In the United States Court of Federal Claims

No. 04-1692C
(consolidated with Nos. 08-782C, -783C & -784C)
(Filed May 26, 2010)

FIREMAN'S FUND INSURANCE COMPANY, AMERICAN HOME ASSURANCE COMPANY, FIDELITY AND DEPOSIT COMPANY OF MARYLAND, AND UNIVERSAL UNDERWRITERS INSURANCE COMPANY,	*	Contracts; trial; Contract Disputes Act of 1978, 41 U.S.C. §§ 601-13 (2006); breach of contract; breach of warranty of specifications; breach of covenant of good faith and fair dealing; claim for lost productivity; delay claims; critical path; validity of Government counterclaim; damages.
Plaintiffs,	*	
v.	*	
THE UNITED STATES,	*	
Defendant.	*	

Michael M. Suga, for plaintiffs. Keith C. Phillips, Watt, Tieder, Hoffar & Fitzgerald, LLP, McLean, VA, of counsel.

James W. Poirier and Cameron Cohick, Washington, DC, with whom was Assistant Attorney General Tony West, for defendant. G. Clay Weisenberger, U.S. Army Corps of Engineers, of counsel.

MEMORANDUM OPINION AND ORDER

MILLER, Judge.

This case is before the court after multiple orders, opinions, and trial. Plaintiffs are sureties that completed performance of a contract upon the bankruptcy of J.A. Jones Construction Company ("J.A. Jones"), a joint venturer with Guy F. Atkinson Construction Company ("Atkinson" and, together with J.A. Jones, the "Joint Venture"), in the construction

of the Montgomery Point Lock and Dam Project ("Montgomery Point" or the "Project") on the White River in eastern Arkansas. Plaintiffs allege that the U.S. Corps of Engineers (the "Corps") is liable due to the subject contract's flawed design specifications for concrete and a labor shortage impacting work on Montgomery Point, i.e., causing the Joint Venture to pay higher wages for skilled craftsmen by commandeering the relevant labor market through the Corps's settlement of a dispute with another contractor for the Corps on a contemporaneous construction project in Pine Bluff, Arkansas. Consolidated with the instant matter are four additional claims (the "Board claims")—including three claims formerly before the Armed Services Board of Contract Appeals (the "ASBCA") and a related subcontractor claim—stemming from the Corps's allegedly deficient design specifications and Project mismanagement. Defendant counterclaims that an unauthorized waiver by the Corps shortened the period of contract performance and entitles the Government to a reduction in the contract price.

BACKGROUND AND FACTS 1/

1. Project description

The belabored execution of Montgomery Point belies the Project's successful completion and reflects its complexity—it is a structure with, as defense counsel suggests, "many nooks and crannies." Transcript of Proceedings, Fireman's Fund Ins. Co., *et al.* v. United States, Nos. 04-1692C, 08-782C, -783C & -784C, at 68 (Fed. Cl. Nov. 2-20, 2009) ("Tr."). Montgomery Point ensures the navigability of the White River in Arkansas notwithstanding low water levels. When the White River's water level is not low and its navigability is unaffected, traffic proceeds through Montgomery Point's 300-foot-wide navigable pass over submerged, hinged, and hydraulically operated steel crest gates. The submerged crest gates extend across the river's width, perpendicularly stemming from one wall of Montgomery Point's navigation lock. The lock's two walls form a 110-foot-wide and 600-foot-long lock chamber sitting parallel to the shoreline. Standing on the wall opposite the crest gates is the concrete control tower, from which extends a 200-foot-wide concrete spillway that allows overflow when water levels are excessively high. An abutment connects the spillway to the shoreline.

1/ The facts set forth in the Background and Facts section of this opinion, together with those included in the Discussion section, constitute the court's findings of fact pursuant to RCFC 52(a). The court's rulings on mixed questions of fact and law are set forth in the Discussion section.

The control tower houses Montgomery Point's various mechanical, electrical, and hydraulic controls. From the control tower, an operator monitors river conditions and regulates river traffic passing Montgomery Point. When a low water level disrupts the navigability of the White River, the operator raises the submerged crest gates to create a temporary dam, thereby blocking the navigable pass and elevating the water level upstream of Montgomery Point. A concrete 524-foot floating guide wall extending from the lock receives river traffic queuing upstream and guides it to the lock chamber (the "upstream floating guidewall"). To facilitate passing traffic, four hydraulically operated tainter valves adjust the water level in the lock chamber, while steel miter gates, functioning as the doors to the lock chamber, open and close. On the downstream end of the lock, a twin floating guide wall directs departing traffic (the "downstream floating guidewall"). Montgomery Point similarly allows traffic to progress in the opposite direction through the lock chamber. Additionally, a Crest Gate Dewatering System (the "CGDS") permits the maintenance of the hydraulic crest gates by dewatering Montgomery Point.

2. Background and submission of proposals

On April 7, 1997, the Corps solicited proposals for the construction of Montgomery Point. The court heard testimony from three of the individuals responsible for preparing the Joint Venture's bid: Norman D. Wagner, the chief estimator for J.A. Jones's Heavy Civil Group; Douglas G. Sickle, a J.A. Jones employee and the Joint Venture's Project Manager; and Calvin Gregory ("Greg") Herrick, a J.A. Jones employee and the Joint Venture's Senior Project Engineer and Project Controls Engineer. See Tr. at 1388 (Wagner); see also Tr. at 179-80 (Herrick) (listing, as involved in Joint Venture's bid preparation, "Dennis Olson, Doug Sickle, Norm Wagner, Rick Scharff, Joe Smith, myself, and representatives from Atkinson"). Mr. Herrick proved to be plaintiffs' most generally knowledgeable witness about Montgomery Point's history and development insofar as he participated in or observed the events that he described.

J.A. Jones hired Mr. Wagner as the chief estimator of its Heavy Civil Group in 1991. Before he left J.A. Jones in 2002, Mr. Wagner had assisted or prepared bids for a variety of projects, including Gray's Landing Dam, Florida's Garcon Bridge, Arizona's Bartlett Dam, Olmsted Lock and Dam, Braddock Lock and Dam, Oliver Lock and Dam, the Arkansas Hydro hydroelectric plant ("Ark Hydro"), and Montgomery Point. Following his departure from J.A. Jones, Mr. Wagner remained a chief estimator for subsequent employers and since has been responsible for bidding projects, including one for the Marmet Lock and Dam. The court found Mr. Wagner to display an impressive recollection and command of the bid process undertaken by the Joint Venture.

Mr. Wagner described the process for bidding on Montgomery Point, as follows:

> The first thing we did was get the documents. We had to order them from the [C]orps. Get the documents, distribute them to the people in our bid team.
>
> Make bid assignments to the individuals. Prepare the joint venture documents, which would have included quantity reconciliation forms, plug pricing for materials, subcontracts, first pass at labor rates.
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> I believe we each [J.A. Jones and Atkinson] did our own equipment rates on that job. Then set up schedules of reviews. That sort of thing. What times things were needed. Set up joint venture meetings. All with consideration of what management time was and that.

Tr. at 1389. "Plug pricing" was necessary because the subcontractors' actual pricing information often was not available when they bid; therefore, the Joint Venture used pricing records obtained from previous projects or from subcontractor estimates and later conformed a given submission with the actual quotes. Quantity and cost reconciliations allowed J.A. Jones and Atkinson to coordinate their respective estimates for Montgomery Point's requirements. Immediately prior to submitting its proposal, the Joint Venture substantiated the amount of its bid with actual pricing data from its subcontractors, which yielded a "conformed" bid. See Tr. at 1393-94 (Wagner) ("We use the term conformed saying that [the bid] was de-plugged to actual material and subcontractor pricing. Any final adjustment at bid time.").

Mr. Wagner explained how the Joint Venture conformed its bid estimate. See Tr. at 1393; see also JX 2061(Joint Venture's conformed bid estimate). The estimate matched the bid items proposed by the Corps's bid sheets. Within the conformed bid estimate were multiple bid items, below which were grouped several work activities "whereby work is actually estimated and the productivities are stated, [an] approved site is stated, and the contractor stated [what] was used for bidding. It developed a cost for each bid item." Tr. at 1394-95 (Wagner). For example, for the large amount of concrete work expected for Montgomery Point, a holding account contained the aggregate estimate for concrete, from which the concrete work then was distributed among the individual concrete activities based on required quantities. Each bid item included a bottom-line total cost, including costs by "labor, burden, permanent materials, construction materials, equipment rent, subcontracting, total, and then . . . the unit costs," Tr. at 1397 (Wagner), as well as indirect costs, including "those costs that are spread throughout the job, such as the project management, the project supervision, the project engineering, the offices, moving equipment in unless it's specific equipment, [and] some of the insurances," Tr. at 1398 (Wagner). Travel costs and other

"project wide expenses" that explicitly were not furnished by the Corps were also included. Tr. at 1398 (Wagner).

Mr. Wagner discussed how the Joint Venture estimated labor rates, also first using plug-pricing, according to both its best judgment and reference to other completed or ongoing projects. Plug-pricing estimates were later subject to cost reconciliation and a final "consensus level opinion" of the Joint Venture's partners. Tr. at 1400 (Wagner). For each activity listed on the conformed bid estimate, Mr. Wagner also estimated the start date and duration of the work until completion. These initial activity start dates and durations were not immutable, however, as Mr. Wagner first entered these dates solely to establish a cash flow for the Joint Venture. According to Mr. Wagner, when these dates failed to produce a good cash flow, the Joint Venture should have had them updated or deleted from the estimate. See Tr. at 1441.

Mr. Sickle began working for J.A. Jones in 1987. Tr. at 1196 (Sickle). Prior to Montgomery Point, he worked as a general superintendent and project manager for work at the Kings Bay Naval Base, as a project manager for Arizona's Roosevelt Dam, and as an estimator for the Homestead Lock and the Roosevelt Dam. Mr. Sickle's recollection of the Project's history was weak.

Mr. Sickle became Montgomery Point's project manager, and at bid time he estimated Montgomery Point's tasks, including concrete work, according to the following process:

> It would start with a thorough review of the contract documents, all the specifications and drawings. You have to be familiar with the scope of the project and would get into a detailed takeoff of the concrete work starting with each individual list of every monolith and would take off the amount of form work, the amount of concrete, the amount of finishing, water stop, blockouts, everything related to those operations.
>
> Once those takeoffs were completed[,] then I would start to develop activities, estimate activities to estimate the man hours [productivity rates] for each one of the different operations. Those man hours were based on historical data from other lock and dam projects and other similar projects where we used the same type of form work and systems.

Tr. at 1198.

Mr. Sickle explained that productivity rates were calculated by extrapolating from job histories the estimated amount of man-hours per unit of measure, such as the "man hours for

unit of square foot of forms, cubic yard of concrete, lineal foot of water stop, et cetera . . . ." Tr. at 1200; see also Tr. at 1301-02 (stating that it is "generally correct" that "[he] went through and [he] didn't try to figure out how many total men were going to be on the site on a given day[;] instead [he] looked activity by activity and figured out how many man hours [sic] to do that"). Thus, by using actual historical data, the Joint Venture's productivity rates accounted for equipment breakdowns, delays, and other construction problems, as well as the learning curve for concrete work. Productivity rates were used to calculate the number of craftsmen required for different construction activities, respectively. See Tr. at 1273 (regarding carpenters, testifying that "[w]e would have looked at the total man hours and estimated the duration and looked at what we thought our peak would be"). Mr. Sickle did not recall making any calculations during the bid process in order to determine the peak number of craftsmen that would be required during concrete work, but he stated that it was J.A. Jones's normal practice to "look[] at the number of man hours generated over the schedule and where [the Joint Venture] thought the man hour requirements would be." Tr. at 1283; see also Tr. at 1296 ("Just about every estimator goes in their head about how many hours are generated and over what period of work they're going and he tries to determine about how many carpenters or how many laborers they might think is [sic] going to be needed for this thing.").

Mr. Sickle also recalled the concerns that he had during the bid period regarding the availability of labor for concrete work. 2/ The estimators discussed Montgomery Point's remote location and its access routes; they understood that the access road leading to Montgomery Point was frequently flooded and weight-restricted. Consequently, they included within their estimate one half-hour of travel time for labor drawn from Mississippi

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2/ The Joint Venture employed various categories of craftsmen, including the following: carpenters (performed concrete form work); finishers (finished the concrete); ironworkers (installed reinforcing steel and the structural steel for the gates); and laborers (placed concrete, helped finish concrete, and performed clean-up activities). See Tr. at 1233-34 (Sickle). Unskilled laborers performed clean-up activities, while skilled laborers performed the various tasks for which they had trained, respectively, e.g., vibrating concrete, operating craft tools, etc. See Tr. at 1234.

Ernest Ron ("Ron") Valdez, carpenter superintendent at Montgomery Point, further elaborated on the role of carpenters: "Carpenters do the forms, set the forms, fabricate the forms. There's fabrication. Assemble the forms if they're gang forms . . . . Tie the forms, secure them, plumb them, align them, scaffold them, monitor them during the placements." Tr. at 1638 (Valdez). The carpenters at Montgomery Point assembled and used Peri forms, steel Burke forms, and custom-made wood forms. See Tr. at 1641.

and Arkansas and planned for crews to be transported by boat to Montgomery Point daily from Mississippi and as-needed from Arkansas. The estimators assumed that the Joint Venture would siphon concrete labor from Ark Hydro's complement of craftsmen, e.g., laborers, carpenters, and ironworkers, as well as from other locales in Arkansas, from Mississippi, and from traveling craftsmen. See Tr. at 1202 (Sickle). Despite Montgomery Point's remoteness, the long (at least four-year) duration of the Project would attract traveling craftsmen. Consequently, in preparing the concrete estimate, Mr. Sickle relied on J.A. Jones's historical records, including the rates that it was paying at Ark Hydro, wage studies for Mississippi labor, and the Government's prevailing wage rates. See Tr. at 1204-05.

Mr. Herrick testified as to the Joint Venture's pre-bid plans to recruit labor for Montgomery Point. He discussed the Joint Venture's operations at Montgomery Point relative to J.A. Jones's concurrent construction of Ark Hydro, which was located twenty miles away from Montgomery Point. He could not recall any conversations during bid preparation concerning whether a union labor agreement could be obtained for Montgomery Point similar to that which was in place at Ark Hydro. 3/ See Tr. at 365. He believed that the Ark Hydro workers were experienced in concrete form work typical of that which would occur at Montgomery Point and that these workers would transfer from Ark Hydro to Montgomery Point. Still, when Montgomery Point's labor was compared at bid time to that at Ark Hydro, the bid's estimated labor rates "were adjusted downward slightly because it was felt that the Montgomery Point work was less complex and the labor pool would be enhanced from the Mississippi side." JX 157 at FF395451-52.

As was testified by both Messrs. Sickle and Herrick, the Joint Venture expected to draw labor from Ark Hydro's laborers, carpenters, and ironworkers; from elsewhere in Arkansas and Mississippi, as well from Louisiana and Florida; and from "travelers" who followed heavy civil construction projects. Advertisements in newspapers and construction-related periodicals would be used. See Tr. at 366 (Herrick); see also Tr. at 1227 (Sickle) (stating that J.A. Jones's Charlotte, NC home office would advertise in major publications and regional newspapers). Mr. Herrick recalled that Montgomery Point required approximately 300 employees during the peak of concrete placement, of whom approximately 120 would be form carpenters, 100 would be laborers, and forty-to-fifty would be ironworkers. Tr. at 328-31.

3/ As did Mr. Sickle, see infra note 4, Mr. Herrick testified as to the Joint Venture's July 1997 meeting with Arkansas labor unions. See Tr. at 366. When the Joint Venture returned without having reached a labor agreement, Mr. Herrick concluded that union labor would not be used for constructing Montgomery Point. See Tr. at 366.

Ark Hydro had a union labor agreement. Although the unions could not supply sufficient labor at Ark Hydro, they confounded J.A. Jones by objecting to any attempts to hire non-union labor. Thus, assuming that the unions would not be able to supply sufficient labor at Montgomery Point (insofar as the Project was similarly and remotely located), the Joint Venture postponed its attempts to sign a union labor agreement. See Tr. at 1208-10, 1315 (Sickle). Mr. Sickle could not recall if an inquiry was made regarding where union labor was concentrated in Arkansas. See Tr. at 1309. He noted, however, that unions were not strong in the area of Montgomery Point and that "[J.A. Jones's] projects are in relatively remote areas where frequently [J.A. Jones] runs into weaker unions where they are unable to supply [J.A. Jones's] labor force." Tr. at 1315. Pre-bid, the Joint Venture had obtained correspondence regarding wage rates for trade labor. See DX 12 (fax titled "Lock and dam labor rate survey," dated June 5, 1997, and sent to a J.A. Jones executive); see also Tr. at 1286 (Sickle) (discussing DX 12); Tr. at 1447 (Wagner) (same). Still, J.A. Jones did not meet with the trade unions until after the bid process concluded. These subsequent meetings did not produce a labor agreement. 4/

Defense counsel elicited testimony from both Messrs. Wagner and Sickle to show that any earlier projects provided an imperfect model upon which to base the Montgomery Point bid estimates. Mr. Wagner acknowledged differences in the metal rebar of Oliver Lock and Dam—a project referenced by Mr. Wagner when he prepared Montgomery Point's bid—*vis-à-vis* that of Montgomery Point. Oliver Lock and Dam required a light amount of rebar, but Montgomery Point's was heavier and more congested, particularly in areas in which larger (three-inch) concrete aggregates would be placed. See Tr. at 1449. Still, Mr. Wagner "could relate to [Oliver Lock and Dam]," as he found "it was somewhat similar work." Tr. at 1449. Testifying about his knowledge of Roosevelt Dam, Mr. Sickle could not recall the exact amount or size of concrete aggregates used in locations with rebar reinforcement. Moreover, Roosevelt Dam utilized forms for the placement of concrete which were appropriate for ten-foot lifts and for which there were sketchings to guide construction by the carpenters; for Montgomery Point, ten-foot, seven-foot, and five-foot lifts were used, and sketches comparable to those at Roosevelt Dam were not provided.

4/ Mr. Sickle's handwritten notes dated July 29, 1997, document a meeting during which the Joint Venture attempted to forge a labor agreement with the local trade unions for Montgomery Point. See JX 99. During the meeting the unions objected to some of J.A. Jones's practices at Ark Hydro. The unions considered that J.A. Jones had set Ark Hydro's wage rates too low, and they objected to J.A. Jones's attempts to circumvent their Ark Hydro labor agreement. See id.; Tr. at 1209 (Sickle).

Mr. Herrick was attached to the J.A. Jones Project Controls Department when, in April 1997, he worked on J.A. Jones's bid estimate. He estimated the miscellaneous metals (well armor, handrails, stair rungs, ladders, set posts, wall armor, corner protection, and other embedded metals) and paint. Mr. Herrick assumed that the metal work associated with the crest gates would be the most complex aspect of Montgomery Point. Mr. Herrick also prepared the preliminary bid schedule, a two-page summary chart of activities. See Tr. at 194 (Herrick); see also Tr. at 1440 (Wagner). For the bid schedule, Mr. Herrick relied upon the initial activity start dates and durations that were prepared by Mr. Wagner for the Joint Venture's conformed bid estimate. Tr. at 443, 455 (Herrick) (discussing JX 2061). 5/ Perhaps because its source material—Mr. Wagner's scheduling data—was tailored for the limited purpose of generating cash flow, as discussed above, Mr. Herrick's bid schedule offered little detail. See Tr. at 449 (Herrick) ("[T]here were durations for all the activities, but the relationships were very limited. The schedule was maybe only two pages.").

The Corps required potential subcontractors to submit schedules, and Mr. Herrick solicited these, 6/ Tr. at 369 (Herrick), although he failed to maintain all of the Joint Venture's bid-related correspondence with its subcontractors, see Tr. at 369-70 (Herrick) (explaining that "laziness" kept him from updating subcontractor files with all communications). Mr. Herrick described a work proposal received on June 20, 1997, from Plateau Electrical Constructors ("Plateau"), the Joint Venture's electrical subcontractor. See JX 83; Tr. at 456 (Herrick) (discussing JX 83). Plateau referenced a list of work items generated by the Corps's solicitation and further stipulated that "[t]his proposal is based upon timely completion of a mutually agreed-upon construction schedule, with a total duration of 1687 calendar days. We will assist the development of a Network Analysis Schedule if requested." JX 83. Mr. Herrick noted that the Joint Venture provided a schedule to Plateau

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5/ Mr. Wagner's testimony on cross-examination is unclear regarding whether Mr. Herrick directly appropriated the activity start dates and durations that initially were proposed by the estimators and included with the Joint Venture's conformed bid estimate. See Tr. at 1442-43 (Wagner). Mr. Wagner indicated that the dates used for the conformed bid estimate (JX 2061) probably do not coordinate with Mr. Herrick's initial schedule and that Mr. Herrick's schedule would overrule the chronology proposed by the conformed bid estimate.

6/ Although Mr. Herrick may have begun consulting with subcontractors while preparing the bid estimate, his testimony suggests that he later more thoroughly discussed scheduling with the subcontractors, particularly when preparing a baseline schedule to supercede the bid schedule, as discussed later in this opinion. See Tr. at 394 ("We consulted with some subcontractors while the preparation of [Schedule 0013, dated June 30, 1998, and approved by the Corps on July 13, 1998] was being prepared . . . .").

when negotiating the subcontract for electrical work, but Plateau never provided a detailed schedule of its own.

Mr. Herrick described how J.A. Jones, as part of the bid process, scrutinized subcontractor bids to verify their compliance with plans and specifications. Still, J.A. Jones deferred finalizing many subcontractor arrangements until the post-bid "buy-out" process. When conducting buy-outs, Mr. Herrick secured the services of vendors that earlier had submitted the best prices for the Joint Venture's subcontracts, e.g., to provide concrete materials; to work on electrical, mechanical, or instrumentation systems; or to conduct dewatering or excavation. Tr. at 942 ("We take the quotes at bid time and prepare a comparison of each of the vendors or suppliers or subcontractors, the materials they intend to supply or the scopes of work, and we try to make sure that everything is in terms of the specifications and the requirements and then try to make sure that they compare apples to apples so that we can make a valid pick as to who we're going to use."); see also Tr. at 944 (Herrick) (stating that buy-out priorities were "[l]ong lead and schedules"). After the contract was awarded in mid-1997, Mr. Herrick first prioritized the buy-out of the excavation subcontractor, Luhr Bros., Inc. ("Luhr Bros.") and—due to the long lead time for the hydraulic cylinders—Plateau. See Tr. at 944. He did not conduct the buy-out for concrete material until October 1998, when concrete work was scheduled to begin within approximately one year. See Tr. at 945 (discussing buy-outs and letters of intent from J.A. Jones for concrete materials).

The Corps had estimated that Montgomery Point would cost $207,252,507.00. On June 20, 1997, the Joint Venture submitted the lowest bid at $186,124,143.00. See JX 200A at FF107826 (Joint Venture Project Execution Plan); Tr. at 1407 (Wagner) (discussing JX 200A). The Joint Venture's bid was approximately 7% ($14 million) less than the next lowest bid ($200.9 million), which was submitted by National Products (MK)/Zachary/Traylor. See JX 200A at FF107826; 7/ Tr. at 1408-09 (Wagner). Mr. Wagner explained that, although the Joint Venture would have preferred that its bid more closely conform with that submitted by the next lowest bidder, the 7% difference was not a source of concern. Tr. at 1408. The highest bid, $228,442,139.00, came from Layne, another established construction company. The $40 million difference separating Layne's bid from the Joint Venture's bid did not alarm the Joint Venture. See Tr. at 367 (Herrick) (testifying that Layne's bid did not make him uneasy and that he could not recall any conversations with Joint Venture estimators regarding whether the Joint Venture's bid was too low).

7/ Bates numbered pages, or actual page numbers when Bates numbers were not used, are provided when the exhibit is lengthy; lengthy exhibits were admitted only to the extent that pages were discussed with a witness, or, for Joint Exhibits, argued by counsel.

3. The contract

On July 21, 1997, the Corps awarded Contract No. DACW03-97-C-0025 (the "Contract"), totaling $186,124,143.50, to the Joint Venture. See JX 89 at FF090313. The Corps's Little Rock District administered the Contract, and Harza Engineers ("Harza") was the Corps's design contractor. 8/ The Joint Venture would construct the cofferdam and place concrete, 9/ but also planned to use multiple subcontractors, including Luhr Bros. for excavation, revetment work, and "riprap"; 10/ Plateau, for permanent electrical systems; and IHP Industrial ("IHP"), for mechanical systems, including piping and hydraulics. See Tr. at 180-81 (Herrick) (discussing these and other subcontractors at Montgomery Point). The Contract anticipated that, discounting excusable delays, the Joint Venture would complete Montgomery Point within 1,687 calendar days from the date of the notice to proceed. See JX 89 at FF090480 (Contract § 00800, ¶ 11). The Corps would assess daily liquidated damages of $6,494.00 for non-excusable delays beyond the substantial completion date. On August 26, 1997, the Corps issued a notice to proceed to the Joint Venture, which, assuming a project timeline of 1,687 calendar days, set a completion date of April 9, 2002. At approximately the same time that the Corps issued the notice to proceed, Atkinson filed for bankruptcy, leaving J.A. Jones as the sole Joint Venture participant. 11/

The Contract contemplated substantial concrete work for Montgomery Point's structure. Concrete "is a combination of cementitious material, which could be Portland cement and/or some pozzolans such as fly ash[;] water, and the water may contain different chemical admixtures[;] sand or fine aggregate[;] and coarse aggregate or rock." Tr. at 2266 (Dr. Ramon L. Carrasquillo, plaintiffs' expert on the materials for mass concrete); see also Tr. at 206-07 (Herrick). A byproduct of coal-burning, fly ash is used for its advantageous cementitious properties and often acts as a cement replacement—it is "somewhat cementitious, it's a binder material, it[] also [has] round particles so it affects the workability

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8/ The Corps designed the lock structure. Harza designed the dam, including the dam's concrete structures, as well as the crest gates and the control tower. See Tr. at 1705-06 (James L. ("Larry") Winters, a Corps structural engineer).

9/ Mr. Herrick commented, "I would like to think the rest of the [construction] industry thought of [J.A. Jones] as [a specialist in concrete work.]" Tr. at 377.

10/ Riprap is the term for rocks placed on revetments, or the built-up banks, or the riverbank. Tr. at 181 (Herrick).

11/ Unless necessary to refer specifically to J.A. Jones, the court uses the convention of the "Joint Venture."

of the materials." Tr. at 207 (Herrick). The combination of cementitious material—either cement or fly ash—and water creates "paste." Tr. at 2266 (Carrasquillo). The combination of paste and a fine aggregate, i.e., natural or manufactured sand, creates "mortar." Tr. at 2267 (Carrasquillo). Mortar acts as a lubricant when mixed with the coarse aggregate, i.e., rock, and concrete "workability" is a subjective concept that signifies the proper balance of mortar and coarse aggregate. Tr. at 2267 (Carrasquillo). 12/ Workability "means that it works, . . . that it has adequate consistency, cohesiveness, flowability, so that when it gets placed and it gets vibrated[,] it gets consolidated without segregating." Tr. at 2273-74 (Carrasquillo); see also Dep. of Billy D. Neeley, Dec. 17, 2009, at 18 (equating workability with "placeability," i.e., "it means that it can be placed in the forms, assuming that the . . . the proper placing and consolidating techniques are being followed. Then the concrete can be placed in the forms without excessive segregation and it will respond well to a vibrator . . . .") (Mr. Neeley was the Corps's authority on concrete proportioning).

Dr. Carrasquillo, an ebullient expert for plaintiffs on the mix properties of concrete and placement of materials, as well as the materials for mass concrete, described the process of proportioning the component elements of concrete mixtures:

> [W]hat it means is for you to select certain materials, basically a rock, or a coarse aggregate, sand, cementitious materials, water, chemical admixtures, and what it means is for you to come up with a combination of different weights of these materials so that when you combine them all you're going to have a mass, you're going to have a mass of these materials, a cohesive mass of material that will be adequate, will have adequate workability for its application.

Tr. at 2268-69; see also Tr. at 219 (Herrick) ("[Proportioning is] the mix design to determine how much of each of the parts of the concrete are going to be put into the mix design."). As proportioned batches of concrete are placed, slump tests allow field-expedient, "quick and dirty" tests to ensure that mix proportions remain consistent from batch-to-batch. See Tr. at 2274 (Carrasquillo) ("[If] the mix has adequate workability for that job, and then you

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12/ Concrete mix designs may require chemical admixtures, which "reduce the amount of water that provides a lubricant to the product." Tr. at 207 (Herrick) (describing some chemical admixtures, stating that "[t]here is air-in training which gets air into the concrete, which is part of the consideration for freestoff exon [sic] concrete, and then there's plasticizers which are used primarily in the pumping when you need the concrete to have an extremely high slump but to hold its consistency and not lose the aggregates from washing out of the mix").

measure the slump and the slump may be 3 inches let's say, then during the conduct of the job you can perform the slump test and if the slump test changes that will give you . . . an indication that maybe the mix proportion [has] changed."). Dr. Carrasquillo described conducting a slump test as

> nothing else but you take concrete and you make a cone, and when you pull the cone out you measure what's left inside [and] how much it sloughs off. So I can make . . . sloughs of different amounts by putting more rock, less lubricant, by putting more water on the lubricant.

Tr. at 2275-76 ("But you have to be careful when you [say] a change in the slump because the slump test is not a very very accurate test."). 13/ Different concrete mixes—such as mixes with the same materials, but measured in different proportions—might have similar slumps but dissimilar workabilities. See Tr. at 2275-76 ("[Y]ou can have the same materials but you can have different proportions of the different materials and you can end up having the same slump. . . . So really, you know, if you tell me a slump test, a concrete has a slump [i.e., a slough] of 3 inches or 5 inches, I don't know what workability it has."); see also Tr. at 2270 (Carrasquillo) ("[S]lump doesn't mean workability."); Neeley Dep. at 60 ("Slump is not a measure of workability, but it's the closest thing that we have, in a simple test, to give us an indication of workability."). But cf. Tr. at 1785 (James L. ("Larry") Winters, a Corps structural engineer) ("[S]lump is an indicator of workability.").

When proportioning concrete, mix designers "keep in mind first of all workability," Tr. at 2270 (Carrasquillo), but also must consider the strength, durability, heat characteristics, and economy of the concrete mix, see Tr. at 2276 (Carrasquillo); see also Tr. at 1729

13/ Mr. Herrick gave a more visual rendition of the slump test:

> [A] slump cone is a 12-inch tall cone, it's about 4 inches diameter [at the] top and about 12 inches diameter at the bottom. The small end's pointed up, you put scoops of concrete so you're about a third of the height inside the cone, you rod the cone with a bullet-nosed bar 25 times, you put another third of the height in there, rod it another 25 times to consolidate the layer in the middle as well as to knit it to the layer below it, and then you repeat the process for the third, you top it off, you strike it off, and then you immediately pull the cone off of it and then set the bar on top and measure the difference between the bottom of the bar and the top of the concrete.

Tr. at 234-35. The slump test measures the concrete cone's sag in inches. Tr. at 235.

(Winters) ("Mass concrete, when you proportion it you have several goals. Workability, limiting the heat of hydration, tearability, strength, cost."). Concrete workability is paramount because "if you cannot place it, consolidate it, and finish . . . it's not going to work." Tr. at 2270 (Carrasquillo). Workability can vary depending upon the nature of the concrete structure; it is subjective, without an accurate test. See Tr. at 2269-70 ("I can give you a concrete mix that is going to be used in a highway paving and a concrete that is going to be used in a sidewalk and a concrete mix that is going to be used in a dam and a concrete mix that is going to be used for pumping concrete . . . . [They] have different balance[s] between the lubricant and the lubricating materials . . . .").

After workability, "the next thing is . . . to have adequate strength to be structurally sound and resist the loads that [the concrete is] going to be subjected to." Tr. at 2270 (Carrasquillo). Strength tests follow the industry-standard "cylinder break" of the American Society for Testing of Materials (the "ASTM") manual, by which an independent laboratory subjects a cylindrical specimen of the concrete to certain temperature ranges and pressure. See Tr. at 2271-72 (Carrasquillo). Next, concrete must be durable in order to resist damaging environmental conditions; concrete's heat characteristics relate to durability, as well, because mix designers "must pay attention to the heat generation and the thermal gradients to make sure [the concrete] doesn't crack." Tr. at 2270-71 (Carrasquillo). Durability is tested when selecting and proportioning materials, before placement begins; durability tests vary based on the foreseen environmental stressors and may include freezing and thawing concrete samples, i.e., a "freeze/thaw" test. See Tr. at 2272-73 (Carrasquillo).

For the mass concrete to be placed at Montgomery Point, the Contract included the Corps's specific requirements for furnishing, proportioning, and testing concrete materials. Mr. Winters, a structural engineer for the Corps, was Montgomery Point's "lead structural engineer, carried [the Project] through from design and answered questions, [including] RFIs [Requests for Information] to be chopped on during construction." Tr. at 1742 (Winters). Prior to joining the Corps in 1992, Mr. Winters never had worked on a significant construction project involving mass concrete design. See Tr. at 1703-04 (Winters). Montgomery Point was the first large concrete project—and remains the largest concrete project—on which he worked. Tr. at 1704 (Winters). He has never performed the actual mix design for mass concrete, and, other than Montgomery Point, he has never worked on a project involving manufactured sand. Tr. at 1704-05 (Winters).

As lead structural engineer of Montgomery Point, Mr. Winters coordinated the structural design among the Corps's different designers and consultants. Tr. at 1705 (Winters). He "reviewed all the Corps criteria, and . . . spoke with people who had done recent projects within the Corps . . . ." Tr. at 1706 (Winters). He spoke with Corps personnel involved with the Olmsted Lock and Dam and the Red River Lock and Dam, respectively.

Mr. Winters also assisted with drafting the Contract's concrete specifications: "The headquarters maintains a set of guide specifications. We use those on projects and pull the ones we need and edit them as needed." Tr. at 1708 (Winters); see also Tr. at 1782 (Winters) (agreeing that the Corps's guide specifications "tend to be applied in a wide variety of circumstances").

Mr. Winters displayed a general knowledge of the Contract's concrete specifications. He was adequate to the task of explaining them, although perhaps not to drafting the specifications; but defendant's case suffered from the absence of Billy D. Neeley (whom plaintiffs would have called as an adverse party witness under Fed. R. Evid.. 611(c))—a Research Civil Engineer with the Corps's Engineering Research and Development Center, Geotechnical and Structures Laboratory—the *de facto* expert to whom defendant's other witnesses deferred as the maestro of cement proportioning. Mr. Neeley testified by deposition. He was ill at the time and rambled somewhat. During trial defense counsel complimented plaintiffs on conducting the deposition so as not to tax Mr. Neeley. Mr. Neeley's testimony was not as finely calibrated as Dr. Carrasquillo's. In the end Mr. Neeley helped to substantiate plaintiffs' positions that the Corps took ownership of the critical proportioning of the concrete and that concrete proportioning was the ultimate cause of problems with concrete placement.

During the design phase of Montgomery Point, as he prepared the Contract's concrete specifications, Mr. Winters reviewed a design memorandum for the Project that was published in 1994 and prepared by Mark Harris, a Corps geologist. See Tr. at 1710; JX 17 (U.S. Army Corps of Engineers, Little Rock District, Montgomery Point Lock and Dam, Design Memorandum No. 4, Construction Materials (1994) (the "DM")). The DM announced its purpose, as follows:

> This Construction Materials Feature Design Memorandum (FDM) presents the results of the construction materials investigation for the proposed Montgomery Point Lock and Dam. The investigation has dealt with the various types and quantities of materials required for the major structures and determined the acceptability of the material from various sources. The most economical use of the materials for the structures were [sic] also considered. This report has been prepared in accordance with [Engineer Manual] 1110-2-2000, Standard Practice for Concrete for Civil Work Structures [see infra].

JX 17 at 637. Mr. Winters did not treat the DM as a "criteria document," but, rather, as an analysis and assurance of an adequate supply of concrete material for Montgomery Point. See Tr. at 1712-13 (confirming that he did not think he needed to use the DM, nor did he duplicate the DM, when drafting the Contract's concrete specifications). Elsewhere in the

DM, however, Jack Woolfork, the Acting Chief of the Corps's Little Rock Engineering Division, recommended that the DM "be approved as the basis of the preparation of [the Contract's] plans and specifications." JX 17 at 628.

Engineer Manual 1110-2-2000 suggests—as does the recommendation of the Acting Chief of the Corps's Engineering Division, discussed above—that the DM was to be a template for the Contract's concrete specifications. See JX 10 at 317 (U.S. Army Corps of Engineers, Engineering and Design Standard Practice for Concrete Civil Works Structures, Engineer Manual 1110-2-2000 (1994) ("EM 1110-2-2000")). Mr. Winters was familiar with EM 1110-2-2000—referenced in the DM—and used it as a source for the Contract's plans and specifications. Tr. at 1717. EM 1110-2-2000 also references the Corps's instructions for drafting guide specifications for mass concrete in lock and dam projects, and Mr. Winters used these guide specifications for Montgomery Point's Contract. Tr. at 1718-19. In discussing guide specifications for concrete, EM 1110-2-2000 directs:

> Guide specifications for concrete are used to ensure that the requirements for concrete construction for all projects will be consistent and that the concrete produced will be uniform in properties, of required quality, and economical. There are several guide specifications for concrete placed for Corps of Engineers civil works projects. These guide specifications should be used in every case, with the only exceptions being for situations requiring the use of special concrete applications not covered in guide specifications. Changes should be limited to minor technical changes unless approved in the DM.

JX 10 at 317. EM 1110-2-2000 also states: "No changes should be made in the format. The completion of project specifications will be based on the approved concrete materials DM." Id. Regarding the selection of different cementitious materials, EM 1110-2-2000 counsels:

> The inclusion or exclusion of available cementing materials options in the preparation of project specifications must be based on and supported by the results of the investigation outlined in Chapter 2 of this manual. The guide specification provides that those types of Portland cement and blended hydraulic cements generally used for mass concrete and available in the project area. Consult the Materials [DM] for those cementitious material options [e.g., fly ash] which should be allowed. The use of fly ash will be permitted.

Id. at 320.

While the DM specifically discusses concrete materials to be used at Montgomery Point, Mr. Winters "did not consider [these] to be a requirement . . . ." Tr. at 1720. Section

3, Cement and Pozzolan, 14/ of the DM concludes: "Class F and class C fly ashes are readily available and the cost is not expected to vary greatly. . . . Both . . . are acceptable and will be allowed in the contract specifications. Only class F fly ash will be allowed for use in the mass concrete." JX 17 at GP0000649. In an endorsement letter dated January 25, 1995, and added to the DM, a comment informs, as follows: "The following comment is provided for information. . . . Portland Cement Concrete containing class C fly ash, at a high cement replacement rate may experience flash set. See ETL [engineer technical letter] 1110-2-364 for guidance." JX 17 at GP0000627. Mr. Winters could not recall seeing the endorsement letter, but he had seen the referenced ETL. 15/ See Tr. at 1707, 1712. The engineer technical letter (the "ETL")—which Mr. Winters saw during the design phase, before completing the Contract specifications—warned of "problems with potential flash setting in Class C fly ash." Tr. at 1707 (Winters).

In addition to fly ash, the DM discusses other concrete materials that were considered for use at Montgomery Point. Regarding aggregates, the DM stipulates that "[t]he fine and coarse aggregate particle shape shall be generally spherical or cubical." 16/ JX 17 at GP0000652. Mr. Winters qualified the DM's provision on aggregate particle shape, noting that "it doesn't list an ASTM test or anything except for the coarse aggregate. There's no requirement[] in here for refined [fine] aggregate in terms of a test method." Tr. at 1725. The DM also specifies four potential sources of fine aggregate, i.e., sand; each of these sources provided natural, not manufactured, fine aggregate. See JX 17 at GP0000655-56; Tr. at 1727-28 (Winters). Mr. Winters was not "aware of anywhere in [the DM] where a manufactured sand was analyzed by the Corps of Engineers as part of the preparation for the [DM]." Tr. at 1728. But see JX 89 at FF053275 (Contract § 03305, Spec. No. 2.1.5.6, "Commercial Concrete Aggregate Sources," disclaiming: "No guarantee is given or implied that any of the following listed sources are currently capable of producing aggregates that meet the required quality stated in [the Contract]").

14/ Pozzolan refers to "fly ash, blast furnace slag, different[] silica fume, [or] different add mixtures [sic] that you add as replacement for cement." Tr. at 1719 (Winters).

15/ Mr. Winters could not recall if the referenced ETL required that potential materials be pre-tested by the Corps's laboratory at its Waterways Experimental Station ("WES"); rather, he thought that "the recommendation was if there were problems observed during the course of construction, that WES should be involved in the testing and determining what those problems were." Tr. at 1708.

16/ The shape of aggregate particles affects workability. Tr. at 1724 (Winters).

The Contract's concrete specifications appear to deviate from the DM. Under "Materials," specification 2.1.1.2 provides that "[p]ozzolan [see supra note 14] other than silica fume shall conform to ASTM#C 618, Class F or C, and, in addition, limits in Table 2A, Uniformity Requirements . . . shall apply to all fly ash." JX 89 at FF053271. Pursuant to a decision of Mr. Winters, with this specification the Corps permitted either Class F or Class C fly ash. 17/ Tr. at 1723 (Winters); see also Tr. at 1721 (Winters) (agreeing that "there's no prohibition in the project specifications that say[s] that you cannot use Class C fly ash in mass concrete"). But see Tr. at 1797 (Winters) (pointing out that specification 2.1.1.2 does not differentiate between mass concrete and structural concrete, that Montgomery Point has structural concrete, and that Class C fly ash is routinely used with structural concrete). Fine and coarse aggregate particle sizes, i.e., sieve sizes—including 3/4-inch, 1.5-inch, and three-inch coarse aggregates—are specified. 18/ See JX 80 at FF053274-75; see also Tr. at 214-17 (Herrick). Regarding particle shapes of aggregates, specification 2.1.5.4 provides parameters for coarse aggregates, but ignores fine aggregates. 19/ See JX 89 at FF053275; see also Tr. at 217-218 (Herrick). Specification 2.1.5.1, covering the composition of aggregates,

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17/ Prior to drafting this specification, Mr. Winters consulted with Mr. Neeley regarding the Corps's likely sources for fly ash:

> We even talked about the situation [i.e., Class C fly ash problems] in Red River [i.e., the Red River Lock and Dam]. But it was, the only Class C fly ash source that we anticipated being used would be the Redfield[, Arkansas] source that was used. We didn't expect a problem with that one.

Tr. at 1720-21 (Winters).

18/ Mr. Herrick described sieve testing:

> A sample of the materials subject to a test [was] run through a set of sieves[], sieves being mesh screens being from size 3/8ths to 200, and that size designation is the number of openings per square inch, and then the amount of material that passes through each of those sieves is weighed and measured as part of the test process, and then if it falls within these limits then it would be acceptable as . . . aggregate for the project.

Tr. at 214-215.

19/ Particle shape of aggregates is important because "if you have too many big pieces then it doesn't really become homogenous material." Tr. at 218 (Herrick). Homogeneity can affect workability. Tr. at 218 (Herrick).

specifies: "Fine aggregate shall consist of natural sand, manufactured sand, or a combination of natural and manufactured sands. Coarse aggregate shall consist of gravel, crushed gravel, crushed stone, or a combination thereof." JX 89 at FF053273; see also Tr. 1726 (Winters) (agreeing that "under the specification, a contractor is permitted to choose manufactured sand"). According to Mr. Winters, the Contract specifications made the Corps responsible for proportioning the concrete materials. Tr. at 1728; see also Tr. at 218 (Herrick) (testifying that the Corps's contracting officer had proportioning responsibility).

As it was discussed by the Corps in the DM and during the design phase, one of the Corps's considerations when selecting and proportioning concrete materials was to limit heat of hydration. See Tr. at 1729 (Winters). Mr. Winters explained this alchemy:

> Mass concrete, when you proportion it[,] you have several goals. . . . The one regarding heat of hydration, if you put a hot mix into a mass concrete, the interior of the mass will retain heat, can be much warmer than the exterior, and then as that interior cools down it will cause cracking because of the differential thermal stresses between the interior and exterior.

Tr. at 1729-30. Mr. Winters indicated that the Corps typically would control heat of hydration by "limit[ing] it in the spe[ifications] by using a low heat cement[,]" Tr. at 1730, but acknowledged his familiarity with more thorough thermal studies conducted by non-linear incremental stress analysis ("NISA"), Tr. at 1730. NISA studies permit

> you [to] get the properties of the particular concrete mix you're going to use on the job. [Y]ou have to look at the thermal properties, the strength gain with time, especially the early age strength. You do a stress analysis using those properties with complex analysis. You have to consider not only the thermal properties, you have to consider the construction sequence as you build the structure.

Tr. at 1730 (Winters). When NISA tests are used, the characteristics of the final concrete structure determine the appropriate NISA testing level—either the least complex, "quick and dirty" NISA level-one analysis, see JX 53A at GP0001681 (U.S. Army Corps of Engineers, Engineer Technical Letter No. 1110-2-542, Engineering and Design Thermal Studies of Mass Concrete Structures, App. A at 3 (1997) (the "1997 ETL")), or "a full blown NISA [level-three] study," Tr. at 1731 (Winters); see also JX 53A at GP0001682.

The Corps waived NISA studies for Montgomery Point's concrete despite the 1997 ETL advising otherwise. See Tr. at 1736 (Winters). The 1997 ETL is not specific to Montgomery Point, but generally "provides guidance for performing thermal studies of mass

concrete structures . . . as required by Engineer Manual EM 1110-2-2000." 20/ JX 53A at GP0001675. Appendix A of the 1997 ETL, "Techniques for Performing Concrete Thermal Studies," states, in relevant part:

> Thermal analysis objectives. A thermal analysis is necessary and cost effective to obtain any of the following design objectives: To develop materials and structural and construction procedure requirements for use in feasibility evaluation, design[,] cost engineering, specifications, and construction of new [mass concrete structures]. Thermal studies provide a rational basis for specifying construction requirements. A thermal study provides a guide for formulating advantageous design features, optimizing concrete mixture proportions, and implementing necessary construction requirements.

Id. at GP0001679-80. A level-one NISA test is the least complex. Id. at GP0001681 ("It is a simplified or 'quick and dirty' methodology, using little or no laboratory testing and incorporating broad assumptions for site conditions and placement constraints."). Lock and dam structures, such as Montgomery Point, warrant a more complex level-three NISA test. Tr. at 1735 (Winters); see also JX 53A at GP0001676 (indicating that a level-one analysis is appropriate for "irrigation canals, low head flood protection structures, [and] low head [mass concrete structures] that impound water on an infrequent basis or for short durations").

The DM's Appendix G, "Thermal Studies," comments that the Corps's Little Rock District requested a waiver of the requirement to perform a NISA test for Montgomery Point. See JX 17 at GP0000823; Tr. at 1736 (Winters) (discussing DM, App. G). The September 22, 1994 waiver—initialed by Mr. Winters—describes the Corps's reasoning:

> Our evaluation of the stated objectives applied to the Montgomery Point Project indicates that a NISA study would not be worthwhile for this project for the following reasons: . . . A [mass concrete structure] design must also satisfy applicable criteria contained in other documents. Cost savings from changes in structural configuration or construction sequence will not likely result from a NISA. The most economical combination of construction materials meeting the construction specifications and readily available to the contractor at the time of construction will be selected. Any construction cost savings identified from a NISA would be offset by the cost of performing the

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20/ Mr. Winters initially contested that the Corps published the 1997 ETL after the Contract specifications were prepared, but then conceded that, while the 1997 ETL may have preceded the specifications, "I doubt that I used [the 1997 ETL]. I don't know." Tr. at 1732.

> analysis and by the potential risk of implementing any cost savings recommendations which are less conservative than the original design.

JX 17 at GP0000825; see also Tr. at 1738 (Winters) (acknowledging that cost was "one of the reasons the waiver was requested"). According to the DM, the risk for concrete cracking caused by heat of hydration at Montgomery Point would be mitigated by "optimizing concrete mix design with fly ash to minimize heat," JX 17 at GP0000825; employing weather-appropriate concreting; incorporating lessons from other Corps projects, e.g., the Red River Lock and Dam; and placing Montgomery Point's concrete around heavily reinforced steel, id. at GP0000825-26.

Mr. Winters elaborated on the concrete tests that were required under the Contract. The Contract specifications require four slump tests for each eight-hour period of concrete placement. See JX 89 at FF053307 (Contract § 03305, Spec. No. 3.8.2.6(c)); Tr. at 1788-90 (Winters) (describing the industry standard for slump tests, ASTM C143, and stating that slump tests were specified because they are "a check not only of workability, but [also] if there were some other issue[s] going on . . . you would get a variability in the slump, so you're looking for consistency"). Additional slump tests are required "when excessive variation in workability [was] reported," JX 89 at FF053307 (Contract § 03305, Spec. No. 3.8.2.6(c)), with adjustments to water and fine aggregate prescribed when slump results approached upper and lower limits, id. at FF053308 (Contract § 03305, Spec. No. 3.8.2.6(d)); Tr. at 1792-93 (Winters) ("Increased water, increased slump. Decreased water, decreased slump. . . . I think when you adjust the water you would adjust the fine aggregate as well to keep the workability consistent."). The acceptable slump range for either 1.5-inch or three-inch aggregate mix is one to three inches. JX 89 at FF053278 (Contract § 03305, Spec. No. 2.2.6); Tr. at 1786 (Winters). Specification 2.1.5.5 prescribes moisture content for aggregates, see Tr. at 1809 (Winters); fine aggregates had to comply with a "fineness modulus" test, Tr. at 1811 (Winters); and materials were subject to freeze/thaw tests, Tr. at 1812 (Winters).

The Contract also specifies requirements for the placement of concrete at Montgomery Point. The Corps included specification 3.3.1.3, "Transportation by Belt Conveyor," to maintain a consolidated, uniform mixture of concrete, as follows:

> Such conveyors shall be designed and operated to assure a uniform flow of concrete from transfer point to final place of deposit without segregation of ingredients or loss of mortar and shall be provided with positive means for preventing segregation of the concrete at the transfer point and the point of placing.

JX 89 at FF053290-91 (Contract § 03305, Spec. No. 3.3.1.3). Specification 3.3.2.6, "Consolidation," requires that, "[i]mmediately after placing, each layer of concrete shall be consolidated by internal vibrating equipment. Vibrators shall not be used to cause concrete to flow for significant distances within the forms." Id. at FF053294 (Contract § 03305, Spec. No. 3.3.2.6). By specifying the proper use of vibrators, the Corps intended to prevent poor workmanship and to avoid concrete mixture segregation. See Tr. at 1785 (Winters).

In addition to its specifications regarding mass concrete for Montgomery Point, the Contract also covered the installation of various mechanical and electrical systems. Section 15005 specifies how Montgomery Point's mechanical and electrical systems, i.e., control systems, should be tested and operated. Specification 3.5, "Trial Operation and Test," provides:

> Upon completion of site installation, and prior to acceptance of the installation, the Contractor shall subject the operating machinery of each gate/valve to such operating tests as may be required by the Contracting Officer to demonstrate satisfactory[,] functional and operating efficiency. The gates/valves shall be opened and closed several times using different modes of operation and all pressures and operating speeds verified.
>
> The tests shall first be conducted in the dry and later again after the water is present.

JX 89 at FF052120 (Contract § 15005, Spec. No. 3.5); see also Tr. at 778 (Macon) (stating that this section applies to all crest gates, miter gates, and tainter valves). Section 15005, specification 2.2.6, "Control Systems," details the proper operation of Montgomery Point's control systems, as follows:

> 2.2.6.1 General
>
> All hinged crest gates, miter gates, and tainter valves shall be operated by the two HPUs [hydraulic power units] as stated above. The HPU main pumps shall be started and their speeds set from the CCC [control console in the Control Tower] before the gate/valve opening or closing is initiated. . . .
>
> 2.2.6.2 Control System for Hinged Crest Gates
>
> The normal operation of the hinged crest gates shall be from a personal computer (PC) located in the control tower. The PC shall provide for open, close and stop commands as well as status signals for various gates. The commands from the PC shall be processed by the main PLC [programmable

logic controller] also located in the control tower and by the local PLC located in the dam gallery. . . .

Each hinged crest gate shall also be operable from a hard-wired local control panel (LCP) located in the cylinder alcove of the respective gate, in case of malfunctioning of the PLC communication link. The pumps in this case shall be started from the CCC. . . .

2.2.6.3 Control System for Miter Gates and Tainter Valves

The normal operation of the miter gates and tainter valves shall be from the CCC (hard wired) which shall contain all pushbuttons, status signals and position indicators for all gates and valves, as shown on the contract drawings.

It shall also be possible to operate the miter gates and tainter valves from portable upstream and downstream local control consoles (ULCC and DLCC) from El. 138.0, the top of the lock wall.

JX 89 at FF052113-14.

4. Commencement of construction and scheduling

In 1997 the Joint Venture began preparing buy-outs and sheet-pile operations for Montgomery Point's cofferdam, a temporary dam-like structure that surrounded the job-site and permitted dewatering and the construction of the permanent lock and dam. The Joint Venture did not hire a personnel manager to handle craft labor recruitment. Tr. at 352 (Herrick); see also JX 200A at GP0005625 ("The addition of a Personnel/Recruiting Manager has been considered and may be implemented should he be needed."). Instead, the Joint Venture's project manager, office manager, safety supervisor, and superintendents successfully recruited labor for the cofferdam and the Joint Venture's other early activities. Tr. at 254 (Herrick) ("Initially we were able to get pile driving crews as travelers to come to the site and we actually hired some locals and worked them into the crews . . . . So we were very successful in the beginning."). In December 1997, however, shortly after cofferdam construction began, the Corps suspended work on Montgomery Point due to insufficient funds (the "funding shutdown"). 21/ The funding shutdown lasted until April 1998; Mr. Herrick testified that the Joint Venture was back on site at Montgomery Point in June 1998 and recommenced work in August 1998.

21/ Atkinson did not resume its participation in the Joint Venture following the funding shutdown, as it had recently filed for bankruptcy. See Tr. at 178 (Herrick).

Due to direct delays caused by the funding shutdown, the Corps generated a unilateral contract modification that extended Contract performance by 123 days. See JX 90 at Tab 25 (Contract Mod. No. P00025). The modification was unilateral because, according to the October 16, 1998 modification, the contractor declined to sign a modification without an account of additional indirect delays related to returning to the job-site and remobilizing. See Tr. at 1324 (Sickle). The parties soon agreed to a subsequent modification adding 106 additional days of indirect delay to constitute a "fair settlement" of the total delay (229 days). See JX 90 at Tab 39 (Contract Mod. No. P00039); Tr. at 1325 (Sickle). The Joint Venture earlier had submitted a claim for delay in the amount of $14,029,487.00, and the parties' second modification did not operate as a waiver or release of the equitable adjustment for that prior claim, nor did it constitute an admission regarding the merits of that claim. JX 90 at Tab 39 (Contract Mod. No. P00039, at 2). In June 1999 the Joint Venture and the Corps settled the claim for $5,500,000.00 and executed a complete release of all affiliated claims. See JX 90 at Tab 41 (Contract Mod. No. P00041, at 2).

Stephen B. Macon, the Joint Venture's general superintendent who took over as project manager during fall 2001, impressed the court as a professional. He was also a diarist. A diary excerpt dated August 10, 1999, followed the $5.5 million settlement and stated that "Doug [Sickle] reported the original claim was sort of pie in the sky, $14 million, with the actual coming in at $7,700,000. They settled with the Corps of Engineers for $5,500,000 now as opposed to fighting it out for four years for the same money." Tr. at 1326-27.

The Corps approved a baseline schedule ("Schedule 0013") superceding the bid schedule soon after the Joint Venture returned to Montgomery Point. The Joint Venture submitted Schedule 0013 to the Corps on June 30, 1998, and on July 13, 1998, the Corps approved it. See JX 137. The Joint Venture had begun compiling data for Schedule 0013 by no later than August 27, 1997. See JX 490 (Schedule 0013, with a data date of August 27, 1997); Tr. at 196 (Herrick) (discussing JX 490). Mr. Herrick was responsible for Schedule 0013. Previously, he irregularly had used the scheduling software for approximately five years on other projects, including Roosevelt Dam, but Montgomery Point was the first project for which he was principally responsible for using the scheduling software. See Tr. at 403. When constructing Montgomery Point, the Joint Venture updated Schedule 0013 once a month and submitted the updates to the Corps; the Joint Venture also used these monthly updates to plan its work. The Joint Venture updated Schedule 0013 by "gather[ing] the information from time sheets, the activity in the daily reports, and site observations of progress of the work, and then . . . enter[ed] it into [Schedule 0013] to show actual dates of that work, either started or . . . finished." Tr. at 196 (Herrick). When preparing Schedule 0013, Mr. Herrick relied on the bid schedule as a primary source for estimating activity start dates and durations, but departed from the bid schedule in order to

provide significantly more detail. Tr. at 194 ("[The bid schedule] was a lot more kind of summary kind of level activities . . . whereas the submitted [baseline] schedule was required to be in more detail.").

For Schedule 0013, Mr. Herrick considered the solicitation's order-of-work provision, as well, see Tr. at 462-63 (Herrick) (discussing DX 38 (Joint Venture Submittal No. 01510.1.9, Order of Work)); still, he did not directly appropriate the solicited order of work, see Tr. at 465-66 (Herrick) (discussing changes made to the proposal for constructing the floating guidewalls). Mr. Herrick's assumption was that the Joint Venture "would install everything in the lock and dam, all the electrical, all the mechanical, and then . . . test it all, and then . . . re-water." Tr. at 468; see also Tr. at 2221 (Wayne M. Smith, project manager for the Joint Venture's mechanical subcontractor, IHP). He knew that the Corps had included certain test requirements in its specifications. See Tr. at 467 (Herrick) (clarifying, however, that the Joint Venture had not investigated what testing would be required—"[w]e just knew we had to test it prior to start up"). In the order of work signed by Mr. Herrick and proposed by the Joint Venture, the Joint Venture had planned the following sequence of activities:

> 18. Construct the lock and dam. Concurrent to this, construct revetments 2.0R, 0.6R and 0.7L within the cofferdam. Construct the mooring cell. Construct the esplande[sic] area retaining walls, fill and paving. Construct the control tower including all operating system controls.
>
> . . . .
>
> 20. Construct the floating guide walls after the lock walls have been completed on the lock floor.
>
> . . . .
>
> 22. Operate, inspect and dry test structural systems. This includes, but is not limited to[,] miter gates, tainter valves[,] associated hoists and operating machinery; hinged crest gate dewatering structure, . . . 50' and 110' stoplogs and culvert bulkheads; . . . control tower, floating guide walls and all other structures; . . . Perform all punchlist and remedial work.
>
> 23. Operate, inspect and dry test mechanical systems. This includes, but is not limited to[,] hydraulic, compressed air, raw water, potable water, sewage, sump-drainage pumping, diesel generating, elevator, HVAC systems, etc. Perform all punchlist and remedial work.

> 24. Operate, inspect and dry test electrical systems. This includes, but is not limited to[,] those supporting the mechanical systems, power distribution, lock and dam operating machinery control and instrumentation systems; submerged systems . . . and cathodic protection systems. . . . Perform all punch list and remedial work.
>
> 25. Rewater the cofferdam. All dry operational testing and inspection will have been completed prior to rewatering.

DX 38 at ME8900225-26 (Joint Venture Submittal No. 01510.1.9, Order of Work, at 3-4).

In November 1998 the Joint Venture considered Montgomery Point to be approximately 15% complete. In accordance with its standard practices, the Joint Venture performed a re-estimate in order to evaluate its progress on its buy-outs and its initial estimates (the "15% re-estimate"). See JX 157 (Summary of Joint Venture's 15% re-estimate); Tr. at 1231 (Sickle). Mr. Wagner led the preparation of the 15% re-estimate, working with a Joint Venture team that included Messrs. Herrick and Sickle. Tr. at 339-41 (Herrick). Mr. Sickle "worked with the estimating home office to review all [buy-out] numbers." Tr. at 1231 (Sickle). The direct cost increase proposed by the 15% re-estimate approximated $1 million. See JX 157 at FF395455; Tr. at 344-45 (Herrick). Mr. Herrick considered that this increase included higher direct labor costs attributable to construction of the cofferdam, which at that time had required pile-drivers, crane operators, and boat-associated operators. See Tr. at 345. Concrete placement had not begun and direct costs attributable thereto were not included in the 15% re-estimate, yet the Joint Venture began anticipating contingencies that could impact concrete placement. See JX 157 at FF395452; Tr. at 345-47 (Herrick). Although percipient testimony on point was lacking, the 15% re-estimate forecast a $1 million contingency correlated to concrete form work and $250,000.00 for contingencies connected to iron workers and concrete, respectively. 22/ See JX 157 at FF395452-53; Tr. at 346-47 (discussing JX 157).

22/ In a document titled "Montgomery Point Lock and Dam Job No. 97074, Joint Venture Report," prepared in part by Mr. Herrick and dated December 1998, the Joint Venture anticipated needs for a "Carpenter Superintendent, Ironworker Superintendent, Equipment Superintendent, Excavation Superintendent, [and] Office Engineer. 5-10 yrs. experience." JX 159A at FF100347-48; Tr. at 349 (Herrick). The Joint Venture began looking for these employees in early 1999, as it expected to begin concrete placement within the year. See Tr. at 350 (Herrick).

Predicated on the Joint Venture's evaluation of Montgomery Point's progress, the 15% re-estimate proposed higher wages for craft labor associated with concrete placement. 23/ Mr. Sickle reviewed an annotated 15% re-estimate with notes dated November 13, 1998. See JX 157 at FF395466-67. Relying on his notes, Mr. Sickle reconstructed the Joint Venture's reevaluation of its wage rates. See id.; Tr. at 1232-33, 1322 (Sickle). The annotated 15% re-estimate lists the wage rates bid by the Joint Venture for Montgomery Point's craft labor and, in handwritten notes, the wage rates that the Joint Venture proposed within its 15% re-estimate. See JX 157 at FF395466-67; Tr. at 1235 (Sickle) ("The rate is the base rate of pay that we [the Joint Venture] were paying these people [craft labor]."). For example, for craft labor designated as "Carpenter 2," the Joint Venture proposed an increase from $12.50/hour to $15.00/hour. See JX 157 at FF395466. Carpenter 2-category workers were skilled craftsmen constituting a significant category of carpenters for Montgomery Point—specifically, an estimated 180,845 man hours. See id.; Tr. at 1323 (Sickle). At the time of the 15% re-estimate, concrete work had not commenced, and the Joint Venture was hiring few skilled carpenters. See Tr. at 1323 (Sickle). The Joint Venture used its business judgment to assess wages paid to an equivalent craft, i.e., pile-drivers, and, from that data, to extrapolate the proposed wage-rate increase for carpenters. See Tr. at 1233-34 (Sickle). Later, when concrete work began and the Joint Venture hired carpenters for this effort, the Joint Venture increased the Carpenter 2 wage rate, although Mr. Sickle could not recall the exact amount of the increased wage rate. See Tr. at 1236-37 (Sickle). Similarly, for "Labor Skilled," the Joint Venture proposed an increase from $10.00/hour to $11.00/hour. JX 157 at FF395466. For "Ironworker Reinforcing" the Joint Venture proposed an increase from $14.00/hour to $16.00/hour. Id. And, for both of these categories, the Joint Venture later paid increased wage rates. See Tr. at 1238 (Sickle).

On June 22, 1999, the Joint Venture prepared a revised baseline schedule ("Schedule 0014")—again through the work of Mr. Herrick—at the request of the Corps's resident engineers, Terry Lynn Steuart and John Balgaty. Within Schedule 0014, the Joint Venture accounted both for its progress and for the impact of the funding shutdown. See DX 901. In particular, Schedule 0014 reflected updated dates through the settlement of the funding shutdown. Schedule 0014 delayed the beginning of the Joint Venture's concrete placement until May 2000 and set a new construction completion date of approximately December 3, 2002. Tr. at 420 (Herrick). Although the Joint Venture did not submit Schedule 0014 to the Corps for approval, Mr. Herrick discussed it with the Corps, and the Joint Venture subsequently used Schedule 0014 for its monthly schedule updates. See Tr. at 389 (Herrick) ("I did discuss [Schedule 0014] with the government, yes, and we agreed that it was the

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23/ The proposed wage rates of the 15% re-estimate were not necessarily what the Joint Venture ultimately paid Montgomery Point's craft labor. See Tr. at 1235 (Sickle).

approved baseline schedule."). In preparing Schedule 0014, Mr. Herrick appropriated the activity durations from Schedule 0013 unless new weather conditions changed the schedule's logic. See Tr. at 387. He also consulted the original bid estimate or with the labor superintendents in order to plan the activity durations.

On cross-examination Mr. Herrick detailed Schedule 0014's depiction of several activities and their respective start dates, durations, and end dates. See generally Tr. at 385-425. Each activity received an early start date and an early finish date, and these dates contemplated the Joint Venture's plan as of June 22, 1999. Late start dates and late finish dates allowed "float time," reflecting the latest possible start and finish that could be accomplished without impacting the project's completion date. Tr. at 395-96 (Herrick). Extra time was not added for testing deficiencies and troubleshooting. See Tr. at 507. Particular attention on cross-examination was given to Mr. Herrick's scheduling of the Joint Venture's various electrical and mechanical activities, e.g., compressed air systems, miter gate and tainter valve installations, HVAC systems, diesel generators and piping, ventilation, control system equipment, operating systems, grounding and lightning protection, motor control systems, etc. See generally Tr. at 391-425. Mr. Herrick coordinated his scheduling with first-tier subcontractors like IHP and Plateau. For example, Mr. Herrick had estimated that installing a hydraulic power pack—the "driver of the crest gate operating system[,] the miter gate operating system, and the tainter valve operating system," Tr. at 393—required twenty days, and this estimate was subject to revision by IHP, see Tr. at 394. Mr. Herrick affirmed that Schedule 0014 required the Joint Venture "to complete the installation of all electrical and mechanical systems and test them before rewatering." Tr. at 1146.

Concurrent with Schedule 0014, the Joint Venture also completed a project execution plan. See JX 200A. Despite being concurrently prepared, Schedule 0014 and the project execution plan are unrelated, and the project execution plan incorporated the original baseline schedule. See Tr. at 248-49 (Herrick). Mr. Herrick began preparing the project execution plan by no later than February 1999 and finished it in May 1999. See Tr. at 351 (Herrick). Mr. Herrick described the project execution plan:

> It's a corporate mandated project execution plan. It's kind of an orientation document for any and all personnel on the job[,] as it covers everything in the job from how we plan to do our work to site utilization, schedule, personnel, cash flow, space quality, owner relations work plan, procurement, equipment, subcontract management, cost, document control, project closeouts and labor relations.

Tr. at 248; see also JX 200A. Mr. Herrick generated the project execution plan for consideration by J.A. Jones's headquarters in Charlotte, NC; it was not provided to the Corps. Tr. at 250.

Mr. Herrick conscripted a boilerplate pamphlet from the Construction Industry Institute (the "CII"), then generated various subsections of the project execution plan in compliance therewith. See Tr. at 357. Mr. Herrick addressed some of the project execution plan's components. For example, the site-utilization section discusses employee transportation, equipment locations, environmental controls, microwave communications, and various logistical matters. See Tr. at 249-50; JX 200A at GP0005248. Mr. Herrick also considered the Joint Venture's plans for recruiting labor. JX 200A at GP0005205. In compliance with the CII pamphlet, Mr. Herrick advised J.A. Jones's senior management to evaluate whether, in the absence of union labor, sufficient manpower would be available at Montgomery Point. See id.; Tr. at 362-363 (acknowledging that the CII pamphlet does not counsel a similar inquiry when union labor is available). The project execution plan includes manpower schedules, as well, see JX 200A at GP0005331, which graphically depict "man days versus month for different crafts of the job," Tr. at 250.

The manpower schedules predate the project execution plan. They were created for the Joint Venture's unsuccessful negotiations in July 1997 with union representatives. Tr. at 250-51 (Herrick); see also Tr. at 356 (Herrick) (stating, "Senior managers had already seen the documents. [I] was just putting the labor graphs into the document."). But see Tr. at 358 (Herrick) (stating that he understood the purpose of the manpower schedules to be "[p]rovid[ing] a schedule showing the manpower requirements for the job over the duration"). The manpower schedules understated the amount of employees—particularly those necessary for concrete-related work—required at Montgomery Point. See Tr. at 251-52 (Herrick). For example, despite Mr. Herrick's estimate that Montgomery Point required approximately 120 form carpenters at the peak of concrete operations, the manpower schedules show a peak of approximately sixty. See JX 200A at GP0005336; Tr. at 252-53 (discussing JX 200A). Likewise, despite Mr. Herrick's estimate that Montgomery Point required approximately 100 laborers at the peak of concrete operations, the manpower schedules show a peak of approximately fifty. See Tr. at 328, 361. Although Mr. Herrick understood that the schedules would communicate manpower requirements to J.A. Jones's Charlotte headquarters, see Tr. at 358-59, he does not seem to have signaled his opinion that a greater number of employees would be necessary, see Tr. at 356-57 (assuming the project manager was responsible for hiring additional employees or a personnel recruiting manager).

The project execution plan includes a two-page section labeled "Work Plan: Critical Activities," JX 200A at GP0005374, by which Mr. Herrick sought to "[c]onvey what we considered the critical activities for the project," Tr. at 375-76 (Herrick), but he did not

intend "to imply critical path[,]" Tr. at 376 (Herrick). Rather, Mr. Herrick used the word "critical" to denote "important things we needed to pay attention to." Tr. at 376. Mr. Herrick did not recall why he had included "Craft Capabilities," JX 200A at GP0005375, as critical, nor did he recall why he did not list rebar and laborer productivity—in the context of concrete placement—as critical, id.; Tr. at 376, 378-79. On the other hand, the category "Form Work Unit Rates" for concrete placement was deemed critical because the Joint Venture intended "to keep track of how well [it] was doing with the concrete . . . [and] mak[e] future projections of cost." Tr. at 378 (Herrick); JX 200A at GP0005375. Mr. Herrick recalled that form work was one item that drove concrete scheduling, and he noted that the Joint Venture regularly tracked form work productivity and presented these productivity updates at its weekly coordination meetings. "Concrete Placing Rates" also were critical. To that end, Mr. Herrick noted that the quantity of carpenters, i.e., those responsible for constructing forms, employed at Montgomery Point would be a bellwether for concrete placement. Tr. at 378, 382.

Finally, the project execution plan flagged "Control Tower Construction" as a critical item, see JX 200A at GP0005375, including the note that "[t]he specifications require dry and wet testing of all operating systems[,] [and] [c]ompletion of the control tower to an operational level will control all testing [at] the lock and dam," id. In 1999 Mr. Herrick knew that the control tower "had to be built before you could do testing," Tr. at 383, and he correspondingly included a milestone on Schedule 0013 for "control tower operationally complete," Tr. at 384.

5. Construction and concrete

The summer of 1999 at Montgomery Point marked the completion of the cofferdam and the parties' earnest commencement of the construction of the lock and dam structure. During this period Mr. Herrick, as the project controls/senior engineer, assumed responsibility for the Joint Venture's monthly schedule updates. 24/ For the monthly updates, Mr. Herrick drew from his observations of the Joint Venture's progress at Montgomery Point, the submitted time sheets from employed craftsmen, and the monthly quality control reports 25/ discussing the activities of the Joint Venture and its subcontractors. He occasionally made "logic changes" to the schedule's order of work as the

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24/ In Mr. Herrick's absence, Martin Porges, the Joint Venture's project engineer, prepared the schedule updates, as he was familiar with Mr. Herrick's scheduling routine and computer software. Tr. at 200 (Herrick).

25/ Quality control "was in charge of making sure that the subcontractor[s] didn't make mistakes when they were doing their work." See Tr. at 473.

Joint Venture rearranged its planned sequence of work in response to unforeseen problems or developments. See, e.g., JX 1405 at FF288597 (lock critical activities). Logic changes could be used to hasten a substantial completion date, thus saving time on a critical path. See Tr. at 1168 (Herrick) (stating that a logic change in August 2003 did not save critical path days (citing JX 1405 at FF288597)). At one point Mr. Herrick was reprimanded for not bringing logic changes to the Corps's attention, but, when he began submitting the changes for approval, he found that the Corps did not respond. He eventually reverted to making the logic changes on his own and noted that the Corps still "at the end of each month . . . got a full update with a complete report that compared the previous month against the current month and showed all changes." Tr. at 199 (Herrick). According to Mr. Herrick, the Corps provided "[a] minimal amount" of comments in response to these updates. Tr. at 199.

Mr. Herrick stated that the Joint Venture's monthly schedule updates played a role in the Joint Venture's practice for monthly billing the Corps. As part of the billing process, the Corps "reviewed [the monthly update], and [the Joint Venture] got to give [the Corps] a preliminary copy of the billing at about the same time, and then [the Corps] would tell if everything's okay or [the Joint Venture] would make adjustments in one or the other and then do a formal submittal." Tr. at 202. The Joint Venture billed the Corps according to the assigned dollar value of completed activities. Mr. Herrick also described the Joint Venture's other iterative scheduling activities, i.e., those in addition to its monthly schedule updates. The Joint Venture held weekly coordination meetings with Corps representatives. During these meetings the Joint Venture distributed simplified schedule updates reflecting on-going construction activities. Mr. Herrick termed these simplified schedule updates as his "three-week look-aheads [that were included] as part of the minutes to the meeting." Tr. at 203. Mr. Herrick occasionally answered the Corps's inquiries regarding the Joint Venture's use of computer software to update the construction schedule. Tr. at 204 (Herrick).

When updating the Joint Venture's schedule and billing the Corps, Mr. Herrick accounted for the progress of the Joint Venture's subcontractors by "talk[ing] to the superintendent to get his information as to percent complete or how far along or how much more duration [the subcontractors] needed." Tr. at 473 (Herrick). The Joint Venture loosely controlled its subcontractors. Although quality control monitored the subcontractors' work to prevent mistakes, see supra note 25, the subcontractor itself was responsible for determining its required order of work, see Tr. at 474 (Herrick) ("We subcontracted to gain the expertise of a particular [sub]contractor."). The Joint Venture deferred to a given subcontractor's expertise unless the Joint Venture's superintendent or project manager (Mr. Sickle) believed that there might be an impact on the Joint Venture's plans. See Tr. at 474 (Herrick). The Joint Venture's first general superintendent for Montgomery Point, Mr. Macon, coordinated any overlapping work, particularly in areas requiring the work of

multiple subcontractors, i.e., the control tower. 26/ As general superintendent, Mr. Macon oversaw and refereed the control tower work conducted by IHP and Plateau. See Tr. at 478 (Herrick). He spent approximately 65-70% of his time at the job-site, received reports from craft superintendents, 27/ convened daily meetings with all superintendents and subcontractor representatives, and attended the Joint Venture's weekly Corps-level coordination meetings. Tr. at 577-78 (Macon).

Completion of the cofferdam allowed the Joint Venture to begin constructing the lock and dam, and, to that end, the parties' attention shifted to proportioning, testing, and placing concrete. The Joint Venture chose and proposed the component materials, e.g., cement, fly ash, aggregate, etc., of the concrete for the Corps's acceptance. 28/ See JX 87 at FF415802; Tr. at 221-24 (Herrick) (describing aggregate selection). The Joint Venture proposed Class C fly ash. Through the buy-out process, the Joint Venture had selected Luhr Bros. as its subcontractor to supply coarse aggregate and, as fine aggregate, manufactured sand; the Joint Venture nominated these components for the Corps's approval, as well. See Tr. at 222-25 (Herrick) ("Luhr Brothers was [low bidder] for the coarse aggregate. They did not bid sand

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26/ Mr. Macon became the Montgomery Point general superintendent in March or April of 1998. He later became the Montgomery Point project manager during fall 2001, replacing William G. McPherson, the preceding project manager. Tr. at 576 (Macon). After his shift to project manager, Mr. Macon still retained responsibility for coordinating subcontractor activities. See Tr. at 581 (Macon).

27/ "[W]e had an operator superintendent and then we had a piling superintendent, and then as the job progressed we brought in a labor superintendent and then eventually a carpenter superintendent, batch plant superintendent, ironworker superintendent both for reinforcing steel and then structural steel and then shift superintendent, second shift." Tr. at 577 (Macon).

28/ As its buy-outs from material suppliers occurred, the Joint Venture's process of selecting and nominating samples for testing began as early as 1999. See Tr. at 1003-04 (Herrick). Because the Joint Venture expected to begin its concrete operations in 2000, it earlier began coordinating with its suppliers to ensure that materials would be supplied by spring 2000. See JX 273; Tr. at 1017-18 (Herrick). A Corps memorandum dated November 1, 1999, indicated that "[a]ggregate properties determinations [had been] completed on the samples received during mid Sep 99." JX 327 at GP0005847. As the Corps disseminated its October and November 1999 test results for aggregates, it continued to expect and to plan subsequent testing of materials. See id.; JX 375; Tr. 1031-32 (Herrick).

at that time, they did it later . . . ."). 29/ The Joint Venture had not been aware of any workability problems with Luhr Bros.' manufactured sand. See Tr. at 225-26 (Herrick) ("Luhr produced the manufactured sand, they bought the equipment to make the gradations, they used material from their quarries . . . and they ground it and then washed it to produce the gradations."); see also Tr. at 1090-96 (Herrick) (discussing selection of manufactured sand and the manufactured sand's acceptable test results). The Joint Venture also proposed a Portland cement mix that conformed with a Corps technical requirement for Type 2 low heat concrete. See Tr. at 946-47 (Herrick) (discussing bidding for Type 2, describing Type 2 as an exotic concrete, and stating "suppliers preferred to produce Type 1").

As the Joint Venture nominated materials, the Corps verified that the proposed materials complied with the Contract's specifications and subsequently proportioned the accepted materials to create a concrete mix suitable for testing. See Tr. at 1742-43 (Winters) (confirming that the Corps would not rely on material testing by material suppliers or contractor); see also Tr. at 1728 (Winters) (acknowledging the Corps's responsibility for mix proportions); Tr. at 1835 (Winters) (agreeing that "there would be acceptance testing of the materials before the mixed proportions were tested"). The Joint Venture's submittal of the material samples for the Corps's testing was untimely, as the specifications required material testing to occur twenty days after the notice to proceed issued, i.e., no later than September 1997. See JX 89 at FF003257 (Contract § 03305, Spec. No. 1.3.1.1); Tr. at 1750 (Winters); see also Tr. at 1010-19, 1043-45 (Herrick) (discussing submission of aggregate samples).

Mr. Winters characterized the impact of the Joint Venture's tardy submission of material samples:

> I don't think it had so much of an effect on the testing of the fine aggregate. It did have some effect on the mixture proportioning in that we were cut short on some of that. We provided the field with some mixtures that we didn't have complete testing on that were conservatively proportioned.

Tr. at 1751. Yet, Mr. Herrick acknowledged that, because the materials were not submitted by the Joint Venture by September 1997 for testing, the Corps spent less time investigating

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29/ Mr. Herrick admitted that when the Joint Venture issued its letter of intent to Luhr Bros., the Joint Venture knew "that Luhr Brothers had not bid fine aggregate because they didn't have confidence that they would be able to provide fine aggregate within the contract specifications." Tr. at 996 (Herrick) (discussing DX 97). He did not recall whether, prior to receiving the Joint Venture's letter of intent, Luhr Bros. investigated whether its fine aggregate would meet the Contract's specifications. Tr. at 997 (Herrick).

the fine aggregate's physical characteristics. See Tr. at 1047-48; see also JX 390 (Corps memorandum dated December 3, 1999, which discussed fine aggregate test results and concluded that "lingering questions about the quality of the project fine aggregate . . . [are] placing this schedule of work in jeopardy"); JX 456 at GP0008982 (March 24, 2000 letter from Daniel E. Clemans, Administrative Contracting Officer, to Mr. Sickle, stating that "the late submission of the initial round of aggregate samples, and the poor quality results . . . has raised considerable concern within the Corps over your ability to make satisfactory progress in beginning concrete operations"). Ultimately, however, the Corps approved both the Class C fly ash and the manufactured sand, 30/ but provided gradation specifications both to Luhr Bros. for the "production of [the fine] aggregates . . . and to [the Joint Venture's] quality control group to do the testing to these standards." 31/ See JX 651 at GP0011998-99 ("The manner in which you are developing the fixed grading curve for the fine aggregate appears acceptable . . . . Based on this and suitable fine aggregate test results off of the sampling belt, I do not object to your continuing concrete operations."); Tr. at 227-30 (Herrick).

30/ The Corps's test results from November 1999 had suggested a problem with the sand proposed and submitted by the Joint Venture. See JX 379 (November 10, 1999 facsimile from Joint Venture to Tower Rock alerting that "results from the aggregate testing have come back and the sand appears to have some problems"); Tr. at 1033-34 (Herrick) (discussing JX 379). Problems included non-compliance with the specified sieve-size percentages. See Tr. at 1034-35 (Herrick). The Joint Venture subsequently continued to receive and supply new sand samples from its supplier. See Tr. at 1053-61 (Herrick). The Corps had evinced its own preference for a natural sand mix. A March 29, 2000 e-mail from Tom Clement, a Corps design engineer, to other Corps officials stated that WES "is telling us that [the natural] fine aggregate will probably provide the best workability with a lower cement requirement," JX 459; and an April 13, 2000 e-mail from Mr. Neeley stated, "I think you will prefer the natural sand mixtures," JX 465. Other tests suggested that the manufactured sand mixes exhibited workability comparable to that of the natural sand mixes. See Tr. at 1091-96 (Herrick).

31/ When placement began, the Joint Venture's quality control group accordingly performed "gradation tests at the beginning of each batching shift . . . [and] also tested material when it came in on the barges." Tr. at 230 (Herrick). The sand occasionally became too fine and did not meet the gradation standards set by the Corps, and Mr. Herrick recalled that concrete operations consequently halted approximately six times, all within the first five or six months of concrete placement. See Tr. at 231-32. The Joint Venture reported the problems to Luhr Bros., and eventually "things settled down and [the Joint Venture] had good results for a very long and consistent time." Tr. at 232. By April 2001 the Joint Venture's sand supplier likely began double-washing the sand to ensure compliance with the Corps's sieve specifications. See Tr. at 1035 (Herrick).

Mr. Winters periodically communicated with Mr. Neeley regarding the Corps's tests of mixture proportions and testified regarding the content of their communications. Tr. at 1744 (Winters). A January 22, 2000 e-mail from Mr. Neeley to Mr. Winters described sample mixes, as follows:

> [The mixes] are not the best mixes I have ever proportioned, but I think it is about as good as I can do with the manufactured sand. It is almost impossible to proportion a really workable mass mixture with that sand. Don't misunderstand, they aren't bad, they just aren't as good as I like to provide. The sand content has to be increased, which drives up the water demand, which drives up the cementitious content.

JX 408. Mr. Winters acknowledged that, as of the date of his e-mail, he understood that the Joint Venture's use of manufactured sand in the concrete mix correspondingly would require more cementitious material in the mix. See Tr. at 1745 (Winters). Mr. Neeley's February 2000 comments indicated that the angular manufactured sand *vis-à-vis* the rounded natural sand would challenge workability. See JX 425 at GP0006879; Tr. at 1065-66 (Herrick). On March 16, 2000, Mr. Winters e-mailed Mr. Neeley, expressing concern regarding the particle shape of the fine aggregate—for which there was no specification—as well as the cost, heat buildup, and workability of the proportioned mix. See JX 443. He stated:

> Our geologist brought back some samples of the manufactured sand. It is the first sample that we have seen. The particle shape looks much worse than I expected. After seeing the samples, we are concerned about workability. We don't want to have to add a lot of cement/fly ash to the mixture just to improve workability of poor aggregate. It is not right for the government to incur additional costs, have greater shrinkage, and heat buildup in the mass concrete just to use a marginal aggregate for the convenience (cost savings) to the contractor.
>
> I would suggest that we proportion the mixtures for strength with similar amounts of cement/fly ash (minor variations would be expected) and then we invite the contractor to look at the workability. He has already expressed some concern about workability. The contractor probably does not want to place harsh concrete. This would perhaps lead him to choose the more workable manufactured sand/natural sand blend, if we approve it for durability. I do not think he will choose the all natural sand on his own. What do you think?

Id.

On May 2 and 3, 2000, the Joint Venture and the Corps jointly assessed the Corps's use of both manufactured and natural sand in test mix proportions. See Tr. at 1748 (Winters); Tr. at 1244-45 (Sickle). An internal Corps e-mail dated May 4, 2000, summarized the parties' conclusions, with Tom Clement, a design engineer with the Corps who served as design coordinator, assuring that both an all-natural sand mix and an all-manufactured sand mix exhibited good workability. See JX 501. The manufactured-sand mix required extra cement and fly ash. See Tr. at 1749 (Winters) ("Billy [Neeley] did a good job proportioning the mixes and he added extra cement and fly ash to that mixture to make up for the manufactured sand and gave [sic] peak workability."); see also Tr. at 1815 (Winters). Due to the added cementitious content, the mix with all-manufactured sand was more expensive for the Corps. See Tr. at 1830 (Winters). The Corps did not direct the Joint Venture to use the mix with all-natural sand, and it declined to express its own preference, as its testing had begun to suggest that the manufactured sand was passable. See Tr. at 1749 (Winters) ("[P]art of the point of the meeting was to let [the Joint Venture] look at the two different mixes and make an informed decision. We had already expressed some concerns with the manufactured sand, the workability of the concrete with the manufactured sand."); Tr. at 1091-96 (Herrick) (discussing tests revealing acceptable workability).

The Joint Venture previously had discussed whether to use natural or manufactured sand and had expressed concern regarding the higher cost of natural sand. See Tr. at 1062-63 (Herrick) (testifying regarding additional logistical and availability concerns). Ultimately, the Joint Venture elected to use a mix with Class C fly ash and manufactured sand. See JX 510 at GP0009794 (handwritten notes from a Joint Venture meeting dated May 11, 2000, stating: "Both manufactured/natural sand okay[.] Will use manufactured"). By letter dated May 12, 2000, Mr. Clemans approved the Joint Venture's fine aggregate selections. See JX 513 ("The coarse aggregate material is acceptable. Both the natural fine aggregate blend and the manufactured fine aggregate produced quality concrete and are acceptable.").

The Joint Venture continued to install the final features of its concrete-manufacturing batch plant, including the conveyor-belt delivery systems, in May 2000. See Tr. at 1101 (Herrick). Concrete placement began in late June or July 2000, see Tr. at 236 (Herrick), with concrete slump tests and ongoing material tests conducted on-site, see Tr. at 1836-37, 1840-44 (Winters) (describing, in addition to regular slump tests, sieve tests used for the quality control of aggregate particle sizes); see supra note 31 (describing on-site tests of fine aggregate). According to Mr. Herrick, the concrete mix immediately exhibited rapid slump loss, i.e., "flash-setting," or a rapidly hardening concrete mix exhibiting too little slump, which manifested in a friable, brittle, and increasingly unworkable concrete mixture. See Tr. at 232-33 (Herrick) ("[W]e saw the flash set in the initial concrete pours."); see also Tr. at 1475 (McPherson) ("[Slump loss occurred] [o]n the first pour."). The slump loss complicated concrete placement:

> Material becomes hard and unworkable, it becomes set, it's not fluid or liquid—it's not really a liquid but concrete in its wet state is a fluid mix, it can be moved with a vibrator, pushed with a shovel. When it becomes the flash set [sic] it begins to get set or become hard like finished concrete and it is not movable or pliable or workable.

Tr. at 233 (Herrick). Still, placement continued, which Mr. Herrick characterized:

> It took more than a reasonable effort and more than a customary effort to place the concrete. And when I say place, that only includes the actual delivery into the form. We had trouble getting it out of the bucket, out of the trucks, and our delivery was impacted as well sometimes out of the plant.

Tr. at 236-37; see also Tr. at 594 (Macon) ("It took much more effort and time to achieve the desired result as far as consolidating the concrete . . . ."); Tr. at 1476-79 (McPherson) (describing the same). Mr. Herrick observed the Joint Venture's vibrator crews experiencing particular difficulty:

> Typically when you hit [concrete] with a vibrator the concrete liquefies and will actually flow and move, and it would not do this, it was stiff, hard, and in fact when [you] pulled a six-inch vibrator out sometimes you would see a crater the size of the vibrator, and then they would have to use a shovel and fill that in and then revibrate it to seal it up.

Tr. at 237; see also Tr. at 592-94 (Macon) (describing appearance of rapid slump loss in June 2000).

Although the Joint Venture continued placing concrete with intermittent work stoppages throughout the summer and fall, 32/ it continually complained about the concrete's

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32/ For example, concrete operations were halted from August 8, 2000, until August 18, 2000, due to low-strength concrete revealed by cylinder-break tests. See JX 620 (August 9, 2000 letter from Mr. Clemans confirming Corps's stop-work order); JX 633 (August 18, 2000 letter from Mr. Clemans lifting stop-work order); Tr. at 2022 (Clemans) (discussing stop-work order); Tr. at 599-600 (Macon) (discussing stop-work order). Commenting on the Joint Venture's notice that it would hold the Corps responsible for the delay, see JX 671, in September 2000 Mr. Clemans wrote that "[c]onsidering that we could not find any significant problems in their plant or materials, we will probably end up recommending at least some merit when they file[,]" JX 678.

workability. See Tr. at 1481-84 (McPherson). The Joint Venture eventually halted placement of concrete altogether in mid-October 2000. See JX 726 at FF038732 (October 23, 2000 letter from Mr. Clemans, the ACO, to William G. McPherson, the project manager, discussing October 18, 2000 meeting, during which "Mr. Doug Sickle advised [that the Joint Venture] . . . is not going to proceed with further concrete placements with the current mix design due to the risk of unsatisfactory results"). The Corps—through its on-site representatives and its laboratory at the Waterways Experimental Station ("WES")—investigated the slump-loss's cause, 33/ and it eventually blamed the Class C fly ash in the concrete mix. See JX 679 (September 19, 2000 letter from Mr. Clemans to Mr. McPherson attributing slump loss to Class C fly ash and recommending Class F fly ash); Tr. at 232, 235-36 (Herrick). Accordingly, the Joint Venture replaced the Class C fly ash with Class F fly ash, and it began receiving the Class F fly ash and integrating it into the concrete mix in November 2000. See JX 726 (October 23, 2000 letter from Mr. Clemans discussing the Joint Venture's switch to Class F and potential switch to natural sand); Tr. at 238 (Herrick); see also Tr. at 1333-35 (Sickle). Concomitant with the switch to Class F fly ash, on November 7, 2000, the Joint Venture notified the Corps that it would submit a claim for the cost of the switch. JX 761 (notification letter); JX 693 (October 3, 2000 letter from Joint Venture to the Corps stating that "this additional cost is not our responsibility since we have not been supplied a mix design that is adequate"); Tr. at 1347-48 (Sickle); Tr. at 1487-88

33/ Mr. Winters, the lead structural engineer on the Project, recounted how the Corps manipulated the fly ash proportions in its attempt to improve concrete workability. See Tr. at 1831-32. He discussed the results of Mr. Neeley's tests from May 2000 through September 2000, see generally Tr. at 1813-28, and acknowledged that, as cementitious content increased in subsequent test batches of 1.5-inch mix, the cost to the Corps increased, see Tr. at 1828.

For its part, the Joint Venture conducted its own investigation:

> We had the manufacturer of the [concrete-manufacturing] batch plant come check . . . the physical qualities of the plant and its operation. We had Chuck Ferris look at the concrete mix designs and materials that we were using, and talked to people within J.A. Jones who had long experience[] with concrete [regarding] if they had any experience like this and could they [sic] point out what we might have a problem with.

Tr. at 235 (Herrick). Nevertheless, "[t]he manufacturer of the plant found no problems, Mr. Ferris found no problems with the materials as specified, and no one in the company was able to help us . . . ." Tr. at 235 (Herrick).

(McPherson). The Joint Venture resumed placing concrete in November 2000, with subsequent placements occasionally halted or slowed due to weather conditions and equipment breakdowns. 34/ See Tr. at 236 (Herrick). See generally Tr. at 624 (Macon) (stating that Joint Venture did not endure an "unusually large" number of breakdowns); Tr. at 524-43 (Herrick) (testifying as to the Joint Venture's daily reports describing poor weather and mechanical problems with creter crane and other equipment).

Mr. Winters testified that the Corps considered the Joint Venture's concrete placements with the Class F fly ash—at least, those that he observed after January 2001—to be successful. See Tr. at 1835 (Winters). But see Neeley Dep. at 37 ("There continued to be issues with slump variability and placement problems."). Plaintiffs' former employees testified contrary to Mr. Winters. See Tr. at 238-39 (Herrick); Tr. at 613-14 (Macon). Mr. Herrick related that, as concrete placements continued throughout the winter, the quality of the concrete mix remained unsatisfactory. See Tr. at 420 (testifying that, despite the switch to Class F fly ash, "we still had issues with the quality of the end product"). Plaintiffs previously had identified workability problems 35/ associated with the manufactured sand

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34/ The parties stipulated to placement delays occasioned by severe weather. See Tr. at 816-17.

35/ The Joint Venture insisted that it was not responsible for the these problems. By letter dated October 6, 2000, Mr. McPherson notified the Corps:

> We . . . are of the opinion that the mix design is the cause of the poorly consolidated concrete. After reviewing this issue with my well experienced staff and observing several placing operations, there is no indication of the concrete being improperly vibrated. Until a quality concrete mix design is provided, as requested on several occasions, I feel that the presence of rock pockets and honeycombs will continue to occur.

JX 696.

The Joint Venture's concrete placement had to overcome obstacles that did not result from the mix design. Aside from weather delays, evidence indicated that, at least in January 2001, the Joint Venture may have violated the Contract's specifications regarding the timely placement and removal of concrete forms. See Tr. at 1520-23 (McPherson). Moreover, Barry Douglas ("Doug") Wolf, the Joint Venture's labor superintendent who had the distinction of being on site more consistently than other former employees of the Joint Venture, discussed the Project's master deficiency list, see JX 1400, which documented concrete placement problems attributable to the Joint Venture, including busted or failed

and had contemplated switching to natural sand. 36/ See JX 726 (Mr. Clemans's October 23, 2000 correspondence referring to potential switch to natural sand); Tr. at 1335 (Macon). Indeed, although the concrete's rapid slump loss had improved after the fly ash switch, workability remained affected by "bleed water problems, . . . problems with still getting the material to consolidate[,] and . . . voids in the concrete." Tr. at 240 (Herrick); Tr. at 614 (Macon) ("It was workable, but it took a significant more [sic] effort . . . ."); Tr. at 633-35 (Macon) (testifying that the Corps never provided an adequately workable concrete mixture). Mr. Macon described unnatural "honeycombing" that created the voids in the concrete placements, complicating the work of the finishers and requiring additional labor and time to repair the compromised concrete placement. See Tr. at 602-07, 615-19. The Joint Venture and the Corps discussed the honeycombing and its related problems. See Tr. at 606-07 (Macon) ("[The Corps] wanted [honeycombing repairs] done in a more timely manner.").

Prompted by its continuing complaints regarding the workability of the concrete, the Joint Venture retained Dr. Carrasquillo as a third-party concrete consultant, Tr. at 1491-92 (McPherson), and discussed potential mix improvements with the Corps. Dr. Carrasquillo proposed running tests of trial batches of concrete with differently proportioned materials. See JX 845; Tr. at 1349 (Sickle). A summit to discuss the concrete mix was held on January 31, 2001, and was attended by Dr. Carrasquillo and other representatives of the Joint Venture and the Corps. 37/ See JX 845; Tr. at 1495 (McPherson). Both the three-inch and 1.5-inch

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35/ (Cont'd from page 39.)

concrete forms and mistakes made by the Joint Venture's employees, see Tr. at 1598-1611, 1619-20 (Wolf) (discussing JX 1400); see also Tr. at 917-20 (Macon) (describing "popping" forms, which led to slower placement rates).

36/ The Joint Venture took the position that the Corps should assume responsibility for costs incurred on account of a switch to natural sand. See Tr. at 1500-01 (McPherson).

37/ According to Dr. Carrasquillo:

> The purpose of that meeting was that we were going to have a meeting with a representative of the Corps of Engineers to discuss what can be done to address the problems that they were having with the mix design. The concrete performance had been very erratic and inadequate all the way through the project. They had a couple times when the project had . . . to be stopped. In fact my recollection was that a few days before that 31 of January the project was stopped for a couple of days because of concrete performance. So we were going to go and sit down and talk about what could be done for the mix

mixes were discussed. See Tr. at 2371 (Carrasquillo). Following the summit the Joint Venture and the Corps agreed to adjust the mix design, and the Corps subsequently designed tests for trial batches. See JX 845 (listing areas of concern, including lowering bleed-water while improving strength gain and placeability); Tr. at 1495-96 (McPherson). During the remainder of the Project, the Joint Venture would continue to use the three-inch and 1.5-inch mix designs that were formulated on January 31, 2001. See Tr. at 2442-43 (Carrasquillo). A March 28, 2001 invoice documents the final consulting services provided by Dr. Carrasquillo to the Joint Venture. See PX 229; Tr. at 2416-18 (Carrasquillo). By May 2001 the Joint Venture conclusively forswore switching to natural sand. 38/ See JX 967; Tr. at 1372-73, 1377 (Sickle).

Mr. Herrick tracked costs occasioned by the switch to Class F fly ash and due to subsequent concrete-placement problems, which included routine "point and patch" repairs 39/ and work attributable to the atypical honeycombing. See Tr. at 309-14 (Herrick). In July 2001 the Joint Venture submitted a claim to the Corps. JX 1000. A September 21, 2001 summary report prepared by Mr. Neeley responded to the Joint Venture's claim. See Tr. at 1758 (Winters) (discussing PX 222). Mr. Neeley's report discussed the fly ash used in the mass concrete:

> Specifications allow[] use of fly ash meeting either class F or class C requirements of ASTMC 618. The original class C fly ash met these requirements. Unfortunately, the ASTMC 618 is lacking in some areas, i.e., performance in concrete mixtures, effect on workability over time, etc. The

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37/ (Cont'd from page 40.)

> design, and one of the main interests at that particular time was that they were getting very low strength gains.

Tr. at 2280-81.

38/ The Joint Venture had considered approximately six sources of natural sand. See Tr. at 1500 (McPherson). The Corps approved one, but the Joint Venture declined to switch because of its concerns regarding both the Corps's willingness to pay for the switch and the lengthy delivery of the natural sand, which belie the supplier's ability to provide a consistent supply of natural sand that would remain within the Contract specifications. See Tr. at 1503-04 (McPherson).

39/ Point and patch repairs entail "just a finisher . . . fixing minor blemishes and small detail voids in places where forms maybe didn't quite fit up." Tr. at 309 (Herrick).

> [Corps] uses this ASTM specification because it is the one widely accepted in the U.S. and because we currently do not have anything better. What little we know about the rapid loss of workability problems often associated with some class C fly ash has come from troubleshooting at various project sites. . . . However, the original class C fly as[h] source chosen by [J.A. Jones] has rendered rather docile behavior when used on earlier projects. We initially did not anticipate any workability problems with this fly ash based upon its past history. However, as things turned out, something has obviously changed since the last time it was used on a [Corps] project we were involved in. We still do not know exactly what it is about the fly ash (perhaps something in the chemistry) that causes certain class C fly ashes to behave badly. . . . In hindsight, we should have run . . . tests [at] the very beginning of the mixture proportioning exercises. However, we did not largely because it had performed well in the past. Having said all that, the bottom line is the original class C fly ash chosen by [J.A. Jones] did meet the contract requirements and therefore may be a problem for the [Corps].

PX 222 at GP0014832-33. The report also discussed the use of manufactured sand:

> This element cuts both ways. The project specifications do allow the use of manufactured fine aggregate. That bolsters the clam [sic] of [J.A. Jones]. On the flip side, we advised against the use of manufactured fine aggregate from the very beginning. We advised [J.A. Jones] that it would be very difficult, if not impossible, to provide concrete mixtures having the level of good workability usually associated with projects such as this one. The angular nature of the manufactured fine aggregates does not lend itself to good workability as does natural sand fine aggregate. Higher cementitious content can improve the workability of mixtures with manufactured fine aggregate to some degree, however, there are practical limits on how much cementitious content can be increased on mass concrete mixtures. The [Montgomery Point] mass concrete did have higher cementitious contents than has historically been used in similar mixes for the [Corps]. I should be able to dig through old records in my office to demonstrate this. If so, that indicates that we made a good faith effort in trying to properly adjust the mixtures for the detrimental properties of the manufactured fine aggregate. The other issue is [J.A. Jones's] inability to keep the manufactured fine aggregate within the requirements of the project specifications. This contributes heavily to the fluctuating slump and strength values due to its impact on water demand in J.A. Jones's typical remedy.

> Unfortunately, the set of materials chosen by [J.A. Jones] to use at [Montgomery Point] did not [maximize workability, strength, durability, and economy]. In an ideal world, any set of materials of which each single material met its respective specification could be combined in such a way that a properly balanced mixture could always be achieved. Unfortunately in the concrete realm, such is not always the case. [Montgomery Point] is an example of a case where a desirable balance has yet to be found. At various times [J.A. Jones] stated that the lack of desirable workability is the result of our inadequate mixture proportions. This implies that desirable mixture proportions could be attained with a different set of mixture proportions. In my opinion, this is an unrealistic assumption. We tried many different proportions. Some improvements in workability and placeability were eventually found, but a level of improvement desired by the Corps or [J.A. Jones] was never attained.

PX 222 at GP0014833-34.

6. Construction and labor

1) Montgomery Point

Throughout the Project the Joint Venture staffed its crews with experienced and inexperienced employees, blended in order to "train the people who are less than perfect or desirable and come up with a mix . . . to still achieve the desired result." Tr. at 638 (Macon). The Joint Venture had attained appropriate mixes of skilled-craft crews since the beginning of the Project, and, when concrete placement began in the spring of 2000, the Joint Venture was "in pretty good shape because it seemed that [it] had an adequate number of people who were skilled vibrator hands, and then the people who weren't picked it up quickly." Tr. at 639 (Macon); see also Tr. at 254 (Herrick) ("[F]or the beginning of concrete we did rather well at getting people."). Still, the commencement of concrete placement necessitated a larger concrete-related workforce, and carpenters became increasingly important as the Joint Venture required more forms to structure the placements. Mr. McPherson described the Joint Venture's expectations: "In the beginning you have large areas of concrete, minimal form work. As you progress on the project, you have more form work versus the cubic yards of concrete that you can place." Tr. at 1525-26 (explaining that mud-slab placements in July 2000 required less carpentry than form-intensive placements in July 2001). Similarly, in response to a question regarding the Joint Venture's May 2001 plan to recruit carpenters, Mr. Sickle understood that "[t]he labor force from the start of concrete operations [would] continually expand until [the Joint Venture] reach[ed] the peak for need for carpenters." Tr. at 1273; see also Tr. at 1526 (McPherson) (acknowledging that, when he arrived at

Montgomery Point in June 2000, he understood that the Joint Venture would recruit more carpenters "in some period of time, yes"). 40/

With the Joint Venture hiring more carpenters, Mr. Macon witnessed a "downward spiral in terms of quality. . . . [p]redominantly [with] the carpenters." 41/ Tr. at 639 (Macon) ("[Carpenters] had the most numbers so therefore it was more evident with regard to the carpenters."); see also Tr. at 255-56 (Herrick) (describing deteriorating quality and turnover). Mr. Macon pinpointed the deteriorating quality of the carpentry workforce as most evident in late 2000 and in early 2001 42/: "As the concrete operations expanded and [the Joint Venture] opened up more work areas, . . . it became more evident that [the Joint Venture] needed more crews." Tr. at 640 (Macon); see also Tr. at 641-43 (Macon) (identifying from aerial photograph increased form work in May 2001 across the Project, including on floor slabs, the control tower foundation, the navigational pass, the overflow spillway, and the

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40/ At the time of the Joint Venture's bid, Mr. Macon was not aware of any specifically planned milestones for expanded or contracted concrete operations. See Tr. at 818 (Macon) ("Nothing more than, you know, what the general—you know, this is when we anticipate [getting] ready to place concrete and we're going to start off and, yes, there would be a ramping up and then a ramping down.").

41/ Mr. Valdez, the superintendent for carpenters, an impassioned witness who was not entirely on message, see supra note 2, expounded on the Joint Venture's carpenters and carpenter recruiting. See generally Tr. at 1637-85 (Valdez). Mr. Valdez was responsible for hiring carpenters. Tr. at 332 (Herrick). Unfortunately, his earnest and enthusiastic testimony was inconsistent and unreliable, but did not undermine plaintiffs' case in any material respect.

42/ Mr. Wolf's testimony was less cogent when asked to identify when the Joint Venture's labor problems became apparent. Queried about labor conditions at the commencement of concrete operations, i.e., summer 2000, Mr. Wolf replied:

> I could pretty much speak for the labor end of it and that was my forte, if you would. We would go through a lot of personnel. It was hard to get . . . people that would stay with us. It turned out to be a situation where if we needed four guys, we would talk to personnel and human resources, bring me six, bring me eight.

Tr. at 1557. When asked to clarify the timeframe of these labor complaints, however, Mr. Wolf stated, "I can't throw a date at you, but . . . as our concrete was progressing, we were spreading out, getting more areas ready for pavement." Tr. at 1558.

abutment (see PX 639)); Tr. at 255 (Herrick) ("After we opened up the navigation pass [i.e., 2001] and needed more carpenters and laborers, that's when we began to have problems getting quantity and quality of craftsmen."). The Joint Venture consequently intensified its recruiting in 2001, which Mr. Macon described:

> Well, the first means of trying to increase our recruitment was that we were currently advertising in local newspapers, and then we expanded that out to include Arkansas, Mississippi, Louisiana, Texas, Alabama, Tennessee, and then if we heard of any area where there were plant shut downs in some of these smaller communities that were being closed at the time we would target those towns looking for carpenters, laborers, iron workers, craftspeople who we could utilize. We had some assistance with regard to placement of ads in national trade magazines.
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> There's a hot sheet which is, again, it's sort of an employment sheet for upcoming projects and outages and shut downs across the country. We advertised in that. Then, as I said, we just expanded out beyond the local. Then we also used an employment service. The first one we tried was PPM [Power Plant Maintenance], which was a company which was affiliated with J.A. Jones. . . . We attempted to get craftspeople from there and bring them in to set them in our workforce, and then we ended up going to another local labor service called Labor Finders which was located, I believe, in Little Rock, Arkansas.

Tr. at 644-45. The Joint Venture complemented its intensified recruiting by offering better pay and training, as well. See Tr. at 646-49 (Macon). Mr. Macon described the Joint Venture's offering an escalated per diem, awarding bonuses and benefits to qualified employees, and increasing wage rates. See Tr. at 646-48.

Despite its efforts the Joint Venture was not able to obtain sufficient skilled craft to perform its work. 43/ See Tr. at 645 (Macon). According to Mr. Macon, the Joint Venture

> was still short and there was an extremely high turnover rate in all crafts. That was accentuated with the carpenters because there were more of them. . . . We

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43/ Fifty workers were terminated for falsification. See Stipulation filed Nov. 9, 2009, ¶ 1. Sixteen of these, including seven carpenters, were terminated in January 2002. Id. ¶ 2. Thirty-one of these, including twenty-two carpenters, were terminated in September 2002. Id. ¶ 3.

> continued to have that problem until the quantity or the progress on the job started to, we reached a completion point and we started downsizing.

Tr. at 645. Mr. Macon qualified the balance of experienced and inexperienced employees on crews as, "instead of a 50/50[,] . . . more like 25 percent good to 75 percent not as good." Tr. at 648. Even with the Joint Venture's supplemental training, the poor quality of labor slowed the progress of construction and delayed the Joint Venture's form work and concomitant concrete placements. See Tr. at 649-51. Mr. Macon explained:

> [W]e didn't have as many people who were just qualified so the crews weren't getting as much of the work, nor performing the quantity of work which we desired from them, so you ended up having more crews, but then that became a situation where you didn't have enough people to man the crews that you had, and so then it became more of a choice as to whether or not we operated short-handed with regard, as I said, to crews, or the crews that we had, we had to pay more and increase the amount of supervision. Typically you'd have three to five crews under a general foreman and then another one or two general foremen on a job of this size. We ended with actually three carpenter superintendents at one point, and then multiple general foreman [sic] where everybody's level of skill with influence was just less. We had more supervisors for less people.

Tr. at 650. 44/

2) Pine Bluff

Concurrent with, but independent of Montgomery Point, the Corps had contracted for the design and construction of the Pine Bluff Chemical Demilitarization Project ("Pine

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44/ On December 26, 2002, the Joint Venture submitted a certified claim to the Corps for concrete deficiencies and the labor shortage. Stipulation filed Nov. 16, 2009, ¶ 1. On November 21, 2003, the cognizant contracting officer issued a final decision on the claim, finding partial entitlement on the concrete mix design for twenty-six days of delay (but without awarding compensation) and denying the labor shortage claim.

On January 20, 2004, Mr. Clemans completed a memorandum for record analyzing the Joint Venture's claim for the concrete mix design and requesting an audit by the Defense Contracting Audit Agency (the "DCAA"). See PX 307; Tr. at 2024 (Clemans). In his discussion of the Joint Venture's switch to Class F fly ash, he "agreed there were damages due to the Class C fly ash." Tr. at 2025.

Bluff"), an incinerator facility in Pine Bluff, Arkansas. 45/ Built by the Raytheon Demilitarization Company ("Raytheon"), Pine Bluff is an incinerator used to destroy—in compliance with an international treaty to which the United States was a signatory—chemical weapons stockpiles. 46/ Testifying about the settlement that plaintiffs contend upended the Joint Venture's retention of skilled laborers at Montgomery Point was Richard Neal Graham, an employee of the Corps's Contract Administration and Quality Assurance Team for the Chemical Weapons Department located at the U.S. Army Engineering and Support Center, Huntsville, Alabama. As part of the team at Pine Bluff, he worked with approximately twelve team-members with experience in construction, scheduling, and quality assurance inspections. Tr. at 1893 (Graham). Mr. Graham supported the field work at Pine Bluff, worked on the Corps's response to a Raytheon request for equitable adjustment (the "Raytheon REA"), and assisted with processing several smaller contract modifications. Tr. at 1893-94 (Graham). William Joseph Taylor served as Raytheon's construction manager at Pine Bluff beginning in August or September of 1998, Tr. at 1964-65 (Taylor), and supervised a project planning and scheduling team responsible for assembling data for the Raytheon REA. Tr. at 1974-75 (Taylor). He testified as an independent contractor employed by plaintiff Fireman's Fund Insurance Co. ("Fireman's Fund").

According to a June 1999 Project Management Plan for Pine Bluff, the Defense Authorization Act of 1986 directed the Department of Defense "'to develop a comprehensive plan to dispose of the nation's stockpile of lethal chemical agents and munitions by 30 September 1994.'" PX 130 at GP0005021 (citing Pub. L. No. 99-145, § 1412, 99 Stat. 583,747 (1985) (codified as amended at 50 U.S.C. § 1521 (2006)). Subsequent legislation extended the program completion date. Tr. at 1897 (Graham). On July 25, 1997, the Pine Bluff contract was awarded to Raytheon by the U.S. Army Industrial Operations Command (the "Industrial Operations Command"), with an anticipated notice to proceed of September 1, 1997. See PX 126; PX 16 at GP0006941; Tr. at 1913, 1917 (Graham). The Pine Bluff Project Management Plan describes the U.S. Army Engineering and Support Center in Huntsville as the program execution agency, with the Corps's Little Rock District "assigned the responsibility for designing construction of support facilities and for design of roads and utilities outside the fence of [Pine Bluff.]" PX 130 at GP0005021. The Corps was tasked

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45/ Mr. Herrick learned about Pine Bluff "about the same time [the Joint Venture] kicked off the navigation pass, April of 2001." Tr. at 256.

46/ William Joseph Taylor, Raytheon's then-construction manager at Pine Bluff, described Pine Bluff as "a very complex huge incinerator. It eventually eats itself once all the materials are disclosed. It's designed to handle, process and demil [sic] all the gaseous toxic products that were used in – and even before, GB, GBX, mustard, and rockets." Tr. at 1965-66.

with the construction of multiple buildings of heavy re-enforced concrete. Tr. at 1966 (Taylor).

Due to a bid protest, Raytheon received a stop-work order on August 7, 1997. PX 126; Tr. at 1913 (Graham). A limited notice to proceed followed in October 1998. Tr. at 1967 (Taylor). According to a Defense Contract Audit Agency ("DCAA") audit request, a full notice to proceed came on January 15, 1999; at that point Pine Bluff's completion had been delayed for 525 calendar days, i.e., until September 2001. PX 126. Raytheon recruited union labor, and all craft employees were subject to a wage-freeze agreement implemented by Raytheon in October 1998. Tr. at 1968 (Taylor). However, notwithstanding the wage-freeze agreement, Raytheon's hiring remained adequate for approximately three to six months, at which point it began its heavy structural concrete work. Tr. at 1970 (Taylor). Mr. Taylor described Raytheon's struggle to hire adequately skilled workers and a sufficient number of workers, with the latter becoming particularly problematic in early summer 1999. Tr. at 1970-72 ("We would call out 30 carpenters and get 20. And after a while, we started ordering 30 when we needed—when we only needed 10 to get the numbers to show up at least.").

Raytheon submitted the Raytheon REA, Parts A and B, for compensation owed on account of the delay occasioned by the stop-work order. See Tr. at 1899-1900 (Graham). Part A of the Raytheon REA dealt with the direct costs of re-escalating work at Pine Bluff, particularly the inflated cost for materials and labor. Part B sought further labor-related compensation, including both entitlement and quantum, because the delay forced Raytheon to compete with "five or six specific projects in the surrounding area, and that in order to get labor to [Pine Bluff][,] [Raytheon was] now having to compete with these projects that [it] did not anticipate having to compete with." Tr. at 1901-02 (Graham); see also PX 126 ("[Raytheon] is now stating that due to the 525-day delay, the available qualified/skilled labor force in the construction area [has] diminished; and wage rates have increased considerably and will, therefore, cost [Raytheon] additional monies to properly staff the project."). Prior to the delay, "there were no known significant craft consuming manpower projects scheduled for the project performance period of September 1997 to May 2000 with a labor peak in the summer of 1999." PX 16 at GP0006964 (the Raytheon REA). Subsequent to the delay, however, Raytheon identified "significant newly started projects during the current performance period of January 1999 through 7 December 2001, with a peak in December 2000." Id.

The Corps received and began analyzing Part B of the Raytheon REA, dated February 23, 2000, see id. at GP0006934, on about February 24, 2000, Tr. at 1906 (Graham) (discussing PX 139, an e-mail from Mr. Graham dated February 24, 2000). Part B requests a modification to address the deteriorating Pine Bluff labor situation occasioned by increased

labor competition. Part B notes Raytheon's particular difficulty after the delay in filling its requirements for carpenters and ironworkers, PX 16 at GP0006960, although Mr. Graham recalled problems in recruiting all trades for Pine Bluff, Tr. at 1922-23. Part B identifies several labor modifications necessary for recruiting these trades, including "Labor Rate Parity, Travel, Allowance and Daily Per Diem." PX 16 at GP0006957. The wage-freeze agreement had locked Raytheon's wages below the rates of Arkansas's local unions; however, by attaining labor rate parity with Little Rock, Arkansas union rates—and by adding travel allowances and daily per diem—Raytheon expected to hire a sufficient number of skilled employees. Tr. at 1976-77 (Taylor); see also Tr. at 2011 (Taylor) ("It was a combination of all the REA part B that brought the numbers and the higher skill levels to the site."). Moreover, expecting that the unions would draw workers from non-union jobs—employees who were not accustomed to paying union dues—Raytheon also requested "union dues for open shop" in order "to provide yet another incentive to come aboard and join the union craft [at Pine Bluff]." Tr. at 1986 (Taylor).

Part B lists five "significant newly started projects," PX 16 at GP0006964-65, impacting Pine Bluff's labor market. Curiously, the list does not include Montgomery Point. See id.; see also Tr. at 2003 (Taylor). According to Mr. Taylor, Raytheon did not include Montgomery Point on the list because Montgomery Point's construction was already substantially underway. See Tr. at 2004 (Taylor). The court questioned Mr. Taylor on this testimony, as the caption to the project list refers to newly started, ongoing projects; Mr. Taylor testified that the caption "[s]hould read to be performed, because they were forthcoming jobs." Tr. at 2006 (Taylor). Mr. Taylor gave the following overview on hiring at that time:

> [Montgomery Point] was another project that obviously we were in some competition with. But it was far removed from our, our main drawing point, meaning Little Rock. We were drawing the craftsmen out of the union hall as our hiring source. That was only 30, 35 miles away, and [Montgomery Point] was 70, 80 miles away.

Tr. at 2007-08. But see Tr. at 2014 (noting that per diem and travel allowances were paid for employees traveling 125 miles to Pine Bluff).

For Part B, Raytheon requested a modification of approximately $24 million. See PX 16 at GP0006958 ("The total price for this [REA] is $23,965,790[.]"). Mr. Graham's pre-negotiation objections called for a counteroffer of $14 million, but, following final negotiations conducted on April 25, 2000, between Raytheon and the Corps, the Corps issued

a modification of $22.5 million. 47/ Tr. at 1903, 1907, 1934, 1944 (Graham). This modification allowed Raytheon to recruit both union and non-union labor. Tr. at 1920, 1927-28 (Graham). Indeed, although all of the new employees came to Pine Bluff through the union, some of these new recruits had transferred to union employ from non-union jobs. Tr. at 1982-83 (Taylor). In Mr. Taylor's opinion, after Raytheon normalized labor rates and implemented travel allowances and per diem payments, the skill-set of Raytheon's Pine Bluff employees became much better. Tr. at 1990. Further, when evaluating skilled-craft employees at Pine Bluff in February 2001, Mr. Taylor had found that absentee rates improved, recruitment took less time, and turnover decreased. Tr. at 1992-95. But see PX 215 at COEPB00001582, 1602 (showing that, as of February 2001, no carpenters recently hired; union dues expended for open shop labor at 0%; and only 12% of committed per diem spent).

7. Completing Montgomery Point

While the Joint Venture was constructing Montgomery Point, J.A. Jones's parent company was struggling financially, which led to J.A. Jones's declaration of bankruptcy in September 2003. See Tr. at 481 (Herrick); see also Tr. at 660 (Macon). Following J.A. Jones's bankruptcy, plaintiffs financed the continued construction of Montgomery Point, and the Corps at that time (September 2003) began withholding liquidated damages for construction delay. Work on the Project continued uninterrupted, as Clark Construction ("Clark") immediately assumed responsibility for constructing Montgomery Point in a "seamless transition." Tr. at 660-61 (Macon) (acknowledging that a delay of a "couple days" in wages ensued and that a few employees left the Project at this time). Fru-Con Construction Corporation ("Fru-Con") later assumed responsibility for the Project's construction in a transition that was "even more smoother than the first one." Tr. at 662 (Macon). 48/ On March 25, 2004, plaintiffs, as sureties, signed an official Takeover

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47/ Mr. Graham called for a $14 million counteroffer because he considered that Raytheon (a) had been warned that a wage-freeze provision in its contract ultimately would impact its ability to recruit labor and (b) should have remained responsible for several months of time because any competition or difficulty was within the scope of the original schedule. See Tr. at 1945-46 (Graham). Although Raytheon had never proved to him that the wage-freeze agreement in the original contract had no impact on its ability to recruit labor, see Tr. at 1945 (Graham), Raytheon was convincing that it should not be responsible for the overlapping schedules, see Tr. at 1946 (Graham).

48/ Unless necessary to specifically refer to plaintiffs, J.A. Jones, Clark, or Fru-Con, the court will continue the convention of referring to follow-on contractors as the "Joint Venture."

Agreement with the Corps, assuming responsibility for the Contract's performance and inheriting all rights, title, and interest as if they were the original contracting party. 49/ See JX 1657 (the "Takeover Agreement"). The United States Bankruptcy Court for the Western District of North Carolina approved the assignment of the Contract to plaintiffs on June 9, 2004. 50/

49/ Plaintiffs expressly reserved all prior rights and claims belonging to the original contracting party, with the Takeover Agreement providing in paragraph 8:

> The Government acknowledges that the Sureties will have the right to assert all claims of the original Contractor arising under the Contract or in connection with the performance of the Contract. Any disagreement between the Government and Sureties shall be considered a dispute within the [Disputes Clause contained within the Contract] and Sureties shall be entitled to exercise such rights as are afforded by the Disputes Clause and the Contracts Disputes Act of 1978, as amended, in addition to any other rights the Sureties may have.

JX 1657 at GP0021580-81 (alteration in original) (footnote omitted). The Takeover Agreement prescribed that a $2,500,000.00 performance bond provided the maximum liability of plaintiffs for the performance of work. Id. at GP0021582.

50/ With the June 9, 2004 bankruptcy court order, the Takeover Agreement became retroactive to March 25, 2004, the date signed. Paragraph 19 of the Takeover Agreement provided:

> In order to implement the completion of the Contract by Sureties as contemplated by this Agreement, the Government and the Sureties have agreed that the most efficient manner to terminate the original Contractor's role under the Contract is for the original Contractor to move in the Bankruptcy Proceeding to assume the Contract and assign the Contract to the Sureties as soon as possible, and both the Sureties and the Government agree to waive any notice requirements with respect to and to consent to such assumption and assignment motion (with such assumption and assignment referred to herein as the "Consensual Assumption and Assignment"). . . . This Agreement shall become effective upon the effectiveness of the Consensual Assumption and Assignment, but such effectiveness shall be retroactive to the date of this Agreement.

JX 1657 at GP0021584. In assigning the Contract to the sureties, the bankruptcy court decreed that the sureties reserved and succeeded to all rights, claims, and defenses of the

The Joint Venture began constructing the control tower in spring 2002. The control tower consists of several floors of reinforced concrete, with each floor supported by concrete columns and concrete walls. See Tr. at 2107 (Clemans). The Joint Venture soon identified a conflict between an embedded steel plate and the reinforcing steel for the stairs and the control tower, which Mr. Clemans described:

> The problem with the embedded plates was fairly simple. It was hitting the reinforcement steel that came up from the top of the lock wall. That steel couldn't move. The embedded plate could not be moved. That had been addressed in an earlier RFI. There were six inch anchor studs welded to the back of the embedded plate.

Tr. at 2108; see also Tr. at 652 (Macon). The Joint Venture had misplaced rebar in that vicinity, but Mr. Herrick testified that the placing error did not contribute to the conflict. 51/ See Tr. at 267-68. He elaborated:

> Yes, the reinforcing steel that protruded above elevation 138 did have a placing error. We did fix that, but . . . . [t]he concrete distance, the thickness of the concrete between the face of the form and the rebar was three inches. The stud was six inches. The rebar had been placed too far back. So it did give us some space, but the fact that the stud was six inches, it was still in the way. . . . So even with it put back into its original location, it still had the issue.

50/ (Cont'd from page 51.)

original contracting party and that the Government retained all defenses and claims that it otherwise could have asserted against the original contracting party, including claims related to periods prior to the date of the Takeover Agreement. Pls.' Br. filed Apr. 26, 2010, at A32-33.

On December 17, 2008, plaintiffs filed an Unopposed Motion Regarding Parties, requesting to drop Atkinson and J.A. Jones as plaintiffs because the Takeover Agreement assigned their rights under the Contract to the sureties. This court granted plaintiffs' unopposed motion by Order entered on December 19, 2008.

51/ Mr. Wolf did not recall misplaced rebar and recalled instead: "[T]here was a lot of rebar. I don't remember [it] actually misaligned. I don't think it would have went in there otherwise." Tr. at 1560. According to Mr. Wolf, the size and the amount of rebar prevented the placement of the embedded plates. Tr. at 1558.

Tr. at 267-68. But see Tr. at 2110 (Clemans) (discussing congested and "out of place" steel, which "at that time . . . became the controlling problem").

On April 23, 2002, the Joint Venture submitted to the Corps request for information ("RFI") 787, requesting clarification regarding the embedded plate and construction of the control tower. 52/ See JX 1163. During the parties' May 8, 2000 coordination meeting, Mr. Herrick recorded that "[the Corps] will check and advise on [RFI] 787[,] as it is due today." 53/ JX 1179; Tr. at 264 (Herrick). Still, a response was not immediately forthcoming. Tr. at 265 (Herrick); see also Tr. at 658 (Macon) ("[W]ith the amount of time that it took to get the response on this RFI the wall placement went on and the column placement had to be made later."); Tr. at 2109 (Clemans) (acknowledging that the Corps's response "was pretty slow"). Outstanding RFIs were topics of discussion during project engineer Martin Porges's weekly status meetings with the Corps, and Mr. Herrick knew that the Corps was apprised of the construction delays attributable to its delayed response. See Tr. at 261, 266 (Herrick); see also JX 1218 (June 11, 2002 letter from Mr. Macon advising the Corps that the lack of a response to RFI 787 "has delayed the concrete in the control tower"). On May 30, 2002, Harza, the Corps's architect/engineer, visited the Project site to evaluate the reinforcing steel and consider alternate splicing/coupling methods. See Tr. at 2110 (Clemans). The Joint Venture received verbal guidance from the Corps on June 13, 2002, and received a formal, written response on July 2, 2002. See JX 1163; Tr. at 265 (Herrick); Tr. at 2111 (Clemans). The Corps recommended new sizes for the concrete columns, which entailed adjusting the anchors on the embedded plates and an alternative splicing of rebar. 54/ See JX 1163; Tr. at 265 (Herrick); Tr. at 655-57 (Macon); Tr. at 2110-11 (Clemans).

52/ Mr. Herrick related that, although the Contract did not require the Corps to answer RFIs within a specific time period, Mr. Porges and Mitchell T. Eggburn, the Corps's resident engineer and the contracting officer's representative ("COR"), agreed to a "normal two week target" for responding to RFIs. Tr. at 261; see also JX 496 (May 2, 2000 e-mail from Mr. Eggburn to Mr. Porges). The Corps would attempt to answer expedited RFIs within seven days. Tr. at 261.

53/ Mr. Herrick never received comments from the Corps that disputed that RFI 787 was due by May 8, 2002. See Tr. at 265 (Herrick).

54/ On April 9, 2003, the Joint Venture submitted a certified claim to the Corps for delays and costs related to the embedded plate in the control tower columns. Stipulation filed Nov. 16, 2009, ¶ 2.

Most of the Joint Venture's concrete work was complete by summer 2003, and the Joint Venture considered that the cofferdam's rewatering lingered as the biggest remaining scheduled item. 55/ Tr. at 513 (Herrick). The Joint Venture knew that rewatering activities would involve the control tower's permanent electrical controls and, hence, would require the coordination of its subcontractors. See Tr. at 513 (Herrick). For example, Mr. Herrick agreed that, as of August 2003, the remaining electrical work at Montgomery Point was concentrated in the relatively limited space within the control tower and in the navigation pass. See Tr. at 1143 (Herrick). Consequently, during fall 2003 the Joint Venture's quality control manager reviewed the Contract specifications and created a rewatering plan, including a checklist of necessary pre-rewatering activities. Tr. at 268-69 (Herrick) ("We had [the plan] reviewed by both subcontractors, the mechanical and the electrical, so we felt that it was complete."). IHP and Plateau reviewed the Joint Venture's plan. Tr. at 269 (Herrick); Tr. at 667 (Macon) ("We then took that list and got together with our subcontractor[s] and evaluated it, and made sure that everyone understood what he intended for it to perform prior to [re]watering."). Mr. Herrick did not recall any discussions at this time regarding a need to increase the activity or number of the Joint Venture's subcontractors to prepare for rewatering. See Tr. at 513-14 (Herrick); see also Tr. at 1142 (Herrick) (recalling no internal discussions to expedite electrical work). The Joint Venture also

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55/ Other scheduled tasks remained, as well. With the completion of the control tower's concrete work, the Joint Venture began working on completing the control tower's control systems. See Tr. at 743 (Macon). Plateau did the electrical work, e.g., "[t]he remaining items for the control systems, your CCATV, your alarm system, lighting, et cetera." Tr. at 744 (Macon). IHP performed the hydraulic work. See JX 1495; Tr. at 743 (Macon). Marvin Marcus Emmerling, a design electrical engineer with the Corps and one of the few witnesses called during the Government's case, testified regarding the complicated nature of the Joint Venture's electrical work and the electrical-work milestones on the Project during this period. See generally Tr. at 3218-80.

Mr. Macon testified that Plateau and IHP timely performed their work, but he agreed that both subcontractors could have more quickly performed their work "[h]ad the Corps of Engineers in August of 2003 indicated . . . that all of the work in the control tower . . . had to be performed before [the Joint Venture] rewatered." Tr. at 745. He could not estimate the potential time saved, but suggested that the Joint Venture

> would have evaluated the specific items that had to be done, defined a more concise schedule of it, and then . . . would have monitored [the subcontractors'] activities more closely as a start and . . . would have gone into corrective actions which could have entailed anything from bringing additional resources in terms of people to bringing another contractor to supplement their work.

Tr. at 745-46.

provided a copy of its plan to the Corps, which offered no response, Tr. at 269 (Herrick), and it scheduled a meeting with the Corps, Tr. at 668 (Macon).

On August 11, 2003, the parties met to plan the site rewatering. See Tr. at 274 (Herrick). Prior to the meeting, the Joint Venture anticipated that the miter gates, tainter valves, and crest gates should undergo a limited pre-rewatering dry-testing—with the CGDS remaining in place during rewatering, see Tr. at 269 (Herrick)—and subsequent wet-testing, see Tr. at 669-70, 799-800 (Macon). Mr. Macon described the plan in general terms:

> We planned on testing the gate system. . . . [W]e looked at it from the standpoint that the gates had been installed and we wanted to test each one of these systems to prove that the systems worked, and then continue on with the re-watering, and then finish any other operational items with regard to the gate systems during the process of moving the cofferdam.

Tr. at 669. Only one representative gate of each mechanical system—whether the crest gates or miter gates, respectively—would be tested. Tr. at 669-70 (Macon). Further, the Joint Venture evidently believed and proposed that it should test the systems using portable, local controls—not the control tower's permanent controls. 56/ See Tr. at 799-800 (Macon). To reflect this proposal, at the end of August Mr. Herrick modified the data in the Joint Venture's schedule software, deleting "control tower operationally complete" as a pre-rewatering requirement, i.e., the "predecessor link code," and thereby eliminating the predicate dry-testing of all the miter gates, crest gates, and tainter valves by the permanent electrical and mechanical controls. 57/ See Tr. at 1149-53 (Herrick).

56/ The Joint Venture proceeded to exercise the mechanical systems from local control units. See Tr. at 670-71 (Macon) (stating that in October 2003 IHP was exercising the crest gates locally, by which "[t]hey use[d] a hydraulic power unit and they would attach the individual hydraulic power unit to the individual gates and then they would lower it"). Mr. Macon clarified that these fall 2003 "exercises" were not the final dry-tests required by the Corps, but instead were the Joint Venture's predicate pre-testing drills. See Tr. at 672-74 (Macon) ("[T]he first thing you did when you installed the gate was you ran it through the complete cycles motion. . . . [The exercises were] [o]peration test[s] that we performed."). Successful completion of these exercises would lead to dry-tests, described by Mr. Macon as "the final test, . . . to test one, anyone [sic] that [the Corps] wanted to see operate." Tr. at 674.

57/ A January 22, 2004 letter from Mr. Clemans to the Corps reflects an agreement to test the mechanical systems from the local controls. See Tr. at 2051-52 (Clemans) (discussing JX 1534). The letter states:

Mr. Macon attempted, with little success, to explain why the Joint Venture at that time did not forward to the Corps a submittal that proposed the Joint Venture's expectations for a limited dry-testing. See generally Tr. at 771-800 (Macon). He understood that specification 1.4 of Contract section 15005 specified a submittal process, see JX 89 at FF052097, according to which "there were items that required submittals and that [the Joint Venture] would prepare the submittals and submit them to the government and then they would review those submittals and return them with the appropriate action to be taken on them," Tr. at 772. As the Joint Venture's project engineer, Mr. Porges had prepared and forwarded "a lot" of submittals that pertained to tests, including shop tests, i.e., pre-delivery to Montgomery Point, and field tests, respectively. 58/ See Tr. at 774-75 (Macon). The Joint Venture previously had forwarded submittals for both shop tests and field tests of the crest gates, miter gates, and tainter valves, respectively. See Tr. at 776-77 (Macon). Although Mr. Macon considered the tests contemplated by specification 3.5 of Contract section 15005 59/

57/ (Cont'd from page 55.)

> I was on the site when the August 11, 2003 meeting took place, and while I did not sit in on the detailed discussions, I did discuss the results with Mr. Eggburn. I remember [a] discussion that some equipment might not be able to be tested from the control panels in the tower at this stage, and that was acceptable, as long as power pack units and manual controls were provided for testing.

JX 1534.

In August 2003 Mr. Herrick did not believe that dry testing required the complete installation of electrical control systems in the control tower because the parties "came up with a work around to perform the test." Tr. at 1154-55 (Herrick). The "work around" mentioned by Mr. Herrick appears to be the Corps's agreement at the August 11, 2003 meeting that the Joint Venture could perform limited local tests of the mechanical systems. Prior to obtaining the work-around, however, he did not believe that the Joint Venture "could fully comply with the contract requirements for dry testing by doing testing that did not involve the electrical systems in the control tower." Tr. at 1155 (Herrick).

58/ "A shop test would be performed, depending upon the item, . . . in the shop prior to[,] or after painting and prior to shipment to the site, and then that may or may not require either government inspection or contractor inspection or both." Tr. at 775-76 (Macon).

59/ As quoted above, section 15005, specification 3.5, provides, in relevant part:

to be field tests, the Joint Venture did not immediately prepare for the Corps a formal submittal for its rewatering plan; rather, its quality control director attempted to prepare the Joint Venture's rewatering plan in compliance with the Contract's testing specifications, and the Joint Venture discussed this plan with the Corps at the August 11, 2003 meeting. See Tr. at 778-83, 799-800 (Macon). Mr. Macon explained:

> It was more than a submittal. . . . [The Joint Venture was] trying to develop a re-watering plan, and we were trying to identify the items on the re-watering plan which would either preclude [the Joint Venture] or allow [the Joint Venture] for rewatering [sic]. And it was a very large list of items, and [the Joint Venture] was trying to be all inclusive and make sure that there wasn't something that [the Joint Venture] had missed.

Tr. at 800.

The parties held a series of meetings during which the Joint Venture discussed its expectations and progress on the rewatering plan. See Tr. at 670-73, 688 (Macon) (discussing meetings held September 12, 2003, and October 22, 2008); PX 300 (same). At the September 12, 2003 meeting, the Corps received copies of the plans of work submitted by IHP and Plateau, respectively. See Tr. at 688-89 (Macon). During these meetings the Joint Venture advised that it could conclude dry-testing in mid-December and rewater on December 18, 2003. 60/ See Tr. at 691 (Macon). The Corps first objected to the Joint

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59/ (Cont'd from page 56.)

> Upon completion of site installation, and prior to acceptance of the installation, the Contractor shall subject the operating machinery of each gate/valve to such operating tests as may be required by the Contracting Officer to demonstrate satisfactory functional and operating efficiency. The gates/valves shall be opened and closed several times using different modes of operation and all pressures and operating speeds verified.
>
> The tests shall first be conducted in the dry and later again after the water is present.

JX 89 at FF052120.

60/ A December 29, 2003 letter from Mr. Macon to Sandra Kay Easter, the Corps's contracting officer, stated that, at the September 12, 2003 meeting,

Venture's plan on December 10, 2003. PX 300. On that date Mitchell T. Eggburn, the Corps's resident engineer and contracting officer's representative ("COR"), directed that, prior to rewatering, the Joint Venture should "(a) test all the miter gates, crest gates, [and] tainter valves as a unit for each individual gate system; (b) install all the downstream stop logs; 61/ and (c) remove the crest gate de-watering system 62/ prior to rewatering and delay the project schedule." PX 300. COR Eggburn did not explain why the Corps issued the new instructions. See Tr. at 696 (Macon) ("[The Corps] just said that . . . this is the new criteria

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60/ (Cont'd from page 57.)

> [t]he [Corps's] on-site representatives were aware of and in agreement with [the Joint Venture's] plans and at no time objected or stated any other consideration in order that we could address it prior to our planned re-watering date of December 18, 2003. Mr. Eggburn only voiced his concern for [the CGDS] . . . and was checking with [the Corps's] designers to see what conditions the system could withstand.

PX 300.

61/ The downstream stop logs "are approximately 13 pieces which were installed as a unit to form a downstream bulkhead for the removal of miter gates." Tr. at 686 (Macon). The Joint Venture had planned to install only two stop logs in order to demonstrate the stop logs' functionality, but Mr. Eggburn "directed [the Joint Venture] to install [all] of those stop logs instead of just two at that time." Tr. at 687 (Macon).

62/ The Joint Venture had installed the CGDS, but it was told by the Corps that the CGDS could not be submerged below certain water levels. See Tr. at 678 (Macon). According to Mr. Macon:

> [T]he [CGDS] consisted of several large key elements which had been assembled and were in place, and it was [the Joint Venture's] desire to leave those in place. It was designed to be installed in the water to isolate these crest gates, so [the Joint Venture] felt it wouldn't hurt anything to leave them in the water during re-watering.
>
> But when we were told we had to remove the [CGDS], that meant that [the Joint Venture] had to come in and disassemble it, and there were 20-30 large pieces of elements which had to be then disassembled, loaded on trucks, taken up out of the hole, and then stored and then put on a barge to be brought back in later, and then proceed with the wet testing.

Tr. at 679. Mr. Macon read the Contract specifications as not requiring that the CGDS be removed prior to rewatering. See Tr. at 679-80.

that [the Joint Venture] would have to test to."). The Joint Venture subsequently complied with the Corps's instructions. Tr. at 696 (Macon).

The Joint Venture's mechanical exercises during the fall of 2003 uncovered a problem with the miter gates. The miter gate cylinders are "large cylinders which were attached to the tops of the miter gates as well as the lock wall which open[] and close[] the miter gates." Tr. at 699 (Macon). When the cylinders open, the gates close, creating a "tight mited connection." Tr. at 702 (Macon). IHP identified a conflict between the Contract specifications and the Corps-approved drawings submitted by IHP. Whereas the specifications required the cylinder to extend or retract fully, i.e., "bottom out," the drawings specifically established a "proximity switch" trigger-point to prevent the cylinders from bottoming-out. See JX 1495; Tr. at 701-04 (Macon); Tr. at 2200-01 (Smith).

On December 18, 2003, the Joint Venture submitted to the Corps RFI 1027, which was IHP's request that the Corps clarify the settings for the miter gate cylinders. See JX 1495. RFI 1027 stated:

> The cylinders are manufactured per the approved shop drawings and Engineer's comments. IHP has installed the cylinders per the referenced specification paragraph. As the cylinders are currently installed the proximity switch on the head end of the cylinder will not actuate when the cylinder is in the recessed position.
>
> It appears [as] though there is a conflict between the contract plans and specifications. How should this conflict be resolved?

JX 1495 at GP0020009. The Corps's January 7, 2004 response overruled the specification and required IHP to adjust the cylinder ends to hit the proximity switch trigger-point and prevent the cylinders from bottoming-out. See JX 1495 at GP0020008; Tr. at 704 (Macon); Tr. at 2206 (Smith). IHP's remedial work was only a "[m]atter of days, not a long time," Tr. at 703 (Macon), but was required prior to dry-testing and rewatering, JX 1495 at GP0020008 ("The dry testing of the gates and controls shall not take place until after the above adjustments are made."); see also Tr. at 1561-62 (Barry Douglas ("Doug") Wolf, the Joint Venture's labor superintendent) (describing miter cylinder adjustments); Tr. at 2207 (Smith) (same).

Rewatering of the cofferdam began in mid-January 2004. However, the Joint Venture's continuing work in January 2004 revealed another problem—a "popping noise"

triggered by the movement of the crest gates. 63/ See Tr. at 271-72 (Herrick); Tr. at 705-06 (Macon); Tr. at 2208-09 (Smith). Mr. Smith was IHP's estimator and project manager at Montgomery Point and testified that IHP responded to the noise by "troubleshooting" the problem with Bosch Rexroth ("Rexroth"), the crest gate cylinder manufacturer. See Tr. at 2209 (Smith). IHP and Rexroth discovered "a hydraulic decompression of the piston caused by the system in total." Tr. at 2209 (Smith). Mr. Smith clarified: "What I mean by that is the location of the hydraulic power units due to the piping and location of the crest gate cylinders all contributed to a condition that caused the dew compression in the piston." Tr. at 2209-10.

In a January 22, 2004 letter to Mr. Macon, Mr. Clemans recommended a solution proposed by Harza; Harza's proposal proved ineffectual. See JX 1538; Tr. at 707-08 (Macon). IHP eventually solved the problem "by install[ing] some pressure reducing valves, [and] that was able to relieve decompression [and] therefore the gate could start moving without noise." Tr. at 2210 (Smith). Mr. Smith believed that, in the interim, rewatering was postponed. Tr. at 2218 (Smith); see Tr. at 708-13 (Macon) (testifying as to correspondence from Mr. Clemans placing a concomitant halt in rewatering, imposed January 22, 2004, and lifted February 5, 2004). Rewatering apparently began before the noise was eliminated fully. See JX 2097G (April 21, 2004 daily report stating that, although crest gate dry testing was complete, the popping noise had not been fully resolved); Tr. at 2239-40 (Smith) (testifying as to JX 2097G, indicating that crest gate adjustments did not affect rewatering); see also JX 1570 (Mr. Clemans's February 5, 2004 letter to the Joint Venture, stating: "Based on the conclusions over the origin of the mechanical noise and that a correction should not be too difficult . . . there appears to be no reason for delaying of rewatering . . . ."). A May 18, 2004 quality assurance report indicated that the popping noise had been corrected and that CGDS dry-testing was complete. See DX 561; Tr. at 3300-01 (Marvin Marcus Emmerling, a design electrical engineer with the Corps) (clarifying that only limited dry-testing was complete).

Mr. Smith recalled that the Corps blamed Rexroth, not Harza, for the noise. See Tr. at 2211-12. Nevertheless, he suggested that, because the noise was caused by the "system in total," it was a design flaw attributable to Harza. See Tr. at 2209-10. He testified about

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63/ Mr. Herrick described the pop-noise phenomenon:

> When [the Joint Venture was] doing the testing with the temporary power unit [the Joint Venture] would stand the [crest] gate all the way up, then when it came time to let it off, there would be a pop noise, it sounded like a gong kind of noise that sounded through the system.

Tr. at 272.

the hydraulic schematic provided by the Corps. See PX 607; Tr. at 2212-13. The schematic offers the following qualifier:

> The schematic provided and the components selected . . . are for general guidance only. The contractor shall be responsible for the final selection for addition of the components and for revising the schematic as necessary and as approved by the Little Rock District, to ensure proper operation as specified in the contractor documents. The basic loads, pressures, and flows are shown . . . . Any accumulators needed to absorb pressure pulsations in the system shall be added by the manufacturer as necessary.

PX 607 at sheet 1. IHP did not interpret this note to attribute design responsibility to Rexroth because of the schematic's conforming extensive detail, including its specificity in identifying components by model number. See Tr. at 2213 (Smith). However, the schematic lists some components to be selected by Rexroth and qualifies: "Model numbers may be incomplete. The final selection is the contractor's responsibility." PX 607 at sheet 3. Rexroth could deviate from the enumerated components only with the Corps's permission, which was not always granted. See Tr. at 2215-16 (Smith). Mr. Smith could not identify any pressure-reducing components—nor the source of the "popping" sound, see Tr. at 2219—in the schematic, and he testified that the pre-remediation crest gates had operated in precise accordance with the schematic, see Tr. at 2217.

Rewatering resumed. 64/ The Contract required the Joint Venture to wet-test the CGDS, which required "four [CGDS] setups and . . . established river elevations that listed when the work could be done, accomplished." 65/ Tr. at 2040 (Clemans); see Tr. at 714 (Macon); see also JX 36 (Contract Drawing No. 23/42, the CGDS installation procedure). Nevertheless, river levels impacted the Joint Venture's work on the CGDS. By letter dated March 8, 2004, Mr. Clemans advised the Joint Venture that certain support beams to the CGDS were not designed for "a maximum submergence under water elevation 123." 66/ See

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64/ On October 22, 2004, the Joint Venture submitted a certified claim to the Corps for site rewatering delays and damages. Stipulation filed Nov. 16, 2009, ¶ 3.

65/ Permitted water levels were different for each of the three major mechanical systems, i.e., the crest gates, miter gates, and tainter valves. See Tr. at 2085 (Clemans).

66/ Mr. Clemans's March 8, 2004 letter was intended as further explanation of why the Corps demanded the removal of the CGDS in December 2003. See Tr. at 698 (Macon); see also JX 1595 ("If we had agreed to leave the support beams in place with the water at a higher elevation, it would be very difficult to retrieve them if unforeseen circumstances caused it to rise even further.").

JX 1495. The river level, however, could be neither too high nor too low. Mr. Macon explained the Joint Venture's quandary:

> [T]he crossover beams could not be installed or be put into position where they would go into the water or be submerged above the 123 elevation. So you could only put the crest gate dewatering system in place during a window when the river was high enough to allow for traffic to pass through the locks. So you had to have conditions that were such that you could put the crest gate dewatering system in place but yet the traffic was still passing through the locks.

Tr. at 717.

The cofferdam was removed in June 2004. Meanwhile, river conditions continually delayed the Joint Venture's work on the CGDS. See Tr. at 2026-27 (Clemans) (acknowledging obstructing river conditions through December 2004). A June 22, 2004 letter from COR Eggburn to Mr. Macon documents the implications of the river conditions, as follows:

> Receipt of your letter COE 2216, dated June 7, 2004 is acknowledged. It appears that the river conditions[']effect on the crest gate dewatering structure wet testing could possibly impact your scheduled early completion date and, if so, we will evaluate any delays under the appropriate section of the Default Clause.

JX 1698. By letter dated June 28, 2004, to Contracting Officer Sandra Kay Easter, Mr. Clemans put the Corps on notice of the Joint Venture's delay-related costs. See PX 336 ("The crest gate dewatering structure became critical on May 13th, 2004."); Tr. at 719-20 (Macon). A July 30, 2004 letter from Mr. Clemans advised the Joint Venture:

> As I have addressed before, the Government acknowledges on the basis of your schedule, that the river stages are delaying the Crest Gate Dewatering Structure Wet Testing, which is the longest path to completion. Once river conditions allow the start of the wet testing, my office will evaluate the actual length of the delay and issue a time extension to adjust the current contract completion date of June 2nd, 2003. Retainage held in lieu of liquidated damages will then be adjusted.

JX 1726; see also Tr. at 2026-27 (Clemans) (discussing JX 1726). The Corps continued to withhold liquidated damages, but periodically suspended such withholding based on river and weather conditions. See Tr. at 2027, 2088 (Clemans).

By September 2004 the Joint Venture had started installing the CGDS. See Tr. at 722 (Macon) ("[W]e felt like the river levels were such that it would allow for the wet test of the [CGDS]."). Because river levels continued to rise, Mr. Clemans advised the Joint Venture by letter dated September 3, 2004 to remove the CGDS column clusters from the navigation paths, 67/ see JX 181; Tr. at 721-22 (Macon), and, by internal e-mail on the same date, Mr. Clemans advised other members of the Corps that "I'm growing increasingly pessimistic of the contractor's chances of successfully completing the required Crest Gate DW structure test setups required by the Contract," JX 1812; Tr. at 2029 (Clemans) (acknowledging "[i]t was a very wet year"). Mr. Clemans's e-mail informed the Corps:

> We waited all summer for suitable river conditions to begin the testing and the Contractor has barely started to initiate the first set up. . . . The contractor has 80 work days scheduled for this testing which requires two complete set ups and disassemblies of both sides. I don't know if it will reasonably take him 50 work days or 150 work days to do the testing.
>
> . . . .
>
> I think the District team needs to get together and be considering some sort of revised or exit strategy for what I fear is quickly becoming a very bad situation.

JX 1812. Mr. Clemans considered it to be "a very bad situation" because he anticipated additional complications during the winter's seasonal high water. See Tr. at 2030 (Clemans).

Mr. Clemans appears to have become increasingly concerned about whether the Joint Venture could comply with the Contract specifications. His September 28, 2004 e-mail to the Corps's secondary Contracting Officer, Darrel L. Johnson, stated:

> I'm getting pretty worried about this wet testing. Contractually I guess we can keep them there waiting to perform this test after all other work is done and

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67/ The Joint Venture complied with Mr. Clemans's September 3, 2004 instructions, but notified the Corps that the removal of the columns constituted a change to the Contract. See JX 1820; JX 1862; Tr. at 723 (Macon).

> claim it's a Default Clause issue. But I just know if it gets into Court they are going to say we unfairly placed all the burden of cost on the Contractor, even after all other work was complete, and didn't do anything to mitigate his damages. Lacking any other standard, I'm also afraid the courts will adopt [J.A. Jones's] 80 work day duration as gospel and . . . determine that if our specification isn't outright impossible, it's at least defective.

JX 1832. A letter sent by Mr. Johnson to Mr. Macon on October 5, 2004, directed the Joint Venture to perform the CGDS wet-testing "in accordance with the contract specifications and drawings, which provide guidance when this work may be accomplished." 68/ JX 1839. An October 6, 2004 letter from Mr. Clemans to the Joint Venture reiterated Mr. Johnson's instructions, but adjusted the water-elevation limits to permit work at higher water levels. See JX 1840 (permitting upstream work at elevation 125).

An October 19, 2004 letter from Mr. Clemans instructed the Joint Venture to continue with the CGDS test cycle, as modified by his October 6, 2004 letter. See PX 366; Tr. at 725-28 (Macon) (discussing PX 366). This directive also imposed what Mr. Macon referred to as "numerous restrictions not previously included in our contract"—particularly, lower and upper water-level limits, navigational pass requirements, support-beam submergence instructions, and a condensed test-cycle timeline. 69/ See JX 1862 (an October 25, 2004

68/ A September 27, 2004 e-mail from Mr. Clemans to Mr. Johnson attached a letter for Mr. Johnson's review and indicated: "Darrel, here is what I propose to send [J.A. Jones] on this." JX 1832. Mr. Clemans did not know whether Mr. Johnson's October 5, 2004 letter to Mr. Macon was the same letter that was attached to the September 27, 2004 e-mail. See Tr. at 2033. Moreover, Mr. Clemans's testimony was both equivocal and inscrutable regarding whether the Contract specifications to which Mr. Johnson's October 5, 2004 letter referred were the same specifications that Mr. Clemans's September 27, 2004 e-mail characterized as "outright impossible, . . . [or] defective." Mr. Clemans first testified that "I don't believe I'm referring to any specifications in my email." Tr. at 2037. Subsequently, he stated that his September 27, 2004 e-mail "could" have referred to the CGDS wet-testing specifications and perhaps implicated either the requirement to accomplish four setups/take-downs of the CGDS or to abide by the water-elevation requirements. See Tr. at 2037-39. He also attempted to confine his comments in the September 27, 2004 e-mail to reflect his concern that a court "possibly" would reach the conclusion that the specified duration for the CGDS wet-tests was impossible or defective. See Tr. at 2036, 2039.

69/ According to Mr. Macon, although the Joint Venture's approved schedule allotted a twenty-workday and twenty-eight-calendar-day test-cycle, the Corps was demanding the test-cycle's completion in seven workdays. See Tr. at 728; see also JX 1862.

letter from Mr. Macon to Ms. Easter discussing PX 366); PX 366; see also Tr. at 726 (Macon). Mr. Clemans testified that, although the Joint Venture attempted another CGDS setup, a "reverse river forecast" with rising water levels halted the work. See Tr. at 2041-42 (Clemans). As a result, Mr. Clemans stated in a November 16, 2004 e-mail to Mr. Johnson:

> I think the best approach would be to send a letter . . . informing the contractor that the set up work is being deleted from the contract and include [a notice to proceed and request for proposal] with it that provides for the deletion of work and requests their proposal for costs associated with the first set up effort and with off-loading and properly placing the material in storage.

JX 1896. With a notice to proceed issued on December 2, 2004, Mr. Johnson deleted the requirement to complete the CGDS wet-tests. 70/ JX 1924A.

In conjunction with their effect on the CGDS wet-testing, river levels complicated the Joint Venture's scheduled dredging, i.e., excavation, downstream of the Project's lock chamber. The Project's L-1 concrete monolith is downstream of the lock chamber and attaches to the downstream floating guidewall. In an October 15, 2004 letter to Mr. Macon, Mr. Clemans directed the Joint Venture to excavate to elevation 94 at monolith L-1, not elevation 75, and to cease any excavation below elevation 94. 71/ See JX 1852; Tr. at 729-30 (Macon) (explaining that less excavation was required); Tr. at 2045 (Clemans) (same). By letter dated October 21, 2004, Mr. Macon informed Ms. Easter that the Joint Venture considered the new dredging limits to be a change to the Contract. JX 1857; Tr. at 732 (Macon). An October 26, 2004 letter from Mr. Macon to Contracting Officer Easter sought additional instruction, explaining that the Joint Venture otherwise had been "instructed to cut off the sheet piling at monolith L-1 to an elevation of 78[, but] [t]his cutoff elevation is 16-

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70/ On February 7, 2008, the Joint Venture submitted a certified claim to the Corps for the deletion of the CGDS wet-testing. Stipulation filed Nov. 16, 2009, ¶ 4.

Plaintiffs seek the payment of the costs for the CGDS, less the bid amount of the wet-testing deleted by the Corps. The parties have stipulated that the bid amount for the CGDS wet-testing was $228,153.00. Stipulation filed Nov. 17, 2009, at 2.

71/ The October 15, 2004 letter confirmed an earlier verbal order from the Corps. See Tr. at 749 (Macon). Mr. Macon testified that it was "the practice that the Corps of Engineers would give . . . written confirmation of verbal orders." Tr. at 749.

feet below the final river bottom elevation [of elevation 94]." 72/ JX 1867; Tr. at 732 (Macon). Correspondence dated October 27, 2004, see JX 1872, and November 19, 2004, see JX 1902, respectively, from COR Eggburn to Robert Wittenberg, an employee of Project surety American Home Assurance Company, clarified the Corps's excavation instructions, see Tr. at 734-36 (Macon). Mr. Macon took the position that the Joint Venture was unable to proceed with the planned excavation around monolith L-1 prior to receiving Mr. Eggburn's November 19, 2004 correspondence.

Water levels continued to complicate the Joint Venture's work. A November 30, 2004 letter from Mr. Macon to Mr. Eggburn advised that high water prevented the Joint Venture's full excavation around monolith L-1 and that the Corps's "delay in defining the parameters of the [excavation] around L-1 [had] prevented Fru-Con from doing this work under more favorable conditions." JX 1912. Following the Corps's directive changing the dredging to elevation 94, Luhr Bros. planned to excavate fully around monolith L-1 with a Leibherr excavator (the "Leibherr"), see JX 1912 at GP0023908, but rising water levels prevented the Leibherr from reaching the bottom excavation levels, see Tr. at 738-40 (Macon). Consequently, the Joint Venture performed the work using a crane and clamshell. 73/ Tr. at 740-41 (Macon); see also Tr. at 1565-66 (Wolf) (describing Joint Venture's excavation work). According to Mr. Wolf, the delayed downstream excavation stalled the placement of the floating guidewalls. See Tr. at 1567; see also Tr. at 2059 (Clemans) (testifying that downstream floating guidewall was installed in December 2004).

72/ Mr. Macon explained the placement of the sheet piling:

> We had installed sheet pile in that area around L-1 prior to the construction of the pier. And that sheet piling extended out to an elevation above water level . . . so that we could construct that pier in the dry. So we constructed the pier in the dry, now we're to the point where we have to cut off that sheet piling and then put in the stone protection around it in preparation of setting the downstream floating guidewall.

Tr. at 733.

73/ On September 8, 2008, the Joint Venture submitted a certified claim to the Corps for revisions to the downstream excavation limits. Stipulation filed Nov. 16, 2009, ¶ 5.

The Joint Venture's work continued. 74/ The Corps's records indicate that high water levels interfered with crest gate testing from October 2004 through July 2005 and that revetment work concurrently was delayed from December 2004 through May 2005. See PX 362; Tr. at 3305-08 (Emmerling). By letter dated December 17, 2004, Mr. Macon declared the Joint Venture's intention to wet-test—in accordance with the Contract specifications—on December 20, 2004, the miter gates and tainter valves, see JX 1943, but the Joint Venture was unable to complete the tests, see Tr. at 2089-90 (Clemans). On June 10, 2005, the Joint Venture finished wet-testing the miter gates and tainter valves, respectively, see JX 1984; Tr. at 2098 (Clemans), despite high water that continued to interfere with crest gate wet-testing, see Tr. at 2137-38 (Clemans) (acknowledging that the "crest gates had the lowest river level for testing"). On that same date, Luhr Bros. was able to perform necessary revetment work. 75/ See JX 1984; Tr. at 2137-38 (Clemans). Shortly thereafter, the Corps declared that June 13, 2005, was the date of Montgomery Point's substantial completion. 76/ See JX 2002. Although crest gate wet-testing was outstanding, after this date the Corps no longer withheld liquidated damages. See Tr. at 2145 (Clemans). The Joint Venture concluded wet-testing the crest gates in August 2005. See JX 1998; Tr. at 2101, 2139 (Clemans). A

74/ From December 2004 through July 2005, IHP and Plateau remained on-site, and the Joint Venture was "[c]ompleting the punchlist":

> We had to do some painting. . . . There was some concrete patchwork we had to do. They had to put this coating, paneling type thing inside the control tower, we were putting that in; just punchlist stuff. It's hard to explain. Just a little bit of this, a little bit of that.

Tr. at 1567-68 (Wolf).

Correspondence dated from the end of 2004 and beginning of 2005 documents the Joint Venture's progress toward completing the final wet-tests of the mechanical equipment and the Corps's complaints regarding what it perceived as the Joint Venture's untimely work. See JX 1943; JX 1961; Tr. at 2088-92 (Clemans).

75/ The Project's order of work identified the revetment work to be completed prior to the installation of the guidewalls. See DX 38; Tr. at 2058-60 (Clemans).

76/ By letter dated October 18, 2005, COR Eggburn notified the sureties: "The access road and revetment work was completed as of June 13, 2005, and this date is considered as substantial completion. Most of the contract-required testing and punchlist items have been completed with the exception of a few issues of which we are still in disagreement." JX 2002.

September 29, 2005 memo from the Corps recognized the impact of high water levels on the Joint Venture's wet-testing and revetment work from December 2004 through May 2005. PX 414.

On September 18, 2008, the contracting officer issued the Contracting Officer's Final Decision of substantial completion, calculating 541 days of unexcused delay and liquidated damages of $3,513,254.00, i.e., 541 days at $6,494.00/day. PX 438.

8. IHP claim

Plaintiffs contend that IHP, the Joint Venture's mechanical-systems subcontractor, similarly was impacted by the events hereinbefore described. See Tr. at 2191 (Smith) ("The progress of the mechanical subcontractor . . . depended upon the progress of the general contractor."). IHP had submitted certified claims for costs and delays as part of the Joint Venture's claims for concrete deficiencies and the labor shortage, supra note 44; the control tower column and embedded plate, supra note 54; and site rewatering, supra note 64, respectively (together, the "IHP claim"). See Tr. at 2190 (Smith) ("[T]here was a concrete mix design delay, I believe, and control tower column delay, some labor productivity, and re-water claim."). Mr. Smith testified as to the IHP claim and as to the component elements of IHP's damages—increased wages, prolonged equipment costs and supervision, field and home office overhead, and profit. See Tr. at 2193-98. The IHP claim is based on the same number of days of delay allegedly suffered by the Joint Venture, hewing to the same delay analyses and revisions performed by plaintiffs and Francis A. McDonough, plaintiffs' critical path and scheduling expert. See Tr. at 2191, 2241 (Smith).

PROCEDURAL HISTORY

Fireman's Fund, American Home Assurance Company, Fidelity and Deposit Company of Maryland, and Universal Underwriters Insurance Company ("plaintiffs") filed their original complaint on November 19, 2004. A first amended complaint followed, filed on January 8, 2007. Consolidated with plaintiffs' action on October 17, 2008, were three related cases (Nos. 08-782C, -783C & -784C) that had been pending before the ASBCA, i.e., the Board claims. The Board claims involved claims originally submitted to the cognizant contracting officer for costs and delays relating to the control tower's construction, site rewatering, and CGDS testing, respectively. After the contracting officer failed to issue a final decision on these claims within sixty days as required by 41 U.S.C. § 605(c) (2006), plaintiffs appealed to the ASBCA.

Plaintiffs subsequently filed in the United States Court of Federal Claims Plaintiffs' Second Amended Complaint on December 1, 2008, seeking relief on the following eight

counts: (1) Count I, a concrete mix design claim alleging changes and a breach of implied warranty of specifications/defective specifications; (2) Count II, a labor shortage claim alleging breaches of the implied duty of good faith and fair dealing and the implied duty of cooperation and non-interference, respectively; (3) Count III, for the labor shortage claim, an allegation of constructive change; (4) Count IV, for the labor shortage claim, an allegation of non-disclosure of superior knowledge; (5) Count V, a control tower claim alleging changes, breach of contract, and a breach of the implied duty of good faith and fair dealing; (6) Count VI, a site rewatering claim alleging breach of contract, changes, and breach of the inspection of construction clause; (7) Count VII, a CGDS claim alleging changes, breach of contract, defective specifications, and a breach of the implied warranty of specifications; and (8) Count VIII, a claim for revisions to downstream excavation limits alleging changes. On January 6, 2009, the court granted plaintiffs' unopposed motion to amend the second amended complaint. Plaintiffs' Second Amended Complaint became Plaintiffs' Third Amended Complaint. On December 19, 2008, the court granted Plaintiffs' Unopposed Motion Regarding Parties, dismissing as plaintiffs the Joint Venture and joining as plaintiffs all of the sureties for Montgomery Point's construction. On March 25, 2009, defendant filed by leave of court an answer to the third amended complaint and a setoff for liquidated damages owed by plaintiffs for unexcused delay.

The parties filed two dispositive motions. The first was filed on April 30, 2009—Defendant's Motion To Dismiss Counts II, III and IV, and, in the Alternative, Defendant's Motion for Summary Judgment Regarding Counts II, III and IV. On May 21, 2009, the court entered a speaking order, granting defendant's motion to dismiss Counts III (constructive change) and IV (superior knowledge) of the third amended complaint, but reserving for this opinion a full discussion of the grounds for dismissal. Given the length of this opinion, the court rests on its May 21, 2009 order as sufficiently dispositive of the issues that it addressed. The May 21, 2009 order also denied defendant's motion to dismiss or for summary judgment with respect to Count II (implied duty not to hinder performance), stating that it would more fully explore Count II in fact-finding following trial.

On July 31, 2009, at the parties' request, the court entered another order in a series of postponements of trial—this one until November 2, 2009, to afford defendant the opportunity to file a counterclaim. On August 4, 2009, defendant filed Defendant's Motion for Leave To File Amended Answer, First Setoff and First Counterclaim, which the court granted on September 1, 2009. Defendant's August 4, 2009 filing is identical to its March 25, 2009 filing but for the addition of defendant's counterclaim. Defendant's counterclaim alleges that Mr. Clemans's fall 2003 waiver of dry-testing requirements for the crest gates, miter gates, and tainter valves to allow early site rewatering shortened the period of contract performance by many months. Defendant represented that, pursuant to RCFC 13(e), its "counterclaim did not mature until the contracting officer issued a final decision on July 23, 2009." Def.'s Br.

filed Aug. 4, 2009, at 1. The contracting officer's final decision calculated a $9,204,480.00 reduction in the contract price owed by plaintiffs on account of the reduced period of performance.

The second dispositive motion, Plaintiffs' Motion for Summary Judgment on Defendant's First Counterclaim, was filed on October 5, 2009. Plaintiffs argued that the contracting officer's July 23, 2009 final decision was not the product of independent judgment and should be considered a nullity. Plaintiffs derided defendant's claimed damages as wholly speculative and its late-filed counterclaim as untimely and prejudicial. By order entered October 13, 2009, at defendant's request, due to the imminence of trial, the court suspended briefing on this motion, reserving all issues raised by plaintiffs' motion for trial.

Plaintiffs filed six motions *in limine* to admit, exclude or limit evidence or testimony, respectively: (1) on July 13, 2009, To Admit the Expert Rebuttal Report of Billy D. Neeley; (2) on July 15, 2009, To Exclude Evidence Regarding Extra-Contractual Considerations in the Selection of Concrete Materials by the Joint Venture; (3) on July 15, 2009, To Exclude the Testimony of Thomas C. Caruso [defendant's scheduling expert] on Labor Shortage Issues; (4) on July 15, 2009, To Exclude Defendant's Proposed Summary Exhibits; (5) on July 22, 2009, To Admit Deposition Transcripts of Terry Lynn Steuart and Carolyn J. Steuart; and (6) on October 26, 2009, To Interpret the Takeover Agreement Regarding Damages Recoverable by the Plaintiffs in This Action.

Plaintiffs' first motion concerned an expert report prepared by Mr. Neeley, the Corps employee responsible for Montgomery Point's concrete mix design. On account of Mr. Neeley's inability to testify due to his poor health, defendant, by a July 13, 2009 unopposed motion *in limine*, see infra, moved to introduce at trial Mr. Neeley's deposition testimony from December 16, 2008, through December 18, 2008. See RCFC 32(a)(4)(C). Plaintiffs, unable to depose Mr. Neeley a second time after production of his expert report, filed their motion to request that Mr. Neeley's expert report also be admitted into evidence. Plaintiffs relied on Fed. R. Evid. 702, the objective of which is to assist the trier of fact in understanding evidence, and Fed. R. Evid. 807, the residual exception to the rule against hearsay. See Order entered July 30, 2009, at 1-2. By order entered July 30, 2009, plaintiffs' motion was granted insofar as Mr. Neeley's report covered topics discussed in Mr. Neeley's deposition, but otherwise was denied. The court agreed with defendant that, "[b]ecause Mr. Neeley is unavailable to explain any differences between his testimony by deposition and his subsequent report, any further differences would confuse the factfinder." Id. at 3. Cases cited as support by plaintiffs were distinguishable. See id. (distinguishing Kerns v. Pro-Foam of S. Ala., 572 F. Supp. 2d 1303, 1312 (S.D. Ala. 2007); House v. Combined Ins. Co. of Am., 168 F.R.D. 236, 249 (N.D. Iowa 1996); Tecom, Inc. v. United States, 86 Fed. Cl. 437, 442 (2009); George Sollitt Constr. Co. v. United States, 64 Fed. Cl. 229, 235 n.3 (2005)).

Mr. Neeley's report was not admissible under the residual hearsay exception, but could be used in questioning plaintiffs' concrete expert, Dr. Carrasquillo, insofar as it was not offered for the truth of the matter asserted and may have been relied upon by Dr. Carrasquillo. See id. at 3-4.

Plaintiffs' second motion sought to exclude any extra-contractual evidence relating to the reasons and motives behind the Joint Venture's decision to select certain raw materials for the concrete mixture, the Joint Venture's knowledge of the characteristics of the different raw materials, and any alleged warnings by the Corps to the Joint Venture about using manufactured sand. Plaintiffs characterized this evidence as irrelevant because any construction delays that occurred resulted directly from the Corps's breach of the Contract's design specifications. See Fed. R. Evid 402 (stating that all relevant evidence is admissible except as otherwise provided). The parties sparred over how the Contract assigned responsibility for concrete mixtures—particularly whether the concrete specifications were design specifications or performance specifications. See Order entered July 29, 2009, at 2. The court considered the relevant Contract provisions cited by plaintiffs—Contract section 03305, specifications 1.3.1.1, 2.1.1.2, 2.1.5.1, 2.1, 2.1.5.3, and 2.2.2—and the instruction of the United States Court of Appeals for the Federal Circuit that the court, when assessing design specifications against performance specifications, should examine the amount of discretion that the specifications afforded to the contractor. See id. at 2-3 (citing Blake Constr. Co. v. United States, 987 F.2d 743, 745 (Fed. Cir. 1993)). The court ruled that the specifications at issue contemplated both design and performance characteristics and that the contested extra-contractual evidence would inform the court's fact-finding. By a speaking order entered July 29, 2009, the court denied plaintiffs' motion.

Plaintiffs' third motion attacked the competence of defendant's scheduling expert Mr. Caruso to testify as an expert on labor shortage issues. See Fed. R. Evid. 702. Defendant responded that Mr. Caruso would not testify as an expert to define the labor market or to evaluate the cause of the alleged labor shortage at Montgomery Point, but that his testimony would be confined to certain labor compilations as summary exhibits pursuant to Fed. R. Evid. 1006. Defendant stated that Mr. Caruso oversaw the compilation of data from the payroll databases for Montgomery Point and Pine Bluff. Accordingly, by order entered July 30, 2009, the court granted plaintiffs' motion.

Plaintiffs' fourth motion challenged four of defendant's proposed summary exhibits (DX 1130, DX 2260, DX 2270, DX 2620) as failing to meet the requirements of Fed. R. Evid. 1006 insofar as they inaccurately reflected the underlying documents. The court considered the preconditions for justifying a summary exhibit as set forth in United States v. Bray, 139 F.3d 1104, 1109-10 (6th Cir. 1998) (citations omitted) (internal quotations omitted): (1) the documents must be so "voluminous" that they "cannot conveniently be

examined in court" by the fact-finder; (2) the proponent of the summary exhibit must make the underlying documents available to opposing counsel "at a reasonable time and place"; (3) the underlying documents are admissible evidence; (4) the summary evidence accurately reflects the underlying documents; and (5) the proponent of the summary should "lay a proper foundation" for its admission at trial through "the testimony of the witness who supervised its preparation." Defendant withdrew its proffer of one challenged exhibit (DX 1130) and eliminated the objectionable material from another (DX 2620). Regarding the other two (DX 2260, DX 2270), which defendant proffered for purposes of illustrating labor movement from Montgomery Point to Pine Bluff, the court ruled that plaintiffs could not exclude the summaries as inaccurate by their motion *in limine*, but could renew their objections during *voir dire* of the exhibits after defendant laid a foundation. By order entered July 31, 2009, the court denied as moot plaintiffs' motion as to DX 1130 and DX 2620 and denied without prejudice plaintiffs' motion as to DX 2260 and DX 2270.

Plaintiffs' fifth motion sought the admission of deposition transcripts of Terry Lynn Steuart and Carolyn J. Steuart, employees of the Corps who worked at both Montgomery Point and Pine Bluff. The Steuarts had retired from the Corps and had unexpectedly relocated to Afghanistan. Defendant did not object to the admission of their deposition transcripts, and by order entered July 23, 2009, the court granted plaintiffs' motion. Their testimony was germane to plaintiffs' attempt to show the impact of the Raytheon REA on labor productivity.

Plaintiffs' sixth motion requested that the court interpret the Takeover Agreement to impose "no monetary cap on plaintiffs' recovery, based on the Sureties' net expenditures in completing [Montgomery Point], that Plaintiffs cannot exceed." Pls.' Mot. filed Oct. 26, 2009, at 1. Acknowledging the late filing of their sixth motion, plaintiffs pleaded that defendant had introduced the issue by mentioning a possible referral to the Civil Fraud Section of the United States Department of Justice. See id. at 1. Plaintiffs' interrogatory responses had revealed a net expenditure of $19,103,967.00, and defendant interpreted the Takeover Agreement to cap plaintiffs' recovery at that amount. See id. at 2. In relevant part, the Takeover Agreement provided:

> Except to the extent of the Sureties' equitable rights, including but not limited to the Sureties' rights to be subrogated to the Government's right of offset, the Sureties shall not be paid any amounts in excess of their total expenditures necessarily made in completing the work and discharging their respective duties under the Bonds.

JX 1657 at GP0021580.

On October 22, 2009, defense counsel asserted that plaintiffs should amend the complaint to reflect the $19.1 million cap and that plaintiffs' claim for recovery in excess of $19.1 million was tantamount to fraud. See id. at 2. According to defendant, the damages estimate (approximately $33 million) calculated by plaintiffs' damages expert Jeffrey E. Fuchs ensured a $13.7 million windfall to plaintiffs. See Def.'s Resp. filed Oct. 27, 2009, at 1. Plaintiffs argued that Mr. Fuchs's $33 million calculation of damages properly included the claims that plaintiffs inherited from the Joint Venture—claims reserved by the Takeover Agreement. See Pls.' Mot. filed Oct. 26, 2009, 4-6. By order entered October 29, 2009, the court granted plaintiffs' motion for reasons stated from the bench during the pretrial conference held on October 28, 2009. While reserving a fuller discussion for this opinion, the court concluded:

> The Takeover Agreement provides a monetary cap on actual expenses by the sureties for work discharged in performing and completing the contract and in pre-takeover performance activities on behalf of the joint venture; the Takeover Agreement does not provide a cap on the amounts recoverable for claims that the joint venture assigned to plaintiffs, which assignment has been accepted by the United States.

Order entered Oct. 29, 2009, ¶ 3. Upon reflection and in view of the length of this opinion, the court's reasoning in the October 29, 2009 bench ruling is sufficient.

Defendant filed twelve motions *in limine* to admit or exclude evidence or testimony, respectively: (1) on November 11, 2008, To Admit Raytheon Spreadsheet; (2) on March 31, 2009, To Admit Five Summaries; (3) on July 9, 2009, To Exclude Testimony of Francis A. McDonough on Labor Shortage Issues; (4) on July 13, 2009, To Exclude New Expert Opinions; (5) on July 13, 2009, To Admit [Billy D.] Neeley Deposition; (6) on July 15, 2009, for an Order Ruling That Plaintiffs' Proposed Summary Exhibits Prepared by Prof. Peter [W.] Philips [plaintiffs' labor expert] Are Inadmissible; (7) on July 15, 2009, for an Order Ruling That Plaintiffs' Proposed Summary Exhibits Prepared by Francis A. McDonough Are Inadmissible; (8) on July 15, 2009, for an Order Ruling That Plaintiffs' Proposed Summary Exhibits Prepared by Jeffrey E. Fuchs Are Inadmissible; (9) on July 15, 2009, for an Order Ruling That Plaintiffs' Proposed Summary Exhibits 52 and 179 Are Inadmissible; (10) on July 16, 2009, To Exclude Testimony of Francis A. McDonough Regarding Claims Relating to Subcontractor IHP Industrial, Inc.; (11) on October 16, 2009, To Exclude Testimony Regarding the Counterclaim by Any Expert Testifying for the Plaintiffs; and (12) on October 16, 2009, To Admit Summary Exhibit 3000.

Defendant's first motion sought to admit an electronic record of Raytheon's employees at Pine Bluff as a business record under Fed. R. Evid. 803(6). The record is a

spreadsheet recording approximately 3,500 employees who worked on the Pine Bluff contract. It was produced by Raytheon to plaintiffs' counsel, who subsequently turned it over to defendant. Plaintiffs did not object to its admission, and, by order dated December 3, 2008, the court granted defendant's motion. Defendant's second motion sought to admit five summary exhibits based upon admissible business records. Defendant later withdrew this motion, which the court denied as moot on April 16, 2009.

Defendant's third motion challenged the qualifications of Mr. McDonough to testify for plaintiffs as an expert on labor markets and sought to exclude his testimony on labor shortage issues. Plaintiffs anticipated that Mr. McDonough would utilize a critical path analysis to prove that Corps-caused labor shortages were responsible for delay at Montgomery Point. Defendant contended that any of Mr. McDonough's testimony regarding the definition of the labor market, causation of the alleged labor shortage, and increased costs derived from the labor shortage would entail his opinion on labor market-related principles that would not be "the product of reliable principles and methods" and would therefore be inadmissible under Daubert v. Merrell Dow Pharmaceuticals, Inc., 509 U.S. 579 (1993), and Fed. R. Evid. 702. Defendant also characterized Mr. McDonough as a construction schedule expert, not a labor expert, and argued that his testimony should be limited to project delay matters. Plaintiffs conceded that, although Mr. McDonough would rely on a critical path analysis to support his opinions on the labor shortage at Montgomery Point, they would not be offering Mr. McDonough as an expert on labor market definitions or costs, causation of the labor shortage, wage-rate increases, or the relevant labor market. On July 30, 2009, the court granted defendant's motion insofar as Mr. McDonough's testimony was to observe the limitations agreed to by plaintiffs.

Defendant's fourth motion followed plaintiffs' service of a second set of expert reports, labeled "supplemental reports" by plaintiffs, on May 29, 2009, the date on which discovery closed. During oral argument on May 18, 2009, regarding defendant's motion to dismiss and for partial summary judgment, the court had indicated that, in light of defendant's arguments and plaintiffs' evidentiary burden, it "'would be inclined to allow [plaintiffs] to make the adjustments [to their expert reports] that [the plaintiffs had been] discussing.'" Order entered July 29, 2009, at 1 (quoting Transcript of Proceedings, Fireman's Fund Ins. Co., *et al.* v. United States, Nos. 04-1692C, 08-782C, -783C & -784C, at 71 (Fed. Cl. May 18, 2009)). A speaking order entered on May 21, 2009, reminded plaintiffs of their burden of proof. In its motion *in limine*, defendant complained that plaintiffs' supplemental reports went beyond the scope of plaintiffs' original expert reports and imposed an unfair burden on defendant. The court found that the experts had been re-deposed by defendant and that, although the supplemental reports contained new analyses, the supplemental reports did not present new data or work by experts to analyze new data; therefore, allowing the supplemental reports to be considered at trial would not be unfair to

defendant and would not delay the most recently scheduled trial date. By order entered July 29, 2009, the court denied defendant's motion.

Defendant's fifth motion—to admit the deposition testimony of Mr. Neeley on account of his poor health—was unopposed by plaintiffs and was granted on July 13, 2009. Defendant's sixth motion concerned forty-one proposed summary exhibits prepared by plaintiffs' labor expert Prof. Philips and sought to exclude a subset of these exhibits that included breakdowns of the employees at Montgomery Point and Pine Bluff. Plaintiffs insisted that the thirteen challenged exhibits merely summarized underlying documents, and therefore qualified as summary exhibits under Fed. R. Evid. 1006. Defendant responded that the exhibits were inadmissible hearsay because they were inaccurate and presented analyses, opinion, and argument. By order entered July 31, 2009, the court granted defendant's motion as to one exhibit, PX 112, insofar as it admittedly depended on a database created by plaintiffs' damages expert Mr. Fuchs and represented Prof. Philips's analysis thereof. The court noted that defendant's objections as to the accuracy of PX 112 would go to the weight accorded the exhibit if plaintiffs sought to introduce it through Mr. Fuchs, but that significant inaccuracies would prevent its admission as a summary or any representation of it. To the extent PX 112 was a pedagogical/demonstrative exhibit admitted to illustrate or understand Prof. Philips's trial testimony, any inconsistencies would go to the weight to be accorded his testimony. See Bray, 139 F.3d at 1111-12 (summaries or charts used as pedagogical devices or illustrative aids which organize or aid jury's examination of testimony or documents in evidence may "in appropriate circumstances" also be admitted in evidence although not within specific scope of Rule 1006). Defendant's motion was denied without prejudice as to the other challenged summaries.

Defendant's seventh motion contended that multiple summary exhibits prepared by Mr. McDonough did not comply with Fed. R. Evid. 1006, as they were not "'objective summaries of voluminous, admissible documents, but instead present[ed] portions of Mr. McDonough's analysis, opinion and argument.'" Order entered July 31, 2009, at 1 (No. 174) (quoting Def.'s Mot. filed July 15, 2009, at 11 (No. 130)). Plaintiffs agreed to withdraw two of the challenged exhibits. Regarding the remainder, the court incorporated its analysis from its order discussing defendant's sixth motion and ruled that the summaries were classic pedagogical/demonstrative exhibits. Accordingly, by order entered July 31, 2009, the court denied defendant's motion as moot regarding the two withdrawn exhibits and granted defendant's motion insofar as plaintiffs proffered the remainder as summaries under Fed R. Evid. 1006. The court allowed the admission of the latter pedagogical/demonstrative exhibits in aid of expert testimony.

Defendant's eighth motion objected that a number of Mr. Fuchs's prepared summaries were "'not mere summaries of voluminous documents [in accordance with Fed. R. Evid.

1006], but, rather, present[ed] the analysis, expert opinion and argument of [plaintiffs] and [their] experts, including Mr. Fuchs.'" Order entered Aug. 4, 2009, at 1 (No. 179) (quoting Def.'s Mot. filed July 15, 2009, at 5 (No. 131)). In response, plaintiffs withdrew their proffer of two of the challenged exhibits, replaced eight of the challenged exhibits with schedules that originally were included with Mr. Fuchs's expert report, and otherwise contested defendant's motion to exclude. By order entered August 4, 2009, the court incorporated its analysis from its order discussing defendant's sixth motion and denied defendant's motion as moot regarding the two withdrawn exhibits. The court granted defendant's motion as to the exhibits replaced as schedules; these were not Rule 1006 summaries, but, instead, were pedagogical/demonstrative exhibits. The court otherwise denied defendant's motion without prejudice subject to qualification of the remaining exhibits as primary-evidence summaries.

Defendant's ninth motion addressed two of plaintiffs' proposed summary exhibits. Plaintiffs proffered summary exhibit 52, prepared by Dr. Carrasquillo, as a summary and timeline of key events relating to its concrete mix design claim. Defendant characterized this exhibit "'as an inherently argumentative determination' of the events that Dr. Carrasquillo subjectively view[ed] as 'important enough to present.'" Order entered Aug. 4, 2009, at 1 (No. 180) (quoting Def.'s Mot. filed July 15, 2009, at 5 (No. 132)). The court ruled that summary exhibit 52 was admissible as a demonstrative exhibit, but it did not qualify for admission under Fed. R. Evid. 1006. Defendant also attacked summary exhibit 179—submitted by plaintiffs as a "'summary of bid man hours related to concrete and metals (Division 85 and 86, respectively),'" id. (quoting Pls.' Resp. filed July 21, 2009, at 3 (No. 156))—as an inaccurate representation of the underlying documents and therefore inadmissible under Rule 1006. The court ruled that plaintiffs must lay a foundation before the proposed exhibit would be admitted into evidence and that defendant could renew its objection following plaintiffs' identification of this summary at trial. After incorporating its analysis from its order discussing defendant's sixth motion, the court granted defendant's motion regarding exhibit 52 and otherwise denied defendant's motion without prejudice.

Because plaintiffs were sponsoring a pass-through claim by IHP for additional work relating to the concrete mix design and the Board claims, plaintiffs sought to have Mr. McDonough testify as to his analysis regarding the cause of delays impacting the work of IHP on Montgomery Point. Defendant's tenth motion argued that, under Fed. R. Evid. 702, Mr. McDonough's underlying analysis of delays incurred by IHP was "not a 'product of reliable principles and methods' and that Mr. McDonough [had] not applied those principles and methods reliably to the facts of this case." Order entered July 30, 2009, at 1 (No. 171) (quoting Def.'s Mot filed July 16, 2009, at 2). The court recognized the requirements of Fed. R. Evid. 702 and noted the court's inherent responsibility to exclude irrelevant or unreliable expert testimony. See Micro Chem., Inc. v. Lextron, Inc., 317 F.3d 1387, 1391 (Fed. Cir. 2003). Plaintiffs assured that Mr. McDonough would not offer a delay estimate for IHP

based solely on facts relating to the critical path delay impact to the Joint Venture; rather, Mr. McDonough would analyze the overall delays and then discern from those facts the events that directly impacted IHP. Accordingly, the court denied defendant's motion but acknowledged that defendant had previewed objections that could go to the weight to be accorded Mr. McDonough's testimony at trial.

The IHP claim ultimately was presented at trial by Mr. Smith, who either attached the IHP claim to the progress of the general contractor (the concrete mix design and labor shortage claims) or did not have an adequate recollection of the specifics (the Board claims). Mr. McDonough did no more than say that his views on the critical path applied to IHP when its activities were involved. IHP never made out its case.

Defendant's eleventh motion sought to exclude any expert testimony offered by plaintiffs regarding defendant's counterclaim because plaintiffs declined to provide in advance of trial a statement disclosing such testimony. Defendant's twelfth (and final) motion sought to admit defendant's summary exhibit 3000—a chart detailing the daily number of on-site workers provided by each of the three key subcontractors at Montgomery Point during the 2003-2005 period relevant to defendant's counterclaim. According to defendant, evidence regarding the quantity of on-site subcontractor employees from 2003-2005 was relevant to the court's consideration of the time and cost saved by Mr. Clemans's waiver of dry-testing requirements prior to Montgomery Point's rewatering. By order entered October 29, 2009, the court granted defendant's eleventh motion insofar as plaintiffs represented that they proffered no additional expert testimony on the issues raised in the counterclaim. By the same order, the court deferred a ruling on defendant's twelfth motion until the exhibit was offered into evidence.

DISCUSSION

I. Jurisdiction under the Contract Disputes Act of 1978, 41 U.S.C. §§ 601-13 (2006) (the "CDA")

After trial concluded and while the case was under advisement, defendant filed on March 19, 2010, Defendant's Motion To Dismiss Claims Arising Prior to June 9, 2004. Briefing on this opposed motion concluded on May 7, 2010. The ballast for this surprise motion apparently was a case eponymously styled Fireman's Fund Construction Co. v. England, 313 F.3d 1344, 1352 (Fed. Cir. 2002), which disclaimed jurisdiction under the CDA over claims brought by a surety that arose prior to its takeover agreement from a defaulting contractor. The gloss on this precedent that defendant advances in the case at bar is that plaintiffs are not a "contractor" for purposes of the CDA because plaintiffs did not assume, without reservation, all of the contractual liabilities of the Joint Venture when the Joint

Venture assigned its pre-Takeover Agreement claims to plaintiffs on June 9, 2004. 77/ The consequence portended by defendant is that "there is no evidence in the record that the joint venture was free from the bankruptcy stay to become the subject of a Government counterclaim when the initial action was filed in November 2004." Def's Br. filed Mar. 19, 2010, at 10.

While the court appreciates, and plaintiffs benefit from, the opportunity to address at the trial level a late-breaking jurisdictional epiphany, examination of defendant's challenge reveals it to be a tautology that, if accepted, would undermine the finality of a valid assignment of claims accepted by the Government on March 25, 2004, and approved by the United States Bankruptcy Court for the Western District of North Carolina on June 9, 2004. See supra note 50. Defendant does not assert the Anti-Assignment Act, 31 U.S.C. § 3727(a)(1) (2006), as a defense. See Def.'s Br. filed May 7, 2010, at 1. Thus, defendant does not argue that the bankruptcy court approved anything other than a full and valid assignment of claims against the United States. Instead, defendant interprets the definition of "successor in interest," per Black's Law Dictionary 1473 (8th ed. 2004), to require that the status of a successor in interest cannot be perfected unless rights retained are unchanged in substance, i.e., carry with them all liabilities. Defendant therefore perceives a gap in the assignment of claims that renders plaintiffs less than a contractor that is authorized to bring a claim under the CDA. See 41 U.S.C. § 601(4) (defining "contractor" as "a party to a Government contract other than the Government"); § 609(a)(1) (authorizing a "contractor" to bring an action in the Court of Federal Claims).

Defendant overlooks the significance of the assignment. The bankruptcy court confirmed that the Government retained all defenses:

> ORDERED, ADJUDGED and DECREED that the United States Government (the "Government") has expressly consented to the assumption set forth herein; provided, however, that nothing in this Order shall constitute a waiver of any claims, rights, or defenses of the Government pursuant to the Contract, the Takeover Agreement, any bonds issued pursuant to the Contract, and applicable law, or in any other way prejudice or adversely affect any claims, rights, or defenses, including the right of setoff or recoupment, that the Government might have against FFIC [Fireman's Fund], the Debtor, the

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77/ As hereinbefore discussed, although defendant fixates on June 9, 2004, the date on which the bankruptcy court approved the assignment of the Contract, the bankruptcy court's order made the Takeover Agreement retroactive to the date on which the parties signed it, i.e., March 25, 2004.

> Debtor's estate, or any other person, including, without limitation, the Government's defenses or right to assert any claims against the original contractor or defenses against all claims of the original contractor arising under the Contract or in connection with the performance of the Contract, including claims relating to periods prior to the date of the Takeover Agreement; . . .

Pls.' Br. filed Apr. 26, 2010, at A32-33. Moreover, even if the bankruptcy court had not enshrined the scope of the agreement in a court order, the claims that were assigned did not shed their capacity to be litigated fully in the Court of Federal Claims, which rendered them amenable to the assertion of a valid counterclaim just like the one that defendant has asserted. See RCFC 13(a)(1)(A) ("A pleading must state as a counterclaim any claim that . . . arises out of the transaction or occurrence that is the subject matter of the opposing party's claim . . . ."); see also 41 U.S.C. § 605(a) ("All claims by the government against a contractor relating to a contract shall be the subject of a decision by the contracting officer."). Unless the Government wants to begin shedding its rights with respect to a claim validly retained by the Government in an assignment of claims accepted by the Government consistent with the Anti-Assignment Act, defendant should be not heard to argue that a validly assigned claim is not subject to a compulsory counterclaim. In short, assignment of a claim carries with it exposure to all liabilities associated with that claim, unless specifically excepted from the assignment, and such a restricted purported assignment would not be valid under the Anti-Assignment Act.

It is true that any extant stated liabilities to which the Joint Venture was liable at the date of assignment were not assumed. Whatever these hypothetical liabilities may have been, however, they had no bearing on the claims assigned by the Joint Venture and those retained by the Government.

Defendant also contends that plaintiffs attempted to limit their liability related to the assigned claims by limiting their "total liability" to the balances of the Performance Bond and Payment Bond. 78/ See JX 1657 at GP0021582 (Takeover Agreement ¶¶ 11, 12). In one of

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78/ Paragraph 5(c) of the Takeover Agreement provides: "[T]he Sureties shall not be paid any amounts in excess of their total expenditures necessarily made in completing the work and discharging their respective duties under the Bonds." JX 1657 at GP0021580. Paragraph 11 of the Takeover Agreement concerns the Performance Bond, stipulating:

> The total liability of the Sureties under this Agreement and the Performance Bond for the performance of work, after the expenditure of the

its *in limine* rulings the court construed the bond "limitations" as a cap on plaintiffs' actual expenses in completing performance. See Order entered Oct. 29, 2009, ¶ 3. This cap does not apply to the amounts recoverable for the pre-Takeover Agreement claims that the Joint Venture assigned to plaintiffs. Before trial defendant sought to limit plaintiffs' recovery to the cap and charge them with fraud for claiming beyond it. See Pls.' Br. filed Oct. 26, 2009, at 2. One would think that defendant would have been satisfied with a ruling that plaintiffs were required to document the actual expenditures for takeover work before they could claim for extra work. The liability on the bonds did not limit plaintiffs' recovery with respect to the assigned pre-Takeover Agreement claims, nor plaintiffs' exposure on the Government's claims stemming from these pre-Takeover Agreement claims. The cap in the Takeover Agreement assured that plaintiffs could make no claim for performing and completing the Contract other than for extra work. In fact, the parties agreed to the admission of PX 800 during trial, an exhibit substantiating that the sureties had expended $19,103,967.00, so that the Government was assured that the amount sought through Mr. Fuchs was net of the $19,103,967.00.

Defendant's jurisdictional argument cannot impede consideration of plaintiffs' claims that were subject to the valid assignment of claims, which included an express reservation of any pre-takeover claims assertable by the Government.

78/ (Cont'd from page 79.)

> Remaining Contract Balance . . . , is limited to and shall not exceed the penal sum of the Performance Bond in the amount of $195,919,733.99 and the amount of any Contract modifications consented to in writing by the Sureties. . . . Nothing in this Agreement constitutes a waiver of such penal sum or an increase or decrease in the liability of the Sureties under the Performance Bond.

Id. at GP0021582. Paragraph 12 concerns the Payment Bond, providing that

> [t]he total liability of the Sureties under the Payment Bond is limited to and shall not exceed the penal sum of the Payment Bond in the amount of $2,500,000.00. . . . Nothing in this Agreement constitutes a waiver of such penal sum or an increase or decrease in the liability of the Sureties under the Payment Bond.

Id.

II. Plaintiffs' concrete claim

Plaintiffs claim that the concrete mixes that the Corps proportioned and supplied to the Joint Venture were deficient. Workability suffered throughout the Project's concrete placement, with the most conspicuous early symptom being the rapid slump loss of the Class C fly ash mix placed from June 2000 until October 2000. 79/ The November 2000 switch to Class F fly ash ameliorated the concrete's rapid slump loss, but workability issues persisted. The Joint Venture's July 2001 claim incorporated many of these concerns, see Tr. at 309-14 (Herrick), and its December 26, 2002 certified claim addressed concrete mix deficiencies. Plaintiffs seek recovery for the direct costs, delay-related damages, and lost productivity attributable to the perceived deficiencies. Plaintiffs argue that the Joint Venture's use of the Corps-proportioned and -provided concrete mixes was a design specification implicating the implied warranty that they would perform as designed, United States v. Spearin, 248 U.S. 132, 136 (1918), and also constitutes a constructive change to the Contract.

1. Design specifications versus performance specifications

Plaintiffs contend that "[t]he Government is liable for design specifications if the prescribed configurations and methodologies cannot achieve the required end result." Pls.' Br. filed July 7, 2009, at 114. The Federal Circuit differentiates design specifications from performance specifications: "Design specifications explicitly state how the contract is to be performed and permit no deviations. Performance specifications, on the other hand, specify the results to be obtained, and leave it to the contractor to determine how to achieve those results." Stuyvesant Dredging Co. v. United States, 834 F.2d 1576, 1582 (Fed. Cir. 1987); see also Blake Constr., 987 F.2d at 745 ("Performance specifications 'set forth an objective or standard to be achieved, and the successful bidder is expected to exercise his ingenuity in achieving that objective or standard of performance . . . .'" (citation omitted)). Whereas performance specifications anticipate a contractor's exercise of discretion, design specifications are to be followed "as one would a road map." Blake Constr., 987 F.2d at 745 (citation omitted) (internal quotation marks omitted); see also J.L. Simmons Co. v. United States, 412 F.2d 1360, 1362 (Ct. Cl. 1969) (describing extensive detail of "classic example" of design specifications); P.R. Burke Corp. v. United States, 277 F.3d 1346, 1357 (Fed. Cir.

79/ Defendant concedes that "the Class C concrete did not meet the level of workability that a reasonable contractor would expect. It stiffened too quickly to permit the joint venture to place it properly without extraordinary efforts." Def.'s Br. filed July 17, 2009, at 17.

2002) (finding performance specifications when "nothing in the contract's description dictates the 'manner' in which [the contractor] must perform; it merely identifies what [the contractor] must have completed by the end of performance" (citation omitted) (italics omitted)).

Whether a contract prescribes design or performance specifications is not always clear. Blake Construction confirms that "the distinction between design and performance specifications is not absolute," 987 F.2d at 746, because "[c]ontracts may have both design and performance characteristics," id. On occasion a contractor might "be granted at least limited discretion to find the best way to achieve goals within the design parameters set by a contract." Id. When contract specifications blur the divide between design and performance, "[t]he real issue is . . . how much discretion the specifications gave [the contractor.]" Id. Viewing the contract in its entirety, the trial court must assess the contract's discretionary elements, and "[i]t is the obligations imposed by the specification which determine the extent to which it is 'performance' or 'design[.]'" Id.; see also Zinger Constr. Co. v. United States, 807 F.2d 979, 982 (Fed. Cir. 1986) (stating that contract must be viewed in entirety, regardless of "design" or "performance" label); Dewey Elecs. Corp. v. United States, 803 F.2d 650, 658 (Fed. Cir. 1986) (determining that mechanical and electrical specifications placed "differing burdens on the contractor"). A contractor may be entitled to an equitable adjustment for additional costs incurred pursuant to defective design specifications. See 48 C.F.R. ("FAR") § 52.243-4 (2007); cf. Blake Constr., 987 F.2d at 747 (reversing award of equitable adjustment).

The Contract specifications for the concrete mix allocate responsibility between the Joint Venture and the Corps. The specifications charged the Joint Venture with selecting and shipping samples of aggregates to the Corps, at the Joint Venture's expense, with testing to be performed by the Corps. JX 89 at FF053257. Similarly, for cementitious materials, admixtures, and curing materials, the Joint Venture was to obtain samples of each material "as directed by and in the presence of the Government Representative," with "[s]ampling and testing as determined appropriate . . . performed by and at the expense of the Government." Id. The Joint Venture could select materials only from a list of sources approved by the Corps, with such materials complying with specified criteria and meeting designated quality-control standards. See id. at FF053271-77. Other materials selected and submitted by the Joint Venture to the Corps for mixture proportioning studies were to comply with specified requirements. Id. at FF053258.

As Montgomery Point is a massive, complex project, other specifications relating to concrete routinely and unsurprisingly provide for shared responsibilities and discretion. The Corps established strict tolerances for concrete castings and placements, albeit providing some discretion to the Joint Venture for construction plans within these tolerances. See JX

89 at FF053262-68. The Contract published explicit requirements for the Joint Venture's delivery, storage, and handling of concrete. See id. at FF053270. Specific requirements for the Joint Venture's batch plant are given, with specific equipment requirements. See id. at FF053279-83. Detailed specifications cover transporting, placing, and vibrating concrete. See id. at FF053285-95. Rigid testing specifications also are set forth, with slump test requirements and parameters, as mere indicia of workability, established in accordance with the ASTM. See id. at FF053307-08. If slumps were to deviate from the prescribed standards, the Joint Venture could adjust the batch weight ratio of water and fine aggregate, but only the contracting officer could adjust proportions. See id. at FF053308. The Contract charged the Joint Venture with submitting plans in accordance with these specifications for the Corps's review and approval.

Aside from the parties' many shared responsibilities in selecting, placing, and testing concrete, proportioning concrete mixes was the province of the Corps. The Contract provides that "mixture proportioning studies will be made by the Government at its expense" and "[t]he Government will sample and test cementitious materials, admixtures, aggregates, and concrete during construction as considered appropriate to determine compliance with the specifications." Id. at FF053258. Again, the Contract establishes that "[t]he concrete mixtures will be proportioned by the Contracting Officer. . . . The proportions of all material entering into each concrete mixture will be furnished to the Contractor. The proportions may be changed by the Contracting Officer as necessary." Id. at FF053277. Montgomery Point's lead structural engineer confirmed that the Corps was responsible for testing the nominated materials, proportioning the concrete mix, and testing the adequacy of the resultant mix. Tr. at 1728, 1742-43, 1835 (Winters). By assuming responsibility for proportioning, the Corps was responsible for providing a workable concrete mix.

Having assessed the concrete-mix specifications in the context of all the concrete specifications and the Contract in its entirety, the court concludes that the pertinent specifications are design specifications. The Joint Venture had some discretion to select its concrete components; it selected its fly ashes and fine aggregate, for example, according to the Contract's stipulated requirements, vendors, and approval procedures. Nevertheless, although such a grant of discretion in selecting materials resembles a performance specification, the remainder of the testing, proportioning, and other concrete specifications explicitly provide that the Joint Venture's discretion was limited and did not count for much in the matters contested in the instant litigation. The Joint Venture could exercise no ingenuity in the proportioning of concrete; for this, the Corps was solely responsible. Mr. Neeley's deposition testimony confirms that the Corps undertook the responsibility not only to proportion the initial concrete mixes, but also to make subsequent proportion adjustments to improve workability. Despite its efforts, however, the Corps never provided an adequately workable mix.

Defendant contends that the Joint Venture was responsible for the initial slump-loss deficiencies, as the Joint Venture selected the Class C fly ash and had notice of prior incidents of rapid slump loss caused by Class C fly ash. See Def.'s Br. filed July 17, 2009, at 17, 23. However, the Corps is not absolved of its responsibility to proportion the concrete components to a workable mixture because the Joint Venture selected Class C fly ash or because the Joint Venture was aware of earlier reports of rapid slump loss, particularly when the Corps also appreciated the potential inferiority of Class C fly ash mix compared with Class F fly ash mix. Before the Contract was finalized, the Corps had published the DM, which had been recommended "as the basis of the preparation of [the Contract's] plans and specifications," JX 17 at GP0000628, and EM 1110-2-2000, which advised minimal deviation from the Corps's guide specifications, JX 10 at GP0000317. The DM condoned the use of both Class F and Class C fly ash, but expressly advised that "[o]nly Class F fly ash will be allowed for use in mass concrete." JX 17 at GP0000649. An endorsement letter attached to the DM advised of flash-setting with concrete mixes incorporating Class C fly ash. Id. at GP0000627. The ETL referenced by the endorsement letter warned of "problems with potential flash setting in Class C fly ash." Tr. at 1707 (Winters). Prior Corps projects, such as the Olmsted Lock and Dam and the Red River Lock and Dam, experienced rapid slump loss when using Class C fly ash.

The Contract's concrete specifications were drafted partly by Mr. Winters, a Corps employee who had not designed mixes for mass concrete, who had no other experience with projects involving manufactured sand, and who never worked a large concrete project like Montgomery Point. See Tr. 1704-05 (Winters). Although a novice on a project of this nature, he coordinated the Project's structural design elements and the activities of the parties, and he chose which aspects of the DM to integrate within the Contract specifications. Whether owing to inexperience or misjudgment, he chose poorly. Mr. Winters acknowledged that, although he reviewed pertinent materials and consulted with Corps employees from other projects that were troubled by Class C-related slump loss, he nonetheless permitted the selection of Class C fly ash by the Joint Venture for use in mass and structural concrete. In permitting this selection, he selectively disregarded instructions from the DM and from EM 1110-2-2000. As warned in these publications, the mix exhibited rapid slump loss, see Tr. at 232-33 (Herrick); Tr. at 1475 (Winters); Neeley Dep. at 16, and placement immediately became unduly and unreasonably difficult, see Tr. at 236-37 (Herrick); Tr. at 594 (Macon).

The chemical characteristics of a Class C fly ash can vary by the source of the fly ash, and proportioning concrete is akin to alchemy. See Neeley Dep. at 23-24 (noting that not all Class C fly ash is deficient, but there is no "foolproof" test). Mr. Winters believed that the local sources of Class C fly ash for Montgomery Point chemically differed from those available for the Corps's earlier, troubled projects, and he testified that "[w]e didn't expect

a problem with" the Joint Venture's source. Tr. at 1720-21. Despite Mr. Winters' expectations, rapid slump loss became a significant problem affecting the concrete's workability and placement. See also PX 222 at GP0014833 (Mr. Neeley's September 21, 2001 report, stating: "We initially did not anticipate any workability problems . . . . However, as things turned out, something has obviously changed . . . . In hindsight, we should have run . . . tests [at] the very beginning of the mixture proportioning exercises. . . . [T]he bottom line is the original Class C fly ash chosen by [J.A. Jones] did not meet contract requirements [80/] and therefore may be a problem for the [Corps]."). Only extraordinary effort by the Joint Venture permitted concrete placement to continue—albeit at a much slower pace than the parties projected—until the October 2000 work stoppage. Throughout, blame for the rapid slump loss lay with the mix that the Corps singularly proportioned, tested, approved, and advanced for placement. See PX 307 (Mr. Clemans's January 20, 2004 memorandum, noting: "The COD [Contracting Officer's Decision] determined that the Government was responsible for difficulties experienced during the initial Contract performance due in part to the Class 'C' fly ash.").

Passable slump tests do not equate to workability. The Contract prescribed slump tests, but did not describe slump tests as the measure of workability. When workability is dependent on an array of variables, such as the type and source of materials, proportioning ratios, and weather, slump tests provide useful, but not definitive, indications of workability. See JX 706B at GP0012368 ("[W]orkability of a mix design is related to the sum of all the materials and how they react with one another."). Well prior to the start of mass-concrete placements and the parties' slump testing, Mr. Neeley on January 22, 2000, commented to Mr. Winters that the mixture was nigh unworkable. See JX 408. As placements began,

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80/ Mr. Neeley inaccurately disparages the Class C fly ash as noncompliant. As discussed herein, although its inclusion may not have permitted a workable concrete mix, the Class C fly ash met the contract specifications, and it was permitted, tested, and approved by the Corps. The evidence acquits the Joint Venture and validates its selection of Class C fly ash. The Corps's mix design, however, was deficient, and it did not comply with the contract specifications. Mr. Neeley's September 2001 assessment is revealing:

> In an ideal world, any set of materials of which each single material met its respective specification could be combined in such a way that a properly balanced mixture could always be achieved. Unfortunately in the concrete realm, such is not always the case. [Montgomery Point] is an example of a case where a desirable balance has yet to be found.

PX 222 at GP0014833-34.

slump tests alone could not assure adequately workable concrete when Class C fly ash was used; Mr. Neeley allowed that the slump testing could not account for the rapid stiffening that occurred during concrete transportation from batch plant to placement. See Neeley Dep. at 16-17. Later, contemporaneous slump tests also failed to capture the workability flaws of the concrete after the Corps substituted Class F fly ash in the mix. Witnesses, however, were in agreement: although the slump loss was remedied, the concrete remained unworkable. See, e.g., Tr. at 2308 (Carrasquillo) (Dr. Carrasquillo assessed the Class F fly ash mix, as follows: "[The mix proportioning adjustments] were deficient. They never got the point of resulting in workable concrete.").

Accordingly, although the Corps re-proportioned the mix when integrating the Class F fly ash, see Neeley Dep. at 32, workability concerns persisted. Defendant deflects the ensuing workability complaints to the Joint Venture's choice of manufactured sand. The Corps had permitted manufactured sand even though it did not analyze manufactured sand sources when drafting the DM, Tr. at 1728 (Winters), and despite Mr. Neeley's limited experience with manufactured sand, see Neeley Dep. at 57, 80. The Contract provided particle size guidelines. 81/ Tr. at 1726, 1805-06 (Winters) (discussing JX 89 at FF053275-76). When proportioning began, concerns about the manufactured sand arose. See JX 408 ("It is almost impossible to proportion a really workable mass mixture with that sand."); JX 706B (October 18, 2000 notice from the Corps, stating that "[w]e voiced concern several times about the use of manufactured sand and the impact it could have on workability . . ."). At a February 14, 2000 planning meeting, Mr. Neeley commented that the manufactured sand selected by the Joint Venture would be difficult to proportion. See JX 417; see also JX 390 (Corps memorandum dated December 3, 1999, complaining of poor quality of fine aggregate); JX 456 (Mr. Clemans's March 24, 2000 letter complaining of the same). Mr. Neeley's summary report, prepared after the Joint Venture first submitted a claim related to the concrete mix design, stated: "We advised against the use of manufactured fine aggregate from the very beginning. We advised [the Joint Venture] that it would be very difficult, if not impossible, to provide concrete mixtures having the level of good workability usually associated with projects such as this one." PX 222 at GP0014833. The Corps had preferred a natural-sand fine aggregate. See JX 459; JX 465. Nevertheless, despite these concerns, the Corps proportioned, approved, and permitted the Joint Venture to place a mix with manufactured sand.

81/ Curiously, the Contract specified particle shape for coarse aggregates, but it did not specify a required fine aggregate particle shape, even though Mr. Neeley testified that the particle shape of fine aggregate was more important than that of coarse aggregate when attempting to control water demand, slump, concrete mix lubrication, and heat. See Neeley Dep. at 60-62; see also JX 89 at FF053274-76.

The cost of adjusting the mix proportions to accommodate the manufactured sand influenced the Corps's decision-making. Successful proportioning relies on a complementary balance of concrete's component materials, see JX 706B, and the Corps recognized that the manufactured sand would require additional cement to create a workable mix, see JX 417 (handwritten notes from February 14, 2000 meeting, with Mr. Neeley indicating that mortar and cement content would rise when proportioning with the manufactured sand); JX 500 (e-mail describing results of parties' May 3, 2000 trip to WES and noting that "[t]he manufactured sand mix contains approximately 20 to 22 pounds per cubic yard more cementitious materials than does the natural sand mix"). The Corps would pay for any additional cement. See Neeley Dep. at 86 ("[S]ince the government is paying for the cementitious materials directly, it drives up the cost for the government . . . ."); see also JX 459 (March 29, 2000 e-mail from Tom Clement seeking cost off-sets to the extra cement). Mr. Winters' March 16, 2000 e-mail best documents the Corps's concerns and resultant strategy: the Corps would use the manufactured sand in spite of its deficiencies, but would continue to limit any costs incurred by the Corps. JX 443 ("We don't want to have to add a lot of cement/flyash to the mixture just to improve workability of a poor aggregate. It is not right for the government to incur additional costs, have greater shrinkage, and heat buildup in the mass concrete just to use a marginal aggregate for the convenience (cost savings) to the contractor.").

To limit costs the Corps also waived the NISA testing of the concrete's thermal properties—important for concrete strength assessments—notwithstanding the guidance of ETL 1110-2-542 to conduct a complex, level-three NISA test. See JX 17 at GP0000823; Tr. at 1735-36 (Winters). Mr. Winters testified that cost was a factor in waiving the NISA test, and his September 22, 1994 waiver stressed the NISA testing's expense. See Tr. at 1737-38; see also JX 17 at GP0000824-25. Rather than conducting an empirical measurement of the concrete's thermal properties with a NISA test, the Corps would employ other mitigating measures, i.e., "optimizing concrete mix design with fly ash to minimize heat." JX 17 at GP0000825. The Corps's waiver stated that "[t]he most economical combination of construction materials meeting the construction specifications and readily available to the contractor at the time of construction will be selected." JX 17. Witnesses disputed whether the Corps fulfilled its responsibility to test the fine aggregate adequately. 82/ Compare Tr. at 1751 (Winters) (defending the Corps's testing), with Tr. at 1047-48 (Herrick) (the Corps spent less time with fine aggregates). The ultimate mix design evidently satisfied Mr.

82/ Although the Joint Venture was late in submitting fine aggregate samples for testing, see Tr. at 1750 (Winters) (discussing late submission); Tr. at 1010-19, 1043-45 (Herrick) (same), the Corps thereby was not relieved of its responsibilities to test and proportion the fine aggregate adequately.

Neeley, who testified that "I cannot think of anything that I could have done to improve the mix that would not have affected the generation of heat and the cost." Neeley Dep. at 172. Dr. Carrasquillo, however, objected to the proposition that concerns of economy should prevail over concerns of concrete strength, workability, or durability. See Tr. at 2276.

The Corps's early mix proportions appeared to be satisfactory. See Tr. at 1749 (Winters) (discussing May 2000 results and stating that "Billy [Neeley] did a good job proportioning the mixes and he added extra cement and fly ash to that mixture to make up for the manufactured sand and gave [sic] peak workability"). Despite these early results and the Corps's subsequent attempts to integrate the manufactured sand, control the concrete's thermal properties, and limit the Corps's cost exposure, the mix was deficient. Following the Class F fly ash substitution, low-strength gain—a fault also diagnosed in August 2000 with the Class C fly ash mix—and excessive bleed water became more apparent and superceded the rapid slump loss concerns. See Tr. at 240 (Herrick) (describing post-Class C fly ash workability deficiencies); Tr. at 614, 633-35 (Macon) (same); Tr. at 2278-79 (Carrasquillo) ("[T]hey were having some problems with strength gain, they were having some problems with a lot of bleeding, they were having some problems with inconsistent performance of the concrete."). A stop-work order came on January 25, 2001, with a letter from the Joint Venture recording:

> Contract specification 03305-13 (3) states that surface finish shall be measured within 72 hours after concrete placement. This cannot be measured within 72 hours because the concrete is too soft to walk on. . . . The inability of the Corps of Engineers to provide J.A. Jones with concrete mix designs that comply with contract specifications and drawings has prompted this concrete stop work order.

JX 832. A January 26, 2001 e-mail copied to Mr. Clemans noted that "the contractor has ever increasing concerns about the workability of the concrete and is very concerned about the 'bleed' water and final surface finishing of the concrete." JX 841.

Mr. Clemans projected a January 31, 2001 site visit to study and remedy the deficient concrete mix. See id. Dr. Carrasquillo and Mr. Neeley testified as to the January 31, 2001 meeting and the parties' desire for a workable concrete mixture. They also testified as to the deficiencies plaguing concrete operations. Mr. Neeley's deposition testimony was insufficient to deflect onto the Joint Venture the Corps's contractual responsibilities and to categorize the relevant Contract provisions as performance specifications. Indeed, Mr. Neeley's deposition testimony confirms that the concrete mix remained deficient after the substitution of Class F fly ash and after the parties' January 31, 2001 tests. His testimony also confirms the Corps's contractual obligation to provide a workable concrete mix. In Mr.

Neeley's absence and given the concessions in his deposition testimony, Dr. Carrasquillo sensibly depicted the concrete's flaws and the Corps's insufficient redress, and he withstood defense counsel's attempts to belittle him or to undermine the substance of his testimony.

The Joint Venture documented three areas of emphasis for the January 31, 2001 site visit and concrete testing:

- Strength gain.
- Lower bleed water.
- Placeability—this includes satisfactory finish properties, workability to determine the concrete compacity [sic] to be placed and consolidated properly and to be finished without harmful segregation.

JX 845; see also Tr. at 2280-82 (Carrasquillo) (discussing the January 31, 2001 meeting). The parties tested trial batches of varying aggregate proportions and sizes. Tr. at 2370 (Carrasquillo). They agreed to adjust the mix design. See Tr. at 1495-96 (McPherson); Tr. at 2280-81 (Carrasquillo); see also JX 854 (Mr. Neeley's February 7, 2001 e-mail documenting "minor adjustment to the 3-in. mixture"). Dr. Carrasquillo described the Class F fly ash mix as non-reactive, and he persuasively explained that, in order to increase heat and strength, the mix required additional cement to offset the non-reactive fly ash and the cold weather. See Tr. at 2282-83. He also was persuasive that additional mortar would have lubricated the mix and provided better workability. See Tr. at 2284 (Carrasquillo). Dr. Carrasquillo was not present at the concrete trials, and he did not witness the concrete placement, but he advised Mr. Neeley of his recommendations at the time. See Tr. at 2287-89 (Carrasquillo).

The Corps failed to re-proportion the mix and appropriately redress the deficiencies. See JX 858 (February 12, 2001 inter-office memorandum from Dr. Carrasquillo: "I stated the bleed has been reduced, but I warned the [Corps] that the mixes are still a problem. I pointed out that the 3" mix is not a good quality mix."). Describing the composition and characteristics of Mr. Neeley's final concrete mix adjustments, Dr. Carrasquillo stated: "[W]hen you analyze this mix you can understand why the workability was not getting adjusted and was not getting solved, because you can see that the mortar content which is a lubricant was being decreased . . . ." Tr. at 2311. He denied that the manufactured sand was defective; rather, the Corps's refusal to lubricate the mix with additional mortar left a rocky, unworkable concrete. See Tr. at 2312. Failure to lubricate the mix resulted in rock pockets, excessive bleeding, and the other workability constraints. In addition, the Corps failed to increase cementitious materials in sufficient quantities to offset the other changes to mix proportions. See Tr. at 2318-20 (Carrasquillo). These flaws were most pronounced in the three-inch mix, but also compromised the 1.5-inch mix. See Tr. at 2329 (Carrasquillo); see

also Tr. at 2374 (Carrasquillo) (noting that, although the majority of subsequent placements used 1.5-inch mix, both "were just basically bad workable mixes"). Dr. Carrasquillo effectively refuted defendant's sundry counter-arguments, including its contentions that the Corps necessarily kept cement quantities low to mitigate heat of hydration and that workability suffered because of the Joint Venture's inability to control excessive trim water or fluctuating sieve sizes. See generally Tr. at 2331-52 (Carrasquillo).

Dr. Carrasquillo ceased advising the Joint Venture in March 2001, and, for the remainder of the project, the Joint Venture placed Mr. Neeley's January 31, 2001 mix designs. Tr. at 2416-18, 2442-43 (Carrasquillo). Defendant conflates these facts as support for the proposition that Mr. Neeley's final concrete mix was satisfactory. This argument is unavailing. On December 26, 2001, the Joint Venture advised the Corps: "To date we have placed in excess of 142,000 cubic yards of concrete and we have yet to develop workable concrete. We realize that at this point that the mix is probably as good as we are going to get, but it is still inferior . . . ." JX 1086. For his part, Mr. Neeley testified, as follows:

> [We] basically [tried] everything we could think of to adjust within the aggregates to try to improve workability, but nothing we did seemed to substantially improve. I think that we probably achieved some minor level of improvement through our adjustments, but we were never able to, as I just said, make the mix behave like a mix containing natural sand. It just—it can't be done.

Neeley Dep. at 68 (emphasis added). But see Neeley Dep. at 78 (describing himself as a "perfectionist" in order to provide context for his concessions).

Assessing the Joint Venture's initial request for an equitable adjustment, Mr. Neeley recorded that "the overall poor workability was due to the manufactured fine aggregate." PX 222 at GP0014834. He noted that "[t]he angular nature of the fine aggregate"—which Mr. Winters did not control in the Contract, despite guidance in the DM—"does not lend itself to good workability," and he faulted fluctuating sieve sizes. Id. at GP0014833. He ultimately concluded:

> Unfortunately, the set of materials chosen by [J.A. Jones] to use at [Montgomery Point] did not [maximize workability, strength, durability, generation of heat, and economy]. In an ideal world, any set of materials of which each single material met its respective specification could be combined in such a way that a properly balanced mixture could always be achieved. Unfortunately in the concrete realm, such is not always the case. [Montgomery Point] is an example of a case where a desirable balance has yet

> to be found. At various times, [J.A. Jones] stated that the lack of workability is the result of our inadequate mixture proportions. This implies that desirable mixture proportions could be attained with a different set of mixture proportions. In my opinion, this is an unrealistic assumption. We tried many different proportions. Some improvements in workability and placeability were eventually found, but a level of improvement desired by the Corps or [J.A. Jones] was never attained.

Id. at GP0014834. As Dr. Carrasquillo convincingly testified, however, the Corps could have remedied the concrete's deficiencies with additional cement and better proportioning. Mr. Neeley's September 21, 2001 summary acknowledged that additional cementitious material may have aided workability and suggested that the Corps increased cement content in "good faith"; still, it admitted "practical limits on how much cementitious content can be increase[d]." Id. at GP0014833. For reasons of economy, the Corps declined to make further proportioning adjustments, and it left the Joint Venture with a deficient mix. See Neeley Dep. at 173 ("[W]e probably could have improved the workability of the concrete a little bit . . . [but] it was going to make the mix more expensive for the government.").

Mr. Neeley's testimony shows that he grew frustrated because he "personally felt that [he] . . . had done everything that [he] knew to do to try to make the mixes better and [he] didn't believe that . . . [he] was going to be able to come up with some magic formula that would solve the problems . . . ." Neeley Dep. at 76. If Mr. Neeley ultimately could not improve the mix, the Corps—rather than condemning the Joint Venture to place an unworkable mix—could have directed the Joint Venture to select alternative components. Natural sand, for example, might have provided a more workable mix. See Neeley Dep. at 93, 98, 160. Mr. Neeley was upset with the Joint Venture's selection of manufactured sand and knew that it would not attain his "high standard" of workability. See Neeley Dep. at 161. Nonetheless, the Corps approved the Joint Venture's nomination of manufactured sand, while merely "hoping" that the Joint Venture would select natural sand. See Neeley Dep. at 91. Later, when the concrete proportions proved flawed and unworkable, the Corps, not performing its contractually mandated proportioning responsibilities, appears to have continued to hope for the best. See Neeley Dep. at 93 (noting no "technical" grounds to reject the manufactured sand).

The Government argues that the successful completion of Montgomery Point undercuts plaintiffs' claim that the concrete was not suitable for its purpose. Trial revealed that the Project's success was attributable to the persistence of the Joint Venture in working with concrete mixes—mixes proportioned by the Corps and used by the Joint Venture at the Corps's direction—that were never adequate to the task. The concrete mixes advanced by the Corps were unworkable from the start, and, despite the parties' efforts, the Joint Venture

never received a satisfactory concrete mix. Ultimately, the Corps's proportioning—a design over which the Joint Venture exercised no discretion—was deficient. In contradiction to the extensive discretion exercised by the Corps throughout the proportioning process, the Joint Venture's discretion ended when it nominated component materials. The minimal post-selection discretion exercised by the Joint Venture "determine[s] the extent to which it is 'performance' or 'design,'" Blake Constr., 987 F.2d at 746, and qualifies the Joint Venture's use of the unworkable concrete mixtures as a design specification. 83/

2. The *Spearin* doctrine

Spearin is the font of an implied warranty of design specifications, as it states that, "if the contractor is bound to build according to plans and specifications prepared by the owner, the contractor will not be responsible for the consequences of defects in the plans and specifications." 248 U.S. at 136 (finding breach of warranty when specifications required contractor to relocate sewer, but relocated sewer was inadequate). The Federal Circuit interprets the Spearin doctrine to contemplate that "if a government contract contains detailed design specifications, as opposed to performance specifications, the government gives an implied warranty that if the specifications are followed an acceptable result will be produced." Rick's Mushroom Serv., Inc. v. United States, 521 F.3d 1338, 1344 (Fed. Cir. 2008). This warranty "attaches only to design specifications detailing the actual method of performance." White v. Edsall Constr., 296 F.3d 1081, 1084 (Fed. Cir. 2002) (discussing applicability of Spearin *vis-à-vis* design and drawings for faulty cable rigging on a helicopter hangar).

Given the ambiguity between clear design specifications and clear performance specifications, "discretion serves as the touchstone for assessing the extent of implied warranty and attendant liability." Fru-Con Constr. Corp. v. United States, 42 Fed. Cl. 94, 96 (1998). Considering a scenario in which a contractor stopped work on account of the

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83/ The court does not overlook evidence that the Corps had legitimate concerns about a mix that minimized the heat of hydration, but the apparent intricacy of that problem does not affect contractual responsibility for design. Although Dr. Carrasquillo, as most experts, testified with the benefit of hindsight, he was confident that a workable mixture that did not risk internal stress fracture could be proportioned. The court also acknowledges that the Joint Venture was not perfect in its execution of the cement placements. Too much trim water was added on occasion; the sieve sizes for passing properly graded sand were not always observed. Still, these problems pale against the overwhelming challenge to place the unworkable concrete, which the court was able to study in the many photographs admitted into evidence.

Government's flawed drawings for the manufacture of floodlights, the Federal Circuit held that, "[w]hen the government provides a contractor with defective specifications, the government is deemed to have breached the implied warranty[,] . . . and the contractor is entitled to recover all of the costs proximately flowing from the breach." Essex Electro Eng'rs, Inc. v. Danzig, 224 F.3d 1283, 1289 (Fed. Cir. 2000). The recoverable costs include any corresponding periods of delay. Id. Regarding delay, the court explained that, "[u]nlike some situations in which the government has a reasonable time to make changes before it becomes liable for delay, 'all delay due to defective or erroneous Government specifications [is] *per se* unreasonable and hence compensable.'" Id. (citations omitted).

The Spearin doctrine has been applied to construction contracts and to contracts for the procurement of goods or services. Rick's Mushroom, 521 F.3d at 1345 (citing examples of each). Although plaintiffs invoke Spearin in a factual setting that differs from prior case law, their concrete claims involve an allocation of responsibility between the Corps and the Joint Venture whereby the Joint Venture would nominate materials and the Corps subsequently would approve the materials and produce a mix design compatible with the Contract. 84/ Although plaintiffs establish liability for the workability problems and attendant delay associated with the concrete mix design claim, it is on their labor claim that plaintiffs' proof begins to falter.

III. Plaintiffs' labor claim

1. Standard of review

Implicit in every contract, the duty of good faith and fair dealing obliges that neither a private party nor the Government "'do anything that will hinder or delay the other party in performance of the contract.'" Essex Electro Eng'rs, 224 F.3d at 1291 (citation omitted); see also Precision Pine & Timber, Inc. v. United States, 596 F.3d 817, 828 (Fed. Cir. 2010); First Nationwide Bank v. United States, 431 F.3d 1342, 1349 (Fed. Cir. 2005). The duty of good faith and fair dealing encompasses a duty not to hinder contract performance. See H&S Mfg., Inc. v. United States, 66 Fed. Cl. 301, 310-11 (2005) ("Generally, a failure to cooperate with the other party in the performance of a contract serves as a breach of that contract because a failure to cooperate violates the duty of good faith." (citing Malone v. United States, 849 F.2d 1441, 1445 (Fed. Cir. 1988))). In discharge of this duty, a party is "not to interfere with the other party's performance and [is] not to act so as to destroy the reasonable

84/ In view of the foregoing, the court does not reach plaintiffs' alternative argument that predicates liability on a constructive change.

expectations of the other party regarding the fruits of the contract." Centex Corp. v. United States, 395 F.3d 1283, 1304 (Fed. Cir. 2005).

On the one hand, neither "bad faith" nor "bad intent" is required to breach the duty of good faith and fair dealing. H&S Mfg., 66 Fed. Cl. at 311 ("'Subterfuges and evasions violate the obligation of good faith in performance even though the actor believes his conduct to be justified.'" (citation omitted)). A party might breach the duty not to hinder performance when committing "actions that unreasonably cause delay or hindrance to contract performance." C. Sanchez & Son, Inc. v. United States, 6 F.3d 1539, 1542 (Fed. Cir. 1993) (emphasis added). A government official, for example, cannot "willfully or negligently interfere with the contractor in the performance of his contract." Peter Kiewit Sons' Co. v. United States, 151 F. Supp. 726, 731 (Ct. Cl. 1957). Conversely, the implied duty of good faith and fair dealing is not an unrestricted guarantee of uninterrupted contract performance, see Precision Pine, 596 F.3d at 831, because "[n]ot all misbehavior . . . breaches the implied duty of good faith and fair dealing[,]" id. at 829 (citing First Nationwide Bank, 431 F.3d at 1350).

The Federal Circuit in Precision Pine—within the context of alleged wrongful government conduct that does not arise directly out of the Government's contract with a plaintiff—somewhat narrowed the concept to require a showing of scienter on the part of the Government: "Cases in which the government has been found to violate the implied duty of good faith and fair dealing typically involve some variation on the old bait-and-switch." Id. The court described two possible variations: (1) the Government's action is "specifically targeted" at an existing contract, and (2) benefits previously guaranteed by the Government pursuant to an existing contract are reappropriated. See id. In cases illustrative of the former, "the subsequent government action was for the specific purpose of eliminating an express, bargained-for benefit in the contracts and sole[ly] impact[ed] these contracts." Id. at 829-30 (internal quotations marks omitted) (alterations in original). In this factual setting, absent a "specifically targeted" action, evidence of the Government's failure to cooperate is not tantamount to a breach of the duty of good faith and fair dealing. See id.; see also infra Part V.1.2 (discussing Precision Pine in context of Board claims). Regarding the latter, the implied duty of good faith and fair dealing offers no recourse to "expand a party's contractual duties beyond those in the express contract or create duties inconsistent with the contract's provisions." Id. at 831.

Plaintiffs cite Bateson-Stolte, Inc. v. United States, 172 F. Supp. 454, 456 (Ct. Cl. 1959), for the proposition that labor-market interference by the Corps can breach the duty of good faith and fair dealing. Pls.' Br. filed July 7, 2009, at 127. In October 1950 the Corps awarded a $7 million power-plant construction contract to a joint venture (the "power-plant project"). Bateson-Stolte, 172 F. Supp. at 455. It was a four-year project, and, "[a]t the time

that the contract was entered into[,] there was ample labor in the area and no other Government projects were competing for the use of this labor force." Id. Contemporaneous with the award of the joint venture's contract, however, the Corps was consulting with the U.S. Atomic Energy Commission (the "AEC") regarding a $1.25 billion project (the "AEC project") located in the vicinity of the power-plant project. Id. The AEC project was awarded within one week of the joint venture's signing its contract, and the AEC project in February 1951 established wage rates that were considerably higher than those available at the power-plant project. Id. at 455-56. The disparate wage rates complicated the joint venture's ability "to obtain and hold construction workers," id. at 456, and forced the joint venture to pay substantial overtime and increased wage rates, id.

Following the denial of its certified claim for $193,637.95 in wages, the joint venture sued, alleging, *inter alia*, "a breach by defendant of an implied condition in the contract the neither party will hinder the other in the discharge of the obligations created by the contract." Id. The United States Court of Claims found that the joint venture's labor cost estimate "did not take into consideration the fact that it would be in competition with [the AEC] for the available labor," id. at 455, but that "[t]he Government realized that the [AEC project] would substantially affect the labor supply, labor rates, and conditions in the area," id. Rejecting defendant's motion for judgment on the pleadings, the court acknowledged the potential for recovery:

> If the defendant knew that it was going to do a thing which of necessity would require plaintiff to pay a wage greater than that prevailing in the community in which its work was to be done, and the plaintiff was ignorant of this fact, it would seem that good faith required the defendant to apprise plaintiff thereof. If defendant caused the increase in the wages plaintiff had to pay, defendant is liable for the increase. It seems hardly necessary to cite authority for this statement, but this is the clear implication of the decision of the Supreme Court in United States v. Buettas, [324 U.S. 768, 772-73 (1945)].

Id. at 456-57.

The court referred the case to a trial commissioner, but instructed that defendant would not be liable "unless the agency dealing with [the joint venture] had knowledge of what the [AEC] was going to do." Id. Significantly, the court suggested that,

> in a business so vast as that engaged in by the United States Government, with its multitudinous departments, bureaus, and independent agencies, with various and sundry projects scattered all over the world, it is impossible for one department to know what another department is going to do. In such case, it

> seems unreasonable to charge one agency with knowledge of what another one is going to do. It would seem that defendant should be held liable only if the agency that dealt with plaintiff had knowledge of the impending employment of this huge labor force.

Id. 85/ When the matter returned to the Court of Claims from the trial commissioner, the court dismissed the joint venture's complaint, concluding that the Corps—as a government agency distinct from the AEC—could not be charged with knowledge of the location and wage-rate impact of the AEC project. See Bateson-Stolte, Inc. v. United States, 305 F.2d 386, 388-89 (Ct. Cl. 1962).

2. Plaintiffs' claim for breach of the duty of good faith and fair dealing

Plaintiffs contend that "the Corps clearly breached its duty not to interfere with the Joint Venture's performance by underwriting the Pine Bluff Project's labor-market-distorting Modification, to the severe detriment of the Montgomery Point Project." Pls.' Br. filed July 7, 2009, at 128. In response to Part B of the Raytheon REA, the Corps issued a $22.5 million modification with "[t]he sole purpose . . . to attract labor to the Pine Bluff Project that would otherwise have worked at competing projects." Id. (emphasis omitted). Corps employees knew of Montgomery Point prior to issuing the modification, and plaintiffs argue that "the Corps knew or, at the very least, should have known that issuing the $22.5 million Pine Bluff Modification Part B would impact Montgomery Point's ability to recruit labor." Id.

Plaintiffs fail to satisfy the legal standards applicable to their claim. Part B of the Raytheon REA informs that the Industrial Operations Command—not the Corps—issued the contract for Pine Bluff. PX 16 at GP0006941. The Raytheon REA responded to a stop-work order and a subsequent proposal for equitable adjustment issued by the Industrial Operations

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85/ The Court of Claims' findings resonate in language employed by the ASBCA. See T.C. Bateson Constr. Co., ASBCA No. 5492, 60-1 BCA ¶ 2,552, at 12,352 ("[T]he duty imposed by law upon the Government not to hinder performance by the contractor is no greater than that of not disturbing or interfering with the usual labor practices of the industry which were within the contemplation of the parties when the contracts were entered into and concerning which the Government was charged with knowledge . . . ."); see also Robert McMullan & Son, Inc., ASBCA No. 11998, 68-1 BCA ¶ 7,068, at 32,678 (citations omitted); cf. NTC Group, Inc., ASBCA Nos. 53720, 532721, 532722, 04-2 BCA ¶ 32,706, at 161,810 ("The crux of the foregoing case law is that we will not allow excusable delay from a labor problem other than a strike except in the most unusual circumstance as where the Government also contributed to the delay . . . .").

Command, not the Corps. See PX 16 at GP0006946. Mr. Graham, a member of the Corps's Contract Administration and Quality Assurance Team for the Chemical Weapons Department located at the U.S. Army Engineering and Support Center, Huntsville, verified that the Industrial Operations Command is a distinct entity, separate from the Corps. See Tr. at 1956. As for the Corps, it "was the design and construction arm for the Industrial Operations Command to design and construct these chem demil facilities." Tr. at 1956 (Graham). The Corps subsequently designated the U.S. Army Engineering and Support Center, Huntsville, as the Program Execution Agency and the Corps's Little Rock District as the agency responsible for the design and construction of support facilities and roads. See PX 130 at GP0005021.

The Corps received and responded to the Raytheon REA pursuant to its responsibilities as the agency designated by the Industrial Operations Command to supervise Pine Bluff's construction. See id. at 1893-94 (Graham). As an employee at the U.S. Army Engineering and Support Center, Huntsville, Mr. Graham assisted with Raytheon's field work at Pine Bluff. See id. at 1893 (Graham). His Contract Administration and Quality Assurance Team negotiated the Corps's response to the Raytheon REA. Id. at 1903-05 (Graham). Documentary evidence reflects the Corps's response to and impressions of Raytheon's labor-market claims. See PX 139 (February 24, 2000 e-mail); PX 147 (March 15, 2000 e-mail); PX 154 (April 3, 2000 e-mail); PX 165 (April 17, 2000 e-mail). A request to audit Raytheon's labor-market claims was sent to the DCAA on January 14, 2000, by Houston Townsend, contracting officer at the U.S. Army Engineering and Support Center, Huntsville. See PX 126. Following the DCAA audit, Mr. Graham prepared a document summarizing pre-negotiation price objectives, within which he described Raytheon's difficulties in attracting sufficient skilled labor and acknowledged that "the Government forced the project into a position to where [Pine Bluff] will be competing with new construction efforts in the Pine Bluff area." See PX 520 at COEPB00000293. Contracting Officer Townsend issued the $22.5 million modification on May 19, 2000, permitting the payment of prevailing union wage rates, travel and per diem allowances, and other recruitment incentives. See PX 198. The modification designated the Corps's Pine Bluff Chemical Demilitarization Resident Office as the administering agency.

Plaintiffs argue that Corps personnel knew or should have known that the modification would affect the Joint Venture's ability to recruit labor at Montgomery Point. See Pls.' Br. filed July 7, 2009, at 128. Mr. Taylor testified that James ("Jim") Lonsford, Senior Resident Engineer for the Corps assigned to Pine Bluff, had discussed Montgomery Point as a source of labor competition. See Tr. at 2006-07. Mr. Taylor's opinion was that Montgomery Point "was another project that obviously we were in some competition with. But it was far removed from [Pine Bluff's] main drawing point, meaning Little Rock." Id. at 2007. The court was not impressed with Mr. Taylor—an independent contractor retained

as a witness by plaintiff Fireman's Fund. See Tr. at 1960 (Taylor). His testimony was equivocal and evasive. Despite the impressive familiarity that he displayed during his direct examination regarding the circumstances attending the Raytheon REA, see generally Tr. at 1975-95, on cross-examination he demonstrated minimal recall of his conversations with Mr. Lonsford and of the $22.5 million modification's impact on the labor market and on Montgomery Point, see Tr. at 2005-06, 2013-16.

Terry Lynn Steuart, who testified by deposition, served as resident engineer and administrative contracting officer ("ACO") for the Corps at Montgomery Point. Mr. Steuart had left Montgomery Point for Pine Bluff where he had served as project engineer since before 1997 and resumed work in quality control after he left Montgomery Point. As ACO, Mr. Steuart worked on modifications and payment applications. He considered Montgomery Point to be "labor depressed," Dep. of Terry Lynn Steuart, Jan. 29, 2009, at 39-40, and stated that the Joint Venture faced a problem with hires. In terms of being in the same competitive sphere, he represented that Pine Bluff did not consider Montgomery Point as another construction project in the area. He was not helpful to plaintiffs concerning a skilled labor drain after the Raytheon REA, indicating that payroll records for the two projects would be revelatory.

Carolyn J. Steuart, formerly "Stuart" until she married Terry in 2002, could not contribute more than general recollections through her deposition testimony. She processed proposed modifications at Montgomery Point from January 1998 to January 2000 until she was transferred to Pine Bluff. She emphasized that Montgomery Point was an isolated, remote location. Ms. Steuart did vouchsafe that the Joint Venture was hiring the "best" tradesmen. Dep. of Carolyn J. Steuart, Jan. 29, 2009, at 58. She spoke about the impact of the Raytheon REA only in terms of Mr. Herrick's asking her questions. Even assuming that Montgomery Point had the benefit of an REA like Pine Bluff, she equivocated whether that relief would have helped the Joint Venture, given its other problems with concrete and scheduling.

Mr. Taylor's explanation for Raytheon's omission of Montgomery Point from its list of competing projects in Part B of the Raytheon REA was unsatisfactory. Part B states that, "in April 1997, there were no known significant craft consuming manpower projects scheduled for the [Pine Bluff] performance period of September 1997 to May 2000." PX 16 at GP0006964. On account of the stop-work order delaying Raytheon's work from September 1997 until January 1999, Raytheon expected to "incur additional costs to attract and retain craft due to the competition with other significant newly started projects." Id. Of these "newly started projects," Part B explicitly names five projects that were within a 50-to-100 mile radius of Pine Bluff and references fourteen paper mills that were within a 500-to-600 mile radius. See id. at GP0006964-65. Part B does not mention Montgomery Point,

which was approximately eighty miles from Pine Bluff, see Tr. at 2008 (Taylor), with a notice to proceed issued August 26, 1997, and a subsequent funding shutdown that lasted until April 1998 and that delayed work until approximately June 1998, see Tr. at 178 (Herrick). Mr. Taylor suggested that Raytheon intended to list only forthcoming projects and that Montgomery Point was not listed because it already was "well underway" when Raytheon compiled its list for the February 23, 2000 REA. Tr. at 2006. Notwithstanding Mr. Taylor's suggestion, the REA list of competing projects is captioned as "Other Projects Currently Performed in Jefferson County and Little Rock[,]" and it includes two projects that also were underway when Raytheon compiled its list. See PX 16 at GP0006964-65 (listing (1) International Paper Co. at Pine Bluff, which commenced December 1999; and (2) El-Dorado Gas Turbine Power Plant, which was "currently underway"). 86/ Mr. Graham's testimony also contradicted Mr. Taylor's, in that Mr. Graham agreed that Raytheon listed projected, not necessarily forthcoming, projects. Tr. at 1925.

On the basis of this evidence, the court cannot find that the Corps personnel responsible for the $22.5 million modification appreciated either the presence of Montgomery Point or the influence that the modification would have on the Joint Venture's labor market. Upon receipt of Part B of the Raytheon REA, Mr. Graham's team petitioned the DCAA to "investigate [Raytheon's list of competing projects] and to travel to Little Rock and spend time with the unions to look at those type of issues [i.e., how many workers Raytheon would lose to the other projects]." Tr. at 1925 (Graham). Although Raytheon's

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86/ In response to defense counsel's question regarding whether Montgomery Point was not included because it was a non-union job, Mr. Taylor testified:

> You asked me that on the deposition, and I was a little perplexed at the time, because the project [Montgomery Point] was already underway. And I don't remember exactly how I answered it then, but having another opportunity to look at more documents since then, since the deposition time, I'm back to more current memories.
>
> . . . .
>
> Just wading through the documents brings back—it's been awhile, of course—and brings back instances and occurrences, and makes them more vivid, by wading through the data.

Tr. at 2003-04. He insisted that the competing projects listed on Part B "weren't ongoing at this time, except for the gas turbine job [El Dorado Gas Turbine Power Plant]," but failed to acknowledge that an additional project—International Paper Co. at Pine Bluff—also was underway and listed as a competing project. See Tr. at 2006.

list named five projects and referenced fourteen others, it omitted Montgomery Point, and no evidence showed that the Corps otherwise commissioned or performed an investigation or evaluation of Montgomery Point. Mr. Taylor's unreliability as a witness discredits his testimony that the topic of Montgomery Point "came up during conversation" with Mr. Lonsford and other Corps employees. Tr. at 2007.

Most significantly, the court holds that the Corps is not liable for the collateral consequences occasioned by a contemporaneous project that ultimately was within the ambit of a separate government agency. The Industrial Operations Command contracted and was responsible for Pine Bluff, and the Corps implemented the $22.5 million modification as Pine Bluff's Project Execution Agency. The Corps's duty not to hinder parties with which it has contracted is not implicated when the Corps, on an unrelated project, acts in accordance with responsibilities that are assumed by designation from another government agency. See Bateson-Stolte, 172 F. Supp. at 457 ("[I]t seems unreasonable to charge one agency with knowledge of what another one is going to do. It would seem that defendant should be held liable only if the agency that dealt with plaintiff had knowledge of the impending employment of this huge labor force."); see also Agredano v. United States, 595 F.3d 1278, 1281 (Fed. Cir. 2010) (restating that no implied-in-fact warranty can be predicated on a government agency's discharge of its regulatory or sovereign functions) (citing D&N Bank v. United States, 331 F.3d 1374, 1378-79 (Fed. Cir. 2003)). The Corps's $22.5 million modification at Pine Bluff conceptually could have had some effect on the Joint Venture's labor market at Montgomery Point, but, as it was implemented pursuant to the Corps's obligation to the Industrial Operations Command, it did not breach a duty that the Corps owed to plaintiffs. See Bateson-Stolte, 305 F.2d at 388-89 (finding that Corps—as a separate government agency—could not be charged with knowledge of location and wage-rate impact of unrelated project).

The implied duty of good faith and fair dealing does not guarantee uninterrupted contract performance. Precision Pine, 596 F.3d at 831. The two breach variations that are recognized by the Federal Circuit in Precision Pine are descriptive, if not rigidly prescriptive or defining. Id. at 829. Notably, the $22.5 million modification was not specifically targeted to eliminate or rescind a provision of the Contract, nor was it a reappropriation of benefits previously guaranteed by the Corps to the Joint Venture pursuant to the Contract. See id. Regarding the latter variation, the Contract did not guarantee a labor force unaffected by unrelated government projects, and plaintiffs cannot expand the Corps's contractual duties beyond those in the Contract or create duties inconsistent with the Contract. See id. at 831. Even if the $22.5 million modification may have had some effect on the Joint Venture's performance, the Corps did not breach the implied duty of good faith and fair dealing.

The court does not shortchange plaintiffs' carefully presented case by not making findings concerning the expert testimony of Prof. Philips, who was qualified to testify on labor economics and econometrics, an "empirical arm" that applies statistics to economics. See Tr. at 2461 (Philips). Throughout the pretrial proceedings, defendant had insisted that Prof. Philips's work was unmoored to a specific or relevant labor market and that he should not be allowed to testify because his analysis did not purport to consider contemporaneous projects at other nearby locations.

The court has found, as a matter of fact, that the Corps, which was tasked with construction at Pine Bluff by the Industrial Operations Command, did not breach an implied contractual duty to the Joint Venture at Montgomery Point by implementing the Raytheon REA. Expert testimony can provide the facts necessary for a finding that a given act breached a contract. See Fed. R. Evid. 702. Prof. Philips opined that Montgomery Point and Pine Bluff constituted an integrated labor market for shared crafts (spanning six southeastern states, with the most weight given to Arkansas and Mississippi) and that wages and incentives at Pine Bluff for shared crafts measurably affected the wages and quality of labor on other projects, among which those at Montgomery Point can be quantified. This testimony presumes that the Corps breached a duty to the Joint Venture and seeks to quantify its impact. The testimony is of no assistance in determining a fact at issue, as no duty was breached by the impact that Prof. Philips's model derived. To the extent that Prof. Philips attempted to prove the existence of a duty (implied from a demonstrable impact), the court rules that Precision Pine forecloses a back-door approach. The court gives Prof. Philips's opinions no weight under Rule 702.

IV. The critical path for Montgomery Point

1. Standard of review

The Government's liability for delay-related damages is limited to those delays that it caused and that hew to the project's critical path. See Wilner v. United States, 23 Cl. Ct. 241, 244 (1991) (citing Broome Constr. v. United States, 492 F.2d 829, 833 (Ct. Cl. 1974)). The critical path links interrelated activities on a construction project, see Wilner v. United States, 24 F.3d 1397, 1399 n.5 (Fed. Cir. 1994), and has been described:

> [T]he critical path method is an efficient way of organizing and scheduling a complex project which consists of numerous interrelated separate small projects. Each subproject is identified and classified as to the duration and precedence of the work. (*E.g.*, one could not carpet an area until the flooring is down and the flooring cannot be completed until the underlying electrical and telephone conduits are installed.) The data is then analyzed, usually by

> computer, to determine the most efficient schedule for the entire project. Many subprojects may be performed at any time within a given period without any effect on the completion of the entire project. However, some items of work are given no leeway and must be performed on schedule; otherwise, the entire project will be delayed. These latter items of work are on the critical path. A delay, or acceleration, of work along the critical path will affect the entire project.

Wilner, 23 Cl. Ct. at 244-45 (quoting Haney v. United States, 676 F.2d 584, 595 (Ct. Cl. 1982)) (internal quotation marks omitted); see also Wilner, 24 F.3d at 1399 n.5 ("A delay to an activity that is on the 'critical path' usually results in a corresponding delay to the completion of the project.").

Rarely does the construction of a complex project advance without variation to its original schedule. As the original grouping of interrelated activities realigns and creates a reorganized sequence of work, the critical path may evolve. Wilner, 23 Cl. Ct. at 245. As work proceeds, "'items not originally on the critical path can become critical.'" Id. (quoting Fortec Constructors v. United States, 8 Cl. Ct. 490, 505 (1985)). Consequently, "in order to grasp accurately the delays that a project takes on, the critical path should be updated regularly." Id. An *ex post facto* determination of the critical path "is crucial to the calculation of delay damages [in] that only construction work on the critical path had an impact upon the time in which the project was completed." Wilner, 24 F.3d at 1399 n.5 (quoting G.M. Shupe, Inc. v. United States, 5 Cl. Ct. 662, 728 (1984)). Further, determining responsibility for delay is essential, as "[a] contractor typically may not recover if government-caused delay is concurrent with additional delay not caused by the Government, such as weather or contractor delay." 87/ Wilner, 23 Cl. Ct. at 245 (citations omitted).

87/ This rule is less rigid than it may appear. As explained by the Federal Circuit:

> The evidence cited . . . is sufficient to uphold the . . . factual finding that [the contractor] caused the delay.
>
> This conclusion, however, does not mean that [the contractor] cannot prevail. The case the government relies on to support the proposition that a contractor cannot recover when there is a concurrent delay, Merritt-Chapman & Scott Corp. v. United States, 528 F.2d 1392, 208 Ct. Cl. 639 (1976), did not hold that a contractor could not prove the government's delay separate and apart from that chargeable to the contractor.

2. Plaintiffs' as-planned analysis

The Joint Venture originally planned to construct the lock and dam, install all electrical and mechanical systems, test everything, and then rewater. Tr. at 469 (Herrick). Schedule 0013, prepared on June 30, 1998, and approved by the Corps on July 13, 1998, contemplated the solicitation's order-of-work provision. See JX 137. Portions of Schedule 0013 deviated from the proposed order of work, Tr. at 464-66 (Herrick), and Mr. McDonough, plaintiffs' critical path expert, attested that the original order of work permitted variation. Tr. at 2795-96. Still, the order of work—ergo, Schedule 0013—was "pretty specified," "logical," and "probably follow[ed] the contract sequence." Tr. at 2795 (McDonough). The order of work enumerated, in pertinent part:

> 18. Construct the lock and dam. . . . Construct the control tower including all operating system controls.
>
> . . . .
>
> 20. Construct the floating guide walls after the lock walls have been completed on the lock floor.
>
> . . . .
>
> 22. Operate, inspect and dry test structural systems. This includes, but is not limited to[,] miter gates, tainter valves[,] associated hoists and operating machinery; hinged crest gate dewatering structure, . . . control tower, floating guide walls and all other structures; . . .
>
> 23. Operate, inspect and dry test mechanical systems. This includes, but is not limited to[,] hydraulic, compressed air, raw water, potable water,

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87/ (Cont'd from page 102.)

> The general rule is that "[w]here both parties contribute to the delay neither can recover damage[s], unless there is in the proof a clear apportionment of the delay and expense attributable to each party." Courts will deny recovery where the delays are concurrent and the contractor has not established its delay apart from that attributable to the government.

Klingensmith, Inc. v. United States, 731 F.2d 805, 809 (Fed. Cir. 1984) (citation omitted).

> sewage, sump-drainage pumping, diesel generating, elevator, HVAC systems, etc. . . .
>
> 24. Operate, inspect and dry test electrical systems. This includes, but is not limited to[,] those supporting the mechanical systems, power distribution, lock and dam operating machinery control and instrumentation systems; submerged systems . . . . and cathodic protection systems. . . . Perform all punch list and remedial work.
>
> 25. Rewater the cofferdam. All dry operational testing and inspection will have been completed prior to rewatering.

DX 38.

Schedule 0014 accounted for the December 1997 through April 1998 funding shutdown and intervening weather-related delays, but otherwise appropriated much of Schedule 0013. See Tr. at 387 (Herrick); Tr. at 3328 (Caruso). Schedule 0014 departed from the proposed sequence of activities by scheduling the construction of the floating guidewalls to commence after the rewatering of the cofferdam within the lock walls. Compare Tr. at 2796-98 (McDonough) (discussing Schedule 0014), with DX 38 (Order of Work, scheduling the construction of the floating guidewalls prior to rewatering). On cross-examination Mr. McDonough testified that the Joint Venture could have constructed the floating guidewalls elsewhere and subsequently launched them on-site, although with greater difficulty than constructing them on the lock floor. Tr. at 2797-98. Moreover, with Schedule 0014, the Joint Venture continued to plan for the installation and testing of all electrical and mechanical systems—including those necessary for major systems like the tainter valves, miter gates, and crest gates, as well as minor systems—prior to rewatering. See Tr. at 1146 (Herrick). The majority of these installations and tests were scheduled to occur between August 2001 and March 2002, prior to a March 2002 rewatering. See DX 901 at 47-48. Mr. McDonough believed that this arrangement was "reasonable." Tr. at 2803-04. Lighting system installation, one of the last electrical-related activities to be completed, was to finish by May 23, 2002, with testing complete by June 3, 2002, and the substantial completion date of the Project was set for December 3, 2002. Tr. at 420 (Herrick) (agreeing with a "float" of 115 days before the lighting activity would interfere with the critical path). Subsequent schedule updates followed the logic of Schedule 0014. Tr. at 198, 388-89 (Herrick).

Mr. McDonough proposed a critical path premised on an update to Schedule 0014 that was submitted by the Joint Venture on May 21, 2000—Update 005B. Between the Corps's August 26, 1997 notice to proceed and May 21, 2000, Mr. McDonough described an uncontested "as-built" period that includes the Joint Venture's early activities, such as the

construction of the cofferdam, the assembly of the batch plant, and the temporary funding shutdown. See Tr. at 2699. Mr. McDonough selected Update 005B because, by May 21, 2000, "the batch plant [was] ready, the cofferdam [was] completed, the river [was] diverted and [the Joint Venture was] ready to build the project in the dry . . . ." Tr. at 2699. Update 005B permitted Mr. McDonough to bypass the parties' preceding, agreed-upon delays, e.g., the funding shutdown, and to predicate his critical path analysis on a schedule update that was submitted immediately prior to the delays at issue in the instant litigation. See Tr. at 2700-01 (McDonough).

Plaintiffs' as-planned critical path is a hypothetical order of work linking a series of planned activities marked by eight "reality" milestones, or "turning points in the project." Tr. at 2705 (McDonough). Mr. McDonough charted the milestones and the as-planned critical path:

- **Milestone 1** (June 28, 2000): The beginning of concrete operations for the lock and dam. The critical path tracks concrete operations through Milestone 2.
- **Milestone 2** (September 18, 2000) through **Milestone 3** (January 1, 2001): Mr. McDonough's proposed measured mile for concrete operations. The critical path continues to track concrete operations. Following Milestone 3 and leading to Milestone 4, the critical path includes expanded concrete operations on the control tower and lock monoliths, as well as the installation of mechanical and electrical systems.
- **Milestone 4** (January 23, 2002): Concrete operations end. Leading to Milestone 5, the critical path tracks the testing of mechanical and electrical systems and, immediately prior to Milestone 5, the removal of the cofferdam.
- **Milestone 5** (March 7, 2002): Rewatering begins. The critical path continues to follow the removal of the cofferdam and includes the construction of the floating guidewalls. Concurrent activities include the installation and testing of the CGDS, as well as the excavation and construction of revetments.
- **Milestone 6** (September 9, 2002): Complete cofferdam removal. The critical path includes the installation of the floating guidewalls and final dredging of the channel.
- **Milestone 7** (November 27, 2002): Complete floating guidewalls.
- **Milestone 8** (November 30, 2002): Substantial completion.

See Tr. at 2702-05.

3. Plaintiffs' as-built analysis

Mr. McDonough reviewed the daily and monthly records of the Joint Venture and the Corps to create an as-built critical path, which he continued to pace and to segment by the

same eight milestones. See Tr. at 2706 (McDonough). Thus, with some deviation that neatly follows plaintiffs' claims, plaintiffs' as-built critical path essentially charts the same activity sequence proposed by the as-planned critical path. Plaintiffs' as-built critical path includes Mr. McDonough's milestones:

- **Milestone 1** (June 27, 2000): The beginning of concrete operations for the lock and dam. The critical path tracks concrete operations through Milestone 2.
- **Milestone 2** (December 31, 2000) through **Milestone 3** (April 30, 2001): Mr. McDonough's as-built measured mile for Montgomery Point. Following Milestone 3 and through Milestone 4, the critical path follows concrete operations, including (a) the lock, which concluded by February 8, 2003; (b) the control tower, which concluded by June 23, 2003; and (c) the floating guidewalls, which concluded in October 2003. Mr. McDonough testified that "it's obvious from a construction standpoint that the concrete is the critical path, it's also dominated by resources, carpenters, form work, and so forth, not only in the walls of the lock but also for the floating guidewalls." Tr. at 2716. Mr. McDonough also tracks—but does not include in plaintiffs' as-built critical path—the installation of the Project's operating systems, including tainter valves and miter gates, beginning in April 2002.
- **Milestone 4** (October 3, 2003): The Joint Venture commences testing operating systems. At this point the critical path follows the systems' testing. According to Mr. McDonough, "the reason the [October 3, 2003] date is selected is that's the first day that's in the [daily reports] where IHP runs the tainter valve, soaks the tainter valves to test it for the first time." Tr. at 2716. Mr. McDonough contended that "concrete is supposed to be completed for the critical path to switch to the testing." Tr. at 2716.
- **Milestone 5** (January 16, 2004): Rewatering begins. The critical path concurrently tracks the Joint Venture's work on the CGDS—which concluded with the Corps's December 2, 2004 deletion of wet-test requirements—and the removal of the cofferdam.
- **Milestone 6** (June 21, 2004): Complete cofferdam removal. The critical path includes dredging and excavation, and it concurrently continues through the Joint Venture's CGDS wet-testing until its December 2, 2004 deletion. A July 30, 2004 letter from Mr. Clemans to the Joint Venture indicated that "the Government acknowledges[,] on the basis of your schedule, that the river stages are delaying the Crest Gate Dewatering Structure Wet Testing, which is the longest path to completion." JX 1726; see also JX 1832 (September 28, 2004 e-mail from Mr. Clemans expressing concern about delayed CGDS wet-tests).
- **Milestone 7** (December 20, 2004): Install floating guidewalls. After accounting for a six-month delay attributable to high water, the critical path links wet testing with two days of revetment work completed on June 11, 2005, and June 12, 2005. Plaintiffs highlight a December 21, 2004 e-mail from Mr. Clemans stating that "we

probably should figure the dredging, revetment work and stone work as the most critical schedule items once the CGDS testing [deleted December 2, 2004] falls off the critical path." JX 1948.

- **Milestone 8** (June 13, 2005): Substantial completion. Plaintiffs note COR Eggburn's October 18, 2005 notice to the sureties, which stated that "[t]he access road and revetment work was completed as of June 13, 2005, and this date is considered as substantial completion." JX 2002.

Mr. McDonough's testimony included his analysis of the as-built critical path delays attributable to inclement weather, to the Corps, and to the Joint Venture.

4. Critical path conclusions

Mr. McDonough's critical path analysis suffered through the withering cross-examination of defense counsel; the contrasting critical path analysis of defendant's critical path expert Mr. Caruso; and its uncanny resemblance to a "total time" critical path analysis. 88/ Cross-examination assaulted Mr. McDonough's inclusion of all concrete activity on plaintiffs' as-built critical path—which extends through the construction of the

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88/ Attacking Mr. McDonough's delay calculations as approximating a "total cost" approach, see Tr. at 2835, defense counsel alluded to a criticism of Mr. McDonough's critical path analysis from Morganti National, Inc. v. United States, 49 Fed Cl. 110 (2001), an opinion in which Judge Firestone found:

> Although Mr. McDonough purported to compare [plaintiff's] as-built performance against [plaintiff's] as-planned . . . schedule, his analysis is in essence a "total time" approach, which is of virtually no value. Mr. McDonough "simply takes the original and extended completion dates, computes therefrom the intervening time or overrun, points to a host of individual delay incidents for which defendant was allegedly responsible and which 'contributed' to the overall extended time, and then leaps to the conclusion that the entire overrun time was attributable to defendant." Law v. United States, 195 Ct. Cl. 370, 382 (1971). It is well settled that this "total time" theory of proving delay is insufficient to meet the contractor's burden to prove that government-caused delay actually delayed the overall completion of the project. [Mel Williamson, Inc. v. United States, 229 Ct. Cl. 846, 852 (1982) (citing Law, 195 Ct. Cl. at 382)]. The "total time" approach to proving delay is "as unsatisfactory as the 'total cost' method of proving damages," because it assumes that the government is responsible for all of the delay. Law, 195 Ct. Cl. at 382.

Id. at 134.

floating guidewalls—at the expense of omitting the installation of the Project's control systems in the control tower. See Tr. at 2800 (McDonough). Selected schedule updates submitted by the Joint Venture in 2003 89/ suggest that work proceeded simultaneously in these two areas, in addition to revealing the Joint Venture's subjective impression of the Project's critical path:

- **February 2002**: "The current critical activity is concrete. Block 19 [the control tower foundation] through the control tower to lock and dam testing and the navigation pass dam to cofferdam removal is the critical." JX 1126.
- **May 2003**: "The critical path is electrical wire to electrical systems testing to lock & dam dry testing to cofferdam removal. . . . Work is concentrated in the control tower to accommodate electrical work progress." JX 1373.
- **July 2003**: "The critical path is installation of the mooring area fenders [floating guidewalls] to rewatering to remove cofferdam. This is a change from last month. The proposal has been submitted to the [Corps], but has not been negotiated. Work is concentrated in the control tower to accommodate electrical work progress and to ensure that rewatering is not impacted." JX 1388.
- **October 2003**: "The critical path is completion of the repairs to the stoplog guides to dry testing the stoplogs and concrete of monolith R24. The dry operational test of the crest gates, miter gates, tainter valves and [CGDS] closely follows that path. . . . Work continues to be concentrated in the control tower to accommodate electrical and mechanical work." JX 1436.
- **November 2003**: "The critical path is concrete of monolith R24. The rewatering of the cofferdam, dry operational test of the crest gates, miter gates, tainter valves, and [CGDS] closely follows [sic] that path. Work continues to be concentrated in the control tower to accommodate electrical and mechanical work." JX 1457.

Mr. McDonough concurred that the control systems' installation originally was required to be complete prior to conducting dry-tests and rewatering. See Tr. at 2802. Indeed, according to Schedule 0014, the control systems and the major operating systems, i.e., the tainter valves, the miter gates, and the crest gates, were to be complete and dry-tested prior to rewatering. Testimony of fact witnesses indicated that site rewatering, and,

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89/ Mr. McDonough would have the court reject the schedule updates as indicators for the critical path: "[U]pdates are dangerous because they reflect planned logic[,] . . . not as built logic." Tr. 2832 (McDonough). Mr. Caruso probably would concur, as he warned that "[s]ometimes they were reflective of the electronic data and sometimes they weren't." Tr. at 3346; see also Tr. at 3391 (Caruso) ("[T]he narratives aren't perfect with the schedule updates, but in some cases they do match . . . .").

therefore, the installation of control systems and the dry-testing—required to be conducted prior to rewatering—became a topic of particular urgency in fall 2003 and notably after the August 11, 2003 site rewatering meeting. The installation of the control systems was to occur in a confined, restrictive space, requiring the close coordination by the Joint Venture and its subcontractors. The monthly schedule updates submitted by the Joint Venture substantiate this concentrated work. Whereas Schedule 0014 projected that dry-testing's predecessor activities would last from approximately August 2001 until March 2002, the as-built records reveal that the installation of the Project's major operating systems spanned from June 2002 until December 2003, and that the control system equipment installation lasted from February 2003 until December 2004. Testing of the control systems went from October 2003 until December 2004, followed by a period of high water between December 2004 and June 2005 and the further testing of the operating systems in June 2005.

Although these activities overcame the expected durations of Schedule 0014, Mr. Herrick did not recall any discussions of expediting the installations—particularly the installation of the control systems. Rather, as the Joint Venture planned its testing and rewatering activities in 2003, Mr. Herrick deleted the "predecessor link code" tying rewatering to the complete installation of the control systems. The Project consequently was dry-tested locally, without using the control tower systems. Mr. McDonough excused this decision. See Tr. at 2804 ("This was accepted and was used and it made sense because it expedited the project."). Further, Mr. McDonough rejected the implication that the electrical and mechanical installations were on the Project's critical path. He suggested that "both parties, from the records, were aware that the control system, the electrical was not, in fact, an as-built critical path, because, otherwise, they would not have dawdled and made all these changes to the control system." Id. Nevertheless, that the Joint Venture proceeded to rewater the site with a limited dry-testing plan did not waive the requirement that the control systems ultimately be installed completely. Whether or not the Joint Venture "dawdled" on the control-system installation, the as-built schedule—drawn from Update 412C, a December 19, 2004 update to Schedule 0014, and Update 506A, submitted in summer 2005—reveals an extended period of installation and testing that was not foreseen by Schedule 0014 and that runs as a concurrent alternative to Mr. McDonough's proposed critical path.

Mr. McDonough insisted on cross-examination that the installation and testing of the operating systems had "float," i.e., flexible start and end dates that ran concurrently with, but were independent from, the Project's critical path sequence. See Tr. at 2810-15. Although the Joint Venture did not conclude its final wet-testing of the miter gates until June 2005, Mr. McDonough stated that the Joint Venture could have performed the wet-testing in summer 2004, but for a critical path encompassing the Corps's instructions to attend to the CGDS wet-testing. See Tr. at 2811-12. Mr. McDonough acknowledged that "there's no mechanical or physical connection between [the CGDS and the miter gate wet-testing]," Tr. at 2812,

from which the court can infer that the Joint Venture could have worked at a faster pace to complete its installation and testing activities. Still, Mr. McDonough denied that the record of extended installation and testing activities is evidence of an alterative critical path, a sequence of activities apart from that proposed by plaintiffs, and he suggested, instead, that,

> from a scheduling standpoint, . . . [i]f my critical path is going through the crest gate de-watering system, that means other activities have float. That means I can get to them when I need to, especially since the Corps is using the lock. There's no big rush to do the wet test on the miter gates. So, the relationship is a schedule relationship and the critical path[']s going through the crest gate de-watering system, the Corps lets almost a year go by and then deletes it [the CGDS wet-test]. So that connects . . . the miter gate wet testing. You can't look at it on its own and say why didn't they do that on schedule.

Tr. at 2812-13.

Although Mr. McDonough could not specify a particular activity that was delayed by the fraught CGDS wet-testing, he insisted that it was on the critical path. See Tr. at 2903 ("The completion of the project [was held up waiting for the CGDS wet-testing] . . . . [But,] it's hard to say what [it was] holding up."). He suggested that the criticality of the CGDS wet-testing created "float" for other activities, e.g., the revetment work and wet-testing, which later became part of the critical path after the Corps deleted the CGDS wet-testing requirements. See Tr. at 2906. These activities could have been performed earlier, but the Joint Venture "didn't have any big hurry-up to do that because [it] knew [it] couldn't complete the project until the Corps deleted the CGDS and then changed the whole schedule status." Tr. at 2906. Following the deletion of the CGDS wet-testing, as the critical path shifted back to follow a path set by the cofferdam removal and excavation, delays occurred that postponed the installation of the floating guidewalls, which Mr. McDonough described as the "critical last really physical activity on the project . . . ." Tr. at 2905 (acknowledging that six months of high water, two days of testing, and revetment work followed the floating guidewall installation). Mr. McDonough's proposed critical path tracks these delays and activities.

Mr. Caruso's testimony detracted from Mr. McDonough's reliance on Update 005B. Cf. Tr. at 3334-37 (Caruso). Including Update 005B, the Joint Venture submitted at least 174 schedule updates, all with modifications to Schedule 0014. Recounting section 01310, specification 3.5.3, the Contract provision governing the addition and deletion of activity relationships, Mr. Caruso affirmed that "only project schedule changes that have been previously approved by the Contracting Officer shall be included in the schedule submission." Tr. at 3337 (quoting JX 89 at FF052876). These approvals were not given for

the 174 schedule updates. See id. On cross-examination Mr. Caruso conceded that he had used unapproved Schedule 0014 for his own critical path analysis. Tr. at 3438-39 (Caruso) (agreeing that Schedule 0014, though not formally submitted and approved, was used and accepted as a baseline); see also Tr. at 388-89 (Herrick) (testifying that, although the Corps did not approve Schedule 0014, "I did discuss [Schedule 0014] with the government, yes, and we agreed that it was the approved baseline schedule"). Mr. Caruso also conceded that Mr. McDonough's use of Update 005B was inconsequential to the differences between Mr. McDonough's critical path and the critical path that he proposed. See Tr. at 3452.

The essence of Mr. Caruso's objection to Mr. McDonough's critical path analysis is that

> what separates [the critical path method] from bar charts and other things [is] that there are relationships in the schedule of both planned and actual [activities] that occur, and we have to look at that and make a determination along those planned relationship paths [regarding] which one forms the longest continuous path from notice to proceed through substantial completion.

Tr. at 3341 (Caruso). Mr. Caruso viewed his own critical path analysis as properly accounting for the nexus between the as-planned schedule and the as-built schedule, because he was mindful of the Joint Venture's as-planned schedule while tracking the Project's fluid as-built sequence and tracing a critical path to substantial completion. Mr. McDonough's analysis, on the other hand, is unmoored from Schedule 0014 and Update 005B. See Tr. at 3342-43 (Caruso). Mr. McDonough's critical path "is a bar chart," Tr. at 3341, in that it merely shows "activities that move right and left without being constrained by predecessors and successors," Tr. at 3341. The court agrees that, without preceding and succeeding constraints tying its activities to substantial completion, Mr. McDonough's bar chart is detached from the critical path.

Mr. Caruso substantiated his characterization of plaintiffs' critical path with specific objections to the inclusion of particular activities on Mr. McDonough's critical path. See Tr. at 3421-22. He contended that the CGDS dewatering system wet-test was never on the critical path "[b]ecause it doesn't impact anything." Tr. at 3421 ("First of all, it has no relationship to control tower system testing. It has no relationship to wet testing when you're done. It's deleted on December 2, 2004. It does not impact the work that is taking the longest, which is the control system in place."). Downstream dredging was never on the critical path because it originally was scheduled to be completed after the control system testing and wet-testing; the Joint Venture merely completed the downstream dredging in advance. See Tr. at 3422 (Caruso). The revetment work was never on the critical path—it was plotted subsequent to the control system testing on the order of work, see Tr. at 3422

(Caruso); as with the downstream dredging, it was completed early, and it did not affect the Project's substantial completion.

Mr. Caruso's proposed critical path begins with Mr. McDonough's, tracing the Joint Venture's early concrete activities. It later deviates to follow the installation and testing of the Project's control and operating systems. Thus, whereas Mr. McDonough's critical path follows the Joint Venture's concrete placement until October 2, 2003, then shifts to follow the Board claims incrementally, Mr. Caruso's critical path from June 28, 2000, until January 25, 2002, follows the concrete for the lock and the control tower's foundation; 90/ from February 19, 2002, until February 20, 2003, tracks the higher-elevation placements of concrete in the control tower; from February 21, 2003, until December 17, 2004, follows the installation and testing of the control system equipment and motor control center; 91/ and, from June 9, 2005, until June 10, 2005, 92/ covers the wet-testing of operating systems. Mr.

90/ On a macro level, Mr. Caruso specifically traces his critical path from the lock concrete to the control tower concrete because the critical path

> cascades through the concrete; and then . . . down to the install motor control center, install control system, and test control system. So the foundation, if you will, is the [control tower foundation]. The concrete is the control tower, and that essentially makes a house, if you will, for the motor control center, the control [console], and then, of course the testing of that equipment.

Tr. at 3356-57 (Caruso); see also Tr. at 3366 (Caruso). Mr. Caruso denied that the construction of the floating guidewalls—as seemingly reflected on Mr. McDonough's critical path—had to occur before the testing of the control systems could commence. See Tr. at 3399.

91/ In addition to the early stages of concrete placement, a second critical path overlap occurs from October 6, 2004, until December 17, 2004, for which both Messrs. Caruso and McDonough account for the testing of operating systems on the critical path. See Tr. at 3350-51 (Caruso).

92/ A third critical path overlap occurs from June 9, 2005, until June 10, 2005, a two-day period during which the critical paths of both Messrs. McDonough and Caruso follow wet-testing. See Tr. at 3351 (Caruso).

Messrs. McDonough and Caruso also agree that June 13, 2005, was the Project's substantial completion. Nevertheless, Mr. McDonough's critical path follows the Joint Venture's revetment work on June 11, 2005, and June 12, 2005. Mr. Caruso's critical path

Caruso generally attributes activity lulls in his critical path to delays caused by inclement weather and, at times, the Joint Venture's failure to proceed. Less elaborate than Mr. McDonough's critical path, Mr. Caruso's critical path does not track the eight "reality" milestones that were designated retrospectively by Mr. McDonough. It offers a narrative of the Joint Venture's activities that Mr. Caruso claims accounts for as-built delays and events and bears greater resemblance to the original order of work, schedules, and intermittent updates. 93/ The court finds that Mr. Caruso's critical path reflects a more recognized approach to charting the critical path.

The court need not accept Mr. Caruso's critical path to find that Mr. McDonough's analysis does not correctly reflect the overall progress and interrelationships of the Project activities. Mr. McDonough's analysis temporally links as critical the activities for which plaintiffs seek compensation, while discounting the impact of activities that occurred simultaneously or concurrently and that ran through the Project to its substantial completion. Plaintiffs nevertheless proved that concrete placement governed the critical path until October 3, 2003.

With respect to the Board claims apart from the control tower delays claim, see infra Part V.2, however, Mr. McDonough could not establish delay on the critical path. Mr. Caruso was persuasive that the critical path deviated from concrete placement to completion of mechanical/electrical work in the control tower coextensive with the delay episodes that

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92/ (Cont'd from page 112.)

accounts for these two days by following on-going control-system testing, which was only 74% complete when the Corps declared the Project's substantial completion. See Tr. at 3444-45 (Caruso) (agreeing with cross-examination that his critical path "link[s] . . . to an activity that continues past substantial completion"). Crest gate wet-testing was completed after substantial completion, in August 2005. See Tr. at 3413 (Caruso).

93/ Schedule 0014 originally projected that, after the control tower was operationally complete, the Joint Venture would dry-test the control and operating systems, then rewater the cofferdam, then wet-test. See Tr. at 3403 (Caruso). According to Mr. Caruso, when Mr. Herrick modified the dry-testing schedule in 2003—deleting certain successor and predecessor link codes in August 2003 and December 2003—these relationships changed, and the critical path no longer included dry-testing the operating systems. Tr. at 3404-08. Further, Mr. Caruso implied that rewatering became a non-critical activity with float because "[t]he path as it went through dry testing to re-water to wet testing now just [goes] to test control system equipment to wet testing." Tr. at 3408; see also Tr. at 3410-11 (reconciling monthly schedule narratives with dry-testing changes).

plaintiffs attribute to the CGDS and other Board claims. The contemporaneous documents pointed to activities in completing equipment installation in the control tower, as well as the CGDS, but the court was persuaded by documentary evidence that the mechanical/electrical work consistently was prolonged and was dominant during the entire period leading to substantial completion.

V. Board claims

Plaintiffs allege that, after the Joint Venture began construction on the control tower, the Corps's subsequent actions involving the control tower and other items of work changed the Contract and delayed completion of the Project. These alleged Contract changes and Project delays constitute the following four claims:

> (1) delayed response to [RFI 787] relating to the construction of the concrete control tower, resulting in delays to the completion of the Project [the "control tower delays claim"]; (2) changes to the requirements for rewatering of the site, resulting in delays and additional costs [the "site rewatering claim"]; (3) delays and additional costs relating to the testing of the Crest Gate Dewatering System [the "CGDS test claim"]; and (4) revisions to the downstream excavation limits, which resulted in delays and additional costs [the "revisions to downstream excavation limits claim"].

Third Am. Compl. filed Jan. 6, 2009, at 2. Upon plaintiffs' motion these claims—filed with the ASBCA under Appeals Nos. 55669, 55670 & 56560—were transferred and consolidated with No. 04-1692C by order entered on October 17, 2008. The Board claims primarily implicate two issues: first, plaintiffs' entitlement under the Contract's Changes clause and the constructive changes doctrine; and second, the implied duty of good faith and fair dealing. Each of the Board claims is discussed separately.

1. Standard of review

1) The Contract's Changes clause and the constructive change doctrine

The Contract incorporated the FAR's changes provision. See JX 89 at FF090434 (incorporating FAR 52.243-4 (1987)). The Contract's Changes clause provides, in pertinent part:

> (a) The Contracting Officer may, at any time, without notice to the sureties, if any, by written order designated or indicated to be a change order,

make changes in the work within the general scope of the contract, including changes —

(1) In the specifications (including drawings and designs);
(2) In the method or manner of performance of the work;
(3) In the Government-furnished facilities, equipment, materials, services, or site; or
(4) Directing acceleration in the performance of the work.

(b) Any other written or oral order (which . . . includes direction, instruction, interpretation, or determination) from the Contracting Officer that causes a change shall be treated as a change order under this clause . . . .

(c) Except as provided in this clause, no order, statement, or conduct of the Contracting Officer shall be treated as a change under this clause or entitle the Contractor to an equitable adjustment.

(d) If any change under this clause causes an increase or decrease in the Contractor's cost of, or the time required for, the performance of any part of the work under this contract, whether or not changed by any such order, the Contracting Officer shall make an equitable adjustment and modify the contract in writing. . . . In the case of defective specifications for which the Government is responsible, the equitable adjustment shall include any increased cost reasonably incurred by the Contractor in attempting to comply with the defective specifications.

Id. at FF090434-35. A finding of breach of the implied duty of good faith and fair dealing will also demonstrate a change to the contract. See J. A. Jones Constr. Co., ASBCA No. 43344, 96-2 BCA ¶ 28,517, at 142,420 (recognizing that breach of duty of good faith performance may be treated as breach or constructive change); John Cibinic, Jr., Ralph C. Nash, Jr. & James F. Nagle, Administration of Government Contracts 460 (4th ed. 2006).

Constructive changes are incorporated into the Changes clause. See FAR 52.243-4(b) ("Any other written or oral order . . . from the Contracting Officer that causes a change shall be treated as a change order under this clause . . . ."). The constructive change doctrine recognizes that "a constructive change occurs where a contractor performs work beyond the contract requirements without a formal order, either by an informal order or due to the fault of the Government." Int'l Data Prods. Corp. v. United States, 492 F.3d 1317, 1325 (Fed. Cir. 2007). In bringing a claim of constructive change, plaintiffs have the burden to furnish evidence showing that the Government "demanded work above and beyond that in the

contract." Id. The court asks whether the contracting officer "constructively altered the contract, either expressly or implicitly, by requiring performance at variance with that set forth in the contract." Ace Constructors, Inc. v. United States, 499 F.3d 1357, 1361 (Fed. Cir. 2007). In reaching its determination, the court consults the contract's language. Aydin Corp. v. Widnall, 61 F.3d 1571, 1577 (Fed. Cir. 1995). "In contract interpretation, the plain meaning of the contract's text controls unless it is apparent that some other meaning was intended and mutually understood." Ace Constructors, 499 F.3d at 1361.

A constructive change is an equitable adjustment to the contract that seeks to "make a contractor whole when the Government modifies a contract." Int'l Data Prods., 492 F.3d at 1325. If the court finds that the Government constructively changed the contract, "then any increased costs flowing directly and necessarily from that change would be compensable." Sauer Inc. v. Danzig, 224 F.3d 1340, 1348 (Fed. Cir. 2000); see also Aydin, 61 F.3d at 1577 ("Where it requires a constructive change in a contract, the Government must fairly compensate the contractor for the costs of the change."). Compensation includes any additional costs incurred in performing the extra work, "including a reasonable profit on this work." States Roofing Corp. v. Winter, 587 F.3d 1364, 1373 (Fed. Cir. 2009).

2) Duty of good faith and fair dealing

Every contract includes the implied covenant of good faith and fair dealing. Precision Pine, 596 F.3d at 828; Centex, 395 F.3d at 1304. This joint undertaking "imposes obligations on both contracting parties that include the duty not to interfere with the other party's performance and not to act so as to destroy the reasonable expectations of the other party regarding the fruits of the contract." Centex, 395 F.3d at 1304. The covenant also imposes obligations of diligence and cooperation, and a breach of these obligations is a contractual breach. Malone, 849 F.2d at 1445; see also Essex Electro Eng'rs, 224 F.3d at 1291 ("Every contract, as an aspect of the duty of good faith and fair dealing, imposes an implied obligation 'that neither party will do anything that will hinder or delay the other party in performance of the contract.'" (quoting Luria Bros. v. United States, 369 F.2d 701, 708 (1966))). "The United States, no less than any other party, is subject to this covenant." Precision Pine, 596 F.3d at 828 (citing First Nationwide Bank, 431 F.3d at 1349).

"Both the duty not to hinder and the duty to cooperate are aspects of the implied duty of good faith and fair dealing." Id. at 820 n.1 (citing Essex Electro Eng'rs, 224 F.3d at 1291)). The specifics of the parties' duties under this covenant are dependent on the particular circumstances of the case. See Milmark Servs., Inc. v. United States, 731 F.2d 855, 859 (Fed. Cir. 1984).

The Government breaches these duties when it acts unreasonably under the circumstances, *viz.*, if it unreasonably delays the contractor or unreasonably fails to cooperate. See C. Sanchez & Son, 6 F.3d at 1542 ("The government must avoid actions that unreasonably cause delay or hindrance to contract performance."); Commerce Int'l Co. v. United States, 338 F.2d 81, 86 (Ct. Cl. 1964) (determining that "breach of [the] obligation of reasonable cooperation" depends upon "particular contract, its context, and its surrounding circumstances").

Precision Pine, the Federal Circuit's most recent explication of the implied duty of good faith and fair dealing, does not change the standards cited above. The Federal Circuit's opinion is directed to the trial court's liability decision, see Precision Pine & Timber, Inc. v. United States, 50 Fed. Cl. 35, 65-72 (2001) ("Precision Pine I"), which misconstrued a contractual provision to find that the U.S. Forest Service breached an express warranty and the implied duty of good faith and fair dealing due to delays attendant to the misconceived warranty. Because defendant trumpets the decision as a *deus ex machina* for all of plaintiffs' claims involving Government-caused delay, and because Precision Pine's holding as to the implied duty of good faith and fair dealing impacts the allegations of Government-caused delay in the Board claims differently from those implicated by plaintiffs' labor claim, a further analysis of Precision Pine and its holding is warranted.

Precision Pine had its genesis in fourteen timber-harvesting contracts between Precision Pine & Timber, Inc., and the Forest Service. See Precision Pine I, 50 Fed. Cl. at 38. Following the listing of the Mexican Spotted Owl as a threatened species, a federal district court held that the Forest Service breached its obligations under the Endangered Species Act, 16 U.S.C. § 1536 (2006) (the "ESA"), for failing to consult with the U.S. Fish and Wildlife Service, as required by the ESA, see Precision Pine I, 50 Fed. Cl. at 38-39. In compliance with the federal district court's order enjoining further timber harvesting until the Forest Service completed the formal consultation process, the Forest Service suspended the fourteen contracts. Id. (citing Silver v. Babbitt, 924 F. Supp 976, 989 (D. Ariz. 1995)).

The judge handling the liability phase of trial in the Court of Federal Claims held the Forest Service liable for breach of contract under three theories, all of which were rejected by the Federal Circuit. First, the trial court construed a contract clause—common to the contracts—providing for the location of plants and animals needing "special protective measures" under the ESA as expressly warranting that the "Forest Service had identified any 'special measures' necessary to comply with the ESA at the time the contracts were entered into, based on an analysis of reasonably available information." Precision Pine, 596 F.3d at 825 (citing Precision Pine I, 50 Fed. Cl. at 66-67 (citing Hercules v. United States, 516 U.S. 417, 425 (1996) ("When the [G]overnment provides specifications directing how a contract is to be performed, the Government warrants that the contractor will be able to perform the

contract satisfactorily if it follows the specifications."))). For seven of the contracts, the trial court held the Forest Service liable for breach of this express warranty for failing to follow the ESA's consultation requirements following a decision of the United States Court of Appeals for the Ninth Circuit that clarified the scope of the ESA. See id. (citing Precision Pine I, 50 Fed. Cl. at 69-70). The breach of the express warranty included misrepresentations as to "the accuracy and completeness of the special measures [in the clause] because in fact the Forest Service had 'no reasonable basis' to know whether those measures were adequate, having failed to follow the procedures required by the ESA." Id. at 825-26 (quoting Precision Pine I, 50 Fed. Cl. at 69-70). Second, following its finding of an express warranty and the Forest Service's breach thereof, the trial court held that the Forest Service breached its implied duty to cooperate as to the seven contracts. See Precision Pine I, 50 Fed. Cl. at 70.

The Federal Circuit was not persuaded by the circular reasoning underlying the trial court's theory of express warranty and reversed the ruling of liability on both grounds. The plain language of the clause created no express warranty that the Forest Service would follow any procedures or comply with any ESA requirements when it developed the special protective measures listed in the clause. See Precision Pine, 596 F.3d at 826. Nor did the clause incorporate—either expressly, by reference, or otherwise—the requirements of the ESA. See id. at 826-27. Unlike the contract at issue in Hercules, 516 U.S. at 425, the Forest Service contracts did not constitute defective specifications, see id. at 827. Therefore, the clause "did not obligate the government to take any particular steps in devising the special protection measures," i.e., create new rights under the contract. Id. Because no express warranty was created, no misrepresentation could have occurred, see id., nor was there a breach of the implied duty to cooperate for those seven contracts, see id. at 827 n.7.

It is within this context, an express warranty misconstrued by the trial court, that the Federal Circuit reversed the trial court's third basis for liability, its finding that the Forest Service breached its implied duty not to hinder eleven of the contracts. See id. at 827-31. The trial court had found that the length of the suspensions was unreasonable, as well as attributable to the Forest Service's violations of the injunction and to its failures to comply with obligations imposed by the ESA, which caused delays to the consultation process with the Fish and Wildlife Service. See Precision Pine I, 50 Fed. Cl. at 70-72. The Federal Circuit held that delays attendant to the misconstrued warranty did not breach the implied duty not to hinder—and its parent duty of good faith and fair dealing—because "the Forest Service's actions during these formal consultations were (1) not 'specifically targeted,' and (2) did not reappropriate any 'benefit' guaranteed by the contracts, since the contracts contained no guarantee that the [sic] Precision Pine's performance would proceed uninterrupted." Precision Pine, 596 F.3d at 829 (citation omitted).

Precision Pine's two-part test for whether the Government breaches the implied duty of good faith and fair dealing must be read in this particular context, a situation where the Government's alleged wrongful conduct does not arise directly out of the contract, i.e., key to the alleged breach are actions involving another government actor or a third party. See, e.g., Bateson-Stolte, 305 F.2d at 388-89 (finding no breach of Corps's duty of good faith and fair dealing because Corps—as a separate government agency—could not be charged with knowledge of location and wage-rate impact of unrelated project). In Precision Pine the alleged breach occurred during a period of suspended contract performance, during which the Forest Service breached its statutory duty arising under the ESA, a duty owed not to the plaintiff, but to the Fish and Wildlife Service. Similarly, in the two cases primarily relied on by the Federal Circuit, First Nationwide and Centex, Congress was alleged to breach the implied duties in contracts between the plaintiffs and the Federal Savings and Loan Insurance Corporation. See First Nationwide, 431 F.3d at 1344-45; Centex, 395 F.3d at 1304-06. It is in this context, where the government conduct giving rise to the allegation of breach does not arise directly out of the contract, that the Federal Circuit clarified the rule that the Government's liability attaches when the "subsequent government action is specifically designed to reappropriate the benefits the other party expected to obtain from the transaction." Precision Pine, 596 F.3d at 829. Here, by contrast, the Corps's obligations arise out of its Contract with the Joint Venture, and the alleged breach involves the Corps's performance under the Contract.

Hercules presents another distinction, as a central issue of that case involved the existence of an implied indemnification. See Hercules, 516 U.S. at 988-89. In the case at bar, by contrast, no question is raised that the Contract contains an implied covenant of good faith and fair dealing. Cf. Centex, 49 Fed. Cl. at 712 n.44 (2001). Moreover, the Federal Circuit relied on Hercules to show that the disputed contract clause did not confer new rights because there was no warranty. In the case *sub judice*, plaintiffs' claims stemming from the placement of concrete and correcting the control tower embedded steel are their "attempt[s] to collect damages . . . for consequences arising from a defective specification." Precision Pine, 596 F.3d at 827.

Mindful that the precedent of the Federal Circuit governs, see Coltec Indus., Inc. v. United States, 454 F.3d 1340, 1353 (Fed. Cir. 2006), the court considers the applicability of Precision Pine's two-part test for determining the Government's liability under the implied duty of good faith and fair dealing. The Federal Circuit recognizes that panel decisions are binding on a given point of law. See Gates v. Raytheon Co., 584 F.3d 1062, 1071 n.10 (Fed. Cir. 2009) (Federal Circuit panel is bound by prior precedent of the Federal Circuit); Barclay v. United States, 443 F.3d 1368, 1373 (Fed. Cir. 2006) ("Panels of this court are bound by previous precedential decisions until overturned by the Supreme Court or by this court *en banc*."); Newell Cos. v. Kenney Mfg. Co., 864 F.2d 757, 765 (Fed. Cir. 1988) (recognizing

binding effect of panel decision). The court concludes that Precision Pine does not foreclose consideration of whether the Corps breached its contractual duty of good faith and fair dealing based on the standards set forth in Malone and its progeny. As explained in detail above, the facts giving rise to Precision Pine's holding are sufficiently distinguishable from this case. Moreover, nothing in Precision Pine overrules the prior cases cited. Cf. Precision Pine, 596 F.3d at 830 (citing Malone, 849 F.2d at 1445-46).

2. Control tower delay claim

Plaintiffs assert that the Corps breached its implied duty of good faith and fair dealing when it failed to respond to RFI 787 in a timely manner, despite being aware that its inaction was causing delays and increasing costs. Plaintiffs also contend that the Corps's failure to respond to RFI 787 in a timely manner constitutes a change to the Contract and that plaintiffs are entitled to an equitable adjustment for costs and delays.

In order to install a staircase in the control tower, the tower's construction plans called for a steel plate to be embedded in a concrete column at elevation 138. However, the Joint Venture was unable to install the steel plate due to protruding reinforcing steel. See Tr. at 2108 (Clemans) ("The problem with the embedded plates was fairly simple. It was hitting the reinforcement steel that came up from the top of the lock wall."); see also Tr. at 259-60 (Herrick) ("The stair system had an embedded plate in the columns that went up through the center of the control tower. The back side of the plate had a Nelson stud, which is a six inch long half or three quarter inch diameter steel bolt. It has a head on it, and it's welded to the back of that plate. When it was to be embedded in the column, it interfered, those Nelson studs interfered with the concrete. We couldn't get it into location."). 94/

The Joint Venture submitted RFI 787 on April 23, 2002, requesting that the Corps provide a revised installation method for the steel plate. See JX 1163. Notes taken by Mr. Herrick at a May 8, 2000 meeting between the parties recorded that "[the Corps] will check

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94/ Mr. Herrick explained the problem further:

> The rebar that protruded above the top of the lock wall at elevation 138 where the control tower started, had an opening in it and columns and there were stairs that went through this opening from all the way in the bottom of the lock chamber to all the way to the top of the control tower. The embedded plate was a support or the tie feature for the stair, the prefabricated stairs. The plate had to be embedded in the concrete columns and there was interference with the rebar that was part of the columns.

Tr. at 262.

and advise on [RFI] 787[,] as it is due today." JX 1179; see also Tr. at 264 (Herrick) (quoting JX 1179). 95/ However, a response was not issued in time to avoid a work-around. See Tr. at 265 (Herrick) (describing held-up work); see also Tr. at 658 (Macon) ("[W]ith the amount of time that it took to get the response on this RFI the wall placement went on and the column placement had to be made later.").

While the Corps did discuss RFI 787 with the Joint Venture, see JX 1179; JX 1218, over one month elapsed before Harza, the Corps's architect/engineer, visited the Project site to evaluate the control tower's reinforcing steel problem, see Tr. at 2110 (Clemans). The Corps finally provided verbal guidance to the Joint Venture on June 13, 2002, allowing the Joint Venture to resume its construction of the control tower. The Corps issued a written response on July 2, 2002. See Tr. at 2111 (Clemans); Tr. at 265 (Herrick). Mr. Herrick explained the solution that the Corps eventually furnished to the Joint Venture: "The bars that protruded out of the elevation 138 were to be spliced at that location and the Corps gave us [] different criteria for the splice which opened up the reinforcing steel. Then we could now get the plate embedded in the face of the form." Tr. at 265. Because problems existed at each control tower elevation where an intermediate landing was supported by a column, see JX 1163, concrete placement in the control tower was delayed during the pendency of RFI 787, see Tr. at 265 (Herrick) (describing delays to "forming and placing of concrete for the control tower").

The court finds that the Corps did not respond to RFI 787 in a reasonably timely manner. 96/ While the Contract did not specify a time limit for the Corps to respond to an

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95/ The Corps never disputed that RFI 787 was due by May 8, 2002. See Tr. at 265 (Herrick).

96/ In the context of correcting defective plans, the Federal Circuit has recognized that the Government

> has an "ever-present obligation to carry out its contractual duties within a reasonable time." The government breaches that duty when it delays correcting defective plans. When the contract does not specify the period in which the government must respond, "the law imposes an obligation to act within a reasonable period of time." That period is determined by "the reasonable expectations of the parties in the special circumstances in which they contracted." Therefore, the government had a continuing obligation not to delay [the contractor's] performance, even if [the contractor's] . . . submissions did not comply with the requirements of the contract.

RFI, the parties agreed to a two-week response time. See JX 496 (May 2, 2000 e-mail from COR Eggburn to Project Engineer Porges noting "our normal 2-week target for responding to RFI's"); Tr. at 261 (Herrick); see also supra note 52. The Joint Venture submitted RFI 787 on April 23, 2002; the Corps gave its first informal response fifty-one days later with oral instructions on June 13, 2002, which allowed concrete work on the control tower to resume. The Corps's written response did not follow until July 2, 2002, seventy-one days after RFI 787 had been submitted. Defendant provided no evidence to justify the protracted response time, nor can the court glean anything from the record indicating that the response time was reasonable. Even the Corps's administrative contracting officer for the Project, Mr. Clemans, acknowledged that the Corps's response to RFI 787 "was pretty slow." Tr. at 2109. The court therefore finds that the Corps's delay in responding to RFI 787 constituted an unreasonable failure to cooperate with the Joint Venture's efforts to construct the control tower. See C. Sanchez & Son, 6 F.3d at 1542 ("The government must avoid actions that unreasonably cause delay or hindrance to contract performance."). The experts agreed on eleven days of critical path delay.

Although the Corps's discussions of RFI 787 with the Joint Venture show that Corps officials considered seriously the problem, see JX 1179, the Government's breach of the duty of good faith and fair dealing may arise through negligent conduct, see Peter Kiewit Sons', 151 F. Supp. at 731 ("[T]here is in every Government contract, as in all contracts, an implied obligation on the part of the Government not to willfully or negligently interfere with the contractor in the performance of his contract . . . ." (emphasis added) (citation omitted)). Ample evidence supports plaintiffs' assertion that, during this period, the Corps was aware that its delayed response to RFI 787 was delaying construction of the control tower. See JX 1218 (June 11, 2002 letter from Joint Venture to Corps stating, in part, that the Joint Venture was "unable to proceed further up the control tower until the fix is in place" and attributing delays in control tower construction to the Corps's slow response to RFI 787); Tr. at 658 (Macon) (explaining that the purpose of JX 1218 was to put the Corps "on notice for . . . the delays [the Joint Venture] . . . encounter[ed] due to [a] lack of response on this RFI"); Tr. at 266 (Herrick) (explaining that Joint Venture kept Corps appraised that RFI 787 was delaying work on control tower).

96/ (Cont'd from page 121.)

Essex Electro Eng'rs, 224 F.3d at 1291 (citations omitted). Although not pleaded, trial encompassed evidence that the control tower's reinforcing steel problem was a design defect. See JX 1163 (describing problems with control tower design drawings).

Accordingly, the court finds that plaintiffs have shown by a preponderance of the evidence that the Corps's unreasonably delayed response to RFI 787 constituted a breach of its implied duty of good faith and fair dealing. See Malone, 849 F.2d at 1445 (noting that "lack of diligence and interference with or failure to cooperate in the other party's performance" breaches implied duty of good faith and fair dealing); Lewis-Nicholson, Inc. v. United States, 550 F.2d 26, 32 (Ct. Cl. 1977) (holding that government-caused delay in contractor's performance violates implied duty not to hinder or delay other party's performance).

The court also finds that plaintiffs have established by a preponderance of the evidence that the Corps's late response to RFI 787 constituted a constructive change to the Contract. See Int'l Data Prods., 492 F.3d at 1325 ("A constructive change occurs where a contractor performs work beyond the contract requirements . . . due to the fault of the Government." (emphasis added)). The Joint Venture could not proceed with its concrete work in the control tower until it received the Corps's untimely response to RFI 787. Moreover, the Corps had notice that its delay in responding to RFI 787 was delaying the Joint Venture's construction of the control tower and causing plaintiffs to incur additional costs. The Corps is liable in damages for the extra work under the constructive change doctrine. See Ace Constructors, 499 F.3d at 1364 ("Impracticability of performance [due to defective specifications] is 'treated as a type of constructive change to the contract; because a commercially impracticable contract imposes substantial unforeseen costs on the contractor, the contractor is entitled to an equitable adjustment.'" (quoting Raytheon Co. v. White, 305 F.3d 1354, 1367 (Fed. Cir. 2002))).

3. Site rewatering claim

Citing the Contract's Changes and Inspection of Construction clauses, plaintiffs contend that they are "entitled to an equitable adjustment to the Contract for the costs and delays associated with the [Corps's] additional work and delays relating to the rewatering of the site." Third Am. Compl. ¶ 224. Plaintiffs allege that the Corps breached the Contract and its implied covenant of good faith and fair dealing "by delaying and interfering with the critical path work of re-watering the site, knowing that its inaction was delaying the contractor and would cause increased costs." Third Am. Compl. ¶ 225. According to plaintiffs, the Corps's breach had three manifestations: first, the Corps's December 10, 2003 directive ordered changes to plaintiffs' rewatering plan; second, the Corps provided conflicting specifications regarding adjustments to the miter gate cylinders; and third, the Corps provided defective specifications for the design of the crest gate hydraulics system.

1) The December 10, 2003 directive

In fall 2003 the Joint Venture created a rewatering plan that it considered to conform to the requirements of Contract section 15005, specification number 3.5. 97/ See Tr. at 268-69 (Herrick); Tr. at 667 (Macon). The plan consisted of a checklist of necessary pre-rewatering activities. The plan was submitted to the Corps. 98/ The parties met to discuss the plan to rewater the cofferdam on August 11, 2003. See Tr. at 268, 274 (Herrick); see also PX 300 at COE002368 (December 29, 2003 letter from Mr. Macon to Contracting Officer Easter, claiming that at the August 11, 2003 meeting the Joint Venture "requested [the Corps's] input to our list of activities required prior to rewatering").

During cross-examination of Mr. Macon, defense counsel attacked the Joint Venture's failure to provide its rewatering plan in the form of a formal submittal to the Corps, as required by Contract Specification 15005, section 1.4. See JX 89 at FF052097; Tr. at 771-800 (Macon). Section 1.4 requires Government approval of any submittal with a "GA" designation. JX 89 at FF052097. Part 1.4, section SD-08, provides, in pertinent part:

SD-08 Statements

97/ Contract section 15005, specification number 3.5 provides:

> Upon completion of site installation, and prior to acceptance of the installation, the Contractor shall subject the operating machinery of each gate/valve to such operating tests as may be required by the Contracting Officer to demonstrate satisfactory functional and operating efficiency. The gates/valves shall be opened and closed several times using different modes of operation and all pressures and operating speeds verified.
>
> . . . .
>
> The tests shall first be conducted in the dry and later again after the water is present.

JX 89 at FF052120.

98/ The Joint Venture's plan proposed pre-rewatering dry-testing of one representative gate of each of the miter gates, tainter valves, and crest gates; the CGDS would remain in place during rewatering and any subsequent wet-testing. See Tr. at 269 (Herrick); Tr. at 669-70, 799-800 (Macon). The system tests would be performed using portable local controls, not the permanent controls in the control tower. See Tr. at 799-800 (Macon).

> Test Procedures; GA
>
> Detailed shop test and field test and start-up procedures shall be submitted for approval before conducting the tests.

Id. at FF052100. Plaintiffs consider the phrase "operating tests" in section 3.5 to be field tests. See Tr. at 779 (Macon). Mr. Macon testified that, prior to the completion of the site installation, the Joint Venture provided the Corps with submittals for shop tests and field tests of the crest gates, miter gates, and tainter valves. See Tr. at 776-77. However, Mr. Macon equivocated as to whether and when the Joint Venture might have provided the Corps with submittals for dry-testing the tainter valves, crest gates, and miter gates once the installation was complete:

> Q [Defense counsel Mr. Poirier] Was a test submittal finally prepared and submitted for the dry testing of the tainter valves and the crest gates and the miter gate?
>
> A [Mr. Macon] I think there was a test submittal prepared for the testing of all of those gate systems.
>
> Q Right, when was that submitted?
>
> A I don't know.

Tr. at 783-84. When asked by defense counsel about whether he had "any reason to believe that the testing described in section 3.5 is not included among the field tests that are described in the submittal section," Mr. Macon responded that he did not "feel that it was clear." Tr. at 781. It is unclear whether Mr. Macon viewed the Joint Venture's plan for limited dry-testing that the parties discussed at the August 11, 2003 meeting as satisfying the submittal requirement. Compare Tr. at 779 (Macon) (responding "[n]o, I am not" when asked whether he referred to a required submittal when he testified as to the Joint Venture's rewatering "plan"), with Tr. at 785 (responding "[t]hat was our interpretation of what we thought needed to be in the submittal, or the testing plan" to defense counsel's suggestion that the parties' discussions in the fall of 2003 were mere "negotiations regarding what should be in the formal test submittal").

What is clear is that the Joint Venture believed that its plan for limited dry-testing conformed to the Contract's testing specifications. Mr. Macon explained:

> It was more than a submittal. . . . [The Joint Venture was] trying to develop a re-watering plan, and [the Joint Venture was] trying to identify the items on the re-watering plan which would either preclude [the Joint Venture] or allow [the Joint Venture] for rewatering [sic]. And it was a very large list of items, and [the Joint Venture] was trying to be all inclusive and make sure that there wasn't something that [the Joint Venture] had missed.

Tr. at 800. Regardless of Mr. Macon's expectations, none of the documents relating to the Joint Venture's rewatering plan that were provided to the Corps before December 11, 2003, conform to the Contract's submittal requirements. In fact, a formal dry-test submittal was only submitted on December 19, 2003, after the Corps's December 10, 2003 directive. See JX 1496; Tr. at 895 (Macon). Despite this omission, more than enough evidence shows that the Corps had notice of the Joint Venture's rewatering plan throughout the fall of 2003.

Apart from the August 11, 2003 meeting, the parties discussed the Joint Venture's rewatering plan at meetings held on September 12, 2003; October 3, 2003; October 22, 2003; and November 25, 2003. See PX 300 at COE002368-69; Tr. at 670-73, 688 (Macon). At the September 12, 2003 meeting, the Joint Venture gave the Corps a copy of its proposed rewatering plan. See PX 300 at COE002368; Tr. at 688-89 (Macon). The Joint Venture also informed the Corps that dry-testing would conclude in mid-December 2003, with rewatering commencing on December 18, 2003. See Tr. at 691 (Macon).

The Corps objected on December 10, 2003, to the Joint Venture's plan for limited dry-testing. See Tr. at 270 (Herrick); PX 300 at COE002377. At a meeting of the parties on that date, COR Eggburn directed the Joint Venture to "(a) Test all the miter gates, crest gates and tainter valves as a unit for each individual gate system[;] (b) Install all the downstream stop logs[;] and (c) Remove the crest gate dewatering system prior to rewatering [and] delay the project schedule." PX 300 at COE002368.

The court finds that the Corps's December 10, 2003 directive breached the covenant of good faith and fair dealing for several reasons.

Defendant provided no explanation for why the Corps waited over 120 days to inform the Joint Venture of its objections after the Corps first learned of the Joint Venture's plan on August 11, 2003. In addition to the testimony of Messrs. Herrick and Macon about the August 11, 2003 meeting, plaintiffs introduced a December 29, 2003 letter from Mr. Macon to Contracting Officer Easter, all of which demonstrated both that the Corps had notice of the Joint Venture's plan at the September 12, 2003 meeting and that the Corps did not object to the plan at that time. See PX 300 at COE002368 ("[The Corps's] on-site representatives were aware of and in agreement with [the Joint Venture's] plans and at no time objected or

stated any other consideration in order that we could address it prior to our planned rewatering date of December 18, 2003. Mr. Eggburn only voiced his concern for [the CGDS] . . . and was checking with [the Corps's] designers to see what conditions the system could withstand."). Regarding the October 3, 2003 meeting, Mr. Macon's December 29, 2003 letter reflects that the parties again discussed rewatering and complains that "Mr. Eggburn's only comments [about the rewatering plan] were regarding touch up painting, point & patching of concrete and that the contract hydraulic power pack is to be used for gate testing prior to rewatering." Id. at COE002369. Moreover, the Joint Venture did "not receive[] any input" from the Corps about the plan until December 10, 2003—one day before the planned tests. Id.; see also Tr. at 269-70 (Herrick).

Responding to Mr. Macon's December 29, 2003 letter, Mr. Clemans on January 22, 2004, wrote to the Joint Venture, disputing its accusations. See JX 1534. Mr. Clemans took the position that, regardless of the Joint Venture's rewatering plan, the Contract required the full complement of testing. See id. (stressing that Contract section 3.5's "reference to each gate/valve is very clear in my opinion" (internal quotation marks omitted)). Mr. Clemans goes on to state, "I also reviewed the meeting notes included in your letter for the date of September 12, 2003 and cannot read into them any apparent attempt to test sample or representative units. . . . I do not remember any discussion or comment on testing representative gates, which would have immediately alarmed me . . . ." Id.

Typed notes from Mr. Herrick summarizing the parties' December 10, 2003 meeting undermine Mr. Clemans's assertion that the Corps had not agreed to dry-test representative units. Relevant portions of the meeting notes state:

> Mitch [Eggburn]: Crest Gates – run all 10 using same power as planned for the 1st one. Run them at the local panel. But, all 10 the same.
>
> . . . .
>
> Mitch [Eggburn]: Steve can you provide a checkoff list?
>
> Steve [Macon]: No – What I am hearing is a complete change to the agreed plan. We had only planned to test those systems which would be inaccessible after rewatering. But, from what I have heard everything has to be . . . operational.
>
> . . . .

> Steve [Macon]: Mitch we consider this new set of requirements a change and would like written direction from you accordingly[.]
>
> Mitch [Eggburn]: This is not a change, but rather an interpretation of the specifications[.]
>
> Steve [Macon]: But this is a different interpretation than was agreed to and from which we have been working all fall[.]

PX 300 at COE002377-78 (emphasis added). Mr. Macon also testified convincingly that at the August and September meetings the Corps approved the Joint Venture's pre-rewatering plan to conduct limited dry-testing. See Tr. at 694-96.

Two closely related aspects of the covenant of good faith and fair dealing are "the dut[ies] to cooperate and not hinder the contractor's performance." C. Sanchez & Son, 6 F.3d at 1542; see also Centex, 395 F.3d at 1304 (stating that covenant of good faith and fair dealing "imposes obligations . . . that include the duty not to interfere with the other party's performance"). A breach of these duties is a breach of the covenant of good faith and fair dealing. See Malone, 849 F.2d at 1445. The Government breaches these duties when it acts unreasonably under the circumstances—specifically, if it unreasonably delays the contractor or unreasonably fails to cooperate. Orlosky Inc. v. United States, 68 Fed. Cl. 296, 311 (2005) (citing C. Sanchez & Son, 6 F.3d at 1542).

The case law is instructive. In Malone the plaintiff contracted with the United States Air Force to paint and renovate 265 homes at Robbins Air Force Base in Georgia. 849 F.2d at 1442. The contractor was required to complete, and the contracting officer to accept, work on an exemplar house "as a means of establishing workmanship standards before [the contractor] commenced work on other houses." Id. After the contractor completed the exemplar, the Government's contracting officer viewed the model home unfavorably, but was evasive in his answers to the contractor, thereby causing the contractor to complete extensive work consistent with the exemplar. See id. The contracting officer "testified that he did not accept the exemplar," whereas the plaintiff "believed that [the contracting officer] had accepted it." Id. The contracting officer "contributed to [the plaintiff's] perception that [the contracting officer] had accepted the exemplar . . . by failing to object to [the plaintiff's] continued performance even though the [contracting officer] knew what [the plaintiff] was doing . . . ." Id. The Federal Circuit upheld a breach of the duty to cooperate on the part of the Government. Id. at 1445. The court concluded that the contracting officer "was evasive when he did not clearly state on inspecting the exemplar . . . whether or not he accepted it," and the contracting officer misled plaintiff to rely on the exemplar as an acceptable standard

by, *inter alia*, "failing to object to [plaintiff's] continued performance." Id. (emphasis added).

In this case the Corps was within its contractual rights to reject the Joint Venture's plan for limited dry-testing. However, although the Corps had notice of the plan as early as August, Corps personnel voiced no objections to the planned use of representative testing until December 10, 2003. At the same time, Corps officials were aware that the Joint Venture worked throughout fall 2003 on the assumption that its plan would be implemented and rewatering would commence on December 18, 2003. See Tr. at 269 (Herrick) ("We then provided a copy [of the plan] to the Corps and asked for their comments, and was there anything else we had missed? Was there a glaring error? Was there anything we needed to add? Any comments? There was no response.").

Moreover, the Corps's December 10, 2003 directive greatly expanded the scope of the extant plan for pre-rewatering dry-testing. Rather than testing representative samples of the miter gates, crest gates, and tainter valves, the Joint Venture was required to test all of them. The Joint Venture's original plan called for the installation of only two stop logs in order to demonstrate functionality of the CGDS, but COR Eggburn "directed [the Joint Venture] to install [all] of those stop logs instead of just two at that time." Tr. at 687 (Macon). The Joint Venture had installed the CGDS and planned on leaving it in place during rewatering. See Tr. at 679-80 (Macon) (explaining that the Joint Venture did not read Contract as requiring removal of CGDS prior to rewatering). Mr. Macon explained that removal of the CGDS

> meant that [the Joint Venture] had to come in and disassemble it, and there were 20-30 large pieces of elements which had to be then disassembled, loaded on trucks, taken up out of the hole, and then stored and then put on a barge to be brought back in later, and then proceed with the wet testing.

Tr. at 679.

Given that the Corps observed the Joint Venture execute its rewatering plan for months, the Corps at a minimum could have, and should have, expressed its disapproval of the plan at an earlier date. Under these circumstances the court finds that the Corps unreasonably failed to cooperate with the Joint Venture's Contract performance by waiting until December 10, 2003, to inform the Joint Venture of the changes that the Corps required to the site rewatering plan, in breach of its duty of good faith and fair dealing. See Malone, 849 F.2d at 1445. Plaintiffs have also satisfied their burden to show that the additional testing of the miter gate cylinders and the crest gate hydraulic system required by the Corps constituted a change to the Contract.

2) Changes to the miter gate cylinders

Testing of the miter gate cylinders in fall 2003 revealed a problem with the cylinder settings. The problem consisted of a conflict between the contract specifications and the Corps-approved manufacturing drawings submitted by IHP. See Tr. at 701-04 (Macon) (explaining that contract specifications required cylinders to bottom-out, i.e., to extend or retract fully, while manufacturing drawings provide for a "proximity switch" trigger-point in order to prevent cylinders from bottoming-out); Tr. at 2200-01 (Smith). On December 18, 2003, the Joint Venture submitted to the Corps RFI 1027, which sought clarification on the miter gate cylinder settings. See JX 1495 ("As the cylinders are currently installed the proximity switch on the head end of the cylinder will not actuate when the cylinder is in the recessed position. It appears as though there is a conflict between the contract plans and specifications. How should this conflict be resolved?"); Tr. at 699-700 (Macon) (discussing JX 1495). The Corps timely responded on January 7, 2004. See JX 1495.

The Corps's January 7, 2004 response overruled the contract specifications, requiring IHP to adjust both ends of each cylinder to hit the proximity switch trigger-point, thereby preventing the cylinders from bottoming-out. See Tr. at 704 (Macon); Tr. at 2206 (Smith). The Corps required IHP to perform additional remedial work prior to dry-testing and rewatering. See JX 1495 ("The dry testing of the gates and controls shall not take place until after the above adjustments are made. The dry test must include a check of the mitering of the gates, seal compression, and proximity switch actuation."); Tr. at 704-05 (Macon); Tr. at 1560-62 (Wolf) (describing miter cylinder adjustments); Tr. at 2206 (Smith).

The court finds that the additional testing of the miter gate cylinders required by the Corps constituted a change to the Contract. Pursuant to the Contract's Changes clause and the constructive change doctrine, plaintiffs are entitled to an equitable adjustment of the Contract price. See FAR 52.243-4(d) ("If any change under this clause causes an increase or decrease in the Contractor's cost of, or the time required for, the performance of any part of the work under this contract, whether or not changed by any such order, the Contracting Officer shall make an equitable adjustment and modify the contract in writing. . . . In the case of defective specifications for which the Government is responsible, the equitable adjustment shall include any increased cost reasonably incurred by the Contractor in attempting to comply with the defective specifications."); see also Ace Contractors, 499 F.3d at 1364 (finding constructive change due to defective specifications).

3) The popping noise

The Joint Venture's site rewatering work in January 2004 revealed a "popping noise" triggered by the movement of the crest gates. See Tr. at 271-72 (Herrick); Tr. at 705-06

(Macon); Tr. at 2208-09 (Smith). IHP responded to the noise by "troubleshooting" the problem with Rexroth, the crest gate cylinder manufacturer. See Tr. at 2209 (Smith). IHP and Rexroth discovered "a hydraulic decompression of the piston caused by the system in total." Tr. at 2209 (Smith). Invoking the Contract's Inspections clause, on January 22, 2004, the Corps ordered the Joint Venture to perform additional testing procedures on the crest gate torque-tube wedge and retainer system that were proposed by Harza. See JX 1538. 99/ The Corps also ordered that the Joint Venture cease rewatering operations to elevation 95.0 until the problem was resolved. The Joint Venture stopped rewatering on January 23, 2004. See Tr. at 708 (Macon). In order to perform the test, the Joint Venture transported and used a 4000 Manitowoc crane. See JX 1558; Tr. at 709-10 (Macon) (explaining that the crane would be used "[i]f you needed additional lifting capabilities with regard to something on these gates, for instance the further examination of the gates and the popping noise"). The testing work ordered by the Corps proved ineffectual. See Tr. at 707-08 (Macon).

On January 30, 2004, the Corps again invoked the Contract's Inspections clause and ordered additional testing, this time on the crest gate hydraulic system. See JX 1555. The Corps acknowledged that the testing on the wedge retainer system was ineffectual and acknowledged its responsibility for extra costs incurred in performing that work. See JX 1552 (January 30, 2004 letter from Mr. Clemans to the Joint Venture stating "it appears that no defects in fabrication or assembly, or relationship to the gate 'popping' problems, were identified"). The letter concluded that determining the cause of the popping noise would also assign responsibility to the party for any rewatering delays. Id. Further testing revealed that the hydraulic system was the cause of the problem. See JX 1570 (February 5, 2004 letter from Mr. Clemans to Mr. Macon confirming that problem was with hydraulic system and holding Joint Venture responsible for "determining the cause and effecting corrections"). IHP eventually solved the problem "by install[ing] some pressure reducing valves." Tr. at 2210 (Smith). Rewatering restrictions were lifted on February 5, 2004. See JX 1570.

99/ Mr. Clemans's instructions directed:

> The cause of the torque loss . . . has not been clearly determined and this procedure is furnished as an attempt to investigate the matter and determine a course of corrective action. Therefore, this letter is my direction to remove a wedge retainer assembly and perform the above procedure on one crest gate for our inspection under the Contract Clause, Inspection of Construction, paragraphs e[] and h. The Clause provides the conditions for compensation of the contractor.

JX 1538 at FF394136.

The testimony of Mr. Smith, IHP's estimator and project manager at Montgomery Point, was more helpful on this claim. Cf. infra Part VII.3.3 (discussing IHP's proof of damages). He testified that the Corps blamed Rexroth, not Harza, for the noise. See Tr. at 2211-12; see also JX 1570. Nevertheless, Mr. Smith suggested that, because the noise was caused by the "system in total," it was Harza's design flaw. See Tr. at 2210. Mr. Smith testified concerning the hydraulic schematic provided by the Corps, see Tr. at 2212-13 (discussing PX 607), which offers the qualifier that

> the schematic provided and the components selected . . . are for general guidance only. The contractor shall be responsible for the final selection or addition of the components and for revising the schematic as necessary and as approved by the Little Rock District to ensure proper operation as specified in the contract documents. The basic loads, pressures, and flows are shown . . . . Any cumulators needed to absorb pressure pulsations in the system shall be added by the manufacturer as necessary.

PX 607. IHP did not interpret this note to attribute design responsibility to Rexroth. See Tr. at 2213 (Smith). But see PX 607 (The schematic lists some components to be selected by Rexroth, and states: "Model numbers may be incomplete. The final selection is the contractor's responsibility."). Still, while Rexroth could select some components, Rexroth could deviate from the enumerated components only with the Corps's permission, which was not always granted. See Tr. at 2215-16 (Smith).

Mr. Smith could not identify any pressure-reducing components—nor the source of the "popping" sound, see Tr. at 2219 (Smith)—in the schematic, see Tr. at 2217. Specifically, he testified:

> Q [Plaintiffs' counsel Ms. Roy] Do you see in this schematic that provides for a function of pressure reducing?
>
> A [Mr. Smith] No.
>
> Q Is that something that, in your experience with hydraulic schematics, you would expect to see carved out as a function in a drawing?
>
> A Yes.

Tr. at 2217. 100/ Mr. Smith did not give way on cross-examination. Indeed, he provided a succinct and convincing explanation as to why the cause of the problem was Harza's design: "[T]he popping noise was caused by the compression of the oil due to the location of the HPU, which was up in the tower, and the location of the cylinders down below and the lengths of piping between them. Those circumstances and the system, itself, created the decompression in the cylinder." Tr. at 2219-20.

Plaintiffs have shown by a preponderance of the evidence that a design flaw caused the problem with the crest gate hydraulic system, for which the Corps is the responsible party. The extra testing procedures and the installation of the pressure reducing valves that were required by the Corps constituted a change to the Contract. Pursuant to the Contract's Changes clause and the constructive change doctrine, plaintiffs are entitled to an equitable adjustment to the Contract. See FAR 52.243-4(d) ("In the case of defective specifications for which the Government is responsible, the equitable adjustment shall include any increased cost reasonably incurred by the Contractor in attempting to comply with the defective specifications."); see also Ace Constructors, 499 F.3d at 1364 (finding constructive change due to defective specifications).

4. The CGDS test claim

Plaintiffs charge that because of the "costs and delays associated with the [Corps's] varying directives and changes" involving the wet-testing of the CGDS, the Contract's Changes clause entitles them to an equitable adjustment to the Contract. Third Am. Compl. ¶ 227. Plaintiffs maintain that the Joint Venture reasonably relied on the Corps's warranty that compliance with the CGDS design specifications would achieve a timely and acceptable result. Id. ¶¶ 228-29. Plaintiffs allege, however, that the design specifications were defective because wet-testing "was impracticable or impossible due to the constraints of the river elevations." Id. ¶ 230. Further, plaintiffs contend that the Corps breached the warranty of correctness of specifications by providing the defective design specifications and that the Corps breached the Contract by directing the Joint Venture to "attempt to comply with the specifications and changes to the specified testing procedures." Id. ¶¶ 231-32. Plaintiffs seek the payment of costs for the CGDS wet-testing, less $228,153.00—the bid amount of the wet-testing deleted by the Corps. Stipulation filed Nov. 17, 2009, ¶ 2.

100/ Mr. Smith's testimony that the pre-remediation crest gates had operated in precise accordance with the schematic, see Tr. at 2217, ultimately did not undermine his explanation of what occurred after remediation.

For the reasons set forth below, the court finds that the Corps's directives involving the CGDS wet-testing, including the ultimate decision on December 2, 2004, to delete the wet-testing requirements do constitute a change to the Contract for which defendant is liable.

Trial revealed that the Joint Venture's attempts to install the CGDS were thwarted continually by unfavorable water elevations, but also by conflicting directions from Corps officials. The Contract required wet-testing of the CGDS under certain river elevations. See Tr. at 2040 (Clemans). 101/ No question exists that high water levels plagued the Joint Venture's work on the CGDS throughout 2004. See Tr. at 2026-27 (Clemans).

In spring 2004 the Joint Venture's attempted setup of the CGDS was hampered due to rising river elevations. See JX 1595; Tr. at 2027-28 (Clemans). The impediment created by elevated river levels continued throughout summer 2004. A June 22, 2004 letter from COR Eggburn to Mr. Macon acknowledged that rising river elevations could impact the Project schedule and advised that the Corps would "evaluate any delays under the appropriate section of the Default Clause." JX 1698; see also JX 1726 ("[M]y office will evaluate the actual length of the delay and issue a time extension to adjust the current contract completion date of June 2, 2003."). A July 30, 2004 letter from Mr. Clemans to the Joint Venture acknowledged that high river elevations delayed CGDS testing. See JX 1726 ("[T]he Government acknowledges on the basis of your schedule, that river stages are delaying the Crest Gate Dewatering Structure Wet Testing, which is the longest path to completion.").

The Joint Venture nonetheless pressed forward with attempts to install the CGDS. On August 25, 2004, the Joint Venture commenced one of the CGDS tests, but the Corps subsequently suspended testing. See JX 1811; JX 1862; Tr. at 723-24 (Macon). Finally, on September 3, 2004, the Corps directed the Joint Venture to remove the CGDS structure from the navigational path. See JX 1811; JX 1862; Tr. at 724 (Macon).

Incredibly, evidence shows that the Corps directed the Joint Venture to continue work on the CGDS even as doubt arose among Corps officials that rising river elevations would

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101/ Mr. Macon explained that, in order to successfully wet-test the CGDS, the Joint Venture "had to install the system in each of the two locations, and then you had to successfully remove one of the crest gates and replace it in front of each setup." Tr. at 714. For each test the CGDS installation procedure involved: "Estimated gate replacement time includes installation of dewatering structure, replacement of one gate leaf and dewatering structure removal is as follows: one barge crane used: 15 days[;] two barge cranes used simultaneously: 13 days." JX 36.

render the work impossible. On September 3, 2004, Mr. Clemans e-mailed Corps officials, complaining:

> I'm growing increasingly pessimistic of the Contractor's chances of successfully completing the required Crestgate DW structure test setups required by the Contract. We waited all summer for suitable river conditions to begin the testing and the contractor has barely started to initiate the first set up. . . . The Contractor has 80 work days scheduled for this testing which requires two complete set ups and disassemblies of both sides. I don't know if it will reasonably take him 50 work days or 150 work days to do the testing.
>
> . . . .
>
> I think the district team needs to get together and be considering some sort of revised or exit strategy for what I fear is quickly becoming a very bad situation.

JX 1812 (emphasis added). Mr. Clemans explained that his cryptic reference to "a very bad situation" only meant anticipated complications during the winter's high water season. See Tr. at 2030. In a September 28, 2004 e-mail from Mr. Clemans to Mr. Johnson, the Corps's secondary contracting officer, Mr. Clemans confided that he was "getting pretty worried about this wet testing." JX 1832. Anticipating litigation over the CGDS wet-testing, Mr. Clemans expressed concern that a court might "determine that if our specification isn't outright impossible, it's at least defective." Id. (emphasis added). 102/

Nevertheless, the Corps continued to direct work on the CGDS. On October 5, 2004, and again on October 6, 2004, letters were sent to the Joint Venture by Messrs. Johnson and Clemans, respectively, directing that wet-testing be performed according to Contract specifications and drawings. See JX 1839; JX 1840; Tr. at 2033-40 (Clemans); see also supra note 68. An October 19, 2004 letter from Mr. Clemans addressed water level limits and reiterated his instructions to continue with the CGDS test cycle. See PX 366; see also Tr. at 726-28 (Macon). Mr. Macon explained—which defendant did not rebut—how Mr.

102/ By this admission from the administrative contracting officer, plaintiffs have established a defective specification. See Ace Constructors, 499 F.3d at 1364 ("Impracticability of performance [due to defective specifications] is 'treated as a type of constructive change to the contract; because a commercially impracticable contract imposes substantial unforeseen costs on the contractor, the contractor is entitled to an equitable adjustment.'" (quoting Raytheon, 305 F.3d at 1367).

Clemans's October 19, 2004 letter imposed "numerous restrictions" on the CGDS test cycles. See Tr. at 726 (quoting JX 1862). These restrictions included lower and upper water-level limits; revised navigational pass requirements; revised support-beam submergence instructions; and a drastically reduced test-cycle timeline, that went from a previously approved twenty-workday test-cycle to a seven-workday test-cycle. See Tr. at 728 (Macon).

After the Corps's October 6, 2004 letter, the Joint Venture attempted yet another CGDS setup, which predictably failed due to rising water levels. See Tr. at 2041-42 (Clemans). This fruitless exercise continued until December 2, 2004, when the Corps issued a notice to proceed to the Joint Venture, deleting the requirement to complete the CGDS wet-testing.

The court finds that the Corps's design specifications for CGDS testing were defective and breached the implied warranty of specifications. The Corps's various directives involving the CGDS wet-testing up to and including the Corps's December 2, 2004 notice to proceed deleting the CGDS wet-testing requirement therefore constituted a change to the Contract under the Changes clause, entitling plaintiffs to an equitable adjustment of the Contract price. See FAR 52.243-4 ("(b) Any other written or oral order . . . from the Contracting Officer that causes a change shall be treated as a change order under this clause . . . . (d) If any change under this clause causes an increase or decrease in the Contractor's cost of, or the time required for, the performance of any part of the work under this contract, whether or not changed by any such order, the Contracting Officer shall make an equitable adjustment and modify the contract in writing. . . . In the case of defective specifications for which the Government is responsible, the equitable adjustment shall include any increased cost reasonably incurred by the Contractor in attempting to comply with the defective specifications.").

Alternatively, the court finds the Corps liable under the constructive changes doctrine. The Corps repeatedly suspended testing due to high water. For example, at the end of August 2003, the Corps not only suspended the Joint Venture's attempted testing, but it instructed the Joint Venture to remove the CGDS from the navigational path altogether. Corps officials continued to order compliance with contract specifications for wet-testing while they privately acknowledged that high water rendered compliance virtually impossible. These doubts among Corps officials emerged as early as September 2004, yet the Corps waited until December 2, 2004, before deleting the wet-testing requirement. This evidence is sufficient to constitute a constructive change to the Contract. See Ace Constructors, 499 F.3d at 1361 (explaining that test for constructive change is "whether the [Government] constructively altered the contract, either expressly or implicitly, by requiring performance at variance with that set forth in the contract").

5. Revisions to downstream excavation limits claim

Plaintiffs contend that the Corps "deleted a substantial amount of downstream excavation work to avoid likely overruns and delays, but failed to provide timely instructions regarding excavation around the L1 monolith, which was impacted by the [Corps's] change to downstream excavation limits." Pls.' Br. filed July 7, 2009, at 95. They sought to prove that the Corps's instructions regarding the revisions to the downstream excavation limits constituted a change to the Contract, for which plaintiffs are entitled to an equitable adjustment to the Contract pursuant to the Contract's Changes clause. Third Am. Compl. ¶¶ 234-35.

Trial showed that the Corps changed the elevation at which the river was to be dredged around the L1 monolith, a matter not in dispute. On October 15, 2004, the Corps directed the Joint Venture to excavate the L1 monolith to elevation 94—not elevation 75, as originally was planned—and to delete the scour-protection zone from around the monolith. 103/ See Tr. at 729-30 (Macon); Tr. at 2045 (Clemans). However, the Corps's October 15, 2004 directive failed to provided adequate instructions. See JX 1852 ("Additional information concerning cutting off the coffer dam Z-piles from around the pile cap in this monolith will be forthcoming."). The Corps's revisions caused the Joint Venture to change how it performed the dredging. In response to the excavation-limit revisions, Luhr Bros., the excavation subcontractor, informed the Joint Venture that the revised elevation levels required that the excavation be "accomplished using a Leibherr excavator on a barge and placing the material into an empty barge to be disposed of in the designated area." JX 1912 ("Had the final elevation in this area remained at [e]levation 75.0, and not raised to [e]levation 94.0, we would not have proceeded with the excavation in this manner, but rather would have performed the majority of the excavation using the hydraulic dredge method.").

Then, on October 22, 2004, the Corps instructed the Joint Venture to cut off sheet piling at the L1 monolith to an elevation of 78, sixteen feet below the river bottom elevation, and to stop excavation around the L1 monolith at elevation 78. See JX 1867; Tr. at 732 (Macon). Mr. Macon explained the problem that the Corps's conflicting instructions created:

> [W]e were instructed to change the downstream excavation limit from elevation 75 up to elevation 94 but . . . we were still supposed to be cutting those sheet pile off at elevation 78, and so now we had a conflict in terms of

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103/ On October 21, 2004, the Joint Venture provided the Corps written notice that it considered the new dredging limits to be a change to the Contract. See JX 1857; Tr. at 730-32 (Macon).

> our instruction and if we were in fact to cut this pile off at elevation 78 that that [sic] was going to be 16 feet below river level and [yet] we had been instructed not to remove any more materials in terms of excavation . . . .

Tr. at 733-34. By letter dated October 26, 2004, Mr. Macon wrote to Contracting Officer Easter explaining the problem and requesting instructions. See JX 1867. Mr. Macon also advised the Corps that, due to safety concerns created by the new excavation limits, the Joint Venture could not proceed with any further excavation work until it received further instructions from the Corps. See id. The Corps's November 19, 2004 letter provided additional excavation instructions to the Joint Venture. See JX 1902; Tr. at 734-36 (Macon). The Joint Venture was able to proceed with the planned excavation only after it received these directions. See Tr. at 736-37 (Macon). The Joint Venture resumed excavation work on November 30, 2004.

By the time excavation around the L1 monolith was able to resume on November 30, 2004, water elevation levels had risen above elevation 128. See JX 1912. On November 30, 2004, Mr. Macon wrote to COR Eggburn advising that high water prevented the Joint Venture's full excavation around monolith L1. See id. Mr. Macon also advised that the Corps's "delay in defining the parameters of the [excavation] around L-1 has prevented [the Joint Venture] from doing this work under more favorable conditions." Id.; see also Tr. at 737 (Macon) (quoting JX 1912).

The high water levels prevented the Leibherr from reaching the river bottom, causing Luhr Bros. to change, for a second time, how it performed the dredging work. Consequently, Luhr Bros. resorted to using a crane and clamshell. See Tr. at 740-41 (Macon); Tr. at 1565-66 (Wolf). Mr. Wolf, the Joint Venture's labor superintendent, confirmed that the delayed downstream excavation stalled the placement of the floating guidewalls. See Tr. at 1567; see also Tr. at 2058-59 (Clemans) (testifying that downstream floating guidewall was installed in December 2004).

The court finds that the Corps's November 19, 2004 directions regarding the L1 monolith excavation work were untimely. The Corps issued its first revisions to the excavation limits on October 15, 2004, and again on October 22, 2004. The Joint Venture informed the Corps of the conflict created by its revisions to the excavation limits on October 26, 2004, and explained that, because of safety concerns created by the new excavation limits, the Joint Venture could not proceed with any further excavation work until it received further instructions from the Corps. The Corps finally responded almost four weeks later, on November 19, 2004.

On the basis of this evidence, the Corps's revisions to the downstream excavation limits—from elevation 75 to elevation 94, including its instructions to cut off the L1 monolith's sheet piling at elevation 98—undoubtedly constitute a change to the Contract under the Contract's Changes clause, entitling plaintiffs to an equitable adjustment of the Contract price. See FAR 52.243-4 ("(b) Any other written or oral order . . . from the Contracting Officer that causes a change shall be treated as a change order under this clause . . . . (d) If any change under this clause causes an increase or decrease in the Contractor's cost of, or the time required for, the performance of any part of the work under this contract, whether or not changed by any such order, the Contracting Officer shall make an equitable adjustment and modify the contract in writing.").

Alternatively, plaintiffs have shown by a preponderance of the evidence that the Corps "demanded work above and beyond that in the [C]ontract." Int'l Data Prods., 492 F.3d at 1325. The Corps changed the elevation limits for the dredging work and for the removal of the sheet piling. The Corps also disrupted the Joint Venture's performance of the dredging work. First, the revisions caused Luhr Bros. to abandon its plans for hydraulic dredging and switch to the Leibherr excavator. Second, the Corps failed to provide adequate direction regarding the L1 monolith excavation when it changed the dredging limits. By the time the Joint Venture received adequate instructions, the work was pushed into another high water period, necessitating the procurement and use of the crane and clamshell digger instead of the Leibherr excavator. As such, the Corps is liable under the constructive change doctrine. See Ace Constructors, 499 F.3d at 1361 (explaining that test for constructive change is "whether the [Government] constructively altered the contract, either expressly or implicitly, by requiring performance at variance with that set forth in the contract").

VI. Defendant's counterclaim

On August 4, 2009, defendant filed its counterclaim alleging, in pertinent part: "Pursuant to the changes clause in the contract, plaintiffs are liable to the United States for a reduction in the contract price in exchange for permitting the contractor to rewater the site before testing the crest gates, miter gates, tainter valves and associated equipment in their normal mode of operation." Def.'s Am. Answer, First Setoff and First Countercl. to Pls.' Third Am. Compl., filed Aug. 4, 2009, ¶ 278.

Defendant's delay in filing the claim was not caused by newly discovered evidence. 104/ The Corps's contracting office personnel were well aware of the factual issues underlying the counterclaim for years prior to its filing. Ms. Easter, the Corps's

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104/ The court does not rule that defendant's counterclaim was untimely, nor that RCFC (now) 13(e) is relevant. Contrary to the court's aside in the order entered on July 30, 2009, defendant's counterclaim was timely.

contracting officer for the Project, discussed as early as 2004 the factual issues underlying the counterclaim. Specifically, Ms. Easter discussed the "out-of-order work that was being allowed to expedite the project," Tr. at 2155 (Easter), with her subordinates, Messrs. Clemans and Eggburn, Tr. at 2153-54.

From 2004 throughout the remainder of the Project, the discussions among several contracting office personnel concerning the out-of-order sequencing did not contemplate a credit due to the Government. Tr. at 2156 (Easter). Rather, they "discussed it in terms of the benefit to both parties." Tr. at 2157 (emphasis added). Ms. Easter explained how the out-of-order sequencing benefitted the parties: "It was saving the contractor the time as well as the overhead had they had to complete the work prior to the re-watering, the installation and dry testing. . . . It benefitted the [G]overnment by allowing the project to continue or to expedite the project." Tr. at 2157.

On November 3, 2005, after Ms. Easter declared substantial completion on the Project, she wrote to American Home Assurance Company stating that, "[s]ince Fru-Con has referenced the Tentative Order of Work in [Contract] Section 01510, I must also point out that preceding steps in this section required a complete and operating lock and dam prior to rewatering (step 5), which was not accomplished until much later in time." JX 2004. Ms. Easter had input from Mr. Clemans in drafting the letter and she was aware of the presequencing of work at that time. Tr. at 2158 (Easter). Ms. Easter admitted that during this time Corps personnel continued to discuss the order-of-work sequencing in terms of a benefit to the contractor and the Government, not in term of a credit owed to the Government for time saved. Tr. at 2159.

It was not until early summer 2009, when defendant's successor counsel began reviewing plaintiffs' claims transferred from the ASBCA, that the contracting office personnel's characterization of the re-sequenced order of work as a benefit enjoyed by both parties blossomed into a credit owed to the Government. Contracting Officer Easter decided to issue the final decision claiming a credit back from plaintiffs in "June or July of 2009," and then only after the issue was brought to her attention by G. Clay Weisenberger, Assistant District Counsel for the Corps's Little Rock District. Tr. at 2160 (Easter). When defendant filed its fourth setoff on July 15, 2009, asserting the credit allegedly owed by plaintiffs, Ms. Easter had not issued the contracting officer's final decision regarding the claim. Defendant's motion admits that its setoff was jurisdictionally imperfect, and it explains why: "Unfortunately, counsel for the United States with principal responsibility for this case delegated responsibility for the board claims added to this case last fall, and he did not understand the facts giving rise to our fourth offset until a few days ago." Def.'s Mot. for Leave To File Setoffs, and in the Alternative, To Exclude Offsets from the Scope of Trial, filed July 15, 2009, at 2. The claim was perfected barely within the limitations period on July

23, 2009, when Ms. Easter issued the contracting officer's final decision. Pressed by plaintiffs' counsel about why it took the Government nearly four years from the time that Ms. Easter sent the letter to American Home Assurance Company and six years from the time that Mr. Clemans authorized a resequence of the order of work for the Government to bring a claim against the contractor, Ms. Easter admitted that "[t]he magnitude of this change or this waiver was not realized until the course of the litigation." Tr. at 2159.

The facts giving rise to this claim were known and discussed by the Corps and the Department of Justice for years. Whether by omission or careful deliberation, a litigation decision was forestalled until a fortnight before trial concerning the facts that developed into a counterclaim. Although defendant delivered this late-filed claim in a jurisdictionally sound posture to the court, the Corps thereby was not absolved from the substantive requirements for issuance of a valid counterclaim.

1. Background facts

The Contract specified the following order of work for the Project prior to rewatering the site: (1) construction of the control tower; (2) installation of all operating systems; (3) installation of all operating system controls; and (4) performance of complete testing, i.e., dry testing, of structural, mechanical, and electrical systems. See JX 89 at FF052919-24 (Contract § 01510, Spec. No. 1.9.4). The Contract further required that, prior to rewatering the site, the Joint Venture test the operating machinery of each of the crest gates, miter gates and tainter valves in their normal mode of operations, i.e., operated from the control tower, and in local mode. See JX 89 at FF052120 (Contract § 15005, Spec. No. 3.5). However, Administrative Contracting Officer Clemans waived the dry-testing requirement by permitting rewatering of the site before testing the crest gates, miter gates, and tainter valves from the control tower. Defendant alleges that the administrative contracting officer was not authorized to make this waiver because he was authorized only to approve contract changes valued at $500,000.00 or less, and the waiver saved the Joint Venture several millions dollars because it shortened the time needed to complete the Project by several months. On July 23, 2009, Ms. Easter issued a final decision asserting the right of the Government to a $9,204,480.00 reduction in the contract price for shortening the period of contract performance.

The contracting officer's final decision consists of the following: (1) a two-page letter—the second page contains only a single sentence and a signature clause—from Ms. Easter to the American Home Assurance Company; (2) a three-page document entitled "Findings of Fact, Dry Testing Requirements"; and (3) ten appended documents, separated by tabs A through J. PX 449. The cover letter's opening paragraph states, in relevant part:

> This letter is the final decision of the Contracting Officer awarding the Government the sum of $9,204,480.00 under the Contract for time and overhead saved by the contractor as a result of the decision by Area Engineer and Administrative Contracting Officer Dan Clemans to allow the Joint Venture to proceed with rewatering the cofferdam prior to completing certain requirements to install and fully test the crest gates, miter gates, tainter valves and accompanying equipment, as well as install and test all control and electrical systems.

PX 449 at 1. The second paragraph provides statutorily required information regarding appealing the decision. See id. The three-page findings of fact summarize the facts and rationale underlying the contracting officer's final decision.

The findings of fact provide a brief summary of the claim, explaining that Mr. Clemans's rewatering decision saved the Joint Venture time and overhead costs from January 17, 2004, through August 2, 2005. Id. at 3. It next lists summaries of the contract clauses and documents upon which the decision is based, along with parenthetical citations to the applicable appended tabbed documents. See id. at 3-4. The subsection entitled "Findings of Fact/Discussion" sets forth the rationale and legal arguments for the claim. It asserts that the reason Mr. Clemans allowed the Joint Venture to dry test the gates and valves using local controls only and to rewater the cofferdam early was to "keep the project moving forward" after J.A. Jones filed for bankruptcy. Id. at 4. After listing the dates when various gates and valves were tested, the final decision contends that Mr. Clemans's decision "undoubtedly saved the contractor a significant amount of time and overhead costs. Under the Changes Clause, the Government is entitled to an equitable adjustment for the reduction in time and cost to the contractor," calculated at 564 days. Id. at 5. The final decision then uses DCAA auditor Rebecca A. Kerr's assessment of field overhead and equipment cost daily rates of $11,664.00 and $4,656.00, respectively, to calculate the Government's claimed total costs savings to the Joint Venture of $9,204,480.00. Id.

Plaintiffs argue that Ms. Easter's final decision, the basis for the Government's counterclaim, is a nullity because it was not the product of the independent exercise of the contracting officer's judgment. According to plaintiffs, the contracting officer's final decision was prepared in its entirety by defense counsel in anticipation of trial, which the contracting officer merely rubber-stamped.

2. Procedural history

On July 15, 2009, two weeks before this case was to be tried, defendant filed Defendant's Motion for Leave To File Setoffs, and in the Alternative, To Exclude Offsets

from the Scope of Trial, by which, for the first time, defendant claimed that it was entitled to a credit of $3,513,254.00 due to an alleged waiver of certain dry-test requirements. An order expediting briefing entered on July 15, 2009, with an extension of time granted on July 16, 2009. Plaintiffs responded on July 20, 2009, arguing that the new claim should be treated as a counterclaim rather than a setoff, see Pls.' Br. filed July 20, 2009, at 2 n.1, and challenging the court's jurisdiction to hear the claim due to the contracting officer's failure to issue a final decision on the claim, see id. at 5. Defendant replied on July 21, 2009, informing the court that it expected the contracting officer to issue a final decision by July 23, 2009, whereupon it would amend its pleading to assert a counterclaim pursuant to RCFC 13(e). See Def.'s Br. filed July 21, 2009, at 2. At the first pretrial conference held on July 24, 2009, defense counsel represented that defendant was prepared to try its counterclaim at trial then scheduled to commence on July 28, 2009, but he requested severance of the counterclaim and the Board claims and trial of these claims at a later date. 105/ See Transcript of Proceedings, Fireman's Fund Ins. Co., *et al*. v. United States, Nos. 04-1692C, 08-782C, -783C & -784C, at 12 (Fed. Cl. July 24, 2009) ("Tr. July 24, 2009"). The court denied defendant's request for severance as moot and left the decision to the parties whether to schedule trial to allow for inclusion of all claims. See Order filed July 30, 2009. The parties agreed to postpone commencement of trial. On July 27, 2009, the court entered an order postponing trial until November 2, 2009. On July 30, 2009, the court denied as moot defendant's Motion for Leave To File Setoffs, and in the Alternative, To Exclude Offsets from the Scope of Trial.

Postponement of trial spawned a contentious round of motions regarding the discovery required to engraft defendant's counterclaim into the rescheduled trial. On July 29, 2009, plaintiffs filed Plaintiffs' Motion for Scheduling Order, and defendant responded on the same date requesting additional discovery through a single interrogatory and three depositions. Plaintiffs replied on July 30, 2009, objecting to any discovery by defendant, given that the lateness of the counterclaim was entirely the fault of defendant. On July 31, 2009, the court issued a Scheduling Order for Perfection of and Discovery, Pretrial, and Trial of Government's Counterclaim, which modified a discovery plan and schedule proposed by the parties. 106/ The court ordered that defendant be allowed one amended pleading to amend

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105/ The contracting officer issued a final decision on July 23, 2009, which prompted defense counsel to explain that the fourth setoff "would now properly be a counterclaim." Tr. July 24, 2009, at 11.

106/ The discovery plan entered by the court provided:

> 1) Plaintiffs may serve up to five written interrogatories requests pursuant to RCFC 33. Defendant may serve the interrogatory framed in its July 29, 2009 response.

its second and third setoffs 107/ and to plead its counterclaim. See Order entered July 31, 2009, ¶ 1. The court's July 31, 2009 order further explained its concern over the delay caused by defendant's late-filed counterclaim. The court stated:

> Although trial has been postponed to allow for trial of the Government's counterclaim, see Order entered on July 27, 2009, defendant

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> 106/ (Cont'd from page 143.)
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> 2) Plaintiffs may serve up to twenty-five requests for admission pursuant to RCFC 36.
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> 3) By August 14, 2009, defendant shall provide to plaintiffs all documents not heretofore provided and identified on any exhibit list exchanged between the parties (this means that to some extent defendant may be reproducing documents already produced) relating to the Government's counterclaim and a list of all witnesses, both fact and expert, that defendant expects to call at trial. Defendant has provided a provisional witness list in its July 29, 2009 response.
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> 4) Plaintiffs may notice and take up to five depositions of fact witnesses and one deposition of any expert witness.
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> 5) Each side shall bear the costs of discovery relating to the Government's counterclaim insofar as costs of production of documents. The only reason for postponing trial to try the substance of the Government's counterclaim is due to defendant's failure to submit it to the contracting officer for decision at an earlier date; and defendant has admitted that the matter could have been developed much earlier in the proceedings, if not years earlier. Should plaintiffs depose any witness previously deposed, defendant shall bear the costs incurred by plaintiffs for the deposition; should defendant depose any witness previously deposed, defendant shall bear the costs incurred by plaintiffs for the deposition. The court does not endorse defendant's suggestion that depositions preferentially should be conducted by telephone.
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> 6) All discovery shall be completed by October 9, 2009.

Order entered July 31, 2009, at 2-3.

107/ Defendant withdrew its second and third setoffs. See Def's Br. filed July 21, 2009, at 3.

> asserted the Government's counterclaim as soon as jurisdictionally possible and as close as possible to the scheduled date for trial. Therefore, plaintiffs are entitled to make a record of the havoc to the trial schedule that this late inclusion of the now ready counterclaim has wrought. While a contracting officer must issue a decision on a Government claim, it is not a responsible exercise of the Government's litigation options to launch this armada at the eleventh hour. The parties and the court now are preparing for a trial commencing on November 2, 2009, that will include the Government's counterclaim. The fact that defendant is required to move to amend its answer to file one amended answer covering all setoffs and the Government's counterclaim will not affect this schedule.

Order entered July 31, 2009, at 1. Defendant's counterclaim was filed on August 4, 2009.

The usual litigation hiatus that characterizes the month of August subsequently was enlivened by a torrent of discovery disputes. On September 9, 2009, plaintiffs filed Plaintiffs' Motion for Clarification of the Court's July 31, 2009 Scheduling Order for Perfection of and Discovery, Pretrial, and Trial of Government's Counterclaim. In light of the limited discovery authorized by the July 31, 2009 order, plaintiffs objected to defendant's issuance of a subpoena for documents and deposition notices regarding the counterclaim. Defendant responded on September 9, 2009. In an attempt to make a record that this court unreasonably denied defendant discovery, defendant argued that, *inter alia*, because plaintiff elected to try the counterclaim as a part of the instant case rather than to sever it, defendant required "reasonable discovery" in order to "develop the record for presentation at trial" and "try the counterclaim efficiently." Def.'s Br. filed Sept. 9, 2009, at 1-2. Defendant also argued that plaintiffs had "very little need for discovery," id. at 2, and that the scheduling order's discovery limitations applied only to plaintiffs, not to defendant, id. at 5.

The court's order entered on September 10, 2009, reminded defendant that, during the first pretrial conference on July 24, 2009, defense counsel represented that the Government was ready to try its counterclaim. The court explained that its July 31, 2009 scheduling order "tailored the discovery consistent with avoiding further delay." Order entered Sept. 10, 2009, at 1. The order also reminded defendant that, by its own admissions, it was responsible for the failure to develop the facts underlying the counterclaim within a reasonable period of time, which delayed its filing of the counterclaim:

> Defendant must bear in mind as it proceeds forward on its counterclaim that the jurisdictional prerequisites that prevented the court from ruling it untimely do not mandate that defendant now be permitted to undertake additional discovery—in fact, different discovery than it originally proposed before the

> court entered the July 31, 2009 scheduling order. This consequence follows from the Government's lack of justification for perfecting the Government's counterclaim at such a late date. Upholding jurisdiction does not equate to allowing discovery that could jeopardize the rescheduled trial date. To reinforce the point, the July 31, 2009 scheduling order taxes defendant with any costs that plaintiffs might incur for duplicative depositions. See Order entered July 31, 2009, at 2-3.

Order entered Sept. 9, 2009, at 2. The order quashed defendant's August 19, 2009 subpoena and September 4, 2009 notices of deposition. Id.

On September 1, 2009, an order entered granting defendant's motion to amend its answer and assert its counterclaim. Plaintiffs filed their answer to the counterclaim on September 11, 2009. On September 16, 2009, defendant filed Defendant's Motion for Supplemental Expert Statements, requesting that each party serve a brief statement regarding the scope of any expert testimony regarding the counterclaim. The court granted defendant's request on September 18, 2009.

On September 10, 2009, defendant filed Defendant's Motion for Leave To Serve Interrogatory 24—the only interrogatory defendant claimed it wanted to serve in its July 29, 2009 response and that was authorized by the court's July 31, 2009 order—to which plaintiffs responded on September 15, 2009, with objections. On September 18, 2009, the court ordered plaintiffs to respond to defendant's Interrogatory 24 by October 15, 2009. Not satisfied, defendant on September 22, 2009, filed Defendant's Motion To Compel a Proper Response to Interrogatory 23, to which plaintiffs responded, again with objections, on September 23, 2009. The court granted defendant's motion on September 24, 2009, ordering plaintiffs to respond to a re-worded Interrogatory 23 by September 30, 2009. Plaintiffs complied, providing a verified response by a RCFC 30(b)(6) witness, Paul Ginnett, Vice President of Fireman's Fund.

On October 5, 2009, plaintiffs filed Plaintiffs' Motion for Summary Judgment on Defendant's First Counterclaim and Plaintiffs' Motion for Expedited Briefing Schedule for Plaintiffs' Motion for Summary Judgment on Defendant's First Counterclaim. The court granted plaintiffs' request to expedite briefing on October 6, 2009. Also on October 6, 2009, defendant—in response to plaintiffs' motion for summary judgment—filed a motion seeking to depose plaintiffs' representative Mr. Ginnett pursuant to RCFC 56(f). Defendant's motion failed to submit an affidavit setting forth the reasons justifying defendant's need for discovery to defend against plaintiffs' motion for summary judgment, as required by RCFC 56(f). However, despite defendant's previous representations that it was ready to try its counterclaim, see Tr. July 24, 2009, at 12, and despite the court's indulgence of defendant's

subsequent discovery requests, defendant complained that "the United States was not allowed to take depositions regarding our counterclaim," Def.'s Br. filed Oct. 6, 2009, at 3, and that the court "den[ied] the United States discovery in connection with the counterclaim," id. at 5. Unwilling to allow defendant's efforts to re-write the record go unremarked upon, the court scheduled a telephonic status conference for October 7, 2009, to discuss the finer points of defendant's October 6, 2009 motion.

Several hours prior to the status conference, defendant filed Defendant's Motion for Leave To File Statement in Advance of Status Conference, wherein defendant suggested that further briefing on plaintiffs' motion for summary judgment would be "an enormously burdensome and unproductive use of time." Def.'s Br. filed Oct. 7, 2009, at 1. At the October 7 status conference the court queried defense counsel as to how

> we got from your exuberance about being ready to try the counterclaim on July 24 to where we are now where you're making a record for appeal that you've been deprived of an opportunity to conduct adequate discovery to prove your counterclaim and essentially should be relieved from the requirements of Rule 56(f) in responding to the motion for summary judgment and indeed to the position that you shouldn't be required to do anything because you're too busy preparing for the case that you haven't had time to adequately discover so that you should be relieved from the responsibility of responding to this motion for summary judgment at all and have it deferred to trial[?]

Transcript of Proceedings, Fireman's Fund Ins. Co., *et al.* v. United States, Nos. 04-1692C, 08-782C, -783C & -784C, at 7-8 (Fed. Cl. Oct. 7, 2009) ("Tr. Oct. 7, 2009"). Defense counsel replied that he did not have time to both prepare for trial and respond to plaintiffs' motion for summary judgment. See Tr. Oct. 7, 2009, at 13-14. Defense counsel also stipulated that, while he required additional discovery to defend against the motion for summary judgment, he did not need that proof to go to trial. See id. at 11 ("In other words, if the Court says we're going to trial I'm happy to withdraw my motion for a 30(b)(6) deposition.").

Subsequently, by order dated October 8, 2009, the court denied for failure to comply with RCFC 56(f) defendant's motion to depose Mr. Ginnett; stayed all briefing regarding the counterclaim; and scheduled a status conference for October 13, 2009, to discuss further briefing on plaintiffs' motion for summary judgment on defendant's counterclaim. At the October 13, 2009 status conference, plaintiffs did not object to defendant's request that the counterclaim be tried and that no further briefing be received on plaintiffs' motion for summary judgment. See Order entered Oct. 13, 2009, at 1. By order entered on the same date, the court vacated its October 6, 2009 order scheduling briefing on plaintiffs' motion for

summary judgment, suspended briefing on the motion without prejudice to plaintiffs' raising all issues addressed therein during trial, and ordered that the counterclaim be tried.

3. Standard of review

"All claims by the government against a contractor relating to a contract shall be the subject of a decision by the contracting officer." 41 U.S.C. § 605(a). "The contracting officer shall issue his decision[] in writing . . . . [stating] the reasons for the decision reached . . . ." Id. FAR 1.602-2 further provides, in pertinent part:

> Contracting officers are responsible for ensuring performance of all necessary actions for effective contracting, ensuring compliance with the terms of the contract, and safeguarding the interests of the United States in its contractual relationships. In order to perform these responsibilities, contracting officers should be allowed wide latitude to exercise business judgment. Contracting officers shall—
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> . . . .
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> (b) Ensure that contractors receive impartial, fair, and equitable treatment; and
>
> (c) Request and consider the advice of specialists in audit, law, engineering, information security, transportation, and other fields, as appropriate.

Id. The contracting officer therefore must render a decision that is fair and impartial. In reaching the decision, the contractor is required to: "(1) Review the facts pertinent to the claim; (2) Secure assistance from legal and other advisors; (3) Coordinate with the contract administration officer or contracting office, as appropriate; and (4) Prepare a written decision . . . ." FAR 33.211(a). The contracting officer is further required to take into account "(1) The size and complexity of the claim; (2) The adequacy of the contractor's supporting data; and (3) Any other relevant factors." FAR 33.211(d).

While there is no "implied prohibition against [the contracting officer's] first obtaining or even agreeing with the views of others," Pac. Architects & Eng'rs, Inc. v. United States, 491 F.2d 734, 744 (Ct. Cl. 1974), a contracting officer must still "'put his own mind to the problems and render his own decisions,'" id. (quoting N.Y. Shipbuilding Corp. v. United States, 385 F.2d 427, 435 (Ct. Cl. 1967)). "Consultation is one thing, however; abdication, quite another." N. Star Ala. Hous. Corp. v. United States, 76 Fed. Cl. 158, 209 (2007). The contracting officer must "take ownership of all determinations included in the final contracting officer's opinion," CEMS, Inc. v. United States, 65 Fed. Cl. 473, 479

(2005), and, if other government officials are consulted, including government attorneys, "a contracting officer may not forsake his duties, but rather must ensure that his decisions are the product of his personal and independent judgment," N. Star Ala. Hous., 76 Fed. Cl. at 209 (emphasis added). A contractor is entitled to a determination by the contracting officer, and therefore "a decision by someone else is a nullity." N.Y. Shipbuilding, 385 F.2d at 436. 108/

4. The involvement of contracting office personnel in issuing the final decision

Trial testimony of Administrative Contracting Officer Clemans illustrated the limited extent of his involvement in the preparation of the contracting officer's final decision. He did not prepare the final decision, and he did not know who did. Tr. at 2061 (Clemans). Asked whether it was in June 2009 that he "first found out that a contracting officer's final decision concerning the change to the dry testing requirements would be issued," Mr. Clemans replied: "That sounds correct." Tr. at 2061. The total extent of his involvement in the final decision was limited to being "consulted a few times for information." Id. at 2062. Mr. Clemans was given a copy of the decision's findings of fact for his review and comment, but he did not recall making any changes. Tr. at 2062-63 ("If I did [make changes to the draft], they were relatively minor."). Although Mr. Clemans recalled spending less than thirty minutes discussing the contracting officer's final decision with COR Eggburn and even less time spent discussing it with his colleagues Amanda Edmondson and Thomas Long, 109/

108/ The Court of Claims decided New York Shipbuilding in 1967, before the enactment of the CDA. The court presumed that a final decision by the cognizant contracting officer was proper.

> Nor can we agree that insistence on a decision by the contractual official is hypertechnical or unrealistic. It may be that, in some instances, the "reality" is that the designated individual merely rubber-stamps a subordinate's or superior's findings, but we must presume that the parties intend otherwise—that they desire that in the end he put his own mind to the problems and render his own decisions.

385 F.2d at 435. Plaintiffs in the case at bar fully rebutted that presumption.

109/ Ms. Edmondson served as an engineer for the Corps at Montgomery Point. Mr. Long was an inspector for the Corps at Montgomery Point.

he had no recollection of ever discussing the final decision with Contracting Officer Easter. 110/ Tr. at 2062.

Ms. Easter herself established that the contracting officer's July 23, 2009 final decision was not the product of her personal and independent judgment.

When asked by plaintiffs' counsel about whether there are any written guidelines that contracting officers follow when issuing decisions on claims, Contracting Officer Easter responded in the negative, but explained that "there is a process that we complete prior to issuing claims on either side." Tr. at 2151-52. According to Ms. Easter, "[t]hat process includes first submission of the claims, and then a technical analysis of the claim, and typically cost analysis of that claim, and then discussions with the parties, and ends with counsel drafting a final decision and findings of fact." Tr. at 2152. With the possible exception of instructing counsel to draft the final decision and findings of fact, Ms. Easter did not follow this process at all.

Ms. Easter admitted that the final decision was entirely drafted by Mr. Weisenberger, Assistant District Counsel for the Corps's Little Rock District who, the court notes, assisted as a most conscientious agency counsel during trial. In fact, Ms. Easter made no changes to Mr. Weisenberger's draft final decision before she signed it. Tr. at 2174. Contradicting the testimony of Mr. Clemans, Ms. Easter testified that, prior to issuing the final decision, she discussed it with Messrs. Weisenberger and Clemans for "less than an hour." Tr. at 2161. The only purpose of Ms. Easter's engaging with them was to verify that they were seeking a time credit. Tr. at 2162 ("I wanted to make certain that the basis for the equitable adjustment had to do with the time and the overhead savings related to the waiver."). Ms. Easter did not attempt to verify the accuracy of the 564-day period that the decision finds was saved. Tr. at 2163. Instead, she relied solely on whatever time-related calculations were made by Mr. Clemans and provided to Mr. Weisenberger. Tr. at 2163 ("I don't know the exact details but [Mr. Clemans] provided input to Mr. Weisenberger in preparing the findings of fact."). Yet, during her conversation with Mr. Clemans concerning the claim, Ms. Easter did not discuss with him his specific input. Tr. at 2163. She recalled speaking with Mr.

110/ Mr. Clemans first considered bringing the claim for the waiver in spring 2005, when he prepared his technical analysis of the rewatering claim. Tr. at 2063 (Clemans) ("I remember preparing that [technical analysis in spring 2005], that I realized, and also based on some additional scheduling information that we were receiving that we probably should have received a credit for this.").

Clemans after she had reviewed the draft, but she did not have a copy with her when she spoke with him. 111/ Tr. at 2164-65.

Contracting Officer Easter did not review the Project schedules. Tr. at 2167-68. Ms. Easter did not independently verify, nor did she ask Mr. Clemans if he verified, the accuracy of any of the facts recited in the findings of fact. Tr. at 2173 ("I was familiar with this project. I've had a history over the past, since January 2003 on this project. I understood the analysis, I understood the concept of equitable adjustment, I understood the analysis and how we arrived at the equitable adjustment, and I didn't feel a need to further verify the information other than what was contained in the findings of fact, as well as the final decision."). While she briefly reviewed the findings of fact before she signed the final decision, Ms. Easter did not review any of the clauses and specifications of cited documents that were appended to the final decision in tabs A through J. Indeed, no documents were appended to the draft that she reviewed. Tr. at 2169-70 ("[T]hey were summarized in the finds of fact."). She understood the "concept of the equitable adjustment," Tr. at 2173, and she was aware that Mr. Clemans was providing the technical input; however, that he did not do.

Administrative Contracting Officer Clemans did not make a technical evaluation that could be imputed to Ms. Easter. He was one witness who suffered from the long lapse between the occurrence of operative facts and the trial. His recollection of the evolution of the final decision was poor, and he could not testify about what information he communicated to Mr. Weisenberger.

Plaintiffs were entitled to a fair and impartial final decision by the contracting officer. FAR 1.602-2(b). Defendant could not demonstrate that the counterclaim was the product of either Ms. Easter's own analysis or that she relied on the technical input of the administrative contracting officer. Her testimony portrayed an orphan decision that she signed because her legal team recommended it. The claim was entirely developed by counsel, with some information from Mr. Clemans, and Ms. Easter acquiesced in Mr. Weisenberger's guidance. What attention she gave the final decision was not a substantive review and analysis of the claim's merits or a review of the technical input; rather, she merely understood the nature of the claim asserted in the decision. Such a decision hardly can be elevated to the product of the exercise of the contractor officer's independent judgment.

111/ Ms. Easter clarified that she had two conversations with Mr. Weisenberger, one prior to reviewing the draft, during which he "gave me an overview," and a second meeting "a couple of days later [when] he came back with a draft decision." Tr. at 2164. Both meetings totaled less than one hour. Tr. at 2164.

The evidence shows that the contracting officer did not assure herself even that the technical analysis in the findings was made by her subordinates. The court found Ms. Easter to be knowledgeable and professional in terms of her overall career accomplishments. Had she relied on Mr. Clemans's substantive input or advice, instead of merely understanding that he provided it to agency counsel, her appreciation of the concept of the equitable adjustment might be viewed as more informed. That she did not do. Accordingly, after receiving the draft of the final decision from Mr. Weisenberger, Ms. Easter did not "put her mind to it" and make it her own. Pac. Architects & Eng'rs, 491 F.2d at 744 (internal quotation marks omitted). Instead, the contracting officer "abdicated [her] responsibility to make independent decisions" as required by the FAR. N. Star Ala. Housing, 76 Fed. Cl. at 211. The final decision is therefore invalid. See OTI Am., Inc. v. United States, 68 Fed. Cl. 646, 658 (2005) (finding government procurement contracting officer failed to exercise independent judgment when she "applied the determinations and conclusions reached by her technical evaluation team"); CEMS, 65 Fed. Cl. at 479-80 (holding that contracting officer's determinations not substantially justified when court found, *inter alia*, contracting officer remained "remarkably detached from the decision-making process" by relying "almost exclusively" on the determinations made by subordinates, and by reviewing the data relied on in the contracting officer's final decision rather cursorily); see also Impresa Construzioni Geom. Domenico Garufi v. United States, 52 Fed. Cl. 421, 427 (2002) (holding contracting officer "failed to conduct an independent and informed responsibility determination" by relying on "technical evaluation board's recommendation without making any independent inquiries"). The contracting officer's final decision does not provide a valid predicate for defendant's counterclaim.

VII. Damages

1. Standard of review

In a suit to recover damages, "'[t]he claimant bears the burden of proving the fact of loss with certainty, as well as . . . the amount of loss with sufficient certainty so that the determination of the amount of damages will be more than mere speculation.'" Lisbon Contractors, Inc. v. United States, 828 F.2d 759, 767 (Fed. Cir. 1987) (quoting Willems Indus., Inc. v. United States, 295 F.2d 822, 831 (Ct. Cl. 1961)). The standard is a preponderance of the evidence. See Teledyne McCormick-Selph v. United States, 588 F.2d 808, 810 (Ct. Cl. 1978). Ascertaining damages is not an exact science. See S.W. Elec. & Mfg. Corp. v. United States, 655 F.2d 1078, 1088 (Ct. Cl. 1981). Once a party adequately demonstrates the existence of damages, it need not quantify their exactness to a mathematical certainty. See Lindemann Maschinenfabrik GmbH v. Am. Hoist & Derrick Co., 895 F.2d 1403, 1406 (Fed. Cir. 1990) (citing Story Parchment Co. v. Paterson Parchment Paper Co., 282 U.S. 555, 562 (1931)). Rather, the claimant must furnish the court with a "reasonable

basis" for computation. 112/ Wunderlich Contracting Co. v. United States, 351 F.2d 956, 968 (Ct. Cl. 1965). This leniency "does not relieve the contractor of his essential burden of establishing the fundamental facts of liability, causation, and resultant injury." Id.

Plaintiffs presented their proof of damages through the testimony of Mr. Fuchs, the founder and President of Delta Consulting Group, a consulting firm specializing in litigation support for the construction industry. See Tr. at 2936 (Fuchs). Mr. Fuchs was a persuasive damages expert, convincing and resilient on cross-examination. He favorably contrasted with Ms. Kerr, a DCAA supervisory auditor, who testified without objection as defendant's expert in the field of cost accounting. 113/ Ms. Kerr endeavored to discredit the extended overhead and equipment costs developed by Mr. Fuchs, see Tr. at 3175 (Kerr), but she was tasked beyond her capabilities. Cross-examination sufficiently discredited the timeliness of her data, the validity of her assumptions, the sufficiency of her records, and the thoroughness of her analysis. See Tr. at 3197-209, 3212-14 (Kerr); see also Tr. at 2970-78, 2980-82 (Fuchs) (explaining shortcomings of DCAA analysis).

2. Defendant's motion to dismiss for failure of proof

At the conclusion of Mr. Fuchs's direct examination, plaintiffs offered Mr. Fuchs's damages presentation, PX 801, as a demonstrative exhibit. See Tr. at 3073-74. Defense counsel objected, previously having moved to dismiss the case for failure of proof of damages, see Tr. at 3070, arguing that because plaintiffs had not entered into the record any Fed. R. Evid. 1006 summary of their direct costs, the record was bereft of damages, see Tr. at 3070 (Poirier) ("[T]here is not a single summary included in the case that shows the amount of money spent for any item on the project."). Due to deficient proof, defense counsel charged that plaintiffs were improperly relying on PX 801 as a *de facto* Fed. R. Evid. 1006 summary. See Tr. at 3070 (Poirier) ("Although [plaintiffs] want to designate 801 as a demonstrative exhibit, it's [a] plain honest fact that they are relying entirely on it as a summary under Rule 1006[;] otherwise they have no evidence.").

112/ Discussing the failure of the ASBCA to award damages notwithstanding a finding of liability, the Court of Claims reminded that, "[w]hen confronted with the clear liability of defendant and the plaintiff's efforts to present all available evidence on damages, the [ASBCA] [was] under a heavy obligation to provide compensation. While there was 'uncertainty as to the extent of damage, . . . there was none as to the fact of damage.'" S.W. Elecs. & Mfg., 655 F.2d at 1088 (citation omitted) (emphasis omitted).

113/ The court would not have qualified her to give expert opinion testimony under Fed. R. Evid. 702.

Responding to an inquiry from the court as to which papers supporting his analysis were made available to defendant, Mr. Fuchs confirmed that the work papers he relied on, including the job-cost records for the Joint Venture and Fru-Con, were made available. See Tr. at 3071. Defense counsel grudgingly acknowledged that a print-out of two-years' worth of the Joint Venture's EPIC cost accounting system had been turned over, although in voluminous, hard-copy format. See Tr. at 3072 (Poirier). Plaintiffs' counsel rejoined that electronic copies of the EPIC systems for the Joint Venture and Fru-Con had been provided to defendant "on at least two occasions." Tr. at 3072 (Phillips). Defense counsel offered another equivocal confirmation—"I think they may have produced a disk that was an electronic summary of a proprietary database that as far as I know is no longer sold," Tr. at 3072 (Poirier)—and insisted that these productions and the cost records that Mr. Fuchs's analysis rely upon failed to satisfy the requirements of Rule 1006, Tr. at 3071 (Poirier) ("[T]here is no evidence that these summaries are the same summaries that were given to the government or that were supported.").

1) Evidence of damages reviewed by Mr. Fuchs

Mr. Fuchs did not list specific documents that he reviewed for each claim. Plaintiffs' Exhibit 801, a Microsoft Power Point printout relied upon by Mr. Fuchs entitled "Expert Opinions[,] Quantification of Damages[,] Loss of Productivity," did not identify as a source for the costs claimed other documents admitted into evidence.

Mr. Fuchs's methodology in calculating damages involved reviewing actual job cost accounting records to derive direct costs for actual labor rates and man-hours, extended field overhead cost rates, and extended equipment cost rates. He also reviewed: (1) depositions of Messrs. Neeley, Sickle, Francis C. Purvis (the Joint Venture's office manager), Herrick, McPherson, Porges, Graham, and Wagner; (2) the May 2008 Amended Schedule Analysis & Pricing for Re-Watering Site Delays & Additional Costs; (3) the February 2008 Request for Equitable Adjustment—Deletion of Crest Gate Dewatering System Wet Test; (4) the September 2008 Request for Equitable Adjustment—Revised Downstream Excavation Limits; (5) the March 2007 Amended Request for Equitable Adjustment; and (6) the Request for Equitable Adjustment—Control Tower Columns, as well as other documents "that pertain to extra costs." PX 85 at 8. While the schedules of damages appended to Mr. Fuchs's report do not identify any original source documents, the report represents:

> Delta analyzed the job costs using the general standards of a Government audit. Delta identified selected cost items, traced them back to the original source documents, such as invoices, and proof of payment was identified. Any questions or clarifications were discussed with Joint Venture personnel to resolve that the cost item transaction was complete and correct.

PX 85 at 9; see also id. at 12 ("Delta used *actual* costs to the extent possible."). The report attests that Delta's analysis conforms with FAR 31.201-2(a), which provides guidance for allowable costs. 114/

2) The court's denial of defendant's motion

The court denied defendant's motion to dismiss for lack of proof of damages and admitted over defendant's objection PX 801 as a demonstrative exhibit. See Tr. at 3073-74. Defense counsel's protests rang hollow because—based on the representations of plaintiffs' counsel—plaintiffs had given the underlying documents to the defense team, see Tr. at 3073 (Phillips) ("[W]e did provide the data electronically on more than one occasion."), and because the court previously ordered plaintiffs' counsel to walk defense counsel through those documents, see Order entered Mar. 31, 2009, ¶ 4 ("Plaintiffs' counsel shall make available to defense counsel as soon as possible personnel who can assist defense counsel on site in reviewing the summary exhibits, and the 'vast financial data used to generate the summary exhibits,' . . . that plaintiffs have provided to defendant." (quoting Pls.' Br. filed Mar. 27, 2009, at 3)). The court was satisfied that plaintiffs' counsel complied with the court's March 31, 2004 order. See Tr. at 3073 (Phillips) ("I believe we've answered any question [defense counsel] had . . . ."). Defense counsel made no showing during trial that defendant could not identify the documentation turned over to support these claims.

The court has found that Mr. Fuchs's testimony and his supporting documentation constituted substantive proof of damages. Plaintiffs established that documents supporting Mr. Fuchs's schedules of additional costs were made available to defendant. Moreover, defense counsel had adequate opportunity to cross-examine Mr. Fuchs and explore the bases for his expert opinions. Mr. Fuchs was entitled to rely on PX 801, see Fed. R. Evid. 703, and the court regards his testimony as substantive evidence insofar as it was self-contained, intelligently and coherently explicated, and survived rigorous cross-examination on the elements that the court awards.

114/ FAR 31.201-2(a) provides:

> A cost is allowable only when the cost complies with all of the following requirements: (1) Reasonableness[;] (2) Allocability[;] (3) Standards promulgated by the CAS Board, if applicable, otherwise, generally accepted accounting principles and practices appropriate to the circumstances[;] (4) Terms of the contract[; and] (5) Any limitations set forth in this subpart.

However, the court goes one step further insofar as it accepts PX 801 as a summary under Fed. R. Evid. 1006. Plaintiffs made all the predicate showings (voluminous documentation, presentation in the form of a chart or calculation, delivery of copies of originals to the other party). Whether defendant's bombast was responsible for plaintiffs' retreat and proffer of PX 801 as a demonstrative, the court rules that the exhibit qualified as a Rule 1006 summary and constitutes substantive evidence of plaintiffs' damages.

3. Damages proved by plaintiffs

Mr. Fuchs calculated $32,826,518.00 in damages, with the following constituent elements: (1) concrete mix design impacts, $8,915,557.00; (2) labor shortage impacts, $14,948,610.00; (3) control tower delays, $428,065.00; (4) site rewatering delays, $1,246,153.00; (5) revision of downstream excavation limits, $1,706,947.00; (6) deletion of the CGDS wet-test and other wet-testing delays, $2,042,609.00; (7) IHP claims, $915,001.00; and (8) return of withheld liquidated damages, $2,623,576.00.

1) Concrete

Mr. Fuchs separately presented the damages for plaintiffs' claims stemming from concrete placement. He used the Joint Venture's job-cost accounting reports to derive direct costs, actual labor rates, and man-hours. For his productivity analysis of impacted forming and rebar work, he used a measured-mile period and the actual quantities and man-hours worked at Montgomery Point. See Tr. at 3005, 3090 (Fuchs). He appropriated his measured mile from January 2001 until April 2001, a span which he believed approximated a "desired productivity." See Tr. at 2960 (Fuchs). The measured mile subsequently paces an "impacted" period of work that runs from May 2001 until September 2003. An additional "relatively unimpacted" period follows, from October 2003 until September 2004, for concluding forming and rebar on monoliths. Id.; see PX 801 at 6. For concrete placement and finishing, Mr. Fuchs lacked an unimpacted period at Montgomery Point from which to draw a measured mile, so he used comparable project studies as a proxy measured mile. Oliver Lock and Dam served for concrete placement productivity and Point Marion Lock and Dam for concrete finishing productivity. See Tr. at 3005-06, 3029-35, 3088-89 (Fuchs). This damage assessment spans from June 2000 until January 2005. Mr. Fuchs's calculations for extended field overhead and extended equipment rates derive from the Joint Venture's actual job-cost accounting records, although defense counsel protested that defendant's trial team was unable to trace Mr. Fuchs's work.

Mr. Fuchs calculated plaintiffs' concrete-related damages at $8,915,557.00. His testimony summarized the components of this total, as follows: (1) for additional labor and other costs incurred on account of concrete deficiencies, $3,731,649.00; (2) material costs,

$447,455.00; (3) equipment costs, $26,819.00; (4) subcontractor costs, $646.00; (5) extended field overhead, $3,127,389.00; and (6) extended equipment, $598,753.00. The sum of these components, increased by home office overhead (at 2.34%, adding $185,625.00), then profit (at 9.82%, adding $797,221.00), yields $8,915,557.00. 115/

More specifically, plaintiffs' closing argument divided the $8,915,557.00 total between damages attributable to the Joint Venture's activities involving Class C fly ash mix, Class F fly ash mix, and repairs to the voids in "honeycombed" concrete placements, respectively. The Class C fly ash period includes $3,680,819.00 in damages, of which the constituent claims are $576,821.00 in direct costs 116/; $2,554,544.00 in delays 117/; $143,683.00 in lost productivity 118/; and $405,771.00 in overhead and profit markups. 119/ The Class F fly ash period includes $3,703,375.00 in damages, of which the constituent claims are $262,579.00 in direct costs; $1,171,598.00 in delays; $1,860,940.00 in lost productivity; and $408,258.00 in overhead and profit markups. The Joint Venture's concrete repairs cost $1,531,366.00, which includes an overhead markup of $31,884.00 and a profit markup of $136,933.00. 120/

115/ Mr. Fuchs reasonably justified his markup percentages for home office overhead and profit. See Tr. at 2981-83.

116/ Direct costs include a change to a second fly ash vendor ($192,604.00); wasted fly ash and a change to delivery systems ($20,838.00); a wasted stayform keyway ($11,699.00); aggregate barge demurrage ($20,764.00); batch plant inspection costs ($10,823.00); and labor escalation ($320,093.00 for the eighty-one days prior to December 31, 2000). For the Class F fly ash period, Mr. Fuchs's direct costs included the purchase of additional formwork ($107,202.00); repairs at the waterstop ($5,209.00); and labor escalation ($150,168.00 for the thirty-eight days after December 31, 2000).

117/ Delay costs for eighty-one days include field office overhead ($2,128,727.00) and extended equipment costs ($425,817.00). For the Class F fly ash period, Mr. Fuchs calculated $998,662.00 in extended field overhead and $172,936.00 in extended equipment.

118/ Mr. Fuchs calculated the Class C-related lost productivity by multiplying 8,507 man-hours by $16.89 per hour. For the Class F fly ash, Mr. Fuchs used 110,180 man-hours.

119/ The markup for home office overhead was calculated at 2.34% and that for profit, at 9.82%. The same percentages are used for the Class F fly ash period and for the concrete repairs.

120/ As presented in their closing argument, plaintiffs' tally for the Class C fly ash, Class F fly ash, and concrete repairs yields an extra three dollars ($8,915,560.00) as compared to Mr. Fuchs's presentation ($8,915,557.00).

Although defendant's cross-examination of Mr. Fuchs was laborious, the expert was resilient. However, Mr. Fuchs could not establish a reasonable basis for computing the labor costs attributable to the concrete deficiencies. A component of Mr. Fuchs's concrete labor-related costs involves "the calculation of man hours that results from the measured mile analysis that [he] performed," by which Mr. Fuchs calculated 118,687 lost man-hours in productivity. Tr. at 2985 (Fuchs); see also Tr. at 3004 (Fuchs) ("[S]how me what you can do in a relatively unimpacted period, and then show me what you can do where you say you are impacted."). Mr. Fuchs displayed impressive command of the measured-mile theorem, but his analysis exceeded the limits of his expert qualifications and inaccurately integrated Prof. Philips's labor market analysis. Tr. at 3018-19 (Fuchs) (describing incorporation of Prof. Philips's analysis). Because Prof. Philips's labor market analysis extended no further than July 2002, Mr. Fuchs's productivity calculations for August 2002 through September 2003 were excluded. See Tr. at 3021-25, 3038-39, 3074. To permit otherwise would have allowed Mr. Fuchs to testify as to the impact of the Raytheon REA on the Joint Venture's productivity—a matter not within the purview of his expertise. See Tr. at 3021-25.

Flexibility in providing an exact measure of damages does not obviate plaintiffs' burden to establish causation. See Wunderlich, 351 F.2d at 968. Wary of Mr. Fuchs's "transferred causation" from Prof. Philips's analysis, Tr. at 3044, the court asked Mr. Fuchs whether his compromised data could be excised from the whole, see Tr. at 3038-39. Mr. Fuchs suggested that correcting his data entailed a simple mathematical exercise. See Tr. at 3039-41. Nevertheless, in no small part due to plaintiffs' failure to enter into evidence sufficient records of Mr. Fuchs's data and analysis—notwithstanding the acceptance of PX 801 as a Rule 1006 summary—Mr. Fuchs was unable to articulate or guide the court to a reasonable method to excise his compromised data from the lion's share of plaintiffs' concrete-related labor damages ($2,004,621.00, out of $3,731,649.00), which he derived from multiplying an average budget labor rate ($16.89) by an aggregate productivity loss for concrete placement work (118,687 man-hours). See PX 801 at 25-26. His allocation of flagging productivity to the concrete mix design or, alternatively, to competition from Pine Bluff did not inspire confidence. See Tr. at 3041-46 (Fuchs). Further, plaintiffs never demonstrated that the Joint Venture prepared its bid for Montgomery Point with a sufficiently certain projected, unimpacted productivity against which to compare the impacted period. See Tr. at 1273-74, 1283-84, 1298-1302 (Sickle) (conceding, notwithstanding some man-hour estimates, no recollection of calculating the necessary manpower required for concrete). But see Tr. at 1200-01, 1283 (Sickle) (describing man-hours as a function of productivity).

Regarding Mr. Fuchs's measured mile, the impact of the Raytheon REA on the Project's productivity belies Mr. Fuchs's characterization of January 2001 through April 2001 as a relatively unimpacted period by which to pace the remainder of the Joint Venture's

activity. But see Tr. at 3051-52 (Fuchs) (contending that "[w]hile [the measured mile] is polluted with some of these labor shortage impacts, it's also polluted with concrete impacts which again makes it a conservative measured mile. . . . [The Raytheon REA] has a larger impact later."); Tr. at 3110 (Fuchs) ("There certainly is some [effect]."). The "comparable project studies" draw from projects of questionable comparability. See Tr. at 3099-100 (Fuchs) (assuming comparability despite ignorance of characteristics); Tr. at 1448-49 (Wagner) (conceding different characteristics of Oliver Lock and Dam). But see Tr. at 3033-35 (Fuchs) (testifying as to similarity of Point Marion Lock and Dam and Oliver Lock and Dam with Montgomery Point). These deficiencies militate against both a finding of causation and plaintiffs' ability to establish by a preponderance of the evidence their $2,004,621.00 claim for additional concrete placement and finishing costs. See Tr. at 3091-92 (Fuchs) (discussing PX 801).

Defense counsel took to task Mr. Fuchs's calculations of extended field overhead and equipment overhead. Mr. Fuchs described extended field overhead costs as "general conditions," or "typical that you find on any project like this that would be your typical time-related cost—project manager, secretary, project engineer, superintendent, . . . those types of costs all the way down . . . ." Tr. at 2965. He attempted to explain the dissonance in categorizing some items resembling direct costs, e.g., site unwatering, pump watch, and a dewatering electric bill, as extended field overhead. See Tr. at 2965. These items were not recorded with an "overhead" accounting code by the Joint Venture, and cross-examination cast the aspersion that they were direct costs improperly recorded as time-related overhead by Mr. Fuchs. See Tr. at 3164-67. Mr. Fuchs, however, validated these costs as overhead and not as per se direct costs. His calculations and explanations generally fared well on cross-examination, but Mr. Fuchs conceded that his accounting of the dewatering electric bill ($2,018,608.00) should be reduced by 350 days because site rewatering began on January 16, 2004. See Tr. at 3165. Accordingly, the court reduces the claimed overhead cost of the dewatering electric bill to $1,721,108.00. 121/ With this recalculation, Mr. Fuchs's extended field overhead damage assessment for plaintiffs' concrete claim reduces to $3,060,171.27. 122/

121/ Discounting Mr. Fuchs's adjustments for actual salvage value, repairs, fuel, oil, and gas, the $2,018,608.00 dewatering electric bill divided by 2,375 days normalizes to an $850.00 daily rate. See PX 801 at 10. The court reduces the $2,018,608.00 by $297,500.00, i.e., $850.00 per day multiplied by 350 days, yielding $1,721,108.00.

122/ Mr. Fuchs's total daily rate for extended field overhead reduces from $26,280.58 to $26,155.31. This is multiplied by the 117 compensable days of delay implicated by the concrete mix design, a figure drawn from Mr. McDonough's analysis. See Tr. at 2691, 2779 (McDonough). Mr. Fuchs claimed to have relied on Mr. McDonough's calculations for compensable days of delay, see Tr. at 3168, but he incorrectly used 119 days of delay.

The Joint Venture prepared its bid for the Project's concrete operations while mindful of its concrete work on prior projects. Its prior work evidently did not prepare it for the magnitude of problems attributable to the defective concrete at Montgomery Point. Testimony of percipient witnesses and contemporaneous photographs revealed the severe impact that unworkable concrete had on the Joint Venture's actual concrete placement and necessary repairs to the concrete honeycombs. To the extent that Mr. McDonough's critical path has been found persuasive, it seems sufficiently clear that concrete operations remained the critical path until attention shifted to the tainter valves on October 3, 2003. See Tr. at 2716 (McDonough). Cross-examination minimally implicated the remainder of the concrete-related damages that Mr. Fuchs calculated. Still, the adjustment of Mr. Fuchs's concrete-related delays to the 117 days of delay calculated by Mr. McDonough requires an adjustment to plaintiffs' proof of damages. Although the $2,004,621.00 of disallowed concrete placement and finishing costs must be eliminated, Mr. Fuchs testified to a measurable impact on concrete placement due to the difficulty in placement. Adjusting labor escalation costs to 117 days of delay, i.e., from $470,261.00 to $462,285.73, PX 801 at 30, the labor-related damages reduce from $3,731,649.00 to $1,719,052.74. Extended field overhead damages are now $3,060,171.27, and extended equipment costs reduce from $598,753.00 to $588,239.47. PX 801 at 19. Adding to the aggregate the otherwise unaffected material ($447,455.00), equipment ($26,819.00), and subcontractor ($646.00) cost elements, the damages subtotal becomes $5,842,383.48. PX 801 at 24. With Mr. Fuchs's reasonable markups for home office overhead (at 2.34%, $136,711.77) and profit (at 9.82%, $587,147.15), the revised total damages for concrete mix design are $6,566,242.40. PX 801 at 24.

2) Labor

Plaintiffs' labor claim based on the impact of the Raytheon REA has no merit. It bears mention that, were the court to entertain an analysis of any damages deriving from plaintiffs' labor-market claim, Mr. Fuchs's analysis would suffer the aforementioned fatal flaws that are attributable to Mr. Fuchs's exceeding the limits of his expert qualifications and relying on Prof. Philips's invalid opinions.

3) Proof of damages for IHP

Unlike plaintiffs' other claims, Mr. Fuchs did not present IHP's damages as discrete claims. Rather, Mr. Fuchs presented IHP's lump-sum damages divided by labor ($592,162.00) and equipment costs ($58,896.00). These totals were adjusted by adding field overhead (at 4%, $26,042.00), home office overhead (at 17%, $115,107.00), contractor profit

(at 10%, $79,221.00), and general contractor markup (at 5%, $43,571.00). Plaintiffs seek a total amount of $915,001.00 in damages for IHP.

IHP's labor damages reflected a total cost approach. See Tr. at 3065 (Fuchs); see also Tr. at 2193 (Smith). Mr. Smith said that IHP had provided Mr. Fuchs with a summary of IHP's costs—not actual payroll or equipment records. Tr. at 2198-99. The court cannot fashion recovery for IHP based on this showing. Plaintiffs did not justify use of this methodology. "[B]efore a contractor can obtain the benefit of the total cost method, it must prove: (1) the impracticability of proving its actual losses directly; (2) the reasonableness of its bid; (3) the reasonableness of its actual costs; and (4) lack of responsibility for the added costs." Hi-Shear Tech. Corp. v. United States, 356 F.3d 1372, 1383 (Fed. Cir. 2004). Plaintiffs failed to show that IHP's proof satisfied any of these requirements.

IHP's equipment cost calculations are based on Mr. McDonough's calculation of 356 days of compensable delay incurred by the Joint Venture. See PX 801 at 107; Tr. at 3066-67 (Fuchs). These delays are apportioned into concrete (twenty-four days), labor (150 days), weather (seventy-eight days), and other REAs (104 days). Tr. at 2788-92 (McDonough). IHP did not account separately for its direct costs incurred in any individual claim. For example:

> Q [Mr. Poirier] But if you had wanted to, you could have separately had [sic] broken out the direct costs for making adjustments to the miter gate cylinder; isn't that true?
>
> A [Mr. Smith] I think I should have.
>
> Q And there's a lack of proof of those damages simply because that calculation has not yet been made?
>
> A That's correct.

Tr. at 2220-21. Mr. Smith's testimony could not withstand cross-examination. He could not recall or otherwise describe what work IHP was doing at Montgomery Point after rewatering commenced, from February 2004 through March 2005. See Tr. at 2229-34. Without more, plaintiffs have not shown that any delays incurred by IHP are solely attributable to the Corps. Accordingly, the court denies any recovery for IHP.

4) Board claims

Similar to his calculations of concrete-related damages, Mr. Fuchs segregated the components of each of the Board claims into the following three components: (1) actual labor

costs; (2) extended field overhead; and (3) extended equipment costs. In addition, for each of the Board claims, the sum of these components was increased by the home office overhead (at 2.34%) and profit (at 9.82%) additurs. As previously explained, the markup percentages for these additurs as they apply to concrete damages are reasonable. See supra note 115. Labor costs, which consist of "actual" and "actual average" labor rates multiplied by the additional man-hours, were reasonably derived from the Joint Venture's job-cost accounting reports and the Joint Venture's calculations of man-hours. See Tr. at 2953, 3054, 3056-57 (Fuchs).

Each Board claim component for extended overhead and extended equipment costs was calculated by multiplying the respective daily rates by Mr. McDonough's estimated number of claimed critical path delay days. See Tr. at 2964 (Fuchs) ("So each [claim for extended field overhead] has its own daily rate type calculation and then it marries up with the days of delay as quantified by Mr. McDonough."); Tr. at 2979-80 (Fuchs) (explaining that for extended equipment costs, the daily rate is "multipl[ied] by the applicable days of delay"). Similarly, the home office overhead markups are calculations for extended costs and are predicated on a finding of delay. See PX 801 at 21. As previously found, except for the control tower delay claim, the Project's critical path does not run through the Board claims because Mr. McDonough's critical path analysis is competent proof only through concrete placement. As to the remaining Board claims, the court cannot credit Mr. Fuch's calculations for home office overhead, extended equipment costs, and extended field overhead insofar as they are dependent on Mr. McDonough's assignment of critical path delay to the Corps.

In addition to Mr. Fuchs's misplaced reliance on Mr. McDonough's critical path delay estimates for the Board claims, the court finds other defects in Mr. Fuchs's calculations of extended equipment costs. While the court does not question the accuracy of Mr. Fuchs's testimony that the extended equipment costs reflect the "actual costs . . . incurred both for [the Joint Venture's] own and for . . . rental equipment," Tr. at 2979, the court declines to adopt extended equipment costs that are not specific to the individual claims. Mr. Fuchs's explanation that he derived the daily rate for a given claim by "divid[ing] it over the duration of whatever the particular claim is" does not conform with his presentation. Tr. at 2979-80. For example, Mr. Fuchs's computations of extended equipment costs for the site rewatering claim applies a $5,257.00 daily rate. See PX 801 at 20. This daily rate reflects $7,354,412.00 in total equipment costs divided by the duration of the Joint Venture's concrete operations, from June 1, 2000, through March 31, 2004 (1,399 days). See PX 85 at Sched. D-1-3. Mr. Fuchs applies this same extended equipment daily rate ($5,257.00) to plaintiffs' concrete, labor, and control tower claims. See id. at Scheds. A-3, B-4, C-1-3. Aside from observing that events giving rise to the site rewatering claim occurred while concrete work was ongoing, no attempt was made, at least none that the court can discern,

to compute a daily rate reasonably tailored to the actual equipment costs incurred in this claim.

By contrast, Mr. Fuchs's computations of extended equipment costs for the revisions to the downstream excavation limits claim and the CGDS test claim are tailored to the work performed by Fru-Con that was associated with those claims. Those calculations apply a calendar year 2004 $5,745.00 daily rate, see PX 801 at 20, reflecting $1,574,165.00 in total equipment costs, divided by the duration of Fru-Con's operations from April 1, 2004, through December 31, 2004 (274 days), see PX 85 at Scheds. E-1-3, F-1-3. For CGDS test claim equipment costs incurred in calendar year 2005, Mr. Fuchs computed a daily rate of $2,360.00, reflecting the more limited work done during construction operations from January 1, 2005, through June 30, 2005 (181 days). See id. at Sched. F-1-3. These equipment costs are more reasonably tailored to their respective claims. The court would be inclined to award these costs if they did not depend on erroneous findings of critical path delay.

Absent a reasonable estimate of days of delay attributable only to the Corps, or at least an alternative method of computation, the court cannot find that plaintiffs have provided a "reasonable basis" to compute the home office overhead, extended field overhead, and extended equipment costs associated with the bulk of the Board claims. See Wunderlich, 351 F.2d at 968. Therefore, except for the control tower delays claim, plaintiffs' claims for home office overhead, extended field overhead, and extended equipment costs for the remaining Board claims are denied. However, because the court finds eleven days of critical path delay associated with the control tower delay claim, see supra Part V.2, the rates applied to plaintiffs' concrete award carry-over to the control tower delays.

(1) Control tower delay claim

Mr. Fuchs calculated plaintiffs' control tower delay claim damages at $428,065.00. This total includes: (1) $2,425.00 in actual labor costs with burden; (2) $315,367.00 in extended field overhead; and (3) $63,083.00 in extended equipment costs. See Tr. at 3053-55 (Fuchs); PX 801 at 85. The sum of these costs is increased by home office overhead (at 2.34%, $8,912.00), and profit markups (at 9.82%, $38,277.00). Mr. Fuchs's calculations of labor costs were based on eighty-one man hours at an actual labor rate of $29.94. His calculations of extended field overhead and extended equipment costs were based on Mr. McDonough's estimated eleven days of critical path delay and one day of weather delay. 123/

123/ Plaintiffs allege they would not have incurred additional weather delays but for the critical path delay attributable to the Corps. Weather delays are compensable to the

After adjusting the amount for the disallowed weather delay day and applying the rates used in the concrete claim, including the adjusted extended field overhead rate, the total damages for plaintiffs' control tower delay claim are $391,071.00, including profit.

(2) Site rewatering claim

Mr. Fuchs calculated plaintiffs' site rewatering claim damages at $1,246,153.00. Direct costs incurred include: (1) $68,460.00 in actual labor; (2) $811,381.00 in extended field overhead; and (3) $236,561.00 in extended equipment costs. See Tr. at 3055-56 (Fuchs); PX 801 at 87. Mr. Fuchs increased the sum of these direct costs, totaling $1,116,402.00, by adding home office overhead (at 2.34%, $26,124.00) and profit markups (at 9.07%, $103,627.00). Mr. Fuchs's calculations of labor costs were based on Joint Venture estimates of a required additional 2,800 man-hours at an actual average labor rate of $24.45, which comes to $68,460.00. Extended field overhead costs and extended equipment costs were based on Mr. McDonough's estimate of thirty-eight days of critical path delay and seven days of weather delay. For the reasons discussed, the court disallows costs for home office overhead, extended field overhead, and extended equipment. The court awards plaintiffs their claimed labor costs of $68,460.00. In addition, the court grants an

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123/ (Cont'd from page 163.)

extent that construction activities that were scheduled for periods of favorable weather are pushed into periods of unfavorable weather due to government-caused delay. See J.D. Hedin Constr. Co. v. United States, 347 F.2d 235, 256 (Ct. Cl. 1965) (awarding costs for snow-removal labor and "additional temporary heating" when these costs "would not have been incurred but for the original government-caused delays"), overruled on other grounds by Wilner, 24 F.3d 1397. "The court may deny an equitable adjustment, however, if the contractor fails to prove that, but for the government delay, the contractor work would have been completed before the onset of the [unfavorable] weather." George Sollitt Constr., 64 Fed. Cl. at 239 (citing Kit-San-Azusa, J.V. v. United States, 32 Fed. Cl. 647, 656 (1995)).

The court does find delays due to high water. The court is particularly troubled by the Corps's conduct associated with the CGDS wet-testing, when Corps officials insisted on performance knowing that work could not be performed due to predictably high water levels. However, plaintiffs have not proven by a preponderance of the evidence that, but for the Corps's conduct, the CGDS testing and other remaining work would have been completed before the onset of high water. See supra note 74. Accordingly, the court does not find that any of plaintiffs' delays attributable to inclement weather are compensable.

award of $6,209.00 in profit on the labor award. The court awards plaintiffs $74,669.00 in total costs associated with the site rewatering claim.

(3) CGDS test claim

Mr. Fuchs calculated the damages for plaintiffs' CGDS test claim and other wet test delays at $2,042,609.00. This total includes: (1) $1,200,320.00 in total incurred costs; (2) $28,087.00 in home office markups (at 2.34%) and $111,417.00 in profit markups (at 9.07%); and (3) $702,785.00 in unpaid earned revenue. Mr. Fuchs's calculation of incurred costs includes $13,162.00 in actual labor costs, which were based on Joint Venture estimates of an additional 644 man-hours at an actual labor rate of $20.44; $713,477.00 in extended field office overhead; and $473,681.00 in extended equipment costs. See Tr. at 3057-60 (Fuchs); PX 801 at 93. The combined extended equipment and overhead costs were based on Mr. McDonough's calculations of 172 days of critical path delay, all of which were attributable to high water levels.

Mr. Fuchs explained that the $702,785.00 in unpaid earned revenue consisted of the "accounting left to be done" following the Corps's deletion of the CGDS wet-testing requirements. Tr. at 3061. The total for those tests and the dewatering system, bid item 75, was bid at $7,572,797.00. See Tr. at 3061 (Fuchs); PX 801 at 101. To date, the Corps has made payments totaling $6,572,797.00, leaving an outstanding balance of $1,000,000.00. Tr. at 3061 (Fuchs). Plaintiffs have offered to credit back to the Corps the bid costs to perform the CGDS wet test ($297,215.00). Tr. at 3061-62 (Fuchs); PX 801 at 101-02. 124/ Subtracting the $297,215.00 credit from the $1,000,000.00 balance leaves $702,785.00 in claimed unpaid earned revenue.

Because the court finds that the delay periods due to high water levels were not attributable to the Corps, the court disallows $1,215,245.00 in claimed home office overhead, extended field overhead, and extended equipment costs, resulting in $13,162.00 in allowable labor costs. After making appropriate adjustments, the profit award is $1,194.00. Combining the $1,194.00 with $13,162.00 in labor costs and plaintiffs' claimed $702,785.00 in unpaid earned revenue, the total damages for plaintiffs' CGDS claim become $717,141.00.

124/ This credit includes $228,153.00 in direct costs for bid items 75600, 75610, 75700, 75710, 75720, and 75730, as well as $69,062.00 in indirect costs and profit. See Tr. at 3061-62 (Fuchs); PX 801 at 102; see also Stipulation filed Nov. 17, 2009, at 2.

(4) Revisions to downstream excavation limits claim

Mr. Fuchs calculated plaintiffs' revisions to downstream excavation limits claim damages at $1,706,947.00. This total includes: (1) $7,566.00 in actual labor costs; (2) $1,153,964.00 in extended field overhead; and (3) $367,688.00 in extended equipment costs. See Tr. at 3056-57 (Fuchs); PX 801 at 89-90. The sum of these costs, $1,529,218.00, is increased by home office overhead (at 2.34%, $35,784.00) and profit markups (at 9.07%, $141,946.00). Mr. Fuchs's calculations of labor costs are based on 222 additional man-hours at an actual labor rate of $34.08. His calculations of home office overhead, extended field overhead, and extended equipment costs are based on Mr. McDonough's estimated fifty-five days of critical path delay and nine additional days of weather delay, all of which the court has disallowed. After subtracting the $1,557,436.00 in disallowed costs and markups, the allowable profit is reduced to $686.00. Combined with labor costs, the total damages for plaintiffs' revised downstream excavation limits claim are $8,252.00.

VIII. Remission of liquidated damages

The Corps withheld a total of $3,558,712.00 in liquidated damages from September 2003 until the June 13, 2005 declaration of substantial completion. Plaintiffs' original claim, as submitted, attributes 144 days of delay to the Joint Venture and, accordingly, seeks the remission of $2,623,576.00 of withheld liquidated damages, i.e., $3,558,712.00 less the $935,136.00 attributable to the Joint Venture's 144 days of delay. See PX 801 at 109. During trial plaintiffs withdrew their claims for all labor delay following July 2002, thereby yielding 253 days of delay caused by the Joint Venture. See PX 801 at 64; Tr. at 3074 (Fuchs). In accordance therewith, plaintiffs seek remission of $1,915,730.00 of withheld liquidated damages, i.e., $3,558,712.00 less the $1,642,982.00 attributable to the Joint Venture's 253 days of delay.

1. Standard of review

The Contract's default clause provides, as follows:

> [T]he Contractor [shall not be] charged with damages under this clause, if – (1) the delay in completing the work arises from unforeseeable causes beyond the control and without the fault or negligence of the Contractor. Examples of such causes include . . . (ii) acts of the Government in either its sovereign or contractual capacity . . . (x) unusually severe weather . . . .

JX 89 at FF090450. To recover withheld liquidated damages, the Joint Venture has the burden of proving by a preponderance of the evidence that delay was excusable under this

clause. See Sauer, 224 F.3d at 1340; FAR 52.249-10(b). The Joint Venture also must show the extent of the excusable delay to which it is entitled. See Sauer, 224 F.3d at 1347. In Sunshine Constr. & Eng'g, Inc. v. United States, 64 Fed Cl. 346, 371-73 (2005), this court read Sauer as consistent with the "clear apportionment" of liquidated damages, particularly in the context of sequential delay. When delays are caused concurrently by the Government and a contractor, "the result is an excusable but not a compensable delay." Weaver-Bailey Contractors, Inc. v. United States, 19 Cl. Ct. 474, 476 (1990).

2. Liquidated damages withheld by the Corps

The Contract provided for the withholding of liquidated damages in the amount of $6,494.00 for each day of non-excusable delay beyond the Contract's completion date. The Corps began withholding liquidated damages in September 2003. The Corps suspended withholding because of high river elevations and other weather delays. See, e.g., JX 1726 (July 30, 2004 letter from Mr. Clemans advising the Joint Venture, in part, that "[o]nce river conditions allow the start of wet testing, my office will evaluate the actual length of the delay and issue a time extension to adjust the current contract completion date . . . . Retainage held in lieu of liquidated damages will then be adjusted"); Tr. at 2027, 2088 (Clemans) (discussing withholding of liquidated damages). Shortly thereafter, the Corps declared that June 13, 2005, was the date of substantial completion at Montgomery Point. See Tr. at 2055 (Clemans). Although crest gate wet-testing remained, after this date the Corps no longer withheld liquidated damages. 125/ See Tr. at 2145 (Clemans); Tr. at 3466-67 (Caruso).

125/ During his closing argument, defense counsel acknowledged that—even though still more testing remained—the Corps chose the otherwise arbitrary date of substantial completion in order help the Joint Venture avoid further liquidated damages and avoid a lawsuit. See Tr. at 3579-80 (Poirier). This can also be inferred from Mr. Clemans's testimony:

> Q [Defense counsel Mr. Cohick] You made reference earlier to substantial completion. Do you recall when the notice of substantial completion was issued?
>
> A [Mr. Clemans] It was substantially complete on – I think it was 12 June 2005.
>
> Q Did that have any effect on the further withholding of liquidated damages?
>
> A You don't hold any liquidated damages or retain any after that date.

On September 18, 2008, Contracting Officer Easter issued the contracting officer's final decision of substantial completion, calculating 541 days of unexcused delay and liquidated damages of $3,513,254.00, i.e., 541 total days of unexcused contractor delay at the Contract's daily rate of $6,494.00. See PX 438; DX 935. Ms. Easter explained that the "total days of contractor delay [were] derived from the total days of delay 126/ minus any excusable delays." Tr. at 2177 (Easter). Ms. Easter granted the Joint Venture a total of 616 days of excusable delay, including: 229 days of funding delay; 191 days of weather delay that the Corps granted through contract modifications between October 1999 and June 2004; 170 days of weather delay due to high river levels for which the Corps had not issued contract modifications; and the twenty-six days of delay due to concrete mix design delays granted by the Corps on November 21, 2003. Tr. at 2178-80 (Easter) (noting that no amount of delay was granted for plaintiffs' labor claim). "If you subtract that number, the 616 days of excusable delay, from the total number of days of [delay,] 1,161, you have a total contractor delay of 545 days." 127/ Tr. at 2180 (Easter).

125/ (Cont'd from page 167.)

Q Did it have any effect on whether testing was still required?

A There was still testing left on the crest gates.

Tr. at 2145.

126/ The total number of calendar days of delay was the "difference between the original [C]ontract completion date and the substantial completion date." Tr. at 2177-78. The Contract completion date relied on by Ms. Easter, April 9, 2002, was calculated by adding the total number of days allocated for the Contract's performance period, 1,687 days, to the Contract's notice to proceed issuance date, August 26, 1997. See Tr. at 2178 (Easter). The difference between the Contract's completion date, i.e., April 9, 2002, to the date of substantial completion, i.e., June 13, 2005, is 1,161 calendar days of delay. Tr. at 2178 (Easter).

127/ The contracting officer's final decision regarding liquidated damages dated November 21, 2003, assessed 541 days of delay to the Joint Venture, rather than the 545 days of delay that Ms. Easter testified to. See DX 935. Without elaboration, Ms. Easter explained that the 541 day figure "was a mistake. It should be 545 days." Tr. at 2180.

3. Amount of remitted liquidated damages conceded by defendant at trial

Mr. Caruso reached a slightly different conclusion than the Corps, calculating that the Joint Venture was responsible for 507 days of delay and finding 654 days of excusable delay. See Tr. at 3429 (Caruso); see also DX 973 (Mr. Caruso's "Delay Summary Chart"). Included in Mr. Caruso's calculation of 654 days of excusable delay are the 229 days of delay due to the funding shutdown and 191 days of weather delay agreed to by the Corps, but only 166 days of delay due to high water. See Tr. at 3428 (Caruso) ("Of the total weather, there were 191 days in modifications by the Corps . . . ."). Mr. Caruso attributed the four-day difference in the experts' respective high water calculations to a mathematical error made by the Corps. See Tr. at 3428 (Caruso) ("There's 166 days of high water. Again, the Corps had 170. I think there's just a mathematical error there. It should be 166 . . . ."). Also included in Mr. Caruso's calculations of excusable delay are sixty-eight days of delay for which the Corps was the responsible party, see DX 973, including forty days of delay due to the concrete mix design, eleven days of delay for the control tower embeds, 128/ and seventeen days of miscellaneous delay, see Tr. at 3428 (Caruso). 129/ Mr. Caruso explained his total calculations:

> So the total excusable/compensable [delay] in my opinion [was] 68 days, and that leaves 507 days that I went through and each one of those periods showed where the time was lost, so that brings us to 932 days of total delay. This is after the 229 [day] extension for the modifications due to funding.

Tr. at 3429. 130/

Defense counsel acknowledged that the Corps was liable for certain delay days claimed by plaintiffs, see Tr. at 3603-04 (Poirier), although he disagreed with some of Mr.

128/ While Mr. Caruso's report includes this figure, he testified that "it's less clear to me now whether that is driven specifically by the interference with the embed plates or also by the enlargement of the columns due to the rebar misplacement." Tr. at 3428.

129/ "That miscellaneous represents the days I had for the control system change, the dedication ceremony, and those days that we came, and 0014 related to Cell 19." Tr. at 3428 (Caruso).

130/ Defense counsel disagreed. "I want to point out that Mr. Caruso on Defendant's Exhibit 973 wants to put down compensable 17 days, but there's no jurisdiction for any claim because no claim has been made for those 17 days. . . . but we will make all those days deduct from liquidated damages." Tr. at 3593-94 (Poirier).

Caruso's calculations, see, e.g., Tr. at 3603 (Poirier) ("I think that Caruso gave up too many days because he admits and gives three days of weather."); Tr. at 3604 (calculating extra thirty-five days of excusable delay for delays associated with Class C fly ash as opposed to Mr. Caruso's forty day total); Tr. at 3607 (disagreeing with Mr. Caruso's calculated seventeen days of miscellaneous delay and attributing their disagreement to a "philosophical approach"). Despite his criticisms of his expert's analysis, defense counsel adopted the calculations made in Mr. Caruso's report, see Tr. at 3607-08 (Poirier) ("I guess I might be stuck with it."), and conceded an extra thirty-one days of remittable liquidated delay damages, see Tr. at 3636 (Poirier). 131/

4. Award of remitted liquidated damages

The total amount of liquidated damages sought by plaintiffs is $1,915,730.00, of which defendant concedes $201,314.00 (thirty-one days at the contract modification daily rate of $6,494.00). 132/ For the reasons previously explained, plaintiffs have proven by a preponderance of the evidence 117 days of excusable delay due to the Corps's delay associated with the concrete mix design and eleven days of delay associated with the control tower claim. The court also grants the seventeen miscellaneous days of delay conceded by defendant. See DX 973. Accordingly, the court finds a total of 145 days of excusable delay and grants plaintiffs $941,630.00 in total remitted liquidated damages.

131/ Defendant's thirty-one day calculation subtracts the twenty-six days of delay attributable to the Corps's faulty concrete mix design, which already was awarded by the contracting officer, from Mr. Caruso's forty days of compensable delay. See Tr. at 3636 (Poirier). The thirty-one day figure also includes Mr. Caruso's seventeen days of miscellaneous delay, but it does not include Mr. Caruso's eleven days of delay for the control tower embeds. See Tr. at 3636 (Poirier).

132/ Mr. Fuchs did not make an independent calculation of excusable delay days. See Tr. at 3067-68 (Fuchs). Rather, Mr. Fuchs multiplied the total number of delay days for which plaintiffs claim responsibility (253 days), by the contract modification daily rate of $6,494.00, for a total amount of $1,642,982.00 in liquidated damages conceded by plaintiffs. See Tr. at 3067-68 (Fuchs); Tr. at 3557 (Suga). Mr. Fuchs then subtracted the amount of conceded liquidated damages, $1,642,982.00, from the total amount of liquidated damages withheld by the Corps, $3,558,712.00, for a total claimed amount of $1,915,730.00 in remitted liquidated damages. See Tr. at 3067-68 (Fuchs); Tr. at 3557 (Suga); PX 801 at 109.

CONCLUSION

Accordingly, based on the foregoing, the Clerk of the Court shall enter judgment, as follows:

1. For plaintiffs on their claim for concrete placement, $6,566,242.40, plus interest pursuant to 41 U.S.C. § 611 from December 30, 2002.

2. For plaintiffs on their control tower claim, $391,071.00, plus interest pursuant to 41 U.S.C. § 611 from April 16, 2003.

3. For plaintiffs on their claim for site rewatering, $74,669.00, plus interest pursuant to 41 U.S.C. § 611 from October 28, 2004.

4. For plaintiffs on their claim for deletion of the crest gate dewatering system wet testing, $717,141.00, plus interest pursuant to 41 U.S.C. § 611 from February 11, 2008.

5. For plaintiffs on their claim for revisions to the downstream excavation limits, $8,252.00, plus interest pursuant to 41 U.S.C. § 611 from September 10, 2008.

6. For plaintiffs on their claim for remission of liquidated damages, $941,630.00, plus interest pursuant to 41 U.S.C. § 611.

7. For plaintiffs on defendant's counterclaim.

8. For defendant on IHP's claim.

9. For defendant on Counts III and IV of Plaintiffs' Third Amended Complaint.

In addition, deferred rulings on exhibits or witness testimony on motions *in limine* were entered during trial, and defendant's motion to dismiss for lack of jurisdiction filed March 19, 2010, is denied.

IT IS SO ORDERED.

/s/ Christine O.C. Miller

_____

Christine Odell Cook Miller
Judge