect today, as the discussion infra shows.

[20]On May 29, 2014, the government moved to strike the rebuttal report written by Ms. Supko that responded to Mr. Brewer's expert report. See Def.'s Mot. to Strike Pls.' Unauthorized Rebuttal Expert Report, ECF No. 25. The court declined to strike the rebuttal report, finding that "[it] addresse[d] new questions regarding costs raised in the government's [expert] report [submitted by Mr. Brewer] and therefore properly constitute[d] rebuttal." System Fuels, Inc. v. United States, 117 Fed. Cl. 362, 365 (2014) ("System Fuels VII").

amended to provide for the acceptance of canistered fuel."). As of the date of trial, neither ANO's Standard Contract nor any of the other extant Standard Contracts had been amended to accept canistered SNF, and Mr. Zabransky was unaware of what amendments might be necessary to make canistered fuel an acceptable waste for DOE's pickup. See Tr. 730:7-11, 735:5-20 (Zabransky). As matters now stand, all of the SNF stored at ANO's IFSFI will have to be extracted and then reloaded for transport by DOE. See Tr. 1987:6-10 (Supko).

Also significant is the type of spent fuel involved, notwithstanding the government's refusal to answer System Fuels' interrogatory in that regard. No one knows whether all of the canistered fuel placed in storage at ANO will satisfy the licensing requirements for transportation if and when DOE does perform. See Pls.' Post-Trial Br. at 43. Regulations codified at 10 C.F.R. Part 71 govern the transportation requirements for canistered fuel. See Tr. 257:9-11 (Walker). Approximately one third of the loaded Holtec storage casks at ANO contain "high-burn[-]up fuel" that is noncompliant with the Part 71 requirements. See Tr. 258:2-10, 269:18-22 (Walker); Tr. 1703:4-16 (Brewer).[21] The Certificate of Compliance for the Holtec system currently restricts transportation of high-burn-up fuel in a Holtec multi-purpose canister. See Tr. 256:14 to 258:10, 275:3-11 (Walker); see also Pls.' Post-Trial Br. at 44.[22] Consequently, the government's premise that the loaded Holtec canisters could simply be extracted from the storage modules for transportation by DOE without repackaging cannot be accepted in light of the current restrictions.

Additionally, high-burn-up fuel, i.e., fuel with burn-ups exceeding 45 gigawatt-days per metric ton of uranium, can cause cladding walls[23] to become thin and brittle from the formation of zirconium hydride. See Tr. 258:17 to 265:15 (Walker).[24] In the event of an accident during

[21]Burn-up is "a measure of how much energy has been extracted from the [fuel] assembly." Tr. 258:17-18 (Walker).

[22]Each cask system has a unique licensing basis. See Tr. 232:9-12 (Test. of Dr. Jaime H. McCoy, ANO's Engineering Director). Utilities are "bound and required to abide by what is in the licensing basis and to ensure that [they] perform evaluations as required by the licensing basis." Tr. 232:16-20 (McCoy). A Certificate of Compliance "is a document that NRC actually issues to the cask vendor that certifies that cask for either [storage or transportation under CFR Parts 71 and 72] . . . and it outlines the specific requirements that vendors and the users are required to maintain to keep the design and licensing basis accurate." Tr. 275:3-9 (Walker); see also Tr. 1703:22 to 1704:1 (Brewer).

[23]Cladding refers to the containment casing of the fuel rods in the fuel assemblies.

[24]Uranium fuel cladding primarily uses the alloy zircaloy, which is based upon the metallic element, zirconium, placed in the periodic table between yttrium and niobium. At high temperatures, zirconium exists in a stable, cubic-phase. When zirconium oxidizes with water, it releases hydrogen gas, five to ten percent of which dissolves back into the alloy. After cooling, the alloy transforms to a hexagonal, tightly packed structure and excess hydrogen is precipitated as zirconium hydride. The presence of zirconium hydride precipitates cause the fuel cladding to

transportation, the cladding could break apart, potentially releasing radioactive material into the environment. See Tr. 265:3-10 (Walker). Little data are available regarding the effects of dry fuel storage on the stability of the cladding for periods longer than twenty years. Tr. 2003:7-9 (Supko); see also PX 4 at 27; PX 118 (NRC, Request for comments for potential rulemaking on *"R*etrievability, Cladding Integrity and Safe Handling of Spent Fuel at an [IFSFI] and During Transportation," 78 Fed. Reg. 3853-01 (Jan. 17, 2013)); PX 914 (prepublication copy of NRC, *Final Rule "Continued Storage of Spent Nuclear Fuel,"* 79 Fed. Reg. 56238, 56244-45 (Sept. 19, 2014)). Additionally, DOE and NRC have begun to study the long-term effects of fuel degradation on storage components, Tr. 265:22 to 266:12 (Walker), see also Tr. 1600:4-8 (Brewer), recognizing that over time levels of hydride precipitation, radioactivity, and heat will change as the fuel continues to cool, see Tr. 2088:15 to 2089:3 (Supko) ("[long-term storage periods] exacerbate[] the degradation of the cladding and particularly the embrittlement."). Prior to transportation, the condition of SNF will have to be re-characterized before it can be safely delivered to DOE.

3. Comparative analysis of the actual and but-for worlds respecting characterization and loading.

Notwithstanding System Fuels' efforts to define the but-for world in light of a dearth of information from DOE, the government contends that all of System Fuels' characterization and loading costs are not recoverable as damages. See Def.'s Post-Trial Br. at 28-31. It emphasizes that System Fuels' "obligation to model the but-for world does not just operate at the macro-level" but "also applies to proving that the costs for each of the specific activities and modifications undertaken as part of the overall project were caused by DOE's delay." Id. at 8. This position by the government cannot be accepted. None of the steps taken to load the Holtec multi-purpose canisters into storage modules at ANO correspond to the packaging activities ANO would have to perform in the but-for world upon DOE performance. Additionally, evidence at trial regarding high-burn-up spent fuel showed that, contrary to the government's refusal to answer a relevant interrogatory, such fuel at ANO could not be loaded for DOE transportation under the regulatory arrangements currently in place. For that spent fuel, there are no "incurred" costs in the but-for world that must be eliminated from System Fuels' damages. For other non-high-burn-up spent fuel at ANO, however, similar steps would have had to be performed to load DOE transportation casks in the but-for world. These steps are somewhat akin to those undertaken to load the Holtec multi-purpose canisters at ANO, depending on the spent fuel type.

The salient question thus becomes whether the court should address System Fuels' claim for characterization and loading costs by allowing System Fuels to recover its costs for (1) characterization and loading of high-burn-up spent fuel and (2) the activity of loading canisters into Holtec storage modules, transporting the modules to the IFSFI at ANO, and placing the storage module on the IFSFI, but disallowing System Fuels' costs for (3) the activity of loading canisters with non-high-burn-up spent fuel. The latter elimination would reflect the

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become embrittled, adversely affecting a fuel rod's structural integrity. See Tr. 259:20 to 262:15 (Walker); see also Tr. 1599:8-11 (Brewer).

fact that loading Holtec canisters at ANO would be similar to, and have a counterpart in, loading DOE-supplied casks for transport. Even so, assuming that the current regulatory regime remains in place, and DOE does not amend the Standard Contract to allow acceptance of canistered fuel, System Fuels would have to extract the stored spent fuel from the canisters currently in use at ANO and reload that spent fuel into DOE transportation casks. The expense of that "redundant" operation would have to be recovered as damages in a future suit by System Fuels. The further issue is whether the government's refusal to answer pertinent inquiries in discovery is sufficiently obstructive that the court should allow System Fuels also to recover the costs of loading the Holtec multi-purpose canisters with "standard," i.e., non-high-burn-up spent fuel. See Boston Edison, 658 F.3d at 1369-70, quoted supra, at 8.

Putting obstruction aside, as the factual record now stands, the court could calculate disallowed characterization and loading damages of mitigation by: (1) starting with the overall amount claimed by System Fuels and disputed by the government ($6,475,497); (2) removing one-third of the costs to account for high-burn-up spent fuel ($2,158,499), leaving $4,316,998; (3) removing one-half of that remaining amount ($2,158,499) to account for the cost of loading canisters containing non-high-burn-up spent fuel into Holtec HI-STORM storage modules and moving those modules to the ISFSI at ANO; and (4) removing one-tenth of that remaining amount to account for the fact that DOE-supplied transportation casks would be bolted rather than welded shut ($215,850), leaving $1,942,649 as the amount of imputed, incurred characterization and loading costs that should be disallowed. With those adjustments, ANO's claim for characterization and loadings costs would be reduced from $6,475,497 to $4,532,848, and the government would have succeeded in eliminating $1,942,649 from System Fuels' claimed damages.

The question of the government's obstruction is a serious one in this case. As described supra, the government provided very little help to System Fuels in constructing a model of characterization and loading costs in the but-for world of DOE'S performance at ANO. To a limited extent, the court has drawn inferences adverse to the government in constructing the calculation of disallowed costs set out above. See Boston Edison, 658 F.3d at 1369-70. Is that sufficient or would it be more appropriate for the court to reject every disallowance of System Fuels' characterization and loading costs on the ground that the government refused to respond meaningfully to discovery requests related to the but-for world? Favoring no disallowance is the fact that the Standard Contract essentially prohibits acceptance by DOE of any spent fuel placed in canisters. Supporting some disallowance is the fact that loading spent fuel from wet pools into canisters is very similar to loading spent fuel from wet pools into DOE-supplied transportation casks. The strength of this latter factor is reduced somewhat by the circumstances that the spent fuel stored at ANO is likely to change as it remains for some time in storage at ANO's ISFSI. The canisters placed in the storage modules will undoubtedly be modified or degrade over the ensuing storage period to the point that they may not be suitable for extraction by ANO for use as transportation casks by DOE upon commencement of performance, and ANO may be required to remove fuel assemblies from stored canisters and reload the assemblies into DOE transportation casks without any current assurances that ANO could sue to recover the costs of such duplicative loading steps.

Overall, given these considerations, the court concludes that the government's obstruction of System Fuels' efforts to establish a but-for model of DOE's performance deserves imposition of some adverse inferences in constructing a calculation for disallowed loading costs, but not complete rejection of any disallowance. Accordingly, the court adopts the calculation of disallowed, incurred costs of characterization and loading set out above, and awards System Fuels $4,532,848, which is a reduction of $1,942,649 from System Fuels' claimed amount of $6,475,497. The court recognizes that this partial adoption of the government's position may not contemporaneously "place the injured party in as good a position as it would have been had the breaching party fully performed." Indiana Michigan, 422 F.3d at 1373. System Fuels may be remitted to seeking in the future a recapture of any duplicative spent fuel characterization and loading expenses.[25]

B. Seismic Stability Issues

1. Seismic analyses.

Holtec casks are loaded in a stack-up configuration in the Auxiliary Building of ANO, which is seismically qualified. Tr. 281:14-23 (Walker); see also Tr. 96:6-9 (McCoy). The loading process for Holtec casks occurs in the following approximate steps: An empty MPC canister is positioned inside a transfer cask, and both are then placed in the bottom of the cask loading pit adjacent to the spent fuel pool. See System Fuels III, 79 Fed. Cl. at 50. The spent fuel assemblies are then moved from the pool and lowered into the MPC canister. See id.; see also PDX 3 (HI-STORM 100 System). After loading, a spent fuel area crane (designated the L-3 crane) places a lid onto the top of the MPC canister. An empty HI-STORM storage cask is placed onto a specially designed railcar and transported to the train bay of the Auxiliary Building, which holds safety-related structures. System Fuels III, 79 Fed. Cl. at 50; see also Tr. 198:7-9 (McCoy); Tr. 279:9 to 281:10 (Walker); PDX 3.[26] The L-3 crane then lifts the transfer cask with the loaded MPC canister out of the cask loading pit and places both components atop the HI-STORM storage cask in a "stack-up" configuration. Tr. 281:14-17 (Walker).[27] The MPC

[25]The government argues that if plaintiffs are responsible for additional characterization and loading costs in the future when DOE performs, "they can bring a claim at that time for those costs." Hr'g Tr. at 52:17-21. No evident principle of contract law would permit System Fuels to recover damages when the government is no longer in breach, however. See Hr'g Tr. 80:2-10; see also San Carlos Irr. & Drainage Dist. v. United States, 877 F.2d 957, 959 (Fed. Cir. 1989) ("To recover for breach of contract, a party must allege and establish: (1) a valid contract between the parties, (2) an obligation or duty arising out of the contract, (3) a breach of that duty, and (4) damages caused by the breach.").

[26]The train bay traverses both the Auxiliary Building and the Turbine Building, which are "under the same roof." Tr. 95:25 to 96:5 (McCoy).

[27]The L-3 crane is fitted with a "single failure proof" capability to protect against the possibility that the loaded canister and transfer cask might be dropped and damaged during transfer. Tr. 280:11-14 (Walker).

canister is subsequently downloaded from the transfer cask into the HI-STORM storage module. Tr. 282:3-12 (Walker). Once downloading is complete, the loaded railcar is moved to the train bay of the Turbine Building where closure of the HI-STORM cask is completed. System Fuels III, 79 Fed. Cl. at 50; see also Tr. 282:23 to 283:25 (Walker). Finally, the railcar is pulled out of the train bay and the HI-STORM cask is removed and transferred to the ISFSI storage pad. System Fuels III, 79 Fed. Cl. at 50.[28]

Prior to purchasing the Holtec casks, System Fuels had also used a freestanding stack-up process to load the VSC-24 casks. See Tr. 93:1-7 (McCoy); see also PDX 6 (VSC-24 Transfer Method). The handling and stack-up of the VSC-24 casks took place in the Turbine Building at ANO, which is not seismically qualified. Tr. 96:10-15 (McCoy). The VSC-24 casks were handled by the L-1 crane during transfer, which is not single failure proof. Tr. 280:21-24 (Walker); see also PDX 6; Def.'s Post-Trial Br. at 12.[29] The Turbine Building, where VSC-24 casks were loaded, does not, however, hold safety-related equipment and is built on bedrock. Tr. 198:10-11 (McCoy); see also Tr. 528:10-14 (Walker). The distance between the VSC-24 stack-up position in the Turbine Building and the Holtec stack-up position in the Auxiliary Building is approximately fifty to sixty feet. Tr. 107:2-8 (McCoy).

In March 2011, System Fuels learned that the NRC had issued a Technical Assistance Request ("TAR")[30] to First Energy's Perry Nuclear Power Plant ("Perry") with regard to the freestanding stack-up configuration of the Holtec casks. See Tr. 89:6-9 (McCoy). Specifically, the NRC questioned whether a seismic event would result in a tip-over of the Holtec cask system while the components were in a freestanding stack-up configuration. See Tr. 108:18-25 (McCoy); see also PX 880 at 3 (Dry Cask Stack-Up Issue Meeting (Apr. 4, 2011)). Perry had been implementing the same Holtec dry fuel storage system and stack-up configuration that System Fuels had been using at ANO. See Tr. 89:10-14 (McCoy); see also Pls. Post-Trial Br. at 11. Therefore, System Fuels felt "[t]he issue [was] common to ANO," PX 880 at 1, and was concerned that its existing loading process for the Holtec cask system did not meet licensing requirements, Tr. 403:12-15 (Walker). As a result of the issuance of a TAR to Perry, System Fuels ceased loading operations at ANO and began to explore "multiple parallel paths" to resolve the seismic licensing-basis issue. Tr. 116:15-19 (McCoy); see also Tr. 403:11-15 (Walker); PX 880 at 3-6. For the remainder of the claim period, no casks were loaded at ANO. Tr. 403:6-10

[28]For a more detailed discussion regarding the Holtec cask loading process at ANO, see System Fuels III, 79 Fed. Cl. at 49-50.

[29]A single failure proof crane was not required for a VSC-24 cask because that cask system can withstand a load-drop if appropriate safety measures are taken. System Fuels III, 79 Fed. Cl. at 61.

[30]"A TAR is issued by the NRC to seek additional information from other organizations when NRC inspectors are inspecting a plant and identify issues that cannot be fully explained by the site." Pls.' Post-Trial Br. at 13 n.7; see also Tr. 401:7-14 (Walker).

(Walker).[31]

The first option pursued by ANO involved re-analyzing the seismic stability of the Holtec cask system during a stack-up to determine if ANO was meeting its licensing requirements for that system. See Tr. 400:6-14 (Walker); see also PX 880 at 4. After errors were found in the then-existing calculations and evaluations for the Holtec cask stack-up configuration, Tr. 193:6-18 (McCoy), System Fuels contracted with three firms, Sargent & Lundy, Stevenson & Associates, and Holtec, to perform seismic analyses, Tr. 171:22 to 172:4, 177:20-25, 182:25 to 184:4 (McCoy), see also DX 1088 (Engineering Calculation); PX 882 (Letter from Larry Rossi to Walker (Nov. 18, 2011)); PX 736 (Arkansas Nuclear One Stack-Up Analysis in Auxiliary Building at Floor El 352' (July 27, 2012)); PX 737 (Letter from Timothy M. Adams to Walker (Aug. 22, 2012)); PX 391 (Sargent & Lundy Contract (Mar. 16, 2012)).[32] Each analysis was unable to show that the Holtec cask stack-up configuration posed no seismic stability problems at ANO. Tr. 184:15-19 (McCoy), 272:1-4, 470:1-23 (Walker).

System Fuels now claims $165,104 for costs incurred to conduct the foregoing seismic analyses. Pls.' Post-Trial Br. at 32; see also Joint Stipulations Regarding Damages ¶ 4(a). In the absence of breach, plaintiffs aver that they would not have performed seismic analyses specific to the Holtec cask system because they would not have needed to procure and load Holtec casks. Pls.' Post-Trial Br. at 14-16; see also Tr. 461:8-10 (Walker). The government concedes that System Fuels incurred the foregoing expenses, but contests recovery on the ground that System Fuels "cannot demonstrate that these costs were caused by DOE's delay." Def.'s Post-Trial Br. at 17. With timely DOE performance, the government maintains that "the same range and type of analyses performed . . . would have been necessary for the VSC-24 cask system . . . ." Id. at 14. "This is particularly so because, prior to loading SNF to DOE, [System Fuels] would have needed to perform the free[]standing stack-up to unload the SNF from the storage-only VSC-24 casks." Def.'s Post-Trial Reply Br. at 16-17.[33] This contention is unavailing because the seismic

[31]Ultimately, due to concerns regarding the stability of a cask system during a seismic event, System Fuels designed and constructed a separate Cask Transfer Facility ("CTF"). Tr. 475:21 to 476:3 (Walker). A CTF "permit[s] the transfer of the loaded dual-purpose canisters from the Holtec transfer cask to the storage cask (actions previously performed using the stack-up inside the Auxiliary Building)." Def.'s Post-Trial Br. at 13; see also Tr. 476:4-13 (Walker); PDX 8-25 (photographs of CTF's construction). System Fuels began loading the Holtec casks using the CTF in 2014. Tr. 444:14-25 (Walker). All costs associated with the design and construction of the CTF fall outside the claim period and are not recoverable in this Phase II litigation. See generally Tr. 443:23-25 (Walker).

[32]System Fuels also re-evaluated analyses for other parts of the cask loading process, including those involved with the spent fuel operation floor and cask loading pit. See Tr. 539:22 to 541:20 (Walker).

[33]Because the VSC-24 casks are storage-only casks not designed for transportation, the spent fuel assemblies would have to be extracted from the VSC-24 casks and repackaged for delivery to DOE. See Tr. 96:21-22, 187:9-15 (McCoy). At trial, Mr. Walker acknowledged that System Fuels would have unloaded the VSC-24 cask by reversing the loading sequence, i.e.,

concerns are not applicable to the VSC-24 casks.

System Fuels presented persuasive evidence at trial demonstrating that "additional analyses to support unloading of the VSC-24 casks were not required to address the NRC's concern [at Perry]." Pls.' Post-Trial Br. at 32. Mr. Walker testified that the VSC-24 cask system has a "totally different license bas[i]s" than the Holtec cask system, Tr. 243:9-16, 519:9-11 (Walker), and that the seismic issue identified in the TAR was specific to the licensing basis for a Holtec cask, see Tr. 399:22-25 (Walker). Dr. McCoy also explained that the concerns raised by the NRC "particularly [referenced] the licensing basis . . . [for] the Holtec system." Tr. 189:2-5 (McCoy). In short, "nothing about the NRC's concerns at the Perry plant regarding the stack-up of the Holtec cask system implicate[d] the VSC-24 cask system at ANO." Pls.' Post-Trial Br. at 33.

There is also no evidence to suggest that any further seismic analyses associated with unloading operations for the VSC-24 casks would have been required by the NRC. Although Dr. McCoy testified that there is a "potential" for the VSC-24 casks to tip over and endanger workers during a seismic event, ANO does not "analyze . . . seismic events for personnel safety." Tr. 105:3-17 (McCoy). Additionally, testimony at trial revealed that the NRC has neither requested nor required ANO to conduct a seismic analysis for the VSC-24 casks. See Tr. 434:13 to 440:24 (Walker); see also Tr. 1679:12-16 (Brewer). Still further, a tip-over of the VSC-24 casks in the Turbine Building during unloading would "not impact any of the safety-related structures." Tr. 434:3-12 (Walker).

Most importantly, a cask drop analysis embodied in a 10 C.F.R § 72.212 report ("§ 72.212 report") for the VSC-24 cask system,[34] considered a fifty-foot drop and rupture of the VSC-24 cask. PX 164 at 29-31 (10 C.F.R. § 72.212 Report, Licensing Basis Document, ANO VSC-24 (Feb. 14, 2012)); see also Tr. 427:10 to 429:10 (Walker). The original VSC-24 Final Safety Analysis Report ("FSAR") determined "that cask or fuel failure is not expected as a result of the drop." PX 164 at 29. The results of a rupture were nevertheless analyzed as a "worse scenario." Tr. 433:18-25 (Walker); see also Tr. 1677:22 to 1678:5 (Brewer) (admitting that it would be a "conservative analysis" to examine a drop for rupturing of the VSC-24 canister). Based on the analysis in the § 72.212 report, "the risk of a cask drop [was] considered acceptable and within the original licensing basis for the plant." PX 164 at 31. Ms. Supko, after examining both the VSC-24 FSAR and § 72.212 report, reached the conclusion that "if a VSC-24 system has to be unloaded, it would be done using the existing plant procedures for unloading the VSC-

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System Fuels would have brought the VSC-24 cask back into the Turbine Building where it would have used the freestanding stack-up configuration to unload the SNF from the casks and place the SNF back into the wet pools. See Tr. 511:23 to 512:8 (Walker).

[34]The 10 CFR § 72.212 report is a "site-specific licensing basis document." Tr. 426:13-14 (Walker).

24 system with a free[-]standing stack-up configuration in the ANO Turbine Building." PX 4 at 22.[35]

In sum, System Fuels has shown that it was required to conduct a seismic analysis for the Holtec cask system but not for the VSC-24 cask system. Had DOE performed, System Fuels would not have been required to procure Holtec casks and would not have needed to conduct seismic analyses.[36] Although System Fuels' analytical efforts did not resolve the seismic concern at ANO, its actions were reasonable at the time. See S. J. Groves & Sons, 576 F.2d at 528. Therefore, System Fuels is entitled to the full amount of costs, $165,104, it seeks for this damages element.

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[35]The government also argues that "because [System Fuels] actually constructed the [Cask Transfer Facility] at ANO, it is reasonable to conclude that the facility will be used for VSC-24 canister transfer operations in the future." Def.'s Post-Trial Br. at 13 n.3 (citing DDX 1 at 18-19; DX 1115 (Brewer Report) at 3-9). According to Mr. Brewer, a CTF "provides the best and most likely method for maintaining the ability to offload the VSC-24 casks and for the future off-site transfer of fuel from the VSC-24 casks." DX 1115 at 9. These assertions are inconsistent with the testimony of Mr. Walker, who worked on the specification, design, and structure for the CTF at ANO:

> Q. . . . Is the cask transfer facility at ANO licensed to handle the VSC casks?
>
> A. No, it is not.
>
> Q. Does the NRC license for the VSC casks have any allowance in it for handling the VSC casks in a cask transfer facility?
>
> A. No, it does not.
>
> Q. What has been Entergy's conclusion regarding the use of the cask transfer facility for the VSC casks?
>
> A. We would not use the CTF for unloading the VSC-24 system.

Tr. 505:5-16 (Walker); see also Tr. 487:2-21 (Walker). This testimony is further supported by statements made in a recent NRC inspection report, which was released after the issuance of Mr. Brewer's expert report. See PX 139 at 3 (ANO ISFSI Inspection Report (Jan. 17, 2014)) ("The CTF will support the stack-up configuration of a fully-loaded HI-TRAC, Mating Device, HI-STORM, and the Vertical Cask Transporter (VCT) during MPC transfer operations from the HI-TRAC into the HI-STORM. . . . The CTF was designed to accommodate both the HI-STORM 100S, Version C, and HI-STORM 100S, which are currently in use at ANO.").

[36]"Had DOE begun performance in 1998 at ANO . . . handling a DOE cask would not have included a stack-up operation." Tr. 988:15-17 (Supko); see also Tr. 1642:12-18 (Brewer).

2. SAFLIFT contract.

To resolve the seismic issue at ANO, System Fuels also considered procuring an overhead lifting device, known as SAFLIFT. Tr. 418:20-25 (Walker).[37] The SAFLIFT device would attach to the L-3 crane to support the weight of the HI-TRAC transfer cask and provide seismic stability during the stack-up operation. See Tr. 117:23 to 118:16 (McCoy); see also Tr. 418:4 to 419:7 (Walker) ("The SAFLIFT device is a device that would[,] . . . with the single failure-proof crane[,] hold the HI-TRAC during the stack-up position, so that is actually attached to the crane, so it is impossible for it to fall off during a seismic event."). In August of 2011, System Fuels entered into a contract with American Crane & Equipment Company ("American Crane") to procure the SAFLIFT device. See PX 256 (SAFLIFT Contract). The contract provided that American Crane would "[d]esign [a] new SAFLIFT[] assembly [for ANO]" and "provide general arrangement drawings, detail drawings and calculations for [System Fuels'] review and approval." SAFLIFT Contract at Ex. A, ¶ II.A.1. System Fuels, in turn, was responsible for making three milestone payments to American Crane, totaling $1,500,000. SAFLIFT Contract at Ex. B, ¶ I.B. The first milestone payment, for $400,000, was due when System Fuels approved draft design drawings. Id. When the contract was executed, Mr. Walker served as Contract Manager and was responsible for reviewing and approving any drawings. See Tr. 451:12 to 453:4, 619:2-9 (Walker); see also Tr. 1107:7-8 (Test. of Charles Garbe, Jr., ANO's Supervisor of Reactor Engineering). Pursuant to its terms, American Crane would deliver the SAFLIFT device "no later than Aug[ust] 3, 2012 to allow adequate time for the completion of site installation, start-up, testing, turn-over and operator training for use by August 20, 2012." SAFLIFT Contract at Ex. A, ¶ IV. System Fuels' refueling loading campaign was scheduled prior to the SAFLIFT delivery date, in May 2012. Tr. 122:15-17 (McCoy).

A few months after System Fuels' entry into the SAFLIFT Contract, American Crane gave notice that it was ready to start ordering components for the SAFLIFT device. Tr. 464:2-3 (Walker). System Fuels made its first milestone payment to American Crane in the amount of $400,000. Tr. 119:22 to 120:3 (McCoy). Then, in an effort "to save time . . . and potentially save the company money in the long run," System Fuels suspended the contract with American Crane while it was performing seismic analyses involving the Holtec cask system. Tr. 464:6-13 (Walker); see also PX 257 (Letter from Linda K. Harris to American Crane (Oct. 31, 2011)). System Fuels subsequently "moved toward canceling the contract" with American Crane when an analysis demonstrated that the railroad bay floor in the Auxiliary Building would not support the loaded Holtec system. Tr. 475:2-15 (Walker). Given that the floor might fail with the weight of the Holtec system, the SAFLIFT device would be unable to assure seismic stability to the stack-up during loading operations. See Tr. 466:18 to 475:11 (Walker); see also PX 737. The

[37]It was reasonable for System Fuels to "work on multiple options" to resolve the seismic problem presented at ANO. See Tr. 458:7-22 (Walker) ("[I]f you don't have 100 percent confidence in one technical process to solve an issue, you need backups."); see also Tr. 1421:20-25 (Test. of John Meyers, ANO's Senior Project Manager) ("The culture in the nuclear industry . . . is that whatever your primary plan is, you have anywhere from one to two, maybe even three, contingencies.").

contract with American Crane was subsequently canceled in 2013. Tr. 475:18-20 (Walker) ("[Cancelling the contract] was not a high priority for me[] because we were in suspension, but I did want to close that out for budget reasons, so I did it shortly after in 2013.").

System Fuels claims $400,000 in costs incurred for the initial milestone payment. Pls.' Post-Trial Br. at 35; see also Joint Stipulations regarding Damages ¶ 4(e). The government contends that it should not have to pay for this cost because System Fuels' actions regarding the SAFLIFT device "[were] not reasonable mitigation of DOE's delay." Def.'s Post-Trial Br. at 18. The government insists that System Fuels' "decision to rush into the contract with [American Crane] and pay the $400,000" was unreasonable because System Fuels did not know "whether the use of SAFLIFT was technically feasible at ANO." Def.'s Post-Trial Br. at 18-20. According to the government, the SAFLIFT device "was not technically feasible to use because the area of the Auxiliary Building railroad bay floor where the HI-STORM cask was placed during the stack-up process could not even support the weight of the HI-STORM by itself." Id. at 19. Although, the SAFLIFT device later proved to be unworkable, the government's reliance on hindsight to decrease damages is not persuasive. See Fisher v. First Stamford Bank & Trust Co., 751 F.2d 519, 524 (2d Cir. 1984); Citizens Fed. Bank, 66 Fed. Cl. at 185. When the seismic problem arouse, Dr. McCoy considered that ANO had a good chance of successfully resolving the issue if it used the SAFLIFT device for stack-up operations, Tr. 118:25 to 119:2 (McCoy), and Mr. Walker testified that he believed that the SAFLIFT device "would comply with the licensing basis of the Holtec FSAR," Tr. 418:20-25, see also PX 880 at 3 ("According to language in the FSAR for the Holtec [cask system,] the NRC feels as though a seismic restraint must be installed on the HI-TRAC or the HI-TRAC shall be supported by the overhead crane."). Further, the evidence presented at trial demonstrates that System Fuels did not learn about the floor limitations until after entering into the contract with American Crane. See Tr. 474:23 to 475:11 (Walker); see also Tr. 119:14-16 (McCoy); compare PX 737 (dated Aug. 22, 2012), with SAFLIFT Contract at 1, 11 (dated Aug. 1, 2011 and executed Aug. 17, 2011).

The government also contends that the SAFLIFT device was not technically feasible because "the L-3 crane, which would have connected with the SAFLIFT to provide stability to the stack-up configuration, had the potential to drop its attached load by several inches, which could have caused the HI-TRAC transfer cask to strike the HI-STORM storage cask and transfer the weight of the loaded HI-TRAC to the railroad bay floor." Def.'s Post-Trial Br. at 19. The government's argument is negated by the testimony of both Mr. Walker and Dr. McCoy. Although Dr. McCoy was not aware of a potential L-3 crane several-inch load drop at the time System Fuels executed a contract with American Crane, Tr. 121:6-11 (McCoy), he testified that ANO "probably could have worked through [that problem] . . . [by] rais[ing] the crane up enough so that you create [a] gap and can't drop [the load onto the HI-STORM storage module]," Tr. 121:1-25 (McCoy). Tellingly, Mr. Walker also explained that ANO "could [have] suspend[ed] the HI-TRAC higher by eliminating interaction between the two . . . [s]o [as to] separate the two with a gap." Tr. 454:23 to 455:11 (Walker).

The government further argues that System Fuels' efforts were unreasonable because "the agreed-upon schedule for the delivery of the SAFLIFT device would not have met [System Fuels'] cask loading schedule at ANO." Def.'s Post-Trial Br. at 20. Mr. Meyers acknowledged that even if the SAFLIFT device was timely delivered in August 2012 pursuant to the SAFLIFT

Contract, it would not have met System Fuels' anticipated spring 2012 loading campaign. Tr. 1382:4-9 (Meyers); see also DX 1060 (E-mail from Meyers to Al Dodds (Sept. 8, 2011)).[38] Even considering the mismatching schedules, System Fuels' decision to enter into the SAFLIFT Contract and make the first milestone payment was not unreasonable. Dr. McCoy testified that System Fuels "could have delayed [its] loading schedule as necessary to accommodate [the delivery schedule for the SAFLIFT device]." Tr. 122:11-14 (McCoy), see also Tr. 450:4-9 (Walker) ("[W]e could just reschedule the [loading campaign] . . . until later on."). Mr. Garbe explained that "[System Fuels'] desire was to maintain [its] site schedules, but the ultimate desire[] [was] that [it] would have [an] operational piece of equipment that would allow [it] to continue to load in the foreseeable future . . . [This policy would apply until there was no] more space available [in the wet pools]." Tr. 1129:22 to 1130:2 (Garbe). Based on the factual record, the mismatched schedules do not undermine System Fuels' claim.

Finally, the government avers that it was unreasonable for System Fuels to pay $400,000 to American Crane on September 13, 2011 because payment was not yet due under the SAFLIFT Contract. See Def.'s Post-Trial Br. at 22-25.[39] In the series of milestone payments under the SAFLIFT Contract, System Fuels was responsible for making a $400,000 payment when it approved American Crane's draft designs. SAFLIFT Contract at Ex. B, ¶ I.B. The government contends that this payment was made before System Fuels had approved the draft design drawings. Def.'s Post-Trial Br. at 22-25. To support this contention, the government relies on an e-mail dated October 16, 2011, in which Mr. Meyers inquired about suspending the SAFLIFT Contract and stated that "[a]s shown below (also in contract) [American Crane] ha[s] provided the draft 'design drawings' on schedule, however[,] we have not approved them as of this day (on hold)." PX 887 (E-mail from Meyers to Linda Harris (Oct. 16, 2011)); see also Tr. 1405:15 to 1406:9 (Meyers). This evidence lacks persuasive force. When Mr. Meyers assumed his new role as project manager for dry fuel storage, Mr. Walker "was still the contract manager," see Tr. 1370:25 to 1371:2 (Meyers), and Mr. Meyers was not aware of what approvals Mr. Walker had given pursuant to the SAFLIFT Contract, see Tr. 1371:2-3, 1426:11-24 (Meyers). The government's contention is further negated by Mr. Walker's testimony at trial. Mr. Walker

[38]The approximate lead-time in the SAFLIFT Contract was eleven months after receipt of the order. Initially, American Crane proposed to System Fuels that it could "provide[] delivery in early April 2012," based on the assumption that the contractual start date would be April 2011. See DX 1054 at 15 (Letter from Jami Rubendall to Walker (May 5, 2011)); see also DX 1050 (ANO Funding Justification (Apr. 18, 2011)) ("[American Crane] can satisfy [ANO's] Spring 2012 loading campaign with certainty depending on start work approval."). Because the contract was not executed until August 2011, delivery of the SAFLIFT device was scheduled for August 2012, after the anticipated date for the loading campaign.

[39]The invoice for the first milestone payment was dated August 1, 2011 and described the $400,000 payment as "Item #1 SAFLIFT (Lump Sum Fixed Pricing Scope) Award of Contract." DX 1056 (American Crane Invoice); see also Tr. 616:23 to 619:1 (Walker). This statement did not match the terms set forth in the SAFLIFT Contract. Compare DX 1056 at 182, with SAFLIFT Contract at Ex. B, ¶ I.B. The invoice was posted to System Fuels' accounting system on August 29, 2011 and was paid on September 13, 2011. DX 1056 at 183.

testified that he, in his role as Contract Manager, had approved the draft design drawings and therefore had no basis to withhold the first milestone payment in fall of 2011. See Tr. 451:12 to 452:22-1 (Walker).[40] As Mr. Walker explained,

> [When American Crane] provided [the draft drawing] to me . . . we did some checks to make sure the concept would work in the train bay and fit. I mean, we had weight problems, too. We had the height up on the floor. We had to actually change their overall design to weld our hook into the structure of the SAFLIFT. So, we shortened their design. And once I approved that -- showed that everything would actually fit within the building, then that was approved to proceed ahead with the more detailed drawings.

Tr. 649:10-21 (Walker); see also Tr. 451:1-19, 638:15 to 639:4, 644:25 to 645:15 (Walker). Given that the draft designs were approved, it was obligatory under the SAFLIFT Contract for System Fuels to pay $400,000 to American Crane.

Although the SAFLIFT device proved to be another unsuccessful route to solving the seismic problem at ANO, System Fuels' efforts at mitigation were reasonable and appropriate in light of the circumstances. See Indiana Michigan, 422 F.3d at 1375; see also Home Sav. of Am., 399 F.3d at 1353. Had DOE performed, System Fuels would not have needed to procure and load Holtec casks and therefore would not have contracted with American Crane and paid $400,000 for the draft design drawings. System Fuels is entitled to $400,000 in costs incurred pursuant to the terms of the SAFLIFT Contract.

C. Payroll Loader Allocation

System Fuels' accounting system gathers direct costs and uses capital suspense loaders, material loaders, and payroll loaders to capture indirect costs, i.e., overheads associated with its business. See Tr. 300:9-15 (Test. of Stephanie Barras, Entergy Services' Manager of Property Accounting); see also System Fuels III, 79 Fed. Cl. at 63. A loader "is the process that [System Fuels] use[s] to apply indirect costs to the costs that caused them." Tr. 301:25 to 302:1 (Barras). Payroll loaders are computed by "tak[ing] the expected cost for a certain period . . . and divid[ing] that [cost] by [the] expected labor" to come up with "a rate to be used on transactions." Tr. 303:7-15 (Barras). The payroll loaders for System Fuels consist of costs associated for employee salaries, in addition to costs relating to employee taxes, nonproductive time, pensions, benefits, and stock options. See Tr. 306:6-12 (Barras); see also PX 654 at 231-44 (Payroll Loaders and Allocations Learning Series (Oct. 2010)). System Fuels uses Resource Codes to identify transactions containing these costs. See Tr. 305:23 to 306:3 (Barras). The government challenges $284,788 in damages claimed for payroll loaders recorded to Resource Code 19 and Resource Code 60 in System Fuels' accounting system. Def.'s Post-Trial Br. at

[40]Mr. Walker testified that he approved the draft designs in an e-mail before approving and directing payment to American Crane. See Tr. 638:25 to 639:4 (Walker). He did not retain a copy of the e-mail. See Tr. 619:2-24 (Walker).

32.[41] Resource Code 19 captures costs not attributable to the current benefit year, costs associated with the implementation of standards adopted by the Financial Accounting Standards Board ("FASB"), and costs involved with "true-ups," such as adjustments for health care costs. See Tr. 308:8 to 309:14 (Barras).[42] Resource Code 60 records stock option costs. See Tr. 363:1-3 (Barras).[43] The parties stipulated that the amounts claimed by System Fuels for Resource Codes 19 and 60 are $273,697 and $11,091, respectively. Joint Stipulations Regarding Damages ¶ 4(f)-(g).

1. Resource Code 19.

The government argues that costs recorded in Resource Code 19 are not sufficiently attributable to mitigation activities at ANO. See Def.'s Post-Trial Br. at 33-34. System Fuels challenges the government's contention on the ground that these costs "are a direct outcome of the need to provide various benefits to [p]laintiffs' employees, who [work on dry fuel storage activities] necessary to mitigate DOE's delay." Pls.' Post-Trial Reply Br. at 19. Ms. Barras testified that Resource Code 19 does include prior period costs, but it also captures current costs associated with implementing financial accounting standards prescribed by FASB. See Tr. 310:7-20, 371:14 to 372:1 (Barras); see also PX 830 (Benefits Costs-Loading and Funding Process). For instance, Ms. Barras said that System Fuels incurred costs for the transition caused by the issuance of Standard 87 (Employers' Accounting for Pensions) and Standard 106 (Employers' Accounting for Postretirement Benefits Other Than Pensions). Tr. 362:4-11 (Barras); see also DX 1114 at 8 n.31 (Peterson Expert Report). Plaintiffs have also shown that the healthcare adjustments reflect fringe benefits for current employees who are working on dry fuel storage activities at ANO, see Hr'g Tr. 25:7 to 26:2, and represent "internal labor costs incurred to mitigate DOE's breach," Pls.' Post-Trial Br. at 48. System Fuels is therefore entitled to recover $273,697 in costs captured in Resource Code 19.

2. Resource Code 60.

[41]"Entergy claimed another approximately $1,241,064 of total payroll loaders which the [g]overnment does not independently challenge." Def.'s Post-Trial Br. at 32 (emphasis in original). Those costs are associated with Resource Code 18 (Benefits Allocation), Resource Code 2 (Incentive Compensation), Resource Code 890 (Non-Productive Loader), and Resource Code 810 (Payroll Taxes). Id. at 32-33.

[42]"The true-up process involves spreading the dollars remaining in the liability accounts over payroll. That is, the dollars are spread over the same projects, accounts, etc. that were loaded during the year." PX 654 at 23.

[43]Costs attributable to stock options were formerly captured in Resource Code 19. See Tr. 311:22-25 (Barras); see also System Fuels III, 79 Fed. Cl. at 65. Because System Fuels "wanted to further distinguish that loader from the rest of [Resource Code 19]," it created Resource Code 60 in the year 2010. Tr. 311:10-15 (Barras).

In its challenge to costs captured by Resource Code 60, the government argues that "stock option costs would not be affected by increases or decreases in the level of capital work at ANO, such as work on the dry storage project." Def.'s Post-Trial Br. at 35 (citing DX 1114 at 9). In response, System Fuels avers that its "work force would not properly function without management," and that the managers who receive these stock options supervise employees who work on the ANO dry fuel storage project. Pls.' Post-Trial Reply at 19. The connection between stock option costs and System Fuels' mitigation efforts is present but attenuated. For example, Ms. Barras acknowledged that the stock options captured in Resource Code 60 are only awarded to certain levels of management within System Fuels' organization and was uncertain if any individuals who worked on dry fuel storage receive such options. See Tr. 364:24 to 365:22 (Barras). In an expert report prepared on behalf of the government, Mr. Robert Peterson noted that "stock options are typically only granted to company executives, and not to tradesmen or junior members of management." DX 1114 at 9 (Peterson Expert Report). He further explained that "stock option costs . . . would not be impacted by increases or decreases to the level of capital work order activity." Id. In all events, a connection between stock option costs and efforts to mitigate the breach of the Standard Contract has not been sufficiently shown. System Fuels is not entitled to recover $11,091 in damages for Resource Code 60.

D. Dry-Storage-Related Property Taxes

System Fuels pays property taxes to jurisdictions in Arkansas, but does not receive "specific asset-by-asset bills from any of the taxing jurisdictions." Tr. 797:20-22 (Galbraith). To isolate the additional taxes paid as a result of its expanded ISFSI, System Fuels multiplied the net book value[44] of the dry casks placed at the ISFSI by a 20 percent assessment ratio and a millage rate[45] applied by Pope County and Russellville School District, the local jurisdictions where ANO is sited. See Tr. 798:24 to 799:3 (Galbraith); see also PX 701 at 1 (Summary of Year End Net Book Value and Estimated Property Tax for Dry Fuel Storage Casks Placed In Service) (calculating amounts paid in additional property taxes from July 1, 2006 to June 30, 2012). In accord with this formula, plaintiffs claim $826,160 in increased property taxes due to DOE's nonperformance. Joint Stipulations Regarding Damages ¶ 2.[46] The government does not conceptually contest that System Fuels may be entitled to recover additional taxes incurred due to dry fuel storage. See DX 1114 at 10. Nonetheless, it argues that the "additional property

[44]After the property has been assigned a year-end net book value, the tax assessment does not occur until July of the following year and taxes are then paid in installments the year after that. PX 701 n.1. For example, the December 31, 2008 year-ending net book value is reported in the 2009 Annual Ad Valorem Tax Report and paid out in 2010. See PX 701.

[45]The millage rate was raised from .0384 to .0453 at the end of 2007. PX 701 n.4. In this claim period, the adjusted rate applies to taxes paid in years 2008 through 2012. See Tr. 802:1-2 (Galbraith).

[46]This claimed amount is understated by $30,000, because an incorrect millage rate was applied to taxes paid in 2008. See supra at 6 n.12.

taxes [calculated by plaintiffs] are incorrect and overstate any increase in property taxes caused by DOE's delay in SNF acceptance." Def.'s Post-Trial Br. at 36.[47]

Market valuation of income-producing industrial property for purposes of ad valorem taxation is "highly theoretical" and requires several assumptions and estimates. See, e.g., Union *Pac. R.R. v. State Tax Comm'*n of Utah, 716 F. Supp. 543, 554 (D. Utah 1988) ("[V]aluation is an art, not a science. It is a function of judgment, not of natural law."); see also Burlington N. R.R. v. Bair, 815 F. Supp. 1223, 1235-36 (S.D. Iowa 1993), *aff'd*, 60 F.3d 410 (8th Cir. 1995) (calculating the true market value of a railroad's operating property using capitalized income and stock-and-debt indicators). To determine the fair market value of property owned by System Fuels, the Tax Division of the Arkansas Public Service Commission ("Tax Division") looks to three standard indicators of value as set forth in Ark. Code. Ann. § 26-26-1607. See DX 1133 (Ark. Code. Ann. § 26-26-1607); see also Tr. 867:20 to 868:7 (Galbraith). The three factors to determine value are cost, income, and stock and debt, which each receive partial weights in the assessment computation. See Tr. 1789:11-15 (Peterson).[48] Each indicator of value functions effectively as a check against the other two values.

In basic terms, the cost factor calculates the original costs of System Fuels' property, less depreciation, to arrive at a net book value. See Ark. Code. Ann. § 26-26-1607(b)(1). From the net book value, an amount may be deducted to reflect functional or economic obsolescence. See id. The income factor estimates future cash flows over a period of time. See Ark. Code. Ann. § 26-26-1607(b)(3)(A)(i). The values are then discounted to their present value, at a capitalization rate no less than 6 percent for properties in Arkansas. See id. Finally, the stock-and-debt factor values the outstanding debt and securities of a business under the presumption that those amounts equal the value of a company's assets. See Ark. Code. Ann. § 26-26-1607(b)(2)(A); see also Tr. 872:22 to 873:9 (Galbraith). This factor assumes that investments are rational and that an enterprise will make a reasonable return.

With respect to property owned by System Fuels during the claim period, the values derived from each factor were assigned the following weights by the Tax Division: cost (30 percent), income (60 percent), and stock and debt (10 percent). See, e.g., Tr. 1790:3 to 1792:13 (Peterson); see also DX 1129 at 162 (year 2006), 183 (year 2008), 191 (year 2009), 201 (year

[47]Recognizing that the court had awarded System Fuels damages for increased property taxes in the Phase I litigation, see System Fuels III, 79 Fed. Cl. at 68-69, the government contends that in this Phase II case "there is additional evidence directly relevant to the [its] challenge to [System Fuels'] property tax claim that was not produced and/or available to the [g]overnment in the first round case." Def.'s Post-Trial Br. at 38 (citing DX 1015, DX 1020, DX 1023, DX 1030, DX 1037, DX 1044, and DX 1074 (Annual Ad Valorem Tax Reports, 2006-2012)); DX 1129 (Arkansas Public Service Commission, Tax Division, Tax Assessments). For this reason, the government is not collaterally estopped from challenging System Fuels' claim for property taxes.

[48]The weights assigned to the factors reflect the type of property being assessed and the adequacy of information pertinent to each of the three factors.

2010), 209 (year 2011).[49] For each year, the Tax Division added the three weighted values to yield a fair market value for the property. See, e.g., DX 1129 at 191 (market value of $3,245,597,710 for 2009).[50] This value, multiplied by a 20 percent assessment rate, resulted in an assessed value for System Fuels' property. See, e.g., DX 1129 at 191 (2009 assessment of approximately $649,000,000). Pope County then used the assessment to calculate the property taxes System Fuels owed for property situated within the county, including ANO. Tr. 852:18 to 856:15 (Galbraith); see also DX 1015; DX 1020; DX 1023; DX 1030; DX 1037; DX 1044.

While the Tax Division included all three factors in developing its assessment during the tax years applicable to the claim period, System Fuels considered only the net book values of the expanded ISFSI to compute the asset-specific property taxes. Compare DX 1129 at 162, 183, 191, 201, 209, with PX 701. In fact, Mr. Metcalfe, who calculated System Fuels' property tax claim, testified that he was unaware how the Tax Division in the State of Arkansas assessed property and erroneously thought the evidence was "irrelevant:"

> Q. How the State of Arkansas determines property taxes is irrelevant to your opinion?
>
> A. Correct. The valuation methodology is irrelevant; the ultimate number is relevant.
>
> Q. All the inputs you used for this property tax calculation that you have in your report, those are included in your binders, right?
>
> A. To the best of my knowledge, yes.
>
> Q. Now, you did not review any State of Arkansas tax code section[s] as to how property taxes at ANO should be calculated, right?
>
> A. No, I did not.
>
> Q. You didn't review any tax code sections when you came up with your calculation, right?
>
> A. No, I did not.

[49]DX 1129 sets out preliminary tax data that were provided to System Fuels. See Tr. 875:2-7; 878:17 to 879:2 (Galbraith).

[50]The market value for each year was adjusted to reflect only "the portion that should be subject to assessment as part of this utility and allocated in Arkansas." Tr. 889:16 to 890:11 (Galbraith); see, e.g., DX 1129 at 191 (96.633 percent was allocated to System Fuels in year 2009).

Tr. 1311:11-25 (Metcalfe). The government has not provided the court with an alternative calculation, see Hr'g Tr. 65:6-9, but asks that the court "reduce the property tax claim to zero, or alternatively, [to] reduce the claimed damages by 70 percent . . . to properly reflect the portion of [System Fuels'] actual assessed value attributable to the cost approach portion of the Tax Division's assessment calculations," Def.'s Post-Trial Br. at 43; see also DX 1114 at 10. Both parties' approaches to this damages element suffer from the same flaw in that they apply only one of the three valuation techniques used by the Tax Division in Arkansas. See Ark. Code. Ann. § 26-26-1607; see also DX 1129.

Given the extensive evidentiary record before the court in this Phase II case, the tri-partite factoral analysis to determine the market value of System Fuels' property should have been used to value the casks on the ISFSI at ANO. See Tr. 1332:7-15 (Metcalfe) (testifying that, "to the extent it was possible," he would want to follow the Tax Division's assessment process to compute System Fuels' property taxes). The cost factor to the valuation provides a starting point for the value of the ISFSI because a prudent buyer, in theory, would pay no more for an asset than what it would cost to build or obtain an equivalent asset with the same economic benefits. The use of a stock-and-debt factor to ascertain the value of the ISFSI at ANO is also rational in this instance because System Fuels' market valuation offers an observable measure of anticipated, prospective earnings. The economic reality is that System Fuels needs the ISFSI to support operation of ANO and thus to generate income from ANO. Similarly, the discounted value of the future earnings for ANO may also be a reliable indicator of value, and the ISFSI contributes to income because it is essential to operations. System Fuels assumed "that net book value is what drives the income from a specific asset" and that over time the income factor and cost factor would yield the same value. Tr. 905:7-8 (Galbraith); see also 894:15-24 (Galbraith). Presumably, the two may equate over time, as evaluated by the Tax Division; nonetheless, throughout the claim period, the income factor yielded values lower than those under the cost approach. See DX 1129 at 162, 183, 191, 201, 209; see also Tr. 900:8-12 (Galbraith). For the years in the claim period, the Tax Division considered that the cost and stock-and-debt factors yielded roughly equivalent measures of value. The income factor resulted in lower values in each year, however, and thus noticeably reduced the overall assessed valuation by the Tax Division, especially because the income factor contributed 60 percent of overall value while the cost and stock-and-debt factors produced the remaining 40 percent. See DX 1129 at 162, 183, 191, 201, 209.

Both of the parties failed to take into account the assessment methodology used by the Tax Division, albeit in different ways. Because those failures are significant, the court necessarily must perform an alternative calculation. To determine the contribution of the ISFSI during each year of the claim period, the court first computes the ratio of the net book value of the ISFSI to the net book value of System Fuels' property reported by System Fuels to the Tax Division. That ratio is then multiplied by the overall valuation of System Fuels' property by the Tax Division, which value incorporates the Tax Division's weighted derivation using each of the three factors. This approach considers that the ISFSI contributed no more than, but no less than, each of the other investments made in ANO.[51] The ISFSI contribution is then multiplied by a

[51]An extrapolation had to be used for the property taxes paid in 2006 and 2008, which reflected year-ending net book values in 2004 and 2006, respectively. Those year-ending values

twenty percent assessment ratio and the applicable millage rate, yielding the amount of tax paid by System Fuels respecting the ISFSI in a given year. Using this methodology, the court finds that System Fuels incurred $700,871 in additional property taxes paid for the six-year claim period through June 30, 2012.

E. Holtec-Related Costs

1. Holtec expediting fees and interest costs.

In two instances during the claim period, System Fuels paid Holtec to expedite delivery of the dry fuel cask storage systems. See DX 1114 Attach. 6-a; see also Tr. 507:23 to 508:1 (Walker). System Fuels incurred these fees when it ordered casks with less than two years' notice as was required by its contract with Holtec. See Tr. 508:9-21 (Walker). In 2006, System Fuels paid Holtec $34,400 in expediting fees to deliver two HI-STORM casks to ANO, which were loaded with SNF in August and November of 2006. DX 1113 at 5 (Pls.' Reponses and Objections to Def.'s First Set of Requests for Admission (Jan. 8, 2014)); see also DX 1114 Attach. 6-a. In 2010, System Fuels paid Holtec $188,376 to expedite delivery of three HI-STORM casks and three MPC canisters, which were loaded with SNF in October and November of 2010. DX 1113 at 6; see also DX 1114 Attach. 6-a. These charges received a capital suspense allocation in the amount of $1,032 for 2006 and $4,521 for 2010. DX 1114 Attach. 6-a. Under its contract with Holtec, System Fuels also "deferred certain milestone payments to Holtec . . . and paid . . . interest charges at a 6.25 percent rate for these deferred payments." DX 1113 at 7; see also DX 1114 Attach. 6-b.

System Fuels has claimed "$228,329 for Holtec expediting fees and $32,725 for Holtec interest charges, for a total of $261,054 for this element of [System Fuels'] [d]amages [c]laim." Joint Stipulations Regarding Damages ¶ 4(c). Plaintiffs aver that they should be awarded these costs in their entirety because "payment of the Holtec expediting fees and interest charges was a direct result of [their] prudent actions to manage ANO's dry fuel cask loading operations." Pls.' Post-Trial Reply Br. at 16. The government objects to these costs because, in its view, DOE's breach of the Standard Contract might have caused the utility "to continue to purchase casks to load at ANO," but that breach did not cause "[System Fuels] to incur Holtec expediting fees." See Def.'s Post-Trial Br. at 45-46. The government's stated postulates are two sides of the same coin, in that System Fuels only failed to meet an ordering lead-time deadline in the contract because it needed to purchase Holtec casks for dry fuel storage, which was caused by DOE's non-performance. See DX 1113 at 5-6; see also Pls.' Post-Trial Br. at 37. In the non-breach world, System Fuels would not have continued to schedule loading operations and would not have needed to order more casks for dry fuel storage; therefore, it would never have been in a position that required it to pay any fees and charges to Holtec. The government alternatively asserts that System Fuels' attempt to recover expediting fees and interest costs should be rejected because payment to Holtec was unreasonable mitigation. Def.'s Post-Trial Br. at 45-47. According to the government, it was not "fair and reasonable under the circumstances" for

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appear to be stated at pages 164 and 211 in the tax worksheets, but the attendant valuations derived in 2005 and 2007 were not found. See DX 1129 ("Five Years Earning Adjusted For Net Plant Investment"). For those missing assessment years, the court extended the available data.

System Fuels to defer milestone payments and order casks after the negotiated deadline set forth in the Holtec contract. Id. at 45-46.

The government's challenge to this aspect of System Fuels' mitigation efforts borders on a captious and hypercritical exercise. See In re Kellett Aircraft Corp., 186 F.2d 197, 198 (3d Cir. 1950). "[M]itigation of damages may not be invoked . . . for the purpose of showing that the injured person might have taken steps which seemed wiser or would have been more advantageous to the defaulter." Id at 198-99 (emphasis in original). System Fuels is entitled to a presumption that it engaged in a good faith effort when negotiating a two-year delivery lead-time in its contract with Holtec. See First Nationwide Bank v. United States, 56 Fed. Cl. 438, 444 (2003), *aff'*d, 431 F.3d 1342 (Fed. Cir. 2005). The expediting fees were necessary because of "scheduling issues associated with predicting when [System Fuels would] need to actually order [the] casks[,] to have them delivered onsite[,] and to be ready for a [loading] campaign and [associated] budgeting issues." Tr. 507:23 to 508:1 (Walker). Further, it was not economically feasible for System Fuels to "order a bunch of casks and just have them ready [at ANO for loading]" because System Fuels is required to "pay interest on [the casks] . . . as they sit on the site." Tr. 508:4-10 (Walker). As Mr. Walker explained at trial, as soon as a cask is ordered, it "hits [System Fuels'] capital budget." Tr. 508:10-11 (Walker). Faced with these circumstances, System Fuels' management of dry-fuel-storage procurement was prudent and reasonable. The court sees no good cause for second guessing System Fuels' decisions to procure Holtec storage casks. "[O]ne is not obligated to exalt the interests of the defaulter to his own probable detriment." In re Kellett Aircraft, 186 F.2d at 199. System Fuels was not obliged to risk additional loss by undertaking measures that might have caused it to "incur unreasonable expense or inconvenience or disrupt [its] business." Restatement (Second) of Contracts § 350 cmt. g (1981). Accordingly, System Fuels' payment of the Holtec expediting fees and interest charges in the amount of $261,054 is recoverable.

2. Holtec users group fees.

The Holtec Users Group ("HUG") is an industry forum enabling users of Holtec casks to "get together and share ideas, share experience, operating experience, and knowledge of their uses of the Holtec cask system." Tr. 89:22-25 (McCoy); see also Tr. 1651:25 to 1652:4 (Brewer). All users of the Holtec cask system in the United States, including System Fuels, have chosen to participate in HUG. Tr. 90:12-14 (McCoy). In this phase of litigation, System Fuels claims a total of $5,235 in costs to participate in the group. Joint Stipulations Regarding Damages ¶ 4(d); Pls.' Post-Trial Br. at 38; see also DX 1114 Attach. 7-a. The government challenges recovery of this amount on the ground that "[System Fuels] failed to prove that participation in HUG was necessary for [System Fuels] to mitigate DOE's delay in SNF acceptance." Def.'s Post-Trial Br. at 46. The government's contention fails to take into account that membership in HUG provides ANO benefits that include the opportunity to discuss best practices. Tr. 90:3-22 (McCoy) ("It's typical for any piece[] of equipment we have at [ANO] . . . to be a part of working groups or users groups so that we can share that operating experience and knowledge across the organization."). For instance, System Fuels exchanged correspondence with other members of HUG discussing "how to deal with" the seismic concern at Perry. Tr. 422:2-9 (Walker). From these conversations, System Fuels learned that "seismic restraints [were] being pursued by several of the utilities." PX 880 at 1. In response, System Fuels also

considered installing seismic supports to the HI-TRAC cask, but realized that this option was not feasible due to issues involving the space and the structural characteristics of the ANO facility. PX 880 at 4-5; see also Tr. 422:22 to 423:11 (Walker). Given these circumstances, System Fuels' participation in HUG was a reasonable aspect of its mitigation of DOE's breach. See Tr. 91:1-2 (McCoy) (testifying that if System Fuels did not employ the Holtec cask system, then there would not be a need to participate in HUG); see also Pls.' Post-Trial Br. at 20. System Fuels may therefore recover $5,235 in costs incurred for its involvement in HUG.

F. Rail Maintenance Costs

System Fuels employs an on-site rail stub that runs directly into the Turbine Building at Unit 1. See PDX 2; see also Tr. 252:23 to 253:2, 255:19 to 256:6 (Walker). The rail line curves towards the northwest from the building and then proceeds in a northern direction, passing the ISFSI to the east and crossing the North Access Road. See PDX 2; see also Tr. 249:24 to 250:10 (Walker). The line eventually links with another rail stub that ends at a cask fabrication facility, where empty HI-STORM casks are poured with concrete. Tr. 250:13 to 251:9 (Walker); see also PDX 2.[52] The conjoined rail stub ultimately connects to the Union Pacific rail line, which is approximately 1.8 miles from the power plant. See Tr. 706:21 to 707:1 (Walker).

During the claim period, maintenance work was performed on the rail stubs at ANO. The maintenance work involved "adding ballasts, fixing some rail connections, [and] some ties, and [repairing] some degradation associated with the rail system." Tr. 506:2-4 (Walker). Specifically, Woodco, Inc. ("Woodco") "replac[ed] . . . the [railroad] track ties in the area between the turbine building (starting outside the concrete area) and just past the ISFSI pad ramp." PX 515 at 1 (Woodco Contract); see also PDX 2-A (aerial photograph of ANO originally denoted as PDX 2 which Mr. Walker during trial marked to indicate the portion of the rail line repaired by Woodco). Work also was done to repair tracks near the construction pad where System Fuels pours concrete into the HI-STORM casks and prepares them for use. See Tr. 506:8-13 (Walker); see also PDX 2. The parties have stipulated that the cost for this maintenance work totals $65,182. Joint Stipulations Regarding Damages ¶ 4(b).

The government's objection to this claimed damages element involves causation: namely, that "[System Fuels] would have incurred the same railroad maintenance costs with DOE performance." Def.'s Post-Trial Br. at 47. Plaintiffs disagree, contending that maintenance work on the rail lines "was performed to facilitate handling of the Holtec casks, and that such work might not have been needed for a DOE-supplied transportation cask, even if it were brought to the site by rail." Pls.' Post-Trial Br. at 37. The court finds Mr. Walker's testimony at trial to be particularly helpful in resolving this dispute. During trial, Mr. Walker stated that "one of the major reasons" maintenance work was required was "to accommodate the [low-profile transporter ('LPT')], which required . . . more stringent requirements for maintaining [the] rail system." Tr. 506:6-8 (Walker). The LPT is a rail car used to move the HI-TRAC casks out of the building where the canisters are loaded into the HI-TRAC cask. Tr. 484:14-18, 535:18-23 (Walker). Because most transporters cannot turn, the LPT was specially designed to "turn

[52] After being poured with "special concrete," Tr. 709:3 (Walker), the casks are shifted into the storage building using an air-pallet, after which they can be moved by rail. See Tr. 709:6 to 710:5 (Walker).

around the curves" of the rail line. Tr. 484:14-18 (Walker); see also PDX 2.[53] Mr. Walker testified that the rail line near where the HI-STORM casks are poured, was damaged "due to equipment transferring . . . the Holtec system." Tr. 506:8-11 (Walker). Specifically, "truck drivers ran into the rails . . . so [plaintiffs] had to repair those sections of the tracks." Tr. 506:11-13 (Walker). Even if DOE were to bring a transportation cask by rail in a non-breach world, System Fuels would not have needed to procure Holtec casks; consequently, it would not have maintained a rail line near the construction pad for the HI-STORM casks or been subject to the "stringent requirements" involving the LPT. See Tr. 506:7, 14-16 (Walker) (testifying that the maintenance work was performed to facilitate handling of Holtec casks). Having established but-for causation, System Fuels may recover $65,182 for this damages element.

G. VSC-24 Cask-Related Costs

In 2009, System Fuels contracted with Advanced Concepts, Inc. ("Advanced Concepts") to perform licensing work for both VSC-24 and Holtec casks used at ANO. See Tr. 713:17 to 715:5 (Walker); see also PX 248 (Change Order between System Fuels and Advanced Concepts (Dec. 1, 2009)). The work performed by Advanced Concepts included revisions to the 10 C.F.R § 72.212 report for both cask systems. Tr. 716:21 to 717:2 (Walker). The government avers that System Fuels may not recover the portion of costs attributable to the work performed on the VSC-24 casks because those casks would have remained onsite had DOE performed. Def.'s Post-Trial Br. at 49-50. Because there were no "documents about how [the] work [was] prorated between one system versus the other," Tr. 1481:13-14 (Brewer), Mr. Brewer inferred that half of Advanced Concepts' work under the contract was associated with the VSC-24 casks, Tr. 1481:16-19 (Brewer).[54] Based on Mr. Brewer's evaluation, Mr. Peterson subtracted 50 percent from the total amount of Advanced Concepts' invoices during the damages claim period, attributing $14,094 in costs to the VSC-24 casks. See DX 1114 Attach. 4-b; see also Tr. 1807:6 to 1809:7 (Peterson). Accordingly, it is the government's position that System Fuels may not recover $14,094 in licensing costs for the VSC-24 cask system.[55]

System Fuels argues that it is entitled to a portion of licensing costs for the VSC-24 casks because nine of the twenty-four VSC-24 casks present at ANO's ISFSI are attributable to DOE's breach. See Pls.' Post-Trial Reply Br. at 31 (citing System Fuels VI, 110 Fed. Cl. at 600 (finding the government responsible for the costs attendant to nine VSC-24 casks at ANO)). To that end, System Fuels posits a deduction calculated on a pro-rata basis. See Pls.' Post-Trial Reply Br. at

[53]Now that System Fuels uses the CTF to load casks, see supra at 18 n.31, it employs a vertical cask transporter ("VCT"). See PDX 18; see also Tr. 485:1-12 (Walker). When moving the HI-TRAC transfer cask to the CTF stack-up, the VCT will "pick up the HI-TRAC from the LPT" and travel along the rail line, which is "sandwiched" between the transporter's two continuous bands of treads. Tr. 485:21-25, 486:21-25 (Walker); see also PDX 20.

[54]System Fuels "failed to remove from damages the portion of the Advanced Concepts contract costs related to the VSC work." Def.'s Post-Trial Br. at 50; cf. Pls.' Post-Trial Br. (omitting an analysis of this damages element).

[55]This amount reflects $13,142 in costs recorded for the VSC-24 cask system, in addition to $952 of capital suspense charges. See DX 1114 Attach. 4-b.

31 (dividing the number of VSC-24 casks not attributable to DOE's breach by the total number of VSC-24 casks on the ISFSI at ANO). Applying this percentage to the value of half of the invoices yields a proposed deduction of $9,315. See id.

The court cannot accept System Fuels' proffered adjustment because it did not provide evidence at trial tying the licensing work to the nine additional breach-related VSC-24 casks that are on the ISFSI at ANO. System Fuels' decision to procure and load the first fifteen casks was not caused by DOE's non-performance. See System Fuels VI, 110 Fed. Cl. at 590 ("Both System Fuels and the government have agreed that in any non-breach scenario, a minimum of fifteen VSC-24 casks would have been loaded into dry storage at ANO."). In the non-breach world, those fifteen VSC-24 casks would have remained at ANO during the claim period, precipitating the need for licensing work on that cask system. See Def.'s Post-Trial Reply Br. at 21. System Fuels has failed to show that any portion of the licensing costs for the VSC-24 cask system was caused by DOE's breach, and accordingly, it may not recover $14,094 in costs incurred for the work performed by Advanced Concepts.

H. Water Transfer System

ANO employs a water transfer system in conjunction with a work platform to adjust water levels in the cask pits when moving assemblies from the wet pools during loading operations. System Fuels VI, 110 Fed. Cl. at 590-91.[56] The original water transfer system installed at ANO was inefficient, and System Fuels sought to resolve that problem by moving to a temporary water transfer system in 1996. Id. The temporary water transfer system was designed to be assembled and disassembled with each use, but could not be operated with the larger Holtec work platform. See id. To prepare for its use of Holtec dry storage casks in 2003, ANO replaced the temporary water transfer system with a permanent water transfer system at each Unit. Id.

In the remand trial during Phase I, the court determined that the installation of the new water transfer system at ANO was caused by DOE's partial breach of the Standard Contract. System Fuels VI, 110 Fed. Cl. at 601. However, it held that the government was entitled to a per-cask offset in the amount of $2,560, representing the avoided costs associated with assembling and disassembling the temporary water transfer system. Id. at 603-04. This value, derived by Mr. Brewer in his expert report for the government, reflected the labor involved in assembly and disassembly:

> This number was reached by assuming that each installation or removal required one supervisor and three additional employees and took eight hours at $40 per hour for each employee. This formula yields a cost of $1,280 for each installation or removal. Since each cask loading could have required both an installation

[56]For a detailed description of the water transfer system, see System Fuels III, 79 Fed. Cl. at 61-61; System Fuels VI, 110 Fed. Cl. at 590-91.

> and a subsequent removal unless several casks were loaded during one session, the total cost of each cask load would be $2,560.

Id. at 604 n.22. During the period covered by the Phase I litigation, twenty-two casks were loaded at ANO without having to assemble and disassemble the water transfer system; therefore, the court awarded an offset in the amount of $56,320. Id. at 603. Neither party appealed that decision.

For Phase II, the government again seeks an offset for the costs which System Fuels avoided by loading casks without the additional burden of assembly and disassembly of the temporary water transfer system. See Def.'s Post-Trial Br. at 50-53. System Fuels does not object to the fact that avoided costs of this type were realized, see Supplemental Joint Stipulations Regarding Damages, and proposes that any proposed offset should be calculated as it was in Phase I, based on a cost-savings of $2,560 per each loaded cask, Pls.' Post-Trial Br. at 49. Because ANO loaded fifteen casks without the temporary water system during this claim period, System Fuels contends that its damages should be reduced by $38,400. Id. The government objects to this figure, arguing that the labor rates calculated in Phase I are now out of date, see Def.'s Post-Trial Reply Br. at 24, and that a proper offset for the current claim period should be at least $53,731, Def.'s Post-Trial Br. at 53.

The offset suggested by the government generally reflects the type of labor calculation that was employed by the court in the Phase I case. Here, Mr. Peterson assumed that each installation and subsequent removal of the temporary water system would have required four crew members and taken a total of sixteen hours (eight hours to assemble and eight hours to disassemble). Compare DX 1114 Attach. 9-a n.3, with System Fuels VI, 110 Fed. Cl. at 604 n.22. However, instead of estimating a rate of $40 per hour for each employee, Mr. Peterson relied on System Fuels' payroll records from cask loading campaigns in 2006, 2007, 2009, and 2010 to quantify an average hourly rate for those years.[57] DX 1114 at 11-12, Attach. 9-b; see Tr. 1817:15-17 (Peterson) ("The only change I made [from the calculation in Phase I] was to substitute an actual labor rate for the assumed rate in the prior calculation.").[58] Each rate was then multiplied by the number of casks loaded in the corresponding year, yielding a total cost of $56,586 for the current claim period. See DX 1114 Attach. 9-a. Mr. Peterson proceeded to reduce this figure by $2,855 to account for costs captured in Resource Codes 19 and 60. See DX 1114 Attach. 9-a; see also Tr. 1819:17 to 1820:22 (Peterson). According to Mr. Peterson's calculations, System Fuels avoided $53,731 in costs as a result of the instillation of the permanent water transfer system at ANO. DX 1114 Attach. 9-a.

[57]System Fuels loaded two casks in 2006, five casks in 2007, four casks in 2009, and four casks in 2010. See DX 1114 Attach. 9-a. No casks were loaded at ANO in 2008, 2011, or the first six months of 2012. See Tr. 1818:11-14 (Peterson).

[58]Mr. Peterson chose not to use the assumed hourly-rate from Phase I because "actual data . . . [were] specific to this [claim period]." Tr. 1817:11-15 (Peterson).

The court finds that the methodology applied by Mr. Peterson accurately quantifies System Fuels' avoided costs for the current claim period with one exception. As discussed supra, Resource Code 19 is properly included in System Fuels' damages claim as a necessary part of the labor costs associated with cask loading activities. Consequently, only those expenses recorded in Resource Code 60 should have been deducted from the total cost figure of $56,586.[59] A total savings under Mr. Peterson's formula thus amounts to $56,432.[60] System Fuels' damages claim shall be reduced by that amount of avoided cost.

CONCLUSION

For the reasons stated, the court concludes that plaintiffs are entitled to recover $31,490,272 in damages plus $30,000 for a corrected property tax cost, less $1,942,649 (a portion of loading and characterization), $11,091 (the payroll loader related to Resource Code 60), $125,289 (a portion of property tax), $14,094 (VSC-24 related work), and $56,432 (water transfer system offset). The total damages awarded to plaintiffs are thus **$**29,370,717. The Clerk shall enter final judgment in favor of plaintiffs for that amount.

Plaintiffs are also awarded costs of suit.

In accord with the Restatement (Second) of Judgments § 26(1)(b) and (e) (1982), plaintiffs shall retain the right to bring subsequent actions on claims for damages incurred after June 30, 2012. See Indiana Michigan, 422 F.3d at 1377.

It is so ORDERED.

s/ Charles F. Lettow
Charles F. Lettow
Judge

[59]The adjustment for Resource Code 60 was reached by multiplying $.60 (the hourly rate for Resource Code 60) by 256 hours (the time it would have taken four employees to assemble and disassemble a temporary water transfer system when loading four casks during the year 2010). See DX 1114 Attach. 9-a-c.

[60]$56,586 (total cost savings) - $154 (adjustment for Resource Code 60) = $56,432 (net cost savings).