ARMED SERVICES BOARD OF CONTRACT APPEALS

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| Appeal of - | ) | |
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| KiewitPhelps | ) | ASBCA No. 61184 |
| | ) | |
| Under Contract No. W9128F-12-C-0023 | ) | |

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OPINION BY ADMINISTRATIVE JUDGE YOUNG

This appeal involves a contract between KiewitPhelps (KP) and the United States Army Corps of Engineers (USACE or government) for the design of the U.S. Strategic Command and Control Facility Headquarters (STRATCOM) Project at Offutt Air Force Base in Nebraska. During construction of the project, mold was discovered in installed fiberglass duct liner located within the project's heating, ventilation, and air-conditioning (HVAC) system. KP alleges that the mold growth was the result of deficiencies in the design of USACE's HVAC system for the project and seeks to recover for delays in the project and additional costs it incurred due to the mold growth. USACE asserts that the mold growth was caused by the failure of KP's subcontractor to adequately protect the lined duct. A 9-day hearing was conducted and extensive post-hearing briefs were filed. We decide entitlement only. Because we conclude that the specification was defective, we sustain the appeal.

APPELLANT'S MOTION TO STRIKE

Pending before the Board is appellant's motion to strike portions of the government's post-hearing brief, arguing that the government offers facts not supported by the record. The government responded and appellant filed a reply in support of its motion. Appellant argues that certain government proposed findings of fact (GFF) have either been not admitted into evidence (GFF 18, 54-56, 58-60), constitute secondary or tertiary sources (GFF 132, 136), or rely on the opinion of a non-expert, Mr. Brian Benson (GFF 253-54).

In formulating our decision below, we have examined in depth the extensive record in this appeal. We have not relied upon the GFF's to which the appellant objects. Accordingly, appellant's request as to these GFF's is moot.

As to Mr. Brian Benson's testimony, we accepted Mr. Benson at the hearing as an expert certified industrial hygienist, an expert in chemistry and an expert in indoor air quality (tr. 8/224). We heard Mr. Benson's qualifications, carefully considered the appellant's objections and the government's responses, and ruled from the bench applying the principles of *Daubert v. Merrell Dow Pharmaceuticals, Inc.*, 509 U.S. 579 (1993). Further, we accepted Mr. Benson's testimony as a fact witness in areas where he was not an expert (tr. 9/104).

Although we are not bound by the Federal Rules of Evidence (FED. R. EVID.), we use them as a guide (Board Rule 10 (c)). FED. R. EVID. 702, Testimony by Expert Witness provides:

> A witness who is qualified as an expert by knowledge, skill, experience, training, or education may testify in the form of an opinion or otherwise if:
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> (a) the expert's scientific, technical, or other specialized knowledge will help the trier of fact to understand the evidence or to determine a fact in issue;
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> (b) the testimony is based on sufficient facts or data;
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> (c) the testimony is the product of reliable principles and methods; and
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> (d) the expert has reliably applied the principles and methods to the facts of the case.

The question of whether to admit, and what extent to rely upon, expert testimony is an evidentiary determination left to the sound discretion of the Board. *Lebolo-Watts Constructors 01 JV, LLC*, ASBCA No. 59740 *et al.*, 21-1 BCA ¶ 37,789 at 183,427. It is up to the Board in its sound discretion to determine what evidence is admissible and the weight to be given it. *Laguna Construction Co. Inc.*, ASBCA No. 58324, 14-1 BCA ¶ 35,748 at 174,947.

Here, we have exercised our discretion and admitted Mr. Benson as an expert in three areas including as a Certified Industrial Hygienist,[1] (see finding 41) and admitted his testimony as a fact witness in other areas where his testimony would be helpful to the Board. Accordingly, appellant's motion is denied.

## FINDINGS OF FACT[2]

1. On October 16, 2009, USACE awarded a contract to HDR Architecture, Inc. (HDR) for design of the STRATCOM Project to be constructed at Offutt Air Force Base, Nebraska (R4, tab 16.2 at 1; JSF ¶ 8). The contract was for a design-bid-build project with HDR as the Designer of Record (DOR) (tr. 2/128:18-20 (McCusker).[3] The contracting officer (CO) for the project, Ms. Ann Young, testified as to the need for sound-insulated HVAC ducts, explaining that because of the missions conducted in the STRATCOM facility, there is sensitive information, classified missions, and classified activities conducted within. Thus, a large amount of the building "is nothing but a large SCIF.[4]" She added that "It's the mission that's sensitive and the documentation and the discussions that people have. So [SCIF buildings] are built in such a fashion that . . . information cannot be detected or heard in other areas" (tr. 3/58 (Young)).

2. On August 2, 2011, USACE Omaha District contracting personnel issued Request for Proposal Solicitation W9128F-11-R-0023 for the construction of the STRATCOM project (app. supp. R4, tab 17.04 at 23).

3. USACE Omaha District advertised the project as a fully designed, one-step best-value analysis using technical and price evaluation factors. The working estimate was $547 million (base bid) and $560 million (with options). (App. supp. R4, tab 17.04 at 23)

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[1] Mr. Benson was accepted at the hearing as an expert in the field of certified industrial hygiene, as an expert in the field of chemistry, and as an expert of indoor air quality (tr. 8/222-24).

[2] The parties entered into a joint stipulation of uncontested facts (JSF) containing 36 numbered paragraphs. The paragraphs incorporated into our findings of fact have been modified for clarity and for conformance with the Board's standard citation conventions.

[3] Mr. Ian McCusker was KP's project manager, on site from September 2015 through the end of the project, who administered the mold issue from KP's end (tr. 1/46-49).

[4] "SCIF" [pr. "skiff"] stands for Sensitive Compartmented Information Facility (tr. 3/58 (Young)).

4. On August 16, 2012, USACE awarded Contract No. W9128F-12-C-0023 (the contract) to KP in the amount of $524,445,824 to construct a five-level, approximately one-million-square-foot STRATCOM replacement facility at Offutt Air Force Base (JSF ¶ 1; R4, tabs 2.01-2.03). The facility was designed to have three levels underground and below the water table (R4, tabs 2.01-2.03; tr. 7/189-91 (Doiel)).[5] For this reason the construction has been likened to "building within a bathtub" (tr. 2/146 (McCusker), tr. 7/191 (Doiel)).

5. At the time the contract was awarded, USACE presented the project as "100 PERCENT DESIGNED CONSTRUCTION RFP" (R4, tab 2.01 at 1, tab 2.02 at 1).

6. HDR used several criteria in effect in October 2009 as bases of its design, including the International Mechanical Code (2009), Design Compatibility Guidelines, Offutt AFB, NE (August 2006), UFC 3-1410-01FA-HVAC (May 15, 2003, including change 3, August 2008), and DCID 6/9 – Physical Security Standards for Sensitive Compartmented Information Facility (SCIF) (tr. 7/145-48 (Doiel), tr. 8/10-11 (Wermes),[6] tr. 5/239-40 (Haglund);[7] R4, tab 16.7; app. R4 supp., tab 2.11 at 5). The United Facilities Guide Specifications (UFGS) were also applicable at the time of contract award (JSF ¶ 15).

7. KP had no hand in the design of the project and did not have any input in the drafting of the project's specifications, including the design of the HVAC's lined duct system and the specifications pertaining to its component parts (tr. 6/64 (Flere),[8] 7/87 (Schmidt)).[9] USACE was solely responsible for the project's design, including the adequacy of the lined duct specifications (tr. 3/34-35 (Young), 6/63 (Flere), 2/128-29, 147-48 (McCusker), 2/173-75 (Dingler).[10]

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[5] Mr. Michael Doiel was a licensed architect employed by HDR (tr. 7/132).

[6] Mr. James Wermes was an engineer responsible for leading projects for HDR (tr. 8/7).

[7] Mr. Erik Haglund was a professional engineer and was accepted by the Board as an expert in the areas of mechanical engineering and design (tr. 5/193-94).

[8] Mr. Joel Flere served as a USACE contracting officer's representative throughout the project (tr. 6/60).

[9] Mr. Steven Schmidt was a retired annuitant temporarily rehired by USACE in fall 2015 to resolve the mold issue and again later to help oppose KP's mold claim (tr. 7/38-40, 63).

[10] Mr. Lance Dingler was the project executive for KP's subcontractor Cobb and had oversight over all aspects of Cobb's subcontract for STRATCOM (tr. 2/154-55).

8. To achieve the building's extensive security requirements, the design included lined ductwork throughout, but costs led to reduction of SCIF and lined ductwork. After award of the construction contract, USACE issued a modification reducing the amount of lined duct. (Tr. 7/266-67 (Doiel), 8/31-32 (Wermes)).

9. The contract's HVAC system was extensive. Approximately half of the project's HVAC design featured the use of fibrous, rigid duct liner. (JSF ¶ 14) The design required the fabrication of over 22 miles of metal ductwork, 12.5 miles of which would be lined with a rigid fiberglass acoustical and thermal duct liner board (*see* app. supp, R4, tab 1.09 at 16; tr. 1/79, 83 (McCusker)). USACE's design required that the lined duct be more heavily concentrated in the building's lower levels, many of which were underground (tr. 1/77-81 (McCusker)).

10. As part of the project, KP, through its subcontractor Cobb Mechanical, Inc. (Cobb), was required to install the project's HVAC system in accordance with the contract (JSF ¶ 9).

11. At the time of contracting, neither KP nor Cobb believed or were concerned that the project's design presented a significant risk of mold growth, and none of KP's other mechanical bidders raised any such concern (tr. 2/159, 171 (Dingler), 8/146-47 (Holroyd)).[11]

12. USACE elected to award the project with "high risk" because of its incomplete design and its low contingency funding—1.1%—the purpose of which is to pay for changes or other issues as they arise on the project. USACE could not issue modifications without funding. (App. supp R4, tab 17.04 at 47; tr. 3/13, 15-16, 21 (Young))

13. Per the contract's specifications, portions of the HVAC system were required to include standard sheet metal air conveyance ducts, whereas other portions were required to use what is referred to in the industry as "lined duct" (JSF ¶ 10).

14. Per the contract's specifications, in addition to the metal duct itself, the lined duct system was to be composed of several different parts, including (1) an acoustical and thermal rigid fiberglass liner board (liner), (2) adhesives, including (a) an adhesive that glues the liner to the interior surface of the metal duct (adhesive), and (b) an adhesive coating, or "mastic,"[12] that is applied to the joints, seams, edges, and

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[11] Mr. Greg Holroyd, a former mechanical designer, evaluated mechanical subcontractor bidders for KP (tr. 8/115-26, 139-40).

[12] While the specifications do not use the term "mastic," both parties use the term to refer to the adhesive coating applied as a sealant to joints and edges of the liner (*see, e.g.*, app. br. at 10; gov't br. at 9, 33; JSF ¶ 13). In its brief, USACE

any frayed or damaged surfaces of the liner where yellow fiberglass is visible (tr. 1/83-85, 107 (McCusker)). The liner was required to meet anti-microbial properties,[13] while the adhesives were required to meet anti-fire standards.[14]

15. The mastic is an adhesive used to cover and contain any surface area on the liner where exposed yellow fiberglass threads could enter the airstream, including where the rigid liner board had to be cut to fit the many irregular sizes and shapes of duct, as well as along transverse and longitudinal joints in the liner and anywhere the black mat coating surface of the liner was damaged, such as by fastener pins (tr. 1/84-87, 130-32 (McCusker); JSF ¶¶ 12-13).

16. The contract required the ductwork to be installed in accordance with the USACE-approved Project Schedule, from which KP was not permitted to deviate (tr. 1/69 (McCusker)).

17. The United Facilities Guide Specifications (UFGS) were applicable at the time of contract award. The UFGS are a joint effort of USACE, the Naval Facilities Engineering Command, the Air Force Civil Engineer Center, and NASA to develop a standard set of design specifications for use in preparing specifications for the construction of military projects (JSF ¶ 15). At the time the contract was awarded in August 2012, UFGS § 23 00 00—which generally prohibited all lined duct and specifically prohibited acoustical lined duct unless "there are no other suitable [sound attenuation] alternatives"—was applicable (R4, tab 5.12 ¶¶ 2.10.11.5, 2.10.12; tr. 3/46-47 (Young)).

18. At the time of contract award, August of 2012, UFGS § 23 00 00 prohibited using acoustical duct liner for thermal purposes in place of external wrap insulation on ductwork (R4, tab 5.25 §2.4.3.1; tr. 3/92-94 (Young)).

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depicts the adhesive and the mastic as a single product (gov't br. at 9), while KP characterizes them as two separate products (app. br. at 10). The validity of KP's interpretation is evidenced by the fact that USACE approved two separate products to be used as an adhesive and a mastic respectively (*see* findings 34, 36). We note that the specification required both the adhesive and the mastic to meet anti-fire properties.

[13] Contract Specification § 23 07 00, "Thermal Insulation for Mechanical Systems," subsection 2.4.4 provides that the rigid fiberglass acoustical and thermal board insulation shall not support microbial growth (app. supp. R4, tab 1.09 at 16). *See* finding 24 for specification language.

[14] Contract Specification § 23 07 00, "Thermal Insulation for Mechanical Systems," subsection 2.2.1.1 provides that the "[a]dhesive shall be a nonflammable, fire-resistant adhesive conforming to ASTM C 916, Type I" (app. supp. R4, tab 1.09 at 10). *See* finding 25 for specification language.

19. HDR, the designer of record, asserted that suitable alternatives existed that allowed for a functional design without lined duct that would have achieved the same results for sound attenuation (tr. 7/226, 229-30 (Doiel); app. supp. R4, tab 17.01 at 4). As early as 2012, KP proposed that USACE eliminate all lined duct and proceed with an unlined system (tr. 2/49 (McCusker)).

20. Mold was discovered in the HVAC system on September 9, 2015 (JSF ¶17). After mold was discovered, KP again proposed eliminating the lined duct and proceeding with an unlined system by letters dated October 9, November 6, and November 10, 2015 (R4, tab 4.10 at 2, tab 4.16 at 1-4, tab 4.18 at 1). USACE nonetheless decided to continue using a lined duct system for the project (tr. 3/70 (Young)).

21. The requirements governing KP's manufacture and installation of the ductwork primarily are set forth in USACE's highly-detailed, 64-page Contract Specification § 23 00 00, entitled "Air Supply Distribution, Ventilation, and Exhaust Systems" (the Ductwork Specification) (*see* app. supp R4 tab 1.08; tr. 2/185-190 (Dingler), 3/92 (Young)).

22. The Ductwork Specification sets forth a step-by-step process that KP and Cobb were required to follow in manufacturing and installing the lined duct system. The Ductwork Specification instructed KP on precisely which types of products to use for the lined duct system and how to assemble them during the manufacturing and installation process. (App. supp. R4 tab 1.08 at 57-60; tr. 2/185-190 (Dingler))

23. The contract requirements governing the composition of the liner component of the lined duct system are set forth in subsection 2.4.4 of Specification § 23 07 00, entitled "Thermal Insulation for Mechanical Systems" (the "Thermal Insulation Specification") (app. supp. R4, tab 1.09 at 16-17; tr. 1/118-22 (McCusker)).

24. Subsection 2.4.4 of the Thermal Insulation Specification, which governs the duct lining, provides:

> 2.4.4 Acoustical Thermal Duct Lining
>
> 2.4.4.1 General
>
> *For ductwork indicated or specified in [the Ductwork specification] to be thermally and acoustically lined the following products are used* and external insulation is omitted. For locations where 23 00 00 indicates lining can not be installed due to installation requirements external insulation per this specification section shall be used.

> 2.4.4.2 Rigid Fiberglass Acoustical and Thermal Board Insulation
>
> *Provide rigid fiberglass acoustical and thermal board insulation* suitable for duct operating temperatures to 250 degF. Minimum installed R-value (hr-ft^2-degF) of 6 for 1-1-1/2 inches thickness and 4 for 1 inch thickness. Minimum NRC (Noise Reduction Criteria) of .9 for 1-1/2 inch thickness and minimum NRC of .7 for 1 inch thickness. Product Maximum Flame [S]pread Index of 25 and Maximum Smoke Developed Index of 50. The duct board shall have a black pigmented mat coating on the airstream side to resist damage during installation and in service. Edges shall be factory coated with the same black pigmented coating to comply with SMACNA 1966.[15] *Product formulated to not support Microbial growth. Product to comply with* ASTM C 1071, Type II[16] insulation standards, NFPA 90A and NFPA 90B,[17] *ASTM G 21 and ASTM G 22*[18] *for no growth*, Greenguard Indoor Air Quality Certified.

(App. supp. R4, tab 1.09 at 16) (emphasis added)

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[15] SMACNA stands for Sheet Metal and Air Conditioning Contractors' National Association. A copy of SMACNA's IAQ Guidelines for Unoccupied Buildings Under Construction is available at tab 5.05 of USACE's Rule 4 file.

[16] ASTM C 1071 is the Standard Specification for Fibrous Duct Lining Insulation (Thermal and Sound Absorbing Material). ASTM C 1071 Type II refers to "Board in sheet form, up to 120 in. (3048 mm) in length, up to 48 in. (1219 mm) in width, and thicknesses of 1/2 to 3 in. (13 to 76 mm) in 1/2-in. (13-mm) increments." (App. R4 supp., tab 3.06 at 2)

[17] NFPB 90A is the Standard for the Installation of Air-Conditioning and Venting Systems, and NFPB 90B is the Standard for the Installation of Warm Air Heating and Air-Conditioning Systems. A copy of NFPA 90A can be found at tab 5.03 of USACE's Rule 4 file. A copy of NFPA 90B is not in the record.

[18] ASTM G21 is a standard antifungal product test for determining fungal resistance of plastics and polymeric materials. ASTM G22 is a standard antibacterial product test for determining the bacterial resistance of plastics. A copy of ASTM G21 is available at tab 3.09 of KP's supplement to the Rule 4 file. A copy of ASTM G22 is available at tab 3.01 of KP's supplement to the Rule 4 file.

25. Subsection 3.2.11 of the Ductwork Specification, which governs the adhesive and mastic products, provides:

> Where duct liner is required the finished duct system shall meet the requirements of NFPA 90A and NFPA 90B. Duct dimensions shown on the plans are finished inside dimensions.
>
> All portions of duct designated to receive duct liner shall be completely covered with duct liner to provide a continuous, unbroken coverage. All joints shall be neatly butted and there shall be no interruptions or gaps. Duct liner shall be installed with the black surface treatment exposed to the air stream.
>
> Duct liner shall be adhered to the sheet metal with 90 percent (minimum) coverage of *adhesive complying with the requirements of ASTM C 916.*[19] All transverse edges that are not to receive sheet metal nosing shall be coated. Longitudinal joints shall occur at the corners of ducts. If duct size and standard duct liner product dimensions make exposed longitudinal joints necessary, *such joints shall be coated with adhesive designated for duct liner application and which meets the requirements of ASTM C 916.* Such joints shall be additionally secured with mechanical fasteners in accordance with SMACNA 1966 as if they were transverse joints. Duct liner shall be additionally secured with mechanical fasteners complying with the requirements SMACNA 1966 and of the correct type for the duct liner being installed. Fasteners may be either weld-secured or impact-driven, and shall be installed perpendicular to the duct surface. Mechanical fasteners shall not compress the insulation more than 1/8 inch (3 mm) based on nominal insulation thickness. Fastener spacing with respect to interior duct dimensions shall be in accordance with SMACNA 1966. Fastener heads or washers shall have a minimum area of 0.75 in2 (484 mm2), with beveled or cupped edges to prevent their cutting into the duct liner.

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[19] ASTM C 916 is transcribed in finding 27.

> Where air velocities exceed 4000 fpm (20.3 m/sec), metal nosing (either channel or "zee" profile) shall be installed on upstream edges of liner duct sections.
> Metal nosing shall be securely installed over transverse liner edges facing the airstream at fan discharge and at any point where lined duct is preceded by unlined duct.
>
> Duct liner in sheet form shall be cut and fit to assure tight, over-lapped corner joints. Top pieces of liner shall be supported at the edges by the side pieces.
>
> Any damage to the air stream surface must be repaired by coating the damaged area with adhesive or coating designed for duct liner application. *Adhesive or coating shall meet requirements of ASTM C 916*.
>
> Upon completion of installation of duct liner and before operation is to commence, visually inspect the system and verify that the duct liner insulation has been correctly installed. Check the duct system to ensure that there are no air leaks through joints.

(App. supp. R4, tab 1.08 at 60) (emphasis added)

26. The contract incorporated several reference publications by reference that formed part of the specification to the extent referenced. Reference publications germane to this appeal include ASTM C 1071 (2005e1) Standard Specification for Fibrous Glass Duct Lining Insulation (Thermal and Sound Absorbing Material) and ASTM C 916 (1985; R 2007) Standard Specification for Adhesives for Duct Thermal Insulation (app. R4 supp., tab 1.08 at 3).

27. ASTM C 916[20] states, in relevant part:

> 1.1 This specification covers minimum material requirements, and safety precautions in application, for adhesives to bond thermal insulation duct liner on the

[20] ASTM C 916 standard is reproduced in each of the parties' Rule 4 files (R4, tab 5.01; app. supp. R4, tab 3.08). The parties have each submitted the same standard from the year 2014, not the 1985, R 2007 version listed in the specification. The Board is unable to locate in the record the 1985, R 2007 version. As the parties refer to the 2014 version, we will proceed with our analysis using the 2014 standard.

> interior surfaces of sheet metal air conditioning ducts; *and for coating exposed edges and joints of duct liner* thermal insulation to minimize erosion of insulation fibers by air movement.[21]
>
> . . .
>
> 3.1.2 For definitions of other terms on thermal insulating materials used in this specification, see Terminology C168.[22]
>
> . . .
>
> 4. Classification of Adhesives
>
> 4.1 Adhesives supplied under this specification are classified as follows:
> 4.1.1 Type I-An adhesive in which the vehicle is nonflammable in the liquid (wet) state and which will pass the edge-burning test of 6.2.
> 4.1.2 Type II-An adhesive in which the vehicle is nonflammable in the liquid (wet) state and which will not pass the edge-burning test of 6.2.

(R4, tab 5.01; app. R4 supp., tab 3.08) (emphasis added)

28. ASTM C 916 Type I and Type II criteria relate to a product's flammability and its fire-retardancy properties as measured by a specified edge-burning test, and do not relate to whether a product possesses antimicrobial or anti-fungal properties (JSF ¶ 30). In certain parts, the specification specifies the Type (I or II) of ASTM C 916 compliance required of a product. For example, subsection 2.2.1.1 of Section 23 07 00, Thermal Insulation for Mechanical Systems, provides that the adhesive for the external wrap lined duct "shall be a nonflammable, fire-resistant adhesive *conforming to ASTM C 916, Type I*" (app. supp. R4, tab 1.09 at 10; tr. 3/91 (Young)) (emphasis added).

29. The specification did not specify the Type of ASTM C 916 compliance required for the adhesives to be used in the interior of the lined ducts (*see* language of the specification at finding 25). Subsection 3.2.11 of the Ductwork Specification, which governs the adhesives, was adapted from the government's UFGS. The

[21] *See* finding 14.
[22] A copy of ASTM C168 is not in the record.

corresponding UFGS provision expressly included a "Type I" requirement under ASTM C 916 for the adhesive. However, in drafting subsection 3.2.11, USACE modified the language by deleting the reference to "Type 1" and adding two provisions requiring the mastic to comply with ASTM C 916. There is no reference to Type I anywhere in the Ductwork Specification. (*Compare* R4, tab 5.12 at 70 *with* app. supp. R4, tab 1.08 at 60; *see also* tr. 3/100-02 (Young))

30. USACE's design for the lined duct system required KP to use a liner product that, among other things, complied with the specific fungal resistance, or "antimicrobial," requirements set forth in industry specification ASTM G21 (app. supp. R4, tab 1.09 at 16-17; tr. 1/118-20, 123-24 (McCusker)) (*see* finding 24, n.18).

31. Conversely, USACE's design for the mastic and adhesive did not specify any antimicrobial or anti-fungal requirement (app. supp. R4, tab 1.08 at 57-60; tr. 3/106 (Young), 6/21 (Van Dine), 7/110 (Schmidt)). Instead, the Ductwork Specification required the mastic and the adhesive to comply with ASTM C 916, which sets forth bonding strength and edge-burning requirements but no antimicrobial requirements (app. supp. R4, tab 1.08 at 60; JSF ¶ 30; tr. 1/126-27 (McCusker), 3/97 (Young), 3/234-35 (Giese)[23] , 6/20-21 (Van Dine)).

32. As awarded, the contract's specifications did not contain any provisions requiring KP to provide a mastic that met any antimicrobial standard (app. supp. R4, tab 1.08 at 60). Rather, the Ductwork Specification required that "joints shall be coated with adhesive designated for duct liner application and which meets the requirements of ASTM C 916" (*id*.). Ms. Young, the contracting officer, testified that she "didn't find anything in the contract specifications that required the mastic coating to meet any sort of antimicrobial or fungal-resistant requirements," or "provide that the adhesive or mastic coating meet any antimicrobial properties" (tr. 3/107-08 (Young)). She further testified that neither KP nor any of the project's other bidders had submitted an inquiry expressing concern about the project's potential for mold growth (tr. 3/173-74, 191-94 (Young)). Several witnesses provided testimony that a contractor would not inquire whether the product possessed antimicrobial properties. USACE's retained certified industrial hygienist (CIH) Mr. Brian Benson, [24] testified that "contractors weren't required, nor should they have been, and likely were not, looking for antimicrobial products" (tr. 9/163 (Benson)). The research conducted by Mr. Benson in anticipation of litigation indicates that most adhesives are not tested for antimicrobial requirements; and that per several manufacturers, mold should not

[23] Mr. Sean Giese performed on-site contract administration, technical support, and quality assurance roles for USACE throughout the course of the project (tr. 3/206).

[24] Mr. Brian Benson was employed by Weston Solutions, Inc., a consultant retained by USACE (tr. 8/208-09).

develop provided proper storage and the proper application of the adhesive and liner board (gov't supp. R4, tab 18.1 Ex. C at 2170). KP's expert, Mr. McConnell testified that the question whether the mastic should have been required to be antimicrobial was a design issue "which the designer should have probably considered" as the fact that the building was built below the water table was "not uncommon" (tr. 5/173, 175 (McConnell)) Specifically, he testified:

JUDGE YOUNG: So do you think this mold on the C 135 was a fluke?

THE WITNESS: I think it was a location-driven humidity issue [. . .] the designer HDR should have probably considered [w]here the project was being built and based on the location factor combed through the spec [. . .] (Tr. 5/173-74)

Mr. McConnell added that "in terms of the design, it's a design-bid-build project. So for starters, the contractor relies on this very thorough and detailed design document, set of design documents. So this issue is clearly a design issue" (tr. 5/175-76).

Mr. McConnell also testified that the adhesive requirement is "such a discrete item tucked into a Division 23 specification," "so obscure" that a reasonably situated contractor would not say to the government "you need to reconsider your design" (tr. 5/173-77 (McConnell)). The government would have already packaged those contract requirements into the design (tr. 2/146-48 (McCusker)).

33. On or about May 28, 2013, KP submitted Transmittal No. 23 00 00-2 for the approval of two items: the CertainTeed ToughGard Rigid Liner Board and the DP 2501 adhesive to glue the liner to the ducts (JSF ¶ 25; R4, tab 6.01).

34. On June 17, 2013, USACE approved Transmittal No. 23 00 00-2, thereby approving use of the CertainTeed ToughGard Rigid Liner Board and the DP 2501 adhesive (JSF ¶ 26; R4, tab 6.01).

35. The CertainTeed ToughGard Rigid Liner Board, as submitted and approved, complied with the antimicrobial requirements set forth in ASTM G21 (JSF ¶ 27).

36. On or about November 4, 2014, KP submitted Transmittal No. 23 00 00-55 for the approval of CP-135 adhesive coating/mastic for the project's specified rigid lined duct system (JSF ¶ 28; R4, tab 6.02).

37. Included with Transmittal No. 23 00 00-55 was a letter from Childers, the manufacturer of CP-135, specifically advising that CP-135 meets the adhesion and bond requirements for ASTM C 916, Type II criteria (JSF ¶ 29; R4, tab 6.02 at 17).

38. On November 19, 2014, USACE approved Transmittal No. 23 00 00-55, thereby approving use of CP-135 as the adhesive coating/mastic for the project's rigid lined duct system (R4, tab 6.02 at 2; JSF ¶ 31). Along with its approval, USACE stated: "[p]lease note in addition to [the] spec requirements, the product requirements state 'In either case the cut edges must be coated with a mastic or duct liner adhesive that meets the requirements of ASTM C916 as required by the NAIMA and SMACNA standards'" (R4, tab 6.02 at 2).

39. On October 13, 2014, KP's mechanical quality control representative, Mr. Steven Smith, stated in his Quality Action Log. Entry 50, that "[d]uctwork with duct liner being loaded into mission support LL1 was being done while in the rain and uncovered ends. Ductwork hanging in loading dock was subjected to surface rain" (R4, tab 10.04 at 1421). The same entry stated that the duct "was demolished/removed from jobsite in accordance with the specification. Issue closed" (*id.*). Entry 236 in the same log stated: "Ductwork has been exposed to dripping water. . . The duct will require removal and replacement if moisture damage has occurred." The same entry stated: "USACE inspection confirmed no signs of moisture in duct" (R4, tab 10.04 at 1431). Mr. Smith testified that when wet materials were found, they were removed (Smith dep. at 110, App. Hearing Ex. 8 at 30).

40. On September 9, 2015, USACE's quality assurance representative, Mr. John L. Calhoun, first discovered mold in the seams and joints of several pieces of the project's lined duct (JSF ¶ 17). At this point, roughly three of the 12.5 miles of lined duct had been installed (tr. 1/94-96, 9/261-62 (McCusker)). There were other problems at the site, such as mold found in trash piles, wood panels and dry wall (tr. 7/58 (Schmidt)). Mold was found in a bucket that contained water discarded after tools used to spray the adhesive had been rinsed (tr. 4/78-79 (Giese)). Also at the job site, mold was found in a bucket containing leftovers of an unidentified substance, possibly DP-1030 adhesive or CP-135 mastic. The buckets were removed and stored by the government in a trailer (tr. 4/81-83, 87) (Giese)). It was not known whether the mold found in the buckets and other places was the same as the mold in the ducts (tr 7/58 (Schmidt)). Around this timeframe as well, a dead mouse was found in a duct. The government marked the duct and directed Cobb to remove it. The next day Cobb attempted to use the marked duct, and upon the government's direction, removed it (tr. 4/160) (Giese)).

41. In order to grow, mold requires (1) a food source, (2) moisture, and (3) mold spores. Mold will not grow in the absence of any of these three elements. (JSF ¶ 16; tr. 8/90-91 (Benson)). USACE's Certified Industrial Hygienist (CIH)

Mr. Benson, in an email to government personnel concerning the Sampling Plan when mold was discovered, stated that mold spores are ubiquitous in the environment and would have inevitably settled on every surface throughout the project (app. supp. R4, tab 9.116 at 1). Mr. Benson also testified at the hearing that even with high humidity, "without the presence of food or the biological spores, mold will not grow." (Tr. 8/90-91) Mr. Benson was accepted at the hearing as an expert in three areas, that is, as an expert Certified Industrial Hygienist, as an expert in the field of chemistry, and as an expert of indoor air quality (tr. 8/222-24).

42. Once mold was discovered, USACE issued a Stop Work Order (SWO) on September 11, 2015, immediately precluding KP or Cobb from conducting any additional lined duct installation for the project until a mold investigation and remediation plan had been submitted, reviewed, approved by USACE, and implemented (JSF ¶ 18).

43. KP immediately conducted an investigation, which revealed that the mold growth was not isolated to one particular area of the project site or one specific batch of lined duct. Rather, mold was found in lined duct throughout the project, including duct installed throughout the building and duct that had not yet been unloaded from trailers. (App. supp. R4, tab 9.034 at 1; tr. 1/90, 94 (McCusker), 6/71 (Flere)).

44. KP's investigation revealed that the mold uniquely and consistently tracked the seams and joints on the duct liner where the CP-135 mastic had been applied (app. supp. R4, tab 15.08; tr. 1/50, 54 (McCusker)). Mr. McCusker analogized this to "ants following a line of honey" (tr. 1/50 (McCusker)). USACE's Mr. Giese testified: "The cause of mold in my opinion was a product that was susceptible, that had easily a food source within it that was susceptible to a particular species of mold that required very little moisture. And that that moisture was driven by just normal conditions on the site" (tr. 4/176). The record supports that, from September 9, 2015 forward, virtually all mold in the duct system was observed growing only in the CP-135 mastic in the lined ductwork (app. supp. R4, tabs 9.34 at 1-2, 9.51, 9.72, 9.103, 9.127; tr. 1/90, 153, 9/261-63 (McCusker), 2/223-25 (Dingler), 3/212-16 (Giese), 4/175-76 (Sumner), 6/72 (Flere), 6/35-36, 56 (Van Dine)[25], 9/123-25 (Benson)).

45. USACE inspections confirmed that the mold was only growing in the CP-135 mastic and led USACE to conclude that the mastic was causing the mold. Colonel John Henderson, USACE's Commander for the Omaha District, testified: "In this case, the food source was the mastic. So I don't know that anybody's going to argue with that. We spent a lot of time establishing that" (Henderson dep. at 393, App. Hearing ex. 18 at 99).

[25] Rebecca Van Dine was a USACE engineer working on the project in 2015, and later became Chief of Contract Administration (tr. 6/7-8)

46. USACE suspected that condensation resulting from ordinary environmental humidity and temperature fluctuations supplied the moisture source for the mold (tr. 6/72 (Flere)). USACE observed that when lined duct was unloaded from trailers, condensation would form on the inside of the blue plastic that had been used to seal the ends of each duct segment (tr. 6/165, 201 (Flere), 9/189-90 (Benson)). Mr. Benson testified that he saw "noticeable condensation" on these pieces of duct (tr. 9/189-90)).

47. Part 1.5 of the Ductwork Specification requires KP and its subcontractors to: *Protect stored equipment at the jobsite from the weather*, humidity and temperature variations, dirt and dust, or other contaminants. Additionally, cap or plug all ductwork until installed. Replace damaged items with new. (App. supp. R4, tab 1.08 at 10) (emphasis added)

48. Part 3.1.1 of the Ductwork Specification provides standards for cleanliness and storage of uninstalled components and installed ductwork:

> a. Basic Level: Basic level of cleanliness shall apply to ductwork systems serving mechanical and electrical equipment rooms. Under this level of ductwork cleanliness it is acknowledged that ductwork leaving the premises of the manufacturer will include some or all of the following:
>
> 1. Internal and/or external self-adhesive labels or marking for part(s) identification.
>
> 2. Exposed mastic sealant.
>
> 3. Light zinc oxide coating on the metal surface.
>
> 4. A light coating of oil on machine formed ductwork.
>
> 5. Minor protrusions into the airway of rivets, screws, bolts and other jointing devices.
>
> 6. Internal insulation and associated fasteners.
>
> 7. Discoloration marks from plasma cutting process.
>
> b. *The internal surfaces of ductwork shall be wiped to remove excess dust immediately prior to installation.*
>
> c. Intermediate Level: Intermediate level of cleanliness shall apply to all building areas other than mechanical or

> electrical equipment rooms. Under this level of ductwork cleanliness it is acknowledged that ductwork leaving the premises of the manufacturer will include some or all of the following:
>
> 1. Internal and/or external self-adhesive labels or marking for part(s) identification.
>
> 2. *Exposed mastic sealant.*
> 3. Light zinc oxide coating on the metal surface.
> 4. A light coating of oil on machine formed ductwork.
> 5. Minor protrusions into the airway of rivets, screws, bolts and other jointing devices.
>
> 6. Internal insulation and associated fasteners.
> 7. Discoloration marks from plasma cutting process.
>
> d. Site storage: The area provided for storage shall be clean, dry and exposure to dust minimized.
>
> e. *The working area should be clean and dry and protected from the elements.*
>
> f. The internal surfaces of ductwork shall be wiped to remove excess dust immediately prior to installation. Open ends on completed ductwork and overnight work-in-progress shall be sealed.

(App. R4 supp., tab 1.08 at 41-42) (emphasis added)

49. Specification § 01 50 00, Temporary Construction Facilities and Controls, Part 3.3.4, Weather Protection of Temporary Facilities and Stored Materials, requires KP and its subcontractors to:

> Take necessary precautions to ensure that roof openings and other critical openings in the building are monitored carefully. Take immediate actions required to seal off such openings when rain or other detrimental weather is imminent, and at the end of each workday. Ensure that the openings are completely sealed off to protect materials and equipment in the building from damage. All stored

materials shall be kept off of the ground and stored as directed by the manufacturer.

(App. supp. R4, tab 1.06 at 6) (emphasis added)

50. Specification § 01 81 19, Indoor Air Quality (IAQ) Management, Part 3.1, Construction IAQ Management Plan During Construction, provides the following requirements during construction:

> a. LEED Credit EQ 3.1, Construction IAQ Management Plan, During Construction: General IAQ Plan requirements during construction include:
>
> 1. Compliance with SMACNA 008 "SMACNA Guidelines for Occupied Buildings Under Construction."
>
> 2. Provide solid physical barriers to isolate areas of construction. Securely attach and seal at floor and structure above.
>
> 3. Schedule adequate time for product installation.
>
> . . .
>
> 8. Comply with manufacturer's instructions for *appropriate drying times.*
>
> 9. Protect installed absorbent materials with recycled or recyclable materials.
>
> . . .
>
> c. HVAC Protection:
>
> . . .
>
> 3. Apply protection immediately after installation of equipment and ducting.
>
> . . .
>
> d. Source Control:

> 1. Protect stored on-site or installed absorptive or porous materials such as batt insulation and drywall from exposure to moisture.
>
> 2. Do not use wet, damaged porous materials in the building. Materials with evidence of moisture damage, including stains, are not acceptable, including both stored and installed materials. Immediately remove them from the site and properly dispose.
>
> . . .
>
> 4. Take special care to *prevent accumulation of moisture on installed materials* and within packaging during delivery, storage, and handling to *prevent development of molds and mildew, including materials with moisture stains.*
>
> 5. *Replace moldy materials with new, undamaged materials.*
>
> 6. *Provide sufficient ventilation, air circulation and air changes to dissipate excess humidity when present.*

(App. supp. R4, tab 1.07 at 3-5) (emphasis added). Specification § 01 81 19 further required the IAQ plan to include housekeeping, such as "[r]emov[ing] accumulated water and keep work areas as dry as possible" (*id*. at 5).

51. The primary fungal growth in the mastic was determined to be of the *Aspergillus* genus (*see* app. supp. R4, tab 12.03 at 1; tr. 1/100 (McCusker)). USACE's retained mold expert, Weston Solutions, Inc. (Weston), performed testing that allowed the exact species of mold to be determined. Weston determined that *Eurotium Amstelodami*—among the most xerophilic (dry-loving) of all mold species, requiring only minimal levels of moisture to propagate—was the most abundant mold type in the ducts by a wide margin (tr. 4/189-90 (Sumner), app. supp. R4, tab 14.02 at 2; R4, tab 4.02).

52. Based on Weston's investigation, Mr. Benson concluded that, aside from identifying the mastic as the food source for the mold, he could not identify any other basis for the cause of the mold growth (tr. 9/51 (Benson)). USACE stated that although dirt was present in some instances, it was unable to demonstrate that dirt served as a food source for the mold, or that there was any causal connection between

the presence of dirt and the mold growth (tr. 3/225, 4/164 (Giese); 9/137-39, 150-51, 201-02 (Benson)). We find this testimony compelling.

53. USACE witnesses testified that the government could not identify a water intrusion event that led to or caused mold in the lined ductwork (tr. 6/188-92, 197 (Flere), 4/163-64 (Giese), 9/151, 193 (Benson)).

54. On September 25, 2015, USACE rescinded its prior approval of the CP-135 mastic and the DP 2501 adhesive (JSF ¶ 33). That same day, USACE also rescinded its prior approval of CertainTeed ToughGard Rigid Liner Board (JSF ¶ 32).

55. USACE determined that that the CP-135 mastic "[did] not meet the contract requirements" (R4, tab 4.03). USACE informed KP that the CP-135 mastic was unacceptable because "the CP-135 Coating and Adhesive only meets the requirements of ASTM C 916 Type II" and not ASTM C 916 Type I criteria. The Type I and Type II criteria pertain to edge-burning properties and do not relate to mold resistance (R4, tabs 4.03, 4.04, 4.11, 4.24; tr. 3/123 (Young)).

56. An extensive mold investigation effort began in September 2015. Between September 16, 2015 and January 8, 2016, KP conducted three comprehensive rounds of increasingly extensive survey inspections of all installed lined ductwork, as follows: (1) a visual inspection, from the ends of the duct, from September 16 through October 2, 2015; (2) a borescopic inspection performed through drilled inspection ports, coupled with air sampling tests, from October 5 through October 21, 2015; and (3) a robotic camera inspection of the entirety of the three miles of previously installed lined duct, from October 29 to January 8, 2016 (JSF ¶ 19, 23-24; R4, tabs 4.10, 4.16, 4.40; tr. 1/101-02, 137-44, 147-53 (McCusker)).

57. On September 18, 2015, as part of USACE's mold investigation efforts, USACE personnel visited Cobb's facility and determined that the facility was "clean". USACE personnel ruled out fabrication, storage, handling, or environmental issues as potential causes of the mold growth (JSF ¶ 20; app. supp. R4, tabs 9.40, 9.41, 9.42; tr. 1/106-07 (McCusker), 7/114-15 (Schmidt)).

58. Also as part of KP's mold investigation efforts, on October 1, 2015, KP personnel visited Cobb's manufacturing and fabrication facility in Colorado Springs, Colorado to conduct a source inspection and document the condition of stored material, shop cleanliness, and the ductwork fabrication process (JSF ¶ 21).

59. KP engaged infrastructure consulting firm AECOM to perform an investigation regarding the conditions that led to the mold growth and to prepare a mold remediation plan (JSF ¶ 22).

60. In late October 2015, KP commenced a comprehensive duct survey with a customized robotic camera in order to satisfy USACE's directive to conduct a complete visual review of the installed lined ductwork throughout the entire project (JSF ¶ 23). The robotic visual inspection was completed in early January 2016 (JSF ¶ 24). All mold found during this investigation was growing in the CP-135 mastic (JSF ¶¶ 23-24; tr. 1/147-55 (McCusker)). Mr. Benson testified that out of the hundreds of pieces of lined duct that he personally inspected, he only saw mold in the mastic (tr. 9/123-25).

61. By letter dated November 6, 2015, KP recommended to USACE a course of action going forward based on expert opinions from an HVAC design firm and a certified industrial hygienist. KP recommended to proceed without a lined duct system, eliminating the mastic from the project while still satisfying USACE's acoustic and thermal requirements for the project's duct system (R4, tab 4.16 at 1-19; tr. 1/155-58 (McCusker)).

62. By letter dated November 30, 2015, USACE rejected KP's recommendation for an unlined system and eventually rejected further remediation plans proposed by KP. USACE ultimately directed KP to remove and replace all moldy duct. (R4, tab 4.24; tr. 1/157-64, 2/72 (McCusker))

63. USACE determined internally that the project required an antimicrobial mastic to solve the mold problem, and specifically determined that the mastic must satisfy an antimicrobial industry standard such as ASTM G21 (app. supp. R4, tab 9.150, tab 9.160 at 2, tab 9.161; tr. 6/23-24 (Van Dine), 6/82-87 (Flere), 7/94 (Schmidt)).

64. At that time, there was no mastic available that complied with ATSM C 916 (Type I or II) and also met an antimicrobial standard such as ATSM G21 (app. supp. R4, tab 9.140 at 1, tab 9.160 at 1, tab 9.161 at 1; tr. 4/19 (Giese) ("I never saw a product data sheet for a mastic that had been tested to the anti-microbial ASTMs that we found and ASTM 916 Type I."), 6/21, 33-34 (Van Dine) ("We did not find [a mastic] that met both.")). The government, in anticipation of litigation in 2017, researched and found four products that did meet anti-microbial and anti-fire standards. This was long after the government decided to direct the use of an anti-microbial mastic (the Johns Manville product) as replacement for the CP-135 (see finding 66). (Tr.7/92-95 (Schmidt)). We note that the Johns Manville product was not among the four products identified by the government in 2017 as meeting both standards (*see also* finding 66).

65. An internal email from USACE's Mr. Schmidt dated February 12, 2016, explained the problem with the adhesive specification as follows:

> The CP-135 adhesive . . . appears to be a food source for much of the mold . . . . However, *our specifications do require that it meet ASTM C916 and by meeting those requirements there appears to be an inability to also contain antimicrobials in the product. Our research found no ASTM C916 adhesive that also had antimicrobials.* SMACNA officials that we talked to verified that the liner coating material . . . would indeed be better served meeting the antimicrobial properties (ASTM G21, G22) of the liner surface.

(App. supp. R4, tab 9.161 at 1) (emphasis added)

66. USACE decided to proceed with the project by using a replacement mastic, manufactured by Johns Manville, that complied with antimicrobial industry standards set forth in ASTM G21. The Johns Manville mastic did not comply with the Ductwork Specification's original requirement to meet ASTM C 916's standards. (Tr. 4/21 (Giese), 6/22-24, 32-34 (Van Dine)).

67. The decision to proceed with the Johns Manville antimicrobial mastic was made by a USACE team that was assigned to resolve the mold issue (*see* tr. 4/20 (Giese); R4, tab 6.04 at 1). USACE, through Mr. Schmidt, hand-delivered the Johns Manville data sheet[26] to KP and directed KP to submit for approval the Johns Manville product as replacement mastic (R4, tab 4.34; tr. 1/165 (McCusker)). The Johns Manville mastic was certified to meet the ASTM G21 antimicrobial standard but was not certified to meet ASTM C 916 Type I nor Type II (R4, tab 4.34 at 1, 3 (data sheet, which states "[t]his coating incorporates an immobilized, EPA-registered, anti-microbial agent to protect the coating on the airstream surface from potential growth of fungus and bacteria as indicated by tests conducted in accordance with ASTM G 21 . . ." but makes no mention of ASTM C 916); tr. 1/164-69 (McCusker), 2/202 (Dingler) (Johns Manville mastic "did not" comply with ASTM C 916)). An amendment to the Ductwork Specification was not issued when the government directed KP to submit the Johns Manville mastic for approval.

68. KP asserts that without USACE's direction, it could not have submitted the Johns Manville mastic because it did not meet the express ASTM C 916 requirement

[26] The data sheet is a pamphlet published by Johns Manville that describes the properties of the Johns Manville antimicrobial mastic and provides general information about the product (R4, tab 4.34 at 3-4).

specified in the Ductwork Specification (app. supp. R4, tab 1.08 at 60). Mr. McCusker testified, "we would have gone and said it has to meet ASTM C 916 in the specifications in 23.0000 and it would not meet that, so it could not be approved as a contract-compliant material until they changed the contract to this Johns Manville product" (tr. 1/170 (McCusker)). As to product approval, Mr. McConnell explained that in contrast with a "closed prescriptive specification" which provides the exact criteria and lists the vendor names of the products that can be used, "our specification is an "open prescriptive specification" [which] does not provide a vendor name . . . So it's the contractor's duty to submit a product that aligns [with the criteria] and submit it to the owner for approval" (Tr. 5/181-82 (McConnell)).

69. By letter dated December 9, 2015, KP complied with USACE's directive and submitted the Johns Manville mastic for approval (R4, tab 4.34). On December 17, 2015, USACE approved the Johns Manville mastic (R4, tab 6.04 at 1).

70. USACE believed that it had resolved the mold issue "[i]n large part" by requiring an antimicrobial mastic instead of a mastic that complied with ASTM C 916 (tr. 4/31-32 (Giese)).

71. When KP and Cobb resumed ductwork fabrication and installation in 2016, an extensive inspection protocol was implemented by which every piece of lined ductwork was inspected for mold multiple times by all parties prior to installation (JSF ¶ 34).

72. As part of this inspection protocol, the pieces of ductwork manufactured prior to the September 11, 2015 SWO—and thus fabricated with anti-fire compliant mastic which was not anti-microbial—were labeled with a green sticker (JSF ¶ 35).

73. On October 4, 2016, KP submitted a 43-page Request for Equitable Adjustment (REA) setting forth specific alleged deficiencies in USACE's HVAC system design for the project (JSF ¶ 2).

74. On November 28, 2016, USACE issued a letter rejecting KP's REA (JSF ¶ 3).

75. In late 2016 and early 2017, additional mold was found in some of the green-stickered ducts (JSF ¶ 36). Virtually all of this mold was found only in the areas coated with CP-135 mastic. Conversely, no new mold was found on the antimicrobial replacement mastic product. (Tr. 1/217, 9/261-63, 268-69 (McCusker), 2/223-25 (Dingler), 4/162-63 (Giese), 6/34-35 (Van Dine), 6/91 (Flere))

76. From May 2017 to October 2018, Mr. Benson's team conducted extensive testing inside lined duct during five separate testing events. The test results indicate

that no mold colonization has occurred in the lined duct segments since the HVAC system has become operational. (R4, tab 18.1 at 30) Mr. Benson determined that there is no mold currently growing in the operational HVAC system (tr. 8/239 (Benson)).

77. On or about March 10, 2017, KP submitted a request for a contracting officer's final decision (COFD) to USACE's CO relating to alleged deficiencies in USACE's HVAC design (JSP ¶ 4). KP's claim sought an equitable adjustment to the contract price in the amount of $40,719,678 and a 209-day time extension relating to the alleged deficiencies in USACE's design (JSF ¶ 5).

78. On May 25, 2017, KP appealed the CO's deemed denial of its March 10, 2017 claim to the Board.

79. After KP filed its appeal with the Board, the CO issued a final decision on October 20, 2017, concluding that KP's claim was without merit and denying the claim in its entirety (JSF ¶ 7).

## DECISION

### *1. The Parties' Contentions*

KP argues that under the *Spearin* doctrine of implied warranty of design specifications, USACE impliedly warranted that adherence to its mastic specification would result in satisfactory performance, that KP substantially complied with the specification, but the mold growth occurred nonetheless (app. br. at 5). KP also argues that USACE constructively changed the Ductwork Specification to require an antimicrobial mastic instead of one that complied with ASTM C 916, the anti-fire standard required by the specification (*id*. at 67-72). Additionally, KP argues that the government breached its implied duty of good faith (*id.* at 84-85). USACE contends that the design was not defective (gov't br. at 69-74), that the mold growth resulted from KP and Cobb's failure to adequately store the ducts (*id*. at 81-83), and that the government did not change the contract (*id*. at 83-84). The government also denies that it failed to act in good faith (*id.* at 84-85).[27]

[27] The parties also disagree about the impact of applicable guidelines on the design. KP argues that the design was defective because the government failed to adhere to the construction guidelines applicable at the time, which prohibited the use of lined duct except in certain circumstances (app. br at 82). The government counters that the design was consistent with the criteria in place at the time the contract was awarded (gov't br. at 69). We hold that the specification was defective on other grounds, so we do not reach this argument.

### 2. *The* Spearin *Doctrine*

The *Spearin* doctrine sets forth 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." *United States v. Spearin*, 248 U.S. 132, 136 (1918). Thus, the government's detailed design specifications contain an implied warranty that if they are followed, a satisfactory result will be produced. *Id*. at 136-37; *Stuyvesant Dredging Co. v. United States*, 834 F.2d 1576, 1582 (Fed. Cir. 1987). In other words, when a contractor's adherence to the government's detailed specifications results in unsatisfactory performance, the design is considered defective, and the government is deemed to have breached this implied warranty. *Essex Electro Eng'rs, Inc. v. Danzig*, 224 F.3d 1283, 1289 (Fed. Cir. 2000); *Spearin*, 248 U.S. at 136-37.

A contractor is not required to demonstrate that the design was impossible or impracticable to perform. *See Dynalectron Corp.-Pac. Div.*, ASBCA Nos. 11766, 12271, 69-1 BCA ¶ 7,595. Nor is the contractor required to establish that its adherence to the specification rendered the work entirely unacceptable. *See Columbia Eng'g Corp.*, ASBCA Nos. 32139, 32679, 89-2 BCA ¶ 21,689 at 109,054-55. Furthermore, the contractor is not required to prove negligence on the part of the government (*see Greenbrier Indus., Inc*., ASBCA No. 22121 *et al.*, 81-1 BCA ¶ 14,982), nor establish the precise reason that unsatisfactory performance resulted from its adherence to the specifications. *See, e.g.*, *Woerner Eng'g, Inc.*, ASBCA No. 52248, 03-1 BCA ¶ 32,196; *C.L. Fairley Constr. Co., Inc.*, ASBCA No. 32581, 90-2 BCA ¶ 22,665. Appellant must prove that defective design of the work caused the damage. *Santa Fe Engineers, Inc.*, ASBCA 27933, 85-2 BCA ¶18,001, opinion at 10, citing *George Okano Electrical Contracting Corp*., ASBCA No. 20978, 78–1 BCA ¶ 12,914; *JOBEAR, Inc*., ASBCA No. 22050, 78–1 BCA ¶ 12,952; *Baifield Industries, Division of A–T–O, Inc*. ASBCA No. 18057, 77–1 BCA ¶ 12,348; *Construction Service Co., Inc.,* ASBCA No. 16434, 73– 1 BCA ¶ 10,021. The contractor must establish that the Government design was defective, showing the causative link between the alleged design defect and the resulting damage. Only then the burden shifts to the government to establish that the failure was caused by the contractor's defective workmanship or negligence. (*Id.).*

### 3. *The Mastic Specification was a Design Specification—The* Spearin *Doctrine Applies*

Design specifications are specifications that explicitly state how the contract is to be performed and permit no deviations. *Stuyvesant*, 834 F.2d at 1582. Conversely, performance specifications specify the results to be obtained, but leave it to the contractor's discretion as to how to achieve those results. *Id*. (citing *J.L. Simmons Co. v. United States*, 412 F.2d 1360, 1362 (Ct. Cl. 1969)). The implied warranty that the government's specifications are free from design defects attaches only to design specifications—it "does not accompany performance specifications that merely set forth an objective without specifying the method of obtaining the objective." *White v. Edsall Constr. Co., Inc.*, 296 F.3d 1081, 1084 (Fed. Cir. 2002).

USACE provided the design for the STRATCOM project (findings 1, 3, 5). The design included the Ductwork Specification containing the requirement that the mastic meet ASTM C 916's standards. KP had no input in drafting any of the contract's specifications and was not permitted to deviate from the contract's requirements (findings 5, 7, 25). The Ductwork Specification called for corners, joints, and seams in the lined ductwork to be coated with ASTM C 916-compliant mastic (findings 14-15, 25), but did not require the mastic to have any antimicrobial properties (finding 32). KP was required to submit all products for USACE's approval (findings 33-34, 36, 38, 68-69) which approval the government could withdraw at its discretion (findings 54, 66-67). Thus, USACE approved the use of the ASTM C 916-compliant CP-135 mastic for the project (finding 38). After mold was discovered in the lined ductwork, USACE revoked its prior approval of the CP-135 mastic (findings 38, 54), directed KP to submit the antimicrobial Johns Manville mastic for approval, and approved it prior to its use by KP (findings 66-69). The record does not support that the government merely specified the results to be obtained and left it to KP's discretion how to achieve those results as would be the case in a performance specification. *Stuyvesant*, 834 F.2d at 1582. Rather, the contract provided a highly detailed 64-page specification governing the manufacture and installation of the duct system (findings 21-22). The government repeatedly rejected KP's suggestions as to how to resolve the mold problem (findings 61-62), which supports that the contractor had no discretion on how to achieve the desired result. *J.L. Simmons,* 412 F.2d at 1362. We conclude that the language of the specification, the conduct of the parties and the facts of the case support that the STRATCOM specification was a design specification.

USACE argues that the Ductwork Specification's mastic requirement was an "open prescriptive specification"[28] because KP could have chosen to submit any compliant mastic for approval (gov't br. at 71, 74; *see also* finding 68). However, KP's product selection was still limited by the fact that the specification directed exactly which types of products must be used for the project, and the fact that KP was not permitted to use any product without express approval from USACE (in an open prescriptive specification "it's the contractor's duty to submit a product that aligns with [the criteria and submit it] to the owner for approval" (McConnell, finding 68); *see also* findings 33-34, 36, 38, 68-69)). KP asserts, and we find believable, that it could not have submitted the Johns Manville antimicrobial mastic for USACE's

[28] USACE provides no legal authority for the concept of an "open prescriptive specification."

approval because the Johns Manville product did not meet the ASTM C 916 standard required by the specification (findings 25, 68) and KP only did so upon the government's direction. For these reasons, we conclude that the Ductwork Specification's requirement that the mastic comply with the ASTM C 916 anti-fire standard was a design specification, and thus the *Spearin* doctrine applies. We also conclude that USACE impliedly warranted that if KP complied with the specification, a satisfactory result would ensue. *Spearin*, 248 U.S. at 136; *Stuyvesant*, 834 F.2d at 1582.

*4. The Ductwork Specification Was Defective*

KP argues that the Ductwork Specification was defective because KP's compliance with its requirements resulted in unacceptable mold growth in the lined duct (app. br. at 66-67). KP argues that USACE's design was defective because it did not require the use of an antimicrobial mastic (*id.* at 64). USACE counters that KP could have used an antimicrobial mastic or a mastic other than the CP-135 product it used for the project (*id*. at 71), and that the design was not defective because the lined ductwork currently functions as designed (*id*. at 72-74).[29]

We held above that the specification at issue was a design specification. Thus, USACE's detailed Ductwork Specification contained an implied warranty that if its specifications were followed, a satisfactory result would be produced. *Spearin*, 248 U.S. at 136-37; *Stuyvesant*, 834 F.2d at 1582. KP followed the Ductwork Specification by submitting the ASTM C 916-compliant CP-135 mastic for approval, which the government approved (finding 36), and by using it to coat the lined ductwork's corners, joints, and seams as required by the specification (*see* findings 22, 25, 36). Despite KP's adherence to the Ductwork Specification, mold nonetheless was discovered growing in the lined duct (finding 40). As discussed above, the mold used the contractually compliant anti-fire CP-135 mastic as a food source (findings 44-45, 52). No mastic available to the parties at the time met both ASTM C 916's anti-fire requirements and an antimicrobial standard such as ASTM G21 (findings 64-65).[30]

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[29] KP also argues that the design was defective because it used fiberglass lined duct in contravention of applicable guidelines (app. br. at 82). USACE counters that the use of lined duct was in accordance with applicable guidelines and has been used successfully and without mold growth in numerous projects all over the country and around the world (gov't br. at 69). As we find that the design was defective on other grounds, we do not reach whether the use of fiberglass lined duct was in accordance with applicable guidelines or the success of its use on other projects.

[30] The government argues that there were at least four products that met both the anti-fire and anti-microbial requirements. However, the government found these products almost three years after the mold was discovered in the ducts, when it

And while USACE asserts that the lined ductwork has been fully operational and mold-free since it directed KP to use the Johns Manville mastic, the record supports that this occurred because the CP-135 mastic was replaced with an anti-microbial product at the direction of USACE (findings 75-76). We conclude that USACE's decision to not require an antimicrobial mastic in its original design resulted in the mold growth, making the design defective. *Spearin*, 248 U.S. at 136-37; *Essex*, 224 F.3d at 1289; *Stuyvesant*, 834 F.2d at 1582.

*5. Defect Latent or Patent?*

The *Spearin doctrine*'s implied warranty does not eliminate the contractor's duty to investigate or inquire about a patent ambiguity, inconsistency, or mistake when the contractor recognized or should have recognized an error in the specifications. *Edsall*, 296 F.3d at 1085 (citing *Blount Bros. Constr. Co. v. United States*, 346 F.2d 962, 972-73 (Ct. Cl. 1965)). This duty requires contractors to clarify patent ambiguities or defects, but it does not require them to "ferret out hidden or subtle errors in the specifications." *Edsall*, 296 F.3d at 1085; *Blount Bros.*, 346 F.2d at 973. A design defect is not sufficiently patent so as to trigger a duty to inquire unless the defect constitutes a "major patent discrepancy, or obvious omission, or a drastic conflict in provisions" that would have been glaring or obvious to a reasonable contractor. *States Roofing Corp. v. Winter*, 587 F.3d 1364, 1372 (Fed. Cir. 2009) (quoting *WPC Enters., Inc. v. United States*, 323 F.2d 874, 877 (Ct. Cl. 1963)).

USACE argues that the Ductwork Specification was not defective (gov't br. at 69-72), yet at the same time asserts that any defect in the design was so patent as to trigger KP's duty to inquire (*id*. at 77-79). As the Board has previously determined, "[i]t is inconsistent for the Government to insist that there was nothing wrong with the specification and, on the other hand, contend that the contractor should have found out what was wrong with it." *R.C. Hedreen Co.*, ASBCA No. 20599, 77-1 BCA ¶ 12,328, opinion pg. 14. The record supports that nothing on the Ductwork Specification's face would lead a reasonable contractor to conclude that the requirement to use an ASTM C 916-compliant mastic would lead to mold growth (finding 32). CO Young testified that not one of the project's bidders recognized nor expressed any concern about the project's potential for mold growth (*id.*). The record reflects unrebutted expert testimony by Mr. McConnell that the issue was "so obscure" and buried in the specification, and that building in the water table was so common, that a similarly situated contractor would not reasonably think to question the design because the designer would have already thought of those items (*id.*). Additionally, when USACE relayed the issue to SMACNA—the industry association that developed the standards

conducted research on such products in preparation of litigation. The Johns Manville product was not one of the four products the government identified as meeting both the anti-fire and anti-microbial standards (finding 64).

from which the Ductwork Specification was derived—shortly after the mold was discovered, SMACNA representatives determined that there could be a design problem with the project but advised that SMACNA would have to investigate further to determine if the problem warranted rewriting its standards (app. supp. R4, tab 9.160 at 2; finding 65). Contractors are not required to "ferret out" hidden or subtle errors, or in this case "obscure" errors in the specification. *Edsall*, 296 F.3d at 1085; *Blount Bros.*, 346 F.2d at 973. We conclude that the Ductwork Specification's defect was latent, and therefore did not trigger KP's duty to inquire further.

*6. Causation: The Mold Used the CP-135 Mastic as a Food Source. USACE has Failed to Demonstrate that Cobb's Storage Practices Caused the Mold.*

Appellant must prove that defective design caused the damage, and show the causative link between the design defect and the resulting damage. *Santa Fe,* 85- 2 BCA ¶18,001, opinion at 10-11.

Mr. Benson testified that, in order to grow, mold requires (1) a food source, (2) moisture, and (3) mold spores. Mold will not grow in the absence of any of these three elements (finding 41). We find his testimony persuasive.

As to the spores, the record supports that mold spores are "ubiquitous to the environment" and would have invariably settled on all surfaces, including the ducts (finding 41). The mold, produced by ever-present spores, was present throughout the project's lined duct (findings 40, 43, 60). The record supports that the mold most abundant in the ducts was *Eurotium Amstelodami*, one of the most xerophilic (dry-loving) of all species (finding 51). This mold requires minimal amounts of moisture to propagate (*id.*). As to the moisture, we heard testimony that humidity may originate in normal conditions of the site (finding 44) or ordinary environmental humidity and temperature fluctuations (finding 46).

As to the food, the record supports that the mold consistently followed the CP-135 mastic "like ants following a line of honey" (finding 44). Virtually all mold in the duct system was observed growing in the CP-135 mastic (finding 44, testimony by McCusker, Dingler, Giese, Flere, Sumner, Van Dine and Benson). Colonel John Henderson, USACE's Commander for the Omaha District, testified: "In this case, the food source was the mastic. So I don't know that anybody's going to argue with that. We spent a lot of time establishing that" (finding 45). We are persuaded that the CP-135 mastic provided the food for the mold.[31] This is further evidenced by the fact that

[31] We note that there were other problems in the building site, such as food refuse and a dead mouse in the ducts, and mold in two different buckets and in drywall and piles of trash. It is unknown if that mold was the same type as the mold that

no mold was found growing in the lined duct once the CP-135 mastic was replaced with the antimicrobial Johns Manville mastic (findings 75-76).[32]

Based on the above, we are persuaded that the three elements necessary for mold growth, i.e. spores, humidity and food, were present (finding 41). The spores were pervasive in the environment and were not caused by a design defect. The mold was of a xerophilic type that required very little humidity, and the humidity found in the normal conditions of the site was sufficient to favor its growth throughout the lined duct system. The humidity existed independently of the specification requirements. We are persuaded that the mold fed on the CP-135 mastic, which it followed "like ants following a line of honey" throughout the duct system. The record supports that the choice of mastic in the specification provided food for the mold to grow. We conclude that KP has demonstrated the causal link between the design defect (the requirement for anti-fire mastic that fed the mold) and the resulting damage.

USACE alleges that the mold grew in the lined duct because Cobb's poor storage of the duct allowed it to be subjected to surface rain, providing a source of moisture for the mold (gov't br. at 81-83, finding 39). KP provided documentation and unrebutted witness testimony that any wet duct was destroyed and removed from the jobsite (finding 39). The government has not provided evidence that the three miles of installed lined duct removed from the building due to mold (finding 40) had been wet by previously being left out in the rain. Additionally, the record supports that USACE representatives could not identify a water intrusion event that led to or caused the mold on the part of Cobb (finding 53). We are not persuaded that Cobb's outdoor storage of the ducts allowing them to be subjected to surface rain, provided a source of moisture for the mold.

Even if we assume for the sake of argument that Cobb's poor storage caused the moisture in the installed ducts, the record is devoid of proof that the mold needed such moisture to thrive. The record supports that the mold was of the *Eurotium Amstelodami* variety, which is a xerophilic type that thrives in dry environments. The records support that condensation resulting from ordinary environmental humidity and temperature fluctuations (finding 46) and the humidity that may originate in normal conditions of the site (finding 44) would be enough to provide the needed moisture. Accordingly, even if the government were to prove that Cobb permitted intrusions of

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grew on the mastic (finding 40). These problems, however, do not detract from our conclusion that the CP-135 provided food for the mold.

[32] The record supports that the use of the non-antimicrobial CP-135 mastic fed the mold, and when the CP-135 was changed for an antimicrobial product, the mold was not observed again (findings 75, 76). Analogous to the tort law doctrine of *res ipsa loquitur (See Byrne v. Boadle*, 159 Eng. Rep. 299 (1863), here "the thing speaks for itself."

rainwater into the ducts, the record is devoid of proof that the *Eurotium Amstelodami* needed or used the rainwater to thrive. The record does support, however, that the *Eurotium Amstelodami* mold would grow and did in fact grow using the minimal humidity already present in the environment. We conclude that the government failed to demonstrate that the mold in the installed lined duct used the rainwater as a source of moisture (*see* finding 39).

Based on the above, we conclude that the design specification was defective in failing to require anti-microbial mastic, that the latent defect did not trigger KP's duty to inquire, and that KP's performance in compliance with the specification resulted in an unsatisfactory result, i.e., in mold growth in the project's lined duct system. Accordingly, we hold that the government breached the implied warranty of specification. *Essex Electro Eng'rs,* 224 F.3d at 1289.

*7. USACE Constructively Changed the Contract by Revoking its Approval of the CP-135 Mastic and Directing the Use of the Johns Manville Mastic*

KP asserts that USACE constructively changed the contract by requiring an antimicrobial mastic in lieu of a mastic complying with ASTM C 916's anti-fire standards as originally specified in the Ductwork Specification (app. br. at 69). "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). The government effectuates a constructive change when it rejects a submitted product that complies with the contract's specifications. *Jaynes Corp.*, ASBCA No. 58385, 13-1 BCA ¶ 35,311 at 173,348.

The record supports that no mastic available to the parties at the time mold was discovered complied with ATSM C 916 (Type I or II) and also met an antimicrobial standard such as ATSM G21, and neither party was aware of this fact at the time of contract award (findings 64-66). Although neither party was aware of this fact (finding 64), USACE chose to require in the specification a mastic that conformed to ASTM C 916's anti-fire standards (finding 25). KP complied with the contract by submitting anti-fire compliant adhesives (i.e., DP-2501 and CP-135), which the government approved (findings 34, 38). Later the government disapproved the products asserting that they did not comply with the specific types of anti-fire capability required in the specification (finding 54). The government stated that the CP-135 was unacceptable because it only met ASTM 916 Type II, but not Type I as required in the contract (finding 55). We note that the specification, however, did not specify whether the adhesives for the rigid fiber lined system were required to meet Type I or Type II of ASTM C 916 (finding 29).

Assuming *arguendo* that the specification required compliance with ASTM C 916 Type I, the government would have been well within its rights to require KP to substitute the product that failed to comply with ASTM C 916 Type I with a product that actually did comply with ASTM C 916 Type I. However, the government completely changed the requirement from anti-fire to anti-microbial by directing KP to remove the anti-fire mastic and substitute it with a product that did not comply with the ASTM C 916 anti-fire standard mandated by the specification (findings 66, 70). The government effectuates a constructive change when it rejects a submitted product that complies with the contract's specifications. *Jaynes Corp.*, 13-1 BCA at 173,353. We conclude that USACE constructively changed the contract.

*8. USACE did not Breach its Implied Duty of Good Faith*

KP alleges that USACE breached its implied duty of good faith by attempting to assign the blame for the mold to KP and by failing to properly administer the contract (app. br. at 84-85). Specifically, KP contends that USACE acted in bad faith by rescinding its prior approvals of the DP 2501 adhesive and CP-135 mastic despite the fact that both products complied with the Ductwork Specification's requirements, and by continuing to hold KP responsible for the mold despite determining internally that it should have required an antimicrobial mastic, that no mastic available complied with both ASTM C 916 and an applicable antimicrobial standard, and that it could only resolve the mold issue by directing KP to use a mastic that did not comply with the Ductwork Specification's original requirements (*id.* at 84). KP further asserts that USACE's CO Young, issued a final decision that was not the result of her own personal and independent judgment (*id.* at 84-85). The government denies that it breached its implied duty of good faith, asserting that USACE rescinded approval of the products with good reason pending the mold investigation, that the parties worked cooperatively to resolve the mold problem and that the contracting officer spent several months investigating KP's claim before issuing a final decision (gov't br. at 84-85).

"The covenant of good faith and fair dealing is an implied duty that each party to a contract owes to its contracting partner. The covenant 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 Corp. v. United States*, 395 F.3d 1283, 1304 (Fed. Cir. 2005). This duty applies to the government just as it does to private parties. *Id*. Failure to fulfil the implied covenant of good faith and fair dealing constitutes a breach of the contract. *Metcalf Constr. Co., Inc. v. United States*, 742 F.3d 984, 990 (Fed. Cir. 2014).

When the government is accused of breaching the duty of good faith and fair dealing, we examine the reasonableness of its actions, considering all of the circumstances. *SIA Construction, Inc*., ASBCA No. 57693, 14-1 BCA ¶ 35,762 (citing *Free & Ben*, 09-1 BCA ¶ 34,127 at 168,742). A review of the record in this appeal, including the evidence presented at trial shows that the government's actions did not rise to the level of being considered unreasonable. Accordingly, we hold that KP's arguments to the contrary are untenable.

## CONCLUSION

For the foregoing reasons, the appeal is sustained. The issues raised in the government's motion for summary judgment, on which we deferred ruling until the hearing on the merits, have been fully developed, and are resolved in the instant decision. Accordingly, the government's motion is moot. The appeal is returned to the parties for a determination of quantum consistent with this decision.

Dated: December 30 2022

LIS B. YOUNG
Administrative Judge
Armed Services Board
of Contract Appeals

I concur

RICHARD SHACKLEFORD
Administrative Judge
Acting Chairman
Armed Services Board
of Contract Appeals

I concur

OWEN C. WILSON
Administrative Judge
Vice Chairman
Armed Services Board
of Contract Appeals

I certify that the foregoing is a true copy of the Opinion and Decision of the Armed Services Board of Contract Appeals in ASBCA No. 61184, Appeal of KiewitPhelps, rendered in conformance with the Board's Charter.

Dated: December 30, 2022

PAULLA K. GATES-LEWIS
Recorder, Armed Services
Board of Contract Appeals